

PREVENTING A LAUNCH SCRUB OF THE SATURN I SA-4 VEHICLE

By Russel Rhodes

In 1958, I received an aeronautical engineering degree from Indiana Tech and was pleasantly surprised that my parents would leave the farm to see me graduate. I was unable to get an engineering job because Uncle Sam's military draft was imminent; thus I was soon drafted into the US Army. Little did I know that I was about to embark on an amazing adventure of being on the team that would land man on the moon with their moon buggy.

I was assigned to the Army Ballistic Missile Agency (ABMA) at Huntsville, AL, and introduced to Albert Zeiler of Werner Von Braun's German team. After a short discussion, he asked me to join their team with Dr. Debus, Director of the Missile Firing Laboratory in Cape Canaveral, FL. At the rank of Private, I was a college graduate earning \$72.00 a month with a \$4.00 clothing allowance. I lived at Patrick Air Force Base and was getting introduced to rattle snakes, alligators, mosquitoes, and hurricane Donna. The best was yet to come.

For me, the most memorable moment working with the German team was when the liquid oxygen (Lox) fill and drain valve on Saturn 1 SA-4 did not indicate close and a scrub was called. I quickly presented a proposal for a workaround to Dr. Von Braun and he, with the advice of his electrical engineer, agreed this was doable and a costly scrub was averted. Here's how it happened:

During the final launch countdown, the Lox replenish is completed and the vehicle propellant tanks are pressurized for launch. In those days we hadn't developed digital control capability and we used what is known as relay logic to accomplish automatic sequencing. A basic principle of mine was to prepare myself for failures and workarounds (the operational what ifs). Our ground electrical system used latching relays for many functions. Therefore, when the Lox system commanded the fill and drain valve closed in preparation for pressurization, we received a sequence stop as we never received the valve closed indication.

At this time the test conductor announced that the launch would be scrubbed. I blurted out that there was no need to scrub as we could work around this simple failure. Dr. Wernher von Braun was standing in front of me in just a few seconds and asked: "What is your proposal"?

Knowing we had latching relays in the logic chain, I suggested we set up the manual components panel to match the automatic configuration at the time, then switch the control selector from automatic to manual. This allowed the cycling of the Lox fill and drain valve to verify, using a TV system, that we could flow Lox out the tail service mast drain and then close the valve and watch the Lox flow stop. Once we performed this sequence we would switch the control back to automatic to allow normal actions to take place.

Dr. Wernher von Braun asked his electrical expert to go with Bill Wheeler, our electrical engineer, and review the drawing to verify if this was possible. In only a few minutes they returned from the side room and said, yes we believe he is correct and Dr. Wernher von Braun said OK to me. I responded with "WHAT?", and he said: "You have my permission to go ahead".

We performed the work-around and verified that the failure was instrumentation. The next function was to install an electrical jumper in the control system bypassing the closed indication failed instrument. We then proceeded to launch the Saturn I SA-4 vehicle successfully.