THE IDENTIFICATION OF MEDICAL AIRCRAFT IN PERIODS OF ARMED CONFLICT

by P. Eberlin

Introduction

Since the end of the Second World War, technological developments in armaments have produced increasingly sophisticated weapons. The most dangerous of these for air transports protected by the Geneva Conventions of 12 August 1949 are remote controlled missiles equipped with homing devices, the operating raduis of which exceeds the visual range of the protective emblems recognized by these Conventions and carried by medical aircraft. The visual range of the emblem is frequently much less than 1,000 metres.

Modern arms therefore make necessary new identification procedures to ensure that medical transports, whether on land, at sea or in the air, are respected and protected, even beyond visual range of the protective emblems which they carry and whatever long-range weapons are used by the parties to the conflict.

Identification in peacetime

Medical aircraft may be civilian or military, airplanes or helicopters, assigned temporarily or permanently to the transport of wounded or sick persons.

If the medical aircraft are *civilian*, they are subject to the same regulations as other civil air transport, particularly in relation to identification. They must fulfil the requirements of the International Civil Aviation Organization (ICAO) and comply with the instructions given by regional air traffic control services. They carry the red cross emblem only if they are in the service of a Red Cross organization.

These civilian medical aircraft may identify themselves as such by mentioning their medical mission or their conveyance of medical cases in the flight plan filed with the departure airport and subsequently communicated to the arrival airport. If they are carrying wounded or sick persons requiring emergency treatment, the pilot, when approaching the arrival airport, may obtain landing priority, which is at times vital.

Military medical aircraft engaged in transporting wounded or sick persons, whether civilian or military, in peacetime, must observe the same procedures as civil aviation concerning air safety and identification, at least when flights are inserted within civilian air traffic control patterns, which is almost always the case.

It is of the greatest importance to be able to identify a medical aircraft throughout its flight, so that it can be given the priority essential for the survival of the sick or wounded persons it carries. The time lapse for effective medical treatment after a wound has been sustained or a disease has appeared is sometimes very short. It is during this brief survival period that sick and wounded persons must be transferred to hospitals to receive appropriate treatment. The rapidity of medical transport is therefore of prime importance, and such transport receives priority.

In time of peace the identification of medical aircraft, whether civilian or military, is achieved by four methods, all of which must always be used *simultaneously*, exactly as prescribed in the ICAO regulations, that is:

— communication of the flight plan between the departure point and the arrival point,

— nationality and registration markings to be shown on the aircraft,

— radio communication to be maintained between the aircraft and the ground-based control services,

— secondary radar to be carried.

Identification in times of armed conflict

At a time of armed conflict, the procedure to be followed for the identification of a medical aircraft is similar to that prevailing in peacetime, whether the aircraft is civilian, belonging, for example, to a Red Cross organization or to a civil defence unit, or if it is a military medical aircraft belonging to the armed forces.

This procedure for the identification at a time of armed conflict was defined by the Diplomatic Conference for the Reaffimation and Development of International Humanitarian Law in Armed Conflicts, which took place in Geneva from 1974 to 1977. It had been preceded by Conference of Government Experts, which created a technical subcommittee to examine the ICRC proposals relating to the identification of medical transport on land, at sea and in the air.

The Diplomatic Conference adopted Regulations concerning Identification, which form Annex I of Protocol I additional to the Geneva Conventions of 12 August 1949. These Regulations are accompanied by three Resolutions, addressed to the international organizations responsible for dealing with the technical problem arising, that is, ITU (International Telecommunications Union), IMCO (Intergovernmental Maritime Consultative Organization) [1] and ICAO (International Civil Aviation Organization).

The Geneva Conventions of 12 August 1949 had specified only visual identification for medical aircraft in periods of armed conflict; the Regulations concerning Identification, attached to Protocol I, provide for additional means of identification, as follows:

I. Visual and infra-red identification

Medical aircraft may be marked with the emblem of the red cross or the red crescent on a white ground. These are the two protective emblems recognized by the 1949 Geneva Conventions, with the red lion and sun, now no longer in use. For simplicity, only the term "red cross" is used below.

The aircraft's nationality markings and registration number may be carried in addition to the protective red cross emblem.

It is no longer obligatory for the whole aircraft to be painted white: it may retain its original paint or military colours and must carry a red cross on a white ground, provided the competent authorities have granted permission.

To prevent abuses, every medical aircraft must be properly authorized to carry the protective emblem of the red cross. The authorities granting this authorization will normally be a ministry, whether of health, defence or internal affairs, or any other official body appointed by the government to supervise the use of the protective red cross emblem.

[1] Now IMO (International Maritime Organization) as from 1 July 1982.

The emblem referred to here is indeed the protective emblem, and not the very small red cross, unrecognizable from a distance of more than a few dozen metres, which can be fixed to an aircraft in peacetime to indicate that it belongs to a Red Cross organization, with the organization's consent.

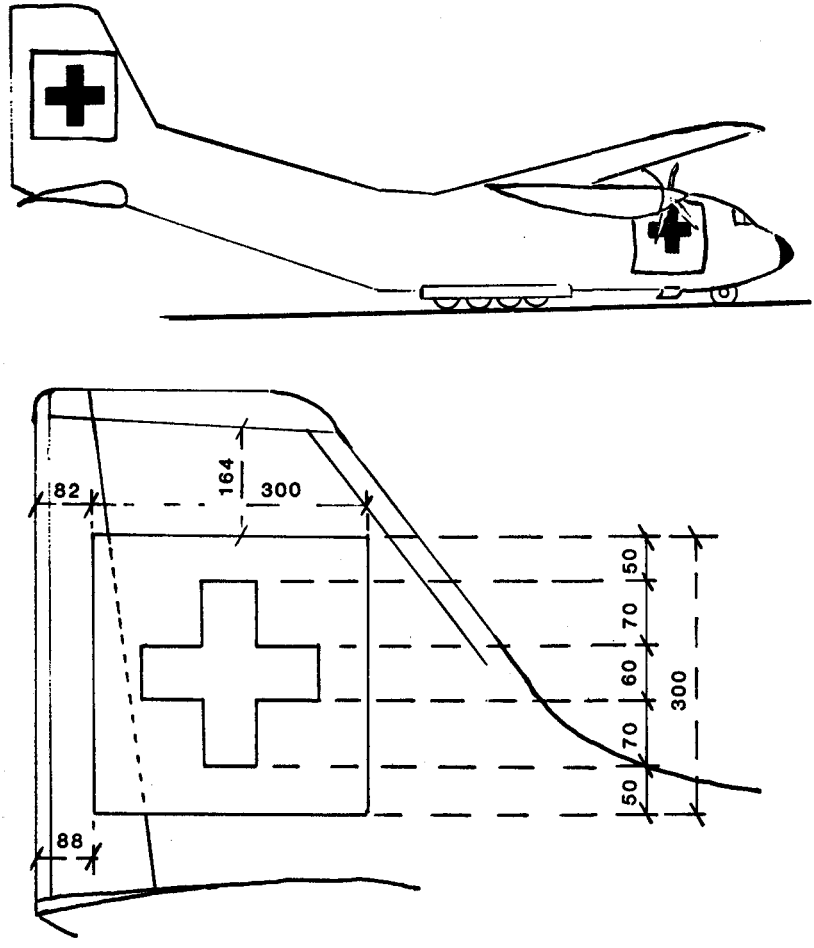

Fig. 1. A Transall C 160 as used by the EMMIR (Elément médical militaire d'intervention rapide — France) and the tail fin, with dimensions of the red cross sign in centimetres.

There are seven red crosses on the plane: one on each side of the fuselage, one on each side of the tail fin, one atop the fuselage between the wings, one on the underside of each wing. Time required to paint the crosses: 16 hours, with six painters. Markings by means of adhesive emblems is quicker but requires skilled workmen.

The protective emblem, which is of very large dimensions, indicates that the aircraft is entitled to respect and protection by combatants. They must be instructed of its meaning and know that they must not fire on the red cross emblem, whether on land, at sea or in the air.

Fig. 1 gives an example of the positions and dimensions of the red cross emblem on a 30-tonne Transall C160 aircraft used by the Elément Militaire Médical d'Intervention Rapide (EMMIR) — the emergency medical operations unit of the French armed forces.

The white ground, a square 3 metres by 3 metres, painted on the tail fin of the plane, allows the display of a red cross 2 metres high and 2 metres wide, which can be identified, if the line of sight is perpendicular to it, from a distance of at least 1,000 metres.

At night, or in reduced visibility, these protective emblems can be illuminated. They may also be composed of materials detectable by infra-red equipment

Tests carried out by the ICRC during the Conferences of Government Experts referred to above, demonstrated that a red cross painted on a pale ground such as the metal body of a vehicle or white paint was invisible to infra-red equipment or infra-red-sensitive film. The same was true for some light-amplification equipment.

After various tests, the best solution found, and the simplest, to avoid disappearance of the emblem painted in red consisted of first painting a cross in black and then covering it with a coat of red paint. In this way, the sharp pale-dark contrast of the protective emblem was visible to infra-red observation. This precaution is probably not very important for aircraft in flight, but when they are on the ground, parked for the night, and close to a combat zone, it is no doubt useful to be able to identify the red cross on a white ground in the dark with infra-red equipment.

The first photograph shows the markings of an airliner used as a medical aircraft, with protective emblems of large dimensions, too large to be used for a helicopter or a small touring aircraft adapted as medical aircraft.

For marking small medical aircraft, as for large ones, the rule is simple: a red cross or a red crescent must be placed on the plane where its height is greatest and must occupy the whole height.

The visibility of the protective emblem is proportional to its dimensions, and it must be identifiable at the same moment as the silhouette of the aircraft. Yet in spite of its size the protective emblem is not always identifiable, due to poor light, bad weather or darkness, which

often prevent the red cross painted on an aircraft from being seen, particularly in the case of helicopters.

Seen from directly ahead or astern, medical aircraft are extremely difficult to identify. Even at only a few hundred metres altitude, it is rarely possible to distinguish an emblem painted on a medium-sized aircraft, such as those used for the past few years by the ICRC in various conflict zones.

To remedy this defect in visual identification, the Regulations concerning Identification prescribe the use of a distinctive light signal.

II. The distinctive light signal: a flashing blue light

In conditions of poor visibility as described above, it is noticeable that aircraft navigation lights and anti-collision lights sometimes remain visible for long distances.

A distinctive light signal is therefore able to remedy the deficiency in visual identification when visibility is limited. As white, red and green are used already for navigation lights, there remained blue, which was adopted as the colour to be used for a light flashing at the same rate as the anti-collision lights, that is, between 60 and 100 flashes per minute.

The blue colour to be used has been defined by trichromatic co-ordinates on the chromatic diagram, as indicated in the Regulations concerning Identification (see Fig. 2).

This light signal, adopted in 1977 by the Diplomatic Conference, appears in theory to be very simple, all that is required to give a medical aircraft a blue light being to replace the red domes of the anti-collision lights with blue domes of glass or plastic. In practive, the fitting of the blue flashing light is more complicated, as the ICRC discovered during its medical air transport operations in Africa and Asia.

The difficulties encountered were as follows:

— The dimensions of the rotating anti-collision light fittings in civil and military aircraft are not standardized, but vary from one plane to another depending on the manufacturer.

— The blue glass or plastic domes are not marketed commercially or are very difficult to obtain. They have to be ordered from suppliers producing heat-resistant glass or plastic, in view of the great amount of heat energy retained by dark blue.

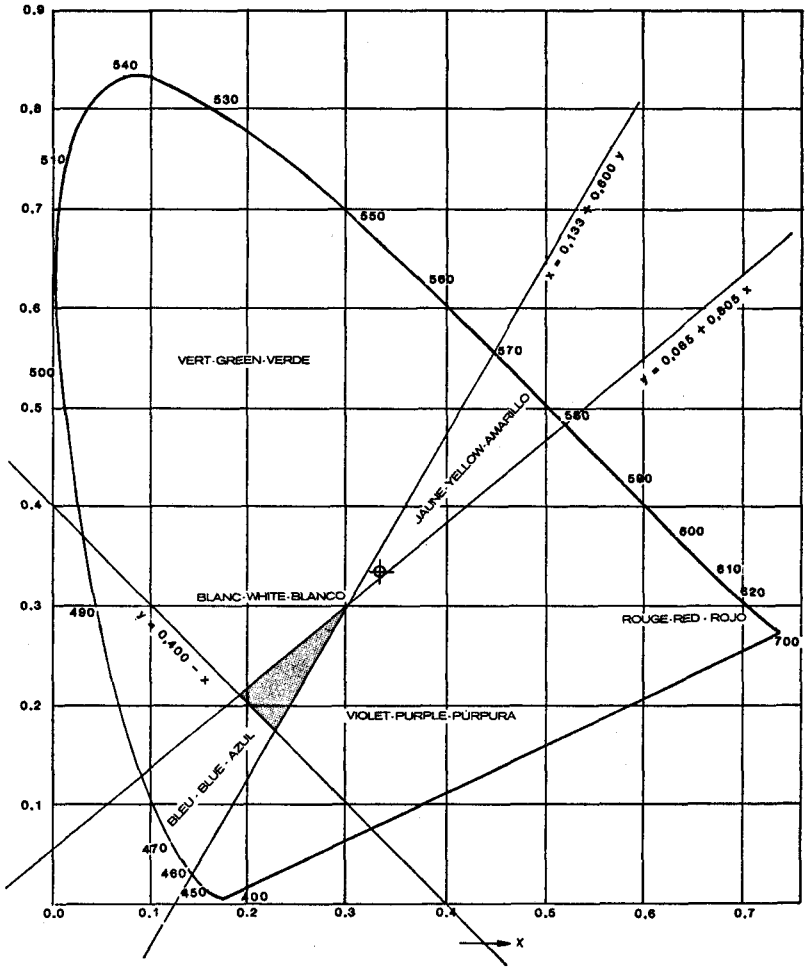

Fig. 2. Chromaticity diagram of the International Commission on Illumination, showing trichromatic co-ordinates determining the blue of the light signal for medical vehicles.—The dark triangle is the recommended blue zone.

— To install in an aircraft a rotating blue light of the same type as used by vehicles having priority in road traffic raises problems of electricity supply, compliance with aviation standards, and space. Tests made by the ICRC showed that a rotating light of this type, fitted under the fuselage of a Piper Cherokee Six medical aircraft, pro-

truded too much and was smashed by stones and lumps of earth when taking off from improvised runways.

The ICRC has also tried the use on board its medical aircraft of blue lights of the "strobe" type, that is, lights in which electricity is discharged in a gas. The major disadvantages of this equipment caused the ICRC to reject its use:

— The intensity of the flashes produced by strobe lights may interfere with the piloting of the aircraft.

— Beyond a few hundred metres, the strobe light loses its blue colour and is seen from the ground as white. Flying in daylight over territory controlled by guerilla fighters, an ICRC plane was fired on by automatic weapons, despite the fact the strobe light was operating. Later, the guerilla fighters explained that as the plane flew towards them emitting rapid flashes of blue-white light, it looked like a military aircraft machine-gunning the ground, the flashing light resembling gunfire.

A solution therefore has to be worked out with the manufacturers of aircraft equipment, so that medical aircraft can make use of the light signalling system provided for in the Regulations concerning Identification. The ICAO is aware of this problem, as well as other technical problems relating to the identification of medical aircraft and included in Resolution 17 which the Diplomatic Conference sent to the ICAO in 1977. The Resolution does not mention the use of radio, which comes within the competence of the International Telecommunications Union.

III. Identification by radio: radio signal

The Diplomatic Conference, in its Resolution 19, requested the ITU to submit the requirements for medical transports to the World Administrative Radio Conference (WARC 79), which was held in Geneva at the end of 1979, so that the necessary arrangements could be made to meet essential radiocommunications needs for protected medical transports in armed conflicts.

WARC 79 responded to this request by adopting a new Section II, "Medical Transports", of the Radio Regulations, under Article 40, "Urgency and Safety Transmissions, and Medical Transports".

This Section specifies a procedure by which a medical transport may identify itself by transmitting a distinctive radio signal reserved exclusively for the use of medical transports, especially medical aircraft:

Excerpt from the Radio Regulations

ARTICLE 40

Urgency and Safety Transmissions, and Medical Transports

Section I. Urgency Signal and Messages

3196 § 1. (1) In radiotelegraphy, the urgency signal consists of three repetitions of the group XXX, sent with the letters of each group and the successive groups clearly separated from each other. It shall be transmitted before the call.

3197 (2) In radiotelephony, the urgency signal consists of three repetitions of the group of words PAN PAN, each word of the group pronounced as the French word "panne". The urgency signal shall be transmitted before the call.

3198 § 2. (1) The urgency signal shall be sent only on the authority of the master or the person responsible for the ship, aircraft or other vehicle carrying the mobile station or mobile earth station in the maritime mobile-satellite service.

3199 (2) The urgency signal may be transmitted by a land station or an earth station in the maritime mobile-satellite service at specified fixed points only with the approval of the responsible authority.

3200 § 3. (1) The urgency signal indicates that the calling station has a very urgent message to transmit concerning the safety of a ship, aircraft or other vehicle, or the safety of a person.

3201 (2) The urgency signal and the message following it shall be sent on one or more of the international distress frequencies (500 kHz, 2 182 kHz, 156.8 MHz), or on any other frequency which may be used in case of distress.

3202 (3) However, in the maritime mobile service, the message shall be transmitted on a working frequency:

a) in the case of a long message or a medical call; *or*

b) in areas of heavy traffic in the case of the repetition of a message transmitted in accordance with the provision as laid down in No. **3201.**

An indication to this effect shall be given at the end of the call.

3203 (4) The urgency signal shall have priority over all other communications, except distress. All stations which hear it shall take care not to interfere with the transmission of the message which follows the urgency signal.

3204 (5) In the maritime mobile service, urgency messages may be addressed either to all stations or to a particular station.

3205 § 4. Messages preceded by the urgency signal shall, as a general rule, be drawn up in plain language.

3206 § 5. (1) Mobile stations which hear the urgency signal shall continue to listen for at least three minutes. At the end of this period, if no urgency message has been heard, a land station should, if possible, be notified of the receipt of the urgency signal. Thereafter, normal working may be resumed.

3207 (2) However, land and mobile stations which are in communication on frequencies other than those used for the transmission of the urgency signal and of the call which follows it may continue their normal work without interruption provided the urgency message is not addressed "to all stations" (CQ).

3208 § 6. When the urgency signal has been sent before transmitting a message "to all stations" (CQ) which calls for action by the stations receiving the message, the station responsible for its transmission shall cancel it as soon as it knows that action is no longer necessary. This message of cancellation shall likewise be addressed "to all stations" (CQ).

Section II. Medical Transports

3209 § 7. The term "medical transports", as defined in the 1949 Geneva Conventions and Additional Protocols, refers to any means of transportation by land, water or air, whether military or civilian, permanent or temporary, assigned exclusively to medical transportation and under the control of a competent authority of a Party to a conflict.

3210 § 8. For the purpose of announcing and identifying medical transports which are protected under the above-mentioned Conventions, a complete transmission of the urgency signals described in Nos. **3196** and **3197** shall be followed by the addition of the single group "YYY" in radiotelegraphy and by the addition of the single word MAY-DEE-CAL, pronounced as in French "médical", in radiotelephony.

3211 § 9. The frequencies specified in No. **3201** may be used by medical transports for the purpose of self-identification and to establish communications. As soon as practicable, communications shall be transferred to an appropriate working frequency.

3212 § 10. The use of the signals described in No. **3210** indicates that the message which follows concerns a protected medical transport. The message shall convey the following data:

3213 *a)* the call sign or other recognized means of identification of the medical transport;

3214 *b)* position of the medical transport;

3215 *c)* number and type of medical transports;

3216 *d)* intended route:

3217 *e)* estimated time en route and of departure and arrival, as appropriate;

3218 *f)* any other information, such as flight altitude, radio frequencies guarded, languages used and secondary surveillance radar modes and codes.

3219 § 11. The provisions of Section I of this Article shall apply as appropriate to the use of the urgency signal by medical transports.

3220 § 12. The use of radiocommunications for announcing and identifying medical transports is optional; however, if they are used, the provisions of these Regulations and particularly of this Section and of Articles 37 and 38 shall apply.

The requirements of the Radio Regulations are known to flying crews, as they are international regulations applicable everywhere in the world and are complied with by national legislation concerning radiocommunications and the use of the electromagnetic frequency bands.

During their training, air pilots are given instructions in the radio procedures to be followed, and flight instructors are responsible for teaching their pupils the distinctive radio signal for medical aircraft, as they do for distress, alarm and safety signals, which are also internationally recognized.

On the ground, military air traffic controllers must know that medical aircraft, whether military or civilian, may identify themselves by radio in a period of armed conflict by implementing the provisions of the Regulations concerning Identification and those of Section II of the Radio Regulations.

These controllers must send information concerning the movements of the medical aircraft to the commanding officers of troops within the sectors overflown by such aircraft and in the adjacent sectors, to ensure that there is no firing in their direction. This is a question of military liaison and transmissions, which must be organized, like other military matters, between the different services and especially with the medical services of the armed forces. The procedures for identification of medical

aircraft have been adopted to provide greater safety in the transport of wounded, sick or shipwrecked persons and of medical personel—they are worth putting into practice.

IV. Identification by Secondary Surveillance Radar (SSR)

The radio signal reserved for medical transports in periods of armed conflict is a new means of identifying medical aircraft. However, this is not the case for radar identification. In fact, all aircraft, including medical aircraft, are fitted, in peacetime too, with radar transponders by which they can be identified on the panoramic radar screens of the civil or military air traffic controllers.

Radar transponders are transceivers installed on board aircraft; they pick up the signals from surveillance radars and reply automatically, giving aircraft identification and flight data, pre-recorded on the transponder. Many years ago the International Civil Aviation Organization (ICAO) laid down a number of detailed regulations concerning civilian aircraft identification by secondary surveillance radars (SSR). Secondary radar is so called because interrogation by a primary surveillance radar produces a reply from the transponder.

Radar identification requires the use of a specific mode and code. The SSR mode indicates the specific pulse spacing of the interrogation signal and the code is a number assigned to a reply signal received from the transponder.

The ICAO has established four different modes, A, B, C, and D. The number of codes that can be recorded in a transponder is limited. That is why it would be difficult to reserve an identification code exclusively for medical aircraft, much less numerous than other aircraft. The ICAO is nevertheless considering the possibility.

Diplomatic Conference Resolution No. 17 requested the ICAO in 1977 to establish appropriate procedures so that in the event of an armed conflict, States would immediately be informed of the SSR modes and code available to all medical aircraft in the air traffic control area concerned for the duration of the conflict. The selected radar code would thus be withdrawn from general use only in the area affected by the conflict and for a limited period of time.

Radar identification of medical aircraft in periods of armed conflict should therefore not meet with any international regulation difficulties, so that aircraft should be able to fly the wounded and sick out of the

various combat zones defined in Section II, entitled "Medical Transportation", of Protocol I adopted by the Diplomatic Conference in 1977.

V. Notification, prior agreement, interception

Before planes can overfly or land in some areas of hostilities, an agreement must be concluded between the belligerents. The distinctive "*Medical*" radio signal reserved for medical aircraft may be used to establish radio communications between parties to a conflict and to notify them of the flight plans of medical aircraft. If need be, the standard international codes for world radio communications and other internationally recognized codes may be used for communications between belligerents. Flight plans must be drawn up in accordance with the procedures laid down by the ICAO.

When one of the parties to the conflict—for example, guerrilla fighters—has no air traffic control system, the flights of medical aircraft should be notified, and agreements concluded for taking out the wounded, through a neutral organization such as the ICRC.

It may be of interest to note here that, for air radio messages only, the ICRC uses the two-letter callsign RX, registered by the ICAO to identify aircraft chartered by the ICRC. This callsign is not used by medical aircraft, which have their own national callsigns, registered with the ICAO.

The Regulations concerning Identification, annexed to Protocol I, also provide for the interception of medical aircraft.

It is lawful to intercept a medical aircraft and to order it to land for inspection purposes. In such a case, the Regulations stipulate that the procedures applied should be those normally used for visual and radio interception, as specified by the ICAO for the interception of civil aircraft by military aircraft. Air traffic controllers on the ground may apply the same procedures. In this way it is possible to avoid the use of warning shots summoning a plane to land, this practice being extremely dangerous to the safety of wounded persons being moved from the combat area.

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The identification of medical aircraft had remained solely visual from the time when medical aircraft were first included in the Geneva Conventions, in 1929, until the Regulations concerning Identification

were adopted by the Diplomatic Conference in 1977. Owing to the speed of technical developments, the Regulations are to be revised every four years to bring them up to date. The ICRC is responsible for submitting to the States the proposals for the required meetings of experts.

The International Red Cross hopes that modern methods of identifying medical aircraft, both civilian and military, will make it easier to take the rapid medical action essential to save human lives.

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