



# Gemini Microcomputers

in conjunction with

**BITS + P.C.S.**  
**COMPUTER PRODUCTS LTD**

**2708 / 2716 EPROM PROGRAMMER**  
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**Assembly Instructions and Circuit Diagrams**

## KIT CONTENTS

=====

Check your kit against the following list and report any shortages to your dealer.

1 of G808 iss. 2 Printed circuit board  
1 of assembly listing  
1 of cassette tape with operating software  
2 of Zero insertion sockets  
2 of 4 pole change over switches  
2 of 16 pin i/c sockets  
1 of 8 pin i/c socket  
2 solder posts  
1 of i/c 555 (IC 1)  
1 of i/c 4049 (IC 2 Observe CMOS precautions)  
1 of i/c 4040 (IC 3 Observe CMOS precautions)  
1 of 680 ohm resistor [BLUE/GREY/BROWN] (R1)  
1 of 560 ohm resistor [GREEN/BLUE/BROWN] (R3)  
6 of 10K ohm resistor [BROWN/BLACK/ORANGE] (R2,R4,R8,R13,  
R19,R20,)  
1 of 180 ohm resistor [BROWN/GREY/BROWN] (R5)  
1 of 47 ohm resistor [YELLOW/PURPLE/BLACK] (R6)  
1 of 33K ohm resistor [ORANGE/ORANGE/ORANGE] (R7)  
3 of 1K ohm resistor [BROWN/BLACK/RED] (R9,R14,R15)  
1 of 820K ohm resistor [GREY/RED/YELLOW] (R10)  
1 of 47K ohm resistor [YELLOW/PURPLE/ORANGE] (R11)  
4 of 1M ohm resistor [BROWN/BLACK/GREEN] (R12,R16,R17,R18)  
8 of 4K7 ohm resistor [YELLOW/PURPLE/RED] (R21,R22,R23,R24,  
R25,R26,R27,R28)  
2 of 22uf Tantalum capacitors (C1,C2)  
2 of 2.2uf Tantalum capacitors (C3,C4)  
4 of 10N ceramic capacitors (C5,C6,C7,C9)  
1 of 47N ceramic capacitor (C10)  
2 of 100N ceramic capacitor (C8,C11)  
2 of AA119 diode (D1,D2)  
2 of 4148 diode (D5,D6)  
1 of BZY88C 24V zener diode (D3)  
1 of BZY88C 4.7V zener diode (D4)  
4 of BC548 transistor (TR3,TR4,TR5,TR6)  
1 of BC558 transistor (TR2)  
1 of BFY50 transistor (TR1)

Please note that resistor colour codes are shown in square  
[] brackets and that component numbers are shown in round  
( ) brackets.

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## ASSEMBLY INSTRUCTIONS

=====  
With reference to the P.C.B. overlay and the contents list ,assemble your Eprom blower in the following order.

- 1)The two solder posts
- 2)All resistors
- 3)All diodes
- 4)The i/c sockets
- 5)All capacitors
- 6)All transistors (see overlay for orientation)
- 7)The switches SW1 and SW2
- 8)Zero insertion sockets
- 9)I/cs 1,2,and 3 into sockets (see overlay for orientation)

With reference to the overlay and your NASCOM circuit diagrams wire PL1 to your port connections as shown.

NASCOM 2 owners or NASCOM 1 owners with a PIO board can purchase a 26 pin strip line connector and a 26 way ribbon cable with two IDC plugs terminated at either end.Thus eliminating the need for soldering. The only other connections required are the two power supplies -5v and +12v connect these from the Eprom programmer to any convenient place on your system.

Please note that the lines on your computer ports marked ASTB and BSTB will need tying to 0 volts.This can be achieved by connecting PL1 18 to PL1 9 and PL1 11.

### USING THE PROGRAMMER

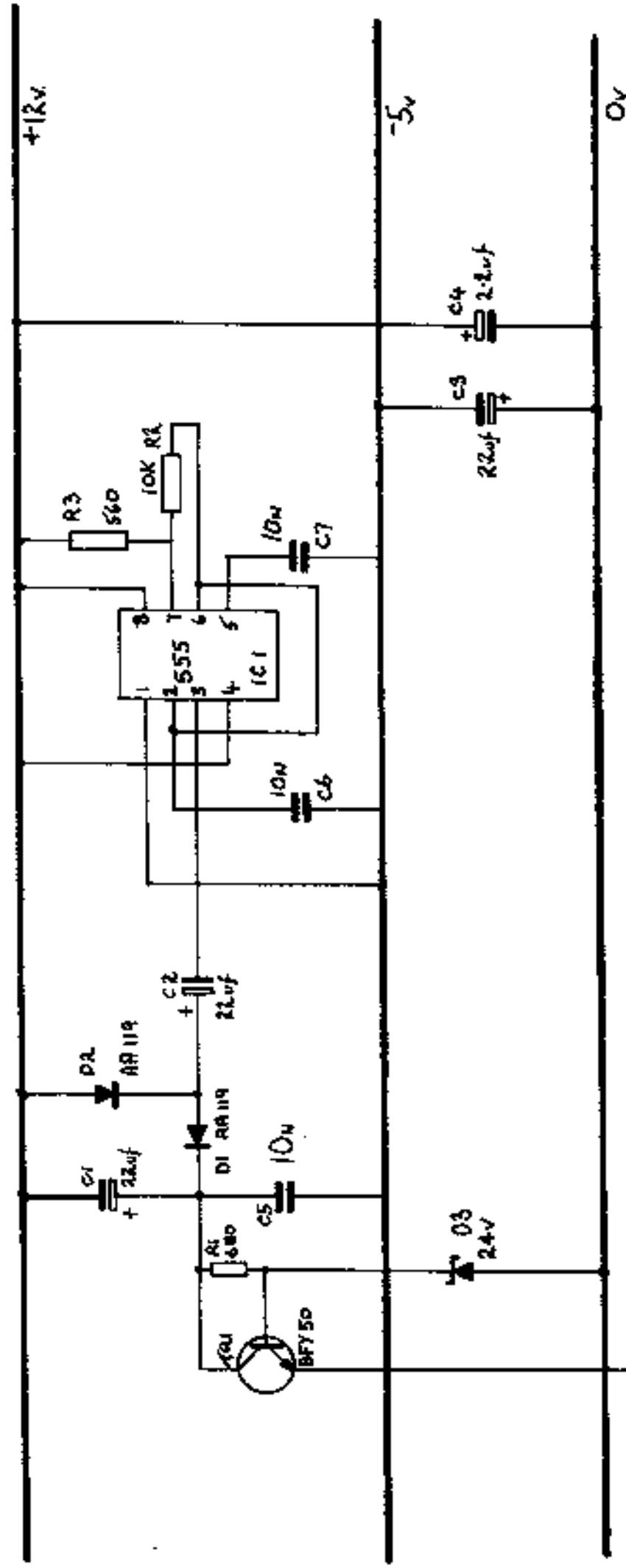
=====  
Having connected the Eprom programmer load the operating software into your NASCOM execute the software at 1000Hex. By reading the assembly listing and the control menu you should now be ready to blow your first eprom.

\*\*\*\*\* HAPPY EPROM BLOWING \*\*\*\*\*

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2.5 VOLT GENERATOR

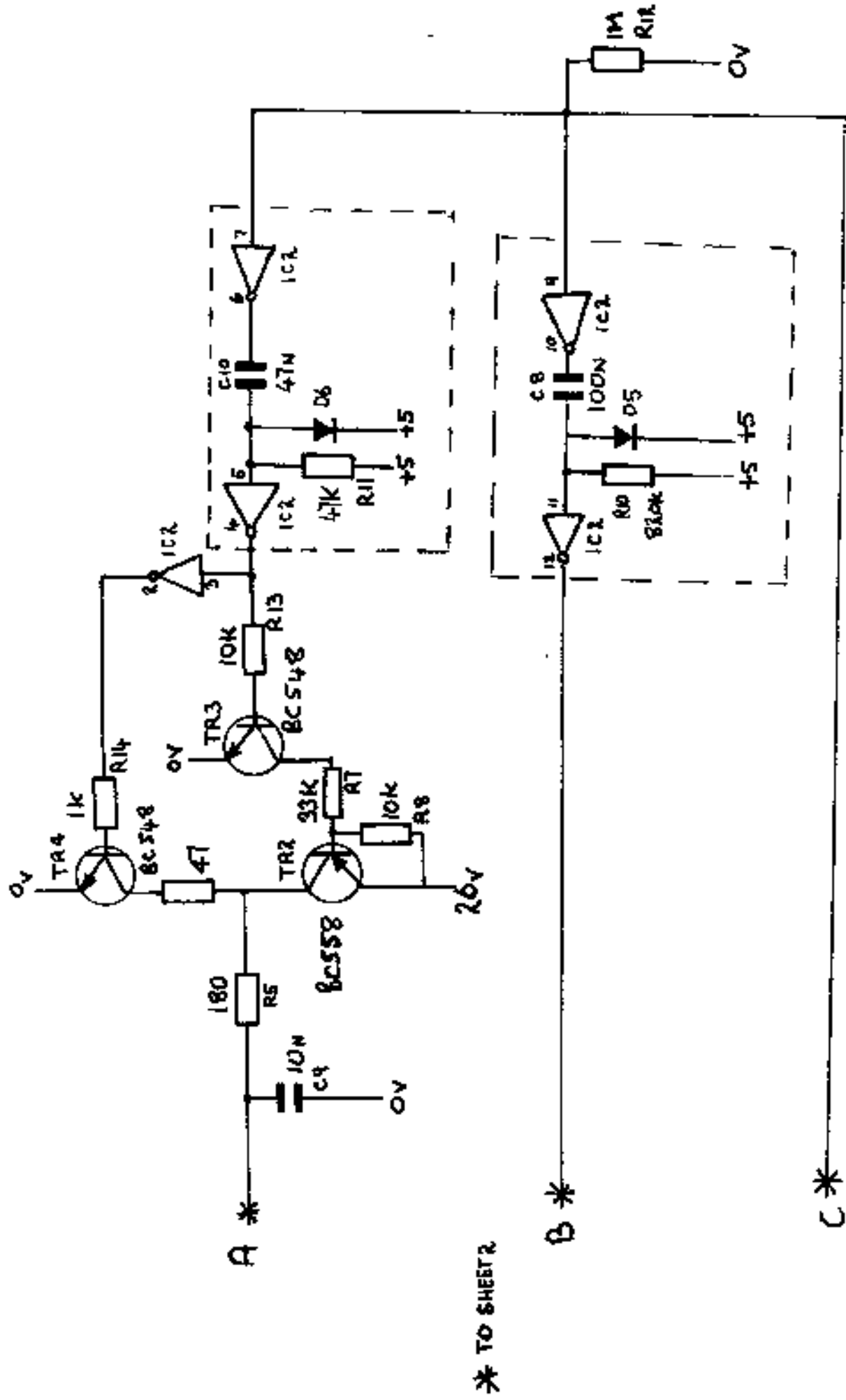


➤ +2.5 VOLTS TO SHEETS 2 + 3



COMPUTER PRODUCTS LTD





\* TO SHEET

## ZEAP Z80 Assembler - Source Listing

```

1000      0010      ORG      $1000
          0020      ;BITS & P.C.s COMPUTER PRODUCTS LTD
          0030      ;***** 2708/2716 PROM BLOWER *****
          0040      ;***** 03:3:81 *****
          0050      ;
          0060      ;***** TEST AND AND DEMO SOFTWARE *****
          0070      ;ITS A PROM BLOWER SO MAKE THIS ROMABLE
          0080      ;      ALLOW 1K SO LOTS OF ROOM
          0090      ;----- DO,s AND DONT,s -----
          0100      ;
          0110      ;ALWAYS CHECK THAT THE ROM TYPE SELECTION
          0120      ;SWITCH IS SET CORRECTLY
          0130      ;      I.E. IN FOR 2708 EPROMS
          0140      ;      OUT FOR 2716 EPROMS
          0150      ;
          0160      ;ALWAYS SWITCH OFF THE BLOWER BEFORE
          0170      ;REMOVING OR INSERTING A ROM
          0180      ;      I.E. IN FOR ON
          0190      ;      OUT FOR OFF
          0200      ;
          0210      ;OBSERVE MOS HANDLING PRECAUTIONS WITH
          0220      ;ALL ROMS AND WITH THE BLOWER ITS SELF
          0230      ;
          0240      ;EXECUTE THE PROGRAM TAPE FROM 1000H
          0250      ;THE MENU WILL HELP YOU
          0260      ;IT CAN ALWAYS BE RETURNED TO BY $1000H
          0270      ;
          0280      ;THIS LISTING WAS USED FOR ASSEMBLING YOUR
          0290      ;TAPE SO IT HAS WORKED
          0300      ;
          0310      ;THE PROTOTYPE BLOWER HAS BEEN BLOWING
          0320      ;OUR BOMS FOR SEVERAL MONTHS
          0321      ;
1000 0004      0330      ADATA      EQU      $4      ;DATA TO AND FROM COMPUTER
1000 0006      0340      ACTRL      EQU      $6      ;control for data port
1000 0005      0350      BDATA      EQU      $5      ;CONTROL FOR BLOWER
1000 0007      0360      BCTRL      EQU      $7      ;control for control port
          0370      ;
1000 0C0E      0380      ARG2      EQU      $C0E
1000 0C10      0390      ARG3      EQU      $C10
          0400      ;
          0410      ;The blower control port is as follows
          0420      ;BIT 0 ADDRESS COUNTER CLOCK low to clock
1000 0000      0430      ACLOCK      EQU      $0
          0440      ;BIT 1 RESET ADDRESS COUNTER high to reset
          0450      ;LOW TO ENABLE
1000 0001      0460      RESET      EQU      $1
          0470      ;BIT 2 READ/PROG. 2708 low to read
1000 0002      0480      RP2708      EQU      $2
          0490      ;BIT 3 MASTER ROM SELECT low to select
1000 0003      0500      MR0M      EQU      $3
          0510      ;BIT 4 TRIG PROGRAM PULSE high to trigger
1000 0004      0520      TRIG      EQU      $4
          0530      ;BIT 5 2716 READ/WRITE low to read
1000 0005      0540      RW2716      EQU      $5
          0550      ;BIT 6 ACTIVATE 2708 Deselect
          0560      ;used in conjunction with bit 2
1000 0006      0570      STATE3      EQU      $6

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0580 ;
0590 ;BIT 7 spare on this version
0600 ;
0610 ;THE DATA PORT IS CONNECTED IN SEQUENCE
0620 ;E.G. BIT 0 to BIT 0
0630 ;
0640 ;INITIALY A CONTROL WORD (CTRLWD)IS SET UP
0650 ;
1000 0007 0660 TBIT EQU 7 ;USED IN CTRLWD TO INDICATE
0670 ;2708 OR 2716 ROM 1=2716 0=2708
0680 ;
0690 ;BITS IN THE PORT CTRLWD CAN BE USED
0700 ;TO INDICATE SOURCE FROM RAM OR DONOR
0710 ;
0720 ;DISPLAY SCREEN PROMPTS
1000 EF0C00 0730 START1 DEFB 2EF 20C 200
1003 EF0D0D0D 0740 START2 DEFB 2EF 20D 20D 20D
1007 456E7465 0750 DEFM /Enter options as follows/
72206F70
74696F6E
73206173
20666F6C
6C6F7773
101F 0D 0760 DEFB 20D
1020 45786563 0770 DEFM /Execution address prefixed by E
7574696F
6E206164
64726573
73207072
65666978
65642062
792045
103F 0D 0780 DEFB 20D
1040 526F6D20 0790 DEFM /Rom type 2708 or 2716 /
74797065
20323730
38206F72
20323731
3620
1056 0D 0800 DEFB 20D
1057 536F7572 0810 DEFM /Source address or D for Donor /
63652061
64647265
7373206F
72204420
666F7220
446F6E6F
7220
1075 0D 0820 DEFB 20D
0830 ;
0840 ;THREE ARGUMENTS ARE ALWAYS REQUIRED
0850 ;AFTER EACH OPTION THE BLOWER RETURNS TO
0860 ;THE NAS-SYS COMMAND MODE.THIS ALWS THE
0870 ;REPETION OF THE PREVIOUS BLOWER OPTIONS
0880 ;BY SIMPLY ENTERING "E".
0890 ;OR OF COURSE E1000 FOR THE OPTION MENU
0900 ;ALTERNATIVELY ANY NAS-SYS COMMAND CAN
0910 ;BE USED. e.g. "M","T","W",ETC.

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0920 ;
1076 45786563 0930      DEFM /Execution options:/
      7574696F
      6E206F70
      74696F6E
      733A
1088 0D          0940      DEFB E0D
1089 31314535 0950      DEFM /11E5 BLOW A ROM (Fully erased)/
      20424C4F
      57204120
      524F4D20
      2846756C
      6C792065
      72617365
      6429
      0960 ;
      0970 ;THIS ROUTINE CHECKS THE ROM FOR ERASURE
      0980 ;BLOWS IT AND THEN VERIFIES IT
      0990 ;DATA IS FROM DONOR OR RAM ADDRESS USED
      1000 ;IN THE OPTIONS
      1010 ;
10A7 0D          1020      DEFB E0D
10A8 31333431 1030      DEFM /1341 BLOW A ROM (Not erased)/
      20424C4F
      57204120
      524F4D20
      284E6F74
      20657261
      73656429
      1040 ;
      1050 ;THIS ROUTINE BLOWS A ROM WITHOUT CHECKING
      1060 ;FOR ERASURE AND VERIFIES IT
      1070 ;DATA IS FROM DONOR OR RAM ADDRESS USED
      1080 ;IN THE OPTIONS
      1090 ;
10C4 0D          1100      DEFB E0D
10C5 31324238 1110      DEFM /12B8 VERIFY A ROM/
      20564552
      49465920
      4120524F
      4D
      1120 ;
      1130 ;THIS ROUTINE VERIFIES A ROM WITH EITHER
      1140 ;THE DONOR OR RAM DEPENDING UPON THE
      1150 ;OPTIONS USED
      1160 ;IT WILL PRINT OUT ANY LOCATIONS INCLUDING
      1170 ;CONTENTS WHICH HAVE NOT COMPARED
      1180 ;
10D6 0D          1190      DEFB E0D
10D7 31324130 1200      DEFM /12A0 LOAD DATA FROM DONOR TO RAM/
      204C4F41
      44204441
      54412046
      524F4D20
      444F4E4F
      5220544F
      2052414D
      1210 ;

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1220 ;SIMPLY DUMPS THE DONOR ROM CONTENTS
1230 ;INTO THE ADDRESS SPECIFIED IN THE OPTIONS
1240 ;
10F7 0D 1250 DEFB £0D
10F8 31323941 1260 DEFM /129A CHECK FOR FULLY ERASED ROM/
      20434845
      434B2046
      4F522046
      554C4C59
      20455241
      53454420
      524F4D
      1270 ;
1117 0D00DF5B 1280 ;CHECKS THAT ALL BITS IN THE ROM ARE SET
      1290 DEFB £0D £00 £DF £5B
      1300 ;
      1310 ;THIS ROUTINE INPUTS FROM THE DATA PORT
      1320 ;DOES NOT SAVE CTRLWD
      1330 ;CTRLWD PRESET TO SELECT DONOR OR MASTER
      1340 ;
111B 3E7F 1350 INBYTE LD A £7F
111D D306 1360 OUT (ACTRL) A ;SET FOR INPUT
111F 79 1370 LD A C ;GET CTRLWD
1120 D305 1380 OUT (BDATA) A ;SELECT ROM
1122 DB04 1390 IN A (ADATA) ;GET A BYTE
1124 C9 1400 RET
      1410 ;
      1420 ;
      1430 ;ROMCHK THIS ROUTINE CHECKS FOR A VALID
      1440 ;ROM TYPE AND PREPARES THE REGISTERS FOR
      1450 ;THE NUMBER OF CYCLES AND SIZE OF ROM
      1460 ;IT ALSO SETS THE TEST BIT
      1470 ;
1125 ED5B0E0C 1480 ROMCHK LD DE (ARG2)
1129 3E27 1490 LD A £27
112B BA 1500 CP D ;VERIFY ENTRY
112C 2038 1510 JR NZ ERROR
112E 3E08 1520 LD A £08
1130 BB 1530 CP E ;CHECK ROM TYPE
1131 2008 1540 JR NZ ROMT2 ;NOT 2703 BUT IS IT 2716 ?
1133 110004 1550 LD DE 1024 ;NO OF LOCATIONS IN ROM
1136 79 1560 LD A C ;GET CTRLWD
1137 CBBF 1570 RES TBIT A ;NOT 2716
1139 4F 1580 LD C A ;SAVE CTRLWD
113A C9 1590 RET
113B 3E16 1600 ROMT2 LD A £16
113D BB 1610 CP E ;IS IT 2716 ?
113E 2026 1620 JR NZ ERROR
1140 110008 1630 LD DE 2048 ;NO OF LOCATIONS
1143 79 1640 LD A C ;GET CTRLWD
1144 CBFF 1650 SET TBIT A ;IS 2716
1146 4F 1660 LD C A ;SAVE CTRLWD
1147 C9 1670 RET
      1680 ;
      1690 ;PREPARE CONTROL PORT AND CTRLWD
      1700 ;ASSUMES A ROM TO BLOW FROM RAM

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1710 ;
1148 3E0F      1720  INIT   LD    A  E0F
114A D307      1730          OUT   (BCTRL) A ;SET PORT TO OUTPUT
114C 3E6F      1740          LD    A  E6F ;X1101111 CTRLWD
114E D305      1750          OUT   (BDATA) A ;INIT PROM BLOWER
1150 CB8F      1760          RES   RESET A
1152 D305      1770          OUT   (BDATA) A ;RESET ADDRESS COUNTER
1154 4F        1780          LD    C A      ;SAVE CTRLWD
1155 C9        1790          RET
1800 ;
1810 ;DONROM THIS ROUTINE DETERMINES THE
1820 ;SOURCE OF DATA TO BE USED i.e. DONOR
1830 ;OR RAM AND SETS THE CTRLWD
1840 ;
1156 2A100C    1850  DONRAM LD    HL (ARG3)
1159 3E0D      1860          LD    A  ED
115B BD        1870          CP    L
115C 2007      1880          JR    NZ MBRAM ;MUST BE RAM
115E 79        1890          LD    A  C      ;GET CTRLWD
115F CB9F      1900          RES   MROM A   ;TURN DONOR ON
1161 4F        1910          LD    C A      ;SAVE CTRLWD
1162 210000    1920          LD    HL 0000
1165 C9        1930  MBRAM  RET
1166 EF0C      1940  ERROR  DEFB  EEF E0C
1168 2A2A2A20  1950          DEFM /*** OPTIONS INCORRECT ***/
      4F505449
      4F4E5320
      494E434F
      52524543
      54202A2A
      2A
1181 00        1960          DEFB  E00
1182 C30310    1970          JP    START2
1980 ;
1990 ;THIS ROUTINE INCREMENTS THE ADDRESS
2000 ;COUNTER AND DEC DE READY FOR TESTING
2010 ;ALSO INC HL FOR NEXT BYTE
2020 ;
1185 79        2030  INCADD LD    A  C ;GET CTRLWD
1186 CB87      2040          RES   ACLOCK A
1188 D305      2050          OUT   (BDATA) A ;INCREMENT COUNTER
118A 00        2060          NOP
118B CBC7      2070          SET   ACLOCK A
118D D305      2080          OUT   (BDATA) A ;COMPLETE CLOCK PULSE
118F 4F        2090          LD    C A      ;SAVE CTRLWD
1190 23        2100          INC   HL      ;NEXT BYTE
1191 1B        2110  DECDE  DEC   DE ;USED FOR DELAYS AND LOOPS
1192 7A        2120          LD    A  D
1193 B3        2130          OR    E      ;SET FLAG IF ZERO
1194 C9        2140          RET   ;TEST FLAG IN MAIN ROUTINE
2150 ;
2160 ;
1195 EF0D0D    2170  FINISH DEFB  EEF E0D E0D
1198 454E5445  2180          DEFM /ENTER "E" FOR SAME OPTIONS/
      52202245
      2220464F
      52205341
      4D45204F
      5054494F
      4E53

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11B2 0D      2190      DEFB £0D
11B3 4F522045 2200      DEFM /OR E1000 TO RETURN TO START/
      31303030
      20544F20
      52455455
      524E2054
      4F205354
      415254
11CE 000D00DF 2210      DEFB £0D £0D 00 £DF £5B
      5B
      2220 ;
      2230 ;ROUTINE TO OUTPUT REGISTER CONTENTS IN
      2240 ;HEX AND TO INDICATE THAT THE PROG. IS
      2250 ;RUNNING
      2260 ;
11D3 78      2270 PNTHEX LD   A B
11D4 3D      2280      DEC   A
11D5 DF68    2290      DEFB £DF £68
11D7 3E07    2300      LD   A 7
11D9 85      2310      ADD  A L
11DA 6F      2320      LD   L A
11DB 2229DC  2330      LD   (£0C29) HL
11DE 7A      2340      LD   A D
11DF DF68    2350      DEFB £DF £68
11E1 7B      2360      LD   A E
11E2 DF68    2370      DEFB £DF £68
11E4 C9      2380      RET
11E5 CD7B12  2390 ROMBLO CALL ALSET1 ;VERIFY ROM ERASED
11E8 214713  2400 BLO   LD   HL MES1
11EB CD8313  2410      CALL TLINE
11EE 79      2420      LD   A C      ;GET CTRLWD
11EF CB7F    2430      BIT  TBIT A ;TEST FOR ROM TYPE
11F1 C2F811  2440      JP   NZ CYCL16
11F4 0664    2450      LD   B 100 ;2708 CYCLES
11F6 1802    2460      JR   ROMBL4
11F8 0602    2470 CYCL16 LD   B 2 ;2716 CYCLES
11FA CD4811  2480 ROMBL4 CALL INIT
11FD CD2511  2490      CALL ROMCHK
1200 CD5611  2500      CALL DONRAM
1203 79      2510      LD   A C      ;GET CTRLWD
1204 CBB7    2520      RES STATE3 A ;2708 INTO PROG MODE
1206 4F      2530      LD   C A      ;SAVE CTRLWD
1207 CB5F    2540      BIT  MROM A ;RAM OR DONOR
1209 C41012  2550      CALL NZ ROMBL1
120C 3E7F    2560      LD   A £7F ;TO SET PORT FOR INPUT
      2570 ;IN THIS MODE IT WILL NOT EFFECT THE
      2580 ;DATA BUS ON THE PROM BLOWER
      2590 ;SLAVE IN PROGRAM MODE FROM INIT
      2600 ;
120E 1802    2610      JR   ROMBL2
1210 3E0F    2620 ROMBL1 LD   A £0F ;TO SET PORT TO OUTPUT
1212 D306    2630 ROMBL2 OUT  (CTRL) A ;SET TO CHOSEN MODE
1214 79      2640      LD   A C      ;GET CTRL
1215 D305    2650      OUT  (BDATA) A ;OUT CTRLWD
1217 7E      2660 ROMBL3 LD   A (HL) ;DATA TO A FROM RAM

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1218 D304      2670      OUT (ADATA) A      ;SEND DATA TO PORT
121A 79        2680      LD A C              ;RESTORE CTRLWD
121B CBE7      2690      SET TRIG A
121D D305      2700      OUT (BDATA) A      ;TRIG PULSE
121F D5        2710      PUSH DE
1220 54        2720      LD D H
1221 5D        2730      LD E L
1222 E5        2740      PUSH HL
1223 211B08    2750      LD HL E081E
1226 22290C    2760      LD (E0C29) HL
1229 CDD311    2770      CALL PNTHEX
122C E1        2780      POP HL
122D D1        2790      POP DE
122E 79        2800      LD A C              ;GET CTRLWD
122F D5        2810      PUSH DE            ;SAVE LOCATION COUNT
1230 CB7F      2820      BIT TBIT A        ;2708 OR 2716
1232 CA3E12    2830      JP 2 NODEL
1235 115505    2840      LD DE E0555        ;DELAY FOR 2716 PROG.PULSE
                2850      ;
                2860      ;THE BITS AND P.C.s FROM BLOWER NORMALLY
                2870      ;WORKS @ 4MHZ FOR 2MHZ WORKING LD DE E0333
                2880      ;
1238 CD9111    2890      GODEL CALL DECDE ;WAIT FOR DELAY TIME
123B C23812    2900      JP NZ GODEL
123E D1        2910      NODEL POP DE
123F 79        2920      LD A C              ;TRIG OFF FROM INIT
1240 D305      2930      OUT (BDATA) A      ;TRIG OFF
1242 CD8511    2940      CALL INCADD        ;INC ADDRESS COUNT AND HL
1245 20D0      2950      JR NZ ROMBL3      ;GO AGAIN IF NOT END
1247 05        2960      DEC B              ;CHECK FOR LAST CYCLE
1248 C2FA11    2970      JP NZ ROMBL4      ;RESET AND GO AGAIN
124B 000000EF 2980      DEFB 00 00 00 EEF E0C
                0C
1250 57414954 2990      DEFM /WAITING 4 Secs
                494E4720
                32205365
                63732020
                20202020
                20202020
                20202020
                202020
126F 00        3000      DEFB E00
                3010      ;
1270 DF5DDF5D 3020      DEFB EDF E5D EDF E5D ;WAIT 2 SECS
1274 DF5DDF5D 3030      DEFB EDF E5D EDF E5D ;WAIT 2 SECS
                3040      ;ERRORS WILL OCCUR WHEN VERIFYING EPROMS
                3050      ;WHICH HAVE NOT BEEN ALLOWED TO COOL
                3060      ;THIS DELAY SHOULD BE HALVED FOR 2MHZ
                3070      ;i.e. REPLACE 2 DELAYS WITH NOPS
                3080      ;*****BITS AND P.C.S*****
                3090      ;
1278 CDB812    3100      CALL VERIF1
127B EF0C00    3110      ALSET1 DEFB EEF E0C E00
127E CD4811    3120      CALL INIT
1281 CD2511    3130      CALL ROMCHK        ;GET ROM SIZE
1284 79        3140      LD A C              ;GET CTRLWD
1285 CB97      3150      RES RP2708 A      ;*
1287 CBF7      3160      SET STATE3 A      ;* SET RECIPIENT TO READ
1289 CBAF      3170      RES RW2716 A      ;*
128B 4F        3180      LD C A              ;SAVE CTRLWD
128C CD1B11    3190      ALSET2 CALL INBYTE ;GET A BYTE

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1218 D304      2670      OUT  (ADATA) A      ;SEND DATA TO PORT
121A 79        2680      LD   A C            ;RESTORE CTRLWD
121B CBE7      2690      SET  TRIG A
121D D305      2700      OUT  (BDATA) A     ;TRIG PULSE
121F D5        2710      PUSH DE
1220 54        2720      LD   D H
1221 50        2730      LD   E L
1222 E5        2740      PUSH HL
1223 211B08    2750      LD   HL £081B
1226 22290C    2760      LD   (£0C29) HL
1229 C0D311    2770      CALL PNTHEX
122C E1        2780      POP  HL
122D D1        2790      POP  DE
122E 79        2800      LD   A C            ;GET CTRLWD
122F D5        2810      PUSH DE            ;SAVE LOCATION COUNT
1230 CB7F      2820      BIT  TBIT A        ;2708 OR 2716
1232 CA3E12    2830      JP   Z NODEL
1235 115505    2840      LD   DE £0555      ;DELAY FOR 2716 PROG.PULSE
2850 ;
2860 ;THE BITS AND P.C.s PROM BLOWER NORMALLY
2870 ;WORKS @ 4MHZ FOR 2MHZ WORKING LD DE £0333
2880 ;
1238 CD9111    2890      GODEL CALL DECDE ;WAIT FOR DELAY TIME
123B C23812    2900      JP   NZ GODEL
123E D1        2910      NODEL POP  DE
123F 79        2920      LD   A C            ;TRIG OFF FROM INIT
1240 D305      2930      OUT  (BDATA) A     ;TRIG OFF
1242 CD8511    2940      CALL INCADD        ;INC ADDRESS COUNT AND HL
1245 20D0      2950      JR   NZ ROMBL3     ;GO AGAIN IF NOT END
1247 05        2960      DEC  B            ;CHECK FOR LAST CYCLE
1248 C2FAll    2970      JP   NZ ROMBL4     ;RESET AND GO AGAIN
124B 000000FF 2980      DEFB 00 00 00 £EF £0C
DC
1250 57414954 2990      DEFM /WAITING 4 Secs /
494E4720
32205365
63732020
20202020
20202020
20202020
202020
126F 00        3000      DEFB £00
3010 ;
1270 DF5DDF5D 3020      DEFB £DF £5D £DF £5D ;WAIT 2 SECS
1274 DF5DDF5D 3030      DEFB £DF £5D £DF £5D ;WAIT 2 SECS
3040 ;ERRORS WILL OCCUR WHEN VERIFYING EPROMS
3050 ;WHICH HAVE NOT BEEN ALLOWED TO COOL
3060 ;THIS DELAY SHOULD BE HALVED FOR 2MHZ
3070 ;i.e. REPLACE 2 DELAYS WITH NOPS
3080 ;*****BITS AND P.C.S*****
3090 ;
1278 CDB812    3100      CALL VERIF1
127B EF0C00    3110      ALSET1 DEFB £EF £0C £00
127E CD4811    3120      CALL INIT
1281 CD2511    3130      CALL ROMCHK        ;GET ROM SIZE
1284 79        3140      LD   A C            ;GET CTRLWD
1285 CB97      3150      RES  RP2708 A      ;*
1287 CBF7      3160      SET  STATE3 A      ;* SET RECIPIENT TO READ
1289 CBAF      3170      RES  RW2716 A      ;*
128B 4F        3180      LD   C A            ;SAVE CTRLWD
128C CD1B11    3190      ALSET2 CALL INBYTE ;GET A BYTE

```

128F	FEFF	3200	CP	EFF	;TEST FOR ALL BITS SET
1291	C2FF12	3210	JP	NZ ERROR1	
1294	CD8511	3220	CALL	INCADD	
1297	20F3	3230	JR	NZ ALSET2	;GET NEXT BYTE
1299	C9	3240	RET		
129A	CD7B12	3250	ERASE	CALL ALSET1	
129D	C39511	3260	JP	FINISH	
12A0	CD4811	3270	INPUT	CALL INIT	
12A3	CD2511	3280	CALL	ROMCHK	
12A6	2A100C	3290	LD	HL (ARG3)	
12A9	CB9F	3300	RES	MROM A	
12AB	4F	3310	LD	C A	
12AC	CD1B11	3320	INPUT2	CALL INBYTE	
12AF	77	3330	LD	(HL) A	
12B0	CD8511	3340	CALL	INCADD	
12B3	20F7	3350	JR	NZ INPUT2	
12B5	C39511	3360	JP	FINISH	
12B8	216513	3370	VERIF1	LD HL MES2	
12BB	CD8313	3380	CALL	TLINE	
12BE	CD4811	3390	VERIFY	CALL INIT	
12C1	CD2511	3400	CALL	ROMCHK	
12C4	CD5611	3410	CALL	DONRAM	
12C7	D5	3420	VI	PUSH DE	
12C8	79	3430	LD	A C	
12C9	5F	3440	LD	E A	
12CA	CB97	3450	RES	RP2708 A ;*	
12CC	CBF7	3460	SET	STATE3 A ;* SET RECIPIENT TO READ	
12CE	CBAF	3470	RES	RW2716 A ;*	
12D0	CBDF	3480	SET	MROM A ;DONOR DESELECTED	
12D2	4F	3490	LD	C A ;SAVE CTRLWD	
12D3	CD1B11	3500	CALL	INBYTE ;GET BYTE FROM RECIPIENT	
12D6	57	3510	LD	D A ;SAVE BYTE FROM RECIPIENT	
12D7	7B	3520	LD	A E	
12D8	CB5F	3530	BIT	MROM A ;DATA FROM ROM OR RAM	
12DA	200E	3540	JR	NZ VRAM	
12DC	CBEF	3550	SET	RW2716 A ;*	
12DE	CB07	3560	SET	RP2708 A ;* DESELECT RECIPIENT ROM	
12E0	CBF7	3570	SET	STATE3 A ;*	
12E2	CB9F	3580	RES	MROM A ;SELECT DONOR	
12E4	4F	3590	LD	C A ;SAVE CTRLWD	
12E5	CD1B11	3600	CALL	INBYTE ;GET A BYTE FROM DONOR	
12E8	1801	3610	JR	V2	
12EA	7E	3620	VRAM	LD A (HL);GET A BYTE FROM RAM	
12EB	BA	3630	V2	CP D ;ARE BOTH BYTES THE SAME	
12EC	C41A13	3640	CALL	NZ ERROR2	
12EF	D1	3650	POP	DE	
12F0	CD8511	3660	CALL	INCADD	
12F3	20D2	3670	JR	NZ V1 ;GET NEXT BYTE	
12F5	C39511	3680	JP	FINISH	
12F8	21CA0B	3690	CURPOS	LD HL E0BCA	
12FB	22290C	3700	LD	(E0C29) HL	
12FE	C9	3710	RET		
12FF	EF0C	3720	ERROR1	DEFB EFF E0C	

```

1301 202A2A20 3730      DEFM / ** ROM NOT ERASED **/
      524F4D20
      4E4F5420
      45524153
      4544202A
      2A
1316 00              3740      DEFB 00
1317 C39511          3750      JP   FINISH
131A 47              3760  ERROR2 LD   B A      ;SAVE A
131B 04              3770      INC  B
131C E5              3780      PUSH HL
131D D5              3790      PUSH DE
131E 54              3800      LD   D H
131F 5D              3810      LD   E L
1320 EF0D            3820      DEFB EEF E0D
1322 4552524F 3830      DEFM /ERROR @ /
      52202040
      202020
132D 00              3840      DEFB 00
132E 2A290C          3850      LD   HL (E0C29)
1331 CDD311          3860      CALL PNTHEX
1334 3E08            3870      LD   A 8
1336 85              3880      ADD  A L
1337 6F              3890      LD   L A
1338 22290C          3900      LD   (E0C29) HL
133B D1              3910      POP  DE
133C 7A              3920      LD   A D
133D DF68            3930      DEFB EDF E68
133F B1              3940      POP  HL
1340 C9              3950      RET
1341 CD2511          3960  FBLOW CALL ROMCHK
1344 C3E811          3970      JP   BLO
1347 2A2A2A20 3980  MES1  DEFM /*** BLOWING *** LOOP LOCATION/
      424C4F57
      494E4720
      2A2A2A20
      4C4F4F50
      20204C4F
      43415449
      4F4E
1365 2A2A2A20 3990  MES2  DEFM /*** VERIFYING ***
      56455249
      4659494E
      47202A2A
      2A202020
      20202020
      20202020
      2020
      4000 ;
      4010 ;TLINE WRITES TO THE TOP LINE OF THE
      4020 ;SCREEN
      4030 TLINE PUSH BC
      4040      DEFB EEF E0C E00
1383 C5              4050      LD   DE E0BCA
1384 EF0C00          4060      LD   BC 30
1387 11CA0B          4070      LDIR
138A 011E00          4080      POP  BC
138D EDB0            4090      RET
138F C1
1390 C9

```