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Administration**

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Change:

STANDARDS FOR AIRPORT SIGN SYSTEMS

1. **PURPOSE.** This advisory circular contains the Federal Aviation Administration standards for the siting and installation of signs on airport runways and taxiways.

2. **CANCELLATION.** Advisory Circular 150/5340-18B, Standards for Airport Sign Systems, dated August 21, 1984, is cancelled.

3. **PRINCIPAL CHANGES.** Several new sign applications have been added as follows:

- a. A sign has been added to identify the taxiway or runway on which the aircraft is located.
- b. A sign has been added to indicate the boundary of the runway safety area/object free zone for aircraft exiting the runway.
- c. A sign has been added to indicate the boundary of ILS critical areas for aircraft exiting the ILS critical area.
- d. A sign has been added to denote a holding position on taxiways crossing runway approach areas.
- e. A marker has been added to indicate that a taxiway ends at the intersection.

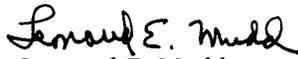
4. **APPLICATION.**

a. It is recommended that all airports install a system of taxiway guidance signs in accordance with the standards in Chapter 1 of this circular. Installing the components of the taxiway guidance sign system in accordance with paragraph 3 of Chapter 1 represents an acceptable means of compliance with the requirements of Federal Aviation Regulation, Part 139, for those airports that are certificated under this regulation.

b. A taxiway designation system in accordance with the standards of Chapter 1 should be the goal of every airport. However, it is recognized that such a change at many airports could create a major problem if accomplished all at once. Therefore, airports should develop an implementation plan to change over to the standardized taxiway designation system in incremental steps to prevent confusion and operational safety problems.

c. Runway distance remaining signs in accordance with the standards of Chapter 2 of this circular are recommended for all runways used by turbojet aircraft.

d. Generally, signs should be lighted if the runway or taxiway on which they are installed is lighted. Holding position signs and any collocated location signs should be lighted if the runway for which they are installed is lighted even if the taxiway on which they are installed is unlighted.

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Leonard E. Mudd
Director, Office of Airport Safety
and Standards

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CHAPTER 1. TAXIWAY GUIDANCE SIGNS

1. GENERAL. A properly designed and standardized taxiway guidance sign system is an essential component of a surface movement guidance control system necessary for the safe and efficient operation of an airport. It should:

- a. Provide the ability to easily determine the designation or name of any taxiway on which the aircraft is located.
- b. Readily identify routes toward a desired destination.
- c. Indicate mandatory holding positions.
- d. Identify boundaries for approach areas, ILS critical areas, and runway safety areas/obstacle free zones (OFZ).

2. PLANNING. Users of this advisory circular should recognize that the functional layout of each airport is different. Although two airports may have similar runway and taxiway configurations, the number of signs needed to provide the pilot with the necessary taxiway guidance information may differ. This difference can be attributed to such factors as ground traffic patterns, presence of an air traffic control tower, location of terminals, fixed-base operators and other facilities, the airport's instrument weather capability, number of aircraft operations, and types of operators. In view of the differences in each airport's functional layout, the airport operator should work with the Federal Aviation Administration (FAA) to ensure that a taxiway guidance sign system in accordance with the standards of this advisory circular is achieved whenever practicable. In developing the taxiway guidance sign system, it is advisable and strongly recommended that the airport operator consult with the airport users.

3. COMPONENTS OF A SIGN SYSTEM. Overall safety is enhanced by a standardized system of signs at all airports. Paragraphs 5, 6, 7, and 9 contain standards for different types of taxiway guidance signs and along with paragraphs 12, 13, 14, and 16 provide information on their installation. Figures included in this chapter, as well as appendix 1, show graphic depictions of these signs and common applications. However, except for holding position signs, it is virtually impossible to prescribe the location and types of signs that should be installed as part of a taxiway guidance sign system at a particular airport due to the varying functional layouts discussed in paragraph 2. In this regard, the signs described in the aforementioned paragraphs should be viewed as the inventory of signs available to develop a taxiway guidance sign system on an airport. In deciding where signs should be installed as part of a taxiway guidance

sign system at a particular airport, the following guidelines should be applied to the airport:

a. A holding position sign and taxiway location sign should be installed at the holding position on any taxiway that provides access to a runway.

b. A holding position sign should be installed on any taxiway at the boundary of the ILS critical area or the runway approach area when it is necessary to protect the navigational signal, airspace, or safety area for a runway.

c. A holding position sign should be installed on any runway where that runway intersects another runway.

d. A sign array consisting of taxiway direction signs should be installed prior to each taxiway/taxiway intersection if an aircraft would normally be expected to turn at or hold short of the intersection. The direction signs in the array should include a sign panel (taxiway designation and an arrow) for each taxiway that an aircraft would be expected to turn onto or hold short of. A taxiway location sign should be included as part of the sign array unless it is determined to be unnecessary. If an aircraft normally would not be expected to turn at or hold short of the intersection, the sign array is not needed unless the absence of guidance would cause confusion.

e. A runway exit sign should be installed along each runway for each normally used runway exit.

f. Destination signs may be substituted for the signs described in paragraphs 3d and 3e at uncontrolled airports.

g. Standard highway stop signs should be installed on vehicle roadways at the intersection of each roadway with a runway or taxiway. For roadway intersections with taxiways, a standard highway yield sign may be used in lieu of the stop sign.

h. Additional signs should be installed on the airfield where they are necessary to eliminate confusion or provide confirmation. For example, it may be necessary to install a taxiway location sign at the entrance to a taxiway from an apron area where there are several such entrances. Similarly, on runway exit taxiways where air traffic control regularly requests pilots to report clear of the runway, it may be beneficial to install a runway safety area/OFZ boundary sign to assist the pilot in making this report. Another situation involves complex intersections or intersections along low visibility routes, where it may be benefi-

cial to install location signs on the far side of the intersection so that the pilot can confirm that the correct turn has been made.

4. DEVELOPING TAXIWAY DESIGNATIONS. The first step in designing a taxiway guidance sign system is developing a simple and logical method for designating taxiways. The following general guidelines should be followed:

- a. Keep it simple and logical.
- b. Letters of the alphabet should be used for designating taxiways. Optimally, designation of the taxiways should start at one end of the airport and continue to the opposite end, e.g., east to west or north to south (see figure 2 for an example).
- c. Where there are more taxiways than letters of the alphabet, then double letters such as "AA" should be used. An exception is permitted for a major taxiway having numerous stub exits such as a taxiway parallel to a runway or a taxiway adjacent to a ramp area. In such instances the short taxiways could be designated "A1," "A2," "A3," etc. Numbers alone and the letters "I" and "O" should not be used since they could be mistaken for a runway number. Also, the letter "X" should not be used since a sign with an "X" could be misconstrued as indicating a closed taxiway. Number and letter combinations should not result in confusion, whereby, the taxiway designation could be mistaken for that of a runway. For example, if an airport has a runway "4L," a taxiway designation of "L4" should not be used.
- d. All separate, distinct taxiway segments should be designated.
- e. No separate, distinct taxiway should have the same designation as any other taxiway.
- f. Taxiway designations should not be changed when there is no significant change in direction of the taxiing route. However, when the overall system design indicates a need, such a change can be made and appropriately signed (see figures 20c and 20d). Such changes should be made only at intersections.
- g. Designating taxiways by reference to a direction of travel or to a physical object should be avoided. This includes the use of terms such as "inner," "outer," "parallel," and "bridges." Such informal nicknames or abbreviations should not be used on taxiway guidance signs.
- h. NOTAMS regarding taxiways should refer to the formal designation that appears on the taxiway guidance sign.

5. MANDATORY INSTRUCTION SIGNS. Mandatory instruction signs have white inscriptions on a red background. They denote an entrance to a runway or critical area. At controlled airports, vehicles and aircraft are required to hold unless cleared by air traffic control. At uncontrolled airports, these signs are intended to be proceeded beyond only after appropriate precautions are taken. Arrows should not be used on these signs except as discussed in paragraph 5a. Mandatory signs are installed on the left side of the taxiway or runway and include the following:

a. Holding Position Signs for Taxiway/Runway Intersections. The inscription on a holding position sign at a taxiway/runway intersection is the runway number(s), such as "15-33" as shown in figure 1. The runway numbers are separated by a dash and their arrangement indicates the direction to the corresponding runway threshold. For example, "15-33" indicates that the threshold for runway "15" is to the left and the threshold for runway "33" is to the right. The sign at each takeoff end contains the inscription only for the takeoff runway while all other signs contain both runway designation numbers. However, both runway designation numbers may be used on signs at runway ends where there is an operational need, such as where a taxiway crosses the runway at the runway end. Application examples for holding position signs are shown in figure 3. Arrows are used on these signs only for identifying intersecting runways at a taxiway/runway/runway intersection (see figure 4). Note that in figure 4b, the holding position signs have both runway numbers to avoid confusion as to the runway direction. In some geometrical configurations of runways and taxiways, it is necessary to install hold position signs on both sides of the taxiway. These configurations include:

- (1) Taxiways that are 150 feet or greater in width (see figure 3).
- (2) Taxiways where the painted hold position markings extend across an adjacent holding bay, etc., as shown in figure 8a.

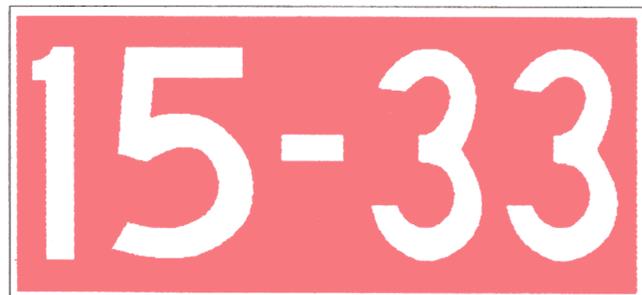


Figure 1. Typical Holding Position Sign for Runways

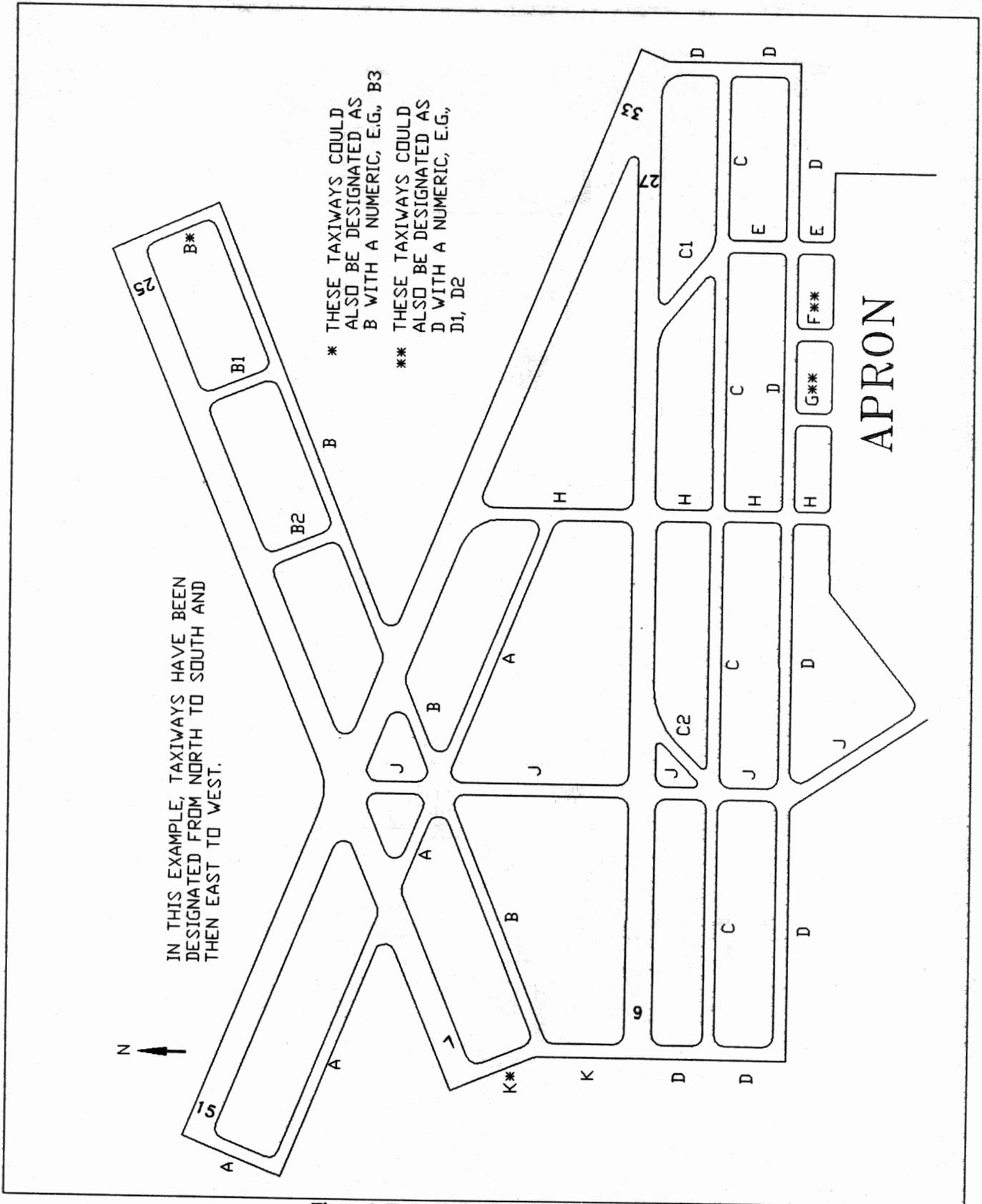


Figure 2. Example for Designating Taxiways

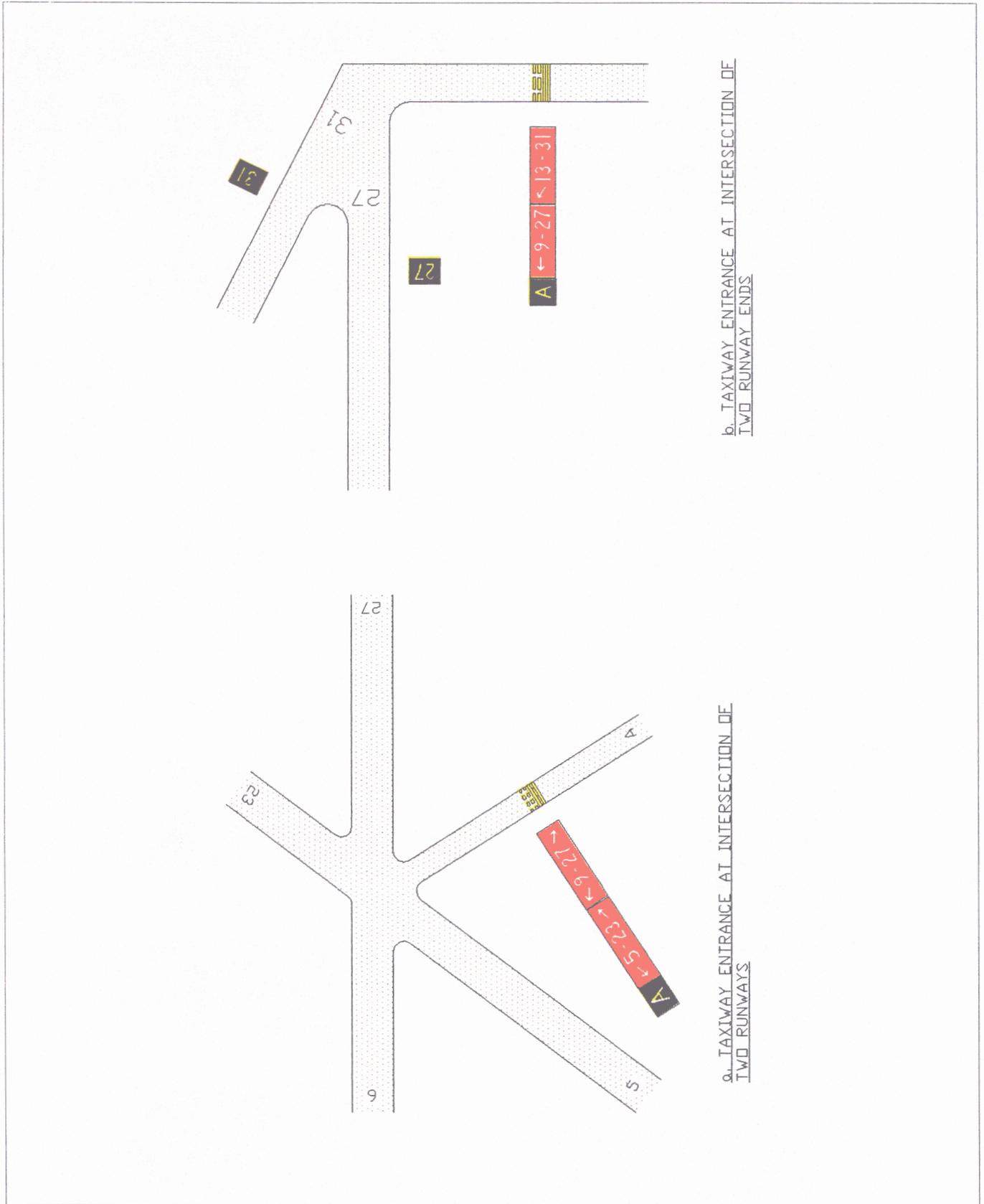


Figure 4. Runway Location Signs and Arrows on Holding Position Signs

(3) Taxiways where the painted hold position markings do not extend straight across the taxiway as shown in figure 8c.

(4) Taxiways where the painted hold position markings are located a short distance from an intersection with another taxiway. In this situation, the pilot turning onto the taxiway would have difficulty seeing the hold position sign on the left. This commonly occurs when the separation distance between the runway and the parallel taxiway is less than standard and the hold position markings are located near the edge of the parallel taxiway (see figure 8b). Because of cockpit visibility limitations, pilots of some aircraft making a left turn from the parallel taxiway onto the connecting taxiway with the runway would have difficulty seeing a sign on the left. In this situation, it may be necessary to install the sign on an angle in accordance with paragraph 16.

b. Holding Position Signs for Runway/Runway Intersections. Signs used to identify runway/runway intersections are identical to signs used for taxiway/runway intersections. For runways 150 feet or less in width, only one sign is needed. For runways more than 150 feet in width, or for runways of any width which are used for "land and hold short" operations or normally used for taxiing, signs on both sides of the runway are needed (see figure 9). Signs should be located at a distance from the intersecting runway to meet the clearance requirements of the intersecting runway as specified in table 1.

c. Holding Position Signs for ILS critical Areas. The inscription on a sign for an ILS critical area is shown in figure 5. Where the distance between the runway holdline and the holdline for an ILS critical area is 50 feet or less, one holdline may be installed, provided it will not affect capacity, by moving the runway holdline back to the ILS holdline position as shown in figure 10. (The critical area for MLS is likely to be smaller than that for ILS. Where the MLS critical area controls, the holding position signs should say MLS). The local FAA office will designate the ILS (or MLS) critical area boundaries for the airport operator. ILS holding position signs should be located on both sides of the taxiway when the ILS holding position marking is located in the geometrical configurations described in paragraph 5a(1) through 5(a)4.

d. Holding Position Signs for Runway Approach Areas. The inscription on a sign for a runway approach area is the associated runway designation followed by a dash and the abbreviation APCH for approach (see figure 6 for an example). The sign is installed on taxiways located in approach areas where an aircraft on a taxiway would either cross through the runway safety area or penetrate the airspace required for the approach or departure runway. This

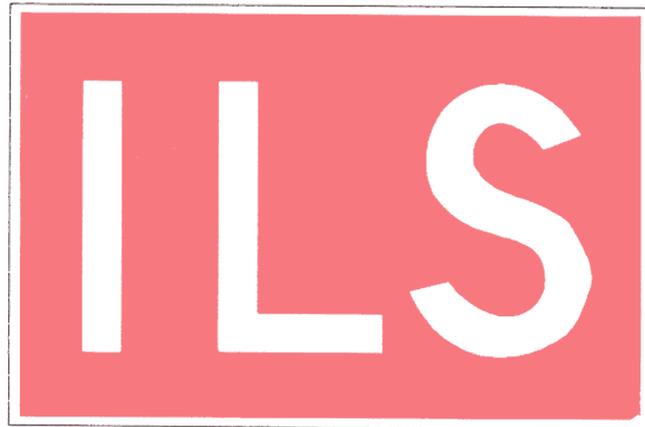


Figure 5. ILS Holding Position Sign

* sign should not be installed on runways. This sign should not be installed on runways or on taxiways that intersect the runway specified on the sign.

e. No Entry Sign. This sign indicates that entry into a particular area is prohibited to aircraft. The sign inscription is shown in figure 7.

6. LOCATION SIGNS. These signs identify the taxiway or runway upon which the aircraft is located. The signs are also used to identify the boundary of the runway safety area/OFZ or ILS critical area for a pilot exiting the runway. Location signs include the following:

a. Taxiway Location Signs. These signs identify the taxiway on which an aircraft is located. A typical sign is shown in figure 11. The signs have yellow inscriptions on a



Figure 6. Holding Position Sign for Approach Areas

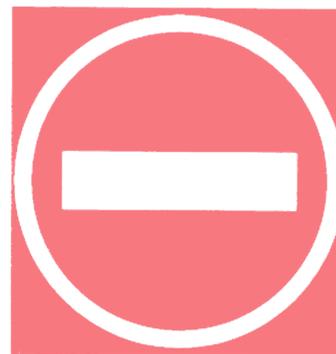


Figure 7. No Entry Sign

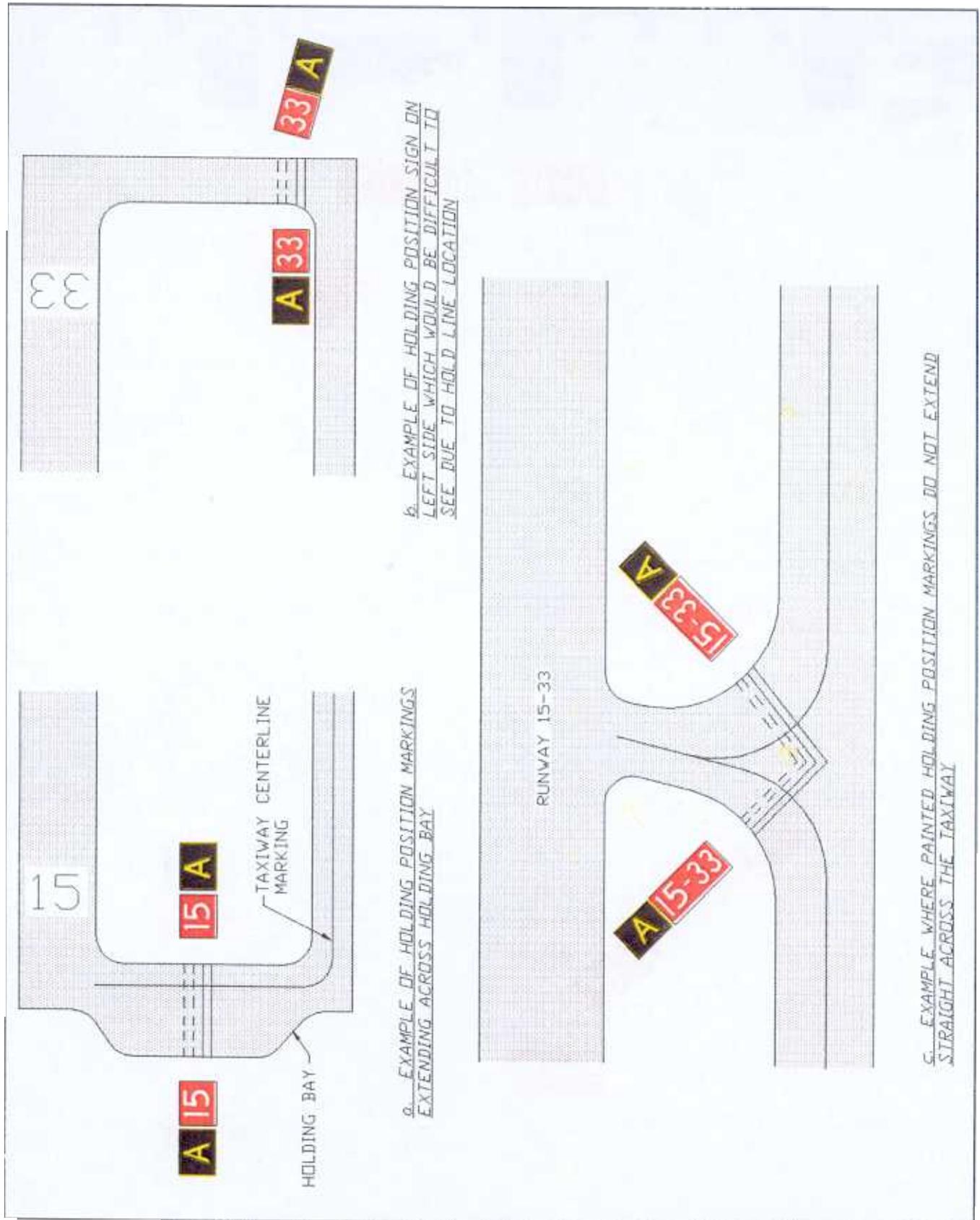


Figure 8. Examples of Siting Holding Position Signs for Nontypical Conditions

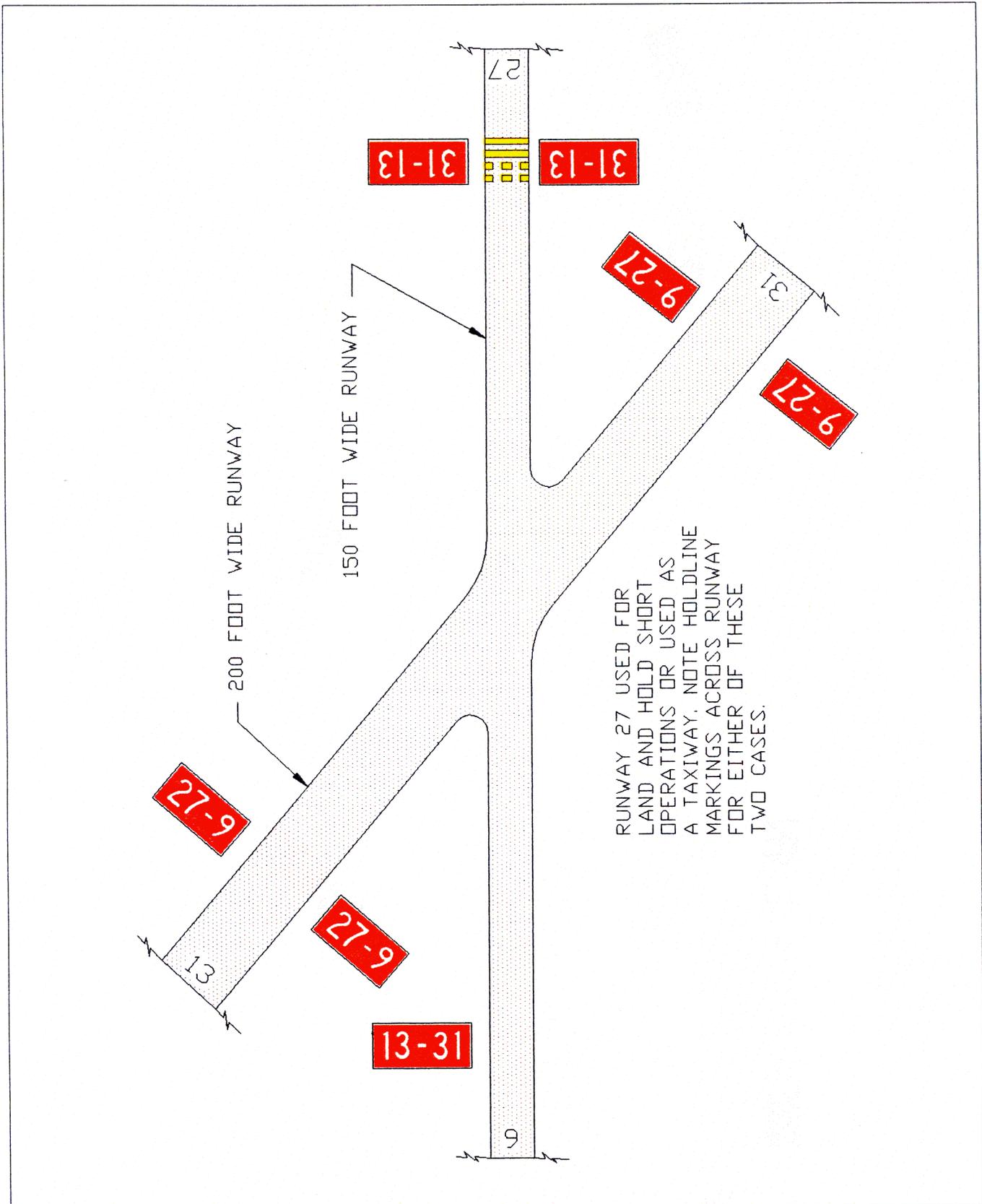


Figure 9. Holding Position Signs at Runway Intersections

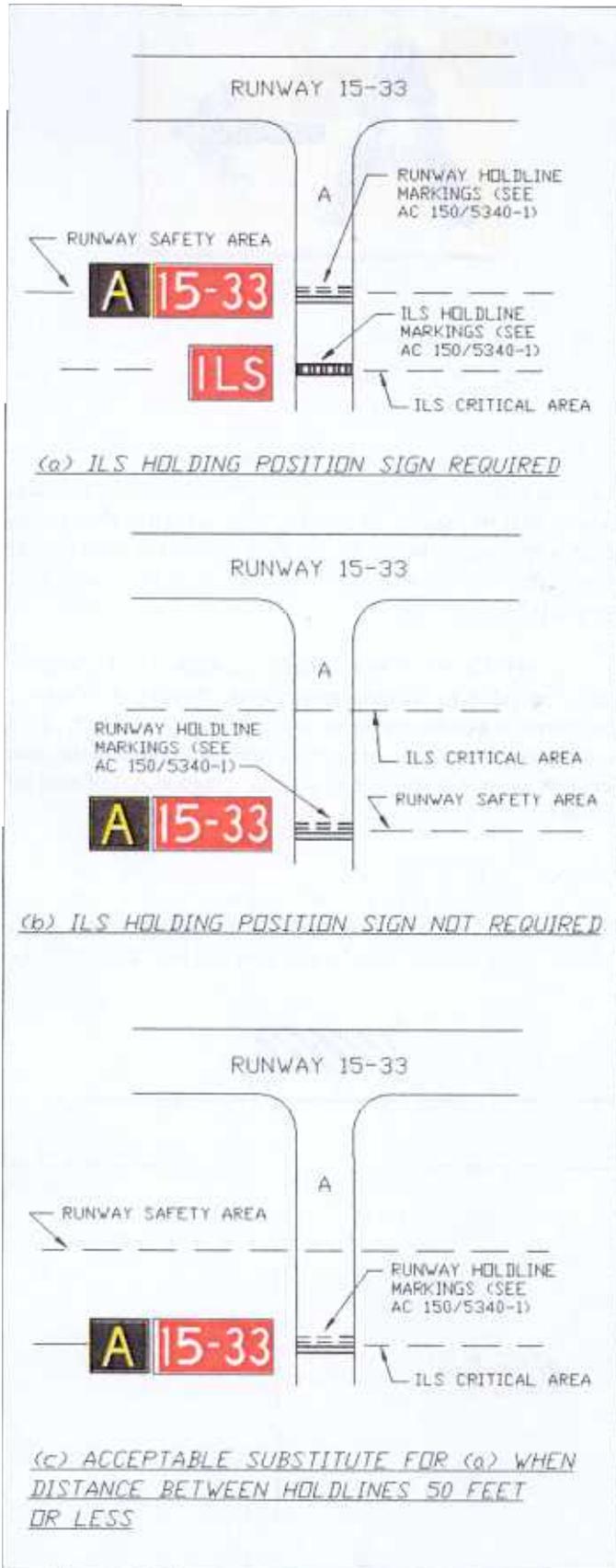


Figure 10. Sign Applications for ILS Critical Areas



Figure 11. Taxiway Location Sign

black background with a yellow border and do not contain arrows.

b. Runway Location Signs. These signs are installed on

- * runways where two runways are in proximity which could create confusion as shown in figure 4b. A typical sign is shown in figure 12. These signs should be located to identify clearly the runways for pilots and contain the runway designation only for the one runway end. The signs have yellow inscriptions on a black background with a yellow border and do not contain arrows.



Figure 12. Runway Location Sign

c. Runway Safety Area/OFZ and Runway Approach Boundary Signs. These signs identify the boundary of the

- * runway safety area/OFZ or the runway approach area to pilots who are exiting these areas. They have a black inscription that depicts the holdline marking on a yellow background as shown in Figure 13. These signs are only used at controlled airports on taxiways where the controller commonly asks the pilot to report "clear of the runway." The pilot can use the sign as a guide in deciding when to report back to the controller. Consequently, these signs would not normally be installed at every runway exit. This sign would not normally be installed on taxiways having color coded centerline lights but may be desirable in areas where the centerline lights could be obscured by snow or ice.

d. ILS Critical Area Boundary Sign. These signs identify the boundary of the ILS critical area to pilots who are

- * exiting this area. They have a black inscription that depicts the ILS holdline marking on a yellow background as shown in Figure 14. These signs are used at controlled airports on

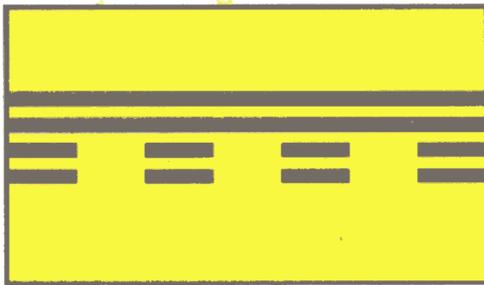


Figure 13. Runway Safety Area/OFZ Boundary Sign and Runway Approach Area Boundary Sign



Figure 15. Direction Sign

(1) If a taxiway crosses a runway and an aircraft can be expected to exit on either side, then exit signs should be located on both sides of the runway.

(2) For taxiways that are intended only to be used as exits from the runway in one direction, such as taxiways located near the end of the runway or intersecting the runway at an acute angle, the signs should be installed only for the runway direction in which they are intended to be used (see appendix 1).

(3) When two acute-angle taxiways (i.e., high speed exits), intended to be used in opposite directions, intersect the runway at a common point, the exit signs should be located prior to the common point intersection rather than in the area between the two exits (see appendix 1, figure A-1, Taxiways D and E).

8. TAXIWAY ENDING MARKER. The sign system does not provide a sign to indicate that a taxiway does not continue beyond an intersection. A frangible, retroreflective barrier, as shown in figure 16, should be installed on the far side of the

taxiways where the controller commonly asks the pilot to report “clear of the ILS critical area.” The pilot can use the sign as a guide in deciding when to report back to the controller. This sign would not normally be installed on taxiways having color coded centerline lights but may be desirable in areas where the centerline lights could be obscured by snow or ice. These signs are installed only on the back side of ILS holding position signs.

7. DIRECTION SIGNS. These signs indicate directions of other taxiways leading out of an intersection. The signs have black inscriptions on a yellow background and always contain arrows. The arrows should be oriented to approximate the direction of turn. Direction signs should not be collocated with holding position signs or installed between the holdline and the runway. Signs used to indicate the direction of taxiways on the opposite side of a runway should be located on the opposite side of the runway.

a. Taxiway Direction Signs. A typical taxiway direction sign is shown in figure 15, and application examples are shown in figures 20, 21, and appendix 1.

b. Runway Exit Signs. A typical runway exit sign is shown in figure 15, and application examples are shown in figures A-1, A-2, and A-3 of appendix 1. Signs for runway exits are located prior to the runway/taxiway intersection on the side and in the direction of the runway where the aircraft is expected to exit. A runway exit sign should never have more than one arrow for each taxiway designation shown on the sign.

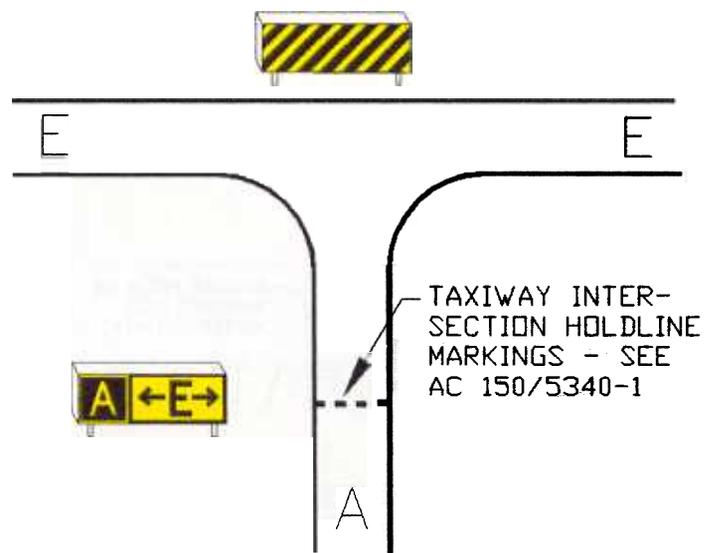


Figure 16. Taxiway Ending Marker

intersection if the normal visual cues such as marking and lighting are inadequate.

9. DESTINATION SIGNS. Destination signs have black inscriptions on a yellow background and always contain an arrow. These signs indicate the general direction to a remote location. They are not normally needed on an airport where taxiway direction signs are used. At many of the larger airports, taxiway routing is a very dynamic process, dependent on many variables including airfield construction and primary runway utilization. In these cases destination signs may provide contradictory information or routing possibilities in relation to air traffic control (ATC) communications. The use of destination signs at such airports is justified in cases of remote locations or where it is determined that such a level of confusion can exist that taxiway location signs and direction signs alone would not adequately guide a pilot to the desired destination. Destination signs may be more beneficial at uncontrolled airports.

a. Outbound Destination Signs. Outbound destination signs are used to identify directions to the takeoff runways. These routes usually begin at the entrance to a taxiway from an apron area. The inscription is the runway number plus an arrow indicating the direction (see figure 17). More than one runway number, separated by a dot, may be shown where the taxiing route is common to both runways as shown in figure 18.

b. Inbound Destination Signs. Major destination areas are usually shown on inbound destination signs. For example, at many airports, signs indicating the way to the apron may be adequate; whereas, at other airports, it may be necessary to make a distinction between passenger aprons, cargo aprons,



Figure 17. Typical Outbound Destination Sign



Figure 18. Outbound Destination Sign to Different Runways



Figure 19. Example of an Inbound Destination Sign

military aprons, or between aprons in different locations on the airport, such as north apron, east apron, etc. At appropriate points closer to the major destination areas, more detailed destination signs should be provided to indicate specific areas which are designated for parking service, passenger handling, military aircraft, etc. (see figure 19 for a typical sign). The inscription on destination signs should contain a minimum of three letters which should be selected so that no confusion could exist with other taxiway guidance signs. Common abbreviations used for inbound destinations are:

APRON --- general parking, servicing, and loading areas

FUEL --- areas where aircraft are fueled or serviced

TERM --- gate positions at which aircraft are loaded or unloaded

CIVIL --- areas set aside for civil aircraft

MIL --- areas set aside for military aircraft

PAX --- areas set aside for passenger handling

CARGO --- areas set aside for cargo handling

INTL --- areas set aside for handling international flights

FBO --- fixed-base operator

10. ROADWAY SIGNS. Vehicle roadways that intersect runways or taxiways should have a standard retroreflective highway stop sign on them prior to the intersection. At intersections with taxiways, it is permissible to use a standard retroreflective highway yield sign in lieu of a stop sign. These signs should be located at the edge of the applicable runway safety area/OFZ or taxiway safety area on frangible mounts and restricted to a height that does not interfere with aircraft using the runways or taxiways. It should be noted that aircraft clearance requirements and jet blast may preclude the use of

these signs on roadways that are located on the apron or other parts of the air operations area.

11. INFORMATION SIGNS. Signs installed on the airside of an airport, other than taxiway guidance signs as described in this chapter or runway distance remaining signs as described in chapter 2, should have black inscriptions on a yellow background, should provide adequate clearance to aircraft, and should conform to the general installation guidelines in paragraph 16. An example of such a sign is one that provides noise abatement procedures or other such specialized information. These signs need not be lighted and the size of the inscription is at the discretion of the airport operator.

12. GENERAL SIGNING CONVENTIONS. The following general signing conventions should be followed:

a. Unless otherwise noted herein, signs should always be placed on the left side of the taxiway as seen by the pilot of the approaching aircraft. If signs are installed on both sides of the taxiway at the same location, the sign faces should be identical (an exception is for holding position signs as explained in paragraph 12d). Signs should not be installed between the taxiway/runway holding position sign and the runway.

b. Signs may be located on the right side of the taxiway when necessary to meet clearance requirements or where impractical to install on the left side because of terrain or conflicts with other objects.

c. Some signs may be installed on the back side of other signs even though it results in the sign being on the right side of the taxiway. Signs that may be installed in this manner include:

(1) Runway safety area/OFZ and runway approach area boundary signs may be installed on the back sides of taxiway/runway intersections and runway approach area holding position signs.

(2) ILS critical area boundary signs may be installed on the back sides of ILS critical area holding position signs.

(3) Taxiway location signs, when installed on the far side of an intersection, may be installed on the back side of direction signs. *Note:* Location signs installed in this manner do not replace the need for location signs installed on the left prior to the intersection.

(4) Taxiway location signs may be installed on the back side of holding position signs.

(5) Destination signs may be installed on the back sides of direction signs on the far side of intersections when the destination referred to is straight ahead (see appendix 1, figure A-1).

d. Taxiway location signs installed in conjunction with holding position signs for taxiway/runway intersections should always be installed outboard of the holding position sign (see taxiway B, figure 3).

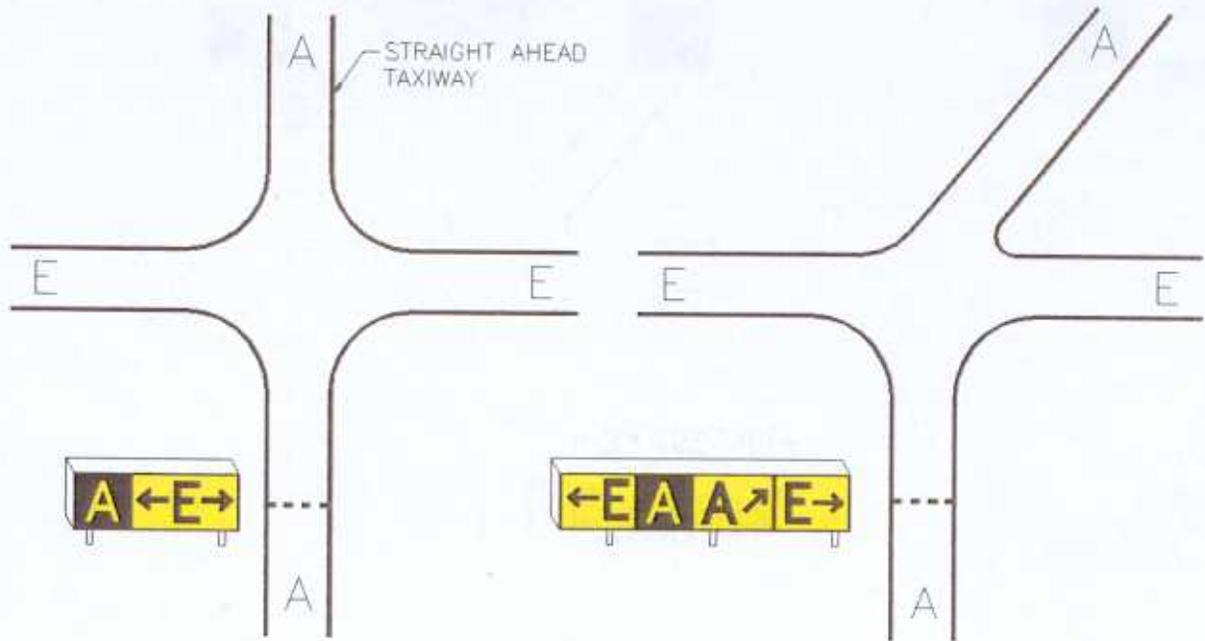
e. Location signs are normally included as part of a direction sign array which is located prior to the taxiway intersection. Except for intersections of only two taxiways (see paragraph 12h), the location sign is placed in the array so that the designations for all turns to the left would be located to the left of the location sign; the designations for all turns to the right or straight ahead, when required (see paragraph 12g), are located to the right of the location sign (see figure 20).

f. When more than one taxiway direction sign is installed at the same location, the designations of the intersecting taxiways and their respective arrows are arranged left to right in a clockwise manner starting from the taxiway or runway on which the aircraft is located (see figure 21).

g. All direction signs have arrows. Arrows on signs should be oriented to the approximate direction of the turn. Except as noted in paragraph 12h, each designation appearing in an array of direction signs should be accompanied only by one arrow. A direction sign with an arrow indicating that a taxiway continues straight ahead (25 degrees or less change in alignment at the intersection) is not normally needed (see figure 20a). Where the intersection alignment changes more than 25 degrees, a sign with an arrow approximating the direction of the taxiway should be used (see figure 20b). If the taxiway continues straight ahead (25 degrees or less change in alignment) and the designation of the taxiway changes at the intersection, then a direction sign with an arrow should be used (see figures 20c and 20d).

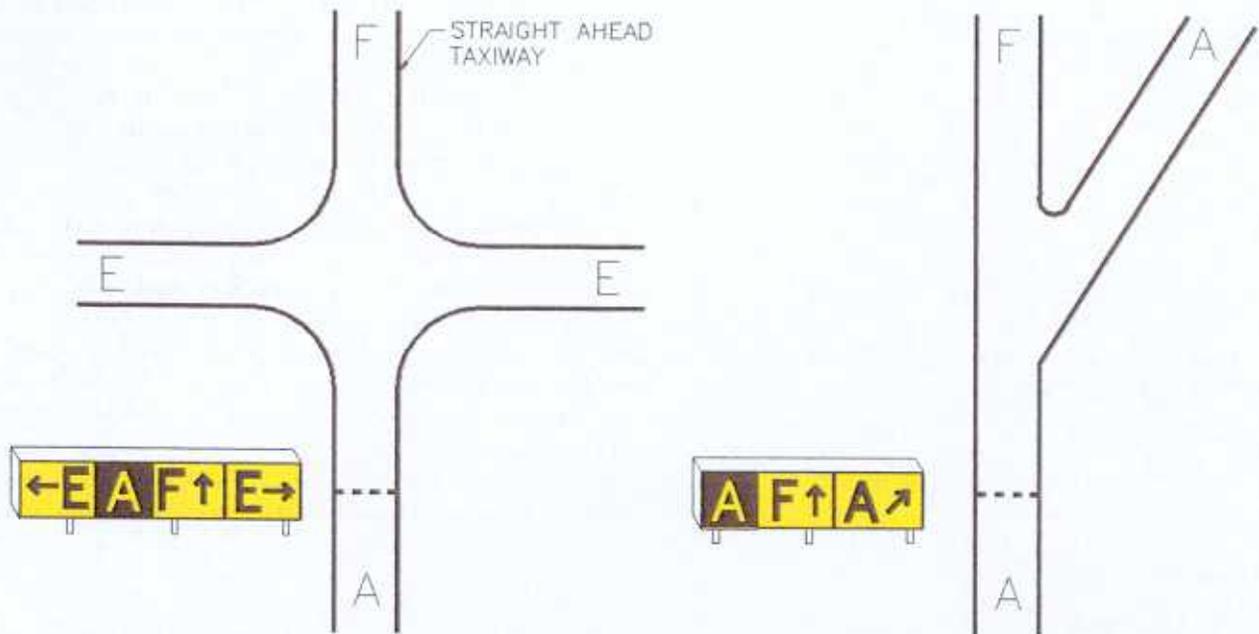
h. When a taxiway intersection is comprised of only two taxiways, it is permissible to place the location sign to the left of the sign array. In this case the designation for the intersecting taxiway on the direction sign will be accompanied by two arrows. For this type of installation, the taxiway cannot change designation or alignment (more than 25 degrees) on the other side of the intersection (see figure 20a).

i. In some cases, location signs may not be needed in conjunction with direction signs (see figure 21.) In analyzing the need for a location sign, all information concerning the intersection must be considered. This would include but not be limited to:



(a) STANDARD 4-WAY INTERSECTION

(b) STRAIGHT AHEAD TAXIWAY HAS DIRECTION CHANGE GREATER THAN 25 DEGREES



(c) DESIGNATION OF STRAIGHT AHEAD TAXIWAY HAS CHANGED

(d) Y CONFIGURATION WITH TAXIWAY 'A' CHANGING DIRECTION

Figure 20. Signing Examples

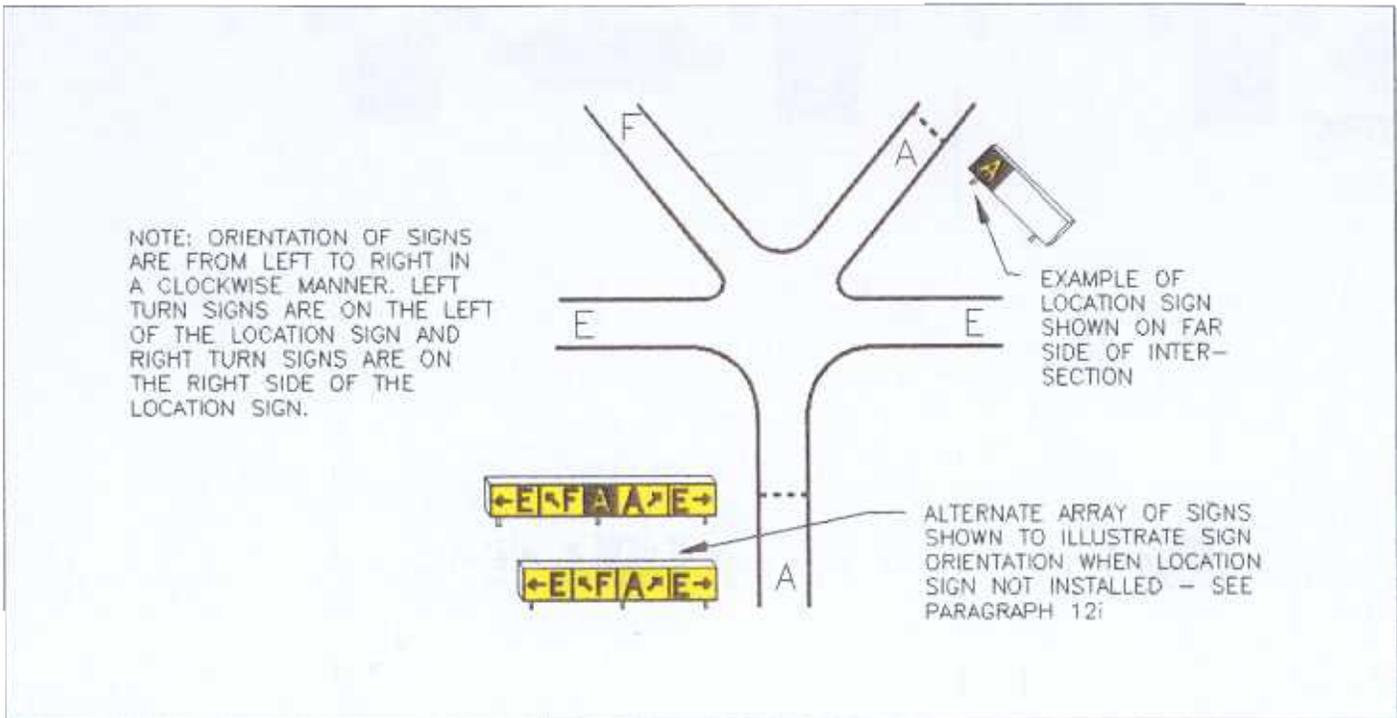


Figure 21. Signing an Intersection

- (1) complexity of the intersection layout.
- (2) distance from last location sign.
- (3) complexity of prior intersections.
- (4) traffic flow patterns through the intersection
- (5) visibility conditions under which the intersection is used.

j. Destination signs should be installed in advance of intersections but should not be collocated with other signs. They may also be installed on the far side of an intersection when the taxiway does not continue, and direction signs are provided prior to the intersection.

k. Information signs should not be collocated with mandatory, location, direction, or destination signs.

l. Each designation and its associated arrow included in an array of direction signs or destination signs should be delineated from the other designations in the array by a black vertical border. When it is appropriate, a location sign may be used to provide this delineation (see figure 21.)

13. SIGN SIZE AND LOCATION. The signs should be in accordance with AC 150/5345-44, *Specifications for Taxiway and Runway Signs* (current edition). Three sizes (heights) of signs are available (see table 2). The choice of a particular size involves several factors such as effectiveness, aircraft

clearance, jet blast, and snow removal operations. Normally, the larger the sign and the closer it is located to the runway or taxiway edge, the more effective it is. However, aircraft clearance requirements and jet blast effects require smaller signs when located near the pavement edges, whereas, effectiveness requires larger signs when located at further distances. Also, the effects of snow removal operations on the signs should be considered in the choice of sign size and location. The sign used must provide 12 inches (30 cm) of clearance between the top of the sign and any part of the most critical aircraft using, or expected to use, the airport when the aircraft's wheels are at the defined pavement edge. The distances shown in table 1 should be used in determining runway holding positions. All signs in an array, e.g., a runway/taxiway holding position sign array consisting of a runway holding position sign and a taxiway location sign, should be the same size and same height above the ground. For determining sign locations with respect to intersecting taxiways, the clearance requirements to other moving aircraft, as given in table 3, should be used. For signs installed at holding positions, the signs should be in line with the holdline markings; however, a tolerance of ± 10 feet is allowed. Where there is no operational need for taxiway holdline markings (at taxiway/taxiway intersections), the signs may be installed in the area from the taxiway point of tangency to the location where holdline markings would be installed (table 3). However, locating the signs where the holdline marking would be installed will obviate the need to relocate the signs if the operational need for a taxiway holding position develops in the future.

Table 1. Location Distances for Holding Position Markings

Aircraft approach category and (airplane design group)	Perpendicular distance from runway centerline to intersecting runway/taxiway centerline in feet (meters)*	
	Visual and nonprecision instrument	Precision instrument
A & B (I and II) small airplanes only	125 (38)	175 (53)
A & B (I, II, and III)	200 (60)	250 (75)
A & B (IV)	250 (75)	250 (75)
C & D (I through IV)	250 (75)	250 (75)
C & D (V)	250 (75)	280 (85)

* Increases for elevation above sea level are:

1. Aircraft approach categories A and B.

- a. Airplane design groups I and II. No increase to this distance is required.
- b. Airplane design group III. This distance is increased one foot for each 100 feet above 5,100 feet above sea level.
- c. Airplane design group IV.
 - (1) Visual and nonprecision instrument. No increase to this distance is required.
 - (2) Precision instrument. This distance is increased one foot for each 100 feet above sea level.

2. Aircraft approach category C.

- a. Airplane design groups I, II, and III. No increase to this distance is required.
- b. Airplane design group IV.
 - (1) Visual and nonprecision instrument. No increase to this distance is required.
 - (2) Precision instrument. This distance is increased one foot for each 100 feet above sea level.
- c. Airplane design group V. This distance is increased one foot for each 100 feet above sea level.

3. Aircraft approach category D. This distance is increased one foot for each 100 feet above sea level.

14. SIGN OPERATION. Holding position signs for runways, ILS critical areas, approach areas, and their associated taxiway location signs should be illuminated when the associated runway lights are illuminated. Other taxiway guidance signs should be illuminated when the associated taxiway lights are illuminated. Signs powered from lighting circuits that are electrically monitored may have an adverse effect on the monitoring of the lighting circuit.

15. PAVEMENT MARKING SIGNS. Where signs cannot be installed and/or there is a need for additional guidance, then directional guidance or location information may be painted on the pavement.

16. INSTALLATION. The signs should be mounted on a concrete slab, concrete pedestals, or angle iron stakes so that the top of the sign is level. The concrete edges or stakes should not protrude above grade. Signs are oriented so that the face is perpendicular to the centerline of the taxiway or runway. For special situations where visibility would be improved, single sided signs may be canted. Power to the signs should be provided through breakaway cable connectors installed within the frangible coupling portion of the sign's mounting legs. Auxiliary equipment, such as isolation transformers or series circuit power adapter units, should be installed in a light base can embedded in the ground.

17-19. RESERVED.

Table 2. Location Distances for Taxiway Guidance Signs

Sign size	Sign heights [inches (cm)]			Perpendicular distance from defined taxiway/runway edge to near side of sign [feet (m)]
	Legend	Face	Installed (max.) *	
1	12 (30)	18 (46)	30 (76)	10-20 (3-6)
2	15 (38)	24 (61)	36 (91)	20-35 (6-10.5)
3	18 (46)	30 (76)	42 (107)	35-60 (10.5-18)

* * The height referred to in this column is the distance from top of the sign to grade measured at the side of the sign that is nearest to the applicable runway, taxiway, or apron. In accordance with paragraph 13 this height should be reduced, if necessary, to provide the required 12-inch clearance between the top of the sign and the critical aircraft.

Table 3. Perpendicular Distances for Taxiway Intersection Markings from Centerline of Crossing Taxiway

Airplane design group ¹					
I	II	III	IV	V	VI
44.5 feet (13.5 m)	65.5 feet (20 m)	93 feet (28.5 m)	129.5 feet (39.5 m)	160 feet (48.5 m)	193 feet (59 m)

¹ See AC 150/5300-13, *Airport Design*

CHAPTER 2. RUNWAY DISTANCE REMAINING SIGNS

20. GENERAL. Runway distance remaining signs are used to provide distance remaining information to pilots during takeoff and landing operations.

21. DESCRIPTION. The signs are located along the side(s) of the runway, and the inscription consists of a white numeral on a black background, as shown in figure 22, to indicate the runway distance remaining in increments of 1,000 feet.

22. CONFIGURATION. The signs may be configured by either of three different methods, as illustrated in figure 23 and as described below. Displaced threshold areas which are used for takeoffs and/or rollout are treated as part of the runway for purposes of locating the signs. The method chosen should be based on cost considerations and adaptability to the specific airport configuration. When using the preferred method or alternate method #2 for runway lengths which are not an exact multiple of 1,000 feet, one-half of the excess distance is added to the distance of each sign on each runway end. For example, for a runway length of 6,500 feet, the excess distance is 500 feet and the location of the last sign on each runway end is 1,000 feet plus $1/2(500)$ or 1,250 feet. If a sign cannot be installed at its standard location, a tolerance of ± 50 feet is allowed for that sign. The sign should be omitted if it cannot be installed within this tolerance.

a. Preferred Method. The most economical installation consists of double-faced signs located only on one side of the runway. Where this method is used, the signs should be placed on the left side of the runway as viewed from the most often used direction. However, the signs may all be placed on the right side of the runway where necessary due to runway/taxiway separation distances or because of conflicts between intersecting runways or taxiways.

b. Alternate Method #1. This method uses single-faced signs installed on both sides of the runway. The advantage of this method is that the runway distance remaining can be

more accurately reflected in cases where the runway length is not an exact multiple of 1,000 feet.

c. Alternate Method #2. This method uses double-faced signs installed on both sides of the runway. The advantage of this method is that runway distance is displayed on both sides of the runway which is particularly advantageous when a sign on one side has to be omitted because of a clearance conflict.

23. OPERATION. The sign system should be designed so that they are illuminated at all times the runway edge lights are illuminated.

24. SIGN SELECTION. Signs should be in accordance with AC 150/5345-44, *Specification for Taxiway and Runway Signs* (current edition), type L-858B, size 4 (48-inch sign face with a 40-inch legend) or size 5 (30-inch sign face with a 25-inch legend). The signs should be of the same size on any particular runway. The choice of a size involves several factors such as effectiveness, aircraft clearance, jet blast, and snow removal operations. Normally, the larger the sign and the closer it is located to the runway or taxiway edge, the more effective it is. However, aircraft clearance requirements and jet blast effects require smaller signs when located near the pavement edges, whereas, effectiveness requires larger signs when located at further distances. Also, the effects of snow removal operations on the signs should be considered in the choice of sign size and location. The sign should provide 12 inches of clearance between the top of the sign and any part of the most critical aircraft using, or expected to use, the airport when the aircraft wheels are at the pavement edge.

25. INSTALLATION. The signs should be located with respect to the runway in accordance with table 4 and installed in accordance with paragraph 16.



Figure 22. Typical Runway Distance Remaining Sign



NOTES

1. EXAMPLES BASED ON A 6500 FOOT RUNWAY.
2. SIGNS LESS THAN 1000 FT. FROM TAKEOFF END, AS INDICATED BY ASTERISKS IN ALTERNATE METHOD #1, MAY BE OMITTED.

Figure 23. Runway Distance Remaining Sign Configurations

Table 4. Location Distances for Runway Distance Remaining Signs				
Sign size	Sign heights [in. (cm)]			Distance from defined pavement edge [ft. (m)]
	Legend	Face	Installed (max.) *	
4	40 (100)	48 (120)	60 (152)	50-75 (15-22.5)
5	25 (64)	30 (76)	42 (107)	20-35 (6-10.5)

* The height referred to in this column is the distance from top of the sign to grade measured at the side of the sign that is nearest to the applicable runway. In accordance with paragraph 13 this height should be reduced, if necessary, to provide the required 12-inch clearance between the top of the sign and the critical aircraft.

APPENDIX 1. AIRPORT SIGNING EXAMPLES

1. GENERAL. This appendix depicts examples of signs that would be installed on various airport configurations. To understand why some signs are included in this system while others are omitted, it is important to understand the functional layout of each of these airports. For this reason, we have provided a brief description of the airport with each example, as well as a brief rationale on why certain signs were installed or omitted. The intent of these examples is to illustrate that the types and locations of the signs included in an airfield sign system reflect a determination made by the airport operator in consultation with the users and the FAA.

2. EXAMPLE 1. Figure A-1 depicts a taxiway guidance sign system for a portion of a complex airport. The airport serves both domestic and international air carriers, as well as general aviation, and has an air traffic control tower. The apron area shown at the south of the figure is for air carriers with the international terminal being located on the eastern end of the apron. The two high speed exits (D and E) have centerline lights. All the other taxiways have edge lights. Taxiway G leads to fixed-base operator facilities. Taxiway H leads to corporate hangars and an air carrier maintenance hangar. The intersection of Taxiways C, G, and H, and Runway 9-27 represents a major crossing point for aircraft travelling between the north and south areas of the airport. It is also commonly used by general aviation aircraft for intersection departures. Taxiway holdline markings are shown on the taxiways where a pilot will normally be requested by air traffic control to hold because of traffic on an intersecting taxiway. With this background, let's review the signs included in this system:

- o Holding position signs along with taxiway location signs are installed on all taxiways that intersect the runway.
- o Taxiway B passes through the ILS critical area so an ILS holding position sign is also necessary on this taxiway since the critical area is not within the area protected by the standard runway holdline.
- o On Runway 9, exit signs are shown for Taxiways C, E, G, and H, since aircraft using this runway would normally use these taxiways as exits. On Runway 27, exit signs are shown for Taxiways B, C, D, G, and H, since aircraft using this runway would normally use these taxiways as exits. The exit signs for

Taxiways D and E are installed in accordance with the guidance provided in paragraph 7b(2) and 7b(3). It should also be noted that for the Runway Exits G and H, the G is placed first in the sign array in accordance with paragraph 12f which establishes the clockwise convention for direction signs within an array beginning from the taxiway or runway where the aircraft is located.

- o Taxiways D and E are both high speed exits that are equipped with centerline lights. Since these lights are color coded, runway safety area/OFZ boundary signs are not needed on these taxiways even though air traffic control commonly asks pilots to report when they are clear of the runway. Also, since an aircraft would not normally use these taxiways as an entrance to the runway, it is not necessary to install direction signs for them on Taxiway B.

- o Pilots of air carrier aircraft that use Taxiway C as an exit are commonly asked by air traffic control to report when they are clear of the runway. To assist the pilot in judging when he/she is clear of the runway, a runway safety area/OFZ boundary sign has been installed on the back of the hold position sign on Taxiway C.

- o Pilots exiting the runway on Taxiway B during instrument meteorological conditions are asked to report clear of the ILS critical area. An ILS critical area boundary sign is included on the back of the ILS holding position sign to identify the perimeter of the critical area, since this taxiway is not equipped with color coded centerline lights.

- o Taxiway direction signs are placed only at the intersections for the taxiways on which the pilot would normally turn. As an example, look at the intersection of Taxiways B, E, and F.

- o On Taxiway B, direction signs are provided only for Taxiway F, since an aircraft would not be expected to turn onto Taxiway E.

- o On Taxiway E, direction signs are provided for both Taxiways B and F, since an aircraft could be expected to turn onto any of these taxiways.

- o On Taxiway F, a direction sign is provided only for Taxiway B, since an aircraft would not normally proceed from Taxiway F onto Taxiway E.

Appendix 1

o Taxiway direction signs for Taxiways G and H have been provided on the north side of the runway to provide guidance to pilots crossing the runway from Taxiway C. Location signs have also been placed on the back of the holding position signs on these two taxiways so that the pilot can confirm what taxiway he/she has chosen. A direction sign has not been provided for Taxiway C since pilots crossing from Taxiways G and H have one choice. A location sign has been added to the back of the runway hold position sign to confirm to the pilot that he/she is on Taxiway C.

o Aircraft departing the apron on Taxiways C and F arrive at these taxiways from various directions depending upon their gate position. Some aircraft approach these taxiways by taxiing along the edge of the apron, while others approach these taxiways straight on. Direction signs have been placed on the edge of the apron for the former case while location signs have been installed on these taxiways for the latter case.

o In the past, the airport has had problems with international airline pilots getting lost as they taxied to the international terminal. For this reason, the air traffic control tower developed a preferred routing for these pilots. The airport operator has decided to install destination signs to indicate this preferred routing in addition to the taxiway direction signs. The location of three of these signs deserve further mention. The two destination signs that indicate the international terminal is straight ahead are located on the far side of the intersection on the right side of the taxiway. This is permissible in accordance with the signing conventions provided in paragraph 12c(5). The destination sign at the intersection of Taxiway B and D is located on the far side of the intersection even though it indicates a turn. This is permissible in accordance with the signing conventions provided in paragraph 12j since Taxiway D ends at this intersection, and taxiway direction signs are provided on Taxiway D prior to the intersection.

3. EXAMPLE 2. This example (see figure A-2) involves an airport with two intersecting runways. The main runway, 9-27, is 8,500 feet in length while the crosswind runway, 18-36, is 5,000 feet in length. The air carriers use only Runway 9-27, while the commuters and general aviation use both runways. The air carrier and commuter terminal is on the south side of the airport, while all the general aviation facilities are located on the north side. The airport has an air traffic control tower. When general aviation aircraft are landing on Runway 9, air traffic control will often ask

them to hold short of Runway 18-36 so that it can be used for a general aviation departure.

With this background, let's review the signs included in this system:

o Holding position signs along with taxiway location signs are installed on all taxiways that intersect the runways. Even though it is possible to cross the runway at the thresholds for Runway 27 and Runway 36, a sign with only one runway designation is installed at each of the hold positions located on these taxiways. Since air traffic does not use these taxiways to cross these runways, there is not an operational need to have two runway destinations on these signs. (See paragraph 5a).

o Holding position signs have been installed at the intersection of the two runways. Since Runway 9 is used for "land, hold short" operations, two signs are installed at its intersection with Runway 18-36.

o Exit signs are installed for the taxiways where aircraft normally exit. For Runway 9, exit signs have been installed at Taxiways D, F, G, and A. Since Taxiway F crosses this runway, it is necessary to install an exit sign on both the left and right side of the runway. For Runway 27, exit signs are installed on Taxiways A, B, C, and D. Exit signs are installed on Runways 18 and 36 at Taxiway A, as well as at the runway ends.

o Because of the straightforward layout of this airport, the airport operator in conjunction with the users and FAA determined that taxiway direction signs were only needed at two intersections. This airport's configuration requires the majority of the aircraft to taxi through or turn at the intersection of Taxiways A and F. For this reason, direction signs and the associated location sign were installed on each leg of this intersection. A direction sign was also installed on Taxiway E at its intersection with Taxiway A. Since the left side of Taxiway E is contiguous with the air carrier apron at this point, the sign is installed on the right side of Taxiway E.

o A location sign is installed on Taxiway A where it leaves the west side of the air carrier apron. A similar sign is not included on the east side, since the location sign installed with the runway holding position sign is sufficient to provide the location information to the pilot. A location sign is installed on Taxiway E where it leaves the air carrier apron. Location signs have also been installed on Taxiways F and G where they leave the general aviation apron.

- o It was determined that there was no need to install runway safety area/OFZ boundary signs on this airport.

4. EXAMPLE 3. This example (see figure A-3) involves an airport with a single runway and parallel taxiway. The runway is 4,500 feet in length. The airport does not have an air traffic control tower. The apron serves both general aviation and the scheduled commuter.

With this background, let's review the signs included in this system:

- o Holding position signs along with taxiway location signs are installed on all taxiways that intersect the runway.

- o Exit signs have been installed for both runway directions at Taxiways B and D, as well as at the end of each runway for Taxiway A.

- o Direction signs for Taxiway A have been installed at the intersections of Taxiways B, C, and D. Direction signs for Taxiway C have also been installed on Taxiway A. (Note: Since this airport does not have a control tower, an analysis could have concluded that it was advantageous to install destination signs in lieu of direction signs.) Location signs have not been

installed as part of the direction sign arrays, since, in the case of Taxiways B and D, location signs were installed on the back of the runway holding position array. For the intersection of Taxiways A and C, it was determined by the airport operator in conjunction with the users and the FAA that location signs were not needed since this location should be obvious to the pilot. This determination was based upon the relatively simple configuration of this airport and the fact that there is only one parallel taxiway and one apron with a single taxiway providing access to it.

- o Location signs have been placed along Taxiway A for aircraft taxiing from the runway ends towards the terminal.

- o An outbound destination sign for the runway ends has also been placed at the intersection of Taxiways A and C. Since this is a "T" intersection and direction signs are provided prior to the intersection, it is permissible to install this sign on the far side of the intersection (see paragraph 12j). The face of this sign merits further discussion. The runway numbers are separated by a vertical border rather than a dash since this is a destination sign. In this case, each runway designation and its associated arrow is considered to be a separate panel and, therefore, separated by a vertical border (see paragraph 12l).

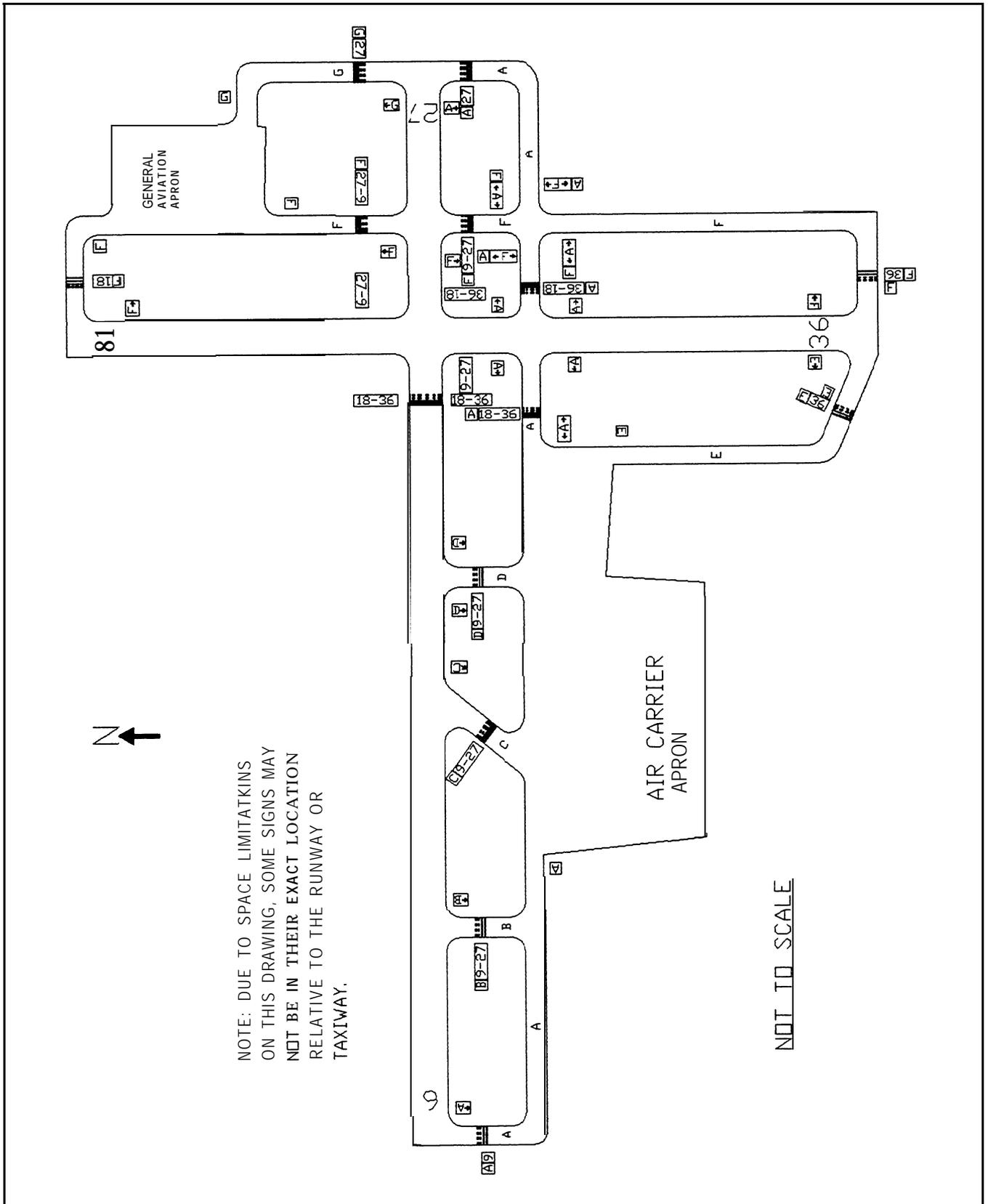


Figure A-2. Signing Example for Airport with Two Intersecting Runways

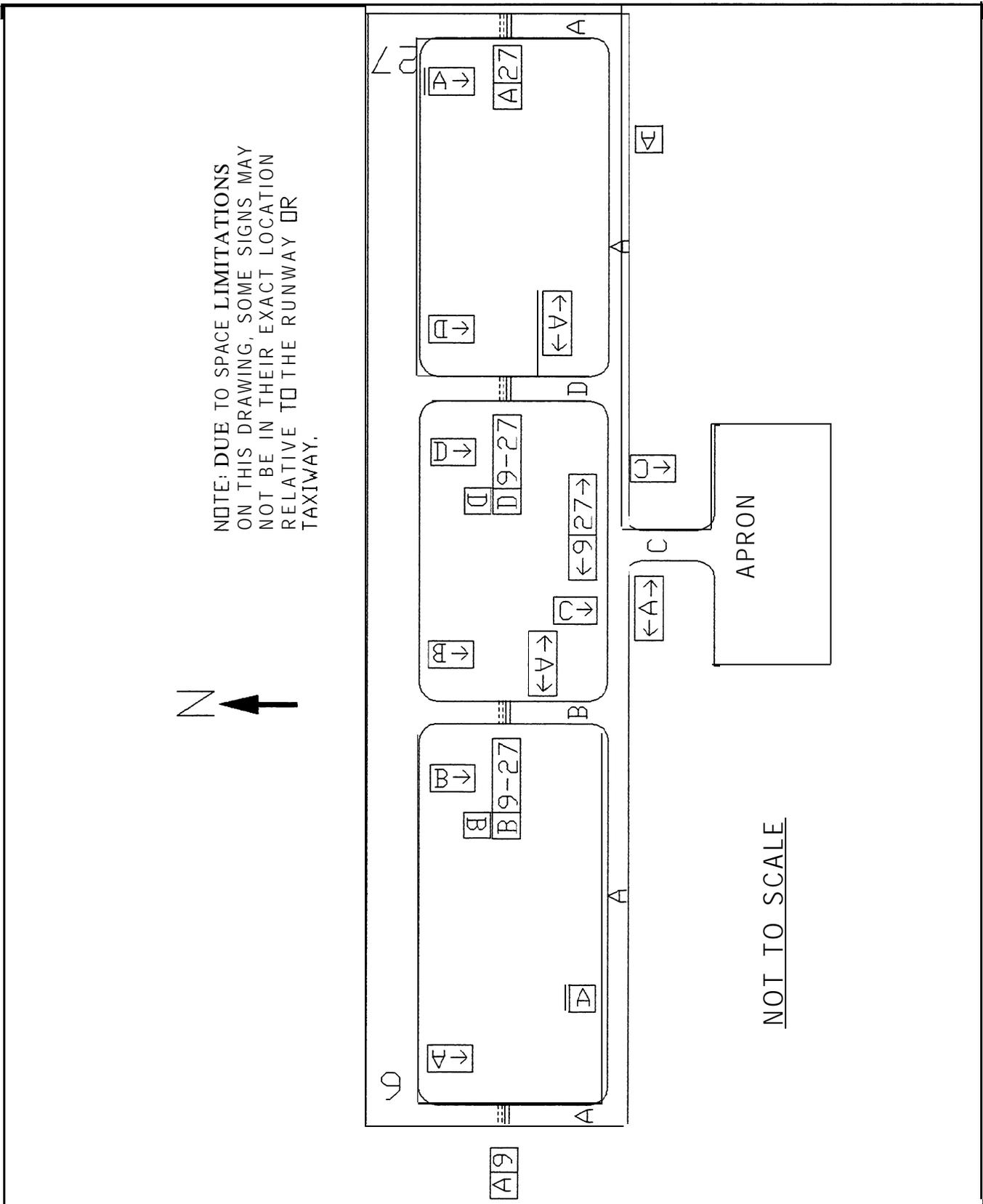


Figure A-3. Signing Example for an Airport with a Single Runway

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