APPROVED BY
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IDENTIFICATION

Six Column Integer Print, MU PRI2

L. D. Fosdick - January 21, 1957

Midwestern Universities Research Association, Madison, Wisconsin

PURPOSE

To print, via the 716 on-line printer, the six fixed point integers I_0, $I_1, \ldots, I_5$ located in the memory at B, B + 1, . . . , B + 5 in six columns on one line.

RESTRICTIONS

The MURA PRINTER BOARD 1 is required. See attached sheet for wiring diagram.

METHOD

Accuracy: Exact

Range: $-(2^{35} - 1) \leq I \leq 2^{35} - 1$

USAGE

Calling Sequence:

UA SAP		MURASS	
Loc.	Instruction	Loc.	Instruction
α	TSX PRI2, 4	α	BTSX A 4
$\alpha + 1$	HTR B	$\alpha + 1$	BHTR B
$\alpha + 2$	return	$\alpha + 2$	return

where the integers to be printed are in locations B, B + 1, . . . , B + 5. The integers are printed as 11 digit decimal numbers with sign if negative and without sign if positive. The integers are printed, in order, from left to right in six columns on one line. The decimal point is not printed and is assumed to be located immediately to the right of the least significant digit of the integer. At the leftmost end of the line the letter I appears to indicate that the numbers printed are integers.

Space Required:

	UA SAP	MURASS
68 words program at:	PRI2	A
19 words temporary at:	COMMON	T

CODING INFORMATION

Timing: 507.4 ms. is the average time if the printer is not in motion upon entry. The printer will be kept running at full speed (150 lines per minute) if the time between exit and successive entry to this program does not exceed 114.6 ms.

```
        REM PRI2 MURA SIX COLUMN INTEGER PRINT                          MU  PRI2
PRI2    SXD COMMON,1      SAVE IR1                                      PRI2  0001
        SXD COMMON+1,2    SAVE IR2                                      PRI2  0002
        SXD COMMON+2,4    SAVEIR4                                       PRI2  0003
        CLS PRI2+21                                                     PRI2  0004
        ADD 1,4           FORM INTEGER CALL ADDRESS                     PRI2  0005
        STA PRI2+9        PLANT INTEGER CALL ADDRESS                    PRI2  0006
        STA PRI2+20       PLANT INTEGER CALL ADDRESS                    PRI2  0007
        WPR               SELECT PRINTER                                PRI2  0008
        LXA PRI2+21,1     SET IR1 EQUAL TO 6                            PRI2  0009
        CLA 0,1           INTEGER INTO AC, ADDRESS PLANTED              PRI2  0010
        TPL PRI2+12       TRANSFER IF INTEGER +                         PRI2  0011
        PSE 247,1         PULSE EXIT HUB FOR -                          PRI2  0012
        TIX PRI2+9,1,1    LOOP, OUT AFTER 6 PASSES                      PRI2  0013
        PSE 248           PULSE EXIT HUB 8 FOR I                        PRI2  0014
        PXD 11            CLEAR AC                                      PRI2  0015
        LXA PRI2+14,1     SET IR1 EQUAL TO 11                           PRI2  0016
        STO COMMON+19,1   CLEAR NUMBER BANK                             PRI2  0017
        TIX PRI2+16,1,1   LOOP OUT AFTER 11 PASSES                      PRI2  0018
        LXA PRI2+21,2     SET IR2 EQUAL TO 6                            PRI2  0019
        LXA PRI2+4,4      SET IR4 EQUAL TO 1                            PRI2  0020
        LDQ 0,2           INTEGER IN MQ, ADDRESS PLANTED                PRI2  0021
        PXD 6             CLEAR AC                                      PRI2  0022
        DVP PRI2+66       DIVIDE BY 10                                  PRI2  0023
        ALS 29,1          POSITION REMAINDER                            PRI2  0024
        ORS COMMON+19,4   REMAINDER TO NUMBER BANK                      PRI2  0025
        TXI PRI2+26,4,1   STEP IR4 BY +1                                PRI2  0026
        TXL PRI2+21,4,11  LOOP OUT AFTER 11 PASSES                      PRI2  0027
        TXI PRI2+28,1,4   STEP IR1 BY +4                                PRI2  0028
        TIX PRI2+19,2,1   LOOP, OUT AFTER 6 PASSES                      PRI2  0029
        CAL PRI2+65       T EQUAL TO 10 INTO AC                         PRI2  0030
        ACL PRI2+64       REPLACE T BY T-1                              PRI2  0031
        SLW COMMON+3      STORE T (FIXED)                               PRI2  0032
        SLW COMMON+4      STORE T (SHIFTING)                            PRI2  0033
        CAL PRI2+64       EXTRACTOR INTO AC                             PRI2  0034
        SLW COMMON+5      STORE EXTRACTOR                               PRI2  0035
        LXA PRI2+21,1     SET IR1 EQUAL TO 6                            PRI2  0036
        LXA PRI2+67,2     SET IR2 EQUAL TO 3                            PRI2  0037
        LXA PRI2+63,4     SET IR4 EQUAL TO 2                            PRI2  0038
        CAL COMMON+6,4    CALL IN T AND EXTRACTOR                       PRI2  0039
        ARS 4             AND SHIFT RIGHT 4 PLACES                      PRI2  0040
        SLW COMMON+6,4    FOR NEXT COLUMN                               PRI2  0041
        TIX PRI2+38,4,1   LOOP, OUT AFTER 2 PASSES                      PRI2  0042
        LXA PRI2+14,4     SET IR4 EQUAL TO 11                           PRI2  0043
        CAL COMMON+19,4   DIGIT INTO AC                                 PRI2  0044
        ANA COMMON+5      EXTRACT DIGIT                                 PRI2  0045
        CAS COMMON+4      COMPARE WITH T                                PRI2  0046
        TRA PRI2+48       FORM 0 IMAGE BIT FOR DIGIT GREATER THAN T     PRI2  0047
        CLA PRI2+48       FORM 1 IMAGE BIT FOR DIGIT EQUAL TO T         PRI2  0048
        LRS 1             FORM 0 IMAGE BIT FOR DIGIT LESS THAN T        PRI2  0049
        TIX PRI2+43,4,1   LOOP, OUT AFTER 11 PASSES                     PRI2  0050
        TNX PRI2+54,1,1   TRANSFER AFTER ALL COLUMNS PROCESSED          PRI2  0051
        TIX PRI2+37,2,1   LOOP, OUT AFTER 3 PASSES                      PRI2  0052
        STQ COMMON+6      STORE LEFT IMAGE                              PRI2  0053
```

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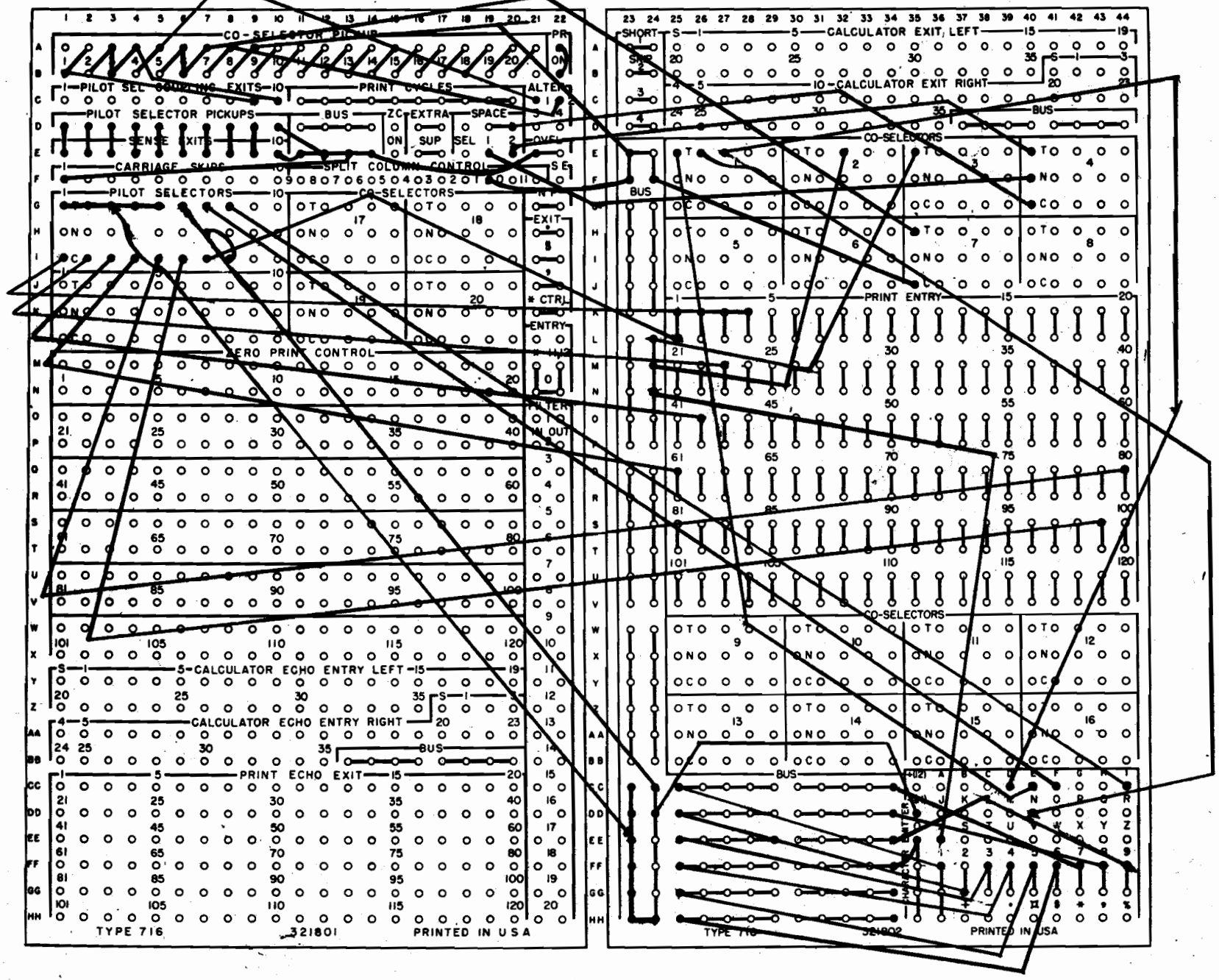
TRA PRI2+36       RETURN FOR RIGHT IMAGE                          PRI2  0054
STO COMMON+7      STORE RIGHT IMAGE                               PRI2  0055
CPY COMMON+6      COPY LEFT IMAGE                                 PRI2  0056
CPY COMMON+7      COPY RIGHT IMAGE                                PRI2  0057
CAL COMMON+3      T INTO AC.                                      PRI2  0058
ANA PRI2+64       CLEAN OFF T                                     PRI2  0059
TNZ PRI2+30       TRANSFER IF T NOT EQUAL TO ZERO                 PRI2  0060
LXD COMMON,1      RESTORE IR1                                     PRI2  0061
LXD COMMON+1,2    RESTORE IR2                                     PRI2  0062
LXD COMMON+2,4    RESTORE IR4                                     PRI2  0063
TRA 2,4           EXIT                                            PRI2  0064
OCT 740000000000  CONSTANT, EXTRACTOR                             PRI2  0065
OCT 500000000000  CONSTANT, T EQUAL TO 10                         PRI2  0066
HTR 10            CONSTANT FOR INTEGER CONVERSION                 PRI2  0067
HTR 3                                                             PRI2  0068
```

Form 24-6127-0

TYPE 716 PRINTER



MURA PRINTER BOARD

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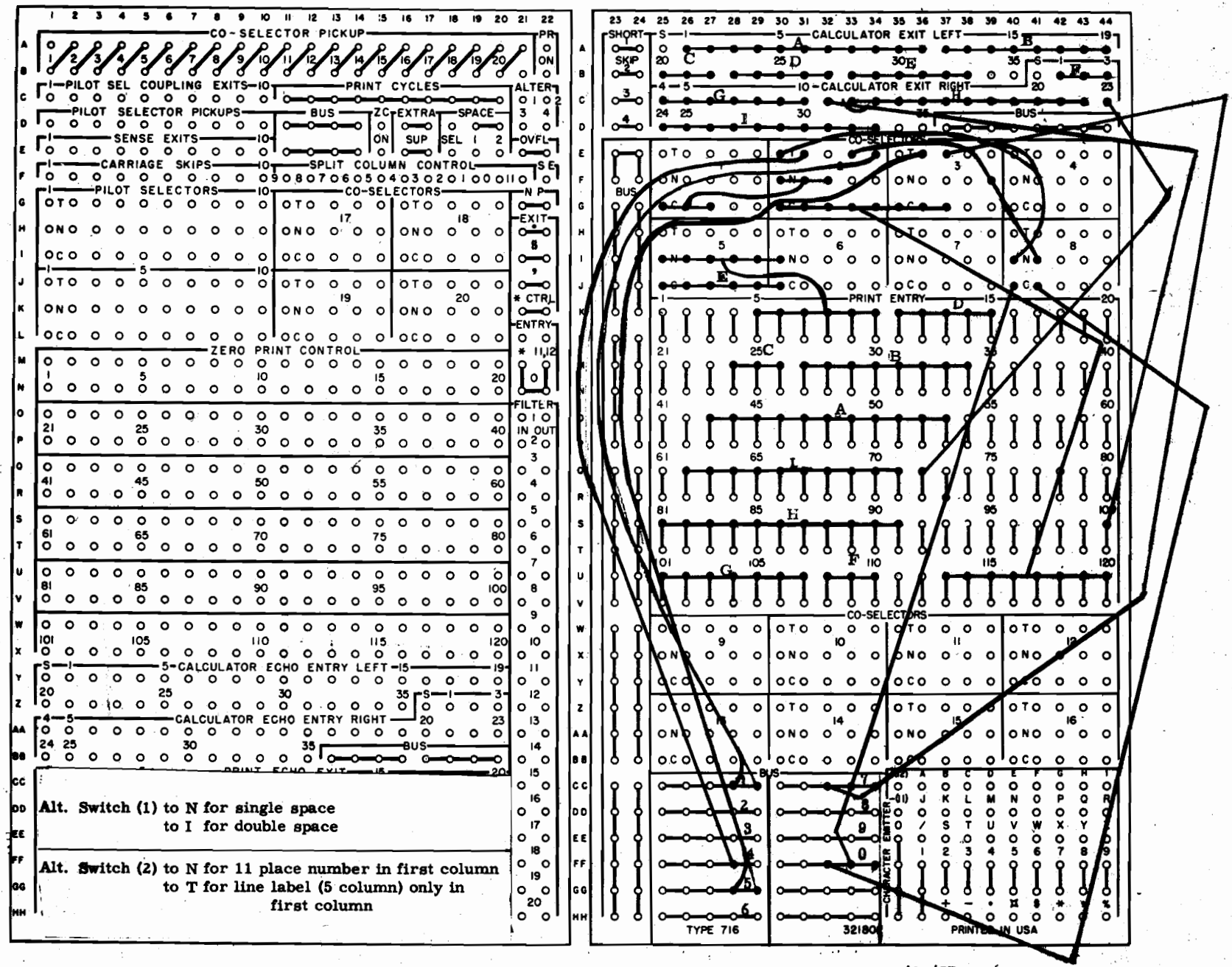

EXAMPLE DATE 04/01/57