1056-05-1731 **Ralucca Gera**, Naval Postgraduate School, **Grady Bullington** (eroh@uwosh.edu), University of Wisconsin Oshkosh, **Linda Eroh*** (eroh@uwosh.edu), University of Wisconsin Oshkosh, 800 Algoma Blvd., Oshkosh, WI 54963, and **Steven J Winters**, University of Wisconsin Oshkosh. *On k-circuit distance in graphs.*

A delivery person must leave a central location, deliver packages at a number of addresses, and return. Naturally, he/she wishes to find the most efficient route. This motivated the definition of $(k-1)$-stop-return distance by Gadzinski, Sanders, and Xiong, now called k-circuit distance. Given a set of k distinct vertices $\mathcal{S} = \{x_1, x_2, \ldots, x_k\}$ in a simple graph G, the k-circuit-distance of set $\mathcal{S}$ is defined to be

$$d_k(\mathcal{S}) = \min_{\theta \in \mathcal{P}(\mathcal{S})} \Big(d(\theta(x_1), \theta(x_2)) + d(\theta(x_2), \theta(x_3)) + \ldots + d(\theta(x_k), \theta(x_1)) \Big),$$

where $\mathcal{P}(\mathcal{S})$ is the set of all permutations from $\mathcal{S}$ onto $\mathcal{S}$. Thus, $d_k(x_1, \ldots, x_k)$ is the length of the shortest circuit through the vertices $\{x_1, \ldots, x_k\}$.

The 2-circuit distance is twice the standard distance between two vertices. We present results about the k-circuit radius, k-circuit diameter, k-circuit center and k-circuit periphery, with particular attention to $k = 3$. We also note some relationships between k-circuit distance and Steiner distance. (Received September 22, 2009)