716 PRINTER INTERROW TIMING TEST

A. PURPOSE OF TEST

1. This test is designed to measure the interrow timings on the 716 Print. These timings are derived from the Master Circuit Breakers and will give an indication of the stability of these breakers.

2. A REGULAR RUNNING OF THIS TEST IS REQUIRED. Interpretation of the printouts will show up potential troubles before errors actually occur on the printer. The timing chart shown gives ideal timings and should be used only as a guide for interpretation of the printouts.

B. METHOD OF TEST

1. The address register of the DSU steps each time a word is sent to the printer. By means of a storage channel instruction in DSU can be interrogated to keep track of the address register. A pre-calculated delay gets the program within range of the expected left time, then a series of store channel instructions are used to detect when the address register steps. A count of the store channels is kept for calculations.

   The printer and the program are synchronized by the occurrence of 9 left and tend to run together except when the DSU is using storage to extract a word. During this time the printer gets ahead of the program. but this is accounted for in the program by decreasing the increment each pass and adding the delay during calculations.

C. AREA OF MACHINE REQUIRED

1. Units - MF, any size CF, CR, DS, PR

2. Storage - 00000-00523
   and LOC. 777777 or 17777

D. PROGRAM CONTROL

1. Card Deck

000	9LD01 Diagnostic Loader
001-005	Timing Test
006-014	SPLAT
015	TRA CARD, TRA 00030
016, 017	Blanks

2. Printer Control Board
   Regular Diagnostic Board

3. Sense Switches

   a) SSW 1 to 5 Not used
      SSW 6 UP Halts at end of test
      SSW 6 DOWN Repeat test

E. NORMAL STOPS

   00146 Stops at end of test if sense switch 6 is UP.
         Press start to repeat test.

F. ERROR STOPS

   00066 Indicates accumulator is higher than storage
         channel and compare loop. Possible DSU trouble. Restart
         program; if stop reoccurs run appropriate diagnostics.

G. PRINTOUTS

   Normal printouts will be as in the sample. The first eleven lines contain no information other than they are the printouts from which the timings occurred.

   The next eleven lines contain the timigns in microseonds from 9 left to the other left timings. (See sample printout). The timing between 9 left and 8 left is 16,572 microseconds or, if the decimal is moved left three places, it would be 16.572 milliseconds.

H. COMMENTS

1. The only subroutine used in this test is "SPLAT" which is called in to convert timings to decimal and printout timing information.

2. Diagnostic Engineering would appreciate reports on the results of this test. Any suggestions for improvement or any peculiar conditions which this test shows up are of interest to Diagnostic Engineering.

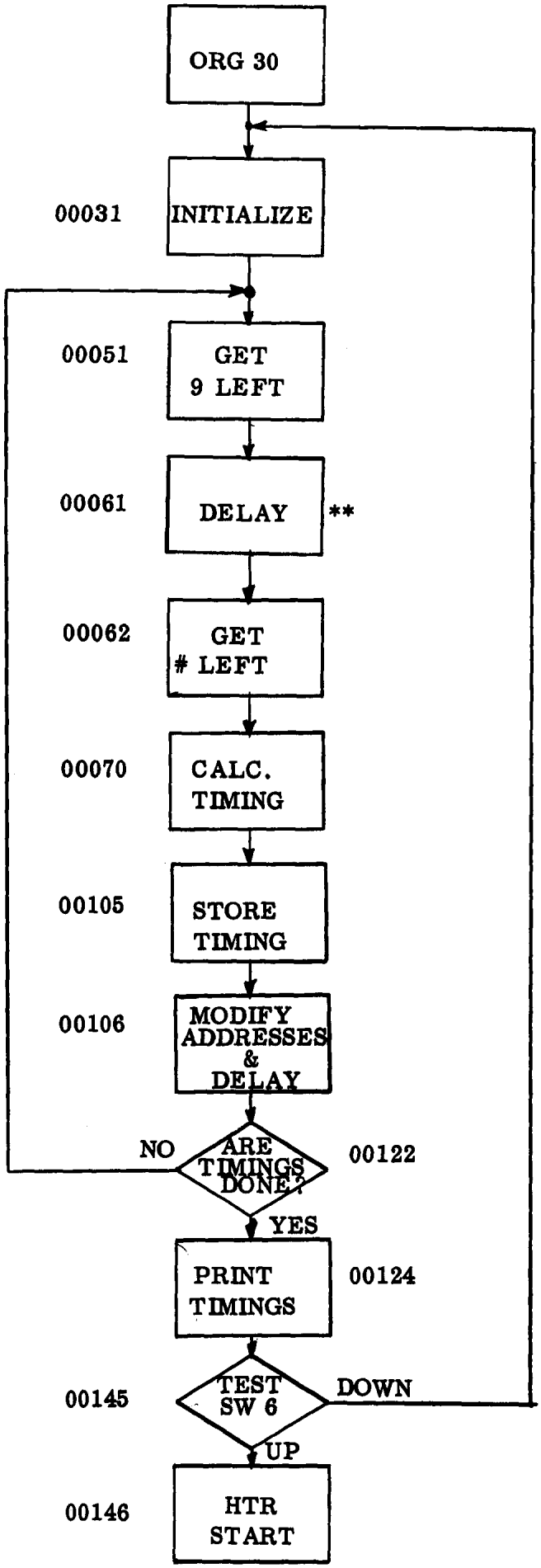
3. While running this test on printers being final tested, it was noted that the timings increased beyond theoretical timings as the speed of the printer decreased and as the printer speed increased the timings dropped below theoretical timings. If timing differ widely from theoretical, it is suggested that the sped of the machine be checked.

File Attachments: Source Cards Deck

SAMPLE PRINTOUT

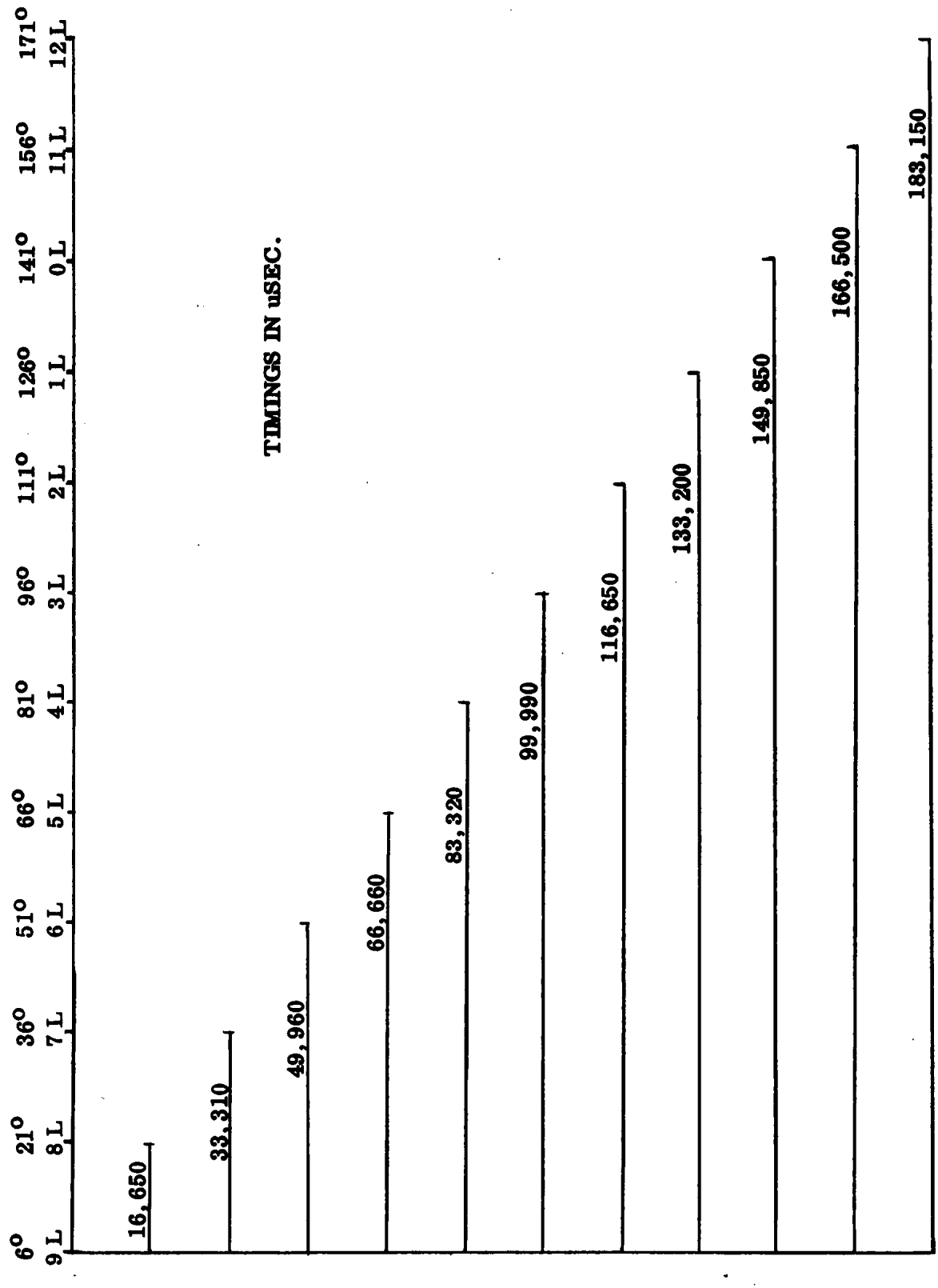
```
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
88 X7('28 '788 8  H+++H++H+BHIHGHG.PD  ('''' Z5 99 +   9999999999('(((
 16572 MICROSECONDS 9 LEFT TO  8 LEFT.
 33648 MICROSECONDS 9 LEFT TO  7 LEFT.
 50700 MICROSECONDS 9 LEFT TO  6 LEFT.
 67644 MICROSECONDS 9 LEFT TO  5 LEFT.
 83724 MICROSECONDS 9 LEFT TO  4 LEFT.
100032 MICROSECONDS 9 LEFT TO  3 LEFT.
116316 MICROSECONDS 9 LEFT TO  2 LEFT.
133416 MICROSECONDS 9 LEFT TO  1 LEFT.
150744 MICROSECONDS 9 LEFT TO  0 LEFT.
167796 MICROSECONDS 9 LEFT TO 11 LEFT.
184152 MICROSECONDS 9 LEFT TO 12 LEFT.
184152 MICROSECONDS 9 LEFT TO 12 LEFT.
```

716 PRINTER
INTERROW
TIMING TEST



Varies as delay increases 8-7-6-5-4-3-2-1-0-11-12

** Delay is varied for each timing



THEORETICAL TIMINGS
FROM 9 LEFT
FOR 716 PRINTER

```
*      PRINTER INTERROW TIMING TEST

                00030         ORG 24

00030  0766 00 0 01361  START  WPRA 1        SPACE PRINTER

00031  0500 00 0 00200         CLA INITA     RESTORE INCREMENT
00032  0601 00 0 00177         STO INCR

00033  0500 00 0 00201         CLA INITB     RESTORE INITIAL
00034  0601 00 0 00050         STO DELAY     DELAY.

00035  0500 00 0 00202         CLA INITC     RESTORE FIRST
00036  0601 00 0 00105         STO LOCNA     LOCATION.

00037  0500 00 0 00173         CLA PONE      RESTORE PRINTER
00040  0601 00 0 00175         STO PAHD      AHEAD DELAY.

00041  0600 00 0 00164         STZ SYNC      CLEAR STORE AREAS.
00042  0600 00 0 00165         STZ TEMPA
00043  0600 00 0 00166         STZ TEMPB
00044  0600 00 0 00171         STZ ROW
00045  0600 00 0 00170         STZ VARD
00046  0774 00 2 00013         AXT 11,2      SET XRB FOR TIMING LOOP.
00047  0774 00 1 00000  GET    AXT 0,1       RESET XRA
00050  0774 00 4 01204  DELAY  AXT 644,4     SET XRC FOR DELAY

*      SET UP CONTROL WORD, SELECT PRINTER + LOOK
*      FOR 9 LEFT.

00051  0500 00 0 00163         CLA CW        PUT CTRL WORD
00052  0601 00 0 77777         STO 32K       IN UPPER MEM.
00053  0766 00 0 01361         WPRA          SEL PRINTER
00054  0540 00 0 77777         RCHA 32K      GIVE COMMAND
00055  0640 00 0 00164         SCHA SYNC     INTERROGATE DSU
00056  0500 00 0 00164         CLA SYNC      SCHA INFO INTO ACC.
00057  0767 00 0 00030         ALS 24        SHIFT OUT HIGH ORDER
00060 -0100 00 0 00055         TNZ *-3       IS ACC ZERO

*      FOUND 9 LEFT-DELAY + LOOK FOR NEXT
*      LEFT TIME.

00061  2 00001 4 00061         TIX *,4,1     YES-TAKE DELAY
00062  0640 00 0 00165         SCHA TEMPA    INTERROGATE DSU
00063  0500 00 0 00165         CLA TEMPA     LOAD ACC
00064  0640 00 0 00166  SCHAD  SCHA TEMPB    INTERROGATE DSU
00065  0340 00 0 00166         CAS TEMPB     HAS ADR REG CHANGED
00066  0000 00 0 00066         HTR *         POSSIBLE DSU FAILURE, RERUN
00067  1 00003 1 00064         TXI SCHAD,1,3 NO-BACK THRU LOOP

*      FOUND NEXT LEFT TIME-STORE INDEX +
*      CALCUCLATE TIMINGS.

00070  0634 00 1 00171         SXA ROW,1     YES-STORE INDEX
00071  0534 00 4 00050         LXA DELAY,4   PUT DELAY IN XRC
```

```
00072  0634 00 4 00170         SXA VARD,4    STORE DELAY
00073  0560 00 0 00171         LDQ ROW       FIND TOTAL DELAY
00074  0200 00 0 00176         MPY 28US      THRU LOOP.
00075 -0600 00 0 00167         STQ TEMPC     STORE TOTAL DELAY
00076  0500 00 0 00170         CLA VARD      GET VARIABLE DELAY
00077  0400 00 0 00175         ADD PAHD      ADD PRINTER AHEAD DELAY
00100  0601 00 0 00172         STO TOT       STORE IT.
00101  0560 00 0 00172         LDQ TOT       FIND DELAY IN USEC
00102  0200 00 0 00174         MPY 24US      AND ADD IT
00103  0131 00 0 00000         XCA           TO LOOP DELAY
00104  0400 00 0 00167         ADD TEMPC     FOR INTERROW
00105  0601 00 0 00203  LOCNA  STO RO        TIMING.

*      MODIFY ADDRESSES + CONSTANTS.

00106  0500 00 0 00105         CLA LOCNA     STEP STORE
00107  0400 00 0 00173         ADD PONE      LOCATION FOR
00110  0601 00 0 00105         STO LOCNA     NEXT TIMING.

00111  0500 00 0 00177         CLA INCR      DECREASE AMOUNT
00112  0402 00 0 00173         SUB PONE      OF INCREMENT AS
00113  0601 00 0 00177         STO INCR      TIMING PROGRESS.

00114  0500 00 0 00050         CLA DELAY     INCREASE DELAY
00115  0400 00 0 00177         ADD INCR      FOR NEXT TIMING.
00116  0601 00 0 00050         STO DELAY

00117  0500 00 0 00175         CLA PAHD      INCREASE PRINTER
00120  0400 00 0 00173         ADD PONE      AHEAD DELAY
00121  0601 00 0 00175         STO PAHD

00122  2 00001 2 00047         TIX GET,2,1   REPEAT TILL ALL
                                             TIMINGS ARE COMPLETED.
*      INTERROW TIMINGS COMPLETED
*      PRINT OUT TIMINGS.

00123  0766 00 0 01361         WPRA 1        SPACE PRINTER

00124  0774 00 1 00013         AXT 11,1      SET XRA TO PRINT
00125  0500 00 1 00216  PRINT  CLA RO+11,1   OUT INTRROW
00126  0074 00 4 00455         TSX BTEN,4    TIMINGS.
00127  0761 00 0 00000         NOP           CALL IN SPALT
00130 -0600 00 0 00135         STQ TIME      PRINT ROUTINE.
00131 -0500 00 1 00163         CAL LT+11,1
00132  0602 00 0 00142         SLW DESIG
00133  0074 00 4 00216         TSX SPLAT,4
00134  0000 01 0 00007         HTR 7,,1
00135  606060606060     TIME   BCD 1
00136  604431235146            BCD 4 MICROSECONDS 9 LEFT TO
00137  622523464524
00140  626011604325
00141  266360634660
00142  606060606060     DESIG  BCD 1
00143  633360606060            BCD 1T.
00144  2 00001 1 00125         TIX PRINT,1,1
```

```
00145  0760 00 0 00166         SWT 6          REPEAT PROGRAM
00146  0000 00 0 00030         HTR START      NO-IF SENSE SW IS UP
00147  0020 00 0 00030         TRA START      YES-IF SENSE SW IS DOWN



00150  601060432526     LT     BCD 1 8 LEF
00151  600760432526            BCD 1 7 LEF
00152  600660432526            BCD 1 6 LEF
00153  600560432526            BCD 1 5 LEF
00154  600460432526            BCD 1 4 LEF
00155  600360432526            BCD 1 3 LEF
00156  600260432526            BCD 1 2 LEF
00157  600160432526            BCD 1 1 LEF
00160  600060432526            BCD 1 0 LEF
00161  010160432526            BCD 111 LEF
00162  010260432526            BCD 112 LEF

00163  0000 30 0 77776  CW     IOCD 32K-1,0,24

00164  0 00000 0 00000  SYNC
00165  0 00000 0 00000  TEMPA
00166  0 00000 0 00000  TEMPB
00167  0 00000 0 00000  TEMPC
00170  0 00000 0 00000  VARD
00171  0 00000 0 00000  ROW
00172  0 00000 0 00000  TOT

00173 +000000000001     PONE   DEC 1
00174 +000000000030     24US   DEC 24
00175 +000000000001     PAHD   DEC 1
00176 +000000000034     28US   DEC 28
00177 +000000001266     INCR   DEC 694
00200 +000000001266     INITA  DEC 694

00201  0774 00 4 01204  INITB  AXT 644,4
00202  0601 00 0 00203  INITC  STO RO
                 00203  RO     BSS 11
                 77777  32K    EQU 32767
```

INDEXABLE BCD PRINT SUBROUTINE.

*THIS SUBROUTINE USES THREE SYMBOLS, THEY ARE...

SPLAT, THE FIRST WORD OF THE ROUTINE

CI, USED FOR CARD IMAGE, 26 LOCATION

SUBET, THE CONTENTS OF XRC ARE STORED
IN THE ADDRESS OF SUBET.

*CONDTION OF THE ACC, MQ, AND ACC OVERFLOW
*TRIGGER IS NOT GUARANTEED ON EXIT FROM THIS ROUTINE.

THE PRINTER ON CHANNEL A IS USED
YOU MAY ENTER SPLAT+1 IF YOU HAVE
ALREADY GIVEN WRIT SELECT.

THE RCHA INSTRUCTION IS AT SPLAT+60.

THERE IS NO CHANNEL DELAY IN THE
SUBROUTINE, THEREFORE TAKE CARE NOT
TO USE CI UNTIL AFTER 12 ROW-RIGTH
HAS BEEN WRITTEN. FOR THIS REASON,
YOU MUST GIVE WRS FOR EACH ENTRY
OR ENTER AT SPLAT.

```
00216  0766 00 0 01361  SPLAT  WPRA          GET GOING
00217  0634 00 1 00313         SXA SPLAT+61,1
00220  0634 00 2 00314         SXA SPLAT+62,2
00221  0634 00 4 00404         SXA SUBET,4   SAVE ORGINAL XRC.
00222 -0520 00 4 00001         NZT 1,4       IF CONTROL WORD ZERO.

*5
00223  0020 00 4 00002         TRA 2,4       RETURN

00224 -0500 00 4 00001         CAL 1,4       GET NON-ZERO WORD
00225  0602 00 0 00343         SLW SPLAT+85  SAVE CONTROL WORD
00226 -0734 00 1 00000         PDX 0,1       TYPE WHEEL NO.
00227 -3 00000 1 00317         TXL SPLAT+65,1,0 IF DECR. ZERO, GET
                                             NEW CONTROL WORD

*10
00230 -0634 00 4 00232         SXD *+2,4     GET EXIT ADDRESS
00231  0737 00 2 00000         PAC 0,2       BY ADDING TWOS COMP.
00232  1 00000 2 00233         TXI *+1,2,0   OF N TO XRC.
00233  0634 00 2 00315         SXA SPLAT+63,2 EXIT VALUE.

                                SET BIT INDEX TO STARTING WHEEL

00234  0634 00 1 00237         SXA *+3,1     FOR SHIFTING

*15
00235  0774 00 3 00001         AXT 1,3       1 TO XRA AND XRB
00236 -0500 00 0 00340         CAL SPLAT+82  BIT INDEX TO P
```

```
00237 -0765 00 1 00000         LGR 0,1       SHIFT TO STARTING POINT
00240 -0100 00 0 00243         TNZ *+3       IF ACC IS ZERO, SET FOR
00241 -0600 00 0 00341         STQ SPLAT+83  RIGHT ROW, AND MAKE

*20
00242  1 00001 2 00244         TXI *+2,2,1   XRB A DUECE
00243  0602 00 0 00341         SLW SPLAT+83  OTHERWISE, LEFT ROW.
00244  0774 00 1 00032         AXT 26,1
00245  0600 00 1 00404         STZ CI+26,1   CLEAR CARD IMAGE
00246  2 00001 1 00245         TIX *-1,1,1


                                   FORM CARD IMAGE.

*25
00247  2 00001 4 00250         TIX *+1,4,1   ADDRESS OF FIRST WORD.
00250  0774 00 1 00006         AXT 6,1       CHARACTER COUNT.
00251  0560 00 4 00001         LDQ 1,4       GET THE WORD.
                                             SOME PEOPLE NEVER
                                             DO, YOU KNOW

00252  0634 00 1 00304         SXA SPLAT+54,1 SAVE CHARACTER COUNT.
00253 -0754 00 0 00000         PXD           CLEAR ACC

*30
00254 -0763 00 0 00002         LGL 2         ZONE
00255  0767 00 0 00001         ALS 1         TIMES 2
00256  0734 00 1 00000         PAX 0,1
00257  0634 00 1 00273         SXA SPLAT+45,1 FOR FUTURE REFERENCE.
00260  0760 00 0 00000         CLM

*35
00261 -0763 00 0 00004         LGL 4         DIGIT
00262  0767 00 0 00001         ALS 1         TIMES 2
00263  0602 00 0 00352         SLW CI        TEMP0
00264 -0500 00 0 00341         CAL SPLAT+83  BIT INDEX
00265 -0520 00 0 00352         NZT CI        IS DIGIT ZERO.

*40
00266  3 00000 1 00336         TXH SPLAT+80,1,0 IS ZERO ZONE TOO.
00267  0534 00 1 00352         LXA CI,1      OK, PROCEED
00270  3 00030 1 00276         TXH SPLAT+48,1,24 CHECK FOR ILLEGAL
00271  3 00024 1 00334         TXH SPLAT+78,1,20 SPECIAL CHARACTER.
00272 -0602 60 2 00352         ORS* SPLAT+92,2 XRB PICKS LEFT OR RIGHT.

*45
00273  0774 00 1 00000         AXT 0,1       ZONE AGAIN.
00274 -3 00000 1 00276         TXL *+2,1,0   NOTHING FOR ZERO ZONE
00275 -0602 60 2 00350         ORS* SPLAT+90,2 PLACE ZONE BIT.

                                    COLUMN SET.

00276  0771 00 0 00001         ARS 1         SET BIT INDEX TO
00277 -0100 00 0 00303         TNZ *+4       NEXT COLUMN, IF ANY.

*50
```

```
00300  3 00001 2 00312         TXH SPLAT+60,2,1 IF BX ZERO,+XRB 1, STOP

00301 -0500 00 0 00340         CAL SPLAT+82  IF NOT, SET TO RIGHT
00302  1 00001 2 00303         TXI *+1,2,1   ROW AND PROCEED.
00303  0602 00 0 00341         SLW SPLAT+83  BX READY FOR NEXT COLUMN.
00304  0774 00 1 00000         AXT 0,1       MORE CHARACTERS.

*55
00305  2 00001 1 00252         TIX SPLAT+28,1,1 NEXT COLUMN
00306  0534 00 1 00343         LXA SPLAT+85,1 MORE WORDS MAYBE.
00307 -2 00001 1 00312         TNX *+3,1,1    IF NOT, STOP.
00310  0634 00 1 00343         SXA SPLAT+85,1 YUMMY, GO GET EM.
00311  1 00000 0 00247         TXI SPLAT+25

                                   FIFTEEN MEN ON A DEAD MANS CHEST.

*60
00312  0540 00 0 00342         RCHA SPLAT+84  LET HER RIP
00313  0774 00 1 00000         AXT 0,1
00314  0774 00 2 00000         AXT 0,2
00315  0774 00 4 00000         AXT 0,4
00316  0020 00 4 00002         TRA 2,4         EXIT


                                    GET NEW CONTROL WORD FROM SOMPLACE


*65
00317  0634 00 4 00315         SXA SPLAT+63,4 FOR EXIT
00320  0534 00 1 00313         LXA SPLAT+61,1 RESTORE XRA
00321 -0520 60 0 00343         NZT* SPLAT+85 IF CONTROL WORD ZERO
00322  0020 00 0 00313         TRA SPLAT+61  RETURN.
00323 -0500 00 0 00343         CAL SPLAT+85  OLD CONTROL WORD

*70
00324  0625 00 0 00325         STT *+1       BRING OUT INDEX
00325 -0634 00 0 00327         SXD *+2,0     REGISTER, IF ONE IS TAGED.
00326  0737 00 4 00000         PAC 0,4
00327  1 00000 4 00330         TXI *+1,4,0   GET EFFECTIVE ADDRESS.
00330 -0500 00 4 00000         CAL 0,4       NEW CONTROL WORD.

*75
00331 -0734 00 1 00000         PDX 0,1       TYPE WHEEL ID.
00332  0602 00 0 00343         SLW SPLAT+85
00333  1 00001 4 00234         TXI SPLAT+14,4,1 PROCEED

                                   YOUR AN OLD SMOOOTHY.

00334 -0602 60 2 00346         ORS* SPLAT+88,2 PUT EIGHT IN, TAKE
00335  2 00020 1 00272         TIX SPLAT+44,1,16 16 OUT, - GOOD BUSINESS

*80
00336 -3 00004 1 00275         TXL SPLAT+47,1,4 IF NOT BLANK, SET ZONE.
00337  0020 00 0 00276         TRA SPLAT+48    BLANK.

00340 -0 00000 0 00000         MZE             FOR BIT INDEX.
```

```
00341  0000 00 0 00000         HTR             DYNAMIC BIT INDEX.
00342  0000 30 0 00354         IOCD CI+2,,24   BUFFER COMMAND

*85
00343  0000 00 0 00000         HTR             SPECIAL SALON FOR
                                                THE CONTROL WORD
00344  0000 00 0 00357         HTR CI+5
00345  0000 00 0 00356         HTR CI+4        BROW ADDRESSES
00346  0000 00 1 00405         HTR CI+27,1
00347  0000 00 1 00404         HTR CI+26,1     ZONE ROW ADDRESSES

*90
00350  0000 00 1 00377         HTR CI+21,1
00351  0000 00 1 00376         HTR CI+20,1     DIGIG ROW ADDRESSES

                 00352  CI     BSS 26
                 00404  SUBET  BSS 1

                                      TO WRITE PUNCH, USE TSX CRNCH,4.

00405  0766 00 0 01341  CRNCH  WPUA
00406  0020 00 0 00217         TRA SPLAT+1



*TRANSFORM THE CONTENTS OF ACC 1-35 TO OCTAL IN BCD FORMAT.
*A SIGN CHARACTER FOR MINUS, AND THE Q AND P BITS
*ARE STORED IN THE ADDRESS OF X+1. IF THERE ARE 6
*CHARACTERS OF LESS, RETURN IS MADE TO X+3, OTHER
*WISE, TO X+2. TRANSFORMED WORDS IN MQ AND ACC.
*THIS SUBROUTINE STORES XRC IN SUBSET, WHICH MUST BE
*SUPPLIED BY THE PROGRAM. NO BLANKS ARE INSERTED


00407  0634 00 1 00437  PX     SXA PX+24,1
00410  0634 00 2 00440         SXA PX+25,2
00411  0634 00 4 00404         SXA SUBET,4     SAVE XRC
00412  0601 00 0 00443         STO FREE
00413  0771 00 0 00043         ARS 35          P AND Q

*5
00414  0621 00 4 00001         STA 1,4         P AND Q TO X+1
00415  0560 00 0 00443         LDQ FREE
00416 -0754 00 0 00000         PXD             CLEAR ACC
00417 -0763 00 0 00001         LGL 1
00420  0767 00 0 00013         ALS 11          SIGN IF MINUS

*10
00421 -0602 00 4 00001         ORS 1,4         SIGN TO X+1
00422 -0765 00 0 00001         LGR 1           DROP SIGN
00423  0774 00 3 00006         AXT 6,3
00424 -0754 00 0 00000         PXD             CLEAR ACC
00425  0767 00 0 00003         ALS 3           ZONE

*15
00426 -0763 00 0 00003         LGL 3           DIGIT
```

```
00427  2 00001 1 00425         TIX *-2,1,1   6 TIMES.
00430  0602 00 0 00444         SLW FREE+1
00431 -0754 00 0 00000         PXD           CLEAR ACC
00432  0767 00 0 00003         ALS 3         ZONE

*20
00433 -0763 00 0 00003         LGL 3         DIGIT
00434  2 00001 2 00432         TIX *-2,2,1   6 TIMES
00435 -0130 00 0 00000         XCL           SECOND WORD TO MQ,
00436 -0500 00 0 00444         CAL FREE+1    FIRST TO ACC
00437  0774 00 1 00000         AXT 0,1

*25
00440  0774 00 2 00000         AXT 0,2
00441  0100 00 4 00003         TZE 3,4       X+3 FOR 1 WORD.
00442  0020 00 4 00002         TRA 2,4       X+2 FOR 2 WORDS.

                 00443  FREE   BSS 10

*FIXED BINARY TO FIXED BCD. BINARY WORD IN THE ACC ON
*ENTRY, BCD WORDS IN ACC AND MQ ON EXIT.
                                LEADING BLANKS FOR LEADING ZEROS.
                                BLANKS FOR PLUS, - FOR MINUS

*IF THE HIGH ORDER 6 CHARACTERS AR BLANK, RETURN IS
*MADE TO X+2, OTHERWISE X+1.

                                XRC IS STORED AT SUBET, WHICH MUST
                                BE SUPPLIED BY THE PROGRAM.

00455  0634 00 1 00504  BTEN   SXA BTEN+23,1
00456  0634 00 2 00505         SXA BTEN+24,2
00457  0634 00 4 00404         SXA SUBET,4   SAVE XRC
00460  0602 00 0 00443         SLW FREE      DROP SIGN
00461  0760 00 0 00000         CLM

*5
00462  0601 00 0 00446         STO FREE+3    SAVE SIGN
00463  0600 00 0 00444         STZ FREE+1
00464  0600 00 0 00445         STZ FREE+2
00465  0774 00 2 00002         AXT 2,2
00466  0774 00 1 00044         AXT 36,1

*10
00467 -0754 00 0 00000         PXD           CLEAR ACC.
00470  0560 00 0 00443         LDQ FREE
00471 -0520 00 0 00443         NZT FREE      WHEN ZERO-
00472  0020 00 0 00507         TRA BTEN+26   FINISHED.
00473  0221 00 0 00523         DVP BTEN+38   BY 10 DECIMAL.

*15
00474 -0600 00 0 00443         STQ FREE
00475  0767 00 1 00044         ALS 36,1      SHIFT TO POSITION,
00476  0361 00 2 00446         ACL FREE+3,2  TACK ON LOW ORDER-
00477  0602 00 2 00446         SLW FREE+3,2  SAVE PARTIAL RESULT.
00500  2 00006 1 00467         TIX BTEN+10,1,6 GET NEXT DIGIT, OR
```

```
*20
00501  2 00001 2 00466         TIX BTEN+9,2,1 SECOND WORD.
00502 -0500 00 0 00445         CAL FREE+2    IF XRB RUNS OUT BEFORE
                                             QUOT. IS ZERO, NO
                                             ROOM FOR SIGN.
00503  0560 00 0 00444         LDQ FREE+1    LOW ORDER TO MQ.
00504  0774 00 1 00000         AXT 0,1
00505  0774 00 2 00000         AXT 0,2

*25
00506  0020 00 4 00001         TRA 1,4       EXIT-TO X+1 FOR 2 WORDS.

                                    HE IS A FOWL CANINE.

00507  0500 00 0 00446         CLA FREE+3    BRING IN SIGN.
00510 -0501 00 0 00521         ORA BTEN+36   BLANK-MINUS.
00511 -0120 00 0 00513         TMI *+2       WAS WORD MINUS.
00512 -0500 00 0 00522         CAL BTEN+37   NO, GET BLANKS

*30
00513  0767 00 1 00044         ALS 36,1      BUMBSIE DAISY.
00514  0361 00 2 00446         ACL FREE+3,2  NON-ZERO DIGITS.
00515 -3 00001 2 00503         TXL BTEN+22,2,1 OUT ON HIGH ORDER
00516 -0130 00 0 00000         XCL
00517 -0500 00 0 00522         CAL BTEN+37   HIGH ORDER BLANK.

*35
00520  1 77777 4 00504         TXI BTEN+23,4,-1 RETURN TO X+2
00521 -006060606040            OCT -406060606040 BLANK MINUS.
00522 -206060606060            OCT 606060606060  BLANK PLUS
00523  0000 00 0 00012         HTR 10        DIVISOR

                 00030         END START
```

EOF*