

NASA Space Trucking

I had the good fortune of enjoying a 30-year progressively successful career in technology management, systems engineering, operations management, and business development. Most of my career was focused on the design, implementation, and operations of large, complex, real-time mission critical systems for the Federal Government (NASA, NOAA, DOD).

Prior to starting my technology career, I drove tractor-trailers (aka semis, 18-wheelers). It was hard work loading and unloading freight, occasionally exasperating due to traffic, and at times quite dangerous. Nevertheless, I enjoyed being a trucker. For the most part, I was a local and regional driver working in the Northern Virginia, Washington, DC, and Baltimore area. But I did also serve as a long-haul/over-the-road trucker in the Mid-Atlantic region.

In 1981, I was happily employed as an Electronics Technician/Customer Engineer with Wang Laboratories installing and maintaining computer systems. I was totally stoked when I learned that NASA was looking to hire a combination truck driver and electronics technician. The prospect of working for NASA was over-the-top exciting **and** it bridged both worlds – trucking and working with high-tech systems.

The job was based at the Simulations and Communications Test Branch located at the Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. My interview went well, and I passed the pre-hiring driving test in one of their Peterbilt cab-over tractors hauling a custom-built 45' trailer. I did not know the specifics of what was in the trailer until after my hiring. What I did know from the driving test was it was a very heavy load, and with the axles/wheels positioned near the tail end it required a making wide turns at intersections.

When they gave me an overview of the job during the interview, my reaction was simply a resounding Wow! I was to drive the rig to sites across the country. including the rocket launch facilities at the Kennedy Space Flight Center in Florida and the Vandenberg Air Force Base in California and to the handful of satellite manufacturers (e.g. Ford Aerospace, TRW, GE, RCA).

The tractor and trailer were white and bore distinctive NASA logos, including the iconic red worm lettering on the sides of the cab. It drew practically everyone's attention, which resulted in lots of calls on the CB radio. In retrospect, *Space Trucker* would have been my ideal CB handle. But I called myself *Stargazer*, a reasonable choice.

NASA had three custom-built trailers which were designated as Compatibility Test Vans (CTV-1, -2, and -3). The trailers were similarly instrumented to support multiple concurrent satellite testing and launch activities. At the time I was hired, two CTVs were fully operational and the

third was being built by the trailer manufacturer.

The CTVs were mobile computer labs outfitted with an array of equipment used for satellite communications testing and to serve as a mobile tracking stations for rocket launch support. They had 22-foot-long slide out sections on both sides that provided rear access to a slew of 24” x 36” x 80” steel computer equipment rack enclosures. The trailers were heavily insulated and had three air conditioning units mounted on the front end that kept the interior environment at a constant 65 degrees, even in hot deserts. It had two doors, one near the front on the port side and one at the rear that had small rectangular thick glass pane viewing ports and meat freezer style door handles inside and out.

The CTVs when fully equipped were very heavy, weighing in at 53,000+ pounds. A stout, turbo-charged Cummings diesel engine powered the dual-axle Peterbilt cab-over tractor. The total rig weight exceeded 80,000 pounds. Every pound was in full evidence each time I went up or down even the slightest grade. Driving in mountainous regions was down-right scary.



<http://www.bfec.us/bfecpho1.htm>



https://einstein.stanford.edu/highlights/hl_111000.html

The Art and Science of Satellite Laser Ranging

The trailer had several other unusual features. It had vehicle support jacks on the bottom of the four corners to ensure that it was completely level when operational. These were heavy duty jacks able to support the t of the trailer. Lastly, it had a small compartment underneath the trailer that contained a plumb-bob that could be dropped down to ensure the CTV was precisely positioned over the center of a 4” diameter land survey marker (aka benchmark).

I had to position a CTV over a survey marker at a laser tracking and ranging system at GSFC. It was a *vertical control point* type benchmark that included the elevation (altitude). The laser system was used to make very precise ranging (distance) measurements of satellites in orbit. Given the power of the laser, a radar system was setup adjacent to ranging system to detect approaching aircraft.



Land Survey Markers

As you can well imagine, it is painfully difficult to position tractor-trailer so that a plumb bob suspended under the trailer dangles within the area of a benchmark. Sitting high in the cab fifty-odd feet away from it, I relied on verbal instructions and visual clues from two spotters on the ground to guide my maneuvering. Semi-tractor brakes and transmissions are designed to haul heavy loads. It took more than ten minutes of jockeying to get the CTV precisely positioned. The Peterbilt tractor I drove had a very heavy clutch action and I was concerned about getting cramps in my left calf.

I made cross-country trips to the Space Launch Complex at Vandenberg Air Force Base in Lompoc, California to support two launches.

- **1981 August 3 09:56** - Dynamics Explorer 1 *Launch Vehicle: [Delta 3000](#). Partial Failure..* Delta 3913 642/D155 *Apogee: 23 232 km (14 435 mi).* Dynamics Explorer 1.
- **1981 October 6 11:27** - SME *Launch Vehicle: [Delta 2000](#).* Delta 2310 639/D157 *Apogee: 337 km (209 mi).* Solar Mesosphere Explorer. Spacecraft engaged in practical applications and uses of space technology such as weather or communication (US Cat C).

I also drove a CTV to perform pre-launch communication testing at four satellite manufacturing facilities:

- TRW (Redondo Beach & El Segundo, CA)
- Ford Aerospace (Palo Alto. CA)
- RCA (Hightstown, NJ)
- GE (Valley Forge, PA)

While this was one of the most exciting jobs I ever had and well paying, it kept me on the road for extended periods. I had a three-year-old son and a one-year-old daughter at home. I gave notice and quit the job after five months.

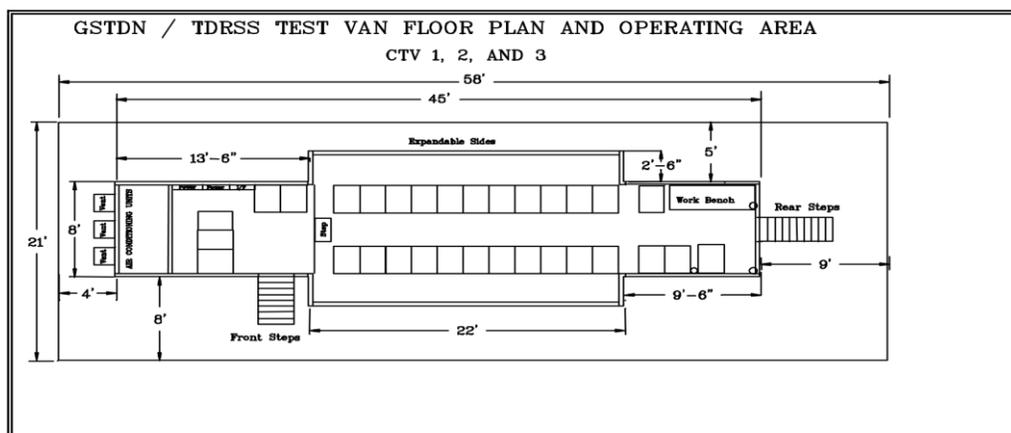


Figure B-1. Bird's-eye view of CTV Trailer footprint.

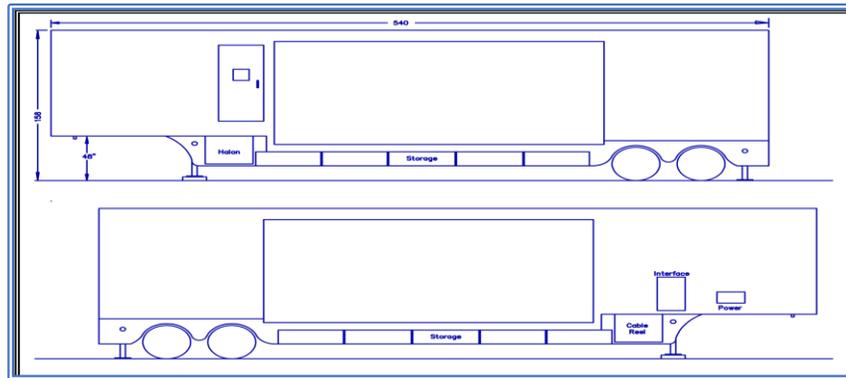


Figure B-2. Port (Driver's side) and Starboard (Curb side) elevations of CTV Trailer



Photo from NASA/USGS Ground System Architectures
Workshop 2014 Landsat 8 Test as You Fly, Fly as You Test
<http://www.bfec.us/bfecph01.htm>