

# Transport of the Olympic Flame



*Mr. Charles de Lotbinière Harwood*

The task of drawing up the itinerary and the method of transporting the Olympic Flame between Olympia and Montreal was awarded to Mr. Charles de Lotbinière Harwood, COJO's Director General of Protocol.

To begin with Mr. Harwood studied what was done at previous Games, and admits that he was impressed by the Mexicans' idea which was based on the itinerary followed by Christopher Columbus. He therefore thought of having the flame taken to Saint Malo, and from there, retracing Jacques Cartier's voyage to Gaspé. This plan did not prove very practical however since, as Cartier did not go further than Gaspé, it was difficult for the whole of Canada to participate in the event.

Furthermore in 1964, the Japanese needed 100,000 runners to carry the Olympic Flame from one end of their country to the other.

One can therefore imagine the number of runners needed for such a project on Canadian soil. With a twinkle in his eye Mr. Harwood comments that there would probably not have been enough Canadians to cover the transcanadian route.

In the knowledge that pictures and sounds can be transmitted by satellite from one continent to another in a matter of seconds, or less, Mr. Harwood wondered whether a flame could be transmitted in the same way. He therefore went to see friends at Bell Canada to ask them two questions: "Has it already been done, and if not, is it feasible?" The answer to the first was "no"; and a young engineer from Bell Northern in Ottawa was left to reply to the second. After some laboratory research his reply was positive. Mr. Charles Harwood had thus just provided the Montreal Olympic Games with a "first".

The following document will enable our readers, we hope, to familiarise themselves with this new system of which the brilliant simplicity is rivalled only by the obscurity of the technical terms often used to describe it.

## **Technical information**

The intention of this document is to cover in some detail the principles involved in the transmission of the Olympic Flame, from Athens to Ottawa, via the international communications network.

It must be noted, however, that although the general principles involved will not change, the details with reference to the equipment involved are not final and are dependent upon the sequence of events and special effects to be defined by COJO and the producers of the Olympic Flame program.

## **General description**

The transfer of the Olympic Flame, as far as the telecommunications aspect is concerned, starts in the Panathenian Stadium in Athens where an urn has been lit by means of a flame carried by runners from Olympia.

Sometime during the ceremonies in this Stadium, a flame is lit from the urn and carried manually to an "ionic sensor"; when the flame is applied to this sensor, part of the energy from the flame is converted into electrical energy. The electricity thus generated is then used in a "tone generator" to produce a coded signal, equivalent to a telephone number signaled with a touch-tone telephone set.

The signal is then transmitted, through the Hellenic Telecommunications Organization network and their satellite earth station, to the INTELSAT satellite, and from there to an earth station in Canada which will retransmit the signal to Ottawa. In Ottawa, and based on the producer's requirements, the signal could be used to trigger an optical display by means of a laser beam, optical fibers, etc., and finally to light up the urn in Ottawa.

The flame is thus transmitted from Athens to Ottawa, untouched by human hand, using different wavelengths of the electromagnetic

spectrum, but always conserving a part of the original energy of the flame.

### The sensor

The flame sensor that will be used in Athens consists basically of two electrically charged metal plates. One of the plates has a positive charge and the other a negative charge.

When a flame is applied between those plates, the air between the plates becomes ionized; this means that the air molecules are broken up into positive and negative ions. The charged plates then act as a magnet and attract the ions of opposite sign, that is, the negative plate attracts the positive ions and the positive plate, the negative ones.

The result of this is the production of an electrical voltage at the end of two terminal wires connected one to each plate.

This arrangement is independent of ambient conditions, such as air temperature, as it requires an actual flame to obtain an electrical voltage. This provides for one of the safety features to ensure that the flame in Ottawa is not lit accidentally.

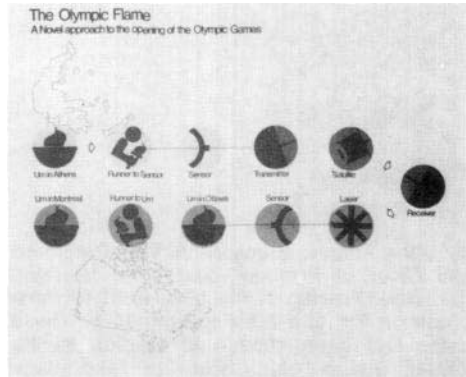
### Tone generator

The electrical voltage produced by the flame sensor is used to trigger a tone generator. This electronic device consists of a touch-tone pad, similar to those used in the telephone sets, a digit storage and a repertory dialer.

Shortly before the ceremony of the transfer of the Olympic Flame, a predetermined sequence of numbers is entered in the digit storage, by means of the touch-tone pad. Once the device is triggered by the voltage from the flame sensor, the repertory dialer generates a sequence of tones corresponding to the number kept in the digit storage.

### Satellite transmission

This sequence of tones is then transmitted, over a private telephone line, to the satellite earth station in Greece. Should a television channel be used, via satellite, to transmit the ceremonies to Canada, the sequence of tones will use the voice band of this TV channel. The viewers will then hear this sequence of tones when the flame is applied to the sensor. The tones are identical to those used in a



standard touch-tone telephone set and, as such, are easily identifiable by the viewers as a telephone call being generated.

From the earth station in Greece, the signal is then transmitted, via a communications satellite (INTELSAT), to a satellite earth station in Canada, and from there, via private telephone facilities, to Parliament Hill in Ottawa. The usage of telephone private lines or the voice band of a television channel implies that the telephone signal generated in Athens is not switched by the telephone companies involved, thus eliminating the risk of somebody accidentally or intentionally triggering the flame in Ottawa by dialling the appropriate sequence of numbers from an ordinary touch-tone telephone set.

### Tone decoder

The predetermined sequence of tones generated in Athens is received in Ottawa by a tone decoder. This device will be programmed to react only when the predetermined sequence of tones is received, once again for safety purposes. Upon reception of the appropriate sequence of tones, the tone decoder generates an electrical pulse which can be used either to light up the flame directly by triggering some form of spark discharge, or to trigger an optical display by means of laser beams, optical fibers, etc, prior to lighting up the flame. As previously mentioned, these special effects are to be defined by COJO and the producers of the Olympic Flame program.



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