

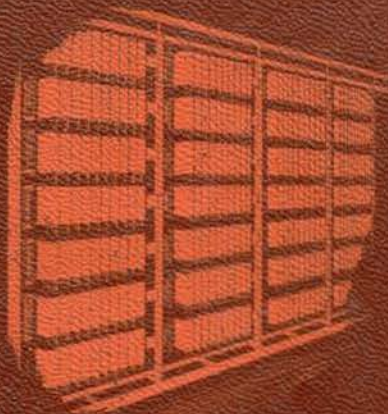
STEP-BY-STEP DIAL TELEPHONE SYSTEM

COMPLETION OF CALLS

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Western Electric Company
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STEP-BY-STEP DIAL TELEPHONE SYSTEM

COMPLETION OF CALLS

THIS BULLETIN IS ISSUED TO PROVIDE STEP-BY-STEP SWITCH TERMINOLOGY, THE SEQUENCE IN WHICH THESE SWITCHES ARE USED IN COMPLETING A CALL BETWEEN TWO SUBSCRIBERS OR BETWEEN A SUBSCRIBER AND AN OPERATOR, AND HOW AN UNINTENTIONALLY SENT DIGIT (PRELIMINARY PULSE) IS COUNTERACTED WITHOUT AFFECTING THE CALL.

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BIBLIOGRAPHY

BELL SYSTEM PUBLICATIONS

COMPLETION OF CALLS

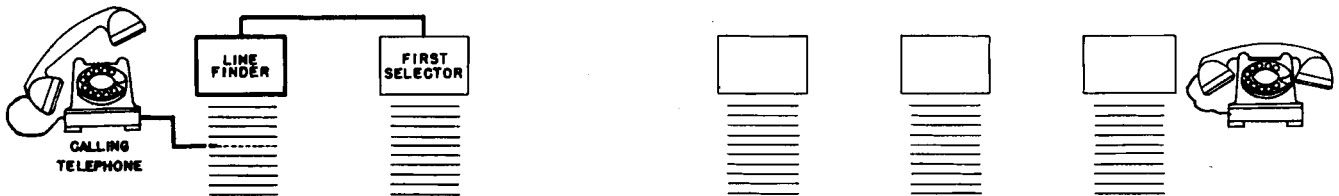
GENERAL

THE STEP-BY-STEP DIAL TELEPHONE SYSTEM IS ONE OF THE THREE TYPES OF DIAL SYSTEMS USED BY THE BELL TELEPHONE COMPANIES. STEP-BY-STEP EQUIPMENT IS PARTICULARLY ADAPTABLE FOR HANDLING TELEPHONE SERVICE IN TOWNS AND MEDIUM-SIZED CITIES, AND FINDS CONSIDERABLE APPLICATION IN UNATTENDED DIAL OFFICES AND PRIVATE BRANCH EXCHANGES.

SKETCHES ONE TO THIRTEEN DEPICT THE VARIOUS STAGES OF CALLS MADE THROUGH THE STEP-BY-STEP DIAL TELEPHONE SYSTEM WHILE THE FOURTEENTH SKETCH SHOWS ALL OF THE SWITCHES IN SEQUENCE WHICH ARE REQUIRED IN COMPLETING THESE CALLS. IN ORDER THAT THE READER MAY CONTINUALLY HAVE BEFORE HIM THE NAMES OF ALL SWITCHES USED, IT IS SUGGESTED THAT THE LAST PAGE, CONTAINING SKETCH FOURTEEN, BE LEFT OPEN IN FOLLOWING THROUGH THE VARIOUS STEPS.

CALL BETWEEN TWO SUBSCRIBERS

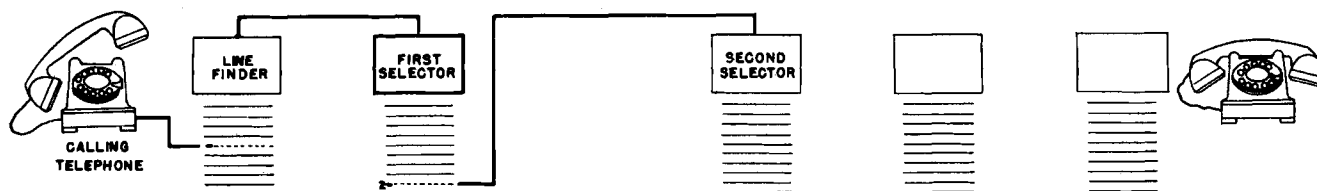
WHEN ONE SUBSCRIBER WISHES TO CALL ANOTHER IN A STEP-BY-STEP DIAL SYSTEM, IT IS NECESSARY THAT HE REMOVE THE HANDSET, WAIT FOR A DIAL TONE WHICH TELLS HIM THE EQUIPMENT IS READY TO RECEIVE THE DIAL PULSES, AND THEN DIAL THE OFFICE AND NUMBER OF THE SUBSCRIBER WANTED. EACH PULSE CREATED BY THE DIAL AS IT RESTORES TO NORMAL, ACTS DIRECTLY ON EITHER A SELECTOR OR CONNECTOR SWITCH, STEPPING IT VERTICALLY IN THE CASE OF A SELECTOR SWITCH OR IN BOTH A VERTICAL AND ROTARY DIRECTION IN THE CASE OF A CONNECTOR SWITCH UNTIL THE CALLED LINE IS LOCATED. IN THE CALL HEREINAFTER DESCRIBED, IT IS ASSUMED THAT THE CALLED NUMBER IS 2-1793.



SK. 1

CALLING SUBSCRIBER REMOVES HANDSET

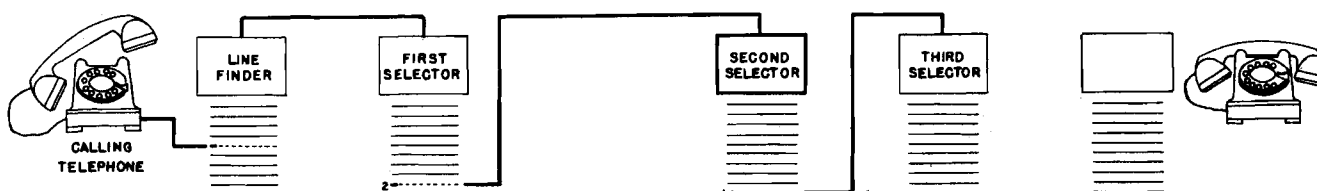
WHEN THE CALLING SUBSCRIBER PICKS UP THE HANDSET, A LINE FINDER SWITCH IMMEDIATELY STEPS VERTICALLY UNTIL IT REACHES THE LEVEL ON WHICH THE TERMINALS OF THE CALLING SUBSCRIBER'S LINE APPEARS AND THEN HUNTS ACROSS THE LEVEL UNTIL THESE TERMINALS ARE FOUND. THE FIRST SELECTOR, WHICH IS PERMANENTLY CONNECTED TO THE LINE FINDER, THEN SENDS BACK A DIAL TONE TO THE SUBSCRIBER AS A SIGNAL FOR HIM TO DIAL.



SK. 2

CALLING SUBSCRIBER DIALS THE OFFICE CODE - 2

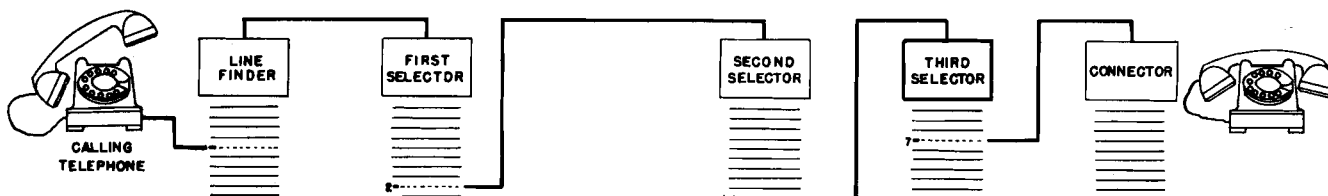
HEARING THE DIAL TONE, THE CALLING SUBSCRIBER PROCEEDS TO DIAL THE SUBSCRIBER WANTED 2-1793 (OFFICE CODE 2, NUMERICAL CODE 1793, OR IN OTHER WORDS CENTRAL OFFICE 2, SUBSCRIBER NUMBER 1793). IN RETURNING TO NORMAL ON THE FIRST DIGIT THE DIAL OPENS AND CLOSSES THE LINE LOOP TWICE (2) CAUSING THE FIRST SELECTOR SWITCH TO TAKE TWO VERTICAL STEPS TO LEVEL TWO. THE SWITCH THEN HUNTS ACROSS THE SECOND LEVEL FOR AN IDLE PATH CALLED A TRUNK TO A SECOND SELECTOR SWITCH.



SK. 3

CALLING SUBSCRIBER DIALS THE FIRST DIGIT OF THE NUMERICAL CODE - 1

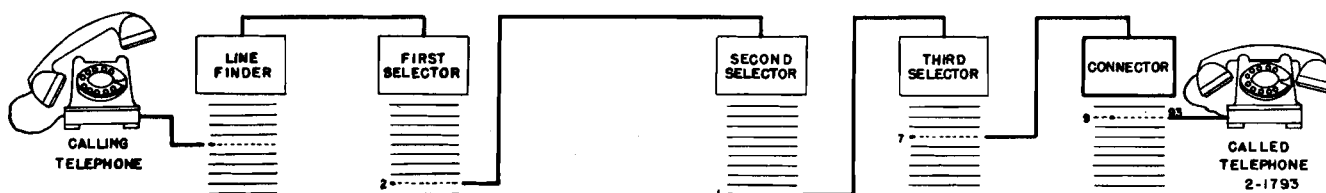
ON THE DIALING OF THE NEXT DIGIT (1), THE SECOND SELECTOR SWITCH TAKES ONE VERTICAL STEP AND HUNTS ACROSS THE FIRST LEVEL FOR AN IDLE TRUNK TO A THIRD SELECTOR SWITCH.



SK. 4

CALLING SUBSCRIBER DIALS THE SECOND DIGIT OF THE NUMERICAL CODE - 7

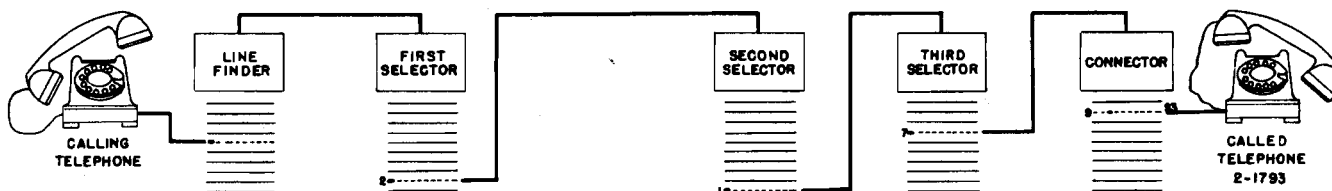
THE DIALED DIGIT SEVEN CAUSES THE THIRD SELECTOR SWITCH TO TAKE SEVEN VERTICAL STEPS AND THEN HUNT ACROSS THE SEVENTH LEVEL FOR AN IDLE TRUNK TO A CONNECTOR SWITCH.



SK. 5

CALLING SUBSCRIBER DIALS THE THIRD AND FOURTH DIGITS OF THE NUMERICAL CODE - 93

THIS CONNECTOR SWITCH HAS BEEN CHOSEN BY THE FIRST THREE DIGITS AS THE ONE HAVING ACCESS TO ONE HUNDRED TERMINALS OF WHICH THE CALLED SUBSCRIBER IS ONE. THE CALLING SUBSCRIBER NEXT DIALS 9. THE CONNECTOR SWITCH STEPS VERTICALLY JUST AS DOES A SELECTOR SWITCH, BUT SINCE IT IS NOW REQUIRED TO SEIZE THE TERMINALS OF A PARTICULAR LINE ON THE NINTH LEVEL RATHER THAN TO CHOOSE AN IDLE TRUNK FROM A GROUP, IT DOES NOT HUNT OVER THIS LEVEL. AS THE SUBSCRIBER DIALS THE LAST DIGIT 3, THE CONNECTOR SWITCH TAKES THREE STEPS IN A ROTARY DIRECTION TO THE TERMINALS OF THE CALLED LINE. A LINE TEST IS MADE AND IF THE LINE IS FOUND IDLE THE CONNECTOR SWITCH PLACES RINGING CURRENT ON THE CALLED SUBSCRIBER LINE. IF THE LINE IS FOUND BUSY THE CONNECTOR PLACES A BUSY TONE ON THE CALLING SUBSCRIBER LINE.



SK. 6

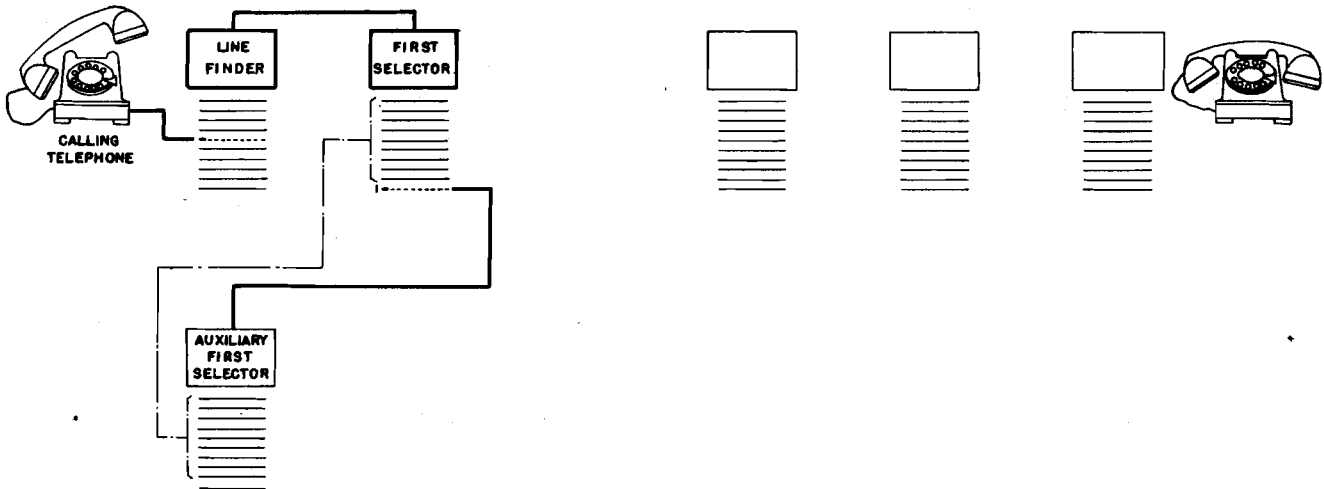
SUBSCRIBER TALKING PATH

AS SOON AS THE CALLED SUBSCRIBER ANSWERS BY REMOVING THE HANDSET, THE TALKING PATH IS COMPLETED BETWEEN THE CALLING AND CALLED LINES. TALKING BATTERY IS FURNISHED TO BOTH SUBSCRIBERS THROUGH THE CONNECTOR SWITCH.

WHEN BOTH SUBSCRIBERS REPLACE THEIR HANDSETS, ALL SWITCHES USED FOR THIS CALL RETURN TO THEIR NORMAL POSITION READY TO BE USED FOR COMPLETING ANOTHER CALL.

COUNTERACTING A PRELIMINARY PULSE

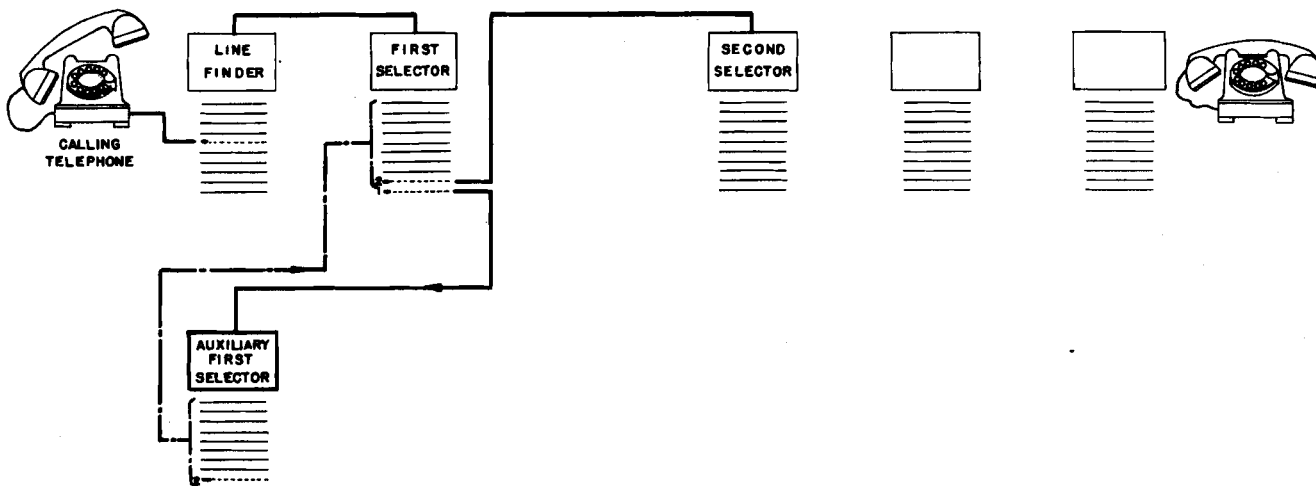
OCCASIONALLY IT HAPPENS THAT A SUBSCRIBER, AFTER REMOVING THE HANDSET, UNINTENTIONALLY SENDS WHAT IS KNOWN AS A PRELIMINARY PULSE BEFORE HE DIALS THE NUMBER OF THE SUBSCRIBER WHOM HE WISHES TO CALL. THIS PRELIMINARY PULSE IS GENERALLY CAUSED BY AN ACCIDENTAL DEPRESSION OF THE PLUNGER OR SWITCH HOOK BEFORE THE NUMBER IS DIALED. THIS MOMENTARILY OPENS AND CLOSES THE LINE LOOP ONCE CAUSING THE FIRST SELECTOR SWITCH IN THE CENTRAL OFFICE TO TAKE ONE VERTICAL STEP AND PREPARE THE CIRCUITS FOR THE NEXT DIGIT. IF NOTHING WAS DONE TO RETRIEVE THIS ERROR, UPON COMPLETION OF THE DIALING, THE SUBSCRIBER WOULD OBTAIN A NUMBER BEGINNING WITH ONE (1) AND COMPLETED BY ALL THE DIGITS EXCEPT THE LAST NUMBER OF THE CALLED SUBSCRIBER. IF A SUBSCRIBER SHOULD DECIDE TO CALL THE NUMBER 2-1793 AND IN PREPARING TO DIAL, SENDS A PRELIMINARY PULSE, HE WOULD IN EFFECT DIAL THE NUMBER 12-1793. THE LAST DIGIT (3) SHOULD PRODUCE NO RESULTS SINCE THE CIRCUITS ARE SO ARRANGED THAT EXTRA DIGITS ARE INEFFECTIVE. TO PREVENT ERRORS OF THIS SORT, THE TRUNKS FROM ALL LEVELS OF THE FIRST SELECTOR SWITCHES ARE TERMINATED IN AUXILIARY FIRST SELECTOR SWITCHES. THE TRUNKS FROM ALL LEVELS OF THE AUXILIARY FIRST SELECTOR SWITCHES, EXCEPT THE FIRST, ARE MULTIPLIED TO THE TRUNKS OF THE CORRESPONDING LEVELS OF THE FIRST SELECTOR SWITCH. ANY DIGIT, EXCEPT THE DIGIT ONE (1), DIALED ON THE AUXILIARY FIRST SELECTOR SWITCH WILL ROUTE THE CALL TO A SECOND SELECTOR SWITCH JUST AS THOUGH THIS DIGIT HAD BEEN DIALED ON THE REGULAR FIRST SELECTOR SWITCH. THIS CAUSES THE PRELIMINARY PULSE TO BE COUNTERACTED.



SK. 7

CALLING SUBSCRIBER UNINTENTIONALLY SENDS PRELIMINARY PULSE

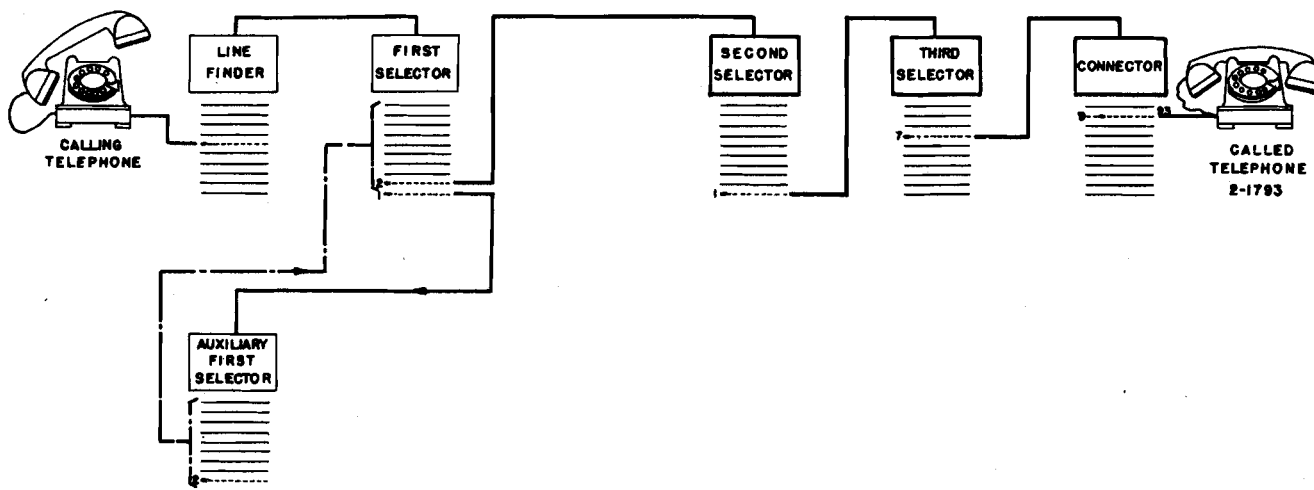
IF THE CALLING SUBSCRIBER DIALS 2-1793 PRECEDED BY A PRELIMINARY PULSE, OR IN OTHER WORDS 12-1793, THE FIRST SELECTOR SWITCH WILL RESPOND TO DIGIT ONE (1) AND STEP VERTICALLY ONE STEP AND HUNT ACROSS THE LEVEL TO FIND AN IDLE TRUNK TO AN AUXILIARY FIRST SELECTOR SWITCH.



SK. 8

CALLING SUBSCRIBER DIALS THE OFFICE CODE - 2

WHEN DIGIT 2 IS DIALED THE AUXILIARY FIRST SELECTOR SWITCH MAKES 2 VERTICAL STEPS AND HUNTS ACROSS THE LEVEL TO FIND A TRUNK TO A SECOND SELECTOR SWITCH. IT WILL BE NOTED THAT THE SECOND LEVEL OF THE AUXILIARY FIRST SELECTOR SWITCH IS THE SAME AS THE SECOND LEVEL OF THE FIRST SELECTOR SWITCH BECAUSE THE TRUNKS FROM THESE LEVELS ARE MULTIPLIED, HENCE, THE CALL IS NOW AT THE SAME POINT IT WOULD HAVE BEEN IF THE PRELIMINARY PULSE HAD NOT ACCIDENTALLY BEEN SENT.



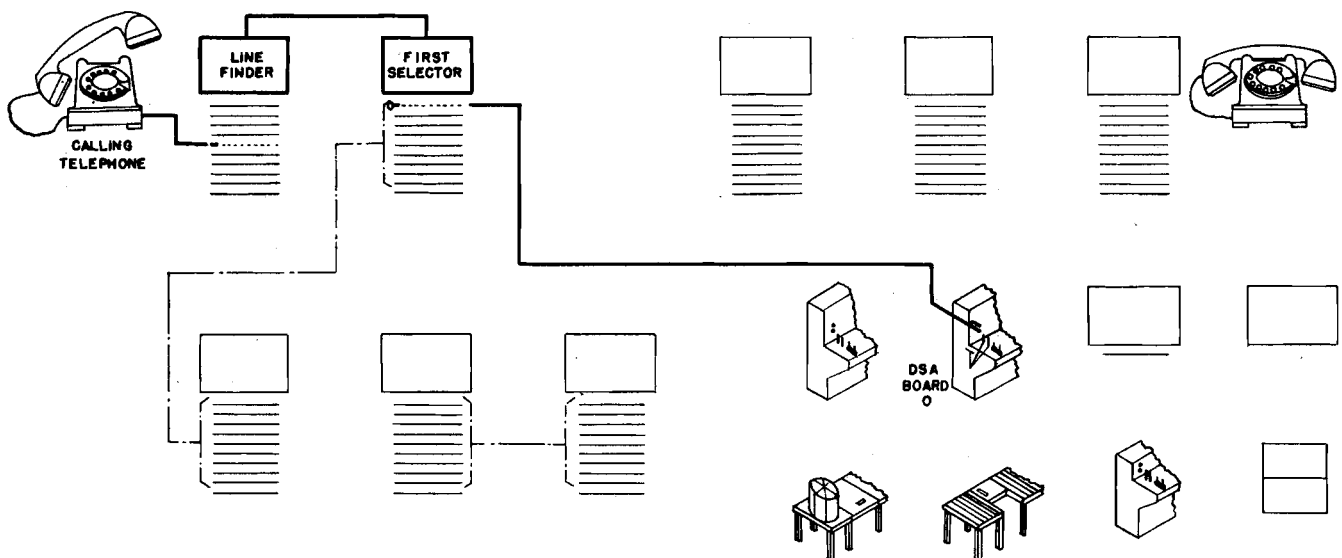
SK. 9

CALLING SUBSCRIBER DIALS THE NUMERICAL CODE (1793)

THESE FOUR DIGITS WHEN DIALED WILL STEP A SECOND SELECTOR SWITCH TO THE FIRST LEVEL, A THIRD SELECTOR SWITCH TO THE SEVENTH LEVEL AND A CONNECTOR SWITCH TO THE NINTH LEVEL AND THIRD TERMINAL TO THE SAME LINE AS THAT WHICH THE CORRECTLY DIALED NUMBER WOULD HAVE ROUTED IT; THE PRELIMINARY PULSE HAS IN THIS WAY BEEN COUNTERACTED.

CALL TO DIAL SYSTEM "A" SWITCHBOARD

DIAL SYSTEM "A" (DSA) SWITCHBOARDS ARE REQUIRED IN STEP-BY-STEP CENTRAL OFFICES FOR ALL CALLS WHICH REQUIRE THE SERVICES OF AN OPERATOR. SOME OF THE REASONS FOR HAVING AN OPERATOR ALWAYS WITHIN REACH OF A SUBSCRIBER ARE TO HANDLE EMERGENCY CALLS TO DOCTORS, HOSPITALS, POLICE OR FIRE STATIONS, AND CALLS ON WHICH ASSISTANCE IS NECESSARY DUE TO A SUBSCRIBER'S INABILITY TO DIAL.



SK. 10

CALLING SUBSCRIBER DIALS FOR OPERATOR - 0

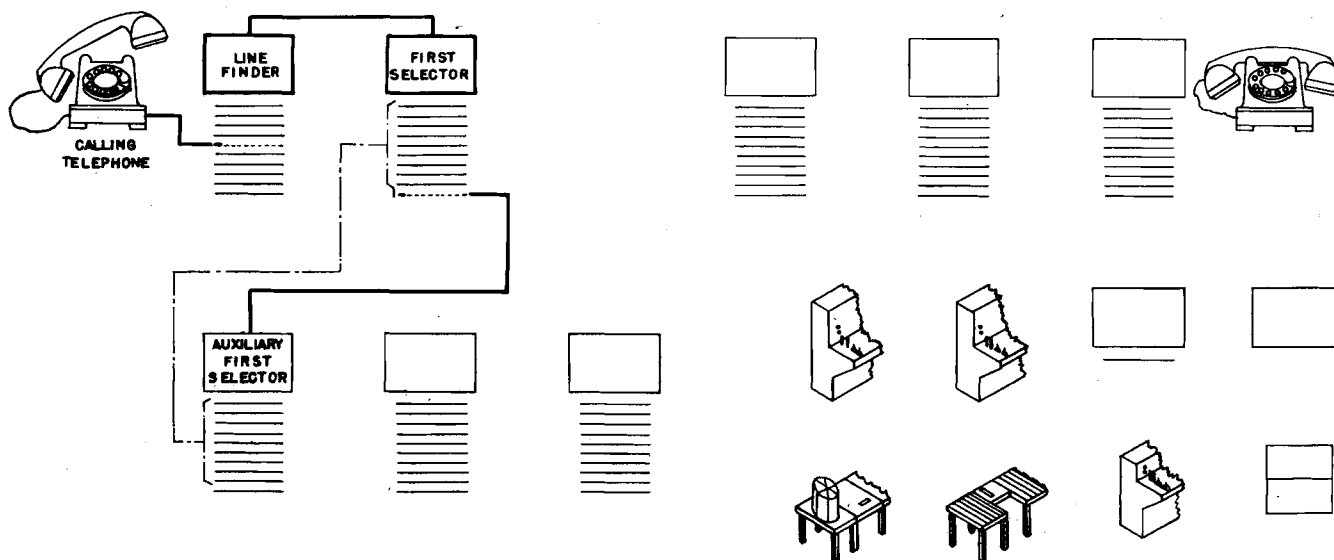
AS IN THE REGULAR CALL, THE REMOVAL OF THE HANDSET CAUSES A LINE FINDER SWITCH TO STEP FIRST VERTICALLY AND THEN HORIZONTALLY TO FIND THE CALLING SUBSCRIBER. WHEN THE DIAL TONE IS RECEIVED FROM THE ASSOCIATE FIRST SELECTOR SWITCH THE SUBSCRIBER DIALS THE DIGIT ZERO (0). THE FIRST SELECTOR SWITCH MAKES 10 VERTICAL STEPS AND THEN HUNTS ACROSS THE TENTH LEVEL FOR AN IDLE TRUNK TO THE DIAL SYSTEM "A" SWITCHBOARD. THE OPERATOR WILL THEN HANDLE THE CALL TO ITS COMPLETION.

CALLS TO TOLL SWITCHBOARDS, DESKS, AND SPECIAL EQUIPMENT USED IN STEP-BY-STEP OFFICES

GENERAL

THE PURPOSE OF THE SERVICE CODE SWITCHES IS TO ENABLE THE CALLING SUBSCRIBER TO GAIN ACCESS TO THE TOLL BOARD, INFORMATION DESK, REPAIR SERVICE DESK, REVERTING CALL EQUIPMENT, ETC., AND TO GIVE A TELEPHONE REPAIR MAN ACCESS TO THE TEST DESK AND RINGER AND DIAL TESTING EQUIPMENT. CALLS TO THESE POINTS ARE MADE BY FIRST DIALING THE NUMBER 11 FOLLOWED BY A THIRD DIGIT AS FOLLOWS:

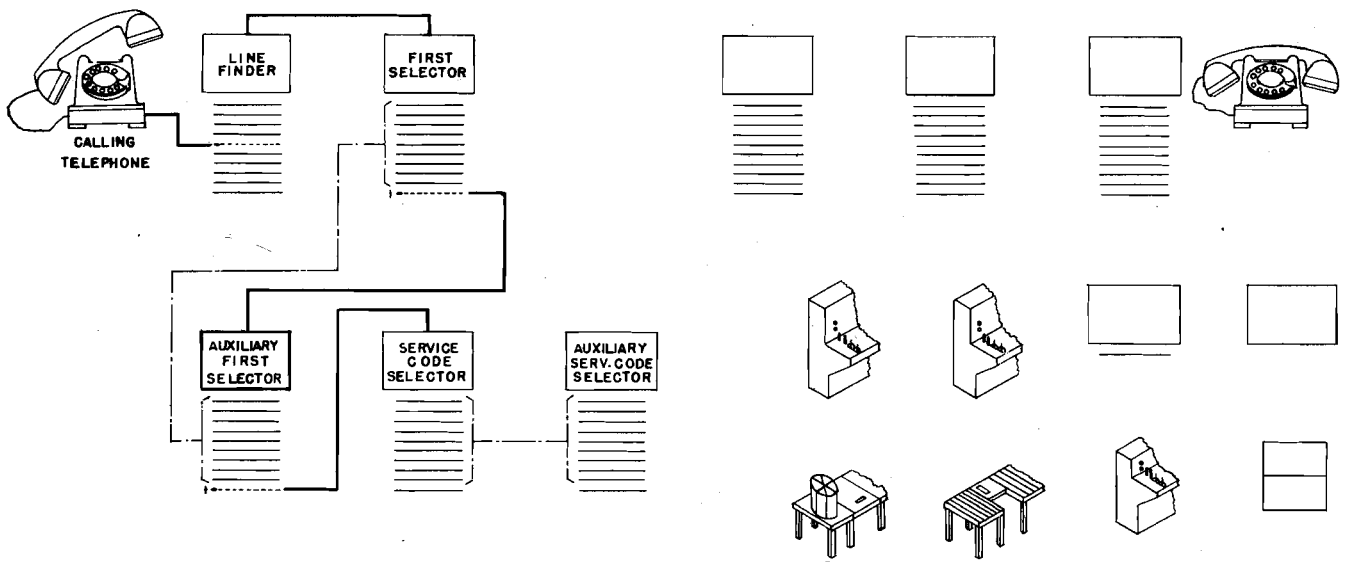
- 113 PROVIDES CONNECTION TO THE OPERATORS AT THE INFORMATION DESK, WHO WILL FURNISH INFORMATION ON CHANGED SUBSCRIBER NUMBERS OR NEW NUMBERS NOT LISTED IN THE DIRECTORY.
- 114 PROVIDES CONNECTION TO THE REPAIR CLERK AT THE REPAIR SERVICE DESK TO WHOM THE SUBSCRIBER MAY REPORT A TELEPHONE OUT OF ORDER, OR MAKE ANY SERVICE COMPLAINTS.
- 117 PROVIDES A CONNECTION WHEREBY A REPAIR MAN CAN CONNECT TO A TEST MAN AT A LOCAL TEST DESK WHEN REPAIRING TROUBLE ON A LINE.
- 118 PROVIDES A CONNECTION WHEREBY A REPAIR MAN AT A SUBSCRIBER'S STATION CAN OBTAIN ACCESS TO DIAL AND RINGER TESTING EQUIPMENT.
- 119 PROVIDES MEANS FOR COMPLETING CALLS TO A SUBSCRIBER ON THE SAME PARTY LINE.
- 110 PROVIDES A CONNECTION TO THE TOLL OPERATOR AT THE TOLL BOARD, WHO WILL COMPLETE ANY CALL THAT MUST BE HANDLED ON A TOLL CHARGE BASIS.



SK. 11

CALLING SUBSCRIBER DIALS FIRST DIGIT - 1

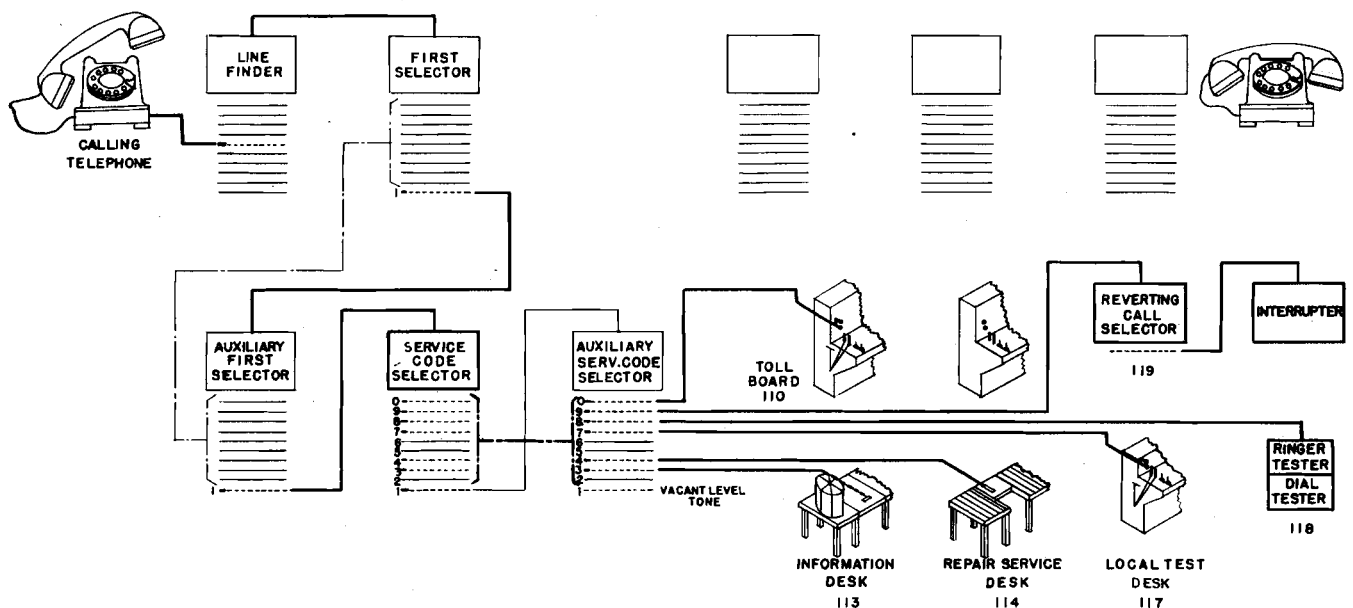
AS IN A REGULAR CALL THE REMOVAL OF THE HANDSET CAUSES A LINE FINDER SWITCH TO STEP FIRST VERTICALLY AND THEN HORIZONTALLY TO FIND THE CALLING SUBSCRIBER LINE. WHEN THE DIAL TONE IS RECEIVED FROM THE ASSOCIATED FIRST SELECTOR SWITCH THE SUBSCRIBER DIALS THE DIGIT (1). THE FIRST SELECTOR SWITCH MAKES ONE VERTICAL STEP AND THEN HUNTS ACROSS THE FIRST LEVEL FOR AN IDLE TRUNK TO AN AUXILIARY FIRST SELECTOR SWITCH.



SK. 12

CALLING SUBSCRIBER DIALS SECOND DIGIT - 1

ON THE DIALING OF THE SECOND DIGIT (1), THE AUXILIARY FIRST SELECTOR SWITCH MAKES ONE VERTICAL STEP AND THEN HUNTS ACROSS THE FIRST LEVEL FOR AN IDLE TRUNK TO A SERVICE CODE SELECTOR SWITCH.



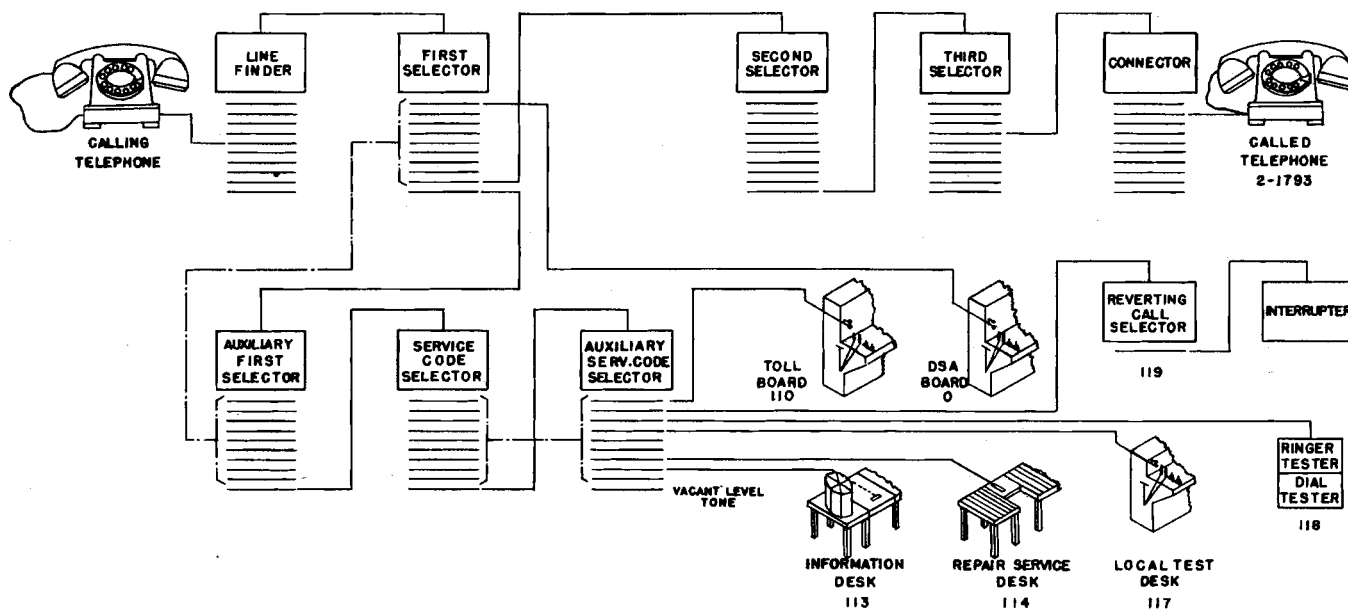
SK. 13

CALLING SUBSCRIBER DIALS THIRD DIGIT - 3, 4, 7, 8, 9, or 0

THE DIALING OF THE THIRD DIGIT STEPS THE SERVICE CODE SELECTOR SWITCH TO THE LEVEL HAVING TRUNKS TO THE DESKS, SWITCHBOARD OR TESTING EQUIPMENT TO BE CONNECTED TO -

- 3 - INFORMATION DESK
- 4 - REPAIR SERVICE DESK
- 7 - TEST DESK
- 8 - RINGER AND DIAL TESTING EQUIPMENT
- 9 - REVERTING CALL SELECTOR (PARTY LINE RINGING)
- 0 - TOLL BOARD

IF A PRELIMINARY PULSE IS ACCIDENTALLY SENT ON A CALL TO AN OPERATOR OR THE SPECIAL EQUIPMENT, THE NUMBER RECORDED WOULD BE 111 PLUS 3, 4, 7, 8, 9, OR 0. THIS WOULD ROUTE THE CALL THROUGH THE AUXILIARY SERVICE CODE SELECTOR SWITCH TO THE PROPER DESTINATION.



SK. 14

SWITCHES, SWITCHBOARDS, AND DESKS USED IN A
STEP-BY-STEP DIAL SYSTEM