

Wireless Set No 19 Mk.3 (Canadian)

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RECEIVER ELEMENTSTECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

## GENERAL

1. Receiver elements may be divided into three groups:-

- (a) Moving-iron diaphragm types
- (b) Moving-iron balanced-armature types
- (c) Moving-coil types

The elements used in the Army are listed under their respective groups in Tables 1001 to 1003. Fig. 1001 illustrates typical elements in each group.

2. It should be noted that in the designations of receiver elements, the term 'Receivers, watch' is used in three senses. In one sense the term indicates a complete unit in which the driver unit, comprising magnet and coils, is permanently mounted in a plastic receiver case, e.g. Receivers, watch, C, L.R. In the second sense the designation indicates an item in which the receiver unit is contained in a separate inset which is readily removable from the plastic receiver case in which it is mounted, e.g. Receivers, watch, D, L.R. The third sense of the designation applies only to Receivers, watch, F and Receivers, watch, J; these receivers contain a separate inset which is not removable from the receiver case.

## PRINCIPLES OF OPERATION

Moving-iron diaphragm types

3. These are the oldest, simplest and most familiar types of receivers. The most common form is illustrated in Fig. 1. A thin diaphragm of magnetic material is clamped rigidly at the edge, while the central portion bridges, but does not touch, the pole pieces of a permanent magnet. On the pole tips are wound coils which carry the audio frequency currents. These currents alternately increase and decrease the strength of the magnetic field which causes the attraction of the diaphragm to be varied accordingly. Due to the fact that the pull on unit area of the diaphragm under the magnet poles is proportional to the square of the flux density in the air gap, the sensitivity of the receiver is directly proportional to the field strength of the permanent magnet. The amount of distortion present is directly proportional to the strength of the magnet and the deviation from an optimum value of air gap determined by the frequency range to be accepted. The strength of the magnet has to be consistent with the resilience of the diaphragm.

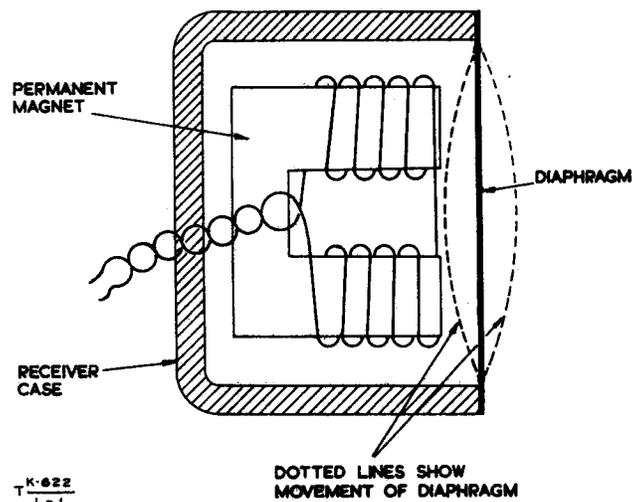


Fig. 1 - Moving-iron diaphragm receiver element

Table 1001 - Moving-iron diaphragm receiver elements

Designation	Dia. in inches	Depth in inches	Weight in ounces	Where used	Remarks
Receivers, watch, C.L.R. (ZA 5796)	$2\frac{3}{8}$	$1\frac{1}{2}$	3	Receivers, head-gear, C.L.R., single, Mks. 2, 3 and 4; and double, Mks. 2 and 7 and Nos. 2 and 7	Resistance 60Ω
Receivers, watch, C.H.R. (ZA 5792)	$2\frac{3}{8}$	$1\frac{1}{2}$	3	Receivers, head-gear, C.H.R., double, Mks. 2 and 8 and Nos. 2 and 8	Similar to Receiver, watch, C.L.R., but has a resistance of 2,000Ω
Receivers, watch, C.H.R., No. 9 (ZA 29349)				Receivers, head-gear, C.H.R., double, No. 9, Mk. 2	The receiver unit is enclosed in a rubber shroud. Resistance 2,000Ω
Receivers, inset, No.1L, black (YA 7687)				Kits, extension, telephone, C.B. exchange	Includes one Diaphragm, No. 12 and one Earpiece No. 18. Not to be perpetuated as a service store. Superseded by Receivers, inset, No. 2P
Receivers, inset, No.1L, (W.D.) (YA 1302)	$2\frac{1}{2}$	$1\frac{3}{4}$	4	Telephones, hand, Nos. 1, 1A, 2, 2A, 3 and 4	80Ω; similar to G.P.O. type, No. 1L but with tropical finish. This inset is obsolescent
Receivers, inset No. 2P (YA 8595)				Kits, extension, C.B. exchanges	Standard Post Office store
Insets, telephone, equalized, No. 1, Mk.1 (YA 6806)	$1\frac{1}{10}$	$\frac{3}{4}$	$1\frac{1}{2}$	Receivers, watch, I.I.E., No. 1 Microphone, hand, I.I.E., Nos. 17 and 18	Equalized telephone inset for use as a receiver or microphone. Four terminal strips on rear

Table 1001 - (contd.)

Designation	Dia. in inches	Depth in inches	Weight in ounces	Where used	Remarks
Insets, telephone, equalized, No. 1, Mk. 2 (YA 7225)	1 1/10	3/4	1 1/4	Receivers, watch, I.I.E., No. 1	Similar to I.I.E., No. 1, Mk. 1, but having only three terminal strips on rear

Table 1002 - Moving-iron balanced-armature receiver elements

Designation	Dia. in inches	Depth in inches	Weight in ounces	Where used	Remarks
Insets, receiver, watch D, L.R., No. 1 (ZA 17944)				Receivers, watch, D, L.R., No. 1	
Insets, telephone, balanced armature, No. 2 (YA 4789)				Receivers, watch, D, L.R., No. 2	
Receivers, watch, D, L.R., No. 3 (ZA 10183)	3.125	0.480		Receivers, head- gear, D, L.R., double, No. 3	D.C. resistance 30
Insets, telephone, balanced armature, No. 4 (YA 4983)				Receivers, watch, sound-power, No. 2	
Insets, telephone, balanced armature, No. 5 (YA 5275)	2 1/10	1	3 1/4	Receivers, watch, D, L.R., Nos. 5 and 5A	Aluminium dia- phragm. Suit- able for trop- ical use
Insets, telephone, balanced-armature No. 5, H.R. (YA 7588)	2 1/10	1	3 1/4	Receivers, watch, D, H.R., No. 5	Similar to I.T.B.A., No.5, but fitted with high resistance coil
Insets, telephone, No. 1 (YA 3918)				Receivers, watch, sound-power, No. 1	Not to be per- petuated as a service store

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Table 1002 - (contd.)

Designation	Dia. in inches	Depth in inches	Weight in ounces	Where used	Remarks
Insets, standard, receiver, electromagnetic (YA 8548)				Army field Tels. equipment	Impedance 300Ω at 1,000c/s. Frequency range 200 - 3,400c/s. A receiver de- veloped by Ministry of Supply which it is intended shall be the standard receiver used in future Wireless and Line equipments
Insets, telephone, No. 2 (YA 3919)	2 1/10	1	4	Receivers, watch, sound-power, No. 2	
Designation	Dia. in inches	Depth in inches	Weight in ounces	Where used	Remarks
Receivers, watch, F (ZA 11335)	3 1/2	2	6 1/2	Microphone and receivers head- gear assemblies Nos. 1; 1 Mk. 2; 2; 2, Mks. 2 and 7	Uses Insets, receiver, (see para. 2)
Receivers, watch, J (ZA 17606)	3.13/16 x 3 3/16  (elliptical)	1 1/4	4	Microphone and receivers head- gear assem- blies Nos. 8, 9, 10	Uses Insets, receiver, watch, J. (see para. 2)

Table 1003 - Moving-coil receiver elements

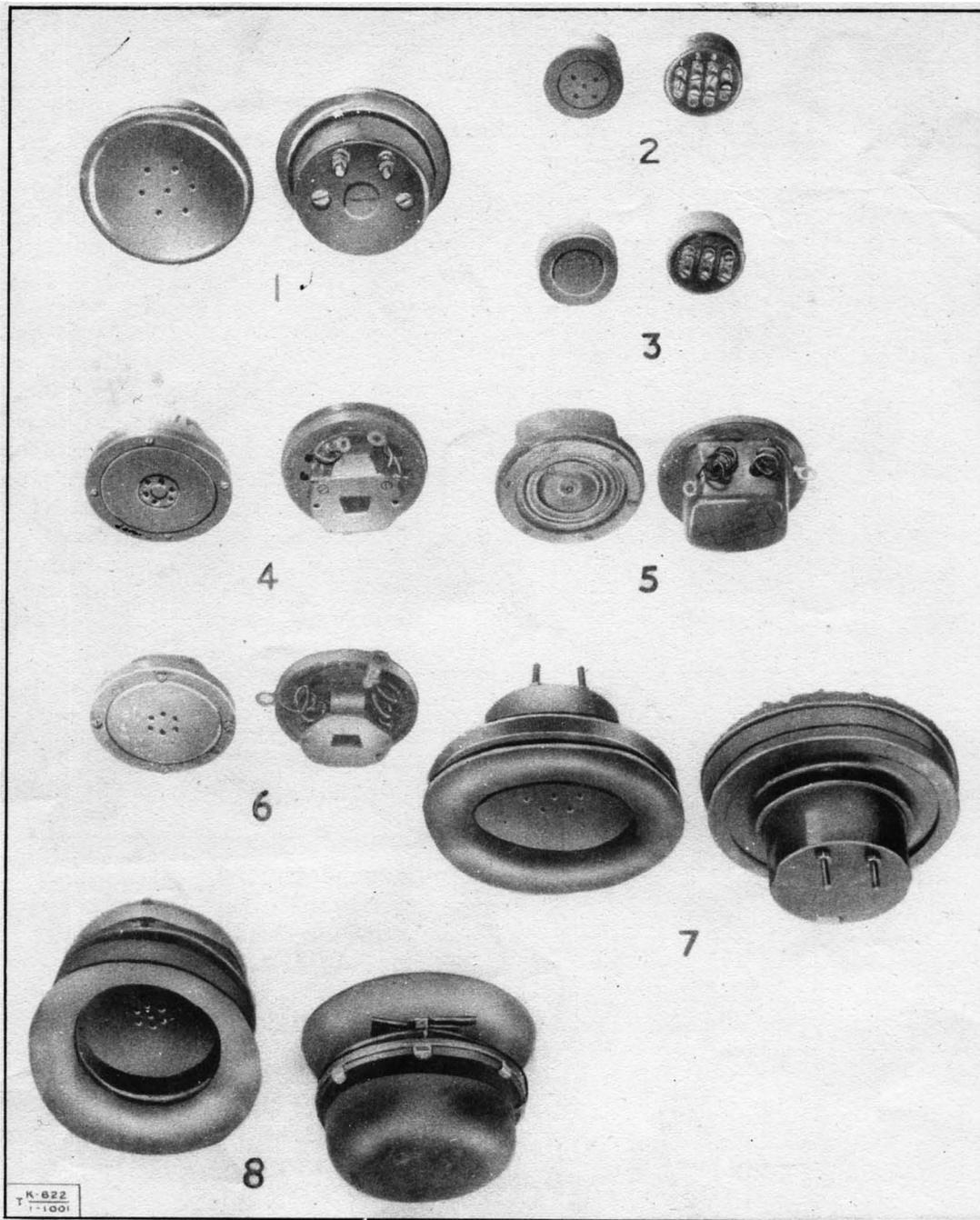


Fig. 1001 - Receiver elements

1. Receivers, watch, C.L.R.
2. Insets, telephone, equalized, No. 1, Mk. 1
3. Insets, telephone, equalized, No. 1, Mk. 2
4. Insets, telephone, balanced-armature, No. 2
5. Insets, telephone, No. 1
6. Insets, telephone, balanced-armature, No. 2
7. Receivers, watch, F
8. Receivers, watch, J

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END

For constant coil current the response is independent of frequency up to the point of diaphragm resonance, at which point it depends on the amount of damping present, while above the resonant point the response falls off rapidly.

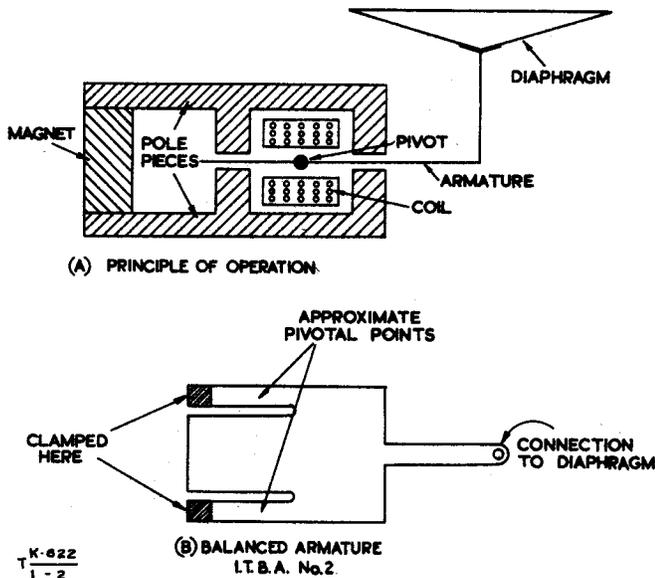


Fig. 2 - Moving-iron balanced-armature receiver element

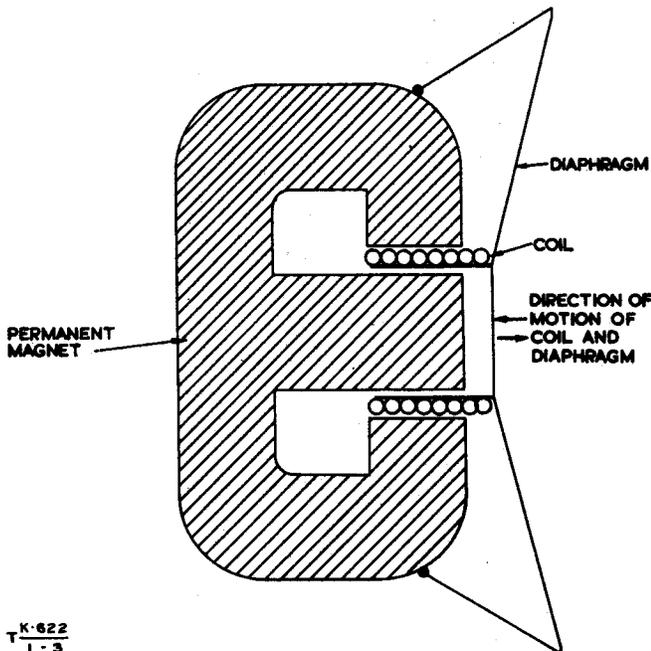


Fig. 3 - Moving-coil receiver element

#### Moving-iron balanced-armature types

4. In the balanced-armature type of element the diaphragm is of non-magnetic material connected at its centre point to one end of a magnetic armature as shown in Fig. 2A. The armature is made of a sheet of magnetic material having two slits cut along the sides as shown in Fig. 2B. When the armature is clamped at the extremities of the side pieces, it will be effectively pivoted at some indeterminate point which is a short distance from the clamps. The armature lies in the magnetic field in such a way that in the quiescent condition the forces acting on each end are balanced and the armature is not subjected to stress. When an audio frequency current is applied to the coil, this condition of balance is destroyed and the armature is caused to move. This movement is transferred to the diaphragm which provides audible sound.

#### Moving-coil types

5. These receivers depend for their action on the movement of a coil in a magnetic field. The coil is situated in the circular gap of a pot magnet and is connected to the centre of a conical diaphragm, the outer edge of which is rigidly clamped. (Fig. 3). When audio frequency currents are passed through the coil the resulting magnetic fields react with the field of the pot magnet and cause movement of the coil and diaphragm. The magnet causes a certain amount of damping on the diaphragm and, if in addition the latter is well designed, this type of element has a very flat response over the speech range.

Note: The next page is Page 1001.

R E S T R I C T E D

ELECTRICAL AND MECHANICAL  
ENGINEERING REGULATIONS  
(By Command of the Army Council)

TELECOMMUNICATIONS  
J 379 Misc Inst No.1

RECEIVER ELEMENTS

TECHNICAL HANDBOOK - MISCELLANEOUS INSTRUCTION

Redesignation of EMERs

Information

1. To maintain the proper sequence of EMER numbers, it is intended that:-
  - (a) all future issues of EMERs on this equipment will be published in the series Tels J 370 - J 379 and
  - (b) the current EMERs will be redesignated.

R E S T R I C T E D

TELECOMMUNICATIONS  
J 379 Misc Inst No.1

ELECTRICAL AND MECHANICAL  
ENGINEERING REGULATIONS

Action

2. The following EMERs will be redesignated as shewn.

Present designation					New designation (e)
	EMER designation (a)	Pages (b)	Issue No. (c)	Date (d)	
1	Tels K 622	1 - 2 1001 - 1004	1 1	12 Sep 52 12 Sep 52	Tels J 372

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