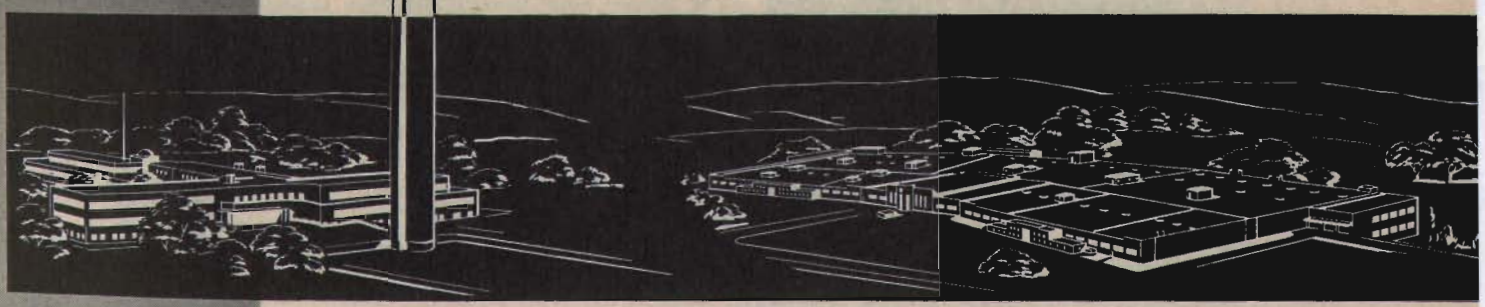
Federal presents

A COMPLETE LINE OF TELEPHONE EQUIPMENT,

to help you provide your subscribers with the finest communication service

- **Rotary Automatic Switching Systems**
- **Community Rotary Exchanges (CRX)**
- **Step-by-Step Automatic Switching Systems**
- **Private Automatic Branch Exchanges (PABX)**
- **Manual Switchboards**
- **Telephones—common battery and magneto**
- **Dials and Test Equipment**
- **Carrier Telephone and Telegraph Systems**
- **Mobile Radiotelephone Equipment**
- **Rectifiers and Battery Chargers**
- **Wire and Cable**



Federal Telecommunication Laboratories at Nutley, N. J.—the center of Federal research.

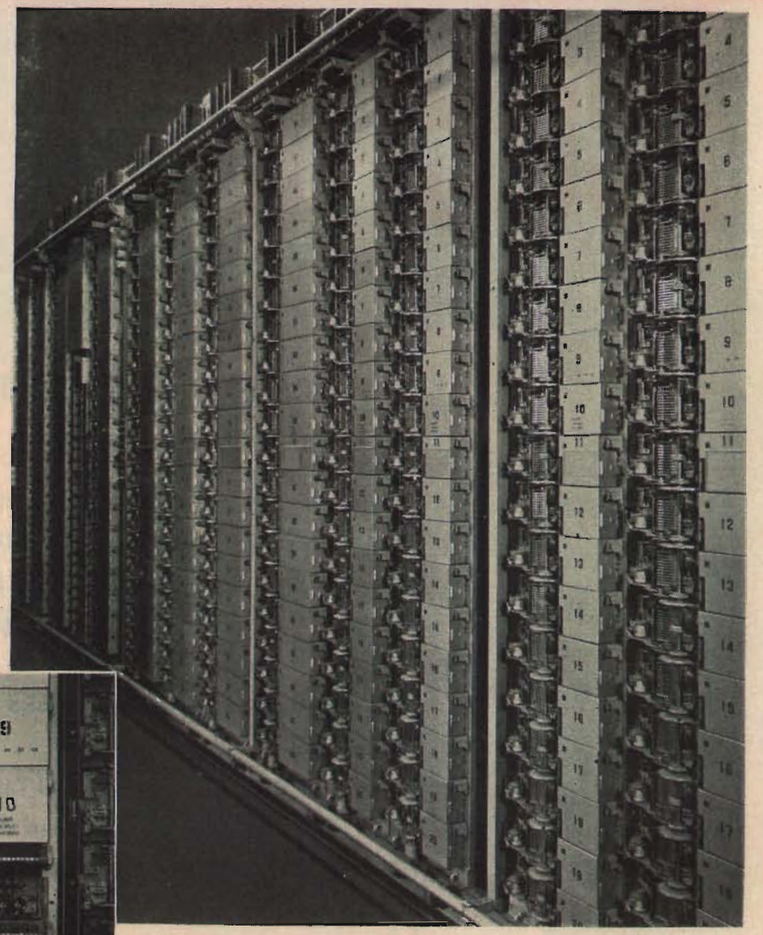
Federal's modern manufacturing plant at Clifton, N. J.

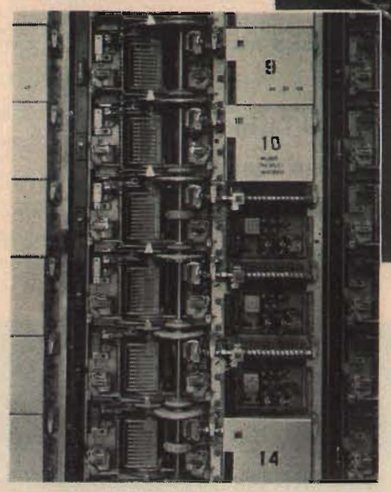
FEDERAL TELEPHONE & RADIO — FTR

ONE OF AMERICA'S GREAT FACTORIES SERVING THE TELEPHONE INDUSTRY

FEDERAL'S 7-A2 ROTARY AUTOMATIC TELEPHONE SYSTEM

- **ECONOMICAL RANGE 4,000 Lines or more** (no top limit to line capacity)
- **SIMPLE, RUGGED, MECHANICAL CONSTRUCTION**
- **SYSTEM DEPENDABILITY and Economy proved by hundreds of installations . . . all over the world.**





Selector switch frames — 15,000-line installation — 7-A2 Rotary equipment at the Baker-Hamilton Exchange of the Rochester Telephone Corporation, Rochester, N. Y.

Close-up view of selector bay, showing selector switches (left) and sequence switches (right).

THE ROTARY DIAL SYSTEM, used extensively in other parts of the world for many years, is now being installed in this country—and as more and more rotary systems are cut over, its many inherent advantages will make it a major factor in domestic dial system efficiency and economy.

Federal's 7-A2 Rotary System differs from other automatic systems in the following important respects:

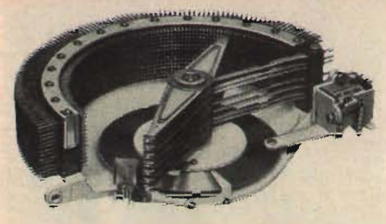
(a) *All switches operate with a simple rotary motion — no vertical movement is involved.*

(b) *The dial pulses are stored in register circuits which govern the subsequent switching operations — switches do not operate in* direct *response to impulses dialed.*

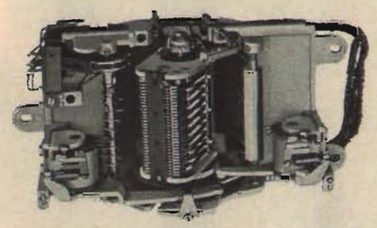
One of the outstanding features of the rotary system is its functional simplicity, which permits a rugged mechanical structure with firm contact pressure, minimum vibration and long trouble-free life. Because the switches are not directly dependent on the impulses of the calling dial, the system gains added flexibility in the routing of calls, and can be operated with higher loop resistances in subscribers' lines.

The 7-A2 system uses rotary finder switches, selector switches, sequence switches and flat-type relays. The power drive shafts operate continuously, and the rotary switches are engaged and disengaged by a quick-acting magnetic clutch arrangement.

The Rotary system can also provide many special features such as: subscriber metering, long-distance dialing, automatic toll ticketing, centralized service observation, automatic routine testing, and false-call indication. Some of the typical accessory panels are shown below.



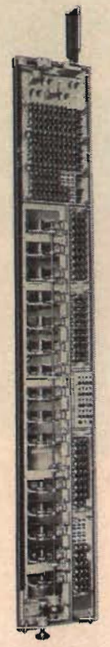
200-point Finder Switch used on the 7-A2 system.



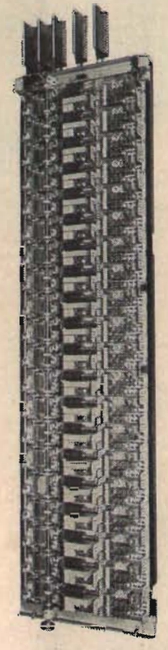
Group Selector Switch of 7-A2 system, consisting of 10 circuit levels, 30 outlets per level.

- Routine Test Bay for 3rd Group Selector Toll, Toll Register, and Master False call circuit.

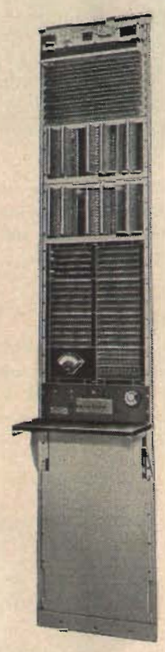
- 3rd Group Inward Toll Bay.



- Direct Reading Traffic Recording Bay.



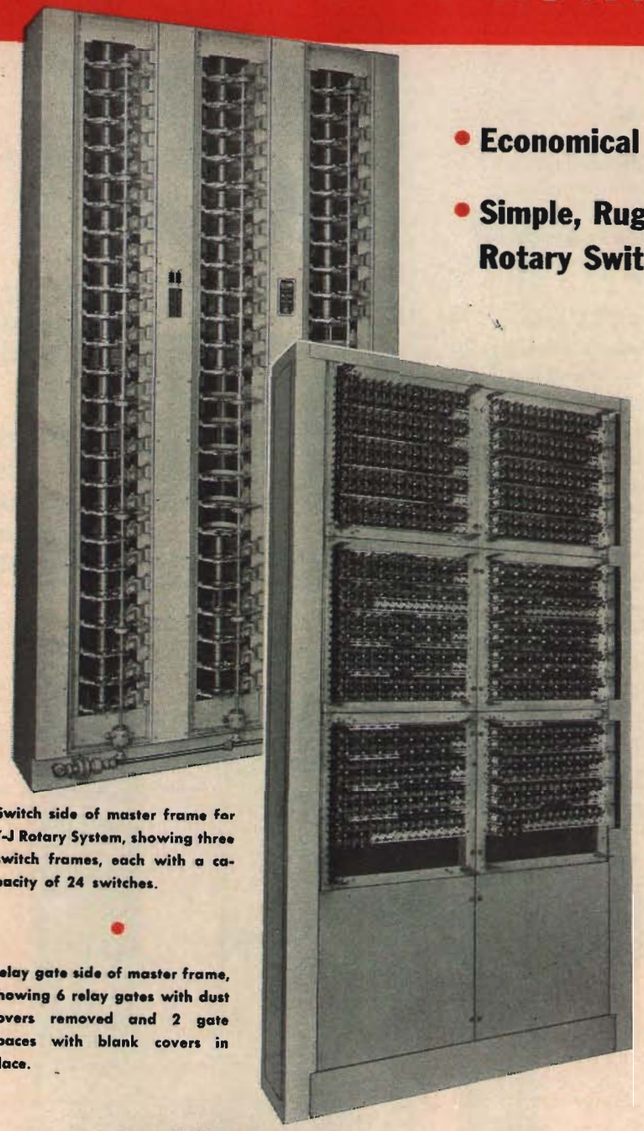
- Routine Test Bay for 3rd Group, 4th Group and Final Selectors.



- Outgoing trunk test bay.

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

FEDERAL'S 7-J ROTARY SYSTEM



- **Economical Range — 400 to 4000 Lines**
- **Simple, Rugged, Single Motion Rotary Switches**

THE 7-J ROTARY SYSTEM provides all the major mechanical and operational advantages of the 7-A2 system, in a simple, flexible equipment designed to meet economically the needs of medium-sized exchanges with capacity range of 400 to 4000 lines. Complete systems for the required number of lines are assembled on standard master frame units, each of which provides for mounting three switch frames on one side, and eight hinged relay gates on the opposite side.

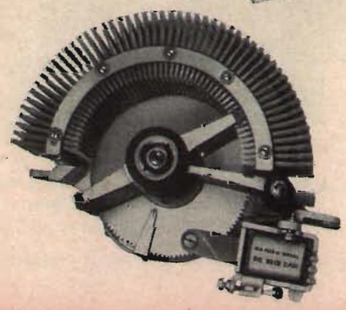
As contrasted to the 7-A2 system, the 7-J system employs only the 100-point, 200 circuit outlet finder switch for all group and final selection.

The sectionalized unit construction simplifies installation and contributes to floor space economy, neat appearance, and ready accessibility of all components. Master frames, switch frames, relay gates and dust covers are of light-weight all-Aluminum construction.

An important feature of the 7-J system is its ready adaptability for subsequent additions in trunking and line capacity, thereby permitting maximum economy in initial installations.

Switch side of master frame for 7-J Rotary System, showing three switch frames, each with a capacity of 24 switches.

Relay gate side of master frame, showing 6 relay gates with dust covers removed and 2 gate spaces with blank covers in place.



100-point rotary switch, used in the 7-J equipment for all finder and selector functions.

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

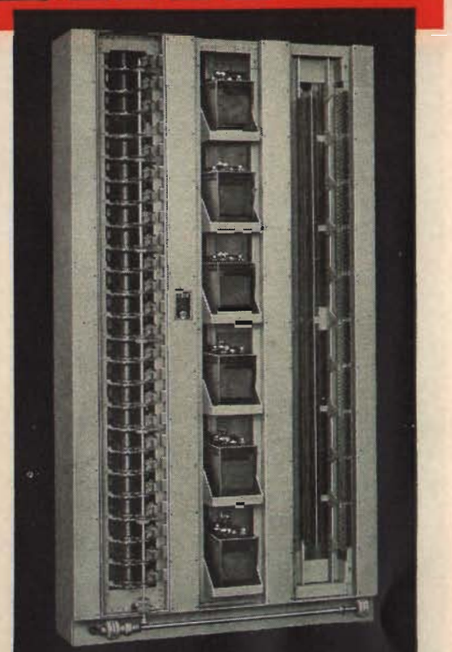
FEDERAL'S NEW "CRX"

The Community Rotary Exchange that permits profitable dial service for the small community.

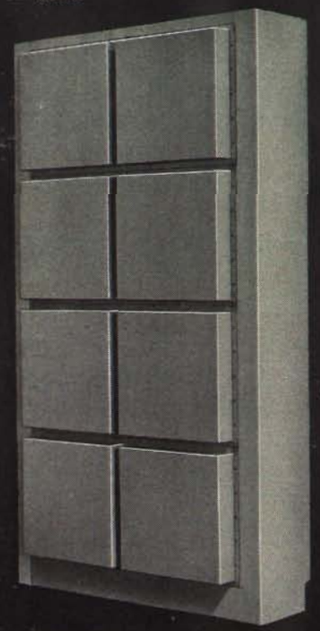
- **Economical Range—40 to 400 lines.**
- **Small Size—a complete 100-line exchange occupies only 24" by 56" of floor space.**
- **Light Weight—All-Aluminum frame construction.**
- **Completely self-contained—shipped ready to connect to power supply and distribution cables.**
- **Interchangeable units—permit simplified maintenance and easy extension.**

Federal's CRX is a radically new and simplified Rotary equipment designed to provide the finest type of automatic service for the *small* exchange—with substantial savings in initial investment and cost of installation, maintenance and subsequent extension. As it is made up of standard, interchangeable, basic units, a complete exchange with a capacity of from 40 to 400 lines can be engineered to your specifications. Maintenance expense is greatly reduced, because of the inherent trouble-free operation of the simple *rotary* equipment—and because all parts are readily accessible and interchangeable.

Features include: Separate toll and local links, assuring maximum toll service—Simplified wiring, without bulky and costly cable forms—Built-in battery rack and full-float Selenium-rectifier power supply—Electronic ringing and tone generator.



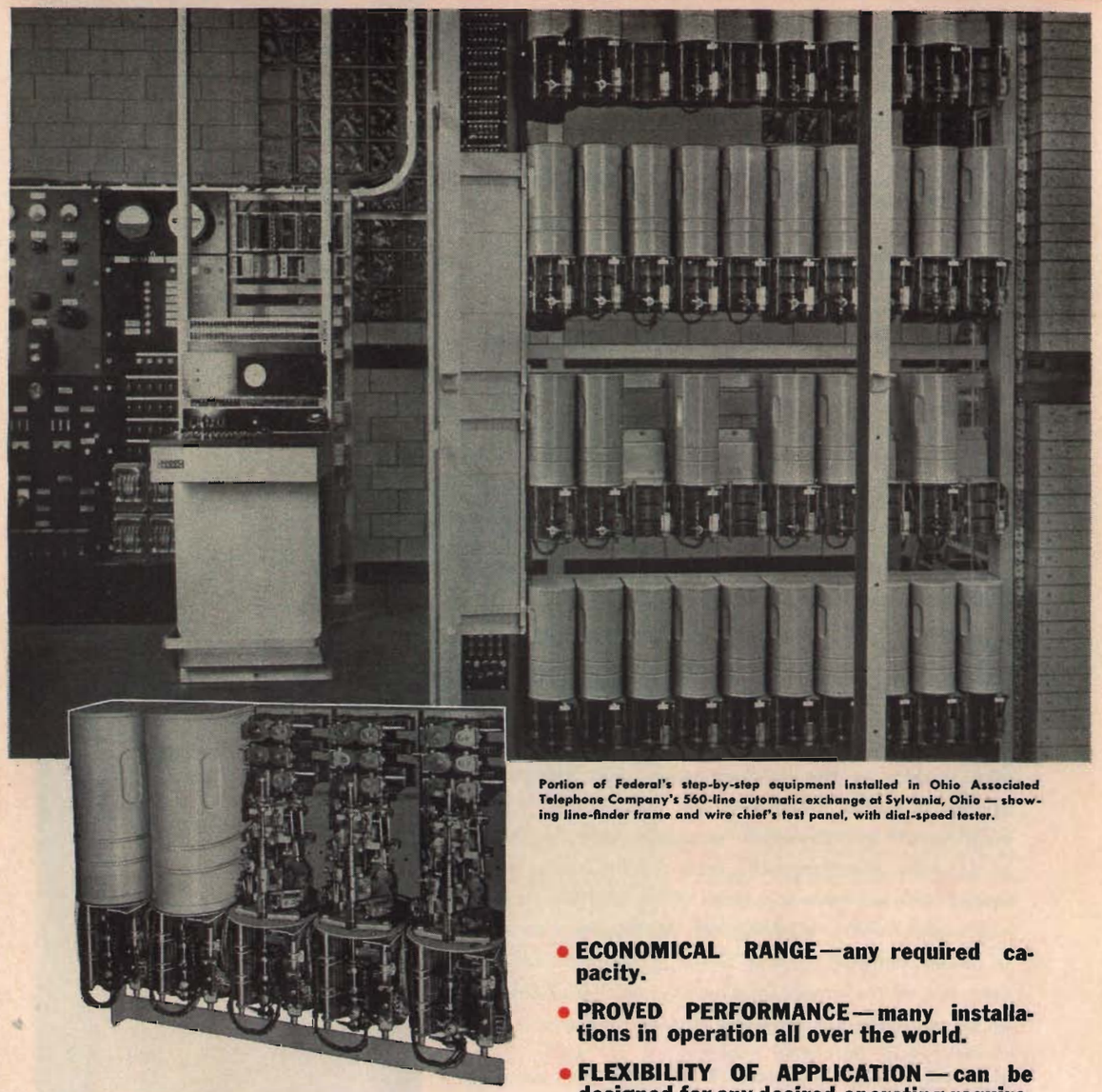
Switch side of complete 100-line CRX, showing switch frame, battery frame, and main distributing frame.



Relay gate side, showing eight hinged relay gates with removable dust covers in place.

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

FEDERAL'S STEP-BY-STEP AUTOMATIC TELEPHONE SYSTEMS



Portion of Federal's step-by-step equipment installed in Ohio Associated Telephone Company's 560-line automatic exchange at Sylvania, Ohio — showing line-finder frame and wire chief's test panel, with dial-speed tester.

Detailed view showing section of line finder shelf; A- 10,000 -A 200 point line finder switches with covers removed.

- **ECONOMICAL RANGE**—any required capacity.
- **PROVED PERFORMANCE**—many installations in operation all over the world.
- **FLEXIBILITY OF APPLICATION**—can be designed for any desired operating requirements.

FEDERAL's step-by-step automatic telephone systems differ from the rotary systems in the following respects:

(a) *Switches combine vertical and rotary motion — vertical motion to select proper level of switch terminals, and rotary motion to select proper terminals.*

(b) *Switches operate in direct response to impulses dialed.*

These step-by-step systems can be supplied for any size or type of automatic exchange—with standard line finders, selectors, connectors and repeaters arranged to meet the desired operating requirements. This equipment automatically performs the following series of functions, by means of electromagnetically driven switches which respond directly to dial impulses from the subscriber's telephone.

When the receiver of the calling telephone is removed from the switch hook, the line circuit immediately operates to select a line finder, which in turn operates an idle first selector. Dialing of the first digit causes the first selector to connect to an idle second selector—and further dialing operates the second selector, which picks an idle connector.

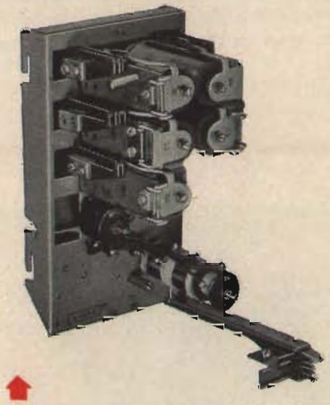
This, in turn, is operated by dial pulses to make connection with the called subscriber's line and either causes the telephone to ring or returns a signal indicating that the line is busy.

The step-by-step components are compactly mounted in standard frames, 11 feet 8 inches high, made of high-grade structural steel designed for floor mounting, with superstructure cross bracing for top support.

Selector frames are of the single-sided distributing terminal strip type for grading purposes—consisting of two bays with bank terminals in the center and selector switches on each side. Each selector bay mounts 8 shelves of 20 selector switches.

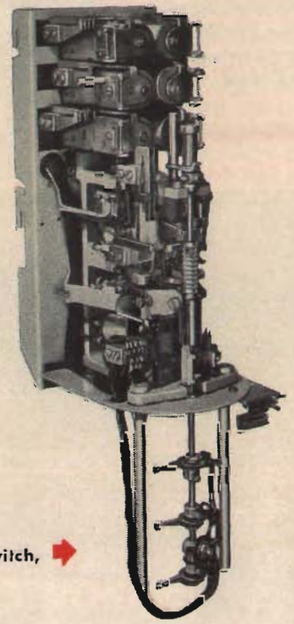
Connector frames, of similar design, normally carry 77 connectors — 70 regular and 7 test. Finder frames consist of three 200 line units, totaling 600 lines per frame.

Every Federal step-by-step system is designed and constructed to handle the maximum number of calls with minimum expense.



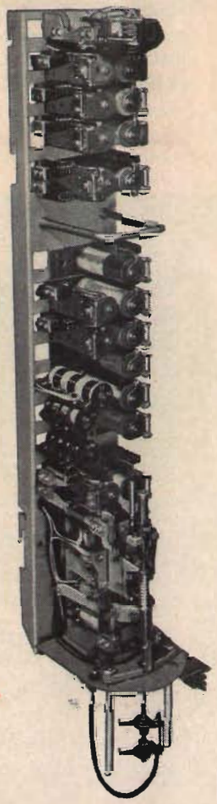
Federal's A - 13,003 repeater

Functions: long line repeater
auto-auto one way



Federal's A-10,000-A 200-point switch, less banks and covers.

Function: line finder.



Federal's A-11,022 connector switch.

Functions: combination local and toll PBX hunting 10-party, 5-frequency, bridged ringing — 1 and 2 ring, ringing digit last — revertive ring — toll operator override — conversation timing — busy flash marking to toll repeater

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

MANUAL BOARDS AND TEST PANELS

In addition to the manufacture of automatic switching systems and components, Federal also offers a wide range of manually-operated switchboards and testing equipment. Manually-operated equipment, such as toll boards and attendant's switchboards for large PABX's can be designed to meet individual requirements for use in connection with the operation of automatic exchange systems. All Federal's manually-operated equipment is of modern design and high-quality construction.

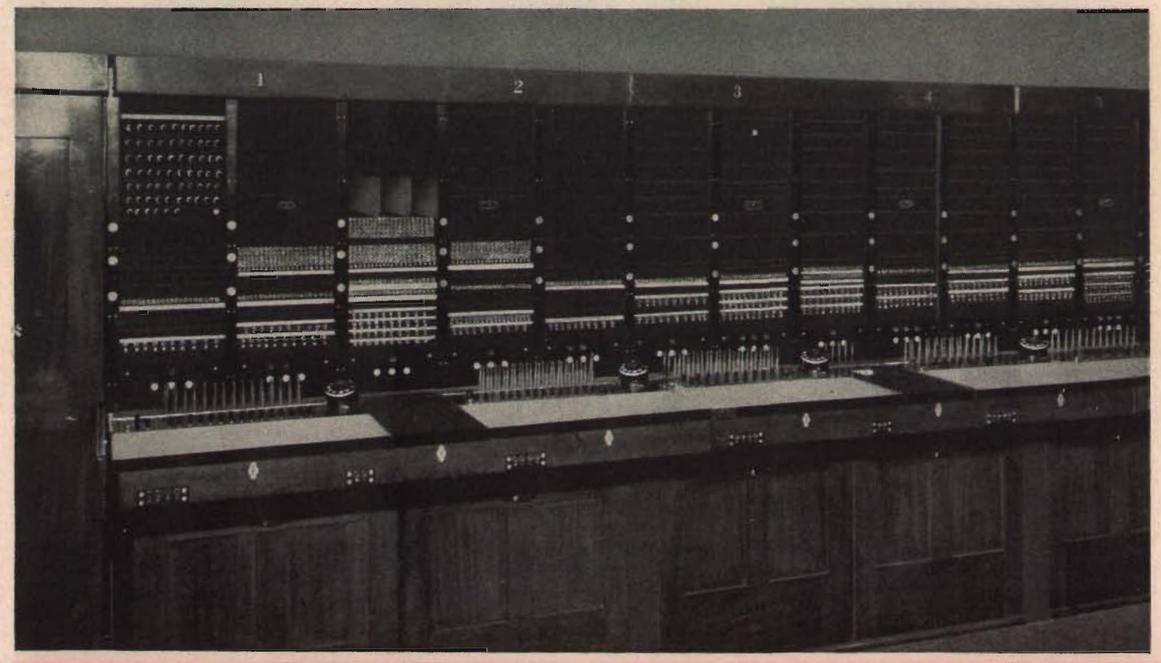
Federal can also supply manually-operated toll test panels, for use in connection with toll boards, and for toll circuit maintenance. These test panels include complete testing facilities and incorporate approved arrangement of equipment to meet any operating requirements. Typical manual boards and test panels, designed for specific applications, are shown in the accompanying illustrations.

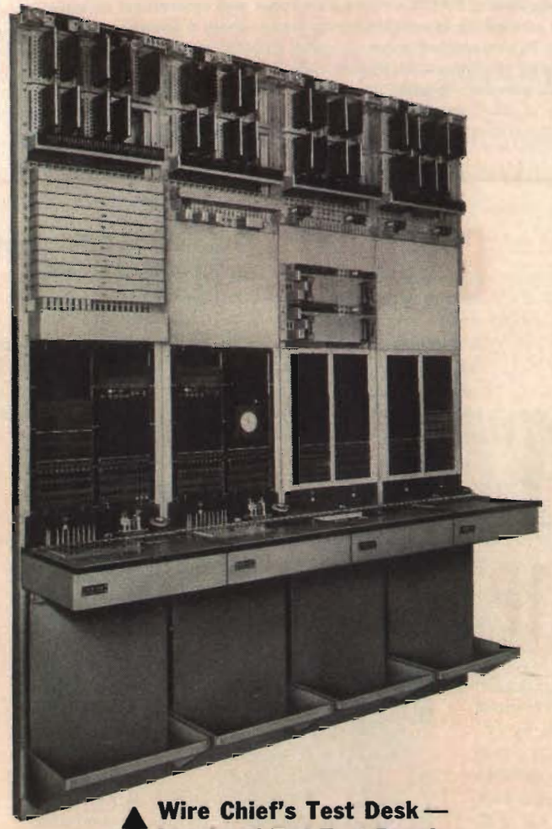
Official PABX Attendant's Board

Provided with 15 cord circuits, for handling incoming trunks from toll and local central offices—and information trunks from the dial equipment. Board can also be provided with a complete jack multiple of the PABX terminal, so that calls may be completed directly in the multiple jack, without dialing.

DSA and Toll Boards

Provide for handling special services and incoming and outgoing toll calls, in large dial system offices. Operators' posts are equipped with key sets for rapidly key-pulsing calls into the dial switching equipment. Arranged for the usual inward, outward, CLR, and through traffic. The DSA position handles special services at night, after the intercepting and information desk has closed down.





⬆ Wire Chief's Test Desk — Local and Toll Test Panels

These panels are equipped for testing local subscribers lines and toll lines, to detect shorts, grounds, and open circuit conditions. A Wheatstone bridge is provided, for accurate measurement of local and toll trouble conditions. Provision is also included for a howler to warn subscribers to replace receivers on switch hooks, and break-down test circuits for making insulation tests.

Interception and Information Desks

Available with a capacity of 54 trunk circuits, to provide for handling information, intercepting, and traffic verification during the daylight traffic period. During the light-load night period, all of this traffic may be tranferred to the DSA board, or, if desired, part of it may be transferred and the rest made busy. Positions are equipped with key sets for use with verification trunks.

⬆ Local Service Observation Board

This board contains suitable apparatus, including a double-pen recorder, for making a large number of random observations of calls going through the dial equipment, to determine the quality of the switching service. Includes provision for making individual observations of specific service complaints from subscribers.

⬆ Repair Service Desk

Used primarily for receiving service complaints from customers, recorded on suitable card records located adjacent to the desk. Also includes suitable trunk facilities for subscriber verification.

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

FEDERAL'S NEW PRIVATE AUTOMATIC BRANCH EXCHANGES

Federal's complete line of PABX's offers a compact and economical intercommunicating telephone service for practically every need—from 6 lines to unlimited size. *Features include:* Intercommunication between all local stations—incoming or outgoing calls from any station—consultation calls from any station while "holding" a trunk call—trunk transfer—partial or complete restriction for any station. Assure complete secrecy of all conversations—continuous and immediate 24-hour service without the attention of an operator. Simple and economical to install.

6E PABX with cover in place (*top*) and cover removed (*right*).

6E PABX

- 2 Central Office Trunks
- 6 Local Stations
- 1 Local Link

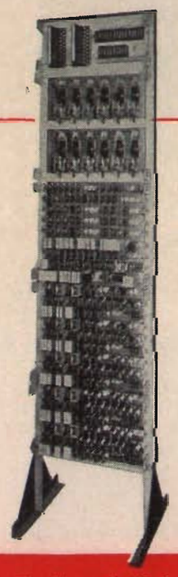
A complete intercommunication system for the small business or large residence. Only 18" high by 18" wide, by 8" deep—weighs only 60 pounds. Arranged for wall mounting, with easily removable dust cover and hinged relay gate for easy access to all components and wiring. Write for Bulletin F-314.

11P PABX

- 3 Central Office Trunks
- 10 Local Stations
- 2 Local Links

A complete intercommunication system for the medium-sized business or institution. Complete unit is only 26" high, by 21" wide, by 9" deep—weighs only 85 pounds. Arranged for convenient wall mounting. All components are readily accessible—mounted on a hinged relay gate with removable dust cover. Write for Bulletin F-340.

11P PABX with cover in place (*top*) and cover removed (*left*).



25C PABX

- 5 Central Office Trunks
- 25 Local Stations
- 3 Local Links

Provides automatic dial intercommunication for office buildings, stores, and industrial plants. All equipment is compactly mounted on a vertical rack, 7' high, by 21" wide, by 20" deep. Removable dust covers on both sides of the rack enclose all wiring and components, yet permit easy access for maintenance.

25C PABX with all dust covers removed, showing accessibility of all components.

Attendant's Set for use with 25C PABX. Provides for manual supervision and allocation of incoming and outgoing calls where desired.

35 Type PABX

Available in Two Capacities:

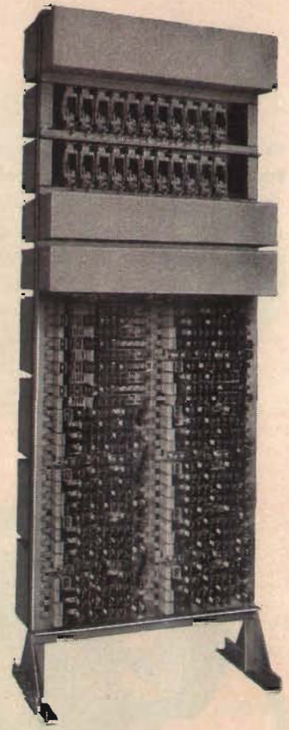
- 10 Central Office Trunks
- 50 Local Stations
- 6 Local Links

- 10 Central Office Trunks
- 99 Local Stations
- 12 Local Links

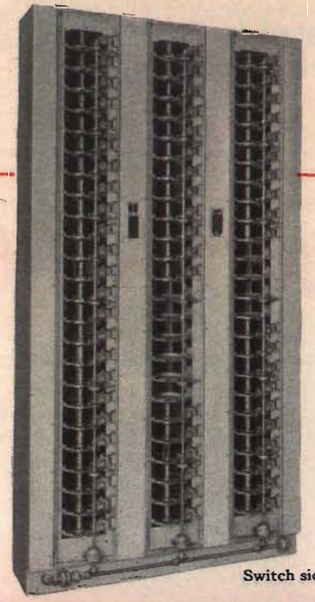
A complete automatic telephone intercommunication system for large office buildings, stores, factories and institutions. Facilities provide for handling heavy traffic in both outside and local calls. Comes in two types—the 50 lines unit which is 8¾' high, by 38¼" wide, by 19¾" deep, and the 99 line unit in two racks, each 7¼' high by 38¼" wide, by 19¾" deep. Racks are fully enclosed by dust-tight paneling with removable covers for easy access to wiring and components.

Attendant's Set for use with 35 Type PABX.

Attendant's Board for use with 35 Type PABX. Performs same functions as Attendant's Set, but special operating features may be incorporated as desired.



35 Type PABX with six front dust covers removed to show ready accessibility of all components.



Switch side of master frame for 7J PABX

7J PABX

- Central Office Trunks as Required
- 100 Local Stations or More
- Local Links as Required

This equipment is similar to the 7J Rotary System, except that it is adapted to provide PABX service for larger industrial or commercial installations. Can be designed for any desired line and link capacity. Equipment is mounted in one or more master frames, each measuring 8' 6½" high, by 56" wide, by 26" deep. Frame construction, switches and relay gates are the same as those used in the 7J Rotary System.

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

TELEPHONES for Common Battery and Local Battery Service

FTR 805

FEDERAL'S NEW FTR 805 common-battery telephone represents the last word in modern styling—lends a distinctive touch to any home or office. Cradle supports are so designed that the handset cannot be accidentally dislodged. Available with or without cold-cathode-tube straight-line selective ringing for up to 4 parties. Bridged ringing with harmonic ringer — fully selective — 5 parties, coded — 10 parties. Divided ringing with harmonic ringer—fully-selective—10 parties.

Designed to operate with most standard American harmonic and straight-line ringers and all standard American dials. All maintenance is a simple screwdriver operation that can easily be done by the service man right on the spot, without returning the instrument to the repair shop.

TELEPHONE

- **Modern Streamlined Design**
- **Non-Slip Construction**
- **Part Replacement Flexibility**

FTR 803

- **Conservative Modern Styling**
- **"Packaged Part" Components**
- **Designed for Private or 2 Party Line Service**

TELEPHONE

THE FTR 803 common battery telephone, attractively yet conservatively styled, has proved its outstanding dependability and ease of maintenance through years of successful operation by operating companies of the I T & T System's vast foreign field. Like the 805, it is designed with simple "packaged part" components which cut maintenance costs and minimize service interruptions. Assures correct on-the-spot replacements and eliminates repair shop handling. Available for either automatic or manual service. Durable, glossy-finish black bakelite case and handset.

FTR 804A

FEDERAL'S NEW FTR 804A magneto, convertible telephone is a *modern* handset type unit that your subscribers will be proud to have in their homes or offices. Unit is convertible from desk to wall mounting simply by reversing the position of the cradle. It includes an improved anti-sidetone circuit for loops of varying resistance. Easier to stock—easier to install—easier to maintain. Simplified, rugged construction, with capsule-type receiver and transmitter units for long life under all kinds of operating conditions.

CONVERTIBLE TELEPHONE

- **ATTRACTIVE** — with the style and convenience of the modern city telephone
- **COMPACT** — smaller and lighter than old-style magneto telephone
- **CONVERTIBLE** — one unit can be used as either a

DESK TELEPHONE or WALL TELEPHONE

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

Federal Telephone and Radio Corporation 100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

DIALS and TEST EQUIPMENT

QUIET-OPERATING, LONG LIFE DIALS

Designed to operate in any standard CB telephone. Standard pulse ratio of 66⅔% break to 33⅓% make. Normal speed, 10 pulses per second.

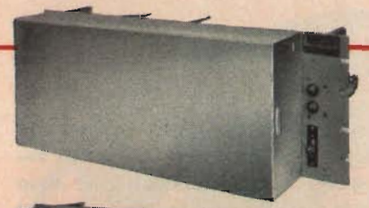
Available in two types, the U801 and U802 — identical in construction except that the 801 dial has an additional shunt (off-normal) spring. Bakelite impulse wheel and kicker assure quiet operation. Main spring easily accessible from front of dial.

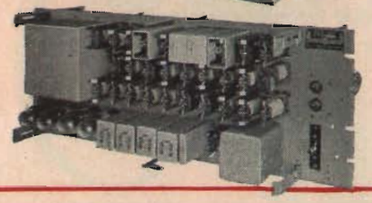
U802

U801

FTR 801 PORTABLE DIAL SPEED TEST SET

Provides a convenient, and accurate means for testing the impulse speed of any automatic telephone dial. Indicates dial speed directly in pulses per second—with an accuracy of ± .005 of a second. Simple in design and construction—easy to operate—all parts readily accessible.





ELECTRONIC DIAL-SPEED TEST SET

Provides for simple and rapid dial speed testing *from the field*. Installed in the central office exchange, it enables a service man to call in from the subscriber's premises—dialing a code number which connects the test set into the circuit. When "O" is dialed, the set returns a tone signal that classifies the dial speed as fast, slow, or normal.

PORTABLE AUTOMATIC TRAFFIC RECORDER

For use in automatic or manual offices. Gives a direct reading, in standard traffic density units (EBHC or CCS), for up to 200 separate circuits, switches, trunks or toll lines, in groups of 50 each.

CURRENT FLOW TEST SETS

Designed to facilitate accurate current flow measurements for the testing of telephone circuits and components. Compact—lightweight—housed in attractive polished wood case. Complete with cord and test probes.

LOW-COST SHORT-HAUL CARRIER TELEPHONE SYSTEMS

FTR 9-H-1 Systems can be stacked to provide 1, 2, or 3 extra telephone channels over an existing line.

- **SMALLEST SIZE.** Complete unit, with built-in power supply, occupies only 7" of vertical rack space.
- **EASE OF INSTALLATION.** No changes in line wiring normally required. Coordinates with other carrier systems.
- **FLEXIBILITY.** May be used as East or West terminal, on a two or four-wire drop basis.

Federal's 9-H-1 Short-Haul carrier telephone system offers a new, low-cost way to increase circuit capacity on open-wire telephone lines of up to 50 miles in length. One complete terminal costs less than the material for 3½ miles of new copper on existing poles. Frequency Bands — 4.2 to 10.2 KC, 13.5 to 19.5 KC, and 27.4 to 33.4 KC. Write for Bulletin F297.

OTHER FEDERAL CARRIER SYSTEMS: 9-A-1 single-channel telephone carrier—9-F-1 single-channel telephone carrier, second story—9-B-1 three-channel telephone carrier—9-C-1 Speech-plus-duplex telegraph carrier—9-E-1 multi-channel telegraph carrier.

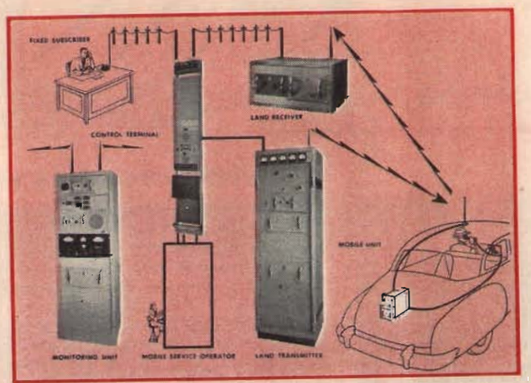
COMPLETE MOBILE TELEPHONE EQUIPMENT

Compact, mobile transmitter-receiver unit—available in either vertical or horizontal arrangement.

A Complete "ONE-PACKAGE" System that assures maximum dependability, performance and economy—for urban or emergency service.

With Federal's mobile equipment, you can give your subscribers the finest radio-telephone service—with minimum maintenance and installation expense. Mobile units are designed for dependable service under all types of vehicular operation. Transmitter and receiver units, with plug-in connectors, can be removed and replaced in a few seconds.

In Federal's complete "one-package" system, all parts are designed and matched to work together, as a perfectly coordinated communications network. For complete information, write for Bulletin F306.



Pictorial representation of Federal's complete FM 2-way urban radio-telephone system.

FEDERAL'S BATTERY CHARGERS

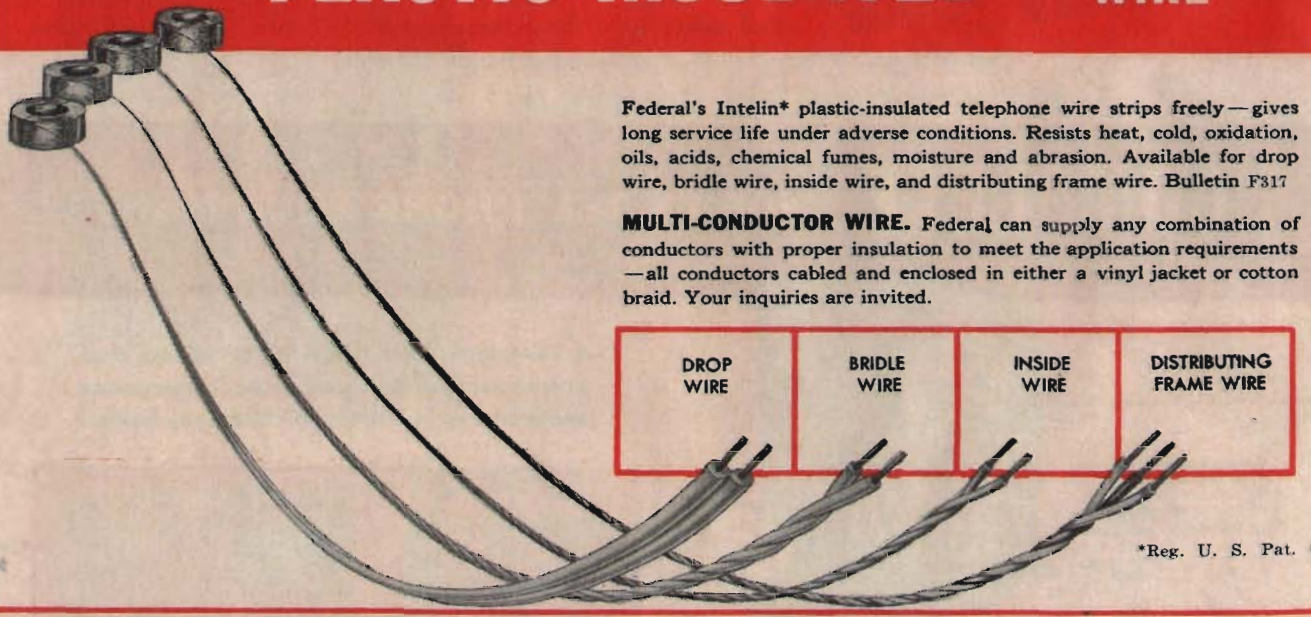
AUTOMATIC TELEPHONE BATTERY CHARGERS

Federal's Selenium-Rectifier telephone battery chargers operate silently, automatically, 24-hours a day—keep batteries fully charged at all times—ready for any emergency. Charging rate—high charge or trickle—is regulated automatically, depending on battery potential. The D-C output circuit is filtered to prevent introduction of "hum" on telephone lines. Available in a wide range of ratings, for practically all requirements.

D-C POWER SUPPLIES

Federal's Selenium Rectifier Power Supplies provide a compact, efficient, and dependable source of D-C power for operating PABX's and other types of telephone equipment. Write for Bulletin F-237.

PLASTIC INSULATED TELEPHONE WIRE



Federal's Intelin* plastic-insulated telephone wire strips freely—gives long service life under adverse conditions. Resists heat, cold, oxidation, oils, acids, chemical fumes, moisture and abrasion. Available for drop wire, bridle wire, inside wire, and distributing frame wire. Bulletin F317

MULTI-CONDUCTOR WIRE. Federal can supply any combination of conductors with proper insulation to meet the application requirements—all conductors cabled and enclosed in either a vinyl jacket or cotton braid. Your inquiries are invited.

*Reg. U. S. Pat. Off.

FEDERAL OFFERS YOU A WORLD OF ACHIEVEMENT IN TELEPHONE ENGINEERING

Federal's products are backed by the experience of IT&T's world wide manufacturing and operating organization—with a history of 60 years of achievement in telephone research and engineering. Whatever your needs, you can always look to Federal for the finest telephone equipment in use anywhere in the world.
For information on any of the items described in this section, write to Federal Dept G395

KEEPING FEDERAL YEARS AHEAD... is IT&T's world-wide research and engineering organization, of which the Federal Telecommunication Laboratories, Nutley, N. J., is a unit.

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