SU/GP-B P0917 Rev – C
21 August, 2002

STANFORD UNIVERSITY
W.W. HANSEN EXPERIMENTAL PHYSICS LABORATORY
GRAVITY PROBE B, RELATIVITY GYROSCOPE EXPERIMENT
STANFORD, CALIFORNIA 94305-4085

GDS ACCEPTANCE TEST PROCEDURE

GP-B ENGINEERING PROCEDURE

P0917 Rev – C

21 August, 2002

PREPARED _____ _____
S. Buchholz, Date

APPROVED _____ _____
K. Bower, GMA Engineer Date

APPROVED _____ _____
C. Gray, GMA REE Date

APPROVED _____ _____
D. Ross, Quality Assurance Date

APPROVED _____ _____
R. Brumley, Hardware Manager Date

REVISION HISTORY

Rev	Date	Comments
-	07/09/02	
A	08/07/02	Change procedure to include new methodologies. (ECO # 1374)
B	08/16/02	Change procedure to include venting of system between high-pressure proof tests due to difficulties closing DP series valves. (ECO# 1377)
C	08/21/02	Update the procedure to include the red lines created during the performance of the procedure. (ECO# 1378)

TABLE OF CONTENTS

A SCOPE

This procedure will test the acceptability of the Gas Delivery System (GDS) for use with flight and flight-like Gas Management Assembly (GMA). It will cover the setting and testing of pressure regulators to supply lines along with valve verification, gauge verification, a proof test, a leak check, and a system verification for gas purity (He 99.9990% or better during ATP). All precautions will be made to insure that the GDS gas path stays as clean as possible.

B SAFETY

The GDS has multiple gas pressure vessels. Under normal operations, GDS requires no safety measures or equipment beyond those required for the use of a supply gas cylinder. The GDS is a high-pressure gas delivery system. When any of the system is pressurized and connected to the vacuum system and/or leak detector be cautious not to vent high pressure through the pumping portions of either system. Only allow high pressure to vent through safe ports and make sure that these are open at time of venting. The table below defines the pressure limits for each zone of the GDS.

GDS Operating Pressure Limitations (psig)

Zone	System MEOP	Rated MEOP	Relief Pressure	Proof Pressure
Red	2640	3500	3775	3960
Orange	2000	3000	2200/3300	3000
Yellow	300	650	330	450
Green	300	1000	330	450
Blue	<10	150	<10	N/A

Note: Observe caution regarding pressure designations of psia vs psi. (psia = psig+ 14.7)

C QUALITY ASSURANCE

C.1 QA Notification

This assembly will be conducted on a formal basis to approved and released procedures. **The QA program office and ONR representative shall be notified 24 hours prior to of the start of this procedure**. A Quality Assurance Representative, designated by D. Ross shall be present during the procedure and shall review any discrepancies noted and approve their disposition. Upon completion of this procedure, the QA Program Engineer, D. Ross or her designate, will certify her concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating in the designated place(s) in this document.

C.2 Red-line Authority

Authority to redline (make minor changes during execution) this procedure is given solely to the Test Engineer or his designate and shall be approved by the QA Representative.

C.3 Discrepancies

Discrepancies will be recorded in a D-log (See section H.3) or as a DR per Quality Plan P0108.

D TEST PERSONNEL

The Test Engineer shall be Ken Bower or an alternate that he shall designate. The Engineer has overall responsibility for the implementation of this procedure and shall sign off the completed procedure and relevant sections within it.

E REQUIREMENTS

E.1 Electrostatic Discharge Requirements

N/A

E.2 Lifting Operation Requirements

N/A

E.3 Hardware/Software Requirements

GDS

Leak detector, Alcatel (or alternate), internally calibrated

Research Grade Helium Supply (99.9995 %) or better

High pressure inert gas supply for Proof Test, > 3500 psig (Laboratory Grade 99.99% or better)

Vacuum system (Turbo Molecular Pump Cart w/ Foreline dry pump)

Pre-cleaned plumbing lines, consistent with Level 100A practices

Hand held particle counter (sensitive to 0.50 microns or better)

4000 psig digital pressure sensor

Calibration Date: _____ S/N: _____ Model #: _____

3500 psig digital pressure sensor

Calibration Date: _____ S/N: _____ Model #: _____

500 psig digital pressure sensor

Calibration Date: _____ S/N: _____ Model #: _____

E.4 Instrument Pretest Requirements

All test equipment used to verify test data is required to be “in calibration.”

E.5 Configuration Requirements

N/A

E.6 Optional Non-flight Configurations

N/A

E.7 Verification/ Success Criteria

Individual quantities should be able to be within tolerances set out in individual procedure sections.

E.8 Constraints and Restrictions

N/A

F REFERENCE DOCUMENTS

F.1 Drawings

GDS Drawing – Advanced Micropolish Inc (AMI) Dwg # STN-103-ASM
GDS Schematic, GP-B Dwg. Number 26278

F.2 Supporting documentation

N/A

F.3 Additional Procedures

N/A

G OPERATIONS

G.1 Verify Appropriate QA Notification

QA Notified_____ ONR Notified_____
(Date & Time) (Date & Time)

G.2 Setup of GDS

Started on: _____

Before test, close all GDS valves and He supply valves and cap all open connections.
Verify pressure relief systems are installed on high and low-pressure sides of GDS. See figure 1 for GDS schematic. Note all problems in Section H.3, Discrepancy Log.

G.3 GDS Leak test

Started on**:** _____

Note: Mark off each step of this section as it is completed.

G.3.1 Verify that the He supply bottle valves are closed. Verify that valves V-1, V-2, V-3, V-4, V-10, V-25, V-27, V-28, V-29 and V-30 are closed. Verify that all other valves are open. Open the pressure regulators PR-1 and PR-2 to full clockwise.

G.3.2 Connect leak detector to the GDS low-pressure outlet for the GMA. Verify the automatic vent function is disabled. Ensure the leak detector has been tuned and calibrated.
Calibration Date _____ Calibration Value _____

G.3.3 Open valve V-25. Evacuate the GDS using the leak detector. Pump down sufficiently enough for leak detector to operate.

G.3.4 Start leak detector. Verify that all GDS pressure sensors read 0 psia once leak detector goes into test mode. Record Helium baseline leak rate _____

G.3.5 Using a small flow, spray helium around every GDS connection, slowly working from the gas supply tanks towards the leak detector. Watch for leak rate spikes that would indicate leaks.

G.3.6 Fix any leaks that are found and repeat step G.3.5 as necessary. Record any discrepancies in section H.3.

G.3.7 Close V-25. Shut down leak detector. Leave GDS under a vacuum.

G.3.8 Record completion of leak test on line 1 of Section H.1.

G.4 Proof Test and Relief Verification

Started on: _____

Note: Mark off each step of this section as it is completed.
'Snoop' and/or an audible hiss will be used to locate system leaks.
When operating with pressures above the MEOP of 3500 psig for the Red Zone and 3000 psig for the Orange Zone, some components MEOP will be exceeded. At these times, additional precautions to protect personnel safety are required. See section B.

G.4.1 Verify that all GDS front panel and supply valves are closed. Verify that the purge gas connection at valve V-12 is capped. Verify that RV-1 and RV-3 cutoff valves (inside GDS) are open.

G.4.2 Connect 500 psig digital pressure sensor to the low-pressure outlet (Yellow Zone) of the GDS @ V-25. Connect 3500psig digital pressure sensor to the high-pressure outlet (Orange Zone) of the GDS @ V-24. Connect 4000 psig digital pressure sensor to a 'T' connector at the purge gas connection at V-5 (Red Zone).

G.4.3 Connect high-pressure clean inert gas supply (>4000 psig) to the 'T' connector at the purge gas connection at valve V-5 and open the bottle supply valve. (Set supply regulator pressure as required.)

G.4.4 Open valves V-1, V-2, V-3, V-4, V-5 and V-6

G.4.5 Set pressure regulator PR-1 to a minimum pressure. (< 90 psig)

G.4.6 Open valves V-8, V-11, V-12, V-13, V-14, V-15, V-16, V-17, V-18 V-19, V-20, V-21, V-22, V-23, V-24, V-25, V-26, V-27, V-28, valves for sample bottles #1 and #2 then set PR-2 to a minimum setting (~0-5 psig).

G.4.7 Slowly increase the pressure to over 10 psig @ PR-2 and verify relief valve RV-1 opens @ 5 psig ($\pm$2 psi).

G.4.8 Adjust RV-1 as required to open @ 5 psig ($\pm$2 psi) and note lift pressure _____.

G.4.9 Close valves V-11, V-26 and PR-2.

G.4.10 Slowly increase the pressure to @ PR-1 to 90 psig and verify that PT-1 agrees with the digital pressure sensor for the corresponding zone (within tolerance) and record reading (Section H2).

G.4.11 Close V-20 and open valve V-26.

G.4.12 Set pressure regulator PR-1 to 500 psig.

G.4.13 Slowly increase the pressure to over 330 psig @ PR-2 and verify relief valve RV-3 opens @ 330 psig ($\pm$15 psi).

G.4.14 Adjust RV-3 as required to open at 330 psig ($\pm$15 psi) and note lift pressure _____..

G.4.15 Close the cutoff valve for RV-3.

G.4.16 Set PR-2 to 450 psig and hold for 15 minutes.

G.4.17 Verify that PI-1, PI-2, PI-3, PI-4, PI-5, PI-6, PI-7, PI-8, PT-2 and PT-3 all agree with the digital pressure sensor for the corresponding zone (within tolerance) and record readings (Section H2).

G.4.18 Fix any leaks that are found and repeat step G.4.16 as necessary.

G.4.19 Close valves V-8, V-13 and PR-2 then set pressure regulator PR-1 to 2000 psig.

G.4.20 Crack open valve V-8 and let the pressure rise slowly to 2000 psig.

G.4.21 Verify that PI-1, PI-2, PI-3, PI-4, PI-5, PI-6 and PT-2 all agree with the digital pressure sensor for the corresponding zone (within tolerance) and record readings (Section H2).

G.4.22 Fix any leaks that are found and repeat step G.4.20 as necessary.

G.4.23 Slowly increase the pressure to over 2200 psig @ PR-1 and verify relief valve RV-2 opens @ 2200 psig ($\pm$100 psi).

G.4.24 Adjust RV-2 as required to open @ 2200 psig ($\pm$100 psi) and note lift pressure _____.

G.4.25 Close valve V-21 and set pressure regulator PR-1 to 2500 psig, letting the pressure rise slowly to 2500 psig and hold for 15 minutes.

G.4.26 Verify that PI-1, PI-2, PI-3, PI-4, PI-5, PI-6 and PT-2 all agree with the digital pressure sensor (within tolerance) and record readings (Section H2).

G.4.27 Fix any leaks that are found and repeat step G.4.25 as necessary.

G.4.28 Close valves V-5 and V-26.

G.4.29 Vent pressure through CV-1. Set PR-1 and PR-2 (CW to open) to minimum flows. Open valves V-13 and V-29. Crack open valve V-26 (CCW to open) and slowly release pressure. When the pressure is below 500 psi, open valvesV-21. When the pressure is below 100 psi, open valve V-20 and release pressure to a nominal 10 psig. (< 50 psig)

G.4.30 Close valves V-13, V-15, V-16, V-18, V-19, V-20, V-21, V-25, V-29 and the sample bottle valves.

G.4.31 Open V-5 and set the pressure to 3000 psig @ PR-1 letting the pressure rise slowly to 3000 psig. Hold the pressure for 15 minutes.

G.4.32 Verify that PI-1, PI-2, PI-3, PI-4, PI-5, PI-6 and PT-2 all agree with the digital pressure sensor (within tolerance) and record readings (Section H2).

G.4.33 Fix any leaks that are found and repeat step G.4.31 as necessary.

G.4.34 Close valves V-5 and V-26.

G.4.35 Vent pressure through CV-1. Set PR-1 and PR-2 (CW to open) to minimum flows. Open valves V-13 and V-29. Crack open valve V-26 (CCW to open) and slowly release pressure. Release pressure to a nominal 10 psig. (< 50 psig)

G.4.36 Close valves V-13, V-14, V-22 and V-29.

G.4.37 Open V-5 and slowly increase the pressure over 3300 psig @ PR-1 and verify relief valve RV-4 opens @ 3300 psig ($\pm$100 psi). (Note: Exceeds MEOP.)

G.4.38 Adjust RV-4 as required to open @ 3300 psig ($\pm$100 psi) and note lift pressure _____.

G.4.39 Close valve V-8 and set PR-1 to minimum flow.

G.4.40 Slowly increase the supply pressure regulator to 3960 psig and hold pressure for 15 minutes. (Note: Exceeds MEOP.)

G.4.41 Verify that PI-1, PI-2, PI-3, PI-4 and PI-5 all agree with the digital pressure sensor (within tolerance) and record readings (Section H2).

G.4.42 Fix any leaks that are found and repeat step G.4.42 as necessary.

G.4.43 Close the high-pressure supply valve on the bottle connected to V-5.

G.4.44 Vent pressure through CV-1. Set PR-1 and PR-2 (CW to open) to minimum flows. Open valves V-13 and V-29. Crack open valve V-8 (CCW to open) and slowly release pressure. Release pressure to a nominal 10 psig. (< 50 psig)

G.4.45 Close valves V-5, V-26 and V-29. Disconnect high-pressure supply from purge gas connection at valve V-5.

G.4.46 Record completion of proof and relief valve tests on Lines 2 through 9 of Section H.1.

G.4.47 Run Section G.3 “Leak Check” again.

G.4.48 Record a successful completion of leak check on line 10 of Section H.1.

G.4.49 Record pressure transducers and gauges passed calibration verification on line 11 of Section H.1.

G.5 Lockout Safety Check

Started on: _____

Note: Mark off each step of this section as it is completed.
Valves V-8 through V-30 have factory manufactured lockout devices and do not require testing.

G.5.1 Verify that supply valves V-1, V-2, V-3, V-4 and V7 are closed and lockout mechanism installed (Handles removed as required). Verify that valves V-5, V-9, V-10, V-11, V-12, V-15, V-16, V-18, V-19, V-22, V-24, V-25, V-27, V-28, V-29 and V-30 are closed. Close the cutoff valve for RV-1 and verify the cutoff valve for RV-3 is open. Verify that all other valves are open. Verify that the purge gas connections are capped.

G.5.2 Connect leak detector to the GDS low-pressure outlet for the GMA. Open valve V-25 and the pressure regulators PR-1 and PR-2.

G.5.3 Evacuate the GDS using the leak detector. Pump down sufficiently enough for leak detector to operate.

G.5.4 Start leak detector. Verify that all GDS pressure sensors read 0 psia once leak detector goes into test mode. Record Helium baseline leak rate _____

G.5.5 Connect a He supply bottle to the purge gas connection at valve V-5.

G.5.6 Open He supply bottle to a nominal 100 psig.

G.5.7 Record background leak rate_____

G.5.8 Try to open valve V-5 with lockout device engaged. Record Helium leak rate _____

G.5.9 Close He supply bottle @ valve V-5.

G.5.10 Open He supply bottle #1.

G.5.11 Record background leak rate_____

G.5.12 Try to open valve V-1 with lockout device engaged. Record Helium leak rate _____

G.5.13 Open He supply bottle #2.

G.5.14 Record background leak rate_____

G.5.15 Try to open valve V-2 with lockout device engaged. Record Helium leak rate _____

G.5.16 Open He supply bottle #3.

G.5.17 Record background leak rate_____

G.5.18 Try to open valve V-3 with lockout device engaged. Record Helium leak rate _____

G.5.19 Open He supply bottle #4.

G.5.20 Record background leak rate_____

G.5.21 Try to open valve V-4 with lockout device engaged. Record Helium leak rate _____

G.5.22 Close and lock valves V-6 and V-7. Close valve V-13.

G.5.23 Unlock and open valve V-1

G.5.24 Verify at PT-2 that there is still a vacuum then open valve V-13.

G.5.25 Record background leak rate_____

G.5.26 Try to open valve V-6 with lockout device engaged. Record Helium leak rate _____

G.5.27 Open valve V-9. Record background leak rate_____

G.5.28 Try to open valve V-7 with lockout device engaged. Record Helium leak rate _____

G.5.29 Close all He supply bottles and cap the purge gas connection @ valve V-5.

G.5.30 If all leak rates are acceptable to the RE, record successful completion of valve lockout function on line 12 of Section H.1

G.6 GDS Particle test

Started on: _____

Note: Mark off each step of this section as it is completed.

Pass level for particle test is < 10 particles of size 0.5 micron or greater per standard cubic foot.

G.6.1 Verify that GDS valves are closed, purge gas connections are capped and all relief valves are enabled except RV-1, which is disabled.

G.6.2 Verify that the GDS is situated in the Class 1000 or better clean room and has been allowed to rest there for at least 1 hour to allow airborne particles to settle.

G.6.3 Manifold the high and low-pressure outlets together.

G.6.4 Open one He supply bottles and valves V-1, V-2, V-3, V-4, V-5 and V-6.

G.6.5 Open valves V-14, V-17, V-20, V-21, V-22, V-23 and V-24. Set regulator PR-1 to a low-pressure (<200 psig) then open valve V-8 to set flow between 5-10 lpm (about 0.25 scfm).

G.6.6 Fashion a clean room bag into an air trap with small openings at either end.

G.6.7 Affix to the outlet. Gas should slightly inflate the air trap.

G.6.8 Insert particle counter inlet loosely into other end of bag.

G.6.9 Allow gas to flow for at least 5 minutes to purge line.

G.6.10 Take five one-minute samples. Average number of 0.5 micron or greater particles should be less than 5 per half cubic foot. Record samples #1 ___ #2 ___ #3 ___ #4___ #5 ___

G.6.11 Remove particle counter and gas trap.

G.6.12 Initial here to verify test pass _____.

G.6.13 Close valves V-14 and V-17.

G.6.14 Open valves V-15, V-16, V-18, V-19 and the sample bottle valves to flow gas through sample bottles #1 and #2.

G.6.15 Repeat steps G.6.9– G.6.11. Record samples #1 ___ #2 ___ #3 ___ #4___ #5 ___
Initial here to verify test pass _____.

G.6.16 Close valve V-24.

G.6.17 Open valves V-13, V-26, V-25 and PR-2 to flow gas through the low-pressure side.

G.6.18 Repeat steps G.6.9– G.6.11. Record samples #1 ___ #2 ___ #3 ___ #4___ #5 ___
Initial here to verify test pass _____.

G.6.19 Close all GDS valves.

G.6.20 Record successful completion of the test on line 13 of Section H.1

G.7 Purity Check

Started on: _____

Note: Mark off each step of this section as it is completed.
This section will use an external sample bottle to preserve the clean integrity of the GDS.

G.7.1 Connect clean prepared 1 liter sample bottles at the high and low-pressure outlets (@ valves V-24 and V25) from the GDS to the GMA. Verify all GDS valves are closed.

G.7.2 Open any supply bottle, valve V-6 and valve (V-1, V-2, V-3 or V-4) that corresponds to the He supply bottle that was opened.

G.7.3 Set pressure regulator PR-1 to a nominal 400 psig.

G.7.4 Open valves V-13, V-14, V-15, V-16, V-17, V-18, V-19, V-21, V-23, V-24, V-25 and V-26. The external sample bottle valves remain closed during the first fill and vent cycle. Open the external bottle valves before starting the second cycle.

G.7.5 Open valve V-8.

G.7.6 Set pressure regulator PR-2 to a nominal 300 psig.

G.7.7 Close the supply bottle.

G.7.8 Vent pressure through CV-1. Close valve V-8. Set PR-1 and PR-2 to minimum flows. Open valve V-29. Crack open valve V-8 and slowly release pressure to a nominal 15 psig ($\pm$5 psi).

G.7.9 Close valve V-29.

G.7.10 Start GDS vacuum pump.

G.7.11 Open valves V-10 and V-11 and evacuate GDS.

G.7.12 Close valves V-10 and V-11.

G.7.13 Repeat steps G.7.2 – G.7.12 two more times. initial ___ repeat 1 ___ repeat 2 ___

G.7.14 Repeat steps G7.2 – G.7.7.

G.7.15 Close the external sample bottle valves.

G.7.16 Open the gas supply valve.

G.7.17 Set regulators PR-1 and PR-2 to minimums (turn fully CCW)

G.7.18 Open valve V-29.

G.7.19 Set PR-2 to a minimal flow to vent the orange Zone.

G.7.20 Set PR-1 to a minimal flow.

G.7.21 Close valve V-29.

G.7.22 Remove external sample bottle, cap the ends of the bottles and ports and send to vendor for analysis.

G.7.23 Close valves V-24, V-25 and the gas supply valve

G.7.24 Record completion of gas sample taken on line 14 of section H1.

G.7.25 Close all GDS valves and verify the system pressure is < 20 psig of helium. Set PR-1 and PR-2 to minimums (turn fully CCW).

G.7.26 Open one of the supply bottles and valves V-1, V-2, V-3 and V-4

G.7.27 Open valves V-6, V-8, V-21, V-13, V-26 and V-30.

G.7.28 Set the pressure at PR-1 to a nominal 100 psig

G.7.29 Set the pressure at PR-2 to a nominal 60 psig.

G.7.30 Open valve V-27 and use the flow controller on the O-Boy to set a reasonable flow.

G.7.31 Purge gas for 2 minutes and then close V-27.

G.7.32 Turn on the Aqua-Pro unit

G.7.33 Open valve V-28 and set reasonable flows on the Aqua-Pro

G.7.34 Purge gas for 2 minutes and then close V-28 and V-30.

G.7.35 Shut off the Aqua-Pro.

G.7.36 Set regulator PR-2 to minimum (turn fully CCW).

G.7.37 Close the open gas supply cylinder.

G.7.38 Slowly open V-29 in order to vent the yellow zone

G.7.39 Set regulator PR-2 to slowly vent remaining gas from system.

G.7.40 When all pressures equalize at less than 10 psig, close V-29.

G.7.41 Close V-1, V-2, V-3, V-4, V-6, V-8, V-21, V-13 and V-26.

G.8 GDS Final Configuration

Started on: _____

Note: Mark off each step of this section as it is completed.
This section is to be performed at the end of the ATP. It back fills the GDS with helium to prevent contamination, removes all optional equipment, and puts it into a safe configuration.

G.8.1 Verify that all GDS purge gas connections are capped and all relief/check valves are enabled.

G.8.2 Close He supply bottles #1 through #4 and the cutoff valve for RV-1.

G.8.3 Open all GDS valves except V-1, V-2, V-3, V-4, V-10, V-20, V-24, V-25, V-29 and V-30, which are closed. (Open valves V-5,V-6, V-7, V-8, V-9, V-11, V-12, V-13, V-14, V-15, V-16, V-17, V-18, V-19, V-21, V-22, V-23, V-26, V-27, V-28 and the sample bottle valves.)

G.8.4 Open regulators PR-1 and PR-2 to minimum flows.

G.8.5 Open a He supply bottle.

G.8.6 Close He supply bottle.

G.8.7 Open the valve (V-1, V-2, V-3 or V-4) that corresponds to the He supply bottle that was opened.

G.8.8 Close valve (V-1, V-2, V-3 or V-4) opened in G8.7.

G.8.9 If pressure is below 15 psig ($\pm$5 psi), repeat G.8.4 –G8.7 as required to set a pressure of 15 psig ($\pm$5 psi) in the GDS.

G.8.10 If pressure is too high (> 20 psig), the gas must be bled out the check valve: Crack open valve V-29 to obtain correct pressure (15 psig ($\pm$5 psi)). Open valve V-20 only when the pressure is less than 100 psig.

G.8.11 Start GDS vacuum pump and close valves V-27 and V-28.

G.8.12 Open valve V-10 and evacuate the system.

G.8.13 Close valve V-10 and turn off vacuum pump.

G.8.14 Repeat steps G.8.3 – G.8.13.

G.8.15 Repeat steps G.8.3 – G.8.9.

G.8.16 If pressure is to high, the gas must be bled out the check valve: Crack open valve V-29 to obtain correct pressure (5 psig ($\pm$2 psi)).

G.8.17 Close all valves and shut off all He supply bottles. Open cutoff valve for RV-1

G.8.18 Sign off on line 15 of Section H.1 to verify that the GDS is safe and back-filled with Helium to 5 psig

G.9 Diagram

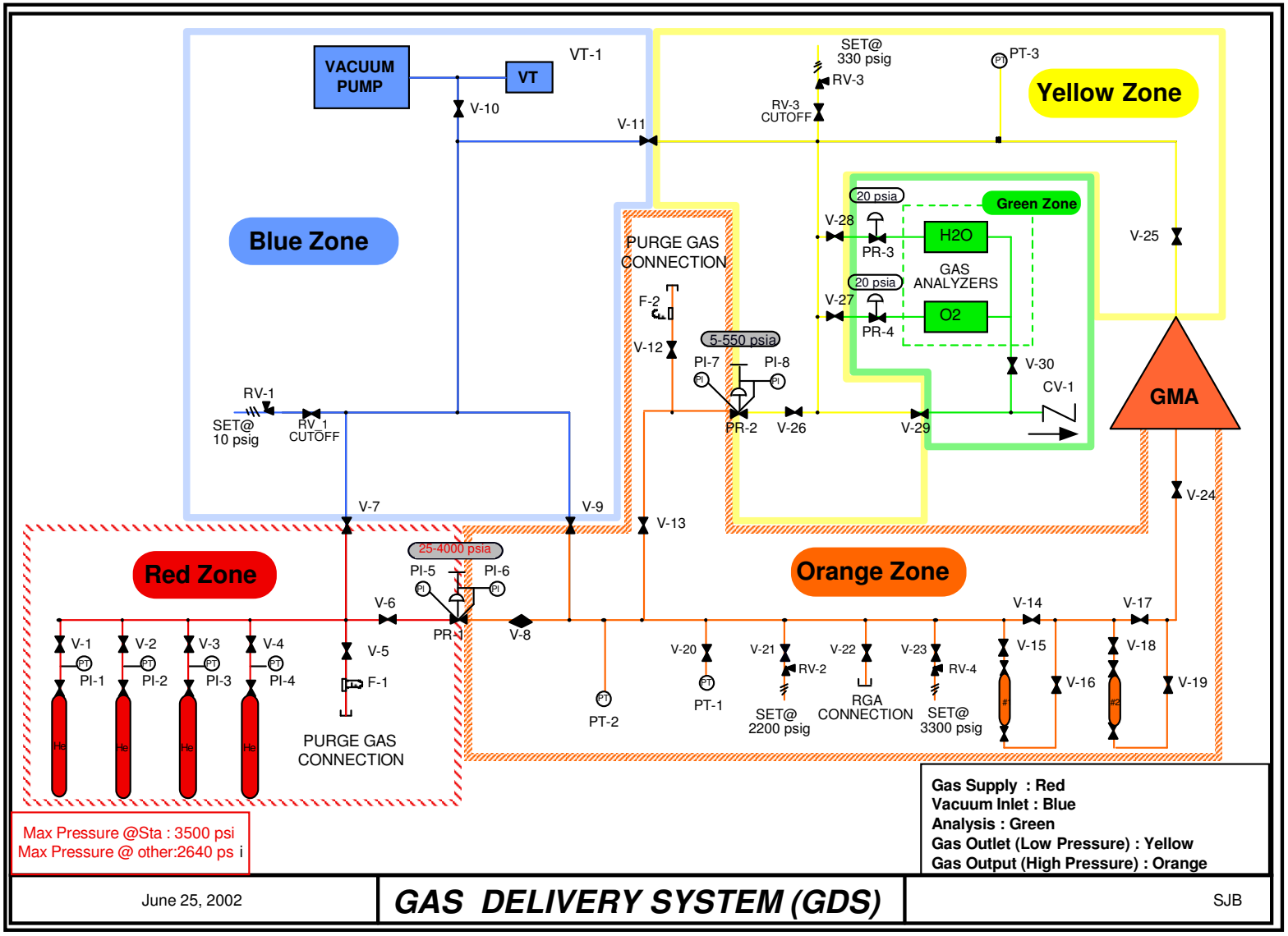

FIGURE 1

H PROCEDURE COMPLETION

H.1 Completion Table

	ATP Section	Task	Details	Completed Date	Completed Initial	QA Approval	Comments
1	G.3	GDS leak test passed	Better than 1x10^-8 sccs external leak rate				
2	G.4	GDS Red Zone Proof test passed	To 3960 psig for 10 minutes, Up to regulators				
3	G.4	GDS Orange Zone Proof test passed	To 3000 psia for 10 minutes, Up to regulators				
4	G.4	GDS Sample Bottle Proof test passed	To 2500 psia for 10 minutes, Up to regulators				
5	G.4	GDS Yellow and Green Zone Proof test passed	To 450 psia for 10 minutes, Up to regulators				
6	G.4	GDS Relief Valve RV-1 test passed	To 10 psig for 10 minutes, Downstream of regulators				
7	G.4	GDS Relief Valve RV-2 test passed	To 2200 psig for 10 minutes, Up to regulators				
8	G.4	GDS Relief Valve RV-3 test passed	To 330 psig for 10 minutes, Downstream of regulators				
9	G.4	GDS Relief Valve RV-4 test passed	To 3300 psig for 10 minutes, Downstream of regulators				
10	G.4	GDS leak test passed Post Proof test	Better than 1x10^-8 sccs external leak rate				
11	G.4	All pressure transducers and gauges passed calibration verification	Within Tolerance (See table)				
12	G.5	Valve lockouts functional	No leaks detected				
13	G.6	GDS particle test passed	<5 particles/cu. ft. of size > 0.5uc				
14	G.7	GDS Purity Check	Sample bottle sent to vender				
15	G.8	GDS backfilled with Helium	To 5 psig				

TABLE 1

H.2 Gauge Data

Digital Pressure (psia)	Gauge Readings (psia)										
	PI-1	PI-2	PI-3	PI-4	PI-5	PI-6	PI-7	PI-8	PT-1	PT-2	PT-3

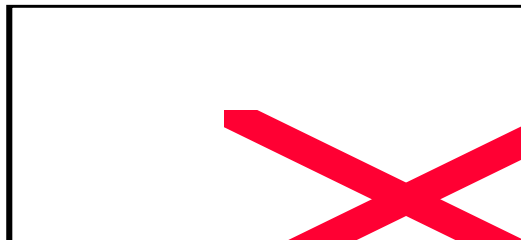

TABLE 2

H.3 Discrepancy Log

DISCREPANCY LOG SHEET

PART NAME:			DRAWING No:		LOT OR SERIAL No:		
					Transfer to	QE	RE
No:	Description of Discrepancy	Disposition/ Correction	Date Accepted	Rework	DR No:	Approval	Approval

TABLE 3

H.4 Procedure Sign Off

The result of the gas purity analysis was _____% helium.
Test passes the better than .999995% purity (5.5 nines pure).

_____
GMA Engineer

The results obtained in the performance of this procedure are acceptable:

_____ date: _____
GMA Engineer

Discrepancies if any:

Approved: _____ date: _____
C. Gray, GMA REE

Approved: _____ date: _____
QA Representative

Approved: _____ date: _____
D. Ross, QA