```
 OPTIONS NODECK,LIST,XREF,NOREL,OBJ(P)

THE LIST OF OPTIONS USED DURING THIS ASSEMBLY IS--    NODECK,LIST,XREF,NOREL,OBJ
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```
                        EXTERNAL SYMBOL LIST

SYMBOL   TYPE                                    VER 15, MOD 00  23/05/20  PAGE   1

#KHELP    MODULE
```

```
ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  23/05/20  PAGE   2

    0000                          1 #KHELP START 0
                                  2        PRINT ON,NODATA
                                  3 *      @SYS  EXP-N
                                214+       PRINT ON
                                215 *      @ERM  EXP-N
                                837+       PRINT ON
                                838 *      @DIR  EXP-N
                                958+       PRINT ON
                                959 *      @FXD  EXP-N
                               1363+       PRINT ON
                               1364 *      @CAN  EXP-N
                               1467+       PRINT ON
                               1468 *      @VOL  EXP-N
                               1506+       PRINT ON
                               1507 *      @HDW  EXP-N
                               1691+       PRINT ON
                               1692 *      @SPF  EXP-N
                               2155+       PRINT ON
```

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      #KHELP - HELP KEYWORD
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```
       #KHELP - HELP KEYWORD


ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  23/05/20  PAGE    4

                           2158 *        HDR    #KHELP,1
                           2159 ******************************************************************************
                           2160 *   PROGRAM HEADER FOR DISK LOAD                                             *
                           2161 ******************************************************************************
                           2162 *#$KHEL EQU   X'0A30'                       DISK ADDR AF #KHELP
                           2163 *#$$KHE EQU   X'0C00'                       CORE LOAD ADDRESS OF #KHELP
                           2164 *#$@KHE EQU   012                           SECTOR CNT OF #KHELP
  0C00                     2165         ORG    #$$KHE                       CORE LOAD ADDRESS
         0C00 2166 $$$$$$ EQU    *                            FIRST LOCATION IN PROGRAM
  0C00 7BD2C8C5D3D7   0C05 2167         DC     CL6'#KHELP'                  PROGRAM NAME
  0C06 33             0C06 2168         DC     IL1'051'                     PROGRAM NUMBER OF #KHELP
                      0C07 2169 $KHELP EQU    *                            ENTRY POINT TO PROGRAM
                           2170 *** END OF EXPANSION ***
                           2171 ******************************************************************************
                           2172 * 5703-XM1      COPYRIGHT IBM CORP. 1970                                     *
                           2173 *                   REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE, 120-2083       *
                           2174 *                                                                            *
                           2175 ******************************************************************************
                           2176 *STATUS                                                                      *
                           2177 *   VERSION 1 MODIFICATION 0                                                 *
                           2178 *                                                                            *
                           2179 *FUNCTION                                                                    *
                           2180 *    * KHELPN PROCESSES THE HELP COMMAND.                                    *
                           2181 *    * THIS ROUTINE CONTROLS AN INTERACTIVE REFERENCE PROGRAM FOR            *
                           2182 *      DISPLAYING INFORMATION ABOUT THE SYSTEM/3.                            *
                           2183 *    * ON THE BASIS OF THE COMMAND PARAMETERS, OR ABSENCE OF THEM,           *
                           2184 *      KHELPN DETERMINES THE TEXT INFORMATION TO BE DISPLACED AND            *
                           2185 *      THE OUTPUT DEVICE TO BE USED.                                         *
                           2186 *                                                                            *
                           2187 *ENTRY POINTS                                                                *
                           2188 *      THE FIRST INSTRUCTION IS THE ONLY ENTRY POINT                         *
                           2189 *                                                                            *
                           2190 *INPUT                                                                       *
                           2191 *    INPUT TO THIS ROUTINE IS THE INPUT LINE BUFFER BEGINNING WITH           *
                           2192 *    THE CHARACTER IMMEDIATELY FOLLOWING THE HELP COMMAND.                   *
                           2193 *    * THE INPUT MAY CONSIST OF A CHARACTER CONSTANT PARAMETER WHICH         *
                           2194 *      SPECIFIES THE TEXT TO BE DISPLAYED.                                   *
                           2195 *    * THE INPUT MAY CONSIST OF A PARAMETER WHICH SPECIFIES THE OUTPUT       *
                           2196 *      DEVICE TO BE USED. (I.E. CRT/PRINTER)                                 *
                           2197 *    * THE INPUT MAY CONSIST OF A COMBINATION OF THE ABOVE OR NEITHER        *
                           2198 *      OF THE ABOVE.  THE LATTER RESULTS IN A DEFAULT TO THE SYSTEM          *
                           2199 *      PRINTER AND A PREDETERMINED SECTION OF TEXT.                          *
                           2200 *    ONCE THE COMMAND HAS INITIATED THE DISPLAY OF INFORMATION, A USER       *
                           2201 *    RESPONSE MAY BE REQUESTED.  IN THIS CASE, INPUT IO THE ROUTINE          *
                           2202 *    MAY BE A SINGLE CHARACTER WHICH INDICATES A REQUEST FOR A CERTAIN       *
                           2203 *    SECTION OF TEXT.                                                        *
                           2204 *    * A POINTER TO THIS INPUT LINE IS EXPECTED IN $XRSAV                    *
                           2205 *                                                                            *
                           2206 *OUTPUT                                                                      *
                           2207 *    * THE OUTPUT IS THE TEXT INFORMATION WHICH IS DISPLAYED                 *
                           2208 *    * IF THE DISPLAYED TEXT IS TERMINAL, THE HELP FUNCTION IS               *
                           2209 *      TERMINATED WHEN THE LAST LINE IS PRINTED,                             *
                           2210 *    * IF THE DISPLAYED TEXT IS NOT TERMINAL, THE USER IS EXPECTED TO        *
                           2211 *      MAKE A RESPONSE AND PROCESSING CONTINUES BASED ON THAT RESPONSE.*
                           2212 *                                                                            *
                           2213 **EXTERNAL REFERENCES                                                        *
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2214 *          $DISKN - ENTRY TO PHYSICAL DISK IOCS                    *
2215 *          $SPRNT - ENTRY TO PRINT ON SYSTEM PRINTER               *
2216 *          $CAERK - ENTRY FOR ERROR EXIT                           *
2217 *          $CARPL - ENTRY FOR ERROR EXIT                           *
2218 *          $CARPL - ENTRY FOR NORMAL EXIT                          *
2219 *          SCANIT - ENTRY TO SCAN BLANKS AND A COMMA               *
2220 *          SCKOUT - ENTRY TO CHECK OUTPUT SPECIFICATION            *
2221 *          SCKDEV - ENTRY IN SCKOUT TO SET OUTPUT DEVICE INDICATORS *
2222 *          SCSTRG - ENTRY TO CHARACTER STRING ANALYZER             *
2223 *          DL2ICS - ENTRY TO 2-DISK LOGICAL IOCS                   *
2224 *          GRABIT - ENTRY TO RETRIEVE LOGICAL RECORDS              *
2225 *          DLPRNT - ENTRY TO DISPLAY ONE LINE                      *
2226 *          @SCTSZ - LENGTH EQUATE OF ONE SECTOR                    *
2227 *          DL2RAD - ADDRESS OF BASE ADDRESS FOR DL2ICS             *
2228 *          GRSRDA - LOCATION TO PASS RELATIVE DISK ADDRESS TO GRABIT *
2229 *          GRSCTR - LOCATION OF INITIAL PASS INDICATOR FOR GRABIT  *
2230 *          GRBFRA - ADDRESS OF LEFT BYTE OF BUFFER FOR GRABIT      *
2231 *          GRTYPE - LOCATION OF RECORD TYPE FROM GRABIT            *
2232 *          GRLINE - LOCATION OF RECORD SIZE FROM GRABIT            *
2233 *          SCSCNT - LOCATION OF CHARACTER COUNT FROM SCSTRG        *
2234 *          SCSLNG - LOCATION OF CHARACTER STRING LENGTH INDICATOR  *
2235 *          DCRCNT - LOCATION OF COUNT INDICATOR IN DLPRNT          *
2236 *          SIOIND - ADDRESS OF COMMAND KEY OFF/ON INDICATOR        *
2237 *          $XRSAV - POINTER SAVE AREA TO INPUT LINE BUFFER         *
2238 *          $WAITF - DPL FOR WAIT FUNCTION                          *
2239 *          $KEYCD - ADDRESS OF CARRIAGE RETURN INDICATOR           *
2240 *          $ERRPG - ADDRESS OF SYSTEM MODE INDICATOR IN ERROR PROGRAM *
2241 *          $CAERR - ADDRESS OF ERROR CODE SAVE AREA                *
2242 *          $CRTIN - ADDRESS OF COMMAND KEY INDICATOR               *
2243 *          $INDR3 - ADDRESS OF SYSTEM STATUS INDICATOR             *
2244 *          $$INND - ADDRESS OF RIGHT BYTE OF INPUT LINE BUFFER     *
2245 *          $$PRES - ENTRY TO ENABLE THE KEYBOARD                   *
2246 *          $SINLN - ADDRESS OF POINTER SAVE AREA TO INPUT LINE BUFFER *
2247 *          $VOLF1 - VOL-ID ENTRY FOR F1                            *
2248 *          $VOLR1 - VOL-ID ENTRY FOR R1                            *
2249 *          $VOLR2 - VOL-ID ENTRY FOR R2                            *
2250 *          $VOLF2 - VOL-ID ENTRY FOR F2                            *
2251 *                                                                  *
2252 *EXITS, NORMAL                                                     *
2253 *    NORMAL EXIT IS TO $CARPL TO LOAD AND EXECUTE GUFUDI           *
2254 *                                                                  *
2255 *EXITS, ERROR                                                      *
2256 *    ERROR EXIT IS TO $CAERK TO LOAD AND EXECUTE ERRPGM            *
2257 *                                                                  *
2258 *TABLES/WORK AREAS                                                 *
2259 *    * KHETB2 IS A TABLE OF CHARACTER CONSTANTS FROM A TO Z -- IT IS *
2260 *      USED FOR CONVERTING A CHARACTER RESPONSE TO A NUMERIC RESPONSE. *
2261 *    * KHESPK IS THE SAVE AREA FOR THE INPUT CHARACTER STRING WITH NO *
2262 *      EMBEDDED BLANKS.                                            *
2263 *                                                                  *
2264 *ATTRIBUTES                                                        *
2265 *    THIS ROUTINE IS NOT REUSABLE                                  *
2266 *                                                                  *
2267 *CHARACTER CODE DEPENDENCY                                         *
2268 *    THE OPERATION OF THIS MODULE DEPENDS UPON AN INTERNAL         *
2269 *    REPRESENTATION OF THE EXTERNAL CHARACTER SET WHICH IS EQUIVALENT *
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                          2270 *    TO THE ONE USED AT ASSEMBLY TIME. THE CODING HAS BEEN ARRANGED    *
                          2271 *    SO THAT REDEFINITION OF CHARACTER CONSTANTS, BY REASSEMBLY, WILL  *
                          2272 *    RESULT IN A CORRECT MODULE FOR THE NEW DEFINITIONS.              *
                          2273 *                                                                     *
                          2274 *NOTES                                                                *
                          2275 *    ERROR PROCEDURES                                                 *
                          2276 *       * SYNTAX ERRORS CAUSE THE UP-ARROW AND AN ERROR MESSAGE       *
                          2277 *         TO BE PRINTED BY SETTING AN ERROR CODE AT $CAERR AND        *
                          2278 *         POINTING THE INDEX REGISTER TO THE PARAMETER OR DELIMITER IN *
                          2279 *         ERROR MORE TAKING THE ERROR EXIT.                           *
                          2280 *       * NON-SYNTAX ERRORS CAUSE AN ERROR MESSAGE TO BE PRINTED BY   *
                          2281 *         SETTING AN ERROR CODE AT $CAERR BEFORE TAKING THE ERROR EXIT.*
                          2282 *       * AN INVALID RESPONSE TO A REQUEST FOR USER RESPONSE RESULTS   *
                          2283 *         IN AN ERROR MESSAGE AND A REQUEST TO RE-ENTER THE RESPONSE   *
                          2284 *         BEING PRINTED VIA $$PRNT.  THE KEYBOARD IS ENABLED AND A     *
                          2285 *         RESPONSE IS EXPECTED. THIS SEQUENCE OF EVENTS CONTINUES      *
                          2286 *         UNTIL A VALID USER RESPONSE IS MADE.                        *
                          2287 *       * NON-TERMINAL TEXT REQUESTED FROM THE DATA RECORDER WILL      *
                          2288 *         CAUSE AN ERROR MESSAGE TO BE PRINTED INDICATING THAT NO      *
                          2289 *         RESPONSE IS ALLOWED.  BY SETTING AN INDICATOR FOR THE ERROR  *
                          2290 *         PROGRAM BEFORE TAKING THE ERROR EXIT, THE SYSTEM WILL        *
                          2291 *         CONTINUE READING CARDS AFTER THE ERROR MESSAGE IS PRINTED.   *
                          2292 *                                                                     *
                          2293 *    REGISTER USAGE                                                   *
                          2294 *       * THE BASE REGISTER IS USED FOR RELATIVE ADDRESSING BUT IS     *
                          2295 *         NEITHER SAVED NOR RESTORED.                                 *
                          2296 *       * THE INDEX REGISTER IS USED FOR SCANNING THROUGH THE INPUT    *
                          2297 *         LINE BUFFER.  IT IS ALSO USED AS A POINTER WITHIN VARIOUS    *
                          2298 *         TABLE AND BUFFERS.                                          *
                          2299 *       * THE ADDRESS RECALL REGISTER IS SAVED IN THE EXIT BRANCH      *
                          2300 *         INSTRUCTION OF AN INTERNAL SUBROUTINE WHICH MAKES A DISK     *
                          2301 *         SEARCH FOR THE HELPTEXT.                                    *
                          2302 *                                                                     *
                          2303 *    SAVED/RESTORED AREAS                                             *
                          2304 *       N/A                                                          *
                          2305 *                                                                     *
                          2306 *    MODIFICATION CONSIDERATIONS                                      *
                          2307 *       N/A                                                          *
                          2308 *                                                                     *
                          2309 *    REQUIRED MODULES                                                *
                          2310 *       * DLPRNT - PROVIDES DEVICE INDEPENDENCE FOR LIST ORIENTED      *
                          2311 *                  PROGRAMS                                          *
                          2312 *       * SCSTRG - CHARACTER STRING ANALYZER                          *
                          2313 *       * GRABIT - RETRIEVE FILE STATEMENTS                           *
                          2314 *       * DL2ICS - 2-TRACK LOGICAL IOCS                               *
                          2315 *       * SCANIT - SCAN VALID DELIMITERS                              *
                          2316 *       * SCKOUT - CHECK OUTPUT SPECIFICATION                         *
                          2317 *       *                                                            *
                          2318 *       * @SYSEQ - GENERAL SYSTEM EQUATES                             *
                          2319 *       * @FXDEQ - NUCLEUS LOCATION EQUATES                           *
                          2320 *       * @DIREQ - FILE LIBRARY EQUATES                               *
                          2321 *       * @ERMEQ - ERROR MESSAGE EQUATES                              *
                          2322 *       * @CANEQ - TRANSCIENT LOCATION EQUATES                        *
                          2323 *       * @VOLEQ - VOLUME LABEL EQUATES                               *
                          2324 *       * @HDWEQ - HARDWARE VALUE EQUATES                             *
                          2325 *                                                                     *
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                               2326 *    OTHER                                                       *
                               2327 *       N/A                                                      *
                               2328 ***********************************************************************
                               2329 *
                               2330 *                        INITIALIZATION
                               2331 *
      0C07 F2 87 50            2332       J    KHE025                      BRANCH AROUND MESSAGES 6 PPL'S
                               2333 *       MTEXT @@M210-@PRETR,PATCH-15
                               2334 ***********************************************************************
                               2335 * PPL'S AND TEXT FOR MESSAGE
                               2336 ***********************************************************************
      0C0A C0            0C0A  2337 @@M210 DC    AL1(@PRETR)              PRINT CONTROL FUNCTION
      0C0B 3D            0C0B  2338        DC    IL1'61'                  LENGTH OF MESSAGE
      0C0C 0C0E          0C0D  2339        DC    AL(@CADDR)(@@T210)       ADDR OF MESSAGE
                               2340 *
                         0C0E  2341 @@T210 EQU   *                        LEFT BYTE OF HESSAGE
      0C0E C5D9D9D6D940F5F9 0C40 2342      DC    CL051'ERROR 595 INVALID RESPONSE-TYPE ALPHA CHAR AT LEFT'
      0C41 40D6C640C3C8D6C9 0C4A 2343      DC    CL010' OF CHOICE'
                               2344 *
                               2345 * PATCH AREA FOR HESSACES
                               2346 *
      0C4B                0C59 2347 $$$001 DS    CL15                     MSC EXPANSION PATCH AREA
                               2348 *
                               2349 *** END OF EXPANSION ***
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                                   2351 *
                                   2352 *                      INITIALIZATION
                                   2353 *
                              0F62 2354           USING  KHE780,@BR              SET VALUE FOR BASE
      0C5A C2 01 0F62              2355 KHE025 LA    KHE780,@BR              POINT BASE REGISTER TO ORIGIN
      0C5E 35 02 03C7              2356        L     $XRSAV,@XR              POINT XR TO INPUT LINE AFTER CMD
      0C62 BD 60 00                2357        CLI   0(,@XR),KHEDSH          CHECK FOR DASH FOLLOWING CMD
      0C65 D0 81 36                2358        BE    KHE800(,@BR)            TAKE ERROR EXIT--SET ERROR CODE
      0C68 3C 01 12D1              2359        MVI   SCAMMA,SCACOM           SET OFF INDR FOR SCANNING COMMAS
                                   2360 *
                                   2361 *                 CHECK FOR F1 ON SYSTEM
                                   2362 *
      0C6C 3D 00 03FE              2363        CLI   $VOLF1,KHENAD           CHECK FOR F1 ON THE SYSTEM
      0C70 F2 81 11                2364        JE    KHE100                  IF NOT, GO TO DO SYNTAX CHECKING
      0C73 3C 09 1061              2365        MVI   KHETXT+@DSAD,KHEDA2     * WITH FUNCTION AND DADDR
      0C77 7C 01 7B                2366        MVI   KHEDKD(,@BR),KHEDA2-KHEDEC  SAVE DISK-DRIVE SPEC
      0C7A 3C 80 0D20              2367        MVI   KHE530+@Q,@NOP          SET INDR TO ENTER CODE FOR WAIT
                                   2368 *KHE050 DISK   KHETXT
      0C7E C0 87 0025              2369 KHE050 B     $DISKN                  PERFORM PHYSICAL DISK OP
      0C82 105F               0C83 2370        DC    AL2(KHETXT)             DPL ADDRESS
                                   2371 *** END OF EXPANSION ***
      0C84 C0 87 12B4              2372 KHE100 B     SCANIT                  SCAN PAST BLANKS
      0C88 C0 81 160A              2373        BZ    SCKDEV                  CHECK VALIDITY OF OUTPUT DEVICE
                                   2374 *
                                   2375 *                 CHECK FIRST PARAMETER
                                   2376 *
      0C8C BD 7D 00                2377 KHE150 CLI   0(,@XR),KHEQTE          IS THIS CHAR SINGLE QUOTE ?
      0C8F F2 01 7C                2378        JNE   KHE450                  IF NOT CHECK FOR I/O SPEC
                                   2379 *
                                   2380 *                 CHECK KEYWORD PARAMETER
                                   2381 *
                                   2382 **          NOP - JUMP IF KEYWORD PARAM HAS PREVIOUSLY SPECIFIED
      0C92 D0 80 44                2383 KHE200 BC    KHE830(,@BR),@NOP           **
      0C95 3C 87 0C93              2384        MVI   KHE200+@Q,@UCB          RESET INDR TO JUMP IN KHE200
      0C99 34 02 0D0A              2385        ST    KHE420+@OP1,@XR         SAVE POINTER TO SINGLE QUOTE
      0C9D 3C 01 153C              2386        MVI   SCSLNG,@B1              SET INDR TO RETURN ONE CHAR ONLY
      0CA1 C0 87 14EB              2387        B     SCSTRG                  CALLING SEQUENCE TO SCSTRG
      0CA5 1008               0CA6 2388        DC    AL2(KHESPK)             CHECK FOR UNBALANCED QUOTES
      0CA7 F2 04 07                2389        JNH   KHE220                  NO ERROR--CHECK LENGTH
      0CAA 35 02 0D0A              2390        L     KHE420+@OP1,@XR         RESTORE POINTER TO FIRST QUOTE
      0CAE D0 87 67                2391        B     SCKERR(,@BR)            TAKE ERROR EXIT
      0CB1 3D 00 1560              2392 KHE220 CLI   SCSCNT,KHENAD           IS THE LENGTH OF CHAR STRING = 0
      0CB5 F2 01 07                2393        JNE   KHE230                  IF NOT CONTINUE
      0CB8 C2 02 0C92              2394        LA    KHE200,@XR              INCREMENT @XR PAST INPUT BUFFER
      0CBC D0 87 52                2395        B     KHE850(,@BR)            GO TO SET ERROR CODE
                                   2396 *
                                   2397 *                 REMOVE EMBEDDED BLANKS
                                   2398 *
      0CBF 4C 00 DE 1560           2399 KHE230 MVC   KHECNT(1,@BR),SCSCNT    SAVE CHAR COUNT FROM 'SCSTRG'
      0CC4 35 02 0D0A              2400        L     KHE420+@OP1,@XR         RESTORE POINTER TO CHAR STRING
      0CC8 F2 87 0C                2401        J     KHE350                  SKIP MODIFICATIONS FIRST TIME
      0CCB 5F 00 DE 75             2402 KHE250 SLC   KHECNT(1,@BR),KHEXON(,@BR)  DECR CHAR COUNT FOR EACH BLANK
      0CCF 1F 00 1560 75           2403 KHE300 SLC   SCSCNT(1),KHEXON(,@BR)  DECR CHAR COUNT FOR EACH CHAR
      0CD4 F2 81 17                2404        JZ    KHE400                  EXIT IF ALL CHARS HAVE BEEN CHKD
      0CD7 E2 02 01                2405 KHE350 LA    KHENC1(,@XR),@XR        POINT TO NEXT CHAR IN DIFFER
      0CDA BD 40 00                2406        CLI   0(,@XR),@BLANK          CHECK FOR BLANK CHARACTER
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0CDD C0 81 0CCB            2407        BE    KHE250
0CE1 6C 00 A6 00           2408 KHE370 MVC   KHESPK(1,@BR),0(,@XR)    SAVE ALL NON-BLANK CHARACTERS
0CE5 1E 00 0CE3 75         2409        ALC   KHE370+@D1(1),KHEXON(,@BR)  INCR INST ADDRESS BY 1
0CEA C0 87 0CCF            2410        B     KHE300                  CHECK NEXT CHARACTER
0CEE 3C 01 12D1            2411 KHE400 MVI   SCAMMA,SCACOM           SET INDR FOR SCANNING A COMMA
0CF2 E2 02 02              2412        LA    KHENC2(,@XR),@XR        INCREMENT PAST CHAR STRING QUOTE
0CF5 C0 87 12B4            2413        B     SCANIT                  SCAN PAST BLANKS AND COMMAS
0CF9 D0 82 67              2414        BL    SCKERR(,@BR)            TAKE ERROR EXIT
0CFC C0 84 0C8C            2415        BH    KHE150                  CHECK NEXT PARAMETER
0D00 BD 1E 00              2416        CLI   0(,@XR),@EOS            TEST FOR EOS
0D03 C0 81 0D1F            2417        BE    KHE530                  GO TO LOCATE THE HELP TEXT
0D07 C2 02 0000            2418 KHE420 LA    *-*,@XR                 RESTORE POINTER TO FIRST QUOTE
0D0B D0 87 3D              2419        B     KHE810(,@BR)            SET ERROR CODE--'INV PARAM'
                           2420 *
                           2421 *              CHECK OUTPUT SPEC
                           2422 *
0D0E C0 87 1566            2423 KHE450 B     SCKOUT                  SET OUTPUT SPEC INDRS FOR DLPRNT
0D12 C0 84 0C8C            2424        BH    KHE150                  NO ERROR--CHECK NEXT PARAMETER
0D16 D0 82 67              2425        BL    SCKERR(,@BR)            ERROR--CONFLICTING OR DUPLICATE
0D19 BD 1E 00              2426 KHE500 CLI   0(,@XR),@EOS            TEST FOR EOS
0D1C D0 01 3D              2427        BNE   KHE810(,@BR)            SET ERROR CODE FOR 'INV PARAM'
                           2428 *
                           2429 *              SET UP DISK SEARCH
                           2430 *
0D1F F2 87 11              2431 KHE530 JC    KHE540,@UCB             SKIP THE WAIT IF F1 NOT ON SYST
                           2432 *KHE532 DISK  $WAITF
0D22 C0 87 0025            2433 KHE532 B     $DISKN                  PERFORM PHYSICAL DISK OP
0D26 057F        0D27      2434        DC    AL2($WAITF)             DPL ADDRESS
                           2435 *** END OF EXPANSION ***
0D28 38 04 1AFF            2436        TBN   KHEBUF+$#TIDR,$#THEL    IS THE HELP TEXT HERE ?
0D2C F2 90 04              2437 KHE535 JF    KHE540                  IF NOT, KEEP SEARCHING
0D2F C0 87 0D92            2438        B     KHE546                  GO TO READ IN KEYWORD TABLE
0D33 0C 01 0D76 1000       2439 KHE540 MVC   KHEDSK,KHEAF2(@CADDR)   SET UP CHECK FOR F2 ON SYSTEM
0D39 3C 0B 1061            2440        MVI   KHETXT+@DSAD,KHEDA4     SET UP DPL DADDR
0D3D 7C 03 7B              2441        MVI   KHEDKD(,@BR),KHEDA4-KHEDEC  SAVE DISK-DRIVE SPEC
0D40 C0 87 0D6F            2442        B     KHE542                  GO TO CHECK FOR DISK ON SYSTEM
0D44 0C 01 0D76 1002       2443        MVC   KHEDSK,KHEAR1(@CADDR)   SET UP CHECK FOR R1 ON SYSTEM
0D4A 3C 08 1061            2444        MVI   KHETXT+@DSAD,KHEDA1     SET UP DPL DADDR
0D4E 7C 00 7B              2445        MVI   KHEDKD(,@BR),KHEDA1-KHEDEC  SAVE DISK-DRIVE SPEC
0D51 C0 87 0D6F            2446        B     KHE542                  GO TO CHECK FOR DISK ON SYSTEM
0D55 0C 01 0D76 1004       2447        MVC   KHEDSK,KHEAR2(@CADDR)   SET UP CHECK FOR R2 ON SYSTEM
0D5B 3C 0A 1061            2448        MVI   KHETXT+@DSAD,KHEDA3     SET UP DPL DADDR
0D5F 7C 02 7B              2449        MVI   KHEDKD(,@BR),KHEDA3-KHEDEC  SAVE DISK-DRIVE SPEC
0D62 C0 87 0D6F            2450        B     KHE542                  GO TO CHECK FOR DISK ON SYSTEM
0D66 78 FF A3              2451        TBN   KHETST(,@BR),KHELVW     WRONG LEVEL NO. EVER FOUND
0D69 D0 10 63              2452        BT    KHE880(,@BR)            YES - SET THAT ERROR CODE
0D6C D0 87 59              2453        B     KHE860(,@BR)            NO - SET ERROR CODE NOT FOUND
                           2454 *
                           2455 *              LOCATE THE HELPTEXT
                           2456 *
0D6F 34 08 0D91            2457 KHE542 ST    KHE544+@OP1,@ARR        SAVE THE RETURN ADDRESS
0D73 3D 00 0000            2458 KHE543 CLI   *-*,KHENAD             IS THE SPECIFIED DISK ON SYSTEM ?
0D77 C0 81 0D8E            2459        BE    KHE544                  NO - CONTINUE LOOKING
                           2460 *        DISK  KHETXT,WAIT
0D7B C0 87 0025            2461        B     $DISKN                  PERFORM PHYSICAL DISK OP
0D7F 105F        0D80      2462        DC    AL2(KHETXT)             DPI ADDRESS
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ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT        VER 15, MOD 00  23/05/20  PAGE  10

     0D81 C0 87 0025            2463       B     $DISKN                  WAIT AND CHECK DISK ERRORS
     0D85 057F           0D86 2464       DC    AL2($WAITF)             WAIT DPL ADDRESS
                              2465 *** END OF EXPANSION ***
     0D87 38 04 1AFF           2466       TBN   KHEBUF+$#TIDR,$#THEL    IS THE HELP TEXT HERE ?
     0D8B F2 10 04             2467       JT    KHE546                  YES - BRING IN KEYWORD TABLE
     0D8E C0 87 0D33           2468 KHE544 B    KHE540+*-*              NO - RETURN TO CONTINUE LOOKING
                              2469 *       *     SET UP DPL TO READ IN THE KEYWORD TABLE
     0D92 0C 01 12B3 1AF2      2470 KHE546 MVC  DL2RAD(@CADDR),KHEBUF+$#THAD  PASS BASE ADDRESS TO DL2ICS
     0D98 1E 01 12B3 7B        2471       ALC   DL2RAD,KHEDKD(@DADDR,@BR)  SET ON DISK DRIVE SPEC
                              2472 *     DSKL2 KHEDP2                   READ IN KEYWORD TALE
     0D9D C0 87 121B           2473       B     DL2ICS                  PERFORM RELATIVE DISK OP
     0DA1 1053           0DA2 2474       DC    AL2(KHEDP2)             DPL ADDRESS
                              2475 *** END OF EXPANSION ***
                              2476 *
                              2477 *              DETERMINE KEYWORD PARAMETER
                              2478 *
     0DA3 0C 00 0DAA 0C93      2479 KHE548 MVC  KHE550+@Q(1),KHE200+@Q  TEST FOR KYWD PARAM SPEC
     0DA9 F2 80 08             2480 KHE550 JC   KHE600,@NOP             JUMP IF KYWD PARAM WAS SPEC
     0DAC 5C 03 A9 73          2481       MVC   KHELPZ(KHELNH,@BR),KHEHLP(,@BR)  SET VALUES FOR
     0DB0 3C 04 1040           2482       MVI   KHECNT,KHELNH           FINDING THE HELP TEXT
                              2483 *
                              2484 *                SEARCH KEYWORD TABLE
                              2485 *
     0DB4 1C 00 0E04 DE        2486 KHE600 MVC  KHE620+@Q(1),KHECNT(,@BR)  DEFINE LGN OF KYWD COMPARE
     0DB9 1F 00 0E04 75        2487       SLC   KHE620+@Q(1),KHEXON(,@BR)  ADJUST LENGTH CODE OF CRP INST
     0DBE 1E 00 0E05 DE        2488       ALC   KHE620+@D1(1),KHECNT(,@BR)   ADJUST INST ADDRESS TO POINT
     0DC3 1E 00 0E06 DE        2489       ALC   KHE620+@DD2(1),KHECNT(,@BR)  * TO RIGHT BYTE OF CHAR STRG
                              2490 *KHE605 DISK  $WAITF
     0DC8 C0 87 0025           2491 KHE605 B    $DISKN                  PERFORM PHYSICAL DISK OP
     0DCC 057F           0DCD 2492       DC    AL2($WAITF)             DPL ADDRESS
                              2493 *** END OF EXPANSION ***

     0DCE C2 02 1B00           2495       LA    KHETAB,@XR              INITIALIZE INDEX REGISTER
     0DD2 9D 01 01 6F          2496       CLC   1(KHELEV,@XR),KHELVN(,@BR)  IS CURRENT LEVEL # ON HELPTEXT
     0DD6 F2 81 07             2497       JE    KHE607                  START TABLE SEARCH
     0DD9 7A FF A3             2498       SBN   KHETST(,@BR),KHELVW     SET ON INDR FOR WRONG LEVELLNO
     0DDC C0 87 0D8E           2499       B     KHE544                  CONTINUE LOOKING FOR HELPTEXT
     0DE0 E2 02 06             2500 KHE607 LA   KHEFST(,@XR),@XR        YES - INCREMENT TO FIRST KEYWORD
     0DE3 74 02 E5             2501 KHE610 ST   KHESAV(,@BR),@XR        SAVE VALUE IN OXR
     0DE6 6C 00 A5 00          2502       MVC   KHEXXX(1,@BR),0(,@XR)   MOVE CHAR COUNT TO 2-BYTE FIELD
     0DEA 5E 01 E5 A5          2503       ALC   KHESAV(@CADDR,@BR),KHEXXX(,@BR)  INCREMENT VALUE BY KYWD
     0DEE 4D 01 E5 0FFE        2504       CLC   KHESAV(@CADDR,@BR),KHEADK  END OF BUFFER AREA ?
     0DF3 F2 02 1E             2505       JNL   KHE640                  YES - READ IN NEXT SECTION
     0DF6 9D 00 00 DE          2506       CLC   0(1,@XR),KHECNT(,@BR)   COMPARE CHAR CNT & KYWD TBL LNG
     0DFA F2 82 0D             2507       JL    KHE630                  CHECK NEXT ELEMENT IN KYWD TAKE
     0DFD F2 81 03             2508       JE    KHE620                  COMPARE KYWD SPEC TO TABLE ENTRY
     0E00 D0 87 52             2509       B     KHE850(,@BR)            GO TO THE ERROR PROGRAM
     0E03 9D 00 00 A5          2510 KHE620 CLC  *-*(@VQ,@XR),KHEPAK+*-*(,@BR)  CMP KYWD SPEC TO KYWD TABLE
     0E07 F2 81 2A             2511       JE    KHE650                  FIND DADDR OF TEXT SPEC
     0E0A 76 02 A5             2512 KHE630 A    KHEXXX(,@BR),@XR        INCR @XR BY LNG OF KEYWORD
     0E0D E2 02 04             2513       LA    KHEXFR(,@XR),@XR        INCR @XR BY KHELAD+1
     0E10 C0 87 0DE3           2514       B     KHE610                  CHECK NEXT ELEMENT IN THE TBL
     0E14 0C FF 1BFF 1EFF      2515 KHE640 MVC  KHETBB-1(@SCTSZ),KHENDK  MOVE LAST SECTOR TO FRONT
                              2516 *     DSKL2 KHEDT2
     0E1A C0 87 121B           2517       B     DL2ICS                  PERFORM RELATIVE DISK OP
     0E1E 1059           0E1F 2518       DC    AL2(KHEDT2)             DPL ADDRESS
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#KHELP - HELP KEYWORD

                              2519 *** END OF EXPANSION ***

    0E20 36 02 0FCE   2521   A   KHEDCC,@XR   POINT @XR TO KYWD BEING CHECKED
    0E24 0E 00 105B 0FCF   2522   ALC KHEDT2+@DSAD(1),KHEARD ADJUST DPL FOR KYWD TABLE
                              2523 *   DISK $WAITF   WAIT FOR READ ON KYWD TABLE
    0E2A C0 87 0025   2524   B $DISKN   PERFORM PHYSICAL DISK OP
    0E2E 057F   0E2F 2525   DC AL2($WAITF)   DPL ADDRESS
                              2526 *** END OF EXPANSION ***

    0E30 C0 87 0DE3   2528   B   KHE610   CONTINUE SEARCHING KYWD TABLE

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       #KHELP - HELP KEYWORD


ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT            VER 15, MOD 00  23/05/20  PAGE  12

                            2530 *
                            2531 *                    CONVERT BYTE TO CYLINDER-SECTOR DISP
                            2532 *
    0E34 C0 87 160A         2533 KHE650 B    SCKDEV                      CHECK VALIDITY OF OUTPUT DEVICE
    0E38 76 02 DE           2534        A    KHECNT(,@BR),@XR            INCR @XR BY LNG OF KYWD
    0E3B 6C 02 E1 03        2535 KHE660 MVC  KHECNV(KHELAD,@BR),KHELAD(,@XR) MOVE 3-BYTE RLTV ADDR
    0E3F 7C 00 E2           2536 KHE680 MVI  KHECTR(,@BR),KHEXZR         INITIALIZE COUNTER TO ZERO
    0E42 5E 00 E2 75        2537 KHE690 ALC  KHECTR(1,@BR),KHEXON(,@BR)  INCR CYL CNT BY 1 AND DECR
    0E46 5F 01 E0 79        2538        SLC  KHESCT(@DADDR,@BR),KHECYL(,@BR) * SCTR CNT BY DECML 48
    0E4A C0 02 0E42         2539        BNL  KHE690                      WITH POS RESULT REPEAT
    0E4E 5F 00 E2 75        2540        SLC  KHECTR(1,@BR),KHEXON(,@BR)  WITH NEG RESULT DECK CYL CNT
    0E52 5E 01 E0 79        2541        ALC  KHESCT(@DADDR,@BR),KHECYL(,@BR) * INCR SCT CNT THEN MOVE
    0E56 5C 00 DF E2        2542        MVC  KHESCT-1(1,@BR),KHECTR(,@BR) SET UP RELATIVE DADDR
                            2543 *
                            2544 *              PRIME THE BUFFERS
                            2545 *
    0E5A 1C 01 104F E0      2546        MVC  KHEPL1+@DSAD(@DADDR),KHESCT(,@BR)  SET UP DPL DADDR
                            2547 *KHE700 DSKL2 KHEPL1,WAIT
    0E5F C0 87 121B         2548 KHE700 B    DL2ICS                      PERFORM RELATIVE DISK OP
    0E63 104D          0E64 2549        DC   AL2(KHEPL1)                 DPL ADDRESS
    0E65 C0 87 0025         2550        B    $DISKN                      WAIT AND CHECK DISK ERRORS
    0E69 057F          0E6A 2551        DC   AL2($WAITF)                 WAIT DPL ADDRESS
                            2552 *** END OF EXPENSION ***
    0E6B 0C 01 11CC 1042    2553        MVC  GRSRDA(@DADDR),KHESCT       PASS RLTV DADDR TO GRABIT
    0E71 3C 04 11D3         2554        MVI  GRSCTR,KHEGR4               SET INDICATORS FOR GRABIT
    0E75 3C 00 11D6         2555        MVI  GRWHAT,KHEGR0               * INITIAL PASS
    0E79 0C 01 11CF 0FFC    2556        MVC  GRBFRA(@CADDR),KHEADB       RESET BUFFER ADDRESS FOR GRABIT
    0E7F C0 87 106D         2557 KHE710 B    GRABIT                      BRANCH TO GRABIT
                            2558 *
                            2559 *              FIND FIRST LOGICAL RECORD
                            2560 *
    0E83 3C 01 11D6         2561        MVI  GRWHAT,KHEGR1               SET INDR FOR SUBSEQUENT PASSES
    0E87 5F 01 E0 E0        2562        SLC  KHESCT(@CADDR,@BR),KHESCT(,@BR)  ZERO HIGH ORDER BYTES
    0E8B 74 02 E7           2563 KHE715 ST   KHEXRS(,@BR),@XR            SAVE VALUE IN INDEX REGISTER
    0E8E 4F 01 E7 0FFC      2564        SLC  KHEXRS(@CADDR,@BR),KHEADB   SUBTRACT ADDRESS OF BUFFER
    0E93 4D 01 E7 1043      2565        CLC  KHEXRS(@CADDR,@BR),KHECNV   IS THIS THE RECORD NEEDED ?
    0E98 F2 84 08           2566        JH   KHE730                      YES - GET THE RECORD
    0E9B C0 87 106D         2567 KHE720 B    GRABIT                      NO - CONTINUE LOOKING
    0E9F C0 87 0E8B         2568        B    KHE715                      IS THIS THE RECORD NEEDED ?
    0EA3 C0 87 106D         2569 KHE730 B    GRABIT                      GET NEXT LOGICAL RECORD
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                              2571 *
                              2572 *                    DETERMINE UTILIZATION OF HELP TEXT
                              2573 *
  0EA7 3D 00 104C             2574 KHE740 CLI    GRTYPE,KHEPRT            TEST FOR LINE TO BE PRINTED
  0EAB F2 81 29               2575        JE     KHE745                  GO TO PRINT ROUTINE
  0EAE 3D 00 104B             2576        CLI    GRLINE,KHETRM           NO FURTHER CHOICES ?
  0EB2 F2 81 18               2577        JE     KHE742                  IF NOT - TERMINATE THE ROUTINE
  0EB5 38 01 03C3             2578        TBN    $KEYCD,$CARDI           TEST FOR CARD INPUT
  0EB9 F2 90 44               2579        JF     KHE757                  NO - GO TO ENABLE INPUT
  0EBC 3C 40 03CE             2580        MVI    $ERRPG,$ERFIL           INDR FOR ERR PGM--READ CARDS
  0EC0 3C A4 03CD             2581        MVI    $CAERR,@@E578           CODE FOR 'NO RESPONSE ALLOWED'
  0EC4 C0 87 12F5             2582        B      DLPRNT                  GO TO DLPRNT TO WAIT FOR
  0EC8 057F             0EC9 2583        DC     AL(@CADDR)($WAITF)      * LAST LINE
  0ECA D0 87 67               2584        B      SCKERR(,@BR)            GO TO ERROR ANDONAN
  0ECD C0 87 12F5             2585 KHE742 B      DLPRNT                  WAIT FOR LAST LINE
  0ED1 057F             0ED2 2586        DC     AL2($WAITF)             *
  0ED3 C0 87 04A1             2587        B      $CARPL                  TERMINATE HELP ROUTINE
                              2588 *
                              2589 *                    PRINT ROUTINE
                              2590 *
  0ED7 3D 00 104B             2591 KHE745 CLI    GRLINE,KHEXZR           IS THIS A BLANK LINE ?
  0EDB F2 01 0A               2592        JNE    KHE750                  IF NOT PRINT IT
  0EDE C0 87 12F5             2593        B      DLPRNT                  PRODUCE A BLANK LINE
  0EE2 1069             0EE3 2594        DC     AL2(KHEBLK)
  0EE4 C0 87 0EA3             2595        B      KHE730                  GO TO GET THE NEXT RECORD
  0EE8 3C C0 1065             2596 KHE750 MVI    KHEPPL,@PRETR           SET UP PPL FOR PRINT & RETURN
  0EEC 0C 00 1066 104B        2597        MVC    KHEPPL+@PRCNT(1),GRLINE
  0EF2 C0 87 12F5             2598 KHE755 B      DLPRNT                  PRINT THE LINE
  0EF6 1065             0EF7 2599        DC     AL2(KHEPPL)
  0EF8 C0 87 0EA3             2600        B      KHE730                  GET NEXT LINE
  0EFC C0 87 0EA7             2601        B      KHE740                  CHECK THE CODE
                              2602 *
                              2603 *                    ENABLE INPUT FOR MULTIPLE CHOICE RESPONSE
                              2604 *
  0F00 3C 05 03D3             2605 KHE757 MVI    $CRTIN,$CRTPU+$CRTUP    SET ROLL UP
  0F04 C0 87 12F5             2606        B      DLPRNT                  GO TO DLPRNT TO WAIT FOR
  0F08 057F             0F09 2607        DC     AL(@CADDR)($WAITF)      * LAST LINE TO BE PRINTED
  0F0A 3B 08 03D2             2608        SBF    $IOIND,$CMDKY           SET OFF COMMAND KEY ONLY
  0F0E 3A 10 03D6             2609        SBN    $INDR3,$CLBFR           SET MDR FOR CLEARING INPUT LINE
  0F12 3C 40 06FA             2610        MVI    $$INND,@BLANK           CLEAR THE INPUT LINE BUFFER
  0F16 0C F2 06F9 06FA        2611        MVC    $$INND-1,$$INND($$INND-$$INLN)  * TO BLANKS
  0F1C C0 87 0890             2612 KHE760 B      $$PRES                  ENABLE INPUT
  0F20 39 10 03C3             2613 KHE762 TBF    $KEYCD,$KYBSY           CHECK FOR CARRIAGE RETURN
  0F24 C0 90 0F20             2614        BF     KHE762                  LOOP TO WAIT FOR CARRIAGE RETURN
  0F28 C2 02 0607             2615        LA     $$INLN,@XR              POINT INDEX REG TO INPUT LINE
  0F2C 3C 01 12D1             2616        MVI    SCAMMA,SCACOM           SCAN BLANKS ONLY
  0F30 C0 87 12B4             2617        B      SCANIT                  LOCATE NON-BLANK INPUT CHAR
  0F34 5F 00 E3 E3            2618 KHE765 SLC    KHETCR(1,@BR),KHETCR(,@BR)   INITIALIZE COUNTER TO ZERO
  0F38 0C 01 0F41 0FFA        2619        MVC    KHE770+@OP1(@CADDR),KHEAD2   REINITIALIZE TABLE ADDRESS
  0F3E 2D 00 0FDE 00          2620 KHE770 CLC    KHETB2+*-*(1),0(,@XR)   SEARCH TABLE OF RESPONSES
  0F43 F2 81 1C               2621        JE     KHE780                  GO TO FIND THE ADDRESS
  0F46 5E 00 E3 75            2622        ALC    KHETCR(1,@BR),KHEXON(,@BR)   INCREMENT COUNTER
  0F4A 1E 01 0F41 75          2623        ALC    KHE770+@OP1(@CADDR),KHEXON(,@BR)  LOOK AT NEXT IN TABLE
  0F4F 4D 00 E3 104B          2624        CLC    KHETCR(1,@BR),GRLINE    CHECK FOR END OF VALID CHOICES
  0F54 C0 82 0F3E             2625        BL     KHE770                  CHECK NEXT ELEMENT
                              2626 *KHE775 SPRNT @@M210                 OUTPUT ERROR MESSAGE
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    0F58 C0 87 0465           2627 KHE775 B      $SPRNT                        PRINT ON SYSTEM PRINTER
    0F5C 0C0A            0F5D 2628         DC     AL2(@@M210)                   PPL ADDRESS
                              2629 *** END OF EXPANSION ***

    0F5E C0 87 0F1C           2631        B      KHE760                        GO TO ENABLE KEYBOARD
                              2632 *
                              2633 *                 DETERMINE TEXT ADDRESS
                              2634 *
    0F62 5F 01 E5 E5          2635 KHE780 SLC    KHESAV(@CADDR,@BR),KHESAV(,@BR)  ZERO 2-BYTE FIELD
    0F66 5C 00 E5 E3          2636        MVC    KHESAV(1,@BR),KHETCR(,@BR)  SAVE VALUE OF COUNTER
    0F6A 5E 00 E5 E3          2637        ALC    KHESAV(1,@BR),KHETCR(,@BR)   TRIPLE THE COUNTER BY ADDING
    0F6E 5E 00 E5 E3          2638        ALC    KHESAV(1,@BR),KHETCR(,@BR)   * IT TO ITSELF 3 TIMES
    0F72 E2 02 01             2639        LA     1(,@XR)                       INCREMENT @XR PAST RESPONSE
    0F75 C0 87 12B4           2640        B      SCANIT                        SCAN TO NEXT NON-BLANK
    0F79 BD 1E 00             2641        CLI    0(,@XR),@EOS                  IS THIS EOS ?
    0F7C C0 01 0F58           2642        BNE    KHE775                        IF NOT - ERROR
    0F80 C2 02 17FF           2643        LA     GRTEXT-1,@XR                  SET UP INDEX REG TO POINT 1-BYTE
    0F84 36 02 1047           2644        A      KHESAV,@XR                    * TO THE LEFT OF THE ADDRESS
    0F88 6C 02 E1 03          2645        MVC    KHECNV(KHELAD,@BR),KHELAD(,@XR)  PASS DADDR FOR CONVERSION
    0F8C 3C 01 140C           2646        MVI    DCRCNT,@B1                    SET COUNT TO 1 FOR DLPRNT
    0F90 C0 87 160A           2647        B      SCKDEV                        CHECK OUTPUT SPEC
    0F94 C0 87 0E3F           2648        B      KHE680                        GO TO CONVERT THE RELATIVE ADDR
                              2649 *
                              2650 *                 SET ERROR CODES
                              2651 *
    0F98 3C 18 03CD           2652 KHE800 MVI    $CAERR,@@E139                 SET ERR CODE - 'INV DELIMITER'
    0F9C F2 87 2A             2653        J      SCKERR                        TAKE ERROR EXIT
    0F9F 3C 11 03CD           2654 KHE810 MVI    $CAERR,@@E131                 SET ERR CODE - 'INV PARAM'
    0FA3 F2 87 23             2655        J      SCKERR                        TAKE ERROR EXIT
    0FA6 3C 15 03CD           2656 KHE830 MVI    $CAERR,@@E136                 SET ERR CODE - 'PARAM DUPCTN'
    0FAA F2 87 1C             2657        J      SCKERR                        TAKE ERROR EXIT
    0FAD 3C 10 03CD           2658 KHE840 MVI    $CAERR,@@E130                 SET ERR CODE - 'MISSING PARAM'
    0FB1 F2 87 15             2659        J      SCKERR                        TAKE ERROR EXIT
    0FB4 3C 4F 03CD           2660 KHE850 MVI    $CAERR,@@E330                 SET ERR CODE - 'KYWD NOT IN TBL'
    0FB8 F2 87 0E             2661        J      SCKERR                        TAKE ERROR EXIT
    0FBB 3C 22 03CD           2662 KHE860 MVI    $CAERR,@@E205                 SET ERR CODE - 'TEXT NOT FOUND'
    0FBF D2 02 59             2663        LA     KHE860(,@BR),@XR              INCR @XR PAST INPUT LINE BUFFER
    0FC2 F2 87 04             2664        J      SCKERR                        TAKE ERROR EXIT
    0FC5 3C 7F 03CD           2665 KHE880 MVI    $CAERR,@@E489                 LEVEL NO INCORRECT
    0FC9 C0 87 0FC9           2666 KHE890 B      SCKERR                        ERROR EXIT
                         0FC9 2667 SCKERR EQU    KHE890                        *
```

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                                  2669 *
                                  2670 *                    EQUATES
                                  2671 *
                          0001    2672 KHENC1 EQU   1                         FOR INCREMENTING THE @XR BY 1
                          0002    2673 KHENC2 EQU   2                         FOR INCREMENTING THE @XR BY 2
                          0037    2674 KHELNS EQU   55                        MAXIMUM LENGTH OF CHAR STRING
                          0004    2675 KHEXFR EQU   4                         BYTES FOR LNG & DADDR-KYWD TABLE
                          0003    2676 KHELAD EQU   3                         LENGTH OF RELATIVE ADDRESS
                          0100    2677 KHESCR EQU   256                       BYTE COUNT FOR A SECTOR
                          0001    2678 KHEONE EQU   1                         COUNT FOR PRINTING BLANK LINE
                          0300    2679 KHESC3 EQU   3*@SCTSZ                   DPL COUNT FOR KEYWORD TABLE
                          0060    2680 KHEDSH EQU   X'60'                     LOOK FOR DASH FOLLOWING KEYWORD
                          007D    2681 KHEQTE EQU   X'7D'                     SINGLE QUOTE SIGNALING KYWD PARM
                          0004    2682 KHEGR4 EQU   X'04'                     SECTOR COUNT FOR GRABIT
                          00FF    2683 KHELVW EQU   X'FF'                     CODE FOR INV LEVEL NO. FOUND
                          0000    2684 KHEGR0 EQU   X'00'                     CODE FOR GRWHAT--INITIALIZATION
                          0001    2685 KHEGR1 EQU   X'01'                     CODE FOR GRWHAT
                          0000    2686 KHEPRT EQU   X'00'                     CODE FOR PRINTING A LINE
                          00FF    2687 KHETER EQU   X'FF'                     CODE TO INDICATE END OF PRINTOUT
                          0000    2688 KHETRM EQU   X'00'                     LNG CODE TO TERMINATE ROUTINE
                          00FF    2689 KHENDT EQU   X'FF'                     INDICATES END OF KEYWORD TABLE
                          0000    2690 KHEXZR EQU   X'00'                     FOR LENGTH FIELD FOR 'SCSTRG'
                          0004    2691 KHEADR EQU   X'04'                     SECTOR DISP IN KYWD TABLE
                          0004    2692 KHELNH EQU   X'04'                     LENGTH OF HELP KEYWORD
                          0008    2693 KHEDA1 EQU   X'08'                     CYLINDER 0 ON R1
                          0009    2694 KHEDA2 EQU   X'09'                     CYLINDER 0 ON F1
                          000A    2695 KHEDA3 EQU   X'0A'                     CYLINDER 0 ON R2
                          000B    2696 KHEDA4 EQU   X'0B'                     CYLINDER 0 ON F2
                          0000    2697 KHENAD EQU   X'00'                     NULL VOLID ENTRY
                          0002    2698 KHELEV EQU   2                         BYTE COUNT OF LEVEL NUMBER
                          0006    2699 KHEFST EQU   6                         INDENTION TO FIRST ENTRY IN TABL
                          0D76    2700 KHEDSK EQU   KHE543+@OP1               SAVE THE ADDRESS IN VOL-ID TABLE
                                  2701 *        *    SECTOR COUNT FOR KYWD TABLE AND CYLINDER ZERO
                          0001    2702 KHESC1 EQU   1                         NO. OF SECTORS TO BE READ IN
                          0000    2703 KHECY0 EQU   0                         CYLINDER ZERO
                          0008    2704 KHEDEC EQU   X'08'                     FOR DECR FOR DISK-DRIVE SPEC
                                  2705 *
                                  2706 *                    CONSTANTS
                                  2707 *
     0FCD FD00             0FCE   2708 KHEDCC DC    AL(@CADDR)(-KHESC3)       FOR DECREMENTING @XR 3 SECTORS
     0FCF 03               0FCF   2709 KHEARD DC    XL1'03'                   SECTOR DISP IN KYWD TABLE
                                  2710 ****** R E L E A S E   L E V E L                            ******
     0FD0 0003             0FD1   2711 KHELVN DC    XL(KHELEV)'0003'          RELEASE LVL OF CURRENT HELP TEXT
                                  2712 ******   CHANGES WITH EACH RELEASE                         ******
     0FD2 C8C5D3D7         0FD5   2713 KHEHLP DC    CL(KHELNH)'HELP'          CHAR STRING--HELP KYWD
     0FD6 0001             0FD7   2714 KHEXON DC    XL(@CADDR)'0001'          FOR DECREMENTING CHAR COU
     0FD8 0011             0FD9   2715 KHELNL DC    XL(@CADDR)'0011'          LENGTH FOR INCREMENTING INST
     0FDA 0030             0FDB   2716 KHECYL DC    XL(@DADDR)'30'            SECTOR-COUNT PER CYLINDER
     0FDC 0000             0FDD   2717 KHEDKD DC    XL(@DADDR)'00'            DISK-DRIVE SPEC
                                  2718 *        *    LEFTMOST BYTE OF TABLE OF MULTIPLE CHOICE RESPONSES
                          0FDE   2719 KHETB2 EQU   *
     0FDE C1C2C3C4C5C6C7C8 0FF7   2720        DC    CL26'ABCDEFGHIJKLMNOPQRSTUVWXYZ'
     0FF8 40               0FF8   2721 KHEBNK DC    CL1' '                    FIELD FOR PRINTING A BLANK LINE
     0FF9 0FDE             0FFA   2722 KHEAD2 DC    AL2(KHETB2)
     0FFB 1B00             0FFC   2723 KHEADB DC    AL2(GRBFR1)               ADDRESS OF GRBFRI
     0FFD 1EFB             0FFE   2724 KHEADK DC    AL(@CADDR)(KHENDK-4)      ADDRESS OF LAST ENTRY-KYWD TABLE
```

```
    0FFF 040E              1000 2725 KHEAF2 DC    AL(@CADDR)($VOLF2)        VOL-ID ENTRY FOR F2
    1001 03F6              1002 2726 KHEAR1 DC    AL(@CADDR)($VOLR1)        VOL-ID ENTRY FOR R1
    1003 0406              1004 2727 KHEAR2 DC    AL(@CADDR)($VOLR2)        VOL-ID ENTRY FOR R2
                           2728 *
                           2729 *              WORK AREAS
                           2730 *
    1005 00                1005 2731 KHETST DC    AL1(*-*)                  INDR FOR POSSIBLE INV LEVEL NO.
    1006 0000              1007 2732 KHEXXX DC    AL(@CADDR)(*-*)           POINTER IN KYWD TABLE SAVE AREA
                           1008 2733 KHESPK EQU   *                        LEFTMOST BYTE OF SPACE ALLOCATED
    1008                   103E 2734        DS    CL(KHELNS)               * FOR CHAR STRING WITHOUT BLANK
                           1007 2735 KHEPAK EQU   KHESPK-1                  BYTE PRECEDING PACKED KEYWORD
                           100B 2736 KHELPZ EQU   KHEPAK+KHELNH             DISPLACEMENT TO RIGHT OF 'HELP'
    103F 0000              1040 2737 KHECNT DC    AL(@CADDR)(*-*)           COUNT OF CHARACTER STRING
    1041                   1043 2738 KHECNV DS    CL(KHELAD)               LOCATION OF ADDR TO BE CONVERTED
                           1042 2739 KHESCT EQU   KHECNV-1                  ADDR OF CYL-SCTR DISPLACEMENT
    1044                   1044 2740 KHECTR DS    CL1                       COUNTER FOR CYLINDER COUNT
    1045                   1045 2741 KHETCR DS    CL1                       COUNTER FOR TABLE
    1046                   1047 2742 KHESAV DS    CL(@CADDR)                SAVE AREA FOR INDEX REGISTER
    1048                   1049 2743 KHEXRS DS    CL(@CADDR)                SAVE AREA FOR INDEX REGISTER
    104A                   104B 2744 GRLINE DS    CL(@CADDR)                LENGTH CODE FROM GRABIT
    104C                   104C 2745 GRTYPE DS    CL1                       TYPE CODE FROM GRABIT
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#KHELP - HELP KEYWORD

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                              2747 *
                              2748 *                    PARAMETER LISTS
                              2749 *
                              2750 *KHEPL1 DPL    FUNC-@DGET,DADDR-*-*,CNT-KHEGR4,CADDR-GRBFR1
                         104D 2751 KHEPL1 EQU    *                      DISK PARAMETER LIST
        104D 01          104D 2752        DC    AL1(@DGET)             REQUESTED FUNCTION
        104E 0000        104F 2753        DC    AL2(*-*)               DISK ADDRESS
        1050 04          1050 2754        DC    AL1(KHEGR4)            SECTOR COUNT
        1051 1B00        1052 2755        DC    AL2(GRBFR1)            BUFFER ADDRESS
                              2756 *** END OF EXPANSION ***

                              2758 *KHEDP2 DPL    FUNC-@DGET,DADDR-KHECTO,CNT-KHEGR,CADDR-KHETAB
                         1053 2759 KHEDP2 EQU    *                      DISK PARAMETER LIST
        1053 01          1053 2760        DC    AL1(@DGET)             REQUESTED FUNCTION
        1054 0000        1055 2761        DC    AL2(KHECY0)            DISK ADDRESS
        1056 04          1056 2762        DC    AL1(KHEGR4)            SECTOR COUNT
        1057 1B00        1058 2763        DC    AL2(KHETAB)            BUFFER ADDRESS
                              2764 *** END OF EXPANSION ***

                              2766 *KHEDT2 DPL    FUNC-@DGET,CYL-KHECY0,SCTR-KHEADR,CNT-KHELAD,CADDR-KHETBB
                         1059 2767 KHEDT2 EQU    *                      DISK PARAMETER LIST
        1059 01          1059 2768        DC    AL1(@DGET)             REQUESTED FUNCTION
        105A 00          105A 2769        DC    AL1(KHECY0)            CYLINDER ADDRESS
        105B 04          105B 2770        DC    AL1(KHEADR)            HEAD/SECTOR/DRIVE/DISK SPEC
        105C 03          105C 2771        DC    AL1(KHELAD)            SECTOR COUNT
        105D 1C00        105E 2772        DC    AL2(KHETBB)            BUFFER ADDRESS
                              2773 *** END OF EXPANSION ***

                              2775 *KHETXT DPL    FUNC-DGET,CYL-KHECY0,SCTR-*-*,CNT-KHESC1,CADDR-KHEBUF
                         105F 2776 KHETXT EQU    *                      DISK PARAMETER LIST
        105F 01          105F 2777        DC    AL1(@DGET)             REQUESTED FUNCTION
        1060 00          1060 2778        DC    AL1(KHECY0)            CYLINDER ADDRESS
        1061 00          1061 2779        DC    AL1(*-*)               HEAD/SECTOR/DRIVE/DISK SPEC
        1062 01          1062 2780        DC    AL1(KHESC1)            SECTOR COUNT
        1063 1A00        1064 2781        DC    AL2(KHEBUF)            BUFFER ADDRESS
                              2782 *** END OF EXPANSION ***

                              2784 *KHEPPL PPL    FUNC-*-*,CNT-*-*,CADDR-GRTEXT
                         1065 2785 KHEPPL EQU *                         PPL ADDRESS
        1065 00          1065 2786        DC    AL1(*-*)               FUNCTION REQUESTED
        1066 00          1066 2787        DC    AL1(*-*)               PRINT COUNT
        1067 1800        1068 2788        DC    AL2(GRTEXT)            DATA ADDRESS
                              2789 *** END OF EXPANSION **

                              2791 *KHEBLK PPL    FUNC-@PRETR,CNT-KHEONE,CADDR-KHEBNK
                         1069 2792 KHEBLK EQU    *                      PPL ADDRESS
        1069 C0          1069 2793        DC    AL1(@PRETR)            FUNCTION REQUESTED
        106A 01          106A 2794        DC    AL1(KHEONE)            PRINT COUNT
        106B 0FF8        106C 2795        DC    AL2(KHEBNK)            DATA ADDRESS
                              2796 *** END OF EXPANSION ***
```

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      #KHELP - HELP KEYWORD


ERR LOC   OBJECT CODE     ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  23/05/20  PAGE  18


                         1154 2798        USING GRABSE,@BR
                         106D 2799 GRABIT EQU   *                        ENTRY POINT TO ROUTINE
     106D 34 01 10F3          2800        ST    GRASBR,@BR               SAVE CALLING PROG'S BASE REG.
     1071 C2 01 1154          2801        LA    GRABSE,@BR               LOAD LOCAL BASE TO BASE REG.
     1075 34 08 10F7          2802        ST    GRASAR,@ARR              SAVE RETURN ADDR.
     1079 7D 00 82            2803        CLI   GRWHAT(,@BR),GRAEFI      IS FUNC REQ'D INITIALIZATION ?
     107C F2 81 13            2804        JE    GRA100                   YES, GO TO INITIALIZATION RTN
                              2805 * THE ADDRESS OF THE NEXT SEGMENT IN THE CURRENT BUFFER IS INITLZ'D
                              2806 * AND MAINTAINED IN THE NEXT INST, WHICH LOADS IT TO THE @XR.
     107F C2 02 0000          2807 GRA020 LA    *-*,@XR                  LOAD NEXT STMNT CADDR TO @XR
     1083 7D 01 82            2808        CLI   GRWHAT(,@BR),GRAEFR      IS FUNC REQ'D RETURN TEXT ?
     1086 F2 81 90            2809        JE    GRA300                   YES, GO RETURN STMNT ROUTINE
     1089 7D 02 82            2810        CLI   GRWHAT(,@BR),GRAEFS      IS FUNC REQ'D SKIP STATEMENT ?
     108C F2 81 3E            2811        JE    GRA200                   YES, GO TO SKIP STMNT ROUTINE
     108F F2 87 41            2812        J     GRA210                   GO TO SKIP SEGMENT RTN
                              2813 *
                              2814 *                     INITIALIZATION ROUTINE
                              2815 *
     1092 75 02 7B            2816 GRA100 L     GRBFRA(,@BR),@XR         LOAD 1ST BFR ADDR TO OR
     1095 74 02 81            2817        ST    GRANCA(,@BR),@XR         PROPAGATE IT TO NEXT BFR DPL
     1098 5C 01 7E 78         2818        MVC   GRANDA(@DADDR,@BR),GRSRDA(,@BR)  INITLZ NEXT BFR DADDR
     109C 7C FF 87            2819        MVI   GRASIZ(,@BR),GRAEBS      INITLZ BUFFER SIZE COUNTER
     109F 5C 00 79 7F         2820        MVC   GRACSC(1,@BR),GRSCTR(,@BR)  INITLZ SCTR COUNT IN DPL
     10A3 7C 98 90            2821        MVI   GRAERR+@Q(,@BR),@@E551   SET ERR CODE TO SAVED FILE
     10A6 C0 87 0025          2822        B     $DISKN                   WAIT FOR FIRST DATA BLOCKS TO
     10AA 057F           10AB 2823        DC    AL2($WAITF)              * GET INTO CORE
     10AC 7D 01 7F            2824        CLI   GRSCTR(,@BR),GRAESC      IS DL4ICS BEING USED ?
     10AF F2 01 49            2825        JNE   GRA260                   NO, GO ACCESS 1ST STATEMENT
     10B2 7C 97 90            2826        MVI   GRAERR+@Q(,@BR),@@E550   SET ERR CODE TO SPECIFY WRKFILE
     10B5 5E 01 81 84         2827        ALC   GRANCA(@CADDR,@BR),GRASSZ(,@BR)  SET CADDR OF NEXT BFR
     10B9 BD 00 00            2828 GRA140 CLI   GRAELK(,@XR),GRAELN      IS 1ST DB LINK CODE = 0
     10BC F2 81 07            2829        JE    GRA150                   YES, GO INCR TO NEXT LOGICAL DB
     10BF 7C 02 7E            2830        MVI   GRANDA(,@BR),GRAEDB      SET DADDR OF NEXT DB
     10C2 6E 00 7E 00         2831        ALC   GRANDA(1,@BR),GRAELK(,@XR)  *
     10C6 5E 00 7E 86         2832 GRA150 ALC   GRANDA(1,@BR),GRANPB(,@BR)  INCR TO NEXT BFR DADDR
     10CA F2 87 2E            2833        J     GRA260                   GO ACCESS FIRST STATEMENT
                              2834 *
                              2835 *              ACCESS NEXT STATEMENT OR NEXT SEGMENT ROUTINE
                              2836 *
     10CD BD 75 07            2837 GRA200 CLI   GRAEDT(,@XR),GRAEET      END-OF-FILE RECORD ?
     10D0 F2 81 16            2838        JE    GRA230                   YES, RESET OR TO THIS RECORD
     10D3 6F 00 87 02         2839 GRA210 SLC   GRASIZ(1,@BR),GRAES1(,@XR)  DECR BFR CT BY SEGMENT LENGTH
     10D7 B6 02 02            2840        A     GRAES1(,@XR),@XR         INCR OR BY SEGMENT LENGTH
     10DA 7D 00 87            2841 GRA220 CLI   GRASIZ(,@BR),@ZERO       IS BUFFER EMPTY ?
     10DD D0 82 8F            2842        BL    GRAERR(,@BR)             GONE NEG, GO TO BAD ERR
     10E0 F2 81 15            2843        JE    GRA250                   YES, GO TO GET NEXT BFR
     10E3 BD 80 01            2844        CLI   GRAES0(,@XR),@SNULL      IS SEGMENT NULL ?
     10E6 F2 81 0F            2845        JE    GRA250                   YES, GO TO GET NEXT BFR
     10E9 34 02 1082          2846 GRA230 ST    GRA020+@OP1,@XR          SAVE CADDR OF NEXT SEG.IN INST.
     10ED E2 02 06            2847        LA    GRAEDL(,@XR),@XR         POINT @XR TO LINE NUMBER
     10F0 C2 01 0000          2848 GRA240 LA    *-*,@BR                  RESTORE THE BASE REGISTER
                         10F3 2849 GRASBR EQU   GRA240+@OP1              * STORED IN INST AT GRA240
     10F4 C0 87 0000          2850 GRA245 B     *-*                      RETURN TO USER
                         10F7 2851 GRASAR EQU   GRA245+@OP1              * TO CADDR SAVED IN GRA245
     10F8 D0 87 3C            2852 GRA250 B     GRA500(,@BR)             ACCESS NEXT BUFFER
     10FB BD 80 01            2853 GRA260 CLI   GRAES0(,@XR),@SNULL      IS 1ST SEGEMENT NULL ?
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    10FE D0 81 8F          2854        BE    GRAERR(,@BR)           YES, GO TO BAD ERR
    1101 B9 02 03          2855        TBF   GRAES2(,@XR),GRAETP    PRIMARY SEGMENT
    1104 C0 10 10E9        2856        BT    GRA230                 YES, SAVE LOCATION
    1108 7D 01 82          2857        CLI   GRWHAT(,@BR),GRAEFR    ACTION REQ'D = RETURN TEXT ?
    110B D0 81 8F          2858        BE    GRAERR(,@BR)           YES, GO TO BAD ERR
    110E 7D 04 82          2859        CLI   GRWHAT(,@BR),GRAEFG    ACTION REQ'D = SKIP SEGMENT ?
    1111 C0 81 10E9        2860        BE    GRA230                 YES, GO SAVE LOCATION
    1115 C0 87 10D3        2861        B     GRA210                 NO, GO SKIP THIS SEGMENT
                           2862 *
                           2863 *                 RETURN TEXT ROUTINE
                           2864 *
    1119 2C 01 104B 06     2865 GRA300 MVC   GRLINE,GRAEDL(GRAELL,@XR)  SET BINARY LINE NO.IN O/P FIELD
    111E 2C 00 104C 07     2866        MVC   GRTYPE,GRAEDT(1,@XR)    SET TYPE CODE IN OUTPUT FIELD
    1123 4C 01 2D 11DD     2867        MVC   GRTEND(@CADDR,@BR),GRATXT  INITLZ TEXT 0/P CADDR IN INST.
    1128 BD 75 07          2868        CLI   GRAEDT(,@XR),GRAEET    END OF FILE STATEMENT ?
    112B F2 01 08          2869        JNE   GRA303                 NO - GO RESET SEGMENT SWITCH
    112E 3C 1C 1800        2870        MVI   GRTEXT,@EOF            MOVE EOF CODE TO GRTEXT
    1132 C0 87 10E9        2871        B     GRA230                 GO GET OUT
    1136 7C 87 01          2872 GRA303 MVI   GRA310+@Q(,@BR),@UCB   INITLZ BRANCH FOR ONLY SEGMENT
    1139 BD 00 03          2873        CLI   GRAES2(,@XR),@SONLY    IS IT AN ONLY SEGMENT ?
    113C F2 81 03          2874        JE    GRA305                 YES, BYPASS BRANCH RESET
    113F 7C 80 01          2875        MVI   GRA310+@Q(,@BR),@NOP   SET FOR MORE SEGMENTS
    1142 6F 00 87 02       2876 GRA305 SLC   GRASIZ(1,@BR),GRAES1(,@XR)  DECR BFR CT BY SEG LENGTH
    1146 9F 00 02 8B       2877        SLC   GRAES1(1,@XR),GRAPSG(,@BR)  DECR SEG CT BY SDF-HDR LENGTH
    114A 6C 00 8E 02       2878        MVC   GRASEG(1,@BR),GRAES1(,@XR)  MOVE TEXT LENGTH TO TEXT CTR
    114E E2 02 07          2879        LA    GRAELP(,@XR),@XR       INCR TO TYPE CODE
    1151 F2 87 2A          2880        J     GRA317                 GO TEST FILE TYPE
    1154 C0 87 10DA        2881 GRA310 B     GRA220                 GO ACCESS NEXT STATEMENT
    1154                   2882        ORG   GRA310                 * UNLESS CURRENT STATEMENT
    1154 C0 87 10DA        2883        BC    GRA220,@UCB            * HAS MORE SEGMENTS
    1158 6C 00 24 00       2884        MVC   GRASVC(,@BR),@ZERO(1,@XR) SAVE CURR CHAR IN RESTORE INST
    115C D0 87 3C          2885        B     GRA500(,@BR)           ACCESS NEXT BUFFER
    115F BD 02 03          2886        CLI   GRAES2(,@XR),@SLAST    LAST SEGMENT ?
    1162 F2 01 03          2887        JNE   GRA313                 NO, GO RESET SEG COUNTER
    1165 7C 87 01          2888        MVI   GRA310+@Q(,@BR),@UCB   RESET BRANCH OUT
    1168 6F 00 87 02       2889 GRA313 SLC   GRASIZ(1,@BR),GRAES1(,@XR)  DECR BUFFER COUNTER
    116C 9F 00 02 8D       2890        SLC   GRAES1(1,@XR),GRASSG(,@BR)  DECR SEG COUNT BY SDF LENGTH
    1170 6C 00 8E 02       2891        MVC   GRASEG(1,@BR),GRAES1(,@XR)  MOVE TEXT LNG TO SEG COUNTER
    1174 E2 02 04          2892        LA    GRAELS(,@XR),@XR       INCR @XR PAST SECONDARY SDF
    1177 BC 00 00          2893 GRA315 MVI   @ZERO(,@XR),*-*        RESTORE CHAR SAVED IN Q-CODE
         1178              2894 GRASVC EQU   GRA315+@Q              SAVED CHAR HOLD AREA
    117A 5E 01 2D 86       2895 GRA316 ALC   GRTEND(@CADDR,@BR),GRABOA(,@BR)  INCR RECEIVING CADDR
         117E             2896 GRA317 EQU   *                     MOVE TEXT TO GRTEXT
    117E 2C 00 0000 01     2897 GRA350 MVC   *-*,GRAENC(1,@XR)      MOVE NON-REPEAT CHAR TO OUTPUT
         1181             2898 GRTEND EQU   GRA350+@OP1           * ADDR SUPPLIED
    1183 E2 02 01          2899 GRA360 LA    GRAENC(,@XR),@XR       INCR @XR TO NEXT CHAR.
    1186 5F 00 8E 86       2900        SLC   GRASEG(1,@BR),GRABOA(,@BR)  DECR BFR SPACE CTR
    118A D0 81 00          2901        BZ    GRA310(,@BR)           NO MORE TEXT IN SEG, CHK MORE
    118D D0 87 26          2902        B     GRA316(,@BR)           MORE TEXT, GO INCR RECV CADDR
                           2903 *
                           2904 *             ACCESS NEXT BUFFER ROUTINE
                           2905 *
    1190 74 08 75          2906 GRA500 ST    GRASSA(,@BR),@ARR
    1193 C0 87 0025        2907        B     $DISKN                 WAIT FOR PRIOR READ TO COMPLETE
    1197 057F              2908 1198    DC    AL2($WAITF)            *
         1199             2909 GRA600 EQU   *
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     1199 7D 01 7F            2910          CLI   GRSCTR(,@BR),GRAESC      DL4ICS BEING USED ?
     119C F2 01 50            2911          JNE   GRA700                  NO, GO REFILL BUFFER
                              2912 *
                              2913 *              DL4ICS BEING USED - ACCESS NEXT DATA BLOCK
                              2914 *
     119F 75 02 7B            2915          L     GRBFRA(,@BR),@XR        SAVE CURR BFR STARTING CADDR
     11A2 5C 04 7B 81         2916          MVC   GRBFRA(GRAED5,@BR),GRANCA(,@BR)  MOVE NEXT DPL TO CURR DPI
     11A6 74 02 81            2917          ST    GRANCA(,@BR),@XR        RESTORE NEXT BFR STARTING CADDR
     11A9 75 02 7B            2918          L     GRBFRA(,@BR),@XR        POINT EN TO CURR BFR CADDR
     11AC BD 00 00            2919          CLI   GRAELK(,@XR),GRAELN     NEXT LOGICAL DB = NEXT PHYS DB
     11AF F2 81 07            2920          JE    GRA620                  YES, GO INCR SCTR DISP.
     11B2 7C 02 7E            2921          MVI   GRANDA(,@BR),GRAEDB     SET DADDR OF NEXT DB
     11B5 6E 00 7E 00         2922          ALC   GRANDA(1,@BR),GRAELK(,@XR)  *
     11B9 5E 00 7E 86         2923 GRA620 ALC   GRANDA(1,@BR),GRANPB(,@BR)  INCR SCTR DISP FOR NEXT PHYS DB
     11BD C0 87 121B          2924 GRA640 B     DL4ICS                  GO READ NEXT DB
     11C1 11D0           11C2 2925          DC    AL2(GRANPL)             * CADDR OF DPL
     11C3 7C FF 87            2926 GRA660 MVI   GRASIZ(,@BR),GRAEBS     RE-INITLZ BFR SPACE COUNT
     11C6 C0 87 0000          2927 GRA680 B     *-*                     RETURN TO
                         11C9 2928 GRASSA EQU   GRA680+@OP1             * CADDR SUPPLIED
                         11CA 2929 GRACPL EQU   *                       DPL FOR CURRENT BUFFER
     11CA 02            11CA 2930 GRACFN DC    AL1(@DPUT)              WRITE FUNCTION CODE
     11CB              11CC 2931 GRSRDA DS    CL2                     RELATIVE DADDR OF CURR. BFR
                         11CB 2932 GRACCA EQU   GRSRDA-@B1              CYLINDER BYTE OF DISK ADDR.
     11CB              11CB 2933          ORG   *-2                     * INITIALIZED TO THE
     11CB 0503          11CC 2934          DC    AL2(@WSTBL)             * 1ST DB OF THE WORK FILE
     11CD              11CD 2935 GRACSC DS    CL1                     SECTOR COUNT
     11CE 1B00          11CF 2936 GRBFRA DC    AL2(GRBFR1)             CADDR OF CURRENT BUFFER
                         11D0 2937 GRANPL EQU   *                       DPL FOR NEXT BUFFER
     11D0 01            11D0 2938          DC    AL1(@DGET)              READ FUNCTION CODE
     11D1              11D2 2939 GRANDA DS    CL2                     RELATIVE DADDR OF NEXT BFR.
     11D3              11D3 2940 GRSCTR DS    CL1                     SECTOR COUNT
     11D3              11D3 2941          ORG   *-1                     * INITIALIZE TO 1
     11D3 01            11D3 2942          DC    XL1'01'
     11D4              11D5 2943 GRANCA DS    CL2                     CADDR OF NEXT BUFFER
     11D6              11D6 2944 GRWHAT DS    CL1                     USER SPEC'D FUNCTION CODE
     11D6              11D6 2945          ORG   *-1                     SET TO ZERO FOR
     11D6 00            11D6 2946          DC    XL1'00'                 * INITIALIZATION CALL
     11D7 0100          11D8 2947 GRASSZ DC    XL2'0100'               SECTOR SIZE
     11D9 0001          11DA 2948 GRANPB DC    XL2'01'                 DISP TO NEXT PHYS BFR DADDR
                         0002 2949 GRAEDB EQU   2                       DB DADDR ADJUSTMENT FACTOR
     11DB              11DB 2950 GRASIZ DS    CL1                     BUFFER SPACE COUNTER
     11DC 1800          11DD 2951 GRATXT DC    AL2(GRTEXT)             ADDRESS OF TEXT OUTPUT AREA
     11DE 0007          11DF 2952 GRAPSG DC    XL2'07'                 SIZE OF PRIMARY SEG. HEADER
     11E0 0004          11E1 2953 GRASSG DC    XL2'04'                 SIZE OF 2NDARY SEG. HEADER
                         11DA 2954 GRAONE EQU   GRANPB                  DECR FACTOR FOR REPITITION CTR
                         11DA 2955 GRABOA EQU   GRANPB                  INCR FACTOR FOR NEXT TEXT CHAR
                         11DA 2956 GRANXC EQU   GRANPB                  CYL ADJ FACTOR
     11E2              11E2 2957 GRASEG DS    CL1                     SEGMENT TEXT COUNTER
                         0000 2958 GRAEFI EQU   X'00'                   INITIALIZATION FUNC. CODE
                         0003 2959 GRAEFW EQU   X'03'                   WRITE BACK ONLY FUNC. CODE
                         0001 2960 GRAEFR EQU   X'01'                   RETURN TEXT FUNC. CODE
                         0002 2961 GRAEFS EQU   X'02'                   SKIP STATEMENT FUNC. CODE
                         0004 2962 GRAEFG EQU   X'04'                   SKIP SEGMENT FUNC. CODE
                         00FF 2963 GRAEBS EQU   X'FF'                   BUFFER TEXT AREA SIZE
                         0001 2964 GRAESC EQU   X'01'                   SCTR COUNT IF DL4ICS USED
                         0000 2965 GRAELK EQU   X'00'                   DISP TO LINK CODE WITHIN DB
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                           0000 2966 GRAELN EQU    X'00'                     LINK CODE TO NEXT PHYS DB
                           0001 2967 GRAEXA EQU    X'01'                     ADJ TO '@' EQU'S FOR @XR ADDRG
                           0006 2968 GRAEDL EQU    @SBLN+GRAEXA              DISP TO STMT BINARY LINE NO.
                           0007 2969 GRAEDT EQU    @STYPE+GRAEXA             DISP TO STMNT TYPE CODE
                           0002 2970 GRAELL EQU    X'02'                     LENGTH OF BINARY LINE NUMBER
                           0075 2971 GRAEET EQU    @EOFTC                    TYPE CODE OF END-O FILE STMT
                           0001 2972 GRAES0 EQU    @SDF0+GRAEXA              DISP TO SDF0 - NULL INDR
                           0002 2973 GRAES1 EQU    @SDF1+GRAEXA              DISP TO SDF1 - LENGTH
                           0003 2974 GRAES2 EQU    @SDF2+GRAEXA              DISP TO SDF2 - SEGMENTATION CDE
                           0002 2975 GRAETP EQU    X'02'                     MASK FOR A PRIMARY SEGMENT
                           0007 2976 GRAELP EQU    X'07'                     LENGTH OF PRIMARY SEG.
                           0004 2977 GRAELS EQU    X'04'                     LENGTH OF SECONDARY SEG.
                           001B 2978 GRAEMR EQU    27                        MAX. REPITITION CODE
                           0001 2979 GRAENC EQU    X'01'                     DISP TO NEXT TEXT CHARACTER
                           0001 2980 GRAEDC EQU    X'01'                     DISP TO CYL IN DADDR
                           1154 2981 GRABSE EQU    GRA310                    BASE ADDRESS OF GRABIT
                           0005 2982 GRAED5 EQU    X'05'                     LNG OF DPL DADDR, SCTR CT.
                           0006 2983 GRAEW2 EQU    6                         SECOND CYL OF WORK FILE
                                2984 *
                                2985 *              ERROR ROUTINE
                                2986 *
   11E3 3C 98 03CD             2987 GRAERR MVI    $CAERR,@@E551             SET BAD FILE ERROR CODE
                                2988 *              THE ABOVE ERROR CODE IS INITIALLY SET FOR A SAVED
                                2989 *              FILE, BUT IS MODIFIED TO THE WORK FILE IF DL4ICS
                                2990 *              IS USED
   11E7 3A 04 03D6             2991        SBN    $INDR3,$ERHRD             SET INDR FOR HARD ERROR
   11EB C0 87 0469             2992        B      $CAERK                   GO TO ERRPGM INTERFACE
                                2993 *
                                2994 *              DL2ICS BEING USED - ACCESS NEXT DATA BLOCK
                                2995 *
   11EF      2996 GRASHT EQU    *                                          ORG HERE TO OVERLAY DL2ICS HDLG
   11EF 5F 00 79 86            2997 GRA700 SLC    GRACSC(1,@BR),GRANPB(,@BR)  DECR IN CORE SCTR COUNT
   11F3 F2 81 07               2998        JZ     GRA720                   IF ZERO, GO GET NEXT BFR BLOCK
   11F6 5E 01 7B 84            2999        ALC    GRBFRA(@CADDR,@BR),GRASSZ(,@BR)  INCR DPL CADDR TO NEXT DB
   11FA F2 87 18               3000        J      GRA740                   GO LOAD CADDR TO @XR
   11FD 5E 00 7E 7F            3001 GRA720 ALC    GRANDA(1,@BR),GRSCTR(,@BR)  INCR LAST DADDR BY SCTRS READ
   1201 C0 87 121B             3002 GRA730 B      DL2ICS                   REFILL CORE BUFFER
   1205 11D0        1206 3003        DC     AL2(GRANPL)              CADDR OF DPL
   1207 5C 00 79 7F            3004        MVC    GRACSC(1,@BR),GRSCTR(,@BR)  RE-INITLZ BFR SECTOR COUNT
   120B 5C 01 7B 81            3005        MVC    GRBFRA(@CADDR,@BR),GRANCA(,@BR)  RE INITLZ BFR START CADDR
   120F C0 87 0025             3006        B      $DISKN                   WAIT FOR READ COMPLETE
   1213 057F        1214 3007        DC     AL2($WAITF)              *
   1215 75 02 7B               3008 GRA740 L      GRBFRA(,@BR),@XR         POINT @XR TO START OF BFR
   1218 D0 87 6F               3009        B      GRA660(,@BR)             GO RE INITLZ BFR SPACE CTR
                                3010 *              END OF GRABIT
                                3011 *** END OF EXPANSION ***
                                3012 *        $DL2P
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3014+****************************************************************************
3015+*  5703-XM1   COPYRIGHT IBM CORP 1970                                      *
3016+*                    REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE. 120-2083   *
3017+*                                                                          *
3018+****************************************************************************
3019+*STATUS -                                                                  *
3020+*    VERSION 1 MODIFICATION 0                                              *
3021+*                                                                          *
3022+*FUNCTION                                                                  *
3023+*    * DL2ICS CONVERTS A RELATIVE DISK ADDRESS TO A PHYSICAL DISK          *
3024+*      ADDRESS AND COMBINES IT WITH A BASE ADDRESS PLACED IN DL2RAD        *
3025+*      BY THE CALLER.                                                      *
3026+*    * THE RELATIVE DISK ADIRESS IS A TWO BYTE CVLINIER SECTOR COUNT A     *
3027+*      IN THE CALLERS DISK PARAMETER LIST (DPL)                            *
3028+*    * THE COUNT IS A CYLINDER SECTOR DISPLACEMENT FROM THE BASE           *
3029+*      ADDRESS PLACED IN DL2RAD                                            *
3030+*    * DL2ICS IS USED TO PROCESS DATA ON THE FIXED OR REMOVABLE DISK       *
3031+*      ON EITHER DRIVE AND PROVIDES THE INTERFACE TO $DISKN.               *
3032+*    * THE PHYSICAL DISK ADDRESS IS PLACED IN A COPY OF THE USERS DPL      *
3033+*      IN DL2ICS AND A CALL IS MADE TO $DISKN TO PERFORM THE REQUESTED     *
3034+*      OPERATION.                                                          *
3035+*                                                                          *
3036+*ENTRY POINTS                                                              *
3037+*    * THE ENTRY IS DL2ICS. THE BASE REGISTER IS SAVED AND RESTORED        *
3038+*      ON RETURN. THE INDEX REGISTER IS NOT USED.                          *
3039+*    * THE FORMAT OF THE CALLING SEQUENCE IS AS FOLLOWS:                   *
3040+*        B   DL2ICS                                                        *
3041+*        DC  AL2(PARMLT)                                                   *
3042+*      WHERE PARMLT IS THE ADDR OF THE PARAMETER LIST TO BE PROCESSED.     *
3043+*                                                                          *
3044+*INPUT                                                                     *
3045+*    * THE INPUT IS A TWO BYTE BASE DISK ADDRESS PLACED IN                 *
3046+*      DL2RAD AND A SIX BYTE DPL. THE SAME FORMAT AS THE DPL FOR $DISKN*
3047+*      EXCEPT FOR THE DISK ADDRESS WHICH IS A RELATIVE CYLINDER AND        *
3048+*      SECTOR DISPLACEMENT FROM THE BASE ADDRESS IN DL2RAD.                *
3049+*                                                                          *
3050+*OUTPUT                                                                    *
3051+*    NONE.                                                                 *
3052+*                                                                          *
3053+*EXTERNAL REFERENCES                                                       *
3054+*     $DISKN - ENTRY TO PHYSICAL DISK ROUTINE IS THE SYSTEM NUCLEUS.       *
3055+*                                                                          *
3056+*EXITS, NORMAL                                                             *
3057+*     NORMAL - EXIT IS TO THE FIRST INSTRUCTION FOLLOWING THE POINTER      *
3058+*      TO THE DPL. THE BASE REGISTER IS RESTORED. THE RETURN ADDRESS IS*
3059+*      THE ADDRESS RECALL REGISTER (APR) +2.                              *
3060+*                                                                          *
3061+*EXITS, ERROR                                                              *
3062+*     NONE                                                                 *
3063+*                                                                          *
3064+*TABLES/WORK AREAS                                                         *
3065+*    * THE CONSTANTS AND WORK AREAS RESIDE AT THE END OF THE EXECUTABLE*
3066+*      CODE AND ARE REFERENCED BY A DISPLACEMENT RELATIVE TO THE VALUE     *
3067+*      IN INDEX REGISTER 1 (@BR).                                          *
3068+*    * DL2SEC AND DL2SAD ARE EQUATED TO OPERAND LOCATIONS IN THE           *
3069+*      EXECUTABLE CODE TO ELIMINATE EXCESS WORKING STORAGE.                *
```

```
                                    3070+*                                                        *
                                    3071+*ATTRIBUTES                                              *
                                    3072+*    * DL2ICS IS REUSABLE                                *
                                    3073+*                                                        *
                                    3074+*CHARACTER CODE DEPENDENCY                               *
                                    3075+*     THE OPERATION OF THIS MODULE DOES NOT DEPEND UPON A PARTICULAR  *
                                    3076+*      INTERNAL REPRESENTATION OF THE EXTERNAL CHARACTER SET.        *
                                    3077+*                                                        *
                                    3078+*NOTES                                                   *
                                    3079+*    ERROR PROCEDURES                                    *
                                    3080+*       NONE                                             *
                                    3081+*                                                        *
                                    3082+*    REGISTER USAGE                                      *
                                    3083+*     INDEX REGISTER 1 (@BR) IS SAVED AND RESTORED. THIS REGISTER IS *
                                    3084+*     USED DURING EXECUTION. REGISTER 2 (@BR) IS NOT USED.           *
                                    3085+*                                                        *
                                    3086+*    SAVED/RESTORED AREAS                                *
                                    3087+*       NONE                                             *
                                    3088+*                                                        *
                                    3089+*    MODIFICATION CONSIDERATIONS                         *
                                    3090+*       NONE                                             *
                                    3091+*                                                        *
                                    3092+*    REQUIRED MODULES                                    *
                                    3093+*      @SYSEQ - COMMON SYSTEM EQUATES.                   *
                                    3094+*      @FXDEQ - SYSTEM NUCLEUS ADDRESSES AND INDICATORS VALUES EQUATES *
                                    3095+*                                                        *
                                    3096+*    OTHER                                               *
                                    3097+*     DL2ICS MAY BE USED TO CONVERT THE DISK ADDRESS ONLY AND NOT TO *
                                    3098+*     CALL $DISKN IF THE USER MOVES A UCB CODE TO DL2SWH.            *
                                    3099+*     THIS OPTION IS NOT STANDARD USAGE.                 *
                                    3100+****************************************************************************
                          121F 3101+        USING DL2000,@BR                ESTABLISH ADDRESSABILITY
                                    3102+*
                    0001 3103+DL2E01 EQU   X'01'                   FIELD LENGTH OF 1
                    0002 3104+DL2E02 EQU   X'02'                   FIELD LENGTH OF 2
                    0018 3105+DL2E18 EQU   X'18'                   HEX TRACK SECTOR COUNT
                    0060 3106+DL2E60 EQU   X'60'                   PHYSICAL SECTOR COUNT
                    0083 3107+DL2TSD EQU   X'83'                   MASK OFF TRACK SPINDLE DISK
                    007C 3108+DL2E7C EQU   X'7C'                   MASK OUT SECTOR COUNT
                    121B 3109+DL2ICS EQU   *                       ENTRY POINT
     121B 34 01 129C         3110+        ST    DL2900+@OP1,@BR          SAVE OLD BASE
                    121F 3111+DL2000 EQU   *                       START PROCESSING
     121F C2 01 121F         3112+        LA    DL2000,@BR               SET BASE ADDRESS
     1223 76 08 8A           3113+        A     DL2C01(,@BR),@ARR        BUMP TO RIGHT BYTE OF ADDR
     1226 74 08 14           3114+        ST    DL2001+@DOP2(,@BR),@ARR  ADDR OF PARAM
     1229 76 08 8A           3115+        A     DL2C01(,@BR),@ARR        BUMP TO RETURN ADDR
     122C 74 08 81           3116+        ST    DL2910+@OP1(,@BR),@ARR   SAVE RETURN ADDR
                                    3117+*
     122F 4C 01 1D 0000      3118+DL2001 MVC   DL2002+@DOP2(@DADDR,@BR),*-* SETUP ADDR OF DPL
     1234 5E 01 1D 8C        3119+        ALC   DL2002+@DOP2(@CADDR,@BR),DL2C05(,@BR) DUMP TO RIGHT END
     1238 4C 05 92 0000      3120+DL2002 MVC   DL2DPL(@DPLNG,@BR),*-*    MOVE USER DPL TO WORK AREA
     123D 5F 00 8F 86        3121+DL2005 SLC   DL2LST+@DSAD(DL2E01,@BR),DL2C48(,@BR) ADJUST SCTR/CYL
     1241 F2 82 07           3122+        JM    DL2006                   GO TO RESTORE TO CONTINUE
     1244 5E 00 8E 8A        3123+        ALC   DL2LST+@DCYL(DL2E01,@BR),DL2C01(,@BR) BUMP CYLINDER COUNT
     1248 D0 87 1E           3124+        B     DL2005(,@BR)             BACK FOR NEXT CYLINDER
     124B 5E 00 8F 86        3125+DL2006 ALC   DL2LST+@DSAD(DL2E01,@BR),DL2C48(,@BR) RESTORE POSITIVE
```

```
                                 3126+*
                                 3127+*       GET THE LOGICAL SECTOR FROM THE DPL. THE NUMBER IS LEFT ADJUSTED
                                 3128+*       TO COMAE IT MTN THE POINTER ESTABLISHED PRIOR TO AN ENTRY.
   124F 5C 00 1D 8F              3129+      MVC    DL2SEC(DL2E01,@BR),DL2LST+@DSAD(,@BR) GET SECTOR NUMBER
   1253 7C 00 8F                 3130+      MVI    DL2LST+@DSAD(,@BR),@ZERO  CLEAR SECTOR BYTE
                                 3131+*
                                 3132+*       MOVE THE RELATIVE START TO THE DFL
                                 3133+*
   1256 5E 01 8F 94              3134+      ALC    DL2LST+@DSAD(DL2E02,@BR),DL2RAD(,@BR) DL2RAD TO DPL
   125A 7D 18 1D                 3135+      CLI    DL2SEC(,@BR),DL2E18        IS COUNT OVER A TRACK
   125D F2 82 08                 3136+      JL     DL2008                     NO GO CHANGE A PHYSICAL ADOR
   1260 5E 01 8F 85              3137+      ALC    DL2LST+@DSAD(DL2E02,@BR),DL2K80(,@BR) BUMP TRACK VALUE
   1264 5F 00 1D 88              3138+      SLC    DL2SEC(1,@BR),DL2K18(,@BR) DECR BY TRACK VALUE
   1268 5E 00 1D 1D              3139+DL2008 ALC   DL2SEC(1,@BR),DL2SEC(,@BR) SHIFT LEFT 1
   126C 5E 00 1D 1D              3140+      ALC    DL2SEC(1,@BR),DL2SEC(,@BR) SHIFT LEFT
   1270 5C 00 14 8F              3141+      MVC    DL2SAD(DL2E01,@BR),DL2LST+@DSAD(,@BR) GET SECTOR ADDRESS
                                 3142+*
                                 3143+*       ZERO OUT THE SECTOR COUNT AND LEAVE THE DISK. SPINDLE AND
                                 3144+*       TRACK BITS AS IS TO BE RE INSERTED AFTER THE SECTOR HAS BEEN
                                 3145+*       LOCATES.
                                 3146+*
   1274 7B 7C 8F                 3147+      SBF    DL2LST+@DSAD(,@BR),DL2E7C TURN OFF
   1277 7B 83 14                 3148+      SBF    DL2SAD(,@BR),DL2TSD        OFF TRACK SPINDLE DISK
   127A 5E 00 14 1D              3149+      ALC    DL2SAD(DL2E01,@BR),DL2SEC(,@BR) COMBINE SECTOR COUNTS
   127E 7D 60 14                 3150+DL2010 CLI   DL2SAD(,@BR),DL2E60        TEST IF TRACK CROSSED
   1281 F2 82 08                 3151+      JL     DL2100
                                 3152+*
                                 3153+*       INCREMENT TRACK BIT. OVERFLOW INTO THE CYLINDER COUNT.
                                 3154+*
   1284 5E 01 8F 85              3155+      ALC    DL2LST+@DSAD(DL2E02,@BR),DL2K80(,@BR)
   1288 5F 00 14 83              3156+      SLC    DL2SAD(1,@BR),DL2K60(,@BR) DECR BY TRACK VALUE
                                 3157+*
   128C 5E 00 8F 14              3158+DL2100 ALC   DL2LST+@DSAD(1,@BR),DL2SAD(,@BR) INSERT SECTOR COUNT
                                 3159+*
   1290 F2 80 06                 3160+DL2110 JC    DL2900,@NOP                CONVERSION SWITCH
        1291                     3161+DL2SWH EQU   DL2110+@Q                  ADDR OF Q CODE FOR SWITCH
   1293 C0 87 0025               3162+      B      $DISKN                     GO PROCESS I/O
   1297 12AC        1298         3163+      DC     AL2(DL2LST)                ADDRESS OF DPL
   1299 C2 01 0000               3164+DL2900 LA    *-*,@BR                    RESTORE CALLERS BASE
   129D C0 87 0000               3165+DL2910 B     *-*
                                 3166+*****************************************************************
                                 3167+*       CONSTANTS
                                 3168+*****************************************************************
   12A1 0060        12A2         3169+DL2K60 DC    XL2'0060'                  SECTOR COUNT OF 24 LEFT ADJUSTD
   12A3 0080        12A4         3170+DL2K80 DC    XL2'0080'                  BIT FOR INCREMENTING TRACK
   12A5 30          12A5         3171+DL2C48 DC    IL1'48'                    CYLINDER VALUE FOR 1 DISK
   12A6 0018        12A7         3172+DL2K18 DC    XL2'18'                    HEX SECTORS PER TRACK
   12A8 0001        12A9         3173+DL2C01 DC    IL2'1'                     CONSTANT FOR REGISTER MODE
   12AA 0005        12AB         3174+DL2C05 DC    IL2'5'                     DISP TO RIGHT END OF DPL
                                 3175+*****************************************************************
                                 3176+*       WORK AREA
                                 3177+*****************************************************************
                     12AC        3178+DL2LST EQU   *                          LIST HIGH END
   12AC              12B1        3179+DL2DPL DS    CL(@DPLNG)                 WORKING DPL
                     12AE        3180+DL2PHY EQU   DL2LST+@DSAD               POINTER TO PHYSICAL DADDR
                     1233        3181+DL2SAD EQU   DL2001+@DOP2               SAVE SECTOR BYTE FROM DPI
```

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        DL2ICS - TWO TRACK LOGICAL IOCR

ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  23/05/20  PAGE  25

                           123C 3182+DL2SEC EQU   DL2002+@DOP2            WORKING SECTOR ADDRESS FIELD
      12B2                 12B3 3183+DL2RAD DS    CL(@DADDR)              USER RELATIVE STARTING ADDR.
                           12B4 3184+DL2END EQU   *                       END OF DL2ICS
                                3185+***                          END OF DL2ICS                        ***
                           121B 3186 DL4ICS EQU   DL2ICS                  DISK OPERATIONS DONE VIA DL2ICS
                                3187 *
                                3188 *       $CANI
```

```
      SCANIT - DELIMETER SCAN MODULE
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```
                           3190+***********************************************************************
                           3191+*  5703-XM1    COPYRIGHT IBM CORP. 1970                           *
                           3192+*                  REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE, 120-2083   *
                           3193+*                                                                 *
                           3194+***********************************************************************
                           3195+*STATUS                                                           *
                           3196+*   VERSION 1 MODIFICATION 0                                      *
                           3197+*                                                                 *
                           3198+*FUNCTION                                                         *
                           3199+*   THE FUNCTION OF SCANIT IS TO SCAN PAST VALID DELIMITERS AND   *
                           3200+*   RETURN A POINTER TO THE FIRST CHARACTER THAT'S NOT A DELIMITER. *
                           3201+*                                                                 *
                           3202+*ENTRY POINTS                                                     *
                           3203+*   * THE ENTRY POINT IS SCANIT.                                  *
                           3204+*   * THE CALLING SEQUENCE IS AS FOLLOWS:                         *
                           3205+*            B     SCANIT                                         *
                           3206+*      WITH REGISTER 2 (@XR) POINTING TO THE FIRST CHARACTER TO BE *
                           3207+*      EXAMINED.                                                  *
                           3208+*                                                                 *
                           3209+*INPUT                                                            *
                           3210+*   NONE                                                          *
                           3211+*                                                                 *
                           3212+*OUTPUT                                                           *
                           3213+*   NONE                                                          *
                           3214+*                                                                 *
                           3215+*EXTERNAL REFERENCES                                              *
                           3216+*   $CAERR - ERROR CODE SAVE AREA                                 *
                           3217+*                                                                 *
                           3218+*EXITS, NORMAL                                                    *
                           3219+*   NORMAL EXIT FROM SCANIT IS TO THE BYTE FOLLOWING THE BRANCH TO *
                           3220+*   SCANIT IN THE CALLING ROUTINE. THE PSR (REGISTER 4) WILL CONTAIN *
                           3221+*   A ZERO IF NO DELIMITERS WERE FOUND OR A HIGH CONDITION IF ONE OR *
                           3222+*   MORE DELIMITERS WERE SCANNED.                                 *
                           3223+*                                                                 *
                           3224+*EXITS, ERROR                                                     *
                           3225+*   ERROR EXIT FROM SCANIT IS TO THE BYTE FOLLOWING THE BRANCH TO  *
                           3226+*   SCANIT IN THE CALLING ROUTINE. THE PSR WILL CONTAIN A LOW      *
                           3227+*   CONDITION.                                                    *
                           3228+*                                                                 *
                           3229+*TABLES/WORKAREAS                                                 *
                           3230+*   * SCACNT - AREA CONTAINING NUMBERS OF DELIMITERS SCANNED      *
                           3231+*   * SCAMMA - LOCATION WHERE SCACOM MAY BE MOVED IF ONE COMMA IS ALSO*
                           3232+*     TO BE CONSIDERED A DELIMITER. MOVING SCACOF BACK INTO SCAMMA *
                           3233+*     INDICATES THAT ONLY BLANKS SHOULD BE CONSIDERED DELIMITERS.  *
                           3234+*                                                                 *
                           3235+*ATTRIBUTES                                                       *
                           3236+*   RELOCATABLE AND RE-USABLE                                     *
                           3237+*                                                                 *
                           3238+*CHARACTER CODE DEPENDENCY                                        *
                           3239+*   THE OPERATION OF THIS MODULE DOES NOT DEPEND UPON A PARTICULAR *
                           3240+*   INTERNAL REPRESENTATION OF THE EXTERNAL CHARACTER SET.        *
                           3241+*                                                                 *
                           3242+*NOTES                                                            *
                           3243+*   ERROR PROCEDURES                                              *
                           3244+*     THE ONLY ERROR CONDITION DETECTED BY SCANIT IS THE CASE WHERE *
                           3245+*     A CARRIAGE-RETURN CODE FOLLOWS A COMMA.  UPON RETURN TO THE  *
```

```
                              3246+*      CALLING ROUTINE, @PSR WILL BE SET TO A LOW CONDITION, THE      *
                              3247+*      ERROR CODE IS SET IN $CAERR, AND MG WU BE POINTING TO THE      *
                              3248+*      CARRIAGE-RETURN CHARACTER.                                     *
                              3249+*                                                                     *
                              3250+*   REGISTER USAGE                                                    *
                              3251+*      REGISTER 2 (@XR) IS USED AS A POINTER ACROSS THE AREA BEING    *
                              3252+*      SCANNED FOR DELIMETERS.                                        *
                              3253+*                                                                     *
                              3254+*   SAVED/RESTORED AREAS                                              *
                              3255+*      UPON ENTRY TO SCANIT, REGISTER 8 (@ARR) IS SAVED AND USED AS   *
                              3256+*      THE RETURN ADDRESS.                                            *
                              3257+*                                                                     *
                              3258+*   MODIFICATION CONSIDERATIONS                                       *
                              3259+*      NONE                                                           *
                              3260+*                                                                     *
                              3261+*   REQUIRED MODULES                                                  *
                              3262+*      * @SYSEQ - COMMON SYSTEM EQUATES                               *
                              3263+*      * @FXDEQ - FIXED NUCLEUS ADDRESSES EQUATES                     *
                              3264+*                                                                     *
                              3265+*   OTHER                                                             *
                              3266+*      SCANIT IS INITIALIZED TO BYPASS BLANKS ONLY. IF SCACOM IS      *
                              3267+*      MOVED TO SCAMMA, ONE COMMA WILL BE SCANNED ALONG WITH BLANKS.  *
                              3268+*      THE INSTRUCTION TO DO THIS IS AS FOLLOWS:                      *
                              3269+*             MVI   SCAMMA,SCACOM                                     *
                              3270+*                                                                     *
                              3271+*      TO DROP THE COMMA FROM ITS DELIMITER STATUS, SCACOF SHOULD BE  *
                              3272+*      MOVED TO SCAMMA, USING THE FOLLOWING INSTRUCTION:              *
                              3273+*             MVI   SCAMMA,SCACOF                                     *
                              3274+*********************************************************************************

                              3276+*
                              3277+*                        EQUATES USED IN THIS SUBROUTINE
                              3278+*
                         0001 3279+SCAINC EQU   1                           TO INCREMENT POINTER
                         0001 3280+SCACOM EQU   @BNE                        SWITCH TO ALLOW SCANNING COMMA
                         0087 3281+SCACOF EQU   @UCB                        SWITCH TO SET OFF THE INDICATON
                              3282+*                                        * FOR SCANNING A COMMA
                         12B4 3283+SCANIT EQU   *                           ENTRY POINT TO THIS SUBROUTINE
 12B4 34 08 12F0              3284+       ST    SCA500+@OP1,@ARR            SAVE RETURN ADDRESS
 12B8 34 02 12F2              3285+       ST    SCASVE,@XR                  SAVE POINTER VALUE
 12BC 3C 04 03CD              3286+       MVI   $CAERR,@@E110               SET ERROR CODE
 12C0 F2 87 03                3287+       J     SCA200                      GO TO PROCESS
 12C3 E2 02 01                3288+SCA100 LA    SCAINC(,@XR),@XR            INCREMENT POINTER TO NEXT CHAR
 12C6 BD 40 00                3289+SCA200 CLI   0(,@XR),@BLANK              IS THIS CHAR BLANK ?
 12C9 C0 81 12C3              3290+       BE    SCA100                      YES, FETCH NEXT ONE
 12CD BD 6B 00                3291+       CLI   0(,@XR),@COMMA              IS IT A COMMA ?
 12D0 F2 87 10                3292+SCA250 JC    SCA400,@UCB                 UCS TO RETURN -- OR NOP IF
                              3293+*                                        * SCAMMA IS ACTIVE AND CHAR
 12D3 E2 02 01                3294+SCA300 LA    SCAINC(,@XR),@XR            INCREMENT POINTER TO NEXT CHAR
 12D6 BD 40 00                3295+       CLI   0(,@XR),@BLANK              IS THIS CHAR A BLANK ?
 12D9 C0 81 12D3              3296+       BE    SCA300                      YES, FETCH NEXT ONE
 12DD BD 1F 00                3297+       CLI   0(,@XR),@EOS+1              IS THIS EOS ?
 12E0 F2 82 0A                3298+       JL    SCA500                      IF NOT, SKIP ERROR ROUTINE
 12E3 34 02 12F4              3299+SCA400 ST    SCACNT,@XR                  SAVE NEW POINTER VALUE
 12E7 0F 01 12F4 12F2         3300+       SLC   SCACNT(2),SCASVE            SET PSR TO EQUAL IF POINTER
```

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       SCANIT - DELIMETER SCAN MODULE

ERR LOC   OBJECT CODE     ADDR STMT SOURCE STATEMENT        VER 15, MOD 00  23/05/20  PAGE  28

                         3301+*                               * NOT ADVANCED
     12ED C0 87 0000      3302+SCA500 B    *-*                YES, RETURN
                     12D1 3303+SCAMMA EQU  SCA250+@Q          TO SET SCAN COMMA INDICATOR
                         3304+*
                         3305+*             SAVE AREA
                         3306+*
                     12F1 3307+SCASV1 EQU  *                  FIRST BYTE OF SCASVE
     12F1             12F2 3308+SCASVE DS   CL2               ORIGINAL POINTER VALUE SAVE
     12F3             12F4 3309+SCACNT DS   CL2               SAVE AREA FOR TOTAL CHAR SCAN
                         3310+***                 END OF SCANIT                    ***
```

```
                         3312 ******************************************************************************
                         3313 * 5703-XM1      COPYRIGHT IBM CORP. 1970                            *
                         3314 *                   REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE, 120-2083  *
                         3315 *                                                                  *
                         3316 ******************************************************************************
                         3317 *STATUS                                                           *
                         3318 *    VERSION 1 MODIFICATION 0                                      *
                         3319 *                                                                  *
                         3320 *FUNCTION                                                          *
                         3321 *    * DLPRNT PROVIDES FOR DEVICE INDEPENDENCE FOR OUTPUT FROM     *
                         3322 *      LIST ORIENTED PROGRAMS.                                     *
                         3323 *    * FOR CRT OUTPUT, ROLL SPEED AND POP FEATURES ARE SUPPORTED.  *
                         3324 *      IN ADDITION DLPRNT WILL FLASH COMMAND LIGHT 13 WHEN IN      *
                         3325 *      STOP MODE.                                                  *
                         3326 *    * IF A 50LMP MATRIX PRINTER IS TO BE USED, ALL PRINTED LINES  *
                         3327 *      ARE ANALYZED FOR LENGTH TO PROVIDE MAXIMUM LINE THROUGHPUT.  *
                         3328 *      THIS IS DONE BY PRINTING RIGHT ONLY AS FAR AS REQUIRED TO    *
                         3329 *      PRINT THE NEXT LINE FROM RIGHT TO LEFT.  THE 50LMP I/O       *
                         3330 *      INTERFACE IS SUPPLIED BY DLPRNT.                            *
                         3331 *    * OUTPUT MAY BE DIRECTED TO THE CRT, THE MATRIX PRINTER, OR    *
                         3332 *      THE CURRENT SYSTEM OUTPUT DEVICE(S).                        *
                         3333 *                                                                  *
                         3334 *ENTRY POINTS                                                      *
                         3335 *    DLPRNT HAS ONE ENTRY POINT.  THIS ENTRY POINT IS USED WHEN A   *
                         3336 *    LINE IS TO BE PRINTED FOLLOWED BY A NORMAL CARRIER RETURN.     *
                         3337 *    THE CALLING SEQUENCE IS:                                      *
                         3338 *                                                                  *
                         3339 *         B     DLPRNT                                             *
                         3340 *         DC    AL2(PPLA)                                          *
                         3341 *    WHERE PPLA IS A TWO BYTE ADDRESS OF THE LEFT BYTE OF A PRINT   *
                         3342 *    PARAMETER LIST.                                               *
                         3343 *                                                                  *
                         3344 *INPUT                                                             *
                         3345 *    * BEFORE USING DLPRNT THE ONE BYTE INDICATOR, DLPTYP, MUST     *
                         3346 *      BE SET TO INDICATE WHICH DEVICE IS TO BE USED FOR OUTPUT.    *
                         3347 *      THE CORRESPONDING VALUES AND THEIR FUNCTION FOLLOWS:         *
                         3348 *         DLPMPR - MATRIX PRINTER IS TO BE USED FOR OUTPUT.        *
                         3349 *         DLPCRT - THE DISPLAY STATION IS TO BE USED FOR OUTPUT.   *
                         3350 *                  ROLL SPEED AND POP FUNCTIONS WILL BE CONTROLED. *
                         3351 *         DLPSPT - THE SYSTEM PRINTER(S) IS TO OE USED FOR OUTPUT.  *
                         3352 *                  THIS IS THE DEFAULT VALUE.                      *
                         3353 *    * A 244 BYTE BUFFER MUST BE ALLOCATED FOR DLPRNTS USE STARTING *
                         3354 *      AT LOCATION DLIBUF.                                          *
                         3355 *    * A FOUR BYTE PRINT PARAMETER LIST (PPL) MUST BE PASSED VIA     *
                         3356 *      A TWO BYTE COME ADDRESS FOLLOWING THE CALL.  THIS PPL IS OF  *
                         3357 *      THE SAME FORMAT AS THE PPL SENT TO DPRINT WITH THE FOLLOWING *
                         3358 *      RESTRICTIONS:                                               *
                         3359 *         * ONLY 'PRINT AND RETURN' CONTROL CODES ARE ALLOWED FOR  *
                         3360 *           PRINTING.                                              *
                         3361 *         * WAIT FUNCTIONS SHOULD NOT BE USED EXCEPT AFTER THE LAST *
                         3362 *           LINE HAS BEEN PRINTED.  IT IS THEN REQUIRED TO TERMINATE *
                         3363 *           DLPRNT'S FUNCTION.                                     *
                         3364 *OUTPUT                                                            *
                         3365 *    UPON COMPLETION THE GENERAL REGISTERS AND PPL WILL BE THE SAME *
                         3366 *    AS AT ENTRY, THE LINE TO BE PRINTED WILL BE PRINTED (OR BUFFERED *
                         3367 *    IN THE CASE OF THE LINE PRINTER).  THE CALLING PROGRAM MAY     *
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                              3368 *    MODIFY THE LINE UPON RETURN.                              *
                              3369 *                                                             *
                              3370 *EXTERNAL REFERENCES                                          *
                              3371 *        $PRDEV - SYSTEM PRINTER INDICATOR.                   *
                              3372 *        DLIBUF - LOCATION OF BUFFER.                         *
                              3373 *        $$PLYN - ENTRY TO DSPLYN.                            *
                              3374 *        $$PRNT - ENTRY TO DPRINT.                            *
                              3375 *        $CRTIN - ROLL INDICATORS.                           *
                              3376 *        $IOIND - LINE PRINTER INDICATOR.                    *
                              3377 *        $UNMSK - ENTRY TO UNMASK INQUIRY REQUEST.            *
                              3378 *        $$PSIO - LOCATION OF CONTROL BYTE IN DPRINT SIG.     *
                              3379 *        $$PCNT - LOCATION OF COUNT BYTE IN DPRINT I/O LIST.  *
                              3380 *                                                             *
                              3381 *EXITS, NORMAL                                                *
                              3382 *    EXIT IS TO THE CALLING PROGRAM FOLLOWING THE PPL ADDRESS.*
                              3383 *                                                             *
                              3384 *EXITS, ERROR                                                 *
                              3385 *    N/A                                                      *
                              3386 *                                                             *
                              3387 *TABLES/WORK AREAS                                            *
                              3388 *    N/A                                                      *
                              3389 *                                                             *
                              3390 *ATTRIBUTES                                                   *
                              3391 *    RELOCATABLE                                              *
                              3392 *    REUSABLE                                                 *
                              3393 *                                                             *
                              3394 *CHARACTER CODE DEPENDENCY                                    *
                              3395 *    N/A                                                      *
                              3396 *                                                             *
                              3397 *NOTES                                                        *
                              3398 *    ERROR PROCEDURES                                         *
                              3399 *      N/A                                                    *
                              3400 *                                                             *
                              3401 *    REGISTER USAGE                                           *
                              3402 *      REGISTERS 1 AND 2 ARE USED FOR BASE ADDRESSING.        *
                              3403 *                                                             *
                              3404 *    SAVED/RESTORED AREAS                                     *
                              3405 *      N/A                                                    *
                              3406 *                                                             *
                              3407 *    MODIFICATION CONSIDERATIONS                              *
                              3408 *      DLPRNT DIRECTLY MODIFIES DPRINT WHEN USING THE LINE PRINTER *
                              3409 *      FUNCTION.  CARE MUST BE TAKEN WHEN MODIFING EITHER DLPRNT OR *
                              3410 *      DPRINT.                                                *
                              3411 *                                                             *
                              3412 *    REQUIRED MODULES                                         *
                              3413 *        @SYSEQ - GENERAL SYSTEM EQUATES                      *
                              3414 *        @FXDEQ - NUCLEUS LOCATION EQUATES                    *
                              3415 *        @HDWEQ - HARDWARE VALUE EQUATES                      *
                              3416 *        @CANEQ - TRANSCIENT LOCATION EQUATES                 *
                              3417 *                                                             *
                              3418 *    OTHER                                                    *
                              3419 *      N/A                                                    *
                              3420 *************************************************************************
```

```
      DLPRNT - LIST OUTPUT INTERFACE


ERR LOC   OBJECT CODE     ADDR STMT SOURCE STATEMENT         VER 15, MOD 00  23/05/20  PAGE  31

                          132E 3422      USING DLPBSE,@BR                 BASE SPECIFICATION
                          12F5 3423 DLPRNT EQU  *                         ENTRY
     12F5 34 01 13FF           3424      ST    DLP480+@OP1,@BR            SAVE BR
     12F9 C2 01 132E           3425      LA    DLPBSE,@BR                 LOAD BASE REG
     12FD 74 02 D5             3426      ST    DLP500+@OP1(,@BR),@XR      SAVE XR
     1300 76 08 ED             3427      A     DLPONE(,@BR),@ARR          CALCULATE PPL ADDR POINTER
     1303 34 08 1310           3428      ST    DLP100+@OP1,@ARR           GET PARM ADDR
     1307 76 08 ED             3429      A     DLPONE(,@BR),@ARR          CALCULATE RETURN ADDR
     130A 74 08 DD             3430      ST    DLP520+@OP1(,@BR),@ARR     SAVE RETURN ADDR
     130D 35 02 0000           3431 DLP100 L    *-*,@XR                   XR POINTS TO PPL
     1311 6C 03 EA 03          3432      MVC   DLPWK2+@PDATA(@PPLNG,@BR),@PDATA(,@XR)  MOVE IN PPL
     1315 7C 20 0F             3433      MVI   DLPEXT-1(,@BR),X'20'       INITIALIZE DSPLYN ADDR    *****
     1318 4E 00 0F 043B        3434      ALC   DLPEXT-1(1,@BR),$EXFTR     GET DSPLYN ADDR
     131D F2 87 00             3435      J     *-*                        GO TO CORRECT INTERFACE
                          131F 3436 DLPTYP EQU  *-1                        I/O DEVICE INDR LOCATION
     131F                      3437      ORG   DLPTYP                     SET INSTR CNTR
     131F 00             131F 3438      DC    AL1(DLPSPT)                SET DEFAULT TO SYSTEM PRINTER
                          1320 3439 DLPBSD EQU  *                         DISPLACEMENT BASE
                               3440 **
                          1320 3441 DLPSPI EQU  *                         SYSTEM PRINTER INTERFACE
     1320 3D 07 044A           3442      CLI   $PRDEV-1,X'07'             SYSPRINT = MATRIX PRINT    *****
     1324 F2 81 7E             3443      JE    DLPNPT                     DO LIME PRINTER INTERFACE
     1327 5C 01 00 10          3444      MVC   DLP120+@OP1(@CADDR,@BR),DLPEXT(,@BR)   GET DSPLYN ADDR
     132B C0 87 0000           3445 DLP120 B    *-*                       GO TO DSPLYN
     132F 1415            1330 3446      DC    AL2(DLPWK2)                PPL ADDRESS
     1331 3D 00 044B           3447      CLI   $PRDEV,X'00'               IS PRINTER REQUIRED TOO    *****
     1335 F2 81 6D             3448      JE    DLPNPT                     DO LINE PRINTER INTERFACE
     1338 F2 87 C1             3449      J     DLP480                     EXIT INTERFACE
                          132E 3450 DLPBSE EQU  DLP120+@OP1                BASE ADDRESS
```

```
                    133B 3452 DLPTIF EQU  *                        ENTRY
     133B C0 87 0000      3453        B    *-*                     GO TO DSPLYN
     133D                 3454        ORG  *-2                     INITIALIZE ADDR
     133D 2004       133E 3455 DLPEXT DC   AL2($$PLYN)             DSPLYN ENTRY ADDR
     133F 1415       1340 3456        DC   AL2(DLPWK2)             PPL ADDRESS
     1341 7D FF E7        3457        CLI  DLPWK2+@PCTRL(,@BR),@PWAIT  WAIT FUNCTION
     1344 F2 81 57        3458        JE   DLP360                  GO TURN OFF CMD LIGHTS
     1347 71 11 E2        3459 DLP140 LIO  DLPK13(,@BR),@KEYBD+@CMLON  TURN ON CMD LITE 13
     134A 38 08 03D3      3460        TBN  $CRTIN,$CRTSP           IN STOP MODE?
     134E F2 90 1D        3461        JF   DLP240                  NO - CONTINUE ROLL
     1351 F2 80 09        3462 DLP160 JC   DLP180,@NOP             JUMP IF LIGHT ON
     1354 71 10 E2        3463        LIO  DLPK13(,@BR),@KEYBD+@CMOFF  TURN POP LITE OFF
     1357 7C 87 24        3464        MVI  DLP160+@Q(,@BR),@UCB    SET FOR TURN ON
     135A F2 87 03        3465        J    DLP200                  GO DO TIME OUT
     135D 7C 80 24        3466 DLP180 MVI  DLP160+@Q(,@BR),@NOP    SET TO TURN OFF
     1360 5C 01 E0 E1     3467 DLP200 MVC  DLPLPC(2,@BR),DLPLIN(,@BR)  SET UP TIME COUNT
     1364 5F 01 E0 ED     3468 DLP220 SLC  DLPLPC(2,@BR),DLPONE(,@BR)  DECREMENT TIME COUNT
     1368 D0 84 36        3469        BH   DLP220(,@BR)            LOOP UNTIL TIME OUT
     136B D0 87 19        3470        B    DLP140(,@BR)            GO TEST STOP MODE
     136E 38 04 03D3      3471 DLP240 TBN  $CRTIN,$CRTPU           POP UP INDR ON ?
     1372 F2 90 07        3472        JF   DLP260                  SKIP LINE CNT INITIALIZATION
     1375 3B 04 03D3      3473        SBF  $CRTIN,$CRTPU           SET POP INDR OFF
     1379 7C 00 DE        3474        MVI  DLPCNT(,@BR),@ZERO      ZERO LINES DISPLAYED CNT
     137C 7D 0D DE        3475 DLP260 CLI  DLPCNT(,@BR),DLPMAX     HAVE MAX NO. OF LINES BEEN
                         3476 *                                  * DISPLAYED ?
     137F F2 01 04        3477        JNE  DLP280                  JUMP IF NOT
     1382 3A 08 03D3      3478        SBN  $CRTIN,$CRTSP           SET ROLL STOP INDR
     1386 F2 04 0E        3479 DLP280 JNH  DLP320                  JUMP IF MAX LINES NOT DISPLAYED
     1389 5C 01 E0 E1     3480        MVC  DLPLPC(2,@BR),DLPLIN(,@BR)  SET UP TIMING LOOP
     138D 5F 01 E0 ED     3481 DLP300 SLC  DLPLPC(2,@BR),DLPONE(,@BR)  DECREMENT COUNT
     1391 D0 84 5F        3482        BH   DLP300(,@BR)            BRANCH IF TIME NOT UP
     1394 F2 87 04        3483        J    DLP340                  GO EXIT
     1397 5E 00 DE ED     3484 DLP320 ALC  DLPCNT(1,@BR),DLPONE(,@BR)  BUMP LINE COUNT
     139B F2 87 5E        3485 DLP340 J    DLP480                  GO EXIT
     139E C0 87 0B44      3486 DLP360 B    $$COFF                  TURN OFF CMD LIGHTS
     13A2 F2 87 57        3487        J    DLP480                  GO EXIT
```

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      DLPRNT - LIST OUTPUT INTERFACE
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```
                      13A5 3489 DLPNPT EQU   *                           ENTRY
     13A5 38 80 03D2       3490        TBN   $IOIND,$LNPTR               LINE PRINTER AVAILABLE
     13A9 F2 10 0F         3491        JT    DLP400                      JUMP IF YES
     13AC C0 87 0707       3492 DLP380 B     $$PRNT                      DO NORMAL PRINT IF NOT
     13B0 1415        13B1 3493        DC    AL2(DLPWK2)                 PPL ADDR
     13B2 C0 87 0707       3494        B     $$PRNT                      WAIT FOR OP COMPLETION
     13B6 057F        13B7 3495        DC    AL2($WAITF)                 WAIT PPL ADDRESS
     13B8 F2 87 41         3496        J     DLP480                      GO EXIT
     13BB 7D FF E7         3497 DLP400 CLI   DLPWK2+@PCTRL(,@BR),@PWAIT  IS THIS A WAIT FUNCTION ?
     13BE F2 01 03         3498        JNE   DLP420                      JUMP IF NO
     13C1 7C 00 E8         3499        MVI   DLPWK2+@PRCNT(,@BR),@ZERO   ZERO NEXT LINE CNT
     13C4 7D FF E3         3500 DLP420 CLI   DLPWK1(,@BR),@PWAIT         IS THERE A LINE TO PRINT ?
     13C7 F2 01 59         3501        JNE   DLPPRT                      JUMP IF YES
     13CA C0 87 0707       3502        B     $$PRNT                      INSURE PRINT HEAD IS AT LEFT
     13CE 1421        13CF 3503        DC    AL2(DLPRTN)                 * MARGIN
     13D0 5C 01 E4 E8      3504 DLP440 MVC   DLPWK1+@PRCNT(2,@BR),DLPWK2+@PRCNT(,@BR)   SET NEXT PPL
     13D4 5C 01 E8 F4      3505        MVC   DLPWK2+@PRCNT(2,@BR),DLPRTN+@PRCNT(,@BR)   SET CARRIER RTN
     13D8 7D FF E3         3506        CLI   DLPWK1(,@BR),@PWAIT         WAS THIS A WAIT FUNCTION ?
     13DB D0 81 7E         3507        BE    DLP380(,@BR)                DO CARRIER RETURN IF YES
     13DE C2 02 1900       3508        LA    DLIBUF,@XR                  POINT XR TO BUFFER
     13E2 BC 40 F3         3509        MVI   DLPBLN-1(,@XR),@BLANK       SET BLANK FOR CLEAR BUF
     13E5 AC F2 F2 F3      3510        MVC   DLPBLN-2(DLPBLN-1,@XR),DLPBLN-1(,@XR)   CLEAR BUF TO OINKS
     13E9 5C 00 CD E4      3511        MVC   DLP460+@DD2(1,@BR),DLPWK1+@PRCNT(,@BR)   SET DATA CNT
     13ED 5F 00 CD ED      3512        SLC   DLP460+@DD2(1,@BR),DLPONE(,@BR)   GET TRUE DISPLACMENT
     13F1 5C 01 CC CD      3513        MVC   DLP460+@D1(2,@BR),DLP460+@DD2(,@BR) SET 0 AND DI VALUES
     13F5 75 01 EA         3514        L     DLPWK2+@PDATA(,@BR),@BR     BR POINTS TO DATA
     13F8 9C 00 00 00      3515 DLP460 MVC   *-*(@VQ,@XR),*-*(,@BR)      MOVE DATA TO BUFFER
                           3516 *
     13FC C2 01 0000       3517 DLP480 LA    *-*,@BR                     RESTORE BR
     1400 C2 02 0000       3518 DLP500 LA    *-*,@XR                     RESTORE XR
     1404 C0 87 048D       3519        B     $UNMSK                      GO CHECK FOR INQUIRY REQUEST
     1408 C0 87 0000       3520 DLP520 B     *-*                         RETURN
```

```
                             3522 ***********************************************************************
                             3523 * CONSTANTS, WORK AREAS AND EQUATES
                             3524 ***********************************************************************
                             3525 *
                        0085 3526 DLPMPR EQU   DLPNPT-DLPBSD                MATRIX PRINTER INDR VALUE
                        0000 3527 DLPSPT EQU   DLPSPI-DLPBSD                SYSTEM PRINTER INDR VALUE
                        001B 3528 DLPCRT EQU   DLPTIF-DLPBSD                CRT INDR VALUE
     140C               140C 3529 DCRCNT DS    CL1                          DISPLAYED LINE CNTR
                        140C 3530 DLPCNT EQU   DCRCNT                       COMMUNICATIONS LABEL
     140C                    3531        ORG   DLPCNT                       SET INST CNTR
     140C 01             140C 3532        DC    XL1'01'                      INITIAL VALUE
     140D               140E 3533 DLPLPC DS    CL2                          TIMING LOOP CNTR
     140F 3B            140F 3534 DLPLIN DC    XL1'3B'                      INITIAL LOOP CNT
     1410 0D            1410 3535 DLPK13 DC    AL1(@CKY13)                  CMD LIGHT 13 CONTROL
                        000D 3536 DLPMAX EQU   13                           MAX LINES TO BE DSPLAYED
                        1411 3537 DLPWK1 EQU   *                            CURRENT PPL
     1411 FFFF          1412 3538        DC    2XL1'FF'                     CTRL AND DATA CNT
     1413 1900          1414 3539        DC    AL2(DLIBUF)                  BUFFER ADDR
                        1415 3540 DLPWK2 EQU   *                            NEXT PPL
     1415               1418 3541        DS    CL(@PPLNG)
     1419 01            1419 3542 DLPNDX DC    AL1(@INDEX)                  INDEX PPL
     141A 0001          141B 3543 DLPONE DC    XL2'0001'                    CONSTANT OF ONE
     141C               141C 3544 DLPRES DS    CL1                          RESIDUAL CNT
     141D 0000          141E 3545 DLPWTH DC    XL2'00'                      WIDTH OF PRINT LINE
     141F               141F 3546 DLPNXT DS    CL1                          NEXT LINE CNT
     1420               1420 3547 DLPREM DS    CL1                          ADDITIONAL CNT FOR NEXT LINE
                        1421 3548 DLPRTN EQU   *                            ADDR OF RETURN PPL
     1421 8080          1422 3549        DC    2AL1(@RETRN)                 RETURN CARRIER PPL
                        0001 3550 DLPPNT EQU   X'01'                        LINE PRINTER CONTROL BYTE
```

                          3552 **
                          3553 * THIS ROUTINE PRINTS THE CURRENT LINE IN THE CORRECT DIRECTION AND
                          3554 * SETS UP THE NEXT LINE CNT.
                          3555 **
                     1411 3556   USING DLPBS2,@BR   NEW BASE VALUE
                     1423 3557 DLPPRT EQU   *   ENTRY TO PRINT
     1423 C2 01 1411   3558   LA   DLPBS2,@BR   LOAD BASE REGISTER
     1427 C0 87 0707   3559   B $$PRNT   WAIT FOR PRINTER READY
     142B 057F   142C 3560   DC   AL2($WAITF)   WAIT PPL
     142D 3C 80 0476   3561   MVI $CIMSK,@NOP   MASK IR FOR THIS FUNCTION
     1431 4C 00 0D 03C0   3562   MVC   DLPWTH(1,@BR),$RMRGN   SET RIGHT MARGIN VALUE
     1436 4F 00 0D 03C1   3563   SLC   DLPWTH(1,@BR),$LMRGN   CALCULATE WIDTH
     143B 5C 00 0E 05   3564   MVC   DLPNXT(1,@BR),DLPWK2+@PRCNT(,@BR) SET NEXT LINE CNT
     143F 7C 00 0B   3565   MVI   DLPRES(,@BR),@ZERO   ZERO RESIDUAL CNT
     1442 5D 00 01 0D   3566   CLC   DLPWK1+@PRCNT(1,@BR),DLPWTH(,@BR) CNT > WIDTH ?
     1446 F2 04 10   3567   JNH   DLP540   JUMP IF NO
     1449 5C 00 0B 01   3568   MVC   DLPRES(1,@BR),DLPWK1+@PRCNT(,@BR) SAVE CNT
     144D 5F 00 0B 0D   3569   SLC   DLPRES(1,@BR),DLPWTH(,@BR)   CALCULATE RESIDUAL CNT
     1451 5C 00 01 0D   3570   MVC   DLPWK1+@PRCNT(1,@BR),DLPWTH(,@BR) SET CNT TO WIDTH
     1455 5C 00 0E 0B   3571   MVC   DLPNXT(1,@BR),DLPRES(,@BR)   SET NEXT LINE CNT = RESIDUAL
     1459 0D 00 03C1 03C2 3572 DLP540 CLC $LMRGN(1),$PRPOS   ARE WE AT LEFT MARGIN ?
     145F F2 01 19   3573   JNE   DLPPRL   JUMP TO PRINT LEFT IF NOT
                          3574 *
                          3575 * SET UP FOR PRINT RIGHT OPERATION
                          3576 *
     1462 5D 00 01 0E   3577   CLC   DLPWK1+@PRCNT(1,@BR),DLPNXT(,@BR) CNT > NEXT CNT ?
     1466 F2 02 24   3578   JNL   DLP560   JUMP IF CURRENT CNT > NEXT CNT
                          3579 *   * NEXT LINE
     1469 5C 00 01 0D   3580   MVC   DLPWK1+@PRCNT(1,@BR),DLPWTH(,@BR) SET CURRENT CNT TO MAX
     146D 5D 00 0E 0D   3581   CLC   DLPNXT(1,@BR),DLPWTH(,@BR)   NEXT LINE LESS THAN WIDTH ?
     1471 F2 02 19   3582   JNL   DLP560   JUMP IF NOT
     1474 5C 00 01 0E   3583   MVC   DLPWK1+@PRCNT(1,@BR),DLPNXT(,@BR) SET CURRENT CNT TO
                          3584 *   * NEXT LINE CNT
     1478 F2 87 12   3585   J   DLP560   GO DO PRINTING
                          3586 *
                          3587 * SET UP FOR PRINT LEFT OPERATION
                          3588 *
                     147B 3589 DLPPRL EQU   *   ENTRY TO PRINT LEFT
     147B 3C 01 07CE   3590   MVI $$PSIO,DLPPNT   SET DPRINT FOR LINE MODE
     147F 4C 00 01 03C2   3591   MVC   DLPWK1+@PRCNT(1,@BR),$PRPOS SET CURRENT PRINT POSITION
     1484 4F 00 01 03C1   3592   SLC   DLPWK1+@PRCNT(1,@BR),$LMRGN GET RETURN PRINT CNT
     1489 5F 00 01 0A   3593   SLC   DLPWK1+@PRCNT(1,@BR),DLPONE(,@BR) SET UP FOR HARDWARE
                          3594 *
                          3595 * DO THE PRINT OPERATION
                          3596 *
     148D 7C 40 00   3597 DLP560 MVI   DLPWK1+@PCTRL(,@BR),@PRINT SET NO CARRIER RETURN
                          3598 *   * PRINT LENGTH = WIDTH
     1490 C0 87 0707   3599   B $$PRNT   GO PRINT THE LINE
     1494 1411   1495 3600   DC   AL2(DLPWK1)   PPL ADDR
     1496 3C 00 07CE   3601   MVI $$PSIO,@ZERO   RESET SIO CTRL FOR NORMAL OPS
     149A 3C 00 07E9   3602   MVI $$PCNT,@ZERO   SET DPRINT PPL CNT ZERO
     149E C0 87 0707   3603   B $$PRNT   INDEX A LINE
     14A2 1419   14A3 3604   DC   AL2(DLPNDX)   INDEX PPL ADDRESS
                          3605 *
                     132E 3606   USING DLPBSE,@BR   USE MAINLINE BASE VALUE
     14A4 C2 01 132E   3607   LA   DLPBSE,@BR   RESTORE MAINLINE BR

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      DLPRNT - LIST OUTPUT INTERFACE


ERR LOC   OBJECT CODE     ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  23/05/20  PAGE  36

    14A8 7D 00 EE            3608          CLI    DLPRES(,@BR),@ZERO          ANY RESIDUAL DATA ?
    14AB D0 81 A2            3609          BE     DLP440(,@BR)                EXIT TO MAINLINE IF NOT
                            3610 *
                       1411 3611          USING  DLPBS2,@BR                  USE PRINT BASE ADDR
    14AE C2 01 1411         3612          LA     DLPBS2,@BR                  SET BR
    14B2 7C F4 0F           3613          MVI    DLPREM(,@BR),DLPBLN         SET REMAINDER TO BUF LENGTH
    14B5 5F 00 0F 0B        3614          SLC    DLPREM(1,@BR),DLPRES(,@BR)  GET REMAINDER FOR BLANK CNT
    14B9 C2 02 1900         3615          LA     DLIBUF,@XR                  XR POINTS TO BUFFER
    14BD 74 02 B7           3616          ST     DLP580+@DOP2(,@BR),@XR      SET MOVE INSTR TO BUF ADDR
    14C0 5E 01 B7 0D        3617          ALC    DLP580+@DOP2(@CADDR,@BR),DLPWTH(,@BR)  POINT TO RESIDUAL
    14C4 8C 00 00 0000      3618 DLP580 MVC     0(1,@XR),*-*                 MOVE A BYTE OF RESIDUAL DATA
    14C9 E2 02 01           3619          LA     1(,@XR),@XR                 INCREMENT DATA POINTER
    14CC 5E 01 B7 0A        3620          ALC    DLP580+@DOP2(@CADDR,@BR),DLPONE(,@BR) INCREMENT DATA ADDR
    14D0 5F 00 0B 0A        3621          SLC    DLPRES(1,@BR),DLPONE(,@BR)  DECREMENT RESIDUAL CNT
    14D4 D0 84 B3           3622          BH     DLP580(,@BR)                DO IT AGAIN TILL DONE
    14D7 BC 40 00           3623 DLP600 MVI     0(,@XR),@BLANK               SET REMAINING BLANKS
    14DA E2 02 01           3624          LA     1(,@XR),@XR                 INCREMENT
    14DD 5F 00 0F 0A        3625          SLC    DLPREM(1,@BR),DLPONE(,@BR)  REMAINDER ?
    14E1 D0 84 C6           3626          BH     DLP600(,@BR)                SET ANOTHER BLANK
    14E4 5C 00 01 0E        3627          MVC    DLPWK1+@PRCNT(1,@BR),DLPNXT(,@BR)   SET NEXT CNT
    14E8 D0 87 12           3628          B      DLPPRT(,@BR)                GO FINISH LINE

                       1411 3630 DLPBS2 EQU    DLPWK1                        BASE VALUE FOR PRINT OP
                       00F4 3631 DLPBLN EQU    244                           LENGTH OF PRINT BUFFER
```

```
                           3633 ****************************************************************************
                           3634 * 5703-XM1       COPYRIGHT IBM CORP. 1970                               *
                           3635 *                    REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE, 120-2083  *
                           3636 *                                                                        *
                           3637 ****************************************************************************
                           3638 *STATUS                                                                  *
                           3639 *    VERSION 1 MODIFICATION 0                                             *
                           3640 *                                                                        *
                           3641 *FUNCTION                                                                *
                           3642 *    * SCSTRG PLACES THE SYNTACTIC UNIT <CHARACTER STRING> IN            *
                           3643 *      AN AREA DEFINED BY THE USER.  THIS ROUTINE WILL ALSO PLACE A      *
                           3644 *      NUMBER OF CHARACTERS IN THE CALLING PROGRAMS AREA.                *
                           3645 *    * A COUNT OF THE NUMBER OF CHARACTERS IN THE STRING IS MAINTAINED *
                           3646 *      BY SCSTRG.                                                         *
                           3647 *                                                                        *
                           3648 *ENTRY POINTS                                                            *
                           3649 *    * THE ONLY ENTRY TO SCSTRG IS THE FIRST BYTE OF                     *
                           3650 *      THE ROUTINE. THE CALLING SEQUENCE IS:                             *
                           3651 *                                                                        *
                           3652 *            B     SCSTRG                                                 *
                           3653 *            DC    AL2(AREA)                                              *
                           3654 *      WHERE AREA POINTS TO THE LEFTMOST BYTE OF THE CALLING             *
                           3655 *      PROGRAMS OUTPUT AREA.                                             *
                           3656 *                                                                        *
                           3657 *INPUT                                                                   *
                           3658 *    INDEX REGISTER TWO(2) SHOULD POINT TO THE LEFT QUOTE OF THE         *
                           3659 *    CHARACTER STRING.  THE CALLING PROGRAM MUST ALSO SET THE            *
                           3660 *    CHARACTER COUNT IN THE ONE BYTE FIELD SCSLNG.  A ZERO(0) LENGTH     *
                           3661 *    DENOTES THAT THE CALLING PROGRAM WANTS THE ENTIRE STRING.           *
                           3662 *                                                                        *
                           3663 *OUTPUT                                                                  *
                           3664 *    THE CHARACTER STRING IS RETURNED TO THE ADDRESS GIVEN BY THE        *
                           3665 *    CALLING ROUTINE.  THE FIELD SCSCNT CONTAINS THE NUMBER OF           *
                           3666 *    CHARACTERS IN THE CHARACTER STRING.                                 *
                           3667 *                                                                        *
                           3668 *EXTERNAL REFERENCES                                                     *
                           3669 *    NONE                                                                *
                           3670 *                                                                        *
                           3671 *EXITS, NORMAL                                                           *
                           3672 *    NORMAL EXIT IS TO THE FIRST BYTE FOLLOWING THE THE                  *
                           3673 *    POINTER TO THE USERS STRING AREA.  THE BASE REGISTER               *
                           3674 *    IS RESTORED(XR1).  XR2 WILL POINT TO THE CHARACTER                  *
                           3675 *    FOLLOWING THE ENDING QUOTE.  THE PSR WILL BE NOT LOW.               *
                           3676 *                                                                        *
                           3677 *EXITS,ERROR                                                             *
                           3678 *    SHOULD AN ERROR BE FOUND THE PSR IS FORCED LOW. THE XR2             *
                           3679 *    WILL POINT TO THE POSITION WHERE THE ERROR WAS FOUND.               *
                           3680 *                                                                        *
                           3681 *TABLES/WORKAREAS                                                        *
                           3682 *    N/A                                                                 *
                           3683 *                                                                        *
                           3684 *ATTRIBUTES                                                              *
                           3685 *    SCSTRG IS REUSABLE                                                  *
                           3686 *                                                                        *
                           3687 *CHARACTER CODE DEPENDENCY                                               *
                           3688 *    THIS ROUTINE ASSUMES THE EBCDIC CODE OF X'7D' FOR A                 *
```

```
                              3689 *    SINGLE QUOTE.                                              *
                              3690 *                                                               *
                              3691 *NOTES                                                          *
                              3692 *    ERROR PROCEDURES                                           *
                              3693 *      N/A                                                      *
                              3694 *    REGISTER USAGE                                             *
                              3695 *      INDEX REGISTER 1 IS USED AS A POINTER TO THE CALLING PROGRAMS *
                              3696 *      STRING AREA. INDEX REGISTER 2 POINTS TO THE CHARACTER STRING  *
                              3697 *      IN THE INPUT LINE. XR 1 IS SAVED AND RESTORED.           *
                              3698 *    REQUIRED MODULES                                           *
                              3699 *      @SYSEQ - SYSTEM EQUATES                                   *
                              3700 *    MODIFICATION CONSIDERATIONS                                *
                              3701 *      N/A                                                      *
                              3702 *    OTHER                                                      *
                              3703 *      N/A                                                      *
                              3704 ******************************************************************************

                         14EB 3706 SCSTRG EQU   *                          ENTRY POINT
    14EB 34 01 155B            3707        ST    SCS050+@OP1,@BR            SAVE BASE REGISTER
    14EF 34 08 155F            3708        ST    SCS051+@OP1,@ARR          SAVE RETURN ADDRESS
    14F3 0E 00 155F 1563       3709        ALC   SCS051+@OP1(@B1),SCSPL2   INCREMENT PAST PARAMETER
    14F9 36 08 1562            3710        A     SCSPL1,@ARR               POINT TO PARAMETER
    14FD 34 08 150C            3711        ST    SCS005+@OP1,@ARR          SAVE PARAMETER ADDRESS
    1501 3C 00 1560            3712        MVI   SCSCNT,@ZERO              CLEAR COUNTER
    1505 3C 80 1532            3713        MVI   SCS020+@Q,@NOP            SET SWITCH OFF
    1509 35 01 0000            3714 SCS005 L     *-*,@BR                   PICK UP OUTPUT ADDRESS
    150D BD 7D 00              3715        CLI   @ZERO(,@XR),SCSQUO        CHECK QUOTES
    1510 F2 01 37              3716        JNE   SCS030                    ERROR -
                              3717 *
    1513 E2 02 01              3718 SCS006 LA    @B1(,@XR),@XR             INCREMENT POINTER
    1516 BD 7D 00              3719        CLI   @ZERO(,@XR),SCSQUO        EMBEDDED QUOTES
    1519 F2 01 09              3720        JNE   SCS010                    NO GO CHECK FOR EOS
    151C E2 02 01              3721        LA    @B1(,@XR),@XR             MOVE INPUT POINTER
    151F BD 7D 00              3722        CLI   @ZERO(,@XR),SCSQUO        DOUBLE QUOTE ?
    1522 F2 01 30              3723        JNE   SCS040                    EXIT
    1525 BD 1E 00              3724 SCS010 CLI   @ZERO(,@XR),@EOS          END OF STATEMENT ?
    1528 F2 81 1F              3725        JE    SCS030                    YES - ERROR
    152B 0E 00 1560 1562       3726        ALC   SCSCNT(@B1),SCSPL1        INCREMENT COUNT
                              3727 *
    1531 F2 00 12              3728 SCS020 JC    SCS029,*-*                SWITCH
    1534 6C 00 00 00           3729        MVC   @ZERO(@B1,@BR),@ZERO(,@XR)  MOVE CHARACTER
    1538 D2 01 01              3730        LA    @B1(,@BR),@BR             BUMP OUTPUT POINTER
                              3731 *
    153B 3D 00 1560            3732 SCS025 CLI   SCSCNT,*-*                CHECK CHARACTER COUNT
    153F F2 01 04              3733        JNE   SCS029                    NOT EXCEEDED CONTINUE
    1542 3C 87 1532            3734        MVI   SCS020+@Q,@UCB            SET SWITCH ON
    1546 C0 87 1513            3735 SCS029 B     SCS006                    RETURN TO MAINLINE
```

```
      DLPRNT - LIST OUTPUT INTERFACE


ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT           VER 15, MOD 00  23/05/20  PAGE  39

                           3737 *
                           3738 *                    ERROR SETTING
                           3739 *
                      154A 3740 SCS030 EQU   *
     154A 35 04 1565       3741        L     SCSERR,@PSR             SET ERROR INDICATOR
     154E 3C 17 03CD       3742        MVI   $CAERR,@@E138           INCOMPLETE CHARACTER CONSTANT
     1552 F2 87 03         3743        J     SCS050                  RETURN
     1555 BD FF 00         3744 SCS040 CLI   0(,@XR),SCSFRC          FORCE PSR LOW
                           3745 *
                           3746 *                    RETURN
                           3747 *
     1558 C2 01 0000       3748 SCS050 LA    *-*,@BR                 RESTORE BASE
     155C C0 87 0000       3749 SCS051 B     *-*                     RETURN
                           3750 *
                           3751 *                    CONSTANTS
                           3752 *
                      153C 3753 SCSLNG EQU   SCS025+@Q               LENGTH REQUESTED
                      007D 3754 SCSQUO EQU   X'7D'                   QUOTE
                      00FF 3755 SCSFRC EQU   X'FF'                   FORCE PSR INDICATOR
                           3756 *
     1560                  1560 3757 SCSCNT DS    CL1               CHARACTER COUNT
     1561 0001             1562 3758 SCSPL1 DC    IL2'1'            PLUS ONE
     1563 02               1563 3759 SCSPL2 DC    IL1'2'            PLUS TWO
     1564 0084             1565 3760 SCSERR DC    XL2'84'           PSR CODE FOR ERROR
```

```
                          3762 ********************************************************************
                          3763 * 5703-XM1       COPYRIGHT IBM CORP. 1970                           *
                          3764 *                   REFER TO INSTRUCTIONS ON COPYRIGHT NOTICE, 120-2083  *
                          3765 *                                                                  *
                          3766 ********************************************************************
                          3767 *STATUS                                                            *
                          3768 *    VERSION 1 MODIFICATION 0                                       *
                          3769 *                                                                  *
                          3770 *FUNCTION                                                           *
                          3771 *    SCKOUT, ENTERED AT SCKOUT, WILL CHECK THE NEXT PARAMETER FOR THE  *
                          3772 *    'CRT' OR 'PRINTER' PARAMETER AND SET THE APPROPRIATE INDICATORS   *
                          3773 *    FOR DLPRNT.  SCKOUT, ENTERED AT SCKDEV, WILL TEST THE NUCLEUS   *
                          3774 *    INDICATORS FOR THE SPECIFIED OUTPUT DEVICE AND, IF NO ERRORS ARE  *
                          3775 *    FOUND, WILL RETURN TO THE USER WITH THE APPROPRIATE OUTPUT DEVICE *
                          3776 *    READY.                                                         *
                          3777 *                                                                  *
                          3778 *ENTRY POINTS                                                       *
                          3779 *    SCKOUT HAS THE FOLLOWING TWO ENTRY POINTS:                      *
                          3780 *       * SCKOUT - ENTRY TO CHECK THE NEXT PARAMETER FOR THE 'CRT' OR  *
                          3781 *         'PRINTER' SPECIFICATION                                    *
                          3782 *       * SCKDEV - ENTRY TO CHECK AND MAKE READY THE SPECIFIED OUTPUT  *
                          3783 *         DEVICE.                                                    *
                          3784 *                                                                  *
                          3785 *INPUT                                                              *
                          3786 *    INPUT TO SCKOUT (ENTRY POINT SCKOUT) IS THE INPUT LINE BUFF WITH  *
                          3787 *    @XR POINTING TO THE FIRST CHARACTER TO BE TESTED.  THERE IS NO  *
                          3788 *    INPUT TO SCKOUT AT ENTRY POINT SCKDEV.                          *
                          3789 *                                                                  *
                          3790 *OUTPUT                                                             *
                          3791 *    THERE IS NO OUTPUT FROM SCKOUT.                                 *
                          3792 *                                                                  *
                          3793 *EXTERNAL REFERENCES                                                *
                          3794 *    * SCANIT - ENTRY TO DELIMITER SCAN ROUTINE                      *
                          3795 *    * SCAMMA - SCANIT INDICATOR SET TO ALLOW A COMMA                *
                          3796 *    * $CAERR - ERROR CODE SAVE AREA                                 *
                          3797 *    * $CAERK - EXIT TO LOAD #ERRPG, THE ERROR PROGRAM               *
                          3798 *    * DLPTYP - DLPRNT INDICATOR FOR OUTPUT DEVICE                   *
                          3799 *    * $IOIND - NUCLEUS INDICATOR WHICH TELLS WHETHER OR NOT THE      *
                          3800 *      PRINTER IS DOWN ($MPDWN) AND WHETHER OR NOT THE CRT IS PRESENT *
                          3801 *      ON THE SYSTEM ($CRTAV), AND CONTAINS THE COMMAND KEYS ONLY IND *
                          3802 *    * $KEYCD - NUCLEUS INDICATOR TO GIVE INPUT MODE                 *
                          3803 *    * $CRTIN - NUCLEUS INDICATOR CONCERNING CRT                     *
                          3804 *    * $EXFTR - CORE EXPANSION FACTOR                                *
                          3805 *    * $$PYCD - ENTRY TO CLEAR CRT AND LIGHT COMMAND INDICATORS       *
                          3806 *    * $$PRES - ENTRY TO ENABLE KEYBOARD TO DEPRESS                  *
                          3807 *                                                                  *
                          3808 *EXIT, NORMAL                                                       *
                          3809 *    NORMAL EXIT FROM SCKOUT (AT BOTH ENTRY POINTS) IS TO THE BYTE    *
                          3810 *    FOLLOWING THE BRANCH TO SCKOUT OR SCKDEV.  UPON EXIT FROM SCKOUT, *
                          3811 *    THE PSR WILL BE SET HIGH TO INDICATE A VALID PARAMETER AND ZERO  *
                          3812 *    TO INDICATE THAT NEITHER 'CRT' NOR 'PRINTER' WAS FOUND.  IF      *
                          3813 *    SCKDEV RETURNS TO THE BYTE FOLLOWING THE BRANCH, THIS INDICATES  *
                          3814 *    THAT NO ERRORS ARE ENCOUNTERED.                                 *
                          3815 *                                                                  *
                          3816 *EXIT, ERROR                                                        *
                          3817 *    ERROR EXIT FROM SCKOUT (ENTRY POINT SCKOUT) IS TO THE BYTE       *
```

```
3818 *    FOLLOWING THE BRANCH TO SCKOUT, WITH THE ERR CODE SET IN $CAERR,  *
3819 *    THE PSR SET LOW, AND @XR POINTING TO THE FIRST INVALID CHARACTER. *
3820 *    ERROR EXIT FROM SCKOUT (ENTRY PT SCKDEV) IS TO THE USER-DEFINED   *
3821 *    LABEL, $CKERR, WITH THE ERROR CODE SET IN $CAERR AND @XR POINTS   *
3822 *    OUTSIDE THE INPUT LINE BUFFER (USER VALUE DESTROYED).             *
3823 *                                                                      *
3824 *TABLES/WORKAREAS                                                      *
3825 *    NONE                                                              *
3826 *                                                                      *
3827 *ATTRIBUTES                                                            *
3828 *    RELOCATABLE AND RE-ENTERABLE                                      *
3829 *                                                                      *
3830 *CHARACTER CODE DEPENDENCY                                             *
3831 *    NONE                                                              *
3832 *                                                                      *
3833 *NOTES                                                                 *
3834 *    ERROR PROCEDURES                                                  *
3835 *      UPON DETECTING AN ERROR, SCKOUT SETS THE APPROPRIATE ERR CODE   *
3836 *      IN $CAERR AND RETURNS EITHER TO THE BYTE FOLLOWING THE BRANCH   *
3837 *      TO SCKOUT OR TO THE USER-DEFINED LABEL, $CKERR.                 *
3838 *                                                                      *
3839 *    REGISTER USAGE                                                    *
3840 *      REGISTER 2 (@XR) IS USED TO SCAN ACROSS THE INPUT LINE BUFFER.  *
3841 *      RESISTER 4 (@PSR) IS SET TO INDICATE THE CONDITION FOUND IN     *
3842 *      SCKOUT (ENTRY POINT SCKOUT).                                    *
3843 *                                                                      *
3844 *    SAVED/RESTORED AREAS                                              *
3845 *      NONE                                                            *
3846 *                                                                      *
3847 *    MODIFICATION CONSIDERATIONS                                       *
3848 *      NONE                                                            *
3849 *                                                                      *
3850 *    REQUIRED MODULES                                                  *
3851 *      * @SYSEQ - COMMON SYSTEM EQUATES                                *
3852 *      * @FXDEQ - FIXED CORE LOCATIONS INSIDE NUCLEUS                  *
3853 *      * @ERMEQ - ERROR MESSAGE EQUATES (SELECTED ERROR CODES)         *
3854 *        @CANEQ - FIXED CORE LOCATIONS OUTSIDE NUCLEUS                 *
3855 *      * $CANIT - DELIMITER SCAN ROUTINE                               *
3856 *      * DLPRNT - ROUTINE TO PRINT THE CURRENT LINE                    *
3857 *                                                                      *
3858 *    OTHER                                                             *
3859 *      NONE                                                            *
3860 *                                                                      *
3861 ***********************************************************************
```

```
     DLPRNT - LIST OUTPUT INTERFACE


ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT          VER 15, MOD 00  23/05/20  PAGE  42

                          1566 3863 SCKOUT EQU    *                          BEGINNING OF SCKOUT SUBROUTINE
     1566 34 08 15F9           3864        ST     SCK460+@OP1,@ARR     SAVE RETURN ADDRESS
     156A 34 02 15ED           3865        ST     SCK440+@OP1,@XR      SAVE XR POINTER
     156E 3C 01 12D1           3866        MVI    SCAMMA,SCACOM        SET SCANIT INDR TO ALLOW COMMA
                               3867 *
                               3868 *              TEST FOR 'CRT' OR 'PRINTER'
                               3869 *
     1572 8D 02 02 15FC        3870        CLC    SCK001-1(SCK001,@XR),SCKCCR  IS 'CRT' SPECIFIFD ?
     1577 F2 81 0F             3871        JE     SCK100               YES, PROCESS CRT PARAMETER
                               3872 *
     157A 8D 06 06 1603        3873        CLC    SCK002-1(SCK002,@XR),SCKCMP  IS 'PRINTER' SPECIFIED ?
     157F F2 81 11             3874        JE     SCK150               YES, PROCESS 'PRINTER' PARAM
                               3875 *
                               3876 *              NEITHER CRT NOR PRINTER SPECIFIED
                               3877 *
     1582 35 04 1605           3878        L      SCK003,@PSR          SET PSR TO BRANCH ZERO
     1586 F2 87 69             3879        J      SCK450               BRANCH TO RETURN
                               3880 *
                               3881 *              CALL SCANIT AND CHECK DELIMITER AFTER PARAM
                               3882 *
     1589 3C 87 15A8           3883 SCK100 MVI    SCK300+@Q,@UCB       SET SW TO PROCESS 'CRT'
     158D E2 02 03             3884        LA     SCK001(,@XR),@XR     INDR XR PAST 'CRT'
     1590 F2 87 03             3885        J      SCK200               JUMP TO CALL SCANIT
                               3886 *
     1593 E2 02 07             3887 SCK150 LA     SCK002(,@XR),@XR     INCR XR PAST 'PRINTER'
                               3888 *
     1596 C0 87 12B4           3889 SCK200 B      SCANIT               BYPASS BLANKS AND A COMMA
     159A C0 82 0469           3890        BL     $CAERK               CALL ERR PROG IF DANGLING COMMA
     159E F2 84 06             3891        JH     SCK300               IF CHARS SCANNED, SET DLPRNT SW
                               3892 *
     15A1 BD 1E 00             3893        CLI    @ZERO(,@XR),@EOS     ELSE, IS PARAM FOLLOWED BY EOS ?
     15A4 F2 01 31             3894        JNE    SCK410               NO, SET 'INV PARAM' ERROR
                               3895 *
     15A7 F2 80 15             3896 SCK300 JC     SCK350,@NOP          NOP IF PRINTER -- UCB IF CRT
```

```
      DLPRNT - LIST OUTPUT INTERFACE


ERR LOC   OBJECT CODE       ADDR STMT SOURCE STATEMENT           VER 15, MOD 00  23/05/20  PAGE  43

                            3898 *
                            3899 *                  PRINTER SPECIFIED
                            3900 *
    15AA 3D 1B 131F         3901        CLI   DLPTYP,DLPCRT        WAS CRT SPECIFIED BEFORE ?
    15AE F2 81 2E           3902        JE    SCK420              YES, SET 'CONFLICTING PARAM' ERR
                            3903 *
    15B1 3D 85 131F         3904        CLI   DLPTYP,DLPMPR        WAS PRINTER SPECIFIED BEFORE ?
    15B5 F2 81 2E           3905        JE    SCK430              YES, SET 'DUPLICATING PARAM' ERR
                            3906 *
    15B8 3C 85 131F         3907        MVI   DLPTYP,DLPMPR        SET SW FOR MATRIX PRINTER
    15BC F2 87 12           3908        J     SCK400              RETURN TO CALLING PGM
                            3909 *
                            3910 *                  CRT SPECIFIED
                            3911 *
    15BF 3D 1B 131F         3912 SCK350 CLI   DLPTYP,DLPCRT        WAS CRT SPECIFIED BEFORE ?
    15C3 F2 81 20           3913        JE    SCK430              YES SET 'DUPLICATE PARAM' ERR
                            3914 *
    15C6 3D 85 131F         3915        CLI   DLPTYP,DLPMPR        WAS PRINTER SPECIFIED BEFORE ?
    15CA F2 81 12           3916        JE    SCK420              YES, SET 'CONFLICTING PARAM' ERR
                            3917 *
    15CD 3C 1B 131F         3918        MVI   DLPTYP,DLPCRT        SET SW FOR CRT
    15D1 35 04 1607         3919 SCK400 L     SCK004,@PSR          SET SW FOR BRANCH HIGH
    15D5 F2 87 1A           3920        J     SCK450              RETURN TO CALLING PROGRAM
                            3921 *
                            3922 *                  SET ERROR CODES
                            3923 *
    15D8 3C 11 03CD         3924 SCK410 MVI   $CAERR,@@E131        SET 'INV PARAM' ERROR CODE
    15DC F2 87 0B           3925        J     SCK440              RETURN
                            3926 *
    15DF 3C 15 03CD         3927 SCK420 MVI   $CAERR,@@E136        SET 'CONFLICTING PARAM' ERR CODE
    15E3 F2 87 04           3928        J     SCK440              RETURN
                            3929 *
    15E6 3C 13 03CD         3930 SCK430 MVI   $CAERR,@@E134        SET 'DUPLICATE PARAM' ERR CODE
                            3931 *
    15EA C2 02 0000         3932 SCK440 LA    *-*,@XR              RESTORE XR VALUE
    15EE 35 04 1609         3933        L     SCK005,@PSR          SET PSR TO BL TO IND ERROR
                            3934 *
                            3935 *                  EXIT
                            3936 *
    15F2 3C 80 15A8         3937 SCK450 MVI   SCK300+@Q,@NOP       SET CRT OR POINTER INDR OFF
    15F6 C0 87 0000         3938 SCK460 B     *-*                 RETURN TO CALLING PROGRAM
                            3939 *
                            3940 *                  EQUATES USED IN SCKOUT
                            3941 *
    0003 3942 SCK001 EQU   3                                      LENGTH OF 'CRT' PARAMETER
    0007 3943 SCK002 EQU   7                                      LENGTH OF 'PRINTER' PARAMETER
                            3944 *
                            3945 *                  CONSTANTS USED IN SCOUT
                            3946 *
    15FA C3D9E3             15FC 3947 SCKCCR DC   CL(SCK001)'CRT'     CRT PARAMETER IMAGE
    15FD D7D9C9D5E3C5D9     1603 3948 SCKCMP DC   CL(SCK002)'PRINTER' PRINTER PARAMETER IMAGE
    1604 0081               1605 3949 SCK003 DC   XL2'81'             PRINTER CODE FOR BRANCN ON ZERO
    1606 0084               1607 3950 SCK004 DC   XL2'84'             PSR CODE FOR BRANCH HIGH
    1608 0082               1609 3951 SCK005 DC   XL2'82'             PSR CODE FOR BRANCH LOW
                            3952 *
```

```
     DLPRNT - LIST OUTPUT INTERFACE


ERR LOC   OBJECT CODE      ADDR STMT SOURCE STATEMENT           VER 15, MOD 00  23/05/20  PAGE  44

                           160A 3954 SCKDEV EQU   *                          PORTION OF SCKOUT TO READY CRT
     160A 34 08 166A            3955        ST    SCK650+@OP1,@ARR           SAVE RETURN ADDRESS
     160E 3C 01 03D3            3956        MVI   $CRTIN,$CRTUP              SET CRT IN ROLL-UP MODE
                                3957 *
     1612 3D 1B 131F            3958        CLI   DLPTYP,DLPCRT              WAS CRT THE SPECIFIED PARM ?
     1616 F2 81 15              3959        JE    SCK475                     YES, CHECK FOR ITS EXISTENCE
                                3960 *
     1619 3D 85 131F            3961        CLI   DLPTYP,DLPMPR              ELSE, WAS PRINTER SPECIFIED ?
     161D F2 01 47              3962        JNE   SCK650                     NO, RETURN TO USER
                                3963 *
     1620 38 01 03D2            3964        TBN   $IOIND,$MPDWN             ELSE, IS PRINTER DOWN ?
     1624 F2 90 40              3965        JF    SCK650                     NO, RETURN TO USER
                                3966 *
     1627 3C 96 03CD            3967        MVI   $CAERR,@@E549             SET ERR CODE FOR PRINTER DOWN
     162B F2 87 19              3968        J     SCK550                     DESTROY YR AND EXIT
                                3969 *
     162E 38 02 03D2            3970 SCK475 TBN   $IOIND,$CRTAV             IS CRT ON THE SYSTEM ?
     1632 F2 90 0E              3971        JF    SCK500                     NO, SET ERROR CODE
                                3972 *
     1635 38 01 03C3            3973        TBN   $KEYCD,$CARDI             IS CRT SPECIFIED FROM CARDS ?
     1639 F2 90 13              3974        JF    SCK600                     IF NOT, SKIP ERROR ROUTINE
                                3975 *
     163C 3C 3A 03CD            3976        MVI   $CAERR,@@E248             SET ERROR CODE - 'CRT SPECIFIED
                                3977 *                                      * WHEN I/O IS FROM CARD READER'
     1640 F2 87 04              3978        J     SCK550                     SET PSR AND EAT
                                3979 *
     1643 3C 38 03CD            3980 SCK500 MVI   $CAERR,@@E241             SET ERR CODE-CRT NOT ON SYSTEM
                                3981 *
     1647 C2 02 160A            3982 SCK550 LA    SCKDEV,@XR                INCR XR TO AVOID SYNTAX ERROR
     164B C0 87 0FC9            3983        B     SCKERR                    RETURN TO CALLING PROGRAM
                                3984 *
                                3985 *            READY CRT
                                3986 *
     164F 3A 08 03D2            3987 SCK600 SBN   $IOIND,$CMDKY             SET CMND KEYS ONLY INDR ON
                                3988 *                                      SCKCL LITE
     1653 0E 00 165B 043B       3989 SCKCL0 ALC   SCKCL1+@D1(1),$EXFTR      CALCULATE ENTRY ADDRESS
     1659 C0 87 2200            3990 SCKCL1 B     $$PYCD                    CLEAR CRT / LIGHT CMND INDRS
     165D 0F 00 165B 043B       3991        SLC   SCKCL1+@D1(1),$EXFTR      INITIALIZE ENTRY ADDRESS

     1663 C0 87 0890            3993        B     $$PRES                    ENABLE KEYBOARD ENTRY TO DEPRES
                                3994 *
     1667 C0 87 0000            3995 SCK650 B     *-*                       RETURN TO CALLING PROGRAM
                           166B 3996 SCKEND EQU   *                         END OF ROUTINE
```

```
                            3998 *         PATCH
                            3999 *********************************************************************
                            4000 * PATCH AREA 1
                            4001 *********************************************************************
                            4002 *
                            4003 * CALCULATE AREA LEFT IN THIS SECTOR
                            4004 *
          166B              4005 $$$$L1 EQU   *                      START OF PATCH AREA 1
     1700                   4006        ORG   *,256,0                SET LOC CNTR TO NEXT SECTOR
          1700 4007 $$$$T1 EQU   *                      DEFINE ADDR OF SCTR BNDRY
     166B                   4008        ORG   $$$$L1                 SET LOC CNTR TO START OF
                            4009 *                             * PATCH AREA
     166B              16FF 4010 $$$$$1 DS    CL($$$$T1-$$$$L1)      PATCH AREA
                            4011 *** END OF EXPANSION ***


                            4013 *         PATCH 256,2
                            4014 *********************************************************************
                            4015 * PATCH AREA 2
                            4016 *********************************************************************
     1700              17FF 4017 $$$$$2 DS    CL256                  PATCH AREA FOR PROGRAM
                            4018 *** END OF EXPANSION ***
```

DLPRNT - LIST OUTPUT INTERFACE

                         1800 4020 GRTEXT EQU   *   LEFT BYTE OF GRTEXT FOR GRABIT
                         1900 4021 DLIBUF EQU   GRTEXT+@SCTSZ   BUFFER FOR DLPRNT--222 BYTES
                         1A00 4022 KHEBUF EQU   DLIBUF+@SCTSZ   BUFFER FOR SECTOR 2 - CYLINDER 0
                         1B00 4023 KHETAB EQU   KHEBUF+@SCTSZ   BUFF FOR KEYWORD TABLE--4 SECTOR
                         1C00 4024 KHETBB EQU   KHETAB+@SCTSZ   ADDRESS FOR REFILLING BUFFER
                         1EFF 4025 KHENDK EQU   KHETAB+4*@SCTSZ-1   LAST BYTE OF KEYWORD TABLE
                              4026 * LARGE BUFFER FOR GRABIT--LOCATED IN CORE BEHIND PATCH AREA--4 SECTORS
                         1B00 4027 GRBFR1 EQU   KHEBUF+@SCTSZ
                         FFFF 4028   END

TOTAL STATEMENTS IN ERROR IN THIS ASSEMBLY =   0

SYMBOL	LEN	VALUE	DEFN	REFERENCES	VER 15, MOD 00 23/05/20 PAGE 47
$$$$$$	001	0C00	2166		
$$$$$1	149	16FF	4010		
$$$$$2	256	17FF	4017		
$$$$L1	001	166B	4005	4008 4010	
$$$$T1	001	1700	4007	4010	
$$$CMD	001	0020	1402		
$$$DAT	001	0040	1401		
$$$EPL	001	0091	1398		
$$$ERN	001	0080	1452		
$$$FUN	001	0010	1403		
$$$NLN	001	00A0	1448		
$$$STD	001	0081	1397		
$$$001	015	0C59	2347		
$$BNLN	001	0605	1378	1380	
$$CDBS	001	08C0	1428		
$$CDND	001	0666	1387		
$$CDRD	001	0890	1426	1428	
$$CKEY	001	0603	1376		
$$CKFF	001	0B3D	1408		
$$COFF	001	0B44	1407	3486	
$$CSNS	001	209C	1437		
$$DATB	001	0BBF	1409		
$$EOSA	001	0AFE	1406		
$$ERSK	001	1C00	1447		
$$FITS	001	1D00	1455		
$$FLIB	001	06FF	1454		
$$ILEN	001	0601	1372	1374 1378	
$$ILHD	001	0600	1370	1372	
$$INLN	001	0607	1385	1387 1389 2611 2615	
$$INND	001	06FA	1389	2610* 2611 2611 2611*	
$$KBDT	001	09E1	1396	1400	
$$KBSN	001	09E2	1400	1405	
$$KLD1	001	0600	1460		
$$KLD2	001	0700	1462		
$$KLD3	001	0C00	1464		
$$LPOS	001	09EB	1405		
$$PCNT	001	07E9	1421	3602*	
$$PLYN	001	2004	1435	3455	
$$PRES	001	0890	1394	1396 1406 1407 1408 1409 1426 2612 3993	
$$PRFL	001	2143	1439		
$$PRNT	001	0707	1415	1416 1420 1421 3492 3494 3502 3559 3599 3603	
$$PRTN	001	0782	1416		
$$PSIO	001	07CE	1420	3590* 3601*	
$$PYCD	001	2200	1441	3990	
$$PYMP	001	2000	1433	1435 1437 1439 1441	
$$SLIB	001	1C00	1450		
$$TPCD	001	0606	1380	1385	
$$UPAR	001	0602	1374	1376	
$$WSPB	001	1E00	1453		
$$XIND	001	06FF	1451	1454	
$$ZERO	001	0000	0967	0968 0970 0971 0972 0976 1433	
$#TALT	001	0075	1480		
$#TBIS	001	00FC	1492		
$#TCET	001	0069	1479		
$#TCYL	001	005C	1478		
$#THAD	001	00F2	1484	2470	

```
                              CROSS REFERENCE

SYMBOL   LEN VALUE DEFN   REFERENCES                           VER 15, MOD 00  23/05/20  PAGE  48

$#THEL   001  0004 1504   2436   2466
$#THVT   001  00F0 1483
$#TIDR   001  00FF 1494   2436   2466
$#TLAD   001  00FE 1493
$#TLBL   001  0008 1475
$#TLIB   001  00F8 1489
$#TLIF   001  0010 1502
$#TLSZ   001  00F7 1488
$#TOID   001  005B 1477
$#TPAD   001  00F6 1487
$#TPFL   001  0008 1503
$#TPSZ   001  00F4 1486
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$#TVTC   001  000A 1476
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$LPRIO   001  03E9 1239
$LPROS   001  03E5 1234   1236
$LPRP3   001  03E4 1233   1234
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$NEXTL   001  03E7 1237   1238
$NOENB   001  0008 1175
$NOLST   001  0004 0999
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$NWRKR   001  0040 1185
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$PLST2   001  045B 1272   1273
$PLST3   001  0462 1273   1274
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$TRVAR  001  0020 1064
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$XPREC  001  0040 1065
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SYMBOL  LEN VALUE DEFN   REFERENCES                         VER 15, MOD 00  23/05/20  PAGE  53

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SYMBOL  LEN VALUE DEFN   REFERENCES                         VER 15, MOD 00  23/05/20  PAGE  54

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#$@SFO	001	0003	1997	
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#$@UDE	001	000E	2065	
#$@UDI	001	0008	2069	
#$@UEX	001	000E	1953	
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#$ZLBM  001  2008 2119
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#$ZLVR  001  20B0 2135
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##DUEF  001  000B 0874
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SYMBOL	LEN	VALUE	DEFN	REFERENCES	VER 15, MOD 00 23/05/20 PAGE 58
##DUEH	001	002B	0879		
##DUEI	001	000C	0875		
##DUEL	001	000F	0877		
##DUEN	001	0007	0872		
##DUER	001	0031	0880		
##DUES	001	000D	0876		
##DUE1	001	000C	0871		
##DUHA	001	0001	0867		
##DUHB	001	0003	0868		
##DUHC	001	0004	0869		
##DUHR	001	000B	0870		
##LAAA	001	0002	0899		
##LAHC	001	0001	0898		
##LN	001	0001	0927		
##LNE	001	0006	0933		
##LNEF	001	0002	0931		
##LNEZ	001	0002	0932		
##LNH	001	0004	0930		
##LNHY	001	0001	0928		
##LNHZ	001	0002	0929		
##LP	001	0004	0903		
##LPE	001	000C	0908		
##LPEN	001	0008	0905		
##LPEZ	001	0002	0906		
##LPH	001	0004	0907		
##LPHZ	001	0003	0904		
##LU	001	0002	0912		
##LUE	001	0032	0923		
##LUED	001	0003	0920		
##LUEF	001	0002	0916		
##LUEH	001	0019	0921		
##LUEI	001	0001	0917		
##LUEL	001	0002	0919		
##LUEN	001	0008	0915		
##LUES	001	0001	0918		
##LUEZ	001	0006	0922		
##LUH	001	000C	0914		
##LUHZ	001	0007	0913		
##MNHM	001	002A	0956		
##MPHM	001	0055	0941		
##MUEG	001	0020	0948		
##MUEK	001	0040	0947		
##MUEP	001	0080	0946		
##MUER	001	0008	0950		
##MUEV	001	0002	0952		
##MUEX	001	0010	0949		
##MUE0	001	0004	0951		
##MUHM	001	000A	0945		
##RN	001	0000	0847		
##RP	001	0001	0848		
##R1	001	0007	0850		
##R2	001	0005	0849		
#KHELP	001	0000	0001		
@@E001	001	0000	0749	0751	
@@E003	001	0001	0751	0753	
@@E004	001	0002	0753	0755	

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                                  CROSS REFERENCE

SYMBOL   LEN VALUE DEFN   REFERENCES                        VER 15, MOD 00  23/05/20  PAGE  59

@@E005   001  0003 0755   0757
@@E006   001  0004 0757   0759
@@E007   001  0005 0759   0761
@@E008   001  0006 0761   0763
@@E009   001  0007 0763   0765
@@E010   001  0008 0765   0767
@@E011   001  0009 0767   0769
@@E012   001  000A 0769   0771
@@E013   001  000B 0771   0773
@@E014   001  000C 0773   0775
@@E015   001  000D 0775   0777
@@E016   001  000E 0777   0779
@@E017   001  000F 0779   0781
@@E018   001  0010 0781   0783
@@E019   001  0011 0783   0785
@@E020   001  0012 0785   0787
@@E021   001  0013 0787   0789
@@E023   001  0014 0789   0791
@@E024   001  0015 0791   0793
@@E025   001  0016 0793   0795
@@E026   001  0017 0795   0797
@@E027   001  0018 0797   0799
@@E028   001  0019 0799   0801
@@E029   001  001A 0801   0803
@@E030   001  001B 0803   0805
@@E031   001  001C 0805   0807
@@E032   001  001D 0807   0809
@@E035   001  001E 0809   0811
@@E036   001  001F 0811   0813
@@E037   001  0020 0813   0815
@@E038   001  0021 0815   0817
@@E039   001  0022 0817   0819
@@E040   001  0023 0819   0821
@@E041   001  0024 0821   0823
@@E042   001  0025 0823   0825
@@E043   001  0026 0825   0827
@@E044   001  0027 0827   0829
@@E045   001  0028 0829   0831
@@E046   001  0029 0831   0833
@@E060   001  002A 0833   0835
@@E080   001  002B 0835
@@E100   001  0000 0221   0223
@@E101   001  0001 0223   0225
@@E102   001  0002 0225   0227
@@E103   001  0003 0227   0229
@@E110   001  0004 0229   0231   3286
@@E112   001  0005 0231   0233
@@E113   001  0006 0233   0235
@@E114   001  0007 0235   0237
@@E115   001  0008 0237   0239
@@E116   001  0009 0239   0241
@@E117   001  000A 0241   0243
@@E120   001  000B 0243   0245
@@E122   001  000C 0245   0247
@@E123   001  000D 0247   0249
@@E124   001  000E 0249   0251
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@@E129   001  000F 0251   0253
@@E130   001  0010 0253   0255  2658
@@E131   001  0011 0255   0257  2654  3924
@@E133   001  0012 0257   0259
@@E134   001  0013 0259   0261  3930
@@E135   001  0014 0261   0263
@@E136   001  0015 0263   0265  2656  3927
@@E137   001  0016 0265   0267
@@E138   001  0017 0267   0269  3742
@@E139   001  0018 0269   0271  2652
@@E142   001  0019 0271   0273
@@E143   001  001A 0273   0275
@@E150   001  001B 0275   0277
@@E151   001  001C 0277   0279
@@E160   001  001D 0279   0281
@@E162   001  001E 0281   0283
@@E163   001  001F 0283   0285
@@E164   001  0020 0285   0287
@@E200   001  0021 0287   0289
@@E205   001  0022 0289   0291  2662
@@E210   001  0023 0291   0293
@@E211   001  0024 0293   0295
@@E212   001  0025 0295   0297
@@E213   001  0026 0297   0299
@@E215   001  0027 0299   0301
@@E216   001  0028 0301   0303
@@E217   001  0029 0303   0305
@@E220   001  002A 0305   0307
@@E221   001  002B 0307   0309
@@E222   001  002C 0309   0311
@@E223   001  002D 0311   0313
@@E225   001  002E 0313   0315
@@E226   001  002F 0315   0317
@@E227   001  0030 0317   0319
@@E228   001  0031 0319   0321
@@E229   001  0032 0321   0323
@@E230   001  0033 0323   0325
@@E232   001  0034 0325   0327
@@E234   001  0035 0327   0329
@@E237   001  0036 0329   0331
@@E240   001  0037 0331   0333
@@E241   001  0038 0333   0335  3980
@@E242   001  0039 0335   0337
@@E248   001  003A 0337   0339  3976
@@E249   001  003B 0339   0341
@@E250   001  003C 0341   0343
@@E251   001  003D 0343   0345
@@E252   001  003E 0345   0347
@@E253   001  003F 0347   0349
@@E254   001  0040 0349   0351
@@E255   001  0041 0351   0353
@@E256   001  0042 0353   0355
@@E300   001  0043 0355   0357
@@E301   001  0044 0357   0359
@@E302   001  0045 0359   0361
@@E303   001  0046 0361   0363
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SYMBOL	LEN	VALUE	DEFN	REFERENCES	
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@@E305	001	0048	0365	0367	
@@E308	001	0049	0367	0369	
@@E310	001	004A	0369	0371	
@@E315	001	004B	0371	0373	
@@E316	001	004C	0373	0375	
@@E320	001	004D	0375	0377	
@@E325	001	004E	0377	0379	
@@E330	001	004F	0379	0381	2660
@@E335	001	0050	0381	0383	
@@E338	001	0051	0383	0385	
@@E340	001	0052	0385	0387	
@@E350	001	0053	0387	0389	
@@E351	001	0054	0389	0391	
@@E352	001	0055	0391	0393	
@@E360	001	0056	0393	0395	
@@E361	001	0057	0395	0397	
@@E362	001	0058	0397	0399	
@@E371	001	0059	0399	0401	
@@E380	001	005A	0401	0403	
@@E390	001	005B	0403	0405	
@@E400	001	005C	0405	0407	
@@E410	001	005D	0407	0409	
@@E415	001	005E	0409	0411	
@@E417	001	005F	0411	0413	
@@E420	001	0060	0413	0415	
@@E430	001	0061	0415	0417	
@@E432	001	0062	0417	0419	
@@E433	001	0063	0419	0421	
@@E450	001	0064	0421	0423	
@@E451	001	0065	0423	0425	
@@E460	001	0066	0425	0427	
@@E461	001	0067	0427	0429	
@@E464	001	0068	0429	0431	
@@E465	001	0069	0431	0433	
@@E466	001	006A	0433	0435	
@@E467	001	006B	0435	0437	
@@E469	001	006C	0437	0439	
@@E470	001	006D	0439	0441	
@@E471	001	006E	0441	0443	
@@E473	001	006F	0443	0445	
@@E474	001	0070	0445	0447	
@@E475	001	0071	0447	0449	
@@E476	001	0072	0449	0451	
@@E477	001	0073	0451	0453	
@@E478	001	0074	0453	0455	
@@E479	001	0075	0455	0457	
@@E480	001	0076	0457	0459	
@@E481	001	0077	0459	0461	
@@E482	001	0078	0461	0463	
@@E483	001	0079	0463	0465	
@@E484	001	007A	0465	0467	
@@E485	001	007B	0467	0469	
@@E486	001	007C	0469	0471	
@@E487	001	007D	0471	0473	
@@E488	001	007E	0473	0475	

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@@E489   001   007F 0475    0477   2665
@@E490   001   0080 0477    0479
@@E491   001   0081 0479    0481
@@E492   001   0082 0481    0483
@@E493   001   0083 0483    0485
@@E494   001   0084 0485    0487
@@E495   001   0085 0487    0489
@@E496   001   0086 0489    0491
@@E497   001   0087 0491    0493
@@E498   001   0088 0493    0495
@@E500   001   0089 0495    0497
@@E501   001   008A 0497    0499
@@E530   001   008B 0499    0501
@@E531   001   008C 0501    0503
@@E535   001   008D 0503    0505
@@E540   001   008E 0505    0507
@@E541   001   008F 0507    0509
@@E542   001   0090 0509    0511
@@E543   001   0091 0511    0513
@@E544   001   0092 0513    0515
@@E545   001   0093 0515    0517
@@E546   001   0094 0517    0519
@@E547   001   0095 0519    0521
@@E548   001   FFFF 0725
@@E549   001   0096 0521    0523   3967
@@E550   001   0097 0523    0525   2826
@@E551   001   0098 0525    0527   2821   2987
@@E552   001   0099 0527    0529
@@E553   001   009A 0529    0531
@@E554   001   009B 0531    0533
@@E555   001   009C 0533    0535
@@E556   001   009D 0535    0537
@@E558   001   009E 0537    0539
@@E570   001   009F 0539    0541
@@E571   001   00A0 0541    0543
@@E572   001   00A1 0543    0545
@@E573   001   00A2 0545    0547
@@E574   001   00A3 0547    0549
@@E575   001   FFFF 0727
@@E578   001   00A4 0549    0551   2581
@@E579   001   FFFF 0729
@@E580   001   FFFF 0731
@@E585   001   00A5 0551    0553
@@E595   001   FFFF 0733
@@E597   001   FFFF 0735
@@E598   001   FFFF 0737
@@E600   001   00A6 0553    0555
@@E601   001   00A7 0555    0557
@@E602   001   00A8 0557    0559
@@E603   001   00A9 0559    0561
@@E604   001   00AA 0561    0563
@@E606   001   00AB 0563    0565
@@E607   001   00AC 0565    0567
@@E608   001   00AD 0567    0569
@@E609   001   00AE 0569    0571
@@E610   001   00AF 0571    0573
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@@E611  001  00B0 0573   0575
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@@E613  001  00B2 0577   0579
@@E614  001  00B3 0579   0581
@@E700  001  00B4 0581   0583
@@E701  001  00B5 0583   0585
@@E710  001  00B6 0585   0587
@@E712  001  00B7 0587   0589
@@E713  001  00B8 0589   0591
@@E714  001  00B9 0591   0593
@@E715  001  00BA 0593   0595
@@E716  001  00BB 0595   0597
@@E717  001  00BC 0597   0599
@@E718  001  00BD 0599   0601
@@E720  001  00BE 0601   0603
@@E721  001  00BF 0603   0605
@@E723  001  00C0 0605   0607
@@E724  001  00C1 0607   0609
@@E725  001  00C2 0609   0611
@@E726  001  00C3 0611   0613
@@E727  001  00C4 0613   0615
@@E728  001  00C5 0615   0617
@@E729  001  00C6 0617   0619
@@E730  001  00C7 0619   0621
@@E732  001  00C8 0621   0623
@@E752  001  00C9 0623   0625
@@E753  001  00CA 0625   0627
@@E754  001  00CB 0627   0629
@@E755  001  00CC 0629   0631
@@E756  001  00CD 0631   0633
@@E757  001  00CE 0633   0635
@@E758  001  00CF 0635   0637
@@E759  001  00D0 0637   0639
@@E760  001  00D1 0639   0641
@@E761  001  00D2 0641   0643
@@E762  001  00D3 0643   0645
@@E763  001  00D4 0645   0647
@@E764  001  00D5 0647   0649
@@E765  001  00D6 0649   0651
@@E766  001  00D7 0651   0653
@@E767  001  00D8 0653   0655
@@E768  001  00D9 0655   0657
@@E769  001  00DA 0657   0659
@@E770  001  00DB 0659   0661
@@E771  001  00DC 0661   0663
@@E772  001  00DD 0663   0665
@@E773  001  00DE 0665   0667
@@E774  001  00DF 0667   0669
@@E775  001  00E0 0669   0671
@@E776  001  00E1 0671   0673
@@E777  001  00E2 0673   0675
@@E778  001  00E3 0675   0677
@@E779  001  00E4 0677   0679
@@E780  001  00E5 0679   0681
@@E781  001  00E6 0681   0683
@@E782  001  00E7 0683   0685
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                              CROSS REFERENCE

SYMBOL  LEN VALUE DEFN   REFERENCES                        VER 15, MOD 00  23/05/20  PAGE  64

@@E783  001  00E8 0685   0687
@@E784  001  00E9 0687   0689
@@E785  001  00EA 0689   0691
@@E786  001  00EB 0691   0693
@@E790  001  00EC 0693   0695
@@E791  001  00ED 0695   0697
@@E792  001  00EE 0697   0699
@@E793  001  00EF 0699   0701
@@E794  001  00F0 0701   0703
@@E795  001  00F1 0703   0705
@@E796  001  00F2 0705   0707
@@E797  001  00F3 0707   0709
@@E798  001  00F4 0709   0711
@@E800  001  FFFF 0739
@@E801  001  FFFF 0741
@@E802  001  FFFF 0743
@@E803  001  FFFF 0745
@@E804  001  FFFF 0747
@@E900  001  00F5 0711   0713
@@E901  001  00F6 0713   0715
@@E902  001  00F7 0715   0717
@@E903  001  00F8 0717   0719
@@E905  001  00F9 0719   0721
@@E906  001  00FA 0721   0723
@@E910  001  00FB 0723
@@M210  001  0C0A 2337   2628
@@T210  001  0C0E 2341   2339
@ALTFL  001  0001 1543
@ARR    001  0008 0016   2457  2802  2906  3113* 3114  3115* 3116  3284  3427* 3428  3429* 3430
                         3708  3710* 3711  3864  3955
@ASIGN  001  007C 0071
@ASTER  001  005C 0069
@BCRDL  001  0050 0088
@BE     001  0081 0043
@BF     001  0090 0052
@BH     001  0084 0041
@BKSPC  001  0010 1639
@BL     001  0082 0042
@BLANK  001  0040 0065   2406  2610  3289  3295  3509  3623
@BM     001  0082 0054
@BNE    001  0001 0046   3280
@BNH    001  0004 0044
@BNL    001  0002 0045
@BNM    001  0002 0057
@BNOL   001  0020 0050
@BNOZ   001  0008 0049
@BNP    001  0004 0056
@BNZ    001  0001 0058
@BOL    001  00A0 0048
@BOZ    001  0088 0047
@BP     001  0084 0053
@BR     001  0001 0013   2354  2355* 2358  2366  2383  2391  2395  2399  2402  2402  2403  2408
                         2409  2414  2419  2425  2427  2441  2445  2449  2451  2452  2453  2471
                         2481  2481  2486  2487  2488  2489  2496  2498  2501  2502  2503  2503
                         2504  2506  2509  2510  2512  2534  2535  2536  2537  2537  2538  2538
                         2540  2540  2541  2541  2542  2542  2546  2562  2562  2563  2564  2565
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                          2584   2618   2618   2622   2622   2623   2624   2635   2635   2636   2636   2637
                          2637   2638   2638   2645   2663   2798   2800   2801*  2803   2808   2810   2816
                          2817   2818   2818   2819   2820   2820   2821   2824   2826   2827   2827   2830
                          2831   2832   2832   2839   2841   2842   2848*  2852   2854   2857   2858   2859
                          2867   2872   2875   2876   2877   2878   2884   2885   2888   2889   2890   2891
                          2895   2895   2900   2900   2901   2902   2906   2910   2915   2916   2916   2917
                          2918   2921   2922   2923   2923   2926   2997   2997   2999   2999   3001   3001
                          3004   3004   3005   3005   3008   3009   3101   3110   3112*  3113   3114   3115
                          3116   3118   3119   3119   3120   3121   3121   3123   3123   3124   3125   3125
                          3129   3129   3130   3134   3134   3135   3137   3137   3138   3138   3139   3139
                          3140   3140   3141   3141   3147   3148   3149   3149   3150   3155   3155   3156
                          3156   3158   3158   3164*  3422   3424   3425*  3426   3427   3429   3430   3432
                          3433   3434   3444   3444   3457   3459   3463   3464   3466   3467   3467   3468
                          3468   3469   3470   3474   3475   3480   3480   3481   3481   3482   3484   3484
                          3497   3499   3500   3504   3504   3505   3505   3506   3507   3511   3511   3512
                          3512   3513   3513   3514   3514*  3515   3517*  3556   3558*  3562   3563   3564
                          3564   3565   3566   3566   3568   3568   3569   3569   3570   3570   3571   3571
                          3577   3577   3580   3580   3581   3581   3583   3583   3591   3592   3593   3593
                          3597   3606   3607*  3608   3609   3611   3612*  3613   3614   3614   3616   3617
                          3617   3620   3620   3621   3621   3622   3625   3625   3626   3627   3627   3628
                          3707   3714*  3729   3730   3730*  3748*
@BT       001 0010 0051
@BZ       001 0081 0055
@BZ37B    001 00F2 1652
@B1       001 0001 0063    2386   2646   2932   3709   3718   3721   3726   3729   3730
@CADDR    001 0002 0142    2339   2439   2443   2447   2470   2503   2504   2556   2562   2564   2565   2583
                          2607   2619   2623   2635   2708   2714   2715   2724   2725   2726   2727   2732
                          2737   2742   2743   2744   2827   2867   2895   2999   3005   3119   3444   3617
                          3620
@CARDL    001 0060 0087    1387
@CC37B    001 0000 1648
@CD37B    001 00F0 1666
@CHARA    001 00C1 0072
@CHARF    001 00C6 0073
@CHARR    001 00D9 0074
@CHARZ    001 00E9 0075
@CKY01    001 0001 1601
@CKY02    001 0002 1602
@CKY03    001 0003 1603
@CKY04    001 0004 1604
@CKY05    001 0005 1605
@CKY06    001 0006 1606
@CKY07    001 0007 1607
@CKY08    001 0008 1608
@CKY09    001 0009 1609
@CKY10    001 000A 1610
@CKY11    001 000B 1611
@CKY12    001 000C 1612
@CKY13    001 000D 1613    3535
@CKY14    001 000E 1614
@CKY15    001 000F 1615
@CKY16    001 0010 1616
@CLOFF    001 0010 0094
@CLON     001 0011 0093
@CMLON    001 0001 1619    3459*
@CMOFF    001 0000 1618    3463*
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@COMMA  001  006B 0066   3291
@CPLUS  001  004E 0079
@CP37B  001  0004 1679
@CRERR  001  0090 1634
@CRPRY  001  0004 1638
@CRTDS  001  0092 1631
@CRTQ   001  0090 1633
@CURSR  001  0040 1635
@DADDR  001  0002 0140   2471  2538  2541  2546  2553  2716  2717  2818  3118  3183
@DBFR1  001  0004 0129
@DBFR2  001  0005 0130
@DBUSY  001  0002 1537
@DCALK  001  0001 0081
@DCBCY  001  0009 0115
@DCBT1  001  0050 0117
@DCFLN  001  0004 1521
@DCNT   001  0003 0128
@DCRID  001  0001 1535
@DCST1  001  0040 0116
@DCTRL  001  0000 0125
@DCTRW  001  0000 1534
@DCWID  001  0001 1531
@DCYL   001  0001 0126   3123*
@DCYMV  001  0001 1522
@DD2    001  0003 0030   2489* 3511* 3512* 3513
@DEFLG  001  0002 1544
@DERCE  001  0020 1574
@DERD2  001  0008 1567
@DEREQ  001  0010 1566
@DERIN  001  0040 1564
@DERMA  001  0020 1565
@DERNR  001  0004 1568
@DERR   001  0000 1538
@DERSC  001  0001 1570
@DERTC  001  0002 1569
@DFCR   001  0006 1524
@DFDR   001  0004 1525
@DGET   001  0001 0134   2752  2760  2768  2777  2938
@DHARD  001  0000 1552
@DLNCT  001  000F 1637
@DLNLG  001  0040 1636
@DOLAR  001  005B 0068
@DOP2   001  0004 0028   3114* 3118* 3119* 3181  3182  3616* 3617* 3620*
@DPLNG  001  0006 0132   3120  3179
@DPOS   001  0000 0133
@DPUT   001  0002 0135   2930
@DREAD  001  0001 1528
@DSAD   001  0002 0127   2365* 2440* 2444* 2448* 2522* 2546* 3121* 3125* 3129  3130* 3134* 3137*
                        3141  3147* 3155* 3158* 3180
@DSBCY  001  0004 0106
@DSBSY  001  0092 1632
@DSCS1  001  0000 0107
@DSEEK  001  0000 1527
@DSIVF  001  0003 0138
@DSPIN  001  0002 0131
@DTRSZ  001  0018 0085
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@DUNSF  001  0080 1563
@DVBCY  001  0007 0108
@DVERY  001  0003 1533
@DVRFY  001  0031 0136
@DVST1  001  0002 1539
@DVST2  001  0003 1540
@DWAIT  001  00FF 0137
@DWBCY  001  0005 0103
@DWRIT  001  0002 1529
@DWSIZ  001  00C0 0105
@DWTB1  001  0003 0104
@DZERO  001  00F0 0064
@D1     001  0002 0026  2409* 2488* 3513* 3989* 3991*
@EOF    001  001C 0077  2870
@EOFTC  001  0075 0162  2971
@EOS    001  001E 0076  2416  2426  2641  3297  3724  3893
@ER37B  001  00F0 1653
@FDDBC  001  0000 0195
@FDE1   001  000C 0200
@FDFNA  001  000B 0198
@FDHLN  001  0002 0208
@FDLNC  001  0002 0193
@FDNSC  001  0003 0210
@FDSD   001  0000 0206
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@FLDIN  001  0012 1626
@FLENT  001  0004 0201
@FLFNA  001  0002 0199
@FLHLN  001  0002 0209
@FLLNC  001  0002 0194
@FLNSC  001  0001 0211
@FLSD   001  0001 0207
@HDRLN  001  0007 0092  1415
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@HSTEN  001  0007 1549
@HSTPE  001  0006 1548
@HSTQR  001  0001 1546
@HSTSN  001  0005 1547
@HSTVI  001  000F 1551
@IAR    001  0010 0017
@ID37B  001  0040 1689
@INDEX  001  0001 0156  0157  3542
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@INST4  001  0004 0033
@INST5  001  0005 0034
@INST6  001  0006 0035
@IP37B  001  00C0 1688
@I1IAR  001  00C0 0020
@KCMDK  001  0020 1600
@KELOK  001  001B 1599
@KENAB  001  001E 1597
@KEXIT  001  001F 1598
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@KFUNK  001  0010 1620
@KHARD  001  0011 1625
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@LO37B  001  00F0 1657
@MAPEN  001  0005 0089
@MINCR  001  2000 0083
@MINUS  001  0060 0080
@NOP    001  0080 0040   2367  2383  2480  2875  3160  3462  3466  3561  3713  3896  3937
@NORFL  001  0000 1545
@NTRDY  001  00A0 1681
@NUMBR  001  007B 0070
@OPD2   001  0004 0029
@OP1    001  0003 0027   2385* 2390  2400  2457* 2619* 2623* 2700  2846* 2849  2851  2898  2928
                         3110* 3116* 3284* 3424* 3426* 3428* 3430* 3444* 3450  3707* 3708* 3709*
                         3711* 3864* 3865* 3955*
@OP2    001  0005 0031
@OVRUN  001  0004 1575
@PBUSY  001  00E2 1587
@PCAR   001  00E6 1584
@PCNT   001  0003 1519
@PCTRL  001  0000 0149   3457  3497  3597*
@PCYL   001  0001 1517
@PC37B  001  00F2 1673
@PDAR   001  00E4 1583
@PDATA  001  0003 0151   3432  3432* 3514
@PD37B  001  0080 1687
@PERR   001  00E0 1590
@PFLAG  001  0000 1516
@PFORM  001  00E1 1588
@PGCSZ  001  0020 0082   0083
@PLITE  001  00E2 1589
@PLNGH  001  0004 1580
@PMGCK  001  0020 1591
@PN37B  001  00F0 1672
@PPLNG  001  0004 0148   3432  3541
@PRCNT  001  0001 0150   2597* 3499* 3504  3504* 3505  3505* 3511  3564  3566  3568  3570* 3577
                         3580* 3583* 3591* 3592* 3593* 3627*
@PRETR  001  00C0 0154   2337  2596  2793
@PRINT  001  0040 0152   0154  3597
@PRITY  001  0080 1624
@PSAD   001  0002 1518
@PSIOQ  001  00E0 1586
@PSIOR  001  0000 1585
@PSNSQ  001  00E2 1592
@PSR    001  0004 0015   3741* 3878* 3919* 3933*
@PWAIT  001  00FF 0158   3457  3497  3500  3506
@P1IAR  001  0020 0018
@P2IAR  001  0040 0019
@Q      001  0001 0024   2367* 2384* 2479  2479* 2486* 2487* 2821* 2826* 2872* 2875* 2888* 2894
                         3161  3303  3464* 3466* 3713* 3734* 3753  3883* 3937*
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@REGL   001  0002 0012
@RETRN  001  0080 0153   0154  3549
@RLDWN  001  004F 0159
@RTCNT  001  0003 1582
@RTRNC  001  0080 0161
@RT37B  001  0005 1680
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SYMBOL   LEN VALUE DEFN   REFERENCES                        VER 15, MOD 00  23/05/20  PAGE  69

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@SDF1    001 0001 0167   2973
@SDF2    001 0002 0168   2974
@SDF3    001 0003 0169
@SECCY   001 0030 0086
@SIST    001 0001 0181
@SKCTL   001 0000 1532
@SLASH   001 0061 0067
@SLAST   001 0002 0183   2886
@SMIDL   001 0003 0182
@SNSB0   001 0000 1556
@SNSB1   001 0001 1557
@SNSB2   001 0002 1558
@SNSB3   001 0003 1559
@SNULL   001 0080 0173   2844   2853
@SN37B   001 00F2 1661
@SONLY   001 0000 0180   2873
@SPINA   001 00A0 1541
@SPINB   001 00B0 1542
@STEXT   001 0007 0172
@STYPE   001 0006 0171   2969
@SYCNT   001 0002 1581
@TBCNT   001 0000 0160
@TBLEF   001 0010 0155   0157
@TBLIX   001 0011 0157
@TJ37B   001 0040 1678
@TYPAM   001 0002 1623
@TYPO    001 001C 1622
@UCB     001 0087 0039   2384   2431   2872   2883   2888   3281   3292   3464   3734   3883
@UPARW   001 005A 0078
@VADDR   001 0002 0141
@VENTA   001 0056 0113
@VMDDV   001 00FE 0114
@VMFD1   001 0000 0109
@VMFD2   001 0001 0110
@VMRS3   001 0002 0112
@VMTRL   001 0001 0111
@VOLID   001 0006 0091
@VQ      001 0001 0025   2510   3515
@WA37B   001 00FF 1686
@WSFIT   001 0500 0101
@WSTBL   001 0503 0102   2934
@XR      001 0002 0014   2356*  2357   2377   2385   2390*  2394*  2400*  2405   2405*  2406   2408   2412
                         2412*  2416   2418*  2426   2495*  2496   2500   2500*  2501   2502   2506   2510
                         2512*  2513   2513*  2521*  2534*  2535   2563   2615*  2620   2639   2639*  2641
                         2643*  2644*  2645   2663*  2807*  2816*  2817   2828   2831   2837   2839   2840
                         2840*  2844   2846   2847   2847*  2853   2855   2865   2866   2868   2873   2876
                         2877   2878   2879   2879*  2884   2886   2889   2890   2891   2892   2892*  2893
                         2897   2899   2899*  2915*  2917   2918*  2919   2922   3008*  3285   3288   3288*
                         3289   3291   3294   3294*  3295   3297   3299   3426   3431*  3432   3508*  3509
                         3510   3510   3515   3518*  3615*  3616   3618   3619   3619*  3623   3624   3624*
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                              3719   3722   3724   3729   3729*  3893
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DLPBLN    001 00F4 3631       3509*  3510   3510   3510*  3613
DLPBSD    001 1320 3439       3526   3527   3528
DLPBSE    004 132E 3450       3422   3425   3606   3607
DLPBS2    001 1411 3630       3556   3558   3611   3612
DLPCNT    001 140C 3530       3474*  3475   3484*  3531
DLPCRT    001 001B 3528       3901   3912   3918   3958
DLPEXT    002 133E 3455       3433*  3434*  3444
DLPK13    001 1410 3535       3459   3463
DLPLIN    001 140F 3534       3467   3480
DLPLPC    002 140E 3533       3467*  3468*  3480*  3481*
DLPMAX    001 000D 3536       3475
DLPMPR    001 0085 3526       3904   3907   3915   3961
DLPNDX    001 1419 3542       3604
DLPNPT    001 13A5 3489       3443   3448   3526
DLPNXT    001 141F 3546       3564*  3571*  3577   3581   3583   3627
DLPONE    002 141B 3543       3427   3429   3468   3481   3484   3512   3593   3620   3621   3625
DLPPNT    001 0001 3550       3590
DLPPRL    001 147B 3589       3573
DLPPRT    001 1423 3557       3501   3628
DLPREM    001 1420 3547       3613*  3614*  3625*
DLPRES    001 141C 3544       3565*  3568*  3569*  3571   3608   3614   3621*
DLPRNT    001 12F5 3423       2582   2585   2593   2598   2606
DLPRTN    001 1421 3548       3503   3505
DLPSPI    001 1320 3441       3527
DLPSPT    001 0000 3527       3438
DLPTIF    001 133B 3452       3528
DLPTYP    001 131F 3436       3437   3901   3904   3907*  3912   3915   3918*  3958   3961
DLPWK1    001 1411 3537       3500   3504*  3506   3511   3566   3568   3570*  3577   3580*  3583*  3591*  3592*
                              3593*  3597*  3600   3627*  3630
DLPWK2    001 1415 3540       3432*  3446   3456   3457   3493   3497   3499*  3504   3505*  3514   3564
DLPWTH    002 141E 3545       3562*  3563*  3566   3569   3570   3580   3581   3617
DLP100    004 130D 3431       3428*
DLP120    004 132B 3445       3444*  3450
DLP140    003 1347 3459       3470
DLP160    003 1351 3462       3464*  3466*
DLP180    003 135D 3466       3462
DLP200    004 1360 3467       3465
DLP220    004 1364 3468       3469
DLP240    004 136E 3471       3461
DLP260    003 137C 3475       3472
DLP280    003 1386 3479       3477
DLP300    004 138D 3481       3482
DLP320    004 1397 3484       3479
DLP340    003 139B 3485       3483
DLP360    004 139E 3486       3458
DLP380    004 13AC 3492       3507
DLP400    003 13BB 3497       3491
DLP420    003 13C4 3500       3498
DLP440    004 13D0 3504       3609
DLP460    004 13F8 3515       3511*  3512*  3513   3513*
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SYMBOL   LEN VALUE DEFN   REFERENCES                          VER 15, MOD 00  23/05/20  PAGE  71

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DLP500   004 1400 3518   3426*
DLP520   004 1408 3520   3430*
DLP540   006 1459 3572   3567
DLP560   003 148D 3597   3578  3582  3585
DLP580   005 14C4 3618   3616* 3617* 3620* 3622
DLP600   003 14D7 3623   3626
DL2C01   002 12A9 3173   3113  3115  3123
DL2C05   002 12AB 3174   3119
DL2C48   001 12A5 3171   3121  3125
DL2DPL   006 12B1 3179   3120*
DL2END   001 12B4 3184
DL2E01   001 0001 3103   3121  3123  3125  3129  3141  3149
DL2E02   001 0002 3104   3134  3137  3155
DL2E18   001 0018 3105   3135
DL2E60   001 0060 3106   3150
DL2E7C   001 007C 3108   3147
DL2ICS   001 121B 3109   2473  2517  2548  3002  3186
DL2K18   002 12A7 3172   3138
DL2K60   002 12A2 3169   3156
DL2K80   002 12A4 3170   3137  3155
DL2LST   001 12AC 3178   3121* 3123* 3125* 3129  3130* 3134* 3137* 3141  3147* 3155* 3158* 3163
                         3180
DL2PHY   001 12AE 3180
DL2RAD   002 12B3 3183   2470* 2471* 3134
DL2SAD   005 1233 3181   3141* 3148* 3149* 3150  3156* 3158
DL2SEC   005 123C 3182   3129* 3135  3138* 3139  3139* 3140  3140* 3149
DL2SWH   003 1291 3161
DL2TSD   001 0083 3107   3148
DL2000   001 121F 3111   3101  3112
DL2001   005 122F 3118   3114* 3181
DL2002   005 1238 3120   3118* 3119* 3182
DL2005   004 123D 3121   3124
DL2006   004 124B 3125   3122
DL2008   004 1268 3139   3136
DL2010   003 127E 3150
DL2100   004 128C 3158   3151
DL2110   003 1290 3160   3161
DL2900   004 1299 3164   3110* 3160
DL2910   004 129D 3165   3116*
DL4ICS   001 121B 3186   2924
GRABIT   001 106D 2799   2557  2567  2569
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GRABSE   004 1154 2981   2798  2801
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GRACFN   001 11CA 2930
GRACPL   001 11CA 2929
GRACSC   001 11CD 2935   2820* 2997* 3004*
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GRAEXA  001  0001 2967   2968   2969   2972   2973   2974
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GRATXT  002  11DD 2951   2867
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GRA140  003  10B9 2828
GRA150  004  10C6 2832   2829
GRA200  003  10CD 2837   2811
GRA210  004  10D3 2839   2812   2861
GRA220  003  10DA 2841   2881   2883
GRA230  004  10E9 2846   2838   2856   2860   2871
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GRA303  003  1136 2872   2869
GRA305  004  1142 2876   2874
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GRA700   004  11EF 2997   2911
GRA720   004  11FD 3001   2998
GRA730   004  1201 3002
GRA740   003  1215 3008   3000
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KHEADK   002  0FFE 2724   2504
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KHEAD2   002  0FFA 2722   2619
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KHEAR2   002  1004 2727   2447
KHEBLK   001  1069 2792   2594
KHEBNK   001  0FF8 2721   2795
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KHECTR   001  1044 2740   2536* 2537* 2540* 2542
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KHEDA2   001  0009 2694   2365  2366
KHEDA3   001  000A 2695   2448  2449
KHEDA4   001  000B 2696   2440  2441
KHEDCC   002  0FCE 2708   2521
KHEDEC   001  0008 2704   2366  2441  2445  2449
KHEDKD   002  0FDD 2717   2366* 2441* 2445* 2449* 2471
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KHEDSH   001  0060 2680   2357
KHEDSK   004  0D76 2700   2439* 2443* 2447*
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KHEGR4   001  0004 2682   2554  2754  2762
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KHELNH   001  0004 2692   2481  2482  2713  2736
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KHENC2  001  0002 2673    2412
KHENDK  001  1EFF 4025    2515   2724
KHENDT  001  00FF 2689
KHEONE  001  0001 2678    2794
KHEPAK  001  1007 2735    2510   2736
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KHEPPL  001  1065 2785    2596*  2597*  2599
KHEPRT  001  0000 2686    2574
KHEQTE  001  007D 2681    2377
KHESAV  002  1047 2742    2501*  2503*  2504   2635   2635*  2636*  2637*  2638*  2644
KHESCR  001  0100 2677
KHESCT  003  1042 2739    2538*  2541*  2542*  2546   2553   2562   2562*
KHESC1  001  0001 2702    2780
KHESC3  001  0300 2679    2708
KHESPK  001  1008 2733    2388   2408*  2735
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KHETCR  001  1045 2741    2618   2618*  2622*  2624   2636   2637   2638
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KHETST  001  1005 2731    2451   2498*
KHETXT  001  105F 2776    2365*  2370   2440*  2444*  2448*  2462
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KHEXXX  002  1007 2732    2502*  2503   2512
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KHE050  004  0C7E 2369
KHE100  004  0C84 2372    2364
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KHE200  003  0C92 2383    2384*  2394   2479
KHE220  004  0CB1 2392    2389
KHE230  005  0CBF 2399    2393
KHE250  004  0CCB 2402    2407
KHE300  005  0CCF 2403    2410
KHE350  003  0CD7 2405    2401
KHE370  004  0CE1 2408    2409*
KHE400  004  0CEE 2411    2404
KHE420  004  0D07 2418    2385*  2390   2400
KHE450  004  0D0E 2423    2378
KHE500  003  0D19 2426
KHE530  003  0D1F 2431    2367*  2417
KHE532  004  0D22 2433
KHE535  003  0D2C 2437
KHE540  006  0D33 2439    2431   2437   2468
KHE542  004  0D6F 2457    2442   2446   2450
KHE543  004  0D73 2458    2700
```

```
KHE544   004 0D8E 2468   2457* 2459  2499
KHE546   006 0D92 2470   2438  2467
KHE548   006 0DA3 2479
KHE550   003 0DA9 2480   2479*
KHE600   005 0DB4 2486   2480
KHE605   004 0DC8 2491
KHE607   003 0DE0 2500   2497
KHE610   003 0DE3 2501   2514  2528
KHE620   004 0E03 2510   2486* 2487* 2488* 2489* 2508
KHE630   003 0E0A 2512   2507
KHE640   006 0E14 2515   2505
KHE650   004 0E34 2533   2511
KHE660   004 0E3B 2535
KHE680   003 0E3F 2536   2648
KHE690   004 0E42 2537   2539
KHE700   004 0E5F 2548
KHE710   004 0E7F 2557
KHE715   003 0E8B 2563   2568
KHE720   004 0E9B 2567
KHE730   004 0EA3 2569   2566  2595  2600
KHE740   004 0EA7 2574   2601
KHE742   004 0ECD 2585   2577
KHE745   004 0ED7 2591   2575
KHE750   004 0EE8 2596   2592
KHE755   004 0EF2 2598
KHE757   004 0F00 2605   2579
KHE760   004 0F1C 2612   2631
KHE762   004 0F20 2613   2614
KHE765   004 0F34 2618
KHE770   005 0F3E 2620   2619* 2623* 2625
KHE775   004 0F58 2627   2642
KHE780   004 0F62 2635   2354  2355  2621
KHE800   004 0F98 2652   2358
KHE810   004 0F9F 2654   2419  2427
KHE830   004 0FA6 2656   2383
KHE840   004 0FAD 2658
KHE850   004 0FB4 2660   2395  2509
KHE860   004 0FBB 2662   2453  2663
KHE880   004 0FC5 2665   2452
KHE890   004 0FC9 2666   2667
SCACNT   002 12F4 3309   3299* 3300*
SCACOF   001 0087 3281
SCACOM   001 0001 3280   2359  2411  2616  3866
SCAINC   001 0001 3279   3288  3294
SCAMMA   003 12D1 3303   2359* 2411* 2616* 3866*
SCANIT   001 12B4 3283   2372  2413  2617  2640  3889
SCASVE   002 12F2 3308   3285* 3300
SCASV1   001 12F1 3307
SCA100   003 12C3 3288   3290
SCA200   003 12C6 3289   3287
SCA250   003 12D0 3292   3303
SCA300   003 12D3 3294   3296
SCA400   004 12E3 3299   3292
SCA500   004 12ED 3302   3284* 3298
SCKCCR   003 15FC 3947   3870
SCKCL0   006 1653 3989
```

```
SCKCL1  004  1659 3990   3989* 3991*
SCKCMP  007  1603 3948   3873
SCKDEV  001  160A 3954   2373   2533   2647   3982
SCKEND  001  166B 3996
SCKERR  004  0FC9 2667   2391   2414   2425   2584   2653   2655   2657   2659   2661   2664   2666   3983
SCKOUT  001  1566 3863   2423
SCK001  001  0003 3942   3870   3870   3884   3947
SCK002  001  0007 3943   3873   3873   3887   3948
SCK003  002  1605 3949   3878
SCK004  002  1607 3950   3919
SCK005  002  1609 3951   3933
SCK100  004  1589 3883   3871
SCK150  003  1593 3887   3874
SCK200  004  1596 3889   3885
SCK300  003  15A7 3896   3883* 3891   3937*
SCK350  004  15BF 3912   3896
SCK400  004  15D1 3919   3908
SCK410  004  15D8 3924   3894
SCK420  004  15DF 3927   3902   3916
SCK430  004  15E6 3930   3905   3913
SCK440  004  15EA 3932   3865* 3925   3928
SCK450  004  15F2 3937   3879   3920
SCK460  004  15F6 3938   3864*
SCK475  004  162E 3970   3959
SCK500  004  1643 3980   3971
SCK550  004  1647 3982   3968   3978
SCK600  004  164F 3987   3974
SCK650  004  1667 3995   3955* 3962   3965
SCSCNT  001  1560 3757   2392   2399   2403* 3712* 3726* 3732
SCSERR  002  1565 3760   3741
SCSFRC  001  00FF 3755   3744
SCSLNG  004  153C 3753   2386*
SCSPL1  002  1562 3758   3710   3726
SCSPL2  001  1563 3759   3709
SCSQUO  001  007D 3754   3715   3719   3722
SCSTRG  001  14EB 3706   2387
SCS005  004  1509 3714   3711*
SCS006  003  1513 3718   3735
SCS010  003  1525 3724   3720
SCS020  003  1531 3728   3713* 3734*
SCS025  004  153B 3732   3753
SCS029  004  1546 3735   3728   3733
SCS030  001  154A 3740   3716   3725
SCS040  003  1555 3744   3723
SCS050  004  1558 3748   3707* 3743
SCS051  004  155C 3749   3708* 3709*
```

TOTAL STATEMENTS IN ERROR IN THIS ASSEMBLY =   0

OL105 I   THE CODE LENGTH OF #KHELP IS 6144 DECIMAL.
OL103 I   TOTAL NUMBER OF LIBRARY SECTORS REQUIRED IS   16
          NAME-#KHELP,PACK-R1R1R1,UNIT-R1,RETAIN-P,LIBRARY-R,CATEGORY-000

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          OVERLAY LINKAGE EDITOR CORE USAGE MAP     23/05/20


 START     CATEGORY   NAME AND        CODE LENGTH
ADDRESS                 ENTRY      HEXADECIMAL DECIMAL

 0C00         0       #KHELP          1800     6144


OL100 I   THE TOTAL CORE USED BY #KHELP IS  6144 DECIMAL.
OL101 I   THE START CONTROL ADDRESS OF THIS MODULE IS 0C00.
OL104 I   TOTAL NUMBER OF LIBRARY SECTORS REQUIRED IS   25
          NAME-#KHELP,PACK-R1R1R1,UNIT-R1,RETAIN-P,LIBRARY-O
```