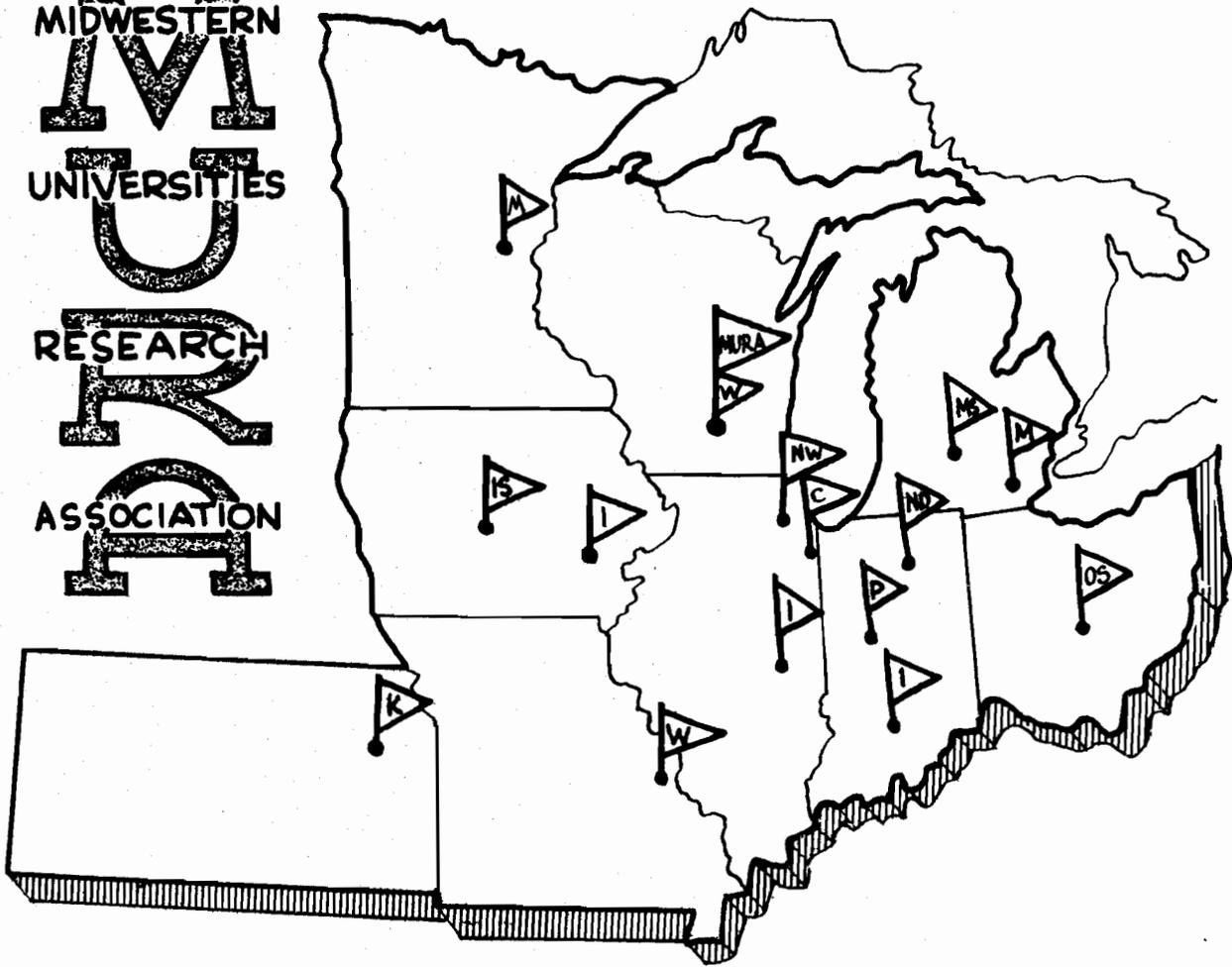


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REPORT JOYBUCKETS
(Program 32)
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JOYBUCKETS (Program 32)

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Description:

JOYBUCKETS computes the integral

$$I(\phi, \phi_0, \gamma) = \int_{\phi_0}^{\phi} \frac{\sin \phi d\phi}{[\cos \phi - \cos \phi_0 + \gamma(\phi - \phi_0)]^{1/2}}$$

which appears in formula (84) of MURA-106, for the increment in W suffered by particles subject to a modulated radio-frequency voltage.

Normal Operation:

In normal operation (SS1, SS2, SS3, SS4, SS5 down), JOYBUCKETS computes and prints a set of tables of I vs ϕ for values of γ between .1 and 2 in .1 increments. For each value of γ , tables are computed for values of ϕ_0 between $-\pi$ and $.9\pi$ in $.1\pi$ increments. For each γ, ϕ_0 , a table of values of I is printed for values of ϕ from ϕ_0 to 8π in $.1\pi$ increments and thence to 15.5π in $.5\pi$ increments. Finally the limit of I for $\phi \rightarrow \infty$ is printed. For those values of γ, ϕ_0, ϕ for which the argument of the square root in the integrand becomes negative a special line is printed (see format) and the computation proceeds to the next initial values of γ and ϕ_0 . For values of I outside the range $I \leq 4096$, a special line is printed (see format).

Special Starting Values:

To print a table beginning with any other starting values of γ, ϕ_0, ϕ enter these in the first three appropriate lines of the agendum sheet* and check SS1 up. ϕ_0 will be increased by $.1\pi$ increments up to $\leq .9\pi$ for each value of γ and γ will be increased by .1 increments up to ≤ 2 .

Listed Initial Values:

To print tables of I vs ϕ for a specified set of initial values or a set which will be incremented differently from the normal increments (.1 or $.1\pi$), list these on the agendum sheet* and check SS1 & 2 up. With SS2 up, γ, ϕ are not incremented; computation proceeds to next initial value card, and stops when all specified values have been tabulated.

Abbreviated Print Out:

Print out occurs only for ϕ values which are multiples of $.5\pi$ if SS4 up is checked.

Print out occurs only to specify initial values and at $\phi = 15.5\pi$ (the complete integral), in the case where only the end point need be examined. Also the limit from $15.5\pi \rightarrow \infty$ will be printed. Check SS5 up.

*Note that SS3 up must be checked if any ϕ_0 is not a multiple of $.1\pi$. (This will cause ϕ to be printed on even multiples of $.1\pi$ while ϕ_0 will still be incremented by $.1\pi$ steps from the specified initial value, if SS2 is down.)

Print Out Format:

F signifies that the numbers are fractions of the form 0000. xxxxxxxx with an accuracy of + 3 in the 11th figure.

$\frac{F}{F}$	00000	$\frac{I}{0}$	$\frac{\phi/\pi}{\phi_0/\pi}$	$\frac{\gamma}{\gamma}$	$\frac{\phi_0}{\phi_0}$ (initial values
F	i	I	ϕ/π		(ith entry in
F	print #	I ($\phi \rightarrow \infty$)	0015. 5		I Table)
					final value of I
F	00222	0	ϕ/π		integrand imaginary at ϕ
F	00111	0	ϕ/π		integrand imaginary at ϕ_0
F	00333	0	ϕ/π		I outside range $I \leq 4096$