

Chapter 2

CONSTRUCTION

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General

1. The ARI.18120 comprises three main units, plus aerials, cockpit switches, indicator and the connectors which are of specified length for the aircraft concerned. The three main units are:—

- (1) RF unit Type 11037.
- (2) AF unit Type 9635.
- (3) Junction box Type 9636.

2. The RF unit Type 11037 and the AF unit Type 9635 are classed as removable equipment and are mounted in such a position in the aircraft that they are accessible and can be easily removed for servicing or replacement.

3. The aerials used with the installation may be aerial, aircraft Type 11421 (para. 40) or such other u.h.f. wideband aerial that may be fitted by the aircraft constructor. The indicator may be either a Type 7 or Type 9024 (para. 41).

4. There is a number of variations of the installation; details of these are given in the "Installation" chapter. The cockpit switches, of



Fig. 1. RF unit, Type 11037—general view

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which there may be either one or three, are of the single hole fixing type (Z510300).

RF UNIT TYPE 11037

5. A general view of the RF unit Type 11037 shown fitted to its anti-vibration mounting assembly, is given in fig. 1. The approximate dimensions of this unit are, width 6 in., height 6½ in. and depth 9 in.; it weighs approximately 12¾ lb.

6. The RF unit Type 11037 is secured to the mounting assembly by two spring loaded spigots, fixed at the rear of the mounting assembly, which locate into holes in the rear of the unit. At the

front two hollow knurled nuts hook on the projections on the front of the unit and, when screwed tight, secure the front of the unit and hold the spigots in engagement at the rear.

7. A view of the RF unit Type 11037 with its dust cover removed, and showing the disposition of the four sub-units of which it consists, is given in fig. 2. The four sub-units are as follows:—

- (1) Chassis assembly Type 11680.
- (2) Amplifying unit (RF) Type 11681.
- (3) Tuning unit Type 11683.
- (4) Relay unit (coaxial) Type 11682.

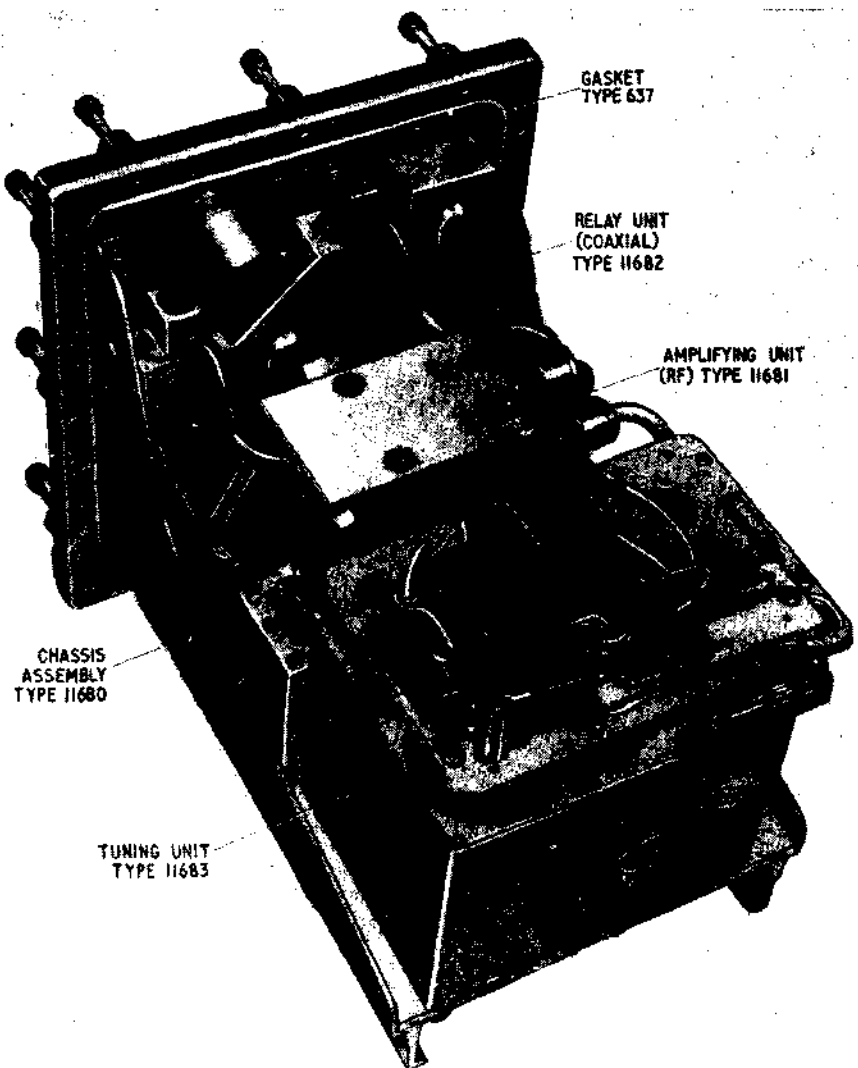


Fig. 2. RF unit, Type 11037—cover removed

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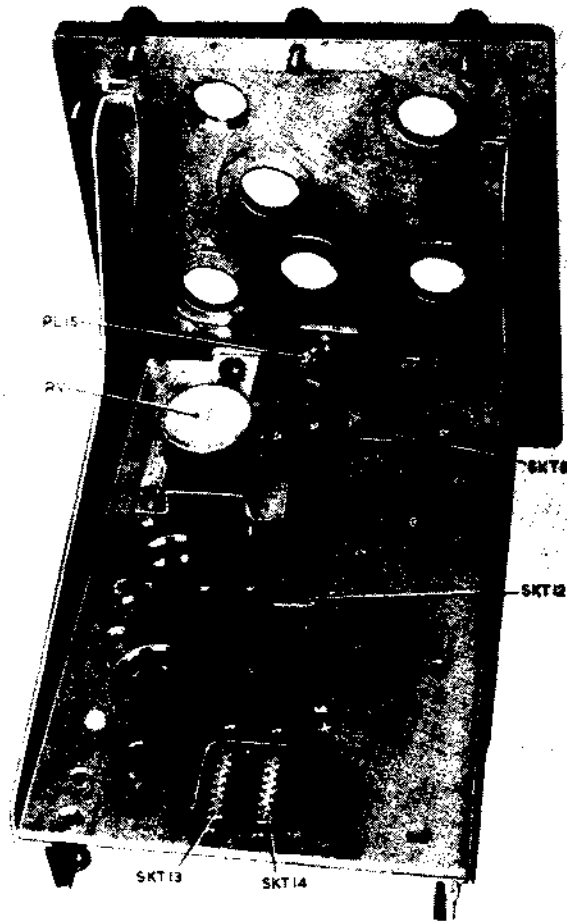


Fig. 3. Chassis assembly, Type 11680 — top

8. The dust cover of the RF unit Type 11037 is corrugated, this gives it strength and allows cooling of the unit. The cover is secured to the front panel of the unit by eleven screws which are captive at the front panel; a gasket Type 637 is fitted at the joint for sealing purposes. A Schrader valve is fitted to the front panel and the whole unit can thus be pressurised. A silica-gel desiccator cartridge, having a window visible from the front through which the colour of the crystals can be seen, is also fitted to the front panel. When in good condition, the crystals are the same colour as the surround of the window, which is light blue. The desiccator cartridge should be changed when the crystals become pink in colour.

Chassis assembly Type 11680

9. The chassis assembly (fig. 2 and 4) forms a mounting for the other sub-units of the RF unit Type 11037. It is constructed of an aluminium alloy base which is riveted to two strengthening sides plates, the whole being bolted to the die-cast front panel. The side plates are specially shaped to fit into channelling on the inside of the dust cover.

10. The inter sub-unit wiring is carried on the chassis assembly together with the gearing of the mechanical drive between the tuning unit and the r.f. amplifying unit. The chassis assembly also carries the potentiometer (RV1); the mechanical drive for this is coupled by gear wheels to the tuning unit. This potentiometer varies the a.f.

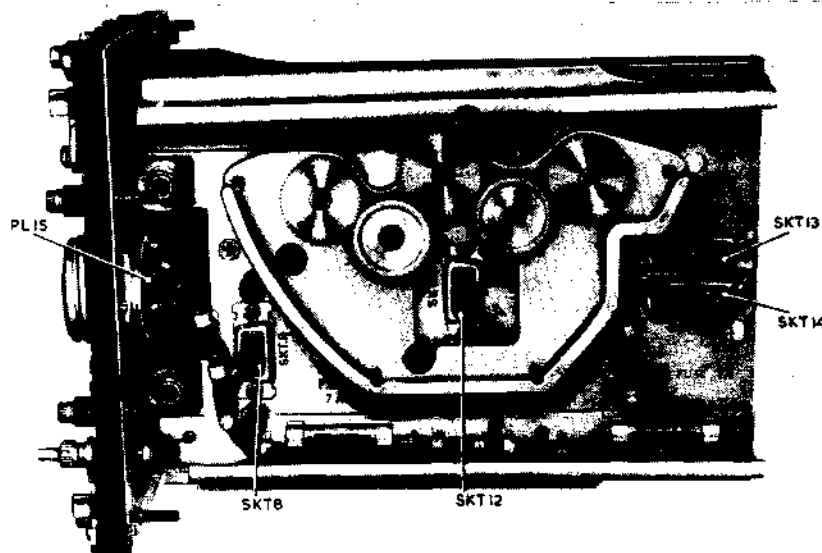


Fig. 4. Chassis assembly, Type 11680 — underside

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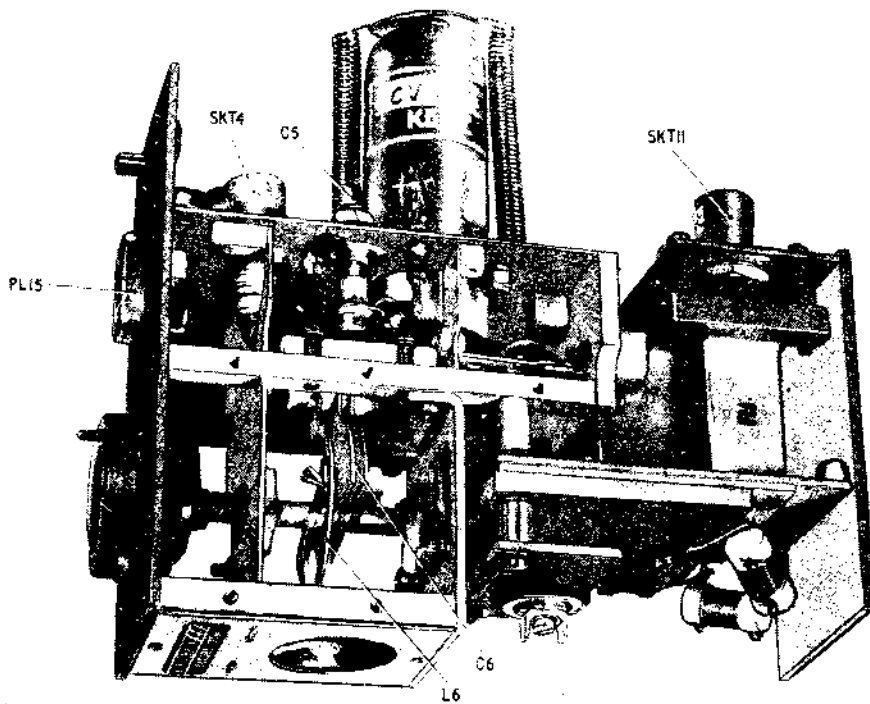


Fig. 5. Amplifying unit (RF) Type 11681 — front

gain of the equipment over the frequency range in order to obtain a constant meter sensitivity. This would otherwise vary over the frequency range, being minimum at the low frequency end.

11. The r.f. amplifying unit and the tuning unit are secured to the chassis assembly by screws which are captive at the chassis; these screws have Phillips type heads and are coloured red. The

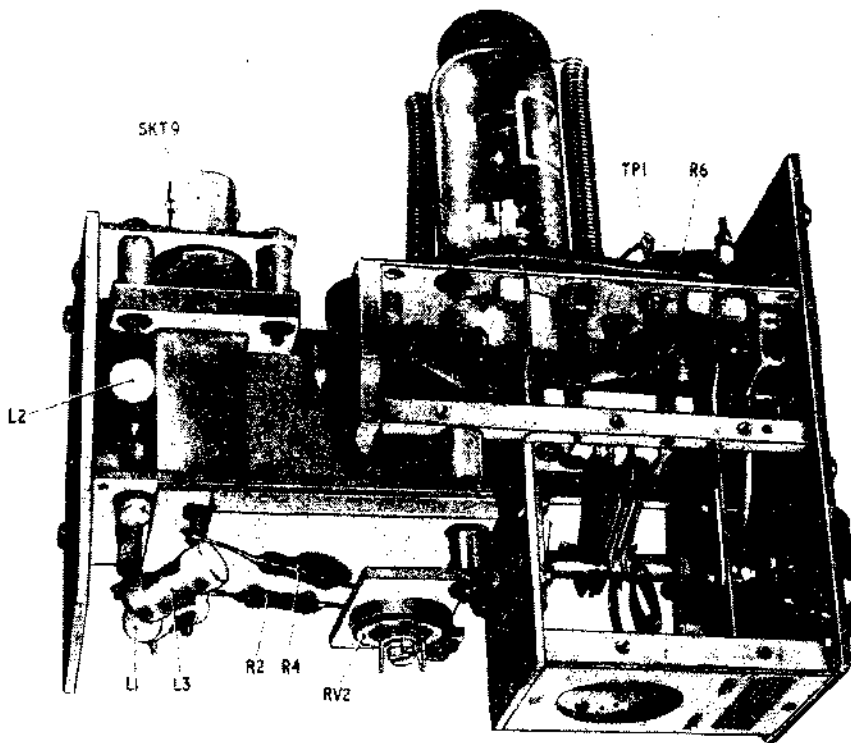


Fig. 6. Amplifying unit (RF) Type 11681 — rear

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relay unit is secured by the nuts of the five coaxial sockets which project through the front panel.

12. Great care must be exercised when refitting the tuning unit and/or the r.f. amplifying unit to the chassis assembly to ensure that the "Oldham" type tuning couplings become correctly meshed. When correctly fitted, an amount of "free-play" can be obtained when rocking the gearing under the chassis by hand. Incorrect fitting causes the gearing to jam and the mechanism is prevented from operating. It is advisable, after refitting either of the sub-units, to test the operation of the mechanism on a test bench.

Amplifying unit (RF) Type 11681

13. The r.f. amplifying unit (fig. 5 and 6) contains the single stage, grounded-grid, r.f. amplifier this has a tuned-anode circuit which also matches it into a 50-ohm output coupling. The valve input circuit is aperiodic and is obtained from an electronic modulator. This modulator is integral with the r.f. amplifying unit and connects the two inputs to the unit (port and starboard aerials) to the valve alternately.

14. Connected between the two inputs, via isolating resistors (R1 and R3) is a short r.f. delay line; this is embedded in a dielectric and moulded in an alloy case.

15. The two crystal diodes (MR1 and MR2) are connected in opposite polarity, at each end of the delay line. When the $\triangleleft 4.75 \text{ kHz} \triangleright$ square wave is applied, the diodes conduct alternately. The input to the r.f. amplifying valve is thus the input at one socket direct plus the input at the other via the delay line, alternately, for each half cycle of the $\triangleleft 4.75 \text{ kHz} \triangleright$ square wave.

16. The unit is of open construction and the overall dimensions are $4\frac{3}{4}$ in. by $1\frac{1}{2}$ in. by $4\frac{1}{2}$ in. The weight is approximately 12 oz. The side panels, which screen and protect the components, have been removed to give the views shown in fig. 5 and 6.

17. The electrical connections, apart from the r.f. connections, are made via the plug PL12 when the sub-unit is in position on the chassis assembly.

18. The two r.f. inputs feed via the fixed sockets SKT9 and SKT11 (starboard and port, respectively); the r.f. output is obtained via the fixed socket SKT10.

19. The r.f. tuned circuit comprises a variable capacitor and variable inductor. The inductor consists of a semi-circular section of plated brass and the amount of inductance in circuit is varied by a double wiping contact attached to the spindle which also carries the moving vanes of the variable capacitor. Thus, both the inductance and capacitance are varied together and give a tuning law of 1 MHz per degree.

20. The tuning spindle is earthed at each side of the compartment by triple wiping contacts. The coupling is made to the gear train of the chassis assembly by means of an "Oldham" type coupling.

Tuning unit Type 11683

21. This tuning unit operates from combinations of electrical connections set up by the control unit. These connections are passed to the tuning unit via the AF unit Type 9635.

22. The motor of the tuning unit rotates and drives the output coupling of the unit to a certain geometrical position at which the electrical connections break and the motor stops.

23. The tuning unit is a plug-in sub-unit and measures approximately $4\frac{1}{4}$ in. by 3 in. by $4\frac{1}{2}$ in.; it weighs 2 lb 2 oz. Further details of the tuning unit are given in Chap. 5.

Relay unit (coaxial) Type 11682

24. The relay unit (fig. 7) contains three change-over coaxial relays which switch the various r.f. inputs and outputs of the equipment. The overall dimensions of the relay unit are $5\frac{1}{8}$ in. by $3\frac{7}{8}$ in. by $3\frac{1}{2}$ in. and it weighs approximately 2 lb 4 oz.

25. The relay unit fits at the front end of the RF unit Type 11037 and is secured in place by the nuts on the five fixed coaxial sockets (SKT1, 2, 3, 4 and 5) which project through the front panel of the unit. Each of the coaxial sockets is fitted

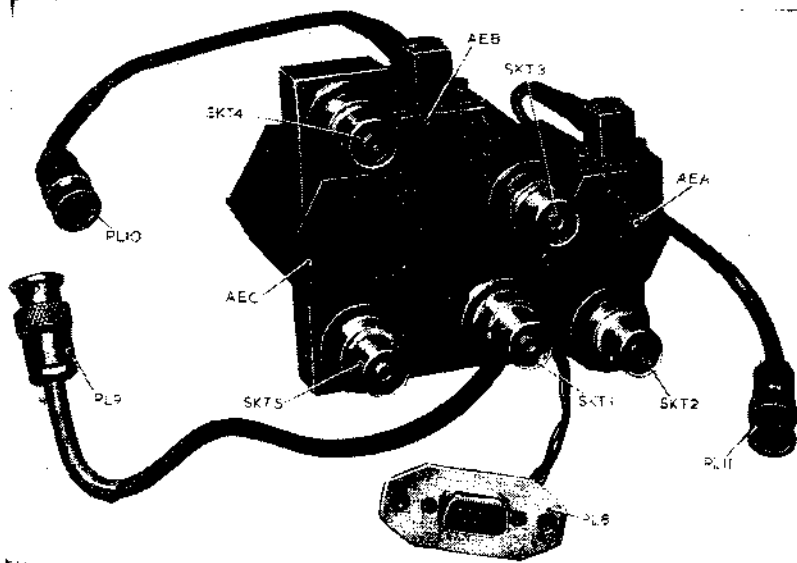


Fig. 7. Relay unit (coaxial) Type 11682

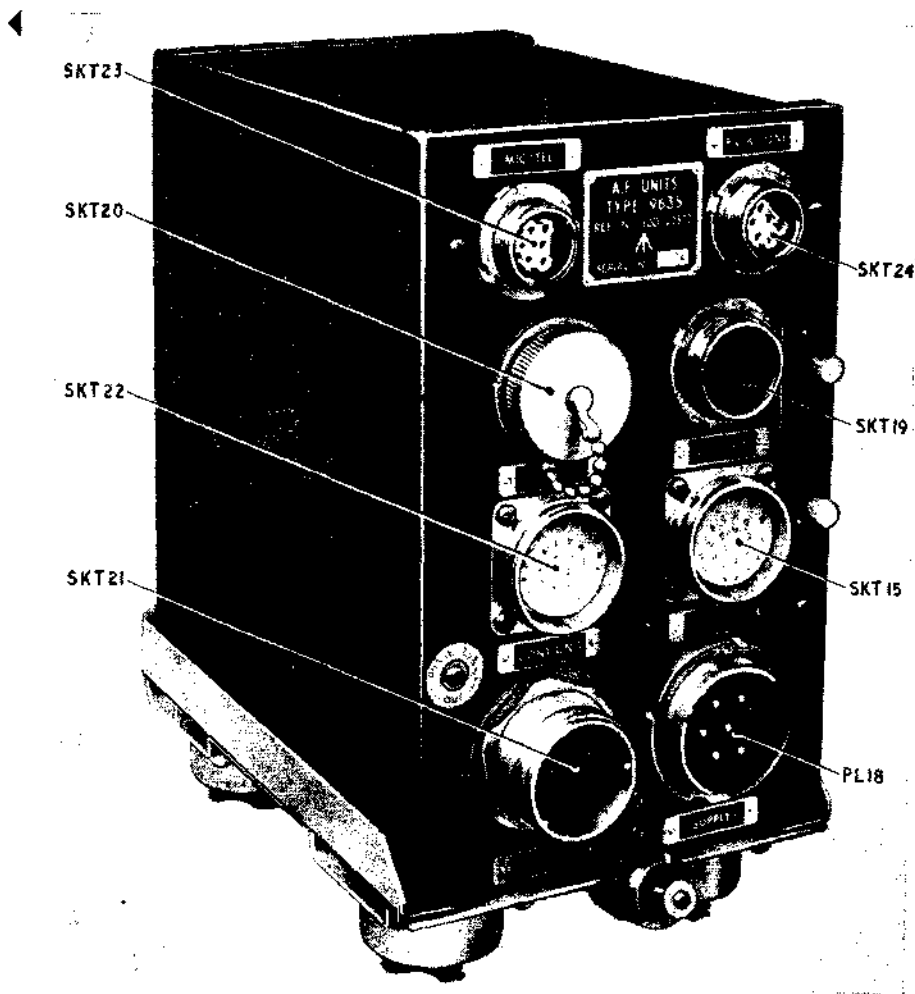


Fig. 8. AF unit, Type 9635 — general view

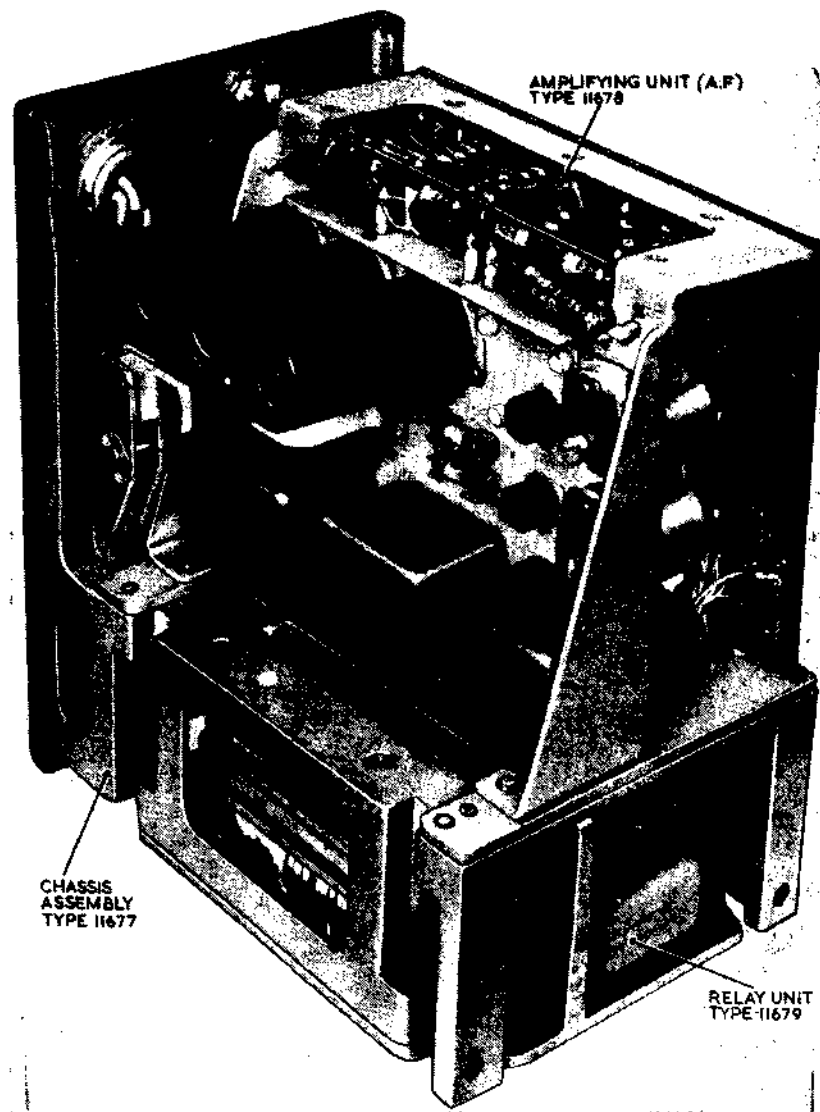


Fig. 9. AF unit, Type 9635 — cover removed

with a gasket so that an airtight seal is made at the front panel.

26. The d.c. supplies for the relays are passed via the plug PL8 which has a mating socket on the chassis. The plug is attached to a small plate which is secured to the chassis by two captive screws.

AF UNIT TYPE 9635

27. The AF unit Type 9635 is shown fitted to its mounting assembly in fig. 8. The approximate dimensions of the complete unit are, width 5 in.,

height $7\frac{1}{2}$ in., depth 8 in., it weighs approximately 8 lb.

28. The AF unit Type 9635 is secured to its mounting assembly in a similar way to the RF unit Type 11037 (para. 6). There are two locating spigots at the rear of the mounting assembly, but in this case only one hollow knurled nut at the front.

29. The dust cover of the AF unit Type 9635 is held in place by two screws with Phillips type heads, these screws are held captive at the rear of the cover. The bottom of the dust cover is

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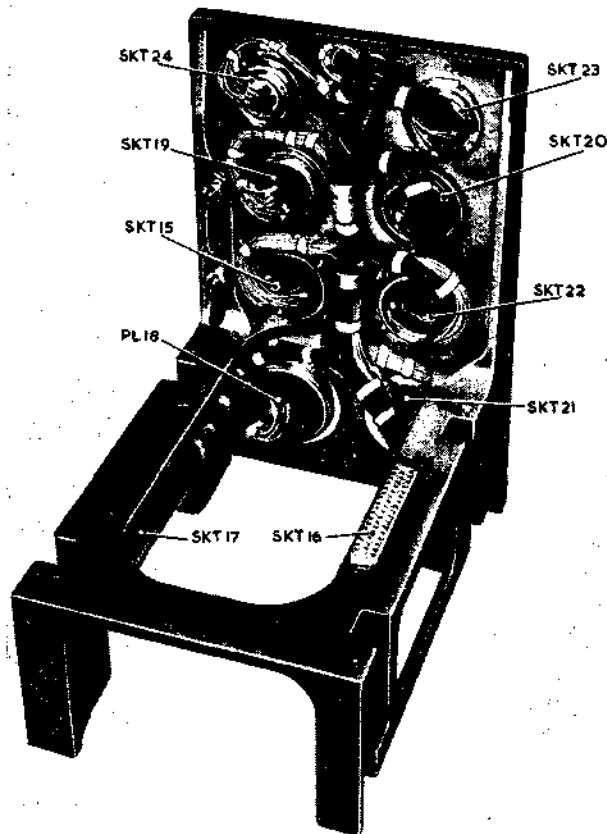


Fig. 10. Chassis assembly, Type 11677

perforated, and louvres are fitted in one side, this allows air to ventilate and cool the unit.

30. The AF unit Type 9635 consists of the following sub-units:—

- (1) Chassis assembly Type 11677.
- (2) Amplifying unit (AF) Type 11678.
- (3) Relay unit Type 11679.

31. A view of the AF unit Type 9635 with the cover removed and showing the disposition of the sub-units is given in fig. 9.

Chassis assembly Type 11677

32. The chassis assembly (fig. 10) provides a mounting for the a.f. amplifying unit and relay

unit (para. 30); the a.f. amplifying unit mounts on top of the chassis and the relay unit fits underneath. Miniature multipole plugs and sockets make the electrical inter-connections between the sub-units. The sub-units are secured to the chassis assembly by means of Phillips-headed screws; these are coloured red.

33. The chassis assembly consists of a die-cast, aluminium-alloy, frame on which is mounted the plugs and sockets, the cable form and the front panel. Since the AF unit Type 9635 acts as a junction box between the transmitter-receiver ARC52 and the control unit C1607, the plugs and sockets of the front panel are interconnected accordingly.

Amplifying unit (AF) Type 11678

34. The a.f. amplifying unit (fig. 11) is of open construction and consists of an aluminium-alloy

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frame riveted to a baseplate. The larger components, valves, transformers, etc., are mounted on the chassis while most of the smaller components are on two p.c.b's. The unit is $5\frac{7}{8}$ by $4\frac{3}{8}$ by $5\frac{1}{8}$ in, weighing 2 lb 2 oz.

35. To reach the components under the chassis, the larger of the p.c.b's can be hinged to one side on its cableform (fig.12).

Relay unit Type 11679

36. The relay unit (fig.13) consists of a die-cast, aluminium-alloy, frame on which are mounted nine relays. The unit is $4\frac{3}{8}$ by $5\frac{7}{8}$ by $2\frac{3}{8}$ in, weighing 1 lb 12 oz.

MOUNTING ASSEMBLIES (fig.14)

37. The mounting assemblies Type 11502 and Type 11503 provide a shock absorbing mounting for the AF unit Type 9635 and the RF unit Type 11037 respectively.

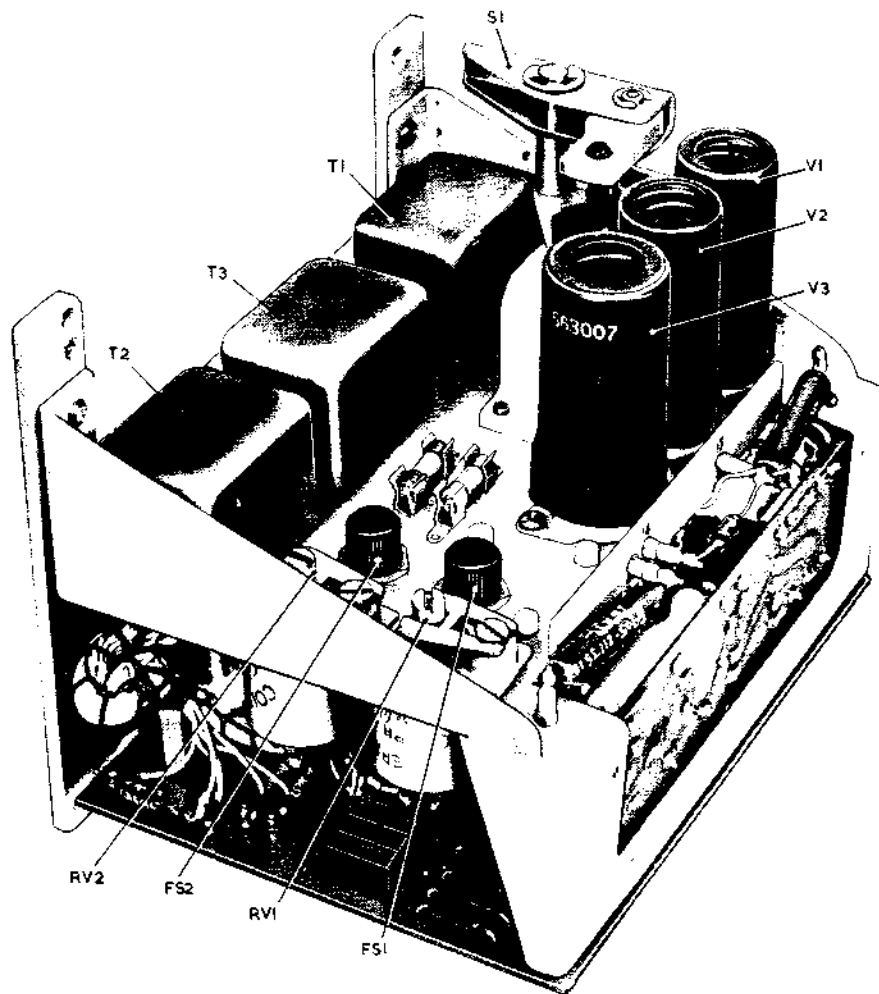


Fig.11. Amplifying unit (AF) Type 11678 - general view

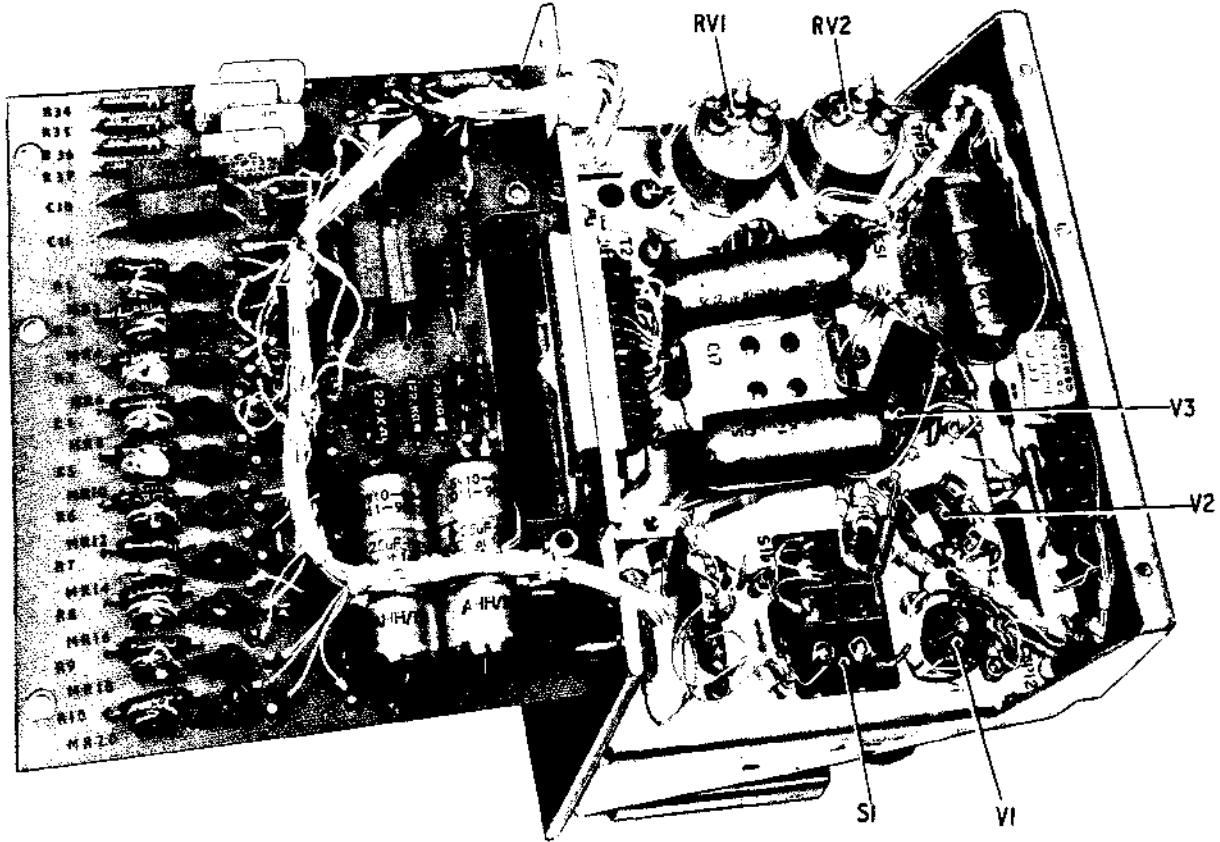


Fig.12. Amplifying unit (AF) Type 11678 - open

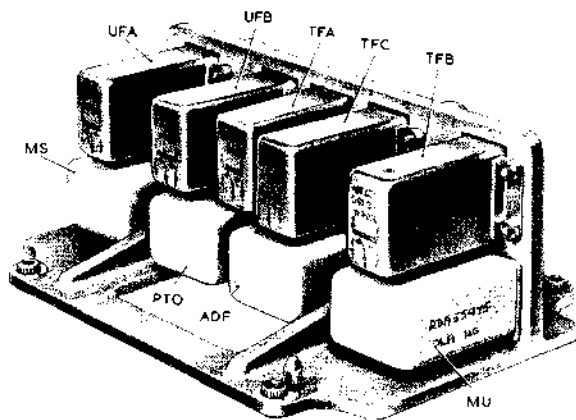


Fig.13. Relay unit Type 11679

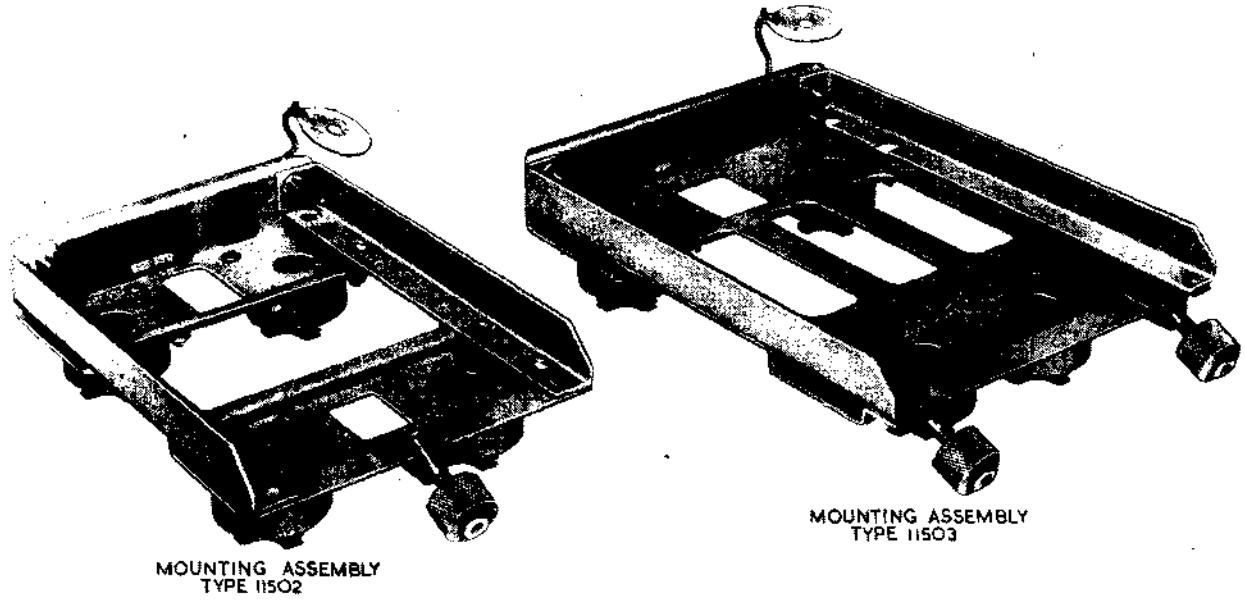


Fig. 14. Mounting assemblies

JUNCTION BOX TYPE 9636

38. This junction box (fig. 15) groups the connections from the indicator, electrical Type 7 or Type 9024, the cockpit control switches (para. 4) and the AF unit Type 9635.

39. The junction box consists of a metal box approximately 3 in by 3¼ in. by 3½ in. weighing 14 oz. On it are mounted four Mk. 4 plugs and sockets; it is provided with four holes to enable it to be secured to the airframe.

39A. Inside the junction box Type 9636 (fig. 15A) is a tag strip having four tags. The two links

which interconnect the tags must be soldered in the correct position according to the relative positions, on the aircraft, of the azimuth and elevation aerials.

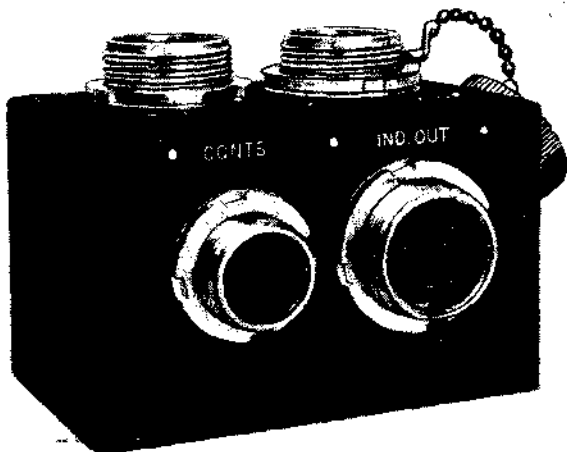


Fig. 15. Junction box, Type 9636

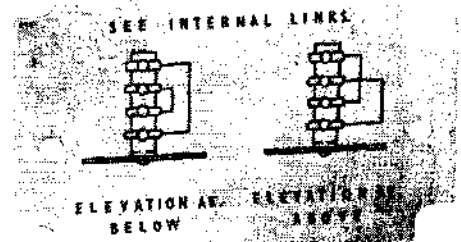
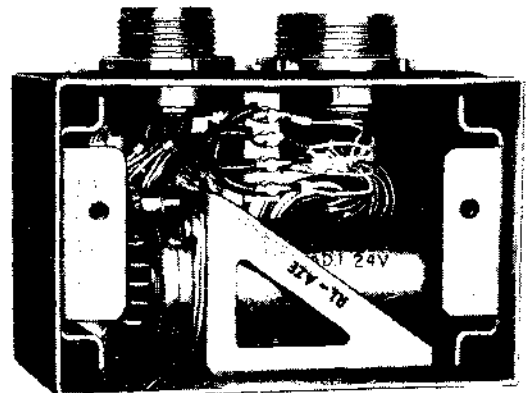


Fig. 15A. Junction box Type 9636—interior

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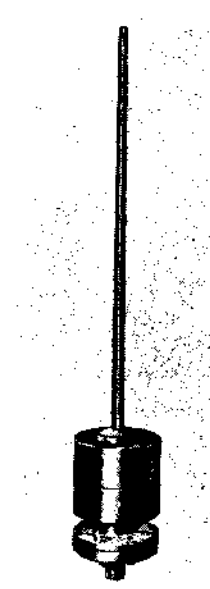


Fig. 16. Aerial aircraft Type 11421

AERIAL, AIRCRAFT TYPE 11421

40. This aerial (fig. 16) consists of a rod element 9 in. long which is moulded into a p.t.f.e. insulator which is in turn bonded into a metal base. Moulded into the base is a short-circuiting stub to provide matching into the feeder. Connection to the feeder is by a socket designed to mate with a plug (Type UKC-3 (plug electrical 5935-99-913-3525)).

INDICATORS, ELECTRICAL TYPE 7 AND TYPE 9024

41. The homing information obtained by the ARI.18120 is portrayed to the pilot on an indicator, electrical Type 7 or Type 9024; these are illustrated in fig. 17. The two instruments are similar, the Type 9024 being a miniaturized version of the Type 7. The overall dimensions and weights of the two instruments are:—

	Width	Height	Depth	Weight
Type 7	3½ in.	3½ in.	4½ in.	1 lb 7 oz.
Type 9024	2 in. diameter		3 in.	10½ oz.

42. The two needles and the two flags of the instruments are operated by four moving-coil movements, these are mounted on an assembly together with the four wedged-shaped magnets which provide the magnetic flux. The whole is fitted into a cylindrical cover with complete protection provided by an end cap which carries the input plug.

43. The indicator Type 7 is covered at the front by a cap fitted with a window through which the needles and flags are viewed. Two hermetically sealed zero adjusters are fitted in the cap for adjusting the needles. The instrument is normally mounted on the aircraft shock-mounted instrument panel; the zero adjusters should be at 9 o'clock and 12 o'clock (i.e. the flags at 3 o'clock and 6 o'clock).

44. There are no external zero adjusters on the Type 9024, the whole casing is airtight and sealed. This instrument is normally mounted in its own shock-absorbing mounting Type 13014 (Ref. No. 10AJ/281, it can then be installed in any part of the aircraft. The correct orientation of the instrument is with the flags at 3 o'clock and 6 o'clock.

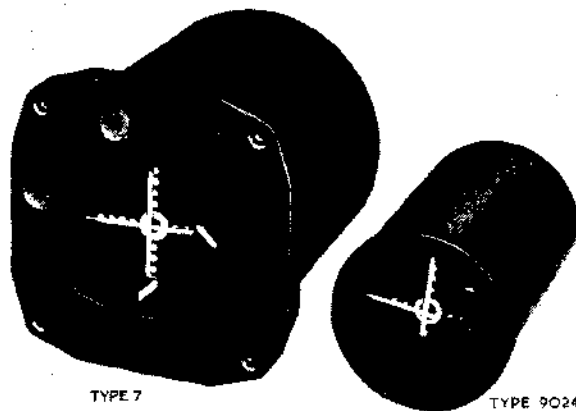


Fig. 17. Indicators, electrical

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