

TELEFONAKTIEBOLAGET L. M. ERICSSON
KATALOGEN

66.



Klischenummer

**TELEFONAKTIEBOLAGET
L. M. ERICSSON**

Ericsson

188

**Telephones
and
Signalling material**

TELEPHONES AND SIGNALLING MATERIAL



TELEFONAKTIEBOLAGET
L. M. ERICSSON
DÖBELNSGATAN 18, STOCKHOLM SWEDEN

CABLE ADDRESS: TELEFONBOLAGET

INTERNATIONAL TELEPHONE: 0 1 2 6

Telephone instruments, battery ringing

Telephone instruments for LB systems

Telephone instruments for manual CB systems

Telephone instruments for automatic CB systems

Intercommunication telephones

Ships' telephones

Loudspeaking conference telephones

Portable telephones and accessories

Manual switchboards

Private automatic switchboards

Private automatic branch exchanges, large automatic exchanges, automatic LB system, selective-calling telephones, etc.

Equipment for long-distance telephony, measuring instruments

Bells, horns and telephone accessories

Rectifiers and charging units

Fire-alarm systems

Burglar-alarm systems

Staff locaters

Electricity meters

Table of types

The present catalogue is intended to replace our previous loose-sheet catalogue. Further particulars of the material described in this catalogue will be supplied on request.

Line material has not been included and for this we refer to our special catalogue. This is also the case with electric impulse clocks and time recording equipment, which are sold by the Ericsson Sales Company, Kungstensgatan 20, Stockholm.

In addition to the material described in detail, there is a special section of general descriptions, page 58—68. This section treats private automatic branch exchanges for local communication and intercommunication with the public telephone net, automatic telephone system with 500-line selectors for large telephone exchanges, automatic LB telephone system for automatization of rural districts, selective-calling telephones, hallway telephones, church telephones, program distribution systems, electric level indicators and synchronous clocks. Exhaustive descriptions of this material will be supplied on request.

The catalogue has in main been arranged in order of the types, but for convenience certain exceptions have been made from this principle. In order to facilitate the finding of a certain type there is to be found at the end of the catalogue a table of contents which includes all material described, with the exception of spare parts.

The accuracy of the dimensions and weights cannot be guaranteed in view of constant alterations and improvements. This applies also to the illustrations. Prices may in all cases be obtained from our representatives.

TELEPHONES.

To ensure good telephone communications, it is necessary that both telephones and switchboards be of suitable type. When selecting the types the length of the lines as well as their insulation should be taken into account. With this as a basis telephones may be classified into three main groups.

- A. *Battery ringing telephones*, suitable for short lines (up to 250 or 300 m) with good insulation. The figure is of course not definite as line resistance and the voltage of the signalling battery will determine whether battery ringing telephones are suitable or not. Such installations can be built as intercommunication telephones or with manual or automatic switchboards.
- B. *Magneto telephones*, suitable for long lines and lines of inferior insulation such as bare wires on insulators. Such installations are usually built with manual switchboards.
- C. *Central battery (CB) telephones*, suitable for long lines with good insulation. Such installations can be built with manual or automatic switchboards.

The properties of intercommunication telephones and manual and automatic systems may be characterized as follows.

In manual systems the connections are set up by operators. The line system is simple and inexpensive and the telephones are simple and easy to keep

in order. Efficiency depends to a great extent on the operator and the manner in which she carries out her work. In intercommunication systems the calling party sets up the connection by setting the switch to the number wanted and pressing the signal key. Intercom. telephones are always ready for use, independent of operators, and are easy and inexpensive to work and keep in order. The number of extensions and the length of the lines must, however, be kept within reasonable limits otherwise the telephones will be too complicated, all lines having to be drawn to all the telephones in the system.

In cases where such systems are not suitable it is advisable to use automatic telephone systems which have all the advantages and none of the disadvantages of the other systems. Automatic switchboards have the following advantages:

- ready for use day and night,
- independent of operators,
- inexpensive in operation,
- rapid connection and disconnection,
- small space requirements.

Plans and estimates for installations furnished on request.

The diagrams below illustrate the ordinary types of telephone communication and suitable types of telephones for each diagram are indicated.

When extension bells are connected to the telephones the resistance of the bell should always be the same as that of the bell in the telephone.

USUAL TELEPHONE INSTALLATIONS.

A. For lines of up to 250 or 300 m.

Battery ringing telephones.

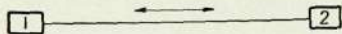
1. Two stations.

a. Signalling in one direction.



1: BC 3011.
2: BC 3001 with bell RA 510/3 or RA 610/3.

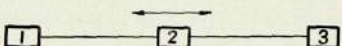
b. Signalling in both directions.



1 and 2: BC 3011 and BC 3012 respectively, with bell RA 510/3 or RA 610/3, or BC 1303, BC 2052 or BC 3051.

2. Three stations.

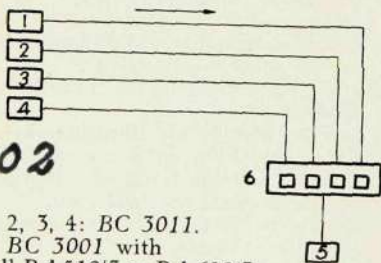
The telephones are connected in parallel, each being called by a different signal; the signals are heard on all telephones.



1, 2 and 3: BC 1303 or BC 2052.

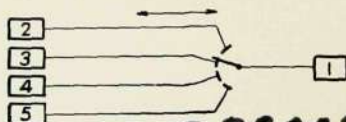
3. More than three stations.

a. Signalling in one direction.



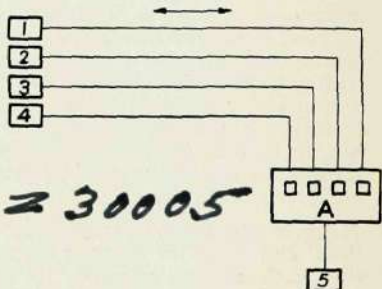
1, 2, 3, 4: BC 3011.
5: BC 3001 with bell RA 510/3 or RA 610/3.
6: annunciator RP 130w/5.

b. Signalling in both directions.



Z 30003
1: BC 3051.
2, 3, 4, 5: BC 3051 or BC 3012 with bell RA 510/3 or RA 610/3.
Switch: RL 100 — RL 160.
The stations 2, 3, 4 and 5 cannot communicate with each other.
In place of telephone 1 with a separate switch, an intercom. telephone HA 270/10 may be used; telephones 2, 3, 4 and 5 should then be HC 130 or HC 210.

c. A telephone connected to a switch-board puts through calls between several stations.

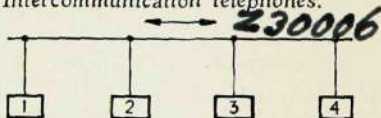


1, 2, 3, 4: BC 1303 or BC 2052.

5: BC 1303.

A: OA 1000, OA 1010 or OB 1100.

d. Intercommunication telephones.



Each telephone can call and converse with all the others. The calls are non-secret. Several calls can be carried on at one time. The telephones should be HA 270/10 or HA 270/20. See further page 36.

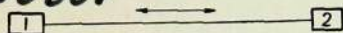
B. For lines longer than 250 or 300 m.

Magneto telephones.

1. Two stations.

Signalling in both directions.

2 30001



1 and 2: AB 126, AB 127, AB 129, AB 711, AC 550 or AC 560.

If wanted, extension bell with 1000 ohm resistance.

For very long lines:

1 and 2: AB 128, AB 712 or AC 570.

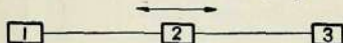
If wanted, extension bell with 2000 ohm resistance.

2. Three stations.

a. Calls and conversations between all telephones.

The telephones are connected in parallel, each being called by a different signal; the signals are heard on all telephones.

2 30004



1, 2, 3: AB 126, AB 127, AB 129, AB 711, AC 550 or AC 560.

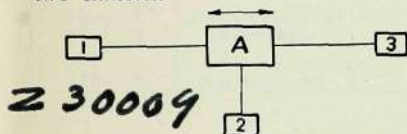
If wanted, extension bell with 1000 ohm resistance.

For very long lines:

1, 2, 3: AB 128, AB 712 or AC 570.

If wanted, extension bell with 2000 ohm resistance.

b. One telephone connected to an extension switch puts through calls between two stations.



2 30009

1, 2, 3: AB 126, AB 127, AB 129, AB 711, AC 550 or AC 560.

A: AF 240.

For very long lines:

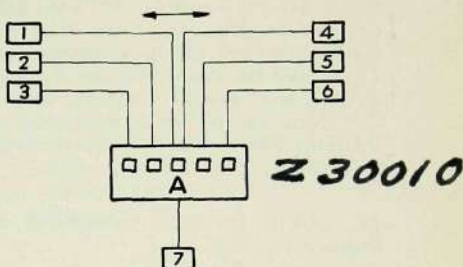
1, 2, 3: AB 128, AB 712 or AC 570.

A: AF 241.

A + 2: AE 265 or AE 270.

3. More than three stations.

A telephone connected to a switchboard puts through calls between several stations.



2 30010

1, 2, 3, 4, 5, 6, 7: AB 126, AB 127, AB 129, AB 711, AC 550 or AC 560.
A: OA 1000, OA 1010, OB 1100.

or

1, 2, 3, 4, 5, 6: as above.

A + 7: switchboard OB 1200-OB 5600.

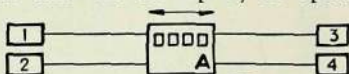
C. For lines with good insulation.

Central battery systems.

In the cases described above each telephone requires a microphone battery but in the examples given below the whole system is fed from a single common battery.

1. Manual switchboard and telephones.

All calls are set up by an operator.

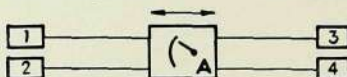


2 30011

1, 2, 3, 4: CD or CG.
A: OE 200-OE 400, OF 500.

2. Automatic switchboard and telephone.

Calls are set up by means of the dials of the telephones.



2 30012

1, 2, 3, 4: DE or DF.
A: OL 3510-OL 3578.

BATTERY RINGING TELEPHONES.

The telephones described below BC 3001, BC 3011 and BC 3012 are particularly suitable for private telephone installations of the most simple type. They may be connected to ordinary electric bell systems and are suitable for lines up to 300 m with good insulation. The connection is very simple (diagrams 1, 2 and 3, page 12).

BC 3001. Domestic telephone for battery ringing.

Parts:

microtelephone RE 9302 with cord RS 4252, terminal block of black polished wood (diameter 51 mm) with terminals and suspension hook for the microtelephone.

Weight: 0.25 kg.



This telephone is used in connection with BC 3011 for installations with signalling in one direction (diagram 1, page 12). For the reception of the signals a separate bell is required, RA 510/3 or RA 610/3, or, if louder signals are desired RA 500/3. Two dry cells RK 210 are required. A suitable battery case is RK 2300. Lead cable, Type EEB, is suitable for the wiring.

Z 20000

BC 3011, BC 3012. Domestic telephones for battery ringing.

Parts:

microtelephone RE 9312 with key and cord RS 4252, terminal block of black polished wood (diameter 51 mm) with press button for signalling, terminals and suspension hook for the microtelephone.

Weight: 0.28 kg.

Two dry cells RK 210 are required. A suitable battery case is RK 2300. Lead cable, Type EEB, is suitable for the wiring. When these telephones are connected for signalling in two directions (diagram 2, page 12) each telephone requires a separate bell RA 510/3, RA 610/3, or, if louder signals are desired, RA 500/3.



Z 30001

catalogue number	connection of terminal block	for use with
BC 3011	Terminals 1 and 4 connected	BC 3001 BC 3012
BC 3012	Terminals 1 and 4 not connected	BC 3011

BC 3051. Domestic telephone for battery ringing.

Parts:

microtelephone *RE 9312* with key and cord *RS 4252*, terminal block of black polished wood (dimensions 75×116 mm) with press button for signalling, bell, terminals and suspension hook for the microtelephone.

Weight 0.6 kg.



Two telephones can be connected over a line up to 300 m with good insulation. If the distance is less than 50 m one common battery will be sufficient (diagram 4, page 13). For greater distances it is advisable to use one battery for each telephone; two conductors between the telephones are then sufficient (diagram 5, page 13).

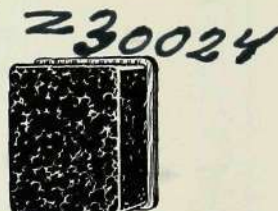
If several telephones are to be connected, a separate simple switch with a number of contacts corresponding to the number of telephones in the system

is required at each telephone. In such systems only those telephones with switches can call and talk with the others (diagram 6, page 13).

Z
20002

An installation with up to 5 telephones can be obtained by means of an inductive resistance with condenser, *BC 3060*, and a switch for each telephone. All telephones can then call and talk with each other. Only one conversation can be carried on at a time (diagram 7, page 14). The length of the lines should not exceed 50 m. A suitable battery is composed of 2 dry cells *RK 210* connected in series. A suitable battery case is *RK 2300*. Lead cable, Type *EEB*, is suitable for the wiring.

BC 3060. Inductive resistance with condenser.



Parts:

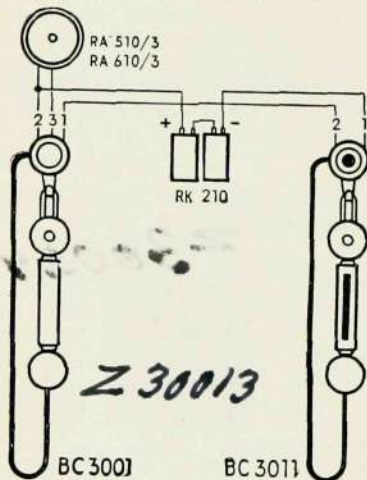
condenser *RI 652*, 2 μ F, base plate of black polished wood, inductive resistance 25 ohm, cover of enamelled sheet-iron.

Dimensions: height 92 mm, width 72 mm, depth 62 mm, weight 0.4 kg.

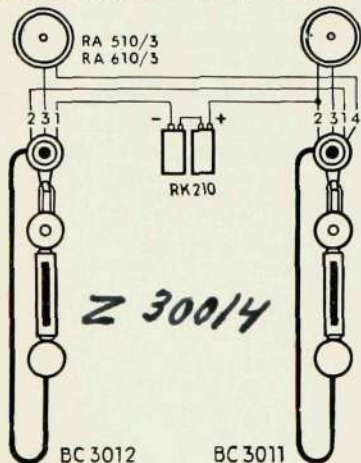
This apparatus is used in connection with telephones *BC 3051* when these are to be connected as intercom. telephones (diagram 7, page 14).

USUAL DIAGRAMS OF BATTERY RINGING
DOMESTIC TELEPHONES.

1. Domestic telephones connected for signalling in one direction.



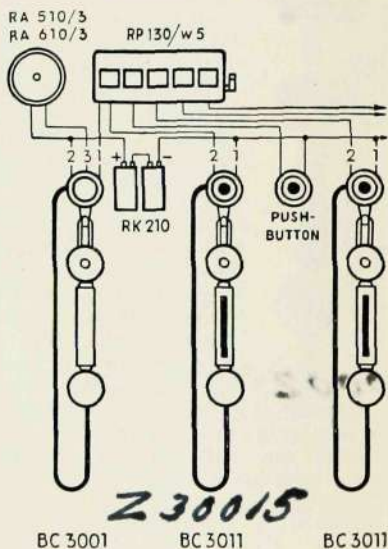
2. Domestic telephones connected for signalling in both directions.



Note:

Care should always be taken that the positive and negative poles of the batteries be connected to the terminals of the telephones as shown in these diagrams, otherwise the receivers may become demagnetized.

3. Domestic telephones connected to electric bell installation with annunciator. Signalling in one direction.

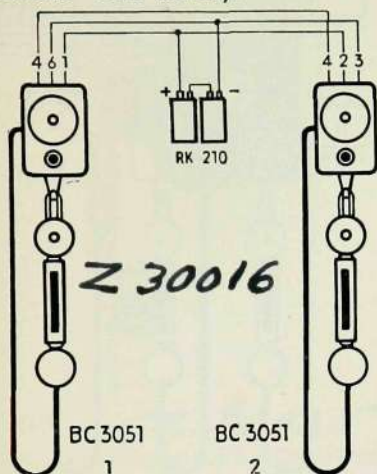


Suitable annunciators are *RP 130w/5* and *RP 130w/10* for 5 and 10 lines respectively (page 92).

Terminal 1 of *BC 3001* should be connected to the main terminal of the annunciator.

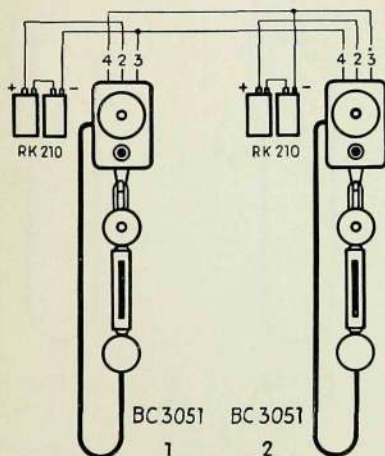
Terminal 2 of *BC 3011* should be connected to the corresponding terminal of the annunciator.

4. Domestic telephones BC 3051 connected for signalling in both directions. One battery.



In addition to the connections shown in the diagram, the following terminals *inside* the telephones should be connected to each other:
 in telephone 1: terminals 2, 3 and 5;
 in telephone 2: terminals 1 and 2; terminals 5 and 6.

5. Domestic telephones BC 3051 connected for signalling in both directions. Two batteries.

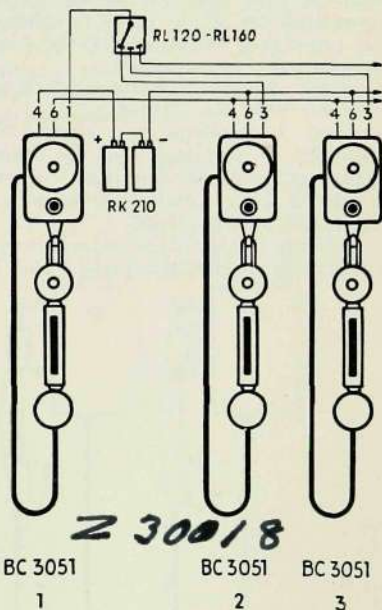


Z 30017

This connection is used instead of number 4 when the distance between the telephones 1 and 2 is great. For this connection only 2 conductors between the telephones are required; while connection number 4 necessitates 3 conductors.

In addition to the connections shown in the diagram, the following terminals *inside* the telephones should be connected to each other:
 terminals 1 and 2; terminals 5 and 6. These connections should be made in both telephones.

6. Domestic telephones BC 3051 in connection with a switch.



Telephone 1 is connected to a switch. This telephone can call and converse with the telephones 2, 3, 4. . . The telephones 2, 3, 4. . . can call and converse with telephone 1 but not with each other.

Terminal 3 of the telephones 2, 3, 4 . . . should be connected to the corresponding terminals of the switch.

In addition to the connections shown in the diagram, the following terminals *inside* the telephones should be connected:

in telephone 1: terminals 2, 3 and 5;
in telephone 2, 3, 4 . . . : terminals 1 and 6; terminals 2 and 5.

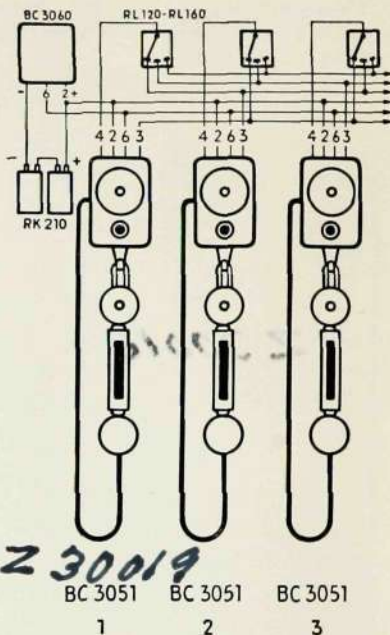
7. Domestic telephones BC 3051 connected as intercom. telephones.

All telephones are connected to the lines over switches, and all telephones can call and converse with each other. Only one conversation can be carried on at a time and the lifting of the microtelephone of a third telephone will cause this station also to be connected to the conversation.

A suitable battery is one composed of three dry cells RK 210 of 1.5 V.

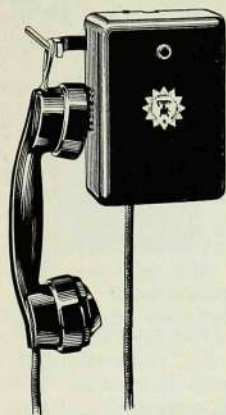
Terminal 3 of telephone 1 should be connected to terminal 1 of the other telephones' switches; terminal 3 of telephone 2 to terminal 2 of the other telephones' switches etc.

In addition to the connections shown in the diagram, the terminals 1 and 2



inside each telephone should be connected to each other.

BC 1303. Battery ringing wall telephone.



RC 4000/40, 40 ohm, and cord RS 5080, DC bell RA 610/4.5, 40 ohm, press button for signalling, case of black enamelled sheet-iron.

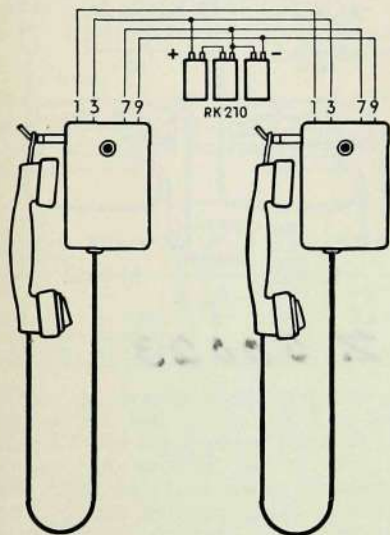
Dimensions: height 160 mm, width 115 mm, weight 1.7 kg. The dimensions refer to the backplate of the telephone.

This telephone can be used in connection with BC 1303 and BC 2052 and requires two dry cells RK 210. If the distance between the telephones is great, an additional dry cell RK 210 is necessary. In such case it should be observed that only two dry cells may be connected to the microphone circuit. A suitable battery case is RK 2300 for two and RK 2310 for three dry cells. Fig. 1 shows the connection of two telephones with a common battery, and Fig. 2 the connection of two or more telephones each with separate batteries.

Parts:

Z 30025

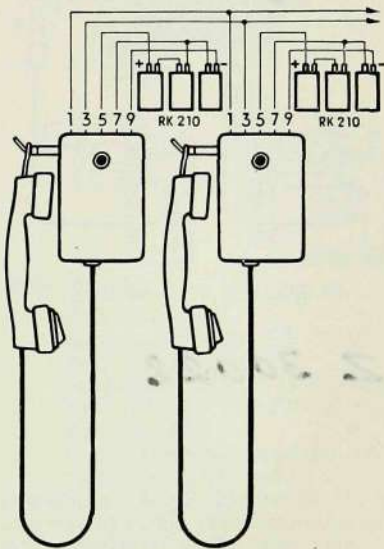
microtelephone RE 4036 of black bakelite with removable capsule transmitter



BC 1303

BC 1303

Fig. 1.



BC 1303

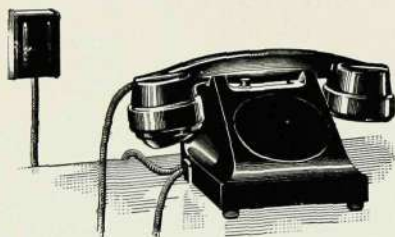
BC 1303

Fig. 2.

Z 30020

Z 30021

BC 2052. Battery ringing table telephone.



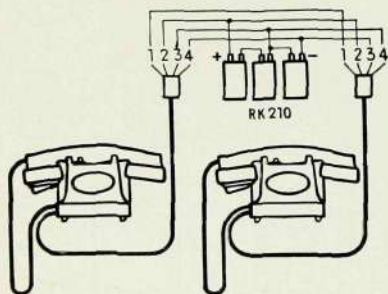
Parts:

Z 30026

microtelephone RE 1036 of black bakelite with removable capsule transmitter RC 4000/40, 40 ohm, and

cord RS 5080, DC bell RA 610/4.5, 40 ohm, terminal block RK 8000/6, instrument cord RS 6163, press button for signalling, case of black bakelite.

Dimensions: height 118 mm, width 233 mm, depth 150 mm, weight 1.7 kg. This telephone can be used in connection with BC 1303 and BC 2052 and requires two dry cells. If the distance between the telephones is great an additional dry cell RK 210 is required, but it should be observed that two dry cells only may be connected to the microphone circuit. A suitable battery case is RK 2300 for two and RK 2310 for three dry cells. Fig. 1 shows the connection of two telephones with a common battery, and Fig. 2 the connection of two or more telephones each with a separate battery. By means of bracket RK 5005 this telephone may be used as wall set.

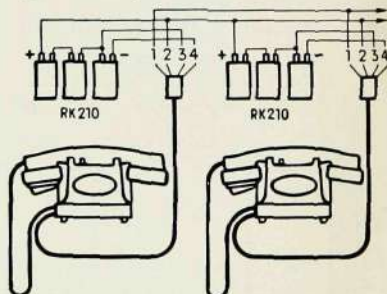


BC 2052

BC 2052

Fig. 1.

Z 30022



BC 2052

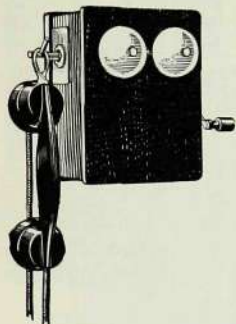
BC 2052

Fig. 2.

Z 30023

TELEPHONE INSTRUMENTS FOR MANUAL LB SYSTEMS.

AB 126-AB 128. Magneto wall tele-
phones.



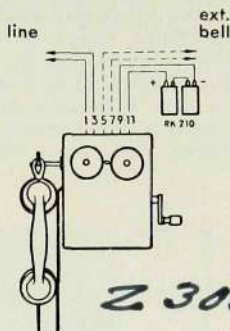
Parts: **Z 30027**

microtelephone *RE 4032* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 6162*, generator and bell according to the table below, case of polished oak.

Dimensions: height 214 mm, width 166 mm (202 mm for *AB 128*). The dimensions refer to the backplate of the telephone.

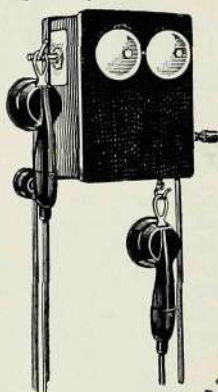
catalogue number	generator	number of magnets	resistance of the bell	weight
			ohm	kg
AB 126	RH 3236	3	1000	4.2
AB 127	RH 4381	4	1000	4.7
AB 128	RH 5602	5	2000	5.3

When the handle of the generator is turned the bell is cut out. Two dry cells *RK 210* are required for each telephone. A suitable battery case is *RK 2300*. In places where disturbing noise occurs and the speech as transmitted by the ordinary kind of microphone is not satisfactory, it is advisable to use *AB 129* which is provided with a special laryngotelephone.



Z 30161

AB 129. Magneto wall telephone with laryngotelephone.



Z 30028

Parts: generator *RH 3236*, bell 1000 ohm, laryngotelephone *RE 9610* of black bakelite with rubber-insulated cord *RS 6200*, extra receiver *RD 220* of black bakelite with rubber-insulated cord *RS 4900*, case of polished oak.

Dimensions: height 214 mm, width 166 mm, weight 4.7 kg. The dimensions refer to the backplate of the telephone.

When the handle of the generator is turned the bell is cut out. The receivers are provided with leather pads.

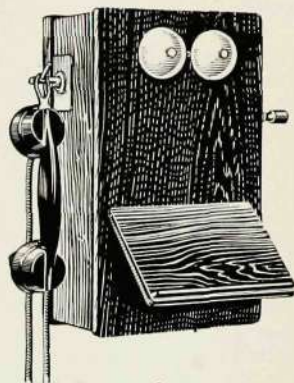
Instruments with laryngotelephones are designed for use in places such as in engine rooms, power stations, etc. where disturbing noise makes it impossible to carry on conversation by means of ordinary microtelephones. The laryngotelephone has a special microphone which is held against the larynx during conversations (see illustration). The

AB 711, AB 712. Magneto wall telephones with battery compartment.



Z 30029

speech oscillations are transferred direct to the diaphragm of the microphone without disturbance from external noise. The speech as reproduced is perfectly clear and distinct. Two dry cells *RK 210* are required. A suitable battery case is *RK 2300*.

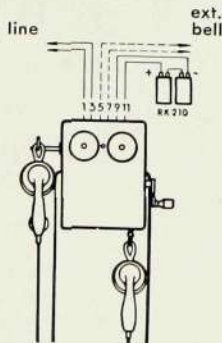


Z 30030

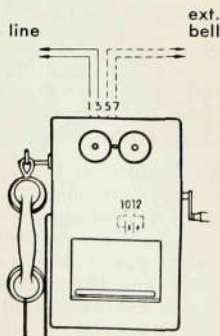
Parts:

microtelephone *RE 4032* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 6162*, generator and bell according to the table below, case of polished oak.

Dimensions: height 398 mm, width 238 mm. The dimensions refer to the backplate of the telephone.



Z 30162



Z 30163

catalogue number	generator	number of magnets	resistance of the bell	weight
AB 711	RH 4381	4	1000 ohm	7 kg
AB 712	RH 5602	5	2000	7.5

When the handle of the generator is turned the bell is cut out. Two dry cells *RK 220* are required.

AB 2400. Extension wall telephone for LB systems.

Small model without generator or bell.



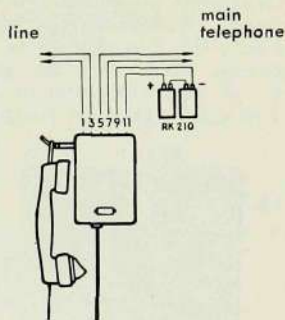
Parts: **230031**

microtelephone *RE 4032* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 6162*, case of black enamelled sheets iron.

Dimensions: height 160 mm, width 115 mm, weight 1.5 kg. The dimensions refer to the backplate of the telephone. This telephone is designed for use in connection with telephones of type *AB* and *AC*. It should be placed where the signals from the main telephone can be heard by the person using the ex-

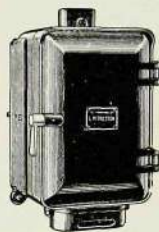
tension telephone. Calls from one telephone cannot be heard in the other. This telephone requires a microphone battery composed of two dry cells *RK 210*.

A suitable battery case is *RK 2300*.



230164

AB 2536, AB 2555. Iron-cased, waterproof magneto telephones.



Parts: **230035**

microtelephone *RE 1018* with removable capsule transmitter *RC 4000/40*, 40 ohm without mouthpiece, and rubber-insulated cord *RS 6201*, bell 2000 ohm, 2 dry cells *RK 190*, generator with 5 magnets according to the table, case of cast iron.

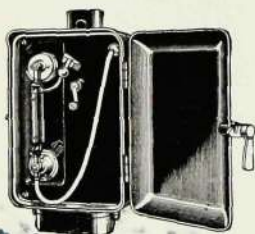
Dimensions: height 440 mm, width 275 mm, depth 170 mm, weight 30 kg.

catalogue number	generator
AB 2536	RH 5202
AB 2555	RH 5203

The telephone is divided in three compartments. The front compartment contains only the microtelephone with its suspension hook and the generator crank. A side compartment contains the two cells. The rear compartment,

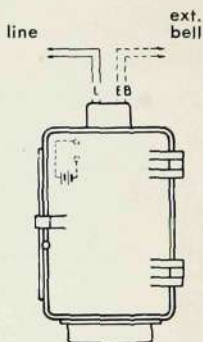
suitable paste or compound after the wires have been led in. These holes are also threaded at the top, thus permitting iron or other tubes to be screwed on to protect the wires, if desired. The telephone AB 2536 is provided with a special generator suitable for use in mines or other places where sparks from other generators might cause an explosion.

The telephone AB 2555 is suitable for use in places exposed to damp or rough usage, such as in railway yards, ship yards and mines where there is no risk of explosion.



Z 30036

which is air and watertight, contains the remaining parts of the telephone. Incoming wires are led through two holes at the top of the telephone, these holes being so shaped that they may be hermetically sealed by filling with



Z 30165

AC 550—AC 570. Magneto table telephones.



Z 30032

Parts:

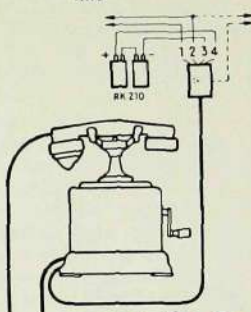
microtelephone *RE 1044* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 6160*, terminal block *RK 8000/6*, instrument cord *RS 9506*, case of black enamelled sheet-iron, generator and bell according to the table.

Dimensions: height 275 mm, width 245 mm, depth 150 mm.

catalogue number	generator	number of magnets	resistance of the bell	
			ohm	kg
AC 550	RH 3230	3	1000	4.8
AC 560	RH 4451	4	1000	5.2
AC 570	RH 5502	5	2000	5.6

These telephones can be supplied with two cranks at an additional cost. Two dry cells *RK 210* are required. A suitable battery case is *RK 2300*. By means of brackets *DL 502* these telephones may be used as wall sets.

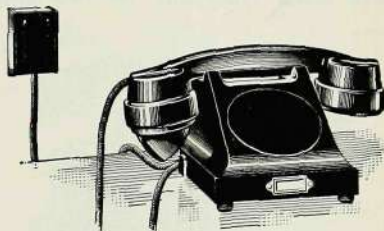
line ext. bell



Z 30166

AC 1010. Extension table telephone for LB systems.

Small model without generator or bell.



Z 30033

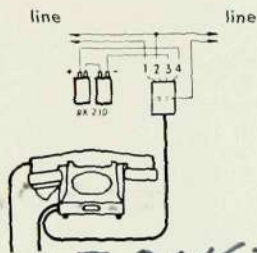
Parts:

microtelephone *RE 1042* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 6162*, terminal block *RK 8000/5*, instrument cord *RS 9507*, case of black bakelite.

Dimensions: height 118 mm, width 233 mm, depth 150 mm, weight 1.4 kg.

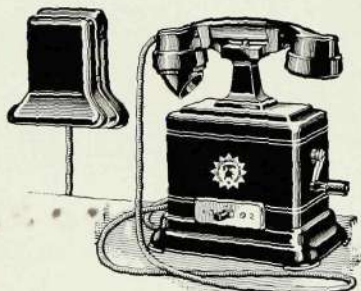
This telephone is designed for use in connection with telephones of type *AB* and *AC*. It should be placed where the signals from the main telephone can be heard by the person using the extension telephone. Calls from one telephone cannot be heard in the other.

This telephone requires a microphone battery composed of two dry cells *RK 210*. A suitable battery case is *RK 2300*. By means of bracket *RK 5005* this telephone may be used as wall set.



Z 30167

AE 265—AE 270. Intermediate magneto table telephone for two lines.



Parts: Z 30034

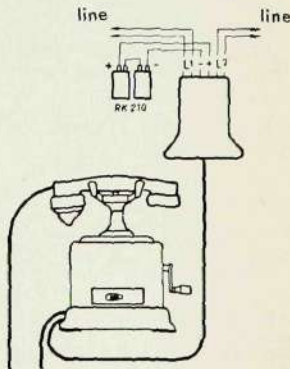
bell 1000 ohm, microtelephone *RE 1044* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 6160*, generator according to the table,

case of black enamelled sheet-iron, wall fitting with a 1000 ohm bell and instrument cord *RS 9808*. The telephone has a three-way key by means of which connection to or interconnection of the other two telephones may be established.

Dimensions: height 275 mm, width 245 mm, depth 150 mm.

catalogue number	generator	number of magnets	weight
AE 265	RH 4451	4	kg 6.3
AE 270	RH 5502	5	6.7

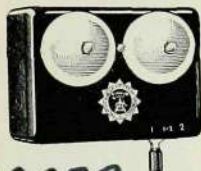
Connection to the lines is made when the key is in left or right position. When it is in central position the two lines are joined and the conversation can then not be heard in the intermediate telephone. Two dry cells *RK 210* are required for this telephone. A suitable battery case is *RK 2300*. By means of bracket *DL 502* these telephones may be used as wall sets.



Z 30168

EXTENSION SWITCHES.

AF 240, AF 241. Extension switches for LB systems.



Z 30039

These extension switches are fitted in cases of black enamelled sheet-iron and have a three-way key and a polarized AC bell.

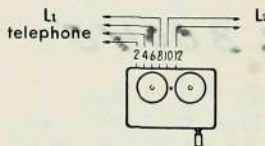
AF 240 has a 1000 ohm bell.

AF 241 has a 2000 ohm bell.

Dimensions: height incl. key 147 mm, width 163 mm, depth 88 mm, weight 1.25 kg.

These extension switches are designed for use in conjunction with telephones of the types AB and AC. The combi-

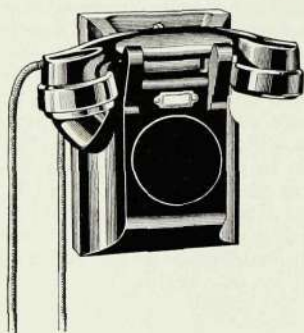
nation of a telephone and an extension switch serves the same purpose as the intermediate telephones of type AE and can communicate with either of the two lines L1 and L2 depending on the position of the key. The key should usually be in one of the side positions so that a signal from one of the lines will ring at the intermediate station only and not on the other extension line. When the key is in mid position the two lines L1 and L2 are connected with each other. When any of the above telephones is in communication with another the conversation cannot be overheard.



Z 30197

TELEPHONE INSTRUMENTS FOR MANUAL CB SYSTEMS.

CD 1200. Wall telephone for CB systems.

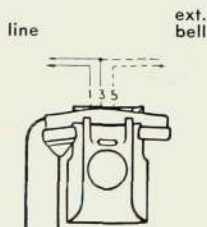


Z 30040

Parts:

dial blank *RG 5000* covering the hole for the dial, condenser *RI 260*, 1 μ F, microtelephone *RE 1041* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and cord *RS 5080*
bell 1000 ohm, case of black bakelite.

Dimensions: height 217 mm, width 151 mm, weight 2.3 kg. The dimensions refer to the backplate of the telephone.



24

Z 30169

CD 1250. Wall telephone for CB systems.

Small model with buzzer instead of bell.

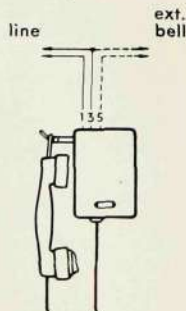


Parts:

Z 30041

condenser *RI 260*, 1 μ F, microtelephone *RE 4037* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and cord *RS 5080*, buzzer, 2000 ohm, case of black enamelled sheet-iron.

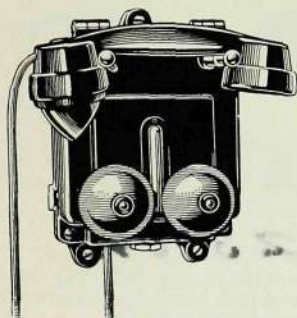
Dimensions: height 160 mm, width 115 mm, weight 1.62 kg. The dimensions refer to the backplate of the telephone.



Z 30170

CD 2010. Watertight wall telephone for CB systems.

Dimensions: height 160 mm, width 115 mm, weight 1.5 kg. The dimensions refer to the backplate of the telephone.



Parts:

Z 30074

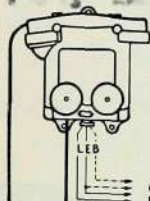
condenser RI 260, 1 μ F, microtelephone RE 1017 of black bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and rubber insulated cord RS 5120, case of light metal, bell 1000 ohm.

Dimensions: height 236 mm, width 180 mm, weight 4 kg. The dimensions refer to the backplate of the telephone.



Z 30031

This telephone is designed for use in connection with telephones of type CD and CG. It should be placed where the signals from the main telephone can be heard by the person using the extension telephone. Calls may be carried on in the same manner from either telephone. Calls from one telephone cannot be heard in the other.



ext. bell line

Z 30195

CD 3010. Extension wall telephone for CB systems.

Small model without bell.

Parts

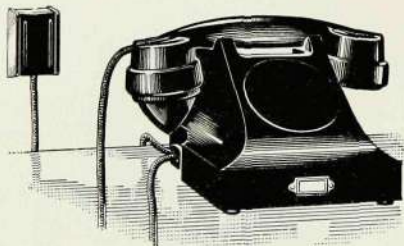
microtelephone RE 4031 of black bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and cord RS 5080, case of black enamelled sheet-iron.

line main telephone



Z 30171

CG 502. Table telephone for CB systems.

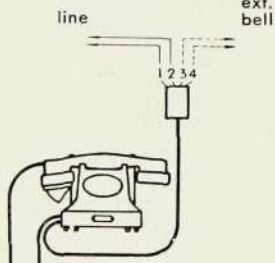


Z 30042

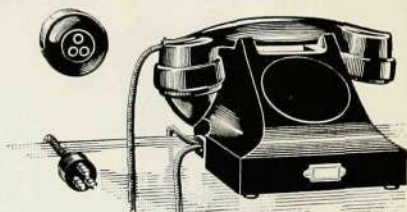
Parts:

dial blank *RG 5000* covering the hole for the dial, condenser *RI 260*, 1 μ F, microtelephone *RE 1041* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and cord *RS 5080*, terminal block *RK 8000/2*, instrument cord *RS 5080*, bell 1000 ohm, case of black bakelite.

Dimensions: height 140 mm, width 233 mm, depth 175 mm, weight 2.3 kg. This telephone may be mounted on a wall by means of a bracket *RK 5010*.

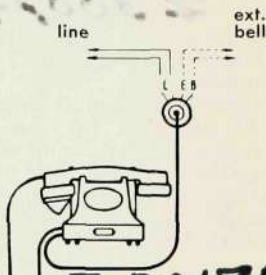


CG 504. Table telephone for CB systems.



Z 30043

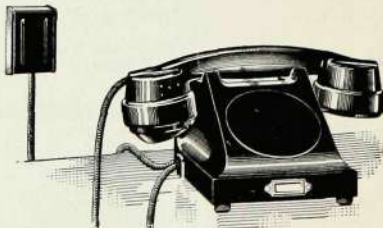
Same parts as CG 502, but three-part plug and jack instead of terminal block, plug cord *RS 5220*.



Z 30173

CG 552. Table telephone for CB systems.

Small model with buzzer instead of bell.



Z 30044

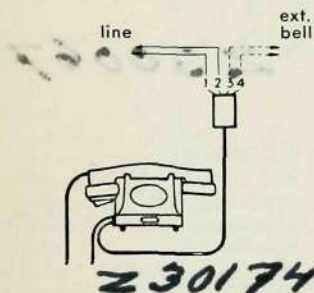
Parts:

dial blank *RG 5000* covering the hole for the dial, condenser *RI 260*, 1 μ F,

microtelephone *RE 1037* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and cord *RS 5080*, terminal block *RK 8000/2*, instrument cord *RS 5080*, buzzer, 2000 ohm, case of black bakelite.

Dimensions: height 118 mm, width 235 mm, depth 150 mm, weight 1.65 kg. This telephone is suitable for offices etc. where ring signals are not desirable. The buzzer gives discreet but distinct signals. The telephone may be mounted on a wall by means of a bracket *RK 5005*.

If desired the telephone is supplied with three-part plug and jack instead of terminal block.



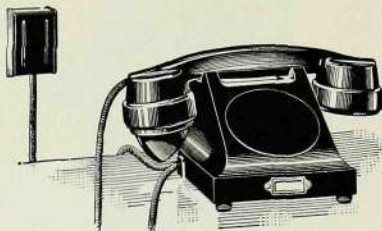
CG 3010. Extension table telephone for CB systems.

Small model without bell.

Parts:

microtelephone *RE 1041* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and cord *RS 5080*,

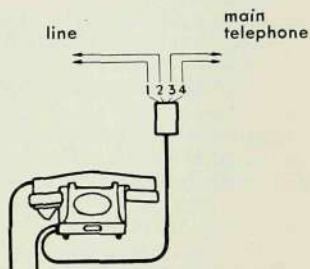
terminal block *RK 8000/9*, instrument cord *RS 5080*, case of black bakelite.
Dimensions: height 118 mm, width 235 mm, depth 150 mm, weight 1.4 kg.



Z 30033

This telephone is designed for use in connection with telephones of type *CD* and *CG*. It should be placed where the signals from the main telephone can be heard by the person using the extension telephone. Calls may be carried on in the same manner from either telephone. Calls from one telephone cannot be heard in the other.

This telephone may be mounted on a wall by means of a bracket *RK 5005*.

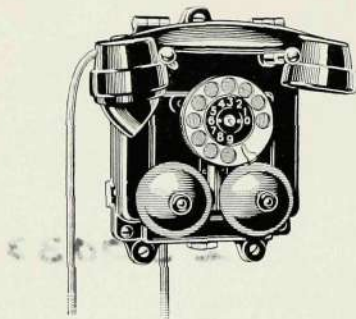


Z 30175

AUTOMATIC TELEPHONES.

DE 140. Waterproof automatic wall telephone.

DE 200. Automatic wall telephone.



Z 30066

Parts:

waterproof dial *RG 403*, dial cord *RS 5050*, condenser *RI 260*, 1 μ F, microtelephone *RE 1017* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and rubber insulated cord *RS 5120*, bell 1000 ohm, case of light metal.

Dimensions: height 236 mm, width 180 mm, weight 4.2 kg. The dimensions refer to the backplate of the telephone.

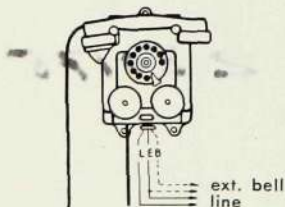


Z 30067

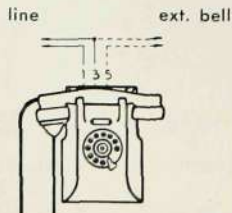
Parts:

dial *RG 112*, dial cord *RS 5063*, condenser *RI 260*, 1 μ F, microtelephone *RE 1041* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and cord *RS 5080*, case of black bakelite, bell 1000 ohm.

Dimensions: height 217 mm, width 151 mm, weight 2.5 kg. The dimensions refer to the backplate of the telephone.



Z 30176



Z 30177

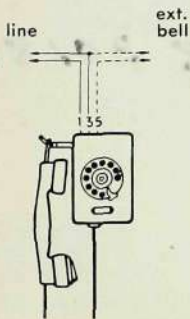
DE 250. Automatic wall telephone.
Small model with buzzer instead of bell.



Parts: **Z 30064**

dial RG 112,
dial cord RS 5062,
condenser RI 260, 1 μ F,
microtelephone RE 4037 of black bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and cord RS 5080, buzzer 2000 ohm, case of black enamelled sheet-iron.

Dimensions: height 160 mm, width 115 mm, weight 1.9 kg. The dimensions refer to the backplate of the telephone.



Z 30178

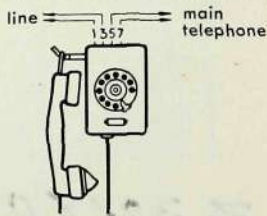
DE 400. Automatic extension wall telephone.
Small model without bell.



Z 30068

Parts: dial RG 112,
dial cord RS 5062,
condenser RI 260, 1 μ F,
microtelephone RE 4031 of black bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and cord RS 5080,
case of blackenamelled sheet-iron.

Dimensions: height 160 mm, width 115 mm, weight 1.8 kg. The dimensions refer to the backplate of the telephone. This telephone is designed for use with types DE and should be placed where the signals on the main telephone may be heard by the person using the extension telephone. Conversation may be carried on in the same manner from either telephone. Calls from one telephone cannot be overheard on the other.



Z 30179

DE 702. Automatic table telephone. DE 704. Automatic table telephone.

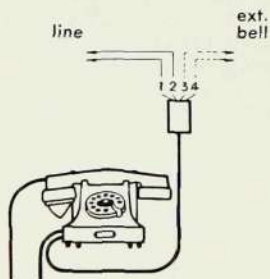


Z 30069

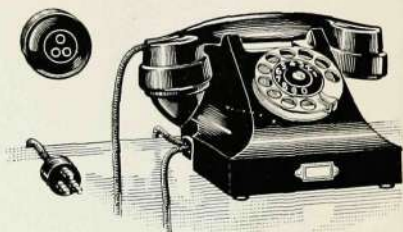
Parts:

dial *RG 112*,
dial cord *RS 5062*,
condenser *RI 260*, 1 μ F,
microtelephone *RE 1041* of black bakelite with removable capsule transmitter *RC 4000/200*, 200 ohm, and cord *RS 5080*, terminal block *RK 8000/2*, instrument cord *RS 5080*, bell, 1000 ohm, case of black bakelite.

Dimensions: height 140 mm, width 235 mm, depth 175 mm, weight 2.5 kg. This telephone may be mounted on a wall by means of a bracket *RK 5010*.



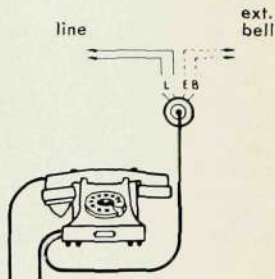
Z 30180



Z 30070

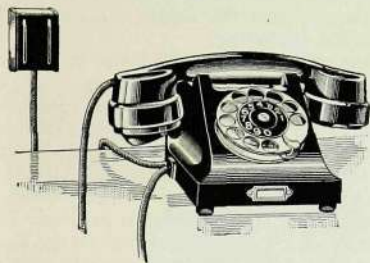
Parts:

Same parts as in *DE 702* but with three-part plug and jack instead of terminal block. The plug cord is *RS 5220*.



Z 30181

DE 752. Automatic table telephone.
Small model with buzzer instead of bell.

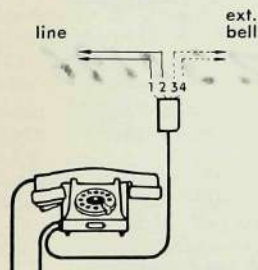


Parts:

230065

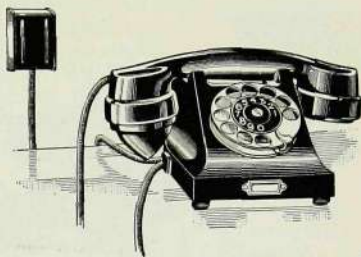
dial RG 112,
dial cord RS 5062,
condenser RI 260, 1 μ F,
microtelephone RE 1037 of black
bakelite with
removable capsule transmitter
RC 4000/200, 200 ohm, and
cord RS 5080,
terminal block RK 8000/2,
instrument cord RS 5080,
buzzer 2000 ohm, case of black
bakelite.

Dimensions: height 118 mm, width 233
mm, depth 150 mm, weight 1.85 kg.
This telephone is suitable for places
where ring signals are not desirable.
The buzzer gives an undisturbing but
distinct signal.
The telephone may be used as wall
set by means of a bracket RK 5005.



230182

DE 3010. Automatic extension table
telephone.
Small model without bell.

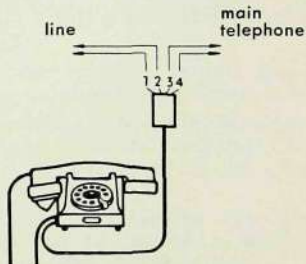


Parts:

230071

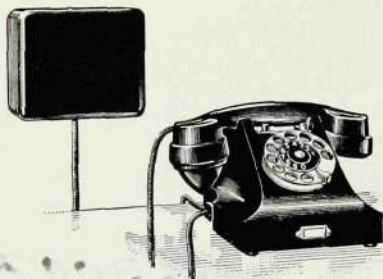
dial RG 112,
dial cord RS 5062,
condenser RI 260, 1 μ F,
microtelephone RE 1041 of black
bakelite with
removable capsule transmitter
RC 4000/200, 200 ohm, and
cord RS 5080,
terminal block RK 8000/9,
instrument cord RS 5080,
case of black bakelite.

Dimensions: height 118 mm, width 233
mm, depth 150 mm, weight 1.7 kg.
This telephone is designed for use with
types DE and should be placed where
the signals on the main telephone may
be heard by the person using the ex-
tension telephone. Conversation may
be carried on in the same manner from
either telephone. Calls from one tele-
phone cannot be overheard on the other.
This telephone may be used as a wall
set by means of a bracket RK 5005.



230183

DF 220. Automatic table telephone for one local and one exchange line.



230072

Parts:

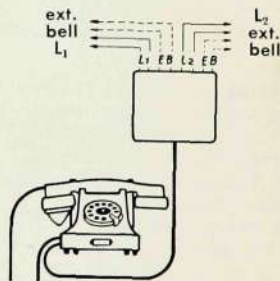
dial RG 112,
dial cord RS 5062,
condenser RI 260, 1 μ F,
microtelephone RE 1041 of black bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and cord RS 5080,
bell 1000 ohm for line L2, 2 press buttons (1 red and 1 white), case of black bakelite,
bell box with 1000 ohm bell for line L1, 2 condensers RI 260, 1 μ F,
instrument cord RS 9637,
case of black enamelled sheet-iron.

Dimensions: height 140 mm, width 233 mm, depth 175 mm, weight incl. bell box 3.6 kg.

The two lines can be connected to manual

or automatic CB systems. The one line (L1) may, for instance, be connected to a public telephone exchange and the other (L2) to a private exchange. The red button would then be for the public exchange and the white button for the private exchange.

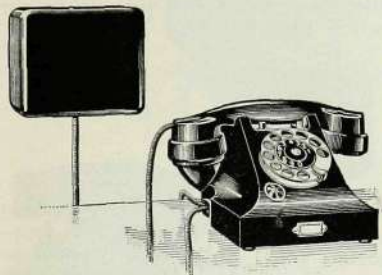
Connection of the telephone to the one or the other of the lines is made by pressing the corresponding button. Conversations on one line cannot be overheard on the other. If during conversation over the public exchange line (L1) information is desired from a local source, the white button is pressed. The telephone is then connected to the local line (L2). The red button remains pressed and the public exchange line (L1) is held. When the conversation with the local line is finished, by pressing again the red button, which has an extra bottom position, the white button is released, the telephone is disconnected from the local line and reconnected to the public exchange line. This telephone may be used as a wall set by means of a bracket RK 5010.



230196

DL 800. Automatic table telephone for one local and one exchange line.

Intermediate telephone for use in conjunction with DL 900.



Parts:

Z 30075

dial RG 112,
dial cord RS 5062,
DC bell RA 610/4.5, 40 ohm,
for the local line,
microtelephone RE 1041 of black bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and cord RS 5080,
condenser RI 654, 2 μ F,
condenser RI 260, 1 μ F,
indicator 100 ohm, 2 press buttons, 1 red and 1 white, case of black bakelite.
bell box with 1000 ohm polarized AC bell for the exchange line,
condenser RI 260, 1 μ F,
instrument cord RS 9951,
line terminals, cover of black enamelled sheet-iron.

Dimensions: height 140 mm, width 233 mm, depth 175 mm, weight with bell box 3.6 kg.

This telephone is designed to work in conjunction with DL 900; DL 900 should be installed in the manager's room and DL 800 in the room of his secretary. The telephones have been de-

signed with a view to relieve the manager from calls which can be answered by the secretary.

The line from the telephone exchange is connected to both instruments, and each instrument has an AC bell for receiving the signals. The manager's telephone, DL 900 has a key for disconnecting the bell, and the secretary's telephone DL 800 has an indicator for indicating when the manager's telephone is in connection with the exchange line. For local communication between the two telephones there is a separate two-wire line, which is connected to a DC bell in each instrument. Each instrument has two press buttons, one red for connecting the exchange line and one white for connecting the local line. One battery is required for the local line and this battery should be placed at the secretary's instrument. The battery may suitably be made up of dry cells and is used on local calls both for transmitter supply and for signalling by means of the DC bells. 3 cells of 1.5 V each will in most cases be sufficient. Should the distance between the instruments be so great that the voltage is insufficient for signalling, additional dry cells may be inserted.

An installation comprising these telephones has the following advantages:

1. calls from the exchange line are received by the secretary's telephone, but, if, for instance in the secretary's absence, the manager should want to answer all incoming calls he has simply to connect the bell of his telephone which will usually be kept disconnected. The bells of both instruments will then ring on incoming calls;
2. when the secretary reports an incoming call the exchange line is held;
3. conversations between the manager's telephone and the exchange line cannot be overheard in the secretary's telephone;
4. local calls between the two telephones can be carried on without disturbing the exchange line;

5. the manager can either call the exchange line direct or use the local line for instructing the secretary to set up the connection wanted;
6. false calls are prevented by the lines being connected only after the handset has been lifted and one of the buttons pressed.

Incoming calls are operated in the following manner:

on incoming calls the bell of the secretary's telephone (A) rings; the bell of the manager's telephone (B) being usually disconnected. The handset of the telephone A is lifted and the red button of this telephone is pressed. The secretary will then be in connection with the exchange line. The secretary then presses the white button in bottom position and in this manner gives a signal to telephone B. When the button is released it remains in pressed position but the ring signal ceases, the white buttons of both instruments having an extra self-restoring bottom position for signalling. The red button remains pressed and the exchange line is held. The manager presses the white button of telephone B and answers the secretary's call; he can then take over the call on the exchange line by pressing the red button of telephone B which will restore the white button. When the secretary replaces the handset of his telephone both press buttons will be restored. The manager will then be in connection with the exchange line.

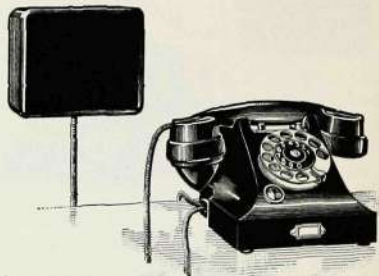
Should the manager want to transfer a call to the secretary this may be carried out in the following manner; the manager presses the white button of telephone B and thus sends a signal to the secretary. The red button remains in pressed position and the exchange line is held. The secretary answers the manager's call by lifting the handset and pressing the white button of his telephone. The secretary can take over the call by pressing the red button and will thus come in connection with the exchange line. When the manager replaces the handset of his

telephone, the two press buttons will be released.

This telephone may be used as a wall set by means of a bracket *RK 5010*.

DL 900. Automatic table telephone for one local and one exchange line.

Substation telephone for use in conjunction with *DL 800*.



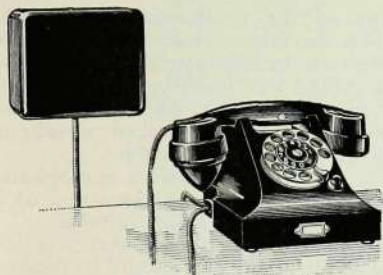
Parts:

230076
 dial *RG 112*,
 dial cord *RS 5062*,
 DC bell *RA 610/4.5*, 40 ohm,
 for the local line,
 microtelephone *RE 1041*, of black bakelite with
 removable capsule transmitter
RC 4000/200, 200 ohm and
 cord *RS 5080*,
 condenser *RI 260*, 1 μ F,
 key for disconnecting the bell
 of the exchange line, 2 press buttons, 1 red and 1 white, case of black bakelite,
 bell box with 1000 ohm polarized
 AC bell for the exchange line,
 condenser *RI 260*, 1 μ F,
 instrument cord *RS 9951*,
 line terminals, cover of black enamelled sheet-iron,

Dimensions: height 140 mm, width 233 mm, depth 175 mm, weight 3.6 kg, incl. bell box.

This telephone may be used as a wall set by means of a bracket *RK 5010*. The operation of this telephone is as described under *DL 800*.

DP 100. Subscriber's amplifying set.



2 3 0 2 2 3

This set is composed of a two-way amplifier and a telephone instrument, both fitted in one cover. The exterior of the set is similar to our standard telephones of bakelite, e. g., DE 702. It is designed for use by persons with bad hearing and also for use with lines having poor transmission properties. For this latter reason amplification of outgoing speech has also been provided for. The maximum amplification of incoming speech is about 2.3 nepers (20 db) and this amplification can be regulated by means of a potentiometer, the knob of which is placed in the bottom righthand corner of the set. The input level should, however, not

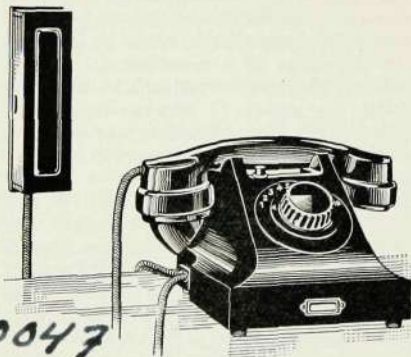
exceed about 1.3 neper (11.5 db), to avoid distortion. For outgoing speech the amplification is usually adjusted so that zero level is obtained at the near end of the line. For lines giving poor transmission the output can be adjusted to a certain positive level by altering the tappings of a transformer. In this manner the amplification can be regulated 0.8 neper (7 db) in steps of 0.2 neper (1.75 db). The highest possible output level will consequently be + 0.8 neper (7 db).

The set requires 1 battery of 1.5 V and 1 of 60 V; these two batteries are contained in a battery case which on request is supplied with the set. The valves are of the Marconi type L 11. The set has a large wall fitting, provided with a bell when it is to be connected to manual or automatic CB systems. When used for LB systems a smaller terminal block is supplied, the bell being then replaced by an ordinary magneto telephone which also provides the generator necessary for the signalling. The magneto telephone can of course be used when amplification is not required. The amplifier is switched on and off when the microtelephone is lifted and replaced in its rest.

Dimensions: height 140 mm, width 235 mm, depth 175 mm, weight incl. wall fitting 3.6 kg.

INTERCOMMUNICATION TELEPHONES.

HA 270. Intercommunication table telephone.



Parts:

microtelephone *RE 1044* of black bakelite with removable capsule transmitter *RC 4000 40*, 40 ohm, and cord *RS 6160*, switch for selecting the lines, press-button for calling, DC bell 100 ohm, case of black bakelite, terminal block see table, terminal block cord length 2 m see table.

Dimensions: height 140 mm, width 233 mm, depth 175 mm.

These telephones operate with battery ringing. To make a call it is only necessary to turn the switch to the desired number and press the button. If the called number is disengaged, the bells of both the calling and the called instrument will ring. If on the other hand it is engaged, neither bell will be actuated, unless the system is connected for single line working; in the latter case both bells will ring. An incoming call will ring the bell independent

of the position of the switch. When the microtelephone is lifted, the telephone is immediately connected to the calling line independent of the position of the switch. The conversations are non-secret and several conversations can be carried on at a time.

Each telephone requires a microphone battery, *M. Batt.*, one consisting of 2 dry cells *RK 210* being suitable.

One signalling battery is necessary for the whole plant. This should be located as near the centre of the system as possible. The number of dry cells required for this battery is determined by the size of the plant and by the length of the lines.

4 to 5 cells *RK 210* will be necessary. A suitable battery case is *RK 2300*.

A suitable cable is Type *EEB* with a minimum of 22 and 42 conductors for 10 and 20 telephones respectively.

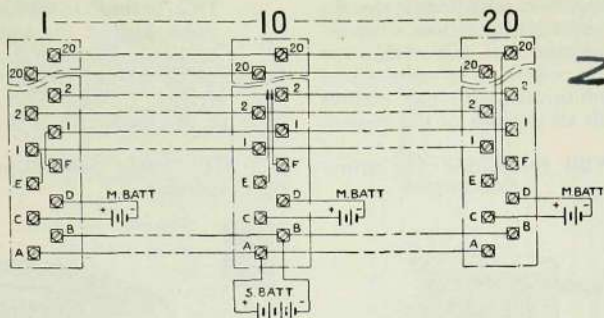
Suitable junction boxes are *HM 160/10* and *HM 160/20*.

By means of brackets *RK 5010* the telephones *HA 270* may be mounted as wall sets.

The telephones can also be used for single line working.

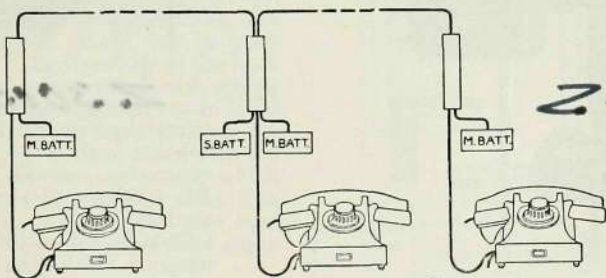
For extension of existing systems having telephones *HA 250*, the new type *HA 275* should be used. This telephone is similar in appearance to *HA 270*.

catalogue number	number of circuits	weight	terminal block	terminal block cord
		kg		
HA 270/10	10	3	HM 160/10	RS 9915/30
HA 270/20	20	3.5	HM 160/20	RS 9915/50



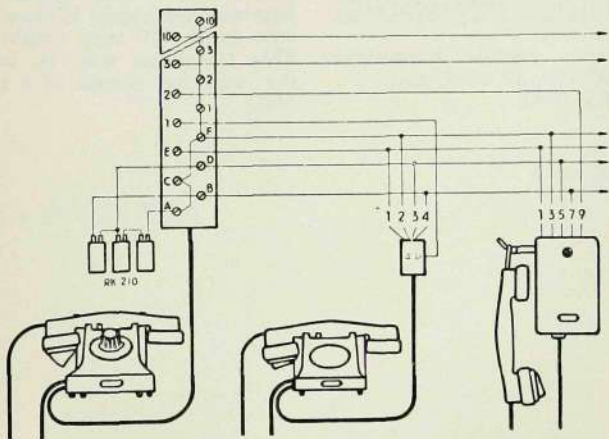
Z 40002

Connection in junction boxes.



Z 40003

Mounting of telephones and junction boxes.

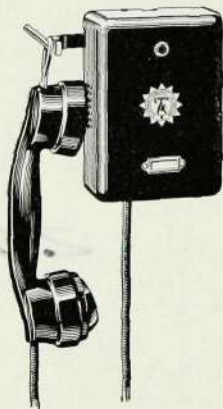


Connection of HC 130 and HC_210.

Z 40000

The following two telephones are designed for use in connection with intercom. telephones *HA 270*. They are used at places where it is only necessary to communicate with one station and not with all stations of the system.

HC 130. Wall telephone for intercom. systems.



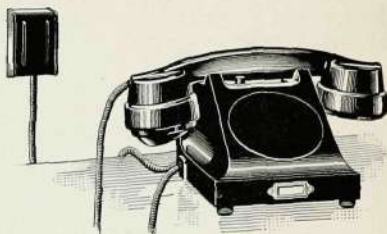
Parts: **Z 30050**

microtelephone *RE 4036* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 5080*,

DC bell *RA 610/6*, 100 ohm, press button for signalling, case of black enamelled sheet-iron.

Dimensions: height 160 mm, width 115 mm, weight 1.7 kg. The dimensions refer to the backplate of the telephone.

HC 210. Table telephone for intercom. systems.



Parts: **Z 30051**

microtelephone *RE 1036* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 5080*, DC bell *RA 610/6*, 100 ohm, terminal block *RK 8000/5*, instrument cord *RS 9507*, press button for signalling, case of black bakelite.

Dimensions: height 118 mm, width 233 mm, depth 150 mm, weight 1.7 kg. This telephone may be mounted on the wall by means of a bracket *RK 5005*.

HM 160. Junction boxes.



2
20003

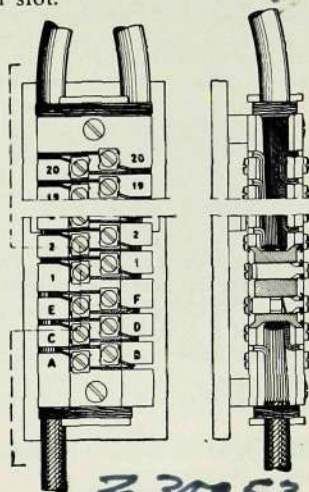
These junction boxes are designed for intercom. installations of up to 20 lines. They consist of a base plate of black enamelled sheet-iron which is fixed to the wall by means of 2 screws. The terminal strip of bakelite is fixed to the base plate and protected by a cover of black enamelled sheet-iron. The

terminal strip is provided on both sides with open slots in which the cables are placed. The sides of these slots have grooves which serve as wire guides. In order to facilitate connecting, the terminals are not placed one in front of the other. The terminals at the back of the block are provided with screws and round connecting washers. In front the terminal screws have washers designed to move up and down with the screws without turning round, which facilitates the fixing of the wires. The rims of these washers are also bent down to prevent the wires from slipping to one side.

Dimensions: width 52 mm, depth 39 mm.

The illustrations show 3 cables connected to a box: one from the tele-

phone and 2 line cables. The junction boxes allow 4 cables to be connected in which case 2 cables are placed in each slot.



2 30053

catalogue number	number of lines	number of terminals	height	weight
HM160/10	10	20+6	mm	kg
HM160/20	20	40+6	178	0.49
			295	0.82

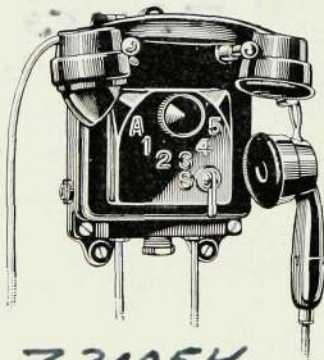
SHIPS' TELEPHONES.

In recent years the use of telephones on board ships has steadily increased for the giving of orders, communication between the various parts of the ship etc, and we offer a special series of telephones and accessories for these purposes. The telephones are waterproof with tight cable inlets and the wiring system must also be waterproof. Rubber insulated cables with conductors of large cross-section should be used for the wiring so as to limit the line resistance as much as possible. Three conductors are required in the cable to a telephone and one additional conductor for each telephone to be called from it. All connections should be made in waterproof junction boxes. The system requires a 12 V battery.

Dimensions: height 235 mm, width 190 mm, weight 3.9 kg. The dimensions refer to the backplate of the telephone. The microtelephone and the extra receiver are of loudspeaking type and provided with leather pads to shut out external noise. The telephone is waterproof and designed for mounting in comparatively exposed places. In very exposed places, for instance on the forecastle, the telephone should be enclosed in a protective case *HD 1000*, page 41. A waterproof DC bell *RA 1200/12* should be connected to the telephone. When the bell rings the switch is set in the position A, after which a conversation can be carried on. When calling the switch is set to the desired number and a signal is emitted by means of the signalling key.

HD 200. Ships' telephone for 5 lines.

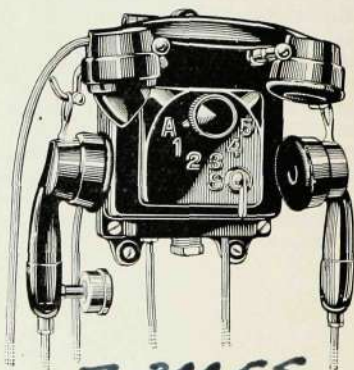
HD 300. Ships' telephone for 5 lines.



230054

Parts:

microtelephone *RE 1048* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and rubber insulated cord *RS 5120*, extra receiver *RD 210* of black bakelite with rubber insulated cord *RS 4900*, six-way switch for selecting the lines, signal key for calling, case of black enamelled light metal.



230055

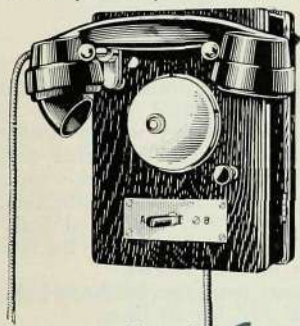
Parts:

microtelephone *RE 1048* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and rubber insulated cord *RS 5120*, laryngotelephone *RE 9600* of black bakelite with rubber insulated cord *RS 5121*, extra receiver *RD 210* of black bakelite with

rubber insulated cord *RS 4900*, six-way switch for selecting the lines, signal key for calling, case of black enamelled light metal.

Dimensions: height 235 mm, width 190 mm, weight 4.6 kg. The dimensions refer to the backplate of the telephone. All receivers are of loudspeaking type and provided with leather pads to shut out external noise. The telephone is designed for mounting in the engine room or other places where noise makes it impossible to carry on conversation by means of ordinary microtelephones. A DC bell *RA 1200/12* is required for the telephone. The laryngotelephone is provided with a special microphone which is held against the larynx during conversations. The speech oscillations are transferred direct to the diaphragm without disturbance from external noise, see illustration on page 18.

HD 500. Ships' telephone for one line.

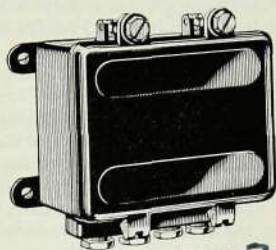


Parts: **Z 30056**
 microtelephone *RE 1046* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 5080*, DC bell *RA 610/6*, 100 ohm, two-way switch, press button for calling, case of polished oak.

Dimensions: height 214 mm, width 166 mm, weight 2.3 kg. The dimensions refer to the backplate of the telephone. The receiver of the microtelephone is loudspeaking. This telephone is de-

signed for mounting in well sheltered places, as for instance the engineer's cabin. Calls can be made to one number only but calls can be received from all telephones of the installation.

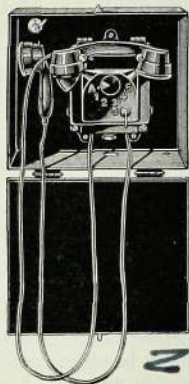
HD 700. Relay apparatus for ships' telephones.



Parts: **Z 30057**
 case of black enamelled light metal, relay, 3 cable inlets, 6 terminal screws.

Dimensions: height 185 mm, width 220 mm, depth 105 mm, weight 3 kg. The apparatus is waterproof and is designed for connecting current of up to 220 V to bells or hooters.

HD 1000. Protective case for ships' telephones.



The case is made of black enamelled brass and is designed for protecting ships' telephones from seawater. Dimensions: height 305 mm, width 334 mm, depth 145 mm.

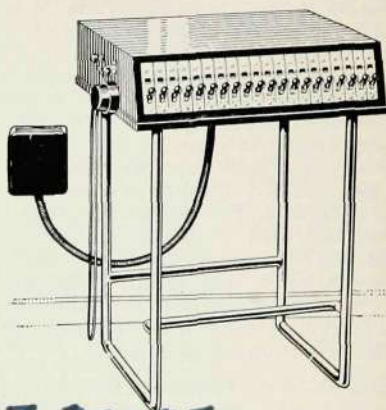
LOUD-SPEAKING CONFERENCE TELEPHONES.

The Ericsson loud-speaking conference telephones have the following properties:

1. the person using the master station may carry on conversations without the use of a handset and from any part of the room;
2. it is possible to arrange telephone conferences;
3. if in a conference in the manager's room certain information is wanted the person capable of giving this information is called up and can take part in the conversation even better than if he were present since he will have access to the necessary files and data;
4. the manager will never receive busy signal when calling up other persons;
5. the speech is reproduced clearly both in the loudspeaker and in the receivers of the telephone instruments;
6. the speech volume is unimpaired even during conferences involving several telephone instruments;
7. all conversations are secret, *i. e.*, they can only be heard at the stations connected by the manager;
8. the telephone instruments and other apparatus are simple and easy to operate;
9. the system is unequalled for reliability of operation;
10. low maintenance cost is ensured through the absence of amplifiers and other complicated devices;
11. all apparatus is attractive and pleasing in design.

An installation on this system is composed of one master station consisting of an executive's switchboard *HF 110* or *HF 120*, a loudspeaker *RD 1100*, and a microphone *RC 2100* or *RC 2110*, and telephone instruments *BC 2055* or *DF 250* for the other stations. The construction and operation of the apparatus is described under the various instruments.

HF 110, *HF 120*. Executive's switchboard.



230187

The switchboard consists of a case of reddish brown polished birch mounted on a nickel-plated frame of welded steel tubes. A key with a corresponding indicator for each side station is fitted at the front of the apparatus. All parts such as transformers, DC bells, relay etc. are fitted inside the case. The case is fixed to the frame by means of four screws.

There are two types of the switchboard:

HF 110 for 10 lines,

HF 120 for 20 lines.

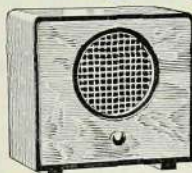
The switchboard is connected to the wall fitting by means of a flexible cable and in addition it is provided with an extra receiver which is connected when lifted, the loudspeaker being disconnected at the same time. There is also a press button for disconnecting the bell, should the manager not wish to be disturbed.

Dimensions: height 750 mm, width 535 mm, depth 450 mm, weight *HF 110* 17 kg, *HF 120* 19 kg.

A side station is called from the master station by throwing the corresponding

key in bottom position which will ring the bell of the side station. As soon as the key is released it returns to middle or speaking position. The speech from the side station is reproduced in the loudspeaker. The conversation is secret, *i. e.* it cannot be overheard unless additional keys are thrown. When the master station is called from a side station the corresponding indicator is actuated; when the corresponding key is thrown the indicator returns to home position and communication with the side station is established.

RD 1100. Loudspeaker.



The loudspeaker is of the moving-coil type and has a permanent magnet. It reproduces the speech in a pure and undistorted manner. It is fitted in a case of the same colour and material as the executive's switchboard. Dimensions: height 380 mm, width 406 mm, depth 251 mm, weight 8.7 kg.

RC 2100, RD 2110. Microphone.



RC 2100

230185

The microphones designed for this system can pick up and reproduce even comparatively feeble speech, no matter from what part of the manager's room it comes. There are two types of microphones: *RC 2100* in a case of wood and *RC 2110* in a case of soapstone.

RC 2100 is fitted in a cover of wood of the same colour as the switchboard and the loudspeaker. It has a red warning lamp placed below the microphone proper.

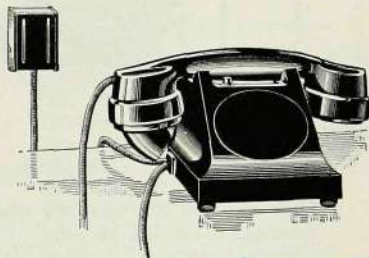
Dimensions: height 126 mm, width 133 mm, depth 77 mm, weight 1 kg.

RC 2110 is fitted in a cover of soapstone with a frame of dull nickel-plated brass. A red warning lamp is placed in the top right-hand corner.

Dimensions: height 131 mm, width 142 mm, depth 77 mm, weight 2.2 kg.

The red warning lamp lights up as soon as a key has been thrown on the switchboard. If after the conversation has been finished a key should not have been returned to home position the lamp remains lit, indicating that conversation in the manager's room may be overheard elsewhere.

BC 2055. Table telephone for loud-speaking conference telephone systems.



Parts:

230052

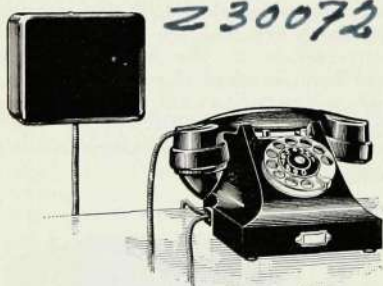
DC bell *RA 610/4.5*, 40 ohm, microtelephone *RE 1040* of black bakelite with removable capsule transmitter *RC 4000/40*, 40 ohm, and cord *RS 5080*, terminal block *RK 8000/5*, instrument cord *RS 9507*, press button for signalling, case of black bakelite.

Dimensions: height 118 mm, width 233 mm, depth 150 mm, weight 1.6 kg.

When a ring signal is received from the master station the microtelephone

should be lifted, which will establish communication between the two stations. Calls to the master station are carried out simply by lifting the microtelephone of the side station. The corresponding indicator of the executive's switchboard will then be actuated. If the button of the side station is pressed, the bell of the master station will ring.

DF 250. Table telephone for one conference telephone line and one CB exchange line.



Parts:

dial *RG 112*,
 dial cord *RS 5062*,
 DC bell *RA 610/45*, 40 ohm,
 condenser *RI 260*, 1 μ F,
 microtelephone *RE 1042* of black bakelite with removable capsule transmitter
RC 4000/40, 40 ohm, and

cord *RS 6162*,
 2 press buttons, 1 red and 1 white, case of black bakelite,
 bell box with
 condenser *RI 260*, 1 μ F,
 instrument cord *RS 9951*,
 1000 ohm bell, cover of black enamelled sheet-iron,

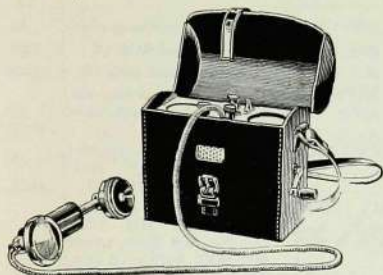
Dimensions: height 140 mm, width 233 mm, depth 175 mm, weight incl. bell box 3.6 kg.

This telephone can be connected with one line (white button) to the loudspeaking conference telephone system and one line (red button) to a CB telephone exchange. Calls from the master station will ring the bell in the telephone and calls from the exchange line the bell in the bell box. The signals will arrive independent of whether one of the lines is engaged or not. The lines cannot be joined up. Calls from the master station are received by lifting the microtelephone and pressing the white button, and calls from the exchange line by pressing the red button. When the microtelephone is replaced the press buttons return to home position. The master station is called by lifting the microtelephone and then pressing the white button. The corresponding indicator on the switchboard will then be actuated. If the white button is pressed in bottom position the bell of the master station will ring. Calls to or from the CB exchange are handled by lifting the microtelephone and pressing the red button, after which the station will be in communication with the CB exchange.

PORTABLE TELEPHONES AND ACCESSORIES.

MB 301, MB 305. Portable telephones, for LB systems.

ME 20. Portable telephone, for LB and CB systems.

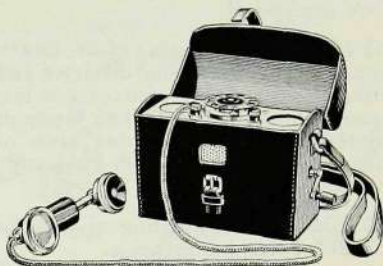


MB 301.

Parts:

Z 30045
microtelephone with waterproof cord and removable capsule transmitter RC 4000/40, 40 ohm, dry cell RK 182, generator combined with bell, press button for short-circuiting the bell, case of polished oak, leather case with shoulder strap.

The microtelephone requires to be telescoped before it is placed in the case. This causes the key of the microtelephone to be locked, thus protecting the battery.



Z 30046

Parts:

dial RG 112, dial cord RS 5053, microtelephone RE 9070 with removable capsule transmitter RC 4000/40, 40 ohm, and waterproof cord RS 6161, generator RH 3181 with three magnets, combined with 500 ohm bell, dry cell RK 182, case of polished oak, leather case MV 320 with shoulder strap.

Dimensions: height 205 mm, width 100 mm, length 230 mm, weight incl. case 5.7 kg.

The microtelephone requires to be telescoped before it is placed in the case. This causes the key of the microtelephone to be locked, thus protecting the battery.

	MB 301	MB 305
microtelephone	RE 9020	RE 9070
waterproof cord	RS 6161	RS 6161
generator	RH 2504	RH 5094
number of magnets	2	5
resistance of bell, ohm	1000	2000
leather case	MV 301	MV 320
length, mm	185	230
width, mm	95	100
height, mm	200	205
weight incl. leather case, kg	4.5	6.1

WIRES AND CABLES.

MG 23. Annealed iron wire, black enamelled.

MG 50, MG 51. Annealed iron wire, black enamelled, insulated with one covering of cotton impregnated with black compound.

MG 205. Cable consisting of one tinned copper wire of 0.44 mm diameter and 8 tinned steel wires, each of 0.26 mm diameter, insulated with two layers of vulcanized rubber and one layer of linen yarn impregnated with black compound.

MG 206. Cable consisting of 2 cables MG 205 twisted together.

catalogue number	diameter	weight per 1000 m	length per coil
	mm	kg	m
MG 23	0.6	2.3	750
MG 50	0.5	2.1	
MG 51	0.5	2.1	100
MG 205	2.5	10.4	500
MG 206	2×2.5	21.8	

* The diameters for MG 23, MG 50 and MG 51 are of the iron wire, and those of MG 205 and MG 206 of the cable.

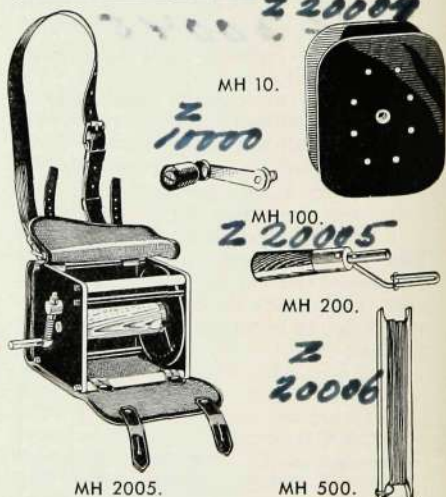
MH 2005. Cable reel.

This reel is especially intended for cable MG 205, and 500 m (weight 5.4 kg) of this cable can be wound on the drum; the reel can also be used for other types of cables. The drum is connected to the crank by means of a spur gearing, which enables the cable to be rapidly paid out or wound in. The reel has a canvas cover, MV 1105, provided with a shoulder strap for carrying purposes, and a plate for protecting the body. The reel is made of black enamelled sheet-iron.

Dimensions: height 200 mm, width 240 mm, depth 200 mm, weight 3.85 kg. The canvas case MV 1105 weighs 0.83 kg.

CABLE REEL WITH ACCESSORIES.

catalogue number	description	weight
		kg
MH 10	Reel for wire (without wire)	0.35
MH 100	Crank for reel MH 10	0.04
MH 200	Handle for reel MH 10	0.125
MH 500	Spool with 15 m insulated wire for earth connection	0.05
MV 1000	Leather case for reel MH 10, crank MH 100, and handle MH 200	0.22
MV 1200	Leather case for reel MH 10, crank MH 100, handle MH 200, spool MH 500, fork and contact hook	0.40



MV 1000.



MV 1200.

21000X1

FORKS AND CONTACT HOOKS.

catalogue number	description	weight	
			kg
MK 10	Fork for rod MN 100		0.065
MK 20	Fork for rods MN 200 and MN 210		0.065
ML 100	Hook for wooden rods		0.065
ML 110	Hook for rod MN 100		0.095
ML 200	Hook for rods MN 200 and MN 210		0.045



MK 10.



MK 20.

210002

210004



ML 100.



ML 110.



ML 200.

210005

210003

CONTACT ROD PARTS.

MN 100. Contact rod of wood with nickel-plated metal mountings and spring lock.

MN 200. Contact rod of seamless steel tubing with spring lock and loop for hanging to the waist belt.

MN 210. Contact rod of bamboo with steel mountings and spring lock. Types MN 200 and MN 210 may be used together, the ends of both types having the same dimensions.

catalogue number	length		weight	for use with	
	total	useful		forks	hooks
	mm	mm	kg		
MN 100	612	556	0.19	MK 10	ML 110
MN 200	607	543	0.37	MK 20	ML 200
MN 210	1150	1085	0.295	MK 20	ML 200



MN 100.



MN 200.



MN 210.

230144

230143

230145

EARTH CONTACT SPIKES.

MO 100. Spike with a milled nut and a spring connection, weight 0.22 kg.

MO 110. Spike with a milled nut and a gimlet end, weight 0.20 kg.



MO 100.

220007

SWITCHBOARDS FOR LB SYSTEMS.

The Ericsson switchboards for LB systems are made for double-line working but may, of course, also be used for single-line working.

Four different devices are used for call signals: drop indicators, combined jacks and drop indicators, indicator jacks and visual indicators. These devices may be characterized in the following manner: drop indicators represent the simplest form of construction,

combined drop indicators and jacks have the advantage that the drop indicator is automatically restored to home position when the plug is inserted,

indicator jacks, in addition to automatic restoring of the signal, have the advantage that they take up a very small space; a given type of switchboard can consequently take a far larger number of lines when indicator jacks are used instead of drop indicators, visual indicators or combined drop indicators and jacks,

visual indicators have no mechanical restoring devices since the restoring is carried out electrically.

As regards the manner of working, the switchboards may be divided into two groups: cordless switchboards in which the lines are connected by means of press buttons, and cord switchboards in which the lines are connected by means of cords. Only the small wall switchboards OA 1000-OA1010 are operated by press buttons, while all other types have cords.

All wall switchboards have drop indicators as calling devices while the other switchboards can be made with any of the above-mentioned calling devices. The switchboards without multiple are made with open lower portion of iron or closed lower portion of wood.

The smallest types of wall switchboards, OA 1000-OB 1200, have fixed mounting and cannot be extended. The other types on the other hand are easy to extend both in respect of the number of line groups and of cord circuits.

Design.

The switchboards are fitted in cases of dark stained, polished oak. The cords are made in two colours: red and grey. Odd cord circuits have red cords and even cord circuits have grey cords. The microtelephones are our modern bakelite type. The generators have 5 magnets. All conductive parts are fitted on insulating material of high quality.

Electric properties.

All switchboards are made for double-line working but may, of course, also be used for single-line working. The induction coils are anti-sidetone connected. The microphone supply has been arranged so that microtelephones without key are used.

The parts belonging to 10 lines, consisting of 10 calling signals and 10 jacks with terminal strip are joined to a separate line-group set.

The necessary parts for one speaking circuit, consisting of one cord circuit with accessories, key, clearing indicator, and terminal base, are joined to a separate switching set.

The parts are simple to fit in the switchboards, which makes extensions very simple to carry out. This, however, does not refer to the smaller types of wall switches which cannot be extended.

All switchboards are fitted with terminals for the lines and consequently the lines are in no case connected direct to the jacks.

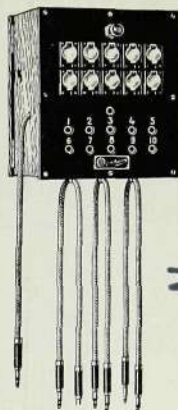
Batteries are supplied only on special request. They can be made up of dry cells or storage batteries. The tension of the microphone battery should be 4.5 V for all switchboards. The tension of the signalling battery for wall switches and switchboards with drop indicators, combined drop indicators and jacks or indicator jacks should be 4.5 V, and for switchboards with visual indicators and all multiple switchboards it should be 6 V.

As a standard the switchboards are supplied with the following numbers of lines and speaking circuits:

lines
10 20 30 40 50 60 80 100 120 160 200
speaking circuits
3 4 6 7 8 9 10 12 13 16 18

The switchboards can, however, be supplied with any number of line-group sets and switching sets up to the full capacity of the switchboards. When ordering, two extra numbers should be added to the catalogue number, the first indicating the number of lines and the second the number of switching sets, e. g. *OB 4402/100/12* which means a switchboard type *OB 4402* for 100 lines and with 12 cord circuits.

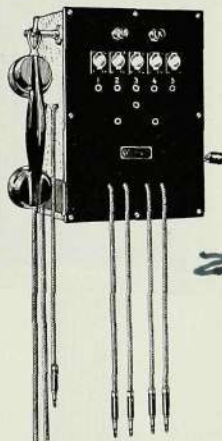
OB 1100. Wall switches.



Z 30154

This type replaces *OB 110*. The switches are designed for operation with magneto telephone instruments. Connections are set up by means of cords. The switches are made for 3, 4, 5, 6, 8, 10, 12 and 15 lines.

OB 1200. Wall switches.



Z 30155

This type replaces *OB 700*. The switches are fitted with speaking and ringing devices. Connections are set up by means of cords. The switches are made for 5, 10 and 15 lines.

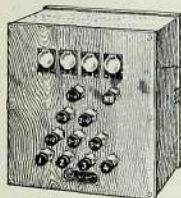
OA 1000. Wall switch.



Z 30152

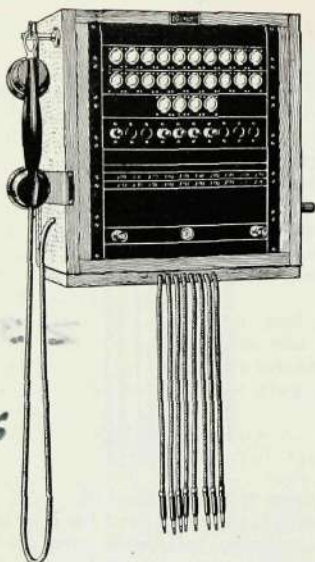
This type replaces *OA 150*. The switch is designed for operation with a magneto telephone instrument and has press buttons as switching devices. The switch is made for 3 lines only.

OA 1010. Wall switches.

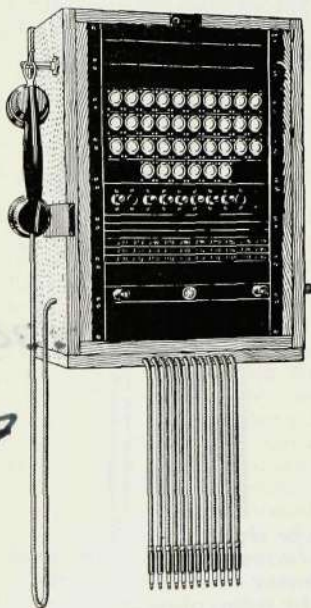


Z 30153

This type replaces *OA 510*. The switches are designed for operation with magneto telephone instruments and have press buttons as switching devices. The switches are made for 4, 5 or 6 lines.



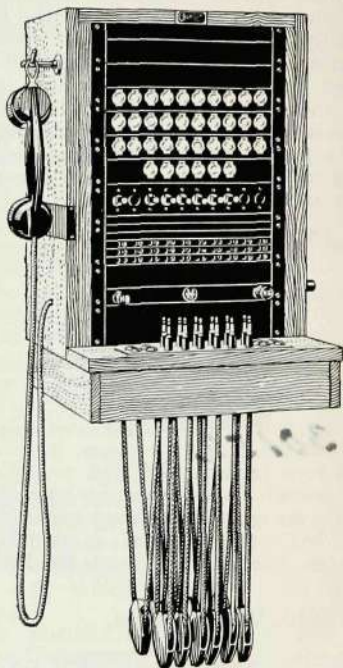
OB 1300/20/4.



OB 1301/30/6.

OB 1300. Wall switches.

This type replaces *OB 750*. The switches are fitted with speaking and ringing devices. Connections are set up by means of cords and keys. The switches are made for 10, 20 and 30 lines.



OB 1302/30/6.

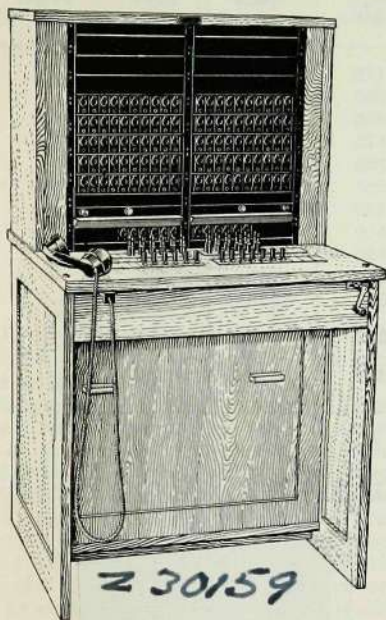
OB 1301. Wall switches.

This type is similar to *OB 1300* but has a larger frame. It is made also for 40 and 50 lines.

OB 1302. Wall switches.

This type is similar to *OB 1301* but is fitted with cord weights and plug board.

OB 4301—OB 4602. Switchboards. OB 5300—OB 5600. Multiple switchboards.

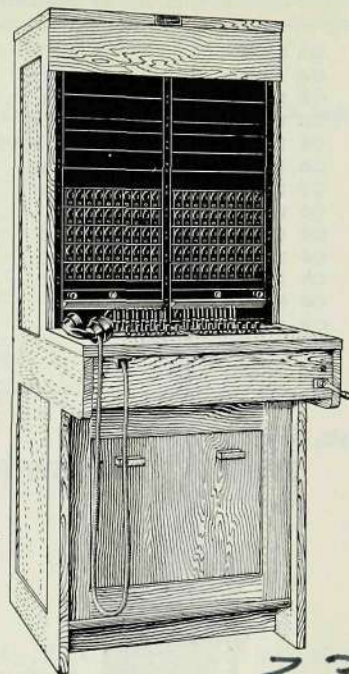


Z 30159

OB 4402/100,12.

These switchboards are made for any multiple of 10 lines up to 160 lines, with the exception of OB 4501 and OB 4502 which are made for up to 200 lines. All switchboards are made for any number of cord circuits up to 19. The types OB 4401 and OB 4602 have mechanical restoring devices for the clearing signals. The various types have the calling devices and lower portions stated below.

- OB 4501: drop indicators, iron stand.
- OB 4502: drop indicators, wood casing.
- OB 4401: combined jacks and drop indicators, iron stand.
- OB 4402: combined jacks and drop indicators, wood casing.
- OB 4501: indicator jacks, iron stand.
- OB 4502: indicator jacks, wood casing.
- OB 4601: visual indicators, iron stand.
- OB 4602: visual indicators, wood casing.



Z 30160

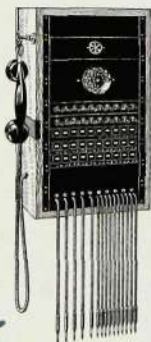
OB 5400/100,12.

These switchboards are made for any multiple of 10 lines up to 160 lines in the answering field with the exception of OB 5500 which is made for up to 200 lines. All types are made for any number of cord circuits up to 19. The capacity of the multiple with four-panel multiplication is 800 lines, except for OB 5500 where it is 1600 lines. The types OB 5400—OB 5600 have mechanical restoring devices for the clearing signals. The various types have the calling devices indicated below.

- OB 5500: drop indicators.
- OB 5400: combined jacks and drop indicators.
- OB 5500: indicator jacks.
- OB 5600: visual indicators.

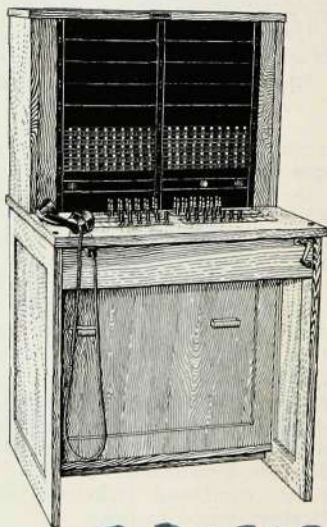
catalogue number	number of lines	height mm	width mm	depth mm	weight kg
OA 1000	3	175	200	180	
OA 1010	4	225	200	180	
OA 1010	5 and 6	335	225	180	
OB 1100	3, 4 and 5	175	200	180	
OB 1100	6, 8 and 10	225	200	180	
OB 1100	12 and 15	335	225	180	
OB 1200	5 and 10	335	225	215	
OB 1200	15	410	260	215	
OB 1300	up to 30	430	390	270	
OB 1301	up to 50	550	390	295	
OB 1302	up to 50	593	390	392	
OB 4300—					
OB 4602		1360	740	700	
OB 5301—					
OB 5600		1600	632	830	

SWITCHES AND SWITCHBOARDS FOR CB-SYSTEM.



2 30208

For manual CB systems we manufacture switches and switchboards, with or without exchange lines. Further particulars will be supplied on request. Two examples are shown, the left illustration representing a wall switch for 5 exchange lines with single cords for the communication with the public exchange, 25 local lines and 5 cord circuits for the local traffic. The calling signals are visual indicators.



2 30209

The right illustration shows a switchboard for 100 lines with calling lamps and 12 cord circuits.

PRIVATE AUTOMATIC TELEPHONES.

OL 10. Automatic telephone switch-board.



230059

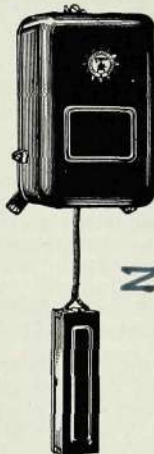
OL 10 is an automatic telephone switchboard suitable for private telephone installations of up to 10 lines. It is designed for one conversation at a time and the conversations are non-secret, *i. e.*, they may be overheard at all telephones connected to the switchboard. When the microtelephone of a connected telephone is lifted and it has been ascertained that no conversation is going on, the switchboard is immediately ready to set up the desired connection. The switchboard is of simple and sturdy construction and all parts, such as relays, selectors, condensers and terminals, are fitted on a frame of black enamelled sheet-iron.

The whole installation is fed from a central battery, and this in view of the small current consumption may be made up of dry cells with a capacity of, say, 150 Ah. It is of importance that the operating tension be kept between 8 and 12 V. A battery composed of eight dry cells RK 224 will thus be suitable; the battery should be located near the switchboard. Only the wall telephone DB 30 and the table telephone DB 200 can be used in conjunction with OL 10. Ordinary two-conductor lead cable, Type EEB, is suitable for the lines. The telephones will have the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0.

Dimensions: height 290 mm, width 172 mm, depth 132 mm, weight 3.5 kg. Care should be taken that the positive and negative poles of the battery are

connected to the switchboard in accordance with the diagram to be found in the switchboard cover.

OL 12. Automatic telephone switch-board.



230060

OL 12 is an automatic switchboard suitable for small private telephone installations of up to 10 lines. It is designed for one conversation at a time, and the conversations are secret, *i. e.*, they cannot be overheard in telephones other than those engaged. When a microtelephone is lifted a dialling tone is sent out from the switchboard if no conversation is going on. If no dialling tone is heard the switchboard is busy. The mechanical construction is similar to that of OL 10 but the terminals are fitted in a junction box HM 160/10 which is connected to the switchboard proper by means of a short cable. The installation is fed from a common battery, which in view of the very small current required may be composed of dry cells of, say, 150 Ah capacity. It is of importance that the operating voltage be kept between 8 and 12 V.

A battery consisting of eight dry cells *RK 224* will thus be suitable and the battery should be located near the switchboard.

The wall telephone *DB 30* and the table telephone *DB 200* are the only ones to be used with *OL 12*.

Ordinary lead covered two-conductor cable, *Type EEB*, is used for the lines. The lines are connected to the terminals of the junction box *HM 160/10*. Regarding *HM 160/10* see page 39.

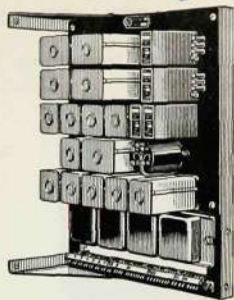
The telephones are given the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0.

Dimensions without *HM 160/10*: height 256 mm, width 172 mm, depth 132 mm, weight incl. *HM 160/10* 4.8 kg.

Note: it is of great importance that the positive and negative poles of the battery be connected according to the diagram in the switchboard cover.

OL 3510—OL 3578. Private automatic switchboards for 10—22 lines.

The parts of the switchboards — relays, selectors, relay pole changer and fuses — are mounted on a black enamelled iron frame. The switchboards have bracket feet at the bottom for attaching to the floor or a wall bracket. If the switchboards are to be fixed direct to a wall then the bracket feet are removed to one side and fixed to the wall so that the switchboard stands at right angles to the wall. One or two storage



OL 3510 fitted on a wall.

batteries of 24 V are required for a switchboard. Charging equipment to suit local conditions can be supplied.

The series of call numbers are:

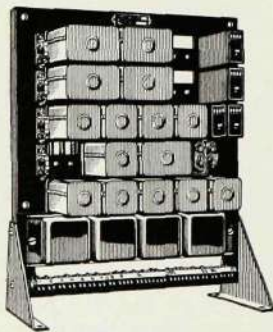
for 10 numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0;

for 12 numbers: 1, 2, 3, 4, 5, 6, 7, 8, 91, 92, 93, 94;

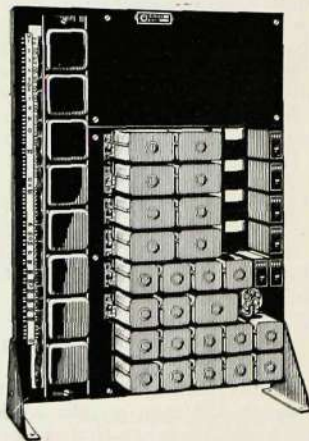
for 22 numbers: 1, 2, 3, 4, 5, 6, 7, 8, 91, 92, 93, 94, 95, 96, 97, 98, 991, 992, 993, 994, 995, 996.

Dimensions: for up to 12 lines: height 485 mm, width 403 mm, depth 180 mm.

for 13—22 lines: height 743 mm, width 540 mm, depth 180 mm



OL 3510.



OL 3522.

catalogue number	number of lines	number of simultaneous calls	weight
			kg
OL 3510	10	2	24
OL 3511	12	2	25
OL 3522	22	3	42
OL 3523	22	4	44

Telephones of type *DE* should be used in connection with these switchboards.

Switchboards with exchange-line facilities.

These automatic switchboards can be connected to a public telephone exchange by one or more lines. The type of switchboard to be used depends on the number of exchange and extension lines required. The switchboard used under these conditions should be equipped with exchange-line relay sets.

If desired, any of the *DE* telephones connected to *OL 3530*—*OL 3578* can be prevented from calling the public exchange by means of a simple alteration of the wiring.

Telephones of the following types should be used:

telephones *DF 310*, one for each exchange line, for those stations which have also to receive and distribute calls from the public exchange;

telephones *DE* for the other extensions. These stations have communication with the public exchange over the sets *DF 310* (incoming calls) or by dialling the digit 0 (outgoing calls).

Under these conditions the following

Erratum: the types *OL 3532* and *OL 3533* have 8 extension lines and not 9 as indicated in the table.

catalogue number		number of				weight
public exchange		ex- change lines	exten- sion lines	simulta- neous calls	kg	
LB	CB					
OL 3530	OL 3531	1	9	2	27.5	
OL 3532	OL 3533	2	9	2	30.0	
OL 3534	OL 3535	1	11	2	28.0	
OL 3536	OL 3537	2	10	2	30.0	
OL 3545	OL 3546	2	20	3	43.0	
OL 3547	OL 3548	3	19	3	46.0	
OL 3560	OL 3561	2	20	4	46.0	
OL 3562	OL 3563	3	19	4	49.0	

types of switchboards should be used. If it is desirable to receive and distribute all incoming calls from the public exchange over one telephone, a telephone *DG 101* should be used.

This telephone is also equipped for one ordinary extension line from the *OL* switchboard. One bell box *DC 1021* should be connected to this extension line. Telephones *DE* are suitable for the other extensions. These stations have communication with the public exchange over the set *DG 101* (incoming calls) or by dialling the digit 0 (outgoing calls). Under these conditions the following types of switchboards should be used.

catalogue number		number of				weight
public exchange		ex- change lines	exten- sion lines	simulta- neous calls	kg	
LB	CB					
OL 3575	OL 3576	3	19	3	46.0	
OL 3577	OL 3578	3	19	4	49.0	

DB 30. Automatic wall telephone.



Z 30064

This telephone can only be used in connection with the switchboards OL 10 and OL 12.

Parts:

dial RG 112 with cord RS 5062, DC bell RA 610/6, 100 ohm, microtelephone RE 4036 of black bakelite with removable capsule transmitter RC 4000/40, 40 ohm, and cord RS 5080, case of black enamelled sheet-iron.

Dimensions: height 160 mm, width 115 mm, weight 1.9 kg. The dimensions refer to the backplate of the telephone.

DB 200. Automatic table telephone.

This telephone can only be used in connection with the switchboards OL 10 and OL 12.

Parts:

dial RG 112 with cord RS 5062, DC bell RA 610/6, 100 ohm,

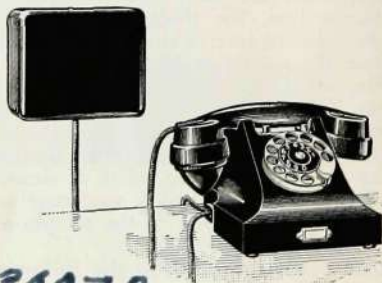
microtelephone RE 1036 of black bakelite with removable capsule transmitter RC 4000/40, 40 ohm, and cord RS 5080, terminal block RK 8000/7, instrument cord RS 4261, case of black bakelite.



Z 30065

Dimensions: height 118 mm, width 233 mm, depth 150 mm, weight 1.9 kg. The telephone may be used as a wall set by means of a bracket RK 5005.

DF 310. Automatic table telephone for one local and one exchange line.



Z 30072

This telephone can only be used in connection with switchboards, Type OL, equipped with special line-relay sets.

Parts:

dial RG 112, dial cord RS 5062, condenser RI 260, 1 μ F, microtelephone RE 1041 of black

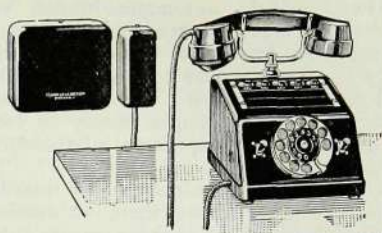
bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and cord RS 5080, bell 1000 ohm, 2 press buttons (1 red and 1 white), case of black bakelite, bell box with 1000 ohm bell, 2 condensers RI 260, 1 μ F, instrument cord RS 9951, case of black enamelled sheet-iron,

Dimensions: height 140 mm, width 235 mm, depth 175 mm, weight incl. bell box 3.6 kg.

One public exchange line and one line from a private exchange, Type OL, can be connected to this telephone. The public exchange may be on the LB or CB system. The telephone is connected to the public exchange line by pressing the red button and to the private exchange by pressing the white button. The bell of the telephone will ring for calls from the main line and that of the bell box for local calls. Conversations on one line cannot be overheard on the other.

When a call comes in over the public exchange line the red button is pressed and conversation can take place. If the call is to be transferred to another telephone connected to the private exchange, the latter is called by means of the white button and the dial, and the call is transferred by replacing the microtelephone of the first telephone which is disconnected at the same time. If the called party is engaged or does not answer the operator can return to the exchange line. For this purpose the red button is pressed to bottom position. The local line of the operator's telephone is engaged only during the transfer of calls; when this has been carried out the telephone can communicate with the private exchange line as usual. This telephone can be used as a wall set by means of a bracket RK 5010.

DG 101. Automatic table telephone for one local and 5 exchange lines.



DC 1021 and DG 101.

2 30073

This telephone can only be used in connection with switchboards, Type OL, equipped with special line-relay sets.

Parts:

microtelephone RE 1015 of black bakelite with removable capsule transmitter RC 4000/200, 200 ohm, and cord, RS 5081, dial, buzzer, 5 press buttons and 5 calling lamps for the 5 public exchange lines, 1 two-way and 1 three-way switch, junction box, instrument cord RS 9915/26.

Dimensions: height 210 mm, width 235 mm, depth 204 mm, weight 3.9 kg.

One line from a switchboard, Type OL, and 5 lines from a public exchange can be connected via the OL switchboard to the telephone DG 101. The public exchange may be on the LB or CB system. Calls on one of the lines cannot be overheard on the others. This telephone is used for transferring incoming calls from the exchange lines to the other stations connected to the private exchange. Outgoing calls from these stations are usually not handled by the telephone DG 101, but if wanted this station can assist in this traffic as well.

One bell box DC 1021 is required for the local line.

PRIVATE AUTOMATIC BRANCH EXCHANGES.

These private automatic branch exchanges meet all reasonable requirements in respect of functioning and traffic facilities for telephone installations of this kind. The switchboards are simple in principle, sturdy of construction and inexpensive in operation and maintenance.

To meet the requirements of installations of various sizes there is a number of different types of these private automatic switchboards, though in respect of operation and traffic facilities they have several properties in common, the following being of the greatest importance:

1. telephones of the standard type are used for all stations, without any modification whatever;
2. all local stations are connected with the switchboards over two-conductor lines;
3. in respect of traffic facilities the local stations can be divided into two main groups, *viz.* non-barred and barred local stations. The non-barred local stations can communicate with the public telephone net, while the barred local stations have not this facility;
4. manual switchboard for distributing incoming traffic from the public telephone net.

The incoming calls are distributed to the local stations by one or more persons. The arrangements for this purpose may vary in design according to the type of the exchange, the number of exchange lines and the amount of traffic.

Traffic facilities.

The following are the principal traffic facilities:

1. automatic local traffic between all local stations, barred as well as non-barred;
2. automatic outgoing traffic to the

public telephone net from the non-barred local stations;

3. manual distribution of the incoming traffic from the public telephone net; the following properties are common for all the arrangements employed for distributing the incoming traffic:
 - a. only non-barred local stations can be connected;
 - b. the operator cannot hear the conversations under normal conditions;
4. automatic inquiry calls.

A local station in communication with the public exchange over an exchange line can carry out inquiry calls to other local stations and during this time the exchange-line connection is held; the local conversation cannot be heard over the exchange line;

5. automatic transfer of exchange-line calls is carried out if the calling party replaces his handset after having received a reply to an inquiry call. The called party will then be put in communication with the exchange line and the former will be disconnected. A local station which has been connected to an exchange line through the transfer of an exchange-line call, has the same facilities as the first called station so that it can in its turn carry out inquiry calls or transfer the call to yet another local station;
6. inquiry calls over the manual switchboard.

It is possible to call the operator of the switchboard during conversations with the public telephone net, and from the switchboard inquiry calls can be set up;

7. transfer of calls over the manual switchboard.
If the handset of the local station is replaced after a reply has been

received from the operator of the manual switchboard, the exchange-line call is switched over to the operator and from there it can be forwarded to another local station; night-service connection.

8. Any desired non-barred local station can be connected for night service to an exchange line. All incoming calls over this exchange line will then go direct to the local station in question. From a local station connected for night service local calls, outgoing exchange-line calls, inquiry calls and automatic transfers are carried out in the usual manner. These private automatic branch exchanges can in addition be combined

with special equipment for various purposes, *e. g.* staff locaters, secretaries' telephones, apparatus for the forwarding of ring signals from one local station to another, if no reply should be obtained from the local station called first, connection of privileged telephones with precedence to exchange line communication, watchmens' telltale apparatus, managers' telephones with loudspeakers, apparatus for direct communication with other private automatic branch exchanges. Further information regarding these exchanges will be supplied on request.

AUTOMATIC TELEPHONE SYSTEM, TYPE OS, WITH 500-LINE SELECTORS.

This automatic telephone system is a machine-drive system and the driving power for the connecting devices is supplied by electric motors. The system operates with registers. A register has the same purpose as an operator at a manual switchboard *i. e.*, it receives the number dialled by the calling subscriber and directs the connection to the wanted number.

When judging an automatic telephone system the two factors reliability and economy are always given first consideration. Economy and reliability are bound up together, seeing that a reliable system cannot fail to be economical in the long run. Leaving out of account the initial cost since in most cases this is determined by the existing competition, an automatic telephone system to be reliable and economical must fulfil the following requirement among others:

- a. simple and sturdy construction,
- b. careful workmanship and inspection,
- c. small space requirements,
- d. simplicity of principle,
- e. convenience of arrangement,
- f. adaptability,

g. low cost of operation and maintenance.

If this automatic telephone system is investigated in respect of the above-mentioned requirements, the following result will be obtained:

- a. simple and sturdy construction. All selectors of the system are of similar construction, which of course carries with it great advantages in regard to the number of spare parts needed in stock. Machine-drive selectors can be given a sturdier construction than step-by-step driven selectors. The movements of machine-drive selectors are much smoother, thus prolonging the life of the equipment.
- b. careful workmanship and inspection. All parts are submitted to thorough tests during and after manufacture.
- c. small space requirements. Many examples from various parts of the world show the extremely small space required by automatic exchanges on this system. This fact is of great importance as affecting

the initial cost and upkeep of the building housing the automatic exchange.

d. simplicity of principle.

Simplicity is a characteristic property of this system. The absence of complicated circuits, margin relays with narrow limits, bridges in the speaking circuits, etc. are examples of its simplicity.

At first sight the register may seem a complication in comparison with systems with direct operation of the selectors. On closer study it will, however, be evident that the register constitutes a guarantee of high reliability and in addition prevents calls being lost.

e. convenience of arrangement.

The arrangement is of great importance for supervision, fault locating and testing. The placing of the bays, the perfection of the supervisory system and the ease with which the position of all connecting devices can be seen are examples of the convenient arrangement.

f. adaptability.

Adaption to variations in traffic is a necessity in a perfect automatic

telephone system. Variations may be of two kinds, permanent and occasional. Adaptability to occasional variations lies in the fact that no connections are lost.

Adaptability in respect of permanent variations is provided for in the design of the system. The bays are made with a certain reserve, and as all connecting devices are connected to the wiring of the bays by means of jacks and plugs, these devices can be removed from or added to the bays according to the requirements of the traffic.

734 390 lines on this system had been installed up to January 1st, 1934. The Stockholm telephone net, which has been automatized on this system, has more than 150 000 lines installed, and one of the exchanges (Söder) is the largest automatic exchange in Europe (present capacity 40 000 lines, final capacity 60 000 lines). The statistics from this telephone net show remarkably good results, and have several times been published in the Ericsson Review.

Further information regarding this automatic telephone system will be supplied on request.

AUTOMATIC LB SYSTEM.

This automatic telephone system has been designed on completely new principles and is intended particularly for rural telephone nets which are to be automatized and in which it is desirable to keep the existing system with LB supply and magneto telephones for the subscribers as used for the manual service. The system allows automatization of the exchanges of rural districts to be carried out at a very moderate cost. It will in most cases be only the old worn-out manual switchboards which need be replaced by the modern automatic exchange. The subscribers' lines can be used in the same state as before the automatization and the existing telephone instruments need not be replaced by automatic telephone instruments but require only to be provided with automatic dials. Compared with previously used automatic CB systems or semi-automatic LB systems this system provides the following advantages:

- the subscribers' lines are not under DC tension;
- the subscribers' lines need not be rebuilt. The lines can have one or two conductors, and lines with a resistance of up to 1500 ohms and an insulation resistance of down to 5000 ohms can be connected;

- the subscribers' lines can be transformed and phantomized;
- the LB telephone instruments can be used without the wiring being altered; the necessary dial is mounted on or at the side of the instrument. If the bell of the instrument has a low impedance, this can be raised by means of an additional resistance. Local batteries for the microphone supply give better transmission than CB supply;
- no operator is required for handling local traffic;
- automatic intercommunication with other automatic exchanges is possible;
- junction lines to other exchanges are not taken up by local calls;
- the called station is called by means of an intermittent ring signal;
- call metering occurs only when the called party answers;
- the connecting devices are restored to home position automatically at the end of conversations, independent of whether a clearing signal has been given or not, and this is also the case with false calls;
- intentional blocking of subscribers' lines is impossible.

Further information regarding this automatic LB system will be supplied on request.

SELECTIVE-CALLING TELEPHONES.

In most telephone systems the lines represent the greatest part of the capital investment. The efficient time of utilization for the subscribers' lines is, however, fairly low but it can be increased by connecting several telephones to one line.

The most useful of these common lines is the selective-calling line. These lines are particularly suitable for telephone communication along various types of transport roads and it is especially in the telephone and signalling service of the railways that the selective-calling lines have proved their usefulness. In commercial telephony also the selective-calling lines have come into use, *e. g.*, in cases where telephone communication is to be arranged with subscribers along a road, along a valley, etc. The selective-calling lines can be made for automatic and manual systems.

We manufacture three different types of selective-calling telephone systems, *viz.*, one non-secret system with decentralized switching, one secret system with decentralized switching and one non-secret system with centralized switching. If required these three systems can be combined in various manners. All these systems operate over two-wire lines without earth connection and with two-direction DC impulses. The selectors used are of the two-magnet type.

The selective-calling telephone systems have been designed with a view to obtaining the greatest possible flexibility. They are therefore manufactured in units which can be combined in a great many different manners. Also in regard of modification and extension this is of great importance, since alterations can be carried out rapidly and without disturbance of the traffic and at the same time the existing equipment can still be used. For further information regarding this material we refer to our special catalogue, which will be supplied on request.

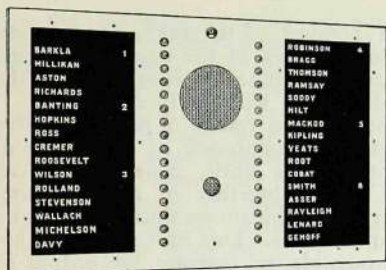
CHURCH TELEPHONES.

Church telephones are used to enable deaf people in church to hear the services clearly and distinctly no matter where their seats in the church may be and almost independent of their degree of deafness.

As a rule the ear of a deaf person cannot separate the speech direct from say the preacher and the echo following immediately after. On antiphones between the choir and the priest the ear has no time to adapt itself to an enjoyable apprehension. Certain deaf persons have a good range while the limit for perfect hearing lies at very loud speech. All these conditions cause services to be less enjoyable to the deaf. A church-telephone installation is composed of a number of sensitive microphones set up at suitable points in the church, *e. g.*, at the altar, at the pulpit, in the choir, gallery, etc. and so that they are as inconspicuous as possible; these microphones are connected to an amplifier which amplifies the speech and distributes it to a number of receivers. The amplifier is placed in a suitable room with good ventilation and is connected to the lighting mains by means of an ordinary wall plug. At the seats for deaf persons sockets for the connection of receivers are placed. The sockets have a two-pole jack for the connecting of a receiver by means of a two-pole plug and in addition there is a knob for regulating the sound volume. The receiver is of a specially light type. The receiver cord is insulated by vulcanized rubber and has a fix plug so that it can easily be washed and desinfected without being injured. The apparatus has received the approval of the Swedish Deaf and Dumb Association and in addition it is approved for connection to the lighting mains.

The wiring usually consists of ordinary lead-sheathed telephone cable, and consequently can be made quite inconspicuous.

HALLWAY TELEPHONES.



This type of telephone has been designed to protect the occupants of flats against hawkers, canvassers, beggars and other undesirable callers in buildings where the hall porter cannot be constantly on the watch or where there is no porter. The telephones can also be combined with a burglar alarm apparatus.

The installation is composed of a main apparatus with loudspeaker in the entrance hall, telephones in the various flats, an electric lock on the door giving access to the flats. When the hallway telephone is to be combined with burglar alarm the following additional equipment is required: an ordinary annunciator with a set of press buttons placed in the room of the porter or caretaker. A person visiting a tenant enters the hall and presses the bell of the tenant in question. The tenant asks who is there, his voice being heard clearly in the loudspeaker. The visitor's reply is picked up by the sensitive microphone. If the tenant is satisfied he presses the button of the

telephone, which unlocks the door and allows the visitor to enter the building. On the main apparatus there is a button to the porter or caretaker so that he can be called if the visitor should want to make inquiries. The burglar alarm system is operated in the following manner. In all the doors leading to the flats contacts are fitted. When the tenant intends to leave he reports this to the porter and when he does leave the flat he presses a switch on the telephone. The porter presses the button corresponding to the flat in question and if, after that, the door of the flat is opened a bell starts ringing in the porter's room, the annunciator showing from which of the flats the alarm comes. The main apparatus is composed of a front plate of chromium-plated brass in the centre of which the telephone equipment is fitted. This equipment consists of a loudspeaker of good quality and a sensitive microphone. In addition there are flat registers of the usual type as well as press buttons. The front plate can easily be let down so that the names are easy to change. The flat registers are protected by glass plates. The plate is locked by means of a Yale lock. The dimensions of the apparatus will of course vary with the number of tenants in the building.

The telephones in the various flats are similar to BC 1303. The instruments are fitted with a special switch when burglar alarm is to be included in the system. The annunciator is of the type used for electric bells, for instance RP 130 w.

PROGRAM DISTRIBUTION SYSTEMS.

When a great number of people wish in a certain range, e. g. hospitals, almshouses, etc. want to hear a broadcasting program, it is as a rule not convenient to go to the expense of providing each listener with a separate receiver. In addition there will be no possibility of arranging local transmission of, e. g., religious services or lectures. In large apartment houses there is usually a large number of disturbances caused by lifts, illuminated signs, stair lighting, oil burners, etc. which in many cases render listening difficult. It will not be suitable to install a large receiver of the usual type in a relatively screened place and distribute the programmes by wires to the various listeners, as this type of receiver is usually not of such a construction that headphones can be connected to it without risk and at the same time as it is made for one loudspeaker only the sound volume will vary considerably if several loudspeakers are connected, and there will be deterioration of the sound quality. In order to meet all requirements of sound quality, sound volume, freedom from disturbance, facility of local transmissions, we have designed special broadcasting receivers and amplifiers. In public parks, and sports grounds it is often desirable to amplify the sound from the band, the stage or a speaker so as to make it possible for a great number of people to hear. In these cases an Ericsson amplifier-unit provides the best solution, partly on account of its simple operation and partly

on account of its sturdy construction which allows of the equipment being placed in unheated rooms during the cold season without ill effects.

The Ericsson system of program distribution is composed of a number of standardized units, panels, which can be joined together in a great number of combinations thus meeting any requirements. This unit system makes it possible to increase the output of an installation at little extra cost, by simply changing the amplifier unit.

Installations are usually made for automatic connection and disconnection of the broadcasting program and consequently no particular supervision or maintenance is necessary. The apparatus is approved for connection to electric mains by the Swedish institution for the inspection of electric material.

Apparatus for electric reproduction of gramophone music can be connected to this program distribution and amplifier equipment.

For program distribution systems special sockets are used for the connection of loudspeakers and headphones. These sockets have one hole only for the insertion of a two-pole plug, this eliminating all danger of mistaking them for sockets connected to the electric mains. Loudspeakers of good quality are necessary for a first class program distribution or amplifier installation if the best possible result is to be obtained and we supply loudspeakers of superior design for any desired output.

ELECTRIC LEVEL INDICATORS.

For the rational operation of water works, hydro-electric power stations, irrigation systems and similar plants, effective supervision of the supply and consumption of water is necessary. Only by such supervision is it possible to utilize in the most economical manner the supply of water from districts with varying resources and this is also the case where surplus water is stored during periods of excess.

Such supervision is arranged in the best manner by means of electric water level indicators, which at any moment, even over great distances, indicate in a reliable manner the level of various reservoirs. A system using such level indicators can record on the receivers installed at a central point all changes in the supply of water from various sources. In this way not only is very economical operation ensured but also immediate steps may be taken to deal with floods. In water works it is possible by means of these instruments to record the levels in the reservoirs and, in conjunction with signalling and operating apparatus, automatic starting and stopping of pump motors, etc., may be arranged. The instruments are suitable both for water and other fluids, and in addition they may be used for distant indication of the movements of sluice gates, gas containers, etc. The Ericsson level indicator system is composed of a number of standardized elements which may be combined in a great number of ways so that for each case the most suitable plant may be arranged. The most important advantages of the system are, briefly, the following: The system is designed to operate over two-wire lines and its perfect functioning is not interfered with by variations of line resistance produced by extremes of temperature or by inferior insulation. The system at the same time allows telephony to be carried on over the lines used. The lines are under tension only during the short intervals when current impulses are being

emitted from the transmitter. By means of closed-circuit current, supervision may be arranged so that alarm is given when line faults occur. The transmitter has its own current source and consequently no separate current supply is necessary for the primary functions. No disturbance can therefore arise because of break-down in the current supply and this is of great importance as ensuring reliability. This arrangement also makes the operating cost very small and no more than the cost of the power consumption of auxiliary apparatus, if any.

The receivers are made either for indicating only or for simultaneous indicating and recording. The accuracy is very great and independent of the measuring range. The system is made as a standard for measuring ranges of 5 and 10 m and measuring intervals of 2.5 and 5 cm. On request, the instruments may be supplied for other measuring ranges and intervals, greater as well as smaller. Secondary apparatus for alarm and operation of motors etc. may be connected. The system operates over an external resistance of up to 3000 ohms if only one receiver is used. Where two receivers are used they should be connected in series and the external resistance in that case must not exceed 2000 ohms. The range covered by the system is consequently very great. If still greater ranges are required or if more than two receivers are to be connected to one receiver, this may easily be arranged by the insertion of impulse repeaters. Finally it should be observed, that the installation is very simple and does not require specially trained staff.

The elements of the system are: the transmitter, with the necessary apparatus such as float and counterweight; the receiver, which may be indicating or recording; the alarm board; the impulse repeater and, finally, the supervisory apparatus. For further information we refer to catalogue 177: Electric level indicators.

SPECIAL EQUIPMENT.

In factories and offices thorough rationalization has been the practice in recent years. Various kinds of machines have been introduced to facilitate and simplify the routine work. Work requiring high qualification can of course not be altogether simplified, but in this sphere also it is possible to introduce a certain amount of simplification by using suitable machines.

Voting-machine.

The voting machine is an apparatus which simplifies the routine work of members of parliament and municipal councillors. Members of parliament, for instance, must decide their attitude on a certain question and afterwards in certain ways, usually rather complicated for the sake of control, record their opinions. The wast of time thus occurring can be avoided by means of a voting machine, the functioning of which will be described in brief.

Each member's desk is fitted with an equipment composed of two buttons and a signalling lamp. The press buttons are marked "aye" and "no". Votes are cast by pressing the necessary button and abstention is indicated by pressing both buttons. The signalling lamp is for the purpose of indicating to the member that his vote has been registered. The counting of the votes is carried out electrically and the result is indicated on the illuminated indicator board.

The apparatus can be made for both open and secret voting. Installations to meet the special requirements of a particular parliament can usually be arranged.

We have supplied voting machines to the parliaments of Finland and Sweden.

Indicator boards.

Another case where routine work can be largely eliminated is that of stock exchanges. The brokers give their quotations by pressing buttons. With mathematical precision an electric indicator system displays the order of the brokers who have given the same quota-

tion, fixes the quotation after conclusion, etc.

Such an installation has been in operation for more than 10 years on the Stockholm stock exchange and a similar installation is at present in hand for the Helsingfors stock exchange.

Totalisators and starting apparatus.

The very popular betting at race courses has been centralized to totalisators and an apparatus has been designed which automatically, exactly and fairly divides the winnings, at the same time keeping the race-course public informed of the division of the betting and the amounts betted on the various horses. A great number of race courses in England have been equipped with totalisators of Ericsson manufacture. In horse races the starting is carried out by hand. The possibility of bad starts and the unfair favouring of certain horses will always be found, and in addition the supervision, time checking, etc. is difficult, especially when starting and finishing points are not the same.

We manufacture starting apparatus which eliminate these disadvantages. The starting order proper is given by means of loudspeakers controlled by an electric talking machine, which also controls the electric release of a rubber band stretched across the course. This arrangement also allows the horses to be started from different points along the course. Distance handicap can consequently be introduced and the ideal start still be ensured.

The accuracy of the time checking will be far superior to that obtained with other systems.

There are many activities of daily life where certain tasks are performed in an old-fashioned manner involving waste of time or other inconveniences. Our great experience of various kinds of special equipment is constantly devoted to the solution of all kinds of problems of this nature.

SYNCHRONOUS CLOCKS.



2 30224

The manufacture of synchronous clocks has been taken up, and a number of new types of modern and attractive appearance have been designed. Two wall clocks are illustrated as examples, but both wall clocks and table clocks are manufactured in several types.

A synchronous clock is driven by a synchronous motor, the speed of which is fixed by the frequency of the mains to which the clock is connected. This frequency is controlled by the electricity works so that a certain number of cycles are transmitted in each unit of time, and this control is carried out by means of a precision chronometer with the necessary equipment installed in the electricity works. On request we supply equipment of this kind.



2 30225

The synchronous clocks are connected to AC mains by ordinary wall sockets and are self-starting, *i. e.*, they are started automatically as soon as the voltage is supplied. The clocks require no winding or supervision and always indicate the right time. The power consumption is very small, about 1.5 W.

If there is a breakdown in the mains the clocks stop but start again automatically as soon as the voltage returns. To indicate that the clock may be giving the wrong time, a small indicator appears in a window in the dial. When the clock has been set right again this indicator disappears. Further information regarding these clocks is supplied on request.

EQUIPMENT FOR LONG-DISTANCE TELEPHONY.

Equipment for long distance communication cannot possibly be detailed in a general catalogue, as such equipment has to be adapted to a large variety of needs. Here the possibilities offered by modern long distance technics are only hinted at. More detailed information may be obtained from our catalogue no 176 and various pamphlets but full information can only be given in separate estimates for each and every case.

It is well known that the range of ordinary telephony is limited from a technical point of view, viz. by the attenuation and the distortion in the overhead or cable lines, connecting the two instruments. In addition the cost of these connecting lines, which rises in proportion to the distance, will limit the use of long distance telephony for economic reasons.

The objects of modern long distance equipment are now broadly speaking:

1. to increase the distance over which reliable communication with good quality may be obtained,
2. to lower the line costs by increasing the number of simultaneous communications on a given number of physical circuits.

The first purpose is primarily served by repeaters of different kinds which amplify the speech currents at intermediate points in the long distance line, by loading coils which compensate for the distortion of cable lines and also by a number of associated equipments such as voice-frequency signalling devices, correcting networks and the like. Thanks to these devices there is practically no limit to the range which may be covered by ordinary telephony.

There are quite a number of methods for obtaining the second purpose, viz. a more extensive use of the lines. The simplest is the well known method of phantoming the lines with the aid of balanced line transformers at the terminals. Practically all other methods are based on

the fact that only a limited frequency range is necessary for a communication while the lines can in many cases transmit a very wide range of frequencies. Consequently a number of different communications may be transmitted simultaneously on a line if only they are using different frequency ranges and if appropriate devices are used in the terminals to separate them from each other.

The first step in this direction is to have simultaneous telegraphy and telephony on a line with composite sets in the terminals, which separate the low telegraph frequencies from the higher frequencies of speech currents. A drawback to this method is that the ordinary type of ringing cannot be used on such lines but must be replaced by voice frequency ringing.

It is, however, not necessary that the different communications transmitted on the same line be of different kinds and use different frequencies in their proper transmitters and receivers. Devices may be installed at the terminals of the toll line, which transform or displace the original frequencies to other frequency bands suitable for a simultaneous transmission on the line. Such devices are known under the common name of *carrier equipments* as an auxiliary «carrier» current is always used in this fundamental displacement of frequency.

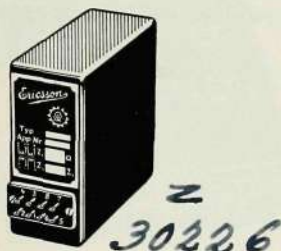
It will be understood from the above that the number of simultaneous carrier communications possible on one pair will depend on the frequency range necessary for a communication as well as on the frequency range which the line in question can transmit. A number of telegraph communications, which use only a narrow frequency band, may for instance be operated within the same frequency range as one telephone communication. This is the case in a special type of carrier system, the *voice frequency telegraph system*, which uses a telephone circuit

of any kind for simultaneous operation of several telegraph communications instead of for telephone communication. The frequency range transmitted by the line is comparatively great in the case of an aerial line of copper, and the standardized carrier telephone systems for such lines are designed for one or three additional telephone circuits. At the same time up to four telegraph carrier circuits may be obtained on the same pair.

Cable circuits of the types now in use cannot transmit much higher frequen-

cies than those used by the ordinary voice frequency telephone communication, and carrier telephony on cables has not, therefore, up to now been very much used. On lightly loaded four-wire cable circuits it is possible to operate one additional carrier telegraph circuit known as a *super-audio telegraph system*. New cables are, however, nowadays often built for higher cut-off frequency in order to allow also carrier telephony on four-wire circuits, and it is expected that carrier telephony in cables will be more widely used in the future.

RM 550—RM 553. Line transformers.



The winding of these line transformers is made in four sections, and each section is connected to two terminals; the mid point of each side will consequently be accessible. The line transformers are manufactured with certain standardized impedance ratios: 800/400, 800/800, 1600/800 and 1600/1600. The transformer is fitted in a cover of sheet-iron and is designed to be mounted on a shelf. Transformers of other design and impedance ratio can be made if required.

Dimensions: height 115 mm, width 49 mm, depth 115 mm, weight 1.85 kg.

Electrical properties.

According to the stipulations of the CCIF, station equipment should have a nominal impedance of 800 ohms, by which is meant impedances between 600 and 950 ohms. These line transformers give very low reflection losses over this impedance range, and at the

same time they have high efficiency at voice frequency, inclusive of ringing frequency. The great importance of line transformers having a high efficiency for ringing current of about 20 c/s at different input voltages should be observed. In most cases only the efficiency at an input of 45 V is measured. The electrical properties are as follows:

- effective attenuation at 800 c/s: 0.045 neper (0.39 db);
- efficiency at 20 c/s: exceeds 83 % for primary voltages between 10 and 90 V.

The two halves of the transformer winding are carefully balanced, so that the side-to-phantom cross-talk attenuation is higher than 10 nepers (87 db) at 1000 c/s.

At 200 V the transformers have an insulation resistance higher than 1000 megohms between the windings as well as between the windings and the cover. The voltage test is carried out with 2000 V, 50 c/s between the windings and between the windings and the cover.

catalogue number	primary impedance	impedance ratio	old designation
	ohm		
RM 550	600—900	1 : 1	800/800
RM 551	300—475	2 : 1	400/800
RM 552	1200—1900	1 : 2	1600/800
RM 553	1200—1900	1 : 1	1600/1600

MEASURING INSTRUMENTS.

The Ericsson instruments for line measurements and laboratory use are the result of many years' experimental work combined with practical experience. Several of these instruments offer completely unique advantages in comparison with others commonly in use. Only a few examples are shown in this catalogue and for further information we refer to the special catalogues U 40 (Swedish edition) and U 43 (English edition) which will be sent on request. Most types of instruments for use on long-distance telephone lines and in laboratories will be found among this material. They include bridges for mea-

suring resistance, capacity, frequency and impedance; instruments for measurements on lines and repeaters such as for measuring gain, balance, cross-talk, attenuation and other transmission properties; valve voltmeters for various purposes; AC generators for audio and high frequency; filters with variable cut-off frequency for audio and high frequency. In addition there are decade resistances and condensers, standard inductances and attenuation sets, laboratory amplifiers and headphones and other accessories. Finally there are complete test racks and portable measuring equipments.

ZA 140. Earth-resistance measuring set.

This measuring set is designed for direct measurement of earth resistances up to 200 ohms, and by the addition of separate resistances still higher resistances may be measured. In order to obtain suitable accuracy there are three measuring ranges: 0-2, 0-20 and 0-200 ohms. The resistance to be measured is read direct on the scale of the slider, except for one multiple of 10 which is determined by the position of the range key.

By means of a special device the measuring set has been rendered practically independent of the properties of the auxiliary earth connections required for the measurement.

The measuring frequency is generated by a tuning-fork buzzer built into the

set, and to avoid disturbance from the buzzer the frequency is doubled by means of a bridge of cuproxide rectifiers before it reaches the measuring bridge proper. Earphones are usually used as indicators but when required a valve voltmeter may be used instead. Dimensions: height 284 mm, width 256 mm, depth 146 mm, weight 8 kg.

ZA 149. Insulation tester and line-fault localizer.

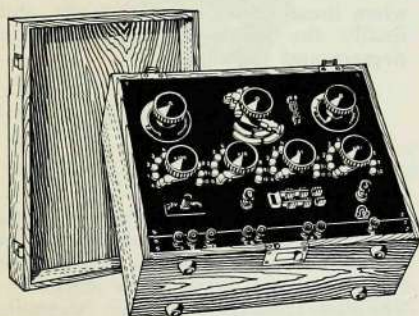
This measuring bridge is designed for linemen's use for resistance measurements and for the locating of line faults. The measuring range covered is 3 ohms to 30 megohms, and, by means of the instrument, line faults caused by

leakage or contact between the conductors may be located.

The bridge is fed with DC. The measurement is carried out by opening and closing a contact in the receiver circuit and clicks are then heard in the receiver until the bridge is balanced.

A sensitive galvanometer may be used as an indicator instead of earphones.

ZA 150. Resistance and capacity measuring bridge.



Z 30227

Application.

The resistance and capacity measuring bridge is used for bridge measurements on lines, but is also a very useful laboratory instrument. It differs from other similar instruments by its many-sided usefulness, and by the chief switching operations being concentrated to one single main switch. By manipulating this switch, bridges are obtained for total, difference (Varley) and ratio (Murray) measurements of resistances, measurements of resistance unbalance, and absolute and relative ca-

capacity measurement. Total, difference and ratio measurements are used for locating faults on lines when earth faults occur. Resistance unbalance measurements are used for the checking of lines. Since the balance of a line is very sensitive even to small changes in the line resistance and leakage, it serves as a good indicator of line conditions. By connecting an audio frequency generator and using a head phone as an indicator, bridges are obtained for absolute and relative capacity measurements.

These measurements are of great importance for locating breaks in lines when earth connections do not occur, e. g., in cables, and for locating scattering in cables, due to faulty splicing. For all bridges except the resistance unbalance bridge there is a threefold ratio of 1:10, 1:1 and 10:1.

Measuring ranges.

Sum and difference measurement: up to 11110 ohms.

Resistance unbalance measurement: ± 8 per mille.

Capacity measurement: up to 11.11 μ F.

Accuracy.

2 per mille for absolute measurement of resistances exceeding 20 ohms.

2 per mille for ratio measurement of values exceeding 0.02.

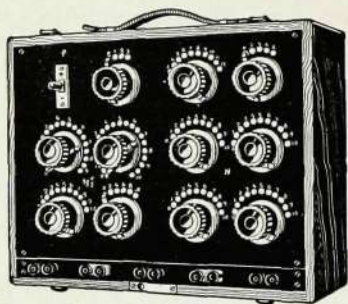
2 per mille for the measurement of capacities exceeding 2000 μ F.

Design.

The measuring bridge is designed either as a portable instrument or for fixed mounting on a test rack. The portable instrument is mounted in a wooden case.

catalogue number	pattern	height	width	depth	weight
ZA 150/10	test rack	mm 180	mm 370	mm 260	kg 4
ZA 150/20	portable	205	395	305	8.4

ZA 350. Impedance measuring set.



230228

Application.

The impedance measuring set is a bridge for measuring the amplitude and phase angle of impedances, indicated directly by the positions of the dials. It differs in this respect from other similar instruments, which permit only the measurement of the real and imaginary components of the impedances. The instrument is intended for the frequency range between 300 and 4280 c/s, corresponding to the angle frequencies $\omega = 1870$ to 26900 and gives direct readings of amplitudes up to 11110 ohms, and phase angles up to $\pm 90^\circ$. Higher amplitudes may be measured by connecting additional decade resistances. By connecting up a standard inductance of $\frac{1}{2\pi}$ H the measuring set may be used also as a frequency bridge. The input impedance of the measuring set is about 9 ohms at

300 c/s, and about 75 ohms at 4000 c/s. In order to facilitate computation of the measuring results a trigonometric table is provided for the purpose of eliminating completely the lengthy calculations involved in impedance measurements by older methods. For a certain value of $\tan \frac{\varphi}{2}$ the table gives $\frac{\varphi}{2}$ expressed direct in degrees. Further, we find the sine, cosine and tangent for the whole angle φ for the purpose of calculating resistance and reactance, when these values are of interest, and finally the whole angle expressed in degrees and radians.

Accuracy.

The amplitude is given with an accuracy of within a few per mille at lower frequencies, and within 1% at higher frequencies and large phase angles. The phase angle is given within 5 per mille with values of less than 0.5 for $\tan \frac{\varphi}{2}$, and within about 1% with higher values.

Design.

The impedance measuring set is designed either as a portable instrument or for fixed mounting on a test rack. The portable instrument is mounted in a wooden case with handle and removable cover.

catalogue number	pattern	height	width	depth	weight
ZA 350/10	test rack	mm	mm	mm	kg
ZA 350/20	portable	260	375	180	8
		305	395	205	12

ZB 455. Direct-reading transmission measuring set.



Z 30329

This measuring set is designed for rapidly checking overall attenuation and level conditions on telephone lines, and is particularly suitable for places where it is sufficient to carry out measurements at one frequency only. The instrument can serve both as a generator for 800 c/s to transmit zero level on a line and as level indicator (at 800 c/s) for through level at intermediate stations and incoming level at terminal stations.

Two sets ZB 455 are required for attenuation measurements on a line. The set contains two Marconi valves, one LP 2 and one B 21, of which the former serves as a generator when transmitting zero level and as an amplifier for level indication. The latter serves as a valve voltmeter for direct reading of the level. The set has two three-position keys, of which the right can be thrown for transmission, calibration and reception, and the left for »zero level» or »+ 1 neper» on transmission and for »terminal level» and »through level» on reception. The set should be calibrated before taking measurements, and this is done by using a potentiometer to adjust the deflection of the instrument. When the line is connected, zero level will be transmitted on the line. If wanted the outgoing

level can be increased to + 1 neper (8.7 db) by means of the left key. The measuring instrument is graduated in neper or db. In order to keep the pointer at the clearest part of the scale the measuring range can be varied between 0 and - 2.5 nepers in steps of 0.5 neper. The total measuring range is consequently 0 to - 3.5 nepers when zero level is transmitted and - 1 to - 4.5 nepers when + 1 neper is transmitted.

The accuracy is better than 0.1 neper. For transmission the accuracy is 1 % in respect of frequency and 2 % in respect of power.

The measuring set is mounted on an iron panel fitted in a wooden case. Dimensions: height 324 mm, width 204 mm, depth 250 mm, weight 7.5 kg.

ZD 110. Audio frequency generator.



Z 30330

This generator supplies purely sinusoidal AC of constant tension at various frequencies. By means of one dial only the frequency may be varied within the range 0-10000 c/s. This dial is fitted with a zero adjustment, by means of which the zero gradation of the frequency scale can be adjusted with an accuracy of 0.1 c/s. The generator will generally give an output of about 200 mW, containing not more than 2 % harmonics. If the percentage of harmonics may be increased to 6 % the out-

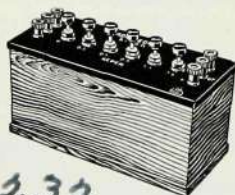
put may be doubled. If the load on the output terminals of the generator is about 6000 ohms and real, the output tension will be constant within about 2 % between 20 and 10000 c/s. By means of an additional unit the frequency range can be changed to 10000—20000 c/s, the properties of the generator then being altered.

The generator is made for connection to 220 V DC mains, or 50 c/s AC mains of any voltage. The change for different kinds of current supply is made by means of a switch which can be locked.

The generator is fitted on a sheet-iron panel which is mounted in a wooden case.

Dimensions: height 520 mm, width 600 mm, depth 250 mm, weight 68 kg.

ZF 400—ZF 421. Attenuation boxes.



230232

Application.

These instruments constitute artificial lines with variable attenuation. They are designed for measurements with DC and audio frequency with a fair degree of accuracy.

The attenuation box consists of six ladder-connected resistance sets which can be switched in and out of circuit by means of six press-button switches. The instrument is graduated either in neper or in db. The total attenuation is either 6.3 nepers and may be varied in steps of 0.1 neper, or for the other types it is 63 db and may be varied in steps of 1 db. The accuracy is 0.05 neper or 0.5 db respectively at DC and audio frequency. The instru-

ment is made with a characteristic impedance of 600 or 800 ohms.

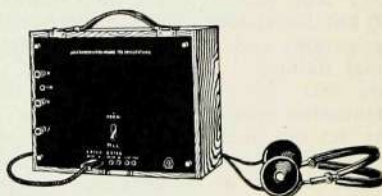
The artificial line is symmetrical, and the middle points of all the attenuation sets are connected to a common terminal. In addition the instrument is screened against the influence of external fields, the screen being connected to the earth terminal.

The attenuation box is designed as a portable laboratory instrument, fitted in a wooden box.

Dimensions: height 140 mm, width 235 mm, depth 100 mm, weight 1.6 kg.

catalogue number	unit	characteristic impedance
ZF 400/20	neper	ohm 600
ZF 401/20	db	600
ZF 420/20	neper	800
ZF 421/20	db	800

ZF 550. Laboratory amplifier.



230233

Application.

This laboratory amplifier, which is intended for insertion in the circuit between the headphone and the measuring bridge when making bridge measurements, gives a maximum amplification of about 5 nepers between 200 and 5000 c/s. The amplifier is particularly well suited for laboratory use.

Design.

The amplifier is fitted with two transformer-connected Philips' Miniwatt

valves, Type A 141. These valves consume very little current, and dry cells built into the instrument are therefore sufficient as current supply. Consequently, the amplifier is always ready for use.

The headphone may be connected by means of jacks, either to the indicator terminals of the bridge, after the first valve, or after the second valve; *i. e.*, without amplification, with one-stage amplification, or with two-stage amplification.

The headphone supplied with the instrument is of special design, and is fitted with contacts which break the valve filament circuits when the headphone is taken off, thereby increasing the life of the dry cells of the instrument. Double contacts in the jacks per-

mit the breaking of the filament circuit of one or both valves if not required for the head phone connection.

The characteristic impedance on the primary side of the input transformer is 500 ohms, but by means of a simple switching operation, it is possible to connect the input terminals direct to the grid of the first stage valve.

The laboratory amplifier is designed as a portable instrument, mounted in a wooden case with handle and removable cover.

Valves.

The instrument is delivered with a complete set of valves, consisting of two Philips A 141.

Dimensions: height 260 mm, width 330 mm, depth 195 mm, weight 6.8 kg.

AC BELLS.

Application.

RA 130.

RA 130 is a small self-contained bell particularly suitable for use as extension bell for telephone instruments.

RA 150—RA 194.

RA 150—RA 174 are suitable not only as extension bells but also for various alarm and signalling purposes. The bells *RA 150—RA 154* have similar gongs to *RA 130*; *RA 160—RA 164* have larger gongs and *RA 170—RA 174* have sheep gongs. These bells thus differ in tone and the power of the signals.

RA 194 is similar to *RA 154* but has a visual indicator. This bell is parti-

cularly suitable in places where several bells are mounted so as to make it possible to tell which bell has rung. A special hood of enamelled sheet-iron has been designed for use when the bells *RA 150—RA 174* are to be mounted out of doors. The catalogue number of this hood is *RK 7000*.

RA 200, RA 210, RA 220.

These bells are watertight and are suitable for mounting in exposed places. The three types differ only in the size of the gongs and the intensity of the signals given. *RA 220* is larger than *RA 210* and this type in its turn is larger than *RA 200*.

230087

RA 130. AC bell.



Gongs *RB 70/1* and *RB 70/2* of nickel-plated brass, diameter 64 mm, case and cover of black enameled sheet-iron. Dimensions: height 135 mm, width 155 mm, depth 49 mm, weight 0.815 kg.

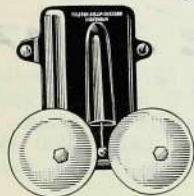
catalogue number	resistance
RA 130/1000	ohm 1000
RA 130/2000	2000

RA 150—RA 174. AC bells.

These bells may be divided into the following three groups, the bells of each group differing only in respect of resistance.

A. *RA 150—RA 154*. These bells have one gong *RB 70/5* and one *RB 70/6* which have a diameter of 64 mm and a depth of 22 mm and give different tones.

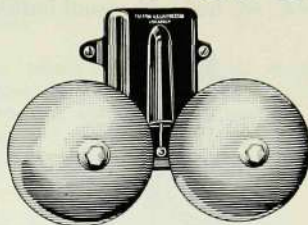
Dimensions: height 142 mm, width 138 mm, depth 74 mm, weight 0.65 kg.



B. *RA 160—RA 164*. These bells have two gongs *RB 622*, diameter 108 mm, depth 37 mm.

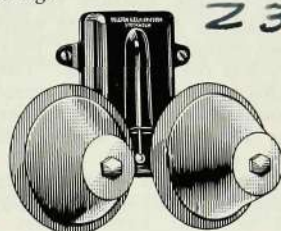
Dimensions: height 164 mm, width 226 mm, depth 86 mm, weight 1.03 kg.

230202



C. *RA 170—RA 174*. These bells have two sheep gongs, *RB 1010*, 108 × 92 mm wide and 101 mm deep.

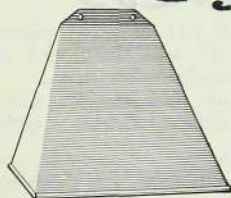
Dimensions: height 164 mm, width 226 mm, depth 151 mm, weight 1.65 kg.



230203

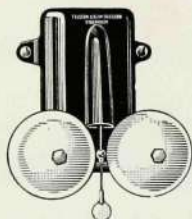
catalogue number			resistance
A	B	C	
RA 150	RA 160	RA 170	ohm 2
RA 151	RA 161	RA 171	20
RA 152	RA 162	RA 172	300
RA 153	RA 163	RA 173	1000
RA 154	RA 164	RA 174	2000

RK 7100. Hood.



This hood is made of enameled sheet-iron and is used when the bells *RA 150—RA 174* are mounted out of doors. The hood is fixed direct to the wall.

RA 194. AC bell with visual indicator. RA 210. Waterproof AC bell.



Z 30204

This bell is similar to RA 154 but is provided with a visual indicator consisting of a steel spring fixed to the clapper. At the bottom end of this spring there is a small plate which will continue swinging for some time after the bell has ceased ringing. This bell is suitable for places where several bells are mounted beside each other as it may be seen clearly which bell has given the signal.

Dimensions: height 161 mm, width 138 mm, depth 74 mm, weight 0.65 kg.

RA 200. Waterproof AC bell.

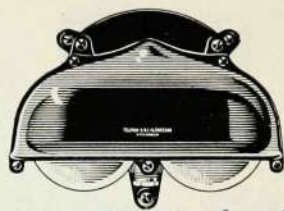


Z 30205

Gongs RB 121 of nickel-plated brass, diameter 67 mm, case and cover of black enamelled sheet-iron.

Dimensions: height 185 mm, width 174 mm, depth 120 mm, weight 4.7 kg.

catalogue number	resistance
	ohm
RA 200/300	300
RA 200/1000	1000
RA 200/2000	2000



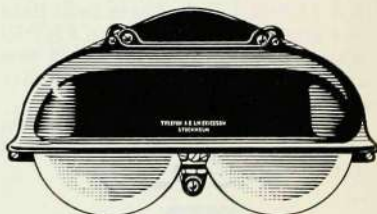
Z 30206

Gongs RB 621 of nickel-plated brass, diameter 108 mm, case and cover of black enamelled sheet-iron.

Dimensions: height 185 mm, width 258 mm, depth 140 mm, weight 6.1 kg.

catalogue number	resistance
	ohm
RA 210/300	300
RA 210/1000	1000
RA 210/2000	2000

RA 220. Waterproof AC bell.



Z 30207

Gongs RB 721 of nickel-plated brass, diameter 150 mm, case and cover of black enamelled sheet-iron.

Dimensions: height 200 mm, width 360 mm, depth 172 mm, weight 8.8 kg.

catalogue number	resistance
	ohm
RA 220/300	300
RA 220/1000	1000
RA 220/2000	2000

DC BELLS.

Application.

RA 500, RA 600, RA 601.

These bells are used in private telephone installations and as electric bells for private houses and offices where particularly loud signals are not necessary.

RA 510, RA 610.

These bells are used for the same purposes as those mentioned above but are smaller and do not give such loud signals. In most cases they are, however, quite sufficient.

RA 910.

This bell is suitable for use in most cases where louder signals are required, both in and out of doors, *e. g.*, for time signalling in schools and factories, for supervisory and alarm signals in power stations and engine rooms, for alarm signals in fire and burglar-alarm installations, etc.

RA 1200.

This bell is suitable for use under severe climatic conditions, *e. g.*, on

ships where the corroding influence of seawater must be taken into account, in tropical districts, in mines and other places where there is a risk of explosion, in chemical industries, etc.

RA 3001—RA 3200.

These bells serve the same purposes as *RA 910* and are used in cases where louder signals are required and when the bells are to be connected to AC or DC mains. When the bells are to be used for 12 V, wiring of sufficient cross-section should be used since the line resistance must not exceed 5 ohms.

RA 5000.

This bell is used in cases where particularly loud signals and perfect reliability are required, *e. g.*, at railway crossings, for special alarm signals, etc. In calm weather the bell can be heard over a radius of 3 km even if the distance between the bell and the listener be partly covered by trees. On account of the powerful signals one bell will in most cases be sufficient at railway crossings.

RA 500. DC bell.



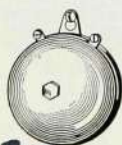
230088

Gong RB 315 of nickel-plated iron, diameter 77 mm, base-plate of enamelled iron with suspension eye.

Dimensions: height 100 mm, width 84 mm, depth 40 mm, weight 0.29 kg.

catalogue number	operating voltage	resistance
	V	ohm
RA 500/3	1.5-3	3
RA 500/10	3-4.5	10
RA 500/40	4.5-6	40
RA 500/100	6-8	100
RA 500/300	12-20	300

RA 510, RA 610. DC bells.



230089

Gong RB 71 of polished nickel-plated brass, diameter 64 mm.

Dimensions: height 81 mm, width 68 mm, depth 35 mm, weight 0.17 kg.

The mechanism, which is built into the gong, is simple and strong and is fitted on a base-plate of bakelite. The bell has one magnet coil only. It is smaller than RA 500, and does not give such loud signals. The clapper and its movement can be adjusted from outside without disturbing the gong.

catalogue number		operating voltage	resistance
with suspension eye, external connection	without suspension eye, internal connection		
		V	ohm
RA 510/3	RA 610/3	1.5-3	10
RA 510/4.5	RA 610/4.5	2.5-4.5	40
RA 510/6	RA 610/6	4-6	100
RA 510/12	RA 610/12	6-12	300
RA 510/24	RA 610/24	18-24	1000

RA 510/24 and RA 610/24 are provided with spark quenchers of 5000 ohms.

RA 600. DC bell.

230090



RA 600, RA 601.

Gong RB 204 of nickel-plated brass, diameter 75 mm, frame of enamelled brass.

Dimensions: diameter 80 mm, depth 40 mm, weight 0.3 kg.

catalogue number	operating voltage	resistance
	V	ohm
RA 600/10	3-4.5	10
RA 600/40	4.5-6	40
RA 600/60	5-7	60
RA 600/100	6-8	100
RA 600/500	20-24	500

RA 601/500. DC bell.

Operating voltage 20-24 V, resistance 500 ohms with a spark quencher of 3000 ohms, gong RB 204 of nickel-plated brass, base-plate of enamelled brass, without suspension eye, diameter of gong 75 mm. Dimensions: height 80 mm, width 80 mm, depth 40 mm, weight 0.3 kg.

RA 910. Weatherproof DC bell.

2 30091



Base-plate, cover and gong of black enamelled cast iron, diameter of gong 150 mm. A rubber packing between the case and the cover protects the internal parts from rain.

Dimensions: height 297 mm, width 150 mm, depth 90 mm, weight 3.1 kg.

The bell is weatherproof and gives loud signals and is therefore suitable for outdoor use.

catalogue number	operating voltage	resistance
	V	ohm
RA 910/6	6	35
RA 910/12	12	125
RA 910/24	24	520

RA 910/6 is provided with a spark quencher of 2000 ohms, and RA 910/12 and RA 910/24 with spark quenchers of 3000 ohms.

RA 1200. Waterproof diaphragm DC bell.

Case of black enamelled light metal, sheep gong RB 1010, width of gong 108 mm.

Dimensions: height 270 mm, width 155 mm, depth 125 mm, weight 1.4 kg. The bell is perfectly gas and watertight on account of the following features:

1. the movement is transmitted to the external part of the clapper by a diaphragm;

2. a rubber packing is provided between the case and the cover of the bell;

3. the cable inlet is designed to fit tightly to the cable.



2 30092

The bell is non-corrosible, even under the severest conditions.

catalogue number	operating voltage	resistance	spark quencher
	V	ohm	ohm
RA 1200/3	2-3	6.6	600
RA 1200/6	4-6	23	1600
RA 1200/12	8-12	100	3000
RA 1200/24	18-24	500	5000

RA 3001—RA 3200. Slow-striking bells for AC or DC.



2 30093

The bells are weatherproof and are suitable for outdoor use.

Case and cover of enamelled cast-iron, diameter of gong 237 mm.
Dimensions: height 457 mm, width 227 mm, depth 125 mm, weight 10.9 kg.

catalogue number	operating voltage	resistance
	V	ohm
RA 3001/12	12 DC	7
RA 3001/24	24 DC	100
RA 3001/110	110 DC	1200
RA 3001/220	220 DC	3400
RA 3100/110	110 AC	1200
RA 3200/220	220 AC	3200

Where RA 3001/12 is used the line resistance should not exceed 4 ohms, which corresponds to a 200 m long double line with 1.5 mm² wires. The corresponding values for RA 3001/24 are 25 ohms and 1200 ohms.

RA 5000. DC signalling bell.

This type of signalling bell gives very powerful and piercing signals. It has a small power consumption and in addition it is very durable and reliable. The bell is provided with a three-part self-interrupting contact so as to prevent the reliability being affected by bad contact. In order to prevent the deposit of snow which would render the signals less powerful, the bell may be fitted with a roof RA 5050. This roof protects the gong perfectly under all con-

ditions. In order to prevent the bell being injured from below a net RA 5060 may be fitted immediately below it. The bell is provided with a spark quencher.



230094

catalogue number	operating voltage	resistance	spark quencher
	V	ohm	ohm
RA 5000/6	5-7	12	200
RA 5000/12	10-14	58	400
RA 5000/24	20-28	225	800

Dimensions: height incl. fixing iron 536 mm, diameter of gong 290 mm, weight 15 kg.
RA 5020 is the bell RA 5000 fitted with roof RA 5050 and net RA 5060.

BUZZERS, HORNS AND SIRENS.

RC 5011. Buzzer.



230146

Base of ebonite, cover of enamelled brass, contacts of platinum. The operating voltage is 3 V DC.

Dimensions: diameter 43 mm, depth 35 mm, weight 0.05 kg.

The tone may be adjusted by means of two screws which regulate the contact pressure and the distance between the magnet poles and the armature.

RC 5021. Buzzer.

230147



Base of ebonite, cover of enamelled brass, contacts of platinum. The operating voltage is 3 V DC.

Dimensions: diameter 58 mm, depth 45 mm, weight 0.125 kg.

The tone may be adjusted by means of two screws which regulate the contact pressure and the distance between the magnet poles and the armature.

This type is larger and gives louder signals than RC 5011.

RC 5022. Buzzer.

Base and cover of bakelite. These buzzers give louder signals than RC 5011 and RC 5021. The buzzers may be operated by DC or AC.

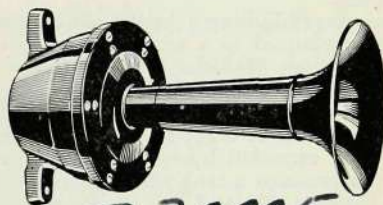
Dimensions: diameter 68 mm, depth 60 mm, weight 0.15 kg.



230148

catalogue number	operating voltage
	V
RC 5022/3	3-5
RC 5022/12	12
RC 5022/24	24
RC 5022/110	100-130
RC 5022/220	200-240

RC 10000 — RC 10100. Electric horns.



230095

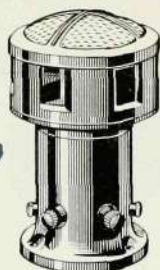
These electric horns give loud and piercing signals and are designed for outdoor mounting. They are made for DC and for AC of 40-60 c/s.

Dimensions: height 166 mm, width 140 mm, length 292 mm, weight 2.7 kg.

catalogue number	operating voltage
	V
RC 10000/12	12 DC
RC 10000/24	24 DC
RC 10000/48	48 DC
RC 10100/110	110-127 AC
RC 10100/220	190-240 AC

KG 100-KG 445. Motor sirens.

230139



These motor sirens are used in cases where louder signals than those given by the electric horns RC 10000-RC 10100 are wanted.

The sirens are made of light metal and cast iron and have a coating of black enamel. The types for 1/2 HP and less can be mounted in any position, the larger types only in vertical position. When used out of doors it is advisable to fit a protective hood over the siren; suitable hoods are supplied on request.

The ranges indicated in the table have been measured in a wind of 2-3 m/s and without obstacles between the siren and the listener. In towns the ranges may be reduced by 50 % and in calm and at night the ranges given may be exceeded by up to 200 %. The sirens produce a tone with a frequency of between 400 and 500 c/s. By means of a special device it is possible to use the sirens for code signalling; equipment for this purpose is supplied on request.

The following starting apparatus is supplied with the sirens:

- KG 220: 1-pole switch;
- KG 225-KG 240: DC starter;
- KG 320: 1-pole press-button switch;
- KG 410-KG 430: 3 pole knife switch;
- KG 435: star-delta starter;
- KG 440-KG 445: 3-pole knife switch rotor starter.

For the types KG 100-KG 110 no starting apparatus is supplied. If wanted apparatus for remote control can be supplied.

catalogue number		power
		HP
universal motors		
110 V		220 V
KG 100/110	KG 100/220	1/20
KG 105/110	KG 105/220	1/6
KG 110/110	KG 110/220	1/2
DC motors		
110 V		220 V
KG 220/110	KG 220/220	1
KG 225/110	KG 225/220	2
KG 230/110	KG 230/220	3
KG 235/110	KG 235/220	5.5
KG 240/110	KG 240/220	10
single-phase AC motors, 50 c/s		
110 V		220 V
KG 320/110	KG 320/220	1
3-phase AC motors, 50 c/s		
110/190 V		220/380 V
KG 410/110	KG 410/220	1/2
KG 420/110	KG 420/220	1
KG 425/110	KG 425/220	2
KG 430/110	KG 430/220	3
KG 435/110	KG 435/220	5.5
KG 440/110	KG 440/220	10
KG 445/110	KG 445/220	15

power	approximate range		dimensions without hood		
	fair wind	head-wind	height	diam.	weight
HP	km	km	mm	mm	kg
1/20	0.5	0.2	142	93	1.5
1/6	1.5	0.6	230	190	3.8
1/2	2.8	0.9	395	250	14
1	4	1.5	410	295	22
2	5.5	2.5	550	360	42
3	6.7	3.1	580	410	63
5.5	8	3.6	640	450	78
10	11	4.5	740	550	118
15	15	5.5	840	620	170

TELEPHONE ACCESSORIES.

RD 305/01. Extra receiver.



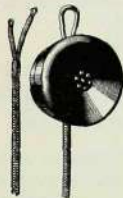
Parts:

2 20013
inset receiver RD 4000/120, resistance 120 ohm, cord RS 4105/1, case of black bakelite.

Dimensions: diameter 66 mm, depth 37 mm, weight 0.20 kg.

This receiver is designed for attachment to new type table telephones of bakelite. The receiver rests on a cradle RD 5000.

RD 315/01. Extra receiver.



Parts:

2 20013
inset receiver RD 4000/120, resistance 120 ohm, cord RS 4105/1, suspension eye of nickel-plated brass, case of black bakelite.

Dimensions: diameter 66 mm, depth 37 mm, weight 0.21 kg.

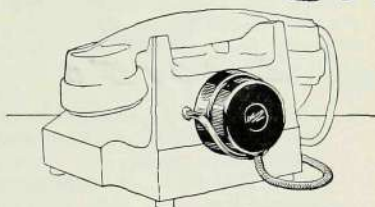
This receiver is designed for attachment to wall telephones. The receiver is suspended from a hook RD 5100.

RD 5000. Cradle.



2 20014
Cradle of nickel-plated brass with nuts and washers, for receiver RD 305/01 for table telephones.

Weight 0.03 kg.

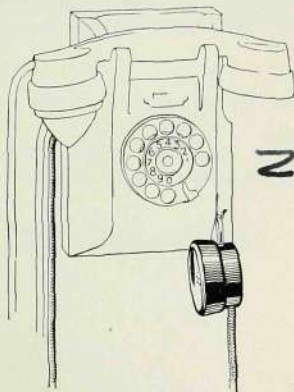


Extra receiver fitted on table set.

RD 5100. Hook.

2 10006
Hook of nickel-plated brass with screws, nuts and washers for receiver RD 315/01 for wall telephones.

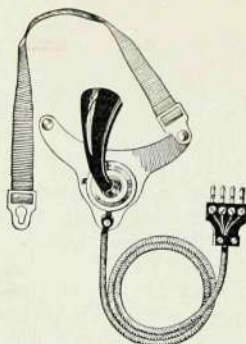
Weight 0.003 kg.



Extra receiver fitted on wall set.

RF 530. Breast transmitter.

RF 1057. Head-gear receiver.



Parts: **230150**

transmitter with removable capsule *RC 4000/40*, 40 ohm and mouthpiece *no 20*, cord *RS 9101*, 4 conductors, length 1 m, plug *RF 3451*, breast-plate of cellastoid, neck band of cotton.

Dimensions of breast plate: height 125 mm, width 175 mm, weight 0.34 kg. Transmitter and receiver terminals are enclosed. The transmitter has a battery key which can easily be short-circuited in case battery switching should not be wanted. This breast transmitter is designed for use with head-gear receiver *RF 1057*.



230151

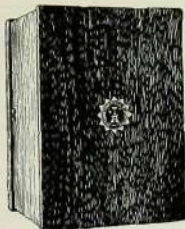
Parts:

receiver with 120 ohm resistance, and earpiece *no 4*, of ebonite, cord *RS 4233*, free length 400 mm, perforated adjustable nickel-plated steel band for fixing the receiver.

Weight: 0.18 kg.

This head-gear receiver is designed for use with breast transmitter *RF 530*.

RH 20002/24. Pole changer.



230140

Pole changers are used in small telephone exchanges for converting DC to AC (ringing current). 50 bells with 1000 ohm resistance each can be connected to this pole changer. This pole changer is designed for connection to 24 V batteries.

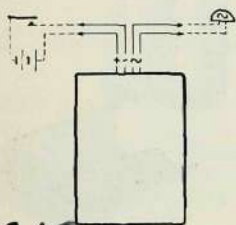
Dimensions: height 300 mm, width 210 mm, depth 190 mm, weight 8.32 kg. If required pole changers for other voltages can be supplied.



230119

This filter is designed for inserting between a pole changer RH 20002/24 and a 24 V battery. When pole changers are used in telephone plants with central battery an intermittent voltage drop occurs in the battery as the pole changer discharges the battery intermittently. This voltage drop will cause noise in the telephones connected to the battery. By inserting a filter RH 21000/24 this noise will be considerably attenuated.

The filter is inserted between the pole changer and the battery in accordance with the diagram. The battery is connected to the terminals marked + and -. It should be observed that the positive pole of the battery is connected to the positive terminal of the filter. A reversion of the connections will spoil the electrolytic condenser. The pole changer should be connected to the two unmarked terminals.

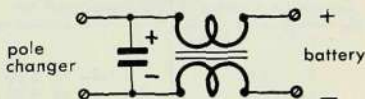


230198

RH 21000/24. Filter for pole changer.

Case of black enamelled sheet-iron, cover of black enamelled brass, inductance coil, electrolytic condenser, terminal block of bakelite.

Dimensions: height 158 mm, width 105 mm, depth 108 mm, weight 1.35 kg.



230141

21007

RK 182 — RK 224. Dry cells.



RK 210



RK 220

catalogue number	voltage	dimensions incl. terminals			weight	terminals
		height	width	depth		
RK 182	V	mm	mm	mm	kg	contact studs and wire wire and screws screws screws screws
	4.5	124	75	38	0.65	
RK 190	1.5	125	55	55	0.60	
RK 210	1.5	170	65	65	0.93	
RK 220	1.5	170	80	80	1.76	
RK 224*	1.5	185	80	80	1.70	

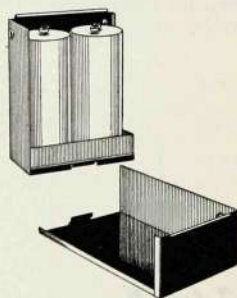
* RK 224 has a capacity of about 150 Ah and is suitable for telephone installations incorporating automatic switchboards OL 10 and OL 12.

21008

RK 2300 — RK 2311. Battery boxes.

These battery boxes are made of black enamelled sheet-iron, the inside bottom being of insulating material. The box is made in two easily separated parts which fit one inside the other, so that they can be packed in a small space.

220016



220015

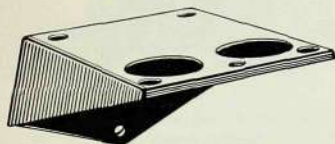


RK 2300

catalogue number	designed for	height	width	depth	weight
		mm	mm	mm	kg
RK 2300	2 cells RK 210	186	147	73	0.64
RK 2310	3 » RK 210	191	217	73	1.15
RK 2311	3 » RK 220 or 4 » RK 210	191	263	98	1.54

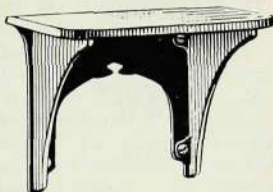
RK 5005, RK 5010, DL 502. Brackets.

These brackets are used for mounting table telephones on walls. They are made of black enamelled sheet-iron. The types *RK 5005* and *RK 5010* are of such a design that they can be packed in a very small space.



RK 5010.

Z 30037



DL 502.

Z 30200

catalogue number	used for types like	height	width	depth	weight
		mm	mm	mm	kg
RK 5005	DB 200	85	150	161	0.4
RK 5010	DE 702	100	188	188	0.5
DL 502	AC 550	175	225	155	0.68

RK 5100. Holder for list of subscribers.

The holder is made of black enamelled sheet-iron and is designed for application to bakelite telephones of type *DE 702* and similar (large model). A cellone plate for protecting the list is supplied with the holder.

Dimensions: height 148 mm, width 127 mm, weight 0.145 kg.

The holder is of such a shape that it will remain firmly fixed without screws or the like. It will hold a list taking 50 subscribers' numbers in ordinary typewritten script, but if a photographic reduction is used a list with a far greater number of subscribers may be employed.



RK 5100.

Z 20017



Z 20018

RK 5100 fitted on a table telephone.

SWITCHES.

The switches have bases of polished oak, and all metal parts are of polished brass.

Z 10010



RL 120.

Z 10011

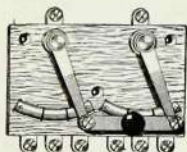


RL 140.

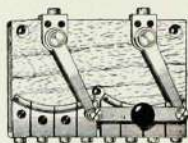
Z 20020



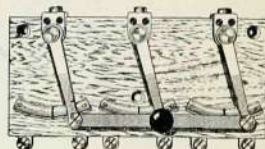
RL 160.



RL 220.



RL 240.



RL 300.

Z 20021

Z 20022

Z 20023

catalogue number	number of		dimensions of base		weight
	levers	positions	height	width	
RL 120	1	3	mm	mm	kg
RL 140	1	4	70	54	0.10
RL 160	1	5*	70	58	0.10
RL 220	2	3	75	75	0.15
RL 240	2	4	67	105	0.19
RL 300	3	2	67	105	0.22
			70	155	0.24

* If required switch RL 160 can be delivered with a greater number of contacts.

RL 201. Two position switch.

The contacts are mounted on a base of bakelite and protected by a case of black enamelled brass. The case is detached for access to the terminal screws by taking out the screw of the switch arm. Dimensions: diameter 54 mm, depth 48 mm, weight 0.12 kg.



RL 201.

Z 30149

220028

OPERATING RELAYS.
220029



num current of 3 A and a maximum tension of 380 V. There are two standard types of mercury contacts, one for maximum 6 A and the other for maximum 30 A; both types are made for a maximum tension of 220 V.

The losses of the relays are small, about 0.1–0.5 W for 24 V relays. The relays are fitted in covers of black enamelled sheet-iron, and in each cover two relays of the 3 and 6 A types may be fitted with auxiliary contacts for signalling purposes. The relays are made for DC or AC for operating voltages up to 380 V. Metal rectifiers being used in the AC relays, these relays are perfectly free from vibration. The relays, which are placed one in

These relays are used for various purposes, e. g., for connecting and disconnecting circuits containing sirens, small motors, bells, signalling and lamp boards, etc. The relays have contacts either of wolfram or of mercury. The wolfram contacts are made for a maxi-

type of contacts and maximum current i A	operating voltage	one relay in the cover				weight	two relays in the cover	weight
		1-pole		2-pole	3-pole		* see note	
		make contact	break contact	make contact	make contact			
	V	catalogue number				kg	cat. no	kg
wolfram contacts for max. 3 A	DC	12	RN 137286			0.9	RN 137287	1.2
		24	RN 138024			0.9	RN 138025	1.2
		110	RN 140578			0.95		
		220	RN 140579			0.95		
mercury contacts for max. 6 A	6		RN 137175			1.0		
	24	RN 136561		RN 145814	RN 145815	1.1	RN 132294	1.3
mercury contacts for max. 30 A	220	RN 145955		RN 145956		1.1		
	24	RN 140470				1.2		
wolfram contacts for max. 3 A	AC	24	RN 140776	switching contact		1.0	RN 140777	1.3
	mercury contacts for max. 6 A	24	RN 136562	RN 134954		1.1	RN 132310	1.4
		48		RN 137178		1.1		
		220	RN 136330			1.3		
mercury contacts for max. 30 A	80	RN 132686			1.3			

* These types have one 1-pole make-contact for each relay. The operating circuits are connected with one end to a common terminal and with the other end to separate terminals.

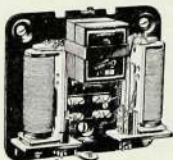
The operated circuits are connected with one end to an other common terminal and with the other to separate terminals.

each cover, can be made 1, 2 or 3-pole; the 1 and 2-pole relays can be fitted with make, break or switching contacts, and the 3-pole relays with make or break contacts.

The relays, which are placed two in each cover, can be made 1-pole and can be fitted with make, break or switching contacts.

Dimensions: height 158 mm, width 105 mm, depth 108 mm.

RN. 142602. Two-line relay for telephones.



The apparatus is composed of 2 condensers RI 654 of 2 μ F each and 2 relays; the parts are fitted in a case of black enamelled sheet-iron.

Dimensions: height 135 mm, width 155 mm, depth 49 mm, weight 1.1 kg.

By means of this apparatus 2 telephones can be connected to the same line. Both incoming and outgoing traffic can be handled by either of the telephones. When one telephone has taken the line on lifting the microtelephone, the other telephone is cut off and cannot overhear or interfere with the call. The apparatus can be used on lines connected to manual or automatic CB systems.

RO 10109, RO 10110. Time checks.



RO 10109.



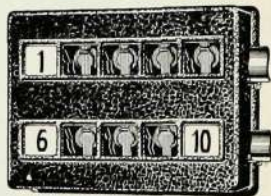
RO 10110.

The time checks have pendulum movement and consequently they have to be mounted in vertical position. When the lever at the bottom of the time check is moved to the right, the time check is stopped; by moving it to the left the hand is returned to 0, and the clockwork is wound and started.

RO 10109 has a signalling bell which gives a brief signal at the end of each three-minute period.

RO 10110 has terminals for the connection of a signalling lamp or the like. A signal is given after 2 minutes and 35 seconds and lasts for 25 seconds. Dimensions: diameter of base plate 57 mm, weight 0.14 kg.

RP 130w. Annunciator.



RP 130w/10.

Case of dull enamelled sheet-iron. The numbers dropped are returned by means of the handle on the right side of the apparatus.

Dimensions: width 170 mm, depth 55 mm.

catalogue number	numbers	height	
		mm	kg
RP 130w/5	5	71	0.50
RP 130w/10	10	121	0.92

RECTIFIERS AND CHARGING UNITS FOR ACMAINS.

(incorporating Westinghouse metal rectifiers under licence).

The demands on a charging unit of good quality are reliability, simple operation, small first cost and upkeep and high efficiency. The Ericsson charging units fulfil these requirements particularly well as the reliability is extremely good and the operation the simplest possible. Moreover they have a practically unlimited life as no change in the rectifiers under ordinary conditions has yet been observed provided they are not overloaded. The efficiency, which varies according to the load and lies between 40 % and 70 %, is very high for rectifiers of this size. These

rectifiers possess the additional advantage that the reverse current is very small. If the mains current fails therefore the battery will not be discharged through the rectifier, which may consequently remain in circuit permanently. Charging starts again automatically as soon as the mains voltage returns. The charging unit proper, which mainly consists of rectifier elements and an air-cooled transformer with separate windings and tappings for voltage regulation, is fitted in a cover of black enamelled sheet-iron. In most of the types there are also arrangements for

Charging current	6 V		12 V		24 V	
	without instrument	with instrument	without instrument	with instrument	without instrument	with instrument
A	c a t a l o g u e n u m b e r s					
0.1					RH 30200	RH 30220
0.2			RH 30195	RH 30215		
0.25					RH 30128 RH 30140	RH 30152 RH 30156
0.4	RH 30190	RH 30210				
0.5	RH 30110		RH 30124 RH 30136	RH 30148	RH 30130 RH 30142	RH 30154 RH 30158
0.75					RH 30234 RH 30246	RH 30262 RH 30266
1	RH 30120 RH 30132	RH 30144	RH 30126 RH 30138	RH 30150		
1.5			RH 30230 RH 30242	RH 30256	RH 30236 RH 30248	RH 30264 RH 30268
2	RH 30122 RH 30134	RH 30146				
3	RH 30226 RH 30238	RH 30252	RH 30232 RH 30244	RH 30258	RH 30354 RH 30374	RH 30394
5	RH 30228 RH 30240	RH 30254	RH 30352 RH 30372	RH 30392	RH 30364 RH 30384	RH 30404
6					RH 30544	RH 30554
8	RH 30350 RH 30370	RH 30390	RH 30362 RH 30382	RH 30402		
10			RH 30540	RH 30550	RH 30546	RH 30556
16	RH 30360 RH 30380	RH 30400				
20			RH 30542	RH 30552		
24					RH 30548	RH 30558

These types are designed for 50 c/s; the types for 25 c/s have the next higher numbers. Example: A rectifier for 0.2 A, 12 V without instrument has catalogue number RH 30195; the corresponding type for 25 c/s is RH 30196

connecting and disconnecting the mains and the battery, and in some cases fuses and measuring instruments. All parts are easy of access and replacement.

Data for ordering.

The charging units are made for standard tensions of 110, 127 and 220 V AC but if required they can also be supplied for other voltages.

When ordering please state catalogue number, mains voltage and frequency as well as the desired DC voltage, and if possible the purpose for which the charging unit is intended, i. e., battery charging (type and number of cells), or, if the unit is to be used for direct feeding, the character of the load (inductive or resistance), etc.

RH 30110, RH 30111. Metal rectifiers.

RH 30120—RH 30131. Metal rectifiers.



Z 30120

Case of black enamelled sheet-iron, cover of black enamelled brass, rectifier element composed of rectifier discs in bridge connection, transformer with tappings, connecting block with contacts for 2, 4 and 6 V batteries, terminal block of bakelite with cover and 4 terminals.

The apparatus supplies rectified current at 0.5 A and 2, 4 or 6 V.

RH 30110 is designed for 50 c/s.

RH 30111 is designed for 25 c/s.

Dimensions: height 158 mm, width 105 mm, depth 108 mm, weight 1.5 kg.

This metal rectifier is used for charging 1, 2 or 3 lead storage cells or 1, 3 or 5 Nife cells. It is also used as a substitute for dry cells and for the supply of small installations.



Z 30122

Case of black enamelled sheet-iron, rectifier element composed of rectifier discs in bridge connection, transformer, switch for the charging circuit, 4 terminals.

Dimensions: height 290 mm, width 163 mm, depth 76 mm.

catalogue number	rectified output		AC	weight
	A	V		
RH 30120	1	6	50	3.4
RH 30121	1	6	25	3.4
RH 30122	2	6	50	3.8
RH 30123	2	6	25	3.8
RH 30124	0.5	12	50	3.4
RH 30125	0.5	12	25	3.4
RH 30126	1	12	50	3.8
RH 30127	1	12	25	3.8
RH 30128	0.25	24	50	3.4
RH 30129	0.25	24	25	3.4
RH 30130	0.5	24	50	3.8
RH 30131	0.5	24	25	3.8

RH 30132—RH 30143. Metal rectifiers.



2 30123

These rectifiers are composed of parts the same as RH 30120—RH 30131 and in addition have a potentiometer for regulating the current. Dimensions: height 290 mm, width 163 mm, depth 99 mm.

catalogue number	rectified output		AC	weight	
	A	V		c/s	kg
RH 30132	1	6	50	3.6	
RH 30133	1	6	25	3.6	
RH 30134	2	6	50	3.9	
RH 30135	2	6	25	3.9	
RH 30136	0.5	12	50	3.6	
RH 30137	0.5	12	25	3.6	
RH 30138	1	12	50	3.9	
RH 30139	1	12	25	3.9	
RH 30140	0.25	24	50	3.6	
RH 30141	0.25	24	25	3.6	
RH 30142	0.5	24	50	3.9	
RH 30143	0.5	24	25	3.9	

RH 30144—RH 30155. Metal rectifiers.

These rectifiers are composed of parts the same as RH 30120—RH 30131 and in addition have a potentiometer for regulating the current, moving-coil voltmeter and a press button for connecting the voltmeter. Dimensions: height 290 mm, width 163 mm, depth 107 mm.



2 30124

catalogue number	rectified output		AC	weight	
	A	V		c/s	kg
RH 30144	1	6	50	3.9	
RH 30145	1	6	25	3.9	
RH 30146	2	6	50	4.2	
RH 30147	2	6	25	4.2	
RH 30148	0.5	12	50	3.9	
RH 30149	0.5	12	25	3.9	
RH 30150	1	12	50	4.2	
RH 30151	1	12	25	4.2	
RH 30152	0.25	24	50	3.9	
RH 30153	0.25	24	25	3.9	
RH 30154	0.5	24	50	4.2	
RH 30155	0.5	24	25	4.2	

RH 30156—RH 30159. Metal rectifiers

These rectifiers are composed of parts the same as RH 30144—RH 30155 and in addition have a choke coil for smoothing out the rectified current. Dimensions: height 290 mm, width 163 mm, depth 107 mm.

catalogue number	rectified output		AC	weight	
	A	V		c/s	kg
RH 30156	0.25	24	50	4.4	
RH 30157	0.25	24	25	4.4	
RH 30158	0.5	24	50	4.7	
RH 30159	0.5	24	25	4.7	

RH 30190—RH 30221. Metal rectifiers.



230121

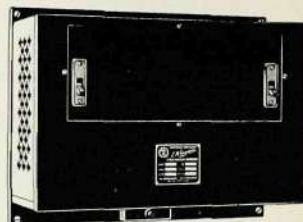
Case of black enamelled sheet-iron with hinged cover, rectifier element composed of rectifier discs in bridge connection, transformer, adjustable charging resistance, fuse in the charging circuit, two-part plug for connection to the AC mains, 2 terminals. In addition, the types RH 30210—RH 30221 are provided with a moving-coil voltmeter with zero adjustment and a press button for connection of the voltmeter.

catalogue number	rectified output		AC	weight
	A	V	c/s	
without instrument				
RH 30190	0.4	6	50	2.1
RH 30191	0.4	6	25	2.1
RH 30195	0.2	12	50	2.1
RH 30196	0.2	12	25	2.1
RH 30200	0.1	24	50	2.1
RH 30201	0.1	24	25	2.1
with instrument				
RH 30210	0.4	6	50	2.4
RH 30211	0.4	6	25	2.4
RH 30215	0.2	12	50	2.4
RH 30216	0.2	12	25	2.4
RH 30220	0.1	24	50	2.4
RH 30221	0.1	24	25	2.4

Dimensions: height 218 mm, width 156 mm, depth 56 mm (with instrument 90 mm).

These rectifiers are suitable for keeping up the charge of batteries with small current consumption.

RH 30226—RH 30237. Metal rectifiers.



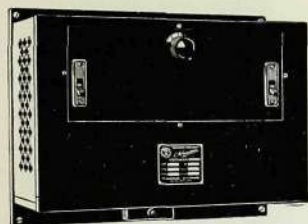
230125

Case of black enamelled sheet-iron, rectifier element composed of rectifier discs in bridge connection, transformer, switch for the primary and charging circuits, 1 fuse in the charging circuit, 4 terminals.

Dimensions: height 283 mm, width 370 mm, depth 131 mm.

catalogue number	rectified output		AC	weight
	A	V	c/s	
RH 30226	3	6	50	8.2
RH 30227	3	6	25	8.2
RH 30228	5	6	50	9.9
RH 30229	5	6	25	9.9
RH 30230	1.5	12	50	8.2
RH 30231	1.5	12	25	8.2
RH 30232	3	12	50	9.9
RH 30233	3	12	25	9.9
RH 30234	0.75	24	50	8.2
RH 30235	0.75	24	25	8.2
RH 30236	1.5	24	50	9.9
RH 30237	1.5	24	25	9.9

RH 30238—RH 30249. Metal rectifiers.



Z 30126

These rectifiers are composed of parts the same as RH 30226—RH 30237 and in addition have a potentiometer for regulating the current.

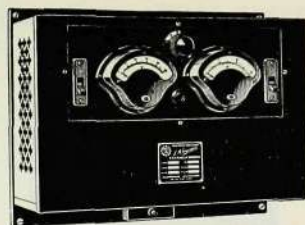
Dimensions: height 285 mm, width 370 mm, depth 154 mm.

catalogue number	rectified output		AC	weight
	A	V		
RH 30238	3	6	50	8.9
RH 30239	3	6	25	8.9
RH 30240	5	6	50	10.6
RH 30241	5	6	25	10.6
RH 30242	1.5	12	50	8.9
RH 30243	1.5	12	25	8.9
RH 30244	3	12	50	10.6
RH 30245	3	12	25	10.6
RH 30246	0.75	24	50	8.9
RH 30247	0.75	24	25	8.9
RH 30248	1.5	24	50	10.6
RH 30249	1.5	24	25	10.6

RH 30252—RH 30265. Metal rectifiers.

These rectifiers are composed of parts the same as RH 30238—RH 30249 and in addition have moving-coil volt and ammeter with zero adjustment, and a press button for connecting the voltmeter.

Dimensions: height 385 mm, width 370 mm, depth 160 mm.



Z 30127

catalogue number	rectified output		AC	weight
	A	V		
RH 30252	3	6	50	9.5
RH 30253	3	6	25	9.5
RH 30254	5	6	50	11.2
RH 30255	5	6	25	11.2
RH 30256	1.5	12	50	9.5
RH 30257	1.5	12	25	9.5
RH 30258	3	12	50	11.2
RH 30259	3	12	25	11.2
RH 30262	0.75	24	50	9.5
RH 30263	0.75	24	25	9.5
RH 30264	1.5	24	50	11.2
RH 30265	1.5	24	25	11.2

RH 30266—RH 30269. Metal rectifiers.

These rectifiers are composed of parts the same as RH 30252—RH 30265 and in addition have a choke coil for smoothing out the rectified current.

Dimensions: height 285 mm, width 370 mm, depth 160 mm.

catalogue number	rectified output		AC	weight
	A	V		
RH 30266	0.75	24	50	10.8
RH 30267	0.75	24	25	10.8
RH 30268	1.5	24	50	12.5
RH 30269	1.5	24	25	12.5

RH 30350—RH 30365. Metal rectifiers.

RH 30370—RH 30385. Metal rectifiers.



230128

Case of black enamelled sheet-iron, rectifier element composed of rectifier discs in bridge connection, transformer with extra tapplings on the primary and secondary windings, 2 switches for the tapplings of the transformer for stepwise regulation of the current and for disconnection, 2 fuses in the charging circuit, 5 terminals. The above rectifiers may be supplied at extra cost with a choke coil for smoothing the rectified current.

Dimensions: height 490 mm, width 380 mm, depth 210 mm.

The types RH 30360—RH 30365 are provided with an additional set of rectifier elements and the overall height of the apparatus is then increased from 490 mm to 840 mm.



230129

These rectifiers are composed of the same parts as RH 30350—RH 30365 with, in addition, a regulating resistance for the accurate adjustment of the current. The above rectifiers may be supplied at extra cost with a choke coil for smoothing the rectified current. Dimensions: height 490 mm, width 380 mm, depth 242 mm.

The types RH 30380—RH 30385 are provided with an additional set of rectifier elements and the overall height of the apparatus is then increased from 490 mm to 840 mm.

catalogue number	rectified output		AC	weight
	A	V		
RH 30350	8	6	50	19.5
RH 30351	8	6	25	19.5
RH 30352	5	12	50	19.5
RH 30353	5	12	25	19.5
RH 30354	3	24	50	19.5
RH 30355	3	24	25	19.5
RH 30360	16	6	50	30
RH 30361	16	6	25	30
RH 30362	8	12	50	30
RH 30363	8	12	25	30
RH 30364	5	24	50	30
RH 30365	5	24	25	30

catalogue number	rectified output		AC	weight
	A	V		
RH 30370	8	6	50	20.3
RH 30371	8	6	25	20.3
RH 30372	5	12	50	20.3
RH 30373	5	12	25	20.3
RH 30374	3	24	50	20.3
RH 30375	3	24	25	20.3
RH 30380	16	6	50	31.2
RH 30381	16	6	25	31.2
RH 30382	8	12	50	31.2
RH 30383	8	12	25	31.2
RH 30384	5	24	50	31.2
RH 30385	5	24	25	31.2

RH 30390—RH 30405. Metal rectifiers.



230130

These rectifiers are composed of the same parts as RH 30350—RH 30365 with, in addition, a regulating resistance for the accurate adjustment of the current, a moving-coil voltmeter and ammeter with zero adjustment and a press button for connecting the voltmeter.

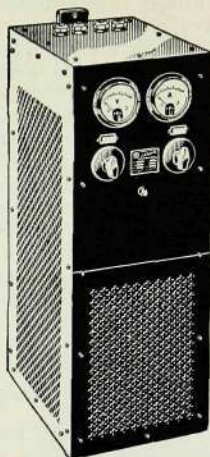
The above rectifiers may be supplied at extra cost with a choke coil for smoothing the rectified current.

Dimensions: height 490 mm, width 380 mm, depth 242 mm.

The types RH 30400—RH 30405 are provided with an additional set of rectifier elements and the overall height of the apparatus is then increased from 490 mm to 840 mm.

catalogue number	rectified output		AC	weight
	A	V		
RH 30390	8	6	50	21.7
RH 30391	8	6	25	21.7
RH 30392	5	12	50	21.7
RH 30393	5	12	25	21.7
RH 30394	3	24	50	21.7
RH 30395	3	24	25	21.7
RH 30400	16	6	50	32.2
RH 30401	16	6	25	32.2
RH 30402	8	12	50	32.2
RH 30403	8	12	25	32.2
RH 30404	5	24	50	32.2
RH 30405	5	24	25	32.2

RH 30540—RH 30559. Metal rectifiers.



230131

catalogue number	rectified output		AC	weight
	A	V		
without instrument				
RH 30540	10	12	50	50
RH 30541	10	12	25	50
RH 30542	20	12	50	68
RH 30543	20	12	25	68
RH 30544	6	24	50	50
RH 30545	6	24	25	50
RH 30546	10	24	50	68
RH 30547	10	24	25	68
RH 30548	24	24	50	143
RH 30549	24	24	25	143
with instrument				
RH 30550	10	12	50	50
RH 30551	10	12	25	50
RH 30552	20	12	50	68
RH 30553	20	12	25	68
RH 30554	6	24	50	50
RH 30555	6	24	25	50
RH 30556	10	24	50	68
RH 30557	10	24	25	68
RH 30558	24	24	50	143
RH 30559	24	24	25	143

Case of black enamelled sheet-iron, rectifier element composed of rectifier discs in bridge connection, switch on the primary side for adjusting the current and for disconnecting, moving-coil voltmeter and ammeter with zero adjustment, press-button for connecting the voltmeter, switch on the secondary side, 2 fuses on the primary and 2 on the secondary side, 4 terminals.

Dimensions: height 875 mm, width 290 mm, depth 400 mm.

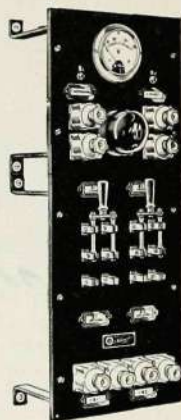
The types *RH 30548*, *RH 30549*, *RH 30558* and *RH 30559* are provided with an additional set of rectifier elements; this set has the same dimensions as the rectifier proper.

RH 31300—RH 31301. Charging units.

This apparatus is designed for the charging of two 24 V batteries with a current of 1 A. The batteries are switched on and off by hand.

The rectifier unit is fitted on a panel of isolite and consists of moving-coil voltmeter with zero adjustment, 2 press buttons for connecting the voltmeter to the 2 batteries, switch for the primary side, rectifier element composed of rectifier discs in bridge connection, transformer.

The charging panel is also fitted on a panel of isolite and consists of 2 double knife-switches for connecting the bat-



230/32

teries for charging or discharging and 4 fuses for the batteries, max. 25 A.

RH 31500 is designed for 50 c/s.

RH 31501 is designed for 25 c/s. Dimensions: height 700 mm, width 270 mm, depth 160 mm, weight 9.4 kg.

CHARGING UNITS FOR DC MAINS.

RH 50300. Charging unit.

This apparatus is designed for the charging of two 24 V batteries with 4.5 A from 110 V mains or with 2.5 A from 220 V mains. The batteries are switched on and off by hand.

The apparatus consists of the following parts: panel of isolite, moving-coil voltmeter with zero adjustment, 2 press buttons for connecting the voltmeter to the batteries, 4 fuses for the mains and for the charging circuit, switch for the mains, resistance, relay for disconnecting the charging circuit on interruption of the battery circuit.

The charging panel is also fitted on a panel of isolite and consists of 2 double knife-switches for connecting the batteries for charging and discharging and 4 fuses for the batteries, max. 25 A.

The apparatus is similar to *RH 31500*. Dimensions: height 700 mm, width 270 mm, depth 160 mm, weight 9.4 kg.

RH 50300/110 is designed for 110 V mains.

RH 50300/220 is designed for 220 V mains.

CHARGING CONTROLLERS.

RH 52110. Automatic charging controller.



Z 30136

This apparatus is used together with charging units for 24 V storage batteries for the supervision of the charging so that the battery voltage is kept constant within about 2 V. The controller is designed for charging current of up to 10 A.

The connecting and disconnecting of the charging current is regulated by the battery voltage. A simple and reliable voltage control is obtained by the intermittent connection of a relay to the battery for testing the voltage. When the battery is on charge and the voltage has not yet reached the fixed value, the relay will remain connected to the battery constantly. When the limit voltage has been reached, the relay will attract and so break the charging current. As long as the relay will attract it is connected intermittently by means of a thermo-contact, but when the voltage has fallen about 2 V the relay will not attract, the intermittent connecting of the relay will cease, and

the charging current will be switched on again.

Frame of black enamelled sheet-iron, cover of black enamelled brass, relay for the supervision of the battery voltage, thermo-contact with mercury contact for breaking the charging current, 2 rheostats for adjusting the voltage at which the relay will attract.

Dimensions: height 158 mm, width 105 mm, depth 108 mm, weight 1 kg.

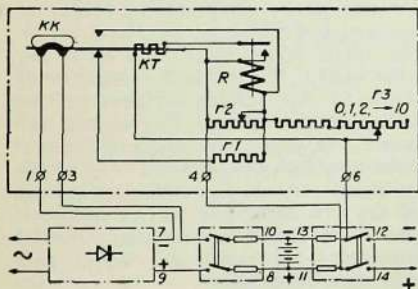
RH 52150—RH 52253. Charging control board.



Z 30138

This board is composed of a charging controller RH 52110 fitted on a frame of black enamelled sheet-iron and provided with one switch on the primary and one on the secondary side and in addition fuses according to the table. Apparatus for AC has two fuses on either side and DC apparatus one fuse on the primary side and two on the secondary side.

Dimensions: height 400 mm, width 180 mm, depth 114 mm, weight 2.4 kg.



Z 30137

catalogue number		fuses	
AC	DC	primary side	secondary side
		A	A
RH 52150	RH 52250	2	10
RH 52151	RH 52251	4	15
RH 52152	RH 52252	6	20
RH 52153	RH 52253	10	25

MAGNETO FIRE-ALARM SYSTEM.

2 30048



The ability of a fire brigade to extinguish a fire depends not only on the organization of the fire brigade and the fire extinguishing material available but also to a great extent on the time which elapses between the outbreak of the fire and the arrival of the brigade. In many cases where fire brigades have not been able to master large conflagrations much damage might have been avoided had the brigades been able to start work at an early stage of the fire.

Fire-alarm installations are used for the rapid calling of the fire brigade. Such installations may be built on various systems, according to the size of the places where they are to be used. The following requirements may be set on a modern fire-alarm system:

1. the giving of signals from the alarm boxes must be as simple as possible;
2. the signals given from the fire-alarm boxes must be distinct and easy to understand;
3. the system should be made so that continuous watching of the alarm board is not required, but that the signals from the alarm boxes actuate the firemen's alarm bells direct;
4. the system must not be complicated and should be so easy to operate that its supervision can be entrusted to persons without special training;
5. the system must not need much maintenance;
6. false alarm signals must not be liable to occur;
7. perfect reliability even when complicated line faults occur;
8. line faults must be signalled automatically and must not put the system out of action;
9. all apparatus must be well protected

against atmospheric discharges and overload;

10. the apparatus must be inexpensive without neglecting any of the above requirements, and the cost of installation must be small.

This fire alarm system fulfils all these requirements and is specially designed for small communities.

An installation on this system at its simplest is composed of magneto fire-alarm boxes *TH 117* and AC bells *RA 171* which are connected in series in a single wire loop. All fire-alarm boxes are connected to earth and at certain points in the loop safety devices *TI 606* are inserted, connecting the loop to earth over condensers. The fire-alarm boxes have built-in generators which on alarm supply the necessary AC for ringing the alarm bells. The boxes are provided with arrangements for giving signals which indicate the position of the calling box. On alarm from a fire-alarm box all bells will ring with signal combinations indicating the number of the calling box. This will be the case even if rupture and leakage should occur at the same time on the line.

To allow of automatic fault-signalling when faults occur on the lines, an alarm board *TH 680* may be inserted at a suitable place in the loop. When rupture or leakage or both these faults occur in the loop, the fault-signalling bell of the alarm board will start ringing and the system may be switched over for emergency operation by means of the switches fitted on the alarm board. The alarm board requires in all 18 dry cells of 1.5 V each and a capacity of about 55 Ah. These batteries will be sufficient to operate the system for about 2½ years. If considered convenient a telegraph receiver *TI 70*, which on alarm records the code transmitted by the fire-alarm box, can be supplied. The alarm board has terminals for the connection of additional alarm and fault signalling bells.

AUTOMATIC FIRE ALARM.

Automatic fire-alarm installations may be based on two different systems:

- the open circuit system and
- the closed circuit system.

In the open circuit system the lines are without current except when alarm is given; the circuit being closed by the alarm contacts.

In closed circuit systems the lines always carry a feeble current: the closed circuit current. Alarm is given when the circuit of this current is broken by interruption in one or more of the alarm contacts. Any fault occurring on the line of a closed circuit system, such as rupture, short-circuit or earth fault is immediately indicated by fault signals.

In the Ericsson fire-alarm system the closed circuit current is led through one or more loops in which are inserted a number of alarm press-buttons and temperature sensitive thermo-contacts. These loops are connected to an alarm board which automatically connects the bells and horns as soon as an alarm contact is actuated.

An automatic fire-alarm installation is composed of the following parts:

1. thermo-contacts,
2. alarm press-buttons,
3. alarm board,
4. alarm bells,
5. batteries,
6. line material.

1. THERMO-CONTACTS.

TH 850, TH 851. Thermo-contacts.



Z 30077

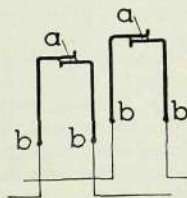
TH 850 with black base and cover.

TH 851 with white base and cover.

Dimensions: diameter 68 mm, depth 68 mm, weight 0.15 kg.

The thermo-contacts are composed of two pairs of contact springs *b*, fitted on a base of bakelite and protected by a strong cover. The contact springs are soldered together two by two by an alloy *a* which melts at 70° C. At this temperature the contact between the springs is broken, whereby the

necessary change in the circuit is produced for giving alarm signals. The contact springs are submitted to a pressure of 250—300 g by separate locking springs. By means of these locking springs it can easily be seen whether the contact springs are under the pressure necessary for the perfect functioning of the thermo-contact. If required TH 850 and TH 851 can be delivered for higher melting temperatures than 70° C.



Z 30078

TH 856/03, TH 856/04. Thermo-con-
tacts.

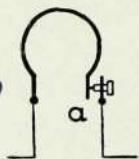


Z 30079

TH 856/03 with black base and
cover.

TH 856/04 with white base and
cover.

Dimensions: diameter 68 mm, depth
68 mm, weight 0.14 kg.



Z 30080

The thermo-contact is composed of a
bimetallic spring fitted on a base of
bakelite and protected by a strong
cover. Heating of the contact spring
causes it to break the circuit.

These thermo-contacts are especially suit-
able where alarm is wanted at a lower
temperature than 70° C but they may
be used for temperatures up to 150° C.
The adjustment screw a is fitted with
a graduated disc, by means of which
the thermo-contact can be adjusted to
break at a certain temperature. The
adjustment disc is, in graduations of
5 degrees, for a range of 40 to 100° C.

TH 859/51. Waterproof thermo-con-
tact.



Z 30081

Dimensions: height 120 mm, width 80
mm, depth 78 mm, weight 0.19 kg.
This thermo-contact is fitted in a case
of bakelite with a cover of thin black
enamelled sheet-brass. In other respect
it is similar to TH 856.

2. ALARM PRESS-BUTTONS.

These buttons are used for manual
alarm signalling and consist of a press
button each, actuating a number of con-
tact springs, which open or close the
alarm circuit. The press buttons are
contained in red enamelled covers of
sheet-iron with a thin glass panel which
is to be broken on giving alarm. The
alarm buttons are made both for ex-
ternal and flush mounting and are
connected to the line system in the same
manner as the thermo-contacts. One
button should be placed beside the
alarm board for testing purposes. The
cover can be removed by means of a
key TH 638.

TH 400, TH 401. Alarm press-buttons
for external mounting.



Z 30190

TH 400 with 2 make contacts.

TH 401 with 2 break contacts.
Bottom plate of oak.

Dimensions: diameter 90 mm, depth
62 mm, weight 0.35 kg.

TH 402, TH 403. Alarm press-buttons for flush mounting.

TH 402 with 2 make contacts.

TH 403 with 2 break contacts.

Dimensions: diameter 100 mm, depth 48 mm, weight 0.385 kg.



230191



230192

TH 405 for external mounting.

Bottom plate of oak.

Dimensions: diameter 90 mm, depth 72 mm, weight 0.385 kg.



230193

TH 405, TH 406. Alarm press-buttons.

These press buttons have each one make contact and are designed for connecting bells etc. direct to electric mains of up to 220 V.

TH 406 for flush mounting.

Dimensions: diameter 100 mm, depth 65 mm, weight 0.385 kg.

3. ALARM BOARDS.

TH 980/01. Combined alarm board for fire and burglar alarm.

230194



The apparatus is fitted in a case of pressed black enamelled sheet-iron and contains closed circuit relay, milliammeter, alarm bell, battery switch so designed that it is impossible to disconnect both batteries at one time, key for

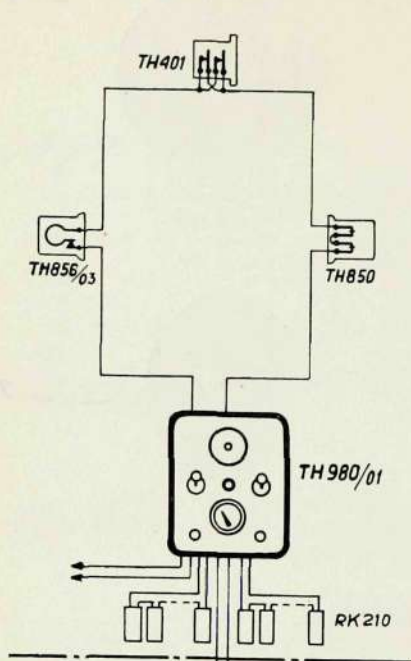
switching on and off, restoring key, earth fault tester and a supervisory lamp.

Dimensions: height 218 mm, width 157 mm, depth 94 mm, weight 1.9 kg.

The system is fed with DC of 12 V. The current supply can be made up of 2 batteries each consisting of 10 dry cells RK 210 of 1.5 V each.

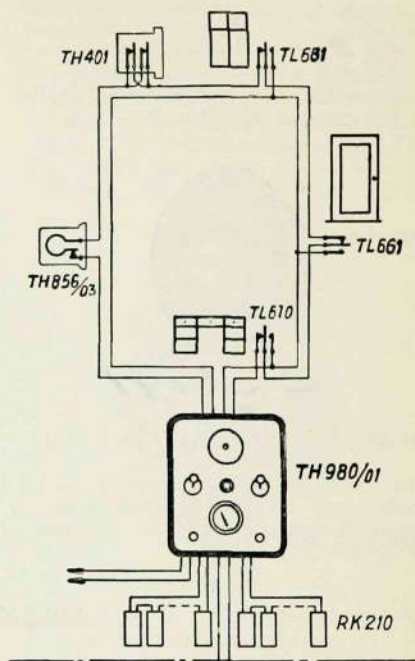
This alarm board is designed for small installations in private houses, shops, almshouses, hospitals, etc. and may be used for fire or burglar alarm separately or for both kinds of alarm at the same time.

When the loop is idle the milliammeter gives a certain deflection. On alarm the closed circuit current is interrupted and the bell of the alarm board, as also any extra bells and horns, give alarm. When the signals have been heard, the alarm board may be disconnected; the signals then cease and the



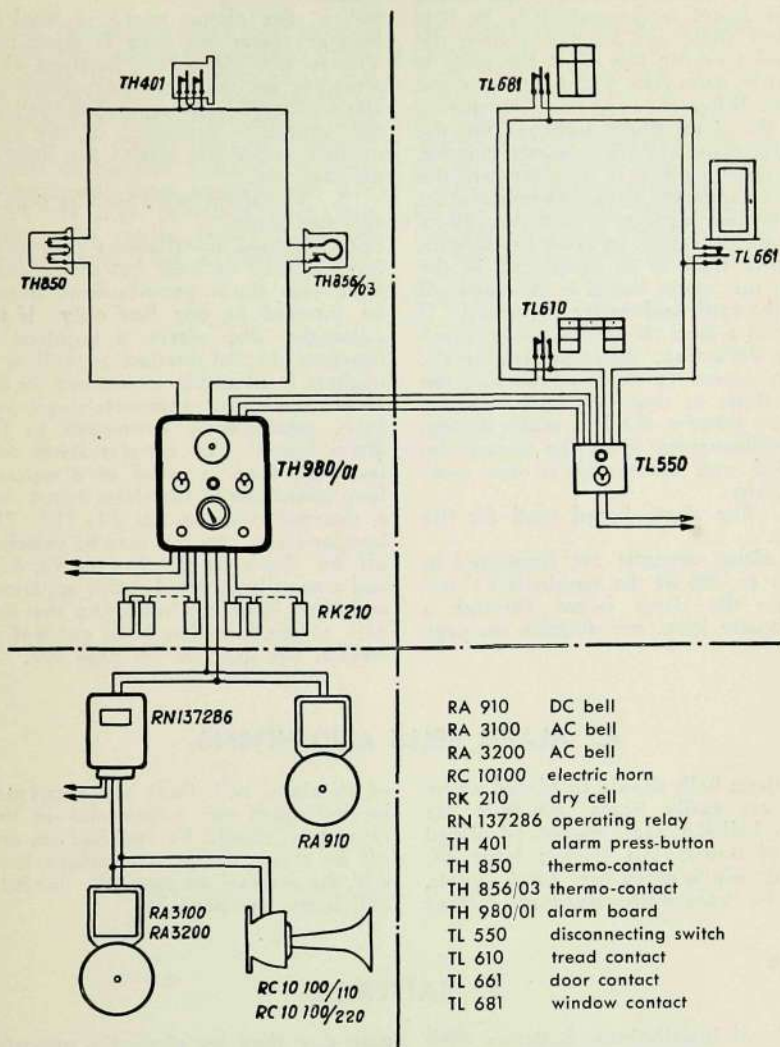
Automatic fire-alarm system.

230188



Automatic burglar-alarm system.

230189



Combined automatic fire and burglar-alarm system.

240001

supervisory lamp lights up. The lamp lights as an indication as long as the alarm board is disconnected. So that current shall not be taken from the batteries during this time, the lamp is a 0.25 W neon lamp fed direct from the mains. When the loop has been cleared and the alarm board switched on, the lamp goes out and the bell starts ringing. The restoring key is then thrown, the bell ceases to ring, the milliammeter gives the normal deflection and the system is again in service. In order to ascertain whether there is an earth fault in the loop, the alarm board is switched off and the earth fault tester is pressed. If there is a fault the milliammeter shows it by deflection. After the testing the alarm board is switched on and the bell starts to ring. The restoring key is then thrown, the bell ceases to ring, the milliammeter gives the normal deflection and the system is once more in service.

1. The alarm board used for fire alarm. The alarm contacts are connected in series to one of the terminals L1 and L2 on the alarm board through a single-wire loop. See diagram on page 106.

4. ALARM BELLS AND HORNS.

The alarm bells should be placed where they are easily heard. At least one alarm bell *RA 5100* should be placed out of doors. An electric horn *RC 10100*, which gives very loud signals, may be used with advantage instead

2. The alarm board used for burglar alarm.

When the alarm board is used for burglar alarm the loop is made two-wire so that alarm shall be given when attempts are made to short-circuit the alarm contacts. On ruptures in the loop the apparatus functions in the same manner as for fire alarm. See diagram on page 106.

3. The alarm board used for burglar and fire alarm.

For combined installations a two-wire loop should be used but thermo-contacts and alarm press-buttons should be inserted in one line only. If the automatic fire alarm is required to function in the daytime as well as at night it is advisable to connect the fire alarm contacts in a separate single-wire loop, permanently connected to the alarm board. The burglar alarm contacts are then inserted in a separate loop connected to the alarm board over a disconnecting switch *TL 550*. The burglar-alarm contacts may be switched off by throwing the key of *TL 550*, and a neon lamp fitted in this apparatus will then light up, indicating that this part of the loop has been put out of service. See diagram on page 107.

of an alarm bell. Bells and horns may be fed from the mains and in this case they should be switched on and off by means of operating relays, Type *RN*. See diagram on page 107. For bells and horns see page 76.

5. BATTERIES.

For small installations, batteries with a total tension of 12 V are used. It is advisable to use 2 batteries. The batteries may be made up of dry cells *RK 210* or *RK 220*, see page 88. By switching on the batteries every alter-

nate day they are given the opportunity of reviving, thus considerably increasing life-time. Used in this way the 2 batteries will last about 2 years, so this part of the operating expenses will be very small.

6. LINE MATERIAL.

Special two-conductor cable is used for the fire and burglar-alarm loops. The wires have a diameter of 0.7 mm and are protected by a lead sheath; in addition the cables are covered with 2 layers of cotton impregnated with minium or paraffin to make it possible to distinguish them from others. The cables are also protected with lead sheath. The cables Type *EDBM* are red and those Type *EDBP* are white.

For small installations ordinary telephone cable Type *EEB*, 2×0.7 mm, or Type *EDBA*, 2×0.7 mm, may be used. Cable Type *EDBM*, 2×0.7 mm, hung on supporting wire may be used for overhead lines. Overhead lines should be connected over fuses *ND 380/1*. Cables with rubber insulation are used for the connections between the batteries and the alarm board and also for connections to alarm bells.

AUTOMATIC BURGLAR ALARM.

Automatic burglar-alarm installations may be based on two different systems: the open circuit system and the closed circuit system.

In open circuit systems the lines are without current except when alarm is given; the circuit is then closed by means of the alarm contacts.

In closed circuit systems the lines always carry a feeble current: the closed circuit current. Alarm is given when the circuit of this current is broken by interruption in one or more of the alarm contacts. Faults, such as ruptures, short-circuits or earth faults, occurring

on the lines of closed circuit systems are immediately indicated by fault signals.

An automatic burglar-alarm installation is composed of the following parts:

1. burglar-alarm contacts,
2. alarm board,
3. alarm bells,
4. batteries,
5. line material.

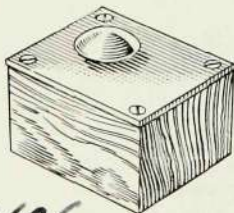
Regarding 3, 4 and 5 see the corresponding sections under fire alarm, page 108.

1. BURGLAR ALARM CONTACTS.

TL 610. Tread contact.

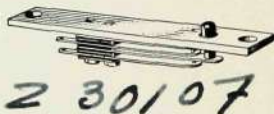
This contact is similar to *TL 611*, but has no case. The contact is designed for fitting in the floor, flush mounting. It replaces the old type *TL 600*.

TL 611. Tread contact.



This contact is fitted in a case of oak. Dimensions: height 82 mm, width 68 mm, depth 38 mm, weight 0.25 kg. This contact is of very sturdy construction and is designed to be placed on the floor below the cashier's desk in the cash department of a bank, post office etc. On hold-ups these contacts may be pressed with the foot unobserved whereby assistance will be called.

TL 650. Door contact.



This contact has no cover and is designed for flush mounting in the door frame. Alarm is given when the door is opened.

Dimensions: length 120 mm, width 20 mm, depth 20 mm, weight 0.075 kg.

TL 661. Door contact.



This contact is similar in function to *TL 650* but has a protective cover and is designed for mounting in safes etc. Dimensions: length 57 mm, width 30 mm, depth 25 mm, weight 0.08 kg.

TL 670. Window contact.



230109

This contact has no cover and is designed for flush mounting. Dimensions: length 120 mm, width 20 mm, depth 20 mm, weight 0.075 kg. A steel cord TL 850 is stretched from the window contact over a number of small pulleys TL 800 to a clamping plate TL 810. When the cord is pulled or when attempts are made to cut off the cord the alarm board will give alarm immediately.

The safe contact is composed of a contact device and a terminal block which is to be mounted beside the safe door. On the safe immediately above the lock a plug is fitted on which the contact device should be fitted when the safe is locked; the alarm board is then switched on. On the slightest movement of the safe door or on attempts to injure the contact or the wiring, alarm will be given from the alarm board. Weight 0.685 kg. This contact is also made for horizontal mounting: catalogue number TL 700/02.

TL 681. Window contact.



230110

This contact is similar in function to TL 670 but has a protective cover. Dimensions: length 57 mm, width 25 mm, depth 30 mm, weight 0.07 kg.

TL 800. Pulley.

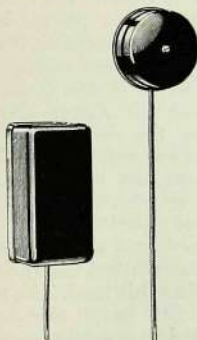


230112

TL 800 is used for the protection of windows together with the contacts TL 670 and TL 681.

Dimensions: length 50 mm, width 20 mm, weight 0.019 kg.

TL 700/01. Safe contact.



230111

TL 810. Clamping plate.

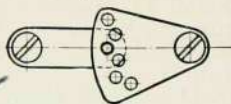


230113

This clamping plate is used for fixing steel cord TL 850.

Dimensions: length 48 mm, width 12 mm, weight 0.01 kg.

TL 820. Link plate.



Dimensions: length 44 mm, width 20 mm, weight 0.008 kg.

By means of this link plate the steel cords protecting windows are easily adjusted to the right length. The protective arrangements may also easily be taken down when the window is to be opened.

TL 850. Steel cord.

Steel cord TL 850 is used for window shields and window contacts. When ordering please state the length required. Diameter 0.5 mm.

TL 900/01. Disconnecting switch for door contacts, with key.



By means of this switch it is possible for the right person to pass through a door protected by a door contact without alarm being given. The switch is composed of a 12-position commutator which is fitted in the door panel. From the inside it is operated by a dial of which the shaft is extended to the outside of the door. From the outside it is operated by means of a key which fits to the free end of the shaft. In one of the 12 positions the door contact is disconnected and this position is known only by the right persons. When the place is left the switch is adjusted by means of the dial inside

the door. After passing through and closing the door, the switch is set in home position by means of the key which is then removed. The door contact will then be in service. If other persons should try to set the switch without knowing the right position, alarm will be given when the door is opened. If two contacts are connected in series, a combination may be chosen, which makes it practically impossible to find the right position.

Dimensions: height 90 mm, width 65 mm, weight 0.165 kg, the length of the shaft is made in accordance with the thickness of the door panel.

TL 910, TL 911. Disconnecting switch for door contacts, with key.



TL 910.



TL 911.

This device is composed of the following two main parts:

TL 910 containing a contact group which is operated by a key, and fitted in a cover of dull nickel-plated brass. Dimensions: diameter 78 mm, depth 33 mm, weight 0.2 kg.

TL 911 composed of a time switch fitted on a base plate.

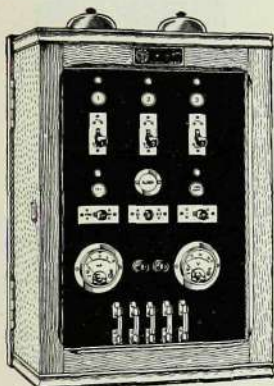
Dimensions: height 77 mm, width 77 mm, depth 70 mm, weight 0.2 kg.

TL 910 should be placed outside and TL 911 inside the door. When leaving the room the time switch should be pressed. This will disconnect the door contact and no alarm signal will be given when the door is passed. When arriving from outside the key should be put into the hole of TL 910 and turned, after which the key should be kept in this position until the door has been opened and the time switch pressed. The door contact will then be disconnected during this time. The time during which TL 911 keeps the door contact disconnected can easily be adjusted.

2. ALARM BOARDS.

TH 980/01. Combined alarm board for automatic fire and burglar alarm. See page 105.

TL 300. Alarm board for 3-7 loops.



2 30116

The alarm board is fitted in a case of polished oak with glass door and contains fault lamp, alarm lamp, relay for closed circuit current, loop keys for throwing when fault or alarm occurs, key and relays for the automatic signalling of earth faults, key and relays for big alarm bells, key for the alternate connection of 2 batteries to the alarm board, milliammeter for the closed circuit current, voltmeter for measuring the battery voltage and for insulation measurements, press buttons for connecting the voltmeter to the batteries, fuses and terminals.

Dimensions: height 540 mm, width 350 mm, depth 245 mm.

The rooms to be protected are divided into sections with up to 20 burglar-alarm contacts *TL 600—TL 700* in each section. The burglar-alarm contacts in each section are connected in series in a two-wire loop, which is connected to the alarm board. The arrangement with two-wire loops gives better protection against attempts to short-circuit the

burglar-alarm contacts. The loops may be switched on and off independent of each other. When a loop or an alarm bell is disconnected this is indicated by the fault lamp of the alarm board lighting up. When alarm is given the section lamps indicate from which section alarm has come in. Faults or injury on the loops will cause alarm immediately. Earth faults are indicated by the earth-fault lamp lighting up. Feeble leakage is detected on insulation tests. An alarm box *TL 500* may be connected to the alarm board. Two storage batteries are required for this alarm board; the batteries should have a tension of 12 V.

catalogue number	number of sections	weight
<i>TL 300/3</i>	3	kg 22
<i>TL 300/4</i>	4	22.5
<i>TL 300/5</i>	5	23
<i>TL 300/6</i>	6	23.5
<i>TL 300/7</i>	7	24

TL 500. Alarm box.

2 30117



The apparatus is fitted in a case of polished oak containing relay for closed circuit supervision of the lines to the alarm board, press button for disconnecting the alarm bell after alarm has been given, key for alternate connection of 2 batteries, signalling bell and fuses.

Dimensions: height 215 mm, width 160 mm, depth 150 mm, weight 2 kg.

The alarm box is designed for connection to alarm boards *TL 300* and may be located, say in the nearest police station. When a burglar-alarm contact has been actuated and this has been indicated on the alarm board, the bell of the alarm box will also ring. An additional alarm box *TL 500*, connected to the one in the police station, may be placed beside the alarm board. This gives the advantage that ring signals may be exchanged between the two alarm boxes by means of the press buttons. The alarm box should be connected to the alarm board over a two-wire circuit. The two alarm boxes should be connected over a two-wire circuit (or one conductor with earth return). When overhead lines are used lightning arresters *ND 380/1* should be inserted at the alarm board and at the alarm boxes. Faults or injury on the lines between the alarm board and the alarm boxes are indicated on the latter. The batteries used for the alarm board may also be used for the alarm box beside it. Two (or 1) batteries, each composed of 10 dry cells *RK 210* are required for the other alarm box. If wanted 12 V storage batteries may be used.

TL 550. Disconnecting switch for alarm loops. **230118**



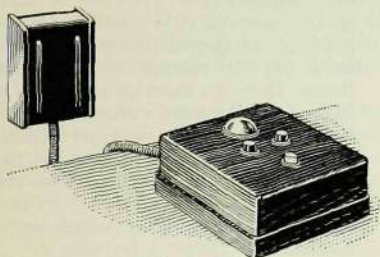
The switch is composed of an operating relay, a neon lamp and a key, all fitted in a casing of black enameled sheet-iron.

Dimensions: height 218 mm, width 157 mm, depth 80 mm, weight 0.7 kg.

This switch is for use when it is desired to disconnect a loop during certain hours of the day in installations having alarm board *TH 980/01*, for instance the burglar-alarm loop in systems for combined fire- and burglar-alarm. In order not to discharge the batteries the neon lamp is fed from the mains. For the connecting of the switch see page 107.

MANAGER'S-ROOM SIGNALS.

TN 100. Manager's-room table contact.



2 30096

Parts:

lamp 5 W or less for 4.5 or 24 V, with pocket-lamp screw, case of polished walnut, two-position switch (red and green button), 1 white press button, red lens for the lamp, cord RS 9508, terminal block RK 8000/5.

Dimensions: height 42 mm, width 85 mm, depth 85 mm, weight 0.26.

This apparatus is placed on the manager's desk and is connected with TN 110.

TN 100/4.5 is designed for 4.5 V.

TN 100/24 is designed for 24 V.

TN 110. Manager's-room wall contact.



2 30097

Parts:

2 lamps 5 W or less for 4.5 or 24 V, with pocket-lamp screw, case of polished walnut, 1 red and

1 green lens for the lamps, 1 white press button.

Dimensions: height 85 mm, width 85 mm, depth 42 mm, weight 0.14 kg.

TN 110/4.5 is designed for 4.5 V.

TN 110/24 is designed for 24 V.

This apparatus is placed on the wall outside the manager's room and cooperates with TN 100.

Operation.

When the manager does not wish to be disturbed he presses the red button; when he is free he presses the green button. A visitor wishing to see the manager presses the button of TN 110, which is placed outside the door; either the red or the green light will then light up, depending on whether the manager wishes to receive a visitor or not. If the manager has pressed the red button the red lamp of TN 110 will light up each time a visitor presses the button of TN 110. When later the manager presses the white button, the green lamp of TN 110 will light up indicating that the visitor who previously received the red or engaged signal can now be received. In addition a buzzer RC 5011 may be connected to the manager's table contact, and a signal will then be heard each time the red lamp lights up.

A battery of 3 dry cells RK 210 is required for 4.5 V systems. If AC is available it is preferable to connect the system to the AC mains over a transformer. If there is a private telephone exchange with a 24 V battery, a 24 V signalling system may be connected to this battery.

Cable of type EEB is suitable for the wiring; two-conductor cable should be used for connecting the battery and the buzzer, if any, and eight-conductor cable between the two contacts.

STAFF LOCATERS.

The requirements on staff-locating systems depend to a great extent on local conditions such as the character of the locating, the size of the system and special considerations. Proposals for staff-locating systems will be furnished on request. The staff-locating systems manufactured by Ericsson may be divided in the following main groups:

1. for offices, stores, factories, etc.;
 - a. the locating signals are operated manually from a switchboard by the telephone operator; the signals consist of light features; see below;

- b. the locating signals are operated automatically from an automatic telephone exchange; see page 117;

2. for hospitals;
 - in this system it is possible to trace persons, as they have to press buttons in the rooms as they enter them. They are then informed by telephone if they are wanted. In addition a signal can be sent out from the locating switchboard so that the person, when next pressing a button, will receive a brief signal from a buzzer placed beside the press-button set.

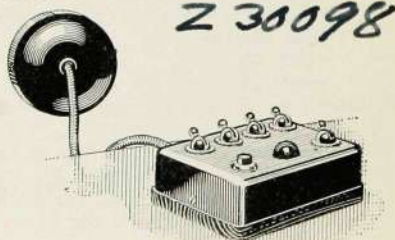
STAFF LOCATERS FOR OFFICES, STORES, FACTORIES, ETC.

Manual systems.

Manual staff locating systems are designed for premises where there are private telephone exchanges operated manually. The staff locaters are used for tracing persons in an establishment immediately at any time, so that the long delays are avoided which may occur when a telephone operator has to call one department after the other in order to trace a person wanted.

A manual staff locating system is composed of a central apparatus, *TN 500*, placed at a central point in the establishment, e. g. near the telephone operator or the porter, and a number of lamp boards, *TN 10100*, one in each department. Buzzers *RC 5022* may be connected to the lamp boards so as to call attention when a lamp board lights up. For connecting current of more than 2.5 A to lamp boards and signalling apparatus, operating relays Type *RN*, see page 91, are necessary.

TN 500. Staff locater for manual systems.



The apparatus has a base plate of polished oak, cover of black enamelled sheet-iron, 4 locator keys, key for lighting the lamp boards, press button for buzzer signals, supervisory lamp with red lens, and terminal block with cord. The lamp is 5 W or less for 24 V, with miniature screw.

Dimensions: height 60 mm, width 131 mm, depth 96 mm, weight 0.9 kg. By throwing one or more of the 4 keys, 15 different combinations may be obtained, each of which corresponds to a certain person. When a combination has been made up the corresponding lamps of the lamp boards are lit by throwing the main key of the staff locater. When this has been done the

supervisory lamp lights up. Buzzer signals may be given by means of the press button when the main key has been thrown. This staff locator is designed for locating up to 15 different persons. In each department or room where it may be necessary to locate persons a lamp board *TN 10100* should be installed and, if desired, a buzzer *RC 5022*.

The operating voltage is 24 V and the system requires a 24 V storage battery, the capacity of which is calculated at the rate of 1 Ah per lamp in the system. The battery must allow a maximum discharge current corresponding to the greatest number of lamps to be lit at one time. A 24 V lamp consumes about 0.2 A. The battery may be charged by means of a charging unit of type *RH*, see page 93.

If AC is available it is preferable to connect staff locating systems to AC mains by means of transformers.

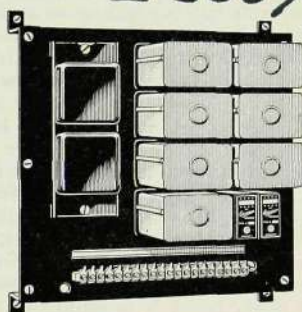
Automatic systems.

For premises where automatic telephone exchanges are installed, the staff locating may often conveniently be carried out in a purely automatic manner by means of an automatic staff locator and this is connected to the automatic exchange in the same manner as the ordinary local lines. The locating is carried out by means of lamp boards *TN 10100* with buzzers *RC 5022*, if desired, or acoustic code signals by bells or electric horns.

An automatic staff locator functions in the following manner: The person who wants somebody located dials the number of the staff locator on his telephone (for instance 50). When a dialling tone is heard from the staff locator, the wanted person's special number in the locating system is dialled (for instance 7). The staff locator then transmits the wanted person's number as light features, acoustic code signals, or both at the same time. When the wanted person observes the signals he has simply to dial the reply number of the staff locator (for instance 51) to

come in connection with the calling person. When the conversation has been finished all connecting devices return to home position. The staff locaters may be connected to the battery of the automatic exchange.

TN 1500 — TN 1600. Automatic staff locaters.



These staff locaters are designed for 24 V and can locate up to 15 different persons. They should be installed near the automatic exchanges to which they are connected. Relays of Type *RN* are required for the lamps and signalling apparatus. If desired the staff locaters can be supplied with protective hood of enamelled sheet-iron.

Dimensions: height 365 mm, width 350 mm, depth 155 mm, weight 11.5 kg.

catalogue number	number of combinations	for connection to switchboards
TN 1500/10	10	OL 3510—OL 3578 OL 4010—OL 4075
TN 1600/10	10	
TN 1600/15	15	OL 550

Line material.

The choice of line material such as connecting boxes, cables, etc. is of great importance; we therefore make up projects for each individual case so that the system shall function in the best manner.

STAFF LOCATERS FOR HOSPITALS.

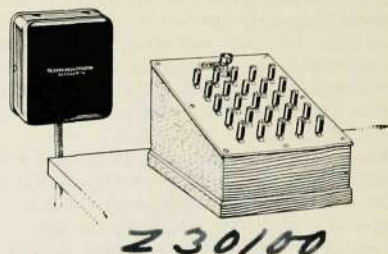
The Ericsson staff locaters for hospitals make possible the rapid tracing of doctors, etc. in the hospital. One locating board and one department board are installed near the telephone operator. The locating board contains one key for each person to be traced, and the department board a number of lamps, each corresponding to a department or a room in the hospital.

Key boards are installed in the departments where one or more of the persons to be located are usually to be found, and in reception rooms, lunch rooms, etc. These boards have one press button for each person who is liable to be found in the department in question. In addition there are two key boards at the main entrance, one for indicating arrivals and one for departures. Near each of the key boards a bell RA 510/24 is mounted.

When a person comes in at the main entrance he or the porter presses the corresponding button on one of the key boards. On arrival in a department he presses his button on the key board in the department; the button previously pressed at the entrance is then released. When a person is to be located the telephone operator throws the corresponding key in the locating board. A lamp will then light up, indicating in which department the person in question last pressed his button. The operator then calls this department by telephone to inform the person that he is wanted. Should the person in question have left the department indicated, the operator may throw the key on the locating board in top position. When the person the next time presses his button at one of the key boards, he will hear a brief signal from the bell mounted beside the key board, indicating that the telephone operator has tried to reach him.

Staff-locating installations on this system are made for 24 V and require 2 batteries, each composed of 20 dry cells RK 210; these batteries will last at least 2 years.

TN 2110. Locating board.



The board is made with a case of polished oak, the number of keys being indicated in the table below.

Dimensions: height 160 mm, depth 266 mm.

The board should be placed along with a department board near the telephone operator. The number of keys on the board will depend on the number of persons to be located, one key being required for each person.

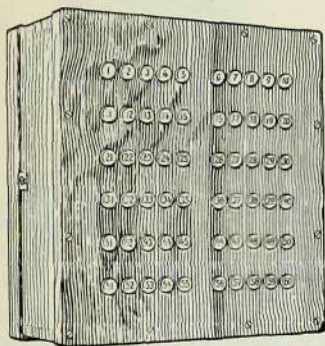
catalogue number	number of keys	width	weight
		mm	kg
TN 2110/20	20	157	4.3
TN 2110/30	30	211	5.6
TN 2110/40	40	265	6.7
TN 2110/50	50	319	7.9
TN 2110/60	60	373	9.1

TN 2200. Department board.

The board is made with a case of polished oak, the number of lamps being indicated in the table below; it has one relay for each lamp. The lamps are switchboard lamps for 24 V, catalogue number RO 10000/30.

Dimensions: height 310 mm, width 300 mm, depth 120 mm.

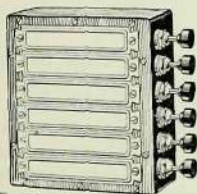
The board should be placed along with a locating board *TN 2110* near the telephone operator. The number of lamps will depend on the number of departments or rooms in which persons are to be located; one lamp being required for each department or room.



230101

catalogue number	number of lamps	weight
		kg
TN 2200/10	10	2.8
TN 2200/20	20	4.0
TN 2200/30	30	5.2
TN 2200/40	40	6.4
TN 2200/50	50	7.6
TN 2200/60	60	8.8

TN. 2300. Key board.



230102

Case of polished oak, press buttons with designation frames as indicated in the table below; the press buttons are provided with magnetic locking.

Dimensions: width 150 mm, depth 56 mm.

These key boards are used for indicating arrival at the main entrance and in the various departments and rooms. The number of press buttons will depend on the number of persons to be located in the place where the board is mounted, one button being required for each person. If more than 10 press buttons are required two or more boards are mounted together. In each room where there is a key board of this type a bell *RA 510/24* should be mounted.

catalogue number	number of press buttons	height	weight
		mm	kg
TN 2300/1	1	82	0.310
TN 2300/2	2	82	0.435
TN 2300/3	3	82	0.560
TN 2300/4	4	145	0.800
TN 2300/5	5	145	0.925
TN 2300/6	6	145	1.050
TN 2300/7	7	229	1.280
TN 2300/8	8	229	1.405
TN 2300/9	9	229	1.530
TN 2300/10	10	229	1.650

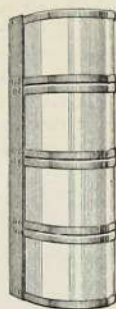
TN 2350. Key board for departures.

Case of polished oak, press buttons with designation frames as indicated in the table below; the exterior is similar to that of *TN 2300*.

Dimensions: width 150 mm, depth 56 mm.

These key boards are used for indicating departure by the main entrance. The number of press buttons will depend on the number of persons whose departure by the main entrance is to be indicated, one press button being required for each person. Where more than 10 press buttons are required two or more boards are mounted together.

catalogue number	number of press buttons	height	weight
		mm	kg
TN 2350/1	1	82	0.250
TN 2350/2	2	82	0.315
TN 2350/3	3	82	0.380
TN 2350/4	4	145	0.560
TN 2350/5	5	145	0.625
TN 2350/6	6	145	0.690
TN 2350/7	7	229	0.860
TN 2350/8	8	229	0.925
TN 2350/9	9	229	0.990
TN 2350/10	10	229	1.055



Z
30103

TN 10100. Lamp boards for staff locaters.

Frame of dull nickel-plated sheet-iron with one socket and one shade for each lamp. The shades are made of cellulone of various colours. The lamps are 24 V, 5 W lamps with miniature screw. Lamps are supplied with the lamp boards.

Dimensions: width 68 mm, depth 92 mm. These lamp boards should be mounted on the wall in rooms where persons are to be located, and if desired they may be connected with a buzzer RC 5022.

If required these lamp boards can be supplied for up to 10 lamps and with



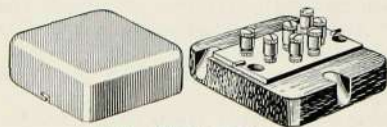
1 Z 30184 4

figures on the insides of the shades. When ordering please state how the figures be placed: pattern 1, 2, 3 or 4.

catalogue number	number of sockets	combinations	height	weight
			mm	kg
TN 10100/1	1	1	54	0.325
TN 10100/2	2	3	108	0.650
TN 10100/3	3	7	162	0.975
TN 10100/4	4	15	216	1.300
TN 10100/5	5	31	270	1.625

SPECIAL LINE MATERIAL FOR STAFF LOCATERS.

ND 900. Terminal block.



Z 30199

This terminal block is designed especially for staff-locater installations. It has 7 terminals of which one is for the return conductor. The terminal block has a base of polished walnut and a cover of enamelled sheet-iron.

Dimensions: height 45 mm, width 80 mm, depth 80 mm, weight 0.19 kg.

Cable.

A special type of cable for staff-locater installations is *Type TDBS*. In these cables one conductor with a greater diameter than the others is provided as return wire. There are cables with 3, 4, 5 and 6 conductors in addition to the above-mentioned return wire. The conductors are made of tinned copper with cotton insulation and the return wire is insulated with impregnated cotton tape. The cable is protected by a lead sheath.

SEARCH INDICATION.

UD 1100. Search-indicator board.



Z 30104

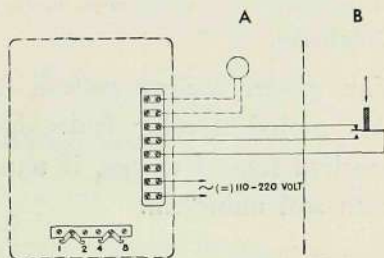
In department stores, workshops, factories handling foodstuffs, etc. and other places where there is temptation to carry away the material handled, there is always a certain risk of theft from unreliable elements among the staff. In such cases it is usual to search individual members of the staff at random. In view of the difficulty of picking out impartially the persons to be searched we have designed an apparatus which carries out the selection impersonally. The apparatus is of such a design that the order in which the signals for search arrive is perfectly uncontrolled and consequently it is impossible to tell when these signals will appear. The only thing determined is the percentage of searches to be made and this percentage may be varied between 4 % and 60 % by a simple switching operation.

Each person passing the exit has to press a marking button *B* and a bell rings

to indicate that this has been done properly. Failure of the bell to ring indicates that the button has not been pressed properly. Each time a person is to be searched a lamp lights up. A neon lamp is provided for checking that the apparatus is connected to the mains; this lamp lights up as soon as the apparatus is switched on. A buzzer and an extra signalling lamp *A* may be connected in parallel with the signalling lamp in the apparatus. The board is made with a case of polished oak. It may be connected to AC or DC mains.

Dimensions: height 215 mm, width 157 mm, depth 170 mm, weight 2.1 kg.

catalogue number	operating voltage
	V
UD 1100/110	110
UD 1100/127	127
UD 1100/220	220



Z 30105

ELECTRICITY METERS.

The Ericsson electricity meters have very good electrical properties and are superior in design. In construction they are simple and durable. All parts are easy of access and of replacement. Case and cover are of pressed sheet-iron. The counters, having white figures on black background, are distinct and easy to read.

Terminal covers.

The terminal covers are made in three sizes:

1. small terminal cover protecting only the terminals;
2. large terminal cover protecting the terminals and the cables;
3. extra large terminal cover, similar to 2 but longer (only for types *V 5*, *V 5 TF* and *V 5 TN* up to 20 A).

Guarantee.

The meters are guaranteed for one year. Meters which during this period develop faults due to bad material or fitting will be repaired free of charge, if returned to the works freight paid and with seal unbroken.

Symbols.

The symbols nominal load, nominal current, nominal voltage and nominal frequency refer to the figures stamped on the meters.

V 5. Kilowatt-hour meter for single-phase AC.



Z 30310

For technical particulars see page 124.

Standard sizes:

nominal voltage: 110, 127 and 220 V;
nominal current: 3, 5, 10, 15, 20,
30, 50, 75 and 100 A;

nominal frequency: 50 and 60 c/s;
if required the meters can be supplied for other frequencies and voltages. The meters are made for one or two-pole connection.

Dimensions; with small terminal cover:

nominal current	height	width	depth	weight
A	mm	mm	mm	kg
3-20	158	105	108	1.4
30-100	196	131	110	1.7

Standard packing:

3-20 A meters: 50 meters in a case 98×66×40 cm, gross weight about 105 kg.

30-100 A meters: 32 meters in a case 114×98×32 cm, gross weight about 80 kg.

When ordering please give the following information.

1. nominal voltage,
2. nominal current,
3. nominal frequency,
4. connection (one or two-pole),
5. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers.

V 5 TF. Polyphase kilowatt-hour meter for balanced load without neutral.



Z 30211

For technical data see page 124.

Standard sizes.

nominal voltage between phases: 190, 220, 380 and 500 V;

nominal current: 5, 10, 15, 20, 30, 50, 75 and 100 A;

nominal frequency: 50 and 60 c/s.

if required the meters can be supplied for other frequencies and voltages.

Dimensions: with small terminal cover:

nominal current	height	width	depth	weight
A	mm	mm	mm	kg
5-20	158	105	108	1.4
30-100	196	131	110	1.7

Standard packing:

5-20 A meters: 50 meters in a case 98×66×40 cm, gross weight about 105 kg.

30-100 A meters: 32 meters in a case 114×98×32 cm, gross weight about 80 kg.

When ordering please give the following information:

1. nominal voltage (between phases),
2. nominal current,
3. nominal frequency,
4. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers.

V 5 TN. Polyphase kilowatt-hour meter for balanced load with neutral.



2 30212

For technical data see page 124.

Standard sizes:

- nominal voltage: 110/64, 190/110, 220/127, 380/220 and 500/290 V;
- nominal current: 3, 5, 10, 15, 20, 30, 50, 75 and 100 A;
- nominal frequency: 50 and 60 c/s. if required the meters can be supplied for other frequencies and voltages.

Dimensions, with small terminal cover:

nominal current	height	width	depth	weight
A	mm	mm	mm	kg
3-20	158	105	108	1.4
30-100	196	131	110	1.7

Standard packing:

- 3-20 A meters: 50 meters in a case 98×66×40 cm, gross weight about 105 kg.
- 30-100 A meters: 32 meters in a case 114×98×32 cm, gross weight about 80 kg.

When ordering please give the following information:

1. nominal voltage,
2. nominal current,
3. nominal frequency,
4. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers.

Technical data for V 5, V 5 TF and V 5 TN.

The data which are not the same in the different meters are given in the table below, in other respects the same data apply for all the types V 5, V 5 TF and V 5 TN.

Principle of design: Ferraris.

Weight of armature: about 25 g.

Loss in voltage coil at 50 c/s: about 0.6 W.

Error between 10 % and 100 % of nominal load:

1. at $\cos \varphi = 1: \pm 1.5 \%$,
2. at $\cos \varphi = 0.5: \pm 2 \%$.

A 10 % voltage variation at from 10 % to 100 % of nominal load does not affect the accuracy by more than about 1 %.

A 5 % variation of the frequency at from 10 % to 100 % of nominal load does not affect the accuracy by more than 0.4 %.

Permissible voltage variation without shunt-running: 20 %. Overload endurance, continuously:

- for 3.5 and 10 A meters: 100 %,
- for 15, 20 and 30 A meters: 75 %,
- for 50 A meters: 50 %,
- for 75 and 100 A meters: 25 %.

Test voltage: 2 kV AC.

The cyclometer registers have six figure wheels, the last wheel having 100 division marks.

	V 5	V 5 TF	V 5 TN
torque at nominal load and $\cos \varphi = 1$, in gcm, about	4.8	4	4.8
speed at nominal load, in rpm	34-42	30-38	33-42
voltage drop in current coils at nominal load in V, for 5 A meters:	0.18	0.09	0.18
starting power in % of nominal load	0.3-0.4	0.5	0.3-0.4

T 2. Polyphase kilowatt-hour meter for three-phase, three-wire unbalanced load.



230213

For technical particulars see page 126.

Standard sizes:

nominal voltage between phases: 110, 190, 220, 380 and 500 V;

nominal current: 3×5 , 3×10 , 3×15 , 3×20 , 3×30 , and 3×50 A;

nominal frequency: 50 and 60 c/s;

the meters are also made for 75 and 100 A and if desired can also be supplied for other voltages and frequencies.

Dimensions, with small terminal cover: height 274 mm, width 172 mm, depth 132 mm, weight 3.3 kg.

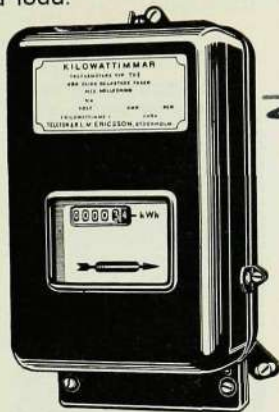
Standard packing:

12 meters in a case $92 \times 72 \times 32$ cm, gross weight about 80 kg.

When ordering please give the following information:

1. nominal voltage between phases,
2. nominal current,
3. nominal frequency,
4. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers,
5. whether the meter is to be connected to current or to voltage transformers,
6. whether the constants of the transformers are to be included in the meter constant.

TV 2. Polyphase kilowatt-hour meter for two phases and neutral, unbalanced load.



230213

For technical particulars see page 126.

Standard sizes:

nominal voltage: 190/110, 220/127, 380/220 and 500/290 V;

nominal current: 2×5 , 2×10 , 2×15 , 2×20 , 2×30 and 2×50 A;

nominal frequency: 50 and 60 c/s;

the meters are also made for 75 and 100 A and if desired can also be supplied for other voltages and frequencies.

Dimensions, with small terminal cover: height 274 mm, width 172 mm, depth 132 mm, weight 3.3 kg.

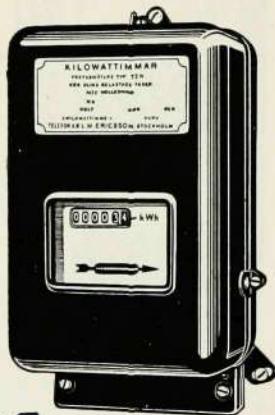
Standard packing:

12 meters in a case $92 \times 72 \times 32$ cm, gross weight about 80 kg.

When ordering please give the following information:

1. nominal voltage between phases and between phase and neutral,
2. nominal current,
3. nominal frequency,
4. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers,
5. whether the meter is to be connected to current or to voltage transformers,
6. whether the constants of the transformers are to be included in the meter constant.

T 2 N. Polyphase kilowatt-hour meter for three-phase, four-wire unbalanced load.



Z 30315

For technical particulars see page 126.

Standard sizes:

nominal voltage: 110/64, 190/110, 220/127, 380/220 and 500/290 V;
nominal current: 3 × 5, 3 × 10, 3 × 15,

3 × 20, 3 × 30 and 3 × 50 A;
nominal frequency: 50 c/s;
the meters are also made for 75 and 100 A and if required can also be supplied for other voltages and frequencies.
Dimensions, with small terminal cover: height 274 mm, width 172 mm, depth 132 mm, weight 3.8 kg.

Standard packing:

12 meters in a case 92 × 72 × 32 cm, gross weight about 85 kg.

When ordering please give the following information:

1. nominal voltage between phases and between phase and neutral,
2. nominal current,
3. nominal frequency,
4. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers,
5. whether the meter is to be connected to current or to voltage transformers,
6. whether the constants of the transformers are to be included in the meter constant.

Technical data for T 2, TV 2, T 2 N.

The data which are not the same for the different meters are given in the table below, in other respects the same data apply for all the types T 2, TV 2 and T 2 N.

T 2 and TV 2 have two meter systems connected according to the two-wattmeter method and T 2 N has three meter systems.

The terminal blocks of T 2 and TV 2 have three extra terminals for connection of e. g. an impulse contact for a duration meter. The cyclometer registers have six figure wheels, the last wheel having 100 division marks.

Principle of design: Ferraris.
Weight of armature: about 55 g.
Voltage drop in current coils (ohmic and inductive) for 5 A meters: about 0.15 V.
Loss in voltage coils at 50 c/s: each coil about 0.7 W.
Starting power in % of nominal load: 0.3–0.5
Error between 10 % and 100 % of nominal load:

- a. if all systems are loaded:
 1. at $\cos \varphi = 1$: $\pm 2.5\%$;
 2. at $\cos \varphi = 0.5$: $\pm 3\%$;

b. if one systems are loaded:

1. at $\cos \varphi = 1: \pm 1.5 \%$;
2. at $\cos \varphi = 0.5: \pm 2 \%$.

A 5 % variation of the frequency at from 10 % to 100 % of nominal load

does not affect the accuracy by more than 0.4 %.

Permissible voltage variation without shunt-running: 20 %.

Overload endurance, continuously:

- for 5 and 10 A meters: 100 %,
- for 20-50 A meters: 75 %.

Test voltage: 2 kV AC.

	T 2	TV 2	T 2 N
torque at nominal load and $\cos \varphi = 1$, in gcm, about	7	7	10
speed at nominal load, in rpm	19-24	19-24	26-32

L 5. Ampère-hour meter for DC.



The meter has brushes and collector of gold-silver foil. The meter can register ampère-hours or kilowatt-hours. The cyclometer registers have six figure wheels, the last wheel having 100 division marks.

Technical data:

Principle of design: magnet motor.

Torque at nominal load: about 14 gcm.

Weight of armature: about 65 g.

Speed at nominal load: 62-98 rpm.

Voltage drop at nominal load:

- for 3-5 A meters: about 1.5 V;
- for 10-15 A meters: about 0.7 V;
- for 20 A meters: about 0.6 V.

Starting current in % of nominal current: 0.4-0.7.

Brush pressure: about 0.5 g.

Error between 10 % and 100 % of nominal load: $\pm 2.5 \%$.

Overload endurance:

continuously: for 3-5 A meters 50 %;

for 10-20 A meters 25 %.

momentarily: for 3-5 A meters 100 %;

for 10-20 A meters 50 %.

Test voltage: 1.5 kV AC.

Standard sizes:

nominal voltage: 110 and 220 V;

nominal current: 3, 5, 10, 15 and 20 A;

if required the meters can be supplied for other voltages and currents. Dimensions, with small terminal cover: height 204 mm, width 147 mm, depth 134 mm, weight 2.5 kg.

Standard packing:

10 meters in a case 97×72×32 cm, gross weight about 50 kg.

20 meters in a case 114×98×32 cm, gross weight about 89 kg.

When ordering please give the following information:

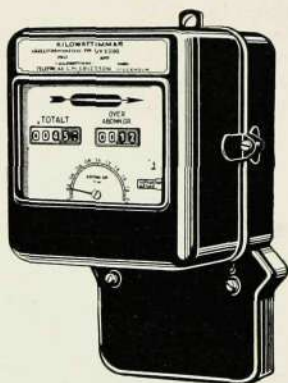
1. nominal voltage, if metering in kilowatt-hours is wanted,

2. nominal current,

3. whether metering in ampère-hours or kilowatt-hours is wanted,

4. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers.

V 5 SD. Subtraction meter for single-phase AC.



Technical data: **230218**

Principle of design: Two cyclometer registers connected with a differential gear driven by one Ferraris and one synchronous motor.

Voltage drop in current coils (ohmic and inductive) for 5 A meters: about 0.18 V.

Loss in voltage coil at 50 c/s: about 0.7 W.

Loss in synchronous motor: 1—1.5 W.

Speed of synchronous motor: 200 rpm. Starting power in % of nominal load: 0.5—1.

Error between 10 % and 100 % of nominal load: ± 3.5 %.

Permissible voltage variation without shunt-running: 20 %.

Overload endurance, continuously:

for 2—10 A meters: 100 %;

for 15—20 A meters: 75 %.

Test voltage: 2 kW AC.

Standard sizes:

see table below.

Dimensions, with small terminal cover: height 194 mm, width 155 mm, depth 145 mm, weight 2.5 kg.

Standard packing:

20 meters in a case 114 × 98 × 32 cm gross weight about 86 kg.

When ordering please give the following information:

1. nominal voltage,
2. nominal current,
3. nominal frequency,
4. connection (one- or two-pole),
5. subtraction limit,
6. type of terminal cover; unless

otherwise specified the meters are supplied with small terminal covers.

The illustration shows a meter with large terminal cover.

By changing a wheel in the meter the subscription limit can be adjusted within a certain range and for certain intervals. The limits of the range within which the subscription limit can be varied as well as the interval are given in the table.

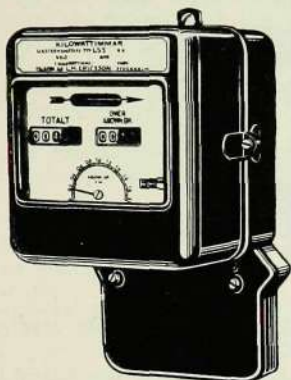
nominal voltage	nominal current	nominal load	subscription limit		
			range		interval
V	A	W	from W	to W *	W
110	3	330	30	270	5
110	5	550	60	550	10
110	10	1100	100	900	16 ² / ₃
110	15	1650	200	1700	33 ¹ / ₃
110	20	2200	300	2200	50
127	3	380	40	270	5
127	5	635	75	650	12.5
127	10	1270	200	1300	33 ¹ / ₃
127	15	1905	300	2000	50
127	20	2540	300	2600	50
220	3	660	75	675	12.5
220	5	1100	100	900	16 ² / ₃
220	10	2200	300	2200	50
220	15	3300	350	2700	50
220	20	4400	600	4400	100

* The meters can also be supplied for higher subscription limits.

This meter can also be supplied with a mercury contact for regulating the load. The catalogue number of this meter is V 5 HD and further particulars of this meter will be supplied on request.

The subscription limit of these meters can not be lower than 20 % of nominal load.

L 5 S. Subtraction meter for DC.



Technical data: **2 30217**

Principle of design: Two cyclometer registers with a differential gear driven by a magnet motor and a clockwork, the clockwork being driven by the meter.

Error between 10 % and 100 % of nominal load: ± 3.5 %.

Overload endurance:

for 3—5 A meters: continuously 50 %;
momentarily 100 %.

for 10 A meters: continuously 25 %;
momentarily 50 %.

Test voltage: 1.5 kV AC.

Standard sizes:

see table below.

Dimensions, with small terminal cover: height 236 mm, width 155 mm, depth 146 mm, weight 3.1 kg.

Standard packing:

20 meters in a case 114×98×32 cm, gross weight about 102 kg.

When ordering please give the following information:

1. nominal voltage,
 2. nominal current,
 3. subscription limit,
 4. type of terminal cover; unless otherwise specified the meters are supplied with small terminal covers.
- The illustration shows a meter with large terminal cover.

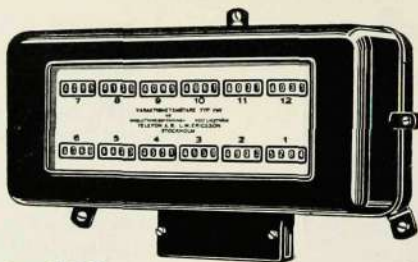
By changing a wheel in the meter the subscription limit can be adjusted within a certain range and for certain intervals. The limits of this range within which the subscription limit can be varied as well as the interval are given in the table.

nominal voltage	nominal current	nominal load	subscription limit		
			range		interval
V	A	W	from W	to W	W
110	3	330	60	270	5
110	5	550	120	550	10
110	10	1100	200	900	16 ² / ₃
110	15	1650	240	1100	20
110	20	2200	400	1800	33 ¹ / ₃
220	3	660	120	550	10
220	5	1100	150	675	12.5
220	10	2200	400	1800	33 ¹ / ₃
220	15	3300	600	2700	50
220	20	4400	1200	4400*	100

* This meter can also be supplied for higher subscription limit.

This meter can also be supplied with a mercury contact for regulating the load. The catalogue number of this meter is L 5 HC and further particulars of this meter will be supplied on request.

VM 1. Duration meter.



Z 30219

The duration meter is used in connection with a consumption or other kind of integral meter (kWh-meter, speedometer, gas- and water meter, traffic recorder, wind-gauge, etc.) to register the total time during which a certain load or a certain point in the total range measured has been reached or exceeded. This time is called the duration of the load or the value measured, and can be read on the cyclometer registers 1 to 12 of the duration meter for 12 intervals within the total range.

The readings from the 12 counters may then be reproduced graphically as follows: The numbers (1 to 12) of the counters or the corresponding values are plotted as ordinates, and the readings or the corresponding numbers of hours as abscissæ in a rectangular system of coordinates. The points thus obtained are connected by a curve, which is extended to the coordinate axes, the point of intersection with the ordinate axis being determined by the maximum power output or value measured, and with the abscissa axis by the total time to be presented by the curve. The curve gives the duration of all values within the range, and is therefore called a *duration curve*.

The duration curve may refer to any period, e. g., one year, six months, one month, etc. An annual duration curve is shown below. The points 1 to 12 in

the diagram represent the readings on the 12 counters.

The duration meter is a useful instrument both for the direct control of operations and for the solution of various technical and economic problems in the design and operation of a plant. In industrial plants a duration meter will thus show all variations in the work, month by month, and year by year; it will also be possible to ascertain if the power required is obtained at the lowest possible cost.

In power stations or in gas and water works the duration meter will indicate whether improvements are needed, and where these ought to be made. It is also possible to find out if the plant is utilized in the best way, or if a change in the subscription rates might improve the utilization and thus increase the revenue. The duration meter will also show if such a change in the rates has had the desired effect by actually leading to a better utilization. For further information we refer to our pamphlet "Duration Meters and their Use".

The mechanism of the duration meter consists of an impulse collector, an operating device, and 12 counters. Impulse collector and operating device have each a stepping relay and a release relay. The impulse collector receives the primary impulses from the consumption meter (the main meter),

which is fitted with a contact device, VM 100, and sends secondary impulses to the operating device, which moves a certain number of counters, from no 1 and upwards, one unit each during fixed periods determined by a switching-clock.

The complete equipment required for the duration meter comprises the following units:

1. a main meter with contact device;
2. a duration meter, VM 1;
3. a switching-clock
and, if DC is not available,
4. a rectifier, RH 31110, prim. 110 and 127 V, 50 c/s, sec. 110 V DC, or prim. 190 and 220 V, 50 c/s, sec. 110 VDC, or RH 31111 for 25 c/s AC.

If the existing main meter has no contact device, it may be fitted with one specially made for duration metering, VM 100. The number of spur wheel teeth in the contact device varies from 3 to 20, and is determined by the speed of the main meter shaft on which the spur wheel is fixed, e. g., one of the shafts in the registering mechanism, and by the length of the recording period. See further under "Technical Data".

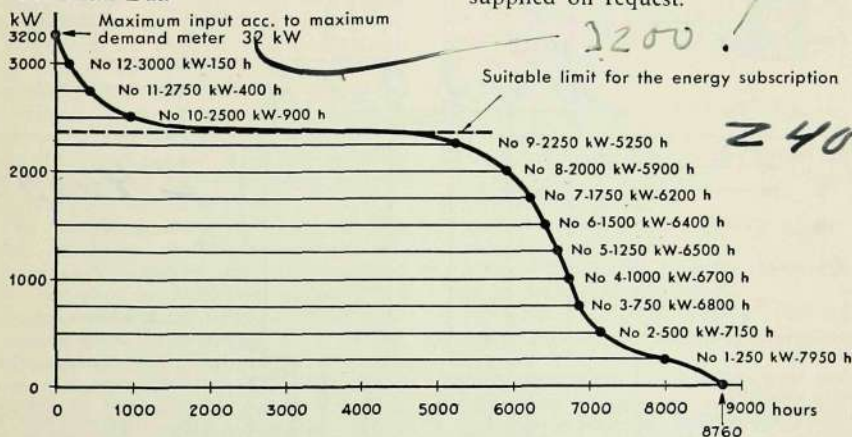
The registering period of the switching-clock can, according to local conditions, be made from 5 min. up to one hour or more. 15 min. is the usual period but one hour registering is also fairly common.

Technical data.

VM 1/110 is designed for 110 V DC. VM 1/220 is designed for 220 V DC. Permissible variation of voltage 90—150 V DC and 200—240 V DC.

The meter consumes at 110 V: continuously about 0.050 A; intermittently (while the switching-clock makes contact) about 0.060 A; momentarily (when sending a secondary impulse, not more than 12 times per registering period) 0.170 A.

The momentary load when secondary impulses are sent out only lasts the fraction of a second, and has therefore no detrimental effect on the accuracy of instruments connected to the same voltage transformer such as the rectifier for the duration meter. The adjustment range of the impulse collector is 1 to 15 impulses for a standard meter. Impulse collectors adjusted for 1 to 25 impulses are supplied on request.



Duration curve for an electric plant during one year = 8760 hours. Counter no 1 has shown 7950 hours, i. e., the duration of a 500 kW load etc. The area surrounded by the curve corresponds to the total consumption which amounts to 16 175 000 kWh.

Test voltage 1500 V DC.

Dimensions: height 194 mm, width 320 mm, depth 106 mm, weight about 4.5 kg.

Standard packing.

1 Duration Meter in a case 55 × 28 × 28 cm. Gross weight about 12 kg.

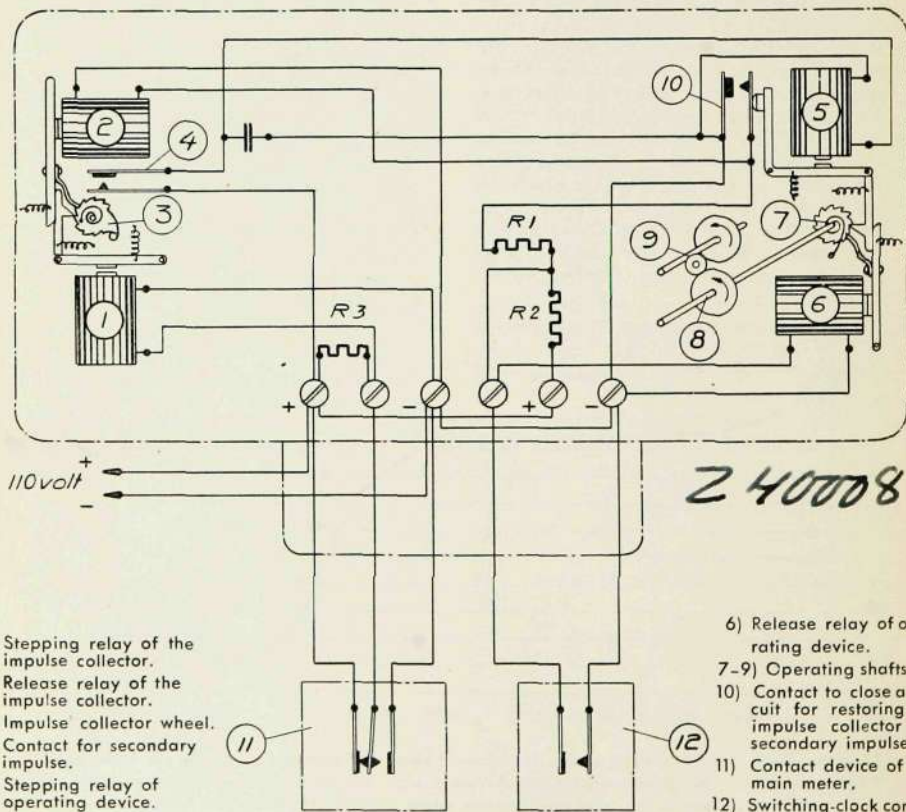
5 Duration Meters in a case 92 × 39 × 31 cm. Gross weight about 40 kg.

When ordering a duration meter, please state kind of current and voltage of the supply to which the meter will be connected, with data of the main meter, *i. e.*, the figures stamped on its casing.

When ordering a contact device please give the following information:

1. diameter of the main meter shaft on which the spur wheel will be fitted;
2. the direction of revolution of the shaft (clockwise or counter-clockwise). The shaft is supposed to be seen towards the surface on which the contact device is to be fitted;
3. the number of teeth on the spur wheel (from 3 to 20). Directions how to find this are given in the pamphlet "Duration Meters and their Use".

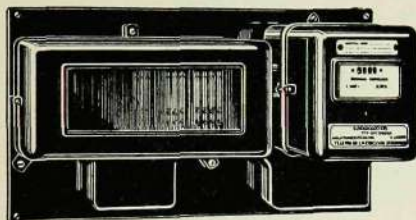
Instead of the number of teeth, the number of revolutions per hour of the shaft at full load may be given, *i. e.*, at a load corresponding to the figures stamped on the main meter.



- 1) Stepping relay of the impulse collector.
- 2) Release relay of the impulse collector.
- 3) Impulse collector wheel.
- 4) Contact for secondary impulse.
- 5) Stepping relay of operating device.

- 6) Release relay of operating device.
- 7-9) Operating shafts.
- 10) Contact to close a circuit for restoring the impulse collector by secondary impulses.
- 11) Contact device of the main meter.
- 12) Switching-clock contact.

VM 100. Totalling meter.



Z 30320

At times it is desirable to collect the recordings of a number of electricity meters on a common counter, so that this will indicate the total consumption registered by these meters in kWh or kVarh. Totalling meters are used for this purpose. The separate meters are provided with impulse contacts as is done for duration metering, see page 131. This impulse contact is closed when a certain number of the units to be measured, kWh etc., have passed the meter.

Each time a contact is closed in a meter, a current impulse is sent out which moves on the totalling meter one unit. This will consequently indicate the total consumption. In some cases this simple totalling is not sufficient, but group totals may be wanted. Various groups of meters are then connected to one totalling meter for each group, and the totalling from these meters is then carried on to a grand-total meter.

By this arrangement it is also possible to transmit the meterings from various meters to a common point.

The totalling meter is designed for the totalling of impulses from different kWh meters. The total number of impulses is registered direct on a counter. The total number of kWh is obtained by multiplying by a certain constant factor. The totalling meter, can also be used for the connection of e. g. a duration meter VM 1 or an additional totalling meter for group totalling.

In power stations, the instruments and meters are usually read every hour. If

for some reason it is not possible always to read the meters at the proper moment, errors may occur in the results. To avoid this the totalling measurement can be arranged as follows: instead of one or one series of totalling meters, two are installed. By means of a switching clock these sets of meters are connected one hour each and disconnected the next hour. By this arrangement a whole hour is available for reading the consumption of the previous hour.

The equipment for single totalling is composed of the following parts:

1. impulse contacts, one for each meter;
2. impulse-collector device, one for each meter, consisting of one impulse relay and one cut-off relay;
3. impulse-sorting device, common to a certain number of meters, consisting of a rotary selector, one testing relay and one stepping relay;
4. one or several counters;
5. one counter for grand-totalling.

Any meter not provided with a contact device can usually be fitted with one, VM 100. The number of teeth on the contact device ranges from 3 to 20, representing 6 to 40 impulses per revolution. The number of teeth depends on the speed of the shaft on which the tooth wheel is fitted and on the length of the interval.

Technical data.

Operating voltage: 24 V DC (on request 110 V DC).

Permissible variation of the operating voltage: 21–33 V DC.

Power consumption:

momentarily (when metering an impulse) about 0,6 A;

intermittently (on impulses from the main meter) about 0,05 A;

for each additional impulse received simultaneously from main meters 0,05 A.

Test voltage: 250 V AC, 50 c/s.

Dimensions: height 270 mm, width 495 mm, depth 140 mm, weight 8–9,5 kg, according to the number of main meters for which the totalling meter is designed.

VM 1104 Time meter for AC.

VM 1304 Load indicator.



2 30221

The time meter is designed for recording the time of operation of AC plants independent of variation in the load. As examples may be mentioned the recording of the time of operation of electric generators, motors, rectifiers etc., all cases in which accurate knowledge of the time of operation may be of great importance. In plants where the load is constant the time meters may also be used as energy meters, and the energy consumption is then arrived at by multiplying the power consumption by the number of hours recorded. If time meters are connected to machines or apparatus used by several subscribers, the cost may conveniently be divided in proportion to the time of operation.

The time meter is composed of a self-starting synchronous motor for single-phase supply, which is connected by means of a worm gear with a counter for recording the time of operation in hours. The cyclometer register has six figure drums and indicates the time in hours, to 1 or 2 decimals according to request.

Technical data.

Principle of design: synchronous motor connected to a cyclometer register.

Power consumption: 1—1.5 W.

Speed at nominal load: 200 rpm.

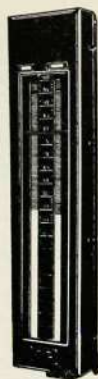
Torque: about 15 gcm.

Error: this arises only on variation of the frequency and is directly proportional to it.

Permissible voltage variation: $\pm 10\%$.

Test voltage: 2 kV AC, 50 c/s.

Weight: 0.865 kg.



2 30222

The load indicator is used for supervising consumption of any kind, e. g., electricity, gas, water, steam — or for supervising the speed of a machine, a shaft, etc. It is, however, chiefly used for supervising the operation of electrically driven plants and particularly where the problem is to prevent the subscribed mean power (subscription limit) for a certain interval (the recording interval) being exceeded. The load indicator is composed of two illuminated columns side by side, provided with screens and with a common scale graduated from 0 to 100. At the commencement of the recording interval both screens are at zero on the scale and start moving upwards. The left screen is driven by a synchronous motor while the right one is driven by impulses from the consumption meter (the main meter) at a speed which is proportional to the load. At the end of the recording interval the two mechanisms are released and the screens return to home or bottom position. If during the recording interval the load has been equal to the subscribed mean power, the two screens will be at the same level at the end of the interval. If the mean power is constant during one complete recording interval, the two screens will mount with the

same speed all the time, but should the load rise above or sink below the mean power, this will be shown on the indicator by the right screen being higher or lower than the left one. In the former case a signalling circuit is closed at a fixed over-load value, in which an optical or acoustic signalling device can be connected, *e. g.*, an intermediate relay which with or without a certain delay carries out a regulation of the load in some manner.

The load indicator is designed so that it can be read from a distance. As it is not connected mechanically to the main meter, but is operated entirely by means of electric impulses, its location is in no way dependent on that of the main meter, provided that the resistance of the junction line is kept below certain limits (as a standard max. about 15 ohm per single conductor).

The normal position of the two screens at the end of the recording interval (the subscription limit) is marked by a clear bar running across the two illuminated columns. If the subscription limit is altered, it is a simple matter by changing a gear wheel to make the necessary alteration in the speed or the release position of the screens.

For a complete plant the following apparatus is required:

1. one main meter with a contact device;
2. one load indicator, *VM 1300*;
and, if DC is not available,
3. a rectifier *RH 30110*.

If the existing main meter has no contact device, it can be fitted with one, *VM 100*. The number of teeth on the tooth wheel of the contact device varies from 3 to 20, and is fixed by the speed of the shaft of the main meter, *e. g.*, a shaft belonging to the counter, on with the tooth wheel is fitted, and also by the length of the recording interval.

The starting and releasing of the screens is controlled by a switching clock built into the load indicator. As a standard the indicator is made for a recording interval of 5, 10, 15, 30 or 60 minutes,

but it can also be made for other recording intervals.

If a plant is required with other indicating or recording instruments having the same recording interval as the load indicator, a common switching clock should be used, but this clock should be fitted with a double contact so as to permit separate switching circuits.

Technical data.

Operating voltage:

1. for the relays:
110 or 220 V DC;
permissible variation $\pm 10\%$;
consumption about 100 mA at 110 V;
2. for the synchronous motor and the lamps of the illuminated columns:
110—127 or 220—250 V AC, 50 c/s;
consumption: 1,0—1.5 W for the motor,
2 \times 40 W for the lamps;
3. for the signalling device:
The necessary number of wires to the main meter and the switching clock;
3 wires if the switching clock built into the load indicator is used;
4 wires if a separate switching clock placed beside the main meter is used;
5 wires if a separate switching clock placed elsewhere is used.

The permissible maximum resistance per single wire is about 15 ohm.

Test voltage: 1500 V.

Dimensions: height about 1170 mm, width 270 mm, depth 145 mm, weight about 25 kg.

Standard recording intervals: 5, 10, 15, 30 or 60 minutes.

Standard packing: 1 load indicator in a case 129 \times 55 \times 25 cm (0.113 m³).

Gross weight: about 45 kg.

When ordering please give the following information:

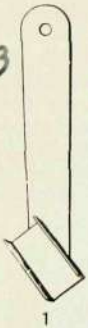
1. available voltages for DC and AC;
2. subscription limit;
3. recording interval;
4. particulars of the main meter;
5. particulars of measuring transformers, if any;
6. desired adjustment of the signalling contacts.

Z 10074

Z 10075

Tools for adjusting electricity meters.

Z 10073



1



5



10

Z 10077



20

Z 10078



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Z 10076



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Z 10081



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Z 10079



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[32

Z 10082



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Z 10083

symbol	description	used for
1	Magnet adjustment spanner	V 5 HD, V 5 SD, T 2, TV 2, T 2 N.
5	Shunt adjustment spanner	L 5.
10	Spanner for the lock-nut of bottom bearing	V 5, V 5 TF, V 5 TN, V 5 HD, V 5 SD, T 2, TV 2, T 2 N, L 5, L 5 HC, L 5 S.
15	Tool for adjustment of impulse number (a)	VM 1.
20	Bent box-wrench for upper bearing	V 5, V 5 TF, V 5 TN, V 5 HD, V 5 SD, T 2, TV 2, T 2 N.
21	Bent box-wrench for fixing-screws of the counter	V 5 V 5 TF, V 5 TN, T 2, TV 2, T 2 N, L 5.*
25	Bent screw-driver for fixing-screw of brake magnet	V 5, V 5 TF, V 5 TN, V 5 HD, V 5 SD, T 2, TV 2, T 2 N.
30	Screw-driver, large size	All types.
31	Screw-driver, medium size	All types.
32	Screw-driver, small size	All types.
50	Syringe for lubricating upper and bottom bearings etc.	All types.
60	Oil, bottle, about 3 cm ³	All types.

* No 21 is in addition used for the shunt terminals of L 5 and as magnet adjustment spanner for V 5, V 5 TF and V 5 TN.

Note: For lubrication of bearings etc. only superior chronometer oil should be used.

Z 10080

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AB 712	18	HC 210	38	MO 110	47
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DE 704	30	MH 10	46	OL 3536	54
DE 752	31	MH 100	46	OL 3537	54
DE 3010	31	MH 200	46	OL 3545	54
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RA 510	80	RH 30142	95	RH 30248	97
RA 600	80	RH 30143	95	RH 30249	97
RA 601	80	RH 30144	95	RH 30252	97
RA 910	81	RH 30145	95	RH 30253	97
RA 1200	81	RH 30146	95	RH 30254	97
RA 3001	81	RH 30147	95	RH 30255	97
RA 3100	81	RH 30148	95	RH 30256	97
RA 3200	81	RH 30149	95	RH 30257	97
RA 5000	82	RH 30150	95	RH 30258	97
RA 5020	82	RH 30151	95	RH 30259	97
RA 5050	82	RH 30152	95	RH 30262	97
RA 5060	82	RH 30153	95	RH 30263	97
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RC 2110	43	RH 30155	95	RH 30265	97
RC 5011	83	RH 30156	95	RH 30266	97
RC 5021	83	RH 30157	95	RH 30267	97
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RC 10000	83	RH 30159	95	RH 30269	97
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RH 30393	99	RK 7100	77	TL 500	113
RH 30394	99	RL 120	90	TL 550	114
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RH 30400	99	RL 160	90	TL 611	110
RH 30401	99	RL 201	90	TL 650	110
RH 30402	99	RL 220	90	TL 661	110
RH 30403	99	RL 240	90	TL 670	111
RH 30404	99	RL 300	90	TL 681	111
RH 30405	99	RM 550	69	TL 700	111
RH 30540	99	RM 551	69	TL 800	111
RH 30541	99	RM 552	69	TL 810	111
RH 30542	99	RM 553	69	TL 820	112
RH 30543	99	RN 132294	91	TL 850	112
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