AIR PUBLICATION

2876B

VOLUME I

FIRST EDITION

AMPLIFIERS

TYPE A.1134 and A.1134A

Prepared by direction of the Minister of Supply

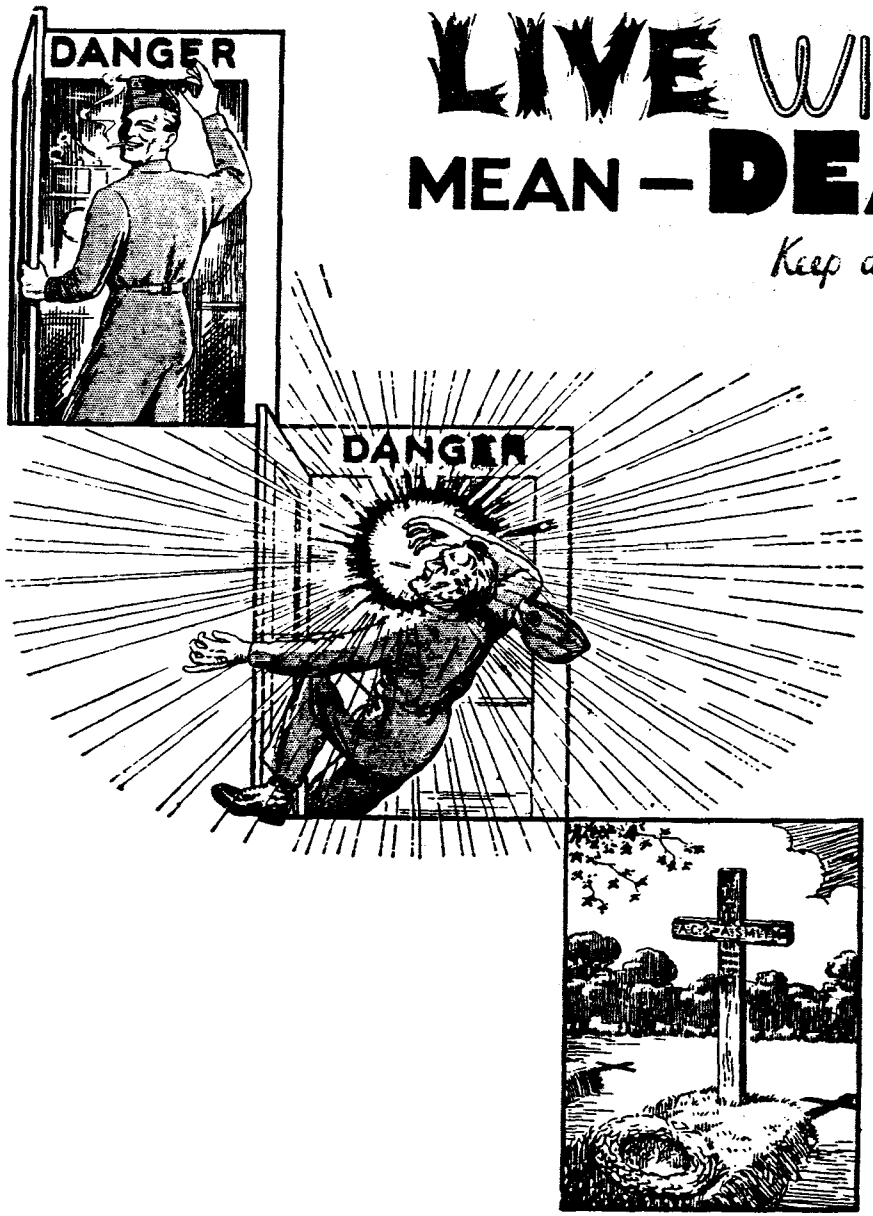
A. C. Farbairn

Promulgated for the information and guidance of all concerned by Order of the Air Council

J. N. Rennes.

AIR MINISTRY

This Publication supersedes A.P.1186, Vol. I, Sect. 4, Chap. 2 and Sect. 6, Chap. 10, Prov.



LIVE WIRES MEAN — DEAD MEN

Keep away from live circuits!

NOTE TO READERS

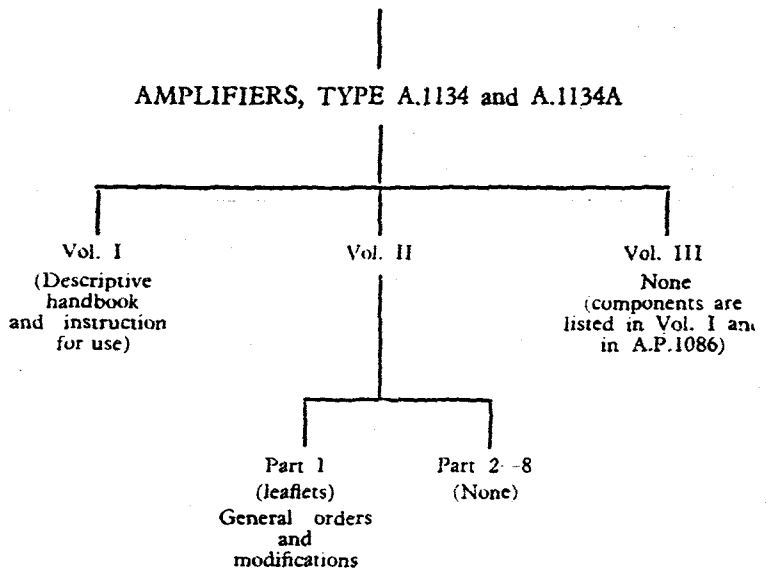
Air Ministry Orders and Vol. II, Part 1 leaflets either in this A.P. or even in some others, may affect the subject matter of this publication. Where possible, Amendment Lists are issued to bring this volume into line, but it is not always practicable to do so, for example, when a modification has not been embodied in all the stores in service.

When an Order or leaflet is found to contradict any portion of this publication, the Order or leaflet is to be taken as the overriding authority.

When this volume is amended by the insertion of new leaves, the new or amended technical information is indicated by a vertical line in the outer margin. This line is merely to denote a change and is not to be taken as a mark of emphasis.

Each such leaf is marked in the top left-hand corner of the right-hand page with the number of the A.L. with which it was issued.

LAYOUT TREE FOR A.P.2876B



AMPLIFIERS, TYPE A.1134 and A.1134A

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

INTRODUCTION

Purpose of equipment

1. The amplifiers types A.1134 and A.1134A, are fitted in multi-seater aircraft to provide intercommunication between all occupants of the aircraft. In certain installations, arrangements may also be made to employ the inter-communication amplifier as a sub-modulator for the R/T transmitter.

2. It is necessary to distinguish between the W/T operator and the remainder of the occupants, and for I C purposes the term "crew" is used to denote all occupants other than the W/T operator; it is therefore used in this sense in this book.

3. The amplifier, type A.1134, is designed for use with high impedance telephones, and the amplifier, type A.1134A, for use with low impedance telephones.

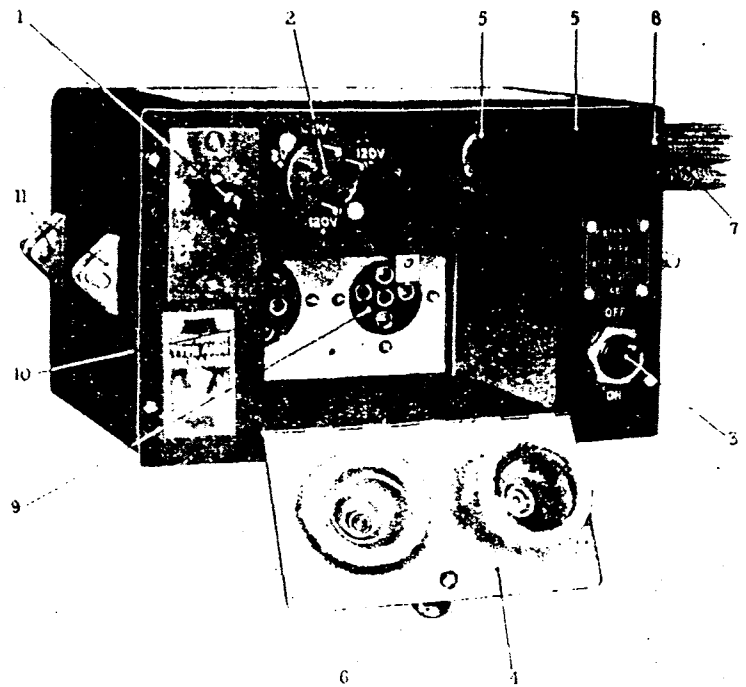
General features

4. The amplifiers are similar in appearance, and the circuits differ only in details consequent upon their functional differences. For this reason it is proposed first to describe the amplifier, type A.1134, following this description by a consideration of the conditions which led to the introduction of the low-impedance inter-communication system, and the manner in which the ampifier, type A.1134A, is developed from the original design.

5. The amplifiers are suitable for use only with electro-magnetic microphones. The output is adequate for six pairs of telephones, and will feed more if some reduction in the output level can be accepted.

6. Provision is made for certain circuit changes by a three-position key switch, type 145, which provides for isolation of the W/T operator, and also, when necessary, for modulation of the general purpose transmitter where this feature is a requirement. A link, or locking strip, is sometimes provided to lock the switch in the normal (B) position when necessary.

7. The dimensions of the amplifier are 6¾ in. by 4½ in. by 6 in., and its weight, without valves or power supply equipment, is approximately 4 lb. 8 oz. A transit case is provided.

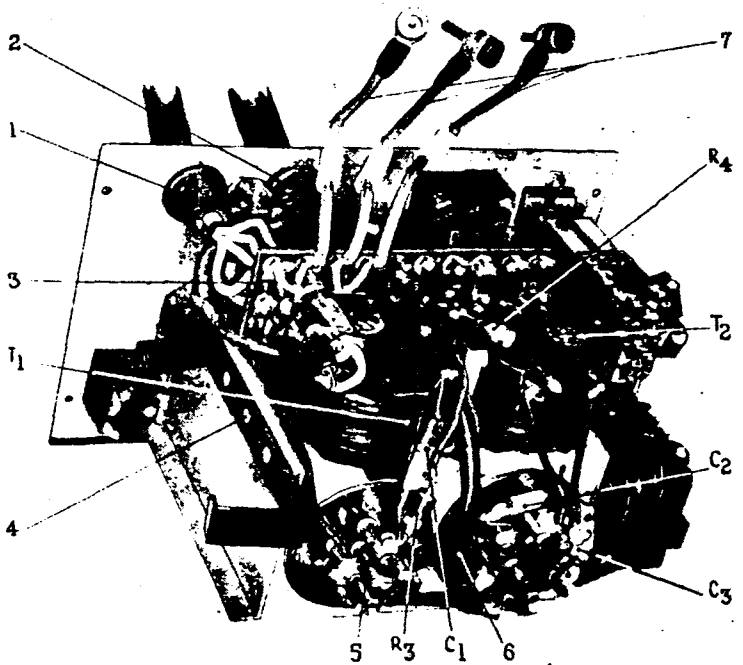


1. Key switch, type 145
2. Plug, type 67
3. Switch, type 152
4. Cover of valve compartment
5. Entry for cables (rubber bushed)
6. Securing screw for (4)
7. 5-core Mic-tel cable terminated by plug, type 33 (*not shown*)
8. 9-core cable, terminated by plug, type 129 (*not shown*)
9. Valveholder for V1
10. Valveholder for V2
11. Spigot, suspension, type B

Fig. 1.—Amplifier, type A.1134

Power supplies

8. Power supplies consist of a 2-volt (usually 20 Ah.) accumulator for LT and a vibratory power unit for HT supply, the latter being driven from the aircraft electrical installation. Where the installation is at 24 volts, a power unit, type 173, is used; with a 12-volt supply, a power unit, type 295, is fitted. Alternatively, a 120-volt dry HT battery may be used



1. 5-core cable, terminated by plug, type 33 (*not shown*)
2. 9-core cable, terminated by plug, type 129 (*not shown*)
3. 20-way connection panel
4. Bracket for grid bias battery
5. Valveholder for V1
6. Valveholder for V2
7. Grid bias battery leads

Fig. 2.—Interior view of chassis, from the right-hand side

instead of the vibratory power unit. A 6-volt dry battery supplies the grid bias voltages; this battery is fitted inside the case of the amplifier.

GENERAL DESCRIPTION

Amplifier, type A.1134

9. The general appearance of the amplifier is given in fig. 1, showing the valve compartment open and the valves removed. Internal views are shown in fig. 2 and 3.

Circuit details

10. A theoretical circuit diagram of the amplifier, type A.1134, is given in fig. 4. The amplifier incorporates two audio-frequency stages consisting of:—

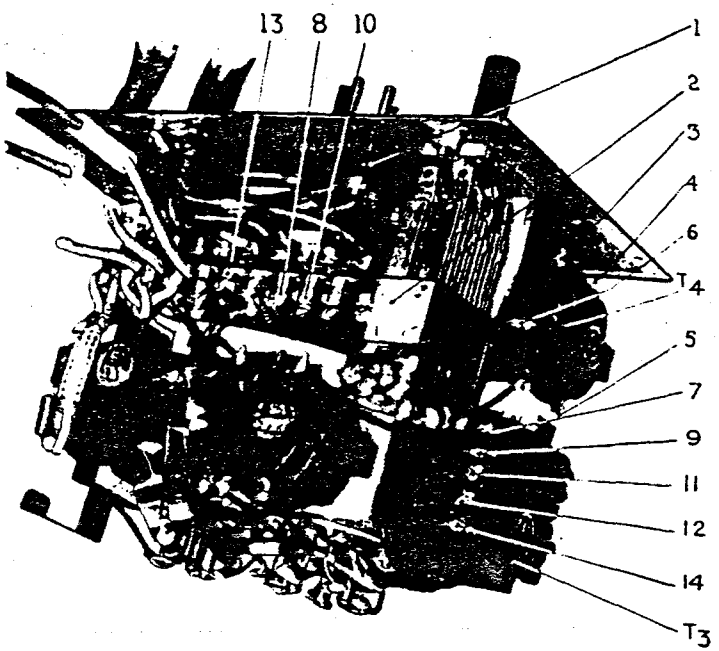
(1) a Class A voltage amplifier, in which a triode valve V1 (VR.21) is employed, and

(2) a quiescent push-pull power amplifier employing a double pentode valve V2 (VR.35).

11. The electro-magnetic microphones of all members of the crew are connected in parallel to the primary winding of the input transformer T1 of the amplifier, via tags 1 and 2 on the connection panel. The W/T operator's microphone is connected to tags 3 and 4 on the connection panel, and thence to connections on the key switch, type 145. When the circuit is completed at the key switch, the W/T operator's microphone is connected in parallel with those of the crew.

12. Two resistances, R1, R2, are also connected across the primary terminals of the transformer T1, the centre-point being earthed. This arrangement equalizes the potentials of the ends of the primary winding with respect to earth, and so reduces the tendency to oscillation ("instability") which might otherwise arise. The microphone circuits, from each microphone to the input terminals of T1, are run in screened cable for the same reason. The use of screened cable reduces the capacitance coupling between the input and output terminals of the transformer.

13. The functions of the key switch, type 145, will be dealt with, in detail, later. For the present, it may be stated that when the W/T operator is connected to "I/C" his microphones are connected in parallel with those of the crew. In this connection, it is important that each occupant



1. Battery plug casing
2. Switch, type 145
3. IP terminal of T4
4. OP terminal of T4
5. IS terminal of T4
6. OS terminal of T4
7. } Secondary terminals of T3
9. }
11. }
12. }
14. }
8. } Spills on connection panel
10. }
13. }

Fig. 3.– Interior view of chassis from the left-hand side

of the aircraft should ensure that his microphone circuit is broken, at the mask switch itself, unless he is actually speaking, otherwise the noise level is greatly increased.

14. The output voltage of the transformer T1 is applied to the control grid of the valve V1 through the condenser C1, the control grid being negatively biased through the resistance R3, normally to − 3 volts. The values of C1 and R3 are so chosen that they constitute a high-pass filter, which attenuates all frequencies below about 500 cycles per second, and so improves the signal noise ratio.

15. The anode load impedance of V1 consists of a transformer T2 with a centre-tapped primary winding. The lead from the anode of V1 to the OP primary terminal is screened, the screening being earthed, while the IP terminal is connected to HT positive. The inner (IS) and outer (OS) ends of the secondary winding supply excitation to the two control grids of the double pentode valve V2 in push-pull. Grid bias is applied to the centre tap on the secondary winding via R4, which is a decoupling resistance to reduce the coupling between V1 and V2 in the common grid bias battery. The bias on V2 is normally fixed at − 6 volts, which brings the operating point on the valve characteristic to nearly cut-off.

16. The two anodes of the valve V2 are taken to the outer (OP) and inner (IP) ends of the centre-tapped primary winding of the output transformer T3. The HT positive feed is taken from the input power plug to the centre tap TP on the primary winding, the screening grids of the pentode being also connected to this point. The suppressor grids are internally connected to the filament.

17. The condensers C2 and C3, connected between the anodes of the pentode and the corresponding control grids, provide negative feedback as will be explained in para. 21.

18. The output transformer T3 has three secondary windings, denoted in the circuit diagram for explanatory purposes, as "a", "b", and "c" respectively. Winding "a" feeds the telephone receivers of the crew. A resistance R12 is connected across this winding, so that even if no telephones are actually connected, the output stage is never entirely unloaded. This resistance also reduces the variation in load impedance with frequency, and with the number of telephones connected. It has a negligible effect upon the output when the amplifier is fully loaded.

19. Winding "c" is used to modulate the general purpose transmitter (usually one of the type T.1154 series), fitted in the aircraft. In the amplifier, type A.1134, the winding "b" is not used.

20. An additional transformer, T4, having a ratio of one-to-one, is used to feed the W/T operator's telephones. This enables the W/T operator to isolate himself from the I/C circuit, when necessary, by the use of the three-position key switch (see para. 24).

Negative feedback

21. Two forms of negative feedback are provided. Referring to the circuit diagram, fig. 4, the resistances R10 and R11 are in effect connected across the terminals of winding "a" on the transformer T3. These form a fixed potentiometer, the tapping point on which is connected back to the terminal IS on the input transformer T1. The proportion of output voltage so fed back is, in amplifier, type A.1134, approximately one-quarter of one per cent.

22. Negative feedback is also introduced by the condensers C2 and C3, connected between each anode of V2 and the corresponding control grid. The capacitance is so chosen that the feedback is negligible at frequencies below about three kc/s, the output falling off rapidly at higher frequencies. The frequency band covered by the amplifier is thus limited to (approximately) the band covered by the current types of Service electro-magnetic microphones.

Three-position key switch

23. The normal position of this switch is at B. Its function, in all three positions, will be explained with reference to the current installations employing a general purpose installation of the T.1154/R.1155 series.

24. In position A, the output of the general purpose receiver is switched direct to the W/T operator only. The W/T operator's telephone circuit to the primary of the transformer T4 is broken at contacts *t*, *y*, of the key switch, so that he cannot receive I/C signals. His microphone circuit is broken by the key switch at contacts *g*, *m*, and *l*, *d*, so that his speech does not pass into the I/C line. The crew's telephones remain across winding "a" of the transformer T3, and their microphones are permanently connected to the input side of T1, so that their I/C is unaffected.

25. In the normal or B position, all microphones are in parallel across the input transformer T1, the W/T operator's being restored at

contacts *g*, *m*, and *l*, *d*. The crew's telephones are across winding "a" of the output transformer, and the primary of the W/T operator's telephone transformer, T4, is in parallel with them, from the following considerations. The signal is fed in from the G.P. receiver to terminal 12 on the connection board, thence via contacts *p*, *u*, on the key switch to the primary of T4; from the other end of the primary the circuit continues through contacts *t*, *y*, on the key switch to terminal 18, the crew's telephones being connected between 18 and the earthed chassis, thus returning the circuit to the other side of the G.P. receiver output. The crew, as well as the W/T operator, thus hear all signals received on the G.P. receiver.

26. In position C, the W/T operator's microphone remains connected to the primary of the input transformer T1. The primary winding of his telephone transformer T4 is re-connected to winding "a" of the output transformer T3. The output from the G.P. receiver is fed through an attenuating circuit C5, R7 to the secondary winding of T1 and so to the control grid of V1, and is fed through the amplifier. The output appears at winding "a" and "c" of T3. From "a" it is fed to the crew's telephones, and also to the W/T operator's telephones as previously explained.

Modulation of transmitter

27. Modulation of the transmitter, type T.1154 series, is effected by the portion "c" of the winding of transformer T3. Referring to fig. 4, the terminals 9 and 10 on the connection block are always linked for use with this installation. When the key switch is in position A or B, winding "c" is disconnected, but in position C it is connected through contacts *a*, *h*, and R13, R14 (in parallel) to terminal 20, thence via pin B on the plug, type 129, to the MIC terminal of the transmitter. The microphone circuit is completed to earth on terminal 10. Thus, with the key switch in position C, the W/T operator's microphone is restored to the input of the I/C amplifier at contacts *d*, *l*, and *m*, *g*, and all speech on the I/C line is fed into the modulation circuits of the transmitter. The speech signals also appear at winding "a" and across the primary winding of T4, giving side tone both to crew and W/T operator.

28. From the above discussion, it follows that in position C, if the transmitter is switched on and the send-receive switch to "send", the speech of all members of the crew, and the W/T operator, will be radiated.

Low impedance I/C system

29. As previously stated, the amplifier, type A.1134, was designed to operate in conjunction with the high impedance (nominally 20,000 ohms per pair) telephones, which were formerly standard equipment in the Service. It was found, however, that audio-frequency stability is much more easily secured in aircraft installations by reducing the voltage at the secondary terminals of the output transformer. If the voltage gain of the amplifier remains the same, this necessitates fitting an output transformer of suitable step-down ratio. To preserve the power output at its original value, it is then also necessary to use output circuits of low impedance. Telephone receivers of low impedance (nominally 150 ohms per pair) were, therefore, introduced into the Service for this purpose.

30. To allow the change over to be effected gradually, all likely combinations of high and low impedance equipment were originally catered for. For example, arrangements were made for either high or low impedance telephones to be energized from either low or high impedance output transformers.

31. The stages in which the changes were effected are as follows. Where necessary, a switch-operated matching unit, type 110, was fitted in the telephone cords, enabling either high or low impedance output transformers to be matched to the existing high impedance telephones. The next stage was the introduction of amplifier, type A.1134A. Finally, when low impedance telephones are universally employed, the matching unit, type 110, will no longer be required.

Amplifier, type A.1134A

32. This amplifier was introduced to provide a low impedance telephone output. It provides all the facilities given by the amplifier, type A.1134, but differs in the following details.

33. Referring to the circuit diagram, fig. 5, the transformers T3 and T4 have low impedance secondary windings. Provision is, however, made for a high impedance modulating circuit by suitably designing the winding "b" on transformer T3. This necessitates an appropriate change in the wiring between winding "b", the connection block, and the key switch. The terminal 6 on the connection block is connected to pin C on the plug, type 129, to permit the use of this winding.

34. The loading resistance across the winding "a" (referred to in para. 18 as R12) is removed, and a loading resistance R15 is fitted across winding "b"; the function of this resistance, in amplifier, type A.1134A, is the same as that of R12 in A.1134.

35. The grid condenser of V1 is reduced in value to give the required low-frequency cut-off, and the feedback condensers on the output valve V2 are reduced in value to give the desired percentage of negative feedback at high frequencies.

INSTALLATION

Panel, type 192

36. Whenever possible, it is customary to employ a panel, mic-tel distribution, type 192, for connecting the I/C amplifier, type A.1134 or A.1134A, to the fixed wiring of the aircraft. The wiring of the panel is given in fig. 6.

37. In certain cases, however, particularly where the I/C amplifier is used solely for inter-communication, no advantage is gained by the use of this panel, and sockets, type 12 (4-point) and socket, type 67 (10-point) are used to connect the amplifier to the fixed wiring of the aircraft.

38. The amplifier must be installed in the aircraft sufficiently close to the panel, type 192, or the alternative sockets, type 12 and 67, to allow the connections to be made by means of the two cables attached to the amplifier. One of these cables terminates in a 4-pin plug, type 33, and the other in a 10-pin plug, type 129, which are engaged with the sockets either on the panel or separately mounted as explained in para. 37. The connections from the panel, or separate sockets, to the crew's and W/T operator's mic-tel wiring, and to the G.P. set, are made by terminal blocks.

39. Referring to the typical installation diagram, fig. 6, it will be seen that the HT supply is normally taken from a vibrator-type power unit operated off the aircraft DC supply. In 24-volt installations, this is a power unit, type 173, and in 12-volt installations, a power unit, type 295. Both units are described in A.P.1186D, Vol. I, Sect. 8, Chapters 1 and 2. In certain instances, however, a 120-volt battery is used for HT supply.

40. The power unit must not be fitted at a distance less than 10 in. from the amplifier, otherwise "hum" may be introduced into the A/F circuits by the vibrator. For the same reason, the DC input to the power unit must not be run adjacent to any microphone or telephone leads.

41. Normally, a single 2-volt accumulator is used for LT supply. Occasionally, however, two LT accumulators are provided, with a plug and socket arrangement for changing over should one become discharged during flight. In other instances, the two accumulators may be permanently connected in parallel.

42. The switch (40) in fig. 6 is arranged to make simultaneously the input circuit to the power unit (thereby providing the amplifier HT), and the 2-volt LT supply from the accumulator to the amplifier. It is normal practice for the LT switch on the amplifier itself to be permanently left ON.

43. On the panel, type 192, a two-way switch labelled EMERGENCY and NORMAL is fitted. This was provided for use with transmitter-receiver, type TR.1196, which is no longer required to be fitted, but this facility may possibly be made use of at some future date. When at EMERGENCY the crew's telephones (but not that of the W/T operator) are disconnected from the I/C amplifier and switched direct to the output of the TR.1196 (or other) receiver, the A/F stages of which can then be used as an I/C amplifier. Care must be taken to ensure that the TR.1196 (or other) receiver has been modified for low impedance output, if low impedance telephones are in use.

44. If a call light circuit is provided it is independent of the I/C installation. The contacts provided on the key switch, type 145, originally intended to illuminate a W/T operator's call lamp in position A, are not used.

45. Fig. 6 also shows a method sometimes used to enable the pilot to over-ride the key switch and call the W/T operator on I/C by pressing a switch labelled PRESS TO CALL W/T OPERATOR.

Wiring and insulation

46. All metal-braided cables are to be bonded across terminal blocks and earthed at intervals, and at each end. All earth leads must be as short as possible. The insulation between the circuits tabulated below must be not less than 30 megohms when tested with a 500-volt Megger.

Tel + ve and Mic + ve
Tel + ve and Mic − ve
Tel + ve and Tel − ve
Tel − ve and Mic + ve
Tel − ve and Mic − ve
Mic + ve and Mic − ve

All Tel − ve terminals at each terminal block must be earthed to the nearest bonding strip.

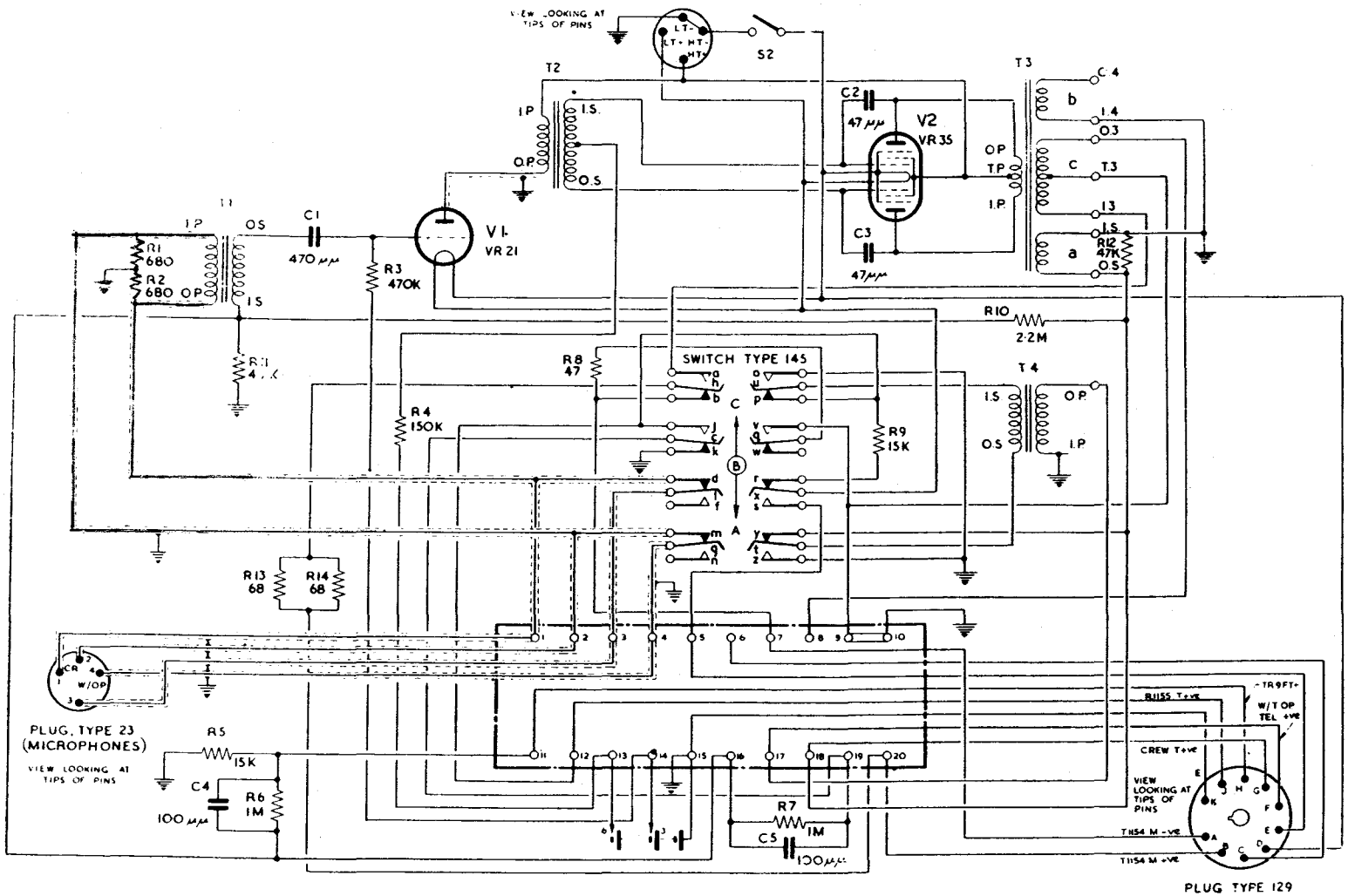


Fig. 4.—Amplifier, type A.1134, circuit

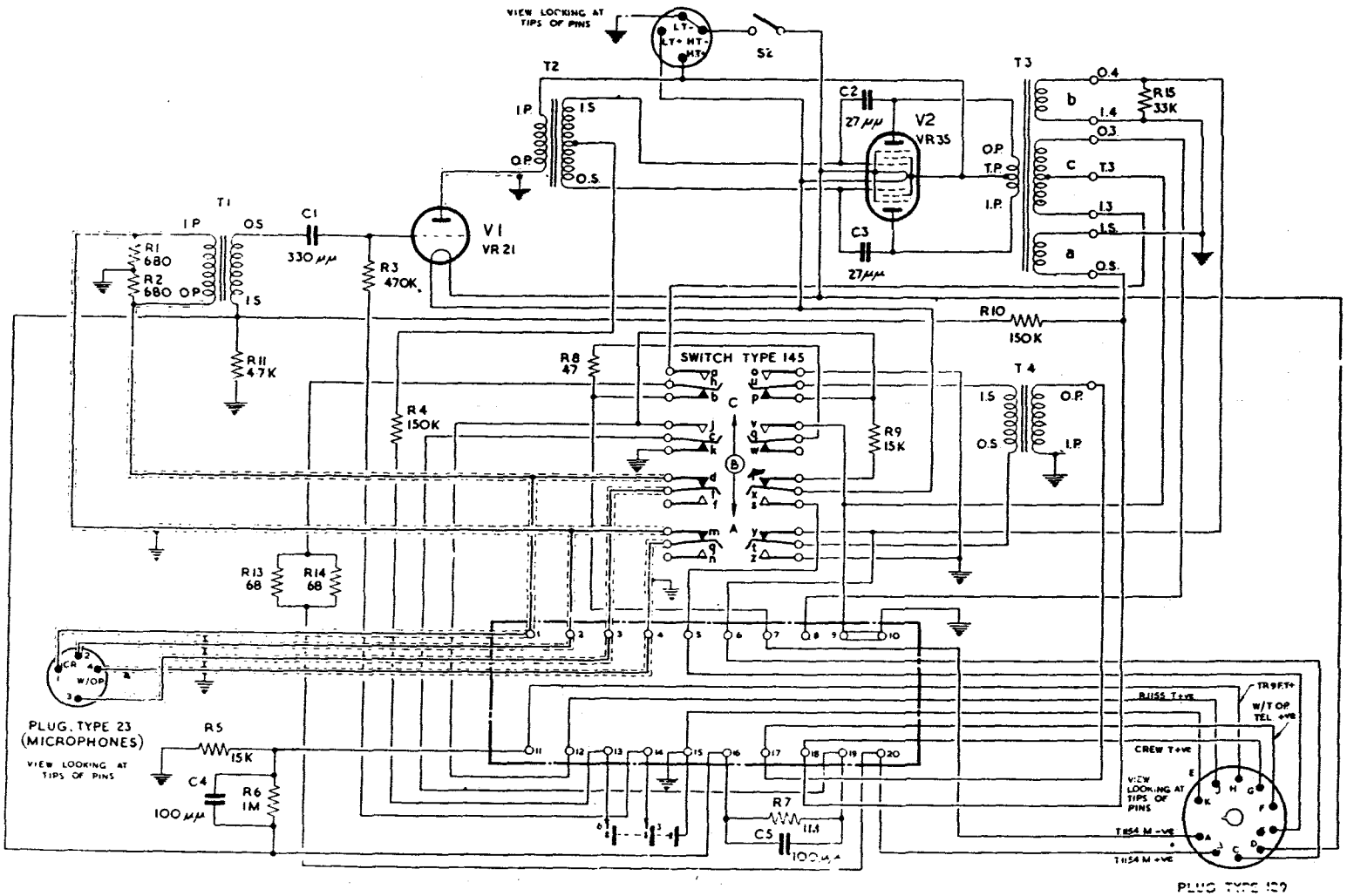


Fig. 5.—Amplifier, type A.1134A, circuit

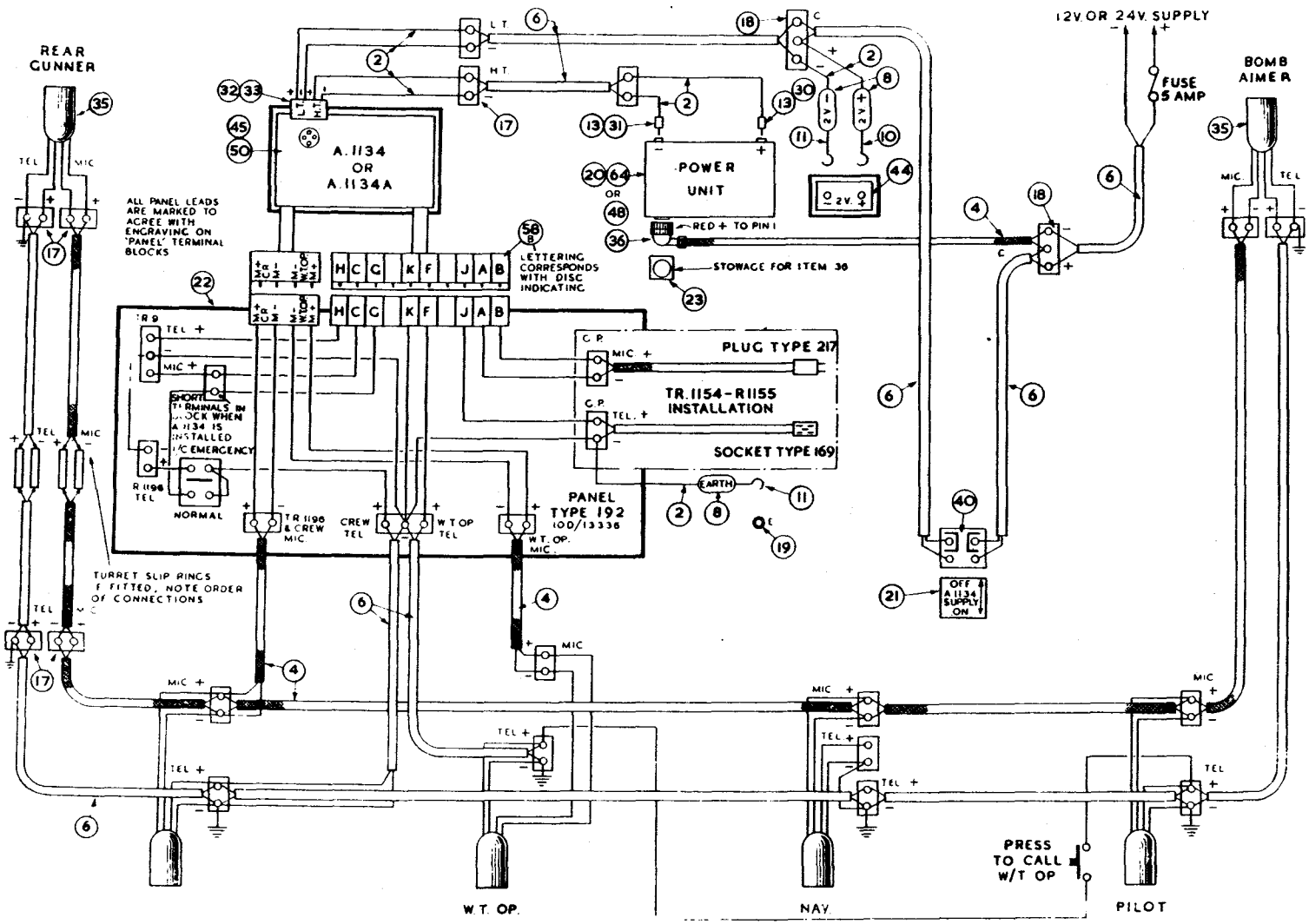


Fig. 6.—Typical installation diagram

47. Table 1 is a key to the annotations on fig. 6, and gives particulars of the types of cable to be used for the various circuits and of all items of equipment used in the typical installation to which reference has previously been made. The general principles are followed in all installations.

SERVICING

48. The condition of the LT and grid bias batteries should be checked regularly; low battery voltages will cause instability. The HT battery, where used, must also be tested regularly; it should be replaced when the voltage on load has fallen to 100 volts. To test the grid bias battery it is necessary to withdraw the amplifier from its case; to do this it is only necessary to remove the four securing screws at the corners of the panel. It is important to ensure that the grid bias plugs are inserted in the correct sockets, namely, — 3 volts for V1 and — 6 volts for V2.

49. The valves may be tested by means of a valve tester, type 4 (Stores Ref. 10S/13001) or type 4A (Stores Ref. 10S/639), instructions for use of which are given in A.P.2537A, Vol. I, and A.P.2537B, Vol. I, respectively. The servicing and testing of microphone and telephone equipment is dealt with in A.P.2876A, Vol. I, Sections 1 and 2.

50. Where a vibrator-type power unit is used for HT supply, a slight amount of "hum" is normal, and is an indication that the power unit is working correctly. The hum level will be noticeable on the ground with the engines stopped, but should not be sufficient to cause any inconvenience during flight. If chirping or twittering noises are heard, however, they may be caused by a defective neon tube stabilizer (CV.45 or VS.110) in the power unit, and the defective tube should be changed for one that is serviceable.

Components

51. The Air Ministry type and Stores Ref. numbers of components of the amplifiers, A.1134 and A.1134A, which may need renewal are given in Table 2. The information given in Tables 1 ("Items of I/C installation in aircraft") and 2 ("List of components") may be added to, or superseded by, Vol. II leaflets or by Vol. III if issued.

TABLE 1
ITEMS OF I/C INSTALLATION IN AIRCRAFT

(To be read in conjunction with fig. 6)

X denotes "quantity as required"

Item No.	*Stores Ref.*	*Description*	*Quantity*	*Remarks*
2	5E 1358	Cable, LT Unicel 4	X	For general wiring
4	5E/1328	Cable, LT Dumet 4	X	Microphone wiring
6	5E/1362	Cable, LT Ducel 4	X	Telephone wiring
8	5A/1073	Sleeve identification	X	
10	5A/1809	Cable end, hook type, crimping, 0 BA	X	
11	5A/1810	Cable end, hook type, crimping, 2 BA	X	
13	5K/298	Cable end, 0 BA	2	For use with items 30, 31
17	5C/430	Block, terminal, type B, 2-way, No. 1	X	
18	5C/432	Block, terminal, type B, 3-way, No. 1	X	
19	5A/1058	Terminal, type A, 2 BA	X	Spring type
20	10A/17355	Mounting, type 646	1	For power unit
21	—	Special lables	X	
22	10D/13336	Panel (Mic-tel distribution), type 192	1	
23	10H/2691	Plug body, W, small	1	Stowage for item 36 when power unit is not installed
24	10H 8261	Plug, type 64, S.P., HT + ve	1	**Note**—If item 22 is fitted items 24 to 29 are not used and are not shown in fig. 6.
25	10H 8262	Plug, type 65, S.P., HT — ve		
26	10H 7283	Socket, type 12, 4-point	1	
27	10H 11511	Disc, indicating, type S 12 F	1	For item 26
28	10H 11506	Socket, type 67, 10-point	1	
29	10H 850	Disc, indicating, type S 67 H	1	For item 28
32	10H 8529	Socket, type 39, 4-point	1	
33	10H 8530	Disc, indicating, type S 39 A	1	For item 32
35	10H/2306	Socket, type 359	1	Mic-tel
36	10H/774	Socket, type W.218	1	With 24-volt supply
or				
36	10H/1598	Socket, type W.309	1	With 12-volt supply
40	10F 3236	Switch, type 894	1	Amplifier HT and LT
44	5A 1387	Accumulator, 2-volt, 20 Ah	1	Two may be specified
45	10U 11500	Amplifier, type A.1134	1	High impedance output
or				
45	10U 90	Amplifier, type A.1134A	1	Low impedance output
48	5A 1333	Battery, dry, 120-volt, type A	1	Alternative to item 64
or				
48	5A 1615	Battery, dry, 120-volt, type B	1	ditto
50	5A 1251	Battery, dry, 6-volt	1	Fitted in item 45
58A	10H 849	Disc, indicating, type P 129 H	1	Only when items 24-29 are used
or				
58B	10H 13801	Disc, indicating, type P 129 L	1	When item 22 is used
64	10K 293	Power unit, type 173 (for 24-volt supply)	1	Alternative to item 48
or				
64	10K 932	Power unit, type 295 (for 12-volt supply)	1	ditto

TABLE 2

LIST OF COMPONENTS

Stores Ref.	*Nomenclature*	*Quantity*	*Ref. in fig. 4*	*Remarks*
10U/11500	Amplifier, type A.1134			
	Principal components:-			
10U/11502	Case			Steel or aluminium
	Condenser—			
10C/14031	Type 4614	2	C2 C3	
10C/10533	Type 422	2	C4 C5	100 $\mu\mu$F
10C/14032	Type 4615	1	C1	470 $\mu\mu$F
	Holder, valve			
10H/9615	Type S	1		5-pin
10H/9756	Type U	1		7-pin
10H/11510	Disc, indicating, type P/33/F	1		
10F/1866	Plate, clicking	1		For locating switch positions
10U/11507	Panel, connection	1		Bakelised panel, with soldering tags
	Plug			
10H/7280	Type 33	1		4-pole
10H/8515	Type 67	1		
10H/9112	Type 82	1		Single-pole, red
10H/9113	Type 83	1		Single-pole, black
10H/11505	Type 129	1		10-pole
	Resistance			
10W/690	Type 874	2	R1 R2	470 ohms
10W/948	Type 975	1	R11	5,000 ohms
10W/10626	Type 3480	2	R13 R14	68 ohms
10W/989	Type 989	1	R3	500,000 ohms
10W/11384	Type 480	2	R6 R7	1 megohm
10W/553	Type 815	1	R10	2·2 megohms
10W/7	Type 541	2	R5 R9	15,000 ohms
10W/546	Type 809	1	R12	47,000 ohms
10W/11382	Type 478	1	R4	150,000 ohms
10W/540	Type 806	1	R8	47 ohms
	Switch			
10F/10338	Type 152	1	S2	Single-pole, change-over
10F/10255	Type 145	1	S1	Lever key, locking, 8 changeovers
	Transformer			
10K/10280	Type 16	1	T2	Push-pull, tapped secondary
10K/11503	Type 100	1	T3	Four secondaries
10K/11504	Type 101	1	T4	For W/Op's phones
10K/1571	Type 1635	1	T1	Microphone transformer

Stores Ref.	*Nomenclature*	*Quantity*	*Ref. in fig. 4*	*Remarks*
	Valve guide			
10H/5554	7-pin	1		
10H/5555	5-pin	1		
	Valve			
10E/7738	VR.21	1		
10E/9779	VR.35	1		
10F/1867	Washer, clamping	1		
	Cable			
5E/193	Liflex 4			Length as required
5E/1328	Dumet 4			Length as required
			Ref. in fig. 5	
10U/90	Amplifier, A.1134A			
	Principal components:—			
10U/11502	Case	1		Low impedance output
5E/193	Cable, Liflex 4			2 ft. 6 in.
10HA/1694	Cord, instrument, type 77	1		22 in. long, 4 screened tinsel conductors with P.O. tag terminations
	Condenser			
10C/14003	Type 4606	2	C2 C3	27 $\mu\mu$F
10C/10553	Type 422	2	C4 C5	100 $\mu\mu$F
10C/14002	Type 4605	1	C1	330 $\mu\mu$F
	Holder, valve			
10H/9615	Type S	1		5-pin
10H/9756	Type U	1		7-pin
10U/11507	Panel, connection	1		Bakelised panel, with soldering tags
10H/7280	Plug, type 33	1		4-pole
10H/11510	Disc, indicating, type P/33/F	1		
	Plug			
10H/8515	Type 67	1		4-pole
10H/9112	Type 82	1		Single-pole, red
10H/9113	Type 83	1		Single-pole, black
10H/11505	Type 129	1		10-pole
10F/1866	Plate, clicking	1		For locating switch positions
	Resistance			
10W/690	Type 874	2	R1 R2	470 ohms
10W/948	Type 975	1	R11	4,700 ohms
10W/989	Type 989	1	R3	0·47 megohms
10W/11384	Type 480	2	R6 R7	1 megohm
10W/11499	Type 487	1	R12	100,000 ohms

TABLE 2—*continued*

Stores Ref.	*Nomenclature*	*Quantity*	*Ref. in fig. 5*	*Remarks*
	Amplifier, A1134A (*contd.*)			
	Resistance			
10W/10604	Type 3480	2	R13 R14	68 ohms
10W/7	Type 541	2	R5 R9	15,000 ohms
10W/540	Type 806	1	R8	47 ohms
10W/11382	Type 478	2	R4	150,000 ohms
	Switch			
10F/10388	Type 152	1	S2	Single-pole, change-over
10F/10255	Type 145	1	S1	Lever key, locking, 8 changeovers
	Transformer			
10K/10280	Type 16	1	T2	Push-pull, topped *secondary*
10K/574	Type 559	1	T4	For W/Op's phones
10K/560	Type 560	1	T3	4 windings
10K/1571	Type 1635	1	T1	Microphone transformer
	Valve			
10E/7738	Type VR.21	1	V1	
10E/9779	Type VR.35	1	V2	
	Valve guide			
10H/5555	5-pin	1		
10H/5554	7-pin	1		
10F/1867	Washer, clamping	1		

The following accessories may be provided, either with the I/C amplifier, or as part of the aircraft installation ("ARI. . . .").

Stores Ref.	*Nomenclature*	*Quantity*	*Ref. in fig. 6*	*Remarks*
5J/1387	Accumulator, type B, 2 volt, 20 Ah	1*	44	Moulded case
	Battery, dry			
5J/1251	6 volt	1	50	
5J/1333	Type A 120 volts	1	48	Home
	or			
5J/1615	Type B, 120 volts			Overseas
10U/11730	Case, transit	1		
10H/1222	Clip, type 33	2		For use with socket, type 67
5L/361	Lamp, filament, 3·5 volts	1		Miniature Edison screw
10A/17355	Mounting, type 646	1		To hold power unit, type 173
	Including:—			
10A/13410	Mounting, anti-vibration, type 155	4		2 lb. load rubber disc
	Plug			
10H/8261	Type 64	1		Red, engraved HT + if specified
10H/8262	Type 65	1		Black, engraved HT − if specified
	Power unit			
10K/293	Type 173	1	64	24-volt supply
10K/932	Type 295		64	12-volt supply
	Socket			
10H/7283	Type 12	1	26	4-pole
10H/8529	Type 39	1	32	4-pole, circular body
10H/11506	Type 67	1	28	10-pole circular holder

* *Note.*—Two off if specified in aircraft installation.

DM 13791/1/162 700 1/50 GL