Memo To: Bruce Robinson, Scott Cutler, Kent Roberts, Roy Neese

Copies To: Gary Kueck, John Elliott, David Butler, Jerry Ballard

Memo From: Frank Durda IV x2865 7-Jan-87 701071

Subject: MMU Expansion for Tandy 6000 Status

This memo is to bring you up to date on the status of the MMU expansion adapter board that was an approved special research project in R&D and later got hung up in some politics.

In December, David Butler contacted System Software, and was told that a prototype had been built but had never been tested because of a stop-work order that had been issued in the hardware group. He then contacted Mike Burger of R&D Hardware and managed to obtain the prototype so that he could experiment with getting the prototype working.

On New Year's day, the prototype was modified and started working. This became a cooperative effort between David Butler and Gary Kueck of Technical Support.

To date the prototype has been tested with up to 4 Megabytes of memory using the Level I release of XENIX 3.2, (now being tested in CPE.) As currently designed, the adapter requires one cut and 6 jumpers on the existing 8Mhz 68000 CPU board. The last estimate of factory cost was around $18, but an additional chip was required to get the circuit working.

No software modifications have been necessary, apart from the requirement that XENIX 3.2 be used. The changes necessary to support the exteneded MMU were added to 3.2 before the special research project was suspended.

Attached you will find the standard BYTE benchmarks run with different amounts of memory, which should give a rough idea of how much improvement would be expected in the field. You will note that above 2 Meg of memory or so, the benchmarks tend to go flat and as they are no longer exceeding the machines' capability. This happens on the 3000 around the 2.5 Meg point.

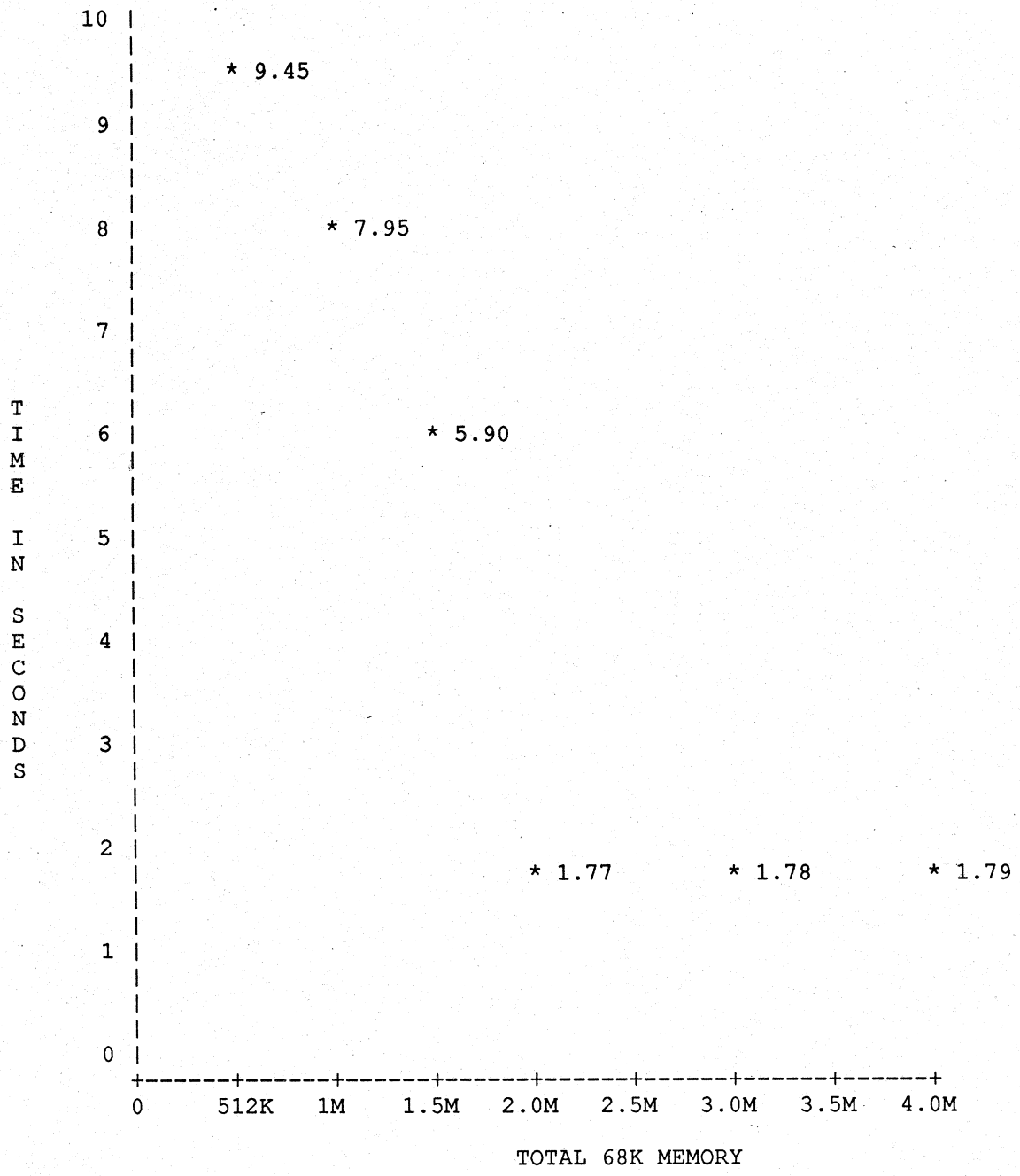
Since the hardware design has proved itself in a wire-wrap prototype with "hanging" modifications, it is proposed that this adapter be considered a viable product, both in cost and feasibility.

If you have any questions or comments, please feel free to call or come by.

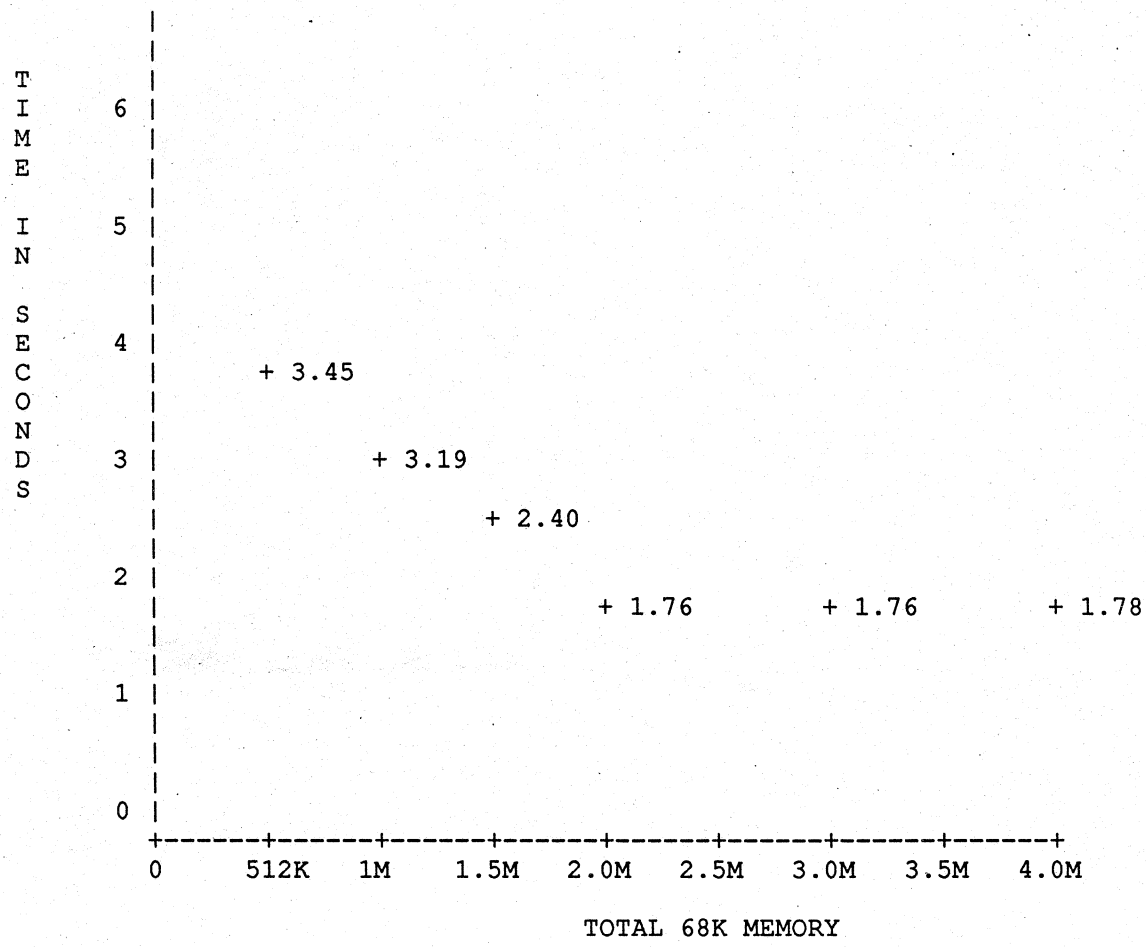
Frank Durda IV

390-2865
1300 Tower II

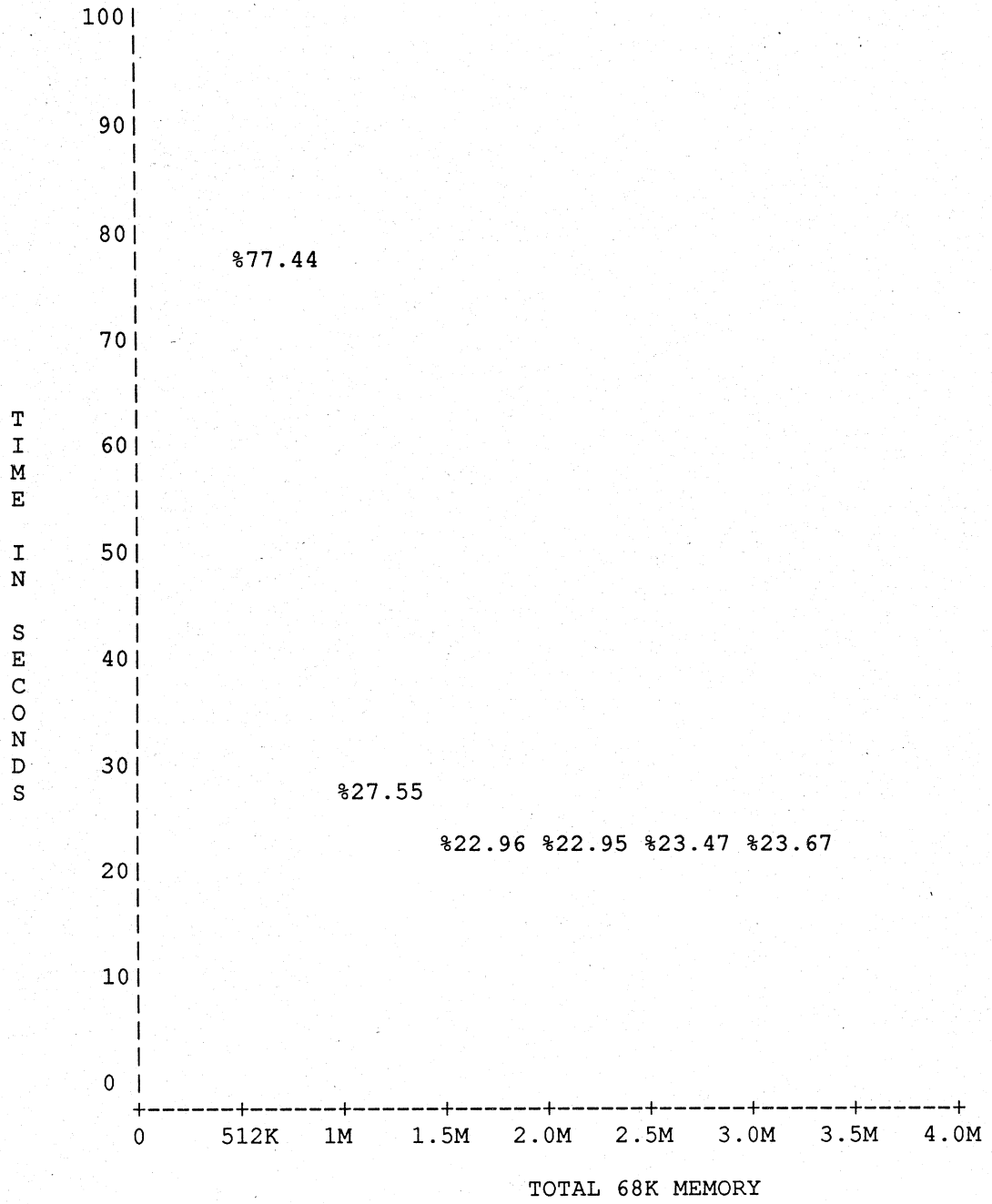
Disk Read Benchmark



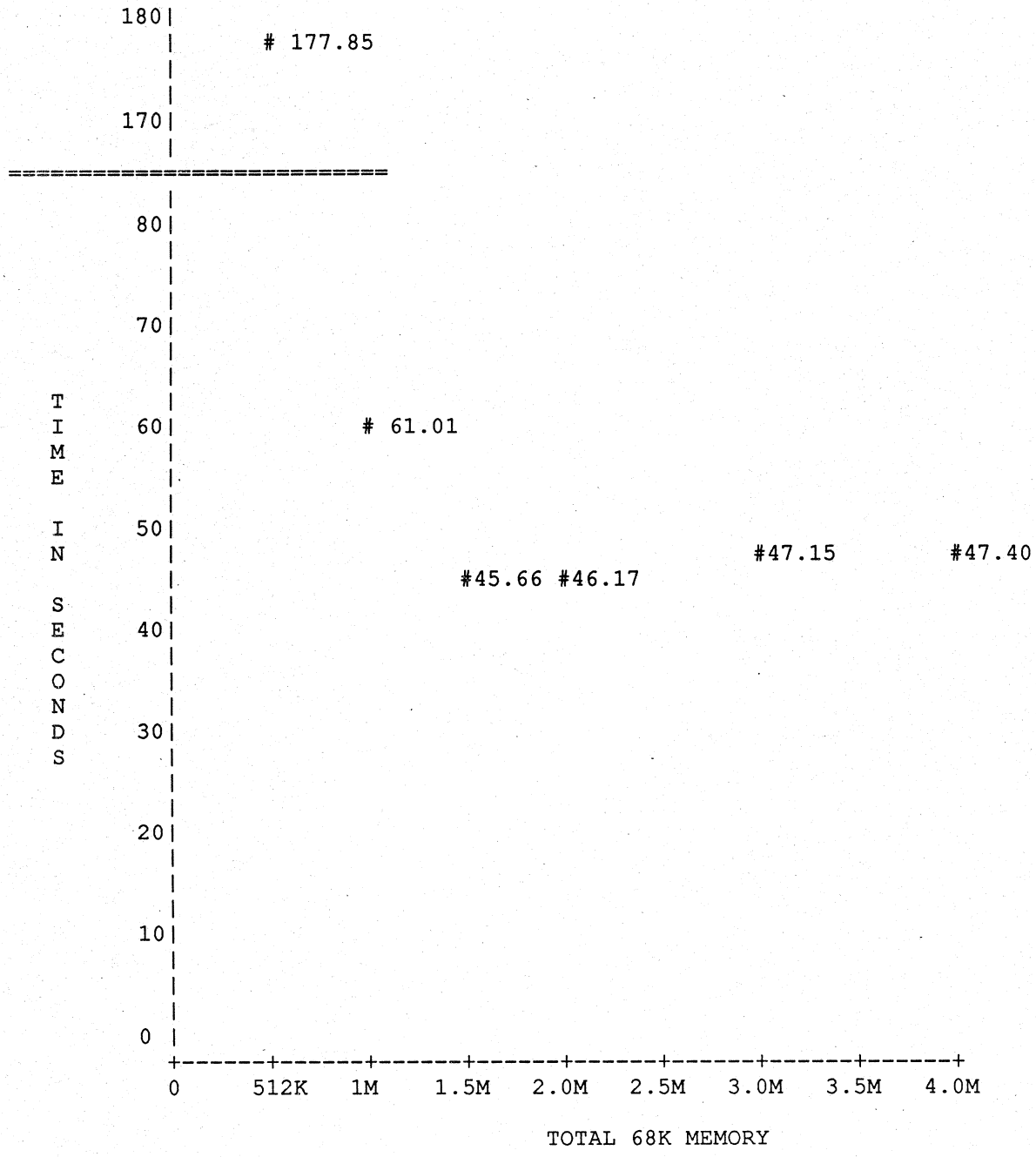
Disk Write Benchmark



10 Concurrent Tasks Benchmark



20 Concurrent Tasks Benchmark



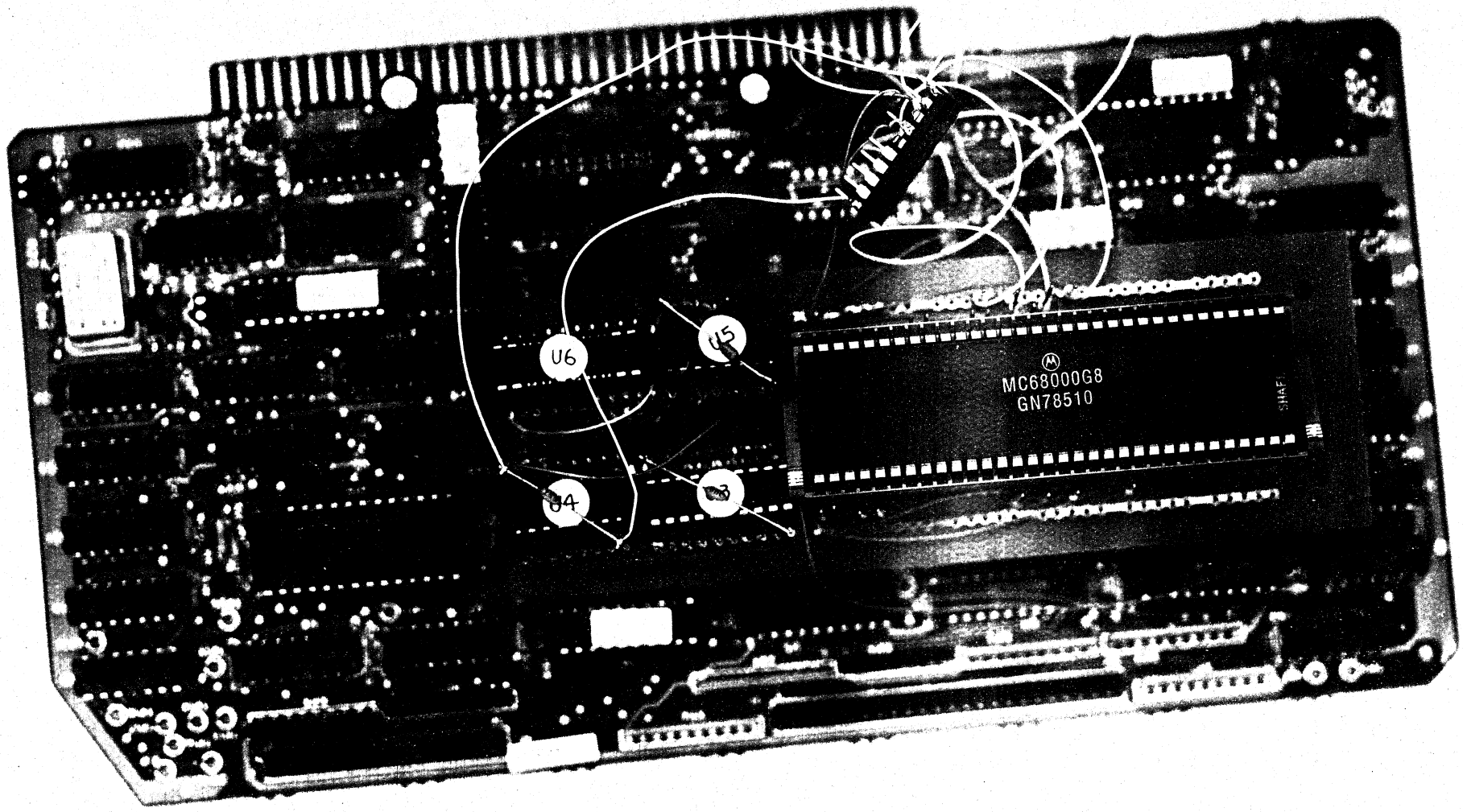
Complete Benchmarking Information

All benchmarks were run on the same machine and hardware configuration, with the only difference between tests being the amount of memory installed.

CPU Tandy 6000
68K 8 Mhz No Wait States
Z80 4 Mhz 1 Wait State
35 Meg Primary hard disk, no secondaries.
Swap Space 4097K
Root Space 29886K
XENIX 3.2 Level I Core installed fresh for each test
All system parameters set for Automatic Configuration (See System/User Memory)
Sticky bit set on /bin/time
All tests were run in system maintenance mode from the same script

Test	512K	1M	1.5M	2.0M	3.0M	4.0M
User Memory	380K	864K	1328K	1768K	2784K	3808K
System Memory	132K	160K	220K	280K	288K	288K
Buffers	50	100	202	302	302	302
Disk Read	9.45	7.95	5.90	1.77	1.78	1.79
Disk Write	3.84	3.19	2.40	1.76	1.76	1.78
Fcalla	0.20	0.20	0.20	0.20	0.20	0.20
Fcalle	1.13	1.13	1.13	1.13	1.13	1.13
Loop	7.91	7.91	7.91	7.91	7.91	7.91
Pipes	2.22	2.38	2.39	2.31	2.37	2.34
Scall	7.82	7.82	7.85	7.84	7.91	7.92
Sieve	3.11	3.11	3.11	3.10	3.10	3.10
Multi 1	6.04	4.27	2.59	2.58	2.64	2.77
Multi 2	9.03	5.95	4.63	4.58	4.72	4.83
Multi 3	13.24	8.58	6.85	6.91	7.04	7.10
Multi 4	22.41	11.56	9.15	9.26	9.42	9.40
Multi 5	31.72	13.61	11.43	11.54	11.73	11.78
Multi 6	40.76	16.31	13.75	13.80	14.21	14.16
Multi 10	77.44	27.55	22.96	22.95	23.47	23.67
Multi 20	177.85	61.01	45.66	46.17	47.15	47.40
			Present Maximum Memory			

The slight increase in times that appears in some tests at 2.5 Meg is attributed to the additional overhead required to keep track of the additional memory.


U6
U5
U4
MC68000G8
GN78510