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Standard Practice for Visual Signals Between Persons on the Ground and in Aircraft During Ground Emergencies[1]

This standard is issued under the fixed designation F1591; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the signals to be used between persons on the ground and in aircraft when two-way voice communications cannot be established during ground emergencies. Ground signals are limited to land-based ones that do not require special equipment. Flare, light, panel, and maritime signals are specifically excluded.

1.2 The signals are divided into two categories: those used by persons on the ground and those used by aircraft.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Document

2.1 *International Civil Aviation Organization Standard:*
International Standards and Recommended Practices, Search and Rescue, Annex 12 to the Convention on International Civil Aviation[2]

3. Significance and Use

3.1 While many of the reasons for needing the signals contained in this practice have been overcome by technology development, situations still arise where voice communications cannot be established between aircraft and persons on the ground during emergencies. This is particularly true of persons in distress, who typically have no communications equipment. These signals continue to meet the need for communications.

3.2 Most of these signals have been adopted by international convention, the others by civilian and military agencies of the United States Government. The signals described in this practice are intended for use on land and can be made without special equipment such as flares or colored panels. Other signaling systems are described in the *National Search and Rescue (SAR) Manual.*[3]

3.3 The signals are also useful in situations where either complete or partial voice communications exist. Where only partial capabilities exist, for example, a ground unit with receive-only capability, the aircrew can transmit voice and the ground crew can respond with the appropriate signal.

3.3.1 The signals described in Section 4, by their nature, are not intended for real-time communications with aircraft. They can be left unattended as messages for aircrews. Persons on the ground (SAR or otherwise) can make a signal and continue on without contact with the aircraft. The SAR personnel should keep this in mind when encountering the signals of Fig. 1.

3.4 Search and rescue agencies utilizing this practice should disseminate these signals to the public as part of their preventative search and rescue (PSAR) efforts. The signals have changed over the years and a number of publications contain obsolete signals.

4. Ground-to-Air Signals

4.1 Signals for use by either SAR personnel or persons in distress on the ground are shown in Fig. 1.

4.1.1 The signals in Fig. 1 have been adopted by the Convention on International Civil Aviation. As defined in Annex 12 to the Convention (see 2.1), these signals are divided into those for use by SAR personnel and those for use by persons in distress. Several of the signals have only been adopted by certain countries.

4.1.2 Since the signals are useful regardless of the user's situation or location, this practice includes all of them without limitation. While there may be potential for this to cause confusion for aircrews seeing the signals, this would be a temporary condition and the aircrew's response should not be dependent on the user's status. The benefits of unlimited use of the signals outweighs any confusion caused by their use contrary to the Convention.

[1] This practice is under the jurisdiction of ASTM Committee F32 on Search and Rescue and is the direct responsibility of Subcommittee F32.02 on Management and Operations.

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[2] Available from the International Civil Aviation Organization; Document Sales Unit; 1000 Sherbrooke St. West, Suite 400; Montreal, Quebec, Canada H3A 2R2.

[3] *National Search and Rescue (SAR) Manual*, Vol I, Joint Publication 3-50, Feb. 1, 1991. Available from United States Coast Guard; Washington, DC 20953-0001.

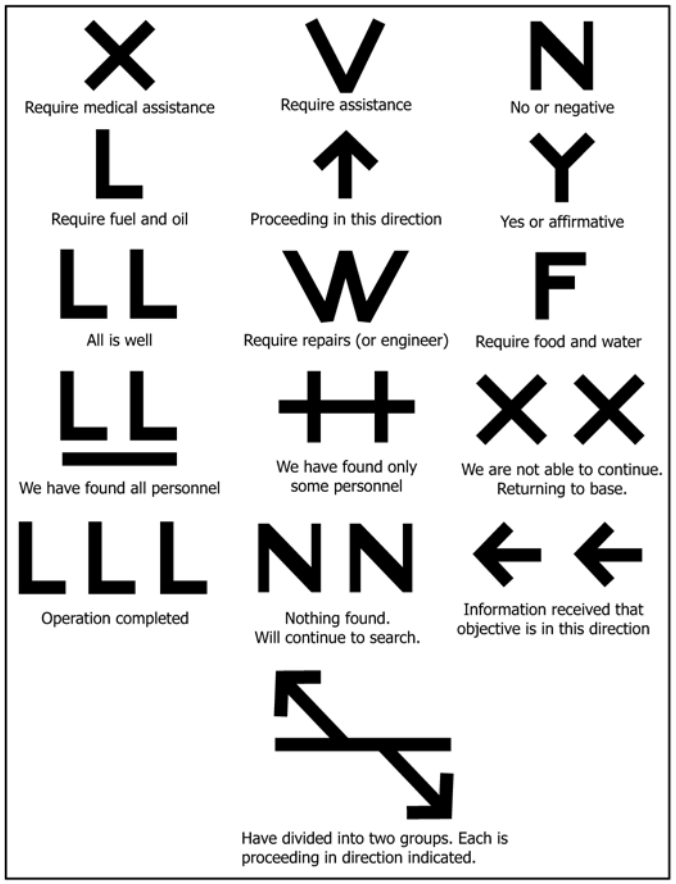

FIG. 1 Ground-to-Air Signals

4.2 The signals in Fig. 1 shall have the meanings indicated. They shall be used only for the purpose indicated and no other signals likely to be confused with them shall be used.

4.3 All signals shall be as large as possible in the proportions shown in Fig. 2.

4.4 The signals shall be made in a manner that contrasts with the surface on which they are placed. Brush, vegetation, rocks, stones, or surface material can be piled up; trenches dug; soft material stomped down; brush or grass cut down; strips of material laid out; etc. Materials can be combined, such as stomping out the signal in snow, then filling it in with brush. The signals should have sufficient height or depth so that shadows will be cast in the shape of the signal to add contrast.

4.5 The signals shall be placed in the open away from the obstacles that could block the signals from the view of overflying aircraft or that could create shadows on the signals.

4.6 Fires, flares, smoke, mirror flashes, or lights may be used with the signals to attract attention. Attraction should be attempted only if aircraft are known to be in the area, however.

4.7 Once a signal has served its intended purpose, it shall be destroyed if at all possible, to prevent confusion and additional search effort later.

5. Ground-to-Air Body Signals

5.1 The signals of Fig. 1 are "messages," in that they take considerable time to prepare, and so are not suitable for direct communications when an aircraft is overhead. For real-time or spontaneous communications, the body signals of Fig. 3 shall be used.

5.1.1 The signals in Fig. 3 shall have the meanings indicated. They shall be used only for the purpose indicated and no other signals likely to be confused with them shall be used.

5.1.2 The person making the signal shall be in the open and as conspicuous as possible. Clothing worn should contrast with the background. Attraction techniques such as flares, signal mirrors, and smoke can be used to draw the aircrew's attention. These devices should not be used once contact has been made, to prevent the signal from being obscured or interfering with the aircrew's vision.

5.1.3 The signals in Fig. 3 are recognized by United States civil and military authorities but are not part of the International Convention. Therefore, their meanings may not be recognized outside the United States.

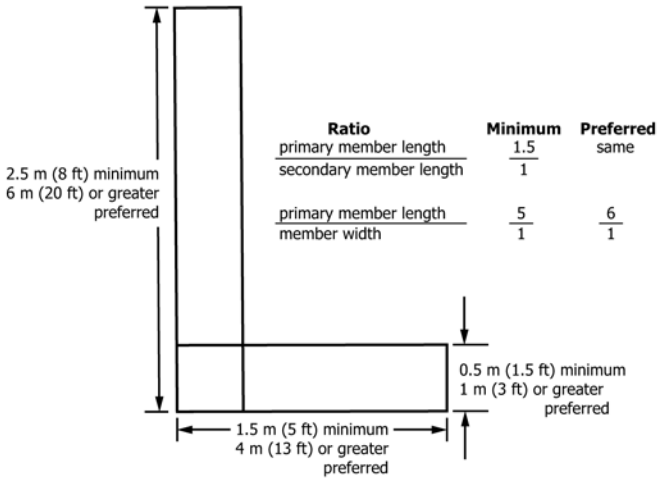

FIG. 2 Minimum Signal Dimensions and Proportions

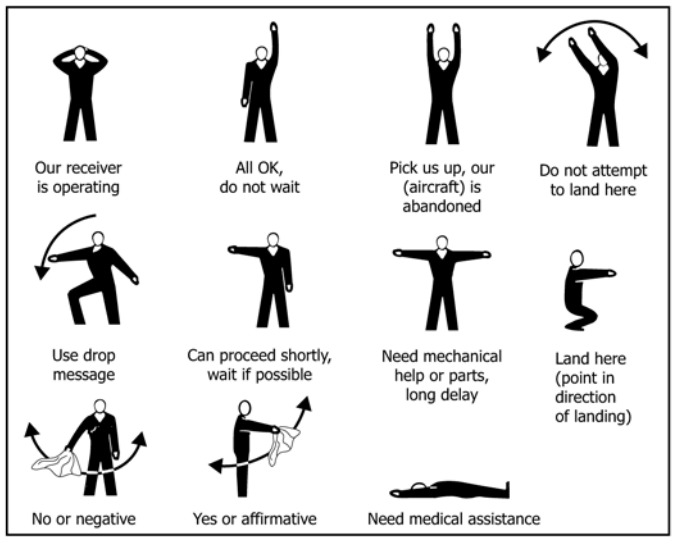

FIG. 3 Ground-to-Air Body Signals

6. Air-to-Ground Signals for Responding to Specific Ground Signals

6.1 The following shall indicate that the aircrew has understood the ground signals of Fig. 1 or Fig. 3:

6.1.1 During daylight, by rocking the wings (rolling the aircraft) as shown in Fig. 4(*a*).

6.1.2 During darkness, by flashing the landing lights or the navigation lights, or both, on and off.

6.1.3 The U.S. military aircraft may flash a green light to acknowledge the ground signal. This is not internationally recognized or typically used by civilian aircrews so is presented here for coordination and reference only. This signal shall not be considered part of this practice.

6.2 Any of the following shall indicate the aircrew has not understood the ground signal:

6.2.1 No response in accordance with 6.1.1., 6.1.2, or 6.1.3.

6.2.2 A complete right-hand circle of the aircraft as shown in Fig. 4(*b*).

6.2.2.1 This positive response by the aircraft is an acknowledgment that the signal has at least been seen, and is recommended over not responding. A lack of aircraft response does not indicate to the persons on the ground whether the aircrew missed the signal or did not understand it. This signal is recognized by U.S. civil and military authorities but is not part of the International Convention. Therefore, its meaning may not be recognized outside the United States.

6.2.3 The U.S. military aircraft may flash a red light to indicate that the ground signal has not been understood. This is not internationally recognized or typically used by civilian aircrews so is presented here for coordination and reference only. This signal shall not be considered part of this practice.

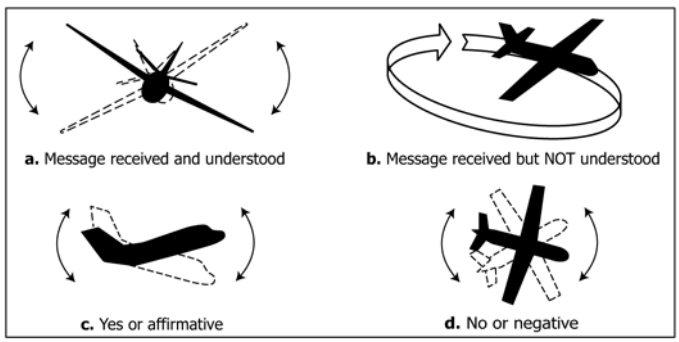

FIG. 4 Air-to-Ground Signals

6.3 An affirmative reply to a ground signal shall be indicated by raising and lowering the nose of the aircraft (pitching) as shown in Fig. 4(*c*).

6.4 A negative reply to a ground signal shall be indicated by moving the nose of the aircraft right and left (yawing) as shown in Fig. 4(*d*).

6.5 The signals of 6.3 and 6.4 are recognized by U.S. civilian and military authorities but are not part of the international convention. Therefore, their use may not be recognized outside of the United States.

7. Air-to-Ground Signals for Directing Persons on the Ground

7.1 The following signal, in the sequence listed, shall indicate the persons on the ground are to follow the aircraft or, if already moving, to proceed in a different direction:

7.1.1 Circling the ground personnel at least once, and

7.1.2 Flying off in the direction to be taken.

7.2 To stop a moving ground party, or to initially get its attention, the following signal shall be used:

7.2.1 Crossing ahead of the ground personnel at low altitude, and

7.2.2 While making this low pass, also rocking the wings (rolling the aircraft), or opening and closing the throttle, or changing the propeller pitch, or some combination thereof.

7.3 To indicate that the aircraft is no longer able to assist the persons on the ground, or to cancel the response of ground SAR personnel, the following signal shall be used:

7.3.1 Crossing behind the ground personnel at low altitude, and

7.3.2 While making this low pass, also rocking the wings (rolling the aircraft), or opening and closing the throttle, or changing the propeller pitch, or some combination thereof.

7.4 The signals of 7.1, 7.2, and 7.3 may be repeated until the ground parties comply.

8. Keywords

8.1 aircraft; communications; distress; emergencies; ground; search; signals; visual