IDENTIFICATION

PRODUCT CODE:	DEC-14-LZPB-D
PRODUCT NAME:	LOAD-14
DATE CREATED:	JUNE 18, 1970
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	EDWARD P. STEINBERGER

1. ABSTRACT

LOAD-14 is a program written in PDP-8 language and run on a Family-of-8 computer whose purpose is to load into 8 memory and properly checksum a PDP-14 binary program on punched paper tape via the teletype reader on the ASR-33 or the high speed paper tape reader. This program is normally used to load PDP-14 tapes for use with the programs VER-14 and RUN-14. It is NOT used to load PDP-14 tapes for SIM-14.

2. LOADING PROCEDURE

LOAD-14 is loaded into 8 memory using the "standard" PDP-8 binary loader technique.

3. USING THE PROGRAM

3.1 Load LOAD-14 into 8 memory using the Binary Loader program.

3.2 Place the PDP-14 binary tape to be loaded into 8 memory in the paper tape reader to be used with leader (code 200 - column 8) over the read diodes or sense pins. Turn reader on.

3.3 Set Switch Register to 7400, depress "LOAD ADDRESS".

3.4 Switch register settings.

3.4.1 If high speed reader is being used, set SR0 to 0; if ASR-33 reader is being used, leave SR0 set to 1.

3.4.2 Set SR11 to 1 if it is desired to load PDP-14 program into the locations indicated by the PDP-14 binary tape. If SR11 is 0, the PDP-14 program will be loaded into the PDP-8 memory starting at location 0000.

3.5 Depress "START". The PDP-14 binary program will be loaded into 8 memory as dictated by SR11.

3.6 If the PDP-14 program loads and checksums properly, the 8 will stop with 0000 in the AC lights. If the 8 stops without 0000 in the AC lights, reposition the paper tape in the reader over loader code and depress "CONTINUE". Repeated checksum errors indicates a "bad" binary tape or a malfunctioning reader.

3.6.1 If the PDP-14 program is greater than 1K and it is desired to load the complete program (only if SR11=1), depress "CONTINUE" after each segment is read in.

3.7 If LOAD-14 is in memory bank 1 and it is desired to load the PDP-14 binary tape into bank 0:
Set IF switches to 1, DF switches to 0, SR to 7400, depress "LOAD ADDRESS", reset SR0 (if necessary), depress "START". PDP-14 program will be loaded into bank 0 from bank 1.

4. DETAIL OF OPERATION AND STORAGE

4.1 LOAD-14 is basically similar to the PDP-8 Binary Loader with the following exceptions:

4.1.1 No extended memory loading capability. LOAD-14 will only load a PDP-14 binary tape into the memory bank indicated by the Data Field switches when LOAD-14 is started.

4.1.2 The PDP-14 binary tape will be loaded into 8 memory starting at location 0000 through 1777 unless SR11=1. If this is undesirable, the instruction in location 7423 may be modified as desired to alter this characteristic.

4.1.3 The sumcheck of the information punched on paper tape is the sum of the 8-bit characters on the tape (excluding leader/trailer, checksum, and text delimited by rubout codes) plus the character count (number of characters added to the sumcheck).

```
                        /LOAD 14
                        /MODIFIED BINARY LOADER FOR PDP-14 ROM TAPES
                7400    *7400
7400    5315    LOAD14, JMP     CLEAR           /CLEAR MEMORY BEFORE LOADING PROGRAM
7401    4342    BEGIN,  JMS     CKSR11
7402    6032            KCC                     /START LOW
7403    6014            RFC                     /AND H,S, READERS
7404    7604            LAS
7405    7700    M0100,  SMA CLA                 /H,S,R, OR L,S,R, SELECTED?
7406    1332            TAD     HIRI            /H,S,R,
7407    1334            TAD     LORI            /L,S,R,
7410    3302            DCA     READ+1
7411    4257            JMS     BEGG            /PROCESS TAPE UNTIL NO LEADER SEEN
7412    5211            JMP     .-1
7413    3331    GO,     DCA     CHKSUM          /STORE CHECKSUM (INITIALLY SET TO 0)
7414    1330            TAD     CHAR
7415    3340            DCA     WORD1
7416    4301            JMS     READ            /READ 2ND CHARACTER OF WORD
7417    3341            DCA     WORD2
7420    4257            JMS     BEGG            /CHECK FOR END OF DATA
7421    5246            JMP     BEND            /END OF DATA, SUMCHECK THE TAPE
7422    4237            JMS     ASSEMB          /NOT END OF DATA, ASSEMBLE 12 BIT WORD
7423    7420            SNL                     /ADDRESS
7424    5234            JMP     STORE           /NO, DATA
7425    0367            AND     KMASK           /MASK ADDRESS TO 10 BITS IF SR11 CLEAR,
7426    3336            DCA     ORIGIN
7427    7326    CHEX,   CLA CLL CML RTL         /CHECKSUM TAPE BY ADDING
7430    1340            TAD     WORD1           /"2" PLUS THE TWO
7431    1341            TAD     WORD2           /CHARACTERS RECEIVED FROM TAPE
7432    1331            TAD     CHKSUM          /TO THE CURRENT CHECKSUM
7433    5213            JMP     GO
7434    3736    STORE,  DCA I   ORIGIN          /STORE DATA
7435    2336            ISZ     ORIGIN          /INCREMENT ADDRESS
7436    5227            JMP     CHEX            /GO CHECKSUM INFORMATION
7437    0000    ASSEMB, 0                       /THIS SUBROUTINE ASSEMBLES
7440    1340            TAD     WORD1           /A 12 BIT WORD
7441    7106            CLL RTL                 /FROM 2 CHARACTERS
7442    7006            RTL                     /FROM TAPE
7443    7006            RTL
7444    1341            TAD     WORD2
7445    5637            JMP I   ASSEMB
7446    4237    BEND,   JMS     ASSEMB          /END OF TAPE
7447    7041            CIA
7450    1331            TAD     CHKSUM          /COMPARE SUMCHECK AND CHECKSUM
7451    7450            SNA                     /GOOD?
7452    5255            JMP     .+3             /YES
7453    7402    M0376,  HLT                     /NO, STOP WITH ERROR IN AC
7454    5201            JMP     BEGIN
7455    7402            HLT                     /PROGRAM STOPS HERE IF GOOD COMPARISON
7456    5201            JMP     BEGIN
```

```
                                                                    /PROCESS TAPE AROUND RUBOUT AND LEADER
7457  0000  BEGG,   0
7460  3337          DCA     SWITCH
7461  4301          JMS     READ
7462  1253          TAD     M0376
7463  7750          SPA SNA CLA
7464  5270          JMP     .+4
7465  2337          ISZ     SWITCH
7466  7040          CMA
7467  5260          JMP     BEGG+1
7470  1337          TAD     SWITCH
7471  7640          SZA CLA
7472  5261          JMP     BEGG+2
7473  1330          TAD     CHAR
7474  0335          AND     MASK
7475  1205          TAD     M0100
7476  7750          SPA SNA CLA
7477  2257          ISZ     BEGG
7500  5657          JMP I   BEGG
7501  0000  READ,   0                                              /READ SUBROUTINE
7502  0000          0                                              /ALTERED INSTRUCTION
7503  6031  LOR,    KSF                                            /LOW SPEED
7504  5303          JMP     .-1
7505  6036          KRB
7506  3330          DCA     CHAR
7507  1330          TAD     CHAR
7510  5701          JMP I   READ
7511  6011  HIR,    RSF                                            /HIGH SPEED
7512  5311          JMP     .-1
7513  6016          RRB     RFC
7514  5306          JMP     LOR+3

                    /ROUTINE TO CLEAR MEMORY BEFORE LOADING PROGRAM
7515  4342  CLEAR,  JMS     CKSR11
7516  4354          JMS     CKIFDF
7517  1370          TAD     KCLEAR
7520  3331          DCA     CHKSUM                                 /COUNTER
7521  3336          DCA     ORIGIN                                 /AND POINTER
7522  3736          DCA I   ORIGIN                                 /CLEAR LOCATION
7523  2336          ISZ     ORIGIN                                 /INCREMENT POINTER
7524  2331          ISZ     CHKSUM                                 /DONE?
7525  5322          JMP     .-3                                    /NO
7526  5201          JMP     BEGIN                                  /YES
7527  2000  M6000,  -6000
7530  0000  CHAR,   0
7531  0000  CHKSUM, 0
7532  0006  HIRI,   HIR-LOR
7533  1777  K1777,  1777
7534  5303  LORI,   JMP     LOR
7535  0300  MASK,   300
7536  0000  ORIGIN, 0
7537  0000  SWITCH, 0
7540  0000  WORD1,  0
7541  0000  WORD2,  0
```

```
                        /
                        /CHECK SR BIT 11,
                        /
7542  0000  CKSR11, 0
7543  7604            LAS                     /CHECK SR11,
7544  7110            CLL RAR
7545  7620            SNL CLA
7546  5351            JMP     .+3
7547  7040            CMA                     /SR11 SET,  SET ADDRESS MASK TO 7777,
7550  7410            SKP
7551  1333            TAD     K1777           /SR11 CLEAR,  SET ADDRESS MASK TO 1777,
7552  3367            DCA     KMASK
7553  5742            JMP I   CKSR11
                        /
                        /CHECK IF AND DF,
                        /
7554  0000  CKIFDF, 0
7555  7200            CLA
7556  6224            RIF
7557  7650            SNA CLA
7560  5364            JMP     .+4
7561  6214            RDF
7562  7650            SNA CLA
7563  7410            SKP                     /IF=1 AND DF=0,
7564  1327            TAD     M0000           /IF=0 OR IF=1 AND DF=1,
7565  3370            DCA     KCLEAR
7566  5754            JMP I   CKIFDF
7567  0000  KMASK,  0
7570  0000  KCLEAR, 0
        6224  RIF=6224                        /READ INSTRUCTION FIELD,
        6214  RDF=6214                        /READ DATA FIELD,

                        $
```

```
0000
0100

0200
0300

0400
0500

0600
0700


1000
1100

1200
1300

1400
1500

1600
1700


2000
2100

2200
2300

2400
2500

2600
2700


3000
3100

3200
3300

3400
3500

3600
3700
```

```
4000
4100

4200
4300

4400
4500

4600
4700


5000
5100

5200
5300

5400
5500

5600
5700


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  10000000

7600
7700
```

/LOAD 14 PAL10 V141 18-JUN-70 21:08 PAGE 3-3

ASSEMB	7437
BEGG	7457
BEGIN	7401
BEND	7446
CHAR	7530
CHEX	7427
CHKSUM	7531
CKIFDF	7554
CKSR11	7542
CLEAR	7515
GO	7413
HIR	7511
HIRI	7532
K1777	7533
KCLEAR	7570
KMASK	7567
LOAD14	7400
LOR	7503
LORI	7534
M0100	7405
M0376	7453
M6000	7527
MASK	7535
ORIGIN	7536
RDF	6214
READ	7501
RIF	6224
STORE	7434
SWITCH	7537
WORD1	7540
WORD2	7541

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 2 SECONDS

2K CORE USED

ASSEMB	23	36#	42	43			
BEGG	14	21	53#	61	64	69	70
BEGIN	6#	49	51	94			
BEND	22	43#					
CHAR	17	65	76	77	96#		
CHEX	28#	35					
CHKSUM	16	31	45	88	92	97#	
CKIFDF	86	123#	133				
CKSR11	6	85	110#	119			
CLEAR	5	85#					
GO	16#	32					
HIR	79#	98					
HIRI	11	98#					
K1777	99#	117					
KCLEAR	87	132	135#				
KMASK	26	118	134#				
LOAD14	5#						
LOR	73#	82	98	100			
LORI	12	100#					
M0100	10#	67					
M0376	48#	56					
M6000	95#	131					
MASK	66	101#					
ORIGIN	27	33	34	89	90	91	102#
RDF	128	137#					
READ	13	19	55	71#	78		
RIF	125	136#					
STORE	25	33#					
SWITCH	54	59	62	103#			
WORD1	18	29	37	104#			
WORD2	20	30	41	105#			