To: Rod Carlson Oct 14, 1985

From: John Minck Re: SMOBC and Repair

Rod, you asked for feedback regarding specific comments on SMOBC I got from some HP people who have concerns with customer satisfaction.

Frankly, from an SPD perspective, I would say that SMOBC may be a ticking time-bomb. For our division's type of field service which features low production runs and local repair at countries large and small around the world, the repair aspects of the new technology are quite threatening.

I'm new to the strategy for SMOBC project, but I infer that we are doing it for cost, and the necessity to move our production to surface-mount processes. Specifically, the line-tolerance on the old nickel/gold apparently won't handle surface-mount. So the trend for SMOBC may be un-stoppable. Yet, surface-mount itself has a repair strategy that may not fit our normal SPD boards. Surface-mount points to throw-away strategy, or at least return-to-the-factory-type repair. It requires special tools and training. It will probably make sense for smaller, lower-cost boards, not the kind we use much at SPD.

I have contacted the following people. Some have experience working with the boards or work with people who do. Others have major responsibilities with customer service repair and field repair (and training customers).

I talked with Al Kovalick about the typical problems he ran into working as a lab engineer. He was using boards from the AWS project. His problems broke down into 3 or 4 types:

1. Al's associates have reported that soldering or removing components or leads on an IC cause cracking of the solder mask. That of course opens the bare copper to time and environment.

2. Absolute care must be used when touching a joint with a soldering iron or the trace and pad will lift. In some cases, the "eyelet" just pulled out of the hole. Al theorizes that the nickel/gold strengthens the through-plating. In another case, the trace cracked underneath the IC itself and was not observable.

3. Apparently for multi-layer boards the situation is worse since the inner layer connection can be severed easier than the gold boards.

4. The "conventional wisdom" and years of training in handling gold boards with the accepted practice of touching the pad first, not the component, will suddenly be reversed. Now the component lead must be touched first, and very carefully at that. The gold boards had such cautions too, but, in fact, they were

much more forgiving. You didn't intentionally abuse them, but even with inadvertant abuse, they hung in there. That is a clear customer expectation.

(I have attached a separate R & D internal memo from Al for your information). (And to be fair about it, I did get reports from the Andy Nagaeli team that outside-prepared SMOBC boards might be better than Bldg 15 boards from a repairability standpoint).

Bill Whitney and Tom Cottrell came to me several months ago in high-concern because the appearance of new PC boards with an entirely new repairability procedure along with the rumor of current repair problems in our SPD labs had come as a surprise.

Bill belongs to a Group Service Council which includes other instrument divisions' Service Managers. No contact had been made with those Service Managers to get comments on new training required for any HP technicians, or customer technicians. And all our service manuals would be affected. Repair procedures would be involved, with re-training indicated.

I called Roger Costa who runs all Instrument Support including all domestic field repair operations and the Customer Repair Center in Mt. View. He had not been contacted, and he is checked further with his people, but does not think any of them had been consulted on field repair and re-training.

I talked with Gene Young who manages the Customer Repair Center in Mt. View. His people are the bench techs who would be involved. That was his first knowledge of the possible changes and to say the least, he was surprised that HP would be considering such a major process change with such customer repair implications without feedback from service.

None of his people had been invited to serve on any review committees or had a chance to try some of the boards in actual bench repair with actual entry-level techs as well as senior techs.

At the barest minimum, we really couldn't understand why a "beta-test" wasn't run with 5 or 10 repair techs to see how easy it was to train them on the new repair procedure. Then the repair-damage factor could have been determined for the average tech. Prudence would seem to dictate that we try the boards in real-life field repair situations and measure results. Or only commit to one product per division.

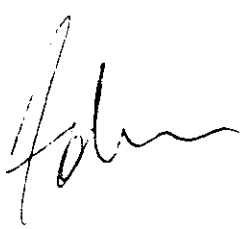
Gene did take the question a step further and called a close friend of his who is an outside consultant for the PC industry. That man reported that SMOBC is, in fact, an un-stoppable trend. And he confirmed that surface-mount technology is one of the main driving forces behind it. He also confirmed that much of the application for surface-mount is in boards that have huge volumes and throw-away strategies.

Our service people tell me that even our SPD instruments which use a board-swap strategy mostly use it for the expensive and complex boards. The small boards often get fixed by remote customers who are trying to cut the long out-of-service times inherent in board-swap or HP service. Even large aerospace firms do their own repair to avoid weeks of turn-around time getting through their own paperwork. On the other hand, they are more sophisticated in their training, but board repair yield would cause loss of HP prestige. So board-swap probably won't be a total solution for SMOBC board repairability limitations.

My knowledge of the military/aerospace market leads me to say that one reason we sell much of our commercial equipment to them is that the construction and design and the processes are easily equivalent to military/aerospace practices and processes. The "Bill West" front-panel switches have the quality "feel" of a solid clunck. The gold-plated boards had the right feel and confidence-building effect that meant the buyer would not be criticized for specifying commercial equipment.

There could be a massive false economy for SPD and MCG if, in saving a few dollars per board, we create serious repair damage on our own production lines. And if we succeed in shipping, we transfer future risk to our customers, who will not be kind. I don't know how many customer techs there are in the world, but Bench Briefs has a circulation of 30,000. Many are supervisors but one could estimate 100,000 techs worldwide. If 10,000 work with HP boards that may be high but even 2,000 is far from trivial.

I feel it is extremely important to learn from past experiences. For example, we had heard field and division feedback about reliability concerns on our programmable attenuators for some years. You can read those types of reports with an attitude that they are the exceptions and optimistically say everything is OK. Or, you can look at each unusual report and realize this may just be the tip of the iceberg and consider that it is a warning. It was the tip of the iceberg on the stickiness on the West switch and on the attenuator life. And, as you can tell, I think it is an iceberg tip on SMOBC.



10/1/85

STANFORD PARK DIVISION

Rod Carlson

JOHN MINCK ——

AL KOVALICK ——

RE OUR LUNCH CONVERSATION

FYI 2ND PAGE

PARTICULARLY.

PLEASE RETURN

JOHN -

WOULD YOU GATHER SOME INFO FROM AL KOVALICK & TOM COTTRELL ABOUT THE SERVICE REPAIRABILITY PROBLEM/CONCERN & SEND AN INPUT LETTER ABOUT IT, SAYING AT MY REQUEST TO FISCHER, TYNDSKOG, EDMONDSON, OVER SUMMARIES

HEWLETT PACKARD

1501 Page Mill Road, Palo Alto, California 94304, Telephone 415 857-1501, TWX 910 373 1267

FROM: Don Summers

DATE: September 26, 1985

TO: John Fischer 20DK

SUBJECT: PCB Supply/Cost

cc: Dick Anderson 20BY
Rod Carlson 5U
Hal Edmondson 20DK
Duane Hartley 1UR
John Lemley 20BY
Connie Marking 5U
Bill Nordskog 15

Thank you for the review of the Printed Circuit business strategy last Thursday. It was a very worthwhile and informative meeting. Especially the part dealing with the Hillview closure and transfer to the Sunnyvale shop. Although several concerns and issues came up, I would like to restate some of them that have a major bearing on board supply and cost.

o The transfer of Hillview's business to Sunnyvale certainly makes good sense geographically. This will have a major impact on the Sunnyvale shop, and will in fact change their charter from being a small mix (<200 part numbers) high lot size to a high mix (>2000 part number) small lot size operation with more than one process. This will probably have the effect of reducing their output capability from about 15,000 ISF/week to something lower, say 10,000 ISF/week. Presumably retooling is going to be the critical path. When the business situation recovers and it usually happens quite quickly, will we have sufficient capacity to cope with both instrument and computer products board demands? Moving a portion of Sunnyvale's tin board load to Boise and increasing sub-contracting for large volume computer boards will no doubt help, but will this be sufficient?

o Hillview's current standard cost increase from 2H FY'85 to 1H FY'86 is 9% based on a load forecast of 4500 ISF/week. Judging from the comments during the meeting, it appears that this number is probably overstated by 10 to 20%, without considering a reduction in inventory levels (>16 weeks) currently being held by individual customers. It's important that a reassessment of Hillview's load and cost impact is made quickly and reflected in our FY'86 production cost targets. We want to avoid surprises, especially in the present business situation.

o SMOBC/SSC. I mentioned the developing anxiety about technical problems with these boards, especially in R&D. Bill addressed the concern about cracking of the solder mask at low temperature, and hopes to have this resolved with the help from Dupont. The concern about innerlayer open circuits also needs to be investigated. I'm concerned about the labs inclination to return to the gold process even on an interim basis. I suggest that perhaps the SMOBC/SSC process is the last to be transfer to Sunnyvale in order to finalize the process design without disruption and avoid customer anxiety, especially as several new products are dependent on this process.

Again, thank you for the review and the opportunity to contribute. Let's continue to do this periodically, say every three months.

Regards,

Don

DS/kbk

IN TRAY > r14

Start of Item 14.

Message. Dated: 10/21/85 at 0854.
Subject: SMOBC Servicability
Sender: Bill WHITNEY / HP0400/02 Contents: 4.

Part 1.

  TO: Larry AUDINO / HP0400/02
      Tom COTTRELL / HP0400/02
      Eric JENNINGS / HP0400/02
      Len LEEB / HP0400/02
      Kelly O'BRIEN / HP0400/02
      Steve THOMAS / HP0400/02

  CC: John MINCK / HP0400/02

Part 2.

FOR YOUR INFORMATION

Part 3.

FROM: Jon SIGLER / HP1000/21

  TO: Bill WHITNEY / HP0400/02

Part 4.

I've talked to Bob Maddix and some of the Service Engineers. We have had no major problems with the SMOBC printed circuit boards in the field. Also indications are that there are much fewer manufacturing probems. We are not using Hillview as a vendor. We are using Praegitzer (spelling ??). This is an Oregon based company.

Regards,
Jon Sigler - Spokane

End of Item 14.

IN TRAY >

IN TRAY > r2

Start of Item 2.

Message. Dated: 10/22/85 at 1624.
Subject: PC boards
Sender: Tom TINKLE / HP0000/50 Contents: 2.

Part 1.

FROM: Tom TINKLE / HP0000/50

TO: John MINOK / HP0400/02

Part 2.

I read your Desk message with great interest. I plan to look into the situation from the federal business point of view . Please keep us informed of any details you may have that would help us or others understand the whole problem. I agree with you that we may be shooting ourselves in the foot.

Thanks for the input.....

End of Item 2.