Addendum to the paper

ON THE INVERSION OF THE CAUER-ROUTH MATRIX

BY

W. H. INGRAM

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This note extends the paper to networks with conductively separate but inductively linked parts. The practical problem of power transmission from energy sources in local networks of this kind to energy sinks in other local networks of the same kind via tie-lines is best solved by inversion of the Cauer-Routh matrix discussed in the main portion of the paper, exactly as in the case of a connected nonseparable network if by $[\Pi, K]$ we understand the Veblen-Poincaré incidence matrix $[\bar{\Pi}, \bar{K}]$ with all linearly dependent rows deleted. But a question arises as to the propriety of denoting vertices corresponding to the deleted rows as ground-points when the local networks are far apart. Ground-points in physics are points in the surface of a poorly conducting half-space and there are no handbook formulas for the resistance and other properties of the earth between separated ground-points. Because of its physical properties, the earth is unsuitable for power transmission and because of this and other reasons, tie-lines are always multi-wire—almost always 3-wire.

The graph is a perfectly valid representation of the physical network (1) when we define a *local network* to be one where the ground-points are effectively the same point as when a heavy wire of very low specific resistance is taken for their location and (2) when the system consists of local networks and multi-wire tie-lines connecting them. In both cases an actual connection to earth of the ground-points can have no effect on the problem of calculating the currents which flow in response to sinusoidal isoperiodic e.m.f.s in the branches of the network.

Box 353, Fire Island
New York 11770