Intermediate Line Irregularity Return Loss

CHANGE IN TYPE OF OPEN WIRE

1.01 The effect of inserting in an open wire circuit a length of a different type of open wire facility can be determined by computing the impedance of the inserted facility terminated in the characteristic impedance of the facility beyond and taking the return loss between this impedance and the characteristic impedance of the circuit in which the insert is made. If the characteristic impedances of the two types of facilities are not widely different the insertion return loss can be determined with sufficient accuracy by adding the term F_y of the following table to the junction return loss between the two facilities.

Length of Inserted Facility in Miles	F_y (db) 300 cycles	1500 or 1600 cycles	2400 or 2500 cycles
10	+13	0	-3
20	+ 7	-4	-5
30	+ 4	-5	0
40	+ 2	-4	+6
50	+ 1	-4	-3
60	0	-4	-4
70	- 1	-3	-3
80	- 1	-3	-3
90	- 2	-3	-2
100	- 2	-2	-2

1.02 More accurate computations may be advisable where the conductor material changes, especially if the insertion return loss has a controlling effect. Insertion of 104 copper-steel, 40 per cent. conductivity, in 104 copper circuits (12 inch spacing) is probably an extreme of the type of mixed materials that may be met to any extent in the toll plant. The insertion return loss for this condition (together with the junction return loss for comparison) is:

		104 Copper-Steel Insert in 104 Copper Insertion Return Loss (db) For the Indicated Length of Insert			
Freq.	Jct. R.L.	5 mi.	10 mi.	20 mi.	40 mi.
300	14	28	22	18	14
500	15	27	21	18	14
1000	18	26	21	17	16
1500	20	26	21	17	20
2000	22	26	21	19	24
2500	24	26	21	21	25
3000	25	26	22	23	24

Small gauge copper and even iron may sometimes be involved. Junction and 5-mile insertion return losses of 134 steel and 80-mil copper in 104-mil 12-inch spaced copper circuits are:

	134-mil Steel		80-mil Copper	
Freq.	Jct.	5 mi. Insertion	Jct.	5 mi. Insertion
300	9	20	18	34
1000	9	13	23	31
2000	11	11	27	30
3000	12	10	29	29