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Digital Computer Laboratory  
Massachusetts Institute of Technology  
Cambridge, Massachusetts

SUBJECT: TRIP TO CONTROL INSTRUMENT CO., AUGUST 27, 28, 29 AND SEPTEMBER 3, 1952

To: Test Equipment Committee

From: B. B. Paine

Date: September 9, 1952

Abstract: After we instructed them in regard to proper soldering of connections, Control Instrument Co. and their subcontractor have increased greatly the quality of Burroughs units on our order. The delay in meeting the promised delivery schedule is primarily due to poor coordination in procuring and delivering to the subcontractor the necessary components, and to the lack of complete parts lists and drawings. On our next order, if any, we are assured of obtaining units built to our standard of quality and delivered on schedule. Control instrument Co. will also attempt to make the several changes in layout and components that we desire.

People:

Larry Langlais  
Harold Akst  
Johnny Barrett  
Stuart Bryant  
Jasper Jeffries  
Walter Lang

Contract Representative  
Head of Product Engineering Section  
Product Engineer on our order  
Head of Test Department  
In charge of inspection on our order  
Engineering

Joseph Chedaker  
Bob Hayworth  
Bill Voss

Burroughs engineer, expediting our order  
Burroughs engineer doing video testing  
Burroughs technician making spot inspections

Irving Kornfeld  
Lou Schwartz  
Willie ---

Head of Electronics & Nucleonics, Inc.  
Production foreman  
In charge in absence of Schwartz

Diary

First morning -- August 27.

Dave Brown, Ernie Nickerson, and I talked with Larry Langlais, Walter Lang, and later with Kornfeld, and Thorne and Connor of purchasing department, about our general comments about soldering, and production schedules and delivery.

Then Brown, Nickerson, Langlais, Kornfeld, Harold Akst, and I drove into West 33rd Street to visit Electronics & Nucleonics. Their shop employs about 20 people, mostly Negro, with Lou Schwartz in charge. The first matter discussed was that of soldered connections. There has been considerable

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confusion concerning the way we want connections to turret lugs soldered. Earlier E & N was instructed to sweat pigtailed into the hollow lugs, and then make the tops flat. Later they were told to make the tops of the connections round, and this they did by adding a cold ball of solder to the flat top of each joint. We then made it clear that all we wanted was a good joint, such that we could see that the solder had flowed over and wetted both the turret lug and the pigtail of the component. They agreed to make up a sample unit employing this soldering technique, which I would inspect later.

First Afternoon -- August 27

I visited the inspection facilities at C. I. C. in Brooklyn, presented our test specifications to Hayworth, Burroughs' test engineer, and later inspected several Flip-Flops which were ready to be shipped out to MIT. In each of these there were many cold joints and lugs with insufficient solder in the bottom groove. The inspection procedure is as follows:

Units are checked during production at E & N by the foreman and one girl assigned to inspection.

They are then inspected by CIC men, and solder joints are reworked where necessary. Continuity checks are also made here.

They are then spot-checked by Bill Voss, Burroughs' inspector, and again reworked if necessary by him.

Then units are video tested.

Bryant and Jeffries looked on while I went over several Flip-Flops and pointed out to them solder joints which would certainly have to be reworked by us if they were shipped that way. Bryant's attitude was that they looked like good joints to him, but they would take our suggestions to please us. It was agreed that the only satisfactory way to improve the quality of soldered joints would be to have Kornfeld's people do it right in the first place, and not to attempt as much corrective reworking.

Second Morning -- August 28.

I met one of CIC's inspectors at Kornfeld's plant to look over the sample unit prepared in accordance with our soldering suggestions. This was soldered by one girl, and did not go through the regular production line. On the whole, the unit showed improvement, but there were still a good many cold-soldered joints, and some joints with not enough solder. We emphasized that they heat their lugs longer, and that they form an even flow of solder over the lower part of the turret lugs. The tops of the lugs, where the component pig-tails are fastened, seemed entirely satisfactory.

Second Afternoon -- August 28.

Had a long talk with Johnny Barrett and Joe Chedaker about design changes on future orders. The outcome of this was that if we would give CIC clear, written specifications at the time such orders are placed, they will

attempt to comply with them. Some of the proposed changes discussed were:

- Marking of our names on panels
- Use of slotted turret lugs
- Substitution of molded RF chokes for open chokes
- Possibility of new layout on Flip-Flop in order to mount all components on lug strips, instead of from point-to-point, as is done now.
- Dust cover on rack power control unit

We should insist at least that all crystal diodes be mounted on lug strips, even if other components must be mounted point-to-point. The availability of crystals was discussed. Sylvania is now offering deliveries of 18 months. If we specify hermetically sealed crystals, as we must, we may have to supply our own crystals. Burroughs, on one job, soldered crystals into a tube envelope and evacuated that when it was impossible to get glass-sealed diodes.

It was agreed that I would continue to work on the problem of the low-voltage contacts of the relay in the rack power control unit, and try the combination of precious metal plating and the rocking wiping contact supplied by Allen Bradley.

It was discovered during the afternoon that two types of lamp sockets have been used in the flip-flops and indicator panels, one with a built-in 270,000 ohm resistor and one without. The additional resistance introduced by the one socket caused the lamps to burn much less brightly, although they still started satisfactorily. All the units still at CIC will be changed to incorporate the sockets without the built-in resistor, but those that have been shipped to MIT will have to be changed there. CIC will replace our stock of lamp sockets that we use in this change.

The long cylindrical nuts which are to be used to mount the pulse transformers on the front panel of flip-flop units already at MIT will be mailed first class on August 29. Pulse transformers mounted elsewhere than on the front panel will have their mounting screws reversed, so the screw head comes between the turret lugs.

Third Afternoon --August 29

In looking over several 1103AW Flip-Flops which had been made up that day, I reiterated my comments about covering leads which wrapped around the turret lugs with solder. Apparently the #22 bare wire used to strap together several turret lugs is particularly hard to get solder to flow on to. The poorly soldered joints in most cases included this bare wire. I tried soldering several joints made with #22 wire from a new reel, with somewhat better results. If poor joints continue to come through to us, we should request that another brand of bus wire be used.

I also found one resistor with no connection to one of its ends, after passing through E & N's inspection. Schwartz estimated that his inspection girls spent half an hour on each unit. I estimated somewhat less than this.

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Johnny Barrett and Ed Connor appeared with some of the needed components, having been out to buy them themselves. On future orders, it is particularly necessary that Control Instrument Co. establish a means to get an easy and even flow of materials to its subcontractor. When proper parts lists are prepared, this should be possible.

Kornfeld showed me, confidentially, his copy of the purchase order from Control Instrument Co. to him for the construction of the balance of this order. It was dated August 12, 1952. Of course this may have been only a formality, following verbal agreements, but it seemed that Control Instrument Co. made quite a late start on our order.

Finally, I inspected several units while Kornfeld looked on, and pointed out individually the joints which should be resoldered. He then took the units back to the girls responsible for them, and had them rework the joints. I initialled the tags on the units which I inspected.

Wednesday, September 3, 1952

I spent the morning at Electronics & Nucleonics, and the afternoon at Control Instrument Co. The soldering of the units, before inspection and rework at CIC, had improved considerably. There was still trouble with poor solder flow over #22 bare wire, but the reel of wire used in these units had been used up in them, and new wire which soldered more easily would be used in future construction. Again I inspected several Flip-Flops which had passed inspection at E & N, and found a wiring error in one unit. These wiring errors would in all probability be caught at Control Instrument Co. in their inspection.

In the afternoon, I talked with Jeffries in the inspection department at CIC about the several cases of wrong components in units which had passed their inspection and had been shipped to us. These were all in places which would not affect the results of video testing that they perform. Jeffries agreed to investigate, and perhaps to initiate more rigorous inspection for this kind of fault.

I talked again with Walter Lang about the general problem of slowness and confusion, and he again assured us that this was their first experience with this type of unit, and that future orders would find them better organized, with respect to complete drawings, parts lists, and procurement of components, and liaison with the subcontractor.

There were a good number of units going through inspection, with an inspection force of some six men, in addition to those doing video testing.

Signed

*BB Paine*

B. B. Paine

BBP/jk

cc: R. R. Everett C. Watt  
H. Fahnestock  
E. Nickerson

Approved

*DRB*

D. R. Brown