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TITLE	RELCON - BINARY TO RELOCATABLE BINARY TAPE CONVERTER
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SOURCE LANGUAGE	

RELCON - BINARY TO RELOCATABLE BINARY TAPE CONVERTER

DECUS Program Library Write-up DECUS No. 8-130B

1. ABSTRACT

RELCON converts standard DEC binary program tapes to a relocatable form acceptable to the Rebil8 loader.

2. REQUIREMENTS

2.1 Storage

The program uses 600 octal memory locations.

2.2 Equipment

Minimum - PDP8/S and ASR-33.

3. USAGE

3.1 Loading

The program is supplied as a relocatable binary tape and is loaded by Rebil8.

Place RELCON in the tape reader and switch the reader ON.

Place 7777 in the Switch Register and press Load Address.

Place the memory address at which RELCON will start loading, then press Start. Refer to Rebil8 write-up for further information regarding relocatable program loading.

3.2 Switch Settings

Leave the Switch Register as set, but ensure that the SR bits 5-11 are zero's. The Switch Register now contains RELCON's starting address.

Note: If the Switch Register contained 7777, re-set the register to 0000.

3.3 Start Up

Place the Address List in the reader and switch the reader ON. At installations having two tape readers, switch the second reader OFF. Switching the reader OFF LINE or removing tape from the reader will suffice.

Press Load Address, then press Start.

If the computer halts before the list is exhausted, a format error has been detected. Rectify the fault and repeat step 3.3.

3.4 DEC Binary Tape Reading

Place the DEC binary tape in the reader and switch the reader ON.

Note: RELCON copies leader/trailer code, so that the length of L/T produced by the punch is dependent on the length of L/T read.

Press the Continue key and the DEC binary tape is read and converted.

If the computer fails to run, a format error detected during step 3.3 has been overlooked. Correct the faulty list and repeat step 3.3

If the trailer code fails to copy, an error has occured during DEC binary tape reading. Reposition the tape and repeat step 3.4.

4. DESCRIPTION

4.1 Discussion

It is suggested that reference is made to Rebil8 write-up for a discussion on Address Modification and Data Modification before continuing.

The principal duty of RELCON is to tag data, used by memory reference instructions for indirect addressing, with the Data Modification Mark (376 Code). It will, if required, also adjust addresses so that the relocatable version commences loading memory at page 0 if no Address modification is specified. This does not necessarily mean that the program will, or can, operate in this area of memory, but serves to simplify address specification at load time.

For example, an unconverted binary program tape normally loading memory from location 5400, is converted to a relocatable tape with addresses justified to page 0. To load this program at location 1000, the absolute memory address (1000) is used as the Address Modification.

If the program is not justified to page 0, an Address Modification of 3400 (-4400) core locations would be used to load the program at address 1000.

4.2 The Address List

The list contains the lowest address occupied by the unconverted program, and the addresses of data to be tagged with the Data Modification Mark.

If addresses are not to be page 0 justified, the lowest address is specified as 0 (*0).

5. LIST FORMAT

5.1 List Structure

An address list is shown in the following example -

```
*200     241     605     777     1063     1065     1066
1066     310     0437    $
```

The asterisk denotes the following octal number is the lowest address to be found on the DEC binary tape. The remaining numbers represent the addresses of data to be tagged with the 376 code.

The dollar sign terminates the list.

Numbers may be preceeded by and are terminated by spaces, carriage return, line feed, and Leader/Trailer.

Deleted characters are ignored.

5.2 Errors

An error is detected during List reading if one of the following conditions occur.

The numeral 8 or 9, or characters not mentioned above appear in the List.

The asterisk does not preceed the first encountered number.

An asterisk appears elsewhere in the List.

The List contains more than 136 data addresses.

5.3 A program requiring conversion to relocatable binary but not containing out-of-page memory references must be accompanied by a list similar to that shown below.

```
* XXXX 0 $
```

where * XXXX represents the lowest address on the unconverted tape, and 0 indicates no address list.

Failure to comply with the above can result in spurious data modification marks appearing on the relocatable binary tape.

```
                / RELCON
                / BINARY TO RELOCATABLE BINARY TAPE CONVERTER
                *600
0600   6014      RFC
0601   6032      KCC
0602   7600     M200, -200
0603   1354      TAD R1
0604   3353      DCA REF
0605   1355      TAD LIM
0606   3350      DCA TEMP
0607   3356      DCA COUNT
0610   3357      DCA MOD
0611   4235      JMS OCTIN
0612   5214      JMP .+2
0613   5233      JMP ERROR       / * MISSING
0614   1345      TAD P6
0615   7440      SZA
0616   5233      JMP ERROR       /ILLEGAL BCD IN
0617   4235      JMS OCTIN
0620   5233      JMP ERROR       /ILLEGAL BCD IN
0621   0202      AND M200
0622   7041      CIA
0623   3357      DCA MOD
0624   4235      JMS OCTIN
0625   5233      JMP ERROR       /ILLEGAL BCD IN
0626   3753      DCA I REF       /STORE DATA ADDRESS IN REFERENCE TABLE
0627   2356      ISZ COUNT
0630   2353      ISZ REF
0631   2350      ISZ TEMP
0632   5224      JMP .-6
0633   7402     ERROR, HLT       /TOO MANY DATA ADDRESSES
0634   5233      JMP .-1
0635   0000     OCTIN, 0
0636   3347      DCA FLAG
0637   3351      DCA TEMP2
0640   4361     INPUT, JMS  READ
0641   7450      SNA
0642   5302      JMP TEST          /BLANK TAPE
0643   1335      TAD M377
0644   7450      SNA
0645   5240      JMP INPUT         /DELETE
0646   1340      TAD P177
0647   7450      SNA
0650   5302      JMP TEST          /LEADER-TRAILER
0651   1343      TAD M12
0652   7450      SNA
0653   5302      JMP TEST          /LINE FEED
0654   1341      TAD M3
0655   7450      SNA
0656   5302      JMP TEST          /CARRIAGE RETURN
```

```
0657  1344    TAD M23
0660  7450    SNA
0661  5302    JMP TEST          /SPACE
0662  1342    TAD M4
0663  7450    SNA
0664  5760    JMP I R2          /END OF FILE
0665  1344    TAD M23
0666  7540    SMA SZA
0667  5635    JMP I OCTIN       /BCD ERROR
0670  2347    ISZ FLAG
0671  1346    TAD P7
0672  7510    SPA
0673  5635    JMP I OCTIN       /BCD ERROR
0674  3310    DCA REPCH
0675  1351    TAD TEMP2
0676  7106    CLL RTL
0677  7004    RAL
0700  1310    TAD REPCH
0701  5237    JMP INPUT-1
0702  1347  TEST, TAD FLAG
0703  7650    SNA CLA           /END OF NUMBER?
0704  5240    JMP INPUT         /NO
0705  1351    TAD TEMP2         /YES
0706  2235    ISZ OCTIN
0707  5635    JMP I OCTIN
0710  0000  REPCH, 0           /DISASSEMBLES A 12-BIT WORD
0711  3350    DCA TEMP
0712  1350    TAD TEMP
0713  7012    RTR
0714  7012    RTR
0715  7012    RTR
0716  4323    JMS PCH2
0717  1350    TAD TEMP
0720  0334    AND P77
0721  4323    JMS PCH2
0722  5710    JMP I REPCH
0723  0000  PCH2, 0
0724  0340    AND P177
0725  3351    DCA TEMP2
0726  1351    TAD TEMP2
0727  4737    JMS I R8
0730  1351    TAD TEMP2
0731  1736    TAD I R7
0732  3736    DCA I R7
0733  5723    JMP I PCH2
0734  0077  P77, 77
0735  7401  M377, -377
0736  1164  R7, CHKOUT
0737  1143  R8, PCH
0740  0177  P177, 177
```

```
0741  7775  M3, -3
0742  7774  M4, -4
0743  7766  M12, -12
0744  7755  M23, -23
0745  0006  P6, 6
0746  0007  P7, 7
0747  0000  FLAG, 0
0750  0000  TEMP, 0
0751  0000  TEMP2, 0
0752  0000  TEMP7, 0
0753  0000  REF, 0
0754  1170  R1, R6+1
0755  7570  LIM, -210
0756  0000  COUNT, 0
0757  0000  MOD, 0
0760  1000  R2, M376
0761  0000  READ, 0
0762  6011   RSF
0763  5370   JMP LSREAD
0764  6016   RRB RFC
0765  3352   DCA TEMP7
0766  1352   TAD TEMP7
0707  5761   JMP I READ
0770  6031  LSREAD, KSF
0771  5362   JMP READ+1
0772  6036   KRB
0773  5365   JMP READ+4
            PAGE
1000  7402  M376, HLT
1001  6014   RFC
1002  6032   KCC
1003  7200   CLA
1004  3364   DCA CHKOUT
1005  4306   JMS INP
1006  5270   JMP LEADER       /PUNCH LEADER
1007  3363  BACK, DCA CHKSUM
1010  1756   TAD I R3
1011  7041   CIA
1012  3351   DCA TEMP3
1013  1357   TAD R4
1014  3352   DCA TEMP4
1015  1762   TAD I R10
1016  3353   DCA HIBYTE
1017  4761   JMS I R9
1020  3354   DCA LOBYTE
1021  4306   JMS INP
1022  5273   JMP FINIS        /FOUND TRAILER
1023  4334   JMS ASEMB
1024  7420   SNL
1025  5237   JMP DPCH
```

```
1026  3355    DCA ADRES
1027  1355    TAD ADRES
1030  1760    TAD I R5
1031  7120    STL
1032  4767   BACK2, JMS I R6  /PUNCH DATA OR ADDRESS
1033  1353    TAD HIBYTE
1034  1354    TAD LOBYTE
1035  1363    TAD CHKSUM
1036  5207    JMP BACK
1037  3306   DPCH, DCA INP
1040  1355    TAD ADRES
1041  7041    CIA
1042  1752    TAD I TEMP4
1043  7650    SNA CLA          /ADDRESS IN REFERENCE TABLE?
1044  5254    JMP RELOC        /YES
1045  2352    ISZ TEMP4        /UPDATE TABLE ADDRESS
1046  2351    ISZ TEMP3        /UPDATE TABLE LIMIT
1047  5240    JMP .-7
1050  2355    ISZ ADRES
1051  1306    TAD INP
1052  7100    CLL
1053  5232    JMP BACK2        /COPY DATA
1054  1306   RELOC, TAD INP
1055  1760    TAD I R5         /MODIFY DATA
1056  7100    CLL
1057  4767    JMS I R6
1060  1267    TAD P376
1061  4343    JMS PCH          /PUNCH DATA MOD. MARK
1062  1267    TAD P376
1063  1364    TAD CHKOUT
1064  3364    DCA CHKOUT
1065  2355    ISZ ADRES
1066  5233    JMP BACK2+1
1067  0376   P376, 376
1070  1762   LEADER, TAD I R10
1070  4343    JMS PCH
1072  5205    JMP M376+5
1073  1364   FINIS, TAD CHKOUT
1074  7100    CLL
1075  4767    JMS I R6
1076  4334    JMS ASEMB
1077  7041    CIA
1100  1363    TAD CHKSUM
1101  7640    SZA CLA
1102  5200    JMP M376         /CHECKSUM ERROR
1103  4761    JMS I R9
1104  4343    JMS PCH          /COPIES TRAILER
1105  5303    JMP .-2          /END
```

```
1106  0000  INP, 0
1107  3365   DCA SWITCH
1110  4761   JMS I R9
1111  1200   TAD M376
1112  7750   SPA SNA CLA
1113  5317   JMP .+4
1114  2365   ISZ SWITCH
1115  7040   CMA
1116  5307   JMP INP+1
1117  1365   TAD SWITCH
1120  7640   SZA CLA
1121  5310   JMP INP+2          /EXTRACT DIAGNOSTIC
1122  1762   TAD I R10
1123  0366   AND P300
1124  1347   TAD M200A
1125  7510   SPA
1126  2306   ISZ INP
1127  7750   SPA SNA CLA
1130  5706   JMP I INP
1131  1762   TAD I R10
1132  4343   JMS PCH            /COPIES FIELD
1133  5307   JMP INP+1
1134  0000  ASEMB, 0
1135  1353   TAD HIBYTE
1136  7106   CLL RTL
1137  7006   RTL
1140  7006   RTL
1141  1354   TAD LOBYTE
1142  5734   JMP I ASEMB
1143  0000  PCH, 0
1144  6046   TLS
1145  6041   TSF
1146  5345   JMP .-1
1147  7600  M200A, 7600
1150  5743   JMP I PCH
1151  0000  TEMP3, 0
1152  0000  TEMP4, 0
1153  0000  HIBYTE, 0
1154  0000  LOBYTE, 0
1155  0000  ADRES, 0
1156  0756  R3, COUNT
1157  1170  R4, R6+1
1160  0757  R5, MOD
1161  0761  R9, READ
1162  0752  R10, TEMP7
1163  0000  CHKSUM, 0
1164  0000  CHKOUT, 0
1165  0000  SWITCH, 0
1166  0300  P300, 300
1167  0710  R6, REPCH
```

```
ADRES   1155
ASEMB   1134
BACK    1007
BACK2   1032
CHKOUT  1164
CHKSUM  1163
COUNT   0756
DPCH    1037
ERROR   0633
FINIS   1073
FLAG    0747
HIBYTE  1153
INP     1106
INPUT   0640
LEADER  1070
LIM     0755
LOBYTE  1154
LSREAD  0770
MOD     0757
M12     0743
M200    0602
M200A   1147
M23     0744
M3      0741
M376    1000
M377    0735
M4      0742
OCTIN   0635
PCH     1143
PCH2    0723
P177    0740
P300    1166
P376    1067
P6      0745
P7      0746
P77     0734
READ    0761
REF     0753
RELOC   1054
REPCH   0710
```

```
R1      0754
R10     1162
R2      0760
R3      1156
R4      1157
R5      1160
R6      1167
R7      0736
R8      0737
R9      1161
SWITCH  1165
TEMP    0750
TEMP2   0751
TEMP3   1151
TEMP4   1152
TEMP7   0752
TEST    0702
```