AMPLIFIERS

TYPE A.1134 and A.1134A

Prepared by direction of the Minister of Supply

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

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AIR MINISTRY

This Publication supersedes AP 1105, V.1 2, Sect. 4, Chap. 2 and Sect. 5, Chap. 10, Para...
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.
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 amplifier, 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 (8) position when necessary.
7. The dimensions of the amplifier are $6\frac{1}{2}$ in. by $4\frac{1}{2}$ in. by 6 in., and its weight, without valves or power supply equipment, is approximately 4 lb. 8 oz. A transit case is provided.

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.

Fig. 1.—Amplifier, type A.1134

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

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

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. 9
11. Secondary terminals of T3
12.
14.
16.
10. Spills on connection panel
13.)
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 3 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 i, v, 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, b, 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.
33. 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 338, 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 (therby 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.

\[
\begin{align*}
\text{Tel} + \text{ve} & \quad \text{and} \quad \text{Mic} + \text{ve} \\
\text{Tel} + \text{ve} & \quad \text{and} \quad \text{Mic} - \text{ve} \\
\text{Tel} + \text{ve} & \quad \text{and} \quad \text{Tel} - \text{ve} \\
\text{Tel} - \text{ve} & \quad \text{and} \quad \text{Mic} + \text{ve} \\
\text{Tel} - \text{ve} & \quad \text{and} \quad \text{Mic} - \text{ve} \\
\text{Mic} + \text{ve} & \quad \text{and} \quad \text{Mic} - \text{ve}
\end{align*}
\]

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.2578A, Vol. I, and A.P.2578B, 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)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Cable, LT Unicel 4</td>
<td>X</td>
<td>For general wiring</td>
</tr>
<tr>
<td>4</td>
<td>Cable, LT Dunet 4</td>
<td>X</td>
<td>Microphone wiring</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5E/1362</td>
<td>Cable, LT Dunet 4</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>5A/1073</td>
<td>Sleeve identification</td>
<td>X</td>
</tr>
</tbody>
</table>
| 10       | 5A/1809     | Cable end, hook type, crimping, 0 BA | X        | Phone unit 
| 11       | 5A/1810     | Cable end, hook type, crimping, 2 BA | X        | For use with items 29, 31 |
| 13       | 5K 298      | Cable end, 0 BA | 2        | Phone unit 
| 17       | 5C 430      | Block, terminal, type B, 2-way, No. 1 | X        | Phone unit 
| 19       | 5C 432      | Block, terminal, type B, 3-way, No. 1 | X        | Phone unit 
| 20       | 5A/1058     | Terminal, type A, 2 BA | X        | Phone unit 
| 21       |            | Mounting, type 4966 | 1        | Phone unit 
| 22       |            | Special tables | X        | Phone unit 
| 23       | 10D 13336   | Panel (Mic-rel distribution), type 192 | 1        | Phone unit 
| 24       | 10H 8261    | Plug, type 64, S.P., HT + ve | 1        | Phone unit 
| 25       | 10H 8262    | Plug, type 65, S.P., HT - ve | 1        | Phone unit 
| 26       | 10H 7283    | Socket, type 12, 4-point | 1        | Phone unit 
| 27       | 10H 11511   | Disc, indicating, type S 12 F | 1        | Phone unit 
| 28       | 10H 11506   | Socket, type 67, 10-point | 1        | Phone unit 
| 29       | 10H 850     | Disc, indicating, type S 67 H | 1        | Phone unit 
| 31       | 10H 8529    | Socket, type 35, 4-point | 1        | Phone unit 
| 32       | 10H 8530    | Disc, indicating, type S 35 A | 1        | Phone unit 
| 33       | 10H 2306    | Socket, type 359 | 1        | Phone unit 
| 34       | 10H 774     | Socket, type W.218 | 1        | Phone unit 
| 35       | 10H 1598    | Socket, type W.309 | 1        | Phone unit 
| 40       | 10F 3236    | Switch, type 894 | 1        | Phone unit 
| 44       | 5A 1387     | Accumulator, 2-volt, 20 Ah | 1        | Phone unit 
| 45       | 10U 11500   | Amplifier, type A.1134 | 1        | Phone unit 
| 46       | 10U 90      | Amplifier, type A.1134A | 1        | Phone unit 
| 48       | 5A 1333     | Battery, dry, 120-volt, type A | 1        | Phone unit 
| 50       | 5A 1615     | Battery, dry, 120-volt, type B | 1        | Phone unit 
| 52       | 5A 1251     | Battery, dry, 6-volt | 1        | Phone unit 
| 55       | 10H 849     | Disc, indicating, type P 129 H | 1        | Phone unit 
| 59B      | 10H 13805   | Disc, indicating, type P 129 L | 1        | Phone unit 
| 60       | 10K 293     | Power unit, type 173 (for 24-volt supply) | 1        | Phone unit 
| 61       | 10K 932     | Power unit, type 295 (for 12-volt supply) | 1        | Phone unit 

Note—If items 22 and 29 are not fitted, items 24 and 26 are not used and are not shown in fig. 6.
### TABLE 2

**LIST OF COMPONENTS**

<table>
<thead>
<tr>
<th>Stores Ref.</th>
<th>Nomenclature</th>
<th>Quantity</th>
<th>Remarks</th>
<th>Ref. in fig. 4</th>
<th>Stores Ref.</th>
<th>Nomenclature</th>
<th>Quantity</th>
<th>Remarks</th>
<th>Ref. in fig. 4</th>
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<tbody>
<tr>
<td>10U/11500</td>
<td>Amplifier, type A.1134</td>
<td></td>
<td></td>
<td></td>
<td>10H/11500</td>
<td>Amplifier, type A.1134A</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>10U/11502</td>
<td>Case</td>
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</tr>
<tr>
<td>10C/14031</td>
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<td>2</td>
<td>Steel or aluminium</td>
<td></td>
<td>10C/14031</td>
<td>Type 4615</td>
<td>1</td>
<td>C1</td>
<td>470 (\mu F)</td>
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<td>10C/10533</td>
<td>Type 422</td>
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<td>C2 C5 100 (\mu F)</td>
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<td>C1</td>
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<td>5-pin</td>
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<td>Type U</td>
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<td>7-pin</td>
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<td>10H/11510</td>
<td>Disc, indicating, type P/33/F</td>
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<td></td>
<td></td>
<td>10K/11510</td>
<td>Plate, clicking</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10F/1866</td>
<td>Plate, clicking</td>
<td>1</td>
<td>For locating switch positions</td>
<td></td>
<td>10F/1866</td>
<td>Plate, clicking</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10U/11507</td>
<td>Panel, connection</td>
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<td>Bakelised panel, with soldering tags</td>
<td></td>
<td>10U/11507</td>
<td>Panel, connection</td>
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<td></td>
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<td>R8 47 ohms</td>
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<td>Four secondaries</td>
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<td>1</td>
<td>T4</td>
<td>For W/Op's phones</td>
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<td>10K/11504</td>
<td>Type 101</td>
<td>1</td>
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<td>T1</td>
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<td>10K/1571</td>
<td>Type 1635</td>
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**Principal components**:

- Valve guides: 7-pin
- Valve: 5-pin
- Washer, clamping: 1
- Cable: Length as required
- Liflex 4: Length as required
- Dumble 4: Length as required

**Ref. in fig. 5**

- Amplifier, A.1134A: Low impedance output
- Condenser: C2 C3 27 \(\mu F\)
- Cable, Liflex 4: 2 ft. 6 in.
- Cord, instrument, type 77: 22 in. long, 4 screened tinsel conductors with F.E. tag terminations
- Panel, connection: Bakelised panel, with soldering tags
- Disc, indicating, type P/33/F: 4-pole
- Plug: 4-pole
- Type 67: 4-pole
- Single-pole, red: 1
- Single-pole, black: 1
- 10-pole: 1
- Plate, clicking: For locating switch positions

**Resistance**

- Type 874: 2 R1 R2 470 ohms
- Type 975: 1
- Type 4605: 2 C2 C3 27 \(\mu F\)
- Type 10533: 2 C4 500 \(\mu F\)
- Type 330: 2
- Type 111507: 2
- Type 111510: 2
- Type 111505: 2
- Type 111499: 2

**Switch**

- Type 874: 2 R1 R2 470 ohms
- Type 975: 1
- Type 4605: 2 C2 C3 27 \(\mu F\)
- Type 111507: 2
- Type 111510: 2
- Type 111505: 2
- Type 11499: 2
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<th>Stores Ref.</th>
<th>Nomenclature</th>
<th>Quantity</th>
<th>Ref. in</th>
<th>Remarks</th>
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<td>fig. 5</td>
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<td>R5 R9 15,000 ohms</td>
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<td>1</td>
<td>R8 47 ohms</td>
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<td>10W 11382</td>
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<td>R4 150,000 ohms</td>
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<td>10H 10255</td>
<td>Type 145</td>
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<td>S1 Lever key, locking, 8 changeovers</td>
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<td>Transformer Type 16</td>
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<td>T2 Push-pull, topped secondary</td>
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<tr>
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<td>Type 559</td>
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<td>T4 For W/Cp’s phones</td>
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<td>T3 4 windings</td>
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**TABLE 2—continued**

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

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<th>Ref. in</th>
<th>Remarks</th>
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<td>Accumulator, type B, 2 volt, 20 Ah</td>
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<td>To hold power unit, type 173</td>
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* Note.—Two off if specified in aircraft installation.