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MURA-536

IDENTIFICATION

READ DATA CARDS, MU RCD2
704 SAP or FORTRAN Program

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PURPOSE

To read numbers and loading addresses from cards and store the numbers in floating point configuration in locations specified by the loading addresses.

METHOD

MURCD2 reads cards until either an end-of-file condition exists, or a card is read which contains blanks in columns 1 and 2, but at least one punch in columns 3-72 (e.g., the words END DATA in columns 65-72 and blanks in columns 1-64).

An end-of-file condition causes MURCD2 to return control to the main program at which time MURCD2 assumes that all data for a program have been read, and allows the program to process that data.

One END DATA card (one in which columns 1 and 2 are blank and at least one column of 3-72 contains a punch) also causes MURCD2 to return control to the main program. A second END DATA card, following immediately after the first, results in a stop on an HPR instruction indicating that the data processing is complete. If the START button is pressed, MURCD2 will continue reading cards and searching for a first END DATA card. A series of runs is possible, but each block of data must be followed by the particular card of the END DATA type. A stop therefore can occur only when two successive END DATA cards are read.

Completely blank cards are normally ignored. An exception occurs when a blank card is read immediately after an END DATA card. This blank card is treated as a second END DATA card, causing a stop. The START button causes continuation as above.

If columns 1 or 2 of a card contains a punch, it is treated as a data card (see DATA CARD FORMAT below). MURCD2 converts the values read into floating point numbers and stores them into locations of an array, where the locations are specified by the loading addresses on the cards, and the array is specified by the SAP or FORTRAN CALLING SEQUENCE (see below). Conversion and storage continues as the columns are deciphered (from left to right on the card) until two blank columns are encountered in succession. MURCD2 then attempts to read the next card.

Since two successive blank columns signify the end of information for MURCD2, those columns following the two blanks can be used for comments (e.g., parameter name, card number, etc.).

If an illegally punched card (e.g., letters or symbols in columns meant to contain numeric information) is read, MURCD2 considers the erroneous column to contain a number equal to the first row punch encountered from bottom to top. (Only the 12-punch for a plus sign and the 11-punch for a minus sign are considered legal by MURCD2.) After processing the illegal card in this manner, MURCD2 prints the entire card image (columns 1-72) on the line printer. Either the MURA 2, SHARE 1, or SHARE 2 printer boards will suffice for this printout. The ingenious user might use this feature to print a submitter's name with the initial conditions of a production program.

DATA CARD FORMAT

At least one loading address and one value must be punched per data card. If more than one value is desired on a card, each value must be preceded by its own loading address (sequential loading addresses are no exception to this rule).

Starting in column one or two (column one may be left blank if desired), a loading address of from one to four digits is punched. Loading addresses must not be signed. A blank column follows this or any other loading address on a card. MURCD2 recognizes the blank as separating an address from a value. Next a value, consisting of a factor followed by an exponent, is punched. The value can be preceded by a plus or minus sign. If not signed, it is considered positive. A decimal point must precede or be contained within the factor part of the value, unless it is understood to follow the rightmost digit. The factor may not contain more than 8 digits. Exponents may be omitted if zero. If not, they must be signed, with no space between a factor and exponent. Exponents may not contain more than 2 digits.

If more than one value is desired on a card, each loading address must be separated from the previous value by a comma or a comma and a blank. As many addresses and values may be punched as will fit into columns 1-70 (two successive blanks are required to indicate the end of data on a card).

EXAMPLE:

```
1234 -567.89012+23, 4 567,8 9-1, 2 3 COMMENTS
```

SAP CALLING SEQUENCE

Location	Instruction
α	TSX RCD2, 4
$\alpha + 1$	HTR LWA
$\alpha + 2$	return

LWA is the highest ordered location (last word address) of a block of core storage into which MURCD2 is to store the values read. The loading addresses refer to this block in descending order of locations; so that for a loading address n, a value is stored at LWA + 1 - n. A loading address of zero is illegal, causing no storage.

FORTRAN CALLING SEQUENCE

MURCD2 is available on the FORTRAN II system tape at this installation. It is executed by means of the statement

CALL MURCD2 (X)

in the main program. X is an array of locations to receive the values. A value with a loading address I is stored at location X(I). A loading address I = 0 is illegal, causing no storage. In the main program, X must have a dimension at least as large as the largest loading address to be encountered.

CODING INFORMATION

If used as a SAP routine, MURCD2 requires 206 words program space and 34 words temporary at COMMON.

If used as a FORTRAN routine, MURCD2 requires 206 words program space and 45 words temporary.

AGENDUM SHEETS

A standard MURA/FORTRAN agendum sheet has been designed and is available at this installation for FORTRAN users of MURCD2. See attachment.

MURA/ FORTRAN AGENDUM

PROGRAM NO. ______ **SUBMITTER** ____________

Instructions:

1. **Enter program number and submitter's name above.**
2. **Enter address and value below for parameters desired.**
3. **Enter sense switch settings:** ______ ______ ______ ______ ______ ______

Notes:

1. **Decimal points may be omitted only if understood to follow the rightmost digit.**
2. **Addresses may not contain more than 4 digits.**
3. **Factors may not contain more than 8 digits.**
4. **Exponents may not contain more than 2 digits.**
5. **Exponents may be omitted if zero. If not, they must be signed.**

Address	Value		Address	Value		Address	Value	
							END DATA	

```
        REM RCD2 MURA/FORTRAN READ DATA CARDS                          MU  RCD2
RCD2    SXD IX1,1              SAVE IRS                                RCD2  0001
        SXD IX2,2                                                      RCD2  0002
        SXD IX4,4                                                      RCD2  0003
        CAL 1,4                PLANT LOC OF ARRAY                      RCD2  0004
        ADD H1                                                         RCD2  0005
        STA STORE                                                      RCD2  0006
RCD     LXA H10,1              CLEAR ALL INDICATORS                    RCD2  0007
        STZ COMMON+34,1                                                RCD2  0008
        TIX *-1,1,1                                                    RCD2  0009
        RCD                    READ A CARD                             RCD2  0010
        LXD D24,7                                                      RCD2  0011
CPY     CPY COMMON+24,1                                                RCD2  0012
IX1     TXI *+2,0,**                                                   RCD2  0013
IX2     TXI OUT,0,**           END OF FILE                             RCD2  0014
        TIX CPY,1,1                                                    RCD2  0015
        LXD D24,1                                                      RCD2  0016
        CAL COMMON+24,1        TEST FOR BLANK CARD                     RCD2  0017
        TNZ NBLNK                                                      RCD2  0018
        TIX *-2,1,1                                                    RCD2  0019
        CLS BBX                                                        RCD2  0020
        TMI RCD                IGNORE BLANK CARD                       RCD2  0021
HPR     HPR                    BLANK AFTER BBX=STOP                    RCD2  0022
        STO BBX                CLEAR BBX INDICATOR                     RCD2  0023
IX4     TXI RCD,0,**           READ ANOTHER CARD                       RCD2  0024
NBLNK   CAL COMMON+24,2        TEST FOR BBX CARD                       RCD2  0025
        ANA TNX                BITS 1 AND 2                            RCD2  0026
        TNZ NBBX                                                       RCD2  0027
        TIX *-3,2,2                                                    RCD2  0028
        CLS BBX                                                        RCD2  0029
        TPL HPR                STOP IF SECOND BBX CARD                 RCD2  0030
        STO BBX                SET INDICATOR FOR NEXT TIME             RCD2  0031
D24     TXI OUT,0,24                                                   RCD2  0032
NBBX    STZ BBX                                                        RCD2  0033
        LXA TNX,1              0=ADDRESS GETTER                        RCD2  0034
SET     SXD LOR,4              SET UP IMAGE LEFT OR RIGHT              RCD2  0035
        LXD D37,4                                                      RCD2  0036
LOOK    TNX SET,4,1            LOOK AT A COLUMN                        RCD2  0037
        LXD D24,2                                                      RCD2  0038
LOR     TIX *+1,2,**                                                   RCD2  0039
AGAN    LDQ COMMON+24,2                                                RCD2  0040
        RQL 36,4                                                       RCD2  0041
        TQP TIX2                                                       RCD2  0042
        STZ BLNK2              NOT BLANK COLUMN                        RCD2  0043
        TXH B,2,4              BRANCH IF 0-9                           RCD2  0044
        TXH A,1,1              BRANCH IF EXP                           RCD2  0045
        TXL A,1,0              BRANCH IF ADDR                          RCD2  0046
        CLA SIND                                                       RCD2  0047
        TMI EXCON              BRANCH IF EXP SIGN                      RCD2  0048
        TXL LOOK,2,2           NEXT COLUMN IF +                        RCD2  0049
        CLS FRACT              SET FRACTION MINUS                      RCD2  0050
        STO FRACT                                                      RCD2  0051
D37     TXI LOOK,0,37                                                  RCD2  0052
        STQ BAD                SET BAD ON                              RCD2  0053
        TRA LOOK                                                       RCD2  0054
B       TXH D,2,22             CHECK FOR COMMA                         RCD2  0055
        TXL D,2,20                                                     RCD2  0056
        LDQ COMMON+34,2                                                RCD2  0057
        RQL 36,4                                                       RCD2  0058
        TQP D                                                          RCD2  0059
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        LDQ COMMON+40,2                                         RCD2  0060
        RQL 36,4                                                RCD2  0061
        TQP C                                                   RCD2  0062
        TRA FPCON           YES COMMA                           RCD2  0063
        TXL D,1,0           BRANCH IF ADDRESS                   RCD2  0064
        TXH F,1,1           BRANCH IF EXP                       RCD2  0065
        LDQ COMMON+44,2     CHECK FOR PERIOD                    RCD2  0066
        RQL 36,4                                                RCD2  0067
        TQP E                                                   RCD2  0068
        CLS *               YES PERIOD                          RCD2  0069
        STO DECPT                                               RCD2  0070
        TRA LOOK                                                RCD2  0071
D       TXH E,1,0           BRANCH IF NOT ADDRESS               RCD2  0072
        CLS *                                                   RCD2  0073
        STO BLNK1                                               RCD2  0074
        TRA F                                                   RCD2  0075
E       TXH F,1,1           BRANCH IF EXP                       RCD2  0076
        CLS *                                                   RCD2  0077
        STO SIND                                                RCD2  0078
        CAL DIV             ADD ONE TO DIV                      RCD2  0079
        ADD H1                                                  RCD2  0080
        STA DIV                                                 RCD2  0081
        CLA DECPT                                               RCD2  0082
        TMI F               BRANCH IF PERIOD BEFORE             RCD2  0083
        CAL EXPA            ADD ONE TO EXPA                     RCD2  0084
        ADD H1                                                  RCD2  0085
        STA EXPA                                                RCD2  0086
F       LDQ NUMB,1          MULTIPLY NUMBER BY TEN              RCD2  0087
        MPY H10                                                 RCD2  0088
        STQ NUMB,1                                              RCD2  0089
        TXI *+1,2,-5        ADD THIS TO NUMBER                  RCD2  0090
        PXD 0,2                                                 RCD2  0091
        ARS 19                                                  RCD2  0092
        ACL NUMB,1                                              RCD2  0093
        SLW NUMB,1                                              RCD2  0094
        TXI *+1,2,3         CHECK FOR ANYTHING ELSE             RCD2  0095
        LDQ COMMON+24,2                                         RCD2  0096
        RQL 36,4                                                RCD2  0097
        TQP *+2                                                 RCD2  0098
        STO BAD                                                 RCD2  0099
        TIX *-4,2,2                                             RCD2  0100
        TRA LOOK                                                RCD2  0101
TIX2    TIX AGAN,2,2                                            RCD2  0102
        TXH SBLNK,1,0       MUST BE BLANK COLUMN                RCD2  0103
        CLS BLNK2           TEST FOR SECOND BLANK               RCD2  0104
        TPL BDTST                                               RCD2  0105
        STO BLNK2                                               RCD2  0106
        CLS BLNK1                                               RCD2  0107
        TPL TXILK                                               RCD2  0108
        STO BLNK1                                               RCD2  0109
        TRA LOOK                                                RCD2  0110
EXCON   TXL TXILK,2,2       SET EXPONENT SIGN                   RCD2  0111
        CLS EXP                                                 RCD2  0112
        STO EXP                                                 RCD2  0113
XILK    TXI LOOK,1,1                                            RCD2  0114
 BLNK   CLS *               SET BLNK2 ON                        RCD2  0115
        STO BLNK2                                               RCD2  0116
FPCON   CLA FRACT           FLOATING POINT CONVERSION           RCD2  0117
        SSP                                                     RCD2  0118
        TZE STORE-2         BYPASS IF NUMBER IS ZERO            RCD2  0119
        CLA EXP             ADD EXPA TO EXP                     RCD2  0120
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      ADD EXPA                                                          RCD2  0121
      STO EXP                                                           RCD2  0122
      LXA DIV,1            DIVIDE FRACT BY 10 TO THE DIV                RCD2  0123
      LDQ DIV                                                           RCD2  0124
      MPY H3                                                            RCD2  0125
      LLS 35                                                            RCD2  0126
      STA *+3                                                           RCD2  0127
      LDQ FRACT                                                         RCD2  0128
      MPY BBX,1                                                         RCD2  0129
      LRS **                                                            RCD2  0130
      STQ FRACT                                                         RCD2  0131
      LDQ EXP              FORM (EXP)(LN10/LN2)                         RCD2  0132
      MPY LNLN                                                          RCD2  0133
      LLS 2                                                             RCD2  0134
      ALS 27                                                            RCD2  0135
      STO EXP                                                           RCD2  0136
      MPR LN               FORM R*LN2/4                                 RCD2  0137
      LRS 2                                                             RCD2  0138
      STO EKS                                                           RCD2  0139
      STZ JAY                                                           RCD2  0140
      STZ SUM                                                           RCD2  0141
      CLA SXNTH            1/16                                         RCD2  0142
EE    STO TEA                                                           RCD2  0143
      ADD SUM                                                           RCD2  0144
      STO SUM              (1/16)(E**X)                                 RCD2  0145
      CLA JAY                                                           RCD2  0146
      ADD H1               1                                            RCD2  0147
      STO JAY                                                           RCD2  0148
      PXD 0,0              CLEAR AC                                     RCD2  0149
      LDQ TEA                                                           RCD2  0150
      LLS 2                4T                                           RCD2  0151
      DVP JAY              4T/J                                         RCD2  0152
      MPR EKS              (X/4)(4T/J)                                  RCD2  0153
      TNZ EE               BRANCH UNTIL CONVERGES                       RCD2  0154
      LDQ SUM                                                           RCD2  0155
      MPY FRACT                                                         RCD2  0156
      SSP                                                               RCD2  0157
      LRS 6                                                             RCD2  0158
      ADD TIX              FLOAT NUMBER                                 RCD2  0159
      ADD EXP                                                           RCD2  0160
      FAD ZERO             NORMALIZE IT                                 RCD2  0161
      STO EXP                                                           RCD2  0162
      ADD H1                                                            RCD2  0163
      ANA MASK                                                          RCD2  0164
      TZE *+2                                                           RCD2  0165
      CLA H1                                                            RCD2  0166
      ADD EXP                                                           RCD2  0167
      LDQ FRACT                                                         RCD2  0168
      LLS 0                SIGN TO NUMBER                               RCD2  0169
      LXA ADDR,1                                                        RCD2  0170
      TXL CLEAR,1,0                                                     RCD2  0171
STORE STO **,1                                                          RCD2  0172
CLEAR LXD D9,1             CLEAR INDICATORS                             RCD2  0173
      STZ COMMON+34,1                                                   RCD2  0174
      TIX *-1,1,1                                                       RCD2  0175
      TXI LOOK,1,-1                                                     RCD2  0176
RDTST CLA BAD              CHECK FOR BAD CARD                           RCD2  0177
      TPL RCD                                                           RCD2  0178
      WPR                  BAD CARD=PRINT IT                            RCD2  0179
      LXD D24,1                                                         RCD2  0180
      CPY COMMON+24,1                                                   RCD2  0181
```

```
        TIX *-1,1,1                                                     RCD2  0182
D9      TXI RCD,0,9                                                     RCD2  0183
OUT     LXD IX1,1           RESTORE IRS                                 RCD2  0184
        LXD IX2,2                                                       RCD2  0185
        LXD IX4,4                                                       RCD2  0186
        TRA 2,4             EXIT                                        RCD2  0187
        OCT 052746167043    2**24/100,000,000                           RCD2  0188
        OCT 065537624654    2**21/10,000,000                            RCD2  0189
        OCT 103067572027    2**18/1,000,000                             RCD2  0190
        OCT 123705530434    2**15/100,000                               RCD2  0191
        OCT 150667056544    2**12/10,000                                RCD2  0192
        OCT 203044672274    2**9/1,000                                  RCD2  0193
        OCT 243656050754    2**6/100                                    RCD2  0194
        OCT 314631463146    2**3/10                                     RCD2  0195
BBX     HTR **                                                          RCD2  0196
H1      HTR 1                                                           RCD2  0197
H3      HTR 3                                                           RCD2  0198
H10     HTR 10                                                          RCD2  0199
TNX     TNX 0,0,0                                                       RCD2  0200
LNLN    OCT 324464741140    (LN10/LN2)/4                                RCD2  0201
LN      OCT 261344137677    LN2                                         RCD2  0202
SXNTH   PZE 0,0,8192        1/16                                        RCD2  0203
TIX     TIX 0,0,1024                                                    RCD2  0204
ZERO    HTR 0                                                           RCD2  0205
MASK    OCT 000777777777                                                RCD2  0206
BLNK2   SYN COMMON+24                                                   RCD2  0207
BAD     SYN COMMON+25                                                   RCD2  0208
SIND    SYN COMMON+26                                                   RCD2  0209
BLNK1   SYN COMMON+27                                                   RCD2  0210
DECPT   SYN COMMON+28                                                   RCD2  0211
DIV     SYN COMMON+29                                                   RCD2  0212
EXPA    SYN COMMON+30                                                   RCD2  0213
EXP     SYN COMMON+31                                                   RCD2  0214
FRACT   SYN COMMON+32                                                   RCD2  0215
ADDR    SYN COMMON+33                                                   RCD2  0216
NUMB    SYN ADDR                                                        RCD2  0217
EKS     SYN SIND                                                        RCD2  0218
JAY     SYN DECPT                                                       RCD2  0219
SUM     SYN DIV                                                         RCD2  0220
TEA     SYN EXPA                                                        RCD2  0221
        END RCD2                                                        RCD2  0222
```