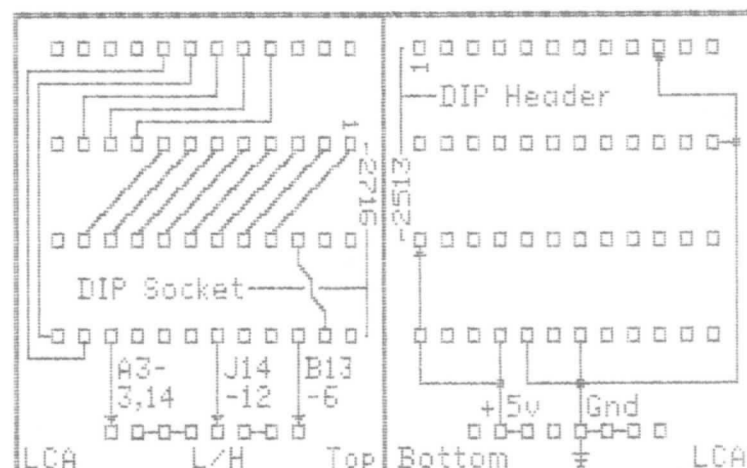
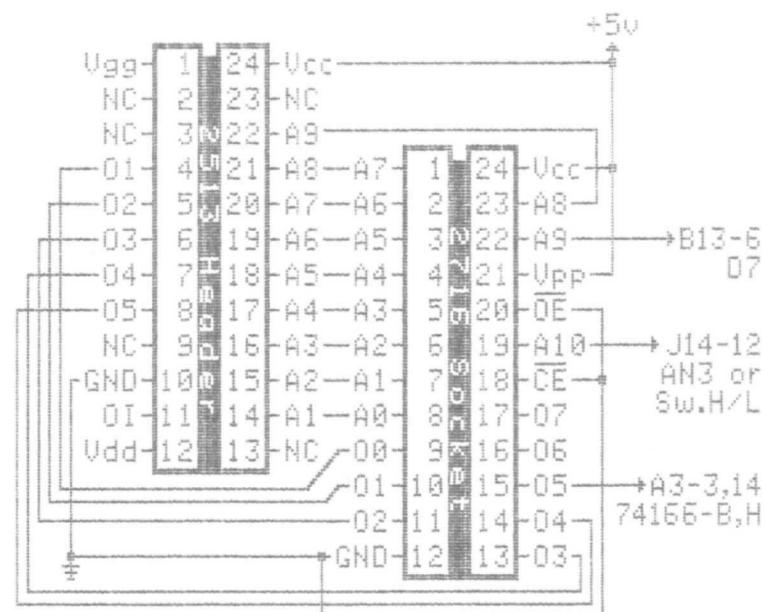


L.C.A.



A.B.A.C.U.S.-Macdougall Lower-Case Adapter
 Printed Circuit Board by James P. Davis from
 article in The ABACUS II, April 1980, Vol. 2, #4.
 (The 2716 DIP Socket attaches to the top &
 the 2513 DIP Header attaches to the bottom)



APPLE BAY AREA COMPUTER USERS SOCIETY

This article describes a simple modification to the Apple II which can be used to display, either upper/lower case letters, when using the Apple Writer Text Editor, or can be used to display an alternate character set. The modification consists of removing the existing 2513 character generator ROM and replacing it with a 2716 EPROM. The 2716 contains two character sets. The first is the standard duplicate of the 2513 and the second is a special set which, for example, works with the Text Editor characters.

Since the 2716 is not pin compatible with the 2513, an interconnect pattern is needed. In addition, certain connections must be made to the main board. To do this effectively, a small circuit board is used which holds the 2716 and plugs into the 2513 socket. Three wires from this board then go to "piggyback" socket extensions on the main board. By this means, the modification is simply plug-in and no modifications are required to the main board. A circuit diagram of this small board and its interconnections is presented in figure 1.

How the Circuit Works:

Imagine that your character generator ROM has two character areas. The first of these is an upper case area and the second is a lower case area. Switching between these two areas can be accomplished by using a high address bit. This turns out to be very appropriate to the Apple Text Editor since it in fact stores the characters such that upper case characters have the high bit set low so that they will display in inverse video. This bit is picked up from pin 6 of B13 and is used to select the ROM area from which the display character is selected. There is one problem with this method, and that is that the high bit set low tells the Apple hardware to set an inverse character. The result of this simple modification is that we now have lower case but the upper case is still in inverse video. The solution is to put into the ROM the inverse characters so that although the Apple thinks it is displaying an inverse character it is really displaying the inverse of an inverse.

There is still a problem when you come to observe the resulting characters. They have funny lines and extra information which is very distracting. This is solved by getting at the shift register parallel load inputs and setting them with a sixth bit from the ROM. To do this they must be lifted from ground and connected to the little board. Thus pins 3 and 14 are cut and the lead from the 2716 is connected to the 74166 pins.

A final refinement to the system is to make the selection of mode software selectable. So rather than put a switch on the circuit board, the mode select address pin is connected to the game socket at annunciator pin 3. The latch which provides this output always comes up with a low output on power-on. The addressing is arranged so that this gives the normal character set in Apple. The result is that to the unsuspecting user, the system configuration looks exactly as he has always seen it and he will never know that there is lower case present. The case can be set and reset as follows:

MODIFICATIONS TO THE APPLE II DISPLAY UPPER AND LOWER CASE LETTERS

by
John Macdougall

For use with the text editor, the conversion to lower case can be made automatic by putting the lower case PEEK into the editor HELLO program as follows:

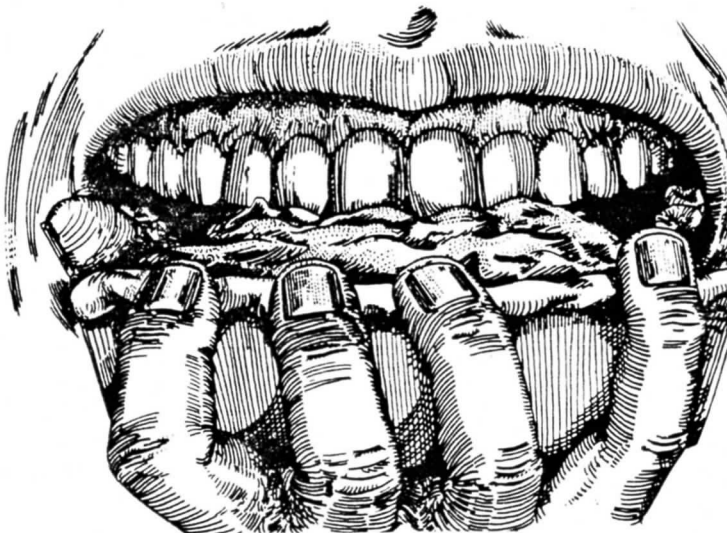
```
5 D$="": REM CONTROL-D
10 PRINT D$; "NOMON I,O,C": CALL -936
20 POKE 1010, 191: POKE 1011, 157: POKE 1012, 56
30 POKE -16289, 0
40 PRINT D$; "BRUNTEDITOR"
50 END
```

Other Features.

Because of the independent character sets with this system, it is possible to have additional characters. You may have noticed the odd brackets used above. The special characters, which can be accessed by this system, as currently implemented, are as follows:

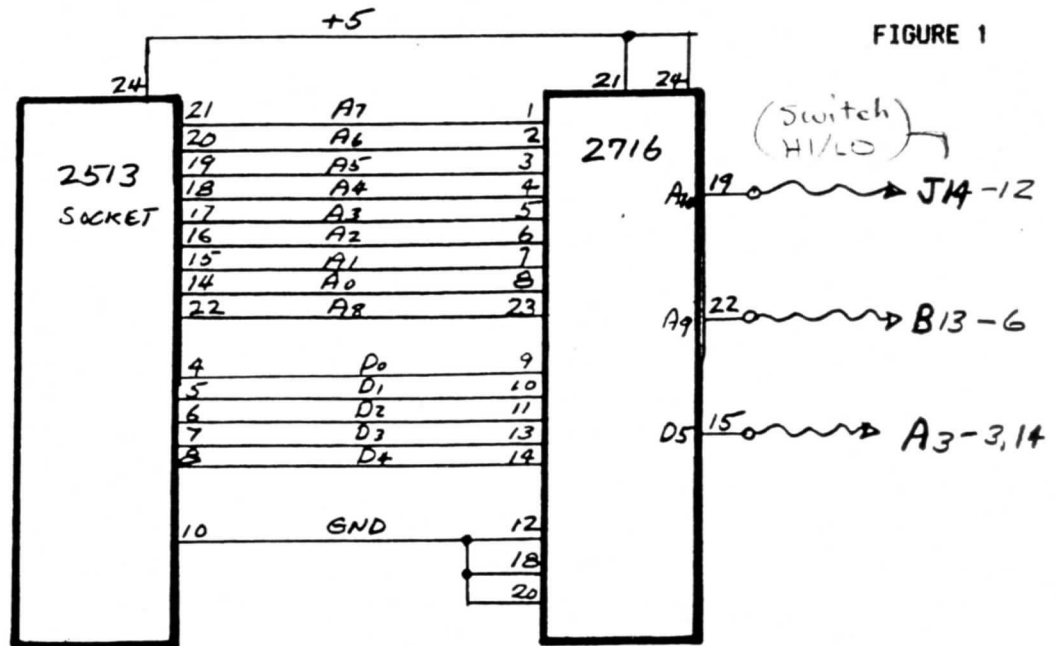
```
[ - esc-control-n
] - esc-shift-m
{ - control-n
} - shift-m
~ - shift-n
^ - esc-shift-n
```

Easy as Pie?



APPLE-PIE !

CIRCUIT FOR DISPLAYING UPPER/LOWER CASE
LETTERS USING THE APPLE TEXT EDITOR.



J14: USE A 16 PIN SOCKET, ATTACH PIN 12 TO THE 2716 at PIN 19. PLUG THIS SOCKET INTO GAME PADDLE SOCKET, GAME PADDLES MAY THEN BE PLUGGED INTO TOP OF THIS SOCKET

B13: AT LOCATION B13, REMOVE THE IC (74LS02) THEN TAKE A 14 PIN SOCKET AND ATTACH A WIRE TO PIN 6, CONNECT THE OTHER END OF THIS WIRE TO PIN #22 OF THE 2716. NOW INSERT THIS SOCKET INTO LOCATION B13, THEN REINSTALL IC (74LS02) INTO THIS SOCKET.

A3: AT LOCATION A3 REMOVE IC (74166) THEN TAKE A 16 PIN SOCKET AND CONNECT A WIRE TO BOTH PINS 3 AND 14, CONNECT THE OTHER END OF THIS WIRE TO PIN #15 OF THE 2716. BE SURE TO CUT PINS 3 AND 14 SHORT SO THEY DO NOT GO THRU AND INTO THE BOARD SOCKET, HOWEVER ALL REMAINING PINS MUST CONNECT TO BOARD SOCKET. NOW PLUG SOCKET INTO LOCATION A3 THEN REINSERT IC (74166) INTO THIS SOCKET.

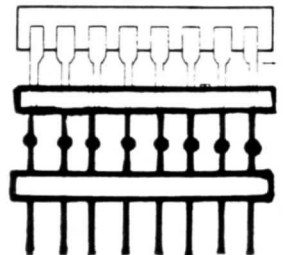
Example of a Piggyback Socket Mounting.

DEVICE----->

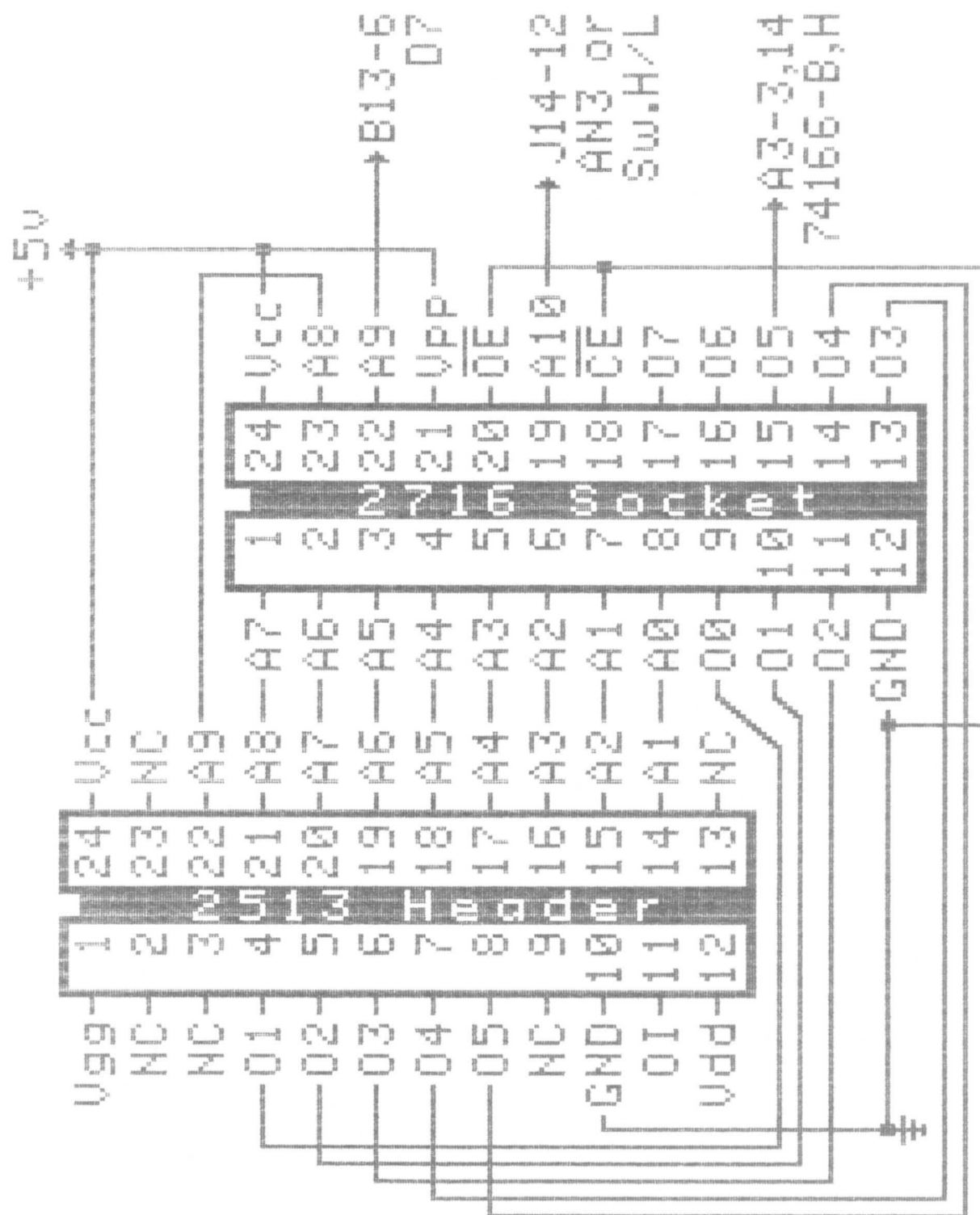
SOCKET----->

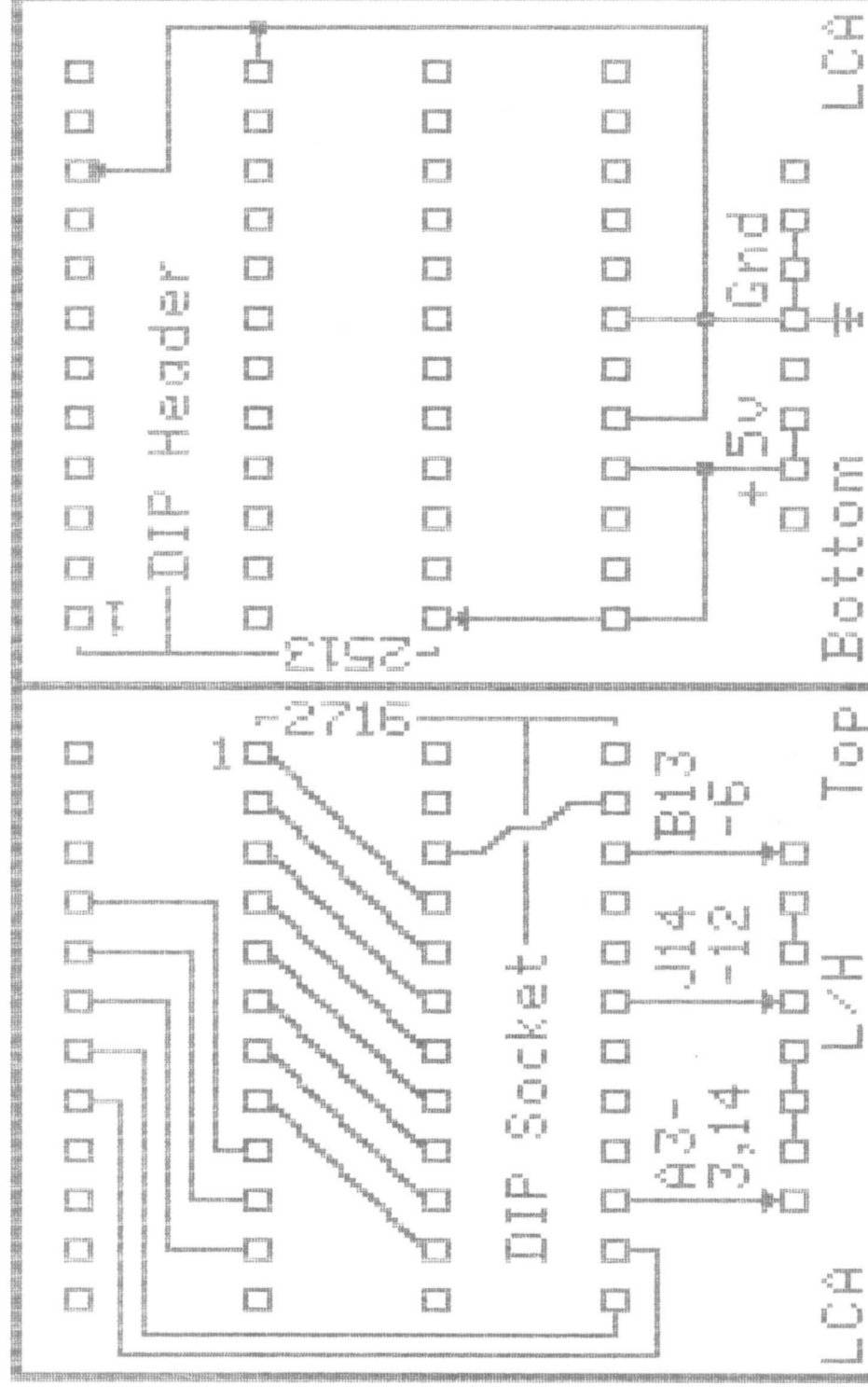
SOLDER----->

HEADER----->

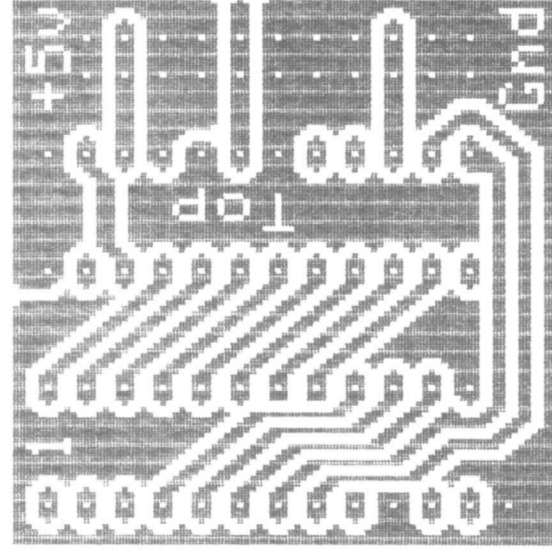


A listing of the hex code for the character ROM is presented on the following pages.





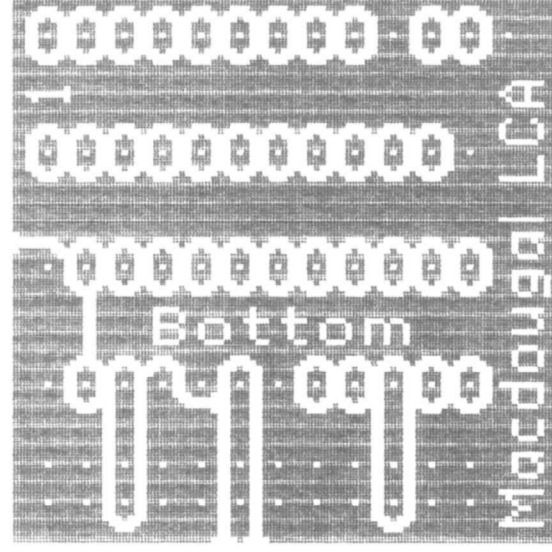
A.B.A.C.U.S.-Macdougall Lower-Case Adapter
 Printed Circuit Board by James P. Davis from
 article in The ABACUS II, April 1980, Vol.2, #4.
 (The 2716 DIP Socket attaches to the top &
 the 2513 DIP Header attaches to the bottom)



B13-6

J14-12

A3-3,14



A.B.A.C.U.S.-Macdougall Lower-Case Adapter Printed Circuit Board by James P. Davis from an article in The ABACUS II, April 1980, volume number 2, issue number 4.
A 2716 DIP IC (socket) attaches to the top of the PCB in the center.

A 24 DIP header attaches to the bottom of the PCB at the right-hand edge (as shown above). This plugs in to the Apple character generator socket at A5 on the mother board.

0E 11 15 17 16 10 0F 00
1F 10 10 1E 10 10 10 00
1F 10 10 1E 10 10 10 00
0F 11 10 10 10 10 10 00
0F 10 10 10 13 11 0F 00

11 11 1F 11 11 11 00
0E 04 04 04 04 04 0E 00
11 11 11 11 11 11 00
11 11 19 15 13 11 00
11 1B 15 15 11 11 00
10 10 10 10 10 10 00
11 12 14 18 14 12 00
01 01 01 01 11 0E 00
0E 04 04 04 04 04 0E 00
0E 11 11 11 15 12 0D 00
11 11 11 11 11 11 00

1E 11 11 1E 10 10 10 00
0E 11 11 11 15 12 0D 00
1E 11 11 11 11 14 12 00
1E 11 11 1E 14 12 11 00
0E 11 10 0E 01 11 0E 00
1F 04 04 04 04 04 04 00
11 11 11 15 15 1B 11 00
11 11 11 11 11 11 00

11 11 0A 04 0A 11 00
11 11 11 11 11 11 00
1F 01 02 04 08 10 1F 00
1F 18 18 18 18 1F 00
00 10 08 04 02 01 00 00
1F 03 03 03 03 1F 00
00 00 04 0A 11 00 00
00 00 00 00 00 00 3F

0E 11 15 17 16 10 0F 00
04 0A 11 1F 11 11 00
1E 11 11 1E 11 11 1E 00
0E 11 10 10 11 0E 00
1E 11 11 11 11 1E 00
1F 10 10 1E 10 10 1F 00
1F 10 10 1E 10 10 1F 00
0F 10 10 13 11 0F 00

11 11 1F 11 11 11 00
0E 04 04 04 04 04 0E 00
11 11 11 1F 11 11 00
11 12 14 18 14 12 11 00
01 01 01 01 01 11 0E 00
0E 04 04 04 04 04 0E 00
11 11 11 11 11 11 00
0E 11 11 11 11 11 0E 00
11 11 19 15 13 11 11 00

1E 11 11 1E 10 10 10 00
0E 11 11 15 12 12 0D 00
1E 11 11 1E 14 12 11 00
0E 11 10 0E 11 11 0E 00
1F 04 04 04 04 04 04 00
11 11 11 11 11 11 0E 00
11 11 11 15 15 1B 11 00

11 11 0A 04 0A 11 11 00
11 11 11 11 11 11 00
1F 18 18 18 18 1F 00
1F 01 02 04 08 10 1F 00
1F 18 18 18 18 1F 00
00 10 08 04 02 01 00 00
1F 03 03 03 03 1F 00
00 00 04 0A 11 00 00 00
00 00 00 00 00 00 3F

EE EE E6 EA EC EE EE FF

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044

Figure 6

EE ED EB E7 EB ED EE FF

A 4x4 grid of 16 small images. Each image contains a single character, either 'E' or '3', rendered in a stylized, blocky font. The characters are arranged in a pattern that suggests a sequence or a specific visual logic, likely related to the 'E' and '3' test mentioned in the text.

Figure 1. The structure of the 128-bit block cipher, *Twofish*.

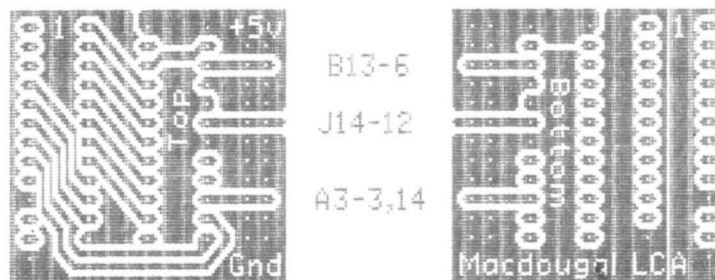
Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: the control group (CG) and the experimental group (EG). The CG was divided into two subgroups: the control group (CG) and the control group (CG). The EG was divided into two subgroups: the experimental group (EG) and the experimental group (EG). The subjects were divided into two groups: the control group (CG) and the experimental group (EG). The CG was divided into two subgroups: the control group (CG) and the control group (CG). The EG was divided into two subgroups: the experimental group (EG) and the experimental group (EG).

F7	F8	F9	F10	F11
F12	F13	F14	F15	F16
F17	F18	F19	F20	F21
F22	F23	F24	F25	F26
F27	F28	F29	F30	F31
F32	F33	F34	F35	F36
F37	F38	F39	F40	F41
F42	F43	F44	F45	F46
F47	F48	F49	F50	F51
F52	F53	F54	F55	F56
F57	F58	F59	F60	F61
F62	F63	F64	F65	F66
F67	F68	F69	F70	F71
F72	F73	F74	F75	F76
F77	F78	F79	F80	F81
F82	F83	F84	F85	F86
F87	F88	F89	F90	F91
F92	F93	F94	F95	F96
F97	F98	F99	F100	F101
F102	F103	F104	F105	F106
F107	F108	F109	F110	F111
F112	F113	F114	F115	F116
F117	F118	F119	F120	F121
F122	F123	F124	F125	F126
F127	F128	F129	F130	F131
F132	F133	F134	F135	F136
F137	F138	F139	F140	F141
F142	F143	F144	F145	F146
F147	F148	F149	F150	F151
F152	F153	F154	F155	F156
F157	F158	F159	F160	F161
F162	F163	F164	F165	F166
F167	F168	F169	F170	F171
F172	F173	F174	F175	F176
F177	F178	F179	F180	F181
F182	F183	F184	F185	F186
F187	F188	F189	F190	F191
F192	F193	F194	F195	F196
F197	F198	F199	F200	F201
F202	F203	F204	F205	F206
F207	F208	F209	F210	F211
F212	F213	F214	F215	F216
F217	F218	F219	F220	F221
F222	F223	F224	F225	F226
F227	F228	F229	F230	F231
F232	F233	F234	F235	F236
F237	F238	F239	F240	F241
F242	F243	F244	F245	F246
F247	F248	F249	F250	F251
F252	F253	F254	F255	F256
F257	F258	F259	F260	F261
F262	F263	F264	F265	F266
F267	F268	F269	F270	F271
F272	F273	F274	F275	F276
F277	F278	F279	F280	F281
F282	F283	F284	F285	F286
F287	F288	F289	F290	F291
F292	F293	F294	F295	F296
F297	F298	F299	F300	F301
F302	F303	F304	F305	F306
F307	F308	F309	F310	F311
F312	F313	F314	F315	F316
F317	F318	F319	F320	F321
F322	F323	F324	F325	F326
F327	F328	F329	F330	F331
F332	F333	F334	F335	F336
F337	F338	F339	F340	F341
F342	F343	F344	F345	F346
F347	F348	F349	F350	F351
F352	F353	F354	F355	F356
F357	F358	F359	F360	F361
F362	F363	F364	F365	F366
F367	F368	F369	F370	F371
F372	F373	F374	F375	F376
F377	F378	F379	F380	F381
F382	F383	F384	F385	F386
F387	F388	F389	F390	F391
F392	F393	F394	F395	F396
F397	F398	F399	F400	F401
F402	F403	F404	F405	F406
F407	F408	F409	F410	F411
F412	F413	F414	F415	F416
F417	F418	F419	F420	F421
F422	F423	F424	F425	F426
F427	F428	F429	F430	F431
F432	F433	F434	F435	F436
F437	F438	F439	F440	F441
F442	F443	F444	F445	F446
F447	F448	F449	F450	F451
F452	F453	F454	F455	F456
F457	F458	F459	F460	F461
F462	F463	F464	F465	F466
F467	F468	F469	F470	F471

03 E7 E7 E7 E7 E7 E7 E0 F0

Figure 1. The structure of the proposed fuzzy expert system for the diagnosis of the type of the fault in the power transformer.

[illegible][illegible][illegible][illegible]

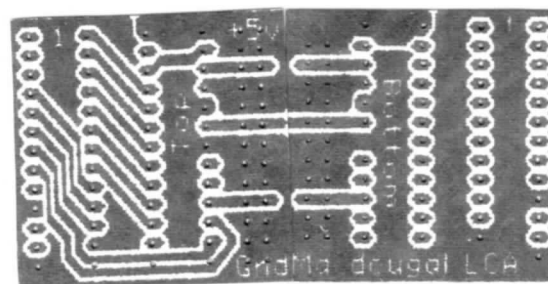


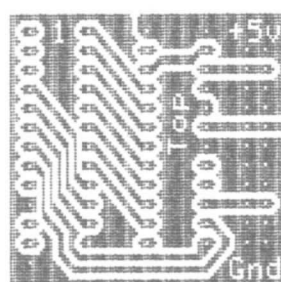
A.B.A.C.U.S.-Macdougall Lower-Case Adapter
Printed Circuit Board by James P. Davis from
an article in The ABACUS II, April 1980, volume
number 2, issue number 4.

A 2716 DIP IC (socket) attaches to the top of
the PCB in the center.

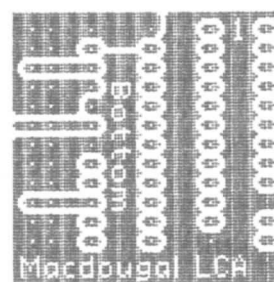
A 24 DIP header attaches to the bottom of
the PCB at the right-hand edge (as shown
above). This plugs in to the Apple character
generator socket at A5 on the mother board.

Davis/Paymar/Mac-
Dougall LCA





B13-6
J14-12
A3-3,14



A.B.A.C.U.S.-Macdougall Lower-Case Adapter
Printed Circuit Board by James P. Davis from
an article in The ABACUS II, April 1980, volume
number 2, issue number 4.

A 2716 DIP IC (socket) attaches to the top of
the PCB in the center.

A 24 DIP header attaches to the bottom of
the PCB at the right-hand edge (as shown
above). This plugs in to the Apple character
generator socket at A5 on the mother board.

