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DECUS NO.	8-272
TITLE	IOPACK - A MESSAGE AND NUMBER I-O UTILITY PACKAGE
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SOURCE LANGUAGE	MACRO-8

IOPACK

DECUS Program Library Write-up DECUS No. 8-272

ABSTRACT

IOPACK is one page long and contains: MESAGE for printing messages; OCTIN and DECIN for inputting unsigned octal or decimal numbers; OCTOUT and DECOUT for outputting unsigned octal or decimal numbers.

REQUIREMENTS

Family-of-eight computer with teletype.

Storage

200_8 locations.

USAGE

MESAGE is called using a JMS with the address of a Macro-8 produced text string contained in the AC. This routine uses a % to produce a carriage-return and a # to produce a line-feed. The return is made to the location following the call to MESAGE with the AC and LINK set to zero. Note: the text does not follow the call to MESAGE.

OCTIN, DECIN are called using a JMS. The user is to enter either an octal or decimal number from the keyboard. Illegal ASCII character values above 300_8 restart these routines and cause a

back-arrow to be typed. Those values below 300_8 terminate the input. The terminating character is not echoed and is stored in location 0 of the page IOPACK is on (MESAGE's entry point). The return is made to the location following the call with the resultant number (DECIN converts decimal to binary) contained in the AC and with a clear LINK. Input values should not exceed the capacity of one twelve-bit computer word (7777 octal or 4095 decimal) otherwise the results are uncertain.

OCTOUT, DECOUT are called using a JMS. Four digits are typed (DECOUT converts binary to decimal). The return is made to the location following the call with a clear AC and LINK.

Location 24 is assumed to contain the address of teleprinter support routine which is assumed to return with a clear AC. Location 25 is assumed to contain the address of a reader support routine which returns with input characters contained in the AC.

RESTRICTIONS

This set of routines is page relocatable.

```
                /UNSIGNED I-O UTILITY PACKAGE
                /
                /CONTAINS:
                /  MESAGE
                /  OCTIN
                /  DECIN
                /  OCTOUT
                /  DECOUT
                /
                /BRIAN BARTON AND KURT METZGER
                /COOLEY ELECTRONICS LABORATORY
                /UNIVERSITY OF MICHIGAN
                /ANN ARBOR, MICHIGAN  48105
                /  MARCH 5, 1970
                /
                *1200
                /
                /MESAGE ROUTINE
                /
                /  USE:  TAD (MLOC /MLOC=ADDRESS OF TEXT
                /        JMS MESAGE
                /                        /RETS HERE WITH C(AC)=C(L)=0
                 /
1200  0000  MESAGE, 0 /AC=ADDR OF TEXT
1201  3234    DCA OCTIN /USE AS A TEMP
1202  1634    TAD I OCTIN /GET WORD
1203  7012    RTR
1204  7012    RTR
1205  7012    RTR
1206  4213    JMS TYPCH /TYPE LH
1207  1634    TAD I OCTIN
1210  4213    JMS TYPCH /TYPE RH
1211  2234    ISZ OCTIN /ADV PTR
1212  5202    JMP MESAGE+2
                /
1213  0000  TYPCH, 0 /TYPES
1214  7100    CLL /SO EXITS WITH CLEAR LINK
1215  0377    AND (77
1216  7450    SNA /0 TERMINATES
1217  5600    JMP I MESAGE /RETURN
1220  1376    TAD (-40
1221  7510    SPA /WILL BE A 200 CODE
1222  1375    TAD (100 /WILL BE A 300 CODE
1223  1374    TAD (-5 /CHECK FOR CR %
1224  7450    SNA
1225  1373    TAD (-30 /ENDS UP AS 215
1226  1372    TAD (2 /SEE IF LINE FEED #
1227  7450    SNA
1230  1371    TAD (-31 /END UP AS 212
1231  1370    TAD (243 /GET ASCII
1232  4424    JMS I TYPE /TYPE IT
1233  5613    JMP I TYPCH /END
                /
                /
                /UNSIGNED OCTAL INPUT
```

```
                /
                /  USE:  JMS OCTIN
                /                   /RETS HERE WITH C(AC)=VALUE C(L)=0
                 /
                /THE TERMINATING CHARACTER IS SAVE IN C(MESAGE)
                /   CODES BELOW 300 (OCTAL) TERMINATE
                /   CODES ABOVE 277 (OCTAL) RESTART ROUTINE
                /   RESTART IS INDICATED BY ← BEING TYPED
                /
1234  0000  OCTIN, 0 /OCTAL INPUT, 4 DIGITS MAX
1235  7300    CLA CLL
1236  1355  OVERM, TAD OCTTAB /TAD (NOP
1237  3262    DCA DFX /DO OCTAL
1240  1357    TAD OCTTAB+2 /TAD (-10 VAL FOR OCTAL TEST
1241  3304    DCA DECIN /USE AS TEMP
1242  3213    DCA OCTOPT /0 OUTPUT VALUE
1243  4425  OCTA, JMS I READ /GET CHARACTER
1244  0367    AND (177
1245  1366    TAD (200 /FORCE PARITY
1246  3200    DCA OCTINP /SAVE
1247  1200    TAD OCTINP
1250  1365    TAD (-260 /SEE IF .GE. 260
1251  7510    SPA /SKIP IF IT MIGHT BE VALID
1252  5272    JMP OCTC /TERMINATE
1253  1304    TAD DECIN /SEE IF IN PROPER RANGE
1254  7700    SMA CLA /SKIP IF OK
1255  5272    JMP OCTC /GREATER THAN INTEGERS
1256  1200    TAD OCTINP
1257  4424    JMS I TYPE
1260  1213    TAD OCTOPT /MULTIPLY BY 8
1261  7106    CLL RTL /MULT BY 4
1262  7000  DFX, NOP /OR TAD OCTOPT FOR DECIMAL
1263  7104    CLL RAL /MULT BY 2
1264  3213    DCA OCTOPT
1265  1200    TAD OCTINP
1266  1365    TAD (-260 /GET VALID VALUE
1267  1213    TAD OCTOPT /UPDATE VALUE
1270  3213    DCA OCTOPT
1271  5243    JMP OCTA /MORE ALLOWED
1272  7300  OCTC, CLA CLL
1273  1200    TAD OCTINP
1274  1364    TAD (-300 /BELOW 300 TERMINATES
1275  7710    SPA CLA /ABOVE IS ← I.E. KILL NUMBER
1276  5302    JMP OVERL
1277  1363    TAD (337 /←
1300  4424    JMS I TYPE
1301  5242    JMP OCTA-1 /RESTART
1302  1213  OVERL, TAD OCTOPT /USED AS A OVERLAY CONSTANT
1303  5634    JMP I OCTIN /RET W AC=VALUE L=0
                /
                /
                /UNSIGNED DECIMAL INPUT ROUTINE
                /
                /  USE:  JMS DECIN
                /                   /RETS HERE WITH C(AC)=VALUE C(L)=0
                 /
```

```
                /SEE NOTES FOR OCTIN ON TERMINATORS
                /
1304  0000    DECIN, 0
1305  7300      CLA CLL
1306  1304      TAD DECIN /SET UP OCTIN FOR DECIMAL
1307  3234      DCA OCTIN /FIX RET POINT
1310  1302      TAD OVERL /TAD (TAD OCTOPT
1311  3262      DCA DFX /SET UP OVERLAY
1312  7344      STA CLL RAL /AC=-2
1313  5240      JMP OCTA-3 /ENTER OCTIN
                /
                /
                /UNSIGNED OCTAL OUTPUT ROUTINE
                /
                /  USE:  TAD VALUE
                /        JMS OCTOUT
                /                  /RETS HERE WITH C(AC)=C(L)=0
                /
                /
1314  0000    OCTOUT, 0 /OCTAL OUTPUT..UNSIGNED
1315  3304      DCA DECIN /SAVE VALUE
1316  1236      TAD OVERM /TAD (TAD OCTTAB
1317  3325      DCA OCTPTR /SET UP DIVIDE TABLE LOC
1320  1362      TAD (-4
1321  3343      DCA DECOUT /USE AS A COUNTER
1322  3200    OCTLA, DCA MESAGE /USE AS A DIVIDEND
1323  1304      TAD DECIN /GET VALUE
1324  7100      CLL /USE LINK TO FIND OVERFLOW
1325  1355    OCTPTR, TAD OCTTAB /OR TAD DECTAB
1326  7420      SNL /L=0 MEANS LOOP DONE
1327  5333      JMP .+4
1330  2200      ISZ MESAGE /ADD 1 TO DIVIDEND
1331  3304      DCA  DECIN /SAVE REMAINDER
1332  5323      JMP OCTLA+1 /SUBTRACT AGAIN
1333  7300      CLA CLL
1334  1200      TAD MESAGE /HAVE THE DESIRED DIGIT
1335  1361      TAD (260 /MAKE ASCII
1336  4424      JMS I TYPE
1337  2325      ISZ OCTPTR /ADV PTR IN TABLE
1340  2343      ISZ DECOUT /4 DIGITS?
1341  5322      JMP OCTLA /NO
1342  5714      JMP I OCTOUT /YES, EXIT WITH C(AC)=C(L)=0
                /
                /
                /UNSIGNED DECIMAL OUTPUT ROUTINE
                /
                /  USE:  TAD VALUE
                /        JMS DECOUT
                /                  /RET HERE WITH C(AC)=C(L)=0
                /
                /
1343  0000    DECOUT, 0 /DECIMAL OUTPUT..UNSIGNED
1344  3304      DCA DECIN /OUTPUT THIS VALUE
1345  1343      TAD DECOUT /USE OCTOUT ROUTINE
1346  3314      DCA OCTOUT
1347  1362      TAD (-4 /USE DECIMAL TABLE
1350  5316      JMP OCTOUT+2
                /
```

```
1351   6030      6030 /-1000 DECIMAL
1352   7634      7634 /-100 DECIMAL
1353   7766      7766 /-10 DECIMAL
1354   7777      7777 /-1 DECIMAL
1355   7000   OCTTAB, 7000 /-1000 OCTAL
1356   7700      7700 /-100 OCTAL
1357   7770      7770 /-10 OCTAL
1360   7777      7777 /-1 OCTAL
                 /
                 OCTINP=MESAGE
                 OCTOPT=TYPCH
                 TYPE=24 /ADDR OF TYPE ROUTINE..RETS WITH AC=0
                 READ=25 /ADDR OF READ ROUTINE..RETS WITH ASCII IN AC
                 /
1361   0260   PAGE
1362   7774
1363   0337
1364   7500
1365   7520
1366   0200
1367   0177
1370   0243
1371   7747
1372   0002
1373   7750
1374   7773
1375   0100
1376   7740
1377   0077
```