

120C, D, E, F, G, H, J, K AND L

REPEATING COILS

<u>CONTENTS</u>	<u>PAGE</u>	<u>New Coils</u> <u>Coils Now Used</u>	<u>Use</u>
1. GENERAL	1		
2. FIELD OF USE	1	62-A*	Also for terminating the phantom circuits of phantom group trunks at subscriber offices and at toll offices when non-repeated and composite signaling is used. In this use it serves also as battery supply repeating coil in phantom circuit at the subscriber office.
3. TRANSMISSION CHARACTERISTICS	2		
4. IMPEDANCE RATIOS, D-C RESISTANCE AND WINDING CHARACTERISTICS	3		
5. SIGNALING FEATURES	3		
<u>1. GENERAL</u>			
1.01 This section gives information pertaining to the low loss 120-type repeating coils. It combines the information given in Issue 1 of this section with similar information regarding a new series of these coils which have recently been developed for use as phantom deriving coils at the local central office end and the toll office end of non-repeated phantom group trunks interconnecting such offices and employing composite d-c signaling.		120-D 94-F# 62-B*	For inequality ratio coils in same circuits as 120-C.
The coils will replace for new work certain previous standard coils in those types of exchange area and phantom group toll tributary and toll connecting trunks in which it is desirable to reduce the losses. The present type coils as indicated below are described in Sections AB22.275, AB22.276 and AB23.326.		120-E D-79982*	For 3-wire and 4-wire trunks and similar services, where the repeating coil is used simultaneously as a battery supply and a toll office terminating coil.
		D-79981* D-79982* 108-Aφ	Also for low impedance recording-completing and 2-wire types of toll switching trunks at toll office end.
		94-E# 86-G* 62-A* 62-C*	Also for terminating the phantom circuits of phantom group trunks at subscriber offices and at toll offices when non-repeated and composite signaling is used. In this use it serves also as battery supply repeating coil in the phantom circuit at subscriber office.
<u>2. FIELD OF USE</u>			
2.01 As transmission studies have shown the new coils to be economical for the various uses given below, these new coils will be furnished in all cases on new work as soon as manufacturing conditions permit.		120-F D-85655* D-85078* 108-Bφ	For high impedance recording-completing and 2-wire types of toll switching trunks at toll office end.
		120-G -	Dual ratio coil in the proposed crossbar switch concentration arrangements of two-wire types of recording-completing trunks at the toll office. This coil will also be shown on trunk circuits, optional with the 120-E and 120-F coils and may be specified where the outside plant loading is such that savings in spare trunk equipments will result from its use.
		120-C 94-E#	For unity ratio coils used in toll grade battery supply circuits or for signaling purposes in toll connecting trunks, centralized intercept trunks, special service trunks, and delayed call completing trunks to centralized D.S.A., tandem incoming trunks, central D.S.B. trunk auxiliaries on toll connecting and tandem completing trunks, D.S.A. switchboard cords and trunks between Community Dial Offices and Dial Offices and Master Offices employing toll grade battery.

New Coils
Coils Now Used

Use

- 120-H D-90508* For terminating side circuits of phantom group trunks at subscriber offices and at toll offices when non-repeated and composite signaling is used. In the subscriber office use it serves also as battery supply repeating coil in the side circuits.
- 100-B*
- 62-F*
- 120-J D-90508* For terminating side circuits of phantom group trunks at subscriber offices when non-repeated and composite signaling is used. In this use it serves also as a battery supply repeating coil.
- 100-B*
- 120-K D-90951* For terminating side circuits of phantom group trunks at subscriber offices and toll offices when non-repeated and composite signaling is used. In the subscriber office use it serves also as battery supply repeating coil in the side circuits.
- 100-A*
- 62-C*
- 120-L 62-E* For terminating side circuits of phantom group trunks at toll offices when non-repeated and composite signaling is used.

Notes: # Partially replaced for new work.
* Entirely replaced for new work.
Ø Replaced when stocks are exhausted.

The field of use of these repeating coils when used as phantom deriving coils is summarized in the table below:

Table

Type of Facility	Toll Office Coils		Local Office Coils	
	Side Circuit	Phantom Circuit	Side Circuit	Phantom Circuit
H-172-63 Cable	120-L	120-E	120-J	120-C
H-88-50 Cable	120-K	120-C	120-H	120-E
B-88-50 Cable	120-L	120-E	120-J	120-C
N.L. Open Wire Line	120-H	120-D	120-K	120-E

2.02 The new practices summarized in the above table for the local subscriber office end of phantom group trunks to toll offices will also be applicable to the local central office ends of non-repeated phantom group trunks to tandem offices assuming composite d-c signaling is used and when the tandem office impedance is about 900 ohms.

The repeating coil practices at the local tandem office on such trunks will depend upon the office impedance of the tandem office. When this is equal to toll office impedance (600 ohms), the practices given in the above table under toll office will also apply at the tandem office assuming windings 2-1, 6-5 on the office side and 4-3, 8-7 on the line side.

For the higher impedance tandem offices (1500 ohms, for example), it is expected to extend the application of the 120-type repeating coils to the different combinations of line and office impedances.

2.03 For existing situations it may possibly be found economical to replace existing coils, provided this will allow economies to be made in connection with trunk rearrangements. This can, of course, be determined by studying individual cases and comparing the cost of the changes with the savings to be effected.

3. TRANSMISSION CHARACTERISTICS

3.01 Toll Office Terminating Coils - Two-Wire Trunks from Local Offices: The losses of the new repeating coils (120-E, 120-F and 120-G) when used at the toll office end of two-wire types of toll connecting trunks are small, but vary slightly depending on the service impedance conditions. The following loss which is representative of important limiting service conditions may be used.

Coil Code Number	Effective Loss
120-E	0 db
120-F	0.1 db
120-G (1.5 to 1 Impedance ratio)	0 db
120-G (2.5 to 1 Impedance ratio)	0.1 db

This figure includes both the repeating coil and the associated midpoint 4 mf. condensers. The low losses are partly due to the effect of the coil in providing shunt loading for the associated circuits.

The effective transmission loss figures given below indicate the magnitude of the superiority of the 120-E and 120-F repeating coils relative to the older designs:

Trunk Impedance	Type of Trunk	Type of Coils	Effective Transmission Improvement -
			120-Type Coil
Low	Recording-Completing	120-E vs. D-79981 (or D-79982)	0.3 db
High	Recording-Completing	120-F vs. D-85655 (or D-85078)	0.2 db
Low	Toll Switching	120-E vs. 108-A	0.2 db
High	Toll Switching	120-F vs. 108-B	0.1 db
Low)	Recording-Completing	120-G (vs. 120-E)	0 db
High)		120-G (vs. 120-F)	0 db

3.02 Toll Office Terminating Coils - Non-Repeated, Phantom Trunks from Local Offices: The effective transmission loss figures given below indicate the magnitude of the superiority of the 120-C, D, E, H, J, K and L repeating coils relative to the older designs which are superseded for these specific services.

Type Facilities	Type of Coils	Effective Transmission Improvement - 120-Type Coil
H-172-63 Cable	(1) (2)	
Side Circuits (1550)	120L(2.5:1) vs. 62E(2.66:1)	0.25 db
Phantom (750)	120E(1.5:1) vs. 62A(1:1)	0.25 db
H-88-50 Cable		
Side Circuits (1120)	120K(1.5:1) vs. 62C(1.62:1)	0.25 db
Phantom (670)	120C(1:1) vs. 62A(1:1)	0.25 db
B-88-50 Cable		
Side Circuits (1560)	120L(2.5:1) vs. 62E(2.66:1)	0.25 db
Phantom (930)	120E(1.5:1) vs. 62C(1.62:1)	0.25 db
Open-Wire		
Side Circuits (600)	120H(1:1) vs. 62F(1:1.28)	0.25 db
Phantom (400)	120D(1:1.5) vs. 62B(1:1.62)	0.25 db

- Notes: 1. Numbers in parentheses adjacent to circuit designations indicate approximate nominal impedance values of trunks.
 2. The coil ratios given in parentheses adjacent to code number are the line-to-office winding impedance ratios.

3.03 Repeating Coils for Toll Grade Battery Supply and Signaling Purposes at Intermediate Points. The effective transmission improvements afforded by the 120-C, D, E, H, J and K repeating coils as compared with the coils which they replace are as follows:

Coil Code No.	Impedance Ratio		Expected Average D-C Resistance-Ohms		Balanced Windings	Battery Supply Windings
	Windings 2-1, 6-5	to Windings 4-3, 8-7	Windings 2-1, 6-5 (each)	Windings 4-3, 8-7 (each)		
120-C	1	to 1	7.8	5.5	None	4-3, 8-7
120-D	1.5	to 1	12.7	5.5	"	4-3, 8-7
120-E	1	to 1.5	5.0	5.5	"	4-3, 8-7
120-F	1	to 2.5	2.5	8.1	"	None
120-H	1	to 1	7.8	5.5	(2-1, 6-5 and 4-3, 8-7)	4-3, 8-7
120-J	1.5	to 1	12.7	5.5	2-1, 6-5	4-3, 8-7
120-K	1	to 1.5	5.0	5.5	(2-1, 6-5 and 4-3, 8-7)	4-3, 8-7
120-L	1	to 2.5	2.5	8.1	4-3, 8-7	None
	<u>Trunk to Office Windings</u>		<u>Trunk Windings (each)</u>		<u>Office Windings (each)</u>	
120-G*	1.5	to 1	4L-3,8-7L 6.0	2-1,6-5 2.5	None	None
	2.5	to 1	4H-3,8-7H 8.1	2-1,6-5 2.5		

Note: * The 120-G repeating coil being a dual ratio coil requires a total of 10 terminals. The designation scheme is generally consistent with the standard arrangement used for the coils listed above except additional symbols have been provided to identify the "tip" and "ring" terminals of the trunk windings of the coils as indicated.

5. SIGNALING FEATURES

5.01 The 120-C, D, E, F, G, H, J, K and L repeating coils are "non-ring through" at 20-cycles, to prevent false signals from being transmitted to a subscriber over a

Types of Coils	Effective $\frac{T+R}{2}$ Improvement		Used at Intermediate Points
	Used in Battery Supply Circuits ST Sets	Used in Battery Supply Circuits AST Sets	
120-C vs. 94-E	.25 db	.35 db	.25 db
120-D vs. 94-F	.25 db	.35 db	.25 db
120-E vs. D-79982	.35 db	.45 db	.35 db
120-H or J vs. D-90508 or 100-B	.25 db	.35 db	-
120-K vs. D-90951 or 100-A	.35 db	.45 db	-

These improvements when the 120-type coils are used as subscriber battery supply coils may be taken into account by subtracting .25 db in the case of sidetone sets, or .35 db in the case of anti-sidetone sets, from the sum of the loop loss (Section AB43.075 and AB43.076) plus the local central office loss (Section AB43.275) applicable to a coil of the same ratio in the case of the 120-C, D, H or J coils, but applicable to a 1:1 ratio coil in the loop loss curves in the case of the 120-E or K coils. For 120-type coils used at intermediate points the values in the last column of the above table may be subtracted from the losses at present allowed for the designated older type coils under the same conditions.

4. IMPEDANCE RATIOS, D-C RESISTANCE AND WINDING CHARACTERISTICS

4.01 Data regarding the nominal impedance ratios, expected average d-c resistance and winding characteristics of the 120 series coils are given below:

Coil connecting trunk equipped with these coils when a distant operator rings on a connected toll line. In this respect they have a lower efficiency for the transmission of 20-cycle signaling current than the older type coils they replace.