VU27

```
   2 3100
  10 3100          \ @@@ @@@  @
  11 3100          \  @   @   @@
  12 3100          \  @   @@   @
  13 3100          \  @   @    @
  14 3100          \ @@@ @   @@@
  15 3100          \
 500 3100 4C 0F 31  JMP KK1
1000 3103          \CONTROL SECTION
1010 3103          :UU1
1020 3103 20 BE 34  JSR QQ13 CHECK FOR CHAR FROM K/B (THIS ROUTINE ALSO
1025 3106          \CALLED FROM JJ1)
1030 3106 20 E9 34  JSR QQ20 SEND ANY CHAR WAITING IN K/B BUFFER (THIS ROUTINE
1035 3109          \ONLY CALLED FROM HERE)
1050 3109 20 7C 35  JSR RR1 TRANSFER PRESTEL BUFFER TO #2C70 W/S (THIS ROUTINE
1055 310C          \ONLY CALLED FROM HERE)
1080 310C 4C 03 31  JMP UU1
$    1 310F
  10 310F          \ @@@ @@@  @@
  11 310F          \  @   @   @  @
  12 310F          \  @   @@     @
  13 310F          \  @   @     @
  14 310F          \ @@@ @   @@@@
  15 310F          \
1000 310F          \INITIALISE
1010 310F 20 F1 36 :KK1 JSR VV4 CLEAR ALL W/S & VIDEO
1020 3112 A9 F0     LDA @#F0
1030 3114 8D 00 B0  STA #B000 HIGH RES GRAPHICS MODE
1040 3117 A9 00     LDA @0
1050 3119 85 86     STA WW19 CLR REVEAL PAGE FLAG
1060 311B 85 96     STA ZZ5 CLR CHAR ARRIVING FLAG
1070 311D 85 98     STA ZZ6 CLR CHAR BEING SENT FLAG
1080 311F 85 B2     STA ZZ19 HOME CURSOR
1090 3121 85 B4     STA ZZ20
1110 3123 85 BA     STA ZZ23 CLR LAST CHAR WAS ESC FLAG
1112 3125 A9 01     LDA @1
1113 3127 85 B8     STA ZZ22 CURSOR ON
1120 3129 A9 FF     LDA @#FF
1130 312B 85 A0     STA ZZ10 SET KEY RELEASED FLAG
1140 312D A9 30     LDA @#30 INITIALISE BUFFERS
1150 312F 85 AB     STA ZZ15+1
1160 3131 85 AD     STA ZZ16+1
1170 3133 85 A3     STA ZZ11+1
1180 3135 85 A5     STA ZZ12+1
1190 3137 85 A4     STA ZZ12
1205 3139 85 A2     STA ZZ11
1210 313B A9 60     LDA @#60
1220 313D 85 AC     STA ZZ16
1235 313F 85 AA     STA ZZ15
1240 3141 A9 2C     LDA @#2C INITIALISE POINTER TO 2ND HALF OF D.H. FLAGS
1250 3143 85 8B     STA WW21+1
1260 3145 A9 50     LDA @#50
1270 3147 85 8A     STA WW21
1280 3149 A9 03     LDA @3 SET UP BAUD RATE TIMES
1290 314B 85 95     STA ZZ4+1
1300 314D A9 41     LDA @#41
1310 314F 85 94     STA ZZ4
1320 3151 A9 34     LDA @#34
```

```
 1330 3153 85 93      STA ZZ3+1
 1340 3155 A9 15      LDA @#15
 1350 3157 85 92      STA ZZ3
 1360 3159 A9 A2      LDA @#A2 SET UP PORT B
 1361 315B 8D 02 B8   STA #B802
 1362 315E A9 02      LDA @2
 1363 3160 8D 00 B8   STA #B800 IDLE AT LOGIC 1
 1364 3163 A9 04      LDA @#4 1.5 BITS @ 100 BAUD
 1366 3165 85 A9      STA ZZ14+1
 1368 3167 A9 E1      LDA @#E1
 1369 3169 85 A8      STA ZZ14
 1372 316B A9 00      LDA @0
 1374 316D 8D 0C B8   STA #B80C SET UP PB1 FOR START BIT INTERRUPT
 1376 3170 A9 90      LDA @#90
 1378 3172 8D 0E B8   STA #B80E ALLOW PB1 TO INTERRUPT
 1380 3175 A9 35      LDA @QQ25/256 SET INTERRUPT VECTOR
 1385 3177 8D 05 02   STA #205
 1390 317A A9 30      LDA @QQ25&255
 1395 317C 8D 04 02   STA #204
 1398 317F 58         CLI ALLOW INTERRUPT
 1400 3180 4C 03 31   JMP UU1 RUN
$    1 3183
   10 3183           \ @@@ @@@ @@@@
   11 3183           \  @  @      @
   12 3183           \  @  @@    @
   13 3183           \  @  @   @  @
   14 3183           \ @@@ @    @@
   15 3183           \
 1000 3183           \
 1010 3183           \CONTROL CODE IN A - SET APPROPRIATE FLAG
 1020 3183           \& REPLACE CODE BY A SPACE IN A
 1025 3183           :GG1
 1030 3183 C9 11      CMP @#11 GRAPHICS?
 1040 3185 90 09      BCC GG3
 1050 3187 C9 18      CMP @#18
 1060 3189 B0 05      BCS GG3
 1070 318B E6 7C      INC WW14 SET GRAPHICS FLAG
 1080 318D 4C FC 31   JMP GG2
 1090 3190 C9 01     :GG3 CMP @#01 ALPHANUMERICS?
 1100 3192 90 0B      BCC GG4
 1110 3194 C9 08      CMP @#08
 1120 3196 B0 07      BCS GG4
 1130 3198 A0 00      LDY @0
 1140 319A 84 7C      STY WW14 CLEAR GRAPHICS FLAG
 1150 319C 4C FC 31   JMP GG2
 1160 319F C9 1A     :GG4 CMP @#1A SEPARATED
 1170 31A1 D0 05      BNE GG5
 1180 31A3 E6 7A      INC WW13 SET SEPARATED FLAG
 1190 31A5 4C FC 31   JMP GG2
 1200 31A8 C9 19     :GG5 CMP @#19 CONTIGUOUS?
 1210 31AA D0 07      BNE GG6
 1220 31AC A0 00      LDY @0
 1230 31AE 84 7A      STY WW13 CLEAR SEPARATED FLAG
 1240 31B0 4C FC 31   JMP GG2
 1250 31B3 C9 0D     :GG6 CMP @#0D DOUBLE HEIGHT?
 1260 31B5 D0 0C      BNE GG7
 1270 31B7 E6 7E      INC WW15 SET DOUBLE HEIGHT FLAG
 1272 31B9 A4 B2      LDY ZZ19 PRESENT LINE
 1274 31BB C8         INY NEXT LINE
 1276 31BC A9 01      LDA @1
 1278 31BE 91 8A      STA (WW21),Y SET 2ND HALF OF D.H. FLAG FOR THAT LINE
 1280 31C0 4C FC 31 . JMP GG2
```

scrap - serial init.

INSTEAD

set up
Rx CB,
Tx IB.

insert top 3 lines.

replace wholesale.

```
1290 31C3 C9 0C     :GG7 CMP @#0C SINGLE HEIGHT?
1300 31C5 D0 07      BNE GG8
1310 31C7 A0 00      LDY @0
1320 31C9 84 7E      STY WW15 CLEAR DOUBLE HEIGHT FLAG
1330 31CB 4C FC 31   JMP GG2
1335 31CE C9 1E     :GG8 CMP @#1E HOLD GRAPHICS ?
1336 31D0 D0 05      BNE GG9
1337 31D2 E6 80      INC WW16 SET HOLD
1338 31D4 4C FC 31   JMP GG2
1340 31D7 C9 1F     :GG9 CMP @#1F RELEASE GRAPHICS?
1350 31D9 D0 07      BNE GG10
1360 31DB A0 00      LDY @0
1370 31DD 85 80      STA WW16 CLEAR HOLD GRAPHICS FLAG
1380 31DF 4C FC 31   JMP GG2
1430 31E2 C9 08     :GG10 CMP @#08 FLASHING?
1440 31E4 D0 05      BNE GG11
1450 31E6 E6 82      INC WW17 SET FLASHING FLAG
1460 31E8 4C FC 31   JMP GG2
1470 31EB C9 09     :GG11 CMP @#09 STEADY?
1480 31ED D0 07      BNE GG12
1490 31EF A9 00      LDA @0
1500 31F1 85 82      STA WW17 CLEAR FLASHING FLAG
1510 31F3 4C FC 31   JMP GG2
1520 31F6 C9 18     :GG12 CMP @#18 CONCEAL?
1540 31F8 D0 02      BNE GG2
1550 31FA E6 84      INC WW18 SET CONCEAL FLAG
1560 31FC A4 80     :GG2 LDY WW16
1570 31FE F0 14      BEQ GG15 HOLD GRAPHICS FLAG?
1580 3200 A4 7C      LDY WW14
1590 3202 F0 10      BEQ GG15 GRAPHICS FLAG ALSO?
1600 3204 A4 72      LDY WW9 HOLD GRAPHICS - GET LAST NON CONTROL CHAR INSTEAD
1610 3206 88        :GG14 DEY
1615 3207 F0 0B      BEQ GG15 AT START OF LINE?
1620 3209 B1 6E      LDA (WW7),Y
1630 320B 29 20      AND @#20 GET BIT 5
1640 320D F0 F7      BEQ GG14
1650 320F B1 6E      LDA (WW7),Y
1660 3211 4C 16 32   JMP GG13
1750 3214 A9 20     :GG15 LDA @#20 PRINT A SPACE INSTEAD
1760 3216 60        :GG13 RTS
$    1 3217
   10 3217          \ @@@ @@@   @
   11 3217          \  @  @    @@
   12 3217          \  @  @@  @ @
   13 3217          \  @  @  @@@@@
   14 3217          \ @@@ @     @
   15 3217          \
2800 3217           \DISPLAY LINE OF PRESTEL POINTED TO BY ZZ19
2810 3217           \(DESTROYS ALL REGISTERS)
2860 3217           :SS1
2870 3217 A4 B2      LDY ZZ19
2880 3219 B1 BA      LDA (WW21),Y 2ND HALF OF D.H. THIS LINE?
2890 321B F0 01      BEQ SS7 (NO)
2960 321D 60         RTS
2970 321E 20 F7 35  :SS7 JSR RR6 CALCULATE WW7
2980 3221 20 21 37   JSR VV8 CALCULATE WW2
2990 3224 20 39 32   JSR SS2 DISPLAY LINE
3000 3227 A4 B2      LDY ZZ19
3010 3229 C8         INY NEXT LINE
3020 322A B1 BA      LDA (WW21),Y 2ND HALF OF D.H. NEXT LINE?
3030 322C F0 0A      BEQ SS8 (NO)
3040 322E E6 B2      INC ZZ19
```

Replace.

```
3050 3230 20 21 37   JSR VV8 CALC WW2
3060 3233 20 39 32   JSR SS2 DISPLAY LINE
3070 3236 C6 B2      DEC ZZ19 BACK TO PRESENT LINE
3080 3238 60         :SS8 RTS
3084 3239            \DISPLAY LINE (DATA FROM WW7 POINTER TO WW2 POINTER)
3085 3239            :SS2
3090 3239 A0 00      LDY @$00 (NEW LINE) CLEAR Y & RESET FLAGS
3092 323B 84 7A      STY WW13 (CONTIGUOUS GRAPHICS)
3093 323D 84 7C      STY WW14 (ALPHANUMERICS)
3094 323F 84 7E      STY WW15 (SINGLE HEIGHT)
3095 3241 84 80      STY WW16 (RELEASE GRAPHICS)
3096 3243 84 82      STY WW17 (STEADY)
3097 3245 84 84      STY WW18 (REVEAL)
3098 3247 84 78      STY WW12 (CLEAR TEMP. STORE)
3100 3249            \Y IS DISPLACEMENT FROM CONTENTS OF WW7
3101 3249            \IE. AT (Y+1)TH CHAR. OF LINE AT ANY MOMENT
3102 3249 84 70      :SS3 STY WW8 STORE AT WW8 THE START OF PRESENT CHAR.
3103 324B            \WITHIN THE WORKSPACE THAT STARTS AT $2B00
3104 324B A9 2B      LDA @$2B
3105 324D 85 71      STA WW8+1
3106 324F B1 6E      :SS4 LDA (WW7),Y GET PRESTEL CHAR
3107 3251 29 7F      AND @$7F REMOVE PARITY BIT
3108 3253 84 72      STY WW9 SAVE Y
3148 3255 A6 84      LDX WW18
3149 3257 F0 06      BEQ SS5 CONCEAL FLAG CLEAR?
3151 3259 A4 86      LDY WW19
3153 325B D0 02      BNE SS5 REVEAL REQUESTED?
3155 325D A9 20      LDA @$20 SPACE INSTEAD
3264 325F C9 20      :SS5 CMP @$20 CONTROL CODE?
3265 3261 B0 03      BCS SS6 (NO)
3290 3263 20 83 31   JSR GC1 FIND WHICH CONTROL CODE & TAKE ACTION
3295 3266 20 ED 32   :SS6 JSR JJ1 CONVERT CHAR IN A TO SIMULATED CHAR
3297 3269 A4 72      LDY WW9 GET Y
3299 326B C8         INY NEXT CHAR
3300 326C C0 28      CPY @40 END OF LINE?
3310 326E D0 D9      BNE SS3
3320 3270 20 74 32   JSR MM1 PRINT LINE ON VIDEO
3330 3273 60         RTS
$    1 3274
  10 3274            \ @@@ @@@ @@@@
  11 3274            \  @  @   @
  12 3274            \  @  @@  @@@
  13 3274            \  @  @     @
  14 3274            \ @@@ @   @@@
  15 3274            \
1000 3274            \SQUEEZE 40*8 BYTES (STARTING AT $2B00)
1010 3274            \INTO 30*8 BYTES IN VIDEO (POINTED TO BY WW2)
1020 3274            \IE. ONE LINE OF TEXT
1030 3274            \(DESTROYS ALL REGISTERS & WW2)
1035 3274 2C 02 B0   :MM1 BIT $B002
1036 3277 30 FB      BMI MM1 REMOVE SNOW
1040 3279 A9 08      LDA @8 SET COUNTER
1050 327B 85 6A      STA WW5
1060 327D A9 00      LDA @0 COPY START ADDR
1070 327F 85 62      STA WW1
1080 3281 A9 2B      LDA @$2B
1090 3283 85 63      STA WW1+1
1100 3285 A9 0A      :MM2 LDA @10 SET COUNTER FOR 40 BYTES
1110 3287 85 66      STA WW3
1120 3289            \SQUEEZE 4 BYTES (A,B,C,D) OF 6 BITS (POINTED TO BY WW1)
1130 3289            \INTO 3 BYTES (E,F,G) OF 8 BITS EA (POINTED TO BY WW4)
1138 3289            :MM3
```

Replace.

```
1140 3289 A0 00     LDY @0 SET DISPLACE TO 0
1150 328B B1 62     LDA (WW1),Y GET A
1160 328D 0A        ASL A
1170 328E 0A        ASL A L.H.JUSTIFY BYTE
1180 328F 91 64     STA (WW2),Y STORE AT E
1190 3291 C8        INY Y=1
1200 3292 B1 62     LDA (WW1),Y GET B
1210 3294 4A        LSR A
1220 3295 4A        LSR A
1230 3296 4A        LSR A
1240 3297 4A        LSR A GET BITS 5,4
1250 3298 88        DEY Y=0
1260 3299 11 64     ORA (WW2),Y OR WITH CONTENTS OF E
1270 329B 91 64     STA (WW2),Y STORE AT E
1280 329D C8        INY Y=1
1290 329E B1 62     LDA (WW1),Y GET B
1300 32A0 0A        ASL A
1310 32A1 0A        ASL A
1320 32A2 0A        ASL A
1330 32A3 0A        ASL A L.H. JUSTIFY 4 LSBS
1340 32A4 91 64     STA (WW2),Y STORE AT F
1350 32A6 C8        INY Y=2
1360 32A7 B1 62     LDA (WW1),Y GET C
1370 32A9 4A        LSR A
1380 32AA 4A        LSR A R.H. JUSTIFY BITS 5,4,3,2
1390 32AB 88        DEY Y=1
1400 32AC 11 64     ORA (WW2),Y OR WITH CONTENTS OF F
1410 32AE 91 64     STA (WW2),Y STORE AT F
1420 32B0 C8        INY Y=2
1430 32B1 B1 62     LDA (WW1),Y GET C
1440 32B3 0A        ASL A
1450 32B4 0A        ASL A
1460 32B5 0A        ASL A
1470 32B6 0A        ASL A
1480 32B7 0A        ASL A
1490 32B8 0A        ASL A L.H. JUSTIFY 2 LSBS
1500 32B9 91 64     STA (WW2),Y STORE AT G
1510 32BB C8        INY Y=3
1520 32BC B1 62     LDA (WW1),Y GET D
1530 32BE 88        DEY Y=2
1540 32BF 11 64     ORA (WW2),Y OR WITH  CONTENTS OF G
1550 32C1 91 64     STA (WW2),Y STORE AT G
1560 32C3 A5 62     LDA WW1 GET NEXT "FROM" ADDR
1570 32C5 18        CLC
1580 32C6 69 04     ADC @4
1590 32C8 85 62     STA WW1
1600 32CA 90 02     BCC MM4
1610 32CC E6 63     INC WW1+1
1620 32CE A5 64    :MM4 LDA WW2 GET  NEXT "TO" ADDR
1630 32D0 18        CLC
1640 32D1 69 03     ADC @3
1650 32D3 85 64     STA WW2
1660 32D5 90 02     BCC MM5
1670 32D7 E6 65     INC WW2+1
1680 32D9 C6 66    :MM5 DEC WW3
1690 32DB D0 AC     BNE MM3 NEXT 4 BYTES
1700 32DD A5 64     LDA WW2 GET NEXT "TO" ADDR
1710 32DF 18        CLC
1720 32E0 69 02     ADC @2
1730 32E2 85 64     STA WW2
1740 32E4 90 02     BCC MM6
1750 32E6 E6 65     INC WW2+1
```

```
 1755 32E8             :MM6
 1760 32E8 C6 6A        DEC WW5
 1770 32EA D0 99        BNE MM2 NEXT 40 BYTES
 1780 32EC 60           RTS
$    1 32ED
   10 32ED             \ @@@ @@@  @@
   11 32ED             \  @  @   @
   12 32ED             \  @  @@  @@@      Replace.
   13 32ED             \  @  @   @  @
   14 32ED             \ @@@ @    @@
   15 32ED             \
 3000 32ED             \TRANSLATE PRESTEL CHAR (IN A) TO SIMULATED CHAR
 3010 32ED             \(8 BYTES OF 6 BITS EA), STORING AT (WW8),(WW8)+40,ETC
 3020 32ED             \(1 BYTE AT EA)
 3021 32ED 48          :JJ1 PHA SAVE
 3022 32EE 20 BE 34     JSR QQ13 CHECK K/B
 3023 32F1 68           PLA RESTORE
 3030 32F2 A4 7C        LDY WW14
 3040 32F4 D0 03        BNE JJ20 GRAPHICS MODE
 3045 32F6 4C 8C 33     JMP JJ2 ALPHANUMERICS
 3050 32F9 C9 40       :JJ20 CMP @$40
 3060 32FB 90 07        BCC JJ3 NOT BLAST THROUGH
 3070 32FD C9 60        CMP @$60
 3080 32FF B0 03        BCS JJ3 NOT BLAST THROUGH
 3090 3301 4C 8C 33     JMP JJ2 BLAST THROUGH ALPHANUMERICS
 3600 3304             \GRAPHICS
 3620 3304 48          :JJ3 PHA GET THE 6 BITS OF PATTERN FROM GR. CHAR.
 3630 3305 29 40        AND @$40
 3640 3307 4A           LSR A
 3650 3308 85 76        STA WW11
 3660 330A 68           PLA
 3670 330B 29 1F        AND @$1F
 3680 330D 18           CLC
 3685 330E 65 76        ADC WW11
 3690 3310 85 76        STA WW11 SAVE THE 6 BITS
 3700 3312 29 30        AND @$30 GET 2 MSB
 3710 3314 4A           LSR A SHIFT TO 2LSB POSITION
 3720 3315 4A           LSR A
 3730 3316 4A           LSR A
 3740 3317 4A           LSR A
 3750 3318 20 7B 33     JSR JJ4 GENERATE BIT PATTERN FOR 1ST 3 BYTES
 3760 331B 8D 45 2C     STA $2C45 STORE
 3770 331E 8D 46 2C     STA $2C46
 3780 3321 8D 47 2C     STA $2C47
 3790 3324 A5 76        LDA WW11 GET THE 6 BITS
 3800 3326 29 0C        AND @$C GET MIDDLE 2 BITS
 3805 3328 4A           LSR A SHIFT TO 2 LSB POSN.
 3810 3329 4A           LSR A
 3820 332A 20 7B 33     JSR JJ4 GENERATE BIT PATTERN FOR MIDDLE 2 BYTES
 3830 332D 8D 43 2C     STA $2C43 STORE
 3840 3330 8D 44 2C     STA $2C44
 3850 3333 A5 76        LDA WW11 GET THE 6 BITS
 3860 3335 29 03        AND @3 GET THE 2LSBS
 3870 3337 20 7B 33     JSR JJ4 GENERATE BIT PATTERN FOR LAST 3 BYTES
 3880 333A 8D 40 2C     STA $2C40 STORE
 3890 333D 8D 41 2C     STA $2C41
 3900 3340 8D 42 2C     STA $2C42
 3910 3343 A9 40        LDA @$40 SET UP ADDRESS OF CHAR. PATTERN
 3920 3345 85 68        STA WW4
 3930 3347 A9 2C        LDA @$2C
 3940 3349 85 69        STA WW4+1
 3950 334B A5 7A        LDA WW13
```

```
3960 334D F0 29      BEQ JJ7 SEPARATED GRAPHICS?
3970 334F A9 00      LDA @0 (SEPARATED)
3980 3351 8D 40 2C   STA $2C40
3990 3354 8D 42 2C   STA $2C42
4000 3357 8D 43 2C   STA $2C43
4010 335A 8D 45 2C   STA $2C45
4020 335D 8D 47 2C   STA $2C47
4030 3360 A9 1B      LDA @$1B
4040 3362 48         PHA
4050 3363 2D 41 2C   AND $2C41
4060 3366 8D 41 2C   STA $2C41
4070 3369 68         PLA
4080 336A 48         PHA
4090 336B 2D 44 2C   AND $2C44
4100 336E 8D 44 2C   STA $2C44
4110 3371 68         PLA
4120 3372 2D 46 2C   AND $2C46
4130 3375 8D 46 2C   STA $2C46
4140 3378 4C A1 33 ;JJ7 JMP JJ11 STORE CHAR. PATTERN IN WORKSPACE
4160 337B 85 78    ;JJ4 STA WW12 PUT IN A THE BIT PATTERN FOR
4170 337D          \THE 2 BITS AT WW12
4180 337D A9 00      LDA @0
4190 337F 46 78      LSR WW12
4200 3381 90 02      BCC JJ5
4210 3383 09 38      ORA @$38
4220 3385 46 78    ;JJ5 LSR WW12
4230 3387 90 02      BCC JJ6
4240 3389 09 07      ORA @7
4250 338B 60       ;JJ6 RTS
5000 338C          \ALPHANUMERICS
5010 338C 85 68    ;JJ2 STA WW4 MULTIPLY PRESTEL CHAR BY 8
5020 338E A9 03      LDA @3 SET COUNTER
5030 3390 85 6C      STA WW6
5040 3392 A9 00      LDA @0
5050 3394 18       ;JJ8 CLC
5060 3395 06 68      ASL WW4 MULTIPLY LSB BY 2
5070 3397 2A         ROL A MULTIPLY MSB BY 2
5080 3398 C6 6C      DEC WW6
5090 339A D0 F8      BNE JJ8
5100 339C          \MSB OF ANS IN A, LSB IN WW4
5110 339C 18         CLC
5120 339D 69 27      ADC @$27 ADD $2700 TO ANS. -> ADDR IN RAM OF CHAR PATTERN
5130 339F 85 69      STA WW4+1
5135 33A1          ;JJ11
5140 33A1 A4 B2      LDY ZZ19 PRESENT ROW
5150 33A3 B1 8A      LDA (WW21),Y 2ND HALF OF D.H. THIS ROW?
5160 33A5 D0 4F      BNE JJ16 (YES)
5170 33A7 A4 7E      LDY WW15
5180 33A9 F0 2E      BEQ JJ13 D.H. FLAG CLEAR
5190 33AB A0 00    ;JJ17 LDY @0 (D.H.)
5200 33AD A2 00      LDX @0
5210 33AF A9 04      LDA @4 SET COUNTER
5220 33B1 85 6C      STA WW6
5230 33B3 84 74    ;JJ14 STY WW10
5240 33B5 8A         TXA
5250 33B6 A8         TAY
5260 33B7 B1 68      LDA (WW4),Y GET BYTE OF CHAR PATTERN
5270 33B9 A4 74      LDY WW10
5280 33BB 91 70      STA (WW8),Y STORE IN W/S
5290 33BD 48         PHA SAVE
5300 33BE 20 CF 33   JSR JJ15 ADD 40 TO Y
5310 33C1 68         PLA RESTORE
```

```
5320 33C2 91 70      STA (WW8),Y STORE AGAIN
5330 33C4 20 CF 33   JSR JJ15 ADD 40 TO  Y
5340 33C7 E8         INX
5350 33C8 C6 6C      DEC WW6
5360 33CA D0 E7      BNE JJ14
5370 33CC 4C F3 33   JMP JJ12
5380 33CF 98        :JJ15 TYA ADD 40 TO Y
5390 33D0 18         CLC
5394 33D1 69 28      ADC @40
5396 33D3 A8         TAY
5400 33D4 90 02      BCC JJ9 IF Y OVERFLOWS, INC POINTER
5410 33D6 E6 71      INC WW8+1
5420 33D8 60        :JJ9 RTS
5440 33D9 A2 00     :JJ13 LDX @0 (SINGLE HEIGHT)
5450 33DB A0 00      LDY @0
5460 33DD A9 08      LDA @8 SET COUNTER
5470 33DF 85 6C      STA WW6
5480 33E1 84 74     :JJ10 STY WW10
5490 33E3 8A         TXA
5500 33E4 A8         TAY
5510 33E5 B1 68      LDA (WW4),Y GET BYTE OF CHAR PATTERN
5520 33E7 A4 74      LDY WW10
5530 33E9 91 70      STA (WW8),Y STORE IN W/S
5540 33EB 20 CF 33   JSR JJ15
5550 33EE E8         INX
5560 33EF C6 6C      DEC WW6
5570 33F1 D0 EE      BNE JJ10
5580 33F3 C6 71     :JJ12 DEC WW8+1 RESTORE POINTER
5590 33F5 60         RTS
5600 33F6           :JJ16\(D.H.-BOTTOM HALF)
5602 33F6 A5 7E      LDA WW15 GET D.H. FLAG
5604 33F8 F0 0E      BEQ JJ21
5610 33FA 18         CLC
5620 33FB A5 68      LDA WW4
5630 33FD 69 04      ADC @4 SET WW4 TO POINT TO BOTTOM 4 BYTES OF CHAR PATTERN
5640 33FF 90 02      BCC JJ18
5650 3401 E6 69      INC WW4+1
5660 3403 85 68     :JJ18 STA WW4
5670 3405 4C AB 33   JMP JJ17
5680 3408 A9 00     :JJ21 LDA @0 SPACE INSTEAD ON 2ND ROW
5690 340A 85 68      STA WW4
5700 340C A9 28      LDA @$28
5710 340E 85 69      STA WW4+1
5720 3410 4C D9 33   JMP JJ13
$    1 3413
   10 3413           \ @@@ @@@ @@@@
   11 3413           \  @  @      @
   12 3413           \  @  @@    @
   13 3413           \  @  @    @
   14 3413           \ @@@ @    @
   15 3413           \
1000 3413           \INTERRUPT ROUTINE TO SERVICE OUTPUT FROM K/B
1005 3413 AD 08 B8 :QQ1 LDA $B808 CLR TIMER 2 INTERRUPT
1008 3416 58         CLI ALLOW INTERRUPT OF INTERRUPT
1020 3417 C6 8E      DEC ZZ1
1030 3419 F0 2C      BEQ QQ4 SEND STOP BIT
1035 341B 30 1E      BMI QQ3 END OF CHAR
1040 341D A5 90      LDA ZZ2 GET CHAR
1050 341F 4A         LSR A ROTATE & PUT LSB IN CARRY
1060 3420 85 90      STA ZZ2 REPLACE
1070 3422 08        :QQ2 PHP
1080 3423 AD 00 B8   LDA $B800
```

```
1082 3426 6A          ROR A
1084 3427 6A          ROR A
1086 3428 28          PLP
1088 3429 2A          ROL A
1090 342A 2A          ROL A
1110 342B 8D 00 B8    STA $B800 PUT ON PORT B
1120 342E A5 92       LDA ZZ3
1130 3430 8D 08 B8    STA $B808
1140 3433 A5 93       LDA ZZ3+1
1150 3435 8D 09 B8    STA $B809 SET TIMER 2
1160 3438 4C AF 34    JMP QQ11
1171 343B A9 20     :QQ3 LDA @$20 DISABLE TIMER 2 INTERRUPT
1173 343D 8D 0E B8    STA $B80E
1176 3440 A9 00       LDA @0
1177 3442 85 98       STA ZZ6 CLEAR FLAG SHOWING IF CHAR IS ALREADY BEING SENT
1180 3444 4C AF 34    JMP QQ11
1190 3447 38        :QQ4 SEC SEND STOP BIT
1195 3448 4C 22 34    JMP QQ2
1200 344B             \
2000 344B             \INTERRUPT ROUTINE TO SERVICE INPUT FROM PRESTEL
2010 344B AD 04 B8  :QQ8 LDA $B804 CLR TIMER 1 INTERRUPT
2020 344E C6 9C       DEC ZZ8
2030 3450 F0 3B       BEQ QQ9 STOP BIT DUE
2040 3452 A5 9C       LDA ZZ8
2050 3454 C9 08       CMP @8
2051 3456 F0 0F       BEQ QQ7 1ST BIT OF BYTE
2053 3458 C9 01       CMP @1
2054 345A D0 28       BNE QQ6 NOT LAST DATA BIT
2055 345C A9 3F       LDA @$3F (LAST DATA BIT)
2056 345E 2D 0B B8    AND $B80B
2057 3461 8D 0B B8    STA $B80B STOP CONTINUOUS INTERRUPTS JUST 1 MORE (STP BIT)
2058 3464 4C 84 34    JMP QQ6
2072 3467 AD 0B B8  :QQ7 LDA #B80B SET TIMER 1 FOR MULTIPLE INTERRUPTS
2074 346A 29 3F       AND @$3F
2076 346C 09 40       ORA @$40
2084 346E 8D 0B B8    STA $B80B
2086 3471 A9 C0       LDA @$C0 ENABLE TIMER 1 FOR INTERRUPT
2090 3473 8D 0E B8    STA $B80E
2110 3476 A5 94       LDA ZZ4
2120 3478 8D 04 B8    STA $B804
2130 347B A5 95       LDA ZZ4+1
2140 347D 8D 05 B8    STA $B805 SET TIMER 1 @ 1200 BAUD
2170 3480 A9 00       LDA @0
2180 3482 85 9A       STA ZZ7 CLEAR TEMP STORE FOR INCOMING CHAR
3040 3484 AD 00 B8  :QQ6 LDA $B800 GET BIT FROM PRESTEL
3050 3487 6A          ROR A
3060 3488 66 9A       ROR ZZ7 PUT IN TEMP STORE WITH OTHER BITS ALREADY ARRIVED
3090 348A 4C AF 34    JMP QQ11
3110 348D           :QQ9\STOP BIT
3115 348D AD 00 B8    LDA $B800 CLR CB1 INTERRUPT FLAG
3120 3490 A9 00       LDA @0
3130 3492 85 96       STA ZZ5 CLEAR FLAG SHOWING IF CHAR IS ARRIVING
3133 3494 8D 0C B8    STA $B80C SET UP CB1 FOR START BIT INTERRUPT
3134 3497 A9 40       LDA @$40 DISABLE TIMER 1 INTERRUPT
3136 3499 8D 0E B8    STA $B80E
3140 349C A9 90       LDA @$90 ALLOW CB1 TO INTERRUPT
3160 349E 8D 0E B8    STA $B80E
3165 34A1 A5 9A       LDA ZZ7 GET CHAR
3174 34A3 A0 00       LDY @0
3175 34A5 91 AA       STA (ZZ15),Y STORE IN BUFFER
3180 34A7 A4 AA       LDY ZZ15
3190 34A9 C0 60       CPY @$60
```

```
3200 34AB F0 06      BEQ QQ10 BUFFER NEEDS WRAP AROUND
3230 34AD C6 AA      DEC ZZ15
3240 34AF 68        :QQ11 PLA
3250 34B0 A8         TAY RESTORE Y
3260 34B1 68         PLA RESTORE A
3270 34B2 40         RTI
3280 34B3 A0 87     :QQ10 LDY @#87 WRAP AROUND THE BUFFER
3290 34B5 84 AA      STY ZZ15
3295 34B7 A0 30      LDY @#30
3297 34B9 84 AB      STY ZZ15+1
3300 34BB 4C AF 34   JMP QQ11
3310 34BE
4000 34BE           \CHECK K/B & PUT ANY CHAR TYPED IN BUFFER
4010 34BE           \(DESTROYS ALL REGISTERS)
4020 34BE 20 71 FE  :QQ13 JSR #FE71 SCAN K/B
4030 34C1 C0 FF      CPY @#FF
4040 34C3 F0 21      BEQ QQ16 NOTHING TYPED
4050 34C5 A5 A0      LDA ZZ10
4060 34C7 F0 11      BEQ QQ14 KEY NOT YET RELEASED FROM LAST TIME: IGNORE
4070 34C9 E6 A0      INC ZZ10 CLEAR KEY RELEASED FLAG($FF -> 0)
4080 34CB 20 2D 37   JSR VV9 GET THE CHAR in A
4082 34CE A0 00      LDY @0
4085 34D0 91 A2      STA (ZZ11),Y STORE CHAR IN BUFFER
4090 34D2 A4 A2      LDY ZZ11
4100 34D4 C0 30      CPY @#30
4110 34D6 F0 03      BEQ QQ15 BUFFER NEEDS WRAP AROUND
4130 34D8 C6 A2      DEC ZZ11
4140 34DA 60        :QQ14 RTS
4150 34DB A0 57     :QQ15 LDY @#57 WRAP AROUND THE BUFFER
4160 34DD 84 A2      STY ZZ11
4162 34DF A0 30      LDY @#30
4164 34E1 84 A3      STY ZZ11+1
4170 34E3 4C DA 34   JMP QQ14
4180 34E6 84 A0     :QQ16 STY ZZ10 SET KEY RELEASED FLAG (TO $FF)
4190 34E8 60         RTS
4200 34E9
5000 34E9           \IF NO CHAR ALREADY BEING SENT TO PRESTEL
5010 34E9           \& CHAR WAITING IN K/B BUFFER, THEN START SENDING
5020 34E9           \WAITING CHAR
5030 34E9           \(DESTROYS ALL REGISTERS)
5040 34E9 A5 98     :QQ20 LDA ZZ6
5050 34EB D0 39      BNE QQ21 CHAR ALREADY BEING SENT
5060 34ED A4 A4      LDY ZZ12
5070 34EF C4 A2      CPY ZZ11
5080 34F1 F0 33      BEQ QQ21 BUFFER EMPTY
5090 34F3 E6 98      INC ZZ6 SET FLAG SHOWING CHAR BEING SENT
5095 34F5 A0 00      LDY @0
5100 34F7 B1 A4      LDA (ZZ12),Y GET CHAR FROM BUFFER
5110 34F9 85 99      STA ZZ2 PUT IN TEMP STORE
5120 34FB A9 FD      LDA @#FD
5130 34FD 2D 00 B8   AND #B800
5140 3500 8D 00 B8   STA #B800 PUT START BIT (0) AT BIT 1 OF PORT B
5150 3503 A5 92      LDA ZZ3
5160 3505 8D 08 B8   STA #B808
5170 3508 A5 93      LDA ZZ3+1
5180 350A 8D 09 B8   STA #B809 SET TIMER 2 @ 75 BAUD
5190 350D A9 09      LDA @9 NO. OF BITS STILL TO BE SENT
5200 350F 85 8E      STA ZZ1
5210 3511 A9 A0      LDA @#A0 ENABLE TIMER 2 FOR INTERRUPT
5230 3513 8D 0E B8   STA #B80E
5240 3516 A9 DF      LDA @#DF SET TIMER 2 FOR 1 SHOT MODE
5250 3518 2D 0B B8   AND #B80B
```

```
5260 351B 8D 0B B8  STA #B80B
5500 351E A4 A4     LDY ZZ12
5510 3520 C0 30     CPY @#30
5520 3522 F0 03     BEQ QQ22 BUFFER NEEDS WRAP AROUND
5530 3524 C6 A4     DEC ZZ12
5540 3526 60       :QQ21 RTS
5550 3527 A0 57    :QQ22 LDY @#57 WRAP AROUND THE BUFFER
5555 3529 84 A4     STY ZZ12
5557 352B A0 30     LDY @#30
5558 352D 84 A5     STY ZZ12+1
5560 352F 60        RTS
5570 3530          \
6000 3530          \SERVICE INTERRUPT REQUEST
6010 3530 98       :QQ25 TYA
6020 3531 48        PHA SAVE Y
6030 3532 AD 0D B8  LDA #B80D
6040 3535 0A        ASL A PUT TIME OUT FLAGS IN BITS 6&7 OF A
6045 3536 85 A6     STA ZZ13
6050 3538 24 A6     BIT ZZ13
6060 353A 30 0B     BMI QQ26 TIMER 1 CALLED INTERRUPT - SERVICE IT
6070 353C 70 0C     BVS QQ27 TIMER 2 CALLED INTERRUPT - SERVICE IT
6080 353E 06 A6     ASL ZZ13
6090 3540 24 A6     BIT ZZ13
6100 3542 70 09     BVS QQ24 START BIT ON CB1 CALLED INTERRUPT - SERVICE IT
6110 3544          \FALSE INTERRUPT
6120 3544 4C AF 34  JMP QQ11
6130 3547 4C 4B 34 :QQ26 JMP QQ8 SERVICE PRESTEL INPUT
6140 354A 4C 13 34 :QQ27 JMP QQ1 SERVICE K/B OUTPUT
6150 354D          \
7000 354D          \INTERRUPT ROUTINE TO SERVICE START BIT FROM PRESTEL
7005 354D AD 00 B8 :QQ24 LDA #B800 CLR INTERRUPT
7010 3550 A5 96     LDA ZZ5 CHECK FLAG TO SEE IF CHAR ALREADY ARRIVING
7020 3552 D0 25     BNE QQ23 YES - IGNORE INTERRUPT
7030 3554 E6 96     INC ZZ5 SET FLAG
7050 3556 A9 10     LDA @#10
7060 3558 8D 0E B8  STA #B80E DISABLE FURTHER CB1 INTERRUPTS
7061 355B AD 04 B8  LDA #B804 CLR TIMER 1 INTERRUPT FLAG
7062 355E A9 C0     LDA @#C0
7064 3560 8D 0E B8  STA #B80E ALLOW TIMER 1 TO INTERRUPT
7070 3563 A9 3F     LDA @#3F SET TIMER 1 FOR SINGLE INTERRUPT
7080 3565 2D 0B B8  AND #B80B
7090 3568 8D 0B B8  STA #B80B
7100 356B A5 A8     LDA ZZ14 LATCH & GO (1.5 BITS @ 1200 BAUD)
7110 356D 8D 04 B8  STA #B804
7120 3570 A5 A9     LDA ZZ14+1
7130 3572 8D 05 B8  STA #B805
7134 3575 A9 09     LDA @9
7136 3577 85 9C     STA ZZ8 NO. OF BITS YET TO COME IN THIS BYTE
7138 3579 4C AF 34 :QQ23 JMP QQ11
$    1 357C
  10 357C          \ @@@ @@@  @@
  11 357C          \  @  @    @  @
  12 357C          \  @  @@   @@
  13 357C          \  @  @    @  @
  14 357C          \ @@@ @    @@
  15 357C          \
1000 357C          \TRANSFER PRESTEL BUFFER TO #2C70 W/S
1010 357C          \& TAKE ACTION ON ANY CONTROL CHARS
1015 357C          \(DESTROYS ALL REGISTERS)
1018 357C          :RR1
1020 357C A4 AC     LDY ZZ15
1030 357E C4 AA     CPY ZZ15
```

difficult.

END BUFF CPY #3... BEQ RA..3 BUFF EMPT

```
1040 3580 F0 2E      BEQ RR28 BUFFER EMPTY
1045 3582 A0 00      LDY @0
1050 3584 B1 AC      LDA (ZZ16),Y GET CHAR FROM BUFFER
1060 3586 A4 AC      LDY ZZ16
1070 3588 C0 60      CPY @$60
1080 358A F0 19      BEQ RR3 BUFFER NEEDS WRAP AROUND
1090 358C C6 AC      DEC ZZ16
1095 358E 29 7F      ;RR2 AND @$7F STRIP PARITY
1100 3590 C9 1B      CMP @$1B ESCAPE?
1101 3592 F0 2A      BEQ RR4 (YES)
1102 3594 A4 BA      LDY ZZ23
1104 3596 08         PHP
1105 3597 A0 00      LDY @0
1106 3599 84 BA      STY ZZ23 CLR ESC FLAG
1107 359B 28         PLP
1114 359C D0 25      BNE RR29 LAST CHAR WAS ESC
1120 359E C9 20      CMP @$20 OTHER CONTROL CHAR?
1130 35A0 30 28      BMI RR5 (YES)
1140 35A2 4C A2 36   JMP RR30 STORE IN W/S
1900 35A5 A0 87      ;RR3 LDY @$87
1910 35A7 84 AC      STY ZZ16
1914 35A9 A0 30      LDY @$30
1916 35AB 84 AD      STY ZZ16+1
1920 35AD 4C BE 35   JMP RR2
1922 35B0            ;RR28\DISPLAY CURSOR IF ZZ22 IS SET
1924 35B0 A5 BB      LDA ZZ22
1926 35B2 F0 09      BEQ RR0 NO CURSOR
1928 35B4 20 D0 36   JSR VV1 PUT CURSOR IN $2B00 W/S
1930 35B7 20 21 37   JSR VV8 CALCULATE WW2
1932 35BA 20 74 32   JSR MM1 REDISPLAY LINE, NOW WITH CURSOR
1934 35BD 60         ;RR0 RTS
1940 35BE E6 BA      ;RR4 INC ZZ23 SET ESC FLAG
1950 35C0 4C C7 36   JMP RR23
1960 35C3            ;RR29
1975 35C3 29 BF      AND @$BF CONVERT CHAR TO CONTROL CHAR
1980 35C5 49 B0      EOR @$B0 CORRECT PARITY
1985 35C7 4C A2 36   JMP RR30 STORE CHAR IN W/S
2000 35CA            \CONTROL CHAR WITHOUT PRECEDING ESCAPE
2010 35CA            \IE, DEMANDING IMMEDIATE CURSOR ACTION
2020 35CA            ;RR5
2030 35CA C9 0C      CMP @12 CS?
2040 35CC F0 6A      BEQ RR17
2050 35CE C9 0D      CMP @13 ACR?
2060 35D0 F0 7B      BEQ RR18
2070 35D2 C9 11      CMP @17 CURSOR DN?
2080 35D4 F0 68      BEQ RR19
2090 35D6 C9 14      CMP @20 CURSOR OFF?
2100 35D8 F0 69      BEQ RR20
2110 35DA 20 F7 35   JSR RR6 CALCULATE WW7
2120 35DD 20 17 32   JSR SS1 DISPLAY CURRENT LINE
2130 35E0 C9 08      CMP @8 APR?
2140 35E2 F0 6D      BEQ RR13
2150 35E4 C9 09      CMP @9 APF?
2160 35E6 F0 7C      BEQ RR14
2170 35E8 C9 0A      CMP @10 APD?
OUT OF RANGE:
2180 35EA F0 00      BEQ RR15
2190 35EC C9 0B      CMP @11 APU?
OUT OF RANGE:
2200 35EE F0 00      BEQ RR16
2210 35F0 C9 1E      CMP @30 APH?
OUT OF RANGE:
```

```
2220 35F2 F0 00      BEQ RR21
2230 35F4 4C C7 36   JMP RR23 NO ACTION OTHERWISE
3000 35F7           \WORK OUT POSITION IN W/S STARTING $2C70 OF 1ST CHAR OF
3001 35F7           \LINE THAT CURSOR IS IN (PUT AT WW7)
3005 35F7           :RR6
3010 35F7 48         PHA SAVE A
3020 35F8 A9 00      LDA @0
3030 35FA 85 6F      STA WW7+1 CLR MSB OF CURSOR POSN IN W/S
3040 35FC A5 B2      LDA ZZ19 ROW OF CURSOR
3050 35FE 0A         ASL A MULTIPLY BY 40 ((*4+1)*8)
3060 35FF 90 02      BCC RR7
3070 3601 E6 6F      INC WW7+1
3080 3603 06 6F     :RR7 ASL WW7+1
3085 3605 0A         ASL A
3090 3606 90 02      BCC RR8
3100 3608 E6 6F      INC WW7+1
3110 360A 18        :RR8 CLC
3120 360B 65 B2      ADC ZZ19
3130 360D 90 02      BCC RR9
3140 360F E6 6F      INC WW7+1
3150 3611 06 6F     :RR9 ASL WW7+1
3155 3613 0A         ASL A
3160 3614 90 02      BCC RR10
3170 3616 E6 6F      INC WW7+1
3180 3618 06 6F     :RR10 ASL WW7+1
3185 361A 0A         ASL A
3190 361B 90 02      BCC RR11
3200 361D E6 6F      INC WW7+1
3210 361F 06 6F     :RR11 ASL WW7+1
3215 3621 0A         ASL A
3220 3622 90 02      BCC RR12
3230 3624 E6 6F      INC WW7+1
3240 3626 18        :RR12 CLC
3242 3627 69 70      ADC @$70 1ST ROW STARTS AT $2C70
3244 3629 85 6E      STA WW7 STORE LSB OF RESULT
3246 362B 90 02      BCC RR32
3248 362D E6 6F      INC WW7+1
3250 362F A5 6F     :RR32 LDA WW7+1 GET MSB OF ANS
3252 3631 18         CLC
3254 3632 69 2C      ADC @$2C
3256 3634 85 6F      STA WW7+1 STORE
3258 3636 68         PLA RESTORE
3260 3637 60         RTS
4000 3638           :RR17\CLEAR SCREEN
4010 3638 20 F1 36   JSR VV4 CLEAR ALL W/S & VIDEO
4020 363B 4C 99 36   JMP RR21 APH
4500 363E           :RR19\CURSOR ON
4510 363E E6 B8      INC ZZ22 SET CURSOR ON FLAG
4520 3640 4C C7 36   JMP RR23
4530 3643           :RR20\CURSOR OFF
4540 3643 A9 00      LDA @0
4550 3645 85 B8      STA ZZ22 CLEAR CURSOR ON FLAG
4560 3647 4C C7 36   JMP RR23
4600 364A           :RR18\ACTIVE POSITION RETURN
4610 364A A9 00      LDA @0
4620 364C 85 B4      STA ZZ20 COLUMN OF CURSOR SET TO 0
4630 364E 4C C7 36   JMP RR23
4640 3651           :RR13\ACTIVE POSITION BACK
4650 3651 C6 B4      DEC ZZ20 1 COLUMN LESS
4660 3653 10 0C      BPL RR22
4670 3655 A9 27      LDA @39 1 ROW LESS ALSO
4680 3657 85 B4      STA ZZ20
```

moving IFG.

```
4690 3659 C6 B2      DEC ZZ19
4700 365B 10 04      BPL RR22
4710 365D A9 17      LDA @23
4720 365F 85 B2      STA ZZ19
4730 3661 4C C7 36 :RR22 JMP RR23
4800 3664          :RR14\ACTIVE POSITION FORWARD
4810 3664 E6 B4      INC ZZ20 1 COLUMN MORE
4820 3666 A5 B4      LDA ZZ20
4830 3668 C9 28      CMP @40
4840 366A D0 10      BNE RR25
4850 366C A9 00      LDA @0 1 ROW MORE ALSO
4860 366E 85 B4      STA ZZ20
4870 3670 E6 B2      INC ZZ19
4880 3672 A5 B2      LDA ZZ19
4890 3674 C9 18      CMP @24
4900 3676 D0 04      BNE RR25
4910 3678 A9 00      LDA @0
4920 367A 85 B2      STA ZZ19
4930 367C 4C C7 36 :RR25 JMP RR23
4940 367F          :RR15\ACTIVE POSTION DOWN
4950 367F E6 B2      INC ZZ19
4960 3681 A5 B2      LDA ZZ19
4970 3683 C9 18      CMP @24
4980 3685 D0 04      BNE RR26
4990 3687 A9 00      LDA @0
5000 3689 85 B2      STA ZZ19
5010 368B 4C C7 36 :RR26 JMP RR23
5020 368E          :RR16\ACTIVE POSITION UP
5030 368E C6 B2      DEC ZZ19
5040 3690 10 04      BPL RR27
5050 3692 A9 17      LDA @23
5060 3694 85 B2      STA ZZ19
5070 3696 4C C7 36 :RR27 JMP RR23
5080 3699          :RR21\ACTIVE POSITION HOME
5090 3699 A9 00      LDA @0
5100 369B 85 B2      STA ZZ19
5110 369D 85 B4      STA ZZ20
5120 369F 4C C7 36   JMP RR23
5130 36A2          \
5200 36A2          :RR30\PUT CHAR IN A INTO #2C70 W/S
5220 36A2 20 F7 35   JSR RR6 CALCULATE WW7
5230 36A5 48         PHA SAVE CHAR
5240 36A6 A5 B4      LDA ZZ20 COLUMN OF CURSOR
5250 36A8 18         CLC
5260 36A9 65 6E      ADC WW7
5270 36AB 85 6E      STA WW7
5280 36AD 90 02      BCC RR31
5290 36AF E6 6F      INC WW7+1
5300 36B1 68       :RR31 PLA RESTORE CHAR
5302 36B2 A0 00      LDY @0
5304 36B4 91 6E      STA (WW7),Y STORE IN #2C70 W/S
5306 36B6 A5 B4      LDA ZZ20
5307 36B8 C9 27      CMP @39
5308 36BA D0 09      BNE RR24 NOT AT END OF LINE
5309 36BC 20 F7 35   JSR RR6 RECALCULATE WW7
5310 36BF 20 17 32   JSR SS1 DISPLAY CURRENT LINE
5311 36C2 4C 64 36   JMP RR14 APF
5312 36C5 E6 B4    :RR24 INC ZZ20 ONE COLUMN MORE
6000 36C7          :RR23
6010 36C7 20 F7 35   JSR RR6 CALCULATE WW7
6074 36CA 20 17 32   JSR SS1 DISPLAY CURRENT LINE
6080 36CD 4C 7C 35   JMP RR1 ROUND AGAIN
```

```
$    1 36D0
   10 36D0            \ @@@ @@@  @@
   11 36D0            \  @  @   @  @
   12 36D0            \  @  @@   @@@
   13 36D0            \  @  @      @
   14 36D0            \ @@@ @    @@
   15 36D0            \
 1000 36D0            \PUT CURSOR IN $2B00 W/S
 1010 36D0            \(DESTROYS ALL REGISTERS)
 1015 36D0            :VV1
 1020 36D0 A9 00       LDA @0 START OF W/S
 1030 36D2 85 B6       STA ZZ21
 1040 36D4 A9 2B       LDA @$2B
 1050 36D6 85 B7       STA ZZ21+1
 1060 36D8 A4 B4       LDY ZZ20 COLUMN OF CURSOR
 1070 36DA A2 08       LDX @8 SET COUNTER
 1080 36DC B1 B6      :VV2 LDA (ZZ21),Y GET BYTE PATTERN
 1090 36DE 49 3F       EOR @$3F INVERT
 1100 36E0 91 B6       STA (ZZ21),Y REPLACE
 1110 36E2 A9 28       LDA @40
 1120 36E4 18          CLC
 1130 36E5 65 B6       ADC ZZ21
 1140 36E7 85 B6       STA ZZ21
 1150 36E9 90 02       BCC VV3
 1160 36EB E6 B7       INC ZZ21+1
 1170 36ED CA         :VV3 DEX
 1180 36EE D0 EC       BNE VV2 INVERT NEXT BYTE PATTERN
 1190 36F0 60          RTS
 1200 36F1            \CLEAR ALL W/S
DNOT LISTENING
```