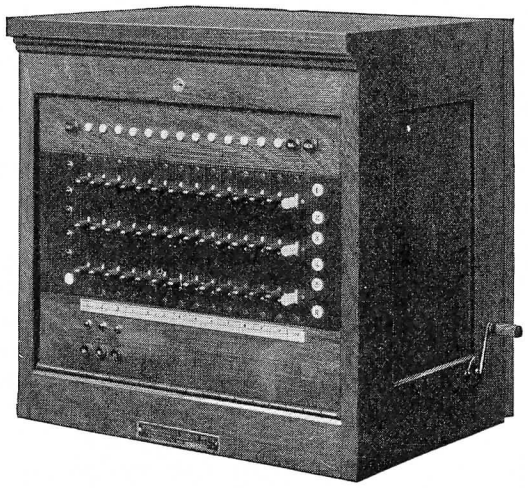
B-12-12-42

No. 104-C Cordless—10 Lines Capacity



Front View of No. 104-C Cordless Switchboard

This Switchboard is recommended for Private Exchange Systems of not more than 10 lines; also for Private Branch Exchange Systems of not more than 10 local lines and three trunk lines to the main exchange.

Both the apparatus and the circuits are arranged to operate either as an isolated system independent of any commercial telephone exchange or as a branch system in conjunction with any commercial type of telephone exchange. The standard equipment is provided with trunking facilities for connecting with a Central Energy Main Exchange but is arranged so that it requires only slight changes to adapt it for service in connection with a Dial System. Such changes are made without sacrificing any of the essential operating features.

On account of the No. 104-C Switchboard's compact design, it is particularly desirable for office use. It may be placed on a desk or table handy for operating by a clerk, stenographer, or any person who has other office duties to perform.

The apparatus used in the No. 104-C Switchboard is practically the same as that used in the Stromberg-Carlson No. 102—100 line and the No. 106—300 line P.B.X. Switchboards. This makes possible interchanging of apparatus with those switchboards. This in many instances proves an important feature, because it is a means of holding the stock requirements of a telephone company to a minimum.

The routine of operations for these switchboards is likewise standardized with the routine of the No. 102 and the No. 106 types of P. B. X. Switchboards. The exception of course is, that the connections on this switchboard are made by means of keys instead of by means of the plugs and cords that are used on the No. 102 and the No. 106 P. B. X. Switchboards. Obviously, this standardization of operating routine is another important advantage to every telephone company that uses P.B.X. equipment—it means maximum efficiency in the operating force with minimum schooling.

Cabinet Design

The cabinet for the No. 104-C P. B. X. Switchboard is very compact. The principal overall dimensions are as follows: Height—16 inches. Width—16 inches. Depth at base—12¼ inches. Depth at top—13⅛ inches. Shipping weight—105 lbs.

The front panel is hinged and the rear panel is entirely removable. This construction provides for the quick inspecting and testing of all apparatus and circuits. A terminal board is furnished in the upper portion of the cabinet, accessible from the rear. The terminal board carries all line, trunk, battery and generator terminals. Each group of these terminals is plainly designated so as to avoid mistakes when installing the apparatus.

Standard woodwork is quarter sawed oak, finished in dull golden oak or birch with walnut finish. In ordering specify type required.

Local Cable

The cable that is provided for inter-connecting the apparatus within the cabinet—excepting the generator leads, the battery leads and the pilot circuit wiring—are made up of No. 22 B. & S. Gauge copper conductors with double silk and single cotton servings.

The generator leads are of No. 22 B. & S. Gauge copper conductors with double silk servings and a cotton braid.

Battery leads and the pilot circuit conductors are of No. 18 B. & S. Gauge copper conductors with double silk and single cotton servings.

Line Equipment

Each Line circuit includes:

1 No. 194-A Relay
1 No. 13 Lamp Socket
1 No. 31-A Lamp Cap
1 No. 24-B-2 Lamp
2 No. 318-A Connecting Keys
1 No. 193-A combined Connecting and Ringing Key

The line circuit features for this switchboard are identical to those described in the catalogue pages for the No. 102 and the No. 106 types of P.B.X. Switchboards.

Connecting Equipment

Stromberg-Carlson No. 104-C Cordless Switchboards are equipped with the single lamp supervisory type of connecting circuit. Each connecting circuit includes:

1 No. 222-B Relay
1 No. 13 Lamp Socket
1 No. 31-B Lamp Cap
1 No. 24-B-2 Lamp

And either a No. 188-A one way listening Key or one-half of a two way No. 318-A listening Key.

The features of these connecting circuits are as follows:

Key Control—All connections between either P. B. X. stations or trunks and P. B. X. stations are made by means of keys.

Balanced Transmission—Both the tip and the ring battery transmission coils to each station are placed on the same relay.

Battery Economy—The battery transmission not only supplies talking current, but also furnishes energy to operate the supervisory relays.

Simplicity—The supervisory relays each have only one break contact; that contact controls the supervisory lamps. There are no other electrically controlled contacts in the cord circuit.

Transmission Efficiency—Both the tip and the ring talking conductors are entirely free from either series resistances or series retardation coils.

Trunk Equipment

The impedance coil trunk lines for Main Exchange connections each, include:

1 No. 306-X Relay
1 No. 263-ZX A B C Relay
1 No. 207-B B B Relay
1 No. 212-AY Relay
1 No. 206 Impedance Coil
1 No. 22 Condenser
1 No. 34 Key, "RL"
2 No. 175-A Keys
1 No. 196-A Key
2 No. 13 Lamp Sockets
1 No. 31-A Lamp Cap
1 No. 31-C Lamp Cap
2 No. 24-B-2 Lamps

These trunks have the following characteristics:

Three Lamp Supervision—A white call lamp indicates that the Main Exchange Operator is calling the P. B. X., a green hold lamp indicates that the trunk is being held by the P. B. X. operator, and a red disconnect lamp indicates when the connected P. B. X. subscriber hangs up. This disconnect lamp is associated with the connecting circuit equipment.

No. 104-C Cordless—10 Lines Capacity (Cont.)

Key Control—All connections between either P. B. X. stations or trunks and P. B. X. stations are made by means of keys.

Convertible—Provision for connecting with a Dial Main Exchange is made in the wiring so that when such service is required it is necessary to change only one key in each trunk, and to install only one dial common to all the converted trunks. Switchboards are wired so that repeating coil (long line) trunks or magneto trunks may be installed readily when the proper equipment is ordered.

Operator's Telephone Equipment

The operator's telephone equipment furnished with the No. 104-C P. B. X. Switchboard may be a No. 1182 Desk Stand, a No. 1197-B Handset, or a No. 1232-M Suspended Type Handset. (See Catalogue Pages describing Central Energy Telephones) and includes:

1 No. MD-4-C 6-foot Cord 1 No. 21-A Impedance Coil
1 No. 42-A Induction Coil 1 No. 37 Condenser
1 No. 21 Condenser

Handy—The desk stand or handset equipment permits the operator answering calls without troubling with a head band.

Battery Economy—This desk stand or handset equipment has the advantage of being very economical of battery current—no current is used except when the operator has the receiver removed from its hook.

Generator Equipment

The operator's facilities for the ringing of station instruments includes:

1 No. 119 Key 1 No. 53 Generator
1 No. P-11730 Crank

Regular Ringing is accomplished by means of 20 cycle current which is brought into the P. B. X. Switchboard from a power generator. The power generator current usually is brought in either from the main exchange or from a Stromberg-Carlson No. 5 Converter, which is of the vibrating type, (see Accessories). This converter when connected with the No. 104-C Cordless Switchboard runs only during the periods in which it is required for ringing.

Emergency Ringing is accomplished by means of the hand generator. A key is provided for switching from the hand generator to the power generator or vice versa. Terminals also are provided for connecting to the outside source of power ringing current.

Night Alarm Equipment

Each No. 104-C Cordless P. B. X. Switchboard is furnished with a night alarm. The apparatus for this purpose includes:

1 No. 50-L Buzzer 1 No. 381A Relay
1 No. 119 Key

The night alarm buzzer sounds not only on the incoming line calls and the incoming trunk calls, but also on the connecting circuit's disconnect signals and the trunk's disconnect signals.

The operation of the night alarm is controlled by a push button switch.

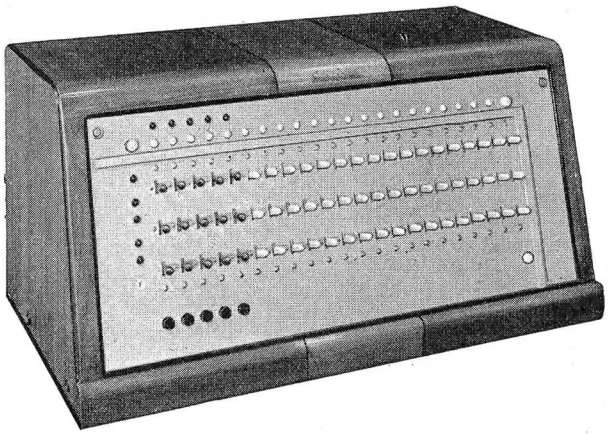
Two types of night alarm circuits are available:

The Regular Night Alarm Equipment which is arranged to operate off the switchboard's source of power ringing current. That type of night alarm will be furnished unless the Special Night Alarm Equipment is specified.

The Special Night Alarm Equipment which is necessary where the power ringing current is derived from an intermittently operated Stromberg-Carlson No. 5 Converter. That type of night alarm is arranged to derive its current from the switchboard's source of battery supply. It requires the following additional apparatus:

1 No. 202 Impedance Coil 1 No. 29 Condenser

No. 121 Cordless Switchboard



Front View of No. 121 Cordless Switchboard

This switchboard has been designed to present a highly attractive appearance, as well as to give the highest grade of performance.

The finish used is walnut. Correct application of overstain produces artistic banding of light and dark, so that the finish harmonizes with modern office furniture and room decoration. Key mountings are made of Sun Tan phenol fibre veneers, while the key handles are of plastic, colored in pleasing shades. Illustrations indicate that the panels are flush, and the use of rounded corners provides a measure of safety, preventing clothes from catching on sharp corners.

Appearance, utility and fine operating qualities make this board ideal for business offices or locations where the switchboard is installed open to public view.

In order to promote better vision for the operator and easier operation of the key cams, the face of the switchboard is inclined. Chassis construction for mounting the apparatus, so that the cabinet cover can be removed and still maintain switchboard operation, is provided. The armatures of the relays are at the rear of the board to allow for easy servicing.

The general operation of the switchboard is the same as that described under the No. 104-C Switchboard, with the added feature which allows the operator to answer another incoming call when all connecting circuits are in use.

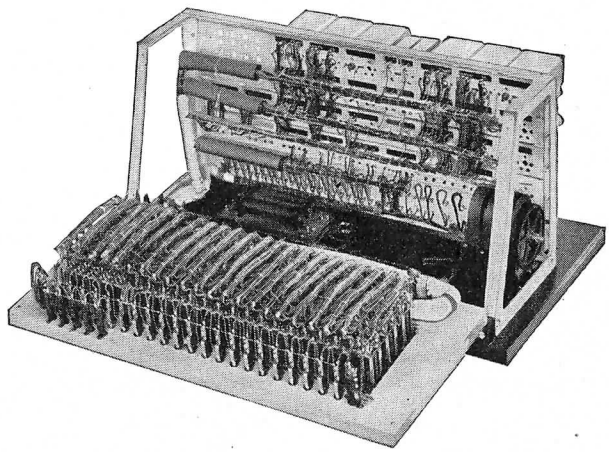
The dimensions of the No. 121 Switchboard are:

Length—2′2¾″ Height—1′2″
Depth—1′2¾″

Approximate Shipping Weight 150 lbs.

Equipment

Code No.	Wired for Lines	Wired for Trunks	Wired for Conn.	Equipped with Lines	Equipped with Trunks	Equipped with Conn.
121	16	5	5	10	2	5



No. 121 Cordless Switchboard with cabinet removed—showing accessibility of wiring and equipment

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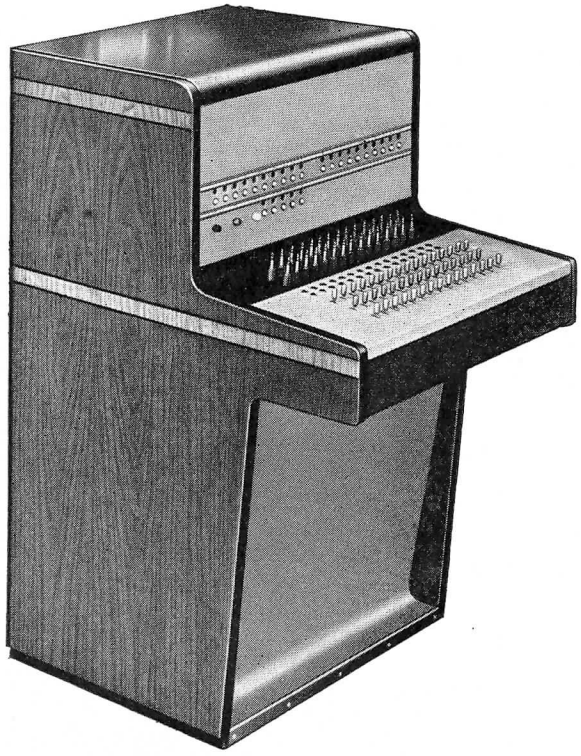
No. 120 Type Switchboard (Cont.)

To meet the insistent demands of the public this switchboard was designed to harmonize and fit in with modern office equipment. While serious thought was directed to outside appearance, the circuit design was not neglected or cheapened. Thus, a P. B. X. Switchboard of outstanding merit is offered to operating companies.

Cabinet

Equipment is mounted on steel frame members housed in an attractive veneered walnut cabinet so designed that it is in keeping with any type of office furniture, and therefore, requires only one kind of finish. Judicious use of stain, overstain and varnish provides a banded two-tone effect which is very pleasing to the eye. The sun tan finish of the face mounting, contrasted with the chocolate colored plugboard and brass finished fittings adds to the overall appearance. The surfaces are all smooth with rounded corners so that cleaning is a rapid and simple matter and the possibility of damage to clothing is very remote. The rear door is completely flush and is removed by means of the finger notch under the bottom of the door.



No. 120 Switchboard, front perspective

Light colored paint is used to cover the inside of the cabinet and this harmonizes with the apparatus. It also provides a brighter space in which to work.

Ample knee and foot room is provided in the linoleum covered space below the key pocket. The space is so covered that damage to shoes or clothing is impossible. This safety factor is carried further by the use of a concealed operator's plug which is recessed so as to be entirely out of the way.

The dimensions of the No. 120 Switchboard are:

Width—2′1⅛″ Height—3′9⅝″
Depth—2′8″

Convenience

The keyshelf is hinged on the left-hand side and when raised permits the board still to be operated because the face is completely visible. Maintenance of P. B. X. Switchboards is generally carried on during business hours, making this feature invaluable as it prevents interruptions to service. For the first time the service man can work conveniently on both sides of the key group. The jack panel is removable from the front and only individual jacks are employed. This makes it possible to easily replace parts and permits economical growth when occasion demands. Cord weights operate in a compartment completely lined with linoleum.

Capacities and Equipment

Description	No. 120-B Wired	No. 120-B Equip'd	No. 122-A Wired	No. 122-A Equip'd
Relay Line Cct less relays	80	20	40	10
Jack Ended Trunks	15	3	10	2
Cord Circuit	15	5	10	5
Dial Circuit, less dial	1	1	1	1
Operator's Circuit	1	1	1	1
Generator's Circuit	1	1	1	1
Battery Switch	1	1	1	1
Night Alarm Cct, A.C.	1	1	1	1

Line Equipment

Stock switchboards are wired for line relays, although relays are not provided except when specified. Standard equipment consists of series lamp signals.

Each line circuit includes:

1 No. 160 Jack
1 No. 13 Lamp Socket
1 No. 31-A Lamp Cap
1 No. 24-B-2 Lamp
1 No. 194-A Relay (in relay line only)

Balanced Talking Conditions—Both battery and ground are cut off the line-jack when the operator plugs up to answer.

Uniform Signal on Relay Lines—The line lamp is in a local relay-controlled circuit, therefore, line length does not effect signal strength.

Battery Economy—The high winding of the line relay requires but a minimum of current on relay lines.

Reliable Signal—The line lamps are equipped with highly evacuated, tipless bulbs, rugged filaments and bakelite bases. Clear and bright signals are produced in series lamp circuits even on long lines.

Cord Equipment

The P. B. X. Cord Circuits used with jack ended trunks are of the double supervisory type, with three conductor plugs and cords. Each circuit includes:

2 No. 53X Plugs with No. 31667 Shells
2 S-32-K 5′ Cords
2 No. 6 Cord Weights
2 No. 13 Lamp Sockets
2 No. 31-B Lamp Caps
2 No. 24-B-2 Lamps
1 No. 41 Condenser (½ used)
1 No. 342 KXZ Key
1 No. 340 EZ Key (red)
1 No. 342 LXZ Key
1 No. 130 Key Mounting
1 No. 242-1Z-NLM Relay
1 No. 254Z-NO Relay
1 No. 293Z-LL Relay
1 No. 366X-A Relay
1 No. 212Z-BY Relay, 4 Ter.
1 No. 212Z-AY Relay, 4 Ter.
1 No. 222 Imp. Coil
1 No. 10-H Resistance Coil
4 No. 26353 Resistors
1 No. 222 Impedance Coil common to position

The following circuit features are found in the P. B. X. Cord Circuits used with Jack Ended Trunks:

Back Cord Ringing Key enables operator to ring over back plug.

Front Cord Ringing Key enables operator to ring over front plug.

No. 120 Type Switchboard (Cont.)

Circuit Features (Cont.)

bells will not be rung. To answer this type of recall, the operator simply needs to operate the listening key of the cord circuit associated with the trunk.

If the P. B. X. station should recall before the P. B. X. operator has removed the plugs or a previous connection, the calling party will again signal the Central Office.

Class "b"—Under wiring condition "b," through supervision or Central Office disconnect on trunk connections is controlled by the P. B. X. station to which the trunk is connected. The signals to the P. B. X. and Central Office Operator are in all respects similar to those under wiring condition "a."

Class "c"—When the cord circuit is wired for "c" condition, the supervisory signals operate as follows: When the P. B. X. station hangs up, the back supervisory lamp is lighted at the P. B. X. However, the Central Office does not receive a disconnect until the front cord at the P. B. X. is removed from the trunk jack. This arrangement is particularly adaptable to Central Office service wherein subscribers find it necessary to transfer calls.

If a trunk is connected to a Dial Office, the trunk is held busy until the front cord is removed.

If the P. B. X. operator is slow in taking down a connection, the station concerned can signal on the back cord supervisory lamp as it will flash in unison with the movement of the telephone hook switch.

Class "d"—Under set-up "d," supervision is similar to that described under "c."

Double Lamp Supervision gives the operator definite information as to the condition of connections between local stations.

Front Cord Trunk Connection requires all trunk calls to be answered or connected by means of the front cord. Supervision is maintained on the back cord supervisory lamp only when the back cord is plugged into the local line.

Circuit Features (Cont.)

Bridged Listening Key enables operator to listen across cord circuit. An attendant answers an incoming call from a P. B. X. station using an idle cord.

Combined Individual Dialing and Listening Key enables operator to dial over the front plug of any cord circuit. During dialing, the operator's circuit is opened, but returns to normal immediately afterward for further conversation.

Through Dial and Night Switching Key enables the P. B. X. subscriber to dial or signal a Dial Central Office or a Manual Central Office over the trunk direct, when the cord pair is set up for this type of service. It is used principally for through night service, when the battery is cut off the board or through service during the day when a party wishes to make a series of consecutive calls.

Double Ringing Keys enable operator to ring over either front or back cord without taking the connection down.

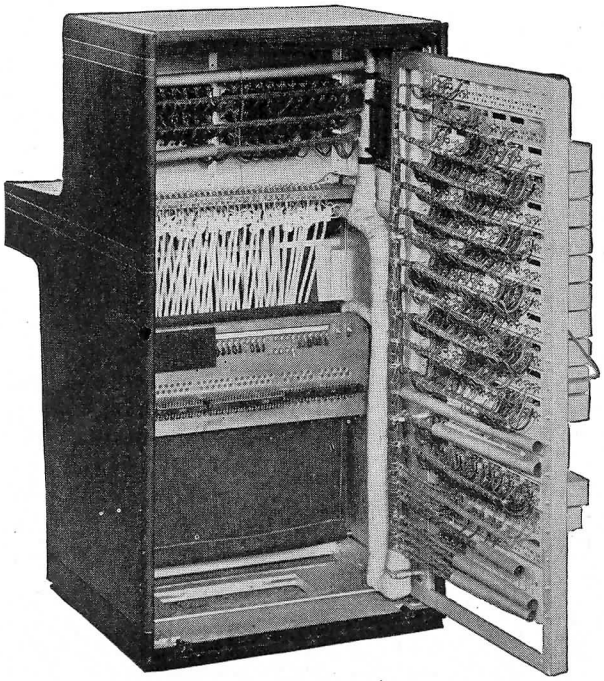
Reverting Ringing Tone—Listening party hears reverting tone when either front or back ringing keys are operated.

Toll Recall (furnished only when specified) provides recall on front cord supervisory lamp, when front cord is plugged in on a trunk being held for toll service.

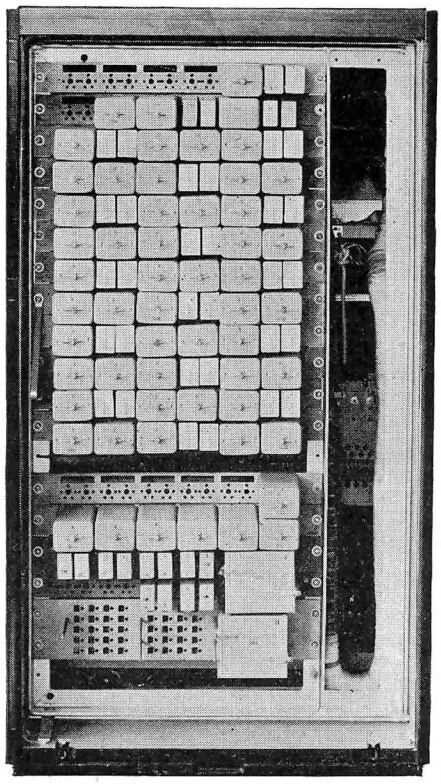
Booster Battery Supply may readily be applied to the battery feed coils of the cord circuits for long P. B. X. lines by means of a simple battery terminal arrangement. This feature provides adequate transmission current for those zones beyond the limitations of the standard battery supply.

Conference Circuit—When this feature is installed, as many as five lines may be set up for simultaneous conversation connections between P. B. X. stations or as many as four simultaneous conversations between P. B. X. stations and trunks.

Full-Talk Circuit—See Trunk Description.



No. 120 Switchboard, rear perspective, with open relay gate



No. 120 Switchboard, rear full view, with relay gate closed

B-9-15-44

No. 120 Type Switchboard (Cont.)

Capacities and Equipment

Standard No. 120 Switchboards are carried in stock with the following wiring and equipment:

Description	No. 120-B Wired	No. 120-B Equip'd	No. 122-A Wired	No. 122-A Equip'd
Relay Line Cct less relays	80	20	40	10
Jack Ended Trunks	15	3	10	2
Cord Circuit	15	5	10	5
Dial Circuit, less dial	1	1	1	1
Operator's Circuit	1	1	1	1
Generator's Circuit	1	1	1	1
Battery Switch	1	1	1	1
Night Alarm Cct, A.C.	1	1	1	1
Conference Circuit	1	0	1	0
Insulated Generator	1	0	1	0

Line Equipment

Stock switchboards are wired for line relays, although relays are provided only when specified. Standard equipment consists of series lamp signals.

Each line circuit includes:

1 No. 160 Jack
1 No. 13 Lamp Socket } No. 95—Mtg.
1 No. 31-A Lamp Cap
1 No. 24-B-2 Lamp
1 No. 194-A Relay (in relay line only)

Balanced talking conditions prevail as both battery and ground are cut off the line jack when the operator plugs in to answer. Reliable signals and battery economy are assured by the use of high grade line lamps and high wound efficient relays.

Cord Equipment—B-37950

Each Universal Cord Circuit contains the following standardized equipment:

2 No. 53-X Plugs with No. 31667 Shells
2 S-32-K 5′ Cords
2 No. 6 Cord Weights
2 No. 13 Lamp Sockets
2 No. 31-B Lamp Caps
2 No. 24-B-2 Lamps
1 No. 43-A Condenser
1 No. 342-AAXZ Key
1 No. 342-CCX Key
1 No. 129 Key Mounting
1 No. 242-IZ-MNN Relay
1 No. 254-Z—NO Relay
1 No. 293-Z-HYCY Relay
1 No. 222-AB Relay
1 No. 222Z-B Relay
1 No. 243-1-GG Relay
1 No. WE B-42 Relay
4 No. 26353 Resistors When Toll Recall is used, add
1 No. 366-XA Relay
1 No. 39-A Condenser

Trunk Equipment

The trunk circuits are of the jack and lamp ended type. Each trunk circuit used in connection with a central energy main exchange or a dial office includes the following equipment:

1 No. 161 Jack
1 No. 13 Lamp Socket } No. 95 Mtg.
1 No. 31-A Lamp Cap
1 No. 24-B-2 Lamp
1 No. 241-1Z-DBG Relay
1 No. 257ZW-AA Relay
1 No. 28153 Resistor
1 No. 43-A Condenser (½ used)

When the P. B. X. is connected for twenty-four hours a day or part time leased toll service (known as Full-Talk Circuit) the following equipment is connected between the P. B. X. trunk terminals and the leased Toll Line and installed outside the P. B. X. cabinet.

The same equipment is used and installed outside the cabinet when the P. B. X. is connected to a magneto exchange.

Trunk Equipment Added for Magneto Service

1 No. 222 Impedance Coil
1 No. 43-A Condenser
1 No. 18-AL Rept. Coil

Capacities and Equipment

Dial Circuit Equipment

The common dial circuit is completely equipped with the exception of the dial and dial mounting. It contains:

1 No. 43-A Condenser
1 No. 44-A Condenser
1 No. 341-AZ Key (Red Hd.)
1 No. 128 Key Mounting
1 No. 4-A Terminal Blk.
1 No. 11-AL Rept. Coil
2 No. 263Z-BL Relays
1 No. 241Z-A Relay
1 No. 222 Imp. Coil
1 No. 252Z-AC Relay
*1 AK-11 Dial
*1 D-78399 Dial Mtg.
*1 P-34572 Dial Mtg. Block, for No. 120 Swbd.
1 P-34571 Dial Mtg. Block, for No. 122 Swbd.

*Furnished only when specified.

Operator's Telephone Equipment

The operator's telephone equipment that is regularly furnished with the No. 120 Type Switchboard is of the breast plate type and includes:

1 No. 47-A Induction Coil
1 No. 205 Impedance Coil
1 No. 42-A Condenser
1 No. 44-A Condenser
1 No. 38-A Condenser
1 No. 93 Jack
1 No. 3-A Varistor
1 No. 4 Operator's Telephone Set

Noiseless—Anti-side tone qualities are provided wherein outgoing transmission, including the effect of local noises, is prevented from reaching the operator's receiver, but does not effect high quality incoming transmission.

Generator

The operator's facilities for the ringing of station instruments consists of a generator circuit which includes:

1 No. 53 Generator
1 No. 33759 Shaft
1 No. 33760 Crank
1 No. 498-M Key with No. 35509 Plunger
1 110 Volt, 40 Watt Lamp or 1 No. 50715 Lamp Socket
1 No. 28-H Ringer

Regular Ringing is accomplished by means of a 20 cycle alternating current derived from some type of power generator such as the Sub-Cycle, Telering, or Rotary Converter.

Emergency Ringing is accomplished by means of the hand generator furnished with the switchboard. A key is provided to switch from hand to power generator or the opposite.

Night Alarm Equipment

To assist the operator in performing her duties, each switchboard is provided with a night alarm. The apparatus for this purpose includes:

1 No. 498-M Key with No. 35509 Plunger
1 No. 381-A Relay (Line)
1 No. 381-A Relay (Supv.)
1 No. 50-LL Buzzer
*1 No. 202 Impedance Coil
*1 No. 44-A Condenser
*Used when D. C. is specified

The night alarm is controlled by the Push Button Key. When this key is "pulled out," the night alarm sounds simultaneously with incoming line calls, incoming trunk calls and on cord circuit supervision.

Convertible—Regular night alarm equipment is furnished to operate off the generator current source of supply, but wiring is arranged so that the night alarm may readily be operated off direct current when this method of operation is desired.

Battery Switch

A switch is provided to cut the battery from the switchboard when no operator is at the switchboard. The equipment provided is:

1 No. 498-M Key with No. 35509 Plunger

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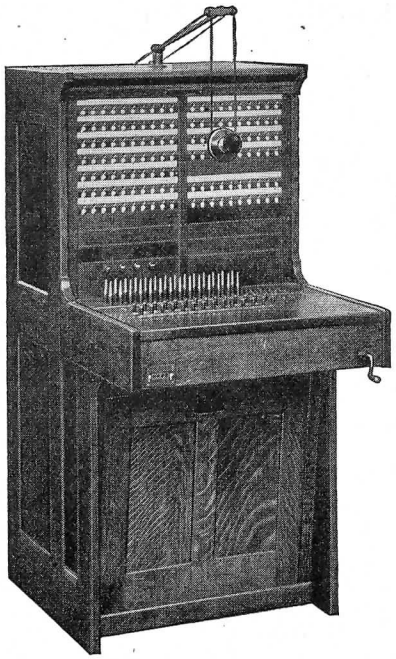
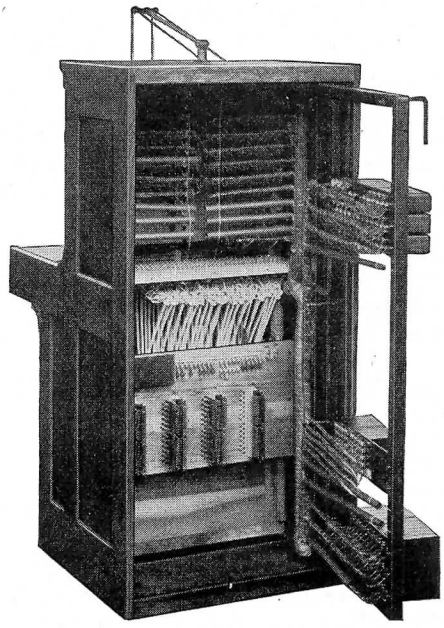
Nos. 102 and 106 Private Branch Exchange Switchboards



Front Perspective No. 106 Switchboard



Rear Perspective No. 106 Switchboard

Cabinet Design

The cabinets of the No. 102 and No. 106 Switchboards are two panel construction. They are compact but have large capacities. The No. 102 has a capacity of 100 lines. Its height is 45½″; width 25¼″; depth over keyboard 35″ and depth at base 24¾″. The No. 106 has a capacity of 180 lines when equipped with jacks mounted 10 per strip and 300 lines when equipped with jacks mounted 20 per strip. The height of the No. 106 is 51″; width 25¼″; depth over keyboard 35″ and depth at base 24¾″.

Common Characteristics

Minimum height permits operator looking over the switchboard's top.

Flush sides simplify matching additional sections when necessary.

Quartered oak woodwork finished in dull golden oak or birch with walnut finish combines attractiveness with durability.

Removable lift out panels for both front and rear of switchboard facilitate both inspection and repairs.

Heavy piano hinge extending entirely across the keyboard guarantees ample strength.

Substantial keyboard lock prevents tampering with the interior parts of the keyboard pocket.

Low keyboard height of only $30\frac{3}{16}$ ins. permits the operator resting her feet on the floor in comfort.

Formica veneer over entire keyboard surface gives a dull black ebony finish with unexcelled mar-resisting and wear-resisting qualities.

Specially prepared black fibrous veneer over plug board protects against the impact of the plugs.

Steel key frame mounts the keys securely flush with the keyboard's surface.

Well constructed jack stiles support the line jacks and lamp sockets in the switchboard's face.

Horizontally swinging relay gate mounts the terminal board, the line relays, the trunk relays, the cord relays, the condensers and the miscellaneous coils in a most accessible manner. This relay gate is of angle construction with welded corners.

Maple Terminal board affords connecting facilities for all outside circuits.

Carefully made, well insulated cable forms eliminate any possibility of either cross-talk or cross-ringing originating within the switchboard. The talking conductors and also the miscellaneous conductors are of No. 22 B. & S. Gauge commercially pure copper wire, with high grade insulation.

Line Equipment

Line equipment is furnished in either the relay or lamp series type.

Each line circuit in either the No. 102 or No. 106 Switchboard includes:

1 No. 135 Jack	1 No. 24-B-2 Lamp
1 No. 121 Lamp Socket	1 No. 194-A Relay, in relay type only
1 No. 27-A Lamp Cap	

Some of the line equipment features are:

Balanced Talking Conditions—both battery and ground are cut off the line-jack when the operator plugs up to answer.

Uniform Signal on Relay Lines—the line lamp is in a local relay controlled circuit; therefore, line length does not affect signal strength.

Battery Economy—the high winding of the line relay requires a minimum of current on relay lines.

Reliable Signal—the line lamps are equipped with highly evacuated, tipless bulbs, rugged filaments and bakelite bases.

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Nos. 102 and 106 Private Branch Exchange Switchboards

Cord Equipment

The P.B.X. Cord Circuits are of the double lamp supervisory type, with three conductor plugs and three conductor cords. Each cord circuit includes:

2 No. 53-X Plugs	2 No. 24-B-2 Lamps
2 No. S-32-K-5 Ft. Cords	1 No. 342-BX Key
2 No. 6 Cord Weights	2 No. 222Z-B Relays
2 No. 13 Lamp Sockets	1 No. 43 Condensers
2 No. 31-B Lamp Caps	

The following equipment and circuit features are found in the P.B.X. cord circuits:

Correct Battery Feed—the cord circuit is of the condenser type, thereby assuring both answering and calling stations their proper proportion of current.

Balanced Transmission and Economy—the double wound transmission coils provide a balanced circuit. They not only supply the talking current, but also supply the energy for the supervisory relays.

Simplicity—the supervisory relays have only one break contact each for controlling the supervisory lamp.

Neat and Serviceable Keyboard Equipment—the keys mount flush and are neatly covered with a dull black insulating material. The lamp caps are of the non-breakable type without guards.

Transmission Efficiency—both tip and ring talking conductors are free from series resistance or impedance coils.

Trunk Equipment

The trunks furnished in the No. 102 and the No. 106 P.B.X. Switchboards are provided with universal wiring, so that it is unnecessary to modify the key cable when adapting the P.B.X. trunking apparatus to connect with any of the following types of main exchanges:

(a) Central Energy Manual Main Exchanges through a normal loop resistance.

(b) Central Energy Manual Main Exchanges through an abnormally high loop resistance.

(c) Automatic Main Exchanges through a normal loop resistance.

(d) Automatic Main Exchanges through an abnormally high loop resistance.

(e) Magneto Main Exchanges through any practical loop resistance.

Stromberg-Carlson P.B.X. Switchboards will be furnished equipped with trunks for service in accordance with paragraph (a) unless modifications are requested to conform with the requirements as outlined in paragraphs (b), (c), (d) and (e).

Each Central Energy manual exchange circuit, which is arranged for operating through a normal loop resistance [See paragraph (a)] includes at the P.B.X. Switchboard:

1 No. 53-X Plug	1 No. 31-C Lamp Cap
1 No. S-32-K-5 Ft. Cord	3 No. 24-B-2 Lamps
1 No. 6 Cord Weight	1 No. 342-DX Key
3 No. 13 Lamp Sockets	1 No. 342-H Key
1 No. 31-A Lamp Cap	1 No. 16-L Trunk Circuit
1 No. 31-B Lamp Cap	Plate

These trunks have the following advantageous characteristics.

Plug Termination at the Switchboard permits the use of all the cord circuits on the P.B.X. Switchboard for local to local service, the convenient connection of local lines to trunk lines for through-night service and the simplification of apparatus in the P.B.X. cord circuits. The plug ending of the P.B.X. trunks also has the advantage that the Main Exchange and the P.B.X. operators simultaneously receive disconnect signals.

Triple Supervision—facilitates fast and accurate operating. A white calling lamp lights when the Main Exchange operator rings out on a P.B.X. trunk line. A green hold lamp lights when the P.B.X. operator throws her listening key to answer a call coming through the Main Exchange operator. The presence of this signal always indicates that the trunk is being held by some act of the operator and signifies an off-normal condition, for example: it relights when the P.B.X. party hangs up provided that the trunk listening key is accidentally left in the operated position; it also will flash under the same conditions if the P.B.X. party moves the hook of his telephone up and down, but it will not light when the operator monitors a connection. A red disconnect lamp lights when the P.B.X. party hangs up after completing a connection.

A Flashing Key—provides effective means for signaling the Main Exchange operator by flashing either the line or the answering supervisory signal before that operator.

The Trunk Circuit Plates—furnish facilities for quickly changing trunks as necessary to connect with any type of Telephone Main Exchange [see paragraphs (a), (b), (c), (d) and (e)]. The ease with which trunks may be added, omitted or modified by means of these trunk circuit plates makes it practical to curtail P.B.X. investment to a minimum. That curtailment of investment may be accomplished not only by carrying just one type of P.B.X. switchboard in stock for connecting with any type of Main Exchange, but by equipping each P.B.X. switchboard as it goes into service with only the exact number of trunks needed for present traffic, omitting provision for future traffic requirements.

Each Central Energy Manual Exchange Trunk which is arranged for operating through an abnormally high loop resistance [see paragraph (b)], includes at the P.B.X. switchboard the same apparatus as that required for the Central Energy Manual Exchange Trunks which operate through a normal loop resistance except that a No. 17-L Trunk Circuit Plate replaces the No. 16-L Trunk Circuit Plate.

Night Switching Keys are recommended with this type of trunk—to cut the repeating coils and the associated apparatus in the No. 17-L Trunk Circuit Plate out of circuit for night service.

Each Trunk which is arranged for connecting to a Dial Main Exchange through a normal loop resistance [see paragraph (c)] includes at the P.B.X. Switchboard:

1 No. 53-X Plug	1 No. 31-B Lamp Cap
1 No. S-32-K-5 Ft. Cord	1 No. 31-C Lamp Cap
1 No. 6 Cord Weight	3 No. 24-B-2 Lamps
3 No. 13 Lamp Sockets	1 No. 342-DX and 1 No. 343-D Key
1 No. 31-A Lamp Cap	1 No. 16-L Trunk Circuit Plate

Common to all these trunks on each P.B.X. Switchboard, there will be required one dial calling device.

Each Trunk which is arranged for connecting to a Dial Main Exchange through an abnormally high loop resistance [see paragraph (d)] includes at the P.B.X. switchboard the same apparatus as that required for the Dial Main Exchange Trunks which operate through a normal loop resistance except that a No. 17-L Trunk Circuit Plate replaces the No. 16-L Trunk Circuit Plate.

Night Switching Keys are furnished standard with this type of trunk—to cut the repeating coil and the associated apparatus in the No. 17-L Trunk Circuit Plate out of the circuit for night service.

Each Trunk which is arranged for connecting to a Magneto Main Exchange [see paragraph (e)], includes at the P.B.X. switchboard:

1 No. 53-X Plug	1 No. 31-C Lamp Cap
1 No. S-32-K-5 Ft. Cord	3 No. 24-B-2 Lamps
1 No. 6 Cord Weight	1 No. 342-DX Key
3 No. 13 Lamp Sockets	1 No. 342-JX Key
1 No. 31-A Lamp Cap	1 No. 17-L Trunk Circuit Plate
1 No. 31-B Lamp Cap	

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Nos. 102 and 106 Private Branch Exchange Switchboards

Operators' Telephone Equipment

The operator's telephone equipment that is regularly furnished with either the No. 102 or the No. 106 P.B.X. Switchboard is of the suspended transmitter type and includes:

1 No. 15 Transmitter Arm
1 No. 22 Transmitter
2 No. MO-1-A-5 Ft. Cord
1 No. 29-A Receiver
1 No. 23 Plug
1 No. MO-2-I-4 Ft. Cord
1 No. 42-A Induction Coil
1 No. 21-A Impedance Coil
1 No. 38 Condenser
1 No. 43 Condensers
1 No. 40 Condenser
1 No. 93 Operator's Cut-in Jack
1 No. 3-A Varistor

This operator's equipment has the following features:

Noiseless—Flexible cords are used to suspend the transmitter so that it will not render the operator's circuit noisy by picking up floor vibrations. As a further means of protecting the operator from the influence of extraneous noises an anti-side-tone induction coil is provided. Receiver protected against damage by the effect of ringing current.

Sanitary—The operator's receiver is provided with a wire head band which is not only light in weight, but free from either dust-collecting or moisture-absorbing surfaces. The transmitter is provided with a non-hygroscopic, removable mouthpiece.

Fool-Proof—Condensers in the circuit make it impossible for the operator to cross a cord circuit with a trunk circuit by overlapping the operation of the listening keys in those circuits.

Convenient—The suspended type of transmitter as regularly furnished with its quickly removed head receiver is convenient for the attendant who has various duties to perform other than those of a P.B.X. operator and who frequently has occasion to leave the switchboard.

Convertible—It is a simple matter to change from breast plate type transmitter to suspended type or vice versa—the wiring is all in place for either type of transmitter. If a breast type transmitter is desired, the No. 4 Operator's Telephone Set will be furnished in place of the regular suspended transmitter.

Generator Equipment

The operator's facilities for the ringing of station instruments consists of a generator circuit which includes:

1 No. 53 Generator
1 No. 13968 Crank Shaft
1 No. 119 Key
1 No. 28-H Ringer
1 No. 297305 Crank

Regular Ringing—is accomplished by means of 20 cycle alternating current which is brought into the P.B.X. switchboard from a power generator. However, the greatest ringing economy is accomplished by using a Stromberg-Carlson No. 5-B Converter, which is of the vibrating type (see Accessories). This converter, when connected with a Stromberg-Carlson P.B.X. switchboard, runs only during the periods in which it is required for ringing, such as: from the moment when a calling cord is plugged up until the called subscriber answers—also from the moment when a trunk listening key is thrown until the called P.B.X. subscriber answers. Each P.B.X. Switchboard which will receive its ringing current from the No. 5-B Converter requires one No. 381-A Relay. This relay is known as the converter-starting relay. It is provided for in the wiring of the No. 102 and the No. 106 P.B.X. Switchboards.

Emergency Ringing—is accomplished by means of a hand generator. A key is furnished for switching from hand to power generator or vice versa.

Signalling Indication—is one of the features of Stromberg-Carlson P.B.X. Switchboards. This provides a great help to operators because through its use the operators know with reasonable assuredness, not only when they are ringing out on a line, but also whether the line is in proper condition for signalling purposes. This "signalling indication" is accomplished by means of a ringer in the generator circuit which responds to the flow of signalling current.

Night Alarm Equipment

To assist the operator in performing her duties each Stromberg-Carlson P.B.X. Switchboard is provided with a night alarm. The apparatus for this purpose includes:

1 No. 119 Key
1 No. 381-A Relay
1 No. 50-LL Buzzer

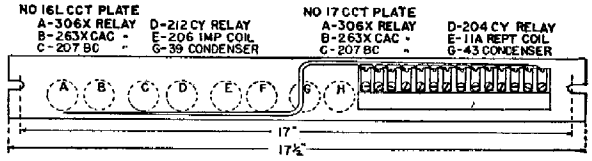
The night alarm is controlled by the Push Button Key, which is mounted near the top of the switchboard. When this key is fully "pulled out" in its operating position, the night alarm sounds simultaneously with incoming line calls; with incoming trunk calls; with the answering cord's disconnect signals and with the trunk's disconnect signals.

The following two types of night alarm circuits are available:

The Regular Night Alarm Equipment—which is arranged to operate off the switchboard's source of power ringing current. This type of night alarm will be furnished unless the Special Night Alarm Equipment is requested.

The Special Night Alarm Equipment—which is necessary when the power ringing current is derived from an intermittently operated Stromberg-Carlson No. 5 Converter. This type of night alarm is arranged to operate from the switchboard's source of battery supply and requires the following additional apparatus:

1 No. 202 Impedance Coil
1 No. 44 Condenser



Line Drawing to Show Piece Parts and Their Code Numbers of the 16-L Circuit Plate

Circuit Plate Piece Parts

Code Numbers		Description
16-L	**17-L**	
119-L	**119-L**	Relay Mounting Strip
39	**43**	Condenser
206	—	Impedance Coil
—	**11-AL**	Repeating Coil
207-BC	**207-BC**	Relay
263-XCAC	**263-XCAC**	"
306-X	**306-X**	"
212-CY	**204-CY**	"
12706	**12706**	Terminal Strip
27053	**27053**	Shell Assembly (Casing)

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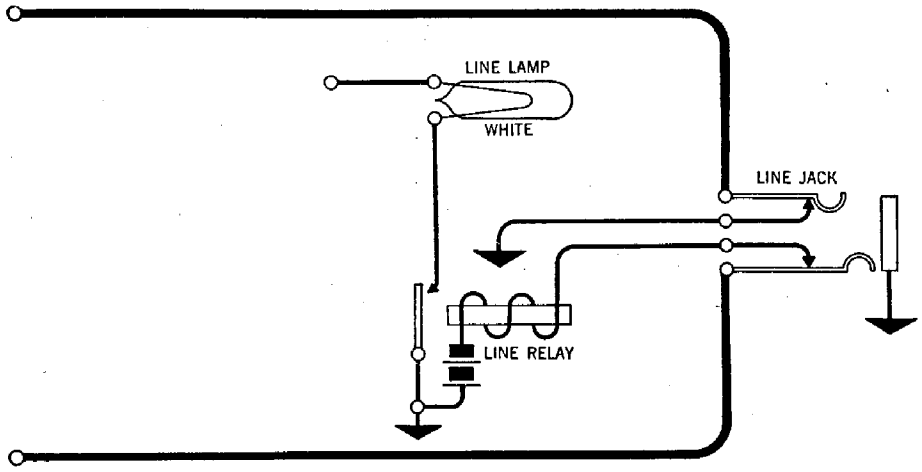
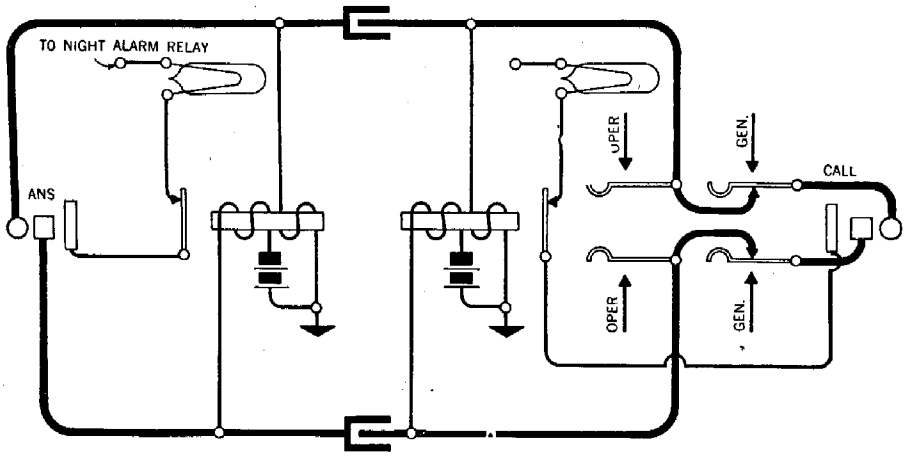
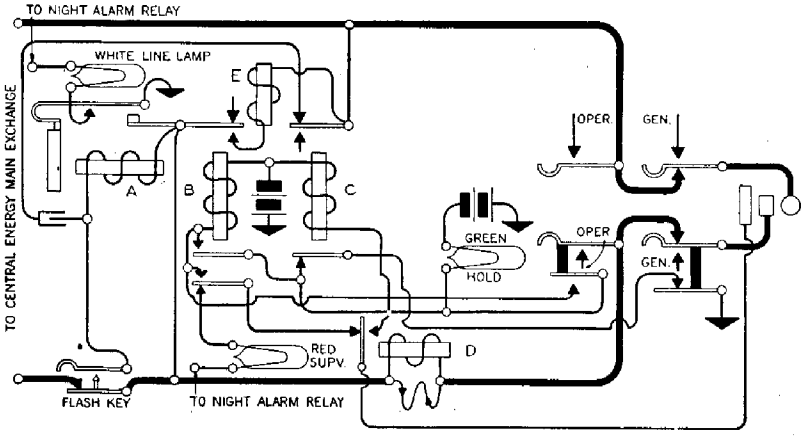
Nos. 102 and 106 Private Branch Exchange Switchboards



Standard Line Circuit

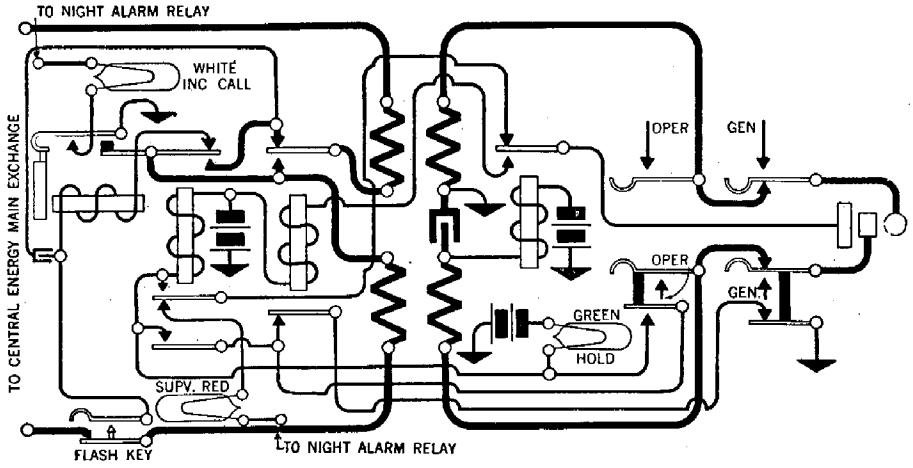


Standard Cord Circuit

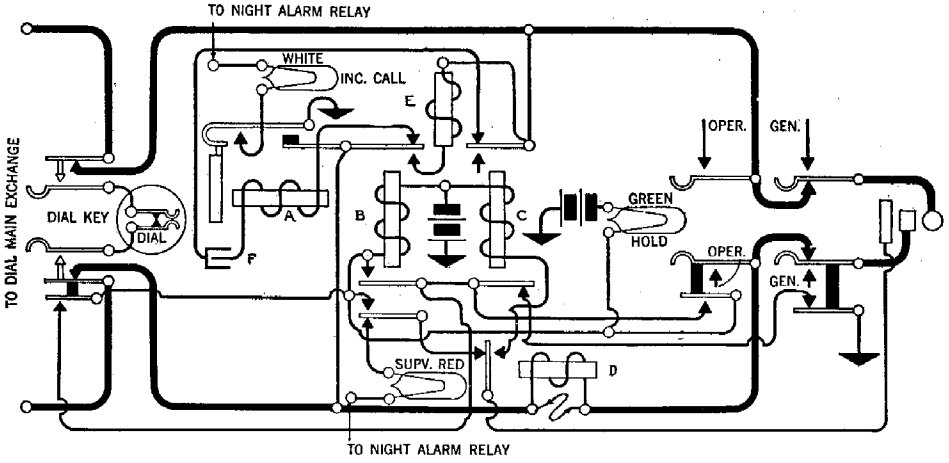


Trunk—Central Energy Manual Main Exchange—Through a Normal Loop Resistance

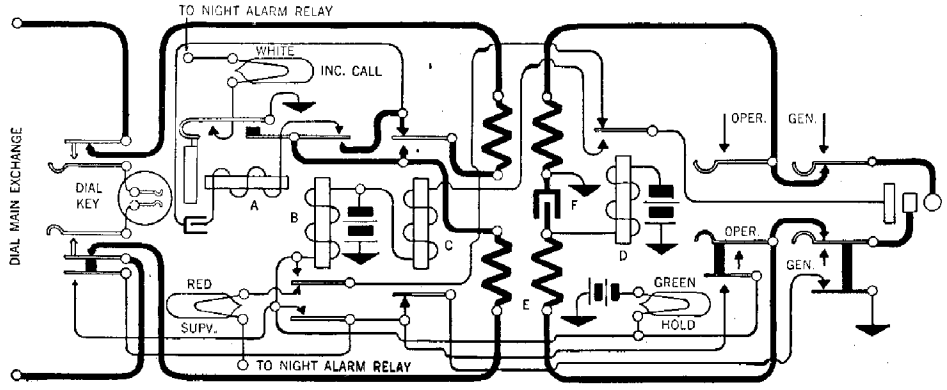
Nos. 102 and 106 Private Branch Exchange Switchboards



Trunk—Central Energy Manual Main Exchange—Through High Loop Resistance

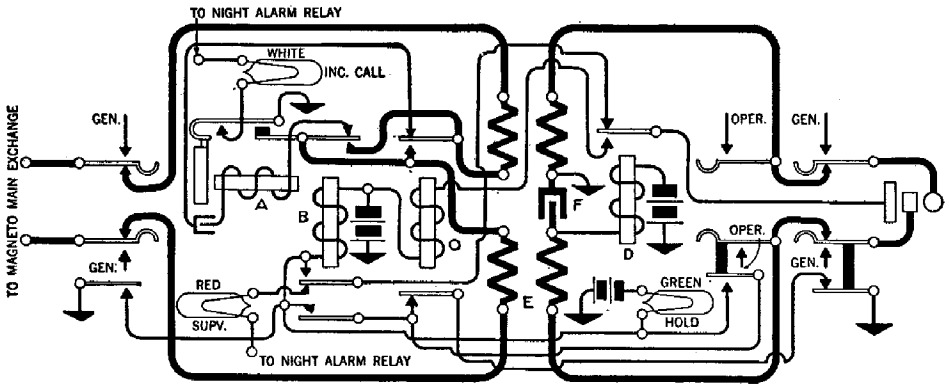


Trunk—Dial Exchange—Through a Normal Loop Resistance

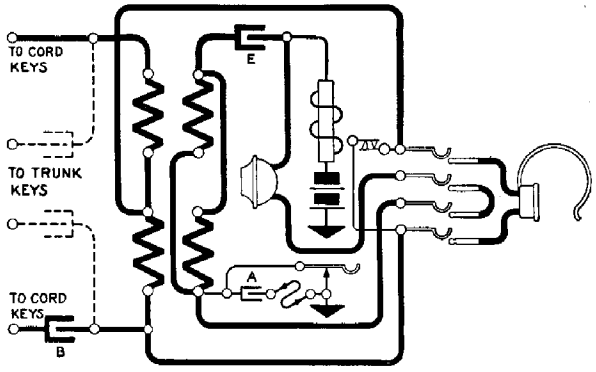


Trunk—Dial Exchange—Through High Loop Resistance

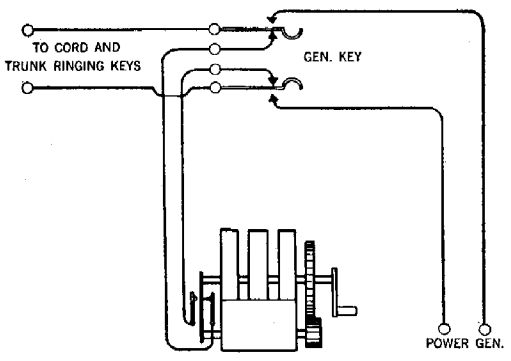
Nos. 102 and 106 Private Branch Exchange Switchboards



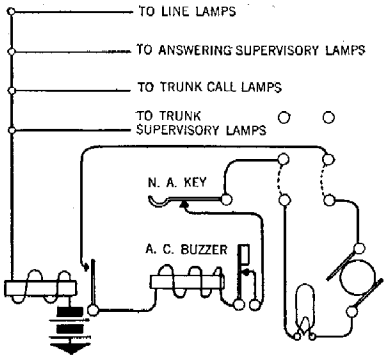
Trunk—Magneto Exchange—Through any Practical Loop Resistance



Standard Operator's Circuit



Standard Generator Circuit



Standard Night Alarm Circuit when A.C. Night Alarm is used

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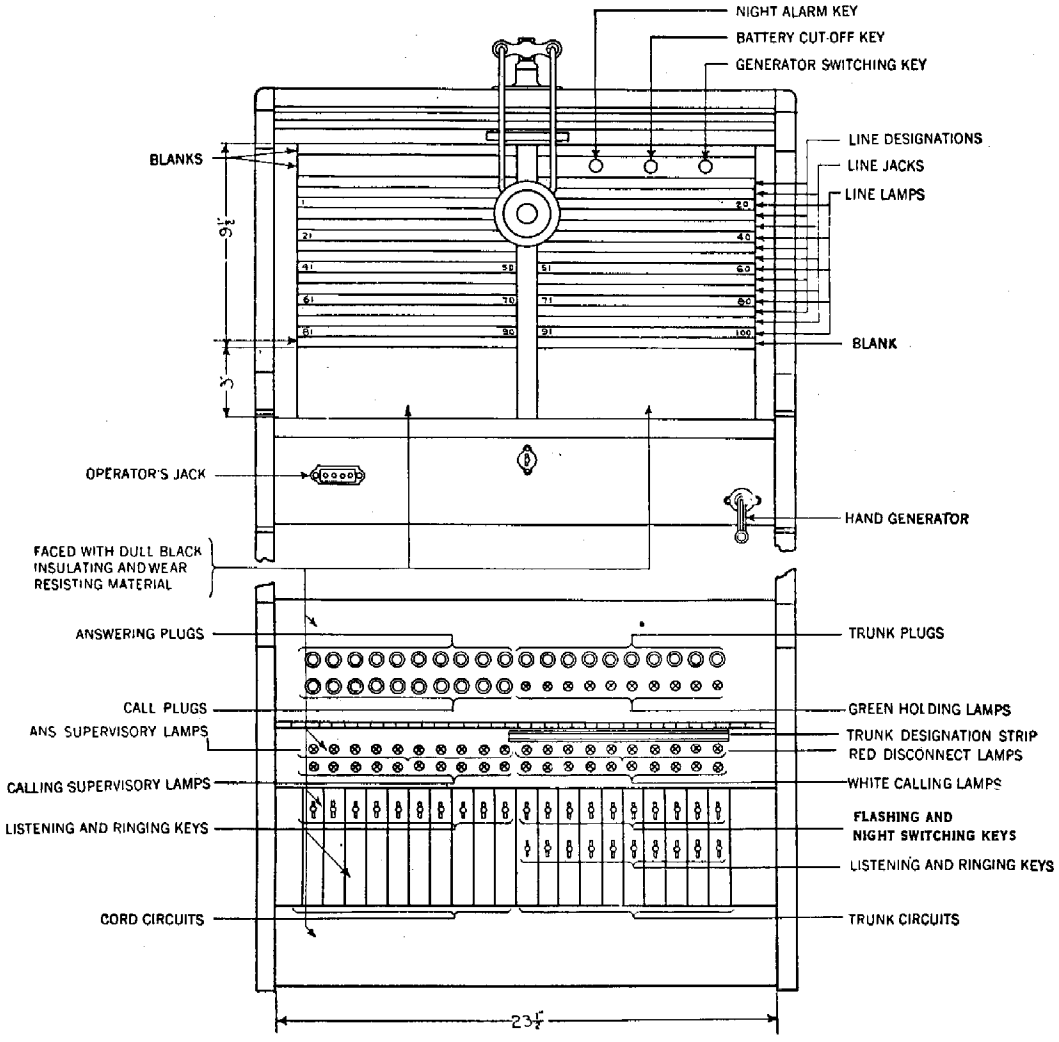
Nos. 102 and 106 Private Branch Exchange Switchboards



Face and Keyboard Equipment—No. 102 P.B.X. Switchboard

No. 102 Type P.B.X.

Line Jacks 10 per Strip with Associated Designation

Ultimate Wiring	Code Letter	Lines Equipped	Cords Equipped	Trunks Equipped	Shipping Weight
100 Lines 10 Cord Prs. 10 Trunks	A	10	4	2	390 lbs.
	B	20	4	3	400 lbs.
	C	30	5	3	410 lbs.
	D	40	6	3	420 lbs.
	E	50	8	3	430 lbs.
	F	60	8	3	440 lbs.
	G	70	8	4	450 lbs.
	H	80	10	4	460 lbs.
	I	90	10	4	470 lbs.
	J	100	10	5	480 lbs.

No. 106 Type P.B.X.

Line Jacks 10 per Strip with Associated Designation

180 Lines 8 Cord Prs. 11 Trunks	A	100	8	5	500 lbs.
	B	150	8	6	550 lbs.
	C	180	8	7	580 lbs.

Line Jacks 20 per Strip with Associated Designation Hotel Type

300 Lines 8 Cord Prs. 7 Trunks	D	200	6	5	560 lbs.
	E	240	7	6	600 lbs.
	F	280	8	7	675 lbs.

NOTE—On Hotel Type boards more or less trunks and cords may be figured to meet requirements but the sum total of such cords and trunks must never exceed the ultimate of 19 circuits.

Data For Series Lamp Line Circuit Systems

In figuring the limitations of Series Lamp line circuits the following data is based on the use of a 11 cell battery system for both types of lamps specified.

No. 18-A-2 Lamp	16,000 ft. pair No. 22 Gauge Wire
No. 18-A-2 Lamp	32,000 ft. pair No. 19 Gauge Wire
No. 24-B-2 Lamp	10,000 ft. pair No. 22 Gauge Wire
No. 24-B-2 Lamp	20,000 ft. pair No. 19 Gauge Wire

In an installation using a combination of No. 22 Gauge and No. 19 Gauge wire it should not exceed 500 ohm loop resistance for the No. 18-A-2 lamp and 325 ohms for the No. 24-B-S lamp. These wire feet values and resistance values given are exclusive of station resistance and should give a satisfactory signal if not exceeded and if battery supply is not allowed to fall two volts less than the rated voltage of a 11 cell battery, which is normally 22 volts.

The station resistance in these calculations is taken as approximately 75 ohms and is included in the overall efficiency of the series lamp line circuit. Use wire feet values only as listed above for maximum line length. In the use of either No. 18-A-2 or No. 24-B-2 lamps, the question of short lines or so called zero loop circuits subjecting the lamp to an over voltage condition is not a serious factor, as the lamp will always have at least the 75 ohm station resistance in series with it. Furthermore, line lamps are not usually subject to long burning periods.

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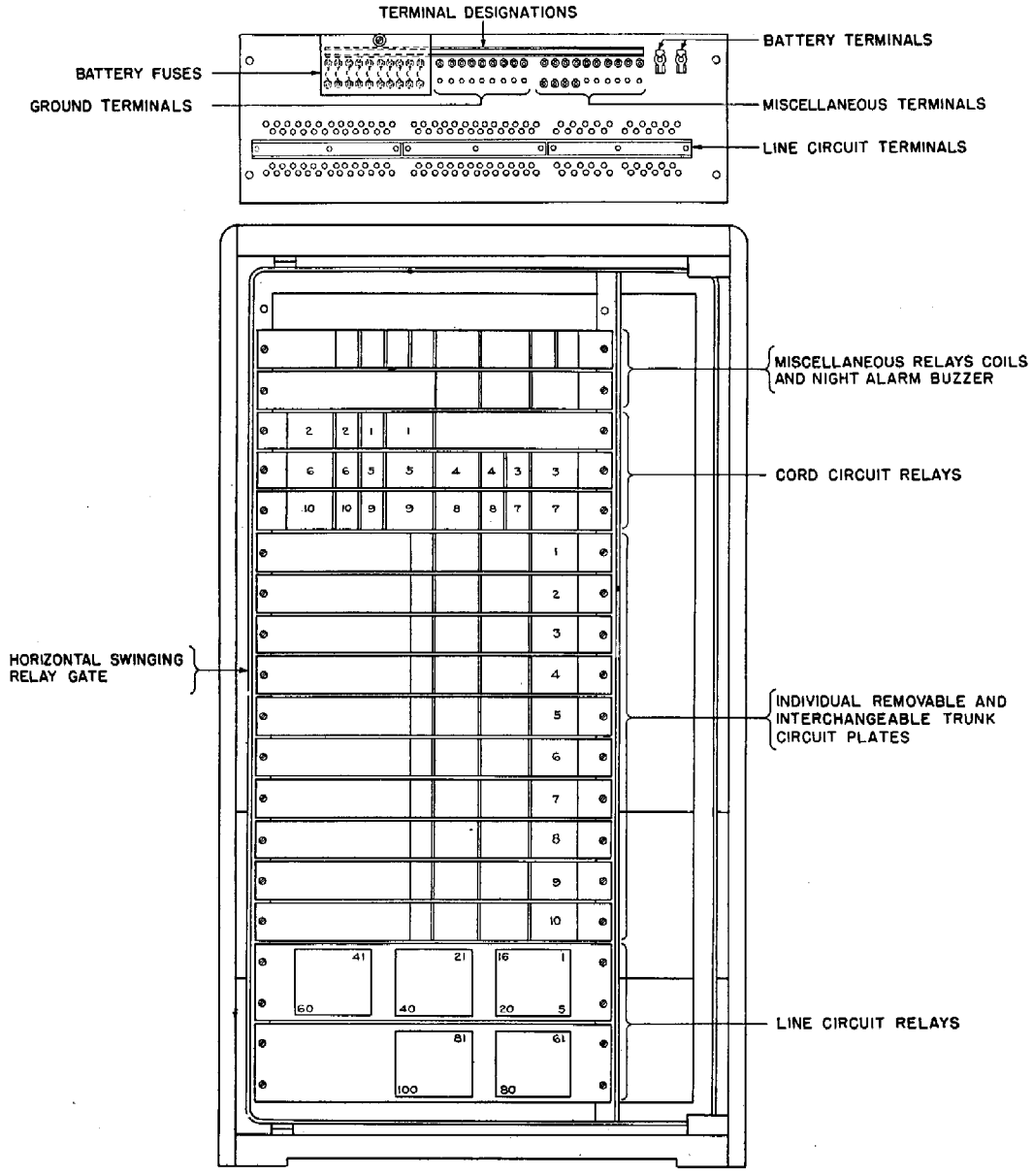
Nos. 102 and 106 Private Branch Exchange Switchboards

In the operation of series lamp line circuits the proper performance of night alarm relay equipment, due to line leakage conditions is an important factor. If the amount of line leakage exceeds the operating value of the night alarm relay it will result in the false operation of the night alarm circuit.

It is also important that the line leakage should not exceed the release value of the night alarm relay, since it will be held operated after it is once energized by an incoming signal.

In a system in which all lines are confined to an interior wiring installation, one night alarm relay, not to exceed 100 lines, will operate satisfactorily under the average normal conditions.

For systems with outside line construction it is recommended that the line circuit should be of the line relay control type, or if series lamp line circuits are employed to equip one night alarm relay circuit equipment for each group of twenty lines furnished.



Rear Equipment No. 102 P.B.X. Switchboard