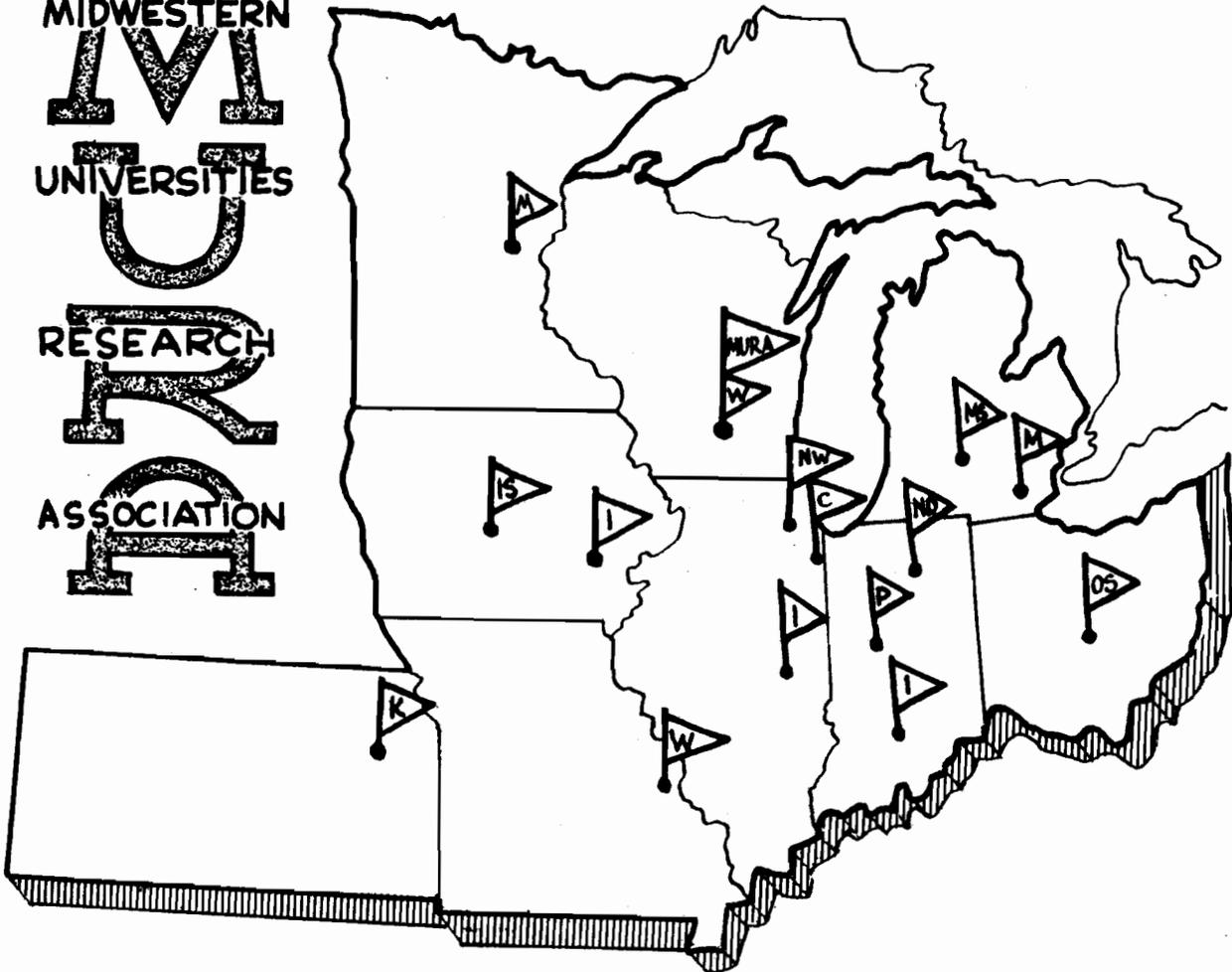




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REPORT DUCNALL
Program 219
November, 1958

NUMBER 438

Computer Program
Internal

DUCNALL
(Program 219)

J. F. McNall

This program arose from a memorandum of 23 October 1958, L. Jackson Laslett to M. Storm. It allows for a FORANAL-type analysis of selected output values of DUCK ANSWER or INVARIANT DUCK BUMPS.

DUCNALL agendum sheets are to be stapled to the front of DUCK ANSWER or INVARIANT DUCK BUMPS agendum sheets. All features of the above-mentioned programs are preserved. Additional output will be of the same format as FORANAL output.

Any of the following parameters may be selected for analysis: p_p , p_ψ , ρ , ψ . A sample agendum sheet is attached. Parameters not entered will be treated as zeroes initially, and will be retained from run to run in a series.

Restrictions:

The number of harmonics, M , is limited to 256. This imposes a restriction on DUCNALL agendum, and also on DUCK ANSWER or INVARIANT DUCK BUMPS because it is required that $N_e/N_p \leq 512$.

The analysis is done only on the results of a run, Case I of FORANAL. An agendum sheet of the FORANAL type is not required. FORANAL-type normalization is accomplished by use of a data word.

DUCNALL AGENDUM (Program 219)

(To be attached by staples to the front of a series of DUCK ANSWER or INVARIANT DUCK BUMPS runs which are to have a Fourier analysis run on some of the output results.)

(Sense switches and output formats are just as in DUCK ANSWER and INVARIANT DUCK BUMPS.)

All quantities are integers and go among INTEGER DATA.

Parameter	Address	Value	Remarks
$M_{p\rho}$	58		If = 0, analysis not run = 1, analysis run with $\frac{N_e}{2N}$ as number of harmonics = other integer, taken as number of harmonics If = 1 normalized.
$M_{p\psi}$	59		
M_ρ	60		
M_ψ	61		
Norm	62		

Me morandum: DUCNALA (Program 219A)

This memorandum is to be used in conjunction with report #438, DUCNALL (Program 219), and shall be appended thereto. Program 219A replaces program 219.

DUCNALA agendum sheets replace those of DUCNALL.

In addition to the features of DUCNALL, DUCNALA allows the user to select one or two pairs of parameters which will be multiplied and then analyzed as in FORANAL.

The products are specified by a data word consisting of XX00YY where XX and YY are the addresses of the parameters desired and may be equal (for squaring). The number of harmonics will be taken as that specified by the previous data.

The user may select whether to do each analysis or only the products.

J. McNall

MEMORANDUM

TO: Computer Users

FROM: J. F. McNall - November 23, 1959

SUBJECT: Addition to DUCK ANSWER

DUCK ANSWER, INVARIANT DUCK BUMPS, and DUCNALA (programs 75, 77, 219) have been modified so that the user may cause a new R_i to be calculated if he so desires:

$$R_i = S_i + A_i \cos (m_1 2 \tau + \alpha_i \pi) + B_i \cos (m_2 4 \tau + \beta_i \pi) \\ + C_i \cos (m_3 6 \tau + \gamma_i \pi) + D_i \cos (m_4 8 \tau + \delta_i \pi)$$

where $D_i \equiv \Gamma_i$

If all of the above m's are equal to zero, then the normal DUCK ANSWER is run. If any of these parameters is non-zero, then R_i is computed as above. If some of the m's are equal to zero, they will be set equal to one by the program.

This addition in no way changes the normal operation of DUCK ANSWER.

An agenda sheet is available for this addition and should be used in conjunction with the normal DUCK ANSWER agendum.

m_1, m_2, m_3, m_4 are printed as a separate line of fractions following the line which prints only δ . The δ_i are printed on the same line as $\alpha_i, \beta_i,$ and γ_i .