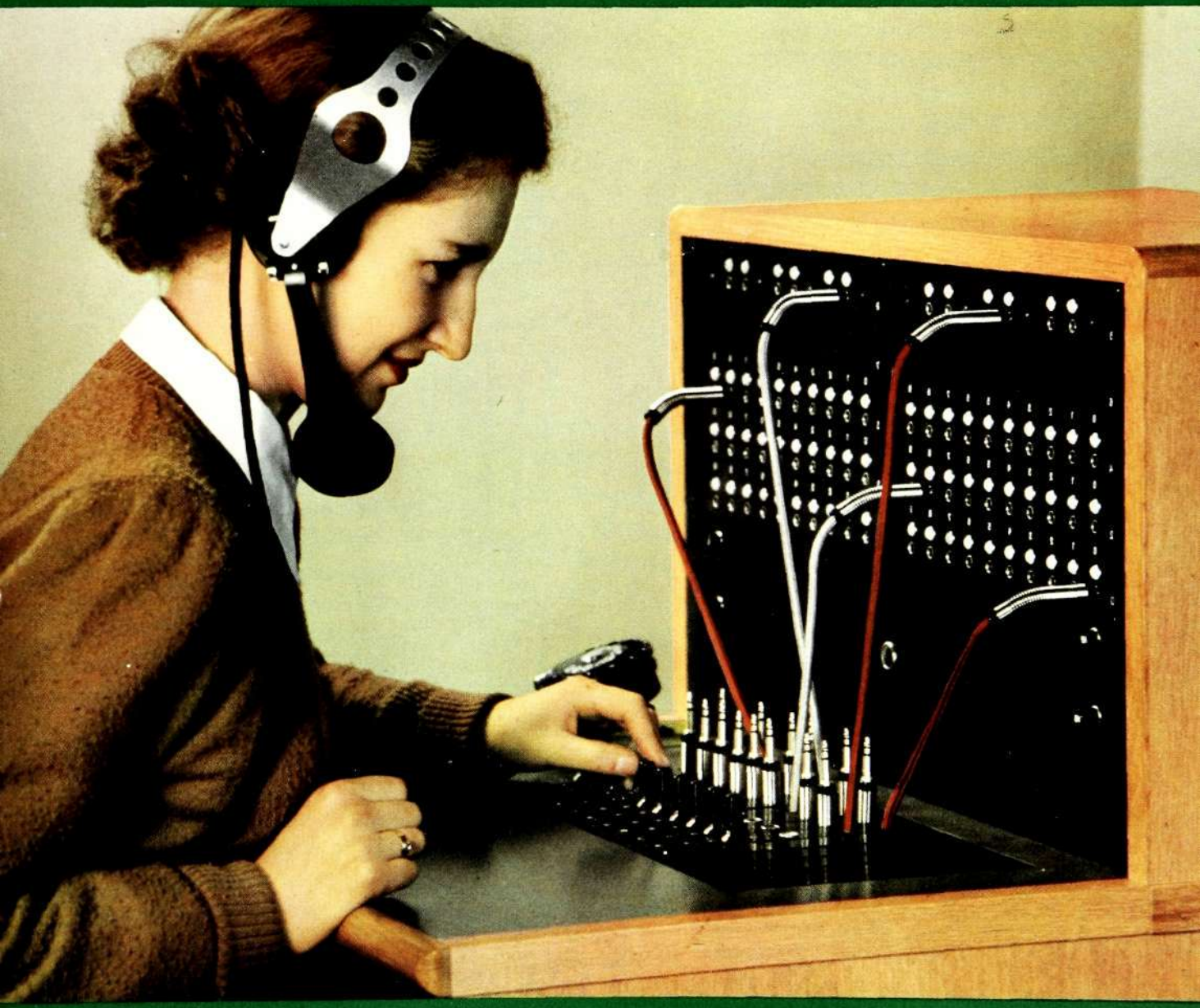
Ericsson Review

No 2
1950



ERICSSON REVIEW

Responsible Publisher: HEMMING JOHANSSON
Editor: SIGVARD EKLUND, DHS
Editor's Office: Stockholm 32
Subscriptions: one year $ 1.50; one copy $ 0.50

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Printed in Sweden, Esselte AB, Stockholm 1950

Manual Private Branch Switchboards with Cords

ERIK I ENGQVIST, TELEFONAKTIEBOLAGET LM ERICSSON, STOCKHOLM

U.D.C. 621.395.23

Manual switchboards of all sizes, and particularly boards requiring one operator only, are still in great demand among L M Ericsson's customers. The development, previously made on the L M Ericsson LB-switchboards and described earlier in Ericsson Review No. 3, 1946, has, therefore, quite naturally, been extended to CB-boards. This development is now, in the main, completed and has with regard to private branch switchboards resulted in a range of cord switchboards, which seem to cover all reasonable requirements as regards appearance and performance of a modern manual switchboard.

The new range of the L M Ericsson manual private branch switchboards covers the following types:

Wall switchboard for a maximum of 40 extensions and 6 exchange lines;
Floor switchboard for a maximum of 80 extensions and 12 exchange lines;
Floor switchboard for a maximum of 180 extensions and 12 exchange lines.

The new range of switchboards has been developed on the same fundamental principles as those applied to the L M Ericsson new LB-boards. The frame work is exactly the same. The calling and connecting equipment for the lines are collected in units for 10 lines. Each cord circuit is assembled to a convenient switching set. The common equipment has been combined to a position set. The relay equipment for the exchange lines is fitted in a separate frame outside the switchboard. The units are in other respects designed in such a way that a complete switchboard may easily be built up from the units, which for this reason in many cases have been provided with plug and jack connections.

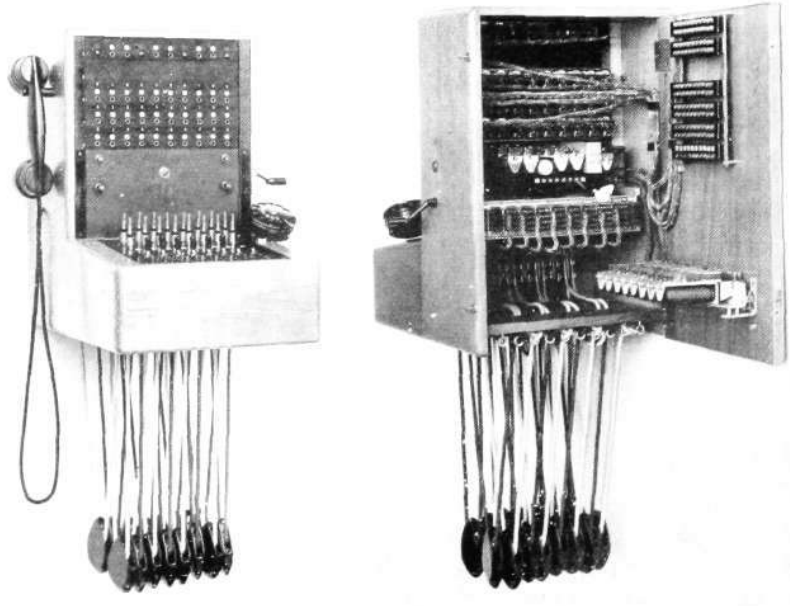


Fig. 1 X 6499

Wall switchboard ADE 1205

for 30 extensions, 6 exchange lines and 8 cord circuits. (right) Opened from base.

Fig. 2 X 4669
Wall switchboard ADE 1205
on floor stand

The following circuit features may be mentioned:

1. All signalling takes place by means of lamps, and extension lines are, therefore, provided with line relays operating even with comparatively high line resistance.
2. The cord circuit is similar to that used on the LME older switchboards with the exception that the key has been provided with a ringing position.
3. The switchboards are wired in such a way that they may be connected to a manual or automatic exchange immaterial of what type. By a minor alteration in the wiring of the relay set for the exchange line, connection may be made to an LB-exchange.
4. Automatic holding of the exchange lines is obtained for incoming exchange calls, enabling inquiry and transfer connections to be performed for such calls.
5. Night connection may be carried out with ordinary cords, irrevelant circuits being made ineffective by means of special keys.
6. The extension instruments are fed from the switchboard battery even for exchange calls, improving transmission in case of high line resistances.

The Wall Switchboard

The smallest type of switchboard, Fig. 1, is normally made for wall mounting. The capacity of this board is 40 + 6 lines (the first figure indicating number of extensions and the second figure number of exchange lines) and 10 cord circuits. The wood work is in light oak with resin glued joints, all corners and edges being rounded. Certain parts inside the board are made in beech wood.

The front side consists of a vertical panel for the line unites and the position set and a projecting, slightly inclined panel for the switching sets and the dial. The receiver has as usual been provided with a hook on the left hand side of the board, and the generator has been placed on the right hand side. The rear consists of a lid on strong hinges and reinforced to take up the strain caused, when the board is mounted on a wall. The lid is fitted with the connection strips required for the incoming lines and below these a row of cord circuit relays.

In some cases wall mounting may be difficult to arrange or not convenient for other reasons. Convenient wall space may, for instance, not be available, en-

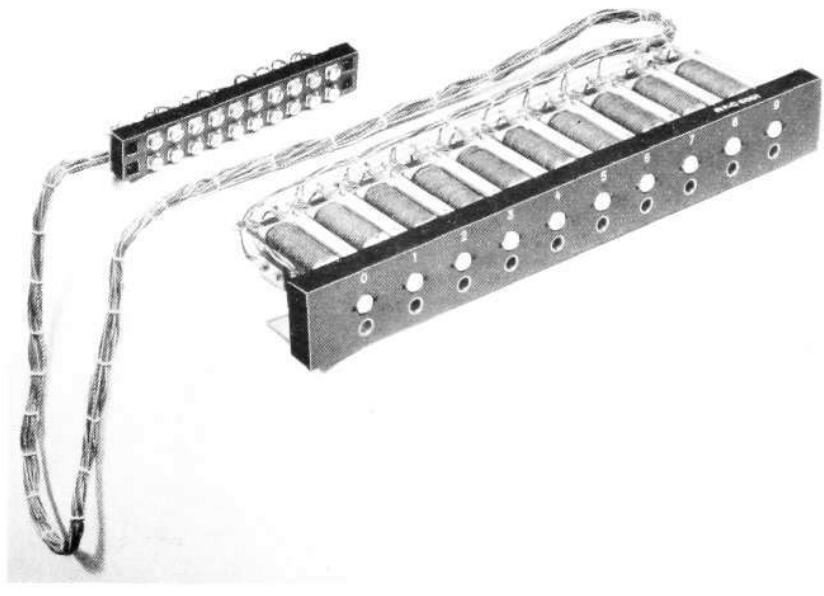


Fig. 3 X 6490
Line unit for ADE 12

vironment may be unsuitable for wall mounting or the operator may have other duties to perform requiring a certain position for the switchboard. In such cases a fixed or movable mounting on the floor may be preferable. For this purpose a special floor stand has been designed. Fig. 2 illustrates the smallest switchboard mounted on such a stand.

The line unit, Fig. 3, comprises a completely wired unit for the line equipment of ten extension lines. The individual calling device is a so called relay-jack, which will be described below. Ten relay-jacks are assembled on a moulded bakelite strip. On the front of this strip only the jack sleeves and the lamp apertures are visible, whereas the relay in the relay-jack is concealed behind the strip. A cable form is run to a terminal strip with ten pairs of terminal screws. All line units contained in a wall switchboard are identical with regard to the numbering of the jacks as well as the cable form.

The line unit for the exchange lines is in principle similar but is equipped for six lines only. The four empty pairs of holes have, therefore, been covered up.

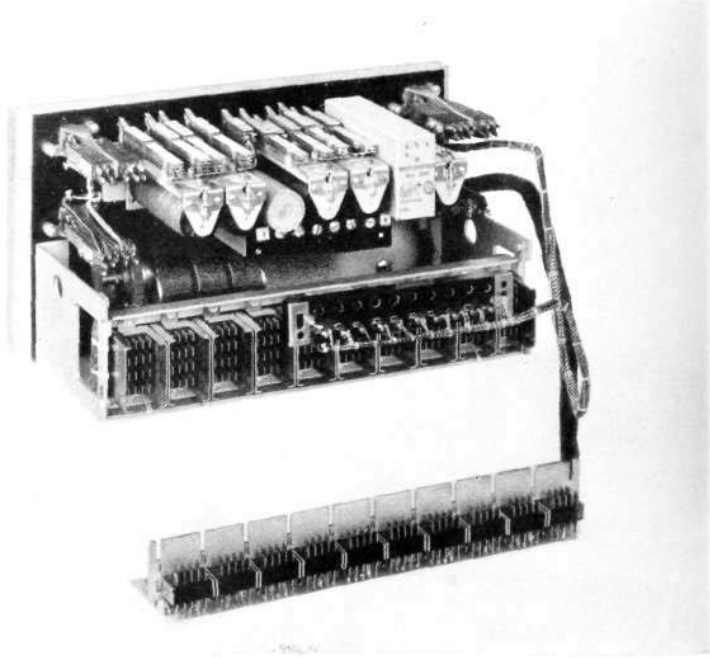
The position set, Fig. 4, consists of an oak panel covered with black phenolic laminate and contains all common equipment for the wall switchbord with the exception of the dial. The generator and the bell will thus be found in this set together with various relays and keys as well as a connection block for the receiver and the dial. The position set finally contains two jack bars with connection jacks, one for connection of switching sets and one for the cord circuit relays. Wiring to battery, pole changer and extension bell is collected in a cable form terminating in a separate connection block.

The switching sets in the wall switchboard will be described below in connection with other components.

The new wall switchboard has been coded *ADE 1205* and has the following dimensions:

Height 19 1/4″ (490 mm), or 34 1/4″ (870 mm) including cords and pulley weights; width 13 1/4″ (336 mm) excluding receiver and generator handle; depth 16 3/8″ (415 mm). The floor stand, *BAR 1101*, is 19″ (480 mm) high and weighs 17 1/4 lbs (7.4 kg).

Net weight of switchboard fully extended excluding frame and relay sets for the exchange lines is approximately 68 lbs (31 kg).



X 6489

Fig. 4
Position set for ADE 12
rear view

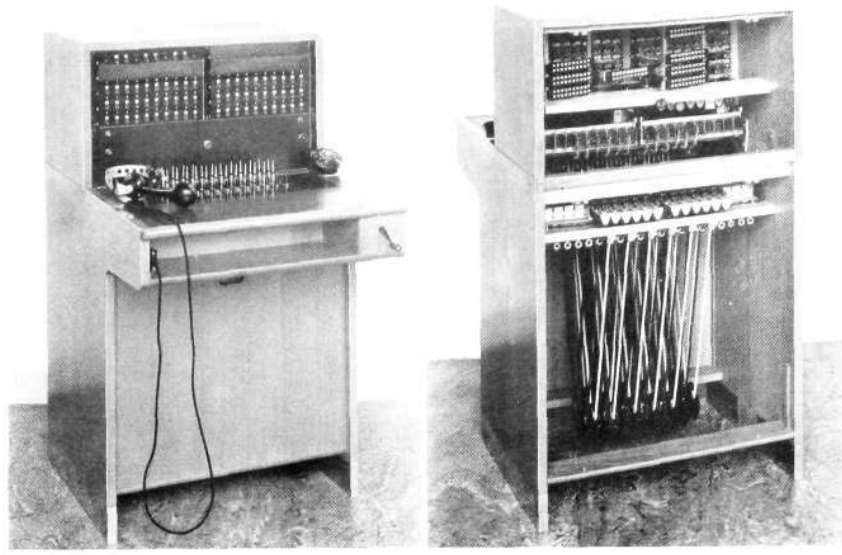


Fig. 5 X 6498

Floor switchboard ADF 1410

for 60 extensions, 6 exchange lines and 12 cord circuits. (right) Rear view with lids removed.

The Floor Switchboards

The floor switchboards are supplied in two sizes, a small, Fig. 5, having a capacity of 80 + 12 lines, and a large, Fig. 6, for a maximum of 180 + 12 lines. Both types may be equipped with a maximum of 20 cord circuits. They are both intended for one operator and are twin panelled. The switchboards differ with regard to the top section, which may be low or high.

The switchboard frames are veneered in light oak on block board combining good mechanical stability with a high quality finish on the large surfaces. Certain stressed elements in the frame are made in solid oak, whereas some concealed parts are in beech wood for manufacturing reasons. The desk surface is covered with green cork lino, which is hard wearing and offers an excellent writing surface. All joints are made by means of resin glue, which is inert against damp and fungii. Certain inside joints have been reinforced by means of wooden laths or angles. A compartment has been arranged under the desk top for the operator's personal effects. The receiver outlet is situated to the extreme left in this compartment and a portion to the right has been partitioned off for the generator. The bottom part of the board has been provided with sheet metal kick guards.

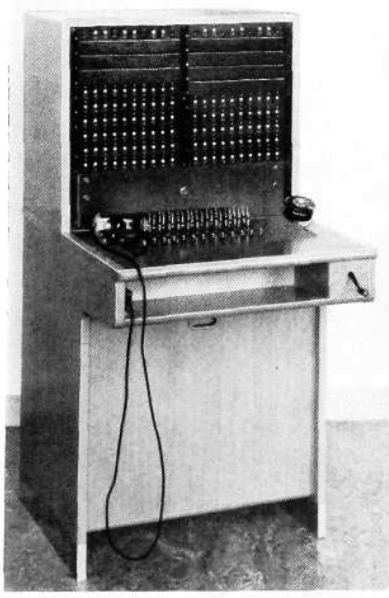


Fig. 6 X 4670

Floor switchboard ADF 1420

equipped for 110 extensions, 12 exchange lines and 12 cord circuits

The rear of the switchboard is covered by two lids made in wall board on a frame of soft wood. When the lids are removed all terminal frames, jacks and cord supports are accessible. There is ample space for running cables to the terminal frames in the top part of the board.

The line unit, Fig. 7, differs from that of the wall switchboard only with regard to the cable form. The illustration shows a unit for ten extension lines. The line units are now identical also in the floor switchboard, the separate left or right hand types having been made obsolete.

The line unit for the exchange lines are only made for six lines as in the case of wall switchboards, see Fig. 6. Normally the units are assembled in the board with extension lines built up from the bottom and the exchange lines at the top, but there is nothing to prevent the exchange lines being lowered to a position immediately above the extension lines.

The position set, Fig. 8, consists of an oak panel covered with phenolic laminate on both sides and carrying all common equipment in the switchboard with

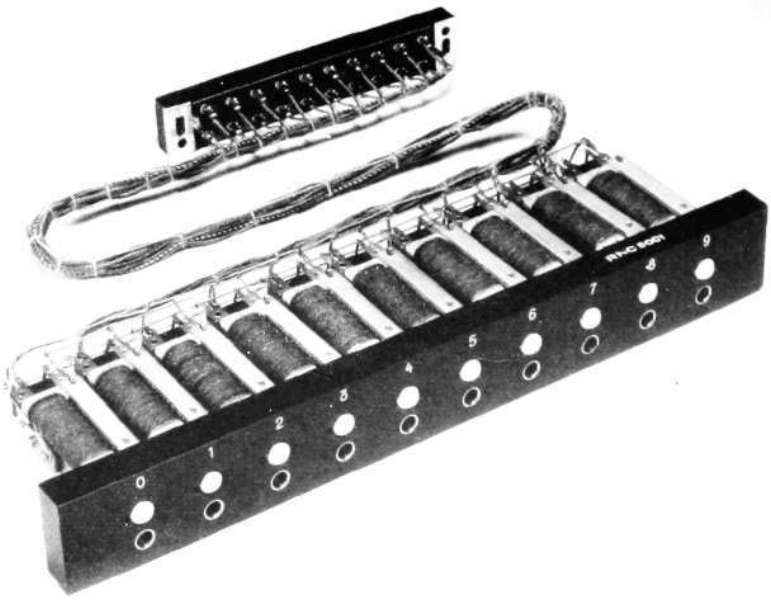


Fig. 7 X 6488
Line unit for ADF 14

exception of the dial and the generator. All wiring for the power supply is collected on a terminal block for easy connection of battery pole changer etc.

The new floor switchboards have been coded *ADF 1410* for the low type and *ADF 1420* for the high type.

The dimensions are:

Height $43^3/_4$" (1 110 mm) and $50^3/_4$" (1 290 mm) respectively
Width $25^1/_8$" (639 mm)
Depth $30^1/_8$" (765 mm)

Net weight for floor switchboard ADF 1410 with 80 + 8 lines and 12 cord circuits is 156 lbs (71 kg) approx. The corresponding board ADF 1420 is approximately 8 lbs heavier, whereas ADF 1420 with 180 + 12 lines and 18 cord circuits weighs 200 lbs approx. All weights are exclusive of frame and relay sets for the exchange lines.

As all the above switchboards may be extended, empty spaces in a board, not fully extended, is covered by dummies of the same dimensions as the line and cord circuit units. These dummies are also moulded in bakelite.

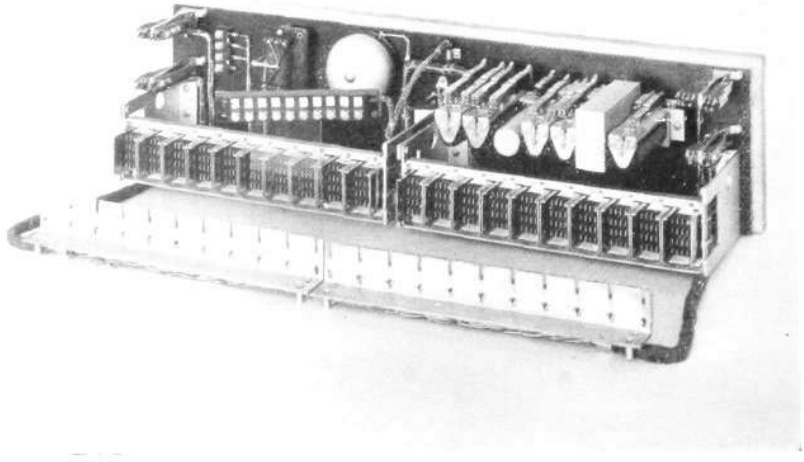


Fig. 8 X 6491
Position set for ADF 14
rear view

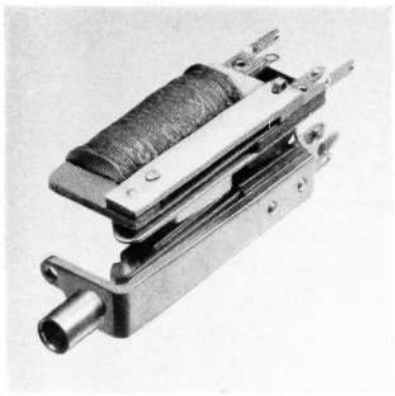


Fig. 9 X 4671
Relay-jack

Components

Only those components which are specially designed for the new CB-switchboards will be described here. The most prominent component is the combined relay-jack, Fig. 9, which serves as calling and connection device in all new CB-boards. It consists of a jack of fairly normal type attached to a lamp fitting and a very simple relay, forming a self-contained unit. The relay is provided with one make-contact only, connecting the lamp on operation of the relay. In spite of the small dimensions the relay will serve as calling relay for comparatively long extension lines. The calling relay and the jack are electrically connected in such a way, that the relay is disconnected from the line, when the plug is inserted in the jack. The relay-jack is mounted on the line unit strip by means of one single screw. All soldering tags, which may be connected in parallel when wiring the line unit, are specially designed for bare wire connection.

The relay in the relay-jack is normally wound with .0032" enam Cu (0.08 mm TE) giving 5.600 turns and 500 ohms, safe operating effect being 0.1 watt approx.

The Switching Set

Fig. 10, contains the essential equipment for a cord circuit. The body is moulded in bakelite and will hold the following components in order from the front.

1 battery feed relay
1 speaking and ringing key
1 supervisory lamp
2 plugs
2 cord connection clamping blocks

The illustration shows a wired unit with the wiring terminating in a connection jack.

The Battery Feed Relay

Fig. 11, has a similar iron circuit as that in the clear signal indicator in the L M Ericsson LB-switchboards. The armature is, however, modified so as to operate a single make-contact, operating the supervisory lamp. When the relay has been fitted in its position in the cord circuit unit, it is enclosed in an iron sheath to prevent cross talk between adjacent units.

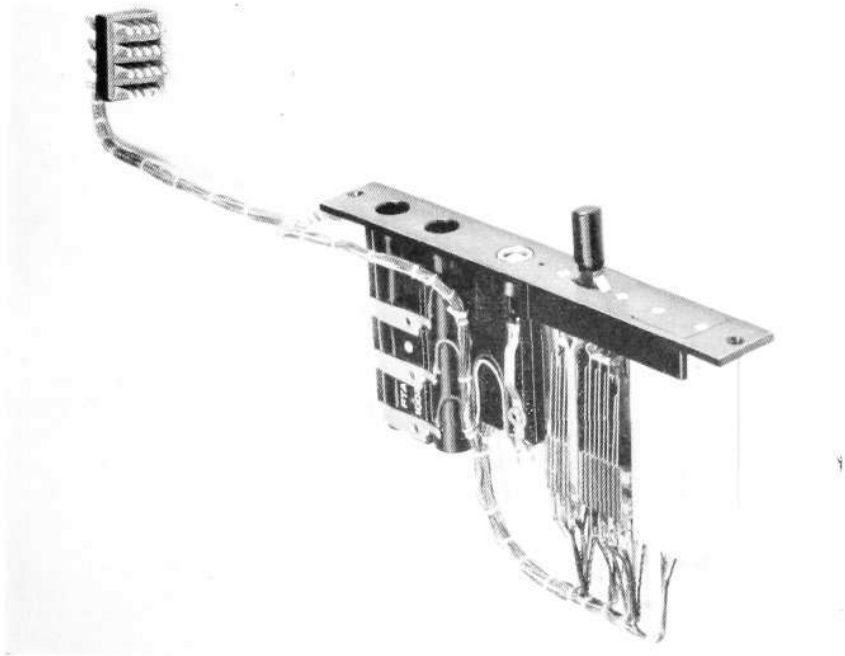


Fig. 10 X 6492
Switching set

The key and the lamp will already be familiar and do not require detailed description.

Fig. 11 X 4672
Battery feed relay

The Cord and the Plug

are comparatively recent components, which have lately been further developed. The cord connections, which earlier consisted of close wound wire cylinders, now consist of metal sheaths which are clamped round the cord, see Fig. 12. The plug has also been improved upon, more hard-wearing materials being used as insulation between plug conductors and as collars on the protection spiral.

The Cord Circuit Relay

Fig. 13, is a complement to the cord circuit unit in the switchboard. Each cord circuit in such a board has to be applied to two different traffic alternatives: internal service and exchange service. For this reason the cord circuit relay has been introduced, which among other things inserts the battery feed relay at internal connections. The cord circuit relay is provided with an attached connection plug and can be connected in its position in the switchboard as easy as the cord circuit unit. The work of replacing a faulty cord circuit or adding new ones is, therefore, only a question of minutes.

The Relay Frame

As indicated above the new range of switchboards have been provided with separately mounted relays for the exchange lines. In this way many advantages have been gained. The switchboard itself can be made smaller and with a neater appearance. The exchange line relays, being comparatively vital components, will be more accessible for inspection and maintenance. Transport problems are simplified as the relay equipment is rather heavy and requires careful packing.

Fig. 12 X 4673
Cord and plug

Fig. 14 shows a relay frame of the type used for the L M Ericsson new switchboards. It is made for wall mounting and contains six relay sets. A wall switchboard ADE 12 requires, consequently, one frame, whereas a fully extended desk switch board ADF 14 requires two frames. The frame is made in mild steel and finished in light aluminium enamel. The individual relay sets are connected over plugs and jacks and are easily removed from the frame. The space at the bottom of the frame is taken up by terminals for incoming and outgoing cables.

The relay frame, which is coded *BED 8006*, has the following dimensions: Height 17¹/₄" (440 mm), width 10¹/₈" (256 mm) and depth including relay set 6¹/₂" (165 mm). Net weight for a frame with fully mounted relay sets *BCB 16* is 44 lbs (20 kg) approx.

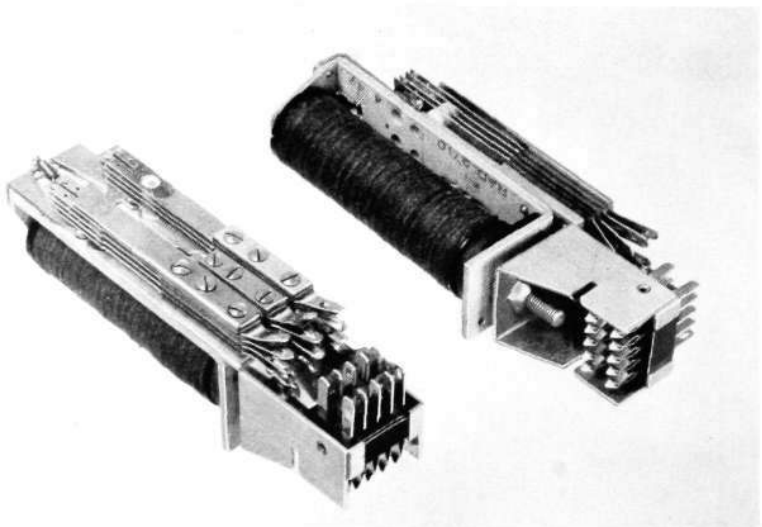


Fig. 13 X 6493
Cord circuit relay with plug

Fig. 14 X 4675
Relay frame BDE 8006
with 6 exchange line relay sets

The Circuit Diagram

Fig. 16 shows the circuit diagram for the new L M Ericsson switchboards. The top part of the diagram is taken up by the line equipment. The centre part shows a cord circuit and the lower part below multiple arrows covers the common position equipment.

The exchange line equipment contains a number of relays XR^1—XR^5, a transformer Tr, a few condensers and resistances and a night switching key NK, assembled to a relay set, Fig. 15. In the switchboard there are, moreover, relay XR, a call lamp XL and a jack XJ.

The extension line equipment is very simple and contains a relay ER, a call lamp EL and a jack EJ, assembled to a relay-jack, Fig. 9.

The cord circuit equipment includes two cords with plugs AP and RP, a key SK—SK—RK, a battery feed relay SR and a supervisory lamp SL, assembled to a switching set, Fig. 10, and finally a cord circuit relay DR, Fig. 13.

Apart from keys NB—S—RB—~, well known in switchboards, the position set contains operator gear M—IC—R, alarm device NR—B, ringing equipment HG—R_4—RV, dial D, switching relays R_1—R_2—R_3 and battery feed relay R_3.

A detailed description of the circuit procedure, when establishing connection, is outside the scope of this article. In the following we will, therefore, confine ourselves to an enumeration of the different connection facilities in the new L M Ericsson switchboard.

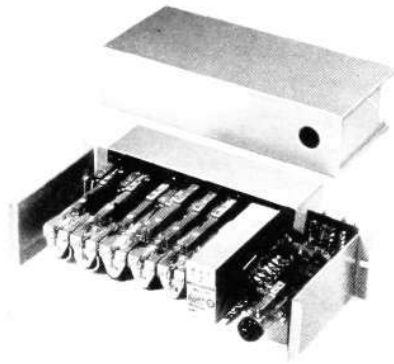


Fig. 15 X 4676
Relay set
cover removed

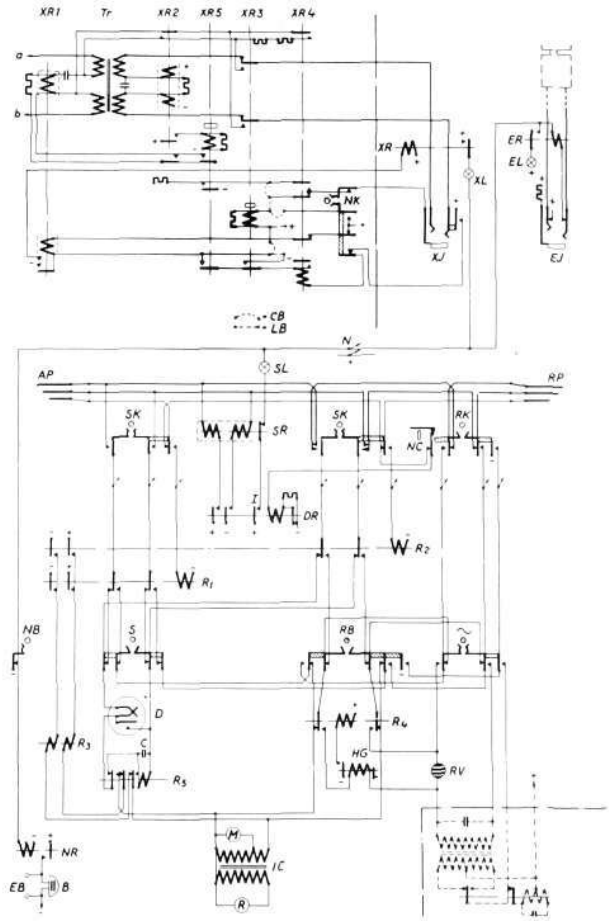


Fig. 16 X 6487
Circuit diagram
for ADE 12 and ADE 14

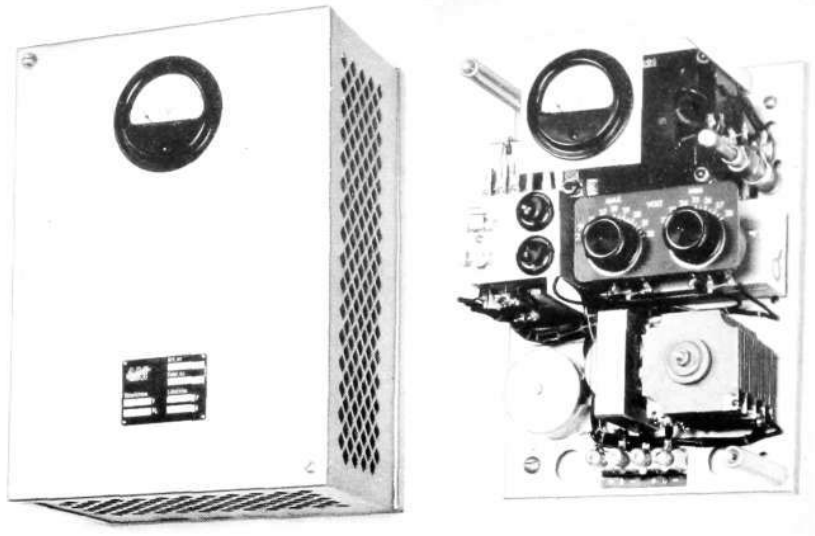


Fig. 17 X 6497
Automatic battery charger
(right) with cover removed

The following connections may be obtained:

extension—operator
extension—extension
extension—exchange
exchange—operator

The same plug in the cord is used when answering an extension and an exchange call.

For calls between two extensions, battery supply is obtained from a common relay *SR* in the cord circuit. For exchange calls, the extension receives battery supply from relay XR_2, in the exchange line relay set. The system is consequently independent of the battery supply from the exchange.

For incoming exchange calls, a holding circuit is formed (by means of relay XR^3) as soon as the operator answers the call, and this circuit remains in operation during the whole call and until disconnection takes place. This enables inquiry and transfer during the call without interfering with the main exchange. In such cases the extension calls the attention of the operator by repeatedly pressing the receiver cradle causing the clear indication lamp *SL* to flash.

For outgoing exchange calls, the exchange line is held directly from the extension instrument this is necessary in order to enable dialling from the extension instrument without the assistance of the operator. The possibilities of inquiry and transfer must, therefore, be dispensed with for such calls.

If an outgoing call is completed but not yet disconnected, a new call may still be received on the exchange line and be indicated in the switchboard. The ringing signal is, however, blocked by transformer *Tr* and does not affect the extension.

Night connection between exchange line and extension may be established by means of the ordinary cord circuits. In doing so, however, certain power consuming circuits must be put out of action by means of key *NK* in the exchange line and *NC* in the cord circuit. Contact *NC* is opened by means of a special key inserted in a round hole in the switching set. At night connection

of the exchange line a relay XR^3 is connected, which transfers the ringing signal to the extension for outside calls.

The exchange line relay set as supplied may be connected to manual or automatic CB-exchanges of any type, but if the exchange is an LB one, the relay set wiring has to be modified as indicated by the dotted lines in the diagram. It should, however, be remembered that with LB exchanges night connection can only be arranged for incoming calls but not for outgoing calls.

With regard to the circuit of the new switchboards it should, finally, be added that by modifying the exchange line relay sets, there are considerable possibilities of meeting the various requirements, which may be put on switchboards of this kind.

Power Supply

A manual switchboard as described above is not complete without power supply of various kinds. In the first place 24 V is required as battery supply and as operating voltage for different local circuits. In the second place AC voltage for ringing should preferably be available.

The most reliable supply for 24 V DC is no doubt an accumulator battery with automatic charging equipment. The following capacities for batteries and charging equipment may be recommended depending on kind of available mains.

	ADE 12	ADF 14
Accumulator battery 24 V	15 Ah	30 Ah
Charging equipment for AC	BMM 1715	BMM 1716
Charging equipment for DC	BML 1102	BML 1102 + BML 1101

Providing AC mains are available and the probabilities of mains failure are small, an eliminator may be used, omitting the battery. Suitable eliminators are *BMN 2111* and *BMN 2211* resp.

Generator ringing is always rather cumbersome for the operator and the addition of a pole changer *RGN 6002*, Fig. 18, is recommended. This pole changer is operated on 24 V DC and has an effect sufficient for simultaneous ringing on approximately ten bells. The circuit of the new pole changer will follow from the dotted diagram in Fig. 16.

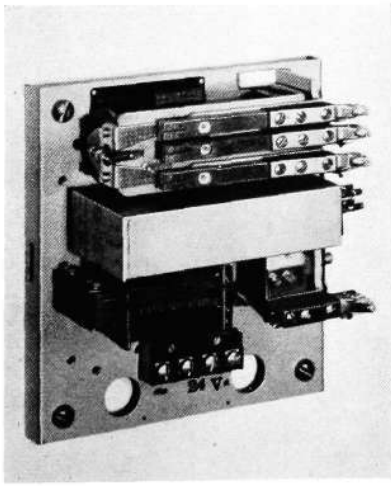


Fig. 18 X 4674
Pole changer RGN 6002
cover removed

Packing

The new private branch switchboards are supplied in parts as in the case of the new LB-boards. The packing principle is in the main similar although a few improvements have been introduced lately. The relay frame and the relay sets for the exchange lines are, however, packed in a separate case.

Through the methodical application of the unit principle for lines, cord circuits, exchange line relays etc., the amount of assembly work is reduced to a minimum and a switch board may be assembled in a few hours without other tools than a screw driver. The new method of packing will no doubt also reduce the risk of transport damage on the more vital components.

Balancing Machine for Motor Car Wheels

E LISELIUS, LM ERICSSONS MÄTINSTRUMENT AB, STOCKHOLM

U.D.C. 621—755:629.113.012.3

Ermi has included a new type of balancing machine in its manufacturing schedule, which is intended for balancing motor car wheels. The Ericsson Review No. 3, 1948 contains a description of the principles followed in the construction of Ermi's balancing machines. The new machine is very similar to these former types, but it has been possible to design it in a simpler form since the demand for accuracy of the measuring results is appreciably less than in the case of the earlier apparatus.

In a rotor which has not been balanced and which is required to rotate at a high speed considerable forces are set up which exercise a disturbing effect and subject the rotor and bearings to appreciable mechanical stresses in the form of vibrations. If, moreover, the rotor has a relatively large diameter in relation to its speed of rotation, these vibrations may have a fatal result on the bearings and shafts. The vibrations are transmitted to the surroundings and, when the rotor is a motor car wheel, the vibrations will not only be transmitted through the steering gear to the steering wheel but the unbalance, both static and dynamic, will set up vibrations throughout the entire car. Modern cars with separate springing are particularly sensitive to these vibrations.

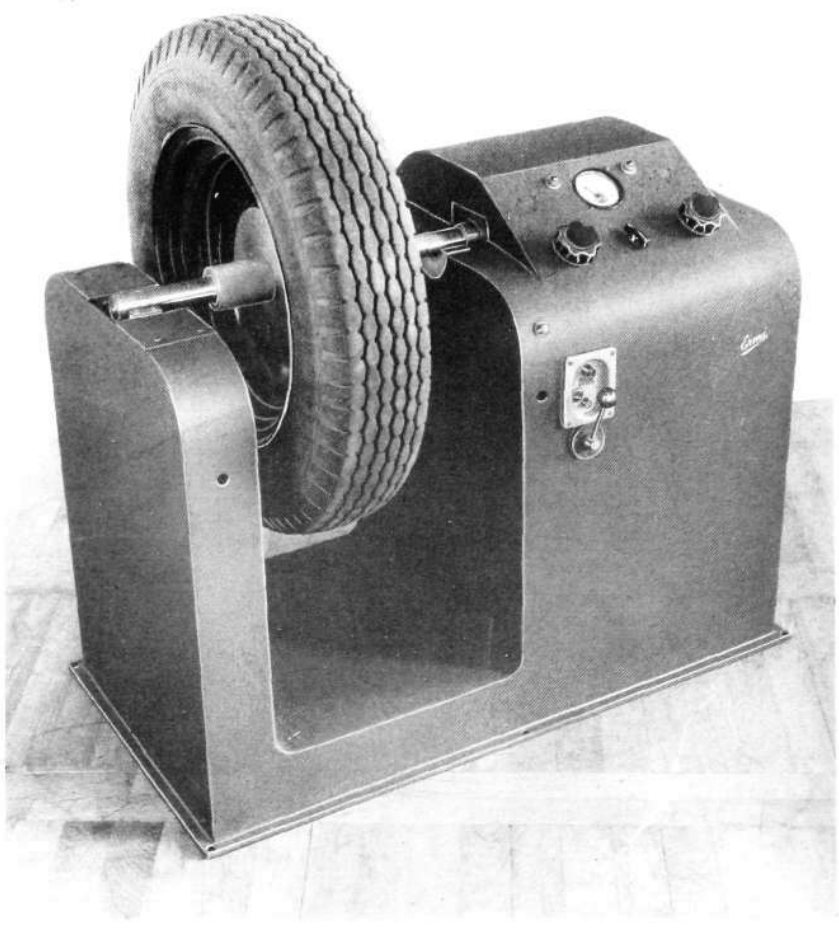


Fig. 1 X 6501
Balancing machine for motor car wheels

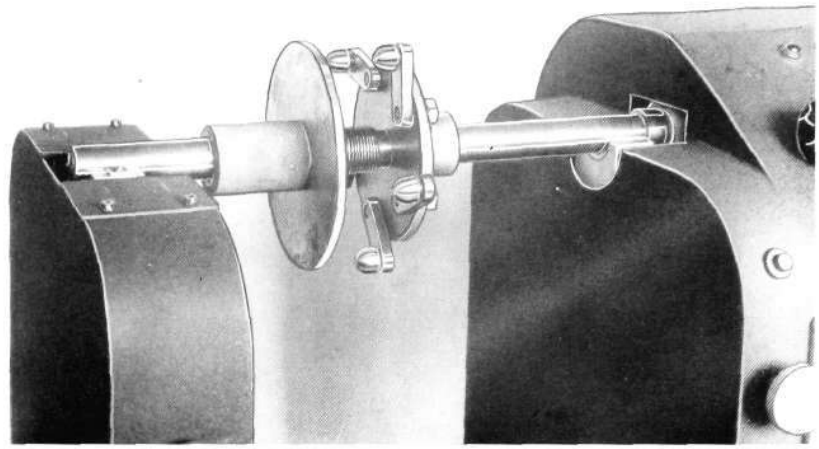


Fig. 2 X 6503
Shafts and hub for fixing the car wheel

If the car is run at a speed as low as 30 km/h (20 miles/h) an unbalance of 100 g (3.5 ozs) will be of no particular significance. When the car is fitted with tyres having the dimensions 6.00 × 16, the forces of vibration will amount to about 1.6 kgs (3.5 lbs). The forces will increase with the square of the speed however, and thus at 60 km/h (37 miles/h) they will be four times as great or 6.4 kgs (14 lbs) and at 90 km/h (55 miles/h) 14.4 kgs (31.5 lbs). A wheel having the above-mentioned dimensions when running at 90 km/h (55 miles/h) rotates at a speed of 670 r. p. m. that is to say, in the course of an hour the wheel will knock against the roadway some 40 000 times with a force corresponding to more than 14 kgs (30 lbs).

An unbalance corresponding to 100 g (3.5 ozs) cannot be regarded as large. Actually, it has been found that the unbalance in car wheels usually varies between 100 (3.5) and 170 g (6 ozs).

Static and Dynamic Unbalance

Static unbalance is produced when the heavy part is distributed symmetrically on both sides of the tyre. This will cause the wheel to jump up and down when rotating. The vibrations thus set up are not perhaps noticeable since the springs and shock absorbers take up the greater part of them. Nevertheless the destructive action which the vibrations exercise on the wheel and its bearings and fastenings still remains.

Dynamic unbalance is produced when the heavy point is located to the side of the wheel's symmetrical plane. Its action is to set up lateral vibration in the car. Thus, dynamic unbalance has a more disturbing effect on the front wheels than on the rear wheels owing to the fact that the lateral vibrations are transmitted directly to the steering gear. This does not imply, however, that unbalance can be permitted in the rear wheels without ill effects. Unbalanced rear wheels give rise to vibrations in the back of the car and these are transmitted through the chassis and set up oscillations and disturbances in the steering gear.

Ermi's balancing machine for motor car wheels, Fig. 1, is built on the same principles as Ermi's other balancing machines, and consequently the experience gained with the latter could be applied to advantage in this new type. It is not necessary to carry out any preliminary static balancing in the wheel balancing machine, since both the static and dynamic unbalance are checked at the same time by a single measurement. The unbalance is referred to and balanced in two planes at right angles to the axis of rotation in such a way that the balance weights are attached between the tyre and the rim on both sides of the latter.

The number of balance weights that should be placed on the wheel may be read off directly from the machine's instrument. The position in which they should be placed is determined automatically inasmuch as a lamp lights up when, after the machine has stopped, the wheel is turned round gently and reaches the position at which the light point is located vertically upwards.

Operating Principles

The wheel is mounted in two open bearings which are resiliently suspended so that they can carry out practically undamped horizontal oscillations of small amplitude. Each bearing is connected to a vibration generator consisting of a coil introduced in the air gap of a permanent magnet. In these two generators alternating voltages of sine wave form are generated which are proportional to the amplitude of the oscillations. These voltages are applied, one at a time, to a coil in an electrodynamic instrument; the other coil is fed from a synchronous generator on the driving shaft, from which it is supplied with a constant voltage. Owing to the cooperation of these two voltages a deflection is produced on the instrument the magnitude of which is dependent upon the amplitude of the vibrations (amount of unbalance) and upon the phase positions of the two voltages in relation to one another.

A synchronous generator is available for each balancing plane, and their stators can be rotated whereby their voltages can be displaced in phase in relation to the voltages from the vibration generators. By comparing the phase positions of the vibration voltages and the phase positions of the reference voltages pro-

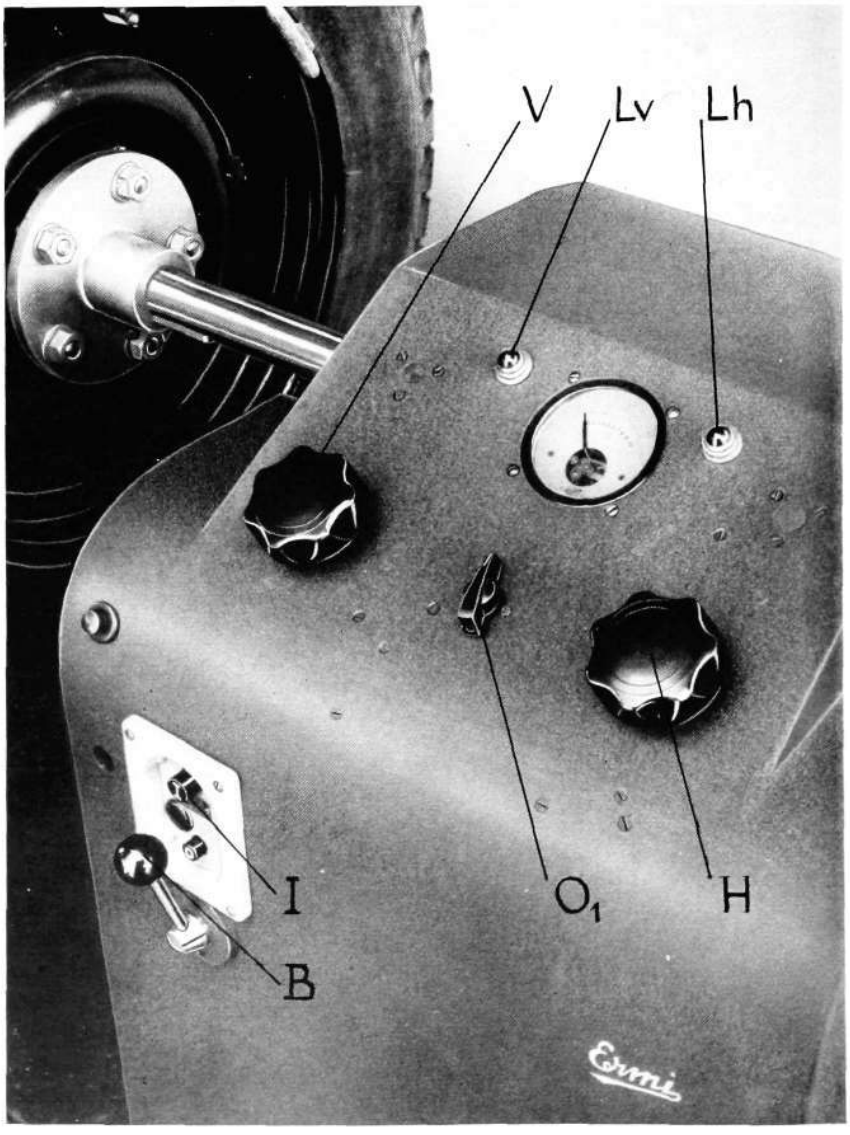


Fig. 3 X 6502

Control- and instrument equipment

The letters refer to the description in the text of the manner in which balancing is carried out.

Fig. 4 X 6496
Balancing weights
with springs for fixing them to the rims

duced by the synchronous generators, that is to say, the angular position of the stators, it is possible to determine the position of the unbalance in the respective correction planes.

Carrying out Balancing

The wheel and its rim are fixed at the hub and the shaft is mounted in the open bearings, Fig. 2.

The motor which is a squirrel-cage asynchronous motor is started by depressing the press-button *I*, Fig. 3. To allow the wheel to be started up gently an automatically acting friction clutch is built into the equipment.

After the wheel has come up to speed the throw-over switch O_1 is moved to the left (measurement in the left-hand correction plane) and the knob I' is turned until the instrument gives its maximum deflection (the pointer reaches a maximum and then turns towards zero if the turning of the knob I' is continued). The deflection obtained constitutes a measure for the amount of unbalance and indicates the number of balance weights which should be applied to the left side in order to balance the wheel in this plane.

Fig. 5 X 6495
The balancing weight is applied to the rim

Without stopping the motor, O_1 is moved over to the right (measurement in the right-hand correction plane) and H is turned until the instrument again gives the maximum deflection. The instrument thereby indicates the number of weights which should be applied to the right side.

When these two measurements have been carried out the wheel is stopped by moving the arm B to the right. If O_1 is now moved to the extreme right position and the wheel is turned, the lamp Lh will light up when the wheel reaches such a position that the point at which the balance weights should be applied is located vertically upwards. If O_1 is turned to the extreme left position the position of the unbalance on the left-hand side is determined in the same way, whereupon the lamp Lv will then light up instead. After balance weights corresponding in number and size to the deflection of the instrument have been applied on both sides, the balancing of the wheel is completed. If the amount of unbalance is not too great, a single measurement will suffice to complete balancing.

Shafts with hubs are supplied with Ermi's balancing machine which may be used for the types of rims and wheels commonly encountered.

The balancing weights, Fig. 4, are made of a lead alloy. The weights are available in different numbered sizes varying between $^1/_2$ and 6 ozs. Each weight is provided with a steel spring by means of which the weight is attached to the edge of the rim.

Technical Data

Maximum tyre diameter:	1 200 mm (41 inches)
Maximum wheel weight:	200 kgs (440 lbs)
Minimum wheel weight:	10 kgs (22 lbs)
Sensitivity:	Vibrations having a magnitude of approximately 0.05 mm (0.002 inch) can be measured.
Balancing speed:	480 r. p. m.

AB Alpha—Mechanical and Plastic Products

N KALLERMAN, AB ALPHA, SUNDBYBERG

U.D.C. 061.5 Alpha

In the autumn of 1949 AB Alpha had been a member of the LME group for 20 years of its more than 60 years of existence. A brief account of the firm's origin, development and comprehensive manufacturing programme is given in the following article.

When the Telefon AB L M Ericsson acquired the shares of AB Alpha during the autumn of 1929 a new member was added to the LME family which, however, was far from being a new creation. Some 40 years earlier at the end of the year 1888 the pioneer, Max Sievert, whose name was subsequently associated with Max Sievert's Fabriks AB (Sieverts Cable Works) took the initiative in the founding of a firm which after taking over the Stockholm and Sundbyberg plants of »Hästskosöm Aktiebolaget» was to devote its activities to the manufacture of metals (so-called Alpha metals) and mechanical engineering work. The new company was known as AB Alpha.

As a matter of curiosity, it may be mentioned that the factory premises in question were situated on the site of the present Sieverts Cable Works, approximately at the spot on which the old offices of the latter concern were located. Alpha carried on its activities here, with Sieverts Cable Works as its tenant up to the turn of the century when it moved across »The Esplanade» to its present site. During these early years the firms were respectively referred to as »Iron-Alpha» and »Wire-Alpha», the latter name applying to Sieverts Cable Works.

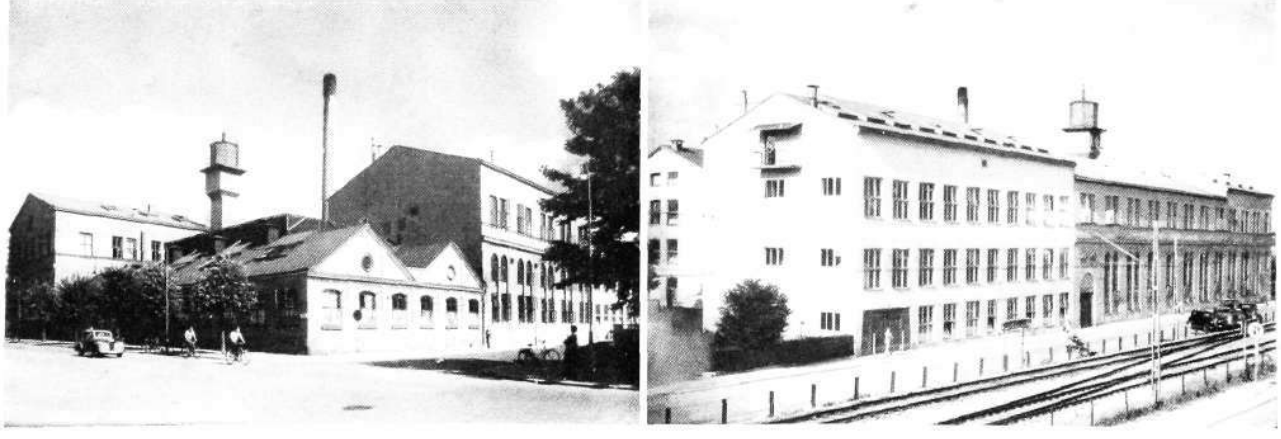
Manufacturing Programme

During the first years of the company's existence its operations were relatively modest and the economic results achieved were on a similar scale. It was only at the beginning of the new century when Alpha took up the manufacture of machines for testing materials which were primarily based on Brinell's inventions and testing methods that the manufacturing outlook widened.

Fig. 1 X 7579

Factory installation at Sundbyberg

Left: The older part of the factory. Right: The new buildings.



Material Testing Machines

The material testing machines, i. e. machines for testing various properties of metals, were for many years — and still remain — one of the company's leading products, and they represent a range for which the firm is practically the sole manufacturer in Sweden. Even at an early stage Alpha's material testing machines made a name for themselves far beyond the country's borders, and thanks to their high quality and consequent precision and reliability, they have built up an excellent reputation for Alpha in this special line. The more important machines included in the production schedule at the present time are Brinell presses, durometers, tensile testing machines, pendulum impact testers, certain testing machines for plastic materials and carbometers.

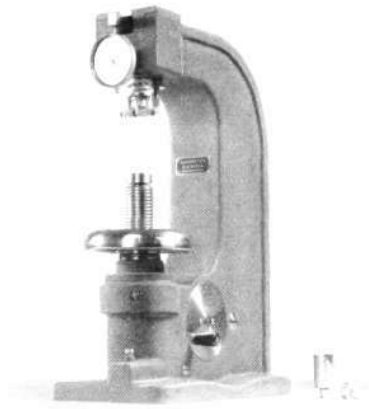


Fig. 2 X 4681

Durometer

for investigating and checking the hardnesss of metallic materials

Plastic Products

After the first world war and at the beginning of the 1920s Alpha became interested in products of an entirely novel character, namely, moulded plastic products. This branch was subsequently to prove of decisive importance to the future fate of the undertaking. Approximately at the same time L M Ericsson had taken up the manufacture of similar products in connection with their production of telephone materials. Since L M Ericsson placed orders covering a by no means inconsiderable part of their requirements with Alpha, however, thus obtaining production from two sources, this proved to be one of the incentives for L M Ericsson's interest in Alpha which culminated in the purchase of this firm by L M Ericsson in 1929. After the concern had been taken over, the bakelite manufacture which had hitherto been carried on at the L M Ericsson factory in Döbelnsgatan was moved to Alpha, and the departments associated with this work have been progressively expanded up to 1949. The moulding department for plastics has a total press capacity of no less than 12 000 tons at its disposal.

Fig. 3 X 4682

Carbometer

for determining the carbon contents in a steel bath

Railway and Tramway Signalling Equipment

The collaboration with L M Ericsson has involved Alpha in a new branch of manufacture, namely, certain equipment for railway and tramway signalling installations. On the basis of the designs prepared by L M Ericssons Signal AB Alpha has taken up the production of electrical interlocking machines, point operating gear, point locking devices, track impedances, cable distribution cubicles, cable end-sealing boxes, etc., all in relatively large quantities. This branch of manufacture is constantly growing and Alpha hopes to achieve a further increase in the future.

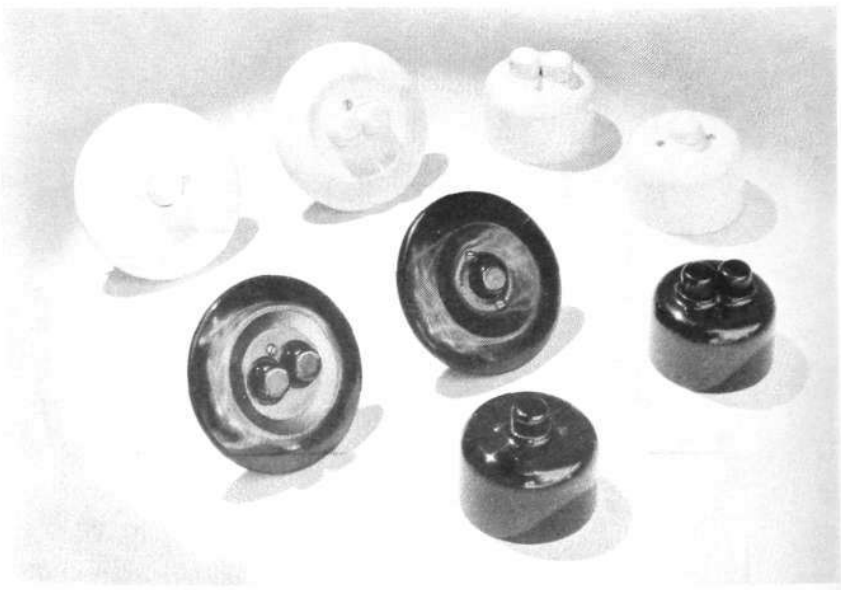


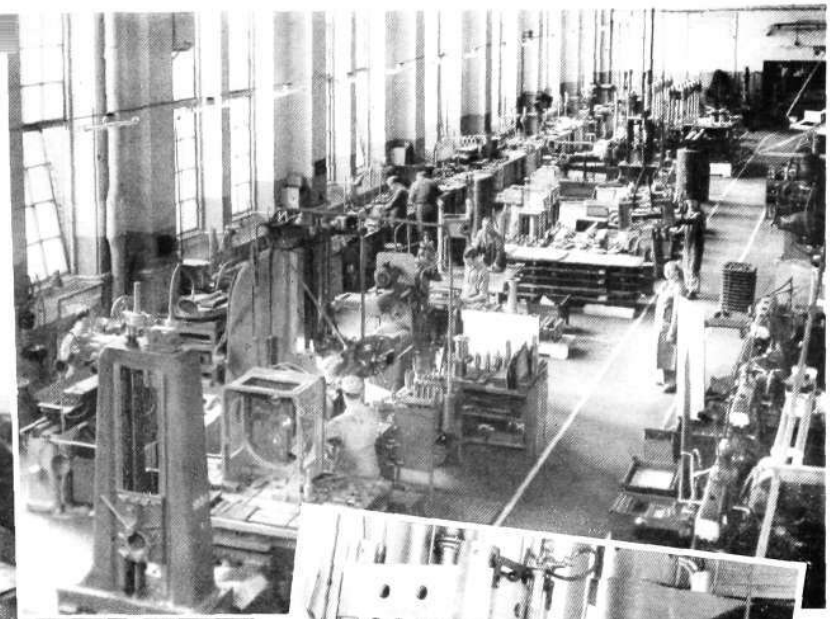
Fig. 4 X 6519

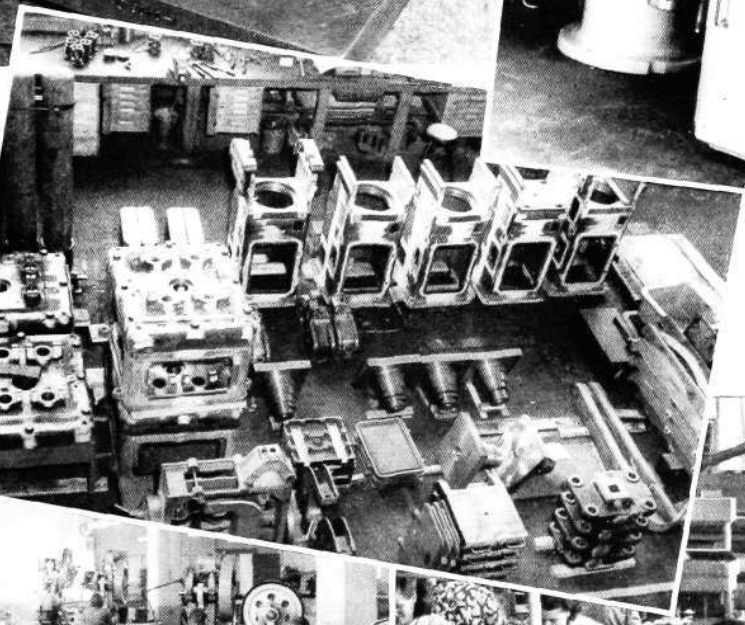
Pello switches

for flush- and surface mounting

Right: Large machine shop. Below: Modern semi-automatic plastic press of Alpha's design. At the front a high frequency set for heating the moulding compound may be seen.

The illustration below shows a filer working on a mould for L M Ericsson's new telephone casing.





Below: Metal sheet pressing department

Left: A part of the machine shop showing five presses for gramophone records under construction. The illustration below shows the assembly of Pello switches on a belt conveyor.

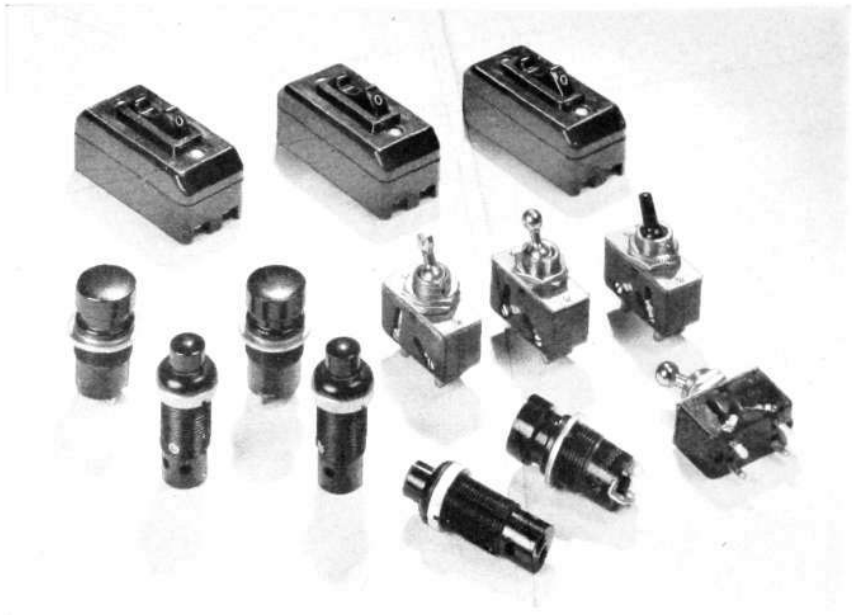


Fig. 5 X 6570
Tumbler switches and press buttons

Electrical Installation Material

Even before its absorption by the L M Ericsson concern, the collaboration with Sieverts Cable Works had provided Alpha with an incentive to take up the manufacture of heavy current installation materials. The best known of these products is unquestionably the Pello switch which has met with a wide sale in Sweden and is probably the most popular amongst the types of switches for lighting purposes at present available in this country.

Apart from the Pello switch, wall sockets represent the leading products, but boxes, lampholders and covers for Gebe fittings, together with the older type of Gebe and the new and smaller ATU type likewise play an important part in the production schedule. Finally, attention may be drawn to the fact that Alpha's tumbler switches, flat-pin contacts and bell circuit material are meeting with ever increasing appreciation and demand.

Hydraulic Moulding Presses

The extensive machine equipment available in combination with Alpha's many years experience of mechanical and hydraulic constructional work rendered

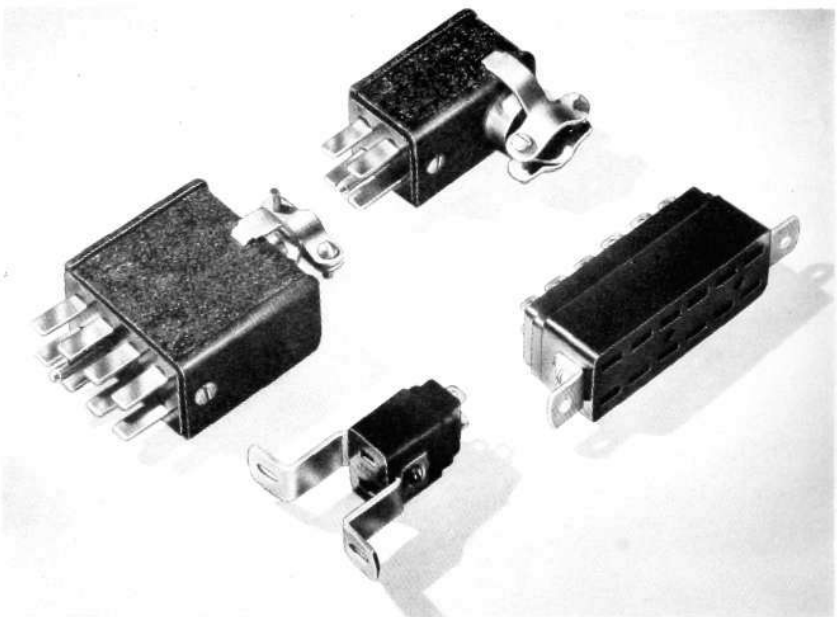


Fig. 6 X 6518
Alpha plugs and sockets

it an obvious step for the firm to take up the construction of the presses required for the production of plastics. The efforts in this direction yielded good results and it not only became possible to provide all the presses needed for Alpha's own moulding department but a number were also supplied in the course of time to the foreign factories associated with the group.

The crowning achievement has been Alpha's delivery of the entire press equipment including moulds to L M's telephone apparatus factory in Karlskrona. This delivery comprised one 50-ton laboratory press, six 100-ton moulding presses for telephone cases, etc., four 165/35-ton presses for transfer moulding of microtelephone handles, one 175-ton press for transfer moulding of bobbins amongst other parts, and two 200/100-ton presses (double acting moulding press) for rings and telephone covers, all provided with instrumentation and control apparatus for semi-automatic operation and adapted for parallel control with high frequency sets, not to mention other refinements.

Appreciable costs have been laid down in the construction of these presses with the object of obtaining a product which would not only meet L M Ericsson's special requirements but could also be sold to outside firms. Up to the present, however, the available production capacity in this branch has been so fully utilized in making deliveries to the companies belonging to the group that it was not possible to deliver to outside firms. Nevertheless, new possibilities have recently been created which have placed AB Alpha in the position to accept a certain number of orders from other customers also. A beginning has already been made inasmuch as the Telegraph Works have ordered three presses and the Åbo Porcelain Factory one press of the Karlskrona type.

Pressing Gramophone Records

Alpha's experience and resources both with respect to mechanical and hydraulic work and the production of plastic materials have also caused the firm to take up the pressing of gramophone records. Ever since the beginning of the 1930s the records of the well-known Swedish brand »Sonora» have been pressed by Alpha. For some time past Alpha likewise counts Decca and Metronome amongst its customers. This work is now carried out in semi-automatic presses of Alpha's own design and construction. Presses of this type were installed some years ago in Denmark and Norway and a marked interest in them is now being displayed by many gramophone recording companies both in Europe and overseas countries.

Manufacture of Moulds

An account of Alpha's manufacturing programme would be incomplete without a special reference to the tool department.

Fig. 7 X 4680
Pressing gramophone records

Alpha's tool department is equipped with an extensive installation of modern machine tools, and thanks to the known skill of its personnel it has been able to produce moulds and dies which, with respect to their quality and precision, are acknowledged to be amongst the best that can be produced in this country. It is, of course, as a supplier of the moulds for all the more or less complicated parts employed in the telephone industry that this department has had to fulfil its chief task, but also for other manufacturing lines in the group such as installation materials, the availability of a highly qualified tool department has been of great value.

It will be realised from what has been said above that Alpha's manufacturing programme has become in the course of time, and still is, comparatively many-sided, although the transference to AB Rifa of the condenser and resistance production formerly carried on may be assumed to have resulted in a certain concentration. These latter forms of manufacture which were taken up by Alpha

at the beginning of the 1930s covered small condensers for low tension, including both paper-insulated condensers and electrolytic condensers, surface resistances, powdered carbon cores and the like, mainly to meet the requirements of L M Ericsson's telephone materials production. This production was transferred in 1949 to AB Rifa, a detailed description of which firm is contained in the Ericsson Review No. 1, 1950.

An Enterprise in Progress

Since the manufacturing programme has attained the extensive proportions described above, it will be clear that Alpha has grown considerably in the course of time, both as regards its premises and staff.

New buildings have been erected on the site at Sundbyberg on several occasions during the past 20 years, and in addition, it became possible to acquire the plant and works of the Svenska Bakelite AB, Uddevalla, in 1938.

Immediately before the transference of the condenser production to Rifa the total staff employed by Alpha amounted to slightly more than 1 000. The number is approximately 800 at the present time, but an increase in this figure may be anticipated, given normal working conditions and after the premises formerly devoted to condenser manufacture have been adapted to new production tasks.

New Telephone Instrument for the L M Ericsson Loudspeaking Telephone

G. THAMES, TELEFONAKTIEBOLAGET LM ERICSSON, STOCKHOLM

U.D.C. 621.395.721.621.395.623.8

The L M Ericsson loudspeaking telephone has up to the present consisted of the telephone instrument, desk microphone, loudspeaker and amplifier. Of these the telephone instrument and the microphone are generally placed on the desk and it has, therefore, been found expedient to combine these two into one single instrument. It has often proved awkward to place both the telephone instrument and the microphone in convenient positions generally to the disadvantage of the microphone. With the combined instrument the microphone will obtain a more favourable position added to which the requisite desk space is reduced.

Design

The new telephone instrument is a combination telephone set and microphone used as part of the L M Ericsson loudspeaking telephone system. As will be seen from Fig. 1 the dial is placed to the left and the microphone to the right on the front of the instrument. Between these two is a pilot lamp which indicates when the microphone is connected. The three push buttons required to operate the instrument are mounted on top of the case. The function of these buttons is the same as in earlier instruments; the left-hand button calls the exchange and the right-hand one increases the volume of incoming speach when required. The centre button is used to disconnect the call when completed.

The handset is supported in a cradle on the back of the instrument. The shape of the cradle is such that the prongs are well visible above the rear edge of the instrument when the handset is removed, thus facilitating the replacement of the handset.

If the handset is lifted during a conversation while using the microphone and loudspeaker, the buttons are released and the call is automatically connected to the handset.

Fig. 1 X 7567

Telephone instrument type DBF 11

with built- in microphone. On the top of the instrument: push buttons, on the front: dial, pilot lamp and microphone; (right) rear view

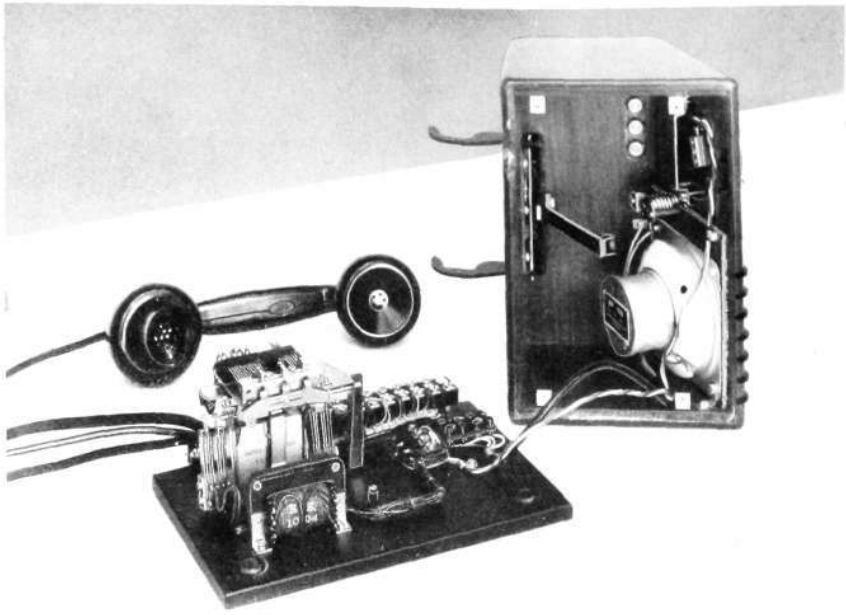


Fig. 2 X 6504

Telephone instrument DBF 1102

cover removed

Apart from handset and cord with terminal box, the instrument consists of a base-plate with a case mounted on it. The case of the instrument as well as that of the loudspeaker is made of polished wood.

Mounted on the base-plate, see Fig. 2, are the cradle switch, push button, contact springs, transformer, condenser, buzzer and various terminal blocks whereas the dial, microphone with pilot lamp and the cradle itself are mounted in the case.

The dial and microphone are wired to the terminals on the base-plate by means of two flexible cords.

Fig. 3 X 6516

Conference telephone

(left) Manager's table and loudspeaker, (right) On the desk the new telephone instrument with built- in microphone

Application

The new telephone instrument may be used in place of the usual loudspeaking telephone or with conference telephone type *AEC 200* as follows:

Telephone instrument	Connected to CB exchange[1]	Corresponding to		Application
		Instrument	Microphone	
DBF 1001 *DBF 1101*	manual automatic	*DBH 2411* *DBH 2511*	*RLC 1001*	Loudspeaking telephone
DBF 1002 *DBF 1102*	manual automatic	*DBH 2402* *DBH 2502*		Conference telephone type *AEC 200*

[1] The instruments are intended for use with 24 V exchanges with 400+400 ohms feeding coils or systems with other working voltages and feeding coils which give the same maximum feed current to the telephone instrument's transmitter. Instruments for connection to exchanges having battery supply conditions deviating from those mentioned here can be supplied on request.

Connection

The new instruments intended for conference telephone type *AEC 200* have circuits identical with those of earlier instruments and the connections are made in exactly the same way.

Even the new instruments used as loudspeaking telephones are connected in the same way as before except for the fact that the terminal box is different. The circuit is, however, now altered to provide for the connection of an extension instrument. The new instrument then serves as a main station and the extension station may be an instrument of ordinary type, for instance *DBH 1501*. Calls on the main station which always has right of way, cannot be overheard on the other instrument. Another new feature is the provision on the main instrument for direct connection of the »ENGAGED ON TELEPHONE» indication. This is an indicator lamp or panel mounted outside the door which lights up when the telephone is being used.

As with the original equipment a signal transfer switch may be connected to the instrument, which transfers the ringing signal to another instrument after a certain number of signals have been received. (See Ericsson Review No. 3, 1945.) Finally the instrument may be provided with an extension bell.

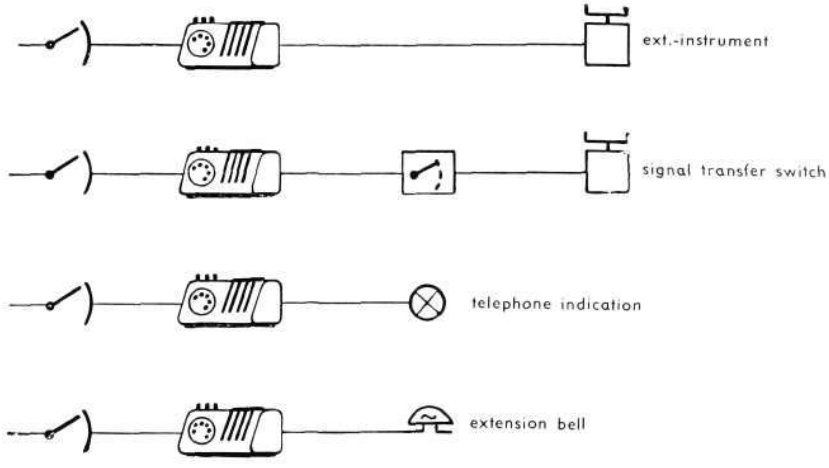


Fig. 4 X 6508

Diagram illustrating various extension equipments which may be connected to the new telephone instrument

New Type of Staff Locator

A TRÄGÅRDH, TELEFONAKTIEBOLAGET L M ERICSSON, TELESIGNALFABRIKEN, STOCKHOLM

U.D.C. 654.938

Staff locator systems are being increasingly used in modern offices as a means towards good service and rational office routine. Such systems enable rapid contact with staff, which owing to the nature of their work often have to be away from their place in the office and which time and again are required by customers or colleagues.

L M Ericsson have designed and marketed a new type of staff locator which in certain respects differs from earlier types.

A staff locator is generally composed of visual indicators e. g. lamp panels, placed in office rooms and corridors and containing up to five differently coloured lamp sections, together with operating relays and control equipment placed at the telephone switchboard. By means of push buttons or keys the operator connects different colour combinations for continuous or flashing light indicating the person required.

When the lamp panels have to be fitted in positions exposed to strong day light it is for certain colour combinations difficult to decide whether the lamps are operated or not. L M Ericsson have, therefore, designed a new lamp panel utilizing specially shaped red coloured lamp lenses emphasizing the effect of the lamps and making them well visible even in sunlight. Due to the design of the lenses lamps for lower effect may be used, which will reduce the power consumption and the cost of the wiring.

A new control set for the operator has also been designed, which may be operated without reference to the actual lamp combinations and which eliminates all confusion between different combinations.

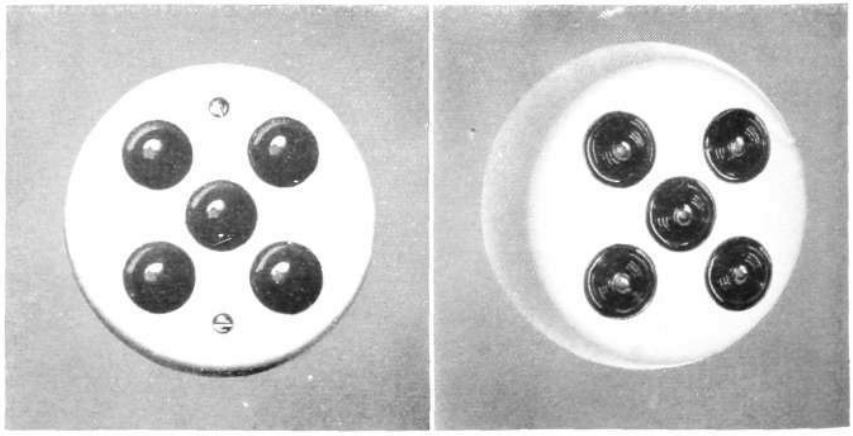


Fig. 1 X 6500

Lamp panels

(left) KNH 9501 for flush, (right) KNH 9511 for external mounting

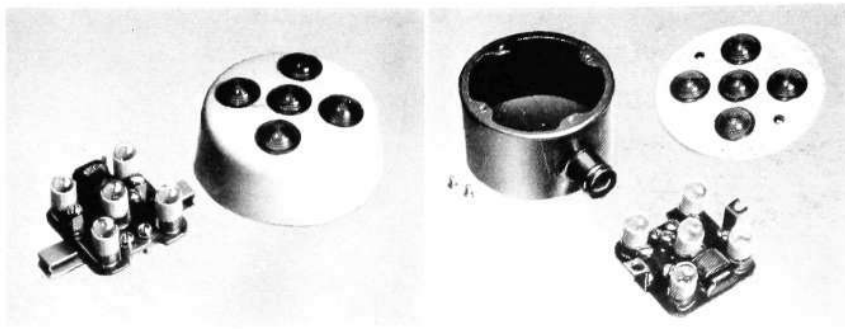


Fig. 2 X 7566
Lamp panels dismantled
(left) external type, (right) flush type

Design

The lamp panels, Fig. 1, are supplied for flush or external mounting and contain 5 red coloured lenses placed to form a square as illustrated, whereas earlier panels have differently coloured lamp sections placed in a vertical row as shown in Fig. 3. In the new lamp panels it is the position of the operated lamp that is of significance, whereas in the earlier panels the colour is a means of reading the combination. A staff locator system must, therefore, contain either old lamp panels or new lamp panels but not both types.

The power consumption of the lamps is only 1.2 W per lamp as compared with 3 and 5 W respectively for the earlier types. The lenses are specially manufactured and moulded in polystyrol with a ribbed inside surface diffracting the light from the lamp in such a way that a lighted lens is well visible, even if the panel is exposed to sunlight.

With 5 lamps in the panel 31 different combinations may be obtained but as a rule only 30 of these are utilized in order to reduce wiring cost. With continuous and flashing light 60 persons may be signalled. Both the flush and the external type may be fitted with buzzer to call attention when signals are in progress.

The casing for the external type and the cover plate for the flush type are made in plastic. Fig. 2 illustrates the build-up of the two lamp panels. It will be noted that the main component, the lamp insert with buzzer, is common to both types. The panels are designed so as to facilitate fitting and replacement of lamps as far as possible.

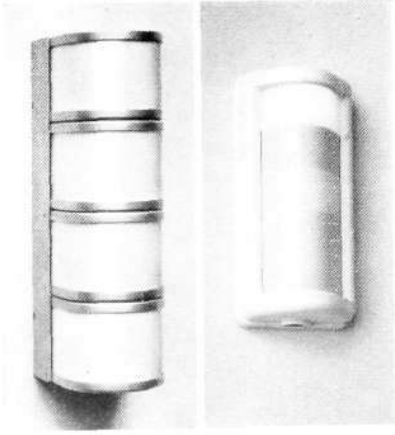


Fig. 3 X 4180
Lamp panels with lamp sections in a vertical row
(left) mild steel frame, (right) plastic frame

The control set, Fig. 4, is made in the manner of a plug switchboard and may be placed with the panel horizontally on a desk or vertically on the top of a switchboard. The set contains 3 jack strips, each containing 10 jacks, and one cordless plug. Each of the 30 jacks may be used for 2 persons, one with continuous light and one with flashing light, and the control set may, consequently, signal 60 persons in all.

The jacks are built up and wired in such a way that the combination of the required person is operated when the plug is inserted in the appropriate jack. There is, therefore, no need for the operator to know each person's lamp combination. The plug is merely inserted in a jack with the guidance of the name designation strip over each jack list. The designation strip may carry two names for each jack, as two persons may have the lamp combination for continuous or flashing light alternatively. Flashing light is obtained by operating a common key in the control set. The set also contains a push button for operation of the buzzers to call attention either at the commencement of the signal or if the required person does not respond within reasonable time.

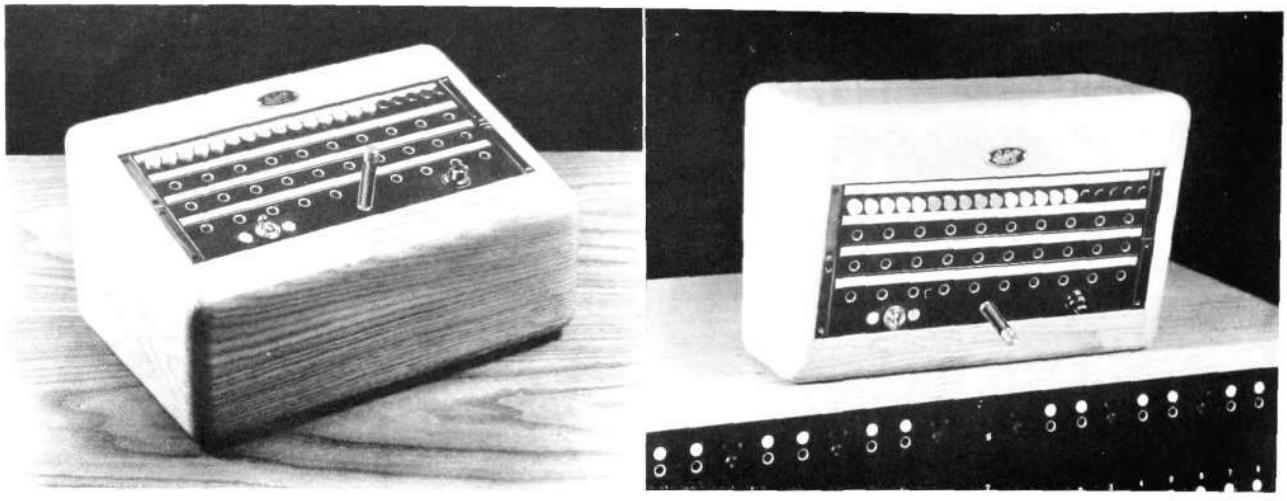


Fig. 4
Control set KEM 3111
(right) placed on top of switchboard

X 7566

Above the jack lists is a separate row of holes containing four groups of differently coloured loose dummy plugs. The operator may utilize these to indicate if a person is unavailable. A dummy plug does not issue a signal when inserted in a jack. If a person is away on a journey, the operator may, for instance, insert a red plug in his jack as an indication of this. If he is ill, a yellow plug may be used, on holiday a green plug, and if he has left for the day, a white plug.

The new lamp panels may also be used in connection with earlier types of control sets for manual transmission of lamp combinations or with automatic control sets. The new control set may similarly be connected to the old vertical types of lamp panels with colour combinations.

Ericsson Radio Receivers

C FREDIN, SVENSKA RADIOAKTIEBOLAGET, STOCKHOLM

U.D.C. 621.396.62

Svenska Radioaktiebolaget presents for the 1950—1951 season in first hand two table sets and one radio-gramophone. The smaller of the table sets goes by the name of the Ericsson Kuplett. Ericsson Operett is the larger one, a 6-valve receiver with band spread (localised) short-wave. The new radio-gramophone is called the Ericsson Spinett.

Ericsson Spinett

Ericsson *Spinett*, Fig. 1, is a very handy and neat radiogramophone, which can be placed anywhere. The radio- and gramophone equipment is concealed under a lid and the volume control in a small ornamental grid in the front alone disclose the nature of this piece of furniture. The legs can be unscrewed for transport purposes, so that the entire apparatus, when packed, is no larger than an ordinary table set. The apparatus is supplied in mahogany, walnut and light elm finish.

The Ericsson Spinett incorporates many features which as a rule are only to be found in more expensive radio-gramophones. The power amplifier in particular has numerous interesting coupling details. The output stage consists of two push-pull coupled output valves operated by a mixer valve which is here used as a double triode. One half of the valve functions as an audio frequency amplifier and the other half as a phase inverter. The intermediate frequency valve is a diode-pentode. The diode is operating as detector and supplies the

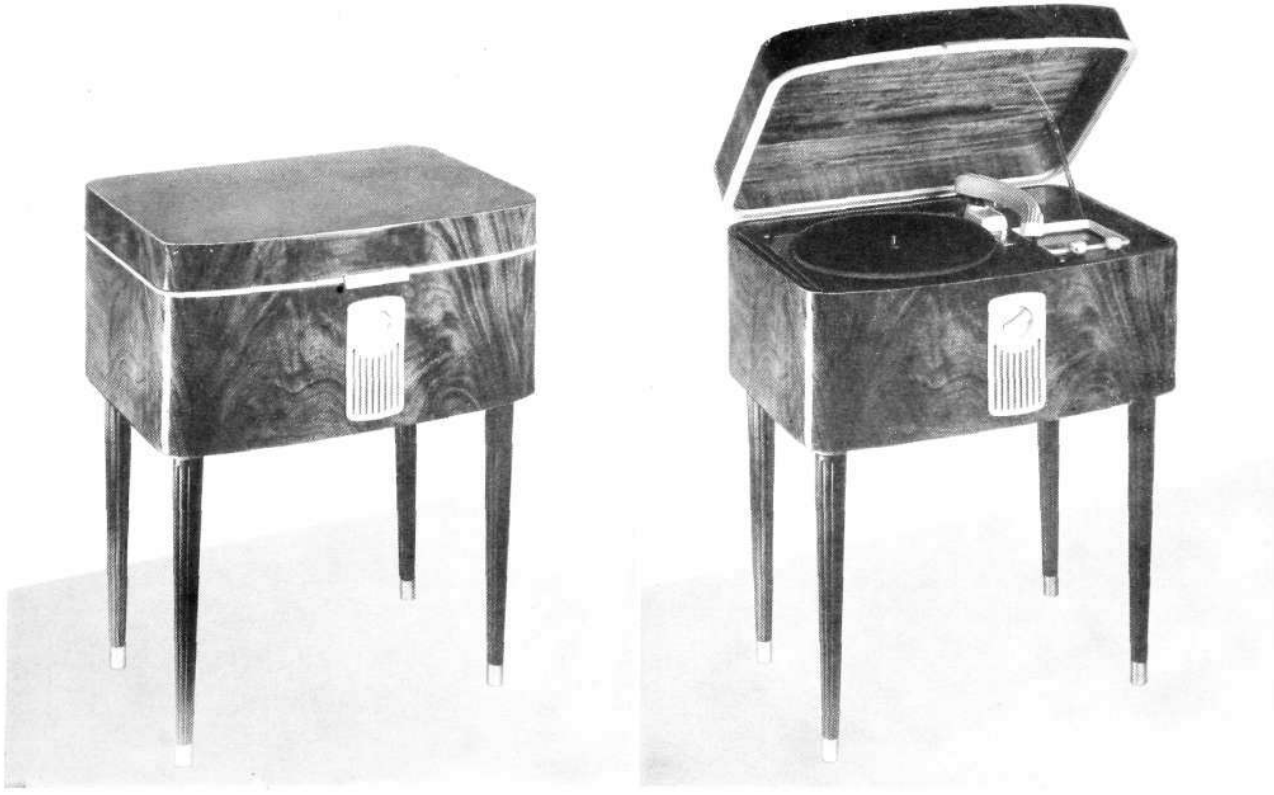


Fig. 1 X 7568
Ericsson Spinett
with lid raised, on the right

Fig. 2 X 6507

Dial, tone control and tuning knob combined with bandswitch

Record player on the left

DC voltage to the A.G.C. system. In the radio position the pentode is an intermediate frequency valve but in the gramophone position it operates as a correction valve. The purpose of this extra valve in the audio frequency amplifier is to improve the tone frequency characteristic of the pick-up. Furthermore, the coupling restores the bass register. When playing gramophone records the bass is actually reduced by 6 dB per octave below 256 c/s.

Ericsson Spinett has two loudspeakers. The bass is reproduced by a 9-inches P.M. speaker *HP 1021* with a flux density of 10 000 gauss. This bass speaker is directed downwards. The treble is reproduced by an *HK 1010* located behind the small decorative grid at the front of the radiogramophone. A choke in parallel prevents the bass to reach the treble-loudspeaker.

As already mentioned, only one of the controls is placed on the front of the apparatus. This device consists of an off-on switch and volume control. The knob or handel is flush-mounted in a cup of plastic, illuminated while the apparatus is on.

Fig. 3 X 7564

Circuit diagram for Ericsson Spinett

Ericsson Spinett is also fitted with a convenient radio-gramophone switch.

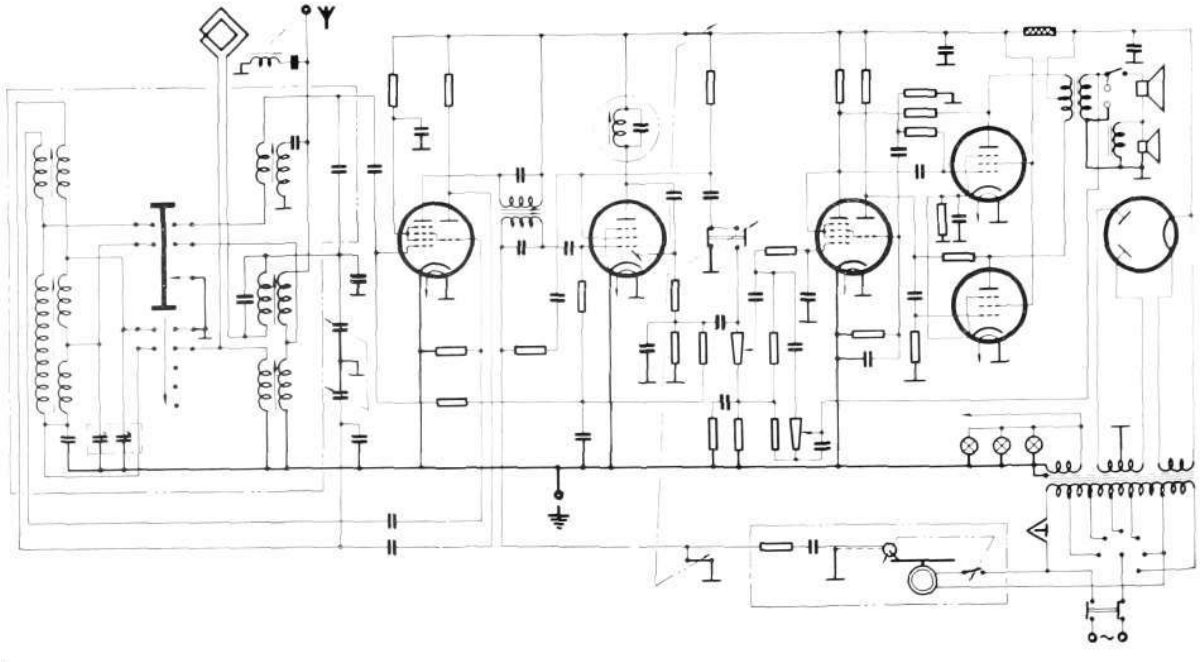


Fig. 4 X 6506
Ericsson Operett

Amongst other refinements, the built-in loop antenna may be noted which gives excellent results without the use of an external antenna. The terminals for an additional loudspeaker will also prove useful, as the amplifier has sufficiently output to feed a number of loudspeakers.

The record player is started by first raising the pick-up-arm and then moving it slightly to the right, and it stops automatically when the record has been played. The apparatus is adaptable to all ordinary AC voltages.

Ericsson Operett

Ericsson *Operett*, Fig. 4, is an entirely new ingeniously designed 6-valve set with 7 bands, tone control and tuning indicator. The construction differs in several respects from earlier models. The new chassis and dial arrangement permit the use of an appreciably smaller cabinet whilst retaining a large speaker. Speaking of size, Ericsson Operett cannot be included amongst the large table sets, but it is nevertheless provided with a 7-inch P.M. speaker *HK 1018*. The dial is printed in decorative colours which show up to the best advantage owing to the effective illumination.

Ericsson Operett has four controls, two knobs at the front and two at the sides, one on each side of the receiver. These controls have the following functions: left-hand knob is the volume control and right-hand tuning knob. At the sides the left-hand knob is a combination of an off-on switch and tone control; the right-hand knob controls the wave bands. The position of the wave band switch is shown by an indicator on the right-hand side of the dial.

On the back of the receiver are the antenna and earthing connections, terminals for extra loudspeaker, pick-up etc.

Fig. 5 X 4467
Intermediate frequency coil for Ericsson Operett

An entirely new design for the intermediate frequency filters has been adopted for Ericsson Operett. The coils, see Fig. 5, are divided into two small coils which are movable directly on the iron core. The distance between the coils determines the inductance. In consequence of the arrangement and coupling of the coils the self-capacity with its associated losses is reduced. The inductance is adjusted by varying the coupling between the coils and not, as is common, by displacing the core so that the latter partially projects outside the coils.

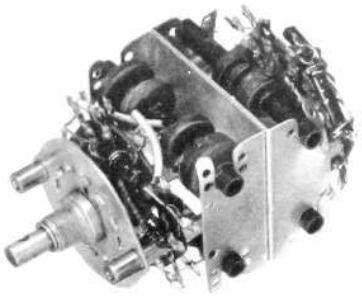


Fig. 6 X 4678
Coil assembly for Ericsson Operett

and consequently an excellent Q (quality factor) is obtained over the entire regulating range. The inductance may be varied ± 15 % and Q will be better than 260.

By means of a filter and a tuned anode circuit a band width of 20 kc/s is obtained with an attenuation of 40 dB. This figure is fully comparable with the results usually obtained with 4 tuned circuits.

Amongst other newly designed features may be noted a tuner of reduced size for medium wave, long wave and »localised short wave» covering the 16, 19, 25, 31, 41 and 49 m bands, see Fig. 6. The various antenna and oscillator coils are threaded into four pertinax tubes containing the necessary iron dust cores. The inductances are set at the correct value by moving the coils laterally. In a certain position they will contain the proper quantity of iron. The tuning coils are connected in series so that a certain sequence must be observed in trimming.

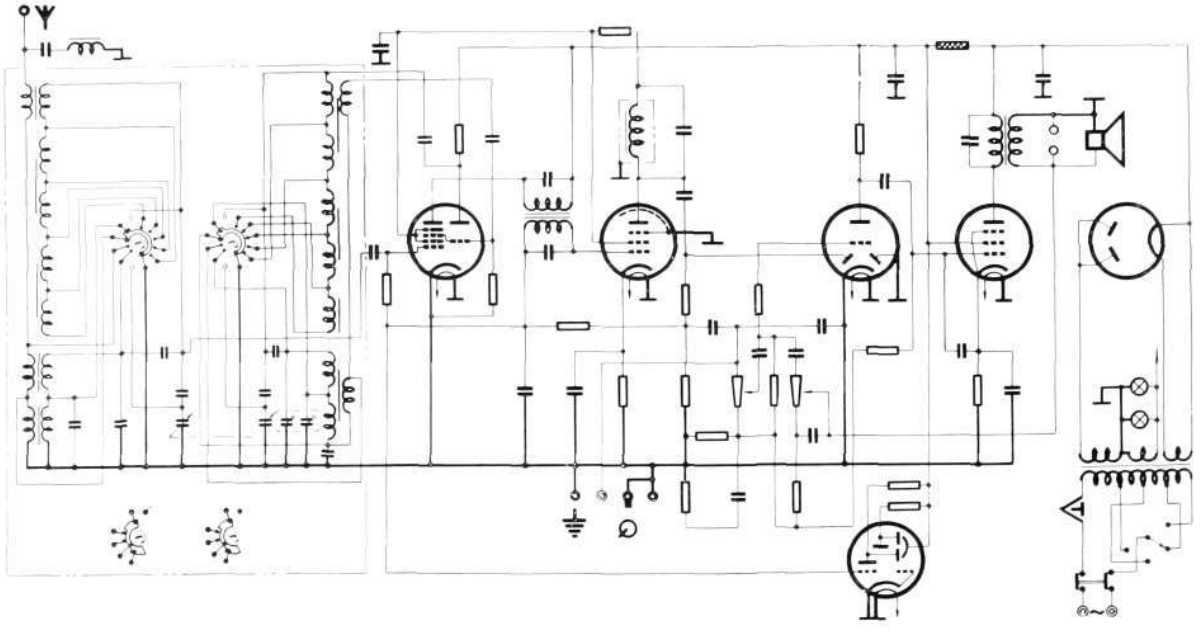
Trimming is rendered extremely simple owing to the fact that the majority of the capacitances concerned are fixed. Capacitative trimming is only required for medium- and long wave.

With a »localised short wave» the tuning is excellent within the broadcast bands which include the majority of the stations. In the intermediate ranges the dial is compressed and tuning is slightly less convenient. The coupling elements employed have been so selected that frequency drift caused by heating has been practically eliminated. A fourth advantage resulting from »localised shortwave» is that the risk of microphone effect between the tuning condenser and speaker is reduced to a minimum.

Notwithstanding the very small dimensions — the entire system is no larger than 50 × 70 mm — relatively good values are obtained for voltage gain and second channel frequency ratio. The oscillating voltage is even over the different ranges, see the following table.

Wavelength	m	19	25	31	41	49	250	500	800	1800
Oscillating voltage	V	4	6	6	5	3	8	6	11	8
Gain in antenna circuit	dB	12	15	15	14	11	15	19	3	17
Second channel suppression	dB	9	11	12	18	21	33	35	29	35

Fig. 7 X 7563
Circuit diagram for Ericsson Operett



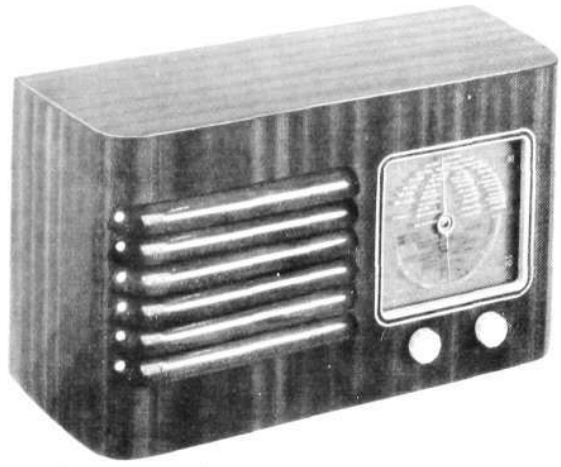


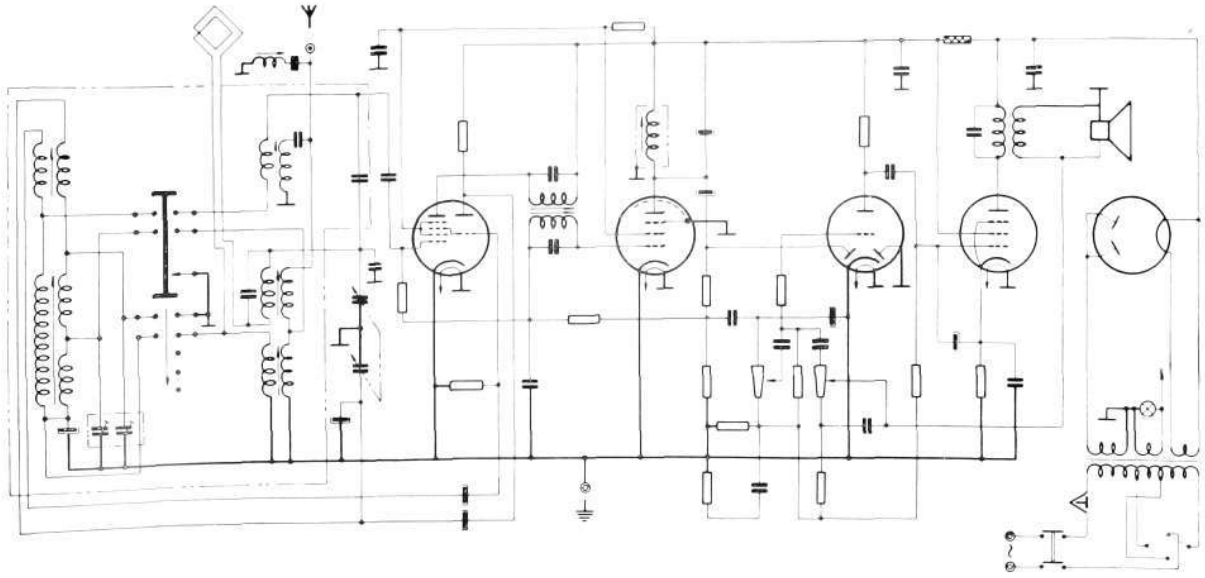
Fig. 8 X 6505
Ericsson Kuplett

Ericsson Kuplett

Ericsson *Kuplett* which is a 5-valve receiver, reminds slightly in appearance and electrical design, of Ericsson 1502 V previously described in the Ericsson Review No. 4, 1940. Ericsson Kuplett is, however, a larger type, and is superior to 1502 V in several respects. It is supplied in highly polished mahogany, walnut or light elm.

As may be seen from Fig. 8, the speaker opening is covered by a number of wooden bars in place of fabric. The station names are printed on thick glass which is richly illuminated. The two knobs below the dial functions as volume control and combined tuning — band switch respectively. The tone control is placed at the back of the receiver and the tone may be varied from a position giving treble, suitable for speech, to a normal response. On further rotation of the knob the top will be damped down, and the bass increased. The 6-inch P.M. speaker *HK 816* has a flux density of 8 000 gauss.

Fig. 9 X 7562
Circuit diagram for Ericsson Kuplett



		Spinett (507)	Operett (1505)	Kuplett (1503)
List of valves				
Converter		MECH 42	MECH 42	MECH 42
I.F. valve			6BA6	6BA6
I.F.-det. 2-corr.valve		MEAF 42		
AF-det. 2-valve			6AT6	6AT6
AF-inverter-valve		MECH 42		
Output valve 1		MEL 41	MEL 41	MEL 41
Output valve 2		MEL 41		
Rectifier valve		MAZ 41	MAZ 41	MAZ 41
Tuning indicator valve			MEM 34	
Number of valves		6	6	5
Number of valve functions		10	8	7
Number of dial lamps BA9S 6,5 V 0,2 A		3	2	1
Main features				
Sensitivity	μV/50 mW	20	10	20
Selectivity (band-width at 40 dB)	kc/s	24	20	24
Output	W	5	3	2.5
Intermediate frequency	kc/s	460	460	460
Receiver's power consumption	W	40	30	28
Record player's power consumption	W	15		
Switchable for voltages	W	110, 127, 140 155, 220, 245	110, 127 220, 245	110, 127, 220
Wave band ranges	m	690—2000 190—580 18—50	690—2000 190—580 40—51 32—42 26—32 20—26 16—20	690—2000 190—580 18—50
Speaker		HP 1021	HK 1018	HK 816
Flux density	gauss	10000	10000	8000
Effective cone area	cm²	300	200	135
External speaker terminals		4 Ω	4 Ω	
Treble speaker		HK 1010		
Flux density	gauss	10000		
Effective cone area	cm²	50		
Tuning indicator		—	x	—
Tone control		x	x	x
External speaker terminals		x	x	—
Pick-up		—	x	—
»Lokalised short wave»		—	x	—
Internal loop antenna		x	—	x
Dimensions and weight				
Height	mm	600	270	197
Width	mm	500	410	354
Depth	mm	335	185	139
Weight	kg	14	6.5	4.3

U.D.C. 621.395.23

ENGQVIST, E I: *Manual Private Branch Switchboards with Cords.* Ericsson Rev. 27 (1950) No 2 pp. 36—45.

The development of the L M Ericsson CB-switchboards has with regard to subscriber's boards resulted in a range of new cord type switchboards meeting very exacting requirements. The article gives a summary of the new types, new elements are described, connection possibilities are listed and finally the new method of packing is explained.

U.D.C. 621—755:629.113.012.3

LISELIUS, E: *Balancing Machine for Motor Car Wheels.* Ericsson Rev. 27 (1950) No 2 pp. 46—50.

In the introduction the article gives examples of the significant effect of unbalance in motor car wheels, followed by a short account of static and dynamic unbalance. The operating principles of the new Ermi balancing machine for motor car wheels and the method of carrying out balancing are then described.

U.D.C. 061.5 Alpha

KALLERMAN, N: *AB Alpha — Mechanical and Plastic Products.* Ericsson Rev. 27 (1950) No 2 pp. 51—56.

A brief description of the company's origin and activities.

U.D.C. 621.395.721:621.395.623.8

THAMES, G: *New Telephone Instrument for the L M Ericsson Loudspeaking Telephone.* Ericsson Rev. 27 (1950) No 2 pp. 57—59.

The L M Ericsson loudspeaking telephone has up to the present consisted of the telephone instrument, desk microphone, loudspeaker and amplifier. The telephone instrument and microphone has been combined into one single instrument, which is described with regard to design, advantages, applications and connections.

U.D.C. 654.938

TRÄGÅRDH, A: *New Type of Staff Locator.* Ericsson Rev. 27 (1950) No 2 pp. 60—62.

In the new L M Ericsson lamp panel for staff locators the position of the operated lamp in the panel, signifies the combination, whereas in the previous models the colour was an additional means of reading the signal. The control equipment has also been redesigned for the new staff locator system, which is described with regard to design and application.

U.D.C. 621.396.62

FREDIN, C: *New Ericsson Radio Receivers.* Ericsson Rev. 27 (1950) No 2 pp. 63—68.

A description of Ericsson Spinett — the new radio-gramophone — and also the Ericsson Operett and Ericsson Kuplett — the new table sets in the Ericsson series, together with circuit diagrams and technical data.

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