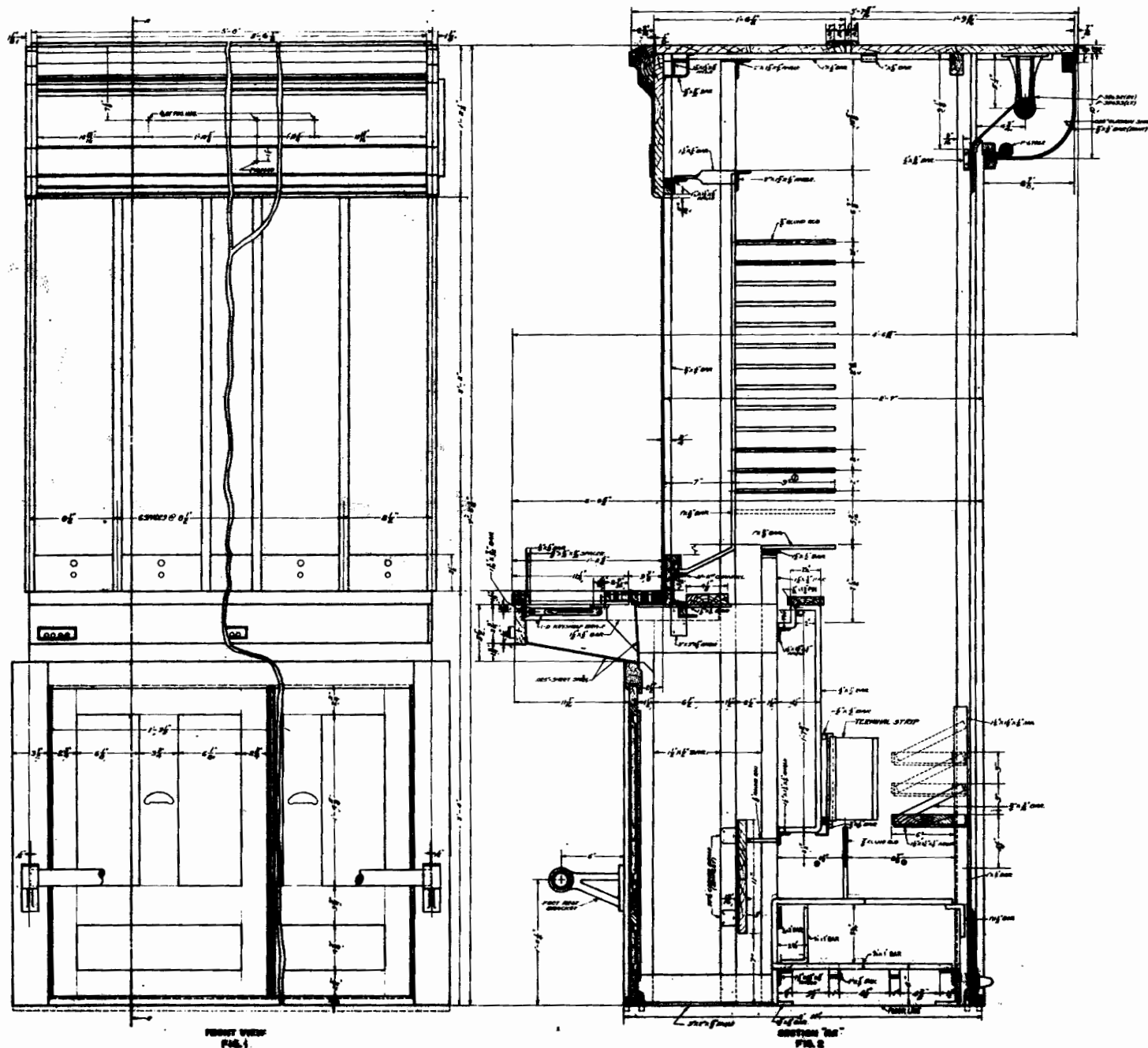


AMERICAN TEL. & TEL. CO.
Department of
Operation and Engineering

STEP-BY-STEP MACHINE SWITCHING SYSTEM
MACHINE SWITCHING 'A' BOARD
Section Assembly, No 1 Section

807-108
Information
Engineer: H. E.
Checked by:
August 1, 1925



STEP-BY-STEP MACHINE SWITCHING SYSTEM

MACHINE SWITCHING "A" BOARD

Dimensions & Location of Equipment - No. 1 Keyshelf

807-110
Information
Engineer *H. E.*
Draftsman
Checked by
August 1, 1923

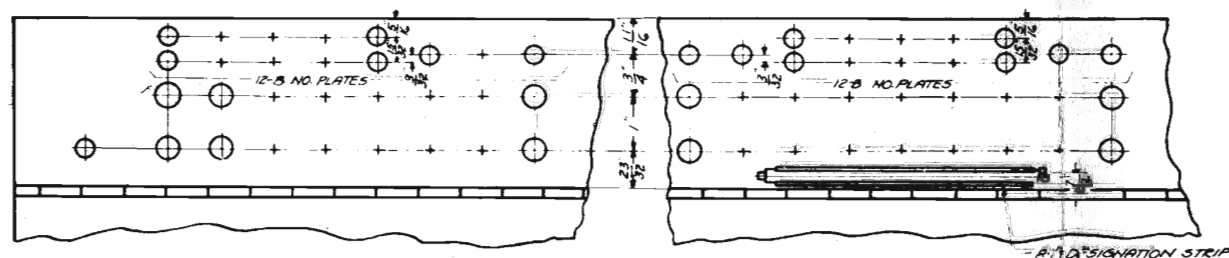
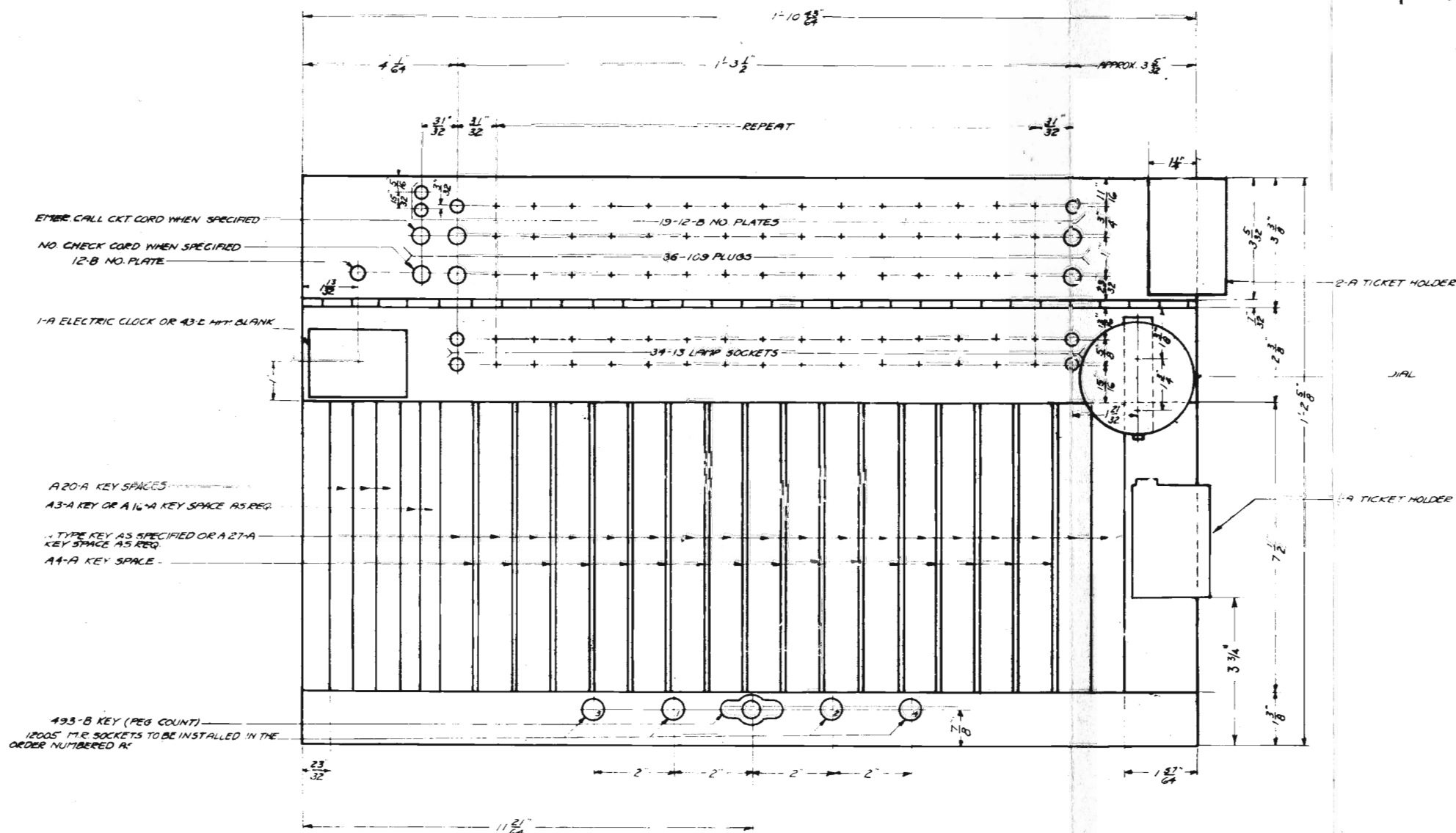


FIG. 1
SHOWING LOCATION OF 12-B NO. PLATES IN TWO ROWS FOR TEST CORDS WITH RESPECT TO LOCATION OF NO. PLATES IN SINGLE ROW.

FIG. 2
SHOWING LOCATION OF 12-B NO. PLATES IN TWO ROWS FOR CALL WIRELESS CORDS WITH RESPECT TO LOCATION OF NO. PLATES IN SINGLE ROW. 8-1/4" DESIGNATION STRIP SHALL BE PROVIDED AND LOCATED AS SHOWN FOR BOTH CONN. TYPES. WIRELESS CORDS SHALL BE IN SINGLE ROW. WHERE CONN. TYPES ARE ADJACENT TO EACH OTHER, ONE CONTINUOUS 8-1/4" DESIGNATION STRIP SHALL BE PROVIDED FOR BOTH TYPES OF CORDS.

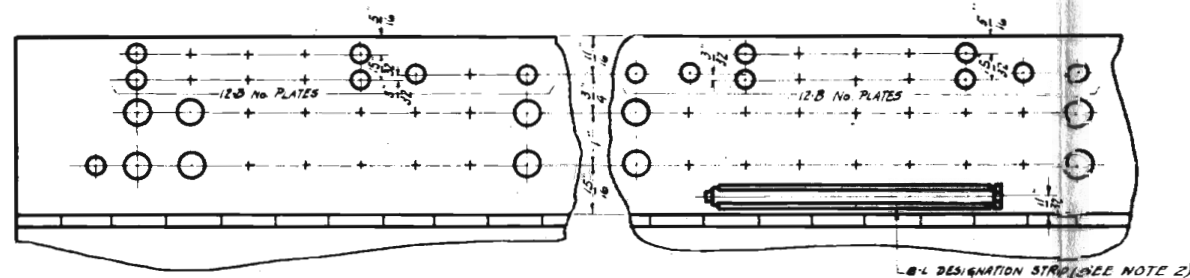


FIG. 2

SHOWING LOCATION OF 12-B NO. PLATES IN TWO ROWS FOR CALL WIRELESS CORDS WITH RESPECT TO LOCATION OF NO. PLATES IN SINGLE ROW. 8-4 DESIGNATION STRIP SHALL BE PROVIDED AND LOCATED AS SHOWN FOR BOTH CONN. TERM. CORDS AND CALL WIRELESS CORDS. FOR CONN. TERM. CORDS 12-B NO. PLATES SHALL BE IN SINGLE ROW WHERE CONN. TERM. CORD AND CALL WIRELESS CORDS ARE ADJACENT TO EACH OTHER. ONE CONTINUOUS 8-4 DESIGNATION STRIP SHALL BE PROVIDED FOR BOTH TYPES OF CORDS.

STEP BY STEP MACHINE SWITCHING SYSTEM
MACHINE SWITCHING "A" BOARD
Equipment Arrangement of Panels - No. 1 Section

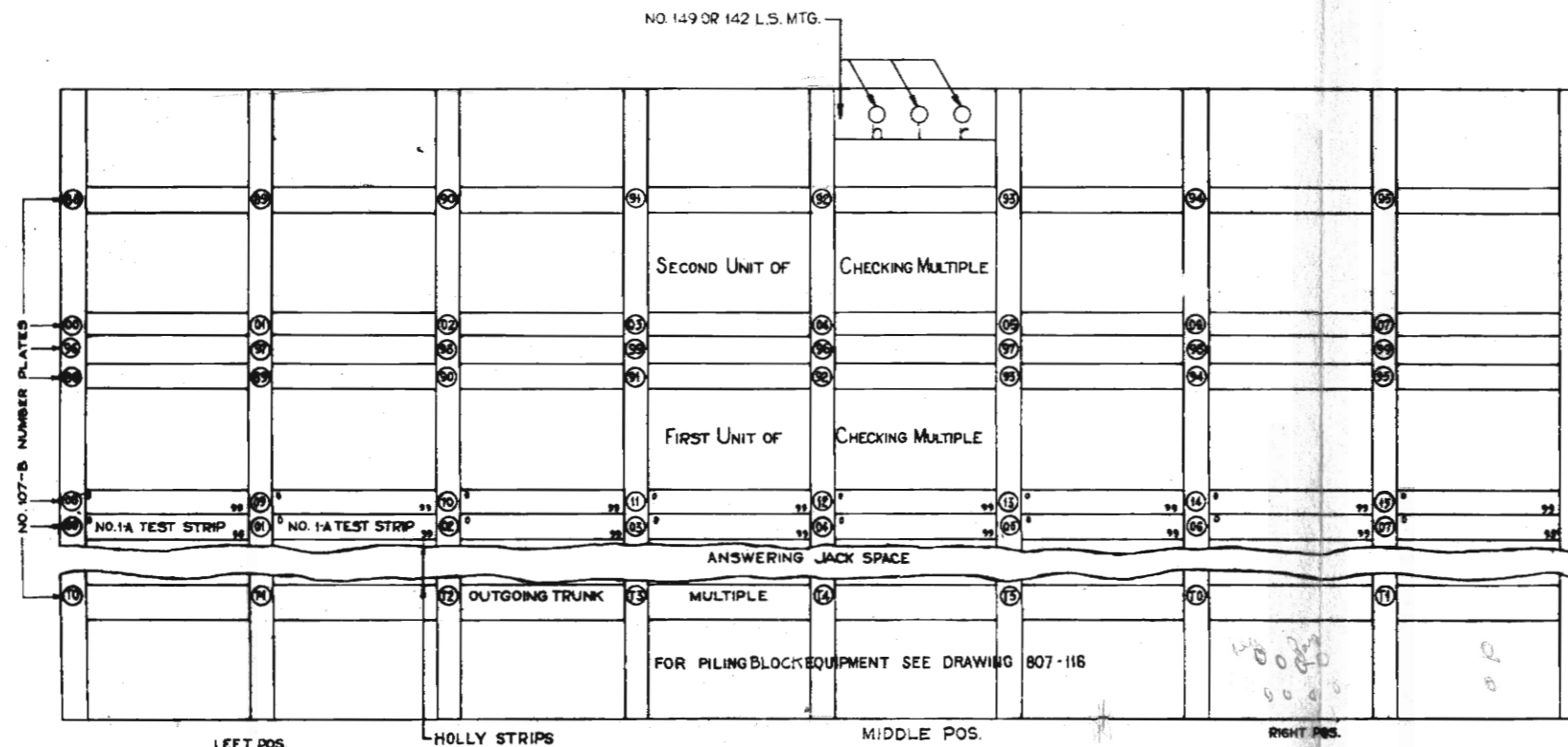


Fig. 1
FACE EQUIPMENT ARRANGEMENT OF CHECKING MULTIPLE & OUTGOING TRUNK MULTIPLE AND PILING RAIL

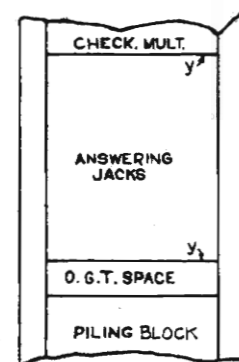


FIG. 2
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND NO MULTIPLE
ANSWERING JACKS

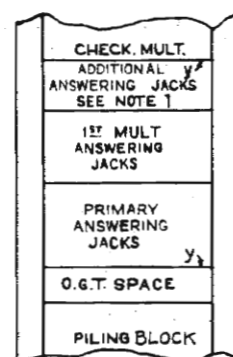


FIG. 3
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST
MULTIPLE ANSWERING JACKS

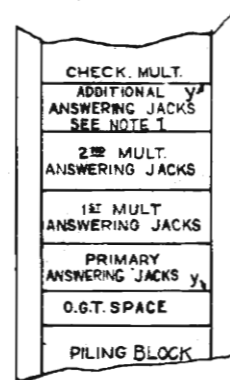


FIG. 4
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST AND 2ND
MULTIPLE ANSWERING JACKS

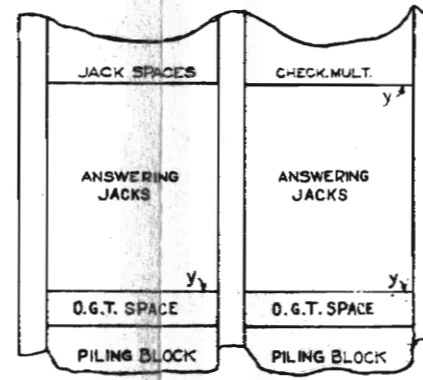


FIG. 5
FACE EQUIPMENT ARRANGEMENT
IN PANEL ADJACENT TO FIRST
PANEL HAVING CHECKING MULTIPLE, THE SWITCH-
BOARD GROWING FROM LEFT TO RIGHT

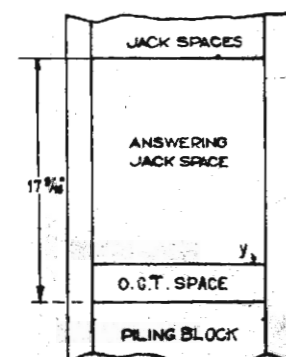


FIG. 6
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN THE HEAD OF THE BOARD
AND POSITIONS ARRANGED FOR CHECKING MULTIPLE

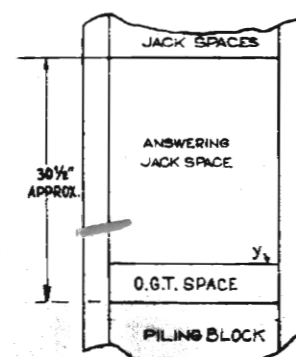


FIG. 7
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN FOOT OF BOARD AND
POSITIONS ARRANGED FOR CHECKING MULTIPLE

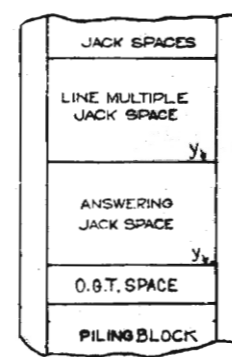


FIG. 8
FACE EQUIPMENT ARRANGEMENT
AT RURAL OR OFFICIAL POSITIONS
HAVING RURAL OR OFFICIAL
MULTIPLE, RESPECTIVELY

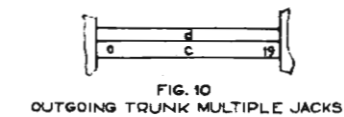


FIG. 10
OUTGOING TRUNK MULTIPLE JACKS

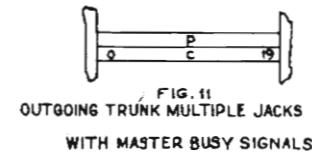


FIG. 11
OUTGOING TRUNK MULTIPLE JACKS
WITH MASTER BUSY SIGNALS

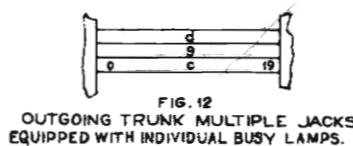


FIG. 12
OUTGOING TRUNK MULTIPLE JACKS
EQUIPPED WITH INDIVIDUAL BUSY LAMPS



FIG. 13
ANSWERING JACKS
MOUNTED 10 PER STRIP
WITH DESIGNATION STRIP

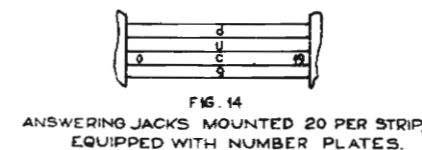


FIG. 14
ANSWERING JACKS MOUNTED 20 PER STRIP,
EQUIPPED WITH NUMBER PLATES

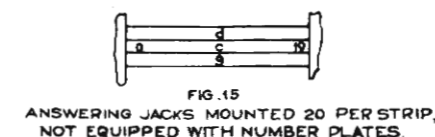


FIG. 15
ANSWERING JACKS MOUNTED 20 PER STRIP,
NOT EQUIPPED WITH NUMBER PLATES

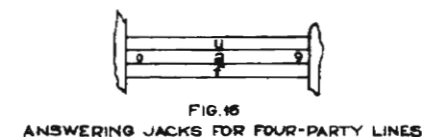


FIG. 16
ANSWERING JACKS FOR FOUR-PARTY LINES

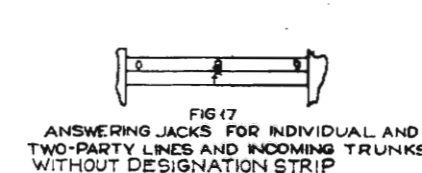


FIG. 17
ANSWERING JACKS FOR INDIVIDUAL AND
TWO-PARTY LINES AND INCOMING TRUNKS,
WITHOUT DESIGNATION STRIP

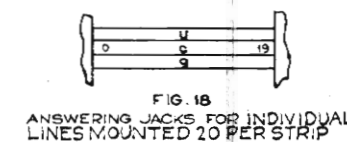


FIG. 18
ANSWERING JACKS FOR INDIVIDUAL
LINES MOUNTED 20 PER STRIP

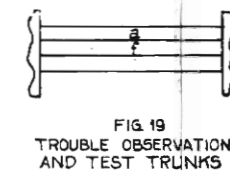


FIG. 19
TROUBLE OBSERVATION
AND TEST TRUNKS

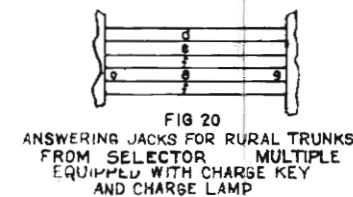


FIG. 20
ANSWERING JACKS FOR RURAL TRUNKS
FROM SELECTOR MULTIPLE
EQUIPPED WITH CHARGE KEY
AND CHARGE LAMP

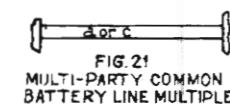


FIG. 21
MULTI-PARTY COMMON
BATTERY LINE MULTIPLE

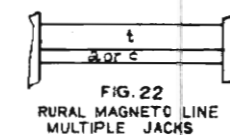


FIG. 22
RURAL MAGNETO LINE
MULTIPLE JACKS

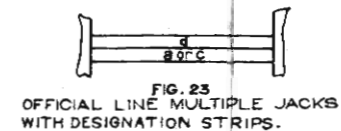


FIG. 23
OFFICIAL LINE MULTIPLE JACKS
WITH DESIGNATION STRIPS

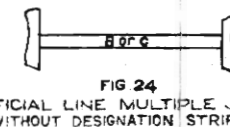


FIG. 24
OFFICIAL LINE MULTIPLE JACKS
WITHOUT DESIGNATION STRIPS



FIG. 25
SPECIAL SERVICE TRUNKS PROVIDED
WITH TONE REMOVAL KEYS

NOTES

- Where additional primary or answering jacks are installed above the initial installation

- a No. 92 Jacks, 10 per strip, No. 1
- b No. 112-AE Jack Space
- c No. 92 Jacks, 20 per strip, No. 1
- d No. 8-F Designation Str
- e No. 492-A Key, No. 344 Key Mou
- f No. 12 Lamp Sockets, 10 per st
- g No. 30 Lamp Sockets, 20 per st
- h Supervisor's Section Lamp
- i Supervisor's Division Lamp
- p No. 257 Lamp Socket Mo
- r Fuse Alarm Pilot, Lamp C
- s No. 56-B Drops, No. 83 Dro
- t No. 61-A Designation Str
- u No. 14-A Designation Str
- v No. 490-A Key, 338 Key Mou
- w No. 188-D Key, No. 345 Key M
- y Holly Strip

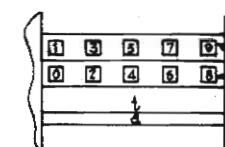


FIG. 26
ANSWERING JACKS FOR
MAGNETO LINES

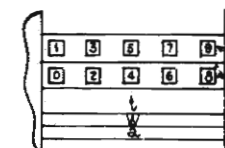


FIG. 27
ANSWERING JACKS FOR RURAL MA
EQUIPPED TO OPERATE WITH COM
CORD CIRCUITS

STEP BY STEP MACHINE SWITCHING SYSTEM

MACHINE SWITCHING "A" BOARD

Equipment Arrangement of Panels - No. 1 Section

807-112
Information
Engineer H.E.L.
Draftsman
Checked by
August 1, 1923
ISSUE 1

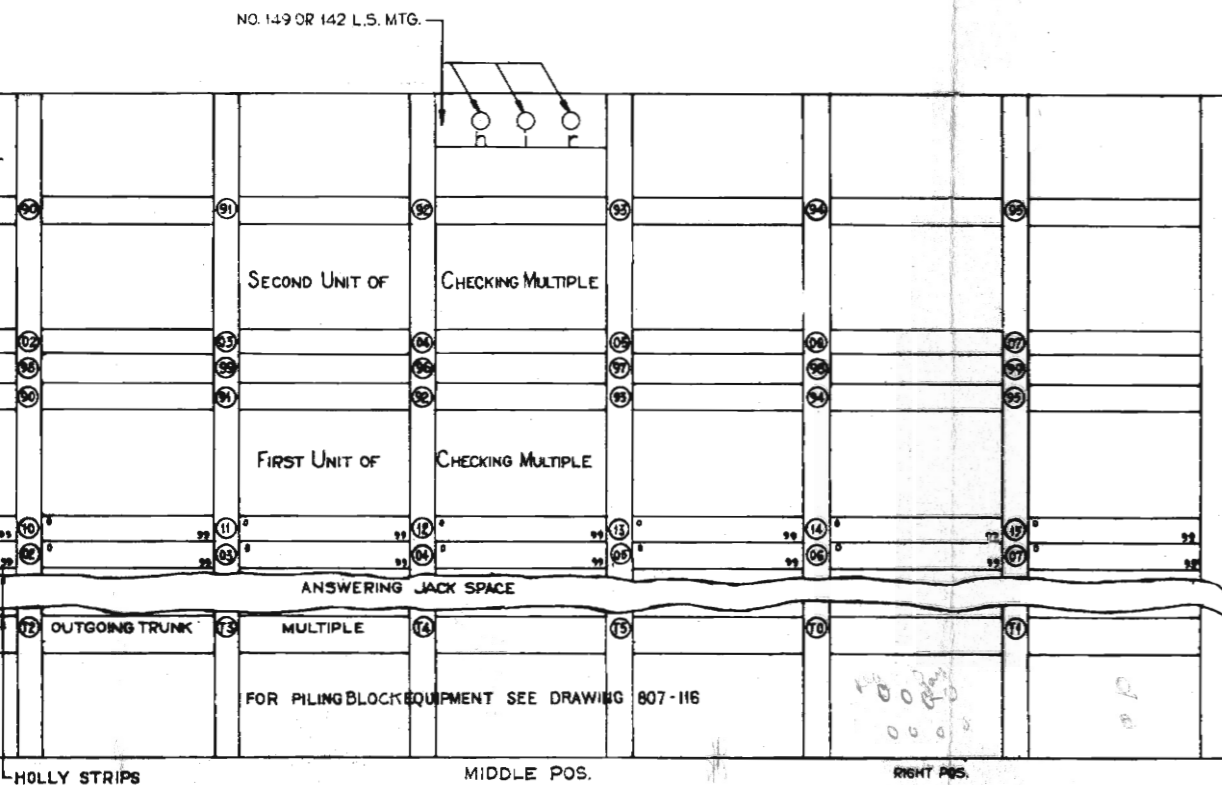


Fig. 1

FACE EQUIPMENT ARRANGEMENT OF CHECKING MULTIPLE & OUTGOING TRUNK MULTIPLE AND PILING RAIL

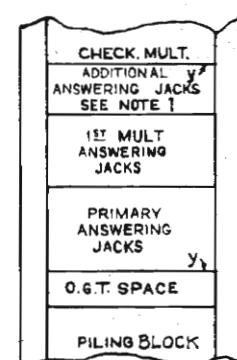


FIG. 3

FACE EQUIPMENT ARRANGEMENT AT POSITIONS HAVING CHECKING MULTIPLE AND 1ST MULTIPLE ANSWERING JACKS

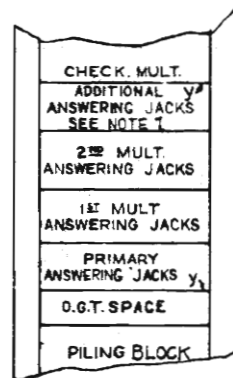


FIG. 4

FACE EQUIPMENT ARRANGEMENT AT POSITIONS HAVING CHECKING MULTIPLE AND 1ST AND 2ND MULTIPLE ANSWERING JACKS

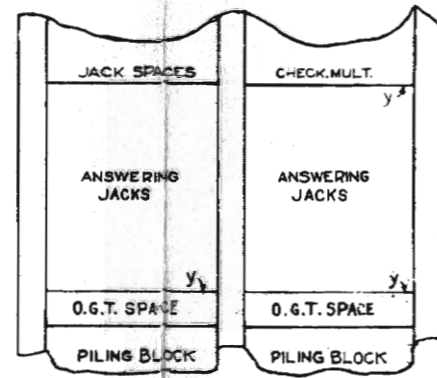


FIG. 5

FACE EQUIPMENT ARRANGEMENT IN PANEL ADJACENT TO FIRST PANEL HAVING CHECKING MULTIPLE, THE SWITCH-BOARD GROWING FROM LEFT TO RIGHT

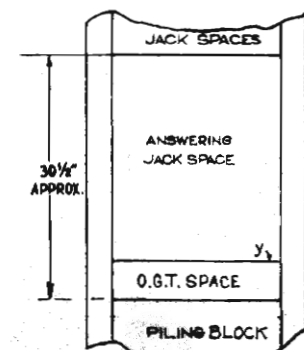


FIG. 7

FACE EQUIPMENT ARRANGEMENT AT POSITIONS BETWEEN FOOT OF BOARD AND POSITIONS ARRANGED FOR CHECKING MULTIPLE

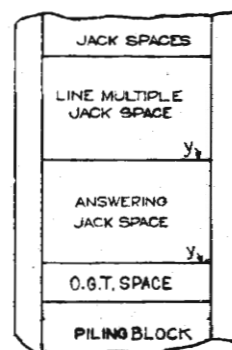


FIG. 8

FACE EQUIPMENT ARRANGEMENT AT RURAL OR OFFICIAL POSITIONS HAVING RURAL OR OFFICIAL LINE MULTIPLE, RESPECTIVELY.

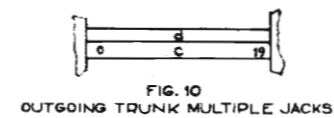


FIG. 10

OUTGOING TRUNK MULTIPLE JACKS

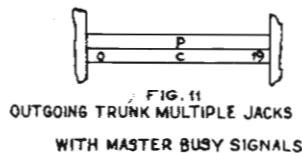


FIG. 11

OUTGOING TRUNK MULTIPLE JACKS WITH MASTER BUSY SIGNALS.

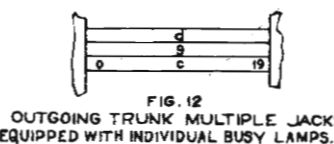


FIG. 12

OUTGOING TRUNK MULTIPLE JACKS EQUIPPED WITH INDIVIDUAL BUSY LAMPS.

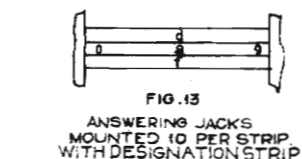


FIG. 13

ANSWERING JACKS MOUNTED 10 PER STRIP WITH DESIGNATION STRIP

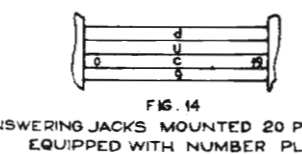


FIG. 14

ANSWERING JACKS MOUNTED 20 PER STRIP, EQUIPPED WITH NUMBER PLATES.

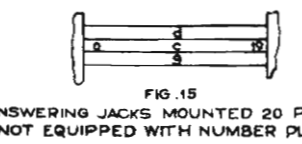


FIG. 15

ANSWERING JACKS MOUNTED 20 PER STRIP, NOT EQUIPPED WITH NUMBER PLATES.

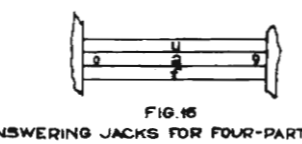


FIG. 16

ANSWERING JACKS FOR FOUR-PARTY LINES.

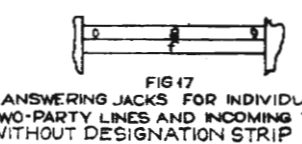


FIG. 17

ANSWERING JACKS FOR INDIVIDUAL AND TWO-PARTY LINES AND INCOMING TRUNKS WITHOUT DESIGNATION STRIP

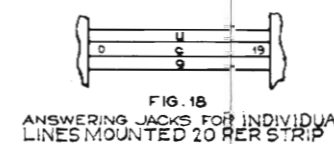


FIG. 18

ANSWERING JACKS FOR INDIVIDUAL LINES MOUNTED 20 PER STRIP



FIG. 19

TROUBLE OBSERVATION AND TEST TRUNKS

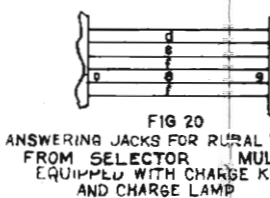


FIG. 20

ANSWERING JACKS FOR RURAL TRUNKS FROM SELECTOR MULTIPLE EQUIPPED WITH CHARGE KEY AND CHARGE LAMP

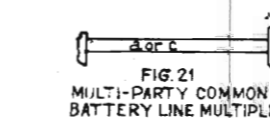


FIG. 21

MULTI-PARTY COMMON BATTERY LINE MULTIPLE

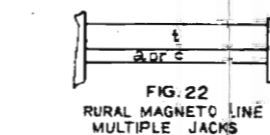


FIG. 22

RURAL MAGNETO LINE MULTIPLE JACKS

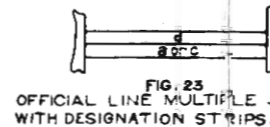


FIG. 23

OFFICIAL LINE MULTIPLE JACKS WITH DESIGNATION STRIPS.

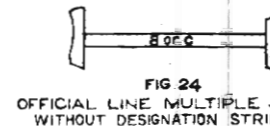


FIG. 24

OFFICIAL LINE MULTIPLE JACKS WITHOUT DESIGNATION STRIPS

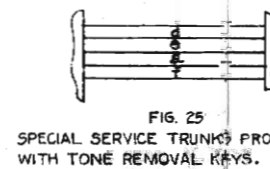


FIG. 25

SPECIAL SERVICE TRUNKS PROVIDED WITH TONE REMOVAL KEYS.

NOTES

1. Where additional primary or additional multiple answering jacks are installed, they are placed above the initial installation of multiple jacks.

- a No. 92 Jacks, 10 per strip, No. 139 Jack Mount'g
- b No. 112-AE Jack Space
- c No. 92 Jacks, 20 per strip, No. 113 Jack Mount'g
- d No. 6-F Designation Strip
- e No. 492-A Key, No. 344 Key Mounting
- f No. 12 Lamp Sockets, 10 per strip, No. 134 Lamp Socket Mounting
- g No. 30 Lamp Sockets, 20 per strip, No. 118 Lamp Socket Mounting
- h Supervisor's Section Lamp, White Cap (Plain)
- i Supervisor's Division Lamp, Red Cap (Jeweled)
- p No. 257 Lamp Socket Mounting
- r Fuse Alarm Pilot, Lamp Cap Green (Plain)
- s No. 56-B Drops, No. 83 Drop Mounting
- t No. 61-A Designation Strip
- u No. 14-A Designation Strip
- v No. 490-A Key, 338 Key Mounting
- w No. 188-D Key, No. 345 Key Mounting
- y Holly Strip

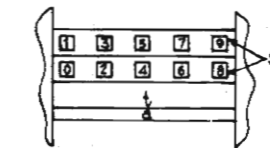


FIG. 26

ANSWERING JACKS FOR RURAL MAGNETO LINES

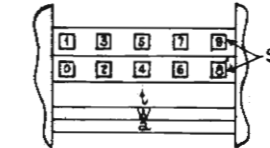


FIG. 27

ANSWERING JACKS FOR RURAL MAGNETO LINES EQUIPPED TO OPERATE WITH COMMON BATTERY CORD CIRCUITS.

STEP-BY-STEP MACHINE SWITCHING SYSTEM

MACHINE SWITCHING "A" BOARD

Equipment Arrangement of Panels - No. 1-D Section

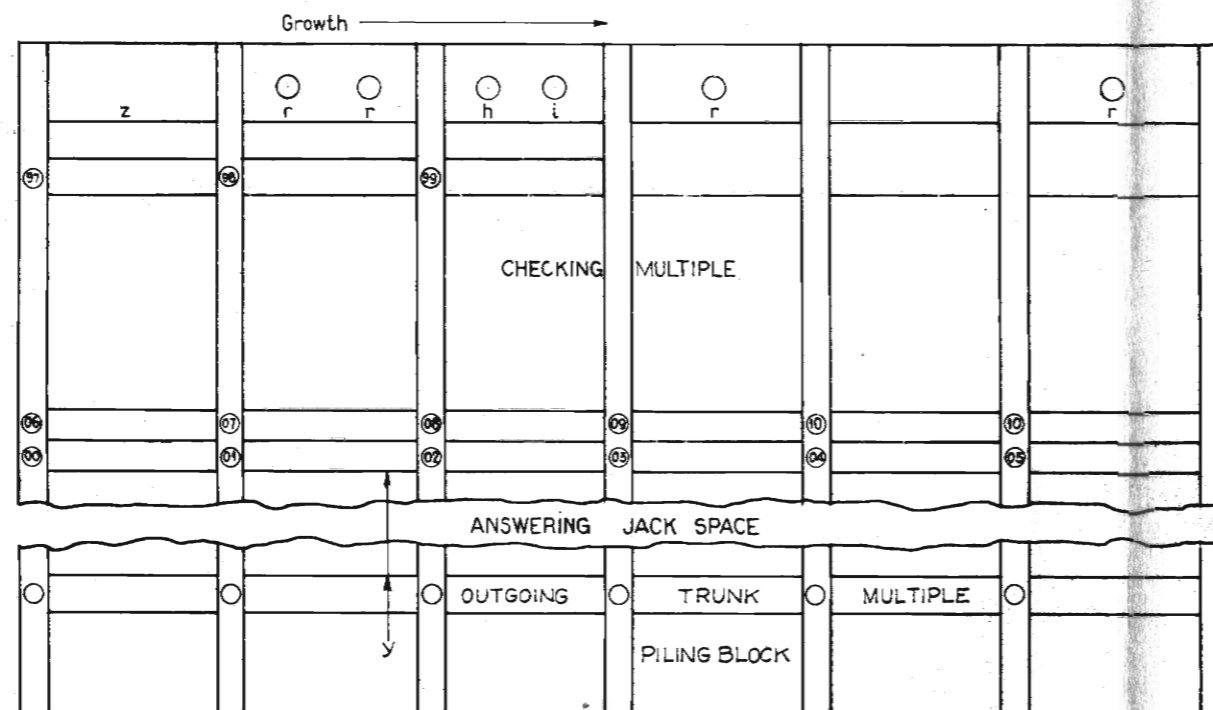


Fig. 1

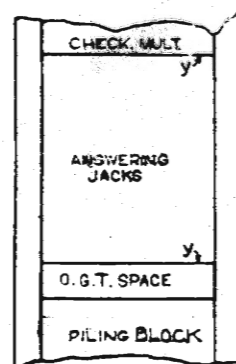


FIG. 2
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND NO MULTIPLE
ANSWERING JACKS

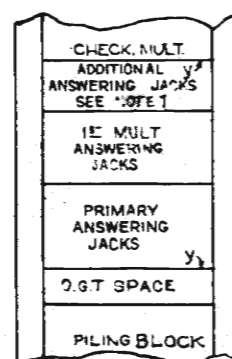


FIG. 3
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST
MULTIPLE ANSWERING JACKS

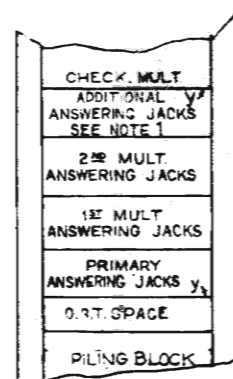


FIG. 4
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST AND 2ND
MULTIPLE ANSWERING JACKS

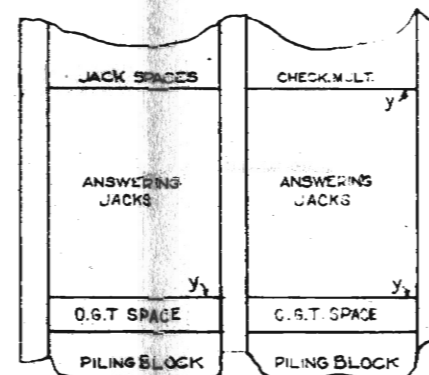


FIG. 5
FACE EQUIPMENT ARRANGEMENT
IN
PANEL HAVING CHECKING MULTIPLE, THE SWITCH-
BOARD GROWING FROM LEFT TO RIGHT

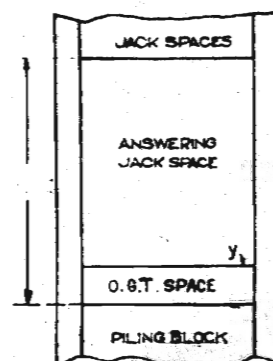


FIG. 6
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN THE HEAD OF THE BOARD
AND POSITIONS ARRANGED FOR CHECKING MULTIPLE

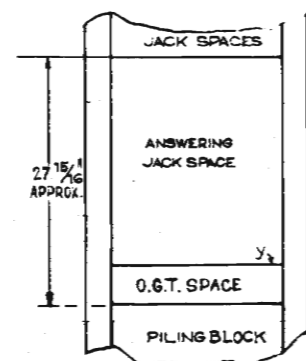


FIG. 7
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN FOOT OF BOARD AND
POSITIONS ARRANGED FOR CHECKING MULTIPLE

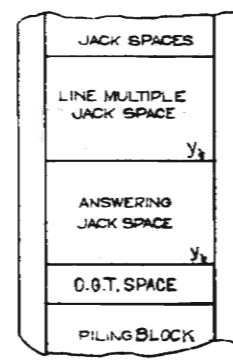


FIG. 8
FACE EQUIPMENT ARRANGEMENT
AT RURAL OR OFFICE POSITIONS
HAVING RURAL OR OFFICE LINE
MULTIPLE, RESPECTIVELY

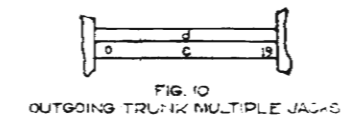


FIG. 10
OUTGOING TRUNK MULTIPLE JACKS.

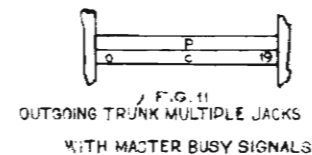


FIG. 11
OUTGOING TRUNK MULTIPLE JACKS
WITH MASTER BUSY SIGNALS.

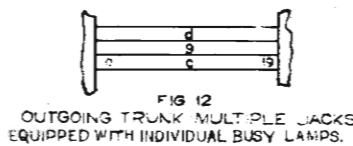


FIG. 12
OUTGOING TRUNK MULTIPLE JACKS
EQUIPPED WITH INDIVIDUAL BUSY LAMPS.

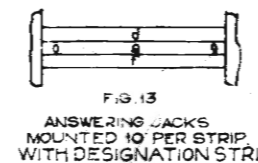


FIG. 13
ANSWERING JACKS
MOUNTED 10 PER STRIP
WITH DESIGNATION STRIP

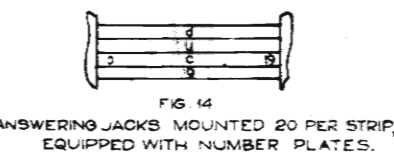


FIG. 14
ANSWERING JACKS MOUNTED 20 PER STRIP,
EQUIPPED WITH NUMBER PLATES.

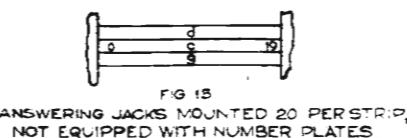


FIG. 15
ANSWERING JACKS MOUNTED 20 PER STRIP,
NOT EQUIPPED WITH NUMBER PLATES.



FIG. 16
ANSWERING JACKS FOR FOUR-PARTY LINES.

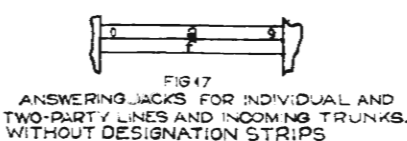


FIG. 17
ANSWERING JACKS FOR INDIVIDUAL AND
TWO-PARTY LINES AND INCOMING TRUNKS.
WITHOUT DESIGNATION STRIPS

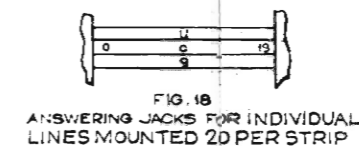


FIG. 18
ANSWERING JACKS FOR INDIVIDUAL
LINES MOUNTED 20 PER STRIP

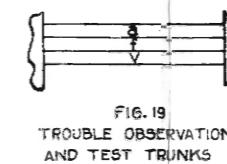


FIG. 19
TROUBLE OBSERVATION
AND TEST TRUNKS

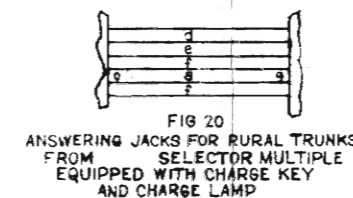


FIG. 20
ANSWERING JACKS FOR RURAL TRUNKS
FROM
SELECTOR MULTIPLE
EQUIPPED WITH CHARGE KEY
AND CHARGE LAMP

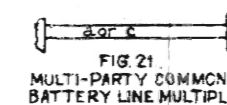


FIG. 21
MULTI-PARTY COMMON
BATTERY LINE MULTIPLE

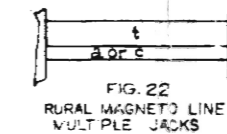


FIG. 22
RURAL MAGNETO LINE
MULTIPLE JACKS

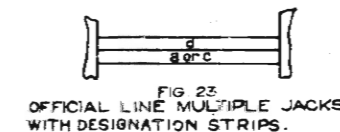


FIG. 23
OFFICIAL LINE MULTIPLE JACKS
WITH DESIGNATION STRIPS.

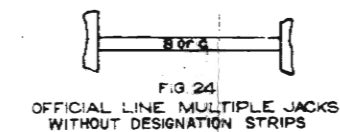


FIG. 24
OFFICIAL LINE MULTIPLE JACKS
WITHOUT DESIGNATION STRIPS



FIG. 25
SPECIAL SERVICE TRUNKS PROVIDED
WITH TONE REMOVAL KEYS.

NOTES
1. Where additional primary or answering jacks are installed above the initial installation

a No. 49 Jacks, 10 per strip, No. 49 Jack Space
b No. 49 Jacks, 20 per strip, No. 49 Jack Space
c No. 49 Jacks, 20 per strip, No. 49 Jack Space
d No. 4-C Designation Strip
e No. 492-A Key, No. 346 Key Mounting
f No. 12 Lamp Sockets, 10 per Socket Mounting
g No. 12 Lamp Sockets, 20 per Socket Mounting
h Supervisor's Section Lamp
i Supervisor's Division Lamp
p No. 258 Lamp Socket Mounting
r Fuse Alarm Pilot, Lamp Mounting
s No. 56B Drops, No. 84 Drop Mounting
t No. 62-A Designation Strip
u No. 2 TYP Designation Strip
v No. 248-A Key, No. 232 Key Mounting
w No. 92-A Key, No. 340 Key Mounting
x No. 492-A Key, No. 342 Key Mounting
y Holly Strip
z Night Alarm and Clock Circuit Panel of first position only

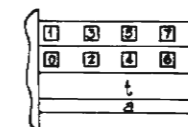


FIG. 26
ANSWERING JACKS FOR
MAGNETO LINE

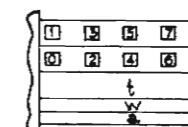


FIG. 27
ANSWERING JACKS FOR RURAL
LINES EQUIPPED TO OPERATE
BATTERY CORD CIRCUITS.

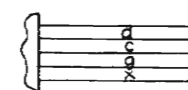


FIG. 28
SPECIAL SERVICE TRUNK
20 PER STRIP PROVIDED
WITH REMOVAL KEY

STEP-BY-STEP MACHINE SWITCHING SYSTEM

MACHINE SWITCHING "A" BOARD

Equipment Arrangement of Panels - No. 1-D Section

807-113

Information

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Draftsman

Checked by

August 1, 1923.

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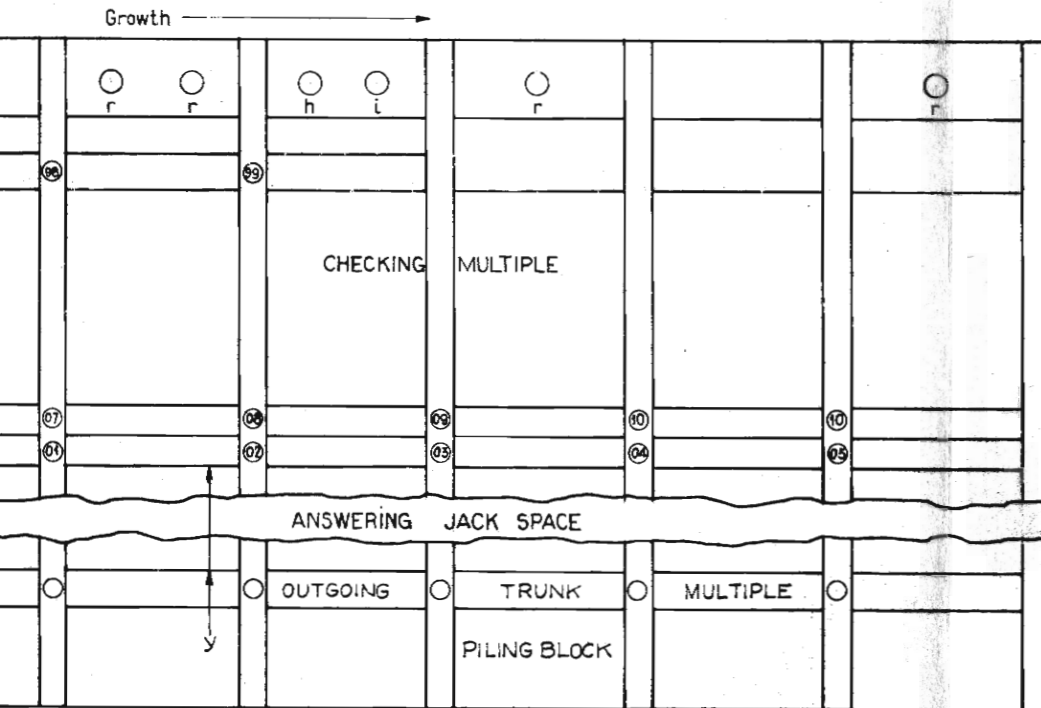


Fig. 1

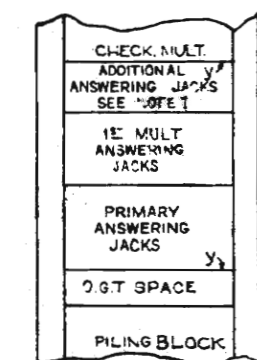


FIG. 3
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST
MULTIPLE ANSWERING JACKS

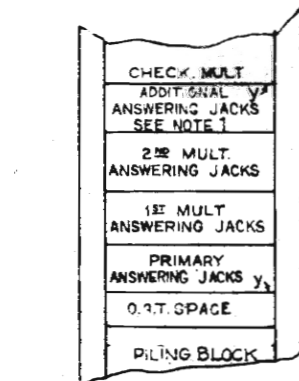


FIG. 4
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST AND 2ND
MULTIPLE ANSWERING JACKS

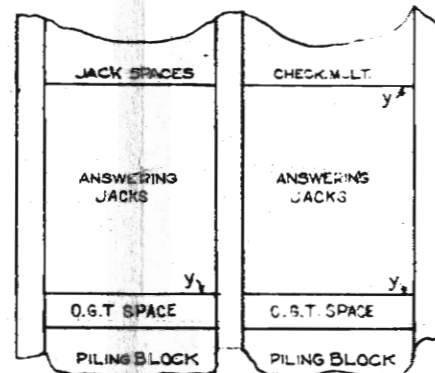


FIG. 5
FACE EQUIPMENT ARRANGEMENT
IN
PANEL ADJACENT TO FIRST
PANEL HAVING CHECKING MULTIPLE, THE SWITCH-
BOARD GROWING FROM LEFT TO RIGHT

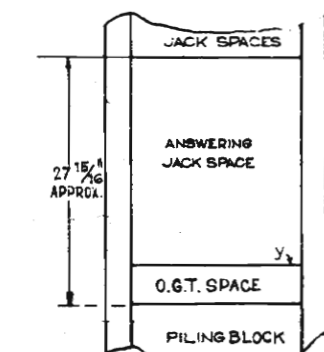


FIG. 7
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN FOOT OF BOARD AND
POSITIONS ARRANGED FOR CHECKING MULTIPLE

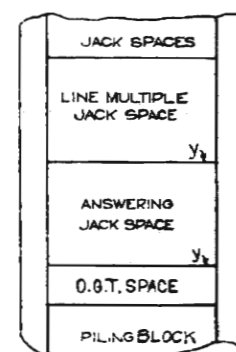


FIG. 9
FACE EQUIPMENT ARRANGEMENT
AT RURAL OR OFFICIAL POSITIONS
HAVING RURAL OR OFFICIAL LINE
MULTIPLE, RESPECTIVELY

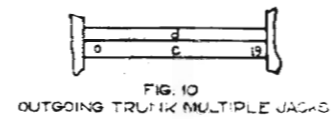


FIG. 10
OUTGOING TRUNK MULTIPLE JACKS

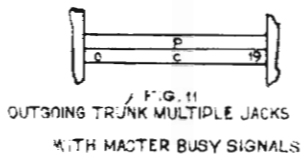


FIG. 11
OUTGOING TRUNK MULTIPLE JACKS
WITH MASTER BUSY SIGNALS

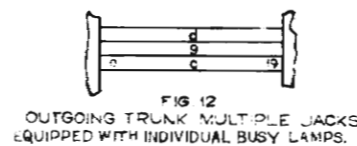


FIG. 12
OUTGOING TRUNK MULTIPLE JACKS
EQUIPPED WITH INDIVIDUAL BUSY LAMPS

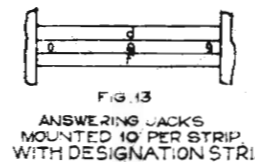


FIG. 13
ANSWERING JACKS
MOUNTED 10 PER STRIP
WITH DESIGNATION STRIP

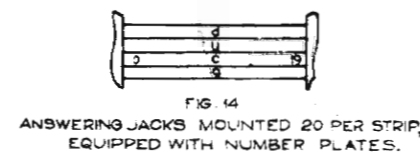


FIG. 14
ANSWERING JACKS MOUNTED 20 PER STRIP,
EQUIPPED WITH NUMBER PLATES

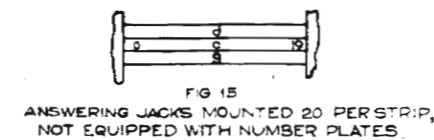


FIG. 15
ANSWERING JACKS MOUNTED 20 PER STRIP,
NOT EQUIPPED WITH NUMBER PLATES

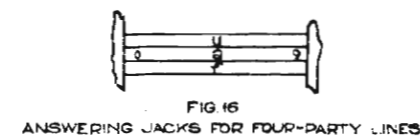


FIG. 16
ANSWERING JACKS FOR FOUR-PARTY LINES



FIG. 17
ANSWERING JACKS FOR INDIVIDUAL AND
TWO-PARTY LINES AND INCOMING TRUNKS,
WITHOUT DESIGNATION STRIPS

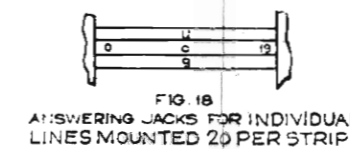


FIG. 18
ANSWERING JACKS FOR INDIVIDUAL
LINES MOUNTED 20 PER STRIP

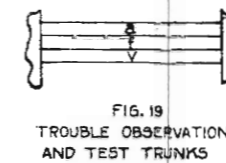


FIG. 19
TROUBLE OBSERVATION
AND TEST TRUNKS

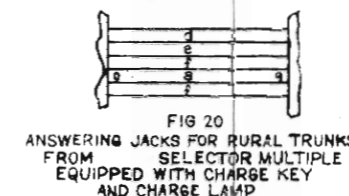


FIG. 20
ANSWERING JACKS FOR RURAL TRUNKS
FROM
SELECTOR MULTIPLE
EQUIPPED WITH CHARGE KEY
AND CHARGE LAMP

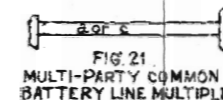


FIG. 21
MULTI-PARTY COMMON
BATTERY LINE MULTIPLE

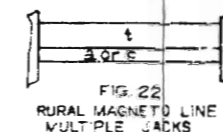


FIG. 22
RURAL MAGNETO LINE
MULTIPLE JACKS

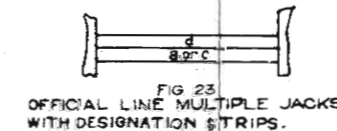


FIG. 23
OFFICIAL LINE MULTIPLE JACKS
WITH DESIGNATION STRIPS

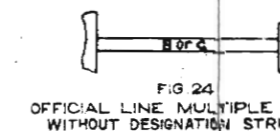


FIG. 24
OFFICIAL LINE MULTIPLE JACKS
WITHOUT DESIGNATION STRIPS

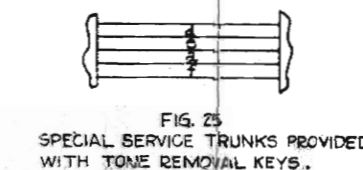


FIG. 25
SPECIAL SERVICE TRUNKS PROVIDED
WITH TONE REMOVAL KEYS

NOTES

f. Where additional primary or additional multiple answering jacks are installed, they are placed above the initial installation of multiple jacks.

- a No. 49 Jacks, 10 per strip, No. 142 Jack Mount'g
- b No. 49 Jack Space
- c No. 49 Jacks, 20 per strip, No. 114 Jack Mount'g
- d No. 1-C Designation Strip
- e No. 492-A Key, No. 346 Key Mounting
- f No. 12 Lamp Sockets, 10 per strip, No. 122 Lamp Socket Mounting
- g No. 12 Lamp Sockets, 20 per strip, No. 102 Lamp Socket Mounting
- h Supervisor's Section Lamp, White Cap (Plain)
- i Supervisor's Division Lamp, Red Cap (Jeweled)
- p No. 258 Lamp Socket Mounting
- r Fuse Alarm Pilot, Lamp Cap Green (Plain)
- s No. 56B Drops, No. 84 Drop Mounting
- t No. 62-A Designation Strip
- u No. 2 TYP. Designation Strip
- v No. 248-A Key, No. 232 Key Mounting
- w No. 92-A Key, No. 340 Key Mounting
- x No. 492-A Key, No. 342 Key Mounting
- y Holly Strip
- z Night Alarm and Clock Circuit Keys, 1st Panel of first position only

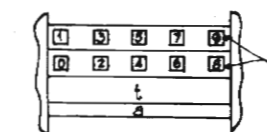


FIG. 26
ANSWERING JACKS FOR RURAL
MAGNETO LINES

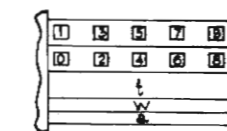


FIG. 27
ANSWERING JACKS FOR RURAL MAGNETO
LINES EQUIPPED TO OPERATE WITH COMMON
BATTERY CORD CIRCUITS

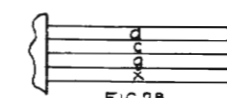


FIG. 28
SPECIAL SERVICE TRUNKS MOUNTED
20 PER STRIP PROVIDED WITH TONE
REMOVAL KEYS

STEP-BY-STEP MACHINE SWITCHING SYSTEM

MACHINE SWITCHING "A" BOARD

Equipment Arrangement of Panels - No. 1 - D Section

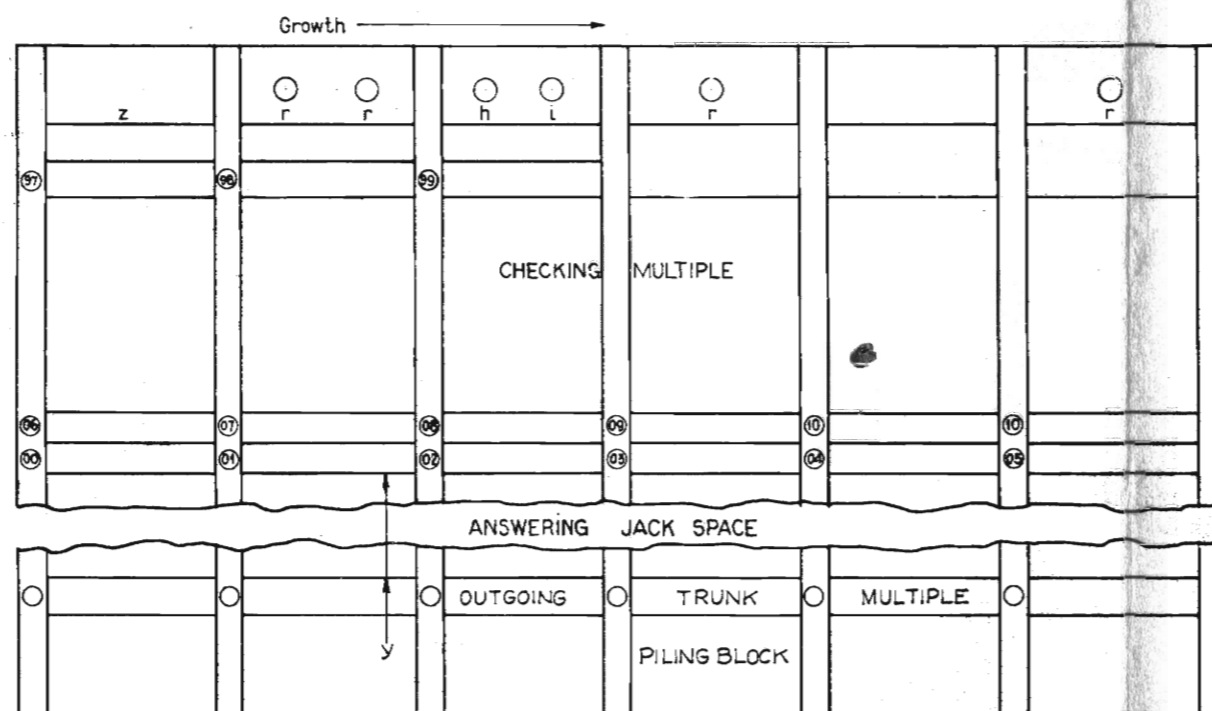


Fig. 1

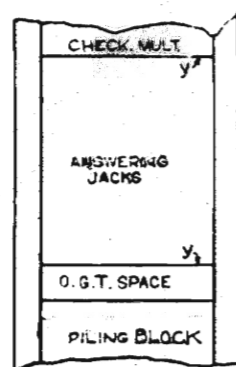


FIG. 2
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND NO MULTIPLE
ANSWERING JACKS

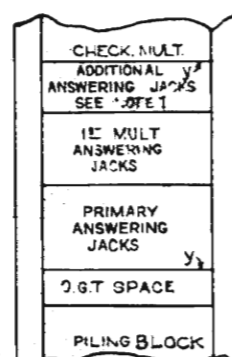


FIG. 3
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST
MULTIPLE ANSWERING JACKS

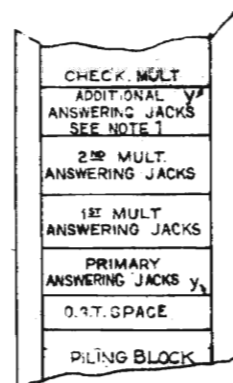


FIG. 4
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST AND 2ND
MULTIPLE ANSWERING JACKS

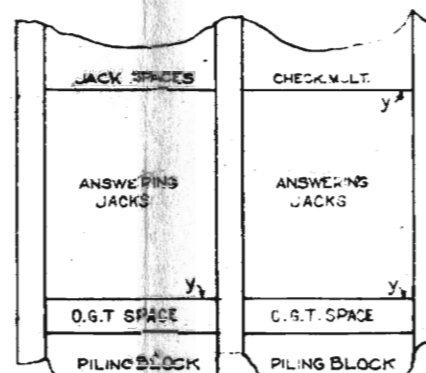


FIG. 5
FACE EQUIPMENT ARRANGEMENT
IN PANEL ADJACENT TO FIRST
PANEL HAVING CHECKING MULTIPLE, THE SWITCH-
BOARD GROWING FROM LEFT TO RIGHT

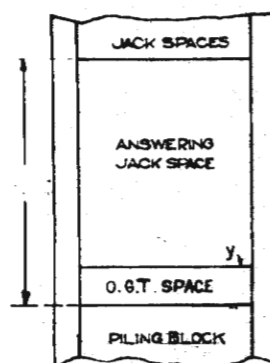


FIG. 6
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN THE HEAD OF THE BOARD
AND POSITIONS ARRANGED FOR CHECKING MULTIPLE

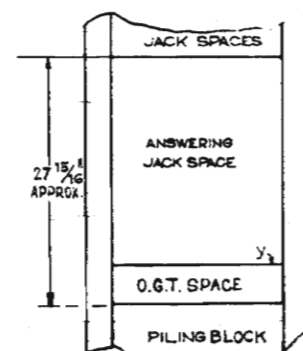


FIG. 7
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN FOOT OF BOARD AND
POSITIONS ARRANGED FOR CHECKING MULTIPLE

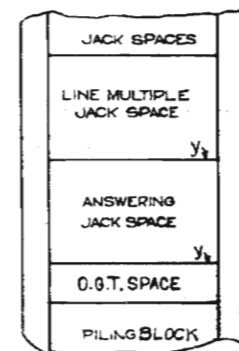


FIG. 8
FACE EQUIPMENT ARRANGEMENT
AT RURAL OR OFFICIAL POSITIONS
HAVING RURAL OR OFFICIAL MULTIPLE, RESPECTIVELY

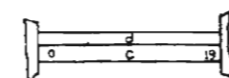


FIG. 10
OUTGOING TRUNK MULTIPLE JACKS

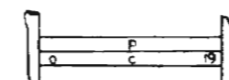


FIG. 11
OUTGOING TRUNK MULTIPLE JACKS
WITH MASTER BUSY SIGNALS

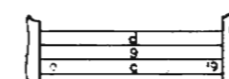


FIG. 12
OUTGOING TRUNK MULTIPLE JACKS
EQUIPPED WITH INDIVIDUAL BUSY LAMPS

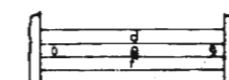


FIG. 13
ANSWERING JACKS
MOUNTED 10 PER STRIP
WITH DESIGNATION STRIP

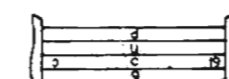


FIG. 14
ANSWERING JACKS MOUNTED 20 PER STRIP,
EQUIPPED WITH NUMBER PLATES

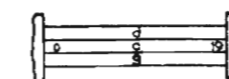


FIG. 15
ANSWERING JACKS MOUNTED 20 PER STRIP,
NOT EQUIPPED WITH NUMBER PLATES

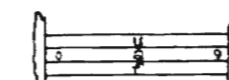


FIG. 16
ANSWERING JACKS FOR FOUR-PARTY LINES

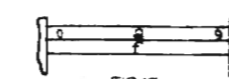


FIG. 17
ANSWERING JACKS FOR INDIVIDUAL AND
TWO-PARTY LINES AND INCOMING TRUNKS
WITHOUT DESIGNATION STRIPS

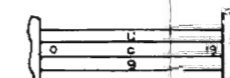


FIG. 18
ANSWERING JACKS FOR INDIVIDUAL
LINES MOUNTED 20 PER STRIP

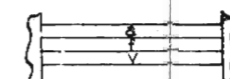


FIG. 19
TROUBLE OBSERVATION
AND TEST TRUNKS



FIG. 20
ANSWERING JACKS FOR RURAL TRUNKS
FROM SELECTOR MULTIPLE
EQUIPPED WITH CHARGE KEY
AND CHARGE LAMP



FIG. 21
MULTI-PARTY COMMON
BATTERY LINE MULTIPLE

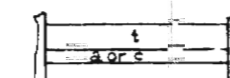


FIG. 22
RURAL MAGNET LINE
MULTIPLE JACKS

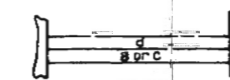


FIG. 23
OFFICIAL LINE MULTIPLE JACKS
WITH DESIGNATION STRIPS

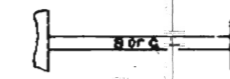


FIG. 24
OFFICIAL LINE MULTIPLE JACKS
WITHOUT DESIGNATION STRIPS

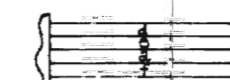


FIG. 25
SPECIAL SERVICE TRUNKS PROVIDED
WITH TONE REMOVAL KEYS

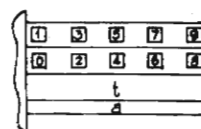


FIG. 26
ANSWERING JACKS FOR
MAGNETO LINE

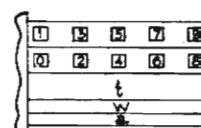


FIG. 27
ANSWERING JACKS FOR RURAL
LINES EQUIPPED TO OPERATE
BATTERY CORD CIRCUITS

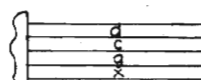


FIG. 28
SPECIAL SERVICE TRUNKS
20 PER STRIP PROVIDED
WITH TONE REMOVAL KEYS

NOTES

1. Where additional primary or answering jacks are installed above the initial installation

a No. 49 Jacks, 10 per strip, No. 49 Jack Space
b No. 49 Jacks, 20 per strip, No. 49 Jack Space
c No. 49 Jacks, 20 per strip, No. 49 Jack Space
d No. 49 Jacks, 20 per strip, No. 49 Jack Space
e No. 492-A Key, No. 346 Key Mo
f No. 12 Lamp Sockets, 10 per strip, Socket Mounting
g No. 12 Lamp Sockets, 20 per strip, Socket Mounting
h Supervisor's Section Lamp
i Supervisor's Division Lamp
p No. 258 Lamp Socket Mounting
r Fuse Alarm Pilot, Lamp C
s No. 56B Drops, No. 84 Drops
t No. 62-A Designation Strip
u No. 2 TYP. Designation Strip
v No. 248-A Key, No. 232 Key Mo
w No. 92-A Key, No. 340 Key Mo
x No. 492-A Key, No. 342 Key Mo
y Holly Strip
z Night Alarm and Clock Circuit Panel of first position only

STEP-BY-STEP MACHINE SWITCHING SYSTEM

MACHINE SWITCHING "A" BOARD

Equipment Arrangement of Panels - No. 1 - D Section

807-113

Information
Engineer H.E.
Draftsman
Checked by
August 1, 1923.
ISSUE 1

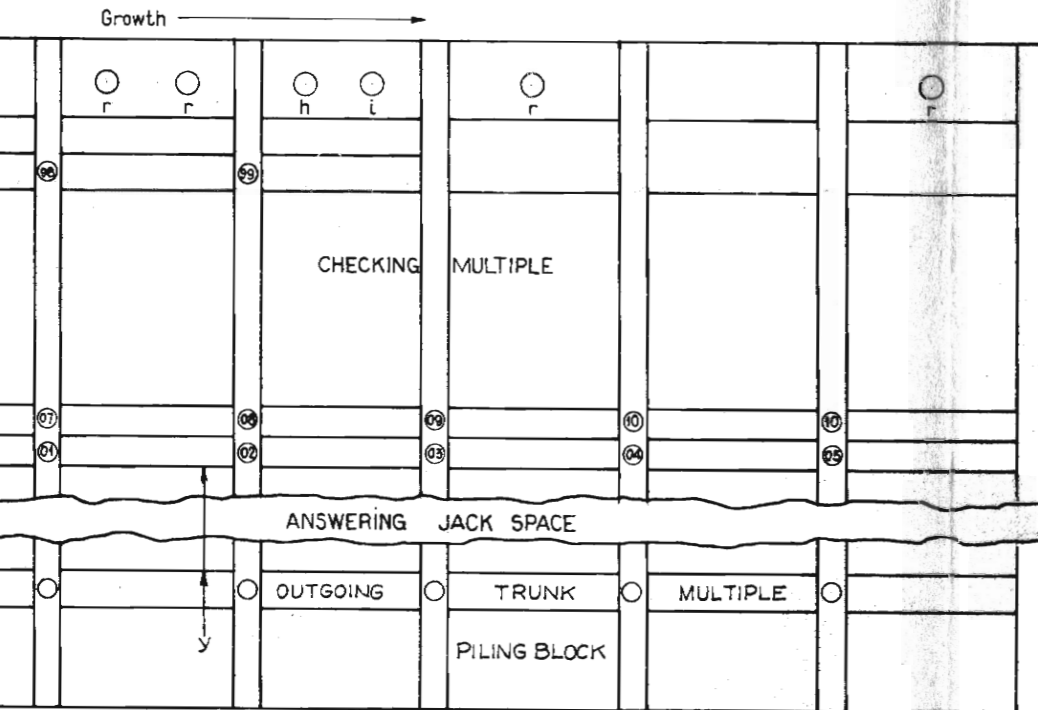


Fig. 1

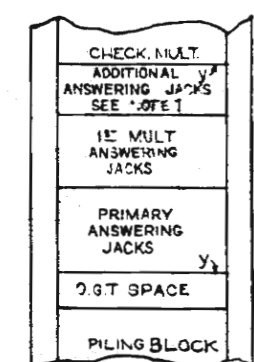


FIG. 3
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST
MULTIPLE ANSWERING JACKS

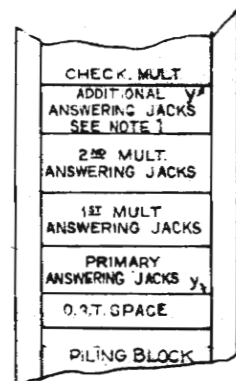


FIG. 4
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS HAVING CHECKING
MULTIPLE AND 1ST AND 2ND
MULTIPLE ANSWERING JACKS

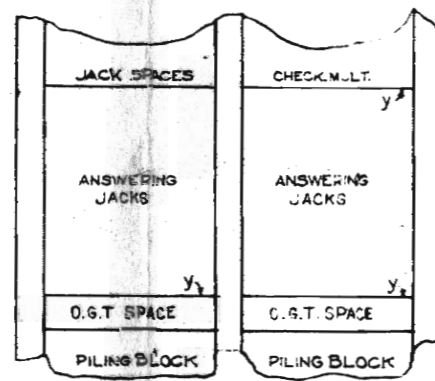


FIG. 5
FACE EQUIPMENT ARRANGEMENT
IN PANEL ADJACENT TO FIRST
PANEL HAVING CHECKING MULTIPLE, THE SWITCH-
BOARD GROWING FROM LEFT TO RIGHT

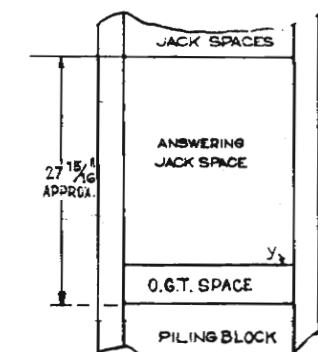


FIG. 7
FACE EQUIPMENT ARRANGEMENT
AT POSITIONS BETWEEN FOOT OF BOARD AND
POSITIONS ARRANGED FOR CHECKING MULTIPLE

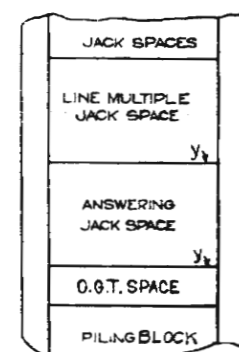


FIG. 9
FACE EQUIPMENT ARRANGEMENT
AT RURAL OR OFFICIAL POSITIONS
HAVING RURAL OR OFFICIAL LINE
MULTIPLE, RESPECTIVELY



FIG. 10
OUTGOING TRUNK MULTIPLE JACKS

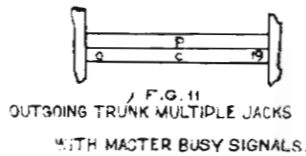


FIG. 11
OUTGOING TRUNK MULTIPLE JACKS
WITH MASTER BUSY SIGNALS

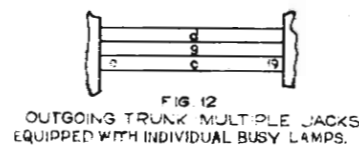


FIG. 12
OUTGOING TRUNK MULTIPLE JACKS
EQUIPPED WITH INDIVIDUAL BUSY LAMPS



FIG. 13
ANSWERING JACKS
MOUNTED 10 PER STRIP
WITH DESIGNATION STRIP



FIG. 14
ANSWERING JACKS MOUNTED 20 PER STRIP,
EQUIPPED WITH NUMBER PLATES

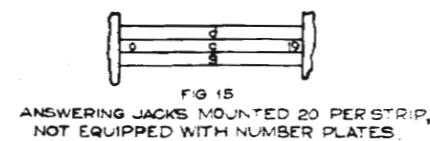


FIG. 15
ANSWERING JACKS MOUNTED 20 PER STRIP,
NOT EQUIPPED WITH NUMBER PLATES

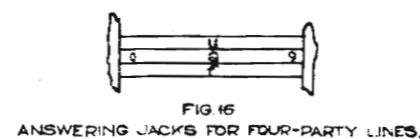


FIG. 16
ANSWERING JACKS FOR FOUR-PARTY LINES

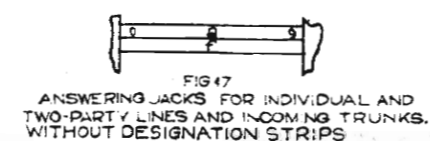


FIG. 17
ANSWERING JACKS FOR INDIVIDUAL AND
TWO-PARTY LINES AND INCOMING TRUNKS,
WITHOUT DESIGNATION STRIPS

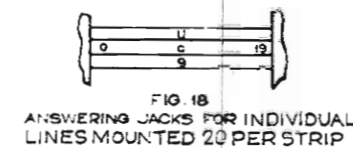


FIG. 18
ANSWERING JACKS FOR INDIVIDUAL
LINES MOUNTED 20 PER STRIP

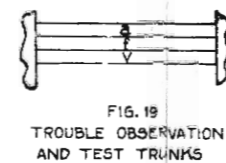


FIG. 19
TROUBLE OBSERVATION
AND TEST TRUNKS

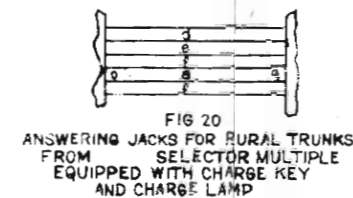


FIG. 20
ANSWERING JACKS FOR RURAL TRUNKS
FROM SELECTOR MULTIPLE
EQUIPPED WITH CHARGE KEY
AND CHARGE LAMP

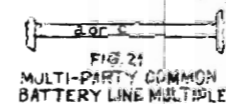


FIG. 21
MULTI-PARTY COMMON
BATTERY LINE MULTIPLE

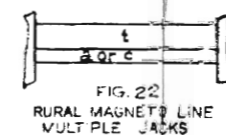


FIG. 22
RURAL MAGNET LINE
MULTIPLE JACKS

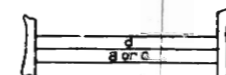


FIG. 23
OFFICIAL LINE MULTIPLE JACKS
WITH DESIGNATION STRIPS

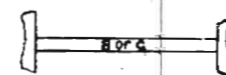


FIG. 24
OFFICIAL LINE MULTIPLE JACKS
WITHOUT DESIGNATION STRIPS

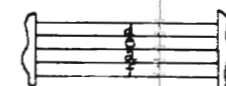


FIG. 25
SPECIAL SERVICE TRUNKS PROVIDED
WITH TONE REMOVAL KEYS

NOTES

1. Where additional primary or additional multiple answering jacks are installed, they are placed above the initial installation of multiple jacks.

- a No. 49 Jacks, 10 per strip, No. 142 Jack Mount'g
- b No. 49 Jack Space
- c No. 49 Jacks, 20 per strip, No. 114 Jack Mount'g
- d No. 4-C Designation Strip
- e No. 492-A Key, No. 346 Key Mounting
- f No. 12 Lamp Sockets, 10 per strip, No. 122 Lamp Socket Mounting
- g No. 12 Lamp Sockets, 20 per strip, No. 102 Lamp Socket Mounting
- h Supervisor's Section Lamp, White Cap (Plain)
- i Supervisor's Division Lamp, Red Cap (Jeweled)
- p No. 258 Lamp Socket Mounting
- r Fuse Alarm Pilot, Lamp Cap Green (Plain)
- s No. 56B Drops, No. 84 Drop Mounting
- t No. 62-A Designation Strip
- u No. 2 TYP Designation Strip
- v No. 248-A Key, No. 232 Key Mounting
- w No. 92-A Key, No. 340 Key Mounting
- x No. 492-A Key, No. 342 Key Mounting
- y Holly Strip
- z Night Alarm and Clock Circuit Keys, 1st Panel of first position only

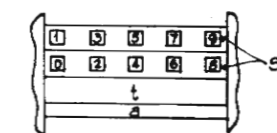


FIG. 26
ANSWERING JACKS FOR RURAL
MAGNETO LINES

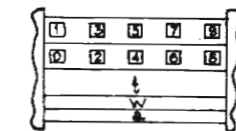


FIG. 27
ANSWERING JACKS FOR RURAL MAGNETO
LINES EQUIPPED TO OPERATE WITH COMMON
BATTERY CORD CIRCUITS

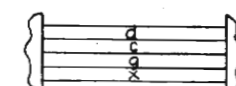


FIG. 28
SPECIAL SERVICE TRUNKS MOUNTED
20 PER STRIP PROVIDED WITH TONE
REMOVAL KEYS

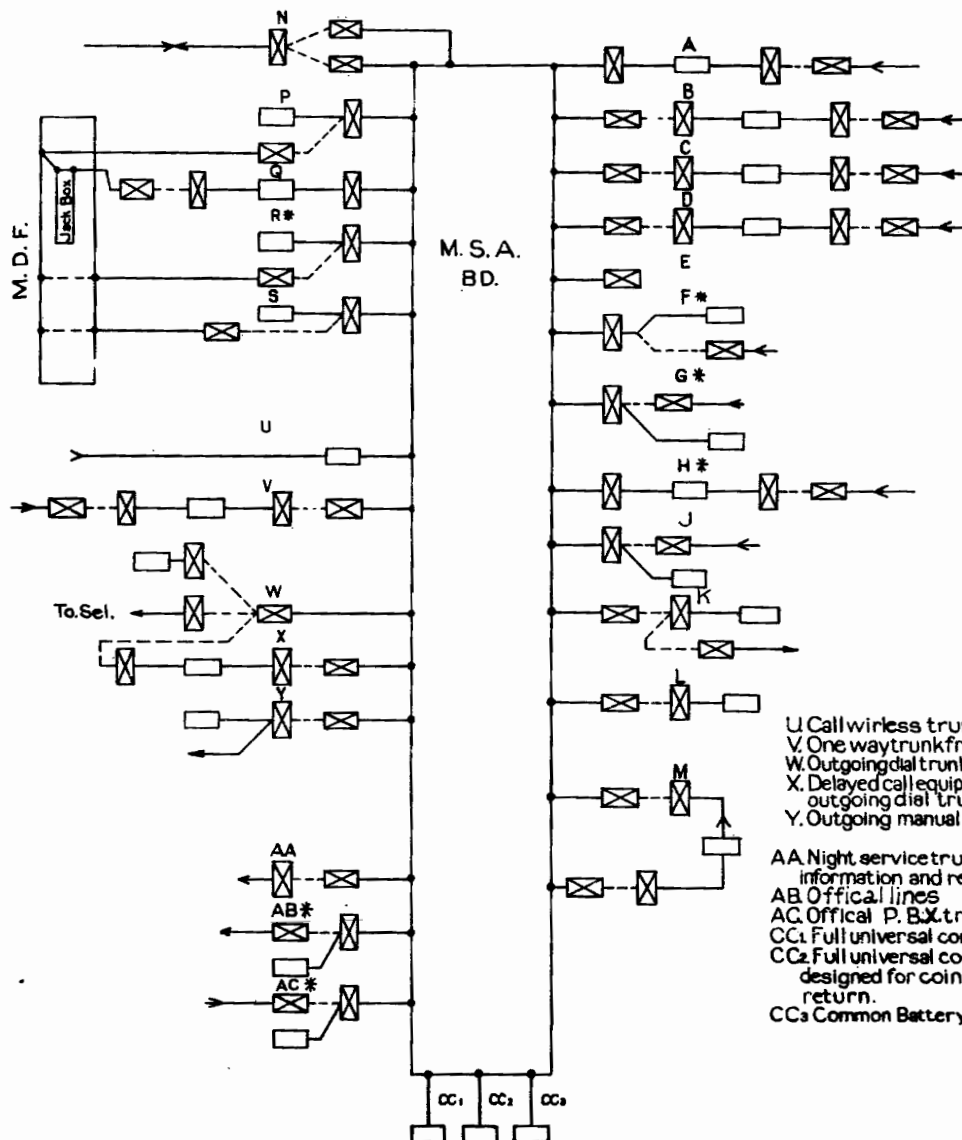
STEP BY STEP MACHINE SWITCHING SYSTEM

Preferred Methods of Cabling To Machine Switching "A" Board

807-115
Information

Engineer *H.E.*
Draftsman C.A.F.R. Jr.
Checked by

Aug. 1, 1923
ISSUE 1



— KEY —
 Horizontal I.D.F.
 Vertical I.D.F.
 Relay rack equipment

- A. Intercepting trunk from connector terminals.
- B. Intercepting trunk from vacant levels on toll transmission selectors.
- C. Intercepting trunk from vacant levels on toll incoming selectors where talking battery is not supplied at incoming selector.
- D. Intercepting trunk from vacant local selector levels.
- E. Spare answering jack
- F. Line circuit with multiple on connector banks.
- G. Special service or rural code trunks (not arranged with class of service tone).
- H. Special service trunks arranged for class of service tones.
- J. Trunk from direct line denied outward service.
- K. Verification trunks from connector terminals.
- L. Busy back circuit and tone trunk.
- M. Three wire interposition trunk.
- N. Two way trunks to desks.
- P. Trouble observation and test trunk.
- Q. Trouble intercepting trunks.
- R. Common battery rural lines.
- S. Magneto rural line.
- U. Call wireless trunk.
- V. One way trunk from toll board.
- W. Outgoing dial trunk to selector.
- X. Delayed call equipment for outgoing dial trunk.
- Y. Outgoing manual trunk.
- AA. Night service trunks to information and repair.
- AB. Official lines.
- AC. Official P.B.X. trunks.
- CC1. Full universal cord circuit.
- CC2. Full universal cord circuit designed for coin collect and return.
- CC3. Common Battery cord circuit.

* Where these groups consist of 20 or less jacks, the relay equipment should be cross connected to jacks.

STEP BY STEP MACHINE SWITCHING SYSTEM

MACHINE SWITCHING "A" BOARD
PILING RAIL EQUIPMENT

807 - 116
INFORMATION
ENGINEER *H.E.*
DRAFTSMAN
CHECKED BY
4-11-23
ISSUE 1

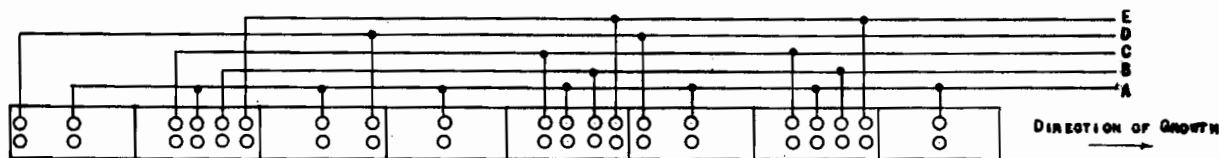


Fig. 1
No. 18 PANEL 3 POSITION SECTION

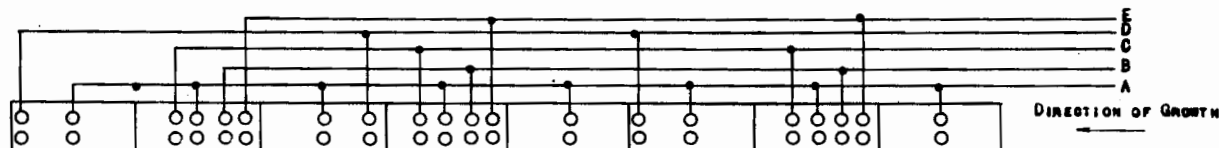


Fig. 2
No. 18 PANEL 3 POSITION SECTION

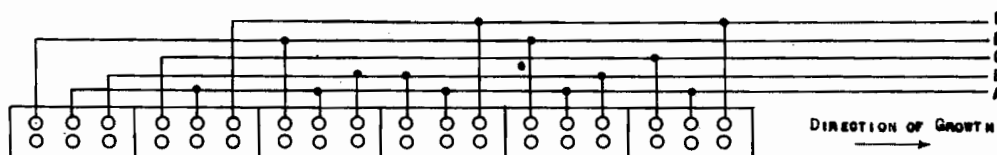


Fig. 3
No. 1-D SECTION

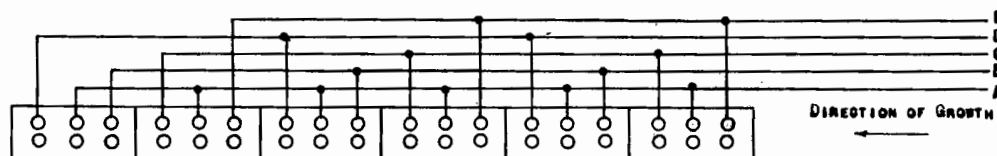


Fig. 4
No. 1-D SECTION

- NOTES -

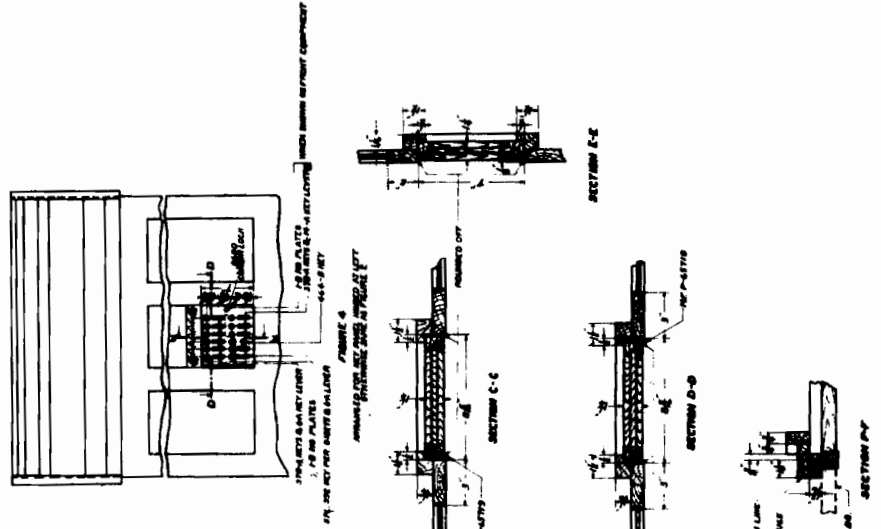
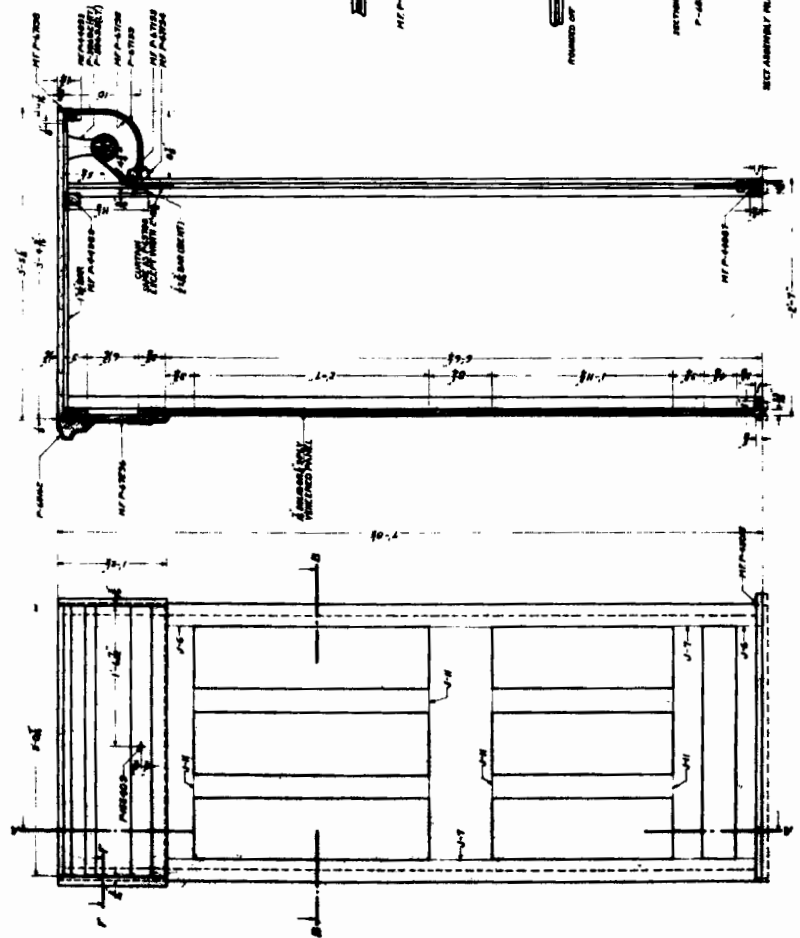
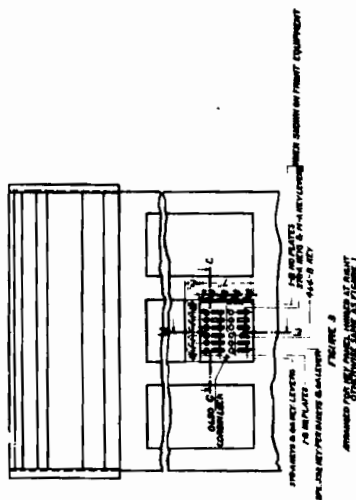
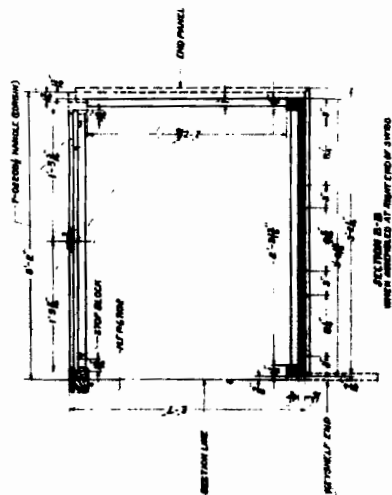
- 1 DRILLING IS PROVIDED FOR ALL EQUIPMENT AS SHOWN. APPARATUS BLANKS ARE PROVIDED WHERE EQUIPMENT IS NOT SPECIFIED.
- 2 LAMP SOCKETS DRILLED FOR No. 34 TYPE MOUNTING AND EQUIPPED WITH No. 2 TYPE LAMPS.
NUMBER PLATES ARE OF No. 1-B TYPE.

KEY

LETTER	PURPOSE OF LAMP	LAMP GAP & MARKING	NUMBER PLATE MARKING
A	AUXILIARY LINE PILOT	WHITE (PLAIN)	PANEL No.
B	PREPAYMENT COIN BOX PILOT	RED (JEWELLED)	PAY
C	MESSAGE REGISTER PILOT	GREEN (JEWELLED)	REG
D	CALL CIRCUIT PILOT	WHITE WITH BLACK CROSS	CORT.
E	DIAL PILOT	GREEN (PLAIN)	DIAL

STEP-BY-STEP MACHINE SWITCHING SYSTEM
MACHINE SWITCHING 'A' BOARD
Section Assembly, No. 1 Cable Turning Section

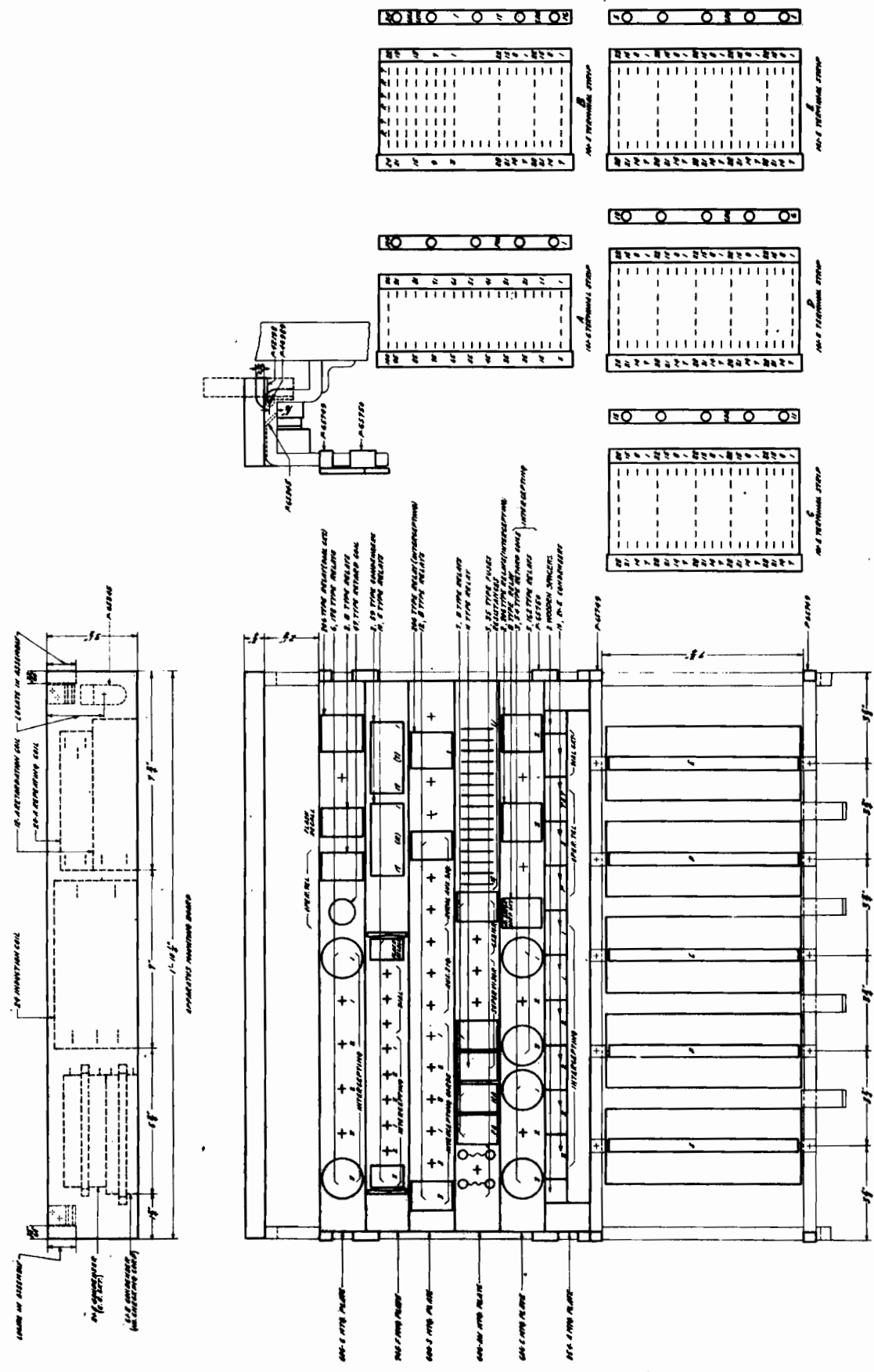
807-117
Information
Engineer, *pg. 2*
Draftsman
Checked by
August 1, 1923.



STEP-BY-STEP MACHINE SWITCHING SYSTEM MACHINE SWITCHING 'A' BOARD

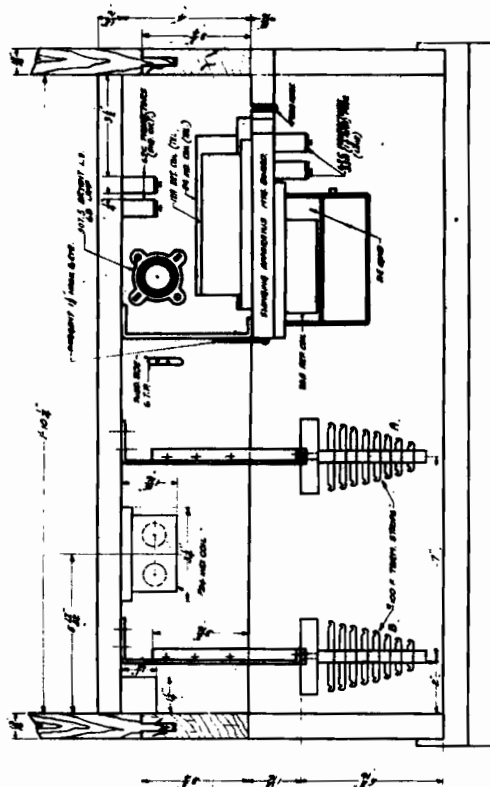
Rear Equipment Arrangement, No. 1 Section, with 3 Intercepting Cords

907-116
Information
Engineer/84
Draftsman
Checked by
August 1, 1922

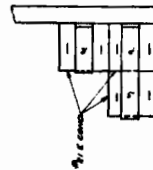
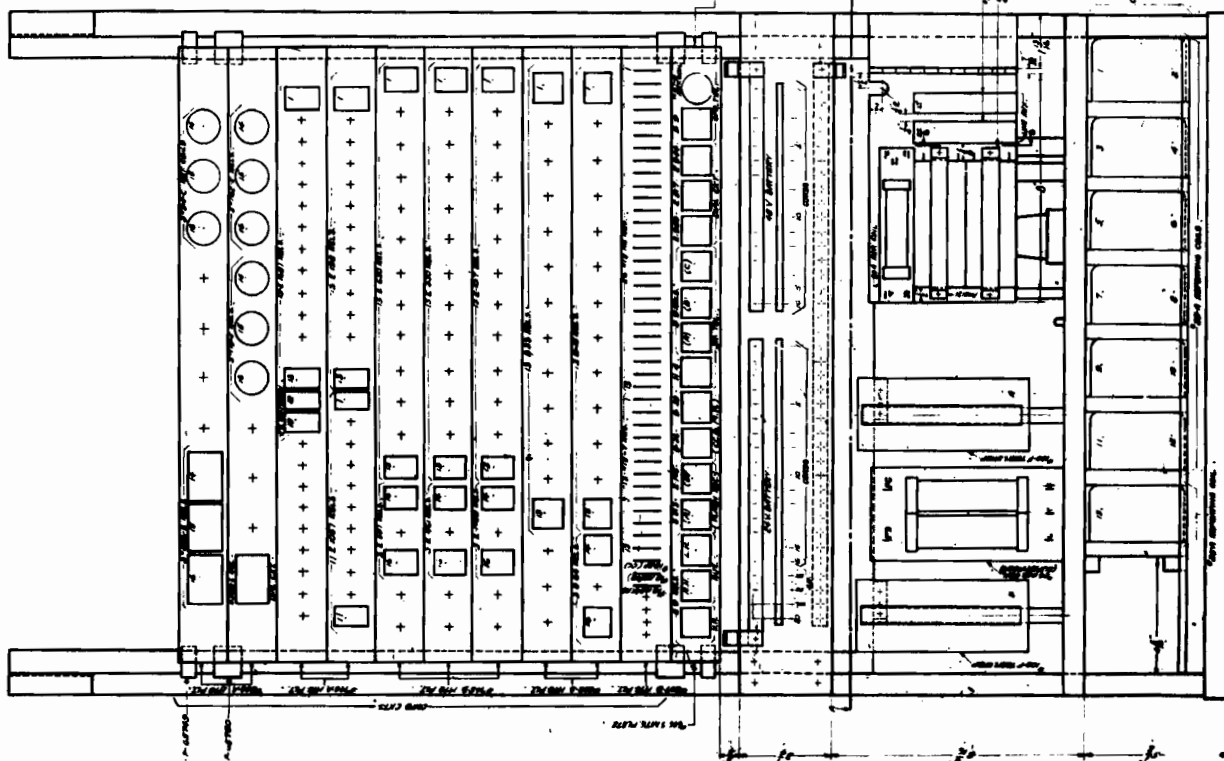


STEP BY STEP MACHINE SWITCHING SYSTEM MACHINE SWITCHING 'A' BOARD Typical Rear Equipment No. 10 Section Equipped with 13 Common Battery Cords Arranged For Coin Collect and 3 Intercepting Cords

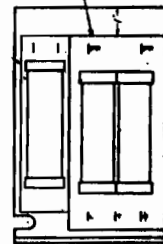
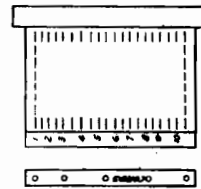
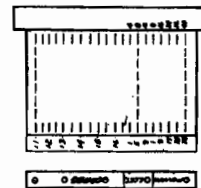
807-119
Information
Engineer/A.T.C.
Checked by
August 1, 1932.



SECT A-A



VIEW B-B

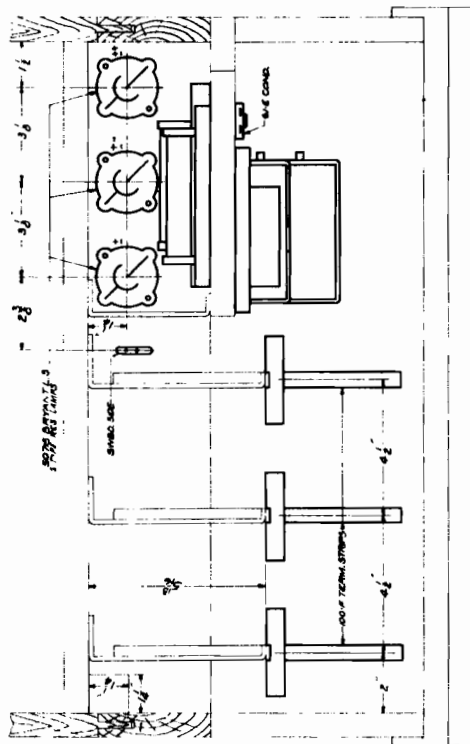


NOTE -

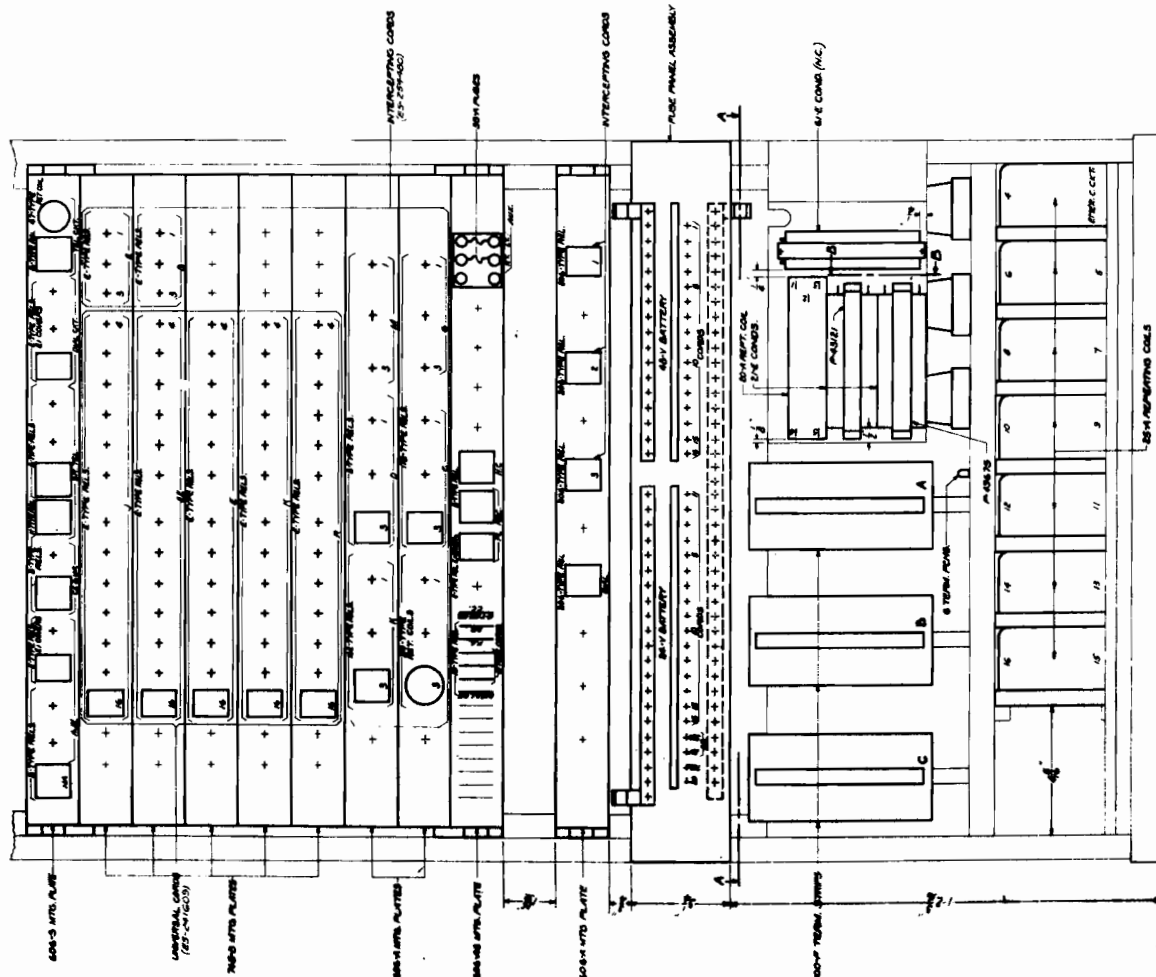
Where only a part of the cord circuits shown above are equipped, the equipment arrangement for the equipped cords will be as shown and the remaining space left vacant.

STEP BY STEP MACHINE SWITCHING SYSTEM MACHINE SWITCHING 'A' BOARD Typical Rack Equipment, No. 1-D Section, Equipped with 18 Full Universal Cords Arranged for Can Collect and Message Register and 3 Interfacing Cord Circuits

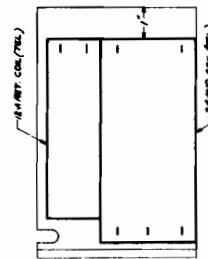
807-120
Information
Engineer: K.S.C.
Draftsman
Checked by
August 1, 1923.



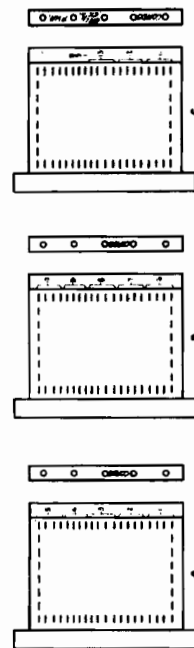
SECTION A-A



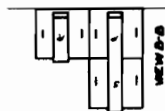
REAR VIEW



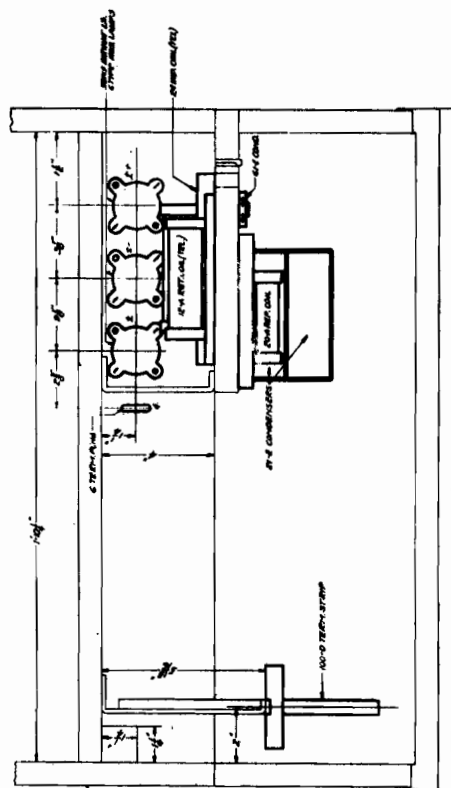
NEW SHOWING REAR OF APP. MTS. D.D.



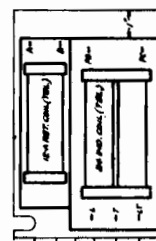
NOTE -
Where only a part of the cord circuits shown above are
equipped, the equipment arrangement for the equipped cords
will be as shown and the remaining space left vacant.



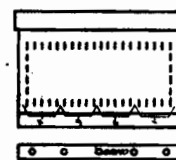
REAR VIEW



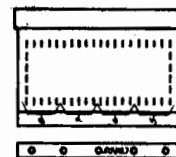
SECTION A



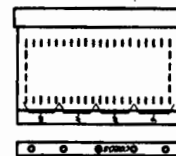
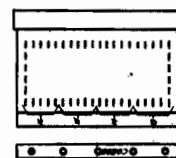
STATE OF ARIZONA THE ACQUISITION BOARD



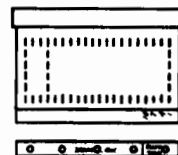
MS-9 787624M 172040



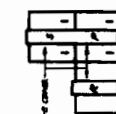
REC-2 TRANSFORM. 07202

[illegible]

120-0 THERMAL STRESS



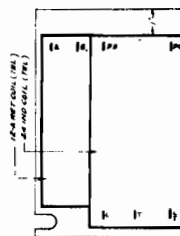
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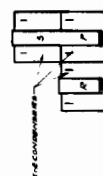
0-9 ALPS

- NOTE -

SECTION "A-A"



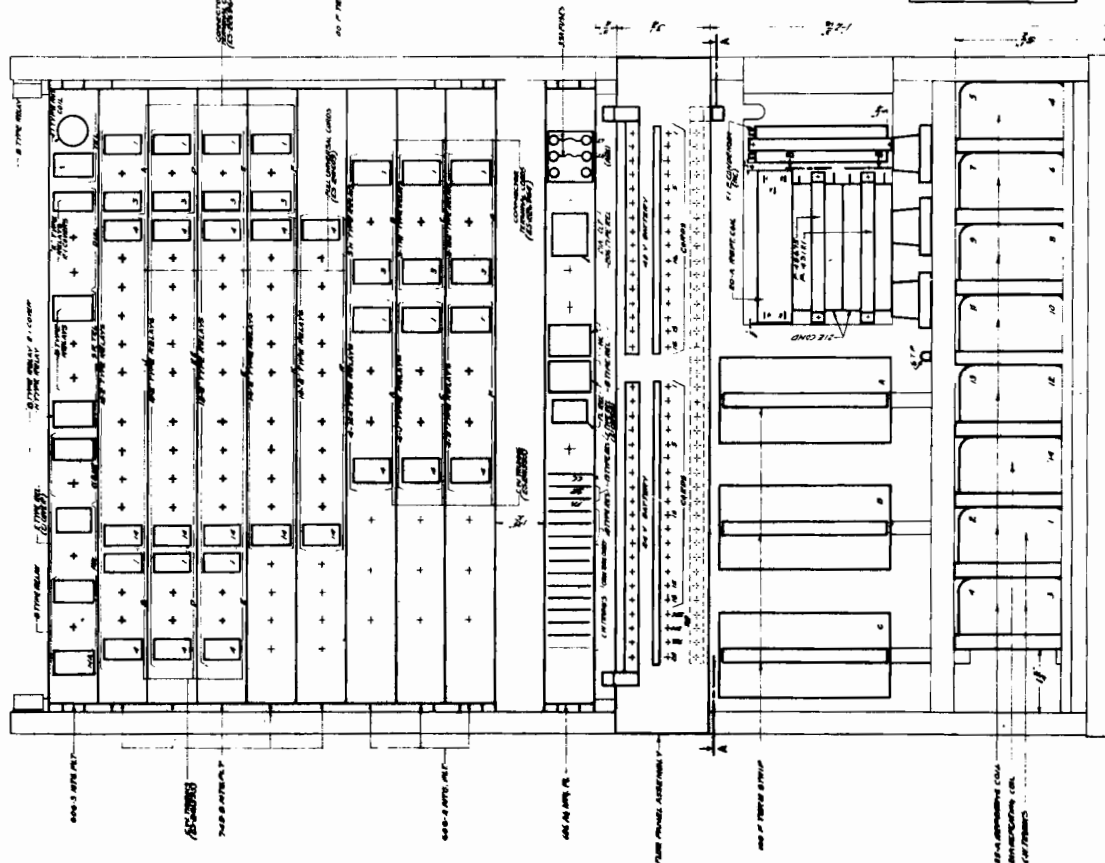
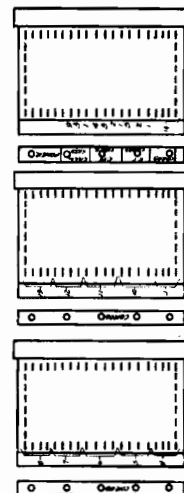
THE 14 SHOOTING TEAM OF APTT & BD



00-ADDA

- NOTE -

NOTE
Where only a part of the card circuits shown above are equipped, the equipment arrangement for the equipped cards will be as shown and the remaining space left vacant.



ATTORNEY GENERAL



FACE EQUIPMENT FOR STEP-BY-STEP MACHINE SWITCHING "A" SWITCHBOARDS.

No. 1, 92 Jack Section

Div. IX
Sec. 4-b
Table I
Aug. 1, 1923

Type of Line or Trunk	No. of Jacks Per Strip	Type of Designation Strip	Type of Number Plate	See Dwg. 807-112 Fig.	Type of Line or Trunk	No. of Jacks Per Strip	Type of Designation Strip	Type of Number Plate	See Dwg. 807-112 Fig.
Line and Trunk Answering Jacks					Intercepting Trunk	10	-	Paper 108-A	17
Message Rate			Hard Rubber or Paper		Local Vacant Selector			Paper	
Four-Party line	10	14-A	60-D or 30-A	16	Level Trunk	10	-	108-A	17
Message Rate			Hard Rubber or Paper		Toll Incoming			Paper	
Two-Party line	10	-	60-D or 30-A	17	Vacant Selector Levels	10	-	108-A	17
Coin Box			Hard Rubber or Paper		Toll Transmission			Paper	
Four-Party line	10	14-A	60-D or 30-A	16	Vacant Selector Levels	10	-	108-A	17
Coin Box			Hard Rubber or Paper		Verification Request Trunk	10	6-F	----	13
Two-Party line	10	-	60-D or 30-A	17	Toll Verification				
Coin Box			Hard Rubber or Paper		Request Trunk	10	6-F	----	13
Individual line	10	-	60-D or 30-A	17	Trunk from Test Desk				
Coin Box			Hard Rubber or Paper		(Answering jack)	10	6-F	----	13
Individual line	20	14-A	60-D or 30-A	18	Trunk from Repair Clerk				
			Hard Rubber		(Answering jack)	10	6-F	----	13
Official line	10	6-F	60-D	13	Trunk from Chief Operator				
			Hard Rubber		(Answering jack)	10	6-F	----	13
Official line	20	6-F & 14-A	60-D	14	Trunk from Repair Clerk				
Trouble Observation		(Per Group)	Hard Rubber		(Answering jack)	10	6-F	----	13
and Test Trunks	10	6-F	60-D	19	Trunk from Information				
Trouble Intercepting		(Per Group)	Hard Rubber		(Answering jack)	10	6-F	----	13
Trunks	10	6-F	60-D	17	Multiple Answering Jacks				
Rural-Magneto Line	10	61-A	----	26 & 27 (1)	Common battery line multiple	10 or 20		----	21
Rural-Common			Hard Rubber or Paper		Rural Magneto line multiple	10 or 20	61-A		22
Battery Line	10	6-F	60-D or 30-D	13	Official line multiple with				
			Paper		designation strip	10 or 20	6-F		23
Outgoing D.N.P. Trunk	10	6-F	108-A	13	Official line multiple				
Incoming "AB" Toll Line	10	6-F	----	13	without designation strip	10 or 20			24
Incoming "AB" Toll Line	20	6-F	----	15	Outgoing Trunk Multiple Jacks				
Incoming Rural Trunk	10	6-F	----	13 & 20 (2)	O.G.T. with group busy lamps	20	-	----	11
Service Trunk	10	6-F	----	13 & 25 (3)	O.G.T. with individual				
Incoming Special					busy lamps	20	6-F	----	12
Service Trunk	20	6-F	----	15	O.G.T. without busy lamps	20	6-F	----	10
			Hard Rubber						
Interposition Trunk	10	6-F	60-D	13					

NOTES:- (1) Used only where the rural positions are equipped with common battery cords.
(2) Used only where message rate and coin box lines have access to those trunks and coin collect and return keys are not provided in the rural cords.
(3) This key and key mounting to be furnished only where class of service tones are to be used.

FACE EQUIPMENT FOR STEP-BY-STEP MACHINE SWITCHING "A" SWITCHBOARDS

No. 1, 49 Jack Section
or
No. 1-D, Section

Div. IX
Sec. 4-b
Table II
August 1, 1923

Type of Line or Trunk	No. of Jacks Per Strip	Type of Designation Strip	Type of Number Plate	See Dwg. 807-113 Fig.	Type of Line or Trunk	No. of Jacks Per Strip	Type of Designation Strip	Type of Number Plate	See Dwg. 807-113 Fig.
<u>Line and Trunk Answering Jacks</u>					Local Vacant Selector				
Message Rate			Hard Rubber or Paper		Level Trunk	10	-	Paper - 109-A	17
Four-Party line	10	2-C	59-B or 31-A	16	Toll Incoming				
Message Rate			Hard Rubber or Paper		Vacant Selector Levels	10	-	Paper - 109-A	17
Two-Party line	10	-	59-B or 31-A	17	Toll Transmission				
Coin Box			Hard Rubber or Paper		Vacant Selector Levels	10	-	Paper - 109-A	17
Four-Party line	10	2-C	59-B or 31-A	16	Verification Request Trunk	10	1-C	----	13
Coin Box			Hard Rubber or Paper		Toll Verification				
Two-Party line	10	-	59-B or 31-A	17	Request Trunk	10	1-C	----	13
Coin Box			Hard Rubber or Paper		Trunk from Test Desk				
Individual line	10	-	59-B or 31-A	17	(Answering jack)	10	1-C	----	13
Coin Box			Hard Rubber or Paper		Trunk from Repair Clerk				
Individual line	20	2-C	59-B or 31-A	18	(Answering jack	10	1-C	----	13
Official line	10	1-C	Hard Rubber	13	Trunk from Chief Operator				
Official line	20	1-C & 2-C	59-B	14	(Answering jack	10	1-C	----	13
Trouble Observation		(Per Group)	Hard Rubber		Trunk from Repair Clerk				
and Test Trunks	10	(1-C)	59-B	19	(Answering jack	10	1-C	----	13
Trouble Intercepting		(Per Group)	Hard Rubber		Trunk from Information				
Trunks	10	(1-C)	59-B	17	<u>Multiple Answering Jacks</u>				
Rural-Magneto Line	10	62-A	----	26 & 27 (1)	Common Battery Line Multiple	10 or 20	----	----	21
Rural-Common			Hard Rubber or Paper		Rural Magneto Line Multiple	10 or 20	62-A	----	22
Battery Line	10	1-C	59 or 31-A	13	Official Line Multiple, with				
Outgoing D.N.P. Trunk	10	1-C	Paper	13	designation strip	10 or 20	1-C	----	23
Incoming "AB" Toll Line	10	1-C	109-A	13	Official Line Multiple, without				
Incoming "AB" Toll Line	20	1-C	----	13	designation strip	10 or 20	1-C	----	24
Incoming Rural Trunk	10	1-C	----	13 & 20 (2)	<u>Outgoing Trunk Multiple Jack</u>				
Incoming Special					O.G.T. with group busy lamps	20	-	----	11
Service Trunk	10	1-C	----	13 & 25 (3)	O.G.T. with individual				
Incoming Special					busy lamps	20	1-C	----	12
Service Trunk	20	1-C	----	15 & 28	O.G.T. without busy				
Intercepting Trunk	10	-	Paper	17	lamps	20	1-C	----	10
Interposition Trunk	10	1-C	Hard Rubber 60-D	13					

NOTES:- (1) Used only where the rural positions are equipped with common battery cords.
(2) Used only where message rate and coin box lines have access to these trunks and coin collect and return keys are not provided in the rural cords.
(3) This key and key mounting to be furnished only where class of service tones are to be used.

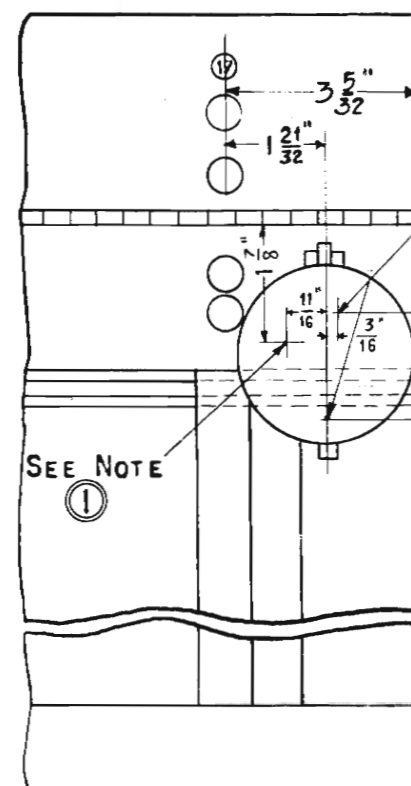


FIG. 1
8 PANEL 92 JACK 3 Pos.
No. 1 SUBSCRIBERS SECTION

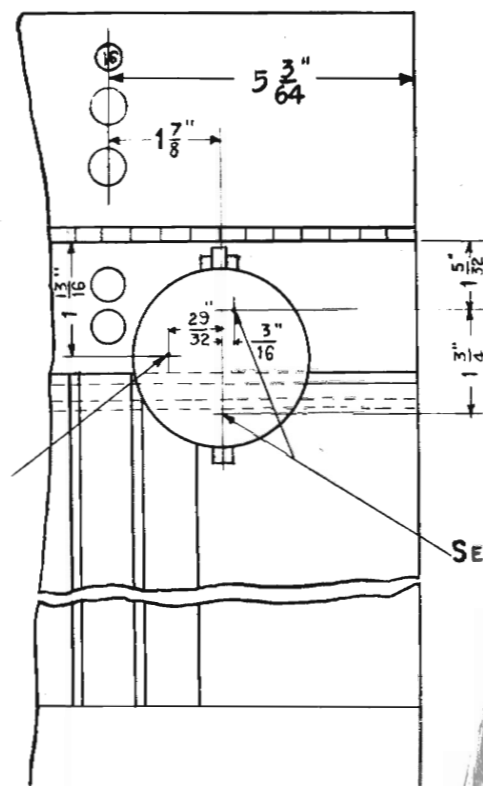


FIG. 3
No. 1-D SECTION

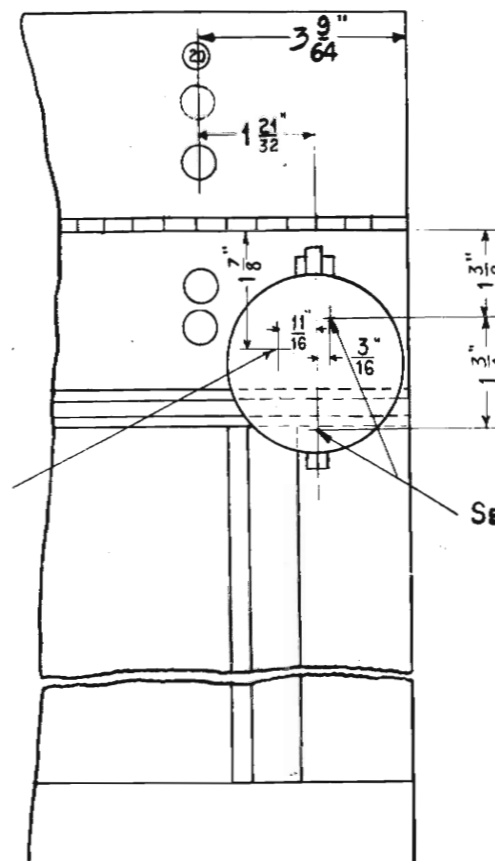


FIG. 5
No. 1-C SECTION

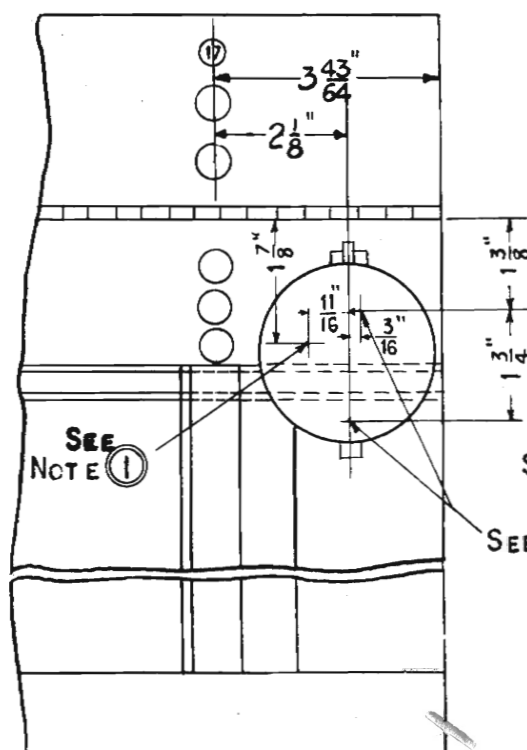


FIG. 2
7 PANEL 49 JACK 3 Pos.
No. 1 SUBSCRIBERS SECTION

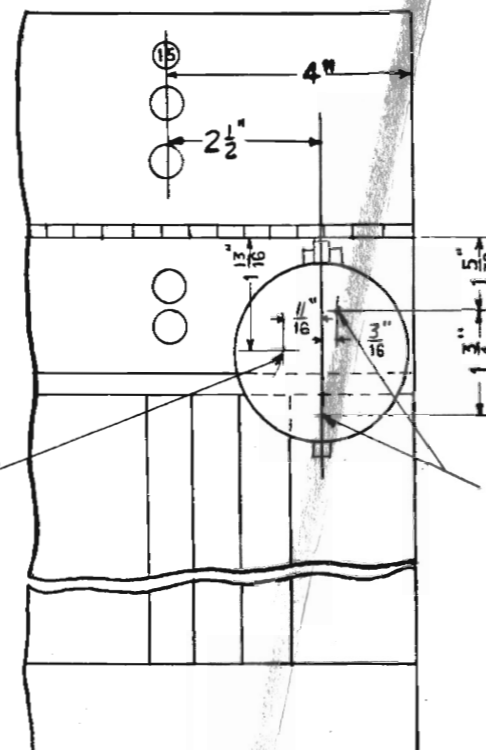


FIG. 4
No. 10 SECTION

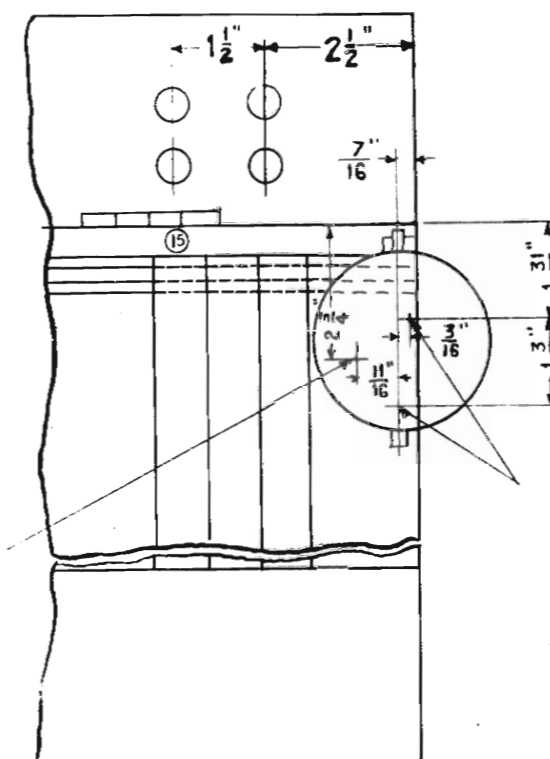


FIG. 6
No. 9-C SECTION

- NOTES:
- ① DRILLING FOR LOC
 - ② MOUNTING SCREW D
 - ③ WHEN DIAL IS MO
 - ④ ON -C SWITCHBOA

ON VIEW OF KE

STEP BY STEP MACHINE SWITCHING SYSTEM
STANDARD DIAL LOCATIONS ON MANUAL "A" SWITCHBOARDS EQUIPPED FOR DIALING INTO STEP
BY STEP MACHINE SWITCHING CENTRAL OFFICES

INFO. ON
ENGINEER H.E. L.
DRAFTSMAN
CHECKED BY
MAR. 1, 19
REISSUED
AUG. 1, 1923

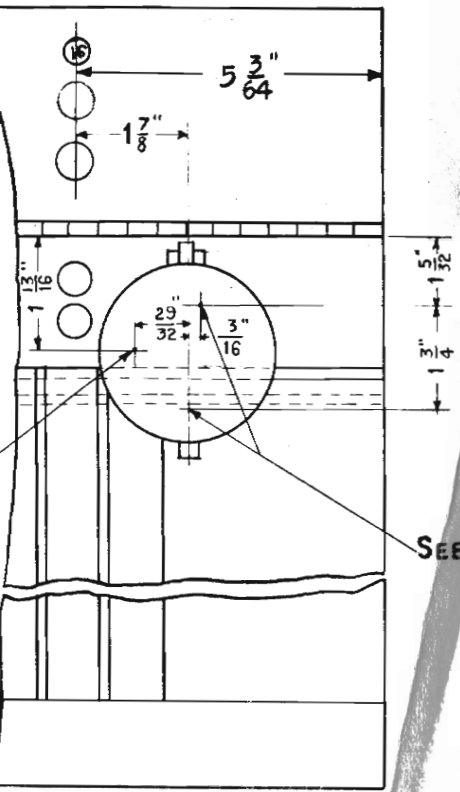


FIG. 3
No. 1-D SECTION

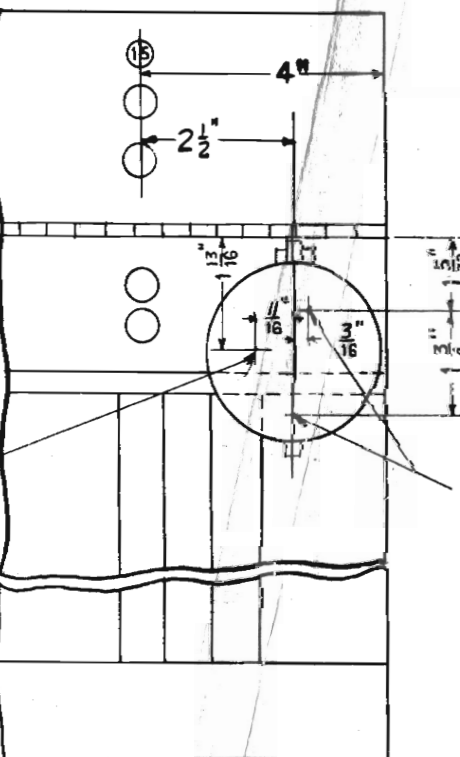


FIG. 4
No. 10 SECTION

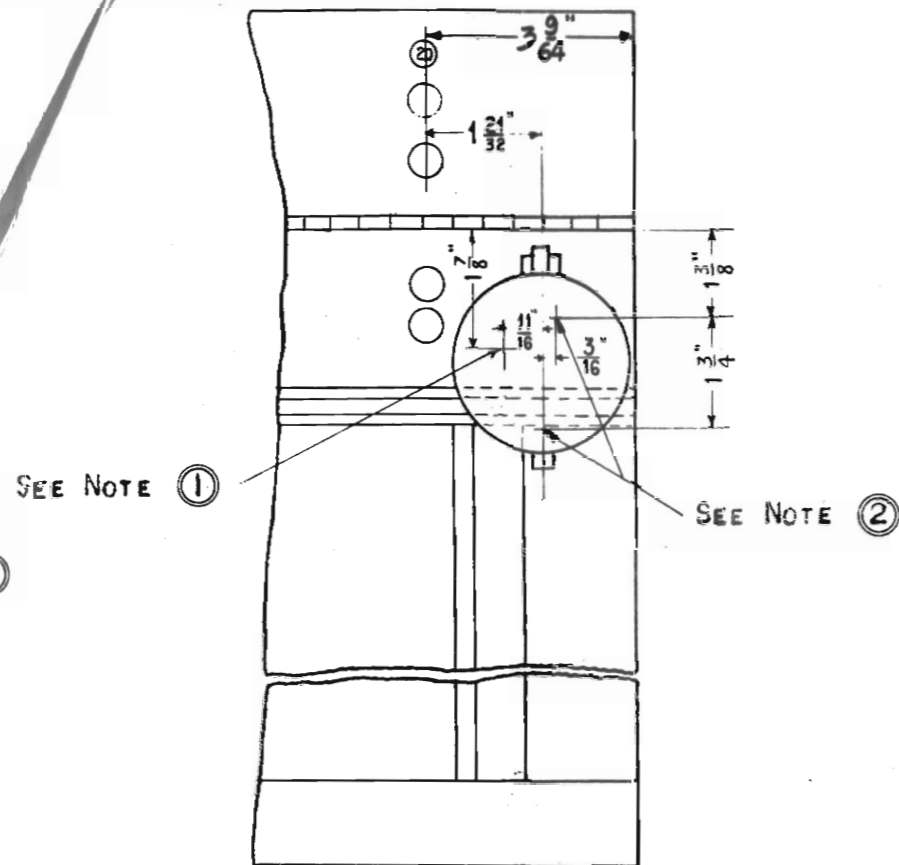


FIG. 5
No. 1-C SECTION

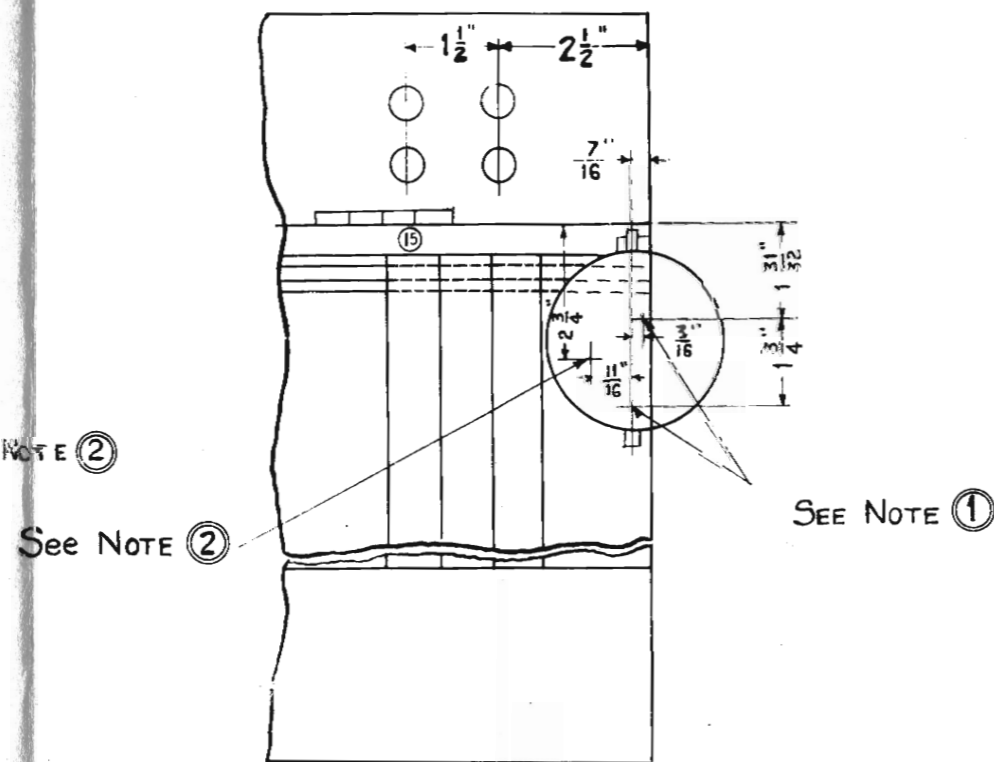
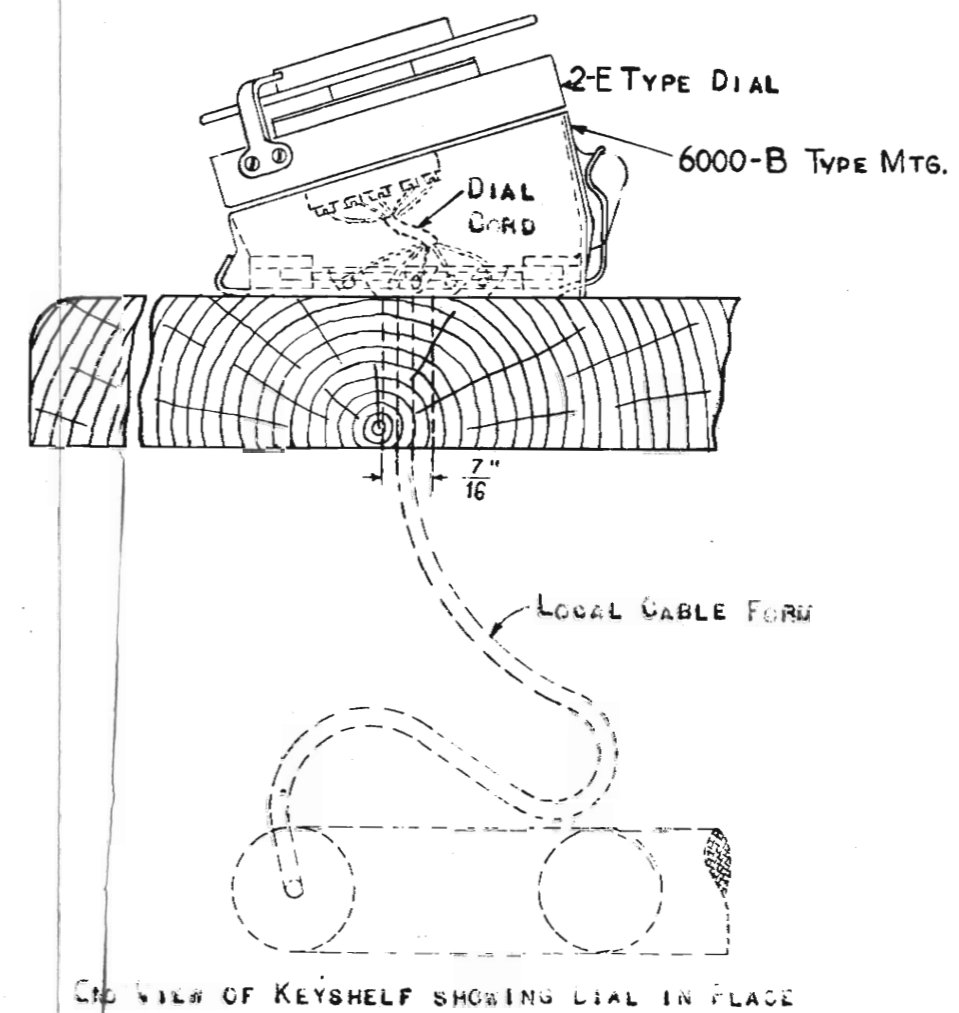


FIG. 6
No. 9-C SECTION



- NOTES: ① DRILLING FOR LOCAL FORM LEADS TO CONNECTING BLOCK.
② MOUNTING SCREW DRILLING FOR CONNECTING BLOCK.
③ WHERE DIAL IS MOUNTED ON KEYSHELVES EQUIPPED WITH END STRIPS, THESE STRIPS WILL BE CUT DOWN IF NECESSARY.
④ ON 9-C SWITCHBOARD IT WILL BE NECESSARY TO MOVE THE KEYSHELF BRACE TO LEFT SIDE OF KEYSHELF.

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EQUIPMENT REQUIRED FOR MANUAL OFFICES IN STEP-BY-STEP
AREAS - CALL INDICATOR EQUIPMENT

General

Call Indicator. The call indicator proper consists essentially of **six** groups of lamps covered by an opaque glass plate. This plate bears a series of transparent **numbers** and **letters** which register with the lamps beneath. The **lamps** and their corresponding numbers and letters are so **arranged** that they **may display** the **numerical** portion of **any** call number, together with the party line letter if **any**.

Incoming Equipment. Each call indicator trunk terminates at a trunk position in a cord and plug and has associated with it on the **keyshelf** an "**assignment lamp**", a "**disconnect lamp**" and a "**display key**". An **additional** display key **may** be provided to **permit** of teamwork operation with an adjacent position. In this case, one display key is called the "**home**" display key, and the other the "**teamwork**" display key.

Recorders. The recorder consists of a **number** of rotary **switches**, termed "**register**" switches, relays, resistances and condensers. **One** register switch is provided for recording each digit in the called **number** and, if jack per line party line **service** is given, an additional register switch is provided for recording the party line letter.

Operation of Call Indicator Equipment. On a call from a machine switching office to a manual office having call indicator equipment the operation of dialing the office code by the calling subscriber selects a trunk outgoing to the desired manual office as shown on drawing 807-10 in Division I. The recorder selector associated with each trunk is pre-selecting so that when a trunk is selected on the completion of the dialing of the office code, a recorder is in general immediately available for receiving the pulses corresponding to the called number.

As soon as a trunk is selected, a connection is completed from a pulsing relay in the trunk to the first register switch in the recorder. The trunk pulsing relay operates in conjunction with the pulsing relay in the trunk repeater in the machine switching office and the first register switch advances one step for each pulse in the first digit of the number dialed. After the first digit has been dialed, the connection is transferred to the second register switch, and when the second digit is dialed, this switch advances one step for each pulse in that digit. The remaining digits and the party line letter, if any, are recorded on separate switches in a similar manner.

If jack per line party line service is given in the manual office, a set of timing relays is provided in each recorder. After the fourth numerical digit is recorded, the recorder starts counting time. If a party line letter is dialed within a certain predetermined interval the assignment lamp

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associated with the trunk is lighted and this letter will be displayed as a part of the called number. If no party line letter is dialed, the assignment lamp is lighted at the expiration of the delay interval. It is considered standard to wire the timing relays so that the delay interval will be from three and one half to four and one half seconds. If local conditions warrant this interval may be altered by making suitable wiring changes at the relays.

The lighting of the assignment lamp is an indication to the operator that a call is waiting. If the home operator handles the call, she depresses the home display key associated with the trunk and the called number is displayed at her position. The assignment lamp then changes from a steady light to a light flashing 120 times per minute. If the trunk is arranged for teamwork operation and the adjacent operator handles the call, she depresses the teamwork display key of the trunk, the assignment lamp flashing 240 times per minute. This transfers the busy test lead to the adjacent operator's telephone set and displays the called number at her position.

Ringing. In No. 1, 1-C, and 1-D manual offices where machine ringing is employed, ringing is started automatically when the operator plugs in and the audible ringing signal is sent back to the calling subscriber. Ringing is continued until the called party answers or until the calling party hangs up. The trunks are not provided with ringing control keys since on a call to a

party line station, the proper type of **ringing** current **is** automatically selected and automatically applied to the proper **side** of the **line**.

In a number 10 office **equipped with** ringing machines, either machine **ringing** or **manual** ringing may be **employed**. In the former **case** a **master** ringing start key will be required at **each** call indicator **position** on account of the cutoff **jacks** in the No. 10 **board**. This key is depressed after a connection is put up in order to **start** the ringing, which then **continues** automatically.

Although no manual ringing call indicator **equipments** have **as yet** been **installed** in **step-by-step** areas the general **features** of this equipment have **been** determined. In **case** manual ringing is **used**, each trunk will **be** equipped with a **ringing** key and a ringing lamp **as** with **call circuit** operation. In this **case**, teamwork operation will **ordinarily** not be used and the **teamwork** key will **be** used **as** a ringing key.

In a No. 10 office equipped with vibrating type **interrupters** and in No. 9 offices, the trunks are **arranged** for manual ringing if the **installation** of the ringing machines which **are** **necessary** for machine ringing **does** not prove economical.

Mutilated Calls - Master Ringing Key. If an idle recorder **is** not available when the **first pulse is** transmitted to the call indicator equipment, the call will **be** mutilated. This condition is **indicated** by the **steady lighting** of the trunk disconnect lamp.

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The operator, on **noting** this condition, **will** connect the trunk to the supervisors circuit and the supervisor **may** ascertain the **number from** the calling **party**. Where the call is to **an individual** line or to a line served on a jack per **station/basis**, the **supervisor** may complete the call by transferring the trunk to the multiple **Jack** of the number called. Where the service is on a **jack per line** party line basis, there is a **master** ringing key associated with each call indicator position and on calla to stations on these lines the **supervisor** after **ascertaining** the number called will first **disconnect** the trunk: then depress the display key of **the trunk** involved **and** the button on the master ringing key **corresponding** to the party line letter in the **called** number. This ,operation sets up the proper ringing **relays** so that when the supervisor plugs the trunk into the multiple **jack** of the number called, the proper type of **ringing** current **is** automatically **applied**.

The master ringing key is **associated** with any trunk on **the** position by the operation of a "**mutilated call**" relay individual to **each** trunk. **This** relay is operated when **there** is no idle recorder available for recording **the** incoming pulses, of a called **number**.

Release of Equipment, Delayed Disconnect Signal. As soon **as** the trunk plug is inserted in a jack, or when another display key is depressed before the trunk plug is inserted in a jack, **the** recorder **is** released **and** the display **extinguished**. The register **switches** return to **normal** and the recorder **is** ready to

handle another call* When the calling subscriber hangs up, the equipment in the machine switching office is restored to normal, thus releasing the call indicator trunk and lighting the associated disconnect signal on the call indicator position. The call indicator operator then releases the called line by withdrawing the plug. If the called subscriber hangs up before the calling subscriber, no disconnect signal will be given until either the calling subscriber restores his receiver or until the expiration of a predetermined time interval which is measured by a set of timing relays. If the calling subscriber hangs up before the expiration of this interval, the regular trunk disconnect signal will be lighted. If the calling subscriber has not hung up before the end of this period, a delayed disconnect lamp which is located in the face of the switchboard and which is common to all the trunks at the position will be lighted. The supervisor can then identify the trunk involved by operating a non-locking key associated with the delayed disconnect lamp, the operation of this key flashing the assignment lamp of the trunk involved.

It is considered standard to adjust the timing relays in the delayed disconnect signal circuit so that the delayed disconnect lamp will be lighted at some time between thirty-two and sixty-four seconds after the called party hangs up provided the calling party has not hung up in the meantime-

Recorder Busy Lamp and Key. Each recorder has associated with it a "Recorder Busy Lamp" and a non-locking push button key

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which are located in the face of the switchboard. The lamp is lighted dimly as soon as a connection is completed to the associated recorder and continues to burn dimly until a display key is depressed. When the home key is depressed, this lamp lights brightly and steadily. When the teamwork key is depressed, the lamp lights brightly and flashes at the rate of 240 flashes per minute. In either case the lamp continues to burn until the recorder is released.

Incomplete Dialing. In case the calling subscriber fails to dial the entire number, there is no indication that a trunk is being held except that a recorder busy lamp will burn dimly for an abnormal length of time. On noting this condition, the supervisor may, by operating the key associated with the recorder busy lamp, light the assignment lamp of the trunk connected to the recorder. She may then depress the display key, plug the trunk into the supervisor's jack and ascertain the called number from the calling party. If the service is on an individual line or jack per station basis, the supervisor may then complete the call by transferring the trunk to the multiple jack of the number called. If the service is on a jack per line basis, it will be necessary to request the calling party to dial the number again as, in this case, the mutilated call relay is not operated and the master ringing key is not associated with the trunk.

Called Line Busy, Out-of-Order, etc. If the called line is found busy, or out-of-order or is affected by multiple marking, the standard manual operating practice is followed.

Separate busy back circuits are required for the call indicator positions, in order to prevent charging on calls from a message register or prepayment coin box line. The call indicator busy back circuit is equipped with an alarm lamp, buzzer and key located at the head of the switchboard and with an alarm lamp, alarm bell, key and emergency pulsing relay located in the terminal room. Should the busy back circuit fail, both of the alarm lamps will be lighted and the buzzer and bell will sound. By operating the key at the switchboard, the buzzer will be cut off and the lamp extinguished. When the circuit is again operative, the lamp will be relighted. The key should then be restored to normal, extinguishing the lamp. When the key in the terminal room is operated, the emergency pulsing relay is substituted for the pulsing relay in the regular busy back circuit, the alarm lamp will be extinguished and the alarm bell will stop ringing. When the trouble has been removed the terminal room key should be restored to normal, which restores the regular pulsing relay in the circuit in place of the emergency relay.

The intercepting trunks throughout the trunk switchboard line up should be provided with a high resistance relay. This is to prevent the operation of the supervisory relay in the trunk when the machine ringing is tripped, in order that false charging may not result on message register or prepayment coin box lines when calls are completed to the intercepting operator.

Call Indicator Arrangement. As shown on Drawing 808-4, the call indicator lamps are divided into six groups. Photograph

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No. 31 shows the actual appearance of these lamps with the number **4259** displayed. When a called number **does** not contain a party line letter, the **"0"** lamp in the ten **thousands** group will be displayed with the number, **as shown** in the photograph. If the called **number** does **contain** a party line letter, there is no display in the ten thousands group, **so** that there are five **characters** displayed on the **call** indicator in each case.

The **"1"** lamp in the ten thousands group is provided in order to display **numbers** above **9999**.

Calls to Numbers above 9999. A separate group of recorders is required for displaying numbers above **9999** and consequently a separate group of trunks, **with a** separate office designation, is required **from each** machine **switching** office if lines with numbers **above 9999** are operated in the manual office. As there are so few of these **numbers** available in any case, it **is** in general recommended that where such **lines are** being operated the **call** numbers be changed **prior** to the **cutover** of the call indicator equipment and that the **manual** office be **limited** to 10000 lines capacity.

Grouping Key. Each call indicator position is provided with a two **way** locking grouping **key** which when in **normal** position serves to connect the busy test strapping of the trunks incoming to the position to the **operator's** telephone set of that position. When this **key is** thrown to the right or left it **transfers** the **busy** test strapping to the telephone circuit of the adjacent position at the

right or left. Several positions **may** be grouped an one telephone circuit in this manner, thus allowing one call indicator operator during hours of light load to eover several **positions** without transferring her telephone **set** from **one position** to another. The adjacent positions may be either **call indicator** or call circuit trunk positions.

Supervisors' Circuit. The standard supervisors^T circuit for No. 1 "B" boards has been **so** modified as to **permit** the use of this circuit throughout the switchboard lineup, on both call **in-dicator** and call circuit **positions**. The modified circuit is so arranged .that the machine ringing will be tripped without **re-**versing the current over the incoming trunk and so making a **charge** on a call completed to a supervisor **as would** otherwise be the case. Where the present standard circuit is not installed the existing **supervisor's** circuit **will** be modified in order to **pre-**vent charging on message register or prepayment coin box **lines** at call indicator **positions**.

Operator's Telephone Circuit. **Where** a position is converted from call circuit **to** call indicator operation or where a call circuit position **is** adjacent to a call indicator position, it will be necessary to install **a** high resistance busy test relay in **the operator's telephone** circuit. Otherwise the tip of a trunk plug just removed from the multiple, coming in contact with the sleeve. of the plug of a **trunk** on which **pulses** were being received, would be apt to cause these pulses to be mutilated.

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Make-Busy Equipment. When it is desired to vacate a call **indicator** position for any **reason**, all **trunks** terminating at the position may be made busy at the originating **machine switching** office or **offices**. For this **purpose** a separate make busy circuit is required for each group of trunks at each call indicator position in the manual office. Each make-busy circuit is controlled by a make busy key located at the call **indicator position** and **terminates** on a control relay in the machine switching office. This relay operates when the **make-busy** key in the call **indicator** office is operated. Where outgoing trunk **secondary** switches are not used this relay controls a number of make-busy relays connected in parallel, each of which has a sufficient number of **contacts** to busy six **trunks**. Where outgoing trunk secondary switches are used, the **trunks** are busied in the same way, and in addition, a separate set of **relays** is required in order to provide a pick up feature similar to that described in Division III, Sec. 2J, pp 5 and 6 in connection with primary line switches where **secondary** line switches are used.

The make busy and pick up relay equipment is mounted on standard **type** relay mounting plate which are mounted on a **shelf** at a **repeater** board.

The repeater to a call indicator office requires the same number of relays as is required in the **interoffice** repeater to another step-by-step office and the mounting is the same. Where a relatively large number of trunks in the same group appear at the same position two make busy keys may be provided at the position, in order to place only a part of the trunks out of service.

Night Positions and Night Alarms. It is often desirable during hours of light traffic to vacate all but one or two night positions. For this purpose, a few trunks from each of the machine switching offices may be terminated at these positions and during night hours all other call indicator trunks may be made buay.

In providing night alarm circuits in a trunk board containing call indicator positions, the positions in the line up are divided into groups of twelve each, starting with the first position of the first section, or if the first section is a three position section and the remainder of the line up is composed of two position sections, starting with the second position in the first section. For each of these groups of twelve positions in which one or more call indicator positions appear a separate night alarm circuit and bell is provided in connection with the call indicator trunks in order that calls on call indicator positions may be more easily located when the night alarm is in use.

If there are any of these groups in which a call indicator position does not appear these positions should be continued on the existing night alarm circuit.

Pilot Lamps. In order to facilitate the location of calls three pilot lamps are provided in connection with the call indicator trunks at each position. Each pilot lamp is associated with a number of trunks at a position as covered later and is lighted when any one of the associated assignment lamps are lighted.

Call Indicator Positions Operated on a Call Circuit Basis.

Call indicator trunks may be installed to operate initially on a call circuit basis. If desired, a part of the call indicator trunks terminating at a position may be operated on a call circuit basis initially and the rest of the trunks operated on a call indicator basis as previously described. Where a sufficient number of spare trunk positions are not available, this flexibility permits the use of the call indicator equipment on a call circuit basis previous to the cutover of the machine switching office or offices.

Call indicator trunks that are to be used initially for call circuit operation are installed and tested as call indicator trunks and are then changed to operate on a call circuit basis. Certain wiring changes and the replacement of one relay per trunk are required in order to convert the trunks from one type of operation to the other and special effort has been made to design the circuits and the mountings so that these changes may be made in the minimum amount of time.

Where existing call circuit positions are to be converted for call indicator operation, approximately two weeks will be required between the time that the position is removed from service and the time that the call indicator tests are completed and the positions returned to call circuit operation.

After the position has been converted and returned to call circuit operation, approximately thirty-six hours should be allowed at the time of cutover to place the trunks on a call indicator basis and make necessary tests.

Switchboard Equipment.

Keyshelves. Drawing 808-4 shows the key& lf for a call indicator trunk position at a No. 1 board. This keyshelf is typical of the call indicator keyshelves for all types of switchboards arranged for machine ringing, trunk capacities and dimensions varying as shown in the notes on the drawing. Where subscribers positions are converted to trunk positions for call indicator operation the existing keyshelves will be replaced with anyshelves similar to the one shown on drawing 808-4.

Keyshelves with a width of 1' 2-5/8" will be furnished for all sections in either trunk or subscribers board, except where new call indicator sections are to be lined up with existing sections having narrower keyshelves or where existing keyshelves of narrower width are to be converted to call indicator operation. In either of these cases the dimensions will be as shown on Drawing 808-4.

In modifying existing positions in a No. 1 board, it will be necessary to furnish new lockrails and keypan if the lockrail and keypan dimensions are less than those shown on American Telephone and Telegraph Company's Drawings No. 131-A-43 for trunk sections and No. 122-A-20 for subscribers sections, or if the lockrail location is different from that shown on those drawings.

Ringling Keys. It is considered standard to provide wiring for both master ringing keys shown on Drawing 808-4 and to equip

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either or both as specified. Where the position is to be operated initially on a call circuit basis, both of the keys should be specified unless the position is an end position or is adjacent to a position with which it will never be grouped. In either of these cases, only one key will be required. Where the position is to be operated only on a call indicator basis, one key only should be specified. In cases where only one key is required the one which is to be specified should be determined from traffic considerations. If a call indicator position is to be operated initially on a call circuit basis, one of the master ringing keys, where two are provided, will be removed at the time the position is cut over.

In No. 10 boards in which master ringing keys are installed, the master ringing start key is mounted on the same base and at the left of the master ringing keys. Otherwise the master ringing start key is located in place of the master ringing key. Where teamwork operation is provided on either or both sides of the call indicator position, two master ringing start keys should be provided, one on each side of the call indicator lamps, in order that the position may be grouped with the adjacent position or positions.

Supervisor's Cord Circuit. The supervisor's cord circuit is wired on all positions and equipped on alternate positions as in manual practise.

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Peg Count Register Keys. The drilling and equipment for the peg count register key shown on Drawing 808-4, should be specified only when call circuit operation is contemplated at *the* position, ~~as~~ the peg count registers used in call indicator operation are operated automatically and do not require peg count keys.

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Face Equipment.

General. The subscribera multiple is extended before the call indicator positions in the same manner as before the call circuit positions and the busy back jacks and intercepting trunk jacks are located as in manual practice. It is considered standard to wire and equip five busy back jacks and five intercepting trunk jacks at each position.

Figure 1 of Drawing 807-101 shows the preferred location of the equipment in the face of the board above the subscriber's multiple. Where there is not sufficient room in any panel to locate the equipment as shown in this drawing, it may be located in other panels or, if necessary in the moulding.

Recorder Busy Lamp and Delayed Disconnect Signal Equipment.

Figure 2 of Drawing 807-101 shows the detailed equipment arrangement of the recorder busy lamp and the delayed disconnect signal equipment. It is considered standard to wire and equip each position with eight recorder busy lamps and the associated flashing keys. The lamps are located in the first eight sockets of a standard type lamp and key mounting as shown on the drawing and the keys are mounted immediately below their associated lamps. The ninth socket is provided with an apparatus blank and the delayed disconnect signal lamp is mounted in the tenth socket with its key immediately below.

Make-Busy Keys. Figure 3 of Drawing 807-101 shows the equipment arrangement of the make-busy keys. It is considered standard to wire each position for five make busy keys and to

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equip in numerical order as epecified by the Telephone Company.

Pilot Lamps. Drawing 807-102 shows the standard location of the pilot lamps in the piling rail of the various types of sections and the trunks with which they are associated. It is not considered necessary to furnish these lamps with number plates or other means of designation.

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Miscellaneous.

Peg Count Registers. Peg count registers are provided in accordance with the recommendations made in the A. T. & T. Co.'s "Step-by-Step Machine Switching Traffic Engineering Practices".

The call indicator operators' peg count registers are preferably mounted with the peg count registers for the call circuit positions. The group peg count registers are mounted in a separate group, preferably on the rack mounting the peg count registers, but where this is impracticable they may be mounted in a separate cabinet.

Busy Back Alarm Equipment. The switchboard busy-back alarm lamp and key referred to in Sec. 1 of this division are mounted in a combination lamp and key mounting located near the head of the lineup, in the first panel of the first section if practicable*. The terminal room alarm lamp and key are located in a similar mounting at the test desk.

Night Alarm Equipment. Except for the key, the apparatus for each call indicator night alarm circuit should be mounted as near as practicable to the center section of the group of twelve positions which the circuit serves. The keys are mounted near the head of the lineup with the call circuit night alarm key or keys.

Terminal Room Equipment.

Relay Rack. Standard type relay racks are used for mounting all of the trunk circuit equipment excepting the recorder selectors, repeating coils and repeating coil condensers, and for mounting the relay equipment of certain of the miscellaneous circuits required in connection with call indicator operation.

Trunk Unit. The trunk equipment on the relay rack is arranged in units of ten trunks each, the relays for each trunk being arranged vertically. These units are assembled, aired and equipped in the shop.

Drawing 807-103 shows the assembly and cabling of one of these units. The table on the drawing shows the number of relays required in each of various types of trunk circuits and also shows the vertical space which will be required on the relay rack for the trunk unit in each case. As shown on this table, it is in general desirable to leave space for one spare relay mounting plate in each unit to care for possible circuit changes. If, however, the provision of this space will affect the number of trunk units which may be located on a relay rack bay, it should be omitted unless it is expected that in the ultimate a type of service requiring a greater number of trunk relays will be introduced. In this case, if there is reasonable assurance that the extra space will be required, a sufficient number of mounting plate spaces should be left to care for the new circuit.

On test jack is associated with each trunk, this jack being mounted in a jack strip near the bottom of the trunk

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unit. This Sack etrip has capacity for twenty jacks, so that ordinarily alternate jack spaces in the plate will be equipped with jacks and the remaining spaces will be equipped with apparatus blanks. On one unit of each bay, three of the spare jack spaces are equipped with jacks cabled to the call indicator test line and used in testing the call indicator equipment. These jacks are marked "A", "SRT" and "T-1".

Miscellaneous Circuits. The miscellaneous circuits, such as the busy back circuit, the delayed disconnect signal circuit, the interrupter relay circuit, and call indicator test line are mounted on the relay rack. They will require in general from six to ten mounting plates. Where practicable, this miscellaneous equipment should be grouped together at one place on the rack.

Repeating Coil Rack. Repeating coils and repeating coil condensers are provided in each trunk as in call circuit trunks and are mounted, arranged and numbered on the repeating coil rack in the same way.

Recorder Rack. Figure 1 of Drawing 807-104 shows the assembly of the rack used for mounting recorder selectors and recorders. The equipment mounted on this rack is assembled and wired in the factory in the form of units which are bolted to the rack. In general one bay of this rack will be required for each position and ordinarily this bay will have sufficient capacity to mount all of the equipment for one position. Where low ceiling heights are encountered, however, it may be necessary to mount a

part of the recorder selector equipment on a separate rack. In this case, the overflow equipment is mounted on a common overflow rack or grouped on several overflow racks.

Recorder selector Unit. Figure 2 of Drawing 807-104 shows the framework on which the recorder selector bank equipment is assembled and wired and which, with its associated equipment forms the recorder selector unit. Mounting space is provided on each unit for ten rotary selectors and one twenty three inch mounting plate for resistances and condensers.

Figure 3 shows the equipment of the recorder selector unit. A terminal strip is provided at the left end of this unit at which the trunk leads to the brushes are terminated and a terminal strip is provided at the right end of the unit at which the leads from the recorder selector bank terminal to the recorders are brought out and at which the multiple wiring between the various recorder selector shelves is terminated.

Recorder selector bank equipment is provided in units to equip ten, twenty, thirty, forty or forty eight trunks as required and is provided with switches as specified.

Recorder Unit. Figures 4 and 4a of Drawing 807-104 show the framework on which the recorder equipment is assembled and wired and which, with the recorder equipment, forms the recorder unit. The framework shown on Figure 4 is used where jack per line party line service is given, and that shown on Figure 4a is used where direct line or jack per station service is given.

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Each of these frameworks provides space for mounting two recorders.

Figure 5 shows the equipment of a recorder unit arranged for jack per line party line service. Where individual line or jack per station service is given, the station switch in the recorder is not provided and the timing relays which are mounted on the lowest plate of Figure 5, are not required.

A terminal strip is provided at the right end of the recorder unit at which the leads from the recorder selectors, the power leads and the leads from the cell indicator lamps are brought in.

Jack. Each recorder is provided with two jacks, designated "T" and "T-1" for use in testing and in making the recorder busy. In addition, a unit type jack box mounting jacks for testing purposes is mounted on alternate bays in a continuous line up of the recorder rack. When one bay of recorder rack is mounted alone, this jack box is located as shown on the drawing.

Number of Recorders. Except as noted, it is considered standard to provide eight recorders per position on positions wired for call indicator operation. This standard is based on the amount of traffic which may be handled at a position rather than on the number of trunks equipped. Where only a portion of the trunks on a position are wired for call indicator operation and the remaining trunks at the position are to be operated permanently as call circuit trunks, it may be desirable to

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provide a smaller number of recorders. Where it is necessary to operate trunks to numbers above 9999, a greater number of recorders will ordinsrily be required. These cases should be given special consideration.

Cabling and Wiring.

Trunk Cabling. Drawing 807-105 shows schematically the cabling of the trunk circuit and the more important position cabling, together with the number and distribution of the leads from the terminal strip at the top of the relay rack unit.

Recorder Rack Cabling. Drawing 807-106 shows schematically the cabling of the recorder rack. For the sake of clearness, the multiple wiring through the selector shelves to the second recorder only is shown. On each fully equipped shelf of selectors the bank wiring is multiplied without slipping through the first five banks. The leads are then gathered into a multiple reversal and are multiplied without further slip through the remaining banks. Where a shelf unit is equipped with only eight banks, this reversal takes place between the fourth and fifth banks. A local form is introduced between the last bank and the terminal strip in order to change the sequence of recorders connected to successive terminals on the different banks. This local form, in conjunction with the multiple reversal, reduces the amount of hunting required by the selector switches in preselecting idle recorders. Table I shows the recorder to which each set of terminals on each of the banks is multiplied.

Switchboard cables are used for multiplying between the terminal strips on the various selector shelves. No slip is

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TABLE I

RECORDER RACK WIRING

'Showing' the Recorder to Which each Set of
 Terminals on Each Selector is Multiplied.

Bank
 Term.
 No.

Recorder Numbers

20	4	1	8	2	7	6	6	3	2	4
19	3	2	6	4	4	1	2	7	8	5
18	2	3	4	6	1	4	7	2	5	8
17	1	4	2	8	6	7	3	6	4	2
16	8	5	7	1	3	2	5	4	6	7
15	7	6	5	3	8	5	1	8	3	1
14	6	7	3	5	5	8	1	1	1	3
13	5	8	1	7	2	3	4	5	7	6
12	4	1	8	2	7	6	6	3	2	4
11	3	2	6	4	4	1	2	7	8	8
10	2	3	4	6	1	4	7	2	5	8
9	1	4	2	8	6	7	3	6	4	2
8	8	5	7	1	3	2	5	4	6	7
7	7	6	5	3	8	5	1	8	3	1
6	6	7	3	8	5	8	8	1	1	3
5	5	8	1	7	2	3	4	5	7	6
4	4	1	8	2	7	6	6	3	2	4
3	3	2	6	4	4	1	2	7	8	5
2	2	3	4	6	1	4	7	2	5	8
1	1	4	2	8	6	7	3	6	4	2
<hr/>										
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-44	45-48

Selector Circuits

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introduced in this multiplying. A separate switchboard cable is carried from the terminal strip on the lowest shelf of selectors to each shelf of recorders, each cable containing the leads to the two recorders on the shelf.

As previously noted, one terminal strip is provided for each shelf of recorders. This strip is used for terminating the selector bank leads and the power leads to the two recorders on the shelf, and for terminating the leads from the call indicator lamps. As shown on Drawing 807-106, the lamp leads from this terminal strip are divided into groups designated "RT" "H" and "LT". The "H" leads are multiplied with local wiring between shelves of recorders and are cabled to the operator's position from next to the upper shelf of recorders. Where teamwork is specified, the "RT" and "LT" leads are also multiplied between shelves and are cabled from the upper shelf of recorders to the "H" punchings on the upper shelf of recorders on the racks serving the positions with which teamwork operation is to be given.

The local form between the recorder unit terminal strip and the recorder apparatus is wired for teamwork operation in all cases.

Positional Cabling and Wiring. It is considered standard to provide local form wiring for the full trunk capacity of the position and for home and teamwork operation in connection with each trunk. This form also contains the leads to the call

indicator lampe, **master** ringing keys and pilot lampe.

Group Peg Count Registers. One lead from the **display** keys in each trunk is brought through the **local** form to a terminal **strip** at the rear of the **position** to provide for the group **register** connections as **shown** on drawing 807-105. These **leads** are **strapped together** on the terminal strip **as** required in order to **associate** the trunks with the registers to which they are **assigned**. It is conidered standard to run one **six** pair **cable** from the terminal etrip on the **rack** mounting the group regietere to each two poeitions, ten **leads** being terminated at the **first** of the **two** positions and **multiplied** to the second. In **this** way, **re** many **as** ten group regietere may be divided **as desired** between the two **positions** by proper atrapping on the terminal **strips**.

Two **sets** of terminal **strips** are mounted at the group register rock, one **set** **terminating** the leads from the registers and the other terminating the **leads** from the poritione. If the **trunks** of a **group** **appear** at positions not **connected** by multiple cable, the individual **peg count circuits** may be croea connected between these terminal strips in order to **connect** any of the **trunks** to the **same** register.

Operators' Peg Count Registers.

The **operators' registers** are aabled directly to the **relay** rack for the poeition with **which** they are aesociated and are operated automatically by the interrupter **relay** control circuit.

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Floor Plans.

General. It is recognized that where call indicator equipment is installed in existing manual offices, it will in the majority of cases be necessary to locate the equipment wherever space is available rather than with regard to an ideal equipment layout. There are certain considerations which control the location of the terminal room equipment however which should be observed if practicable.

Relative Location of Racks. The recorder rack and the relay rack associated with the same position should be located as near each other as possible, both for maintenance and cabling reasons. A desirable arrangement would be to place the recorder rack and the call indicator trunk relay rack in adjacent lines, the racks for each position being opposite each other with their equipment sides facing each other. This arrangement is particularly desirable from a maintenance standpoint in that a part of the trunk circuit equipment is mounted on each of these racks and when making tests it is often necessary to go to the equipment on both racks.

Drawing 807-105 shows the amount of cabling required for each trunk in each of the cable runs from the relay rack terminal strip. From this drawing it may be seen that it is desirable to locate the relay rack as near the cable turning section and the repeating coil rack as possible in order to save cabling.

Aisle Spaces. It is of course necessary to provide aisle space on each side of the recorderrack. It is recommended that two feet six inches be left between the vertical leg of the floor angle iron and my equipment or wall facing the equipment side of the rack and that three feet three inches be left on the wiring side, measuring from the vertical leg. Where these dimensions cannot be obtained, the dimension on the wiring side should be leseened in preference to lessening the dimension on the equipment side. Two feet on the equipment ride and two feet nine inches on the wiring side should be regarded as minimum dimensions.

Miscellaneous. Recorder racks should be located so as to be protected as far as possible from dust and moisture, which if accumulated on the bruehee or banks of the switches are liable 'to cause defective operation.

It is also undesirable to locate recorder racks near the door of a battery room as the fumes generated in charging the batteries may cause corrosion of the banks and brushes.

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Current Drain Data.

Both twenty four and forty eight volt battery sources are required in connection with call indicator equipment. The following data indicates the current drains in ampere seconds per call for calls completed at home positions and for calls completed by teamwork operation.

	24 Volt		48 Volt	
	<u>Build up and Restore</u>	<u>100 Seconds Conversation</u>	<u>Build up and Restore</u>	<u>100 Seconds Conversation</u>
Home Operation	15.45	62.05	3.32	2.4
Teamwork Operation	16.91	65.25	3.38	2.4

EQUIPMENT REQUIRED FOR MANUAL
OFFICES IN STEP-BY-STEP AREAS -
DIALING EQUIPMENT

General

Standard Method of Dialing. As outlined in Division I of these notes, when dialing into Step-by-step Offices from the "A" board in manual offices, the "dial key"^a method of associating the positional dial with the outgoing trunk circuit is considered **standard**. Under this **plan**, the dial may be associated with any cord circuit at the **position** by the operation of a locking dial **key** associated with each cord. The **operation** of **this** key opens the tip and ring of the calling end of the cord and connects the calling end through to the dial circuit. When the cord is plugged into a **trunk** outgoing to a machine **switching** office, a number of **relays associated with the trunk are** operated, and a pulsing relay is connected to the tip side of the trunk. The contacts of this relay are bridged across the line and when the operator **dials repeat** the pulses into the machine switching office.

After dialing has been completed, the dial key is restored to **normal** to close the tip and ring of the **cord** and **remove** the **apparatus** required for **dialing**. Should the

operator fail to restore this **key**, a low tone (153 p.p.s) **is** placed on the operator's telephone set by means of a relay in the dialing circuit as **soon** as the called party **answers**. This tone **remains** on the **operators** telephone set until the dial **key is** restored.

The **ordinary** 24 volt **manual** central office battery **is suitable** for use **with** the dial key method.

Dial Cord Plan. The **dial** cord plan is used, **as** outlined in Division I, only **where** the traffic to the **machine** switching office is-very light or where the **manual** board **is soon** to be replaced. Under this **plan**, each trunk-is provided with an extra jack mounted above the regular **trunk** jack and **known as** the "**dial jack**", and the **dial** is connected directly to a cord and plug, **known as** the "**dial cord**". A relay **is** connected to the sleeve of the **dial** jack. **When** the dial cord is inserted in the dial jack, this **relay** is operated, transferring the trunk leads from the regular outgoing **trunk** jack to the dial jack, **so** that the operator **may** dial directly over **the trunk**. After dialing **has** been completed, **it is** necessary for the operator to **remove** the **dial** cord from the dial jack before the connection is completed.

Trunk Resistance. Under either of the above outlined methods of dialing, the maximum allowable loop resistance of the outside cable pair is 750 ohms. This limitation is imposed by the supervisory relay in the manual office rather than by difficulty in transmitting the pulses. The limit in transmitting pulses is 1000 ohms.

Positional Equipment

Type of Dial. It is considered standard to use a 2-E type dial on all types of switchboards. This dial is of the same construction as the 2-A type dial used in subscribers' sets, except that, for circuit reasons, there are five contact⁸ required on each dial instead of four.

Mounting and Location of the Dial. A new type of dial mounting known as the 6000 type has recently been standardized in order to facilitate the replacement of the positional dial by a new one. This mounting provides a connecting block permanently secured to the keyshelf. This connecting block is equipped with five flat type terminals to which the dial circuit leads from the local form are soldered. The dial is secured to the dial mounting by means of a semi-circular strip of metal known as the "adapter," shown on photograph No. 30 in Division X of these Notes. The dial, adapter and dial mounting are assembled separately and may be snapped on to this connecting block, a strip of five flat type springs on the dial mounting making contact with the terminals on the connecting block and completing the connection. By using this mounting it is possible to remove a defective dial and to snap a new one into place in much less time than has heretofore been required in disconnecting the old type dial cord from a defective dial and

connecting it to a new one. G.E.C. 1260 describes this dial mounting in detail.

Drawing 808-107 shows the preferred location of the dial on standard 60 call circuit "A" switchboard positions. Where other equipment interferes with locating the dial in this space the dial location may be changed but care should be taken that the dial does not overlap on the adjacent position. If the only possible dial locations involve this overlapping the dial should be located in such a way that it may be snapped into position after the adjacent keyshelf has been raised, so that it may be operative while work is being done on the adjacent keyshelf. On boards where capacity for less than 60 call circuits is provided, the dial can usually be located as shown on drawing 807-107. Where capacity for more than 60 call circuits is provided, such as on the 120 call circuit keyshelf, the location of the dial should be considered as a special case, as this type of keyshelf will rarely be encountered in step-by-step areas.

Dial Key Equipment. The positional equipment required in connection with the dial key plan, in addition, to the dial consists of one set of locking springs per cord circuit, one relay, one No. 18 type resistance and a 2 m.f. condenser, the relay resistance and condenser

being mounted in the rear of the section.

In some offices the cord keys **are** equipped with spring combinations which are not **being** used and which **can** be employed for dialing purposes. If there are no **spare** springs available for this **purpose** it may be possible to install additional spring combinations on the existing key units or it **may** be necessary to **replace** the **existing** keys by **new** ones. In considering the **use** of **spare** springs on existing keys, it should be born in **mind** that spring contacts of the **saw** tooth type such as are used for ringing, are not suitable for dialing.

Keys of the old type having their **springs** **mounted** horizontally, as on the No. 110 **type** can **accommo-** **date** **a maximum** of three sets of **springs** per **key**. Keys of this type, **can** be used therefore only where one set of springs **is** sufficient for ringing since one set **is** used for listening and another for dialing. **Where** the existing key⁸ have their springs mounted horizontally and **where** more **than** three sets of **springs** will be required it **rill** be **necessary** to replace the existing keys with keys having their springe mounted vertically. Keys with vertical springs, however, extend **approximately** 1-1/2 inches farther down into the **keyshelf** than **those** equipped with horizontal springs. **As** a result of this, where

horizontal springs are replaced by vertical ones, it may be necessary to deepen the **keyshelf** in order to get proper clearance between the springs and the key pan.

The dial key **plan** may be used in connection with **any standard combination** of key units which is **at present** used with subscribers cord circuits. A key is **now** available **which** may be **used** where four party line ringing **keys** and coin collect and return **keys** are associated with each cord circuit. This key is mounted on an **"A"** type universal key **base** and mounts **six** push button **key** units and a two **way** lever type key which may be used for listening and dialing.

Dial Cord Equipment. Under the dial cord **plan**, the only additional **equipment** required in the section over the standard **"A"** operators section is the **dial** and cord **per** position **and** the dial **jack** in each trunk.

Where this **plan** is used, an additional cord socket, on a line with **the** front cord **sockets** and to the right of the right hand cord **circuit**, will ordinarily be drilled to **accommodate** the dial cord. **Where** there is not room to drill this hole or where there is **an** excess of cord circuits on the position the dial cord may be mounted in the front **socket** of the two assigned to **the** right hand cord circuit.

Trunk Circuit Modifications

Under the standard method of dialing **each** trunk circuit will require **approximately seven** relays, **five** condensers, a resistance and a retardation coil in order to adapt it for dialing. **This** equipment is mounted in units of ten trunks on relay **racks** in the terminal room in **accordance** with **standard manual** practice. The equipment for each of these ten trunks **is** mounted vertically and **will** require about **fourteen mounting** plates.

Under the dial cord plan, **approximately** four relays, two retardation coils and four condensers are required, **necessitating** about **ten** mounting plates.

Method of Cabling. In offices where the **dialing** positions are installed **as** new positions, the outgoing trunks **will** ordinarily **be** cabled from **the** position to the B.I.D.F. In this case the relay equipment is cabled to the V.I.D.P., where it is cross-connected to the leads to the **position**, and to the M.D.F., where it is cross-connected in the usual **my** to the outside **cable** pairs.

Where a subscriber's position is being converted to permit dialing and the existing outgoing trunks are cabled to the H.I.D.F., the **same** procedure **will** ordinarily be followed. Where the existing outgoing trunks are

cabled from the position to the M.D.B., the relays are cabled to two separate terminal blocks on the M.D.F. The trunks are then connected to the relays by a jumper wire and to the outside cable pairs with the usual cross-connection.

Busy Tone. A group busy tone is applied to the sleeve of certain trunks in each group as outlined in Division I, by a series of chain relays. When all of the relays in this chain are operated, the low tone (153 p.p.s.) is placed on the sleeve of one or more of the trunk jacks to indicate that all of the trunks connected to the chain of relays are busy.

STEP BY STEP MACHINE SWITCHING SYSTEM FACE EQUIPMENT-CALL INDICATOR SECTION

807-101
Information
Engineer *A.T.E.*
Draftsman *A.M.C.*
Checked by
Dec. 1-1922
ISSUE 1

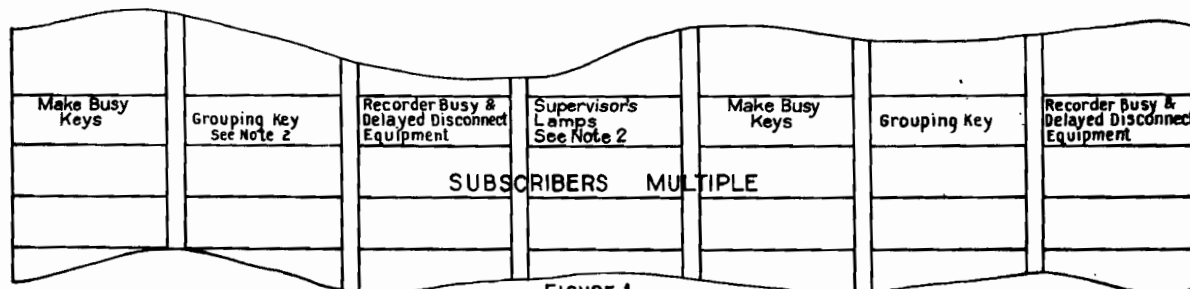
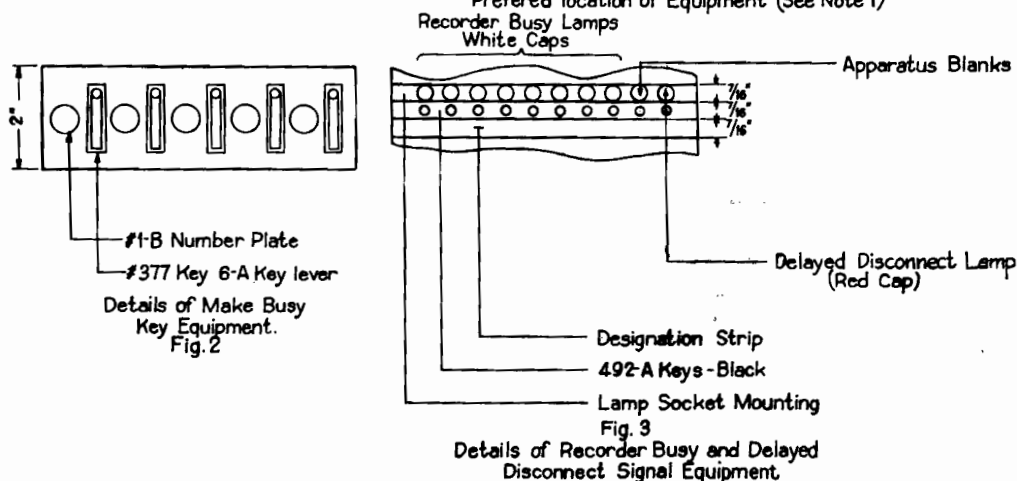


FIGURE 1.
Seven Panel Two Position Trunk Section.
Preferred location of Equipment (See Note 1)



NOTES

- | | | | | | |
|---------------------------------|--------------------------------|---------------|---------------------------------|--------------------------------|---------------|
| ① In 8 Panel-3 Position Section | Growth | | ① In 7 Panel 3 Position Section | Growth | |
| | Left to Right | Right to Left | | Left to Right | Right to Left |
| | Mount make busy keys in Panels | 1-4-7 2-5-8 | | Mount make busy keys in panels | 1-3-6 2-5-7 |
| | recorder busy lamps in | 2-5-8 1-4-7 | | recorder busy lamps in | 2-5-7 1-3-6 |
| | grouping key | 2-5-7 2-4-7 | | grouping key | 2-4-6 2-4-6 |
| | supervisors lamps | 4 5 | | supervisors lamps | 4 4 |
| Where practicable. | | | Where practicable. | | |
| In 5 Panel-2 Position Section | Growth | | In 6 Panel 2 Position Section | Growth | |
| | Left to Right | Right to Left | | Left to Right | Right to Left |
| | Mount make busy keys in panels | 1-4 2-5 | | Mount make busy keys in panels | 1-4 3-6 |
| | recording busy lamps in | 2-5 1-4 | | recorder busy lamps in | 3-6 1-4 |
| | grouping key | 2-4 2-4 | | grouping key | 2-5 2-5 |
| | supervisors lamps | 3 3 | | supervisors lamps | 3 4 |
| Where practicable. | | | Where practicable | | |
- ② This equipment is provided as in manual practice.

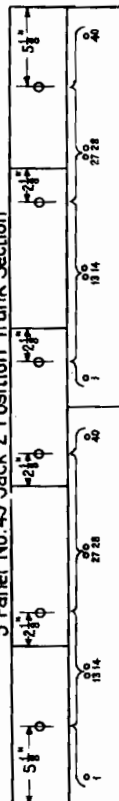
For pilot lamp location see Dwg. 807-102.

STEP BY STEP MACHINE SWITCHING SYSTEM

Location of Call Indicator Pilot Lamps in
Piling Rail of Various Types of Sections

807-102
Information
Engineer *J. L. Z.*
Draftsman W.B.K.
Checked by
Dec. 1, 1922.
ISSUE 1

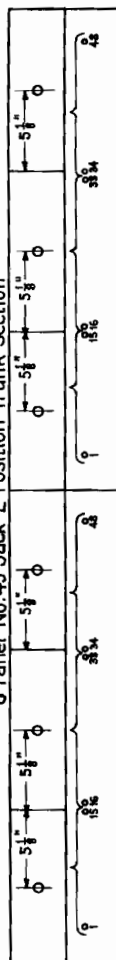
5 Panel No. 49 Jack 2 Position Trunk Section



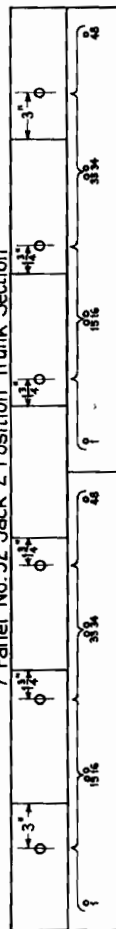
6 Panel No. 92 Jack 2 Position Trunk Section



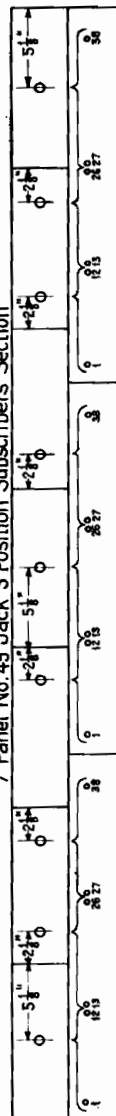
6 Panel No. 49 Jack 2 Position Trunk Section



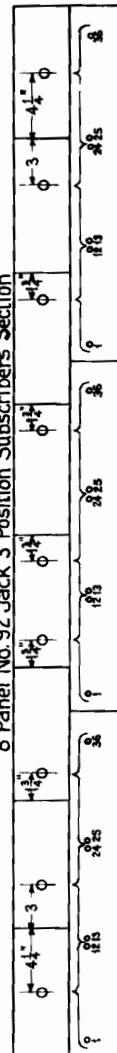
7 Panel No. 92 Jack 2 Position Trunk Section



7 Panel No. 49 Jack 3 Position Subscribers Section



8 Panel No. 92 Jack 3 Position Subscribers Section



Note: Pilot Lamps are equipped
with white caps.

STEP BY STEP MACHINE SWITCHING SYSTEM TRUNK EQUIPMENT UNIT

807-103
Engineer *McL.*
Draftsman *W.*
Checked by
Dec. 1 1922.
Issue 1

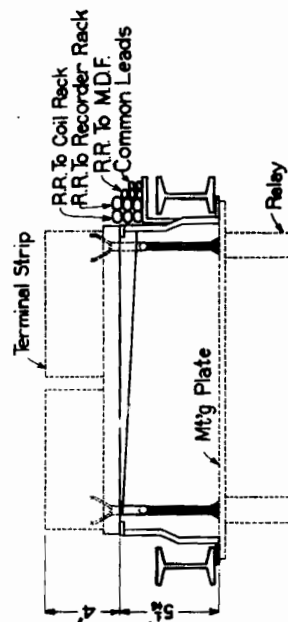
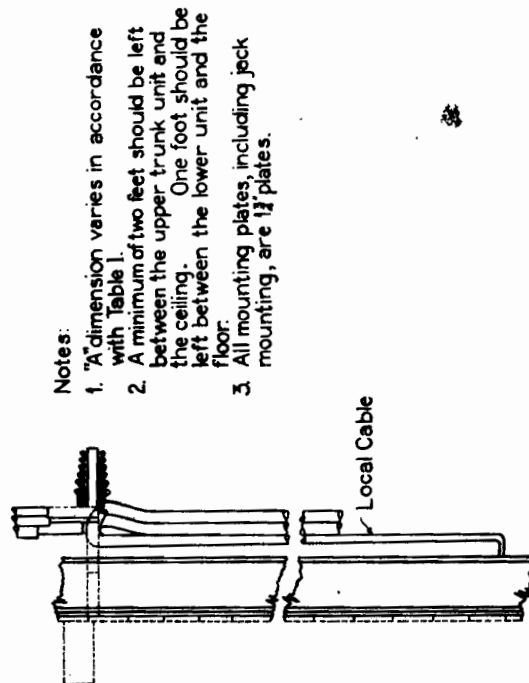
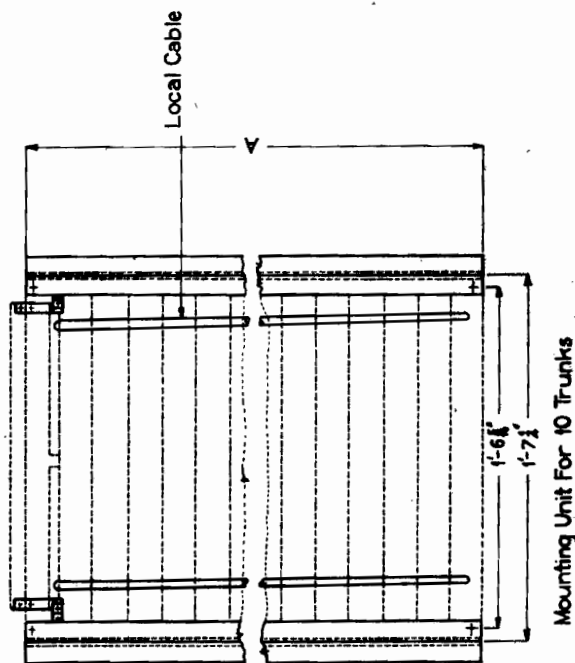


TABLE I
Showing The Number Of Relay Mounting Plates Required In
A Trunk Unit For Various Types Of Circuits.

Type of Circuit	Mounting Plates Required for				Overall Height when wired for teamwork and with space for one spare mount- ing plate (allow 1")
	Relays	Team- work Relays and Jacks	Resistances (where Condensers practi- cally impossible)	Spare	
No. 1, C&I-D boards with machine ringing	15	2	3	1	21
Direct and two party jack per station	18	2	3	1	24
Two party jack per line	19	2	3	1	25
Four party jack per line full selective	19	2	3	1	25
Four party jack per line semi selective	18	2	3	1	24
Four party jack per station semi selective	20	2	3	1	26
No. 10 Board Four party jack per line semi selective with Machine ringing.					



- Notes:
1. "A" dimension varies in accordance with Table I.
 2. A minimum of two feet should be left between the upper trunk unit and the ceiling. One foot should be left between the lower unit and the floor.
 3. All mounting plates, including jack mounting, are $1\frac{1}{2}$ plates.



Mounting Unit For 10 Trunks

STEP BY STEP MACHINE SWITCHING SYSTEM

Recorder Rack - Assembly and Equipment.

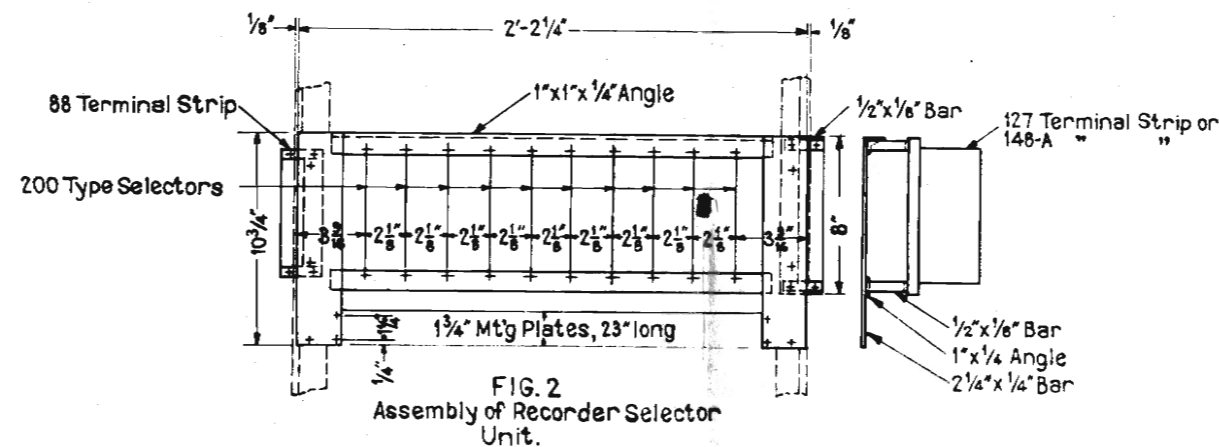
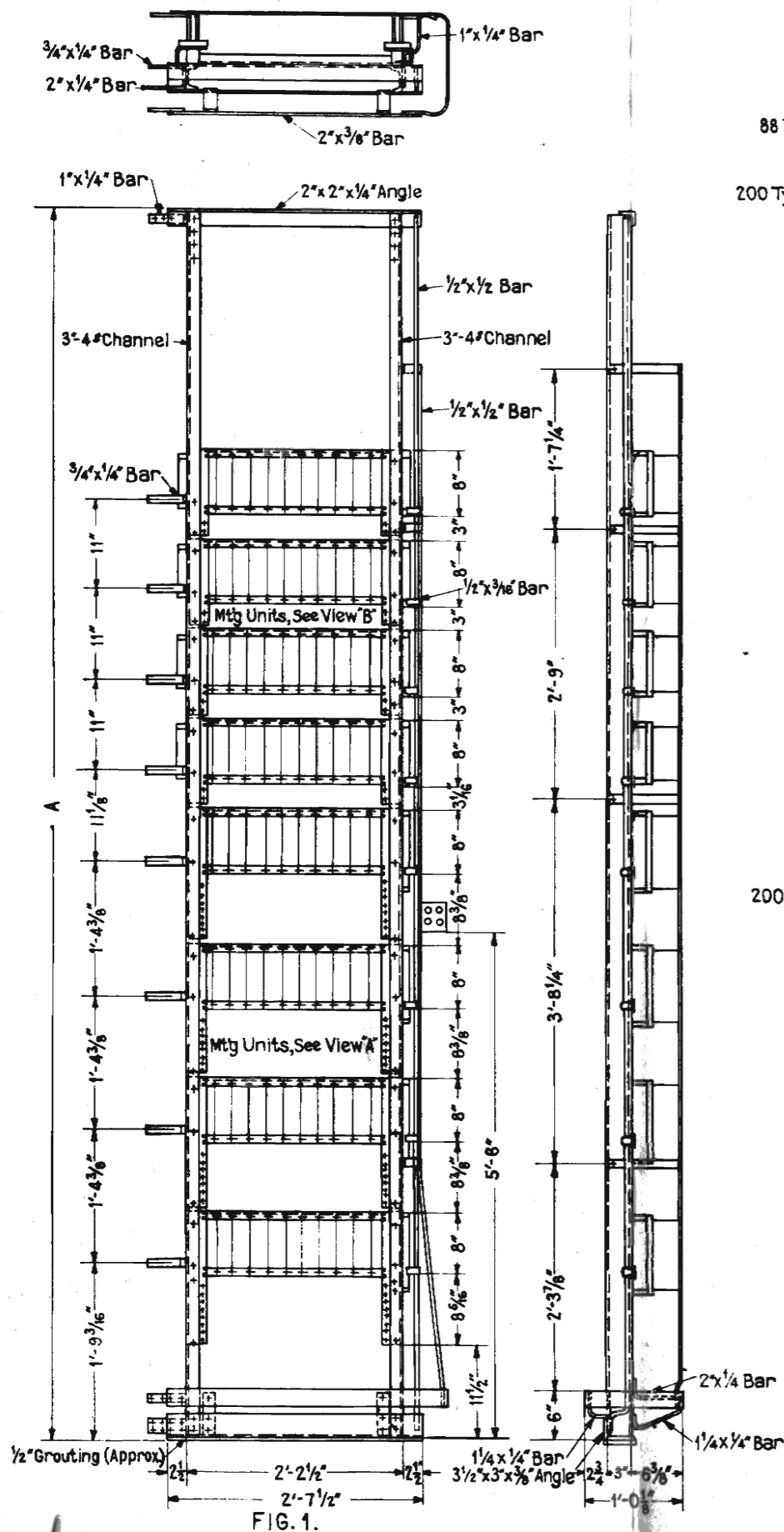


FIG. 2
Assembly of Recorder Selector
Unit.

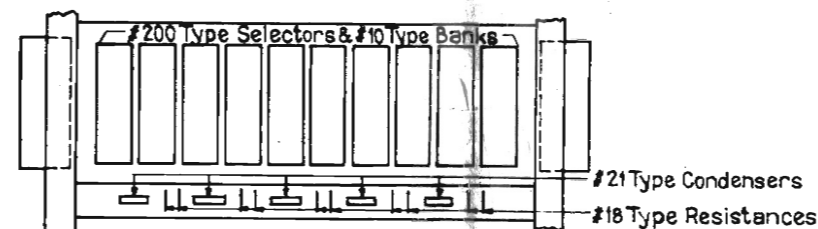


FIG. 3.
Equipment of Recorder Selector
Unit.

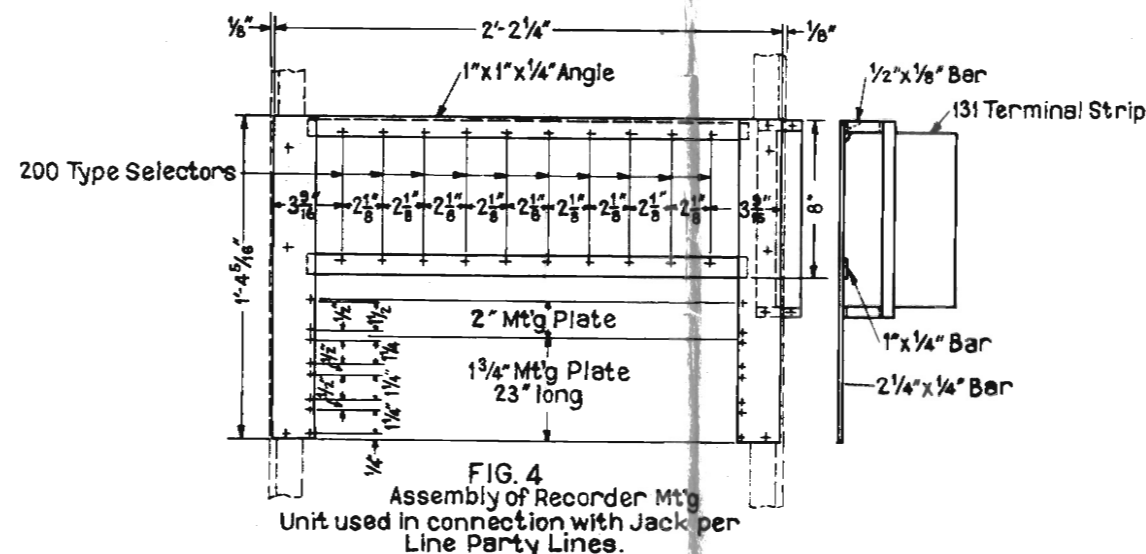


FIG. 4
Assembly of Recorder Mtg
Unit used in connection with Jack per
Line Party Lines.

NOTES

- ① At least 2'-0" cabling space should be left between the upper unit of the selectors and the ceiling.
② "A" dimension, Fig.1, varies with height of ceiling.

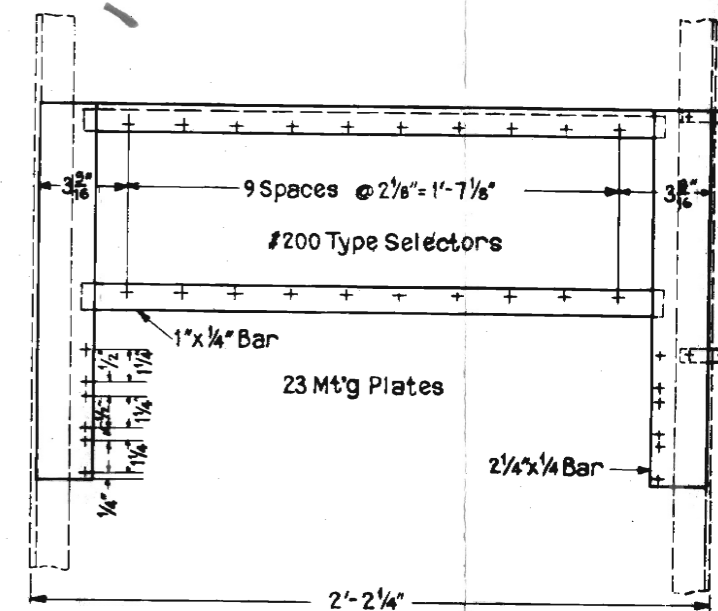


FIG. 4-A
Assembly of Recorder Mounting Unit used in
Connection with Direct and Jack per Station Lines.

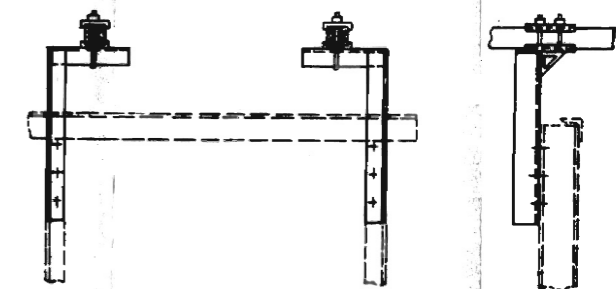


FIG. 6
Method of Mounting Supporting Details.

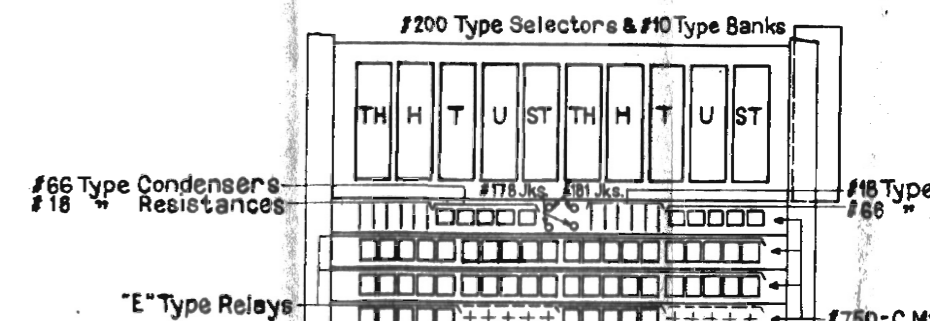
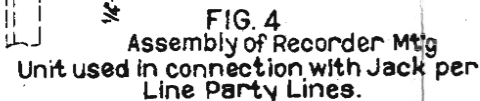
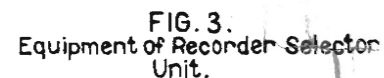
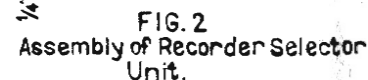


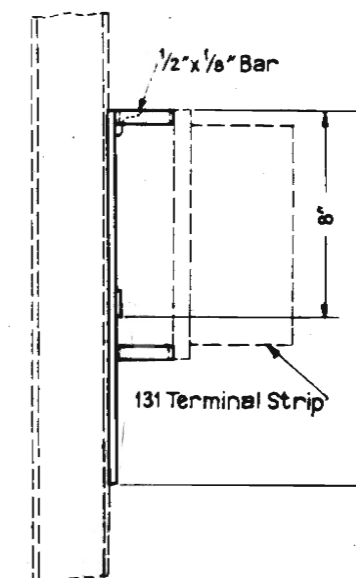
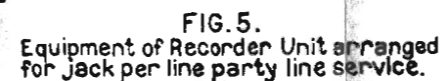
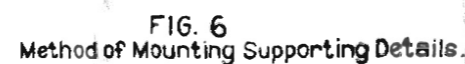
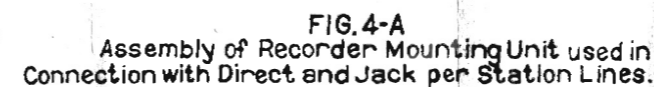
FIG. 5.
Equipment of Recorder Unit arranged
for Jack per line party line service.

Recorder Rack - Assembly and Equipment.

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- ① At least 2'-0" cabling space should be left between the upper unit of the selectors and the ceiling.
- ② "A" dimension, Fig.1, varies with height of ceiling.



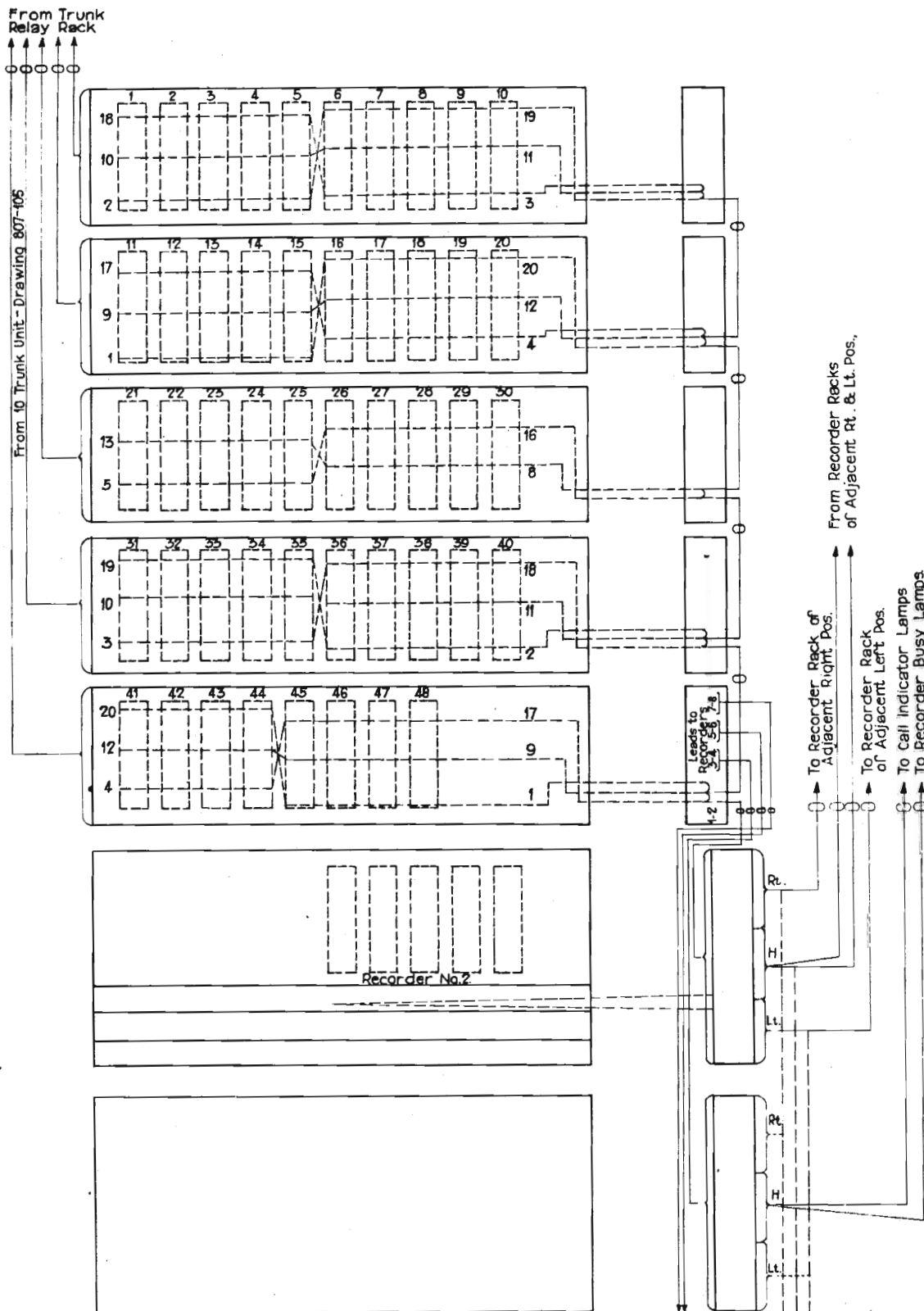
_____ Indicates Trunk Cable
 _____ " Position "
 - - - - - " Local Form

'A' cable contains	6 Leads	From Each of 10 Trunks.
'B' "	5 "	" "
" "	" "	" "
" "	" "	" "

STEP BY STEP MACHINE SWITCHING SYSTEM

Call Indicator Recorder Rack Cabling Schematic

807-106
Information
Engineer *H. E.*
Draftsman
Checked by
Dec. 1, 1922
ISSUE 1



NOTES

————— Indicates Switchboard Cable
- - - - - " " Local

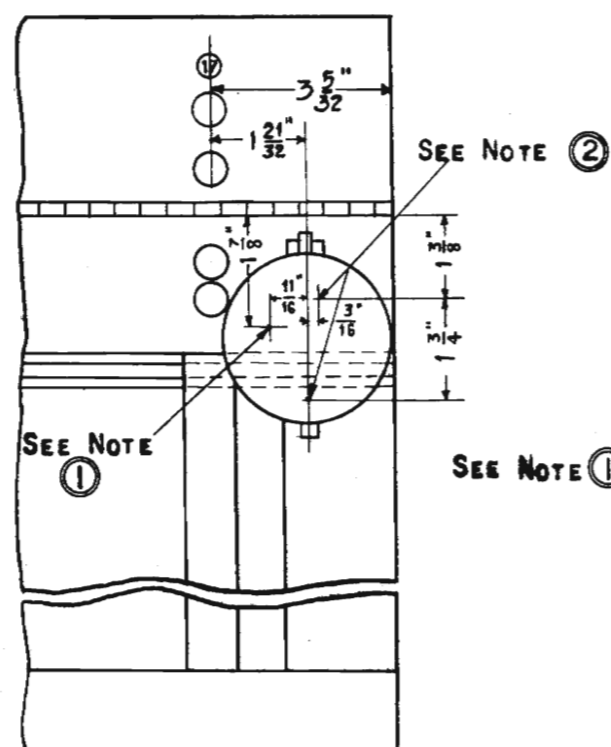


FIG. 1
6 PANEL 92 JACK 3 POS.
No. 1 SUBSCRIBERS SECTION

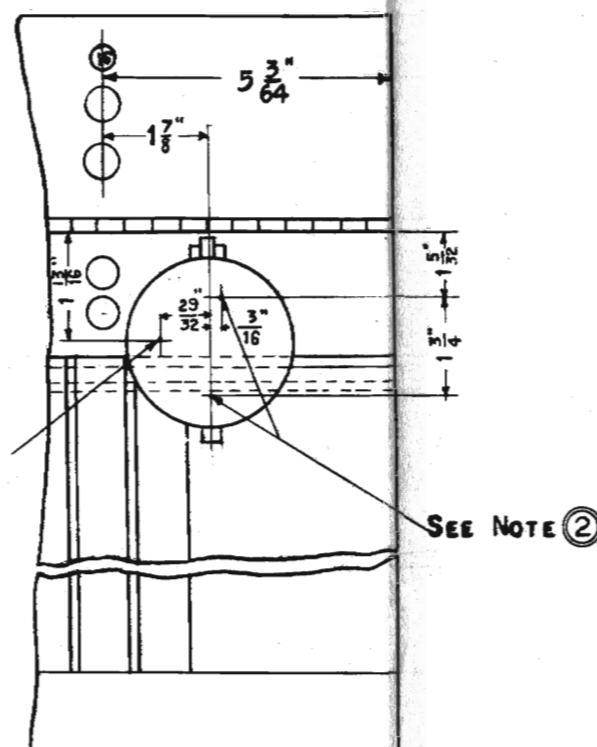


FIG. 3
No. 1-D SECTION

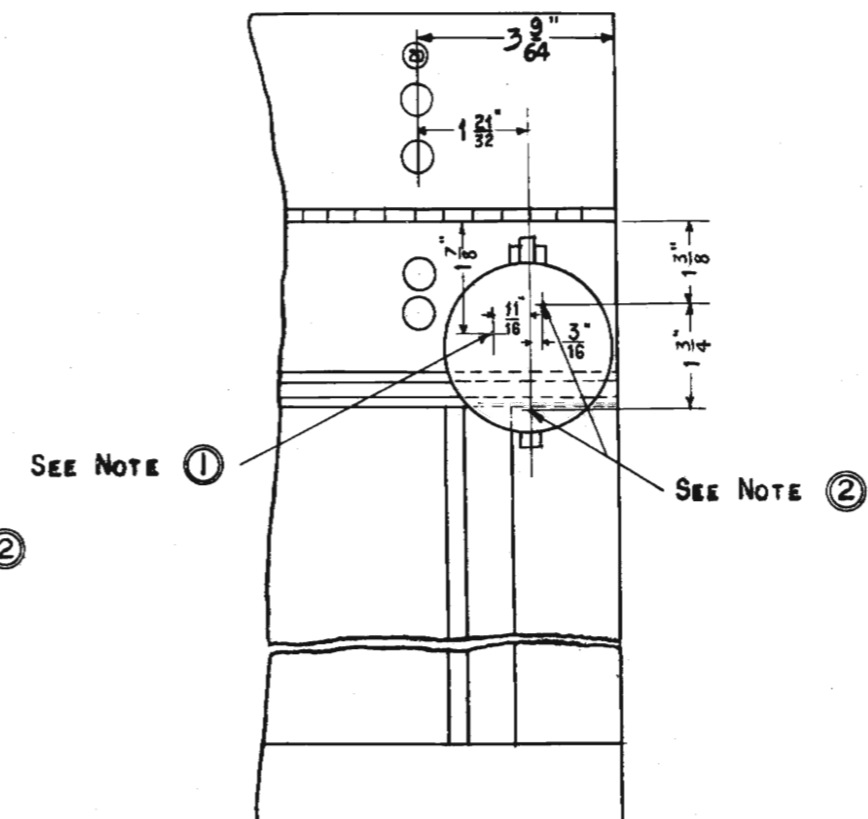


FIG. 5
No. 1-C SECTION

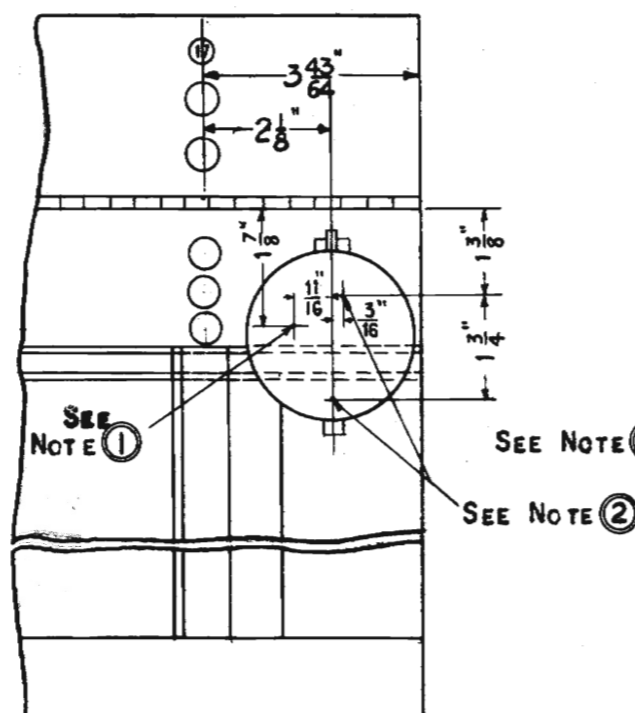


FIG. 2
7 PANEL 49 JACK 2 POS.
No. 1 SUBSCRIBERS SECTION

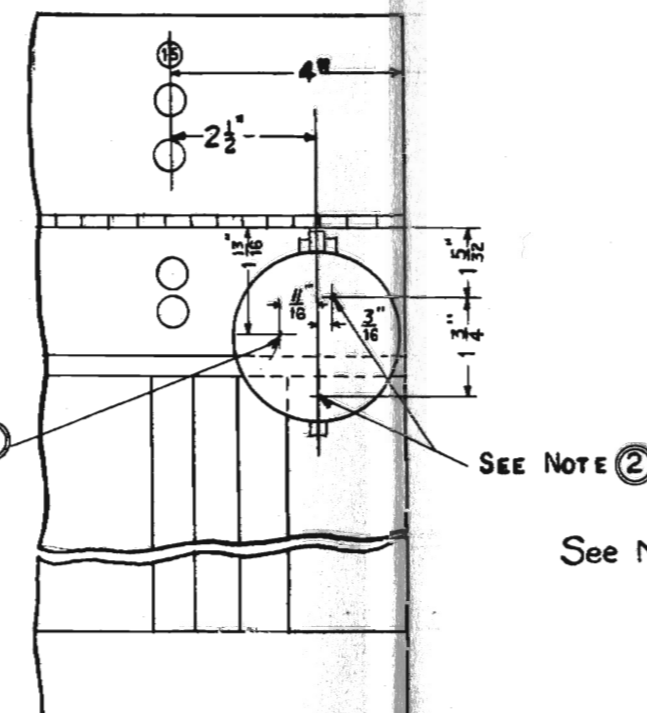


FIG. 4
No. 10 SECTION

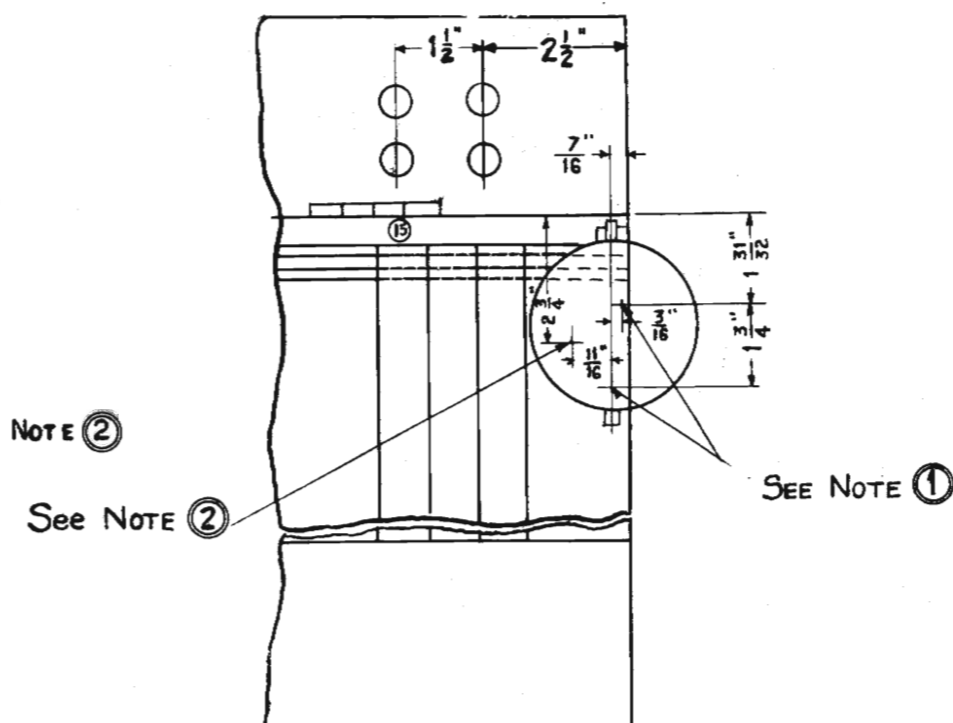


FIG. 6
No. 9-C SECTION

- NOTES: ① DRILLING
② MOUNTING
③ WHERE DIA THESE STR
④ ON 9-C SW
BRACE TO

END VIEW

STEP BY STEP MACHINE SWITCHING SYSTEM
 STANDARD DIAL LOCATIONS ON MANUAL "A" SWITCHBOARDS EQUIPPED FOR DIALING INTO STEP
 BY STEP MACHINE SWITCHING CENTRAL OFFICES

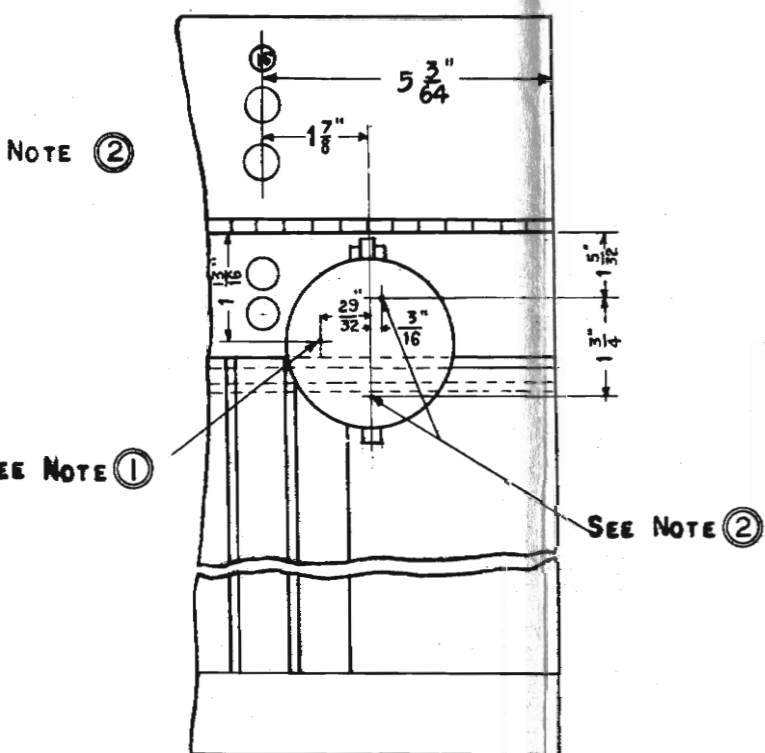


FIG. 3
 No. 1-D SECTION

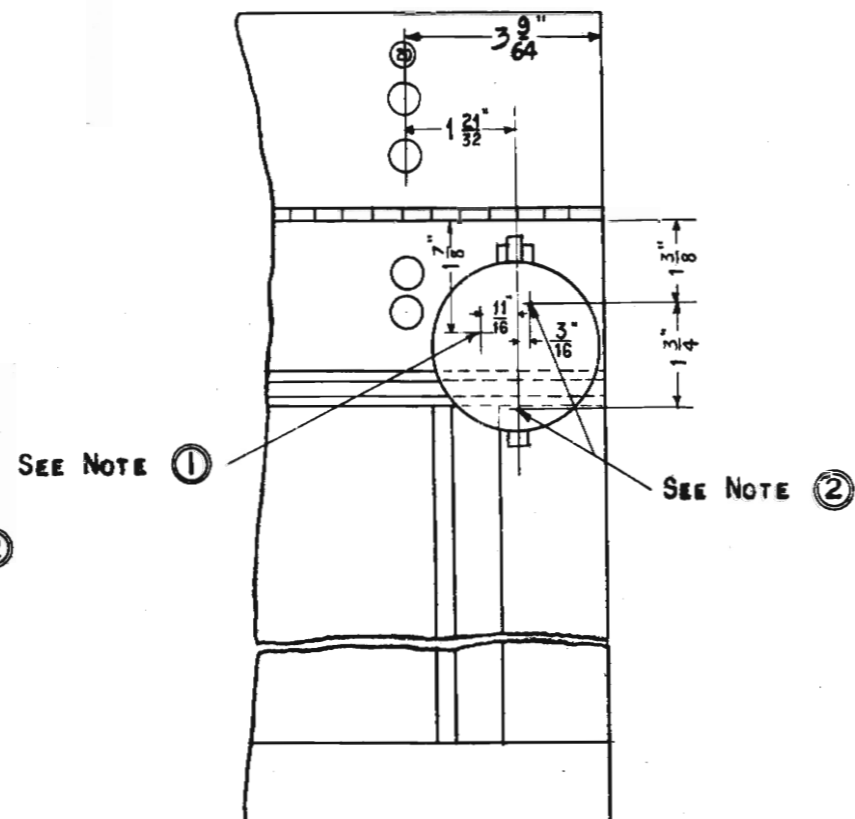


FIG. 5
 No. 1-C SECTION

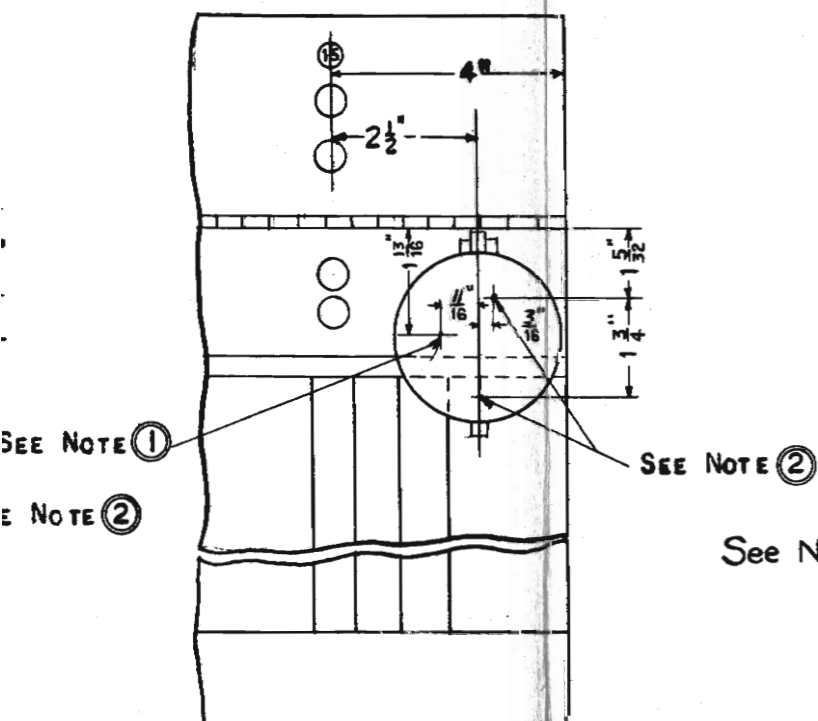


FIG. 4
 No. 10 SECTION

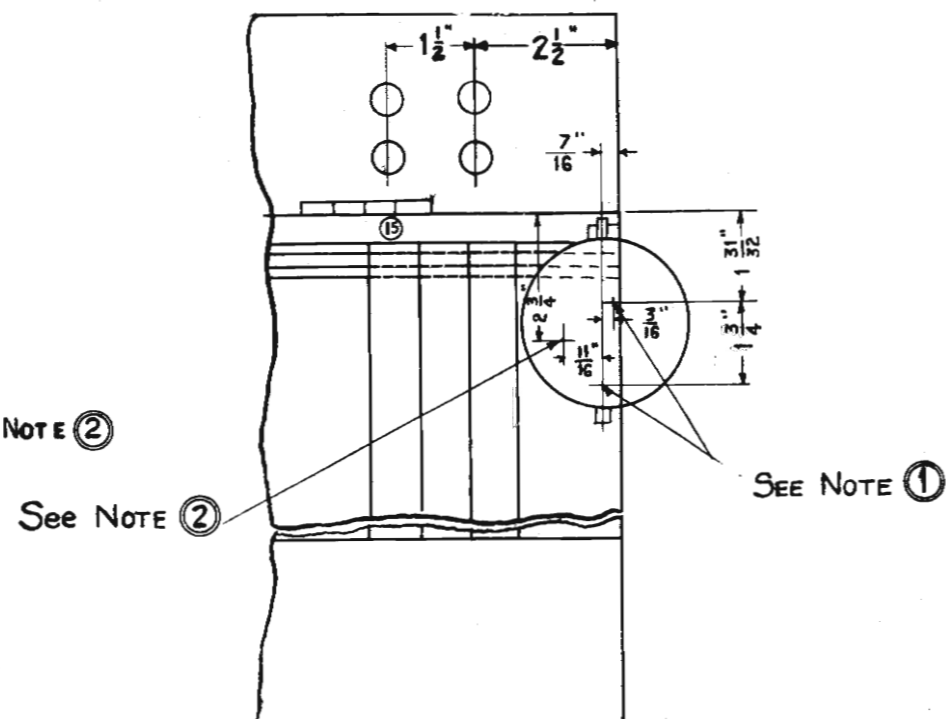
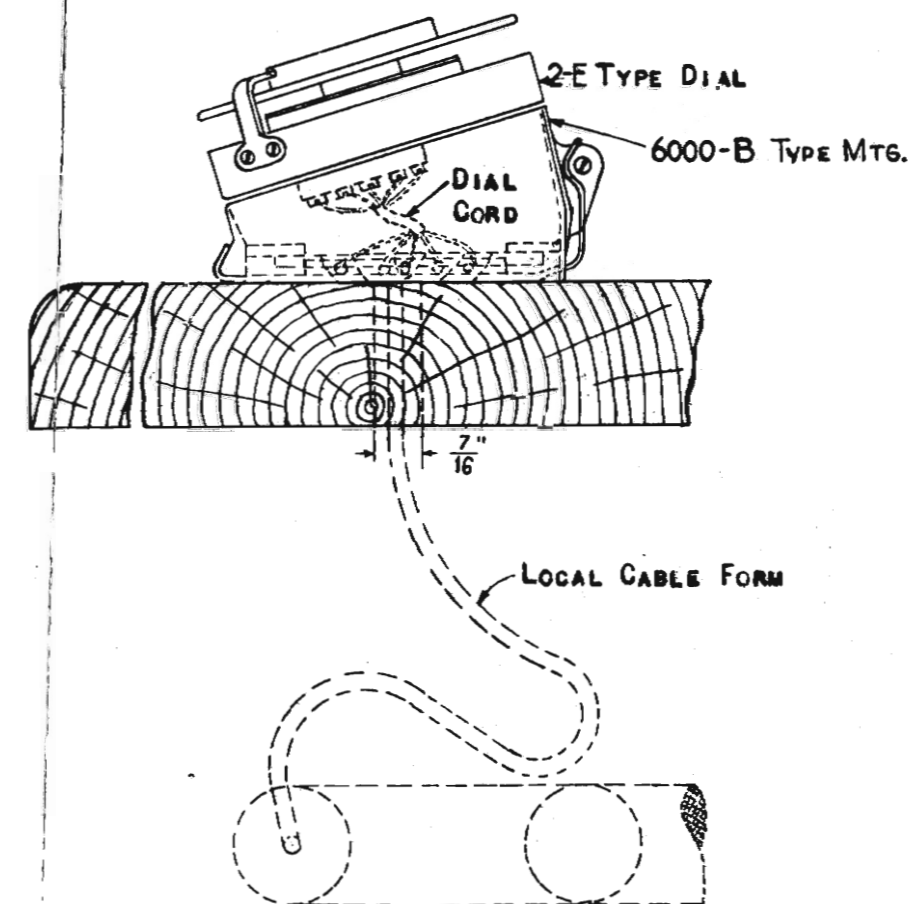


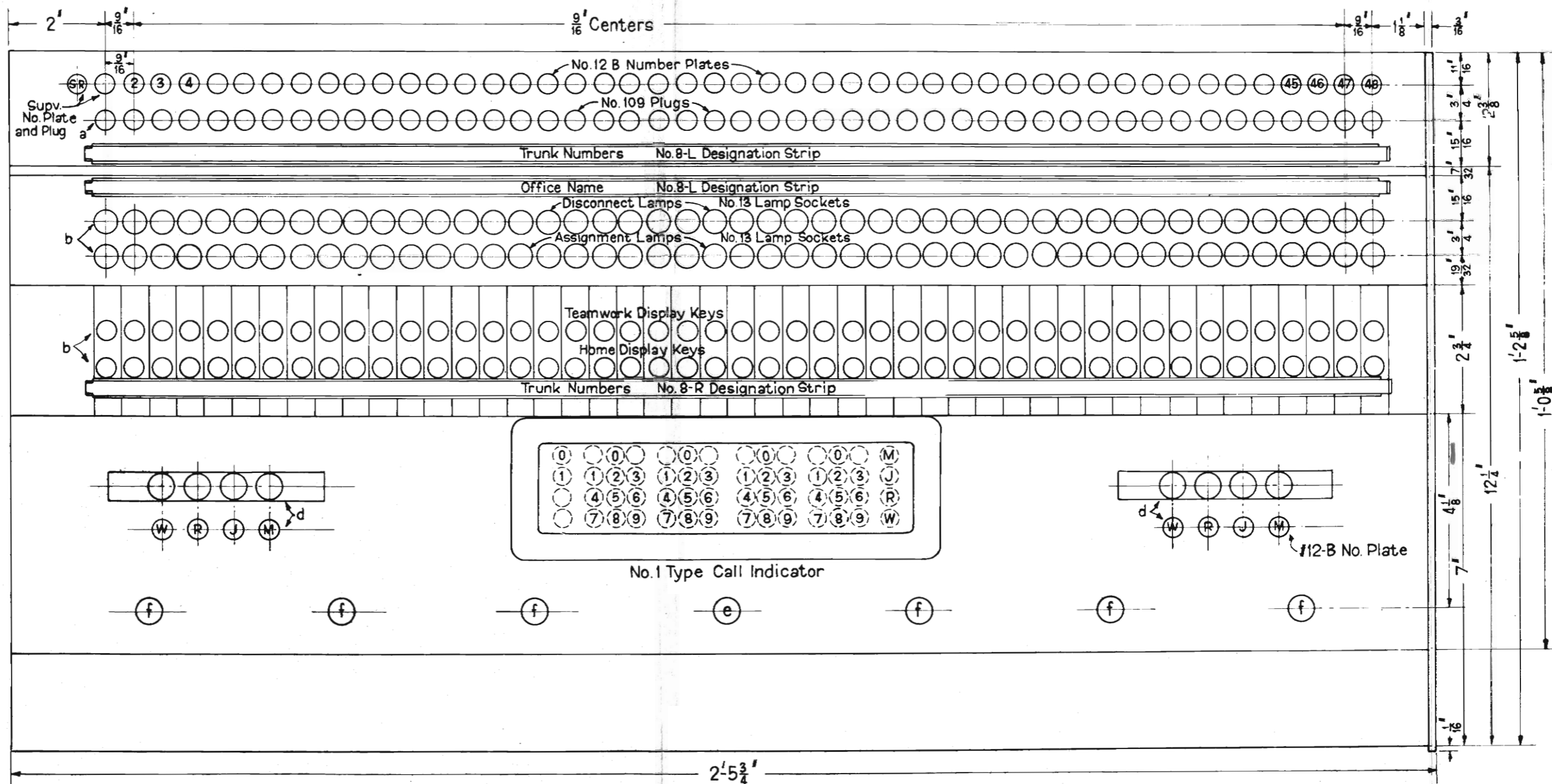
FIG. 6
 No. 9-C SECTION



END VIEW OF KEYSHELF SHOWING DIAL IN PLACE

- NOTES:
- ① DRILLING FOR LOCAL FORM LEADS TO CONNECTING BLOCK.
 - ② MOUNTING SCREW DRILLING FOR CONNECTING BLOCK.
 - ③ WHERE DIAL IS MOUNTED ON KEYSHELVES EQUIPPED WITH END STRIPS, THESE STRIPS WILL BE CUT DOWN IF NECESSARY.
 - ④ ON 9-C SWITCHBOARD IT WILL BE NECESSARY TO MOVE THE KEYSHELF BRACE TO LEFT SIDE OF KEYSHELF.

PANEL AND STEP BY STEP MACHINE SWITCHING SYSTEMS
CALL INDICATOR OPERATOR'S KEYSHELF.



808-4

Engineer *H.E.I.*
Draftsman & *JH*
Checked by

Dec. 1, 1922.
ISSUE 1

- a - Color of cords: Red, white, green, red, white, etc.
color of plug shells: Red, gray, black, red, gray, etc.
- b - Color same as associated cords.
- c - Supervisors plug and No. plates-drill and equip.
only when specified.
- d - Master ringing keys and No. plates.
- e - Peg count register key-drilled and equipped
only when specified.
- f - Message register socket-drilled and equipped
as specified.

—NOTES—

The longitudinal dimensions for the location of the trunks, the number of trunks and the overall length for keyshelves for sections other than the 7 panel $8\frac{1}{2}$ ' section are as shown on standard drawings for call circuit positions having trunks on $\frac{9}{16}$ ' centers.

For new lines of boards, the width of keyshelf is $1'2\frac{5}{8}"$.

For positions in line with existing sections where the width of keyshelf is $1'0\frac{5}{8}"$ the location of equipment is as shown on this Drawing and the 7' dimension is reduced to 5'.

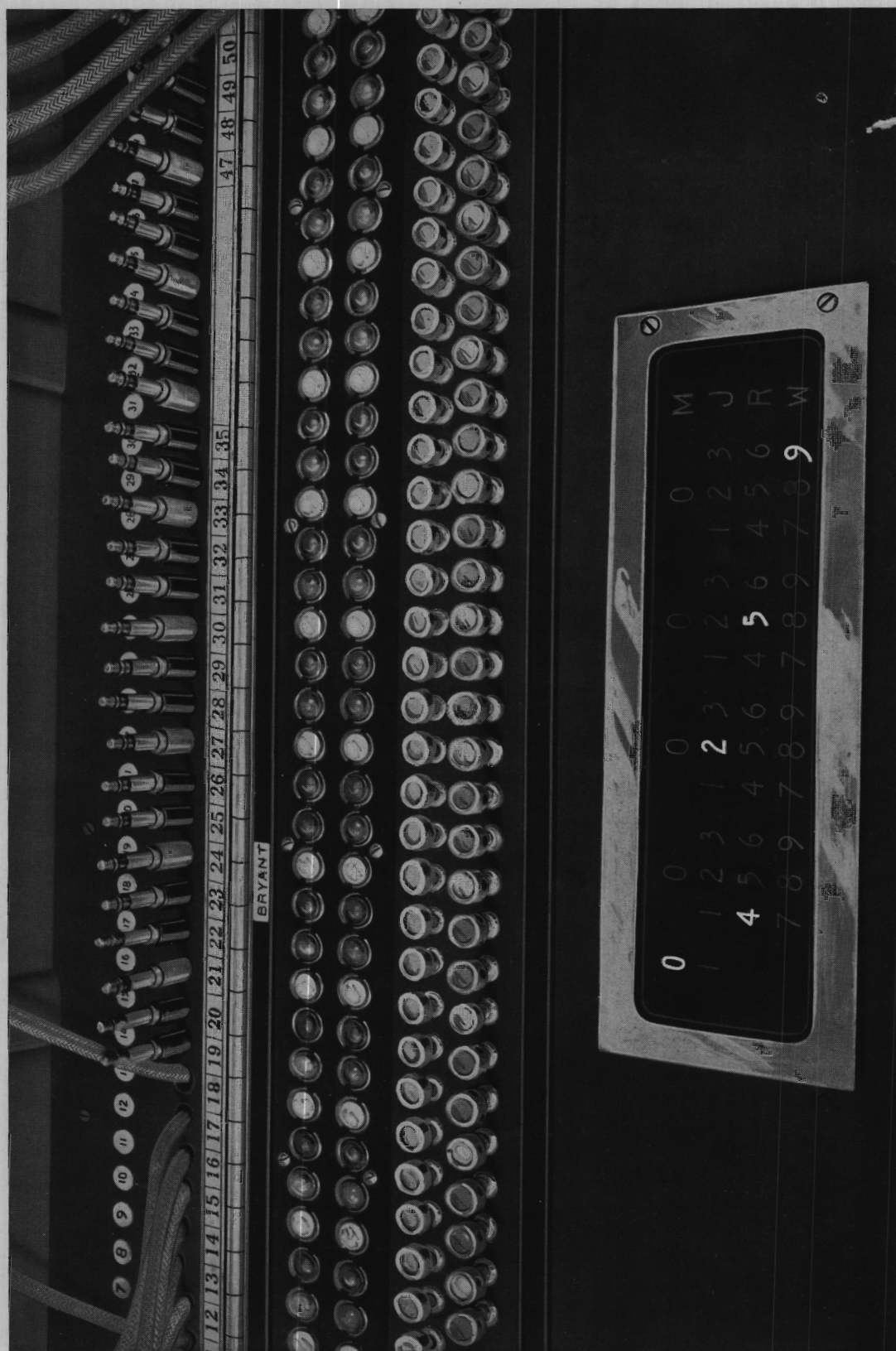
Where the keyshelf is slightly less than $1'0\frac{5}{8}"$ wide, the $4\frac{1}{8}"$ dimension is reduced accordingly.

AMERICAN TELEPHONE & TELEGRAPH CO.
Department of
Operation and Engineering

PANEL AND STEP BY STEP MACHINE SWITCHING SYSTEMS

Call Indicator Operators Position
(Arranged for teamwork operation)

No. 31
December 1, 1922



TOLL SWITCHBOARDS FOR MACHINE SWITCHING AREAS

TOLL SWITCHBOARD NO. 1.

General.

In an exchange area where toll connections are established through a No. 1 toll switchboard and where one or more machine switching units of the step-by-step type are installed, certain modifications are required in the existing toll board to care for the toll traffic originated by and incoming to the machine switching subscribers. Similarly, a new No. 1 toll equipment for use in a machine switching area differs in certain respects from the standard equipment used in manual areas. The discussion in this division refers in general to new toll switchboards and in particular to the features which are required at such boards to care for machine switching toll traffic, but it should be understood that the arrangements outlined should also be followed in modifying existing boards in so far as equipment conditions permit.

It has been decided to discontinue the practice of holding the subscribers line at recording boards, the reasons for this change having been given in Traffic Circular No. 143 "Discontinuing the Practice of Holding at Recording Boards", and the information contained in these notes regarding recording switchboard equipment is based on the recommendations offered in that circular letter.

The question of employing holding cord equipment at outward positions has been made the subject of careful study. As a result of this study it is expected that holding cords will be provided at such positions on new equipments as outlined later in these notes,

It is planned to issue in the near future a General Engineering Circular describing in more detail the use and arrangement of holding cord equipment,

The best method of modifying existing toll equipments to care for traffic to and from machine switching offices will depend largely on the type of section and cord circuit equipment involved and on whether other changes in the existing switchboard, such as the installation of holding cords at outward positions, are to be made at the same time. As a consequence it is impracticable to outline any one method of procedure which will best meet in all cases the conditions imposed by these variable factors, and the method to be followed in each case should be determined by a study of the individual equipment. It is thought that the following general considerations, however, may be found helpful in this connection.

Existing toll cords circuits that are to be arranged for dialing require the addition of one "E" type relay per cord which should be located in the rear of the switchboard section. In some cases it will be found that where relays of the old type are in use, and particularly where the section itself is of the old type, there will not be sufficient room within the section to mount the dialing relays and any additional relays that may be required in connection with other changes. Under such circumstances it will frequently be possible to gain the necessary space by replacing the old relays, with the exception of those of the #162 type, with "B" and "E" type relays, employing new local forms and mounting plates, and substituting No. 100 and No. 101 type terminal strips for connecting racks of the latter are being used. Additional space may also be

obtained by mounting the **supervisor's** relay equipment on the **relay rack**. Because of maintenance and other considerations it will usually be found desirable to follow this general procedure rather than resort to the expedient of mounting a part of the equipment on special **racks** located in the operating room,

Where a machine switching office is installed in the same building with a No. 1 toll switchboard, it may be found desirable in some cases to use standard No. 1 toll sections for the special operators switchboard, required in connection with the machine switching unit, and to locate them in line with the toll switchboard. This plan is particularly suitable if the number of special operators required is small, since it affords opportunity for team work between the two classes of positions during periods of light load. It should be noted, however, that checking multiple equipment, as at present designed, cannot be mounted in No. 49 jack sections, so that if checking multiple is required, No. 1 subscriber's sections should be used for the special operator's positions.

General Operating and Equipment Features.

Recording Positions. Direct recording trunks are provided to the toll board from each machine switching office in the toll exchange area and are multiplied at the recording board as described in Section 1d. Two groups of recording trunks are provided from each office. One of these groups handles calls direct from the machine switching subscribers to the recorders and is terminated in the machine switching office at the multiple banks of selectors. Where the code "110" is used for reaching the recorders, these trunks are multiplied at the zero level of the special third selectors. The other group of trunks is used for handling recording

in the machine switching office and is terminated at the machine switching office in multiple jacks before the special operators.

90 The recording trunks from the mechanical selectors are terminated at the recording board in multiple jacks, lamps and keys. The keys are of the non-locking type and are provided for removing the class of service signal from the trunk if such a signal is present,

As mentioned in Division III, Section 2a, this tone or signal may be applied to a subscriber's line at the primary line switch so that on a call to an operator the latter may be given any necessary information as to the class of service of the originating subscriber. The signals used at present are of two kinds, - one consists of successive single clicks which are heard at regular intervals. The other consists of a series of double clicks; that is, two clicks follow each other in rapid succession and successive pairs of clicks are spaced by a brief silent interval. The single click signal is applied to multi-slot coin box lines and when this signal is heard, the recorder notes on the ticket the class of the calling line in order that the outward operator may know that a coin box switching trunk is to be used. The double click signal is applied to refused toll lines.

The recorder hears either of these signals if present when she plugs into the recording trunk, provided the listening key is in the listening position, and she removes the tone by depressing the tone removal key. The tone may be restored by withdrawing and reinserting the plug and again removed by operating the tone removal key.

Recording trunks provided with tone removal keys are so arranged that the recorder may talk with the subscriber without depressing the key if no click signal is heard. If the key is not depressed, however, the circuit may be found objectionably noisy due to disturbances induced from the third wire.' The wiring will accordingly be furnished so that if it is found desirable, the circuit may later be changed to require the operation of the tone removal key in all cases in order to establish the talking condition.

The recording trunks from the special operators' positions are terminated in the usual manner in multiple jacks and lamps. If a call from a multi-slot coin box station is completed to a recorder through a special operator's position, the class of service signal is not transmitted over the recording trunk, the necessary information being passed verbally by the special operator. Consequently no tone removal keys are required in connection with recording trunks from special operators' positions.

The recording trunks are of the automatic type, the trunk lamp lighting when connection is made to the trunk by a selector or by a special operator. The lamp is extinguished when the recorder answers or if the trunk is released before the recorder answers. If the recorder disconnects before the trunk is released at the machine switching office the lamp remains extinguished. Supervision is obtained on the cord circuit lamps as in the past. The release of the recording trunk and of the mechanical switches used in building up the connection does not take place until the subscriber has restored his receiver and the recorder has disconnected.

An audible ringing signal is heard by the subscriber as

soon as connection is made to a recording trunk either by a selector or by a special operator and the signal continues until the recorder answers. If the call is originated at a multi-slot coin box or refused toll station, the click signal replaces the audible ringing signal as soon as the recorder answers, and is heard by the subscriber until the tone removal key is operated.

No current reversal takes place over the calling subscriber's line when the recorder answers. Consequently on a call to a recorder from a machine switching message rate line the line register will not be operated, and on a call to a recorder from a machine switching coin box line the deposited coin will be returned automatically when the subscriber hangs up and the recorder disconnects.

Outward and Inward Positions. Each outward and each inward operator's position is equipped with a dial which enables the operator to establish connections over the switching trunks to machine switching subscribers. Details of the method of mounting the dial are given in Section 1c. The dial is associated with the cord circuit being used by the operation of the monitoring or dialing key. The arrangement and operation of these keys is described in further detail in Section 1c.

Switching trunks are provided between the toll board and each machine switching unit in the toll area and are multiplied at the outward and inward positions in the regular switching trunk multiple space. As mentioned in Division III, these trunks are usually terminated in the machine switching office at toll first selectors and at toll second selectors in single-office and in multi-office districts respectively, although in some cases it may

be found desirable to provide a separate group of trunks to each thousand subscribers' terminals.

In establishing connection to a machine switching station the operator plugs into an idle switching trunk, operates the key which associates her dial with the card circuit being used and dials the last four or the last three digits of the subscriber's number,

In order to assist the operator in selecting an idle switching trunk these trunks are equipped with a "group busy" signal, consisting of a lamp which is associated with each group of five consecutive multiple jacks and which is lighted when all of the five corresponding trunks become busy. The arrangement of these signals is described in further detail in Section 1d.

After the operator has dialed, she may call the subscriber by operating the cord circuit ringing key. Machine ringing current is applied to the called line and the ringing continues automatically until the subscriber answers or the operator disconnects. The operator can again start the machine ringing after it has been tripped by operating the ringing key, provided the receiver at the called station has been restored. If the receiver has not been restored, or if, on a call to a P.B.X. station, there is a holding bridge across the trunk at the P.B.X. board, the operation of the ringing key will apply ringing current to the line as long as the key is held in the operated position,

If the operator uses a connecting cord in establishing connection to a subscriber's line, the trunk supervisory lamp in the cord circuit remains out during dialing but lights when the dialing key is restored and the called line is selected. Where a holding cord is used in establishing connection to a subscriber's

line, the **subscriber's** supervisory signal **remains** lighted during dialing but is extinguished when the dialing key is restored and the line is selected, **Switchhook** supervision is obtained as usual on both connecting and holding 'cords.

The **switching** trunk and the selectors at the machine **switching** office are not released until the **operator** disconnects and the subscriber hangs up, In any event, there will be an **interval** of at least 2-1/2 **seconds** after the **operator** disconnects before the **trunk** and switches are released. This permits the operator to **change** cords without releasing the connection **when** though the **subscriber's** receiver is on the hook.

If the operator dials a busy line or if she encounters the "all-trunks-busy" condition in one of the sub-groups in the machine switching office, she will receive, when the dialing key is restored, a **flashing signal** on the trunk supervisory lamp of a connecting cord or on the **subscriber's** supervisory lamp of a holding cord, A busy line gives a **rapidly flashing** signal (120 flashes per minute) and the "all-trunks-busy" condition gives a **slowly flashing signal** (60 flashes per minute.)

If a machine switching office serves multi-slot coin box stations, a part of the switching **trunks** to that office are arranged for coin box as well as for regular operation. **Such** **trunks terminate** in the machine switching office at coin box toll selectors as described in Division IV.

The equipment required at the toll **boxrd** for coin box operation depends on whether the board is in a single-office district or in a multi-office district, In a single-off'ice district, assuming that the machine switching unit and the toll board are in the same building, each switching **trunk** that is to be ar-

ranged for coin box operation is provided with an extra **jack**, known as a coin box operating jack, which is located **immediately** above each **regular multiple jack**. In addition, **each** position is provided with a special single ended cord equipped with coin collect and return keys. When the operator is ready to **collect** or **return** the coins, she inserts **the** special cord into the coin **box** operating jack of **the** switching trunk being used and depresses **the** coin collect or **return** key-as **may** be required. A coin box pilot lamp is provided in the piling rail **and lights** when **the** coin **box** operating current **flows over** the line, **The arrangement** of the equipment required for coin box operation is described further in Sections 1c and 1d.

In a multi-office district, the plan just described, involving 3-wire switching trunks, would be costly in outside plant, and in such districts another plan permitting the use of 2-wire trunks is used. Instead of providing each coin box switching trunk with an individual wire for applying coin collect or **return** current to the **subscribers'** side of **the** repeating coil at the toll transmission selector, one or more auxiliary circuits are provided to each machine switching office for use in conjunction with any one of **the associated** coin box switching trunks. The auxiliary circuits, known as coin box operating trunks, terminate in multiple jacks at the toll board and are provided with individual magnetic busy signals. They **are** arranged in the face of the switchboard as described later in Section 1d. These trunks terminate in the machine switching office on the brushes of coin box operating switches the bank **terminals** of which are multiplied with the switching trunks as described in Division IV, Section 3e.

The toll position is equipped with a special cord which is provided with a dialing key and with coin collect and return keys. Further details regarding the arrangement of these keys is given in Section 1c. When the coins are to be collected or returned, the operator inserts the special cord into the jack of an idle coin box operating trunk and dials the number of the switching trunk being used. The dialing operation actuates the coin box operating switch and connects the coin box operating trunk to the switching trunk. The depression of the coin collect or return key then transmits to the coin box operating switch a controlling current which in turn governs the application of coin collect or return current to the subscriber's line. If the listening key is thrown, the operator hears a tone of 153 p.p.s. when the collect key is operated and a tone of 460 p.p.s. when the return key is operated,

In order to simplify the operation of dialing over the coin box operating trunks, it is considered advisable to number the switching trunks to each machine switching office from "eleven" up instead of from "one" up. This removes the need of dialing a preliminary zero, which would be necessary in case trunks numbered from 1 to 9 were used for coin-box operation and which would be somewhat objectionable from an operating standpoint. Where the plan of numbering from "eleven" up is followed, the groups of trunks to manual offices should also be numbered in the same manner for the sake of uniformity.

Miscellaneous. Service to toll subscribers located in a machine switching central office area should in general be given on a manual basis. Such toll subscribers lines are terminated in answering jacks at the recording positions in the usual manner, and are either mul-

multiplied before the line operators or are multiplied at a switching position in the toll office where they can be reached by the line operators over local switching trunks. If there is a large number of toll subscribers lines within the area served by a machine switching office, and the calling rate on these lines is high, it may be found desirable to multiply them at a special group of connectors which are located in the machine switching office, and which are reached over a group of trunks and through a train of selectors that are separate from those used in reaching local subscribers.

As previously noted, trunks are provided to the intercepting positions in the machine switching office from disconnected or vacant connector terminals, from the connector terminals of party line stations which are denied service for non-payment of bills and from the terminals of vacant selector levels. If a toll operator establishes connection over a switching trunk to such a terminal, the trunk lamp at the intercepting position lights when the toll operator rings. The same supervision is obtained at the toll board on the trunk supervisory lamp of a connecting cord or on the subscriber's supervisory lamp of a holding cord as when the connection is established to a working subscriber's terminal as previously described.

If the toll and machine switching offices are in the same building, direct automatic trunks for verifying purposes are provided from the toll to the intercepting positions. These trunks are multiplied at the toll board in the interposition trunk multiple space and are terminated in answering jacks at the intercepting positions. If the toll and machine switching offices are in separ-

ate buildings, the toll operator, in order to obtain connection with an intercepting operator for verifying purposes, plugs into an idle switching trunk, dials a special code, which establishes connection to a connector bank terminal, and rings. The connector terminal which is reached in this way is connected to a trunk that terminates in an answering jack at an intercepting position,

Dialing trunks will be provided from the chief operators', directory, and ticket filing and rate quoting desks to the nearest machine switching office. These trunks are terminated in the machine switching offices at primary line switches. Each desk position is equipped with a dial which is connected to the dialing trunk when the dial is moved to an off-normal position and the listening key is thrown to the talking position. At desks of the turret type where desk stands are provided the dial is mounted on the telephone as at subscribers' stations. If a head set is provided in addition to the desk stand, the dial will be connected to the trunk circuit as just described provided the receiver is off the switchhook or the head set is connected to its telephone jacks,

Switchboard Sections:

Five and seven panel sections of ~~the~~ high, intermediate and low types are used for new No. 1 toll switchboards in areas where step-by-step machine switching offices are installed. Assemblies of the five panel sections are shown on Drawings Nos. 807-73, 807-79 and 807-80. The seven panel sections are like the five panel sections except that they are 5 feet 11-3/4 inches long instead of 4 feet 3-1/4 inches long,

In general, the seven panel type of section is used at the head end of a line of switchboard composed of intermediate or high type sections, and in such cases the end switchboard position is not equipped for regular operation. The seven panel type of section is similarly used at the head end of a line of low type sections where the multiple jacks are installed on a six panel basis or where they are installed on a five panel basis but cannot all be reached readily from the end position,

In cases where the ultimate number of multiple jacks is such as to permit of efficient operating at the end position without an extra panel of multiple being provided, the five panel type of section may be used at the head of the board, the end position being equipped for regular operation,

When the ultimate length of a switchboard line is reached the seven panel type of section is used at the foot of the board wherever, under similar conditions at the head of the board, this type of section would be employed.

All standard sections are equipped with fire protection bulkheads as shown on the drawings. In addition, each section is equipped with two fire screens. one is mounted on the relay irons

at the left of the section; the other is located between adjacent sections and extends from the cord shelf to the floor and from the front panels to the answering jack running box,

In ordering toll switchboard sections it should be stated whether short front panels for use with a platform are to be furnished. When specified, linoleum padding will be provided on the back of the front panels and on the front of the apparatus protection panels to minimize the noise produced by the cord weights.

Where it is specified that rear lighting be installed as a part of the switchboard the equipment and apparatus shown on the A. T. & T. Co.'s Drawing Bo, 137-A-88 will be provided.

It is thought that in general it will not be necessary to make provision for the installation of a pneumatic tube system at a toll board located in a step-by-step machine switching area.

Cable Turning Sections:

The cable turning sections which will be used in connection with No. 1 toll switchboards are shown on Drawings Nos. 807-81, 807-82 and 807-83.

No cable turning sections have been standardized for those cages where cables for another line of switchboard passes through the section or where the cabling enters the operating room from above. It is expected that such cases will be few in number, and that the design of cable turning sections to meet such conditions can readily be worked out for each installation.

Where electrically operated position registers are specified the registers are located in the cabinet shown on the A. T. and T. Co.'s Drawing No. 138-A-63. The cabinet is mounted on the face of the cable turning section as shown on the accompany-

STEP BY STEP MACHINE SWITCHING SYSTEM
HIGH TYPE 5 PANEL NO. 1 TOLL SECTION ASSEMBLY

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FIG 1
FRONT ASSEMBLY OF SECTION WHERE KEYSHELVES ARE
SEPARATED BY A CALCULAGRAPH SHELF OR BY A BLANK PANEL

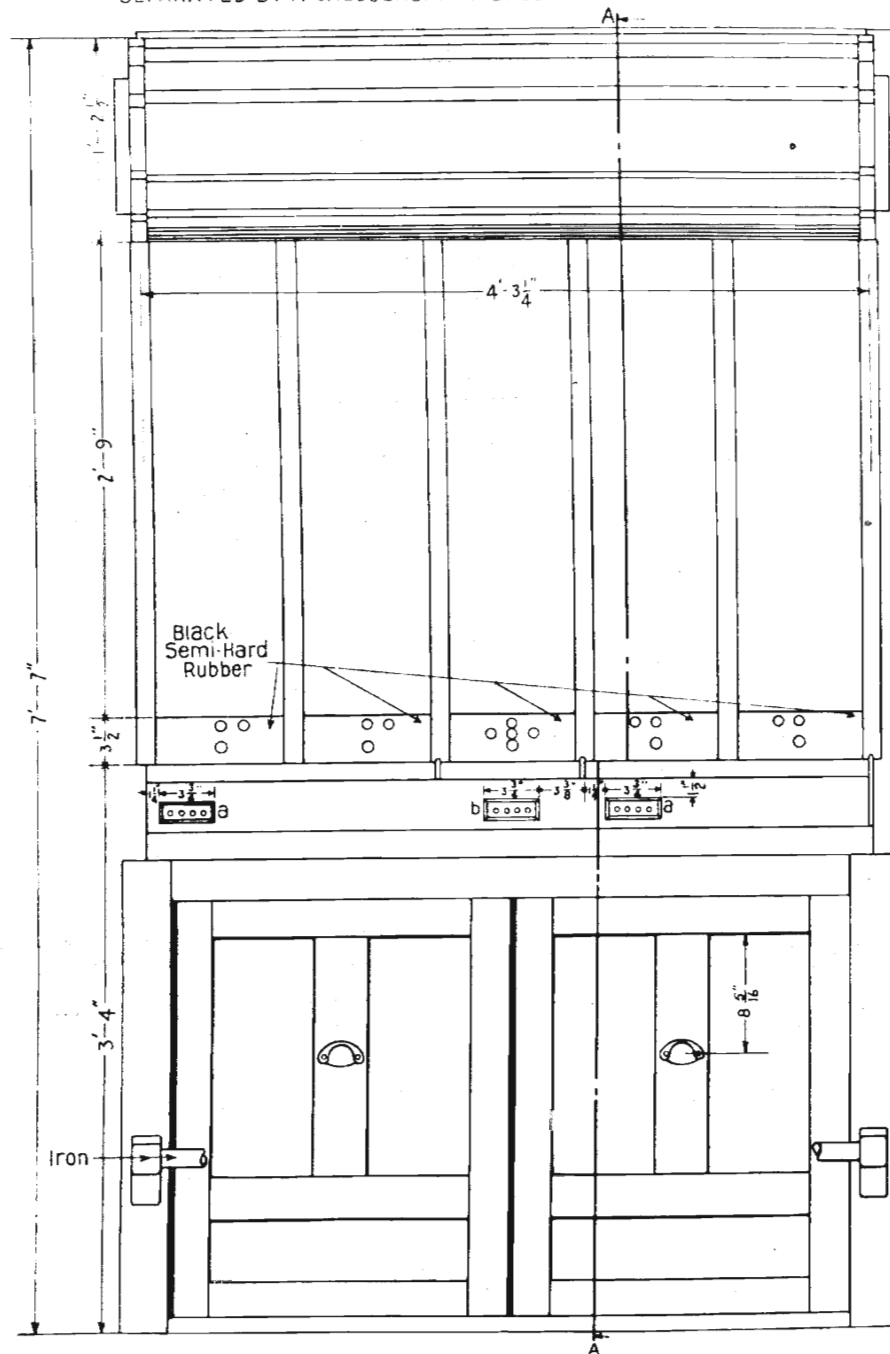
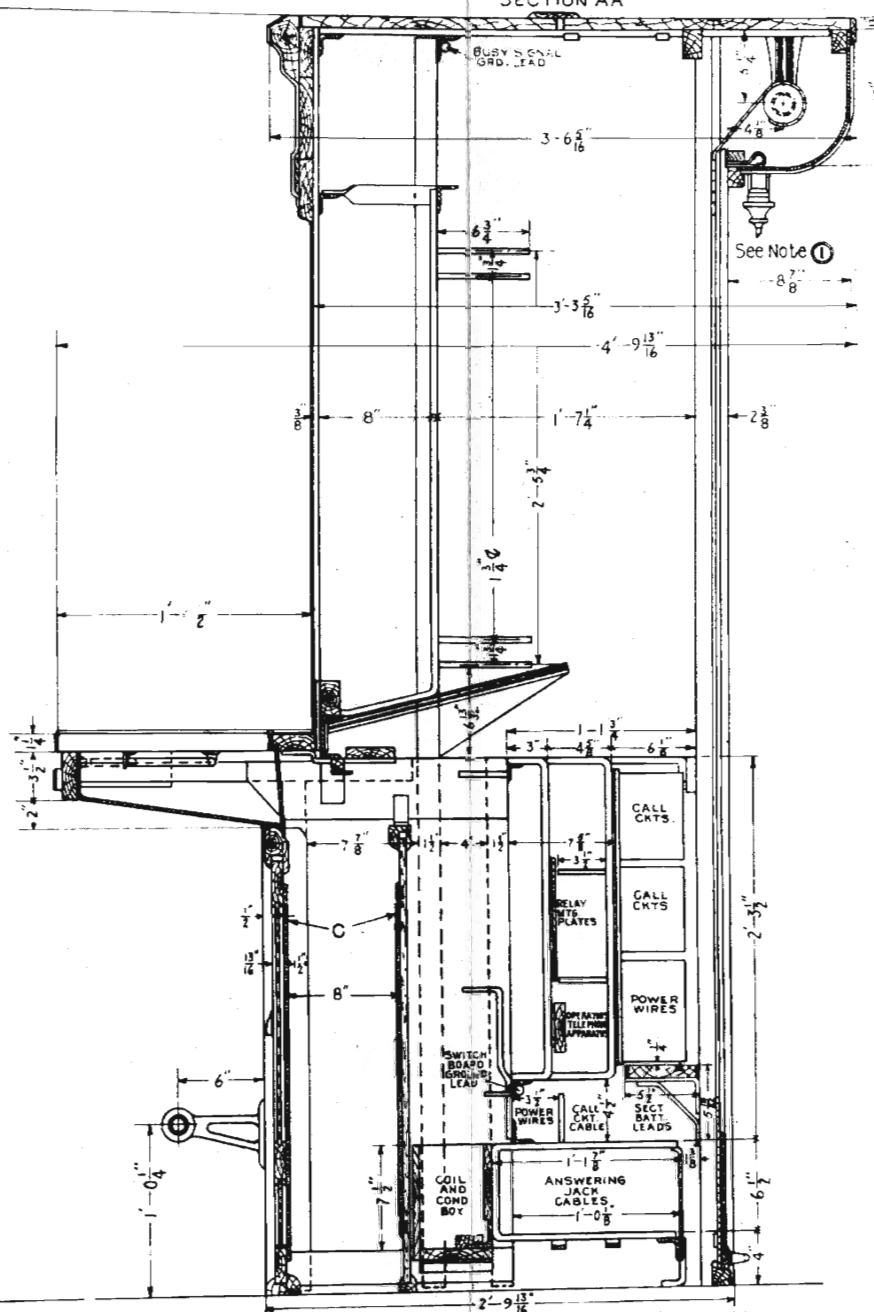


FIG 2
SECTION AA

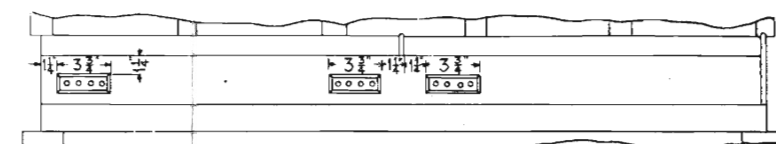


- a - OPERATOR'S TELEPHONE JACKS
- b - SUPERVISOR'S " "
- c - LINOLEUM PADDING, PROVIDED WHEN SPECIFIED.

- NOTES -

- 1 REAR LIGHTING FURNISHED ONLY WHEN SPECIFIED.
- 2 ALL EXPOSED WOODWORK ON FRONT OF SECTION IS OF MAHOGANY.
- 3 CAPACITY OF HIGH TYPE SECTION IS SEVENTY-THREE 7/16" JACK STRIPS.

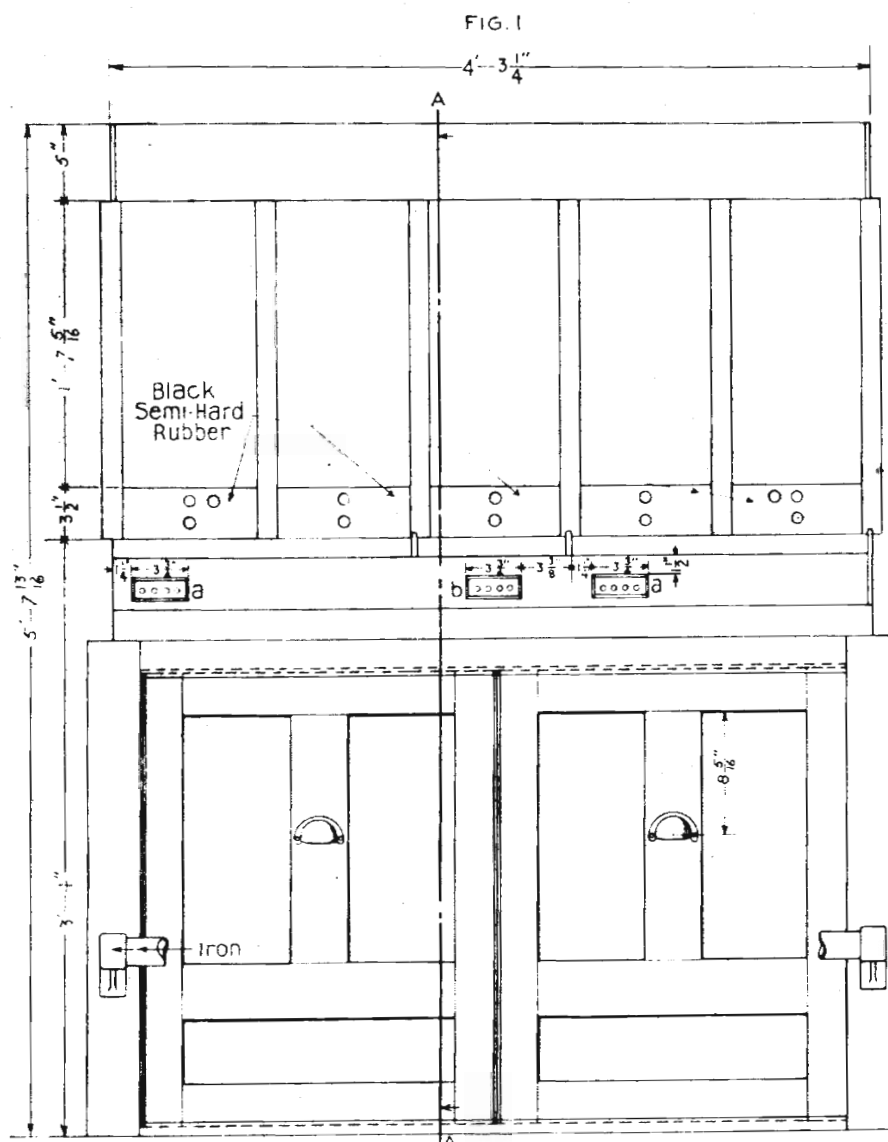
FIG. 3



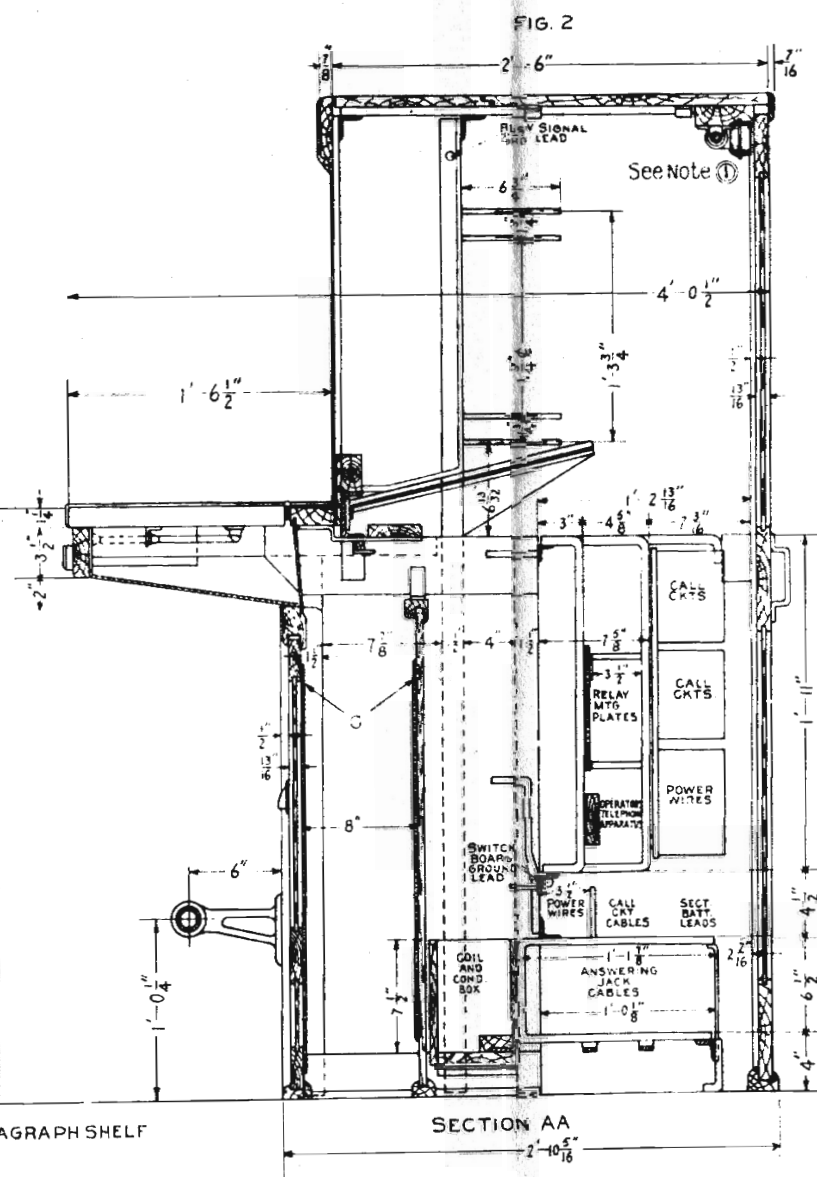
FRONT ASSEMBLY, WHERE KEYSHELVES ADJOIN

STEP BY STEP MACHINE SWITCHING SYSTEM
INTERMEDIATE TYPE 5 PANEL NO. 1 TOLL SECTION ASSEMBLY

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DRAFTSMAN
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FRONT ASSEMBLY OF SECTION, WHERE KEYSHELVES ARE SEPARATED BY A CALCULAGRAPH SHELF OR BY A BLANK PANEL

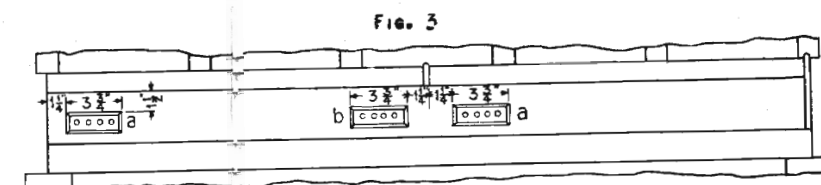


SECTION AA

- a - OPERATOR'S TELEPHONE JACKS
- b - SUPERVISOR'S TELEPHONE JACKS
- c - LINOLEUM PADDING, PROVIDED WHEN SPECIFIED.

- NOTES -

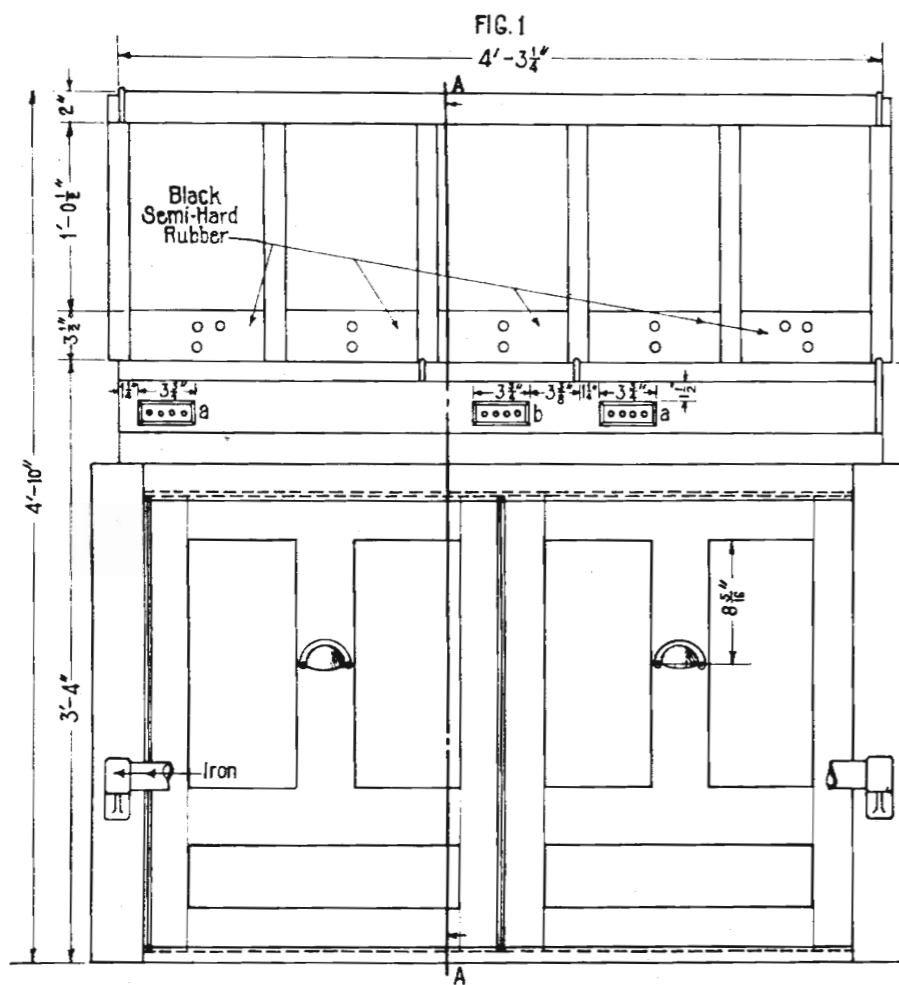
- 1 REAR LIGHTING FURNISHED ONLY WHEN SPECIFIED.
- 2 ALL EXPOSED WOODWORK ON FRONT OF SECTION IS OF MAHOGANY.
- 3 REAR DOORS ARE OF PINE OR BASSWOOD UNLESS OTHERWISE SPECIFIED.
- 4 CAPACITY OF INTERMEDIATE TYPE SECTION IS THIRTY-EIGHT 7/16" JACK STRIPS.



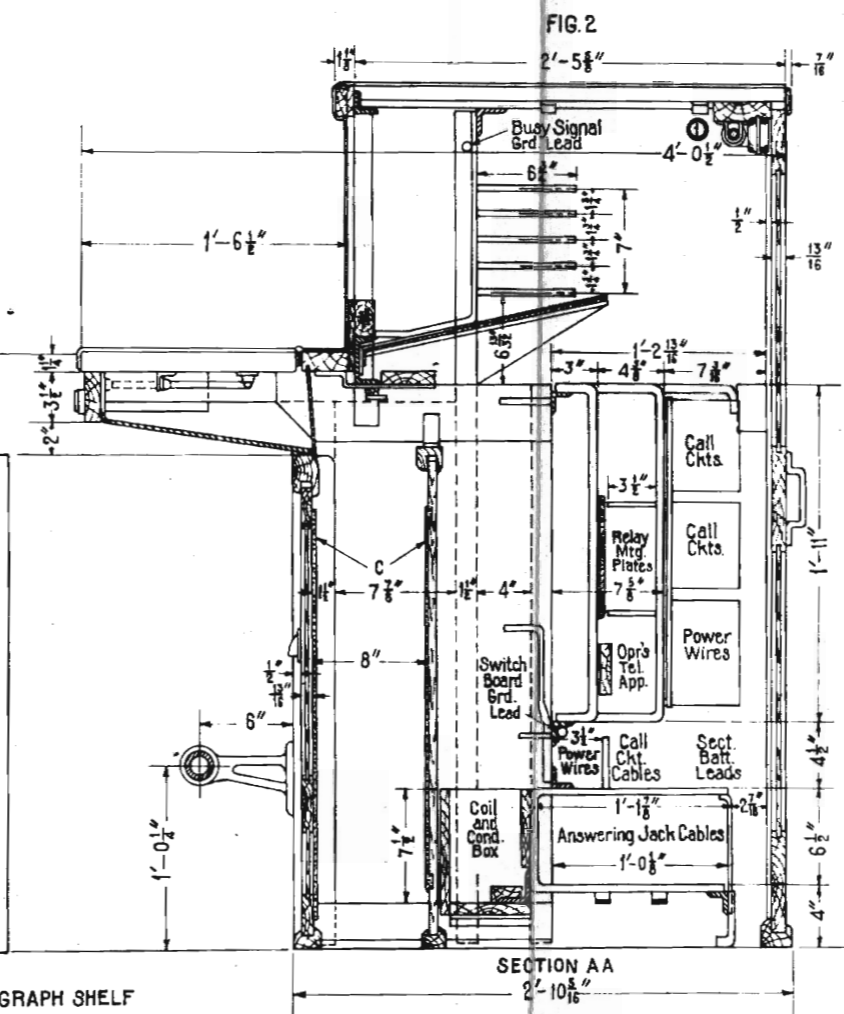
FRONT ASSEMBLY, WHERE KEYSHELVES ADJOIN

STEP BY STEP MACHINE SWITCHING SYSTEM
LOW TYPE 5 PANEL NO. 1 TOLL SECTION ASSEMBLY

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FRONT ASSEMBLY OF SECTION, WHERE KEYSHELVES ARE SEPARATED BY A CALCULAGRAPH SHELF OR BY A BLANK PANEL



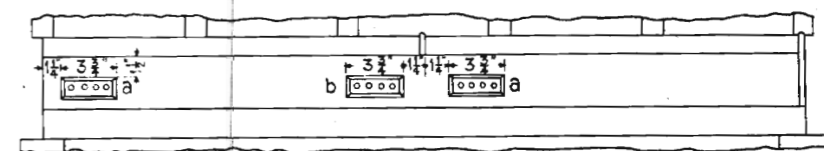
SECTION AA

- a - OPERATOR'S TELEPHONE JACKS
- b - SUPERVISOR'S TELEPHONE JACKS
- c - LINOLEUM PADDING, PROVIDED WHEN SPECIFIED

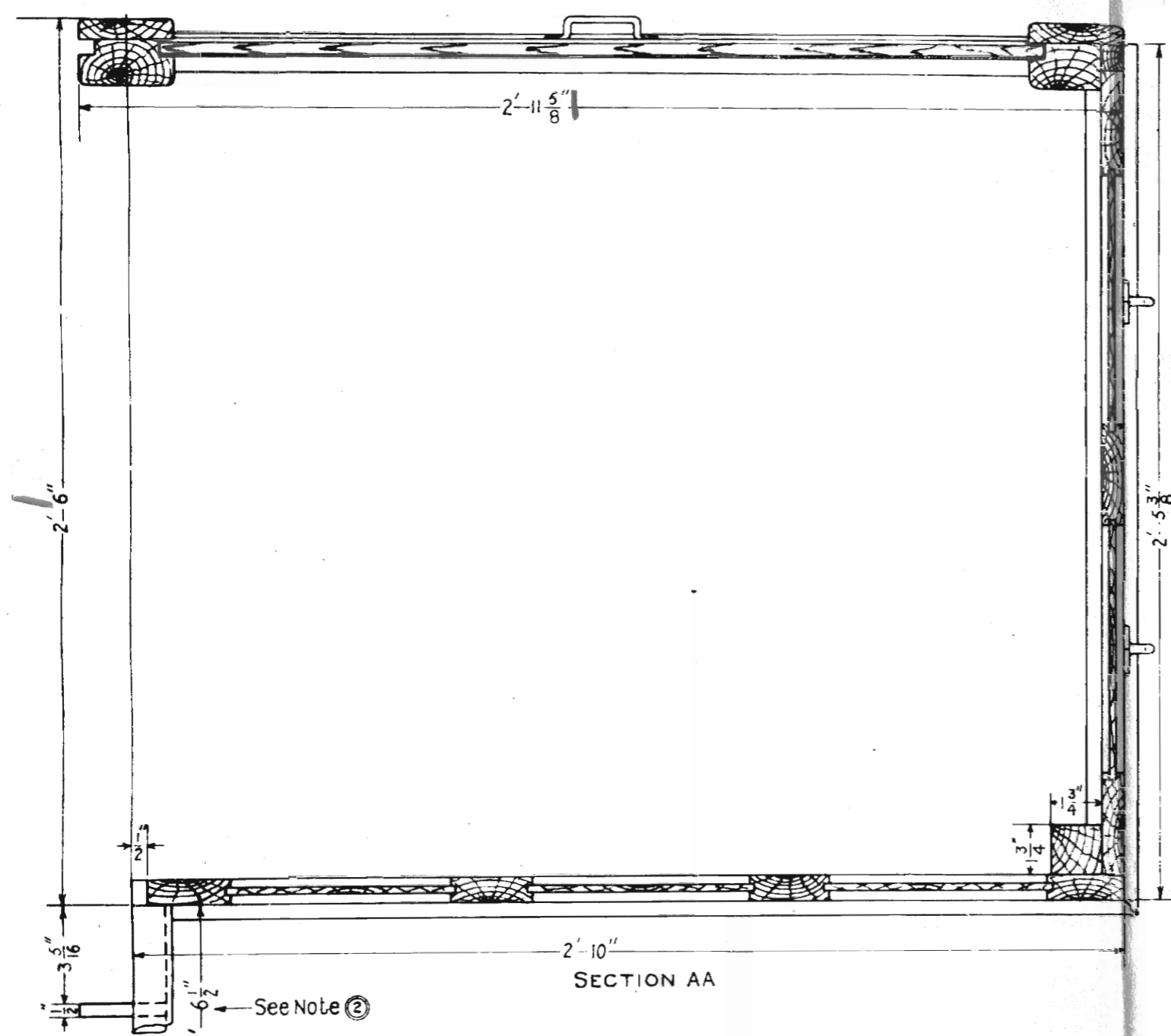
- NOTES -

- 1 REAR LIGHTING FURNISHED ONLY WHEN SPECIFIED.
- 2 ALL EXPOSED WOODWORK ON FRONT OF SECTION IS OF MAHOGANY.
- 3 REAR DOORS AND ROOF ARE OF PINE OR BASSWOOD UNLESS OTHERWISE SPECIFIED.
- 4 CAPACITY OF LOW TYPE SECTION IS EIGHTEEN 7/16" JACK STRIPS.

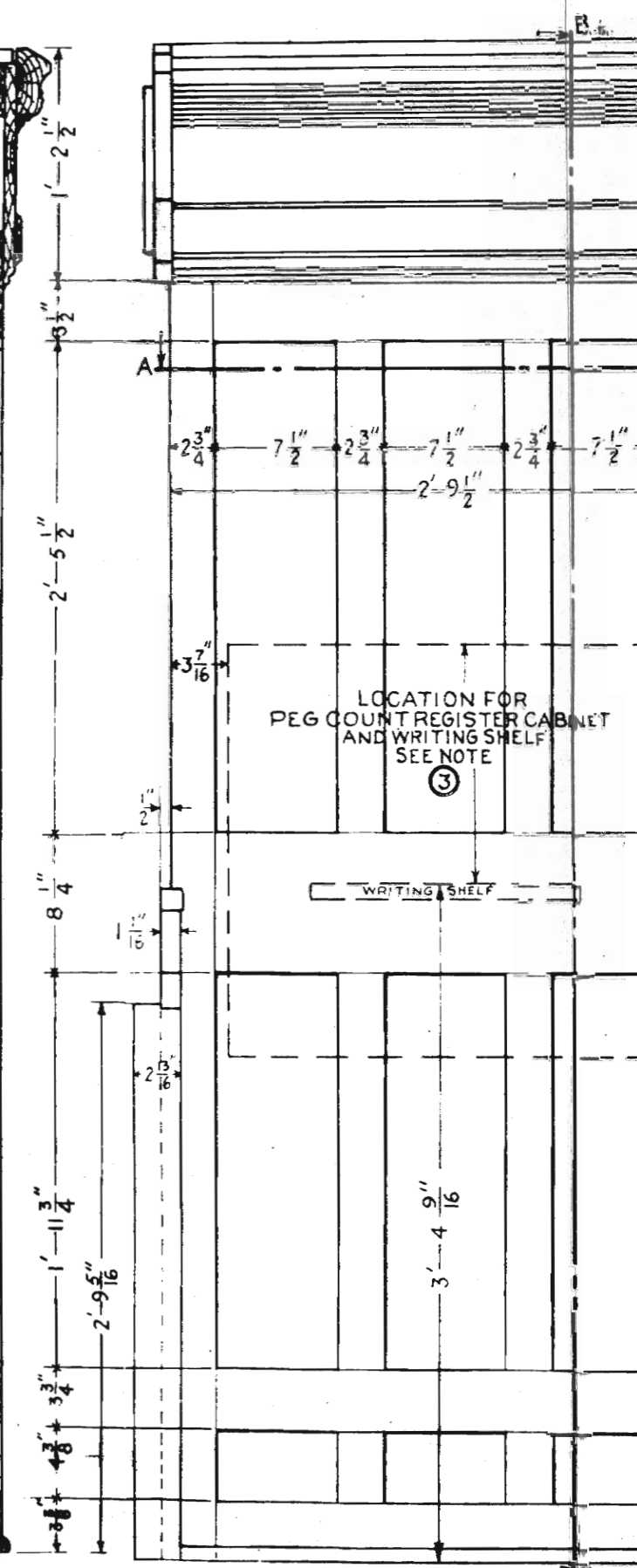
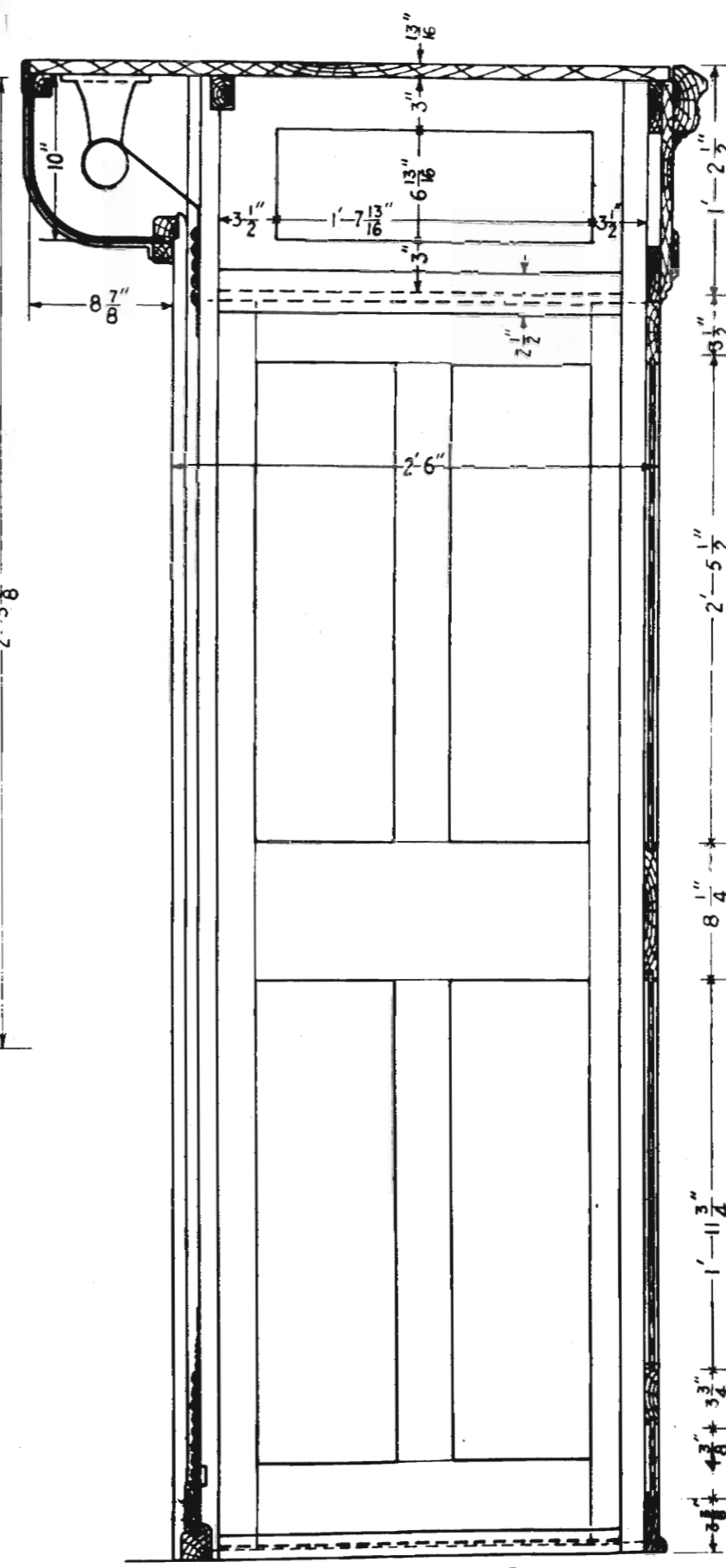
FIG. 3



FRONT ASSEMBLY, WHERE KEYSHELVES ADJOIN

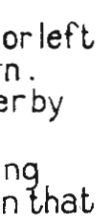


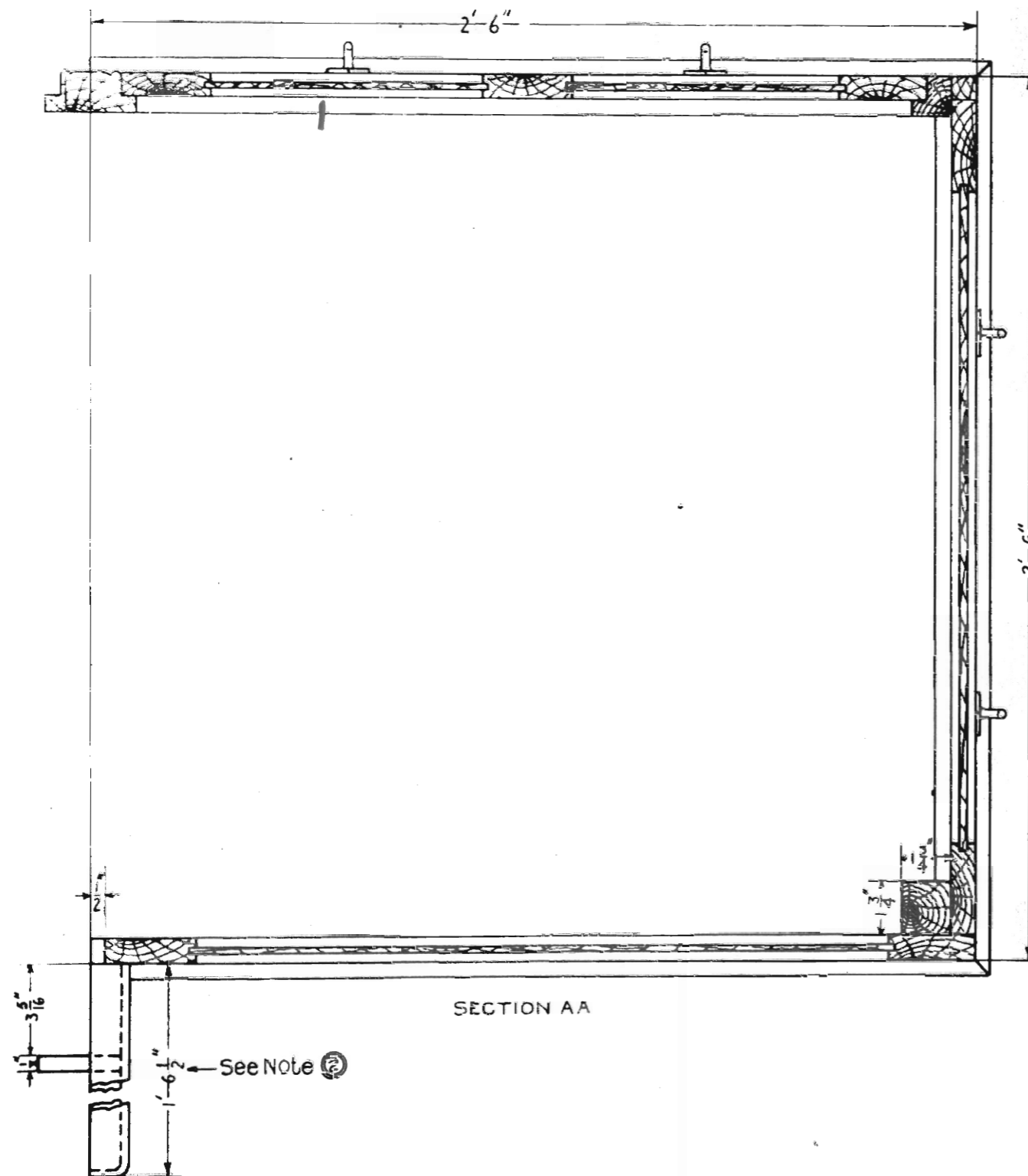
- NOTE
- ① Cable Turning Section provided either for right or left end of Switchboard. Section for right end shown.
 - ② For left end panels these dimensions are greater by $\frac{1}{16}"$ than those shown.
 - ③ When Platform extends in front of Cable Turning Section, location for Cabinet is 8" higher than that shown.



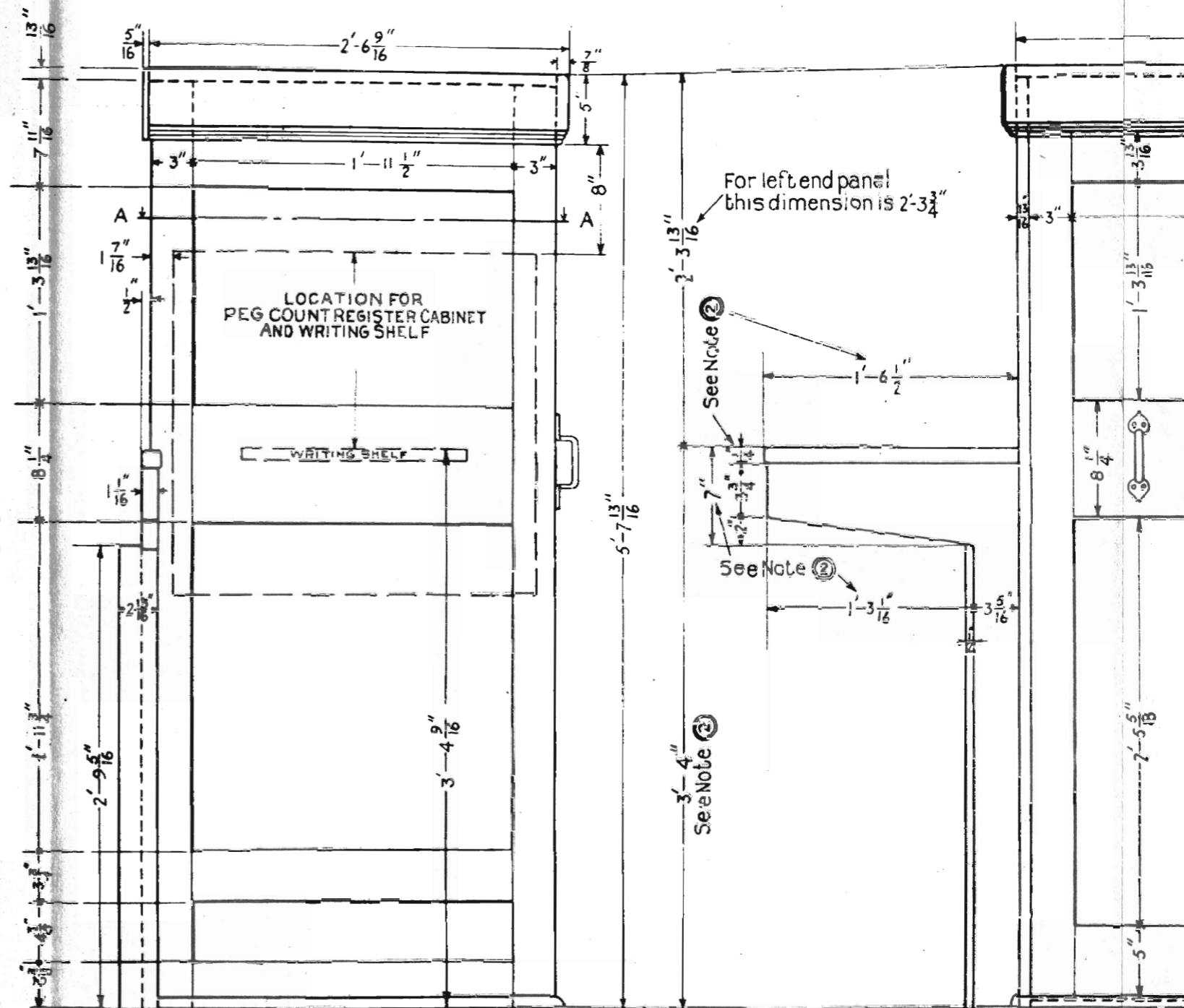
LOCATION FOR
PEG COUNT REGISTER CABINET
AND WRITING SHELF
SEE NOTE ③

WRITING SHELF





SECTION AA



FRONT VIEW

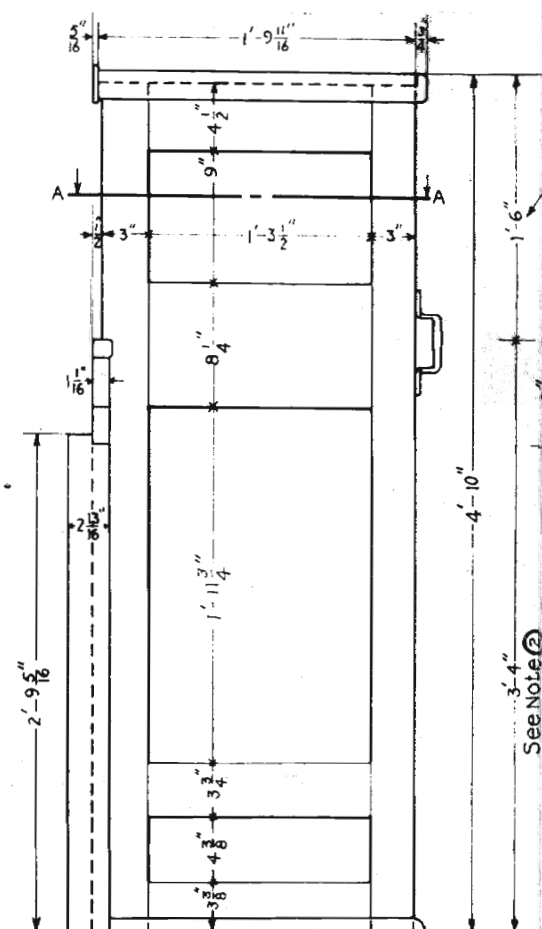
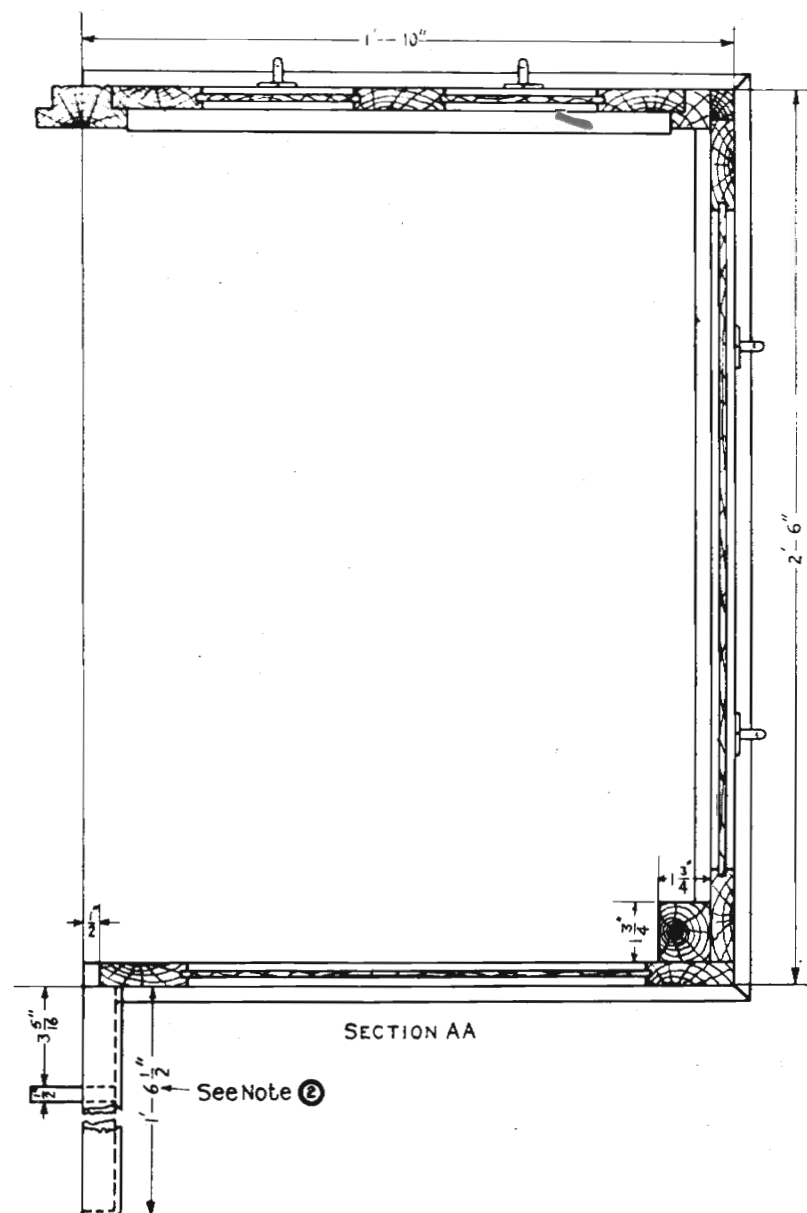
NOTES

- ① Cable Turning Section provided either for right or left end of Switchboard. Section for right end shown.
- ② For left end panels these dimensions are greater by 1/8" than those shown.



STEP BY STEP MACHINE SWITCHING SYSTEM
CABLE TURNING SECTION FOR LOW TYPE NO. 1 TOLL SWITCHBOARD

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DRAFTSMAN
AUG. 1, 1920

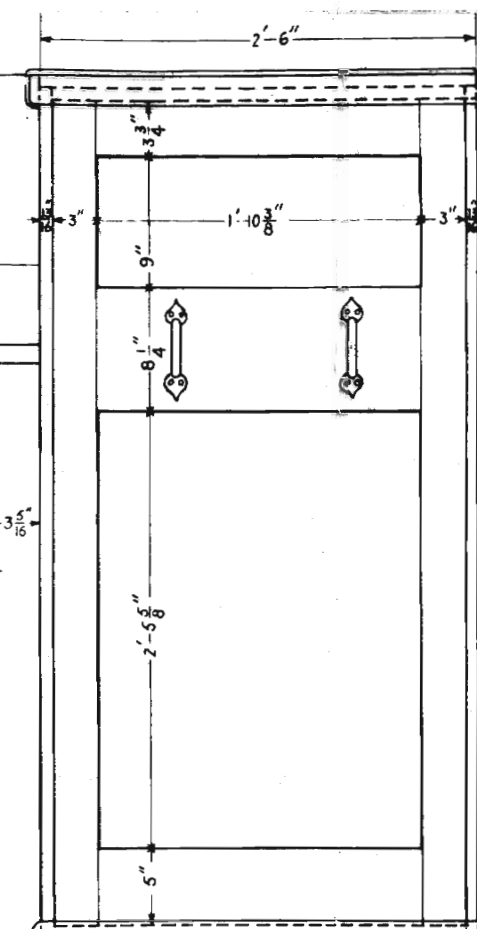


FRONT VIEW

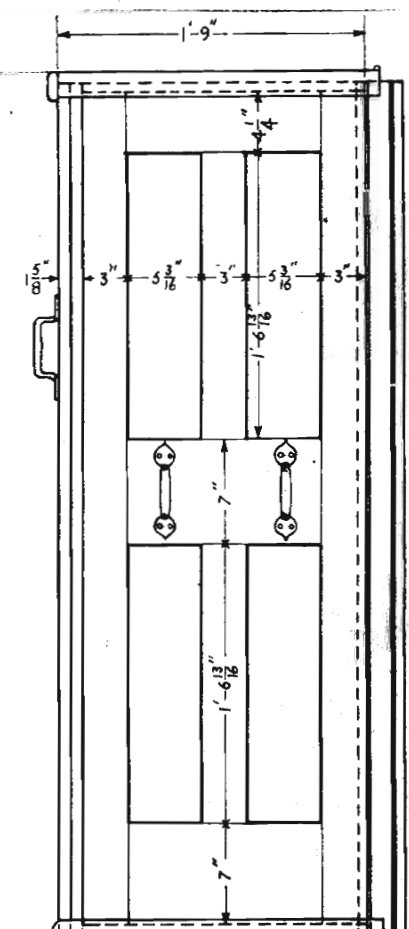
For left end panel
this dimension is 1'-5 13/16"

See Note ②

See Note ②



END VIEW
Panel Removable



REAR VIEW
Door Removable

NOTES

- ① Cable Turning Section provided either for right or left end of Switchboard. Section for right end shown.
- ② For left end panels these dimensions are greater by $\frac{1}{16}$ " than those shown.

ing cable turning section drawings. The hole in the face of the cable turning section for the register wiring is drilled only when the register cabinet is specified. The number of register circuits wired for in the form leading to the cabinet will be as specified. The registers are numbered consecutively from left to right and from the top down,

End Panels:

End panels for use with No. 1 toll switchboards are shown on the A. T. & T. Co.'s Drawings Nos. 137-A-89, 137-A-90 and 137-A-91 for the high, intermediate and low type boards, respectively. The end panels are of two types, one being designed to accommodate a busy signal resistance rack, the other being intended for use where a rack for mounting busy signal resistances is not required,

Position and Panel Numbering-

Where an office will ultimately have two or more separate lines of switchboard, the first operating position in a line is designated by the number "101", or "201," or "301," etc. Where it is expected that an office will have but one line of switchboard in the ultimate the first operating position is designated by the number "1". If a seven panel section is employed at the head of a line of switchboard, the head end position is designated "0", or "100", or "200", etc., depending on what hundreds group of numbers is assigned to the particular line in question,

The panels in each line of switchboard are numbered consecutively from "1" up in the direction of growth.

Keyshelves:

General

Keyshelves for new No. 1 toll equipments are designed for universal type keys and are equipped with keyshelf braces but no locks are provided. The lamp rails and plug shelves are covered with black semi-hard rubber. The space in front of the keys is covered with a glass bulletin holder, five inches in width, extending along the entire length of the keyshelf. A hard rubber separation strip is fastened at the right end of each keyshelf and projects slightly above the top surface and beyond the edge of the shelf. The use of this strip reduces the amount of work involved in aligning the keyshelves and section~.

For new equipments the call circuit keys on each key mounting are numbered consecutively from the rear toward the front, the numbering on the various strips progressing toward the right. The 1/2 inch mountings grow from left to right, and where a 5/8 inch mounting is required it is located at the extreme right end of the call circuit space. The call circuit keys are mounted twelve per strip on both new and additional equipments and each mounting is furnished fully equipped with keys unless otherwise specified. On additional equipments the relative location of the keys for the various offices and the number of keys in service per strip should be the same as at existing positions, the keys not in service being those nearest the front of the keyshelf.

dial. The dial and dial number plate used at toll positions has been assigned the code No. 2-XA. The letter "E" of the code refers to the dial proper whereas the letter "A" denotes the type of number plate with which the dial is equipped. The No. 2-E type

dial is like the No. 2-A type dial, described in Division II, Section 1, except *that* five instead of four **terminals** are provided on **the back** of the dial, and the **connections** between **the** dial **springe** and **terminals**, as well as the **terminal** designations, are somewhat different.

The number plate furnished as a part of the 2-EA dial is the same as the one described in Division II, Section 1, for use where no party line **letters** are required.

The dial is mounted on a base which is known as the No. 31-A dial mounting. The dial is secured to the **mounting** by means of a semi-circular strip of metal, called a dial adapter, which is fastened to the bottom of the dial and to the inside of the mounting by machine screws. The code No. 52-B has been assigned to the adapter used for securing the No. 2-EA type dial to the No. 31-A dial mounting. The dial, dial mounting and adapter are shown in photograph No. 30.

The dial and its mounting are held in place by means of a **spring** clip which is screwed to **the keyshelf** woodwork. By employing this method of mounting and by providing slack in the wiring to the dial, the latter may be readily replaced when necessary or removed to allow the adjacent **keyshelf** to be raised or to permit of minor adjustment. In order to assist the operator in manipulating the dial, the dial mounting is so designed that when it is in place the face of the dial is inclined forward and is also turned slightly toward the center of the position.

Recording Positions.

The type of **keyshelf** used at recording **positions** which are located in a separate line-up is **shown** on Drawing No. 807-84. **Two keyshelves** of **this** type, with a blank **panel** placed between them, **may** be mounted on **the** standard five-panel **section**. The **keyshelf** is equipped as usual **with** three pairs of connecting cords, **but** the holding cords **which** have heretofore been provided are omitted. Call **circuits** from the recording board to the local offices will in general **not** be needed, Call circuits **may** be required for **miscellaneous purposes**, however, and in this event one strip of call circuit **keys** **is** provided and is located at the left of the position as **shown**. A messenger call **key** is **also provided** at **the** right end of each **keyshelf** **if** a messenger call circuit is specified. Either one or two message register **sockets** are **provided**, as specified, and are located in the **lamp** rail as shown on **the** drawing, Dials are not required at positions of this type,

Outward Positions.

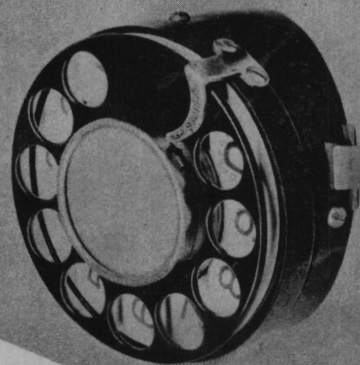
The type of **keyshelf** used at outward positions **is shown** on Drawing No. 807-85. **Two keyshelves** of this type with a **calculate-graph** shelf located between them **may** be mounted on the **standard** five-panel **section**. A dial is provided at each position and is located as shown on **the** accompanying drawing, In general each **keyshelf** will be wired for and equipped with six connecting and **six** holding cords or for six connecting cords, five holding cords and one special coin collect and return cord, located as **shown** on **the** drawing.

The connecting cord circuit **keys** are arranged as shown on Drawing No. 807-87, Figure 2, It will be noted that **the** opera-

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STEP-BY-STEP MACHINE SWITCHING SYSTEM
DIAL MOUNTING AND ADAPTER
FOR USE AT SWITCHBOARD POSITIONS

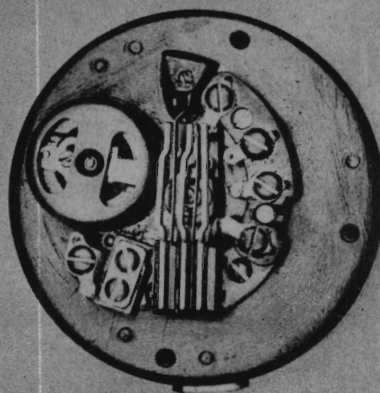
No. 30



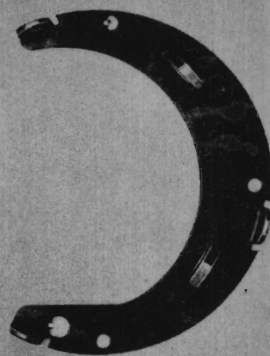
DIAL MOUNTING ASSEMBLED



Nº 31-A DIAL MOUNTING



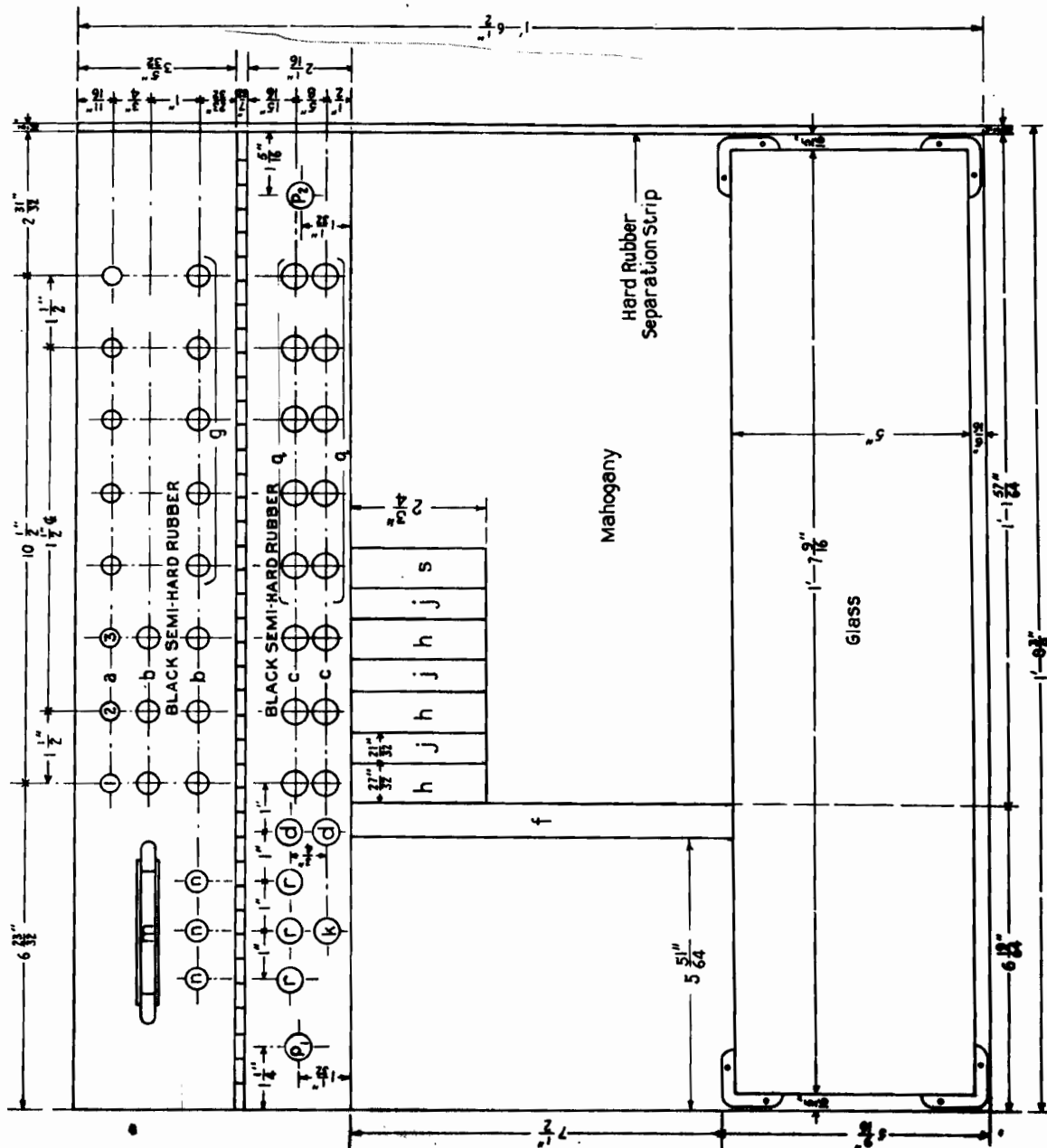
Nº 2-E DIAL



Nº 52-B DIAL ADAPTER

STEP BY STEP MACHINE SWITCHING SYSTEM

RECORDING OPERATOR'S KEYSHELF AT NO. 1 TOLL SWITCHBOARD

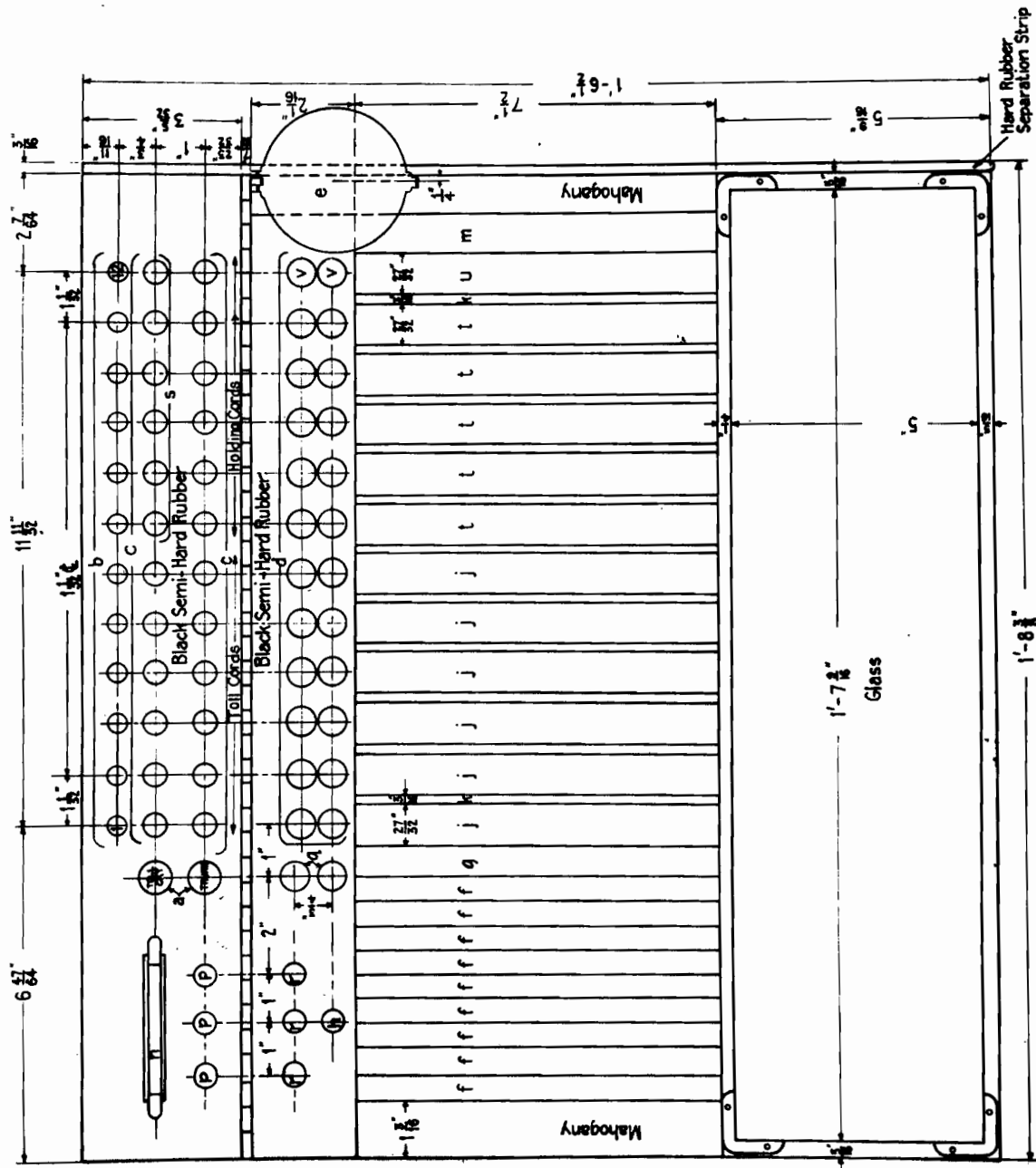


- a - No. 12-8 NUMBER PLATES, ENGRAVED OR BLANK AS SHOWN.
- b - DRILLINGS FOR NO. 110 PLUGS.
- c - DRILLINGS FOR NO. 13 LAMP SOCKETS.
- d - No. 92-8 HOLDING KEYS FOR SUPERVISOR'S CIRCUITS. PROVIDED WHEN SPECIFIED AT RIGHT POSITION OF SECTION.
- f - 1/2\" Call Circuit Key Mounting or Key Space.
- g - No. 38-8 APPARATUS BLANKS.
- h - UNIVERSAL TYPE CODE KEYS.
- j - No. C21-A KEY SPACES.
- k - No. 92-A KEY FOR CALL CIRCUIT FROM DESK. PROVIDED WHEN SPECIFIED.
- m - No. 8-Q DESIGNATION STRIP. PROVIDED WHEN SPECIFIED.
- n - DRILLINGS FOR NO. 110 PLUGS FOR CALL CIRCUIT TRUNKS FROM DESK. PROVIDED WHEN SPECIFIED.
- p - MESSAGE REGISTER SOCKETS. PROVIDED AS SPECIFIED. EQUIPPED IN ORDER INDICATED BY SUBSCRIPTS.
- q - No. 42-8 APPARATUS BLANKS.
- r - No. 13 LAMP SOCKETS FOR CALL CIRCUIT TRUNKS FROM DESK. PROVIDED WHEN SPECIFIED.
- s - No. C1H MESSENGER CALL KEY OR KEY SPACE.

NOTE 1 KEYBOARD IRONWORK TO BE GROUNDED.
HINGE TO BE INSULATED FROM THE IRONWORK.

STEP BY STEP MACHINE SWITCHING SYSTEM
OUTWARD OPERATOR'S KEYSET AT NO. 1 TOLL SWITCHBOARD

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DEPARTMENT
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- NOTE -

- 1 KEYBOARD IRONWORK TO BE GROUNDED
HINGE TO BE INSULATED FROM IRONWORK.

tion of the various key units is the same as in the past with the exception that the monitoring key / s also arranged for use as a dialing key. When this key is thrown to the monitoring position and the dial is rotated to an off-normal position, the dial is looked on the cord circuit being used until the key is restored,

The holding cord keys are arranged as shown on Drawing No. 807-87, Figure 3, The front key unit is arranged for use as a talking key and also as a dialing key, When this key is thrown forward the dial is associated with the holding cord being used until the key is restored,

Where the positions are to be arranged for coin box operation the equipment required will depend on whether the toll board is located in a single-office or in a multi-office area. If the board is in a single office district a coin collect and return key of the type shown on Drawing No. 807-87, Figure 4 is mounted in the twelfth cord key location and the associated single ended cord is located in the corresponding front cord drilling. If the board is in a multi-office area a key of the type shown on Drawing No. 807-87, Figure 5 is used instead and is mounted, with the associated single ended cord, in the twelfth cord circuit position. The dial is associated with the special cord in the same manner as previously described for holding cords.

Inward Positions.

The type of keyshelf used at inward positions is shown on Drawing No. 807-86. Two keyshelves of this type may be mounted adjacent to each other on the standard five panel section. Each keyshelf is wired for and equipped with sixteen connecting cords or, if required, is wired for and equipped with fifteen connecting

cords and one special coin collect and return cord,

The connecting cord circuit keys are arranged the same as described previously for connecting cords at outward positions and as shown on drawing No. 807-87, Figure 2.

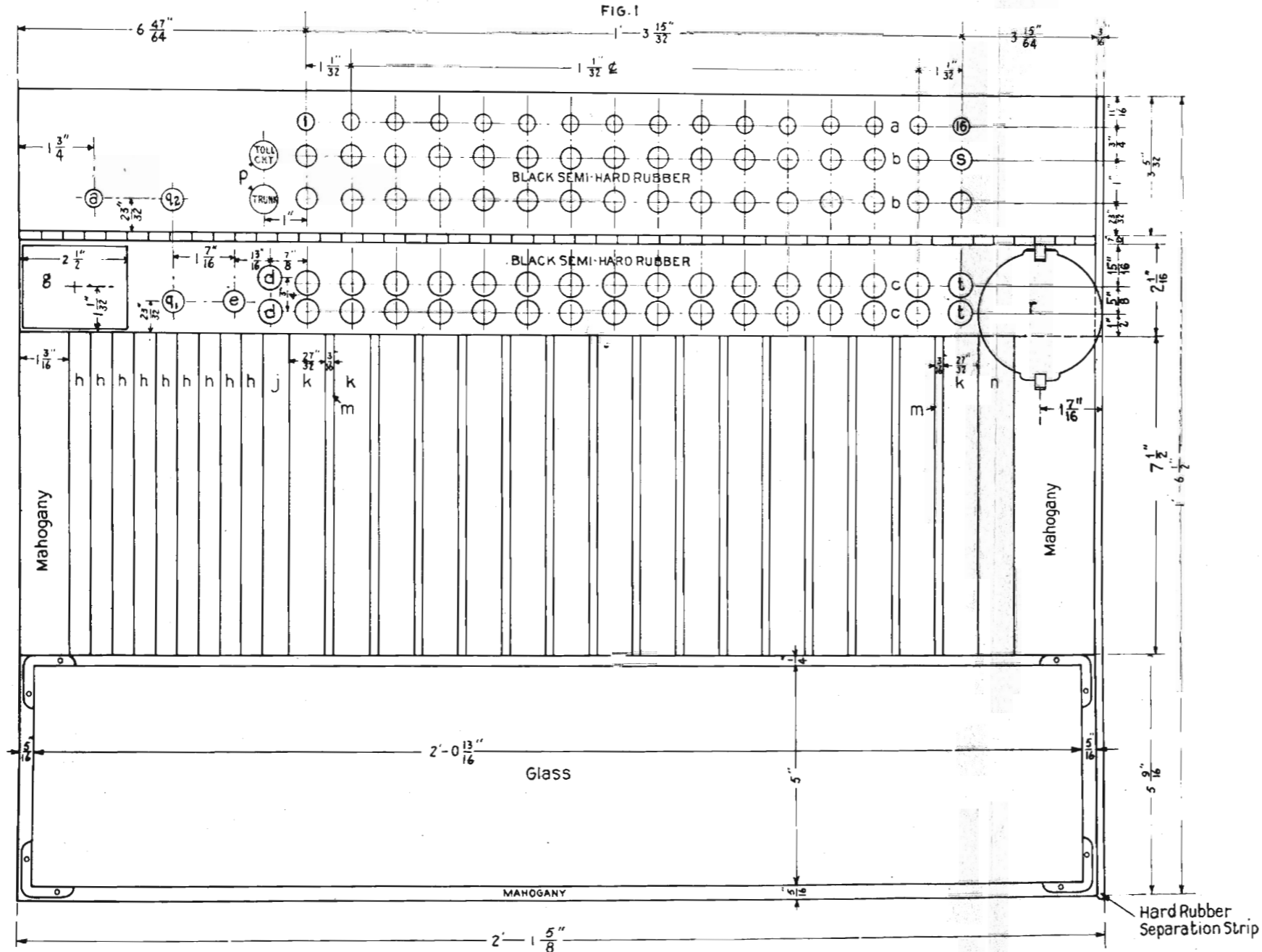
If the night positions are located at the inward board and provision is to be made for coin box operation the sixteenth-cord circuit is replaced by a special coin collect and return cord circuit. The arrangement of this equipment is the same as previously described in connection with coin collect and return equipment at outward positions and as shown on Drawing No. 807-87.

Combined Line and Recording positions.

In small toll offices where the amount of traffic is not sufficient to warrant the segregation of the recording and line operators the type of keyshelf shown on drawing No. 807-85 is used. In such offices the keyshelf equipment is the same as that shown on the drawing with the exception that connecting cords only are used; that is, no holding cords are employed. Each keyshelf is wired for and equipped with twelve connecting cords, or eleven connecting cords and one special coin collect and return cord. The latter, if required, is located in the twelfth cord position.

The operation of the connecting cord keys and the coin box cord key is the same as previously described and as shown on drawing No. 807-87.

FIG. 1



- a - No. 12-B NUMBER PLATES.
- b - DRILLINGS FOR No. 110 PLUGS.
- c - DRILLINGS FOR No. 15 LAMP SOCKETS.
- d - No. 92-B HOLDING KEYS FOR SUPERVISOR'S CIRCUITS. PROVIDED ONLY WHEN SPECIFIED AT RIGHT POSITION OF SECTION.
- e - No. 223-A PEG COUNT KEY. PROVIDED WHEN SPECIFIED.
- g - No. 1-A ELECTRIC CLOCK. PROVIDED WHEN SPECIFIED AT RIGHT POSITION OF SECTION.
- h - 1/2" CALL CIRCUIT KEY MTGS. OR KEY SPACES.
- j - 5/8" CALL CIRCUIT KEY MTG. OR KEY SPACE.
- k - UNIVERSAL TYPE CORD KEYS, OR No. A27A KEY SPACES.
- m - No. A6A KEY SPACES.
- n - TRANSFER, CALL CIRCUIT RINGING AND MESSENGER CALL KEY, AS SPECIFIED.
- p - No. 1-B NUMBER PLATES, ENGRAVED AS SHOWN.
- q - MESSAGE REGISTER SOCKETS. PROVIDED AS SPECIFIED. EQUIPPED IN ORDER INDICATED BY THE SUBSCRIPTS.
- r - No. 2-D DIAL AND No. 31-A DIAL MOUNTING.
- s - No. 38-B APPARATUS BLANK AT NIGHT POSITIONS. EQUIPPED FOR COIN BOX OPERATION.
- t - No. 42-B APPARATUS BLANKS AT NIGHT POSITIONS EQUIPPED FOR COIN BOX OPERATION.

- NOTE -

1 KEYBOARD IRONWORK TO BE GROUNDED.
HINGE TO BE INSULATED FROM THE IRONWORK.

STEP BY STEP MACHINE SWITCHING SYSTEM

LAMP SOCKET MOUNTING FOR BUSY SIGNALS AND
"A" TYPE CORD CIRCUIT KEYS USED AT A NO. 1 TOLL SWITCHBOARD
IN A STEP BY STEP MACHINE SWITCHING AREA

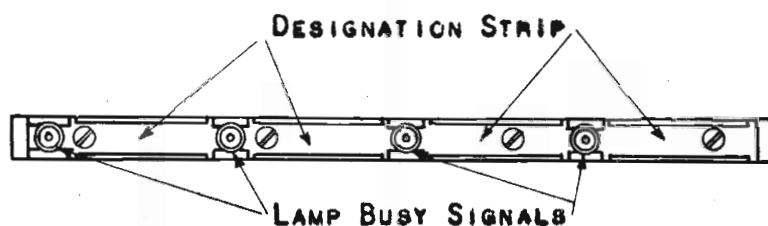


FIG. 1

FRONT VIEW OF NO. 248 LAMP SOCKET MOUNTING

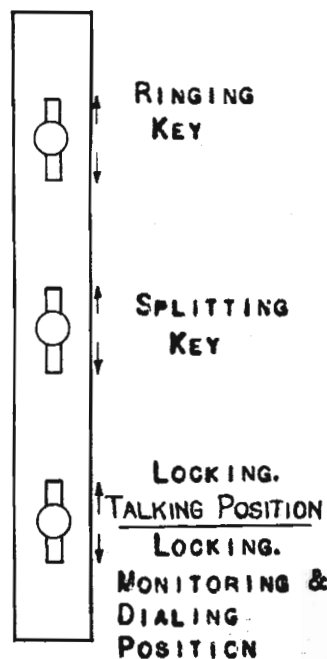


FIG. 2
CONNECTING
CORD KEY

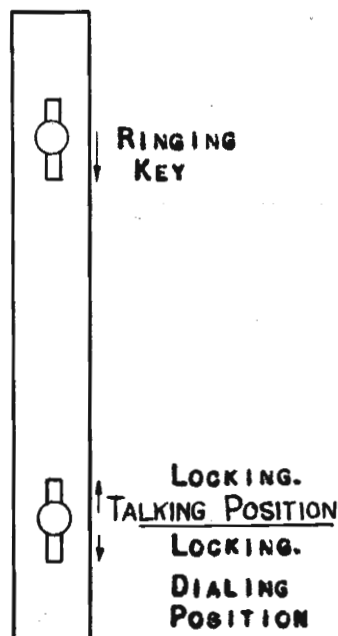


FIG. 3
HOLDING
CORD KEY

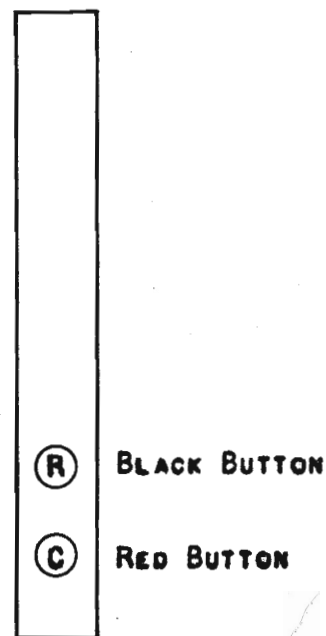


FIG. 4
COIN BOX KEY
(SINGLE-OFF. DIST.)

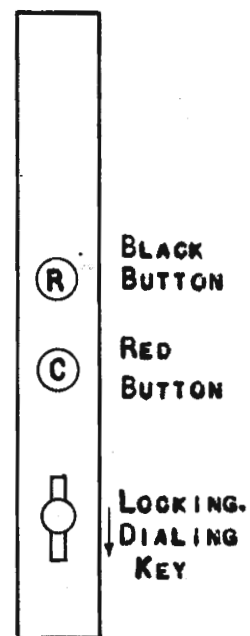


FIG. 5
COIN BOX KEY
(MULT.-OFF. DIST.)

Face Equipment,

For new toll boards the most desirable relative locations for the various groups or classes of lines in the face of the switchboard sections are shown for the high, intermediate and low type sections on drawings Mos. 807-88 and 807-89. On additions to existing switchboards it will usually be found advisable to follow the general arrangements in the existing board. Drawing No. 807-90 shows the relative location in a panel of the various strips of apparatus constituting the different groups or classes of lines.

Switching trunk, toll line, and other multiple equipments may be installed on either a 5-panel or a 6-panel basis. The 6-panel multiple arrangement is considered satisfactory from an operating standpoint and has the advantages of increasing the capacity of the switchboard and decreasing the amount of multiple equipment required. It is recommended that consideration be given to the adoption of the 6-panel arrangement wherever it is estimated that the number of toll lines will exceed 100 in the ultimate. In any case, the switching, interposition, and recording trunks are multiplied on the same basis as the toll lines,

As previously described, switching trunks to machine switching offices are provided with "group-busy" signals at the toll Board. A combination lamp socket mounting and designation strip, coded as the No. 248 lamp socket mounting, is located in place of the usual designation strip as shown on drawing No. 807-90, Figure 7. The width of this mounting is the same as that of a No. 1-C designation strip and consequently trunks to machine switching offices occupy the same amount of space in the face of the board as trunks to manual offices. A sketch of the No. 248 lamp

socket mounting is given on drawing No. 807-87, Figure 1.

As previously noted, and as shown on Drawing No. 807-90, Figures 4 and 5, recording trunks from selectors are provided with tone removal keys in the face of the board, whereas recording trunks from special operators do not require these keys. For equipment and operating reasons, therefore, no attempt is made to group together in the face of the board the two classes of recording trunks incoming from a given office; instead, recording trunks from the selectors in the various offices are located together in the lower part of the recording trunk multiple space, and recording trunks from the special operators in the various offices are grouped together and located above the other recording trunks as shown on Drawings Nos. 807-88, Figure 1, and 807-39, Figure 1.

In single office districts, as previously noted, coin box operating jacks are associated with and mounted above the regular multiple jacks of all switching trunks which are to be used for coin box operation. In order to preserve the regular multiple jack arrangement, however, two strips of jacks and their associated designation strips and busy signal mounting are employed for any group of twenty switching trunks which includes one or more trunks to be employed for coin box connections. The arrangement of this apparatus is shown on Drawing No. 807-90, Figure 9.

Coin box operating trunks, used in multi-office districts, are multiplied on a five-panel basis and appear in the middle panel of each five panel section in the upper part of the answering jack space. The coin box operating jacks and their associated busy signals and designation strip are shown on Drawing No. 807-90, Figure 10. The jacks and signals are mounted ten per strip unless equip-

FIG. 1
RECORDING POSITIONS

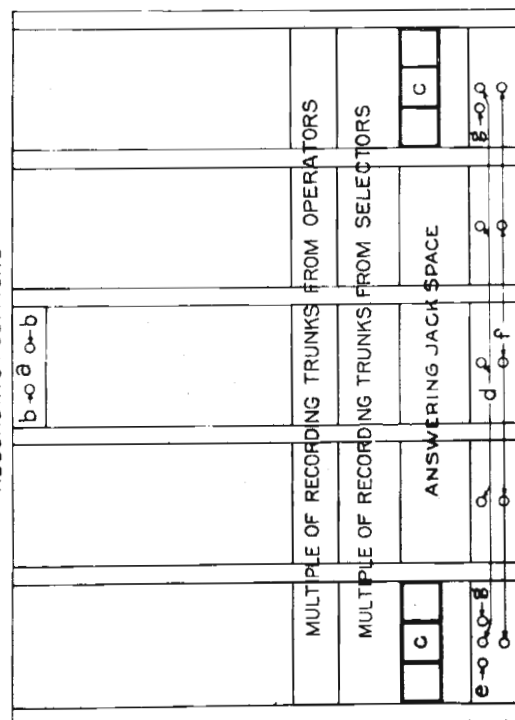


FIG. 2
OUTWARD POSITIONS

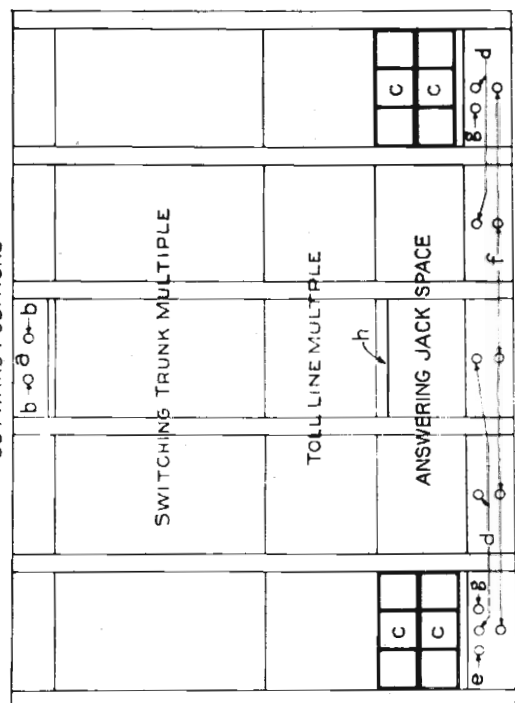
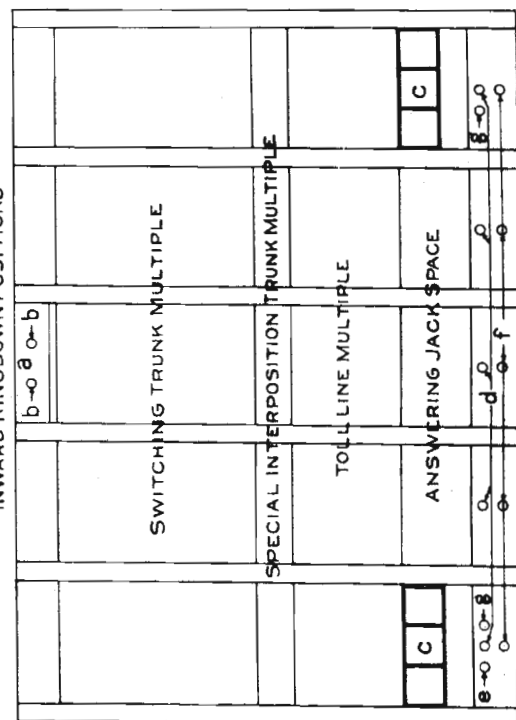


FIG. 3
INWARD RINGDOWN POSITIONS



- a - No. 146 LAMP SOCKET MOUNTING.
- b - SUPERVISOR'S LAMP NO. 33 LAMP SOCKET.
- c - LAMP CAP WHITE (PLAIN). LOCATED AT MIDDLE SECTION OF SUPERVISOR'S DIVISION.
- d - NO. 1-A TICKET BOX.
- e - LINE OR TRUNK PILOT. NO. 33 LAMP SOCKET.
- f - LAMP CAP WHITE (PLAIN) OR NO. 40-B APPARATUS BLANK.
- g - DIRECTORY DESK PILOT. NO. 33 LAMP SOCKET.
- h - LAMP CAP RED (JEWELLED).
- i - PANEL NUMBER. NO. 1-B NUMBER PLATE.
- j - CORD PILOT. NO. 33 LAMP SOCKET.
- k - LAMP CAP RED (PLAIN).
- l - MULTIPLE OF COIN BOX OPERATING TRUNKS.

STEP BY STEP MACHINE SWITCHING SYSTEM
TYPICAL FACE EQUIPMENTS FOR INTERMEDIATE AND LOW TYPE NO. 1 TOLL SWITCHBOARDS
RELATIVE LOCATION OF FACE EQUIPMENT IN SECTION

807 - 89
INFORMATION
ENGINEER *EMM*
DRAFTSMAN
AUG. 1, 1920

FIG. 1
RECORDING POSITIONS

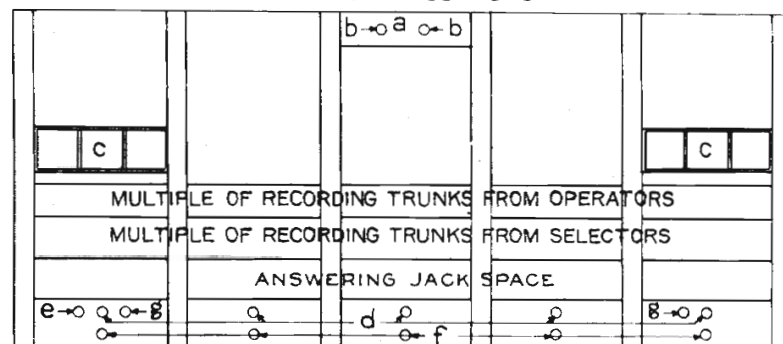


FIG. 2
OUTWARD POSITIONS

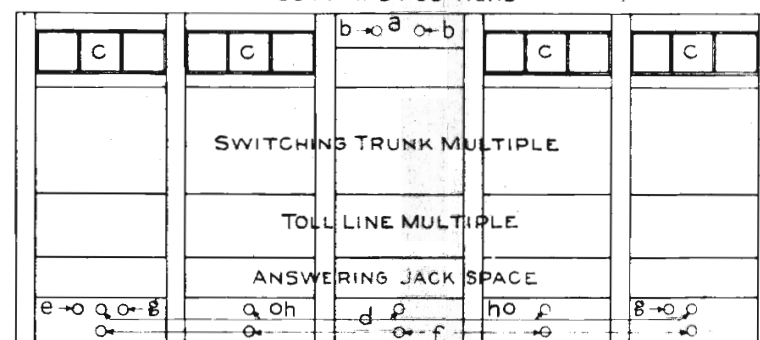


FIG. 3
INWARD POSITIONS

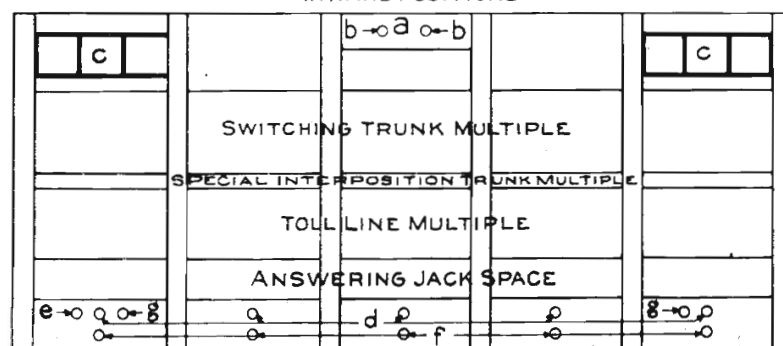
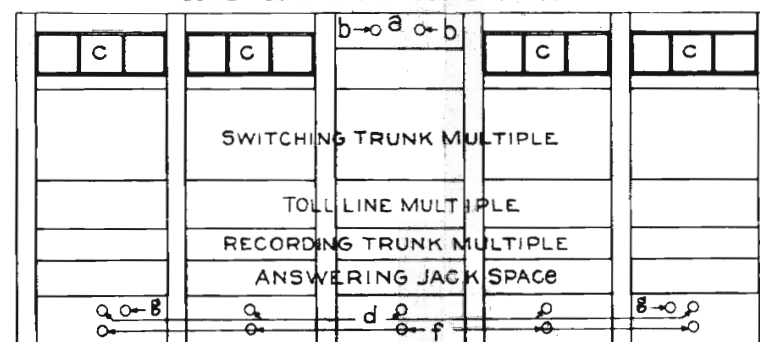


FIG. 4
COMBINED LINE AND RECORDING POSITIONS



- a - No. 146 LAMP SOCKET MOUNTING.
- b - SUPERVISOR'S LAMP No. 33 LAMP SOCKET.
LAMP CAP WHITE (PLAIN). LOCATED AT MIDDLE SECTION OF
SUPERVISOR'S DIVISION.
- c - No. 1-A TICKET BOX.
- d - LINE OR TRUNK PILOT. No. 33 LAMP SOCKET.
LAMP CAP WHITE (PLAIN) OR No. 40-B APPARATUS BLANK.
- e - DIRECTORY DESK PILOT. No. 33 LAMP SOCKET.
LAMP CAP RED (JEWELLED)
- f - PANEL NUMBER. No. 1-B NUMBER PLATE.
- g - COIN PILOT No. 33 LAMP SOCKET.
LAMP CAP RED (PLAIN)
- h - COIN BOX PILOT No. 33 LAMP SOCKET.
LAMP CAP GREEN (JEWELLED)

STEP BY STEP MACHINE SWITCHING SYSTEM
FACE EQUIPMENT FOR LOW, INTERMEDIATE AND HIGH TYPE NO. 1 TOLL SWITCHBOARDS
RELATIVE LOCATION OF APPARATUS IN A PANEL

807 - 90
INFORMATION
ENGINEER *Emil*
DRAFTSMAN *590*
Aug. 1, 1920

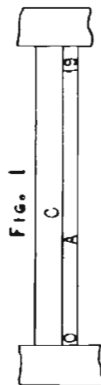


Fig. 1

TOLL LINE MULTIPLE

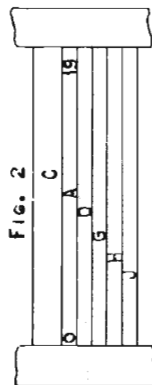


Fig. 2

TOLL LINE MULTIPLE WITH LINE LAMPS AND TRANSFER KEYS IN MULTIPLE

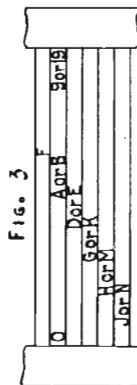


Fig. 3

TOLL LINE ANSWERING JACKS WITH TRANSFER KEYS



Fig. 4

MULTIPLE OF RECORDING TRUNKS FROM OPERATORS, OR TOLL SUBSCRIBER'S ANSWERING JACKS



Fig. 5

MULTIPLE OF RECORDING TRUNKS FROM SELECTORS



Fig. 6

MULTIPLE OF SWITCHING TRUNKS TO A MANUAL OFFICE, INTERPOSITION TRUNKS, MONITORING CIRCUITS OR TOLL SUBSCRIBER'S LINES

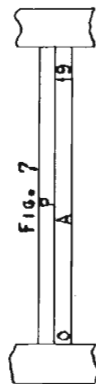


Fig. 7

MULTIPLE OF SWITCHING TRUNKS TO A MACHINE SWITCHING OFFICE



Fig. 8

MISCELLANEOUS ANSWERING JACKS



Fig. 9

MULTIPLE OF SWITCHING TRUNKS TO A MACHINE SWITCHING OFFICE. ARRANGEMENT USED FOR COIN BOX OPERATION IN SINGLE OFFICE DISTRICTS. COIN BOX JACKS ARE LOCATED ABOVE REGULAR JACKS

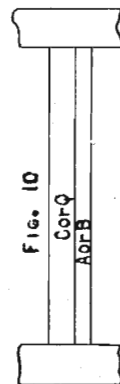


Fig. 10

MULTIPLE OF COIN BOX OPERATING TRUNKS. USED IN MULTI-OFFICE DISTRICTS

- A - No. 49 JACKS. No. 114 JACK MOUNTING.
- B - No. 49 JACKS. No. 141 JACK MOUNTING.
- C - No. 42-A BUSY SIGNALS AND DESIGNATION STRIP.
- D - No. 79 SIGNAL MOUNTING.
- E - TOLL LINE OR RECORDING TRUNK LAMP SIGNALS. No. 30 LAMP SOCKETS. No. 102 LAMP SOCKET MOUNTING.
- F - TOLL LINE OR TRUNK LAMP SIGNALS. No. 12 LAMP SOCKETS. No. 122 LAMP SOCKET MOUNTING.
- G - No. 1-C DESIGNATION STRIP.
- H - No. 492-A KEYS. No. 342 KEY MOUNTING. KEY BUTTONS BLACK.
- I - No. 492-A KEYS. No. 342 KEY MOUNTING. KEY BUTTONS RED.
- J - No. 248-A KEYS. No. 212 KEY MOUNTING. KEY BUTTONS BLACK.
- K - No. 492-A KEYS. No. 346 KEY MOUNTING. KEY BUTTONS BLACK.
- L - No. 492-A KEYS. No. 346 KEY MOUNTING. KEY BUTTONS RED.
- M - No. 248-A KEYS. No. 232 KEY MOUNTING. KEY BUTTONS BLACK.
- N - BUSY SIGNAL LAMPS AND DESIGNATION STRIP. No. 248 LAMP SOCKET MOUNTING.
- O - No. 42-A BUSY SIGNALS AND DESIGNATION STRIP. No. 77 SIGNAL MOUNTING.

NOTE: ① No. 492-A KEYS USED FOR TRANSFERRING SIGNALS TO OUTWARD POSITIONS ARE EQUIPPED WITH RED BUTTONS; THOSE USED FOR TRANSFERRING SIGNALS TO THROUGH POSITIONS ARE EQUIPPED WITH BLACK BUTTONS.

ment conditions require the twenty per strip arrangement.

No definite amount of space is reserved in the face of the board for answering jack equipment, the section being so arranged that multiple jacks can be installed close to the top of the piling blocks if necessary.

Helly strips are provided at all positions for setting apart the different groups or classes of lines and are also installed between the different hundreds groups of any one class of lines.

The locations for the various pilot lamps and keys in the piling blocks and above the multiple, as well as the lamp cap solers, are given for five-panel sections on the accompanying face equipment drawings. The locations given also apply at seven-panel sections to the five panels furthest from the end of the switchboard. The No. 146 type lamp socket mounting is used for supervisors' pilots on additions to existing installations as well as on new switchboards. In order to avoid the necessity of moving these mountings as the equipment grows, they should be so located initially that the distance from the bottom of the mounting to the key-shelf is 34 inches, 20-1/2 inches and 13-1/2 inches for the high, intermediate and low type sections respectively.

Ticket boxes for use at No. 1 toll boards are of the No. 1-A type and, unless otherwise specified, will be located at the different types of positions as shown on the face equipment drawings. Where low or intermediate type sections are used the upper part of the ticket boxes may be raised behind the bottom of the section moulding if equipment conditions require.

Stile casing number plates of the No. 107 type are used

for designating the multiple equipment and are provided for new toll boards as follows:

- (a) Where none of the groups of multiple lines exceeds 100 jacks per panel: One number plate is provided on each stile casing for indicating the hundreds digit applying to all of the groups in the corresponding panel at the right.
- (b) Where the switchinn trunks, or toll lines, or both, are in excess of 100 per panel: One number plate is provided on each stile casing for each hundreds group or fraction thereof included in the switching trunk or toll line equipment. Where a special interposition trunk multiple is located between the toll lines and the switching trunks, one number plate per stile casing is also installed for designating this equipment.

Each stile casing number plate is located approximately midway between the lowest and the ultimately highest equipment in the multiple group to which the number plate applies.

In making additions to toll boards, where the multiple equipment is numbered from 0 to 99 and from left to right across five panels, the existing numbering arrangement should be employed for the addition. In such cases, each hundreds group is designated by one stile casing number plate which is located at the left of the first panel.

For a group of lines or trunks which is numbered from zero up in a panel, the 0-19 strip of jacks and associated equipment are located at the bottom of the space reserved for the group concerned. The 0-19 strips are the first to be installed, the multiple equipment growing upward. The terminal strips on the intermediate distributing frame for the 0-19 lines in the various hundreds are grouped together, the strips for the 26-39 lines are grouped together, etc., thus avoiding the necessity of reserving terminal strip space for 100 lines in each hundreds group.

PANEL MACHINE SWITCHING SYSTEM

PULSE MACHINE. CASING REMOVED

