



KELLOGG

**SWITCHBOARDS
TELEPHONES
SUPPLIES**

**GENERAL CATALOG
No 10**

C H I C A G O U . S . A .

The
TELEPHONE INDUSTRY'S
most complete
useful, and
convenient
GENERAL CATALOG



This Kellogg General Catalog, comprising eight different sections and a General Index, contains everything required for the economical operation and maintenance of telephone systems. It is so complete and is arranged in such a manner as to make it the most convenient and useful general telephone reference book available.

All types of Kellogg central office equipment and sub-station apparatus, repair parts, outside plant material, construction items, tools, etc., are contained here UNDER ONE COVER.

Complete descriptions, giving the kind of information you want, with clearly defined illustrations used throughout, mean that you can order from this book . . . without doubt or question . . . with complete assurance that any item selected will do the job for which it is designed.

Every item in this catalog is listed and cross-indexed alphabetically in the General Index Section. This reference directs you to the particular section and page number of each of the thousands of items contained in the entire catalog . . . quickly and easily.



KELLOGG

SWITCHBOARD AND SUPPLY COMPANY
6650 S. CICERO AVENUE — CHICAGO

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KELLOGG MANUAL CENTRAL OFFICE SWITCHBOARDS

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KELLOGG SWITCHBOARD AND SUPPLY COMPANY

Factory and General Offices: 6650 S. CICERO AVE., CHICAGO, ILL., U. S. A.

**Branch Offices . . . 308 W. Sixth St.
Kansas City, Mo.**

**246 First Street
San Francisco, Calif.**

Switchboard Section

CUSTOMER INFORMATION

Guarantee

Through the years Kellogg has established with its customers the reputation of selling goods that give a full measure of satisfaction. Further, all goods properly used are fully guaranteed for one year against any defect in material or workmanship and are subject to replacement.

Always notify us before making any return shipments. This will help to make the proper adjustment without delay.

Terms

Terms are 30 days net from date of invoice except for some items of construction material which carry a discount for cash within ten days from date of invoice. These terms are shown on invoices.

Charge accounts are invited. New customers who may not be rated by the commercial agencies can help assure prompt service by sending credit information with initial orders. Sight draft or C.O.D. orders receive the same immediate attention as those covered by established charge accounts.

Orders

To avoid errors or delays, catalog numbers as well as the name of each article should appear on the order. Possibilities of delay are decreased when complete information is given in the order.

Telephone or telegraph orders should be confirmed by mail immediately so that if a mistake is made in transmission of the order it can be checked and corrected. However, confirming orders must be marked "Confirming" to avoid the possibility of duplication.

Changes and Cancellations

A reasonable charge is made for changes or cancellation of orders when engineering, special assembly or adjustment is involved. These charges are only sufficient to compensate for the actual loss in time or material.

Shipments

Always specify whether goods are to be shipped via freight, express or parcel post. When shipment is desired by freight please specify the routing. In the absence of instructions we shall use our best judgment in selecting routes which will assure the best service.

Claims for Shortage, Breakage or Non-Delivery

All claims for breakage, damages and non-delivery should be made without delay to the transportation company handling the shipment. We will gladly assist in presenting these claims.

Receipts from the transportation company specify that shipments are received in good condition, therefore shipments must be checked as they are received. Always have the agent of the transportation company make a notation on the bill of lading specifying any damage or shortage.

If packages or cases are in apparent good order, but contents are found to be damaged upon opening, call the freight agent or adjuster and have him mark the freight bill to show the concealed damage.

Claims for damage or non-delivery of parcel post shipments should be made to us as we insure this material and make all adjustments.

Returning Goods

Please notify us before making any return shipments. This will help to make the proper adjustment without delay.

The liability of the Kellogg Company is limited in all cases to the value of the goods claimed to be defective.

Marine and Parcel Post Insurance

Unless otherwise directed, we shall insure against non-delivery all shipments made by steamer or parcel post. A nominal charge will be made to cover the cost of this service.

MASTERBUILT MAGNETO SWITCHBOARDS

SINCE 1897, the Kellogg organization has sponsored the cause of independent telephony — supplying everything it needs to render good telephone service and constantly pioneering new developments for the advancement of the industry. It is Kellogg's policy and constant desire to co-operate closely with every telephone company, so that all may have the full advantage of its tremendous research facilities, extensive equipment, and a wealth of engineering skill and experience.

It is an accepted fact that Kellogg has contributed greatly to the development and progress made by the telephone industry. That the telephone business is profitable, is also largely due to work in designing and building the proper equipment for "low cost, good profit" operation. Today as in the past, Kellogg is continuing to keep faith with the industry, by unceasing research, perfection of new equipment, and in numerous other ways helping the industry reduce costs and improve telephone service.

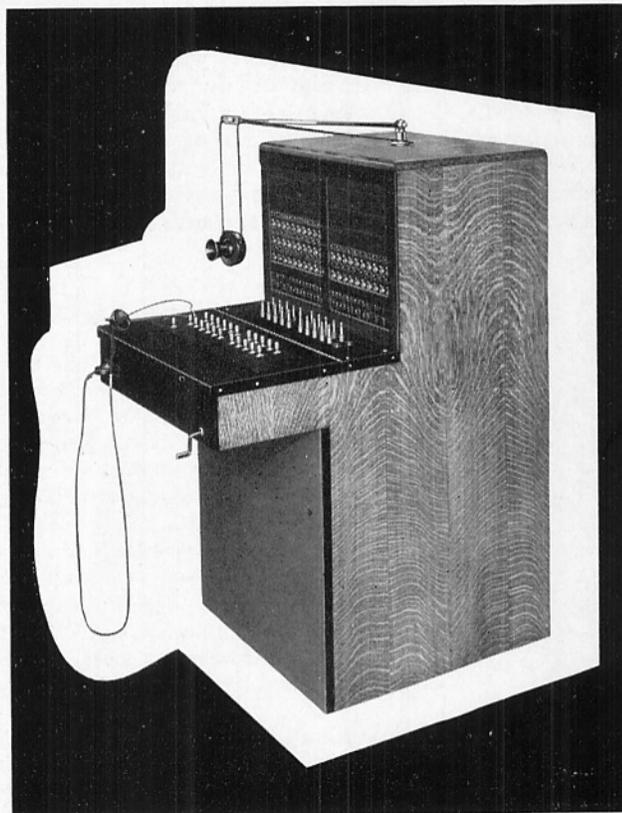
Where Magneto Switchboards are Used

In the early days, local battery or magneto systems were the only type known, and even now magneto most efficiently fills the requirements of the small exchange serving widely scattered subscribers.

This is because: (1) magneto is the simplest form of telephony; (2) local battery transmission, at its best, is the best transmission so far devised by telephone engineers; (3) magneto equipment will overcome obstacles of distance and outside plant, before which any other type of apparatus would fail.

The proper magneto switchboard must be such that it will give satisfactory service to patrons. Its maintenance expense must be extremely low. Replacements must be negligible. The apparatus itself must be so simple that it can be handled perfectly by persons of very limited training and experience.

Kellogg Masterbuilt Magneto Switchboards meet these requirements. How well this is fulfilled is proven by the



thousands of Kellogg magneto switchboards in service in all the civilized countries of the world. These boards are performing faithfully in the service of departments of the United States government, foreign governments, railroads, oil and gas companies, besides the majority of all magneto exchanges in this country.

The underlying quality in material, design and workmanship of Kellogg switchboards is responsible for the service records established by Kellogg owners everywhere.

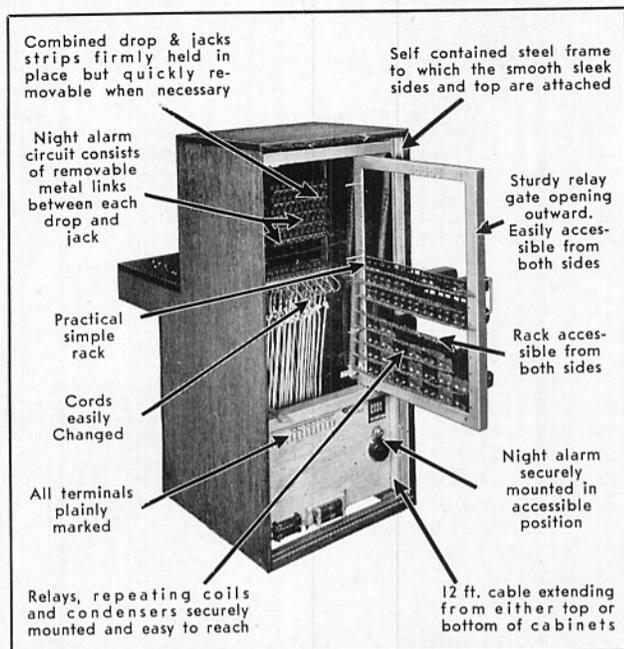
How to Select a Magneto Switchboard

The selection of the proper magneto switchboard depends upon the number of subscribers to be served, the type of line construction, the length of the lines, the number of telephones on each line, and the probability of station growth. These facts make it easy to select the proper size switchboard with sufficient drops and jacks, and cord circuit capacity to adequately care for the needs of the community.

The fact that a magneto switchboard may serve an exchange area for many years makes it necessary to select the equipment on a basis of performance with long service life. Too, the equipment should be flexible enough to meet service demands tomorrow as well as today.

Kellogg Masterbuilt Switchboards are designed specifically to meet these conditions as well as for ease of maintenance. This is achieved by simplicity of design and accessibility of parts. The design and quality of materials used in the manufacture of Kellogg magneto switchboards are responsible for keeping transmission and signalling losses at an absolute minimum. The result is sure ringing and sharp, crisp transmission and reception which gives "telephone satisfaction" to the users.

The complete line of Kellogg magneto switchboards includes a board for every need, from a 10-line wall switchboard to a 200-line floor type board.



Accessibility, compactness and modern, efficient construction are shown in this illustration of the Masterbuilt Magneto Switchboard.

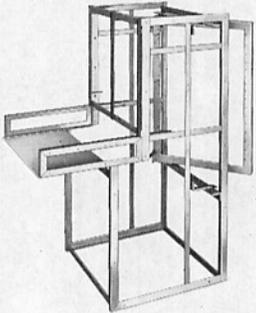
MASTERBUILT MAGNETO SWITCHBOARDS**Construction Features**

How well your switchboard will operate and how long it will continue to do so depends entirely upon the experience in engineering and manufacturing which goes into it . . . how well each individual part is designed and the materials from which it is made . . . and how well the parts work together to give smooth, satisfactory serv-

ice. All are important . . . from the construction of the frame to the installation of the last cord weight . . . all are vital to the perfect operation of the board. Kellogg, with far sighted engineering and efficient manufacturing methods, developed over a period of many years builds this best performance into all Masterbuilt switchboards.

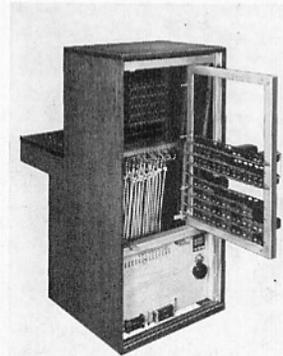
All-Steel Framework

This modern Kellogg Masterbuilt Switchboard is built upon a rigid, all-steel framework, fabricated into one complete interlocking unit. Rivets and spot welding fasten each piece permanently in position. This construction not only provides ample strength to support the equipment and cabinet woodwork, but adds permanence to the installation.



convenience. Even the cam key handles have gone modern with color. Miscellaneous keys are red and white and contrast beautifully with the black mountings.

The continual scraping of plugs does not mar the hard finish around the jacks. Also, the problem of large holes being constantly worn around the plug seats is now solved. Every plug space in this switchboard has a plug well bushing to take up this wear . . . and these bushings are replaceable.

The Swinging Gate

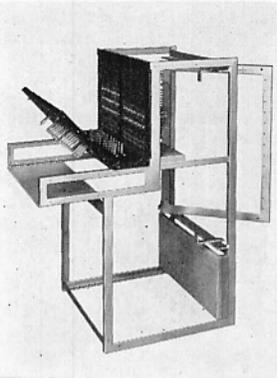
Here is another construction feature, comparatively new to magneto users. It is the swinging gate which carries the cord circuit repeating coils and condensers; and in the case of lamp supervision switchboards, the supervisory relays. Below this steel gate is a maple panel which mounts the operator's telephone circuit and night alarm equipment, terminals for ringing current, battery supply, telephone switching circuits; and in the case of lamp supervision switchboards,

the fuses. This panel is conveniently located for easy access. Just swing the gate open and there are the line equipment, cords and both sides of the gate right before you. Nothing obstructs the wiring. Everything is exposed and easy to get at. Inspecting the switchboard is now a pleasure . . . and it's easy to keep the inside clean.

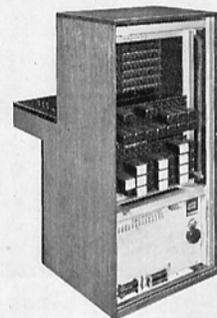
Bakelite Shelves and Panels

Rich, black Bakelite is used for keyshelf and face equipment. Bakelite is used in these switchboards because of its unusual wearing qualities and its permanent lustre. It contrasts beautifully with any surroundings and particularly sets off the cords, plugs, keys, drops and lamps. The keyshelf, hinged with a full length piano hinge, can be raised to provide free and easy access to the key equipment.

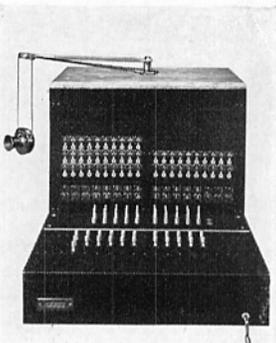
Only the finest materials are used and only the most skillful workmanship is employed in manufacturing the Masterbuilt switchboard.

**Cabinet Design**

You can see that the beautiful hand-rubbed medium golden oak side panels and top are simply attached to the steel framework. Unlike the old fashioned switchboard with its overhanging top, fancy mouldings and panels and extended overlapping sides, this modern switchboard has a smooth, beveled top and sleek, flush sides. The kickboard is completely covered with a solid color battleship linoleum panel.

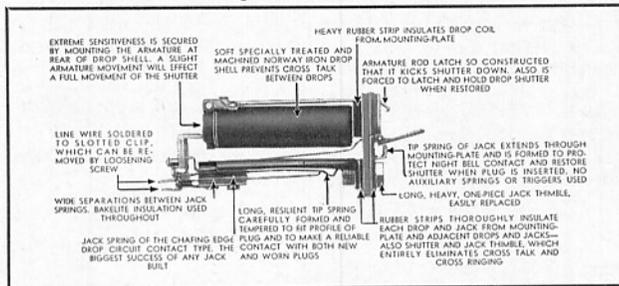
**Face Equipment**

The close-up picture of the keyshelf emphasizes again the simplicity and attractiveness of the modern designed Kellogg Masterbuilt switchboards. Nothing has been spared to make it convenient for the operator. The black Bakelite background is easy on the eyes. Drop shutters are clearly numbered. Jack thimbles are bright nickel. Shiny brass plugs with red or black fibre sleeves are positioned and spaced for maximum



MASTERBUILT MAGNETO SWITCHBOARDS

Drops and Jacks

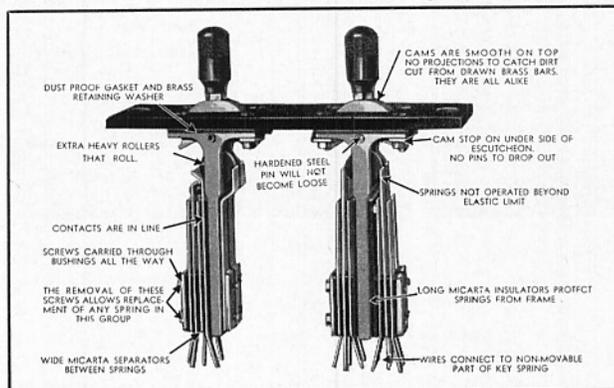


Drops and jacks are really the heart of a magneto switchboard, for drops signal the operator and jacks enable her to connect the parties. Any line is only as good as the drop and jack to which it is connected.

If you will look at the picture above you will see how well the Kellogg drop insures positive operation. The armature which operates the latch is at the back end of the coil. This permits the use of a longer latch rod, with more positive action because the armature can be set closer and be pulled up easier by weaker current. The slightest movement of the armature will cause full movement of the latch. The latch, as it is constructed, not only releases the shutter but kicks it down at the same time. Because of this feature the operation of Kellogg drops is more positive, even on heavily loaded lines where the ringing current is weak.

Jacks with the necessary spring assemblies, are mounted on a rigid frame. The jack thimbles into which the plugs are inserted, are designed to insure a long life and to protect the plugs from excessive wear. When necessary, jack thimbles may be easily and inexpensively replaced in a few seconds.

Switchboard Keys



The picture points out many of the structural features which make for the reputation of Kellogg keys. Unlike a switchboard cord or plug, you can actually see the difference in various manufacturers' key designs, and easily draw your own conclusions as to which has the ruggedness and simplicity to stand the strain. Particularly note such vital things as the long, heavy, evenly shaped and properly tempered springs of nickel silver; contacts of the finest contact metal; heavy "T" shaped brass frame to which the springs are rigidly mounted; the cam and pivot rollers upon which depends smooth operation without wear; the felt dust-protecting cushion; and the extra heavy insulation.

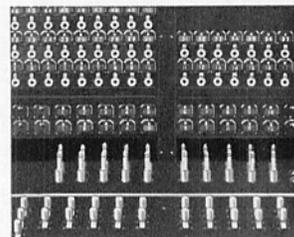
All Kellogg springs are heavily insulated with phenol fibre and withstand the most severe breakdown test of any switchboard key on the market.

Supervision

Probably the most talked of and least understood factor in the performance of a magneto switchboard is supervision. Kellogg offers two types — drop and lamp.

Drop Supervision

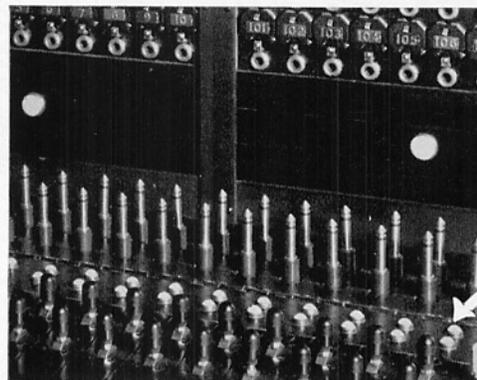
Your operator must have some method of supervision so that she will know when to take down the cord connections after each subscriber conversation. Various methods have been employed to signal the operator, some requiring mechanical signals or targets on the keyshelf. These have not always been satisfactory due to becoming clogged with dust, etc., and becoming partly if not wholly inoperative. The simplest and most reliable method is to use the same type of drop as used for each line, and have it mounted on the face of the board. When the subscriber rings off, the shutter falls. The 'kick' of the Kellogg latch is double insurance.



Most operators and subscribers prefer double drop, non-ring-through supervision, for then the subscriber ringing off signals only the operator and not the party he was talking to. Single drop supervision permits ringing through.

Lamp Supervision

The newer method of providing operator's supervision is that employing lamps. The brilliant glow of these lamps, located in full view on the keyshelf of the switchboard, attracts and compels the operator's attention far better than drops. Because this is a more positive signal, subscribers get better service. When a subscriber "rings off", a lamp immediately lights and continues to glow until the operator takes down the connection.



Obviously there are many technical advantages to be gained by having lamp supervision in your new switchboard. The foremost is maintenance. There are no moving parts on the keyshelf. The lamps alone will need occasional replacing, but they are very inexpensive and have a long life.

Too much emphasis cannot be placed upon the merits of lamp supervision. If you have commercial current available with which to keep a storage battery charged, by all means insist upon it. Lamps speed service and lighten the operator's job. They provide a combination of satisfied subscribers and happy operators which is hard to beat. Kellogg engineers, as usual, are responsible for this better keyshelf supervision.

Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

MASTERBUILT MAGNETO SWITCHBOARDS

Line and Cord Capacity Lamp Supervision

Cabinet Code No.	Maximum Lines	Capacity Cords	Wired For	
			Lines	Cords
150-EL	150	15	100	15
150-FL	150	15	150	15
200-EL	200	15	100	15
200-FL	200	15	150	15
200-GL	200	15	200	15

Drop Supervision

Cabinet Code No.	Maximum Lines	Capacity Cords	Wired For	
			Lines	Cords
50	50	10	50	10
150-E	150	15	100	15
150-F	150	15	150	15
200-E	200	15	100	15
200-F	200	15	150	15
200-G	200	15	200	15

Cord Circuits — Lamp Supervision

LR Double Lamp—Includes repeating coil and should be used for interconnecting metallic and grounded lines. Permits either the calling or answering party to signal the operator for a recall without ringing the other party.

LRK Double Lamp—Same as type LR but also equipped with repeating coil cut-out key. Used for through toll connections on metallic toll lines.

L Double Lamp—Same as LR less repeating coil. Used with either all metallic or all grounded lines.

Cord Circuits—Drop Supervision

DR Double Drop—Same as type LR except drop instead of lamp supervision.

DRK Double Drop—Same as type LRK except drop instead of lamp supervision.

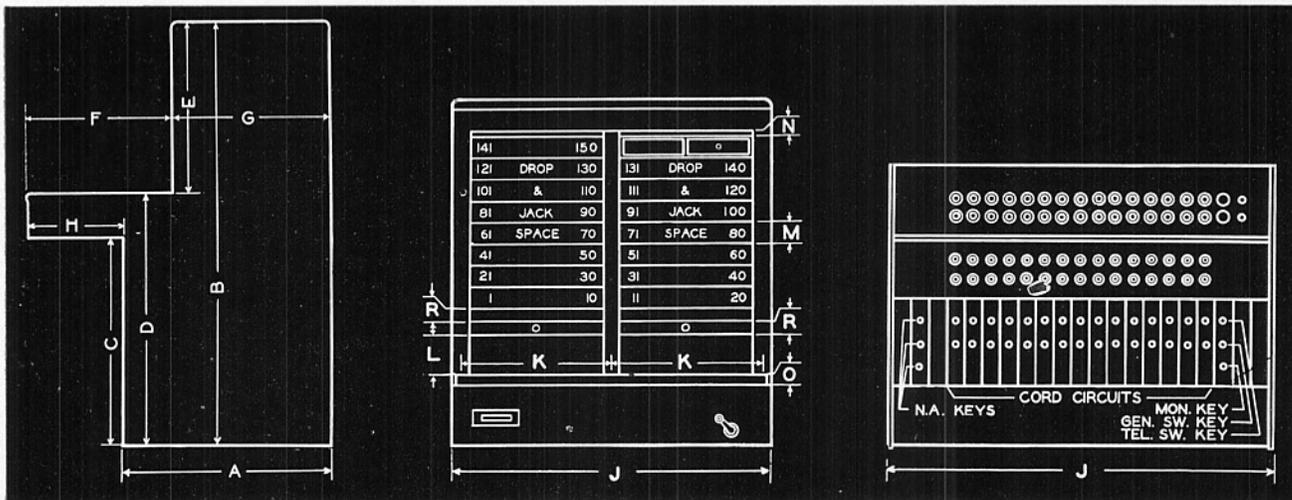
D Double Drop—Same as type L except drop instead of lamp supervision.

SR Single Drop—Includes repeating coil and is not non-ring through.

SRK Single Drop—Same as type SR but with repeating coil cut-out key for through toll connection.

S Single Drop—Same as type SR less repeating coil.

Cabinet Dimensions



CODE NO.

DIMENSIONS (All dimensions are in inches)

	A	B	C	D	E	F	G	H	J	K	L	M	N	O	R
50	22 $\frac{3}{4}$	46 $\frac{9}{16}$	24 $\frac{3}{4}$	30	16 $\frac{9}{16}$	18	16 $\frac{3}{4}$	11 $\frac{7}{8}$	23 $\frac{15}{16}$	11 $\frac{5}{32}$	12 $\frac{29}{32}$	1 $\frac{3}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	1
150-E 150-F	24 $\frac{3}{4}$	50 $\frac{9}{16}$	24 $\frac{3}{4}$	30	20 $\frac{9}{16}$	18	18 $\frac{3}{4}$	11 $\frac{7}{8}$	23 $\frac{15}{16}$	11 $\frac{5}{32}$	12 $\frac{29}{32}$	1 $\frac{3}{4}$	$\frac{3}{8}$	$\frac{7}{8}$	1
200-E 200-F 200-G	26 $\frac{1}{4}$	58 $\frac{5}{16}$	27 $\frac{3}{4}$	33	25 $\frac{5}{16}$	18	20 $\frac{1}{4}$	11 $\frac{7}{8}$	23 $\frac{15}{16}$	11 $\frac{5}{32}$	12 $\frac{29}{32}$	1 $\frac{3}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	1

Equipment

CABINET—Three sizes are available. See table of dimensions.

OPERATOR'S SET—Suspended or breastplate type NON-POSITIONAL transmitter, and featherweight, watchcase type, head band receiver.

LINE DROPS—Code and regular alarm—resistance as specified.

DROPS AND CORDS—May be equipped as desired, up to ultimate capacity.

GENERATOR—5 bar, hand generator, wired to a switching key for switching to power generator.

CABLE—12 Feet of line cable furnished, extended from top or bottom of switchboard cabinet and from the right or left hand side.

NIGHT ALARM—With bell and control key. An additional alarm with buzzer and key is furnished when line drops are equipped with armature contacts for indicating code rings on party lines.

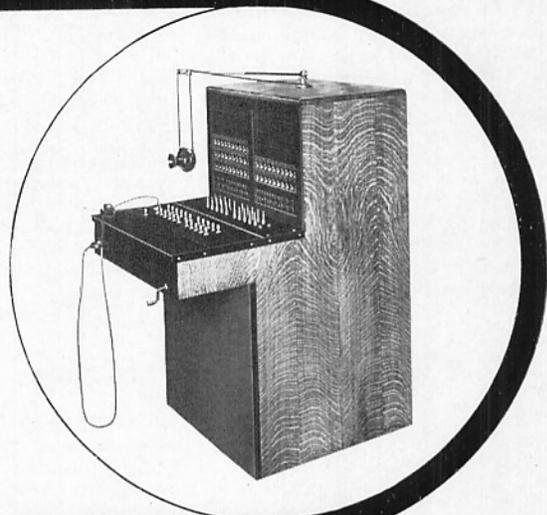
MASTERBUILT MAGNETO SWITCHBOARDS

50-Line Capacity

Type 50 Masterbuilt Magneto Switchboards are wired for 50 lines and 10 cord circuits (ultimate capacity). This Kellogg 50-line switchboard is the smallest of the Kellogg floor types. It is ideally suited for exchanges whose growth is not expected to exceed 50 lines. This switchboard presents no problem to operate and is inexpensive to maintain. It gives the finest type of magneto service.

The medium golden oak finished cabinet is built on a rigid steel frame. The height of its keyshelf permits the operator to use an ordinary chair. Line and cord equipment will be furnished as desired up to the ultimate capacity. Either breastplate or suspended type transmitter may be used.

Complete specifications and ordering information for this switchboard are given on page 6 and in a special bulletin which will be sent on request.



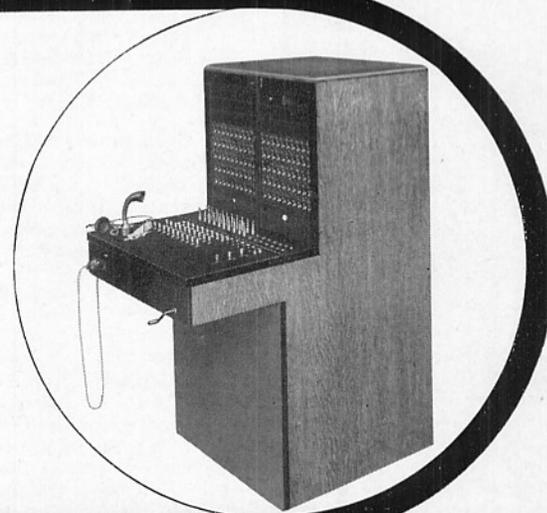
150-Line Capacity

Type 150 Masterbuilt Magneto Switchboards are wired for 100 or 150 lines and 15 cord circuits. This Kellogg 150-line switchboard is a very popular size — one that is found in the average magneto exchange. It presents no problem to operate and is inexpensive to maintain. Like the Kellogg 50 line switchboard, it gives the finest type of magneto service.

The medium golden oak finished cabinet is built on a rigid steel frame. The height of the keyshelf permits the operator to use an ordinary chair.

Either breastplate or suspended type transmitter may be used. Line and cord equipment will be furnished as desired up to the ultimate capacity.

Complete specifications and ordering information for this switchboard are given on page 6 and in a special bulletin which will be sent on request.

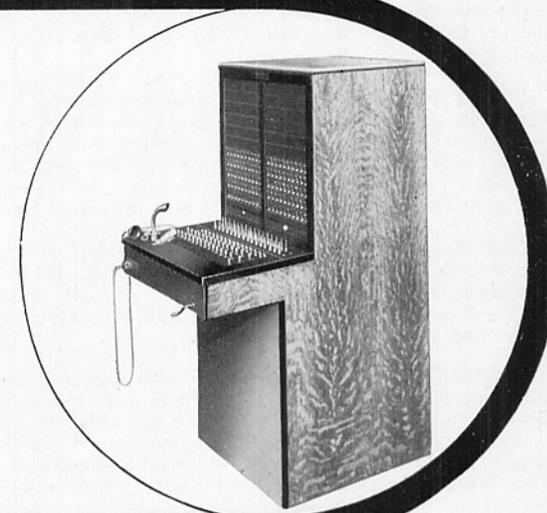


200-Line Capacity

Type 200 Masterbuilt Magneto Switchboards are wired for 100, 150 or 200 lines and 15 cord circuits. This Kellogg 200 line magneto switchboard is the largest single position magneto board of the Kellogg line. The single position cabinet is specially adapted to meet the needs of an exchange where future growth may require added positions. It is usually found impractical for one operator to handle over 200 lines.

This switchboard is provided with a low keyshelf. The cords are of sufficient length to give the maximum reach when two positions are placed together. Either breastplate or suspended type transmitter may be used. Line and cord equipment can easily be added as desired up to the ultimate capacity.

The complete specifications and ordering information for this switchboard are given on page 6 and in a special bulletin which will be sent on request.



Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

WALL TYPE MAGNETO SWITCHBOARDS

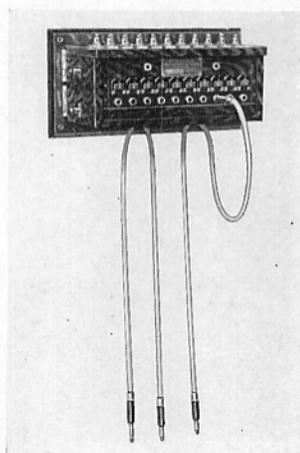
WHEREVER a small number of telephone lines are to be connected together these wall type magneto switchboards answer the purpose most economically. They are small, compact and attractive and can be easily installed in almost any convenient location since they require but little space. There is a size for every need, including a 10, a 15, a 30 and a 50 line unit.

All of these switchboards are designed to give many years of satisfactory service with a minimum of maintenance. The simplicity of these boards makes them easy to operate and maintain. They are ruggedly built and employ standard Kellogg equipment. All major parts such as drops, jacks, cords, plugs, generators, keys, night alarm, etc., are the same as those used regularly in the

larger Kellogg switchboards. Each board is housed in an attractive hand rubbed, medium dark oak cabinet and hinged to a backboard so that the cabinet can be swung open for easy access to the inside.

It is usually best to select a switchboard that has sufficient extra capacity to allow for future growth. All of these switchboards are completely wired at the factory for the maximum equipment, but with the exception of the 9-B type, they can be furnished with just enough equipment to handle your present requirements. As more lines are needed in the future, it is very easy to install the additional parts at that time. When ordering or requesting a price, be sure to state how many lines the board is required to handle at present.

Type 9-B, Capacity 10 Lines



This 10-line switchboard is the smallest of the Kellogg wall types. Its operation is just as positive and just as dependable as the largest magneto board and is recommended for use where the requirements do not exceed 10 lines. It can be used for either grounded or metallic lines.

Gas, power, railway and mining companies find this switchboard indispensable for intercommunicating or dispatching purposes. Once installed it gives very reliable service for many years with practically no attention.

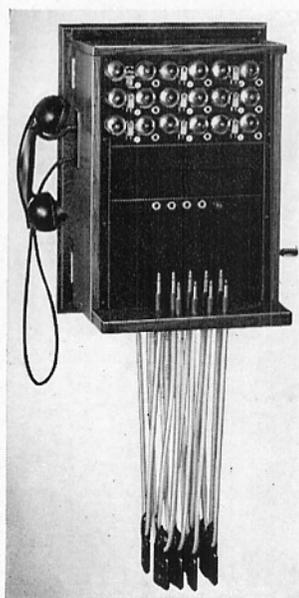
EQUIPMENT AND CONSTRUCTION—The line wires connect to binding posts on the top of the cabinet, and terminate on combined drops and jacks in the face of the switchboard. The binding posts are specially arranged with air gap lightning arresters. Two pairs of connecting cords provide for two complete conversations at the same time between different lines; and in addition, the operator can also answer calls on other lines. A listening-in jack, associated with each pair of cords, enables the operator to supervise the connection without interference. A drop shutter falls when any connected subscriber rings off or makes a recall.

NIGHT ALARM — A night alarm buzzer and a switch come with this switchboard and can be mounted wherever convenient. They connect to two binding posts located on the side of the cabinet and operate from two dry cell batteries connected in series. When the switch is closed the buzzer operates every time a drop on the board falls.

Code ringing night alarm can be furnished extra. This feature, on party lines using code ringing, permits the attendant to go about other duties and still be able to distinguish between calls for the operator and calls for some one else on the same line.

OPERATOR'S SET — Any standard magneto telephone with hand generator and a ringer can be used for the operator's set, and connects to the switchboard through a telephone instrument cord attached to a switchboard plug. A suitable operator's set can be furnished along with the switchboard when specified. Shipping weight is approximately 25 pounds.

Type 48, Capacity 15 Lines



Here is an attractive wall switchboard designed especially for rural switching centers where the operator isn't always close to the board and a loud signal is desired. A double gong bell is wired across each line and operates similar to a telephone bell. These bells are located in the face of the switchboard, and through their code rings, the operator can tell at a distance whether a party line subscriber is signalling the operator or a subscriber on the same line.

CAPACITY—This switchboard has a capacity for 15 lines and 4 connecting cord circuits. Each line terminates on a combined drop-jack-bell unit and is arranged for either grounded or metallic systems. The board can be partially installed for 3, 6, 9, 12 or 15 lines as desired and additional drop-jack-bell units can be easily installed up to full capacity at any time more lines are needed.

OPERATOR'S SET—An all-Bakelite Masterphone handpiece is furnished for the operator. It contains a capsule type NON-POSITIONAL transmitter unit and a self contained capsule type receiver. This handpiece is supported on a standard Kellogg hookswitch and is wired to an operator's answering cord and plug.

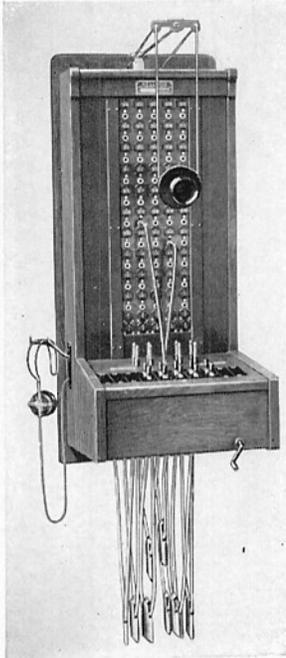
EQUIPMENT AND CONSTRUCTION—All of the plugs are conveniently located on an oak plug shelf in front of the face panel. A hand generator is mounted inside with the crank extending from the right of the cabinet. Also located inside is a night alarm bell, and a button type night alarm control key is mounted in the front of the cabinet in line with the cord circuit jacks. This board comes completely wired with the line wires brought out to binding posts on the back to which is connected an 8-foot cable. Shipping weight is approximately 125 pounds.

How to Order

When ordering or requesting a price for a No. 48 switchboard, please furnish the following information:
Number of lines to be equipped at present.
Resistance of drop coils.
Whether the 8 feet of line cable supplied is sufficient.

WALL TYPE MAGNETO SWITCHBOARDS

Type 7-A, Capacity 50 Lines



When a 50-line magneto switchboard is required and lack of space will not permit a floor type cabinet, this Kellogg 7-A wall switchboard is the popular choice. It is compact, employs standard Kellogg equipment and furnishes very reliable service. The hinged cabinet swings outward permitting free access to the inside.

CAPACITY—The face of the cabinet has space for 50 combined drops and jacks and 5 ring off drops, mounted 5 per strip. The board is wired for its ultimate capacity of 50 lines, but it can be furnished with such equipment as required for present traffic. Additional equipment up to its full capacity, can be added at any time to take care of future growth.

CORD CIRCUITS — A listening key and a combined ringing and ringing back key are furnished with each cord circuit and mount on the tapering key shelf in front of the cords and plugs. This key shelf has a spring lock and is hinged at the back so that it can be raised to permit easy access to the key springs and wiring.

OPERATOR'S SET—This switchboard may be equipped with a suspended type or breastplate type transmitter and headband receiver. As an alternative, the all-Bakelite Masterphone handpiece unit (shown on type 30 switchboard at right) is available.

NIGHT ALARM—A night alarm bell and control key are standard equipment. Code night alarm can also be furnished. This is a very desirable feature for rural communities where party lines using code ringing are heavily loaded. It enables the operator to hear the code signals of party line subscribers at a distance and tell whether or not she must attend the switchboard. For this feature, a buzzer and control key are included so the code and regular alarms are sounded on separate signals.

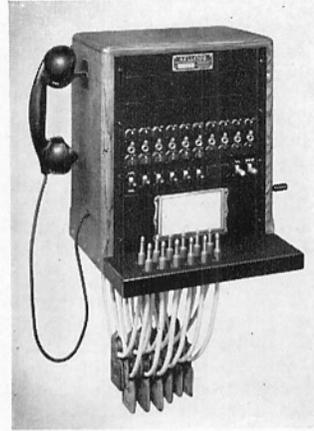
HAND GENERATOR — A heavy duty, 5-bar generator with a generator switching key is furnished with this switchboard.

The lines are brought out of the switchboard in a 12 foot length of 50 pair switchboard cable. All circuits are arranged for connecting either to metallic or grounded lines. Shipping weight is approximately 250 pounds.

How to Order

When ordering or requesting a quotation on No. 7-A switchboard, please furnish the following information:
The number of lines to be equipped at present.
With or without code alarm.
Type of operator's equipment to be furnished, suspended or breastplate type transmitter with headband receiver, or all-Bakelite Masterphone handpiece unit.
Whether the 12 feet of cable supplied is sufficient.
To be used with metallic or grounded lines, or some of each kind.

Type 30, Capacity 30 Lines



This modern, compact magneto switchboard is by far the most popular of the wall types. It fits most cases where a wall board is required because it can handle any number of lines up to its full capacity of 30 lines. This allows for sufficient expansion for those systems where less than 30 lines are now used.

With its sleek, smooth, round-edged cabinet of rich oak and its face panel and plug shelf of lustrous black Bakelite this is an exceptionally attractive switchboard. A directory card holder is mounted on the face of the board for the convenience of the operator. For performance, operation and appearance it makes a very desirable installation.

CAPACITY—Ten drops and jacks are mounted in a row and space is available for three of these rows or a total of 30 lines. There is capacity for 6 cord circuits. It can be equipped with as few as 10 drops and jacks and 4 cord circuits, depending upon the number of lines needed and the amount of traffic handled at present. Additional equipment can be added as more lines are required.

OPERATOR'S SET — This switchboard comes equipped with an all-Bakelite Masterphone handset, containing capsule type, non-positional transmitter and receiver units, supported by a hookswitch mounted on the cabinet.

HAND GENERATOR — A heavy duty hand generator is located inside the cabinet with the generator crank extending from the right side. If power ringing is to be used, a generator switching key can be furnished to switch from the power ringing machine to the hand generator in an emergency.

CORD CIRCUITS — The cord circuits are of the single supervision type, equipped with a "clear out" drop and combined ringing and listening key. The supervisory drops and keys are located on the face of the board. The first pair of cords may be equipped with a repeating coil for connections between metallic and grounded lines.

NIGHT ALARM — The night alarm bell is mounted inside the cabinet and is furnished with a control key to turn it on or off. The bell will ring as long as the drop signal is down.

If desired any strip of line drops can be equipped with a code alarm. This circuit has a buzzer and control key and is entirely separate from the night alarm. The code operates in unison with the ring from the subscriber's telephone so that the operator can distinguish between a station to station call on any one line or a call for central.

This switchboard is designed to give very satisfactory service on either metallic or grounded lines. Shipping weight is 65 pounds.

How to Order

When ordering or requesting information on the No. 30 switchboard, please furnish the following information:
Number of lines to be equipped at present.
Number to be equipped with code alarm.
Number of cord circuits to be equipped at present, should the first pair be equipped with repeating coil?
Should the 8 foot line cable which comes with the switchboard extend from the top or the bottom of the cabinet.

Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

MASTERBUILT JUNIOR SWITCHBOARDS

THE Masterbuilt Junior Switchboard is of the non-multiple type, equipped with universal cord and line circuits designed to provide either common battery or magneto service or a combination of the two.

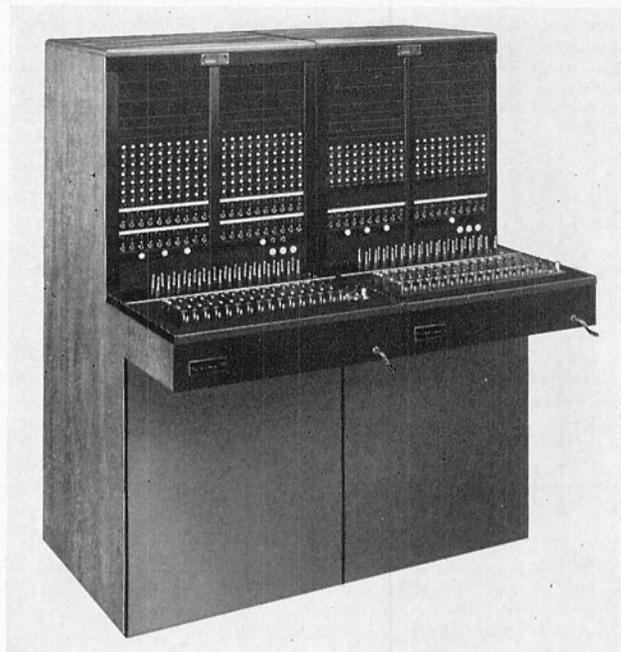
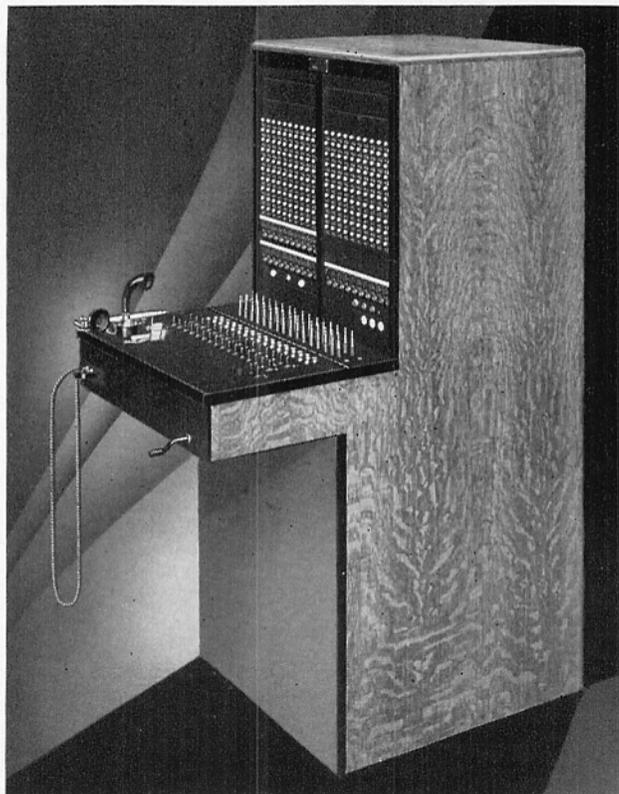
The Masterbuilt Junior is adapted to the modern, progressive town where the anticipated growth will not require a multiple type switchboard. It provides the most modern manual service and the initial cost is little more than that for magneto equipment. Yet with it, the exchange can furnish service to meet both present and future requirements. Both magneto and common battery subscribers may be served with the one switchboard and as these subscribers are changed from magneto to common battery service, the transfer is made by merely switching two wires on the line relay.

The Masterbuilt Junior is designed to improve the earnings of the smaller exchanges. In many cases where the growth of an exchange is apparently static, an improvement in the service such as changing from magneto to common battery increases the number of subscribers. This increase is of course reflected in increased earnings of the exchange.

With the Masterbuilt Junior, important savings in operating cost can be made. There are no dry batteries to be checked or replaced on the subscribers premises in those telephones that have been changed to common battery. At the same time subscribers can be provided with "big city" service which is faster and much more saleable.

Whatever the plant and equipment problems, the Masterbuilt Junior is the answer. You may with assurance install a Masterbuilt Junior with the very same conditions under which your magneto board is working. Any line that will work on your magneto switchboard will work on the Masterbuilt Junior. The magneto switchboard may be disconnected, the Masterbuilt Junior connected in its place and the job is done so far as central office equipment is concerned.

Now the job of changing lines from magneto to common battery service may be started. Here again the Master-



When two Masterbuilt Junior sections are placed together, the switchboard capacity is doubled.

built Junior is the answer. The universal line and cord circuits, designed to function with either magneto or common battery connections or a combination of both make it possible to change one line at a time. Whether it is one line, a group of lines or an entire section that is ready for common battery, just change two connections on the line relay, change the subscribers telephone to a common battery instrument or convert the magneto telephone to common battery and that part of the plant is completely cut over.

It is always more economical for the small exchange to cut over gradually with regular help than it is to put on a large crew and attempt to do all of the central office and outside plant work at the same time. It spreads the expenditure over a longer period and takes up the slack time of regular employes which also means more money in the bank account.

Each Masterbuilt section has a capacity for 200 local lines, either magneto or common battery, and 40 drop signal or 30 lamp signal magneto rural or toll lines, 15 universal cord circuits with either manual or machine ringing and any type of party line service. The sections are complete individual units. Two sections may be placed together which doubles the capacity of one section. When this is done all lines are in easy reach of either operator.

The cord circuits may be equipped with either manual or machine ringing and with any type of party line service desired. Pilot lamps, fuse alarm, cord and wire chiefs tests, generator switching key, operator's telephone switching key and night alarm key are all standard equipment. Code alarm and hand generator will be furnished when specified.

MASTERBUILT JUNIOR SWITCHBOARDS

Operating Features

Common Battery Operation — Lamp lights when subscriber removes telephone from hookswitch.

Magneto Operation—Hand generator at subscribers telephone provides means of signalling operator over magneto lines with either drop and jack or lamp signal.

Full Universal Line Circuits—These circuits handle all types of local lines, magneto or common battery. To convert from local battery to common battery change just two connections on the line relay.

Rural Line Circuits — These are magneto, with either drop or lamp signals.

Full Universal Cord Circuits — Adapt instantly to the line in which the plug is inserted, regardless of whether it is common battery or magneto. Nine different circuits are available to meet specific operating conditions. No additional switchboard wiring or equipment is required to change to common battery.

Pilot Circuits — Line pilots and supervisory pilots are provided for both common battery and magneto lines.

Party Line Ringing — Code, two-party divided, or five-party harmonic ringing may be furnished as specified.

Manual Ringing or Machine Ringing — Machine ringing is recommended for common battery lines because of great saving in operator's time. Revertive ringing tone is recommended with machine ringing only. The switchboard may be wired for machine ringing and the actual equipment added later to meet future needs. Single party, two party divided or five frequency harmonic ringing may be furnished as desired.

Revertive Ringing Tone — Revertive ringing tone is audi-

ble to the calling subscriber when the called subscriber is being rung on a common battery line. Available when machine ringing is specified. For a more complete description of revertive ringing refer to page 18.

Positive Night Alarm — Controlled by a night alarm key.

Code Alarm — Repeats code rings on rural or toll lines. It is used when the operator leaves the board. When code calls are made, the operator does not need to answer. Subsequent calls will not be prevented from coming through.

Fuse Alarm — Sounds whenever a switchboard circuit fuse "blows".

Line Jacks — Masterbuilt Junior switchboards have only ten jacks per strip. This permits the operator to handle the plugs easily and efficiently. Congestion is eliminated, the operator's view is not obstructed and wear on cords is lessened.

Positive Lamp Supervision — Individual supervisory lamps with pilots to attract the operator's attention insure prompt recalls. On common battery connections supervisory signals automatically appear when the receiver is placed on the hook. On magneto connections it is necessary for the subscriber to ring off after placing the receiver on the hook.

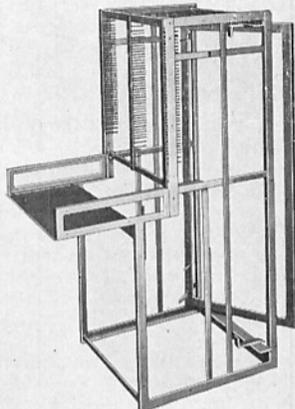
Repeating Coils—Repeating coils are necessary to provide the best universal cord circuits and are recommended under all conditions.

Capacity — The ultimate capacity per position is 200 local lines and 40 magneto lines. When two positions are lined up together the ultimate capacity is 400 non-multiple local lines and 80 magneto lines.

Construction Features

HOW well your switchboard will operate and how long it will continue to do so depends entirely upon the experience in engineering and manufacturing which goes into it . . . how well each individual part is designed, the material from which it is made . . . and how well the parts work together to give smooth, satisfactory service. All are important . . . from the construction of the frame to the installation of the last cord weight . . . all are vital to the perfect operation and long life of the board. Kellogg, with farsighted engineering and efficient manufacturing methods, developed over a period of many years, builds this best performance into all Masterbuilt Switchboards.

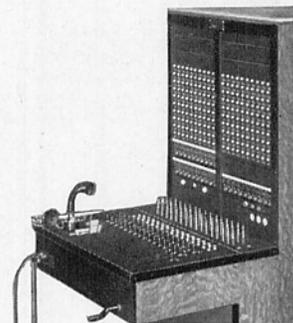
All-Steel Framework



The modern Kellogg Masterbuilt switchboard is built upon a rigid, all-steel framework, fabricated into one complete interlocking unit. Rivets and spot welding fasten each piece permanently in position. This construction not only provides ample strength to support the equipment and cabinet woodwork, but adds permanence to the installation.

Face Equipment

The close-up picture of the keyshelf emphasizes again the simplicity and attractiveness of the modern design of Kellogg Masterbuilt Junior Switchboards. Nothing has been spared to make it convenient for the operator. The black Bakelite background is easy on the eyes. Jack thimbles are bright nickel. Shiny brass plugs with red or black fibre jackets are positioned and spaced for maximum convenience. Even the key handles have gone modern with color. Miscellaneous keys are red and white and contrast beautifully with the black mountings.



The continual scraping of plugs does not mar the finish around the jacks. Also, the problem of large holes being constantly worn around the plug seats is now solved. Every plug space in this switchboard has a plug well bushing to take up this wear . . . and these bushings are replaceable.

Bakelite Key Shelves and Panels — Rich, black Bakelite is used for keyshelf and face panels. Bakelite is used in these switchboards because of its unusual wearing qualities and its permanent lustre. It contrasts beautifully with any surroundings and particularly sets off the cords, plugs, keys, drops and lamps. The keyshelf, hinged with a full length piano hinge, can be raised to provide free and easy access to the key equipment.

Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

MASTERBUILT JUNIOR SWITCHBOARDS

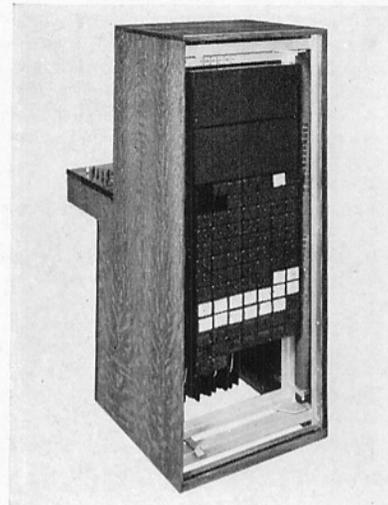
Construction Features

The Swinging Gate

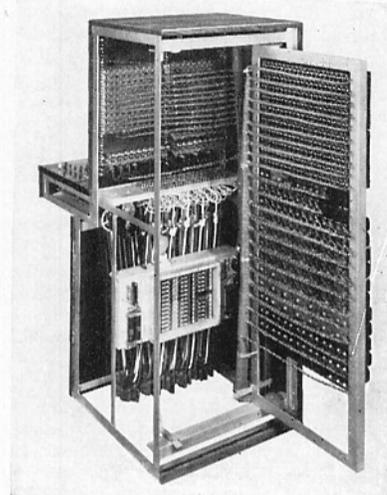
The swinging gate of the Masterbuilt Junior carries the repeating coils, condensers, relays, etc. Below this steel gate is a maple panel which mounts night alarm equipment, terminals for ringing current, battery supply, fuses, telephone switching circuits. This panel is conveniently located for easy access. Just swing the gate open and there are the line equipment, cords and both sides of the gate right before you. Nothing obstructs the wiring. Everything is exposed and easy to get at.

Cabinet Design — You can see that the beautiful, hand-rubbed, medium golden oak side panels and top are simply attached to the steel framework. Unlike the old fashioned switchboard with its overhanging top, fancy mouldings and panels and extended overlapping sides, this modern switchboard has smooth, rounded top edges and sleek, flush sides. The kick-board is completely covered with a solid color battleship linoleum panel.

Key boards are low allowing operators to use ordinary desk chairs.

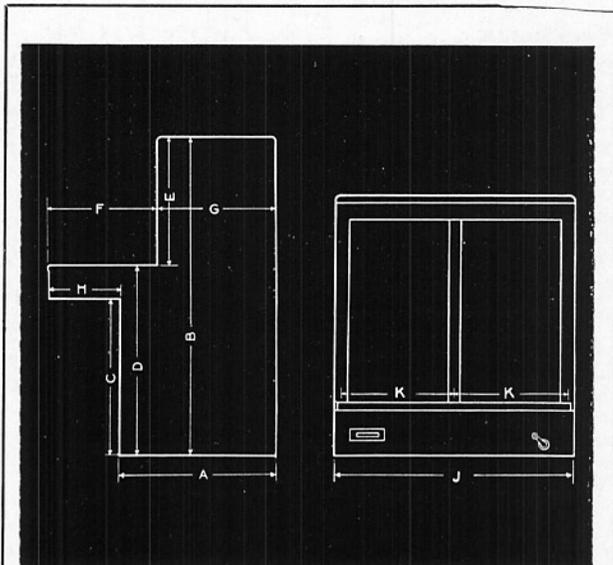


This picture shows the Masterbuilt Junior with the back panel removed and the relay gate closed. This back panel is easily demountable.



Here, the relay gate has been swung open and the side panel has been removed for easy access to all apparatus.

Cabinet Dimensions



The side view of a Masterbuilt Junior Switchboard is shown at the left. Above on the right is the front view of the Masterbuilt Junior face plate.

All dimensions are in inches.

A	B	C	D	E
26 1/4	58 5/16	27 3/4	30	25 5/16
F	G	H	J	K
18	20 1/4	11 7/8	23 15/16	11 5/32

Equipment

Operator's Set — Suspended or breastplate type *Non-Positional* transmitters and featherweight, watch case type head band receivers.

Generator — Switchboard may be furnished with or without 5 bar hand generator.

Keys, Drops and Jacks and Lamps — are of the latest type and are designed to give long service with minimum attention.

Repeating Coils — The well balanced repeating coils and battery feed coils used in Kellogg cord circuits insure the best transmission.

Cable — 15 feet of switchboard cable is furnished and may extend from either the top or bottom of the cabinet.

Blue Prints — A complete set of blue prints covering all circuits used in the Masterbuilt Junior is furnished.

Packing — Masterbuilt Junior Switchboards are packed in wooden boxes lined with waxed paper and are securely braced to prevent damage in transit.

Guarantee — The Kellogg guarantee of free replacement of all defective parts accompanies each order and assures the purchaser of satisfaction in service.

How to Order

When ordering your new switchboard or requesting quotations, give us the following information:

Number of universal lines to be equipped. Any number of these universal lines may be wired for common battery operation as specified.

Number of rural lines to be equipped and whether they are to be equipped with drop and jack or lamp signals.

Number of cord circuits to be equipped. State whether manual or machine ringing is to be furnished and type of party line service. If ringing machine is to be furnished specify type.

Number of feet of cable to extend from top or bottom of cabinet and from the right or left side.

If power equipment is to be furnished specify voltage and frequency of commercial current available.

MASTERBUILT SWITCHBOARDS (Multiple Type)

THE fundamental aim of the telephone man is to furnish the finest available telephone service to his subscribers. Equally fundamental is the fact that he must do this at the lowest possible cost if he wants to make the profits he deserves from his work and his investment.

To help the telephone man accomplish these two purposes — better service, lower operating costs — Kellogg designed its line of Masterbuilt Switchboards. The service provided by these modern switchboards is the fastest and best devised. The fact that these boards provide this better service at the lowest possible expense is evidenced by the many profitable telephone exchanges now using Masterbuilt Switchboards.

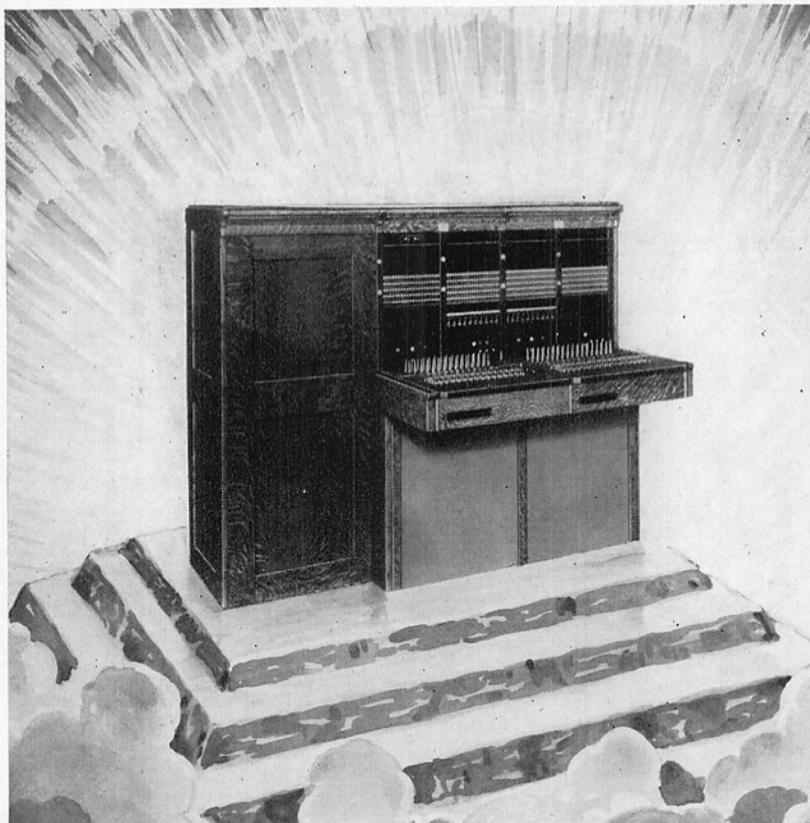
There are five fundamentals of good telephone service which cover everything that subscribers want. These fundamentals are: a quick answer; a speedy connection; a satisfactory conversation; instantaneous disconnect; and a prompt recall. Each of these service features is provided by Masterbuilt Switchboards and subscriber satisfaction is assured.

Soundly engineered, built by skilled craftsmen and made of the highest quality materials throughout, Masterbuilt Switchboards are made for a long, trouble-free service life. Yet, in addition to furnishing the fastest, most modern kind of service, the Masterbuilt Switchboard does it at the lowest possible cost.

Masterbuilt Switchboards are easy to operate. Physical and mental operations of the operators are reduced to a minimum, raising their individual efficiency. This enables each operator to handle more calls in the same amount of time and with less effort.

A Complete Masterbuilt Line

Multiple-type Masterbuilt Switchboards are available in sizes to meet requirements of any exchange of from 300 lines on up to thousands of lines. Three standard sizes are: the 6-800, with 600 lines on a 3-panel multiple basis or 800 lines on a 4-panel multiple basis; the 12-1600, with 1200 lines on a 3-panel multiple basis or 1600 lines on a 4-panel multiple basis; and the 4200, with 4200 lines on a 7-panel multiple basis or 7000 lines on a 7-panel basis, using "inverted multiple".



Lowers Central Office Investment

Masterbuilt Switchboards do not demand excessive investments in surplus idle equipment. In planning for problematical future needs — they may be small or they may be large — Masterbuilt owners know that their switchboards will have the flexibility to meet these future needs economically and efficiently.

The positional equipment of any section or operator's position in a Masterbuilt Switchboard may be removed and reinstalled where needed — and by one man in a few hours.

This is in contrast to boards where several positions are fabricated together to make up a section. In the Masterbuilt, all of the operator's equipment and cord equipment is installed in the keyshelf and relay gate in one demountable unit.

This construction feature enables any Masterbuilt position, whether local, toll or universal to be converted overnight. The multiple is not disturbed, rearrangement costs are kept at an absolute minimum.

Solid Steel Framework

A framework of solid steel is the foundation of every Masterbuilt Switchboard. This framework is one fabricated unit, complete and interlocking from end to end. The construction assures rigidity that will outlast even the Kellogg equipment that it mounts.

Masterbuilt is Easy to Install

Masterbuilt Switchboards save money on installations. "Knock-down" shipment means smaller parcels, easier and cheaper handling and no hoists or special openings in central office telephone buildings.

Also, the frame is shipped separate from the positional equipment. Thus, the frame travels at iron work freight rates instead of the much higher shipping rates for electrical equipment.

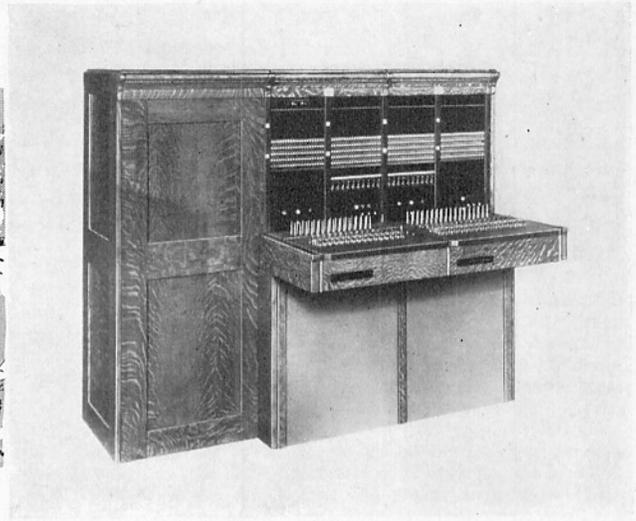
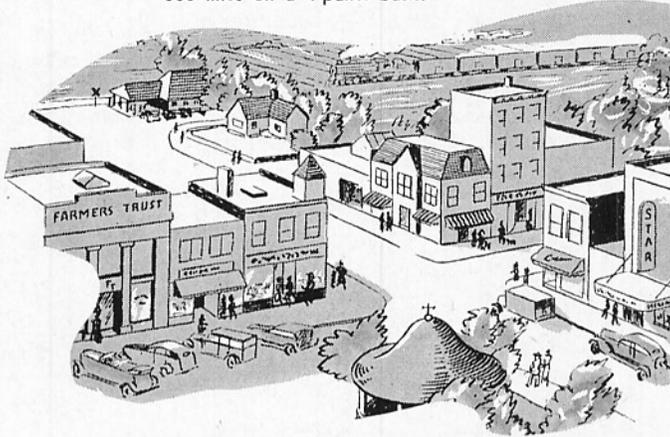
The positional units are factory wired. The cord equipment is completely wired, assembled and tested at the factory. Assembling and wiring relay gates on the job is eliminated. This means saving in installation time and money.

Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

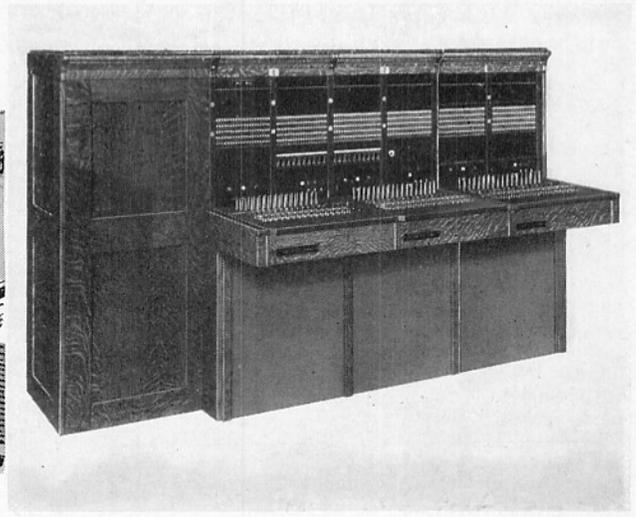
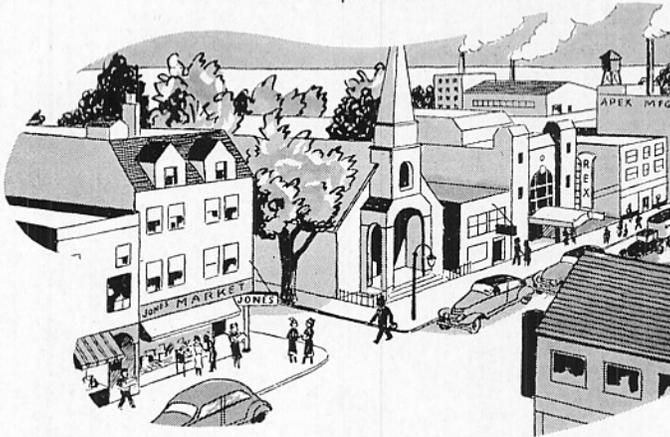
The 6-800 Masterbuilt

Capacity: 600 lines on a 3-panel multiple basis;
800 lines on a 4-panel basis.



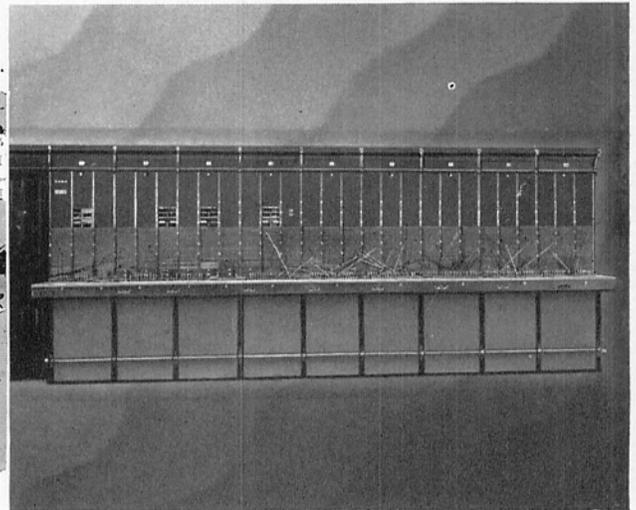
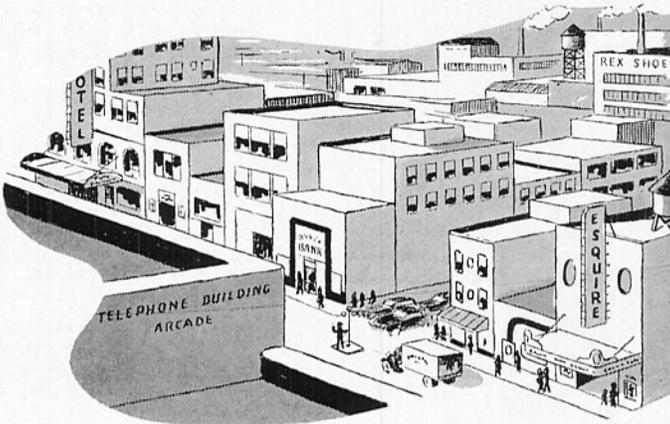
The 12-1600 Masterbuilt

Capacity: 1200 lines on a 3-panel multiple basis;
1600 lines on a 4-panel basis.



The 4200 Masterbuilt

Capacity: 4200 lines on a 7-panel basis;
7000 lines on a 7-panel basis, using "inverted multiple".



Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

the 6-800

There is a Masterbuilt Switchboard for every purpose. The smallest member of the Masterbuilt Multiple Switchboard family is the "6-800", a full multiple, common battery switchboard for the exchange in which the expected ultimate growth is 800 lines or less. It also includes the resort town with little local traffic but a large toll business. New industrial centers and new residential communities also come under the same heading.

Ample space is allowed for rural and toll lines with either drop or lamp signals. Drops are usually preferred for rural lines because the clattering of the drop is an audible indication of code rings originating on that line. Lamp signals on either rural or toll lines are designed so that the lamp flashes as the subscriber turns his hand generator. When the ringing has stopped, the lamp burns steadily. If rural lines are to be changed to common battery at some future time, they may be terminated on lamp signal universal circuits, which make it unnecessary to replace any switchboard equipment when the

change is made from magneto to common battery service.

Any type of cord circuits can be furnished. A traffic study will reveal the type that will most efficiently handle the service. Full universal cord circuits permit any operator to handle local, rural, and toll calls without confusion or undue transmission loss. Common battery subscribers' bells may be rung automatically, speeding up service and relieving the operator of the necessity of supervising and reringing on such calls. Full selective, harmonic party line ringing makes party lines more popular because of increased privacy.

If the number of magneto rural lines is small, it is desirable to use full common battery cord circuits, with the many additional features possible in this type. Automatic listening, instantaneous disconnect and recall, automatic peg count, secret service, and positive protection against intrusion on busy connections are some of the features offered in the 6-800 Masterbuilt. Wherever a low type board of 800 lines capacity is required, a 6-800 Masterbuilt will do the job best.

the 1600

For towns of larger size, and for rapidly growing communities, the 12-1600 Masterbuilt is recommended. In this switchboard a local line capacity of 1600 lines is possible with the equipment multiplied on a four-panel basis. Multiplied on a three-panel basis, the maximum capacity is reduced to 1200 lines. Ample space for rural and toll lines, using either drop or lamp signal, is provided below the local multiple. Space is also available for recording trunks, pay station lines, local to rural trunks, and other miscellaneous apparatus. The cord equipment may be extremely varied, providing for the most efficient handling of traffic.

The requirements in various towns differ to a large extent. These requirements determine the number of toll, rural and local positions and the exact type of equipment to be placed in each position. Toll may be indicated on a straight toll basis, using recording trunks and toll cord circuits, or it may be spread among combination operators who handle

toll and rural service and help out with local connections when required.

The rapidly increasing popularity of A-B toll service has caused concern to many telephone men whose switchboards are not equipped to establish this type of connection. Masterbuilt switchboards may be equipped with full universal cords in all positions, giving a high grade toll service with a maximum transmission loss of 1.0 d.b. In cases where A-B toll service is desired, together with a very rapid and high grade local service, a special A-B toll cord is recommended which has been developed to meet this requirement. The cord circuit contains practically the same local service features as the straight common battery cord, but, in addition, enables any operator to establish, supervise, and time A-B toll connections; also, flashing recall may be provided on such connections. On local to local connections instantaneous disconnect with line lamp recall is provided. There is practically no limit to the possibilities of the 12-1600 Masterbuilt, except the line capacity.

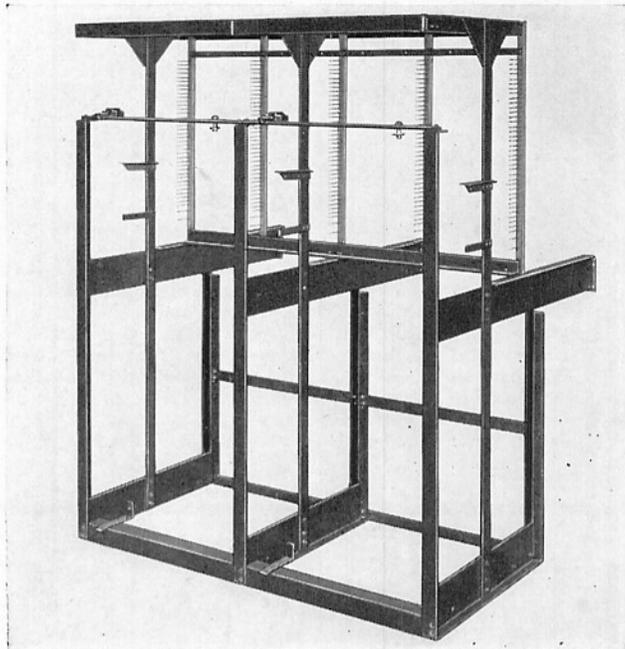
the 4200

The 4200 Masterbuilt with a capacity up to 7000 lines is the answer to the problems of the large exchange. The local line capacity varies according to arrangement. The sections are single position, three panel, high type, having all of the Masterbuilt features of flexibility for additions and rearrangements. In this section all of the Service Switchboard features have been included, as well as a number of recent developments to care for present-day traffic and plant requirements. These include special circuits for the handling of toll and local traffic on a more economical basis than has been possible in the past. The Masterbuilt cabinet design is closely followed permitting the addition of an individual operator's position as desired and the ready removal

and installation of the relay gate and other positional equipment when changes become necessary.

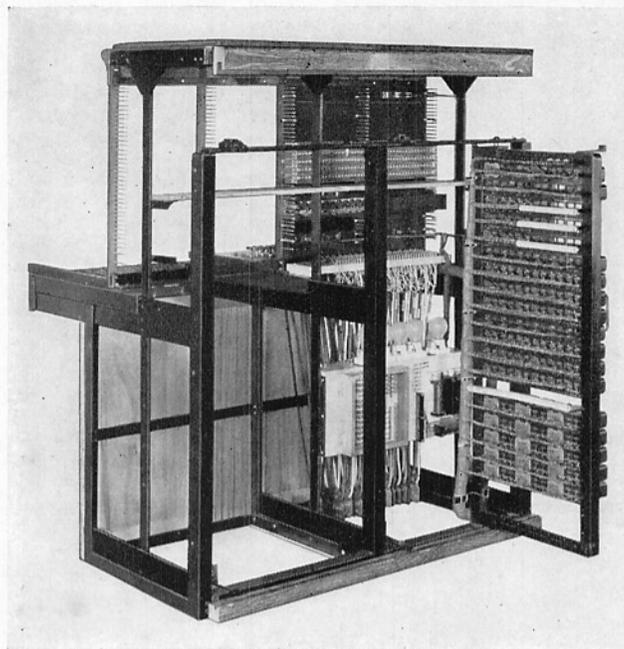
In the past, many companies have hesitated to put toll positions in the same line-up with their local, because toll additions necessitated expensive removal of local equipment to make room for additional toll apparatus. By the installation of separate toll boards with multiple or toll switching trunks and a toll switching position on the local board, a great deal of operating efficiency has been lost. Wherever it is necessary for two operators to handle a call, the operating expense naturally goes up rapidly. With the Masterbuilt design and the low cost of making re-arrangements, it is possible to take advantage of the straight line form of local and toll installation and to profit by the obvious traffic saving.

The Construction of MASTERBUILT SWITCHBOARDS (Multiple Type)



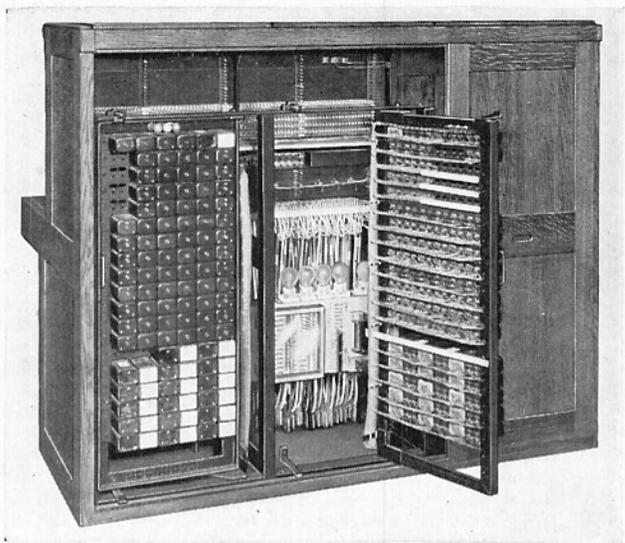
Rigid Steel Frame . . . Continuous and Interlocking

Masterbuilt ironwork goes together as easily as a child's toy. Sections are not sprung out of square in shipment. The complete switchboard is built, as a steel building is built, on the spot where it is to stand. The installer handles one piece at a time and secures each member, square and level, as he goes. Bolts and machine screws do the trick; there is no riveting on the job.



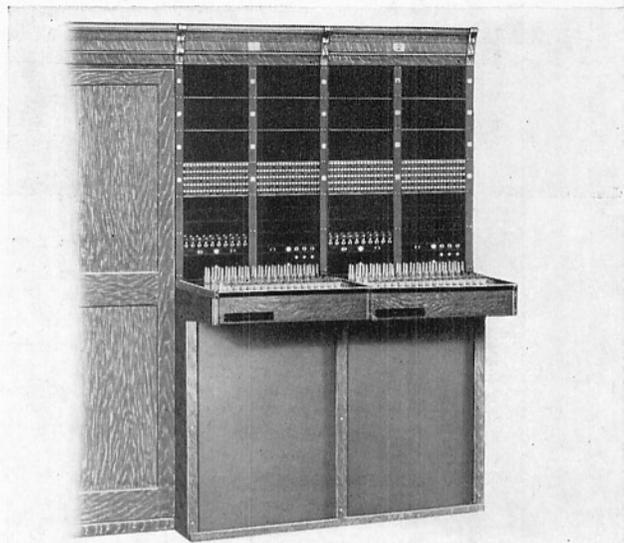
Cord Equipment Shipped Completely Wired, Assembled, and Tested

The cord equipment for each position is shipped completely wired, assembled, adjusted, and tested. It only remains for the installer to slide the key shelf, connecting rack and cord rack into place, and hang the gate, connect the power, hang the cords and connect to the operator's jack and the cords are ready for business.



Construction and Assembly . . . Convenient and Accessible

The swinging gate carries cord circuit relays, condensers, repeaters, coils, etc. Just swing the gate open and the line equipment, cords and both sides of the gate are right before you. Nothing obstructs the wiring. Everything is exposed and easy to get at.



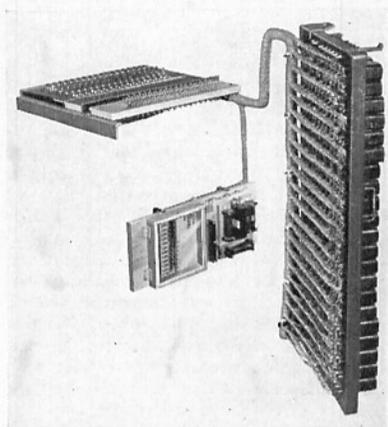
Complete Masterbuilt Board . . . Low Cost, Minimum Installation . . . Flexibility

As wonderful as the Masterbuilt is, you may not be surprised. Maybe it's only what you expected. The outstanding success of the Masterbuilt Line is due solely to careful design and standardization, with which has been achieved the best value ever enjoyed by Kellogg customers.

The Construction of MASTERBUILT SWITCHBOARDS (Multiple Type)

Positional Units . . . Factory Wired, Complete and Interchangeable

Sections in Masterbuilt Switchboards comprise one position only. The positional units are wired at the factory, are complete and easily installed. They are interchangeable — any unit may be removed from the section and be quickly reinstalled where needed.

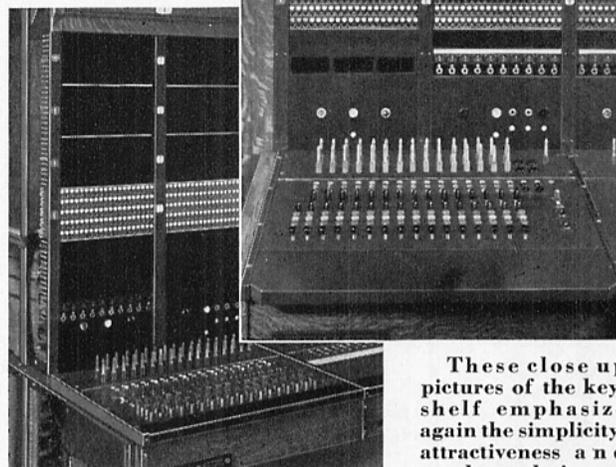


All the equipment is, of course, Kellogg standard. The circuit arrangements are those that have made Kellogg Masterbuilt Switchboards famous. Telephone men will find in the Masterbuilt Line all the operating economies that are associated with Kellogg equipment. The same high grade of service to subscribers, the same low

traffic costs, the negligible maintenance expense and year-on-year dependability are built into all Masterbuilt Switchboards to an even greater degree.

Face Equipment . . . Bakelite Shelves and Panels

Right — Face equipment and key-shelf of the 6-800 Masterbuilt. Below — The 12-1600 Masterbuilt.



These close up pictures of the key-shelf emphasize again the simplicity, attractiveness and modern design of

Kellogg Masterbuilt switchboards. Bakelite is used for the keyshelf and face equipment in these switchboards because of its unusual wearing qualities and its permanent lustre.

Service Features of Masterbuilt Switchboards

No telephone service can be satisfactory unless it provides: (1) A quick answer, (2) A speedy connection, (3) A satisfactory conversation, (4) An instantaneous disconnect, and (5) A prompt recall. In the design of Masterbuilt Service Switchboards, these fundamental elements have been provided in such a way that marked traffic savings have been made possible. The Kellogg service features described in the following paragraphs may be built into the various types of Masterbuilt switchboards where the size of the exchange makes the features advisable and economical.

Multiple Line Lamp Call Distribution

Multiple line lamp call distribution consists of the association of a line lamp with each multiple appearance on switchboards up to 1600 lines and as many appearances as may be necessary on larger installations. In this way every call is made available to every operator so that it is unnecessary for the subscriber to wait on one or two particular operators to answer his signal. Switchboard operation is placed on a competitive basis between operators and their performance may be graded in terms of actual calls handled. This feature not only tends towards the fastest answering time, but it very materially reduces traffic expense. Multiple line lamp makes each operator's position a complete unit in itself which is ideal operation.

Keyless Listening

Keyless listening automatically connects the operator to the calling party upon the insertion of the answering cord,

without the necessity of operating a manual listening key. This feature is a great time-saver both for the operator, who is spared the manual work of key operation, and for the subscriber, whose call is answered that much sooner.

After the operator has answered a call, she can only free her telephone circuit of that call by inserting the calling plug and starting the machine ringing. Therefore, it is impossible for her to accidentally abandon a calling subscriber without completing the desired connection.

This feature also prevents "overlapping" which consists of an operator inserting two or more answering plugs at one time and answering the call on the second plug as soon as she completes the first connection. This abuse results in delaying the second call unnecessarily when it might have been completed by an idle operator. Most well informed traffic authorities seek to prevent overlapping through discipline, but the Kellogg feature cord makes it impossible.

Non-Interference

Non-interference is that feature which prevents two operators from answering the same call. In large exchanges such an arrangement is very desirable since it would be confusing for two operators to simultaneously answer the same subscriber. The cases of attempted double answering are rather remote in exchanges where the traffic is carefully watched by the chief operator or supervisor to see that no more than the required number of operators is on the board. However, non-interference is recommended on large exchanges to prevent even this remote possibility.

Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

Service Features of MASTERBUILT SWITCHBOARDS (Multiple Type)**Automatic Answered-Call Peg Count**

Automatic answered-call peg count automatically registers every call that the operator answers. This provides the chief operator or supervisor with an accurate measure of the traffic handled by hours, days, or months. It furnishes the most satisfactory information from which schedules and payrolls may be computed. As mentioned above, it forms an accurate rating for operative performance.

Secret Service

Secret service is that feature, associated with automatic listening which prevents the operators from listening on a completed connection. As soon as the calling cord is inserted and the machine ringing started, the operator is automatically excluded from the circuit. Machine ringing and dark keyshelf definitely take care of all supervision, and the operator has no further duty except to take down the cords when supervisory lights appear.

Audible Multiple Busy Test

Audible multiple busy test provides an audible indication to the operator that the line to which she wishes to complete a connection is busy. This test consists of a slight click in the operators receiver when the tip of the calling plug touches the thimble of a busy jack. With instantaneous disconnect features, however, the operator, as well as the calling party, is automatically excluded from the busy line even though the operator may actually insert the calling plug.

Machine Ringing

Machine ringing provides an intermittent, automatic ringing of the called subscribers bell. This ringing continues until the called subscriber answers or the calling party abandons the call and hangs up his receiver. If the switchboard is arranged for individual lines only, the automatic ringing may be keyless, so that it is only necessary for the operator to insert the calling plug into the line of the party called for, whereupon the ringing circuit starts immediately. However, with party line systems it is necessary for the operator to start the ringing, after the calling plug has been inserted, by depressing the ringing button which selects the code, or frequency, to be rung and automatically sets the machine ringing mechanism in motion.

Machine ringing will reduce the cord holding time in any exchange now equipped with manual ringing. Subscribers soon learn that the telephone must be answered promptly to stop the incessant ringing of the bell. The reduction in cord holding time means that fewer cords and fewer operator positions are necessary and that reducing the holding time on the calling and called subscribers circuits materially reduces the number of busy reports and unavoidable second calls.

Revertive Ringing Tone

Revertive ringing tone is that feature which provides to the calling party a tone each time that the bell of the called party is rung. This tone indicates to the calling party that the operator has performed every possible function in connection with the call and the desired conversation is then dependent only on the answering of the telephone by the party called. This feature entirely does away with reports that the operator refuses to ring, and of course, relieves the operator of all necessity for re-ringing on established connections.

Dark Keyshelf

Dark keyshelf is that feature which consists of all keyshelf supervisory lamps remaining unlighted after the ringing has been started and until one or the other of the parties hangs up his receiver. The answering supervisory lamp is lighted only when the calling party desires to disconnect or recall. The calling supervisory lamp is lighted when the calling plug is first inserted and serves

as a guard lamp until the automatic ringing has been started. As soon as the ringing is started, the calling supervisory lamp is extinguished and does not light again until the called subscriber restores his receiver to the switchhook, or, if the called subscriber fails to answer, the calling subscriber abandons the call. With this method of supervision any lighted supervisory lamp means that the dark lamp of the cord pair needs attention. There are no flashing signals to irritate the operator nor is perfect supervision dependent upon the operator's understanding and differentiation between the full or partial illumination of the lamps.

Instantaneous Disconnect

Instantaneous disconnect entirely disassociates the cord circuit from the subscriber's line circuit the instant that he restores his receiver to the switch hook. This disconnection applies not only to the talking conductors of the cord, but also to the busy test so that after the completion of a call or the abandonment of an uncompleted call the line of either party or both parties is immediately available for either an outgoing or an incoming call.

This feature materially reduces the cord holding time since the cord may immediately be used for another connection. The disconnect indication on the supervisory lamps is complete and unmistakable; however, in the event that the operator has other idle cords, it is not necessary for her to take down a disconnected cord pair immediately because the cords, if left in the subscribers line jack, can in no way interfere with the subscribers service. This feature results in a saving of operators time and subsequent answering time for the subscriber on both original and subsequent calls. The number of busy tests is reduced by making both subscribers lines immediately available for incoming service.

Instantaneous disconnect may be furnished on both cords or on the answering cord only. Traffic studies show that the majority of recalls come from the party who originates the first call. For this reason some traffic authorities believe that disconnect on the answering cord is sufficient. However, in some cases it has been proven that the saving in the number of busy tests and consequent second calls was more than enough to justify the installation of instantaneous disconnect on the calling cord as well.

Line Lamp Recall

Line lamp recall is that feature associated with instantaneous disconnect which permits a subscriber's recall to appear in the line lamp instead of on the cord supervisory lamp as would be the case without instantaneous disconnect in the cord circuits. The recall appearing in the line lamps is just as available to every operator as was the original call, and the subscriber receives the same prompt answer on all classes of calls.

Busy Line Lock-Out

Busy line lock-out positively prevents a second call from being completed to a busy line so long as ringing or a conversation is in progress. With this feature, the operator gets the audible multiple busy test on a busy line, but even though she may plug into the jack, the cord is held open and the operator cannot start the machine ringing nor release her telephone set from the calling party until she withdraws the incorrectly inserted plug and reports the line as "busy". Under this condition the calling supervisory lamp remains burning as a visible indication of her error until rectified.

This feature may be considered as the last step in perfecting secret service. "Busy line lock-out" prevents a third party from being connected into an established connection and prevents a second operator from listening in on any multiple appearance of a busy line. This feature also prevents careless operators from ringing an established connection in case a busy test is disregarded.

TESTING EQUIPMENT

The Junior Test Cabinet



Every telephone exchange, large or small, magneto or common battery, should be equipped with good testing apparatus so that line, instrument or exchange troubles may be quickly and easily located. The Kellogg Junior Test Cabinet saves time and expense, and eliminates service interruptions. It is a small, compact unit suitable for mounting on or near the switchboard in small exchanges, or on the wire chief's desk in larger offices.

VOLTMETER — The oak turret includes a special Weston type 267 voltmeter with two scales, reading 0 to 30 volts and 0 to 3 volts. The low scale is calibrated for direct reading in ohms. A single scale voltmeter with one reading of 0 to 30 volts, may be supplied when desired.

TESTS — Tests may be made for short circuits, grounds on either side of the line, for crosses, or for resistance measurements on line or apparatus.

EQUIPMENT — These tests are made through three trunks, one wired for the main frame test shoe, one for the switchboard, and one for a pair of test clips. Any or all of these trunks may be equipped as required. Suitable cords, plugs, weights, and other apparatus are furnished to fit standard protectors and switchboard line jacks.

OPERATOR'S TELEPHONE — A set of terminals is provided for an operator's telephone. No instrument is furnished with the Kellogg Junior Test Cabinet unless specified as it is not always necessary to talk directly to the subscriber through the testing circuit. A standard magneto wall or desk telephone may be used when the cabinet is designed for a magneto exchange. A common battery circuit is furnished in the cabinet for common battery exchanges, and any standard common battery telephone may be used as an operator's set.

KEYS — An order wire key may be furnished when desired. A single frequency ringing key is furnished on all sets, but four or five frequency master key may be included for ringing on party lines.

SIZE — The cabinet is 10 inches wide, 6 inches deep, and 13½ inches high.

MOUNTING — The turret may be placed on or near the switchboard, or on any desk or table. No drilling is necessary as the Junior Test Cabinet is self contained, except for the batteries.

BATTERIES — Telephone dry cells or radio "B" batteries may be used for testing with the Junior Test Cabinet. The operator's telephone uses two dry cells if magneto, or operates from the exchange storage battery if common battery.

Ordering Information

Requests for prices should include the following information:

Make and type of switchboard (for switchboard trunk).
Make and type of main frame protection (for MDF trunk).
Type of ringing system (for master key).
Describe voltmeter scale desired, if order wire key should be furnished, and if operator's telephone is wanted.

The Senior Test Cabinet



The Kellogg Senior Test Cabinet is designed as an aid to the wire chief in the average common battery exchange where proper maintenance of lines and equipment is of first importance. With this equipment, line, instrument or exchange troubles may be quickly and easily located. The Senior Cabinet is larger, more completely equipped, and more flexible than the Junior model.

VOLTMETER — The Senior Test Cabinet is equipped with a Weston type 24, two-scale voltmeter, reading 0 to 30 and 0 to 150 volts, with resistance of 10,000 and 50,000 ohms.

TESTS — Tests may be made for short circuits, grounds on either side of the line, for crosses, or resistance measurements on lines or apparatus.

KEYS — The voltmeter is controlled with a key and shunt, battery and reversing keys and a grounding key. Other keys in the test circuit are arranged for testing in or out from the main frame, connecting test trunks to switchboard order wire, connecting howler or bridge, flash key, key for reading voltage of test battery, ringing key for any ringing system and a listening key.

EQUIPMENT — Standard equipment includes an alarm buzzer, a two-way trunk to local switchboard with audible alarm, two test trunks to switchboard, one trunk to main frame test shoe, binding posts for Wheatstone bridge or howler and two order wires. No bridge, howler, test shoe, or cords and plugs for local board are included, but may be added when desired. Kellogg engineers will gladly recommend a suitable bridge for use with the Senior Test Cabinet.

MOUNTING — Suggestions on special desks for mounting the turret will also be made, though any standard office desk is suitable. No drilling is necessary in the desk top, as the Senior Turret is self-contained except for the extension alarm bell, batteries, bridge, and howler, which may be mounted in any convenient location.

BATTERIES — Telephone dry cells or radio "B" batteries are required to furnish the testing voltages of 30 and 150. Current for operating the operator's telephone is obtained from the exchange storage battery.

SIZE — The Senior Test Cabinet is 18½ inches wide, 13 7/16 inches deep and 14 5/8 inches high.

OPERATOR'S TELEPHONE — A desk Masterphone is included with the Senior Test Cabinet.

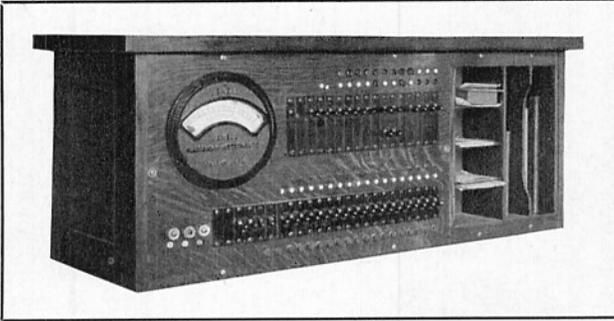
Ordering Information

Requests for prices should include the following information:

Make and type of switchboard.
Make and type of main frame protection.
Type of ringing system.
Whether set is to be equipped with bridge, howler, test shoe or cords and plugs for local board.
Detailed specifications will be sent on request.

Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

TESTING EQUIPMENT**The Major Type Test Cabinet**

The Major Type testing cabinet is specially designed for use in large central offices. It incorporates all the features of the Senior type, plus additional cabinet space, line facilities, and other refinements.

CABINET — The cabinet is of the turret type, suitable for mounting on a flat top desk or table. It may be furnished in any wood or finish to match the switchboard, woodwork or furniture. The interior of the cabinet provides ample space to enclose all relays, condensers, coils and terminal strips. A fuse panel is also located in the back of the cabinet for the protection of all circuits.

VOLTMETER — The turret includes a Weston type 24 voltmeter with two-scales, reading 0 to 30 volts and 0 to 150 volts.

FACE PANEL — The face panel is of the same material and finish as the other exposed woodwork. About two thirds of its area is occupied by the testing equipment and the lamps and keys associated with the in and out lines and trunks. Pigeon holes and book stalls are provided at the right.

OPERATOR'S TELEPHONE — The operator's telephone equipment may be either a desk Masterphone or a suspended operator's set with a head receiver and suspended or breastplate transmitter. With this equipment, the wire chief may talk on any of the desk lines, in and out trunks, or test trunks.

WIRING — Two incoming lines from the local switchboard can be installed. These lines terminate with a line lamp, listening key, holding key and guard lamp in the wire chief's desk and may be used for trouble reports.

Wiring is provided for four order wires, two common battery test trunks, two magneto test trunks and one testing circuit, one generator circuit, one wire chief's telephone, one howler circuit and one MDF test trunk.

TRUNKS — Space and drilling for ten combined test and hospital trunks terminating at supervisory lamps, a guard lamp, and a combined testing and reversing key are provided.

WHEATSTONE BRIDGE — Standard models of Wheatstone Bridge type testing equipment can be supplied to work in conjunction with this test circuit.

SIZE — The cabinet measures 38 inches long, 15 $\frac{3}{4}$ inches high and 15 $\frac{5}{8}$ inches deep.

Ordering Information

It is customary to equip the Major Type Test cabinet to suit a particular installation. Requests for prices should include information as to the make and type of switchboard, etc. Detailed specifications and equipment data will be sent on request.

Information and Chief Operator's Equipment

The chief operator and information clerk are important factors in the operation of any efficient central office. They must be provided with adequate facilities for carrying on their work. It is customary to engineer and build chief operator and information desks to suit a particular installation. For general use, however, the arrangements described below prove very popular.

A flat top desk with a tier of three drawers and a sliding writing shelf at the right, supports a turret type cabinet measuring 38 inches long, 15 $\frac{3}{4}$ inches high and 15 $\frac{5}{8}$ inches deep. The turret may be furnished in any wood or finish to match the switchboard, woodwork, or furniture. The face panel is of the same material and finish as the other exposed woodwork. About two-thirds of its area is occupied by the testing apparatus. Pigeon holes and book stalls are provided.

All turrets have wirings, drillings, punchings, etc., for one operator's set, generator master key, night alarm, magneto through trunk to local switchboard, two-way line to wire chief's desk, two-way line to toll switchboard, and a two-way line to the local switchboard. They are wired for 2 service observation lines, 3 incoming desk lines, 10 peg count meters, and 16 listening and monitoring circuits. All circuits are operated with keys which are mounted in the face of the turret.

Further information, prices, and detailed specifications will be gladly furnished upon request.

Desk for Junior, Senior or Major Type Test Cabinets

Standard flat top desks are suitable for mounting the Junior Senior or Major type test cabinets. For general practice, a single tier desk may be used. This desk is of oak with a 5-ply 1 $\frac{1}{2}$ inch wood top, and contains a row of three drawers at the right. A convenient fourth drawer is located just beneath the top, and above the knee space. A writing board or shelf slides outward from beneath the top and over the tier drawers.

These desks are suitable for average use, measuring 32 x 42 inches across the top and standing 30 $\frac{1}{2}$ inches high. For larger installations, requiring two operator's positions or more desk space, a flat top desk is used. This desk is similar in construction to the above type. It measures 60 x 34 inches across the top and 30 $\frac{1}{2}$ inches high, and has a sliding writing shelf with a tier of three drawers at each end. A large spacious drawer is located above the knee space in the center.

TESTING EQUIPMENT

Wire Chief's Test Panels for Rack Mounting

Senior Type Test Panel

The Senior Type Test Panel is arranged on a Bakelite faced panel for mounting on a relay rack power board. It is wired and equipped with the following circuits:

Testing Circuit — complete with a Weston No. 24, double-scale voltmeter with a reading of 0 to 30 volts, 10,000 ohms resistance, and 0 to 150 volts, 50,000 ohms resistance, and the necessary test keys, etc.

Operator's Telephone Circuit — with a Masterphone handset.

Two-way Line Circuit.

Order Wire Circuit.

Ringling Circuit.

NOTE:— This panel will be furnished with single-frequency ringling keys unless otherwise specified. If 5-party ringling is used a master key is required. A two-party master key is not required on the Senior Type Panel as a reversing key is provided.

Junior Type R-S-CB Test Panel

The Junior Type R-S-CB Test Panel is arranged on a Bakelite faced panel for mounting on a relay rack power board. It is wired and equipped with the following circuits:

Testing Circuit — complete with a Weston No. 267,

single-scale voltmeter with a reading of 0 to 30 volts, 10,000 ohms resistance and the necessary test keys, etc.

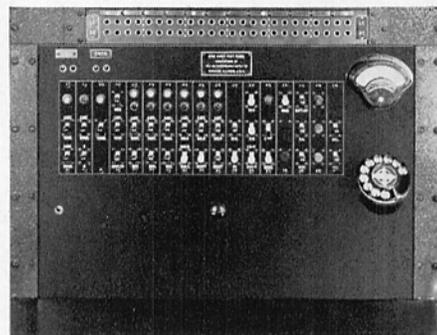
Operator's Telephone Circuit — with a Masterphone handset.

Two Order Wire Circuits — wired but not equipped.
Ringling Circuit.

NOTE: — This panel will be furnished with single-frequency ringling keys unless otherwise specified. If two or five-party ringling is used, a master key is required.

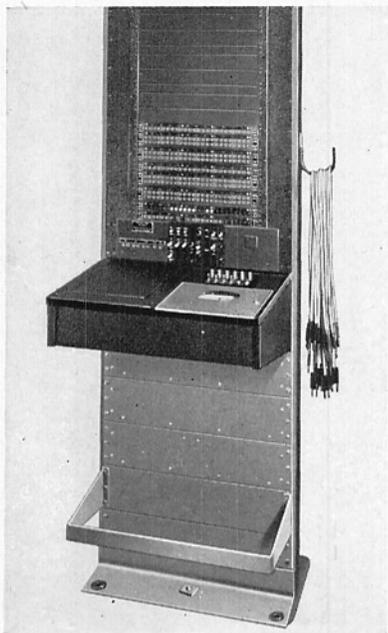
Junior Type R-O-CB Test Panel

The Junior Type R-O-CB Test Panel is the same as the Junior Type R-S-CB except it is equipped with a Weston double-scale meter with an 0 to 30 volt reading and an ohm reading.



Senior Type Wire Chief's Test Panel mounted in the lower part of a relay rack. The Junior type is similar in appearance and may be mounted in the same manner.

Toll Test Panels



Rack Mounted Test Panel

The ever increasing popularity and demand for toll service, with a corresponding increase in the number of toll circuits has created the problem of keeping these toll circuits working twenty four hours a day. The modern toll test panel enables the wire chief to accomplish this end and reduce to a minimum, circuit time lost due to interruptions. It also provides the easiest and most efficient means for the routine testing that is so essential for maintenance and prevention of trouble that might otherwise cause long delays and serious financial losses.

Toll test panels can be furnished for any number of line circuits in either wall or floor type cabinets or for

relay rack mounting as requirements demand. Patching cords, circuits, hand generator and operator's telephone are furnished only as specified.

The Toll Test Panel, in connection with the wire chief's testing equipment described on pages 19 and 20 will permit routine tests and assist materially in locating line failures when they occur. The toll test panel is primarily a series of spring jacks, arranged in groups of 4, 6, 8, 10, 12 and sometimes more, for testing, patching, talking, and ringling on the toll lines. These jacks also form a rapid and convenient means of opening, shorting and grounding the lines for test as well as for cutting in or out repeating coils, composite repeaters, or other toll line apparatus.

The usual minimum is six jacks to a line, each jack having a single conductor, and the group being arranged with two jacks for bridged listening, two for testing the line (out) and two for testing the drop (in).

Greater facility for patching and testing is accomplished by an increased number of jacks in each line. For the more complex toll circuits with simplex and composite equipment, more than six jacks per line are required.

Because of the invariably special nature of toll testing equipment, inquiries should include information on the ultimate line capacity desired, number of lines to be equipped, number of phantom circuits, number of jacks for each line, number of patching cords or cord circuits, and type of operator's set.

A drawing or description of the toll network would also be a material aid to Kellogg engineers in writing specifications. Recommendations on toll test equipment will be furnished without obligation.

Switchboard Section

MANUAL CENTRAL OFFICE EQUIPMENT

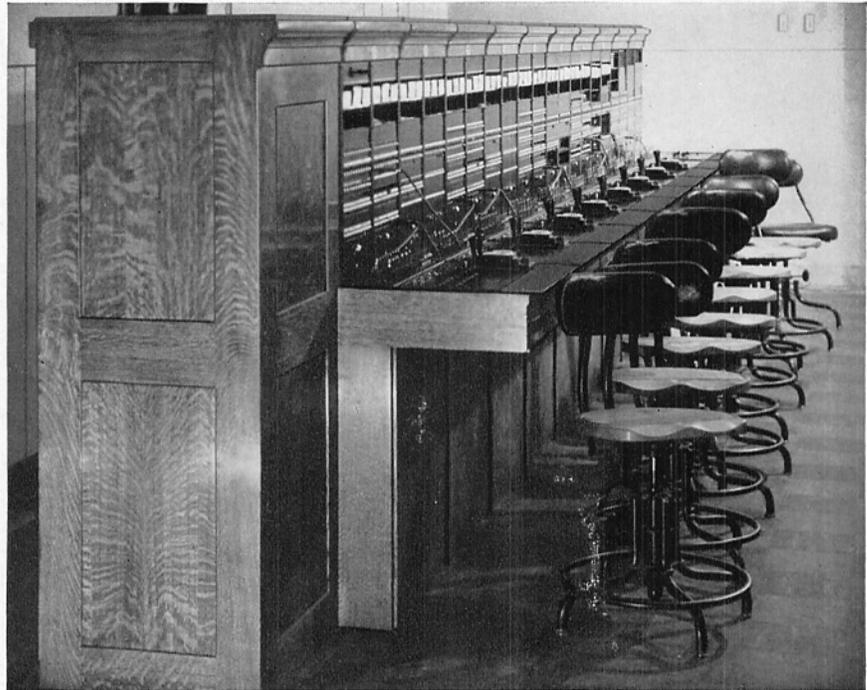
TOLL SWITCHBOARDS

With the ever growing demand for more, better and speedier long distance service Kellogg engineers have led in the development of modern toll switchboard equipment.

Whether your requirements be toll positions in alignment with the local switchboard or for a separate toll board of manual or dial type Kellogg experience and farsightedness can solve the problem for you.

Kellogg toll boards, designed and manufactured entirely within the Kellogg factory, are giving service in many small and large exchanges. These switchboards have established an enviable record for high grade service, with low maintenance expense and high efficiency.

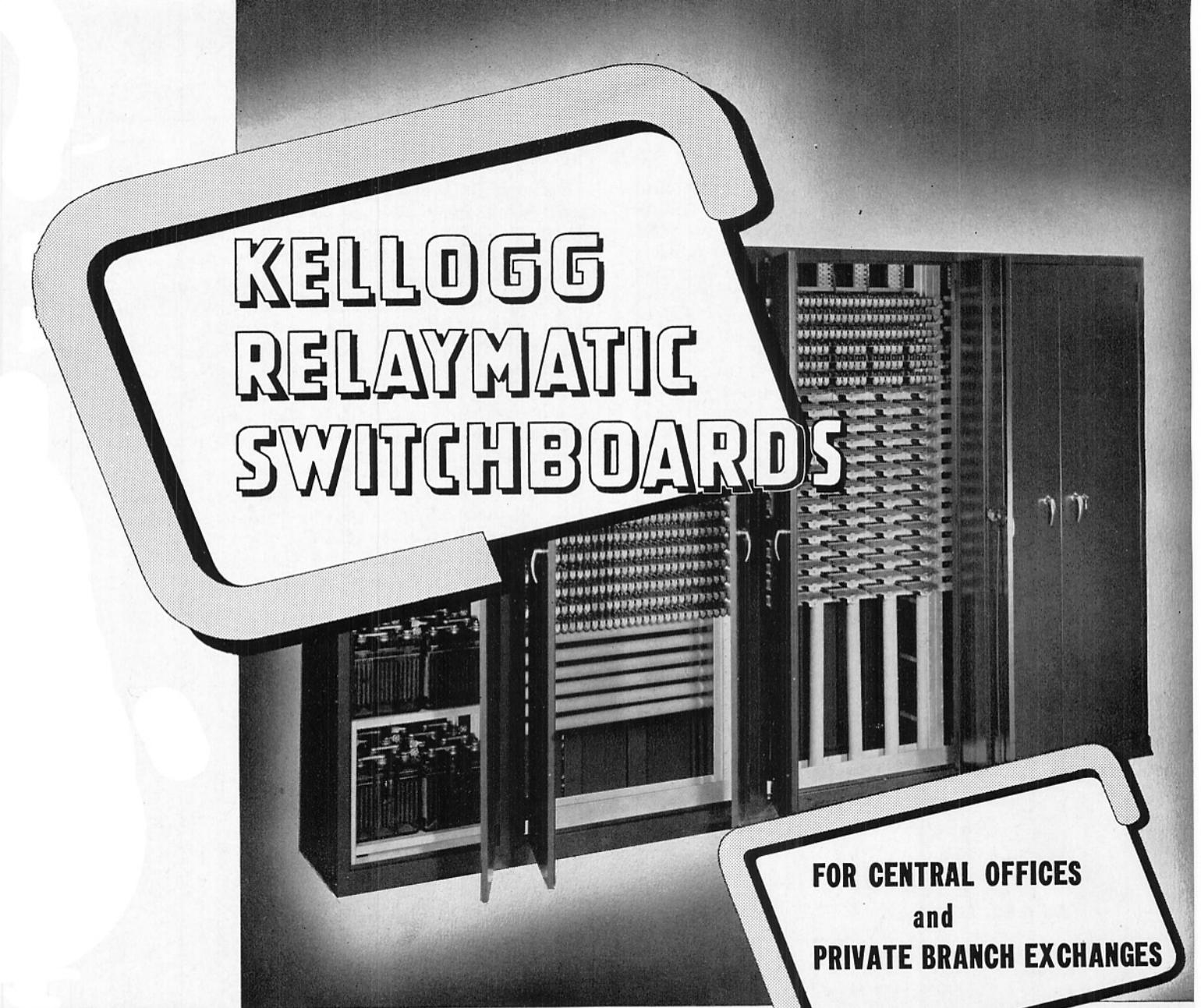
As most toll equipment must be engineered and built to meet special requirements Kellogg engineers will gladly suggest and recommend equipment to assure the best results.



A typical 8-position Kellogg toll switchboard is shown above.

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KELLOGG RELAYMATIC SWITCHBOARDS

FOR CENTRAL OFFICES
and
PRIVATE BRANCH EXCHANGES



GENERAL CATALOG NO. 10

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KELLOGG SWITCHBOARD AND SUPPLY COMPANY

Factory and General Offices: 6650 S. CICERO AVE., CHICAGO, ILL., U.S.A.

Branch Offices . . . 308 W. Sixth St.
Kansas City, Mo.

246 First Street
San Francisco, Calif.

Switchboard Section

RELAYMATIC EQUIPMENT FOR CENTRAL AND PRIVATE OFFICES

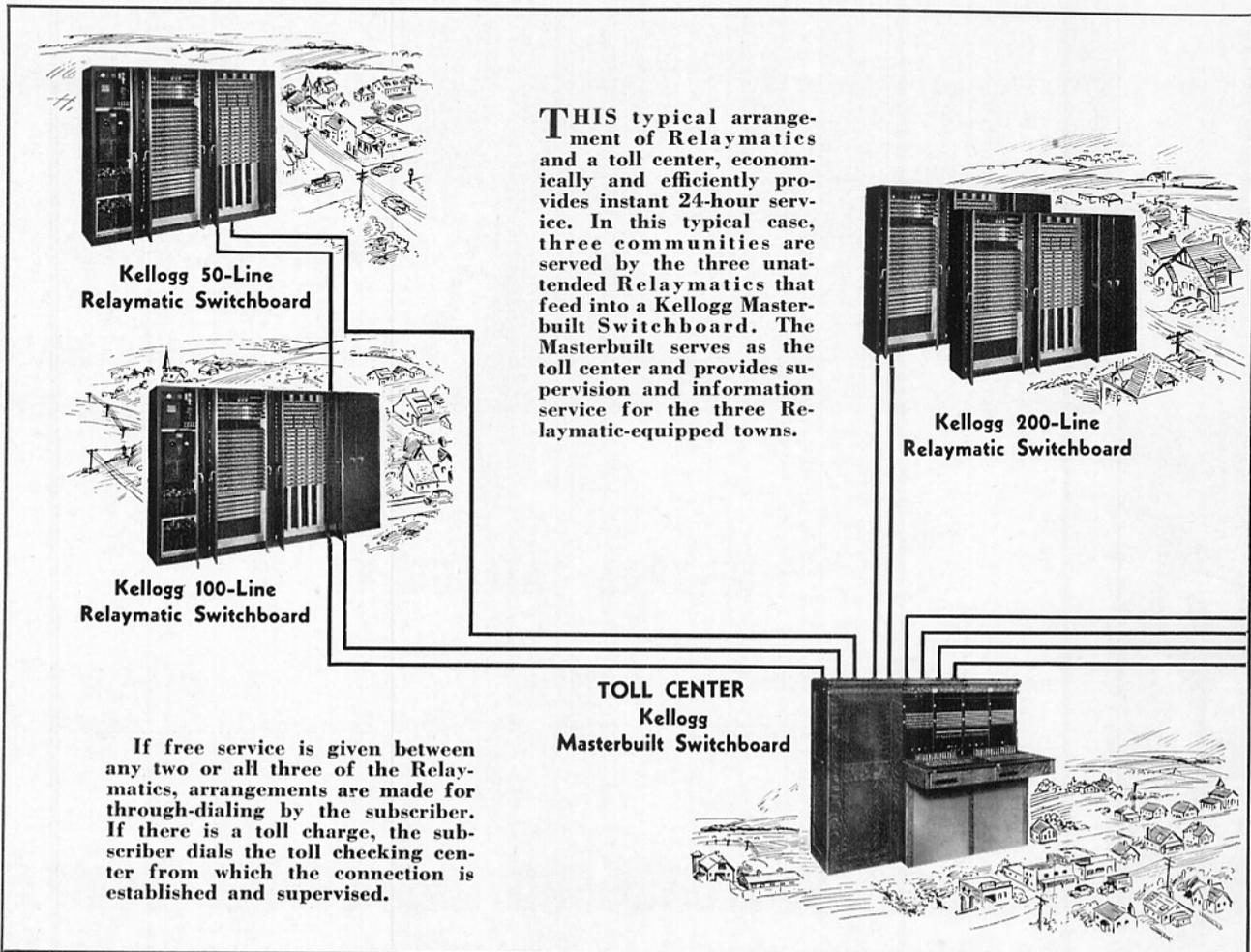
KELLOGG RELAYMATIC SWITCHBOARDS

THE Kellogg Relaymatic is an automatic switching unit for main exchanges or intercommunicating service. Because it operates with relays only, its operation is easily understood. It is composed of line circuits, connecting circuits and auxiliary circuits much the same as manual equipment. The only functional difference is that 24-hour service is provided without operator attendance.

The Relaymatic is not a cure-all, but is ideal in exchanges where mechanical switching is economically practicable. The Relaymatic is particularly suitable for use in unattended exchanges because all functions are performed by relays. These relays have dual contacts of precious metal. There are no shafts, cams, plungers, ratchets or other wearing parts to require frequent lubrication, adjustment and replacement. Because of the simplicity and accessibility of parts, the Relaymatic is easy and economical to maintain.

Kellogg Relaymatic Switchboards are manufactured to meet the requirements of any exchange from the smallest, with as few as 2 or 3 lines up to the very largest. These switchboards are available in standard sizes having capacities of 10, 30, 50, 100, 150, 200, 1000 and 10,000 lines. The 200-line unit may be installed initially with 50 or less lines and can be economically expanded to its full capacity of lines and connecting circuits (links). This feature is more fully explained on pages 6 and 7. Relaymatic's up to 200 lines are further simplified by the omission of selector equipment.

In addition, Kellogg manufactures similar units for inter-office or private branch exchange use. These Relaymatic PBX's are easy to understand, easy to install and maintain, reliable in operation and faithful in performance. See page 8.



KELLOGG RELAYMATIC SWITCHBOARDS

These Operating Features Show Why More and More Exchanges are Going Relaymatic

- Local line circuits are all of the metallic type.
- Line adapters are used for grounded lines.
- Any line circuit can be converted into a trunk by the addition of a trunk adapter.
- A station dialing the trunk number is automatically connected to an idle trunk.
- All links (connecting circuits) have access to all lines.
- Incoming trunk or long-distance calls get first use of links (connecting circuits).
- Calls are assigned to links (connecting circuits) in rotation. This distributes the load equally among all links.
- Links are automatically freed from any line which may be in trouble due to incorrect dialing, receiver left off the hook, shorts, grounds, wet cables, etc.
- All local calls are dialed in the same manner, using the directory number, including revertive calls on the same line.
- Links on revertive calls are instantly released when the called party answers.
- A dial tone tells the subscriber when to begin dialing.
- Busy tone indicates that a called line is in use.
- Revertive ringing tone is heard by the calling subscriber at each ringing interval.
- A time cut-off feature if desired, limits local conversations to a predetermined talking period.
- Maximum transmission is assured.
- Adequate transmitter battery is supplied to the subscriber's line on all types of connections.
- The calling subscriber releases all equipment instantly by restoring his receiver on "Don't Answer" calls.
- All connections are secret and cannot be intruded upon by subscribers on other lines.
- Each answered call is automatically counted.
- All connections are made through relay spring contacts.
- All relays are of the angle armature type having springs equipped with contacts of precious metal.
- Relay armatures and spring contacts are at the front of the relay for easy cleaning and inspection.
- Relay springs are of sufficient length and proper gauge to give ample tension and cleaning action without causing unnecessary wear or pitting.
- Precious metal is used exclusively on all relay contacts. No base metal contacts or wipers are used.
- Circuits and relays are designed throughout to give positive operation with minimum current consumption.

Classes of Service

The line circuits of the Relaymatic may be assigned for common battery local and rural, trunk or pay station service. Local lines provide single-party or multi-party service up to 10-party selective or 16-party code ringing per line. Adapters are available for grounded rural lines.

Wiring

The circuits of the Relaymatic are all wired, connected and tested at the factory. All lines are wired to terminal strips at the top of the bays to facilitate cabling to the main distributing frame and protection equipment.

Trunks to Manual Exchanges

The Relaymatic may be arranged to operate with any type of trunk line. The trunk lines may be provided singly or in groups with not more than 10 trunks equipped in each group. When more than one trunk is equipped in a group they are arranged for progressive allotment so that an idle trunk is automatically selected when the number assigned to the group is dialed. A busy signal indicates that all the trunks are busy.

Trunk lines, as required, for connections to other exchanges may be obtained by adding trunk adapters to certain local lines. The adapter provides supervision and signalling features required for trunk operation and the type of adapter depends upon the kind of outside plant to be used.

Main Distributing Frame

Any standard main distributing frame may be used in connection with a Relaymatic. Protectors having carbons and heat coils are usually recommended. Wall type frames can be used in small exchange buildings where it is desired to conserve floor space.

Auxiliary Equipment

The relay type, code ringing interrupter operates only while a connection is being established and produces well defined codes.

The dial tone generator produces a pleasing tone without radio interference.

The busy back tone is obtained from a tone generator with relays producing the customary interruptions.

The timer is a gas-controlled solenoid plunger with mercury contacts especially designed for reliable performance over wide ranges of temperature and operating voltages.

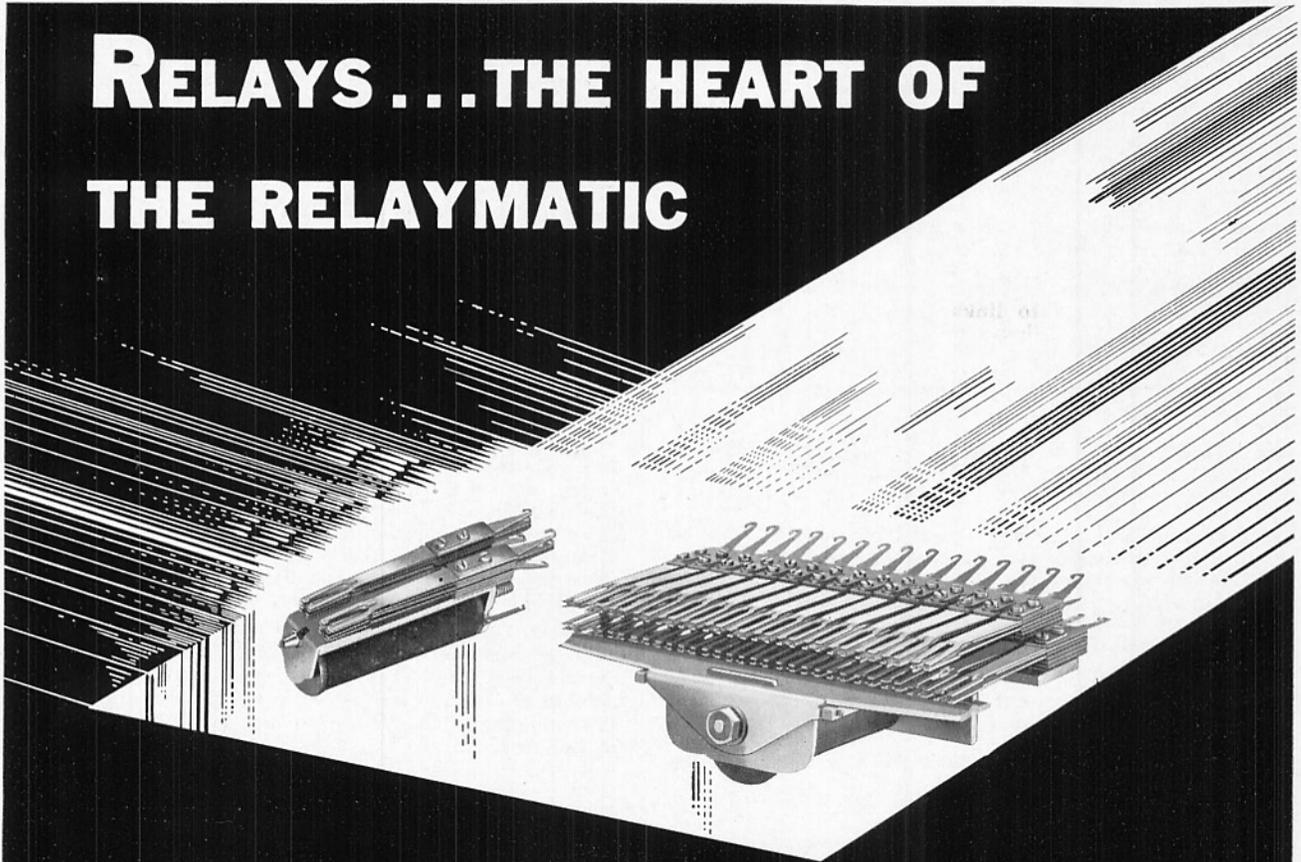
The ringing current is derived from standard pole changer equipment or from another suitable ringing machine.

The tone generators, timer and ringing equipment operate only while there is a call in progress in the exchange.

Revertive ringing tone is taken from the ringing supply through a suitable filter.

Switchboard Section

RELAYMATIC EQUIPMENT FOR CENTRAL AND PRIVATE OFFICES

KELLOGG RELAYMATIC SWITCHBOARDS**RELAYS...THE HEART OF
THE RELAYMATIC****SIMPLE · RUGGED · RELIABLE****THE RESULT OF OVER 40 YEARS EXPERIENCE**

Practically every phase of operation of a dial switchboard is dependent upon the action of relays, for the relays furnish the means by which the switchboard performs its functions. They operate by electrical impulses to answer the calls, select the proper links, lines and telephones, set up the connections, start the ringing and ringing tone or busy tone, restore the equipment to normal after the calls and perform all the other jobs required in handling telephone connections.

Because dial switchboards operate without an attendant, the relays must carry the full responsibility for the excellence of the service. This responsibility includes faithful operation on a continuous 24-hour basis without attention or supervision. Therefore, in the selection of a dial switchboard the reliability and dependability of the relays are of prime importance.

For nearly 50 years, Kellogg has been building telephone and switchboard relays to the highest performance standards. This experience is evidenced in the gang relays and individual relays used in all Relaymatic Switchboards. They are literally "jewels" of Kellogg engineering skill and design.

Precious metal is used on all relay contacts which means quieter operation and increased dialing range. By employing such special metal as this, good connec-

tions are assured. This is particularly important on toll connections.

All relays used in Kellogg Relaymatic have twin contacts. This is a feature that provides a broad margin of safety because the extra contact on each relay practically eliminates every possibility of failure. Because of these twin contacts, the best service is assured with minimum maintenance.

In designing these relays, Kellogg engineers provided another feature that is equally important in assuring perfect connections. The armature is arranged so that even after the relay contacts are closed, there is some armature travel. This action has a cleaning effect which removes dust that may have settled on the contact.

Since the relays are capable of performing all the functions required by a Kellogg Relaymatic Switchboard, no mechanical switches are used. Consequently, there are no intricate moving parts involved and this is important from a maintenance standpoint.

The relay springs are made of a special nickel silver. This alloy was adopted because it is highly flexible and maintains its tension. Special Bakelite insulation is used throughout because of its insulating qualities and because it is least affected by moisture, temperature variations, contraction and expansion.

Kellogg Switchboard & Supply Company, Chicago

KELLOGG RELAYMATIC SWITCHBOARDS

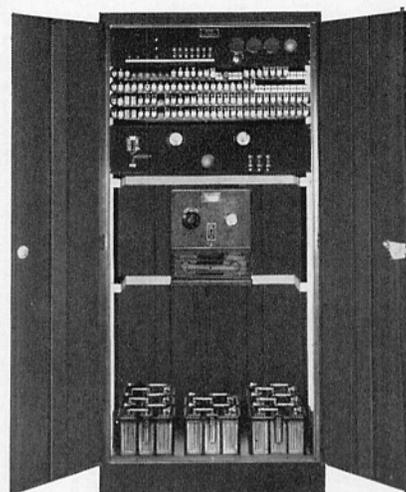
General information for six standard size Relaymatics is given below and on the following pages. These Relaymatics have ultimate capacities of 10, 30, 50, 100, 150 and 200 lines, without being equipped with selectors.

In addition to these standard Relaymatics, Kellogg manufactures equipment with selectors to meet the requirements of larger exchanges up to any capacity required.

In furnishing Relaymatic equipment for many exchanges in various parts of the country, the Kellogg Company has accumulated a wealth of experience on the subject of building plans. This experience is available to anyone considering the installation of this type of equipment.

10-Lines Capacity

This Relaymatic has an ultimate capacity of 10 lines and 2 links. All the line, connecting and power equipment is mounted in a one-bay cabinet, 36 inches wide, 18 inches deep, and 78 inches high. Any line may be converted into a trunk.

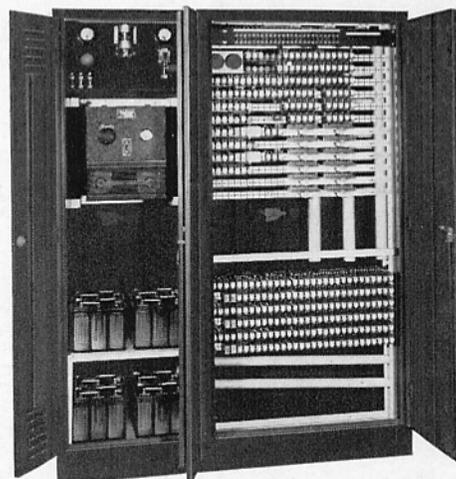


10-Line Relaymatic

30-Lines Capacity

30 lines and 5 links is the ultimate capacity of this Relaymatic. Any line may be converted into a trunk.

The line and connecting equipment is mounted in one bay, occupying a space 36 inches wide, 18 inches deep and 78 inches high. This Relaymatic may be equipped with any number of lines and links up to the ultimate capacity. The power equipment may be located in a 24-inch auxiliary cabinet attached to the relay bay as shown, or in a separate floor or wall rack if desired.



30-Line Relaymatic

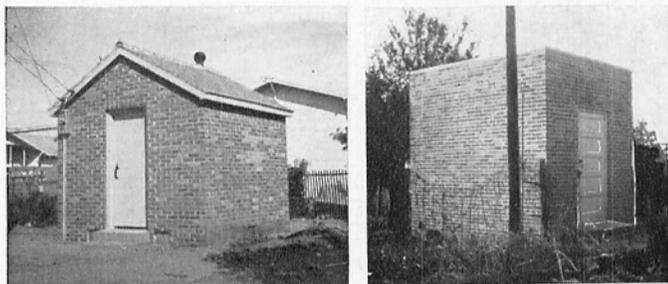
50 to 100-Lines Capacity

The capacity of this Relaymatic as shown is 50 lines and 10 links. It may be equipped with as many lines and links as are immediately required. Any line may be converted into trunks as needed.

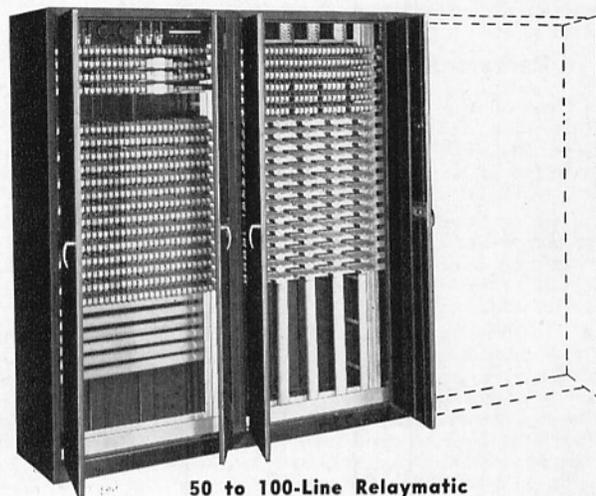
An additional fifty lines can be supplied in a third bay which is indicated by dotted lines in the illustration. This bay is wired completely and may be equipped as desired.

The power equipment may be mounted in a cabinet attached to the equipment bays or it may be mounted on an outside rack.

Floor Space Requirements. Each bay is 36 inches wide, 78 inches high and 18 inches deep.



Typical space-saving buildings that house Kellogg Relaymatics.



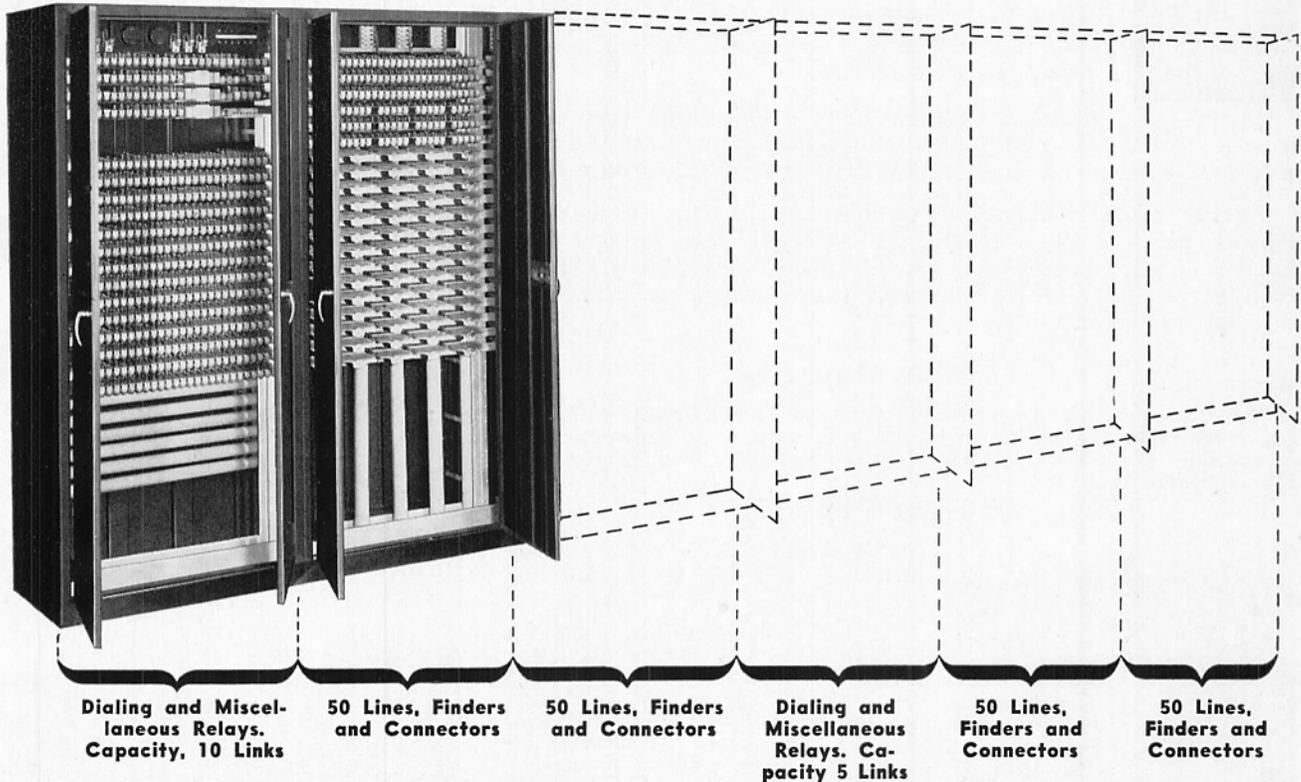
50 to 100-Line Relaymatic

Switchboard Section

RELAYMATIC EQUIPMENT FOR CENTRAL AND PRIVATE OFFICES

KELLOGG RELAYMATIC SWITCHBOARDS

50 to 200 Lines Capacity



The illustration above shows how a telephone exchange, equipped with a Kellogg Relaymatic Switchboard, may grow from 50 or less lines up to 200 lines by simply adding more bays of equipment. This feature of easy expansibility typifies the economy and flexibility of Relaymatic Switchboards of this type. The additional bays may be installed at various times as station growth or traffic requirements demand additional line, link and miscellaneous equipment.

When making additions to the original two bays, such additions may be placed in a continuous line as indicated above, or placed in other arrangements as shown at the right and on the next page . . . whichever is most suitable to the economical use of the available space.

Relaymatic Expansibility and Flexibility

One of the many features that make this Kellogg Relaymatic Switchboard so desirable is its flexibility. It is readily expansible so that the capacity may be easily enlarged to meet increased demands for telephone service, expected or unexpected.

The original 2-bay, 50-line Relaymatic installation may be increased to an ultimate of 200 lines in 50-line stages, simply by adding equipment bays. This is accomplished without expensive rewiring or rearrangement of existing equipment.

The first bay is wired for 10 links and a bay wired for 5 additional links may be added later, bringing the ultimate capacity up to 15 links. Each line equipment bay provides space for 50 lines. Forty lines in the first line equipment bay are wired so that any or all of these lines may be converted into trunks. As requirements increase, additional equipment may be installed. Each bay is 36 inches wide, 78 inches high and 18 inches deep.

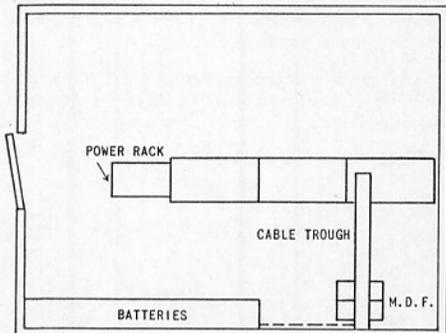
Power equipment and control panels may be mounted in an outside rack or in an auxiliary cabinet to line up with the line and link equipment bays. Batteries are usually preferred on separate racks.

100-Line Installation

The first step in the enlargement of the basic 2-bay, 50-line unit may be the addition of a bay of 50 lines, finders and connectors. This makes a 3-bay unit having a capacity of 100 lines and 10 links.

FLOOR PLAN

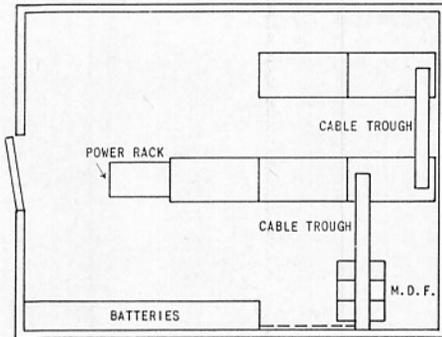
— At the right is the floor plan of a typical 100-line Relaymatic installation. The three bays of equipment are housed in enameled metal cabinets. In this typical layout, the three bays are arranged in one row, connected to the main distributing frame through a cable trough.



Arrangement of a typical 100-line Relaymatic Installation

The batteries are mounted on a rack against the wall and the power equipment is mounted on a separate rack. Additional floor space may be allowed for a second line-up of cabinets to provide additional switchboard capacity in the event that future traffic requirements demand expanded facilities.

KELLOGG RELAYMATIC SWITCHBOARDS



Arrangement of a typical 150-line Relaymatic

150-Line Installation

For an exchange requiring a switchboard capacity of 150 lines and up to 15 links, the Relaymatic consists of five bays of equipment. The first bay contains the basic dialing and miscellaneous relays, having a capacity of 10 links. The second and third bays each contain equipment for 50 lines and the finders and connectors. The fourth bay is similar to the first and provides the 5 additional links which brings the total link capacity of the board up to 15. The fifth bay contains the third group of 50 lines. If future growth should necessitate additional switchboard capacity, this Relaymatic can be further expanded to an ultimate of 200 lines by installing another 50-line equipment bay.

Floor Plan — The floor plan of a typical 150-line Relaymatic installation is shown at the left. All line and connecting equipment is housed in five enameled metal cabinets, each having the same dimensions.

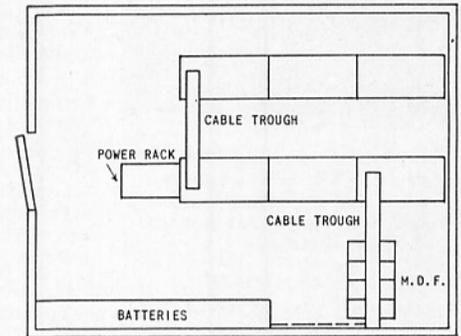
In this typical layout, three of the bays are arranged in one row and two in another. The equipment in these two rows is connected to the main distributing frame through cable troughs.

200-Line Installation

The exchange requiring an ultimate switchboard capacity of 200 lines is served by a Relaymatic consisting of six bays of equipment. This is the same as the original 2-bay, 50-line arrangement, plus the additions required for the 3-bay, 100 line and the 5-bay, 150 line arrangements . . . and an additional 50-line bay which brings the total capacity up to 200 lines and 15 links. At this stage, the six bays contain all the dialing and miscellaneous relays and all of the finders and connectors needed for the ultimate capacity of 15 links and the 200 lines.

Floor Plan — The floor plan of a typical 200-line Relaymatic installation is shown at the right. All line and connecting equipment is housed in six enameled metal cabinets, each having the same dimensions.

In this typical layout, the bays are arranged in two rows of three bays each. The equipment in these two rows is connected to the main distributing frame through cable troughs. The batteries are mounted on a rack against the wall and the power equipment is mounted on a separate rack.



Arrangement of a typical 200-line Relaymatic

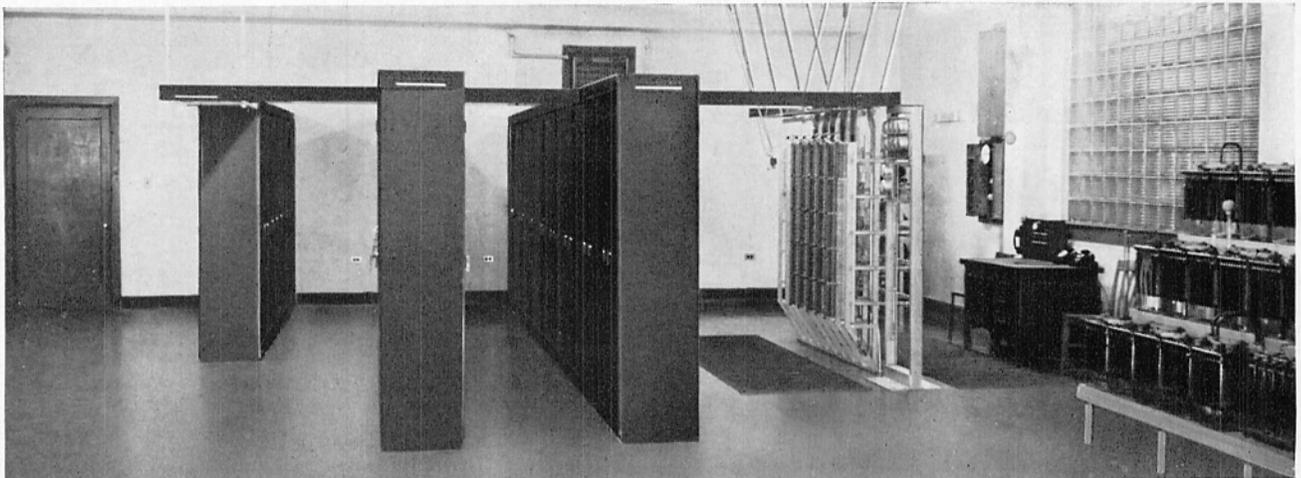
Relaymatics with Selectors

Exchanges requiring more than 200 lines are served by Relaymatic having relay type selectors to complete connections between the "hundreds" or "thousands" groups. All apparatus used in these larger boards is of Kellogg standard design and, with the exception of the selectors, is fundamentally the same as that used in Relaymatics of lesser capacity. With selectors, these larger Relaymatic Switchboards are available in any capacity required over 200 lines.

Illustrated below is a typical Relaymatic installation having 500 lines installed. It can be expanded as future growth or traffic requirements demand additional switchboard capacity.

The Relaymatic cabinets are arranged in three compact rows with a cable trough connecting the switching equipment to the main distributing frame. The wire chief's desk and equipment, battery rack and power apparatus and panels are located adjacent to the switchboard.

The attractive building at the left houses one of these larger Relaymatic exchanges.



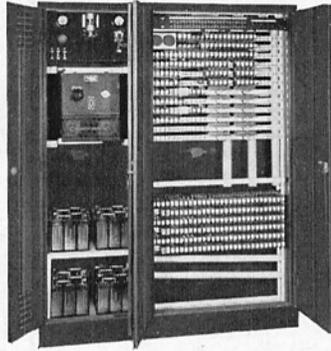
Switchboard Section

RELAYMATIC EQUIPMENT FOR CENTRAL AND PRIVATE OFFICES

RELAYMATIC PBX

Private Branch Exchange Switchboards — With Trunks

The extreme flexibility of the Kellogg Relaymatic Private Branch Exchange Switchboard (PBX), permits telephone companies to meet their subscriber's service demands in a most economical manner. These switchboards are available in sizes from ten lines upwards depending on the ultimate capacity desired. They operate in connection with either a dial or a manual main exchange, or both at the same time.



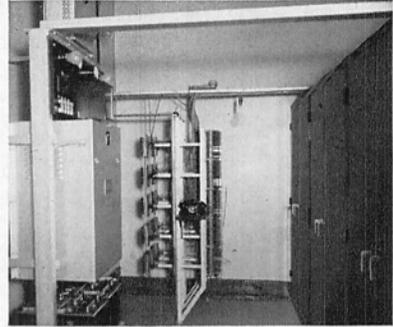
30-Line Kellogg Relaymatic PBX Switchboard with the batteries, power and line equipment housed in the cabinet.

Many features auxiliary to the regular telephone service are available which provide an opportunity to increase revenues. For example, code call and signal equipment,

as well as watchman's recording and supervising circuits and various types of conference circuits may be had, depending on the requirements of the particular subscriber.

Attendant's cabinets for distributing incoming calls may be either the turret or the floor type depending on the size of the exchange. Attendant's cabinet may be used to intercept calls for trunks from restricted stations. These cabinets are equipped with keys so that predetermined PBX stations may be connected to trunks for direct service to and from the main exchange when the attendant is off duty.

Some special applications of Relaymatic PBX's are illustrated in the Special Purpose Switchboard Section of this catalog.



This larger Kellogg PRX installation has the power equipment and batteries mounted in an outside rack. The cabinets at the right contain the Relaymatic line and connecting equipment.

These Operating Features Show Why More and More Telephone Companies are Using Kellogg Relaymatic PBX Equipment

- All links (connecting circuits) have access to all lines.
- Incoming trunk calls get first use of links (connecting circuits).
- Calls are assigned to links in rotation. This distributes the load equally among all links.
- A dial tone tells the subscriber when to begin dialing.
- Busy tone indicates that a called line is in use.
- Revertive ringing tone is heard by the calling subscriber at each ringing interval.
- Maximum transmission is assured.
- Adequate transmitter battery is supplied to the PBX subscriber on all types of connections.
- The calling subscriber releases all equipment instantly by restoring his receiver on "Don't Answer" calls.
- All PBX connections are secret and cannot be intruded upon.

PBX—Private Branch Exchange Switchboards — Without Attendants

Where an attendant is not desired to distribute incoming trunk calls or to supervise outgoing calls, Relaymatics with an annunciator unit are available to provide intercommunication service and trunking to either a manual or a dial main exchange. An annunciator unit is used to signal all incoming calls.

Such calls can be answered from any station and can be transferred to any other station. All stations have access to all trunks and through supervision is provided at the main exchange. Only two wires are required to connect each telephone to the Relaymatic. This makes for the most economical installation and eliminates expensive cabling and congestion in the base of the telephone.

- All connections are made through relay spring contacts.
- All relays are of the single armature type having spring equipped with twin contacts of precious metal.
- Relay armatures and spring contacts are at the front of the relay for easy cleaning and inspection.
- Precious metal is used exclusively on all relay contacts. No base metal contacts or wipers are used.
- Relay springs are of sufficient length and proper gauge to give ample tension and cleaning action without causing unnecessary wear or pitting.
- Circuits and relays are designed throughout to give positive operation with minimum current consumption.
- Any PBX line circuit can be converted into a trunk by the addition of a trunk adapter.
- A PBX station dialing the trunk number is automatically connected to an idle trunk.

PRX—Private Relaymatic Exchange Switchboards—Without Trunks

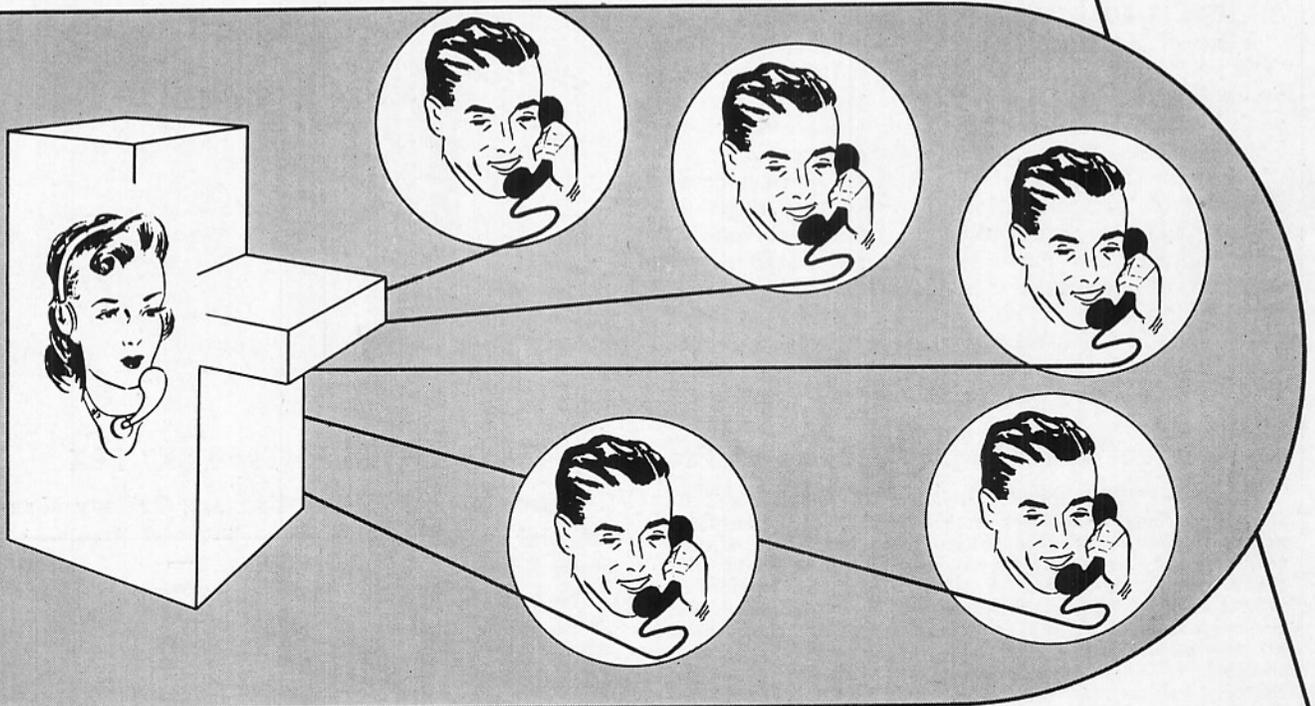
Kellogg PRX switchboards are the same as Relaymatic PBX's except that no trunks are provided for outside connections. These switchboards are available with or without attendant's cabinets. This equipment is engineered by Kellogg to meet any and all service and capacity requirements.

Some special applications of Private Relaymatic Exchange Switchboards are illustrated in the Special Purpose Switchboard Section of this catalog.

KELLOGG

PBX

and SPECIAL PURPOSE SWITCHBOARDS



GENERAL CATALOG NO. 10

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- Kellogg Masterbuilt Cordless PBX Switchboards Pages 5 and 6
- Special Purpose Switchboards Pages 7, 8, 9 and 10

KELLOGG SWITCHBOARD & SUPPLY COMPANY
FACTORY AND GENERAL OFFICES
6650 S. CICERO AVENUE • CHICAGO, ILLINOIS, U. S. A.
Branch Offices . . . 308 W. Sixth St. 246 First Street
KANSAS CITY, MO. SAN FRANCISCO, CALIF.

Switchboard Section

MANUAL PBX AND SPECIAL PURPOSE SWITCHBOARDS

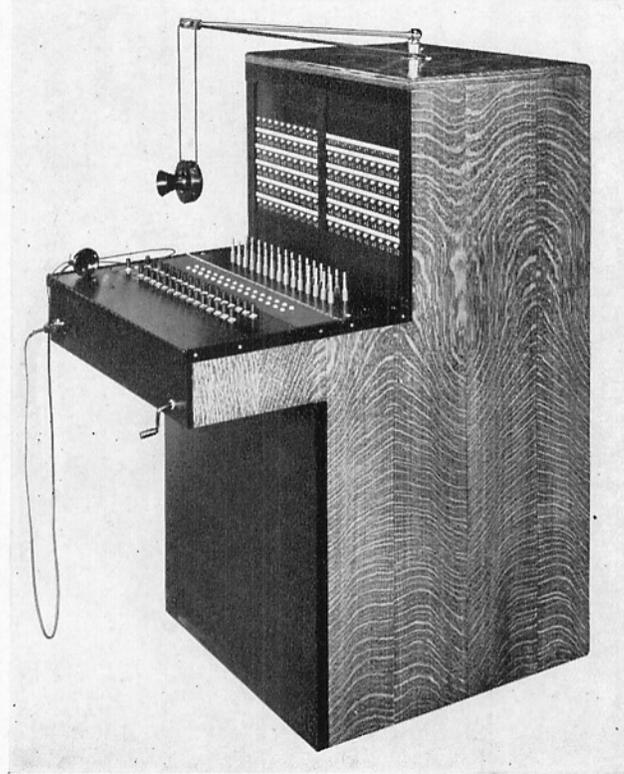
KELLOGG TYPE "K" MASTERBUILT PBX SWITCHBOARDS

Here is an unusually versatile PBX upon which telephone companies can readily standardize because it can be used in any exchange area having either common battery manual, dial or magneto central office equipment. It can connect to one or all at the same time, and it furnishes all types of subscriber services.

This board provides the economies and advantages of standardizing on operating methods, on operator's instructions, on maintenance and routine practices. In addition, it provides standard main exchange double-lamp supervision. *IT EMPLOYS JACK-ENDED TRUNK CIRCUITS WITH THROUGH-BATTERY-FEED AND THROUGH-SUPERVISION FROM THE MAIN EXCHANGE!*

Like all Kellogg Masterbuilt Switchboards the type "K" PBX is built upon a rigid framework of welded steel. The beautiful streamlined cabinet, with black Bakelite keyshelf and linoleum kick-board, makes an attractive installation.

Because this board is so flexible in its circuit design and its application to all service requirements, it is now unnecessary to purchase custom-built boards for each installation! Better yet, subscribers can have almost immediate installation because it is carried in stock, partially equipped, for shipment within a fraction of the time required for engineering and manufacturing custom-built equipment.



Eleven Operating Features Tell The Complete Story of The Type "K" PBX

The type "K" is an all-purpose PBX switchboard. It furnishes whatever services are required by the subscriber, and is so designed that it can connect to any type of central office equipment. It employs the same cord and trunk circuits whether for manual or dial operation. When connected to a common battery manual or dial central office, this PBX provides in a jack-ended trunk all the advantages of through-battery-feed which were formerly available only in plug-ended trunks. Through-battery-feed provides positive, standard, double-lamp supervision at the main exchange which is particularly advantageous on toll.

Because this supervision is under control of the PBX telephone (and not the PBX operator), all trunks, cords, and subscribers' lines are immediately available for other use as soon as each party hangs up. This eliminates "false busies" and false ringing. These features are accomplished without deviation from standard operating practice and without the objectionable changing of plugs which is always necessary with plug-ended trunks.

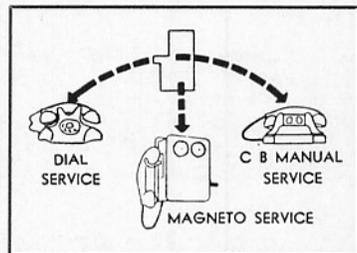
When connected to a dial exchange, the PBX provides both through and attendant-dialing. The central office connectors and the PBX trunk are released as soon as the calling PBX subscriber hangs up. The toll operator also gets standard supervision on connections to PBX stations.

With through supervision the local main exchange operator will receive double-lamp disconnect signals on connections from PBX trunks to main exchange lines. This eliminates the possibility of false rings to the local subscriber.

Through supervision in a dial area assures the prompt release of expensive dial connecting equipment on calls from the PBX to the main exchange.

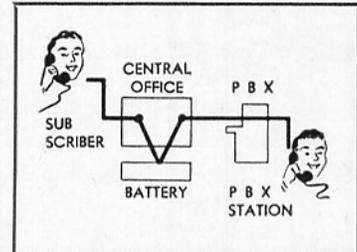
1. Operates With Either Common Battery Manual, Dial or Magneto Main Exchanges.

The jack-ended trunk circuits and cord circuits will operate with either a manual or dial main exchange. For dial operation it is only necessary to add two relays and a dial, common to the PBX board. No wiring changes are necessary.



2. Through-Battery-Feed on Jack-Ended Trunks.

The cord and trunk circuits are arranged to provide through feed talking battery to the PBX stations from the main exchange. This feature assures the PBX subscriber of excellent transmission on both toll and local connections. The subscriber has the advantage of 48-volt talking battery if it is used on toll connections or if the main exchange is dial which usually operates from a 48-volt source.



3. Through Trunk Supervision.

The through-battery-feed jack-ended trunks provide

KELLOGG TYPE "K" MASTERBUILT PBX SWITCHBOARDS

through supervision to the main exchange from the PBX station, thus permitting a prompt main exchange disconnect or recall from the PBX.

With this feature, the PBX subscriber is assured of correct timing on toll connections because the toll operator will receive a disconnect when the PBX station hangs up. Another advantage to the subscriber is that the PBX station can place sequence calls to the main exchange without the assistance of the PBX attendant, the recall being handled directly by the main exchange operator. With feature cord circuits or dial main exchange equipment, connections are released at the main exchange when the PBX station hangs up, releasing the trunk circuits to the PBX for other incoming or originating calls.

With through supervision the local main exchange operator will receive double-lamp disconnect signals on connections from PBX trunks. This eliminates the possibility of false rings, and permits the main exchange operator to disconnect without waiting for the PBX operator to do so first.

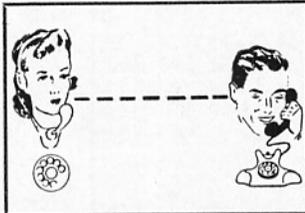
Through supervision in a dial area assures the prompt release of expensive dial connecting equipment.

4. Trunk-Re-Ring Feature.

When the PBX station receiver is restored to the hook, both the main exchange and the PBX will get a disconnect. If the main exchange connection is removed before the PBX connection and another IN TRUNK call originates from the main exchange, the trunk signal at the PBX will light on the ring even though a former PBX connection to the trunk has not been removed. The ringing current, however, will not go on through the connection to the PBX station to effect a false ring.

With this re-ring feature, the PBX subscriber's trunk circuits cannot be tied up because of the attendant's failure to take down connections. As soon as the PBX station user hangs up, the trunk circuit is available for incoming calls from the main exchange regardless of whether the connection at the PBX has been removed.

5. Through or Attendant-Dialing.



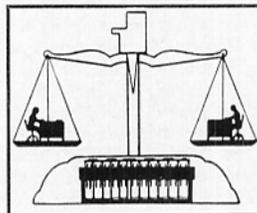
When the PBX is served by a dial main exchange, the PBX stations can dial their own numbers on trunk connections without the assistance of a PBX attendant. This provides valuable service to an industrial concern whose executives might have occasion to make a series of calls over a trunk. Omitting the dial from the PBX station will make it necessary for the attendant to do the dialing on all OUT TRUNK calls.

When the PBX is served by a dial main exchange, the PBX stations can dial their own numbers on trunk connections without the assistance of a PBX attendant. This provides valuable service to an industrial concern whose executives might have occasion to make a series of calls over a trunk. Omitting the dial from the PBX station will make it necessary for the attendant to do the dialing on all OUT TRUNK calls.

6. Balanced Battery Feed.

Connections between any two PBX stations are made with individual high impedance, bridged type battery feed relays for each line, permitting double lamp supervision.

This feature assures the PBX subscriber of excellent transmission on all connections, as well as prompt re-call or disconnect.



7. Automatic Trunk Holding.

Trunk calls are held automatically until the PBX station answers and hangs up. The back cord supervisory lamp serves as a "hold" lamp until the PBX station answers.

This feature permits excellent service by the PBX attendant on "in-trunk" calls as it is impossible to lose the trunk connection at the main exchange while the attendant is handling the call. The hold lamp or back cord supervisory lamp on such connection enables the attendant to properly supervise the connection to insure the calling party on the trunk of prompt service in reaching the called PBX station.

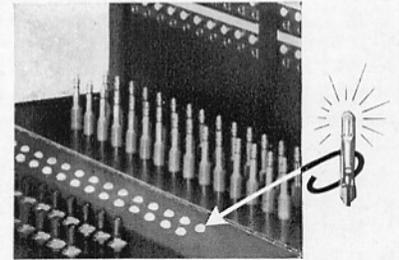
8. Low Current Consumption.

All circuits are designed to consume a minimum amount of current. This is an outstanding feature of Kellogg PBX switchboards. A battery cut-off key is provided to conserve current drain when the board is unattended.

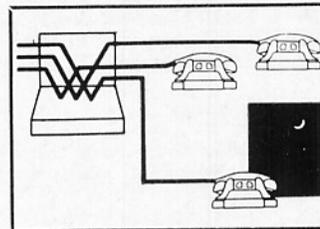
9. Positive Supervision.

Positive lamp supervision is provided for all types of connections.

Positive supervision means that the PBX service will be of the best quality possible. It insures the attention of the attendant on connections when it is required by the telephone users.



10. Single Night Connections With Regular Cords.

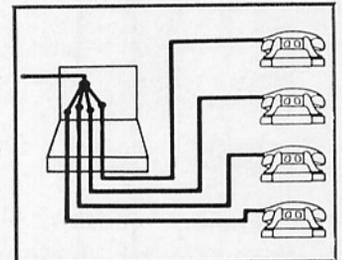


Single night connections are possible with regular cord circuits connected to night trunk jacks with the "Through" key operated. One PBX station may be connected to each PBX trunk for two-way main exchange service while the PBX switchboard is unattended.

11. Multiple Night Connections.

Multiple night connections are obtained by means of "spider" patching cords connected to night trunk jacks and PBX station jacks. Up to five stations can be connected to each trunk for two-way service to the main exchange.

Night connections make it possible to have telephone service on the premises during the night, on Sundays, holidays, or other times when the PBX switchboard is unattended. At such times the battery can be entirely removed from the PBX by the operation of the battery cut-off key.

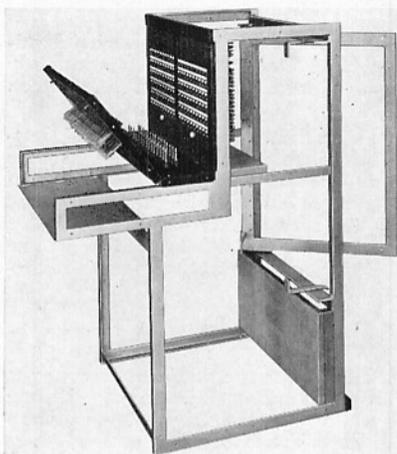


Switchboard Section

MANUAL PBX AND SPECIAL PURPOSE SWITCHBOARDS

KELLOGG TYPE "K" MASTERBUILT PBX SWITCHBOARDS

Steel Framework and High Visibility Keyshelf

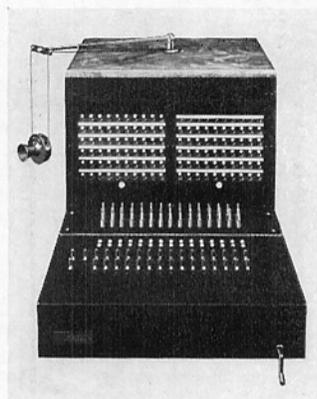


Welded steel framework forms the foundation of Kellogg Masterbuilt PBX switchboards. Rigid and sturdy, this steel structure supports all the weight of the equipment and cabinet woodwork.

The close-up picture of the keyshelf emphasizes the simplicity and high visibility of the modern Kellogg Masterbuilt PBX's. Nothing has been spared to make them convenient for operators.

Rich, black Bakelite is used for keyshelf and face equipment because of its unusual wearing qualities and its permanent lustre. It contrasts beautifully with any surroundings and particularly sets off the cords, plugs, keys and lamps.

The keyshelf, hinged with a full-length piano hinge, can be raised to provide free and easy access to the key equipment.



Capacities of Type "K" PBX

Code	Lines	Line Relays	Trunks	Cords
K-50	50	up to 50	10	10
K-100	100	up to 100	10	15
K-200	200	up to 100	10	15

Each cabinet is wired to full capacity and may be equipped as desired.

Equipment

Any number of lines, in groups of 10, may be equipped up to the capacity of the cabinets, as desired.

The K-50 may be equipped with any number of line relays desired, up to 50. The K-100 and K-200 may be equipped with any number of line relays desired, up to 100.

Any number of cord and trunk circuits can be equipped up to the capacity of the cabinet.

Each type "K" Masterbuilt PBX is furnished with the following common equipment: 1 battery cut-off key, 1 hand generator with switching key, 1 operator's telephone set, 1 night alarm and control key, and 1 dial (if required).

Operator's Sets

The operator's equipment may consist of: a suspended NON-POSITIONAL transmitter and lightweight headband receiver; a Bakelite Masterphone handset with a NON-POSITIONAL transmitter and cobalt magnet receiver which mounts on a hook on the side of the cabinet; or, a breastplate with a NON-POSITIONAL transmitter and lightweight headband receiver.

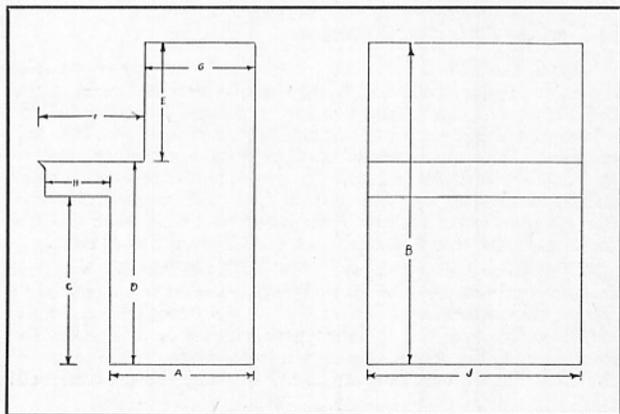


Suspended Type Handset Type Breastplate Type

Cabinet Finishes

Standard	{ No. 9 medium dark dull-rubbed oak Birch-walnut (medium)
Special	

Cabinet Dimensions and Weights



All dimensions are in inches

Code	A	B	C	D	E	F	G	H	J
K-50	22 3/4	46 5/8	24 3/4	30	16 5/8	18	16 3/4	11 7/8	23 1/8
	Approximate shipping weight 400 lbs.								
K-100	22 3/4	46 5/8	24 3/4	30	16 5/8	18	16 3/4	11 7/8	23 1/8
	Approximate shipping weight 500 lbs.								
K-200	26 1/4	58 5/8	27 3/4	33	25 5/8	18	20 1/4	11 7/8	23 1/8
	Approximate shipping weight 600 lbs.								

How to Order

The type "K" PBX has been simplified all the way through . . . right down to the method of ordering. Simply furnish the code number of the size you want, the cabinet finish desired, the number of lines equipped with and without relays, and the few other details indicated below.

- Equipped with designation strips or number plates.
- Number of cord circuits.
- Number of trunk circuits.
- Type of operator's set.
- With or without dial and mounting.
- Number of patching cords to connect one trunk to local lines (number of local lines).

Lines number from bottom up, left to right across face of board. Patching cords can be furnished to connect one trunk to either 2, 3, 4, or 5 PBX lines as desired. K-200 can be equipped with any number of line relays up to 100.

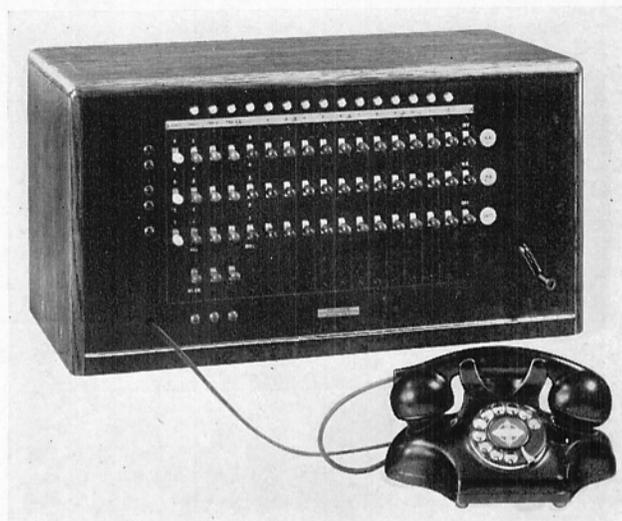
KELLOGG MASTERBUILT CORDLESS PBX SWITCHBOARDS

THE Kellogg Masterbuilt Cordless PBX Switchboard has more uses than the ordinary cordless board. Its service features are practically unlimited. And it can operate in connection with either a common battery manual, dial or magneto main exchange, or one or more at the same time . . . without modification of circuits!

These switchboards are low and compact; of modern, up-to-date appearance. They fit into all types of surroundings. They are attractive with black Bakelite face panels contrasting with metal keys and colored handles, and fine dull-rubbed cabinets. The cabinets can be furnished as standard in either oak or walnut, or special in any other wood or finish.

There are many new construction features. The front panel is hinged at the bottom with a full length piano hinge. This gives easy access to the keys and lamps. The whole cabinet can be lifted off as one piece, giving full access to all equipment.

All of the equipment such as relays, conden-



sers, fuse panel and connecting rack is mounted on a steel frame chassis which is fastened to the base board. The generator crank is in front.

Nine Operating Features Cover Complete Service Requirements For Cordless PBX Users

1. Operates With Either Common Battery Manual, Dial or Magneto Main Exchanges.

The trunk and connecting circuits are so arranged that they will operate with either a manual or dial main exchange, or both. To obtain dial operation, it is only necessary to add a dial to the PBX operator's set.

This feature is extremely advantageous because this switchboard can be moved from one exchange area to another regardless of whether it provides common battery manual, or dial, or magneto service. When connected to a magneto main exchange, a single line adapter is required for each trunk in the central office.

2. Through Battery Feed on Trunks.

The circuits are arranged to provide through feed talking battery to the PBX stations from the main exchange.

This feature assures the PBX subscriber of excellent transmission on both toll and local connections. The subscriber will have the advantage of 48-volt talking battery if it is used on toll connections or if the main exchange is of the dial type which is usually operated from a 48-volt source.

3. Through or Attendant Dialing.

Through dialing on trunk connections from PBX stations, attendant dialing on trunk connections.

When the PBX is served by a dial exchange, the PBX stations can dial their own numbers on trunk connections without the assistance of a PBX attendant. This provides valuable service to an industrial concern whose executives might have occasion to make a series of calls over a trunk.

4. Balanced Battery Feed.

Connections between any two PBX stations are made with a high impedance bridged type battery feed coil, permitting lamp supervision.

This feature assures the PBX subscriber of excellent transmission on all connections, as well as prompt re-call or disconnect.

5. Trunk Holding.

Trunk calls are held with trunk answering keys with the disconnect lamp serving as a holding signal.

This feature permits an excellent service by the PBX attendant on "in-trunk" calls as it is impossible to lose the trunk connection at the main exchange while the attendant is handling the call. The hold supervisory lamp on such connection enables the attendant to properly supervise the connection to insure the calling party on the trunk of prompt service in reaching the called PBX station.

6. Low Current Consumption.

All circuits are designed to consume a minimum amount of current. A battery cut-off key is provided to conserve current when the switchboard is unattended.

Low current consumption is an outstanding feature of Kellogg Cordless PBX Switchboards. Thus it is unnecessary for the PBX subscriber to be concerned about the cost of the power required to maintain the service.

7. Positive Supervision.

Positive supervision is provided for all types of connections.

Positive supervision means that the PBX service will be of the best quality possible. It assures the attention of the attendant on connections when it is required by the telephone users.

8. Night Connections.

Night connections are made to stations as desired with connecting circuits and battery cut-off key.

Night connections make it possible to have telephone service on the premises during the night, on Sundays,

Switchboard Section

MANUAL PBX AND SPECIAL PURPOSE SWITCHBOARDS

KELLOGG MASTERBUILT CORDLESS PBX SWITCHBOARDS

Nine Operating Features Cover Complete Service Requirements For Cordless PBX Users

holidays, or other times when the PBX switchboard is unattended. At such times the battery can be entirely removed from the PBX by the operation of the battery cut-off key.

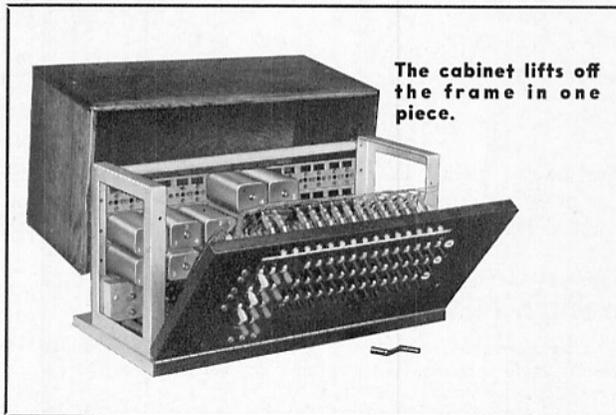
9. Through Trunk Supervision.

The through-battery-feed trunks provide through supervision to the main exchange from the PBX station, thus permitting a prompt recall or disconnect at the main exchange.

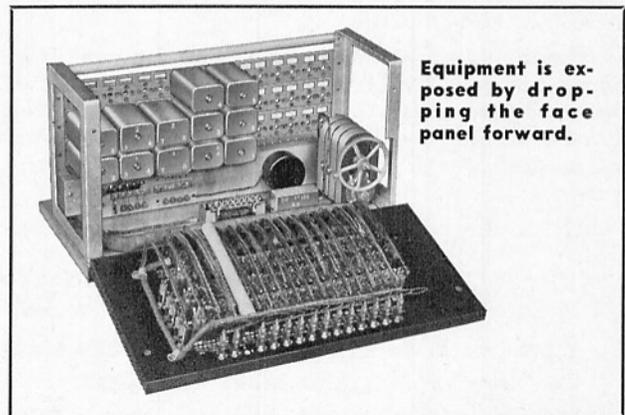
With this feature, the PBX subscriber is assured of

correct timing on toll connections because the toll operator will receive a disconnect when the PBX station user hangs up. Another advantage to the subscriber is that the PBX station user can place sequence calls to the main exchange without the assistance of the PBX attendant. The recall on such connections is handled directly by the main exchange equipment. With feature cord circuits or dial main exchange the connections are released at the main exchange when the PBX station user hangs up, releasing the trunk circuits to the PBX for other incoming or originating calls.

All Equipment is Easily Accessible



The cabinet lifts off the frame in one piece.



Equipment is exposed by dropping the face panel forward.

Easy Accessibility — All equipment is freely exposed upon dropping the Bakelite faced panel forward. Keys, lamps and wiring are readily available as are the generator, condenser, induction coils, relays, etc. Roominess, neatness and convenience are paramount features.

Chassis Construction — All equipment, such as relays, condensers, fuse panel, connecting rack and buzzer is mounted on a steel frame chassis which is fastened to the base board. Front panel hinged at the bottom. Cabinet lifts off in one piece.

Capacities of Stock Boards

Code 1007-CC

	Wired Equipped	
Lines (less relays).....	12	10 or 12
Trunks to Main Exchange.....	3	2 or 3
Connecting Circuits.....	5	5
Cabinet Finish: Oak or Walnut		

Code 1007-CC (Special)

Lines (with relays).....	12	12
Trunks to Main Exchange.....	5	5
Connecting Circuits.....	5	5
Cabinet Finish: Walnut (Oak on Special Order)		

Code 2007-II

Lines (less relays).....	20	15
Trunks to Main Exchange.....	5	3
Connecting Circuits.....	5	5
Cabinet Finish: Oak or Walnut		

Masterphone Operator's Set



All Kellogg Cordless PBX's come with a modern, all Bakelite Masterphone operator's handset. These instruments are equipped with either a dial or dial blank, as specified on the order.

Cabinet Dimensions and Weights

All dimensions are in inches.

Code No.	Height	Length	Depth	Shipping Weight
1007-CC	12	23	12	120 lbs.
1007-CC (Special)	12	24-13/16	12	135 lbs.
2007-II	12	30	12	140 lbs.

How to Order

To order a Cordless PBX, select the code number of the PBX desired and furnish the details indicated below:

- Type of Cabinet (oak or walnut)
- Number of lines equipped (with or without relays)
- Number of Trunk Circuits
- Operator's Handset (with or without dial)

SPECIAL PURPOSE SWITCHBOARDS

IT HAS often been said that every business differs from every other kind of business. In reality, the principles are the same but the characteristics make the difference. So it is with telephone equipment. The average business finds that its communication requirements can be adequately handled by standard telephone facilities. However, there is an endless number of businesses that require certain service features peculiar to their industry, for which Kellogg engineers will design "special purpose" equipment. Such businesses may have requirements that include services other than voice communication, but because these services are equally important, must employ equipment that is equally dependable. Wherever there is a need for facilities using low voltage and low current, whether for communication, signaling, switching, or interlocking, the telephone manufacturer is the logical source for that type of equipment.

The same ability to engineer telephone equipment is available to engineer any special purpose equipment that incorporates the same degree of precision manufacture. It is this combination of precision workmanship and ruggedness that is typical of telephone equipment and represents the main characteristic of the telephone industry. Examples of the many variations of Kellogg equipment and their uses in all types of businesses are contained in these pages under the general classification of "special purpose switchboards". The illustrations and descriptions contained here convey some idea as to the broad use of telephone type equipment in all sorts of industrial applications. The applications shown here do not represent the entire scope of Kellogg engineering, but are shown for the purpose of indicating how telephone type equipment can be engineered for any special purpose or for any specific application.

Kellogg engineers will be glad to discuss any communication problem, regardless of the simplicity or complex nature of the job to be done and furnish detailed information, specifications and prices on the correct equipment to produce the desired results.

Credit Authorization Equipment in Department Stores

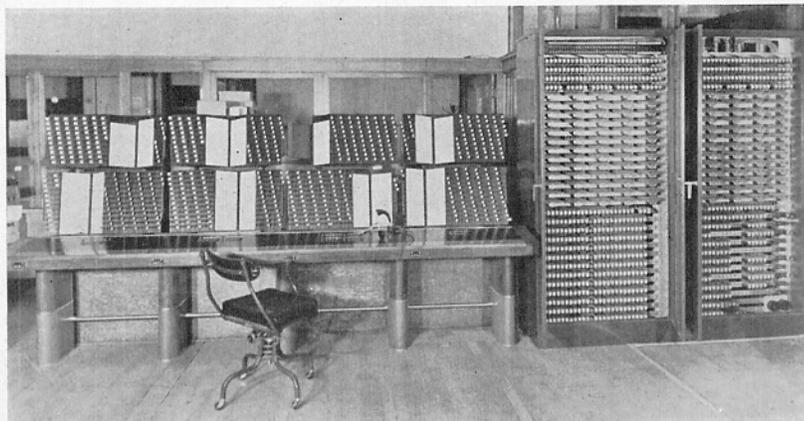
Telephone equipment performs specialized functions in department stores, credit bureaus and many other business establishments.

The Relaymatic shown to the right of the four-position credit desk, is the foundation of a credit authorization system in a department store having approximately 90,000 charge accounts. The equipment consists of 100 dial Master-phones located in the various departments throughout the store, an unattended Kellogg Relaymatic switchboard, a credit operator's desk with positions for four clerks and a sectionalized filing system.

With this system, sales clerks can consummate the sales and check the charge account customers' credit without encountering delays. It is unusually compact and is capable of handling a large volume of calls with a minimum of equipment. It is a labor-saving, smooth operating system, having the flexibility to permit a reduction of credit operators during "off-peak" hours without impairing the speedy service to the customers.

The charge accounts with their credit ratings are divided into four groups, each mounted in a separate section atop the credit operator's table. They may be divided alphabetically, by addresses, by zones or in any other convenient manner. During rush periods there is one clerk at each position, directly in front of one section of the index file.

When a sales clerk desires credit information on a customer she dials directly to the credit operator handling that section of the file which contains the specific account. The clerk dials only one number, for the Relay-



Credit authorization equipment in a large department store. The credit operators' positions with a sectionalized file are in the center. The Relaymatic switchboard is at the right.

matic switchboard then automatically rings the telephone of the proper credit clerk. In answering the call, the credit clerk is able to locate the customer's credit card instantly without moving from her chair and thus convey that information immediately to the sales clerk.

With this system, a credit operator can authorize a credit in about 15 seconds. This speedy authorization means that the sales clerk does not have to hang up and wait for the credit office to call back. Colored lamp signals at the credit operator's table make it possible for this system to function speedily and efficiently at all times, whether there are 1, 2, 3, or 4 credit operator's on duty.

Switchboard Section

MANUAL PBX AND SPECIAL PURPOSE SWITCHBOARDS

SPECIAL PURPOSE SWITCHBOARDS

Watchmen's Reporting and Recording Systems



Kellogg engineers and builds equipment to meet the varied needs of many users of reporting system—police, watchmen, etc.

The picture above shows Kellogg equipment in a large mid-western penitentiary. The heart of the communication system in this institution is a Kellogg Relaymatic.

The equipment shown above provides for reporting into the central office by guards, provides for recording the time and origin of these calls and provides for alarm or indication to the central office if the watchman does not make his rounds as prescribed.

Municipal Service Switchboards



Kellogg PBX Police Switchboard

In the purchase of such important civic equipment as switchboards for fire and police service, dependability

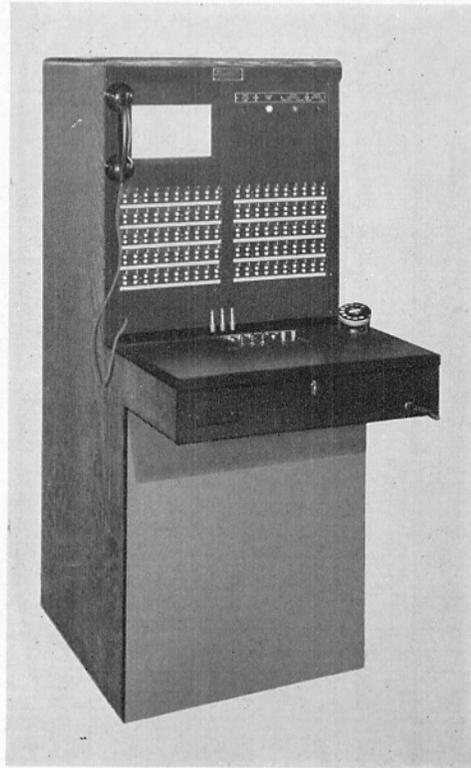
Municipal Service Switchboards—Cont.

is naturally the first consideration. That is the reason why more and more Kellogg equipment is being used by public safety departments of cities, counties and states.

In some instances these switchboards require little more than ordinary PBX (Private Branch Exchange) equipment; in others, many special features are incorporated for services entirely foreign to usual telephone practice. The equipment may vary in size from a twenty-line cordless turret, to a board with thousands of lines and many operator's positions.

The local telephone plant usually offers the logical distribution medium for the police and fire alarm signal system. In many cases, the responsibility of furnishing and maintaining even a large network is placed upon the trained personnel of the telephone company. Whether a municipal protection system is part of, or independent of the commercial telephone system, the equipment is essentially the same. And in engineering the proper facilities for the specific job, the Kellogg Company functions in full co-operation with the city engineers.

Emergency Fire Reporting Switchboards



Floor Type Fire Reporting Switchboard

Regular floor type and cordless desk type fire reporting switchboards are specially designed to take care of communications between a large number of outlying stations and an operator. In this respect, fire reporting equipment is similar to watchman's reporting systems.

Standard sizes are 20-line cordless and 100-line floor type and other capacities can be furnished wherever needed.

The cordless fire reporting board is equipped with 20 line circuits, a trunk circuit, hand generator, line-out-of-order alarm, and no-voltage alarm. The fire reporting

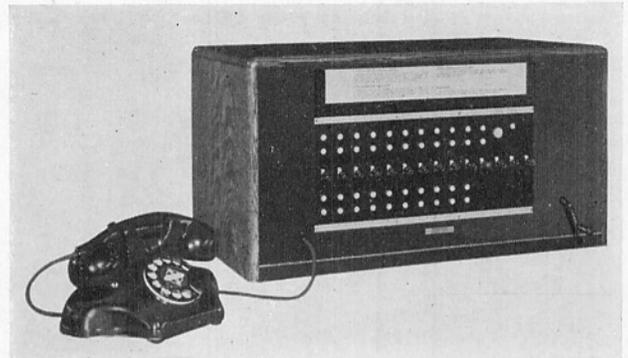
SPECIAL PURPOSE SWITCHBOARDS**Emergency Fire Reporting Switchboards — Cont.**

lines terminate on lamp signals and are for communication between station and operator only.

The standard floor type switchboard incorporates many features contained in other commercial Kellogg boards—a swinging relay gate, oak cabinet, Bakelite faced lamp and key shelf, etc. The capacity of this standard switchboard is 100 lines, 3 cord circuits and 2 trunk circuits. It is equipped with an operator's handset, hand generator, night alarm and power failure lamps.

Fire reporting equipment, in addition to the standard boards mentioned above, is available to meet a wide variety of conditions.

Right: Turret Type Fire Reporting Switchboard

**Annunciator Units**

Annunciator equipment is used wherever visual signalling or visual control is required. It may be used in elevators, shops, hotels, fire reporting systems, watchman systems and has innumerable other applications. Bells or buzzers may be connected in the circuits to provide

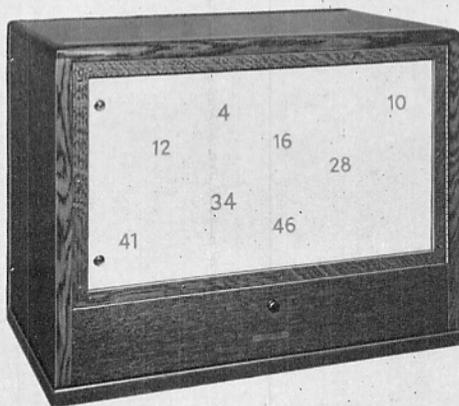
These units are ordinarily designed for specific conditions. Either lamp or drop signals may be used. They may be assembled in steel cabinets for rack mounting, of a type to match other existing panels; or may be turret type in metal or wooden cabinets for desks or table mounting; or may be mounted in floor type steel or wood cabinets. They may be self-contained, or be designed to fit into existing mounting frames or racks. Complete accessibility is provided and every precaution is taken to make each unit as near fire-proof and dust-proof as the nature of the particular installation requires.

The accompanying illustrations show typical Kellogg annunciator units. The top picture in the left hand column is a turret type annunciator for desk or table mounting. In this particular installation numbers appear through the translucent panel in response to telephone impulses.

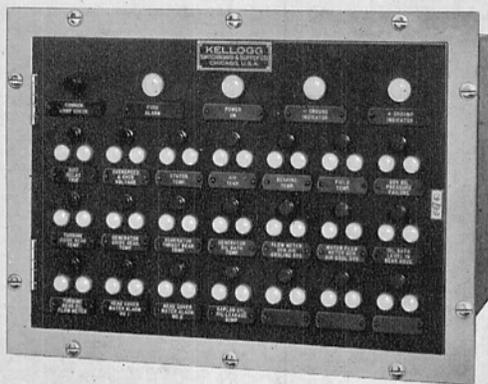
The next annunciator was designed for mounting on a rack. Lamp signals are used for signalling. The picture in the right hand column shows an annunciator mounted in a floor type metal cabinet. This is also a lamp signal annunciator.

Annunciators For Power Plants

The Kellogg Company, through long experience in the application of annunciator equipment, is in a position to make recommendations based on the practice adopted by leaders in the power industry. Many variations of circuit operation are available to meet practically any operating conditions. Provisions for operation with either continuous or momentary alarm are obtainable with manual, automatic, or remote lamp-reset features. Audible alarms of any size or voltage may be equipped with any of the reset features.

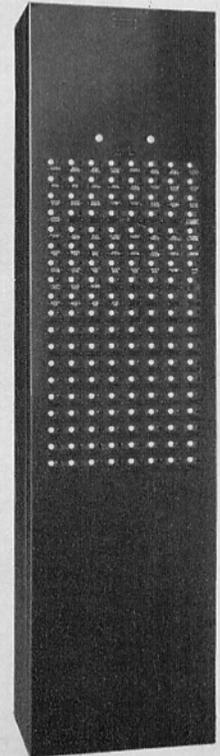


Turret or Desk Type Annunciator Unit



Annunciator Unit for Rack Mounting

audible signals. Also, annunciator units find wide usage in the power field. Wherever used, these annunciator units must be absolutely dependable. For this reason Kellogg is a recognized source of such equipment.



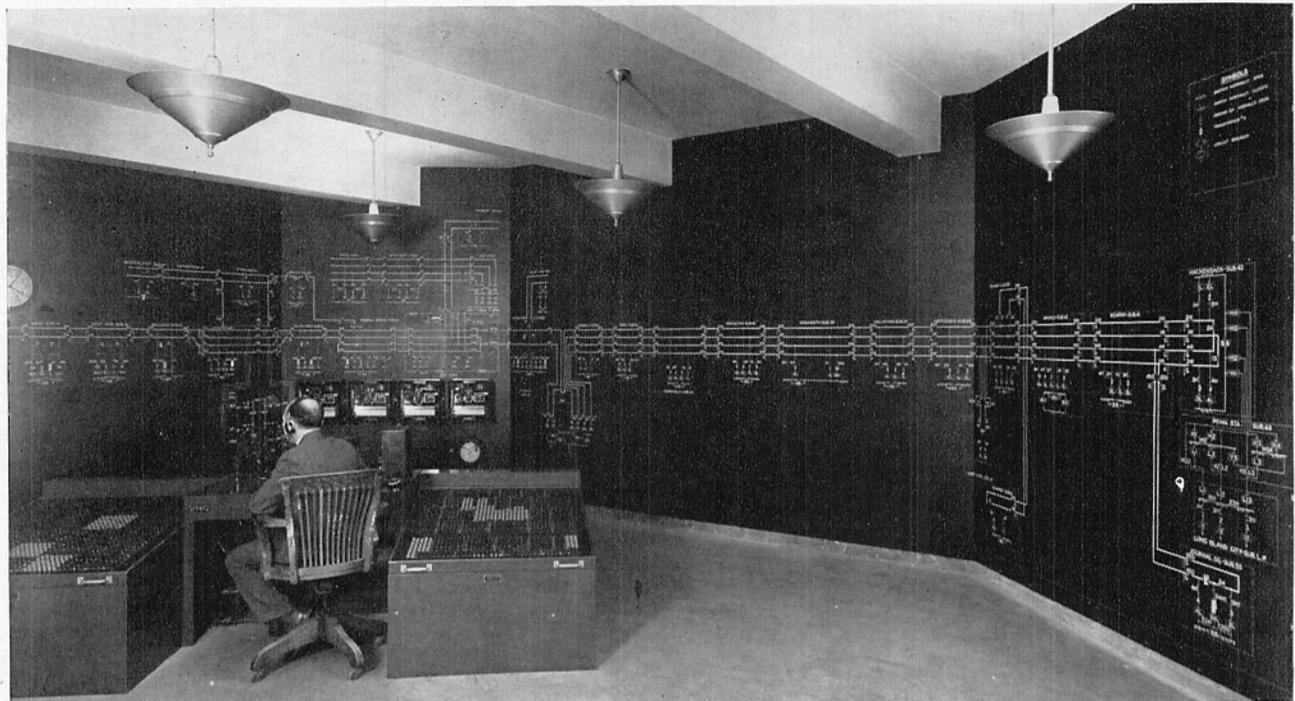
Floor Type Annunciator Unit in a Metal Cabinet.

Switchboard Section

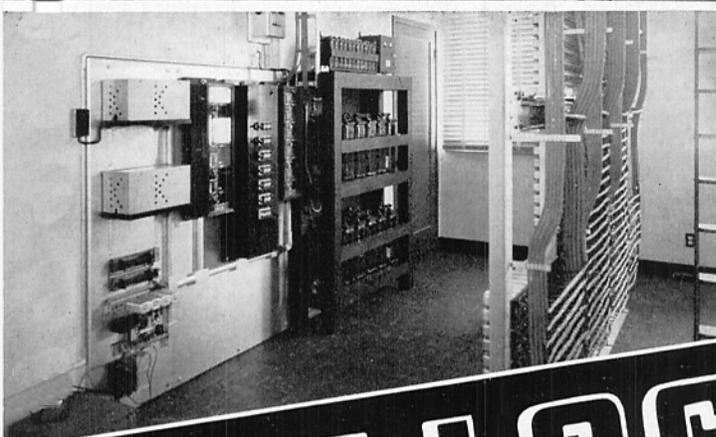
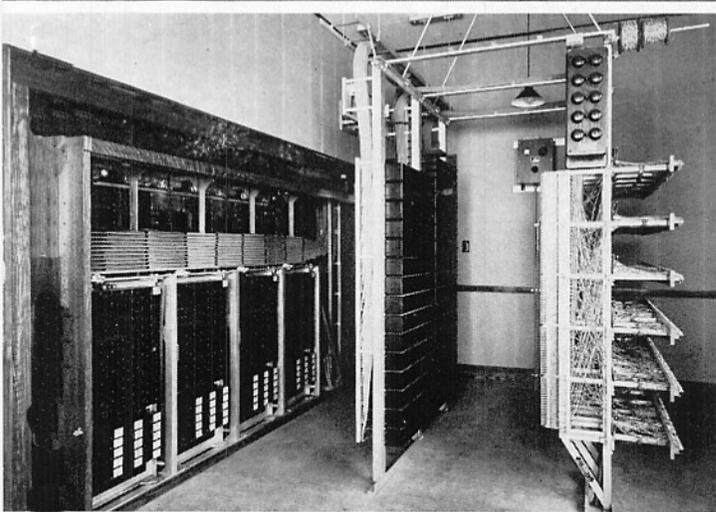
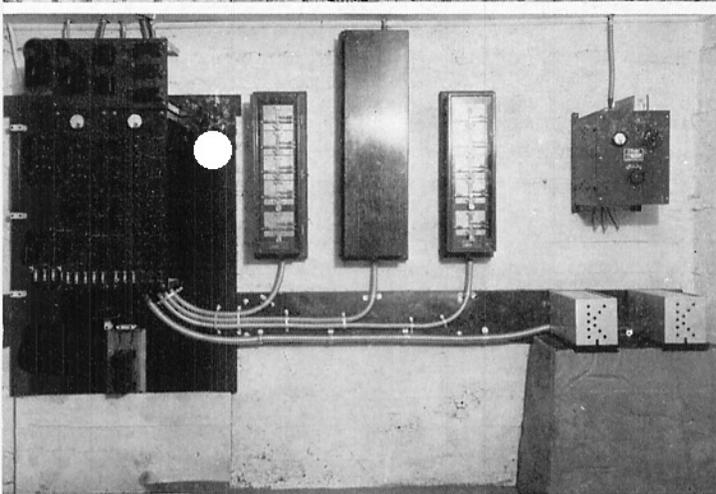
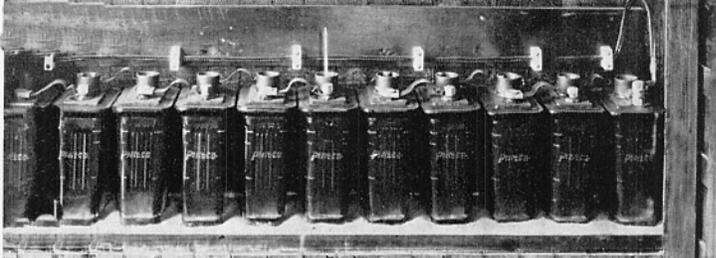
MANUAL PBX AND SPECIAL PURPOSE SWITCHBOARDS

SPECIAL PURPOSE SWITCHBOARDS

Power Director's and Load Dispatcher's Switchboards



These two pictures show the power and local dispatcher's headquarters with equipment used for the control of electrified sections of a large railroad.



POWER and PROTECTION EQUIPMENT

GENERAL CATALOG NO. 10

Contents

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Central Office Protectors	4 to 8
Charging Equipment	13 to 14
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Main Distributing Frames	2 to 7
Pole Changers	16
Power Apparatus	9 to 21
Power Units	15
Power Switchboards	21
Protection and Cross-Connecting Equipment	2 to 8
Rectifiers	15
Ringin Equipment	16 to 20
Storage Batteries	9 to 12



SWITCHBOARD & SUPPLY CO.

KELLOGG

Factory and General Offices: 6650 S. CICERO AVE., CHICAGO, ILL., U. S. A.

Branch Offices . . . 308 W. Sixth St.
Kansas City, Mo.

246 First Street
San Francisco, Calif.

Switchboard Section

POWER AND PROTECTION EQUIPMENT

PROTECTION and CROSS-CONNECTING EQUIPMENT

PROTECTION and cross-connecting equipment is mounted on a main distributing frame in the central telephone office. Two types of main distributing frames are used: wall mounting for small exchanges and self-supporting floor mounting, upright racks for larger exchanges.

Three types of protector units are available for mounting on the main frame:

1. Carbon lightning arresters and heat coils.
2. Carbon lightning arresters and fuses.
3. Carbon lightning arresters, fuses and heat coils.

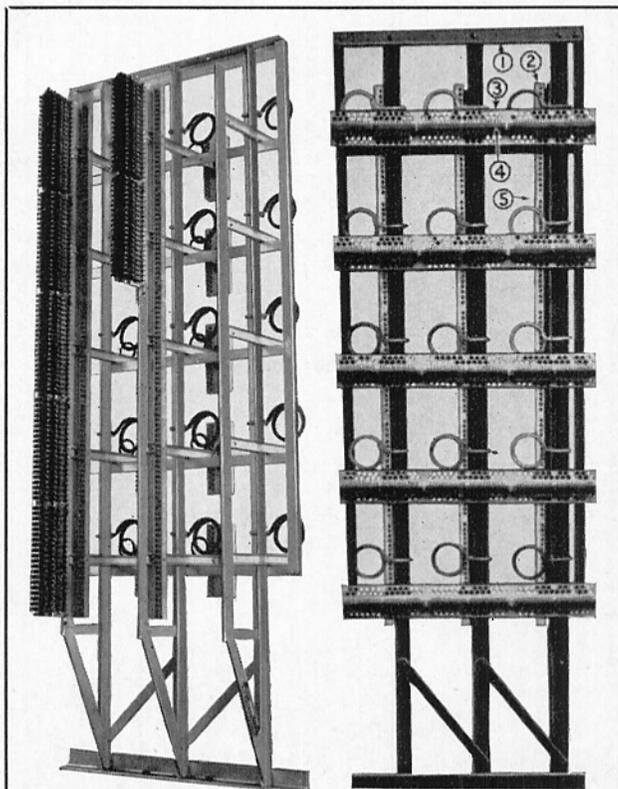
Every switchboard should be protected from lightning by some form of carbon arrester for each incoming line. Where there is danger from

electric light and power circuits a fuse or heat coil protector is used in addition to the carbon arrester.

Fanning strips mounted on the distributing frame make it possible to connect any switchboard number by means of a jumper wire to any outside line. This jumper wire provides a flexible link between the switchboard and line cables as a means of connecting or transferring any switchboard number to any cable pair. This makes it unnecessary to change the telephone number when a subscriber moves from one part of town to another.

The main distributing frame also affords a convenient means for testing both outside line and switchboard circuits and cutting them in and out of service.

Cook Type "L" Main Distributing Frame



This picture shows the side of the type "L" main distributing frame on which the protectors are mounted. The individual line terminal blocks are mounted on vertical fanning strips on the other side.

In this horizontal type "L" main distributing frame, continuous maple fanning strips are illustrated. The protectors are mounted on the other side, the same as on the vertical type frame shown at the left.

The type "L", floor type main distributing frame is constructed in sectional form, 100 or more pairs in height. Additions may be made on either the right or left side of the frame without disturbing existing equipment.

The verticals and top and bottom pieces are of angle iron and the shelf and cross-connecting pieces are of channel iron. Braces are of bar steel. The finish is gray enamel and the frame is shipped "knocked-down".

Switchboard protectors built on $\frac{1}{2}$ -inch centers and standard line terminal blocks may easily be attached as required. Vertical, steel protector mounting bars and numbered maple fanning strips are mounted on the frame. A ground lug is attached to the lower end of each protector mounting bar to assure a good ground connection.

The type "L" frame is built with either a single or double floor angle. The uprights of a standard 100-pair section are 6 feet high but special uprights made to attach to the ceiling of the terminal room are available.

Vertical and Horizontal Type "L" Frames

On the vertical type frame each line terminal block is mounted on an individual vertical fanning strip. On the horizontal type frame the line terminal blocks are mounted on continuous horizontal fanning strips.

Both types include the iron frame work, large jumper rings, bolts, nuts and ground connections. Fanning strips are made of hard maple with holes equal in number to the protector capacity. Protectors are furnished as specified and line terminals, protector number plates and fanning strips are numbered as ordered.

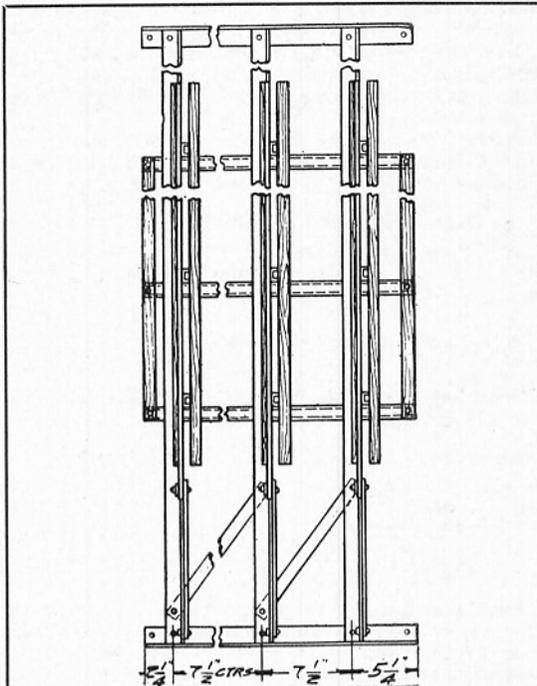
Vertical Type—On the vertical type frame, each line terminal block of 20 to 26 pairs of clips from 2 to 6 clips high is mounted on an individual fanning strip.

Horizontal Type—On the horizontal type frame, continuous type fanning strips run from one side of the frame to the other. The number of line terminal blocks mounted on each continuous type fanning strip depends on the width of the frame. Either No. 1000 or No. 5000 line terminals are supplied, as ordered.

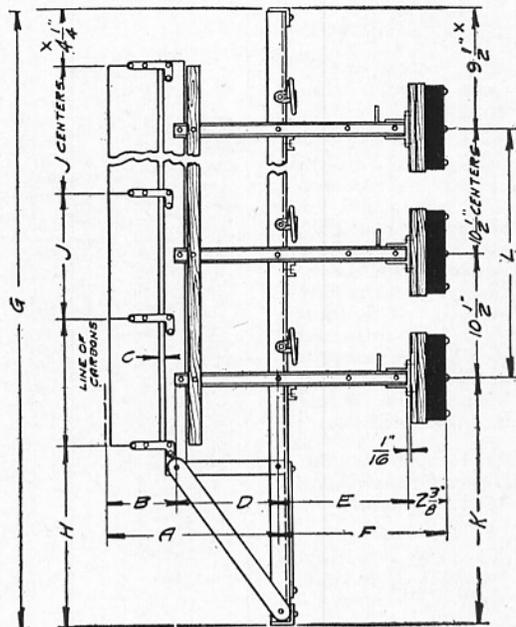
The iron frame work weighs approximately 24 pounds per 100 pairs.

PROTECTION and CROSS-CONNECTING EQUIPMENT

Cook Type "L" Main Distributing Frame



This front view of the type "L" main distributing frame shows dimensions. Dimensions are also shown in the table at the right.



This side view of the type "L" main distributing frame shows dimensions. Dimensions are also shown in the table at the right. Dimensions marked "X" are variable with the height of the ceiling. Standard dimensions are shown.

Dimensions of Type "L" Main Frame

Number of Pairs of Protectors per Vertical	Refer to the diagram at the left for explanation of the dimensions represented by these letters.				
	Gx	H	J	K	L
100 (Stand.)	6' 0"	1' 3 1/4"	10 1/2"	1' 8 1/2"	3' 6"
110	6' 10 1/2"	1' 8 1/4"	5 1/2" & 10 1/2"	1' 8 1/2"	4' 4 1/2"
150	8' 7 1/2"	1' 8 1/4"	5 1/2" & 10 1/2"	1' 8 1/2"	6' 1 1/2"
160	8' 7 1/2"	1' 3 1/4"	10 1/2"	1' 8 1/2"	6' 1 1/2"
200	10' 0"	10 3/4"	10 1/2"	1' 4"	7' 10 1/2"

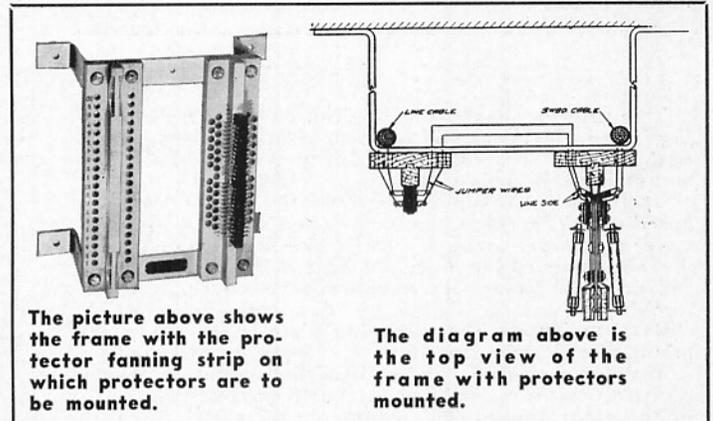
X Dimensions marked "X" are variable with the height of the ceiling. Standard dimensions are shown.

Protector and Line Terminal Dimensions

Dimensions are in inches. Refer to the diagram at the left for explanation of the dimensions represented by these letters.

Type of Protector	Size of Main Frame	A	B	C	D	E (2 clip)	F
100	100 to 400 Pairs	10 1/4	4 1/4	1/2	6	6 1/2	8 7/8
	400 to 1000 Pairs	12 5/8	4 1/4	1/2	8 3/8	10 5/8	13
	1000 Pairs and Larger	14 1/2	4 1/4	1/2	10 1/4	18 1/2	20 7/8
105	100 to 400 Pairs	14 5/8	8 3/8	1	6	6 1/2	8 7/8
	400 to 1000 Pairs	17	8 5/8	1	8 3/8	10 5/8	13
	1000 Pairs and Larger	18 7/8	8 5/8	1	10 1/4	18 1/2	20 7/8
H-36	100 to 400 Pairs	12	6	5/8	6	6 1/2	8 7/8
	400 to 1000 Pairs	14 3/8	6	5/8	8 3/8	10 5/8	13
	1000 Pairs and Larger	16 1/4	6	5/8	10 1/4	18 1/2	20 7/8

Cook No. L-9 Wall Type Distributing Frame



The picture above shows the frame with the protector fanning strip on which protectors are to be mounted.

The diagram above is the top view of the frame with protectors mounted.

This compact, wall type distributing frame is designed to mount No. 100, 105 or H-36 Cook central office protectors and 2-clip, 26-pair line terminals. The frame consists of two pieces of hard, kiln dried maple, one piece drilled and arranged for line terminals, the other piece drilled and milled for mounting the protectors, and two heavy mounting brackets made of bar iron.

The frame is furnished complete with line terminals. Protectors are extra and may be selected according to requirements.

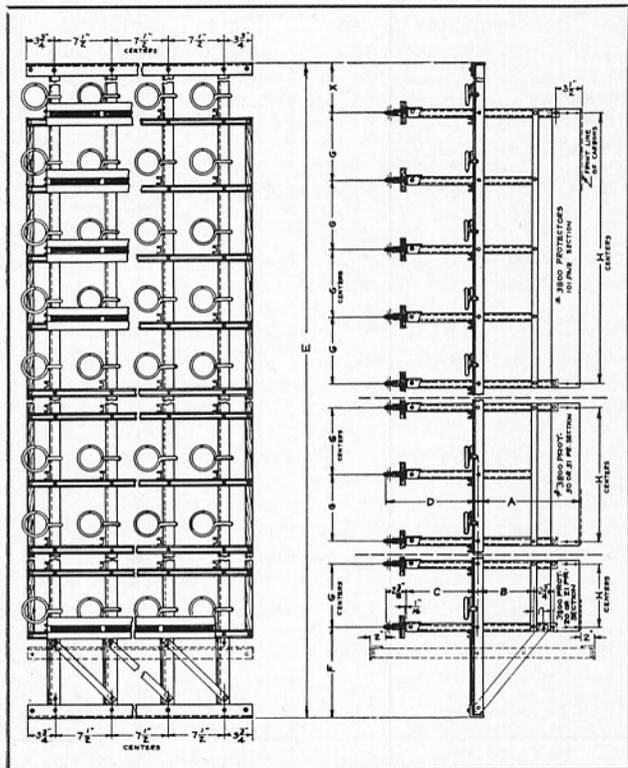
Cat. No.	No. of Pairs, Protector Side	No. of Pairs, Cable Side	Height Overall, Inches	Shipping Weight
1050	20	26	13	10 lbs.
1052	40	52	23 1/2	18 lbs.
1054	60	78	34	32 lbs.
1056	80	102	..	46 lbs.
1058	100	130	..	60 lbs.

Switchboard Section

POWER AND PROTECTION EQUIPMENT

PROTECTION and CROSS-CONNECTING EQUIPMENT

Cook No. 38 Main Distributing Frame



The No. 38 Main Frame is designed to mount the No. 3800 protector on $\frac{3}{8}$ -inch centers. It is similar to the type "L" except that it has no protector mounting bar. The protectors are mounted directly to the shelf channels. Additions to the frame may be made to either the left or right side.

Continuous type fanning strips are mounted horizontally. The dimensions of the frame may be varied to suit conditions.

Dimensions of Main Frame

Number of Protector Pairs Per Section	Dimensions are in inches.				
	E	F	G	H	X
101 Pair	6'	19 $\frac{3}{4}$ "	9 $\frac{3}{4}$ "	39"	13 $\frac{1}{4}$ "
51 Pair	X	X	10 $\frac{1}{8}$ "	20 $\frac{1}{4}$ "	X

X Dimensions marked "X" are variable with the height of the ceiling. Standard dimensions are shown.

Protector and Terminal Dimensions

Type of Protector	of Main Frame	A	B	C	D (2 clip)
3800	100 to 400 Pair	11 $\frac{1}{8}$	4 $\frac{7}{8}$	6 $\frac{1}{2}$	2 $\frac{7}{8}$
	400 to 1000 Pair	13 $\frac{1}{2}$	7 $\frac{1}{4}$	10 $\frac{3}{8}$	13
	1000 Pair and up	15 $\frac{3}{8}$	9 $\frac{1}{8}$	18 $\frac{1}{2}$	20 $\frac{7}{8}$

The dimensional diagram at the extreme left shows the front view of No. 38 main distributing frame. For sizes of this main frame also refer to the table above.

The dimensional diagram at the left shows the side view of No. 38 main distributing frame. Sizes are also shown in the table above. Dimensions marked "X" are variable with the height of the ceiling of the room where the frame is to be installed. Standard dimensions are shown.

Cook No. 3800 Central Office Protector

This protector mounts on the No. 3800 main distributing frame. Heat coils and carbon discharge blocks protect against sneak currents and high potentials. Pairs are mounted on $\frac{3}{8}$ -inch centers.

Operation — This protector opens the switchboard circuit, grounds the outside line and operates an alarm signal. It is reset by relatching the operating spring over the heat coil. The coil does not have to be changed, reversed or resoldered.

Construction — The mounting plate is cadmium plated steel, formed to secure great strength and rigidity. The ends of the mounting plate fasten directly to the shelf channels of the main frame. All springs are of nickel silver, of ample strength to give positive operation and strong, permanent contact pressure. Line connections are on one side of the protector and switchboard connections are on the other side.

Insulation — All current carrying parts are insulated with hard rubber and Bakelite.

Lightning Arresters — No. 2614 sealed-gap unit dischargers are standard. They are made of two carbons, separated by an acetate dielectric and cemented into a unit. They will permanently ground under continuous discharge. They are easily installed and removed.

Heat Coils — The No. 1240 self-soldering, wire wound heat coils will carry .35 amperes for 3 hours, and will operate within 210 seconds on .5 ampere in an



No. 1240 Heat Coil

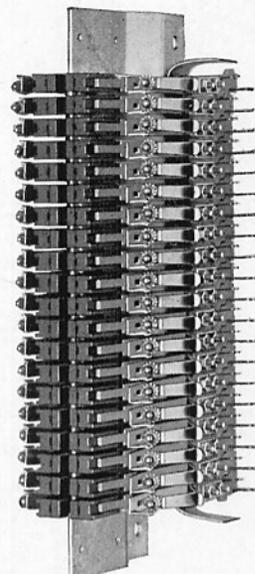
ambient temperature of 68° F. They can be reset without changing.

Temporary Disconnect — To open the circuit, a thin insulator is inserted between the outside spring and the spring holding the heat coil.

Testing — The No. 1236 test plug can be slipped over any pair of protectors, and offers means to test the outside line, the heat coils and the switchboard circuit. When the test plug is withdrawn, the protector is left in an operating position.

Test Plugs, Heat Coils and Dischargers Used with No. 3800 Protector.

Cat. No.	Description
1236	No. 3800 Test Plug
1240	No. 3800 Heat Coil
2614	Unit Discharger



No. 3800 Protectors

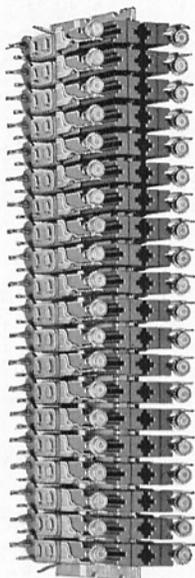
Catalog No.	Description	Dimensions, Inches			Shipping Weight per 100 Pairs
		Length	Width	Depth	
1241	No. 3800, 20-pair section	8 $\frac{5}{8}$	3	4 $\frac{3}{4}$	23 lbs.
1242	No. 3800, 21-pair section	9	3	4 $\frac{3}{4}$	23 lbs.
1243	No. 3800, 51-pair section	20 $\frac{1}{4}$	3	4 $\frac{3}{4}$	22 $\frac{1}{2}$ lbs.
1235	No. 3800, 101-pair section	39	3	4 $\frac{3}{4}$	22 $\frac{1}{2}$ lbs.



No. 1236 Test Plug

PROTECTION and CROSS-CONNECTING EQUIPMENT

Cook No. 100 Central Office Protector



The No. 100 central office protector utilizes heat coils and carbons. Line connections are on one side of the protector and switchboard connections on the other side. Pairs are mounted on ½-inch centers. Testing may be done easily without removing heat coil.

Operation — This protector opens the switchboard circuit, grounds the outside line and operates an alarm signal. The protector is reset by simply relatching the operating spring to the heat coil. The coil does not have to be changed, reversed or resoldered.

Construction — Heavy nickel silver holding springs insure a positive permanent pressure between the lightning arrester carbons and ground plate.

Mounting plates are metal and may be mounted on a standard frame carrying protectors on ½-inch centers. The circuit from the heat coil spring to the switchboard terminal is carried between the grounded mounting plates and is well shielded.

Insulation — All current carrying parts are thoroughly insulated with hard rubber and Bakelite.

Lightning Arresters — These consist of two No. 2625 grooved carbons, separated by a No. 2090 acetate dielectric .005 in. thick and will permanently ground under continuous discharge. No. 2612 Sealed Gap unit dischargers are furnished when specified.

Heat Coils — These No. 100 self-soldering, wire wound heat coils have approximately 3½ ohms resistance, will carry .35 amperes for 3 hours and will operate within 210 seconds on .5 ampere in an ambient temperature of 68° F.



No. 1232 Heat Coil

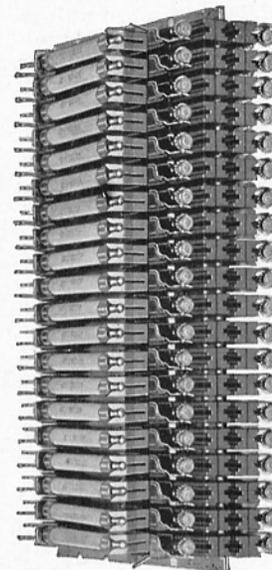
Temporary Disconnect — Before opening the circuit, insert toothpick through the slot of the carbon to keep the ground and alarm spring from making the contact when the operating spring is released.

Testing — The No. 100 test plug can be slipped over any pair of protectors and offers means to test the outside line, the heat coils, and the switchboard circuit. When test plug is withdrawn the protector is left in operating position.

Cat. No.	Description	Dimensions, inches			Shpg. Weight per 100 Pairs
		Length	Width	Depth	
1230	No. 100—10 pr. section	5½	2	3½	17 lbs.
1231	No. 100—20 pr. section	10½	2	3½	17 lbs.

1232	No. 100 Heat Coil
2090	Acetate Dielectric (.005 in.) for No. 100 Protector
1234	No. 100 Test Plug
2625	Carbons for No. 100 Protector
2612	Unit Dischargers

Cook No. 105 Central Office Protector



The No. 105 protector is similar to the No. 100 except that it is equipped with fuses as well as heat coils and arresters.

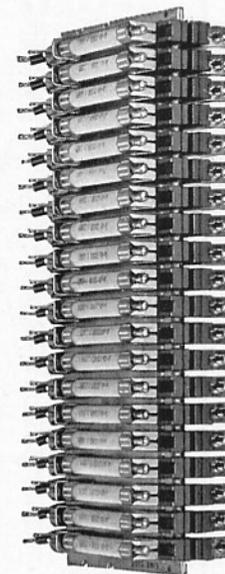
Fuse Clips — Fuses are held under positive tension in clips, but may easily be removed and replaced. Lightning arresters are held under constant pressure against ground plate by heavy springs.

Fuses — Fuses are No. 1114, A-22 composition type which blow at 3 amperes.

No. 1237 and 1238 protectors are 3 in. wide and 7 in. deep. No. 1237 is 5½ in. long and 1238 is 10½ in. long. The shipping weight for both sizes is 41 lbs.

Cat. No.	Description
1237	No. 105, 10-pair Section
1238	No. 105, 20-pair Section

Cook H-36 Central Office Protector



Designed to protect circuits where heat coils are not required.

Construction — This protector is built in 10 and 20 pair sections on metal plates. The pairs are on ½-inch centers.

Fuse Clips — Fuses are held under positive tension in Cook clips, but may easily be removed and replaced. The lightning arresters are held under constant pressure between heavy nickel silver springs and ground plate.

Terminals — Line terminals are on one side and switchboard terminals are on the other. Each terminal is thoroughly insulated and tinned.

Insulation — All current carrying parts are separated by rubber insulation.

Lightning Arresters — Two carbons, No. 2081 grooved and No. 2080 plain, separated by No. 2090 acetate dielectric, .005 inch thick, are standard. Under the influence of a continuous arc, this protector

will ground the outside line until the fuse opens the circuit. No. 4500 True Gap Dischargers, which do not ground the line will be supplied when specified.

Fuses — Unless otherwise specified, this protector is furnished with No. A-45 composition fuses that blow at 1 ampere. No. A-46 wood fuses will be furnished when specified.

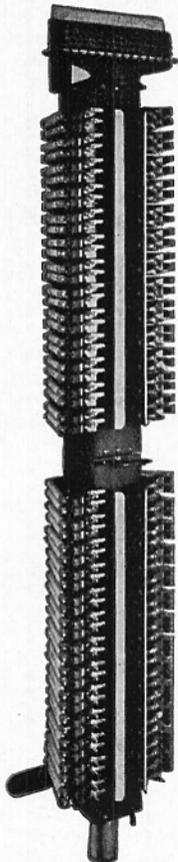
Cat. No.	Description	Dimensions, Inches			Shpg. Weight
		Length	Width	Depth	
1202	H-36, 10 pr. section	5½	1½	5½	21 lbs.
1203	H-36, 20 pr. section	10½	1½	5½	21 lbs.
2109	Type A-45 Composition Fuse (1 ampere) for No. H-36 Protector				
2110	Type A-46 Wood Fuse (1 ampere- for No. H-36 Protector)				

Switchboard Section

POWER AND PROTECTION EQUIPMENT

PROTECTION and CROSS-CONNECTING EQUIPMENT

Cook Type "T" Main Distributing Frame



Type "T",
50 Pairs

The type "T", wall mounting, main distributing frame is the unit of the Cook Trans-Mount system designed for the termination and distribution of the outside paper-wrapped, lead covered cable directly to the line cable terminals. This eliminates the splicing of silk, cotton or wool ends to the paper-wrapped cable for termination on exposed terminal blocks.

The type "T" is equipped with a moisture-proof, roomy but compact steel corebox, metal fanning strip with insulating bushings in fanning holes and a white designation strip for quickly and clearly numbering pairs. Other features are the self-soldering nozzle insuring tight cable sheath joints, rubber covered rings for distributing cross-connection jumpers, solder clips for both ends of the jumpers, and strong, rigid, wall-mounting brackets.

The terminal block provided for switchboard cable has a Bakelite fanning strip and a white designation strip for numbering pairs.

This frame is furnished in standard 26, 52 and 104 pair units but multiples of these sizes are available. The Cook type "H" protector with standard fuse and high-potential discharge block is installed only as required and also is standard equipment for the other apparatus in Cook's Trans-Mount system.

Catalog No.	Capacity	Dimensions, Inches	Shpg. Weight
519-1	26-Pair	26½ x 7½ x 7	26 lbs.
519-2	52-Pair	46½ x 7½ x 7	37 lbs.
519-3	104-Pair	50 x 19½ x 7	82 lbs.

Cook Type "H" Protector Mounts



This type "H" protector unit is used in all apparatus of the Cook Trans-Mount system. Built on a strong, Bakelite base, it provides primary protection with a fuse and high-potential discharger and secondary high-potential protection after the fuse has blown.

These protector mounts are installed only as required and mount standard fuses and dischargers. Non-corrosive studs and washers, phosphor bronze springs and clips, and True-Gap dischargers are standard.

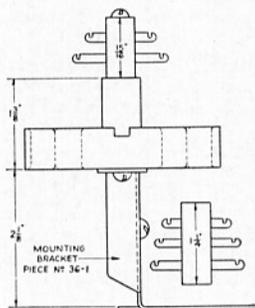
Cook Line Terminal Blocks

Type 1000

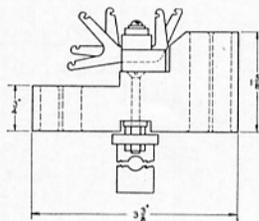
Solder clips (from 2 to 5 clips high) are set in a rubber block mounted on a maple fanning strip. The block mounting 20 pairs is 7¾ in. long and 26 pairs is 7¾ in. long.

Type 4000

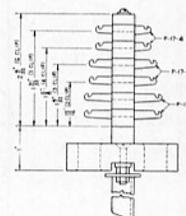
3 point solder clips are set in a rubber block for mounting on a continuous fanning strip. The block mounting 20 pairs is 8¾ in. long and 26 pairs is 8¾ in. long.



Type 4000



Type 5000



Available from 2 to 10 clips high and from 10 to 50 pairs long on mounting centers of 6½ inches and longer. The rubber block mounting 20 pairs is 8¾ in. long and 26 pairs is 8¾ in. long.

Cook No. L-10 Main Distributing Frame

This floor type main frame is of all steel construction and is used for mounting H-51 central office protectors. It consists of two vertical upright angle iron supports with cross pieces, wall braces, jumper rings, and necessary bolts. Additions may be made to either the right or left side. The top cross piece is drilled to attach a cable bracket to the switchboard.

The vertical uprights are 6 feet 9 inches high. The frame is 16 inches wide and the adjustable wall braces are 18 inches long. All steel parts are finished in gray enamel.

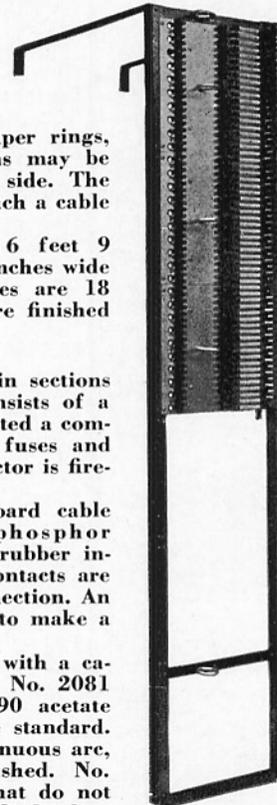
H-51 Protector

These protectors are made in sections of 10 pairs. Each section consists of a steel panel, on which are mounted a combination of line terminals, fuses and lightning arresters. This protector is fire-proof.

Outside cable and switchboard cable are soldered directly to the phosphor bronze terminals set in hard rubber insulation. Screw and washer contacts are provided for proper cross connection. An extra solder clip is furnished to make a common ground.

No. A-12 composition fuses with a capacity of 1 ampere are used. No. 2081 grooved carbons and No. 2090 acetate dielectrics .005 inch thick are standard. Under the influence of a continuous arc, a permanent ground is established. No. 4500 True Gap Dischargers that do not ground the line will be supplied when specified. Arresters ground on a copper ground strip that runs the length of the mounting plate, with provisions to make the ground continuous.

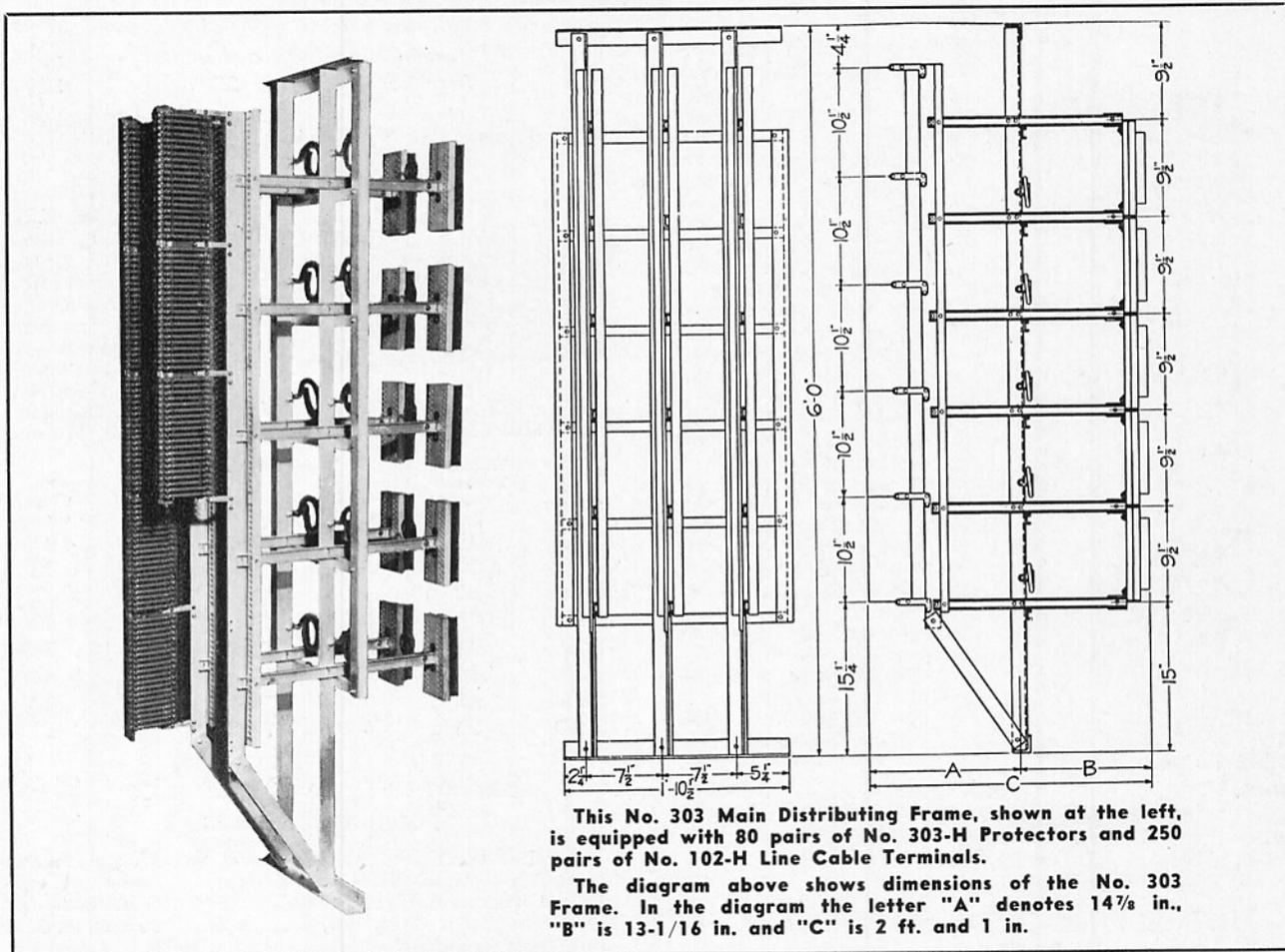
Jumper rings are mounted in the center of each plate. Metal pins on the back are provided for tying up the cable. Where wires run through the metal base, fibre insulation is provided.



No. L-10
Frame with
No. H-51
Protector

Cat. No.	Description	Dimensions, Inches	Shpg. Weight
		Length Width Depth	
1260	L-10 Frame, 50 Pairs	82 12 24	16 lbs.
1040	H-51 Protector, 10 Pairs	11¼ 12 2¾	6 lbs.
2081	Grooved Carbons for H-51 Protector.		
2090	Acetate Dielectrics (.005 in.) for H-51 Protector.		
4500	True Gap Dischargers for H-51 Protector.		
2106	A-12 Composition Fuses, (1 ampere) for H-51 Protector.		

PROTECTION and CROSS CONNECTING EQUIPMENT
Reliable No. 303 Main Distributing Frame



This No. 303 Main Distributing Frame, shown at the left, is equipped with 80 pairs of No. 303-H Protectors and 250 pairs of No. 102-H Line Cable Terminals.
The diagram above shows dimensions of the No. 303 Frame. In the diagram the letter "A" denotes 14 7/8 in., "B" is 13-1/16 in. and "C" is 2 ft. and 1 in.

This floor type frame is strong and rigid and is arranged for growth either on the left or right side. Each vertical section has a capacity of 100 pairs of No. 303-F or 303-H switchboard protectors mounted in banks of 20 pairs each. Terminal blocks may be attached in either vertical or horizontal rows as ordered, in 26 pair blocks. Vertical rows of terminals are recommended for frames up to 600 lines. Line terminals are numbered from 1 to 125 for each vertical.

Jumper rings are of generous size and are well insulated. Cable fanning strips and jumper wire facilities permit a neat and convenient cable and jumper layout. Test plugs and cords are supplied.

When ordering specify iron work, fanning strips, terminal blocks and central office protectors. Type 102-H line terminals are used.

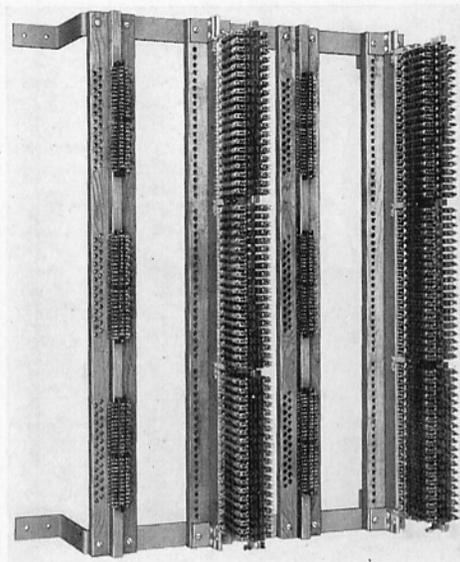
Cat. No. 303	Description Iron Work Only—100-Pair Unit	Net Weight 36 lbs.
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Reliable No. 307 Wall Type Distributing Frame

This accessible, substantial wall type frame may be used where space does not permit the installation of a floor type frame. Each vertical section has a capacity of 60 pairs of No. 303-F or 303-H switchboard protectors, mounted in banks of 20 pairs each, and 78 pairs of No. 104-H line terminals in 26-pair groups.

Verticals are equipped alternately with protectors and line terminals. The maximum capacity of this wall type frame is 240 pairs of protectors and 312 pairs of line terminals. Protector fanning strips are numbered beginning with one from the top down and from left to right, unless otherwise specified.

Cat. No. 307	Description Iron Work Only—60-Pair Unit	Net Weight 12 1/2 lbs.
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Switchboard Section

POWER AND PROTECTION EQUIPMENT

PROTECTION and CROSS-CONNECTING EQUIPMENT

Reliable No. 303-H Switchboard Protector



The No. 303-H heat coil and air gap central office protector is used for protection against sneak currents, lightning, and direct crosses with power circuits.

The heat coil, which may be reset repeatedly, is of the quick, wide opening type which will protect against crosses with power circuits as efficiently as a standard telephone fuse. After operating, the indicator protrudes more than an inch from the end of the cartridge and can be seen from a distance. To reset, the repair man presses on the indicating rod while a current of 1 ampere is applied to the coil. When the solder melts, he feels the rod give, cuts off the current and holds the rod a moment to give the solder time to set.

If it is desired to connect the heat coil fuse inside the carbons, the bank is simply turned end for end.

Each protector pair consists of two No. 107 heat coils, two No. P-945 sawtooth discharge blocks, and two No. P-633 carbons.

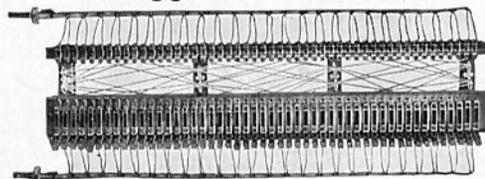
Cat. No.	Description	Net Weight
303-H	20-Pair Bank Protector Unit	4½ lbs.
107	Heat Coil for No. 303-H Protector	
P-495	Discharge Block for No. 303-H Protector	
P-663	Carbon for No. 303-H Protector	

Reliable No. 303-F Switchboard Protector

The No. 303-F Switchboard Protector is used where the expense of heat coils is not justified. Each protector pair consists of two No. 106 fibre fuses, two No. P-495 sawtooth discharge blocks and two No. P-663 carbons.

Cat. No.	Description	Net Weight
303-F	20-Pair Bank-Protector Unit	4½ lbs.
106	Fibre Fuse for No. 303-F Protector	
P-495	Discharge Block for No. 303-F Protector	
P-663	Carbon for No. 303-F Protector	

Kellogg No. 6 Arrester



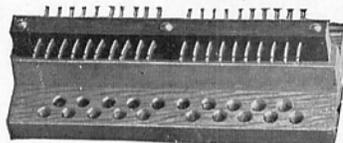
No. 6 is a combination lightning arrester, fuse and cross-connecting rack. The capacity is 25 metallic lines or 50 grounded lines and the arrester is so arranged that any line can be cross connected to any switchboard drop. Additional racks may be added to obtain any capacity desired.

It is equipped with No. 11 fuse and carbon arresters with mounting centers spaced on ⅝-inch centers. The

carbons used are 1¼ inches long, ⅜ inch wide and ¼ inch thick.

Cat. No.	Description	No. of Pairs Capacity	Length in Inches
6	Arrester	25	32½

Reliable Type No. 112 Line Terminal Blocks



Reliable No. 112 line terminal blocks are used for terminating cables on No. 303 type main distributing frames with five transverse arms. Solder terminals are embedded

in maple and mounted on maple fanning strips. Brackets are provided for mounting terminal blocks on the frame.

Cat. No.	Number of Terminals in Each Row	Number of Rows of Terminals	Length of Strip, Inches	Width of Strip, Inches	Net Weight, Ounces
112-A	20	1	7½	3	10
112-B	20	2	7½	3	11
112-C	20	3	7½	3	13
112-D	20	4	7½	3	13
112-AA	26	1	7½	3	10
112-AB	26	2	7½	3	12
112-AC	26	3	7½	3	13
112-AD	26	4	7½	3	14

Reliable Type No. 2 Line Terminal Blocks

These line terminal blocks are used on wall type main distributing frames. They are the same as the type 112 terminal blocks described above but they are not mounted on fanning strips. They may also be used on continuous maple fanning strips.

Cat. No.	Number of Terminals in Each Row	Number of Rows of Terminals	Dimensions, Inches			Net Weight, Ounces
			Length	Width	Height	
2-A	20	1	5⅞	⅞	⅞	2
2-B	20	2	5⅞	⅞	⅞	3
2-C	20	3	6⅞	⅞	1¼	5
2-D	20	4	6⅞	⅞	1½	5
2-AA	26	1	7⅞	⅞	⅞	2
2-AB	26	2	7⅞	⅞	⅞	4
2-AC	26	3	7⅞	⅞	1¼	5
2-AD	26	4	7⅞	⅞	1½	6

Reliable Type No. 102 Line Terminal Blocks

Type No. 102 line terminal blocks are used on No. 303 main distributing frames with 6 transverse arms. They are the same as No. 112 line terminal blocks except that they are mounted on longer fanning strips for mounting vertically between the transverse arms of the distributing frame.

Cat. No.	Capacity	Length, Inches	Width, Inches	Net Weight
102-H	26 Pairs	9⅞	3	12 oz.
102-K	20 Pairs	9⅞	3	12 oz.

POWER APPARATUS

All telephone switchboards require a source of current for ringing and talking purposes. Magneto switchboards are provided with hand generators wired to a generator switching key so that power ringing may be used if desired. Unless otherwise specified the operator's set is designed to operate from dry cell batteries which may be replaced by a battery eliminator. Power ringing may be used for magneto service

when the operator must handle a large number of calls. All common battery boards require storage batteries both for ringing and talking.

The type of ringing equipment best suited for an individual exchange varies with each installation. Kellogg engineers will, upon request, and without obligation, recommend the most reliable and economical type for your exchange.

Storage Batteries

In selecting the proper battery for a telephone installation, the purchaser should consider the requirements of his particular exchange and the ratio of cost to potential life of the battery that will meet these requirements. Generally the life of a battery is determined by two factors: type of plates, and method of charging.

There are two general types of plates — Planté and Faure. Both types have been proved in telephone work; however, longer life is generally conceded to the Planté type while the Faure type usually has lower unit capacity cost.

Planté plates are formed from lead with the active material electro-chemically deposited on ribbons or grooved strips inside. The Faure (or pasted) plate is formed by the mechanical pasting of the active material in the open spaces of the grid-shaped, lead-antimony sheet. This construction is used by virtually all manufacturers of Faure cells.

The following listings of storage batteries are confined to the sealed glass-jar which, due to their construction, completely confine the spray within the cells. This eliminates the need for special compartments, trays or battery rooms. However, open-type batteries are still available for large installations. These, as well as repair parts, can be furnished on order.

Sealed glass-jar type batteries are shipped complete with electrolyte, inter-cell connectors, and other necessary parts to insure quick and satisfactory installation. Cells are shipped charged, ready for immediate service.

The following table shows the correct size and type of battery for small exchanges with various traffic loads and types of cord circuits. For battery capacity greater than 60 ampere hours, consult a Kellogg representative or submit detailed information to the Kellogg factory.

Exide Batteries

There are two types of Exide batteries used in telephone service: the chloride accumulator (Planté type); and the pasted plate (Faure type). These are furnished in capacities to meet virtually every requirement. In all types listed the glass covers are sealed to the top of the jars and have spray-proof vents.

Chloride Accumulator Type—The chloride accumulator is the more durable of the two types because of its rugged plate construction. The Manchester positive plate is of lead-antimony alloy, perforated with openings into which buttons of active metal are forced. Its Box negative plate has a grid formed of square pockets with perforated sides holding the sponge lead in permanent position.

Pasted Plate Type — The pasted plate type will furnish greater ampere-hour capacity in a given space than the chloride type and the initial cost is lower. Both chloride accumulator and pasted plate Exide batteries are of the

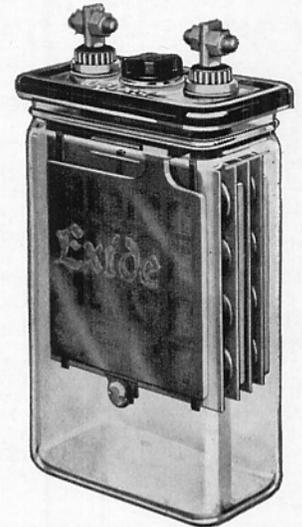
same general construction exclusive of the plates. The active material is deposited on both sides of the plate framework in vertical strips between horizontal bars which are staggered for greater strength except for type LXGH which is specially constructed. Where space is limited and cost is a consideration, where service requirements are light and operating conditions are satisfactory, the results obtained from the pasted plate type may justify its selection.

A thermometer and a hydrometer syringe will be added to all battery orders for 11 cells or more of 80 amperes hours or larger capacity.

Exide DMGO, EM and FM — Chloride Accumulator Type

Types EM and FM Exide batteries have square posts and burned ring seal construction in all sizes. Type EM and DMGO cells have single-post construction while type FM cells have double-post construction. All three types have Manchester positive and Box negative plates with wood separators.

They are shipped assembled, sealed, charged and filled with electrolyte, ready for service. Bolt connectors, lead-plated copper inter-cell connectors and lugs are furnished with 2 cells or more. These units are shipped without crates. Information on racks for these cells will be furnished on request.



Single Cell Units

Type	Ampere Hours Capacity, 8-Hour Rate, 1.75 Volts	Dimensions in Inches			Shipping Weight Lbs.
		Length	Width	Height	
DMGO-5	40	4 1/8	8 1/16	14 3/8	40
DMGO-7	60	5 1/8	8 1/16	14 3/8	50
DMGO-9	80	7	8 1/16	14 3/8	62
EM-5	80	5 3/4	10 3/4	17 3/8	72
EM-7	120	6 3/8	10 3/4	17 3/8	91
EM-9	160	8 1/4	10 3/4	17 3/8	119
EM-11	200	9 3/4	10 3/4	17 3/8	143
EM-13	240	11	10 3/4	17 3/8	163
EM-15	280	12 3/8	10 3/4	17 3/8	182
FM-9	320	9 1/4	14 7/16	22	220
FM-11	400	10 1/8	14 7/16	22	250

Switchboard Section

POWER AND PROTECTION EQUIPMENT

STORAGE BATTERIES

Exide EOT and FOT — Pasted Plate Type

These pasted plate batteries have extra thick plates which greatly increase the useful life of the battery. Elements are suspended in blown glass jars. Type EOT has single post construction and four hard rubber tie bars between the outside negative plates, holding the entire element together, forming a strong compact assembly. The larger size, type FOT has six tie bars and double post construction.

These cells are shipped assembled, sealed, charged and filled with electrolyte. Information on racks for these batteries will be furnished on request.

Single Cell Units

Type and Size	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	Dimensions in Inches			Shipping Weight Lbs.
		Length	Width	Height	
EOT-5	105	5 $\frac{1}{8}$	10 $\frac{3}{4}$	17 $\frac{3}{8}$	62
EOT-7	158	5 $\frac{3}{4}$	10 $\frac{3}{4}$	17 $\frac{3}{8}$	75
EOT-9	210	7 $\frac{1}{4}$	10 $\frac{3}{4}$	17 $\frac{3}{8}$	97
EOT-11	263	8 $\frac{1}{8}$	10 $\frac{3}{4}$	17 $\frac{3}{8}$	118
EOT-13	315	8 $\frac{7}{8}$	10 $\frac{3}{4}$	17 $\frac{3}{8}$	129
EOT-15	368	10 $\frac{3}{8}$	10 $\frac{3}{4}$	17 $\frac{3}{8}$	151
EOT-17	420	11	10 $\frac{3}{4}$	17 $\frac{3}{8}$	163
EOT-19	473	11 $\frac{7}{8}$	10 $\frac{3}{4}$	17 $\frac{3}{8}$	175
FOT-11	525	9 $\frac{1}{4}$	14 $\frac{7}{8}$	22	214
FOT-13	630	10	14 $\frac{3}{8}$	22	237
FOT-15	735	11 $\frac{1}{2}$	14 $\frac{3}{8}$	22	273
FOT-17	840	12 $\frac{5}{8}$	14 $\frac{3}{8}$	22	295
FOT-19	945	13	14 $\frac{3}{8}$	22	318
FOT-21	1050	14 $\frac{5}{8}$	14 $\frac{3}{8}$	22	354
FOT-23	1155	15 $\frac{1}{4}$	14 $\frac{3}{8}$	22	377

Exide BTMH-2, CTMH-2, ETMH-2 and PTMH-2 — Chloride Accumulator Type

These 2-plate batteries are adapted to those general services where the current requirements are small. Each cell has one Manchester positive and one Box negative plate with a thick wooden separator between them.

For convenience in handling and installation these batteries are assembled in wooden crates with from 2 to 12 units, arranged in either single or double rows. The crates of the two larger sizes, PTMH-2 and ETMH-2 are equipped with steel handles. The inter-cell connectors in each crate are burned to the posts.

When shipped, these cells are assembled in crates, sealed, charged and filled with electrolyte, and equipped with connectors, ready for service.

Multi-Cell Units

Type	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	No. of Cells in Crate — 1 Row	Dimensions in Inches			Shipping Weight Each Unit, Lbs.
			Length	Width	Height	
BTMH-2	6	3	7 $\frac{7}{8}$	4 $\frac{1}{8}$	10 $\frac{1}{8}$	23
		4	10 $\frac{3}{8}$	4 $\frac{1}{8}$	10 $\frac{1}{8}$	30
		11	26 $\frac{5}{8}$	4 $\frac{1}{8}$	10 $\frac{1}{8}$	81
		12	28 $\frac{1}{8}$	4 $\frac{1}{8}$	10 $\frac{1}{8}$	88
CTMH-2	12	3	8 $\frac{1}{8}$	7 $\frac{1}{2}$	12 $\frac{1}{8}$	45
		4	11 $\frac{1}{8}$	7 $\frac{1}{2}$	12 $\frac{1}{8}$	59
		11	29 $\frac{5}{8}$	7 $\frac{1}{2}$	12 $\frac{1}{8}$	156
PTMH-2	24	12	32 $\frac{1}{8}$	7 $\frac{1}{2}$	12 $\frac{1}{8}$	170
		3	11 $\frac{1}{8}$	8	16 $\frac{7}{8}$	73
		4	14 $\frac{1}{8}$	8	16 $\frac{7}{8}$	95
ETMH-2	36	11	34 $\frac{5}{8}$	8	16 $\frac{7}{8}$	249
		12	37 $\frac{9}{8}$	8	16 $\frac{7}{8}$	271
		3	12 $\frac{1}{8}$	10 $\frac{9}{8}$	16 $\frac{5}{8}$	105
		4	15 $\frac{5}{8}$	10 $\frac{9}{8}$	16 $\frac{5}{8}$	137
		6

Exide LXGH, KZHGR and BTER — Pasted Plate Type

The elements are made up of plates of the pasted type, assembled with both wood and rubber separators in strong, sealed glass jars. Spray-proof, easy to remove vent plugs are furnished. Each container has one cell equipped with pilot balls to give an indication of the state of charge.

11 and 12-cell BTER and KZHGR batteries are assembled in wood crates. Shipped assembled, sealed, charged and filled with electrolyte, ready for service. On all orders for 11 cells or more a hydrometer syringe and lead tape inter-cell connectors will be added.

Multi-Cell Units

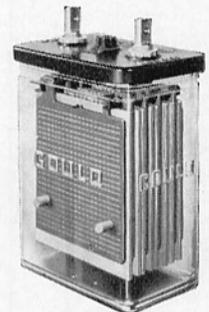
Type and Size	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	No. of Cells Per Unit	Dimensions in Inches			Shipping Weight Per Unit Lbs.
			Length	Width	Height	
3-BTER-5	14.4	3	9	5 $\frac{3}{8}$	8 $\frac{3}{8}$	37
3-BTER-7	21.6	3	9	5 $\frac{3}{8}$	8 $\frac{3}{8}$	40
11-BTER-5	14.4	11	21 $\frac{1}{8}$	12	9 $\frac{7}{8}$	141
11-BTER-7	21.6	11	21 $\frac{1}{8}$	12	9 $\frac{7}{8}$	163
12-BTER-5	14.4	12	21 $\frac{1}{8}$	12	9 $\frac{7}{8}$	153
12-BTER-7	21.6	12	21 $\frac{1}{8}$	12	9 $\frac{7}{8}$	165
3-KZHGR-7	25.0	3	9	5 $\frac{3}{8}$	8 $\frac{3}{8}$	39
11-KZHGR-7	25.0	11	21 $\frac{1}{8}$	12	9 $\frac{7}{8}$	161
12-KZHGR-7	25.0	12	21 $\frac{1}{8}$	12	9 $\frac{7}{8}$	167
2-LXGH-7	50	2	6 $\frac{3}{8}$	7 $\frac{1}{2}$	10 $\frac{1}{4}$	41
3-LXGH-7	50	3	9 $\frac{3}{8}$	7 $\frac{1}{2}$	10 $\frac{1}{4}$	58
2-LXGH-9	60	2	6 $\frac{3}{8}$	7 $\frac{1}{2}$	10 $\frac{1}{4}$	50
3-LXGH-9	60	3	9 $\frac{3}{8}$	7 $\frac{1}{2}$	10 $\frac{1}{4}$	72
2-LXGH-13	100	2	9 $\frac{3}{4}$	7 $\frac{1}{2}$	10 $\frac{1}{4}$	68
3-LXGH-13	100	3	14 $\frac{3}{8}$	7 $\frac{1}{2}$	10 $\frac{1}{4}$	103

Gould Batteries

The Gould line includes a comprehensive range of capacities in three types of cells: Planté, Armored Kathode and Dreadnaught (Faure).

All Gould cells are assembled in blown glass jars with hard rubber covers. Types HSC, NHSC, MPE and NPE are of dual suspension construction. Types HSX and NHSX are also of Gould suspension design. This construction features projections which rest on opposite top edges of the jars to support the weight of the element and the use of hard rubber channels resting on the top edges of the plates of one group to support the far side of the group of opposite polarity.

Planté Type—Gould Planté cells have elements made up of Planté positive and Faure negative groups insulated with white cedar separators. The positive plates are shaped from lead sheets by the Gould "Spinning Operation" and the active material is formed directly from the pure lead base. This type of Gould battery should be selected where the primary consideration is long life and a minimum of maintenance.



STORAGE BATTERIES

Gould Batteries — Continued

Armored Kathanode Type — Armored Kathanode cells have elements assembled with positive Kathanode units and pasted type negative groups insulated with white cedar separators. The positive active material is retained in antimony-lead supporting structures by spun glass retaining mats and perforated hard rubber envelopes which constitute the positive elements from which the positive Kathanode units are assembled.

Dreadnaught Type — Dreadnaught cells are of the pasted plate type with the active metal in staggered bar grids. Perforated rubber envelopes open at top and bottom and with solid vertical edges, encase each positive plate. Cedar separators provide insulation and correct spacing. Where minimum first cost is the first consideration, this type of Gould battery should be selected.

Gould MPE and NPE — Plante' Type

These cells are shipped completely assembled and charged, supplied with inter-cell, inter-row and terminal connectors.

Single Cell Units

Type and Size	Capacity in Ampere Hours, 8-Hour Rate, 1.75 Volts	Dimensions in Inches			Shipping Weight Lbs.
		Length	Width	Height	
MPE-303	20	5	8 1/8	12 1/2	29
MPE-305	40	5	8 1/8	12 1/2	35
MPE-307	60	5 7/8	8 1/8	12 1/2	41
MPE-309	80	6 7/8	8 1/8	12 1/2	47
NPE-405	80	5 1/8	10 1/8	15 7/8	55
NPE-407	120	6	10 1/8	15 7/8	66
NPE-409	160	6 7/8	10 1/8	15 7/8	77
NPE-411	200	9 3/4	10 1/4	18 1/2	115
NPE-413	240	9 3/4	10 1/4	18 1/2	125
NPE-415	280	13 1/4	10 1/4	18 1/2	155
NPE-417	320	13 1/4	10 1/4	18 1/2	165
NPE-419	360	13 1/4	10 1/4	18 1/2	175
NPE-421	400	13 1/4	10 1/4	18 1/2	185

Gould HSX and NHSX — Armored Kathanode Type

Shipped completely assembled, sealed and charged with all necessary accessories—ready for immediate installation and service.

Single Cell Units

Type and Size	Capacity in Ampere Hours, 8-Hour Rate, 1.75 Volts	Dimensions in Inches			Shipping Weight Lbs.
		Length	Width	Height	
HSX-3	20	5	8 1/8	12 1/2	26
HSX-5	40	5	8 1/8	12 1/2	29
HSX-7	60	5	8 1/8	12 1/2	31
HSX-9	80	6 7/8	8 1/8	12 1/2	36
HSX-11	100	6 7/8	8 1/8	12 1/2	41
HSX-13	120	6 7/8	8 1/8	12 1/2	44
NHSX-5	80	5 1/8	10 1/8	15 7/8	50
NHSX-7	120	5 1/8	10 1/8	15 7/8	56
NHSX-9	160	6	10 1/8	15 7/8	67
NHSX-11	200	6 7/8	10 1/8	15 7/8	78
NHSX-13	240	6 7/8	10 1/8	15 7/8	85
NHSX-15	280	9 3/4	10 1/4	18 1/2	125
NHSX-17	320	9 3/4	10 1/4	18 1/2	130
NHSX-19	360	9 3/4	10 1/4	18 1/2	135
NHSX-21	400	13 1/4	10 1/4	18 1/2	175
NHSX-23	440	13 1/4	10 1/4	18 1/2	180
NHSX-25	480	13 1/4	10 1/4	18 1/2	185
NHSX-27	520	13 1/4	10 1/4	18 1/2	190

Gould HSC and NHSC — Dreadnaught Type

Shipped completely assembled, sealed and charged—with connectors and lugs ready for immediate installation and service.

Single Cell Units

Type and Size	Capacity in Ampere Hours, 8-Hour Rate, 1.75 Volts	Dimensions in Inches			Shipping Weight Lbs.
		Length	Width	Height	
HSC-3	20	5	8 1/8	12 1/2	26
HSC-5	40	5	8 1/8	12 1/2	29
HSC-7	60	5	8 1/8	12 1/2	31
HSC-9	80	5 7/8	8 1/8	12 1/2	36
HSC-11	100	6 7/8	8 1/8	12 1/2	41
HSC-13	120	6 7/8	8 1/8	12 1/2	44
NHSC-5	80	5 1/8	10 1/8	15 7/8	50
NHSC-7	120	5 1/8	10 1/8	15 7/8	56
NHSC-9	160	6	10 1/8	15 7/8	67
NHSC-11	200	6 7/8	10 1/8	15 7/8	78
NHSC-13	240	6 7/8	10 1/8	15 7/8	85
NHSC-15	280	9 3/4	10 1/4	18 1/2	125
NHSC-17	320	9 3/4	10 1/4	18 1/2	130
NHSC-19	360	9 3/4	10 1/4	18 1/2	135
NHSC-21	400	13 1/4	10 1/4	18 1/2	175
NHSC-23	440	13 1/4	10 1/4	18 1/2	180
NHSC-25	480	13 1/4	10 1/4	18 1/2	185
NHSC-27	520	13 1/4	10 1/4	18 1/2	190

Philco Batteries

Philco sealed-type, spray-proof telephone batteries are available in capacities ranging from 12 to 1120 ampere hours. Composition covers have funnel type vents to condense moisture so that battery tops are kept clean and dry. Water can be added without removal of vents.

Flote' Type — Philco batteries are of the Faure or pasted plate type and feature Floté special grids and plate construction. The active material is firmly pressed into the plate and locked in place, by virtue of crossing grid members on opposite plate surfaces.

Diamond Grid Type — For those installations where low initial cost is a factor, Philco batteries with standard "Diamond" grids are available. Quarter-sawed fir separators with alternate hard and soft vertical layers are placed between the positive and negative plates providing uniform porosity and great strength. Plates are suspended from composition molded covers and are sealed in blown glass jars. Slotted rubber envelope retainers are held firmly against and completely surround each positive plate surface protecting the separators and holding active material in place.

Construction — Types DF, EFP, FFP, RT, KG, CF, and PF are of Philco, "Steel Glass" jar construction — a method of assembly in which the elements are supported by ribs formed in the bottom of the pressed moulded jar and held in place by corner and side locks consisting of tapered hard rubber wedges. This reduces excessive sediment, and prevents buckling of plates or shifting from their original positions.

Types DFS and EFS are of the suspended element type with blown glass jars.

Charge Indicators — All types have built-in charge indicators to show the state of charge without the use of hydrometer.

Crates — Sturdy UXB type cabinets without covers can be furnished. They are finished with two coats of acid-proof asphaltum paint.

Switchboard Section

POWER AND PROTECTION EQUIPMENT

STORAGE BATTERIES

Philco DF, EFP and FFP — Flote' Type.

These suspended element type batteries are shipped charged and sealed with all necessary inter-cell, inter-row and terminal connectors ready for service.

Single Cell Units

Type and Size	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	Dimensions in Inches			Shipping Weight Lbs.
		Length	Width	Height	
5-DF	48	4½	8⅝	12⅞	34
7-DF	72	6¾	8⅝	12⅞	47
9-DF	96	6¾	8⅝	12⅞	52
5-EFP	96	7⅞	10⅞	16⅞	72
7-EFP	144	7⅞	10⅞	16⅞	79
9-EFP	192	7⅞	10⅞	16⅞	86
11-EFP	240	10⅞	10⅞	16⅞	120
13-EFP	288	10⅞	10⅞	16⅞	127
9-FFP	384	10⅞	10⅞	16⅞	134
11-FFP	480	12⅞	10⅞	16⅞	159
13-FFP	576	12⅞	10⅞	16⅞	165
15-FFP	672	12⅞	10⅞	16⅞	172



Philco DFS and EFS — Flote' Type.

Types DFS and EFS have standard Faure cells with suspended elements.

Shipped charged and sealed, with all necessary inter-cell, inter-row and terminal connectors, ready for service.

Single Cell Units

Type and Size	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	Dimensions in Inches			Shipping Weight, Lbs.
		Length	Width	Height	
5-DFS	50	4½	8⅝	12⅞	34
7-DFS	75	6¾	8⅝	12⅞	47
9-DFS	100	6¾	8⅝	12⅞	52
5-EFS	100	7⅞	10⅞	16⅞	72
7-EFS	150	7⅞	10⅞	16⅞	79
9-EFS	200	7⅞	10⅞	16⅞	86
11-EFS	250	10⅞	10⅞	16⅞	120
13-EFS	300	10⅞	10⅞	16⅞	127
15-EFS	350	10⅞	10⅞	16⅞	134
17-EFS	400	12⅞	10⅞	16⅞	159
19-EFS	450	12⅞	10⅞	16⅞	165
21-EFS	500	12⅞	10⅞	16⅞	172

Philco RT — Flote' Type

These 3-cell, steel-glass jar assemblies with Flote' suspended plates may be used for intercommunicating systems, operator's transmitter battery, etc. The larger assemblies offer greater capacity for restricted space.

Multi-Cell Units

Type and Size	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	No. of Cells	Dimensions in Inches			Shipping Weight Per Unit Lbs.
			Length	Width	Height	
72-RT*	50	1	8½	7½	10⅞	43
74-RT*	50	2	8½	7½	10⅞	48
76-RT	50	3	8½	7½	10⅞	53

Philco RT Type — Cont.

Type and Size	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	No. of Cells	Dimensions in Inches			Shipping Weight Per Unit Lbs.
			Length	Width	Height	
132-RT*	100	1	13⅞	7⅞	10⅞	77
134-RT*	100	2	13⅞	7⅞	10⅞	87
136-RT	100	3	13⅞	7⅞	10⅞	97

*Units are assembled in 3-compartment containers. One compartment is left blank for 4-volt units and two compartments left blank for 2-volt units.

Philco CF and PF — Flote' Type.

These batteries are shipped fully charged, sealed and with all necessary connectors, ready for service.

The 96-PF is a rugged, 3-cell unit, recommended for manual and dial PBX, central office No. 2 battery service and other low discharge requirements.

Single-cell units may be had with built-in charge indicators. Specify the number of cells required. Multi-units have one cell fitted with built-in charge indicator.

Multi-Cell Units

Type and Size	Unit Volts	Capacity in Amperes Hours, 8-Hour Rate, 1.75 Volts	No. of Cells Per Unit	Dimensions in Inches			Shipping Weight Lbs.
				Length	Width	Height	
52-CF	2	10	1	2⅝	3⅝	7¾	8
54-CF	4	10	2	2⅝	7¼	7¾	12
92-PF	2	20	1	4⅝	3⅝	7¾	13
94-PF*	4	20	2	4⅝	10⅞	7¾	25
96-PF	6	20	3	4⅝	10⅞	7¾	29

Noise Killer Condenser for Ringing Machine — Type FT-10

Used to kill the noise induced by pole changer ringing equipment. This tantalum electrolytic condenser is puncture-proof and self healing . . . it has an indefinitely long life, is simple in construction and requires practically no attention. It cannot be broken down.

It consists of a pair of tantalum plates in sulphuric acid electrolyte. Tantalum is the permanent, non-corroding rectifier metal used in Fansteel Balkite Rectifiers in a special porous form which provides high condenser output.

Normal capacity at 24 volts (11 cells) is 50 mfd. Dimensions are 5¼ inches high x 4 inches in diameter. Shipping weight is 6 lbs.



Kellogg Battery Racks

Two types of Kellogg steel battery racks are available: the tier type and the step type.

The more popular step type is used wherever space permits. This type of rack permits easy servicing of the batteries as the tops of all the cells are out in the open exposed to view, and are easily accessible for hydrometer readings, addition of water, etc.

The tier type battery rack is built up in shelves, one directly above the other. This rack will be the same length as the step type but will be higher and will not be as wide. The tier type is used where space is a deciding factor and as one shelf is above the other it is not as easy to add water, take readings and make inspections as with the step type.

Either type of rack can be built for any size or any number of glass jar battery cells. They are built of 1¼ in. to 2½ in. angle iron, depending on the size, weight, and number of cells of battery to be mounted. All joints are spot welded—the frame is finished in gray.

CHARGING EQUIPMENT

Charging

Most storage batteries are charged by the trickle, or the automatic control method. The trickle method consists of charging the batteries continuously over a twenty-four hour period at a constant rate sufficient to compensate for drain and battery losses.

The automatic control method allows charging equipment to automatically operate or start when battery discharge reaches a predetermined point. The charger automatically disconnects when battery becomes fully charged.

Raytheon Rectichargers

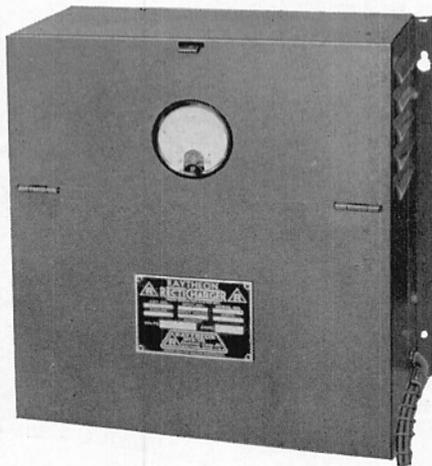
A Recticharger with a small storage battery floating across its terminals makes a complete AC to DC telephone power unit. Basically it is a dry disc copper oxide rectifier with a Raytheon control circuit which maintains a substantially constant DC voltage output at any load in the presence of wide changes in AC input voltage. Built-in filters insure quiet operation.

When the load current demand is less than the Recticharger rating, the Recticharger supplies all of the current required, and, at the same time delivers to the battery a trickle charge of the right amount to make up for internal battery losses and to prevent destructive chemical action as well as replace any load taken from the battery while the load was greater than the output of the Recticharger. If the current demand exceeds the rating, the excess is supplied by the battery. When the load drops back to a value below the Recticharger rating, the Recticharger output remains at its maximum rated value. The difference between the Recticharger rating and the load current is then supplied to the battery until it is fully charged. When this point is reached the Recticharger output will be reduced to a point where it is operating the switchboard and trickle charging the battery again.

The battery acts as a reservoir of power to supply any peak DC current demand over the current rating of the Recticharger, or to furnish all the DC power in case of AC interruption.

Battery activity is reduced to a minimum, and maximum battery life is assured. The only maintenance required is the replacement of battery water lost through evaporation.

A Recticharger may be used to supplement existing constant current chargers with filters for telephone service. When this method is employed, the effect of follow-



Automatic control of the charging equipment eliminates the possibility of starving or overcharging the battery. The control unit may be either an ampere hour meter or voltmeter relay. An automatic starting rectifier must be used with the automatic charging control circuit. The Fansteel Tungar or copper oxide type of rectifiers listed are the automatic starting type and are suitable for use with an automatic charging control circuit. The Raytheon Recticharger which has copper oxide rectifying units has its own control unit built in as a part of the rectifier circuit.

ing the load and keeping the battery fully charged is achieved.

This doubles the available power and is accomplished by installing a special relay and a Recticharger of the proper rating with the constant current charger. The output current rating of the charger should not exceed the rating of the Recticharger. If the rating is higher, the output current must be adjusted to match the Recticharger current rating.

Input — Input is 95-130 volts, 60 cycles stabilized frequency, single phase. All Rectichargers are equipped with AC input voltage, stabilizing equipment providing for operation on AC lines that may fluctuate from 95 to 130 volts.

Ratings — Normal Recticharger ratings are based on their being installed in live air and where the ambient temperature will not exceed 95° F. for appreciable periods.

Mounting — All equipment is enclosed in a steel cabinet provided with a hinged door. The cabinet is arranged for wall mounting. Brackets are available for floor or table mounting.

Rectichargers With Natural Ventilation

Cat. No.	Battery Cells	Amps. Cont.	Width	Size in Inches Depth	Height	Shipping Weight
1066	11/12	1.0	14½	7⅝	14⅛	62 lbs.
1073	11/12	2.0	14½	9½	14⅛	94 lbs.
1058	11/12	3.0	19	11	21	163 lbs.
1067	11/12	6.0	19	15¼	28	233 lbs.
1068	22/24	1.0	14½	9½	14⅛	93 lbs.
1076	22/24	2.0	19	11	21	173 lbs.
1069	22/24	3.0	19	15¼	28	231 lbs.

Rectichargers With Forced Ventilation

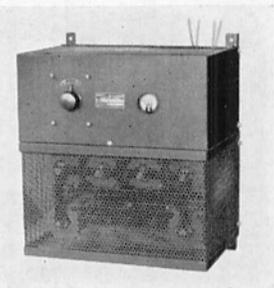
1085	11/12	12.0	19	15¼	21	252 lbs.
1070-A	22/24	6.0	10¼	9¼	13½	280 lbs.

Cut-In control Relays are available for use with Rectichargers used in constant current charger combinations.

G. E. Copper Oxide Battery Chargers

This Copper Oxide Rectifier for telephone service obtains output adjustment over an extremely wide range in very small steps. The copper oxide rectifying unit is a permanent, reliable and safe assembly.

After the charging rate is adjusted no other attention is required. The dial mounted on the front of the cabinet gives perfectly



Switchboard Section

POWER AND PROTECTION EQUIPMENT

CHARGING EQUIPMENT

G. E. Copper Oxide Battery Chargers

uniform adjustment from zero to full load. Since all the adjustment is made with a transformer the efficiency of the rectifier is high. No bulbs are used with this unit.

The lower section of the black crackle finish metal cabinet is perforated to allow free circulation of air to cool the unit.

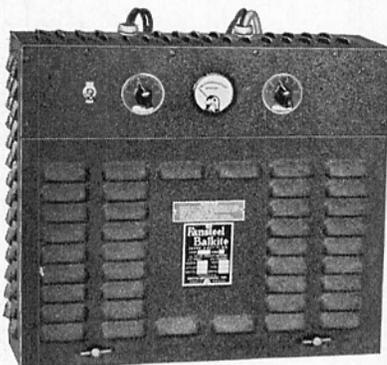
Model	Cells	Amperes	Dimensions in Inches			Shipping Weight Lbs.
			Height	Width	Depth	
6RC49D2	12	0.5	10 $\frac{7}{8}$	11 $\frac{7}{8}$	9 $\frac{1}{4}$	35
6RC98D1	12	1.0	19	13 $\frac{3}{8}$	14 $\frac{7}{8}$	120
6RC98D2	12	2.0	19	13 $\frac{3}{8}$	14 $\frac{7}{8}$	135
6RC98D3	12	3.0	19	13 $\frac{3}{8}$	14 $\frac{7}{8}$	145
6RC99D3	12	4.0	25	13 $\frac{3}{8}$	14 $\frac{7}{8}$	150
6RC99D2	12	5.0	25	13 $\frac{3}{8}$	14 $\frac{7}{8}$	165
6RC99D1	12	6.0	25	13 $\frac{3}{8}$	14 $\frac{7}{8}$	175
6RC95D2	12	8.0	25	20 $\frac{3}{8}$	14 $\frac{7}{8}$	200
6RC96D1	12	12.0	31	20 $\frac{3}{8}$	14 $\frac{7}{8}$	260
6RC98D5	24	1.0	19	13 $\frac{3}{8}$	14 $\frac{7}{8}$	135
6RC99D4	24	2.0	25	13 $\frac{3}{8}$	14 $\frac{7}{8}$	150
6RC99D6	24	3.0	25	13 $\frac{3}{8}$	14 $\frac{7}{8}$	175
6RC100D1	24	4.0	31	13 $\frac{3}{8}$	14 $\frac{7}{8}$	200
6RC96D2	24	5.0	31	20 $\frac{3}{8}$	14 $\frac{7}{8}$	240
6RC96D3	24	6.0	31	20 $\frac{3}{8}$	14 $\frac{7}{8}$	260

Fansteel Balkite Taper Rectifiers

The Fansteel Balkite Rectifier is used for float charging small storage batteries for telephone exchange and PBX switchboards. In the Fansteel Balkite taper charge system the tantalum rectifier automatically raises and lowers the rate of battery charge over a wide range in direct proportion to the load demand on the battery. No relays or other control devices are necessary.

All Balkite Taper Rectifiers are full wave with dial tap switches for close adjustment and are provided with choke and self-healing tantalum condenser for complete filtering.

Type CM



mounting. AC and DC leads are provided in bushings for open or conduit wiring.

For charging 18 to 54 volt batteries at rates up to 2.5 amperes where the daily load does not exceed 50 to 60 ampere hours. The rectifier consists of a transformer with primary and secondary taps, 4 or 8 medium size tantalum rectifier cells, ammeter, AC-DC switch, fuses and output controls in a steel housing arranged for wall

Type	Battery Volts	AC Supply Volts	Cycles	Dimensions in Inches			Shipping Weight Lbs.
				Height	Width	Depth	
CM-30	16-25	100-125	50-100	16	22	8 $\frac{1}{2}$	130
CM-31	16-25	200-250	50-100	16	22	8 $\frac{1}{2}$	130
CM-50	32-54	100-125	50-100	28	22	8 $\frac{1}{2}$	200
CM-51	32-54	200-250	50-100	28	22	8 $\frac{1}{2}$	200

Fansteel Balkite Taper Rectifiers

Type G

Type G full wave rectifier is designed for float charging small 16 to 24 volt batteries at rates up to .5 amperes. It consists of four small rectifier cells, transformer and output adjustment tap switch assembled in a steel cabinet arranged for shelf mounting. Flexible rubber covered leads are provided for battery and AC line connection.



Type	Battery Volts	AC Supply Volts	Cycles	Dimensions in Inches			Shipping Weight
				Length	Width	Height	
G-30	16-25	115	50-100	12	8 $\frac{1}{2}$	6 $\frac{1}{2}$	65 lbs.
G-31	16-25	230	50-100	12	8 $\frac{1}{2}$	6 $\frac{1}{2}$	65 lbs.

Type CB

Type CB is designed for charging batteries from 16 to 54 volts at low charging rates up to 1 ampere. The rectifier contains a transformer with primary and secondary taps, 4 or 8 tantalum rectifier cells, ammeter and controls in a ventilated steel cabinet arranged for wall mounting. AC and DC leads are provided in bushings for open or conduit wiring.



Type	Battery Volts	AC Supply Volts	Cycles	Dimensions in Inches			Shipping Weight Lbs.
				Height	Width	Depth	
CB-30	16-25	100-125	50-100	12	12	9	70
CB-31	16-25	200-250	50-100	12	12	9	70
CB-50	32-54	100-125	50-100	21	12	9	130
CB-51	32-54	200-250	50-100	21	12	9	130

Type CR

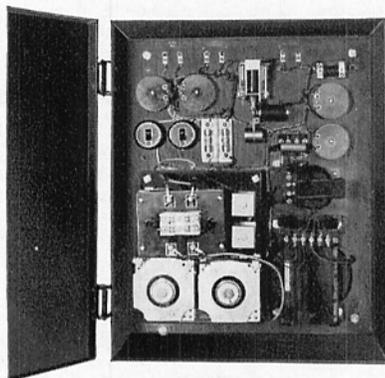
For charging 16 to 54 volt batteries at a rate up to 5 amperes — where the average daily load does not exceed 100 to 120 ampere-hours. The rectifier consists of a transformer with primary and secondary taps, 3 or 6 large tantalum rectifier cells, ammeter, AC-DC switch, fuses, and output controls in a steel cabinet arranged for wall mounting. AC and DC leads are provided in bushings for open or conduit wiring.

Type	Battery Volts	AC Supply Volts	Cycles	Dimensions in Inches			Shipping Weight Lbs.
				Height	Width	Depth	
CR-30	16-25	100-125	50-100	21	19	10 $\frac{1}{2}$	260
CR-31	16-25	200-250	50-100	21	19	10 $\frac{1}{2}$	260
CR-50	32-54	100-125	50-100	37	19	10 $\frac{1}{2}$	400
CR-51	32-54	200-250	50-100	37	19	10 $\frac{1}{2}$	400

POWER UNIT and BATTERY ELIMINATORS

No. 2-A Power Unit

The Kellogg 2-A Power Unit, used with a twenty-four volt storage battery, forms a complete power installation for PBX, magneto or small common battery switchboards handling any number of calls up to 2500 a day. It supplies adequate ringing current of 100 volts, 20 cycle, and does not interfere with radio reception.



This compact unit combines in one cabinet all the necessary fuses, switches, condensers, pole changer, transformer, dry charger, and filter equipment. All of the equipment is mounted on a wood backboard inside the black enameled steel cabinet. Dimensions of mounting cabinet: 20 inches high, 16 inches wide, 8 inches deep. Two conduit knockout holes are provided at top, one for entrance of commercial current and ringing leads to switchboard; the other for direct current leads to storage battery.

The direct current charging rate of the Copper Oxide charger used is variable from approximately 100 milliamperes to 1 ampere by means of slide band resistors.

Code No.	Operating Cycles	Current Voltage	Ringing Cycle	Current Voltage	Net Weight
2-A	60	110-115	20	100	100 lbs.

Raytheon Rectifiers



Raytheon Rectifiers are used to obtain telephone DC power direct from an AC source. They are designed particularly for PBX switchboards, either dial or manual.

Rectifiers provide long, trouble-free, economical operation. Each Rectifier will operate a telephone system for 24 hours a day as long as the maximum current demand does not exceed the rating. Current ratings are based on

installations being in live air where the maximum ambient temperature does not exceed 95° F.

Rectifiers are available with change of source relays which make it possible to furnish DC with dry cells during an interruption.

Rectifiers Using Copper Oxide Rectifying Units

Catalog No.	DC Output for Talking		AC Supply Frequency	Cabinet Size, Inches			Shipping Weight, Lbs.
	Volts	Amps.		Width	Depth	Height	
1024	6	0.5	50/60	7	6¼	10½	17
1026	12	0.5	50/60	7	6¼	10½	17
1027	24	0.5	50/60	7	6¼	10½	34

Raytheon Rectifiers — Cont.

Catalog No.	DC Output for Talking		AC Supply Frequency	Cabinet Size, Inches			Shipping Weight, Lbs.
	Volts	Amps.		Width	Depth	Height	
1044-E	24	1.0	60	14½	7⅝	14⅛	84
1044-ER*	24	1.0	60	14½	7⅝	14⅛	84
1043	24	1.5	60	14½	7⅝	14⅛	90
1043-R*	24	1.5	60	14½	7⅝	14⅛	90
1040	24	3.0	60	14½	9⅝	14⅛	100
1040-R*	24	3.0	60	14½	9⅝	14⅛	100
1082	48	3.0	60	19	12	21½	190
1079	48	4.0	60	19	15⅜	28	210

*With change of source relay. Change of source relays can be supplied on all models where not listed. Order by adding suffix "R" to the catalog number.

Raytheon Rectifiers — Cont.

Battery Eliminator for Operators' Transmitters on Magneto Switchboards

A full 4 volts is furnished by this Rectifier for the best operation of telephone operator's headset transmitters. Lifetime copper oxide rectifying units are used.

Operates from 115 volts, 50/60 cycle AC light socket. Delivers 4 volts DC. Current consumption is 4½ watts. Powers 1 or 2 transmitters.

If there is an AC power interruption, a relay automatically disconnects the Rectifier and connects a set of dry cells provided by the telephone company for this emergency. The Rectifier is automatically reconnected as soon as the AC power circuit is restored to service.



Cat. No.	DC Output		AC Supply Frequency	Cabinet Size, Inches			Shipping Weight, Lbs.
	Volts	Amps.		Width	Depth	Height	
1057-R	4	0.23	50/60	7	6¼	10½	17

Exide Model ES Charge Control

This Exide Charge Control Unit is used to control the charging of an automatic starting type rectifier. The control unit works equally well with either the bulb or dry disc type rectifier.

The unit consists of a small, self-starting synchronous motor driven time switch which operates from 115 volts, 60 cycles AC supply. This time switch starts the charge by operating an Exide T.V.R. voltage relay. The voltage relay winding is bridged across the battery terminals with one side of the winding connected through the contacts of the time switch which are closed 59 minutes and open 1 minute each hour. If the battery voltage is below 2.3 volts per cell at 77° F, the T.V.R. relay will remain unoperated and through its back contacts close the winding circuit of an auxiliary relay which closes AC through its contacts to the rectifier and starts the battery charge.

When the battery voltage rises to a predetermined point the T.V.R. relay operates. This stops the charge.

The unit is installed in a wall mounting steel cabinet 11⅛ in. high, 10 7/16 in. wide and 4 in. deep. The cabinet has a hinged door which may be padlocked if desired. When ordering it is necessary to specify the type of charger and the number of cells as the control is built for a definite number of cells.

Switchboard Section

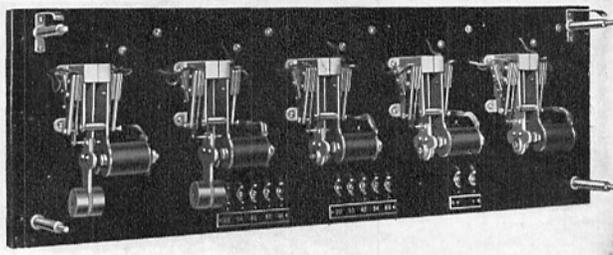
POWER AND PROTECTION EQUIPMENT

POLE CHANGERS

The pole changer is a machine designed to convert direct current into alternating current for telephone ringing purposes. It operates on the same principle as the ordinary door bell, with weighted vibrator to regulate its frequency of vibration. Ordinarily, the telephone exchange storage battery of twenty-four volts is used to operate the vibrator, although a separate set of batteries of the correct voltage and ampere hour capacity may be used.

Pole changers are supplied with a single vibrating unit for straight line service or with four or five vibrating units of different frequencies for party line service.

Five Frequency Harmonic Pole Changers for Relay Rack Mounting



Five Frequency

The Kellogg No. 37, 5-frequency pole changer is designed for selective ringing service. It consists of 5 side-swinging vibrating units identical with each other except for the vibrator reeds and weights. These simple vibrators change the direct current supplied by a 24-volt storage battery to frequencies of 16, 30, 42, 54, and 66 cycles, alternating current. This current is then stepped up to the proper ringing voltage by the use of No. 27-A relay rack mounting or No. 18-A wall mounting transformer set.

The No. 37 pole changer is arranged for relay rack mounting. The vibrators are mounted on an ebony asbestos panel, drilled for mounting on the relay rack tee iron. The pole changer is protected from dust with a black enameled cover.

Cat. No.	Description	Size of Panel
37	Five Frequency	26 in. x 8½ in. x ¾ in.

Four Frequency

The Kellogg No. 39, 4-frequency pole changer is of the same design and has the same method of operation as the No. 37, 5-frequency pole changer. The output is 16-2/3, 33-1/3, 50 and 66-2/3 cycles. It is arranged for relay rack mounting and can be used with either a 21-A wall mounting or a No. 27-A relay rack mounting transformer set. The dimensions are the same as the No. 37 pole changer.

Single Frequency Pole Changer

The Kellogg No. 41 type single frequency pole changer operates directly from the 24-volt D.C. exchange storage battery and produces 100-volt, 20-cycle ringing current. This ringing current can be used for straight line, code and party line (divided tip and ring) ringing.

The simple, side-swinging vibrator is of Kellogg standard design and requires but occasional inspection and adjustment to keep it in perfect operating condition. The ringing transformer is accurately wound with heavy gauge wire, thoroughly insulated and provided with a sufficient number of iron laminations to prevent undue heating under ordinary ringing loads.

The cabinet is of oak, designed for wall mounting. All of the equipment is securely fastened to the heavy oak backboard, and wired to convenient terminals. A hinged glass door protects the apparatus from dust and

Kellogg pole changers require very little attention. They hold their adjustment over a long period of time. There are only three vibrating springs; one is used to operate the pendulum or vibrator reed; the other two, together with the swinging vibrator, produce the desired frequency of ringing current.

To protect the pole changer contacts, a 15 or 25 watt, 120 volt Mazda lamp should be installed in the live side of the ringing leads in each position of the switchboard.

Single Frequency Pole Changer — Cont.

other foreign substances. It is easily opened, permitting free access for inspection and adjustment.

Cat. No.	Dimensions in Inches			Net Weight
	Height	Width	Depth	
41	20½	3⅝	5½	37 lbs.

Five Frequency Transformer Sets

No. 18-A for Wall Mounting

The Kellogg No. 18-A transformer set is used in conjunction with the No. 19 or No. 37, 5-frequency pole changer. It contains five efficient, heavy-duty ringing transformers that are accurately wound with heavy gauge wire, thoroughly insulated, and provided with a sufficient number of iron laminations to prevent undue heating under the most severe ringing loads.

These transformers are mounted in an oak cabinet having a solid oak hinged door. All the wiring is brought to a connecting rack on the top of the transformer and then cabled to terminals at the bottom of the trans-

former set. Provision is made for fusing each individual transformer.

The cabinet dimensions of the 18-A transformer set are 37-5/16 inches high, 10¾ inches wide and 5¼ inches deep.

Code No.	Used With Pole Changer	Ringing Voltage	Frequencies
18-A	19 or 37	100	16, 30, 42, 54, 66

No. 27-A for Relay Rack Mounting

The No. 27-A transformer set is equipped with the same transformers as the No. 18-A. The 27-A transformers are mounted on a panel arranged for relay rack mounting while the 18-A transformer set is arranged for wall mounting. The dimensions of the No. 27-A panel are 26 in. wide, 12¾ in. high and ¾ in. thick. The five transformers, distributing bars, etc., are mounted on this panel.

Code No.	Used With Pole Changer	Ringing Voltage	Frequencies
27-A	19 or 37	100	16, 30, 42, 54, 66

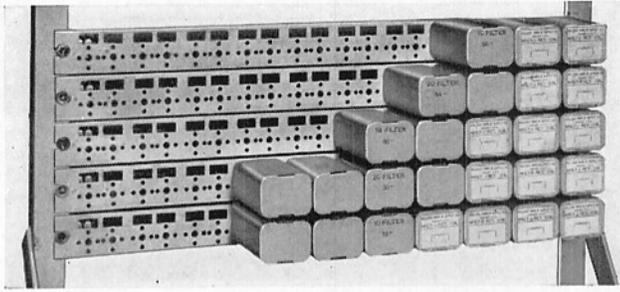
Four Frequency Transformer Sets No. 21-A for Wall Mounting

Kellogg four frequency harmonic transformer sets are similar in construction and appearance to No. 18-A and No. 27-A shown above except equipped with only four transformers. The No. 21-A set is mounted in an oak cabinet for wall mounting. The cabinet dimensions are 37-5/16 inches high, 10¾ inches wide, and 5¼ inches deep. The net weight is 105 pounds.

Code No.	Used With Pole Changer	Ringing Voltage	Frequencies
21-A	38 or 39	100 to 145	16-2/3, 33-1/3, 50, and 66-2/3

POLE CHANGER EQUIPMENT

Kellogg Pole Changer Filters



This Pole Changer Filter, designed and manufactured by Kellogg, reduces to a minimum cross-ringing, radio interference and ringing induction in the switchboard and outside cables. In accomplishing this the Kellogg filter greatly improves harmonic party line ringing.

It is generally agreed that harmonic ringing is the most desirable form of selective party line signalling that has been devised. It permits selective ringing for 4 or 5 subscribers without ringing to ground, or 8 to 10 parties with divided circuit, ringing one side to ground.

There are, however, disadvantages in the harmonic vibrating type of pole changer. The output voltage theoretically takes the form of a square wave. This wave is composed of more than one frequency, or as the engineers would term it, "is made up of a fundamental frequency and harmonics". Due to improper adjustments of pole changer contacts and also because of the reactive load imposed by the ringers on the line, this condition of harmonics is still further aggravated.

These extra harmonics introduce two evils. One is cross ringing and takes place for example when the transient 50 cycle harmonic of the vibrator with a fundamental frequency of $16\frac{2}{3}$ cycles, is high enough in voltage to ring the 50 cycle ringer. The other evil is that known as "ringing induction" and is manifested by noise in the cables, in the operators circuit, or by interference with nearby radio sets. The problem then, is that of eliminating the harmonics or reducing them in value without reducing the fundamental ringing voltage which is the actual voltage of the true frequency without the harmonics. The Kellogg Pole Changer Filter is designed to meet all these requirements at a reasonable cost, and without the installation in the telephone of relays, tubes, or other gadgets.

After the filter has been installed, the ordinary AC voltmeter may record a slight drop in the output voltage of the pole changer due to the elimination of the stray harmonics. However, the fundamental voltage, under certain conditions, will be higher because the square wave form is changed to almost a pure sine wave, eliminating the undesirable features of the pole changer and greatly improving ringing.

On the whole, a little more battery current will be required to operate the pole changer with filters than without, but as the operation of vibrator pole changers is extremely economical, this increase is negligible.

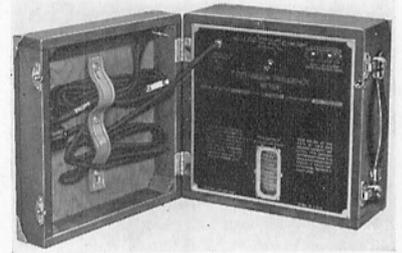
Kellogg Pole Changer Filters — Cont.

The illustration shows a complete filter unit for a five frequency pole changer. Each mounting plate contains a filter unit for one frequency.

A filter circuit for any frequency produced by a Kellogg Pole Changer can be furnished. Each filter unit is mounted on a single, No. 1003 relay mounting strip. Any maintenance man can make the necessary changes in wiring to connect a filter in the pole changer circuit.

Kellogg Comparison Frequency Meter

This No. 2-A frequency meter enables the maintenance man to check and accurately adjust pole changer frequencies. It is a stroboscopic type of meter, operated by a synchronous motor. The reading is accurate and direct; no computations or stop watches are necessary. The pole changer to be regulated is connected to the meter and adjustments made until the desired frequency is shown.



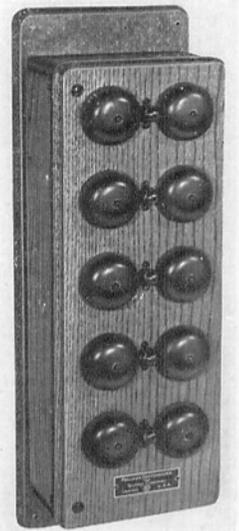
The 2-A meter is arranged to check any of the following frequencies: $16\frac{2}{3}$, 20, 25, 30, $33\frac{1}{3}$, 42, 50, 54, 60, 66 and $66\frac{2}{3}$ cycles, and operates directly from 115 volt, 60 cycle current.

The meter is portable, rugged and is housed in a neat wooden box, 10 in. square and 6 in. high. Weight is 10 lbs.

Pole Changer Test Sets

The Kellogg No. 5 Pole Changer Test Set provides a quick and easy method of checking harmonic pole changer frequencies. It consists of a set of 5 harmonic ringers and the necessary condensers, mounted in a compact, wall-mounting oak cabinet. Other frequency combinations other than that shown below can be furnished. The No. 2 pole changer test set is $23\frac{3}{4}$ inches high, 8 inches wide and $6\frac{1}{4}$ inches deep. The net weight is 17 pounds.

Cat. No.	Frequencies
5	30, 42, 54, 66 and 16



Switchboard Section

POWER AND PROTECTION EQUIPMENT

RINGING EQUIPMENT

Single phase, 75 to 115 volt alternating current, at 16 to 25 cycles is ordinarily used for ringing subscribers telephones except on selective party lines. For selective party lines there are two systems in general use: one system using pulsating direct current; and the other, single phase alternating current of from 2 to 5 frequencies, depending on the number of parties to be selected on a line. As the particular types of ringing current required are not obtainable directly from commercial lighting and power circuits, it is necessary to use some kind of converting apparatus.

Converting Equipment

For obtaining single frequency ringing current the converting apparatus may be: a vibrating pole changer operating from a storage battery; a motor generator consisting of 2 machines, a motor and a generator direct-connected; a magneto motor-generator having a generator of the magneto type; or a dynamotor, a single ma-

chine with 2 windings.

When the source of power is alternating current, a motor generator or magneto motor generator is used. When the source of power is a direct current power circuit or a storage battery, a motor-generator, a dynamotor or a pole changer may be used.

To obtain multi-frequencies a multi-vibrating pole changer operating from a storage battery or motor-generators embodying several machines are required. The further choice of this type of equipment depends upon the number of subscribers to be served, the source of power available, the cost and space requirements, and the existing equipment in service.

In connection with ringing equipment, various interrupting devices are required for automatic ringing and to furnish such signals as "busy-back", "howler", "don't answer" and "flashing recall". These may be part of the motor-generator or dynamotor or may be driven separately by means of a small motor.

Magneto Ringing Set — No. MG-125

This MG-125 Magneto Ringing Set using "Alnico", a new powerful, magnetic material provides simplicity of construction and the ability to run long periods without attention. Operation is quiet, causes no interference with radio reception and has close voltage regulation.

A two bearing frame is used, with stationary windings for both motor and generator.

Motor and generator terminals are mounted on insulating blocks in recesses cast in the base which are used as junction boxes with facilities for direct conduit connection.

In cases where this type of machine is used in supplying ringing current for exchanges which employ machine ringing and superimposed battery for tripping purposes, an insulating transformer furnished by the manufacturer is specified.

Performance Characteristics of the 60 Cycle Set. Watts input: running idle, 60; full load, 75; average, 65. The motor may be 115 volts, 60 cycles, 1140 R.P.M. or 230 volts, 60 cycles, 1140 R.P.M. Generator, 15 watts, 80 volts, 19 cycles.

The floor space required is 11x5/16x7 1/2 inches. Shipping weight is 63 pounds.

Ringling Dynamotor

Ringling Dynamotors operate from a direct current supply where the voltage variations are not excessive and where space and cost are important. They may be furnished with pulsating current and signalling or tone attachments. Sizes HD-12, HD-1 and HD-2 are supplied with counter E.M.F. starters.

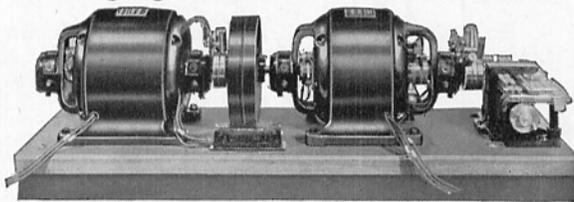


Primary: 24, 48, or 115 volts, D.C.

Secondary: 19 cycles, 80 volts, range 80 to 115 volts.

Cat. No.	Watt Output	Floor Space Required, Inches	Shipping Weight
HD-1415	15	11 1/2 x 8	70 lbs.
HD-1420	20	11 1/2 x 8	70 lbs.
HD-1430	30	11 1/2 x 8	70 lbs.
HD-13	50	16 x 9	150 lbs.
HD-12	75	18 1/2 x 9 3/4	175 lbs.
HD-1	150	20 x 10 1/2	225 lbs.
HD-2	300	24 x 14	300 lbs.

Ringling Motor-Generator Sets



On these sets the motor and generator are mounted on an insulating base and are direct connected by flexible coupling. The machines are of simple and rugged construction and are equipped with bearings of large oil capacity which require infrequent attention. They have proven extremely reliable in service and give very good frequency regulation, whether a direct or alternating current motor is used. They can be supplied with pulsating current and signalling attachments. For direct current, sizes HD-12 to HD-2 are supplied with counter E.M.F. starters. May be supplied with interrupter and tone-wheel attachments as specified.

Alternating Current Supply

Motor: 115 or 230 volts, 60 cycles, single phase. 1150 RPM.

Generator: 19 cycles, 80 volts, range 80 to 115 volts.

Watt Output	Floor Space, Inches	Shipping Weight
20	30x12	200 lbs.
30	30x12	200 lbs.
45	30x12	200 lbs.
65	30x12	200 lbs.
100	35x13	250 lbs.
200	35x13	350 lbs.
400	36x14 1/2	400 lbs.

Direct Current Supply

Sizes HD-12 to HD-2 are supplied with counter E.M.F. starters.

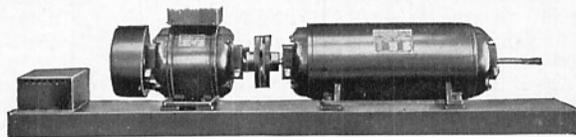
Motor: 20, 48, 115 or 230 volts DC.

Generator: 19 cycles, 80 volts, range 80 to 115 volts.

Watt Output	Floor Space, Inches	Shipping Weight
20	26x10 1/2	160 lbs.
35	26x10 1/2	160 lbs.
50	26x10 1/2	160 lbs.
75	26x10 1/2	160 lbs.
100	27x10 1/2	180 lbs.
125	35x13	300 lbs.
250	36x13	500 lbs.
400	44x13 1/2	650 lbs.

RINGING EQUIPMENT

Four-Frequency Motor Generator



These 25-watt, four frequency, ringing magneto motor-generators supply ringing current for harmonic party line installations. They require very little attention.

In a harmonic party line installation, ringing current must be constant in frequency, and must approach as nearly as possible a true sine wave. These machines provide this service, with simplicity and trouble-free operation.

The generator rotors consist of four solid "Alnico" castings mounted on a single shaft, running on two bearings. The generator is connected directly to the motor with a flexible coupling and both generator and motor are mounted on a channel iron base. A speed governing device holds the set to an even speed and insures constant ringing frequencies. Contact interrupting devices can be mounted and driven directly from a shaft extension of the generator if desired.

The motor operates from 115 volts, 60 cycles AC. It operates at 1000 R.P.M. and is designed to deliver four frequencies — 16-2/3, 33-1/3, 50 and 66-2/3 cycles, 25 watts at 75, 100, 135 and 175 volts, no load, respectively.

Motor	Dimensions in Inches			Shipping Weight
	Length	Width	Height	
60 cycle, single phase	62	10	12 3/8	325 lbs.

50-Watt Multi-Frequency Motor-Generator Sets



These multi-frequency sets fulfill in a single machine all the requirements for supplying suitable frequencies of alternating current for selective party lines. Cost and maintenance are thus reduced. These multi-frequency sets include several individual machines, each of which is extremely simple and rugged; and they embody a unique arrangement of driving motors and governor so that regulation within plus or minus 1% is maintained.

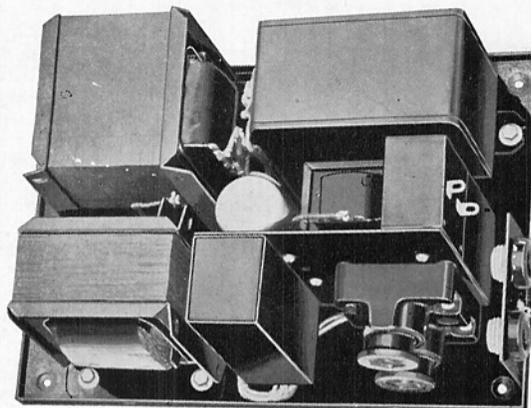
Four-Frequency Generators — Outputs, 16-2/3, 33-1/3, 50, 66-2/3 cycles, 50 watts at 75, 100, 135 and 175 volts, no load, respectively.

Five-Frequency Generators — Same as above with the addition of 25 cycles.

Sets with DC drive are equipped with counter E.M.F. starters and are held to close frequency by centrifugal governors which operate in the motor field circuit. Sets with AC drive require no starters and are held to close frequency by magnetic governors.

Cycles	Motor		Frequencies	Floor Space, Inches	Shipping Weight, Lbs.
	Phases	Volts			
60	1 or 3	220	4	79x14	675
60	1 or 3	220	5	104x14	1150

Sub-Cycle Ringing Converter



Produces a powerful ringing current entirely independent of frequency variations in the commercial power supply. Has no moving parts — nothing to adjust, requires no routine maintenance. The output frequency is always one-third of the input frequency, regardless of fluctuations in the power supply.

With 60-cycle input current the output is 20 cycles; with 50-cycle input the output is 16 2/3 cycles.

Model S—For Offices up to 1600 Stations

Produces 16 2/3 or 20-cycle ringing A.C. supply. Operates on 105-125 volts, 50 or 60-cycle A.C. supply. Output is approximately 20 watts at 90 volts. It is necessary to indicate the frequency desired when ordering.

Cabinet is finished in black, wrinkle lacquer. Size 8x-11 1/2x5 inches. Shipping weight, 30 lbs.

Model SP—For Offices up to 1600 Stations

Produces positive and negative impulses without moving parts for biased selective ringing in addition to 16 2/3 or 20-cycle A.C. ringing supply. Operates on 105-125 volts 60-cycle A.C. supply. Output is approximately 20 watts at 90 volts. Made for use with either 60-cycle or 50-cycle power supply but it is necessary to indicate which frequency is desired when ordering.

Cabinet is finished in black, wrinkle lacquer. Size, 8x11 1/2x5 inches. Shipping weight, 31 lbs.

Model B—For Offices up to 1600 Stations

Produces 20-cycle A.C. ringing supply. Output is approximately 15-20 watts at 90 volts. Operates on 105-125 volts, 60-cycle A.C. supply. Equipped with safety switch and enclosed fuse cutout.

Cabinet is finished in aluminum lacquer. Size is 9 1/2x-14x5 3/8 inches. Shipping weight, 37 lbs.

Model C—For Offices up to 4000 Stations

Designed particularly for use in cases where the ringing load is abnormally heavy. Produces 20-cycle A.C. ringing supply. Operates on 105-125 volts, 60-cycle A.C. supply. Output is approximately 40-50 watts. There are two output voltages, 130 and 90 volts.

Cabinet is finished in black, wrinkle lacquer. Size is 11x15x5 3/8 inches. Shipping weight, 49 lbs.

Model CP—For Offices up to 4000 Stations

Same as model C but includes built-in pulsator. Shipping weight, 51 lbs.

Step-Down Transformers

To operate "Sub-Cycle" on 210-240 volts commercial supply the use of step-down transformers is recommended.

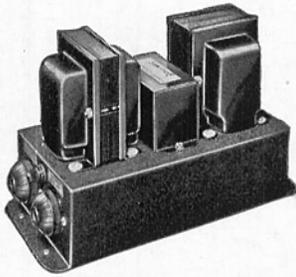
Cat. No.	Step-Down	Use with Model	Shipping Weight
T-155	220 V. to 110 V. 50 or 60 Cycles	S. SP. B.	8 lbs.
T-203	220 V. to 110 V. 50 or 60 Cycles	C. CP.	13 lbs.

Switchboard Section

POWER AND PROTECTION EQUIPMENT

RINGING EQUIPMENT

Sub-Cycle Ringing Converter Model M-7.5



This new Sub-Cycle has been developed to meet the need for a small, low-priced, static-type ringing converter. It may be used with PBX's, inter-communicating systems, cordless boards and in small exchanges. It has all the features of the regular Sub-Cycle but is reduced in sizes and power. A "tone coil" producing rever-

vertive ringing tone is furnished.

Used on 105-125 volt, 60 cycle regular lighting current, model M7.5 has a rated output of $7\frac{1}{2}$ watts, 20 cycles, 90 volts. It is housed in an attractive cabinet finished in black crackle laquer. The size is $11 \times 5 \times 6\frac{3}{4}$ inches and the shipping weight is 18 lbs.

Auxiliary Transformers for Use with "Sub-Cycle"

Special Transformer T-2259

For use with Sub-Cycle, Models S or B.

This transformer should be used in offices having super-imposed ringing. The T-2259 transformer is connected to the output of the "Sub-Cycle" and provides a path for the direct current used in super-imposed ringing. However, the A.C. voltage on the output terminals of the transformer is the same as the voltage obtained directly from the "Sub-Cycle."

Size is $3\frac{7}{8} \times 4\frac{1}{2} \times 4\frac{1}{8}$ inches. Shipping weight, 8 lbs.

Special Transformer T-2378

For use with Sub-Cycle, Model C.

The T-2378 transformer is used where high ringing voltages are required. By means of this transformer it is possible to obtain ringing voltages of 90, 150, 175, 200, 250 or 300 volts. Under certain conditions these higher ringing voltages can be used advantageously.

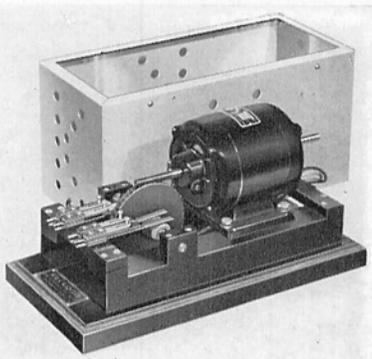
Size is $6 \times 5 \times 4\frac{1}{4}$ inches. Shipping weight, 17 lbs.

Kellogg Interrupters—6 Circuits or Less No. 10-A—Alternating Current

The Kellogg No. 10-A Automatic Ringing Interrupter efficiently and economically furnishes automatic ringing and signalling tones. The motor of this interrupter unit operates from 115 volts, 60 cycles A.C., and the machine can be equipped with 6 sets of interrupter springs and a 3-tone commutator.

Tones—A tone mechanism equipped with a 3-tone commutator is available when required. This will produce a high tone of 394 interruptions per second for howler service, a medium tone of 206 interruptions per second for dial and miscellaneous tones and a low tone of 131 interruptions per second for "busy back" and "out of order" tone.

Automatic ringing—is accomplished directly through cam operated interrupter spring contacts which operate a relay in the cord circuit and send the ringing current out on the line for one



Kellogg Interrupter—Continued

second and then withholds it for 5 seconds. The interrupter cams make 10 R.P.M. to furnish a 6 second cycle of ringing interruptions of 1 second make and 5 seconds break or open period.

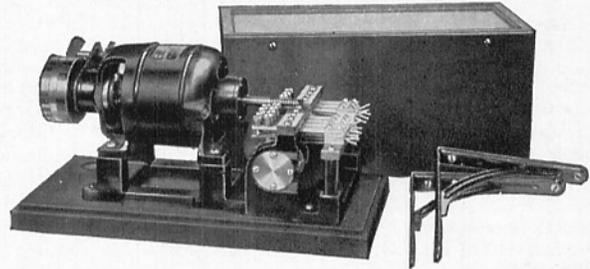
The interrupter is complete with driving motor, mounting base and glass top ventilated steel cover. Floor space required is 15×7 inches. Shipping weight is 45 pounds.

No. 10-D—Direct Current

The No. 10-D Kellogg Automatic Ringing Interrupter is the same size, the same construction and gives the same service as No. 10-A but is equipped with a direct current motor which operates from the main storage battery.

The 10-A and 10-D machines are used in pairs with the 10-A as the regular or No. 1 machine and the 10-D as the emergency or No. 2 machine, held in reserve for emergency service.

Interrupters — 4 to 12 Circuits



Ordinarily this interrupter is equipped with four ringing circuits and one busy tone or flash recall interrupter circuit, but it can be equipped with as many as twelve circuits if necessary.

The general features include a shaft driven at high speed to which a tone commutator may be attached and "make and break" springs operated by cams on a cross shaft driven at reduced speed through a worm gear. All parts are equipped with ball bearings.

Tones—The tone mechanism is equipped with a two-tone commutator; a high tone of 394 interruptions per second for the "howler" and a low tone of 131 interruptions per second for the busy tone or dial tone.

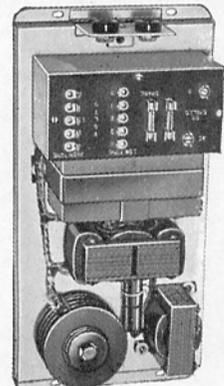
Automatic Ringing—Automatic ringing is accomplished directly through the cam-operated interrupter spring contacts. The interrupter springs have a speed of 10 cycles per minute. Ordinarily the ringing interrupter springs have a ringing period of 1 second and a silent period of 5 seconds. Interrupters are complete with individual driving motors.

Volts	Motor	Cycles	Floor Space Required Inches	Shipping Weight
115		60	$14\frac{1}{2} \times 17\frac{1}{2}$	50 lbs.
24	DC		$14\frac{1}{2} \times 17\frac{1}{2}$	50 lbs.

Lorain Tone Generators Model A

For dial type offices. Operates directly from the regular 60-cycle commercial A.C. supply, 105-125 volts.

The high and low tones are produced by making use of the harmonics generated when a magnetic material is saturated. Model A has an output of 100 milliwatts for the low tone and 65 milliwatts for the high tone, with unity power factor load. These ratings are conservative and under normal operating conditions the generator will supply 50% more power than rated



POWER BOARDS

Model A Lorain Tone Generator — Cont.

capacity. Thus, ample tone power is provided for the large dial office up to 5000 lines, and a reserve tone power is available for the future growth of the small dial office.

There are seven high tone voltages and six low tone voltages. There are no adjustments to make and no operating maintenance attention is necessary.

Housed in an aluminum finished cabinet.

Cat. No.	Size	Weight
A	13x7x4½ inches	17 lbs.

Automatic Interrupter Switching Circuit

This circuit consists of a series of relays which automatically start the No. 2 emergency interrupter and switch all interrupter and tone circuits from the regular to the emergency machine whenever there is an interruption in the commercial AC supply. During this interruption the No. 2 machine operates from the office storage battery.

As soon as the AC circuit has been restored to service, the No. 1 regular interrupter is started and the interrupter and tone circuits automatically switched back again to the regular machine. The No. 2 machine then is stopped and held in reserve for the next power interruption.

Power Switchboards

There are two types of power switchboards in general use today, the wall type and the relay rack type.

Wall Type

In small exchanges the wall type power board requiring a minimum of space is usually sufficient. This saving in space is due to the greatly simplified types of power equipment now in general use, such as sealed type batteries, trickle charging, automatic control of charging and automatic switching circuits.

Ebony asbestos is generally used for power panels because it does not chip, buckle or warp, has high electrical resistance, is practically unaffected by chemicals and takes a lustrous black finish. It is free from metallic veins or other substances detrimental to the performance of power switchboards.

The power equipment mounted on this panel may include an ammeter, voltmeter, switches, fuses, Sub-Cycle, pole changer, etc.

Kellogg engineers will gladly furnish suggestions and cost estimates on power boards of correct style and type to meet specific conditions.

Relay Rack Type Power Boards

Relay rack mounting economically provides space for necessary power equipment in convenient, efficient panels mounted on standard relay rack uprights.

This type of power board is made up of a number of ebony asbestos panels, each arranged to control a certain portion of the power apparatus. This is a very flexible setup and can be adapted to meet almost any condition that may arise in any telephone exchange up to a point where it is necessary to use a generator for charging the exchange battery.

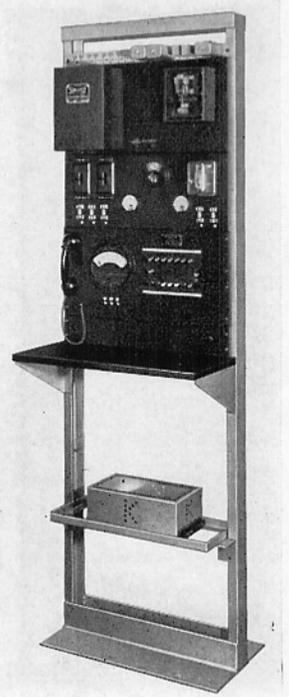
A relay rack power control board is usually located on the non-growing end of the relay rack and consists of the

Relay Rack Type — Cont.

necessary panels with meters, etc., to control all the power equipment. The rack also mounts the rectifier, interrupter, pole changers, transformer set, etc., in the same relay bay.

On the relay rack illustrated at the right is shown various necessary apparatus for the efficient operation of a medium sized exchange. At the very top of the rack is shown the train of relays making up the automatic interrupter switching circuit. On the panel immediately below the relays, a Sub-Cycle and emergency Pole Changer are mounted. Transformers, condensers, etc., are on the rear of the panel, behind the pole changer. The power panel is just below this apparatus and mounts the switches, ammeter, voltmeter, etc. Next is the Junior Wire Chief's Test Desk and below the desk is the Kellogg No. 13 Interrupter.

Right: Typical relay rack power installation with Junior Wire Chief's Test Desk.



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