09 57 hrs

Fylingdales, Yorkshire: radar detects an attack on this country. The United Kingdom Warning and Monitoring Organisation acts immediately. Its job is to warn the public.

Sgt EBDON

Liskeard 42351 ext 37.

UKWMO

09 58

Enemy attack warning received by 250 carrier control points in major police stations. Police sound sirens – warning public to take cover. Every second is vital.

Protecting by warning

The United Kingdom is very vulnerable to nuclear attack. But even if this happened, countless lives could still be saved – provided that the public was given even a few minutes' warning. Further large-scale casualties could also be avoided if information on the pattern and path of any radioactive fall-out could be gathered and broadcast quickly enough.

To meet these two basic requirements, the United Kingdom Warning and Monitoring Organisation (UKWMO) has been developed over recent years. It is a system covering every square mile of the country, and parts of it could continue to function even if other sections were to sustain widespread damage.

UKWMO comes under the direct control of the Home Office. It is no mere concept or blueprint. It exists today as a combination of "concrete, copper wire and trained personnel". Although in "normal" times it is kept ticking over by a skeleton staff, during a national alert or emergency it can be brought into full operation in a matter of hours. At peak strength, it is manned by many thousands of trained personnel, the vast majority of whom are volunteers from all walks of life – including architects, mechanics, farm and factory workers, accountants, civil servants and various other trades and professions.

Links with NATO

In addition to its basic role, UKWMO provides one of Britain's civilian services to NATO. In the event of a nuclear attack, one of its jobs would be to supply information on nuclear bursts and fall-out over the British Isles and neighbouring areas: in return, information from the Continent would be received. The UKWMO structure of communications is fully geared to meet this service.

Time is vital in all these activities. If called into action, the Organisation might be able to give no more than three or four minutes' warning of attack. The effectiveness of these few minutes would depend on people being prepared for an attack and knowing at once what to do. That would be a matter of intensive education in the period immediately preceding hostilities and is a story in itself. This booklet describes just how much thought and effort have gone into making the warning system as foolproof as possible.

UKWMO

The Role of UKWMO

The United Kingdom Warning and Monitoring Organisation has three main functions. These are:

1. Warning the public of any air attack.
2. Warning the public of the approach of nuclear fall-out.
3. Supplying the civilian and military authorities in the United Kingdom and neighbouring countries in NATO with details of nuclear bursts and with a scientific assessment of the path and intensity of fall-out.

Among these activities, warning of air attack is of vital and primary importance. The task of monitoring fall-out, though calling for more resources of men and equipment, is seen essentially as an important adjunct. It is in fact sometimes claimed that UKWMO will have justified its existence if it carries out its first and vital function.

Warning against air attack

Information of an impending air attack on this country would come from a number of sources, including North America, NATO, and our own Master Radar Stations. In the main, however, warning of such attacks would come from the Ballistic Missile Early Warning System at Fylingdales, on the Yorkshire coast, backed up perhaps by further information from other points of the system in Alaska and Greenland.

As for the threat of "back door" nuclear attack from submarines, this too has been taken into account. Special electronic equipment is able to register any nuclear burst the moment it occurs. This equipment is known as AWDREY, an acronym for Atomic Weapon Detection Recognition and Estimation of Yield.

All these reports would be assessed by Home Office staff stationed for the purpose at RAF Strike Command Operations Centre (SCOC). It would be for them to decide from the military advice available whether to set the national warning network in action.

Turning a key in a special electronics box at SCOC alerts simultaneously 250 carrier control points (CCPs) located in major police stations throughout the United Kingdom. By pressing a switch on the special communications equipment at each CCP, the police can activate powered sirens sited at strategic locations in urban parts of their warning area. In all, there are some 7,000 power-operated sirens installed throughout the country.

These are backed up by a network of some 11,000 other warning points in rural areas, located mostly at police, fire and coastguard stations, civil and military establishments, hospitals, various industrial centres, and monitoring posts manned by the Royal Observer Corps. Certain warning points are also to be found in shops, pubs and private houses, in areas where suitable locations would not otherwise exist.

Each CCP is linked to the warning points in its area of responsibility by means of a unidirectional carrier line broadcast system, which superimposes additional signals upon the existing Post Office local telephone cable network without interfering with the normal traffic carried on that network. A warning message can be broadcast over this system and heard by the warning point operator on the carrier receiver unit, which resembles a small loudspeaker in appearance.

Upon receiving a warning message of an air attack from its carrier control point over this carrier broadcast system, a warning point operator would sound the alarm by hand-siren. At the same time,

1002

First of the sinister mushroom clouds: nuclear bursts are recorded in UKWMO Group Controls at the very moment of explosion by special AWDREY electronic equipment.

1003

Underground monitoring posts also register nuclear explosions. Information is passed to Group Controls in minutes or even seconds. *Inset:* Surface view of one post.

warnings would be broadcast at national level on TV and radio. Altogether, in the ways described, it is estimated that the vast majority of the population would be alerted in time to take action to protect themselves against the danger.

A simple but effective warning code has been devised as an integral part of the UKWMO system (see Appendix). This code can be easily understood and conveys a sense of great urgency. It covers warnings both against air attack and radioactive fall-out, and gives a subsequent "All Clear" signal.

Monitoring nuclear bursts and fall-out

Special procedures have been built into UKWMO to deal with monitoring nuclear bursts and fall-out – initially to enable fall-out warnings to be assessed and in the longer term to enable a scientific appreciation of the paths and intensities of fall-out to be developed. These procedures are contained within a three-tiered, nationwide structure which absorbs most of the personnel on the strength of the Organisation. First, at field level, is a network of monitoring posts manned by members of the Royal Observer Corps. These are under the control of the second tier, known as Group Controls. In turn, Group Controls report developments in their areas to Sector Controls, which, among other duties, keep the various NATO authorities informed of what is happening over the British Isles.

As far as the general public is concerned, the key feature in this structure is the Group Control, for it is at this level that many basic decisions would be taken – and the intensity and likely behaviour of radioactive fall-out assessed. It is here, too, that warnings of fall-out would originate.

Altogether, there are 873 monitoring posts up and down the country. Each is responsible for sending information to one of the twenty-five Group Controls. In turn, there are five Sector Controls, four in England and one in Scotland, each with five Group Controls reporting to it. One of these, Western Sector Control, is also responsible for Northern Ireland.

Neighbouring Group Controls are linked by teleprinter, radio and telephone, while each Sector Control is co-located with one of its Group Controls – for example, at Lincoln, in the case of Midland Sector Control, and at Dundee, in the case of Caledonian.

Apart from the lack of windows, there is nothing very conspicuous about the buildings housing Group and Sector Controls, but each has been purpose-built to withstand a certain amount of blast and give protection against radioactive fall-out. Each has its own stand-by services, including power, sanitation, ventilation and decontamination facilities, as well as emergency food and water supplies.

An important feature of UKWMO is that there is no one overall authority within it. Each Sector functions as an independent unit, though there is of course full communication between the component parts. This is deliberate policy, which would make for greater flexibility in decision-taking if parts of the Organisation were destroyed through enemy action.

Meteorological help

Meteorology would play a vital role in the work of UKWMO. The country's entire weather observation and forecasting services would be available to NATO, and these facilities will be vital if the pattern of

fall-out over the British Isles and Western Europe is to be predicted and fall-out warnings assessed.

At Sector Control level, two specially trained meteorologists would be stationed at each headquarters to interpret and make predictions from information fed in from the nerve-centre of the Meteorological Office – the £3 million computer installation at Bracknell in Berkshire. Yet even if this was destroyed by enemy action, each Sector Control could continue to draw on data provided through its direct links with the eight Radio Sonde or Upper Air Stations in this country.

UKWMO would also contribute through its network of 873 monitoring posts. Eighty-seven of these have been equipped with meteorological instruments, enabling ROC personnel at these posts to supply basic information to Group Controls, especially on barometric pressure and wind direction. Data of this kind is essential for updating predictions concerning fall-out behaviour.

In this way, UKWMO can be assured of receiving a weather service of one kind or another, as long as the Organisation itself continues to function. It can also provide, during the strike and post-strike phases, a national meteorological service for both civil and military authorities.

Monitoring posts

The front line of fall-out warning

Group Controls may represent the nerve-centres of UKWMO, but the monitoring posts make up the front line – at least as far as nuclear activity is concerned.

In time of emergency, these posts would be manned on a round-the-clock basis by personnel of the Royal Observer Corps; in peacetime, members of the Corps inspect their posts and check the equipment on a regular basis and participate in training exercises. The ROC, it should be pointed out, is today an integral part of UKWMO, though it still enjoys its distinct status and traditions, which go back to the time of the First World War. It has a distinguished record as an aircraft-reporting organisation throughout the Second World War and for some time in the post-war period, before becoming the field force of the UKWMO.

Typical of this chain of posts, sited to cover the whole of the United Kingdom, is one only a few miles from a major city. It lies less than 200 yards from a main road, but is concealed in a thicket of grass and trees. Above ground, the only sign of anything unusual are two objects, one resembling a blue plastic dome and the other a white dustbin. The first is in fact the ionisation chamber of the fixed survey meter for measuring radiation levels. The other encases four pin-hole cameras so arranged that a nuclear burst in any direction from the post would record a mark indicating the bearing and elevation of the burst; it is called a "ground zero indicator".

Some 20 feet below ground is a concrete chamber measuring about 7×16 feet by 7 feet in height, which is reached by a ladder running down a concrete shaft. As well as being linked to its carrier control point, it also has communications links to its Group Control. As part of the monitoring equipment, there is an instrument known as a "bomb power indicator" which records the blast peak over-pressure of an explosion.

It would be the job of each monitoring post to report nuclear burst details to Group Control, beginning with the reading of blast peak over-pressure. Such information should be followed up as soon as possible with details of the elevation and spot size of the burst, recorded

1008

Position and power of nuclear bursts are calculated at a Group Control from information supplied by monitoring posts. There are 873 posts throughout the country.

1019 Nuclear bursts are plotted on transparent screens. Likely path of radioactive fall-out is predicted from meteorological forecasts – and the public is alerted.

by the ground zero indicator.

The fixed survey meter above each post records the intensity of radioactive fall-out. A post would report the arrival of fall-out to its Group Control and thereafter would monitor the intensity of radioactivity, reporting the readings to the Group Control at regular intervals.

As one would expect, monitoring posts have been designed to withstand the effects of blast and fall-out. As in the case of Group and Sector Controls, they have their own source of power independent of the mains supply. They also have sanitation facilities and are equipped with supplies of food and water.

Group Controls in action

The 25 Group Controls may be said to combine the functions of a post office with those of a data processing centre. Their main job is to evaluate reports of nuclear activity sent in by the monitoring posts. From these reports, they would predict how fall-out is likely to develop and originate warnings to the public on its approach. A second key job is to pass on findings and conclusions to other authorities, such as Sector Controls, central and local government controls and military authorities.

To carry out its tasks, a typical Group Control would require about 50 trained personnel, including some 40 ROC members and a team of warning officers, some of whom are also scientists. It is these warning officers who make the decisions on whom to alert and when warnings should be issued.

Suppose, for example, a nuclear bomb were to explode in the Thames Estuary. Data on the burst would be sent in from various monitoring posts in the vicinity to Group Control at Maidstone. Here, using triangulation techniques, it would be determined whether it was an air or ground burst; its power, position and height would also be established.

A number of selected Group Controls have been equipped with electronic AWDREY instrumentation, and information from this equipment can also be used in the triangulation process. AWDREY can detect and record nuclear bursts, no matter how the weapon is delivered. Additional electronic equipment called DIADEM is to be installed at Group Controls to work in conjunction with the AWDREY units by providing the data to fix the location of a burst. DIADEM is short for Directional Indication of Atomic Detonations by Electromagnetic Means.

Warnings of fall-out

Once the triangulation process has been completed, fall-out warnings need to be assessed. Fall-out warnings are based on two kinds of predictions. The first, or initial, prediction indicates the outer limit of the area within which fall-out would be contained during the first hour or two after a nuclear burst. It is based on the information relating to the burst computed by the triangulation process, and also on the meteorological forecasts compiled at the Sector Controls, in particular the forecasts of speeds and directions of winds up to 100,000 feet altitude.

The fall-out warning procedure is based on a pattern of warning districts, 750 in all in the United Kingdom, each with an area of about 100 square miles. The warning would originate with a message from a Group Control to carrier control points, whence the warning would be

relayed to the various warning points over the carrier line broadcast system. Each of these is equipped with a radiac survey meter for measuring the level of radioactivity and with a maroon for sounding the fall-out warning. If a warning point should find itself isolated, the operator would fire his maroon when the fall-out reached a certain level – 0.3 röntgens per hour.

Subsequently the scientific team would be working on a second type of fall-out prediction: one derived from actual times of fall-out arrival, as observed from ground readings, supported by further meteorological forecasts. Predictions of this type would give a more accurate picture of the probable path of fall-out up to some three hours ahead of its arrival. Meanwhile, ROC personnel in the monitoring posts would be transmitting details of radiation dose-rate readings at regular intervals. These readings would be plotted on graphs, making it possible both to map areas of high radiation risk and to predict later arrivals of fall-out. This information, together with the earlier fall-out predictions, would be passed to all the authorities concerned and, via Sector Control, to civil authorities in NATO countries.

Work of the Sector Controls

UKWMO at national level

As with the Group Controls, the job of the five Sector Controls is to provide an instant information service, but at national and international levels – to the Government, the Armed Forces, and NATO headquarters in other countries. Each Sector Control would be capable of doing this, even if the others were destroyed, for each has been designed to function independently.

Specifically, the role of a Sector Control is to co-ordinate the activities of the Group Controls under its responsibility and in particular to control communications within its area. Another key function is to offer high-level scientific advice and generally to ensure that UKWMO's responsibilities are being met.

It is also responsible for liaison with specific countries in the NATO alliance. For example, Midland Sector liaises with Denmark and the Netherlands, while Metropolitan Sector liaises with France and Belgium. This is no hollow arrangement included for bureaucratic tidiness. In the event of an emergency, specially trained liaison officers resident in adjacent NATO countries would report to the headquarters of fall-out reporting centres in Western Europe: in the same way, liaison officers would report to Sector Controls in the United Kingdom. These officers would be responsible for sending back to their respective countries information on nuclear bursts and fall-out hazards.

When fully operational, each Sector Control would need a staff of about 80. Among this number would be a scientific team, including a scientific adviser and two senior scientists, whose job would be "to advise on any unexpected developments" – and a team of meteorologists to provide weather forecasts on which fall-out predictions could be based. These predictions would be frequently updated by new forecasts.

A worthwhile investment

It would be impossible to assess the value of UKWMO in terms of money. Yet the actual cost of maintaining it in full working order comes to a remarkably modest £2 million a year. This, for a system that is not only comprehensive, but simple, robust and flexible.

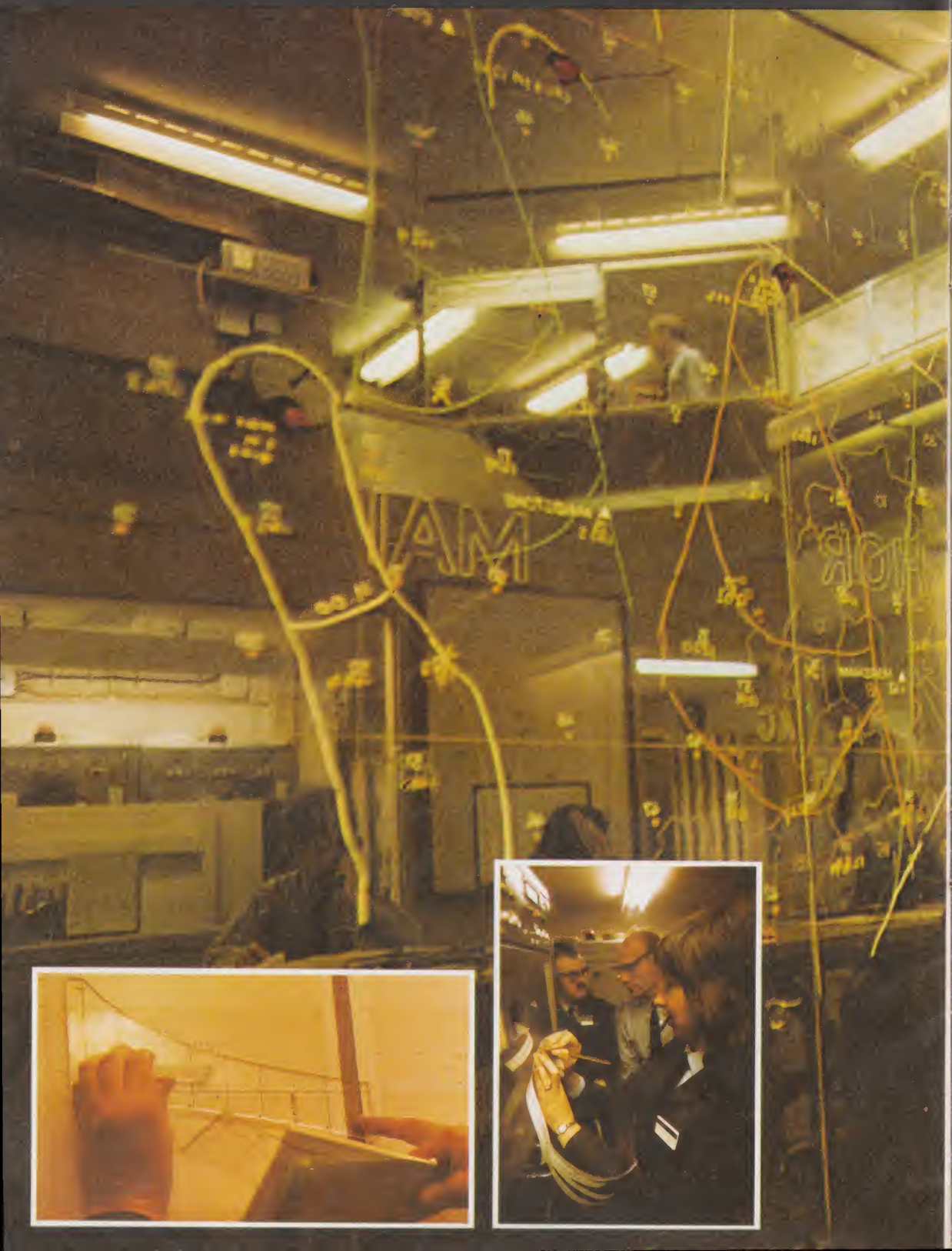
Throughout the development of UKWMO, moreover, much thought

1023

Carrier control points relay fall-out warnings to 18,000 locations all over the country. Maroons detonated from these points warn the public to keep under cover.

1420

The 25 Group Controls are the nerve-centres of the system. By now information on the path and intensity of fall-out is being passed by teleprinter tape network to other Groups and Sectors. The fall-out



decay rate is checked on logarithmic charts. Group Controls combine "the functions of a post office with those of a data processing centre" in their job of evaluating reports sent in by the monitoring posts.

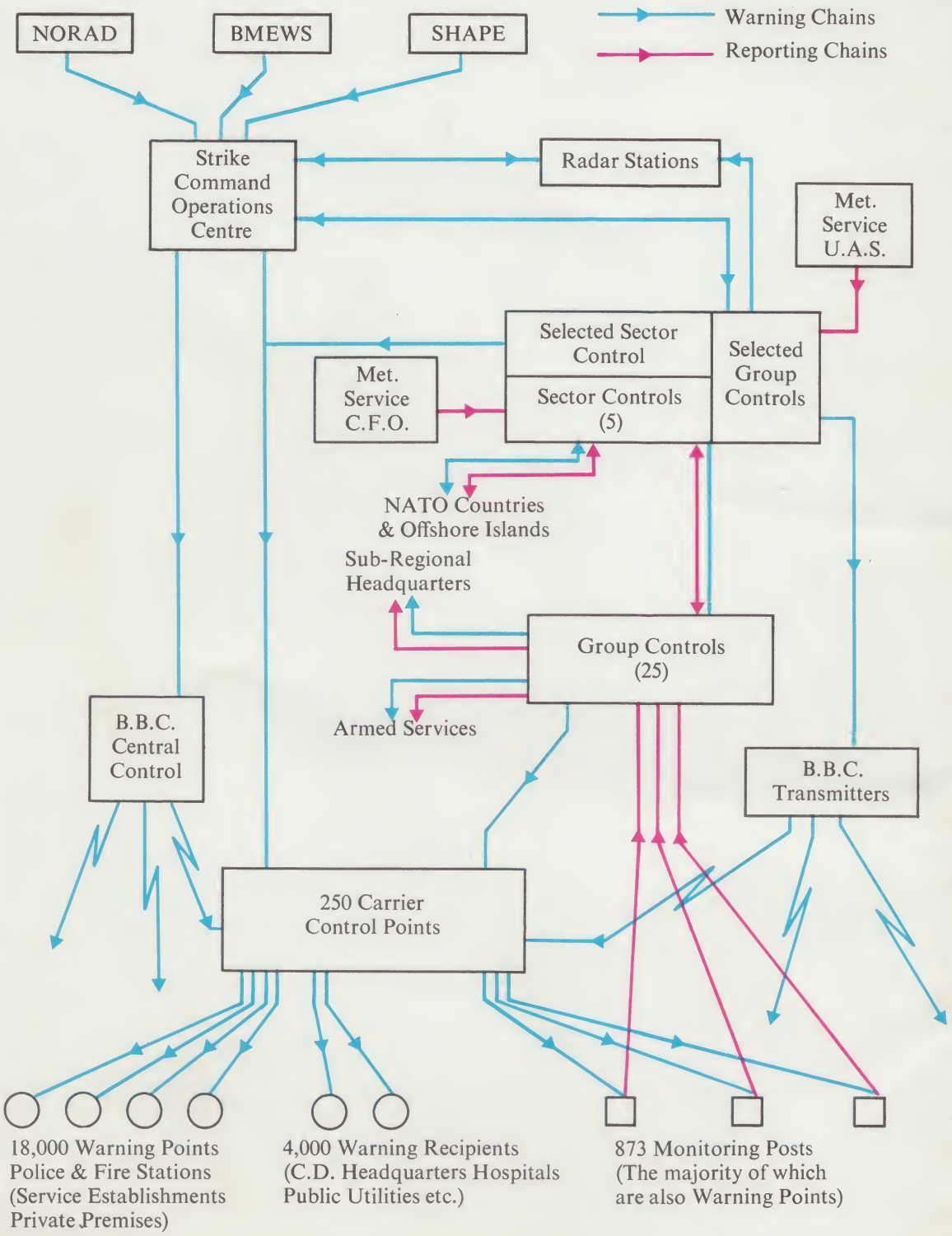
1515

Five Sector Controls exercise overall control and co-ordination. Their job is to provide a broader information service – at national and international levels.

has gone into making it as foolproof as possible, into finding an answer for every contingency. In the final analysis, even if the structure of the Organisation was extensively damaged, there still exist what are described as "sufficient alternative means of getting the warning message across." Furthermore, other sections of the Government's emergency control network are concerned with advising the public what to do in the event of attack.

UKWMO is of course only one of a number of services either planned or created by government to go into action in time of national emergency – and each of these has a vital contribution to make. As far as the system described in these pages is concerned, experts have calculated that its contribution could amount to the saving of as many as six to ten million lives – simply by warning enough people in time.

Appendix


Warning Chains
Reporting Chains
NORAD
BMEWS
SHAPE
Strike Command Operations Centre
Radar Stations
Met. Service U.A.S.
Selected Sector Control
Sector Controls (5)
Selected Group Controls
Met. Service C.F.O.
NATO Countries & Offshore Islands
Sub-Regional Headquarters
Group Controls (25)
Armed Services
B.B.C. Central Control
B.B.C. Transmitters
250 Carrier Control Points
18,000 Warning Points Police & Fire Stations (Service Establishments Private Premises)
4,000 Warning Recipients (C.D. Headquarters Hospitals Public Utilities etc.)
873 Monitoring Posts (The majority of which are also Warning Points)

Warning code

The following types of warning will be given to the public:

Attack warning – RED
Given by siren (rising and falling note); and by BBC broadcast.
Means imminent danger of attack from air.

Fall-out warning – BLACK
Given by maroon, gong or whistle (three bangs or blasts in quick succession).
Means imminent danger of fall-out.

All clear – WHITE
Given by siren (steady note).
Means no further danger.

The fall-out warning will be reinforced by information messages broadcast by local BBC stations wherever possible.

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Life goes on. . . . Through the existence, readiness and prompt response of UKWMO, ten million lives may have been saved – to see the dawn of another day.