

108-A AND 108-B REPEATING COILS

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REFERENCES

D. & R. Bull. No.	Title	Key Index No
301	Toll Switchboard No. 3	1B7B 3C5A
313	Nos. 94, 95 and 86-Type Battery Supply Repeating Coils for Vertical Rack and Frame Installations	1L1N

108-A AND 108-B REPEATING COILS

0. General

This bulletin standardizes the 108-A and 108-B repeating coils to supersede 62-type repeating coils per "D"-specifications D-79981 and D-85655 respectively, for use on toll switching trunks outgoing from No. 3 toll switchboards* and for other services where the repeating coil requirements are similar. The 108-A repeating coil has an impedance ratio of 1.5:1 (trunk to office) and the 108-B repeating coil a ratio of 2.5:1.

The principal improvement provided by the new coils is a reduction in voice-frequency transmission loss from about 0.5 db to about 0.2 db. In all other transmission and signaling features the new coils are as good as, or better than, those they supersede. The price of the 108-type repeating coils is about the same as that of the "D"-specification coils. The 108-type repeating coils are enclosed in individual rectangular sheet metal cases which are suitable for mounting on relay racks. They are considerably smaller than the coils they supersede and can be mounted on one side of a 19½ inch relay rack in horizontal rows of ten. The improved transmission efficiency and the small size of the 108-type repeating coils is made possible chiefly by the use of permalloy as a core material.

1. Equipment Features

The general equipment features of the 108-type repeating coils are shown on Drawing 909-1944.

The 108-type coils are rectangular in shape, the outside dimensions of the case being—width, 1½ inches; height, 3½ inches; and length, 3¼ inches. These dimensions make it possible to mount the coils on 1¾ inch horizontal centers and 3½ inch vertical centers so that ten coils can be installed on a 19½ inch relay rack bay in a vertical space equal to that occupied by two relay mounting plates. Also, five single coils can be mounted in a horizontal position in a vertical space equal to that occupied by one relay mounting plate. From these mounting standpoints the 108-type coils are generally similar to the 94-type repeating coils.* The 108-type coils are about one inch shorter than the 94-type coils. They are given an aluminum finish.

For attachment to the relay rack, two lugs protrude from the rear of each coil case. The terminals

* D. & R. Bulletin No. 301.

* D. & R. Bulletin No. 313.

are also located on the rear and, therefore, appear on the same side of the relay rack as the terminals of the associated relays. Drawing 909-1944 gives the significance of the terminal designations. It should be noted that the superseded "D"-specification coils have the office or low windings numbered 4-3, 8-7, and the trunk or high windings numbered 2-1, 6-5, whereas with the 108-type coils the reverse designation is employed. This change was made to conform with standard practice.

Each 108-type repeating coil has four individual windings of insulated copper wire: 4-3, 8-7, 2-1 and 6-5. The trunk or high windings (4-3 and 8-7) are wound in a bifilar manner in order to obtain a high degree of series impedance balance with respect to noise induction on the associated trunk. The office or low windings (2-1 and 6-5) are applied as single windings. The d-c. resistances of the windings are given by the following Table A.

TABLE A

Coil Code No.	Nominal D-C. Resistance Ohms			
	Office or Low Wdgs.		Trunk or High Wdgs.	
	2-1	6-5	4-3	8-7
108-A	3.2	3.2	4.1	4.1
108-B	2.7	2.7	7.8	7.8

The coil windings are protected from moisture penetration by a compound which completely fills the enclosing case. This compound also holds the coil in position. Under normal or trouble conditions with the No. 3 toll board, the 108-type coil is not required to dissipate more than about one watt. If a 108-type repeating coil is required to dissipate more than about 6 watts continually, the compound melts and exudes from the case. Furthermore, if a considerable amount of the compound is lost from the case, the coil will not be held firmly and with vibration the connections to the outside terminals may be broken.

2. Transmission Characteristics

The 108-type repeating coils have such characteristics that when used on toll switching trunks outgoing from No. 3 toll switchboards their voice-frequency transmission losses are about 0.2 db. When used for this service with the No. 3 board, not more than about 5 milamperes direct current flows through the coil windings during the talking interval. The transmission frequency characteristics of the 108-type coils for these saturation con-

ditions and also greater values of superposed direct currents are illustrated by the curves for typical coils given on Drawings 909-1945 and 909-1946. It may be noted from these curves that the voice-frequency transmission losses of the 108-type repeating coils do not deviate to any considerable extent from 0.2 db for superposed currents from zero up to about 15 milamperes. Greater values than these result in larger losses. The residual effects of direct current are negligible. During the operator's talking interval the shunting effect of the 108-type repeating coils on operator's transmission is about the same as that of the superseded "D"-specification coils.

The 108-A repeating coil has an impedance ratio of 1.5:1 (trunk to office) and is designed for use with non-loaded and M-88 loaded toll switching trunks. The 108-B coil has an impedance ratio of 2.5:1 (trunk to office) and is designed for use with H-135, H-175 and D-175 loaded toll switching trunks.

As stated in Section 1, the two halves of the trunk windings (4-3, 8-7) of 108-type repeating coils are wound in a bifilar manner. This provides a high degree of series impedance balance from the standpoint of noise induction on the toll switching trunks. The office windings (2-1, 6-5) are individual windings. Bifilar application is not required for these windings since toll office circuits are not subject to noise induction and the repeating coils in the toll

lines insulate the toll switching trunk coils from noise induction to ground occurring on the toll lines. The admittance unbalances of the 108-type repeating coils are small and the possible circuit noise due to this type of unbalance is negligible. The coil-to-coil crosstalk between adjacent 108-type repeating coils is less than that of the superseded "D"-specification repeating coils.

3. Signaling Features

For service on toll switching trunks outgoing from No. 3 toll switchboards it is required that repeating coils be "non-ring through" at 20 cycles. Such a characteristic is desired so that when a toll operator rings on a toll line, the subscriber, if connected, will not be falsely signaled. By design, the 108-type repeating coils have satisfactory characteristics in this respect. It is also required that these repeating coils shall have such characteristics that when toll switching trunks are connected to toll circuits, the impedances shunting 20-cycle, 135-cycle or 1000-cycle ringing relays will be high enough to allow satisfactory signaling at these frequencies. The 108-type repeating coils adequately meet these requirements.

From the standpoint of the production of clicks in telephone circuits or the false operation of relays due to interruptions of direct currents flowing through the coil windings, the 108-type repeating coils have practically the same characteristics as the superseded "D"-specification repeating coils.

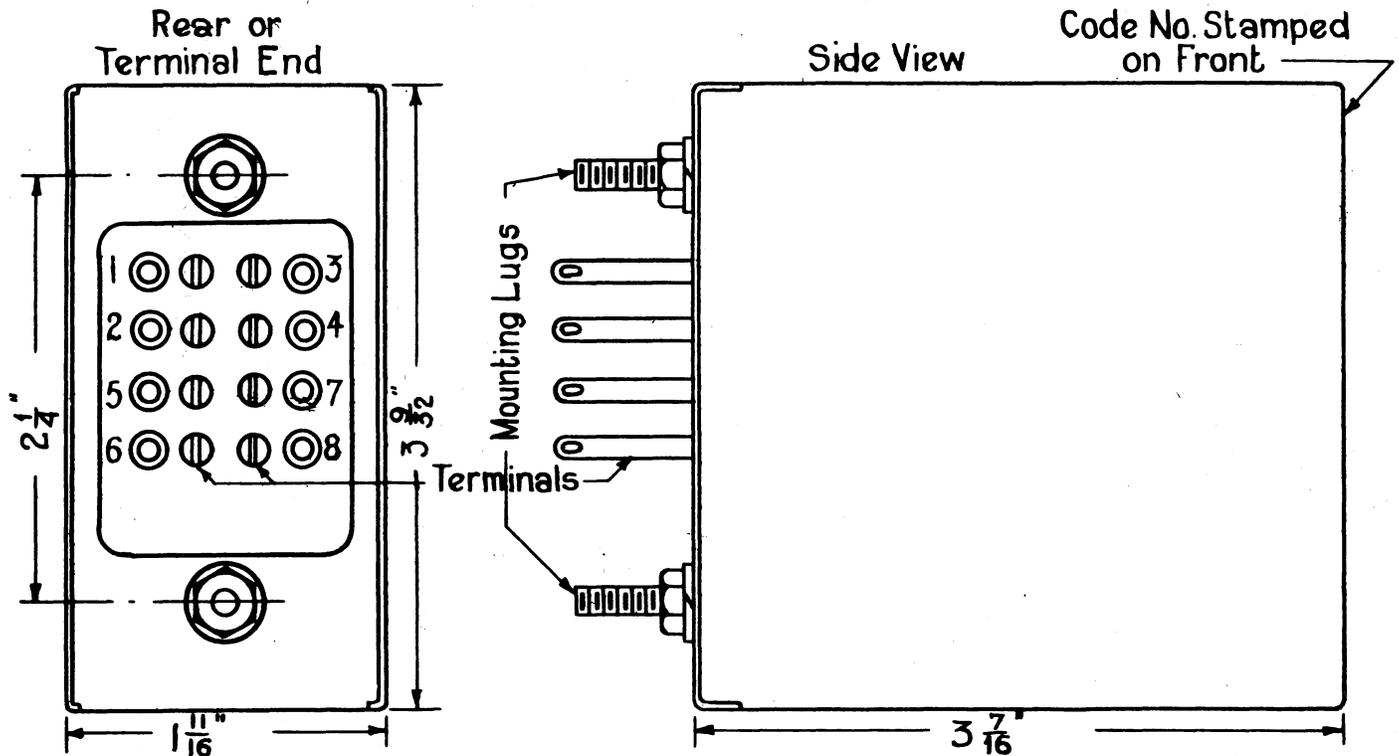


Fig. 1 Equipment Features

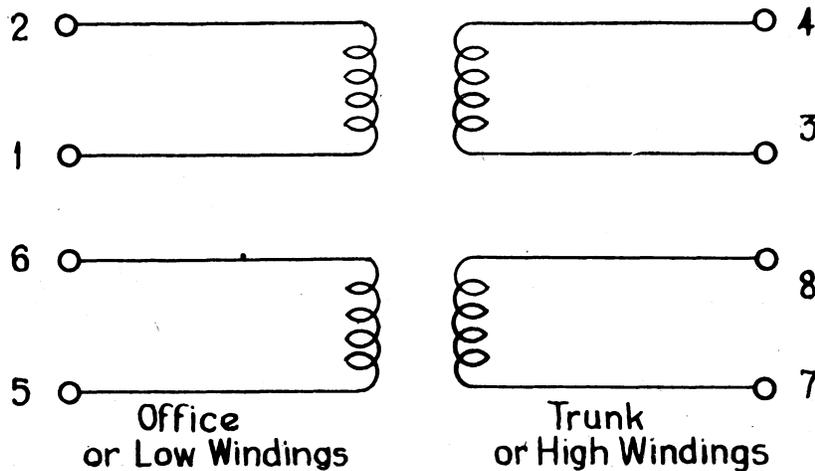


Fig. 2 Terminal Designation

A. T. & T. Co.
Dept. of
Dev. & Res.

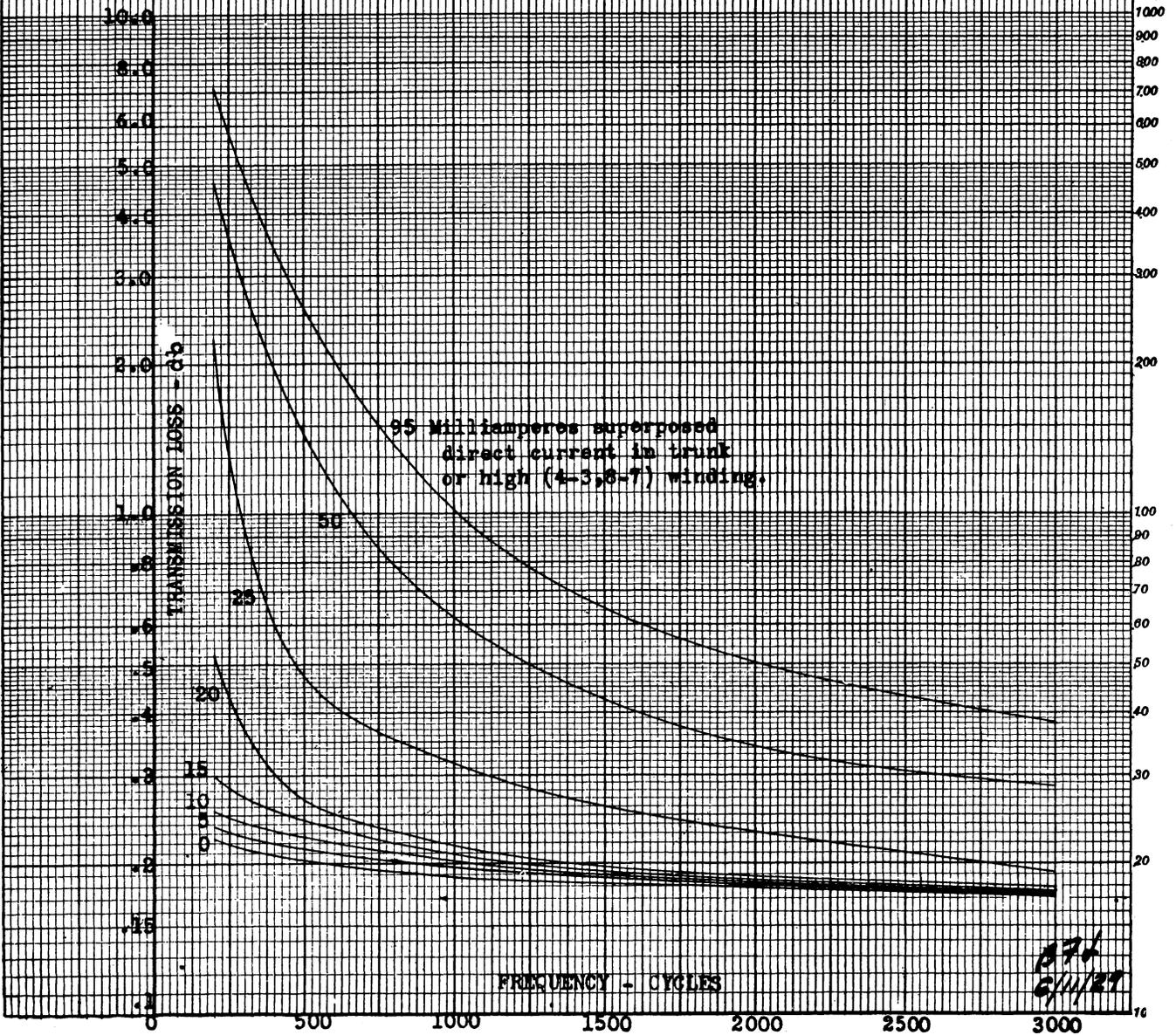
905-1545

108-A REPEATING COILS

EFFECTS OF SUPERPOSED D-C. SATURATION ON THE
TRANSMISSION-FREQUENCY CHARACTERISTICS OF A TYPICAL COIL

The transmission losses given are the transmission losses
for the coil when used between 900 and 600 ohms, these
being respectively representative impedances for low-
impedance toll switching trunks and toll offices.

$$\text{Turns Ratio} = (4-3, 8-7) : (2-1, 6-5) = 1.225:1$$



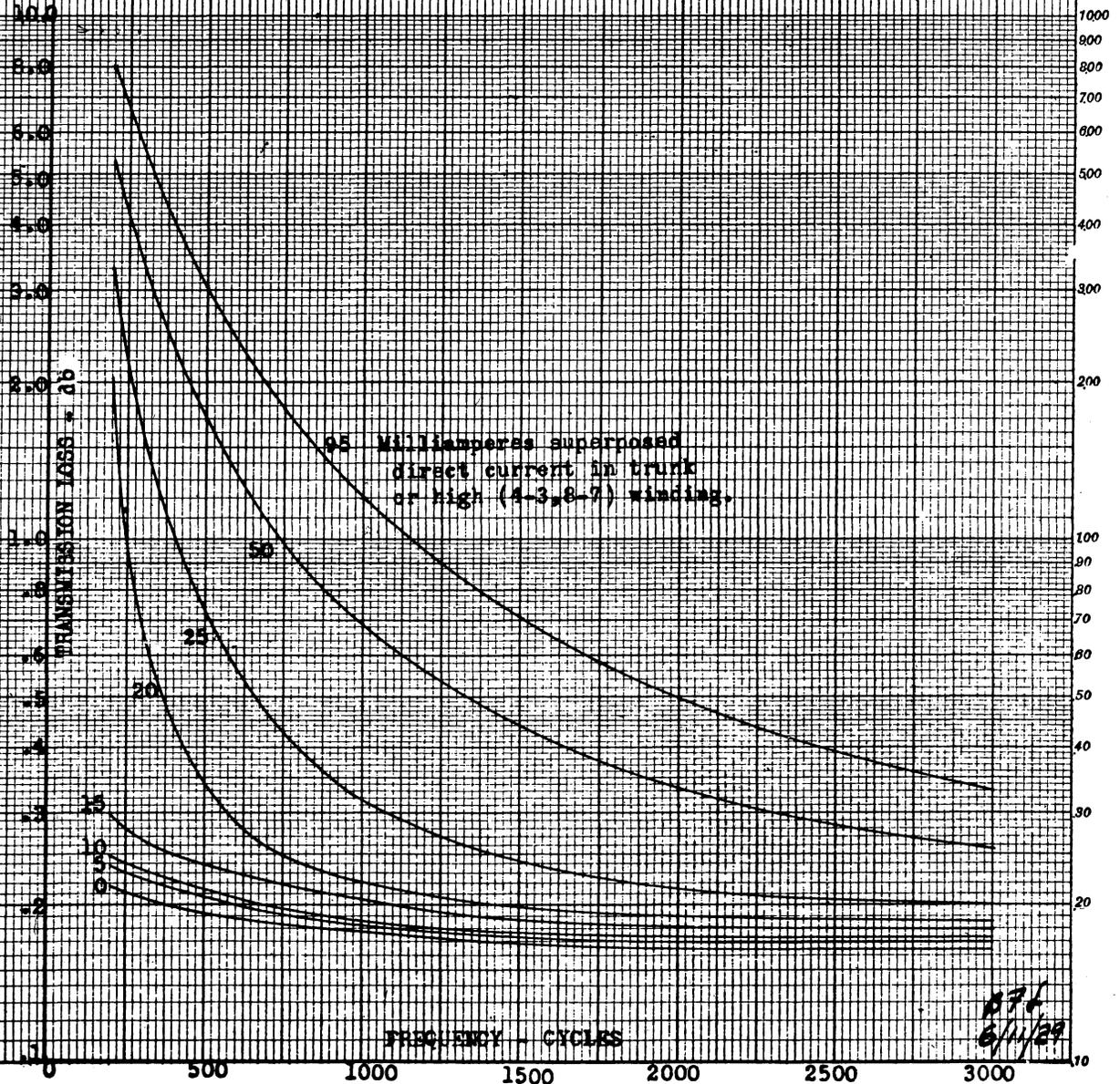
874
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100-A REPEATING COILS

EFFECTS OF SUPERPOSED D-C. SATURATION ON THE
TRANSMISSION FREQUENCY CHARACTERISTICS OF A TYPICAL COIL

The transmission losses given are the transmission losses for the coil when used between 1500 and 600 ohms, these being respectively representative impedances for high-impedance toll switching trunks and low-impedance toll offices.

$$\text{Turns Ratio} = (4-3, 8-7) : (2-1, 6-5) = 1.58:1$$



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