You can't touch the hardware yet but it sure sounds great.

The Gemini

by R. A. McLaughlin, Associate Editor

The president of Computer Operations, Inc., announced his company's maxi computer line with the preface that "this must be the worst time in the last 50 years to launch an enterprise." From an economic, state-of-the-market standpoint he may be right, but from a technical standpoint he may be quite wrong—for the Gemini Systems he introduced appear to have all the things that were hoped for but absent in the just-announced IBM 370 Series machines. Things like terminal administration, variable micrologic, and multiprocessing are all here. Or make that almost here, because the introduction of the Gemini Generation, unlike that of the 370, was not accompanied by the unveiling of hardware, only the unveiling of concepts and the offer to sell.

Unlike almost any other computer company, the Costa Mesa, Calif., firm's first offer to sell was for very big machines, not for starter sets. The smallest configuration mentioned was the equivalent of multiple 360/50s, and the size went up from there to models whose only competition will come from the IBM 360/195 and the Control Data 7600. Prices for "little" models did not even begin before $3 million and the top was not reached before $10 million. Professing that "economy comes through scale," COI has started at the top.

It is immediately apparent that the Gemini will not look like the 370. Any similarities come not from molding around a 360 computer line—if anything, the Gemini's ancestors live at CDC, not IBM—but because some design goals for the 70's seem to have become clear, and among these are massive on-line memory, the need for a relatively small and exceptionally fast semiconductor buffer memory to interface with core, redundancy for reliability, and flexible and capacious communications channels.

Finally, enough core?

The Gemini have this and more. Core sizes start at 2 million bytes and go to 16 million, five times the top offered for the 370 and much larger than any memory installed anywhere in the world today. Although the core has a nominal cycle time of 2.5 mikes, it is interfaced to the 1,000,000 instruction/second central processor through either an 8K or 16K byte associative semiconductor memory running at 160 or 260 nsec cycles. The effective core *size* is greater, too, due to the use of 1K byte pages and virtual addressing of more than a billion bytes.

The Gemini configurations include a minimum of four processors of various types. There is a 128-bit word size central processor; a peripheral processor that provides up to eight selector channels; a communications processor that either connects up to 1,024 terminal devices operating at rates to 9600 baud or up to 16 high speed channels at up to 480,000 baud each; and the memory processor. The peripheral processor, cpu, and communications processors can be paired, providing automatically for doubling all the numbers given.

One of the best learned lessons of the 60's was that any new hardware would have to be compatible with earlier hardware at the program level. The Gemini architects claim that it will be able to run multiple IBM 360 OS jobs alongside multiple DOS jobs alongside multiple Gemini-coded jobs. It is no secret that this sort of compatibility is best handled through emulation at the hardware level, and Gemini provides for this too. In addition, after the 1500 "essentially different" instructions in the machine's set are used up, there is still writable microcode space left over for up to 256 user-defined instructions.

There are more tricks, too. The whole shebang is memory processor driven, a la the GE 600 series, and every logic box is asynchronous. The logical arrangement is described as a two-dimensional pipeline, wherein the instructions and data are taken apart by four units in the cpu—a microprogram control unit, instruction unit, operand unit, and execution unit.

Conversion relief

Trick number 30 or 40 is "what happened to the assembler?" Some hardware, which we will not need to identify, has been delivered without a good operating system and accompanying application software. No problem here. The software libraries you already have (ain't emulation grand?). The operating system comes with it; called the Gemini Operational Control Program, it performs resource management, failure diagnostics and recovery, and Gemini Program Language (GPL) translation. GPL, in a move like others we have seen for the 70's, starts with PL/I as a base and works in language processors, the "assembler," its version of a job control language, and everything else as subsets.

Some big new machines have been dropped on an unsuspecting marketplace with all the logic for doing great things and only first-attempt peripherals to do them through. The Gemini's peripherals and peripheral controllers are completely compatible with those of the 360 series. They *are* the 360 series peripherals and controllers. This is a good deal since IBM peripherals, though not cheap, are pretty good. Afraid of cpu vs peripheral compatibility problems and intervendor haggling? Fear not. Each Gemini comes with four live-in on-site field engineers.

It all begins to sound like magic and would be easier to accept if there were a piece of hardware to touch and poke at, but there is not. The prototype comes in mid '71; first deliveries at the end of '71. Meanwhile, the numbers surely look impressive. ■