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Signed

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## ALARMS BY CARRIER

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### Introduction

The number of fire and intruder alarm installations continues to grow each year and the methods at present available for the transmission of alarm signals to points where action can be taken are inadequate and are unsuitable either on grounds of cost or reliability for the increased demand expected in the future.

Alarm signals may be transmitted by:-

- a. Automatic dialling devices, connected to an ordinary telephone exchange line, usually calling the '999' service.
- b. Direct point-to-point private wires, rented from the Post Office, from the protected premises to the appropriate Fire or Police control room.
- c. Direct private wires, rented from the Post Office, sometimes shared by a number of installations, to a commercial central alarm station, where signals are checked and passed on as required to the Fire or Police control room.

Method a. has disadvantages both from the user and Post Office points of view; it demands a grade of service which the public telephone network is not designed to give. The service given by these devices must in any case be somewhat worse than that obtained from a telephone connected to that line, taking into account the additional factors which are not under the control of the Post Office. It should be remembered that while these dialling devices are 'approved for attachment', this approval does not refer to the reliability of the device itself.

Method b. is expensive because connection to continuously manned operation rooms or central points, sometimes Fire Brigade or Police HQ, may involve long private wires. Such circuits make very inefficient use of the Post Office line resources.

Method c. leads to long and elaborate private wire systems which present maintenance problems, and there is the added disadvantage that all calls are 'double handled' in that they are retransmitted to the required authority. Nevertheless the service given by commercial alarm stations, particularly in respect of security installations, is often comprehensive in regard to testing and checking throughout the day, although it is costly to the customer.

### Approach to GPO

Following discussions with the Fire Service Inspectorate and some of the larger fire brigades, informal talks were held at the Post Office Laboratories, Wembley, to ask whether they could design a transmission system for signals between fire detector installations and fire brigade controls. The requirements of such a system were broadly:-

- a. to be capable of handling a large number of alarms at the control point with a minimum of display equipment;
- b. to be self checking with automatic line fault alarm;
- c. fault alarm to be given at a Post Office maintenance centre;

- d. to be independent of the public mains electricity supply;
- e. to be available throughout the country at a low cost to the renter.

Fortunately these proposals fitted in well with development that was already in hand, aimed at making fuller use of the local telephone exchange line networks.

The Post Office considered that such a scheme was technically feasible but in view of the comparatively small number of automatic fire alarm installations known to exist, they felt that it could not be offered at a cost low enough to be attractive to potential users, unless the service was widened to include signals from at least the 'lower risk' security alarm installation as well, which at that time outnumbered the automatic fire alarms by about ten to one. (This did not mean that signals from fire alarms were considered to be less important than signals from the high risk security installations, but that many of the latter used comprehensive checking and routine testing procedures, for which a simple 'one way' system would not be suitable.) This was readily accepted although it was foreseen at the outset there might be difficulties in getting the system approved by all interested parties. We therefore asked that there should be the closest cooperation throughout the development stages not only with the Home Office, representing the fire and police authorities, but also the alarm companies themselves through their respective trade associations and the Fire Offices Committee.

After development work in the laboratory, it was decided that a field trial should be set up in the Bradford telephone area, extending into part of the West Riding.

#### Principle of Operation

- a. The system operates over the local telephone exchange network; but the method of transmission using a frequency well above the audible range, known as a carrier, is quite separate from the exchange switch equipment and there is no interference with or dependence on normal telephone calls. Each protected building is fitted with a small unit consisting of a transistor carrier generator connected to an exchange line and provided with means for superimposing alarm signals from the fire detector installation on the carrier.
- b. The carrier signals are detected at the local telephone exchange and each exchange within an area is linked by a special line network to an appropriate central exchange. This network is equipped with tone signalling and time sharing apparatus (time division multiplexing) which checks each risk connexion once every three seconds, and an alarm signal is registered in a central store.
- c. The central store automatically identifies and redirects the information to the appropriate fire or police control over a specially provided private circuit.
- d. At the fire or police control the information is printed out in coded form on a new type of tape machine.

#### Main Features of Scheme

- a. A single system as described could accommodate many hundreds of separate alarm installations; where required a second system could be added covering the same area.

- b. Alarm signals are given to the correct point. For example, where a system covers more than one fire brigade, alarms proper only to each brigade are received. It is proposed there should be no charge to the Fire or Police authorities, all costs being covered by the rental paid by the customers.
- c. Line faults are transmitted to a Post Office maintenance centre, where the necessary action will be taken. For security alarms, line faults will also be transmitted to the police control.
- d. The main line links in the system will be provided with automatic changeover facilities to standby circuits to avoid the loss of signals from whole exchange areas.
- e. The lines to the fire or police controls are provided in duplicate; they are constantly monitored and facilities are incorporated for checking both the print out circuits and mechanism and the state of the system at any time.
- f. All equipment will be independent of the public mains supply even at the protected premises; the carrier unit includes a small charger unit with a rechargeable dry battery.

#### Progress of Bradford Trial

It was not until the beginning of 1970 that trials finally started, due mainly to the Post Office having difficulty in obtaining certain items of apparatus. There will be some 60 alarm systems connected (roughly half of which are fire detectors) with printers installed at the County and City fire and police controls.

The basic transmission system has sent many thousands of signals to the printer at the Post Office centre with virtually no errors, and a comprehensive testing programme has confirmed the merits of the system. In instances where an alarm installation has been linked to both an ABC channel and an existing '999' dialling device, it has been clearly shown that the '999' call has on occasion been received a matter of minutes after the ABC call.

An interesting and not unimportant side effect of the trial was an improvement in the reliability of the local exchange lines themselves, brought about by the virtual continuous monitoring feature of the system.

#### Introduction of the System

It is clear that the system will meet the requirements for the great majority of alarm installations and if the price is right the Post Office should have no difficulty in finding sufficient potential users to justify the large capital investment which would be needed to provide a countrywide service.

There is however a major difference between police forces and fire brigades in the way in which they are organised to deal with emergency calls. Almost every fire brigade now operates a centralised mobilising system which means that all alarm calls are received at a central 'action point'. Thus a fire brigade is readily served by a single print out installation. On the other hand police action tends to be initiated at local controls (perhaps as many as a dozen within a force area) and whilst the ABC system can be arranged to meet such a requirement, it does increase considerably the basic cost in terms of the number of alarms served by each printer. In order to offer the service at a reasonable rental it is likely that the PO will undertake to serve only a very small number of police action points within each force area.

Throughout our discussions on the facilities to be available, we have tried to ensure that regular routine testing to fire brigade controls would not be necessary, as, with the very large numbers of connections envisaged, an intolerable load would be placed upon the control staff. The Fire Offices Committee have rather stringent rules on this, but there are signs that at least a reasonable compromise will be reached.

Although no final decision has yet been taken by the PO, we are hopeful that ABC, so long awaited, will be introduced into at least the large conurbation areas where there are many alarm installations now waiting to be served.