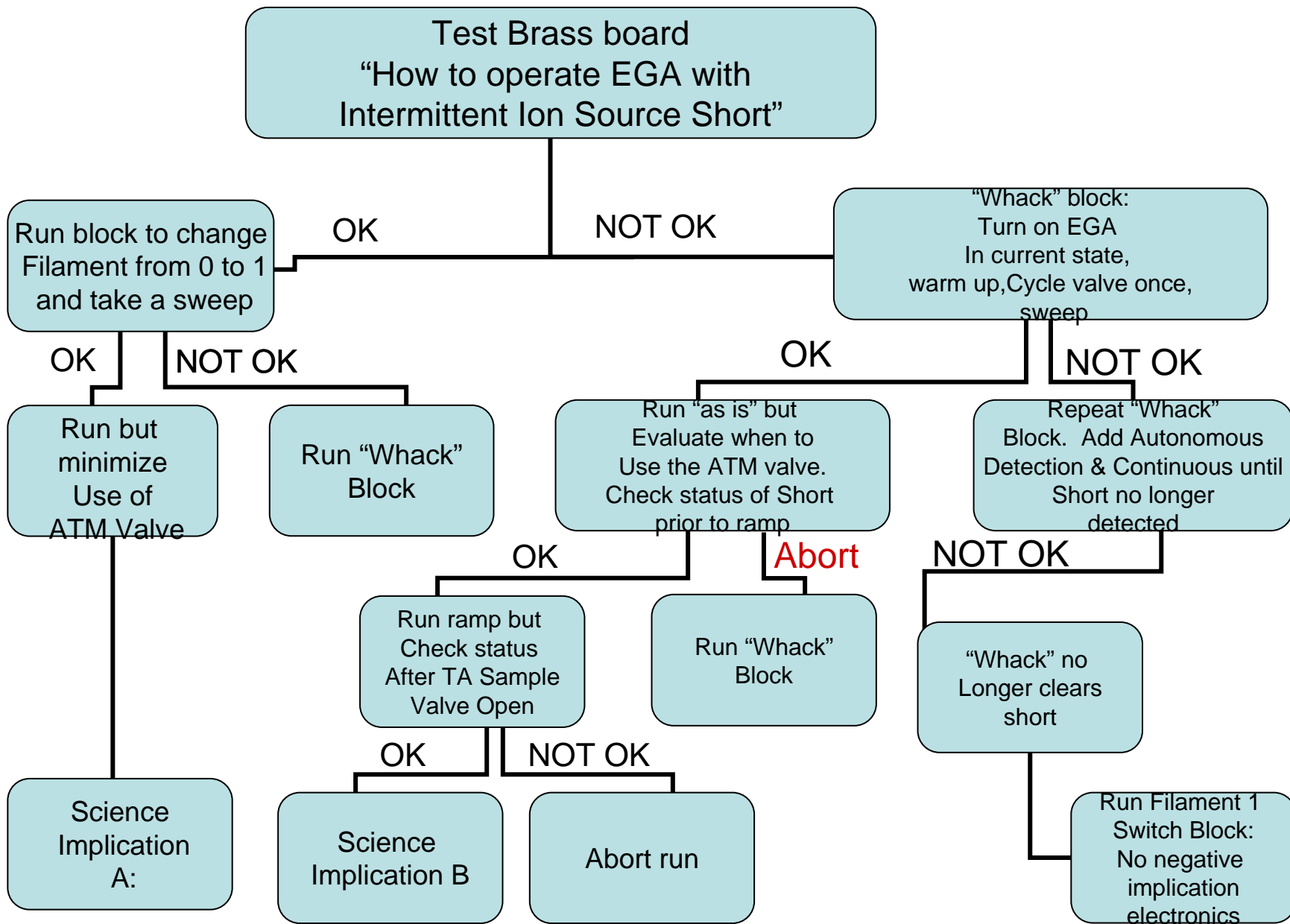


TEGA Sol 4

Checkout II Ion Source Anomaly

5/30/08



Science Implications

- A: This path gives us nearly all science originally planned. We expect that we may pay a performance penalty of only 20% or so in terms of sensitivity, but most of our sensitivity limits are driven by background count rates, so we may not pay much of a price at all.
- B: This path gives us full capability for soil and ice analyses, but it precludes us from analyzing the atmosphere with maximum sensitivity (which requires using the atmosphere inlet to the EGA). We can still measure Ar abundances and CO₂ abundances and isotopic ratios in the atmosphere by using the much less sensitive TA sample inlet. Later in the mission, perhaps after all eight ovens have been used, we can use the atmosphere inlet to get maximum sensitivity for other noble gases (Ne, Kr, and Xe) by using the gas enrichment cell, which only connects via the atmosphere inlet valve. Although we could use the much more sensitive atmosphere inlet at the end of the mission, we could not measure D/H ratio because we expect the background water signal would be too high by this point. We could consider accepting the risk of another actuation of the atmosphere valve and make one or two measurements of D/H ratio early in the mission.

TEGA Characterization Activity Status

- Can do with EGA in current state
 - Cover Retract (without Ion Pump)
 - Door Open
 - Sample Acquire (receipt)
- Can NOT do with EGA in current state
 - Atmosphere Run
 - Sample Process surface sample
 - Low, Mid or High Temp Ramps

Fault propagation from filament drive to control electronics

- Because of the high voltages present in the EGA, great care was taken in the design, both electronically and mechanically, to prevent a fault in the EGA high voltage sections from propagating into the control electronics. The high voltage sections in the EGA are potted and encased in their own Faraday shields, and isolated from the low voltage sections by high voltage opto-isolators and transformers with grounded shields between the primary and secondary windings. Zap traps are used on all ground connections to block the high frequency pulses resulting from any electric discharges. Because of the nature of the emission control circuit (the whole circuit floats at the 300 - 2000V sweep potential), an additional layer of transformer isolation exists between the filament, ionization, and J-plate supplies and the low voltage section. Finally, the interface between the EGA low voltage section and the main control electronics is also very robust. It consists of a current limiting FET switch followed by two stages of both common-mode and single ended filtering for the +28V, opto-isolated control and status lines, and a bidirectional RS-422 link based on Intersil 26C31/32 drivers and receivers.