Static Test Procedures/Checklist

1. Pre-flight Checks
   1. Propellant supplies
      1. N2 storage tank pressure > 100bar.
      2. N2O storage tank pressure > 100bar.
      3. N2O storage tank contained mass > 1kg
   2. Engine Computer
      1. Communication with Engine Computer is good
      2. Engine Computer battery voltage > 100V
      3. Engine Computer external power voltage > 100V
      4. Data-logger is recording
   3. Valve actuators
      1. Test all valves and visually verify prompt open/close
      2. Voltage should not fluctuate as a result of stalling
   4. Sensors
      1. Pressures all should read 0
      2. Thrust should read 0
   5. Ignitor
      1. Close ignitor safety switch
      2. Ignitor is ready and has continuity.
      3. Open ignitor safety switch
2. Fuel Fill
   1. Open Fuel Vent Valve.
   2. Close Main Fuel Valve.
   3. Pour in 100mL ethanol.
   4. Close Fuel Vent Valve.
3. Fuel Pressurization
   1. Open Fuel Vent Valve.
   2. Close Main Fuel Valve.
   3. Connect N2 line
   4. Open N2 storage tank valve slightly
   5. Wait until Fuel Tank Pressure Sensor reads 100bar
   6. Close Fuel Vent Valve
   7. Close N2 storage tank valve
   8. Disconnect N2 line
   9. If tank pressure is too high, pulse Fuel Vent Valve to lower to 100bar.
4. Oxidizer Fill
   1. Open Oxidizer Vent Valve
   2. Close Oxidizer Main Valve
   3. Connect N2O line
   4. Open N2O storage tank valve slightly
   5. Close Oxidizer Vent Valve
   6. Close N2O storage tank valve
   7. Disconnect N2O line
   8. If tank pressure is too high, pulse Oxidizer Vent Valve to lower to 100bar.
   9. Oxidizer Level Sensor should read 100mL.
5. Pre-burn Checks
   1. Pressures
      1. Fuel Tank Pressure Sensor and Oxidizer Tank Pressure Sensor read 100bar.
      2. Fuel Injector Pressure Sensor and Oxidizer Injector Pressure Sensor read 0.
   2. Valves
      1. All valves are closed.
   3. Ignitor
      1. Ignitor safety switch is closed
      2. Ignitor has continuity.
6. Ignition Sequence (Engine Computer controlled)
   1. Countdown
   2. Open Main Oxidizer Valve slightly.
   3. Fire ignitor
   4. Open Main Fuel Valve slightly
   5. Check for ignition before proceeding (Manual)
7. Burn Sequence
   1. Open both Main Oxidizer Valve and Main Fuel Valve simultaneously, controlling for proper injector pressure
   2. Fuel Injector Pressure Sensor and Oxidizer Injector Pressure Sensor read 100bar.
   3. Thrust Sensor reads 100N.
   4. Continue until propellants run out
      1. Thrust diminishes
      2. Injector pressures fall
      3. Tank pressures fall
8. Post-burn
   1. Close both Main Oxidizer Valve and Main Fuel Valve
   2. Open both Oxidizer Vent Valve and Fuel Vent Valve
   3. Stop data-logger recording and save to file.
   4. Download EEPROM data from burn and save to file.
   5. Wait for engine to cool
   6. Open Main Fuel Valve and Fuel Vent Valve. Vent fuel tank, lines, and cooling jacket with N2 through Fuel Vent Valve

Soft Abort during Burn

1. Close Main Fuel Valve
2. Wait for combustion to stop
3. Close Main Oxidizer Valve

Hard Abort during Burn

1. Close both Main Fuel Valve and Main Oxidizer Valve simultaneously

Abort during Fuel Pressurization

1. Open Main Fuel Valve
2. Close N2 Valve
3. Close Fuel Vent Valve

Abort during Oxidizer Fill:

1. Open Main Oxidizer Valve
2. Close N2O valve
3. Close N2O Vent Valve

All Aborts go to Post-burn once safe state reached