

ANSWERS!

How to provide for NEW SWITCHING SERVICES

**THREE PLANS TO
ADD INTELLIGENCE TO
YOUR STEP-BY-STEP OFFICES**

EAS Network Growth

Universal Numbering

Expand
Exchange Capacity
TONE DIAL™
SERVICE

Standardize
Service Codes

Additional Access Code Capacity

Extend DDD System
Capability

Alternate
Routing

CLASSES OF SERVICES

Toll Network
Multifrequency
Outpulsing

Toll Diversion

ABBREVIATED DIALING

SIX DIGIT TRANSLATION

Three-Digit Translation

CALL FORWARDING

Digit Adding
Digit Deletion

WHERE'S THE FUTURE OF YOUR CENTRAL-OFFICE EQUIPMENT INVESTMENT?

In Stromberg-Carlson's Switching System Control Concept.

A concept already proved in switching installations. A concept that can add common-control flexibility, service-code standardization, EAS growth, pushbutton dialing, and toll-ticketing capabilities to *any* size office.

To be specific, Stromberg-Carlson offers three Switching System Control Plans—each designed to protect your equipment investment, to meet your specific requirements, and to be expanded economically for future growth and service.



TONE-DIAL™ SWITCHING SYSTEM CONTROL. Now, it is possible for any size telephone exchange with step-by-step equipment, to provide TONE-DIAL telephone service. A simple applique does it. TONE-DIAL switching System Control is the safest minimum investment for providing this newest service to your customers. It has maximum reusability—this means that you can start now by offering TONE-DIAL service and upgrade your service, as required, to Plan 2—Electromechanical Switching System Control with maximum application of equipment in use.



ELECTROMECHANICAL SWITCHING SYSTEM CONTROL. By combining electromechanical and electronic techniques in modular form, Stromberg-Carlson Electromechanical Switching System Control provides the practical means for introducing common control flexibility into the *smallest* as well as medium size step-by-step offices.



ELECTRONIC SWITCHING SYSTEM CONTROL. Stromberg-Carlson's Electronic Switching System Control is the only solid-state switching system control in the industry and it is *proven-in-use*. Proven electronic techniques, now in use, provide complete numbering flexibility and adds to the toll-ticketing capabilities for medium and large offices.

Where is the future of your COE investment?

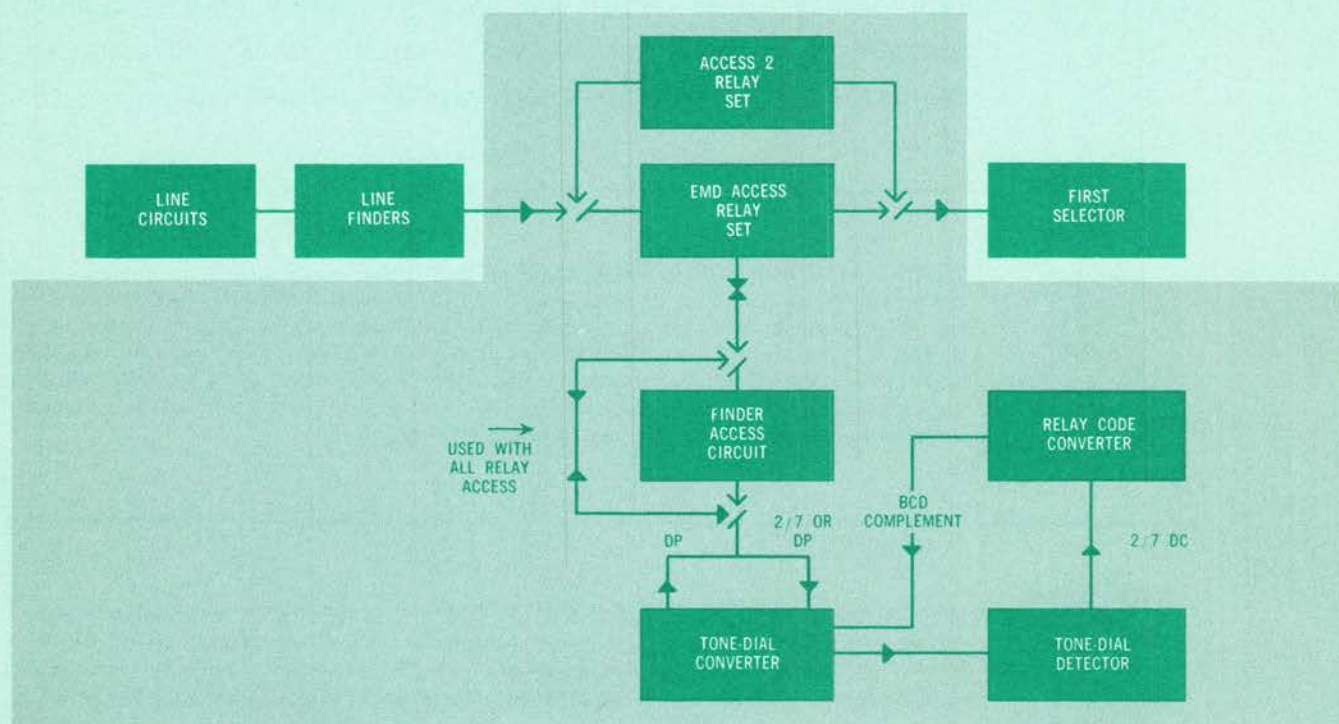
■ **IN STROMBERG-CARLSON'S SWITCHING SYSTEM CONTROL CONCEPT**



ADD TONE-DIAL SWITCHING SYSTEM CONTROL TO ANY SIZE STEP-BY-STEP OFFICE

Offer TONE-DIAL pushbutton dialing to your PABX and central-office subscribers—TONE-DIAL and rotary-dial telephones can be placed on the same line or in the same linefinder group. In addition to local service, systems can be arranged to handle 11X codes, 411 Information, "O" Operator, Single Digit Access EAS Codes, 1 + and 0 + DDD Access Codes, and Circle Digit or ANI.

TD-SSC is the safest minimum investment in taking the first step to features of the future. Most of the equipment can be reused when you upgrade to Plan 2—Electromechanical Switching System Control—at a later date.



TD-SSC SYSTEM OPERATION

The block diagram illustrates a typical TONE-DIAL Switching System Control (TD-SSC) interposed between the linefinder and first selector.

On a dial-pulse call, an off-hook signal causes seizure of the TONE-DIAL converter which, in turn, seizes a first selector. Dial tone is returned to the subscriber. When the TONE-DIAL converter recognizes the dial pulses, dial tone is disconnected from the line. The pulses of the first digit are repeated to the line, and during the interdigital period following the first digit, the TONE-DIAL converter signals the access relay set. The access relay set then cuts through a connection from the line-finder directly to the first selector, and the TONE-DIAL converter releases.

On a tone-dial call, an off-hook condition establishes the signal path as in a dial-pulse call. Each TONE-DIAL Telephone contains

an oscillator capable of generating seven audible tones. Pressing one of the buttons causes two of the seven tones to be generated and sent over the line. The TONE-DIAL detector checks the tones as they are received. If the tone combination is valid, they are converted to dc code and transferred to the relay code converter. The relay code converter changes the dc code to the complement of a binary coded decimal (BCD) and transfers the complementary BCD to the converter. The TONE-DIAL converter can be equipped with up to 14 digit register cards for handling calls requiring the keying of up to 14 digits. After a digit has been registered, the steering-in circuit advances in preparation for receiving and registering the next digit. The TONE-DIAL converter pulse generator generates pulses used in outpulsing the digits of the called number. The number of pulses sent out over the line, for a particular digit, depends on the count stored on the digit register card associated with the digit.

TD-SSC

SYSTEM FEATURES

The TD-SSC will release after seven digits have been outpulsed. For calls requiring fewer or more than seven digits, translation strapping provides for releasing the TD-SSC after the proper number of digits have been outpulsed.

Circuits will release, if a digit is not dialed or keyed within thirty seconds after seizure of the TONE-DIAL Converter or if the time between keying of digits exceeds thirty seconds.

On revertive calls, it is possible for the calling party to finish keying and hang up before the last digit has been outpulsed. Provisions to hold the TD-SSC until the last digit has been outpulsed, are available by translation strapping.

Pulsing out starts immediately after keying of the first digit. This results in a substantial savings in time of switching.

Test and monitoring facilities are easily accessible for testing and maintaining the system.

A digit display test unit for monitoring the output of the TONE-DIAL Converter is available.

TD-SSC

SYSTEM DESIGN

The TONE-DIAL Switching System Control is designed on a modular basis. Features or additional quantities of basic circuits can be added with a minimum of installation effort. A typical TD-SSC consists of four equipment or circuit groups.

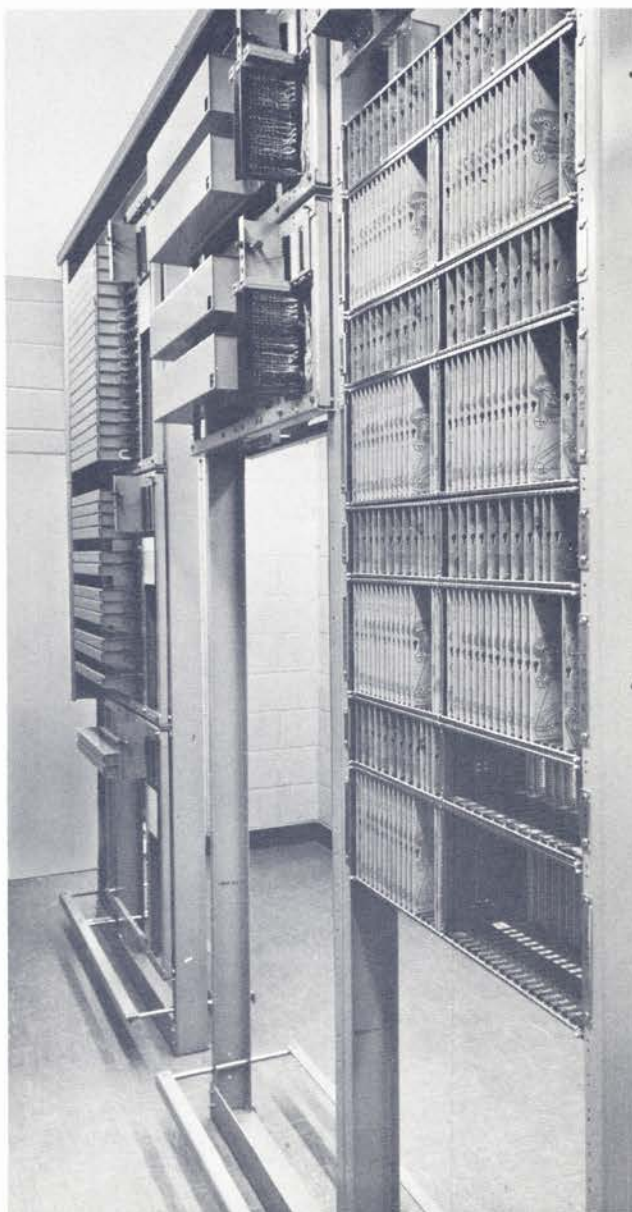
ACCESS CIRCUITS—The access equipment provides for subscriber access to the TD-SSC Converters without any modification to the existing switches. Two methods of access are available: (1) all relay access, which requires an Access 2 Relay Set; or (2) EMD Motor switch access, which requires an EMD Access Relay Set and Finder Access Circuit.

TONE-DIAL CONVERTER—The TONE-DIAL Converter receives Tone-Dial signals or dial pulses. If dial pulses are received, the TONE-DIAL Converter repeats the first digit pulses. During the interdigital period following the first digit, the access relay cuts through the connection from the linefinder directly to the first selector and the TONE-DIAL Converter releases. Tone-Dial signals received by the TONE-DIAL Converter are detected by the TONE-DIAL Detector, modified by the Relay Code Converter, and stored in a TONE-DIAL Converter digit register

card. The registered information is used for sending dial pulses over the line.

TONE-DIAL DETECTOR—The TONE-DIAL Detector checks the tones as they are received to make certain that a valid combination of two-out-of-seven tones is received. The tones are converted to two-out-of-seven dc code and transferred to the relay code converter.

RELAY CODE CONVERTER—The Relay Code Converter modifies the digital information received from the TONE-DIAL Detector. This information is then transferred to the TONE-DIAL Converter where it is stored in a digit register.

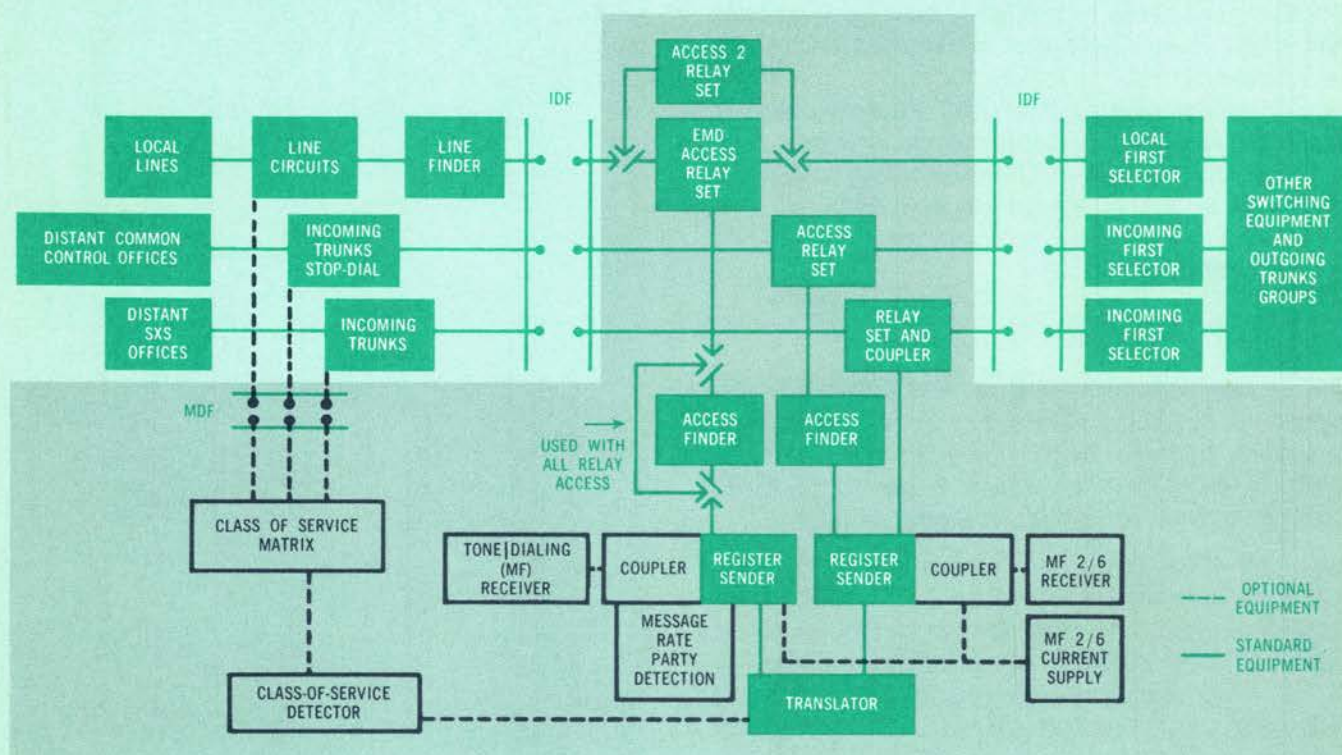




ADD ELECTROMECHANICAL COMMON CONTROL TO STEP-BY-STEP CENTRAL OFFICES

Stromberg-Carlson has combined electromechanical and electronic techniques in a modular design to provide the practical means for the *smallest* as well as medium size step-by-step offices to expand capacity, add numbering flexibility, and broaden service. In addition, the modular design, has made it practical to select the type and the amount of equipment needed to solve your particular communication problems, to permit the addition of extra features as needed, and to provide low-cost expansion as traffic increases. This system provides important economies in initial cost, in space requirement, and in later additions.

EM-SSC is the economical way to provide common control to smaller and medium size step-by-step offices.



EM-SSC SYSTEM OPERATION

The block diagram illustrates typical Electromechanical Switching System Control (EM-SSC) within a step-by-step office. One group of register-senders is interposed between the linefinder and the local first selector and is used in handling calls originated in the local office. Another group of register-senders is interposed between trunk circuits and the incoming first selectors. Both groups of register-senders have access to a common translator.

Digits dialed are routed through access relay sets to the register-sender where they are stored in binary form. When sufficient digits have been registered, the translator is actuated and appropriate routing instructions are sent to the register-sender. On local calls, the instruction may be for the register-

sender to release and permit the call to be completed under control of the incoming pulses. Therefore, the office code would be absorbed and the digits of the called number would be used in establishing the connection. On toll calls, the instructions may consist of routing digits and outpulsing some or all digits of the called number.

The class-of-service matrix and the class-of-service detector provide a means of inhibiting the translator when a routing should be denied to a group of subscribers or to a group of incoming trunks; or changing the translated routing depending on the assigned class-of-service of the originating line or trunk. When rotary and pushbutton dial telephones are provided, or when both dial-pulse (DP) and multifrequency (MF) trunk groups are provided, different routing instructions may be required. On DP calls, the MF routing instructions are inhibited at the translator, and on MF calls, the DP routing instructions are inhibited at the translator.

EM-SSC SYSTEM CAPABILITIES

PROVIDE ACCESS TO MORE EAS POINTS—Subscribers can dial published directory number of distant party over EAS routes—on a universal numbering or any other numbering scheme.

SOLVE EVERCHANGING TRUNKING PROBLEMS—Provides for economical use of trunk groups by routing through tandem points. Strapping field permits quick modification of routing requirements.

COMPLETE NUMBERING FLEXIBILITY—Examination of digits permits addition of routing digits and disposing of each call in accordance to assigned class of service; provides digit deleting (up to 6 digits) or digit adding (up to 5 digits); routes "invalid codes," "vacant selector levels," etc., to connector terminal for interception.

HANDLE ALL TYPES OF CALLING—The addition of a tone-frequency detector, permits tone dialing or standard dial pulse calling—even on the same line. Accepts up to 14-digits impulsed, receives MF 2/6 mode trunk signaling, and will send MF 2/6 DP or MF outpulsing.

DIAL PULSE OR MULTIFREQUENCY OUTPUTSING—Will outpulse up to 15 digits at 10 pps, or the output mode can be changed to MF 2/6, after routing through the step-by-step switch train has been completed.

DDD ACCESS CODES—Provide for digit "1" DDD access, digit "0" (+delay) operator access, and digit "0" (+7 and +10 digit) PPCS DDD access.

THREE AND SIX DIGIT TRANSLATION—Provide three-digit translation for all combinations of central-office and area codes. Provide six-digit translation for up to five numbering plan areas.

PARALLEL OUTPUTSING—Outpulse the first, as well as subsequent digits, to the step-by-step facility, while these digits are being stored in the register sender for possible translation.

UP TO 225 ORIGINATING CLASSES OF SERVICE—Provide translation control by class-of-service marking for routing changes and for toll diversion and restriction applied to S or HS lead on a "per-line" or "per-trunk" basis.

TOLL TICKETING COMPATIBILITY—Compatibility with fully-automatic, two-party identification for ANI and toll-ticketing services.

ALTERNATE ROUTING—In addition to a primary route, provides up to 3 alternate routes.

EM-SSC SYSTEM DESIGN

Equipment and circuit design is such that every standard feature required to meet the needs of each office can be provided with a minimum of equipment units.

Maintenance effort is reduced to a minimum through efficient arrangement of test and routine facilities and through the use of proven reliability design techniques.

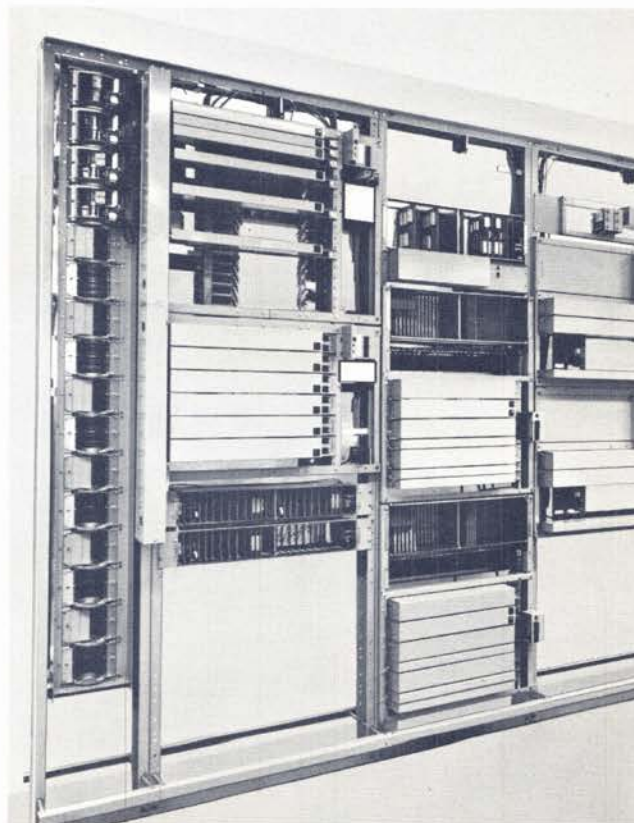
Strapping field permits quick modification of routing instructions.

Operates directly from 48-volt (44 to 54 volts) central-office battery.

Alarms are provided to indicate blown fuses or inability of a register-sender to complete its functions.

Traffic meters provide an all-trunk busy count and tabulate the calls handled by the register-senders and associated circuits.

Applicable to any new or existing step-by-step office, with a minimum of work and expense, through low-cost access relay sets inserted between line-finder and first selector stage of existing switching equipment.

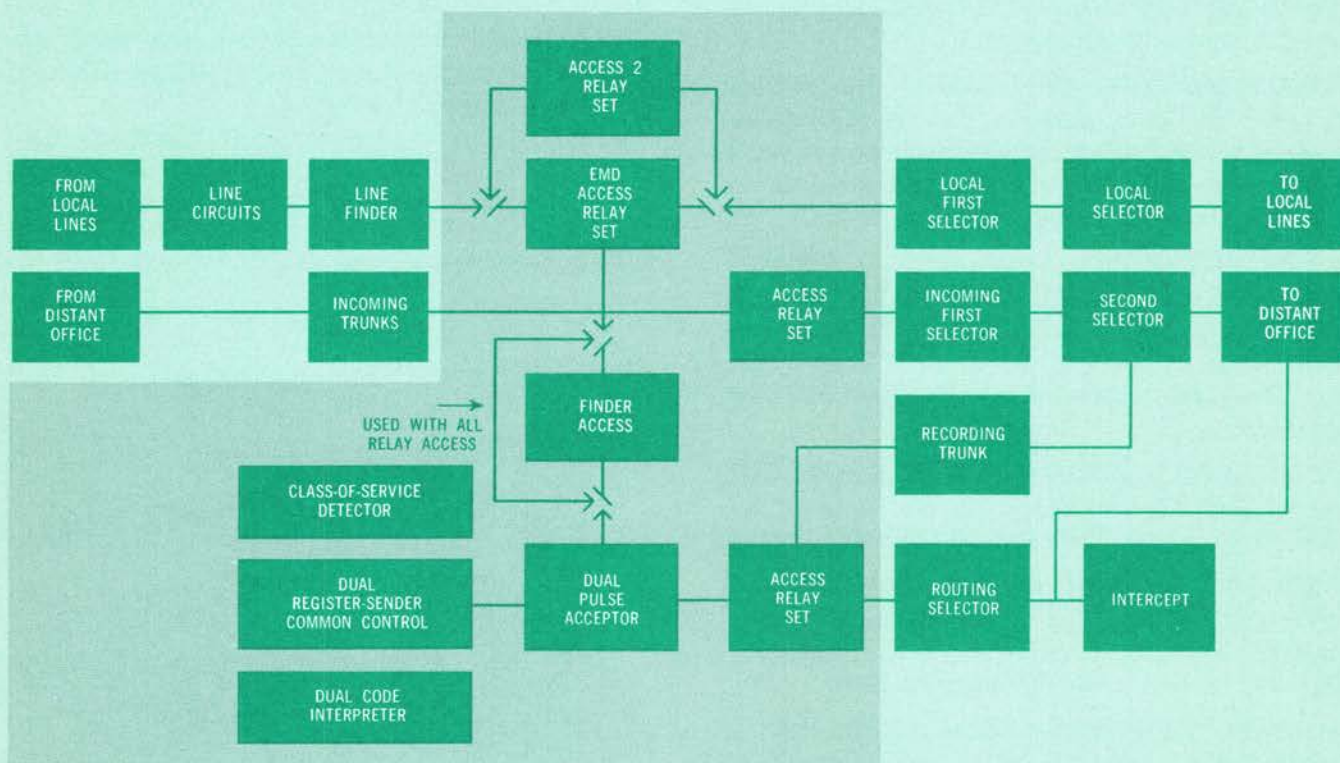




ADD ELECTRONIC COMMON CONTROL AND ADDITIONAL TOLL TICKETING CAPABILITIES TO ANY STEP-BY-STEP OFFICES

Stromberg-Carlson's Electronic Switching System Control uses proven electronic techniques—techniques with built-in reliability—techniques that are already providing tone dialing—and techniques that will, in the future, provide abbreviated calling, call forwarding, and other new custom services to capture the interest of your subscribers.

EL-SSC is the only solid-state switching system control in the industry and it is proven-in-use.



EL-SSC SYSTEM OPERATION

The block diagram illustrates a typical Electronic Switching System Control (EL-SSC) interposed between the linefinder and the first selector.

On a local call, an off-hook signal extends the calling line through the linefinder and access relay set to the local first selector. A signal path is established through the dial-pulse acceptor (DPA) to the register-sender common-control and dial tone is returned to the subscriber. When the register sender recognizes that a local call is in progress, the sender signals the DPA to supply the switch-through condition to the access relay set. The DPA is disconnected, the Switching System Control is erased and released, and the calling line is switched through to the forward switching train.

On a toll call, an off-hook signal establishes the signal path as in a local call. When the subscriber dials the DDD access digit or digits, the local cells perform the necessary translation, establish a route to the recording trunk, and then release. Subsequent dialed digits will be stored and translated, and the routine switching instructions are transmitted, through the toll ticketing routing selector, to the distant office.

Outgoing EAS calls originate in a similar manner as local calls. When the call is recognized as an EAS call, the digits are stored and translated, and the routing paths through the special second selector to the distant office is established.

The incoming trunk groups establish a signaling path to the register-sender. Incoming digits are stored and switching instructions are received from the translator. When the local call is recognized, switching instructions to complete the call through the incoming first selector are transmitted.

EL-SSC

SYSTEM CAPABILITIES

EXTENDS CAPABILITIES OF YOUR TOLL BOARD AND TOLL TICKETING EQUIPMENT—Provides capability of keysender operation—nationwide routing including operating codes—6-digit translation—alternate routing—dial-pulse or multifrequency signaling—stop and start dial control.

PROVIDE ACCESS TO MORE EAS POINTS—Enable subscribers to dial published directory number of distant party over EAS routes—on a universal numbering or any other numbering scheme dictated by local requirements.

SOLVE EVERCHANGING TRUNKING PROBLEMS—This new Switching System Control has the flexibility to solve your trunking and routing problems. Strapping field permits quick modification of routing requirements.

COMPLETE NUMBERING FLEXIBILITY—Examination of dialed digits permits addition of routing digits and disposing of each call in accordance to assigned class of service; provides digit deleting or digit adding (up to 6 digits); route "invalid codes," "vacant selector levels," etc., to connector terminal for interception.

TOLL DIVERSION AND RESTRICTION—Restrict and divert toll traffic on a "per-line" or "per-trunk" basis.

HANDLE ALL TYPES OF CALLING—The addition of a TONE-DIAL Detector, permits multifrequency or standard dial-pulse calling—even on the same line. Accepts up to 14 digits impulsed, receives MF 2/6 mode trunk signaling, sends MF 2/6 mode trunk signaling, and will send MF 2/6 mode to a common-control office.

DIAL PULSE OR MULTIFREQUENCY OUTPUTSING—Will output up to 15 digits at 10 pps, or the output mode can be changed to 20 pps or MF 2/6 after routing through the step-by-step switch train has been completed.

DDD ACCESS CODES—Provide for digit "1" DDD access, digit "0" (+delay) operator access, and digit "0" (+7 and +10 digit) PPCS DDD access.

UP TO 241 ORIGINATING CLASSES OF SERVICE—Provide translation control by class-of-service for routing changes and for toll diversion and restriction applied to S or HS lead on a "per-line" or "per-trunk" basis.

THREE AND SIX DIGIT TRANSLATION—Provide three-digit translation for all combinations of central-office and area codes. Provide six-digit translation for up to six numbering plan areas.

PARALLEL OUTPUTSING—Output the first as well as subsequent digits to the step-by-step facility, while these digits are being stored in the register-sender for possible translation.

CLASS-OF-SERVICE TRANSLATION—Provide translation control by class-of-service marking applied to S or HS lead on a "per-line" or "per-trunk" basis.

EL-SSC

SYSTEM DESIGN

Strapping field permits quick modification of routing requirements.

Modules can be strapped and plugged in to provide class-of-service change.

Operates directly from 48-volt (44 to 54 volts) battery supply.

Every installation consists of sender common control operating in pairs or triples—each control assumes one-half or one-third of traffic.

In the event of trouble in one sender, others assume the traffic load with minimum reduction in grade of service.

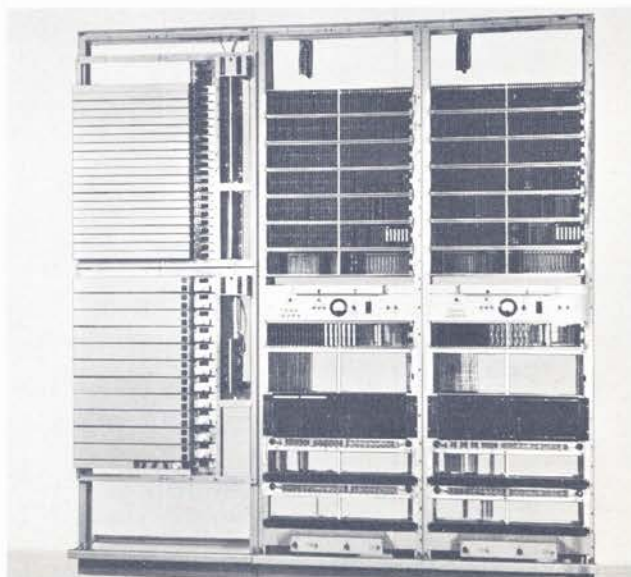
Continuous electronic scanning of major circuits detects, indicates, and alarms faults.

Normal repairs are accomplished by substitution of plug-in circuit cards or modules.

Modular design permits addition of extra features as needed—as well as, low-cost expansion as traffic increases.

Electronic techniques provide improved reliability and reduced maintenance.

Saves more than 31% of space required by competitive systems.



STROMBERG-CARLSON'S SWITCHING SYSTEM CONTROL CONCEPT

TD-SSC



offers TONE-DIAL pushbutton dialing to any step-by-step office. Tone-Dial and rotary-dial telephones can be placed on the same line or in the same linefinder group. TD-SSC is the safest minimum investment in taking this first step to features of the future.

EM-SSC



provides the practical means to introduce common-control facilities into any size step-by-step offices. Maximum economy can be achieved by equipping small size offices with Electromechanical Switching System Control.

EL-SSC



modular design and use of modern solid state techniques provide improved reliability, reduced maintenance, important economies in space requirements, and low-cost expansion. TONE-DIAL and rotary dial compatibility and expanded toll ticketing and toll board routing capabilities are standard with the Electronic Switching System Control.

Stromberg-Carlson has been a synonym for quality since 1894. This reputation is maintained and enhanced today by the Switching System Control concept to accommodating the demand of your present communication facility. Switching System Control offers the practical means for expanding capacity, adding numbering flexibility, and broadening service to cope with today's service requirements and tomorrow's service challenges in telecommunication.

For more detailed technical information and for the complete story on how the Switching System Control Concept can serve you, contact your Stromberg-Carlson representative.

Stromberg-Carlson

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