GRAVITY PROBE B

TEST PROCEDURE

FIST EMERGENCY PROCEDURES

1/14/98

Approvals:

_____	_____
M. Taber, originator Date GP-B GTU Cryogenics Ops Mgr.	D. O. Murray Date Lockheed Test Engineer
_____	_____
B. Taller Date GP-B Quality Assurance	J. Turneaure Date GP-B Hardware Manager

REVISION RECORD

Revision	Description	Approval	Date
Original	–	–	14 Jan 1998

FIST EMERGENCY PROCEDURES

1 SCOPE

This document describes the procedures to be used in the case of various credible emergency situations which could arise during Full Integrated System Test (FIST) Operations. It is a supplement to the detailed LMMS Test Procedures, Plans, and their Stanford equivalents. For the purposes of this document, an emergency is an unforeseen circumstance which places personnel or equipment at risk and requires immediate response. Safety hazards or procedures to be used in case of personnel injury are not dealt with here but are found in various Hazard Reports and a Safety Plan prepared by LMMS which are included or referenced in the main procedures. It should also be noted that an unforeseen circumstance which does not require immediate response should be handled by normal discrepancy disposition procedures.

2 GENERAL PROCEDURE

In an emergency (requiring immediate response):

1) Determine if a personnel safety hazard exists as a result of the emergency. If it does, evacuate lab personnel to a safe location or otherwise eliminate the hazard to personnel. Call or have someone call **9-911** if medical assistance is needed.

2) If the emergency is local but potentially endangers people elsewhere in the building, pull the fire alarm, and call 9-911 if time allows.

3) If no safety hazard to personnel exists, attempt to mitigate damage to equipment **ONLY** after full consideration is given to the safety of the procedures involved. In assessing the situation, the risk of the actions being considered should be kept in mind and *the tendency to take ill-considered or precipitous action should be avoided*. In all cases, Mike Taber and/or Dave Murray should be informed of any emergency or unusual circumstances in the FIST Facility. Their telephone numbers are listed at the end of this document.

3 FACILITY EMERGENCY (FIRE, EARTHQUAKE)

In the case of a fire, earthquake or other emergency affecting Hansen Labs:

1) Follow the evacuation instructions posted in the halls of HEPL. (These should be studied in advance.) Immediate evacuation may not be possible in the case of an earthquake, in which case a structurally strong shelter should be sought until the quake subsides. If at all possible, move away from the high bay region of the lab since the End Station crane is most likely to be over that region.

2) When evacuating the building, do so in an orderly fashion. Report to the designated assembly point (at the corner of Via Pueblo and Via Palou near the Center for Integrated Systems) for instructions.

3) Do not return to the building before being advised it is safe to do so by the authorities.

4 GENERAL BUILDING EMERGENCY

In the case of an utility emergency (water, gas, electricity, etc.) or other building emergency which does not involve imminent danger to life and safety:

1) Call University Facilities at **3-2281** for 24 hour emergency service.

2) Call Mike Killian, HEPL Building Manager. His telephone numbers are listed at the end of this document

5 POWER FAILURE

In the event of a power failure:

1) If only a single circuit is affected, reduce the load on that circuit (all outlets are labeled with circuit numbers) and reset the breaker. The circuit breaker box is located on the exterior wall of the lab next to the east door.

2) If the whole lab is affected, power should be restored by the emergency standby generator within a few seconds. Secure and shutdown all unnecessary loads to the generator. (Note: All lights, all lab circuits, air compressor, and turbo pump chiller are backed up. Air conditioning, air handling, and vacuum pumps in the pump shed are not backed up.)

3) Check all relay-latched devices (such as valves for various pump systems) and reset only after consulting with Mike Taber or Dave Murray . Be aware that these devices may drop out again when normal utility power is restored. (Note: Retransfer to normal power is delayed by the transfer switch for a number of minutes in order to avoid surges and instability that frequently occur at the resumption of utility power. The speed of retransfer, however, is sufficiently rapid that some devices may not necessarily drop out.)

4) Contact Mike Taber at the number listed below if he is not already present.

5) If power failure occurs during a time when hoisting operations are essential, the hoist may be restored to operation by means of a manual transfer switch located across the corridor from the clean room circuit breaker box (outside the east clean room door). This standby circuit is limited to 30 A and is intended for clean room hoisting operations only. Do not attempt to use the End Station I crane system (including operation of the trolley for E/W traversal) while on standby power. The circuit breaker for this standby power circuit is located next to the green Onan automatic transfer switch located on the east exterior wall of the clean room. Be sure to return the manual transfer switch to its normal position after resumption of utility power.

6 CRANE MALFUNCTION

In the event that the FIST Clean Room Hoist operates in an uncontrolled manner:

1) The Crane Operator should immediately attempt to shut down the system by use of the red "EMS" button on the radio control unit**. If this fails, immediately perform the next step.**

2) Shut off the power to the hoist system by means of the manual shutoff switch located on the east wall of End Station I, immediately outside the east door of the FIST Clean Room. The switch lever should be moved to its central (horizontal) position to shut off power.

3) Secure (with a padlock if possible) and tag the crane shutoff switch with a warning to not operate.

4) Call WPH Crane Services at (9)-1-800-480-0049 for emergency service. If necessary, Mike Killian may be called at the numbers listed below for assistance if difficulty is encountered in reaching Crane Services.

If the EMS function is used to shut down the FIST Clean Room Hoist, operation can be restored only by shutting power off to both the transmitter unit and to the crane system.

7 ACTIVATION OF THE FIST ALARM SYSTEM

The FIST alarm system consists of an alarm/communicator unit and an attached control panel. The alarm/communicator unit currently serves four "zones": zone 1 is triggered if the Leakage Gas Turbopump System fails *or is turned off*, zone 2 is triggered by a low liquid helium level or other dewar-related problem, and zone 3 is triggered if a power failure occurs. Zone 5 is triggered by an alarm condition (such as low liquid helium level) in the New Low Field Facility. If one of the zones is triggered, the control panel will sound an audible alarm and display which zone is triggered. Unless the alarm system is disarmed, it will communicate the alarm to the central office computer after a delay of approximately 30 sec. An operator at the central office will then attempt to contact the appropriate individuals at telephone numbers stored in the central office computer. The first number that will be called in all instances is the FIST Lab telephone (725-8632).

In the event of an activation of the FIST alarm system as indicated by either an audible alarm or a call from All-Guard Alarm Co:

1. Disarm the alarm system by entering the keystrokes "1,2,<ent>" on alarm control panel keyboard. If the alarm company has called, advise the operator that the situation is being addressed and indicate that the password is "swordfish", if asked.

2. Ascertain which zone has been triggered and ,if possible, whether the alarm is real or false. In the case of zone 2, the alarm may be set off by either a liquid level sensor via the Liquid Helium Level Sensor/Alarm Switch Box, or by the DAS computer. The DAS computer can trigger an alarm if any of a number of selected sensors is out of range. Contact Mike Taber or Dave Murray for assistance in dealing with any alarm condition associated with zones 1-3, and Bruce Clarke, Chris Gray, or Dave Hipkins for zone 5 (see numbers listed below). This is preferable to allowing the alarm company to process the alarm as your presence in the lab may facilitate a simpler and/or more timely response to the alarm condition.

3. Note that brief instructions and the telephone numbers for All-Guard Alarm Co. are posted next to the alarm control panel. If a problem is encountered in any aspect of the alarm system, contact Mike Taber or Dave Murray.

8 POSSIBLE AIR INCURSION INTO THE WELL

If there is a loss of purge pressure or flow, there is a possibility of accumulation of frozen air in the well. This circumstance does not necessarily constitute an emergency since immediate action may not be necessary or desirable. If such a situation occurs during probe insertion or removal, however, relatively prompt action is necessary because it is impractical to suspend operations for a lengthy period. In this case the following procedure is to be utilized:

1) If the event occurs during a probe removal, the purge or LHe transfer to the well is to be restored as quickly as possible. Removal of the probe should be completed according to procedure once the LHe level and airlock pressure have returned to normal.

2) If the event occurs during a probe insertion, it will undoubtedly be due to a massive failure of the piston seal or a failure of similar scope. Small failures will not be problematic due to the high helium flow rates during insertion. If a massive air lock seal failure does occur, an external transfer to the well should be initiated and a transition to the appropriate step in the probe removal procedure undertaken.

3) Once the probe removal procedure is completed (from either of the steps above), an assessment of the amount of solid air accumulation should be made as soon as practicable. Snow removal should then be undertaken if necessary.

9 O_2 MONITOR ALARM AND/OR SMD EMERGENCY VENT

The Science Mission Dewar (SMD) has a capacity in excess of 2300 liters of liquid helium and will typically contain approximately half that amount. In the event that the heat input to the SMD main tank becomes too high (due, for example, to a loss of vacuum in the vacuum shell), the pressure in the main tank may become high enough to rupture one of the main tank burst disks, causing a rapid discharge of cold helium vapor into the room. The rapid vaporization of this amount of liquid helium has two potential hazards: the oxygen concentration in the Lab may fall to an unsafe level (< 19.5%, where the normal concentration is 20.9%), and cryogenic burns (frostbite) due to cold gas impinging on personnel. An event of this sort will normally be quite evident to laboratory personnel because of the presence of a large plume of cold gas and fog due to condensation of atmospheric gases and moisture. If sufficient oxygen depletion occurs near the ceiling of the Lab, the O_2 Monitor Alarm in the Lab will also sound. It should be noted that rotatable 90° deflectors are installed on the SMD burst disk assemblies. These deflectors serve to prevent accidental damage to the delicate burst disks and to deflect the cold gas plume away from personnel work locations. It is the responsibility of the Cryogenic Test Engineer in charge to ensure that these deflectors are installed and oriented in a manner consistent with these objectives.

In the event of an emergency vent, all personnel are to evacuate the Lab in a calm and deliberate manner. If an emergency vent occurs during Probe insertion or removal operations, any personnel stationed on the top level of the airlock scaffolding are to evacuate using an emergency escape breathing apparatus that is provided on the scaffold. Reoccupation of the Lab may take place only when the Cryogenic Test Engineer in charge has determined that it is safe to do so.

10 FIST EMERGENCY TELEPHONE NUMBERS

For zones 1 - 3

Mike Taber	24 hr. pager number: (9)-599-8033 Office: 5-4136
Dave Murray	Home: (9)-961-3155 Pager: (9)-1-408-407-2216
Dave Frank	Office (at Stanford): 3-2155 Office (at Lockheed): (9)-354-5311 Home: (9)-1-408-244-9377

Chuck Warren (zone 1)	Office: 3-4796 Home: (9)-1-408-263-1036

For zone 5 (New Low Field Facility):

Bruce Clarke	Office: 5-5999 Home: (9)-1-510-487-6760
Chris Gray	Office: 5-8683, 3-7547 Home: (9)-654-6140 Page: (9)-598-8932
Dave Hipkins	Office: 5-6753, 3-4738 Home: (9)-359-9189
Yueming Xiao	Office: 3-3361 Home: (9)-967-9279
John Mester	Office: 3-4227 Home: (9)-326-5609
Sasha Buchman	Office: 5-4110 Home: (9)-857-9075

Contact for HEPL problems:

Michael Killian	Office: 3-0269 Home: (9)-1-510-634-5534 (access code: 1304997) Cell phone: (9)-519-9506 Page: (9)-858-9946