ODS GRAHAM

UK Warning and Monitoring Organisation

ROYAL OBSERVER CORPS

TRAINING MANUAL

5th Edition *February 1989*

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ROYAL OBSERVER CORPS

TRAINING MANUAL

5TH EDITION, FEBRUARY 1989

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PREFACE

The Royal Observer Corps Training Manual is a handbook containing general information about the Corps and the United Kingdom Warning and Monitoring Organisation (UKWMO). It covers the Corps' history and organisation and the function of the Corps within the UKWMO: it also provides information about the effects of nuclear weapons. The publication is designed to give officers and observers the background information which they require in order to become operationally efficient. A personal copy is issued to each member of the Corps.

The Training Manual does not include information on operational procedures which is issued separately by Headquarters, Royal Observer Corps (HQ ROC) in the form of Standard Operating Procedures (SOPs) for sector and group control crews, post crews and nuclear reporting cell teams. SOPs are distributed on an authorised scale so that each officer and observer has those which he needs to train for and work at his operational tasks.

The number of training meetings and exercises which officers and observers may attend per year and the standards of proficiency which observers are required to reach and maintain are contained in HQ ROC Training Staff Instructions (TSIs). This document, which also details the style and content of proficiency tests at various standards, is issued to all officers and chief observers.

Information on conditions of service (including discipline) and on administrative, accounting and supply matters is contained in AP 3306 "Regulations for the Royal Observer Corps", a copy of which is held by all officers and head observers of posts. A copy is also held in each group/sector control for use by the Crew Supervisors when required.

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CHAPTER 1

HISTORY OF THE ROYAL OBSERVER CORPS

101. The badge of the Royal Observer Corps depicts a beacon lighter of Elizabethan times. The beacon lighters, recruited from the local population, were organised and paid by the county sheriff to care for and light the warning beacons. Their counterparts can be found in the observers of today.

102. It would appear that the earliest system for the detection and reporting of aircraft was started late in 1914. The Police were instructed to telephone reports of any aircraft or Zeppelins seen or heard within 60 miles of London to the Admiralty, who were at that time in charge of defences. In 1915 it was decided to extend the area covered by such reports to East Anglia, Northamptonshire, Oxfordshire, Hampshire and the Isle of Wight. The scheme was found to be unsatisfactory and in 1917 the War Office was given control. It can be said that Major General Ashmore CB CMG MVO was the founder of the Corps on which the present system and organisation has developed.

103. In an endeavour to reduce time lag, the War Office placed all sections of the ground and air defences of London under Major General Ashmore in a Command known as London Air Defence Area (LADA). In this scheme he made use of all the existing defence units which covered the London Area and districts to the south and south-east of London. The units comprised coastal and inland watching posts, searchlights, gun stations, balloon aprons, aerodromes and emergency landing grounds. This scheme necessarily entailed a large amount of telephone construction work and it was not until September 1918 that it was put into full operation; the last German raids had been made in May 1918. It did prove, however, that the time lag had been reduced appreciably and it is fair to say that this system formed the basis of the Royal Observer Corps. With the coming of the Armistice of the First World War and with the considerable reduction of the forces, the system faded away to practically nothing.

104. In January 1924 the Committee of the Imperial Defence appointed a sub-committee to investigate the aerial defence of South-East England, south of a line drawn from Portland Bill to the Wash. It was decided that an organised system was essential for the rapid collection and distribution of information on the movements of hostile and friendly aircraft, and this led eventually to the formation of the Observer Corps.

105. In August and September 1924 the first experiments were organised by Major General Ashmore. It was decided to use the area between the Romney Marshes and Tonbridge and these trials proved very satisfactory. So much so that, in the following year two observation areas were formed to embrace the whole of Kent, Sussex and part of Surrey. With the co-operation of the Chief Constables concerned these two areas were sited with observation posts and plotting centres manned by personnel who had been enrolled as special constables. These first Observer Corps groups were No 1 with its headquarters in Maidstone, and No 2 with its headquarters in Horsham, the former Group having twenty seven posts and the latter sixteen.

106. By November 1926 the Observer Corps covered an area extending from Hampshire to the middle of Suffolk, and comprised Nos 1 and 2 Groups, and Nos 3 and 18 Groups with the headquarters at Winchester and Colchester respectively. As the tests carried out with these groups proved successful, Major General Ashmore proposed a further extension in Hertfordshire and Buckinghamshire, and observer posts were also established at Harrow and Uxbridge.

107. On 1 January 1929 control was handed over to the Air Ministry. The Observer Corps had now become a corporate body and it was logical, therefore that it should be given an officer in command. The suggestion was made by the AOC in C Air Defence of Great Britain, in a letter to the Air Ministry, that an officer of the rank of air commodore or group captain on the retired list should be appointed as the first Commandant of the Corps. As Commandant of the Corps, he would carry out his duties directly under the command of Headquarters, Air Defence of Great Britain and would be responsible to the AOC in C for the training and maintenance of centres and posts. The Air Ministry agreed and on 1 March 1929 appointed Air Commodore E A D Masterman CB CMG CBE AFC RAF (Ret'd) as the first Commandant of the Corps. Air Commodore Masterman held his appointment until 1 March 1936, when he retired. He was succeeded by Air Commodore A D Warrington-Morris CMG OBE RAF (Ret'd) who was destined to lead the Corps until well into the Second World War.

108. Although the Corps had made a good start, expansion slowed and in 1929 at the end of five years, only the original four groups existed. On 15 May 1931, however, No 17 Group, with the centre at Watford, was formed and No 18 Group was enlarged by the addition of three new posts.

109. With the passing of years the political situation in Europe worsened. In January 1935 the Boyd Committee recommended that the Observer Corps should be expanded in four stages. From this time until the start of World War II, new groups were rapidly formed and on 24 August 1939, when the Corps was called out, the greater part of the country was covered by Observer Corps posts.

WARTIME ACTIVITIES AND ACHIEVEMENTS

110. There is no doubt that the first big test of the Corps came with the Battle of Britain. How well the Corps did its job can be deduced from the fact that on 9 April 1941 it was announced in the House of Commons that His Majesty King George VI had granted the Corps permission to use the title "Royal".

111. The tracking of aircraft overland was the responsibility of the Corps but scientific research had developed a system to be known as radar whereby it was possible to detect the presence of an aircraft over the sea area. This detection and the resultant tracking was treated as a form of early warning of the approach of possible hostile aircraft. The joining of radar tracks produced over the sea approaches with ROC tracks overland gave the fighter controllers at RAF control rooms a complete picture of enemy incursions and made possible a greater number of interceptions.

112. During this vital period experiments were also made in giving imminent danger warnings to factories on war work. These experiments were so successful that the Ministry of Home Security installed air raid warning officers in ROC centres to warn certain vital industrial undertakings. This warning scheme was extended considerably and was responsible for saving many

millions of man hours, thus making a vital contribution to the production of a large bomber force and of war material which made possible the invasion of France.

113. Had the invasion of this country been attempted the Corps would have played a part in its defence. Home Defence staff officers would have been stationed at each ROC centre, where the tracks of attacking airborne forces would have been displayed, thus enabling the small defending force available in this country to be used to its best advantage.

114. In September 1941, due to the increased call-up of manpower, women were introduced into the Corps and, as in all the other branches of the Services, they acquitted themselves well.

115. In June 1942 Air Commodore G H Ambler, OBE AFC was appointed Commandant of the Corps. He made extensive changes in the organisation. Some of his more important changes are listed below:

a. Reorganisation of ROC Headquarters.

b. Reorganisation of Area Headquarters.

c. Area territory to conform with the appropriate fighter groups.

d. Greater employment of young women at centres.

e. Training to become compulsory and to be the official responsibility of Headquarters, Royal Observer Corps.

f. Reorganisation of the Corps on a non-military basis, but with graded ranks.

116. The first of these organisations to be put into effect was the adjustment of each area to conform with that of the fighter group with which it was concerned. The Southern and Western Areas were unaffected by these changes, as they already corresponded approximately in area with Nos 11 and 10 Fighter Groups of the RAF. Having altered the area territories the next logical step was to move the ROC Area Headquarters to locations closer to fighter group headquarters. There were now six Area Headquarters - Scottish, Northern, North-Western, Midland, Southern and Western - but with the closing down of No 13 RAF Fighter Group, the Northern Area of the ROC ceased to exist and its Groups were re-allocated to the Scottish and Midland areas.

117. Up to now a centre controller had been responsible for each operations room, while observer group officers had been responsible for the posts which supplied the information to the operations room. It was recommended that a group commandant should be appointed to unify the policy within each group, assisted by a deputy group commandant. An adjutant was appointed for administration within the group.

118. Duty controllers and group officers were appointed in the rank of observer officer to take charge of operations room crews and sectors of posts respectively.

119. Up to this time training varied from group to group but now that Headquarters ROC had undertaken the responsibility for training, methods became standardised and a full training programme was instituted in each group.

120. At each post an observer was appointed as a training instructor with the rank of leading observer and at the same time acted as deputy to the head observer, who was now ranked "Chief observer" and was responsible to his group officer for the administration of the post.

121. It became compulsory for group officers to attend training courses so that they, in turn, could train post instructors.

122. Post meetings were held weekly and the periodic training visits of post personnel to the operations rooms were authorised. Finally, tests for post observers became compulsory.

123. Ranks were also given to operations room personnel. In the crews at the operations rooms, in addition to the duty controller, ranks were given to appointments as follows:

Duty controller's assistant	=	Chief observer
Post controller	=	Chief observer
Floor supervisor	=	Leading observer

124. In Fighter Group operations rooms the ROC had been represented by a liaison officer. Under the reorganisation he was given the rank of observer lieutenant. An addition was now made to this liaison service by providing ROC representation in the sector operations rooms, where the ROC representative was termed a sector liaison teller, with the rank of chief observer.

125. At this period, ROC group operations rooms were either built or altered to a standard design and a new system of operational procedure was brought into use, including the long-range plotting board, designed to improve the hand-over of tracks from group to group. This board also made possible the decentralisation of the civil air raid warnings. Ministry of Home Security officers were now situated in ROC operations rooms. This brought about an excellent system for the sounding of air raid warnings.

126. While the reforms mentioned in the previous paragraphs were being completed, Air Commodore Ambler returned to Fighter Command, and he was succeeded by Air Commodore Finlay Crerar CBE, who remained as Commandant until November 1945.

127. The ROC played a big part in combating the hit-and-run raids on the south and south-east coasts. A large number of satellite posts were quickly constructed along the coast to give complete low level coverage, which was vital as radar could not be expected to pick up all the low-flying aircraft. Air raid warnings to several coastal towns were sounded direct from the ROC posts.

128. The Defence Committee had been expecting a new phase of enemy air activity which became known as the "flying bomb". Some doubt had been expressed as to the ability of the Corps to deal with this threat, but the ROC once again rose to the occasion and proved its alertness and flexibility.

Observers at the coast post of Dymchurch identified the very first of these weapons and within seconds of their report the defences were in action. This new weapon gave the ROC much additional work both at posts and operations rooms. RAF controllers actually took their equipment to two ROC operations rooms at Horsham and Maidstone and vectored fighters direct from the ROC plotting tables. The critics who had said that the Corps would be unable to handle the fast-flying jet aircraft were answered when these aircraft on their first operation were actually controlled entirely by using ROC information.

129. It was fitting that in the last stage of hostilities the worth of the ROC should again be proved. The C in C of the Allied Air Force, Air Chief Marshal Sir Trafford Leigh-Mallory KCB DSO, expressed concern at the number of friendly aircraft being shot down. In discussing this problem and its solution with the Commandant of the Corps, a need was stated for observers trained in aircraft recognition to advise gun crews on board the defensively equipped merchant ships (DEMS) during the allied invasion of Europe, "Operation Overlord". This scheme became known as "Seaborne". The observers required to man the ships were drawn from some 1400 members of the Corps who volunteered for this duty. How well they performed is recorded in many letters of appreciation received from the chiefs of the various Services. Ten of the volunteers were mentioned in despatches and subsequently HM King George VI approved the wearing of the shoulder badge "Seaborne" by all who took part in the operation.

RE-FORMATION OF THE CORPS

130. Although a period of stand-down was ordered, the Corps was not completely disbanded because it was considered that the ROC must continue as an essential component of the defence system. Cabinet approval was given for the Corps to be re-formed in January 1947 and Air Commodore the Earl of Bandon CB DSO who had been appointed Commandant of the Corps in November 1945, drew upon a considerable number of wartime observers to form the nucleus around which the Corps was re-formed. During the next two years the ROC was reorganised on geographical lines similar to those existing at the end of the war.

131. On 1 February 1949 Air Commodore R B Jordan CB DFC ADC was appointed Commandant ROC on relinquishment of the appointment by Air Commodore the Earl of Bandon.

132. On 1 March 1950 the Air Officer Commanding in Chief, Fighter Command assumed administrative control of the Corps. Under this change Headquarters Royal Observer Corps continued to operate in its existing form and assumed a status comparable with that of a fighter group headquarters.

133. On 11 April 1950 in recognition of the Corps' record of service during the twenty-five years of its existence, His Majesty King George VI honoured the Corps by becoming its first Air Commodore in Chief.

134. On 20 March 1951 Air Commodore G H Vasse CBE was appointed to succeed Air Commodore Jordan as Commandant of the Corps.

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135. Early in 1953 it was decided that the area covered by the Corps should be extended to include Northern Ireland and, as a result of this decision, a new group was formed with headquarters at Belfast.

136. On 1 June 1953 it was announced that Her Majesty Queen Elizabeth II, on the occasion of her Coronation, had assumed the appointment of Air Commodore in Chief, Royal Observer Corps.

137. For some years it had been appreciated that the ever-increasing operating speeds of service aircraft would necessitate a revision of the operational layout of the Corps in order to maintain efficiency. Accordingly, a reorganisation of the Corps was brought into effect on 1 November 1953.

138. The main purposes of this reorganisation were to:

a. Rearrange group and area boundaries to conform with the revised boundaries of Fighter Command sectors.

b. Improve the handover of tracks from group to group by increasing the size of groups and providing additional facilities.

139. The rearrangement of area boundaries necessitated the splitting of Midland Area into two; namely Northern and Eastern Areas. At the same time Southern Area was renamed Metropolitan Area, Western became Southern and North-Western became Western; thus the names of these areas became the same as those of the Fighter Command sectors to which they were affiliated. Scottish Area, however, retained its original name although its boundaries coincided with those of Caledonian Sector.

140. The increase in size of groups could only be effected by reducing the number from 40 (including the new Northern Ireland Group) to 31. The operations rooms at Maidstone, Lincoln, Bury St Edmunds, Cambridge, Gloucester, Cardiff, Wrexham and Dunfermline were therefore declared redundant and became secondary operations rooms with facilities for training a reserve of personnel who, in the event of emergency, could operate at the parent operations room. In addition the wartime operations rooms of York 9 and York 10 were combined and the premises used by York 10 become the headquarters of the new Northern Area.

141. Concurrently with these alterations, new facilities were introduced to improve track handover. These took the form of post clusters arranged to straddle group boundaries, whose reports could be received simultaneously by the two or more groups concerned, or of open liaison lines between groups so that fast-flying aircraft could be "talked over" the group boundary.

142. On 29 March 1954 Air Commodore J H T Simpson DSO AFC was appointed to succeed Air Commodore Vasse as Commandant of the Corps.

INTRODUCTION OF THE FALL-OUT REPORTING ROLE

143. During 1955 it was announced that the Corps was to undertake the additional task of detecting, measuring and reporting the radioactive fall-out resulting from the use of nuclear weapons, in order to provide the National Warning Organisation with information on which warnings to service and civil authorities could be based. Training for this additional role was begun on 3 October 1955.

144. The new role might require ROC personnel to remain on duty and to continue reporting for up to a week during fall-out. Accordingly a building programme, designed to provide protected accommodation for each post and operations room, was started in 1957. This programme required many posts and some operations rooms to be re-sited.

145. The first protected post (2/N.1) had already been built at Farnham, Surrey in June 1956 and, during the ensuing years, was the scene of most of the experiments required for the development of equipment and procedures. It was quickly followed by many others and building continued at about 250 each year so that by the end of 1963 the programme was almost complete.

146. Disused anti-aircraft operations rooms were converted for use as group headquarters for Nos 12 and 31 Groups, Bristol and Belfast. Other conversions were at Inverness (No 30 Group) and Preston (No 21 Group) where disused RAF sector operations centres were acquired. The ramaining groups were provided with purpose-built group headquarters. These were of two types, semi-sunk and surface. The first two were completed in 1960 at Fiskerton (semi-sunk) for Lincoln and Wrexham (surface) for the North Wales Group.

147. On 4 May 1959 Air Commodore J M Warfield CBE DSO AFC was appointed to succeed Air Commodore Simpson as Commandant of the Corps.

148. During 1959 a cluster of four posts was established by the Isle of Man Government; these posts were linked to the mainland reporting system and became part of No 22 group, Carlisle.

149. To complete the fall-out monitoring coverage of the United Kingdom an additional twenty-five posts were established in Scotland during 1960. Some of these filled gaps in the coverage of the mainland, but others were sited in Orkney, Shetland and Hebridean Islands.

150. As a result of the provision of protected group headquarters and in order to provide reasonable safety of communications, some re-organisation of the Corps took place between 1960 and 1963.

151. Western Area was the first to be altered; the northern part of No 19 Group, Manchester was amalgamated with the greater part of No 21 Group, Lancaster to become a new No 21 Group, Preston. The group headquarters at Manchester and Lancaster became redundant but continued to function as secondary operations rooms, later to be known as secondary training bases.

152. Scottish Area was next: No 26 Group, Glasgow was divided between Nos 25, 27 and 28 Groups and other changes of boundary were made so that the Glasgow Group disappeared altogether. This was followed by Northern Area: here only the sizes of the groups were affected. No 18 Group, Leeds was reduced substantially, while No 20 Group, York and No 23 Group, Durham were enlarged.

153. When re-organising Western, Scottish and Northern Areas the opportunity was taken to dispense with the overlap clusters which were not required for the fall-out reporting role. The re-organisation of the Corps was completed on 1 January 1963, when the boundaries of the other three areas were altered to eliminate the remaining overlap clusters.

154. In the meantime on 29 May 1961 Air Commodore Warfield had relinquished his appointment as Commandant of the Corps and had been succeeded by Air Commodore C M Wight-Boycott CBE DSO.

155. 1962 marked the end of the programme to equip the Corps with the instruments necessary to report nuclear bursts and fall-out and the beginning of a programme to improve the reliability of ROC communications by providing radio as a backing to the normal telephone system. Posts in No 14 Group, Winchester were equipped on the basis of one radio per cluster. Development of the system continued during the next two years and proved so successful that it was decided to equip further groups in the same way.

156. On 3 June 1964 Air Commodore Wight-Boycott, relinquished his appointment as Commandant of the Corps and was succeeded by Air Commodore J H Greswell CBE DSO DFC.

157. Later in 1964 a working party was set up to investigate the feasibility of introducing teleprinter transmission to replace speech telling of information between groups and from group to sector and other users. For this investigation a series of trials was conducted with an experimental installation at No 1 Group's secondary training base at Beckenham. As a result of these trials a decision was reached in 1965 to install the system in the four groups covering South-East England, Nos 1, 2 4 and 5 with the intention of applying the system to the remainder of the United Kingdom should further trials be successful.

158. During the years following 1955, the fall-out reporting role increased in importance and complexity; nuclear burst reporting was introduced and developed and nuclear reporting cells, manned by ROC personnel, were set up in the Air Defence Operations Centre of Fighter Command and other operations rooms of the Royal Air Force commands. Concurrently the importance of the aircraft reporting role diminished until in 1965 the Air Officer Commanding in Chief, Fighter Command, stated in a new directive to the Commandant, Royal Observer Corps that there was no current operational requirement for aircraft reporting by the ROC, but that training in aircraft recognition was to continue in order to preserve the skill as an insurance against any possible requirement in the future.

159. In the same year, the administrative and training organisation of the Corps was altered to effect economies in cost and to equalise the distribution of groups between areas. No 23 Group, Durham was transferred to Western Area; the remaining two groups of Northern Area were combined with the four of Eastern Area to form a new Midland Area; Eastern Area was disbanded. The transfer of Nos 3 and 14 Groups from Southern to Metropolitan Area completed the reorganisation.

160. On the afternoon of 24 June 1966, the Banner of the Royal Observer Corps was presented by Her Majesty Queen Elizabeth II, Air Commodore in Chief, Royal Observer Corps, in gracious recognition of the Corps' long service and achievement. The Banner was presented during a Royal Review at Royal Air Force, Bentley Priory, Stanmore to mark the 25th anniversary of the assumption of the style and title "Royal" Observer Corps conferred by His late Majesty King George VI. The parade of 103 officers and 653 observers drawn from all areas and groups of the Corps, was commanded by

Observer Captain W Rusby OBE, Deputy Commandant ROC. The Banner was dedicated by the Chaplain in Chief, Royal Air Force, after which it was handed by the Commandant, Air Commodore J H Greswell, to Her Majesty who presented it to the Banner Bearer, Observer Officer J D Ballington. Her Majesty addressed the parade and graciously accepted a jewelled brooch in the form of the ROC badge which was presented by the Commandant on behalf of all members of the Corps as an expression of loyalty and as a token of appprecation for the presentation of the Banner. The Banner was then marched in slow time to the front of the parade as the Central Band of the Royal Air Force played the National Anthem. The Review concluded with three rousing cheers for Her Majesty and a Royal Salute during which the Banner was let fly and lowered. Later in the afternoon Her Majesty walked amongst 1,500 officers, observers and guests assembled informally on the sports field, meeting and talking with many individuals.

Fig 101

The Royal Observer Corps Banner presented by
Her Majesty Queen Elizabeth II on 24 June 1966

161. The Royal Observer Corps Banner is lodged at Headquarters, Royal Observer Corps. It is paraded, on special occasions with Royal Observer Corps guards of honour and displayed at suitable area and group functions as directed by the Commandant.

162. In January 1968 the Government decided that major cuts in expenditure on Home Defence were necessary. This resulted in the disbandment of the Auxiliary Fire Service, the Civil Defence Corps and some elements of the Territorial Army and Volunteer Reserve. The ROC and the Womens Royal Voluntary Service were retained, the Corps because of its role within the UKWMO and the WRVS because of its very considerable and notable peace-time service. The supporting reasons for the retention of the Corps were that capital costs had largely been met and its techniques were more complex than in the other voluntary organisations. Substantial economies were called for, which resulted in the closure of 686 posts, the re-organisation of group territories to allow the closure of Watford and Leeds Group Headquarters and the reduction of the Truro and Oban Group Headquarters to little more than communications centres parented operationally by Exeter and Inverness Groups respectively. The establishment of the Corps was cut from 25,000 to 12,500.

163. On 28 June 1968 Air Commodore Greswell retired and was succeeded by Air Commodore D F Rixson OBE DFC AFC. The following years saw the completion of the telegraph transmission system and the re-organisation of the Home Departments' specialist teams at groups and sectors. This period was also marked by efforts to renew links with the Royal Air Force which had become less strong in recent years.

164. In January 1971 Air Commodore E B Sismore DSO DFC AFC was appointed Commandant on the retirement of Air Commodore Rixson. During the years 1971 to 1973 the Commandant visited several similar organisations overseas and a particularly close association was formed with the Royal Danish Air Force Home Guard (Ground Observer Corps) - a situation which continues to this day.

165. In May 1973 Air Commodore R K Orrock DFC succeeded Air Commodore Sismore as Commandant. Later in the year No 11 Group, Truro and No 27 Group, Oban were disbanded and posts within these groups were transferred to No 10 Group, Exeter and No 30 Group, Inverness respectively.

166. 1975 marked the Golden Jubilee of the Corps which was celebrated by groups throughout the country in a variety of ways. On 31 October the celebrations culminated in a commemorative dinner held at the Officers Mess, RAF High Wycombe in the presence of Her Majesty the Queen and His Royal Highness the Duke of Edinburgh.

167. In November 1976 Air Commodore Orrock retired and was succeeded by Air Commodore M H Miller CBE AFC.

168. 1976 saw a number of developments in procedures and was a period of consolidation. As usual the Corps took part in exercises and training, progressing steadily to greater efficiency. In October No 6 Group, Norwich and No 15 Group Lincoln, undertook a trial to report low flying aircraft to Royal Air Force defence systems. The challenge was eagerly accepted and the outcome most successful. This trial was extended and continued the following year.

169. In 1977 the Corps celebrated the Silver Jubilee of Her Majesty The Queen's Accession. To mark the occasion it was decided to offer a distinctive gift to Her Majesty in the form of a silver model of the Elizabethan beacon lighter who forms the centre-piece of the ROC badge. On 4 February the model was displayed at a Silver Jubilee dinner held at RAF Bentley Priory at which representative officers of the whole Corps were present.

170. In April 1977 Air Commodore J F G Howe AFC was appointed Commandant.

171. Many groups took part in local Jublilee celebrations and events and every advantage was taken to publicise the works of the Corps. On 30 June 1977 an ROC contingent took part in the Royal Review of Reserve and Cadet Forces at Wembley Stadium. On 29 July 1977 the Corps was represented in the indoor exhibition at the Royal Review of the Royal Air Force at RAF Finningley.

Fig 102

A replica of the silver model of an Elizabethan Beacon Lighter presented to Her Majesty the Queen to mark the occasion of the Silver Jublilee of her Accession. It was sculpted by Scott Sutherland.

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172. During the years since 1968 the sectors had become increasingly important and in 1979 they were linked by emergency circuits which were converted into private wires early in 1980 so that telegraph equipment could be used. During the same period, group commandants and wholetime officers were given operational tasks which developed and increased considerably.

173. Other developments were foreseen by the purchase of Headquarters United Kingdom Warning and Monitoring Organisation (UKWMO) of their first micro-computer for trials at Oxford to see whether programmes could be devised which would help in the operational tasks of the ROC and warning teams

174. In April 1980 Air Commodore J F G Howe CBE AFC relinquished his appointment and was succeeded by Air Commodore R J Offord AFC MBIM.

175. 1981 saw the first results of a Home Defence Review which had recognised the need to improve and update the communications and equipment in use in the UKWMO and the Emergency Control Network (ECN). Many of these improvements had a direct effect on the Corps and its procedures.

176. The Warning system was given first priority and by November of that year almost all attack warning circuits, including those to carrier control points had been converted from emergency circuits to private wires. Sector and group controls had been completely re-equipped with modern push button keyboards and the installation of new loudspeaker telephones at posts, also operating over private wires instead of emergency circuits, had began. This involved considerable re-clustering of posts within the groups and some transfer of posts from one group to another in order to obtain the most efficient and economical layout. New radio equipment had been installed in posts in the Maidstone group within the intention that other installations should follow in groups to westward and then northward until the whole UK was covered. Plans were also made for improving and completing radio links between groups.

177. Also in 1981 a working party was set up to improve the monitoring post environment especially in regard to heating, lighting, ventilation and feeding.

178. On the occasion of the wedding of His Royal Highness the Prince of Wales to Lady Diana Spencer on 29 July 1981 the Corps presented a Caithness glass centrepiece rosebowl bearing on one side the full arms of HRH the Prince of Wales and the coat of arms of Lady Diana Spencer and on the other the ROC badge with the inscription "Presented by the Royal Observer Corps 29 July 1981".

179. Since the first post-war re-organisation in 1953, some redundant group operations rooms had been retained as secondary operations rooms, later called secondary training bases. The number of these had dwindled as contemporary manning policy precluded observers from travelling long distances in the event of the Corps being activated. On 31 October 1981, the last secondary training base at Derby closed. It had survived since 1 November 1953 when No 6 Group, Derby became redundant.

Fig 103

The centrepiece rose-bowl of Caithness glass presented to His Royal Highness the Prince of Wales and Lady Diana Spencer on the occasion of their wedding.

180. Early in 1982 the first results of the working party on monitoring posts were evident in the issue of ration packs sufficient for seven days of operations: the residue, to allow for twenty-one days in all, was issued during the next two years. Also, a trial installation of a ventilation fan was made in a post in No 2 Group, Horsham. New flooring was provided during 1983 and 1984 for all posts and lighting was improved by stronger strip lights.

181. In February 1982 it was announced that, in spite of the success of the aircraft reporting and plotting trials in 1976 and 1977, the Ministry of Defence had decided for various operational reasons not to proceed with the scheme.

182. Improvements in communications continued and the installation of new loud-speaker telephones and private wires at posts was completed in England and Wales by early 1983 and in Scotland and Northern Ireland by the end of that year. The installation of new carrier receiver equipment also commenced in April 1982, at carrier control points and warning points including controls and monitoring posts. Links from controls to armed forces headquarters were installed early in 1983.

183. The training patterns of the Corps had developed over the years and it was decided to standardise and regularise them. This resulted in the issue on 1 January 1983 of a training staff instruction which consolidated earlier documents. All officers and head observers of posts received personal copies.

184. On 20 February 1983, Air Commodore G P Black OBE AFC ADC FBIM succeeded Air Commodore Offord as Commandant of the Corps.

185. In 1981 the Scottish Home and Health Department at the request of the Director UKWMO had installed as a trial message switch equipment, initially at Dundee and subsequently at other groups. This equipment took the form of a micro-processor which routed messages automatically in conjunction with the existing teleprinter equipment originally installed in the late 1960s. The Home Office realised the need to plan replacement for the ageing teleprinter system and to introduce equipment using more up-to-date technology. They therefore decided to introduce message switch (MSX) equipment working with visual display units and modern teleprinters capable of operating at higher speeds.

186. The first was installed at Maidstone and by February 1984 a further five installations had been made. Other installations proceeded apace so that by March of the following year, MSX was in use at all groups except No 31 Group Belfast. At this time second private wire speech circuits were ordered for inter-group and inter-sector links. These improvements led to a notable enhancement of the operational efficiency and capability of the Corps in its role as field force for the UKWMO.

187. 1984 also saw a start made on the installation of a microwave radio highway for the ECN into which sector and group controls were to be linked.

188. On 29 September 1984 Air Commodore J Broughton assumed command of the Corps in succession to Air Commodore Black.

189. In June 1985 the control at Belfast was converted to message switch bringing the whole of the UKWMO onto the new system.

190. On 27 June 1985, Her Majesty The Queen, accompanied by His Royal Highness the Duke of Edinburgh attended a Garden Party, held at Royal Air Force Bentley Priory, to celebrate the 60th Anniversary of the formation of the Corps. Two thousand officers and observers, representing all units of the Corps assembled at Bentley Priory for the occasion. The Queen and the Duke met and spoke with many of those who attended. The Battle of Britain Memorial Flight consisting of a Lancaster, a Hurricane and a Spitfire, in the original Observer Corps markings flew past in 'Vic' formation as part of the Royal Salute. Her Majesty graciously accepted a jewelled hat-pin which was presented by the Commandant, Air Commodore Broughton, on behalf of all members of the Corps as a small token to mark the occasion. The visit concluded with a Royal Salute and three rousing cheers for Her Majesty.

191. On September 1986 Air Commodore I Horrocks took over the appointment of Commandant from Air Commodore Broughton.

192. In July 1988 the first of a new generation of automated switchboards (SX 2000) was installed at Horsham and Oxford controls. The installation was completed in all Groups by March 1989 providing a national private telephone network with little need for operator intervention.

193. In September 1989 Air Commodore G M Boddy OBE succeeded Air Commodore Horrocks as Commandant of the Corps.

CHAPTER 2

ROC ORGANISATION

Introduction

201. The Royal Observer Corps (ROC) was established under Royal Warrant dated 21 May 1947 as amended by successive Royal Warrants.

Status

202. The ROC is a uniformed civilian organisation under the command of an Air Commodore, Royal Air Force or Observer Commodore, ROC. ROC members have the status of uniformed civil servants and are subject to the regulations contained in AP 3306, Regulations for the Royal Observer Corps. In addition, wholetime officers and civilian staff are subject to the provisions of the Ministry of Defence Civilian Pay Regulations (MOD Manual 8) and the Ministry of Defence Civilian Staff Regulations (MOD Manual 11) and the Ministry of Defence Civilian Travel Regulations (MOD Manual 12).

Control

203. The Commandant ROC is responsible to the Home Office through the Director, United Kingdom Warning and Monitoring Organisation, for operational efficiency and to the Ministry of Defence, Civilian Management (Administration), for the administrative efficiency of the Corps.

Organisation

204. a. The Commandant ROC, who has the status of a RAF Group Commander within Royal Air Force Strike Command, receives administrative support and assistance from Command Headquarters. Responsibilities of the Royal Air Force towards the Royal Observer Corps are defined in Royal Air Force General and Administrative Instructions.

b. Headquarters Royal Observer Corps (HQ ROC) is located at Royal Air Force, Bentley Priory, Stanmore, Middlesex alongside Headquarters No 11 (Fighter) Group and other Royal Air Force Units. The staff organisation at HQ ROC is shown at Chapter 3, Fig 301.

c. Command and control is exercised through five area headquarters, each being responsible for five groups. The staff organisations at area and group headquarters are shown at Chapter 3, Figs 302 and 303 respectively. The locations of area and constituent group headquarters are listed below: the group which is associated with the sector control is listed first.

d. Area headquarters and the associated UKWMO sector headquarters are, with the exception of Southern Area and Sector, co-located with the group headquarters which mans the sector control. Arrangements are being made for Southern Area and Sector to conform. In every case the group headquarters is situated alongside the control which it is responsible for manning.

	AREA HEADQUARTERS	GROUP	NO
(1)	METROPOLITAN AREA	Horsham	2
	Horsham	Maidstone	1
	West Sussex	Oxford	3
		Colchester	4
		Winchester	14
(2)	MIDLAND AREA	Lincoln	15
	Fiskerton	Norwich	6
	Lincoln	Bedford	7
		Coventry	8
		York	20
(3)	SOUTHERN AREA	Bristol	12
	RAF Rudloe Manor	Yeovil	9
	Hawthorn	Exeter	10
	Wilts	South Wales	13
		Shrewsbury	16
(4)	WESTERN AREA	Preston	21
	Goosnargh	North Wales	17
	Preston	Carlisle	22
	Lancs	Durham	23
		Belfast	31
(5)	SCOTTISH AREA	Dundee	28
	Craigiebarns	Edinburgh	24
	Dundee	Ayr	25
	Angus	Aberdeen	29
		Inverness	30

Affiliation with the Territorial Auxiliary and Volunteer Reserve (TAVR)

205. The ROC was affiliated to TAVR Associations from 1 April 1968. ROC membership of Associations and responsibilities of ROC officers as Air Force members are contained in HQ ROC Administrative Staff Instructions.

Ranks and Insignia

206. Royal Observer Corps ranks, appointments, insignia and equivalent RAF ranks are shown at Chapter 4.

The Royal Observer Corps Benevolent Fund

207. The Royal Observer Corps Benevolent Fund is a registered charity regulated by a Declaration of Trust dated 5 November 1945. It operates under a scheme approved and established by the Charity Commissioners for England and Wales on 23 June 1975.

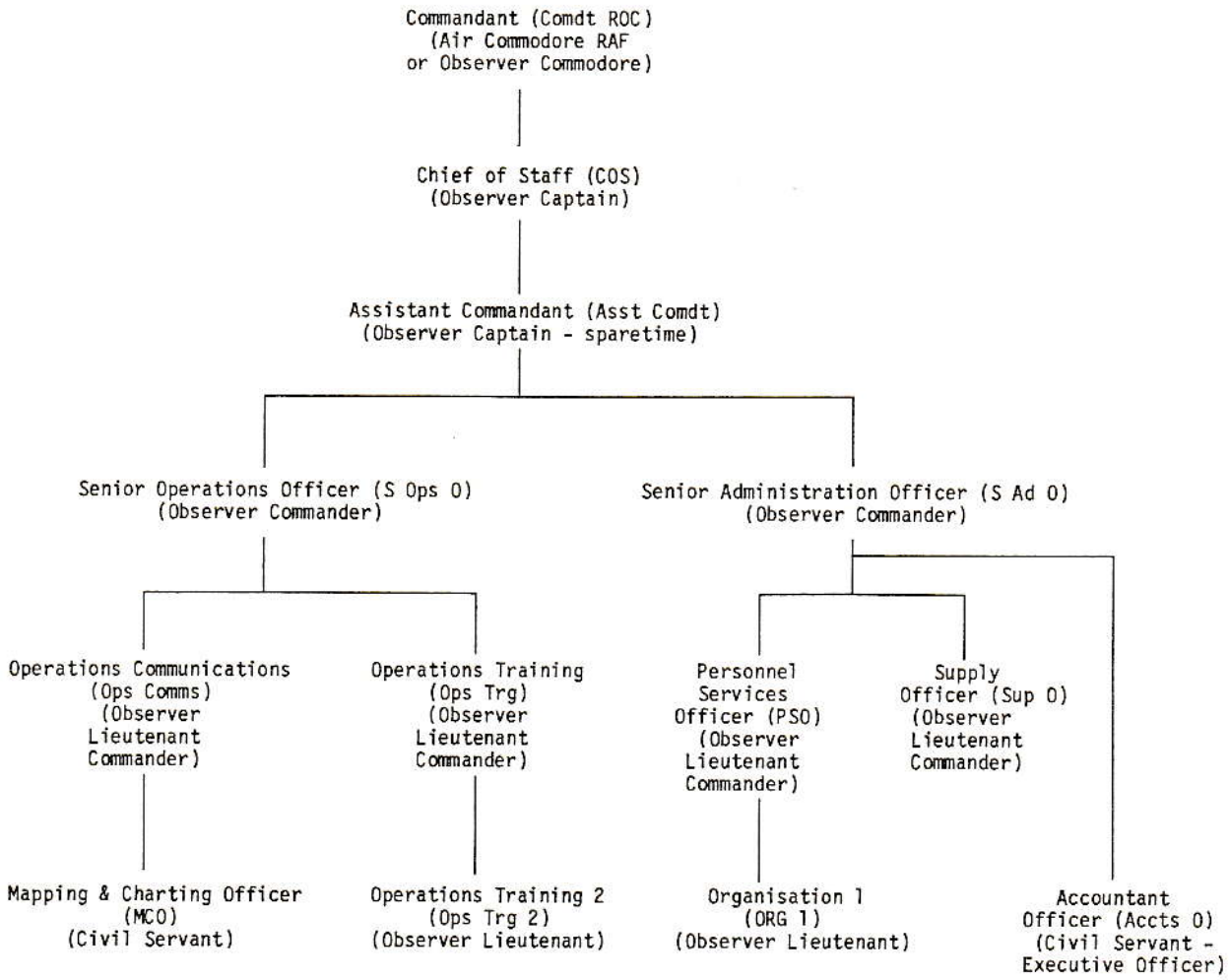
208. The ROC Benevolent Fund exists for the relief of distress or need amongst past and present members of the Corps, their widows, children and other dependants. Applications for grants are considered by the Managing Trustees who aim to provide adequate relief in cases where state assistance is inapplicable or inadequate. There are no hard and fast rules defining the circumstances in which help may be considered or the amount of financial assistance that may be given; each application is considered on its merits.

Assistance is available to Corps members, ex-members and their dependants at any time when difficulties arise as a result of bereavement, disability, sickness, infirmity, poverty or any other misfortunes. Length or quality of service is not considered. Full details are available from group headquarters and are included in AP 3306.

CHAPTER 3

ROYAL OBSERVER CORPS STAFF ORGANISATION

Fig 301. HEADQUARTERS ROC



NOTES

1. All appointments are held by wholetime officers except where stated.

2. The Commandant may appoint one or two assistant commandants: if there are two they may be designated Assistant Commandant (North) and Assistant Commandant (South) or Assistant Commandant and Assistant Commandant (Public Relations).

3. Clerical and typing staff of the Civil Service are added as necessary.

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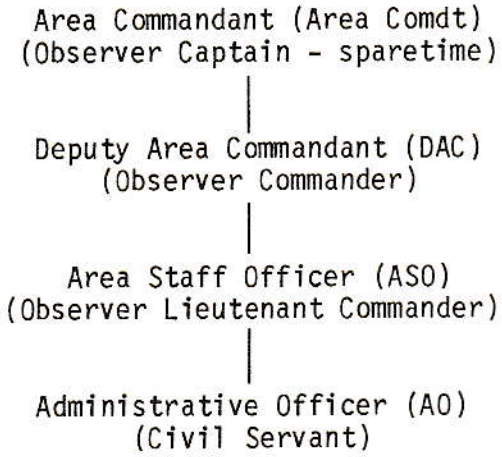
Fig 302. AREA HEADQUARTERS



NOTES

1. All appointments are held by wholetime officers except where otherwise stated.

2. Clerical and typing staff of the Civil Service are added as necessary.

3. During operations and exercises:

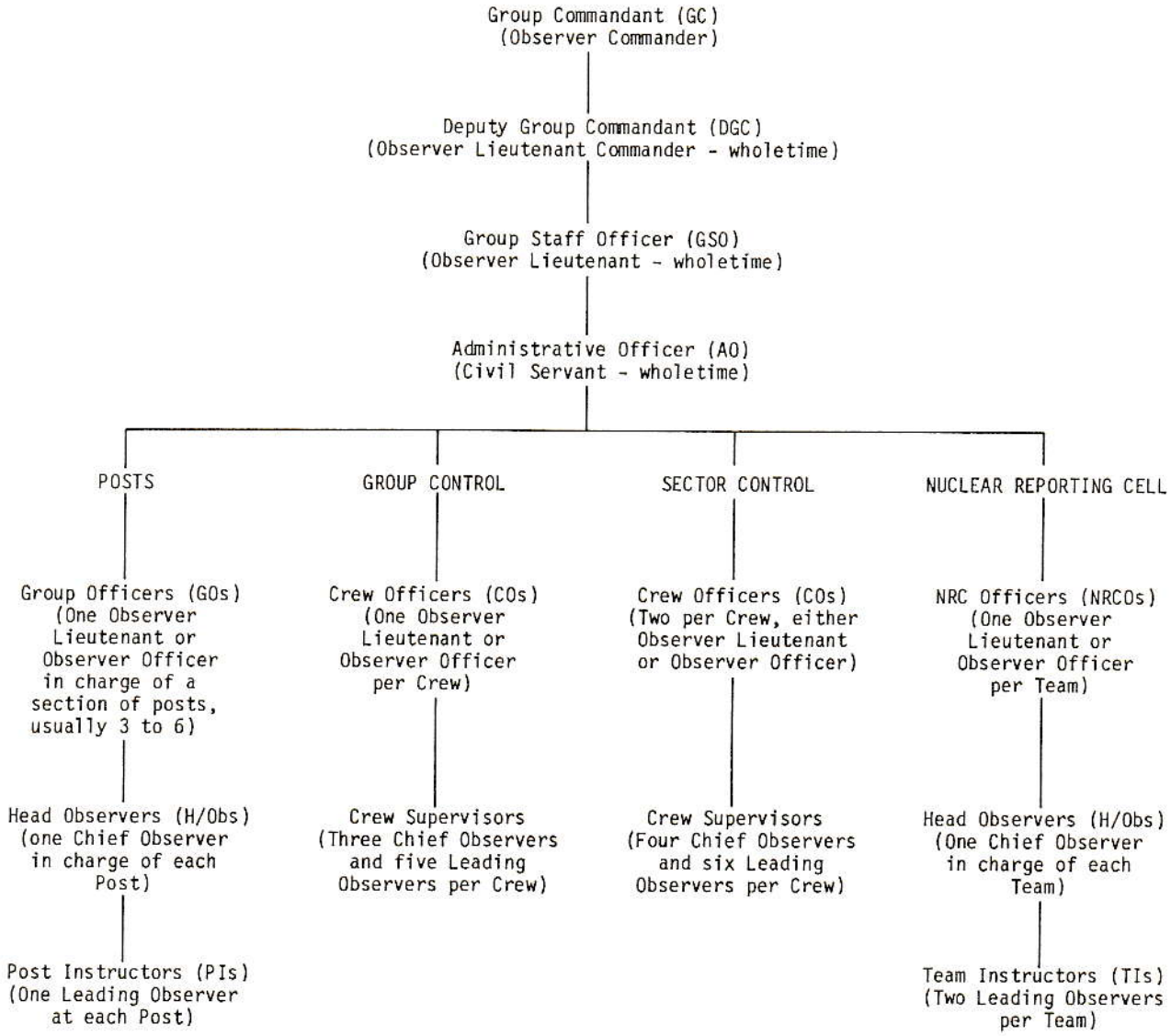
   a. The area commandant, while retaining his responsibilities to the Commandant ROC for the command of all ROC personnel in the sector and for keeping him informed on administrative and logistic matters, is responsible to the Home Department sector controller for the overall management of administrative and logistic matters within the sector and for advice on resources of ROC personnel available for use post-attack.

   b. The deputy area commandant, under the title of sector executive officer (SEO) is responsible to the sector controller primarily for the operational efficiency of ROC personnel within the sector and for the effective use of communications within the sector.

   c. The area staff officer, under the title of deputy sector executive officer (Dep SEO), acts as deputy for the sector executive officer as required.

ROYAL OBSERVER CORPS
STAFF ORGANISATION

Fig 303



NOTES

1. All appointments are held by sparetime personnel except where stated.

2. Civil Service clerical and typing staff are added as necessary.

3. Posts, controls and nuclear reporting cells are manned by crews of sparetime observers as necessary.

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4. At sector controls, two crew officers are appointed to each crew, one of whom is responsible for crew administration.

5. At group and sector controls one chief observer in each crew may be allotted the administrative duty of assistant crew officer. The remaining chief and leading observers within each crew may be allotted administrative and training tasks and may be referred to, within the group, by these titles.

6. Nuclear reporting cell teams are administered by the group which provides operational data to the cell.

7. During operations and exercises:

a. The group commandant, while retaining his responsibility to the area commandant for the command of all ROC personnel in the group and for keeping him informed on administrative and logistic matters, is responsible at group controls to the Home Department group controller for the overall management of administrative and logistic matters within the group. At sector controls, the group commandant has similar responsibilities but to the area commandant.

b. The deputy group commandant, under the title of senior duty officer (SDO) is responsible for the operational efficiency of the ROC within the group, and, in liaison with the Home Department chief warning officer, for the effective use of communications within the group. At sector controls, this responsibility is to the sector executive officer: at group controls, it is to the group controller, but additionally, he is required to provide the SEO with up-to-date information on communications within the group.

c. The group staff officer, under the title of deputy senior duty officer (Dep SDO) acts as deputy to the senior duty officer as required.

d. At sector controls one of the crew officers assumes the responsibility of duty officer and another that of information officer, for a specified tour of duty. Similarly, at group controls the responsibility of duty officer is assumed by one of the crew officers. Other crew officers are available for duty as directed by the group commandant or are off watch, at rest.

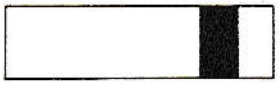
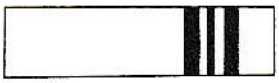
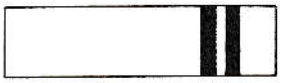
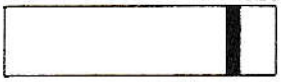
e. At both sector and group controls one of the crew officers is appointed administration officer (AdO) to assist and act as deputy to the group commandant.

f. During operations and exercises chief and leading observers at sector and group controls assume supervisory appointments appropriate to their rank during a tour of duty.

g. At NRCs, the operational responsibility of crew supervisor is assumed by one of the chief or leading observers during each tour of duty.

CHAPTER 4

ROYAL OBSERVER CORPS RANKS AND INSIGNIA

ROC Rank (Abbreviation)	Appropriate to Appointment as	Insignia	Equivalent RAF Rank (Abbreviation)
Observer Commodore (Obs Cdre)	Commandant Royal Observer Corps		Air Commodore (Air Cdre)
Observer Captain (Obs Capt)	Chief of Staff, Royal Observer Corps. Assistant Commandant, Royal Observer Corps. Area Commandant		Group Captain (Gp Capt)
Observer Commander (Obs Cdr)	Senior Operations Officer (HQ ROC) Senior Administrative Officer (HQ ROC) Deputy Area Commandant Group Commandant		Wing Commander (Wg Cdr)
Observer Lieutenant Commander (Obs Lt Cdr)	Operations Communications (HQ ROC) Operations Training (HQ ROC) Personnel Services Officer (HQ ROC) Supply Officer (HQ ROC) Area Staff Officer Deputy Group Commandant		Squadron Leader (Sqn Ldr)
Observer Lieutenant (Obs Lt)	Operations Training 2 (HQ ROC) Organisation 1 (HQ ROC) Group Staff Officer		Flight Lieutenant (Flt Lt)
Honorary Observer Lieutenant (Obs Lt)	Crew Officer Group Officer NRC Officer		
Observer Officer (Obs Off)	Crew Officer Group Officer NRC Officer		Flying Officer (Fg Off)
Chief Observer (C/Obs)	Supervisor (Control) Head Observer (Post) Head Observer (NRC)		Sergeant (Sgt)
Leading Observer (L/Obs)	Supervisor (Control) Post Instructor Team Instructor (NRC)		Corporal (Cpl)
Observer (Obs)	Basic rank for Post, Control and NRC personnel		Aircraftman or Aircraftwoman (AC or ACW)

NOTES

1. As the Commandant of the Corps is usually a serving Royal Air Force officer, he carries the rank of Air Commodore and not Observer Commodore, which would be applicable only if a Royal Observer Corps officer held the appointment.

2. Where it is necessary to distinguish between male and female officers and observers, (W) is added after the rank, eg Observer Officer (W) or L/Obs (W).

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CHAPTER 5

THE UNITED KINGDOM WARNING AND MONITORING ORGANISATION

Function

501. In the United Kingdom the Home Office is responsible for the operational control of the United Kingdom Warning and Monitoring Organisation (UKWMO) which has been established to:

a. Originate warnings of the threat of air attack, both conventional and nuclear.

b. Provide confirmation of nuclear strike.

c. Provide an emergency meteorological service for fallout prediction.

d. Originate warnings of the approach of radioactive fallout.

e. Provide regional government headquarters (RGHQs), local authority emergency centres (LAECs), armed forces headquarters (AFHQs) and nuclear reporting cells (NRCs) of the armed services in the United Kingdom, neighbouring countries and offshore islands with details of nuclear bursts and a scientific appreciation of the path and intensity of radioactive fallout.

Staffing

502. The UKWMO is staffed principally by sparetime personnel who are recruited in peace-time by the Home Departments or as members of the Royal Observer Corps which is the field force of the UKWMO and which is responsible for the collection, movement, processing and further movement of data. These personnel train and exercise regularly to a high standard of operational performance. Sparetime personnel undertake to report for duty in a war emergency when ordered, and to devote such time to the UKWMO (including the ROC) as may be directed.

503. There is a small cadre of wholetime civil servants of the Home Departments and wholetime officers of the ROC who are responsible for the day-to-day running of the UKWMO, including the ROC, in peace-time. They also have operational roles in exercises and in a war emergency.

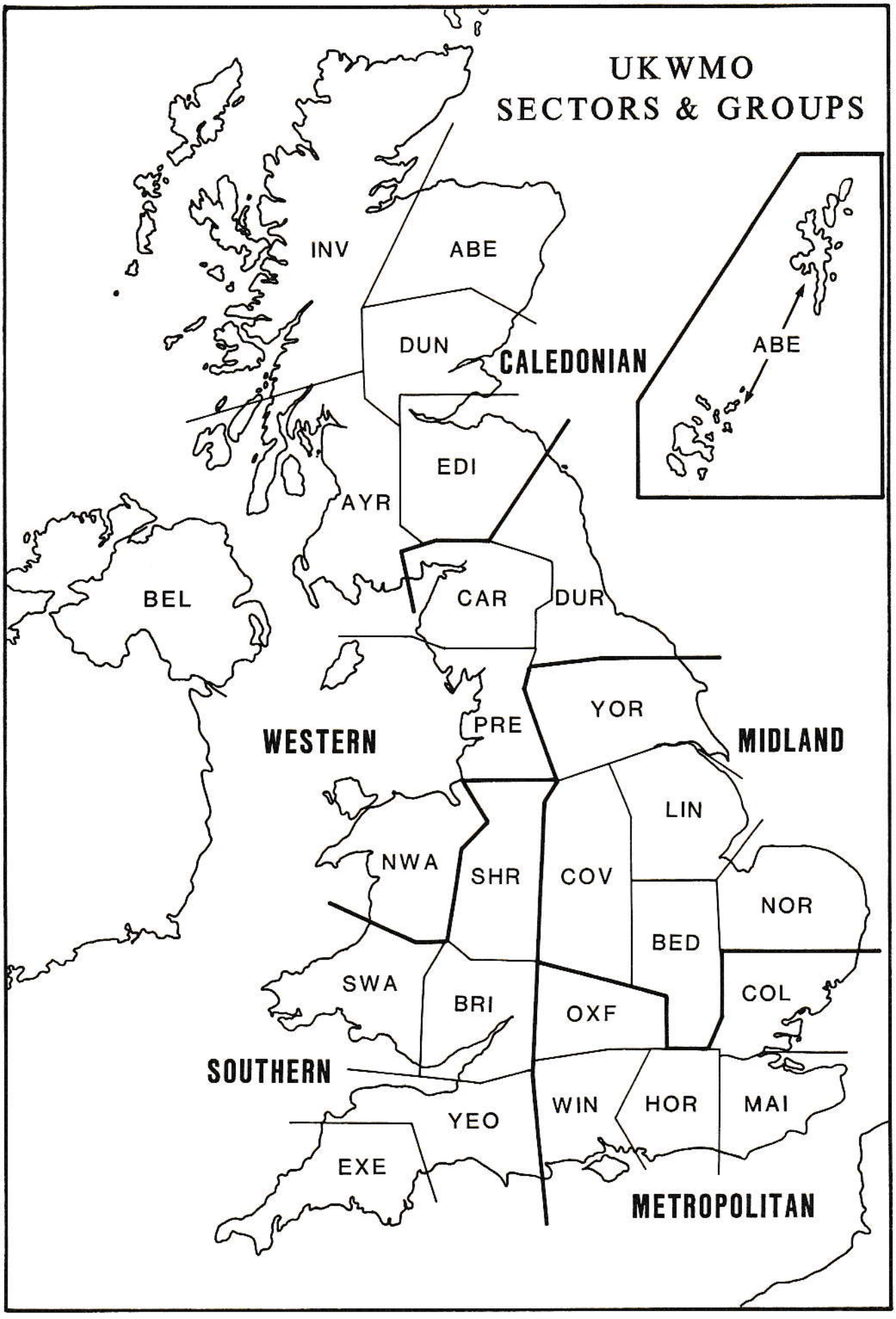
504. Certain sections of the warning system are planned in peace-time and operated in exercises or a war emergency by local police forces.

Operational Layout

505. The United Kingdom is divided into five UKWMO sectors with which ROC administrative areas are equated. They are Metropolitan, Midland, Southern, Western and Caledonian Sectors.

506. Each UKWMO sector has five constituent UKWMO groups each with a control building. The sector control is co-located with one of the constituent groups.

Fig. 501


UKWMO
SECTORS & GROUPS
INV
ABE
DUN
CALEDONIAN
ABE
EDI
AYR
BEL
CAR
DUR
YOR
PRE
WESTERN
MIDLAND
LIN
NWA
SHR
COV
NOR
BED
SWA
BRI
OXF
COL
SOUTHERN
WIN
HOR
MAI
YEO
EXE
METROPOLITAN

507. Each UKWMO group has a number of monitoring posts, varying between 27 and 58, which report to the group control. There are 870 monitoring posts in all covering the UK at intervals of about 10 miles.

508. Monitoring posts and group and sector controls are purpose built to withstand blast and give protection against radioactive fallout. They are independent of mains services, being equipped with power, sanitation and ventilation, and are provided with food and water so that personnel can survive for a prolonged period in an area of radioactivity. Details of the equipment provided in these structures are given in ROC Standard Operating *Procedures*.

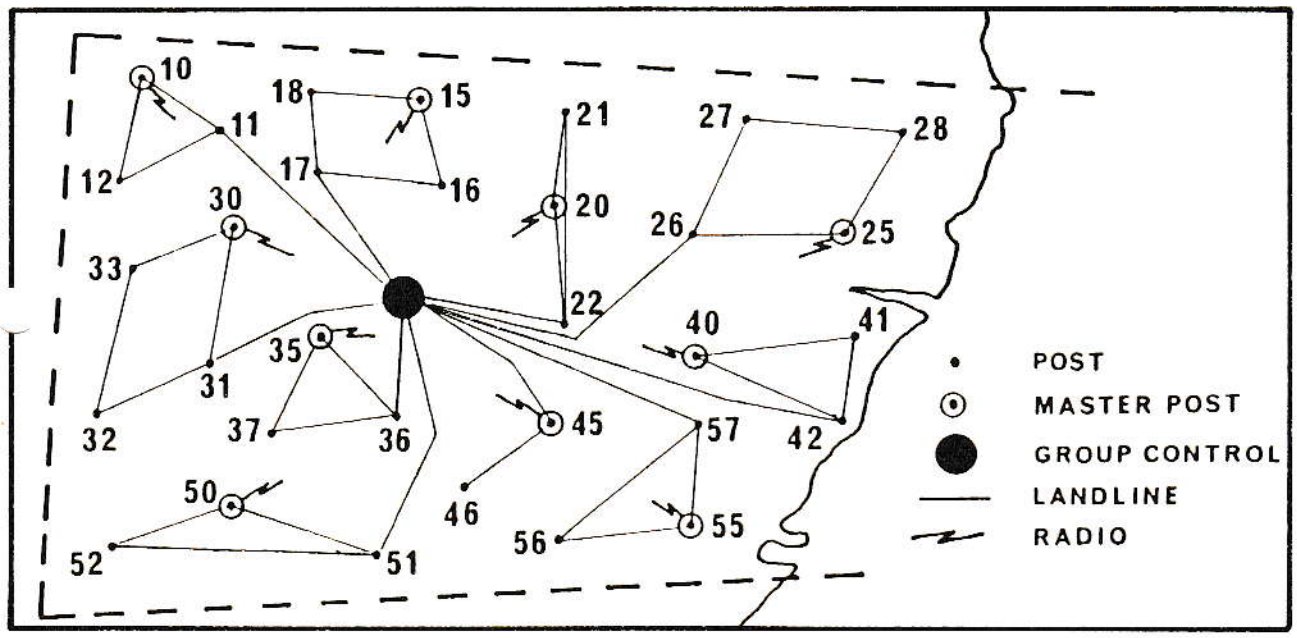
509. A map of the UKWMO sectors and groups is at Fig 501.

Communications

510. Each monitoring post is connected to others in a cluster of two, three or four posts with common private wire (PW) land-line communications for speech to the parent group control. One post in each cluster, known as the master post has been or is planned to be equipped with radio for use in certain circumstances in the event of the loss of land-line communications.

511. A diagram of typical post-group communications is at Fig 502.

Fig 502



Typical communications layout, posts to group control

512. Each group control has speech and telegraph links equipped with electronic message-switching facilities over PW land-lines to all adjacent

group controls and has been or is planned to be equipped with radio which can be brought into use in certain circumstances for re-establishing contact with adjacent group controls in the event of the loss of land-line communications.

513. Each sector control has speech and telegraph links equipped with electronic message-switching facilities over PW land-lines to all other sector controls.

The Meteorological Service

514. In peace-time the Central Forecasting Office of the Meteorological Office broadcasts computer-based reports and forecasts continuously over teleprinter and facsimile channels for which terminations are provided at sector controls.

515. In a war emergency, meteorological forecasting officers at the sector controls will provide reports and forecasts at least every six hours (coded MM) with an indication of the effective downwinds for UK areas for specified periods of validity over the subsequent 24 hours (coded EF for UK and WD1 for neighbouring countries and offshore islands).

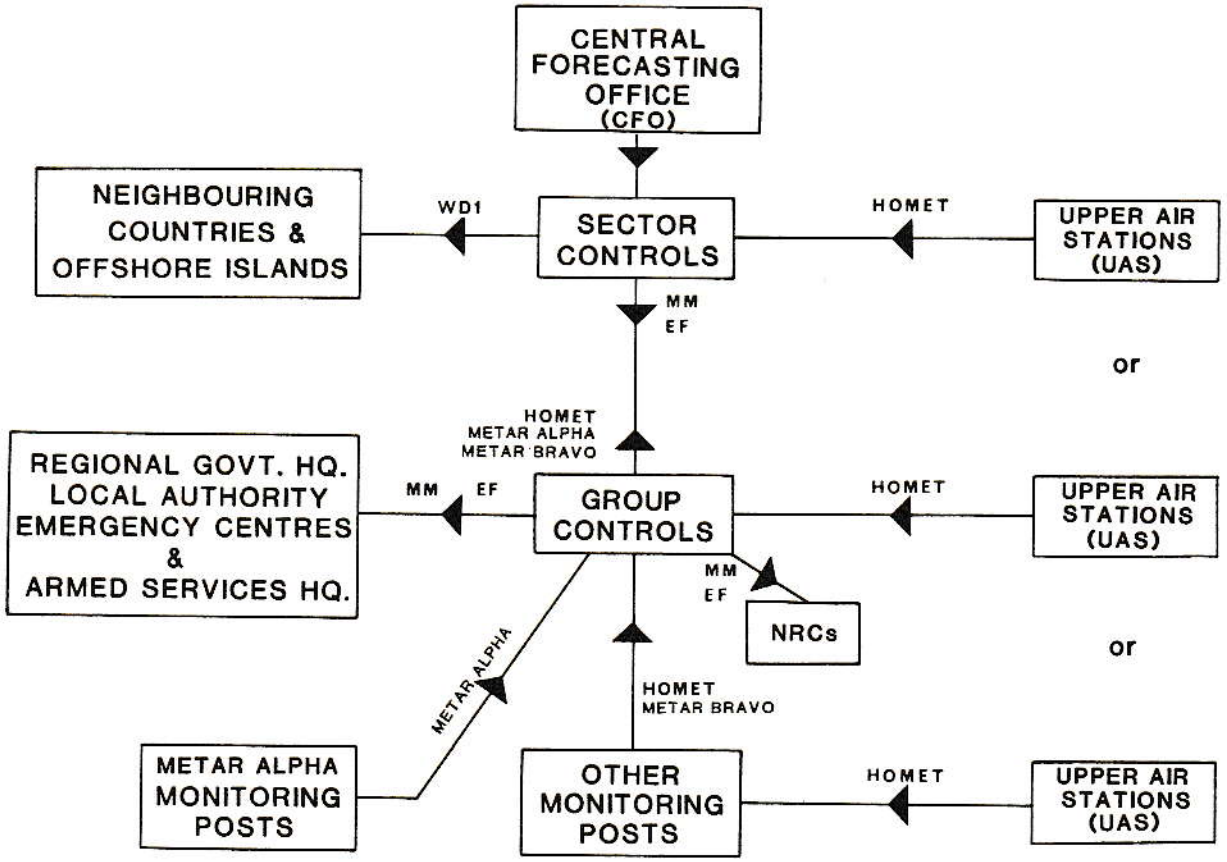
516. Eight upper air stations of the UK Meteorological Office using radio sondes prepare mean vector wind data for transmission on request over speech and teleprinter links to sector controls: in certain cases the messages are sent via monitoring posts and/or group controls. This information, known as HOMET, can be processed by the sector meteorological officers to maintain the fallout prediction service required by the UKWMO, Regional Government HQs (RGHQs - or Zones in Scotland), Local Authority Emergency Centres (LAECs) and specified Armed Forces HQs (AFHQs) and Nuclear Reporting Cells (NRCs).

517. 87 selected monitoring posts have been equipped with instruments to enable them to take surface weather observations every hour. The reports, under the name METAR ALPHA, are transmitted via the parent group control to sector controls for processing by the sector meteorological officers and exchange with the Royal Air Force METAR system.

518. The HOMET and METAR ALPHA observations can be supplemented by the remaining monitoring posts whenever or wherever necessary to provide additional surface weather information. Taken without the use of instruments, these supplementary reports are known as METAR BRAVO.

519. A diagram of the UKWMO Meteorological Service is at Fig 503.

Fig 503



The UKWMO Meteorological Service

The Air Attack Warning System

520. The origination of warnings to the public of the threat of air attack by missile or manned aircraft is based on detection intelligence, information and advice available to the Principal Warning Officer (PWO) stationed at the Primary War Headquarters (PWHQ) - previously UKRAOC where early warning information from all allied detection systems is available, including the Ballistic Missile Early Warning System (BMEWS), the Northern Radar System (NORAD), and Royal Air Force Sector Operations Centres (SOCs) which form part of the NATO Air Defence Ground Environment System (NADGE).

521. In the event of PWHQ becoming non-operational, alternative arrangements have been made for certain sector controllers to acquire early warning information.

522. Air attack warnings (RED) will be passed from PWHQ (or selected sector controls) simultaneously to the BBC Central Control for radio broadcast and by a land-line broadcast system to some 250 carrier control points (CCPs) installed in major police stations throughout the UK.

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523. In the event of loss of communications between PWHQ and the selected sector control and the BBC Central Control and/or the CCPs over the carrier line broadcast system, alternative arrangements have been made for the origination of the RED warning by other sector controllers over speech circuits to local BBC stations and/or to local CCPs through group controls. These alternative arrangements can also be used to issue RED warnings to selected areas, if required.

524. CCPs will immediately issue a warning message simultaneously over a unidirectional carrier line broadcast system to carrier receivers installed at warning points (WPs) in the carrier area and then sound simultaneously by remote control all the power-operated sirens at siren points (SPs) within the area.

525. The RED warning is given by a rising and falling note on a siren for one minute and warns of imminent danger of attack from the air.

526. Air attack warning messages are passed from sector controls to neighbouring countries and offshore islands (using message code WD2) and from group controls to RGHQs, LAECs, AFHQs and NRCs, using plain language.

527. A diagram of the UK attack warning system is at Fig 504.

The Fallout Warning System

528. The origination of warnings to the public of the approach of radioactive fallout is based on fallout predictions assessed by warning officers at group controls. Initial assessments are made on the basis of meteorological information applied to surface burst details. Subsequent assessments are based on actual fallout arrival times reported by monitoring posts. The issue of fallout warnings is monitored at the sector controls.

529. Fallout warnings BLACK will be passed over speech circuits from group controls to CCPs and thence to WPs within the carrier area. In the event of loss of communications between either the group control and the CCP or between the CCP and the WP, the warning point operator will sound the warning immediately fallout is detected by his dose rate meter.

530. Fallout warnings BLACK are given by maroon, gong or whistle sounding three bangs or blasts in quick succession and warn of imminent danger of fallout. Wherever possible fallout warnings will also be broadcast by local BBC stations.

531. Fallout warning messages are also passed from group controls to RGHQs, LAECs and AFHQs and NRCs (coded WW) and exchanged between sector controls and neighbouring countries and offshore islands (coded WD6 and WD7). Incoming information is converted at sector controls into messages giving the expected location and time of arrival of fallout on the UK coast from bursts outside the UK (coded TX).

532. A diagram of the UK fallout warning system is at Fig 505.

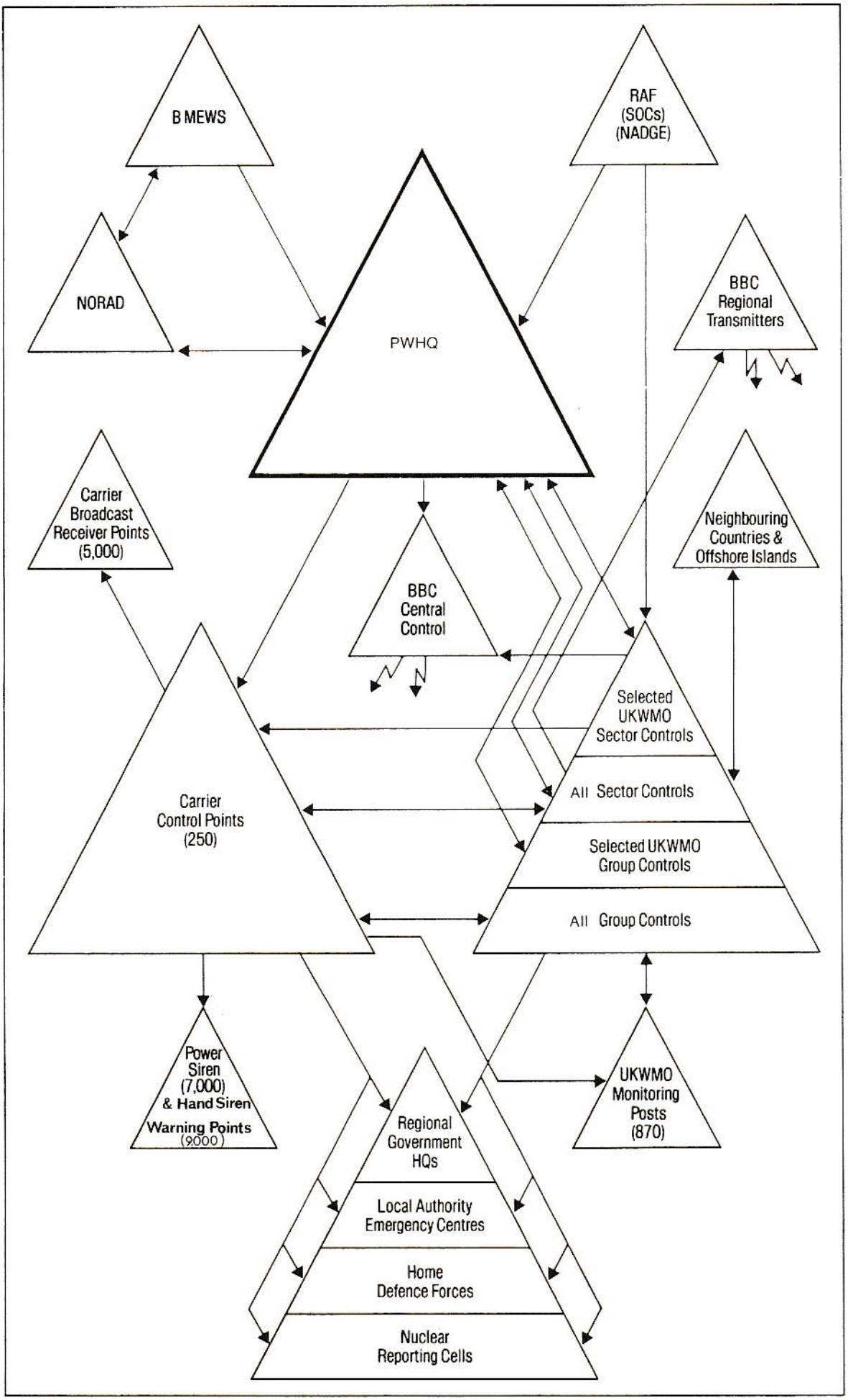

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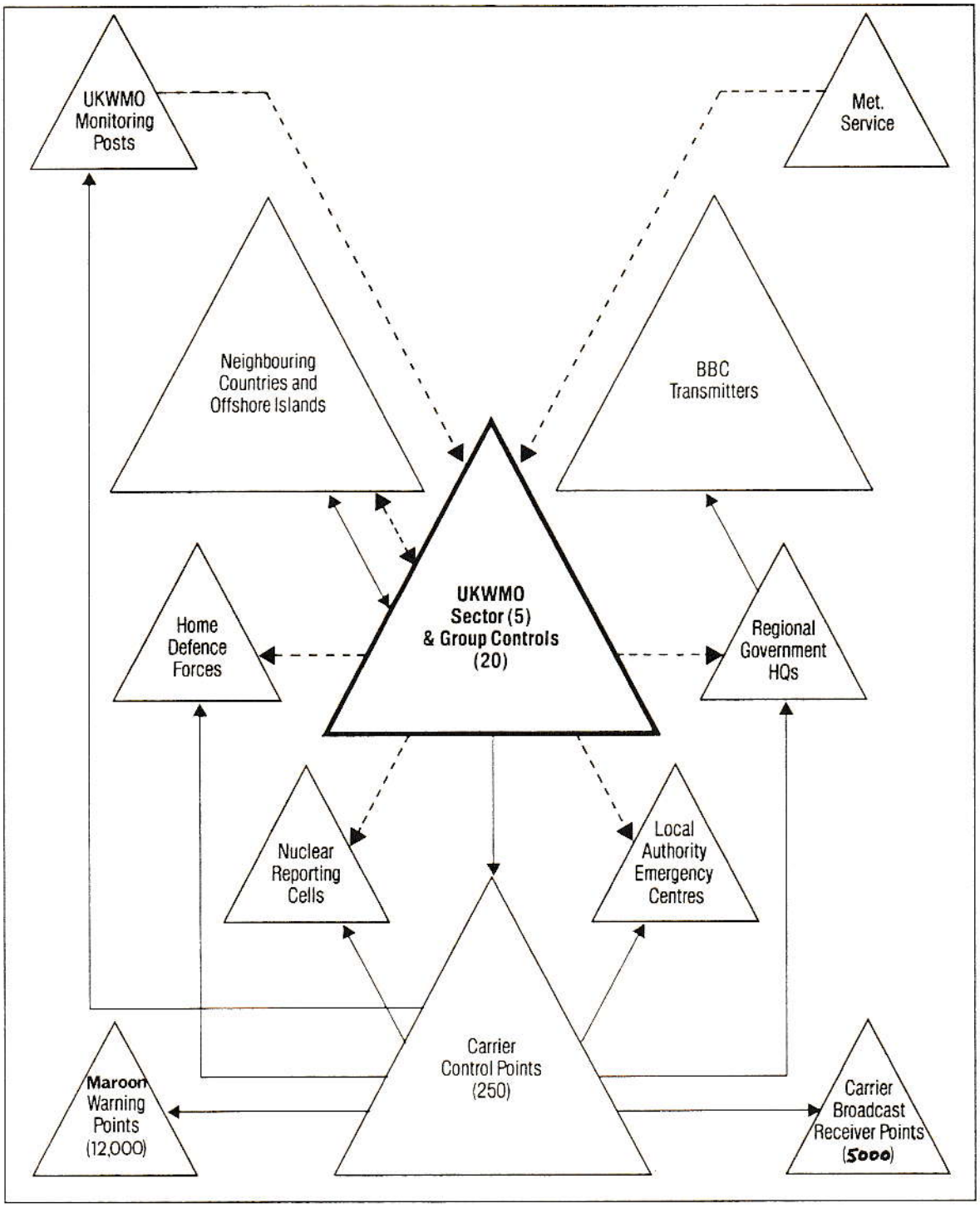
Fig 504



Monitoring services ----------→

Fallout Warning Chain ——————→

Fig 505

The All-Clear

533. In circumstances in which no nuclear strike has taken place and therefore no fallout hazard exists or is likely, and it is considered that, at least for the time being, there is no further threat from air attack, the PWO at PWHQ and/or sector controllers may issue a message giving RELEASE FROM AIR ATTACK and may also originate the WHITE to the public over the warning systems, including radio broadcasts, shown in Fig 504.

534. In circumstances in which a nuclear strike has taken place and a message giving release from air attack has been received, sector and/or group controllers in co-ordination with RGHQs and/or LAECs may originate all-clear (WHITE) messages to CCPs and WPs using the warning system shown in Fig 505, but only if no fallout hazard exists or is threatened.

535. The all-clear WHITE is given by a steady note on a siren for one minute and indicates that there is no further danger from either air attack or fall-out.

536. All-clear messages are passed from sector controls to neighbouring countries and off-shore islands (coded WD2) and from group controls to RGHQs, LAECs, AFHQs and NRCs.

537. In places where fallout has occurred, public release procedures will be directed by RGHQs and/or LAECs in consultation with sector and/or group controllers.

Warning Coverage

538. The 250 carrier areas in the UK are divided into some 750 warning districts each of 100 square miles in area. The CCPs control some 7,000 power-operated sirens installed at siren points (SPs) in urban and suburban areas of the UK and, in addition, some 19,000 warning points (WPs) established throughout the UK. 9,000 WPs are equipped with hand-operated sirens and maroons, 2,000 have only hand-operated sirens and 3,000 have only maroons: nearly all of these are in rural areas. The remaining WPs are receiver points.

539. WPs have been established in police, fire and coastguard stations, monitoring posts, group controls, RGHQs, LAECs, AFHQs and NRCs, hospitals and industrial and private premises.

540. Siren coverage is planned having regard to peace-time noise levels: maroon coverage against lower noise levels assumed to obtain after attack. Over 90% of the population of the UK can currently be warned by sirens and maroons: 100% can be warned by radio broadcast.

The UK Monitoring System

541. Each monitoring post and group control is equipped with a bomb power indicator (BPI), a ground zero indicator (GZI), a fixed survey meter (FSM), one or more radiac survey meters (RSMs) and a supply of personal dosimeters. The BPI is a fixed remote-reading instrument which records the peak over-pressure produced by the blast wave of a nuclear burst. The GZI provides the bearing and elevation of a nuclear burst by means of four pin-hole cameras which photograph the fireball and a locating graticule on sensitized paper; the size of the image of the fireball can also be used to

give a rough estimate of the power of a nuclear burst. The FSM is a remote-reading instrument which records dose-rates: the normal ranges is from 0 to 300 cGy/h. The RSM is a similar, but portable, instrument which takes direct readings. The dosimeter measures and records the accumulated dose of radiation absorbed by the wearer over a period of time.

542. In addition, electronic nuclear burst indicators are installed at 13 group controls. Known as AWDREY (Atomic Weapon Detection Recognition and Estimation of Yield) these instruments each have a minimum range of 75 miles and thereby give complete coverage of the UK.

543. BPI and AWDREY information (coded TOCSIN and TOCSIN BANG) is passed through group controls and sector controls to UKRAOC to give confirmation of nuclear strike. Sector controls also pass the confirmation to neighbouring countries and offshore islands (coded WD2).

544. By using BPI and GZI information from a number of monitoring posts, triangulation teams can determine the position, height and power of nuclear bursts which can be checked with data supplied by AWDREY. The nuclear burst information assessed in this way (coded BB) is passed by each group control to all adjacent group controls over teleprinter and speech landlines (or in certain circumstances, by radio), to associated RGHQs, LAECs, AFHQs and NRCs and to sector controls for transmission to all other sector and group controls as well as to neighbouring countries and offshore islands (coded WD4). Incoming WD4 information of nuclear bursts outside the UK is converted into standard UK messages (coded BX) which are distributed within the UK over the same lines as BB messages.

545. Monitoring posts report the time of first arrival of fall-out (coded FF) and thereafter the dose-rate at five-minute intervals from their FSM. The dose-rate readings are plotted on graphs at group controls, which enable the warning officers to detect subsequent arrivals of fall-out (coded LL).

546. At two-hourly intervals each group control produces a summary of the situation within the group (coded CC) indicating which posts have been affected by fall-out, the current dose-rate and whether it is rising or falling.

547. BB, FF and LL information is plotted on the back of a vertical transparent plotting screen (called Display A) on which is marked the National Grid system, the location of all monitoring posts and controls together with group and sector boundaries, the warning districts (see para 538) and the coastline where appropriate, by ROC members in sector and group controls. Posts which are out of communication for any reason (coded PP) are also marked and when communications are restored (coded QQ) this mark is removed. Warning officers of the Home Departments use the front of the screen to assess the need to issue fall-out warnings (see para 528), to plot the progress of fall-out arrivals across the group and its adjacent groups and to delineate the plumes of fall-out resulting from surface-burst nuclear weapons. From this display in each sector control, messages are produced giving the latest position reached by the fall-out from each burst every hour (coded TT). This information is exchanged between sectors and is passed to all UKWMO controls, RGHQs, LAECs, AFHQs and NRCs as required.

548. When fall-out from a burst on the Continent is likely to affect the UK, or vice versa, the information is exchanged between liaison officers in the countries concerned (coded WD8 and WD9). Incoming information is converted into messages (coded TX) giving the location and estimated time at which the fall-out is expected to reach the UK coast.

549. BB details and the two-hourly CC reports are plotted on another vertical plotting screen (called Display B) which is marked in a similar manner to Display A except that warning districts are omitted and instead a topographical map is interlaid to correlate with the location of monitoring posts and other details. TT information is also plotted to give an indication of approaching fall-out fronts beyond the group and its adjacent groups. Using the data thus provided to them, the warning officers can mark on the front of the screen a circle round each nuclear burst showing the area of a specified degree of damage caused by the weapon, and can assess which areas of the group and its adjacent groups are safe from fallout and likely to remain so, which are safe for a limited period and which are unsafe. This assessment can be used to provide advice to any RGHQ, LAEC or AFHQ or NRC which may request it.

550. BB details and TTs outside the area covered by Display A are plotted on an opaque plotting screen (called Display T) to provide a nationwide picture of the attack and the resultant fall-out. BX details are plotted on a similar screen showing a map of the Continent (called Display E).

551. Once the attack is deemed to be over and fall-out readings at monitoring posts have passed their peak and are decaying, the readings at all monitoring posts can be computed to a common time, known as DR7: this information (coded RR) is passed from groups to sectors and exchanged between sectors so that it can be provided for the whole UK to all UKWMO controls, RGHQs, LAECs and AFHQs. As soon as the DR7 time is declared, production of CC reports ceases and, instead, RR readings are plotted as they are received. These are plotted on Display B and are used by the warning officers to produce a contour map of DR7 readings for the group and all adjacent groups. This can be used to predict dose-rates in the future at any location covered by the plot or to calculate radiation doses which would be received by persons moving through an area affected by fall-out and so on. It can also provide a basis for planning all kinds of activities in the post-attack period.

Communications, Logistic and Other Information

552. In addition to the operational messages circulated within the system, information on communications, logistics, states of readiness and so on are passed so that every level of command and control can have available such information as it needs.

Nuclear Reporting Cells and Armed Forces Headquarters

533. Among the armed services HQ which receive a service from the UKWMO are major headquarters of the Royal Navy, the Army and the Royal Air Force at which nuclear reporting cells (NRCs) are situated. These NRCs are manned by sparetime ROC members under the command of a sparetime ROC officer, locally recruited and trained. Additionally, armed forces headquarters (AFHQs) receive similar data to an NRC but handle the processing themselves.

N.B. This insert is a copy of Chapter 6 in the Training Manual 3rd Edition dated July 1978. The chapter is under review by Home Office Scientific Research and Development Branch (SRDB) and will be re-issued in due course.

CHAPTER 6

EFFECTS OF NUCLEAR WEAPONS

INTRODUCTION

601. Conventional high explosive (H.E.) weapons contain substances which, on detonation, release energy as a result of chemical changes.

602. Nuclear explosives, weight for weight, liberate vastly greater amounts of energy than conventional explosives and this energy comes from the inner core of nucleus of each atom. Various types of nuclear weapons can be made.

Fission (or Atomic) Weapons.

603. The large atoms of the heavy metals, plutonium (made artifically in a nuclear reactor) and uranium, can split into two not quite equal parts, a process which is called FISSION. This is the process which takes place in the explosion of atomic weapons. The purely fission type of bomb is limited in size because, above a certain critical size, a lump of fissile material is self-disruptive.

Fusion (or Hydrogen) Weapons

604. Another process by which nuclear energy can be released is called FUSION, because certain kinds of hydrogen atoms (called deuterium or tritium) can fuse together at temperatures of millions of degrees. The temperatures attained in the detonation of atomic fission weapons are nearly as high as those at the centre of the sun. Fusion or hydrogen weapons therefore need a small atomic or fission charge as an initiator, and for this reason they are sometimes known as fission-fusion devices and are termed THERMONUCLEAR weapons. These are theoretically limited in size only by the method of delivery on to the target.

605. Another possible thermonuclear weapon is the fission-fusion-fission type in which a fusion or hydrogen bomb, containing a core of fissile Uranium-235 as an initiator, is encased in Uranium-238. This U-238 casing also undergoes fission from the high speed neutrons produced in the hydrogen fusion detonation and, since the casing might be many times heavier than the fissile core of U-235, correspondingly larger quantities of fission products would be released as fall-out from such a weapon.

Energy Distribution in a Nuclear Detonation

606. The nuclear energy released in a detonation at or near ground level is distributed approximately in the following way:

45 per cent in the form of blast and shock waves
35 per cent as light and heat radiation
5 per cent as initial nuclear radiation
15 per cent as residual radiation from fission products

607. Blast and shock waves, and to a lesser extent light and heat flash, are effects common to both conventional H.E and nuclear detonations, but only a nuclear detonation gives rise to nuclear radiation. Initial radiations include the instantaneous radiation, most of which is delivered within 10 seconds, and, by accepted definition, all other nuclear radiation emitted within a minute of the detonation. The residual radiation comes from radio-active fission products, which, together with the other contents of the bomb, are vaporised by the intense heat in the fireball; when they condense on debris or dust, these particles will fall to the ground as radio-active FALL-OUT over an extensive area. The residual radiation decays rapidly at first, but more slowly with time, and it may continue to be a hazard for a long period.

Weapon power or yield

608. The power of a nuclear weapon is the total amount of energy released on detonation, including all forms of energy mentioned in paragraph 606. A weapon can be 'tailor-made' to cause maximum damage to a particular type of target.

609. The power of atomic weapons is expressed in kilotonnes (KT), one kilotonne equivalent to 1,000 tonnes of TNT, or Megatonnes (MT), one megatonne equivalent to 1,000,000 tonnes of TNT.

610. The atomic bombs dropped on Hiroshima and Nagasaki during World War 2 had a power of about 20 KT but since then there have been trials with thermonuclear weapons of up to 65 MT in power, but there are relatively few targets in the world which would appear to justify the use of so powerful a weapon.

611. For normal purposes weapons below 500 KT in power are classed as 'kilotonne' weapons and more powerful types in 'megatonnes'; a 500 KT weapon being classed as half-megatonne ($^1/_2$ MT).

The fireball and the cloud

612. The contents of a nuclear weapon are vaporised in the luminous fireball which rapidly expands and cools to form the familiar radio-active mushroom cloud and stem. The fireball on expansion becomes lighter than the surrounding atmosphere and starts to shoot upwards at speeds which may reach 480 km per hour. Its maximum size, its duration as a luminous fireball, the speed at which it will rise and the height to which the cloud will ascend, depend upon the power of the weapon and, to some extent, upon the height of burst and prevailing meteorological conditions.

613. The cloud from a kilotonne weapon would not normally rise higher than about 12,000 m in the northern temperate latitudes, after which it would flatten out into the familiar mushroom shape. That from a megatonne weapon, on the other hand, may rise to 32 km or more.

TYPES AND HEIGHTS OB BURST

614. The effects of the burst will vary considerably according to whether the weapon is fused to burst.

a. on or near the ground;

b. in shallow water in a harbour, lake or river, or in deep water at sea;

c. high in the air;

d. very high, on the fringe of the earth's atmosphere.

615. For each weapon of a specific power there is a critical height above which the fireball will not touch the ground and therefore will produce neither appreciable contamination of the ground beneath it nor a significant fallout hazard (see Fig 1).

Power of bomb	Maximum height for contaminating burst
20 KT	180 m
100 KT	330 m
1/2 MT	660 m
1 MT	870 m
2 MT	1.2 km
5 MT	1.6 km
10 MT	2.1 km
20 MT	2.8 km

Fig 1

Critical heights for Nuclear Weapons of certain sizes

Ground bursts

616. A ground burst is one in which the weapon is detonated either on the ground or at such low altitude that an appreciable part of the fireball touches the surface beneath it. As the fireball shoots upwards it not only carries up with it much vaporised soil material, it also leaves behind a partial vacuum, and this causes a strong wind directed inwards and upwards towards the centre of the fireball. As this wind speed may be 300 or more km per hour, it will carry with it large quantities of dust and debris on which radio-active fission products can also condense; these radio-active particles will ultimately be deposited on the ground as fallout. Large pieces of debris and particles measuring over 2 millimetres will probably fall in the vicinity of the crater but small particles, carried to greater altitudes in the cloud, will fall at lower speeds according to their shape and size and will be carried along by the prevailing winds considerable distances before returning to the ground.

617. In a ground burst, an appreciable amount of the total energy released is dissipated in forming a crater and some of the initial heat and nuclear radiation will be absorbed by the material displaced and lifted from the crater. Consequently, the ranges of blast damage, fires and skin burns and the effects from initial nuclear radiation will be less than they would be for an air burst of the same power.

Water bursts

618. A water burst is one in which the weapon is burst below the critical height in or over shallow or deep water. In shallow water, mud and water will be carried into the fireball, the water will vaporise and then condense to rain and bring down with it radio-active fission products. The fallout pattern on neighbouring land will be less extensive in area but more intensely radio-active than from a ground burst. A burst in deep water will produce similar effects apart from the absence of mud but more of the total energy will be expended in vaporising water, producing a shock wave through the water, and in forming surface waves. Most of the fission products will be trapped in water near the burst and will disperse rapidly.

Air bursts

619. An air burst is one in which the weapon is detonated so that the fireball is well clear of the surface beneath it. There will be very few dust particles to which the vaporised fission products can adhere and they will therefore condense to minute particles with such a low speed of fall that they will have been dispersed far and wide by the winds before they reach the ground. No significant fallout hazard will occur from this type of burst except perhaps to the extent that heavy rainfall may carry down some of the fission products from the lower parts of the cloud before it disperses.

BIOLOGICAL EFFECTS OF NUCLEAR RADIATION

620. The primary biological effect of nuclear radiation is to damage the living cells of the body. The damage is caused by the release within the cells of the body electrical charges, which interfere with the vital functions of the cells and cause many secondary functional disorders, as well as reducing resistance to infection and disease. Hence, the correlation of cause and effect is difficult and sometimes impossible.

621. The unit used to measure the total amount of radiation (the dose) received by any particular object or person is the centigray (cGy). The intensity of radiation (or dose-rate) at any moment is measured in centigrays per hour (cGy/h).

622. The injury caused by radiation will vary according to the dose received and will not necessarily be immediately apparent. As a general rule, a dose of 150 cGy will produce no immediate effect but an increasingly serious long-term hazard. Larger doses produce more serious and more immediate effects; doses over 600 cGy would result in death in most cases.

623. It should be remembered that all radiation is harmful and should be kept to a minimum. In peacetime, care is taken to ensure that radiation in industry or medicine does not exceed tolerances. In a nuclear war, however, large sections of the population would have no option but to try and avoid or reduce the serious radiation hazard by seeking cover during the early rapid decay of radioactivity and by controlling exposure for some time after. In these circumstances, the permissible dose for personnel who must expose themselves on essential duty will obviously be much greater. This war-time emergency dose is 100 cGy in any one day, or a total of 200 cGy except that a dose of 15 cGy/per day may be received for up to 100 days.

624. The biological effects of radiation appear in stages. The first, radiation sickness, may appear within a few hours after exposure depending on the dose received. Other effects are usually delayed and are mainly due to injury to the blood-forming system. Long-term effects may include anaemia or leukemia, etc, and genetic damage.

RADIOACTIVE DECAY

625. Radioactivity decays naturally and this decay cannot be accelerated or delayed by heat, pressure or chemical reaction. Some products of a nuclear explosion decay very rapidly, others very slowly so that the decay rate of a mixture of fission products is rapid at first and then slows down as the short-lived ones disappear.

This decay rate is expressed mathematically by a formula known as the "t to the minus one point two decay law".

626. For ROC purposes a simplified version of this law known as the "seven-tenths rule" is applied. The rule is that the intensity of radiation falls by a factor of ten as the time lengthens by a factor of seven, that is, if you mutiply the time by seven, you divide the dose-rate by ten. The application of the rule to a dose-rate of 100 cGy/h at 1 hour after a burst is shown in Fig 2.

INITIAL NUCLEAR RADIATION

627. Nuclear radiations are emitted from the moment of detonation and for long periods thereafter. For convenience initial radiation is taken as that emitted within one minute of detonation; it consists of neutrons and gamma rays.

Time after burst	Dose-rate in cGy/h
1 hour	100
($1\frac{3}{4}$ hours)	(50)
7 hours	10
2 days (49 hours)	1
2 weeks (14 days)	0.1
14 weeks	0.01

Fig 2

Application of the seven-tenths rule. The 50 cGy/h figure has been included because it is often useful to know that the dose-rate is halved when the time is multiplied by 7/4.

628. For all practical purposes, neutrons are not a hazard because the limit of their damaging range is well within the lethal limits of other effects.

629. For the same reason the initial gamma radiation from megatonne weapons can be discounted but that from kilotonne weapons is significant because it extends beyond the range of other effects. For example a 20 KT weapon would give a dose of 450 cGy at 1.2 km and 75 cGy at 1.6 km; the corresponding distances of a 100 KT weapon would be 1.6 km and 2 km.

630. The only protection from initial nuclear radiation is to be under adequate shielding when the flash occurs. It must also be remembered that the radiation decreases with distance.

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THERMAL RADIATION

631. The maximum size and duration of the fireball depends on the weapon power; that from a 20 KT weapon last about 1 1/2 seconds while that from a 10 MT weapon lasts about 20 seconds. The heat and light radiation can cause fires and skin burns out to considerable distances; it is absorbed by dark colours and reflected by light ones.

632. A 20 KT airburst will cause a main fire zone of more than 2.4 km radius, with isolated fires out to 3.2 km; corresponding figures for a 5 MT airburst are 24 km and 35 km. Weapons which are ground bursts will be effective over shorter distances.

633. Skin burns of varying severity will be suffered by persons directly exposed to the rays from the fireball. For example, blistering of the skin would be suffered by people directly exposed to the rays of the fireball of a 20 KT airburst weapon at a distance of 2.8 km; a 5 MT weapon would produce the same effect at 29 km.

634. People caught in the open should dive behind any available cover to get out of the direct path of the rays of the fireball. In this way, serious burns can be avoided. Light coloured clothing gives better protection than dark; woollen garments are better than cotton.

CRATER FORMATION AND GROUND SHOCK

635. When a nuclear detonation takes place on or near the ground a crater is formed and a shock wave is transmitted outward through the ground. Much vaporised or pulverised material is sucked up by the rising fireball, but a still larger quantity is gouged out of the crater and deposited to form a highly radioactive "lip".

636. The groud shock effects from a megatonne weapon would be similar to those of a moderate earthquake. Small underground structures and underground utilities (such as telephone cables, etc) would be unaffected beyond a mile from a 5 MT surface burst.

EFFECTS OF AIR BLAST

637. The enormous pressure produced by a nuclear weapon results in a wave of high pressure transmitted outwards and developing into a shock front. The pressure wave is followed by a suction wave. Initially, the pressure wave travels much faster than the speed of sound but gradually slows to the speed of sound at great distances.

638. Structural damage depends on the weapon power, whether it is air or ground burst and the distance from the detonation. It also, of course, depends on the type strength, size, etc of the structure.

639. Figure 3 shows the ranges of various categories of damage for ground burst weapons of various powers.

Weapon power	20 KT	100 KT	1/2 MT	1 MT	2 MT	5 MT	10 MT
Total destruction	0.6	1.2	2.0	2.4	3.2	4.4	5.6
Irreparable damage	0.6 - 1.0	1.2 - 1.6	2.0 - 2.8	2.4 - 3.6	3.2 - 4.8	4.4 - 6.4	5.6 - 8.0
Moderate damage	1.0 - 2.6	1.6 - 4.4	2.8 - 7.2	3.6 - 8.8	4.8 - 11.3	6.4 - 16.0	8.0 - 19.3
Slight damage	2.6 - 4	4.4 - 6.8	7.2 - 11.6	9.6 - 14.5	11.3 - 19.3	16.0 - 25.8	19.3 - 32.2

Fig 3

Average ranges (radii) in kilometres of damage to typical British cities caused by ground-burst nuclear weapons

640. Debris would be a serious problem in built-up areas, preventing or restricting movement of vehicles required for fire-fighting, rescue, etc.

641. The main blast risk to human beings (apart from being struck by debris or missiles) is being blown over by the blast wind; this risk can be considerably reduced by lying prone on the ground.

EFFECTS OF RESIDUAL RADIATION

642. The radioactive fission products from a ground-burst weapon condense on debris and dust lifted by the explosion and would be deposited over a wide area in a complex pattern of radioactive fallout, the shape and extent of which would be determined by the wind strength and direction at the various levels through which the particles fall. With the average winds in the United Kingdom the fallout pattern might extend to several hundred miles down-wind of the point of burst (ground zero or G.Z.).

643. The extent of the fallout pattern would also be dependent upon the power of the weapon. In typical British weather conditions, it would be irregular in shape with the more intensely radioactive areas towards the centre and closer to ground zero and with the intensity falling off towards the edges of the contaminated area and further down-wind.

644. In order to define fallout contours in a contaminated area it is necessary for dose-rates to be related to a standard time. The time normally chosen is seven hours after the mid point between the times of the first and last known bursts affecting a Sector. In practice, dose-rates would be measured and reported after maximum has been reached and for the decay law these dose-rates would be converted to the standard reference time and known as DR7s. A pattern of DR7s could then be drawn on a map and from these the fallout contours could be defined; thereafter, the dose-rate at any place within the contours could be calculated for any given time.

THE DIFFERENT HAZARDS PRESENTED BY FALLOUT

645. The fission products decay be emitting:

a. Alpha particles, which lose their energy passing through a few centimetres of air; they cannot penetrate clothing or unbroken skin.

b. Beta particles which are stopped by air within a few metres; they cannot penetrate deeply beneath clothing and skin but can cause skin burns.

c. Gamma rays which can travel tens of metres in air and can penetrate through the deeper tissues and organs of the body.

646. Fallout therefore presents two distinct hazards:

a. Contact with, or proximity to, the skin or organs of the body, eg, fallout on light clothing, on the skin and hair or inside the body by access through cuts or in food or water.

b. Gamma radiation from fallout over a wide area which can affect the whole body from a distance.

647. In some circumstances, it may be possible to see or hear fallout coming down, but for all practical purposes it should be assumed that it will not be noticed except by instruments.

PROTECTION FROM RADIATION

648. There are two factors involved in protection from radiation:

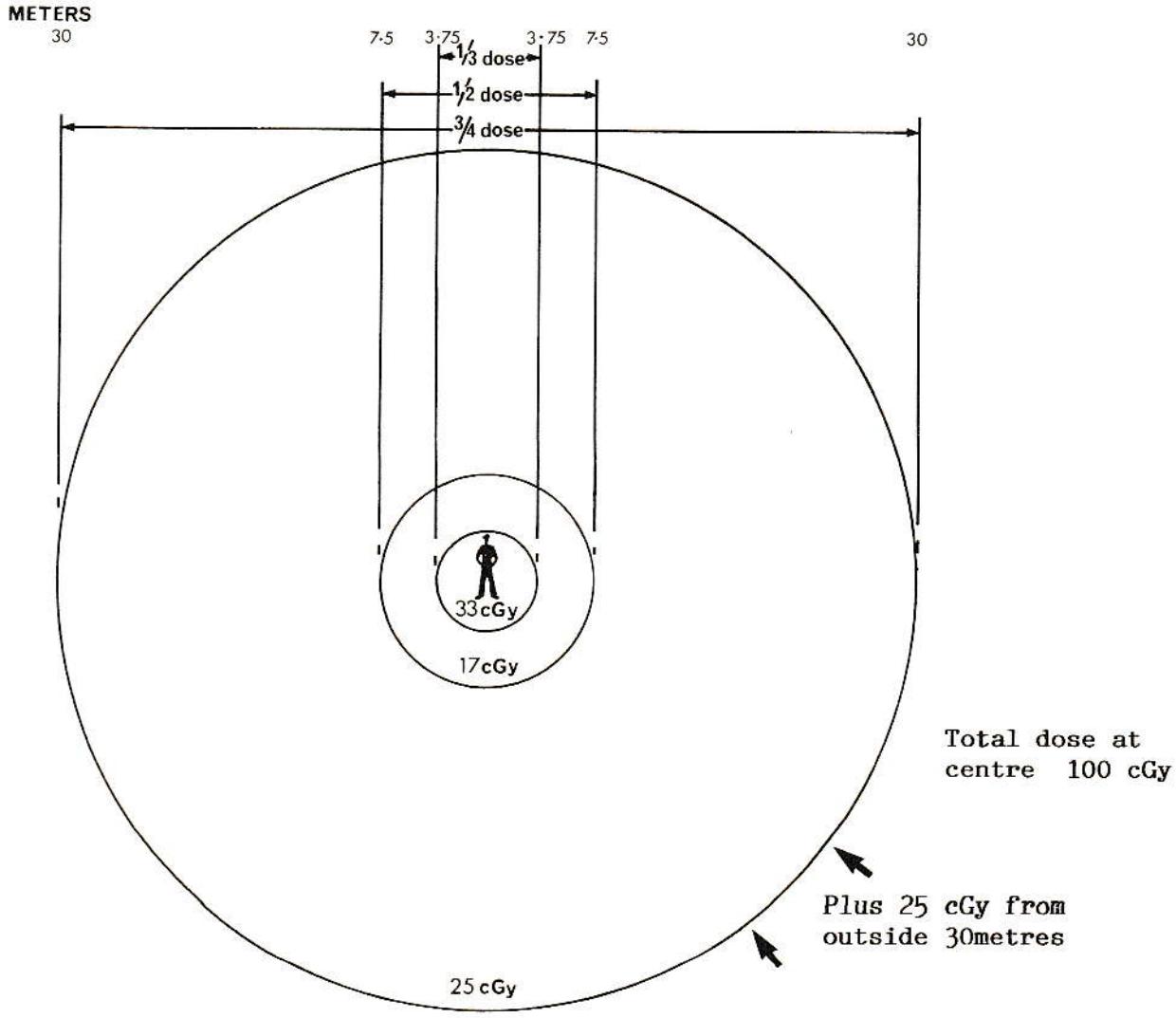
a. The distance between the person and the contamination.

b. The shielding effect of the material between the person and the contamination.

Effect of Distance

649. The intensity of gamma radiation diminishes as the rays travel through the atmosphere, so that in an area which is uniformly contaminated a person in the open is affected mainly by contamination close to. Fig 4 shows that half the dose comes from fall-out within 7.5 m.

650. It will also be appreciated from Fig 4 that a person in the centre of a building at 3.75 m from the walls and roof will be protected from 1/3 of the radiation, even ignoring any shielding effect on the walls and roof.



eg. If the observer at the centre is receiving 100 cGy
33% is coming from the 3.75m radius =33 cGy
50% is coming from the 7.5m radius 33 cGy+17 cGy=50 cGy
75% is coming from the 30m radius 33 cGy+17 cGy+25 cGy=75 cGy
The remaining 25% therefore comes from outside the 30m radius

Fig 4

Total dose from fall-out - contributions from different distances.

Effect of Shielding

651. Gamma radiation can penetrate all material but its intensity is reduced and if the material is thick enough it gives protection of practical value. This protection increases with the weight and density of the material. (See Fig 5).

652. The thickness of shielding material needed to reduce the dose-rate by half is called the half-value thickness of that particular material. Typical half-value thicknesses are concrete 5.6 cm, brick 7.1 cm, earth 8.4 cm and steel 1.8 cm

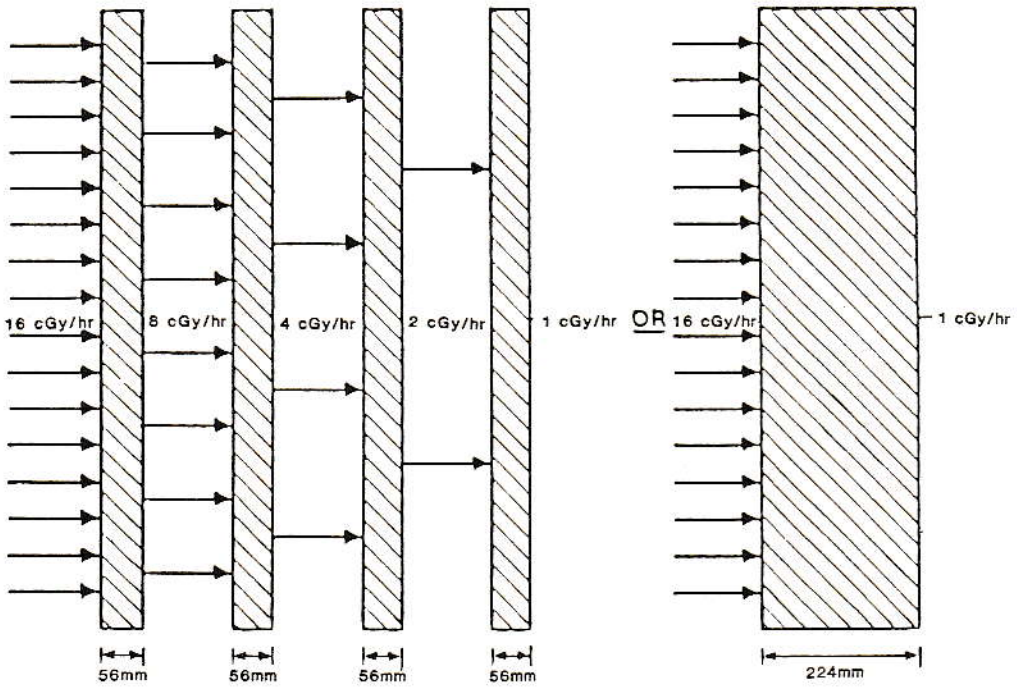


Fig 5
Diagram of reduction of gamma radiation by successive half-value thicknesses of concrete.

Protection Afforded by Buildings

653. The protection from fall-out afforded by a building is usually expressed as the "protective factor" of the building; that is the factor by which the dose-rate received by a person in the building is reduced compared with that received by a person standing in the open. Thus a person within a building with a protective factor of 40 would receive 1/40th of the dose received by a person standing oustide.

654. Protective factors of ground-floor rooms used as a refuge in typical British houses are:

Bungalow	5-10
Detached two-storey	15
Semi-detached two-storey	25-40
Terraced back-to-back	60

Protection Afforded by Vehicles

655. The protective factors of various types of road transport are very low compared with buildings and would be about 1.5 or slightly more depending upon the size and weight of the vehicle, the height of seating above ground and on the number of passengers.

PERSONAL CLEANSING

656. If it is suspected that a person has become contaminated by fallout settling on his clothing before he has taken cover, or if he has had to emerge from cover whilst fallout is coming down, personal cleansing should be carried out as soon as practicable to remove as much as possible of the contamination.

657. The outer clothing should be removed as soon as possible, care being taken not to shake it unnecessarily. It should then be disposed of somewhere where it does not remain a hazard to other persons. Personal washing should then follow at once, soap and water being used as liberally as circumstances permit, particular attention being paid to the nails and hair.

FIRST AID FOR RADIATION SICKNESS

658. If there is any suspicion that a person is suffering or will later suffer from radiation sickness, he should be treated for shock as well as for any injuries sustained from other causes. Complete physical and mental rest are very important and every care should be taken to prevent chilling. Scrupulous care should also be taken to prevent added risk of infection through wounds by flushing them freely with water if possible.

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Converted to metric measurements February 1989.

ROYAL OBSERVER CORPS

TRAINING MANUAL

CHAPTER 7

GLOSSARY OF ABBREVIATIONS

Area Comdt	Area Commandant	Fig 302
AC	Aircraftsman RAF	Chap 4
ACW	Aircraftswoman RAF	Chap 4
AdO	Administration Officer	Chap 3
AO	Administrative Officer	Fig 302
Accts O	Accounts Officer HQ ROC	Fig 301
AOC in C	Air Officer Commanding in Chief	Para 107
ASO	Area Staff Officer	Fig 302
Air Cdre	Air Commodore RAF	Chap 4
Asst Comdt	Assistant Commandant ROC	Fig 301
AWDREY	Atomic Weapon Detection, Recognition and Estimation of Yield	Para 542
BMEWS	Ballistic Missile Early Warning System	Para 520
BPI	Bomb Power Indicator	Para 541
CCP	Carrier Control Point	Para 523
CFO	Central Forecasting Office	Fig 503
Comdt ROC	Commandant Royal Observer Corps	Fig 301
CO	Crew Officer	Fig 303
Cpl	Corporal RAF	Chap 4
C/Obs - C/Obs (W)	Chief Observer - (Woman)	Chap 4
COS	Chief of Staff HQ ROC	Fig 301
cGy	centigray	Chap 6
cGy/h	centigray per hour	Chap 6
DAC	Deputy Area Commandant	Fig 302
DEMS	Defensively equipped merchant ship	Para 129
Dep SDO	Deputy Senior Duty Officer	Note 7c Fig 301
DGC	Deputy Group Commandant	Fig 303
ECN	Emergency Control Network	Para 175
Fg Off	Flying Officer RAF	Chap 4
Flt Lt	Flight Lieutenant RAF	Chap 4
FSM	Fixed Survey Meter	Para 541
FSMT	Fixed Survey Meter Trainer	Para 541
GC	Group Commandant	Fig 303
Gp Capt	Group Captain RAF	Chap 4
GO	Group Officer	Fig 303
GSO	Group Staff Officer	Fig 303
GZI	Ground Zero Indicator	Para 541
HE	High Explosive	Para 601
H/Obs	Head Observer	Fig 303
HQ ROC	*Headquarters Royal Observer Corps*	*Para 204b*

KT	Kilotonnes	Para 609
LADA	London Air Defence Area	Para 103
LAEC	Local Authority Emergency Centre	Para 501
L/Obs - L/Obs (W)	Leading Observer - (Woman)	Chap 4
MCO	Mapping and Charting Officer HQ ROC	Fig 301
MOD	Ministry of Defence	Para 202
MSX	Message Switch	Para 185
MT	Megatonnes	Para 609
NADGE	NATO Air Defence Ground Environment	Para 520
NORAD	Northern Radar	Para 520
NATO	North Atlantic Treaty Organisation	Para 520
NRC	Nuclear Reporting Cell	Para 553
NRC O	Nuclear Reporting Cell Officer	Fig 303
Obs - Obs (W)	Observer - Woman Observer	Chap 4
Obs Capt	Observer Captain	Chap 4
Obs Cdre	Observer Commodore	Chap 4
Obs Cdr	Observer Commander	Chap 4
Obs Lt	Observer Lieutenant	Chap 4
Obs Lt Cdr	Observer Lieutenant Commander	Chap 4
Obs Off	Observer Officer	Chap 4
Ops Comms	Operations Communications Officer HQ ROC	Fig 301
Ops Trg	Operations Training Officer HQ ROC	Fig 301
Ops Trg 2	Assistant Operations Training Officer HQ ROC	Fig 301
Org 1	Organisation Officer HQ ROC	Fig 301
PI	Post Instructor	Fig 303
PSO	Personnel Services Officer HQ ROC	Fig 301
PW	Private wire	Para 510
PWHQ	Primary War Headquarters	Para 520
PWO	Principal Warning Officer	Para 547
RAF	Royal Air Force	Para 168
RGHQ	Regional Government Headquarters	Para 501
ROC	Royal Observer Corps	Para 202
RSM	Radiac Survey Meter	Para 541
S Ad O	Senior Administration Officer HQ ROC	Fig 301
SDO	Senior Duty Officer	Note 7b Fig 301
SEO	Sector Executive Officer	Fig 302
Sqn Ldr	Squadron Leader RAF	Chap 4
Sgt	Sergeant RAF	Chap 4
Sup O	Supply Officer HQ ROC	Fig 301
SOC	RAF Sector Operations Centre	Para 520
SOPs	Standard Operating Procedures	Preface
S Ops O	Senior Operations Officer HQ ROC	Fig 301
SPs	Siren Points	Para 524
SRDB	Home Office Research and Development Branch	Chap 6
SX2000	MITEL SX2000 Automated Switchboard	Para 192

TAVRA	Territorial Auxiliary & Volunteer Reserve Association	Para 205
TI	Team Instructor	Fig 303
TSIs	Training Staff Instructions	Preface
UAS	Upper Air Station	Fig 503
UKWMO	United Kingdom Warning and Monitoring Organisation	Para 501
Wg Cdr	Wing Commander RAF	Chap 4
WP	Warning Point	Para 536
WRVS	Womens Royal Voluntary Service	Para 162

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