KG11-A

CYCLIC REDUND CHECK TEST

MD-11-DZKGA-B

EP-DZKGA-B-DL-B

FICHE 1 OF 1

APR 1977

digital

MADE IN USA

.REM %

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZKGA-B-D

PRODUCT NAME: KG11A - CYCLIC REDUNDANDCY CHECK TEST

DATE RELEASED: MARCH, 1977

MAINTAINER: DIAGNOSTIC GROUP

NOTE: REV. A OF THIS PROGRAM OBSOLETED MD-11-D8K

CONTENTS

ABSTRACT.

THIS PROGRAM TESTS THE LOGIC OF THE CYCLIC REDUNDANCY CHECK DEVICE (KG11A).

REQUIREMENTS.

A STANDARD PDP-11 (WITH OR WITHOUT A HARDWARE SWITCH REGISTER) AND A KG11

LOADING--STORAGE.

LOADING PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED.

DEVICE ADDRESS CHANGE.

TO CHANGE THE DEVICE ADDRESS (WHICH WAS LOADED AS 170700), CHANGE THE CONTENTS OF THE LOCATION "DEVADR" SHOWN ON PAGE 24/ SET THIS LOCATION TO THE ADDRESS OF THE CSR DESIRED, THEN START (OR RESTART) AS GIVEN IN OPERATION BELOW.

OPERATION.

1. THIS PROGRAM MAY BE OPERATED IN TWO MODES.

   A. FULL TEST MODE.
   THIS IS THE MAIN BODY OF THE PROGRAM AND SHOULD BE USED TO ACCEPT OR DIAGNOSE A DEVICE.
   TO RUN: START AT LOC. 200 WITH SWR15 SET.
   (DETAIL ON PAGE 5.)

   B. SELECT TEST MODE
   THIS IS A SUBPROGRAM TO ALLOW THE OPERATOR TO RUN A SELECT INSTRUCTION ON A SELECT DATA WORD.
   TO RUN: START AT LOC. 204 WITH SWR15 SET.
   SELECT INSTRUCTION ON SWR5-0.
   SELECT DATA WORD ON SWR11-6.
   (DETAIL ON PAGE 6.)

SWITCH REGISTER.

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

1) TYPE CONTROL G (↑G); THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:

   A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A (CR). (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)
   IF A (CR) IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

   B) IF A CONTROL U (↑U) IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

1. SWR15 SET, HALT ON ERROR.
   RESET, BYPASS ERROR.

2. SWR14 SET, SCOPE LOOP ON ERROR.
   RESET, BYPASS ERROR.

3. SWR13 SET, INHIBIT PRINTOUTS DURING SCOPE LOOP.
   RESET, ALLOW PRINTOUTS DURING SCOPE LOOP.

4. SWR12 SET, INHIBIT TRACE TRAPPING.
   RESET, ALLOW TRACE TRAPPING.

5. SWR11 SET, INHIBIT ITERATIONS.
   RESET, ALLOW ITERATIONS.

6. SWR11 - SWR6 AND SWR5 - SWR0 ARE DEFINED IN THE SELECT TEST MODE SECTION ON PG. 6 & 7.

FULL TEST MODE.

1. START OR RESTART.

   A. ZERO THE SWR

   B. LOAD 200 AND START

2. PROGRAM ACTION.

   A. WHENEVER THE PROGRAM IS STARTED, OR RESTARTED, THE TTY WILL TYPE: KG11A.

   B. IF THE SOFTWARE SWITCH REGISTER IS SELECTED THEN THE FOLLOWING WILL BE TYPED:
   SWR=XXXXXX NEW=(REFER TO SWITCH REGISTER SECTION FOR OPERATOR ACTIONS)

   C. IF THERE ARE NO ERRORS DETECTED, THE PROGRAM WILL LOOP INDEFINITELY AND WILL RING THE TTY BELL ONCE FOR EACH PASS. TRACE TRAP IS EFFECTIVE AND EACH SUBTEST IS BEING ITERATED 100 TIMES.

   D. IF AN ERROR OCCURS, A ONE LINE ERROR MESSAGE WILL BE TYPED ON THE TTY AND THE PROGRAM WILL HALT. (SEE THE ERROR SECTION ON PAGE 8.)

3. OPERATER CONTROL VIA THE SWR.

   (REFER TO SECTION ON SWITCH REGISTER SETTINGS FOR SOFTWARE SWITCH REGISTER.)

   A. SWR15 SET. (NORMAL)
   HALT ON ERROR AFTER ERROR MESSAGE IS TYPED.

   SWR15 RESET.
   TYPE THE ERROR MESSAGE AND CONTINUE TO THE NEXT ITERATION OF THE CURRENT TEST OR TO THE NEXT SUBTEST.

   B. SWR12 SET.
   INHIBIT TRACE TRAP.

   SWR12 RESET (NORMAL)
   ALLOW TRACE TRAP.

   C. SWR11 SET.
   INHIBIT ITERATIONS

   SWR11 RESET (NORMAL)
   ALLOW ITERATIONS

SELECT TEST MODE.

1. START OR RESTART.

A. RESET SWR15 THRU SWR0.

B. LOAD ADDRESS 204

C. SELECT THE INSTRUCTION TO BE TESTED FROM THE LIST OF INSTRUCTIONS ON PAGE NN OF THE PROGRAM LISTING. SET SWR5 THRU SWR0 TO THE "I" NUMBER GIVEN WITH SAID INSTRUCTION.

D. SELECT THE DATA WORD TO BE TESTED FROM THE LIST OF DATA WORDS GIVEN ON PAGES NN AND NN OF THE PROGRAM LISTING. SET SWR11 THRU SWR6 TO THE "D" NUMBER GIVEN WITH THE SAID DATA WORD.

E. START.

F. ****REFER TO SECTION ON SWITCH SETTINGS FOR SOFTWARE SWITCH REGISTER ACTION.

SPECIAL NOTES ON C. AND D. ABOVE.

1. THE SELECTED INSTRUCTION AND/OR THE SELECTED DATA MAY BE CHANGED WHILE THE PROGRAM IS RUNNING.
2. IF SWR11 THRU SWR6 ARE ALL RESET, THEN THE SELECTED INSTRUCTION WILL RUN ON ALL DATA WORDS.
3. IF SWR5 THRU SWR0 ARE ALL RESET THEN ALL INSTRUCTIONS WILL BE RUN ON THE SELECTED DATA WORD.
4. IF SWR11 THRU SWR6 AND SWR5 THRU SWR0 ARE ALL RESET, THEN ALL INSTRUCTIONS WILL BE RUN ON ALL DATA WORDS.

2. PROGRAM ACTION

A. IF THERE ARE NO ERRORS THE PROGRAM WILL LOOP THE SELECTED INSTRUCTION (SWR5-0) USING THE SELECTED DATA (SWR11-6). TRACE TRAP IS EFFECTIVE.

B. IF AN ERROR OCCURS, A ONE LINE ERROR MESSAGE WILL BE TYPED ON THE TTY AND THE PROGRAM WILL HALT. (SEE THE ERROR SECTION ON PAGE 8.)

(REFER TO SWITCH SETTING SECTION FOR USE OF SOFTWARE SWITCH REGISTER)

3. OPERATER CONTROL VIA THE SWR.

(REFER TO SECTION ON SWITCH SETTING'S FOR SOFTWARE SWITCH REGISTER DYNAMIC CHANGING.)

A SWR15 SET. (NORMAL)
HALT ON ERROR AFTER ERROR MESSAGE IS TYPED.

SWR15 RESET.
TYPE THE ERROR MESSAGE AND CONTINUE TESTING THE SELECTED INSTRUCTION (SWR5-0) USING THE SELECTED DATA (SWR11-6)

B. SWR12 SET.
INHIBIT TRACE TRAP.

SWR12 RESET. (NORMAL)
ALLOW TRACE TRAP.

C. SWR11 THRU SWR6.
SELECTED DATA WORD.

D. SWR5 THRU SR0.
SELECTED INSTRUCTION.

ERRORS

1. ERROR MESSAGE

***ROUTINE CHECKS FOR THE DYNAMIC CHANGING OF THE SOFTWARE SWITCH REGISTER REFER TO SWITCH SETTING SECTION FOR OPERATOR ACTION.
TESTX IXX DXX SXXXXXX HXXXXXX

TESTX (X = A OR B)
THIS IS THE NAME (TAG) OF THE TEST THAT WAS IN USE AT THE TIME OF THE ERROR.
TESTA IS ON PAGE 27 OF THE PROG. LIST.
TESTB IS ON PAGE 28 OF THE PROG. LIST.

IXX (XX = A NUMBER FROM 01 THRU 57)

THIS IS THE NAME/NUMBER (TAG) OF THE INSTRUCTION IN USE AT THE TIME OF THE ERROR.
R1 (INST. POINTER) POINTS AT THIS INSTRUCTION.
THE INSTRUCTION TABLE IS ON PAGE 18 OF THE PROG. LIST.

DXX (XX = A NUMBER FROM 01 THRU 77)

THIS IS THE NAME/NUMBER (TAG) OF THE DATA WORD IN USE AT THE TIME OF THE ERROR.
R2 (DATA WORD POINTER) POINTS AT THIS DATA WORD.
THE DATA WORD TABLE IS ON PG. 20 OF THE PROG. LIST.

SXXXXXX (XXXXXX = ANY 6 DIGIT, 16 BIT, OCTAL NUMBER)
THIS IS THE SIMULATED (GOOD) BCC WORD.

HXXXXXX (XXXXXX = ANY 6 DIGIT,16 BIT, OCTAL NUMBER)
THIS IS THE HARDWARE (BAD) BCC WORD.

DONE BIT: S\S (EACH X CAN =0 OR 1)
THIS IS THE STATUS OF THE DONE BIT (BIT 7 OF THE CSR).
THE FIRST NUMBER (X\) IS WHAT THE DONE BIT SHOULD BE (GOOD). THE SECOND NUMBER (\X) IS WHAT THE DONE BIT ACTUALLY WAS.

2. OPTIONS AFTER A HALT ON ERROR.

****IF THE SOFTWARE SWITCH REGISTER IS USED THEN THE OPERATOR CAN CHANGE THE SWREG LOCATION BY TYPING A ↑G AND THEN CONTINUING.***
A. SCOPE LOOP. SEE SCOPE LOOP SECTION.

B. BYPASS THIS ERROR AND CONTINUE TO THE NEXT ITERATION OR SUBTEST.

1. RESET SWR14 AND SWR15.

2. CONTINUE.

C. UTILIZE SELECT TEST MODE (PAGE 6)

SCOPE LOOP

ROUTINE CHECKS FOR ↑G FUNCTION.

1. SET UP.

   A. SET SWR14.

   B. RESET SWR15.

   C. CONTINUE.

2. PROGRAM ACTION.

   THE PROGRAM WILL SCOPE LOOP ON THE FAILING TEST FOR AS LONG
   AS SWR14 IS SET, AND SWR15 IS RESET.

3. OPERATOR CONTROL VIA THE SWR.

   A. SWR13 SET.
      INHIBIT ERROR TYPEOUTS.

      SWR13 RESET.
      ALLOW ERROR TYPEOUTS.

   B. SWR12 SET.
      INHIBIT TRACE TRAPS.

      SWR12 RESET.
      ALLOW TRACE TRAPS.

FORCED ERROR TYPEOUT.

IN THE EVENT OF AN UNEXPECTED OR ILLEGAL TRAP, OR AT ANY TIME THE OPERATOR DEEMS IT USEFUL, THE PROGRAM CAN BE HALTED (IF IT HASN'T ALREADY) AND A TYPEOUT CAN BE OBTAINED AS TO THE STATUS OF THE PROGRAM.

THIS TYPEOUT IS THE SAME ONE USED IN THE EVENT OF AN ACTUAL ERROR. (SEE ERROR MESSAGE ON PG. 8.)

1. HALT THE PROGRAM
2. START AT LOC. 210. (SWR SETTINGS ARE IMMATERIAL.)

THE TYPEOUT WILL BE MADE AND THE PROGRAM WILL HALT. THE PROGRAM CAN NOW BE RESTARTED. (SEE OPERATION, PG. 3.)

%

```
                                ;KG11A CYCLIC REDUNDANCY CHECK DEVICE TEST.
                                ;COPYRIGHT 1976,1977 DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754.

                                ;PROGRAM OBSOLETES MD-11-D8K
                                ;RELEASED 21 MAY 76 BY SAM CARPENTER
                                        ;SUPPORTS THE SOFTWARE SWITCH REGISTER LOC.175
                                        ;ALSO SUPPORTS THE DYNAMIC LOADING OF LOC.  176
                                ;REVISED TO MEET ALL ACT11 SPEC.S; REV. B RELEASED FEB. 1977

                                        ;TRAP CATCHER (LOC. 0 TO LOC. 776)***********

000030                                  .REPT   30
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                        .ENDR


000030                                  .REPT   30
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                        .ENDR

000030                                  .REPT   30
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                        .ENDR

000030                                  .REPT   30
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                        .ENDR

000030                                  .REPT   30
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                        .ENDR

000010                                  .REPT   10
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                        .ENDR
```

```
                    000014                          .=14
000014  004042                                     TRTRTN
000016  000340                                     340
                    000030                          .=30
000030  003154                                     ERR
000032  000340                                     340
                    000034                          .=34
000034  004030                                     $CORCD
000036  000340                                     340
                    000046                          .=46
000046  002406                                     $ENDAD
                    000052                          .=52
000052  000000                                     000000

                                                    ;;SOFTWARE SWITCH REGISTER*********

                    000176                          .=176
000176  000000                                     SWREG:  0               ;SOFTWARE SWITCH REGISTER

                                                    ;;PROGRAM STARTS***********

                    000200                          .=200
000200  000167  001456                    NORMAL: JMP     IDENT
                    000204                          .=204
000204  000167  001606                    SELECT: JMP     INTA
                    000210                          .=210
000210  000167  003122                    FORERR: JMP     FORCER
```

```
                                        ;INSTRUCTION TABLE
                    001000                  .=1000
001000  000402     I01:    000402           ;LRC8 1 STEP.
001002  004104             SMLRCF
001004  001002     I02:    001002           ;LRC8 2 STEPS.
001006  004104             SMLRCF
001010  001402     I03:    001402           ;LRC8 3 STEPS.
001012  004104             SMLRCF
001014  002002     I04:    002002           ;LRC8 4 STEPS.
001016  004104             SMLRCF
001020  002402     I05:    002402           ;LRC8 5 STEPS.
001022  004104             SMLRCF
001024  003002     I06:    003002           ;LRC8 6 STEPS.
001026  004104             SMLRCF
001030  003402     I07:    003402           ;LRC8 7 STEPS.
001032  004104             SMLRCF
001034  004002     I10:    004002           ;LRC8 10 STEPS.
001036  004104             SMLRCF
001040  000403     I11:    000403           ;LRC16 1 STEP.
001042  004060             SMLRCC
001044  001003     I12:    001003           ;LRC16 2 STEPS.
001046  004060             SMLRCC
001050  001403     I13:    001403           ;LRC16 3 STEPS.
001052  004060             SMLRCC
001054  002003     I14:    002003           ;LRC16 4 STEPS.
001056  004060             SMLRCC
001060  002403     I15:    002403           ;LRC16 5 STEPS.
001062  004060             SMLRCC
001064  003003     I16:    003003           ;LRC16 6 STEPS.
001066  004060             SMLRCC
001070  003403     I17:    003403           ;LRC16 7 STEPS.
001072  004060             SMLRCC
001074  004003     I20:    004003           ;LRC16 10 STEPS.
001076  004060             SMLRCC
001100  000401     I21:    000401           ;CRC16 1 STEP.
001102  004214             SMC16C
001104  001001     I22:    001001           ;CRC16 2 STEPS.
001106  004214             SMC16C
001110  001401     I23:    001401           ;CRC16 3 STEPS.
001112  004214             SMC16C
001114  002001     I24:    002001           ;CRC16 4 STEPS.
001116  004214             SMC16C
001120  002401     I25:    002401           ;CRC16 5 STEPS.
001122  004214             SMC16C
001124  003001     I26:    003001           ;CRC16 6 STEPS.
001126  004214             SMC16C
001130  003401     I27:    003401           ;CRC16 7 STEPS.
001132  004214             SMC16C
001134  004001     I30:    004001           ;CRC16 10 STEPS.
001136  004214             SMC16C
001140  000405     I31:    000405           ;CCITT 1 STEP.
001142  004352             SMCITC
001144  001005     I32:    001005           ;CCITT 2 STEPS.
001146  004352             SMCITC
```

```
541
542  001150  001405          I33:    001405          ;CCITT 3 STEPS.
543  001152  004352                  SMCITC
544  001154  002005          I34:    002005          ;CCITT 4 STEPS.
545  001156  004352                  SMCITC
546  001160  002405          I35:    002405          ;CCITT 5 STEPS.
547  001162  004352                  SMCITC
548  001164  003005          I36:    003005          ;CCITT 6 STEPS.
549  001166  004352                  SMCITC
550  001170  003405          I37:    003405          ;CCITT 7 STEPS.
551  001172  004352                  SMCITC
552  001174  004005          I40:    004005          ;CCITT 10 STEPS.
553  001176  004352                  SMCITC
554  001200  000400          I41:    000400          ;CRC12 1 STEP.
555  001202  004502                  SMC12B
556  001204  001000          I42:    001000          ;CRC12 2 STEPS.
557  001206  004502                  SMC12B
558  001210  001400          I43:    001400          ;CRC12 3 STEPS.
559  001212  004502                  SMC12B
560  001214  002000          I44:    002000          ;CRC12 4 STEPS.
561  001216  004502                  SMC12B
562  001220  002400          I45:    002400          ;CRC12 5 STEPS.
563  001222  004502                  SMC12B
564  001224  003000          I46:    003000          ;CRC12 6 STEPS.
565  001226  004502                  SMC12B
566  001230  000102          I47:    000102          ;LRC8 ONE BYTE DATA.
567  001232  004076                  SMLRCE
568  001234  000112          I50:    000112          ;LRC8 TWO BYTE DATA.
569  001236  004070                  SMLRCD
570  001240  000103          I51:    000103          ;LRC16 ONE BYTE DATA.
571  001242  004052                  SMLRCB
572  001244  000113          I52:    000113          ;LRC16 TWO BYTE DATA.
573  001246  004044                  SMLRCA
574  001250  000101          I53:    000101          ;CRC16 ONE BYTE DATA.
575  001252  004206                  SMC16B
576  001254  000111          I54:    000111          ;CRC16 TWO BYTE DATA.
577  001256  004200                  SMC16A
578  001260  000105          I55:    000105          ;CCITT ONE BYTE DATA.
579  001262  004344                  SMCITB
580  001264  000115          I56:    000115          ;CCITT TWO BYTE DATA
581  001266  004336                  SMCITA
582  001270  000100          I57:    000100          ;CRC12 ONE BYTE DATA.
583  001272  004474                  SMC12A
584  001274  000102          I60:    000102          ;RESERVED.
585  001276  004076                  SMLRCE
586  001300  000102          I61:    000102          ;RESERVED.
587  001302  004076                  SMLRCE
588  001304  000102          I62:    000102          ;RESERVED.
589  001306  004076                  SMLRCE
590  001310  000102          I63:    000102          ;RESERVED.
591  001312  004076                  SMLRCE
592  001314  000102          I64:    000102          ;RESERVED.
593  001316  004076                  SMLRCE
594  001320  000102          I65:    000102          ;RESERVED
595  001322  004076                  SMLRCE
```

```
  596  001324  000102                I66:    000102          ;RESERVED
  597  001326  004076                        SMLRCE
  598  001330  000102                I67:    000102          ;RESERVED
  599  001332  004076                        SMLRCE
  600  001334  000102                I70:    000102          ;RESERVED
  601  001336  004076                        SMLRCE
  602  001340  000102                I71:    000102          ;RESERVED
  603  001342  004076                        SMLRCE
  604  001344  000102                I72:    000102          ;RESERVED
  605  001346  004076                        SMLRCE
  606  001350  000102                I73:    000102          ;RESERVED
  607  001352  004076                        SMLRCE
  608  001354  000102                I74:    000102          ;RESERVED
  609  001356  004076                        SMLRCE
  610  001360  000102                I75:    000102          ;RESERVED
  611  001362  004076                        SMLRCE
  612  001364  000102                I76:    000102          ;RESERVED
  613  001366  004076                        SMLRCE
  614  001370  000102                I77:    000102          ;RESERVED
  615  001372  004076                        SMLRCE
  616
```

D02


```
                                        ;DATA WORD TABLE
001374  000001                          D01:    000001
001376  000002                          D02:    000002
001400  000004                          D03:    000004
001402  000010                          D04:    000010
001404  000020                          D05:    000020
001406  000040                          D06:    000040
001410  000100                          D07:    000100
001412  000200                          D10:    000200
001414  000400                          D11:    000400
001416  001000                          D12:    001000
001420  002000                          D13:    002000
001422  004000                          D14:    004000
001424  010000                          D15:    010000
001426  020000                          D16:    020000
001430  040000                          D17:    040000
001432  100000                          D20:    100000
001434  177776                          D21:    177776
001436  177775                          D22:    177775
001440  177773                          D23:    177773
001442  177767                          D24:    177767
001444  177757                          D25:    177757
001446  177737                          D26:    177737
001450  177677                          D27:    177677
001452  177577                          D30:    177577
001454  177377                          D31:    177377
001456  176777                          D32:    176777
001460  175777                          D33:    175777
001462  173777                          D34:    173777
001464  167777                          D35:    167777
001466  157777                          D36:    157777
001470  137777                          D37:    137777
001472  077777                          D40:    077777
```

```
 651  001474  052525                D41:    052525
 652  001476  125252                D42:    125252
 653  001500  031463                D43:    031463
 654  001502  146314                D44:    146314
 655  001504  070707                D45:    070707
 656  001506  107070                D46:    107070
 657  001510  007417                D47:    007417
 658  001512  170360                D50:    170360
 659  001514  041045                D51:    041045
 660  001516  136732                D52:    136732
 661  001520  154321                D53:    154321
 662  001522  023456                D54:    023456
 663  001524  133333                D55:    133333
 664  001526  044444                D56:    044444
 665  001530  000000                D57:    000000
 666  001532  177777                D60:    177777
 667  001534  000000                D61:    000000
 668  001536  111111                D62:    111111
 669  001540  022222                D63:    022222
 670  001542  133333                D64:    133333
 671  001544  044444                D65:    044444
 672  001546  155555                D66:    155555
 673  001550  066666                D67:    066666
 674  001552  177777                D70:    177777
 675  001554  101010                D71:    101010
 676  001556  111111                D72:    111111
 677  001560  121212                D73:    121212
 678  001562  131313                D74:    131313
 679  001564  141414                D75:    141414
 680  001566  151515                D76:    151515
 681  001570  161616                D77:    161616
```

```
                                        ;;EQUATES, CONSTANTS AND VARIABLES


                000000                  R0=%0                   ;WORK.
                000001                  R1=%1                   ;INSTRUCTION POINTER.
                000002                  R2=%2                   ;DATA POINTER.
                000003                  R3=%3                   ;DEVICE ADDRESS POINTER (BCC).
                000004                  R4=%4                   ;WORK
                000005                  R5=%5                   ;SUBROUTINES.
                000006                  SP=%6                   ;STACK POINTER
                000007                  PC=%7                   ;PC
                000007                  R7=PC
001572          177570                  SWR:    177570          ;SWITCH REGISTER.
                177776                  PS=177776               ;PROCESSOR STATUS
                104400                  SCOPE=TRAP
                104000                  HLT=EMT
                000240                  NOP=240
                177560                  TKCSR=  177560          ;TTY KEYBOARD STATUS
                177562                  TKDBR=  177562          ;TTY KEYBOARD BUFFER
                177564                  TPCSR=  177564          ;PRINTER STATUS
                177566                  TPDBR=  177566          ;PRINTER BUFFER
                001000                  INTBEG=I01
                001270                  INTEND=I57
                001374                  DATBEG=D01
                001570                  DATEND=D77
001574          170700          DEVADR: 170700
001576          000000          DFLG:   0
001600          000000          DFLGA:  0
001602          000000          EFLG:   0
001604          000000          HBCC:   0
001606          000000          HDONE:  0
001610          000000          IFLG:   0
001612          000000          IFLGA:  0
001614          000000          ITACNT: 0
001616          000100          ITANO:  100
001620          000000          OPSTAT: 0
001622          000000          OTACNT: 0
001624          000000          OTAWKA: 0
001626          000000          OTAWKB: 0
001630          000000          SELFLG: 0
001632          000000          SCORTN: 0
001634          000000          SMBCC:  0
001636          000000          SMBCCA: 0
001640          000000          SMCNT:  0
001642          000000          SMDATA: 0
001644          000000          SMDONE: 0
001646          000000          SMWKA:  0
001650          000000          SMWKB:  0
001652          000000          STCNT:  0
001654          000000          TEWK:   0
001656          000000          FTITLE: 0       ;TITLE PRINTED = 1
001660          000000          PASCNT: 0
```

```
                                                    ;;INIALIZATION
                                                    ;
001662  000005                              IDENT:  RESET
001664  012706  001000                              MOV     #1000,SP        ;SET SP TO 1000.
001670  023737  000042  000046                      CMP     @#42,@#46       ;IN ACT11 AUTOMATIC MODE?
001676  001444                                      BEQ     INIT            ;YES, SKIP TITLE
001700  005767  177752                              TST     FTITLE          ;HAS TITLE BEEN PRINTED BEFORE?
001704  001041                                      BNE     INIT            ;YES, SKIP TITLE
001706  004567  001746                              JSR     R5,TYPE         ;TYPE THE PROG. NAME.
001712  077536  043513  030461                      .ASCII  /↑/<177>/KG11A - CYCLIC REDUNDANCY CHECK TEST, MD-11-DZKGA-B/<177>/↑←/
001720  020101  020055  054503
001726  046103  041511  051040
001734  042105  047125  040504
001742  041516  020131  044103
001750  041505  020113  042524
001756  052123  020054  042115
001764  030455  026461  055104
001772  043513  026501  077502
002000  057536
                                                    .EVEN
002002  012767  000001  177646                      MOV     #1,FTITLE       ;SET FLAG
002010  005067  177614                      INIT:   CLR     SELFLG          ;CLEAR SELFLG (START WAS FROM LOC. 200.)
002014  000402                                      BR      INTB            ;BRANCH.
002016  005267  177606                      INTA:   INC     SELFLG          ;SET SELFLG (START WAS FROM LOC. 204.)
002022  000005                              INTB:   RESET
002024  005067  177552                              CLR     EFLG
002030  012706  001000                              MOV     #1000,SP
002034  023737  000042  000046                      CMP     @#42,@#46       ;ARE WE IN ACT11 AUTOMATIC MODE?
002042  001402                                      BEQ     .+6             ;YES, NEVER MIND ABOUT SWR
002044  004767  002600                              JSR     PC,$USWR        ;CHECK FOR HARDWARE SWITCH REGISTER
002050  016703  177520                              MOV     DEVADR,R3       ;R3 ← DEVICE ADDRESS.
002054  005723                                      TST     (R3)+           ;ADJUST R3 TO POINT AT BCC.
002056  004567  000012                              JSR     R5,OPCHG        ;READ SWR & SET UP PROG. ACCORDINGLY.
002062  005767  177542                              TST     SELFLG          ;WAS START FROM LOC. 200?
002066  001434                                      BEQ     FULMOD          ;YES - BRANCH.
002070  000167  000324                              JMP     SELMOD          ;NO. - JUMP.
                                                    ;
                                                    ;
002074  017767  177472  177516              OPCHG:  MOV     @SWR,OPSTAT     ;STORE SWR.
002102  052767  000020  175666                      BIS     #20,PS          ;SET "T" BIT IN PS.
002110  032767  010000  177502                      BIT     #10000,OPSTAT   ;INHIBIT TRACE TRAP?
002116  001403                                      BEQ     OPCA            ;NO. - BRANCH
002120  042767  000020  175650                      BIC     #20,PS          ;YES. - CLEAR "T" BIT IN PS.
002126  005767  177476                      OPCA:   TST     SELFLG          ;SELECT MODE (START WAS FROM 202)?
002132  001011                                      BNE     OPCB            ;YES. - BRANCH.
002134  016767  177456  177452                      MOV     ITANO,ITACNT    ;NO. - SET ITERATE CNT. TO ITERATE NO.
002142  032767  004000  177450                      BIT     #4000,OPSTAT    ;INHIBIT ITERATIONS?
002150  001402                                      BEQ     OPCB            ;NO. - BRANCH.
002152  005067  177436                              CLR     ITACNT          ;YES. - CLEAR ITERATE COUNTER
002156  000205                              OPCB:   RTS     R5              ;RETURN.
```

```
                                        ;FULL TEST MODE. CONTROL THE TESTING OF ALL KG11 INSTRUCTIONS
                                        ;IN THE INSTRUCTION TABLE USING ALL DATA WORDS IN THE DATA
                                        ;WORD TABLE WITH EACH INSTRUCTION.

002160  012701  001000          FULMOD: MOV     #INTBEG,R1      ;INST. POINTER (R1) SET TO BEGIN OF INST. TABLE.
002164  012702  001374          FULA:   MOV     #DATBEG,R2      ;DATA POINTER (R2) SET TO BEGIN OF DATA TABLE.
002170  116167  000001  177442  FULB:   MOVB    +1(R1),$MCNT    ;STEP COUNT (IF ANY) SET FOR SIMULATE.
002176  004767  002542          FULB:   JSR     PC,CKSWR        ;CHECK FOR CNTL G TO LOAD SWR
002202  005067  177426                  CLR     SMBCC           ;SIMULATED BCC SET TO 0.
002206  052767  000200  177430          BIS     #200,SMDONE     ;SET THE SIMULATED DONE BIT.
002214  004571  000002                  JSR     R5,@+2(R1)      ;SIMULATE INST. (VIA R1) ON DATA (VIA R2).
002220  105761  000001          FULC:   TSTB    +1(R1)          ;IS THE INST. A STEP TYPE?
002224  001413                          BEQ     FULE            ;NO - BRANCH.
002226  031127  004000                  BIT     (R1),#4000      ;YES. - IS THE INST. I10,I20,I30, OR I40?
002232  001005                          BNE     FULD            ;YES. - BRANCH.
002234  021167  176764                  CMP     (R1),I46        ;NO. - IS THE INST. I46?
002240  001402                          BEQ     FULD            ;YES. - BRANCH.
002242  005067  177376                  CLR     SMDONE          ;NO. - CLEAR THE SIMULATED DONE BIT.
002246  004567  000476          FULD:   JSR     R5,TESTA        ;DO TEST A (STEP INST. TEST).
002252  000402                          BR      FULF            ;BRANCH.
002254  004567  000606          FULE:   JSR     R5,TESTB        ;NO. - DO TEST B (NON-STEP INST. TEST).
002260  027767  177306  177332  FULF:   CMP     @SWR,OPSTAT     ;HAS OPERATION STATUS STATUS (SWR) CHANGED?
002266  001403                          BEQ     FULG            ;NO. - BRANCH.
002270  004567  177600                  JSR     R5,OPCHG        ;YES. - GO SET UP NEW OPERATION STATUS.
002274  000731                          BR      FULMOD          ;BRANCH.
002276  032767  004000  177314  FULG:   BIT     #4000,OPSTAT    ;NO. - ITERATE?
002304  001011                          BNE     FULH            ;NO. - BRANCH
002306  005767  177346                  TST     PASCNT          ;FIRST PASS?
002312  001406                          BEQ     FULH            ;YES, SKIP ITERATIONS THIS TIME
002314  005367  177274                  DEC     ITACNT          ;YES. - DECREMENT ITERATE COUNTER.  IS IT=0?
002320  001337                          BNE     FULC            ;NO. - BRANCH.  (KEEP ITERATING).
002322  016767  177270  177264          MOV     ITANO,ITACNT    ;YES. - SET ITERATE CTR. TO ITERATE NUMBER.
002330  020227  001570          FULH:   CMP     R2,#DATEND      ;HAVE ALL DATA WORDS BEEN TESTED?
002334  001403                          BEQ     FULI            ;YES - BRANCH.
002336  062702  000002                  ADD     #2,R2           ;NO. - ADVANCE DATA POINTER (R2).
002342  000712                          BR      FULB            ;BRANCH.
002344  020127  001270          FULI:   CMP     R1,#INTEND      ;HAVE ALL INSTS. BEEN TESTED?
002350  001403                          BEQ     FULJ            ;YES. - BRANCH.
002352  062701  000004                  ADD     #4,R1           ;NO. - ADVANCE INST. POINTER (R1).
002356  000702                          BR      FULA            ;BRANCH.
002360  004567  001274          FULJ:   JSR     R5,TYPE         ;YES.  PASS COMPLETE.  RING TTY BELL AND PRINT '*'.
002364  025007                          025007
002366  005015                          005015
002370  057400                          057400
002372  005267  177262                  INC     PASCNT          ;INCREMENT PASS COUNT SO SUBSEQUENT
                                                                ;PASSES WILL ITERATE
002376  013700  000042                  MOV     @#42,R0
002402  001405                          BEQ     RETURN
002404  000005                          RESET
002406  004710          $ENDAD: JSR     7,(R0)
002410  000240                          NOP
002412  000240                          NOP
002414  000240                          NOP
002416  000660          RETURN: BR      FULMOD          ;START TEST OVER
```

```
                                        ;SELECT TEST MODE.  CONTROL THE TESTING OF THE INSTRUCTION SELECTED
                                        ;ON SWR5-0 (00=ALL INSTS.) USING THE DATA WORD SELECTED ON SWR11-6.

002420  012701  001000          SELMOD: MOV     #INTBEG,R1      ;INST. POINTER (R1) SET TO THE INST.
002424  016767  177170  177156          MOV     OPSTAT,IFLG     ;SELECTED ON SR BITS 5-0.
002432  042767  177700  177150          BIC     #177700,IFLG
002440  016767  177144  177144          MOV     IFLG,IFLGA
002446  001412                          BEQ     SELA
002450  000241                          CLC
002452  006167  177132                  ROL     IFLG
002456  006167  177126                  ROL     IFLG
002462  162767  000004  177120          SUB     #4,IFLG
002470  066701  177114                  ADD     IFLG,R1
002474  012702  001374          SELA:   MOV     #DATBEG,R2      ;DATA POINTER (R2) SET TO THE DATA
002500  016767  177114  177070          MOV     OPSTAT,DFLG     ;WORD SELECTED ON SR BITS 11-6
002506  042767  170077  177062          BIC     #170077,DFLG
002514  016767  177056  177056          MOV     DFLG,DFLGA
002522  001420                          BEQ     SELB
002524  000241                          CLC
002526  006067  177044                  ROR     DFLG
002532  006067  177040                  ROR     DFLG
002536  006067  177034                  ROR     DFLG
002542  006067  177030                  ROR     DFLG
002546  006067  177024                  ROR     DFLG
002552  162767  000002  177016          SUB     #2,DFLG
002560  066702  177012                  ADD     DFLG,R2
002564  004767  002154          SELB:   JSR     PC,CKSWR        ;CHECK FOR CNTL G TO LOAD SWREG
002570  116167  000001  177042          MOVB    +1(R1),SMCNT    ;STEP COUNT (IF ANY) SET FOR SIMULATE.
002576  005067  177032                  CLR     SMBCC           ;SIMULATED BCC SET TO 0.
002602  052767  000200  177034          BIS     #200,SMDONE     ;SET THE SIMULATED DONE BIT.
002610  004571  000002                  JSR     R5,@+2(R1)      ;SIMULATE INST. (VIA R1) ON DATA (VIA R2).
002614  105761  000001                  TSTB    +1(R1)          ;IS THE INST. A STEP TYPE?
002620  001413                          BEQ     SELD            ;NO. - BRANCH.
002622  031127  004000                  BIT     (R1),#4000      ;YES. - IS THE INST. I10,I20,I30, OR I40?
002626  001005                          BNE     SELC            ;YES. - BRANCH.
002630  021167  176370                  CMP     (R1),I46        ;NO. - IS THE INST. I46?
002634  001402                          BEQ     SELC            ;YES. - BRANCH.
002636  005067  177002                  CLR     SMDONE          ;NO. - CLEAR THE SIMULATED DONE BIT.
002642  004567  000102          SELC:   JSR     R5,TESTA        ;DO TEST A (STEP INST TEST).
002646  000402                          BR      SELE            ;BRANCH.
002650  004567  000212          SELD:   JSR     R5,TESTB        ;NO - DO TEST B (NON-STEP INST. TEST).
002654  026777  176740  176710  SELE:   CMP     OPSTAT,@SWR     ;HAS OPERATION STATUS (SWR SETTINGS) CHANGED?
002662  001403                          BEQ     SELF            ;NO. - BRANCH.
002664  004567  177204                  JSR     R5,OPCHG        ;YES. - GO SET UP NEW OPERATION STATUS.
002670  000653                          BR      SELMOD          ;BRANCH.
002672  005767  176702          SELF:   TST     DFLGA           ;IS DATA FLAGA NON-ZERO?
002676  001010                          BNE     SELH            ;YES. - DATA POINTER (R2) IS FROZEN. - BRANCH.
002700  020227  001570                  CMP     R2,#DATEND      ;NO. - HAVE ALL DATA WORDS BEEN TESTED?
002704  001403                          BEQ     SELG            ;YES. - BRANCH.
002706  062702  000002                  ADD     #2,R2           ;NO. - ADVANCE DATA POINTER (R2).
002712  000724                          BR      SELB            ;BRANCH.
002714  012702  001374          SELG:   MOV     #DATBEG,R2      ;DATA POINTER (R2) SET TO BEGIN OF DATA TABLE.
002720  005767  176666          SELH:   TST     IFLGA           ;IS INST. FLAGA NON-ZERO?
002724  001317                          BNE     SELB            ;YES. - INST. POINTER (R1) IS FROZEN (BRANCH).
002726  020127  001270                  CMP     R1,#INTEND      ;NO. - HAVE ALL INSTS. BEEN TESTED?
```

```
 898  002732  001403                          BEQ     SELI            ;YES. - BRANCH.
 899  002734  062701  000004                  ADD     #4,R1           ;NO. - ADVANCE INST. POINTER (R1).
 900  002740  000711                          BR      SELB            ;BRANCH.
 901  002742  012701  001000        SELI:     MOV     #INTBEG,R1      ;INST. POINTER (R1) SET TO BEGIN OF INST. TABLE.
 902  002746  000706                          BR      SELB            ;BRANCH.
 903
```

```
                                        ;TEST A.
                                        ;TEST THE INSTRUCTION POINTED AT BY R1 USING THE DATA WORD
                                        ;POINTED AT BY R2.  (HIGH BYTE OF THE INST. WORD IS THE STEP COUNT
                                        ;& LOW BYTE IS THE ACTUAL INST.)  THE FINAL RESULT IS STORED
                                        ;INTO LOC. "HBCC" TO BE COMPARED WITH THE SIMULATED RESULT
                                        ;WHICH HAS BEEN STORED IN LOC. "SMBCC".

002750  104400                  TESTA:  SCOPE                   ;GO RECORD ENTRY TO THIS TEST.
002752  116167  000001  176672          MOVB    +1(R1),STCNT    ;SET UP STEP COUNT.
002760  012763  000020  177776          MOV     #20,-2(R3)      ;CLEAR THE BCC & THE DONE BIT.
002766  111163  177776                  MOVB    (R1),-2(R3)     ;MOVE INST. TO CSR.
002772  011263  000002                  MOV     (R2),+2(R3)     ;MOVE DATA TO DBR.
002776  052763  000040  177776  TAA:    BIS     #40,-2(R3)      ;STEP (SHIFT) ONE.
003004  000240                          NOP                     ;PAUSE.
003006  016367  177776  176572          MOV     -2(R3),HDONE    ;READ & STORE CSR (DONE BIT)
003014  011367  176564                  MOV     (R3),HBCC       ;READ & STORE BCC.
003020  005367  176626                  DEC     STCNT           ;IS STEP COUNT = 0?
003024  001364                          BNE     TAA             ;NO - BRANCH.
003026  042767  177577  176552          BIC     #177577,HDONE   ;YES. - CLEAR ALL BUT THE DONE BIT.
003034  026767  176546  176602          CMP     HDONE,SMDONE    ;HARDWARE DONE BIT = SIMULATED DONE BIT?
003042  001004                          BNE     TAB             ;NO. - BRANCH. (ERROR)
003044  026767  176534  176562          CMP     HBCC,SMBCC      ;YES. - HARDWARE BCC = SIMULATED BCC?
003052  001401                          BEQ     TAC             ;YES. - BRANCH.
003054  104000                  TAB:    HLT                     ;NO. - TRAP TO ERROR HANDLER.
003056  005767  176520          TAC:    TST     EFLG            ;IS AN ERROR SCOPE LOOP RUNNING?
003062  001374                          BNE     TAB             ;YES. - BRANCH.
003064  000205                          RTS     R5              ;NO. - RETURN.
```

```
                                        ;TEST B.
                                        ;TEST THE INSTRUCTION POINTED AT BY R1 USING THE DATA WORD
                                        ;POINTED AT BY R2.  THE RESULT IS STORED IN LOC. "HBCC" TO BE
                                        ;COMPARED WITH THE SIMULATED RESULT WHICH HAS BEEN STORED
                                        ;IN LOC. "SMBCC".

003066  104400                  TESTB:  SCOPE                   ;GO RECORD ENTRY TO THIS TEST.
003070  012763  000020  177776          MOV     #20,-2(R3)      ;CLEAR THE BCC.
003076  011163  177776                  MOV     (R1),-2(R3)     ;MOVE INST. TO CSR.
003102  011263  000002                  MOV     (R2),+2(R3)     ;MOVE DATA TO DBR (COMPUTE BCC).
003106  000240                          NOP                     ;PAUSE.
003110  016367  177776  176470          MOV     -2(R3),HDONE    ;READ & STORE CSR (DONE BIT)
003116  011367  176462                  MOV     (R3),HBCC       ;READ & STORE BCC.
003122  032767  000200  176456          BIT     #200,HDONE      ;IS DONE BIT = 1?
003130  001404                          BEQ     TBA             ;NO. - BRANCH. (ERROR)
003132  026767  176446  176474          CMP     HBCC,SMBCC      ;HARDWARE BCC = SIMULATED BCC?
003140  001401                          BEQ     TBB             ;YES. - BRANCH.
003142  104000                  TBA:    HLT                     ;NO. - TRAP TO ERROR HANDLER.
003144  005767  176432          TBB:    TST     EFLG            ;IS AN ERROR SCOPE LOOP RUNNING.
003150  001374                          BNE     TBA             ;YES. - BRANCH.
003152  000205                          RTS     R5              ;NO. - RETURN.
```

```
                                        ;TRAP SERVICE ROUTINE (CALLED BY PSUEDO-OP HLT)
                                        ;ERROR HANDLER. - TYPEOUTS - HALT - SCOPE LOOP.

003154  004767  001564        ERR:    JSR     PC,CKSWR        ;CHECK FOR CNTL G TO LOAD SWREG
003160  005767  176416                TST     EFLG            ;FIRST ERR CALL FOR CURRENT TEST?
003164  001003                        BNE     ERA             ;NO. - BRANCH.
003166  005267  176410                INC     EFLG            ;YES. - SET ERR FLAG.
003172  000404                        BR      ERB             ;BRANCH. (UNCONDITIONAL TYPE OUT).
003174  032767  020000  176416  ERA:  BIT     #20000,OPSTAT   ;INHIBIT TYPE OUT?
003202  001002                        BNE     ERC             ;YES. - BRANCH.
003204  004567  000140        ERB:    JSR     R5,TYPERR       ;NO. - TYPE ERR MESSAGE.
003210  023737  000042  000046  ERC:  CMP     @#42,@#46       ;ARE WE IN ACT11 AUTOMATIC MODE?
003216  001404                        BEQ     .+12            ;YES, HALT ON ERROR
003220  032777  100000  176344        BIT     #100000,@SWR    ;HALT ON ERR?
003226  001401                        BEQ     ERD             ;NO. - BRANCH.
003230  000000                        HALT                    ;YES. - HALT HERE AND WAIT FOR OPERATOR.
003232  004767  001506        ERD:    JSR     PC,CKSWR                ;CHECK FOR CNTL G TO LOAD SWREG
003236  027767  176330  176354        CMP     @SWR,OPSTAT     ;HAS OPERATION STATUS (SWR) CHANGED?
003244  001402                        BEQ     ERE             ;NO. - BRANCH.
003246  004567  176622                JSR     R5,OPCHG        ;YES - GO SET UP NEW OPERATION STATUS.
003252  032767  040000  176340  ERE:  BIT     #40000,OPSTAT   ;SCOPE LOOP?
003260  001403                        BEQ     ERF             ;NO. - BRANCH.
003262  022626                        CMP     (SP)+,(SP)+     ;YES. - POP STACK
003264  000177  176342                JMP     @SCORTN         ;RETURN (SCOPE LOOP).
003270  005067  176306        ERF:    CLR     EFLG            ;CLEAR ERR FLAG.
003274  005767  176330                TST     SELFLG          ;SELECT MODE?
003300  001001                        BNE     ERG             ;YES. - BRANCH.
003302  000002                        RTI                     ;NO. - RETURN (CONTINUE TESTING).
003304  032777  000077  176260  ERG:  BIT     #77,@SWR        ;SWR5-0 = 0?
003312  001410                        BEQ     ERH             ;YES. - BRANCH.
003314  032777  007700  176250        BIT     #7700,@SWR      ;NO. - SWR6-11 = 0?
003322  001404                        BEQ     ERH             ;YES. - BRANCH.
003324  062706  000006                ADD     #6,SP           ;NO. - POP STACK.
003330  000167  177064                JMP     SELMOD          ;RESTART AT SELMOD.
003334  000002            ERH:        RTI                     ;RETURN (CONTINUE TESTING).


003336  000005        FORCER: RESET                   ;FORCE AN ERROR-TYPE TYPEOUT
003340  004567  000004                JSR     R5,TYPERR       ;WHENEVER STARTED FROM LOC.210,
003344  000000            FEA:        HALT                    ;THEN HALT.
003346  000776                        BR      FEA
```

```
  998
  999                                   ;SUBROUTINE - SET UP AND TYPE THE ERROR MESSAGE THAT STARTS AT EMA.
 1000
 1001  003350  105761  000001          TYPERR: TSTB    +1(R1)
 1002  003354  001404                          BEQ     TEA
 1003  003356  012767  020101  000214          MOV     #20101,EMC
 1004  003364  000403                          BR      TEB
 1005  003366  012767  020102  000204  TEA:    MOV     #20102,EMC
 1006  003374  010167  176254          TEB:    MOV     R1,TEWK
 1007  003400  162767  000774  176246          SUB     #INTBEG-4,TEWK
 1008  003406  006067  176242                  ROR     TEWK
 1009  003412  006067  176236                  ROR     TEWK
 1010  003416  042767  177700  176230          BIC     #177700,TEWK
 1011  003424  004567  000306                  JSR     R5,OTA
 1012  003430  001654                          TEWK
 1013  003432  003606                          EMF
 1014  003434  000002                          2
 1015  003436  010267  176212                  MOV     R2,TEWK
 1016  003442  162767  001372  176204          SUB     #DATBEG-2,TEWK
 1017  003450  006067  176200                  ROR     TEWK
 1018  003454  042767  177700  176172          BIC     #177700,TEWK
 1019  003462  004567  000250                  JSR     R5,OTA
 1020  003466  001654                          TEWK
 1021  003470  003613                          EMH+1
 1022  003472  000002                          2
 1023  003474  004567  000236                  JSR     R5,OTA
 1024  003500  001634                          SMBCC
 1025  003502  003624                          EMM
 1026  003504  000006                          6
 1027  003506  004567  000224                  JSR     R5,OTA
 1028  003512  001604                          HBCC
 1029  003514  003635                          EMQ+1
 1030  003516  000006                          6
 1031  003520  112767  000061  000123          MOVB    #61,EMX+1
 1032  003526  032767  000200  176110          BIT     #200,SMDONE
 1033  003534  001003                          BNE     TEC
 1034  003536  112767  000060  000105          MOVB    #60,EMX+1
 1035  003544  112767  000061  000101  TEC:    MOVB    #61,EMY+1
 1036  003552  032767  000200  176026          BIT     #200,HDONE
 1037  003560  001003                          BNE     TED
 1038  003562  112767  000060  000063          MOVB    #60,EMY+1
 1039  003570  004567  000064          TED:    JSR     R5,TYPE
 1040  003574  042524                  EMA:    .ASCII  /TE/
 1041  003576  052123                  EMB:    .ASCII  /ST/
 1042  003600  020077                  EMC:    .ASCII  /? /
 1043  003602  044440                  EMD:    .ASCII  / I/
 1044  003604  037477                  EME:    .ASCII  /??/
 1045  003606  020040                  EMF:    .ASCII  /  /
 1046  003610  037504                  EMG:    .ASCII  /D?/
```

```
 1047  003612  020077                    EMH:    .ASCII  /? /
 1048  003614  051440                    EMI:    .ASCII  / S/
 1049  003616  037477                    EMJ:    .ASCII  /??/
 1050  003620  037477                    EMK:    .ASCII  /??/
 1051  003622  037477                    EML:    .ASCII  /??/
 1052  003624  020040                    EMM:    .ASCII  /  /
 1053  003626  037510                    EMN:    .ASCII  /H?/
 1054  003630  037477                    EMO:    .ASCII  /??/
 1055  003632  037477                    EMP:    .ASCII  /??/
 1056  003634  020077                    EMQ:    .ASCII  /? /
 1057  003636  042040                    EMR:    .ASCII  / D/
 1058  003640  047117                    EMS:    .ASCII  /ON/
 1059  003642  020105                    EMU:    .ASCII  /E /
 1060  003644  044502                    EMV:    .ASCII  /BI/
 1061  003646  035124                    EMW:    .ASCII  /T:/
 1062  003650  037440                    EMX:    .ASCII  / ?/
 1063  003652  037534                    EMY:    .ASCII  /\?/
 1064  003654  057536                    EMZ:    .ASCII  /↑←/
 1065  003656  000205                            RTS     R5
```

```
1066
1067                                    ;SUBROUTINE - TYPE ON THE TTY THE MESSAGE IMMEDIATELY FOLLOWING
1068                                    ;THE CALL TO THIS SUBROUTINE.  UP-ARROW (↑) CAUSES A CRLF AND BACK-ARROW
1069                                    ;(←) CAUSES TERMINATION OF TYPEOUT.  RETURN WILL BE TO THE INSTRUCTION
1070                                    ;FOLLOWING THE MESSAGE.
1071  003660  105767  173700      TYPE:   TSTB    TPCSR
1072  003664  100375                       BPL     TYPE
1073  003666  121527  000136              CMPB    (R5),#136
1074  003672  001005                       BNE     TPA
1075  003674  105725                       TSTB    (R5)+
1076  003676  004567  177756              JSR     R5,TYPE
1077  003702  005015                       005015
1078  003704  000137                       000137
1079  003706  121527  000137      TPA:    CMPB    (R5),#137
1080  003712  001403                       BEQ     TPB
1081  003714  112567  173646              MOVB    (R5)+,TPDBR
1082  003720  000757                       BR      TYPE
1083  003722  105725              TPB:    TSTB    (R5)+
1084  003724  032705  000001              BIT     #1,R5
1085  003730  001401                       BEQ     TPC
1086  003732  005205                       INC     R5
1087  003734  000205              TPC:    RTS     R5
```

```
1088
1089                                    ;SUBROUTINE - OCTAL TO ALPHA CONVERSION ACCORDING TO THE THREE WORDS
1090                                    ;IMMEDIATELY FOLLOWING THE CALL TO THIS SUBROUTINE.  THE FIRST WORD POINTS
1091                                    ;AT THE WORD TO BE CONVERTED.  THE SECOND WORD POINTS AT THE STARTING
1092                                    ;LOC. WHERE THE RESULT IS TO BE MOVED.  THE THIRD WORD IS THE NUMBER
1093                                    ;OF CHARACTERS TO BE CONVERTED AND MOVED.  RETURN WILL BE TO THE
1094                                    ;INSTRUCTION FOLLOWING THESE THREE WORDS.
1095
1096  003736  013567  175662          OTA:    MOV     @(R5)+,OTAWKA
1097  003742  012504                          MOV     (R5)+,R4
1098  003744  012567  175652                  MOV     (R5)+,OTACNT
1099  003750  016767  175650  175650  OTALA:  MOV     OTAWKA,OTAWKB
1100  003756  000241                          CLC
1101  003760  006067  175640                  ROR     OTAWKA
1102  003764  000241                          CLC
1103  003766  006067  175632                  ROR     OTAWKA
1104  003772  000241                          CLC
1105  003774  006067  175624                  ROR     OTAWKA
1106  004000  042767  177770  175620          BIC     #177770,OTAWKB
1107  004006  052767  000060  175612          BIS     #60,OTAWKB
1108  004014  116744  175606                  MOVB    OTAWKB,-(R4)
1109  004020  005367  175576                  DEC     OTACNT
1110  004024  001351                          BNE     OTALA
1111  004026  000205                          RTS     R5
1112
1113
```

```
1114
1115                                    ;TRAP SERVICE ROUTINE - SCOPE = TRAP.
1116
1117  004030  011667  175576  SCORCD: MOV     (SP),SCORTN     ;SAVE THE STARTING LOC. OF TESTA OR TESTB.
1118  004034  004767  000704          JSR     PC,CKSWR        ;CHECK FOR CNTL G TO LOAD SWREG
1119  004040  000002                 RTI                     ;RETURN.
1120
1121                                    ;TRAP SERVICE ROUTINE - "T" BIT SET =TRAP.
1122
1123  004042  000002  TRTRTN: RTI                            ;GOOD BOY, NOW RETURN.
1124
```

```
1125                                            ;SUBROUTINE - SIMULATE ALL MODES OF LRC
1126  004044  012767  000010  175566  SMLRCA: MOV     #10,SMCNT       ;ENTRY LRC16 DOUBLE BYTE DATA.
1127  004052  062767  000010  175560  SMLRCB: ADD     #10,SMCNT       ;ENTRY LRC16 SINGLE BYTE DATA.
1128  004060  042767  100000  000070  SMLRCC: BIC     #100000,SMLRCJ  ;ENTRY STEP LRC16.
1129  004066  000411                          BR      SMLRCG
1130  004070  012767  000010  175542  SMLRCD: MOV     #10,SMCNT       ;ENTRY LRC8 DOUBLE BYTE DATA.
1131  004076  062767  000010  175534  SMLRCE: ADD     #10,SMCNT       ;ENTRY LRC8 SINGLE BYTE DATA.
1132  004104  052767  100000  000044  SMLRCF: BIS     #100000,SMLRCJ  ;ENTRY STEP LRC8.
1133  004112  005767  175522          SMLRCG: TST     SMCNT
1134  004116  001002                          BNE     SMLRCH
1135  004120  005267  175514                  INC     SMCNT
1136  004124  016767  175504  175504  SMLRCH: MOV     SMBCC,SMBCCA
1137  004132  011267  175504                  MOV     (R2),SMDATA
1138  004136  016767  175472  175502  SMLRCI: MOV     SMBCC,SMWKA
1139  004144  066767  175472  175474          ADD     SMDATA,SMWKA
1140  004152  006067  175470                  ROR     SMWKA
1141  004156  006067  175452          SMLRCJ: ROR     SMBCC           ;INSTR. MODIFIED:  LRC16=ROR   LRC8=RORB.
1142  004162  000241                          CLC
1143  004164  006067  175452                  ROR     SMDATA
1144  004170  005367  175444                  DEC     SMCNT
1145  004174  001360                          BNE     SMLRCI
1146  004176  000205                          RTS     R5
1147
```

```
                                        ;SUBROUTINE - SIMULATE ALL MODES OF CRC16.

004200  012767  000010  175432  SMC16A: MOV     #10,SMCNT       ;ENTRY CRC16 DOUBLE BYTE DATA.
004206  062767  000010  175424  SMC16B: ADD     #10,SMCNT       ;ENTRY CRC16 SINGLE BYTE DATA.
004214  005767  175420          SMC16C: TST     SMCNT           ;ENTRY STEP CRC16.
004220  001002                          BNE     SMC16D
004222  005267  175412                  INC     SMCNT
004226  016767  175402  175402  SMC16D: MOV     SMBCC,SMBCCA
004234  011267  175402                  MOV     (R2),SMDATA
004240  016767  175370  175400  SMC16E: MOV     SMBCC,SMWKA
004246  066767  175370  175372          ADD     SMDATA,SMWKA
004254  000241                          CLC
004256  006067  175352                  ROR     SMBCC
004262  000241                          CLC
004264  006067  175352                  ROR     SMDATA
004270  006067  175352                  ROR     SMWKA
004274  103014                          BCC     SMC16F
004276  012767  120001  175342          MOV     #120001,SMWKA
004304  046767  175324  175334          BIC     SMBCC,SMWKA
004312  042767  120001  175314          BIC     #120001,SMBCC
004320  066767  175322  175306          ADD     SMWKA,SMBCC
004326  005367  175306          SMC16F: DEC     SMCNT
004332  001342                          BNE     SMC16E
004334  000205                          RTS     R5

                                        ;SUBROUTINE - SIMULATE ALL MODES OF CCITT.

004336  012767  000010  175274  SMCITA: MOV     #10,SMCNT       ;ENTRY CCITT DOUBLE BYTE DATA.
004344  062767  000010  175266  SMCITB: ADD     #10,SMCNT       ;ENTRY CCITT SINGLE BYTE DATA.
004352  005767  175262          SMCITC: TST     SMCNT           ;ENTRY STEP CCITT.
004356  001002                          BNE     SMCITD
004360  005267  175254                  INC     SMCNT
004364  016767  175244  175244  SMCITD: MOV     SMBCC,SMBCCA
004372  011267  175244                  MOV     (R2),SMDATA
004376  016767  175232  175242  SMCITE: MOV     SMBCC,SMWKA
004404  066767  175232  175234          ADD     SMDATA,SMWKA
004412  000241                          CLC
004414  006067  175214                  ROR     SMBCC
004420  000241                          CLC
004422  006067  175214                  ROR     SMDATA
004426  006067  175214                  ROR     SMWKA
004432  103014                          BCC     SMCITF
004434  012767  102010  175204          MOV     #102010,SMWKA
004442  046767  175166  175176          BIC     SMBCC,SMWKA
004450  042767  102010  175156          BIC     #102010,SMBCC
004456  066767  175164  175150          ADD     SMWKA,SMBCC
004464  005367  175150          SMCITF: DEC     SMCNT
004470  001342                          BNE     SMCITE
004472  000205                          RTS     R5

                                        ;SUBROUTINE - SIMULATE ALL MODES OF CRC12.

004474  012767  000006  175136  SMC12A: MOV     #6,SMCNT        ;ENTRY CRC12 SINGLE BYTE DATA.
004502  005767  175132          SMC12B: TST     SMCNT           ;ENTRY STEP CRC12.
```

```
 1204  004506  001002                                BNE     SMC12C
 1205  004510  005267  175124                        INC     SMCNT
 1206  004514  016767  175114  175114  SMC12C:       MOV     SMBCC,SMBCCA
 1207  004522  011267  175114                        MOV     (R2),SMDATA
 1208  004526  016767  175102  175112  SMC12D:       MOV     SMBCC,SMWKA
 1209  004534  066767  175102  175104                ADD     SMDATA,SMWKA
 1210  004542  106367  175066                        ASLB    SMBCC
 1211  004546  106367  175062                        ASLB    SMBCC
 1212  004552  006067  175056                        ROR     SMBCC
 1213  004556  106067  175052                        RORB    SMBCC
 1214  004562  106067  175046                        RORB    SMBCC
 1215  004566  042767  160000  175040                BIC     #160000,SMBCC
 1216  004574  006067  175046                        ROR     SMWKA
 1217  004600  103014                                BCC     SMC12E
 1218  004602  012767  036001  175036                MOV     #36001,SMWKA
 1219  004610  046767  175020  175030                BIC     SMBCC,SMWKA
 1220  004616  042767  036001  175010                BIC     #36001,SMBCC
 1221  004624  066767  175016  175002                ADD     SMWKA,SMBCC
 1222  004632  000241                        SMC12E: CLC
 1223  004634  006067  175002                        ROR     SMDATA
 1224  004640  005367  174774                        DEC     SMCNT
 1225  004644  001330                                BNE     SMC12D
 1226  004646  000205                                RTS     R5
```

```
1227
1228
1229                                            ;SWITCH REGISTER SIZING ROUTINE
1230
1231  004650  013746  000006          SUSWR:  MOV     @#6,-(SP)       ;SAVE VECTORS
1232  004654  013746  000004                  MOV     @#4,-(SP)
1233  004660  012737  004700  000004          MOV     #64$,@#4        ;SET UP FOR TIMEOUT
1234  004666  022777  177777  174676          CMP     #-1,@SWR        ;REFERENCE HARDWARE SWITCH REGISTER
1235  004674  001402                          BEQ     65$
1236  004676  000404                          BR      66$
1237  004700  022626                  64$:    CMP     (SP)+,(SP)+     ;ADJUST STACK
1238  004702  012767  000176  174662  65$:    MOV     #SWREG,SWR      ;POINT TO SOFTWARE SWITCH REG
1239  004710  012637  000004          66$:    MOV     (SP)+,@#4       ;RESTORE VECTORS
1240  004714  012637  000006                  MOV     (SP)+,@#6
1241  004720  022767  000176  174644          CMP     #SWREG,SWR      ;IS SWREG USED
1242  004726  001002                          BNE     67$
1243  004730  004767  000070                  JSR     PC,CNTLU        ;ALLOW SWREG TO BE LOADED
1244  004734  000207                  67$:    RTS     PC
1245
1246
1247                                            ;CHECK SWITCH REGISTER ROUTINE. CHECKS FOR ↑G TO ALLOW CHANGING
1248                                            ;OF LOC.176.
1249                                            ;LOCATIONS USED:
1250  004736  000000                          TEMPST: .WORD   0
1251  004740  000000                          COUNT:  .WORD   0
1252  004742  000000                          TIB:    .WORD   0
1253
1254
1255  004744  022767  000176  174620  CKSWR:  CMP     #SWREG,SWR      ;SOFTWARE SWITCH REGISTER PRESENT
1256  004752  001143                          BNE     OUT             ;NO, GET OUT
1257  004754  105767  172600                  TSTB    TKCSR           ;YES,WAIT FOR
1258  004760  100140                          BPL     OUT             ;READY, GET CHARACTER
1259  004762  016767  172574  177752          MOV     TKDBR,TIB       ;AND STRIP OFF
1260  004770  042767  177600  177744          BIC     #177600,TIB     ;THE GARBAGE
1261  004776  022767  000007  177736          CMP     #7,TIB          ;IS IT ^ (↑G)
1262  005004  001126                          BNE     OUT
1263  005006  004567  176646                  JSR     R5,TYPE         ;TYPE CNTL G
1264  005012  041536  052116  020114          .ASCII  /↑CNTL G↑←/
1265  005020  057107    137
1266          005024                          .EVEN
1267  005024  004567  176706          CNTLU:  JSR     R5,OTA          ;MOVE CONTENTS
1268  005030  000176                          SWREG                   ;OF SWREG TO BE
1269  005032  005055                          MSWREG                  ;TYPED FOLLOWING
1270  005034  000006                          6                       ;THE MESSAGE SWR=
1271  005036  004567  176616                  JSR     R5,TYPE         ;TYPE THE COMPLETE MESSAGE
1272
1273  005042  051536  051127    075   MSWR:   .ASCII  /↑SWR=/         ;SWR=
1274  005047    077   037477  037477          .ASCII  /??????/        ;     XXXXXX
1275  005054    077
1276  005055    040   020040  020040  MSWREG: .ASCII  /      /
1277  005062    040
1278  005063    040   042516  036527  MNEW:   .ASCII  / NEW= ←/       ;         NEW=
1279  005070  057440
1280                                            .EVEN
1281
```

```
1282  005072  005067  177640          $READ:  CLR     TEMPST
1283  005076  012767  000007  177634          MOV     #7,COUNT
1284  005104  004767  000154          1$:     JSR     PC,TTIN         ;GO  READ A CHARACTER
1285  005110  042767  177600  177624          BIC     #177600,TIB     ;STRIP OFF GARBAGE
1286  005116  122767  000025  177616          CMPB    #25,TIB         ;IS IT A ↑U?
1287  005124  001001                          BNE     2$              ;BRANCH IF NOT
1288  005126  000736                  3$:     BR CNTLU                ;START OVER
1289  005130  122767  000015  177604  2$:     CMPB    #15,TIB         ;IS IT A <CR>?
1290  005136  001010                          BNE     4$              ;BRANCH IF NOT
1291  005140  004567  176514                  JSR     R5,TYPE         ;TYPE LF,CR
1292  005144  057536                          .ASCII  /↑←/
1293  005146  022767  000007  177564          CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
1294  005154  001036                          BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
1295  005156  000441                  8$:     BR      OUT             ;GET OUT
1296  005160  122767  000060  177554  4$:     CMPB    #60,TIB
1297  005166  003004                          BGT     5$
1298  005170  122767  000067  177544          CMPB    #67,TIB
1299  005176  002005                          BGE     6$
1300  005200  004567  176454          5$:     JSR     R5,TYPE
1301  005204  037536  057536                  .ASCII  /↑?↑←/
1302  005210  000746                          BR      3$              ;START OVER IF NOT LEGAL CHARACTER
1303  005212  006367  177520          6$:     ASL     TEMPST
1304  005216  006367  177514                  ASL     TEMPST
1305  005222  006367  177510                  ASL     TEMPST
1306  005226  142767  000060  177506          BICB    #60,TIB         ;GET NITTY-GRITTY
1307  005234  156767  177502  177474          BISB    TIB,TEMPST
1308  005242  005367  177472                  DEC     COUNT           ;ONLY WANT 6   DIGITS
1309  005246  001754                          BEQ     5$
1310  005250  000715                          BR      1$
1311  005252  016777  177460  174312  7$:     MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
1312  005260  000736                          BR      8$
1313  005262  000207                  OUT:    RTS     PC              ;RETURN TO PROGRAM
```

```
1314
1315                                                    ;TTY INPUT SUBROUTINE**********
1316
1317  005264  005067  172270          TTIN:   CLR     TKCSR
1318  005270  005067  172266                  CLR     TKDBR
1319  005274  005067  177442                  CLR     TIB
1320  005300  005267  172254                  INC     TKCSR
1321  005304  105767  172250          TTIN1:  TSTB    TKCSR
1322  005310  100375                          BPL     TTIN1
1323  005312  016767  172244  177422         MOV     TKDBR,TIB
1324  005320  105767  172240          TTIN2:  TSTB    TPCSR
1325  005324  100375                          BPL     TTIN2
1326  005326  116767  177410  172232         MOVB    TIB,TPDBR
1327  005334  000207                          RTS     PC
1328
1329          000001                          .END
```

```
CKSWR   004744
CNTLU   005024
COUNT   004740
DATBEG= 001374
DATEND= 001570
DEVADR  001574
DFLG    001576
DFLGA   001600
D01     001374
D02     001376
D03     001400
D04     001402
D05     001404
D06     001406
D07     001410
D10     001412
D11     001414
D12     001416
D13     001420
D14     001422
D15     001424
D16     001426
D17     001430
D20     001432
D21     001434
D22     001436
D23     001440
D24     001442
D25     001444
D26     001446
D27     001450
D30     001452
D31     001454
D32     001456
D33     001460
D34     001462
D35     001464
D36     001466
D37     001470
D40     001472
D41     001474
D42     001476
D43     001500
D44     001502
D45     001504
D46     001506
D47     001510
D50     001512
D51     001514
D52     001516
D53     001520
D54     001522
D55     001524
D56     001526
D57     001530
D60     001532
D61     001534
D62     001536
D63     001540
D64     001542
D65     001544
D66     001546
D67     001550
D70     001552
D71     001554
D72     001556
D73     001560
D74     001562
D75     001564
D76     001566
D77     001570
EFLG    001602
EMA     003574
EMB     003576
EMC     003600
EMD     003602
EME     003604
EMF     00360E
EMG     003610
EMH     003612
EMI     003614
EMJ     003616
EMK     003620
EML     003622
EMM     003624
EMN     003626
EMO     003630
EMP     003632
EMQ     003634
EMR     003636
EMS     003640
EMU     003642
EMV     003644
EMW     003646
EMX     003650
EMY     003652
EMZ     003654
ERA     003174
ERB     003204
ERC     003210
ERD     003232
ERE     003252
ERF     003270
ERG     003304
ERH     003334
ERR     003154
FEA     003344
FORCER  003336
FORERR  000210
FTITLE  001656
FULA    002164
FULB    002170
FULC    002220
FULD    002246
FULE    002254
FULF    002260
FULG    002276
FULH    002330
FULI    002344
FULJ    002360
FULMOD  002160
HBCC    001604
HDONE   001606
HLT   = 104000
IDENT   001662
IFLG    001610
IFLGA   001612
INIT    002010
INTA    002016
INTB    002022
INTBEG= 001000
INTEND= 001270
ITACNT  001614
ITANO   001616
I01     001000
I02     001004
I03     001010
I04     001014
I05     001020
I06     001024
I07     001030
I10     001034
I11     001040
I12     001044
I13     001050
I14     001054
I15     001060
I16     001064
I17     001070
I20     001074
I21     001100
I22     001104
I23     001110
I24     001114
I25     001120
I26     001124
I27     001130
I30     001134
I31     001140
I32     001144
I33     001150
I34     001154
I35     001160
I36     001164
I37     001170
I40     001174
I41     001200
I42     001204
I43     001210
I44     001214
I45     001220
I46     001224
I47     001230
I50     001234
I51     001240
I52     001244
I53     001250
I54     001254
I55     001260
I56     001264
I57     001270
I60     001274
I61     001300
I62     001304
I63     001310
I64     001314
I65     001320
I66     001324
I67     001330
I70     001334
I71     001340
I72     001344
I73     001350
I74     001354
I75     001360
I76     001364
I77     001370
MNEW    005063
MSWR    005042
MSWREG  005055
NOP   = 000240
NORMAL  000200
OPCA    002126
OPCB    002156
OPCHG   002074
OPSTAT  001620
OTA     003736
OTACNT  001622
OTALA   003750
OTAWKA  001624
OTAWKB  001626
OUT     005262
PASCNT  001660
PS    = 177776
RETURN  002416
R7    =%000007
SCOPE = 104400
SCORCD  004030
SCORTN  001632
SELA    002474
SELB    002564
SELC    002642
SELD    002650
SELE    002654
SELECT  000204
SELF    002672
SELFLG  001630
SELG    002714
SELH    002720
SELI    002742
SELMOD  002420
SMBCC   001634
SMBCCA  001636
SMCITA  004336
SMCITB  004344
SMCITC  004352
SMCITD  004364
SMCITE  004376
SMCITF  004464
SMCNT   001640
SMC12A  004474
SMC12B  004502
SMC12C  004514
SMC12D  004526
SMC12E  004632
SMC16A  004200
SMC16B  004206
SMC16C  004214
SMC16D  004226
SMC16E  004240
SMC16F  004326
SMDATA  001642
SMDONE  001644
SMLRCA  004044
SMLRCB  004052
SMLRCC  004060
SMLRCD  004070
SMLRCE  004076
SMLRCF  004104
SMLRCG  004112
SMLRCH  004124
SMLRCI  004136
SMLRCJ  004156
SMWKA   001646
SMWKB   001650
```

```
STCNT   001652          TBA     003142          TESTA   002750          TPB     003722          TTIN2   005320
SUSWR   004650          TBB     003144          TESTB   003066          TPC     003734          TYPE    003660
SWR     001572          TEA     003366          TEWK    001654          TPCSR = 177564          TYPERR  003350
SWREG   000176          TEB     003374          TIB     004742          TPDBR = 177566          $ENDAD  002406
TAA     002776          TEC     003544          TKCSR = 177560          TRTRTN  004042          $READ   005072
TAB     003054          TED     003570          TKDBR = 177562          TTIN    005264          .       = 005336
TAC     003056          TEMPST  004736          TPA     003706          TTIN1   005304

. ABS.  005336  000


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 DSKZ:DZKGAB,DSKZ:DZKGAB/SOL=DSKZ:DZKGAB.P11
 RUN-TIME: 4 9 1 SECONDS
 RUN-TIME RATIO: 145/14=10.0
 CORE USED:  5K  (9 PAGES)
```