Chapter 8

DETECTOR HEADS, FIRETEC

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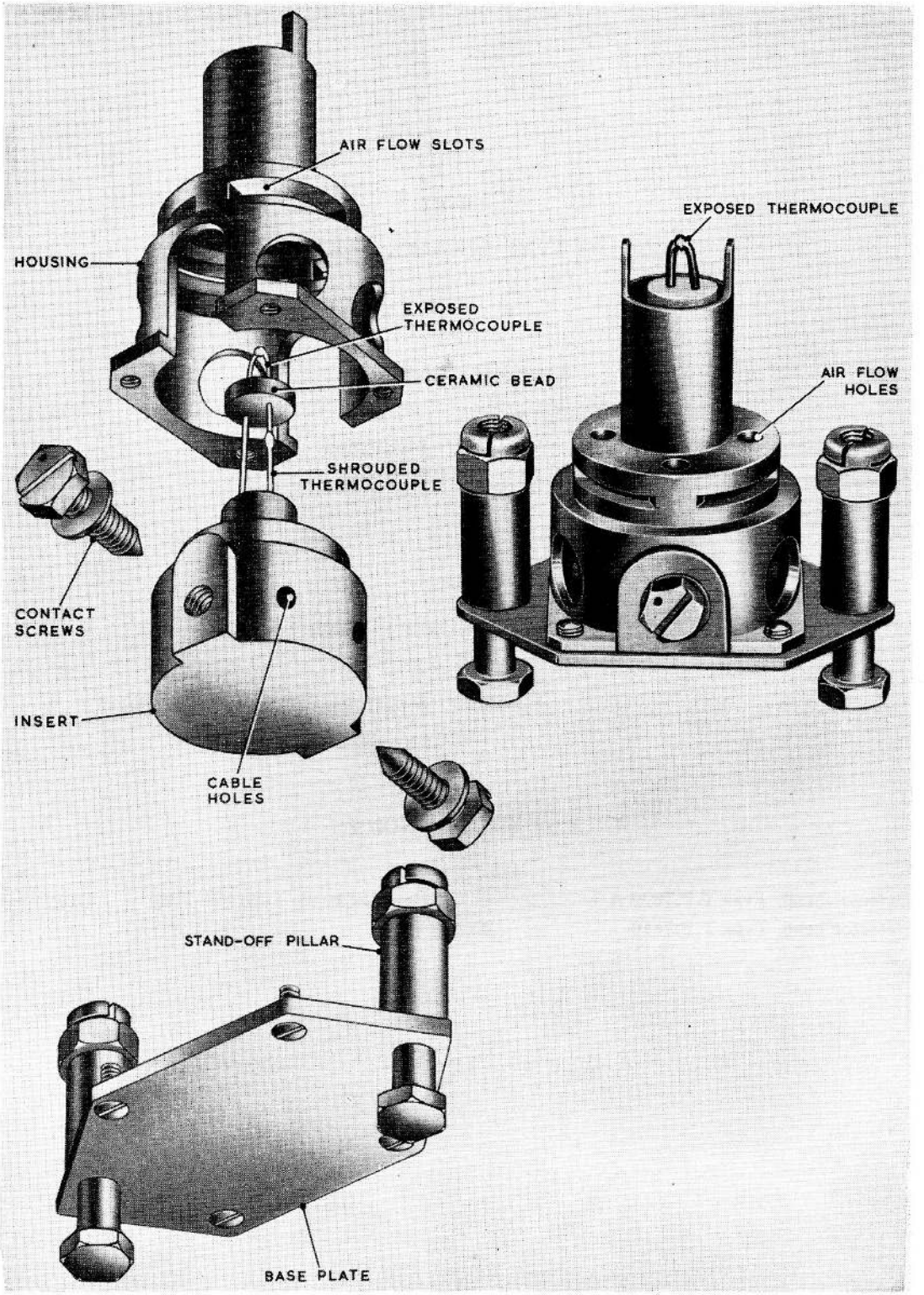

Fig. 1. Typical detector head

Introduction

1. The detector heads used in the " Firetec " fire-warning system are thermocouple units consisting of two thermocouples working in opposition. Their function is to produce a voltage to operate the control unit of the warning system in the event of abnormal and rapid rise in temperature, such as would occur with an outbreak of fire. When installed a number of detector heads are connected in series and situated in the fire danger zone. This chapter deals only with detector heads, general information on the " Firetec " fire warning system is given in A.P.4343, Vol. 1, Sect. 22. The detector head illustrated and described in this chapter is a detector head, Type T.P.7090 A/1, for individual detectors reference must be made to the Appendices to this chapter.

DESCRIPTION

2. The detector (*fig.* 1) consists of an insert which fits in a housing and is held in position by a base plate.

3. The insert consists of a body which contains two thermocouples made by two pieces of one type of metal and one piece of another, the pieces being welded together without the use of filler metal, to form a loop. The body is drilled to enable electrical cable to pass through, and special screws with rhodium-plated points are used for making electrical contact between the thermocouples and the cables. A ceramic bead insulates the thermocouples from the housing.

4. The housing fits over the insert and shrouds one thermocouple and leaves the other thermocouple exposed. Slots and holes in the housing allow air from the surrounding atmosphere to reach the shrouded thermocouple.

5. Two bolts which pass through the base plate are used for installation purposes. In some installations stand-off pillars are used and these are supplied with the detectors as required.

OPERATION

6. Under normal operating conditions a normal, slow, temperature variation between the two thermocouples of the detector will produce only a very low voltage. With an abnormally high and rapid rise of temperature, as would occur in the event of fire, the exposed thermocouple responds to the increase before the shrouded one, and a voltage, high enough to operate the sensitive moving coil relay of the control unit, is developed. The minimum voltage required for this purpose is 7·5 mV and this is developed when the temperature difference between the exposed and the shrouded thermocouples reaches 185°C. This voltage may be developed by one detector, or by a chain of detectors. When a chain of detectors is being used, the required voltage will be obtained when the difference between the combined temperatures of the exposed thermocouples and the combined temperatures of the shrouded thermocouples reaches 185°C.

7. When the ambient temperature returns to normal, i.e. when the fire has been extinguished, the difference in temperatures between the two thermocouples decreases, the voltage developed becomes insufficient to operate the relay in the control unit, and the warning is cancelled.

INSTALLATION

8. The detector heads must be installed in the fire danger zone with their exposed thermocouples facing towards the direction from which the flame may be expected. Where through-bulkhead type of mounting is required the stand-off pillars illustrated in fig. 2 are to be used to ensure that the air compensation slots are not covered or shrouded.

9. The cable connecting the thermocouples to the control unit should pass through a flame-proof plug and socket, and the cable used for wiring the detectors in the fire danger zone must be Unifiredet 7 (Ref. No. 5E/3704). A diagram showing a typical installation of a chain of detectors in a fire warning system is shown in Chapters 6, 7 and 23 of Sect. 14 in this publication. The total resistance of a chain of detectors and the fire proof cabling must not exceed 2 ohms.

10. The method of wiring the detectors is to withdraw the rhodium plated point screws, pass the cable through the appropriate

positive or negative hole until the cable end is visible at the exit hole, then tighten the point screws. The point screw pierces the cable braiding, thus clamping the cable, and is itself locked by the shakeproof washer under its head. It is not necessary to remove any insulation or braiding from the cable.

11. It is essential, in the event of the replacement of a detector head, where the existing Unifiredet cable is to be used again, that the end of the cable is cut off to prevent possible entry of the pierce screw into the existing hole in the cable. It is therefore desirable to allow for future replacement of detector heads when initially fitting the cable.

12. Two mounting bolts, and two stand-off pillars if required, are supplied with each detector head. Diagrams of typical methods of mounting are illustrated in fig. 2.

SERVICING

13. Servicing instructions for the complete fire detecting system including the detector heads, are contained in A.P.4343, Vol. 1, Sect. 22. Examine the detector heads for mechanical damage and breakage of the thermocouple wires. If a detector is so damaged as to impair its satisfactory function, or the thermocouple wire is broken, a serviceable detector must be fitted in its place. The thermocouple wires are directly welded together and broken ones must not be soldered or welded by any method which uses a filler metal.

14. Check that the air flow slots and holes are clear, and remove any obstruction that may be present.

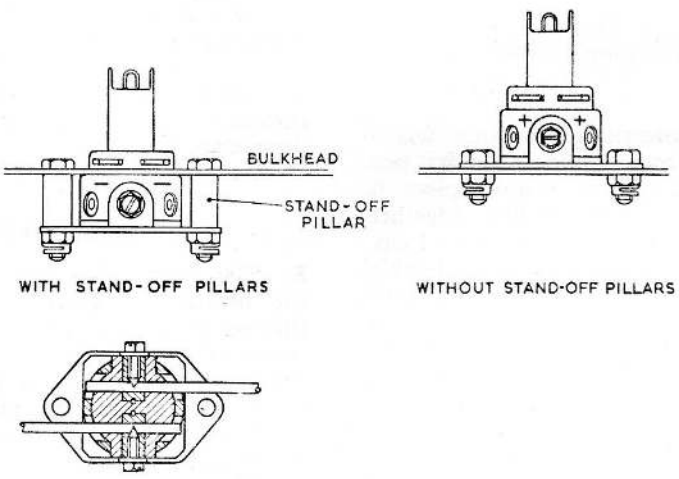

Fig. 2. Installation with and without Stand-off pillars

Appendix 1

DETECTOR HEAD, TYPE T.P.7090 A/1

LEADING PARTICULARS

Detector head, Type T.P.7090 A/1	*Ref. No.* 5CZ/5129
Screw terminal, pierce type, P7095 rhodium plated	*Ref. No.* 5CZ/5268
Washers special, for terminal screw	*Ref. No.* 5CZ/5269
Weight	$2\frac{3}{4}$ *oz.*
Overall dimensions	
Width (across contact screw)	1·375 *in.*
Height (without fixing bolts)	1·812 *in.*

This detector head is identical with that described and illustrated in the main chapter, and is completely interchangeable with the detector heads Type T.P.7610 and T.P.7700, but the cable ends of the aircraft system will require renewing or removing as the different method of cable connection on individual detectors demand.

Appendix 2

DETECTOR HEAD, TYPE T.P.7610

LEADING PARTICULARS

*Detector head, Type T.P.*7610	*Ref. No.* 5CZ/6187
*Terminal positive, nut, 4BA stainless steel P*7642	*Ref. No.*
*Terminal negative, nut, 2BA stainless steel P*7101	*Ref. No.*
Weight	2 *oz.*
Overall dimensions	
Width (across contact terminal)	1·156 in.
Height (without fixing bolts)	1·75 in.

This detector head is similar to that described and illustrated in the main chapter, and is completely interchangeable with the detector heads Type T.P.7090 A/1 and T.P.7700; but the cable ends of the aircraft system will require renewing or removing as the different method of cable connection on individual detectors demand.

Appendix 3

DETECTOR HEAD, TYPE T.P.7700

LEADING PARTICULARS

Detector head Type T.P.7700 ... ... *Ref. No. 5CZ/6188*

Terminal positive, nut No. 6 U.N.F. stainless steel P.7632 Ref. No.

Terminal negative, nut No. 10 U.N.F. stainless steel P.7630 Ref. No.

Weight ... ... 2 *oz.*

Overall dimensions

Width (across contact terminal) ... ... 1·156 *in.*

Height (without fixing screw) ... ... 1·75 *in.*

This detector head is similar to that described and illustrated in the main chapter, and is completely interchangeable with the detector heads Type T.P.7090 A/1 and T.P.7610; but the cable ends of the aircraft system will require renewing or removing as the different method of cable connection on individual detectors demand.