inserting and removing the digestion tubes. Holes were cut through the masonite and styrofoam for the digestion tubes. Flanges at the tops of the digestion tubes prevented their dropping completely through the digestion-tube rack. The desired water level around the digestion tubes was maintained with the floating rack, even when the water level in the bath was lowered because of evaporation.

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A Further Note on Random Locations for Sample Units in Circular Plots[1]

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Highlight

This note presents radii for sample locations for eight different circular sampling areas with or without center areas restricted from sampling and briefly discusses the use of the system for locating plots, transects, or plants in range and pasture studies.

Random location of samples in field investigations is a costly effort, especially when sampling points need to be relocated repeatedly. Gaiser (1951) proposed a scheme using circular plots and polar coordinates for locating sample positions. He presented a graph for use on .2 acre plots to correct for the fact that polar coordinates converge toward their origin. An equation for calculating radii for a circular sampling system requiring only one marker post for random location of study units was derived in an earlier note (Van Dyne, 1960). This note presents radii for sample locations for eight different circular sampling areas with or without center areas restricted from sampling.

One hundred sampling points each representing an equal area are delineated by an annulus of ten rings of appropriate radii intersected by five diameters at 36° intervals (Figure 1). In investigations not involving grazing animals or in studies where the permanent center marker post or stake will not attract and cause concentration of animals, a center area restricted from sampling is wasteful of space, and the entire sampling area can be utilized (Figure 1A). Contrastingly, in other situations the center of the study area should be restricted from sampling (Figure 1B).

Sampling areas with maximum radii varying from 25 to 200 ft. are described in Table 1. For each sampling area a restricted center is calculated at 0, 10, and 20 percent of the maximum radius. Additionally, the square feet and acres of usable area are given for each annulus of rings. The distances to sampling points representing circular segments of equal area are given to the nearest 0.01 ft., but most linear and area measurements would apply equally well to metric units.

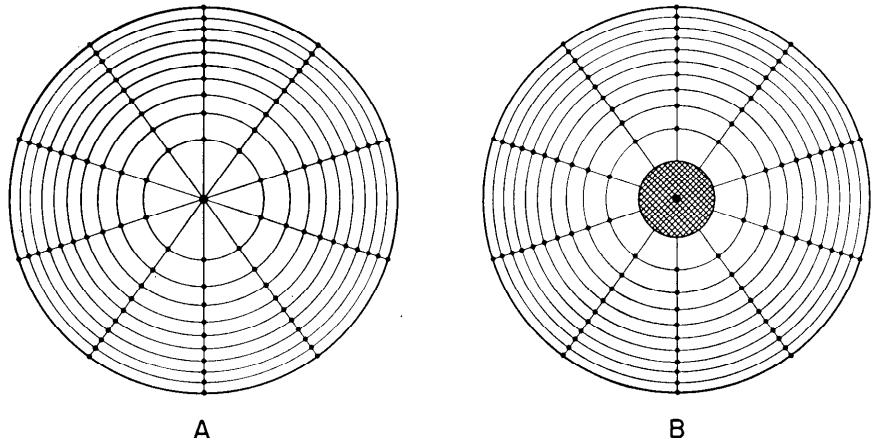
Numbers 0, 1, 2, . . . 9 are used to designate the directions of 0, 36, 72, . . . 324°. Paired numbers are taken from a random numbers table to designate the direction (by the above scheme) and the distance (see Table 1) to a sampling point.

The smaller sampling areas have been especially useful in dense vegetation in pasture and ecological studies in the Southeast. The medium sampling areas were appropriate for investigations on annual and perennial foothill grasslands. The larger sampling areas are useful in studies on salt desert shrubs or other low-growing shrub types wherein distances from the center marker posts may be readily taped.

Relocation of sampling points located by these techniques, and marked by iron pins driven to within less than one inch of the soil surface, has been surprisingly easy even though several years elapsed since original installation and different workers were involved. By fastening the end of his tape to a swivel attached to the center marker post and using a hand compass, one man can easily locate sample points with this method.

Locating sampling points which will not be relocated does not require a compass and tape. By taking an approximate bearing on the desired direction and by pacing in that direction for the desired distance, personal bias in the choice of location of sampling points is eliminated.

This procedure is easier to use than that of Gaiser (1951). His procedure requires: 1) drawing a 3-digit random number in the range of 000 to 359 to give the direction,



A B

FIGURE 1. Sampling areas of equal maximum radius and each providing 100 points representing equal areas. The shaded area in B is restricted from sampling and has a radius 20 percent that of the maximum radius.

[1] *Research sponsored by the U.S. Atomic Energy Commission under contract with Union Carbide Corporation.*

Table 1. Positions for 100 sampling points representing equal areas with maximum radii varying from 25 to 200 ft. and restricted centers of 0, 10, and 20% of the maximum radii.

Radius of Sampling Area	Restricted Center	Distances from center for random numbers										Total Sampling Area	
		0	1	2	3	4	5	6	7	8	9		
ft	% of radius	ft										ft^2	acres
25	0	7.91	11.18	13.69	15.81	17.68	19.36	20.92	22.36	23.72	25.00	1963	.0451
	10	8.25	11.48	13.85	15.93	17.77	19.43	20.96	22.39	23.73	25.00	1944	.0446
	20	9.22	12.04	14.32	16.28	18.03	19.62	21.10	22.47	23.77	25.00	1885	.0433
50	0	15.81	22.36	27.39	31.62	35.36	38.73	41.83	44.72	47.43	50.00	7854	.1803
	10	16.51	22.80	27.70	31.86	35.53	38.86	41.92	44.78	47.46	50.00	7775	.1785
	20	18.44	24.08	28.64	32.56	36.06	39.24	42.19	44.94	47.54	50.00	7540	.1731
75	0	23.72	33.54	41.08	47.43	53.03	58.09	62.75	67.08	71.15	75.00	17671	.4057
	10	24.76	34.21	41.56	47.79	53.30	58.29	62.88	67.17	71.19	75.00	17495	.4016
	20	27.66	36.12	42.95	48.84	54.08	58.86	63.29	67.42	71.31	75.00	16965	.3895
100	0	31.62	44.72	54.77	63.25	70.71	77.46	83.67	89.44	94.87	100.00	31416	.7212
	10	33.02	45.61	55.41	63.72	71.06	77.72	83.85	89.55	94.92	100.00	31102	.7140
	20	36.88	48.17	57.27	65.12	72.11	78.49	84.38	89.89	95.08	100.00	30159	.6924
125	0	39.53	55.90	68.47	79.06	88.39	96.82	104.58	111.80	118.59	125.00	49087	1.1269
	10	41.27	57.01	69.26	79.65	88.83	97.15	104.81	111.94	118.65	125.00	48596	1.1156
	20	46.10	60.21	71.59	81.39	90.14	98.11	105.48	112.36	118.85	125.00	47124	1.0818
150	0	47.43	67.08	82.16	94.87	106.07	116.19	125.50	134.16	142.30	150.00	70686	1.6227
	10	49.52	68.41	83.11	95.58	106.60	116.58	125.77	134.33	142.38	150.00	69979	1.6065
	20	55.32	72.25	85.91	97.67	108.17	117.73	126.57	134.83	142.62	150.00	67858	1.5578
175	0	55.34	78.26	95.85	110.68	123.74	135.55	146.42	156.52	166.02	175.00	96211	2.2087
	10	57.78	79.81	96.96	111.51	124.36	136.01	146.73	156.72	166.11	175.00	95249	2.1866
	20	64.54	84.29	100.22	113.95	126.19	137.35	147.67	157.31	166.39	175.00	92363	2.1204
200	0	63.25	89.44	109.54	126.49	141.42	154.92	167.33	178.89	189.74	200.00	125664	2.8848
	10	66.03	91.21	110.82	127.44	142.13	155.43	167.69	179.11	189.84	200.00	124407	2.8560
	20	73.76	96.33	114.54	130.23	144.22	156.97	168.76	179.78	190.16	200.00	120637	2.7694

2) drawing a 2-digit random number (or larger) to give the uncorrected distance, and 3) adjusting the distance by use of the graph correcting for convergence of polar coordinates. Separate graphs are required for each plot size and the procedure does not easily allow for restriction from sampling of plot centers. Conversely, my procedure provides for only 100 sample locations as compared to a much larger number provided for by Gaiser's method. For practical field and statistical purposes, however, 100 possible locations are sufficient.

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AIBS STYLE MANUAL FOR BIOLOGICAL JOURNALS

Just one year ago the Journal of Range Management announced publication of the new Style Manual for Biological Journals, 2nd edition, 1964; 117 p., see J. Range Manage. 17:162, 1964. The book may be purchased for $3.00 from the American Institute of Biological Sciences, at its new address: 3900 Wisconsin Ave., NW., Washington, D. C. 20016

Every contributor and editor preparing material for the Journal should have a copy of this excellent writing aid. More and more, it will be used as authority for form and style in the Journal, as indicated in the revised Information for Authors, page 108 of the March, 1965 issue of the Journal. Here are a few quotes from the introductory pages of the Style Manual:

"Learn to write effectively. . . . especially to readers, you owe accurate, clear, concise writing. You also owe brevity to the publishing journal, since costs are high and competition for space is keen. . . .

"Lead the reader from a clear statement of your subject and purpose, through the procedures and data, on to conclusions. . . .

"The introduction should open with a succinct statement of the subject, should orient the report in its field, and should explain the purpose. . . .

"Use words with precision, clarity and economy. Every sentence should be exact and as simple as possible. Economy and accuracy require using the straightforward English sentence with all parts showing: subject, verb, and object. . . .

"When you finish your first draft, study each sentence to see whether you can shorten or even omit it."

More tips on writing and rules for form and style from the Manual will be printed in future issues of the Journal.