

SECONDARY CONSTANTS OF NON-LOADED CABLE (AT 68° F.)  
16 GAUGE NH, TH

Freq. Cyc./Sec.	Propagation Constant — Per Mile			Characteristic Impedance			
	Attenuation		Phase Shift $\beta$ Radians	r Ohms	x Ohms (Neg.)	Z Ohms	Angle Deg. (Neg.)
	$\alpha$ Nepers	db					
50	.02082	.1808	.02092	1,011	1,002	1,423	44.7
100	.02933	.2547	.02970	718	705	1,006	44.5
200	.04117	.3576	.04231	511	495	712	44.1
300	.05004	.4346	.05222	420	401	581	43.7
500	.06366	.5529	.06841	330	306	451	42.8
1,000	.08681	.7540	.1004	242	209	320	40.7
2,000	.1150	.9992	.1530	185	138	231	36.8
3,000	.1323	1.149	.2011	162	106	193	33.1
5,000	.1525	1.325	.2952	145	74	163	27.1
8,000	.1696	1.473	.4388	133	50	142	20.8
10,000	.1780	1.547	.5365	130	42	136	18.0
15,000	.1937	1.682	.7837	126	30	130	13.5

Note: db =  $\alpha$  x 8.686

**SECONDARY CONSTANTS OF NON-LOADED CABLE (AT 55° F.)  
THROUGH CARRIER FREQUENCIES  
16 GAUGE NH, TH**

Freq. Kc/Sec.	PROPAGATION CONSTANT (PER MILE)					PHASE DELAY Sec./Mi. $\times 10^{-6}$	VELOCITY OF PROPAGATION Mi./Sec. $\times 10^3$
	Attenuation		Phase Shift	Variation* per Degree F.			
	$\alpha$ Nepers	db	$\beta$ Radians	db	Radians		
0.1	.029	0.3	.030			47.15	21.2
0.2	.041	0.4	.042			33.59	29.8
0.5	.064	0.6	.068			21.72	46.0
1	.087	0.8	.100	.0011	.00011	15.94	62.7
2	.115	1.0	.153	.0016	.00013	12.14	82.4
5	.152	1.3	.294	.0024	.00019	9.35	106.9
10	.178	1.5	.532	.0032	.00022	8.47	118.0
15	.194	1.7	.775	.0034	.00025	8.22	121.6
20	.210	1.8	1.02	.0034	.00029	8.11	123.3
50	.298	2.6	2.48	.0030	.00060	7.88	127.0
100	.421	3.7	4.77	.0030	.00120	7.59	131.8
200	.630	5.5	9.19	.0036	**	7.32	136.7
250	.718	6.2	11.4	.0038		7.26	137.8
500	1.09	9.5	22.3	.0053		7.10	141.0
1,000	1.69	14.7	43.7	.0118		6.95	143.9
2,000	2.64	22.9	86.1	.0324		6.85	146.0
4,000	4.17	36.2	170.7	.0924		6.79	147.2
5,000	4.82	41.9	212.6	.1280		6.77	147.7
10,000	7.52	65.3	422.6	.3080		6.73	148.6

Freq. Kc/Sec.	CHARACTERISTIC IMPEDANCE					
	r Ohms	x Ohms (Neg.)	Z Ohms	Angle Degrees (Neg.)	Variation* per Degree F.	
					r Ohms	x Ohms
0.1	713	700	999	44.5		
0.2	508	492	707	44.1		
0.5	329	305	449	42.9		
1	242	208	319	40.7	+.185	-.241
2	185	138	231	36.7	+.113	-.173
5	142	73	160	27.2	+.041	-.115
10	129	42	136	18.0	+.006	-.074
15	126	30	130	13.4	-.005	-.053
20	124	25	126	11.4	-.011	-.039
50	121	13	122	6.1	-.018	-.022
100	117	9	117	4.4	-.018	-.014
200	113	6	113	3.0	**	**
250	112	5	112	2.6		
500	110	4	110	2.1		
1,000	107	3	107	1.6		
2,000	106	2	106	1.1		
4,000	105	1	105	0.5		
5,000	104		104			
10,000	104		104			

\* Average values between 34° and 76° F.

\*\* Due to the importance of the effect of variation of inductance on phase change and impedance at high frequency, and the uncertainty of the variation of inductance with temperature, the phase and impedance variations above 100 kc are not given.