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DECUS NO.	8-534
TITLE	DUAL BINARY LOADER
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SOURCE LANGUAGE	PAL III

DUAL BINARY LOADER

Hardware: PDP-8/E (8/I or 8/L allowed, if one patch is made to program).
8 K (or more) of core memory.
Two on-line Teletype paper tape readers, dev. codes 03 & 40.

Core Locations: 4245 to 4575 in field 1 only.

Function: Two binary tapes are simultaneously loaded into core. The tape on the console TTY reader is loaded into field 0, or into whatever field is indicated by a field pseudo-op punched on the tape itself. Similarly, the tape on TTY device 40 reader (the second TTY) is loaded into field 1 unless and until a pseudo-op is encountered by the reader.

[Pal-III and Editor do not have pseudo-ops on their binary tapes; Edu-20 BASIC does.]

Specific Use: To replace Edu-20 BASIC, the normal school language, by an assembly language package consisting of Pal-III, Editor, and "Mate" (DECUS #); and, to restore the BASIC in about 10 minutes rather than 20. The BASIC was repunched in six segments, each with its own field pseudo-op; these were arranged into two tapes of roughly equal length.

[Footnote: the inital starting address of Edu-20 is 12000. The program is subsequently restarted at address 00200.]

Procedure: Load the dual loader into core with a standard binary loader. Set DF=IF=1. Load address 4370. If the console TTY reader is to be used, set (raise) S.R. bit 1; if the second TTY reader is to be used, set S.R. bit 2. Normally both are set. Check to see that both binary tapes are loaded into their respective readers, that the readers are set to "Start" and the TTY's to "Line". Start the computer.

Checksums: The console TTY checksum is displayed in the MQ lights, the second (device 40) checksum in the AC lights. The loader can be restarted by pressing "Continue"; if one of the TTY readers has nothing more to do, lower (clear) the S.R. bit which controls it before pressing "Continue".

Notes: (1) Certain errors in reading cause the reader where the errors occured to halt. The tape must be reloaded; the other reader is not affected.
(2) The leader codes (200) are read alternately, the binary data simultaneously. The beginning of a read-in will seem slow; this is not a sign of trouble.
(3) 8/I or 8/L users should deposit 7402 in loc. 4365. The AC lights will display the console checksum; press "Continue" once and the lights will display the sum of both checksums, hopefully 0

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                FIELD 1

                        /SET S.R. BIT 1 TO START READER #1
                        /SET S.R. BIT 2 TO START READER #2

                /DUAL BINARY LOADER, TTY1 INTO FIELD 0, TTY2 INTO F. 1
                /FIELD PS.-OPS. OVERRIDE THESE INITIAL SETTINGS.

                *4245           /START AT *4370 IN FIELD 1


4245  0000  READ2,  0                 /ROUTINES & SUBROUTINES:
4246  6401          KSF2
4247  5246          JMP .-1
4250  6406          KRB2
4251  5645          JMP I READ2
4252  0000  READ1,  0
4253  6031          KSF
4254  5253          JMP .-1
4255  6036          KRB
4256  5652          JMP I READ1
4257  0000  PACK1,  0
4260  1666          TAD I PFIRS1      /1ST FRAME OF WD. (RDR. #1)
4261  7106          CLL RTL
4262  7006          RTL
4263  7006          RTL
4264  1667          TAD I PSECN1      /2ND FRAME OF WD., INTO
                                      /  BITS 6-11
4265  5657          JMP I PACK1
4266  4553  PFIRS1, FIRST1
4267  4554  PSECN1, SECND1
4270  4555  PFIRS2, FIRST2
4271  4556  PSECN2, SECND2
4272  0000  STOR,   0
4273  7600  M200,   -200
4274  4565  PCK1,   CK1
4275  4566  PCK2,   CK2               /OFF-PAGE POINTERS
                /SUBROUTINE TO GET 1ST FRAME OF WD. (2 ARGUMENTS):

4276  0000  FRAME,  0
4277  1676          TAD I FRAME       /ADDRESS OF STORAGE
4300  3272          DCA STOR
4301  2276          ISZ FRAME
4302  1676          TAD I FRAME       /ADDRESS OF READ SUBR.
4303  3252          DCA READ1
4304  2276          ISZ FRAME
4305  4652          JMS I READ1
4306  3672          DCA I STOR
4307  1672          TAD I STOR
4310  1273          TAD M200
4311  7440          SZA
4312  2276          ISZ FRAME         /TO RETURN TO CALL+4
4313  7750          SPA SNA CLA
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4314  5676            JMP I FRAME      /NON FIELD PS.-OP.;RETURN

4315  1672            TAD I STOR
4316  1317            TAD M300
4317  7500  M300,     SMA
4320  5324            JMP .+4
4321  2272            ISZ STOR         /COUNT ADDRESS UP TO ADRS. OF
                                       /THE 'HALT' FLAG FOR THIS RDR.
4322  3672            DCA I STOR       /HALT THIS READER
4323  5676            JMP I FRAME      /EXIT FROM BAD CODE<300
4324  0327            AND K70          /SHOULD BE A FIELD PS.-OP.;
                                       /MASK OUT BITS 0-5 & 9-11
4325  1330            TAD KCHDF
4326  5676            JMP I FRAME

4327  0070  K70,      70
4330  6201  KCHDF,    CDF

4331  0000  PACK2,    0
4332  1670            TAD I PFIRS2
4333  7106            CLL RTL
4334  7006            RTL
4335  7006            RTL
4336  1671            TAD I PSECN2
4337  5731            JMP I PACK2
4340  4257  TRAIL1,   JMS PACK1
4341  7041            CIA
4342  1674            TAD I PCK1
4343  3674            DCA I PCK1
4344  2746            ISZ I PHLT1
4345  5750            JMP I PNEWD2
4346  4560  PHLT1,    HLT1
4347  4436  PLOOP,    LOOP
4350  4514  PNEWD2,   NEWRD2
4351  4562  PHLT2,    HLT2
4352  4331  TRAIL2,   JMS PACK2
4353  7041            CIA
4354  1675            TAD I PCK2
4355  3675            DCA I PCK2
4356  2751            ISZ I PHLT2

4357  1746  TEST,     TAD I PHLT1      /BOTH RDRS. FINISHED YET?
4360  7640            SZA CLA
4361  1751            TAD I PHLT2
4362  7650            SNA CLA
4363  5747            JMP I PLOOP      /NO, GO LOOP ONCE MORE
                                       /YES, DO CHECKSUMS:
4364  1674  END,      TAD I PCK1
4365  7421            MQL              /CKSUM DIFF. #1 IN MQ LIGHTS
4366  1675            TAD I PCK2
4367  7402            HLT              /CKSUM DIFF. #2 IN AC LIGHTS

4370  6402  START,    KCC2             /**STARTING ADDRESS = 4370**
4371  6032            KCC
4372  3674            DCA I PCK1
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4373  3675          DCA I PCK2
4374  7604          LAS
4375  7106          CLL RTL
4376  7700          SMA CLA          /WAS BIT 2 SET?
4377  7001          IAC              /NO, HALT RDR2 BY SETTING HLT2
4400  3362          DCA HLT2
4401  7420          SNL              /WAS BIT 1 SET?
4402  7001          IAC              /NO, HALT RDR1 BY SETTING HLT1
4403  3360          DCA HLT1
4404  1310          TAD CURFLD
4405  3352          DCA F2
4406  1350          TAD KCDF
4407  3351          DCA F1           /INITIALIZE LOADING FLDS.

4410  1360  LDR1,   TAD HLT1         /1 OR 0?
4411  7640          SZA CLA
4412  5223          JMP LDR2         /HALT FLAG=1; SKIP RDR1
4413  4773          JMS I PFRAME     /FLAG=0; READ.
4414  4557            MQ1            /RDR1 STORAGE ADDRESS
4415  4252            READ1          /READ SUBR. FOR THIS TTY
4416  5213          JMP .-3          /READ UNTIL PAST LEADER
4417  7450          SNA
4420  5223          JMP .+3
4421  3351          DCA F1           /FIELD PS.-OP.
4422  5213          JMP .-7          /  READ 1 MORE FRAME

4423  1362  LDR2,   TAD HLT2
4424  7640          SZA CLA
4425  5236          JMP LOOP
4426  4773          JMS I PFRAME
4427  4561            MQ2
4430  4245            READ2
4431  5226          JMP .-3
4432  7450          SNA
4433  5236          JMP .+3
4434  3352          DCA F2
4435  5226          JMP .-7

4436  1357  LOOP,   TAD MQ1
4437  3353          DCA FIRST1

4440  1361          TAD MQ2
4441  3355          DCA FIRST2

4442  1351  NEXT1,  TAD F1           /CDF INSTR. FOR TTY1
4443  3306          DCA DEPOS1
4444  1360          TAD HLT1
4445  7640          SZA CLA
4446  5252          JMP NEXT2
4447  4774          RDR1
4450  0346          AND K77          /EVEN FRAME: MUST BE<100
4451  3354          DCA SECND1
4452  1352  NEXT2,  TAD F2
4453  3340          DCA DEPOS2
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4454  1362            TAD HLT2
4455  7640            SZA CLA
4456  5262            JMP NEWRD1
4457  4775            RDR2
4460  0346            AND K77
4461  3356            DCA SECND2

4462  1360  NEWRD1,   TAD HLT1
4463  7640            SZA CLA
4464  5314            JMP NEWRD2
4465  4773            JMS I PFRAME
4466  4557              MQ1
4467  4252              READ1
4470  5767            JMP I PTRAI1    /RETURN FROM CODE 200=TRAILER
4471  7450            SNA
4472  5275            JMP .+3
4473  3351            DCA F1          /FIELD PS.-OP.; READ 1 MORE FRAME
4474  5265            JMP .-7
4475  4771            JMS I PPACK1    /PACK BY ROTATION
4476  7420            SNL             /ADRS. WORD WILL HAVE LINK=1
4477  5306            JMP DEPOS1
4500  3363            DCA ADR1
4501  1353  CHECK1,   TAD FIRST1
4502  1354            TAD SECND1
4503  1365            TAD CK1
4504  3365            DCA CK1
4505  5314            JMP NEWRD2
4506  6201  DEPOS1,   6201            /TTY1 INIT. INTO FLD. 0
4507  3763            DCA I ADR1
4510  6211  CURFLD,   CDF 10
4511  2363            ISZ ADR1
4512  7600            7600
4513  5301            JMP CHECK1

4514  1362  NEWRD2,   TAD HLT2
4515  7640            SZA CLA
4516  5747            JMP I PTEST
4517  4773            JMS I PFRAME
4520  4561              MQ2
4521  4245              READ2
4522  5770            JMP I PTRAI2
4523  7450            SNA
4524  5327            JMP .+3
4525  3352            DCA F2
4526  5317            JMP .-7
4527  4772            JMS I PPACK2
4530  7420            SNL
4531  5340            JMP DEPOS2
4532  3364            DCA ADR2
4533  1355  CHECK2,   TAD FIRST2
4534  1356            TAD SECND2
4535  1366            TAD CK2
4536  3366            DCA CK2
4537  5747            JMP I PTEST
4540  6211  DEPOS2,   6211            /TTY2 INIT. INTO FLD. 1
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4541   3764            DCA I ADR2
4542   6211            CDF 10
4543   2364            ISZ ADR2
4544   7000            NOP
4545   5333            JMP CHECK2

4546   0077   K77,     77
4547   4357   PTEST,   TEST


4550   6201   KCDF,    CDF
4551   0000   F1,      0
4552   0000   F2,      0
4553   0000   FIRST1,  0
4554   0000   SECND1,  0
4555   0000   FIRST2,  0
4556   0000   SECND2,  0
4557   0000   MQ1,     0
4560   0000   HLT1,    0
4561   0000   MQ2,     0
4562   0000   HLT2,    0
4563   0000   ADR1,    0
4564   0000   ADR2,    0
4565   0000   CK1,     0
4566   0000   CK2,     0
4567   4340   PTRAI1,  TRAIL1          /POINTERS TO 1ST PAGE:
4570   4352   PTRAI2,  TRAIL2
4571   4257   PPACK1,  PACK1
4572   4331   PPACK2,  PACK2
4573   4276   PFRAME,  FRAME

               RDR1=JMS I .
4574   4252             READ1
               RDR2=JMS I .
4575   4245             READ2

               /DEFINITIONS:
               KCC2=    6402
               KSF2=    6401
               KRB2=    6406
               MQL=     7421
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ADR1     4563
ADR2     4564
CHECK1   4501
CHECK2   4533
CK1      4565
CK2      4566
CURFLD   4510
DEPOS1   4506
DEPOS2   4540
END      4364
FIRST1   4553
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FIRST2	4555
FRAME	4276
F1	4551
F2	4552
HLT1	4560
HLT2	4562
KCC2	6402
KCDF	4550
KCHDF	4330
KRB2	6406
KSF2	6401
K70	4327
K77	4546
LDR1	4410
LDR2	4423
LOOP	4436
MQ1	4557
MQ2	4561
M200	4273
M300	4317
NEWRD1	4462
NEWRD2	4514
NEXT1	4442
NEXT2	4452
PACK1	4257
PACK2	4331
PCK1	4274
PCK2	4275
PFIRS1	4266
PFIRS2	4270
PFRAME	4573
PHLT1	4346
PHLT2	4351
PLOOP	4347
PNEWD2	4350
PPACK1	4571
PPACK2	4572
PSECN1	4267
PSECN2	4271
PTEST	4547
PTRAI1	4567
PTRAI2	4570
RDR1	4774
RDR2	4775
READ1	4252
READ2	4245
SECND1	4554
SECND2	4556
START	4370
STOR	4272
TEST	4357
TRAIL1	4340
TRAIL2	4352