BELL SYSTEM PRACTICES
Plant Series

DIGIT-ABSORBING SELECTORS
GENERAL DESCRIPTIVE INFORMATION
STEP-BY-STEP OFFICES

SECTION 955-110-100
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1. INTRODUCTION

1.01 This section describes the digit-absorbing selectors which are available for use in step-by-step offices. It covers local, toll transmission, AB toll transmission, toll intermediate (or incoming), and AB toll preceding selectors

1.02 A digit-absorbing (DA) selector is a switch which uses up unneeded digits. It is used primarily to avoid provision of additional ranks of selectors in areas where the numbering plan calls for more digits than required for switching purposes. Digit-absorbing selectors are usually placed at the beginning of the switch train.

2. SWITCHING PRINCIPLES

The Selector

2.01 The selector is one of the basic elements of the step-by-step automatic dial switching system. It is an electro-mechanical device (see Fig. 1) which is under control of pulses from a subscriber or operator dial.

2.02 The selector consists of a number of relays which control the action of the switch; a bank of 100 trunk terminals arranged in ten levels, ten terminals per level (see Fig. 2); a set of wipers which hunt for an idle trunk; a vertical stepping mechanism; a rotary stepping mechanism; and
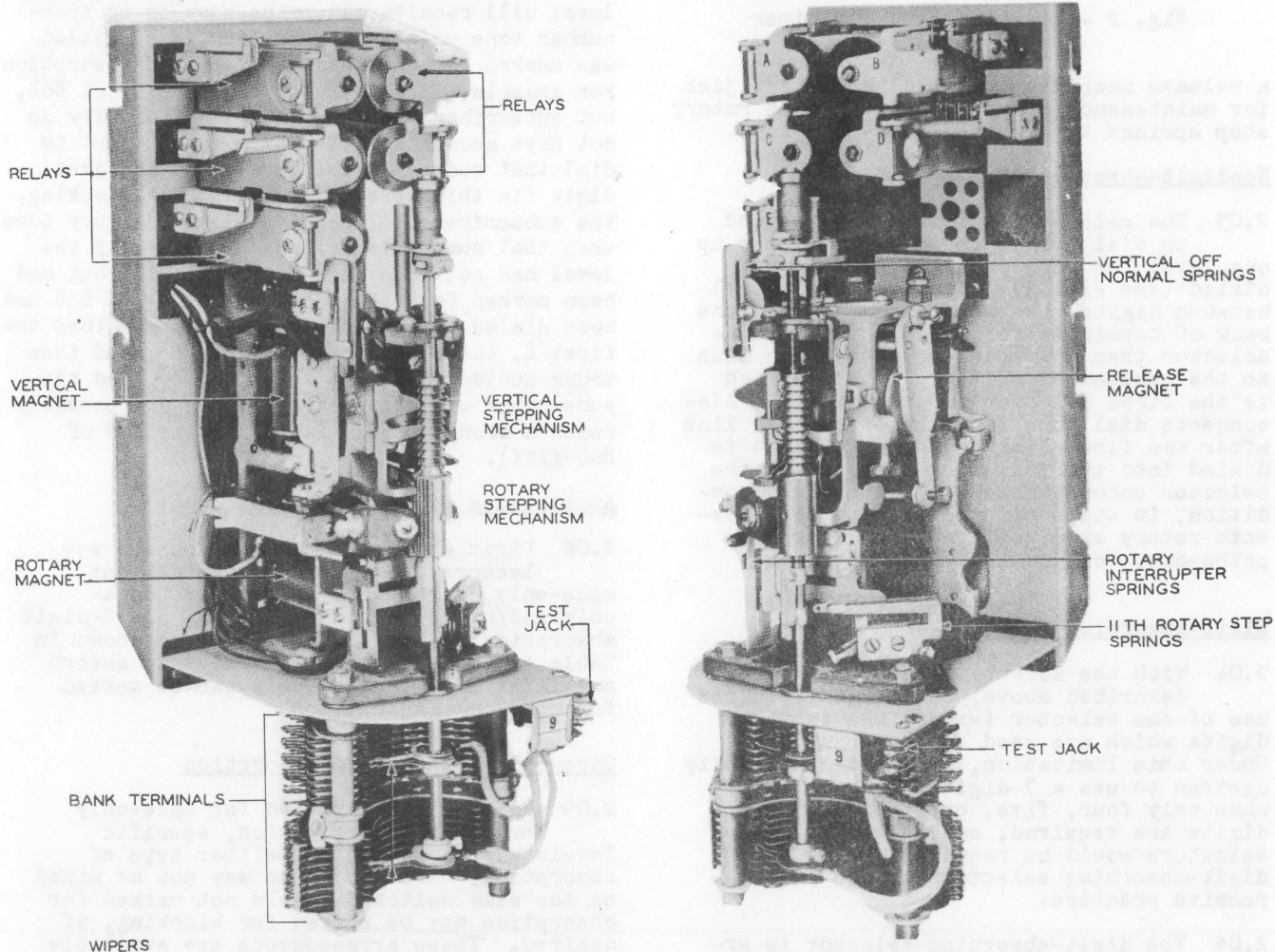
RELAYS

RELAYS

VERTICAL MAGNET

VERTICAL STEPPING MECHANISM

ROTARY STEPPING MECHANISM

ROTARY MAGNET

TEST JACK

BANK TERMINALS

WIPERS

VERTICAL OFF NORMAL SPRINGS

RELEASE MAGNET

ROTARY INTERRUPTER SPRINGS

11 TH ROTARY STEP SPRINGS
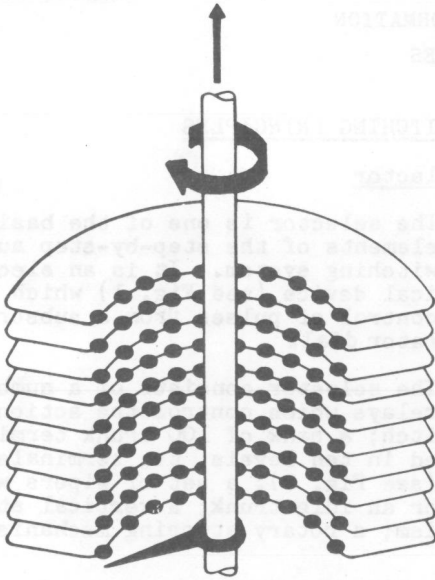
TEST JACK

Fig. 1 - Local Selector

Fig. 2 - Selector Bank and Wiper

a release mechanism, as well as a test jack for maintenance purposes and eleventh rotary step springs to provide paths-busy tone.

Nondigit-absorbing Selector

2.03 The relays of the selector respond to dial pulses to move the wipers up one level for each pulse of the digit dialed (see Fig. 2). During the interval between digits, the wipers hunt across the bank of terminals for an idle trunk. The selector then connects the subscriber line to the succeeding switch. If the switch is the first selector in the train, it disconnects dial tone from the subscriber line after the first digit. The next digit is dialed into the following switch. If the selector encounters an all-paths-busy condition, it steps off the bank to the eleventh rotary step position and returns paths-busy tone to the subscriber.

Digit-absorbing Selector

2.04 With the selector functioning as described above, each digit requires use of one selector (except the last two digits which are used by the connector). Under this limitation, if a small community desired to use a 7-digit numbering plan when only four, five, or six effective digits are required, unnecessary ranks of selectors would be required. The use of digit-absorbing selectors avoids this expensive practice.

2.05 The digit-absorbing selector is arranged to use up the digits that are not needed for switching but which are desirable from the standpoint of the

numbering plan. When a digit is received which drives the switch to a level marked for absorption, the switch drops back to normal. The levels are marked by bending cams associated with normal post springs.

2.06 There are two types of absorption most used, namely, repeated and once only. If a level is marked for repeated absorption, the switch drops back to normal each time it is driven to that level. If a level is arranged for once-only absorption, the switch drops back to normal the first time that level is dialed. After that the switch is unlocked and it will trunk hunt on the next digit, even if that level had been marked for absorption or blocking. Switches are also provided which absorb on certain levels on the first digit and on other levels on the second digit.

Blocking

2.07 Blocking is used to restrict service and to prevent wrong numbers. When a level is marked for blocking, any call reaching that level will receive all-paths-busy or no-such-number tone unless the previous level dialed was marked for once-only or repeated absorption. For example, if a community has a code of 868, but subscribers in a neighboring community do not have access to it, they might attempt to dial that code. If the level for the first digit (in this case 8) is marked for blocking, the subscriber will receive all-paths-busy tone when that number is dialed. However, if the level had not been marked for blocking but had been marked for repeated absorption and 868 had been dialed, the switch would have absorbed the first 8, the 6, unlocked (see 2.06), and then trunk hunted on 8 (the third digit), and the subscriber would continue dialing and possibly reach a wrong number (XX8-XXXX, instead of 868-XXXX).

Application of Digit Absorption

2.08 Digit absorption is used on the selectors in different combinations, once-only, or repeated absorption, once-only and/or repeated absorption, and 2-digit absorption. They are available as shown in Table A. Should it be necessary to absorb any first digit, all levels can be marked for once-only absorption.

Once-only or Repeated Absorption

2.09 On a switch arranged for once-only or repeated absorption, specific levels may be marked for either type of absorption. The two types may not be mixed on the same switch. Levels not marked for absorption may be marked for blocking, if desired. These arrangements are available for local, toll transmission, toll incoming, and AB toll transmission selectors. Fig. 3 is an example of this type of selector.
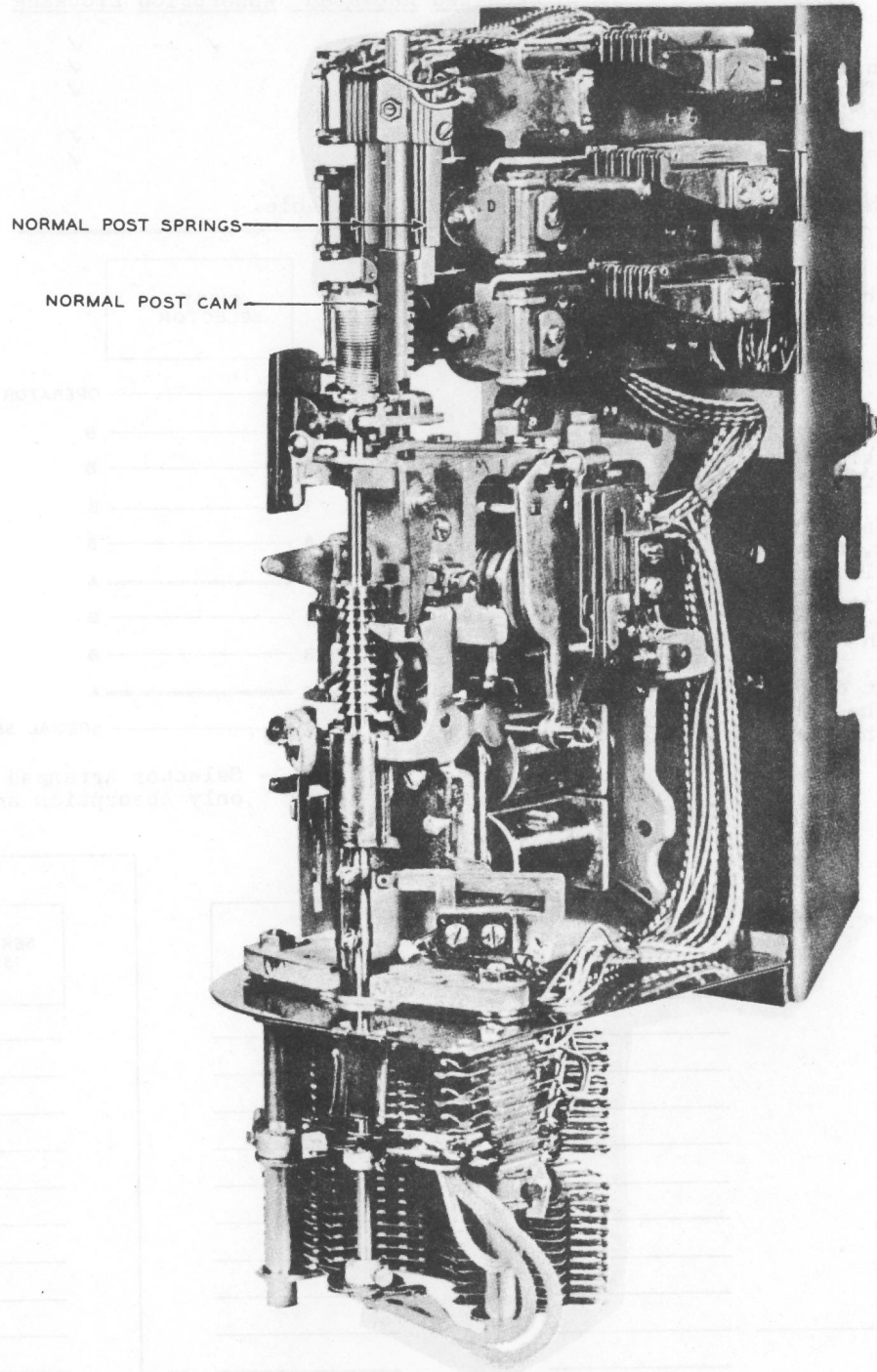
NORMAL POST SPRINGS

NORMAL POST CAM

Fig. 3 - Once-only or Repeated Digit-absorbing Selector

TABLE A

	Once Only or Repeated	Once Only and/or Repeated	2-digit, Digit Absorption	Blocking
Local	✓	✓	✓	✓
Toll Transmission	✓	✓		✓
AB Toll Transmission	✓			✓
Toll Incoming (or Intermediate)		✓		✓
AB Toll Preceding		✓		✓

Note: Check (✓) indicates that feature is available.

2.10 The switch is often used with once-only absorption and blocking. For example, assume the switch is marked for once-only absorption on levels 2 and 5 and for blocking on all other levels except 0 and 1 (see Fig. 4). If office code 224 is dialed, the switch will move up to level 2 on the first digit. Since this level is marked for absorption, the switch will drop back to normal. Since it is also the once-only type of absorption, the switch will be unlocked (see 2.06), and when the next digit, 2, is dialed, it will trunk hunt on the second level. The following switch will use the digit 4. Similarly, if the code had been 274, the switch would unlock after the first digit, 2, is absorbed and trunk hunt on the next digit, in this case, 7. If 7 had been the first digit dialed, the customer would have received all-paths-busy tone.
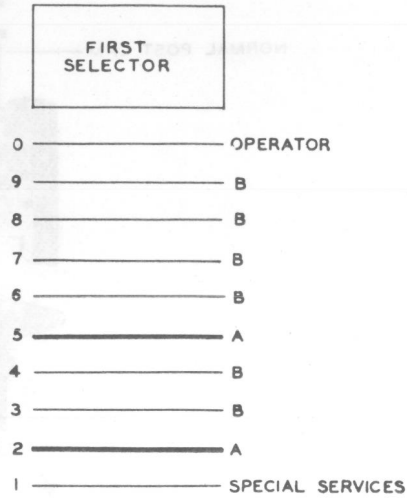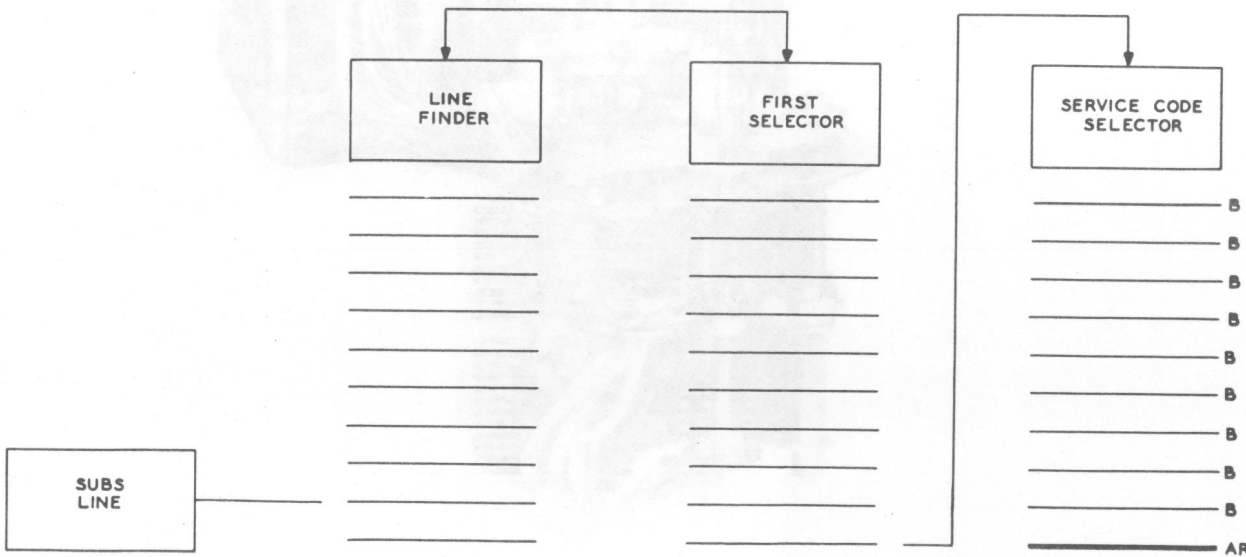

Fig. 4 - Selector Arranged for Once-only Absorption and Blocking

NOTES:
1. SERVICE CODE SELECTOR IS ARRANGED TO UNLOCK BLOCKING AFTER FIRST DIGIT 1 IS ABSORBED.

Fig. 5 - Use of Repeated Absorption With Service Code Selector

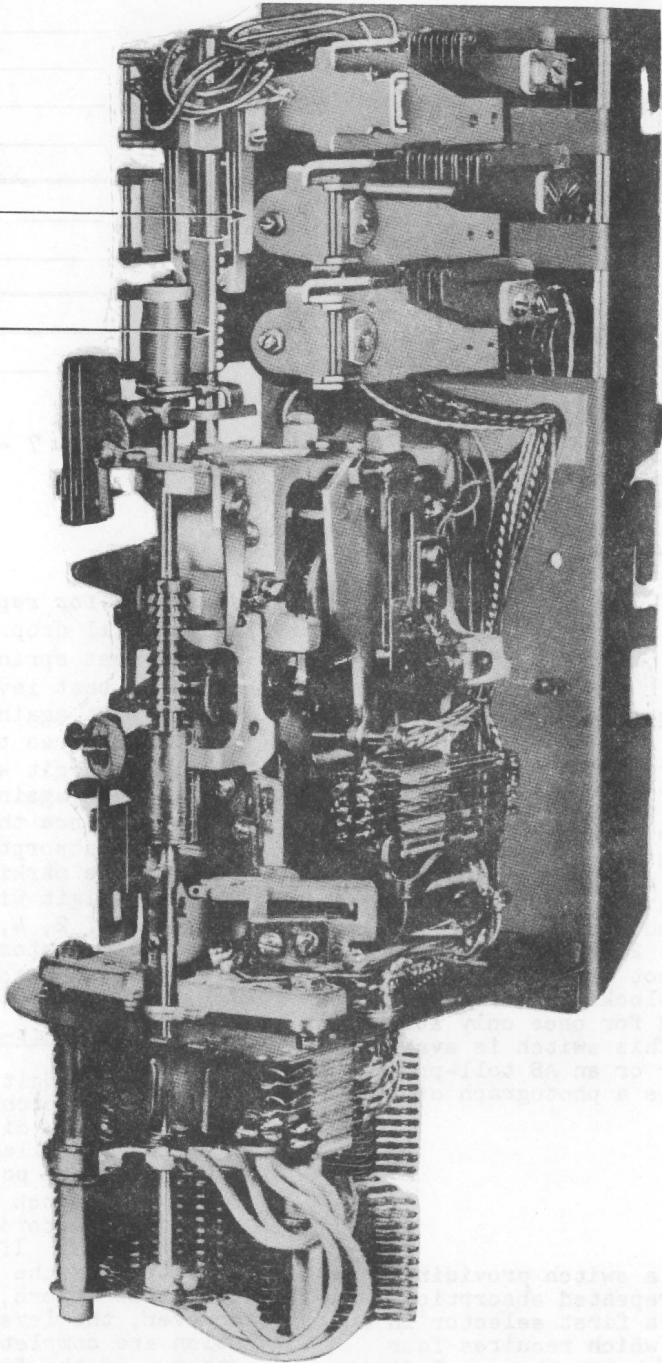NORMAL POST SPRINGS —

NORMAL POST CAM —

Fig. 6 - Once-only and/or Repeated Digit-absorbing Selector

2.11 If the switch is arranged for repeated
absorption, it continues to absorb
digits until a level not marked for absorption or blocking is dialed.

2.12 This switch is often used as a service
code selector (see Fig. 5). In this
case, it is arranged to absorb repeatedly
on the first level and to block on all
other levels unless a digit (necessarily 1)
has been absorbed. For example, if the
code 112 were dialed, the first selector
would trunk hunt on 1 and connect to the
service code selector. The second digit,
1, will be absorbed by the service code
selector. On the third digit, 2, the
switch will trunk hunt. If the second
digit dialed had been 2, paths-busy tone
would have been returned to the subscriber.
However, if a code of 1112 were dialed
by error, the switch would absorb the third
digit, 1, and trunk hunt when 2 was dialed.
It will be noted that in this instance the
blocked levels are unlocked by the dialing
of a digit corresponding to a repeatedly
absorbed level.

Once-only and/or Repeated Absorption

2.13 A switch that provides once-only
and/or repeated absorption may have
any combination of the two types of absorption on any one switch. Levels may be
marked for blocking, if desired. The
switch will absorb repeatedly or block when
those levels so indicated are dialed until
after a level marked for once-only absorption is dialed (see 2.06). Blocking may be
used on any level not marked for absorption.
Levels marked for blocking will be unlocked
when a level marked for once only absorption
has been dialed. This switch is available
as a local selector or an AB toll-preceding
selector. Fig. 6 is a photograph of this
type of switch.

2.14 Fig. 7 shows a switch providing once-
only and/or repeated absorption. Assume it is used as a first selector in a
single office unit which requires four
digits for switching but where a 7-digit
numbering plan is in effect. The switch
may be arranged to absorb repeatedly on
level 3, once only on level 6, and to block
on all other levels except 1 and 0. Assume
an office code of 336. On the first digit
dialed, the switch steps to level 3 which


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        ┌──────────────┐
        │    FIRST     │
        │   SELECTOR   │
        └──────────────┘

  0 ──────────────────── OPERATOR
  9 ──────────────────── B
  8 ──────────────────── B
  7 ──────────────────── B
  6 ──────────────────── A
  5 ──────────────────── B
  4 ──────────────────── B
  3 ──────────────────── AR
  2 ──────────────────── B
  1 ──────────────────── SPECIAL SERVICES
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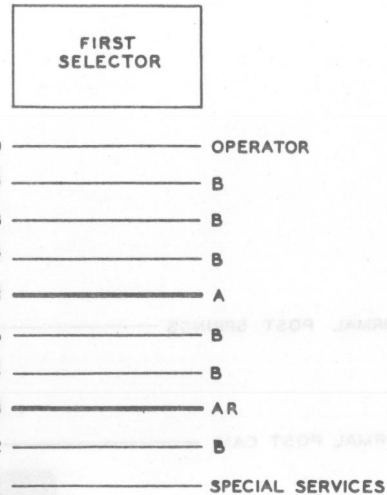
Fig. 7 - Selector Arranged
for Once-only
and/or Repeated
Absorption and
Blocking

is marked for repeated absorption. The
switch will drop back to normal (due to
normal post spring contacts adjusted to
close on that level) and on the second
digit, will again step to level 3. The
switch restores to normal a second time.
The third digit will step the switch to
level 6 and again it will restore to normal.
However, since the switch is marked for
once-only absorption on that level (6), it
removes the markings on all levels and on
the next digit will trunk hunt on any level
dialed. If 2, 4, 5, 7, 8, or 9 is dialed
first, the customer will receive an
all-paths-busy tone.

Two-digit, Digit-absorbing Selector

2.15 The 2-digit, digit-absorbing selector
knows which digit it is working on
and can take a different action accordingly.
This is controlled by the markings on four
sets of normal post springs. On the first
digit the switch will absorb, block, or
trunk hunt according to the marking on the
level dialed. If the first digit has been
absorbed, on the second digit the switch
will also absorb, block, or trunk hunt;
however, the levels assigned for each operation are completely independent of each
other. If the first and second digits have
been absorbed, on the third digit the
switch will trunk hunt on all levels. The
switch returns no-such-number or all-paths-
busy tone on levels marked for blocking.
Fig. 8 is a photograph of this type of
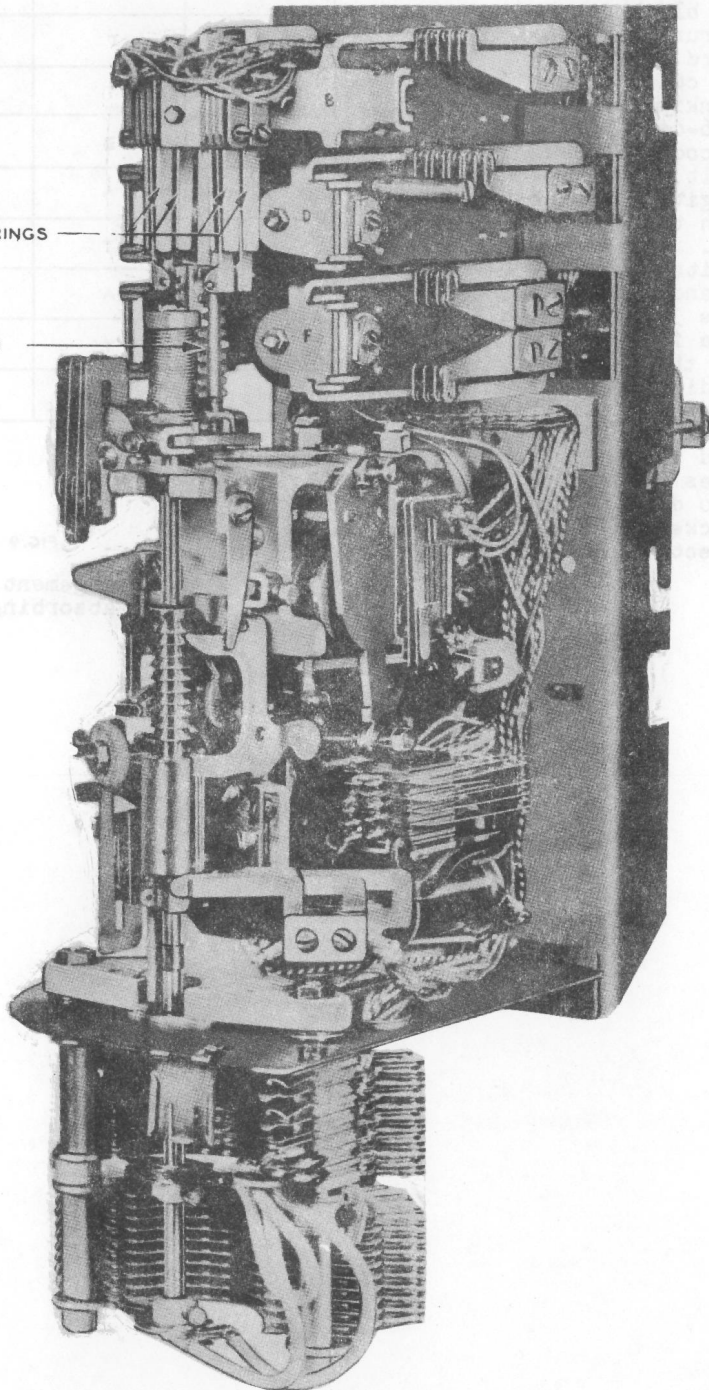switch.

NORMAL POST SPRINGS

NORMAL POST CAM

Fig. 8 - Two-digit, Digit-absorbing Selector

2.16 The following is an example of
a possible arrangement of the
switch. Levels 3 and 5 might be
specified to absorb and level 6 to
block on the first digit (see Fig.
9); levels 4 and 5 to absorb and
levels 0, 1, and 8 to block on the
second digit; and to trunk hunt on
all levels on the third digit.
Assume present office codes with
5-digit effective trunking to be
354 and 545 and with 6-digit trunk-
ing to be 328. When code 354 is
dialed, the first digit, 3, is ab-
sorbed, the second digit, 5, is ab-
sorbed, and the switch trunk hunts
on the third digit, 4. Similarly,
with code 545, the switch absorbs
the first two digits and trunk hunts
on the third. If code 328 is dialed,
the switch absorbs the first digit,
3, and trunk hunts on the second
digit, 2. The third digit, 8, is
handled by the succeeding switch (in
another office). A nearby office
which cannot be dialed from our sample
office might have codes 677 and 587.
If a customer tries to dial these
codes, he will be blocked on the first
or second digit, respectively.

LEVEL	FIRST DIGIT	SECOND DIGIT	THIRD DIGIT
0	T	B	T
9	T	T	T
8	T	B	T
7	T	T	T
6	B	T	T
5	A	A	T
4	T	A	T
3	A	T	T
2	T	T	T
1	T	B	T

NOTES:
1. T – TRUNK HUNTING
   A – ABSORPTION
   B – BLOCKING

FIG. 9

Fig. 9 - An arrangement for Use of 2-digit
Digit-absorbing Selector