BYTESAVER

ASSEMBLY MANUAL

Cromemco
Specialists in computer peripherals
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BYTESAVER ASSEMBLY INSTRUCTIONS

The Cromemco Bytesaver™ kit can be assembled in about one evening. All components are mounted on the component side of the pc board (the side with the printed legend) and soldered on the opposite side. Be sure to use high-quality rosin core solder for the assembly and a fine-tipped low wattage soldering iron.

( ) Solder in position the 10 14-pin IC sockets, the 6 16-pin IC sockets, and 8 24-pin IC sockets.

( ) Solder in position the $\frac{1}{4}$ watt resistors:

R1	47K	yellow-violet-orange
R2	10K	brown-black-orange
R3	180	brown-gray-brown
R4	1K	brown-black-red
R5	9.1K	white-brown-red
R6	1.5K	brown-green-red
R7	1K	brown-black-red
R8	47	yellow-violet-black
R9	1K	brown-black-red
R10	10	brown-black-black
R11	5.6K	green-blue-red
R12	5.6K	green-blue-red
R13	10K	brown-black-orange
R14	5.6K	green-blue-red
R15	180	brown-gray-brown
R16-R39	18K	brown-gray-orange

( ) Next install the 1N914 diodes. NOTE we recommend that no diode be installed in the diode position just below transistor Q0. When using the Bytesaver we recommend that the PROM containing the Bytemover software be inserted in PROM position zero. By not installing this diode there will be no chance of accidentally programming this PROM.

When installing the diodes be careful to orient them properly, noting the position of the cathode (banded) end. Due to the close spacing of the holes in the pc board, the diodes should be mounted on end.

( ) Now install the 23 capacitors as shown on the pc board. Be careful that the electrolytic capacitors are oriented with the positive (+) end as shown.

( ) Now solder the transistors in place taking care to orient them properly. Note that Q8 and Q9 are 2N3906 transistors, and Q10 is a type MPS6560. All other transistors are type 2N3904.

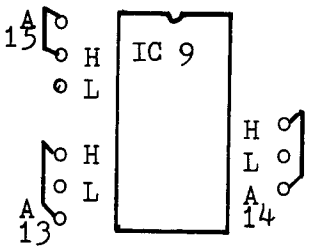
( ) Install the pc board switch, SW1, in the upper left corner of the board.

( ) Install the Cromemco high-speed pulse transformer, model XT8K, in position T1. Note that the leads are asymmetrically positioned so that there is only one correct orientation of the transformer.

( ) Now install IC14, the positive twelve volt regulator IC, using a 6-32 X $\frac{1}{4}$ screw and nut.

( ) Next install the heatsink in the upper right corner of the board just starting the nuts on the 6-32 x 3/8 screws. Install IC12 and IC 13 being sure to place the insulating washer between IC13 and the heat sink. The nylon screw must be used to hold IC13 in place. (The insulating washer supplied may have to be trimmed with a pair of scissors to clear the protrusions of the heatsink.) Tighten the nuts on the screws in the heatsink assembly only after all screws have been inserted. Take care that the leads on the voltage regulators do not come in contact with sides of the openings in the heatsink.

( ) Next install three jumper wires to select where the Bytesaver is to reside in memory space. Each of the three high order address lines (A15, A14, and A13) may be tied either to the corresponding "H" or "L" terminal. For the Bytesaver to reside in the top 8K of memory space, for example, the three jumper wires would be installed as shown:



( ) Now install the ICs in their sockets being careful to orient pin one of each IC as shown by the small white dot on the pc board at each IC position. Install a PROM containing Bytemover software in PROM position 0.

The assembly of your Bytesaver is now complete. Detailed operating instructions are given in the Bytemover software manual.

PROM AVAILABILITY: Additional 2704 and 2708 PROMs are available from Cromemco. The 2704 is $50 each, and the 2708 is $75. Our PROMs are factory fresh, full speed devices that we purchase directly form the manufacturer.

WAIT STATE: Should you wish to use low speed 2704 or 2708 PROMs in your Bytesaver (with access times greater than 450 ns) there is a provision for a wait state. Simply insert a jumper wire, as shown, between IC10 and IC11. No jumper wire need be inserted here when using full-speed PROMs.

REPAIR: If for any reason you need service on your Bytesaver, you may return it to Cromemco along with a check for $35. The $35 covers the cost of repair and return postage. We reserve the right to not repair any Bytesaver that we judge to be unserviceable.

BYTESAVER PARTS LIST

C1 - C8	0.1 uF
C9 - C15	10uF 50v.
C16	.005
C17	680 pF
C18	.01 uF
C19	680 pF
C20	220 pF
C21 - C23	0.1 uF
D1 - D19	1N914 or 1N4531
Q0 - Q7	2N3904
Q8, Q9	2N3906
Q10	MPS6560
Q11, Q12	2N3904
R1	47K
R2	10K
R3	180
R4	1K
R5	9.1K
R6	1.5K
R7	1K
R8	47
R9	1K
R10	10
R11	5.6K
R12	5.6K
R13	10K
R14	5.6K
R15	180
R16-R39	18K
SW1	pc board switch
T1	Cromemco XT8K high-speed pulse transformer.

Sockets

10	14 pin
6	16 pin
8	24 pin

IC1	74123
IC2	7474
IC3	7402
IC4	7406
IC5	7406
IC6	7402
IC7	7406
IC8	7442
IC9	74LS04
IC10	74LS10
IC11	74LS04
*IC12	340T-5.0 or 7805
*IC13	320T-5.0 or 7905
*IC14	340T-12 or 7812
IC15	7432 or 74LS32
IC16	74367
IC17	74367
IC18	74367
IC19	74367

Hardware

3	#6 X 3/8 screws
1	#6 X 1/4 screw
**1	#6 X 3/8 nylon screw
5	#6 nuts
1	Heatsink

Documentation

Assembly manual
Bytemover manual
Schematic diagram

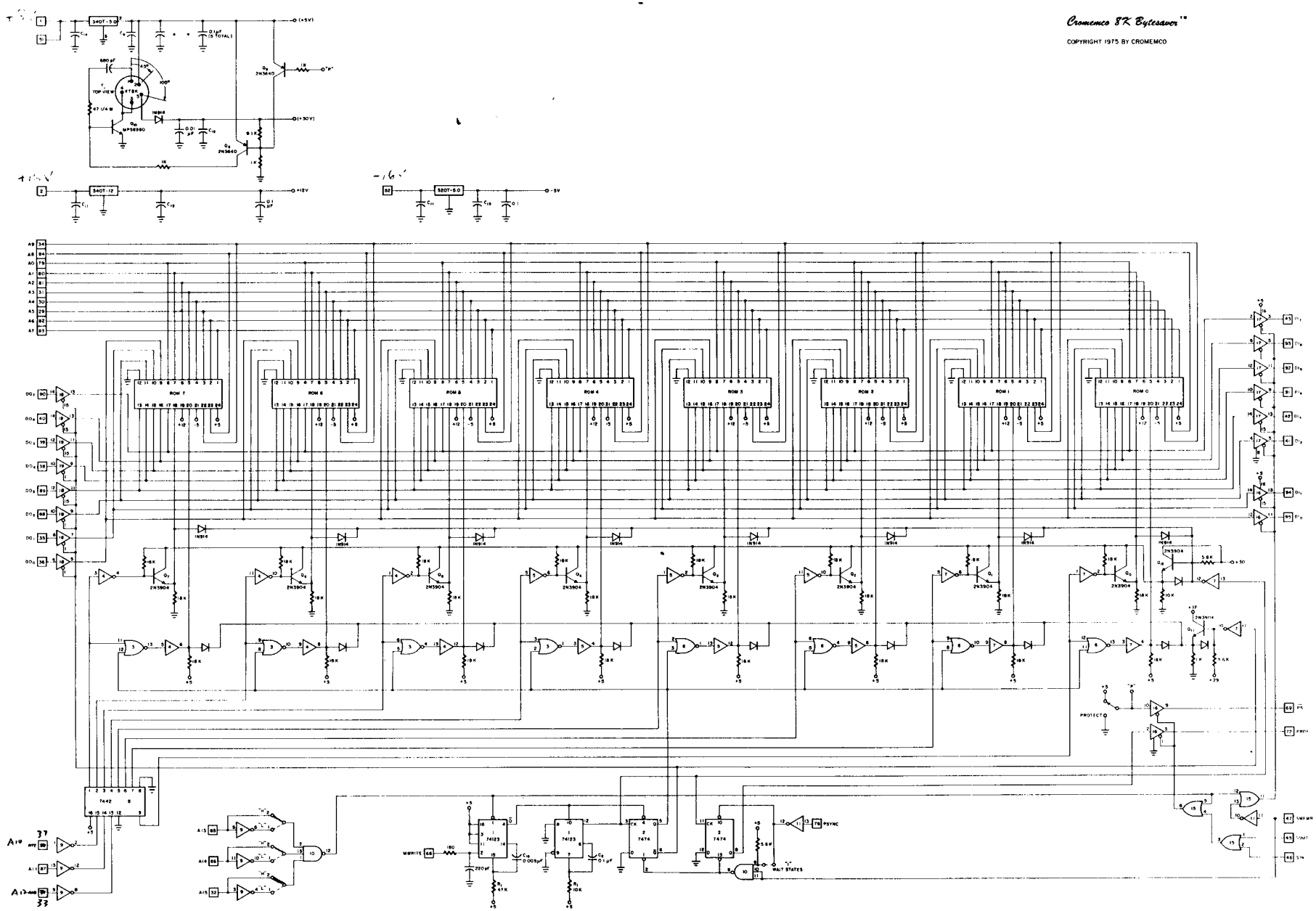
Other

Insulating washer to be used under IC13

Bytesaver pc board

* NOTE: The three voltage regulator ICs (IC 12, 13 and 14) may look physically similar, but they are not interchangeable. Each must be mounted in the proper IC location.

** NOTE: The nylon screw is used to secure IC13. It is important that the screw be inserted from the pc board side of the assembly so that the head of the screw is against the foil side of the pc board.



BYTEMOVER

SOFTWARE FOR THE CROMEMCO BYTESAVER

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CROMEMCO BYTEMOVER 3.1 OPERATING INSTRUCTIONS

Cromemco BYTEMOVER software is designed to be used with the Cromemco 8K BYTESAVER. When you purchase a Bytesaver with one 2704 PROM, the Bytemover software comes preprogrammed in the 2704 PROM.

The 2704 PROM containing the Bytemover software is normally inserted into PROM location 0 on the Bytesaver board. The Bytemover software can be used to program a PROM in any of the PROM locations on the Bytesaver board. The Bytemover software can also be used to transfer programs from PROM to RAM. The operation of the Bytemover software is controlled by the setting of the front panel sense switches on the Altair computer. To use the Bytemover software there must be a RAM board in the Altair beginning at location zero in memory; further, this RAM board must be unprotected for proper execution of the Bytemover software.

STEP-BY-STEP INSTRUCTIONS

1) Before using the Bytesaver you must install three jumper wires to set the location of the Bytesaver in memory space. This is shown in Figure 1. The assembled Bytesaver comes with A13, A14, and A15 each tied to the corresponding "Hi" pad to position the board at the very top of memory. In the following instructions it is assumed that this is the jumper connection used.

2) With the Altair 8800 power turned off, plug the Bytesaver board into the computer.

3) Be sure that the program power on the Bytesaver is turned OFF (program power switch in the down position.)

4) Turn on the Altair. Raise the reset switch, then raise the stop switch, and then raise the reset switch once again to initialize the Altair.

5) Raise address switches A15, A14, and A13. All other address switches should be down.

6) Raise the examine switch. You are now examining the contents of the first byte of PROM in PROM location zero of the Bytesaver memory board (memory location 340 000). If the PROM supplied with your Bytesaver is in this PROM location the data lights will read "061", the first byte of the Bytemover program.

EXAMPLE: Transfer the Bytemover program from PROM to RAM beginning at location zero in RAM.

1) Raise the reset switch.

2) Depress the unprotect switch (on the Altair front panel).

3) Raise A15, A14, and A13. Raise the examine switch. The data lights should read "061" octal.

4) Now set the sense switches for the task to be done, refering to Fig. 2.

A15 - Down to transfer from PROM to RAM
A14 - Down for the transfer of 1K bytes.
A13 - Down
A12 - Down
A11 - Down
All down since we are transferring from the same PROM that contains BYTEMOVER (PROM 0)
A10 - Down
A9 - Down
A8 - Down
All down for storage to begin at location zero in RAM.

5) Push the run switch. In less than one second the contents of PROM will be transferred to RAM. (Of course the contents of the PROM are unaffected by this operation.

6) Raise the STOP switch.

7) Raise the reset switch. Note that the data lights read "061".

EXAMPLE: Program a 2708 PROM inserted in PROM location 1. This PROM is to be programmed with the contents of the first 1K bytes of RAM beginning at location zero in memory. The Bytemover software is still in the PROM in PROM location zero on the Bytesaver board.

1) Raise the reset switch.

2) Depress the unprotect switch (on the Altair front panel)

3) Raise A15, A14, and A13. Raise the examine switch. The data lights should read "061" octal.

4) Raise the protect switch on the Bytesaver board (i.e. program power switch to the ON position). The protect light on the Altair front panel should go off when this switch is raised.

5) Now set the sense switches for the task to be done:

A15 - Up to program a PROM
A14 - Down (always down for PROM programming)
A13 - Down
A12 - Down
A11 - Up
To select the PROM 1K higher in memory than the PROM that contains BYTEMOVER
A10 - Down
A9 - Down
A8 - Down
All down for transfer to begin at location zero in RAM.

6) Push the RUN switch. Note that panel light A9 is blinking at a rate of about twice per second. When this light stops blinking the PROM programming is complete.

7) Raise the STOP switch.

8) Now note the INTE light on the Altair front panel. If this light is on, the BYTEMOVER VERIFIER has verified that the contents of the programmed PROM are indeed identical to the contents of the selected 1K bytes of RAM. If this light is off, the PROM has not programmed correctly; this could be due, for example, to a defective PROM.

EXAMPLE: Altair 8K BASIC can be stored in seven 2708 PROMs. Given that these seven PROMs are in PROM locations 1 through 7 on the BYTESAVER board, 8K BASIC can easily be transferred into RAM using the following procedure:

1) Raise the RESET switch.

2) Depress the unprotect switch (on the Altair front panel).

3) Raise A15, A14, and A13. Raise the examine switch. The data lights should read "061" octal.

4) Now set the sense switches for the task to be done:

A15 - Down to transfer from PROM to RAM.
A14 - Up for a 7K transfer
A13 - Down
A12 - Down } To begin transfer from the PROM 1K higher in memory than the BYTEMOVER program.
A11 - Up
A10 - Down
A9 - Down } All down for storage to begin at location zero in RAM.
A8 - Down

5) Push the RUN switch. In less than one second BASIC will be loaded into RAM (it sure beats paper tape!). Raise the STOP switch.

EXAMPLE: If you do not have BYTEMOVER in PROM, you can program a PROM with BYTEMOVER that is stored in RAM. The BYTEMOVER software (a listing of which is attached) must first be loaded into RAM beginning at location zero in memory. The BYTEMOVER software can then be burned into a PROM using the following procedure:

1) Raise the reset switch.

2) Depress the unprotect switch (on the Altair front panel).

3) Insert an erased PROM into PROM location 0 on the BYTESAVER board.

4) Examine location 000 240 in memory.

5) Raise the program power switch on the BYTESAVER board.

6) Set the sense switches with A15 and A14 and A13 up.

7) Push the RUN switch. When light A9 stops blinking the programming is complete. The INTE light will be on to verify correct programming.

8) Turn off PROM program power by depressing the switch on the BYTESAVER.

ERASING PROMs: The 2704 and 2708 PROMs are erased by shining intense UV light through their quartz window. One such UV source, the UV-85 PROM ERASER, is available for $37.50 from the BYTE SHOP, 1063 El Camino Real, Mountain View, CA 94040.

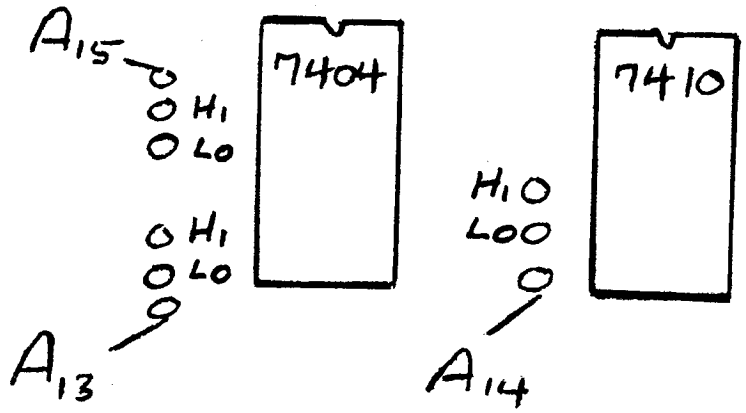
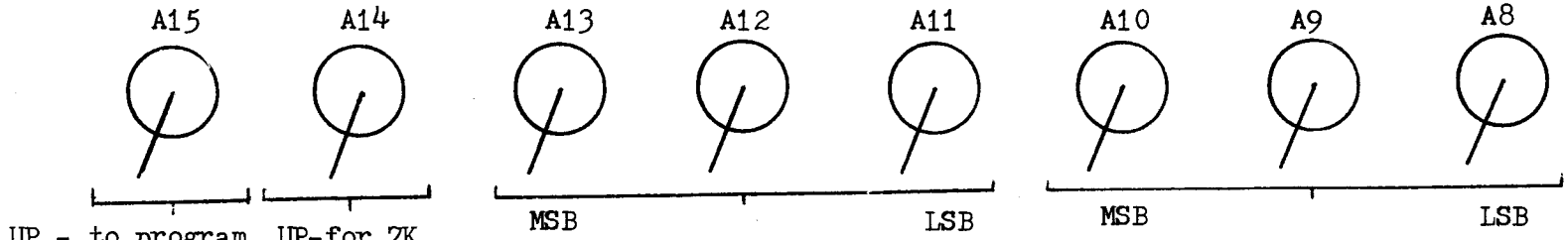


Fig. 1. How to set the Bytesaver address in memory. The built Bytesaver comes with A15, A14, and A13 connected to the corresponding "Hi" terminals so that memory address occurs when these three bits are high. Any or all of these address lines may be connected to the corresponding "Lo" terminal to move the memory board lower in memory. There are thus eight positions in memory that this board can be used.



UP - to program a PROM.

DOWN - to move from PROM to RAM

UP-for 7K transfer

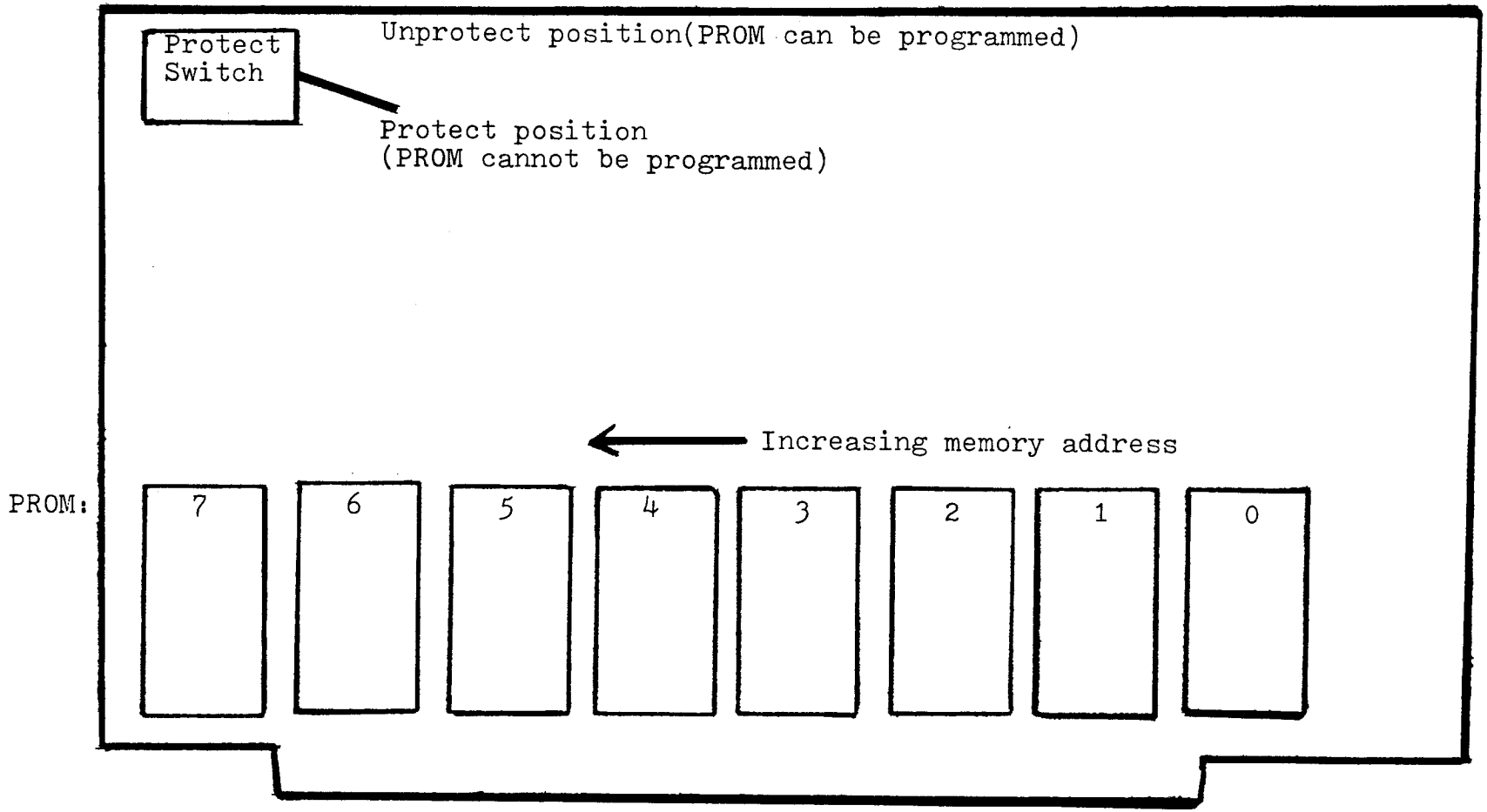
DOWN- for 1K transfer

PROM address location in increments of 1K from the PROM in which BYTEMOVER is stored

Selection of RAM address in 1K increments

FIGURE 2. FUNCTION OF THE SENSE SWITCHES IN THE BYTEMOVER PROGRAM.

Fig. 3. Bytesaver physical layout.



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0000                    0000 * BYTEMOVER (T.M.) SOFTWARE FOR
0000                    0001 * CROMEMCO 8K BYTESAVER (T.M.)
0000                    0002 * VERSION 3.1
0000                    0003 * SELF-RELOCATING SOFTWARE LOCATABLE AT ANY
0000                    0004 * 1024 BYTE (1K) BOUNDARY IN MEMORY
0000                    0009 * ROUTINE TO FIND ONESELF IN MEMORY
0000                    0010 SP EQU 6
0000                    0019 * DEFINE FIRST 4 BYTES IN MEMORY AS STACK
0000 31 00 00           0020  LXI SP, 0
0003                    0029 * SAVE FIRST FOUR BYTES IN REGISTERS
0003 C1                 0030  POP B
0004 D1                 0040  POP D
0005                    0049 * REPLACE BYTE 0 WITH A 'RETURN'
0005 2E C9              0050  MVI L, 0C9H
0007 F3                 0051  DI
0008 E5                 0060  PUSH H
0009 E5                 0070  PUSH H
000A 00                 0080  NOP
000B 00                 0081  NOP
000C 00                 0082  NOP
000D 31 04 00           0090  LXI SP, 4
0010 CD 00 00           0100  CALL 0
0013                    0101 * ROM LOCATION NOW IN BYTE 3
0013 31 02 00           0110  LXI SP, 2
0016 E1                 0120  POP H
0017                    0129 * RETURN BYTES 0-3
0017 31 04 00           0130  LXI SP,4
001A D5                 0140  PUSH D
001B C5                 0150  PUSH B
001C                    0159 * STORE ROM LOCATION IN SP
001C F9                 0160  SPHL
001D 0E 00              0170  MVI C, 0
001F 59                 0180  MOV E,C
0020 69                 0190  MOV L,C
0021                    0199 * INPUT SENSE SW COMMANDS
0021 DB FF              0200  IN 255
0023 57                 0210  MOV D,A
0024                    0219 * STRIP RAM ADDRESS
0024 E6 07              0220  ANI 7
0026 07                 0230  RLC
0027 07                 0240  RLC
0028                    0249 * STORE RAM ADDRESS IN BC
0028 47                 0250  MOV B,A
0029 7A                 0260  MOV A,D
002A                    0269 * STRIP ROM ADDRESS
002A E6 38              0270  ANI 56
002C 0F                 0280  RRC
002D 00                 0290  NOP
002E 67                 0300  MOV H,A
002F 39                 0310  DAD SP
0030 2E 00              0320  MVI L, 0
0032 7A                 0330  MOV A,D
0033 EB                 0340  XCHG
0034                    0341 * ADDRESS OF ROM BEING PROCESSED IN DE
0034                    0349 * BRANCH TO TRANSFER OR PROGRAM ROUTINE
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```
0034 E6 80                0350  ANI 128
0036 0F                   0360  RRC
0037 0F                   0370  RRC
0038 C6 2D                0380  ADI 45
003A 21 00 00             0390  LXI H, 0
003D 6F                   0400  MOV L,A
003E 39                   0410  DAD SP
003F E9                   0420  PCHL
0040                      0500 * ROUTINE TO TRANSFER ROM TO RAM
0040 F9                   0510  SPHL
0041 21 0B 00             0520  LXI H, 11
0044 39                   0530  DAD SP
0045 EB                   0550  XCHG
0046 F9                   0560  SPHL    STACK CONTAINS ROM LOCATION
0047 EB                   0570  XCHG    H&L CONTAIN LOOP ADDRESS
0048 11 00 00             0580  LXI D, 0
004B                      0588 * START OF TRANSFER LOOP
004B                      0589 * INCREMENT ROM ADDRESS
004B 3B                   0590  DCX SP
004C                      0599 * MOVE DATA FROM ROM TO RAM
004C F1                   0600  POP 6
004D 02                   0610  STAX B
004E                      0619 * INCREMENT RAM ADDRESS
004E 03                   0620  INX B
004F                      0629 * INCREMENT BYTE COUNT
004F 13                   0630  INX D
0050 7A                   0640  MOV A,D
0051 E6 04                0650  ANI 4
0053 07                   0660  RLC
0054 07                   0670  RLC
0055 00                   0680  NOP
0056 85                   0690  ADD L
0057 6F                   0700  MOV L,A
0058 E9                   0710  PCHL
0059 00                   0716  NOP
005A 00                   0717  NOP
005B                      0719 *  JUMP TO 00B1 FROM TRANSFER ROUTINE
005B 3E 56                0720  MVI A, 56H
005D 85                   0725  ADD L
005E 6F                   0730  MOV L,A
005F E9                   0740  PCHL
0060                      1000 * ROUTINE TO PROGRAM ROM
0060 00                   1010  NOP
0061                      1019 * MOVE RAM ADDRESS INTO HL
0061 69                   1020  MOV L,C   ;ZERO
0062 7C                   1030  MOV A,H   ;ZERO
0063 60                   1040  MOV H,B   ;ZERO
0064                      1049 * MOVE RAM ADDRESS INTO SP
0064 F9                   1050  SPHL      ;ZERO
0065 67                   1060  MOV H,A   ;ZERO
0066 2E 6B                1070  MVI L, 107 ;6BH
0068                      1079 * INCREMENT RAM ADDRESS
0068 01 00 00             1080  LXI B, 0   ;ZERO B&C
006B                      1089 * INCREMENT RAM ADDRESS
006B 3B                   1090  DCX SP
006C                      1098 * USE STAX AND POP 6 (PSW)
006C                      1099 * TO MOVE DATA FROM ROM TO RAM
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006C F1                  1100  POP 6
006D 12                  1110  STAX D
006E                     1119 * INCREMENT ROM ADDRESS
006E 13                  1120  INX D
006F                     1129 * INCREMENT BYTE COUNT
006F 03                  1130  INX B
0070                     1138 * B STORES TWO CONSTANTS
0070                     1139 * # COMPLETE PASSES & IN ROM CNT
0070 78                  1140  MOV A,B
0071                     1149 * # PASSES = 32 ?
0071 FE FC               1150  CPI 252
0073 3F                  1160  CMC
0074 1F                  1170  RAR
0075 1F                  1180  RAR
0076                     1198 * SET 64 TO 0 FOR TWO MINUTE TIMER VERSION
0076 E6 40               1200  ANI 64
0078                     1201 * A=64 IF COMPLETED 32 PASSES
0078 2E 7D               1205  MVI L, 7DH
007A 85                  1210  ADD L
007B 6F                  1220  MOV L,A
007C E9                  1225  PCHL
007D 2E 6B               1226  MVI L, 6BH
007F 78                  1230  MOV A,B
0080 E6 04               1240  ANI 4
0082                     1241 * A=4 IF END OF 1024 BYTE PASS
0082 07                  1250  RLC
0083 07                  1260  RLC
0084 07                  1270  RLC
0085 85                  1280  ADD L
0086 6F                  1290  MOV L,A
0087                     1291 * GO BACK TO 1090 UNLESS OVERFLOW
0087                     1292 * THEN GO TO 1380 FOR
0087                     1293 * ADDRESS SUBTRACTION
0087                     1294 * OR 2135 FOR QUITS
0087 E9                  1300  PCHL
0088 00                  1350  NOP
0089 00                  1360  NOP
008A 00                  1370  NOP
008B                     1378 * ANOTHER PROGRAM PASS TO BE DONE
008B                     1379 * ADJUST ROM AND RAM ADDRESSES
008B 7C                  1380  MOV A,H
008C 21 00 FC            1390  LXI H, 64512
008F                     1399 * SUBTRACT 1024 FROM ROM ADDRESS
008F 39                  1400  DAD SP
0090 F9                  1410  SPHL
0091 21 00 FC            1420  LXI H, 64512
0094                     1429 * SUBTRACT 1024 FROM RAM ADDRESS
0094 19                  1430  DAD D
0095 EB                  1440  XCHG
0096 67                  1450  MOV H,A
0097 2E 6B               1460  MVI L,107
0099 78                  1470  MOV A,B
009A E6 F8               1480  ANI 248
009C                     1489 * INCREMENT PASS CONTER BY ONE
009C C6 08               1490  ADI 8
009E 47                  1495  MOV B,A
009F                     1499 * GO BACK TO 1090
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009F E9                  1500  PCHL
00A0                     2000 * ROUTINE TO LOAD BYEMOVER INTO ROM
00A0 DB FF               2010  IN 255
00A2 47                  2020  MOV B,A
00A3 E6 E0               2030  ANI 224
00A5 1E 00               2040  MVI E, 0
00A7 4B                  2050  MOV C,E
00A8 57                  2060  MOV D,A
00A9 78                  2070  MOV A,B
00AA E6 1F               2080  ANI 31
00AC 47                  2090  MOV B,A
00AD 67                  2100  MOV H,A
00AE 2E 60               2110  MVI L, 96
00B0 E9                  2120  PCHL
00B1                     2121 * CHECK FOR 7K TRANSFER OF ROM TO RAM
00B1 C6 1A               2122  ADI 1AH
00B3 6F                  2123  MOV L,A
00B4 DB FF               2124  IN 255
00B6 E6 40               2125  ANI 64
00B8 0F                  2126  RRC
00B9 0F                  2127  RRC
00BA 85                  2128  ADD L
00BB 6F                  2129  MOV L,A
00BC E9                  2130  PCHL
00BD                     2133 * PROGRAMMER VERIFICATION ROUTINE
00BD                     2134 * PART 1
00BD 7C                  2135  MOV A,H
00BE 21 00 FC            2145  LXI H, 64512
00C1 39                  2155  DAD SP
00C2 F9                  2165  SPHL
00C3 2E CD               2175  MVI L, 0CDH
00C5 67                  2185  MOV H,A
00C6 E9                  2195  PCHL
00C7 00                  2205  NOP
00C8 00                  2210  NOP
00C9 00                  2215  NOP
00CA 00                  2220  NOP
00CB                     2229 * ROM TO RAM TRANSFER STOP ROUTINE
00CB FB                  2230  EI
00CC E9                  2240  PCHL
00CD                     2248 * PROGRAMMER VERIFICATION ROUTINE
00CD                     2249 * PART 2
00CD 7C                  2250  MOV A,H
00CE 21 00 FC            2260  LXI H,64512
00D1 19                  2270  DAD D
00D2 EB                  2280  XCHG
00D3 2E F1               2290  MVI L, 0F1H
00D5 67                  2300  MOV H,A
00D6 01 00 00            2310  LXI B, 0
00D9 E9                  2320  PCHL
00DA 00                  2625  NOP
00DB                     2629 * 7K TRANSFER COMPLETION CHECK
00DB D6 90               2630  SUI 90H
00DD 6F                  2640  MOV L,A
00DE 7A                  2650  MOV A,D
00DF C6 04               2660  ADI 4
00E1 57                  2670  MOV D,A
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00E2 FE 38              2680  CPI 56
00E4 3F                 2685  CMC
00E5 3E 00              2690  MVI A, 0
00E7 1F                 2700  RAR
00E8 85                 2710  ADD L
00E9 6F                 2720  MOV L,A
00EA E9                 2730  PCHL
00EB                    2879 * ROM PROGRAMMER STOP ROUTINE
00EB 00                 2880  NOP
00EC 00                 2881  NOP
00ED FB                 2885  EI
00EE E9                 2890  PCHL
00EF E9                 2900  PCHL
00F0 E9                 2906  PCHL
00F1                    2918 * PROGRAMMER VERIFICATION ROUTINE
00F1                    2919 * PART 3
00F1 3B                 2920  DCX SP
00F2 F1                 2930  POP 6
00F3 EB                 2940  XCHG
00F4                    2949 * COMPARE FOR GREATER
00F4 BE                 2950  CMP M
00F5 EB                 2960  XCHG
00F6 17                 2970  RAL
00F7 E6 01              3000  ANI 1
00F9 2F                 3010  CMA
00FA 3C                 3011  INR A
00FB 85                 3015  ADD L
00FC 6F                 3020  MOV L,A
00FD 3B                 3030  DCX SP
00FE 3B                 3040  DCX SP
00FF                    3050 * COMPARE FOR LESSER
00FF F1                 3055  POP 6
0100 2F                 3056  CMA
0101 EB                 3058  XCHG
0102 86                 3059  ADD M
0103 EB                 3060  XCHG
0104 C6 07              3061  ADI A,1
0106 3F                 3065  CMC
0107 17                 3070  RAL
0108 E6 01              3090  ANI 1
010A 2F                 3100  CMA
010B 3C                 3101  INR A
010C 85                 3105  ADD L
010D 6F                 3110  MOV L,A
010E 03                 3130  INX B
010F 13                 3140  INX D
0110 78                 3150  MOV A,B
0111 E6 04              3180  ANI 4
0113 2F                 3190  CMA
0114 3C                 3191  INR A
0115 85                 3195  ADD L
0116 6F                 3200  MOV L,A
0117 E9                 3210  PCHL
```

BYTEMOVER VERSION 3.1 OCTAL LISTING

```
061 000 000 301 321 056 311 363 345 345 000 000 000 061 004 000
315 000 000 061 002 000 341 061 004 000 325 305 371 016 000 131
151 333 377 127 346 007 007 007 107 172 346 070 017 000 147 071
056 000 172 353 346 200 017 017 306 055 041 000 000 157 071 351
371 041 013 000 071 353 371 353 021 000 000 073 361 002 003 023
172 346 004 007 007 000 205 157 351 000 000 076 126 205 157 351
000 151 174 140 371 147 056 153 001 000 000 073 361 022 023 003
170 376 374 077 037 037 346 100 056 175 205 157 351 056 153 170
346 004 007 007 007 205 157 351 000 000 000 174 041 000 374 071
371 041 000 374 031 353 147 056 153 170 346 370 306 010 107 351
333 377 107 346 340 036 000 113 127 170 346 037 107 147 056 140
351 306 032 157 333 377 346 100 017 017 205 157 351 174 041 000
374 071 371 056 315 147 351 000 000 000 000 373 351 174 041 000
374 031 353 056 361 147 001 000 000 351 000 326 220 157 172 306
004 127 376 070 077 076 000 037 205 157 351 000 000 373 351 351
351 073 361 353 276 353 027 346 001 057 074 205 157 073 073 361
057 353 206 353 306 007 077 027 346 001 057 074 205 157 003 023
170 346 004 057 074 205 157 351 000 000 000 000 000 000 000 000
```