

Lesson No. 1

FUNDAMENTALS OF TELEPHONY

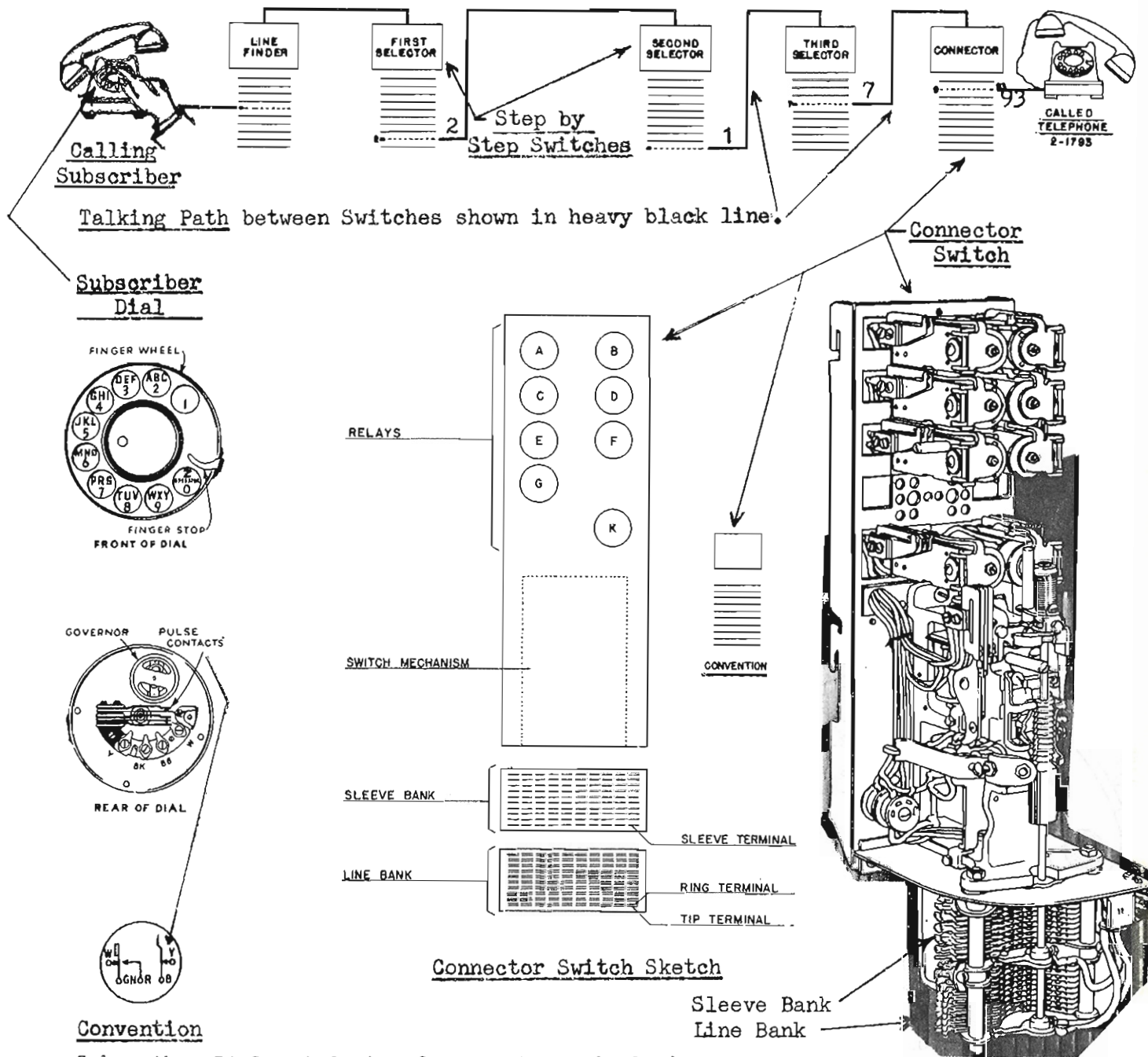
Section 9

The Step by Step Dial Switching System

<u>CONTENTS</u>	<u>Page</u>
General Switching Plan	113
Comparison of Step by Step Dial and the Manual Systems	114
Switches Used in Handling a Step by Step Call	117
Making a Call Through a Step by Step Office	118
197-Type Step by Step Switch	119
Line Finder Switch, Units and Frame	120-
Selector Switch, Shelf and Frame	124-
Connector Switch, Shelf and Frame	127-
Relay Racks	130

## THE STEP BY STEP DIAL SWITCHING SYSTEM

In the Step by Step System, a telephone call progresses, a "step-at-a-time," through a series of Switches in the Central Office. Each step is taken under direct control of the Subscriber Dial, as the Calling Subscriber dials the Called Telephone Number.

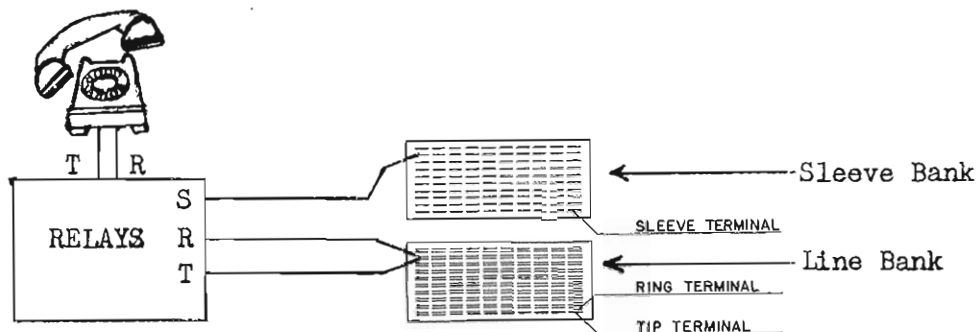


### Convention

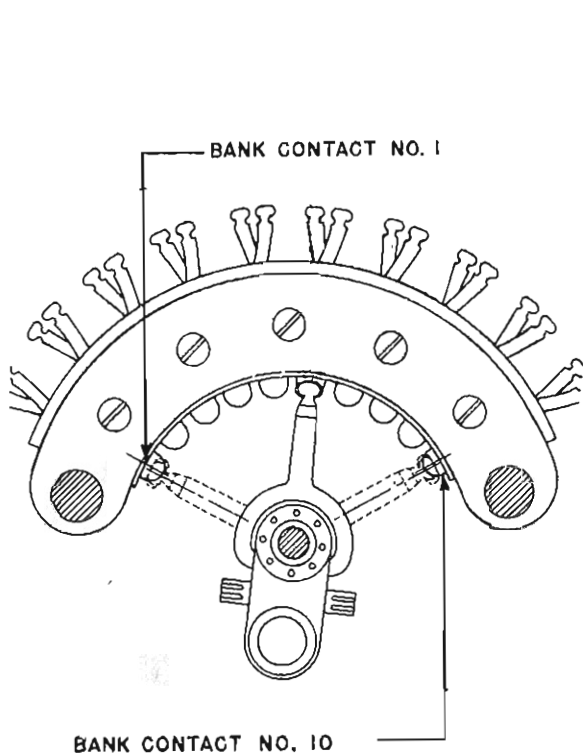
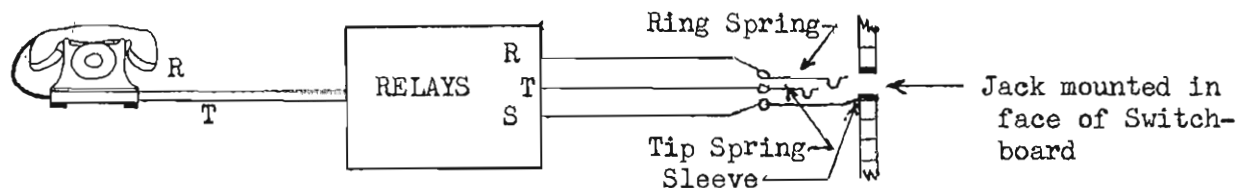
Subscriber Dial - A device for opening and closing the circuit between the Subscriber Station and the Dial Central Office Equipment at a normal rate of 10 times per second.

A series of Step by Step Switches replaces the Manual Switchboard in that a Talking Path is built up on them.

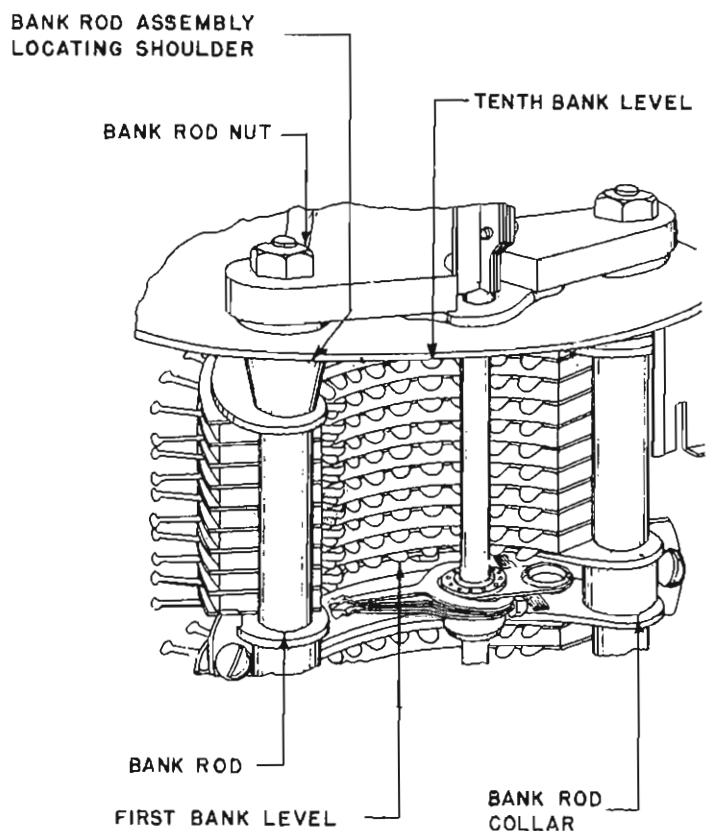
Step by Step Subscriber Lines are wired to Switch Bank Terminals.



Manual Subscriber Lines are wired to Jacks mounted in the Face of a Switchboard.



Switch Bank Terminals are mounted in Horizontal Rows or Levels; 10 sets per Level.

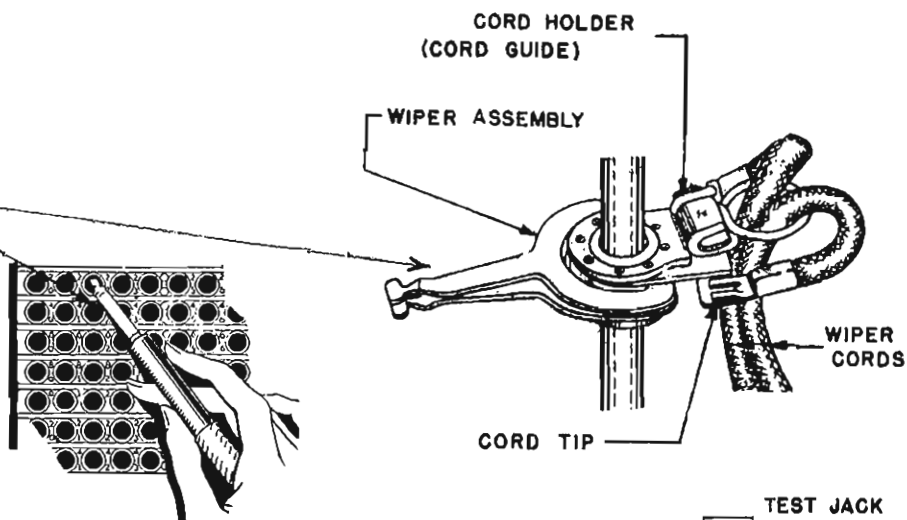


10 Horizontal Rows or Levels make up a Switch Bank.

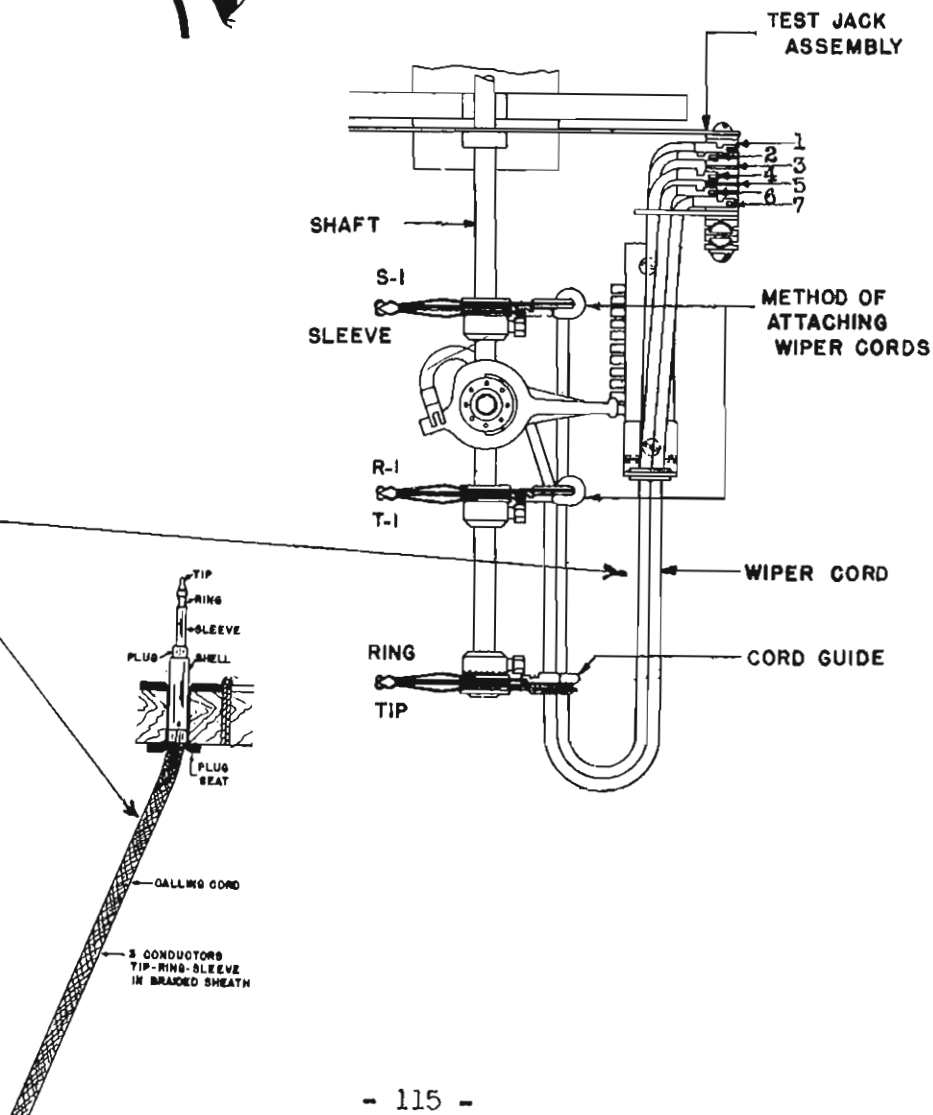
Line Bank Numbering, necessary in the case of Selectors and Connectors, which are dial-controlled, to conform to the numbering plan followed on the Subscriber Dial.

0	01	02	03	04	05	06	07	08	09	00
9	91									90
8	81									80
7	71									70
6	61									60
5	51									50
4	41									40
3	31									30
2	21									20
1	11	12	13	14	15	16	17	18	19	10

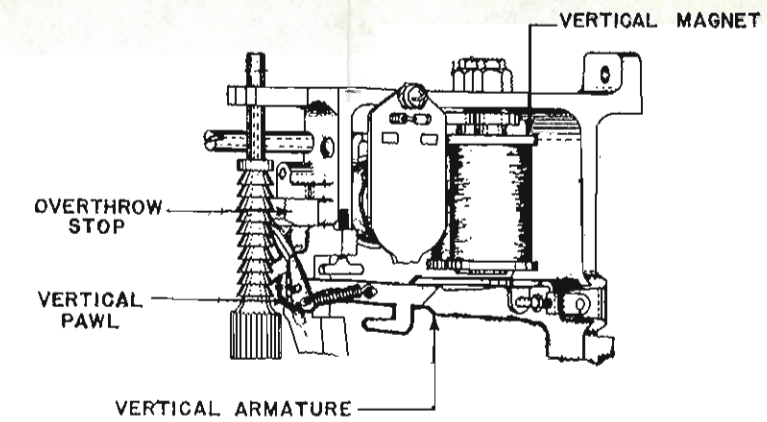
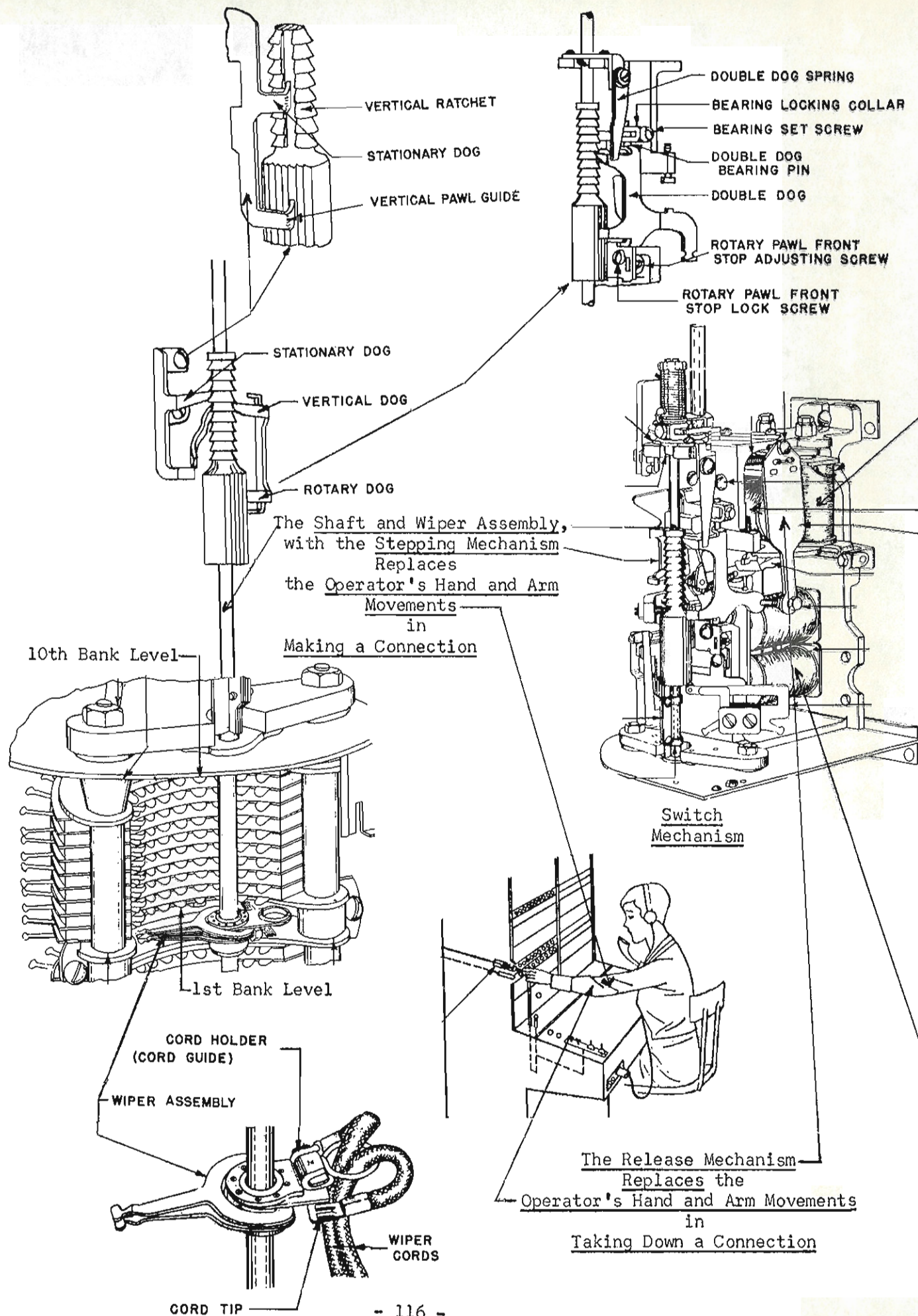
The Step by Step Wiper replaces the Manual Plug in making a connection.



The Step by Step Wiper Cord replaces the Manual Cord.

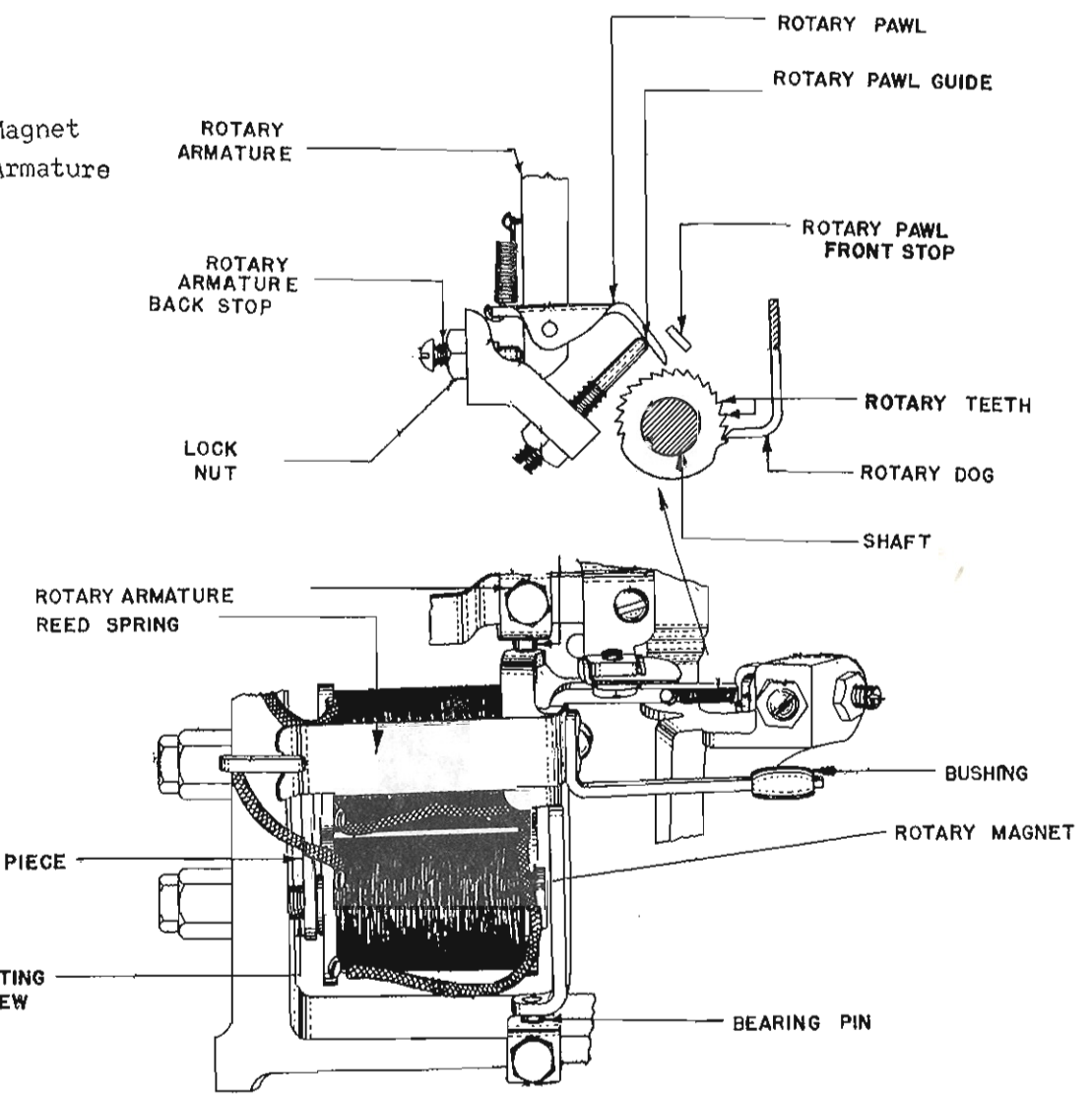






Vertical Stepping Mechanism

The Shaft and Wipers are stepped first vertically by the Vertical Magnet which thrusts the Vertical Pawl into the Vertical Ratchet, forcing the Shaft upward. The Vertical Dog engages the Vertical Ratchet to prevent the Shaft restoring to Vertical Normal.



Rotary Stepping Mechanism

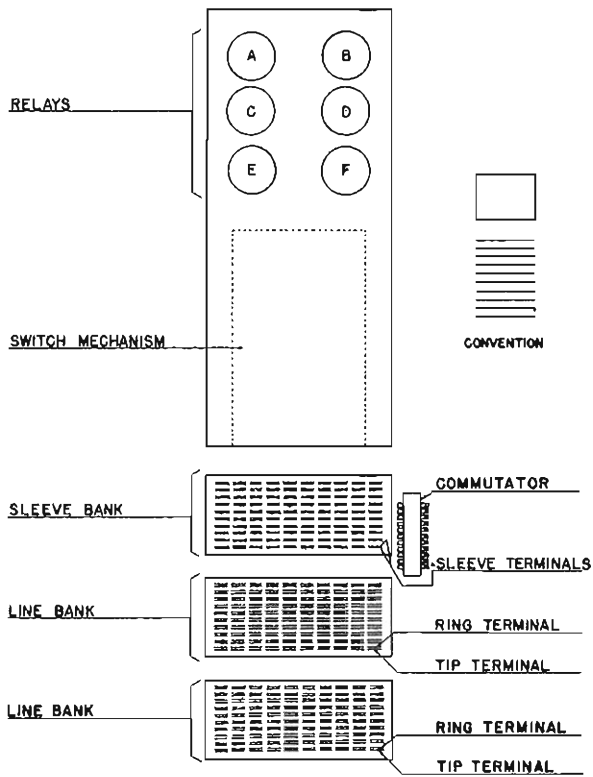
The Rotary Magnet thrusts the Rotary Pawl into the Rotary Ratchet, rotating the Shaft, causing the Wipers to rub or "wipe" over the terminals in one of the Horizontal Rows or Levels. The Stationary Dog prevents the Shaft restoring to Vertical Normal, while the Rotary Dog engages the Rotary Ratchet to prevent the Shaft restoring to Horizontal Normal.

## SWITCHES USED IN HANDLING A STEP BY STEP CALL

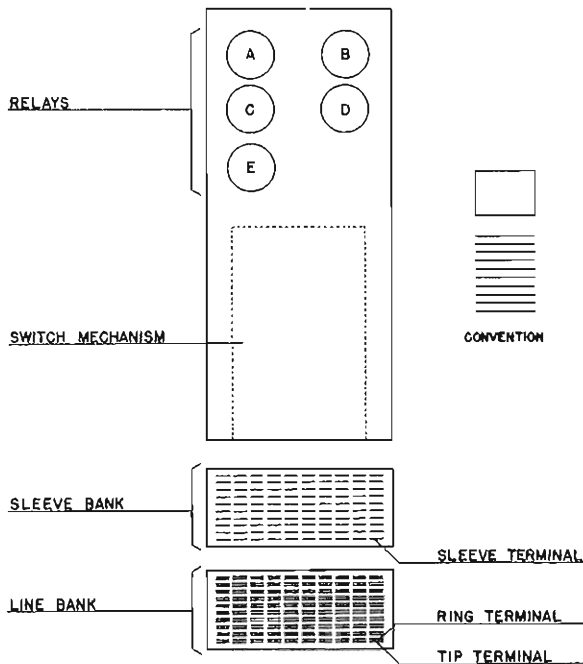
Three types of Step by Step Switches are used in handling a Call:

- 1) Line Finder - First Switch used in handling a Call - Finds the Calling Line when the Calling Subscriber lifts his Handset.
- 2) Connector - Last Switch used in handling a Call - Finds the Called Line under control of the Calling Subscriber Dial.
- 3) Selector - One or more Intermediate Switches used in handling a Call - Finds an

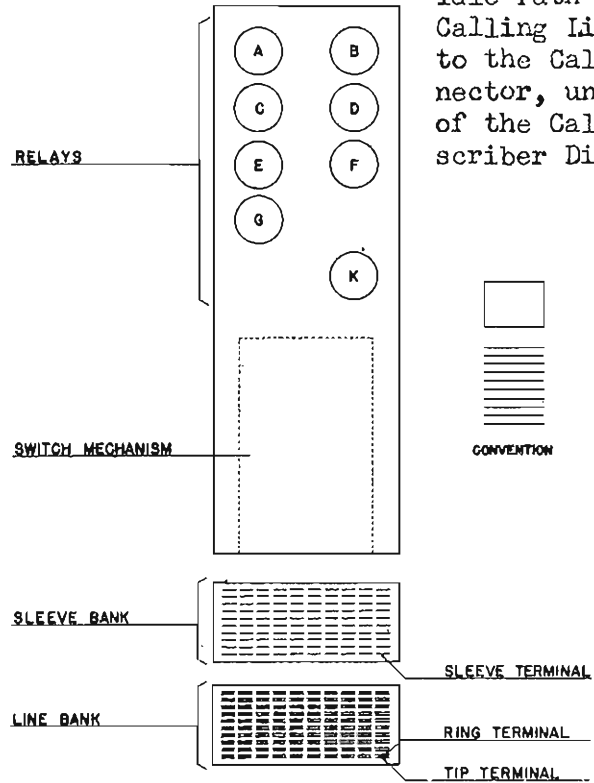
Idle Path from the Calling Line Finder to the Called Connector, under control of the Calling Subscriber Dial.



200 POINT LINE FINDER SWITCH



SELECTOR SWITCH

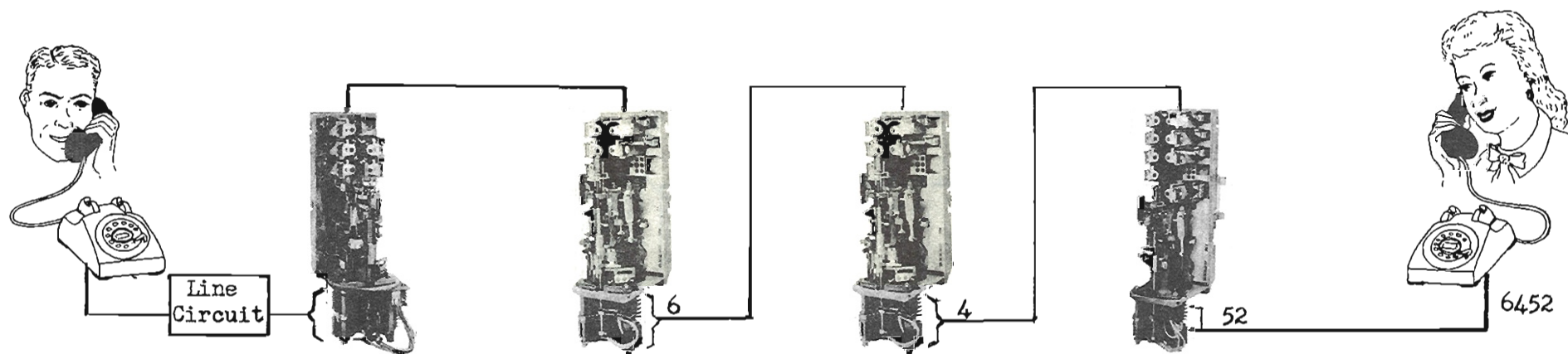


CONNECTOR SWITCH

## SWITCHES USED IN HANDLING A STEP BY STEP CALL



## MAKING A CALL THROUGH A STEP BY STEP OFFICE



Line Finder

When you pick up your Handset, an Idle Line Finder in your Group performs its job: locates the Terminals of your Line, connects you with an Idle "Selector" Switch, and you hear Dial Tone ("Number, Please!"). The Line Finder is similar in operation to the Connector Switch, but does its work automatically.

First Selector

You dial the first number, "6." The First Selector Shaft and Wipers step up to the 6th Level. The 10 Sets of Terminals on this Level are wired to 10 other Selector Switches affording access to all numbers beginning with "6" - 6000 to 6999. The Selector Shaft and Wipers rotate automatically until an Idle Set of Terminals is found, and you're connected to a Second Selector.

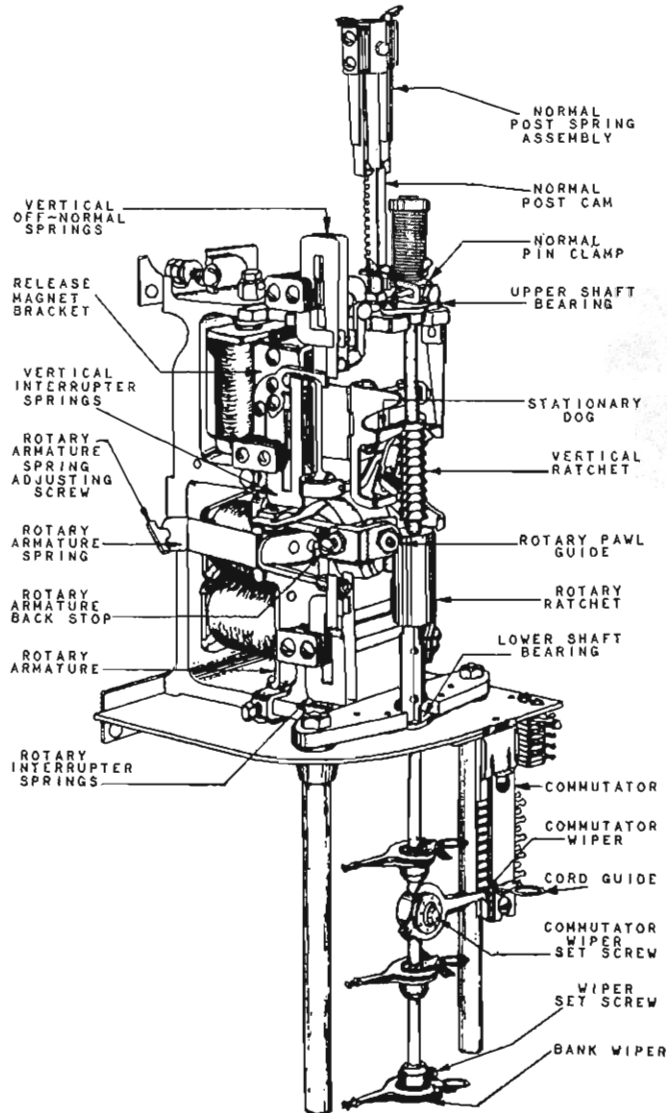
Second Selector

As you dial "4," the second number, the Second Selector Shaft and Wipers step up to the 4th Level. The 10 Sets of Terminals on this Level are wired to 10 Connector Switches, each of which has connected to it 100 telephones - those with numbers from 6400 to 6499. The Selector Shaft and Wipers rotate automatically until an Idle Set of Terminals is found, and you are connected to an Idle Connector Switch.

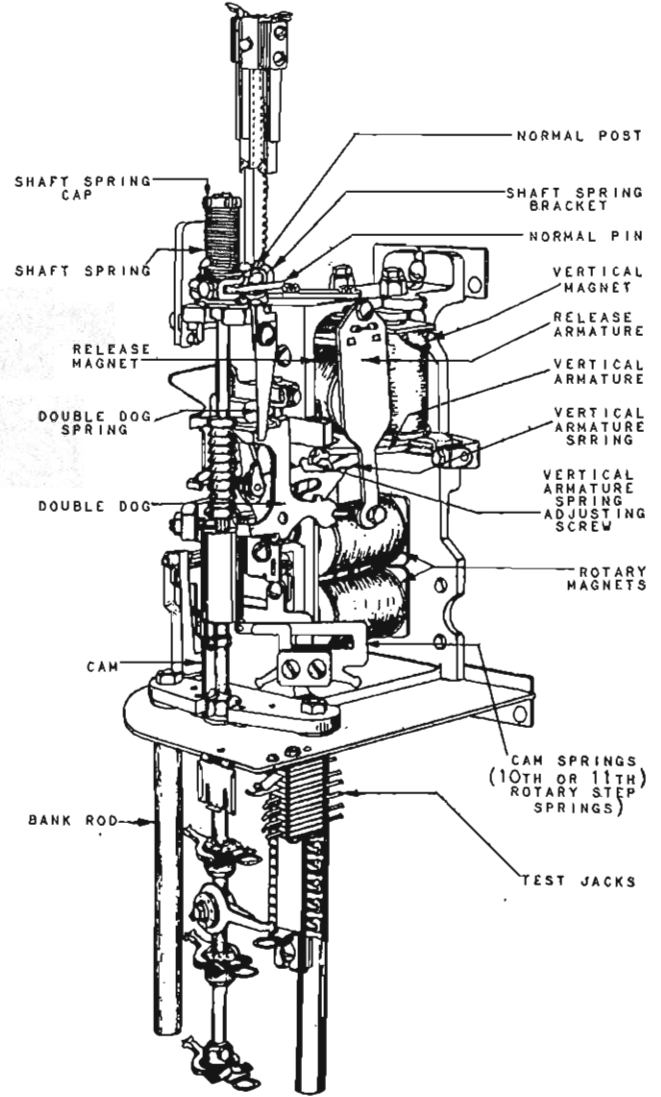
Connector

You dial "5," and the Connector Switch Shaft and Wipers step up to the 5th Level. You dial "2," and the Shaft and Wipers move around on the 5th Level to the second Set of Terminals. At this point, you've reached the Terminals of Line "6452." The Called Party's Bell rings until the telephone is answered, or until you hang up.

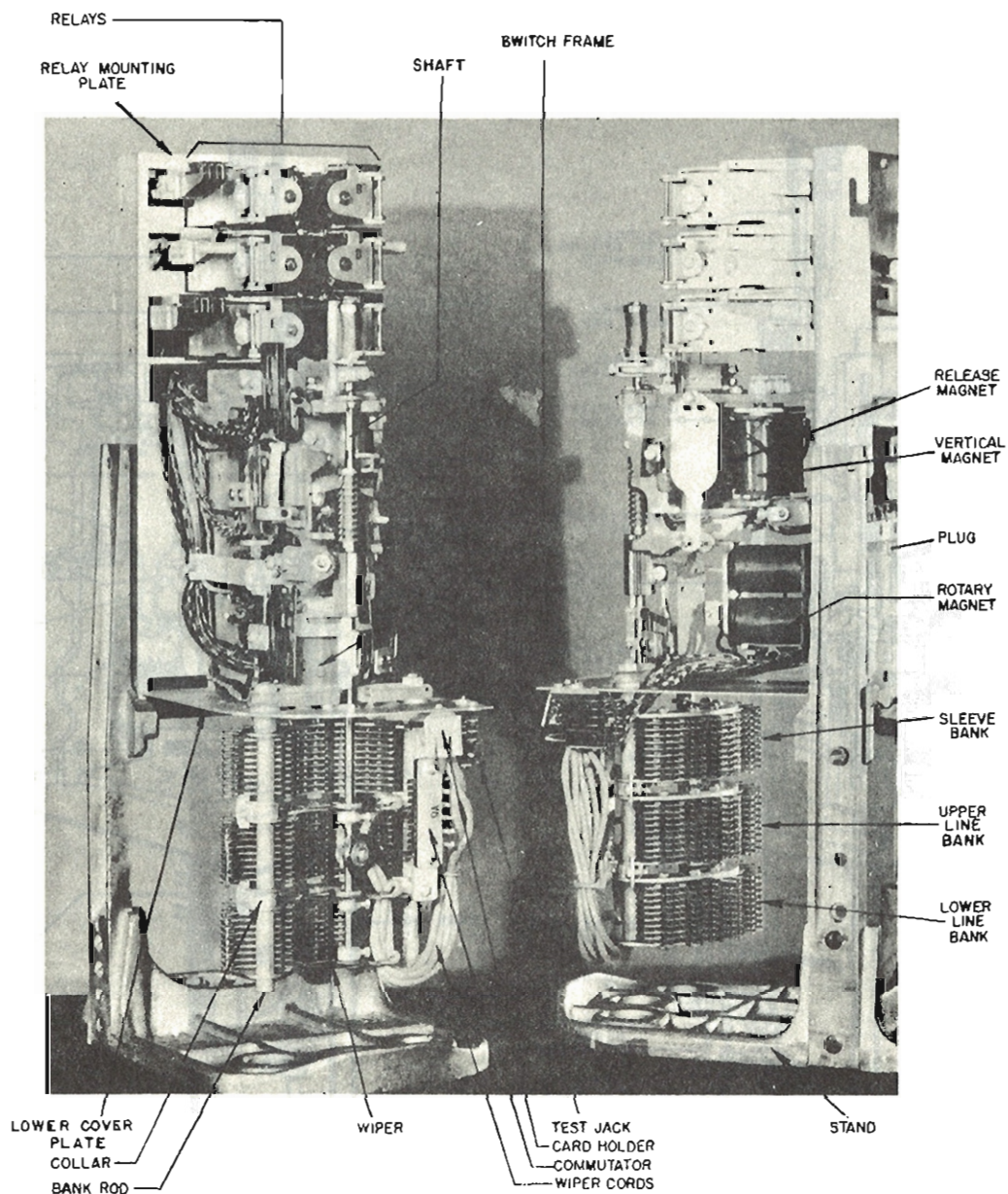
## STEP-BY-STEP SWITCHES



PARTS OF 197 TYPE SWITCH AS VIEWED FROM THE LEFT SIDE

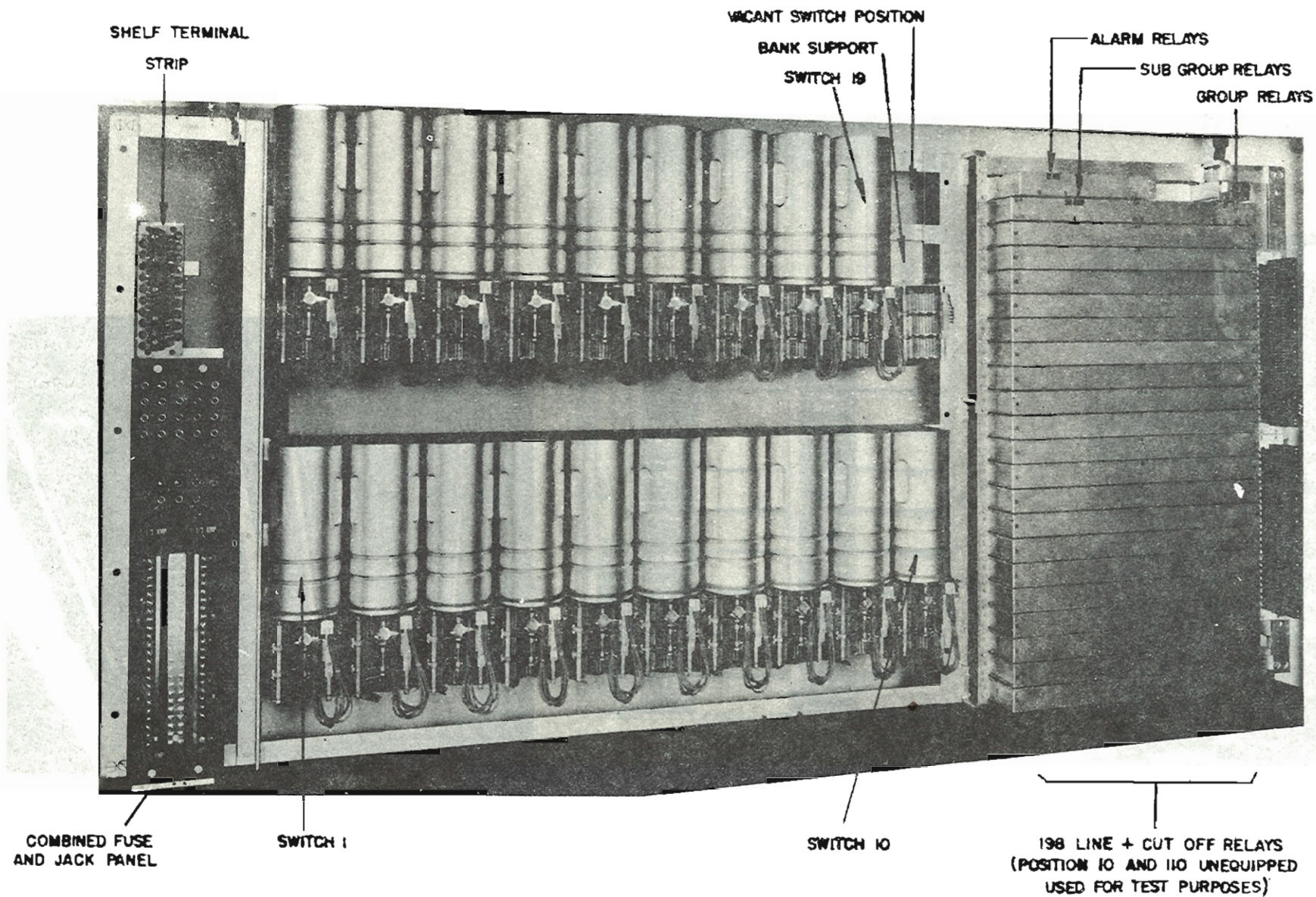


PARTS OF 197 TYPE SWITCH AS VIEWED FROM THE RIGHT SIDE



200 Point Line Finder Switch and Banks

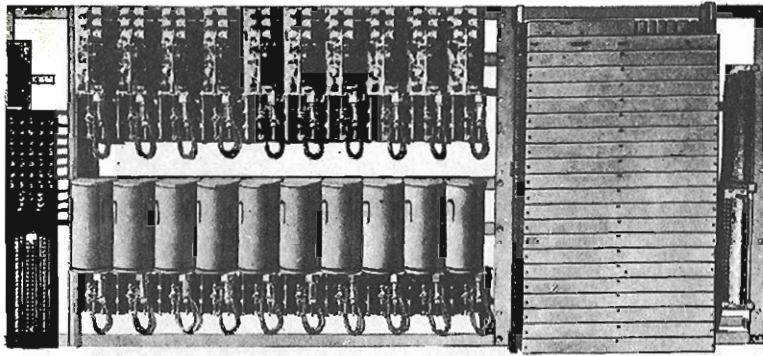




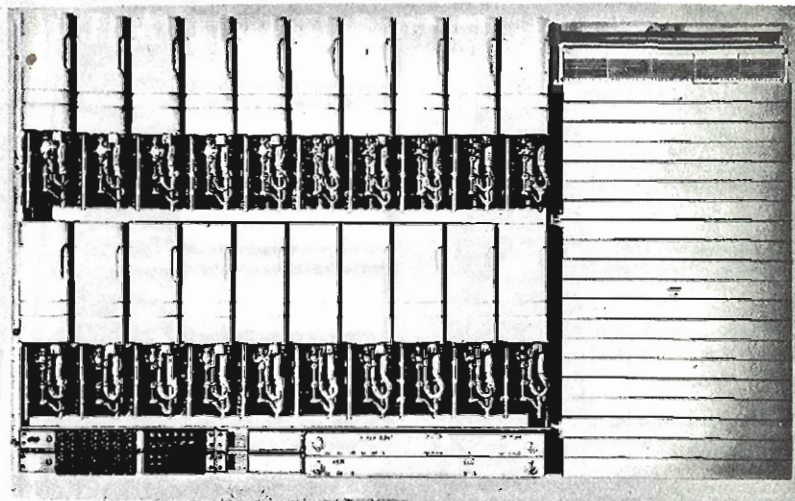
200 Point Line Finder Unit - 20 Switch Capacity



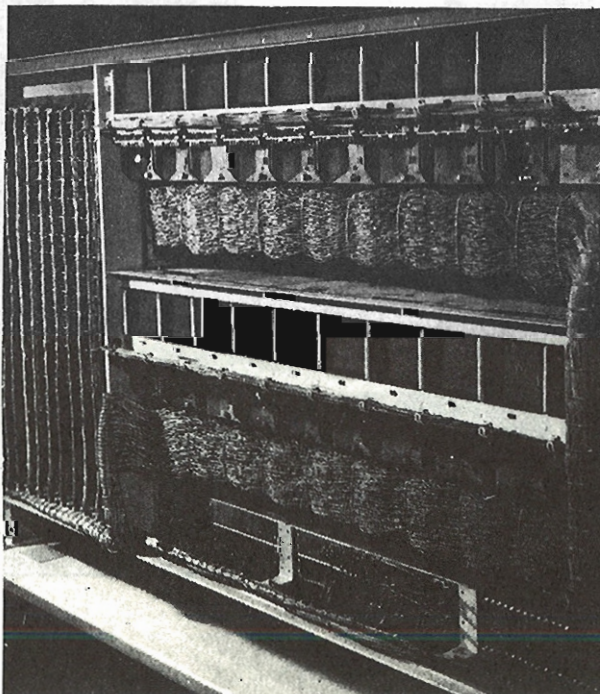
LINE FINDER UNITS



Older Type

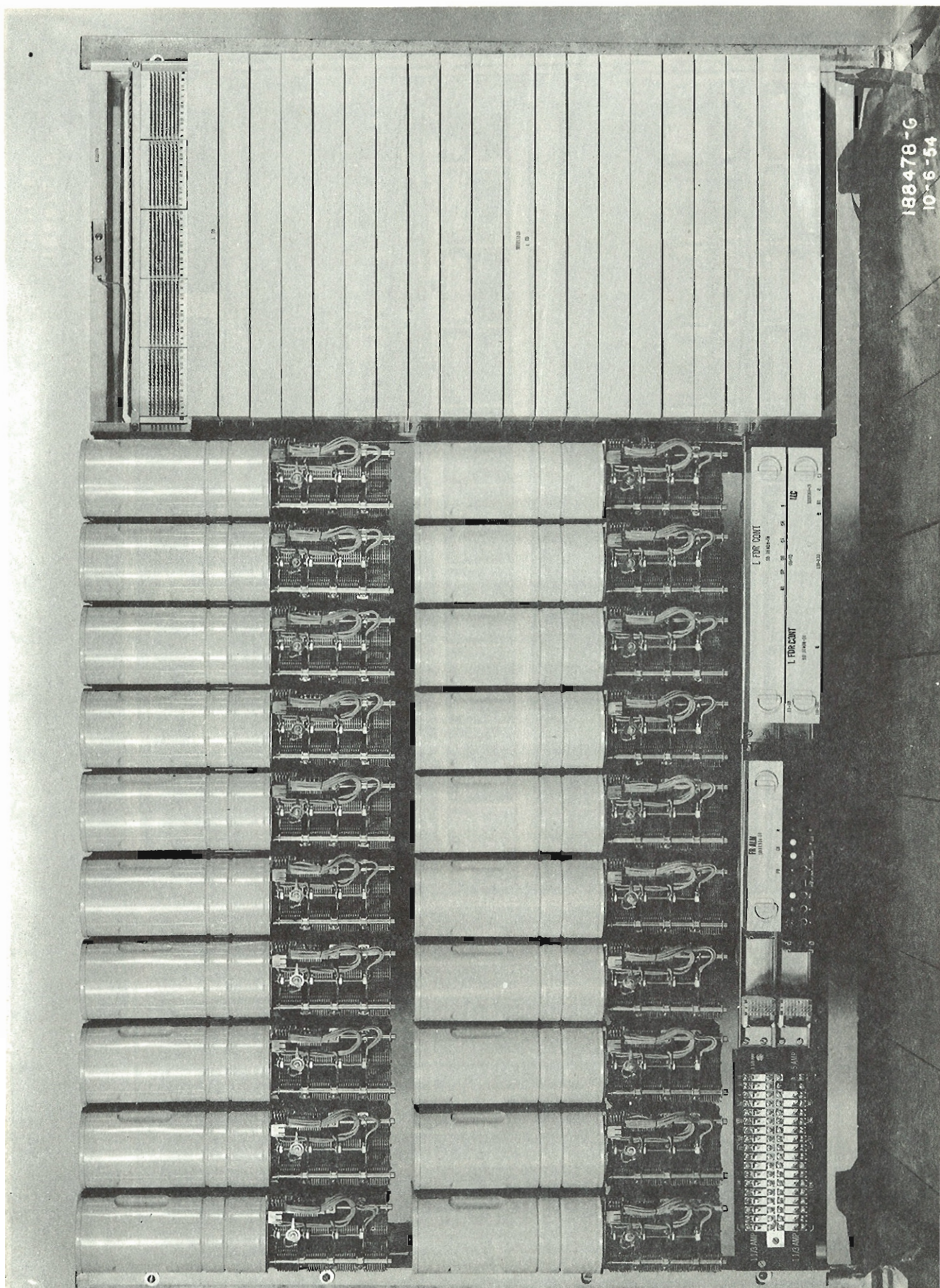


Newer Type



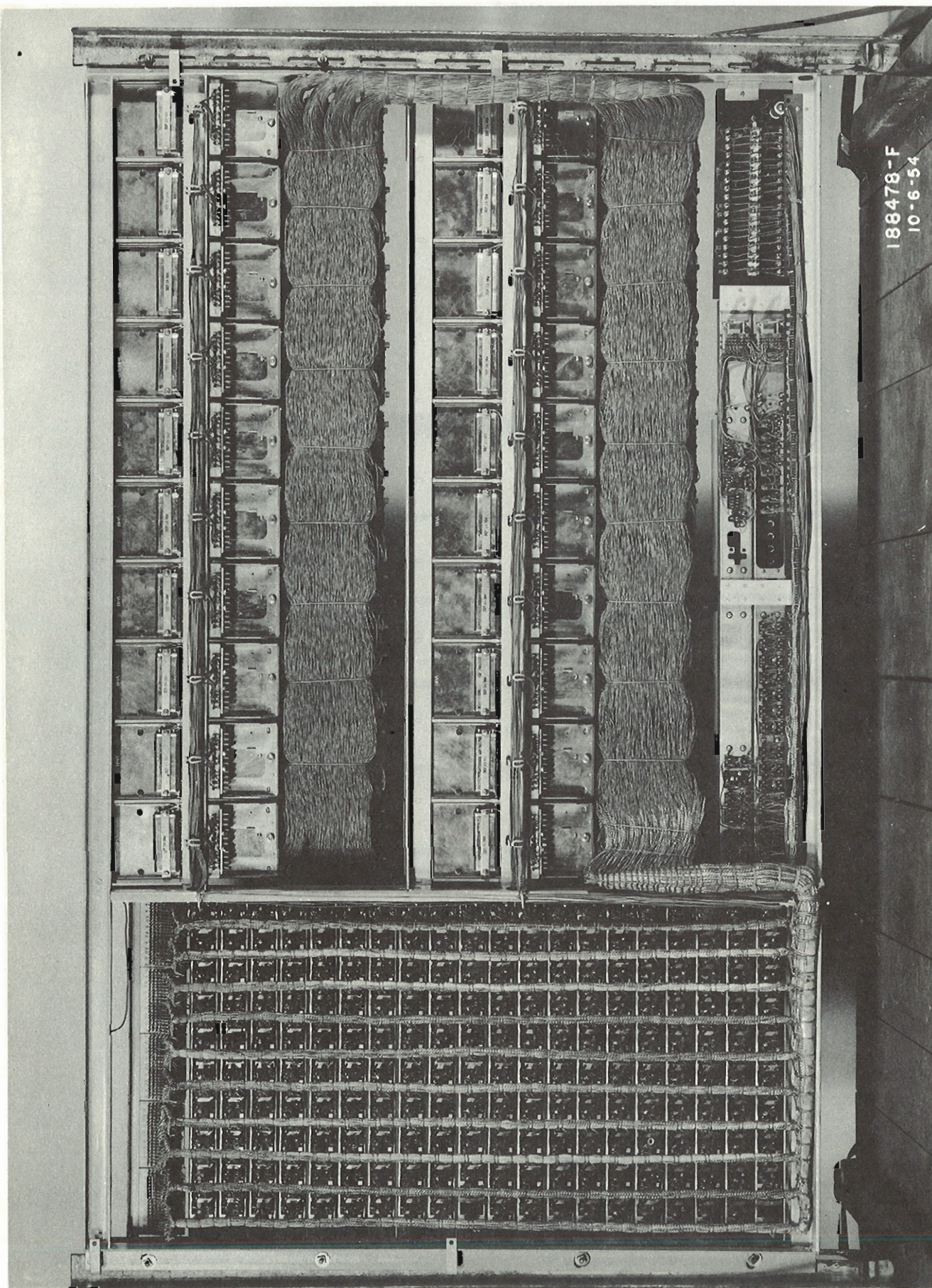
Line Finder Bank Multiple





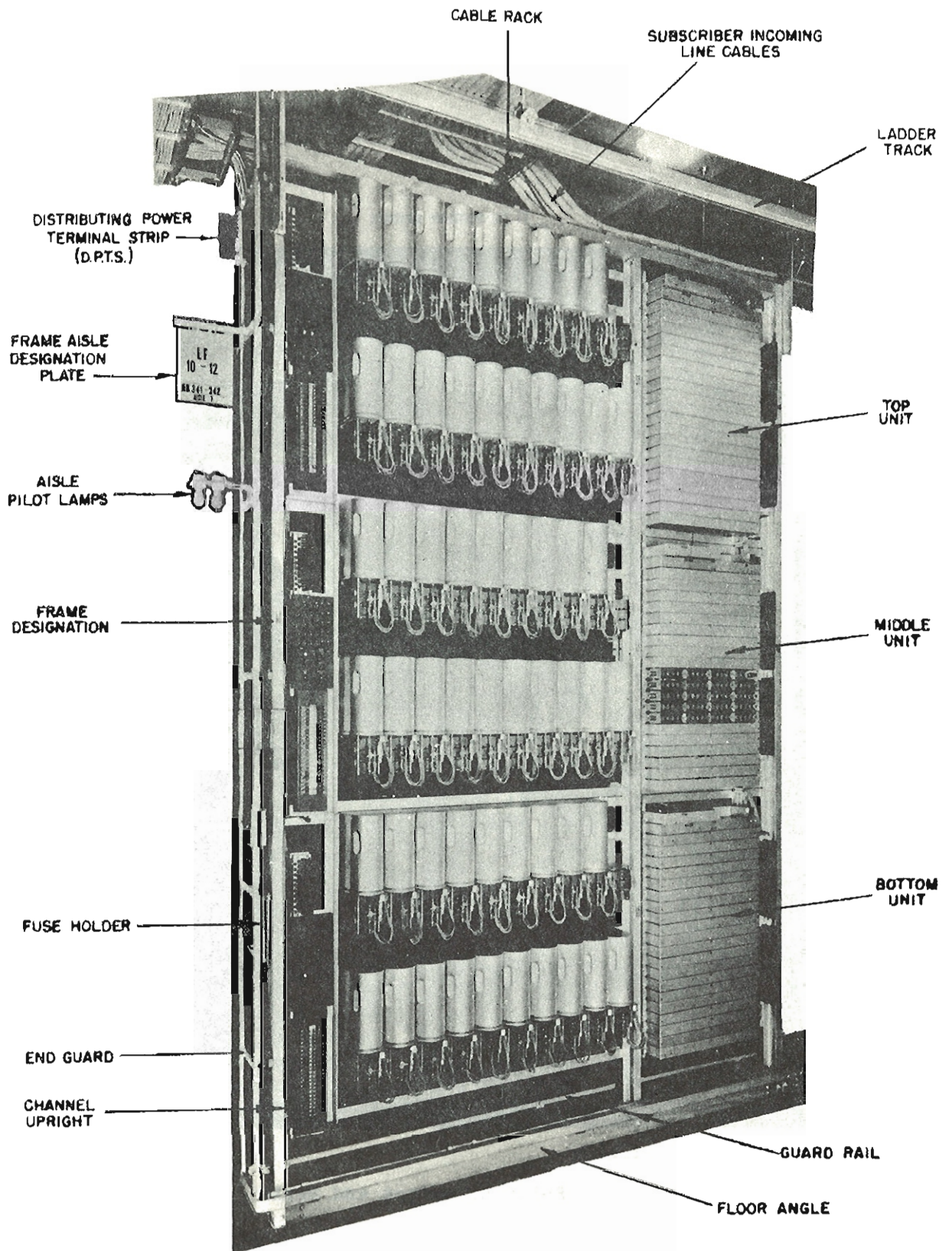
188478-G  
10-6-54





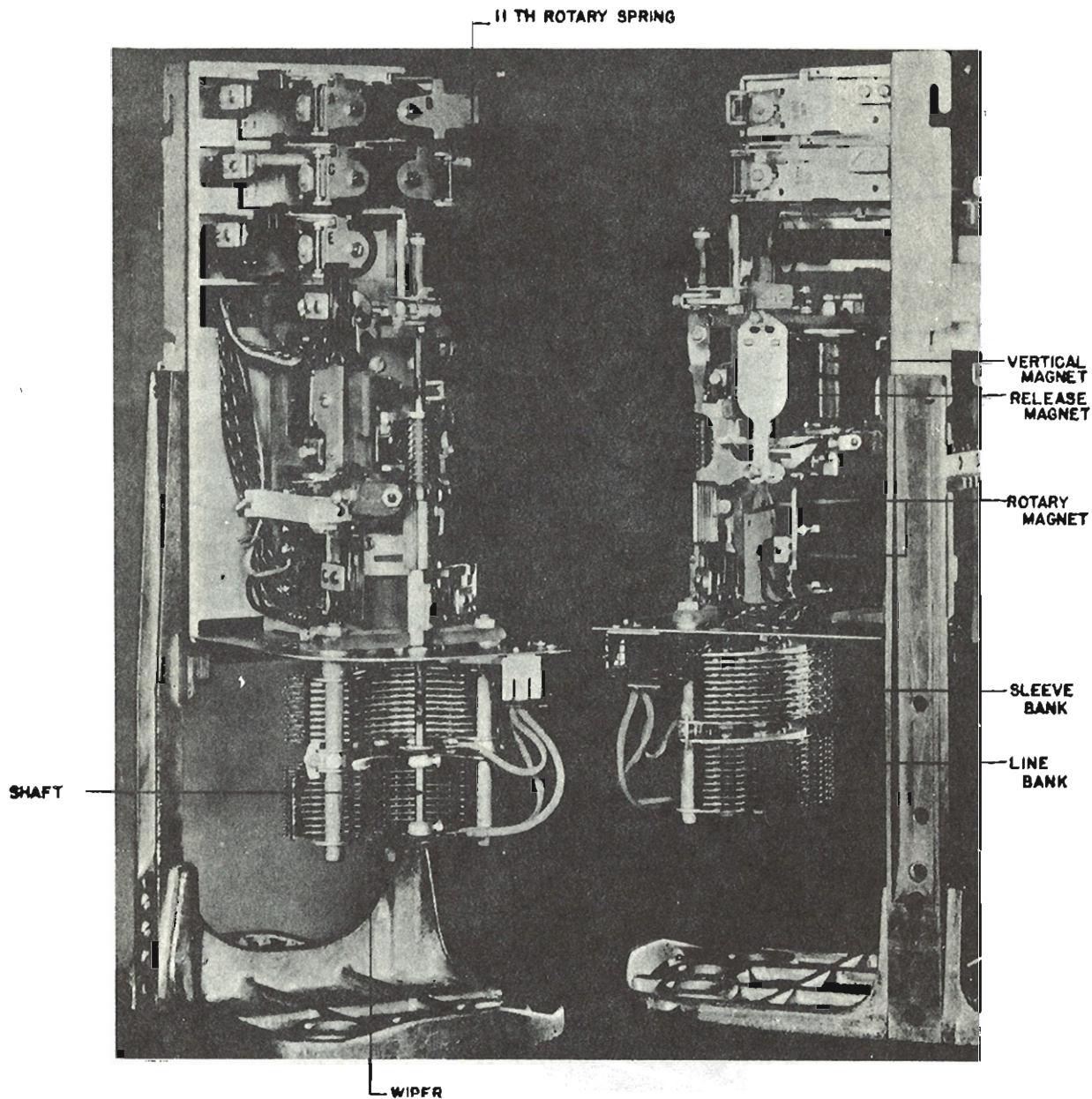
188478-F  
10-6-54



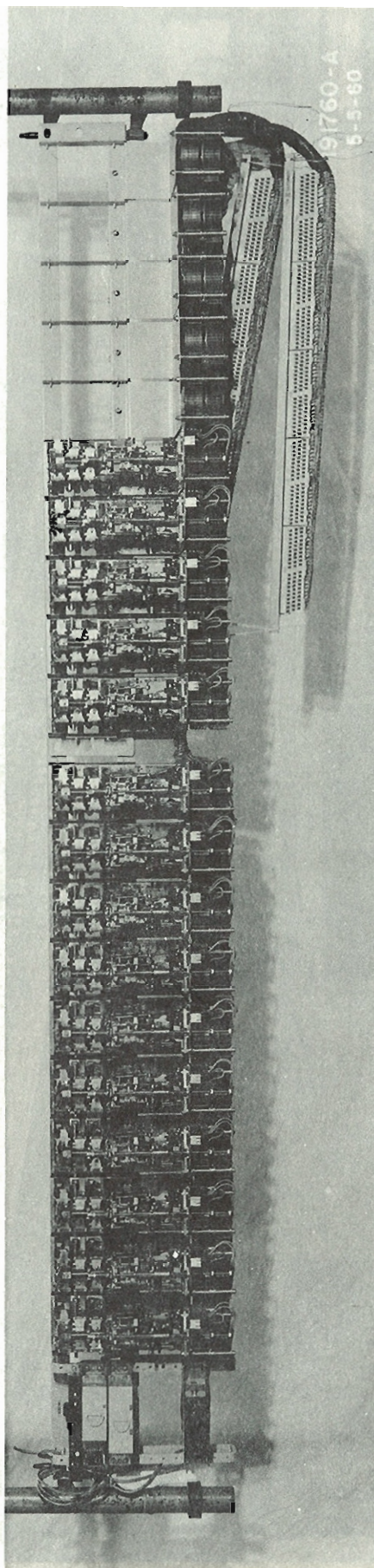


Line Finder Frame



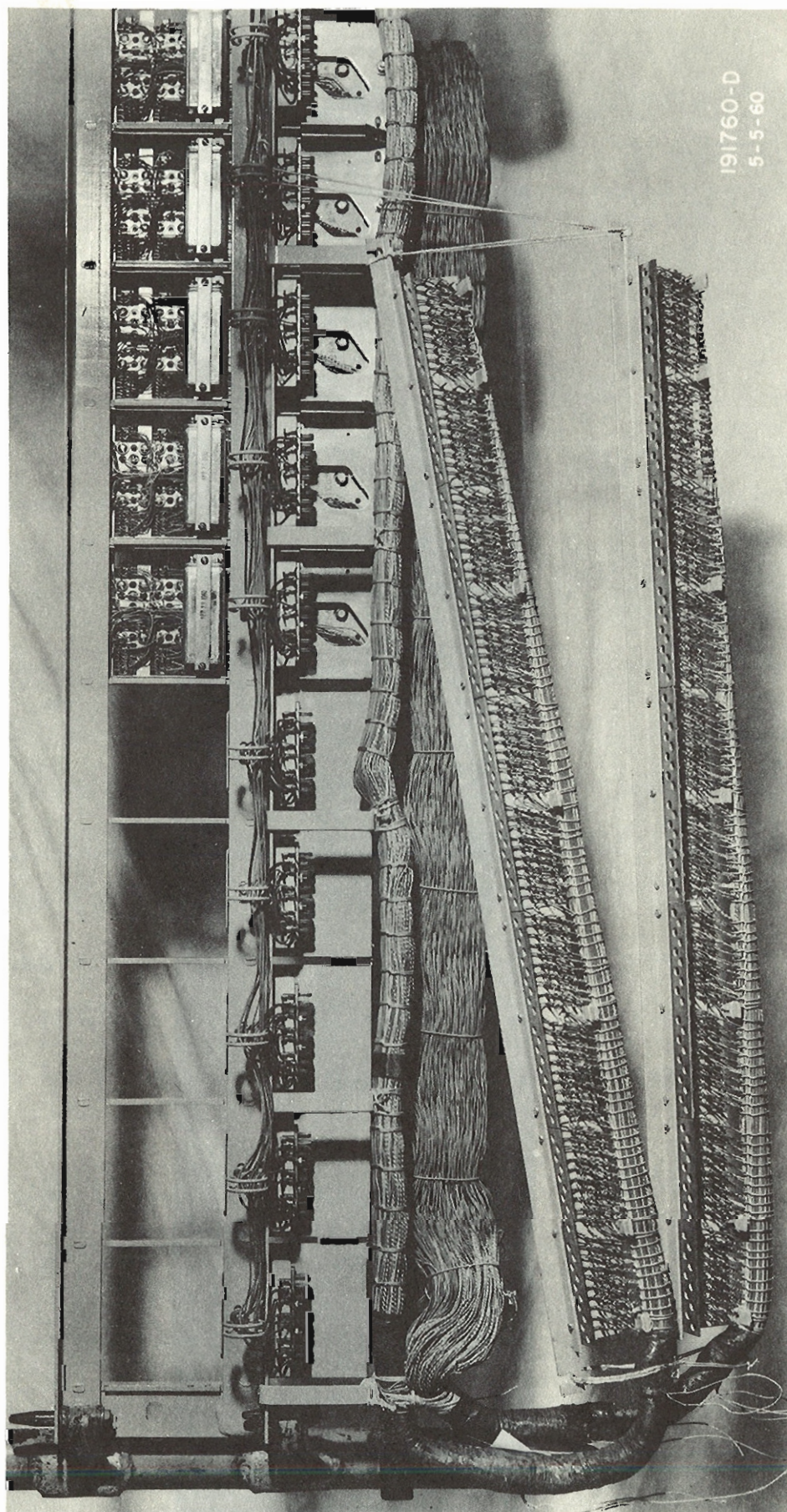


Selector Switch and Banks



91760-A  
5-5-60





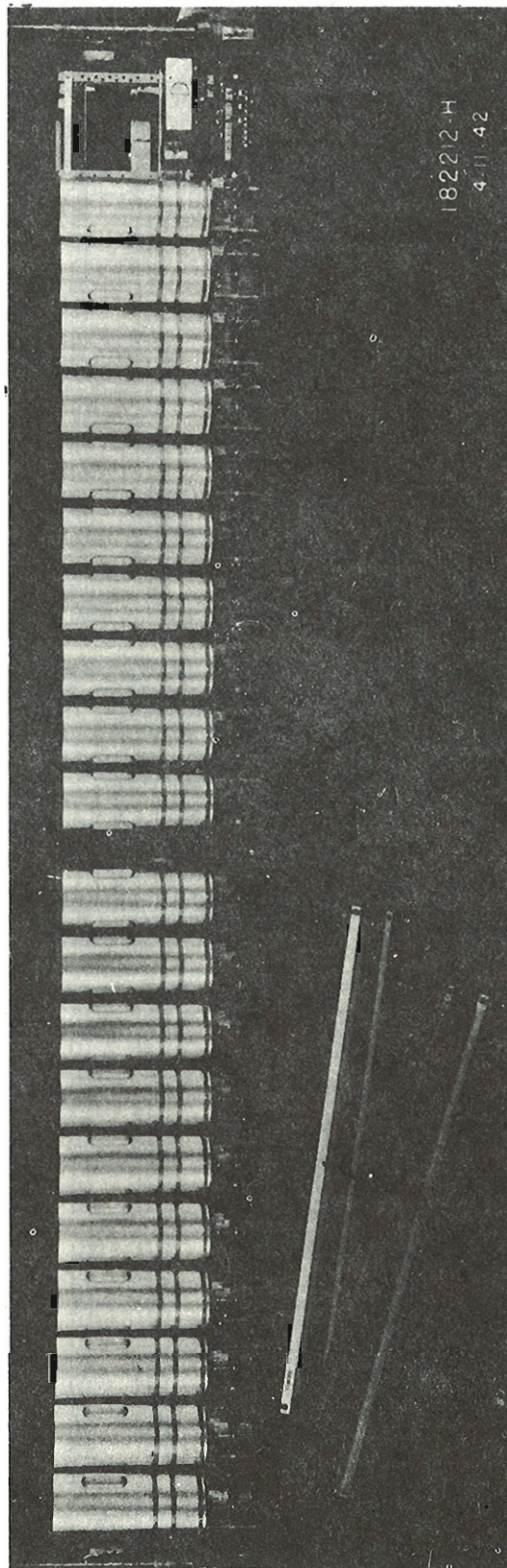
191760-D  
5-5-60



MISCELLANEOUS  
EQUIPMENT

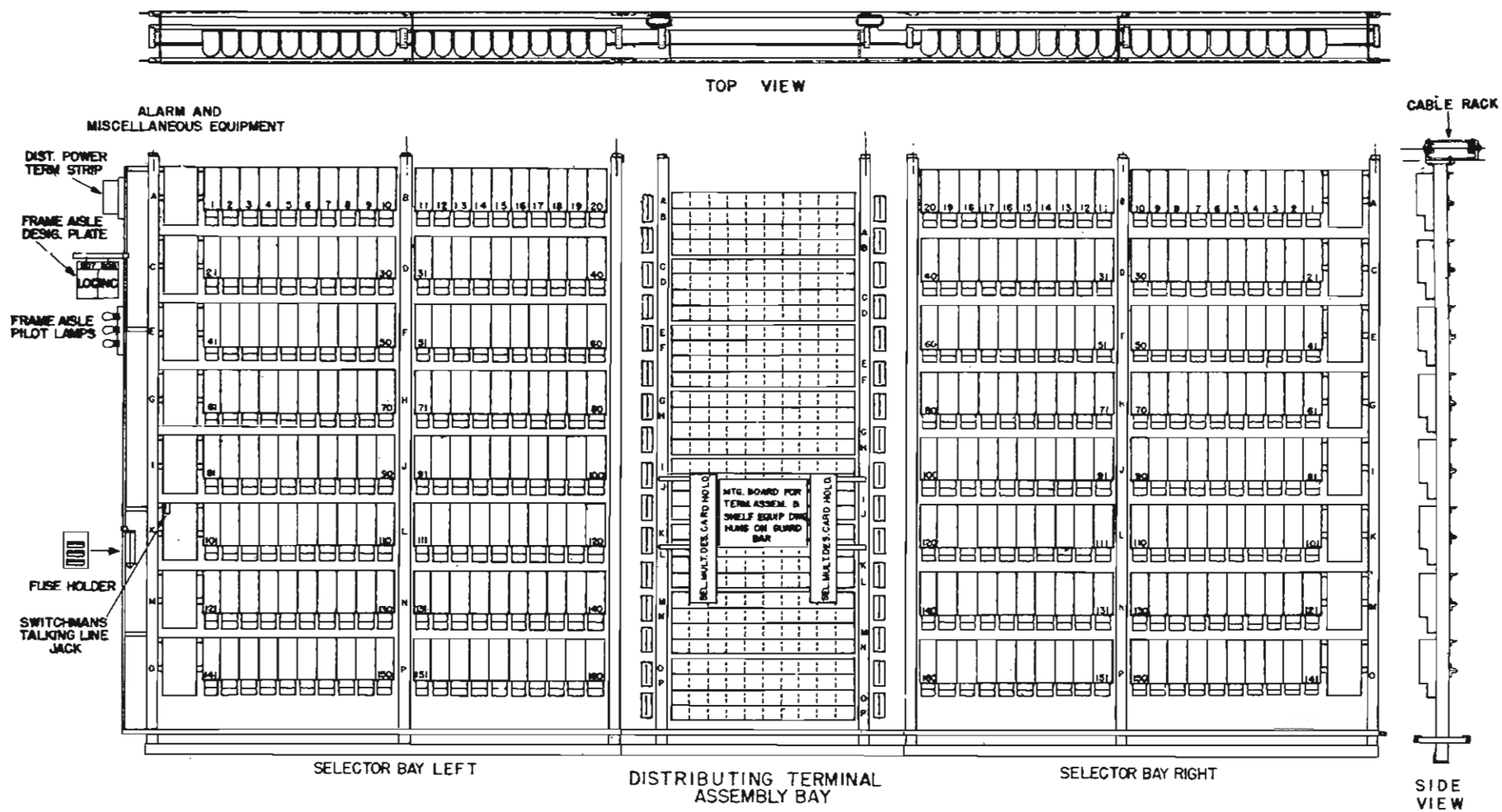
HALF SHELF

HALF SHELF



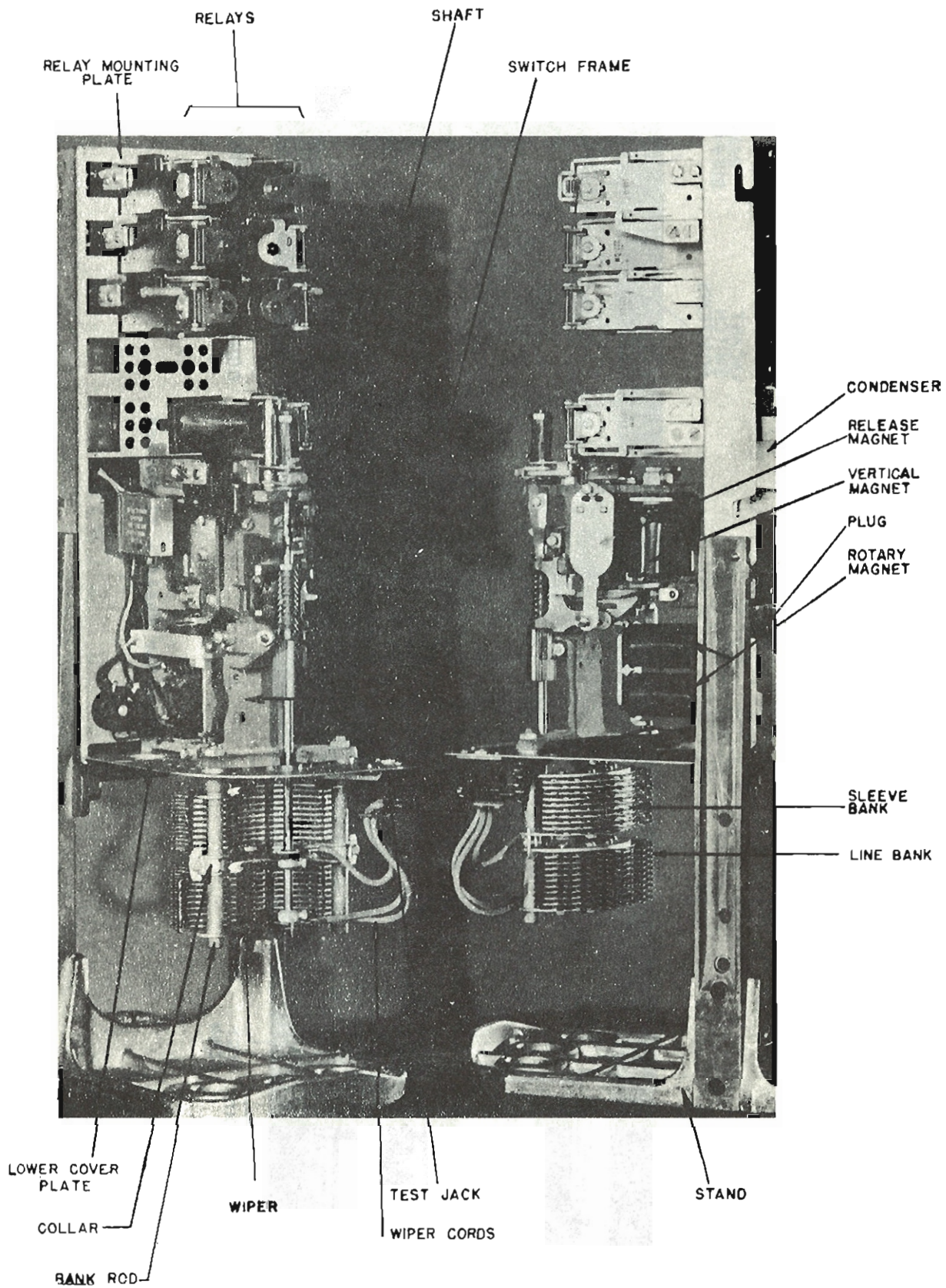
2 - 180 TYPE TERMINAL STRIPS - ONE PER HALF SHELF

Selector Shelf

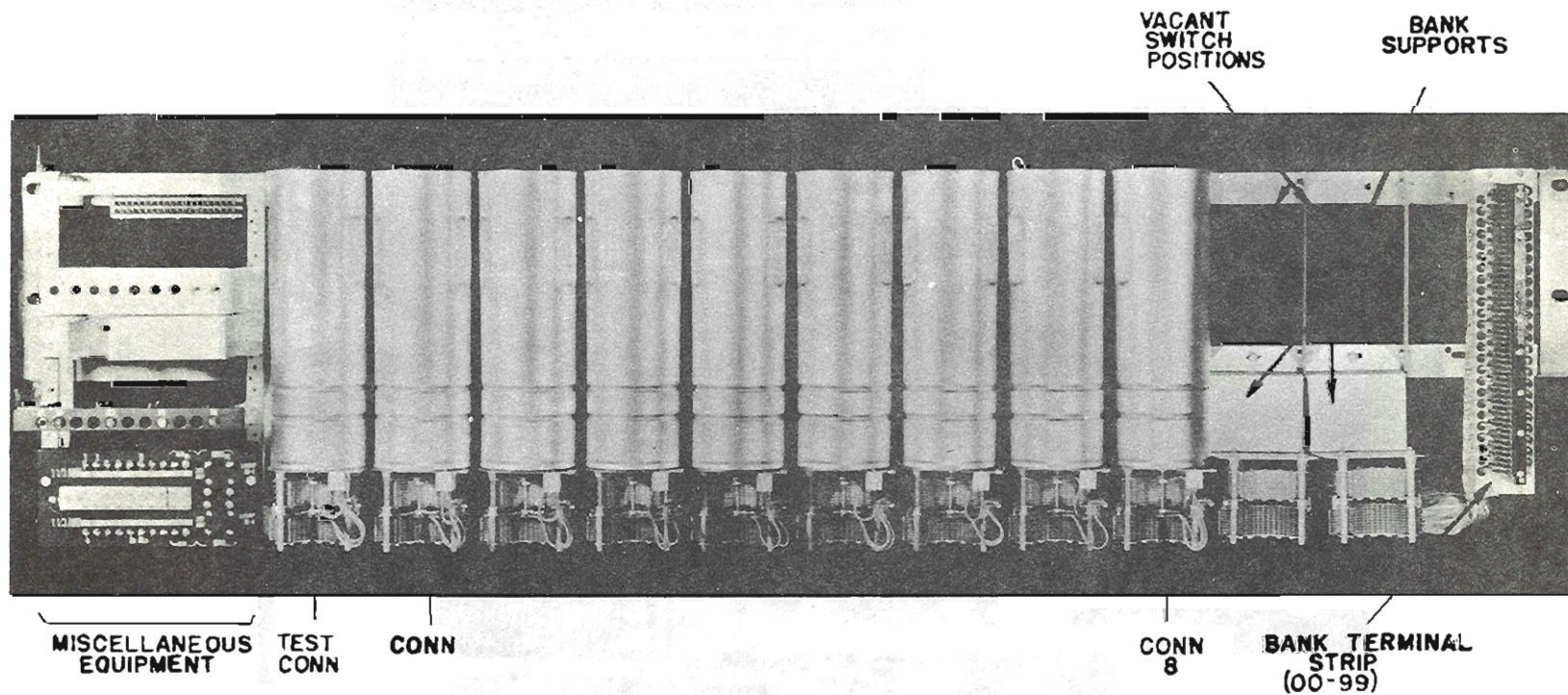


Selector Frame Sketch



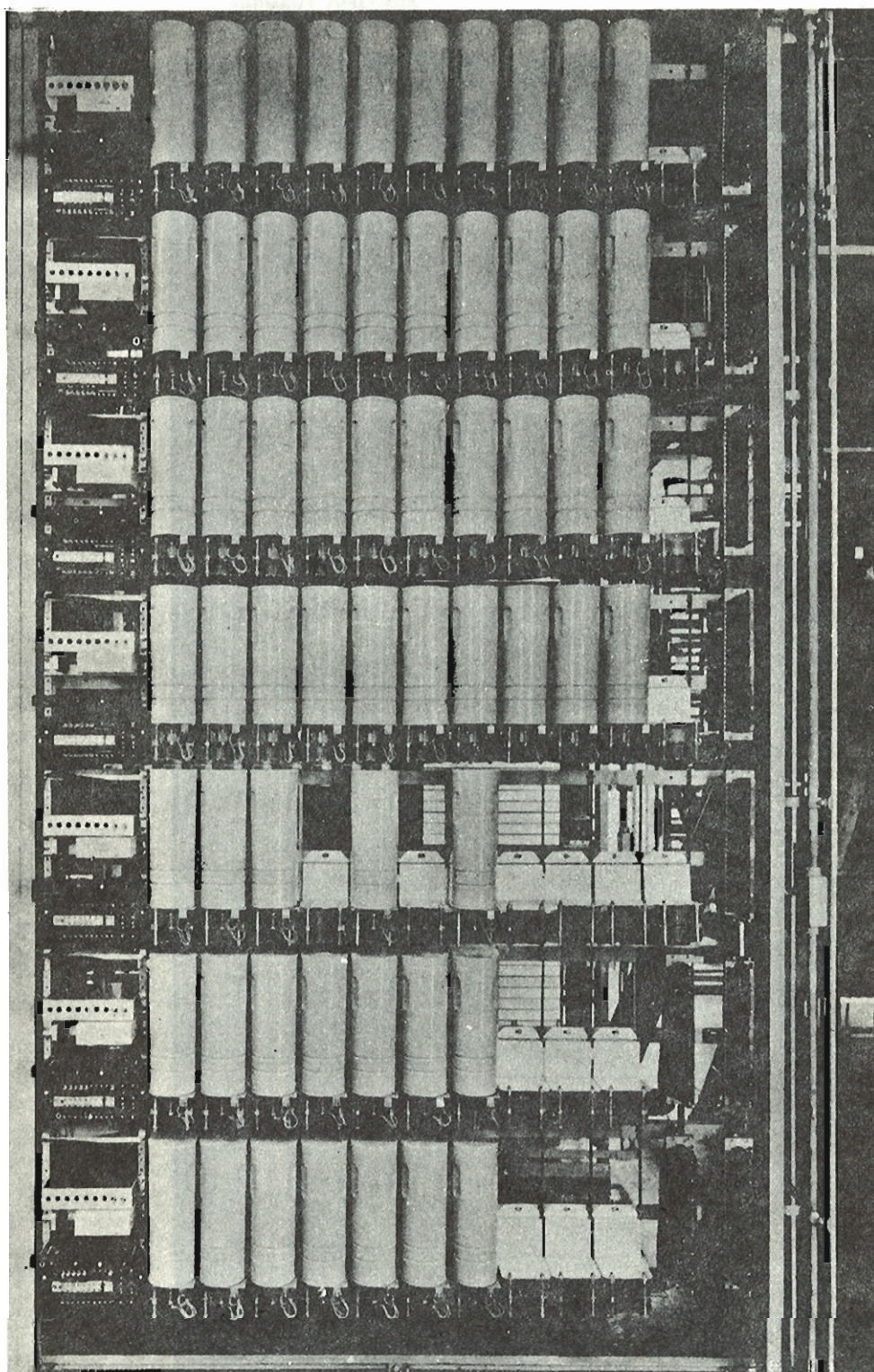


Connector Switch & Banks



Connector Shelf - 11 Switch





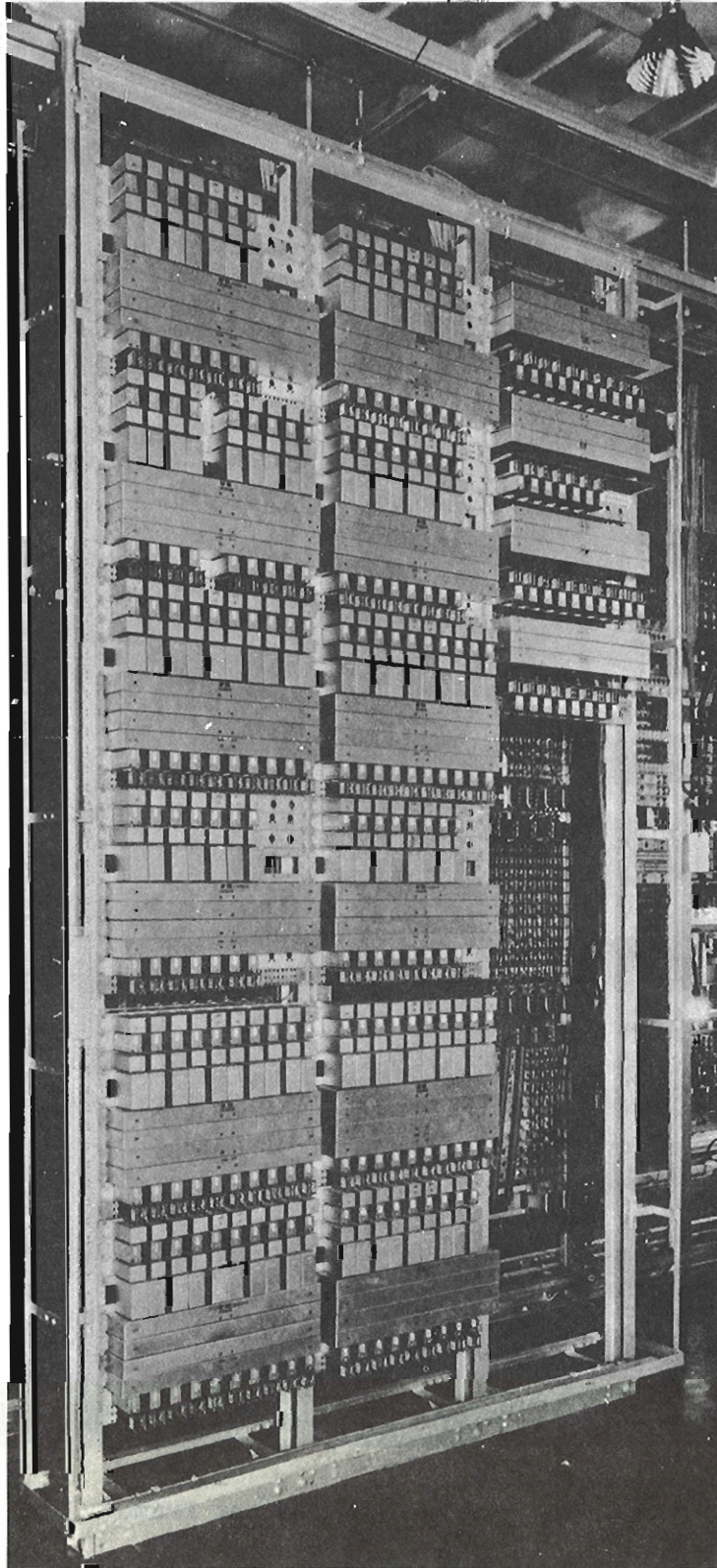
COMBINATION  
LOCAL AND  
TOLL GROUP

PBX  
ROTARY  
HUNTING  
GROUP

Connector Frame



AUXILIARY FRAMING



Relay Racks