FAX TRANSMISSION

To: Tom Harada Equipment Division #2 Kamigo Engine Plant From: Bob Sanders Date: Thursday, June 13, 1989

Re: Follow Up Data Analysis (Fax 7)

Mr. Harada

You are right! This is not a simple skills problem as I mistakenly thought. I looked at the data from TMM and Kamigo and realized that the typical call for help from an assembly line is indeed to repair some type of sensor or switch. However as we discussed the average time to make the repair in Japan is under 10 minutes for this type of problem versus over 20 minutes here at TMM.

The data alone could not tell me the answer so I decided to follow "Genchi-Genbutsu" as you suggested. I followed about 10 different relevant maintenance calls to final assembly over the past 3 days for closer investigation. Here is a short summary of what the typical repair process looks like on average (Refer to attachment Comparison of Repair Sequence). All the cases I observed were remarkably similar so I do not think I am leaving anything significant out.

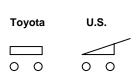
As you can see from the chart the difference is all explained by two areas of action A) the time it takes to diagnose the actual problem and B) the time it takes to get a spare part. I anticipated your next question (Why does it take so much longer?) and here is what I found on the two issues.

A. Why it takes longer to diagnose the problem.

There are three different factors that I found out

1. The electrical schematic drawings in the control panel do not match the actual circuits in the machine. Why? Upon installation various circuits get added and changed and these are not reflected in the paper drawings in the control panel.

2. The standard electrical symbols used in the schematics for items like a limit switch are different in Toyota versus the U.S. In total I found over a dozen minor differences. Here is an example of just one.



People are getting used to the new symbols but it is like having to read two languages on the drawings. This was a big problem initially and still a considerable hindrance.

3. There are phrases either mistranslated or not translated at all in the schematic prints!

| Mistranslation example: | What is written - Cylinder up end What is meant - Cylinder advanced |
|-------------------------|--|
| Non-translated example: | シリンダ後退端 - (Cylinder retracted) |

The combination of these three items is very confusing to say the least to the maintenance people doing the repair. I am surprised that the repairs are not even taking longer than they are.

B. Why is it taking so long to find the right spare parts?

Here again I can find three different reasons why it takes so long.

1. All parts are stored by a machine number that relates to an actual location on the assembly line. There are 50 different sections to the assembly line and hence machine numbers. Spare part items like switches are common through out the line so we did not order them for every section of the line on purpose to save money. But this means it is hard to find the common items as they are only stored in some machine number locations in the store but not others! This is

merely a problem of organization as common parts should not be stored by machine number at all. This is 90% of the search problem I am convinced and why it just looks like we are "missing" some spare parts.

- 2. However, I did check all the limit switch parts in the store for good measure. There are over 17 types of basic limit switches used on the conveyor line between the U.S. and Japanese equipment! This seems like too many but I have no basis for comparison. It take time to look through the 17 types and takes additional minutes to find the right one at times in the store room.
- 3. Some "wrong" limit switch spare parts are also in the store. I checked the detail part specification by which we ordered the switch and they look very close but have one digit missing or mistaken. For example:

| LS-1734ZZTS-OP | This is OK |
|----------------|------------------------------------|
| LS-152522TS-ED | This is no good. We don't use this |
| | type at all. |

What I think happened is that when we faxed the spare parts list over so that TMM could order spare parts before launch some items got fuzzy and hard to read. The latter example probably should be type "ZZ" in the middle instead of "22" as this is a different style of switch completely. The text was either written wrong into the purchase order or mistaken when sent to the distributor in the U.S. for order.

I would like to discuss with you what to do during my last week here at TMM. I am happy to extend my trip if needed.

Regards,

Bob Sanders