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PART 2 : SECTION 2

CHAPTER 2

THE AERODROME

Definitions

1. (a) *Aerodrome*. An area of land or water, including any buildings and installations, normally used for the take-off or landing (alighting) of aircraft.

(b) *Airfield*. An area of land used for take-off, landing, and manoeuvring of aircraft on the ground.

THE AIRFIELD

Introduction

2. Airfields have gradually developed since the earliest days of flying, and vary greatly in design and layout. A broad distinction can be made, however, between those where the airfield is entirely of grass and those with paved runways. There are comparatively few grass airfields left nowadays and they are used mainly by light aircraft engaged on flying instruction and civil club flying.

3. The majority of service airfields have one or more runways, most of which were laid down during the Second World War. At that time the effect of the wind on an aircraft landing was such that it was the practice to have a triangular pattern of three runways, the longest of which was usually in line with the prevailing wind.

4. As aircraft developed and approach and landing speeds increased, the length of the runway became a more important consideration than the wind direction. Modern tendency is for operations to be confined to one, or at the most two, runways on each airfield. The longest of these is usually designated as the main instrument runway and has full lighting, radio and radar facilities.

5. R.A.F. airfields are divided into five main categories according to their role. For each category certain minimum standards are laid down, e.g. runway width, length, and bearing capacity; cleared zones; overrun areas, etc. Details are given in a pamphlet issued by the Air Ministry (D.D.O.1.) entitled "R.A.F. Layout Specifications for Permanent Airfields".

Runways

6. Runways vary in width and length according to the role of the aerodrome. Most main instrument runways are 150 feet wide and 6,000 feet long. Subsidiary runways are usually

of the same width but are shorter in length. On some bomber aerodromes the main runway is 9,000 feet long and 200 feet wide.

7. Modern runways are constructed of concrete and surfaced with asphalt to give a clean smooth surface. The ends of runways intended for the operation of jet aircraft, however, are usually finished with a concrete surface which is less affected by jet efflux and fuel dripping.

Flight Strips

8. A rectangular portion of an airfield comprising a runway, the runway shoulders, cleared zones, and overrun areas, is known as a *flight strip* (Fig. 1).

9. *Runway Shoulders*. On each side of the paved runway a strip 90 feet wide, known as a *runway shoulder*, is cleared, levelled, and hardened. The runway shoulders are usually sown with grass and may be used for landing in an emergency.

10. *Cleared Zones*. On each side of the main runway shoulders are *cleared zones*, 435 feet wide, which are levelled to provide a reasonably even surface and are cleared of all obstructions except those which are absolutely necessary to the functioning of airfield services. Cleared zones on subsidiary runways are only 135 feet wide.

11. *Width of Flight Strips*. The total width of a flight strip embracing a main instrument runway 150 feet wide is therefore 1,200 feet, and that of a flight strip embracing a subsidiary runway 600 feet.

12. *Overrun Areas*. These are areas beyond the ends of a runway which are kept clear of obstructions in case they are needed by aircraft overrunning or undershooting the runway. Overrun areas vary in length but are equal to the width of the flight strip, the centre portion corresponding in width to the runway and its shoulders being specially hardened and grassed.

Taxiways

13. A taxiway is a specially constructed or marked path for aircraft moving on the ground. The average width is 50 feet and, like flight strips, they have shoulders and cleared zones of 10 feet and 115 feet respectively, on each side.

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Load Classification Numbers (L.C.N.)

14. Runways and taxiways are load-tested and allocated a load classification number. This number, when compared with the L.C.N. of an aircraft, will indicate whether the paved surfaces are strong enough to bear the aircraft under normal operating conditions.

15. The L.C.N. is used principally by operating authorities when planning operations and may also be significant when aircraft are diverted. The captain of every aircraft is responsible for ensuring that, except in an emergency, he lands his aircraft only at airfields with runways strong enough to accept his aircraft without damage. He must therefore know the L.C.N. of his aircraft under various conditions of loading, and if an unexpected diversion is necessary he must be prepared to pass this information to the diverting authority, or to the air traffic control staff at the airfield at which he intends to land. In an emergency, however, an aircraft may land on any airfield which the captain considers is practicable, having regard to the degree of emergency. Occasional landings can be made

on a runway having an L.C.N. equal to one-half of the aircraft L.C.N., since an occasional landing under such conditions would be unlikely to do any serious damage to the runway, and such damage would be of secondary importance to the safe landing of the aircraft. A landing on a runway of an L.C.N. less than one-half that of the aircraft might cause a failure of the runway surface with risk of serious damage to the aircraft.

Sterile Areas

16. Where a public road or a railway passes close to the end of a runway, it is necessary to ensure that sufficient clearance is provided when aircraft are landing. In such cases the nearest point of touchdown is marked by a broad white line across the full width of the runway. The area between the end of the runway and the white line is known as a sterile area (Fig. 2) and is marked with four white chevrons, the points of which touch the white line in the direction of landing.

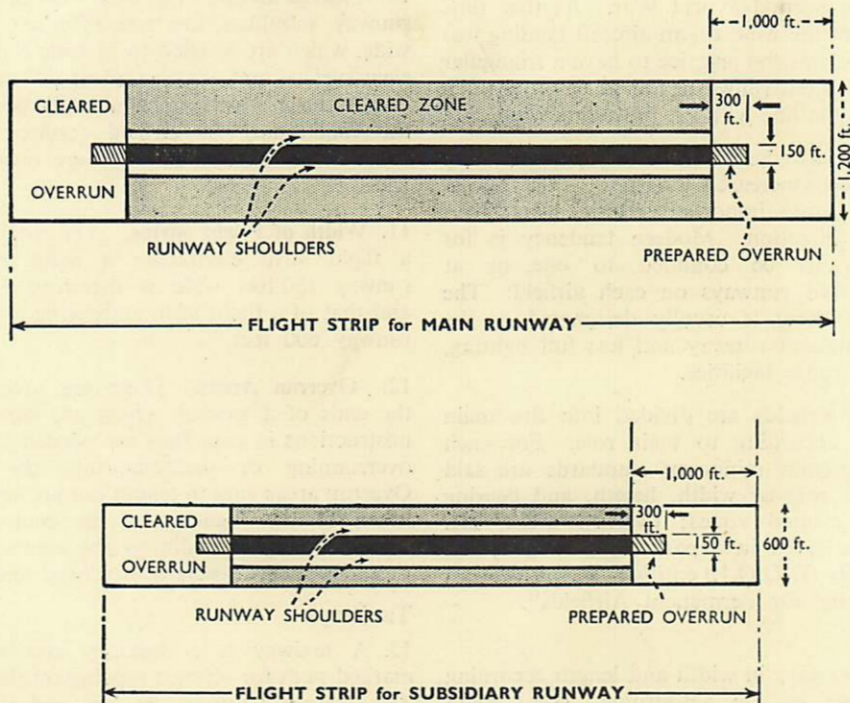
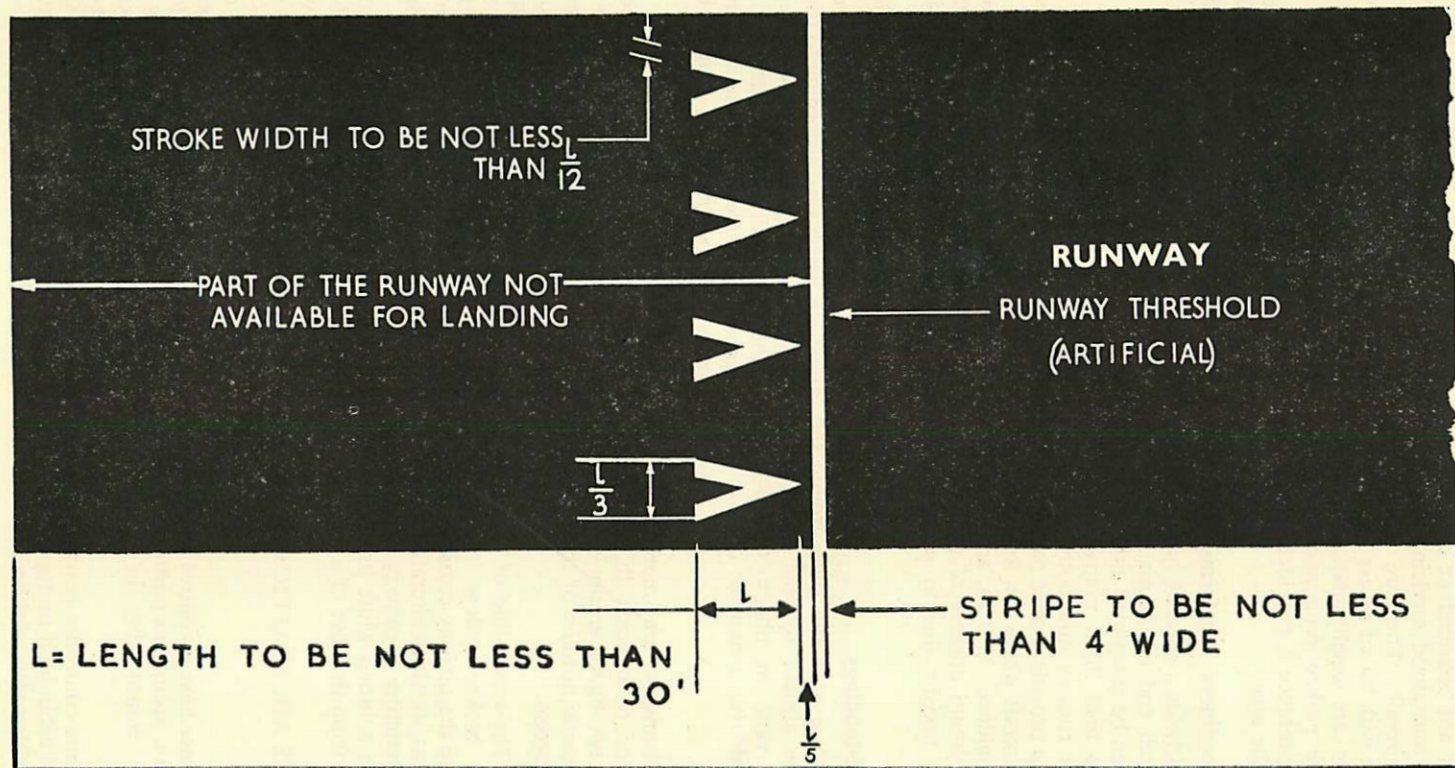


Fig. 1. Flight Strips

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Fig. 2. Runway Sterile Area Marking

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Aircraft Servicing Platforms (A.S.P.)

17. Paved areas are provided at certain aerodromes for the centralized servicing and quick turn-round of aircraft. They are usually rectangular in shape with broad access tracks to the taxiway. A.S.Ps. are usually marked to ensure that aircraft are parked economically and so that maximum clearance is provided for aircraft moving within the area.

Operational Readiness Platforms (O.R.P.)

18. At fighter airfields a specially prepared area is provided at each end of the main runway on which aircraft can be assembled either for rapid "scrambling" or final flight preparation. The areas adjoin the runway and both are on the same side of it to provide a clear passage on the other side for aircraft which are forced to land on the grass shoulders. O.R.Ps. are marked to provide the maximum number of positions for aircraft, with a taxiing line to each parking position.

Dispersal Hardstandings

19. Paved areas are normally sited around the perimeter of the airfield for the dispersal of aircraft. They vary in shape considerably, having developed over a number of years.

Markings

20. **Runways.** Runways are marked with a broken white line to indicate the centre-line. At each end a two-figure group is painted to indicate the magnetic heading of the runway to the nearest 10 degrees.

21. **Taxiways.** The centre-line of a taxiway is marked with a broken yellow line which is interrupted where the taxiway crosses a runway. Marshalling points, at which aircraft are required to stop before entering a runway for take-off, are marked with a broad white line across the taxiway 225 feet from the edge of a runway.

AERODROME AIR TRAFFIC CONTROL

Control Tower

22. All aerodromes have a control tower, which ideally is sited in a prominent position. Individual towers vary considerably in design and layout.

23. The aerodrome controller is usually housed in a glass control cabin built on top of the tower to provide him with a view of the airfield and the

circuit. The approach controller operates from inside the tower, where radio and radar aids are provided to assist him, and a view of the airfield and circuit is less important. At some aerodromes the traffic density is such that one controller can combine the functions of aerodrome and approach control.

24. The control tower houses the remainder of the air traffic control staff, much of the radio/radar and telecommunications equipment, and generally the meteorological section. Flight planning sections are often located in or near the tower.

Runway Control Caravan

25. The runway controller occupies a caravan sited to the left of the touch-down end of the runway. The caravan is distinctively painted in black and white checks and bears the elevation of the airfield in red figures on the side.

Air Traffic Control Facilities

26. Control towers are manned and equipped to standards which vary according to the role of the aerodrome, and the extent to which it participates in the overall air traffic control and emergency organization. Details of facilities in individual towers are published in Flight Information Documents.

27. **Radio.** Every tower is equipped for R/T communication with aircraft. Two frequencies are provided for locally based aircraft, one for aerodrome control and the other for approach control. In addition, common frequencies are provided for the control of visiting aircraft and many towers keep watch on distress frequencies. Crash and rescue vehicles and an ambulance are controlled on short-range radio from the tower.

28. Radio direction-finding equipment is installed at nearly all aerodromes. There are two main types, one automatic and the other manually operated. The former, known as CR/DF, shows the bearing of aircraft on a cathode ray presentation in the tower. In the case of the manually operated equipment, bearings are passed to the tower by means of a landline and loudspeaker. The manual D/F is not as accurate as the CR/DF, and is slower in operation as it requires longer transmissions for the operator to determine each bearing. Both the CR/DF and the manual D/F are usually located on the airfield; the latter is often mobile.

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29. **Telecommunications.** Every control tower has a direct telephone line to its air traffic control centre. Certain towers may also have direct lines to neighbouring airfields, in order to provide mutual information about the latest weather conditions and to assist in traffic co-ordination.

30. A tele-talk intercommunication system connects the control tower with other vital offices and sections on the aerodrome.

31. In addition, many towers are connected on a teleprinter circuit to their appropriate air traffic control centre so that they should have immediately available the latest information applicable to their flight information regions. The meteorological office is also normally connected on the meteorological teleprinter network for the supply of the appropriate meteorological information.

32. **Ground Signals.** Visual ground signals have been developed to supply pilots with essential information. These signals are fully illustrated and described in A.P. 3024 (Manual of Air Traffic Control) and A.P. 3322/3 (Supplementary Flight Information Documents). They are displayed in a hollow white square, adjacent to the tower, known as the *signals square*.

33. In addition to the standard signals, each aerodrome has a two-letter identification group in white near the signals square. The group corresponds to the characteristics of the aerodrome identification beacon.

34. Apart from the signals in the signals square the direction of landing is also shown by a white "T" near the runway caravan.

35. Wind sleeves are placed in suitable prominent positions to show wind direction. The most reliable sleeve is surrounded by a white ring on the ground.

Approach Aids

36. Most airfields have some form of approach aid applicable to their particular role. Approach aids are either air-interpreted or ground-interpreted. In the former type information is provided in the aircraft generally by means of special receivers; the pilot or navigator then has to interpret that information and control the aircraft on to the required flight path. In the ground-interpreted aid the information is made

available to controllers who then pass directions to the pilot by R/T. The main aids in use are described briefly in the following paragraphs. (See Vol. 1, Part 3, for full details.)

37. Air-Interpreted Aids.

(a) *Voice Rotating Beacons.* The V.H.F. Voice Rotating Beacon (V.R.B.) is a short-range aid providing verbal, magnetic, homing bearings to any aircraft fitted with a standard V.H.F. receiver. The ground equipment consists of a mobile transmitter contained in one to three vehicles which may be sited within the airfield boundary.

(b) *Rebecca Mark. 7.* Rebecca Mk. 7 is a medium-range radar aid showing ranges from, and limited relative bearings to, a ground Eureka Mk. 7 transponder beacon, the information being presented on a range and heading meter. The ground beacon is usually installed on a suitable high building on the aerodrome.

(c) *Rebecca Mark. 8.* Rebecca Mk. 8 is a development of Rebecca Mk. 7 and uses the same ground Eureka Mk. 7 beacons for homing purposes. It is also used with BABS Mk. 4 ground beacons to provide range and azimuth approach facilities. The BABS Mk. 4 installation stands about 12 feet high and is normally sited at least 1,100 feet beyond the upwind end of the runway.

(d) *Standard Beam Approach.* Standard Beam Approach (S.B.A.) is a ground equipment employing a main transmitter radiating in two slightly overlapping sectors to provide an approach in azimuth, with two marker beacons sited on the approach to give specific ranges. The main transmitter is sited at the upwind end of the runway, housed in a large vehicle or hut on a prepared site, and has aeriels about 30 feet high. The inner and outer marker beacons are relatively small units, about three feet square, located approximately 150 yards and two to three miles respectively downwind of the touchdown point.

(e) *Tuneable Beam Approach.* Tuneable Beam Approach (T.B.A.) is the airborne receiving equipment used with S.B.A. It allows more variety in frequency selection by providing a tuneable receiver in the aircraft, instead of a receiver with pre-set frequencies which was originally used.

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(f) *Radio Range*. The Low Frequency 4-Course Radio Range is a system of ground aeri-als radiating four overlapping sectors to provide four equi-signal "beams". An aircraft with a receiver tuneable to the appropriate frequency can home along a beam using aural interpretation and identification. The ground equipment is normally fixed; four aeri-als are equally spaced around a small hut, which carries a fifth aerial. Let-down procedures are produced for airfields having this aid.

(g) *Radio Compass*. A radio compass is a receiver that can determine the direction of a ground transmitter and indicate this information to the pilot either aurally or visually as a relative or true bearing. If the transmitter is situated on an aerodrome, or in line with the landing runway, an approach procedure can be used.

(h) *Instrument Landing System*. An Instrument Landing System (I.L.S.) employs four or five transmitters. One, sited at the upwind end of the runway, supplies the azimuth approach path, and another, sited near the touchdown end supplies the glidepath, both transmitters radiating slightly overlapping sectors to define their paths. Two or three marker beacons may be sited along the approach to provide ranges to the touchdown point. The airborne equipment consists of receivers, a control unit, and a cross-pointer indicator to show deviations from the approach or glide paths.

(j) *Rebecca Mark 4*. Rebecca Mk. 4 is a medium-range radar aid which gives the navigator a cathode ray tube presentation of ranges from, and limited relative bearings to, a ground Eureka Mk. 2 transponder beacon. The Eureka Mk. 2 beacon is normally sited on a high building on an aerodrome. In addition, Rebecca Mk. 4 can be used with ground BABS Mk. 2 beacons to provide range and azimuth approach facilities. The BABS Mk. 2 installation stands about six feet high and is either a small fixed hut or a light mobile van sited in line with the runway beyond the overshoot area.

38. Ground-Interpreted Aids.

(a) *Ground Controlled Approach (G.C.A.)*. The equipment and operating crew are housed in a vehicle positioned half to one mile from the touchdown, and generally to the left of the upwind end of the main instrument runway. The vehicle is painted in red and white squares and a second vehicle parked alongside contains a Diesel generator. The G.C.A. equipment comprises two separate units:—

(i) *Search Radar*. The search radar detects aircraft in azimuth through 360°, and within certain limits of altitude. An aircraft requiring assistance will first be detected and identified on the search radar and vectored to a position from which it can be directed on to the final approach to the runway.

(ii) *Precision Radar*. The precision radar is of higher definition than the search radar, but covers only the immediate approach path to the runway. The position of the aircraft is indicated in azimuth and elevation to the controller, who then passes the information to the pilot to enable the aircraft to be flown along the glide path.

(b) *Airfield Control Radar Mark 7 (A.C.R.7)*. The A.C.R.7 equipment may be either mobile or static. In the mobile type the equipment and operators are housed in a trailer, painted with red and white squares, which is suitably positioned on the airfield. In the static type the radar scanner, painted orange, is sited on the airfield with remote presentation either in the tower or other appropriate control position. The A.C.R.7 is a search radar only and, unlike G.C.A., has no separate high precision radar to supply glide path information. Aircraft are marshalled to a suitable position for a final approach, as in a G.C.A., and the pilot is then given directions to enable him to align his aircraft on the approach. At intervals the controller also passes the range of the aircraft and the corresponding altitude, thereby enabling the pilot to control his rate of descent.

Safety Services

39. Crash and rescue vehicles stand by under the control of the duty air traffic control officer whenever flying is in progress. The vehicles are stationed near the tower or at some other vantage point and are alerted by crash bell or short-range radio. Crash and rescue vehicles are designed, equipped, and manned to save life and minimize the danger and effects of fire.

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40. A fully equipped ambulance is also at readiness, usually at the medical section, whenever flying is in progress. The ambulance is alerted by crash bell at the medical section, and directed by short-range radio from the tower.

41. Heavy crash equipment is maintained ready for instant use at all aerodromes to remove and salvage crashed aircraft and to clear an obstructed runway if necessary.

AERODROME LIGHTING

Introduction

42. Aerodrome lighting may be considered conveniently under two headings: approach lighting and airfield lighting.

43. Several types and combinations of approach lighting and airfield lighting are in use but they are gradually resolving into a few main types of each. Permanent installations are normally on the mains electricity supply but have some alternative arrangement to cover the possibility of power failure. Temporary and portable airfield lighting is provided where alternative power supplies are inadequate or are not immediately available. Portable airfield lighting is also used to supplement permanent lighting wherever necessary.

Approach Lighting

44. Approach lighting systems are designed to assist pilots during the approach for landings in conditions of poor visibility and at night. The more modern approach lighting is particularly intended to help pilots in making the vital change from instruments to visual flight when approaching to land in very bad visibility. Three main types of approach lighting are in use, the type depending on the role of the aerodrome.

45. **Approach Funnels Lighting.** The funnels system was originally developed as part of the "Drem" lighting system used in the Second World War, and consisted of an outer circle of white lights, corresponding to the circuit, with "funnels" leading in to each runway. Most of the circles have since been removed but the funnels remain at a number of aerodromes. They consist of a number of white lights arranged in groups of three, two, and one, on each side of the approach to a runway. The outer groups of lights, forming the funnels, are arranged to form two separate "Vs".

46. **Centre-Line Approach Lighting.** Centre-line approach lighting is a later development of the funnels system. It consists of a number of white lights mounted on poles and extending 4,500 feet from the threshold of the runway in a straight line out towards the approach. In addition, most centre-line approach lighting systems have sodium lamps which may be selected from the tower as alternatives to the white lights. The sodiums are used mainly during bad visibility in daylight.

47. **Centre-Line and Bar Lighting.** Aerodromes at which aircraft are required to operate in conditions of very poor weather and visibility are being equipped with centre-line and bar lighting, known as the CL5B system (Fig. 3), on the main instrument runway. Each installation normally has five bars but there are a few with only two.

48. The centre-line of white lights extends 3,000 feet from the threshold of the runway with double lights on its outer half. The cross-bars, also of white lights, are spaced at equal intervals along the centre-line and are of decreasing length towards the runway. The outermost bar is wider than the runway, and the remaining bars are of such a length that lines joining the ends would converge at a point 1,000 feet along the runway. The lights in the CL5B system are of high intensity and beamed towards the approaching aircraft, *i.e.* the lights are uni-directional.

49. **Low-Intensity "T".** A "T" of omni-directional red lights is incorporated in the CL5B approach lighting (Fig. 4). The crosspiece of the "T" is built into the bar of white lights nearest the runway and its tail extends along the centre-line out to 1,500 feet. The low-intensity "T" provides a less intense approach lighting system on its own, but it also assists pilots to locate the approach line when they are flying in the circuit outside the coverage of the high-intensity, uni-directional white lights. A similar red "T" is installed at the opposite end of the main instrument runway on many aerodromes, but only one "T" can be selected depending on the runway in use.

50. The high-intensity approach lighting and the low-intensity "T" are controlled from a panel in the tower, which also gives a wide range of brilliancy control for use in varying conditions of darkness and visibility.

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51. **Angle-of-Approach Indicators.** The indicators (Fig. 5) show coloured segments of light towards the approaching aircraft, the correct glide-path angle being indicated by a narrow green sector. If the aircraft is above or below the glide path the indicators show amber or red respectively. In modern lighting installations the indicators are placed side-by-side on the left-hand side of the runway, viewed from the approach, and 300 feet along the runway from the threshold. Where, however, there is an O.R.P. the indicators may be placed on the right-hand side. In older types of airfield lighting the indicators are placed one on either side of the touchdown point of the runway.

52. The green segment of the angle-of-approach indicators subtends a vertical angle of one degree. When set up with modern lighting the indicators are adjusted to $2\frac{1}{2}^\circ$ and $3\frac{1}{2}^\circ$, left and right respectively. With green/green visible this ensures an accurate indication of the approach angle of 3° , also the pilot is given early warning of any deviation, since he receives an amber/green or green/red indication even if he is only slightly above or below the correct approach angle. When used with older lighting

systems, the indicators are set at angles which are decided locally and published in local orders.

53. To avoid confusion with other lights, the permanent angle-of-approach indicators flash on and off, but portable indicators, which are battery operated, show only a steady light.

Permanent Airfield Lighting

54. **Runway Lighting.** Older installations of runway lighting consist of a row of white lights along each edge of the runway. The lights, which are omni-directional, are in fittings almost flush with the surface and the whole system is known as *strip* lighting.

55. Modern installations have raised, high-intensity white lights along each side of the runway, beamed towards the landing aircraft (Fig. 6). High-intensity runway lighting is usually employed with high-intensity approach lighting, but is sometimes installed with older forms of approach lighting.

56. The ends of runways are marked with threshold bars of green lights which extend across the full width of the runway.

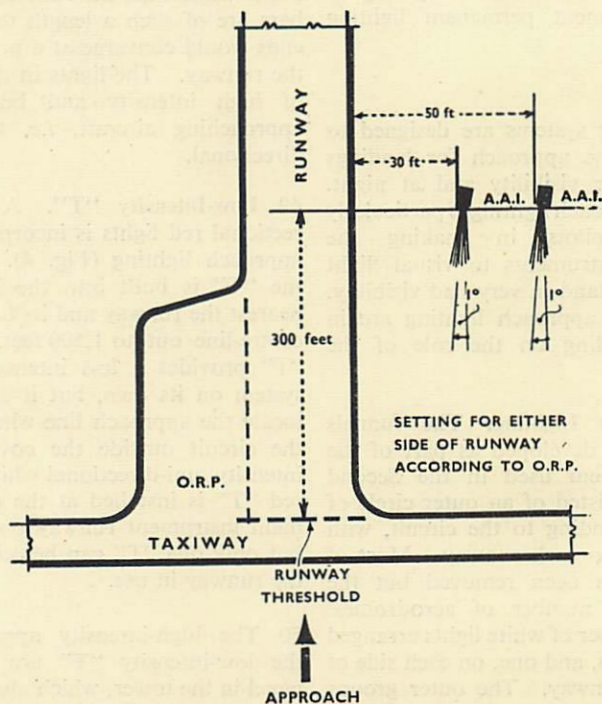


Fig. 5. Angle-of-Approach Indicators

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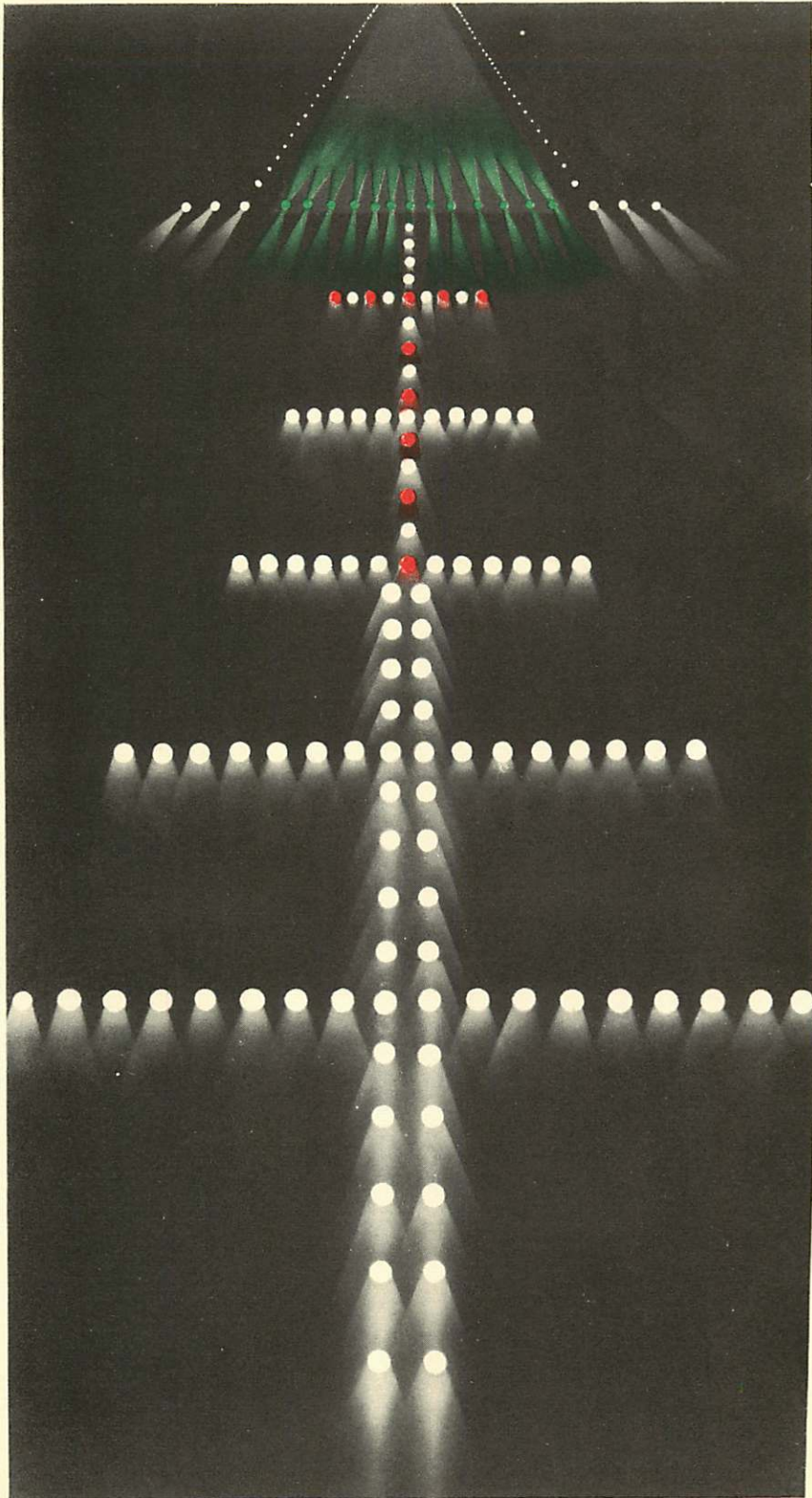
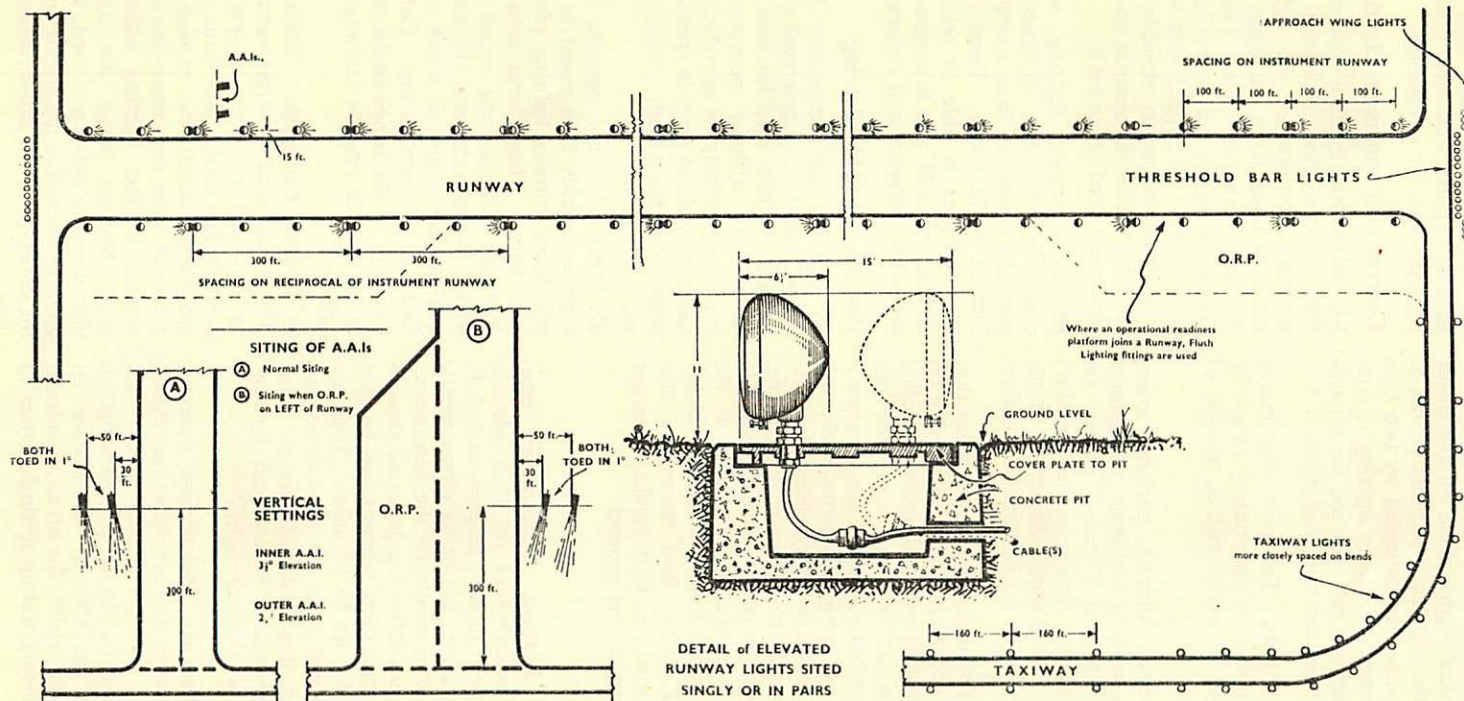


Fig. 3. CL5B APPROACH LIGHTING



Fig. 4. LOW-INTENSITY "T"

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Fig. 6. Elevated Runway Lighting

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57. Taxiway Lighting. Taxiways are lined at the edges with small lights, blue on the inside and amber on the outside. Turning points at the entry to runways are indicated by two blue lights close together. Taxiway lighting is controlled so that sections not required for a particular taxiway pattern are not illuminated.

58. Marshalling Points. The post that marks the marshalling point for the runway in use by day is illuminated at night with a triangle of three blue lights.

59. Parking Areas. Aircraft parking areas, including aircraft servicing platforms, operational readiness platforms, and dispersal points, are marked with blue lights similar to those used on the taxiway. In addition, dispersal points are usually indicated by an illuminated number.

60. Obstruction Lighting. All obstructions that are a hazard to aircraft in the air or moving on the ground are marked with red lights controlled either from the tower or locally near the obstruction. Obstructions which are comparatively high carry red lamps at various levels with one on top, while those of considerable horizontal extent are lit to indicate their shape. Installations and specialist vehicles that are normally located on the airfield, such as the runway control caravan and G.C.A. vehicles, are lit with red lights. Red lamps are also used to mark anything that might endanger an aircraft moving on the ground.

Beacons

61. Identification Beacons. Beacons are established at most aerodromes for their identification from the air at night. Beacons at R.A.F. aerodromes flash a red, two-letter characteristic in Morse Code appropriate to the aerodrome. Civil aerodrome identification beacons show a green light. Identification beacons can be seen in good weather for up to 15 miles. They are sometimes positioned near the touchdown end of the runway during bad visibility to assist pilots on the approach. When used for this purpose they show a steady light.

62. Aerodrome Beacons. Aerodrome beacons, or aerial lighthouses as they are sometimes called, are positioned at or near master aerodromes and water alighting areas in the United Kingdom and on trunk routes abroad. They show an occulting white light, visible for up to 30 miles in good visibility, incorporating a single letter in Morse code.

63. Hazard Beacons. Hazard beacons show red flashing lights, and are positioned in areas hazardous to air navigation.

Control of Permanent Lighting

64. All modern lighting systems are so arranged that failures affect individual lamps and not complete sections of the lighting. Power is normally taken from the mains electrical supply, but an alternative source (usually a stand-by Diesel generating set) is available if the mains supply fails. The speed with which the change-over from mains to stand-by supply can be made influences the amount and type of portable equipment used on airfields.

65. All permanent lighting, with the possible exception of some obstruction lighting, is normally controlled from a lighting control panel located in the tower. From the control panel the controller is able to select those lighting services required, and to control the brilliancy of approach, runway, and taxiway lighting.

Portable Airfield Lighting

66. Portable and temporary lighting (Fig. 7) is used mainly to supplement airfield permanent lighting. There are, however, a few smaller aerodromes without permanent installations, which rely entirely on portable equipment. It is rarely possible to provide approach lighting with temporary equipment, other than angle-of-approach indicators.

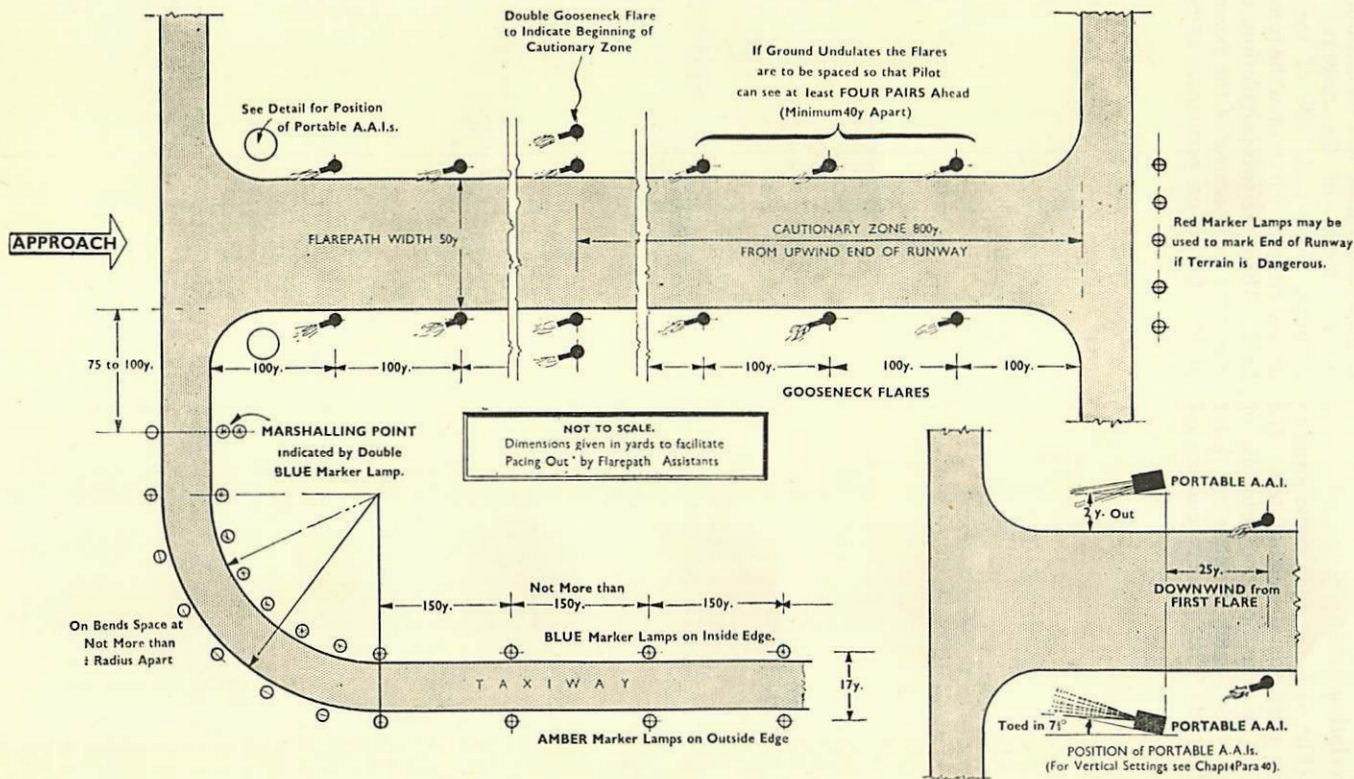
67. Where it is not possible to change power supplies quickly it is usual to supplement the permanent runway lighting with paraffin *goose-neck* flares. These flares consist of a paraffin container with a long spout which carries a wick. When necessary, the taxiway is lit with marker lamps, most of which carry a battery to feed a small lamp on top. Coloured covers for the bulbs of the lamps enable the marker lamps to be used to provide taxiway and obstruction lighting.

68. Sodium Flarepath. Yellow sodium lamps (Fig. 8) are used to supplement runway lighting by day and by night in poor visibility. In daylight the lamp units shine towards the approaching aircraft, but at night they are turned outwards from the centre-line of the runway to provide indirect lighting without dazzling the pilot. Sodium lamps are unnecessary when high-intensity lighting is used, but are used as a guide to aircraft in the circuit until they turn into the coverage of the uni-directional high-intensity lights.

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Fig. 7. Portable Airfield Lighting

(A.L. 3, April '57)

FOG INTENSIVE DISPERSAL OPERATION
(F.I.D.O.)

General Description

69. F.I.D.O. (Fig. 9) is the code name given to the equipment used for dispersing fog. The dispersal of fog is based on the principle of evaporating the fog water droplets by direct heating of the air. The process consists of

burning large quantities of petrol which is under pressure and vapourized so that the heat which is generated raises the temperature of the air in the vicinity of the runway. Burners are arranged along each side of the runway and across the approach short of the runway threshold hold. There are two installations in the United Kingdom but, because of the expense, only one, at Manston, is on permanent standby.

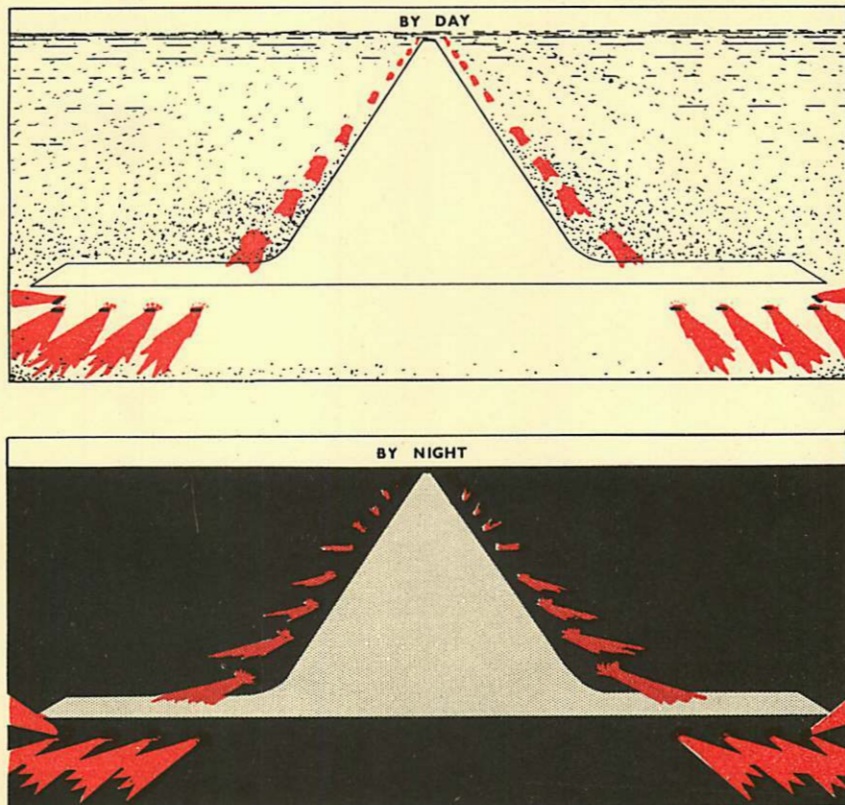
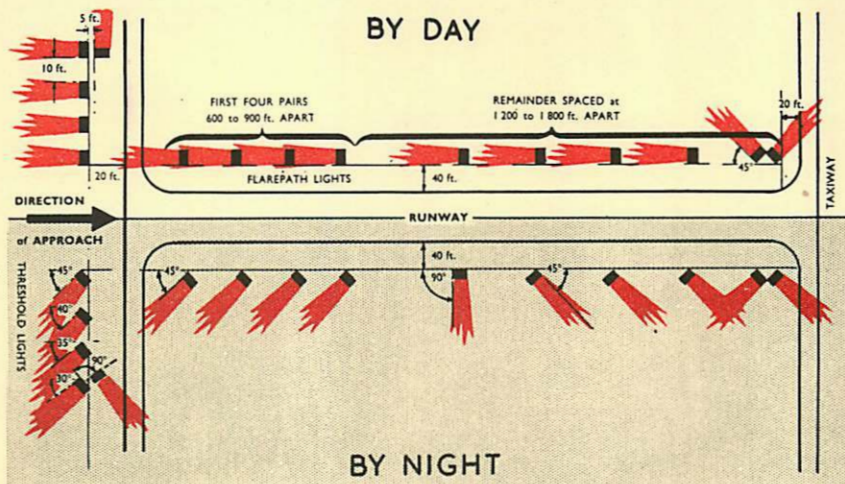
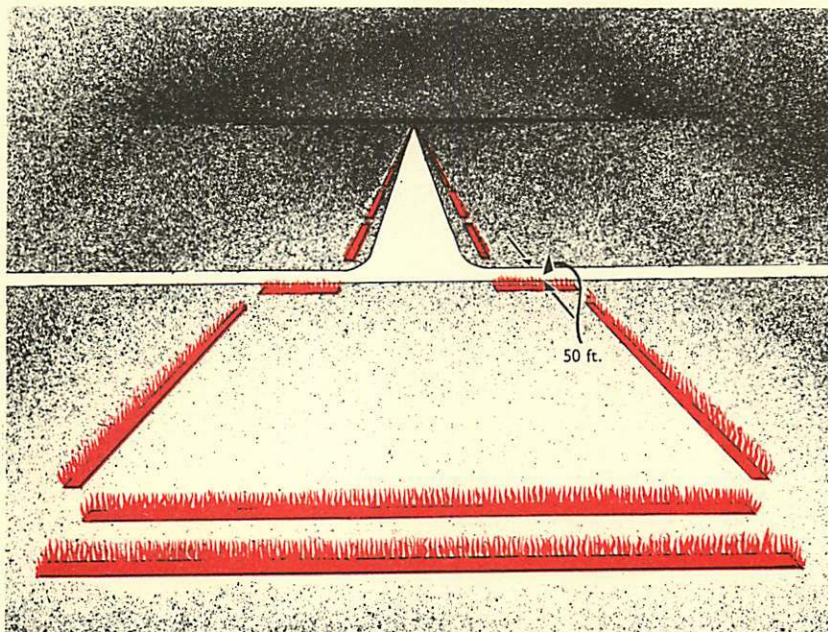


Fig. 8. TYPE 'F.F.' SODIUM FLAREPATH



PILOT'S VIEW FROM APPROACH

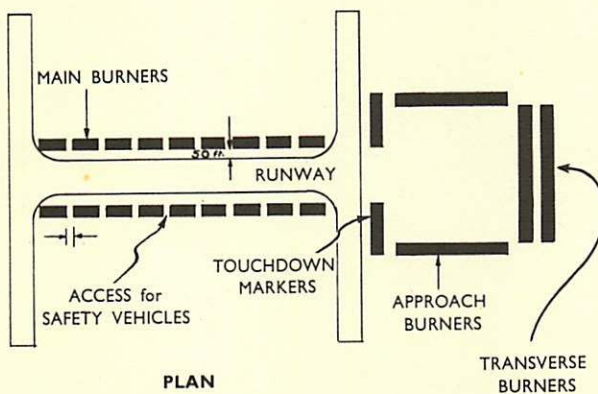


Fig. 9. FIDO: TYPICAL LAYOUT

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