

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

A Division of International Telephone & Telegraph Corporation

Chicago, Illinois



Kellogg Booklet 5407

1954

K-500 Series Telephones

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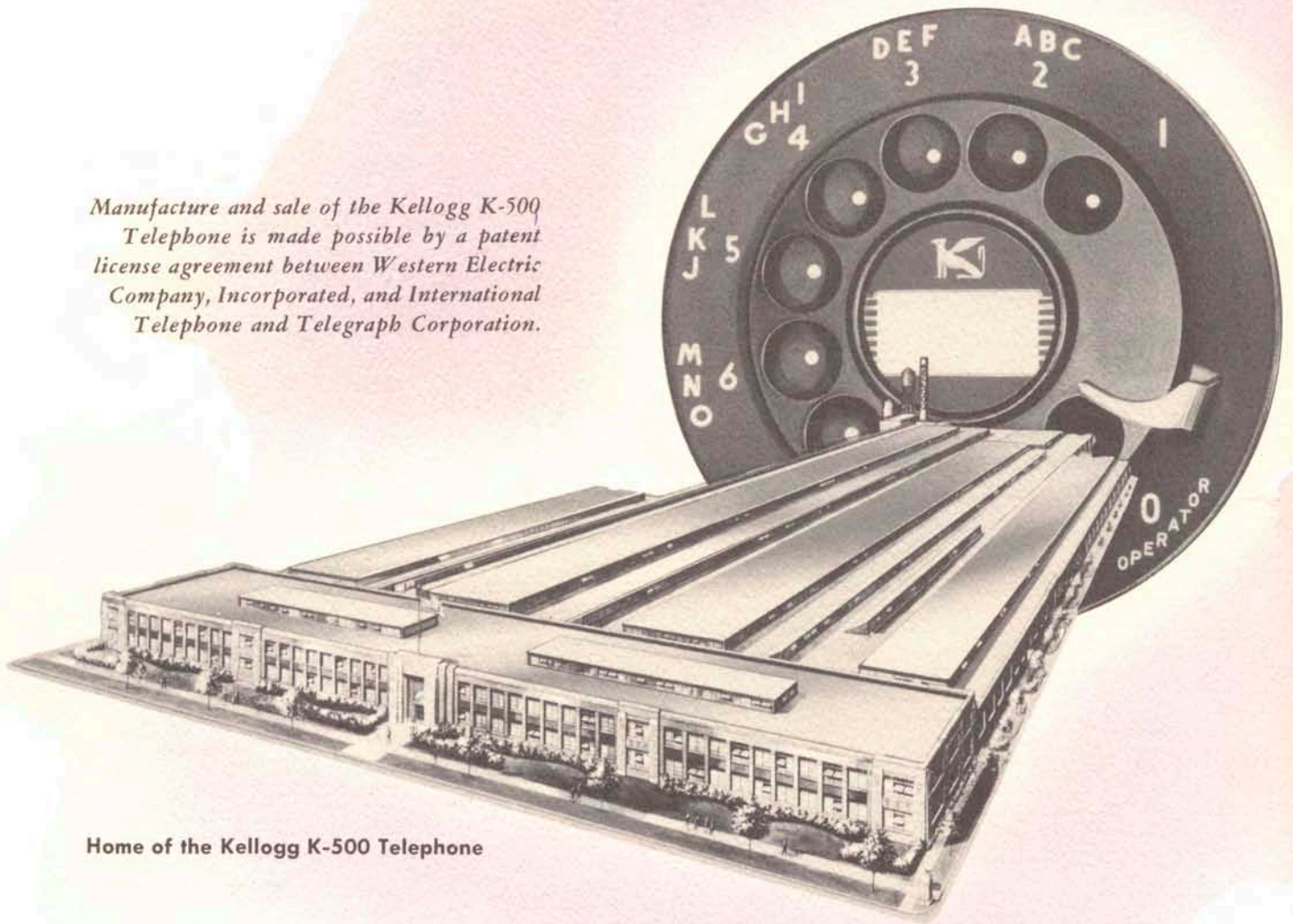
New standard of excellence ... for the independent telephone industry

KELLOGG

K-500

TELEPHONE

Manufacture and sale of the Kellogg K-500 Telephone is made possible by a patent license agreement between Western Electric Company, Incorporated, and International Telephone and Telegraph Corporation.



Home of the Kellogg K-500 Telephone

KELLOGG *K-500* TELEPHONE

Speaks Best for Itself

KELLOGG brings you the ultimate in telephone engineering achievement—the K-500 Telephone—an outstandingly superior instrument, designed to provide these altogether new performance advantages:

1. Automatic controls for transmission equalization.
2. Superior speech quality and transmission.
3. Improved transmission, dialing and ringing performance on much longer common battery lines.

With the introduction of the remarkable K-500 Telephone, Kellogg's tradition of leadership in the Independent Telephone Industry is brilliantly maintained . . . for over five decades Kellogg has consistently established new standards for telephones in the Independent Telephone Field. Kellogg introduced the Grabaphone, the first hand-set telephone in the United States, to the Telephone Industry in 1906 . . . leading again in 1934, Kellogg announced and marketed the first unit type desk telephone with all component apparatus combined in single housing and base assembly . . . and with



the presentation of the famous 1000 Series Master-telephone in 1945, Kellogg introduced a universal-design telephone for all classes of common battery, local battery and magneto services.

Now, with the K-500 Telephone, Kellogg offers the new standard of excellence to the Independent Telephone Field . . . designed, engineered and manufactured to surpass all previous instrument performance. After you have reviewed its technical advantages, we invite you to test this remarkable new instrument . . . let a field trial prove that the Kellogg K-500 Telephone *speaks best for itself!*

the **KELLOGG**

K-500

TELEPHONE



**Increased
Transmitting and
Receiving Efficiency**

The anti-sidetone circuit is designed for maximum electrical efficiency. A new high in transmitting and receiving performance has been achieved through advanced design in the handset.

**New Handset with Improved
Transmitter and
Receiver Capsules**

The shorter handset design of the K-500 Telephone, in conjunction with the greatly improved capsules, provides the extended frequency bandwidth which gives improved speech quality.

**Acoustic
Peak Suppression**

Because of the greater efficiency of the K-500 receiver, a click suppressor is used to protect the subscriber from loud acoustic peaks and simultaneously to protect the receiver from possible demagnetization by high electrical transients. The suppressor is attached directly to the receiver capsules.

**Improved
Dialing Performance**

The K-500 dial provides improved speed regulation, more uniform pulse, and the "drive-bar" governor reduces the effects of dial forcing.

*Designed For All Common
Battery Services*

The Kellogg K-500 Telephone may be used for all classes of common battery manual or dial subscribers' services. Since the types and method of ringing are the greatest remaining variables in common battery systems, the K-500 Telephone provides facilities for the following ringing services:

brings you these **TECHNICAL ADVANTAGES!**

**Efficient Anti-Sidetone
Circuit with
Automatic Controls**

Automatic controls incorporated in the K-500 circuit provide the proper level of transmission by preventing the inherently higher gain from becoming uncomfortably loud on the short loop. As loop length progresses, this control action diminishes until when required, the full effect of additional gain in transmitting and receiving performance of 10 db (T+R) is available. This gain by design is equally divided between transmitting and receiving. Therefore, the K-500 Telephone provides improved quality performance on short loops where automatic volume control is effective as well as a greater margin of transmission efficiency and performance on long loops.

**New Improved
Ringer Design**

Bias or harmonic ringers are provided for the K-500 Telephone. All employ a single coil on a laminated silicon steel core. Brass gongs are provided with resonators for reinforcing the low frequency tones. Performance adjustments and loudness controls are provided.

BIASED RINGERS

Non-Polarized Ringing

Individual Lines
Two Party Selective Divided Lines
Two Party Selective Message Rate Lines
Two Party Selective Automatic Ticketing Lines
Four Party Semi-Selective Divided Ringing Lines
Code Ringing Non-Selective Bridged or Divided
Ringing Lines

Polarized Ringing (With #426A Vacuum Tube)

Four Party Selective Lines
Eight Party Semi-Selective Lines

FREQUENCY SELECTIVE RINGERS

One to Five Selective Bridged Party Lines
One to Ten Selective Divided Party Lines
Six to Ten Semi-Selective Bridged Party Lines
Eleven to Twenty Semi-Selective Divided Party Lines



K-500

High Efficiency

Theory of Anti-Sidetone Circuits

The high efficiency performance of the K-500 circuit is more easily explained by first considering the performance of the simpler 1000 Type circuit, shown in Figure 1. When transmitting, the currents are as shown by the solid line brown arrows. These currents in windings A and B are opposing and therefore induce a relatively small current in winding C and in the receiver. The size of the current in winding A is fixed by the connecting telephone line, but that in winding B is dependent on the balancing network which is designed to secure the required sidetone reduction. It is desirable to reduce sidetone only to approximately the level at

which the talker hears his own voice in normal conversation. During reception, the currents are as shown by the broken line brown arrows. The current from the distant telephone enters the circuit and passes mainly through the path including winding A and the transmitter, thereby inducing a current in winding C and the receiver. That part of the current which would otherwise flow through winding B and the balancing network is opposed by the induced voltage in winding B, and thus relatively little current flows in that branch and very little energy is wasted.

Control Features Regulate K-500 Performance

The improved circuit of the K-500 Telephone as shown schematically in Figure 2, automatically controls its transmitting and receiving efficiencies with respect to the length of the loop. On short loops, K-500 circuit efficiencies are about equal to telephones of recent design. On long loops, however, full advantage is taken of the 5 db increase in

efficiency in the transmitter and in the receiver, thus permitting the use of still longer loops. The important automatic control is provided by the Line Varistor, the resistance of which decreases with an increase in the voltage applied to it. Since it shunts the line, it causes appreciable loss on short loops and almost none on longer loops.

K-500 Has Improved Balancing Network

The K-500 circuit also has a greatly improved balancing network, required by the increased efficiency of the transmitter and receiver. One of its elements is a second Varistor, the resistance of which changes with loop length to provide more uniform sidetone reduction over a wider range of loop resistance. In general, the new features of the K-500 circuit—

plus the improved transmitter and receiver—provide substantially improved transmission performance over a wider range of loop lengths. In addition, K-500 transmission is more uniform throughout the exchange area, and ambient noise at the higher levels is less disturbing.

Circuit

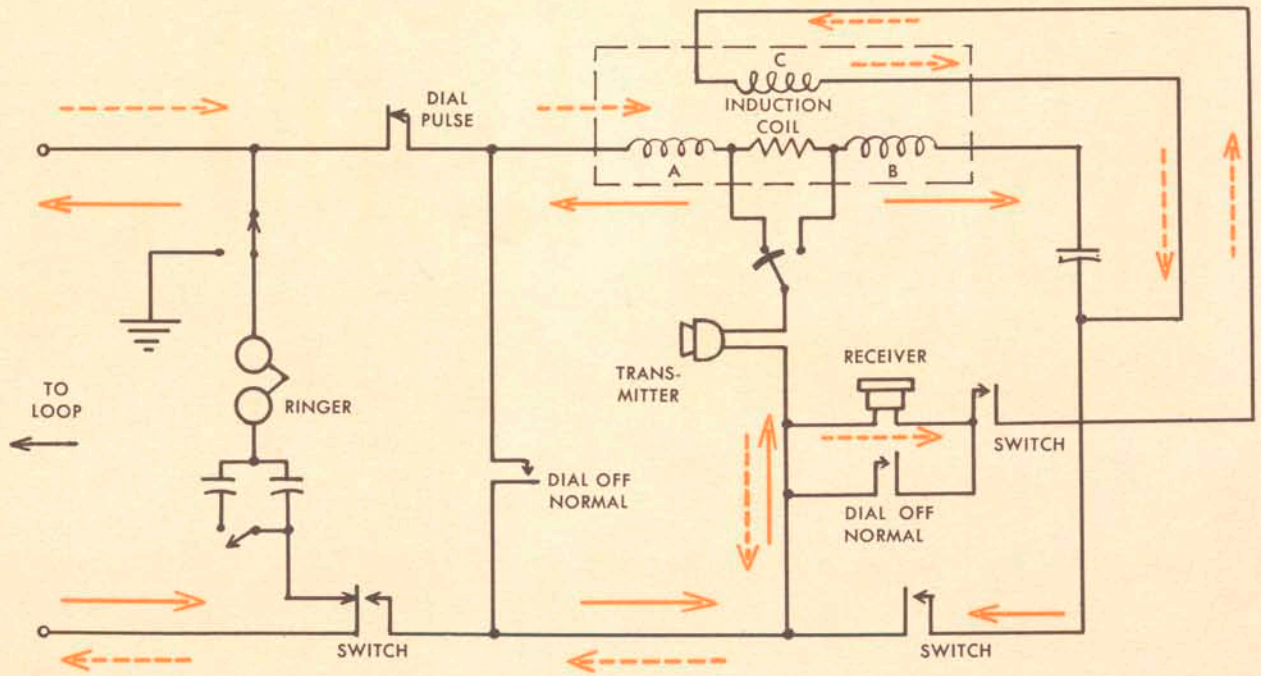


Figure 1—Circuit Schematic 1000 Type Masterphone

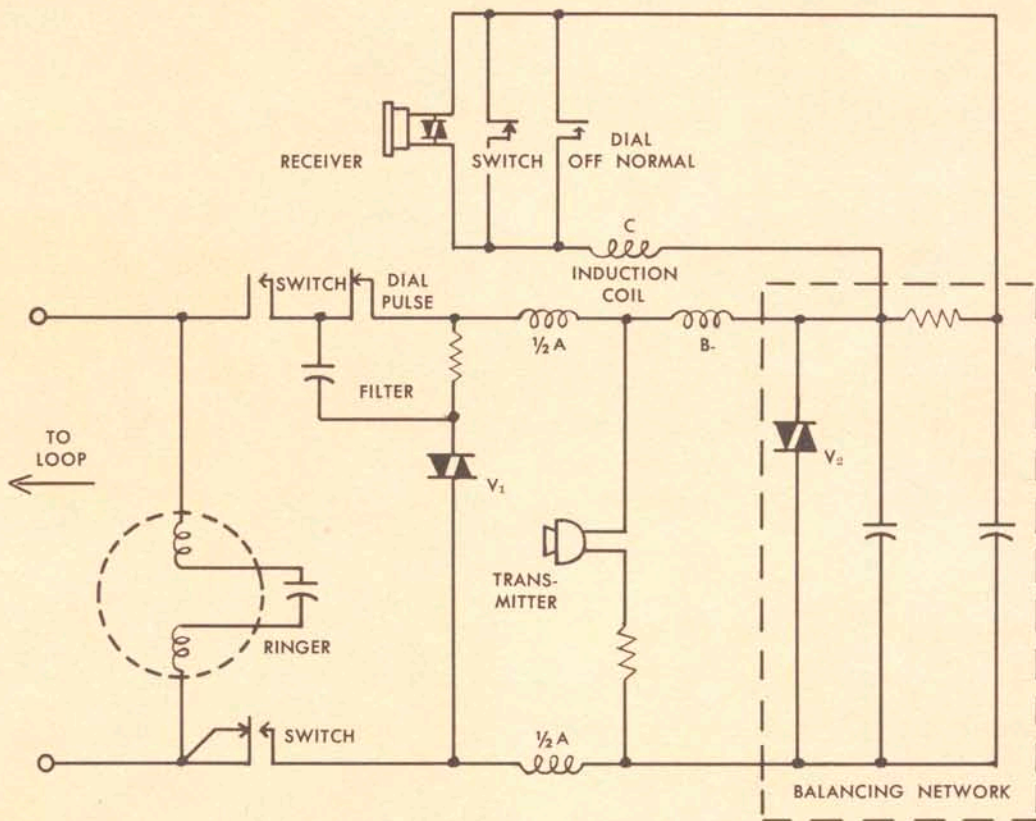


Figure 2—Circuit Schematic K-500 Type Telephone

the New

K-500

HANDSET

• **SHORTER** • **LIGHTWEIGHT** •



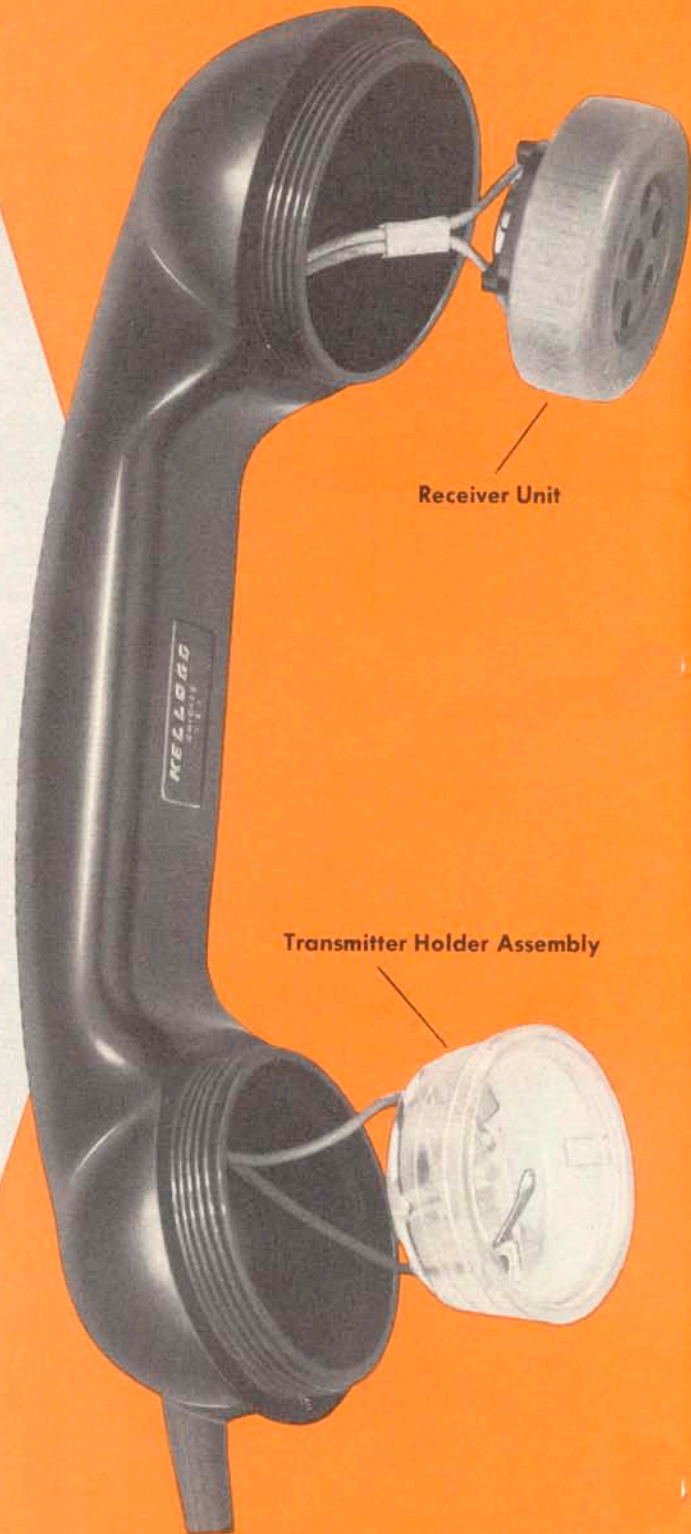
Recent Handset



K-500 Handset

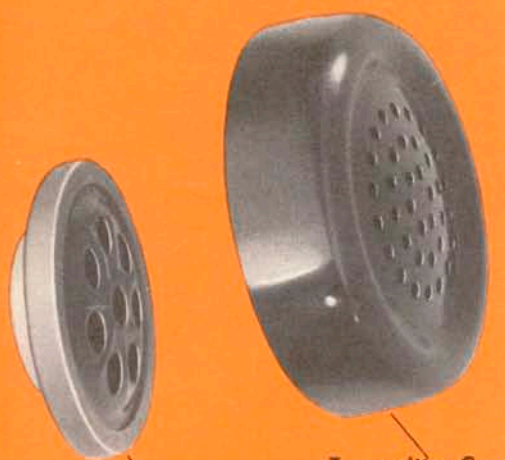
NEW SHORTER HANDSET

The new K-500 Handset is shorter, much lighter in weight and acoustically superior. Reduced distance between the receiver and transmitter places the transmitter closer to the user's mouth for increased transmission and increased signal-to-noise ratio. A new transmitter design with improved carbon granules and a receiver entirely new in principle provide the means for meeting more exacting performance requirements. Molded of high impact material, the K-500 handset will withstand rough usage.





Receiver Cap



Transmitter Unit

Transmitter Cap

RECEIVER

Entirely New In Principle.

The K-500 receiver capsule employs a completely new design that uses a ring armature instead of the conventional disc armature. This newly designed armature permits considerable reduction in the effective mass of the diaphragm with a consequent increase in sound output over an extended frequency range. An effective increase of 5 db is thus obtained. In addition, this new receiver offers more protection against ambient noise and is not as sensitive to variations of the air distance between the ear cap and the user's ear. The receiver cap is acoustically designed to aid in the performance of the receiver.

TRANSMITTER

Improved Through Design.

The K-500 transmitter capsule is a new design which, in conjunction with the transmitter holder assembly and transmitter cap of the new handset, provides an output that is fully 5 db above previous carbon granule transmitters, and is more uniform with frequency. These improvements stem from highly refined design of the mechanical and acoustic elements, from the improved carbon granules, and the shortened handset. Longer transmitter service life is insured by the protection provided by the control features in the subset circuit.



the K-500

features these improved components

K-500 Network

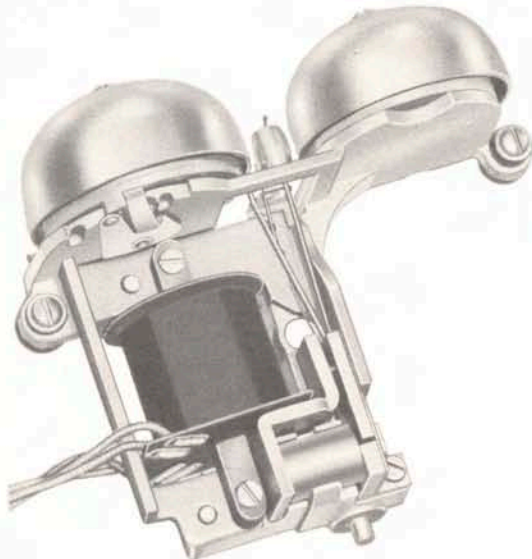


A Single Interconnection Unit.

Enclosed in a single, sealed housing, the K-500 network unit contains many of the circuit elements: the induction coil, capacitors, resistors and varistors.

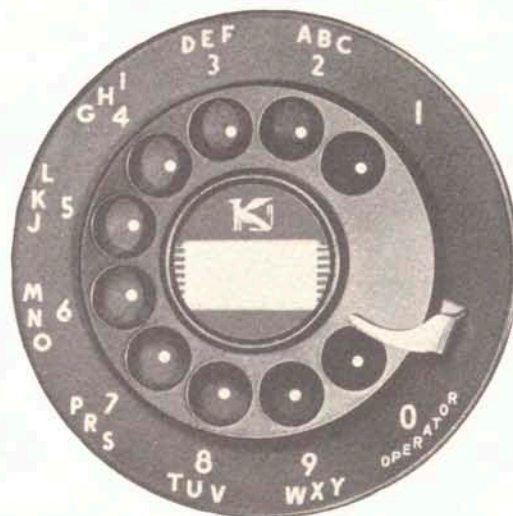
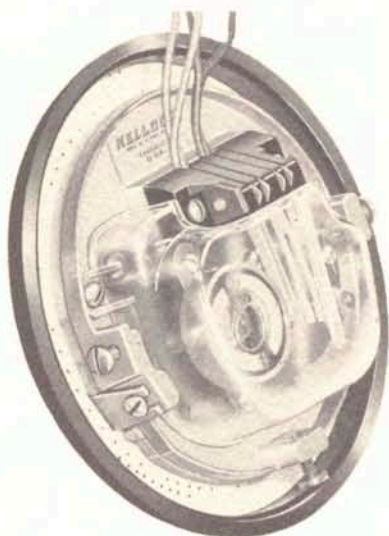
1. The *induction coil* is essentially a three-winding transformer with a split, balanced primary. It serves as a means of matching the various connected impedances and provides the basis for sidetone balance and neutralizing balance.
2. The four *capacitors* are for the ringer, the radio-interference-suppression network, and the sidetone balancing network. They are the metallized paper type, small in size, and self-clearing.
3. The *resistors* are of the carbon type. They are used in the transmitter circuit, the sidetone balancing network, and the dial suppression circuit.
4. There are two silicon carbide *varistors*, thin wafer shaped elements, the dc and ac resistances of which vary with the voltages impressed across them. One of them, V-1, serves to regulate transmission and the other, V-2, is a variable control for the balancing network.

K-500 Ringer • Higher Impedance and Improved Performance.



The K-500 ringer is a new, single-coil design with a higher impedance, allowing more ringers to be placed on a line with no increase in bridging loss or increase of unbalance on divided ringing circuits. The sound output is adjustable—by the subscriber—over a range of about 14 db with the highest value about 2 db above previous ringers. The two gongs have harmonically related frequencies, the fundamentals of which are reinforced by resonant air chambers below the gongs. This emphasis equals about 15 db gain in sound output. The magnetic circuits include a laminated coil core, the pole pieces and armature, the permanent magnet and a magnetic shunt. These are designed to provide adequate sensitivity to ringing signals and low sensitivity to transients or other operating surges. The structure design includes the magnetic circuit saturation feature, to limit the effects of high surge currents which might otherwise weaken the permanent magnet.

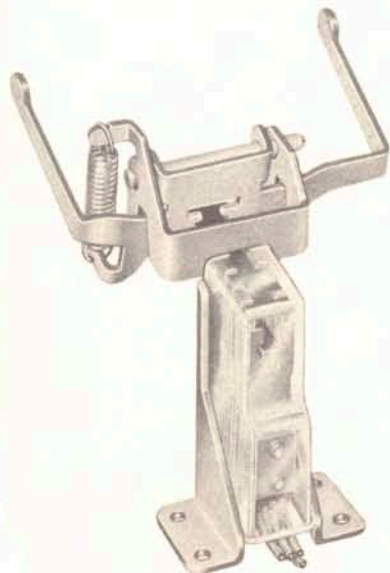
K-500 Dial • Uniform Performance Integrated with the Design.



One of the advantageous elements of the new K-500 dial is a single-lobed cam which operates the pulsing springs, and assures more uniform dial pulses. This cam is driven by the motor spring acting through a gear train. The governor is an improved type providing better speed control. The governor is connected to the dial by a clutch which engages only

on the self-return of the dial. Forcing of the dial on return is minimized by the governor's "drive-bar" feature. The K-500 number plate is an improved type, with characters located outside of the finger wheel, providing increased legibility and thus facilitating faster and more accurate dialing.

K-500 Switch • Protected and Reliable.



The reduced weight of the K-500 handset required a novel switch design in order to insure positive action. The activating force to operate the K-500 switch is furnished by a coil spring, which is opposed by the counteracting force of the contact springs. As a result, the handset weight is required only to offset the difference of these two forces. On replacing the handset, the last interval of travel moves the coil spring linkage near its dead center position, thus reducing its force and assuring positive seating of the light-weight handset. In keeping with the encouraging performance of past designs, the switch springs are remote from the plunger mechanical elements, and are protected from mechanical interference, dust, foreign particles, and insects.



KELLOGG K-500 TELEPHONE

ORDERING INFORMATION

K-500 SERIES: Kellogg K-500 Type indicates a standard common battery desk telephone for Dial or Manual subscribers' services. High Impedance Biased Ringers are available for either Non-Polarized or Polarized Ringing. High Impedance Frequency Selective Ringers are available for Harmonic, Synchronomic and Decimonic Ringing frequencies. Prefix and Suffix symbols are used for ordering.

The Kellogg coding system is explained as follows:

Prefix Symbol "DK" represents "Dial Kellogg"
Prefix Symbol "MK" represents "Manual Kellogg"

Dial type telephones are always referred to as DK-500. Manual types are always referred to as MK-500.

Ringers are identified by using the following Suffix Symbols:

Biased Ringer

BA—For Polarized and Non-Polarized Ringing

Frequency Selective Ringers

HA-1	33 $\frac{1}{3}$	cycle	Harmonic	HB-1	30	cycle	Synchronomic	HC-1	20	cycle	Decimonic
HA-2	50	"	"	HB-2	42	"	"	HC-2	60	"	"
HA-3	66 $\frac{2}{3}$	"	"	HB-3	54	"	"	HC-3	30	"	"
HA-4	162 $\frac{2}{3}$	"	"	HB-4	66	"	"	HC-4	40	"	"
HA-5	25	"	"	HB-5	16	"	"	HC-5	50	"	"

Example: Code DK-500-HB-3 would be a K-500 type telephone with metropolitan type dial and a 54 cycle Synchronomic Ringer.

Koiled Kords: Kellogg K-500 Telephones are furnished with a straight Neoprene Jacketed Handset cord unless otherwise specified. When Koiled Kord is desired the Suffix Symbol "(2)" should appear after the Suffix Ringer Symbol, as shown in the following example:

DK-500-HA-3(2)

KELLOGG BRANCH WAREHOUSES AND OFFICES:

6000 W. 51st Street
CHICAGO 38, ILLINOIS

4501 Truman Road
KANSAS CITY 1, MISSOURI

410 N. Syndicate Avenue
ST. PAUL, 4 MINNESOTA

1515 Turtle Creek Blvd.
DALLAS 2, TEXAS

1663 Mission Street
SAN FRANCISCO 3, CALIFORNIA

1555 West Fourth Street
MANSFIELD, OHIO

KELLOGG BRANCH OFFICES:

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LOS ANGELES 13, CALIFORNIA

720 S. Washington Street
PORTLAND 5, OREGON

157 Chambers St.
NEW YORK 7, NEW YORK

EXPORT DISTRIBUTORS:

International Standard Electric Corporation
50 Church Street, New York 7, New York



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A Division of International Telephone and Telegraph Corporation

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