



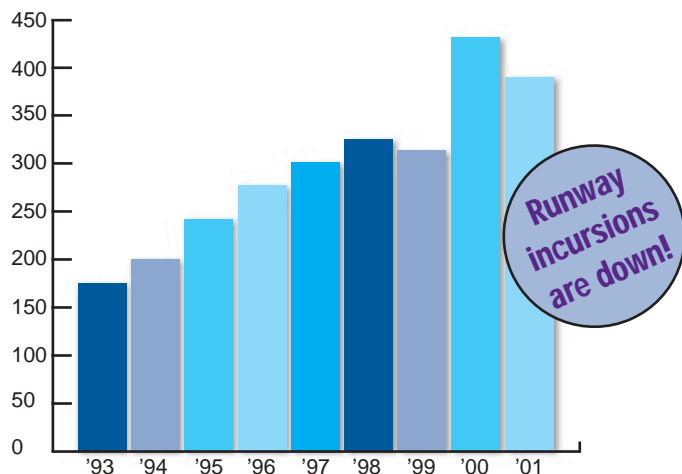
## Operations At Towered Airports

### Runway Incursion

#### Long Beach, CA

Pilot was instructed “Runway 25 Left, taxi into position and hold, traffic landing Runway 30.” The pilot acknowledged with “position and hold.” Takeoff clearance was not issued, but the aircraft was observed to begin takeoff. At the same time, another aircraft was on short final for Runway 30, which intersects Runway 25L.

“Runway incursions average more than one per day. Pilot awareness is the key to safe operations at towered airports.”



There are two kinds of airports—those with an operating control tower and those without. When a part-time tower is closed, the airport is considered nontowered. Every year, there are more than 60 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. The second is that a pilot must maintain two-way radio contact with the tower and obtain a clearance to enter the airspace, land, taxi, and take off.

Because of the clearance requirement, pilots generally follow different procedures than at nontowered fields. For example, a pilot approaching a nontowered airport normally would plan the 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 location of other arriving aircraft.

## 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. The FAA encourages pilots to visit ATC facilities. Telephone first to make an appointment. Take a diagram of the airport and charts (sectional or IFR enroute) with you to ask questions.



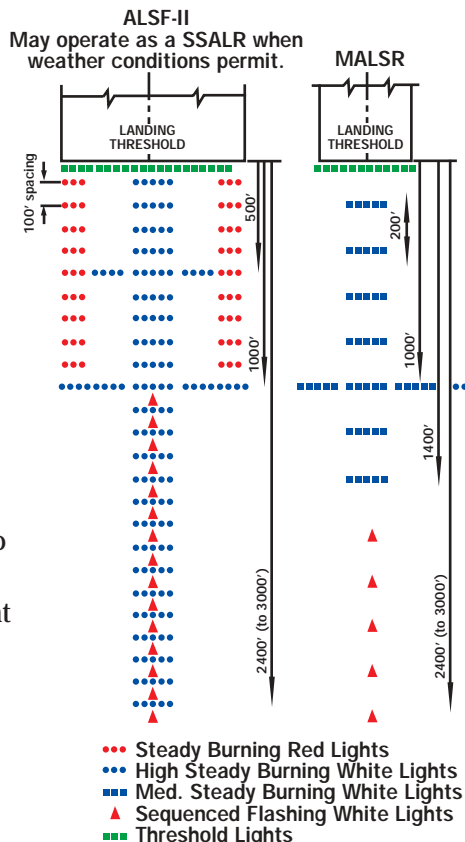
The key to safe operations at towered airports, both in the air and on the ground, is **awareness**. Good pre-flight planning is essential. Focus on the task at hand, organize the cockpit to minimize your work load, and know where you are in relation to other aircraft in the vicinity.

## 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. 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.

### Two Kinds of Approach Lighting Systems

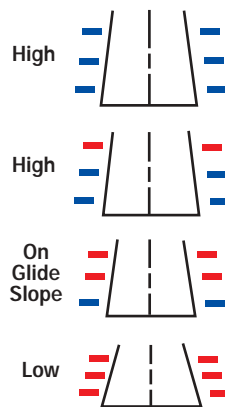


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### VASI

— Red VASI Lights  
— White VASI Lights

#### STANDARD (3-bar)



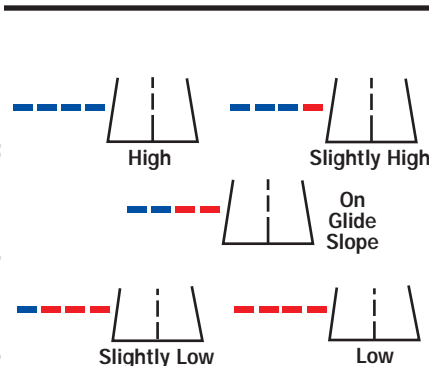
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Visual approach slope indicators (VASIs) provide visual descent guidance during the approach to a runway. The lights are arranged in bars and vary in number from two to 16. The lights are arranged so that the pilot will see the combination of lights 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, and the glidepath indicators are shown below.

### PAPI

— Red PAPI Lights — White PAPI Lights



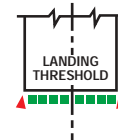
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Runway end identifier lights (REILs) consist of a pair of synchronized flashing lights located on each side of the runway threshold.

Runway edge lights are white and outline the edges of the

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.

### REIL



## 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.

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

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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 a taxi chart available and check your assigned route against the chart before moving.

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



*The heading indicator is as useful on the ground as it is in the air. Use it together with the taxi chart to maintain orientation.*

### 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 on next page). 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, hold short” or taxiing 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.

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

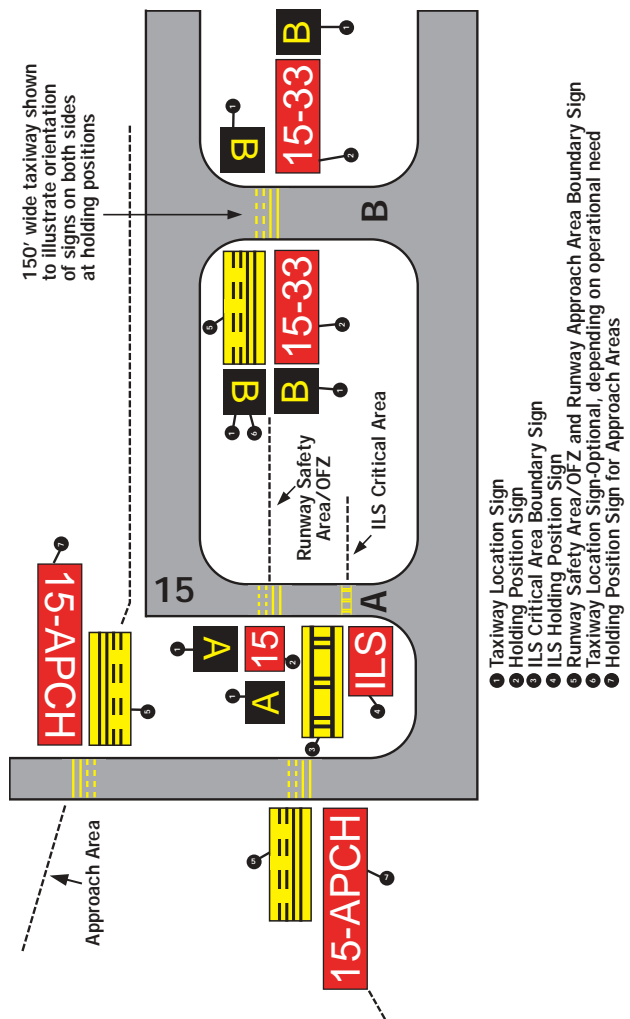
**15-33** *Holding position sign:* Hold here. From your position on the taxiway, the threshold for Runway 15 is to your left and the threshold for Runway 33 is to your right. This sign is located next to the yellow holding position markings painted on the taxiway pavement.

 *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.

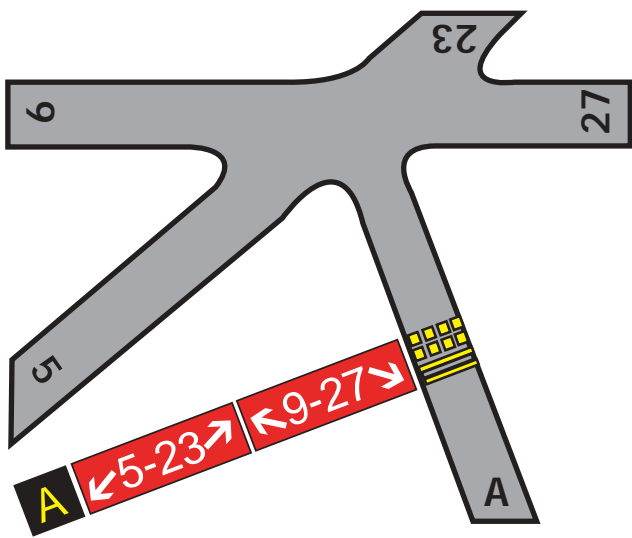
**ILS** *ILS holding position sign:* ATC may hold you at this sign when the instrument landing system is being used at the airport. Aircraft taxiing beyond this point may interfere with the ILS signal to approaching aircraft.

 *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.

**15-APCH** *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 next page). 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.



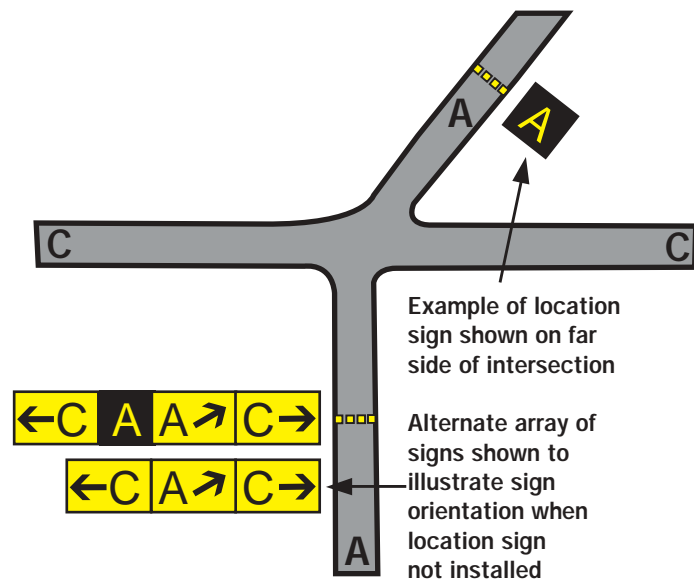
Taxiway intersection (below). You are on Taxiway A. The orientation of these signs is from left to right in a clockwise manner. Left turn signs are on the left side of the location sign and right turn signs are on the right side of the location sign.

## 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.


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 **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.org](http://www.faa.org)

## 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 with the airport manager or FBO to see if mandatory or recommended noise-abatement procedures apply. Noise-abatement procedures avoid noise-sensitive areas near the airport such as a hospital or residential area. 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 climb speed, reduce to climb power, and retract flaps as soon as practical after takeoff to minimize the noise of your aircraft.



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

## 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.



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 a flight service station or 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:

- (1) The airport name and location 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.

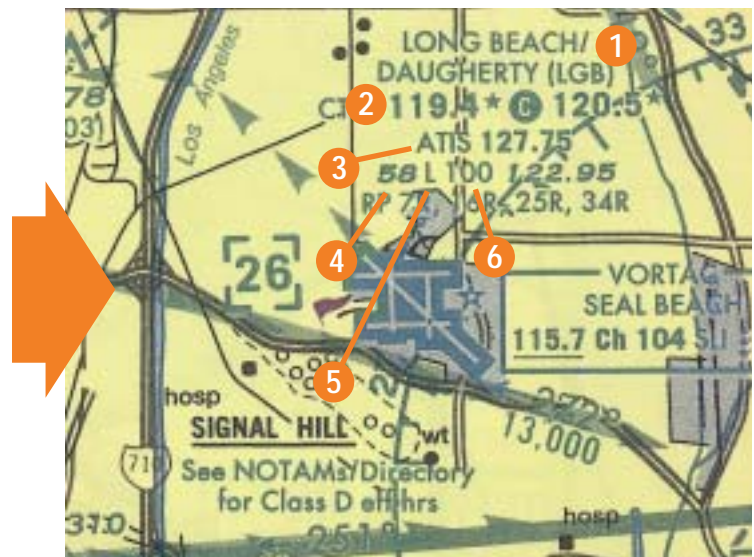
VFR charts also note if a flight service station facility is on the field, airport surveillance radar is available, the tower is part-time or a non-federal facility, if special

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*.

## Airport/Facility Directory

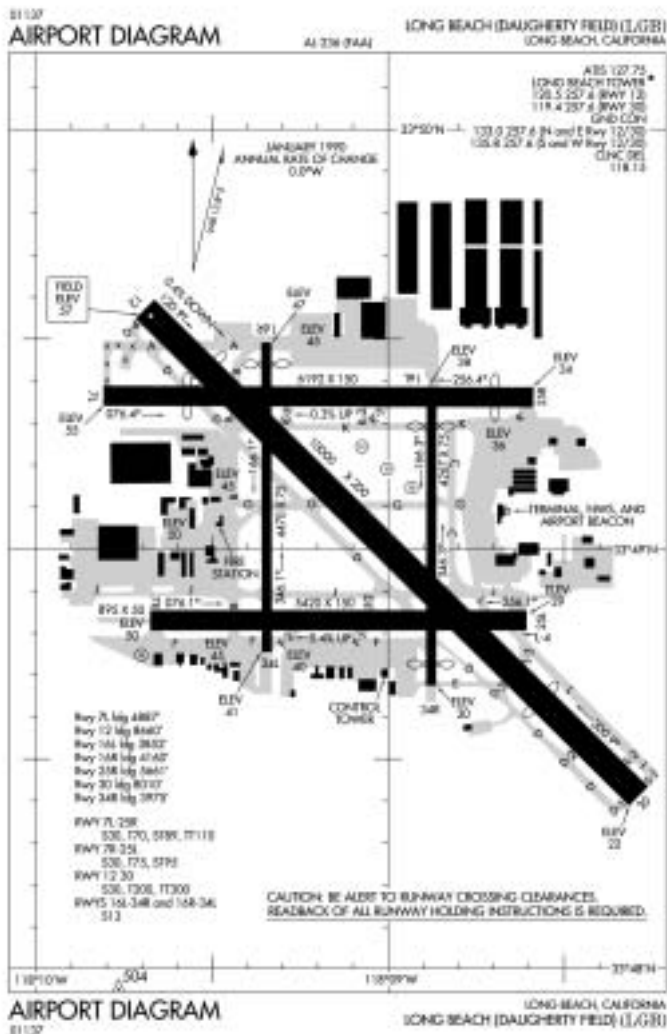
CALIFORNIA		101
<b>LONG BEACH (DAUGHERTY FLD)</b> (LGB) 33° 06' N 118° 07' W	118° 07' W	118° 07' W
<p><b>UNICOM</b> 122.1</p> <p><b>COMMUNICATIONS</b> 121.5</p> <p><b>NAVIGATION</b> 118.1</p> <p><b>WEATHER</b> 122.1</p> <p><b>RESOURCES</b> 122.1</p> <p><b>NOTAM FILE</b> 122.1</p> <p><b>CLASS G</b> 118.1</p> <p><b>CLASS E</b> 118.1</p> <p><b>CLASS D</b> 118.1</p> <p><b>CLASS C</b> 118.1</p> <p><b>CLASS B</b> 118.1</p> <p><b>CLASS A</b> 118.1</p> <p><b>CLASS G</b> 118.1</p> <p><b>CLASS E</b> 118.1</p> <p><b>CLASS D</b> 118.1</p> <p><b>CLASS C</b> 118.1</p> <p><b>CLASS B</b> 118.1</p> <p><b>CLASS A</b> 118.1</p>	<p><b>LONG BEACH TOWER</b> 119.4 (Day 24 hrs, Nts 12 hrs) 120.5 (Nts 12 hrs, Day 24 hrs) 119.5 (119.5-120.5)</p> <p><b>UNICOM</b> 122.1 (North and East of rwy 22-30) 122.8 (South and West of rwy 22-30)</p> <p><b>NAVIGATION</b> 118.1 (118.1-119.5) other times 118.1 G</p> <p><b>WEATHER</b> 122.1 (118.1-119.5) other times 118.1 G</p> <p><b>RESOURCES</b> 122.1 (118.1-119.5) other times 118.1 G</p> <p><b>NOTAM FILE</b> 122.1</p> <p><b>CLASS G</b> 118.1</p> <p><b>CLASS E</b> 118.1</p> <p><b>CLASS D</b> 118.1</p> <p><b>CLASS C</b> 118.1</p> <p><b>CLASS B</b> 118.1</p> <p><b>CLASS A</b> 118.1</p>	<p><b>LONG BEACH (DAUGHERTY FLD)</b> (LGB) 33° 06' N 118° 07' W</p> <p><b>UNICOM</b> 122.1</p> <p><b>COMMUNICATIONS</b> 121.5</p> <p><b>NAVIGATION</b> 118.1</p> <p><b>WEATHER</b> 122.1</p> <p><b>RESOURCES</b> 122.1</p> <p><b>NOTAM FILE</b> 122.1</p> <p><b>CLASS G</b> 118.1</p> <p><b>CLASS E</b> 118.1</p> <p><b>CLASS D</b> 118.1</p> <p><b>CLASS C</b> 118.1</p> <p><b>CLASS B</b> 118.1</p> <p><b>CLASS A</b> 118.1</p>

## VFR Terminal Area Chart



Study the airport layout so you can taxi to and from the active runway without getting lost. 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.aopa.org/asf/taxi/](http://www.aopa.org/asf/taxi/)) or in the back of the Airport/Facility Directory (A/FD).

### Airport Diagram Page



NOT TO BE USED FOR NAVIGATION

### 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, GPS, and loran make the job a lot less stressful.



### 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;
- 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.**

### Communication

Because clearances are required to operate at towered airports, good radio communication 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 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 hand-held



Controller with light gun

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 below and tape it to your clipboard. Acknowledge the signals by rocking your wings or flashing your landing light.

### 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

### 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 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

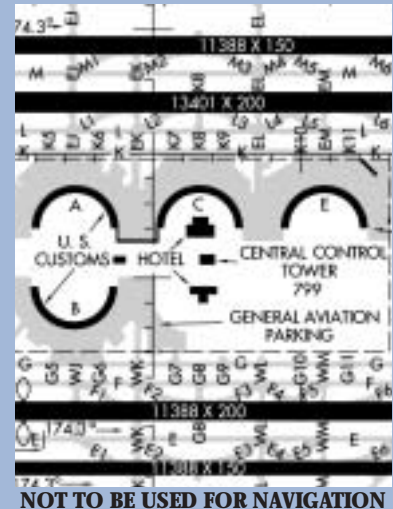
ATC instructions common at towered airports include:

- **"Taxi to...."** In the absence of holding instructions, a clearance to "taxi to" any point other than an assigned takeoff runway is a clearance to cross all runways that intersect the taxi route to that point. It does not include authorization to taxi onto or cross the assigned takeoff runway at any point.
- **"Taxi to—hold short of...."** A clearance to begin taxiing, but enroute to the taxi clearance limit you *must* hold short of another taxiway or a crossing runway as specified by the controller.
- **"Cross runway...."** You are cleared to taxi across the runway crossing your taxi route and continue to the taxi clearance limit.
- **"Hold short...."** *Do not* enter or cross the taxiway or runway specified by the controller. If there is a painted hold line, do not cross it.
- **"Cleared for immediate takeoff."** A clearance to initiate the takeoff without delay. This clearance usually means another aircraft is on final approach.

### Runway Incursion

#### Dallas/Fort Worth, TX

The pilot crossed Runway 18R at Taxiway WM without clearance. The pilot was instructed to cross Runway 18L and contact Ground on 121.85. The ground controller instructed the pilot to turn left on Taxiway G. Moments later, the tower controller observed the aircraft on Runway 18L with an MD-80 on departure roll. The MD-80 was instructed to abort.



NOT TO BE USED FOR NAVIGATION



- If you are not ready, do not accept this clearance.
- **“Report location....”** Identify your location on the airport (“Five-Eight Quebec at the transient ramp”) or in the air with respect to the airport (“Five-Eight Quebec is seven miles southeast of the airport at one thousand five hundred”).
  - **“Squawk....”** Tune a discrete four-digit code into your transponder (the controller will specify the code or say “VFR,” which is 1200). Make sure the transponder is in the “alt” mode.
  - **“Report entering....”** Call the tower when you are turning onto a leg in the airport pattern specified by the controller. For example, “Report entering left downwind for Runway Two-Three.”
  - **“Cleared to land...cleared for touch and go...cleared for the option.”** A controller may issue this clearance, even though one or more aircraft will land ahead of you.

“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, 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. Ask the controller the distance to the crossing runway. 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.

## Ground Fatality

### St. Louis, MO

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.



## 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.

# Departure Procedures

P	R	O	C	F	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 of the delay.	Scan the final approach area as you taxi into position for takeoff.

## 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 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.
- 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.

### Safety Tip

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

### 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.

- A full readback of all ATC instructions on the ground is required.
- A taxi chart 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 takeoff clearance, landing and strobe lights are turned ON to let other aircraft know they are beginning the takeoff roll.

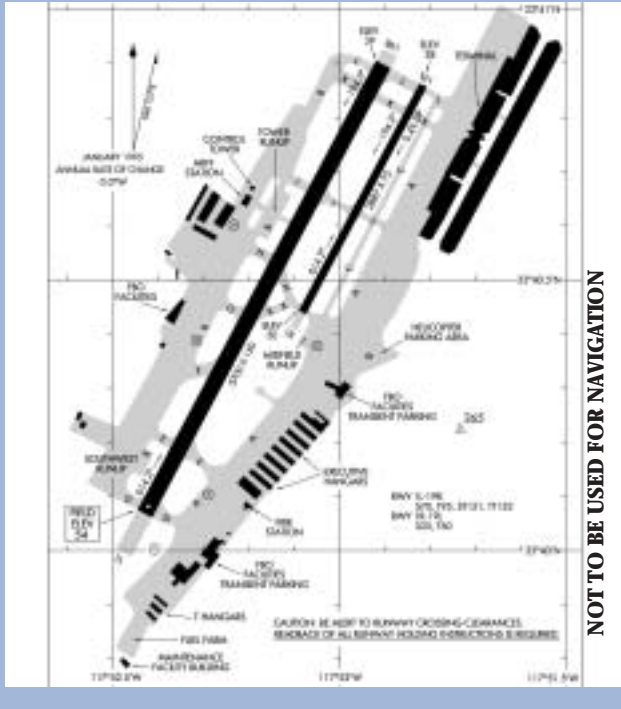
### Sterile Cockpit

This is a term coined by the airlines to limit conversation topics to flight operations when pilot work load is high—in high density airspace, that 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.



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,

## 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, and he was looking but did not see it and descended into it. All four people aboard were killed.



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.

## 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.

## Let's Go Flying!

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 NOS *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 page 7.) 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.

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.

"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, 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.

### 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 ASRS. Reporting forms can be obtained online (<http://asrs.arc.nasa.gov/forms.htm>) or by calling NASA at 650-969-3969.

“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.



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.





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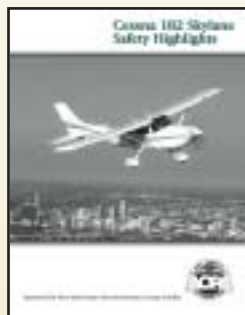
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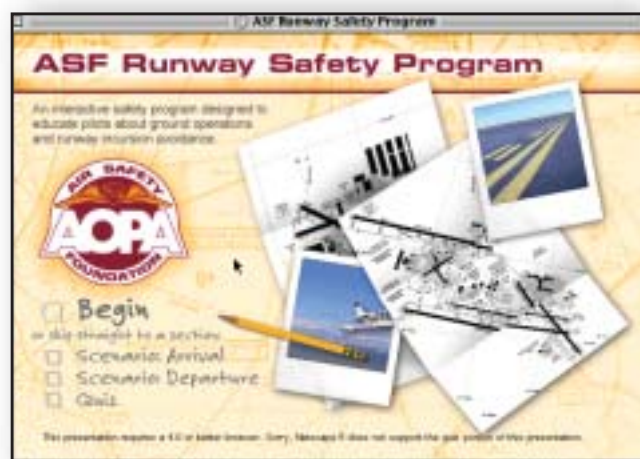
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