```
0001                    * 0078-001-H902 (O$XA)       DRAWING NO. 41285374-001-02
0002                    *
0003                    *
0004                    *
0005                    * COMPUTER:  H316, DDP-516
0006                    *
0007                    *
0008                    * PROGRAM CATEGORY:  INPUT/OUTPUT
0009                    *
0010                    *
0011                    * PROGRAM TITLE:  O$XA
0012                    *                TO PLOT ALPHA-NUMERIC AND SPECIAL CHARACTERS ON THE
0013                    *                DIGITAL PLOTTER
0014                    *
0015                    *
0016                    *
0017                    *
0018                    *
0019                    *
0020                    *
0021                    *
0022                    *
0023                    *
0024                    *
0025                    *
0026                    *
0027                    *
0028                    *
0029                    *
0030                    *
0031                    *
0032                    *
0033                    *
0034                    *
0035                    *
0036                    *
0037                    *
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APPROVAL	DATE
PROG H. A. Dimma	23. Sep. 70
SUPR N. G. Depledge	23. Sep. 70
QUAL	24. Sep. 70
NO. OF PAGES	30

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0038                    *
0039                    *
0040                    * AUTHOR
0041                    *
0042                    *     HONEYWELL - COMPUTER CONTROL DIVISION (EUROPE)
0043                    *
0044                    *
0045                    * PURPOSE
0046                    *
0047                    *     TO PLOT ALPHA-NUMERIC AND SPECIAL CHARACTERS OF VARIABLE SIZE AND
0048                    *     AT VARIABLE ANGLE OF INCLINATION ON THE DIGITAL PLOTTER
0049                    *
0050                    *
0051                    * RESTRICTIONS
0052                    *
0053                    *     THE ROUTINE WILL WORK ON AN H316 OR DDP-516 COMPUTER WITH A DIGITAL
0054                    *     PLOTTER
0055                    *
0056                    *
0057                    * STORAGE
0058                    *
0059                    *     1520   (OCTAL)
0060                    *     848    (DECIMAL)
0061                    *
0062                    *
0063                    * USE
0064                    *
0065                    *     PLOT A LIST OF ALPHA-NUMERIC AND/OR SPECIAL CHARACTERS
0066                    *
0067                    *           CALL O$XA (X,Y,HGHT,BCD,THETA,NS)
0068                    *
0069                    *           OR
0070                    *
0071                    *           CALL O$XA          PLOT A SYMBOL LIST
0072                    *           DAC    X           LOWER LEFT CORNER OF FIRST SYMBOL,X CO-ORD.
0073                    *           DAC    Y           LOWER LEFT CORNER OF FIRST SYMBOL,Y CO-ORD.
0074                    *           DAC    HGHT        HEIGHT OF THE CHARACTER TO BE DRAWN
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0075                *
0076                *          DAC    BCD       LOCATION OF THE ALPHANUMERIC LIST
0077                *                           THIS MAY BE A HOLLERITH STATEMENT
0078                *                           OF THE ACTUAL MESSAGE.
0079                *          DAC    THETA     THE ANGLE OF ORIENTATION OF THE CHARACTERS
0080                *                           MEASURED ANTICLOCKWISE FROM THE X-AXIS
0081                *          DAC    NS        THE NUMBER OF CHARACTERS IN THE LIST
0082                *                           IF NS IS NEGATIVE, A SINGLE SPECIAL
0083                *                           CHARACTER WILL BE PLOTTED AT (X,Y)
0084                *                           AND BCD MUST SPECIFY THE SPECIAL
0085                *                           CHARACTER TO BE USED AS AN INTEGER
0086                *                           WITHIN THE RANGE 1 TO 25.  IF NS IS
0087                *                           -1, THE PEN WILL MOVE TO (X,Y) WITH
0088                *                           THE PEN UP AND PLOT THE SYMBOL.
0089                *                           IF NS IS -2, THE PEN WILL MOVE TO
0090                *                           (X,Y) WITH THE PEN DOWN AND PLOT THE
0091                *                           SYMBOL.
0092                *          OCT    0         END OF PARAMETER LIST
0093                *                           NORMAL RETURN
0094                *
0095                *                           N.B. IF (X) OR (Y) ARE ZERO, THEN THE
0096                *                           SYMBOL STRING IS CONTINUED BY USING
0097                *                           THE PREVIOUSLY COMPUTED X AND/OR Y
0098                *                           CO-ORDINATES.  TO RETURN THE PEN TO
0099                *                           THE ORIGIN, THE CO-ORDINATES SHOULD
0100                *                           BE SET TO ALMOST ZERO.
0101                *
0102                *     THE SYMBOL SUBROUTINE PLOTS ALL THE STANDARD ISO CHARACTERS FOR THE
0103                *     H316 OR DDP-516 PLUS 25 SPECIAL CHARACTERS, THE FIRST 16 OF WHICH
0104                *     ARE CENTRED.  A STRING OF ANY NUMBER OF STANDARD CHARACTERS CAN BE
0105                *     PLOTTED STARTING AT A SPECIFIED POINT AT ANY ANGLE OR HEIGHT.  THE
0106                *     STARTING POINT SPECIFIED WILL BE THE BOTTOM LEFT-HAND CORNER OF THE
0107                *     FIRST CHARACTER.  THE CHARACTERS IN THE STRING ARE ASSUMED TO BE
0108                *     IN ISO AND PACKED TWO TO A WORD.  THE SPECIAL CHARACTERS ARE PLOTTED
0109                *     ONE AT A TIME.
0110                *
0111                *
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0112                    * METHOD
0113                    *
0114                    *    HAVING ESTABLISHED THE PARAMETERS OF THE CALL, THE PROGRAM STORES
0115                    *    THE LIST OF CHARACTERS TO BE PLOTTED. THE PARAMETER LIST, STARTING
0116                    *    IN LOCATION (BCD), IS THEN SEARCHED FOR ALPHA-NUMERIC AND SPECIAL
0117                    *    CHARACTERS AND EACH SYMBOL HAS A CODE WORD ASSIGNED TO IT.  THE
0118                    *    PROGRAM SEARCHES THROUGH THE SYMBOL CODE WORD TABLE (TABL) TO
0119                    *    DETERMINE:
0120                    *
0121                    *         1) WHICH PAIR OF OFFSET VALUES IS TO BE PLOTTED FIRST,
0122                    *         2) HOW MANY PAIRS ARE TO BE PLOTTED,
0123                    *         3) A REFERENCE ADDRESS TO THE OFFSET VALUES TABLE WHICH
0124                    *         CONTAINS THE ACTUAL CO-ORDINATES TO BE PLOTTED FOR EACH
0125                    *         SYMBOL.  USING THESE CO-ORDINATES, MODIFIED FOR OFFSET,
0126                    *         THE ROUTINE O$XP IS CALLED TO PLOT EACH PAIR OF
0127                    *         CO-ORDINATES.
0128                    *
0129                    *              NOTE: THE CO-ORDINATE 70 IS A REQUEST TO LIFT THE PEN, AND
0130                    *              NOT A REQUEST TO PLOT AT THIS POINT.
0131                    *
0132                    *    THE PROGRAM ALSO CALLS THE FOLLOWING MATH LIBRARY ROUTINES: D$22,
0133                    *    M$22, A$22, S$22, C$12 AND L$22.
0134                    *
0135                    *
0136                    ********************************************************************************
0137                    *
0138                    *
0139                         SUBR  O$XA                 PLOT ALPHANUMERIC AND SPECIAL CHARACTERS
0140                         SUBR  SYMBOL,O$XA          PLOT ALPHANUMERIC AND SPECIAL CHARACTERS
0141                    *
0142                    *
0143                         CF5                        H316 AND DDP-516 ONLY
0144                         REL                        RELOCATABLE
0145                    *
0146                    *
0147                    * MAIN PROGRAM
0148                    *
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cc1

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0149                        * PICK UP PARAMETERS
0150 00000   0 000000   O$XA DAC   **          ENTRY POINT
0151 00001   0 15 00612      STX   SAVX        SAVE INDEX
0152 00002   140040           CRA
0153 00003   0 04 00601      STA   SPCH        SPECIFIC CHARACTER INDICATOR
0154 00004   0 10 00527      JST   PCUP        PICK UP X PARAMETER
0155 00005   101040           SNZ             IS IT ZERO?
0156 00006   0 01 00012      JMP   CONA        YES, USE ORIGINAL X
0157 00007   0 04 00542      STA   XFLO        NO, STORE X PARAMETER - WORD A
0158 00010   000201           IAB
0159 00011   0 04 00543*     STA   XFLO+1      STORE X PARAMETER - WORD B *
0160                        *
0161 00012   0 10 00527 CONA JST   PCUP        PICK UP Y PARAMETER
0162 00013   101040           SNZ             IS IT ZERO
0163 00014   0 01 00020      JMP   CONB        YES, USE ORIGINAL Y
0164 00015   0 04 00544      STA   YFLO        NO, STORE Y PARAMETER - WORD A
0165 00016   000201           IAB
0166 00017   0 04 00545      STA   YFLO+1      STORE Y PARAMETER - WORD B
0167                        *
0168 00020   0 10 00527 CONB JST   PCUP        PICK UP HEIGHT PARAMETER
0169 00021   0 04 00536      STA   HGHT        STORE HEIGHT PARAMETER - WORD A
0170 00022   000201           IAB
0171 00023   0 04 00537      STA   HGHT+1      STORE HEIGHT PARAMETER - WORD B
0172                        *
0173 00024  -0 02 00000      LDA*  O$XA        CHARACTER STRING ADDRESS
0174 00025   101400     BACK SMI             IS IT INDIRECT?
0175 00026   0 01 00033      JMP   L1          NO, GO SAVE ADDRESS
0176 00027   140320           CSA             YES, REMOVE INDIRECT BIT
0177 00030   0 04 00000      STA   0
0178 00031   1 02 00000      LDA   0,1         PICK UP NEW ADDRESS
0179 00032   0 01 00025      JMP   BACK        GO MAKE SURE NOT INDIRECT
0180 00033   0 04 00576 L1   STA   BCD         SAVE ADDRESS OF ALPHANUMERIC LIST
0181 00034   0 12 00000      IRS   O$XA        INCREMENT ADDRESS FOR NEXT CHARACTER STRING
0182                        *
0183 00035   0 10 00527      JST   PCUP        PICK UP ANGLE PARAMETER
0184 00036   0 04 00540      STA   THTA        STORE ANGLE PARAMETER - WORD A
0185 00037   000201           IAB
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0186 00040   0 04 00541       STA   THTA+1          STORE ANGLE PARAMETER - WORD B
0187                        *
0188 00041   0 10 00527       JST   PCUP            PICK UP NUMBER OF CHARACTERS IN THE LABEL
0189 00042   0 04 00577       STA   NS              STORE NUMBER OF CHARACTERS IN THE LABEL
0190                        *
0191                        * CALCULATE SCALE FACTOR     FACT=HGHT/7.0
0192 00043   0 02 00537 ASYM  LDA   HGHT+1          HEIGHT PARAMETER - WORD B
0193 00044   000201            IAB
0194 00045   0 02 00536       LDA   HGHT            HEIGHT PARAMETER - WORD A
0195 00046   0 10 00000       CALL  D$22            FLOATING POINT DIVIDE
0196 00047   0 000621          DAC   SEVN            FLOATING POINT SEVEN
0197 00050   0 04 00552       STA   FACT            SCALE FACTOR - WORD A
0198 00051   000201            IAB
0199 00052   0 04 00553       STA   FACT+1          SCALE FACTOR - WORD B
0200                        *
0201                        * TEST FOR SPECIAL CHARACTER
0202 00053   0 02 00577         LDA   NS                NUMBER OF CHARACTERS PARAMETER
0203 00054   100400             SPL                     IS IT NEGATIVE?
0204 00055   0 01 00060         JMP   SPEC              YES, SPECIAL CHARACTER
0205 00056   0 04 00602         STA   NSCM              NO, NUMBER OF CHARACTERS IN LIST
0206 00057   0 01 00107         JMP   NORM              CONTINUE WITH NORMAL CHARACTER LIST
0207                        *
0208                        * SPECIAL CHARACTER TREATMENT
0209 00060   0 02 01517 SPEC  LDA   =1
0210 00061   0 04 00602       STA   NSCM              ONE SPECIAL CHARACTER
0211 00062   0 02 01516       LDA   ='77777
0212 00063   0 04 00601       STA   SPCH              INDICATE SPECIAL CHARACTER
0213 00064  -0 02 00576       LDA*  BCD               SYMBOL
0214 00065   0 11 01515       CAS   =15               IS IT TO BE CENTERED?
0215 00066   0 01 00100       JMP   SPCA              NO
0216 00067   101000           NOP                     YES
0217                        *
0218                        * CALCULATE SCALE FACTOR FOR CENTRALISED SPECIAL CHARACTER
0219 00070   0 02 00537         LDA   HGHT+1            SYMBOL HEIGHT - WORD B
0220 00071   000201             IAB
0221 00072   0 02 00536         LDA   HGHT              SYMBOL HEIGHT - WORD A
0222 00073   0 10 00000         CALL  D$22              FLOATING POINT DIVIDE
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0223 00074   0 000615        DAC   FOUR              FLOATING POINT FOUR
0224 00075   0 04 00552      STA   FACT              FACTOR=HGHT/4.0 - WORD A
0225 00076   000201          IAB
0226 00077   0 04 00553      STA   FACT+1            FACTOR - WORD B
0227                        *
0228                        * SET PEN READY TO PLOT SPECIAL CHARACTER
0229 00100   0 02 00577 SPCA LDA   NS                NUMBER OF CHARACTERS
0230 00101   0 11 01514      CAS   =-2               PEN DOWN?
0231 00102   0 01 00107      JMP   NORM              NO
0232 00103   0 01 00105      JMP   L2                NS=-2, REQUIRES PEN DOWN
0233 00104   0 01 00107      JMP   NORM              NO
0234 00105   0 02 01513 L2   LDA   =2                PUT PEN DOWN
0235 00106   0 01 00110      JMP   IND               GO INDICATE PEN DOWN
0236 00107   0 02 01512 NORM LDA   =3                PUT PEN UP
0237 00110   0 04 00600 IND  STA   IC                PEN POSITION INDICATOR
0238                        *
0239                        * CONVERT THE ANGLE TO RADIANS
0240 00111   0 02 00541      LDA   THTA+1            ORIENTATION ANGLE - WORD B
0241 00112   000201          IAB
0242 00113   0 02 00540      LDA   THTA              ORIENTATION ANGLE - WORD A
0243 00114   0 10 00000      CALL  D$22              CONVERT DEGREES TO RADIANS
0244 00115   0 000623        DAC   RADN              CONVERSION FACTOR
0245 00116   0 04 00554      STA   RTHT              ANGLE IN RADIANS - WORD A
0246 00117   000201          IAB
0247 00120   0 04 00555      STA   RTHT+1            ANGLE IN RADIANS - WORD B
0248                        *
0249                        * CALCULATE THE SINE POLAR OFFSET FACTOR
0250 00121   0 10 00000      CALL  SIN               SINE ROUTINE
0251 00122   0 000554        DAC   RTHT              SIN THETA
0252 00123   0 10 00000      CALL  M$22              FLOATING POINT MULTIPLY
0253 00124   0 000552        DAC   FACT              (HGHT/4.0) OR (HGHT/7.0)
0254 00125   0 04 00556      STA   INCS              POLAR OFFSET FACTOR (SINE) - WORD A
0255 00126   000201          IAB
0256 00127   0 04 00557      STA   INCS+1            POLAR OFFSET FACTOR (SINE) - WORD B
0257                        *
0258                        * CALCULATE OFFSET Y VALUE   YT=INCS*6.0
0259 00130   000201          IAB                     BRING BACK INCS
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0260 00131   0 10 00000      CALL  M$22            FLOATING POINT MULTIPLY
0261 00132   0 000617        DAC   SSIX            FLOATING POINT SIX
0262 00133   0 04 00564      STA   YT              OFFSET Y - WORD A
0263 00134   000201          IAB
0264 00135   0 04 00565      STA   YT+1            OFFSET Y - WORD B
0265                        *
0266                        * CALCULATE THE COSINE POLAR OFFSET FACTOR
0267 00136   0 10 00000      CALL  COS             COSINE ROUTINE
0268 00137   0 000554        DAC   RTHT            ANGLE IN RADIANS
0269 00140   0 10 00000      CALL  M$22            FLOATING POINT MULTIPLY
0270 00141   0 000552        DAC   FACT            (HGHT/4.0) OR (HGHT/7.0)
0271 00142   0 04 00560      STA   INCC            POLAR OFFSET FACTOR (COSINE) - WORD A
0272 00143   000201          IAB
0273 00144   0 04 00561      STA   INCC+1          POLAR OFFSET FACTOR (COSINE) - WORD B
0274                        *
0275                        * CALCULATE OFFSET X VALUE   XT=INCC*6.0
0276 00145   000201          IAB                   BRING BACK INCC
0277 00146   0 10 00000      CALL  M$22            FLOATING POINT MULTIPLY
0278 00147   0 000617        DAC   SSIX            FLOATING POINT SIX
0279 00150   0 04 00562      STA   XT              OFFSET X - WORD A
0280 00151   000201          IAB
0281 00152   0 04 00563      STA   XT+1            OFFSET X - WORD B
0282                        *
0283                        * SET UP NUMBER OF SYMBOLS IN CURRENT WORD
0284 00153   0 02 01514*     LDA   =-2
0285 00154   0 04 00603*     STA   SCWM            NO. OF SYMBOLS IN CURRENT WORD
0286 00155  -0 02 00576      LDA*  BCD             FIRST WORD OF CHARACTER LIST
0287 00156   0 04 00611      STA   SBCD            STORE ITS ADDRESS
0288 00157   000201          IAB
0289 00160   0 02 00601      LDA   SPCH            SPECIAL CHARACTER INDICATOR
0290 00161   100040          SZE                   IS IT ZERO?
0291 00162   0 01 00257      JMP   MORE            NO, SPECIAL CHARACTER
0292                        *
0293                        * GET CURRENT G-BIT CHARACTER TO PLOT
0294 00163   0 02 00611 LOC  LDA   SBCD            CURRENT SYMBOL WORD
0295 00164   0412 70         LLR   8               TAKE LEAST SIGNIFICANT HALF
0296 00165   0 04 00611      STA   SBCD            BALANCE OF MESSAGE WORD
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0297 00166   000201          IAB                    BRING BACK MOST SIGNIFICANT HALF
0298 00167   0 03 01511      ANA    ='77            CONSIDER L.S. SIX BITS
0299 00170   0 04 00604      STA    CSMS            CURRENT SIX BIT CHARACTER TO PLOT
0300 00171   0415 77         ALS    1               TIMES TWO
0301 00172   0 04 00000      STA    0               TO INDEX
0302                        *
0303                        * PICK UP SYMBOL CODE WORD AND OFFSET ADDRESS
0304 00173   1 02 00627 LOCA LDA    TABL,1          SYMBOL CODE WORD TABLE
0305 00174   0 04 00575      STA    CDWS            FIRST WORD OF PAIR
0306 00175   1 02 00630      LDA    TABL+1,1        OFFSET VALUES ADDRESS
0307 00176   0 04 00575      STA    CDWS+1          SECOND WORD OF PAIR
0308 00177  -0 02 00575      LDA*   CDWS+1          GET CURRENT OFFSET WORD
0309 00200   0 04 00607      STA    WOFW            CURRENT OFFSET WORD
0310                        *
0311                        * EXAMINE NUMBER OF OFFSET PAIRS
0312 00201   0 02 00574      LDA    CDWS            OFFSET VALUE CODE WORD
0313 00202   0 03 01511      ANA    ='77            CONSIDER L.S SIX BITS
0314 00203   0 04 00605      STA    NMBT            NUMBER OF OFFSET PAIRS
0315 00204   101040         SNZ                    IS IT ZERO?
0316 00205   0 01 00303      JMP    CLAP            YES, NO OFFSET PAIRS.  GO PUT PEN UP
0317 00206   0 02 00601      LDA    SPCH            NO, GET SPECIAL CHARACTER INDICATOR
0318 00207   100040         SZE                    IS CURRENT SYMBOL A SPECIAL CHARACTER?
0319 00210   0 01 00344      JMP    SPZR            YES, GIVE SPECIAL CHARACTER TREATMENT
0320 00211   0 02 00574 SPZS LDA    CDWS            NO, TAKE OFFSET PAIR
0321 00212   0404 72         LGR    6               EXAMINE FOR SHIFT INSTRUCTION CHOICE
0322 00213   0 04 00000      STA    0               PUT SHIFT VALUE IN X-REGISTER
0323 00214   1 02 00624 FRED LDA    SHFT-1,1        SHIFT INSTRUCTION CHOICE
0324 00215   0 04 00217      STA    SKIP            ALS 4 OR ALS 10
0325 00216   0 02 00607      LDA    WOFW            CURRENT OFFSET WORD
0326 00217   0 00 00000 SKIP ***    **              SHIFT INSTRUCTION
0327 00220   0 04 00607      STA    WOFW            SHIFTED TO BITS 1 TO 6
0328 00221   0 02 00000      LDA    0               X-REGISTER
0329 00222   0 06 01510      ADD    =-3
0330 00223   0 04 00606      STA    SWPW            NUMBER OF SETS REMAINING IN THIS WORD
0331                        *
0332                        * EXAMINE VALUE OF CURRENT PAIR
0333 00224   0 02 00607 DLOC LDA    WOFW            CURRENT OFFSET WORD
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0334 00225   0412 72          LLR   6                FIRST PAIR
0335 00226   0 04 00607       STA   WOFW             RESTORE BALANCE
0336 00227   000201          IAB                      BRING BACK FIRST PAIR
0337 00230   0 03 01511       ANA   ='77             EXAMINE L.S. SIX BITS
0338 00231   0 04 00610       STA   OFFW             CURRENT PAIR
0339 00232   0400 75          LRL   3                EXAMINE VALUE OF CURRENT PAIR
0340                        *
0341                        * IF VALUE >6 PEN MUST BE LIFTED
0342 00233   0 11 01507       CAS   =6
0343 00234   0 01 00237       JMP   L3               VALUE>6.  GO LIFT PEN
0344 00235   0 01 00431       JMP   SYMD             VALUE=6.  GO PLOT POINT
0345 00236   0 01 00431       JMP   SYMD             VALUE<6.  GO PLOT POINT
0346                        *
0347 00237   0 02 01512 L3    LDA   =3               INDICATE PEN UP
0348 00240   0 04 00600 STDA  STA   IC               PEN POSITION INDICATOR
0349                        *
0350                        * GET NEXT OFFSET PAIR
0351 00241   0 02 00605       LDA   NMBT             NUMBER OF OFFSET PAIRS
0352 00242   0 06 01506       ADD   =-1              TEST FOR END OF SYMBOL PLOT
0353 00243   101040          SNZ
0354 00244   0 01 00303       JMP   CLAP             GO FOR NEXT SYMBOL
0355 00245   0 04 00605       STA   NMBT             REMAINING NUMBER OF OFFSET PAIRS
0356                        *
0357 00246   0 12 00606       IRS   SWPW             IS IT LAST PAIR OF THIS WORD?
0358 00247   0 01 00224       JMP   DLOC             NO, CONTINUE EXAMINING OFFSET PAIR
0359 00250   0 02 01514       LDA   =-2
0360 00251   0 04 00606       STA   SWPW             REMAINING SETS THIS WORD
0361 00252   0 12 00575       IRS   CDWS+1           ADDRESS OF NEXT SYMBOL CODE WORD
0362 00253  -0 02 00575       LDA*  CDWS+1           NEXT SYMBOL CODE WORD
0363 00254   0 04 00607       STA   WOFW             NEW OFFSET WORD
0364 00255   0 35 01517       LDX   =1               RESET X-REGISTER
0365 00256   0 01 00214       JMP   FRED             GO EXAMINE NEW OFFSET WORD
0366                        *
0367                        *
0368                        * SPECIAL CHARACTER TREATMENT
0369 00257   000201        MORE IAB                  BRING BACK FIRST WORD OF CHARACTER LIST
0370 00260   0 04 00000       STA   0                TO INDEX
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                                  cc|
0371 00261   0 11 01515      CAS   =15          IS SYMBOL TO BE CENTERED?
0372 00262   0 01 00265      JMP   L4           NO.
0373 00263   0 01 00301      JMP   LOCB         YES, GO AND ADD CENTERING FACTOR
0374 00264   0 01 00301      JMP   LOCB         YES, GO AND ADD CENTERING FACTOR
0375                        *
0376 00265   140040      L4  CRA
0377 00266   0 04 00601      STA   SPCH         CLEAR SPECIAL CHARACTER INDICATOR
0378 00267   0 02 00611      LDA   SBCD         NEXT CURRENT SYMBOL WORD
0379 00270   0 11 01505      CAS   =24          IS IT A SPECIAL CHARACTER?
0380 00271   0 01 00274      JMP   L5           YES, GO LOOK AT SIX BIT CHARACTER TO PLOT
0381 00272   0 01 00301      JMP   LOCB         NO, GO TREAT THIS AS NORMAL CHARACTER
0382 00273   0 01 00301      JMP   LOCB         NO, GO TREAT THIS AS NORMAL CHARACTER
0383                        *
0384 00274   0 03 01511 L5   ANA   ='77         EXAMINE L.S. SIX BITS
0385 00275   0415 77    L9   ALS   1            TIMES TWO
0386 00276   0 04 00000 LOCZ STA   0            TO INDEX
0387 00277   0 04 00604      STA   CSMS         CURRENT SIX BIT CHARACTER TO PLOT
0388 00300   0 01 00173      JMP   LOCA         GO LOOK UP NEXT SYMBOL CODE WORD
0389                        *
0390 00301   0 06 01504 LOCB ADD   ='100        ADD TO CURRENT SYMBOL WORD
0391 00302   0 01 00275      JMP   L9           RETURN TO LOOK UP SYMBOL CODE WORD
0392                        *
0393                        * CALCULATE THE COORDINATES TO PLOT THE SYMBOL
0394 00303   0 02 01512 CLAP LDA   =3           INDICATE PEN UP
0395 00304   0 04 00600      STA   IC           PEN POSITION INDICATOR
0396 00305   0 02 00543      LDA   XFLO+1       X PARAMETER - WORD B
0397 00306   000201          IAB
0398 00307   0 02 00542      LDA   XFLO         X PARAMETER - WORD A
0399 00310   0 10 00000      CALL  A$22         FLOATING POINT ADD
0400 00311   0 000562        DAC   XT           OFFSET FOR X
0401 00312   0 04 00542      STA   XFLO         OFFSET X PARAMETER - WORD A
0402 00313   000201          IAB
0403 00314   0 04 00543      STA   XFLO+1       OFFSET X PARAMETER - WORD B
0404                        *
0405 00315   0 02 00545      LDA   YFLO+1       Y PARAMETER - WORD B
0406 00316   000201          IAB
0407 00317   0 02 00544      LDA   YFLO         Y PARAMETER - WORD A
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0408 00320    0 10 00000        CALL   A$22              FLOATING POINT ADD
0409 00321    0 000564          DAC    YT                OFFSET FOR Y
0410 00322    0 04 00544        STA    YFLO              OFFSET Y PARAMETER - WORD A
0411 00323    000201            IAB
0412 00324    0 04 00545        STA    YFLO+1            OFFSET Y PARAMETER - WORD B
0413                       *
0414                       * HAS THE END OF THE ALPHANUMERIC LIST BEEN REACHED?
0415 00325    0 12 00603        IRS    SCWM              TALLY SYMBOL COUNT
0416 00326    0 01 00334        JMP    SYME              NOT END OF LIST, CHECK NO. OF CHARACTERS
0417 00327    0 02 01514-       LDA    =-2
0418 00330    0 04 00603-       STA    SCWM              SYMBOL COUNT FOR NEXT WORD
0419 00331    0 12 00576        IRS    BCD               TALLY ADDRESS OF ALPHANUMERIC LIST
0420 00332   -0 02 00576        LDA*   BCD               ALPHANUMERIC LIST
0421 00333    0 04 00611        STA    SBCD              NEXT CURRENT SYMBOL WORD
0422                       *
0423 00334    0 02 00602 SYME   LDA    NSCM              NUMBER OF CHARACTERS
0424 00335    0 06 01506        ADD    =-1               DECREASE BY ONE
0425 00336    0 04 00602        STA    NSCM              NUMBER OF CHARACTERS
0426 00337    100040            SZE                      END OF CHARACTER LIST?
0427 00340    0 01 00163        JMP    LOC               GO AND PROCESS NEXT CHARACTER ON LIST
0428 00341    0 35 00612        LDX    SAVX              RESTORE INDEX
0429 00342    0 12 00000        IRS    O$XA              INCREMENT EXIT
0430 00343   -0 01 00000        JMP*   O$XA              EXIT
0431                       *
0432                       * SPECIAL CHARACTER TREATMENT
0433                       *
0434                       * OFFSET FLOATING POINT X VALUE - XFLO=XFLO+2.0*(INCS-INCC)
0435 00344    0 02 00557 SPZR   LDA    INCS+1            POLAR OFFSET FACTOR (SINE) - WORD B
0436 00345    000201            IAB
0437 00346    0 02 00556        LDA    INCS              POLAR OFFSET FACTOR (SINE) - WORD A
0438 00347    0 10 00000        CALL   S$22              FLOATING POINT SUBTRACT
0439 00350    0 000560          DAC    INCC              POLAR OFFSET FACTOR (COSINE)
0440 00351    0 10 00000        CALL   M$22              FLOATING POINT MULTIPLY
0441 00352    0 000613          DAC    TWOO              FLOATING POINT TWO
0442 00353    0 04 00572        STA    CAMP              RESULT =2.0*(INCS-INCC) - WORD A
0443 00354    000201            IAB
0444 00355    0 04 00573        STA    CAMP+1            RESULT =2.0*(INCS-INCC) - WORD B
```

```
0445                        *
0446 00356   0 02 00563      LDA   XT+1          OFFSET X - WORD B
0447 00357   000201           IAB
0448 00360   0 02 00562      LDA   XT            OFFSET X - WORD A
0449 00361   0 10 00000      CALL  S$22          FLOATING POINT SUBTRACT
0450 00362   0 000572       DAC   CAMP          2.0*(INCS-INCC)
0451 00363   0 04 00562      STA   XT            OFFSET X - WORD A   XT=XT-2.0*(INCS-INCC)
0452 00364   000201           IAB
0453 00365   0 04 00563      STA   XT+1          OFFSET X - WORD B
0454 00366   0 02 00573      LDA   CAMP+1        2.0*(INCS-INCC) - WORD B
0455 00367   000201           IAB
0456 00370   0 02 00572      LDA   CAMP          2.0*(INCS-INCC) - WORD A
0457 00371   0 10 00000      CALL  A$22          FLOATING POINT ADDITION
0458 00372   0 000542       DAC   XFLO          FLOATING POINT X PARAMETER
0459 00373   0 04 00542      STA   XFLO          OFFSET FLOATING POINT X VALUE - WORD A
0460 00374   000201           IAB
0461 00375   0 04 00543      STA   XFLO+1        OFFSET FLOATING POINT X VALUE - WORD B
0462                        *
0463                        * OFFSET FLOATING POINT Y VALUE - YFLO=YFLO-2.0*(INCC+INCS)
0464 00376   0 02 00561      LDA   INCC+1        POLAR OFFSET FACTOR (COSINE) - WORD B
0465 00377   000201           IAB
0466 00400   0 02 00560      LDA   INCC          POLAR OFFSET FACTOR (COSINE) - WORD A
0467 00401   0 10 00000      CALL  A$22          FLOATING POINT ADDITION
0468 00402   0 000556       DAC   INCS          POLAR OFFSET FACTOR (SINE)
0469 00403   0 10 00000      CALL  M$22          FLOATING POINT MULTIPLY
0470 00404   0 000613       DAC   TWOO          FLOATING POINT TWO
0471 00405   0 04 00572      STA   CAMP          RESULT - WORD A
0472 00406   000201           IAB
0473 00407   0 04 00573      STA   CAMP+1        RESULT - WORD B
0474 00410   0 02 00545      LDA   YFLO+1        FLOATING POINT Y PARAMETER - WORD B
0475 00411   000201           IAB
0476 00412   0 02 00544      LDA   YFLO          FLOATING POINT Y PARAMETER - WORD A
0477 00413   0 10 00000      CALL  S$22          FLOATING POINT SUBTRACT
0478 00414   0 000572       DAC   CAMP          RESULT
0479 00415   0 04 00544      STA   YFLO          OFFSET FLOATING POINT Y VALUE - WORD A
0480 00416   000201           IAB
0481 00417   0 04 00545      STA   YFLO+1        OFFSET FLOATING POINT Y VALUE - WORD B
```

```
0482 00420   0 02 00573       LDA   CAMP+1          RESULT - WORD B
0483 00421   000201           IAB
0484 00422   0 02 00572       LDA   CAMP            RESULT - WORD A
0485 00423   0 10 00000       CALL  A$22            FLOATING POINT ADDITION
0486 00424   0 000564         DAC   YT              OFFSET Y
0487 00425   0 04 00564       STA   YT              OFFSET Y - WORD A   YT=YT+2.0*(INCC+INCS)
0488 00426   000201           IAB
0489 00427   0 04 00565       STA   YT+1            OFFSET Y - WORD B
0490 00430   0 01 00211       JMP   SPZS            GO AND PLOT THIS SYMBOL
0491                      *
0492                      * PLOT THE CURRENT SYMBOL
0493 00431   0 35 01503 SYMD LDX   =-4             X-REGISTER FOR COUNT OF 4
0494 00432   1 02 00546 L6    LDA   XFLO+4,1        FLOATING POINT X & Y VALUES
0495 00433   1 04 00552       STA   XX+4,1          TEMPORARY FLOATING POINT X & Y VALUES
0496 00434   0 12 00000       IRS   0               TALLY COUNT
0497 00435   0 01 00432       JMP   L6              RETURN FOR NEXT VALUE
0498 00436   0 02 00610       LDA   OFFW            CURRENT PAIR TO PLOT
0499 00437   0400 75          LRL   3               TAKE X PART OF PAIR
0500 00440   0 10 00000       CALL  C$12            FIXED TO FLOATING
0501 00441   0 04 00566       STA   OFFX            X PART OF CURRENT PAIR - WORD A
0502 00442   000201           IAB
0503 00443   0 04 00567       STA   OFFX+1          X PART OF CURRENT PAIR - WORD B
0504                      *
0505 00444   0 02 00610       LDA   OFFW            CURRENT PAIR TO PLOT
0506 00445   0 03 01502       ANA   ='7             TAKE Y PART OF PAIR
0507 00446   0 10 00000       CALL  C$12            FIXED TO FLOATING
0508 00447   0 04 00570       STA   OFFY            Y PART OF CURRENT PAIR - WORD A
0509 00450   000201           IAB
0510 00451   0 04 00571       STA   OFFY+1          Y PART OF CURRENT PAIR - WORD B
0511                      *
0512                      * CALCULATE ACTUAL COORDINATES FOR PLOTTING
0513                      *
0514                      * XX=XX+(OFFX*INCC)-(OFFY*INCS)
0515 00452   000201           IAB                   BRING BACK OFFY
0516 00453   0 10 00000       CALL  M$22            FLOATING POINT MULTIPLY
0517 00454   0 000556         DAC   INCS            POLAR OFFSET FACTOR (SINE)
0518 00455   0 04 00572       STA   CAMP            RESULT - WORD A
```

```
0519 00456   000201          IAB
0520 00457   0 04 00573      STA   CAMP+1          RESULT - WORD B
0521                 *
0522 00460   0 02 00567      LDA   OFFX+1          X PART OF CURRENT PAIR - WORD B
0523 00461   000201          IAB
0524 00462   0 02 00566      LDA   OFFX            X PART OF CURRENT PAIR - WORD A
0525 00463   0 10 00000      CALL  M$22            FLOATING POINT MULTIPLY
0526 00464   0 000560        DAC   INCC            POLAR OFFSET FACTOR (COSINE)
0527 00465   0 10 00000      CALL  A$22            FLOATING POINT ADDITION
0528 00466   0 000546        DAC   XX              FLOATING POINT X VALUE
0529 00467   0 10 00000      CALL  S$22            FLOATING POINT SUBTRACT
0530 00470   0 000572        DAC   CAMP            RESULT
0531 00471   0 04 00546      STA   XX              X CO-ORDINATE TO PLOT - WORD A
0532 00472   000201          IAB
0533 00473   0 04 00547      STA   XX+1            X CO-ORDINATE TO PLOT - WORD B
0534                 *
0535                 * YY=YY+(OFFX*INCS)+(OFFY*INCC)
0536 00474   0 02 00571      LDA   OFFY+1          Y PART OF CURRENT PAIR - WORD B
0537 00475   000201          IAB
0538 00476   0 02 00570      LDA   OFFY            Y PART OF CURRENT PAIR - WORD A
0539 00477   0 10 00000      CALL  M$22            FLOATING POINT MULTIPLY
0540 00500   0 000560        DAC   INCC            POLAR OFFSET FACTOR (COSINE)
0541 00501   0 04 00572      STA   CAMP            RESULT - WORD A
0542 00502   000201          IAB
0543 00503   0 04 00573      STA   CAMP+1          RESULT - WORD B
0544                 *
0545 00504   0 02 00567      LDA   OFFX+1          X PART OF CURRENT PAIR - WORD B
0546 00505   000201          IAB
0547 00506   0 02 00566      LDA   OFFX            X PART OF CURRENT PAIR - WORD A
0548 00507   0 10 00000      CALL  M$22            FLOATING POINT MULTIPLY
0549 00510   0 000556        DAC   INCS            POLAR OFFSET FACTOR (SINE)
0550 00511   0 10 00000      CALL  A$22            FLOATING POINT ADDITION
0551 00512   0 000550        DAC   YY              FLOATING POINT Y VALUE
0552 00513   0 10 00000      CALL  A$22            FLOATING POINT ADDITION
0553 00514   0 000572        DAC   CAMP            RESULT
0554 00515   0 04 00550      STA   YY              Y CO-ORDINATE TO PLOT - WORD A
0555 00516   000201          IAB
```

```
0556 00517   0 04 00551       STA    YY+1              Y CO-ORDINATE TO PLOT - WORD B
0557                        *
0558 00520   0 10 00000       CALL   O$XP              PLOT A LINE
0559 00521   0 000546        DAC    XX                X CO-ORDINATE
0560 00522   0 000550        DAC    YY                Y CO-ORDINATE
0561 00523   0 000600        DAC    IC                PEN POSITION INDICATOR
0562 00524   000000          HLT                      END OF PARAMETER LIST
0563                        *
0564 00525   0 02 01513      LDA    =2                INDICATE PEN DOWN
0565 00526   0 01 00240      JMP    STDA              RETURN FOR NEXT POINT
0566                        *
0567                        *
0568                        * SUBROUTINES
0569                        *
0570                        * PICK UP A FLOATING POINT PARAMETER
0571 00527    0 000000   PCUP DAC    **                ENTRY POINT
0572 00530   -0 02 00000      LDA*   O$XA              PARAMETER ADDRESS
0573 00531    0 04 00533      STA    PCUA              PARAMETER VALUE
0574 00532    0 10 00000      CALL   L$22              FLOATING POINT LOAD
0575 00533    0 00 00000 PCUA ***    **                PARAMETER VALUE
0576 00534    0 12 00000      IRS    O$XA              TALLY PARAMETER ADDRESS
0577 00535   -0 01 00527      JMP*   PCUP              EXIT
0578                        *
0579                        *
0580                        * VARIABLES
0581                        *
0582 00536   000000     HGHT BSZ    2                 HEIGHT OF SYMBOL
     00537   000000
0583 00540   000000     THTA BSZ    2                 ANGLE OF INCLINATION OF SYMBOL
     00541   000000
0584 00542   000000     XFLO BSZ    2                 FLOATING POINT X PARAMETER
     00543   000000
0585 00544   000000     YFLO BSZ    2                 FLOATING POINT Y PARAMETER
     00545   000000
0586 00546   000000     XX   BSZ    2                 X CO-ORDINATE TO PLOT
     00547   000000
0587 00550   000000     YY   BSZ    2                 Y CO-ORDINATE TO PLOT
```

```
     00551   000000
0588 00552   000000     FACT BSZ   2          SCALE FACTOR
     00553   000000
0589 00554   000000     RTHT BSZ   2          ANGLE IN RADIANS
     00555   000000
0590 00556   000000     INCS BSZ   2          POLAR OFFSET FACTOR (SINE)
     00557   000000
0591 00560   000000     INCC BSZ   2          POLAR OFFSET FACTOR (COSINE)
     00561   000000
0592 00562   000000     XT   BSZ   2          OFFSET X
     00563   000000
0593 00564   000000     YT   BSZ   2          OFFSET Y
     00565   000000
0594 00566   000000     OFFX BSZ   2          X PART OF CURRENT PAIR
     00567   000000
0595 00570   000000     OFFY BSZ   2          Y PART OF CURRENT PAIR
     00571   000000
0596 00572   000000     CAMP BSZ   2          RESULT
     00573   000000
0597 00574   000000     CDWS BSZ   2          OFFSET VALUE CODE WORD
     00575   000000
0598                    *
0599 00576   000000     BCD  BSZ   1          SYMBOL LOCATION
0600 00577   000000     NS   BSZ   1          NUMBER OF CHARACTERS PARAMETER
0601 00600   000000     IC   BSZ   1          PEN POSITION INDICATOR
0602 00601   000000     SPCH BSZ   1          QPECIAL CHARACTER INDICATOR
0603 00602   000000     NSCM BSZ   1          NUMBER OF CHARACTERS IN LIST
0604 00603   000000     SCWM BSZ   1          NO. OF SYMBOLS IN CURRENT WORD
0605 00604   000000     CSMS BSZ   1          CURRENT SIX BIT CHARACTER TO PLOT
0606 00605   000000     NMBT BSZ   1          REMAINING NUMBER OF OFFSET PAIRS
0607 00606   000000     SWPW BSZ   1          REMAINING SETS THIS WORD
0608 00607   000000     WOFW BSZ   1          NEW OFFSET WORD
0609 00610   000000     OFFW BSZ   1          CURRENT PAIR
0610 00611   000000     SBCD BSZ   1          BALANCE OF MESSAGE
0611 00612   000000     SAVX BSZ   1          INDEX
0612                    *
0613                    *
```

```
0614                        * CONSTANTS
0615                        *
0616 00613   040500   TWOO DEC   .2E1          2.0
     00614   000000
0617 00615   040700   FOUR DEC   .4E1          4.0
     00616   000000
0618 00617   040740   SSIX DEC   .6E1          6.0
     00620   000000
0619 00621   040760   SEVN DEC   .7E1          7.0
     00622   000000
0620 00623   041562   RADN DEC   57.29577       DEGREES TO RADIANS CONVERSION FACTOR
     00624   113557
0621 00625   0415 74  SHFT ALS   4             SHIFT INSTRUCTION
0622 00626   0415 66       ALS   10            SHIFT INSTRUCTION
0623                        *
0624                        *
0625                        * SYMBOL CODE WORD TABLE
0626 00627   000215   TABL OCT   215           @
0627 00630   0 001230       DAC   AT
0628 00631   000111        OCT   111           A
0629 00632   0 001111       DAC   A
0630 00633   000214        OCT   214           B
0631 00634   0 001263       DAC   D
0632 00635   000110        OCT   110           C
0633 00636   0 001170       DAC   G
0634 00637   000110        OCT   110           D
0635 00640   0 001263       DAC   D
0636 00641   000107        OCT   107           E
0637 00642   0 001115       DAC   E
0638 00643   000206        OCT   206           F
0639 00644   0 001115       DAC   E
0640 00645   000112        OCT   112           G
0641 00646   0 001170       DAC   G
0642 00647   000106        OCT   106           H
0643 00650   0 001136       DAC   N+1
0644 00651   000206        OCT   206           I
0645 00652   0 001242       DAC   I
```

```
0646 00653   000105          OCT   105          J
0647 00654   0 001133        DAC   U+1
0648 00655   000206          OCT   206          K
0649 00656   0 001153        DAC   K
0650 00657   000103          OCT   103          L
0651 00660   0 001115        DAC   E
0652 00661   000205          OCT   205          M
0653 00662   0 001151        DAC   M
0654 00663   000104          OCT   104          N
0655 00664   0 001135        DAC   N
0656 00665   000114          OCT   114          O
0657 00666   0 001455        DAC   O
0658 00667   000207          OCT   207          P
0659 00670   0 001156        DAC   R
0660 00671   000114          OCT   114          Q
0661 00672   0 001271        DAC   Q
0662 00673   000212          OCT   212          R
0663 00674   0 001156        DAC   R
0664 00675   000214          OCT   214          S
0665 00676   0 001122        DAC   S
0666 00677   000104          OCT   104          T
0667 00700   0 001142        DAC   T
0668 00701   000206          OCT   206          U
0669 00702   0 001132        DAC   U
0670 00703   000103          OCT   103          V
0671 00704   0 001142        DAC   T            Y
0672 00705   000205          OCT   205          W
0673 00706   0 001317        DAC   W
0674 00707   000207          OCT   207          X
0675 00710   0 001200        DAC   X
0676 00711   000205          OCT   205          Y
0677 00712   0 001236        DAC   Y
0678 00713   000204          OCT   204          Z
0679 00714   0 001140        DAC   Z
0680 00715   000104          OCT   104          [
0681 00716   0 001463        DAC   OSB
0682 00717   000102          OCT   102          BACK SLASH
```

```
0683 00720   0 001132        DAC   U
0684 00721   000104          OCT   104          ]
0685 00722   0 001175        DAC   SQB
0686 00723   000205          OCT   205          ↑
0687 00724   0 001335        DAC   UP
0688 00725   000105          OCT   105          LEFT ARROW
0689 00726   0 001340        DAC   LEFT
0690 00727   000101          OCT   101          SPACE
0691 00730   0 001132        DAC   U
0692 00731   000205          OCT   205          EXCLAMATION MARK
0693 00732   0 001304        DAC   EX
0694 00733   000205          OCT   205          "
0695 00734   0 001222        DAC   QUOT
0696 00735   000121          OCT   121          POUND SIGN
0697 00736   0 001341        DAC   PND
0698 00737   000115          OCT   115          $
0699 00740   0 001143        DAC   T+1
0700 00741   000216          OCT   216          %
0701 00742   0 001342        DAC   PER
0702 00743   000111          OCT   111          &
0703 00744   0 001163        DAC   AND
0704 00745   000102          OCT   102          '
0705 00746   0 001225        DAC   APOS
0706 00747   000104          OCT   104          (
0707 00750   0 001245        DAC   LB
0708 00751   000104          OCT   104          )
0709 00752   0 001241        DAC   RB
0710 00753   000110          OCT   110          *
0711 00754   0 001465        DAC   STAR
0712 00755   000105          OCT   105          +
0713 00756   0 001312        DAC   PLUS
0714 00757   000106          OCT   106          ,
0715 00760   0 001302        DAC   COM
0716 00761   000102          OCT   102          -
0717 00762   0 001247        DAC   MNUS
0718 00763   000105          OCT   105          .
0719 00764   0 001307        DAC   STOP
```

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0720 00765   000102          OCT   102          /
0721 00766   0 001156        DAC   R
0722 00767   000111          OCT   111          0
0723 00770   0 001455        DAC   O
0724 00771   000105          OCT   105          1
0725 00772   0 001226        DAC   ONE
0726 00773   000210          OCT   210          2
0727 00774   0 001126        DAC   TWO
0728 00775   000115          OCT   115          3
0729 00776   0 001205        DAC   VIII
0730 00777   000206          OCT   206          4
0731 01000   0 001217        DAC   IV
0732 01001   000211          OCT   211          5
0733 01002   0 001116        DAC   E+1
0734 01003   000214          OCT   214          6
0735 01004   0 001255        DAC   SIX
0736 01005   000106          OCT   106          7
0737 01006   0 001215        DAC   VII
0738 01007   000121          OCT   121          8
0739 01010   0 001205        DAC   VIII
0740 01011   000114          OCT   114          9
0741 01012   0 001322        DAC   NINE
0742 01013   000113          OCT   113          :
0743 01014   0 001277        DAC   SCOL
0744 01015   000114          OCT   114          ;
0745 01016   0 001277        DAC   SCOL
0746 01017   000103          OCT   103          <
0747 01020   0 001167        DAC   LT
0748 01021   000205          OCT   205          =
0749 01022   0 001250        DAC   EQ
0750 01023   000103          OCT   103          >
0751 01024   0 001204        DAC   GT
0752 01025   000113          OCT   113          ?
0753 01026   0 001330        DAC   QUST
0754                        *
0755                        * SPECIAL SYMBOL CODE WORD TABLE
0756 01027   000211          OCT   211          @
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0757 01030   0 001351      DAC    S1
0758 01031   000114        OCT    114          01
0759 01032   0 001355      DAC    S2
0760 01033   000206        OCT    206          02
0761 01034   0 001362      DAC    S3
0762 01035   000107        OCT    107          03
0763 01036   0 001365      DAC    S4
0764 01037   000107        OCT    107          04
0765 01040   0 001370      DAC    S5
0766 01041   000207        OCT    207          05
0767 01042   0 001375      DAC    S6
0768 01043   000207        OCT    207          06
0769 01044   0 001400      DAC    S7
0770 01045   000106        OCT    106          07
0771 01046   0 001373      DAC    S8
0772 01047   000210        OCT    210          08
0773 01050   0 001403      DAC    S9
0774 01051   000107        OCT    107          09
0775 01052   0 001407      DAC    S10
0776 01053   000116        OCT    116          10
0777 01054   0 001412      DAC    S11
0778 01055   000115        OCT    115          11
0779 01056   0 001365      DAC    S4
0780 01057   000206        OCT    206          12
0781 01060   0 001420      DAC    S13
0782 01061   000204        OCT    204          13
0783 01062   0 001366      DAC    S4+1
0784 01063   000215        OCT    215          14
0785 01064   0 001375      DAC    S6
0786 01065   000104        OCT    104          15
0787 01066   0 001365      DAC    S4
0788 01067   000202        OCT    202          16
0789 01070   0 001427      DAC    VECT+1
0790 01071   000105        OCT    105          17
0791 01072   0 001431      DAC    DAR          DOWN ARROW
0792 01073   000110        OCT    110          18
0793 01074   0 001247      DAC    MNUS
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0794 01075   000205          OCT   205          19
0795 01076   0 001433        DAC   AR           RIGHT ARROW
0796 01077   000106          OCT   106          20
0797 01100   0 001436        DAC   GREQ
0798 01101   000103          OCT   103          21
0799 01102   0 001443        DAC   AST
0800 01103   000210          OCT   210          22
0801 01104   0 001444        DAC   NOEQ
0802 01105   000210          OCT   210          23
0803 01106   0 001450        DAC   PMI
0804 01107   000106          OCT   106          24
0805 01110   0 001440        DAC   LEEQ
0806                         *
0807                         * OFFSET VALUES TABLE
0808 01111   000004      A     OCT   0004,4404,0617,3746
     01112   004404
     01113   000617
     01114   003746
0809 01115   004000      E     OCT   4000,0747,0704,3443
     01116   000747
     01117   000704
     01120   003443
0810 01121   004130            OCT   4130
0811 01122   001001      S     OCT   1001,1030,4143,3414
     01123   001030
     01124   004143
     01125   003414
0812 01126   000506      TWO   OCT   0506,1737,4645,0100
     01127   001737
     01130   004645
     01131   000100
0813 01132   004007      U     OCT   4007,0110,3041
     01133   000110
     01134   003041
0814 01135   004740      N     OCT   4740,0700,0444
     01136   000700
     01137   000444
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0815 01140   004740     Z     OCT   4740,0047
     01141   000047
0816 01142   000747     T     OCT   0747,2720,7002,1131
     01143   002720
     01144   007002
     01145   001131
0817 01146   004233           OCT   4233,1405,1636
     01147   001405
     01150   001636
0818 01151   004500     M     OCT   4500,0724
     01152   000724
0819 01153   004740     K     OCT   4740,0400,0704
     01154   000400
     01155   000704
0820 01156   004700     R     OCT   4700,0737,4645,3404
     01157   000737
     01160   004645
     01161   003404
0821 01162   003443           OCT   3443
0822 01163   004015     AND   OCT   4015,2635,0201,1020
     01164   002635
     01165   000201
     01166   001020
0823 01167   004204     LT    OCT   4204
0824 01170   004637     G     OCT   4637,1706,0110,3041
     01171   001706
     01172   000110
     01173   003041
0825 01174   004333           OCT   4333
0826 01175   001040     SQB   OCT   1040,4717
     01176   004717
0827 01177   004333           OCT   4333
0828 01200   004707     X     OCT   4707,2400,2440,2447
     01201   002400
     01202   002440
     01203   002447
0829 01204   000244     GT    OCT   0244
```

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0830 01205   000617     VIII OCT   0617,3746,4534,1434
     01206   003746
     01207   004534
     01210   001434
0831 01211   004341          OCT   4341,3010,0103,1405
     01212   003010
     01213   000103
     01214   001405
0832 01215   000607     VII  OCT   0607,4746
     01216   004746
0833 01217   002120     IV   OCT   2120,4030,3702
     01220   004030
     01221   003702
0834 01222   004217     QUOT OCT   4217,1570,3537
     01223   001570
     01224   003537
0835 01225   002527     APOS OCT   2527
0836 01226   001627     ONE  OCT   1627,2010
     01227   002010
0837 01230   003031     AT   OCT   3031,3313,1131,4043
     01231   003313
     01232   001131
     01233   004043
0838 01234   003414          OCT   3414,0301
     01235   000301
0839 01236   001020     Y    OCT   1020,2407,2447
     01237   002407
     01240   002447
0840 01241   001726     RB   OCT   1726
0841 01242   002110     I    OCT   2110,3020,2717
     01243   003020
     01244   002717
0842 01245   003726     LB   OCT   3726,2130
     01246   002130
0843 01247   000444     MNUS OCT   0444
0844 01250   007045     EQ   OCT   7045,0570,0343
     01251   000570
```

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                                  cc1
        01252   000343
0845    01253   000106          OCT   0106,1737
        01254   001737
0846    01255   003603    SIX   OCT   3603,1434,4341,3010
        01256   001434
        01257   004341
        01260   003010
0847    01261   000106          OCT   0106,1737
        01262   001737
0848    01263   004641    D     OCT   4641,3000,0737,4645
        01264   003000
        01265   000737
        01266   004645
*0849   01267   003404          OCT   3404,3443
        01270   003443
0850    01271   004130    Q     OCT   4130,1001,0617,3746
        01272   001001
        01273   000617
        01274   003746
0851    01275   004170          OCT   4170,4022
        01276   004022
0852    01277   002414    SCOL  OCT   2414,1525,2470
        01300   001525
        01301   002470
0853    01302   002111    COM   OCT   2111,1222
        01303   001222
0854    01304   002120    EX    OCT   2120,2170,2227
        01305   002170
        01306   002227
0855    01307   002120    STOP  OCT   2120,1011,2101
        01310   001011
        01311   002101
0856    01312   002125    PLUS  OCT   2125,2303,4323,0541
        01313   002303
        01314   004323
        01315   000541
0857    01316   000720    V     OCT   0720
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0858 01317   004707     W     OCT   4707,1024,3047
     01320   001024
     01321   003047
0859 01322   000110     NINE  OCT   0110,3041,4637,1706
     01323   003041
     01324   004637
     01325   001706
0860 01326   000413           OCT   0413,3344
     01327   003344
0861 01330   000617     QUST  OCT   0617,3746,4534,2422
     01331   003746
     01332   004534
     01333   002422
0862 01334   007021           OCT   7021
0863 01335   002021     UP    OCT   2021,2615,3526
     01336   002615
     01337   003526
0864 01340   000415     LEFT  OCT   0415,1304
     01341   001304
0865 01342   004417     PER   OCT   4417,0706,1617,7047
     01343   000706
     01344   001617
     01345   007047
0866 01346   000070           OCT   0070,4030,3141
     01347   004030
     01350   003141
0867 01351   004022     S1    OCT   4022,2404,0040,4424
     01352   002404
     01353   000040
     01354   004424
0868 01355   002224     S2    OCT   2224,1403,0110,3041
     01356   001403
     01357   000110
     01360   003041
0869 01361   004334           OCT   4334
0870 01362   002422     S3    OCT   2422,2401,4124
     01363   002401
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      01364   004124
0871  01365   002242    S4    OCT   2242,0222,2024
      01366   000222
      01367   002024
0872  01370   002244    S5    OCT   2244,0022,0440
      01371   000022
      01372   000440
0873  01373   002200    S8    OCT   2200,4404
      01374   004404
0874  01375   004022    S6    OCT   4022,2402,2042
      01376   002402
      01377   002042
0875  01400   002422    S7    OCT   2422,2024,0242
      01401   002024
      01402   000242
0876  01403   002422    S9    OCT   2422,4404,4400,4000
      01404   004404
      01405   004400
      01406   004000
0877  01407   002204    S10   OCT   2204,2244,2220
      01410   002244
      01411   002220
0878  01412   002244    S11   OCT   2244,3313,0413,1100
      01413   003313
      01414   000413
      01415   001100
0879  01416   001131          OCT   1131,4031
      01417   004031
0880  01420   003322    S13   OCT   3322,4404,4000
      01421   004404
      01422   004000
0881  01423   002210    S15   OCT   2210,3650,0464
      01424   003650
      01425   000464
0882  01426   001022    VECT  OCT   1022,6222,2625
      01427   006222
      01430   002625
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0883 01431   002720     DAR   OCT   2720,1131
     01432   001131
0884 01433   002003     AR    OCT   2003,4334,3243
     01434   004334
     01435   003243
0885 01436   000644     GREQ  OCT   0644,0270
     01437   000270
0886 01440   000141     LEEQ  OCT   0141,7042,0446
     01441   007042
     01442   000446
0887 01443   000125     AST   OCT   0125
0888 01444   004145     NOEQ  OCT   4145,0570,2226,2404
     01445   000570
     01446   002226
     01447   002404
0889 01450   004401     PMI   OCT   4401,4170,2226,2404
     01451   004170
     01452   002226
     01453   002404
0890 01454   004400           OCT   4400
0891 01455   004130     O     OCT   4130,1001,0617,3746
     01456   001001
     01457   000617
     01460   003746
0892 01461   004170           OCT   4170,0047
     01462   000047
0893 01463   003000     OSB   OCT   3000,0737
     01464   000737
0894 01465   002126     STAR  OCT   2126,7005,4270,4502
     01466   007005
     01467   004270
     01470   004502
0895 01471   004130     PND   OCT   4130,2011,0100,1016
     01472   002011
     01473   000100
     01474   001016
0896 01475   002737           OCT   2737,4670,0323,7024
```

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      01476   004670
      01477   000323
      01500   007024
0897  01501   000400          OCT   0400
0898                    *
0899                    * LITERALS
0900                    *
0901  01502   000007          FIN                        LITERALS
      01503   177774
      01504   000100
      01505   000030
      01506   177777
      01507   000006
      01510   177775
      01511   000077
      01512   000003
      01513   000002
      01514   177776
      01515   000017
      01516   077777
      01517   000001

0902                    *
0903                    *
0904                    *
0905                          END   O$XA          END OF O$XA 16.JUL.70 HAD
NO ERRORS IN ABOVE ASSEMBLY.
$DA 41285326-002-02
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