Historian's Corner

By Jim Rivers
(riversnco@yahoo.com)

The Silent Hero's Silent Heroes

Many Senior Government Space Officials knew the Titan Space Launch Vehicles, as the Silent Hero's of the Cold War. But, they also had silent heroes that everyone knew existed, although these silent heroes never really got their deserved recognition.

These silent heroes were born in 1951, served in the Korean War, were wounded in action, and were destined for future unrecognized glory in the service of their country. They are the Titan III and Titan IV ITL railroad locomotives.

They were built for the US Army by General Motors Electro-Motive Division (EMD), in 1951 and served in Korea as a part of the 724th Transportation Battalion. The records are fuzzy but many of the 41 SW-8 diesel-electric switch engines received some bullet holes "Wounded-in-Action" during their service. After the war ended and they returned to the United States, three of the engines (number 2000, 2007 and 2021) ended up painted blue and assigned to The Air Force for use as a part of the Titan ITL operations. But, that's just the beginning of the story.

How do two locomotives, operating on parallel tracks, push/pull 2,000,000 to 2,800,000 lbs. of Umbilical Mast/Transporter, Launch Frame, Titan Launch Vehicle and Solid Rocket Motors while being able to locate their final resting place within fractions of an inch? As a starting point switch engines locomotives are normally strong but not really considered "micro-precision" devices. So, how did they do it?

Early on it was clear that two locomotives operating independently on parallel tracks weren't going to work. Also for redundancy sake, there were three ITL locomotives that would need to be interchangeable. The team (Martin, US Air Force and General Motors) conceived of a Master/Slave relationship where each locomotive needed to be configured to serve as either the Master or Slave locomotive. How did they do it?

It was decided that the physical configuration would have a boom on the right side of each locomotive that would carry the communications (electric and pneumatic connections with color coded and keyed connectors) between the Master and Slave locomotives, which would be connected to the Transporter undercarriages. Also, either locomotive could be designated as the master or slave unit. Now the hard part; how to get two non-precision locomotives to act in precise unison? How does an engineer simultaneously exercise precision control of two locomotives? Solution: Modify each locomotive's electrical and braking control systems.

Each standard locomotive has an 800 horsepower diesel motor (controlled by a governor to regulate the engine RPM) and a generator (controlled by a load regulator to maintain output current). This combo generates the electrical and pneumatic energy needed to operate, and has load ammeters that indicate the locomotive's pulling force. Each standard locomotive has 4 electrical traction motors (each traction motor drives two wheels) electrically connected in parallel that are controlled by the governor and load regulator. There is also a wheel slip control that automatically drops torque if any wheel slippage is detected, and each axle has a speed recorder to monitor speed.

The modification for each locomotive was to be able to switch (when in the Dual Master/Slave Operation Mode) the electrical connection to its traction motors from a parallel to a series connection to increase torque capacity and have the Master locomotive provide all the braking controls for both locomotives. The Master locomotive's throttle potentiometer would simultaneously provide the same voltage to both the Master and Slave locomotive governors. In turn each governor would control the diesel's RPM via the engine fuel supply, and via the load regulator, would control the generator current output to the traction motors. This effectively would make sure that the load is appropriately distributed to each wheel. To make sure each wheel would be the same diameter, the operation of each of the three locomotives would be tracked to make sure that all the wheels got the same wear. Next how would each locomotive get to the same starting point?

The starting point: At the Transporter refurbishment area, the vehicle processing facilities and the launch pads, the transporter would rest on the platform support pier, which would have ball joints to assure consistent alignment.

To support movement of the vehicle/transporter, there would be four (4) undercarriage assemblies. Each undercarriage would consist of four (4) truck assemblies, an elevation jack system and a lateral alignment screw jack system. All four (4) elevation jack and lateral alignment systems would be interconnected electrically to allow control of all four (4) elevation jack or lateral alignment systems as a single assembly or control of each of the four (4) elevation jack or lateral alignment systems independently.

Each locomotive would be independently coupled to the transporter undercarriage on its track. After the two locomotives were independently coupled to the undercarriages, the locomotive brakes would be set and the boom between the two locomotives would be swung into position and the electrical and pneumatic connections engaged.

Before movement, the undercarriage elevation systems would lift the vehicle/transporter off of the platform support piers to a full up position. With the transporter clear of the piers, away they go (at 5 MPH or less). As they would approach the next set of platform support piers, the vehicle/ transporter would be moved to within +/- 1/8" (fore and aft) of the 4 platform support pier ball joints. At that point the locomotive brakes are set and before the elevation system would lower the vehicle/ transporter, the lateral alignment system would finish the alignment over the pier ball joints.

Guess what? Even though most railroad experts said, "It couldn't be done", this plan worked successfully for over 40 years. Albeit, a little help from the ITL Railroad Team was needed periodically to keep it "unnoticed".

Although this was the “Exotic” part of the ITL Railroad Operation, most of the day-to-day operations involved movement of the heavy and hazardous solid motor segments, propellant and other items need to support the Titan program.

This article would have been impossible without the assistance of Carl Welton and Craig Schreiber (ITL Railroad Team Members).

THE FUTURE: For now my story well has run dry! Only **you** know the story(s) about unique parts and happenings of the Titan’s wonderful history! So, please submit any suggestions you have for future articles to “riversnco@yahoo.com”.