MAKING THE MOST OF YOUR RECEIVER

UP-TO-DATE INFORMATION ON:—

- SHORT WAVE AERIALS
- GENERAL PURPOSE AERIALS
- AERIALS ON BOARD SHIP
- USE OF AN EARTH
- MINIMISING ELECTRICAL INTERFERENCE
- CARE OF BATTERIES
- POINTS ABOUT LOUDSPEAKERS

PRICE ONE SHILLING

HOW TO GET THE BEST RESULTS FROM YOUR RADIO RECEIVER

There are many different types of listener using Eddystone receivers and also there are several types of receiver possessing different characteristics. Of necessity, therefore, the advice given in these notes is of a general character. Some users are very interested technically as well as aesthetically—others are solely interested in the actual performance obtained, and, providing the latter is good, are not concerned how it is brought about. Those in the first category are usually in the position to know how to get the best out of the receiver, and we would ask those in the second category to appreciate the fact that, by paying attention to a few details when installing the receiver, their listening pleasure can be greatly enhanced. Some of the following suggestions, which amplify those given in the Instruction Book, can be carried out by the user with little difficulty—others may need the assistance of a friend or of the distributor from whom the receiver was purchased.

USE OF AN EARTH.

Twenty years ago it was the rule to go to some trouble to provide a really good earth for any wireless set. To-day, probably the vast majority of users do not bother about a direct earth connection.

With a mains operated receiver, an earth of sorts generally exists. One side of the mains is usually earthed and the metal work in any receiver tends to take up earth potential, although this is not always the case, particularly on the higher frequencies.

As with other receivers, your Eddystone set will function well without an earth connection, but, if you want maximum performance on all frequency ranges, a good earth is definitely advisable. It will confer two benefits—one to balance the aerial and increase the effectiveness of the latter, the other to reduce background noise, particularly in cases where electrical interference is experienced.

A metal plate buried in the soil, with a lead of moderately heavy wire, as short as possible, is the best arrangement. Failing this, it is often possible to fit a clip to a main water pipe, but the latter should have only a short run before going into the ground. If, for any reason, the earth lead has to be long, the effectiveness of the earth will vary, but it is well to leave it connected at all times, since it is always desirable, for reasons of safety, to earth electrical apparatus.

On board ship, it should not be difficult to make a direct connection to a metal bulkhead, which, being in electrical contact with the sea, will make a first-class "earth".

AERIALS.

Books have been written on aerials, and all we do here is to make suggestions regarding various types of aerials which, from practical experience, we know will give excellent results when used with an Eddystone receiver.

The better the aerial, the better the results you will obtain. Reception is possible using an indoor aerial, but this is not recommended. An indoor aerial is screened by electric wiring and various metal work, and is also liable to pick up interference radiated off the electric mains. The proportion of noise may therefore be high and, on a sensitive receiver, the background noise will be more than it should be.

The wire used for the actual aerial is relatively unimportant. Mechanical strength is the main consideration, and 12 or 14 gauge wire—enamelled or plain—will usually be satisfactory. Stranded 7/22 wire is equally suitable.

Insulators should combine adequate mechanical strength with high insulating properties, and the latter should be maintained in all sorts of atmospheres. One cannot do better than choose the Cat. No. 966—it is suitable for use with any type of aerial and is often employed for transmitting aerials. One at each supporting point is usually sufficient.

For general all round reception of the whole range of frequencies covered by the receiver, an aerial about 60 feet long is recommended. The greater portion of it should be well out in the clear and as high above the ground as can conveniently be arranged. A tree is often available and can well be used, but the aerial proper must not be allowed to touch the leaves or branches—an insulator well out from the tree will ensure this (see Fig. 1). Also keep the aerial well away from metal roofs, gutters, etc., even if this means shortening it to some extent. Signal pick-up is greater when the aerial is kept away from anything likely to act as a screen and this point is definitely more important than obtaining maximum length. Good insulation is necessary at the lead-in point.

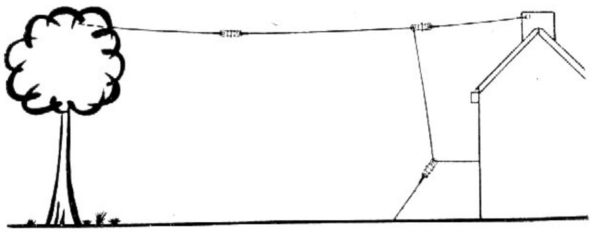

Fig. 1. A good general purpose aerial. It should be kept clear of obstructions.

Excellent results will be obtainable on aerials much shorter than 60 feet, particularly on the shorter wavelengths. This applies especially on board ship, where it may be difficult to erect a long aerial.

At the rear of the receiver are two terminals, one marked "A" and the other "AE". The latter is normally strapped to the chassis and should remain so when a single wire is used. The aerial lead-in wire is attached to terminal "A" and the earth to terminal "AE". By the way, if you are temporarily stuck for an aerial, try connecting an earth lead to the aerial terminal "A" (leaving "AE" blank, of course). It is surprising how good results can be with this system—often they are better than with a poor indoor aerial.

SPECIAL AERIALS.

Past experience shows that many listeners are particularly interested in certain shortwave broadcast stations, or possibly in one of the amateur bands, and wish to obtain optimum results just where their interests lie.

In such cases, the dipole (otherwise known as the doublet) type of aerial, is recommended. As can be seen from the sketch in Fig. 2, it consists of two equal lengths of wire "a" and "b" attached to a centre insulator, from which a twin feeder (or transmission line) runs to the receiver. This feeder, which takes the form of two wires embedded in solid insulating material, is convenient to use and easily obtainable. Alternatively, two 18 gauge wires (bare or enamel-covered) may be employed, small spacing insulators being fixed at intervals to keep the wires separate. The length of feeder, within reason (say up to 100 feet) has but little effect on the performance.

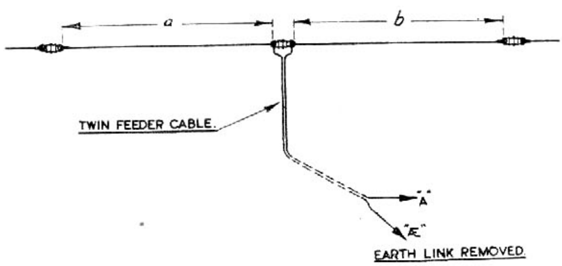

Fig. 2. The dipole or doublet type of aerial, the benefits of which are explained in the text.

The two feeder wires are connected to the aerial wires, one each side of the centre insulator. At the receiver end, the two wires are attached to the "A" and "AE" terminals, the shorting strap or plug being removed.

Two further benefits derive from the use of a doublet aerial. Electrical interference, radiated off the electric mains, is picked up equally on each of the pair of wires and the induced voltages tend to cancel out, so that reception becomes free of local interfering noises. Also, the feeder does not require further insulation (unless the spaced type is used), and may be allowed to run near, or come into contact with metal objects. At times it may be wise to add some mechanical protection such as a wrapping of tape, to prevent the feeder insulation being rubbed away by wind movement.

Where interest lies in a particular frequency band, the lengths of the aerial wires can be adjusted to give optimum results. The following table gives details of the appropriate lengths to use for the short wave broadcast and amateur bands.

	Wavelength (Metres)	*Frequency (Megacycles)*	*Lengths of "a" and "b" (feet)*
Broadcast	49	6.1	40
	31	9.6	26
	25	11.8	20
	19	15.1	15.5
	16	17.8	13
	13	21.5	10.5
	11	26	9
Amateur	40	7	33
	20	14	16.5
	10	28	8.25

WIDE BAND RECEPTION.

If additional pairs of aerial wires are added to the simple dipole, improved reception over an equivalent number of frequency bands becomes possible. Also, a cross-over effect occurs and good results are obtained over a wide frequency range.

The lengths of the additional wires should again be made according to the foregoing table. For example Fig. 3 shows an aerial with two pairs of wires. If space permits, more wires can be added.

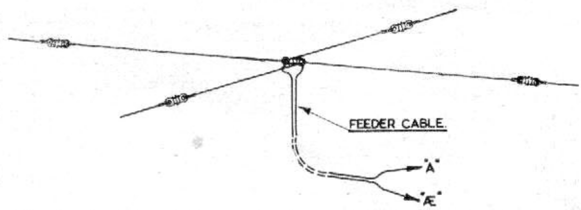

Fig. 3. Double dipole aerial, giving wider frequency coverage than a single dipole.

The drawback to the aerial shown in Fig. 3 is that four supporting points are required. A folded up version of the same aerial is sketched in Fig. 4. Only two main supports are called for, the lower portions of the aerial being anchored to any convenient points.

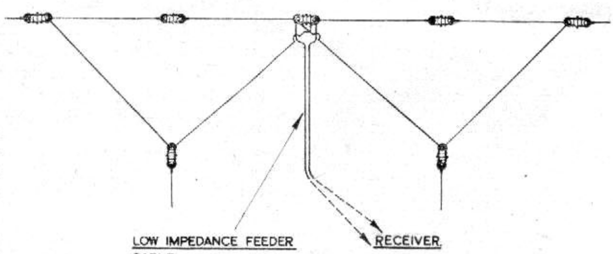

Fig. 4. Folded up version of double dipole aerial, and occupying less space.

FOLDED DIPOLE AERIALS.

An excellent aerial for amateur band reception, and also for specific short wave broadcast bands, is the folded dipole type shown in Fig. 5.

There are two methods of constructing this aerial. One is to use 300 ohm ribbon feeder (Telcon K25, available from short wave specialist dealers) throughout—for the aerial and for the lead-in portion. Fig. 5(a) is self-explanatory. Strain insulators will be required, as usual, for supporting the aerial at the ends

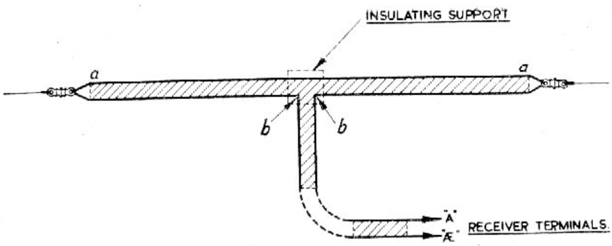

Fig. 5(a). Folded dipole aerial, constructed with 300 ohm feeder cable throughout.

and some additional mechanical support will be required at the centre.

The second method is to employ 14 or 16 gauge wire, spaced apart with small insulators of ceramic or other high grade insulating material. This system is illustrated in Fig. 5(b).

The lengths of the arms will be as shown in the table given earlier for the dipole aerial. The folded dipole will give maximum efficiency at the frequency for which it is cut, but it will also give good results on harmonic frequencies. The length should be made to correspond with the band in which the user is mainly interested. For instance, an aerial constructed with arms each 33 feet long will ensure excellent reception on 40 and 20 metres. Results will be good on 10 metres but, as a separate aerial for the latter band will not take up much space, it is worth while erecting one. On 80 and 160 metres, the lower ends of the feeder should be connected together and to the aerial terminal.

Where the main interest lies in 20 metres, the arms should be 16½ feet long. By using a switch connected as in Fig. 6, good reception will be obtained on all amateur bands.

For short wave broadcast reception, the lengths quoted can be altered to suit, according to the figures given earlier.

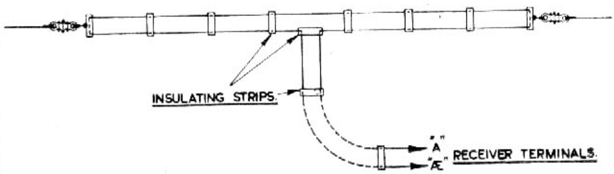

Fig. 5(b). Folded dipole aerial, using ordinary wire and spacing insulators.

Another type of folded dipole aerial is shown in Fig. 7. It calls for more wire and is not quite so simple as the ordinary folded dipole, but it is of the "wide-band" type and gives good results over a wide range of frequencies. The wires should preferably be separated by six inches or so, when spacing insulators will not be required. Should it not be possible to arrange wide spacing, then small block insulators should be fitted at intervals.

The downlead portion of this aerial may be flat twin 300 ohm feeder or it may be constructed in the same way as that used in Fig. 5(b). The length is relatively unimportant. For high frequency use, it should be on the short side and made fairly long for lower frequencies—the table given earlier can be used as a guide, remembering to make the overall length equal to "a" plus "b".

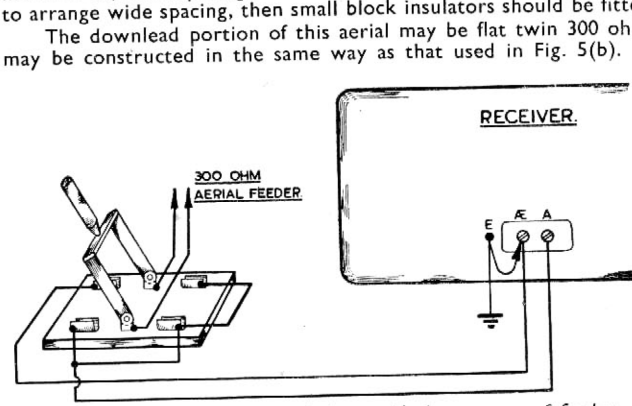

Fig. 6. Connections to switch for rapid change over of feeder wires from series to parallel.

DIRECTIONAL EFFECTS.

On the shorter wavelengths, directional effects are likely to be experienced with almost any type of aerial. Advantage can be taken of the effects when reception from a particular country or station is the aim. A long wire aerial will receive best in four major directions at acute angles to the run of the aerial. A dipole exhibits two major directional lobes, at right angles to the length of wire and the wires should therefore be erected to take advantage of this property.

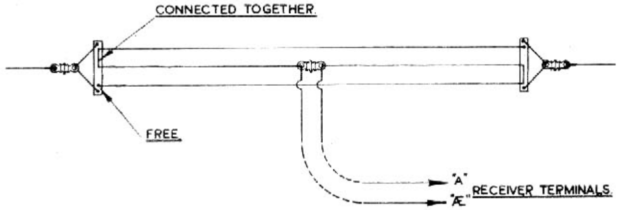

Fig. 7. Three-wire folded dipole, giving wide frequency coverage. 300 ohm feeder cable is recommended between centre insulator and receiver.

With a single wire, the greater the vertical portion of the aerial the less will be the directional effects.

The directional properties of a dipole can be reduced by running the two arms at an angle to each other, instead of in a straight line.

ALL ROUND RECEPTION.

An excellent aerial, for general purpose use, is a vertical rod or whip, illustrated in Fig. 8. It should be made as long as possible—15 feet is a good average figure and preferably erected well above surrounding objects. This type of aerial is useful in cases where space is restricted and it is not possible to put up a horizontal aerial of any length.

The vertical aerial should be mounted on insulating supports and a wire run from the base to the receiver. This wire should be kept away from walls and it will probably be necessary to provide mechanical (insulated) supports at intervals along the run.

If electrical interference is prevalent, of the type radiated off the mains wiring, it may be advisable to use screened co-axial cable for the last 10 to 20 feet of the lead-in, the inner wire being connected to the aerial proper, and the outer screen earthed at the receiver. The addition of this length of cable, whilst reducing noise, will also, to some extent, reduce the strength of signals, and it should therefore not be made any longer than necessary. Some special anti-noise aerial systems use a long length of screened feeder cable, but then matching transformers must be fitted at each end of the cable, or results will be poor. Further, in cases where the interest lies in short wave reception, these transformers must be suitable for short waves as well as for medium waves, which complicates the design.

A vertical aerial will receive signals equally well from any direction, and is usually slightly less susceptible to fading than the horizontal type of aerial.

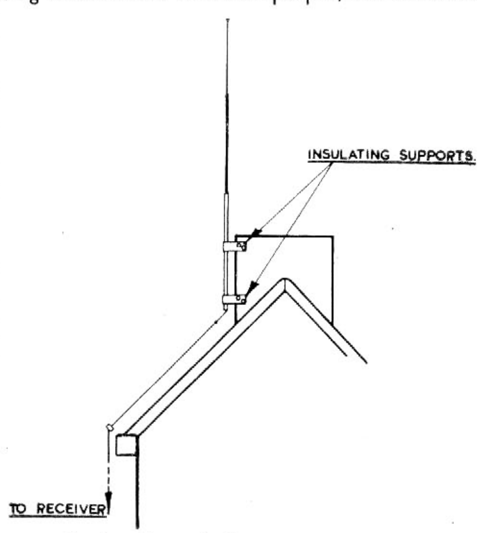

Fig. 8. Vertical whip aerial, for non-directional reception.

PROPAGATION.

Many users of Eddystone receivers will already be familiar with the propagation characteristics which affect short wave reception. Conditions are liable to vary considerably at different times of the year and sunspot activity, which is believed to peak at intervals of eleven years, also has a great influence on long distance transmission. During daylight, and especially in the summer months, the higher frequencies can generally be relied upon to produce good results. At night, signals on the higher frequencies may fade out and this will definitely be the case during the winter months, when lower frequencies must be used. The commercial broadcasting authorities take care to choose frequencies which will give reliable service according to distance involved, time of day or night, and other factors.

A booklet entitled "International World Radio Station List" is published by Bernards Ltd., The Grampians, London, W.6 (1s. 6d. plus postage), and the information it contains will be useful to owners of Eddystone Short Wave receivers. A column is provided for recording dial settings.

AERIALS ON BOARD SHIP.

Circumstances vary greatly on board ship, and the only advice generally applicable is to place the aerial as high as possible and well clear of other wires and metal objects. The insulated wire(s) forming the aerial proper must not be allowed to rub against anything—as might possibly happen in a high wind—or severe noises may mar reception.

Good results are obtainable from the usual single wire aerial, which may be partly horizontal and partly vertical, or entirely vertical. It should be well insulated, both at points of support and where it passes through a deck or partition. The longer the aerial, in general the better the results, particularly on the lower frequencies and on the medium wave broadcast band. But it will be found that excellent results are obtainable, even with quite a short aerial, on the higher frequencies.

That portion of the aerial near the deck is liable to pick up interference from nearby electrical wiring, and there is also the problem of arranging adequate insulation at the lead-in point. Both these disadvantages can be overcome by the use of a doublet type of aerial, details of which are given elsewhere. The Eddystone Cat. No. 731 Aerial is of this type, and includes aerial wire, insulators and fifty feet of special low impedance feeder, all ready for putting into use immediately, with the minimum of trouble. In some cases, fifty feet of feeder may not be enough, when the Cat. No. 731/1, with one hundred feet of feeder, will be suitable.

It should be appreciated that, by employing a longer length of feeder, it will often be possible to site the aerial proper in a better location. The longer length of feeder has practically no effect on reception. Where a surplus exists, there is no need to cut the feeder—it can be made up into a neat roll and stowed away behind the receiver.

The feeder wires are buried in insulating material, and no further insulation

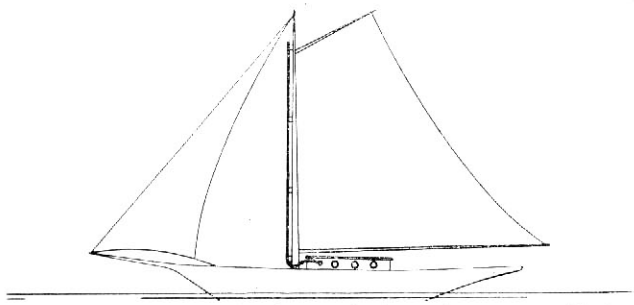

Fig. 9. A vertical wire, attached to the mast (and greatly exaggerated in the drawing) makes a good aerial on a yacht. No fouling with stay wires can occur.

is necessary at the point of lead-in. In some cases, it may be advisable to protect the feeder against friction and a wrapping of insulating tape will serve.

The effect of local electrical interference tends to cancel out in the two wires forming the feeder, with the result that noise from this source is much less than it otherwise would be.

SMALL BOATS.

By small boats is meant yachts, trawlers, cabin cruisers and similar sized vessels.

Again, it is difficult to give advice, since so much depends on individual circumstances. In the majority of cases, it will only be possible to employ a comparatively short length of wire but, because of the open surroundings and freedom from serious screening, results will still be good.

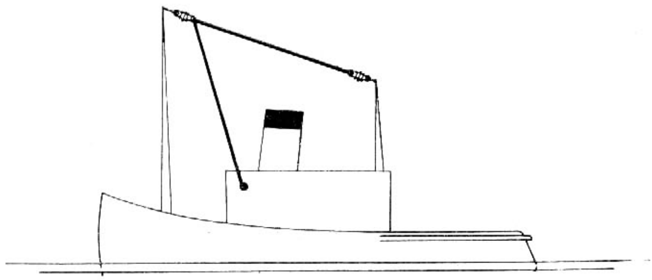

Fig. 10. A suitable aerial for use in a tug or similar vessel.

Some suggestions are made in the sketches herewith. Where a single mast exists, alternative arrangements are possible. Running a wire directly up the mast, as in Fig. 9, will prevent any possibility of fouling guy wires. It is necessary to use insulated wire and the insulation known as P.V.C. is very suitable, since it is tough and will not deteriorate quickly when exposed. For maximum efficiency, the wire should be spaced away from the mast with the aid of small porcelain stand-off insulators, but this refinement is not essential.

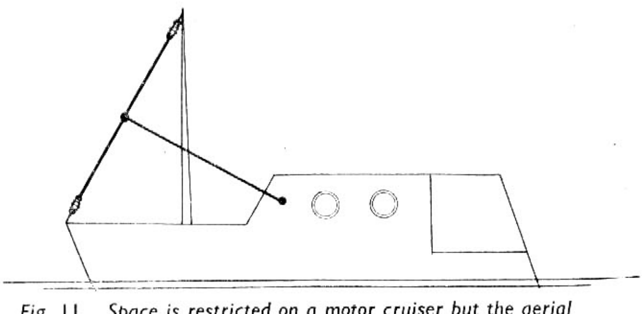

Fig. 11. Space is restricted on a motor cruiser but the aerial illustrated will give good results.

Alternatively, the insulated twin feeder cable may be employed as an aerial. The insulation is fairly robust and it will not be important if the cable touches metal or other objects. The cable should be run right up to the receiver and the two bared ends twisted together and connected to the aerial terminal (or socket). Whatever sort of wire is used, it must be fixed in a way which does not result in damage to the insulating covering.

PROTECTION FROM LIGHTNING AND STATIC DISCHARGES.

In temperate climates, only very rarely is trouble experienced with lightning, but it should be appreciated that an aerial can collect static electricity, particularly during hailstorms and thunderstorms. No ill effects are likely when a metallic path to earth exists, as will be the case with many receivers. With some, however (e.g., the Eddystone "670" marine Receiver), a condenser is interposed in the aerial circuit and the aerial proper is then highly insulated and is liable to attain an electric charge of quite a high value.

In the tropics, thunderstorms are frequent and there is a greater liability to both lightning discharges and to the collection of static electricity.

A number of devices are available which give simultaneous protection against lightning and static. One is the *Belling-Lee* type L.350, which consists of carbon blocks separated by a mica ring, the assembly being mounted in a sealed glass tube, provided with wire connections. On a larger scale is the *Ediswan* Gas Discharge Protector, two types of which exist. One will pass surges of more than 20 amperes, the second and smaller one surges up to 5 amperes.

It is important, with any form of lightning arrester, to connect one electrode to a good low resistance earth.

MAINS CONNECTIONS.

Advice regarding mains connections will be found in the handbook or folder which accompanies your receiver. It is desirable to emphasise that proper time and care should be taken over connecting your set to the mains in order that no loose connections will cause noise or any other difficulties.

The first operation is to see that the voltage adjustment panel is correctly set and, of course, this should be done before the receiver is in any way connected to the mains. The 110 volts point is for use with mains between 100 and 110 volts, and no harm will accrue should the mains be of a value below 100 volts, as may be found on board a ship. Where the mains are between 200 and 250 volts the voltage adjustment plug should be inserted in whichever socket is marked with the value nearest to the actual mains voltage. It is very important, before connecting an A.C. mains operated receiver to the supply, to ensure that the latter is definitely A.C. and not D.C. Should it be D.C. no dial light will show and the receiver may be seriously damaged.

With an A.C. set, it is immaterial which way round the mains plug is inserted. With an AC/DC set, however, it may be found that a rough sort of hum occurs in one position, in which case, it is only necessary to reverse the mains plug when, in practically every case, the hum will disappear and reproduction will be entirely normal. Also, when connecting an AC/DC or DC set to D.C. mains, the dial light may glow but no sound will be heard. In this case, again, the mains plug must be reversed so that the correct polarity is applied to the receiver.

CARE OF BATTERIES.

It should be appreciated that the excellence of the performance of a battery operated receiver depends to a large extent on the state of the batteries used with it. It pays in the long run to give these batteries proper attention, both from the point of view of obtaining long life and of securing the best possible performance from your receiver.

The modern lead acid cell can be purchased in several forms. When the container is of glass or celluloid, the plates are visible and one can see at a glance by their colour the condition of the cells. When well charged, the positive plate should be a rich chocolate colour and the negative plate a light grey colour. When the grey becomes dark and when the chocolate colour becomes a lighter shade of brown it is an indication that the time has come to recharge the cell.

Other cells are constructed in bakelite cases and it is then not so easy to determine the actual state by immediate inspection. A small volt meter is always a handy thing to have by one, as it is a fairly reliable indication of the state of the accumulator. Normally, a reading of between 5.9 and 6.2 volts on load should be obtained, but as soon as it drops below 5.9, the accumulator should be charged.

A reliable method of judging the state of the accumulator is to use what is known as a Hydrometer, available in various sizes. With this instrument a sample is taken of the acid inside one of the cells, and providing a reading of

1.15 is obtained, or greater, everything is in order, but should the value be below this, then charging is necessary. A fully charged cell will normally show a specific gravity of approximately 1.25.

There are two important points to watch to ensure maximum life from the battery. One is that the level of the acid is maintained to the maker's mark, where visible, but in any case, always above the top edge of the interior plates. The second point is not to allow the accumulator to become discharged to any great degree or to leave it in a discharged condition for any length of time. As soon as you become aware that charging is necessary, steps should be taken to put the battery on charge as quickly as possible.

Eddystone battery receivers are provided with a length of cable adequate for all normal requirements. Should, however, in exceptional cases, an additional length of cable be found necessary, this cable should be of heavy gauge wire to minimise voltage drop.

The top of the accumulator should be kept clean, the terminals well greased with ordinary vaseline, and the filter-vent kept screwed down tight except when the accumulator is being charged. It is important to loosen these vents whilst the cell is being charged to allow the escape of gas formed during the charging process.

Normally, when the level of acid drops, it will only be necessary to add distilled water. Care is required during this operation to prevent the spillage of any acid, as it will have a deleterious effect on any material with which it comes into contact.

From time to time, it is advisable to wash out the cells of the accumulator in order to remove the deposit at the bottom. This, if allowed to increase, might result in a partial short circuit of the cell. A sign of this is that the accumulator will not hold its charge properly, or that one cell always shows a much lower voltage than the others.

This washing out process is best entrusted to someone used to the job, such as a garage or wireless service station. Before emptying the cells they should be in a fully charged condition, and when filling with new acid, the specific gravity of the latter should be approximately 1.25.

An accumulator should always be kept in as cool a place as possible, and not exposed to direct sunlight, which is likely to have a bad effect on the chemicals inside the cells.

LOUDSPEAKERS AND TELEPHONES.

Because compactness is desirable, a loudspeaker is fitted internally in some Eddystone receivers, but in others, the individual is free to choose a speaker to suit personal requirements.

An output transformer is fitted as standard in Eddystone receivers of all types—communications and broadcast. The secondary winding is brought out to terminals or sockets, and a loud-speaker, connected to the latter, should have an impedance of between 2 and 3 ohms. No matching transformer is required with an external loudspeaker.

The Eddystone speaker illustrated here is 7ins. overall diameter and takes the form of a diecast aluminium housing, fitted with a 5ins. speaker unit and also a special acoustic baffle. Three colours are available—black (Cat. No. 688), brown (Cat. No. 697) and grey (Cat. No. 698), with highly polished chromium plated feet.

This speaker is recommended for use with an Eddystone receiver (communications or broadcast)

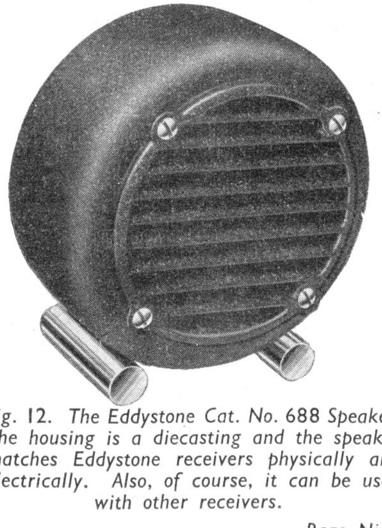

Fig. 12. The Eddystone Cat. No. 688 Speaker. The housing is a diecasting and the speaker matches Eddystone receivers physically and electrically. Also, of course, it can be used with other receivers.

which it will match by correct choice of colour physically and electrically.

When it is desired to use an extension speaker, this should be connected to the terminals on the receiver, either in place of the local speaker or, when simultaneous operation is required, in parallel with it. In the latter case, there may be a slight mismatch, but it will have negligible effect.

An important point is the length of wire necessary to connect the extension speaker to the receiver. Where the run is short, ordinary insulated bell wire is suitable, but it is desirable to use a heavier gauge of wire for a longish run, to prevent an unduly high proportion of the audio power being wasted in the wiring, with a consequent reduction of volume in the extension speaker.

Eddystone communications receivers are fitted with jacks for the insertion of a telephone plug. The telephones should be of the high impedance type, having a resistance of 2000 or 4000 ohms. A number of good makes are available. Crystal telephones are also suitable.

Sometimes, the listener may have on hand low impedance telephones, having a resistance of about 120 ohms, or moving coil telephones (about 50 ohms). In such cases, the better procedure is to connect them to the loudspeaker output terminals. This advice may seem to conflict with that previously given about using a speaker of 3 ohms impedance, but this is not actually the case. Power is required to work a loudspeaker, and matching conditions are important. Telephones take very little power, but require an adequate voltage and this is provided at the loudspeaker terminals, for telephones of the low impedance type.

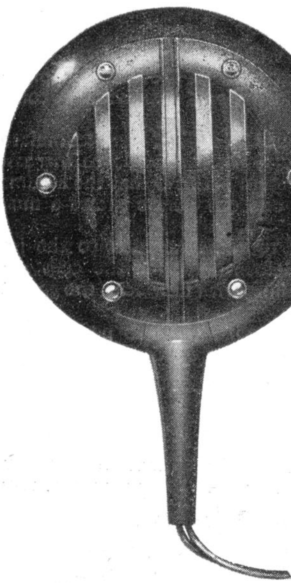

Fig. 13. The Pillow Speaker—very useful for individual use, when it is desired not to disturb others (Eddystone Cat. No. D1419).

The special Pillow Speaker, illustrated here, also takes very little power and its requirements are similar to those of telephones. This speaker is popular on board ship. When slipped under a pillow, speech and music can be heard with extraordinary clarity by a resting person, but are not audible to other occupants of the room, and sleeping personnel will not be disturbed.

The Pillow Speaker is of the high impedance type—it is in fact similar in characteristics to crystal telephones. It is normally supplied complete with matching transformer, for direct connection to the loudspeaker output terminals (or sockets).

ELECTRICAL INTERFERENCE.

Any electrical equipment which incorporates make-and-break contacts (of which a commutator in an electric motor is one variation) is liable to create interference, audible in a wireless receiver. This interference is carried along the mains and so possibly carried into a receiver *via* the mains lead. It is also radiated off the mains wiring, in the same way as radio signals, and is then liable to be picked up by the aerial attached to the receiver.

The interference is due to the sparking which occurs, and the heavier the sparking, the greater the noise and the more difficult it becomes to prevent it spoiling radio reception.

Many modern appliances are fitted with electric motors—fans, refrigerators and vacuum cleaners, for example—and these are a common source of interference. Other electrical devices, such as bells, razors and thermostats—the latter usually form part of water-heaters, electric blankets and refrigerators—also give rise to intermittent noises.

Experience is necessary to diagnose the type of electrical equipment producing noise in wireless receivers, and often considerable patience is necessary when tracking it down. Listeners in the United Kingdom, whether they use communication or broadcast receivers, should obtain the appropriate form from the Post Office and send in details, when the matter will receive the attention of the Post Office engineers, who have been trained in the location and prevention of interference, and who are properly equipped to carry out the work.

It is probable that the same procedure is available to overseas listeners—in any case, it is worth while making enquiries before tackling the work oneself.

The general advice which follows is provided mainly for the benefit of those using short wave broadcast receivers on board ship, but it is also applicable to others. It is necessary to emphasise two points—great care should be taken when carrying out tests, since even 110 volt mains can cause a nasty shock under some conditions, and secondly, only very reliable components should be used for reducing or preventing the interference.

It should be noted that any electrical noise heard may be emanating from a comparatively weak near-by source, or from a machine at a distance but producing severe interference. Further, the sensitivity of the receiver comes into the picture. Maybe noise is weak or inaudible on a domestic type of receiver, but becomes serious on a set possessing high sensitivity, as is the case with Eddystone receivers, particularly communications models.

Another point to bear in mind is that the interference created by a machine is likely to vary over the frequency range used for radio communication and although, after fitting a suppressor, the interference disappears over one particular range on a receiver, it may appear again at other frequencies. It may happen that some equipment in use has already been fitted with suppressors by the manufacturers—for instance, a rotary converter, as frequently employed for transforming D.C. to A.C. or *vice versa*—but often such suppressors are designed for cutting out interference on medium frequencies (that is, the medium wave broadcast band) and they may not be fully effective at the high frequences used for long distance short wave broadcast transmissions.

There are two ways of tackling the problem: (a) to endeavour to eliminate the interference at the source, and (b) to prevent it entering the radio receiver. It is more satisfactory, and, in the long run, more economical, to suppress the interference at the source, since, in a bad case, the noise may be affecting reception over a comparatively wide area. On board ship, efforts to cure the trouble at the source will probably meet with considerable support, since both the ship's communications installation and receivers used for broadcast reception will benefit.

When the offending machine or apparatus has been located, the first thing to do is to check its condition. All connections should be examined for tightness and, where a metal frame exists, a test should be made to ensure that it is properly earthed. Quite likely the equipment has been in use for a long time, and renovation may be required. If a motor, perhaps the brushes are badly worn or the commutator may be rough, causing severe sparking and

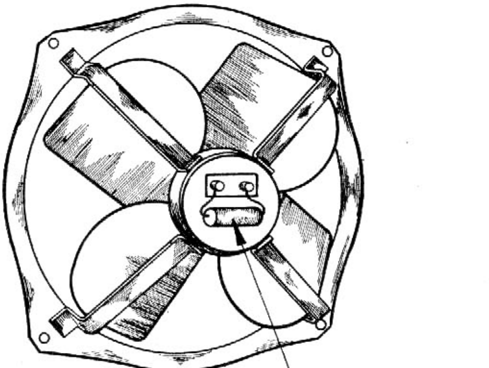

Fig. 14. Showing how a fixed condenser is connected across the terminals of a fan, for suppressing interference.

calling for renewals. If other equipment, the contacts may be worn or dirty.

If the machine is found to be in good condition but still producing interference, it becomes necessary to fit a suppressor, either across the terminals of the offending unit, or in series with them, depending on the type of suppressor employed. The simplest takes the form of a single condenser, connected as shown in Fig. 14. It is difficult to specify a definite value of capacity, since what may be correct in one instance may not be entirely suitable in another. An average value is 0.1 uF but other capacities between 0.01 and 0.5 uF should be tried, if possible. Where the interference occurs on short waves, the addition of mica condensers, having values between .0005uF and .005uF may improve matters.

The alternative arrangement, illustrated in Fig. 15 and using two condensers in series, with the centre earthed, usually proves very effective, provided the earth lead can be made short.

Whilst a common type of electric fan is indicated, the same principle (of connecting condensers) can be applied to other electrical equipment, of larger or smaller size.

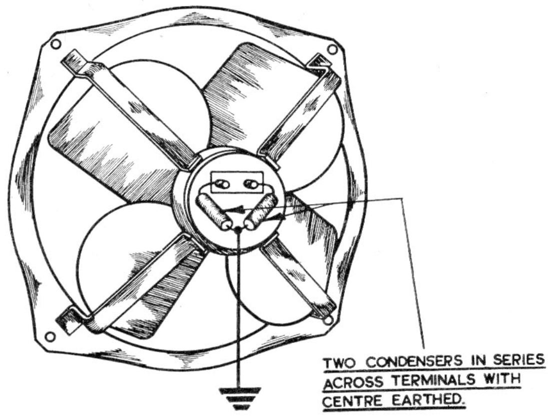

Fig. 15. An improved way of suppressing interference—two condensers in series with the centre earthed.

The voltage rating of the condenser is important. It should be not less than 500 volts D.C. working, under any circumstances, and if the mains are 200/250 volts A.C. the condenser should be rated at not less than 600 volts A.C. working.

More elaborate suppressor units are available for cases where the interference is severe and not completely amenable to the relatively simple methods outlined above. These units are larger, and incorporate various combinations of condensers and chokes. Where large machines are concerned, the current rating becomes an important factor, and since some disturbance of the mains wiring is called for, it is recommended that the services of a skilled electrical or radio engineer be utilized, in such cases.

For preventing mains-borne interference entering a receiver *via* the connecting lead, the specially developed Eddystone Mains Filter Unit (Cat. No. 732) will be found of value. It is efficient and reliable, and can be fitted between the plug on the receiver lead, and the mains socket, without special tools or expert knowledge. This Filter Unit is suitable for use with any Eddystone receiver, or, as far as that goes, with any receiver the line current of which is not greater than 0.5 amperes. It can be used with mains of voltages up to 250, either A.C. or D.C.

Fig. 16. The Eddystone Cat. No. 732 Filter Unit—useful for placing between the mains and a receiver which suffers from local electrical interference.

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