

# International Effort Toward Uniformity on Road Traffic Signs, Signals, and Markings

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In the last three years, a great effort has been made by the United Nations and the Organization of American States to achieve uniformity in the field of road signs, signals, and markings. These efforts have culminated in three major conferences: (a) the Highway and Highway Transport Subcommittee of the United Nations Economic Commission for Asia and the Far East (ECAFE) meeting in Bangkok, Thailand, from January 30 through February 9, 1967, at which the position of the Asian countries with regard to the new draft convention on road signs and signals was determined; (b) the Tenth Pan American Highway Congress in Montevideo, Uruguay, in December 1967, which recommended that governments of the countries of the Americas adopt as a guide the Inter-American Manual on Uniform Traffic Control Devices; and (c) the United Nations Conference on Road Traffic in Vienna from October 7 to November 6, 1968, where a draft convention on road traffic and another on road signs and signals were discussed. In the first two meetings, regional agreements were obtained on the subject of signs and signals. The major task of the U.N. Conference in Vienna was to bring about a convention that could be acceptable to many countries and continents of the world. In this paper an analysis is made of the regional sign systems and the significance and implications of the Vienna Conference. Recommendations are made for future steps to be taken by developing nations in the adoption of a suitable road sign system.

•BEFORE the second world war, various agreements had been made concerning road traffic and road signs and signals. After the war, these agreements became relatively obsolete. In 1949, the United Nations convened a conference in Geneva to update international legislation in this field and, as a result of this conference, two documents (1) were adopted: the 1949 Convention on Road Traffic, and the 1949 Protocol on Road Signs and Signals. This 1949 Protocol referred to as the Protocol, provided for a road sign system that relies almost wholly on symbols without words. It was based on European designs, which constituted the most widespread symbolized system.

A group of experts, under an assignment by the United Nations Economic and Social Council, submitted a report in 1952 on road signs and signals (2). This document, later designated as the 1953 Draft Convention on Road Signs and Signals and now called the 1953 Draft Convention, made some adjustments in the Protocol. The 1953 Draft Convention was the result of research carried out by these experts in a variety of climates and environmental conditions in France, South Africa, Chile, India, the United States, and Turkey; it represented an attempt to combine the best of the Protocol with the best of the United States system.

In 1957, the Central American countries approved a new sign system based largely on the 1953 Draft Convention. In 1963, Canada adapted the Protocol to its own needs

and introduced some new symbols and legends that appeared in English and French on the same sign. In 1964, the Ministry of Transport of Great Britain adopted the Protocol for British road traffic signs. At a meeting of the Highway and Highway Transport Subcommittee of the United Nations Economic Commission for Asia and the Far East in Bangkok, Thailand, January-February, 1967, a road sign system was recommended similar to the one proposed in the 1953 Draft Convention. The Tenth Pan American Highway Congress, convening in Montevideo, Uruguay, December 1967, recommended that the governments of the countries of the Americas adopt as a guide the Inter-American Manual on Uniform Traffic Control Devices (5). The sign system in this manual is similar to that in the 1953 Draft Convention.

There thus exists a wide range of sign systems in the world. The system in the United States, Australia, and New Zealand still uses many written-word messages. The Protocol system is widely used in Europe, where the messages are presented mostly in symbolic language without the use of words. The 1953 Draft Convention system uses symbols, but the shape of the warning signs is a diamond instead of a triangle; the red diagonal bar on the regulatory sign is consistently used as a prohibition; and prohibitory and mandatory signs are not distinguished by color. Variations of the Old British system are found in some parts of eastern and southern Africa where a combination of Protocol symbols and written messages are used. The Central American system uses the 1953 Draft Convention. The Canadian system relies mostly on symbols but introduces new symbols as well as different uses for the colors; the mandatory signs have a green ring, lane-use control signs have a black ground with white arrows, and the parking signs have a written message instead of symbols. This system utilizes the Protocol, the 1953 Draft Convention, the United States system, and other new signs.

Because both the Protocol and the 1953 Draft Convention were in wide use and in need of updating, the United Nations convened a Conference on Road Traffic in October 1968 at Vienna, Austria, that produced a Draft Convention on Road Signs and Signals, referred to as the 1968 Draft Convention (3). Naturally, the standardization of road signs at the international level should and must rely on symbols rather than on written messages. The absence of language barriers must be the basic requirement for signs intended for international traffic. On the other hand, to express everything by symbols would complicate any system beyond reasonable simplicity and comprehension. In writing about the Vienna Conference, Masson (9) also emphasized these requirements: "It is obvious that developing countries, where road traffic is very light, do not require the sophisticated rules and regulations that are indispensable in highly developed countries with dense road traffic. However, in view of the considerable development in international travel in general and the consequential increase in numbers of persons driving cars in foreign countries, be it their own or hired ones, it is most desirable that there be as few differences as possible between the systems applied in the various countries of the world." The spirit of these international conferences has always been one of laying foundations for a world system of traffic signs that could replace the many that now exist. To accomplish this will require many barriers to be broken, many political obstacles to be overcome, and some doubts to be resolved by much more research.

We will now discuss the Protocol and the 1953 Draft Convention, the two systems that are most widely used and were considered by the 1968 Vienna Conference on Road Traffic. Options from both systems are included in the 1968 Draft Convention.

### WARNING SIGNS

The 1968 Draft Convention contemplates the use of two shapes and two colors for warning signs. With regard to the shape, the alternatives are an equilateral triangle having one side horizontal and the opposite vertex above it, or a diamond-shaped square.

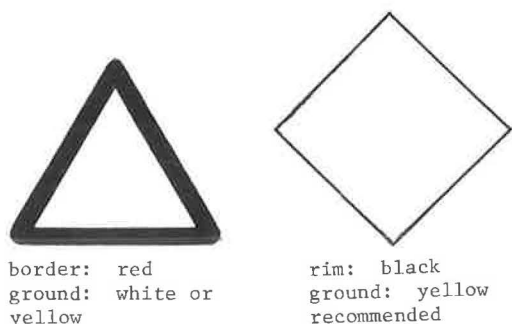


Figure 1. Alternative signs warning of danger.

The triangle may have a white or yellow ground and a red border; the diamond has a yellow ground and a black rim (Fig. 1).

Which of the alternatives is technically better? In 1952, the experts reported to the U.N. (2) that "the two-color combination consisting of a black symbol on a yellow ground gave better legibility than the black symbol on white ground. The effect of the size of the symbol on legibility was studied and it was concluded that those of bolder design or strong outline and those of larger area gave better legibility results. It was further noted that the 'diamond' gave greater legibility distances in the black and yellow combination than in the combination having a white ground with a narrow red border, a black symbol of the same size being used in both cases. The narrow red border did not seem to contribute towards the improvement of legibility." It has been found that the diamond can accommodate a symbol 17 percent larger than can a triangle of equal area (8). Also, the Road Research Laboratory of England found that the diamond (American system) has a recognition range 10 percent longer than that of the triangle (European system) (7). Besides, the use of yellow as a color for warning is consistent with its use in traffic signals. Because of these considerations, the diamond with a yellow ground, black rim, and black symbol is recommended as the better sign.

Symbology for warning signs does not present a problem because, even in the cases where there are alternative designs to be chosen, their meaning is not a matter of discussion. Perhaps one symbol is easier to understand than another, such as in the case of dangerous descent and steep ascent (Fig. 2), in which the symbol of an automobile is easier to understand than the one with a number for percentage of grade.

Of course, there is room for improvement in many of the proposed symbols. Article 8, paragraph 1, of the 1968 Draft Convention (3) states that "Where Contracting Parties consider it necessary to modify the symbols prescribed, the modifications made shall not alter their essential characteristics." If we take into account these provisions, we are safe in saying that a fairly uniform symbology has been attained for warning signs.

## REGULATORY SIGNS

The 1968 Draft Convention divides the regulatory signs into the following categories: signs regulating priority at intersections, signs regulating priority at narrow sections of road, prohibitory or restrictive signs, and mandatory signs.

### Priority at Intersections

In this category of signs are give way or yield, stop, priority road, and end of priority. The approved give-way or yield sign conforms to generally accepted recommendations with regard to shape. It is an equilateral triangle having one side horizontal and the opposite vertex below it (Fig. 3). It may be white or yellow with a red border; no symbol or message is inscribed. Here again we are confronted with an alternative with regard to color. It has been stated previously that yellow is a warning color and not a regulatory one. Also, red is characteristic of regulatory signs, meaning stop



border: red  
ground: white\* or yellow  
\*recommended

Figure 3. Give-way or yield sign.



Figure 2. Symbology vs numbers in warning signs to indicate steep grade.

or do not. That is why the Special Committee on Color of the National Joint Committee on Uniform Traffic Control Devices of the United States has suggested that the color of the United States yield sign be changed from black on yellow to the Protocol-type of red on white (10). It then appears desirable to establish the inverted triangle with a white ground and a red border as the only one in the system.



rim: red  
border: white  
ground: red  
word: white  
recommended



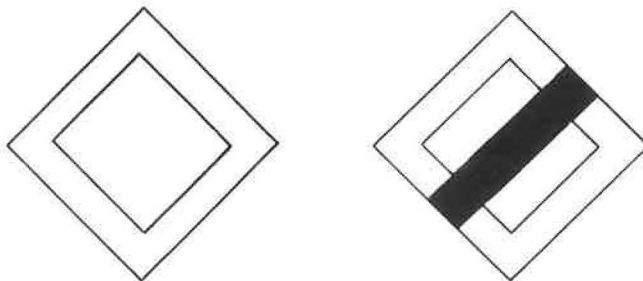
border: red  
ground: white or yellow  
symbol: red  
word: black or dark blue

Figure 4. Alternative stop signs.

The stop sign has a double standard: the octagonal with red ground bearing the word "STOP" (or the equivalent in the language concerned) in white, and the circle with white or yellow ground and red border, a give-way sign within, and the word "STOP" (or the equivalent in the language concerned) in black or dark blue (Fig. 4). In any system, the stop sign is the most important, and for this reason its shape, color, and recognition must have an especially distinctive design that stands out among the other signs of its system. If the circular type is used, then all the prohibitory signs have the same shape and under certain circumstances, such as heavy snow or rain, the message could be lost and an unfortunate situation could arise. On the contrary, the octagonal shape is not used for any other sign and it cannot

easily be mistaken even in snow storms. The Road Research Laboratory of England (7) found that "in the European system (circular) the identification distance for the STOP sign was only slightly greater than the mean for the whole system, whereas in the American system (octagonal) it was twice the mean." The octagonal sign stands out among the other signs of its system. Also, the recognition distance of the octagonal sign is 50 percent greater than that of the circular one, and the word "STOP" can be 50 percent larger in the octagonal sign than in the circular one (8). When there is a choice between the two signs, it is then recommended that the red octagonal sign be used as the stop sign of a system.

The priority road and end of priority road signs (Fig. 5) are typical abstracts signs in which neither the shape nor the color is consistent with the rest of the system. The shape and the color belong to the warning signs. Perhaps it would have been better to use a green circle for the priority sign with a slant for the end of priority sign. But, let us not introduce more alternatives; the use of these two signs in Europe is so widespread that perhaps it is too late to do anything about it. No apparent need for these signs has been found in the United States.



rim: black  
ground: yellow  
oblique bar: black

Figure 5. Road-priority signs.

### Priority at Narrow Sections of Road

There are two signs in this category: one sign indicating priority for oncoming traffic, and another indicating priority over oncoming traffic (Fig. 6). The first of these signs is consistent with the rest of the 1968 Draft Convention because its shape and the use of red color are within the framework of its context. But the sign indicating priority over oncoming traffic does not conform in any aspect to its category; the shape and color belong to the informative signs. In any case, if the first sign is understood because of the position and color of the arrows, why couldn't a very opposite be understood the same way? It may be that there are other reasons more powerful than the technical ones that governed the adoption of the second sign.

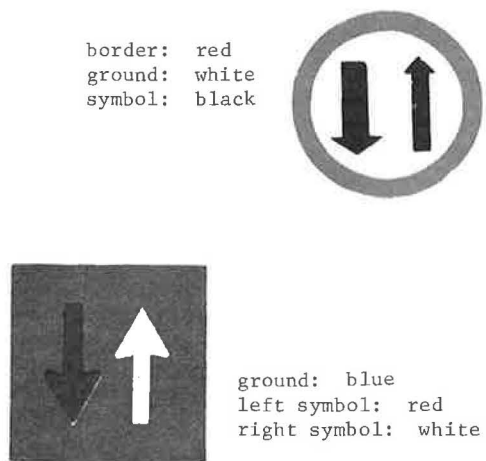


Figure 6. Signs indicating priority at narrow road sections.

### Prohibitory or Restrictive

All these signs are circular with white or yellow ground, wide red border, and black or dark blue symbol. The oblique bars, if any, are red with their slopes downward from left to right. Included are signs that prohibit entry, following too closely, turning, overtaking, specified speeds, use of audible warning devices, passing without stopping, and parking; and those that indicate the end of prohibition or restriction. Because the color red has been consistently used along highways to indicate a prohibition of some sort, it is a suitable color to use for the border and oblique bars in these prohibitory signs. On the other hand, the alternative choice for ground (white or yellow) is subject to criticism; yellow is a warning color and must be reserved for that purpose and, therefore, the white ground in all prohibitory or restrictive signs is wholly appropriate.

Another very important subject to be discussed is the consistent use of the oblique bar to mean "prohibited" or "do not." It is very unfortunate indeed that the 1968 Draft Convention leaves open to contracting parties the option of omitting the red oblique bar from certain prohibitory signs such as several that prohibit entry and overtaking. And yet the oblique bar is required by the 1968 Draft Convention in signs that prohibit turning and the use of audible warning devices. This inconsistency produces a more dangerous situation when we realize that in many countries, following the 1953 Draft Convention, mandatory signs are circular with a red border and, of course, without oblique bar. That is to say, they are precisely what the 1968 Draft Convention allows optionally as prohibitory signs, but with an exactly opposite meaning. In other words, what is "no" in some countries is "yes" in others—an extremely unsafe situation.

England, perhaps, is the country where most of the study and research has been done in comparing different sign systems. On the subject of the oblique bar, the Road Research Laboratory expressed the following (7):

The signs of the 1949 Protocol suffer from several defects which the 1953 convention avoided. One of them is the inconsistent use of the red cancellation bar across a sign. For example, to indicate a "No Right Turn" a white circle with a red edge bears a bent arrow cut through by a red bar. The reason for the bar here is obvious; if there were no bar, the sign would appear to be an invitation to turn right, the very opposite of what is intended. Now if the bar means "Don't do this" it should be used consistently; for example, the circle in the "No Cycling" sign should also have a bar, similarly the overtaking car on the "No Overtaking" sign, but this is not done and these illogicalities and inconsistencies may make it more difficult for people to learn the meaning of the signs. The reason given for the omission of this bar is said to be that it tended to hide the symbol underneath, but tests carried out by the Laboratory showed that this is not a serious difficulty.

Technically, is it better to use the oblique bar or not to use it at all? The findings of the Road Research Laboratory of England (7) are as follows:

Children can guess the meaning of signs with bars. A class of 11 year old children was divided into two groups, A and B, of equal intelligence. Group A was shown a set of Protocol signs, warning, mandatory and prohibitory; Group B was shown the same set of signs with bars added to four of the prohibitory signs which do not have them on the Protocol system (but do in the system proposed in the 1953 Draft Convention). Both groups were told only that triangles give warnings and circles commands (either do's or don'ts) and were asked to guess their meanings. It was found that 71 per cent of the answers given by Group B for the meanings of the four modified signs were correct, although they had never seen them before, whereas only 16 per cent of the answers given by Group A for the strictly Protocol versions of the same signs were correct. Moreover, 25 per cent of the answers to the Protocol signs were the exact opposites of the messages the symbols were intended to convey. There were no such errors with the modified signs.

In spite of these findings, England adopted, more for political than for technical reasons, the Protocol sign system already in use in the rest of continental Europe. Three years after that adoption it is not very surprising to find that the head of the Road Safety Division reported (8): "National Surveys make it clear that for the time being many motorists here are still in ignorance of what some of our new signs mean. For instance, at the end of last year one third of those questioned did not understand the meaning of the 'No Overtaking' symbol; half did not know the symbol indicating 'End of Dual Carriageway'; two-thirds failed to recognize the sign prohibiting entry to all motor vehicles; eighty per cent did not understand the symbol for a cross road; and four-fifths were mistaken about the sign which prohibits cycling." These findings corroborate those of the Road Research Laboratory that the omission of the oblique bar in the prohibitory signs causes them to be misunderstood. In short, technically speaking, it is advisable that all prohibitory signs be circular and bear an oblique red bar within a red border and on a white ground.

There are two models of the prohibition of entry signs (Fig. 7). The first model is entirely abstract, and the second, the canceled arrow, is more directly understood and is considered to be superior. Another abstract sign that could be replaced by the no-entry sign placed for both directions of traffic is that shown in Figure 8 to indicate the road is closed to all vehicles in both directions.

No-entry signs that indicate certain vehicles or pedestrians are prohibited from using the road are shown in Figure 9. The symbols are shown inside the red circle and may include those for power-driven vehicles, motorcycles, mopeds, goods vehicles, trucks and full trailers, pedestrians, animal-drawn vehicles, handcarts, and agricultural tractors. It is on these signs that the 1968 Draft Convention allows the oblique bar to be omitted; it is clear by now that this omission is not advisable. Figure 9 shows no-entry signs intended to prohibit the entry of those vehicles whose weight or dimensions exceed certain limits,

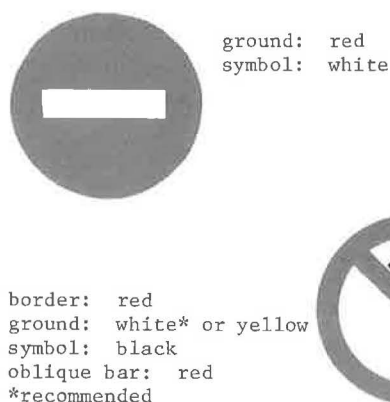
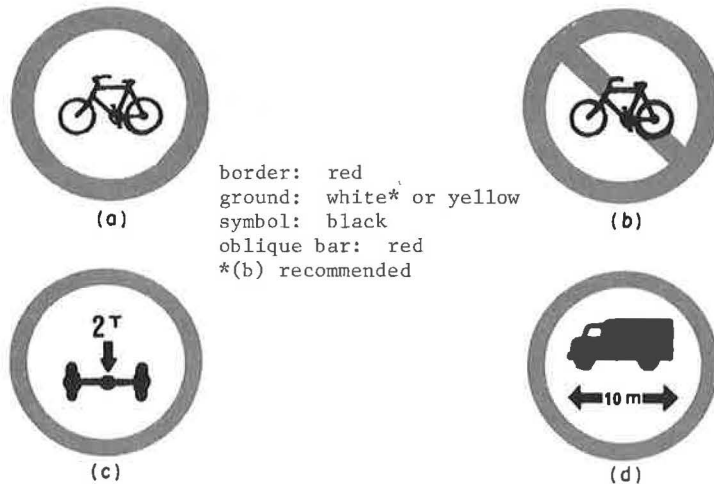


Figure 7. No-entry signs.



Figure 8. Sign indicating road closed to all vehicles in both directions.





border: red  
ground: white\* or yellow  
symbol: black  
oblique bar: red  
\*(b) recommended

Figure 9. No-entry signs for certain road users and for vehicles with certain weights or dimensions.

as shown within the red border. The restrictive sign in Figure 10 indicates the distance that should be maintained between vehicles.

Prohibition of turning is shown by bent arrows that point toward the prohibited direction and are crossed by the oblique bar (Fig. 11). Prohibition of overtaking is shown in Figure 12 by two different sign models: The first one prohibits the maneuver only by means of the color red on the overtaking vehicle; the second model shows both vehicles in black color but with the oblique bar. It is obvious that if the second one means "no overtaking," the first one may be misunderstood for "overtaking allowed." Countries seeking a sign system consistent in all its elements will have to choose the sign with symbols crossed by an oblique bar.

The speed limit (Fig. 13) and the prohibition of the use of audible warning devices (Fig. 14) signs are appropriate to the system. The sign that prohibits passing without stopping (Fig. 15) warns of the proximity of a customhouse or police station, at which a stop is compulsory. This sign is abstract, and its meaning is dependent on the words "custom" or "police." With certain exceptions, it is accepted worldwide. Signs that prohibit or restrict parking are abstract and have to be learned. They include parking prohibited, standing and parking prohibited, alternate parking, and limited duration parking zone (Fig. 16). This group of signs is considered for an international

border: red  
ground: white or yellow  
symbol: black



Figure 10. Sign indicating distance between vehicles.



border: red  
ground: white\* or yellow  
symbol: black  
oblique bar: red  
\*recommended

Figure 11. No-turning signs.



border: red  
ground: white or yellow  
left symbol: red  
right symbol: black



border: red  
ground: white\* or yellow  
number: black  
\*recommended

Figure 13. Speed limit sign.

border: red  
ground: white\* or yellow  
symbol: black  
oblique bar: red  
\*recommended



Figure 12. No-overtaking signs.

border: red  
ground: white\* or yellow  
symbol: black  
oblique bar: red  
\*recommended



Figure 14. Sign indicating prohibition of use of audible warning devices.

agreement; it is recommended that an explanatory plaque be added until the users come to understand the messages. More research for parking signs is needed.

The end of prohibition or restriction is shown by a white or yellow circular ground with no border, only a black rim, and with diagonal black or dark gray parallel lines. The yellow ground as an alternative to the white ground in this type of sign is not a good one, because yellow is a warning color and not appropriate in these signs; the white ground is recommended. These signs are end of all local prohibitions imposed on moving vehicles, end of speed limit, and end of prohibition of overtaking (Fig. 17). Of the three signs of this category, only the first one is wholly abstract; it has to be learned to be understood.



border: red  
ground: white or yellow  
symbol: black  
words: black

Figure 15. Sign indicating that a stop at a certain place is compulsory.

### Mandatory

In accordance with the 1968 Draft Convention, mandatory signs are circular, have a blue ground, and have symbols of a white or light color; the alternative is a circular sign with a white ground, a red border, and black symbols. An analysis of both alternatives follows.

The fundamental defect of the blue circular sign (Fig. 18) is that blue is used in highway signs for informative purposes and to identify services of any kind; it is, therefore, not advisable to use it as a mandatory color. The argument that the circular shape



border: red  
ground: blue  
oblique bars: red



Figure 16. No-parking signs.



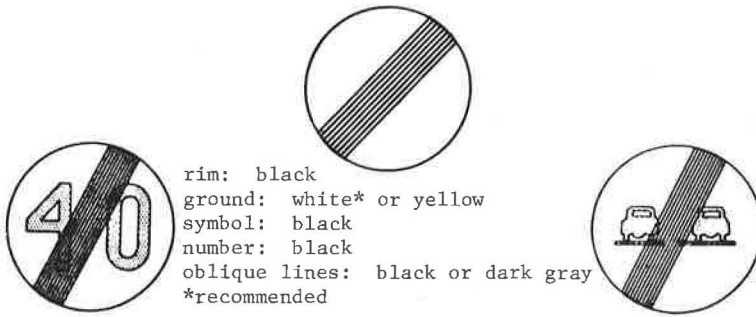


Figure 17. Signs indicating the end of prohibition or restriction.

provides the necessary distinctive meaning is refuted by research conducted on the comparison between colors and geometric forms in which it was found that "when color and shape are superimposed on a display, the color code will prove dominant in the visual separability it provides" (17). It can be concluded then that mandatory signs should not have a blue ground. On the other hand, the white ground as an alternative is consistent with the regulatory coding system recommended previously in this paper. So, the white ground, also shown in Figure 18, is here recommended for mandatory signs.

But let us examine very closely the fact that an alternative of this kind has been allowed to exist elsewhere in the 1968 Draft Convention. A mandatory circular white sign with red border and black symbol is essentially the same prohibitory sign that has been permitted by this same Convention when it left open to contracting parties the option to omit from certain signs the red oblique bar (Figs. 9 and 18). In effect the result is that while part of the world is saying "no entry" for some kind of road user, another part of the world will be saying "compulsory" for the same road user: Two absolutely contradictory messages with the same sign! This is what happens when we try to embrace two or more sign systems in their entire forms without sacrificing parts of one and taking the best and most consistent parts of the other or others. It is impossible to achieve an international consensus if the parties concerned do not reach a sound technical compromise.



Figure 18. Mandatory signs.

Let us try then to solve the problem. It must be recalled that the use of the oblique bar was recommended as the best means to convey the message of prohibition; it is more than logical that if we want to express a restrictive positive message we use the same sign without the oblique bar (Fig. 18b). This is exactly what the group of experts recommended in 1952, and it was proposed in the 1953 Draft Convention.

The signs in this category are direction to be followed, pass this side, compulsory roundabout, compulsory cycle track, compulsory minimum speed, and snow chains compulsory. Except for two of these signs, compulsory minimum speed and end of compulsory minimum speed, the rest do not present any problem with the recommended circular white sign with red border. If the black symbol goes inside the circle for these two signs, however, the message conveyed would be that of the maximum speed limit (Fig. 13). More research is needed to find a good solution.

## GUIDE AND INFORMATIVE SIGNS

Guide and informative signs are grouped in the following categories: direction signs, place identification signs, confirmatory signs, pedestrian-crossing signs, information signs, and facilities or auxiliary-services information signs.

### Direction

Direction signs can be classified as advance-direction and direction-of-place signs. The advance-direction signs are rectangular in shape and, according to the 1968 Draft Convention, the ground may be white or blue and the message may be in black or white characters depending on the ground color (Fig. 19). The white ground has been used in advance-direction signs in almost every country of the world; the dark ground has been specified for special types of highway signs like the freeways signs in the United States that have a green ground. So, the white ground with black characters is recommended for this type of sign. Included in the advance-direction signs there is a special one to indicate no through road (Fig. 20). It is rectangular with blue ground and white and red characters. To be consistent with our previous recommendations, we would have to suggest a white ground with black and red characters.

The direction-of-place signs may be rectangular in shape or may be an elongated rectangle with the longer side horizontal and with one end terminating in an arrowhead



Figure 19. Advance-direction signs.

(Fig. 21). The ground may be white or blue. The recommendation for the ground color is the same as that for the advance-direction signs.

### Place Identification

The 1968 Draft Convention makes a distinction between signs showing the beginning of a built-up area and signs showing the end of a built-up area. Of the two ground alternatives, white or blue, white appears to be the preferred color.

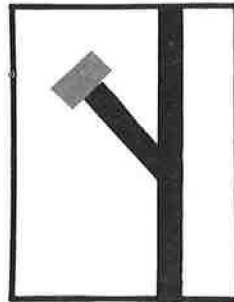
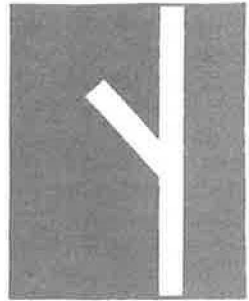
### Confirmatory

Confirmatory signs confirm to the driver information given by the direction signs.

### Pedestrian Crossing

Pedestrian-crossing signs show pedestrians and drivers the position of a pedestrian crossing. Typically, the 1968 Draft Convention states: "The panel shall be blue or black, the triangle white or yellow and the symbol black or dark blue.... However the sign...having the shape of an irregular pentagon may also be used." Sometimes I wonder if the purpose of this Conference was to achieve uniformity or to perpetuate a chaos of road signs. For reasons stated before, the recommended sign has a rectangular shape, blue ground, white triangle, and black symbol (Fig. 22).

ground: blue  
symbol: white



border: black  
ground: white  
symbol: black  
short oblique bar: red  
recommended

Figure 20. Signs indicating no through road.



border: black  
ground: white  
words: black  
numbers: black  
recommended



rim: black  
border: white  
ground: blue  
words: white

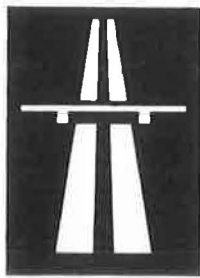
Figure 21. Signs indicating direction of place.

ground: blue\* or black  
triangle ground: white\* or yellow  
symbol: black\* or dark blue  
\*recommended

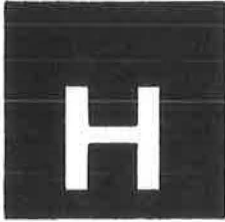
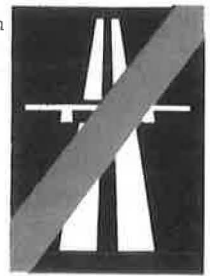


rim: black  
border: white  
ground: blue  
symbol: white

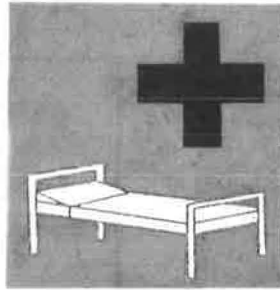
Figure 22. Pedestrian-crossing signs.

entrance to  
motorway

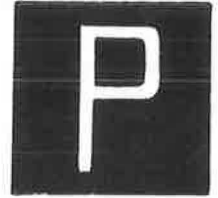
ground: blue  
symbol: white  
oblique bar: red  
cross: red

exit from  
motorway

hospital



hospital



parking

Figure 23. Information signs.

### Information Signs

All information signs (Fig. 23) are rectangular in shape and have a blue ground. Among the most common signs in this category are hospital, parking, one-way road, no through road, entry to a motorway, exit from a motorway, road for motor vehicles, end of road for motor vehicles, bus stop, tramway stop, and road open or closed.

One of the hospital sign alternatives bears an H for hospital, and the other is symbolic. For countries using a different type of alphabet, the first sign is meaningless; that is enough reason to recommend the sign bearing a hospital bed and a first-aid symbol such as a red cross or red crescent.

The parking sign bears a white P inside a blue rectangle. This is a sign that needs to be improved because a Latin character is not good for countries that have other types of alphabet. Perhaps the blue rectangle alone could be enough; anyway, parking signs are abstract.

### Auxiliary Services

The 1968 Draft Convention establishes (3) that these "signs shall have a blue or green ground; they shall bear a white or light yellow rectangle on which the symbol shall be displayed." For consistency with other informative signs, blue is recommended as the ground color with a white rectangle on which the symbol is displayed (Fig. 24).



ground: blue\* or green  
inside ground: white\* or yellow  
symbol: black  
cross: red  
\*recommended

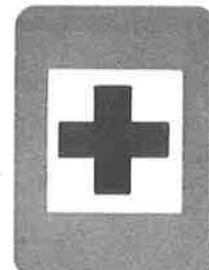


Figure 24. Auxiliary-services signs.

Some of the signs in this category are first-aid station, breakdown service, telephone, filling station, hotel or motel, restaurant, refreshments or cafeteria, picnic site, starting point for walks, camping site, caravan site, camping and caravan site, and youth hostel.

## CONSTRUCTION AND MAINTENANCE SIGNS

The 1968 Draft Convention states (3) that:

1. The limits of road works on the carriageway shall be clearly shown.
2. Where the extent of the road works and the volume of traffic justify it, the limits of the works shall be marked by setting up continuous or discontinuous barriers painted with alternate red and white, red and yellow, black and white, or black and yellow stripes, and in addition, at night, if the barriers are not reflectorized by lights and reflecting devices. Reflecting devices and fixed lights used for this purpose shall be dark yellow.

However, (a) lights and devices visible only to traffic moving in one direction and marking the limits of road works on the opposite side of the road from that traffic may be white; (b) lights and devices marking the limits of road works separating the two directions of traffic may be white or light yellow.

Because these signs are in the category of signs that warn of danger, it is recommended that the stripes of the barriers be yellow and black.

## ROAD MARKINGS

Road markings are covered in very great detail in the 1968 Draft Convention, which is not usual for this kind of document, and should be very thoroughly studied before final acceptance. It would have been preferable to have had a more general coverage and a less detailed account of the technical procedures to be followed in performing the actual job of road marking. The 1968 Convention does not distinguish colors for different types of roads and situations. In this matter, the U.S. Manual on Uniform Traffic Control Devices (4) is more comprehensive and should be used as a guide for future discussions in this subject.

## ROAD SIGNALS

The provisions for road signals are in accordance with their normal use throughout the world. There are two points to which we must pay some attention: The first is the use of a single flashing red light allowed for railroad crossings, and the second is the prohibition of the use of a single flashing red light for any other purpose. Using a single flashing red light for railroad crossings is considered a setback for the long-standing practice of using two flashing red lights at these crossings. A further complication is the fact that the flashing beacon is used in the western hemisphere for intersections or other locations that have special conditions. These locations do not include railroad crossings. A very unsafe situation may arise for an international traveler confronted with a single flashing red light that has been given this extra meaning. These are the reasons why the western hemisphere and many other countries will not be complying with the 1968 Draft Convention.

## RECOMMENDATIONS AND CONCLUSIONS

There has been a great effort on the part of the United Nations and the Organization of American States to bring about a solution to the lack of uniformity in road signing throughout the world. Sometimes these efforts have not been adequately recognized, as in the case of the 1952 study made by a group of experts. This study provided the basis for the 1953 Draft Convention, which never was officially submitted to the members of the United Nations for ratification. This time, perhaps because of the experience of 1949 and 1953, the United Nations has made a renewed effort to try to find a consensus for both of the earlier propositions. Unfortunately, a document of this type tends to

perpetuate and not eliminate the differences among the main existing sign systems. When the conclusions of a technical conference like the one in Vienna are settled in political terms, they may be acceptable to everybody but they will not necessarily meet the purpose and conditions of the conference, which are uniformity in signs.

From the viewpoint of a developing nation, conclusions of this sort tend to confuse rather than to clarify the problems involved. Lack of experience may yield disastrous results, and the adoption of inconsistent alternatives may produce a completely new and undesirable sign system. The task ahead, then, is to avoid the proliferation of differences among not only systems but also neighboring countries. It is very urgent to bring under responsible sponsorship the development of regional conventions for road signs that will unify continents in this matter. For instance, the countries of Asia and the Far East, the Americas, and Africa must begin to plan for these kinds of agreements if they ever want to have safe intercontinental highways. The time has come to learn that unless the countries get together in the spirit of compromise, the time and the opportunity to achieve international uniformity on road signs and signals will be lost.

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## *Discussion*

C. THOMAS VAN VECHTEN, District of Columbia Department of Highways and Traffic—The author's arguments against the Vienna decision to permit the use of identical signs to indicate mandatory and prohibited movements are fully persuasive. It is strange indeed that the dangers inherent in such a signing system were not sufficient to have prevented this most unfortunate decision. It was to avoid confusion between mandatory and prohibited movements that the Manual of Uniform Traffic Control Devices for Canada specified a red circle with a red oblique bar through the symbol to indicate prohibitions, and a green circle around the symbol to indicate mandatory movements. Use of some such means to clearly distinguish between the signs for mandatory and prohibited movements appears absolutely imperative.

In general I agree with almost all of Mr. Zuñiga's arguments and recommendations. However, I do not understand his reasons for grouping the pedestrian-crossing sign with the guide and information signs, and his consequent use of a blue ground and white triangle design. Perhaps this design is adequate in countries where pedestrians have few rights and where motor vehicles have the right-of-way over pedestrians in crosswalks. But there is clearly a good case for considering this sign to be a warning sign as is done in Canada, Central America, the United States, much of Europe, and parts of both Africa and Asia. A cattle-crossing sign is considered a warning sign, and it seems unreasonable to give greater attention to the safety of cows than to that of people. I also question Mr. Zuñiga's recommendation to drop the use of a yellow ground on the yield sign. Because a yield sign imposes the duty to stop if necessary, there seem good reasons for its having a yellow, rather than a white, ground. A yellow ground makes a yield sign stand out from the other regulatory signs because of color as well as shape, and underlines its higher level of urgency. The proposed modifications of the color schemes of both the pedestrian-crossing sign and the yield sign reduce their attention values and visual "punch." Until research proves that the performance of signs with the modified color schemes is at least as good as that with the present colors, I would question the change in the color of their grounds.

I am in full agreement with the author's statement that "...it is impossible to express everything by symbols unless we want to complicate any system beyond a reasonable simplicity and comprehension." Obviously that is exactly what we don't want to do. Those who are overly enamored with completely symbolic signs may wish to consider designing a symbolic sign for a pedestrian crossing to be used by deaf pedestrians. A reasonable, perhaps even a generous, minimum criterion for the sign of understandability is that at least 85 percent of the driving public correctly understand it the first time they encounter the sign by looking at it for no more than three seconds. Those who advocate universal adoption of one of the sign systems having only symbols might be interested in seeing how close their signs come to meeting this criterion.

Our experience with symbolic signs indicates that they have numerous advantages, but that many people do not understand them the first time they see them, and that a substantial proportion of the driving public does not understand the true meaning of some symbol signs even after seeing the signs repeatedly. The author points out that national surveys in England showed that more than half of the motorists did not understand some of the English symbol signs several years after they were adopted. Yet the English signs were developed after much effort by competent and dedicated professionals. Experience with other symbol sign systems indicates that they have given similar problems. The difficulty seems to be inherent in signs that have symbols alone. There appears to be very little likelihood that any system of purely symbolic signs can be developed that would be immediately understood by all motorists.

If this is so, then the sudden adoption of a purely symbolic sign system could possibly create widespread confusion, misunderstanding, and hazards. A transportation system that depends for its safety and efficiency on the speed and correctness of the decisions of millions of vehicle operators simply cannot accept an information system that doesn't work for even a small percentage of those operators, much less one that fails to work for a majority of them. Neither do signs that use only word messages reach all motorists because drivers may speak many different languages, some word



ground: white  
circle and bar: red  
U-arrow: black  
words: black

Figure 25. No-U-turn sign in use in Central America.

message signs may take longer to read than symbol signs, and some word messages may have shorter legibility distances.

Signs that use both symbol and word messages offer one solution. Signs, such as these, have been extensively used in Central America and were also used to some extent in both France and Great Britain. A Central American no-u-turn sign that uses both symbols and words is shown in Figure 25. It shows a black arrow in the shape of a U, in the center of a red circle. A red oblique bar is through the U-shaped arrow; the ground is white. This is similar to European signs except that, instead of using a square sign blank, the Central American system uses a rectangular blank with the long

dimension vertical. The symbol is at the top of the blank. Below it is the word message "No U Turn" in the local language. Such a sign is meaningful to motorists either (a) who already understand the symbol or (b) who can read the language. Such combination signs also have the great advantage of automatically familiarizing drivers with the symbols and teaching them their meaning.

Similar designs could be developed for warning and information signs. For example, a possible design for a combination symbol and word message on a warning sign for a draw bridge is shown in Figure 26. It uses a white rectangular sign blank. The familiar yellow diamond with black border occupies the upper portion of the rectangle. The diamond carries the appropriate symbol (in this case a Central American, rather than a European, draw-bridge symbol) and below it a yellow rectangle on which the hazard is written out in the dominant local language. A simpler alternative would be to put the symbol on a conventional yellow diamond-shaped blank, with the word message on a supplementary rectangular plate mounted below the diamond. Figure 26 shows this arrangement for a narrow-bridge sign.

Designers of symbolic signs tend to have an emotional objection to destroying the "purity" of symbol signs by adding word messages. After all, if symbol signs are intended to do away with the difficulties caused by word messages, why should they be "corrupted" with superfluous word messages? The answer is simple: Unless the symbol is understood immediately and correctly by the vast majority of motorists, the word message is not superfluous, it is necessary.

Admittedly the use of sign designs similar to those shown in Figure 26 would somewhat increase the cost of signing. But the objective of any signing program is to give the motorist the necessary information, and neither a pure symbol nor a pure word



ground (a): white  
diamond ground: yellow  
small rectangle ground: yellow  
symbol: black  
words: black



Figure 26. Combination word-symbol warning signs.

sign system appears capable of reaching all drivers. In order to improve signs while maintaining reasonable signing budgets, perhaps we should carefully review the real need for some of the signs we now use. Savings by elimination of unnecessary signs might more than balance the increased cost of improving the signs we do use.

In view of the differences among languages, alphabets, and the meanings of both words and symbols throughout the world, uniform signs present monumental difficulties. Fully uniform international signs may never be reached, but significant improvements on the present situation seem possible, particularly by elimination of direct conflicts among the several existing systems. Our decisions must be based on facts and on the results of objective research, for ethnocentrism and prejudice can only increase our troubles. The proliferation of both vehicles and drivers continues, and each day's delay only makes the problem more difficult. The time for concerted action is now. But today's actions must be the correct ones if we are to make the situation better instead of worse.

JOSE M. ZUNIGA, Closure—Most of Mr. VanVechten's remarks may stem in part from the fact that the 1968 Draft Convention on Road Signs and Signals from the Vienna Conference have not been widely enough distributed to be known by most technicians in this field.

The question of having a pedestrian-crossing sign with the guide and informative signs is not an invention of my own but the result of that Conference in which certain European countries expressed the need to have a guide sign for pedestrians in urban areas where that crossing would be difficult to find, like the underground pedestrian crossings in Vienna. The use of the informative sign does not exclude the pedestrian warning sign (3, Fig. A, 11<sup>a</sup>), which is intended mostly for drivers. Both are very different in shape and color; one is an informative and the other is a warning sign.

The question of the ground color in the yield sign is a matter that belongs to the general discussion on color coding. Robinson has written a very good paper on this subject (10). At this moment few countries retain the yellow ground for the yield sign; even the United States is considering the change from yellow to white.

With regard to the use of symbols and words, the 1968 Vienna Convention (3), in Article 8, Paragraphs 3, 4, and 5, is very explicit:

3. Nothing in this Convention shall prohibit the addition, in order to facilitate the interpretation of signs, of an inscription in a rectangular panel below the sign or in a rectangular panel containing the sign: such an inscription may also be placed on the sign itself, if this does not make the sign more difficult to understand for drivers who cannot understand the inscription.

4. Where the competent authorities consider it advisable to make the meaning of a sign or symbol more explicit or, in the case of regulatory signs, to limit their application to certain categories of road-user or certain periods, and where it would not be possible to convey the necessary information by an additional symbol or by numerals as provided in the annexes to this Convention, an inscription shall be placed below the sign in a rectangular panel, though such inscriptions may be replaced or supplemented by one or more symbols placed in the same panel.

5. The inscriptions referred to in paragraphs 3 and 4 of this Article shall be in the national language, or in one or more of the national languages, and also, if the Contracting Party concerned considers it advisable, in other languages, in particular official languages of the United Nations.

I would like to point out that my paper is by no means a substitution for the 1968 Draft Convention on Road Signs and Signals; it is merely an analytical comment that I hope is constructive.