IDENTIFICATION

Product Code:	MAINDEC 9A-D4FA-D
Product Name:	TC59 Random Exerciser Executive Routine
Date Created:	March 20, 1968
Maintainer:	Diagnostic Group
Author:	Keith F. Nelson

1. ABSTRACT

The TC59 Random Exerciser Executive Routine is a series of utility and typeout subroutines designed to run in open interrupt mode. This Executive Routine also includes a system parameter input routine, routines to keep a 24 hour clock and facilities to handle the PDP-9 standard processor interrupts.

2. REQUIREMENTS

2.1 Equipment

Minimum configuration PDP-9

2.2 Storage

The TC59 Random Exerciser Executive Routine occupies most of memory from address ØØØØ to 1777 and specifically utilizes the following memory locations.

FROM	TO	PURPOSE
ØØØØØ	ØØØØ3	Interrupt Handling
ØØØØ7	-	Real Time Clock
ØØØ2Ø	ØØØ21	CAL Handling
ØØØ4Ø	ØØØ77	API Error JMS
ØØ1ØØ	ØØ177	To communicate with other programs
ØØ2ØØ	Ø2ØØØ	Program Storage

3. LOADING PROCEDURE

Place the ABS binary tape in the PTR

Set ADDRESS to 1772Ø

Press I/O RESET

Press READ-IN

Repeat the above procedure for each program to be run

with the TC59 Random Exerciser Executive Routine.

4. STARTING PROCEDURE

4.1 Control Switch Settings

(NONE)

4.2 Starting Address

The TC59 Random Exerciser Executive routines starts at address ØØ2ØØ.

4.3 Program and/or Operator Action

Set ADDRESS to Ø2ØØ

Press I/O RESET

Press START

The Program will type

SELECT SYSTEM PARAMETERS

TYPE IN 5 FOR 5Ø OR 6 FOR 6Ø CYCLE POWER

Type in a "5" if the processor power is 5Ø cycle or "6" if the processor power is 6Ø cycle. Any other key will cause a question mark to be typed and will be ignored. After registering the power cycle parameter the programs will type:

API-Y FOR YES N FOR NO

Type in an "N" if the system does not have an API option or if API is not to be utilized. Type in a "Y" for API to be enabled. Any other key will cause a question mark to be typed and will be ignored. After registering the API parameter selection, the program will type:

SELECT MEMORY

Ø FOR 8K

1 FOR 16K

2 FOR 24K

OR 3 FOR 32K

Type the appropriate key for the amount of memory to be initialized. Any key other than Ø to 3 will cause a question mark to be typed and will be ignored.

At this point, the program will proceed to the drive selection typeout for the TC59 Random Exerciser, (Paragraph 4.3 of MAINDEC 9A-D4GA)

After drive selection is completed, the following typeout will be issued by the RTC routine.

DISABLE RTC

TYPE IN TIME

WHEN TIME IS REACHED ENABLE RTC

TIME

The RTC routine keeps track of time utilizing a twenty-four hour clock, (i.e., 1:00 P.M. is 13:00) and requires that four digits be input).

Eight fifteen A.M. must be typed in as Ø8:15. Two thirty P.M. must be typed in as 14:30.

The TIME input routine will reject any characters that are not numeric (Ø to 9), type a question mark and reset to receive four characters. Care should be taken to type in a valid time.

5. OPERATING PROCEDURE

5.1 Operational Switch Settings

With AC switches 16 and 17 both Ø, the program will typeout the time every five minutes.

Time will be typed on the ten minute marks if the switches 16 and 17 are Ø1.

With switches 16 and 17 set to 1Ø the time will only be typed at the half hour marks.

If both switches are set to 1, the time will only be typed on the hour.

6. ERRORS

Most hardware malfunctions deleted by the TC59 Random Exerciser Executive Routine result in processor halts at specific addresses.

ADDRESS	EXPLANATION
234	A program interrupt occurred following an IOT instruction.
236	A program interrupt occurred and no flag could be found to be a 1. AC = I/O STATUS
336	A CAL Instruction was executed that did not equal CAL RANNUM or CAL* RANNUM
1615 to 1655	API Channel unexpected interrupt channels.

```
                        .TITLE MTEXEC
                        .ABS
                    /TC59 RANDOM EXERCISER EXECUTIVE ROUTINE
                    /DESIGNED TO BE USABLE BY ANY DEVICE
                    /ROUTINE HANDLES ALL MIN CONFIG 9 INTERRUPTS
                    /ALSO CONGLOMERATION OF OPEN INTERRUPT TYPEOUT
                    /ROUTINES AND TIME KEEPING VIA RTC
                    /TEXT ROUTINE HANDLES 5-7 ASCII
                    /TYPE CONTENTS OCTAL OUTPUTS AC IN 6 OCTAL DIGITS
                    /TYPE 2 OCTAL OUTPUTS AC 12 TO 17
                    /TYPE 1 OCTAL OUTPUTS AC 15 TO 17
                    /TYPE 1 ASCII OUTPUTS AC 10 TO 17
                    /TYPE CONTENTS DECIMAL TREATS AC AS 18 BIT UNSIGNED INTEGER
                    /ALL LOCATIONS USED BETWEEN 100 AND 200
                    /SHOULD BE DEFINED TO EACH PROGRAM
                    /
                    /
                    /THE CONTENTS OF THE FOLLOWING LOCATIONS
                    /WILL NOT CHANGE AND MUST BE DEFINED
                    /TO ANY EXTERNAL PERIPHERAL TEST USED
                    /WITH THIS EXECUTIVE ROUTINE
                    /
                    /THE ONLY LEGAL CAL INSTWSION IS FOR RANDOM NUMBERS.
00020                   .LOC 20
00020   000325              GETRNM
00021   600342          JMP GETRAN
00100                   .LOC 100
                    /
00100   000351  TYPTEX          TYPET           /TO GET TO TYPE TEXT
00101   000431  TYPCON          TYPEC           /TO GET TO TYPE CONTENTS OCTAL
00102   000454  TYOCT2          TY2OCT          /TYPE LOWEST 2 OCTAL
00103   000467  TYOCT1          TY1OCT          /TYPE 15 TO 17 OCTAL
00104   000476  TYASC1          TY1ASC          /TYPE 1 ASCII
00105   000507  TDECIM          TYDECI          /TYPE CONTENTS DECIMAL
00106   000574  WKYBD           GETKEY          /TO SET UP KYBD REQUEST
00107   000263  RANNUM          RANGEN          /TO GET RANDOM NUMBERS
                                            /JMS* RANNUM
                                            /CAL RANNUM
                                            /OR CAL* RANNUM ARE ALL LEGAL
                                            /ANY OTHER CAL IS ILLEGAL
00110   000074  CYCLEK          74              /=60 CYCLE MAKE=50 FOR 50 CYCLE
00111   017777  UPCORE          17777           /8K OF CORE GRTR IF EXTENDED
00112   000000  APIENA          0               /IF =400000 API EXISTS
                    /
                        .EJECT
```

```
                        /
00113   000256  DEVTES  NOTDEV              /IN CASE DEV TEST NOT LOADED
00114   000261  DEVFLG  NOFLAG              /DITTO
00115   000254  GETDEV  NODEVI              /DITTO NO PARAMETER ROUT
00116   000254  RDRTES  NODEVI              /NO RDR TEST
00117   000254  PUNTES  NODEVI              /NO PUNCH TEST
00120   000254  TTYTES  NODEVI              /NO TTY TEST
00121   000254  PROTES  NODEVI              /NO PROCESSOR TEST
00122   001164  GETSYS  SYSTEM              /NO SYSTEM GENERATOR
00123   000254  EAETES  NODEVI              /NO EAE TEST LOADED
00124   000261  RDRFLG  NOFLAG
00125   000261  PUNFLG  NOFLAG
00126   000262  TTYFLG  TTRUSY
00127   000254  KBDTES  NODEVI
                /TO DISMISS FROM TTY FLAGS
                /
00130   001551  TTYDIS  XTTYPR+1            /TO DISMISS PRINTER
00131   001536  KBDDIS  XKBDPR+1            /TO DISMISS KEYBOARD
00132   000251  LSTKEY CLRKBD               /TO NULLKBD AND DISMISS KBD FLG
                /
                /TO STORE DEVICE TEST INTERRUPT ROUTINE
00133   001501  DEVINT  XDEVFL    /STORE ADDRESS OF DEV INT ROUTINE
                                   /INDIRECT THROUGH DEV INT
                /FOR READER AND PUNCH TEST USAGE
00134   001607  PUNINT  XPTPPR     /WHW TO GO WHEN PUNCH FLAG=1
00135   001570  RDRINT  XPTRPR     /TO STORE READER FLAG RETURN ADDRS
00136   001610  PUNDIS  XPTPPR+1   /TO DISMISS FROM PUNCH FLAG
00137   001571  RDRDIS  XPTRPR+1   /TO DISMISS FROM READER FLAG
00140   000261  TELTES  NOFLAG     /TO CLEAR TELETYPE TEST ACTIVE
00141   001472  RDRSKP XFNOFL+11    /TO NOP RDR SKIP IF API IS ON
00142   000235  UNKNWN  IOHALT
00143   000255  DEVSTR  NODEVI+1
00144   000000  DEVHNG  0
                /
                        .EJECT
```

```
                        /RUN PORTION OF EXECUTIVE ROUTINE
                        /LOAD ALL PERTINENT TESTS AND START AT 200
00200                           .LOC 200
00200   703302  EXECTV   CAF                     /CLR ALL FLGS
00201   700004          CLOF                    /TURN CLOCK OFF
00202   707702          EEM                     /ENABLE EXTENDED
00203   100240          JMS CLRBSY              /CLR BUSY FLAGS
00204   700042          ION                     /ENABLE INTERRUPTS
00205   120122          JMS* GETSYS             /GET SYSTEM PARAMETERS
00206   120115          JMS* GETDEV             /GET DEVICE PARAMETERS
00207   100604          JMS GTTIME              /START REAL TIME CLOCK
00210   200112          LAC APIENA
00211   705504          ISA                     /EITHER TURN API ON OR NOP
                        /
                        /
                        /ROUTINE CYCLES IN THE NEXT SERIES
                        /OF JMS INSTRUCTIONS TO EXECUTIVE ROUTINES
                        /
00212   120113  EXECLP   JMS* DEVTES
00213   120117          JMS* PUNTES
00214   120116          JMS* RDRTES
00215   120120          JMS* TTYTES
00216   120127          JMS* KRDTES
00217   120121          JMS* PROTES
00220   120123          JMS* EAETES
00221   100766          JMS TSTIME
                        /NOW DO A STRING OF IOTS JUST FOR CONFUSION
00222   140000  PROINT   DZM 0
00223   700301          KSF                     /USE IOP
00224   707702          EEM                     /PULSES
00225   700314          IORS                    /1 2 AND 4
00226   200000          LAC 0                   /GET ADDRS 0
00227   741200          SNA
00230   600212          JMP EXECLP              /NO KEEP TESTING
00231   501656          AND (17777              /ONLY LEGAL ADR
00232   541657          SAD (PROINT+1)          /IS THE DZM+1
00233   600212          JMP EXECLP
00234   740040          HLT

                        /INTERRUPT DURING IOT'S
                        /
                        /INTERRUPTS COULD NOT FIND FLAG
00235   700314  IOHALT   IORS                    /RD STATUS
00236   740040          HLT                     /DISPLAY
00237   600236          JMP .-1                 /CALLS FOR RESTART
                        .EJECT
```

```
                                /
                                /CLR BUSY FLAGS SET UP IN CASE PREMATURE KBD FLG
                                /
00240   400240          CLRBSY  XCT .
00241   160114                  DZM* DEVFLG
00242   160124                  DZM* RDRFLG
00243   160125                  DZM* PUNFLG
00244   160126                  DZM* TTYFLG
00245   160140                  DZM* TELTES
00246   140144                  DZM DEVHNG
00247   120106                  JMS* WKYBD
00250   620240                  JMP* CLRBSY
                                /
00251   120106          CLRKBD  JMS* WKYBD
00252   620131                  JMP* KBDDIS
00253   600251                  JMP .-2
                                /
00254   400254          NODEVI  XCT .
00255   620254                  JMP* NODEVI
00256   400256          NOTDEV  XCT .
00257   140144                  DZM DEVHNG
00260   620256                  JMP* NOTDEV
                                /
00261   000000          NOFLAG  0
00262   000000          TTBUSY  0
                                /
                                /
                                .EJECT
```

```
                        /RANDOM NUMBER GENERATOR
                        /SHOULD ONLY BE ENTERED BY A MAINSTREAM PROG
                        /AND NOT BY INTERRUPT PROCESSORS
                        /
00263   400263  RANGEN  XCT .
00264   200312          LAC RANDEX
00265   541660          SAD (RANTBL+10
00266   741000          SKP
00267   600277          JMP RANTAD-1
00270   201661          LAC (RANTBL
00271   040312          DAC RANDEX
00272   200311          LAC RANCON
00273   745100          SPA!CLL
00274   744002          STL
00275   740010          RAL
00276   040311          DAC RANCON
00277   220312          LAC* RANDEX
00300   340311  RANTAD  TAD RANCON
00301   060312          DAC* RANDEX
00302   200310          LAC RANSAV
00303   740020          RAR
00304   360312          TAD* RANDEX
00305   040310          DAC RANSAV
00306   440312          ISZ RANDEX
00307   620263          JMP* RANGEN
00310   000000  RANSAV  0
                        /
00311   123456  RANCON  123456
00312   000323  RANDEX  RANTBL+10
00313   654321  RANTBL  654321
00314   361416          361416
00315   055363          055363
00316   546060          546060
00317   243035          243035
00320   762572          762572
00321   453237          453237
00322   150214          150214
                        /
                        .EJECT
```

```
                        /THE ONLY LEGAL CAL INSTRUCTION IS FOR RANDOM NUMBERS
                        /CAL OR CAL INDIRECTS ARE BOTH LEGAL
                        /FIRST ENTERED BY CAL  INDIRECT
00323   000020          GETCAL  0
00324   000000          GETCR   0                       /-1 IS DIRECT CAL 0 IS INDIRECT
00325   400325          GETRNM  XCT .
00326   140324                  DAM CALDIR              /INDICATE CAL I
00327   777777                  LAC -1
00330   340325                  TAD GETRNM              /CAL ADR+1
00331   040323                  DAC GETCAL
00332   200323                  LAC* GETCAL             /GET CAL INSTR
00333   501662                  AND (760777
00334   541663                  SAD (RANNUM             /GET CONTENTS OF IT
00335   741000                  SKP                     /MUST=RANNUM OR ILLEGAL
00336   740040                  HLT                     /ILLEGAL CAL HLT
                                                        /OK SKIP THE HALT
00337   100263                  JMS RANGEN              /GET RANDOM  NUMBER
00340   703344                  DBR                     /CLEAR IN CASE API
00341   620325                  JMP* GETRNM             /RESTOR LINK EXTEND MODE
                        /CAL DIRECT COMES HERE RESET 20 FOR NEXT CAL INDIRECT
00342   200020          GETRAN  LAC 20
00343   040325                  DAC GETRNM
00344   201664                  LAC (GETRAN
00345   040020                  DAC 20
00346   777777                  LAC -1
00347   040324                  DAC CALDIR
00350   600327                  JMP GETRAN+2
                        /
                        /MTEXEC - TAPE 2
                        /
                        /TYPE OUT ROUTINE RUN IN OPEN INTERRUPT MODE
                        /
                        /TYPE TEXT ROUTINE
                        /ENTERED BY JMS TYPET AC= ADDRESS OF TYPE OUT
                        /FIRST EXIT=JMS+1 WHEN FIRST CHARACTER OUTPUT
                        /2ND EXIT=JMS+2 WHEN COMPLETE MESSAGE IS OUT
                        /AFTER 2ND EXIT THERE MUST BE A JMP XTTYPR+1 TO DISMISS
                        /NONE OF THESE TYPE OUT ROUTINES ARE RE-ENTRANT
                        /MAINSTREAM MUST MAINIPULATE A TYPEOUT BUSY FLAG
00351   400351          TYPET   XCT .
00352   040424                  DAC CHRPTR              /SAVE TEXT ADDRESS
00353   777777                  LAC -1
00354   040427                  DAC PAIRCT              /RESET WORD PAIR COUNT
00355   100374                  JMS GETCHR              /GET FIRST CHAR OF MESS
00356   341665                  TAD (200                /CONVERT TO 8 BIT
00357   100476                  JMS TY1ASC              /START ITS OUTPUT
00360   620351                  JMP* TYPET              /FIRST EXIT MESSAGE STARTED
                        /
                        /
                        /AFTER EVERY TTY INTERRUPT THE PROGRAM STAYS
                        /IN TYPLUP UNTIL END OF MESSAGE
                        /RETURN FROM FIRST CHAR INTERRUPT IS TYPLUP
00361   100374          TYPLUP  JMS GETCHR              /GET NEXT CHARACTER
00362   541666                  SAD (177                /DELETE CODE
```

```
00363   600372                  JMP TYTXIT                  /YES END OF MESSAGE
00364   741200                  SNA                 /00 CHARACTER
00365   600361                  JMP TYPLUP          /YES DONT TYPE IT
00366   341665                  TAD (200            /CONVERT TO ASCII
00367   100476                  JMS TY1ASC          /START OUTPUT
00370   601551                  JMP XTTYPR+1        /RETURN OUTPUT START DISMISS
00371   600361                  JMP TYPLUP          /RETURN TTY INT GET NEXT CHAR
                        /EXIT END OF MESSAGE MAIN STREAM MUST JMP XTTYPR+1
00372   440351          TYTXIT  ISZ TYPET           /SO EXIT EOM
00373   620351                  JMP* TYPET          /WILL BE ENTER +2
                        /
                                .EJECT
```

```
                            /
                            /UNPACK ROUTINE -7 ASCII
                            /
00374      400374           GETCHR    XCT .
00375      440427                     ISZ PAIRCT
00376      600407                     JMP NUCHAR
00377      220426           NUPAIR    LAC* CMDPTR
00400      040424                     DAC LFHALF
00401      440426                     ISZ CMDPTR
00402      220426                     LAC* CMDPTR
00403      040425                     DAC RTHALF

00404      440426                     ISZ CMDPTR
00405      777773                     LAW 17773
00406      040427                     DAC PAIRCT

00407      777770           NUCHAR    LAW 17770
00410      040430                     DAC TEMPER
00411      200425           GETBCK    LAC RTHALF
00412      740010                     RAL
00413      440430                     ISZ TEMPER
00414      600417                     JMP GETMRE
00415      501666                     AND (177
00416      620374                     JMP* GETCHR
                            /
00417      040425           GETMRE    DAC RTHALF
00420      200424                     LAC LFHALF
00421      740010                     RAL
00422      040424                     DAC LFHALF
00423      600411                     JMP GETBCK
                            /
00424      000000           LFHALF    0
00425      000000           RTHALF    0
00426      000000           CMDPTR    0
00427      000000           PAIRCT    0
00430      000000           TEMPER    0
                            /
                                      .EJECT
```

```
                        /
                        /TYPE CONTENTS OCTAL ROUTINE
                        /
00431   400431  TYPEC   XCT .
00432   040571          DAC TYPECT              /SAVE LEAST SIG 6
00433   742020          RTR
00434   742020          RTR                     /MOVE MIDDLE 6 OVER
00435   742020          RTR
00436   040572          DAC TYPECT+1            /AND SAVE MIDDLE 6
00437   742020          RTR
00440   742020          RTR                     /MOVE MOST SIG 6 OVER
00441   742020          RTR
00442   100454          JMS TY2OCT              /AND START FIRST 1 OUT
00443   620431          JMP* TYPEC              /RETURN FIRST OF 2 START TYPE
00444   200572          LAC TYPECT+1            /RETURN 2 CHAR COMPLETED
00445   100454          JMS TY2OCT              /START 2ND 2 CHAR OUT
00446   601551          JMP XTTYPR+1            /RETURN FIRST OF 2ND 2 STARTED
00447   200571          LAC TYPECT              /RETURN 2 MORE CHAR FINIS
00450   100454          JMS TY2OCT              /START OUTPUT LAST 2 CHAR
00451   601551          JMP XTTYPR+1            /DIMISS FROM LAST OF 2ND 2
00452   440431          ISZ TYPEC               /EXIT JMS +2 WHEN
00453   620431          JMP* TYPEC              /ALL 6 DIGITS ARE OUT
                        /
                        /THE JMS TO TYPEC MUST BE FOLLOWED BY JMP XTTYPR+1
                        /SOMETIME AFTER END OF 6 CHARACTERS RETURNED
                        /
                        /TYPE 2 OCTAL CHARACTERS
                        /USE TYPEC ROUTINE AS AN EXAMPLE FOR USING TY2OCT
00454   400454  TY2OCT   XCT .
00455   040573          DAC TYPECT+2            /SAVE LEAST SIG 3 BITS
00456   742020          RTR                     /MOVE MOST SIG3 OVER
00457   740020          RAR
00460   100467          JMS TY1OCT              /OUTPUT 1 OCTAL DIGIT
00461   620454          JMP* TY2OCT             /RETURN IMMED AFTER TLS
00462   200573          LAC TYPECT+2            /RETURN AFTER INTERRUPT
00463   100467          JMS TY1OCT              /OUTPUT 2ND CHARACTER
00464   601551          JMP XTTYPR+1            /DISMISS FROM FIRST
00465   440454          ISZ TY2OCT              /STEP TY2 EXIT
00466   620454          JMP* TY2OCT             /EXIT BOTH CHAR TYPED
                        /
                        .EJECT
```

```
                        /
                        /TYPE 1 OCTAL CHARACTER USE TY2OCT AS EXAMPLE FOR ENTER
00467   400467  TY1OCT  XCT .
00470   501467          ANI (7                  /MASK OFF 3 BITS
00471   341470          TAD (260                /CONVERT TO ASCII
00472   100476          JMS TY1ASC              /START OUTPUT
00473   600473          JMP* TY1OCT             /RETURN OUTPUT STARTED
00474   440474          ISZ TY1OCT              /RETURN OUTPUT COMPLETED
00475   600467          JMP* TY1OCT             /EXIT 1 OCTAL CHAR TYPED
                        /
                        /
                        /TYPE 1 ASCII CHARACTER
                        /USE TYPET TYDECI OR TY1OCT AS ENTRANCE EXAMPLES
                        /
00476   400476  TY1ASC  XCT .
00477   700406          TLS                     /START OUTPUT CHAR
00500   200503          LAC TY1RET
00501   041550          DAC XTTYPR              /SET UP INT RETURN
00502   620476          JMP* TY1ASC             /EXIT CHAR STARTED
00503   000504  TY1RET  .+1                     /TO RETURN FROM INT
00504   700402          TCF                     /CLR FMAG IN CASE LAST CHAR
00505   440476          ISZ TY1ASC              /STEP EXIT INT RECD
00506   620476          JMP* TY1ASC             /EXIT CHARACTER PRINTED
                        /
                        /
                        /TYPE CONTENTS DECIMAL
                        /ENTER AC=18 BIT UNSIGNED NUMBER
                        /CONVERT TO 6 DECIMAL DIGITS AND OUTPUT
                        /FIRST LOOP CONVERTS TO 6 ASCII CHARACTERS
00507   400507  TYDECI  XCT .
00510   040562          DAC TYQUOT
00511   777772          LAW -6
00512   040430          DAC TEMPER
00513   040571          DAC TYPECT
00514   201671          LAC (DCHAR6
00515   040572  TYDLUP  DAC TYPECT+1
00516   100541          JMS TYVERT
00517   060572          DAC* TYPECT+1
00520   777777          LAW -1
00521   340572          TAD TYPECT+1
00522   440430          ISZ TEMPER
00523   600515          JMP TYDLUP
                        /
                        .EJECT
```

```
                                /
                                /
                                /2ND LOOP OUTPUTS 6 CHARACTERS
                                /GENERATED BY FIRST LOOP
                                /AFTER FIRST CHARACTER OUTPUT RE-ENTERED BY INTERRUPTS
00524   220572          TYDOUT  LAC* TYPECT+1           /GET FIRST OF 6
00525   440572                  ISZ TYPECT+1            /STEP ADRS
00526   440571                  ISZ TYPECT              /AND CHAR COUNTER
00527   100476                  JMS TY1ASC              /START OUTPUT FIRST
00530   620507                  JMP* TYDECI             /EXIT FIRST CHAR STARTED
00531   220572                  LAC* TYPECT+1           /RETURN FIRST CHAR DONE
00532   100476                  JMS TY1ASC              /START OUTPUT NEXT
00533   601551                  JMP XTTYPR+1            /DISMISS FROM LAST
00534   440572                  ISZ TYPECT+1            /STEP ADDRS FOR NEXT
00535   440571                  ISZ TYPECT              /DONE 6
00536   600531                  JMP .-5                 /NO START OUTPUT NEXT
00537   440507                  ISZ TYDECI              /STEP ENTER
00540   620507                  JMP* TYDECI             /EXIT ALL 6 OUTPUT
                                /GENERATE 1 DECIMAL CHARACTER
                                /TYQUOT=18 BIT UNSIGNED NUMBER
00541   400541          TYVERT  XCT .
00542   200562                  LAC TYQUOT
00543   140562                  DZM TYQUOT
00544   740100                  SMA
00545   600552                  JMP TVRTPL
00546   440562                  ISZ TYQUOT
00547   341672                  TAD (-12
00550   741100                  SPA
00551   600546                  JMP .-3
00552   341672          TVRTPL  TAD (-12
00553   741100                  SPA
00554   600557                  JMP .+3
00555   440562                  ISZ TYQUOT
00556   600552                  JMP TVRTPL
00557   341673                  TAD (12
00560   341670                  TAD (260
00561   620541                  JMP* TYVERT
                                /
                                .EJECT
```

```
00562  000000  TYQUOT  0
00563  000000  OCHAR1  0
00564  000000          0
00565  000000          0
00566  000000          0
00567  000000          0
00570  000000  OCHAR6  0
00571  000000  TYPECT  0
00572  000000          0
00573  000000          0
                /SET UP FOR KEYBOARD INPUT ROUTINE
00574  400574  GETKEY  XCT .
00575  200600          LAC KYBRET          /WHEN KBD FLAG=1
00576  041535          DAC XKBDPR          /COME HERE TO PROCESS
00577  620574          JMP* GETKEY                 /EXIT SET UP COMPLETE
00600  000601  KYBRET  .+1
00601  440574          ISZ GETKEY          /KBD FLAG=1 GETS US HERE
00602  700312          KRB                 /READ KYBD BUFFER
00603  620574          JMP* GETKEY         /EXIT ENTR+2 AC=CHAR
                /MAIN STREAM MUST DEBREAK BY JMP XKBDPR+1
                /

                /
                /MTEXEC - TAPE 3
                /REAL TIME CLOCK ROUTINES
                /GET CURRENT TIME AT START AND TURN CLOCK ON
                /HANDLE RTC INTERRUPTS KEEP TIME
                /TYPE OUT TIME EVERY 5-10-30 OR 60 MINUTES
00604  400604  GTTIME  XCT .
00605  220126          LAC* TTYFLG
00606  740200          SZA                 /TELETYPE BUSY
00607  600605          JMP .-2             /YES WAIT FOR IT
00610  777777          LAW -1
00611  041012          DAC TMTYPD          /SET TYPING TIME ACTIVE
00612  060126          DAC* TTYFLG         /SET PRITER ACTIVE
00613  201372          LAC TIMTEX
00614  120100          JMS* TYPTEX         /START TIME REQUEST
00615  620604          JMP* GTTIME         /EXIT BEFORE TYPED
                /
                .EJECT
```

```
                                /RETURN HERE AFTER TIME TEXT IS FULLY TYPED
00616   777774          GTTIM4  LAW -4
00617   040706                  DAC MINUTE+1            /TO COUNT 4
00620   200701                  LAC TENHR-1
00621   040707                  DAC MINUTE+2            /TO STORE 4
00622   120106                  JMS* WKYBD              /WAIT FOR KYBD FLG
00623   601551                  JMP XTTYPR+1            /DISMISS LAST TTY CHAR
00624   600627                  JMP TESVAL              /SEE IF VALID NUMBER
00625   120106                  JMS* WKYBD              /WAIT FOR NEXT INPUT
00626   601536                  JMP XKBDPR+1            /DISMISS LAST
00627   060707          TESVAL  DAC* MINUTE+2           /SAVE CHARACTER
00630   041154                  DAC SAVMIN              /IN CASE ITS LAST
00631   501674                  AND (360
00632   541670                  SAD (260                /WITHIN NUMBERS MAYBE
00633   600640                  JMP .+5                 /YES
00634   201451                  LAC TYQUES              /NO
00635   120100                  JMS* TYPTEX             /TYPE QUES MARK
00636   620132                  JMP* LSTKEY             /DISMISS KYBD FLG IGNORE PREMATURE KEY
00637   600616                  JMP GTTIM4              /TRY 4 NEW ONES
00640   777775                  LAW -3
00641   540706                  SAD MINUTE+1            /JUST INPUT 2ND
00642   760272          TMCOLN  LAW 272                 /YES
00643   440707                  ISZ MINUTE+2            /STEP STORE ADDRS
00644   440706                  ISZ MINUTE+1            /GOT 4 YET
00645   600673                  JMP TSCOLN              /NO SEE IF 2ND
00646   160126                  DZM* TTYFLG             /CLR PRTR ACTIVE
00647   760000                  LAW 0
00650   041012                  DAC TMTYPD              /SET WAIT NEXT MINUTE
00651   200110                  LAC CYCLEK              /1 COMP TO RTC
00652   740001                  CMA                     /FIRST INCREMENT IS
00653   040007                  DAC 7                   /TO SYNCHRONIZE
00654   200711                  LAC RTCRET              /SET UP RTC INT
                                /
00655   041516                  DAC XCLKPR              /TO PROCESS
00656   200112                  LAC APIENA
00657   740100                  SMA                     /API EXIST
00660   600665                  JMP .+5                 /NO
00661   201675                  LAC (JMS XCLAPI         /YES SETUP
00662   040051                  DAC 51                  /FOR API INTERRUPT
00663   201676                  LAC (NOP
00664   741000                  SKP
00665   201677                  LAC (CLSF
00666   041461                  DAC XFNDFL              /DONT CLSF IF API ON
00667   700044                  CLON                    /TURN CLOCK ON
00670   777704                  LAW -74                 /EXIT
00671   040710                  DAC RTCDEX
00672   620132                  JMP* LSTKEY             /DISMISS LAST KBD FLAG
                                /
                                .EJECT
```

```
00673   540642  TSCOLN  SAD TMCOLN          /2ND CHAR INPUT
00674   741000          SKP                 /YES
00675   600625          JMP TESVAL-2        /NOT 2ND WAIT NEXT
00676   120104          JMS* TYASC1                 /TYPE COLON
00677   620132          JMP* LSTKEY         /DISMISS 2ND INPUT AND PREMATURE KBD
00700   600622          JMP GTTIN4+4        /COLON TYPED GET 3RD CHAR
00701   000702          .+1
00702   000260  TENHR   26Ø
00703   000260  HOUR    26Ø
00704   000260  TENMIN  26Ø
00705   000260  MINUTE  26Ø
00706   777774          LAW -4
00707   000702          TENHR
00710   777704  RTCDEX  LAW -74
                /
                        .EJECT
```

```
                        /REAL TIME CLOCK INTERRUPT
                        /CHECK FOR SECOND MINUTES ETC
00711   000712  RTCRET  .+1
00712   440712          ISZ RTCDFX              /ONE MINUTE IS SKIP
00713   600762          JMP RTCXIT
00714   777704          LAW -74                 /RESET
00715   040710          DAC RTCDFX              /60 SECOND COUNTER
00716   440705          ISZ MINUTE
00717   777506          LAW -272
00720   340705          TAD MINUTE
00721   741100          SPA                     /GONE PAST 9 MINUTES
00722   600757          JMP RTCXIT-1            /NO
00723   201670          LAC (260
00724   040705          DAC MINUTE              /SET MINUTES TO 0
00725   440704          ISZ TENMIN              /+1 TEN MINUTE COUNTER
00726   777512          LAW -266
00727   340704          TAD TENMIN              /GONE PAST 60 MINUTES
00730   741100          SPA
00731   600757          JMP RTCXIT-1            /NO NOT HOUR YET
00732   201670          LAC (260
00733   040704          DAC TENMIN              /SET TEN MINUTES TO 0
00734   440703          ISZ HOUR                /+1 HOUR COUNT
00735   777506          LAW -272
00736   340703          TAD HOUR
00737   741100          SPA                     /HOUR COUNT EXCEED 9
00740   600744          JMP .+4                 /NO TEST FOR 24
                        /
00741   201670          LAC (260
00742   040703          DAC HOUR                /RESET HOUR TO 0
00743   440702          ISZ TENHR               /+1 TEN HOUR
00744   777514          LAW -264
00745   340703          TAD HOUR
00746   740200          SZA                     /AT A 4 HOUR INCREMENT
00747   600757          JMP RTCXIT-1            /NO
00750   777516          LAW -262                /YES SEE IF 2400
00751   340702          TAD TENHR
00752   741100          SPA                     /HOURS=24
00753   600757          JMP RTCXIT-1            /NO
00754   201670          LAC (260                /RESET TIME
00755   040703          DAC HOUR                /TO 00:00
00756   040702          DAC TENHR
00757   101713          JMS TDVHNG
00760   200110  RTCXIT  LAC CYCLEX
00761   740201          CMA
00762   040007          DAC 7                   /RESET 1 SECOND RTC
00763   440007          ISZ 7                   /TO 2 COMP CYCLES
00764   700244          CLON                    /ENABLE CLOCK
00765   601517          JMP XCLKPR+1            /DISMISS
                        /
                        .EJECT
```

```
                        /SEE IF IT IS TIME FOR 5-10-30 OR 60 MINUTE TYPEOUT
                        /OR IF IT IS PAST LAST TIME TYPED CLR TMTYPD
00766   400766  TSTIME  XCT .
00767   201012          LAC TMTYPD
00770   740200          SZA                     /TIME TYPEOUT ACTIVE
00771   601073          JMP TSPAST              /YES TEST HOW ACTIVE
00772   200705          LAC MINUTE
00773   541670          SAD (260                /AT A TEN MINUTE POINT
00774   601052          JMP TES510              /YES CHECK TIME SWS
00775   541700          SAD (265                /AT A 5 MINUTE
00776   741000          SKP                     /YES
00777   620766          JMP* TSTIME             /NOT 5 OR 10 EXIT
01000   750004          LAS
01001   501701          AND (3
01002   740200          SZA                     /TYPE EVERY 5
01003   620766          JMP* TSTIME             /NO WAIT FOR TEN
                        /TIME TO TYPE TIME TEST PRINTER ACTIVE
01004   220126  TYTIME  LAC* TTYFLG
01005   741200          SNA                     /PRINTER ACTIVE
01006   601105          JMP TYTMOK              /NO START TYPEOUT
01007   141012          DZM TMTYPD
01010   441012          ISZ TMTYPD              /PRINTER ACTIVE SET WAITING
01011   620766          JMP* TSTIME             /TRY AGAIN NEXT PASS
01012   000000  TMTYPD  0                       /=0 WAITING TIME
                                                /=1 WAITING TYPEOUT INACTIVE
                                                /=777777 TYPING TIME
                                                /=760000 WAITING NEXT MINUTE

                        /
                                .EJECT
```

[illegible]

```
01013   601017          TDVHNG  JMP .
01014   200144                  LAC DEVHNG              /GET HUNG FLAG
01015   740200                  SZA                     /HAS IT BEEN CLEARED
01016   601020                  JMP .+3                 /NOT FOR 5 MINUTES
01017   777777                  LAW -1
01020   040144                  DAC DEVHNG              /RESET HUNG FLAG
01021   621013                  JMP* TDVHNG             /EXIT NOT DEV HUNG
01022   200117                  LAC CYCLEK              /GET PWR
01023   740001                  CMA                     /CYCLES
01024   040007                  DAC 7
01025   440007                  ISZ 7                   /RESET RTC
01026   703302                  CAF                     /PWR CLR STOP ALL
01027   700002                  IOF                     /DISABLE INT
01030   700004                  CLOF                    /AND CLOC
01031   200112                  LAC APIENA
01032   705504                  ISA                     /RE ENABLE INTRUPTS
01033   700044                  CLON                    /CLOCK ON AGAIN
01034   700042                  ION
01035   707702                  EEM
01036   777777                  LAW -1
01037   060126                  DAC* TTYFLG                     /SET TTY BUSY
01040   201436                  LAC DHNGTX
01041   120100                  JMS* TYPTEX             /START TYPEOUT
01042   501042                  JMP .                   /HANG HERE UNTIL DONE
01043   100240                  JMS CLRBSY              /CLEAR-MAJOR RESTART
01044   201702                  LAC (.+3  /TO GET BACK DISMISS
01045   041546                  DAC XTTYPC
01046   620143                  JMP* DEVSTP             /RESTART DEVICE
01047   707702                  EEM
01050   441012                  ISZ TMTYPD              /TYPE OUT THE TIME
01051   620766                  JMP* TSTIME
                        /
                                .EJECT
```

```
                                /AND A TEN MINUTE MARK CHECK SWS
01052   750004   TES510   LAS
01053   501701            AND (3
01054   741200            SNA                    /TYPE EVERY 5
01055   601004            JMP TYTIME             /YES
01056   541703            SAD (1                 /TYPE EVERY 10
01057   601004            JMP TYTIME             /YES
01060   200704            LAC TENMIN
01061   541670            SAD (260
01062   601004            JMP TYTIME             /ALWAYS TYPE ON THE HOUR
01063   541704            SAD (263               /AT A HALF HOUR MARK
01064   741000            SKP                    /YES
01065   620766            JMP* TSTIME
01066   750004            LAS
01067   501701            AND (3
01070   541705            SAD (2                 /TYPE ON THE HALF HOUR
01071   601004            JMP TYTIME             /YES SEE IF PRTR ACTIVE
01072   620766            JMP* TSTIME
                          /SEE STAGE OF TYPEOUT IS BEING WAITED ON
01073   740100   TSPAST   SMA                    /WAITING PRINTER IN ACTIVE
01074   601004            JMP TYTIME             /YES SEE IF READY
01075   740001            CMA
01076   741200            SNA                    /IN PROCESS OF TYPING
01077   620766            JMP* TSTIME            /YES WAIT UNTIL DONE
01100   200705            LAC MINUTE             /TIME HAS BEEN TYPED
01101   541154            SAD SAVMIN             /IF ONE MINUTE HAS ELAPSED
01102   620766            JMP* TSTIME            /WHICH IT HASNT GET OUT
01103   141012            DZM TMTYPD             /CLR TIME TYPED FLAG
01104   620766            JMP* TSTIME            /WAIT FOR NEXT TYPEOUT
                          /PRINTER IS IN ACTIVE OK TO TYPE TIME
01105   777777   TYTMOK   LAW -1
01106   041012            DAC TMTYPD             /SET ACTIVE TYPING TIME
01107   060126            DAC* TTYFLG            /AND PRINTER ACTIVE
01110   200007            LAC 7
01111   740001            CMA                    /WAIT FOR MORE
01112   741200            SNA                    /THAN 1 CLOCK SLOP
01113   601110            JMP .-3                /BEFORE SAVING CURRENT TIME
01114   200702            LAC TENHR
01115   041151            DAC SAVTIM             /SAVE TEN HOUR
01116   200703            LAC HOUR
01117   041152            DAC SAVTIM+1           /HOUR
01120   200704            LAC TENMIN
01121   041153            DAC SAVTIM+2           /TEN MINUTE
01122   200705            LAC MINUTE
01123   041154            DAC SAVMIN             /AND MINUTE TIME
01124   777774            LAW -4
01125   041155            DAC SAVMIN+1           /SET UP TO
01126   201150            LAC SAVTIM-1           /OUTPUT THE 4 NUMBERS
01127   041156            DAC SAVMIN+2
01130   201431            LAC TIMETX
01131   120100            JMS* TYPTEX
01132   620766            JMP* TSTIME
                          /
                                   .EJECT
```

```
01133  777776          TMTYLP  LAW -2
01134  541155                  SAD SAVMIN+1            /2 CHARACTER SLOT
01135  101157                  JMS TYCOLN              /YES TYPE COLON
01136  221156                  LAC* SAVMIN+2           /GET NEXT DIGIT
01137  120124                  JMS* TYASCI                     /START TYPE IT
01140  601551                  JMP XTTYPR+1            /DISMISS LAST TTY INT
01141  441154                  ISZ SAVMIN+2            /INCR FOR NEXT
01142  441155                  ISZ SAVMIN+1            /TYPED 4
01143  601133                  JMP TMTYLP              /NO NO NEXT
01144  760000                  LAW 0
01145  041512                  DAC TMTYPD              /SET TYPED WAIT FOR NEXT MIN
01146  140124                  DZM* TTYFLG             /CLR PRINTER ACTIVE
01147  601551                  JMP XTTYPR+1            /DISMISLAST FLAG
01150  001151                  .+1
01151  000260          SAVTIM  260
01152  000260                  260
01153  000260                  260
01154  000260          SAVMIN  260
01155  777774                  LAW -4
01156  001151                  SAVTIM
01157  401157          TYCOLN  XCT .
01160  760272                  LAW 272
01161  120124                  JMS* TYASCI
01162  601551                  JMP XTTYPR+1
01163  621157                  JMP* TYCOLN
                       /
                               .EJECT
```

```
                                /LOAD SYSTEM PARAMETERS VIA
                                /TTY INPUT
01164   401164      SYSTEM      XCT .
01165   777777                  LAW -1
01166   060126                  DAC* TTYFLG                 /SET TTY ACTIVE
01167   201247                  LAC SYSTEX
01170   120100                  JMS* TYPTEX                 /TYPE HDR
01171   621164                  JMP* SYSTEM                 /EXIT
01172   120106                  JMS* WKYBD                  /SET UP WAIT KYBD
01173   620130                  JMP* TTYDIS                 /DISMISS TTYFLG
01174   541700                  SAD (265                /RETU AC=CHAR TYPED
01175   601202                  JMP .+5                     /50 CYCLE POWER
01176   541706                  SAD (266
01177   601204                  JMP .+5                     /60 CYCLE POWER
01200   101365                  JMS PTYQES                  /INVALID NOT 5 OR 6
01201   601172                  JMP SYSTEM+6                /TRY AGAIN
01202   201707                  LAC (62                     /62=50 FOR 50 CYCLE
01203   741000                  SKP
01204   201710                  LAC (74                     /60 FOR 60 CYCLE
01205   040110                  DAC CYCLEK
01206   201306                  LAC PAPITX                  /GET API SELECT
01207   120100                  JMS* TYPTEX
01210   620132                  JMP* LSTKEY                 /DISMISS KBD FLG
01211   120106      SYSTM1      JMS* WKYBD                  /SET UP WAIT KBD
01212   620130                  JMP* TTYDIS                 /DISMISS TTYFLG
01213   541711                  SAD (331                /Y
01214   601222                  JMP .+6                     /YES USE API
01215   541712                  SAD (316                /N
01216   601221                  JMP .+3                     /YES USE PIC ONLY
01217   101365                  JMS PTYQES                  /INVALID KEY
01220   601211                  JMP SYSTM1                  /TRY AGAIN
01221   751000                  CLA!SKP                     /AC=0 NO API
01222   201713                  LAC (400000                 /API ENABLE BIT
01223   040112                  DAC APIENA
01224   201323                  LAC MEMTEX                  /TYPE MEM SELECT
01225   120100                  JMS* TYPTEX
01226   620132                  JMP* LSTKEY                 /DISMISS KBD
01227   120106      SYSTM2      JMS* WKYBD                  /SET UP WAIT KBD
01230   620130                  JMP* TTYDIS                 /DISMISS TTY
01231   041360                  DAC SAVMEM                  /SAVE CHAR
01232   501714                  AND (374                /MASK
01233   541670                  SAD (260                /NUMBER 0 TO 3
01234   601237                  JMP .+3                     /YES
01235   101365                  JMS PTYQES                  /INVALID KEY
01236   601227                  JMP SYSTM2                  /TRY AGAIN
01237   201360                  LAC SAVMEM                  /GET CHARACTER
01240   501701                  AND (3                      /MASK 0-1-2 OR 3
01241   341715                  TAD (LAC MEMTBL)        /GET UP CORE INST
01242   041243                  DAC .+1                     /TO EXECUTE
01243   201361                  LAC MEMTBL                  /GET UP MEM LIMIT
01244   040111                  DAC UPCORE
01245   160126                  DZM* TTYFLG                 /CLR TTY ACTIVE
01246   620132                  JMP* LSTKEY                 /DISMISS LAST KEY
                                /
```

.EJECT

```
01247   001250          SYSTEX  .+1
01250   064241                  .ASCII <15><12><12>'SELECT SYSTEM PARAMETERS'<15><12>
01251   251612
01252   462130
01253   352100
01254   516632
01255   352212
01256   465012
01257   040644
01260   406330
01261   552212
01262   512461
01263   505000
01264   522632                  .ASCII 'TYPE IN 5 FOR 50 OR 6 FOR 60 CYCLE POWER '<177>
01265   042500
01266   446344
01267   032500
01270   432372
01271   220152
01272   301011
01273   751100
01274   331010
01275   647644
01276   201546
01277   020206
01300   546071
01301   442500
01302   502372
01303   742644
01304   203760
01305   000000
                        /
01306   001307          PAPITX  .+1
01307   064250                  .ASCII <15><12>'API-Y FOR YES N FOR NO '<177>
01310   150222
01311   266624
01312   043236
01313   511013
01314   142646
01315   202344
01316   043236
01317   511011
01320   647500
01321   774000
01322   000000
                        /
01323   001324          MEMTEX  .+1
01324   064252                  .ASCII <15><12>'SELECT MEMORY'<15><12>'0 FO'
01325   342630
01326   426072
01327   420232
01330   426331
01331   751262
01332   064246
```

```
01333   020214
01334   474000
01335   000000
01336   511007                  .ASCII 'R 8K'<15><12>'1 FOR 16K'<15><12>'2 F
01337   045432
01340   051424
01341   043236
01342   511006
01343   133226
01344   064246
01345   220214
01346   476444                  .ASCII 'OR 24K'<15><12>'OR 3 FOR 32K  '<177>
01347   031150
01350   454321
01351   247644
01352   201464
01353   043236
01354   511006
01355   331226
01356   201017
01357   700000
01360   000000         SAVMEM   0
                       /
01361   017777         MEMTBL   17777      /8K
01362   037777                  37777      /16K
01363   057777                  57777      /24K
01364   077777                  77777      /32K
                       /
01365   401365         PTYQES   XCT .
01366   201451                  LAC TYQUES
01367   120130                  JMS* TYPTEX
01370   620132                  JMP* LSTKEY
01371   621365                  JMP* PTYQES
                       /
                                .EJECT
```

```
01372  001373          TIMTFX  .+1
01373  [illegible]             .ASCII <15><12><12>'DISABLE RTC'<15>
01374  242222
01375  516[illegible]
01376  246[illegible]
01377  202452
01400  441417
01401  052[illegible]          .ASCII <12>'TYPE IN TIME'
01402  15021[illegible]
01403  202231
01404  620250
01405  446330
01406  500700
01407  064252                  .ASCII <15><12>'WHEN TIME IS REACHED ENABLE RTC'<15><12>
01410  744212
01411  471712
01412  444632
01413  425011
01414  151500
01415  512130
01416  141620
01417  426124
01420  242634
01421  406251
01422  442500
01423  512510
01424  306424
01425  522231                  .ASCII 'TIME '<177>
01426  542500
01427  774700
01430  000000
                       /
01431  001432          TIMETX  .+1
01432  064241                  .ASCII <15><12><12>'TIME '<177>
01433  252222
01434  466124
01435  077400
01436  001437          CHNGTX  .+1
01437  364241                  .ASCII  <15><12><12>'DEV TEST IS HUNG UP'<177>
01440  242[illegible]
01441  531[illegible]
01442  442[illegible]
01443  521[illegible]
01444  151[illegible]
01445  442[illegible]
01446  643500
01447  526417
01450  700000
                       /
01451  001452          TYQUFS  .+1
01452  375004                  .ASCII <077><40><40><177>
01453  077400
                       /
```

```
                        /
                        /MTEXEC - TAPE 4
                        /STANDARD PROGRAM INTERRUPT HANDLER
                        /FOR RANDOM EXERCISERS OR ANY PERIPHERAL
                        /TEST THAT MAY WANT TO RUN A PROCESSOR
                        /TEST AS A BACKGROUND JOB
                        /ALL PROGRAM LABELS ON THIS TAPE
                        /WILL CONTAIN AT LEAST 1 X
                        /THE TAPE HAS AN END STATEMENT AS THE
                        /LAST COMMAND AND MAYBE USED AS THE
                        /LAST TAPE OF YOUR ASSEMBLY
                        /
                        /FLAGS MUST BE CLEARED OUTSIDE THESE ROUTINES
                        /BUT AC AND ADDRESS 0 ARE SAVED EXCEPT
                        /FOR ANY OPTIONAL DEVICE
                        /
00001
00001   707702          XINEEM  EEM                     /ENTER EXTEND MODE PIE
00002   620003                  JMP* .+1                /FIND OUT WICH INTER
00003   001461                  XFNDFL
                        /DETERMINE WHICH FLAG CAUSED PROGRAM INT
01461
                                .LOC TYQUES+10
01461   700001          XFNDFL  CLSF
01462   741000                  SKP
01463   601503                  JMP XCLKFL
01464   700301                  KSF
01465   741000                  SKP
01466   601527                  JMP XKBDFL
01467   700401                  TSF
01470   741000                  SKP
01471   601542                  JMP XTTYFL
01472   700101                  RSF
01473   741000                  SKP
01474   601555                  JMP XPTRFL
01475   700201                  PSF
01476   741000                  SKP
01477   601601                  JMP XPTPFL
                        /THE STANDARD PDP-9 FLAGS HAVE BEEN TESTED
                        /BY SKIP IOTS AND DO NOT=1
                        /EITHER FOLLOW THE STRING WITH YOUR OWN
                        /SKIP CHAIN BY HAVING ITS TAPE EDITED OR
                        /YOUR PROGRAM SHOULD STORE THE ADDRESS OF THE CHAIN IN XDEVFL
01500   621501                  JMP* XDEVFL
                        /STORE THE ADDRESS OF OPTIONAL DEVICE
                        /SKIP IOTS IN THIS NEXT ADDRESS
01501   001502          XDEVFL  .+1
01502   740040                  HLT                     /IN CASE YOU DONT
                                                        /MODIFY CONTENTS OFF
                                                        /XDEVFL
                        /
                                .EJECT
```

```
                                /PROCESS CLOCK INTERRUPT
                                /EITHER FROM PIE OR API
                                /IF API ON 51 SHOULD=JMS XCLAPI
01503   041514          XCLKFL  DAC XCLKAC              /SAVE ACCUMULATOR
01504   200000                  LAC 0                   /GET INTER ADDRESS
01505   601511                  JMP .+4                 /SUB 1 AND SAVE IT
01506   401506          XCLAPI  XCT .                   /IN CASE PIE GOES CONFUSED
01507   041514                  DAC XCLKAC
01510   750000                  CLA
01511   341614                  TAD XMIN1
01512   041515                  DAC XCLKPC
01513   621516                  JMP* XCLKPR
                                /
                                /IT HAS BEEN DETERMINED THAT CLOCK FLAG = 1
                                /AC AND PC HAVE BEEN SAVED
                                /THE CONTENTS OF XCLKPR MUST CONTAIN
                                /THE ADDRESS OF YOUR ROUTINE TO ACTUALLY
                                /PROCESS THE CLOCK FLAG
                                /
01514   000000          XCLKAC  0
01515   401515          XCLKPC  XCT .
                                /
                                /DE BREAK FROM CLOCK FLAG ROUTINE
                                /ENTERED EITHER BY JMP XCLKPR+1 OR JMS XCLKPR
01516   401516          XCLKPR  XCT .
01517   201514                  LAC XCLKAC              /GET SAVED ACCUMULAPOR
01520   441515                  ISZ XCLKPC              /ENTEREDBY A@I
01521   601524                  JMP .+3                 /NO FROM PIE
01522   703344                  DBR
01523   621506                  JMP* XCLAPI
                                /
                                /IF DEBREAK ROUTINE IS ENTERED BY A
                                /JMS TO XCLKPR THE NEXT CLOCK INTERRUPT
                                /WILL RETURN TO THE JMS +1
                                /CLOCK FLAG SHOULD BE CLEARED OUTSIDE
                                /OF THIS ROUTINE
                                /
01524   700042                  ION
01525   703344                  DBR
01526   621515                  JMP* XCLKPC
                                /
                                .EJECT
```

```
                        /XKBDFL IT HAS BEEN DETERMINED THAT THE
                        /KEYBOARD FLAG IS SET
                        /SAVE THE AC AND 0 THEN GO TO PROCESS
                        /
01527   041533  XKBDFL  DAC XKBDAC          /SAFE THE AC
01530   200000          LAC 0               /GET ADDRESS 0
01531   041534          DAC XKBDPC          /SAVE FOR KYBD DBK
01532   621535          JMP* XKBDPR         /PROCESS KEYBD FLAG
                        /
                        /KEYBOARD FLAG = 1  AC AND PC HAVE BEEN SAVED
                        /
01533   000000  XKBDAC  0
01534   401534  XKBDPC  XCT .
01535   401535  XKBDPR  XCT .
01536   201533          LAC XKBDAC
01537   700042          ION
01540   703344          DBR
01541   621534          JMP* XKBDPC         /RETURN FROM TTY INT
                        /
                        /DEBREAK FROM KEYBOARD FLAG CAN BE ENTERED
                        /EITHER BY JMS XKBDPR OR JMP XKBDPR+1
                        /IF ENTERED BY JMS NEXT KEYBOARD FLAG
                        /WILL RETURN TO JMS +1 CLEARING OF THE
                        /KEYBOARD FLAG MUST OCCUR OUTSIDE THIS ROUTINE
                        /
                        /TELETYPE PRINTER FLAG = !
                        /SAVE AC AND PC GO TO ROUTINE TO PROCESS FLAG
01542   041547  XTTYFL  DAC XTTYAC          /SAVE AC CONTENTS
01543   200000          LAC 0               /AND INTERRUPT
01544   041546          DAC XTTYPC          /ADDRESS IN 0
01545   621550          JMP* XTTYPR         /PROCESS FLAG
                        /
01546   401546  XTTYPC  XCT .
01547   000000  XTTYAC  0
01550   401550  XTTYPR  XCT .
01551   201547          LAC XTTYAC
01552   700042          ION
01553   703344          DBR
01554   621546          JMP* XTTYPC
                        /
                        .EJECT
```

```
                        /PAPER TAPE READER FLAG = 1
                        /SAVE PC AC AND PROCESS FLAG
                        /
01555   041566  XPTRFL  DAC XPTRAC                  /SAVE AC FROM PDP INT
01556   200000          LAC 0                      /GET ADDRESS 0
01557   621563          JMP .+4                    /-1 AND SAVE IT
01560   401560  XPRAPI  XCT .                      /ENTERED HERE BY API
01561   041566          DAC XPTRAC                 /SO SKP AT ISZ FOR API
01562   750777          CLA                        /SO SKP AT ISZ FOR API
01563   341614          TAD XMIN1                  /ADDRESS -1 OR AC = -1
01564   041567          DAC XPTRPC                 /SAVE FOR DBR ROUTINE
01565   621570          JMP* XPTRPR
                        /
01566   000000  XPTRAC  0                          /AC AT INTERRUPT
01567   401567  XPTRPC  XCT .
01570   401570  XPTRPR  XCT .
01571   201566          LAC XPTRAC                 /GET AC AT INTERRUPT
01572   441567          ISZ XPTRPC                 /API INTERRUPT
01573   601576          JMP .+3                    /NO
01574   703344          DBR                        /API DO NOT ION
01575   621566          JMP* XPRAPI                /GO BACK TO PROCESSING
                        /
                        /
                        /READER INTERRUPT WAS FROM PIC NOT API
01576   700042          ION                        /TURN INTERRUPTS ON
01577   703344          DBR                        /TO RESTORE LINK
01600   621567          JMP* XPTRPC                /EXIT
                        /
                        /
                        /PAPER TAPE PUNCH FLAG = 1
                        /SAVE INTERRUPT AND PC GO TO PROCESS FLAG
                        /
01601   041604  XPTPFL  DAC XPTPAC
01602   200000          LAC 0
01603   041605          DAC XPTPPC
01604   621607          JMP* XPTPPR
                        /
01605   401605  XPTPPC  XCT .
01606   000000  XPTPAC  0
01607   401607  XPTPPR  XCT .
01610   201604          LAC XPTPAC
01611   700042          ION
01612   703344          DBR
01613   621605          JMP* XPTPPC
01614   777777  XMIN1   777777

                        .EJECT
```

```
                        /A HALT AT ONE OF THE FOLLOWING LOCATIONS
                        /INDICATES THAT AN API ADR IS INCORRECT
01615   401615          API40   XCT .
01616   740040                  HLT             /API XCT 40 IN ERR
01617   740040                  HLT             /41
01620   740040                  HLT             /42
01621   740040                  HLT             /43
01622   740040                  HLT             /44
01623   740040                  HLT             /45
01624   740040                  HLT             /46
01625   740040                  HLT             /47
01626   740040                  HLT             /50
01627   740040                  HLT             /51
01630   740040                  HLT             /52
01631   740040                  HLT             /53
01632   740040                  HLT             /54
01633   740040                  HLT             /55
01634   740040                  HLT             /56
01635   740040                  HLT             /57
01636   740040                  HLT             /60
01637   740040                  HLT             /61
01640   740040                  HLT             /62
01641   740040                  HLT             /63
01642   740040                  HLT             /64
01643   740040                  HLT             /65
01644   740040                  HLT             /66
01645   740040                  HLT             /67
01646   740040                  HLT             /70
01647   740040                  HLT             /71
01650   740040                  HLT             /72
01651   740040                  HLT             /73
01652   740040                  HLT             /74
01653   740040                  HLT             /75
01654   740040                  HLT             /76
01655   740040                  HLT             /77
                        /
                                .EJECT
```

```
                                /THE FOLLOWING JMS INSTRUCTIONS FILL API LOCATIONS
                                        .LOC 40
00040                                   JMS API40
00040      101615                       JMS API40+1
00041      101616                       JMS API40+2
00042      101617                       JMS API40+3
00043      101620                       JMS API40+4
00044      101621                       JMS API40+5
00045      101622                       JMS API40+6
00046      101623                       JMS API40+7
00047      101624                       JMS API40+10
00050      101625                       JMS API40+11
00051      101626                       JMS API40+12
00052      101627                       JMS API40+13
00053      101630                       JMS API40+14
00054      101631                       JMS API40+15
00055      101632                       JMS API40+16
00056      101633                       JMS API40+17
00057      101634                       JMS API40+20
00060      101635                       JMS API40+21
00061      101636                       JMS API40+22
00062      101637                       JMS API40+23
00063      101640                       JMS API40+24
00064      101641                       JMS API40+25
00065      101642                       JMS API40+26
00066      101643                       JMS API40+27
00067      101644                       JMS API40+30
00070      101645                       JMS API40+31
00071      101646                       JMS API40+32
00072      101647                       JMS API40+33
00073      101650                       JMS API40+34
00074      101651                       JMS API40+35
00075      101652                       JMS API40+36
00076      101653                       JMS API40+37
00077      101654                       .EJECT
```

```
                000000                  .END
01656           017777      *LIT
01657           000023      *LIT
01660           000323      *LIT
01661           000313      *LIT
01662           757777      *LIT
01663           000107      *LIT
01664           000325      *LIT
01665           000000      *LIT
01666           000177      *LIT
01667           000007      *LIT
01670           000260      *LIT
01671           000570      *LIT
01672           777766      *LIT
01673           000012      *LIT
01674           000360      *LIT
01675           101506      *LIT
01676           740000      *LIT
01677           700001      *LIT
01700           000265      *LIT
01701           000003      *LIT
01702           001747      *LIT
01703           000201      *LIT
01704           000263      *LIT
01705           000002      *LIT
01706           000266      *LIT
01707           000262      *LIT
01710           000274      *LIT
01711           000331      *LIT
01712           000316      *LIT
01713           400000      *LIT
01714           000374      *LIT
01715           201361      *LIT

                                        NO ERROR LINES
```

APIENA 00112
API40 01615
CALDIR 00324
CLOF 700074
CLON 700044
CLRBSY 00240
CLRKBD 00251
CLSF 700071
CMDPTR 00426
CYCLFK 00110
DCHAR1 00563
DCHAR6 00570
DEVFLG 00114
DEVHNG 00144
DEVINT 00133
DEVSTR 00143
DEVTFS 00113
DHNGTX 01436
EAETFS 00123
EXECIP 00212
EXFCTV 00200
GETBCK 00411
GETCAL 00323
GETCHR 00374
GETDEV 00115
GETKEY 00574
GETMRE 00417
GETRAN 00342
GETRNM 00325
GETSYS 00122
GTTIME 00604
GTTIM4 00616
HOWR 00703
IOWAIT 00235
KBDDIS 00131
KBDTFS 00127
KBF 700312
KSF 700301
KYWRET 00600
LFWAIF 00424
LSTKEY 00132
MEMTBL 01361
MEMTEX 01323
MINUTE 00705
NO EVI 00254
NOFLAG 00261
NOTDEV 00256
NOTHAR 00407
NUPAIR 00377
PAIRCT 00427
PAPITX 01306
PCF 700202
PLS 700276
PRTINT 00222
PRTTFS 00121

PSA	700204
PSB	700244
PSF	700221
PTYQFS	01365
PUNDIS	00136
PUNFLG	00125
PUNINT	00134
PUNTFS	00117
RANCON	00311
RANDFX	00312
RANGFN	00263
RANNUM	00107
RANSAV	00310
RANTAD	00300
RANTRL	00313
RCF	700102
RDRDIS	00137
RDRFLG	00124
RDRINT	00135
RDRSKP	00141
RDRTFS	00116
RRB	700112
RSA	700104
RSB	700144
RSF	700101
RTCDFX	00710
RTCRFT	00711
RTCXIT	00760
RT-ALF	00425
SAVMFM	01360
SAVMIN	01154
SAVTIM	01151
SYSTFM	01164
SYSTFX	01247
SYSTM1	01211
SYSTM2	01227
TCF	700402
TDECIM	00105
TDVHNG	01013
TFLTFS	00140
TEMPFR	00430
TENHR	00702
TENMIN	00704
TESVAL	00627
TES510	01052
TIMETX	01431
TIMTFX	01372
TLS	700406
TMCOLN	00642
TMTYLP	01133
TMTYPD	01212
TSCOLN	00673
TSF	700401
TSFAST	01073
TSTIME	00766

TTBUSY	ØØ262
TTYDIS	ØØ13Ø
TTYFLG	ØØ126
TTYTES	ØØ12Ø
TVHTPL	ØØ552
TYASC1	ØØ124
TYCOLN	Ø1167
TYDECI	ØØ577
TYDLUP	ØØ515
TYOOUT	ØØ524
TYOCT1	ØØ123
TYOCT2	ØØ122
TYPCON	ØØ121
TYPEC	ØØ431
TYPECT	ØØ571
TYPET	ØØ351
TYPLUP	ØØ361
TYPTEX	ØØ1ØØ
TYQUES	Ø1451
TYQUOT	ØØ562
TYTIME	Ø1ØØ4
TYTMOK	Ø11Ø5
TYTXIT	ØØ372
TYVERT	ØØ541
TY1ASC	ØØ476
TY1OCT	ØØ467
TY1RET	ØØ5Ø3
TY2OCT	ØØ454
UNKNWN	ØØ142
UPCORE	ØØ111
XKYBD	ØØ1Ø6
XCLAPI	Ø15Ø6
XCLKAC	Ø1514
XCLKFL	Ø15Ø3
XCLKPC	Ø1515
XCLKPR	Ø1516
XDEVFL	Ø15Ø1
XFIDFL	Ø1461
XINEFM	ØØØØ1
XKBDAC	Ø1533
XKBDFL	Ø1527
XKBDPC	Ø1534
XKBDPR	Ø1535
XMIN1	Ø1614
XPRAPI	Ø156Ø
XPTPAC	Ø1626
XPTPFL	Ø1621
XPTPPC	Ø1625
XPTPPR	Ø16Ø7
XPTRAC	Ø1566
XPTRFL	Ø1555
XPTRPC	Ø1567
XPTRPR	Ø157Ø
XTTYAC	Ø1547
XTTYFL	Ø1542

```
.TTYPC    01546
.TTYDR    01550
```

```
XINERM      00021
TYPTBX      00130
TYPCON      00141
TYOCT2      00102
TYOCT1      00103
TYASC1      00104
TDECIM      00105
XKYBD       00106
XAXNUM      00107
CYCLEK      00110
UPCORE      00111
APIENA      00112
DEVTBS      00113
DEVFIG      00114
GETDEV      00115
RDRTBS      00116
PUNTBS      00117
TTYTBS      00120
PRDTBS      00121
GETSYS      00122
SAFTBS      00123
RDRFIG      00124
PUNFIG      00125
TTYFIG      00126
KBDTBS      00127
TTYDIS      00130
KBDDIS      00131
LSTKEY      00132
DEVINT      00133
PUNINT      00134
RDRINT      00135
PUNDIS      00136
RDRDIS      00137
TELTBS      00140
RDRSKP      00141
UNKNWN      00142
DEVSTR      00143
DEVHNG      00144
EXECTV      00200
EXECIP      00212
PRDINT      00222
IO-AIT      00235
CLKBSY      00240
CLKRD       00251
XOTEVT      00254
XOTDEV      00256
XOFLAG      00261
TTXUSY      00262
XAXGEN      00263
XAXTAD      00320
XAXSAV      00318
XAXCON      00311
XAXDFX      00312
XAXTRL      00313
GETCAL      00323
```

SYSTEM 01164
SYSTM1 01211
SYSTM2 01227
SYSTEX 01247
PAPITX 01326
MEMTEX 01323
SAVMEM 01360
MEMTRL 01361
PTYOFS 01365
TIMTEX 01372
TIMETX 01431
DHNGTX 01436
TYOUFS 01451
XFNOFL 01461
XOFVFL 01501
XCLKFL 01503
XCLAPI 01506
XCLKAC 01514
XCLKPC 01515
XCLKPR 01516
XKBOFL 01527
XKBOAC 01533
XKBOPC 01534
XKBOPR 01535
XTTYFL 01542
XTTYPC 01546
XTTYAC 01547
XTTYPR 01550
XPTRFL 01555
XPRAPI 01560
XPTRAC 01566
XPTRPC 01567
XPTRPR 01570
XPTPFL 01601
XPTPPC 01605
XPTPAC 01606
XPTPPR 01607
XMIN1 01614
API40 01615
CLSF 700001
CLOF 700004
CLON 700044
RSF 700101
RCF 700102
RSA 700104
RRB 700112
RSB 700144
PSF 700201
PCF 700202
PSA 700204
PLS 700206
PSB 700244
XSF 700301
XRB 700312
TSF 700401

ICS 700472
TL 700406