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EMERGENCY COMMUNICATIONS

By: D S Oldnall

Introduction

The normal everyday work of Police Forces and Fire Brigades calls for the use of radio communication equipment. Both bodies are equipped for this routine and their communication capability is usually sufficient for their needs.

When an incident grows in scale or extends beyond the normal duration, the communication capability of the units in attendance frequently becomes insufficent to carry the traffic generated, and/or provide the communications necessary for liaison between the various services in attendance. At this point a requirement exists for a communications unit with a capability to provide the increased communication requirement. Obviously, this communication unit must be provided quickly when required and the only possible source is either the police or fire service.

At present almost every police force and some fire brigades are equipped to provide this communication support. The equipment carried, the vehicle, and the facilities available vary considerably, as may be expected. There has never been an attempt to standardise such facilities and as a result the capability varies considerably between the various forces.

When an incident becomes an emergency there is sometimes a need to provide more communications than can be expected to be provided from force held resources. Contingency planning by the Directorate of Telecommunications has foreseen such requirements, and action has been taken to provide equipment to cover any possible requirement for reinforcement, substitution or replacement of existing communication facilities used by police and fire forces.

The Response to an Emergency

The ideal solution to contingency requirements would be for every force to own a fully equipped mobile communication group which could provide all the facilities required at any time. It is obvious however that such a group would be extremely expensive to produce and would not be a cost-effective solution. Our studies have shown that the requirement can be effectively covered by a three-phased response which, though expensive, appears to be a cost-effective solution.

The first response is that provided by the force. The number of communication units held by the force to provide this response will obviously depend upon funds available but it is essential that all forces have the minimum single unit. As stated in the introduction, most forces (particularly police) hold such a unit. The capability of the unit will be described later.

The second and third responses are the responsibility of the Home Office. The second response is a mobile communication group held at each Regional Wireless Depot throughout the country, and at one Sub-Depot - a total of 11. These groups will be set up as required by Home Office personnel and will provide office accommodation in addition to technical equipment.

The third response is a mobile communication column which can replace an existing radio site or set up a complete independent communication network, should this be required. Two of these columns are held centrally and are manned by Home Office personnel.

Full descriptions of Home Office facilities are given later.

In the event of an emergency and should additional communications be required the response would be:-

a Attendance by the force vehicle and at the same time advice to the Regional Wireless Engineer of the situation and that there is, or may be, a requirement for additional support, with details of the possible requirement. This advice will enable the RWE to prepare equipment and warn personnel, particularly important when the emergency arises outside normal working hours.

b Call-in of Depot held resources. The actual response time will vary, but the earliest warning to the RWE will reduce this to a minimum. This early warning is most important, the RWE would prefer early warning and then to be stood down if necessary rather than not being warned until actually required.

c Call-in of Central Resources. The decision to call these will be taken by the force and RWE, and will be arranged by the latter.

In addition to contingency use, the Directorate of Telecommunications support can be made available for preplanned events and will often provide a more efficient service than has been given in the past by ad hoc arrangements.

Training

Efficient support can be given in an emergency only if all personnel likely to use the facilities have been trained and made fully conversant with them. To this end the maximum use should be made of the equipment, both force and depot held, for exercises and preplanned events. This non-emergency use will also exercise the equipment and ensure that it is more likely to work when deployed for emergencies.

Costs

As with all other equipment supplied by the Directorate of Telecommunications it has been ruled that rental charges will be raised for the use of this equipment. Unfortunately the rates have not yet been decided but will be advised by the Home Office in due course.

Availability of Equipment

The support available from the Home Office at present (August 1971) is:-

a Central Resources. Two columns completed and in use.

b Depot Resources. Two Depots - Cranbrook (Kent) and Bridgend (Glamorgan) are operational although not yet complete to scale. The next Depot due to complete is Kippax (Yorkshire). The remaining Depots have received their vehicles, and equipment outstanding is being provisioned. It is envisaged that all Depots will be completed by July 1972.

Modifications

Many modifications have been incorporated in the vehicles described as a result of demonstrations and deployments. We are anxious to improve our communication vehicles and any comments or suggestions will be welcomed, particularly on the use of the new radio teleprinter facility being demonstrated.

Details of Vehicles and Equipment

SYSTEM I - First Response (Police only).

The system involves the provision of a vehicle fitted with two battery-operated transmitter/receiver units, as follows:-

a A normal 10 channel mobile unit, preferably wide band, ie capable of being switched to any frequency in the Police/Fire Brigade bands, and also for preference capable of being used in the AM or FM mode. This unit will use a normal roof-mounted $\frac{1}{4}$ wave aerial.

b A 5 channel UHF mobile unit in the reverse frequency mode, ie capable of operating as a main station and communicating with normal pocketfones.

To be fully effective this unit will use 2 aerials which can be roof mounted, but in order to increase the effective range a pneumatic mast 30 ft in height should be fitted to the vehicle, and provision made for mounting aerials on this mast.

A special control unit to provide the following facilities: -

a Normal operation to base on the 10 channel set, or communication with other mobile units on the same channel, via the main wireless scheme talk-through facility, as shown on Figure 1.

b Using the UHF 5 channel set as the control, communication with any other unit at the scene, as shown.

c By using the UHF set in the talk-through mode, inter-communication between any or all of the units at the scene.

d By auto switching the UHF 5 channel receiver into the VHF 10 channel transmitter, and the VHF receiver into the UHF transmitter, the vehicle becomes a repeater, re-transmitting anything received from units present, on to the VHF transmitter, and anything received from HQ control, out on the UHF transmitter, to all local units.

There is no reason why a portable generator, battery charging facilities, or additional lighting should not be carried, provided the basic communications system described above does not depend for instant availability on anything other than the vehicle battery, already in situ and connected to equipment for use, if necessary, whilst on the move.

The other ends of this co-ordinating network are provided by the use of standard UHF pocketfones, and it is not intended, generally speaking, that these shall be carried permanently on the vehicle. Every force has a number of pocketfone schemes, and every emergency will take place in one or other of the Divisional or Sub-Divisional areas served by such a scheme.

When an emergency occurs therefore, the emergency vehicle, probably located at the Division, should take on board a number of pocket sets, obtained either from those surplus to routine requirements, or borrowed from now less important beats.

On arrival at the emergency these pocket sets, issued to other attending units, will provide immediate communications for phase I; furthermore, as these sets will normally be used daily, they stand a very good chance of being serviceable.

There are probably up to 5 or 6 channels in use in a force area, so there will be no difficulty in selecting the channel required on the 5 channel set.

As this vehicle is simple in concept, training in its deployment and use can also be simple.

It cannot be over emphasised however, that to be fully effective this vehicle must be as ready to proceed to an emergency as a fire appliance is to proceed to a fire.

Fire brigades do not have UHF personal radio and would therefore not fit the UHF set. (Current trials with personal radio for fire brigades may result in their possessing this capability in the future). It is possible that as the police are often in attendance at fire emergencies their vehicle could provide the liaison communications. Comments are invited from Fire Officers on this point and also whether any other equipment could usefully be fitted.

System II Details of Scheme

System II is intended to provide a follow-on or back-up of unit for the force owned System I.

As shown on Figure 2 this system consists of 3 vehicles, a portable generator, and a 100 ft telescopic mast, and is normally intended to be held at Regional Wireless Depots, and to be set up by technicians.

It is much more sophisticated in concept than the system described previously, but still uses a great deal of standard equipment, and is versatile; Figure 3 shows a possible use.

A block diagram (Figure 4) details the equipment fitted; the diagram is divided into 3 sections:

a Depot Emergency (relay) Vehicle, Signals Vehicle A

b Depot Emergency (ops) Vehicle, Signals Vehicle B

c Police, Fire Brigade or other premises used either temporarily or permanently as the control point.

Signals Vehicle A (Section I Figure 4):-

This vehicle contains the following equipment, which by means of a patching panel can be connected to perform the functions indicated under each.

a. AF101 (set no 1)

This is a battery powered transmitter/receiver, which can be set to operate on any frequency in the Police or Fire Brigade mobile bands.

The bandwidth can be varied to suit the operating conditions, and the unit can transmit or receive on AM or FM.

This extremely versatile equipment can be used as:

(i) a mobile unit in communication with any Police or Fire main scheme

(ii) a main station in communication with any mobile unit

(iii) as a radio link to vehicle "B" to a Police or Fire main scheme, or to a fixed location used as a control point.

b. Standard Mobile (Set No 2)

This is a battery powered 10 channel mobile transmitter/receiver which can be used to:

(i) Provide a link with any Police or Fire scheme to which the 10 channels are set up

(ii) Provide as above for the vehicle on the move.

c. Pocketfone base section (Set No 3)

This transmitter/receiver unit can be used to control:

(i) A network of pocket sets carried on the vehicle

(ii) Pocket sets operating with other force controls at the scene, to provide inter-unit communication.

d. Main receiver (Set No 4)mains operated

This is a mains operated receiver of the same type as that used in a normal police or fire main scheme, and is intended to provide a long term mains operated receiving site for:

(i) Local mobile vehicles

(ii) Another fixed station

e. Main transmitter 50 watts (Set No 5) mains operated

This is a high power main transmitter as used in Police or Fire main schemes, and is intended to provide a long term mains operated transmitting set complementary to the receiver under (d).

f. AF101 (Set No 6)

This is a replica of Set No 1, and can be used for the same variety of purposes.

g. VHF link transmitter and receiver, mains operated (Set Nos 7 and 8)

These are intended to provide radio links to:

(i) Vehicle B

(ii) Temporary fixed control premises

(iii) Normal Police or Fire main schemes.

h Pocket Radio Set No 15

This can be used to provide communication with the local pocket set scheme, and can be used in vehicle B, or fixed premises.

These units are all provided with local control facilities, and also with remote control panels, to enable them to be operated over telephone lines.

Signals Vehicle B Section II Figure 4:-

This vehicle contains the following equipment connected to perform the functions indicated under each.

a AF101 Set No 1

A battery powered mobile transmitter/receiver as in signals vehicle A Section (a) and capable of the same functions.

b VHF link transmitter and receiver mains operated (Sets Nos 13 and 14)

These are the counterpart of Sets Nos 7 and 8 in vehicle A and can be used for all the same purposes.

All units are provided with local controls, the VHF link (b) above is provided with a remote control panel to enable this link to be controlled via a telephone line.

Remote control panels are also provided to terminate the remote control panels in vehicle A, thus extending control of equipment in vehicle A to vehicle B.

Police or Fire premises Section III Figure 4:-

By locating:

(a) An AF101 transmitter receiver

(b) A VHF link transmitter and receiver

(c) Remote control panels

in Police or Fire premises, or in a building taken over as control, all the pre-arranged functions of equipment in vehicles A and B can be controlled from this building.

Practical assembly of vehicles:-

Figures 5 to 11 inclusive are mainly self-explanatory and show some of the uses for these vehicles.

Figure 8 shows vehicles A and B co-sited.

Figure 9 shows vehicles A and B separately sited, and linked by radio to provide optimum results from a hill top site, and convenience of control near the scene of operations.

Extension is also shown into a building.

Figure 10 shows vehicle A used as a repeater in a static chain, and linked to vehicle B and a building as above.

It should be noted that the equipment carried on these vehicles is a mixture of battery and mains operated units, thus failure of the portable generator or of the battery supplies does not put the signals unit out of action.

Furthermore all the equipment carried can be used as spares for maintenance of the normal Police or Fire Brigade schemes.

The Land Rover (Vehicle C) is fitted with its own mobile radio system and is intended to give technical personnel mobility during and after installation of the communications vehicles A and B.

The communications system herein described, being mobile and designed for maximum versatility, an be set up in a large number of configurations, and in almost any location.

Furthermore it has the power and sophistication of a force main communications network.

System III L ails of Scheme

As shown on Figures 13 and 14 system III comprises 2 complete mobile communications columns, each capable of:

a Communicating in the VHF band on 4 channels, employing 3 x 50 watt and 1 x 250 watt, main transmitters.

b Providing a UHF pocketfone scheme complete with 50 pocketfones and battery supplies to enable pocketfones to be employed on a 24 hour basis.

c Providing a number of 2-way radio links for inter-vehicle or vehicle to local force operation.

d Providing operational sub-control of a local scheme, via talk-through, from a radio sub control transmitter/receiver.

e Providing mobile communications on any channel by means of 3 all-channel mobile units. These units can be used whilst en route.

f Providing telephone communications by means of 3 exchange telephone lines; one of these lines can be used for the teleprinter installed in the control or Comcentre vehicle.

g Providing 9 local telephone extensions via a PBX carried in the Comcentre vehicle.

h Providing mobile sets on 2 channels for 50 cars, and distributed between 2 channels for 30 motor cycles.

j Providing 2 x 10 KVA power supplies and an emergency floodlighting system.

Vehicles carry their own 30 ft telescopic masts, and additionally, a 100 ft trailer mast is part of the complement of each column.

The equipment is carried on 4 vehicles as follows:

a Base Station Vehicle containing:

(i) 4 main transmitter/receiver units

(ii) Associated radio links

(iii) VHF Radio Sub-Control

b Operations Radio Vehicle containing:

(i) Radio link equipment to communicate with 1 (b) above

(ii) Pocketfone base station and 8 pocketfones.

c Operations Comcentre Vehicle containing:

(i) 2 complete control systems

(ii) Tape recorder

(iii) PBX with 3 exchange and 6 extension outlets

(iv) Teleprinter

(v) All-channel mobile equipment

(vi) Pocketfone base station in duplicate, plus 42 pocketfones, batteries and chargers. Remote control facilities for the dual base station are also provided.

(vii) 2-way radio link.

This vehicle can be sub-divided internally into 3 sections, each with its intercom telephone system.

To bring the whole system up to date and to provide a relatively fool-proof last means of getting back to base, speaking tubes are provided between the main body of the vehicle and the driver!

d Spares and Workshop Vehicle.

These mobile columns were employed in Wales for the Investiture, and for events which preceded and followed.

They provided, or were on standby duty for communications with:

a Normal Police radio schemes

b " " pocketfone schemes

c Special security pocketfone schemes (3 in number)

d Communications with security helicopters

e " " Queens flight aircraft

f " " Royal Yacht

g " " Security Co-ordinator

h Liaison with ancillary forces and facilities

This was an extremely complex communications exercise, and throughout no system failed.

In addition the columns have been on stand-by duty for civil emergencies, and part is at present being employed in Northern Ireland.

Mr D S Oldnall joined the Directorate of Telecommunications on 1 February 1971 after 24 years service in the Royal Electrical and Mechanical Engineers as a Specialist Electronics Officer. During his Army service he was trained in Telecommunications Engineering at Leicester College of Technology and was later engaged in the training of Telecommunications Technicians, the installation of long distance HF radio links, evaluation of new electronic equipment and the writing of technical handbooks. Later he was responsible for defect investigations as a staff officer(Tels) in the War Office, the Ministry of Defence and HQ MELF. He was attached to the Directorate as MOD Liaison Officer in 1968. Since joining the Dirctorate he has been responsible for the Special Duties Section of Field Services.

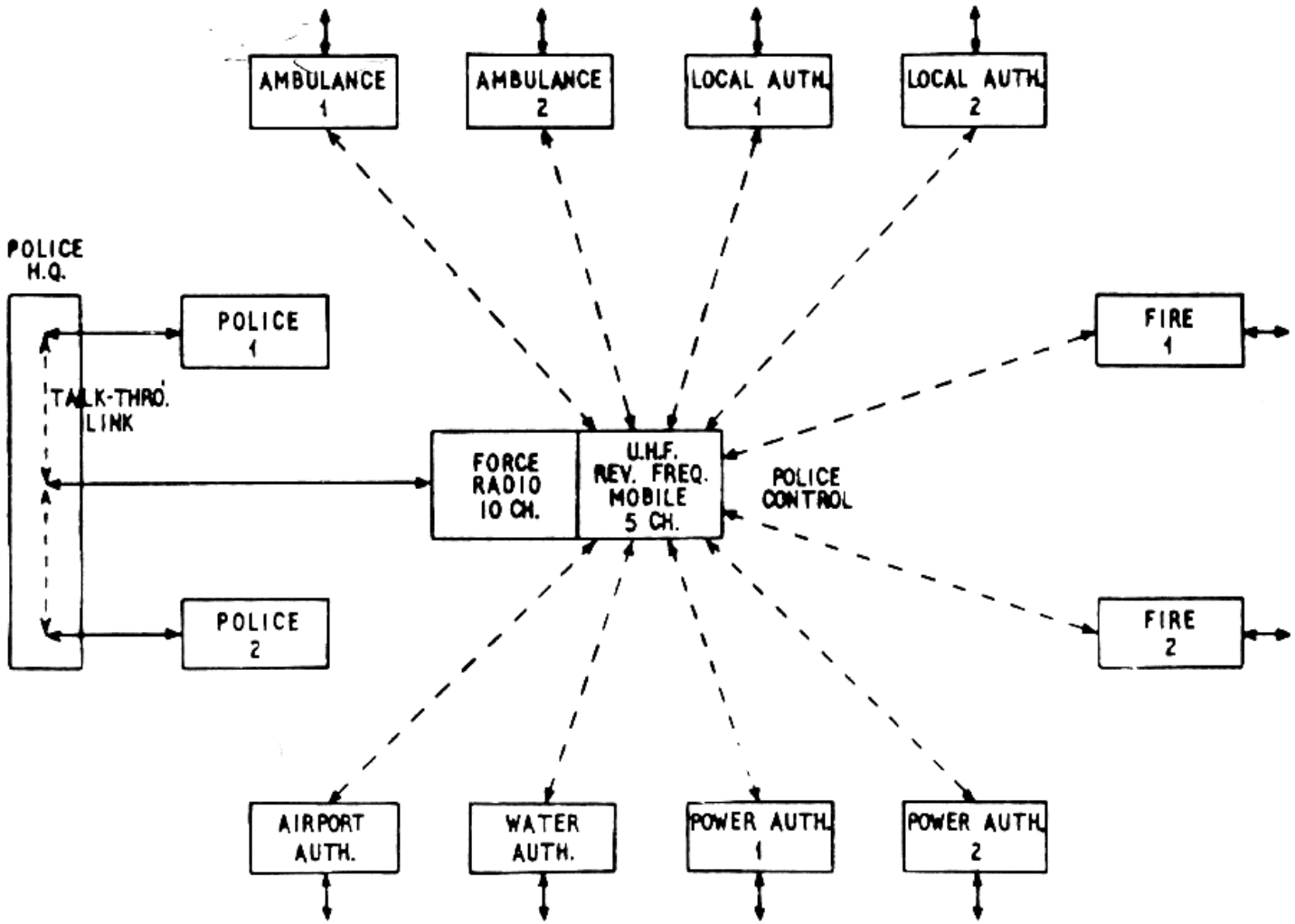
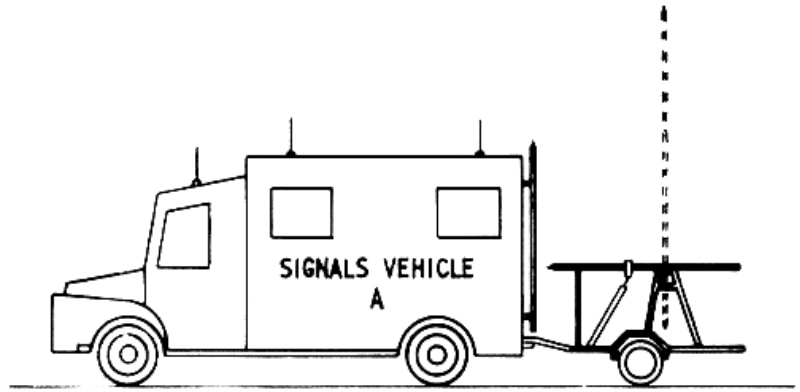
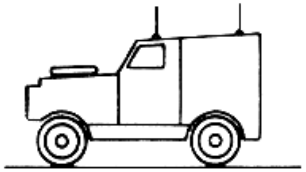

AMBULANCE 1
AMBULANCE 2
LOCAL AUTH. 1
LOCAL AUTH. 2
POLICE H.Q.
POLICE 1
TALK-THRO. LINK
POLICE 2
FORCE RADIO 10 CH.
U.H.F. REV. FREQ. MOBILE 5 CH.
POLICE CONTROL
FIRE 1
FIRE 2
AIRPORT AUTH.
WATER AUTH.
POWER AUTH. 1
POWER AUTH. 2
POLICE EMERGENCY VEHICLE

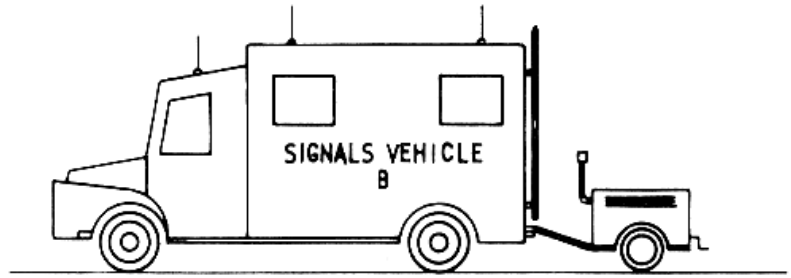
FIG. 1



TRAILER MAST
100 FT.



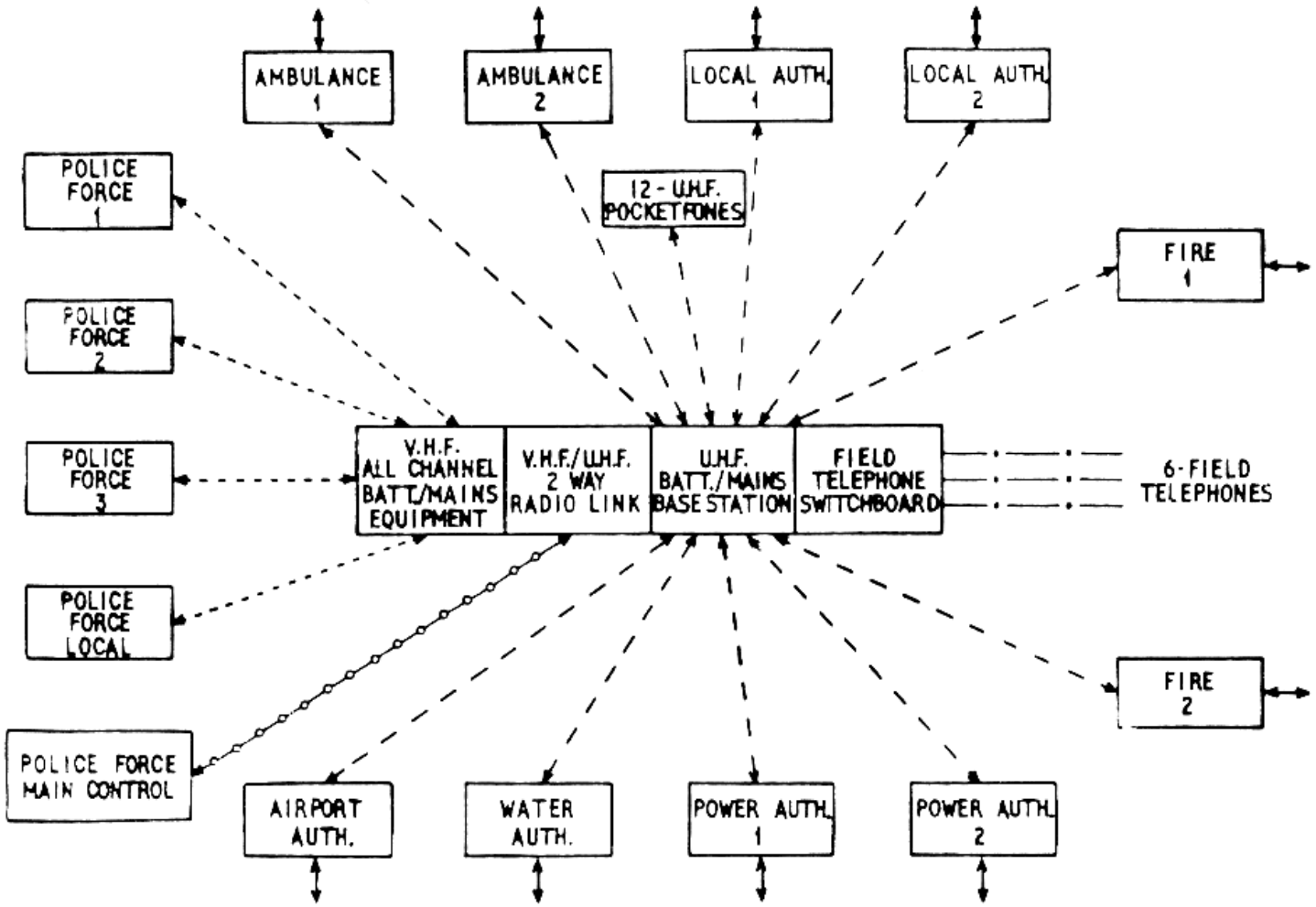
LAND ROVER
C



PORTABLE
GENERATOR

REGIONAL DEPOT BASED EMERGENCY SIGNALS UNIT

FIG. 2



REGIONAL WIRELESS DEPOT BASED EMERGENCY COLUMN

RADIO VEHICLE & TRAILER MAST : OPERATIONAL SIGNALS UNIT : LAND ROVER & 10 K.V.A. GENERATOR

FIG. 3

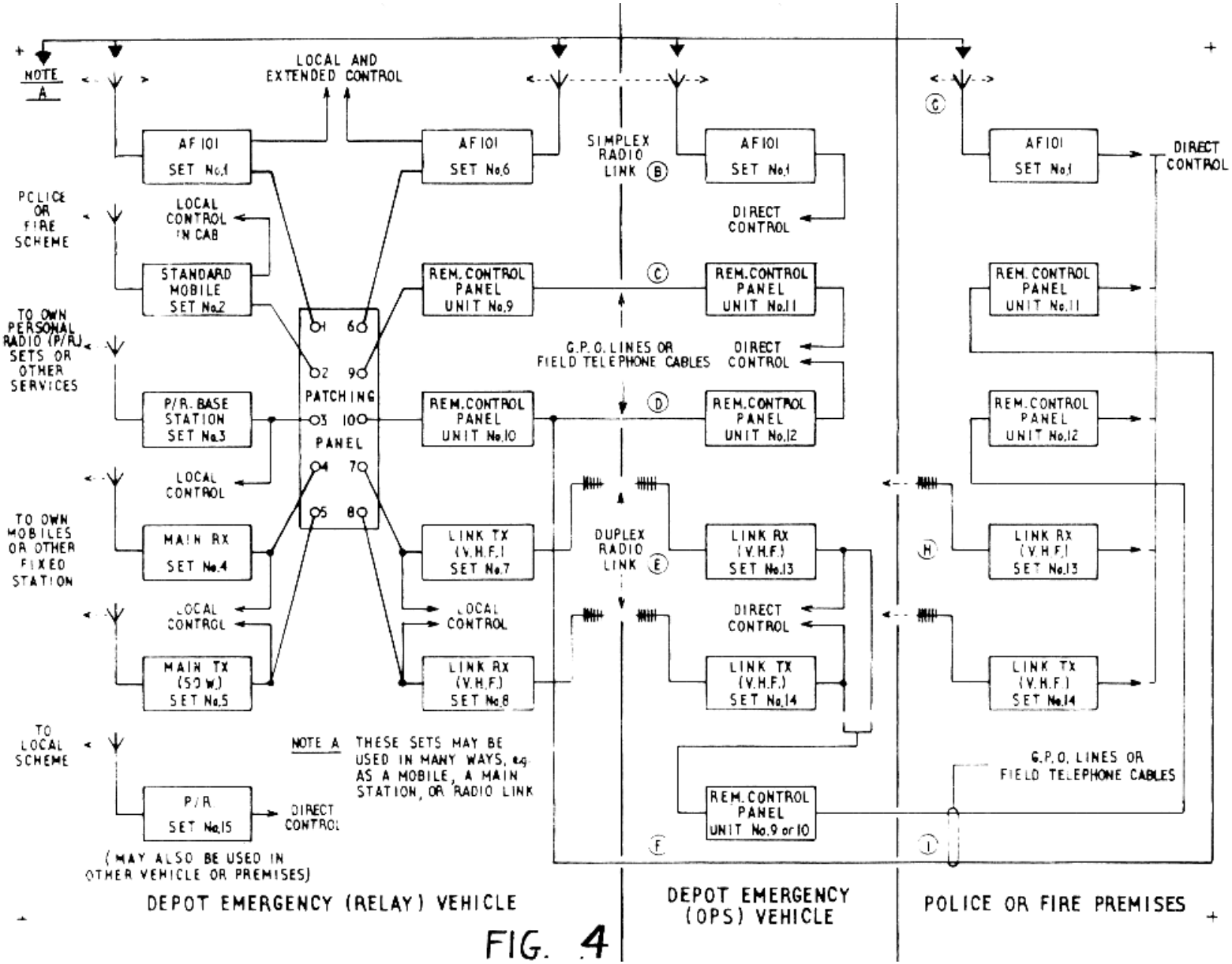
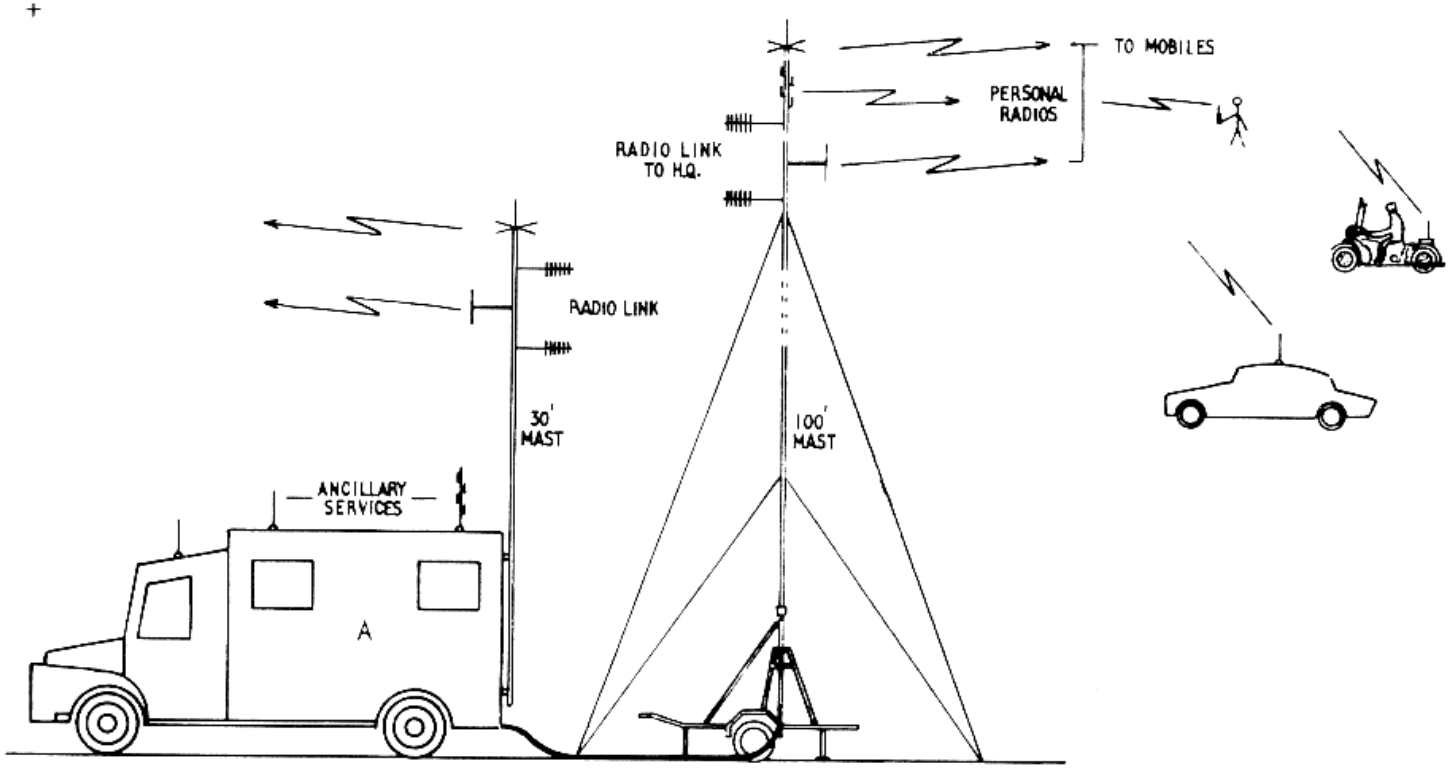
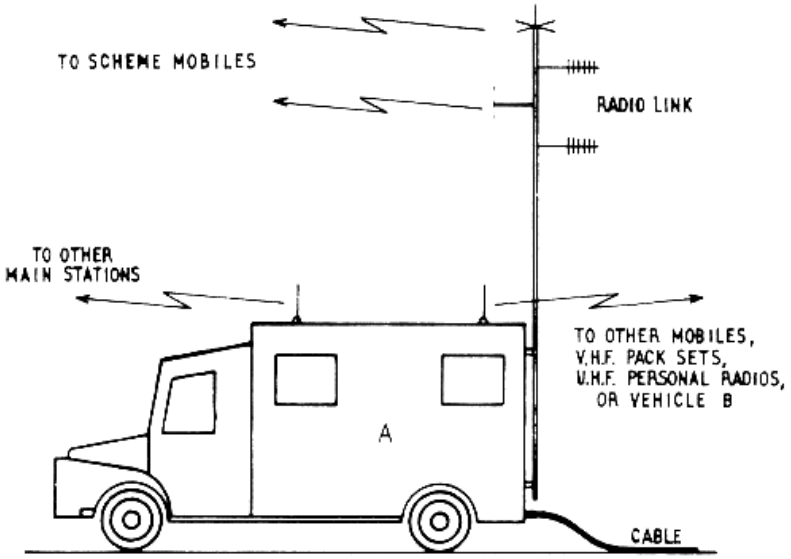

NOTE A
LOCAL AND EXTENDED CONTROL
AF 101 SET No.1
AF 101 SET No.6
SIMPLEX RADIO LINK (B)
AF 101 SET No.1
AF 101 SET No.1
DIRECT CONTROL
POLICE OR FIRE SCHEME
LOCAL CONTROL IN CAB
STANDARD MOBILE SET No.2
REM. CONTROL PANEL UNIT No.9
(C)
REM. CONTROL PANEL UNIT No.11
REM. CONTROL PANEL UNIT No.11
TO OWN PERSONAL RADIO (P/R) SETS OR OTHER SERVICES
G.P.O. LINES OR FIELD TELEPHONE CABLES
DIRECT CONTROL
1 6
2 9
PATCHING
3 10
PANEL
4 7
5 8
P/R. BASE STATION SET No.3
REM. CONTROL PANEL UNIT No.10
(D)
REM. CONTROL PANEL UNIT No.12
REM. CONTROL PANEL UNIT No.12
LOCAL CONTROL
TO OWN MOBILES OR OTHER FIXED STATION
MAIN RX SET No.4
LINK TX (V.H.F.) SET No.7
DUPLEX RADIO LINK (E)
LINK RX (V.H.F.) SET No.13
(H)
LINK RX (V.H.F.) SET No.13
LOCAL CONTROL
LOCAL CONTROL
DIRECT CONTROL
MAIN TX (50 W.) SET No.5
LINK RX (V.H.F.) SET No.8
LINK TX (V.H.F.) SET No.14
LINK TX (V.H.F.) SET No.14
TO LOCAL SCHEME
NOTE A THESE SETS MAY BE USED IN MANY WAYS, e.g. AS A MOBILE, A MAIN STATION, OR RADIO LINK
G.P.O. LINES OR FIELD TELEPHONE CABLES
P/R SET No.15
DIRECT CONTROL
REM. CONTROL PANEL UNIT No.9 or 10
(F)
(I)
(MAY ALSO BE USED IN OTHER VEHICLE OR PREMISES)
DEPOT EMERGENCY (RELAY) VEHICLE
DEPOT EMERGENCY (OPS) VEHICLE
POLICE OR FIRE PREMISES

FIG. 4



VEHICLE A AT HILL TOP SITES
SHOWING ALTERNATIVE 30 FT. & 100 FT. MASTS

FIG 5

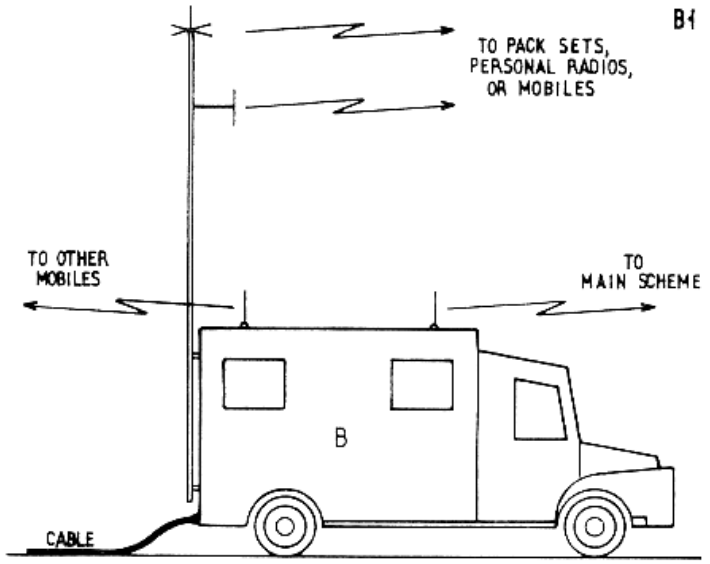


Vehicle A at hilltop site acting as substitute for, or addition to existing Main Station.

Ancillary facilities

Link to other Schemes.
Link to Vehicle B.
Link to other stations of own Scheme.

FIG. 6



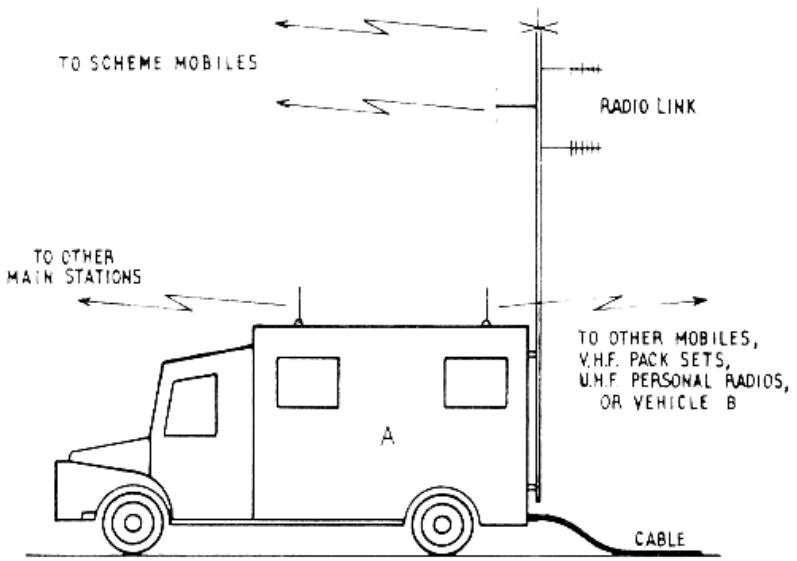
Vehicle B may be used on its own as a Control Station for local operations

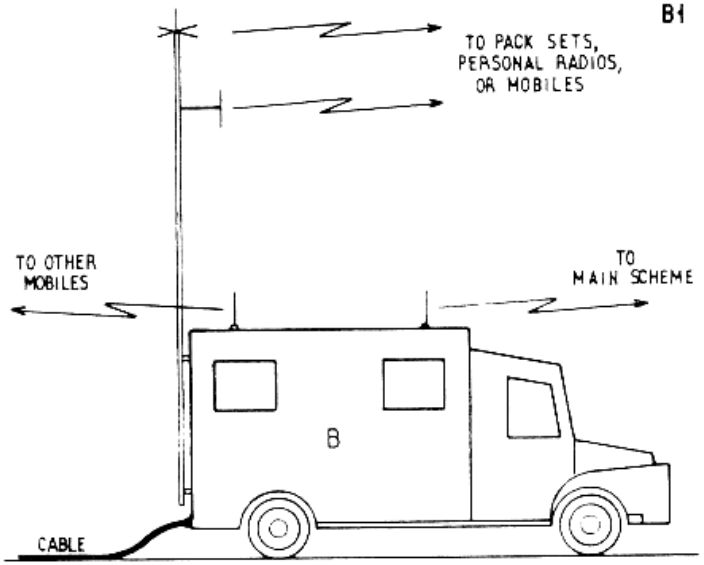
Ancillary facilities

Sub Control on own Scheme.
" " on adjacent Scheme.
" " of other Mobiles.

It can also be linked by a multi way cable to Vehicle A when co-sited.

FIG. 7





Vehicle A at hilltop site acting as substitute for, or addition to existing Main Station.

Ancillary facilities

Link to other Schemes.
Link to Vehicle B.
Link to other stations of own Scheme.

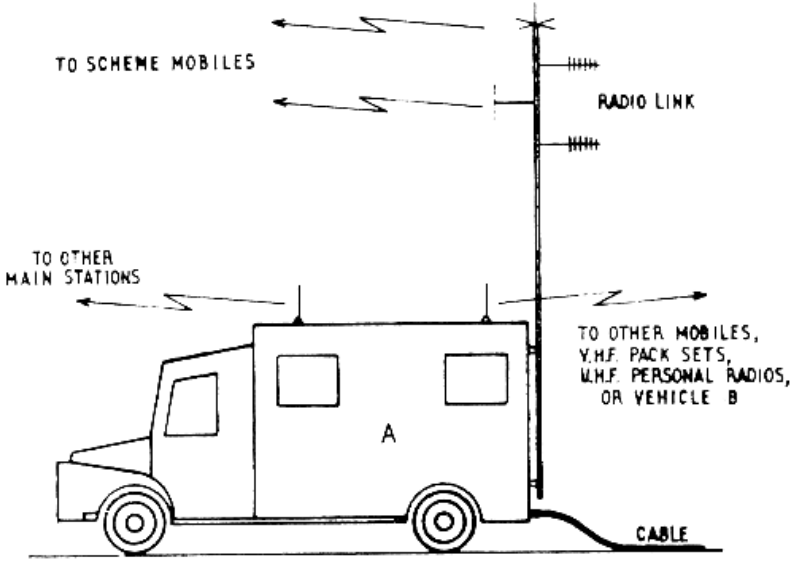
Vehicle B may be used on its own as a Control Station for local operations

Ancillary facilities

Sub Control on own Scheme.
" " on adjacent Scheme.
" " of other Mobiles.

It can also be linked by a multi way cable to Vehicle A when co-sited.

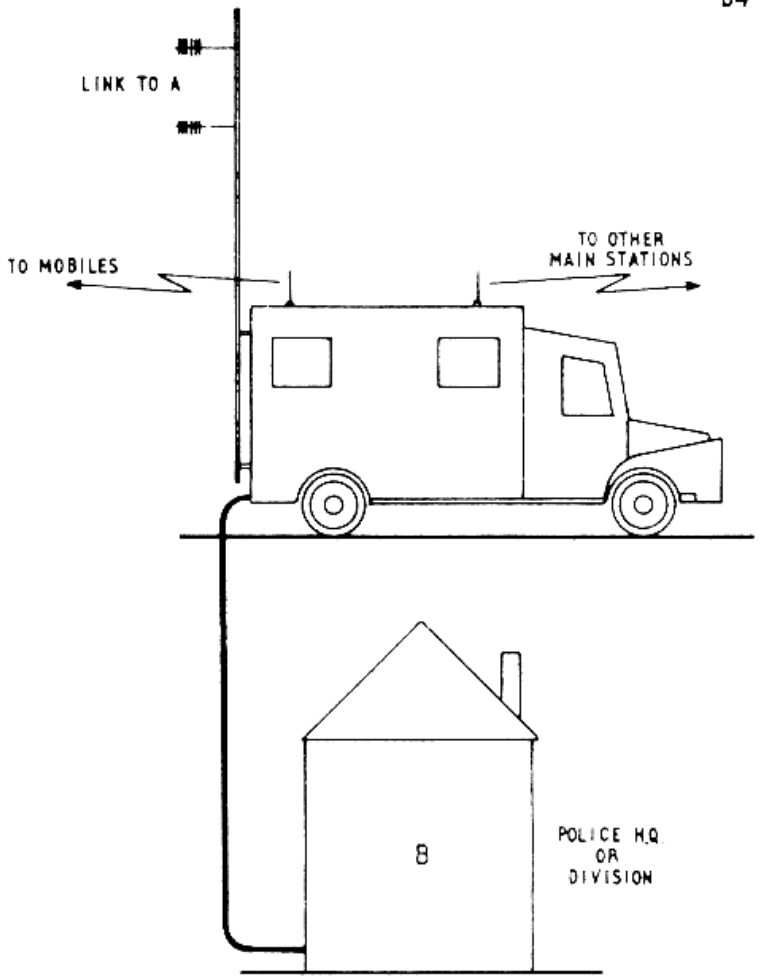
FIG. 8



Vehicle A at hilltop site acting as substitute for, or addition to existing Main Station.

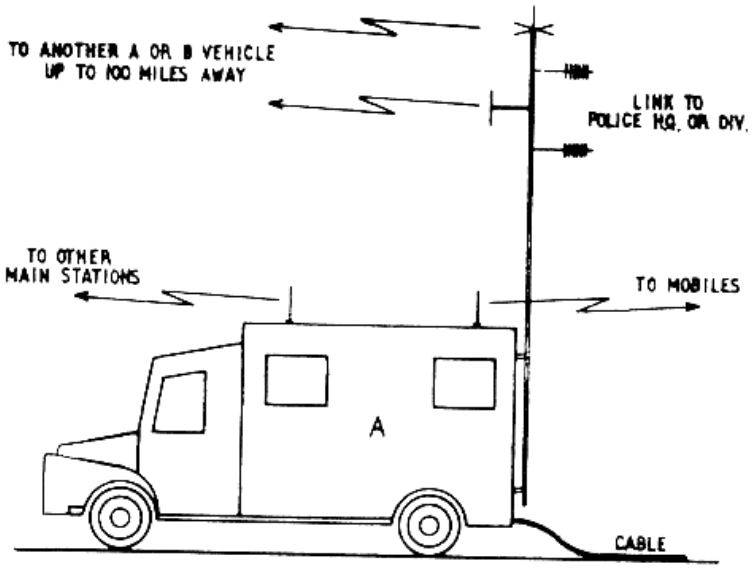
Ancillary facilities

Link to other Schemes.
Link to Vehicle B.
Link to other stations of own Scheme.



Facilities as B2 but Control extended to Police H.Q.

FIG. 9

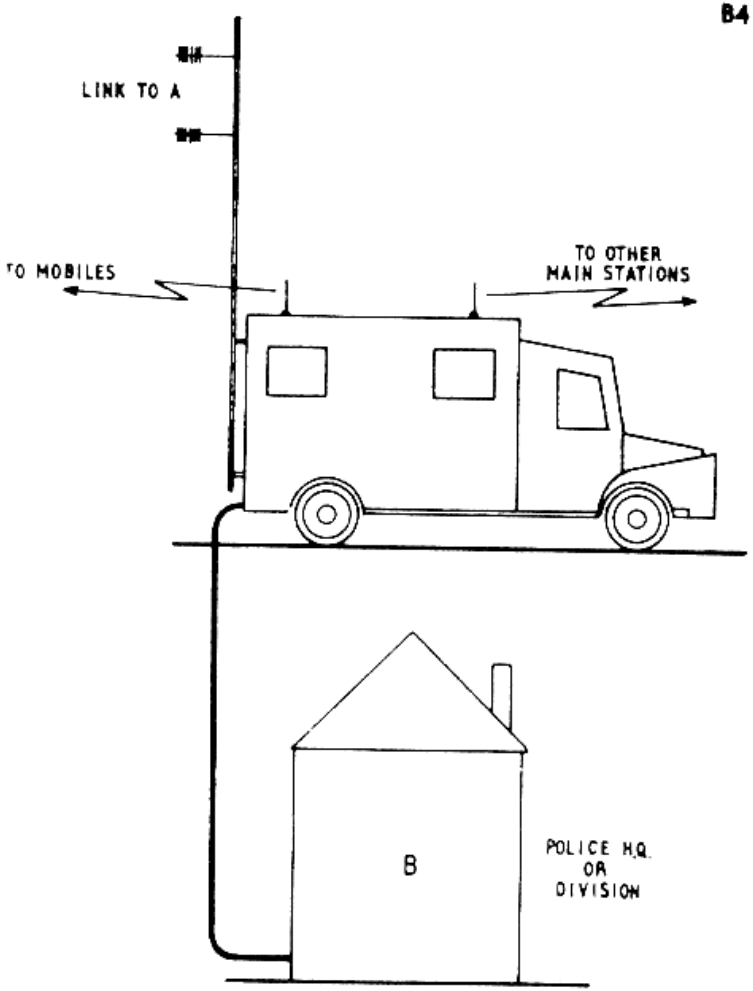


Vehicle A used as Repeater station in a static link.

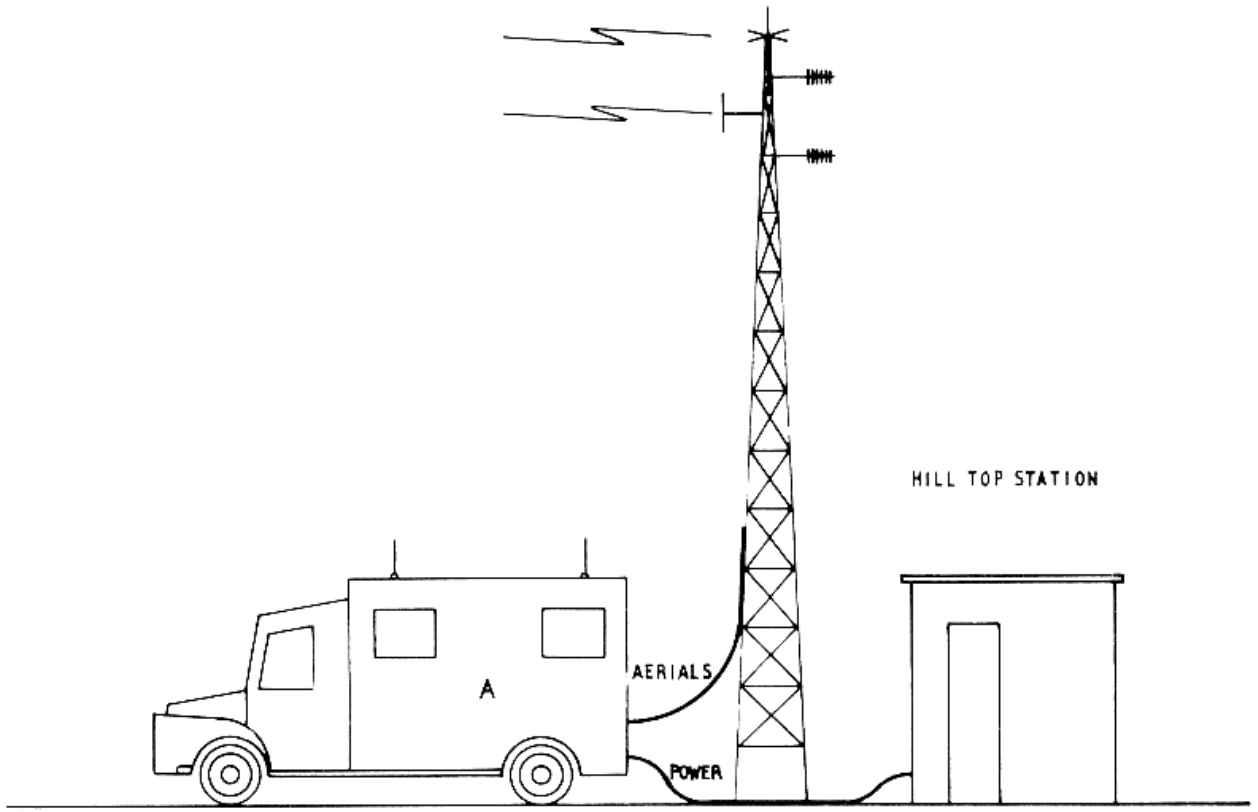
Ancillary facilities

Link to other Main Stations.
Link to Mobiles.

FIG. 10

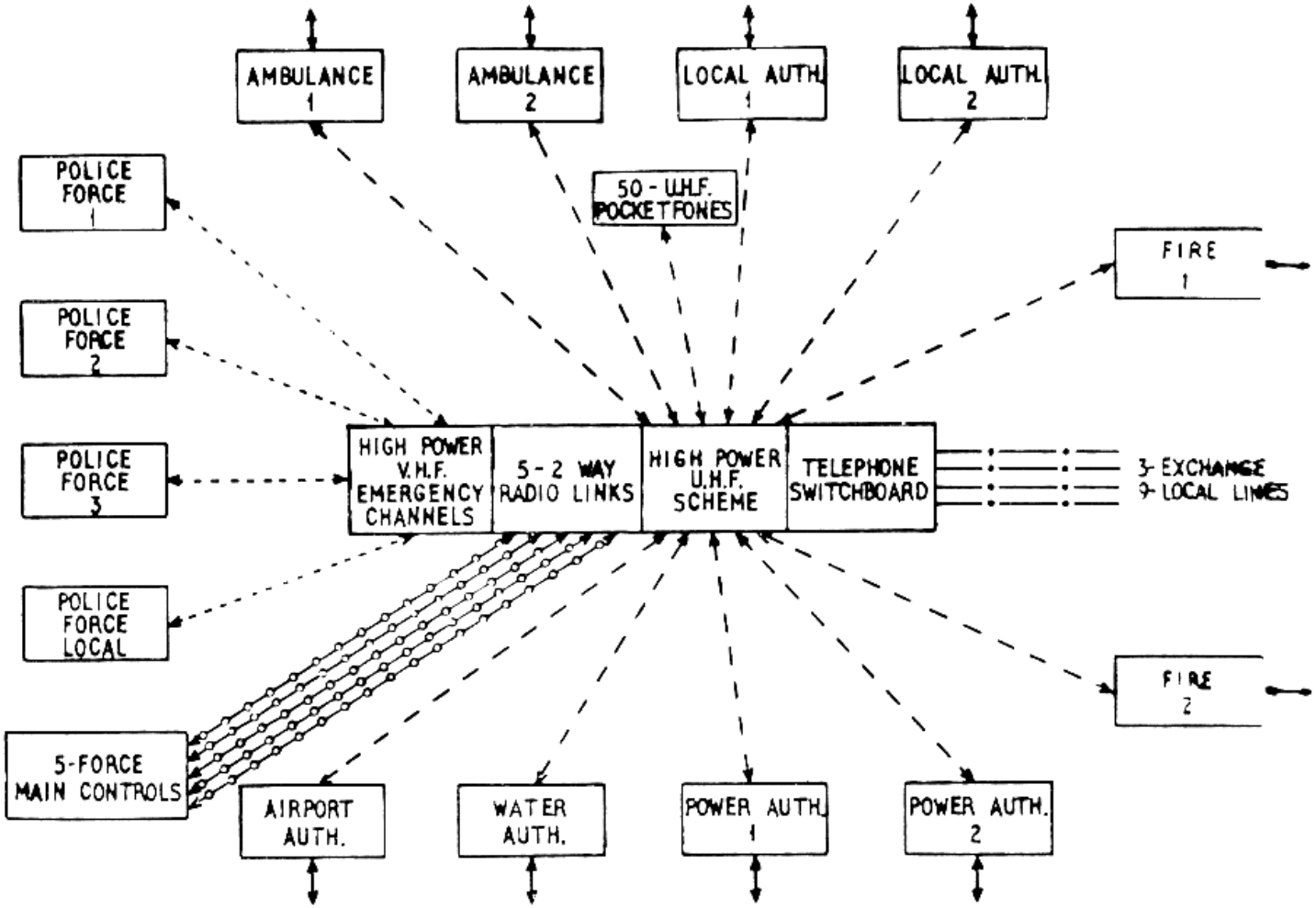


Facilities as B2 but Control extended to Police H.Q.



VEHICLE A USED TO PROVIDE TEMPORARY SERVICE
DURING BUILDING WORK OR EQUIPMENT CHANGES

FIG. 11



MOBILE SIGNALS COLUMN

OPS. COMCENTRE VEHICLE : OPS. RADIO VEHICLE : BASE STATION RADIO VEHICLE
2 x 10 K.V.A. GENERATORS

FIG. 13

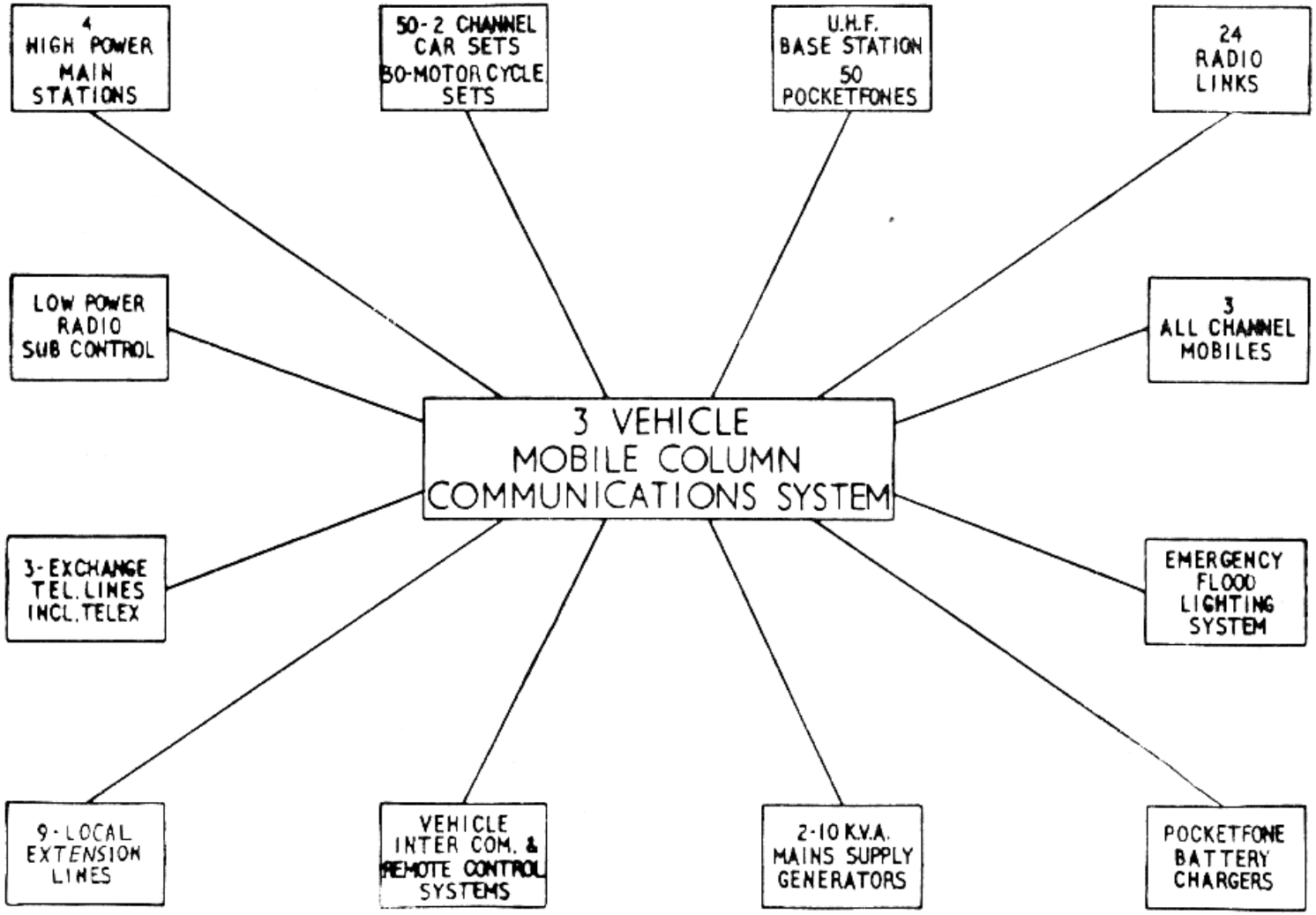

4
HIGH POWER
MAIN
STATIONS
50-2 CHANNEL
CAR SETS
80-MOTOR CYCLE
SETS
U.H.F.
BASE STATION
50
POCKETFONES
24
RADIO
LINKS
LOW POWER
RADIO
SUB CONTROL
3
ALL CHANNEL
MOBILES
3 VEHICLE
MOBILE COLUMN
COMMUNICATIONS SYSTEM
3-EXCHANGE
TEL. LINES
INCL. TELEX
EMERGENCY
FLOOD
LIGHTING
SYSTEM
9-LOCAL
EXTENSION
LINES
VEHICLE
INTER COM. &
REMOTE CONTROL
SYSTEMS
2-10 K.V.A.
MAINS SUPPLY
GENERATORS
POCKETFONE
BATTERY
CHARGERS

FIG 14