

Polski

April 1, 1960

MEMORANDUM : To 1401 File

SUBJECT: Multiply/Divide Option for 1401 and ARS

REFERENCE: Mr. W. P. Hanf's Letter dated March 30, 1960.

At a meeting attended by Messrs. S. Bepalko, T. M. Mc Adon and R. M. Smith, it was determined and agreed that the following rules and limitations are desirable and/or necessary to attach the subject option with the previously discussed changes in the format.

Multiply Op.

1. The units positions of the multiplicand field (AAA) and the product field (BBB) will be specified in the instruction.
2. The length of the B field must be equal in length to the (Multiplier + Multiplicand + 1) with the multiplier field located in the high order positions of the field.

Product	0	0	6	9	3	4	5	B Field
Multiplier	WM	2	0	1				B' Field
Multiplicand				WM	3	4	5	A Field

3. The A and B Auxiliary MARs will be set during the first A and B cycles of the operation.
4. A and B MARs will be set to the units position of the adjacent field to the left of the specified fields, at the end of the operation.

Multiplier:

1. A WM must appear in the high order position of the multiplier only and will be used to terminate the multiply operation. WM's in the product field (other than the multiplier field) will be ignored.
2. A one digit multiplier will be permissible.

All four forms of sign designation can be present in the units

position. At the completion of the operation a sign will be inserted in the units position of the product only. All other zone information will be removed.

4. All positions in the B field up to but not including the units position of the multiplier will be cleared and replaced by zeros at the start of the operation.
5. Special characters 8-7, 8-6, 8-5, 8-4 8-3 will have the 8's stripped off and recognized as 7, 6, 5, 4, and 3.

Divide Op:

1. The units position of the divisor (AAA) and the high order position of the dividend (BBB) will be specified in the instruction.
2. The A and B Auxiliary MARs will be set during the first A and B cycles of the operation.
3. The length of the B field must be equal to the lengths of the (Divisor + Dividend + 1) with the Dividend located in the lower order positions of the B field

	Units Position									
Quotient	0	0	3	4	5	0	0	0	0	B Field
Dividend	0	0	0	0	8	9	3	4	5	B' Field
Divisor							WM			A Field
							2	0	1	

4. The units position of the Quotient will be located at (Divisor + 1) positions from the units position of the B field. (See above example)

Divisor:

1. A WM must appear in the high order position of the A field.
2. All four forms of sign designation can appear in the units position of the field. Zone bits in other positions will be ignored and regenerated.
3. One digit divisors are permissible.

Dividend:

1. WM's are ignored and regenerated in the B field.
2. A 'B' bit must be located in the units position of the dividend only and will be regenerated. "B" bits in other positions of the dividend will cause the divide operation to end.

3. Zone bits will appear in the units position of the Quotient at the completion of the operation: All other zone bits in the Quotient field will be removed.
4. The high order position of the B field should be preset with a zero. Any numerical data in this position will be retained and added to the quotient generated. A carry generated by adding to the digit in this position will cause an overflow. If no carry is generated then an incorrect quotient will be produced with no external indication to the programmer.
5. If the magnitude of the high order positions of the B field, including the highest order position of the dividend, is greater than 10 times the divisor, an Overflow will be generated.

Dividend	0	3	1	4	$\frac{1}{8}$
Divisor				WM	2

6. Division by zero will generate an Overflow.

Comments on the subject matter would be appreciated by and should be forwarded to the participants of the fore-mentioned meeting. A meeting of interested people copied on this memo will be planned in the very near future.

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