

THE BELL TELEPHONE CO. OF CANADA

ENGINEERING DEPARTMENT

Specifications 4160

Supplement 1.

November, 1927.

(Insert this supplement before specifications 4160).

DIAL STATIONS

CONVERTING MANUAL WALL SETS FOR DIAL OPERATION

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GENERAL

1. Purpose of Supplement. The purpose of this supplement is to describe the "New Door Method" of converting manual wall sets for dial operation at the stations on the subscribers' premises.

STATION APPARATUS AND MATERIALS

2. The apparatus and materials given below in alphabetical order supplement the apparatus included in Specifications 4160.

Cover **SPECIAL COVER ASSEMBLY** per Northern
Electric Specification MD-877.
For converting No. 293-A subscriber sets for
dial operation.

Cover Parts The following are parts of the special cover assembly and are included when one special cover assembly is ordered.

CABLE—2 Wire Local Cable

LOCK—Screw Type Lock

MOUNTING PLATE.....P.P. 9410

SCREWS—

Woodscrew for attaching P.P. 9012 .. P.P. 2231

3 Woodscrews for attaching P.P.7346..P.P. 6431

4 Woodscrews for attaching N7-A Bracket

P.P. 10850

TERMINAL ASSEMBLIES P.P. 7346

P.P. 9012

TRANSMITTER BRACKET.....No. N7-A

WIRING DIAGRAM in manilla envelope.

Hinge

BRASS HINGE

Used for attaching door to setP.P. 11345

Screw

½ IN. F.H. BRIGHT WOODSCREW

For use with hinge.....P.P. 6474

1/4 IN. F.H. BRASS WOODSCREW

For use with P.P. 7346.....P.P. 6431

3/4 IN. R.H. MACHINE SCREW

Used for attaching dial.....P.P. 17082

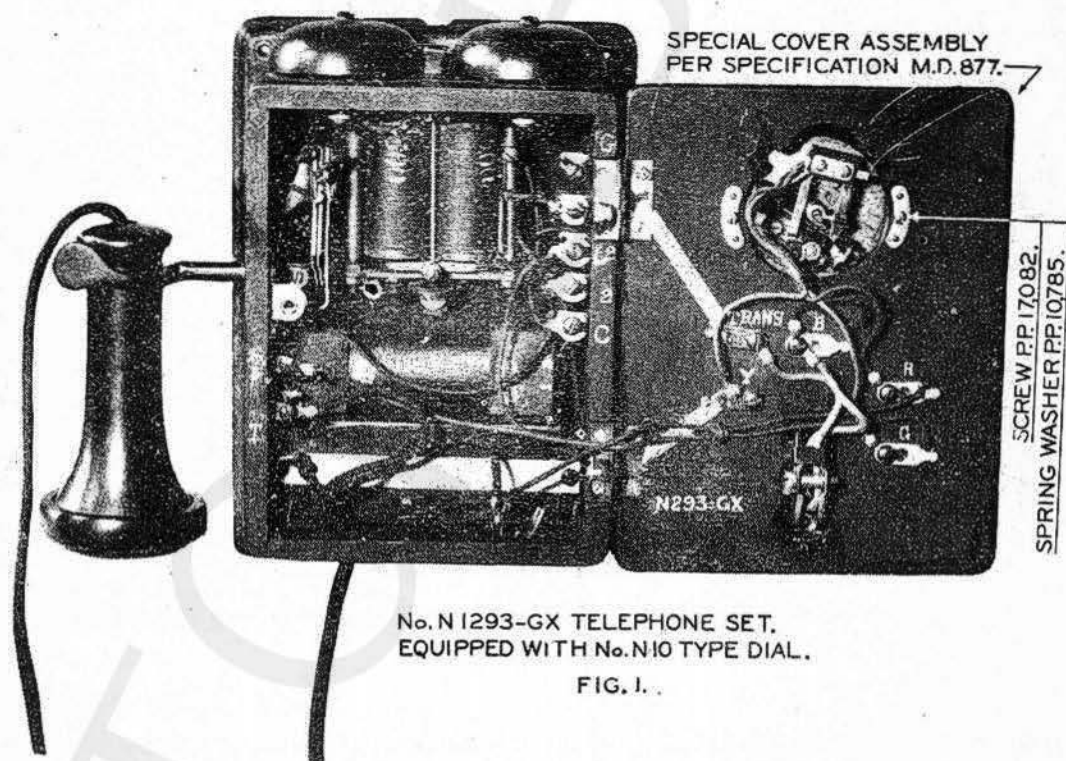
Terminal

TERMINAL ASSEMBLY

For use on door.....P.P. 7346

GENERAL DESCRIPTION

3 General Description. The method to be followed in converting manual wall sets for dial operation at the station shall be known as the "New Door Method" and consists of replacing the existing door on a manual wall set by a new door unit as described herein. Instructions are given for converting manual sets which are equipped for use with either insulated or grounded transmitters. All sets, when converted, will be arranged for use with insulated transmitters only. The converted set will, except for minor equipment details, be the equivalent of a standard No. N293-G subscriber set. The new door unit will be marked with a code number "N293-GX". A No. 293-A subscriber set converted for dial operation by the new door method will therefore become a No. N293-GX subscriber set as covered by the code marking "N293-GX" on the new door. See Figure 1.



The Northern Electric Company have arranged that the No. 293-A subscriber sets which have been converted in the field to

No. N293-GX subscriber sets and are returned for repairs will have the code marking "293-A" on the back of the set obliterated and the code marking "N293-GX" substituted in the standard manner below the obliterated marking.

4. Sets to be Converted. The method of converting manual wall sets for dial operation as outlined herein is suitable for No. 293-A subscriber sets having the following characteristics:—

- (a) **Appearance.** The general appearance of a set shall be a governing factor in deciding whether or not it shall be converted by this method. It should be noted that due to the door being replaced this will apply only to the casing of the set.

The general appearance of a set which has been slightly scratched or disfigured may be made suitable for conversion by a thorough cleaning and polishing with a good grade of commercial furniture polish.

Sets having nickle finished gongs, clapper guard or switch-hook shall be classed as suitable for conversion providing the nickle finish is in good condition or can be made of a good appearance by a thorough cleaning.

Any combination of black and nickle finished gongs, clapper guard and switch hook will be suitable provided that both gongs are of the same finish, but nickle finished transmitters shall not be reused.

Consideration should be given to the fact that certain sets will have an appearance which would be classed as unsuitable for a new installation. Such sets should not, in general, be replaced due to the fact that their appearance after conversion by this method will be consistent with the existing surroundings. This will apply to sets which have been partly or wholly painted, calcimined, white washed or otherwise changed in appearance to agree with surrounding woodwork.

If in doubt as to whether or not a set should be converted by this method refer the particular case to your immediate superior.

- (b) **Lock.** A set having the regular screw type lock is suitable for conversion by this method. A set having the old type key lock shall be replaced.
- (c) **Ringer.** A set having a ringer with either 500 ohm coils or 700 ohm coils is suitable for conversion by this method.
- (d) **Condenser.** A set having either a 1 M.F. condenser or a 2 M.F. condenser is suitable for conversion by this method.
- (e) **Induction Coil.** A set having either a No. 20 induction coil or a No. 46 induction coil is suitable for conversion except in Zone "C" where a No. 46 induction coil must be used.

The above items of equipment together with the switchhook shall be in good working condition. The installer shall be prepared to supply the following items as may be necessary to ensure the satisfactory operation of the set:

- Receiver or parts thereof
- Receiver Cord
- Transmitter
- Transmitter Mouthpiece
- Transmitter Cords
- Terminals
- Hinges
- Mounting Screws

5. Where Sets are to be Converted. Sets shall be converted at the station in accordance with the instructions given herein. It is desired that this method of converting manual wall sets for dial operation on the subscribers' premises shall be used whenever it is considered reasonably advantageous to do so.

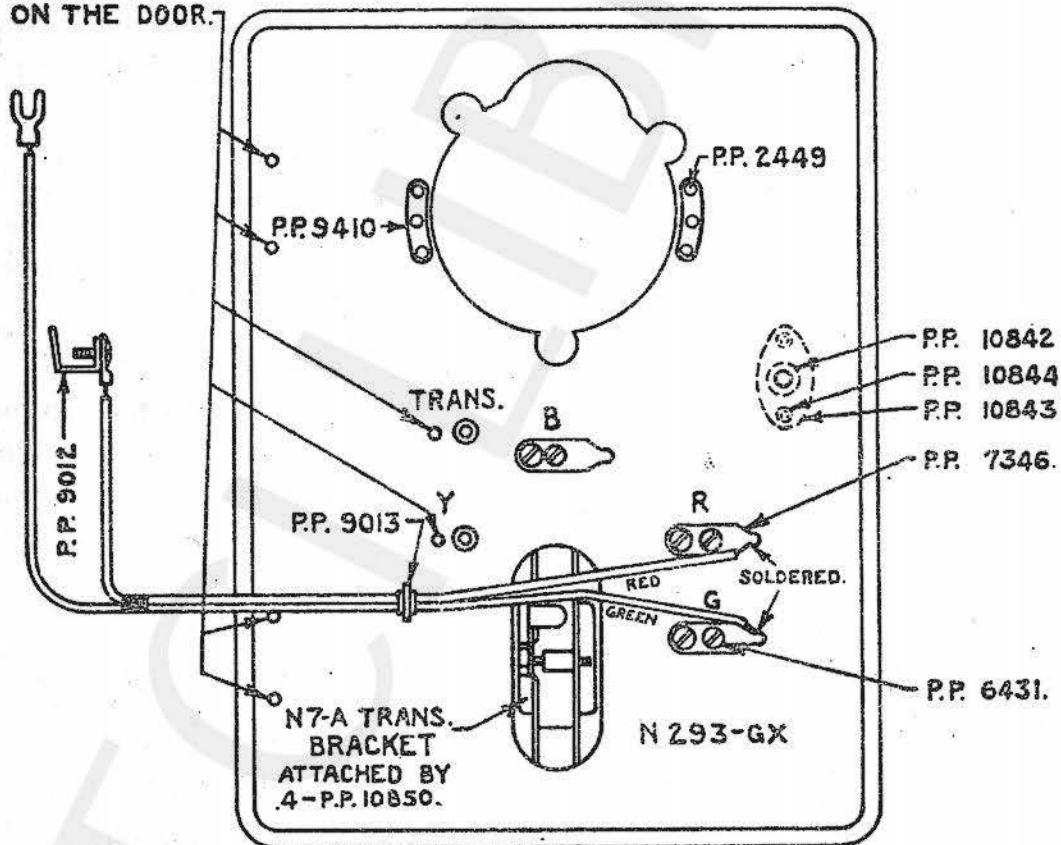
DETAILED DESCRIPTION

6. No. 293-A Set with Insulated Transmitter.

- (a) The installer shall inspect the set to determine whether or not it is suitable for conversion by this method, his decision to be based on the items outlined in section 4 above.
- (b) Disconnect and remove the transmitter and transmitter cords which will be reused on the new door if suitable. The transmitter bolt, screw and washer will be reinserted in the transmitter bracket on the old door and securely tightened.

- (c) Remove the existing door from its hinges. This will involve:—
 - (1) The removal of the two brass wood screws which will release the two terminals from the door.
 - (2) The removal of the door from the set by the removal of the two wood screws from each hinge.The two hinges, two terminals and the two tinned copper straps connecting the terminals to the hinges will remain on the set. Care should be taken to see that the hinges are in good working condition both mechanically and electrically.
- (d) Place the new door on the set using the four screws removed from the old door.
- (e) Attach the two terminals to the new door using the two brass wood screws.

LEADER HOLES ARE DRILLED FOR THE GUIDANCE OF THE
INSTALLER IN LOCATING THE HINGES AND THE TERMINALS
ON THE DOOR.



ASSEMBLY
OF SPECIAL COVER
PER SPEC. MD- 877
FIG.2

- (f) Mount the terminal connected to the red conductor of the two wire local cable on the new door, in the bottom right hand corner of the set as shown in Figure 3 using the wood screw provided. Disconnect the receiver cord conductor from the upper receiver terminal and attach it to the new terminal. Connect the green conductor of the 2 wire local cable to the upper receiver terminal.

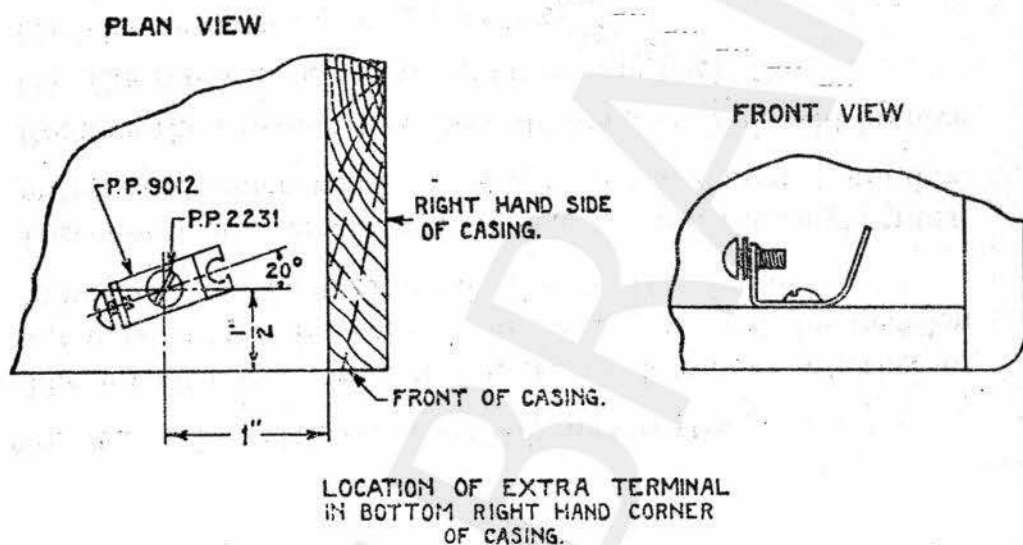


FIG. 3

- (g) The transmitter removed from the old door shall be reused if it is of the proper type as required by the Plant Design Data. Transmitters with nickle finish shall not be reused. Mount the transmitter on the No. N7-A transmitter bracket. Connect the transmitter cords, one to the terminal marked "Trans" and the other to the terminal marked "B". See Figure 1.
- (h) Mount the dial on the new door using two screws P.P. 17082 and two spring washers P.P. 10785 as in a No. N293-G set. See Figure 1.
- (i) Connect the four conductors of the No. N13-A or No. N54 dial cords, which are parts respectively of the N10 and N14 type dials, to the terminals on the back of the door as follows:
- | | | | |
|-----------------|-------------|--------|-----|
| Green conductor | to terminal | marked | "G" |
| Red | " | " | "R" |
| Black | " | " | "B" |
| Yellow | " | " | "Y" |

- (j) Place manilla envelope containing special circuit label which is part of the Special Cover Assembly, per Specification MD-877 in set. See Figure 4.

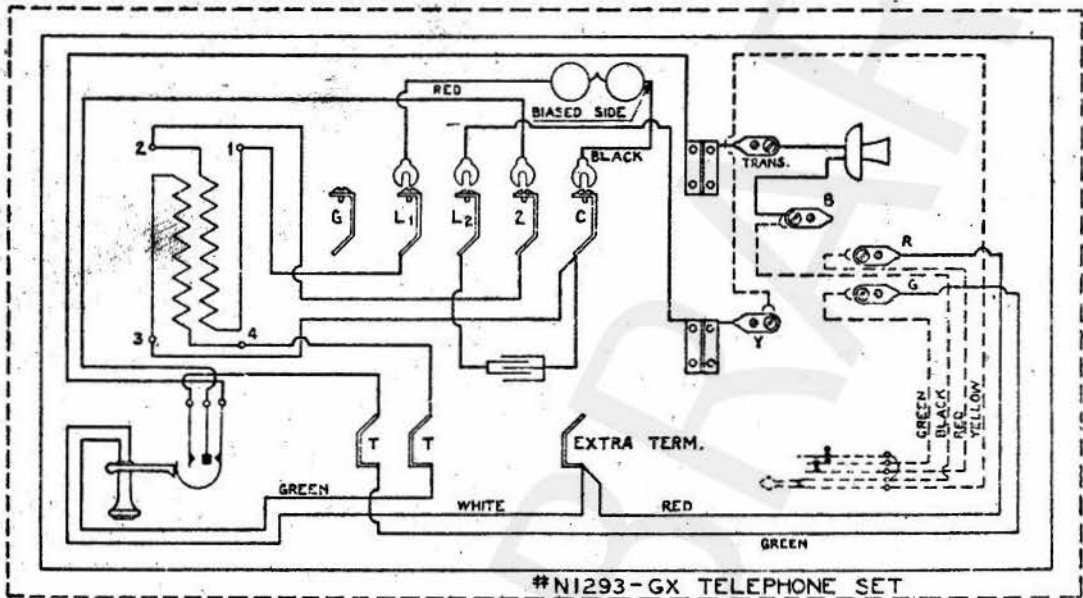


FIG 4.

7. No. 293-A Set with Grounded Transmitter

- (a) The installer shall inspect the set to determine whether or not it is suitable for conversion by this method, his decision to be based on the items outlined in Section 4 above.
- (b) Disconnect and remove the transmitter and the single transmitter cord which will be reused on the new door if suitable.
- (c) Remove the existing door from its hinges. This will involve
 - (1) The removal of the terminal on the back of the door.
 - (2) The unsoldering of the upper tinned copper strap from the boss of the transmitter bracket which projects through the door.
 - (3) The removal of the door from the set by the removal of the two wood screws from each hinge.

The two hinges, the upper tinned copper strap and the terminal connected to the lower hinge will remain on the set. Care should be taken to see that the hinges are in good working condition both mechanically and electrically.

- (d) Place the new door on the set using the four screws removed from the old door.
- (e) Bend the upper tinned copper strap upon itself so that the end of the strap coincides with the leader hole marked "Trans". The terminal attached to the lower hinge should be made to coincide with the leader hole marked "Y".
- (f) Provide a terminal P.P. 7346 for use with the upper tinned copper strap.
- (g) Attach the two terminals to the new door by means of two brass wood screws. Mount the upper terminal on the upper tinned copper strap, the screws to go through the strap into the leader hole. See Figure 5.

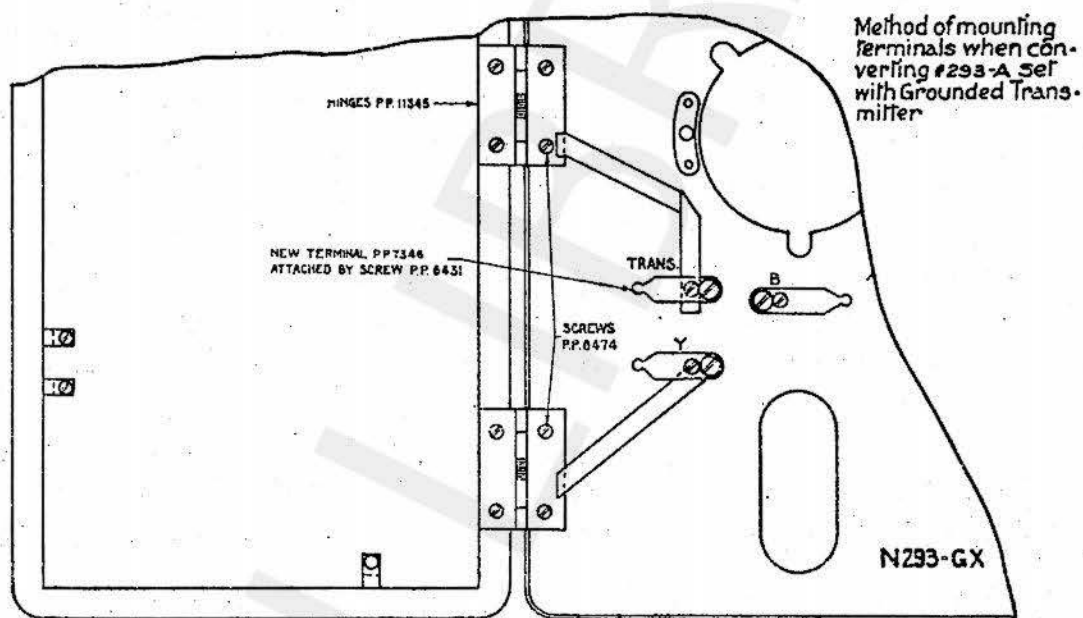


Fig. 5.

- (h) Mount the terminal connected to the red conductor of the 2 wire local cable on the new door, in the bottom right hand corner of the set as shown in Figure 3 using wood screw provided. Disconnect the receiver cord conductor from the upper receiver terminal and attach it to this new terminal. Connect the green conductor of the 2 wire local cable to the upper receiver terminal.

- (i) The transmitter removed from the old door shall be reused if it is of the proper type as required by the Plant Design Data. Transmitters with nickle finish shall not be reused. If the transmitter is suitable install a No. 547 transmitter cord, connecting it to the centre terminal of the transmitter, removing the bare copper wire connecting this terminal to the bridge. See page 4 of Specifications 3854.
- (j) Mount the transmitter on the No. N7-A transmitter bracket. Connect the transmitter cords, one to the terminal marked "Trans" and one to the terminal marked "B".
- (k) Mount the dial on the new door using two screws P.P. 17082 and two spring washers P.P. 10785 as in a No. N293-G set. See Figure 1.
- (l) Connect the four conductors of the No. N13-A or No. N54 dial cords, which are parts respectively of the N10 and N14 type dials, to the terminals on the back of the door as follows:

Green conductor	to	terminal	marked	"G"
Red	"	"	"	"R"
Black	"	"	"	"B"
Yellow	"	"	"	"Y"
- (m) Place the manilla envelope containing special circuit label which is part of the Special Cover Assembly per Specification MD-877 in set. See Figure 4.

8. Tests and Instructions in Dialing. Instruct the subscriber and make tests after conversion is completed as covered in Specifications No. 4160 for new installations.

9. Location of Apparatus. At certain stations it will be necessary to relocate the set to obtain sufficient light for dialing, but relocating of sets should be avoided wherever possible. In relocating sets avoid danger of wet cords due to open windows. When the location is not changed the requirement of 56½ inches for transmitter height will be reduced due to the fact that the transmitter on the dial wall set is a little lower than on the manual wall set. However, except in cases where the lowering of the transmitter is not

satisfactory to the subscriber, no change should be made in the location of the set for this reason.

10. Disposal of Displaced Apparatus. The displaced apparatus consisting of the old door and the transmitter bracket, bolt, screw and washer will be returned to the stores in the usual manner.

THIS PAGE SEPARATES SUPPLEMENTS

1 & 2

THE BELL TELEPHONE CO. OF CANADA
ENGINEERING DEPARTMENT

Specifications 4160.
Supplement 2.

July 1928.

(Insert this supplement before Specifications 4160)

DIAL STATIONS

**USE OF WESTERN ELECTRIC CO.
No. 2 TYPE DIALS**

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GENERAL

1. Purpose of Supplement. The purpose of this supplement is to describe the application of Western Electric Co. #2 type dials to the existing standard wall sets and desk stands used in the Bell Telephone Company of Canada.

Information is also given herein covering the maintenance of #2 type dials at stations.

APPARATUS

2. Names of apparatus required by this supplement which are not listed in Specifications 4160 or Supplement 1 thereto are given below.

Apparatus Blanks:	#50-D APPARATUS BLANK (Use as indicated in specifications for Hand Telephone Sets)
	#50-H APPARATUS BLANK (Use as instructed in specifications for Hand Telephone Sets)
Apparatus Blank Repair Parts:	FOR # 50-D and #50-H APPARATUS BLANKS: Card Holder Frame.....P-154988 Card Holder Window.....P-137593 Card Retainer.....P-164442 Card Retainer Spring.....P-172045
Carrying Case:	#4-A CARRYING CASE Cardboard box with metal ends for carrying W. E. Co. #2 type dial to protect it from injury.
Cords:	#N69 CORD. Dial cord for use on wall sets or desk stands when W. E. Co. #2 type dial is used. Has 4 conductors, white, blue, black and yellow.
Dials:	#2-AA DIAL For use at all dial stations requiring #132-A Number Plate. #2-AB DIAL For use at all dial stations requiring #132-B Number Plate.

**Dial Repair
Parts:**

Card Holder Frame.....	P-15498g
Card Holder Window.....	P-137593
Card Retainer.....	P-164442
Card Retainer Spring.....	P-172045
Dial Mounting Screw for fastening #2 type dial to desk stand.....	P.P. 19900
Dial Mounting Screw for fastening #2 type dial to wall set.....	P.P. 19902
*Finger Stop for #2 type dials.....	P-172189
Finger Stop Screws.....	P-137536
Finger Wheel.....	P-153971
Finger Wheel Clamping Nut.....	P-153996
Number Plate Clamping Ring.....	P-153976
Steel Lock Washer for use with dial mounting screws.....	P.P. 11949

*When ordering finger stop specify code number of dial on which it is to be used.

**Instruction
Cards:**

FORM #1130-A

Circular Card (English) used on #2 type dials in six digit exchange or in five digit exchange using central office names. Central Office name required to be specified on order. First two letters or first letter of C.O. name will be capitalized as specified on order.

FORM #1130-B

Circular Card (Bilingual). Otherwise same as Form #1130-A.

FORM #1130-C

Circular Card (English) used on #2 type dials in five digit exchange using central office numbers. Central Office number required to be specified on order.

FORM #1130-D

Circular Card (Bilingual). Otherwise same as Form #1130-C

FORM #1130-E

Circular Card used on #2 type dials or on #50 type apparatus blanks at P.B.X. stations. Central Office name or number required to be

specified on order. First two letters or first letter of C.O. name will be capitalized as specified on order.

FORM #1130-F

Circular Card used on #50 type apparatus blanks. May also be used in dial instruction card holder before cutover. Otherwise same as Form #1130-E.

FORM #1130-G

Blank Circular Card used on #2 type dials or on #50 type apparatus blanks where a blank card is desired. May also be used where printed matter other than that covered in regular forms is required.

**Number
Plates:**

#132-A NUMBER PLATE

Porcelain covered metal ring having numbers 1 to 0 with the word "OPERATOR" above 0. Part of #2-AA Dial.

#132-B NUMBER PLATE

Porcelain covered metal ring having numbers 1 to 0 with word "OPERATOR" above 0 and three letters above each of the other numbers except 1. Part of #2-AB Dial.

WESTERN ELECTRIC CO. #2 TYPE DIALS

3. Western Electric Co. #2 Type Dials perform the same functions when installed at dial stations as the Northern Electric Co. dials which have been used up to the present. Aside from the different mechanical arrangement of the dial proper, there are several points in which the Western Electric Co. #2 Type Dial differs from the Northern Electric Co. Dial which are of interest to the installer.

- (a) The W.E.Co. #2 type dial requires a separate cord to connect it to the set whereas the N.E.Co. dial has a cord permanently soldered to the spring pile-up.
- (b) The W.E.Co. #2 type dial is arranged to be mounted on a desk stand or wall set by means of three mounting screws whereas the N.E.Co. dial requires only two. It is not possible, however, to use the third screw when mounting a W.E.Co. dial on the existing standard sets in use in this Company.

- (c) The W.E.Co. #2 type dial is arranged with an instruction card holder in the centre of the dial which accommodates a circular card bearing the station number as well as the information given on the #N104 type number plate which is a part of the N.E.Co. dial. This makes it unnecessary to have a #128-B number plate mounted on the transmitter at stations equipped with #2 type dials.

DESCRIPTION

4. Dial Stations equipped with W.E.Co. dials and dial stations equipped with N.E.Co. dials may exist indiscriminately in the same central office area, providing the test and maintenance requirements of the two different types of dials are met.

The W.E.Co. dial differs from the N.E.Co. dial fundamentally in the design of the governor and of the pulsing mechanism. The operating description given on pages 2 and 3 of Specifications 4160, therefore, applies in general to stations equipped with W.E.Co. #2 type dials. The speed of the finger wheel in returning to normal and consequently the rate of interruption of the "Pulse Contacts" is regulated by the governor on back of dial. In order that the Central Office apparatus may function properly, the rate of interruption of the "Pulse Contacts" and the "per cent. break" must be within certain limits. The "per cent. break" is explained below.

A complete dial pulse consists of two parts:

- (1) The break—when "Pulse Contacts" are open.
- (2) The make—when "Pulse Contacts" are closed.

The length of the "break" compared with the total length of time required for the complete pulse is known as the "per cent. break". When dials are manufactured or repaired, the "per cent. break" is adjusted to close limits. If the "per cent. break" is outside of these limits, the dial is likely to fail to operate the Central Office equipment properly even if the speed is within the proper limits.

The "per cent. break" depends largely on the position of the tip of the pulse spring with respect to the pulse pawl which operates it and on the tension of the pulse spring. Because of this the pulse spring and the pulse spring stop should always be protected from injury and no attempt should be made to adjust pulse spring or stop or to otherwise adjust dial except as covered in this supplement.

5. Dial Cord. The #N69 cord is required for connecting the W.E.Co. #2 type dial to #50-AL desk stands and #N293-G or #N293-GX subscriber sets. The colours of the individual conductors in the #N69 cord vary from the colours of the individual conductors of the #N54 or #N13-A cord which are parts respectively of the #N14 and #N10 type dials. The differences in colour of the conductors of the two types of cords are shown below in tabular and in diagrammatic form.

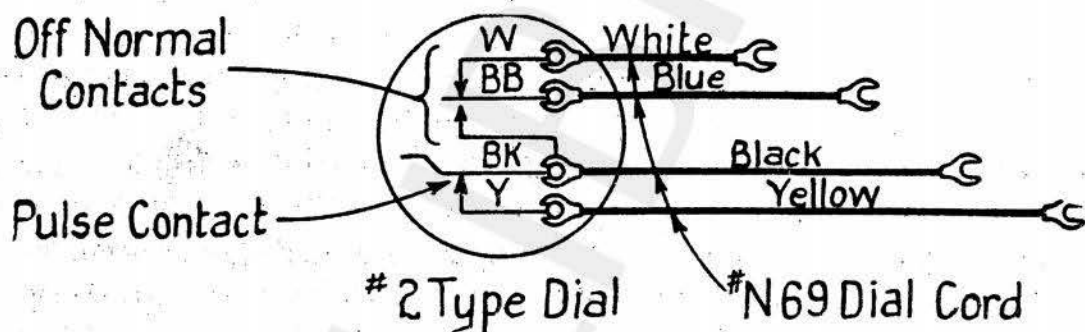
Colour of Conductor
on N.E.Co. Dial

Red
Green
Black
Yellow

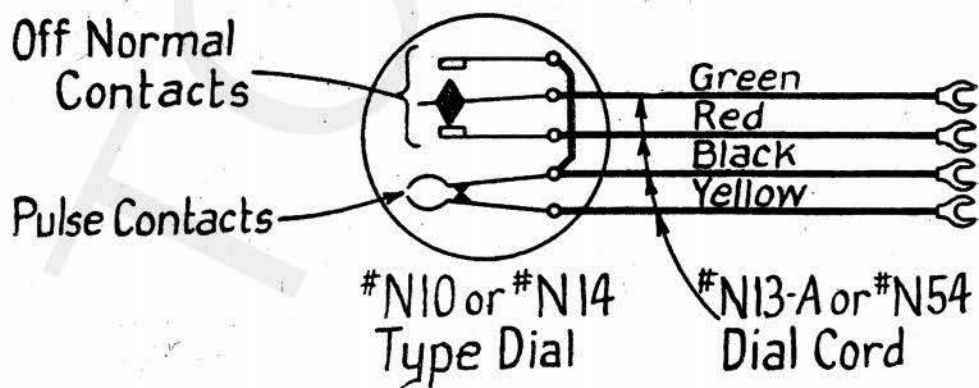
Colour of Equivalent
Conductor on #2 Type Dial

White
Blue
Black
Yellow

CORD ARRANGEMENT ON W. E. Co. #2 TYPE DIAL



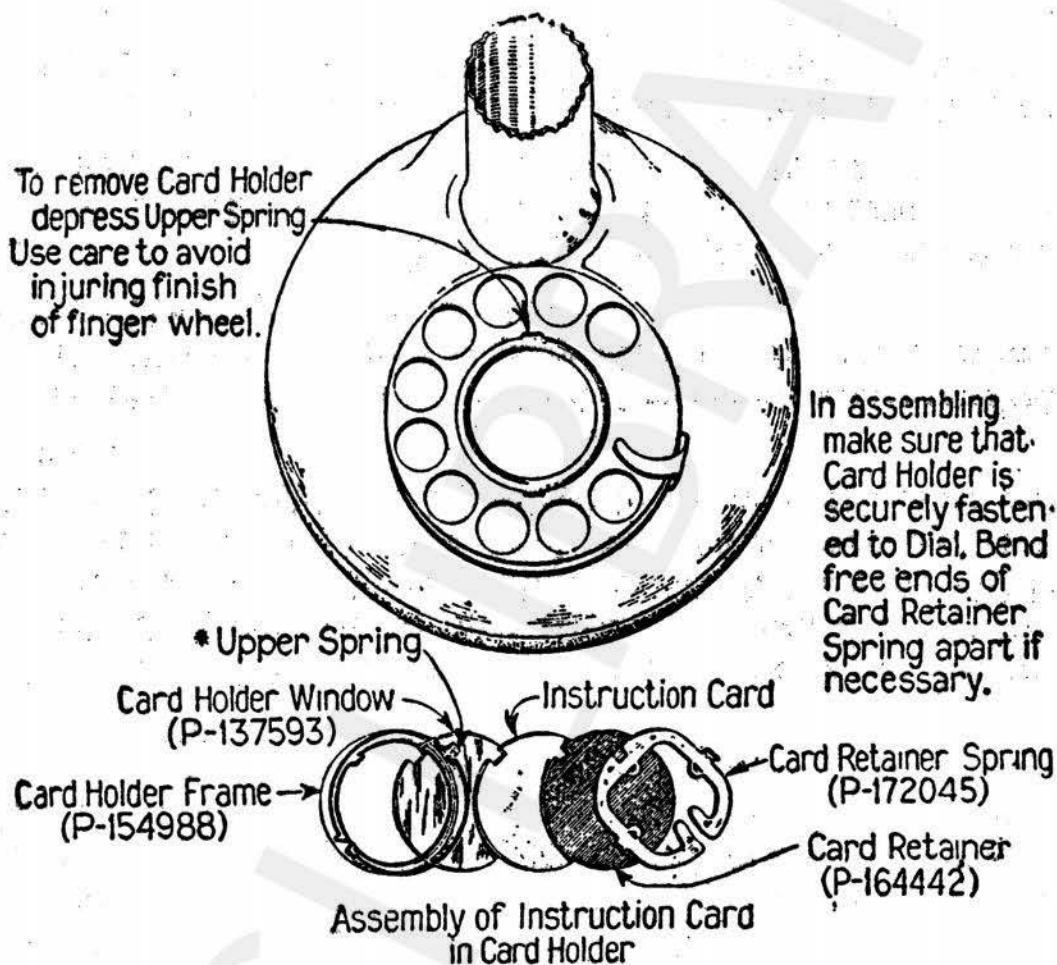
CORD ARRANGEMENT ON N.E.Co. DIAL



APPARATUS INSTALLATION

6. Instruction Cards. Place an instruction card on all #2 type dials giving:

- (a) Name or number of Central Office to which station is connected.
- (b) Station number.



* If upper spring on card holder frame rubs on number plate clamping ring (when card holder is attached to dial) remove card holder and bend tip of spring with pliers.

7. Testing Dials. With connection established to Test Desk, ask for dial speed test (see **Testing Dial Speed** sec. 14) and mention that a W.E. Co. #2 type dial is to be tested. When dial tone is heard, dial "zero". If dial speed is not between 8 and 11 pulses per second, follow **Adjusting Dial Speed** sec. 14.

If difficulty is experienced with station dial, use hand test set dial to call Test Desk. Have receiver on hook when hand test set dial is used.

It should be noted that the W.E.Co. #2 type dial should be tested between the limits of 8 and 11 pulses per second, whereas the N.E. Co. N10 or N14 type dials should be tested between the limits of 9 and 12 pulses per second as covered in Specifications 4159-1.

8. Mounting Dials: The method of mounting Western Electric #2 type dials on existing standard wall sets and desk stands is substantially the same as for mounting Northern Electric Company dials except that longer screws are required for mounting the Western Electric Company dials than are required for the Northern Electric Company dials.

Three tapped holes are provided on the back of the Western Electric Company dial for three mounting screws, but only two mounting screws can be used when the W. E. Company dial is mounted on #N50-AL desk stands and #N293 type wall sets. The two holes which are approximately opposite each other will be used.

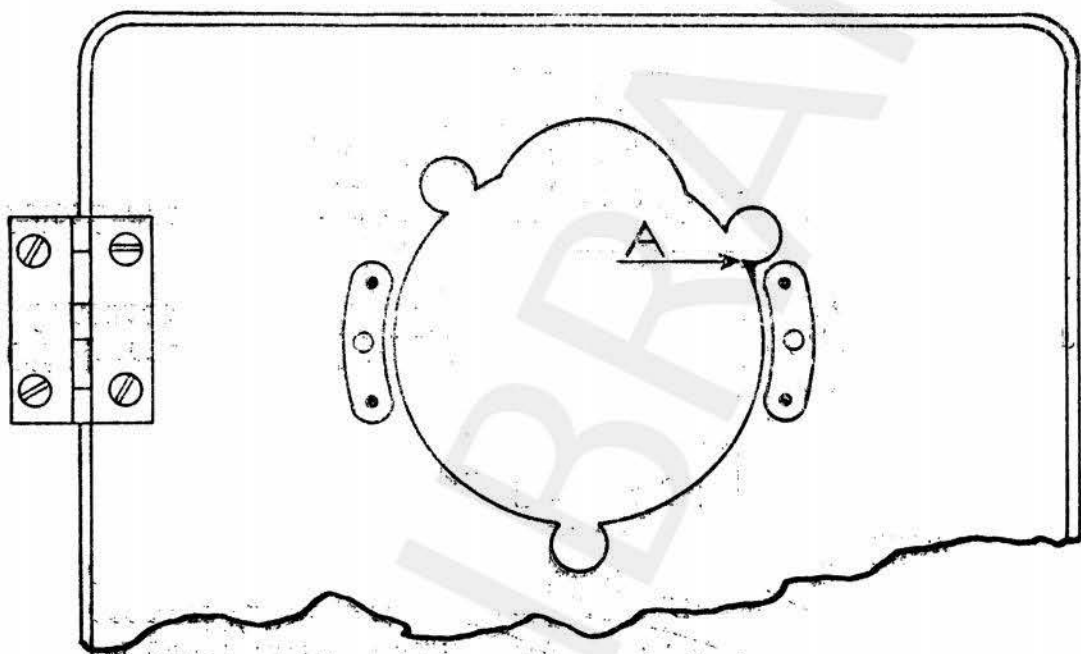
The Piece Part numbers for the dial mounting screws required for the Western Electric Company dials and for the Northern Electric Company dials are as follows:

	# N293 Type Set	# N50-AL Desk Stand
Western Electric Dial	P.P. 19902	P.P. 19900
Northern Electric Dial	P.P. 11667	P.P. 7928

P.P. 19902 and P.P. 19900 are longer respectively than P.P. 11667 and P.P. 7928. Care should be taken to avoid using P.P. 19902 or P.P. 19900 with Northern Electric Company dials as these screws are too long and will injure the enamelled number plate of the Northern Electric Company dial. For identification purposes, Flat Fillister Head Cap Screws are provided for mounting W.E.Co. dials while ordinary Round Head Screws are used for mounting the N. E. Co. dials.

In all cases a lock washer P.P. 11949 should be used with each mounting screw.

In mounting Western Electric Company #2 type dials on #N293 type wall sets some difficulty may be experienced due to the bracket which supports the impulse pawl on the dial, bearing on the side of the cut-out. Under no condition should the dial be forced into place. This difficulty may be overcome by cutting away the wood at the side of the cut-out as shown below.



IF DIAL BINDS ON SIDE OF CUT-OUT AT "A"
CUT AWAY WOOD AS SHOWN IN BLACK

CONNECTIONS

9. General: Station connections at stations using #2 type dials will be the same, in general, as given in Specifications 4160, the only difference being the method of connecting the dial to the desk stand or wall set.

Connections are shown in Figures 1, 2 and 3 for the three general conditions under which #2 type dials will be used. Connections for Individual Line Stations are shown in each case.

#295-A
Subscriber Set

For side tone reduction
connect Yellow to R
and Red to Y

Desk Stand Cord

Receiver Cord

Normal Contacts

White
Blue
Black
Yellow

Dial *
Dial Cord

Transmitter Cord

#N69 *

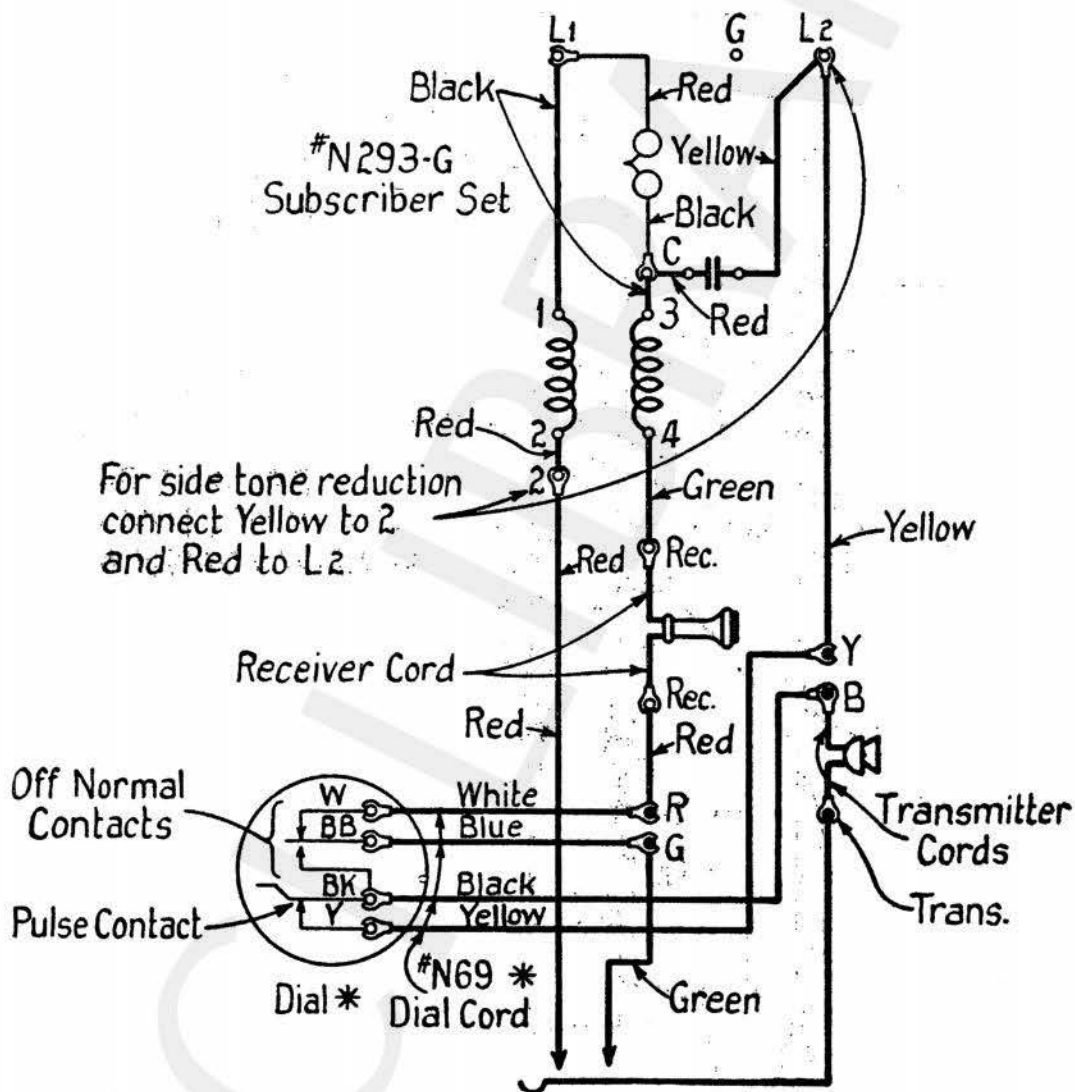
#N19-A Cord

*When #N50-A Apparatus Blank is used, dial and dial cord are omitted and terminal "WR" is strapped to terminal "GR" and terminal "Y" to terminal "B" in base of desk stand.

- Terminal on rack of desk stand

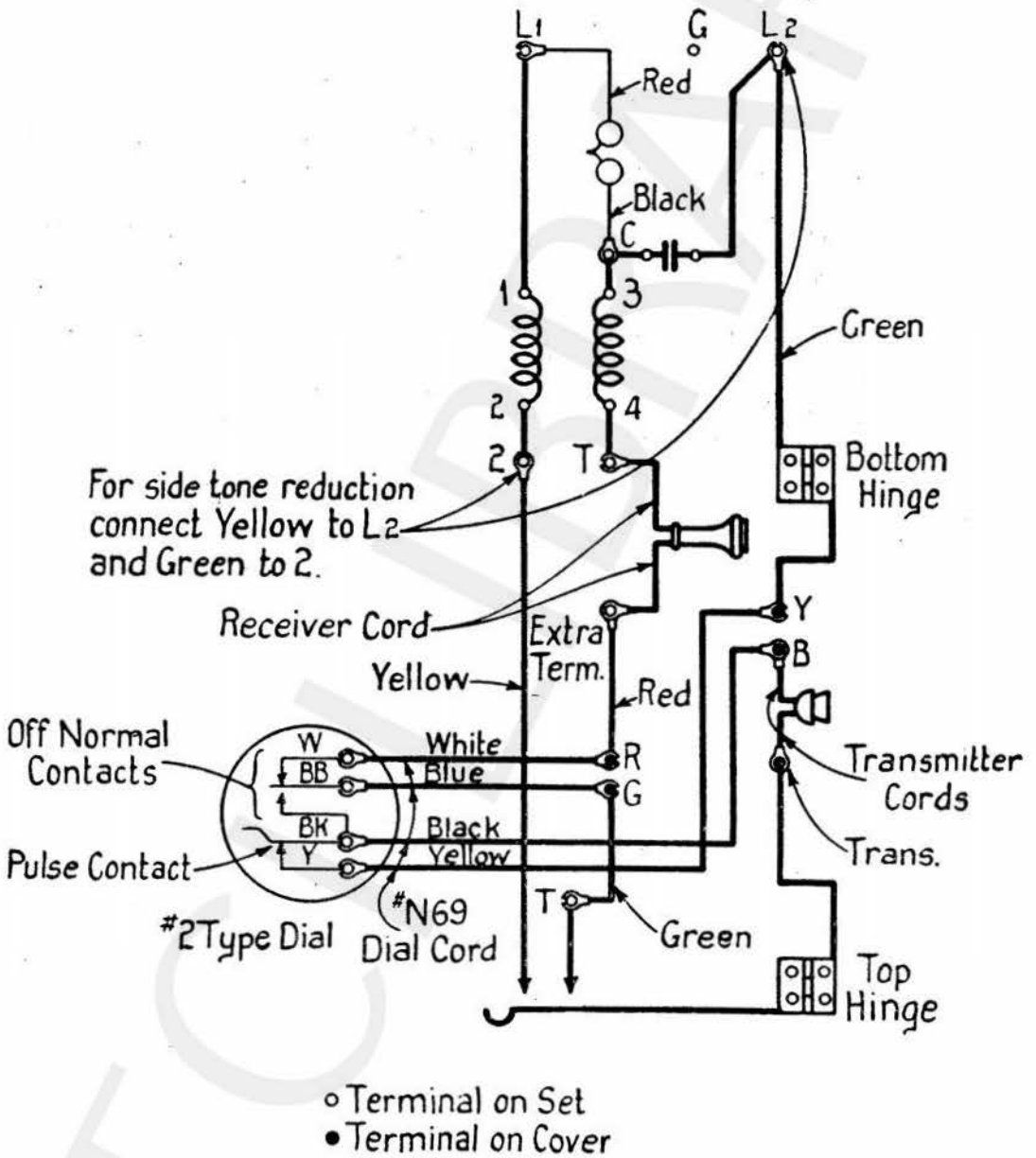
11. Wall Set Connections.

Figure 2.
#N293-G Subscriber Set
with #2-A Type Dial.



*When #N104-A Apparatus Blank is used, dial and dial cord are omitted and terminal "R" is strapped to terminal "G" and terminal "Y" to terminal "B" on set door.

Figure 3.
#N293-GX Subscriber Set
with #2-A Type Dial.



MAINTENANCE

12. Avoiding Interference with Subscriber's Service:

Disconnect leads from "R" or "2" and "Y" or "L2" terminals in set or red and yellow conductors at connecting block while working on desk stands or sets so that switchhook operation or short circuiting of terminals will not cause interference with incoming calls or false operation of central office apparatus.

In using hand test set do not bridge on line without condenser in series until sure that line is not in use.

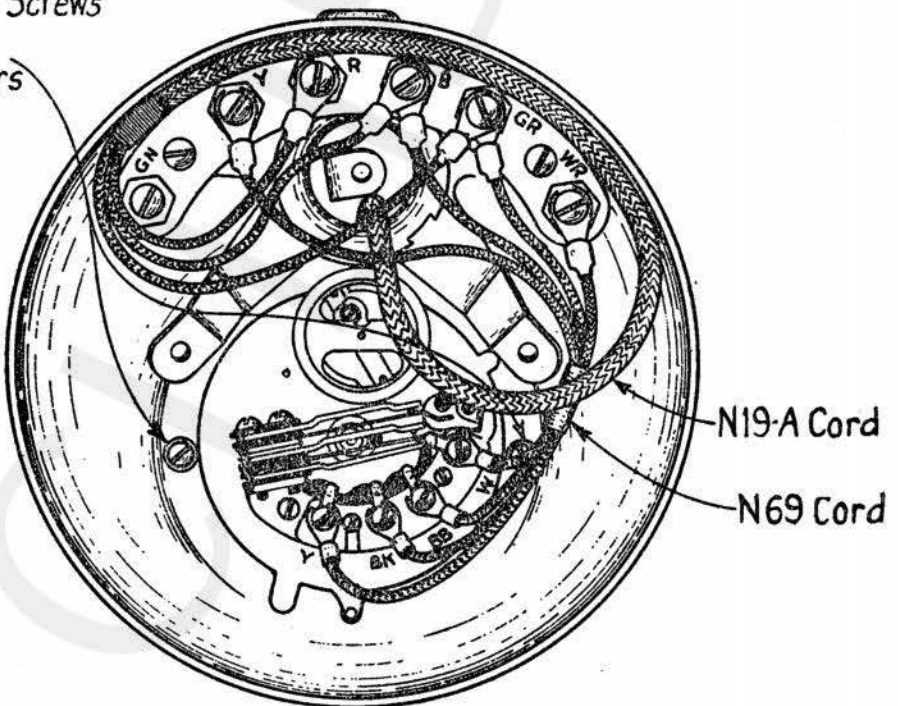
13. Cording of Desk Stand:

Arrange cords in # N50-AL desk stand as shown below so that no conductors will rest against springs or any operating part of dial when dial is in place.

Arrangement of Cords in Base of
N50-AL Desk Stand with
2 Type Dial

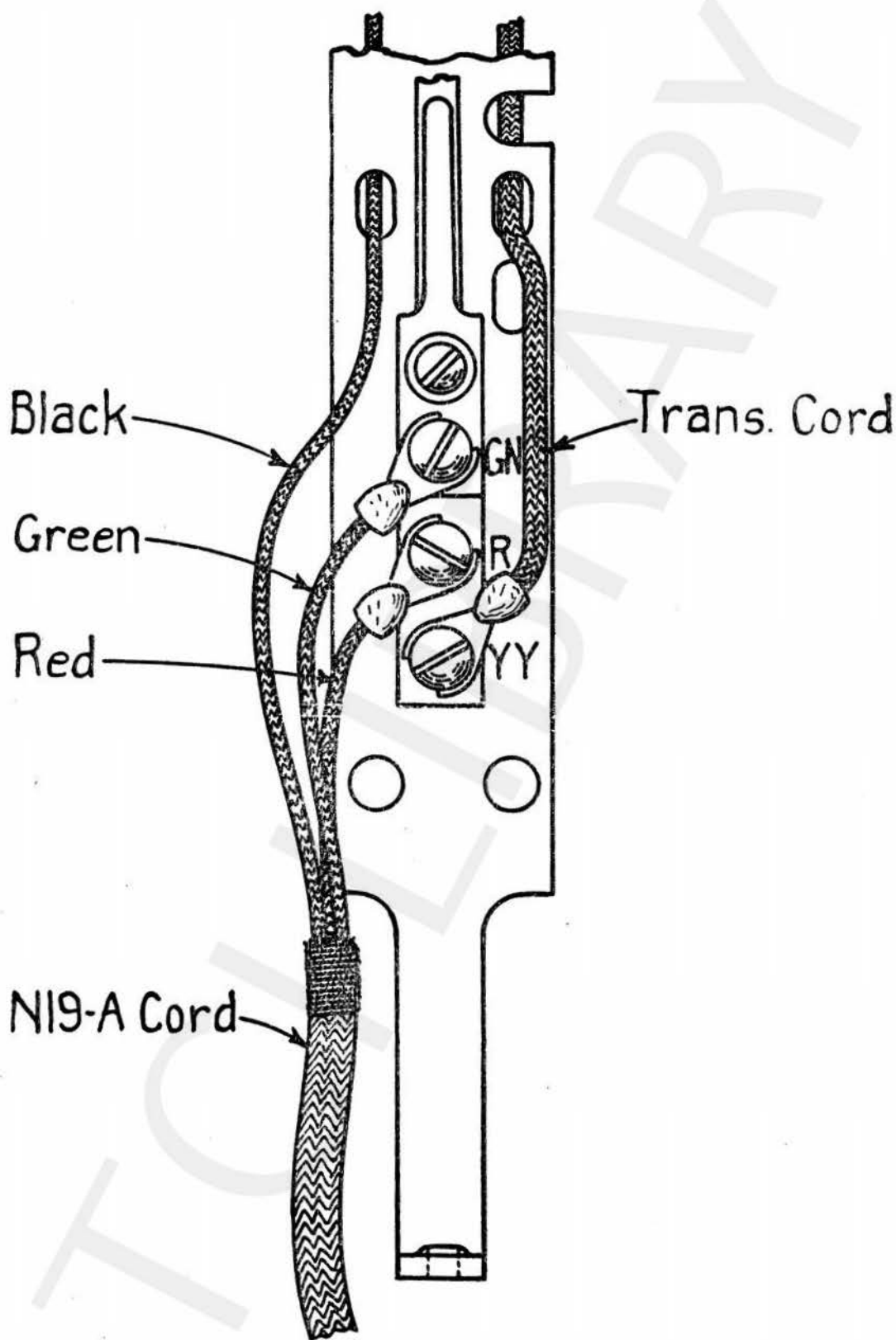
Dial Mounting Screws

Lock Washers



Note:- Desk Stand Cord and Receiver Cord
are not shown.

Arrangement of Cords on Rack of
#N50-AL Desk Stand.



14. Dials:

Whenever a dial station is visited for any reason, inspect the dial and clean the dial number plate.

If the station is equipped with a W.E.Co. #2 type dial, repair the external parts of the dial as required in this supplement. If connection is established to test desk for other purposes test dial speed with Test Desk. If speed test shows dial not operating satisfactorily, adjust speed as instructed herein. If connection is not established to test desk for other purposes and if satisfied that dial is operating satisfactorily, do not test speed of dial with test desk unless so instructed in supplemental instructions.

Make no adjustment of dial mechanism other than adjustment for speed. Do not oil any parts of dial at stations.

Repair and Replacement of Dial Parts:

To avoid unnecessary replacement of dials make following repairs:

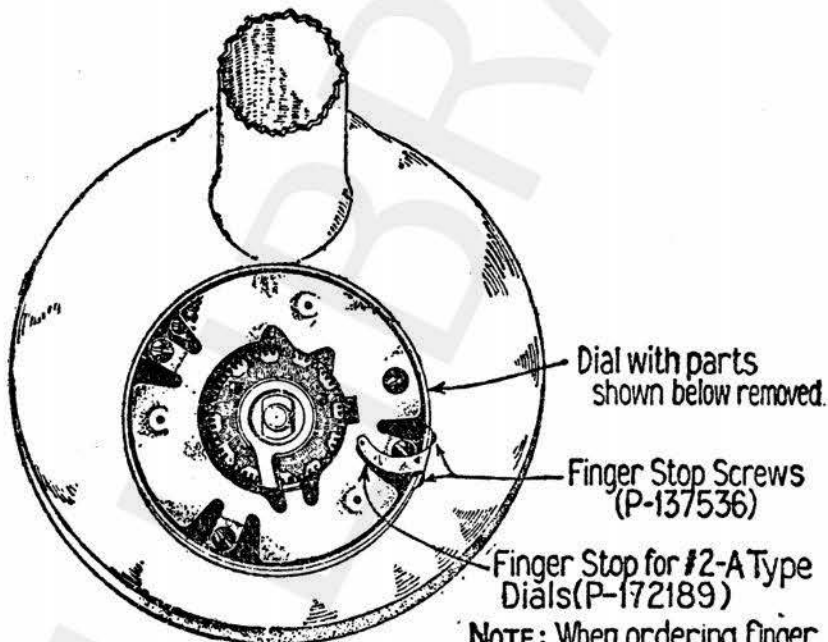
- (1) If dial is loose tighten the dial mounting screws.
- (2) If card holder is loose on dial and is equipped with spring P-153975, replace with spring P-172045. See Sec. 6. If card holder is loose on dial and is equipped with spring P-172045, remove spring from card holder and bend free ends of spring apart.*
If card holder is damaged or missing, replace with new card holder equipped with spring P-172045. See that upper spring of card holder frame does not touch number plate clamping ring.
- (3) If finger wheel is bent so that **with straight finger stop** the clearance between finger wheel and under side of finger stop is less than $\frac{1}{32}$ of an inch at any point in the rotation, or is otherwise badly bent, replace with new finger wheel.
- (4) If finger stop is bent so as to interfere with rotation of finger wheel or if it projects over the edge of the finger hole in the "zero" position, bend it back to its proper shape or replace with new one. The clearance between finger wheel and under side of finger stop should not be less than $\frac{1}{32}$ of an inch at any point in the rotation. Tighten finger stop screws if loose.
- (5) If base of stand is removed and it is found that dial cord tips are not clamped tightly by dial terminal screws, tighten screws, making sure that cord tips are arranged as shown in section 13.

*Spring P-153975 is a split ring of spring steel wire and was originally used on #2 type dials.

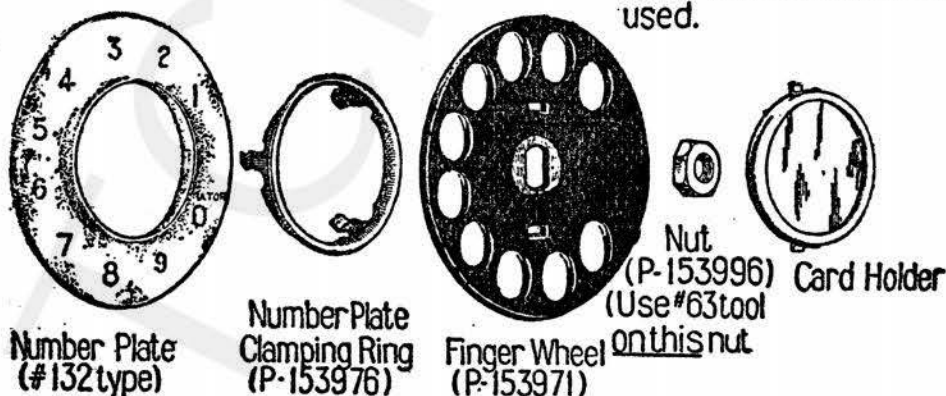
- (6) Replace number plate with new one if:
 - (a) So damaged or scratched that any letters or numbers are not legible.
 - (b) If plate is loose due to more than one of the locating pins being broken off.
 - (c) If the enamel on the plate cannot be properly cleaned or is chipped off so as to expose the metal.
- (7) If contacts of pulse springs or off-normal springs are dirty or slightly pitted, clean with No. 265-B tool. Slide the tool back and forth between the contacts while they are held together by the pressure of their springs.

NOTE: The dial repair parts given in section 2 are required for the above dial maintenance.

Assembly of Dial Parts



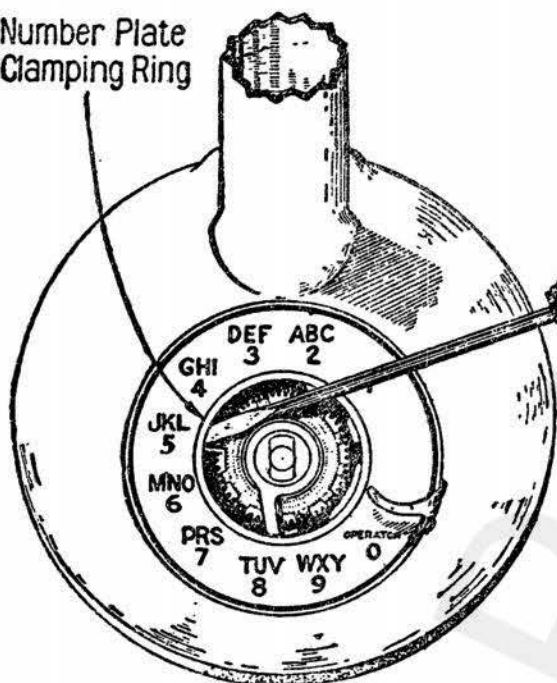
NOTE: When ordering finger stop, specify code number of dial on which it is to be used.



The above parts and finger stop are the only parts to be removed or replaced by repairman

Dials.

Number Plate
Clamping Ring



To change number plate,
remove number plate
clamping ring as shown.
To avoid chipping enamel
on number plate, do not
apply end of screw driver
to outside of clamping ring!

Testing Dial Speed:

The procedure in testing dial speed depends upon the type of tester at the Central Office. Always inspect dial and make necessary repairs before making a speed test. Then call Test Desk and proceed as follows:

With No. 50-A Dial Tester:

After Test Desk has connected line to No. 50-A Dial Tester, dial "zero." Test Desk will ask that this be repeated at least once to determine whether successive operations are between the required limits of not less than 8 pulses nor more than 11 pulses per second. If dial speed is not between these limits, adjust governor.

Adjusting Dial Speed:

To adjust the governor, proceed as follows:

- (a) Place #260 adjusting tool on governor.
- (b) Loosen adjusting screw only enough to permit movement of adjusting arm with slight friction.
- (c) Move adjusting arm toward "F" (to increase speed) or "S" (to reduce speed) as required.
- (d) Tighten adjusting screw.
- (e) Remove adjusting tool.
- (f) Retest with Test Desk until speed is between the "adjust" limits, which are $9\frac{1}{2}$ and $10\frac{1}{2}$ pulses per second.*

*These narrower limits provide a greater margin of safety against the dial getting outside of the "test" limits.



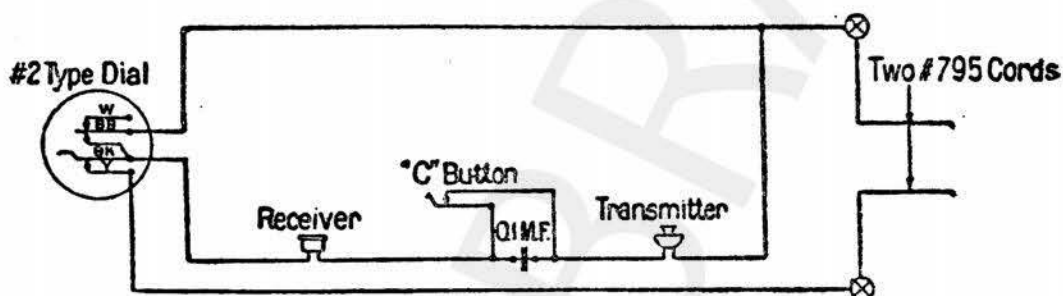
If it is impossible to bring dial speed within the "adjust" limits or if after adjusting to them dial does not operate satisfactorily, replace by another dial. **Do not bend or adjust any of the dial springs.**

To avoid injury, carry dials in carrying case.

15. Use of Hand Test Set M.D.-95.

In using this set depress "C" button, connect cords in the usual manner and listen on line. If line is not in use, release "C" button and if dial tone is heard, dial the number desired. Do not depress "C" button during dialing or talking as this will release the connection in the central office. To immediately dial another number, depress "C" button for about two seconds, release it and then dial. Never release "C" button until sure that line is not in use because if dial pulses or ringing current are being transmitted over the line it will cause interference.

Circuit of Hand Test Set M.D.-95.



Test hand set dials (and if necessary adjust) with Test Desk when first call to test desk is made. Make test and adjustment as given herein.

THIS PAGE SEPARATES SUPPLEMENTS 2 & 3

THE BELL TELEPHONE CO. OF CANADA

ENGINEERING DEPARTMENT

Specifications 4160
Supplement 3

May 1929

(Insert this Supplement before Specifications 4160)

DIAL STATIONS

EQUIPMENT FOR REDUCING DIALING INTERFERENCE IN RADIO RECEIVING SETS

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GENERAL

1. Purpose of Supplement. The purpose of this supplement is to provide information in connection with the installation of equipment intended to reduce interference in radio receiving sets resulting from the dialing operations of subscribers in the dial system plant.

It is recommended that, when a station is visited for the purpose of installing equipment as outlined herein, care should be taken to attract as little attention as possible from the subscriber. When handled on this general basis there is little likelihood of adverse publicity with reference to this type of radio interference which appears to be such a small part of the total interference experienced by radio sets.

Information is given herein as to the method of applying the remedial measures to both desk stands and wall sets.

APPARATUS

2. Names of Apparatus required by this supplement which are not listed in Specifications 4160 or supplements 1 or 2 thereto, are given below.

Condenser-Resistance Unit:	CONDENSER-RESISTANCE UNIT per D-89330. A combined condenser and resistance mounted in a common casing approximately 1 3/16" x 1" x 17/32", and equipped with mounting lugs. The condenser and resistance are connected in series within the mounting and the free ends are brought out by means of leads approximately 6 inches long equipped with spade terminals.
Mounting Plate:	SPECIAL MOUNTING PLATE per MD-1160. A mounting plate of sheet brass arranged to mount one Condenser-Resistance Unit per D-89330 in the base of a #N50 type desk stand. Two nuts P.P. 448 and two screws P.P. 8659 are included with the mounting.
Nuts:	HEXAGONAL BRASS NUT P.P. 448. For use in mounting Condenser-Resistance Unit per D-89330 on Special Mounting Plate per MD-1160.

**Retardation
Coil:**

#67-A RETARDATION COIL.

A solenoidal type of coil wound on a core of non-magnetic material. Has one winding with a resistance of approximately 6.9 ohms. Intended for use at stations where the condenser-resistance unit alone is not effective in eliminating dialing interference to radio receiving sets. A brass wood screw should be used for mounting the retardation coil.

Screws:

R. H. BRASS MACHINE SCREW P.P. 8659.

For use in mounting Condenser-Resistance Unit per D-89330 on Special Mounting Plate per MD-1160.

3/8 IN. # 3 R.H. BRASS WOOD SCREW.

For use in mounting Condenser-Resistance Unit per D-89330 on door of wooden wall set.

1-1/4 IN. # 8 R.H. BRASS WOOD SCREW.

For use in mounting the # 67-A Retardation Coil on a spool head of the induction coil in a subscriber set.

3/8 In. #4 R.H. WOOD SCREW P.P. 2231.

Wood Screw for attaching P.P. 9012.

Terminal:

TERMINAL ASSEMBLY P.P. 9012.

Terminal Assembly to be used to provide extra terminal in subscriber set when #67-A Retardation Coil is required.

DESCRIPTION

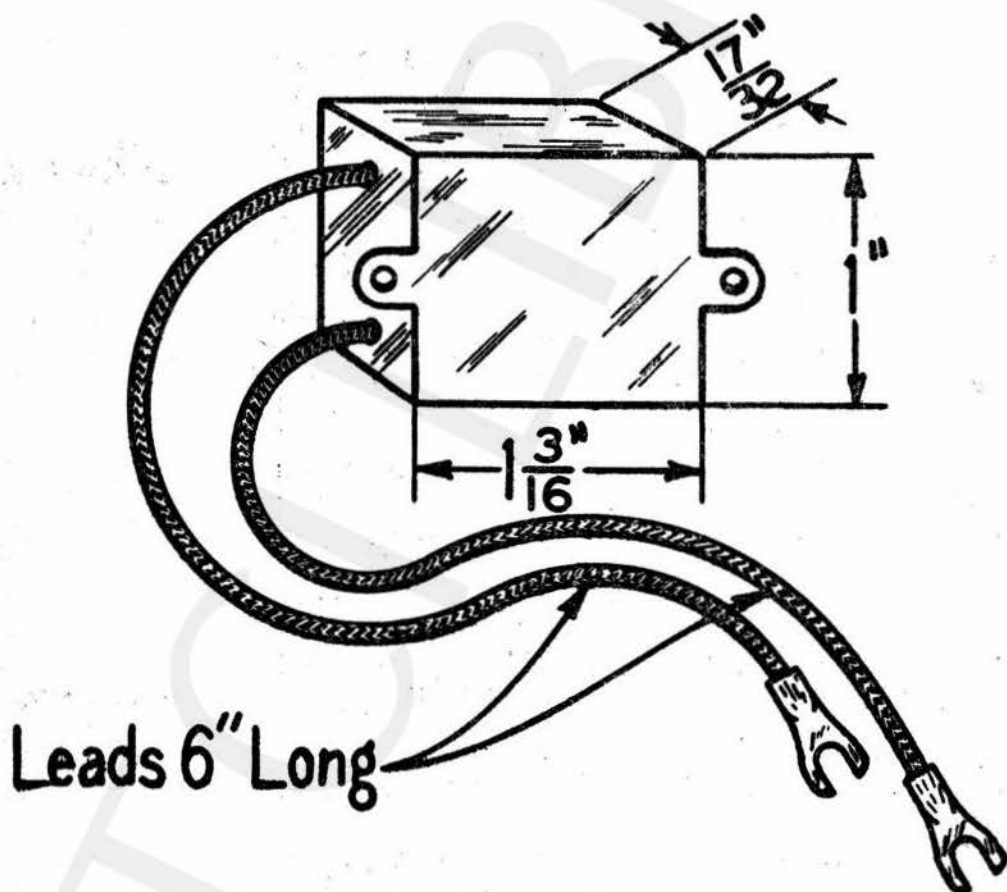
3. **Dialing Interference** in radio receiving sets is caused by radio frequency components of the pulses set up at the pulse contacts of the dial. The method which has been adopted for suppressing this interference consists of providing a shunt path at or near the point at which the radio frequency components of the dialing current originate, that is, at or near the dial pulse contacts.

The shunt path is provided by means of a Condenser-Resistance Unit per D-89330 which is connected directly across the dial pulse contacts of the W. E. Co. #2 type dial or across the terminals at which the two conductors of the dial cord of the N. E. Co. dial from the pulse contacts terminate. The Condenser-Resistance Unit per D-89330 consists of a condenser of approximately 0.1 mf. and a resistance of approximately 100 ohms.

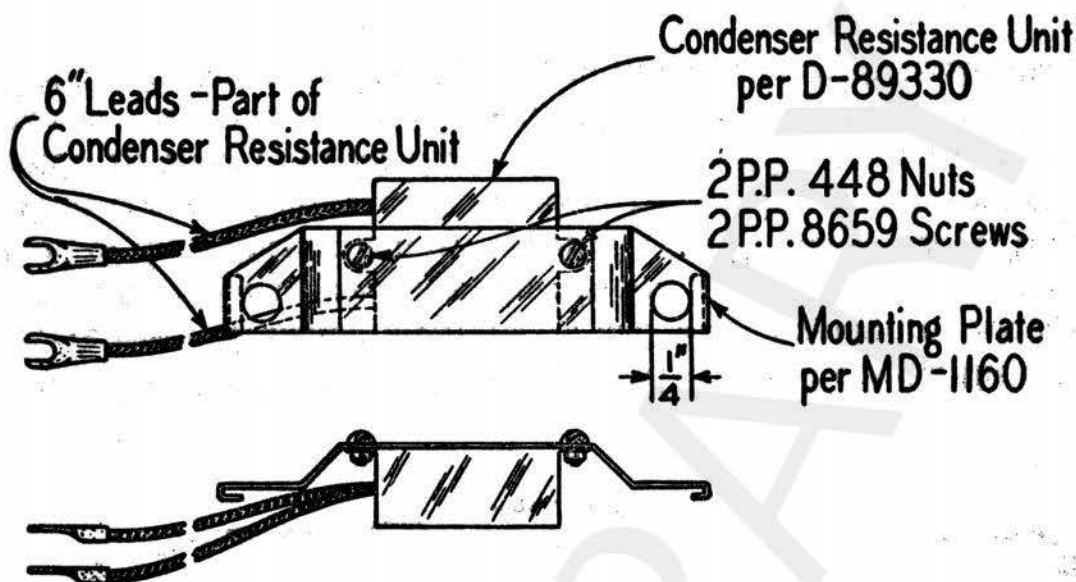
It is expected that the condenser-resistance unit will prove effective in eliminating the dialing interference except in the most severe cases. Where the condenser-resistance unit alone is not effective, a # 67-A retardation coil should be connected into the station circuit as shown herein in addition to the condenser-resistance unit.

APPARATUS INSTALLATION

4. **Desk Stands** of the # N50 type may be equipped with the Condenser-Resistance Unit per D-89330 by first mounting the Condenser-Resistance Unit on a special Mounting Plate per MD-1160. To mount the mounting plate in the base of the desk stand, remove the base plate of the desk stand and slip the lugs of the mounting plate over the two long spider legs. No additional screws are required as the mounting plate is secured by the screws for fastening the base plate. The mounting plate should be slipped over the spider legs from the dial side.



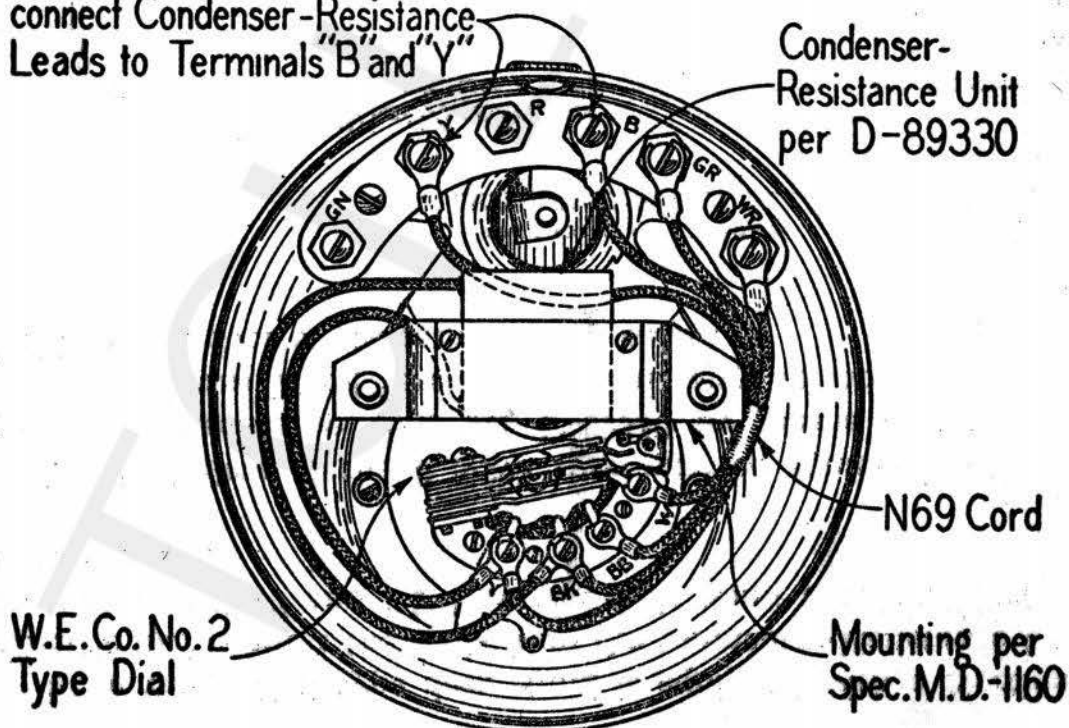
Condenser-Resistance Unit per D-89330



Showing Condenser Resistance Unit on Mounting Plate per MD-1160

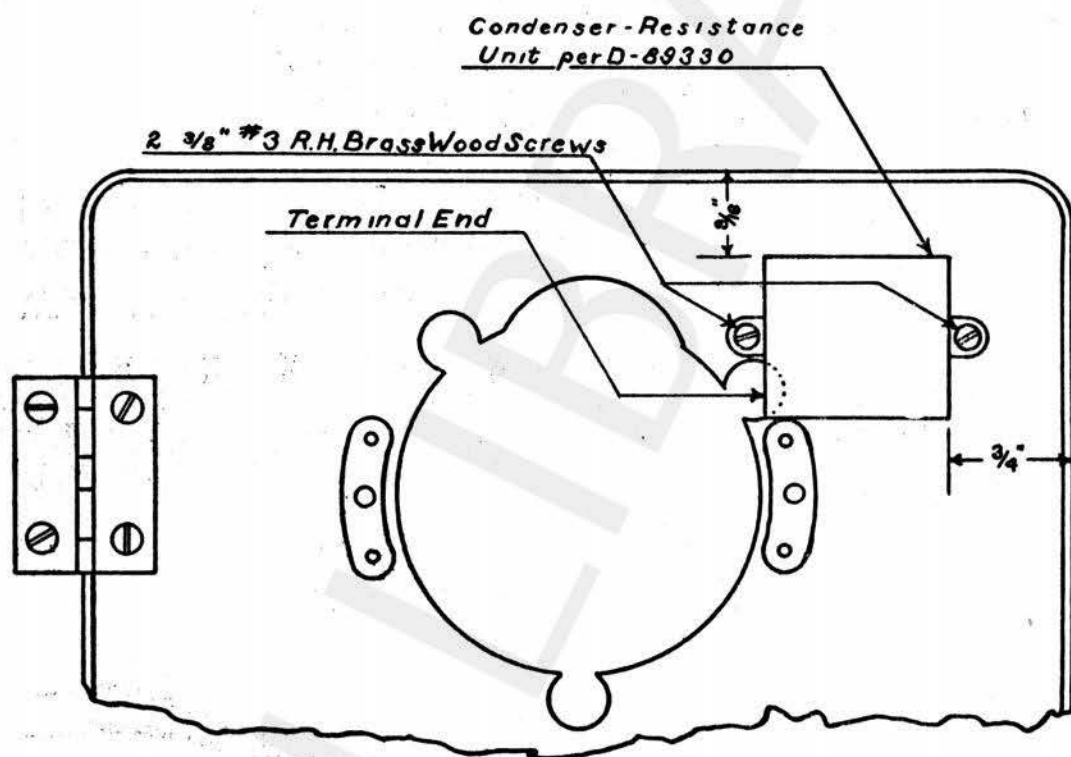
The method of mounting and connecting the Condenser-Resistance Unit in the base of the # N50 type desk stand equipped with a Western Electric # 2 type dial, is shown below. Desk stand cord, receiver cord and switch cord are not shown.

When N.E.Co. Dial is used
connect Condenser-Resistance
Leads to Terminals "B" and "Y"



When the # N50 type desk stand is equipped with a Northern Electric dial connect the leads from the Condenser-Resistance Unit to terminals "B" and "Y" on the desk stand terminal block as shown above.

5. **Wall Sets** of the # N293 type may be equipped with the Condenser-Resistance Unit per D-89330 by means of two $\frac{3}{8}$ " # 3 R.H. Brass Wood Screws. The unit may be mounted on the inside of the door of the set as shown below.



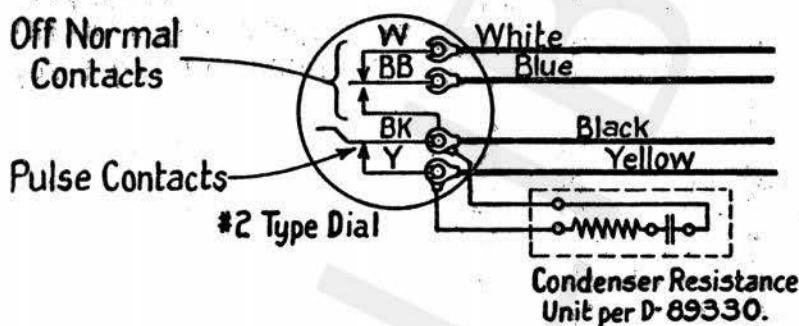
6. **The # 67-A Retardation Coil** will be used only in the most severe cases of dialing interference, and when required in addition to the Condenser-Resistance Unit it will be mounted on a spool head of the induction coil by means of a $1\frac{1}{4}$ inch # 8 R.H. Brass Wood Screw. Care should be taken to see that a brass screw is used. In order to avoid the necessity of soldering leads to the terminals of the #67-A Retardation Coil at the station, it is suggested that the Retardation Coil be equipped with two leads about six inches long in the store room.

When the Retardation Coil is installed, it will be connected into the station circuit between the dial pulse contacts and the L2 terminal on the subscriber set. For this purpose an extra terminal assembly P.P. 9012 is required and will be located in the set in a convenient location by the installer.

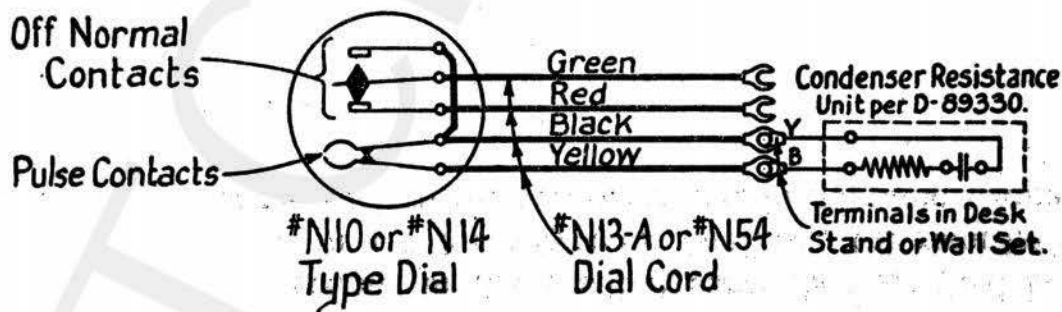
CONNECTIONS

7. The Condenser-Resistance Unit should be connected across the pulse contacts of the dial as shown below.

WHEN W. E. Co. #2 TYPE DIAL IS USED



WHEN N. E. Co. DIAL IS USED



8. The # 67-A Retardation Coil, when required, will be connected into the station circuit in addition to the Condenser-Resistance Unit between the dial pulse contacts and the L2 terminal. The connections in the # 295-A subscriber set (bell box) are shown below. In a # N293 type set (wall set) the retardation coil will be connected into the station circuit in the same manner.

