M-494.6

AC 150/5340-18A

DATE 6/2/80

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Washington, D.C.

Subject: TAXIWAY GUIDANCE SIGN SYSTEM

1. PURPOSE. This advisory circular describes the recommended standards for design and installation of a taxiway guidance sign system.

2. CANCELLATION. AC 150/5340-18, Taxiway Guidance Sign System, dated 9/27/68, is canceled.

3. PRINCIPAL CHANGES. Installation criteria and figures have been changed to include data for installation of three sizes of taxiway guidance signs.

4. METRIC UNITS. To promote an orderly transition to metric units, the advisory circular includes both English and metric dimensions. The metric conversions may not be exact equivalents, and until an official changeover to metric units is effected, the English dimensions will govern.

5. TAXIWAY GUIDANCE SIGNS. Taxiway guidance signs are installed on an airport to aid pilots of aircraft to destinations, to identify aircraft holding position markings, and for safety of ground operations. The extent of guidance and control provided will depend upon the complexity of the airport layout, volume of traffic, and visibility. Airports with complex layouts require more precise taxiing guidance as pilots are presented with more decisions in determining an appropriate destination route. As traffic increases, use of signs simplifies and reduces the extent of information needed to be transmitted by radio. Traffic volume alone may be justification for signs to promote safe taxiing. Irrespective of the complexity of the airport layout or extent of the traffic volume, signs are required at holding position markings for runways and all critical areas. Typical taxiway guidance sign locations and installation details are shown in appendix 1, figures 1 through 5.

Initiated by: AAS-200

6. SIGN SELECTION CONSIDERATIONS. The following sign parameters should be considered when making sign selections. Signs are available with either a single or a double face to satisfy operational requirements.

a. Type. Taxiway guidance signs are available in three types. Type 1 is an illuminated, reflective sign with a white legend on a red background and is used to denote holding positions. When installed for unlighted runways, an unlighted sign may be used. Type 2 is an illuminated sign with a black legend on a reflective yellow background and is used to indicate a specific location or destination on an aircraft movement area or to denote other useful information. Type 3 signs are unilluminated type 2 signs and may be adequate for aircraft pilot guidance on airports without operations during conditions of poor visibility.

b. Size. Taxiway guidance signs are available in three sizes. Size 1 has an 18-inch (45 cm) high legend on a 30-inch (76 cm) high sign face. Size 2 has a 15-inch (38 cm) high legend on a 24-inch (60 cm) high sign face. Size 3 has a 12-inch (30 cm) high legend on an 18-inch (45 cm) high sign face. The selection of the sign size depends on several factors. Normally, the effectiveness of the sign will depend on its size and closeness to the observer. However, signs placed close to aircraft operational surfaces are more likely to suffer from jet blast and must be sized to provide adequate clearance between the sign and any part of an aircraft that overhangs when the aircraft wheels are at the pavement edge. Space limitations, caused by the proximity of another paved aircraft operational surface, may also affect size selection.

c. Style. Illuminated signs are available in two styles. Style 1 is for use with a 120-volt ac power source. Style 2 is for use with a 4.8- to 6.6-ampere series circuit power source.

d. Class. Illuminated signs are available in two classes. Class 1 is for installations where the ambient temperature is not expected to go below -20°C. Class 2 is for installations in locations where lower than -20°C ambient temperatures are expected.

7. SIGN APPLICATIONS.

a. Destination Signs. Figure 1 of appendix 1 illustrates both inbound and outbound taxiing route marking with signs.

(1) Outbound Destination Signs. Signs can be used to mark outbound taxiing routes from their beginning to termination. Outbound routes usually begin at the entrance of a taxiway from an apron area. Their termination will be at the takeoff point of the appropriate runway. Outbound destination signs may show more than one runway destination number if the direction of travel on a taxiing route to them is the same. In such cases, separate any pair of runway destination numbers by a circular dot.

(2) Inbound Destination Signs. Inbound routes usually begin at the entrance to a taxiway from a runway. Inbound traffic routes, at the beginning, are marked with destination signs that give direction to only general destination areas on an airport. Destination signs giving directions to specific areas are provided at appropriate intersections along the inbound traffic route and closer to the general destination area. Typically, signs installed at the entrance to a taxiway from a runway show "RAMP," "E RAMP," "MIL," etc. (See paragraph 9a). Destination signs are installed at other locations along the inbound traffic routes and in the vicinity of the general destination area with symbols which show the direction to specific areas such as "GATE 3," "VSTR," etc. This information is provided as a general guide and may be varied where necessitated by local conditions due to variations in airport layout and ground traffic conditions.

b. Intersection Signs. Intersection signs with appropriate numbers or letters are provided at the intersections of taxiways or at an intersection of a taxiway with a runway or critical area. (See appendix 1, figures 1(d), 1(e), and 2.)

(1) Holding Position Signs. Signs are used to identify holding position markings on taxiways entering runways or critical areas. The assigned numbers and letters on a holding position sign for a taxiway intersecting a runway are separated by a dash such as "33-15." The arrangement of the runway numbers on the sign indicates the direction to the corresponding runway threshold. For example, "33-15" indicates to the pilot that the "33" runway threshold is to the left and the "15" runway threshold is to the right. The holding position sign for a taxiway intersecting the runway at its threshold would contain only that runway number, such as "33." For holding position signs on taxiways that intersect (but do not cross) a runway within 1500 feet (450 m) of the runway threshold or 1/4 of the length of the runway, whichever distance is less, the sign legend may contain only that runway number, such as "33." The holding position sign for an instrument landing system (ILS) critical area contains the letters "ILS."

(2) Taxiway Intersection Signs. Letters are used to identify taxiways as shown in appendix 1, figure 1(e). The same letters are used to identify an entire taxiway even though it is composed of short sections caused by intersections of other taxiways or runways as shown in appendix 1, figure 1(f). Double letters such as "AA" are used to identify taxiways where an airport has a larger number of taxiways to identify than there are useable single letters available.

8. SIGN LOCATIONS.

a. Taxiway Intersection Signs. A taxiway intersection sign should preferably be located at the left side of the taxiway prior to the intersection.

b. Holding Position Signs. Signs are installed preferably at the left side of the taxiway and in line with the hold line marking. Where the hold line marking exceeds 150 feet (45 m) in length, a sign should be located at both sides of the taxiway in line with the hold line marking. Holding position signs should face the direction of approach to the hold line. (See AC 150/5340-1, Marking of Paved Areas on Airports, current edition, for locations of hold line marking and typical holding position sign applications.)

c. Destination Signs. A sign indicating a destination should be located on the same side of a taxiway (left or right) as the direction to the location indicates. If the destination is straight ahead, the preferred sign location is the left side of the taxiway. At an intersection, a destination sign should preferably be located so that it can be seen prior to entering the intersection. At intersections or junctions where the possibility of alternate routes to a particular destination exists, the destination sign shall indicate only one route to follow. (See appendix 1, figure 1(c), for placement of signs.)

9. SYSTEM DESIGN. Prior to designing a taxiway guidance sign system, a thorough study should be made of the taxiway layout, and the proposed sign locations should be coordinated with local traffic controllers and the operational groups using the airport. The airport paving and drainage personnel should also be consulted to aid in determining the number, size, and location of ducts or conduits for cable runs under paved areas.

a. Sign Face Symbols. Use arrows, letters, assigned runway numerals, or letter abbreviations to identify intended instructions. Appendix 1, figure 1(b), illustrates typical applications. Use the following abbreviations:

(1) General parking, servicing, and loading areas - RAMP or RMP

(2) Areas specifically set aside for aircraft parking - PARK

(3) Areas where aircraft are fueled or serviced - FUEL

(4) Gate position at which aircraft are loaded or unloaded - GATE

(5) Areas set aside for itinerant aircraft - VSTR

(6) Areas set aside for military aircraft - MIL

(7) Areas set aside for freight and cargo handling - CRGO

(8) Areas set aside for handling international flights - INTL

(9) Hangar or hangar area - HGR

(10) ILS critical area - ILS

NOTE: Add a prefix or suffix letter or numeral to a sign; e.g., "N RAMP" (for north ramp), "GATE 2," etc., to distinguish between similar destinations at different geographical locations on an airport. Leave a space between a prefix or suffix letter or numeral added to a sign.

b. Power Requirements. Normally, in designing a taxiway guidance sign system, the signs are considered a part of either a series taxiway edge lighting system or a taxiway centerline lighting system. The signs are connected into the series circuit by means of an isolation transformer or an adapter unit supplied with the sign. When a taxiway guidance sign system is planned for installation, independent of other lighting circuits, AC 150/5340-24, Runway and Taxiway Edge Lighting System, current edition, may be used for system reference and material needs. When signs are to be connected to 120/240-volt circuits, size electrical cable to provide the sign's voltage requirement within the manufacturer's tolerance. If a tolerance is not given, provide cable of such a size as to limit the voltage drop at the sign to 5 percent maximum.

10. EQUIPMENT AND MATERIALS. The following listed materials and equipment represent most of the items required for installations of taxiway guidance sign systems. Where Items L-108, L-110, and P-610 are mentioned in succeeding paragraphs, they refer to the lighting installation specifications of AC 150/5370-10, Standards for Specifying Construction of Airports, current edition. AC 150/5370-10 is sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

a. Taxiway Sign Fixtures. Taxiway signs which conform to the requirements of AC 150/5345-44, Specification for L-858, Taxiway Guidance Signs, current edition, are to be used. Each lighted sign is furnished complete with a lamp or lamps, connecting leads, panels, any required ballasts or adapter units, and mounting assemblies ready to connect into a series circuit or to a 120/240-volt circuit, as appropriate. Unlighted signs are furnished with mounting hardware.

b. Cables. Any primary power cables used are to conform with the requirements of AC 150/5345-7, Specification for L-824, Underground Electrical Cable for Airport Lighting Circuits, current edition, and be specified by type, AWG size, and voltage as required for the circuit.

c. Counterpoise Wire. If a counterpoise is installed use bare copper wire conforming to the requirements of Item L-108, paragraphs 108-2.3 and 108-3.9.

d. Isolation Transformers. Isolation transformers conforming to the requirements of AC 150/5345-47, Isolation Transformers for Airport Lighting Systems, current edition, are to be used when required for connecting into a series circuit.

e. Transformer Bases. L-857 bases conforming to the requirements of AC 150/5345-42, FAA Specification L-857, Airport Light Bases, Transformer Housings, and Junction Boxes, current edition, are installed at each sign for housing isolation transformers or adapter units and for making connections with the primary power cable(s). (See appendix 1, figure 4, for typical installation details.)

f. Cable Connectors. For series circuits, L-823 primary cable connectors conforming to the requirements of AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors, current edition, are used. For multiple circuits, cable connections are made in accordance with Item L-108, paragraph 108-2.4.

g. Concrete. The concrete for a sign foundation or slab mounting is proportioned, placed, and cured in accordance with Item P-610, Structural Portland Cement Concrete.

h. Stakes. Runway edge light fixture stakes may be used to mount signs. The breakable couplings supplied with the sign can be screwed into the stake flange or coupling. A holding cup or device is provided on these stakes to accommodate and hold the rubber receptacle (figure 1c of AC 150/5345-26) of the secondary transformer lead in a positive position near the disconnect point. (See appendix 1, figure 5.) This mounting is especially suited for use in circuits utilizing direct burial cable.

11. INSTALLATION. A taxiway guidance sign system may consist of type 1 and type 2 signs and/or type 3 signs. Type 1 and type 2 signs are generally powered from taxiway lighting circuits. The following guidance is given for sign installation.

a. Sign Installation Criteria.

(1) Location of Signs.

(i) Size 1 - 35 to 60 feet (10.5 to 18 m) from the defined pavement edge.

(ii) Size 2 - 20 to 35 feet (6 to 10.5 m) from the defined pavement edge.

(iii) Size 3 - 10 to 20 feet (3 to 6 m) from the defined pavement edge.

(iv) Taxiway "Entrance-Exit." Taxiway guidance signs are installed at an intersection of a taxiway with a runway to clearly define the throat or entrance into the intersecting taxiing route. (See appendix 1, figures 2(b), 2(c), and 2(d) for details.) Where only a short taxiway system exists, two taxiway lights, spaced 5 feet (1.5 m) apart on a line perpendicular to the runway centerline may be installed in lieu of a sign. (See figure 25 of AC 150/5340-24 for details.)

(v) Other Locations. At all taxiway intersections with another taxiway or with an apron (ramp), signs are located opposite the point of tangency of paving fillets. (See appendix 1, figure 2(b).) At intersections of taxiways with runways, the signs are located as shown in appendix 1, figure 1(d). Signs are installed on an extension of one or both ends of hold lines. (See AC 150/5340-1 for hold line details.) The location of the signs from the edge of the pavement or surface is as described in paragraph 11a(1).

(2) Orientation of Signs. Signs are usually installed so that the face of the sign is approximately 90 degrees to the direction of the taxiing path from which it is viewed. It may be necessary to alter this orientation for signs identifying an ILS critical area. Locations of these signs should be coordinated with the local FAA Airway Facilities personnel, and installation should be scheduled in conjunction with the periodic ILS flight checks to ensure that the signs do not cause interference with the ILS electronic signal. If interference exists, orient the face of the sign away from the ILS antenna direction as much as possible without destroying the viewing angle of the sign. If this does not eliminate the interference, a nonmetallic sign face may be required.

(3) Height of Signs. Signs are to be installed so that the overall height above the surrounding ground of the sign assembly, including mounting supports and any lighting fixture, does not exceed 42 inches (107 cm) for size 1 signs, 36 inches (91 cm) for size 2 signs, and 30 inches (76 cm) for size 3 signs. Clearance conditions for aircraft are discussed in paragraph 11a.

b. Installation Procedures. Following are recommended installation procedures for taxiway guidance signs.

(1) Concrete Foundation. A concrete pad or footing(s) may be installed to mount the signs on. Concrete pads, as a minimum, should be 2 feet (0.6 m) wide by 4 inches (10 cm) thick and of a length extending 1 foot (0.3 m) beyond the end of the support(s). Reinforce to meet load requirements and/or crack control. Slope the surface of the concrete at 1/2-inch per foot (4 cm per meter). Finish the exposed surface of the concrete to a smooth finish. Install a minimum of one L-857 transformer housing in or at each concrete foundation for illuminated signs. Where

required, place anchor bolts in the concrete pad or footing for additional flange supports. If the sign is to be mounted on an L-857 housing, adjust and firmly hold it in place during construction of the concrete pad or foundation so that the upper surface of the housing flange will be maintained level within ± 2 degrees and not more than 3/8 inch (1 cm) above the concrete surface. All other bearing surfaces for additional flange supports should be kept in the same horizontal plane as the L-857 housing flange. (See appendix 1, figures 3 and 4, for typical concrete pad installations.)

(2) Stake Mounting. The sign may be mounted on metal stakes as specified for the L-862 edge lights. Install stakes in 6-inch (15 cm) diameter holes of a depth of 30 inches (76 cm). Do not install the stakes by driving. Make electrical connections as necessary and backfill around the stake with thoroughly compacted earth passing a 1-inch (2.5 cm) sieve. Where required due to unstable soil conditions, backfill with concrete. Install the top of the stake even with, or not more than 1/2 inch (1.3 cm) above the finished grade and maintain within 3 degrees of the vertical. (See appendix 1, figure 3, for a typical stake installation.) If signs are supplied with underground mounting hardware, follow manufacturer's installation instructions.

(3) Cable and Connections. All cable for direct earth burial or to be run in duct shall be installed according to Item 108 or Item 110 of AC 150/5370-10 as appropriate. Figure 5 of appendix 1 illustrates typical sign connections.

(i) Series Circuit. Install field-attached L-823 cable connectors on the supply cables to make connection with the isolation transformer or adapter unit.

(ii) 120/240-Volt Multiple Circuits. Connect the pigtail splicing leads, supplied with the sign, to the power supply leads with compression connectors and apply insulation compatible with the cable to form a waterproof connection. (See Item L-108 of AC 150/5370-10.)

(4) Installing Signs. Assemble signs in accordance with the manufacturer's instructions. Install a lamp or lamps of proper type and rating. Set up the sign within the height limitations of paragraph 11a(3). Connect the sign to the power supply leads as outlined in paragraph 11b(3).

12. INSPECTION.

a. Inspect each sign to determine that it is installed plumb at the proper height, level, and properly oriented.

b. Check each lighted sign to determine that the proper lamp(s) is installed.

c. Inspect all cables, wiring, splices, ducts, and duct markers to assure that the installation is in accordance with AC 150/5370-10. Inspect underground installations before the backfilling is completed.

13. TESTING.

a. Check and test all electrical circuits to assure the following:

(1) All circuits are properly connected, continuous, and free of short-circuits and unspecified grounds.

(2) Resistance to ground of all ungrounded conductors using 5000-volt cable is not less than 50 megohms or not less than 10 megohms for conductors of 600-volt cable.

b. Check signs connected into series lighting circuits as follows:

(1) Test the sign installation sufficiently to determine that the signs illuminate when the series circuit to which they are connected is energized at its lowest brightness intensity setting.

(2) Check to see that the signs are at full brightness illuminated at the 4.8- and 6.6-ampere brightness steps of the lighting circuit.

c. Check all signs connected to multiple 120/240-volt circuits for proper voltage and operation when the circuits are energized.

William V. Vitale

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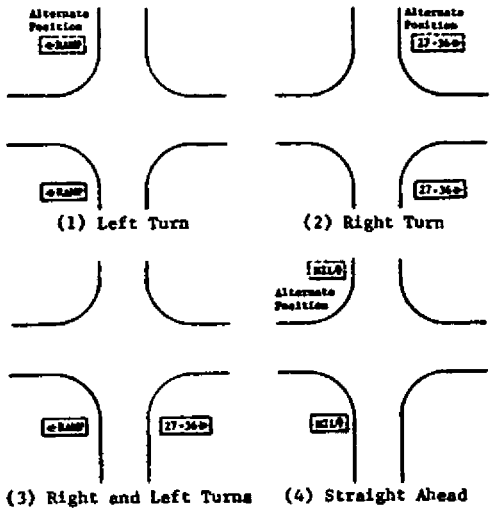
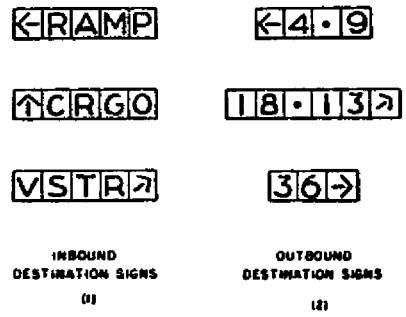
Director, Office of Airport Standards

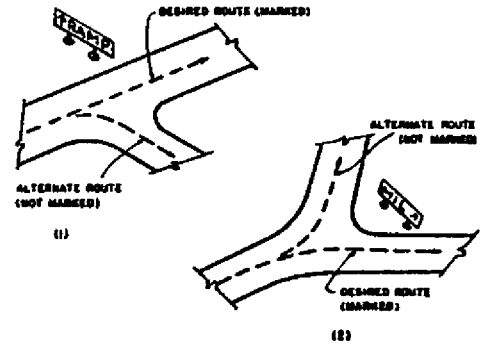
Appendix 1. Illustrations.



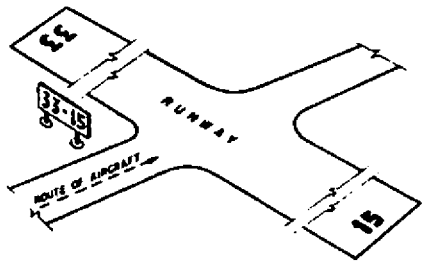
(a) DESTINATION SIGN PLACEMENT CRITERIA



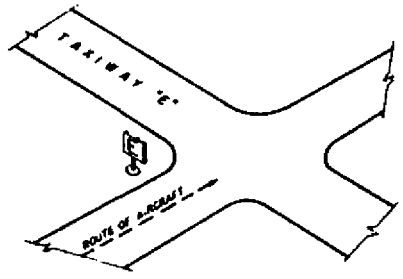
(b) TYPICAL DESTINATION SIGNS



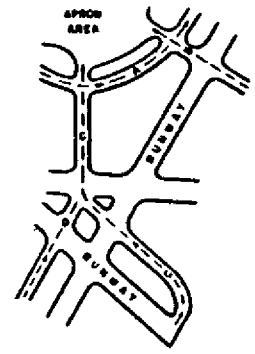
(c) ALTERNATE ROUTES



(d) TYPICAL RUNWAY INTERSECTION SIGN

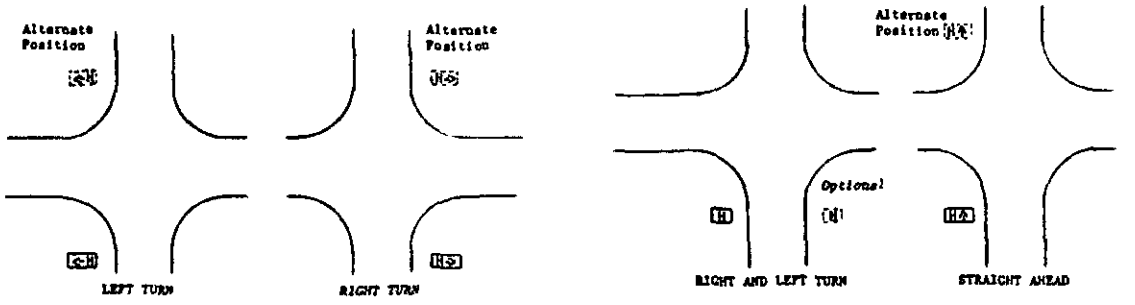


(e) TYPICAL TAXIWAY INTERSECTION SIGN

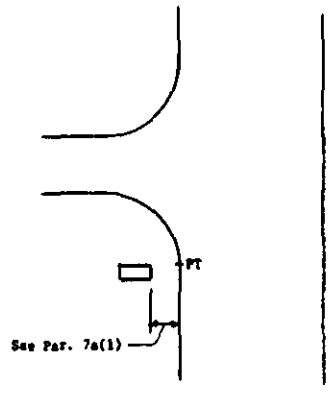


(f) ASSIGNMENT OF LETTERS TO TAXIWAYS

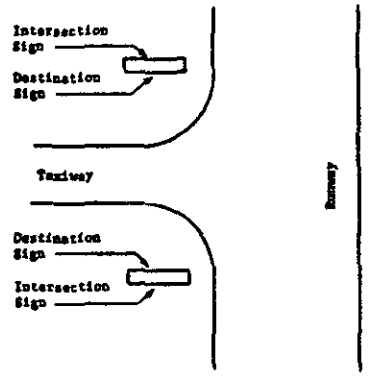
Figure 1. Typical taxi sign applications.



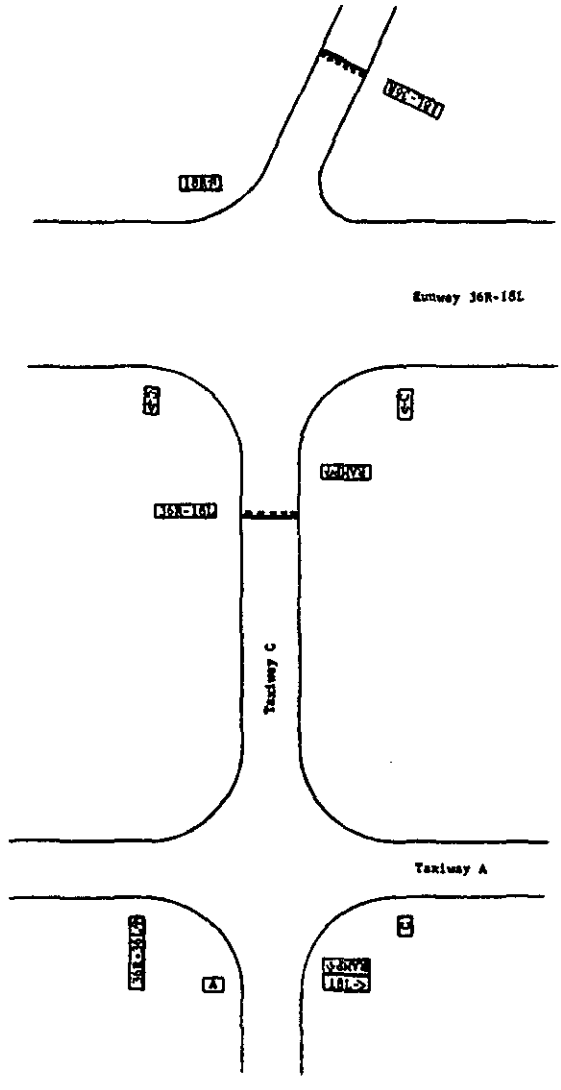
(a) Intersection Sign Placement



(b) Intersection Sign Location

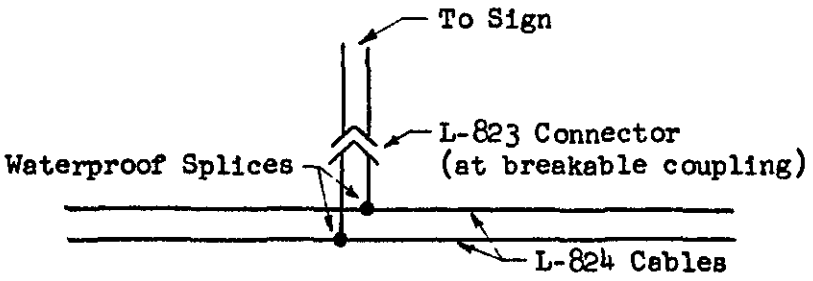


(c) Runway Exit - Taxiway Entrance

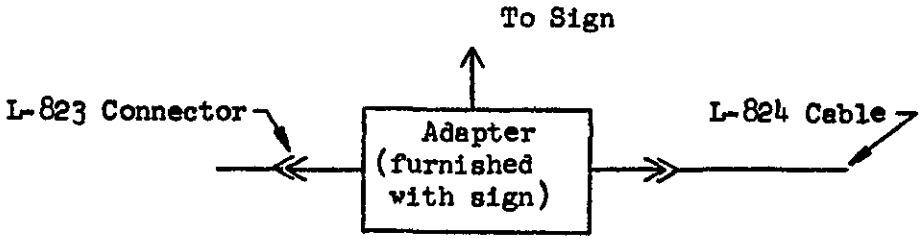


(d) Typical Taxi Sign Applications

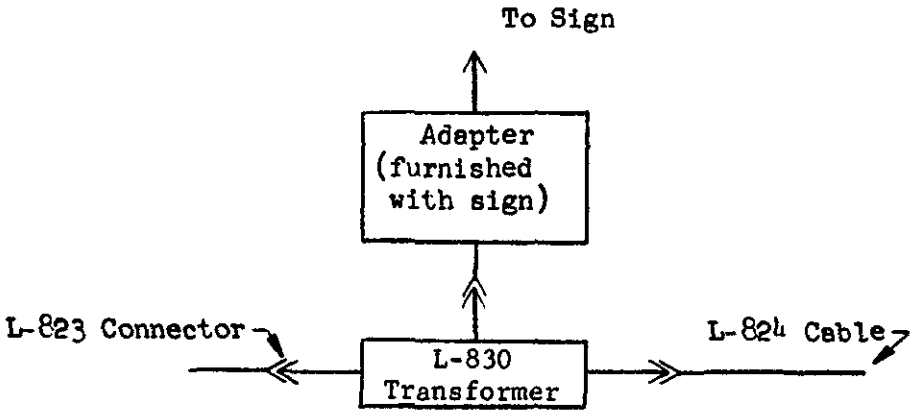
Figure 2. Additional sign applications.



SIGN CONNECTIONS INTO A PARALLEL CIRCUIT.



When adapter can be connected in directly



When adapter requires an isolation transformer

SIGN CONNECTIONS INTO SERIES CIRCUITS

Figure 5. Typical sign connections.

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