

Saltzer

TO: Whom It May Concern
FROM: J. M. Grochow and N. I. Morris
DATE: December 17, 1969
SUBJECT: Saga of the DSU-270 Installation

Tuesday, December 9

At the Site Meeting, five hours of Service Machine time (on Thursday and Friday, 12/11 and 12/12) were assigned for the modification of the three Service GIOC HPC units for use with the DSU-270's. It was also decided to push back the installation of the 270's from Sunday, 12/14, to Wednesday, 12/17, in order to allow the checkout and repair of the fifth DSU-270 unit.

Thursday, December 11

One Service GIOC HPC was modified.

Friday, December 12

Various hardware problems prevented modification of the two other Service HPS's (this was not reported nor was more time asked for by Field Engineering).

Monday, December 15

It was discovered, late in the afternoon, that another HPC problem had been found. The "fix" was to be installed and tested on the Development GIOC that evening and, if testing was successful, it was to be installed on

the Service GIOC at 0500 on Tuesday, 12/16. It was also reported that the fifth DSU-270 unit has not as yet been checked out. It should be reported that there was general confusion among the members of the Field Engineering staff as to what had and had not been accomplished.

Tuesday, December 16

The additional fix was installed on one HPC on the Service Machine. The fifth DSU-270 unit was not fixed.

Wednesday, 12/17

The switch over of Multics to use both DS-10 disks and DSU-270 disks was started at midnight Tuesday, the DSU-270's first being exercised at 0330 Wednesday. Continuous programmer coverage was started at midnight Tuesday. Multics was up for users at 1100 with both types of disks. At 1310 a fatal 270 error (read error) caused Multics to crash. Attempts at SAVE'ing failed because of numerous 270 errors. A bug in BOS caused us to believe that the 270's could not even be written but this error was soon discovered. 270 problems were investigated until 2000 and included parity errors in unit 3 (4 if counting by Burroughs method) and a bad board in the electronics unit. At 2000 a RESTOR of tapes taken at 0800 was attempted and Multics was finally up for users at 2305.

Thursday, 12/18

At 0125 Multics crashed after numerous 270 errors. Salvaging failed (probably because of 270 errors) and a RESTOR was again attempted. When Multics was brought up, further 270 errors caused a crash almost immediately.

Multics was brought up several times but crashed because of 270 errors within fifteen minutes. Users never were allowed on. Periodic attempts to salvage and restart Multics were interspersed with F.E. repairs to the 270's.

At noon the machine was declared completely down; no Multics boot attempts have been made using 270's since that time. It should be pointed out that the "write" instruction was changed to a "write and verify" instruction in the 270 software at about 1100. Numerous check errors were discovered using this between 1100 and noon - Multics crashed anyway. From 1530 until 0415 only one Field Engineer was on site. At 1800 it was ascertained that we would, in fact, have 24-hour coverage until the problems were solved and that Phoenix had been notified. There was continuous programmer coverage except between 0115 and 0300, and from 2000, Thursday, until 0600 on Friday.

Friday, December 19

A bad board was found in head selection logic very early in the morning (before 0415). Another problem in the head selection logic was found at 0730. This was discovered after the acceptance test in the DSU-270 test and diagnostic package had been run successfully!! In fact, the board had a resistor completely broken in half. At this point only two 270 units would run without error. Units zero and one (1 and 2 according to Burroughs) were physically switched. This showed that further problems were caused by bad disk units and not by a bad electronics unit. The fifth disk unit (which had been adjusted during the last two days) was then substituted for one of the malfunctioning 270 units. Now it was possible to run three of the four units needed by Multics without error. This occurred at about 1330. At about 1530, after substitution of various

amplifiers and adjustment to the remaining malfunctioning unit, errors were detected on all four units! This is the current status (1700). There will be continuous programmer coverage at least until Saturday noon. There are 2 F.E.'s on site from 1600 to midnight Friday at which time they will be joined by a man from Phoenix.