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0000 ; 0001 ..*****
0000 ; 0002 ..NAME: UT62/4
0000 ; 0003 ..DESC: RCA MICROBOARD MONITOR FOR CASSETTE I/O
0000 ; 0004 ..DATE: 6/16/82
0000 ; 0005
0000 ; 0006
0000 ; 0007 .. UT62 IS A MONITOR PROGRAM DESIGNED TO
0000 ; 0008 .. EXAMINE MEMORY, ALTER MEMORY, AND TO
0000 ; 0009 .. TO BEGIN PROGRAM EXECUTION AT A GIVEN
0000 ; 0010 .. LOCATION. ALSO, PROGRAMS CAN BE SAVED ON TAPE. THESE FUNCTIONS
0000 ; 0011 .. ARE ACCOMPLISHED THROUGH A SERIES OF MONITOR
0000 ; 0012 .. COMMANDS WHICH
0000 ; 0013 .. ARE INITIATED BY TYPING A,B,C,D,E,F,I,J,M,P,R,S,OR W.
0000 ; 0014 .. THE FUNCTIONS INCLUDE MEMORY INSERT[I],
0000 ; 0015 .. MEMORY DISPLAY[D], MEMORY MOVE[M],
0000 ; 0016 .. MEMORY FILL[F], MEMORY SUBSTITUTE[S],READ TAPE[R],
0000 ; 0017 .. RUN EDITOR[E],RUN ASSEMBLER[A],RUN BASIC[B],
0000 ; 0018 .. WRITE TAPE[W],REWIND TAPES[J],COPY TAPE TO SCREEN [C],
0000 ; 0019 .. AND RUN PROGRAM[P].
0000 ; 0020 .. TAPE READ LOADS MEMORY FROM TAPE.
0000 ; 0021 .. TAPE WRITE SAVES MEMORY ON TAPE FROM START TO
0000 ; 0022 .. END ADDRESS AS SPECIFIED.
0000 ; 0023 .. ALSO INCLUDED ARE THE STANDARD READ AND
0000 ; 0024 .. TYPE ROUTINES WHICH PROVIDE COMMUNICATION
0000 ; 0025 .. WITH THE USERS TERMINAL.
0000 ; 0026 .. UPON INVOCATION, THE CONTENTS OF THE
0000 ; 0027 .. CPU REGISTERS ARE SAVED IN RAM AT #8C00.
0000 ; 0028 .. THE CONTENTS OF R0, R1, AND R4.1 ARE
0000 ; 0029 .. DESTROYED, HOWEVER, BY THE PROCESS.
0000 ; 0030 .. THEIR CONTENTS CAN BE EXAMINED BY DOING
0000 ; 0031 .. D8C00 FOR 20 BYTES.
0000 ; 0032
0000 ; 0033 ..*****
0000 ; 0034 .. SYSTEM EQUATES, CONSTANTS & OFFSETS
0000 ; 0035 ..*****
0000 ; 0036
0000 ; 0037 .. REGISTER ASSIGNMENTS - GEN. & UTILITIES
0000 ; 0038
0000 ; 0039 SP=#02..STACKPOINTER
0000 ; 0040 PC=#03..PROGRAM COUNTER
0000 ; 0041 CALL=#04..CALL ROUTINE COUNTER
0000 ; 0042 RETN=#05..RETURN ROUTINE COUNTER
0000 ; 0043 LINK=#06..SUBROUTINE DATA LINK
0000 ; 0044 BYTSTR=#07..TEMPORARY STORAGE DURING WRITE
0000 ; 0045 SRTADD=#07..START ADDRESS FOR TAPE WRITE
0000 ; 0046 PARITY=#07..FOR TAPE ROUTINES
0000 ; 0047 TMPRG1=#07..TEMPORARY REGISTER
0000 ; 0048 BITRDR=#08...POINTS TO THE ROUTINE TO READ TAPED BITS
0000 ; 0049 BITWRT=#08...POINTS TO ROUTINE TO WRITE A BIT TO TAPE
0000 ; 0050 ENDADD=#08...HOLDS END ADDRESS FOR WRITE TO TAPE
0000 ; 0051 ADRPTR=#08...HOLDS ADDRESS DURING STORE FROM TP
0000 ; 0052 TMPRG2=#08...TEMPORARY REGISTER
0000 ; 0053 LDRCNT=#09...COUNTER FOR TAPE LEADER
0000 ; 0054 BITCNT=#09...COUNTER FOR BITS PER WORD FROM TAPE
0000 ; 0055 TMPRG3=#09...TEMPORARY REGISTER
0000 ; 0056 BUFPTR=#0A...POINTS TO TAPE READ/WRITE BUFFERS
0000 ; 0057 CNT=#0A...BYTE COUNT
0000 ; 0058 SRC=#0B...SOURCE REGISTER
0000 ; 0059 TPTR=#0B...TABLE POINTER

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0000 ;      0060 BLKFLG=#0B...FLAG TO SIGNAL TO WRITE A BLOCK
0000 ;      0061 DELAY=#0C...DELAY ROUTINE COUNTER
0000 ;      0062 PTR=#0C...IOCB PTR
0000 ;      0063 PTR=#0C...DITTO
0000 ;      0064 ASL=#0D...HEX INPUT REGISTER
0000 ;      0065 DEST=#0D...DESTINATION REGISTER
0000 ;      0066 AUX=#0E...AUX.1 HOLDS BIT TIME CONSTANT
0000 ;      0067 CHAR=#0F...STORES ASCII I/O
0000 ;      0068 FLAG=#0F...FLAGS FOR TAPE
0000 ;      0069
0000 ;      0070 ..      RAM / ROM ALLOCATIONS
0000 ;      0071
0000 ;      0072 RDBUFF=#8E7F
0000 ;      0073 TOPSTK=#8CFF
0000 ;      0074 WRAM=#8C1F
0000 ;      0075 WRTBUF=#8E80
0000 ;      0076 UT62=#8000
0000 ;      0077
0000 ;      0078 ..      ROM BASED PROGRAM HIGH ORDER ADDRESS VALUES
0000 ;      0079
0000 ;      0080 ABAS=#B0
0000 ;      0081 AEDIT=#90
0000 ;      0082 AASM=#9B
0000 ;      0083 PRMPGR=#E0
0000 ;      0084
0000 ;      0085 ..      ASCII CONTROL CHARACTERS
0000 ;      0086
0000 ;      0087 NULL=#00      ...NULL
0000 ;      0088 COMMA=#2C      ...COMMA
0000 ;      0089 SEMCOL=#3B<      ...SEMICOLON
0000 ;      0090 BS=#08      ...BACK SPACE
0000 ;      0091 LF=#0A      ...LINE FEED
0000 ;      0092 CR=#0D      ...CARRIAGE RETURN
0000 ;      0093 EOF=#13      ...END OF FILE
0000 ;      0094 SPACE=#20      ...SPACE (WORD SEPARATOR)
0000 ;      0095 CRLF=#0D0A      ...RETURN,LINEFEED
0000 ;      0096
0000 ;      0097 ..      CONSTANTS
0000 ;      0098
0000 ;      0099 BDSEL=#01...PORT FOR TWO LEVEL I/O SELECT
0000 ;      0100 BTHDRV=#C0 ..SELECTS BOTH TAPE DRIVES
0000 ;      0101 DRIVE0=#40...SELECTS TAPE DRIVE 0
0000 ;      0102 DRIVE1=#80...SELECTS TAPE DRIVE 1
0000 ;      0103 HIGH=#01...WRITE A HIGH TO TAPE
0000 ;      0104 LNECNT=#0F...# OF BYTES PER LINE IN DISPLAY ROUTINE
0000 ;      0105 LINES=#14...NUMBER OF LINES PER SCREEN LOAD
0000 ;      0106 LOW=#00...WRITE A LOW TO TAPE
0000 ;      0107 PCMSRT=#0005 ..START ADDRESS FOR INIT1
0000 ;      0108 PROMPT=#2A...PROMPT CHARACTER
0000 ;      0109 TAPEIO=#02...SELECTS TAPE RECORDER
0000 ;      0110 TPEOFF=#00...TURN OFF TAPES
0000 ;      0111 TPESEL=#04...PORT TO SELECT TAPES
0000 ;      0112 TPEWRT=#05...PORT TO WRITE TO TAPE
0000 ;      0113 TRMINL=#01...SELECTS THE TERMINAL
0000 ;      0114
0000 ;      0115 ..*****
0000 ;      0116      ORG UT62
8000 ;      0117
8000 7100;      0118      DIS;0      ..DISABLE
8002 F880B0;      0119      LDI A.1(UT62) ;PHI RO..ESTABLISH PROGRAM COUNTER AT

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8005 ;          0120                      ..8000 HEX
8005 ;          0121
8005 ;          0122 ..*****
8005 ;          0123 ..          REGISTER SAVE
8005 ;          0124 ..          SAVES CONTENTS OF THE CPU REGISTERS @#8C00.
8005 ;          0125 ..*****
8005 ;          0126
8005 F88CB1;    0127          LDI A.1(WRAM-1) ;PHI R1 ..THIS SEQUENCE PERFORMS
8008 F81EAL;    0128          LDI A.0(WRAM-1) ;PLO R1..THE REGISTER SAVE
800B F8A0B4;    0129          LDI #A0;PHI R4  ..MODIFIED INSTRUCTION
800E E1;        0130          SEX R1
800F ;          0131                      ..SET UP SEP INSTRUCTION
800F F8D051;    0132 LOOP:  LDI #D0;STR R1  ..FOR RETURN
8012 F3;        0133          XOR                      ..CHECK IT WROTE
8013 3A29;      0134          BNZ UT62A
8015 21;        0135          DEC R1                      ..PREPARE FOR 9N INST.
8016 94FC70;    0136          GHI R4;ADI #70
8019 331D;      0137          BDF *+4
801B FC21;      0138          ADI #21                      ..NO, 8N ;9N
801D FC7F;      0139          ADI #7F                      ..YES, 9N ;8(N-1)
801F B4;        0140          PHI R4
8020 51;        0141          STR R1                      ..SAVE INST. & EXECUTE IT
8021 D1;        0142          SEP R1
8022 73;        0143          STXD                      ..STORE RESULT IN RAM
8023 21;        0144          DEC R1                      ..BACK UP & CHECK IF
8024 94FB91;    0145          GHI R4;XRI #91  ..STORAGE DONE?
8027 3A0F;      0146          BNZ LOOP  ..NEXT BYTE
8029 ;          0147
8029 C08381;    0148 UT62A: LBR INIT
802C ;          0149
802C D480FE;    0150 START: SEP CALL;A(TIMALC)
802F ;          0151
802F ;          0152 ..*****
802F ;          0153 ..          OUTPUT THE UTILITY PROMPT
802F ;          0154 ..*****
802F ;          0155
802F D483FF;    0156 PRMPT: SEP CALL;A(TPOFF)  ..TURN OFF TAPES,SEL RCA GRP
8032 D483F0;    0157          SEP CALL;A(OSTRNG)  ..OUTPUT PROMPT TO USER TERMINAL
8035 0D0A2A00;  0158          ,A(CRLF),PROMPT,0
8039 ;          0159
8039 ;          0160
8039 ;          0161 ..*****
8039 ;          0162 ..          MONITOR COMMAND INTERPRETER
8039 ;          0163 ..          FETCHES THE ADDRESS FROM THE COMMAND TABLE AND SETS
8039 ;          0164 ..          THE PROGRAM COUNTER TO IT
8039 ;          0165 ..          REG USED: PTR, CHAR, SP, ASL
8039 ;          0166 ..*****
8039 F85AAB;    0167          LDI A.0(TAB2);PLO TPTR
803C F880BB;    0168          LDI A.1(TAB2);PHI TPTR  ..GET COMMAND TABLE ADDR
803F ;          0169
803F D4813E;    0170 SCNLTR: SEP CALL;A(READ)  ..READ COMMAND
8042 EB;        0171          SEX TPTR
8043 ;          0172
8043 9FF3;      0173 SCAN:  GHI CHAR;XOR                      ..LOOK FOR MATCH
8045 1B;        0174          INC TPTR
8046 324F;      0175          BZ GOTHERE ..YES, COMPUTE ADDRESS
8048 1B1B;      0176          INC TPTR;INC TPTR  ..INC THE POINTER TO THE
804A 0B;        0177          LDN TPTR                      ..NEXT COMMAND
804B 3285;      0178          BZ ERROR  ..ERROR IF END OF TABLE
804D 3043;      0179          BR SCAN                      ..ELSE CONTINUE LOOKING

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804F ;          0180
804F 2222;      0181 GOTHRE: DEC SP; DEC SP      ..FAKE IT FOR THE RETURN
8051 ;          0182                        ..PICK UP COMMAND ADDRESS
8051 48B6;      0183          LDA TPTR;PHI LINK      ..AND TRANSFER TO THE
8053 ;          0184                        ..SUBROUTINE BY EXECUTING
8053 4BA6;      0185          LDA TPTR;PLO LINK      ..A RETURN INSTRUCTION
8055 F800BDAD;  0186          LDI 0 ;PHI ASL;PLO ASL
8059 D5;        0187          SEP R5              ..P=3,X=2,R4 ;SEP CALL;;R5 ;RETURN,R2=#8CFF
805A ;          0188
805A ;          0189 ..*****
805A ;          0190 ..          COMMAND TABLES
805A ;          0191 ..*****
805A ;          0192
805A 4482BD;    0193 TAB2:  ,T'D',A(DISPLY)      ..MEMORY DISPLAY
805D 4983A7;    0194          ,T'I',A(INSERT)      ..INSERT INTO MEMORY
8060 4D82F7;    0195          ,T'M',A(MOVE)        ..MOVE A BLOCK OF MEMORY
8063 468240;    0196          ,T'F',A(FILL)      ..FILL A BLOCK OF MEMORY
8066 538099;    0197          ,T'S',A(SUBST)      ..BYTE SUBSTITUTION
8069 508534;    0198          ,T'P',A(RUN)        ..RUN A USER PROGRAM
806C 528474;    0199          ,T'R',A(TPLOAD)      ..READ FROM TAPE TO MEMORY
806F 4A852E;    0200          ,T'J',A(TPWIND)      ..REWIND TAPES
8072 5786D4;    0201          ,T'W',A(TPWRT)      ..WRITE ONTO TAPE FROM MEMORY
8075 4585E7;    0202          ,T'E',A(EDITOR)      ..START THE EDITOR
8078 4185EC;    0203          ,T'A',A(ASSEMB)      ..START THE ASSEMBLER
807B 4285F1;    0204          ,T'B',A(BASIC)      ..START BASIC
807E 5A85F6;    0205          ,T'Z',A(PROMIT)      ..START CPU AT #E000,P&X=0
8081 438254;    0206          ,T'C',A(TPSCRN)      ..COPY FROM TAPE TO SCREEN
8084 00;        0207          ,0
8085 ;          0208
8085 ;          0209 ..*****
8085 ;          0210 ..          UTILITY ERROR MESSAGE
8085 ;          0211 ..          NOTE: ENTRY HERE RESETS STACK TO TOP
8085 ;          0212
8085 ;          0213 ..REG USED:  CHAR
8085 ;          0214 ..*****
8085 F8FFA2;    0215 ERROR:  LDI A.0(TOPSTK);PLO SP
8088 F88CB2;    0216          LDI A.1(TOPSTK);PHI SP
808B D483F0;    0217          SEP CALL;A(OSTRNG)
808E 0D0A4552524F52; 0218          ,A(CRLF),T'ERROR',0
8095 00;        0218
8096 C087F0;    0219 PRMPT1: LBR RENTER
8099 ;          0220
8099 ;          0221 ..*****
8099 ;          0222 ..          START OF SUBROUTINES
8099 ;          0223 ..
8099 ;          0224 ..*****
8099 ;          0225 ..          MONITOR SUBSTITUTE FUNCTION
8099 ;          0226 ..          DISPLAYS THE FIRST BYE FROM THE ADDRESS GIVEN FOLLOWED
8099 ;          0227 ..          BY A HYPHEN. IF A HEX PAIR IS ENTERED FOLLOWED BY A SPACE,
8099 ;          0228 ..          IT IS SUBSTITUTED FOR THE BYTE DISPLAYED, IF A SPACE IS
8099 ;          0229 ..          ENTERED THERE IS NO CHANGE. IN EITHER CASE THE DATA BYTE FROM
8099 ;          0230 ..          THE NEXT ADDRESS WILL THEN BE DISPLAYED. THE ROUTINE IS ENDED
8099 ;          0231 ..          BY ENTERING A RETURN.
8099 ;          0232 ..REG USED:  ASL, SRC, CHAR
8099 ;          0233 ..*****
8099 ;          0234
8099 D487EA;    0235 SUBST:  SEP CALL;A(READHX)..INPUT ADDRESS
809C 9DBB;      0236          GHI ASL;PHI SRC      ..SAVE STRT ADDRESS
809E 8DAB;      0237          GLO ASL;PLO SRC
80A0 ;          0238

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80A0 9FFB0A;      0239 DECODE: GHI CHAR;XRI LF      ..FIRST NON-HEX MUST BE
80A3 32AF;        0240      BZ ADDOUT ..A LINEFEED OR
80A5 FB07;        0241      XRI #07  ..TERMINATION OR
80A7 3296;        0242      BZ PRMPT1
80A9 FB2D;        0243      XRI #2D  ..A SPACE
80AB 32B7;        0244      BZ OLDDTA
80AD 30B5;        0245      BR ERROR      ..ELSE ERROR
80AF ;           0246
80AF D483F00D00;  0247 ADDOUT: SEP CALL;A(OSTRNG);,CR,0
80B4 D480CD;      0248      SEP CALL;A(OUT1)
80B7 ;           0249
80B7 DC17;        0250 OLODDTA: SEP DELAY;,#17      ..WAIT TO FINISH READ
80B9 0BBF;        0251      LDN SRC ;PHI CHAR      ..STAY ON SAME LINE
80BB D481AE;      0252      SEP CALL;A(TYPE2)      ..HEX OUTPUT
80BE D483F0;      0253      SEP CALL;A(OSTRNG)      ..OUTPUT A HYPHEN
80C1 2D00;        0254      ,T'-',0
80C3 0BAD;        0255      LDN SRC ;PLO ASL..COPY DATA FROM CELL INTO ASL
80C5 ;           0256
80C5 D487EA;      0257 GETDTA: SEP CALL;A(READHX)      ..GET ANY CHANGE
80C8 8D5B;        0258      GLO ASL;STR SRC      ..RESTORE THE DATA INTO THE CELL
80CA 1B;          0259      INC SRC      ..OPEN THE NEXT CELL
80CB 30A0;        0260      BR DECODE      ..EXAMINE INPUT
80CD ;           0261
80CD DC17;        0262 OUT1:  SEP DELAY;,#17
80CF 9BBF;        0263      GHI SRC;PHI CHAR      ..ROUTINE TO OUTPUT A HEX PAIR
80D1 D481AE;      0264      SEP CALL;A(TYPE2)      ..AND A SPACE
80D4 8BBF;        0265      GLO SRC;PHI CHAR
80D6 D481AE;      0266      SEP CALL;A(TYPE2)
80D9 D483F02000;  0267      SEP CALL;A(OSTRNG);,SPACE,0
80DE D5;          0268      SEP R5
80DF ;           0269
80DF ;           0270 .. *****
80DF ;           0271 ..      DELAY IS 2(1 + AUX.1(3 + @LINK)) & IS
80DF ;           0272 ..      USED BY TYPE, READ, AND TIMALC.  AUX.1
80DF ;           0273 ..      IS ASSUMED TO HOLD A DELAY CONSTANT =
80DF ;           0274 ..      ((BIT TIME OF TERMINAL)/
80DF ;           0275 ..      (20 * INSTR TIME OF COSMAC)) - 1.  THIS
80DF ;           0276 ..      CONSTANT CAN BE GENERATED AUTOMATICALLY
80DF ;           0277 ..      BY THE TIMALC ROUTINE.
80DF ;           0278 ..REG USED:  AUX, PC
80DF ;           0279 .. *****
80DF ;           0280
80DF ;           0281      ORG UT62+EA
80EA ;           0282
80EA DCDC;        0283 DEXIT:  SEP DELAY; SEP DELAY      ..4 NOP'S
80EC DCDC;        0284      SEP DELAY; SEP DELAY
80EE D3;          0285      SEP PC      ..RETURN
80EF ;           0286
80EF 9EF6AE;      0287 DELAY1: GHI AUX;SHR;PLO AUX      ..SHIFT OUT ECHO BIT
80F2 ;           0288
80F2 2E;          0289 DELAY2: DEC AUX      ..AUX.0 = BIT DELAY
80F3 43;          0290      LDA PC      ..LOAD CONSTANT
80F4 ;           0291
80F4 FF01;        0292 DELAY3: SMI 1      ..LOOP UNTIL ZERO
80F6 3AF4;        0293      BNZ DELAY3
80F8 8E;          0294      GLO AUX
80F9 32EA;        0295      BZ DEXIT      ..DONE ?
80FB 23;          0296      DEC PC      ..POINT BACK TO THE CONSTANT
80FC 30F2;        0297      BR DELAY2      ..AND LOOP
80FE ;           0298

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80FE ;          0299
80FE ;          0300 ..*****
80FE ;          0301 ..      CALCULATES BIT TIME AND ECHO FLAG.  WAITS
80FE ;          0302 ..      FOR LF(NO ECHO) OF CR (ECHO) TO BE TYPED
80FE ;          0303 ..      IN.  ALSO SETS UP POINTER TO THE DELAY
80FE ;          0304 ..      ROUTINE.  AUX.1 ENDS UP HOLDING, IN THE
80FE ;          0305 ..      MOST SIGNIFICANT 7 BITS, THE DELAY CONSTANT
80FE ;          0306 ..      THE LEAST SIGNIFICANT BIT IS ZERO FOR ECHO
80FE ;          0307 ..      OR ONE FOR NO ECHO.
80FE ;          0308 ..REG USED:  AUX, CHAR
80FE ;          0309 ..*****
80FE ;          0310
80FE 93BC;      0311 TIMALC: GHI PC;PHI DELAY          ..DELAY SUBROUTINE ADDRESS
8100 F8EFAC;    0312          LDI A.0(DELAY1);PLO DELAY
8103 F800AEAF;  0313          LDI 0;PLO AUX;PLO CHAR
8107 3707;      0314          B4 *          ..WAIT FOR THE START BIT
8109 3F09;      0315          BN4 *          ..WAIT FOR FIRST NON-ZERO
810B F803;      0316          LDI 3          ..DATA BIT.  SET UP FOR 10
810D ;          0317          ..EXECUTIONS SO THAT THE
810D FF01;      0318 TC2:   SMI 1          ..ROUND-OFF IS MINIMAL
810F 3A0D;      0319          BNZ TC2          ..SEE IF THE DATA CHANGED.
8111 8F;        0320          GLO CHAR          ..BR IF IT HAD, ELSE LOOK
8112 3A17;      0321          BNZ ZERO          ..FOR CHANGE TO ZERO
8114 3719;      0322          B4 INCR          ..BRANCH IF NO
8116 1F;        0323          INC CHAR          ..YES, SET SWITCH
8117 ;          0324
8117 371E;      0325 ZERO:  B4 DAUX          ..LOOK FOR A CHANGE TO 1
8119 ;          0326
8119 1E;        0327 INCR:  INC,AUX          ..SET UP FOR 20 INST. LOOPS
811A F807;      0328          LDI 7
811C 300D;      0329          BR TC2
811E ;          0330
811E 2E2E;      0331 DAUX:  DEC AUX; DEC AUX
8120 8EF901BE;  0332          GLO AUX;ORI 1;PHI AUX
8124 DC0C;      0333          SEP DELAY ;,#0C          ..WAIT
8126 3F2C;      0334          BN4 WAIT          ..BR IF LF =] NO ECHO
8128 9EFAFEFE;  0335          GHI AUX;ANI #FE;PHI AUX  ..CR =] ECHO
812C ;          0336
812C DC26;      0337 WAIT:  SEP DELAY ;,#26
812E D5;        0338          SEP R5
812F ;          0339
812F ;          0340 ..*****
812F ;          0341 ..      READS ONE BYTE INTO CHAR.1.  WHEN ENTERED
812F ;          0342 ..      VIA READAH, ANY HEX INPUT IS ASSEMBLED
812F ;          0343 ..      INTO ASL AND DF =1, ELSE DF = 0 ON RETURN.
812F ;          0344 ..      NOTE-DON'T FOLLOW READ WITH IMMEDIATE TYPE.
812F ;          0345 ..      INSERT DELAY OR ENTER TYPE VIA TYPED.
812F ;          0346 ..REG USED:  CHAR, AUX & ASL
812F ;          0347 ..*****
812F ;          0348
812F FC07;      0349 CKDEC:  ADI 7          ..CHECK FOR ASCII DECIMAL
8131 3337;      0350          BDF NFND          ..OUT OF RANGE
8133 FC0A;      0351          ADI #0A          ..SUBTRACT NET 30
8135 337A;      0352          BDF FND
8137 ;          0353
8137 FC00;      0354 NFND:  ADI 0          ..SET DF = 0
8139 ;          0355
8139 9F;        0356 REXIT:  GHI CHAR          ..PUT INPUT INTO D
813A D5;        0357          SEP R5          .. & RETURN
813B ;          0358

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813B F80038;      0359 READAB: LDI 0;SKP          ..SKIP TO READ1 WITH D=0
813E ;           0360
813E 93;         0361 READ:   GHI PC          ..CONSTANT GREATER THAN 0
813F ;           0362
813F AF;        0363 READ1:  PLO CHAR          ..SAVE ENTRY POINT
8140 ;           0364
8140 F880BF;     0365 READ2:  LDI #80; PHI CHAR  ..BIT COUNT, ;SHR; UNTIL DF=1
8143 3F43;      0366          BN4 *          ..WAIT FOR END OF DATA BIT
8145 3745;      0367          B4 *          ..WAIT FOR START BIT
8147 DC02;      0368          SEP DELAY;;#02    ..HALF BIT TIME DELAY
8149 ;          0369
8149 E2E2;      0370 NOBIT:  SEX SP; SEX SP      ..DELAY
814B ;          0371
814B 9EF6;      0372 BIT:   GHI AUX;SHR          ..ECHO ?
814D 3357;      0373          BDF READ3        ..BR IF NO
814F 3754;      0374          B4 OUTBIT        ..IS IT A 1 ?
8151 7B;        0375          SEQ              ..NO
8152 3059;      0376          BR NOECHO
8154 ;          0377
8154 7A;        0378 OUTBIT: REQ              ..YES
8155 3059;      0379          BR NOECHO
8157 ;          0380
8157 C4C4;      0381 READ3:  NOP; NOP          ..DELAY
8159 ;          0382
8159 DC07;      0383 NOECHO: SEP DELAY;;#07    ..ONE BIT TIME DELAY
815B C4C4;      0384          NOP; NOP          ..MORE DELAY
815D 9FF6BF;    0385          GHI CHAR;SHR;PHI CHAR ..NEXT BIT
8160 3369;      0386          BDF NEXT
8162 F980;      0387          ORI #80
8164 3F49;      0388          BN4 NOBIT        ..BR IF INPUT WAS ZERO
8166 BF;        0389          PHI CHAR
8167 304B;      0390          BR BIT          ..CONTINUE
8169 ;          0391
8169 7A;        0392 NEXT:  REQ              ..OUTPUT STOP BIT
816A 3240;      0393          BZ READ2        ..IF D=0, CHAR.1 IS A NULL
816C 8F;        0394          GLO CHAR          ..CHECK ENTRY
816D 3A39;      0395          BNZ REXIT        ..ENTERED VIA READ
816F ;          0396
816F 9FFF41;    0397 CKHXE:  GHI CHAR;SMI #41    ..CHECK FOR ASCII HEX
8172 3B2F;      0398          BNF CKDEC        ..CHECK FOR ASCII DECIMAL
8174 FF06;      0399          SMI 6          ..A THRU F
8176 3337;      0400          BDF NFND        ..NO
8178 FC10;      0401          ADI #10          ..SUBTRACT NET 37
817A ;          0402
817A AE;        0403 FND:   PLO AUX          ..SAVE TEMPORARILY
817B 9D;        0404          GHI ASL          ..SHIFT DATA INTO ASL
817C FEFEFEF52; 0405          SHL;SHL;SHL;SHL;STR SP  ..SHL 4X
8181 8D;        0406          GLO ASL
8182 F6F6F6F6;  0407          SHR;SHR;SHR;SHR
8186 F1BD;      0408          OR;PHI ASL
8188 8D;        0409          GLO ASL
8189 FEFEFEF52; 0410          SHL;SHL;SHL;SHL;STR SP
818E 8EFA0F;    0411          GLO AUX;ANI #0F
8191 FIAD;      0412          OR;PLO ASL
8193 FF00;      0413          SMI 0          ..SET DF = 1
8195 3039;      0414          BR REXIT
8197 ;          0415
8197 ;          0416 ..*****
8197 ;          0417 ..      TYPES ONE BYTE FROM CHAR.1 AS AN ASCII
8197 ;          0418 ..      CHARACTER OR AS TWO HEX DIGITS.  LINE-FEEDS

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8197 ;      0419 ..      ARE FOLLOWED BY SIX NULLS.  USES REGISTERS
8197 ;      0420 ..      AUX AND CHAR AND A STACK LOCATION.  TYPED
8197 ;      0421 ..      & TYPE5D ALLOW AN EARLIER READ TO COMPLETE.
8197 ;      0422 ..
8197 ;      0423 ..      AUX.0 HOLDS OUTPUT CHARACTER (AT FIRST),
8197 ;      0424 ..      THEN THE DELAY CONSTANT BETWEEN BITS.
8197 ;      0425 ..      CHAR.0 HOLDS THE NUMBER OF BITS (11) IN
8197 ;      0426 ..      ITS LOWER DIGIT AND THE FOLLOWING CODE IN
8197 ;      0427 ..      ITS UPPER DIGIT:
8197 ;      0428 ..          0 - BYTE OUTPUT
8197 ;      0429 ..          1 - FIRST HEX OUTPUT
8197 ;      0430 ..          2 - LAST NULL OUTPUT
8197 ;      0431 ..          8 - LF OUTPUT
8197 ;      0432 ..
8197 ;      0433 ..REG USED:  CHAR, AUX
8197 ;      0434 ..*****
8197 ;      0435
8197 ;      0436          ORG UT62+#0198
8198 ;      0437
8198 DC17;      0438 TYPED:  SEP DELAY;,#17          ..THREE BIT TIME DELAY
819A 30A4;      0439          BR TYPE
819C ;      0440
819C DC17;      0441 TYPE5D: SEP DELAY;,#17          ..THREE BIT TIME DELAY
819E 38;      0442          SKP
819F ;      0443
819F D5;      0444 TEXTIT: SEP R5
81A0 ;      0445
81A0 45;      0446 TYPE5:  LDA R5          ..PICK UP DATA
81A1 38;      0447          SKP
81A2 ;      0448
81A2 46;      0449 TYPE6:  LDA R6          ..PICK UP DATA
81A3 38;      0450          SKP
81A4 ;      0451
81A4 9FAE;      0452 TYPE:  CHI CHAR;PLO AUX          ..KEEP A COPY
81A6 FBOA;      0453          XRI LF          ..IS IT A LINE-FEED ?
81A8 3ABF;      0454          BNZ TY5
81AA F88B;      0455          LDI #8B          ..# BITS + # NULLS
81AC 30C1;      0456          BR TY6
81AE ;      0457
81AE 9FF6F6F6F6; 0458 TYPE2:  CHI CHAR;SHR;SHR;SHR;SHR
81B3 FCF6;      0459          ADI #F6          ..CONVERT TO HEX
81B5 3BB9;      0460          BNF TY4          ..IF A OR MORE, ADD 37
81B7 FC07;      0461          ADI 7
81B9 ;      0462
81B9 FFC6AE;      0463 TY4:   SMI #C6;PLO AUX          ..ELSE ADD 30
81BC F81B;      0464          LDI #1B          ..10 ADI NO. OF BITS
81BE C8;      0465          LSKP
81BF ;      0466
81BF F80B;      0467 TY5:   LDI #0B          ..NO OF BITS
81C1 ;      0468
81C1 AF;      0469 TY6:   PLO CHAR
81C2 8D73;      0470          GLO ASL;STXD          ..SAVE USER'S RD.0
81C4 ;      0471
81C4 7B;      0472 BEGIN:  SEQ          ..START BIT
81C5 8EAD;      0473          GLO AUX;PLO ASL          ..COPY CHAR TO RD.0
81C7 ;      0474
81C7 DC07;      0475 PREBIT: SEP DELAY;,#07          ..1 BIT TIME DELAY
81C9 2F;      0476          DEC CHAR          ..DEC BIT COUNT
81CA F5;      0477          SD          ..SET DF = 1
81CB 8D76AD;      0478          GLO ASL;SHRC;PLO ASL

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81CE 33D3;      0479      BDF OUT1A      ..BR IF BIT IS A ONE
81D0 7B;        0480      SEQ              ..ELSE OUTPUT A ZERO
81D1 30D5;      0481      BR OUT1B
81D3 ;          0482
81D3 7A7A;      0483 OUT1A:  REQ; REQ              ..OUTPUT A ONE AND DELAY
81D5 ;          0484
81D5 8FFA0F;    0485 OUT1B:  GLO CHAR;ANI #0F      ..DONE ?
81D8 C4C4C4C4; 0486      NOP;NOP;NOP;NOP      ..DELAY
81DC 3AC7;      0487      BNZ PREBIT      ..BR IF NOT
81DE ;          0488
81DE 8FFCFBAF;  0489 NXCHAR: GLO CHAR;ADI #FB;PLO CHAR
81E2 3BFB;      0490      BNF FIXRD      ..SEP R5 IF NO MORE
81E4 FF1B;      0491      SMI #1B      ..TEST FOR ALTERNATIVES
81E6 32FB;      0492      BZ FIXRD      ..TYPED LAST NULL
81E8 3BEE;      0493      BNF HEX1      ..TYPED FIRST HEX
81EA F800;      0494      LDI 0      ..TYPED LF OR NULL
81EC 30F8;      0495      BR HEX3
81EE ;          0496
81EE 9FFA0F;    0497 HEX1:  GHI CHAR;ANI #0F ..GET 2ND HEX DIGIT
81F1 FCF6;      0498      ADI #F6      ..CONVERT TO HEX
81F3 C7;        0499      LSNF      ..IF A OR MORE,
81F4 FC07;      0500      ADI 7      ..ADD NET 37
81F6 ;          0501
81F6 FFC6;      0502 HEX2:  SMI #C6      ..ELSE ADD NET 30
81F8 ;          0503
81F8 AE;        0504 HEX3:  PLO AUX      ..AND SAVE
81F9 30C4;      0505      BR BEGIN
81FB ;          0506
81FB 12;        0507 FIXRD:  INC SP
81FC 02AD;      0508      LDN R2;PLO ASL
81FE 309F;      0509      BR TEXT      ..RESTORE USER'S RD.0
8200 ;          0510
8200 ;          0511 ..*****
8200 ;          0512 ..      INPUT OPTION
8200 ;          0513 ..      ALLOWS ENTRY OF EITHER STARTING AND ENDING
8200 ;          0514 ..      ADDRESSES OR BYTE COUNT.EXIT WITH THE
8200 ;          0515 ..      STARTING ADDRESS IN REG SRC AND THE BYTE
8200 ;          0516 ..      COUNT IN REG CNT. RETURNS WITH DF =1
8200 ;          0517 ..      IF SYNTAX ERROR EXISTS
8200 ;          0518 ..REG USED:  ASL, SRC, CHAR, CNT
8200 ;          0519 ..*****
8200 ;          0520
8200 D487EA;    0521 OPTION: SEP CALL;A(READHX) ..GET THE STARTING ADDRESS
8203 9DBB;      0522      GHI ASL;PHI SRC      ..AND SAVE IT
8205 8DAB;      0523      GLO ASL;PLO SRC
8207 F800ADB;   0524      LDI 0;PLO ASL;PHI ASL ..CLEAR THE INPUT REG.
820B 9FFB20;    0525      GHI CHAR;XRI SPACE      ..FIRST NONSMI HEX MUST
820E 3231;      0526      BZ CNTIN      ..BE A SPACE OR
8210 FB0D;      0527      XRI #0D      ..A HYPHEN
8212 3A46;      0528      BNZ PRMPT2      ..ELSE SYNTAX ERROR
8214 D487EA;    0529      SEP CALL;A(READHX) ..EXPECT ENDING ADDRESS
8217 ;          0530
8217 8B52;      0531 BYTCNT: GLO SRC;STR SP      ..CALCULATE THE BYTE COUNT
8219 8DF7AA;    0532      GLO ASL;SM;PLO CNT
821C 9B52;      0533      GHI SRC;STR SP
821E 9D77BA;    0534      GHI ASL;SMB;PHI CNT
8221 333F;      0535      BDF EXITOK      ..CHECK FOR SRC LESS THAN ASL
8223 ;          0536
8223 8D52;      0537 INVERT: GLO ASL;STR SP      ..ELSE EXCHANGE THE CONTENTS OF
8225 8BAD;      0538      GLO SRC;PLO ASL      ..SRC AND ASL

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8227 02AB;      0539      LDN SP;PLO SRC
8229 9D52;      0540      GHI ASL;STR SP
822B 98BD;      0541      GHI SRC;PHI ASL
822D 02BB;      0542      LDN SP;PHI SRC
822F 3017;      0543      BR BYTCNT          ..RECALCULATE
8231 ;          0544
8231 D487EA;    0545 CNTIN: SEP CALL;A(READMX) ..INPUT THE BYTE COUNT
8234 8DFF01AA;  0546      GLO ASL;SMI 1;PLO CNT
8238 9D7F00BA;  0547      GHI ASL;SMI 0;PHI CNT
823C 333F;      0548      BDF EXITOK
823E 1A;        0549      INC CNT
823F D5;        0550 EXITOK: SEP R5          ..RETURN WHEN DONE
8240 ;          0551
8240 ;          0552 ..*****
8240 ;          0553 ..          FILL ROUTINE
8240 ;          0554 ..          LOADS MEMORY BEGINNING AT ADDRESS CONTAINED
8240 ;          0555 ..          IN SRC WITH DATA CONTAINED IN ASL.0 FOR
8240 ;          0556 ..          THE NUMBER OF BYTES SPECIFIED BY CNT.
8240 ;          0557 ..          USER CALLABLE @ USRFIL.
8240 ;          0558 ..REG USED: ASL, SRC, CNT ,CHAR
8240 ;          0559 ..*****
8240 ;          0560
8240 D48303;    0561 FILL:  SEP CALL;A(READAD)    ..GET THE ADDRESSES
8243 D4824B;    0562      SEP CALL;A(USRFIL)    ..CALL THE MOVE
8246 ;          0563
8246 C087F0;    0564 PRMPT2: LBR RENTER          ..GOTO UT62 AND PROMPT
8249 ;          0565
8249 1B;        0566 NXTCEL: INC SRC          ..POINT TO NEXT CELL
824A 2A;        0567      DEC CNT          ..REDUCE BYTE COUNT
824B 8D5B;      0568 USRFIL: GLO ASL;STR SRC    ..LOAD THE DATA;USER ENTRY PT.
824D 8A;        0569      GLO CNT          ..LOOP UNTIL COUNT = 0
824E 3A49;      0570      BNZ NXTCEL
8250 9A;        0571      GHI CNT
8251 3A49;      0572      BNZ NXTCEL
8253 D5;        0573      SEP R5          ..EXIT THE CALL
8254 ;          0574
8254 ;          0575 ..*****
8254 ;          0576 ..          ROUTINE TO READ FROM TAPE TO SCREEN
8254 ;          0577 ..          AFTER EACH 20 RETURNS, ROUTINE OUTPUTS "****" AND
8254 ;          0578 ..          WAITS FOR BREAK KEY TO BE HIT TO CONTINUE.
8254 ;          0579 ..          HALTS ON BREAK, EXITS ON Q OR CONTINUE ON OTHER
8254 ;          0580 ..*****
8254 D48774;    0581 TPSCRN: SEP CALL;A(FINDTP)    ..GET TAPE #
8257 9C73;      0582      GHI RC;STXD          ..SAVE IOCB
8259 8C73;      0583      GLO RC;STXD
825B D483F00A00; 0584      SEP CALL;A(OSTRNG),LF,0..OUTPUT A LINEFEED
8260 12;        0585      INC SP          ..RESTORE IOCB
8261 42AC;      0586      LDA SP;PLO RC
8263 02BC;      0587      LDN SP;PHI RC
8265 F814AA;    0588      LDI LINES;PLO CNT    ..INITIALIZE FOR 20 LINES
8268 ;          0589
8268 D48542;    0590 MORLST: SEP CALL;A(READT)    ..GET A BYTE
826B ;          0591
826B 9C73;      0592 CHKOUT: GHI RC;STXD
826D 8C73;      0593      GLO RC;STXD
826F 9FFB13;    0594      GHI CHAR;XRI EOF
8272 3246;      0595      BZ PRMPT2          ..WE'RE DONE
8274 FB1E;      0596      XRI #1E          ..ASSEMBLY LISTINGS DON'T HAVE
8276 3AA4;      0597      BNZ SHOWIT
8278 D483F0;    0598      SEP CALL;A(OSTRNG)    ..LINE FEEDS

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827B 0D0A00;      0599      ,A(CRLF),0
827E 2A8A;        0600      DEC CNT;GLO CNT          ..DID 20 RETURNS GO BY ?
8280 3A96;        0601      BNZ NXTLNE
8282 D483F0;      0602      SEP CALL;,A(OSTRNG)
8285 2A2A2A2A00;  0603      ,T'****',0          ..PROMPT FOR A KEY WHEN READY
828A D4813E;      0604      SEP CALL;,A(READ)
828D D483F0;      0605      SEP CALL;,A(OSTRNG)
8290 0D0A00;      0606      ,A(CRLF),0
8293 F814AA;      0607      LDI LINES;PLO CNT
8296 ;            0608
8296 12;          0609 NXTLNE: INC SP
8297 72AC;        0610      LDXA;PLO RC
8299 02BC;        0611      LDN SP;PHI RC
829B D48542;      0612      SEP CALL;,A(READT)
829E FB0A;        0613      XRI LF
82A0 3268;        0614      BZ MORLST
82A2 ;            0615
82A2 306B;        0616      BR CHKOUT          ..IT ISN'T A LINE FEED SO
82A4 ;            0617          ..SEE WHAT IT IS
82A4 F8EFAC;      0618 SHOWIT: LDI A.0(DELAY1);PLO DELAY
82A7 F880BC;      0619      LDI A.1(DELAY1);PHI DELAY
82AA D481A4;      0620      SEP CALL;,A(TYPE)          ..PUT IT TO THE TERMINAL
82AD 37B6;        0621      B4 MRLST1          ..HALT ON BREAK ASSERTED
82AF D4813E;      0622      SEP CALL;,A(READ)
82B2 FB51;        0623      XRI T'Q'          ..EXIT ON Q OR CONTINUE ON
82B4 3246;        0624      BZ PRMPT2          ..ANYTHING ELSE
82B6 ;            0625
82B6 12;          0626 MRLST1: INC SP          ..RESTORE IOCB POINTER
82B7 72AC;        0627      LDXA;PLO RC
82B9 02BC;        0628      LDN SP;PHI RC
82BB 3068;        0629      BR MORLST
82BD ;            0630
82BD ;            0631 ..*****
82BD ;            0632 ..          OUTPUT
82BD ;            0633 ..          FORMATS AND OUTPUTS MEMORY DATA BEGINNING
82BD ;            0634 ..          AT THE ADDRESS IN REG SRC FOR THE NUMBER
82BD ;            0635 ..          OF BYTES SPECIFIED IN REG CNT
82BD ;            0636 ..REG USED: SRC, CNT, CHAR
82BD ;            0637 ..*****
82BD ;            0638
82BD D48200;      0639 DISPLY: SEP CALL;,A(OPTION)          ..GET STARTING ADDRESS
82C0 FB0D;        0640      XRI CR          ..TERMINATE WITH CR
82C2 CA8085;      0641      LBNZ ERROR
82C5 ;            0642
82C5 D483F00A00;  0643 OUTPUT: SEP CALL;,A(OSTRNG);,LF,0..START ON A NEW LINE
82CA D480CD;      0644      SEP CALL;,A(OUT1)          ..OUTPUT THE ADDRESS
82CD ;            0645          ..OF THE CURRENTLY OPENED
82CD ;            0646          ..CELL
82CD ;            0647
82CD D483F0;      0648 SPCOUT: SEP CALL;,A(OSTRNG)
82D0 2000;        0649      ,SPACE,0
82D2 ;            0650
82D2 4BBF;        0651 DATOUT: LDA SRC;PHI CHAR          ..RETRIEVE THE CELL DATA
82D4 D481AE;      0652      SEP CALL;,A(TYPE2)          ..AND OUTPUT IT
82D7 8A;          0653      GLO CNT          ..DETERMINE IF THE
82D8 3ADD;        0654      BNZ NOTDON          ..REQUESTED NO. OF BYTES
82DA 9A;          0655      GHI CNT          ..HAVE BEEN SENT
82DB 3246;        0656      BZ PRMPT2          ..GET A NEW COMMAND
82DD ;            0657
82DD 2A;          0658 NOTDON: DEC CNT          ..DEC THE BYTE COUNT

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82DE 8BFA0F;    0659      GLO SRC;ANI LNECNT
82E1 3AEB;      0660      BNZ SAMELN          ..END OF CURRENT LINE?
82E3 D483F0;    0661      SEP CALL; ,A(OSTRNG)
82E6 3B0D00;    0662      ,T'; ,CR,0
82E9 30C5;      0663      BR OUTPUT
82EB ;          0664
82EB F6;        0665 SAMELN: SHR
82EC 33D2;      0666      BDP DATOUT          ..WITHIN PAIR
82EE 30CD;      0667      BR SPCOUT          ..ELSE BETWEEN PAIRS
82F0 ;          0668
82F0 ;          0669 ..*****
82F0 ;          0670 ..      READ 1 CHARACTER FROM TAPE AND DF=1 IF HEX
82F0 ;          0671 ..*****
82F0 ;          0672
82F0 D48542;    0673 RDHEX: SEP CALL; ,A(READT)
82F3 D4816F;    0674      SEP CALL; ,A(CKHXE)
82F6 D5;        0675      SEP R5
82F7 ;          0676
82F7 ;          0677 ..*****
82F7 ;          0678 ..      UT62 MOVE COMMAND
82F7 ;          0679 ..      CALLS USRMV AND REQUESTS SRC&DEST ADDR'S
82F7 ;          0680 ..*****
82F7 D48303;    0681 MOVE:  SEP CALL; ,A(READAD)          ..GET SRC&DEST ADDR'S
82FA D48429;    0682      SEP CALL; ,A(USRMV)          ..DO THE MOVE
82FD C38085;    0683      LBDP ERROR          ..ERROR IF OVER FFFF ON MOVE
8300 C08246;    0684      LBR PRMPT2          ..IF OK,GOTO UT62 PROMPT
8303 ;          0685 ..*****
8303 ;          0686 ..      SUBROUTINE TO GET THE ADDRESSES FOR OTHER ROUTINES
8303 ;          0687 ..*****
8303 D48200;    0688 READAD: SEP CALL; ,A(OPTION)          ..DETERMINE THE MODE
8306 FB20;      0689      XRI SPACE          ..MUST BE A SPACE
8308 3A60;      0690      BNZ ERR1          ..ELSE ERROR
830A ADBD;      0691      PLO ASL;PHI ASL          ..CLEAR INPUT REGISTER
830C D487EA;    0692      SEP CALL; ,A(READHX)          ..INPUT THE CONSTANT
830F FB0D;      0693      XRI CR          .. 'CR' TERMINATES
8311 3A60;      0694      BNZ ERR1          ..ELSE ERROR
8313 D5;        0695      SEP R5
8314 ;          0696 ..*****
8314 ;          0697 ..      FILLS ASL UNTIL A CARRIAGE RETURN IS ENTERED
8314 ;          0698 ..*****
8314 D4813B;    0699 READCR: SEP CALL; ,A(READAH)
8317 FB0D;      0700      XRI CR
8319 3A14;      0701      BNZ READCR
831B D5;        0702      SEP R5
831C ;          0703 ..*****
831C ;          0704 ..      READ A BIT OF DATA FROM TAPE
831C ;          0705 ..      ENTERED WITH SET P TO BITRDR
831C ;          0706 ..*****
831C ;          0707
831C D3;        0708 RBYE:  SEP PC
831D ;          0709
831D F816;      0710 RDBIT:  LDI #16          ..0/1 BIT DISTINGUISH TIMER
831F ;          0711
831F ;          0712 ..*****
831F ;          0713 ..      FOR 2 MHZ CRYSTAL
831F ;          0714 ..      THE TIMING LOOP USED GIVES 22X24US DELAY(528)
831F ;          0715 ..      TO TEST FOR A 1/0 TRANSITION DATA FROM TAPE
831F ;          0716 ..      TYPICALLY HAS A 350/750US DIFFERENCE. (0/1)
831F ;          0717 ..*****
831F ;          0718

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831F 3D1F;      0719      BN2 *          ..WAIT FOR TRANSITION
8321 D8;        0720      SEP BITRDR      ..DELAY AND THEN RETEST
8322 3D1D;      0721      BN2 RDBIT       ..TO BE SURE
8324 3D34;      0722 HERE: BN2 SLIDE1     ..TIME OUT LOOP
8326 FF013A24;  0723 HERE1: SMI 1; BNZ HERE
832A ;          0724
832A 17;        0725 HERE2: INC PARITY     ..SET BIT READ AS A ONE
832B 93;        0726      GHI PC
832C ;          0727
832C FE;        0728 SLIDE2: SHL          ..PUT BIT IN DF
832D 352D;      0729 SLIDE3: B2 *        ..WAIT FOR BIT TO END
832F D8;        0730      SEP BITRDR      ..DELAY AND RETEST TO
8330 352D;      0731      B2 SLIDE3       ..BE SURE
8332 301C;      0732      BR RBYE
8334 ;          0733
8334 FF01;      0734 SLIDE1: SMI 1        ..DECREMENT LOOP COUNT AND RETEST
8336 3D2C;      0735      BN2 SLIDE2     ..BRANCH IF STILL FALSE TO SET BIT A ZERO
8338 3A26;      0736      BNZ HERE1      ..IF TIME OUT GO TO SET BIT A ONE
833A 302A;      0737      BR HERE2       ..ELSE CONTINUE TIMEOUT
833C ;          0738
833C ;          0739 ..*****
833C ;          0740                      ORG UT62+#035D
833D ;          0741
833D C087F0;    0742 PRMPT5: LBR RENTER
8360 C08085;    0743 ERR1:  LBR ERROR          ..GENERAL FOR THIS PAGE
8363 ;          0744
8363 ;          0745 ..*****
8363 ;          0746 ..DESC: STANDARD CALL AND RETURN
8363 ;          0747 ..REG USED: SP,PC,CALL,RETURN,LINK & STACK
8363 ;          0748 ..*****
8363 ;          0749                      ORG UT62+#0363
8363 ;          0750                      .. STANDARD CALL
8363 ;          0751
8363 D3;        0752 EXITC: SEP PC          ..GO TO IT
8364 ;          0753
8364 E2;        0754 CALLR: SEX SP          ..SET R(X)
8365 9673;      0755      GHI LINK;STXD     ..SAVE THE CURRENT LINK ON
8367 8673;      0756      GLO LINK;STXD     ..THE STACK
8369 93B6;      0757      GHI PC;PHI LINK
836B 83A6;      0758      GLO PC;PLO LINK
836D 46B3;      0759      LDA LINK;PHI PC     ..PICK UP THE SUBROUTINE
836F 46A3;      0760      LDA LINK;PLO PC     ..ADDRESS
8371 3063;      0761      BR EXITC
8373 ;          0762                      ..STANDARD RETURN
8373 ;          0763
8373 D3;        0764 EXITR: SEP PC          ..RETURN TO MAIN PGM.
8374 ;          0765
8374 96B3;      0766 RETR:  GHI LINK;PHI PC
8376 86A3;      0767      GLO LINK;PLO PC
8378 E212;      0768      SEX SP;INC SP       ..SET THE STACK POINTER
837A 72A6;      0769      LDXA;PLO LINK     ..RESTORE THE CONTENTS OF
837C F0B6;      0770      LDX;PRI LINK       ..LINK
837E 9F;        0771      GHI CHAR          ..PUT THE CONTENTS OF CHAR.1 INTO D
837F ;          0772                      ..BEFORE RETURNING
837F 3073;      0773      BR EXITR
8381 ;          0774
8381 ;          0775 ..*****
8381 ;          0776 ..                      REGISTER INITIALIZATION ROUTINE
8381 ;          0777 ..          INITIALIZES REGISTER C TO THE DELAY ROUTINE, REG 2 AS A STACK
8381 ;          0778 ..          POINTER TO LOCATION 8CFF HEX, REG 4 TO CALL, REG 5 TO RETURN

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8381 ;          0779 ..      AND REG 3 AS PROGRAM COUNTER. FOR ENTER1 REG 3 IS 0005, FOR
8381 ;          0780 ..      ENTER2 REG 3 MUST BE PRESET.
8381 ;          0781 ..      REG USED:  PC, DELAY, CALL, RETURN, SP
8381 ;          0782 ..      *****
8381 ;          0783
8381 F82CA3;      0784 INIT:   LDI A.0(START);PLO PC
8384 F880B3;      0785       LDI A.1(START);PHI PC
8387 308F;        0786       BR ENTER2
8389 ;          0787
8389 F805A3;      0788 ENTER1: LDI A.0(PGMSRT);PLO PC
838C F800B3;      0789       LDI A.1(PGMSRT);PHI PC
838F ;          0790
838F F8EFAC;      0791 ENTER2: LDI A.0(DELAY1);PLO DELAY    ..DELAY ROUTINE
8392 F880BC;      0792       LDI A.1(DELAY1);PHI DELAY
8395 F883B4B5;    0793       LDI A.1(CALLR);PHI CALL;PHI RETN
8399 F864A4;      0794       LDI A.0(CALLR);PLO CALL
839C F874A5;      0795       LDI A.0(RETR);PLO RETN
839F F8FFA2;      0796       LDI A.0(TOPSTK);PLO SP
83A2 F88CB2;      0797       LDI A.1(TOPSTK);PHI SP
83A5 E2D3;        0798       SEX SP;SEP PC
83A7 ;          0799
83A7 ;          0800 ..      *****
83A7 ;          0801 ..      HEX BYTE INSERT ROUTINE
83A7 ;          0802 ..      INSERTS HEX PAIRS INTO MEMORY STARTING AT A SPECIFIED
83A7 ;          0803 ..      ADDRESS. AFTER A ";" ALL IS IGNORED UNTIL A RETURN
83A7 ;          0804 ..      THEN A NEW ADDRESS IS EXPECTED. ANY NON-HEX DATA IS
83A7 ;          0805 ..      IGNORED BETWEEN HEX PAIRS BUT NOTHING IS PERMITTED
83A7 ;          0806 ..      BETWEEN MEMBERS OF THE PAIR. ROUTINE IS TERMINATED
83A7 ;          0807 ..      WITH A RETURN, EXCEPT AFTER A ";".
83A7 ;          0808 ..      REG USED:  ASL, SRC, CHAR
83A7 ;          0809 ..      *****
83A7 ;          0810
83A7 F800BDAD;    0811 INSERT: LDI 0;PHI ASL;PLO ASL    ..CLEAR INPUT REGISTER
83AB ;          0812
83AB D487EA;      0813 FSTHEX: SEP CALL;A(READHX)    ..WAIT FOR FIRST NON-HEX INPUT
83AE FB20;        0814       XRI SPACE    ..FIRST NON-HEX MUST BE
83B0 3A60;        0815       BNZ ERR1    ..A SPACE
83B2 9DBB;        0816       GHI ASL;PHI SRC    ..STORE STARTING ADDRESS
83B4 8DAB;        0817       GLO ASL;PLO SRC
83B6 ;          0818
83B6 D4813B;      0819 NXTCHR: SEP CALL;A(READAH)    ..GET FIRST CHARACTER
83B9 3BC5;        0820       BNF NTDATA
83BB D4813B;      0821       SEP CALL;A(READAH)    ..OTHERWISE SECOND ONE MUST BE HEX
83BE 3B60;        0822       BNF ERR1
83C0 8D5B;        0823       GLO ASL;STR SRC    ..STORE THE DATA
83C2 1B;          0824       INC SRC    ..POINT TO THE NEXT CELL
83C3 30B6;        0825       BR NXTCHR    .. & CONTINUE
83C5 ;          0826
83C5 FB0D;        0827 NTDATA: XRI CR    ..DONE IF CR
83C7 325D;        0828       BZ PRMPT5
83C9 9F;          0829       GHI CHAR
83CA FB3B;        0830       XRI SEMCOL    ..IF ";" WAIT FOR CRLF
83CC 3AD3;        0831       BNZ COMCHK    ..ELSE CHECK IF ","
83CE D483DD;      0832       SEP CALL;A(CKCRFLF)
83D1 30A7;        0833       BR INSERT    ..GO GET NEW ADDRESS
83D3 ;          0834
83D3 9F;          0835 COMCHK: GHI CHAR    ..CHECK FOR ","
83D4 FB2C;        0836       XRI COMMA
83D6 3AB6;        0837       BNZ NXTCHR    ..IGNORE IF NOT , ; CR
83D8 D483DD;      0838       SEP CALL;A(CKCRFLF)    ..WAIT FOR CRLF

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83DB 30B6;      0839      BR NXTCHR
83DD ;          0840
83DD D4813E;    0841 CKCRLF: SEP CALL; ,A(READ)      ..GET A CHAR
83E0 FB0D;      0842      XRI CR                  ..IS IT CR?
83E2 3A60;      0843      BNZ ERR1                 ..BETTER BE!
83E4 D4813E;    0844      SEP CALL; ,A(READ)        ..GET NEXT CHAR
83E7 FB0A;      0845      XRI LF                  ..IS IT LF?
83E9 3A60;      0846      BNZ ERR1                 ..ERROR IF NO!
83EB D5;        0847      SEP R5                   ..EXIT IF ALL OK
83EC ;          0848
83EC ;          0849 ..*****
83EC ;          0850 ..      UTILITY ENTRY TABLE
83EC ;          0851 ..*****
83EC ;          0852      ORG UT62+#03F0
83F0 ;          0853
83F0 C08419;    0854 OSTRNG: LBR MSGE
83F3 C08389;    0855 INIT1: LBR ENTER1
83F6 C0838F;    0856 INIT2: LBR ENTER2
83F9 C087F0;    0857 GOUT62: LBR RENTER
83FC C0816F;    0858 CKHEX: LBR CKHXE
83FF ;          0859
83FF ;          0860 ..*****
83FF ;          0861 ..      ..TAPES OFF ROUTINE
83FF E3;        0862 TPOFF: SEX PC
8400 6102;      0863      OUT BDSEL; ,TAPEIO          ..SELECT TAPE BD
8402 6400;      0864      OUT TPESEL; ,TPEOFF        ..OUTPUT OFF BITS
8404 6101;      0865      OUT BDSEL; ,TRMINL         ..SELECT RCA GRP
8406 D5;        0866      SEP R5                   ..RETURN TO CALLER
8407 ;          0867
8407 ;          0868 ..*****
8407 ;          0869 ..      ..REGISTER SAVE ROUTINES
8407 ;          0870 ..      SAVES THE CONTENTS OF REGISTERS TMPRG1 (7),
8407 ;          0871 ..      TMPRG2 (8), TMPRG3 (9) AND CNT (A) ON THE STACK.
8407 ;          0872 ..      USES 8 BYTES OF STACK, AND LEAVES STACK POINTER
8407 ;          0873 ..      AT A FREE BYTE
8407 ;          0874 ..*****
8407 ;          0875
8407 8A73;      0876 REGSAV: GLO CNT;STXD
8409 9A73;      0877      GHI CNT;STXD
840B 8973;      0878      GLO TMPRG3;STXD
840D 9973;      0879      GHI TMPRG3;STXD
840F 8873;      0880      GLO TMPRG2;STXD
8411 9873;      0881      GHI TMPRG2;STXD
8413 8773;      0882      GLO TMPRG1;STXD
8415 9773;      0883      GHI TMPRG1;STXD
8417 9F;        0884      GHI CHAR          ..TO COMPENSATE FOR BASIC CALL
8418 D5;        0885      SEP R5
8419 ;          0886
8419 ;          0887 ..*****
8419 ;          0888 ..      OSTRNG
8419 ;          0889 ..*****
8419 ;          0890
8419 F8EFAC;    0891 MSGE: LDI #EF;PLO DELAY
841C F880BC;    0892      LDI #80;PHI DELAY
841F ;          0893
841F 46BF;      0894 MSGE1: LDA LINK;PHI CHAR
8421 3228;      0895      BZ EXITM
8423 D48198;    0896      SEP CALL; ,A(TYPED)
8426 301F;      0897      BR MSGE1
8428 ;          0898

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8428 D5;          0899 EXITM:  SEP R5
8429 ;           0900
8429 ;           0901 ..*****
8429 ;           0902 ..      MOVE ROUTINE
8429 ;           0903 ..      COPIES A BLOCK OF MEMORY FORM ONE CONTINUOUS AREA
8429 ;           0904 ..      TO ANOTHER CONTINUOUS AREA IN MEMORY. THERE IS NO
8429 ;           0905 ..      RESTRICTION AS TO THE DIRECTION OF THE MOVE AND THE
8429 ;           0906 ..      AREAS MAY OVERLAP.
8429 ;           0907 ..      REG USED:  SRC, DEST, CHAR, & CNT
8429 ;           0908 ..*****
8429 ;           0909
8429 E2;          0910 USRMV:  SEX SP
842A 8B52;        0911      GLO SRC;STR SP          ..TEST THE RELATIVE POSITION
842C 8DF7;        0912      GLO DEST;SM           ..OF SOURCE & DESTINATION
842E 3A36;        0913      BNZ DIRECT           ..NOT EQUAL!
8430 9B52;        0914      GHI SRC;STR SP       ..RETURN IF THEY ARE EQUAL
8432 9D77;        0915      GHI DEST;SMB
8434 3272;        0916      BZ USRBYE           ..EXIT TO CALLER
8436 ;           0917
8436 8B52;        0918 DIRECT: GLO SRC;STR SP     ..ELSE TEST FOR UP OR DOWN
8438 8DF7;        0919      GLO DEST;SM           ..DIRECTION OF THE MOVE
843A 9B52;        0920      GHI SRC;STR SP
843C 9D77;        0921      GHI DEST;SMB
843E 334D;        0922      BDF MOVUP
8440 ;           0923
8440 0B5D;        0924 MOVDN:  LDN SRC;STR DEST    ..DO THE MOVE DOWN AND
8442 8A;          0925      GLO CNT              ..AND CHECK IF DONE
8443 3A48;        0926      BNZ MOVDN1
8445 9A;          0927      GHI CNT
8446 3272;        0928      BZ USRBYE           ..EXIT TO CALLER
8448 ;           0929
8448 1B1D;        0930 MOVDN1: INC SRC;INC DEST    ..ADJUST THE POINTERS
844A 2A;          0931      DEC CNT              ..REDUCE THE BYTE COUNT
844B 3040;        0932      BR MOVDN            ..FINISHED
844D ;           0933
844D 8A52;        0934 MOVUP:  GLO CNT;STR SP      ..SET THE POINTERS TO THE
844F 8BF4AB;      0935      GLO SRC;ADD;PLO SRC    ..TOP OF MOVE AREAS
8452 9A52;        0936      GHI CNT;STR SP
8454 9B74BB;      0937      GHI SRC;ADC;PHI SRC
8457 8A52;        0938      GLO CNT;STR SP
8459 8DF4AD;      0939      GLO DEST;ADD;PLO DEST
845C 9A52;        0940      GHI CNT;STR SP
845E 9D74BD;      0941      GHI DEST;ADC;PHI DEST
8461 3B65;        0942      BNF UP
8463 ;           0943
8463 3073;        0944 ERRCO:  BR USRBYE+1        ..EXIT DF=1 IF OVERFLOW
8465 ;           0945
8465 0B5D;        0946 UP:    LDN SRC;STR DEST    ..DO THE MOVE UP
8467 8A;          0947      GLO CNT              ..AND CHECK IF DONE
8468 3A6D;        0948      BNZ UP1
846A 9A;          0949      GHI CNT
846B 3272;        0950      BZ USRBYE           ..EXIT TO CALLER
846D ;           0951
846D 2B2D2A;      0952 UP1:   DEC SRC;DEC DEST;DEC CNT..ADJUST THE POINTERS
8470 3065;        0953      BR UP
8472 ;           0954
8472 F6;          0955 USRBYE: SHR              ..SET DF=0 IF A{FFFF
8473 D5;          0956      SEP R5              ..EXIT TO CALLER
8474 ;           0957
8474 ;           0958 ..*****

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8474 ;          0959 ..          TAPE LOADER ROUTINE
8474 ;          0960 ..LOADS USER MEMORY FROM TAPE, ASSUMES TAPE HAS "M" OR "I" TO
8474 ;          0961 ..INDICATE START OF DATA TO BE STORED. "P" FOLLOWED BY AN ADDRESS
8474 ;          0962 ..STARTS PROGRAM EXECUTION WITH P=0 AND X=0.
8474 ;          0963 ..*****
8474 ;          0964
8474 D48774;      0965 TPLoad: SEP CALL; ,A(FINDTP)          ..SELECT TAPE
8477 9C73;        0966          GHI RC;STXD
8479 8C73;        0967          GLO RC;STXD
847B D483F0;      0968          SEP CALL; ,A(OSTRNG)
847E 0A4C4F4144494E; 0969          ,LF,T'LOADING',0
8485 4700;        0969
8487 12;          0970          INC SP
8488 72AC;        0971          LDXA;PLO RC
848A 02BC;        0972          LDN SP;PHI RC
848C ;           0973
848C D48542;      0974 READZ: SEP CALL; ,A(READT)          ..READ 1 ASCII DIGIT
848F FB50;        0975          XRI T'P'          ..CHECK FOR PROGRAM EXECUTE
8491 32DF;        0976          BZ ADLP
8493 FB1D;        0977          XRI #1D          ..SET MEMORY?
8495 CE;          0978          LSZ
8496 F804;        0979          XRI #04          ..INSERT MEMORY?
8498 32A0;        0980          BZ READX1
849A FB5A;        0981          XRI #5A          ..CHECK FOR EOF(DC3)
849C 32F9;        0982          BZ PRMPT4
849E 308C;        0983          BR READZ
84A0 ;           0984
84A0 ;           0985          ..READ THE HEX ADDRESS
84A0 ;           0986
84A0 D482F0;      0987 READX1: SEP CALL; ,A(RDHEX) ..IGNORE ALL TILL HEX DIGIT
84A3 33B2;        0988          BDF READX2          ..THEN GET SECOND ONE
84A5 FB2E;        0989          XRI #2E          ..UNLESS "." WHICH MEANS COMMENT
84A7 3AA0;        0990          BNZ READX1
84A9 D48542;      0991 READXA: SEP CALL; ,A(READT) ..THEN IGNORE ALL TILL END OF LINE
84AC FB0D;        0992          XRI CR
84AE 3AA9;        0993          BNZ READXA
84B0 30A0;        0994          BR READX1
84B2 ;           0995
84B2 D482F0;      0996 READX2: SEP CALL; ,A(RDHEX) ..READ NEXT ASCII CHARACTER
84B5 33B2;        0997          BDF READX2          ..IF HEX KEEP READING
84B7 FB20;        0998          XRI SPACE          ..OTHERWISE MUST BE A SPACE
84B9 3AE7;        0999          BNZ ERRORX
84BB 9DB8;        1000          GHI ASL;PHI ADRPTR
84BD 8DA8;        1001          GLO ASL;PLO ADRPTR
84BF ;           1002
84BF D482F0;      1003 READX3: SEP CALL; ,A(RDHEX) ..READ NEXT ASCII CHARACTER
84C2 33CE;        1004          BDF READXB          ..IF HEX THEN IT'S DATA & NEED ANOTHER
84C4 FB0D;        1005          XRI CR          ..OR COULD BE END OF LINE
84C6 328C;        1006          BZ READZ          ..THEN START AGAIN
84C8 FB36;        1007          XRI #36          ..OR IF ";" THEN IT IS END OF DATA
84CA 32A9;        1008          BZ READXA          ..FOR THIS LINE
84CC 30BF;        1009          BR READX3          ..CAN ONLY BE MORE DATA
84CE ;           1010
84CE D482F0;      1011 READXB: SEP CALL; ,A(RDHEX) ..READ 2ND ASCII CHARACTER
84D1 3BE7;        1012          BNF ERRORX          ..BETTER BE A HEX DIGIT
84D3 8D58;        1013          GLO ASL;STR ADRPTR          ..STORE AT THE SPECIFIED ADDRESS
84D5 E8F3;        1014          SEX ADRPTR;XOR          ..MAKE SURE THERE WAS RAM THERE
84D7 32DC;        1015          BZ WRTOK
84D9 D485C5;      1016          SEP CALL; ,A(NOTRAM)
84DC ;           1017

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84DC 18;          1018 WRTOX:  INC ADPCTR
84DD 30BF;        1019          BR READX3
84DF ;           1020
84DF ;           1021          ..ROUTINE TO START A PROGRAM RUNNING
84DF ;           1022
84DF D482F0;      1023 ADLP:  SEP CALL; ,A(RDHEX)  ..GET THE START ADDRESS
84E2 33DF;        1024          BDF ADLP
84E4 C0853C;      1025          LBR RUN1
84E7 ;           1026
84E7 ;           1027          ..ERROR MESSAGE
84E7 ;           1028
84E7 D483F0;      1029 ERRORX: SEP CALL; ,A(OSTRNG)
84EA 0D0A464F524D41; 1030          ,A(CRLF),T'FORMAT ERROR',0
84F1 54204552524F52; 1030
84F8 00;          1030
84F9 C087F0;      1031 PRMPT4: LBR RENTER
84FC ;           1032
84FC ;           1033 ..*****
84FC ;           1034 ..      USER ENTRY POINTS FOR TAPE ROUTINES
84FC ;           1035 ..*****
84FC ;           1036          ORG #8500
8500 ;           1037
8500 3090;        1038          BR TWRITE          ..ENTRY TO TAPE WRITE
8502 ;           1039
8502 3042;        1040          BR READT          ..ENTRY TO TAPE READ
8504 ;           1041
8504 ;           1042 ..*****
8504 ;           1043 ..      TAPE REWIND ROUTINE
8504 ;           1044 ..*****
8504 ;           1045
8504 D483F0;      1046 REWIND: SEP CALL; ,A(OSTRNG)
8507 0D0A524557494E; 1047          ,A(CRLF),T'REWIND,THEN HIT ANY KEY',0
850E 442C5448454E20; 1047
8515 48495420414E59; 1047
851C 204B455900;  1047
8521 E3;          1048          SEX PC
8522 6102;        1049          OUT BDSEL; ,TAPEIO
8524 64C0;        1050          OUT TPESL; ,8THDRV
8526 6101;        1051          OUT BDSEL; ,TRMNL
8528 D4813E;      1052          SEP CALL; ,A(READ)  ..WAIT FOR KEY
852B C083FF;      1053          LBR TPOFF
852E ;           1054
852E D48504;      1055 TPWIND: SEP CALL; ,A(REWIND)  ..FOR THE UTILITY CALL "J"
8531 C087F0;      1056          LBR RENTER
8534 ;           1057
8534 ;           1058 ..*****
8534 ;           1059 ..      STARTS A USER PROGRAM WITH SPECIFIED ADDRESS
8534 ;           1060 ..      IN REGISTER 0, AND X=0. THE SCREEN IS CLEARED
8534 ;           1061 ..      AND THE CURSOR IS HOMED.
8534 ;           1062 ..REG USED:  CHAR, ASL, R0
8534 ;           1063 ..*****
8534 ;           1064
8534 D487EA;      1065 RUN:  SEP CALL; ,A(READHX)  ..LOOK FOR STARTING ADDRESS
8537 FB0D;        1066          XRI CR          ..FIRST NON-HEX MUST BE A
8539 CA8085;      1067          LBNZ ERROR          ..CR, ELSE SYNTAX ERROR
853C ;           1068
853C 9DB0;        1069 RUN1:  GHI ASL; PHI R0          ..GET THE ADDRESS
853E 8DA0;        1070          GLO ASL; PLO R0
8540 E0;          1071          SEX R0
8541 D0;          1072          SEP R0          ..AND GO!

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8542 ;          1073
8542 ;          1074 ..*****
8542 ;          1075 ..          READ TAPE ROUTINE
8542 ;          1076 ..          INITIALLY READS ONE BLOCK OF 384 BYTES INTO A BUFFER FROM TAPE
8542 ;          1077 ..          THEN EACH CALL TO IT PUTS ONE BYTE INTO CHAR.1 AND DECREMENTS
8542 ;          1078 ..          DOWN THE BUFFER UNTILL IT IS EMPTY THEN GETS NEXT BUFFER LOAD
8542 ;          1079 ..          USES A 3 BYTE BUFFER WHICH WHEN NOT IN USE IS STORED ON STACK
8542 ;          1080 ..          LOWEST ADDRESS IS BLOCK COUNT
8542 ;          1081 ..          NEXT IS DRIVE # IN TOP2 BITS AND MSB OF BYTE COUNT
8542 ;          1082 ..          HIGHEST IS REST OF BYTE COUNT
8542 ;          1083 ..          PTR (REGISTER C) NORMALLY POINTS AT THE HIGHEST BYTE
8542 ;          1084 ..          %% NOTE: REGISTER C MUST CONTAIN THE IOCB ADDRESS AS SET UP
8542 ;          1085 ..          IN THE ROUTINE FINDTP. %%
8542 ;          1086 ..*****
8542 ;          1087
8542 9373;          1088 READT:  GHI PC;STXD          ..INIT PARITY FLAG
8544 0C;          1089          LDN PTR          ..IF BYTE CNT GREATER THAN 0, THEN JUST PUT IT
8545 3A7B;          1090          BNZ EXRD          ..IN CHAR.1
8547 2C;          1091          DEC PTR
8548 0CF6;          1092          LDN PTR;SHR          ..TEST HI BIT OF IOCB
854A 3379;          1093          BDF EXRD1
854C 0CF901;          1094          LDN PTR;ORI 1          ..SET BYTE COUNT TO MAXIMUM
854F 5C;          1095          STR PTR
8550 1C;          1096          INC PTR
8551 F8805C;          1097          LDI #80;STR PTR
8554 D48676;          1098          SEP CALL;A(RDBLOK)          ..GET NEXT BLOCK FROM TAPE
8557 3B7A;          1099          BNF TAG1          ..IF NO PARITY ERR
8559 12;          1100          INC SP          ..OTHERWISE SET PARITY FLAG
855A F80073;          1101          LDI 0;STXD
855D 9C73;          1102          GHI PTR;STXD          ..SAVE IOCB!
855F 8C73;          1103          GLO PTR;STXD
8561 D483F0;          1104          SEP CALL;A(OSTRNG)
8564 0D0A5041524954; 1105          ,A(CRLF),T'PARITY BAD'
856B 5920424144;          1105
8570 0D0A00;          1106          ,A(CRLF),0
8573 12;          1107          INC SP          ..RESTORE IOCB
8574 42AC;          1108          LDA SP;PLO PTR
8576 02BC;          1109          LDN SP;PHI PTR
8578 38;          1110          SKP
8579 ;          1111
8579 1C;          1112 EXRD1:  INC PTR
857A ;          1113
857A 0C;          1114 TAG1:  LDN PTR          ..DEC BYTE COUNT IN THE IOCB
857B FF015C;          1115 EXRD:  SMI 1;STR PTR
857E AF;          1116          PLO CHAR          ..CHAR POINTS INTO THE READ BUFFER
857F 2C;          1117          DEC PTR
8580 0C7F005C;          1118          LDN PTR;SMBI 0;STR PTR
8584 FA01FC8DBF;          1119          ANI 1;ADI A.1(RDBUFF-256);PHI CHAR
8589 1C;          1120          INC PTR
858A 0FBF;          1121          LDN CHAR;PHI CHAR          ..PUT THE BYTE INTO CHAR.1
858C 12;          1122          INC SP          ..SET PARITY FLAG (1=PASS)
858D 02FE;          1123          LDN SP;SBL
858F D5;          1124          SEP R5
8590 ;          1125
8590 ;          1126 ..*****
8590 ;          1127 ..          WRITE TAPE ROUTINE
8590 ;          1128 ..          PUTS BYTE FROM CHAR.1 INTO BLOCK BUFFER.
8590 ;          1129 ..          WHEN BUFFER FULL,WRITES IT TO SELECTED TAPE.
8590 ;          1130 ..          NOTE: REGISTER C MUST CONTAIN THE IOCB ADDRESS
8590 ;          1131 ..*****

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8590 ; 1132
8590 9F52; 1133 TWRITE: GHI CHAR;STR SP ..SAVE BYTE
8592 0CFC80AF; 1134 LDN PTR;ADI A.0(WRTBUF);PLO CHAR
8596 2C; 1135 DEC PTR ..CHAR POINTS TO NEXT FREE
8597 0CFA01; 1136 LDN PTR;ANI 1 ..BUFFER LOCATION
859A 7C8EBF; 1137 ADCI A.1(WRTBUF);PHI CHAR
859D 025F; 1138 LDN SP;STR CHAR ..WRITE BYTE TO BUFFER
859F 1F; 1139 INC CHAR
85A0 1C; 1140 INC PTR ..PT TO IOCB3
85A1 0CFC015C; 1141 LDN PTR;ADI 1;STR PTR ..INC BYTE CNT
85A5 2C; 1142 DEC PTR
85A6 0C7C005C; 1143 LDN PTR;ADCI 0;STR PTR
85AA 1C; 1144 INC PTR
85AB 9FFB90; 1145 GHI CHAR;XRI #90 ..BUFF FULL?
85AE 3AC2; 1146 BNZ EXWT
85B0 D485FE; 1147 SEP CALL;A(WRBLOK) ..ELSE,WRITE BUFFER TO TAPE
85B3 2C2C; 1148 DEC PTR;DEC PTR ..PT TO BLK CNT
85B5 0CFC015C; 1149 LDN PTR;ADI 1;STR PTR ..INC CNT
85B9 1C; 1150 INC PTR ..POINT TO BYTE COUNT
85BA 0CFAFE; 1151 LDN PTR;ANI #FE ..SET IT TO 0
85BD 5C1C; 1152 STR PTR;INC PTR
85BF F8005C; 1153 LDI 0;STR PTR
85C2 ; 1154
85C2 FF00; 1155 EXWT: SMI 0
85C4 D5; 1156 SEP R5
85C5 ; 1157
85C5 ; 1158 ..*****
85C5 ; 1159 .. MESSAGE FOR NO RAM AT A LOCATION FOR STORE OF A READ
85C5 ; 1160 ..*****
85C5 ; 1161
85C5 9C73; 1162 NOTRAM: GHI RC;STXD
85C7 8C73; 1163 GLO RC;STXD
85C9 D483F0; 1164 SEP CALL;A(OSTRNG)
85CC 0D0A4E4F205241; 1165 ,A(CRLF),T'NO RAM @',0
85D3 4D204000; 1166
85D7 98BF; 1166 GHI ADRPTR;PHI CHAR ..TELL HIM THE ADDRESS
85D9 D481AE; 1167 SEP CALL;A(TYPE2)
85DC 88BF; 1168 GLO ADRPTR;PHI CHAR
85DE D481AE; 1169 SEP CALL;A(TYPE2)
85E1 12; 1170 INC SP
85E2 72AC; 1171 LDXA;PLO RC
85E4 02BC; 1172 LDN SP;PHI RC
85E6 D5; 1173 SEP R5
85E7 ; 1174 ..*****
85E7 ; 1175 .. ROM ENTRY FROM UTILITY
85E7 ; 1176 ..*****
85E7 F890B0; 1177 EDITOR: LDI AEDIT;PHI R0
85EA 30F9; 1178 BR GOADD
85EC ; 1179
85EC F89BB0; 1180 ASSEMB: LDI AASM;PHI R0
85EF 30F9; 1181 BR GOADD
85F1 ; 1182
85F1 F8B0B0; 1183 BASIC: LDI ABAS;PHI R0
85F4 30F9; 1184 BR GOADD
85F6 ; 1185
85F6 F8E0B0; 1186 PROMIT: LDI PRMPGR;PHI R0
85F9 ; 1187
85F9 F800A0; 1188 GOADD: LDI 0;PLO R0
85FC E0; 1189 SEX R0
85FD D0; 1190 SEP R0 ..GO TO ROM

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85FE ; 1191
85FE ; 1192 ..*****
85FE ; 1193 .. WRITE BLOCK ROUTINE
85FE ; 1194 .. WRITES A BLOCK OF 384 BYTES TO TAPE
85FE ; 1195 ..*****
85FE ; 1196
85FE D48407; 1197 WRBLOK: SEP CALL; ,A(REGSAV)
8601 8B52; 1198 GLO RB;STR SP ..NEED EXTRA STORAGE
8603 F880AA; 1199 LDI A.0(WRTBUF);PLO BUFPTR..POINT TO WRITE BUFFER
8606 F88EBA; 1200 LDI A.1(WRTBUF);PHI BUFPTR
8609 AB; 1201 PLO BLKFLG ..INIT BLOCK FLAG
860A F859A8; 1202 LDI A.0(WRBIT);PLO BITWRT
860D F886B8; 1203 LDI A.1(WRBIT);PHI BITWRT
8610 E3; 1204 SEX PC
8611 6102; 1205 OUT BDSEL; ,TAPEIO
8613 EC2C; 1206 SEX PTR;DEC PTR ..POINT TO DRIVE #
8615 64; 1207 OUT TPESEL ..SELECT DRIVE(S)
8616 2C2C; 1208 DEC PTR;DEC PTR ..PT TO BLOCK COUNT
8618 0C; 1209 LDN PTR
8619 3A1E; 1210 BNZ LDR2
861B F8C0C8; 1211 LDI #CO;LSKP ..COUNT FOR INITIAL LEADER
861E F810; 1212 LDR2: LDI #10 ..COUNT FOR INTER BLOCK LEADER
8620 B9; 1213 PHI LDRCNT
8621 FC00; 1214 LEADER: ADI 0 ..SET DF=0 TO WRITE A LOW
8623 D8; 1215 SEP BITWRT ..WRITE ONE ZERO
8624 29; 1216 DEC LDRCNT
8625 99; 1217 GHI LDRCNT
8626 3A21; 1218 BNZ LEADER
8628 F810A7; 1219 SET1: LDI #10;PLO PARITY ..PRESET PARITY EVEN
862B F808A9; 1220 LDI 8;PLO BITCNT ..PRESET BIT COUNTER
862E 8B; 1221 GLO BLKFLG
862F 3237; 1222 BZ NOTBLK
8631 4CB7; 1223 LDA PTR;PHI BYTSTR ..STORE THE BYTE TO BE WRITTEN
8633 F800AB; 1224 LDI 0;PLO BLKFLG ..CLEAR THE BLOCK FLAG
8636 C8; 1225 LSKP ..IT IS THE BLOCK START
8637 ; 1226
8637 4AB7; 1227 NOTBLK: LDA BUFPTR;PHI BYTSTR ..STORE FIRST BYTE
8639 FF00; 1228 SMI 0
863B D8; 1229 SEP BITWRT ..WRITE START BIT
863C ; 1230
863C 97F6; 1231 SET: GHI BYTSTR;SHR ..MOVE EACH BIT INTO DF FOR
863E B7; 1232 PHI BYTSTR ..OUTPUT
863F D8; 1233 SEP BITWRT
8640 29; 1234 DEC BITCNT
8641 89; 1235 GLO BITCNT
8642 3A3C; 1236 BNZ SET ..DO IT FOR ALL BITS
8644 17; 1237 INC PARITY ..SET ODD PARITY
8645 87F6; 1238 GLO PARITY;SHR
8647 D8; 1239 SEP BITWRT ..WRITE OUT PARITY
8648 9AFB90; 1240 GHI BUFPTR;XRI #90 ..BUFFER DONE?
864B 3A28; 1241 BNZ SET1
864D D8; 1242 SEP BITWRT ..REPEAT PARITY FOR 2 BITS
864E D8; 1243 SEP BITWRT
864F 1C; 1244 INC PTR ..PT TO IOCB#3
8650 02AB; 1245 LDN SP;PLO RB ..REPLACE REG B
8652 ; 1246
8652 D487D7; 1247 RESTOR: SEP CALL; ,A(REGSTR)
8655 C083FF; 1248 LBR TPOFF
8658 ; 1249 ..*****
8658 ; 1250 .. ROUTINE TO WRITE A BIT ONTO TAPE

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8658 ;          1251 ..          ENTERED WITH SEP TO BITWRTR
8658 ;          1252 ..*****
8658 ;          1253
8658 D3;          1254 BYE:      SEP PC
8659 ;          1255
8659 E8;          1256 WRBIT:   SEX BITWRT
865A F8FFAF;      1257          LDI #FF;PLO FLAG          ..FLAG FOR SIGNAL HIGH (FF),
865D ;          1258          ..LOW (00)
865D F80C;        1259          LDI #0C          ..0 BIT TIMING
865F 3B64;        1260          BNF OUTAPE
8661 F827;        1261          LDI #27          ..1 BIT TIMING
8663 17;          1262          INC PARITY          ..INC PARITY CTR IF 1 BIT
8664 ;          1263
8664 6501;        1264 OUTAPE:   OUT TPEWRT; ,HIGH
8666 BF;          1265          PHI CHAR          ..SAVE BIT TIMING IN CHAR.1
8667 FF01;        1266 TEST1:   SMI 1          ..DEC TIMER
8669 3A67;        1267          BNZ TEST1          ..KEEP HI TIL CNT = 0
866B BF;          1268          GLO FLAG
866C 3258;        1269          BZ BYE          ..EXIT WHEN TAPE SIGNAL IS A LOW
866E F800AF;      1270          LDI 0;PLO FLAG          ..SET FLAG FOR A LOW
8671 6500;        1271          OUT TPEWRT; ,LOW
8673 9F;          1272          GHI CHAR          ..GET THE BIT TIMING
8674 3067;        1273          BR TEST1
8676 ;          1274
8676 ;          1275 ..*****
8676 ;          1276 ..          READ BLOCK ROUTINE
8676 ;          1277 ..          READS ONE BLOCK, 384 BYTES, FROM TAPE INTO THE READ BUFFER
8676 ;          1278 ..          EXITS WITH DF AS PARITY FLAG, 0 IS GOOD
8676 ;          1279 ..*****
8676 ;          1280
8676 D48407;      1281 RDBLOK:   SEP CALL; ,A(REGSAV)
8679 F87FAA;      1282          LDI A.0(RDBUFF);PLO BUFPTR
867C F88EBA;      1283          LDI A.1(RDBUFF);PHI BUFPTR
867F BF;          1284          PHI FLAG          ..INITIALIZE BLOCK FLAG TO SET
8680 F800AF;      1285          LDI 0;PLO FLAG          ..AND PARITY FLAG TO GOOD
8683 F81DA8;      1286          LDI A.0(RDBIT);PLO BITRDR
8686 F883B8;      1287          LDI A.1(RDBIT);PHI BITRDR
8689 E3;          1288          SEX PC
868A 6102;        1289          OUT BSEL; ,TAPELO
868C 2C;          1290          DEC PTR          ..MOVE TO DRIVE # IN IOCB
868D 0CFE;        1291          LDN PTR;SHL
868F 1C;          1292          INC PTR          ..BACK TO HOME IN IOCB
8690 3395;        1293          BDF DR1
8692 6440;        1294          OUT TPESEL; ,DRIVE0
8694 C8;          1295          LSKP
8695 ;          1296
8695 6480;        1297 DR1:     OUT TPESEL; ,DRIVE1
8697 ;          1298
8697 F808B9;      1299 LDR1:     LDI #08;PHI LDRCNT
869A ;          1300
869A D8;          1301 LEDER1:   SEP BITRDR          ..GET 1 BIT
869B 3397;        1302          BDF LDR1          ..MUST BE A 0 TO BE THE LEADER
869D 29;          1303          DEC LDRCNT
869E 99;          1304          GHI LDRCNT
869F 3A9A;        1305          BNZ LEDER1          ..LOOP TIL LEADER COUNTER EMPTYS
86A1 ;          1306
86A1 D8;          1307 STRT1:   SEP BITRDR          ..LOOP TIL START BIT
86A2 3BA1;        1308          BNF STRT1
86A4 F809A9;      1309          LDI 9;PLO BITCNT
86A7 A7;          1310          PLO PARITY

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86A8 ; 1311
86A8 97; 1312 SHIFT: GHI TMRG1 ..KEEP SHIFTING THE BIT INTO THE MSB
86A9 76B7; 1313 SHRC;PHI TMRG1 ..POSITION
86AB 29; 1314 DEC BITCNT
86AC D8; 1315 SEP BITRDR
86AD 89; 1316 GLO BITCNT
86AE 3AA8; 1317 BNZ SHIFT ..ASSEMBLE THE BYTE
86B0 87; 1318 GLO PARITY ..READ PARITY ON LAST PASS
86B1 F6; 1319 SHR
86B2 CF; 1320 LSDF ..FOR NO PARITY ERROR
86B3 93AF; 1321 GHI PC;PLO FLAG ..ELSE SET PARITY FLAG
86B5 9F; 1322 GHI FLAG ..IS IT BLOCK # ?
86B6 32C3; 1323 BZ BYTE
86B8 2C2C; 1324 DEC PTR;DEC PTR ..POINT TO BLOCK #
86BA 975C; 1325 GHI TMRG1;STR PTR..WRITE IT TO IOCB
86BC 1C1C; 1326 INC PTR;INC PTR ..POINT TO HOME
86BE F800BF; 1327 LDI 0;PHI FLAG ..RESET BLK FLAG
86C1 30A1; 1328 BR STRT1
86C3 ; 1329
86C3 975A; 1330 BYTE: GHI TMRG1;STR BUFPTR ..PUT BYTE IN BUFFER
86C5 2A; 1331 DEC BUFPTR
86C6 8AFBFF; 1332 GLO BUFPTR;XRI #FF
86C9 3AA1; 1333 BNZ STRT1
86CB 9AFB8C; 1334 GHI BUFPTR;XRI #8C
86CE 3AA1; 1335 BNZ STRT1 ..UNTIL BUFFER IS FULL
86D0 8FFE; 1336 GLO FLAG;SHL ..SET/RESET PARITY
86D2 3052; 1337 BR RESTOR
86D4 ; 1338
86D4 ; 1339 ..*****
86D4 ; 1340 .. TAPE SAVE ROUTINE
86D4 ; 1341 .. COPIES DATA FROM MEMORY TO TAPE
86D4 ; 1342 ..*****
86D4 ; 1343
86D4 D483F0; 1344 TPWRIT: SEP CALL;A(OSTRNG)
86D7 0D0A46524F4D20;1345 ,A(CRLF),T'FROM ',0
86DE 00; 1346
86DF F800B7A7; 1346 LDI 0;PHI SRTADD;PLO SRTADD..CLEAR THE START ADDRESS
86E3 A9; 1347 PLO TMRG3 ..POINT TO BEGINNING OF THE BUFFER
86E4 BDAD; 1348 PHI ASL;PLO ASL
86E6 D48314; 1349 SEP CALL;A(READCR)
86E9 9DB7; 1350 GHI ASL;PHI SRTADD
86EB 8DA7; 1351 GLO ASL;PLO SRTADD
86ED F800ADBD; 1352 LDI 0;PLO ASL;PHI ASL
86F1 D483F0; 1353 SEP CALL;A(OSTRNG)
86F4 0A544F2000; 1354 ,LF,T'TO ',0
86F9 D48314; 1355 SEP CALL;A(READCR)
86FC 9DB8; 1356 GHI ASL;PHI ENDADD
86FE 8DA8; 1357 GLO ASL;PLO ENDADD
8700 18; 1358 INC ENDADD
8701 D48774; 1359 SEP CALL;A(FINDTP)
8704 D487A6; 1360 SEP CALL;A(WRITEX) ..WRITE AN "I" TO TAPE FOR
8707 490D0A00; 1361 ,T'I',A(CRLF),0 .."INSERT"
870B D48752; 1362 SEP CALL;A(WRTH) ..WRITE THE ADDRESS
870E 8852; 1363 CKEND: GLO ENDADD;STR SP ..DID WE DO ALL THE ADDRESSES?
8710 87F3; 1364 GLO SRTADD;XOR
8712 3A1A; 1365 BNZ WRD2
8714 9852; 1366 GHI ENDADD;STR SP
8716 97F3; 1367 GHI SRTADD;XOR
8718 3230; 1368 BZ FINISH
871A ; 1369

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871A 87FA1F;      1370 WRD2:  GLO SRTADD;ANI #1F ..CHECK IF 32 PAIRS OF DATA ARE
871D 3A29;        1371      BNZ WRD1      ..PRINTED IN ONE LINE
871F D487A6;      1372      SEP CALL;A(WRITEX)
8722 3BDD0A00;    1373      ,T';A(CRLF),0      ..";" ENDS THE HEX DATA ON A LINE
8726 D48752;      1374      SEP CALL;A(WRTH)      ..WRITE THE NEXT ADDRESS
8729 ;           1375
8729 47B9;        1376 WRD1:  LDA SRTADD;PHI TMPRG3..STORE THE DATA BYTE
872B D487B7;      1377      SEP CALL;A(ASCII)      ..CONVERT THE BYTE TO ASCII
872E ;           1378      ..AND WRITE IT OUT
872E 300E;        1379      BR CKEND
8730 ;           1380
8730 D487A6;      1381 FINISH: SEP CALL;A(WRITEX)      ..AT END WRITE OUT
8733 OD1300;      1382      ,CR,EOF,0      ..RETURN AND'DC3'
8736 F880A9;      1383      LDI #80;PLO TMPRG3      ..LOAD A NUMBER SO THAT WE CAN
8739 F8FEB9;      1384      LDI #FE;PHI TMPRG3      ..FILL THE BUFFER WITH 383 BYTES
873C ;           1385
873C F813BF;      1386 FILBFR: LDI EOF;PHI CHAR      ..OF DC3'S
873F D48590;      1387      SEP CALL;A(TWRITE)
8742 1999;        1388      INC TMPRG3;GHI TMPRG3
8744 3A3C;        1389      BNZ FILBFR
8746 D483F0;      1390      SEP CALL;A(OSTRNG)
8749 0A444F4E4500; 1391      ,LF,T'DONE',0
874F ;           1392
874F C087F0;      1393      LBR RENTER
8752 ;           1394
8752 ;           1395 ..*****
8752 ;           1396      ..ROUTINE TO WRITE A HEX ADDRESS TO TAPE
8752 ;           1397 ..*****
8752 ;           1398
8752 97B9;        1399 WRTH:  GHI SRTADD;PHI TMPRG3
8754 D487B7;      1400      SEP CALL;A(ASCII)
8757 87B9;        1401      GLO SRTADD;PHI TMPRG3
8759 D487B7;      1402      SEP CALL;A(ASCII)
875C D487A6;      1403      SEP CALL;A(WRITEX)
875F 2000;        1404      ,SPACE,0
8761 ;           1405
8761 D5;          1406 WRITER: SEP R5
8762 ;           1407
8762 ;           1408 ..*****
8762 ;           1409      ..ROUTINE TO GET THE TAPE DRIVE NUMBER
8762 ;           1410      AND SET UP THE IOCB
8762 ;           1411 ..*****
8762 ;           1412
8762 ;           1413      ORG #8774 ..TO COMPENSATE FOR THE PROM PROGRAMMER
8774 ;           1414
8774 D483F0;      1415 FINDTP: SEP CALL;A(OSTRNG)
8777 0DOA5441504523; 1416      ,A(CRLF),T'TAPE# ',0
877E 2000;        1416
8780 ;           1417
8780 F800AD;      1418 ASK2:  LDI 0;PLO ASL
8783 D48314;      1419      SEP CALL;A(READCR)      ..GET THE DRIVE #
8786 8DF6;        1420      GLO ASL;SHR      ..VALID ENTRY?
8788 3298;        1421      BZ FOUND
878A D483F0;      1422      SEP CALL;A(OSTRNG)
878D 0A30204F522031; 1423      ,LF,T'0 OR 1?',0
8794 3F00;        1423
8796 3080;        1424      BR ASK2
8798 ;           1425
8798 ;           1426      ..FORM THE IOCB VALUES ON THE STACK
8798 ;           1427

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8798 73;          1428 FOUND: STXD          ..STORE IT FOR IOCB
8799 F840;        1429          LDI DRIVE0
879B 3B9E;        1430          BNF DRBIT    ..IF DRIVE 0 SELECTED
879D FE;          1431          SHL        ..ELSE SET TO 1
879E ;           1432
879E 73;          1433 DRBIT: STXD          ..STORE 0 COUNT + DRIVE FOR IOCB
879F F80073;      1434          LDI 0;STXD    ..SET BLOCK#=0
87A2 30AF;        1435          BR FIXERR    ..NEED TO JUMP OVER THE NEXT ORG
87A4 ;           1436
87A4 ;           1437 ..*****
87A4 ;           1438 ..          TAPE WRITE SUBROUTINES
87A4 ;           1439 ..*****
87A4 ;           1440
87A4 ;           1441          ..WRITE IMMEDIATE
87A4 ;           1442
87A4 ;           1443          ORG #87A6    ..ONCE AGAIN FOR THE PROM PROGRAMMER
87A6 ;           1444
87A6 46BF;        1445 WRITEX: LDA LINK;PHI CHAR    ..GET THE IMMEDIATE BYTE AND
87A8 3261;        1446          BZ WRITER
87AA D48590;      1447          SEP CALL; ,A(TWRITE) ..WRITE IT TO TAPE UNTIL GET
87AD 30A6;        1448          BR WRITEX    .. A 0
87AF ;           1449
87AF ;           1450 ..*****
87AF ;           1451 ..          REST OF THE FIND TAPE ROUTINE
87AF ;           1452 ..*****
87AF ;           1453
87AF 92BC;        1454 FIXERR: GHI SP;PHI PTR    ..POINT PTR TO IOCB AREA
87B1 82AC;        1455          GLO SP;PLO PTR
87B3 1C1C;        1456          INC PTR;INC PTR
87B5 1C;          1457          INC PTR    ..POINT TO HOME IN IOCB
87B6 D5;          1458          SEP R5
87B7 ;           1459
87B7 ;           1460 ..*****
87B7 ;           1461 ..          ..ROUTINE TO OUTPUT ASCII BYTE TO TAPE
87B7 ;           1462 ..*****
87B7 ;           1463
87B7 99;          1464 ASCII: GHI TMPRG3    ..DO THE HIGH NIBBLE
87B8 F6F6F6F6A9; 1465          SHR;SHR;SHR;SHR;PLO TMPRG3
87BD D487C8;      1466          SEP CALL; ,A(ASCII)
87C0 99FA0F;      1467          GHI TMPRG3;ANI #0F    ..AND THE LOW ONE
87C3 A9;          1468          PLO TMPRG3
87C4 D487C8;      1469          SEP CALL; ,A(ASCII)
87C7 D5;          1470          SEP R5
87C8 ;           1471
87C8 89FC30BF;    1472 ASCII: GLO TMPRG3;ADI #30;PHI CHAR
87CC FF3A3BD3;    1473          SMI #3A;BM ASCI ..FOR 0 TO 9
87D0 FC41BF;      1474          ADI #41;PHI CHAR..FOR A TO F
87D3 ;           1475
87D3 D48590;      1476 ASCI: SEP CALL; ,A(TWRITE)
87D6 D5;          1477          SEP R5
87D7 ;           1478
87D7 ;           1479 ..*****
87D7 ;           1480 ..          REGISTER RESTORE
87D7 ;           1481 ..          RESTORES THE REGISTERS SAVED BY REGSAV,
87D7 ;           1482 ..          ASSUMES STACK POINTER IS 1 BYTE ABOVE THE
87D7 ;           1483 ..          STORED DATA. EXITS POINTING TO A FREE BYTE
87D7 ;           1484 ..*****
87D7 ;           1485
87D7 60;          1486 REGSTR: IRX
87D8 72B7;        1487          LDXA;PHI TMPRG1

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87DA 72A7;      1488      LDXA;PLO TMPRG1
87DC 72B8;      1489      LDXA;PHI TMPRG2
87DE 72A8;      1490      LDXA;PLO TMPRG2
87E0 72B9;      1491      LDXA;PHI TMPRG3
87E2 72A9;      1492      LDXA;PLO TMPRG3
87E4 72BA;      1493      LDXA;PHI CNT
87E6 02AA;      1494      LDN SP;PLO CNT
87E8 9F;        1495      GHI CHAR      ..TO COMPENSATE FOR BASIC
87E9 D5;        1496      SEP R5
87EA ;          1497
87EA ;          1498      ..*****
87EA ;          1499      ..      FILLS ASL AS LONG AS HEX DIGITS ARE ENTERED
87EA ;          1500      ..*****
87EA ;          1501
87EA D4813B;    1502 READHX: SEP CALL; ,A(READAH)
87ED 33EA;      1503      BDF READHX
87EF D5;        1504      SEP R5
87F0 ;          1505
87F0 ;          1506      ..*****
87F0 ;          1507      ..      ENTRY POINT FOR BASIC "BYE" COMMAND AND FOR GENERAL REENTER
87F0 ;          1508      ..*****
87F0 ;          1509
87F0 ;          1510      ORG #87F0
87F0 ;          1511
87F0 F8F7A0;    1512 RENTER: LDI A.0(RENTRI);PLO RO ..CAN BE ENTERED WITH X
87F3 F887B0;    1513      LDI A.1(RENTRI);PHI RO .. AND P SET TO
87F6 D0;        1514      SEP RO      ..ANYTHING. RESETS ALL THE SCRT
87F7 F82FA3;    1515 RENTRI: LDI A.0(PRMPT);PLO PC      ..REGISTERES.
87FA F880B3;    1516      LDI A.1(PRMPT);PHI PC
87FD C0838F;    1517      LBR ENTER2
8800 ;          1518
8800 ;          1519

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