and the memory signals. This was a problem with ECL circuits generally. Memory people are struggling to put ECL interfaces into their memory parts to avoid those big voltages that you can't get with ECL. Here was a nice match, even though they're made out of wholly different things. They're electrically very compatible.

Q: Will the manufacturing facility for the CRAY-3 be open?

A: Yes, I don't have any secrets. I love to have people stop by and see what we're doing. The facility in Colorado will probably be getting into full swing about mid-1989. We plan to have system checkout there as well as module production and it does seem like we're going to have loads of visitors, especially during ski season. That's not all bad if you can get your customer to come there for whatever reason and check out your product and kick the tires, I think that's desirable.

Q: What do you think of COS vs. UNICOS?

A: COS vs. UNICOS--I never got involved with COS because of where I was at the time in the CRAY-2 program. As you know, Dave Judd picked UNICOS, and so what else is there?

Q: Will the CRAY-3 modules be repairable?

A: What we want to do is make these robots work backwards. The robot manufactures the jumper with laser welding as the wire moves down through a capillary. This all happens in a fraction of an inch space as it's coming down into the module. This is on-site manufacture, on-site being within a quarter of an inch. As the jumper is put through, a laser burns off the tail at just the right place so there's a lead on the bottom which is pulled through the clamp. Then it's cut off with a mechanical snipper at a depth such that you can grab it and pull it through the rest of the way. Our plan then is to program a robot with a dull blade and proceed with the same sort of positioning program and pull them all out. One of the interesting things about the CRAY-3 modules is there are no screws. It's all held together by the friction of these jumpers. I don't know if you noticed the picture, but there are 16 stacks of 1 inch boards on a 4 inch plate, which makes the 4 inch module. For repair purposes, you pull out the approximately 800 jumpers that are in a 1 inch board stack, and the board should just fall off. Then you can easily repair the board and re-stack it the same way. You don't have to disassemble the whole module--only the 1 inch board stack.