

T-920
ISSUE 1

STROMBERG-CARLSON
CENTRAL OFFICE
EQUIPMENT

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ISSUE I

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XY[®] DIAL SYSTEMS

To meet today's increasing demand for fast, dependable dial service, Stromberg-Carlson offers a modern and extremely versatile electro-mechanical system which has fully met the test of service under a variety of operating conditions in 3,500 central offices across the country.

The XY* Dial System has been proven in operation over many years. It is suited to the demands of multi-office systems, where its inherent economies are multiplied; yet is so simple in its basic design that it is equally practical for the small operating com-

pany. 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.

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



Typical XY Installation in a Large City

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

1. XY TYPE OF SWITCHING IS MORE ECONOMICAL in operation than any other type of electro-mechanical switching.
2. XY UNIVERSAL SWITCH SYSTEMS ARE MORE READILY ADAPTABLE to large installations than an all-relay system.
3. MULTIPLE USE OF THE XY UNIVERSAL SWITCH. The same switch can be used as a linefinder, selector or connector.
4. XY UNIVERSAL 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 UNIVERSAL 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.

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

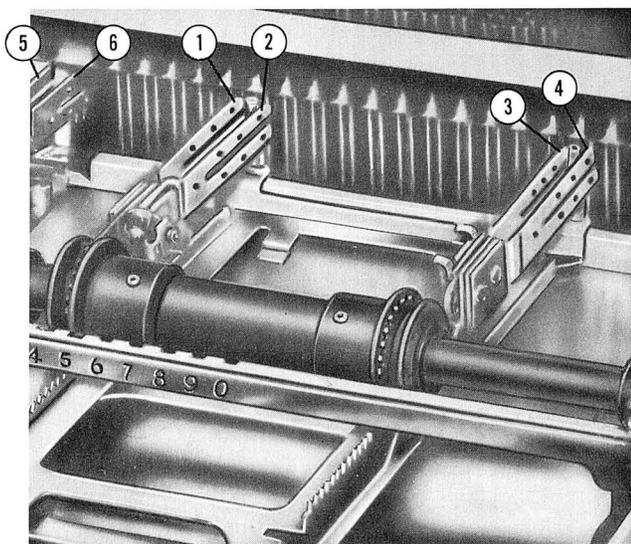
Versatility of XY System

The XY Dial Telephone System includes refinements for which the need has only become apparent in the industry in recent years. Other systems which were adequate for the conditions that existed in the past are not always adaptable to the needs of today, including nation-wide toll dialing and ticketing.

The XY Dial system includes the general use of plug-in units, both switches and circuit plates. The operator of several exchanges of a similar pattern can easily move switching units from one exchange to another, or from a central store to an exchange, to cater to sudden traffic changes; additions to and rearrangements of equipment are quickly effected.

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 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.



XY Universal Switch in Wire Bank, after "x" travel

Basic XY Switching Scheme

The XY Universal Switch operates on the order of 25 steps per second—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 Universal 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 reassigned without change and the new frequency taken care of by changing the jumper to the Fourth Wire.

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

Wiper (4), Hunt Sleeve, is the famous Fourth Wire which solves party-line and many other problems. Wipers (5) and (6) are XX and X respectively.

XY DIAL SYSTEMS

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:

Linefinder and Line Relay 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, 18 or 20 linefinders 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 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.

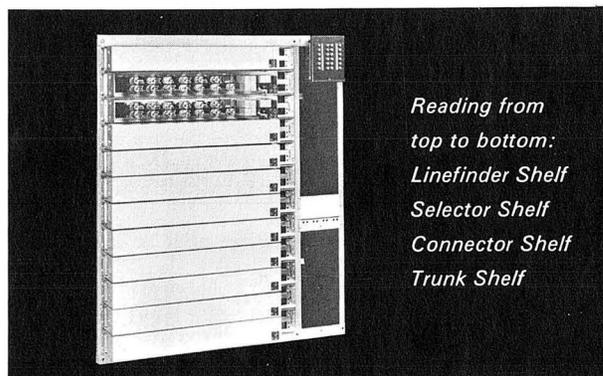
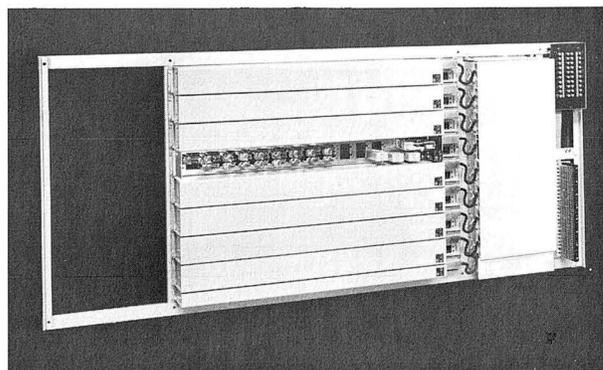
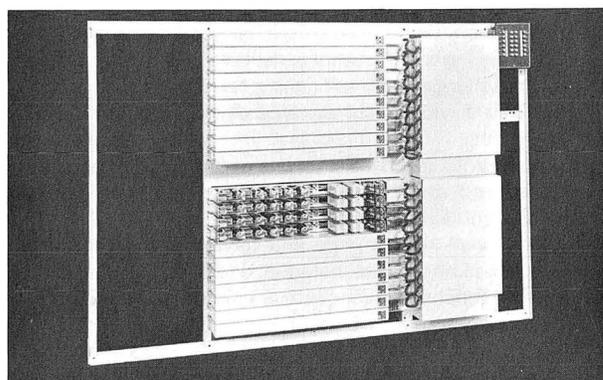
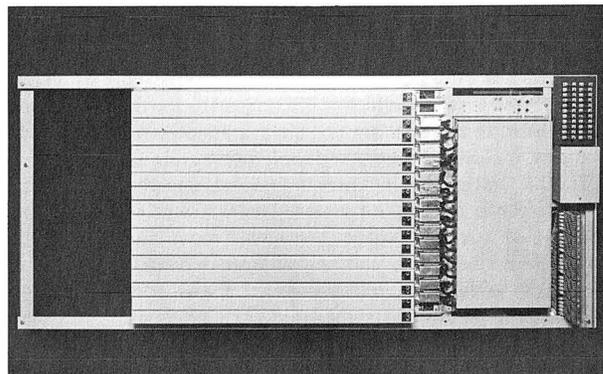
Each shelf has its own fuse panel, signal equipment and alarm lamps.

Connector 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 and toll 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 associated with the shelf when desired. The Shelf Supervisory Circuit is mounted directly beneath the regular connectors.

Trunk Units

Trunk circuits, reverting call circuits and all miscellaneous circuits (pay station, information, intercepting, etc.) not requiring switches will be mounted on trunk shelves or relay racks. Shelves are made in two standard capacities, for 20 mounting plates, or for 10 mounting plates. The number of circuits which will mount on these shelves or racks 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.



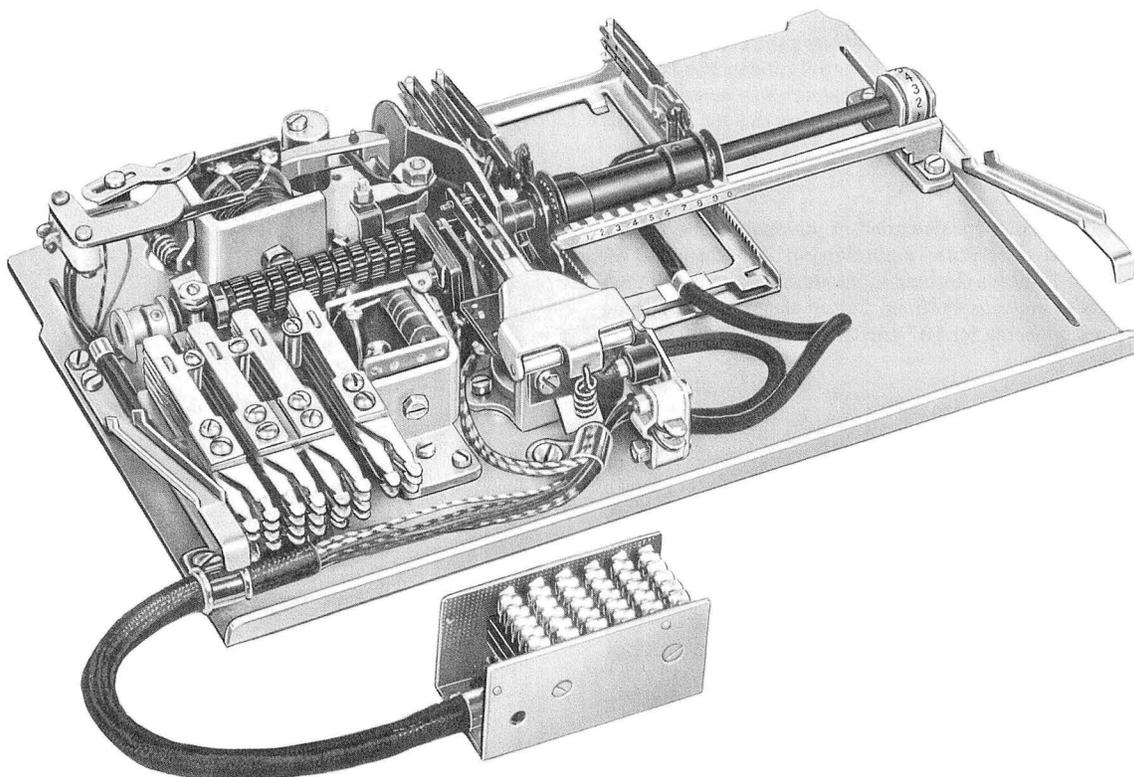
Reading from
top to bottom:
Linefinder Shelf
Selector Shelf
Connector Shelf
Trunk Shelf

THE XY UNIVERSAL SWITCH

The XY Universal 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 ($12\frac{1}{2} \times 1\frac{9}{16}$ 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.



XY Universal Switch Assembly

STROMBERG-CARLSON

OTHER COMPONENTS OF XY DIAL SYSTEMS

“A” and “C” Type Relays

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 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.

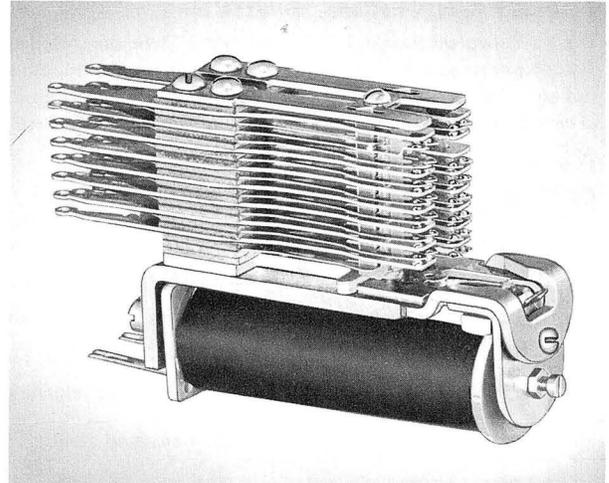
The Twin “C” Relay (actually two relays on one frame) is designed to mount in the same space and on same mounting as one standard “A” Relay. Developed for use in line circuits where space limitations were a major factor, it may be used wherever the economy of small size is an advantage and where extremely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

XY Deca Switch

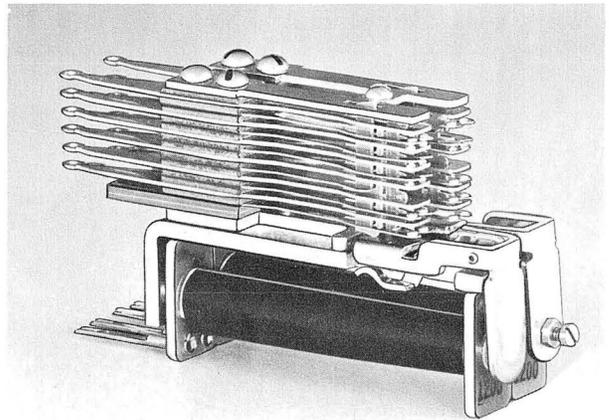
This switch is designed to perform various control and selecting functions commonly found in dial central offices. It has a 10-point selection over four levels; is a direct drive switch of the resetting type. Many parts are common to the XY Universal Switch.

Circuit Plates

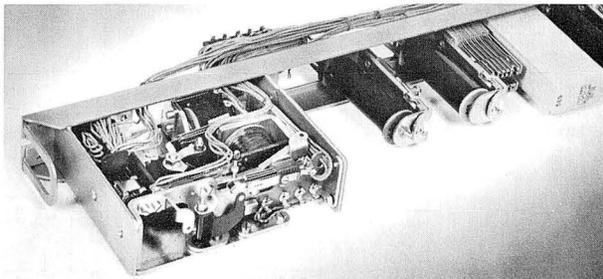
Plug-in Circuit Plates are designed in various widths, single, double, triple or quadruple—mounting on 27 ½” and 38 ½” width shelves. They are selected, or custom wired, to meet the requirements of individual offices. Circuit plates with unit type mounting are available for 19” and 27 ½” relay racks.



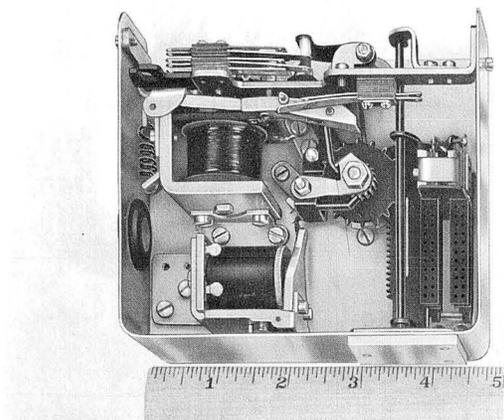
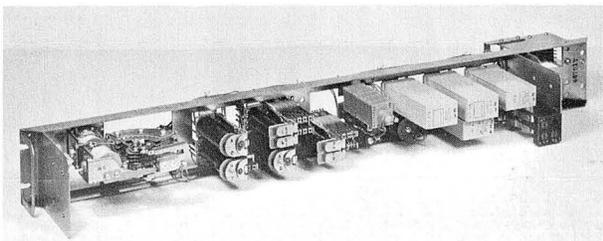
Stromberg-Carlson A Type Relay



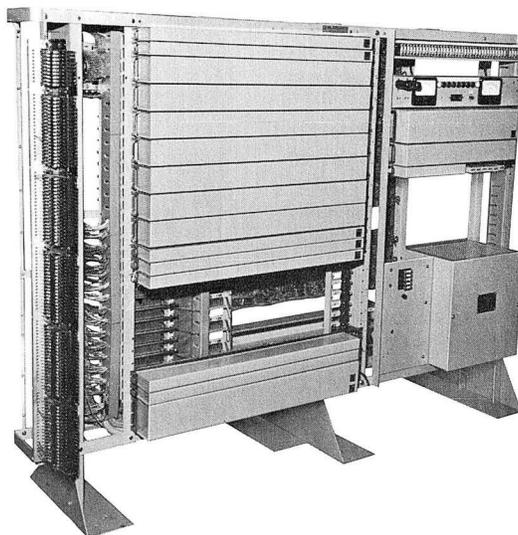
Stromberg-Carlson C Type Relay



Typical Circuit Plates



Stromberg-Carlson Deca Switch

COMPAK I DIAL SWITCHBOARD

The Compak I is a low cost, universal package—an assembled and fully wired “off the shelf” XY System. You order equipment according to desired requirements.

This “off the shelf” system offers full C.D.O. features:

1. 2-5 numbering.
2. Normal access to outgoing toll.
3. Universal numbering with E.A.S. (Extended Area Service) exchanges.
4. No “stop-dial” necessary on incoming toll calls.
5. No “second-dial tone” necessary on incoming E.A.S. calls.
6. Multi-frequency ringing.
7. Intercept service.
8. Transistorized ringer source.
9. Integrated power and switching equipment.
10. “A type” frame included.

Capacity:

This switchboard provides facilities for 100 lines, 15 links including a maximum of 10 trunk lines. The maximum number of trunk groups is two (2) and unused line facilities in a line group used for trunks may be used for local lines.

Power:

The common power equipment (with the exception of the secondary cells and charging equipment) is an integral part of the switchboard.

- a. Batteries—Power for the switching equipment and the transmission circuits is supplied from a 100 AH, 23-cell storage battery.
- b. Charging Equipment—Charging equipment for charging the battery is supplied for operation from 110V 60 cps commercial power. It is of the constant-voltage type for charging batteries on a full float basis. Charger capacity is 6 amps. Charge failure alarm is provided.
- c. Metering and Control—A 20 amp circuit breaker distributes the switchboard current drain via a 50 amp interval shunt ammeter to a series of alarm type fuses feeding the individual circuits. The voltage is monitored with a 100V 1000 ohm/volt meter.

Operating Range:

- a. Battery voltage—44-54 volts.
- b. Dial Speed—8-12 pulses per second.
- c. Ringing Voltage—The ringing voltage does not drop below a minimum value of 65 volts with maximum ringing load.
- d. Subscriber Lines—
 - (1) Loop Resistance—1200 ohms maximum.
 - (2) Insulation Resistance—15,000 ohms minimum.
 - (3) Ringer Load—Not to exceed 10 bridged low-impedance ringers per line.
- e. Inter-Office Trunks—
 - (1) Loop Operation—
 - (a) Loop Resistance—2000 ohms maximum with battery and ground pulsing.
 - (b) Insulation Resistance—30,000 ohms min.
 - (2) Composite or Simplex Operation with Polar Duplex Signaling and Supervision. For this type of operation, polar duplex signaling equipment is used, and trunk limits are determined by the signaling set used.

Ringing and Interrupter:

- a. Ringing—The ringing source is a five-frequency transistorized ringing machine with an output of 25 watts per frequency. It is DC operated, therefore a standby machine is not necessary.
- b. Interrupter—A relay type interrupter, comprising standard fast operate, fast release “A” type relays driven from a transistorized $\frac{1}{4}$ second pulse source is used to supply ringing interruption cycles, PU, ECP, 60 and 120 IPM pulses.

Physical Features:

The over-all dimensions of the switchboard are:

- a. Height—5 ft. 2 in.
- b. Width—7 ft.
- c. Depth—1 ft. 6 in.

All supervisory, power distribution, interruption and metering equipment is built into the basic unit.

STROMBERG-CARLSON

XY® TOLL TICKETING

XY Toll Ticketing is tailored to meet the demands for efficient, modern toll accounting; engineered for each specific application to yield the maximum operating economies. XY Toll Ticketing is automatic not only in its magnetic recording function, but also in the subsequent steps necessary to arrive at a permanent record of the toll calls.

Stromberg-Carlson Toll Ticketing Systems are compatible with any direct response dialing system. They conform to all requirements of the 2-5 numbering scheme and permit complete flexibility in routing. Line Identification is automatically accomplished. These systems are not limited as to the type of permanent record that can be printed or punched.

XY Toll Ticketing is high speed in operation. The identification, recording, playback-readout portions are completely flexible, and can be arranged for the most economical means of equipping both remote and central offices.

DIRECT DISTANCE DIALING

XY Toll Ticketing Systems conform to all requirements of multi-frequency and DC pulsing, and supervision. Common register-senders are standard equipment. Register-senders, together with associated route translators, provide the necessary route interpretations, code conversions, and alternate routing.

Modern Techniques

Techniques involving the use of transistors, cold cathode gas tubes, hot cathode vacuum tubes, solid-state devices, and neon diodes have been used wherever feasible to achieve high speed, improved reliability and low maintenance.

Identification of Calling Party

There are two ways of establishing the identity of the calling party: either manually or automatically. In manual identification (MID), the operator enters the call for a brief moment—just long enough to establish the identity of the calling party. In automatic identification, no operator is involved; the equipment verifies the line or station. In offices that are tributaries to Bell Company CAMA equipment, systems are designed to automatically identify the calling party. When the tributary office “homes” on another independent, the various methods of identification are: CAMA pattern, circle digit, or MID.

PPCS

Stromberg-Carlson Toll Ticketing Systems can be arranged for PPCS service (Person-to-Person, Collect, and calls requiring Special instructions to the operator for billing purposes) whenever this is specified. The operator is called in momentarily to handle only those details of the call requiring a response of some kind. Upon completion, she then keys in an appropriate accounting digit for billing the proper type and class of call, and retires. Examples of accounting digits that can be used are:

Type of Call	Station-to-Station	Person-to-Person
Paid	1	4
Collect	2	5
Special Instructions	3	6

PRINTED RECORDS

Stromberg-Carlson Toll Ticketing Systems can work into several types of permanent record systems: punched card, perforated tape, or ticket printer. The type of output device desired must be specified at the time of ordering.

SYSTEM OPERATION



Processing Punched Card Tickets

The Magnetic Tape Recorder

One of the important functions which must be performed automatically is the recording of pertinent data on each call, so that charges can be made. The XY magnetic recorder shown below is the mechanism which records this information. The recorder is similar in appearance to the XY Universal Switch, mounts in similar cells and uses some of the same parts.

The data is recorded on a magnetic tape which is in the form of an endless reel capable of storing the information for many calls. Magnetic tape storage has many advantages. It takes less space, is faster and more reliable than any form of punched paper tape. The storage medium can be used and re-used indefinitely, without having to replace the rolls or transport the records. Playback from remote offices to a central billing point can be initiated at any desired time—automatically—without anyone in attendance. This medium has become the basis for most of our computer techniques today.

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 on playback.

The upper half of the twin-track head transforms electrical impulses, that are fed into it, into magnetic impressions (called “Mark” pulses) indicating the subscriber’s telephone number, the called station, time, date and conversation time.

Magnetic impressions are made on the lower half of the tape by the lower half of the same head, serving to separate the groups of “Mark” pulses. These impressions are called “Space” pulses.



Magnetic Recorder

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

The Playback Operation

It is unnecessary to produce a ticket individually as each call is completed because of the large storage capacity of the XY recorder. Under normal circumstances, the playback process will be initiated automatically at a time when toll traffic is low. Convenient strapping on the Clock-Calendar circuit can start the playback process at any of the 24 hours in the day.

When initiated the Playback Control Circuit will seize each idle recorder in rotation until a complete cycle of the circuits in the office has been made. A second and third cycle is then made to pick up those circuits which were busy during the previous cycles.

The tapes are advanced by a motor which is common to all recorders on one bay side. The tape is driven at a continuous rate of speed and the information stored on the tape for each call is converted into a permanent record, under the direction of the Readout Control circuitry. Pulses representing digits of the call are counted by 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. Rate interpreting and computing equipment can be provided as desired. With the tubes cleared, the tape advances and the process is repeated until all information on the tape is used. The tape is erased as the data is being converted to permanent record so that, when cleared, the recorder is immediately ready to accept and record more call data.

Remote Operation

The XY magnetic recorder is admirably suited to remote operation in unattended offices. 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 point. Any number of remote offices can be served by a single ticketing point at which most of the common equipment would be located. If the recorders are located in the remote offices, the recorded pulses can be carried over an existing voice frequency channel on a data link to some central point. Carrier and/or microwave transmission may be used where conditions warrant.

System Features Summarized

The Stromberg-Carlson Toll Ticketing System is based upon certain fundamental concepts that are unique. Among these are: magnetic tape recording for increased efficiency and reliability; direct readout into the chosen method of ticket preparation; automatic readout from remote offices; basic CDO operation without necessity for register sender.

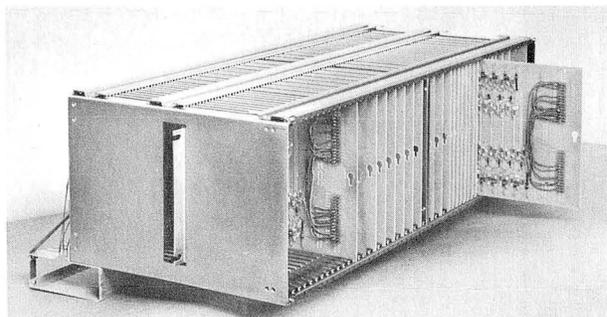
Reliability far beyond industry standards is being achieved daily in hundreds of offices. This fact is *provable*, for—when desired—the Stromberg-Carlson system will record all calls attempted, whether completed or not. This aids in traffic studies and provides a means for accurate routining.

The continuing program to extend its applicability has achieved a further reduction in size—most compact of any comparable system.

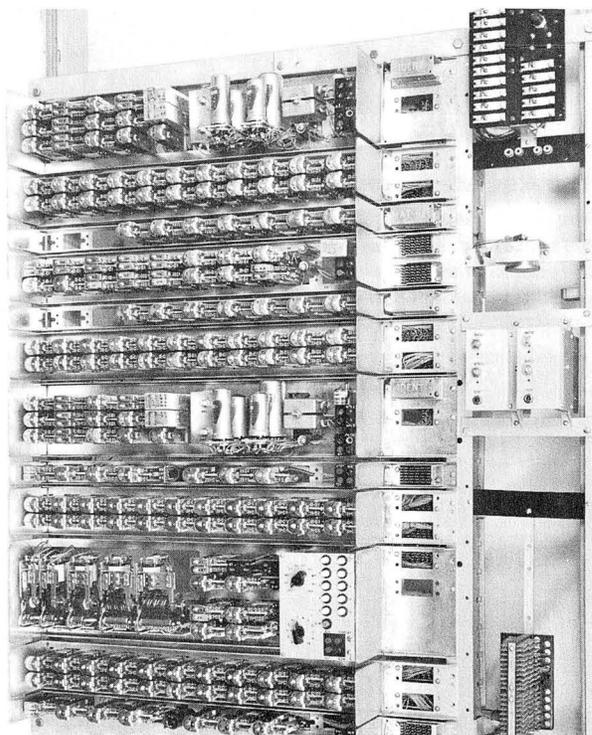
MAJOR EQUIPMENT UNITS OF XY TOLL TICKETING SYSTEMS

The XY[®] Millipulse Identifier and Clock Calendar

The XY Millipulse Identifier translates the matrix signal into numerical information for recording. Two identifiers are mounted in the upper portion of the shelf. Mounted in the lower part of the shelf is the clock calendar which establishes the date and connect (start) time of the call.



XY[®] Matrix Cell



The XY[®] Millipulse Identifier and Clock Calendar

The Recording Trunk and Timer

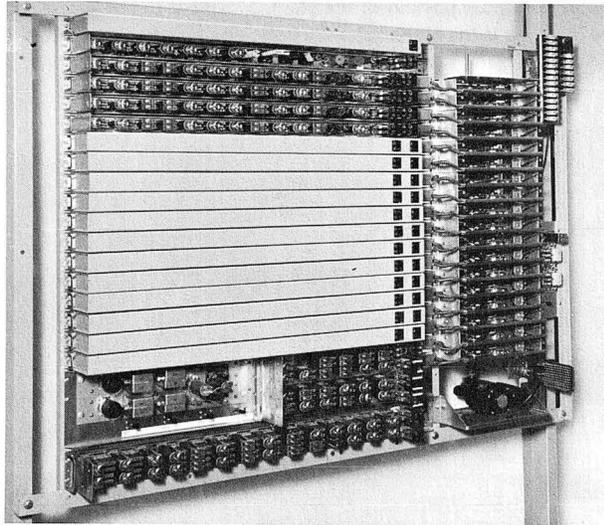
The recording trunk is the focal point of the system. This equipment calls in the identifier, the clock calendar, and the register sender when needed. Also mounted on this shelf is the timer, which measures the elapsed time of the call in progress.

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TOLL TICKETING COMPONENTS

Recorder Control

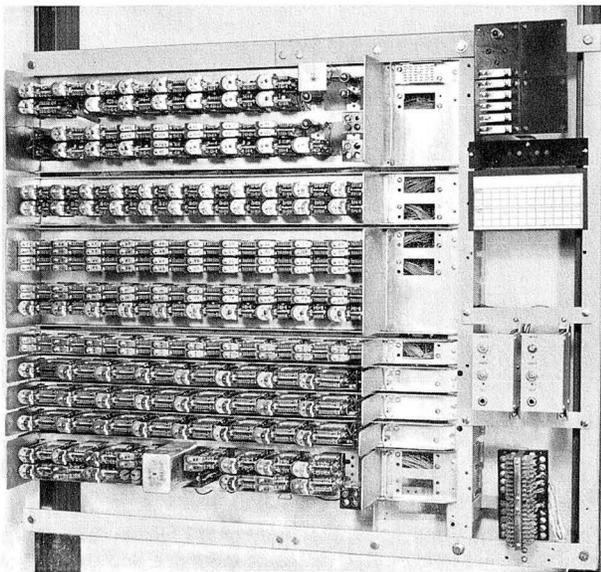
This equipment controls the recording of toll data as well as the playback function. Located in the lower portion of this shelf is the preamplifier and playback test equipment.



Recorder Control

The Register Sender

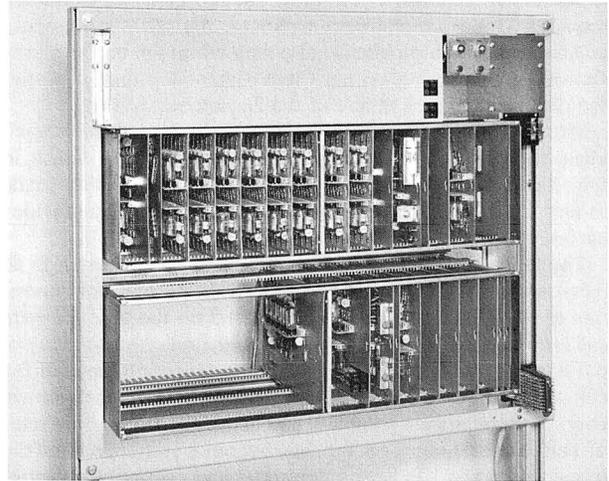
The register sender receives the called number as it is dialed by the subscriber. It then selects the proper route for the call under the control of the route interpreter. It is arranged to outpulse the called number in either dc or multifrequency pulse form.



The Register Sender

The Readout Circuit

The readout circuits convert the toll data, from magnetic impressions on the recording tape, to hard copy. In this operation it programs the data into the desired accounting format conforming to industry standards. The readout equipment activates and controls the output devices.



The Readout Circuit

Output Devices

No other toll ticketing system has comparable flexibility in direct application to any desired type of bill preparation. Each of the devices shown here is used with Stromberg-Carlson systems where it is best suited to the accounting procedure. Computing and rate interpreting equipment may be included as part of this process.

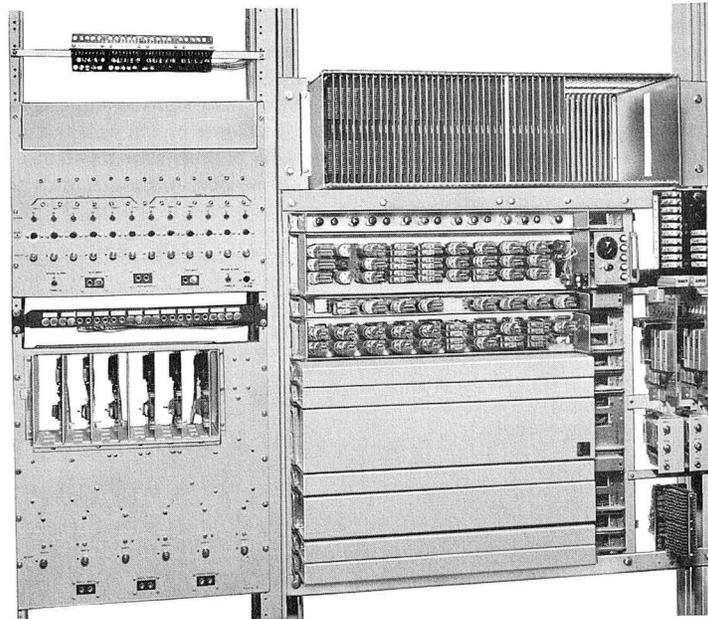


Printing Card Punch

The XY[®] Universal Test Set

In addition to the playback test panel mounted on the recorder control shelf, a portable universal test set provides a means for testing the identifier, clock calendar, and register sender.

ANI IDENTIFIER FOR CAMA SYSTEMS



The STROMBERG-CARLSON Parallel Millipulse Identifier is a compact, economical system which offers automatic number identification for telephone exchanges that must provide direct distance dialing (DDD) to their subscribers through Bell CAMA systems. Automatic station identification of all parties can be accomplished by the use of party digit dialing on the part of users. If desired, the equipment can be arranged to provide fully automatic identification of one- and two-party service (ANI) with manual identification of multi-party lines.

The identifier works in conjunction with a matrix circuit by applying a series of pulses to the third wire or sleeve lead of the originating switch train. These pulses are routed through the matrix and detected by the identifier to determine the calling line number. The identifier's function is considered to be parallel because it instantaneously detects a complete digit. Out-pulsing of the calling number identity to the CAMA office is in the form of multifrequency pulses.

Because of its use of the third wire or sleeve lead, the parallel identifier can be applied to any electromechanical switching system that has a continuous control lead.

The entire identification system, including the identifier, matrix, multi-frequency current supply, and trunks, operates on 48-volt office battery.

Size

A complete system with two parallel identifiers and matrix equipment for 8,000 TPS connector terminals can be mounted on one bay 11 feet 6 inches high and 3 feet wide. This would include an identifier shelf and 8 matrix cells equipped with 400 printed wiring boards. On a 9-foot bay, an identifier shelf and matrix equipment for 6,000 TPS connector terminals can be accommodated. Additional bays of matrix equipment can be provided as required.

The multifrequency current supply for the identifier is mounted in a separate 21-inch bay. It can be furnished with a second current supply when dual equipment is desired.

The factory-wired identifier shelf takes 2 feet 7 inches of bay space. It is capable of mounting two identifiers, each of which consists of five plug-in circuit plates and two printed-wiring board assemblies. If only one identifier is proved initially, the second can be added at any time. The shelf also includes a supervisory circuit plate which serves both identifiers.

Capacity

A single Parallel Millipulse Identifier is capable of serving the direct distance dialing traffic carried by up to 90 one-way trunks working into a CAMA office. A second identifier can be furnished when dual equipment is desired. Both identifiers (which are mounted in the same shelf) are served by the same multifrequency current supply.

The parallel identifier can provide calling number identification of four 10,000-station units, with up to four office codes in any one unit, and as many as six office codes spread over the four 10,000-station units. Normally the identifier segregates office codes by the thousands digit. When mixtures occur, special auxiliary matrix equipment can be provided.

Standard matrix equipment is furnished for terminal-per-station (TPS) or terminal-per-line (TPL) groups, or a combination of both.

Features

Entire system operates on 48-volt office battery. No extra power supplies are needed.

Identification equipment in most offices can be mounted in 4 feet 9 inches of linear floor space.

System is completely compatible with CAMA offices. Calling number identifications by a single identifier will serve the traffic handled by up to 90 CAMA trunks.

Can be added to any electromechanical switching system that uses a continuous sleeve lead, or third-wire control lead.

STROMBERG-CARLSON

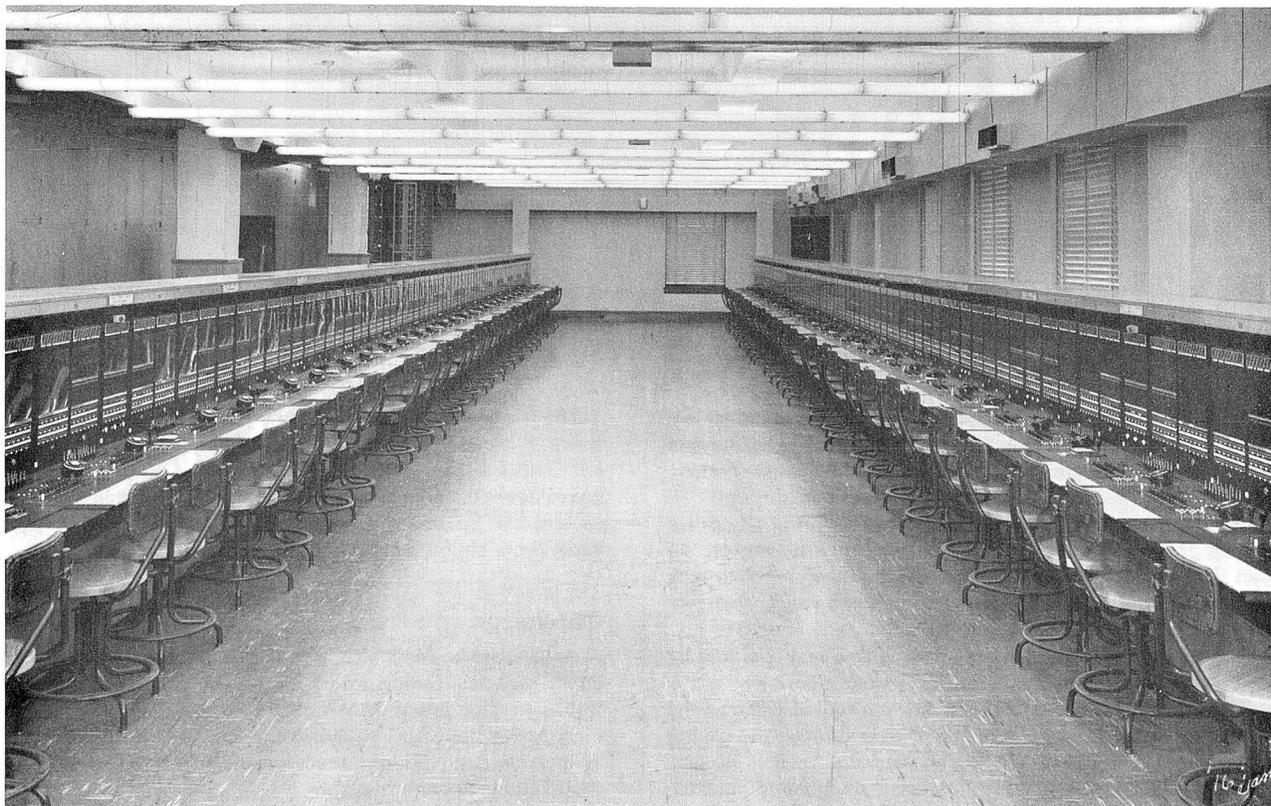
TOLL SWITCHBOARDS

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 future.

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.



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

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, including multi-frequency key pulsing when applicable, 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.

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

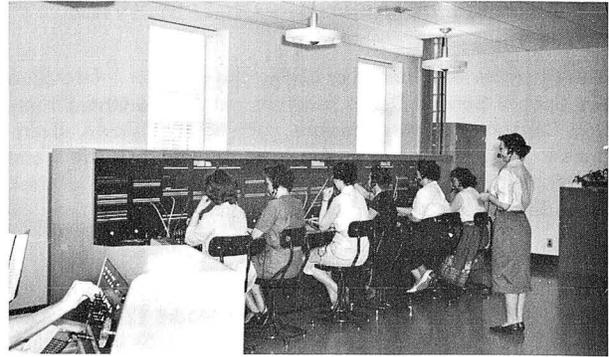
The key shelves are low, with the top only 30" from the floor. This allows the operator to rest her feet comfortably on the floor. Keyboards are extra wide with removable glass bulletin holders. Each keyboard is arranged for mounting both a dial and a key sender set. It has a capacity of fourteen cord 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.

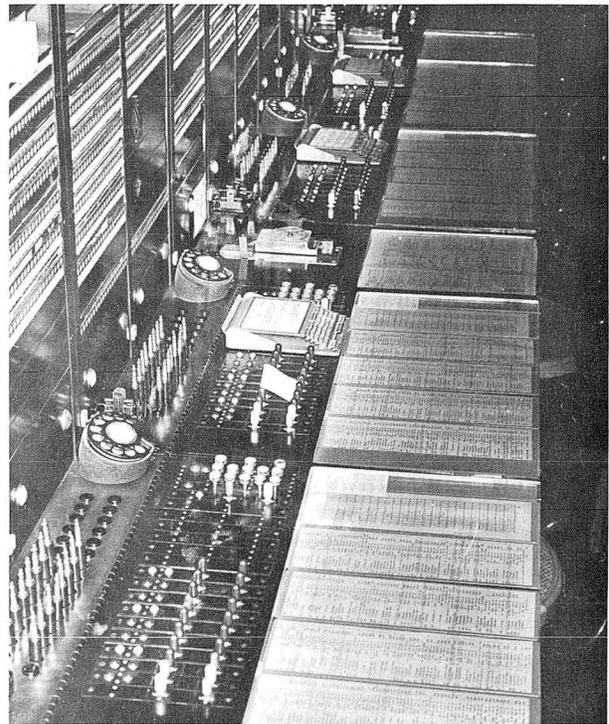
Terminal Power Equipment

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.



Small Toll Board used with XY[®] Toll Ticketing and containing PPCS Jacks.



Close Up of Key Shelf in a Toll Board for a Larger Installation.

Description of No. 200 Type Section

The No. 213 or 214 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 23 1/2", depth at floor 20", depth at keyboard 38 1/2". The calculagraph section is the same except for the width which is 12 5/16". The jack opening in the face of the switchboard is 15" high (or 20" on the higher section).

STROMBERG-CARLSON

INFORMATION AND SPECIAL SERVICE DESKS

With the growth of customer dialing the need for Information and Special Service Desks becomes more important. 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 depends upon the size and traffic conditions in the office.

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.

Dimensions are: 26 3/4" long, 14" high and 14 3/4" deep. Approximate shipping weight is 260 pounds.

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.

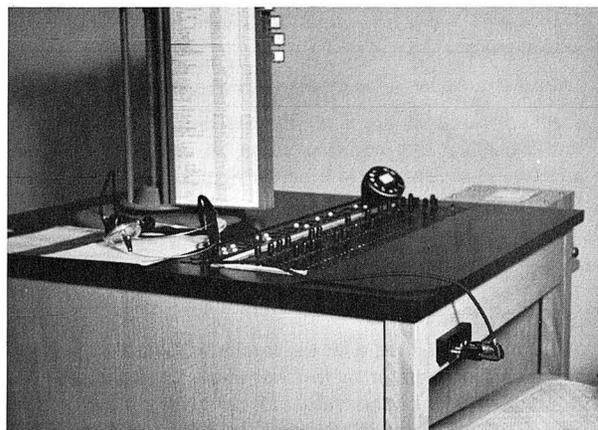
A maximum of 36 Information, Intercept, or other Special Service trunks together with Supervisor's, Verification and Miscellaneous trunks can be equipped. Any number of positions can be multiplied together.

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.

Dimensions are: 30 1/8" high, 30" wide and 37" deep per desk. Shipping weight is approximately 350 pounds.



Single position Flat-Top Information Desk.



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.

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.

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 Universal 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 indicates 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.

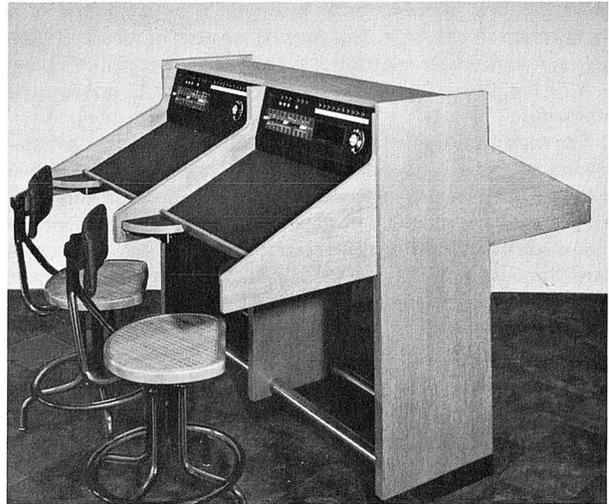
5. Flashing Distant Operators

Verification, transferring calls to supervisors, and "Call Splitting" can be accomplished.

Dimensions are: 28 ½" wide, 56 ½" deep and 46 ¾" high at rear sloping to 30 ¾" high at front. Shipping weight is approximately 600 pounds.



Information Position used in connection with XY Toll Ticketing in Large Toll Center



Two Sloping-Front Information Desks in Tandem Arrangement for Two Operators

COMMON BATTERY SWITCHBOARDS

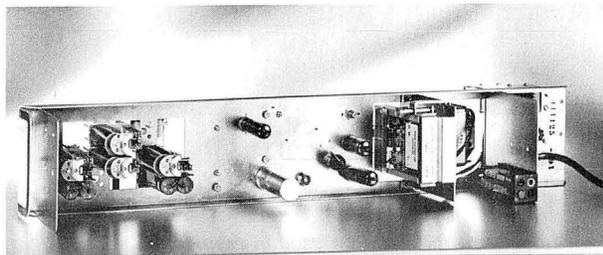
STROMBERG-CARLSON will provide, on special order, certain types of common battery switchboards for additions to a manual central office. Also, when a new application can best be filled by this type of service, inquiry is invited. All common battery switchboards or sections are custom-engineered to specification.

MAGNETO SWITCHBOARDS

Magneto Switchboards are no longer available except as a special order, custom engineered to specification. Some replacement or repair parts can still be obtained while stock lasts; make inquiry through normal Branch Office contacts.

TAPE ANNOUNCER

The Stromberg-Carlson Tape Announcer is designed especially to be used in telephone offices to repeat recorded messages over regular telephone lines. It operates for both recording and playback on 105 to 120 volts, 60 cycle ac, with control relays which operate on the regular exchange battery. Messages recorded on one Tape Announcer may be played on another, thus making it possible to produce all recordings on a master recorder and to transfer the cartridges to other tape announcers which are used for playback only.



Tape Announcer for 27 1/2-Inch Rack

Tape Cartridge

Messages are recorded on a magnetic tape contained in a handy snap-in cartridge. This may be inserted or removed from the tape announcer without using any tools or disturbing any part of the apparatus whenever it is expedient to change the message.

The tape cartridge is a simple metal and plastic holder containing an endless magnetic tape which is normally supplied in a length for three 30-second messages. However, this cartridge can be supplied with tapes varying in lengths giving a time duration of from 15 to 90 seconds. The 30- and 90-second cartridges are available with a standard message for intercept service already recorded.

Drive Mechanism

The drive mechanism for the tape announcer consists of a small squirrel cage induction motor, a large rubber drive wheel and a small rubber capstan. The large drive wheel which is driven by the motor shaft is directly coupled by means of a shaft to the capstan which drives the tape at a speed of 3 3/4 inches per second. The drive wheel and capstan are mounted on a plate which is free to slide in or out against a coil spring as the tape cartridge is inserted or removed from the cartridge holder. The coil spring serves to eject the tape cartridge when the cartridge release button is depressed and to allow the drive wheel to move away from the motor shaft.

Amplifier

The amplifier for the Stromberg-Carlson Tape Announcer consists of a pre-amplifier, a voltage amplifier and an output or power amplifier.

The maximum output per 600-ohm telephone line connected to the tape announcer is about 6 milliwatts with 1 to 10 telephone lines bridged across the output at the same time. Under normal operating conditions this should be sufficient under even the heaviest traffic. Usual conditions such as cut-over or extensive number changes may result in an extremely heavy temporary usage of the tape announcer; only a slight difference in the output permits up to thirty simultaneous connections.

Recording

The tape announcer is used for recording as well as playback. Since room noises can be picked up by the microphone, the recording must be done in a quiet location. Only the 105 to 120 volt 60 cycle ac power supply is required for recording and it is not necessary to make any external connection to the shelf jack or terminal block.

It is possible to make recordings on one tape announcer used as a master recorder and to play those recordings in other announcers used for playback only. In this way the master recorder may be permanently placed in a suitable quiet location.

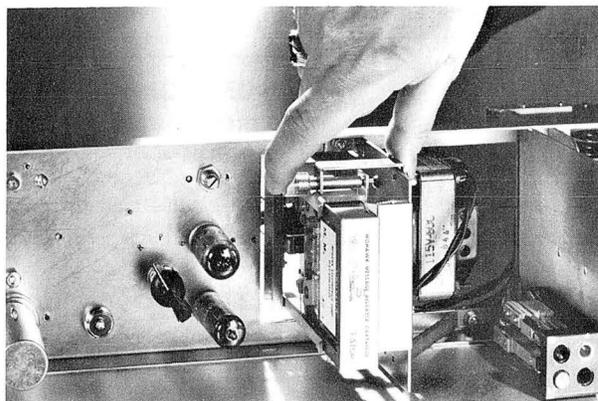
Ordering Information

The associated circuit of the Tape Recorder varies with the design and requirements of any central office. It is therefore custom-ordered with the assistance of Branch sales personnel. Additional or replacement parts can be ordered using the information contained in the installation manual covering this equipment.

Stromberg-Carlson Power Boards feature 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. Unit Control Panels for various operations may be selected for individual needs.
3. Common equipment, such as Tone Generators, Interrupters, etc., may easily be provided in duplicate to insure constant supply.
4. Any type of charging system, from the older Motor Generator to the modern Silicon Controlled Rectifiers, may be used.
5. Battery Control is available, employing either end cells or counter E.M.F. wet or dry cells.
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 Panels provide centralized common alarm signals, and identify the alarms location and class. Alarms may be transmitted to distant points when required.



Push Button Ejection of Tape Cartridge

TRAFFIC RECORDER

The Stromberg-Carlson Centralized Traffic Recorder provides an accurate record of telephone traffic during a given period of time. The information is used to determine busy hours, rate of traffic flow, overloading and other traffic calculations.

This Traffic Recorder used the "switch-count" method wherein the groups of circuits are scanned at regular intervals and the number of busy circuits in a group is counted at every scan. The recorder, which operates with any type of step-by-step dial-switching equipment, obtains the information from the sleeve leads of the circuit group. Each lead is scanned once every 10 seconds to register the number of busy (grounded) circuits and provide a "circuit-in use" total.

Size and Capacity

A complete Traffic Recorder can be made up of as many Traffic Recorder Units as desired. Each unit scans up to 20 circuit groups of 25 circuits per group.

There are two arrangements of this equipment, depending on chosen method of mounting and traffic density. When mounted on Relay Racks each Traffic Recorder Unit is 19" wide and 12 1/8" high, fully equipped and wired. Equipment racks, pre-wired with common and supervisory circuit leads, are available in two heights. The 9 ft. equipment rack can be equipped with as many as seven Traffic Recorder Units; the 11 ft. 6 in. rack will accommodate as many as 9 units. (See illustration).

In the other arrangement, offering larger capacity, Traffic Recorder Units are provided as 27 1/2" wide shelf equipment, similar to XY Dial shelves. Meters may be incorporated with Traffic Units or placed in a completely separate meter bay.

Traffic Metering

Traffic recording is expressed in tenths of unit calls. Scan intervals are controlled by a 60 cycle synchronous motor to ensure accurate readings. The 10-second scanning rate provides an accurate record of calls with low, as well as high, holding times.

The Recorder can be operated continuously or for 1, 2 or 3 hours, with automatic or manual start and automatic shut-off. When automatic start is used, the pulse must be furnished from an external source.

Peg-Count Metering

Peg-count metering can be proved, when required, to record the actual number of calls on an individual circuit within the group, while the traffic recorder is registering the group busy conditions. When peg-count meters are supplied with the Traffic Recorder, a means of controlling the meters is provided.

This feature automatically connects the peg-count meters at the start of the recording period and disconnects the meters at the end of the recording period. The peg-count meters can also be used in the normal manner.

Features

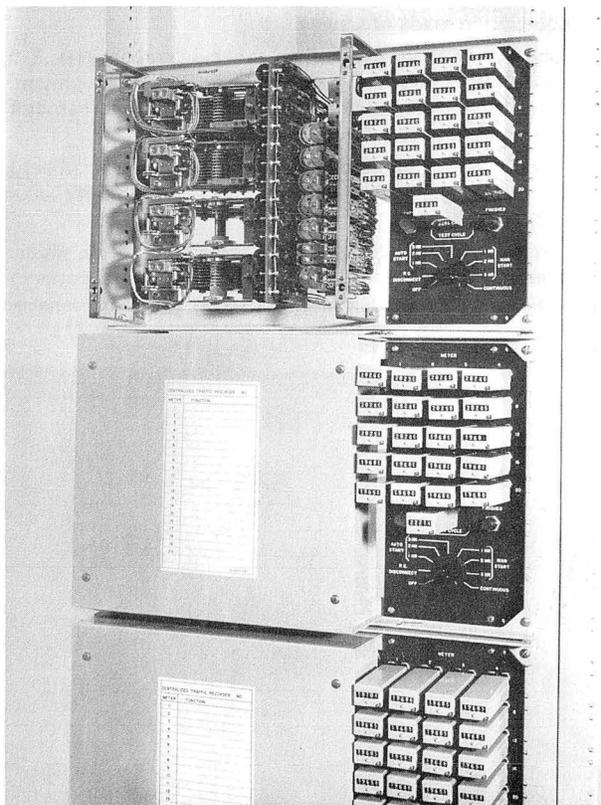
Records traffic in tenth of unit calls.

Each unit provides for 20 circuit groups with up to 25 circuits per group.

Seven or nine units can be installed in one 19" rack; more when using 27 1/2" shelf mounting.

Peg-count meters can be provided when required.

Variations of described models can be supplied when specified.



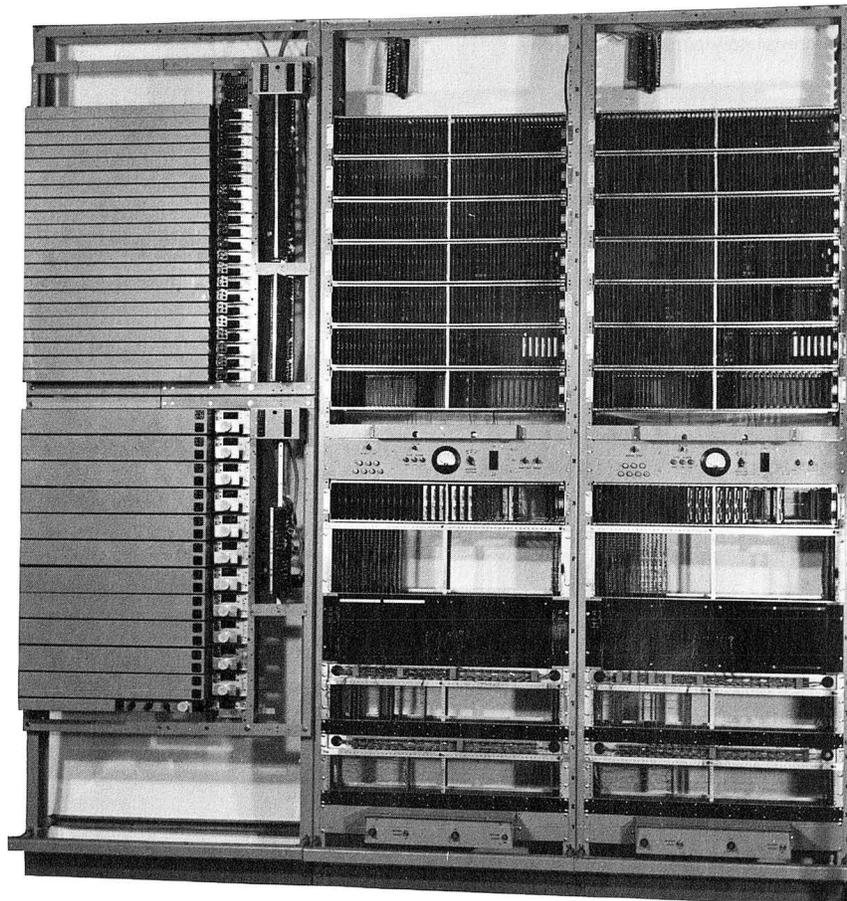
Centralized Traffic Recorder on Relay Rack

UNIVERSAL ELECTRONIC REGISTER SENDER TYPE E

To meet the complex demands of present communication facilities, Stromberg-Carlson offers the Universal Electronic Register Sender, Type E. This system gives any step-by-step exchange numbering flexibility. It offers the practical means for expanding capacity and provides important economies in initial cost, in space requirements, and in later additions.

The following partial list of applications and features indicates the unique flexibility of the Universal Electronic Register Sender and the many ways this system could broaden your service to cope with today's requirements.

1. Every installation consists of sender common controls operating in pairs or triples, each control assuming one-half or one-third of traffic. In the event of trouble in one sender, others assume the traffic load with a minimum reduction in grade of service.
2. Converts existing numbering scheme to universal 2-5 numbering plan without changing switching equipment. Expands capability of your step-by-step office to permit it to conform with DDD numbering pattern.
3. Provides access to more EAS points. Enables subscriber to dial published directory number of distant party over EAS routes.
4. Provides digit deleting or digit adding up to six digits. Examines digits dialed, adds routing digits, and disposes of each call in accordance to assigned class of service.
5. Routes "invalid codes," vacant selector levels, etc. to intercept.
5. Optional equipment handles touchbutton or standard dial pulse calling—even on same line.
6. Optional equipment provides up to 225 different classes of service. Restricts and diverts toll traffic on a "per line" or "per trunk" basis. Determines restricted service, controls emergency lines, determines WATS zone subscriber service, determines incoming line class-of-service, identifies operator or line seizure, by class-of-service marking.
7. Provides digit "1" DDD access and allows use of "0" + delay and "0" + 7-digit and 10-digit ppcs DDD.
8. Accepts up to 14 digits impulsed. Selectively absorbs digits on a digit-by-digit basis; eliminates the need for digit absorbing selectors.
9. Optional equipment provides six-digit translation to a maximum of six numbering plan area codes.
10. Outpulses up to 15 digits at 10 pps and the output mode can be changed to 20 pps or (with optional equipment) to MF sending at any point in routing process. Provides up to 50 different outpulsing routes.
11. Operates from —48 volt (44 to 54 volt) battery supply.
12. For more detailed information contact your Stromberg-Carlson representative.

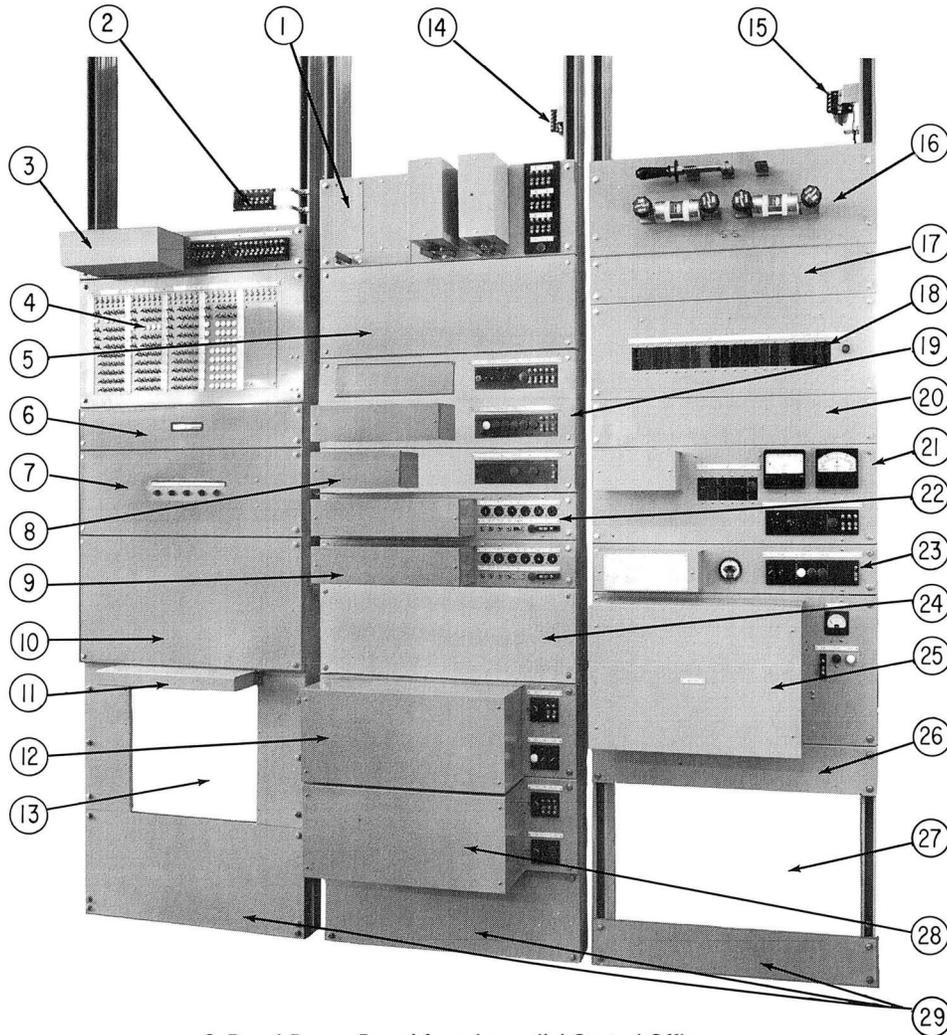


POWER AND SUPERVISORY

POWER AND SUPERVISORY BOARDS

Stromberg-Carlson Power Boards can be designed and arranged to fit any size central office—large or small—with equal effectiveness and still have ample room for future growth. This

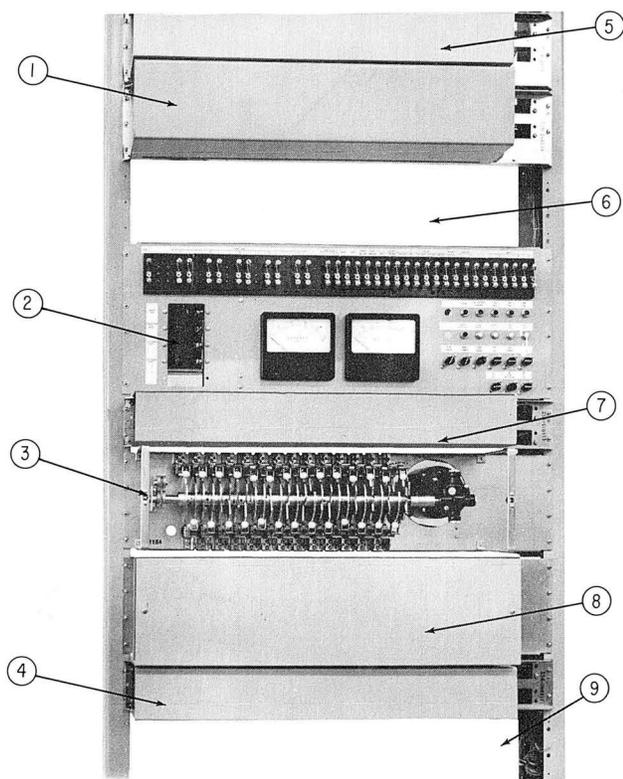
board matches XY Dial System equipment in overall appearance and flexibility. All controls are placed for easy identification and operation. The illustration identifies the principal components of typical installation.



3-Panel Power Board for a large dial Central Office

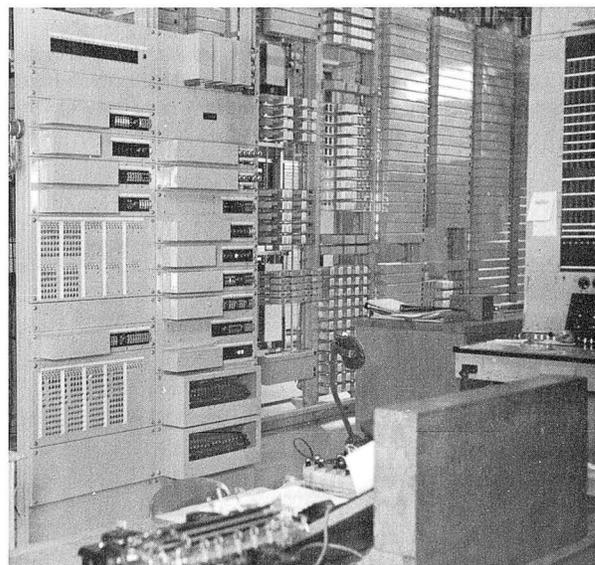
- | | |
|--|---|
| 1. Group Supervisory Control | 15. Cross Connect Term. Block Assem |
| 2. Misc. Fuse Panel | 16. Duplicate Ground Fuse Panel (Main Fuse) |
| 3. Ringing Relay Panel, T/S 1 Ring | 17. 5" Blank |
| 4. Freq. or Gen. Marking Alarm Panel | 18. Battery Distribution Panel |
| 5. 10" Blank | 19. Common Supervisory Panel |
| 6. 5" Blank and Name Plate | 20. 5" Blank |
| 7. Emergency AC Power Panel | 21. Battery Discharge Panel |
| 8. Marking Alarm Common | 22. Tone Generator (Main) |
| 9. Tone Generator, Duplicate | 23. Voltage Control Panel |
| 10. 15" Blank (Behind blank is AC Power Source for Calculagraph in Local and Toll Board) | 24. 10" Blank |
| 11. Cct Plate to Provide Interrupted Gen. | 25. End Cell Switch |
| 12. Interrupter Control and Machine AC | 26. 5" Blank |
| 13. S-C Transistorized Ringing Machine, with Auto Standby | 27. End Cell Chgr. Space |
| 14. Cross Connect Term. Block Assem | 28. Interrupter Control and Machine DC |
| | 29. Bottom Angles |

POWER BOARDS FOR SMALL OR MEDIUM SIZE DIAL OFFICES

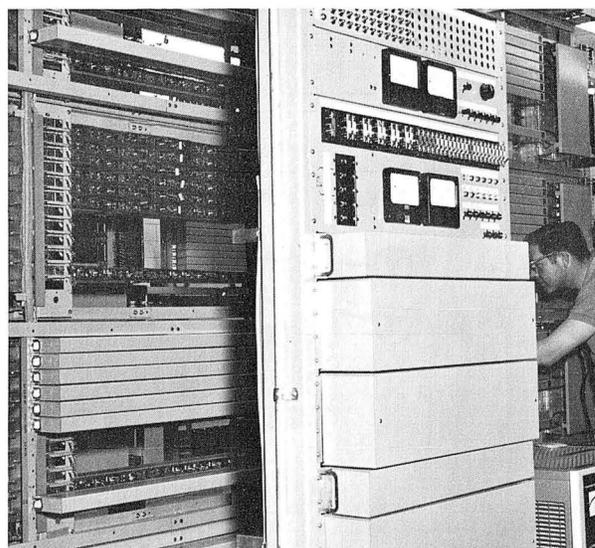


Compact Power Board for a small dial Central Office

1. Common Supervisory
2. Battery Discharge and Alarm
3. AC Interrupter Machine
4. Ringing Control
5. Tone Generators—Main, Duplicate and Intercept
6. Space for Frequency Indicator
7. Interrupter Control
8. D.C. Interrupter Machine
9. Space to Mount Ringing Machines



Power and Supervisory Equipment in a Medium Size Dial Office



Typical Installation of Compact Power Board

ELECTRONIC RINGING GENERATOR

Stromberg-Carlson RG5-25 Electronic Ringing Generators offer the advantages of an electronic source for any conventional five-frequency ringing application, thereby increasing economy plus flexibility. The RG5-25 is a natural replacement for reed and rotating-type ringing equipment that has passed the point of efficient maintainability, and for the earlier tube-type generators that have previously been available.

Interchangeable Plug-In Units

Each unit of the RG5-25 generators, standby, transfer or common control, is plug-in for easy inspection and substitution; any one can be replaced without disturbing any other. In addition, any frequency can be substituted for any other frequency by inserting a different frequency sub-unit module in a given generator unit.

The universal standby, capable of furnishing any frequency, will in most cases be considered ample margin of safety during any emergency repair situation. If more complete insurance against an emergency condition is desired, a single spare generator unit and a set of five small frequency-selective modules can be provided. After plugging in the frequency module, a screwdriver can be used for providing fine adjustment of the frequency.

The universal standby has no power applied unless it is actually called into service. If a failure occurs, automatically causing the standby to switch in, the inoperative unit can be unplugged for inspection, repaired on the bench, or a spare substituted in a matter of seconds.

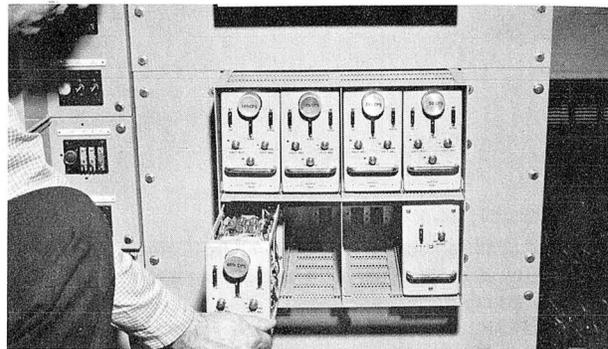
Common Equipment

This supplies ringback tone at 420 cps modulated with 40 cps —which can be superimposed on any, all, or none of the 5 frequencies supplied by the generators. The level of this tone can be adjusted to fit variable loads.

Stability and Maintenance

Because of its solid-state design, using long-life components, in-service life of the RG5-25 is greatly prolonged; frequency stability is held to within 1 % of nominal frequency. Mechanical faults are, for all practical purposes, eliminated. An optional remote-control relay feature makes it possible to apply power only as service is required, when such operation is necessary.

The standard ringing generator is on the approved list of the REA for acceptable materials and meets REA spec PE-40.



Specifications—Electronic Ringing Generator

- Size 15²⁵/₃₂ inches high, 19 inches wide, 15²¹/₃₂ inches deep.
- Input voltage —44 to —56 volts dc.
- Input current *Basic System.*
No load—less than 1 amp.
Full load—approximately 5 amp.
Complete System (with standby generator).
No load—less than 1 amp.
Full load—approximately 6 amp.
- Output voltages The following chart shows the output voltages of the frequency generators.

Generator	Decimonic		Harmonic		Synchrononic	
	Frequency CPS	Output Voltage RMS	Frequency CPS	Output Voltage RMS	Frequency CPS	Output Voltage RMS
1	20	95	16 2/3	90	16 or 20	90 or 95
2	30	105	25	100	30	105
3	40	115	33 1/3	110	42	115
4	50	125	50	125	54	125
5	60	135	66 2/3	140	66	140

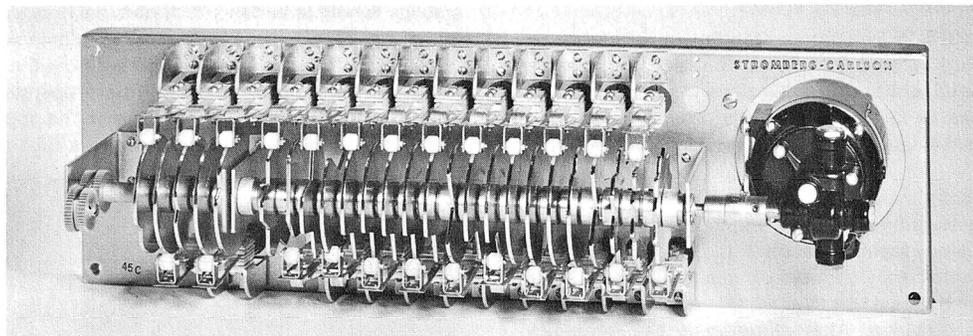
- Output Power 25 watts per frequency.
- Output Resistance dc resistance of less than 40 ohms at 68°F.
- Ambient Temperature 10° to 125°F.
- Relative Humidity Not to exceed 90 %.

STROMBERG-CARLSON

STROMBERG-CARLSON INTERRUPTER MACHINE

The Stromberg-Carlson Interrupter recognizes the many known uses in telephony: harmonic, superimposed or code ringing, busy signal, alarm, conversation timing, warning tone, automatic cut-off and lock-out. It is adapted for timing sequences in many other industries: laundries, foundries, plastic centers, bakeries. A growing use is with intermittent electric displays.

Front View of Stromberg-Carlson Interrupter Machine. Dust Cover Removed to Show Motor, Cams, Switches and Drive Shafts.



Construction Features

The unusual feature of the Stromberg-Carlson Interrupter which multiplies its value, is the complete interchangeability of all the working parts.

THE MOTOR, a standard purchased item with specially built-in reduction gearing, can be removed and replaced in 30 seconds. This can be supplied for D.C., or for 50 or 60 cycle, 115 Volt A.C. The two precision-cut couplings mesh securely without adding to motor load.

THE SNAP-ACTION SWITCHES require no relays to open or close them; the spring accomplishes immediate contact or break. Any switch can be unmounted and moved to a new position in a matter of seconds without stopping the unit, using only a screw driver. These switch mounting screws control the adjustment of switch rollers on the cams. Jack-in contacts make for simple yet positive contact without the use of solder. The nylon rollers turn on a case-hardened polished steel bearing, held by a small steel screw. The transfer springs of beryllium copper have performed more than one billion mechanical operations without any sign of failure. Large size self-cleaning transfer contacts with built-in wiping action are made of a special alloy and have excellent heat dissipation. Contact make or break can be timed within 50 milliseconds.

TWO SPEEDS. The high speed side, with capacity for 22 circuits operating at either 6- or 8-second cycle is used for busy signal, ringing and alarm, the shaft connected through the couplings directly to the motor. Torque is so low that motor load is close to zero. The low speed side with 6 circuits, is a concentric shaft whose speed has been reduced by planetary gears to a 2-minute cycle—as simple as the Model T transmission. The cams are usually cut to regulate conversation timing, automatic cut-off after warning tone and the like.

THE CAMS are of polished case-hardened steel, chromium plated. All cams are precision cut on the same standard milling cutters. The hub fastens to the shaft with a set screw. One set of cams can be slipped off the shaft and a new set, precision cut to different time intervals, can be secured and the switches re-set for the new timing sequence.

Installation and Maintenance

The Stromberg-Carlson Interrupter jacks into place ready for immediate use, and can be removed for examination, re-setting or moved to a new location with minimum of time and effort. The complete unit is light and very compact, occupying only 150 square inches of rack space. The sides form a rigid protecting flange, so that the unit can be set down in any position for adjustment. Three finger holes in each side plate make easy hand grips for carrying. Base-mounted plugs accommodate the switch jacks; these are wired to the main jack out in the open on the back, for easy checking.

Ordering Information

Because of the complete interchangeability of motor, cams, and switches, Stromberg-Carlson Interrupter Machines are assembled to specific requirements. Order these machines by specifying the circuits that are to be interrupted, and details as to timing and sequence of interruptions.

The motor unit usually supplied with the Interrupter is 60 cycle AC or DC. However, 50 cycle AC motors can be supplied for any circuit.

The following list contains only a few applications in which an Interrupter Machine can be used:

1. For Harmonic 1 and 2 ring, 6 second cycle, interrupted ground.
2. For 10 and 20 Code, 8 second cycle, interrupted generator.
3. For 5 Frequency, 1 and 2 ring, 6 second cycle, interrupted generator.
4. For Superimposed 1 and 2 ring, 6 second cycle, interrupted generator.

Information regarding new or replacement parts will be furnished by your nearest Stromberg-Carlson branch office.

STORAGE BATTERIES

Stromberg-Carlson recommends the use of storage batteries for three main purposes:

MAIN BATTERY which is required to provide the main or standby current supply for transmission signalling and general operation of circuit apparatus.

BOOSTER BATTERY which is required to increase the voltage for toll transmission when the main battery is 11 or 12 cells. When machine ringing is employed this battery is generally used for tripping the ringing.

CONVERTER BATTERY is required to operate the ringing converter. When used separately this battery maintains the voltage within narrow limits thereby keeping the ringing voltages steady. It also prevents ringing induction from noising the main talking battery. This battery is usually 12 cells of the couple type.

The desirable size for the main battery is dependent upon the number of lines, the calling rate, the answering time, conversation period time, of restoring cords and the reliability of local commercial power supply.

EMERGENCY POWER SUPPLY

Since storms, hurricanes, wind, ice and accidents all cause frequent interruptions of the electric power on which millions of telephone and telegraph subscribers rely, an emergency power supply is a necessity.

The emergency engine generator need be only as large as the essential electrical load, not large enough to carry the entire load. The fuel may be gasoline, gas from city mains, LP gas or diesel fuel.

Radiator cooled, gasoline, gas or diesel engine generators are built in all standard voltages, both single or three phase and in two speeds, 1200 and 1800 RPM. Since the engines are all designed for speeds greater than 1800 RPM, they operate well within their maximum.

BATTERY CHARGING EQUIPMENT

Solid-state, constant voltage, fully automatic battery charging equipment provides the utmost in efficiency.

These constant voltage chargers automatically compensate for changes in line load, holding the dc output voltage within the close limits required for best equipment operation.

Complete description and ordering information given in the Stromberg-Carlson Supply Catalog.

BATTERY ELIMINATORS—RECTIFIERS

Rectifiers furnish a desirable method of obtaining direct current telephone power directly from an alternating current source of supply.

Many large telephone companies have found it desirable to replace their present power installations with battery eliminators and to equip new installations with this modern means of supplying power.

Change of source relays may be added to any model. Stromberg-Carlson recommends the use of battery eliminators equipped with change of source relays for all telephone switchboard installations.

All items described on this page plus similar items such as multiple frequency sub-cycles, dc power supplies, and tone and ringing generators are fully described and ordering information given in the Stromberg-Carlson Supply Catalog. Request information from your Stromberg-Carlson representative.

FIXED TEST EQUIPMENT

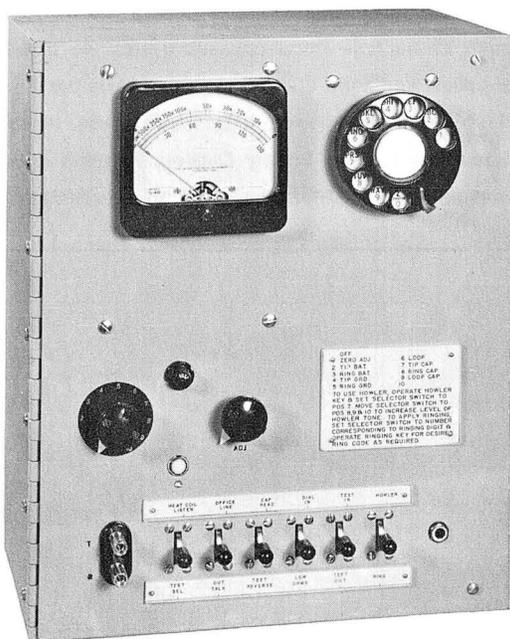
Stromberg-Carlson has devised many types of testing equipment for use in checking and maintaining inside and outside plant facilities. Seven major types of testing equipment have been developed to assist the wire chief and plant man in maintaining a trouble-free operating company. These types include: Type "A" Test meter—a volt-ohm-milliammeter; Type "B" Test Boxes—for unattended offices; Type "C" Test Turret—for the smaller central offices; Type "D" Test Desk—for the larger central offices (local testing only); Type "E" Test Panels—for the largest offices (local and toll testing); Portable Maintenance Test Sets—for individual pieces of equipment, Circuit Plate Test Apparatus—and many others.

TYPE "A" TEST METER

This meter is a Weston 697 volt-ohm-milliammeter, used to test resistances, amperes, and voltages. This model combines a selection of AC and DC voltage, direct current and resistance ranges in a light weight, pocket size case. The meter is furnished complete with a leather carrying case.

TYPE "B" TEST BOXES

No. B-1 Wire Chief's Test Box



Wire Chief's Test Set Type "B-1" Test Box

The "B-1" Test Box is a testing position used primarily in unattended dial offices to check the operation of the equipment. All testing circuits are contained in a gray box which can be mounted on a main distributing frame or near-by wall or column.

The box itself measures 14⁹/₁₆" high, 11¹⁵/₁₆" wide, 6¹/₂" deep, and when mounted on a main distributing frame, it protrudes 3³/₄" in front of the frame.

All equipment is mounted on the hinged front panel which makes servicing easier and faster.

The following is a list of tests that can be accomplished with this set:

1. Foreign potential tests—for battery on Tip and Ring.
2. Loop leakage tests—high and low leakage.
3. Tip and Ring leakage tests—high and low leakage.
4. Capacitance tests—for Tip, Ring and Loop capacitance.
5. Selector tests—access is provided to a local test selector.
6. Remote testing—provision for testing distant offices.
7. Ringing tests—frequency, code or superimposed ringing.
8. Heat Coil test—access to line equipment if heat coil is closed.
9. Reverse tests—reverses test leads.
10. Howler—may be applied through test selector or MDF shoe.

Aside from the test mentioned above, this test set is arranged for an office line for communication purposes.

Nos. B-3 and B-4 Wire Chief's Test Box

The Nos. B-3 and B-4 Wire Chief's Test Boxes are used in manual central office exchanges. These units can be mounted either on the equipment frames (their normal position) or on walls or posts.

The No. B-3 test set operates on 24 volts while the No. B-4 operates on 48 volts DC. Both sets have the same testing circuits and same method of operation. With these sets, the wire chief can accomplish the following tests and operations:

1. Test for foreign potential on Tip and Ring leads.
2. Test for high resistance on Tip and Ring leads.
3. Test for low resistance on Tip and Ring leads.
4. Test for high and low Loop resistance.
5. Test for Tip, Ring, and Loop capacitance.
6. Test for ringing on any line.
7. Test for heat coil operation.
8. Test for inside plant equipment.
9. Manual stepping Howler control.
10. Test for idle line condition.

There are three types of ringing that can be applied with this unit. These are:

1. Five frequency—ten party ringing.
2. Single frequency—with code key.
3. Superimposed ringing—four party.

The size of these sets is approximately 12" wide, 14¹/₂" high, and 6¹/₂" deep. The cabinets are gray to match the frames and circuit plates in the equipment room.

SUMMARIZED ORDERING INFORMATION

WIRE CHIEF'S TEST SETS, TYPES "A" AND "B"

Stock No.	Code	Description
679-000	(A)	Weston volt-ohm meter with carrying case
486830-000	(B-1)	Wire Chief's Test Set, Dial Systems
486831-000	(B-1)	Wire Chief's Test Set (with Test Pair), Dial Systems
487437-000	(B-3)	Wire Chief's Test Set (24 volts), Manual Systems
487438-000	(B-4)	Wire Chief's Test Set (48 volts), Manual Systems

CIRCUIT PLATE TESTING EQUIPMENT

Connector Routine Test Circuit Plate

This unit tests connectors for proper operation of the Answering Bridge (AB) relay, the Ring Trip (RT) relay, the Busy Test (BT) relay, trunk hunting and Tip and Ring transmission continuity.

The test man or wire chief can gain access to this unit by either using a hand test set jacked into a connector plate or by using a station telephone, and dialing a pre-selected number. Various tones are emitted as the test progresses. This set may be arranged to send two or three ring back tones to indicate proper operation of the RT relay. The unit will also emit three dial tones to denote progress of the Tip and Ring transmission continuity tests and will also send back reverse battery flashes providing the AB relay pulses properly. Other tests for the AB relay, BT relay and trunk hunting are accomplished through the use of twist type keys in the make busy and test unit on the corner of this circuit plate.

<i>Stock No.</i>	<i>Description</i>
487017-000	Connector Routine Test Circuit Plate (Superimposed ringing)
487018-000	Connector Routine Test Circuit Plate (Harmonic, Decimonic, Synchromonic or Single Frequency ringing)

Dial Speed Test Circuit Plate

This unit tests a subscriber's dial for speed. The test man, on the subscriber's telephone, dials a pre-determined number to gain access to the test unit. Spurts of dial tone will be given off during testing: One spurt indicates that the dial is too slow, two spurts indicate proper speed of the dial (8 to 12 pulses per second), three spurts indicate that the dial is too fast.

<i>Stock No.</i>	<i>Description</i>
484062-000	Dial Speed Test Circuit Plate (Unit to be wired to terminal block)
485199-000	Dial Speed Test Circuit Plate (Unit is jacked in to position)

Line Testing Circuit Plate

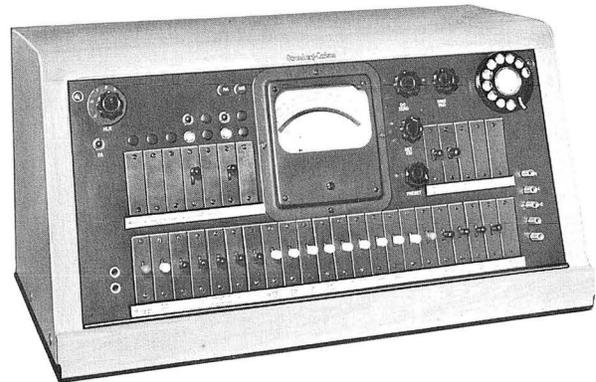
The line testing circuit plate checks a subscriber's line for battery, leakage, and ground faults. Such faults are indicated by splashes of tone given off by this set. Like the Dial Speed Test Circuit Plate, access to this test unit is gained by dialing a pre-selected number from the subscriber's telephone.

<i>Stock No.</i>	<i>Description</i>
488054-000	Line Testing Circuit Plate

THE TYPE "C" TEST TURRET

This turret is admirably suited for testing local equipment in a small central office. All of the basic circuits used in the turret will also be found in the larger pieces of test equipment.

The circuits are neatly arranged in a No. 121 Cordless Switchboard cabinet; will fit conveniently on any desk or table.



The Type "C" Test Turret

Test Provisions

Trunking Circuits—Circuits that establish connection between the turret and a switchboard, the turret and another test position, and the turret and the MDF are available up to a total of two each. These circuits are established in one of two ways: (1) Trunk two-way between positions key, for turret to turret or turret to switchboard operation, which necessitates operation of a similar key at the other end; (2) Trunk two-way-to-line circuit which provides a means of access to and from a turret and a dial line circuit or a magneto extension telephone.

Meter Circuits—This turret is wired and equipped with a meter that can be used as a volt meter, a milliammeter and an ohm meter. It has a full scale deflection of .00075 amperes and is accurate within 1 % of full scale.

Testing Circuits—All testing circuits are wired into this turret. Optional circuits and those listed as furnished in quantity as desired are only wired into the standard turret. All other circuits are wired and equipped. See the tables at the end of the test equipment portion of this catalog for ordering information.

Accessories—Provision is made for connecting a standard 1543 Telephone to the turret. If desired, an operator's head set may be used in addition to or in place of the telephone. Jacks are provided for this purpose. Provision is also made for attaching a portable Wheatstone Bridge to this test turret.

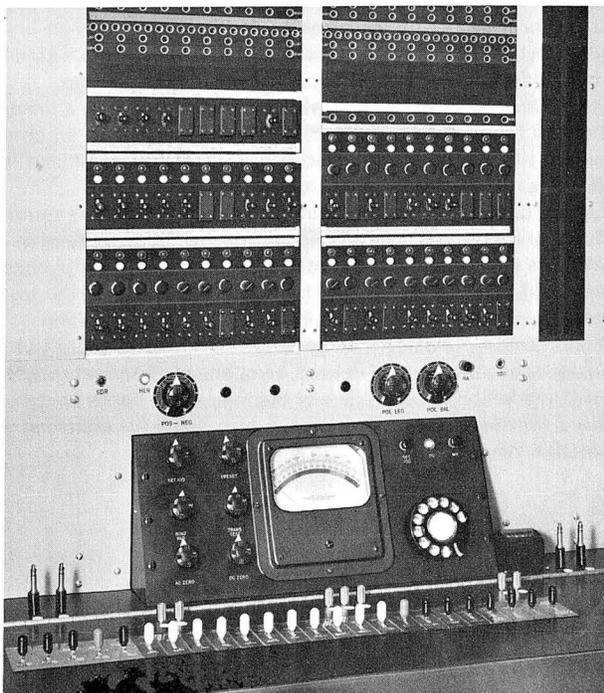
THE TYPE "D" TEST DESKS

The Type "D" Test Desks are used in larger central offices that require more local testing facilities than the Type "C" Test Turret. Circuit features found in the Type "C" Test Turret have been incorporated, along with additional features for more complete local testing.

All equipment is mounted in a No. 204 PBX Switchboard cabinet and may be multiplied to other test positions if desired.



The Type "D" Test Desks



Close-up of Type "E" Test Panel

Test Provisions—Type "D"

Trunking Circuits—The test desk in addition to greater capacity, contains auxiliary testing paths that can be used along with the primary paths. This permits the wire chief to conduct a test on one path and still have access to another test train.

Meter Circuit—Same as the test turret.

Testing Circuits—Only the standard testing circuits are wired and equipped in the test desk. Refer to the ordering information tables for optional circuits available. These circuits can also be used with the auxiliary testing paths.

TYPE "E" TEST PANELS

The Type "E" Test Panel contains even more testing facilities than either the Type "C" or Type "D" test positions, with circuits which test toll as well as local facilities. All equipment is mounted on a steel frame made of channel uprights. Provision is made to mount jacks, lamps and keys in the face of the section with ample space allowed for future growth. If more than one testing position is required, they can be easily added and circuits may be multiplied or paralleled as desired.

This panel has two sets of cords and plugs equipped. A set consists of one cord and plug used for the primary circuit paths, and another cord and plug used for the auxiliary circuit paths.

Test Provisions

Trunking Circuits—Like the Type "D" Test Desk, the test panel provides auxiliary circuits to make tests when primary paths are busy. Six separate means are provided to connect the testing circuits to equipment or lines; they are: (1) the Test Train, (2) MDF trunks and test shoe, (3) inspector's trunks, (4) test jack circuits, (5) binding posts, and (6) test cords at manual switchboards.

Meter Circuit—Same as the test turret and the test desk.

Testing Circuits—Only the standard testing circuits are wired and equipped in the test panel. Other testing circuits should be ordered as per the chart opposite (below).

Due to the capability of this type of test panel to test toll facilities, there are additional optional circuits available such as the following:

1. Test Circuit for No. 3 Toll Switchboard trunks—tests for the trunk relay equipment for proper operation.
2. Polar Duplex and E and M Dial Leg—provides for pulsing tests on polar duplex dial legs. Both line and drop tests can be accomplished.
3. Positive-Negative Dial Leg—provides for pulsing tests and both line and drop tests on positive-negative dial legs.
4. Differential Duplex Dial Leg—provides for the same type of tests mentioned previously on a differential duplex dial leg.
5. High and Low Dial Leg—again provides for the same type of tests on a high and low dial leg.

The above items should be ordered only as they apply to specific circuits in your exchange.

The chart referred to previously shows a howler circuit for each type of testing position. The howler circuit is automatically graduated in intensity on both the Type D and E boards but is manually graduated in the Type C Test Turret. The automatic howler may be applied to both primary and auxiliary test pairs.

TEST DESK ORDERING INFORMATION

This information is helpful ordering information for standard test positions, and also lists all available test desk features. Certain circuits associated with the test position may be multiplied to other positions, such as selector level trunks, inspector's trunks, etc. In such cases, only key and lamp equipment is required at the annex position.

Type "C" Test Turret is for small offices where only local testing is required. Type "D" Test Desks are normally provided where local testing only is required and the number of testing circuits exceeds the capacity of the Type "C." Type "E" Test Panels are used for combined local and toll testing, with certain features omitted if it is used for local testing only.

In the tables below, chart 1 shows the features of the main testing circuit while chart 2 shows the features of additional testing circuits.

Explanation of Symbols

E—This circuit is furnished wired only even though not ordered if the features it supplies are required in the office.

N—Not available.

O—Optional circuit, furnished only if ordered.

Q—Optional circuit, furnished only if ordered and in quantity ordered.

Q1, Q2—As above, figure indicates maximum quantity.

X—Standard equipment, furnished even though not ordered.

Chart 1

Type "C"	Type "D"	Type "E"	Testing Position Circuit Features	Notes
X	X	X	Voltage, Resistance, Capacitance measurements, Ring, Reverse, Dial and Talk battery keys. Operator's circuit, monitor circuit, Nite and Fuse Alarm, Audible Alarm cutoff.	
N	X	X	Constant voltage AC rectified test battery	
X	N	N	Exchange battery test battery	
N	X	X	Exchange battery as standby test battery	
N	O	O	Dry cell battery as standby test battery	a
X	N	N	Position terminals for operator's set	
X	N	N	Single jacks for operator's set	
N	X	X	Double jacks for operator's set	
N	N	N	Order wire key	b
N	X	X	Separate monitoring circuit	c
X	X	X	Cutoff control and Test connector release key	
N	X	X	Auxiliary test keys	
E	X	X	Meter shunt resistor	
N	N	E	Leg dial key	d
X	X	X	Ring keys, Generator 2 to 5	
N	X	X	Toll Generator ring key	
N	X	X	135/1000 cycle ring key	
N	N	X	Sleeve testing key	

Chart 2

Type "C"	Type "D"	Type "E"	Auxiliary Testing Circuits	Notes
Q2	Q	Q	MDF Trunk	
N	Q	Q	Testing jacks double cutoff type	
N	N	O	Testing jacks twin type	e
N	X	X	Plug termination of test leads	
N	E	E	Coin control	
N	X	X	Transmission Test	
N	N	X	Current on test leads	
N	N	X	Hi-Lo incoming AC	
X	X	X	Pulse speed and ratio	
X	N	N	Howler, manually graduated	
X	X	X	Howler, automatically graduated	
N	E	E	No. 3 Toll type test circuit	
N	O	O	Sounder circuit	
N	O	O	Telegraph key	
X	X	X	Wheatstone bridge control circuit	g
N	X	O	High voltage breakdown test circuit	
N	N	X	Polar duplex and E and M dial leg	
N	N	E	Pos. Neg. dial leg	
N	N	E	Diff. Duplex dial leg	
N	N	E	High low dial leg	
Q2	Q	Q	Trunk to test selector	
Q2	Q	Q	Inspector's trunk (Selector level trunk)	
Q2	Q	Q	Trunk, 2 way between positions (Desk trunk, Order wire)	f
N	Q	Q	Trunk 2 way CB	
Q1	Q	Q	Trunk 2 way to line circuit	
N	Q	Q	Trunk intercept answering	
N	Q	Q	Intertoll Test Trunk "101", key termination for	
N	X	X	PBX Line seizure and prepay paystation adapter test	

Explanation of Notes

a—Dry cell battery as stand-by voltage source is furnished instead of exchange battery stand-by battery.

b—As the No. 3 toll operator's circuit does not provide direct order wire access, specify trunks and two-way between positions in required quantity.

c—The operator's circuit induction coil is used for monitoring when this circuit is not provided.

d—Used in conjunction with dial leg testing circuits.

e—The equipment is not arranged for twin jacks.

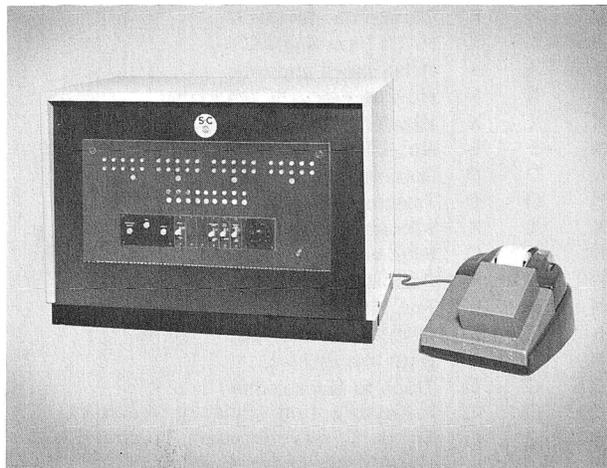
f—This circuit works into toll board appearance of No. 3 toll type trunk circuits. It is normally cabled to a test cord to the trunk jacks as required. If a multiple appearance of the toll board jack is provided on the test board jackfield, single or twin patch cords are furnished.

g—This circuit does not include the Wheatstone bridge. If required, a portable Wheatstone bridge must be ordered separately.

AUTOMATIC LINE ROUTINER

The Line Routiner automatically tests inside and outside plant facilities. The outstanding features incorporated in the Routiner are:

1. Fully automatic, including remote start.
2. Usable in any step type office, providing there is a separate test train installed.
3. High speed.
4. Accurate and self checking.



Stromberg-Carlson Automatic Line Routiner

The Line Routiner follows the present day trend toward automation in that the unit, once started, needs no further attention. It provides a permanent printed record of all line faults found in testing out an office. The unit may be started remotely. It is arranged to test any number of remote offices regardless of the type of step-by-step switching equipment, providing there is a separate test train available. The Routiner provides a means of automatically stepping a test train consisting of a test selector

and a test connector, successively to each connector terminal in the office, and from there to test the outside cable for:

1. Leakage resistance between the tip and ring connectors.
2. Leakage from tip or ring to ground.
3. The presence of a "foreign" potential.

To provide flexibility of use, the routiner may be arranged on a per office basis as selected by one of the six office keys to provide varying features. This furnishes access to:

1. Four digit test train.
2. Three digit test train, or
3. Test train in a mixed terminal-per-line and terminal-per-station office requiring cancellation of the hundreds digits in certain thousands group only.

When encountering a line fault, the printer control circuit scans: first, the office selection circuit to determine which office is being tested; then the sequence relays in the line testing unit to determine the type of fault found; and thirdly, scans the position of the line number registering deca switches to obtain the connector terminal number on which the fault is found. At this time a six digit entry is automatically made on the printer tape. The first digit is an arbitrarily-chosen digit corresponding to the office being routined. The second digit designates the type of fault found and the remaining four digits record the line number.

The routiner circuit and printer control circuit are contained in an attractively styled cabinet, available in gray, mahogany or limed oak with a black laminated front panel. The over-all cabinet dimensions are approximately 30" long x 20" high x 18" deep.

The printer itself, in size and appearance, resembles a conventional adding machine.

The DC power supply, required for the printer, and the AC control circuit are generally mounted on the powerboard. Test selector trunks, giving the routiner access to the test trains, are mounted external to the routiner. This makes the routiner completely independent of the test desk, permitting its placement to any desired location.

Routiner Stock No. 491378-000

Printer Stock No. 217045-000

PORTABLE TEST EQUIPMENT

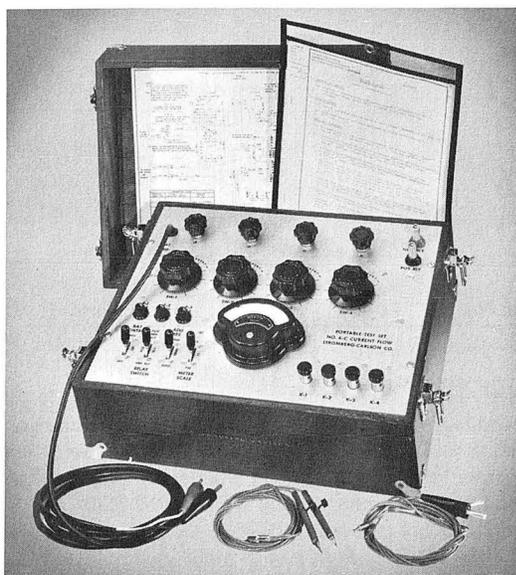
CURRENT FLOW TEST SET NO. 6C

Proper adjustment of relays used in telephone circuits, both mechanical and electrical, are necessary to insure the best operating results.

Mechanical adjustments for separation of contacts and springs are made with thickness gauges. Pressure values are established by means of a gram gauge. After these adjustments have been made the electrical adjustments can be undertaken. The proper tension is placed on the relay springs to meet the requirements indicated on the Relay Adjustment Value Sheets, available for each Stromberg-Carlson central office circuit.

It is seldom that relays are required to meet more than four electrical test qualifications. They are:

- | | |
|----------------|------------|
| 1. Operate | 3. Hold |
| 2. Non-Operate | 4. Release |



The No. 6C Test Set is designed to aid in establishing the proper current flow adjustments and to check circuits previously adjusted. For this purpose a Weston Milliammeter with three scales 0-15, 0-75, and 0-750 is provided. By its proper use the various current measurements and requirements can be accurately determined.

This Test Set is so arranged that four different values of current can be set up at the same time for testing. Individual to each of the four testing circuits are a rheostat, a tap switch and a push button key, used for selecting the resistance path desired. The rheostat has a variable resistance from 0-1500 ohms. The tap switch has eleven steps, the first has 0 resistance, the second permits cutting in, by means of a cam key, 10,000 or 30,000 ohms, and the remaining nine steps cuts in 1200 ohms on each successive step. Thus it is possible to cut in a total of 42,300 ohms resistance in each of the four testing paths.

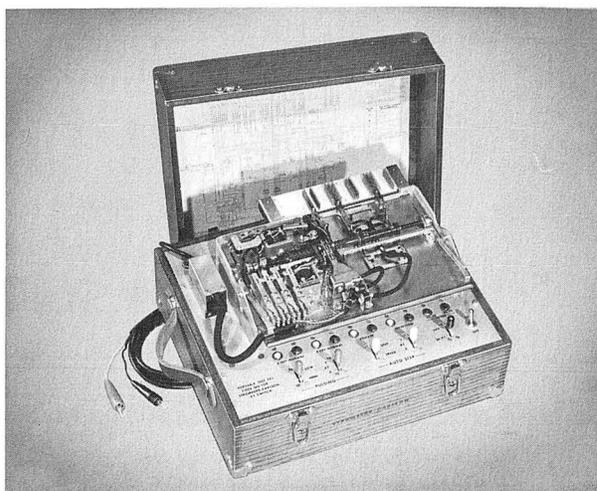
Common equipment consists of two binding posts for the operating battery, three fuse holders provided to carry ½ amp. fuses, four cam keys for Battery Cut-off, Release, Reverse, and Resistance Switching.

Size: 7 5/8" high by 14 9/16" wide by 11 5/16" deep.

Stock No.	Code	Description
485826-000	(6C)	Current Flow Test Set

XY UNIVERSAL SWITCH TEST SET NO. 10B

This test device permits routine checking and adjusting of the XY Universal Switch under conditions resembling actual line operation. Automatic re-cycling permits continuous operation in either X or Y direction, with the switch operating by applied pulsing or automatic stepping. The X or Y magnet may be held operated with 24 volt battery. The set tests spring assemblies for proper sequence of operation. Wiper alignment also is checked. The self contained test unit is packaged in an instrument-type wood cabinet with snap on cover and carrying strap. Size: 7 5/8" high by 14 9/16" wide by 11 5/16" deep.



XY Universal Switch Test Set No. 10B

Stock No.	Code	Description
484731-000	(10B)	Universal Switch Test Set

CIRCUIT PLATE TEST SET NO. 11

Built into a handy wood carrying case, this test set provides for routine checking of circuit plates of all types. Circuit plates will be tested for speed and per cent make of pulses, toll marking conditions and complete operation of local and toll connections. These tests can be performed under simulated maximum shunt or loop resistance conditions. The test equipment is designed to automatically preset the meter for the approximate throw of the needle.

Size: 7 5/8" high by 11 5/16" wide by 14 9/16" deep.

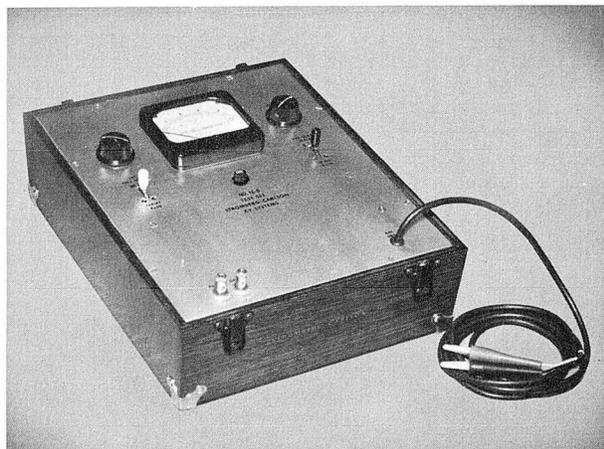


Stock No.	Code	Description
481705-000	(11)	Circuit Plate Test Set

STROMBERG-CARLSON

SPEED AND PER CENT MAKE TEST SET NO. 12B

Pulse speed and per cent make are tested by this electrically operated portable unit. The set will test pulse speed up to 20 pulses per second. These pulses can originate at a dial, switching equipment or pulse generator. The meter on the test unit can be checked for full scale deflection and may be manually preset for the expected throw of the needle.
 Size: 7 5/8" high by 11 15/16" wide by 14 9/16" deep.

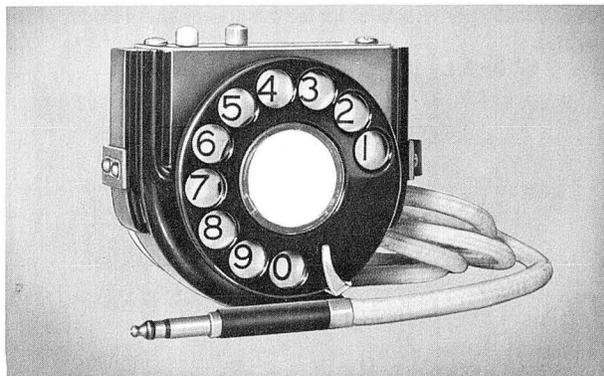


Speed and Per Cent Make Test Set No. 12B

Stock No.	Code	Description
209809-000	(12B)	Speed and Per Cent Make

PULSING LIMITS TEST SET NO. 13

This set, small enough to fit in the palm of your hand, tests the response of circuits to dial pulses. Simulated extreme loop or shunt resistance may be thrown onto the line during testing simply by pushing a button on the unit. When the button is restored to its original position, the equipment returns to normal operating conditions.
 Size: Slightly larger than a standard dial.

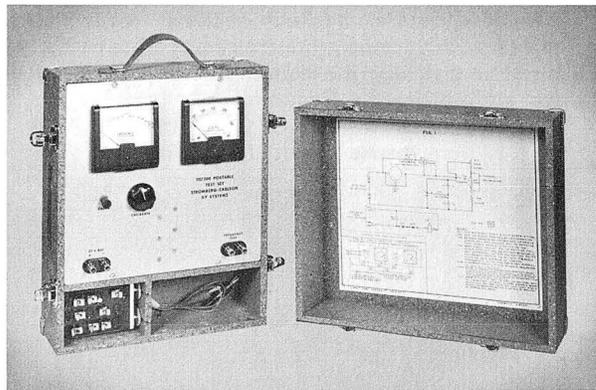


Pulsing Limits Test Set No. 13

Stock No.	Code	Description
482058-000	(13)	Pulsing Limits Test Set

FREQUENCY INDICATOR NO. 17

This battery-operated (22 1/2 volt) portable set checks ringing frequency and voltage. It will test frequencies between 0 and 70 cycles per second; alternating current voltages between 0 and 250 volts. The unit is encased in a wood cabinet, complete with carrying strap. Deflection of the frequency meter can be calibrated before each reading.
 Size: 14 9/16" high by 11 5/16" wide by 7 5/8" deep.



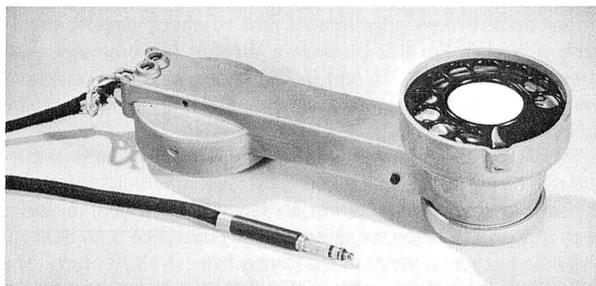
Frequency Indicator No. 17

Stock No.	Code	Description
207300-000	(17)	Frequency Indicator

HAND TEST SET

The hand test set, commonly referred to as a "Buttinsky," can be used to test or monitor Linefinders, Allotters, Selectors and Connectors in XY Dial Systems. This set is equipped with a cord and plug assembly (Stock No. 202452-000) and a wall mounting bracket (Stock No. 203684-000) for suspending this set on either equipment frames or walls.

Stock No. 203685-000.



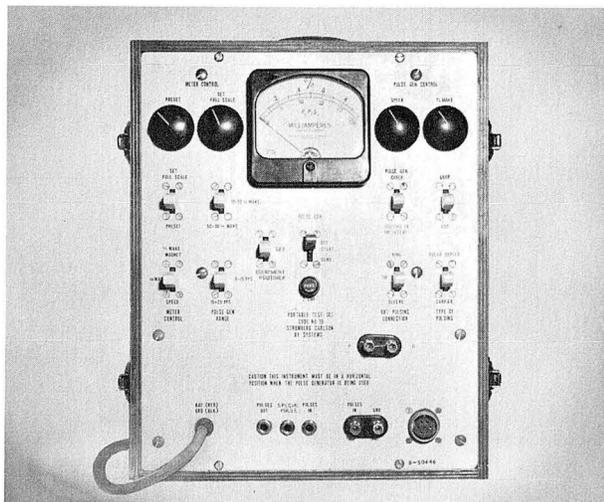
Hand Test Set

PULSE GENERATOR AND MEASURING SET NO. 19

This equipment contains a ready, accurate and handy source for generating and measuring pulses. Pulses ranging from 6 to 25 PPS may be generated and measured as to speed and per cent make with extremely high degree of accuracy.

It may be desired to feed pulses to other pieces of test apparatus such as the No. 20 Equipment Routiner listed below.

The No. 19 Pulse Generator will function to:
 Generate pulses from 6-25 PPS
 Control percent make of such pulses—from 10 %-90 % make
 Synchronize pulses to insure full break measurement
 Generate and measure out pulses
 Receive and measure inward pulses
 Measure speed of dials
 Size: 14 5/8" high by 11 5/16" wide by 7 3/8" deep.

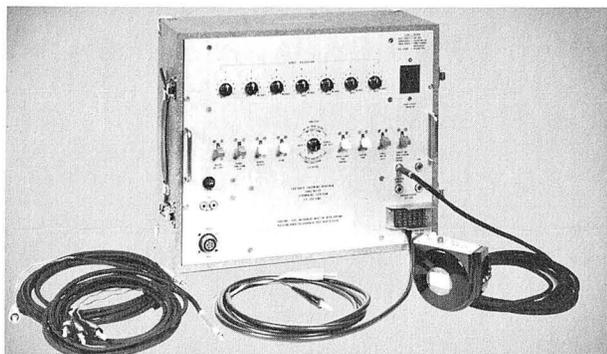


Pulse Generator and Measuring Set No. 19

Stock No.	Code	Description
217636-000	(19)	Pulse Generator and Measuring Set

EQUIPMENT ROUTINER NO. 20

This test device will routine and locate faulty switching equipment by calling a pre-determined number in a connector group from a pre-selected line in a finder group. The connector under test may be wired for terminal-per-line or terminal-per-station, with or without trunk hunting. The routiner can be used on a manual or fully automatic basis in any step-by-step dial office. The No. 19 Pulse Generator and Measuring Test Set is used to supply required pulse to this routiner.
 Size: 13 3/8" high by 16" wide by 7 3/8" deep.



Equipment Routiner No. 20

Stock No.	Code	Description
419000-058	(20)	Equipment Routiner

KEYSENDER TEST SET NO. 22

The No. 22 Keysender Test Unit is used to test keysenders on toll switchboards in XY dial exchanges. This unit is patched to the sender shelf by means of a cord equipped with two jacks that are similar to XY Universal Switch jacks.

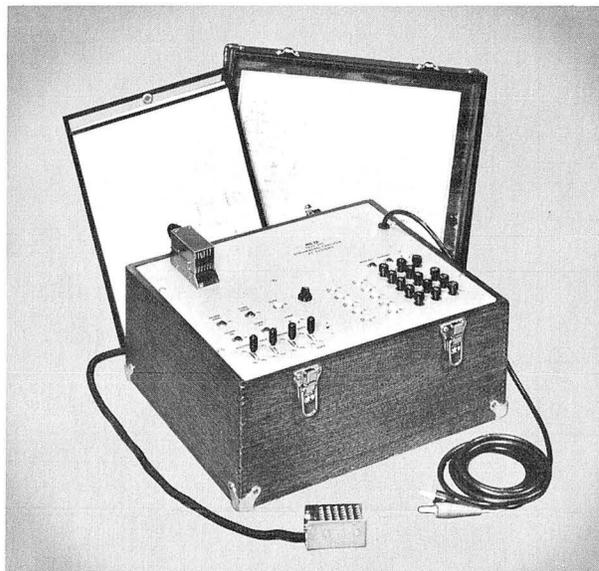
There are two adjustable arms on the test box which enable this set to be suspended on a ladder for the purpose of bringing the unit closer to the sender shelf.

The following functions are tested with this unit:

1. Test for sender seizure
2. Test for pick-up and hold of dial cut-in relay and cord
3. Test for digit registration
4. Test for number of pulses and supervision
5. Test for all registers busy supervision
6. Test for error (ER) key operation
7. Test for first stop dial operation
8. Test for removal of first stop dial signal
9. Test for drop-off on second stop dial signal
10. Test for blocking digit registration after operation of the Stop Registration Key
11. Test for sender release with ringing key (Auto-ringing sender)
12. Test for sender release without ringing key (Auto-ringing sender)
13. Test for sender release with ringing key (Key controlled ringing sender)
14. Test for sender release without ringing key (Key controlled ringing sender)
15. Test for pulsing Stop Dial without sender release

Also available is the No. 21 Keysender Test Set for Strowger exchanges.

Size: 7 3/8" high by 14 9/16" wide by 11 5/16" deep.



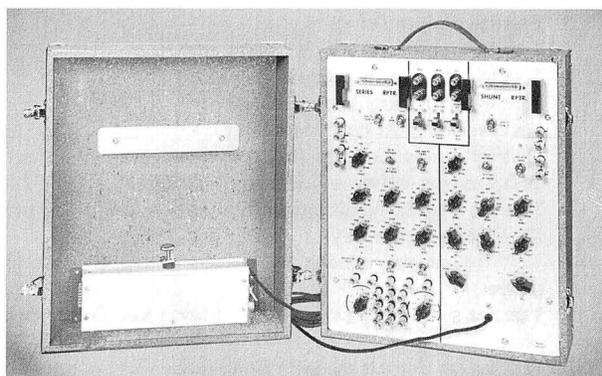
Keysender Test Set No. 22

Stock No.	Code	Description
493865-000	(22)	Keysender Test Set-XY offices
493864-000	(21)	Keysender Test Set—Strowger offices

**NEGATIVE IMPEDANCE REPEATER
TEST SET NO. 541-A41**

This set facilitates selection of the series and shunt repeater network that provides the most favorable gain-frequency response for a given line. Insertion gain can be measured for series repeaters or for a series-shunt combination. All necessary network adjustments can be made by the operation of dials and switches on the test set. The set can test loaded or nonloaded cable facilities or a combination of both.

Size: 16" high by 13 3/8" wide by 7 5/8" deep.



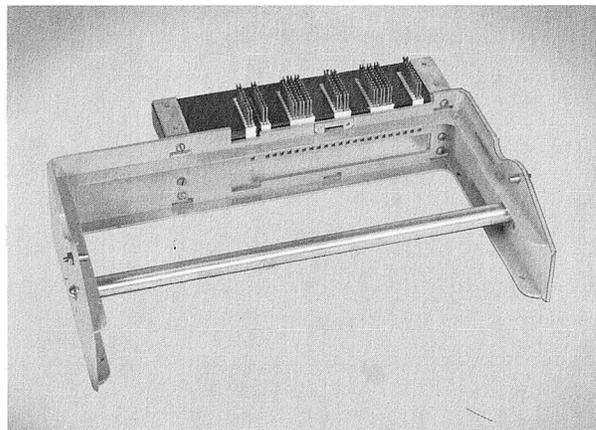
Negative Impedance Repeater Test Set No. 541-A41

<i>Stock No.</i>	<i>Code</i>	<i>Description</i>
439900-018	(541-A41)	Repeater Test Set

WIPER ADJUSTMENT FIXTURE

This portable fixture is used to hold the XY Universal Switch during wiper adjustment. The XY Universal Switch is locked into a fixed position in relation to the wire banks so that an accurate adjustment can be made to the T, R, S, HS, X, and XX wipers of the XY Universal Switch. This fixture is identical to the test cell of the XY Universal Switch Test Set.

Size: 2 1/4" high by 11 1/2" wide by 8" deep.



Wiper Adjustment Fixture

<i>Stock No.</i>	<i>Description</i>
210482-000	Wiper Adjustment Fixture

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