120CS, DS, ES, FS, GS, HS, JS, KS AND LS

REPEATING COILS

1. GENERAL

Because of the shortage of nickel for use in permalloy core material, the 120C, D, E, F, G, H, J, K and L repeating coils have been rated "Manufacture Discontinued" and are superseded respectively by the 120CS, DS, ES, FS, GS, HS, JS, KS and LS repeating coils having silicon steel cores. The new 120S-type coils are bifilar wound and are similar in impedance ratio, mutual inductance and mechanical features to the coils which they supersede; but have higher d-c resistances and leakage inductances, and consequently, somewhat higher transmission losses. The structure of these new repeating coils is the same as that of the 94-type and the transmission characteristics of the 120CS (1 to 1 ratio) and 120DS (1.5 to 1 ratio) repeating coils respectively, are practically the same as those of the 94E and 94F coils. Whenever the optional use of the 120S and 94-type coils appear on the circuit drawings, the latter type may now be specified as there are no transmission advantages to be gained by the use of the former and the 94-type coils are cheaper.

2. FIELD OF USE

The 120CS, DS, ES, FS, GS, HS, JS, KS and LS repeating coils will be used in all existing circuits in which the former types of coils referred to above are now used, even though not at present specifically so indicated on the circuit and equipment drawings. Personnel is not available for making these changes on existing drawings except at such times as revisions are necessary for other reasons. On new drawings, however, the new coils will be specified and on these drawings and drawings otherwise revised, the new transmission test requirements also will be indicated.

In the field of use of the 120-type (phantom deriving) repeating coils on phantom group trunks as summarized in the table in Section AB22.277, (Page 2), the 120E (120ES) is shown for use on the phantom circuit at the local office with N.L. open wire facilities. Occasions may arise where it is desirable to step up the phantom circuit impedance to 900 ohms. In such cases the 120F (120FS) repeating coil may be used (if battery supply is not involved) when the signaling current can be limited to 56 mils or less.

3. TRANSMISSION CHARACTERISTICS

3.1 Toll Office Terminating Coils - 2-Wire Trunks from Local Offices

When the 120ES, FS and GS coils are used at the toll office end of 2-wire toll connecting trunks, in place of the 120E, F and G coils, the effective loss of the circuit is increased by about 0.3 db.

3.2 Toll Office Terminating Coils - Nonrepeatered, Phantom Trunks from Local Offices

When the 120HS, JS, KS and LS repeating coils are used in the side circuits of the phantom groups in place of the 120H, J, K and L coils the loss of the circuit is increased by about 0.3 db. For use in the phantom circuits, the 120C, D and E coils are being superseded by the 120CS, 120DS and 120ES coils respectively. These changes increase the effective losses for the phantom circuits by about 0.3 db per coil.

3.3 Toll Grade Battery Supply Repeating Coils

Since the 120CS and DS coils have the same d-c resistance and voice frequency transmission losses as the 94E and F repeating

Coil Code No.	Impedance Ratio Windings 2-1, 6-5	to	Windings 4-3, 8-7	Expected Average D-C Resistance Ohms Windings 2-1, 6-5 (each)	Windings 4-3, 8-7 (each)
120CS or 94E	1	to	1	20	20
120DS or 94F	1.5	to	1	30	20
120ES	1	to	1.5	13.5	21
120FS	1	to	2.5	10	41

	Office to Trunk Windings	Office Windings	(each)	Trunk Windings	(each)
120GS	1 to 1.5	2-1, 6-5	10	4L-3, 8-7L	31
	1 to 2.5	2-1, 6-5	10	4H-3, 8-7H	42

Type and Ratio of Coil		Equivalent Network Impedances A	B	C
120CS, 120HS or 94E	1:1	40 +j 38	40 +j 38	235 +j 3290
120DS, 120JS or 94F	1.5:1	130 +j 970	-10 -j 700	285 +j 4030
120ES or 120KS	1:1.5	-10 -j 460	85 +j 650	190 +j 2680
120FS or 120LS	1:2.5	-70 -j 1050	230 +j 1760	270 +j 2930
120GS	1:1.5	-10 -j 400	95 +j 540	205 +j 2280
	1:2.5	-70 -j 1050	230 +j 1760	270 +j 2930

Note: Superimposed direct currents up to 200 mils will not significantly change the transmission losses of the coils.

coils, in those cases where these coils are used the effective loop losses for panel, manual and step-by-step toll grade connections may be obtained directly from sections in the AB series of Bell System Practices.

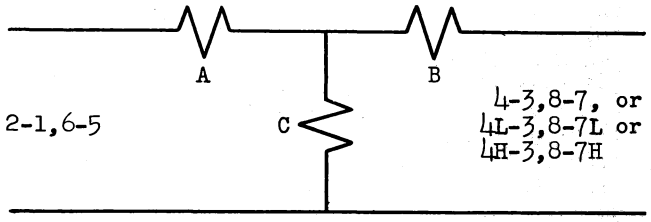
4. IMPEDANCE RATIOS, D-C RESISTANCE AND WINDING CHARACTERISTICS

Data regarding the nominal impedance ratio, expected average d-c resistance and winding characteristics of the 120S-type coils are given in the table on Page 1.

The data given in the table on Page 1 for the 120CS, 120DS, 120ES and FS repeating coils also applies for the 120HS, JS, KS and LS coils respectively. The latter coils also have certain of their windings balanced for phantom deriving use as described in the table on Page 3 of AB22.277 for the 120H, J, K and L coils.

5. EQUIVALENT IMPEDANCES AT 1000 CYCLES

The 1000-cycle impedances of the equivalent T-networks for expected average coils are given in the above table.



6. SIGNALING FEATURES

All the 120S-type repeating coils are "non-ring through" at 20 cycles.

7. TRANSMISSION TEST REQUIREMENTS

Individual apparatus losses for the two types of coils are given in the following table, together with the corrections to be added when the 120-type coils are replaced by those of the 120S series.

For circuits in which the 120S-type replaces the 120-type coils, but for which the drawings have not yet been changed, the maximum allowable values of measured circuit losses should be increased by the same maximum loss corrections.

Individual Apparatus Losses and Corrections
(1000 Cycle Loss Between 600-Ohm Lines)

Discontinued Repeating Coils		Superseding Repeating Coils		
Coil No.	Apparatus Losses	Coil No.	Apparatus Losses	Corrections to be Added to the Circuit Losses
120C or 120H	Max. 0.4	120CS or 120HS	1.1	0.7
	Min. 0.2		0.5	0.3
120D or 120J	Max. 0.7	120DS or 120JS	1.3	0.6
	Min. 0.4		0.8	0.4
120E or 120K	Max. 0.6	120ES or 120KS	1.2	0.6
	Min. 0.3		0.6	0.3
120F or 120L	Max. 1.3	120FS or 120LS	2.0	0.7
	Min. 0.9		1.5	0.6
120G 1:1.5	Max. 0.6	120GS 1:1.5	1.2	0.6
	Min. 0.3		0.6	0.3
120G 1:2.5	Max. 1.3	120GS 1:2.5	2.0	0.7
	Min. 0.9		1.5	0.6