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## The New Gecophone

Fig. 1.—The New Gecophone, automatic wall telephone.

*During the past thirty years, the G.E.C. Gecophone has given efficient and reliable service to subscribers throughout the world. Inevitably in that period, new materials and components have been developed and the tastes and ideas of people have changed. All these factors have been taken into account in the development of the New Gecophone.*

*The basic performance of the new telephone is similar to that of the "G.E.C. 1000" Telephone, described in detail in "G.E.C. Telecommunications" No. 22, but an automatic line regulator can be added to equalise the effect of variation in the lengths of local lines. The same basic instrument can be used either as a table telephone or as a wall telephone. To meet the varying requirements of different decorative schemes the New Gecophone is available in a range of seven colours, illustrated in the frontispiece. The new telephone is designed specifically for Overseas Administrations and all components are suitable for reliable service under widely varying climatic conditions.*

### Case

The New Gecophone is an attractive addition to the Company's range of telephone instruments, both for its pleasing new shape and for the wide range of colours that enable it to blend with its surroundings, whether in kitchen or in bedroom, workshop or office. The case and handset have the advantage of being moulded from a thermoplastic material that has a high durability and improved colour fastness over the thermosetting material previously used. The number ring clips on to the case around the dial, the dial itself being mounted on the base of the telephone.

The case is fastened to the base by placing it over two lips at the front of the instrument and securing two screws that pass through the cradle of the telephone near to the plungers. In this way the case can be removed to give access to the components, when necessary, without having to invert the telephone. The securing screws fasten into a main bracket within the telephone.

A plate is fitted across the cradle to give a means of easily lifting and carrying the telephone using only one hand (Fig. 2). This is secured by the same screws that hold the case, and any strains imposed by lifting the instrument are carried by the main bracket and not by



Fig. 2.—Lifting plate on table telephone.



Fig. 3.—Handset rest on wall telephone.

the case. In front of the cradle, a small rectangular hole is cut in the case to take a pushbutton, when required. When a pushbutton is not required, the hole is closed by a moulded dummy, which is slotted to assist ventilation.

To meet the growing demand for a wider range of colours, the New Gecophone can be supplied in seven colours :—

- |                 |              |
|-----------------|--------------|
| Two-tone grey.  | Lacquer Red. |
| Two-tone green. | Light Ivory. |
| Topaz Yellow.   | Black.       |
| Concord Blue.   |              |

In the two-tone instruments, the handset and number ring are a darker shade than the case (see Fig. 1 and the frontispiece).

A further advantage of the thermoplastic case is that it is lighter than the thermosetting type. This, combined with the lightweight handset and the reduced weight of many of the components, provides a telephone that is considerably lighter than previous models.

### Handset

The rectangular handle harmonises well with the remainder of the telephone shape, and the curvature of the handset ensures that the transmitter is in its most sensitive position when the receiver is held normally to the ear. The transmitter unit is the immersed-electrode carbon-granule type that was so effective in the former Gecophone.



Fig. 4.—New Gecophone handset.

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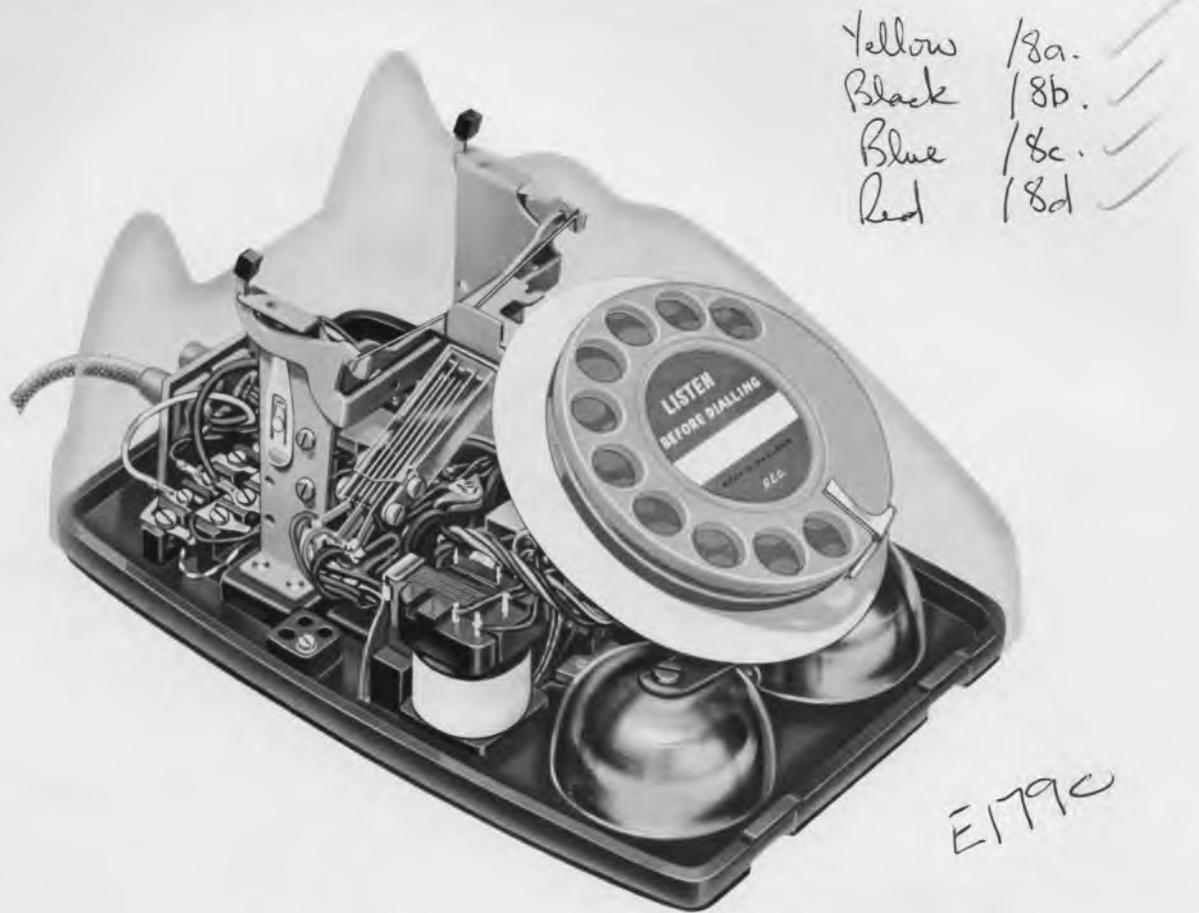


Fig. 5.—Internal view of New Gecophone.

The receiver, however, is of the new rocking armature type. In this, the armature, rocking on a central support, drives the light alloy diaphragm via a small rod. The use of the light alloy gives a large increase in the ratio of effective area to effective mass compared with the ratio for the former flat plate diaphragms of magnetic material. The magnetic and mechanical parameters of the receiver unit are critically proportioned to produce the correct mass to compliance ratio and mechanical impedance to suit an ear-damped unit.

The high efficiency of the receiver is obtained by the use of a very small air gap, a high permeability magnetic system, and a high stiffness-to-mass ratio. The small central magnet is anisotropic and works on a recoil loop on its demagnetisation curve.

The overall reduction in weight is particularly noticeable, the complete handset weighing 9½oz. This is only a little over half the weight of the handset used on the former Gecophone. As a result of this reduction

in weight and the improved shape of the handset, the new instrument is particularly easy to operate and comfortable to use.

### Cradle Switch

An entirely new type of cradle switch has been developed (Fig. 6). The main disadvantage of previous designs has been that the plungers on which the handset rests slide in bores inside the case and in very dusty atmospheres trouble has been encountered due to these plungers sticking. With the new lightweight handset this tendency would have increased.

In the New Gecophone, however, the plungers are formed on two arms of a pivotal bracket, and protrude through the holes in the telephone case without touching the sides. Thus, there is no friction apart from the contact between the pivotal bracket and the main fixed bracket on which it pivots, and the whole weight of the handset is usefully employed in operating the springset.

The fixed bracket is fastened to the base plate and has two tapped holes in the top surface to which the case is fastened by its securing screws. When the case is removed, the plungers can be locked in the "handset-on" position by depressing the bottom end of a small spring clip (Fig. 7). Should the case be replaced and the plungers inadvertently left in this position, the spring clip is released by simply pressing down on the plungers, either by hand or by replacing the handset.

The springset itself is of a new design. Each spring has twin contacts as previously, but now each contact is fixed on a longer limb. Thus, the same reliability is obtained as with the normal twin contact springs, while giving greater operational flexibility. The springsets are fitted with a transparent cover to protect them against dust and damage.

**Dial**

While the dial retains the well-known G.E.C. trigger action, it incorporates new features. The case is now of moulded plastic, and hence the dial is also lighter than the previous metal-body pattern. The finger plate is also of plastic, and is the same colour as the main case of the telephone. A plastic dust cover is fitted to the back of the dial to protect the mechanism and springsets.

The dial operates at a speed of ten impulses per second, and has a break-to-make ratio of 2 : 1. Dials having other ratios can be fitted if required. In telephones for connexion to a C.B. manual exchange the dial is replaced by a dial dummy. The telephones are simply converted for automatic working by replacing the dial dummy by a dial, connecting the dial to the telephone circuit by connexions already included in the wiring (no additional dial cord is required), and fitting a number ring to the case.

This number ring is fitted completely independent of the dial. The larger number ring means that the figures are easier to see and the likelihood of a subscriber dialling an incorrect number is reduced.

The dial itself is mounted on the main internal bracket of the telephone, so that the case can be removed without affecting any components. There is also no risk of the dial wires being trapped in a vulnerable part of the dial when the telephone is re-assembled.

**Ringer**

The performance of the ringer is similar to that used in previous telephones. It has a resistance of 1000 ohms, an impedance of 17 000 ohms at 1000c/s, and responds to alternating ringing current from hand or automatic



Fig. 6.—Cradle switch.



Fig. 7.—Cradle switch held operated by spring clip.

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ringing machines the optimum response being to a frequency of 25c/s. Coils of higher impedance for use on multi-party lines are fitted when required.

This modern design contains striking new features, including a lightweight moulded ceramic magnet, which replaces the former cobalt steel magnet. The ceramic magnet has greater coercivity than the former type, and the new ringer is easier to adjust. The bell gongs are a slightly different shape to fit the new shape of the telephone case, but so adjusted as to give the same loudness of ringing.

An additional feature that can be provided when requested is a volume control for the ringer. This allows the telephone user to adjust the volume of sound from the bell to suit the location in which the telephone is to operate, *e.g.* the bell in a telephone on an office desk need not be so loud as that in a noisy workshop, while in the home it may be desirable to have the bell loud during the day but toned down in the evening.

### Automatic Regulator

When required, an automatic volume regulator can be fitted in the New Gecophone. This may be required principally on short lines since the sensitivity of the instrument is such that normal speech can be reproduced at a level of loudness that may be uncomfortable to the ear, unless there is some line attenuation. The regulator can be supplied separately and is easily fitted to the telephone on site, when necessary.

### Cords

The new instrument cord is thinner, lighter and more flexible than previous cords. The conductors are insulated with P.V.C. covered by nylon overall braid, materials which are well proven to give long life, and pleasing appearance. When specified, a plastic coiled (extensible) cord can be fitted instead of the normal textile covered straight cord. Grommets hold the cords at the entrances to the telephone and the handset, thus preventing any strain on the actual connexions due to pulling of the cords.

### Tropicalisation

All the components and wiring used in the New Gecophone are suitable for service under the varying climatic conditions experienced throughout the world. The sound apertures in the base under the bell gongs are covered by a fine-mesh gauze to prevent the ingress of dust and insects, while this, together with the space surrounding the plungers and the slots in the push-



Fig. 8.—Automatic regulator unit.

button dummy provides adequate ventilation. A plastic foam strip is fastened round the base to give a dust proof seal between the base and the case when the telephone is assembled.

### Performance

The performance of the New Gecophone is similar to that of the "G.E.C. 1000" Telephone described in "G.E.C. Telecommunications" No. 22. This means that the new telephone will operate over a local line loop of 1120 ohms of 6½lb cable (0.5mm conductor) with a performance equal to that of the Gecophone (or other previous telephones) operating over a local line loop of 660 ohms, *i.e.*, local lines may be extended by 70%. Alternatively, the New Gecophone will operate over a length of 4lb cable (0.4mm) with a performance equal to that of the Gecophone operating over the same length of 10lb (0.6mm) cable.

### Circuit

The circuit employed in the New Gecophone is essentially the same as that designed for the "G.E.C. 1000" Telephone. When the "G.E.C. 1000" Telephone was first introduced into service, a few users, particularly on short lines, found that the greatly increased efficiency raised the volume of received speech to an uncomfortable level. Accordingly, subsequent telephones were produced having a 300 ohm shunt connected across the transmitter and part of the induction coil. This provided a considerable improvement in the sidetone performance of the instrument while introducing only a slight loss in transmission (less than 1db for sending and 2db for receiving), and has been retained

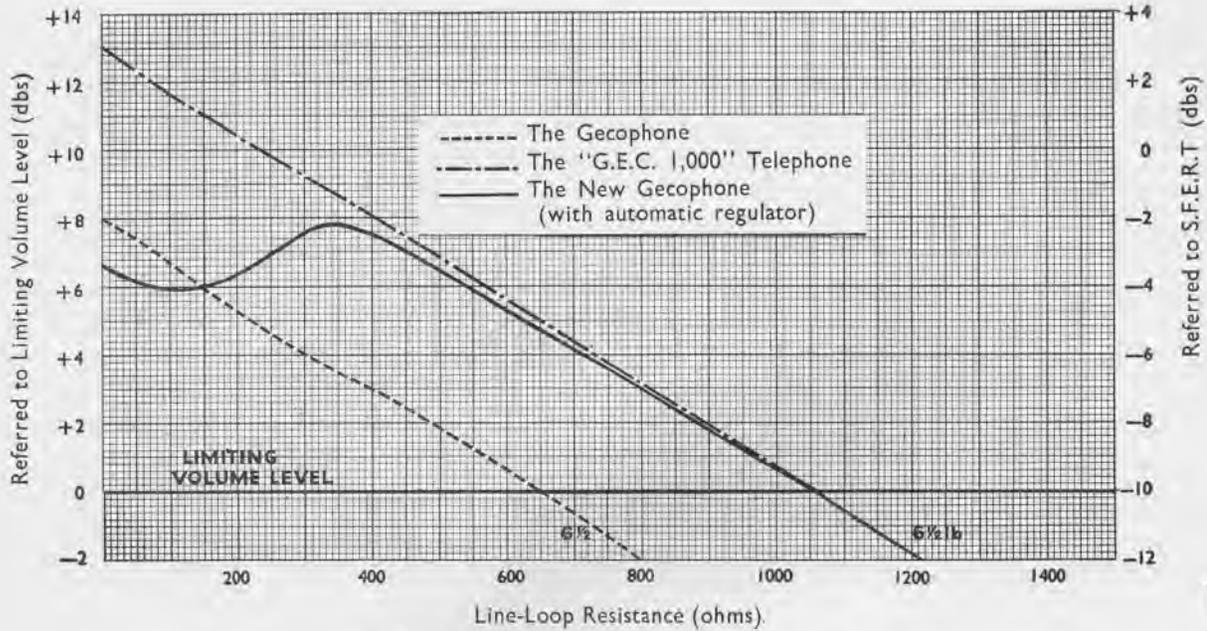


Fig. 9.—Volume ratings for New Gecophone—sending.

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in the New Gecophone (previous G.E.C. telephones were fitted with a similar shunt across the transmitter only.)

When required an automatic volume regulator can be fitted. This regulator attenuates the send and receive speech according to the d.c. current in the line, *i.e.*, according to the length of the line. The circuit diagram

of the New Gecophone including the automatic regulator is shown in Fig. 11.

The attenuation is applied to the send and receive paths by means of rectifier shunts across the transmitter and receiver, respectively. These rectifiers are biased either open or closed by the potential difference across a resistance in series with the line. Thus, the shorter

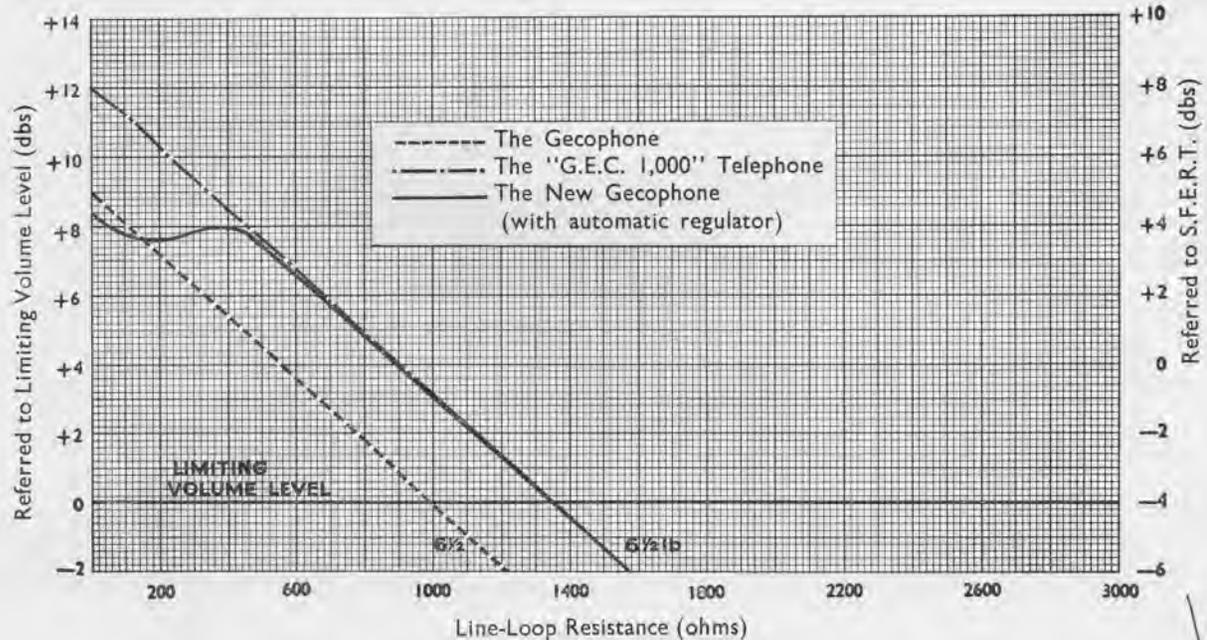
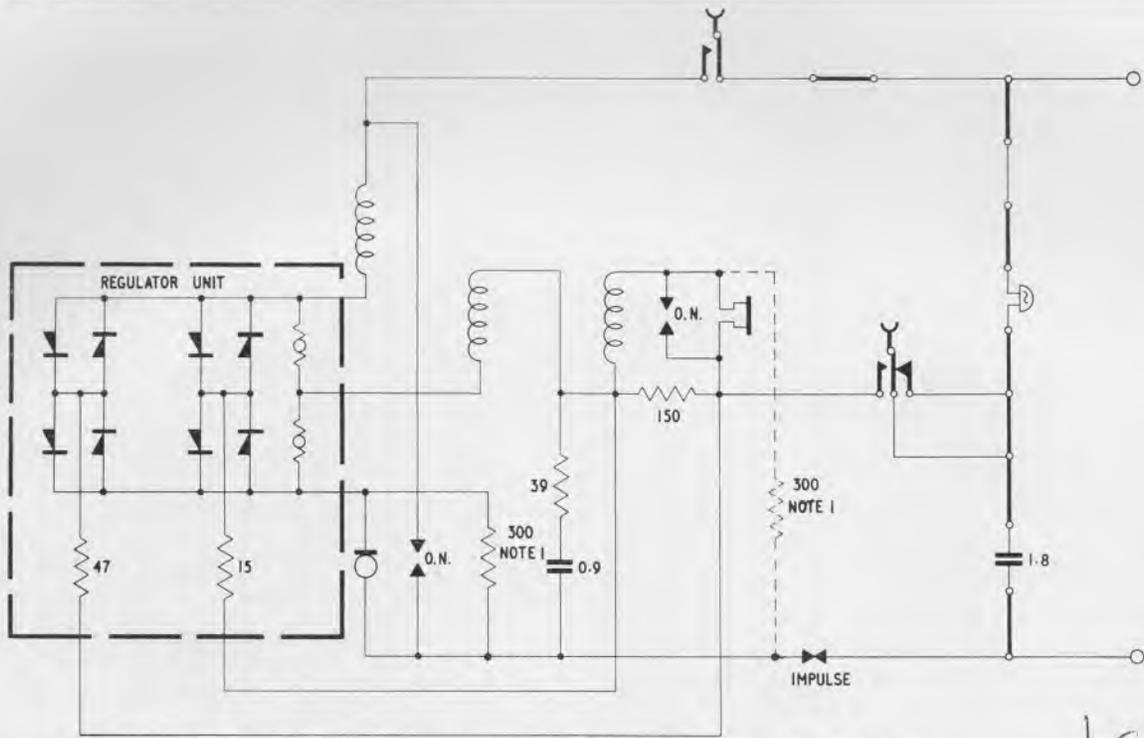


Fig. 10.—Volume ratings for New Gecophone—receiving.

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NOTE 1: WHEN THE AUTOMATIC REGULATOR UNIT IS NOT FITTED, THE 300 OHM SHUNT RESISTOR IS CONNECTED AS SHOWN BY THE DOTTED LINE

Fig. 11.—Circuit for New Gecophone, including regulator.

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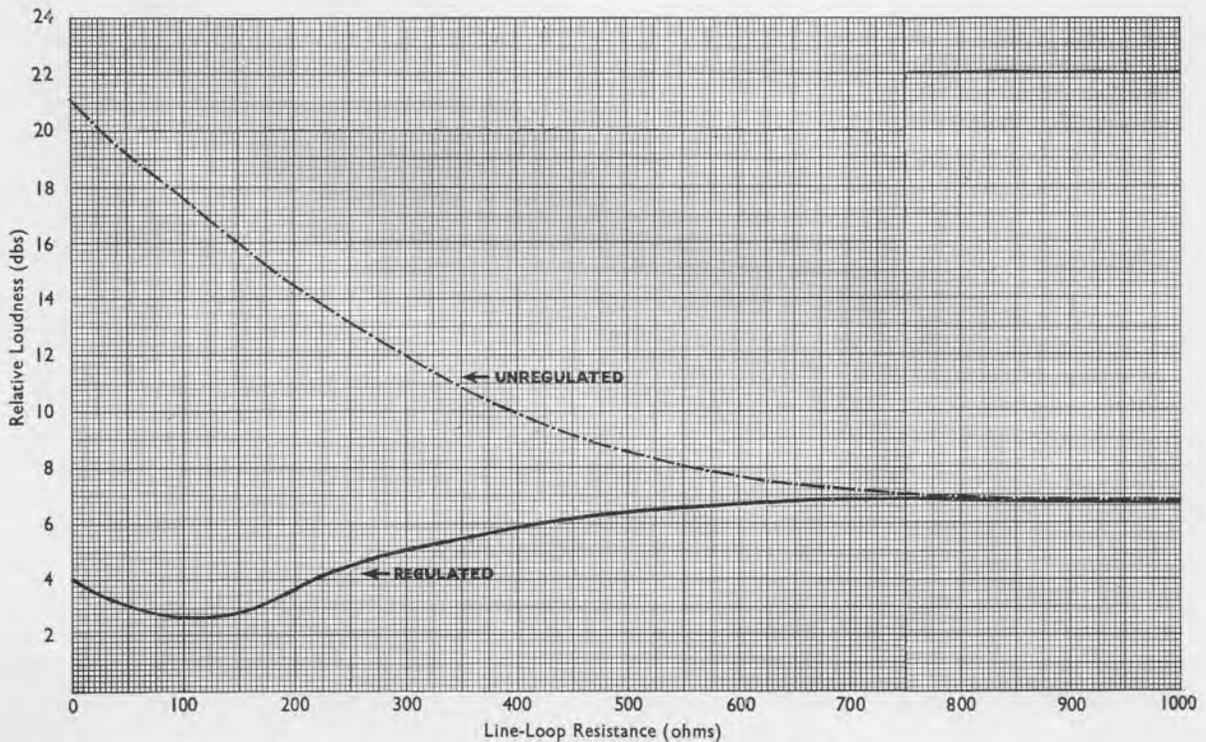


Fig. 12.—Sidetone levels for New Gecophone—regulated and unregulated.

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Fig. 13. The New Gecophone, Automatic table telephone.

the line, the higher the current and hence the higher the potential difference across the resistor biasing the rectifiers. Similarly, on long lines there will be only a small voltage drop across the resistor and the rectifiers will have high resistance, and so the amount of energy absorbed from the signal will be negligible.

In practice, the resistor used is a double filament lamp to provide greater variation in resistance with length of line. The double filament gives balanced biasing to both the receive and sending paths. The characteristic of the lamp is such that the lower the current flowing the lower is the resistance. Thus, on long lines the resistance, and hence the transmission loss, is low, while on short lines the rectifier biasing voltage is high.

The effect of the regulator on the performance is shown in Figs. 9 and 10, where it is seen that the attenuation on zero lines is 6db for sending and 4db for receiving, while on lines longer than 400 ohms the loss introduced is negligible. The curves depict the performance of the telephones without a 300 ohm shunt.

### Sidetone

The level of sidetone for the unregulated New Gecophone is rather high on very short lines due to the increased output. However, the regulator reduces the sidetone to a level that is always less (by at least 2db) than the level found experimentally to be objectionable. The comparative sidetone performance is shown in Fig. 12.

### Additional Features

Several additional features are available on the new telephone when required. Some of these have been mentioned above in the appropriate section, *e.g.* the ringer volume control, while others include a shared service adaptor, dial lock switch and local-battery adaptor.



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### Shared Service Adaptor

This can be simply fastened to the main bracket in the telephone to make it suitable for automatic separate-metering shared-service lines. The rectangular push-button is conveniently positioned in front of the cradle when the instrument is assembled, the pushbutton dummy being removed from the case. The switch-hook springset has an additional pair of springs to disconnect the earthed ringer when the handset is removed.

### Dial Lock Switch

The dial lock switch is fitted in front of the dial and is accessible through a hole in the front of the case to insert the key. When the key is removed, the dial is inoperative except for digits "9" and "0", thus preventing the unauthorized use of the telephone, but allowing it to be used for emergency calls, if necessary. Incoming calls are not affected.

### Local Battery Adaptor

An adaptor may be added to the normal C.B. telephone to convert it into a local-battery telephone. This means that the new telephone can be supplied to local-battery subscribers and converted to C.B. or automatic working, when required, by removing the adaptor.