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MATHEMATICAL PHYSICS LABORATORY.

Report No. NS t 54

Date 23.8.55

Reference

Order No.

Telephone:—Stafford 700.

Front Sheet.

Data Sheet 1.

Figure Sheet S6/10155.

DEUCE Subroutine No. 61 (E01)

Report by

N.P.L.

SUMMARY.

The attached document contains details of a DEUCE Subroutine which has been prepared and tested by N.P.L.

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MATHEMATICAL PHYSICS LABORATORY.

NW

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NS t 54

Sheet No.: 1.

Description. Second order subroutine, using Chebyshev series to compute a logarithm to 30 b.p.

Data. x to 29 b.p. ( $1 \leq x \leq 2$ )

Result.  $c = \log_e x$  to 30 b.p.

Uses. A re-coded version of MO4/1 (No. 64) having entry in 2<sub>7</sub>. This subroutine is punched into the cards, with a shift of 3.

Instructions for Use.

|                    |    |    |      |      |                 |    |
|--------------------|----|----|------|------|-----------------|----|
| Stores Used.       | 13 | 14 | 15   | 16   | 20 <sub>2</sub> | 21 |
| Contents at Entry. | x  | -  | Link | -    | -               | -  |
| Contents at Exit.  | c  | -  | -    | 4x-6 | -               | -  |

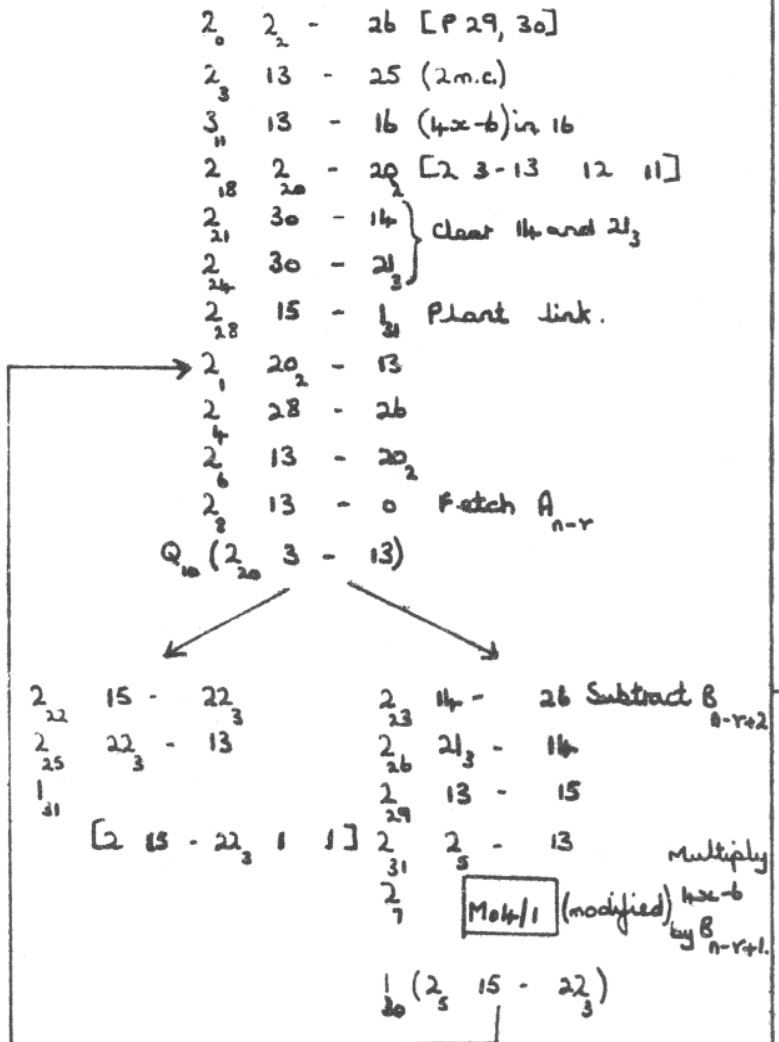
Entry. m.c. 0

Occupies. 2, 3<sub>11-23</sub> (including space for MO4/1 (No. 64), which is in 2<sub>7</sub>, 9-17, 19, 27, 30 and has entry in 2<sub>7</sub>, and including 3<sub>12-23</sub> as storage for coefficients).

Constants available. P29 P30 in 2<sub>2</sub>. P.1 in 3<sub>23</sub>.

|                      |     |     |     |     |     |     |   |                         |
|----------------------|-----|-----|-----|-----|-----|-----|---|-------------------------|
| <u>Coefficients.</u> | 10, | 12, | 19, | 15, | 1,  | 12, | 0 | in 3 <sub>12</sub> etc. |
|                      | 24, | 12, | 6,  | 12, | 31, | 10, | 0 |                         |
|                      | 23, | 25, | 12, | 27, | 1,  | 31, | 3 |                         |
|                      | 24, | 20, | 10, | 14, | 3,  | 0,  | 0 |                         |
|                      | 21, | 21, | 25, | 17, | 31, | 31, | 3 |                         |
|                      | 17, | 11, | 30, | 1,  | 0,  | 0,  | 0 |                         |
|                      | 22, | 2,  | 23, | 31, | 31, | 31, | 3 |                         |
|                      | 30, | 9,  | 1,  | 0,  | 0,  | 0,  | 0 |                         |
|                      | 22, | 25, | 31, | 31, | 31, | 31, | 3 |                         |
|                      | 31, | 0,  | 0,  | 0,  | 0,  | 0,  | 0 |                         |
|                      | 28, | 31, | 31, | 31, | 31, | 31, | 3 |                         |
|                      | 1,  | 0,  | 0,  | 0,  | 0,  | 0,  | 0 |                         |

| D.L. 2                             |    | Track   |    |     |   |    |   |
|------------------------------------|----|---------|----|-----|---|----|---|
| Card Nos.                          |    |         |    |     |   |    |   |
| mc                                 | MS | S       | D  | C   | W | T  |   |
|                                    |    |         |    |     |   |    | Y |
|                                    |    |         |    |     |   |    | X |
|                                    |    |         |    |     |   |    | 0 |
|                                    |    |         |    |     |   |    | 1 |
| 0                                  | 2  | 2       | 26 | 0   |   | 1  | 2 |
| 1                                  | 2  | 20      | 13 | 1   |   | 1  | 3 |
| 2                                  |    | P29, 30 |    |     |   |    | 4 |
| 3                                  | 3  | 13      | 25 | 0   |   | 6  | 5 |
| 4                                  | 2  | 28      | 26 | 0   |   | 0  | 6 |
| 5                                  | 2  | 15      | 22 | 1   |   | 1  | 7 |
| 6                                  | 2  | 13      | 20 | 0   |   | 0  | 8 |
| 7                                  |    | Moth/I  |    |     |   |    | 9 |
| 8                                  | 0  | 13      | 0  | 0   |   | 0  | Y |
| 9                                  |    |         |    |     |   |    | X |
| 10                                 |    |         |    |     |   |    | 0 |
| 11                                 |    |         |    |     |   |    | 1 |
| 12                                 |    |         |    |     |   |    | 2 |
| 13                                 |    |         |    |     |   |    | 3 |
| 14                                 |    |         |    |     |   |    | 4 |
| 15                                 |    |         |    |     |   |    | 5 |
| 16                                 |    |         |    |     |   |    | 6 |
| 17                                 |    |         |    |     |   |    | 7 |
| 18                                 | 2  | 2       | 20 | 0   |   | 1  | 8 |
| 19                                 |    | Moth/I  |    |     |   |    | 9 |
| 20                                 | 2  | 3       | 13 | 12  |   | 11 | Y |
| 21                                 | 2  | 30      | 14 | 0   |   | 1  | X |
| 22                                 | 2  | 15      | 22 | 1   |   | 1  | 0 |
| 23                                 | 2  | 14      | 26 | 0   |   | 1  | 1 |
| 24                                 | 2  | 30      | 21 | 1   |   | 2  | 2 |
| 25                                 | 1  | 22      | 13 | 0   |   | 4  | 3 |
| 26                                 | 2  | 21      | 14 | 1   |   | 1  | 4 |
| 27                                 |    | Moth/I  |    |     |   |    | 5 |
| 28                                 | 2  | 15      | 1  | 1   |   | 3  | 6 |
| 29                                 | 2  | 13      | 15 | 0   |   | 0  | 7 |
| 30                                 |    | Moth/I  |    |     |   |    | 8 |
| 31                                 | 2  | 2       | 13 | 4   |   | 6  | 9 |
| 3 <sub>11</sub> is 2 <sub>18</sub> |    | 13 - 16 |    | = 5 |   |    |   |



N.B. There is one instruction in D.L.3.

Flow Diagram AND Coding for SUBROUTINE no.61 (E01) logarithm to base e.

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