CALCUL ORG $0000 POCKET CALCULATOR PROGRAM

0010: 0000
0020:
0030: ** ** ** THE FOLLOWING PROGRAM IS
0040: ** A POCKET CALCULATOR
0050: *
0060: ** INPUT/OUTPUT IS EITHER TELETYPAGE
0070: ** OR KIM KEYBOARD AND DISPLAY
0080: *
0090: ** INPUT IS GIVEN BY PRESSING THE
0100: ** KEYS FOR A DECIMAL NUMBER
0110: ** FOLLOWED BY A FUNCTIONKEY
0120: *
0130: ** ** ** FUNCTIONS:
0140: *
0150: ** A = + = ADD NUMBER TO RESULT
0160: ** B = - = SUBTRACT NUMBER FROM RESULT
0170: ** C = * = MULTIPLY RESULT BY NUMBER
0180: ** D = / = DIVIDE RESULT BY NUMBER
0190: ** E = C = CLEAR INPUT NUMBER
0200: ** F = A = CLEAR RESULT
0210: ** AD = R = REMAINDER OF LAST DIVISION
0220: ** DA = I = NUMBER STORED IN MEMORY
0230: ** + = C = NUMBER FROM MEMORY
0240: ** PC = % = CALCULATE PERCENTAGE
0250: ** GO = C = CLEAR RESULT
0260: *
0270: ** THE PROGRAM MAKES USE OF THE
0280: ** INTEGER CALCULATION PACKAGE
0290: ** 'INTCAL' PARTNO 770110.
0300: ** A 3-BYTE VERSION IS USED.
0310: *
0320: ** WHENEVER A DIFFERENT
0330: ** NUMBER OF BYTES PER
0340: ** NUMBER IS REQUIRED, THE
0350: ** DEFINITIONS CONTAINING
0360: ** SIZE, SIZA, SIZEB, SIZEC,
0370: ** ACQU, ACCMSB, ACCLSB,
0380: ** DACCU, DACLSB AND LOADAD
0390: ** HAVE TO BE CHANGED TO THE
0400: ** PROPER VALUE IN RELATION TO
0410: ** SIZE AND THE PROGRAM MUST BE
0420: ** REASSEMBLED.
0430: *
0440: ** AUTHOR: SIEP DE VRIES
0450: ** ------ BRUGSTRAAT 32
0460: ** LIMMEN (NH)
0470: ** THE NETHERLANDS
0480: *
0490: *
0500: *
0510:  *  *
0520:  * * * DEFINITIONS:
0530:  *
0540:  0000  SIZE  *  $0003
0550:  0000  SIZEA  *  SIZE  -01  ; SIZE  =  1
0560:  0000  SIZEB  *  SIZE  +03  ; SIZE  =  2
0570:  0000  SIZEC  *  SIZE  +02  ; SIZE  =  2 - 1
0580:  0000  PIAOAT  *  $1740  ; PIA TO TEST KIM/TTY
0590:  0000  INITRP  *  $17FE  ; INTERRUPT BREAK TRAP
0600:  0000  NMITRP  *  $17FA  ; NON-MASKABLE INTERRUPT TR
0610:  *
0620:  * * * GENERAL SUBROUTINES:
0630:  *
0640:  0000  SCARDS  *  $1F1F  ; DISPLAY DATA ON LED DISPLAY
0650:  0000  GETKEY  *  $1F6A  ; READ DATA FROM HEX KEYPAD
0660:  0000  QUTCH  *  $1E00  ; PRINT CHARACTER ON TTY
0670:  0000  GETH  *  $1E5A  ; READ CHARACTER FROM TTY
0680:  0000  CRLF  *  $1E2F  ; PRINT CARRIAGE RETURN/LINE
0690:  0000  PRIDY  *  $1E3B  ; PRINT 8YTF AS 2 DIGITS
0700:  0000  MONITR  *  $1000
0710:  *
0720:  * * * CHARACTER SET
0730:  *
0740:  0000  PLUS  *  $002B
0750:  0000  MIN  *  $002D
0760:  0000  MAAL  *  $002A
0770:  0000  DEEL  *  $002F
0780:  0000  CLANUM  *  $0043
0790:  0000  CLRALL  *  $0041
0800:  0000  REP  *  $0052
0810:  0000  MEMIN  *  $0049
0820:  0000  MEMOUT  *  $004F
0830:  0000  PRCNT  *  $0025
0840:  0000  VRAAG  *  $003F
0850:  *
0860:  * START OF PROGRAM
0870:  *
0880:  0000  DS  START CLD  ; INITIALIZE
0890:  0001  7B  SEI
0900:  0002  A9  00  LDAIM MONITR
0910:  0004  8D FE  F7  STA INITRP
0920:  0007  8D FA  17  STA NMITRP
0930:  000A  A9  1C  LDAIM MONITR /
0940:  000C  ED FF  17  SIA INITRP +01
0950:  000F  ED FB  17  STA NMITRP +01
0960:  0012  A0  00  LDYIM $00  ; RESULT AND
0970:  0014  A2  74  LDXIM NULL  ; MEMORY ARE BOTH
0980:  0016  20  13  03  JSR LOAD  ; ZERO
0990:  0019  A2  7A  LDXIM MEMRY
1000:  0018  20  27  03  JSR STORE
1010: 001E 20 00 02 GETINP JSR INPUT ; READ NUMBER + FUNCTION
1020: 0021 A2 F9 WEDER LDXIM DATA ; ADDRESS OF
1030: 0023 A0 00 LDVIM #00 ; OPERAND
1040: 0025 C9 2B CMPIM PLUS
1050: 0027 D0 05 BNE NOADD
1060: *
1070: 0029 20 35 03 JSR ADD ; ADD OPERAND
1080: 002C B0 40 BCS PROBLM ; CARRY SET IN ERROR
1090: 002E C8 20 NOADD CMPIM MIN
1100: 0030 D0 05 BNE NOMIN
1110: *
1120: 0032 20 47 03 JSR SUB ; SUBTRACT OPERAND
1130: 0035 B0 37 BCS PROBLM ; CARRY CLEAR IS ERROR
1140: 0037 C8 2A NOMIN CMPIM MAAL
1150: 0039 D0 05 BNE NOMAAL
1160: *
1170: 003B 20 5F 03 JSR MPY ; MULTIPLY OPERAND
1180: 003E B0 2E BCS PROBLM ; CARRY SET IS ERROR
1190: 0040 C8 2F NOMAAL CMPIM DEEL
1200: 0042 D0 05 BNE NODEEL
1210: *
1220: 0044 20 AC 03 JSR DVI ; DIVIDE BY OPERAND
1230: 0047 B0 25 BCS PROBLM ; CARRY CLEAR IS ERROR
1240: 0049 C8 41 NODEEL CMPIM CLRALL
1250: 004B D0 05 BNE NOCLER
1260: 004D A2 74 CLEAR LDXIM NULL
1270: 004F 20 13 03 JSR LOAD ; JUST LOAD ZERO
1280: 0052 C8 25 NOCLER CMPIM PRCNT
1290: 0054 D0 0C BNE NOPER
1300: *
1310: 0056 20 5F 03 JSR MPY ; MULTIPLY BY
1320: 0059 B0 13 BCS PROBLM ; PERCENTAGE
1330: 005B A2 77 LDXIM EENHON
1340: *
1350: 005D 20 AC 03 JSR DVI ; DIVIDE BY
1360: 0060 B0 0C BCS PROBLM ; ONE HUNDRED
1370: *
1380: 0062 C8 52 NOPER CMPIM REP
1390: 0064 D0 05 BNE NOREP
1400: 0066 A2 85 LDXIM DACCU
1410: 0068 20 1D 03 JSR LOAD
1420: 0068 4C 1E 00 NOREP JMP GETINP
1430: 006E 20 02 02 PROBLM JSR ERROR
1440: 0071 4C 1E 00 JMP GETINP
1450:
1460:
1470:
1480:
1490:
1500:
1510:   *
1520:   *   *   *   PAGE ZERO DEFINITIONS:
1530:   *
1540:   *
1550:  0074 00   NULL  =  $00
1560:  0075 00   =  $00
1570:  0076 00   =  $00
1580:  0077 00   EENHN  =  $00
1590:  0078 01   =  $01
1600:  0079 00   =  $00
1610:  007A 00   MEMRY  =  $00
1620:  007B 00   =  $00
1630:  007C 00   =  $00
1640:  007D 00   NUMCAR  =  $00
1650:  007E 00   PREV  =  $00
1660:  007F 00   ACCU  =  $00
1670:  0080   ACCMB  *  ACCU  -03 ;  ACCU  - SIZE
1680:  0080   ACCLSB  *  ACCU  +03 ;  ACCU  + SIZE
1690:  0080   DACCU  *  ACCU  +06 ;  ACCU  + 2  *  SIZE
1700:  0080   DACLSB  *  DACCU  +02 ;  DACCU  + SIZE  - 1
1710:  0080   LOADAD  *  DACCU  +06 ;  DACCU  + 2  *  SIZE
1720:  0080   ACCSAV  *  LOADAD  +02
1730:  0080   MULIND  *  ACCSAV  +01
1740:  0080   MULCNT  *  MULIND  +01
1750:  0080   DATA  *  MULCNT  +01
1760:  0080   DATA  *  $00F9
1770:   *
1780:  0200   ORG  $0200
1790:   *
1800:   *
1810:   *
1820:   *
1830:   *
1840:   *
1850:   *
1860:   *
1870:   *
1880:   *
1890:   *
1900:   *
1910:   *
1920:  0200  A2 F9   INPUT  LDXIM  DATA  ;  PERFORM  OUTPUT
1930:  0202 A0 00   LDYM  $00  ;  FIRST
1940:  0204 20 27 03   JSR  STORE
1950:  0207 20 92 02   WERDN  JSR  OUTPUT
1960:  020A  A9 00   LDAIM  $00  ;  CLEAR  DIGIT-
1970:  020C 85 7D   STA  NUMCAR  ;  COUNTER
1980:  020E 20 71 02   WERIN  JSR  INCHAR  ;  READ  NEXT  CHARACTER
1990:  0211  C9 43   CMPIM  CLRNUM  ;  CLEAR  NUMBER
2000:  0213 F0 EB   BEQ  INPUT  ;  RE-DISPLAY  RESULT
2010: 0215 C9 49 CMPIM MEMIN
2020: 0217 D0 0F BNE NOMEMI
2030: 0219 A5 F9 LDA DATA ; MEMORY IN
2040: 021B 85 7A STA MEMRY ; DISPLAY NUMBER
2050: 021D A5 F9 LDA DATA +01
2060: 021F 85 7B STA MEMRY +01
2070: 0221 A5 FB LDA DATA +02
2080: 0223 85 7C STA MEMRY +02
2090: 0225 4C 07 02 JMP WERONP
2100: 0228 C9 4F NOMEMI CMPIM MEMOUT ; NUMBER COMES
2110: 022A D0 0F BNE TESDEC ; FROM MEMORY
2120: 022C A5 7A LDA MEMRY
2130: 022E 85 F9 STA DATA
2140: 0230 A5 7B LDA MEMRY +01
2150: 0232 85 FA STA DATA +01
2160: 0234 A5 7C LDA MEMRY +02
2170: 0236 85 FB STA DATA +02
2180: 0238 4C 07 02 JMP WERONP
2190: 023A C9 30 TESDEC CMPIM '0'
2200: 023C 10 01 BPL GODEC
2210: 023E 60 NODEC RTS ; LEAVE CHARACTER UNKNOWN
2220: 0240 C9 3A GODEC CMPIM $3A
2230: 0242 10 FB BPL NODEC
2240: 0244 A6 7D LDX NUMCAR ; IT IS DECIMAL
2250: 0246 00 0B BNE NOTFRS
2260: 0248 A0 00 LDVIM #00 ; FIRST DIGIT CLEARS
2270: 024A 84 F9 STY DATA ; NUMBER
2280: 024C 84 FA STY DATA +01
2290: 024E 84 FB STY DATA +02
2300: 0250 3B NOTFRS SEC
2310: 0251 E9 30 SBCIM '0' ; OBTAIN VALUE
2320: 0253 2A ROLA ; DIGIT LEFT POSITIONED
2330: 0254 2A ROLA ; IN ACCUMULATOR
2340: 0255 2A ROLA
2350: 0256 2A ROLA
2360: 0257 A2 04 LDVIM $04 ; SHIFT DIGIT IN
2370: 0259 2A ROLVER ROLA
2380: 025A 26 F9 ROL DATA
2390: 025C 26 FA ROL DATA +01
2400: 025E 26 FB ROL DATA +02
2410: 0260 CA DEX
2420: 0261 D0 F6 BNE ROLVER
2430: 0263 E6 7D INC NUMCAR
2440: 0265 A5 7D LDA NUMCAR
2450: 0267 C9 07 CMPIM #$07 ; TEST IF TOO MANY DIGITS
2460: 0269 30 A3 BMI WERINP
2470: 026B 20 A0 02 JSR ERROR
2480: 026E 4C 00 02 JMP INPUT
2490:
2500:
2510:    *               "                  "
2520:    *  *** SUBROUTINE TO READ A
2530:    *  CHARACTER FROM KIM OR TTY
2540:    *  OUTPUT IS IN ASCII
2550:    *
2560: 0271 A9 01 INCHAR LDAIM $01
2570: 0273 2C 40 17 BIT PIADAT ; TEST IF KIM
2580: 0276 F0 16 BEQ TTYIN
2590: 0278 20 1F 1F PUNTA JSR SCANDS ; WAIT FOR NO KEY
25a0: 027B D0 FB BNE PUNTA
25b0: 027D 20 1F PUNTB JSR SCANDS ; WAIT FOR A KEY
25c0: 0280 F0 FB BEQ PUNTB
25d0: 0282 20 6A 1F JSR GETKEY
25e0: 0285 C9 15 CMPIM $15 ; IGNORE IT IF
25f0: 0287 10 EF BPL PUNTA ; BOUNCE
2600: 0289 AA TAX
2610: 028A BD FD 03 LDAAX ASCTAB ; CONVERT TO ASCII
2620: 028D E0 RTS
2630: 028E 20 5A 1E TTYIN JSR GETCH ; TTY IS EASIER
2640: 0291 E0 RTS
2710:    *
2720:    *  *** OUTPUT NUMBER FROM
2730:    *  DATA AREA TO TTY IF CONNECTED
2740:    *
2750: 0292 A9 01 OUTPUT LDAIM $01
2760: 0294 2C 40 17 BIT PIADAT
2770: 0297 F0 01 BEQ ITTTY
2780: 0299 E0 RTS
2790: 029A A2 02 ITTTY LDIXM $02
27a0: 029E 20 3B 1E JSR PRIBYT
27b0: 02A1 CA DEX
27c0: 02A2 10 FB BPL WTYP
27d0: 02A4 20 2F 1E OUTYP JSR CRMLF
27e0: 02A7 E0 RTS
2860:    *
2870:    *  *** ERROR SUBROUTINE
2880:    *
2890: 02A8 A9 01 ERROR LDAIM $01
2900: 02AA 2C 40 17 BIT PIADAT
2910: 02AD F0 0A BEQ TTYERR
2920: 02AF A2 02 LDIXM SIZEA
2930: 02B1 A9 FF LDAIM $FF
2940: 02B3 95 7F SETFUL STAAX ACCU
2950: 02B5 CA DEX
2960: 02B6 10 FB BPL SETFUL
2970: 02B8 E0 RTS
2980: 02B9 A9 3F TTYERR LDAIM VRAAG
2990: 02BB 20 A0 1E JSR DUTC
3000: 02BE 4C A4 02 JMP OUTYP
ORG $0300

* * * INTEGER PACKAGE 'INTCAL'

* #770110

* COPYRIGHT (C) 1977, 1982

* WESTVIERI COMPUTER CONSULTING B.V.

* P.O. BOX 20

* OOSTZAAN

* THE NETHERLANDS

* * FUNCTIONS PROVIDED:

* LOAD, STORE, ADD, SUBTRACT,

* MULTIPLY, DIVIDE

* * B E G A L G S T X  LOADAD ; GENERAL SETUP AND

B E G A L G S T Y  LOADAD +01 ; INITIALIZE

S T A  ACCS A V

L D X I M  S I Z E A

L D Y I M  $00

C L R W E R  S T Y I X  A C C L S B

D E X

B P L  C L R W E R

L D X I M  S I Z E A

S E D

R T S

L O A D  J S R  B E G A L G ; LOAD INTO

L O A D A Y  L D A I Y  LOADAD ; ACCU

S T A I Y  A C C U

I N Y

D E X

A L G O U T  C L D ; GENERAL EXIT

L D X  LOADAD ; RESTORE REGISTERS

L D Y  LOADAD +01

L D A  A C C S A V

R T S

S T O R E  J S R  B E G A L G ; STORE FROM

N S T O R  L D A I Y  A C C U ; ACCU

S T A I Y  LOADAD

I N Y

D E X

B P L  N S T O R

B M I  A L G O U T

J S R  B E G A L G ; ADD INTO

A L G O U T  C L ; ACCU

L D A I Y  A C C U

A D O C I Y  LOADAD

S T A I Y  A C C U

I N Y

D E X
4010: 03A0 CA DEX *
4020: 03A1 D0 F9 BNE WUSTUR
4030: 03A3 86 85 STX DACCU
4040: 03A5 C8 INY
4050: 03A6 C6 8F DEC MULCNT
4060: 03A8 D0 CE BNE OUTLUP
4070: 03A9 F0 B0 PULGO BEQ CLICAR
4080: 03AC 86 8B DVI STX LOADAD
4090: 03AE 84 8C STY LOADAD +01
4100: 03BA 85 8D STA ACCSAY
4110: 03B2 A2 03 LDXIM SIZE
4120: 03BA 86 8E STX MULIND
4130: 03B6 A2 05 LDXIM SIZEC
4140: 03BB B5 7F MOVDIV LDAAX ACCU
4150: 03BA 95 85 STAAX DACCU
4160: 03BC A9 00 LDAIM $00
4170: 03BE 95 7F STAAX ACCU
4180: 03C0 CA DEX
4190: 03C1 10 F5 BPL MOVDIV
4200: 03C3 A0 02 DIVLUP LDYIM SIZEA
4210: 03C5 86 8E LDX MULIND
4220: 03C7 B5 87 TESWER LDAAX DACLSB
4230: 03CB D1 8B CMPXY LOADAD
4240: 03CB 90 29 BCC FINDIV
4250: 03CD B5 87 LDAAX DACLSB
4260: 03CF F0 21 BEQ NOCOMP
4270: 03D1 A6 8E LDX MULIND
4280: 03D3 A0 00 LDYIM $00
4290: 03D5 A9 03 LDAIM SIZE
4300: 03D7 B5 8F STA MULCNT
4310: 03D9 F8 SED
4320: 03DA B5 85 DIVRE LDAAX DACCU
4330: 03DC F1 8B SBCXY LOADAD
4340: 03DE 95 85 STAAX DACCU
4350: 03E0 E8 INX
4360: 03E1 C8 INY
4370: 03E2 C6 8F DEC MULCNT
4380: 03E4 D0 F4 BNE DIVRE
4390: 03E6 B5 7C LDAAX ACCMSB
4400: 03E8 C9 99 CMPIM $99
4410: 03EA B0 A4 BCS ULGO
4420: 03EC 69 01 ADCIM $01
4430: 03EE 95 7C STAAX ACCMSB
4440: 03F0 D8 D1 BNE DIVLUP
4450: 03F2 CA NOCOMP DEX
4460: 03F3 B8 DEY
4470: 03F4 10 D1 BPL TESWER
4480: 03F6 C6 8E FINDIV DEC MULIND
4490: 03F8 10 C9 BPL DIVLUP
4500: 03FA 4C 03 JMP CLICAR
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