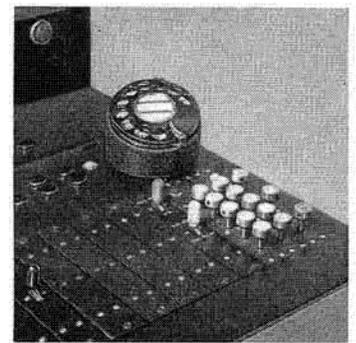
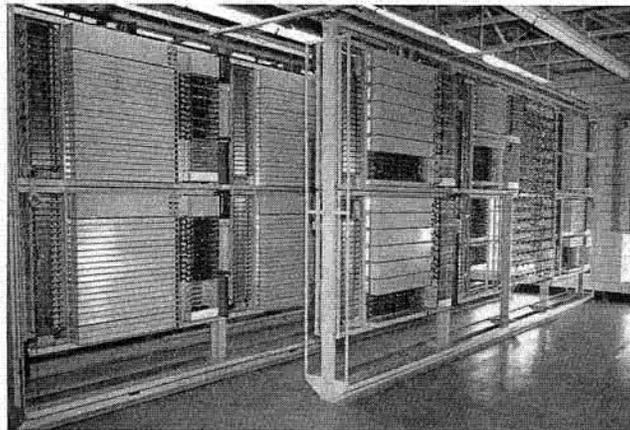
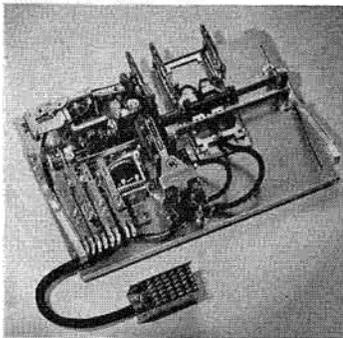


**STROMBERG-CARLSON**

# Central Office Equipment



**XY Dial Systems offer the most versatile and easily expanded method of modern dial telephony for city or village. XY Toll Ticketing makes short-haul toll operation profitable. No. 3 Toll Switchboards are geared to nationwide service.**

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## SECTION B

### CENTRAL OFFICE EQUIPMENT

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# STROMBERG-CARLSON CENTRAL OFFICE EQUIPMENT

## **Flexibility**

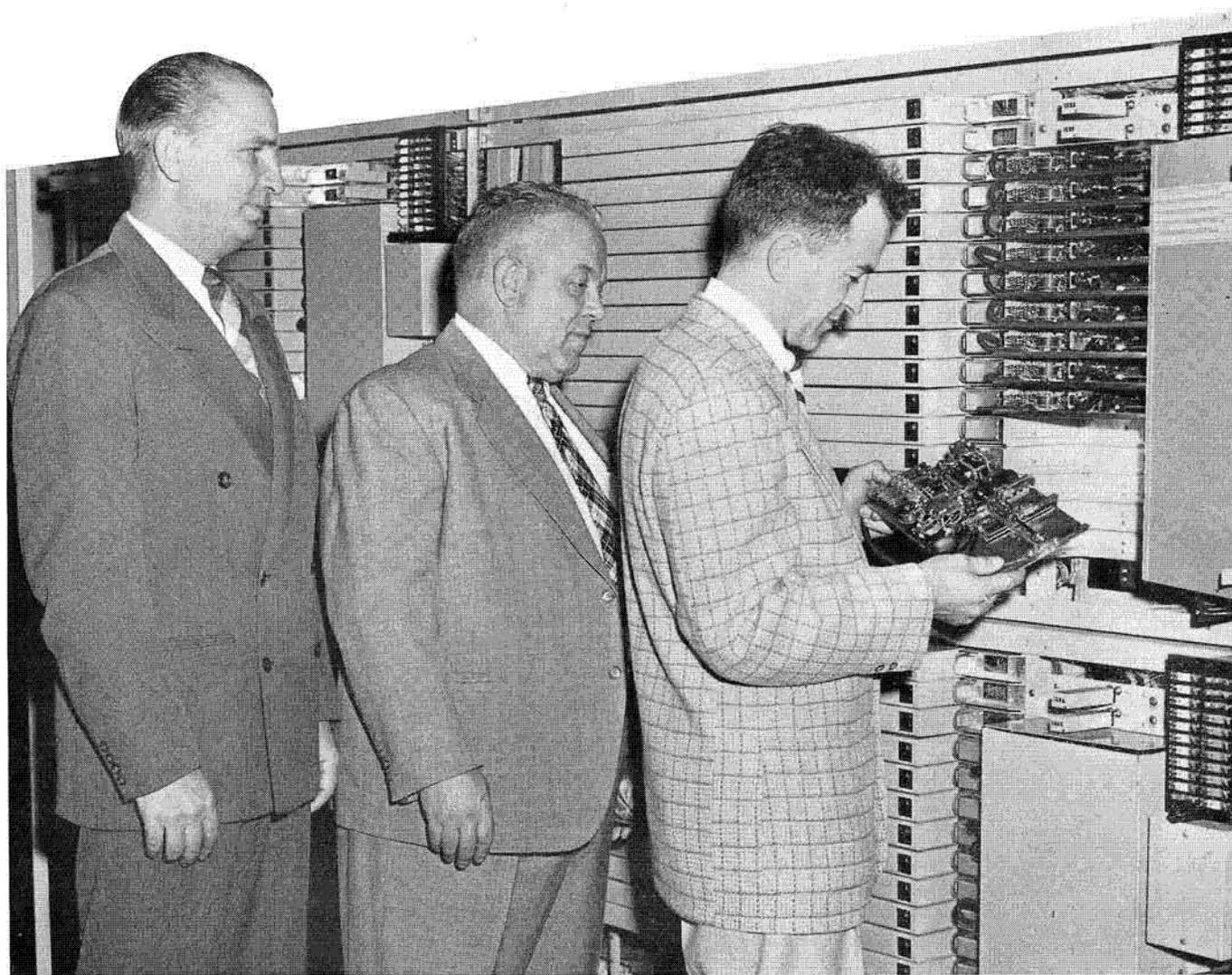
XY Dial Systems employ a universal switching mechanism serving in any capacity—line finder, selector or connector. Both switches and circuit plates are ready-for-use, jack-in-place units.

## **Reliability**

Dual precious metal contacts on all switch wipers and relay springs extend life—make connections doubly sure. Vertical wire banks do not collect dust, improve transmission.

## **Economy**

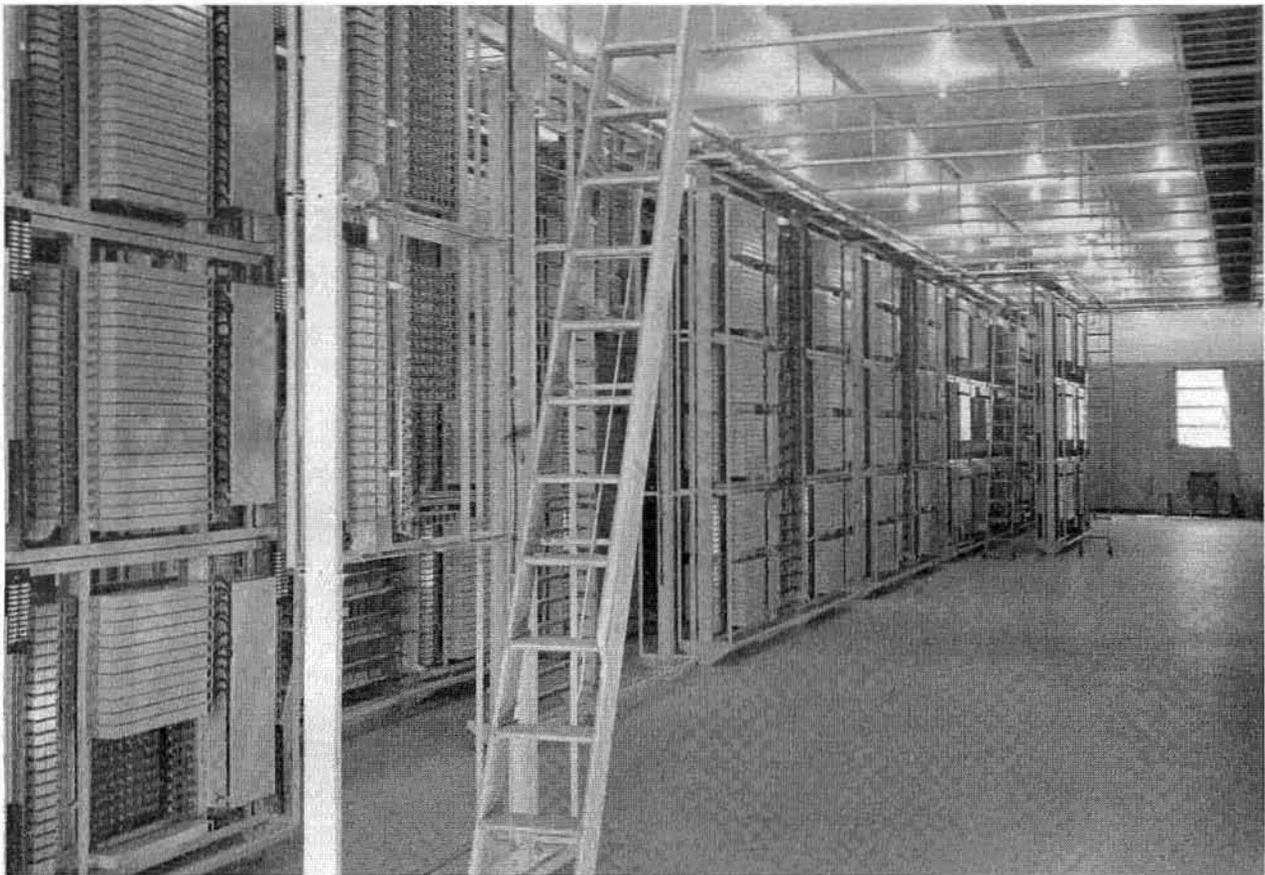
Twin wiper contacts engage smooth wire banks, eliminating customary replacement due to wear. Wire bank units save hundreds of costly soldering operations, lowering installation and service costs.



**XY<sup>®</sup> DIAL SYSTEMS**

To meet today's increasing demand for speedy, dependable dial service, Stromberg-Carlson offers a modern and extremely versatile switch-operated system which has fully met the test of service under a variety of operating conditions in the many installations all over the country.

The basic principle of XY\* Dial Systems has been proven in operation over the years. It is suited to the demands of the multi-office exchanges, where its inherent economies are multiplied; yet so simple in its basic design that it is equally practical for the small operating company. The "know-how" which Stromberg-Carlson has accumulated since it began serving the telephone industry in 1894, skilled workmanship and the best materials result in a dial system which is as trouble-free as can be devised.



Typical XY Installation in a Large City

Older types of automatic telephone systems require a considerable field maintenance program and frequent repairs and adjustments are necessary to keep the exchange in first class working order. Most of this "after-installation" adjustment has been eliminated in the XY step-by-step system.

Some of the outstanding features incorporated in the XY system of dial telephony are shown below:

1. **XY TYPE OF SWITCHING IS MORE ECONOMICAL** for the customer than any other type of switching now developed.
2. **XY SWITCH SYSTEMS ARE MORE READILY ADAPTABLE** to large installations than an all-relay system.

\*"XY" is a registered United States trade mark. Wherever it appears in this catalog, the term is used in the trade mark sense.

3. **UNIVERSAL USE OF THE XY SWITCH.** The same switch can be used as a line finder, selector or connector.
4. **XY SWITCH IS THE SMALLEST AND LIGHTEST** available, permitting space economy within the exchange building.
5. **XY SYSTEM INTERCHANGEABILITY** lends itself to unit-type construction of frames and circuit plates.
6. **XY SWITCHES AND RELAY STRIPS PLUG IN.**
7. **BARE WIRE MULTIPLE BANKS** are removable as individual units; save countless soldered joints.
8. **READILY ADAPTABLE** for terminal per line or terminal per station systems.

Revised 1-3-55

## XY DIAL SYSTEMS (Cont.)

### Versatility of XY System

The XY Dial Telephone System includes refinements for which the need has only become apparent in the industry in the last few years. Systems which were adequate for the conditions which existed many years ago are not always adaptable to the needs of today, with the trend toward nation-wide toll dialing, toll ticketing and similar developments.

Modern methods incorporated in the design of the XY system include the general use of plug-in units, both switches and circuit plates. Other important features can be had with no additional expense. For example, the operator of several exchanges of a similar pattern can easily and quickly move switching units from one exchange to another, or from a central store to an exchange, to cater to sudden traffic changes; and additions to and rearrangements of equipment are likewise quickly effected. Thus again has the viewpoint of the exchange operator been kept uppermost in mind during design of the XY system.

Regarding operating and circuit features, all modern requirements are provided for in the most economical manner. The problems of both local and toll switching have been exhaustively studied and solutions to all of these problems are readily available in the various XY systems. In particular, methods to meet the requirements of the recently developed system of nation-wide toll dialing have been incorporated in all XY exchanges. Even if the necessity for toll dialing is not present at the time of the initial installation of an exchange, such toll dialing features can be added at any future date without complicated or extensive additions or rearrangements.

For local switching, various types of line conditions can be easily met, and many restrictions can be made for local or inter-exchange dialing, where such restrictions are desirable. All types of well-known party line services are available and various types of ringing are included; bridged or divided ringers — harmonic, synchronic, decimonic code or superimposed. Trunking facilities are designed for adaptability, because it is often necessary to work into other exchanges of various types of manufacture, but all of these requirements can be fulfilled with one or two way loop or composite trunks. In addition, special services including intercept, paystation, information and various other special facilities are available.

### Basic XY Switching Scheme

The XY switch operates on the order of 25 steps per second — a complete cycle of X and Y motion is finished before the mind can register the start. This makes the operation of hunting both practical and low in cost. When the calling subscriber lifts his handset, the switches find the calling party's line and connect him through to an associated idle first selector or, in connector systems, an idle connector. This connection causes dial tone to be heard by the subscriber who now proceeds to dial the desired number.

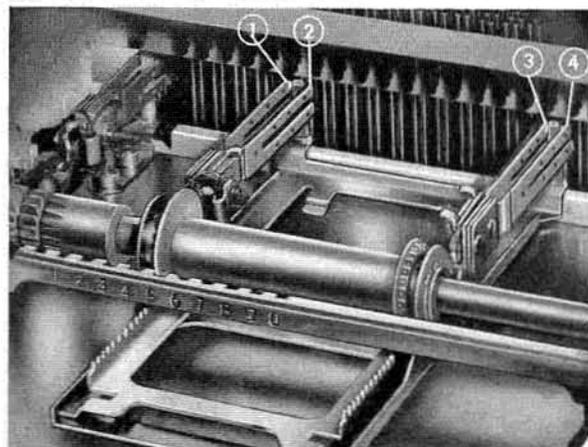
Dialing of the first digit sets the wipers of the first selector opposite the level (X motion) of the digit dialed, whereupon a hunting action (Y motion) takes place to locate a trunk to an idle second selector or to the next unit in the switch train. This procedure is repeated as the second digit is dialed and continues until all digits of the directory number have been selected except those of the individual line (and his ringing code if a party line).

Since the XY switch is 100-point (10 positions in both X and Y directions), the first two digits dialed into the connector in a terminal per line system are the means of connecting through to the called line. An additional digit is dialed to select the proper ringing frequency or code to cause the proper station bell to be rung.

In the Stromberg-Carlson terminal per station system this additional digit is not required and only two digits are dialed into the connector. With this system any frequency may be assigned to any terminal, and consequently any terminals may be combined to form a party line. This provides for maximum efficiency in loading party lines and in the number of connector terminals required. This arrangement is possible in Stromberg-Carlson equipment without any extra cost because of the Fourth Wire.

By means of the Fourth Wire an operating company can effect real economies by maintaining 100 per cent fill on all lines without the expense of changing directory numbers. When a subscriber moves to a different line, where a different frequency is open, his former directory number can be re-assigned without change and the new frequency taken care of by changing the jumper to the Fourth Wire.

Wires (1) (2) (3) are Tip, Ring, and Sleeve Conductor.



Wire (4) is the famous Fourth Wire which solves party-line and many other problems.

XY Switch in Wire Bank, after "x" travel

**XY DIAL SYSTEMS (Cont.)**

**Basic Shelf Equipment**

XY systems are built with the equipment arranged as shelf units, which in turn will mount on standard frames. In general there are the following types of shelf units:

**Line Finder and Line Relay Shelf Units**

These units mount 100 line circuits either lock-out or non lock-out and the associated line finder relays and switches. These shelf units are normally wired for 14 or 18 line finders per shelf and equipped as required to carry the traffic. Any specified percentage of lines can be arranged for lock-out.

The finder switches are in one common group, and any finder may be assigned from either of two allotments depending on whether the call comes from odd or even level lines. This arrangement provides for more even distribution of originating traffic over all finders and associated selectors in a particular group.

**Selector Shelf Units**

These units are normally arranged for mounting 20 selectors with their associated switches and wire banks. The wire banks are normally split into 2 groups in order to provide flexibility in trunking. On equipment for smaller offices the wire banks will be wired to terminal blocks on the shelf, and on larger installations the wire banks will be wired directly to terminals on the grading bay. There is one grading bay located between each of two selector bays and serving both. In either case, the selector shelf will have its own common equipment and be a complete unit. These shelves mount all types of selectors (local, incoming or toll).

Multiple digit adding selector circuits have been designed for use in XY dial offices to provide for 2-5 numbering without the addition of any ranks of selectors to meet the requirements of nationwide intertoll dialing. These selectors make use of the XY universal switch with its auxiliary wipers and banks used for level marking.

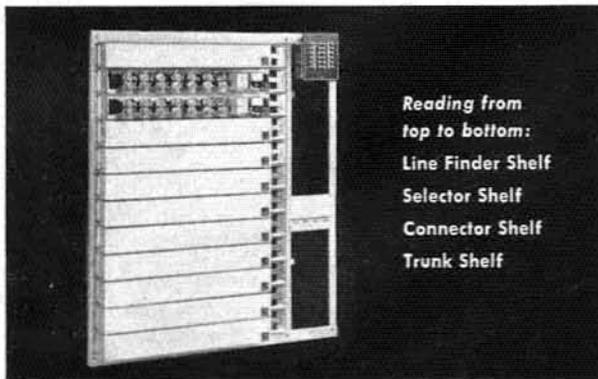
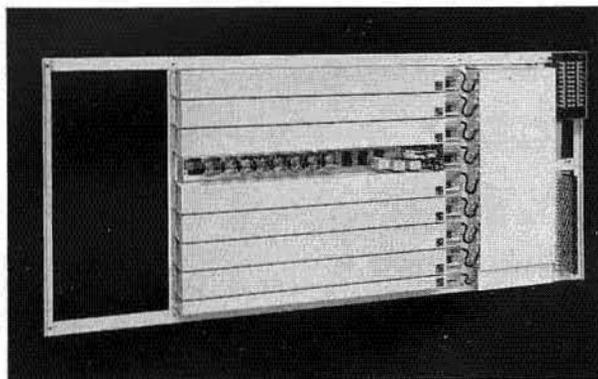
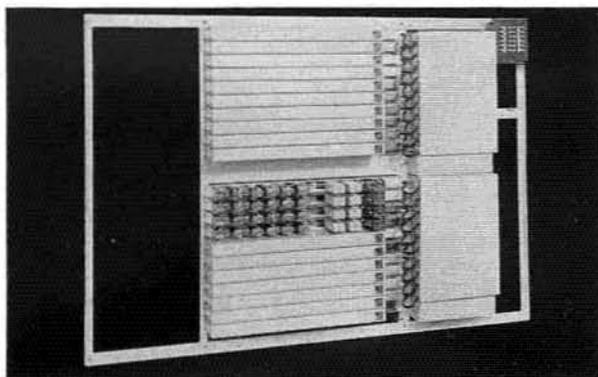
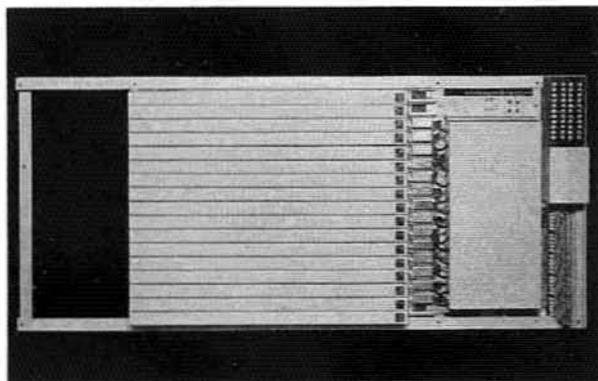
Each shelf has its own fuse panel, signal equipment and alarm lamps.

**Connector Shelf Units**

These units are arranged for mounting either 11, 16, or 21 connectors, one of which is the test connector. There is space for mounting 10, 15, or 20 local connectors on a shelf, depending on the trunking requirements. These shelves are also complete units in that each shelf has its own fuse panel, common alarm circuit and alarm lamps. The connector wire banks are wired to a terminal block mounted on the shelf. Peg Count meters are connected to the shelf when desired. The Shelf Supervisory Circuit can be mounted directly beneath the regular connectors.

**Trunk Shelves**

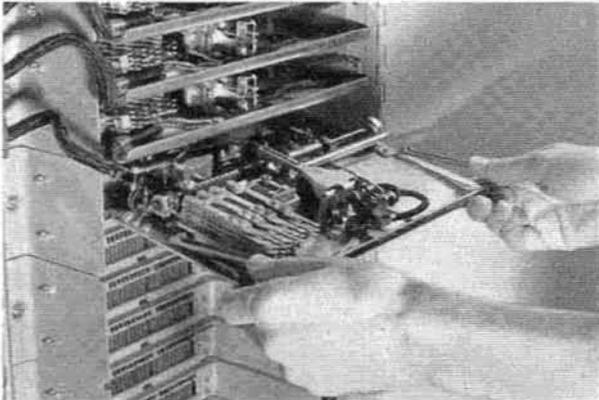
Trunk circuits, reverting call circuits and all miscellaneous circuits (pay station, information, intercepting, etc.) not requiring switches will be mounted on trunk shelves. These shelves are made in two standard sizes, one with a capacity for 20 mounting plates, and the other for 10 mounting plates. The number of circuits which will mount on these shelves will depend on the amount of equipment required for each circuit. These shelves are also complete units in that fuses, alarm circuits, and alarm lamps, are all individual to each shelf.



*Reading from top to bottom:*  
**Line Finder Shelf**  
**Selector Shelf**  
**Connector Shelf**  
**Trunk Shelf**

## THE XY SWITCH

The XY switch is the heart of the Stromberg-Carlson dial telephone system. The switch is a masterpiece of mechanical and electrical design, providing fast and accurate stepping in two directions to find and connect to any one of 100 circuits.



### Outstanding Features

1. Switches interchangeable for use as Line Finders, Selectors, and Connectors.
2. "Plug-In" construction facilitates routine inspection and tests.
3. Flat Plate construction facilitates cleaning and adjusting.
4. All parts subject to wear are of case-hardened steel.
5. Positive action interrupters are built into the switch.
6. High speed operation.
7. Off-normal and overflow contacts are built in.
8. Release magnet is self-holding until switch returns to "normal".
9. Operating principles thoroughly proven in many progressive exchanges operating for many years.
10. Occupies 20 sq. ins. of mounting space on equipment frame per switch (12½ x 1 9/16 cell dimensions).
11. 100 point switch.
12. Not sensitive to reasonable voltage fluctuations.
13. Can operate at temperatures from 0° to 120° F.
14. Twin contacts used throughout on spring pile-ups and wipers.
15. Tip, Ring, Sleeve, and Hunting Sleeve are all separate wipers.

### Description and Operation

This switch is manufactured in a modern factory by skilled workmen using the finest modern production tools and gages. Each switch is subjected to rigid inspection and must pass exacting performance tests before it is approved for shipment.

It is the function of this switch to step contact wipers into an associated wire bank, establishing connection with the circuit selected, in response to the supervisory circuits, or to the subscriber's dial impulses. Wipers are provided for the usual Tip, Ring, Sleeve and Hunting Sleeve circuits, and also for two additional circuits used for supervisory purposes and known as the 'X' and 'XX' circuits.

The switch carriage bearing the T, R, S, and HS wipers moves first across in front of the wire bank, and then steps into the wire bank. The switch performs this stepping rapidly, accurately and reliably. Stepping speeds of 25 pulses per second and higher are realized when the switch is trunk-hunting.

In the assembly of the XY switch we see the carriage bearing the wipers on the upper right hand side. There are two pairs of bifurcated wipers, for the T, R, S, HS functions, mounted on the carriage. The carriage is controlled by the cog roller, which slides on the tubular shaft, (extending across the mechanism plate), and rotates with it. As the cog roller slides along the tubular shaft, the carriage is moved in the 'X' direction, and as the cog roller rotates, the carriage is racked forward in the 'Y' direction.

Sliding of the cog roller in the 'X' direction is effected by rotation of the 'X' Gear Assembly, whose sprocket engages annular rings in the cog roller. The 'X' Gear Assembly is advanced by the driving pawl of the 'X' Magnet which appears at the upper left in illustration. The 'X' Gear is prevented from over-running by the tip of the 'X' Magnet armature which engages the adjacent sprocket tooth at the end of the armature stroke. After the stroke of the armature the 'X' Gear is held in position by 'X' Retaining Pawl which drops into mesh with the ratchet wheel. As a positive assurance that the armature driving pawl will not interfere with the release function, an ejector is mounted on the 'X' Gear Assembly.

The 'X' Gear Assembly also controls the 'XX' carriage which meshes by rack and pinion directly with it. The 'XX' carriage carries the 'X' and 'XX' wipers previously mentioned.

The 'X' and 'Y' magnet frames are built of the highest quality magnetic iron. The coils are wound to exacting standards with close tolerances on resistance and the number of turns. Armature bearings are case hardened for long service. The magnets are normally wound to operate on 48 volts D.C.

Mounted on the 'X' and 'Y' Magnets, and operated directly by the armature is the Stromberg-Carlson type of integral Interrupter Switch. Adjustments are provided for setting and for timing the switch to its best performance.

The rotation of the cog roller in the 'Y' direction is effected by engagement of the driving pawl on the Y Magnet armature with the cog roller teeth.

**THE XY SWITCH (Cont.)**

The 'Y' Magnet appears in the lower center of illustration. Overrunning is prevented by the stop bar (which appears just below the cog roller) moving in to engage the teeth of the ratchet on the left hand end of the cog roller. The stop bar is positively operated by a cam on the 'Y' Magnet armature. An ejector is provided to positively disengage the driving pawl from the cog roller upon release.

The cog roller is held firmly in position by the 'Y' Retaining Pawl at the conclusion of each stroke of armature.

The release magnet appears just to the left of the 'Y' Magnet. The release magnet disengages the X and Y retaining pawls and also operates the release spring pile-up. A holding circuit is provided in conjunction with the off-normal contacts to lock a release magnet once it has been actuated until the cog roller has completely returned to the normal position. The release spring pile-up is usually used to busy out the switch, preventing its seizure until it is restored to normal.

The spring combination appearing to the left of the release magnet provides three functions; the 'X' off-normal, the overflow and the 'Y' off-normal contact positions. The 'X' off-normal spring pile-up appearing just to the left of the release pile-up is actuated by a toggle which derives its motion from a switching lever underneath the cog roller. The contacts of this pile-up are used as previously mentioned to lock the release magnet and also for supervisory circuit functions.

At the center appears the overflow pile-up which is actuated from two sources. Should the cog roller run into 'X' overflow,

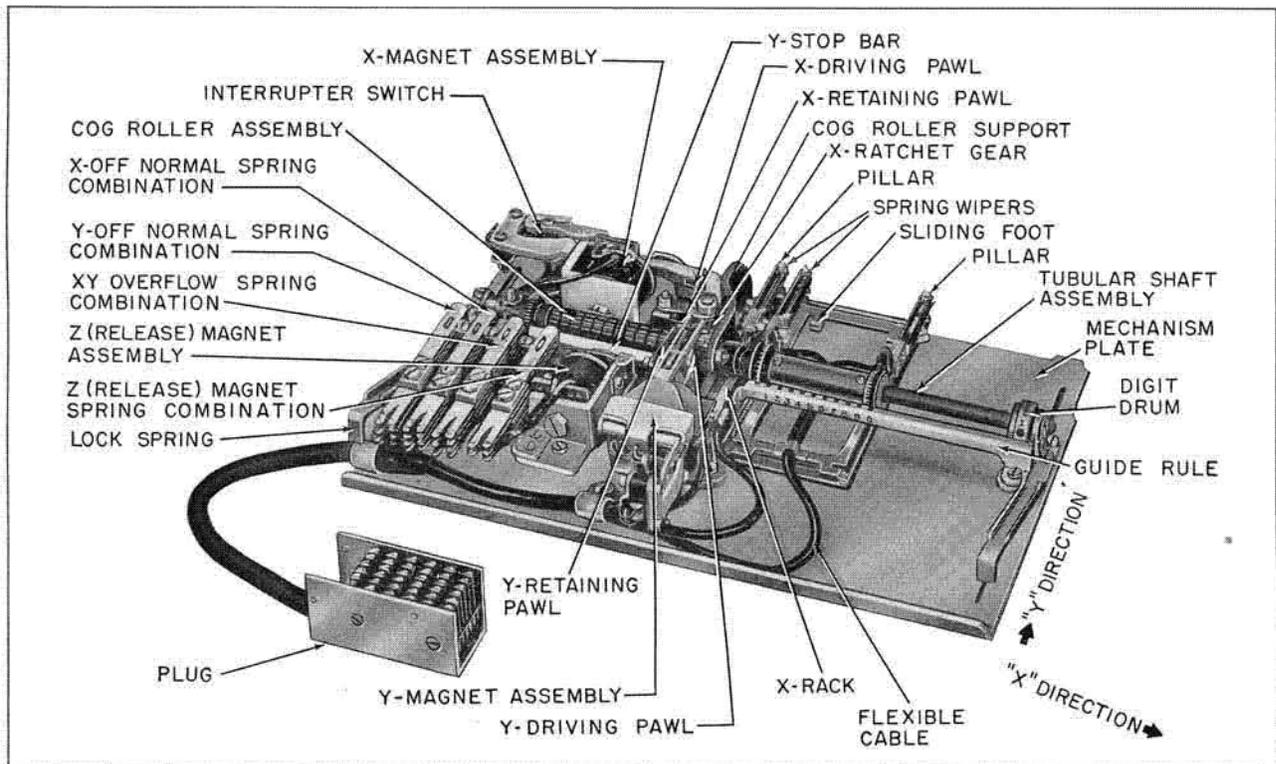
the switching lever is moved to the right hand limit of its travel, operating the toggle previously mentioned. This depresses the pusher spring of the overflow pile-up. This pusher spring may also be actuated by the cam mounted on the tubular shaft in event that the cog roller rotates to the 'Y' overflow position. The contacts of the overflow pile-up are used to interrupt the battery feed to the 'X' and 'Y' magnets and also for supervisory purposes.

On the left hand side of the spring combination appears the 'Y' off-normal pile-up. This pile-up is actuated by the cam mounted at the left hand end of the tubular shaft. The contacts of this pile-up have similar functions to those of the 'X' off-normal pile-up.

Electrical connection to the XY Switch is made by means of the cable attached at the lower left hand corner. This cable terminates in a multi-point plug in which 36 terminals are mounted in a minimum of space. This terminal plug is arranged to lock into a mating piece on the equipment frame providing quick and positive connection.

As an aid in adjusting and checking the switch, a numbered drum is mounted at the right hand end of the tubular shaft, providing ready indication of the 'Y' position of the switch. The guide rule mounted under the tubular shaft on the right hand side is numbered to indicate the 'X' positions on the carriage.

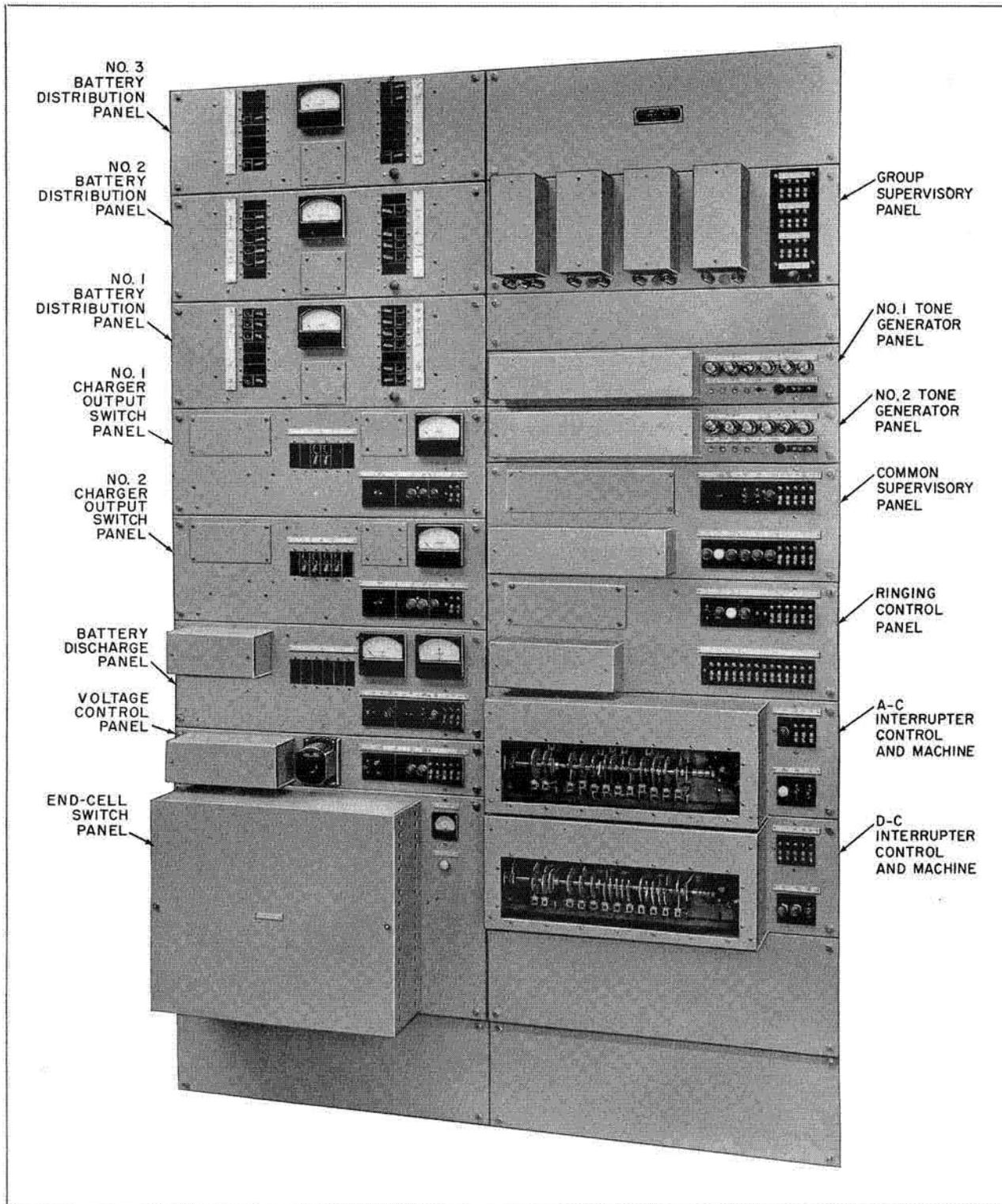
Any dial system is only as efficient as its switching element. In the XY switch, Stromberg-Carlson offers a reliable, versatile, thoroughly tested instrument which the company is proud to include in its established line of the finest telephone products.



XY Switch Assembly

# 8b • CENTRAL OFFICE EQUIPMENT

Revised 1-3-55



A Typical Power and Supervisory Panel

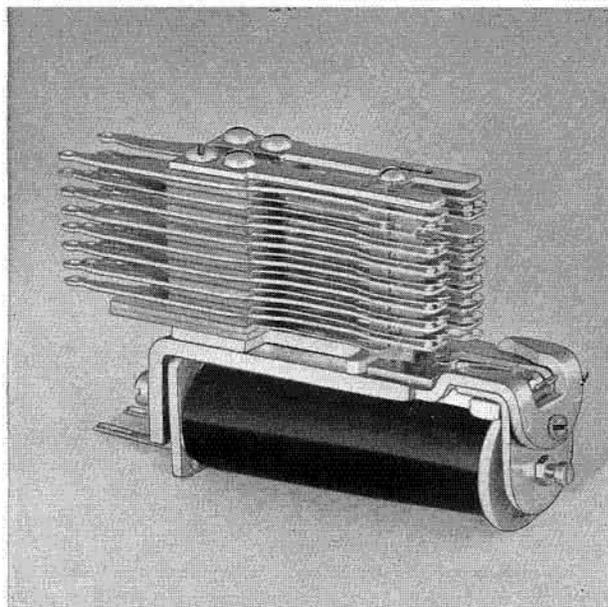
**POWER AND SUPERVISORY EQUIPMENT**

Stromberg-Carlson Power Boards match the switching equipment in appearance and complete flexibility. All controls are placed where they can be easily identified and operated. Panel wiring separates outside power source from local power. All connections between panels are by means of cable.

The essentially new feature of the Stromberg-Carlson Power Board is its flexibility. In assembly, in operation and in future expansion, changes and enlargement of service are not a problem of complete rebuilding, but a simple matter of sliding out one unit and sliding in another. Units can be provided to fit any type of dial equipment, method of charging or type of ringing.

**Outstanding Features**

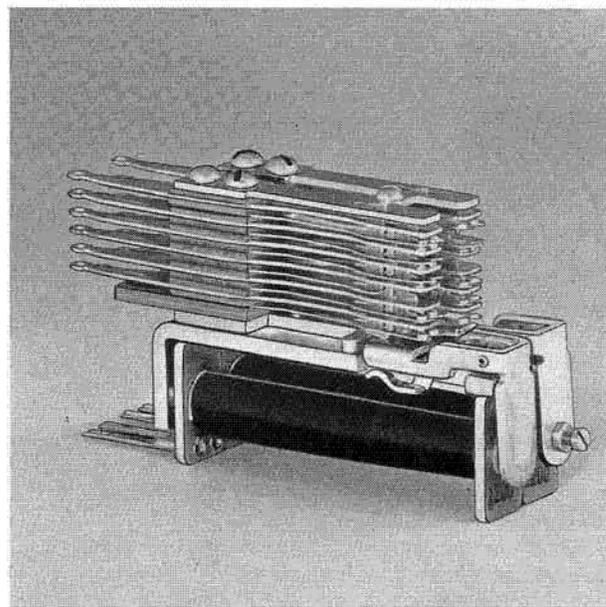
1. Frame construction, with identical uprights arranged for mounting any basic unit in any position.
2. The "Unit Control Panel" of functional operations will be selected for individual needs; other panels will then be built up around basic control unit.
3. Motor-Generator or dry disc rectifier for charging batteries may be used.
4. End cell or counter cell battery control may be used.
5. The interrupter machine provides "jacked in" springs and motor. These parts can be readily removed from face of machine without disturbing any wiring.
6. Tone Generator panel provides basic tones for Dial, Busy and Tick. Provision is made for adding the second tone panel when needed.
7. Common Supervisory control panel provides common alarm signals in one location.
8. Locates and types service interruptions.

**A AND C TYPE RELAYS**

Stromberg-Carlson A Type Relay

The Stromberg-Carlson "A" Type Relay was designed to meet the exacting requirements of dial switching systems. This relay, because of its construction and carefully selected materials, will give reliable service under adverse conditions where many other relays fail. An outstanding feature of this relay is the use of twin precious metal contacts—positive insurance for reliable operation and long life.

The adjustable armature support simplifies adjusting the armature travel when necessary. Residual Screws or welded residual discs furnished as required. A continuous single piece pusher



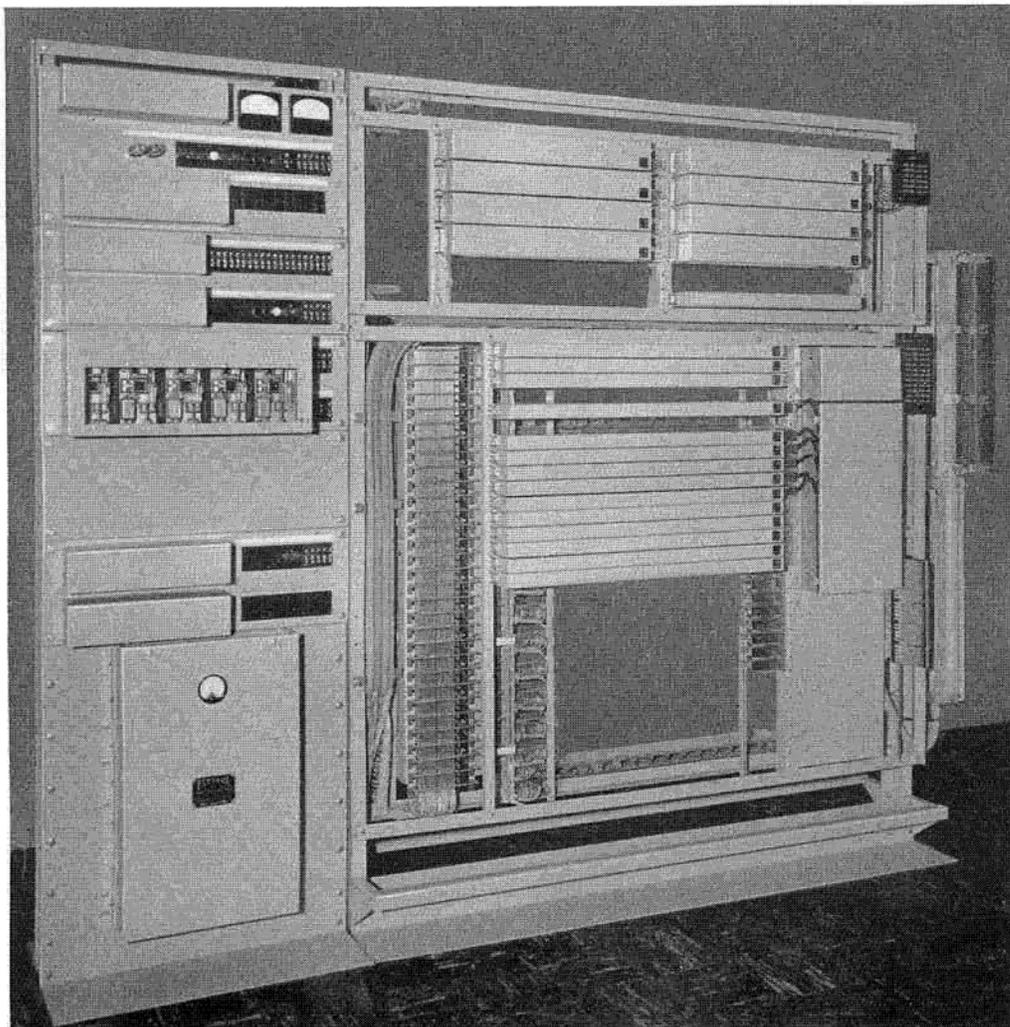
Stromberg-Carlson C Type Relay

permits each moving spring to operate individually, assuring long life with very little spring adjustment. The spring combination can be unscrewed as a unit. Coils, with integral terminals, are easily removed.

The Twin "C" Relay (actually two relays on one frame) is designed to mount in the same space and on same mounting as one standard "A" Relay. Developed for use in line circuits where space limitations were a major factor, it may be used wherever the economy of small size is an advantage and where extremely high resistance coils are not required.

Revised 1-3-55

## THE XY "B" SYSTEM 100-LINE C.D.O.



There has been an increasing demand for XY dial equipment designed expressly for the small community office, not initially requiring selectors. The "B" System 100-Line XY C.D.O. is the answer to this demand.

The inherent flexibility of the XY dial system permits the same features which have given larger XY installations the enthusiastic approval of the industry, to be built into these smaller systems. In addition, the design incorporates several new features which simplify installation and ease of maintenance:

The main distributing frame is normally mounted directly on the end of the equipment frame, shown on right side of the illustration above. Thus all wiring between the M.D.F. and the equipment frame can be completed prior to shipment; the installer has only to connect the leads to outside plant, greatly reducing installation costs.

The power board, shown at left in illustration, is built up in standard size demountable panel sections — each a complete working unit which can be selected to meet individual requirements, yet all match each other. Mounting and appearance duplicate the switching equipment.

Services which in other systems are provided as extras — conversation timing, line lock-out, restricted service, pay station service, PBX or consecutive line hunting, reverting calls and national intertoll service — are all included in standard equipment and can be utilized as required.

This system is designed for an ultimate capacity of 100 lines, including trunks and 14 finder-connectors. Unused line facilities in a line group that is used for non-restricted trunks, may be used for local lines. One terminal between the trunk group and the local lines must be left vacant. A maximum of 10 inter-office trunks can be provided.

Operating power for the "B" System is obtained from a storage battery and associated battery charging equipment which operates from a commercial electrical power source.

This system is arranged so that it can be used as a tributary office out of a terminating toll center in an inter-toll dialing network. Stop and start-dialing signals are provided as well as 60 IPM tone and flash-busy indications for line busy as required in the general plan for Nation-Wide Inter-toll Dialing. This system is also adaptable to Toll-Ticketing when desired.

## XY TOLL TICKETING

XY Toll Ticketing can be tailored to specific problems of convenience and finance, and will be engineered for each specific application to yield the maximum operating economies. XY Toll Ticketing is automatic not only in its recording functions, but also in every step thereafter.

Stromberg-Carlson has two types of toll ticketing systems—the Verification Identifying "VID" and the Line Identifying "LID" systems. Both systems are compatible with any direct response dialing system. When desired, they will also conform with the 2-5 Numbering scheme established by the telephone operating companies to facilitate nation-wide toll dialing. In the "LID" system, line identification is automatically accomplished. Neither system is limited as to the type of permanent record that can be printed or punched. Both systems are able to store information on many calls and automatically play them back at a time when traffic is low, thus busy hour traffic is not affected.

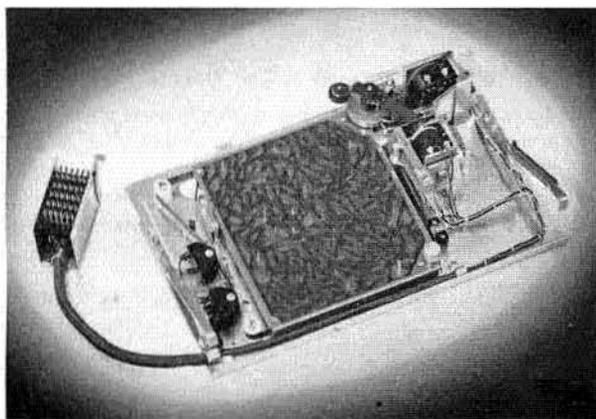
Both systems are high speed in operation thereby eliminating the need for duplication of many pieces of equipment. The recording, verifying or identifying, playback and ticketing equipment are completely flexible and can be arranged for the most economical means of equipping remote or central offices.

### Types of Systems

The two systems, designated "VID," and "LID," differ largely in the manner by which the identity of the calling subscriber is determined. In the "VID" system which is the most economical to install, the calling subscriber identifies himself by dialing his own complete number in addition to the number of the desired station. In the "LID" system, part of the identification process is automatic and the subscriber dials only a single extra digit which distinguishes the station on a party line.

These two systems have been carefully engineered to permit conversion from one type to another, thus lessening the danger of obsolescence because of changing needs or conditions.

### The Magnetic Tape Recorder



One of the important functions which must be performed automatically is the recording of pertinent call data so that charges can be made. The XY Trunk Recorder, shown above, is the mechanism which records this information. The Recorder looks very much like an XY Switch, mounts in the same manner, and uses many of the same parts.

The data is recorded on a magnetic tape which is in the form of an endless loop, approximately 35 feet long. Magnetic recording has been chosen as being preferable to other means of temporary storage because it provides the unique facility of erasing and reusing the tape. Thus the operation becomes truly automatic for unlimited periods.

The tape passes over a twin-track head which is used for both recording and playback. This is followed by a double width erase head which erases both tracks simultaneously.

The upper half of the twin-track head transforms electrical impulses that are fed into it, into magnetic impressions on the tape (called "mark" pulses) indicating the subscriber's telephone number, the called station, the time, date and elapsed time.

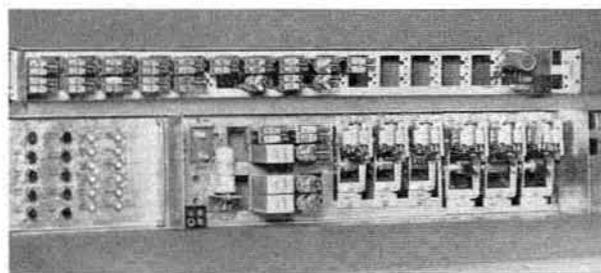
The lower half of the same head becomes energized upon release of the inter-digit relay. Magnetic impressions are made on the lower half of the tape, serving to separate the groups of "mark" pulses, and thus they are called "space" pulses.

The end of a call, whether it is completed or not, is indicated by a third signal, called "COE" signal, consisting of a simultaneous "mark" and "space" pulse which is followed by several advances of the tape to provide a blank section between calls.

### Identification of Calling Party

In the "VID" system, once the subscriber has seized a trunk, he also seizes a Verification Selector. Under control of the dialed digits, this will seize a verifying Connector. The subscriber must dial his own number first, which is recorded. This number is checked through a verification train. If the call is verified, the subscriber is permitted to continue dialing. If the call is not verified, further dialing is blocked and a tone is returned to the calling subscriber.

In the "LID" system, the subscriber first dials his party digit and then the desired station number. Later, when the call is connected, identification takes place and the information recorded on the magnetic tape.



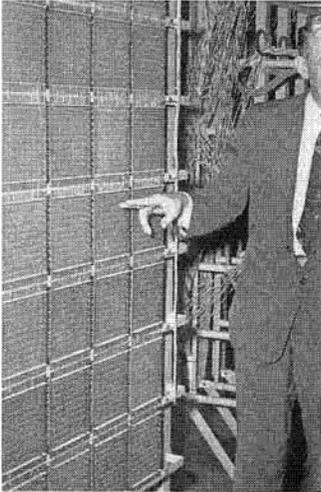
The Clock-Calendar Unit.

Revised 1-3-55

## XY TOLL TICKETING (Cont.)

### The Playback Operation

It is unnecessary to produce tickets individually as each call is completed because of the large storage capacity of the XY Trunk Recorder. Under normal circumstances, the playback process will be initiated automatically at a time when trunk traffic is low. However, if traffic has been unusually high and the capacity



The Matrix Panel.

of the recorder has been reached, playback will begin immediately in order to clear that trunk and restore it to service with a minimum of delay. When initiated, the Playback Control Circuit will seize each idle trunk in rotation. The tapes are advanced by the common motor at a rate of speed that plays back one trunk in approximately 10 minutes. The information stored on the tape is printed on individual tickets, one at a time, under the direction of the Readout Control circuit. Pulses representing digits of the call are counted by

### The Ticket Printer

chains of cold-cathode gas tubes that have been chosen for their reliability and economy. When the end-of-call signal is received, the tape becomes stationary until the tube information has been interpreted and printed. With the tubes cleared, the tape advances and the process is repeated until all information on the tape is used. The tape is then erased.



The Ticket Printer.

### Remote Operation

The XY trunk recorder is admirably suited to remote operation in unattended offices since no periodic attendance is required. At the same time, its ability to store a large number of calls makes it unnecessary to tie up a trunk facility permanently for playback purposes if the ticketing of the information is to be done at a central ticketing point.

Any number of remote offices can be served by a single ticketing point at which most of the common equipment and printer would be located. If the Recorders are located in the remote offices, the recorded pulses can be carried over any existing voice-frequency channels on an interrupted tone basis, thus making it unnecessary to provide any special circuits in most cases. Carrier transmission may be used where conditions warrant.

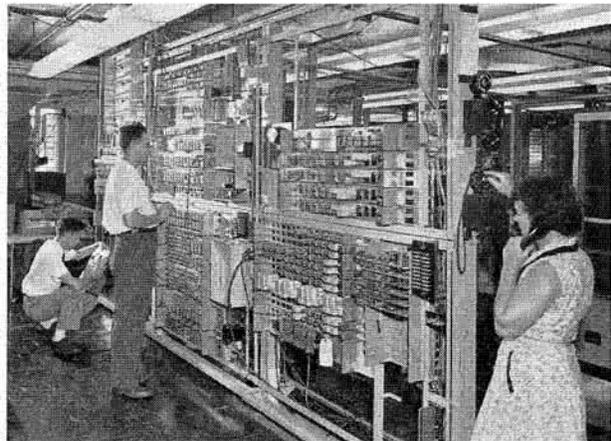
If the system trunking diagram permits all recorders to be located in a central tandem point, the remote offices need contain only the verifying or identifying equipment.

### Not Limited to AB Toll Calls

The "VID," "LID," toll ticketing systems described have so far found their greatest application in "AB" or short-haul toll traffic. It is expected that the immediate future will necessitate the application of such systems to long distance operation so that subscribers can dial their own calls throughout the length and breadth of the country. The "VID," and "LID," systems are convertible to long distance dialing and the additions of common-register senders may be required in some instances to convert the digits dialed by the subscriber into proper routing codes required by intertoll routes. It would also be necessary to change the rate computer in order to handle the greatly increased number of rates to be figured.

### Developments in Toll Ticketing

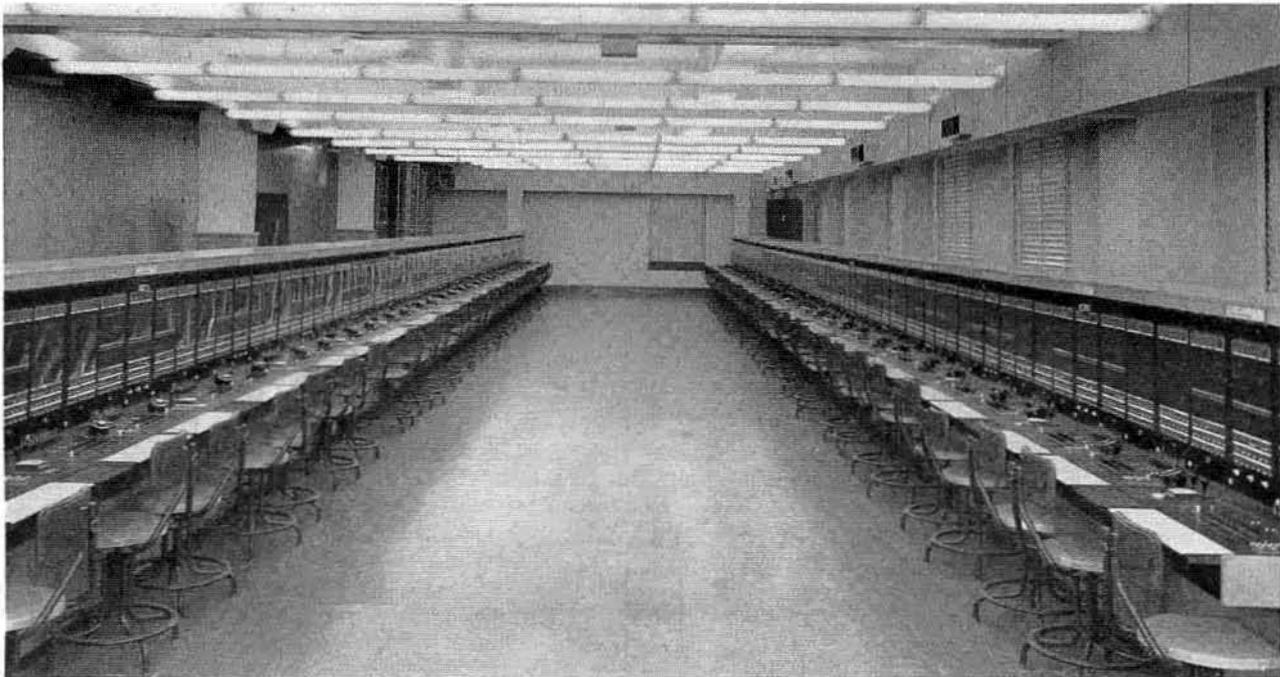
Stromberg-Carlson is engaged in a development program on variations of their existing toll ticketing systems to provide for fully identifying equipment, omitting the dialing of extra digits by the subscriber, and operator identifying which requires the services of a toll or special operator to identify the calling subscriber.



Testing Toll Ticketing in the Laboratory.

**TOLL SWITCHBOARDS**

Stromberg-Carlson Toll Switchboards are designed to meet the exacting requirements of local and long distance toll service. Every toll board is custom-engineered to meet individual requirements in the best manner consistent with the nation-wide character of long distance operation. Stromberg-Carlson switchboards are now serving the toll needs of scattered agricultural areas, growing suburban communities, and busy metropolitan centers. Talk with your Stromberg-Carlson representative about the many new developments in toll switchboard engineering. He will be glad to cooperate in developing a layout which is suited to your needs, both for the present and for the foreseeable future.



80 Positions of Stromberg-Carlson No. 3 Toll Switchboard in a large toll center.

The entire arrangement of the No. 3 Toll Switchboard reduces the cost per position, which is an important factor in modern toll offices where the number of cords often exceeds the number of lines and trunks by 60% or even more.

Stromberg-Carlson engineers are giving continuous study to the problems of toll operation, both present and anticipated. As new problems arise and the method for handling them has been devised and thoroughly tested, these additions will be incorporated into the No. 3 Toll board.

#### Features of the No. 3 Toll Switchboard

The Stromberg-Carlson No. 3 Toll Switchboard is the best answer to meet the exacting requirements of operator intertoll dialing over long distances. This board is also used to supply service to local subscribers.

Some of the more important features of this switchboard are listed below.

1. Supervisory and signaling functions are in the line or trunk circuits instead of in the cord circuit. This is more economical when there is a large number of cords in respect to trunks, and provides better means of adjusting to individual line conditions.
2. The cord circuit has zero loss.
3. This board can be supplied with keysenders for use with dial type equipment. Keysenders greatly increase the sending rate, giving higher operating efficiency.
4. No signaling generator is carried into the section.
5. AC operation is available for line and/or busy lamps.
6. Idle lamp indications may be used for trunk groups.
7. No auxiliary contacts are used on jacks. This simplifies maintenance.
8. Jack sleeves can be removed from the front without disturbing operation of the switchboard.
9. All equipment for cord circuits, position circuit, operator circuit, etc., is mounted in the switchboard and has been wired and thoroughly tested at the factory.
10. Line and trunk circuit relay equipment is assembled on circuit plates which have been wired and tested before shipment.
11. This board is easily adaptable to CLR. Inward and TX operator positions where services are normally used in large central offices.

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## TOLL SWITCHBOARDS (Cont.)

### Circuit Features of No. 3 Toll Switchboard

#### CORD AND POSITION CIRCUITS

1. Cord and Position circuits have zero loss.
2. Intentional overlap is possible so as to permit monitoring one cord and listening on the other. However, it is impossible to accidentally connect two toll calls by false operation of the talk keys.
3. Splitting and control features such as dialing and coin control are always associated with the talk key, never the monitor key.
4. Ringing control—Ringing is under direct control of the operator. She can delay ringing when desired. If the board is equipped with a Non-Ring (NR) key, delayed ringing is accomplished by depressing this key during dialing or key-sending. If the board is equipped with a Ring key, automatic ringing is accomplished by depressing this key during dialing or key-sending.

#### TRUNK CIRCUITS

1. Trunks are designed to fit into the latest intertoll requirements established by telephone operating companies to facilitate nation-wide toll dialing.
2. Trunks will work into manual as well as into dial type exchanges.
3. Trunks are available for many types of special services.
4. Trunks include all signaling and supervisory functions, so that individual line conditions can be met by making an adjustment within the trunk instead of making an adjustment to each individual cord circuit.

Adjustable cable pins are provided supporting the switchboard multiple.

### Keyboard Features

The key shelves are low, with the top only 30" from the floor. This allows the operator to rest her feet comfortably on the

floor. Keyboards are extra wide with removable glass bulletin holders. Each keyboard is arranged for mounting both a dial and a key sender set. It has a capacity of fourteen cord circuits, with common keys for splitting, coin control, dial, "wipe out" and "send rear."

An unusual feature which has met with great favor is the provision for mounting individual ticket slots associated with each cord circuit.

### Terminal Power Equipment

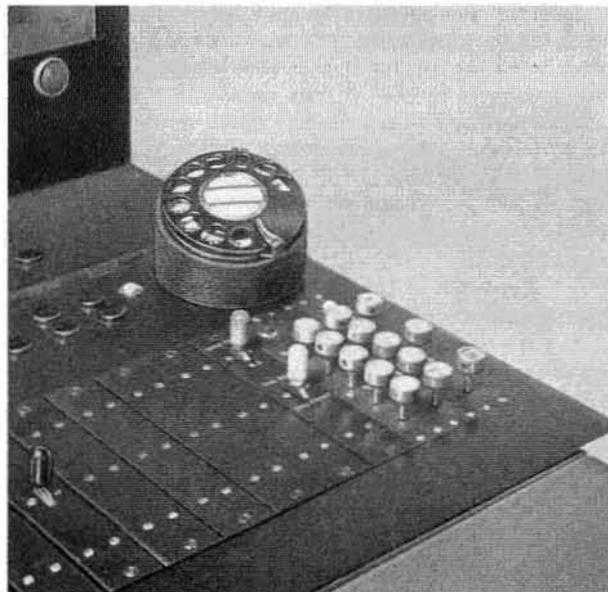
Switchboard multiple cables are terminated on the horizontal side of the IDF and the relay equipments are terminated on the vertical side, so that all circuit assignments are made with jumpers at the frame. Jack circuits and composite equipments for toll testing are terminated at the IDF, thus providing maximum flexibility.

A separate bay is available for mounting power panel, fuse panels, generator lamp panels, and auxiliary control equipment. Other power equipment, such as power control panel, emergency converters, and emergency switching circuits are available. Operating current is supplied from 24 cells of storage battery.

### Description of No. 200 Type Section

The No. 203 or 204 Section is of steel frame construction with removable end panels, roof, front and rear doors.

The sections are of single position, two panel type for easy handling. A single panel calculagraph section of the same construction is furnished with each two operating sections for use of both operators. Cable turning sections are available for either right or left end, depending on the direction of growth. Dimensions of a standard section (less end panels) are: height 51", (or 56"), width 23½", depth at floor 20", depth at keyboard 38½". The calculagraph section is the same except for the width which is 12¼". The jack opening in the face of the switchboard is 15" high (or 20" on the higher section).



**INFORMATION AND SPECIAL SERVICE DESKS**

With the advance of telephony in the direction of customer dialing the need for Information and Special Service Desks becomes more apparent. Stromberg-Carlson offers three designs, each having its own advantages in application: the Turret Type, the Flat-Top Type, and the Sloping-Front Type Information Desks. The type of desk necessary for your office depends upon the size and traffic conditions.

**The Turret Type Information Desk**

The simplest of the Information Desks, this type is ideal for small dial exchanges. Using a standard Model 121 PBX cabinet, the Turret desk provides for terminating 20 Information, Intercept or other Special Service Trunks. The desk provides all the facilities required in small offices and can be mounted on any convenient desk or table which will permit the operator to perform other duties when traffic warrants.

Features of the Turret Type Information Desk:

1. **INTERCEPT**, local and toll information, rate and route, repair and other special answering services can be accomplished through the use of the Turret Type Information Desk.
2. **HOLDING**. It is possible for the operator to hold an incoming call in order to look up information, verify the line, or perform other duties relative to the incoming call.
3. **SWITCHING POSITION**. Ideal for small offices during light duty hours. The operator can transfer all incoming calls to a toll board. This feature will not reduce the number of possible trunks that can be assigned to this turret.
4. **VERIFICATION**. By using the dial, the operator can verify an incoming local call.
5. **TRUNK LINES** can be directed from the turret to a toll board and to a test board if desired.

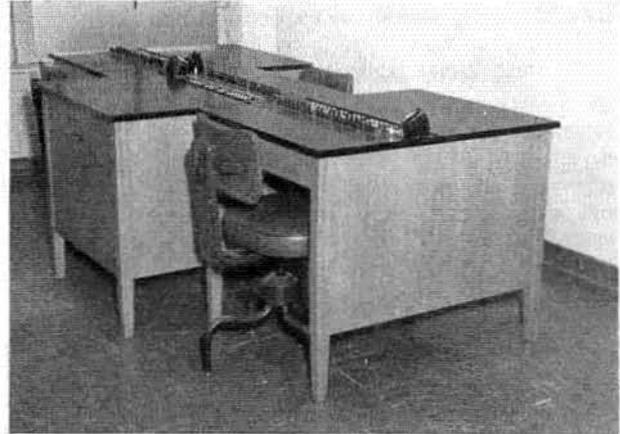
**Flat-Top Type Information Desk**

Larger offices prefer more complete desk facilities such as found in the Flat-Top Type Information Desks. These desks provide space for terminating more trunks and also offer a table surface for using information or other files. If more than one position is required, they are normally placed in a staggered line with adjacent operators facing in opposite directions.

A maximum of 36 Information, Intercept, or other Special Service trunks together with Supervisor's, Verification and Miscellaneous trunks can be equipped. Any number of positions can be multiplied together.

Originally designed for use in XY Dial equipment, the Flat-Top Type Information Desk is also adaptable to work with other types of dial equipment. In this desk, the trunk relay equipment is mounted on racks outside the desk. The relays used are the same twin contact relays used in XY Dial Systems.

**FEATURES**. All features are identical with those of the Turret Type Information Desk; the principal difference, other than the physical construction is in the larger capacity.



Flat-top information desks (3 positions shown here).

**Sloping-Front Type Information Desk**

This type of information desk is a recent development of Stromberg-Carlson. The Sloping Front model is intended for use with book type Information files, whereas its companion model, the Flat-Top type, is intended for use with rotary files. Equipment and operation is the same for either type desk.

This desk has a capacity of 100 Special Service Trunks and up to 20 operator positions may be installed in one group. It is intended for use in large offices or multi-office areas.

Special Features of this Sloping-Front Information Desk:

1. **LINK CIRCUITS**. Two such circuits are provided for each position. The operator can hold one call, and answer a second call while looking up information on the first call.
2. **RELEASE KEY**. Permits release of a call by the operator when call is completed.
3. **CALL FINDER**. Utilizing standard XY Switches, this arrangement "finds" an incoming call and connects it to an idle Information Desk operator. A spurt of tone signals the operator that she is connected to a calling party. A row of lamps indicate the type of call, such as Toll Information, Local Information, Intercept, etc., and she answers accordingly.
4. **LOCAL CALLS** can be made by the operator when necessary.
5. **FLASHING DISTANT OPERATORS**, verification, transferring calls to supervisor, and "Call Splitting" can be accomplished on this desk.

**CLASSIFICATION OF CALLS**. As many as ten different classes of service may be provided on these Information and Special Service Desks. The preferential classes of calls are picked up first. The rest are held until used. To guard against excessive waiting time for the less preferential calls during busy periods, a simple "gate" system is used which filters the calls without harrying the operator. This insures that all calls are answered within a reasonable period of time.

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## COMMON BATTERY SWITCHBOARDS

Stromberg-Carlson continues to make a diversified line of common battery switchboards, both for additions to present manual offices and for new installations where local conditions will indicate use of this type of service. New developments in the industry at large have been carefully studied, and modifications to the equipment made as a result of these findings. The manual switchboards shown here provide simplified circuits giving faster, more economical and accurate service than was heretofore possible.

### THE NON-MULTIPLE SWITCHBOARD

The Stromberg-Carlson Non-Multiple Switchboard compares favorably in price and simplicity of circuits with a good magneto switchboard. It is often furnished with drop-ended magneto jack strips for rural lines, and with common battery operation on town lines, making an easy transition from a single wire to a fully metallic system.

In addition to the obvious advantages of common battery operation over magneto operation, Stromberg-Carlson Non-Multiple Switchboards also:

1. Assure speed and accuracy by using double lamp supervision.
2. Provide the operator with position supervision on all connections.
3. Reduce operator's reach by use of compact lamp signal and jack on local lines.
4. Allow the use of present magneto telephone (by adding a capacitor in the ringer circuit) until it is convenient to install standard common battery telephones.

NOTE: The battery sizes are estimated on the average of 15 calls per line per day, with an average holding time of 1½ minutes. These sizes will carry the load for 24 hours when batteries are fully charged.

### Dimensions and Capacities

Dimensions of a single section are:

- Height—51 inches
- Width—25¼ inches
- Depth—20 inches (on floor)
- Depth—38½ inches (at keyboard)

A two-position board has a width of 48¾ inches.

The Non-Multiple Switchboard is placed in stock wired for 200 local lines, 30 drop or lamp ended toll or rural lines, 16 manual ringing cord circuits, and 5 dial trunks either jack or key ended. Common battery lines should always be ordered in groups of 20, and ringdown lines in groups of 10.

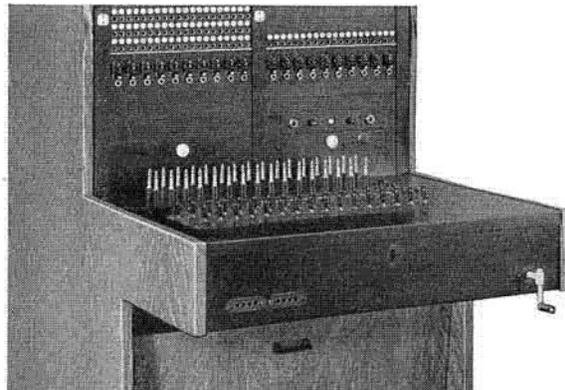
### Power Recommendations

#### Single Position

- 11 Cells of 10 Ampere Hours Battery
- 1 Battery Charger, 3 Ampere Hour
- 1 Type "S" Sub-Cycle Set
- 1 Type "D" D.P.S.T. Switch
- 2 15-Ampere Fuses

#### Two Position

- 11 Cells 30 Ampere Hours Battery
- 1 Battery Charger, 3 Ampere Hour
- 1 Model "S" Sub-Cycle Set
- 1 Type "D" D.P.S.T. Switch
- 2 25-Ampere Fuses

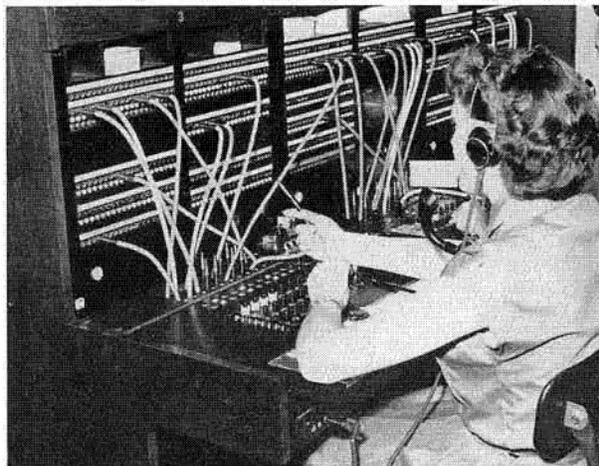


Keyshelf showing Non-Multiple Switchboard, Drop Signal Magneto and Signal Common Battery Lines.

### THE MULTIPLE SWITCHBOARD

Multiple switchboards for additions to manual central offices or for attendant's cabinets in hotels or large business offices where operator assistance is desired will be furnished to specification on an engineered basis. Larger boards are built up in sections, using standard welded steel frames. Two-level plug boards, making it easier to select the correct cord, are a feature of these sections. When sections are placed together the installation has a continuous-face appearance.

The No. 17 Section is 22-11/32" wide, 5'-4½" high, 3'-6¾" deep, 2'-10⅞" from floor to keyshelf, and has a 20" jack face opening. The No. 18 Section is wider—25½", higher—5'-10⅞", and has a larger jack face opening—24⅞"; other dimensions and all construction features are the same.



Recent installation of Multiple Switchboard.

**NO. 125 MAGNETO SWITCHBOARD**

There are many reasons for the continued popularity of the Stromberg-Carlson No. 125 Magneto Switchboard for those offices where magneto service is to be retained. Standardization on one model permits volume manufacture, and brings the switchboard to you in a shorter time at lower cost.

**Features of The No. 125 Switchboard**

1. **DOUBLE CUT-OFF CONTACTS** on each line jack sever both sides of the drop coil from the line.
2. **UNIT TYPE DROP MOUNTINGS**, each containing groups of drops, make it easier to add extensions.
3. **DOUBLE RING-OFF SIGNALS** that increase the efficiency of operating by designating to the operator just which party to a connection has rung off.
4. **NON-RING-THROUGH AND REPEATING COIL TYPE CORD CIRCUITS**. Eliminates confusion between operators and subscribers; minimizes noises from inductive disturbances.
5. **MODERN, LONG-LIFE OAK CABINET** looks well in any office. Hand-rubbed in limed-oak finish.
6. **LINE DROPS** operate on unusually small amount of current.
7. **THIMBLE OF JACK** separately removable from the front of the switchboard to enable easy replacement of the part most subject to wear.
8. **RING BACK KEY ON EACH CORD CIRCUIT** permits ringing on the answering cord without reversing cord connection.
9. **PLUG-RESTORED DROP SHUTTERS** promote speed in operating.
10. **CONTRASTING COLOR OF SHUTTER**, when operated, provides easy visibility and increases efficiency.
11. **REMOVABLE NUMBER PLATES** make it convenient to properly designate lines to conform with directory listings.
12. **REMOVABLE DROP COILS** permit economical repairs.
13. **CODE ALARM** provided on any line, when specified, by the use of a drop equipped with code alarm contacts.
14. **MANUALLY RESTORED RING-OFF SHUTTERS** designate which subscriber to a connection is ringing off.
15. **ZERO-LOSS CORD CIRCUIT**. The first two cord circuits on the left are wired for this feature. Repeating coil cut-out keys are required for this service.

**Line Equipment**

Each equipped line circuit of the No. 125 Switchboard includes:

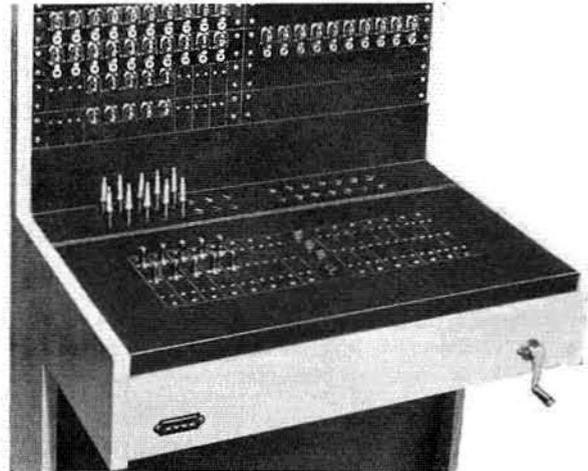
Stock No.	Code	Description
801789	(No. 18-B)	Drop, less Code Alarm or
801798	(No. 23-B)	Drop, with Code Alarm
	Mounted on	
37197	(No. 147)	Drop Mounting, 10 per strip

See Coded Parts Section for codes covering 10 drops on one strip.

**FULL METALLIC LINE CIRCUIT WIRING** with looped-in wire for connecting ground to drop as required, provides facilities so that any signal in the switchboard may be associated with a grounded line, a metallic line, a common return line, or a central checking line.

**CODE ALARM** provided on any line, when specified, by the use of a drop equipped with code alarm contacts. The code alarm contacts may be purchased separately and added to any line drop signal originally furnished without this feature.

**LINE CABLE**, which may be extended 12 feet from either the top or bottom of the switchboard, affords ample length for connecting to a standard Stromberg-Carlson No. 1 Protector Frame.



Keyboard of No. 125 Switchboard.

**Cord Circuit Equipment**

Each circuit includes the following equipment:

Stock No.	Code	Description
42623		Cord and Plug Assembly (consists of one S-22-F Cord and one .56-X Plug)
800707	(No. 6)	Cord Weight
*802994	(No. 172-U)	Key
802627	(No. 171-D)	Key
	on	
207332	(No. 89)	Key Mounting
801794	(No. 21-B)	Drops (2)
37198	(No. 148)	Drop Mounting, 10 per (2)
800440	(No. 13-AL)	Repeating Coil
42375	(No. 61)	Condenser

\*Specify 803021 (No. 172-B) Key when repeating coil cut-out key is desired in first two cord circuits only.

**Dial Trunks**

When connected with a Dial Exchange, it is necessary to provide for dial trunks. Wiring is provided in each switchboard for dial, dial cord, dial jack, and wipe-out key. These items can be installed in standard switchboards without major alterations.

**Material Required for Dial Cord**

Stock No.	Code	Description
42623		Cord and Plug Assembly (consists of one S-22-F Cord and one .56-X Plug)
800707	(No. 6)	Cord Weight
49520	(No. 336-C)	Key Engr. "WO"
42376	(No. 62)	Condenser (Dial as required)

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## NO. 125 MAGNETO SWITCHBOARD (Cont.)

### Operator's Telephone Equipment

A suspended operator's telephone set is furnished with the No. 125 Switchboard. The following apparatus is included:

Stock No.	Code	Description
801592	(No. 29)	Receiver
201839	(No. 66)	Plug
800646	(No. MO-2-1)	4-ft. Cord
201757	(No. 6)	Dry Cells (4) 45 v. Burgess Battery
801802	(No. 93)	Jack
802527	(No. 15)	Transmitter Arm
800424	(No. 44-A)	Induction Coil
802525	(No. 22)	Transmitter
800632	(No. MO-1-A)	5-ft. Duratex Cords (3)

The following items are furnished only when specified: 802632 (No. 188-A) Key and 800443 (No. 14-AL) Repeating Coil for Monitor Equipment and 66241 (No. 3-A) Varistor for "click" reduction; No. 801083 (No. 93-B) Jack for Learner accommodation; and 801453 (No. 4) Operator's Breast Set when transmitting arm is not desired.

### Night Alarm and Code Alarm Circuit

**THE NIGHT ALARM CIRCUIT.** This circuit is arranged to give a continuous ring as long as a drop shutter and the Night Alarm Key are in their operated position.

**THE CODE ALARM CIRCUIT.** This circuit provides a buzzer which buzzes in unison with the code signals when a subscriber rings on a party line. The operator thus knows whether her services are required when a drop falls, or whether the call is simply for another party on the line.

### Equipment Required

Stock No.	Code	Description
<b>Night Alarm</b>		
38346	(No. 571)	20 ohm 2½" Vibr. Bell
49532	(No. 338-C)	Key (Night Alarm)
<b>Code Alarm</b>		
39483	(No. 570)	20 ohm Buzzer
49532	(No. 338-C)	Key (Code Alarm)
803054	(No. 265-A)	Relay
801610	(No. 25)	Relay Casing

### Generator and Power Equipment

The apparatus furnished for ringing the subscriber's station instruments consists of:

Stock No.	Code	Description
201678	(No. 64)	Generator
13287		Crank Shaft
201792		Crank
49532	(No. 338-C)	Key (Gen.)
801822	(No. 28-H)	Ringer

**POWER RINGING GENERATOR**, such as the Type "S" Sub-Cycle Ringing Machine, is recommended for the busy switchboard.

**SIGNALING INDICATION** is given by means of a buzzer which responds to the flow of current in the generator circuit. This indicates to the operator that she is ringing out on a line and that the line is in proper condition for signaling.

**MASTER KEY SPACE** on the keyboard affords a means for installing Divided Circuit, Pulsating or Harmonic Ringing.

**OPERATOR'S CIRCUIT POWER SUPPLY**, such as the 1057-R Rectifier, is recommended, when the building lighting circuit is constant. This type of current supply is equipped with a change of source relay, so that a stand-by set of dry cells may be switched into service in case of city power failure.

### Grouping or Position Switching Key

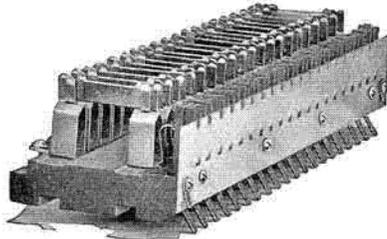
Facilities for switching the operator's set of one position to the cord circuits of an adjacent position is accomplished by means of a "Grouping" or "Position Switching Key." The No. 125 Magneto Switchboard is drilled, blanked and wired for a Position Switching Key which may be installed at any time when needed. The requirements consist of one No. 338-H Key.

### No. 125 Switchboard Tools No. 41307 Package Assembly

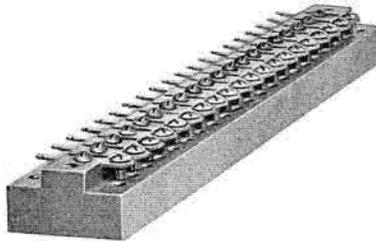
Stock No.	Code	Description
802456	(No. 2)	Socket Wrench
41140		Wrench for Arm. Nut
802485	(No. 56)	Screw Driver
8104		Screw Driver C.A.
2941	(No. 14)	Flat Wrench
12077	(No. 42)	Screw Driver
892713		Yankee Screw Driver, 3" blade
802457	(No. 7)	Spring Adjuster

**MAGNETO SWITCHBOARDS—PROTECTOR EQUIPMENT**

**Mica Fuse and Carbon Block Type**



No. 12606 Protector Strip



No. 12607 Protector Strip

**No. 69 Type Protector**

The Stromberg-Carlson No. 69-A Protector is designed especially for use in Magneto Exchanges. It is of the well-known carbon block and mica-protected fuse type. Mounts 50 pairs high on the Stromberg-Carlson No. 1 Floor Type Protector Frame which should be specified for installations of the No. 125 and No. 115 Magneto Switchboards.

The No. 69-B Wall Mounting Type Protector is recommended for the No. 126 Magneto Switchboard.

Stock No.	Code	Description
801557	(69-A)	Used with Floor Type Frame
801558	(69-B)	Used with Wall Type Frame

Stock No. 801557 (No. 69-A) Protector consists of 1 No. 12606, 10 pair Carbon Block and Mica Fuse Strip and 1 No. 12607, 10 pair Jumper Strip complete with Western Union Type Fuses. Both units mount side by side on the face of No. 1 Protector Frame.

Stock No. 801558 (69-B) Same as No. 69-A except mounts on hard maple sub-base side by side for wall installations.

**Protector Parts**

Stock No.	Pairs per Strip	Description
12606	10	Protected Strip less Fuses
12607	10	Jumper Strip
12614		Carbon Blocks
12625		Dielectrics

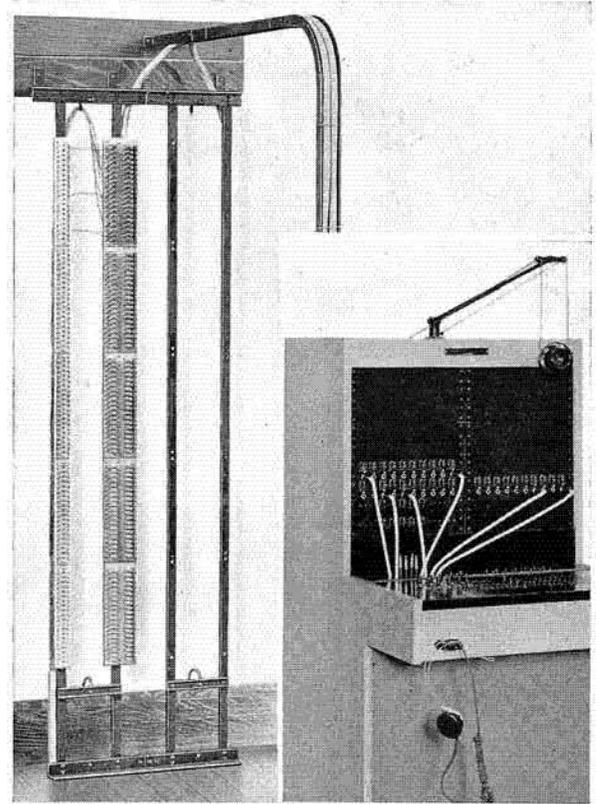
¼ amp. Fuses-quantities of 100

**Other Type Frames**

Sometimes other than mica fuse protectors are desirable, especially when power circuits are close enough to the central office equipment to cause trouble from "sneak" currents.

Under these conditions a wall or floor type frame with heat coil and carbon block protectors is recommended. The verticals, as well as the switchboard, should be so located that the cable will reach farthest protector without splicing.

**Protector Frame—Floor Type**



Two No. 1 Protector Frames and No. 1 Cable Rack Installed with No. 125 Switchboard.

The Stromberg-Carlson No. 1 Protector Frame is of the sectional wall type and is therefore of flexible capacity.

It is built for Nos. 125 and 115 Magneto Switchboards, but is adaptable to any Magneto Switchboard installation.

Each Protector Frame Unit mounts 50 pairs of No. 69-A Protectors.

For a 50 line installation order 1 No. 1 Protector Frame. For a 100 line installation order 2 No. 1 Protector Frames, and so on to any desired capacity.

This Protector Frame makes a remarkably neat and practical installation at a very low cost.

Stock No.	Code	Description
801599	(1)	Floor Type Protector Frame

Stock No. 801559 (No. 1) Unit Type Protector Frame 50 lines capacity mounts 5 No. 69-A Protectors.

**Protector Frame to Switchboard Cable Rack**

The Stromberg-Carlson No. 1 Cable Rack is designed for carrying overhead the cabling between a No. 125 or No. 115 Switchboard and an associated No. 1 Protector Frame. The Cable Rack is constructed of heavy channel iron, rust proofed, and painted black. It is equipped at the frame end with wall mounting brackets and at the switchboard end with brackets for the roof of the switchboard. One No. 1 Cable Rack is required for each switchboard section.

Stock No.	Code	Description
800152	1	Channel Iron Cable Rack