



**EXPERIMENTAL ROCKET PROPULSION SOCIETY**

**KISS-reflight  
PROJECT**

**Trials Documentation**

**SAFETY AND OPERATIONS PLAN**

**Launch Campaign 13-14 April 2002**

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## SECTION 1. INTRODUCTION

### 1.1 PURPOSE

The purpose of the ERPS Safety and Operations Plan is to prescribe the policies, procedures and basic responsibilities governing the storage, transport, preparation, launch and breakdown of the ERPS KISS-II Sounding Rocket **reflight**.

These procedures have been prepared for use only by authorised ERPS personnel during authorised ERPS trial activities and are not to be used for any other purpose.

### 1.2 SCOPE

The following procedures are intended for the preparation, loading, launch, recovery and breakdown of the small sounding rocket of the following designation only:

ERPS KISS-II Sounding Rocket, Mk 1 (Mod 0)

### 1.3 AUTHORITY

Users are to regard these Operating Procedures as an authoritative publication. They have been compiled from operating, technical, manufacturing and safety sources and represent the best level of information available at the time of publication.

### 1.4 AMENDMENT ACTION

To assist in maintaining the KISS-**reflight** Safety and Operations Plan in an up to date condition, users are to bring to the notice of the KISS-**reflight** Trial Manager (KTM), without delay, any errors, omissions or suggestions for improvement. Amendment of the KISS-II Safety and Operations Plan is not permitted without the approval of the KTM.

### 1.5 STRUCTURE

The KISS-II Safety and Operations Plan contains a complete set of operating procedures for the organisation and conduct of trials under the KISS-II Project. The operating procedures fall into two categories:-

**Standard Procedures**, which facilitate the organisation and conduct of trials. Although mandatory, they may be field modified as necessary or convenient; and

**Hazardous Procedures**, which ensure the safe operational conduct of trials. They are mandatory and must not be the subject of any field modification. The Hazardous Procedures are as follows:-

HAZ02	KISS-II Launcher & Vehicle Setup
HAZ03	KISS-II Launch Sequence
HAZ04	KISS-II Recovery & Rework

## 1.6 PRECAUTIONARY DATA SIGNS

Precautionary Data Signs used throughout these procedures are described as follows:

- a. **Warnings:** Warnings refer to procedures which, if not correctly followed, could result in injury to personnel or loss of life.
- b. **Cautions:** Cautions refer to procedures which, if not strictly observed, could result in damage to or destruction of equipment or computer software.
- c. **Notes:** Notes refer to procedures or conditions which are essential to highlight.

## SECTION 2. DESCRIPTION OF HAZARDOUS ITEMS

### 2.1 KISS-II PROPULSION MODULE

The KISS-II propulsion module is comprised of:

1. One 1270 N (285 lbf), hydrogen peroxide (85%) mono-propellant rocket motor utilising silver plated metal foam catalyst, with associated adapter plate and fitting, rated to 2 Mpa chamber pressure operation.
2. One pressurised aluminium propellant tank (10 L capacity) rated to 3.45 Mpa (500 psi) operation with associated valves, gages and fittings.
3. One fin unit

The characteristics of the KISS-II Propulsion Module are as follows:

Nomenclature	-	KISS-II Propulsion Module Mk 1 (mod 0)
Dry Mass	-	11.33 kg (25 lb) kg
Hydrogen Peroxide Mass	-	5.5 kg (4 L)
Fuelled Mass	-	16.83 kg (37.1 lb)
Hazard Division (HD)	-	5.1 (Fuelled)

### 2.2 KISS-II PARACHUTE DEPLOYMENT CHARGE

The KISS-II parachute deployment operation utilises dual black powder charges, each independently initiated by a single electric match. A quantity (5-6) of these charges will be available at the launch campaign. Characteristics of the deployment charge are as follows:

Nomenclature	-	KISS-II Deploy Charge Mk 1 (mod 0)
Charge Composition	-	Black Powder (4Fg)
Charge Mass	-	7 g
Hazard Division (HD)	-	4.1

### 2.3 KISS-II HYDROGEN PEROXIDE

The KISS-II sounding rocket is fuelled with 4 Liters (5.5 kg) of 85% Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>). The Hydrogen Peroxide is shipped to the launch site in isolation from the propulsion module in order to lower the safety concern. Characteristics of the deployment charge are as follows:

Nomenclature	- 85% Hydrogen Peroxide
Composition	- H <sub>2</sub> O <sub>2</sub>
Shipping Mass	- 12 L (17 kg)
Hazard Division (HD)	- 5.1
Packaging	- 20 L Poly-Ethylene Tank

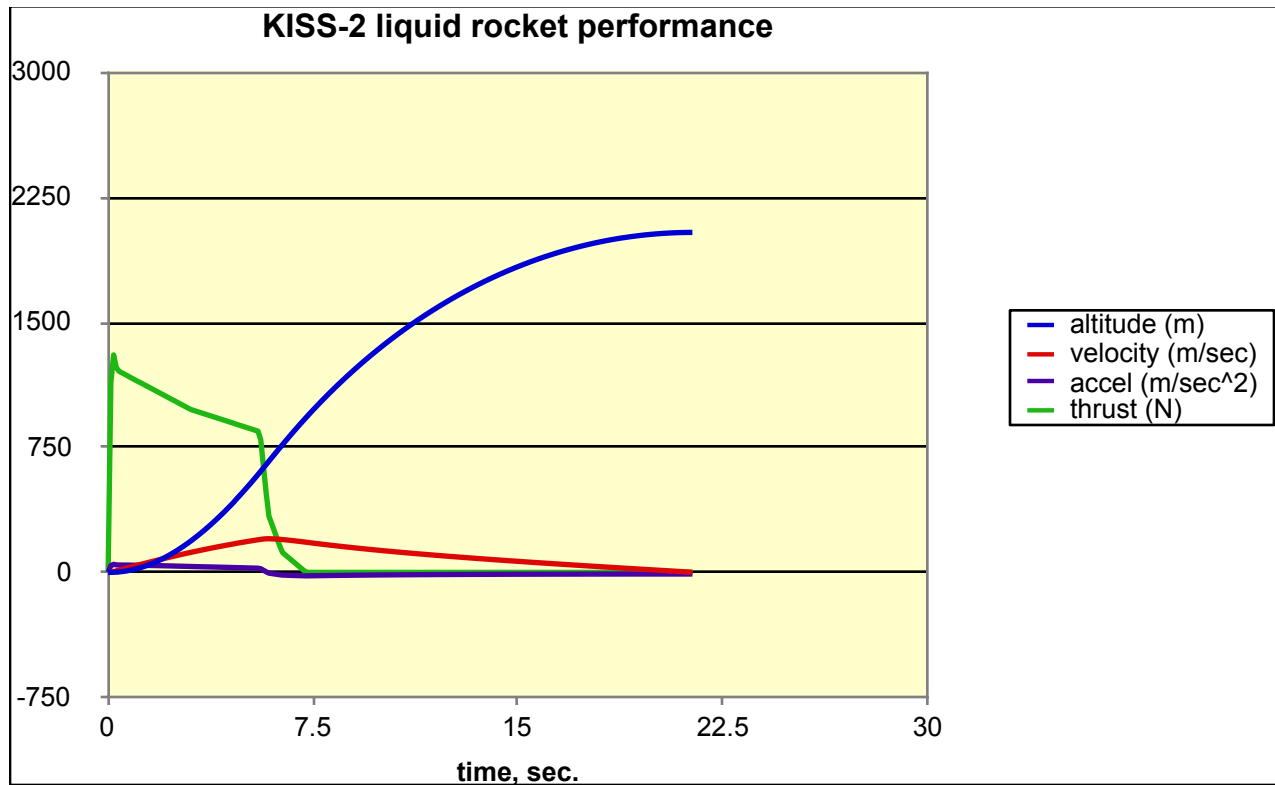
**NOTE: The Risk Analysis contained in the following section has been prepared on the basis of the above KISS-II Propulsion Module and KISS-II Recovery module. The risk analysis is NOT VALID for configurations outside of those parameters and the configuration must be the subject of specific analysis.**



## SECTION 3. FLIGHT PERFORMANCE

### 3.1 NOMINAL FLIGHT PERFORMANCE

The nominal flight performance of the KISS-II sounding rocket is as shown in the following graph:



### 3.2 SAFETY TEMPLATE

The following chart shows the nominal maximum range circle superimposed over a map of the MTA:

## SECTION 4. PRE-TRIAL MANAGEMENT

### 4.1 PLANNING

#### 4.1.1 Initial Scheduling

The starting point for organising any trial needs to be a meeting between the ERPS President or other authorised officer and the party principally responsible for organising the trials, which will usually be the KISS-II Trial Manager (KTM). In the ordinary course of events, this meeting should be no later than one (1) month prior to the proposed launch date.

A launch date should be determined having regard to the availability of personnel, the time taken for personnel to travel to and from the launch site and any other relevant factor. This will usually mean that the trials need to be conducted over a long weekend.

The following matters should be considered:-

- the date and time of launch
- whether there is any conflict with known range activities
- the number and type of launches
- the payloads to be flown
- tracking and recovery
- development of hardware
- funding of hardware and other costs
- personnel
- accommodation
- documentation
- insurance cover
- whether new safety traces will be needed
- responsibility for co-ordination of preparatory phases
- photographic and other recording
- public attendance
- media attendance and management

## 4.2 NOTIFICATION

A reasonable time before the proposed trials the KTM must notify and obtain approval from the launch site authority, local safety authorities, and the FAA.

## 4.3 PERSONNEL

The personnel to fulfill each of the key trial positions should be contacted and their availability confirmed. This Safety and Operations Plan (SOP) should be forwarded to them before the proposed trial so that they have time to familiarise themselves with the same.

## 4.4 ACCOMMODATION

Accommodation should be booked as early as possible to avoid inconvenience. Accommodation is available at: a number of Mojave Motels. The following motel is recommended:

- Whites Motel Ph +1-661-824-2421  
16100 Sierra Highway  
Mojave

(room prices around \$35 USD / night)

If sufficient accommodation is not able to be secured for trials personnel, the KISS-II Project Logistics Officer (PLO) should arrange alternatives.

## 4.5 TRIAL LOGISTICS

The PLO is to ensure that the logistics aspects of the KISS-II Trial are met in a satisfactory and convenient manner. These aspects include:-

- Transport
- All Flight and Ground Hardware
- Tools
- Food, Drink
- Hygiene services

## 4.6 TRIAL SCHEDULE

The KISS-II Trial Schedule is as follows:

Time	Activity
<b>Friday 12<sup>th</sup> April 2002</b>	
1430	Meet at CDIT – Load all gear
1500	Depart CDIT for Mojave
2200	Arrive at Mojave – Check into White’s Motel
	A separate group will travel to the Rocket Ranch to pick up the peroxide and fuelling gear
<b>Saturday 13<sup>th</sup> April 2002</b>	
0900	Breakfast
1000	Depart Mojave for MTA site
1100	Arrive at MTA site – Team 1 to unload and setup all KISS-II ground & flight gear – Team 2 to prep KISS-Beta
1230	Lunch
1330	Conduct KISS-II dummy launch sequence test
1430	Enter Launch Sequence for KISS-Beta
<b>1500</b>	<b>Launch KISS-Beta (following established HPR processes)</b>
1530	Recover KISS-Beta and refurbish KISS-II Recovery Module
1630	Prep KISS-II for early Sunday morning flight
1700	Secure all equipment for night.
1730	Drive back to Mojave
1830	Dinner
<b>Sunday 14<sup>th</sup> April 2002</b>	
0600	Breakfast
0630	Depart Mojave for MTA site
0710	Arrive at MTA site – Unload and setup all ground & flight gear
0800	Enter Launch Sequence for KISS-II (Launch #1)
<b>0830</b>	<b>Launch KISS-II</b>
0900	Recover and field prep recovery module for second flight on KISS-II

1030	Enter Launch Sequence for KISS-II (Launch #2)
<b>1100</b>	<b>Launch KISS-II</b>
1130	Recover
1200	Lunch
1300	Pack up all gear
1430	Depart for SF Bay Area

#### 4.7 GENERAL TRIAL MANAGEMENT - ARTICLES IN USE

The KTM is to ensure that the following are acquired/prepared and available for the trials:-

- 2 Copies of the KISS-II SOP
- binoculars;
- protractor, rulers and maps for calculation of impact points;
- video and still cameras;
- compasses for observers.
- marking out paint (pink, yellow)
- hardhats, overalls, safety gear
- black permanent ink marker
- GPS

#### 4.8 GENERAL PRE-TRIAL CHECKLIST FOR KTM

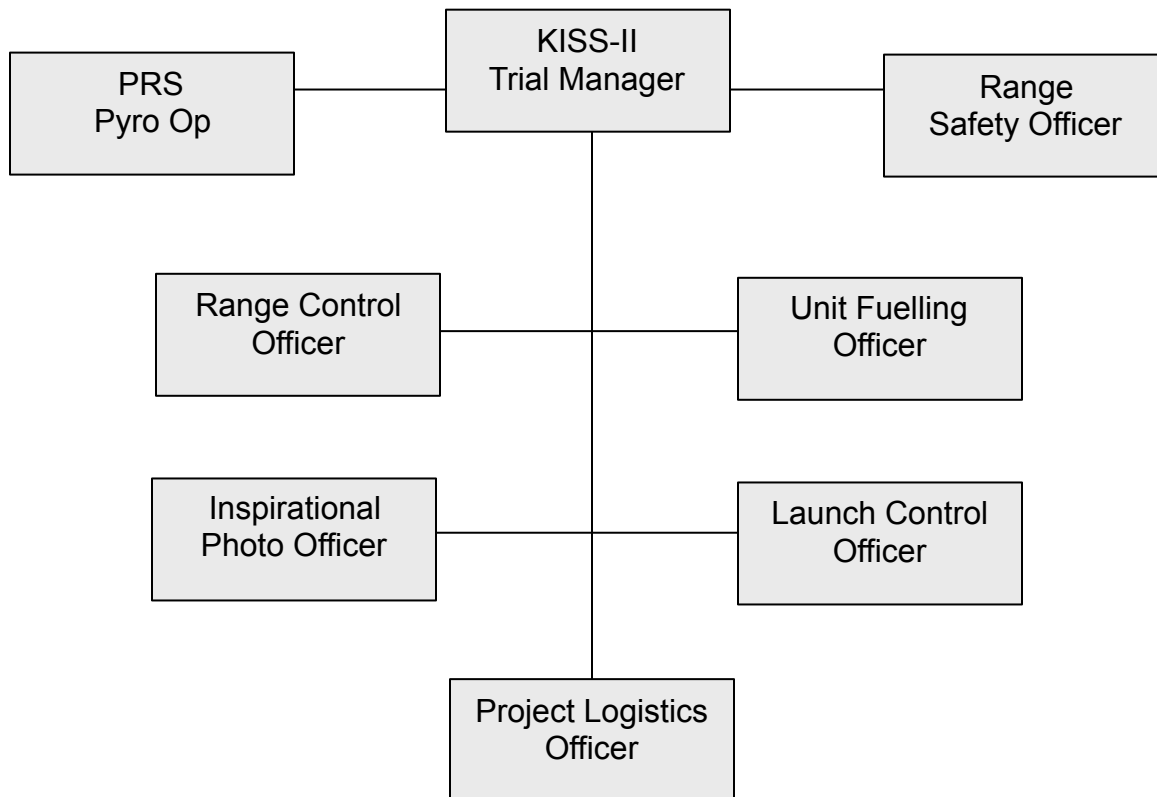
- is there going to be any interference to other range users?
- are there any outstanding issues with locals
- has the SOP been distributed to all relevant parties?
- has accommodation been organised?
- is there adequate provision for public control?
- are media arrangements in place?
- are arrangements for photographic/video recording in place?
- are arrangements for tracking in place?

- is all hardware complete?
- are sufficient propellant & gases available
- Is there adequate documentation of the flight apparatus?
- has the Pyrotechnics Operator put an FAA NOTAM in place?
- has a pre-trial briefing been conducted?
- do personnel understand their responsibilities?

## SECTION 5. FIELD LOGISTICS

### 5.1 CHAIN OF COMMAND

The chain of command during the KISS-II launch campaign is as follows:



### 5.2 PERSONNEL AND RESPONSIBILITIES

Personnel involved in core trial operations are as follows:

#	Position	Person
1	KISS-II Trial Manager (KTM)	Mark Blair
2	Range Safety Officer (RSO)	Dave Masten
3	PRS Pyro Op (PPO)	Mark Holthaus
4	Range Control Officer (RCO)	Randall Clague



5	Unit Fuelling Officer (UFO)	Dan Solvin
6	Launch Control Officer (LCO)	Dave Weinschenker
7	Inspirational Photography Officer (IPO)	Michael Wallis
8	Project Logistics Officer (PLO)	Pierce Nichols

### 5.3 STORAGE OF HYDROGEN PEROXIDE

The requirements and procedures for the transport and storage of hydrogen peroxide for the KISS-II launch campaign are provided in 'Section 8: HAZ 1 – Transport and Storage of Hydrogen Peroxide' of this document.

### 5.4 OBSERVATION AREA

An observation area is available at the MTA for visitors and other non-essential personnel. An assigned ERPS representative will be responsible for the control of all visitors and other non-essential personnel in accordance with the requirements of the Range Safety Officer (RSO) and KISS-II Trial Manager (KTM).

### 5.5 AREA CONTROL

Area control is the responsibility of the PRS Pyrotechnics Operator (PPO) and may be delegated by the PPO to other personnel. This involves ensuring that all roadways and airspace are clear, and all personnel are safe during hazardous operations.

### 5.6 VEHICLE STANDING AND PARKING

During hazardous operations, all vehicles are to be located behind the MTA observation area. During non-hazardous operations, essential vehicles may approach the launch area with KTM approval.

### 5.7 KISS-II LAUNCHER

A custom portable fixed azimuth launcher has been constructed and will be installed at the Mojave Test Area (MTA). The launcher elevation is adjustable from 60-90 degrees.

## 5.8 FIRST AID

A serviceable First Aid Kit shall be available in a prominent position during program activities. ERPS personnel shall familiarize themselves with the location of this equipment.

## 5.9 FOOD AND DRINK

There are no food or drink outlets at the Mojave Test Area (MTA). Food and drink for the assigned trials personnel will be the responsibility of the Project Logistics Officer (PLO). All other visitors will be responsible for their own food and drink.

## 5.10 STILL AND MOTION PHOTOGRAPHY

For most close-up applications the rockets will be out of shot (20 metres) within 1.2 seconds. Accordingly, very high shutter speeds and a high rate of frames per second is required for full recording.

For video cameras, the shutter speeds of 1/2000th of a second available on most camcorders will produce reasonable results for general viewing. Video cameras take 25 frames per second, so 30 frames may be expected from a usual close up.

## 5.11 STOP CALLS

A STOP Call may be called by any trials personnel at any time after clearance has been given by the KTM to commence the Launch Sequence. This call should only be given for the following reasons:

- **Overflying Aircraft**
- **Vehicle or personnel observed in the launch or impact area or**
- **Any other matter that may affect the safe conduct of the launch**

## 5.12 WEATHER REPORT

The Range Safety Officer (RSO) is to ensure that a reliable weather report and any other necessary information relating to atmospheric conditions is obtained prior to entering the final launch sequence.

## SECTION 6. STANDING ORDERS

### 6.1 SMOKING

Smoking is not permitted within 50 meters of the launcher, or any vehicle transporting hydrogen peroxide, or in the blockhouse.

### 6.2 FIRE PROTECTION

A serviceable fire extinguisher shall be located in the cabin of the vehicle transporting hydrogen peroxide and in the blockhouse during program activities. ERPS personnel shall familiarise themselves with the location of this equipment.

### 6.3 PROHIBITED AND RESTRICTED ARTICLES

Explosives, tools, appliances and materials other than the 'Articles in Use' listed in Hazardous Procedures 1 to 3 shall not be used. In particular, the following items shall not be permitted on the launcher apron during hazardous operations:

- a. Oil or gas filled lighting, heating or burning appliances and all flame, spark or fire producing appliances.
- b. Matches and other portable means of producing spark or flame.
- c. Cigarettes, tobacco in any form, and any article used for the purpose of smoking or carrying tobacco.
- d. Beers, wines and other alcoholic beverages.
- e. Petrol, Oils, Lubricants or Solvents not contained in the fuel tank of a vehicle or in a sealed container.
- f. Firearms.
- g. Drugs or medicines other than those contained in First Aid Kits.
- h. Food and drink.
- i. Battery or mains operated equipment excepting those used to achieve the objectives detailed in the trials specification.

### 6.4 ELECTRICAL STORMS

If a warning system is not available to determine the approach of an electrical storm, hazardous procedures shall cease and the launcher apron shall be vacated upon hearing thunder or observing weather conditions which have the potential of producing electrical storms

## 6.5 TRANSPORT OF HYDROGEN PEROXIDE

Hydrogen Peroxide shall be transported in accordance with Hazardous Procedure 1 (Section 8).

## 6.6 LAUNCH SEQUENCE

The Launch Sequence is detailed in Hazardous Procedure 2 (Section 9).

## 6.7 RECOVERY

Recovery procedures are detailed in Hazardous Procedure 3 (Section 10).

## 6.8 CONDUCT OF PERSONNEL

Safety is at all times the paramount concern. Please read and adhere to the Health and Safety guidelines below. It is also important that ERPS presents itself in a professional manner. Please:

***Speak Clearly***

***Be Courteous and Professional***

***Do not engage in unnecessary or informal banter during procedures***

***Remain calm and professional at all times***

## 6.9 MEDIA MANAGEMENT

### 6.9.1 Generally

It is important to future ERPS initiatives for the media to be presented with material and commentary that is consistent with ERPS's objectives and policy. The ERPS Public Relations Officer (PRO) will be responsible for this.

Accordingly, other **personnel should not give media interviews** without prior clearance from the ERPS PRO. This can be difficult, as the media can be very persistent. If circumstances do not allow clearance by the ERPS PRO, personnel should:-

- only comment about the things they personally know about such as the performance of their particular tasks, how that went, how they feel about it etc; and
- insofar as they are asked about ERPS's agenda, future plans, aspirations etc, simply say "you will have to speak to the ERPS PRO about that".

### 6.9.2 In the event of an Accident, Incident or Mishap

In the event of an accident, incident or mishap, personnel are not to make any comment to the media or public under any circumstances. This is because there will be an investigation. Any public or media **questions are to be met with the response “no comment”**.

The ERPS PRO may release a statement after the situation has been considered and/or an investigation completed.

## 6.10 HEALTH AND SAFETY

The activities of ERPS are intrinsically hazardous. For this reason safety is always the paramount concern and the responsibility of **everyone** concerned. If something cannot be done safely then it should not be done at all. All persons undertaking or accepting any tasks shall responsibly and conscientiously perform the task in accordance with the following principles:-

### 6.10.1 Personal Obligations

Each person involved is to, so far as is reasonably practicable:-

- Protect their own health and safety
- Avoid adversely affecting the health and safety of others
- Use equipment and follow instructions and procedures for health and safety
- Adhere to health and safety policy
- Ensure that alcohol/drug consumption or lack of adequate rest does not affect health and safety.

Performance of tasks is on a voluntary basis and is at all times at the option of the voluntary agent. However, as the safety and efforts of others may depend on the faithful performance of tasks voluntarily undertaken:-

- a person must not volunteer to undertake the performance of any task for and on behalf of ERPS unless he or she intends to properly complete and has a reasonable expectation of being able to properly complete that task;
- If a person does voluntarily undertake a task, he or she must not abandon or decline to perform that task without providing others that may be affected with a reasonable period of notice, especially where the safety of others may otherwise be jeopardized; and
- The period of notice that is reasonable will depend on the circumstances including safety considerations, the replaceability of the voluntary agent and the likely prejudice to the activity that the task is relevant to.

Any fact, circumstance, matter or thing that might adversely affect the safety of others involved in ERPS activities shall be promptly brought to the attention of those potentially affected.

If a procedure relevant to the task in question exists, then any performance of that task shall be in accordance with that procedure. If no such procedure exists, then any performance of that task may be in such manner as the voluntary agent considers appropriate but must be:-

- in a responsible, conscientious and safety conscious manner; and
- with an appropriate level of liaison with others that may be affected by the manner of performance or non performance of that task.

Individuals who perform tasks for and on behalf of ERPS do so as voluntary agents only and are not in any sense employed by ERPS. This means that individuals are not covered by any workers compensation scheme or insurance for any injury or accident in the course of the performance of tasks and should ensure that they have such accident and/or disability insurance as they may consider appropriate.

### **6.10.2 Accidents**

In the event of an accident, being an occurrence giving rise to significant injury:-

- All medical and other needs shall be provided as a priority;
- The activity shall cease until sufficient medical and other needs have been provided and the cause of the accident has been identified and adequate changes made to procedures;
- Notice of the accident shall be given to all relevant insurers and other parties concerned;

- The circumstances and causes of the accident shall be investigated and all necessary support and liaison obtained for that purpose;
- A report as to the causes and other relevant circumstances shall be produced and circulated to all parties concerned;
- Any necessary changes to procedures shall be made; and
- A record shall be kept of the above.

### **6.10.3 Incidents**

In the event of an incident, being an occurrence potentially but not actually giving rise to serious injury:-

- The activity shall cease until the cause of the incident has been identified and adequate changes made to procedures;
- The circumstances and causes of the incident shall be investigated and all necessary support and liaison obtained for that purpose;
- If considered necessary, a report as to the causes and other relevant circumstances may be produced and circulated to all parties concerned;
- Any necessary changes to procedures shall be made; and
- A record shall be kept of the above.

### **6.14.4 Mishaps**

In the event of a mishap, being an occurrence giving rise to trivial injury:-

- Any medical and other needs shall be provided as a priority;
- If considered necessary, the circumstances and causes of the mishap shall be investigated and all necessary support and liaison obtained for that purpose;
- If considered necessary, a report as to the causes and other relevant circumstances may be produced and circulated to all parties concerned;
- Any necessary changes to procedures shall be made; and

- A record shall be kept of the above.



## SECTION 7. PRE-TRIAL BRIEFINGS

### 7.1 EMERGENCY SERVICES

The emergency services applicable to the Mojave Test Area are as follows:

- Fire Brigade                      Fire Chief (Mr. Rick Aday)  
  Ph: 661 824 5240  
  Fax: 661 824 2914
- Ambulance                      ph 911
- Police                              ph 911

### 7.2 ERPS PERSONNEL

#### 7.2.1 Timing

Before any trial is actually commenced, the KTM is to conduct a short briefing of all trials personnel involved. This should be done before public or media attendance the day or evening before trials but in any event no later than the securing of the MTA for hazardous operations.

#### 7.2.2 Weather Check

The Weather Service can be contacted on **XXX**. The RSO is to confirm that the forecast weather meets the prescribed criteria namely that:-

- **mean surface winds are not expected to exceed 10 m/s (ie about 20 knots) at the time of launch**
- **There is no forecast local thunderstorm activity or the passage of active weather fronts when surface winds might be expected to gust to more than 15 m/s (ie about 30 knots).**

#### 7.2.3 Content

The following issues should be canvassed at the briefing:-

- formal introduction of personnel
- general trial content
- the documentation and how to use it
- schedule and variations

- location of personnel and their responsibilities
- emergency procedures including STOP calls
- health and safety (don't be shy about raising any concern)
- adequacy of equipment and provisions
- weather
- procedure and variations
- tracking and recovery
- public and media management
- any other outstanding issues
- questions

## SECTION 8. ☠ HAZ 1 : TRANSPORT AND STORAGE OF HYDROGEN PEROXIDE

**WARNING**

**THIS IS A HAZARDOUS PROCEDURE  
FOR AUTHORISED PERSONNEL ONLY**

### 8.1 INTRODUCTION

This hazardous procedure outlines the requirements for the safe transport and storage of 85% hydrogen peroxide throughout the KISS-II launch campaign at the MTA in California.

### 8.2 GENERAL SAFETY REQUIREMENTS

The general safety requirements detailed in ERPS Safety and Operations Plan – Field Standing Orders are to be observed during the performance of this procedure.

### 8.3 PERSONNEL REQUIREMENT

The KTM, RSO and UFO are required to complete this procedure.

## 4. PERSONNEL LOCATION

The personnel involved in this procedure will be located at the Rocket Ranch, in road transit from the Rocket Ranch to Mojave to MTA, and at the MTA.

## 5. ARTICLES IN USE

The following tools, appliances and materials are required to complete this procedure:

### a. Transporting Equipment

- (1) 5 Gallon Poly Ethylene transport container,
- (2) 4 x tie-down straps, and
- (3) 2 x HD '5.1 Oxidizer' vehicle hazard diamonds.

### b. Tools

- (1) 1 Pair of Straight Bladed General Purpose Snips.

**c. Personal Protective Equipment**

- (1) gloves,
- (2) safety spectacles,
- (3) safety footwear,
- (4) protective clothing.
- (5)

**WARNING**

**PROTECTIVE CLOTHING (COVERALLS), SAFETY FOOTWEAR AND GLOVES ARE TO BE WORN WHILST THIS PROCEDURE IS BEING PERFORMED.**

**WARNING**

**HYDROGEN PEROXIDE CAUSES SEVERE SKIN BURNS. PROTECTIVE CLOTHING (COVERALLS), GLOVES AND EYE PROTECTION ARE TO BE WORN BY PERSONNEL INVOLVED IN FUELLING OPERATIONS.**

**8.6 PROCEDURE**

Item	Description	Check
1		
2		
3		
4		

**SECTION 9. ☠ HAZ 2 : LAUNCHER & VEHICLE SETUP****WARNING**

**THIS IS A HAZARDOUS PROCEDURE  
FOR AUTHORISED PERSONNEL ONLY**

**9.1 INTRODUCTION**

This hazardous procedure outlines the requirements for the safe assembly and integration of the KISS-II launcher and KISS-II sounding rocket.

**9.2 GENERAL SAFETY REQUIREMENTS**

The general safety requirements detailed in ERPS Safety and Operations Plan – Field Standing Orders are to be observed during the performance of this procedure.

**9.3 PERSONNEL REQUIREMENT**

The personnel required to complete this procedure are KTM, RSO, LCO, UFO, IPO plus 2 assistants.

**4. PERSONNEL LOCATION**

The personnel involved in this procedure will be located at the Launcher area and Blockhouse.

**5. ARTICLES IN USE**

The following tools, appliances and materials are required to complete this procedure:

**a. Equipment**

- (1) 1 x Equipment transport vehicle (SUV or larger),
- (2) tie-down straps
- (3) KISS-II Launcher
- (4) KISS-II sounding rocket
- (5) 2 x nitrogen bottles
- (6) pressurant hose

- (7) actuator gas hose
- b. **Tools**
- (1) KISS-II general purpose tool kit
- c. **Personal Protective Equipment**
- (1) gloves,
- (2) safety spectacles,
- (6) safety footwear,
- (7) protective clothing.

**WARNING**

**PROTECTIVE CLOTHING (COVERALLS), SAFETY FOOTWEAR AND GLOVES ARE TO BE WORN DURING HAZARDOUS PARTS OF THIS PROCEDURE.**

**9.6 PROCEDURE**

Item	Description	Check
<b>Launcher Assembly</b>		
1	Check all launcher components: <ul style="list-style-type: none"> <li>• 1 Bottom tower frame</li> <li>• 1 Mid tower frame</li> <li>• 1 Top tower frame</li> <li>• 4 Guide Rail sections</li> <li>• 3 Guide Rail connectors</li> <li>• 4 Guy Cables</li> <li>• 4 Steel Stakes w/Cable loop</li> <li>• 4 Steel Stakes w/washer and cotter pin</li> <li>• 2 Bolt and washer ass'y for tower angle setting</li> <li>• Various bolts, washers, nuts for assembly.</li> </ul>	
2	Lay out the three tower sections on the ground with rail attachments up.	

3	Assemble tower sections, insure all nuts/bolts are tight	
4	Loosen rail attachment bolts allowing ~1" free movement	
5	Slide guide rails on to rail attachment nuts. Tighten attachment bolts to rail.	
6	Sight down the rail looking for bowing. Adjust and tighten attachment bolts until rail is straight.	
7	Verify pad/exhaust deflector attachment.	
8	Mount actuators and solenoids.	
9	Attach solenoid/actuator pressure lines.	
10	Mount pressurant line slip fitting.	
11	Mount gauge camera support beam	
12	Mount guy wire standoff bracket to top of tower	
<b>KISS-II Sounding Rocket Assembly</b>		
1	Unpack propulsion module and inspect all fittings and components for correct alignment.	
2	Unpack recovery module and inspect for damage	
3	Fill ejection charge assemblies with powder.	
4	Connect ejection charge leads to terminal block on forward recovery bulkhead and tape charge assemblies to forward anchor cables.	
5	Ensure O-ring is correctly positioned on bulkhead, and fasten bulkhead to studs in forward airframe with nuts and washers.	
6	Plug ejection circuit leads from nosecone assembly into connectors on forward recovery bulkhead. Attach nosecone to forward airframe with screws and washers.	
7	Switch on recovery electronics, verify "ready" status, switch off.	
8	Remove shipping cover from aft end of forward airframe tube.	
9	Clip carabiner on recovery harness to anchor cables of propulsion module and secure carabiner gate with strip of aluminum tape.	

10	Align pressurant tube slot and pressure transducer umbilical window of forward airframe tube with corresponding components of aft assembly, and slide forward airframe onto coupler section of propulsion module.	
<b>Launcher load process</b>		
1	Slide assembled vehicle onto rail from exit end.	
2	Line up pressurant line to pressurant slip fitting.	
3	Adjust actators and valves for proper mating.	
4	Slide vehicle into launch position.	
5	Insure vehicle is in proper position, actuators and valves lined up, pressurant line properly seated in slip fitting.	
<b>Tower Erection process</b>		
1	Loop the ends of the four guy cables to the top of the tower standoff bracket.	
2	Lift and hold tower in vertical position. (requires two (2) team members)	
3	With turn-buckles adjusted to halfway, extend cables to stake location.	
4	Hammer in stakes at 20-30 degrees from vertical and away from tower.	
5	Attach cables to stake.	
6	Insure cables will not interfere with vehicle launch.	
7	Move tower base as appropriate until the tower is vertical side to side and at the appropriate angle front to back.	
8	Adjust set bolts at base	
9	Stake down base.	
10	Tighten guy wires as appropriate.	
11	LCO Connect valve control cable to switch-box, pressure transducer umbilical to amplifier, and amplifier to display box	
12	LCO Power up pressure transducer amplifier and display boxes and confirm tank pressure reading (0 psi).	
13	LCO Connect batteries to switch-box.	



14	LCO Power up switch-box and test solenoid operation.	
15	RSO Connect pressurant line to pressurant gas bottle	
16	RSO Connect solenoid valve inlet line to actuator gas supply bottle	
17	LCO Power down switch-box.	
<b>Proceed to Section 10: Securing Launch Area</b>		

## **SECTION 10. SECURING THE LAUNCHER AREA**

### **10.1 INTRODUCTION**

The general requirements for the securing the launcher area before entering the final launch sequence for the KISS-II Sounding Rocket are contained in this section.

### **10.2 GENERAL SAFETY REQUIREMENTS**

The general safety requirements detailed in this KISS-II Safety and Operations Plan Section 1 - Standard Operating Procedures are to be observed during the performance of this procedure.

### **10.3 BRIEFING OF PERSONNEL**

The KTM is to ensure that all personnel are adequately briefed as to their duties, responsibilities and any other relevant information before the commencement of hazardous operations.

### **10.4 GENERAL INSPECTION OF LAUNCHER AREA**

The RSO is to complete a general assessment of the launcher area, surrounds, weather conditions and any other matter considered to be relevant before hazardous operations are commenced.

### **10.5 CLEARANCE OF LAUNCHER AREA**

At the commencement of hazardous operations:-

- Only the RSO and UFO may remain at the launcher. They are to cross check each other for compliance with Field Standing Orders whilst area security is established.
- The KTM, PPO, RCO, and LCO are to retire to the blockhouse. All other personnel are to retire to the observation point.
- KTM and PPO are to establish area security by checking the road, airspace and hazardous operations area.
- The ERPS PRO is to establish observation area security by accounting for all non trials personnel against the attendance listing and report to the KTM.

### 10.6 CONFIRMATION OF LAUNCHER ANGLE

The RSO is to confirm that the Launcher is set at the specified angle.

### 10.7 WEATHER CHECK

The RSO is to confirm that:

- mean surface winds are not expected to exceed 10 m/s (ie about 20 knots at the time of launch)
- There is no forecast local thunderstorm activity or the passage of active weather fronts when surface winds might be expected to gust to more than 15 m/s (ie about 30 knots).

**Proceed to Section 11: HAZ 3 – KISS-II Launch Sequence**

## SECTION 11. ☠️ HAZ 3 : KISS-II LAUNCH SEQUENCE

**WARNING**

**THIS IS A HAZARDOUS PROCEDURE  
FOR AUTHORISED PERSONNEL ONLY**

### 11.1 LOCATION

All personnel associated with this procedure are located at either the MTA blockhouse or MTA launcher apron.

### 11.2 GENERAL SAFETY REQUIREMENTS

The general safety requirements detailed in the KISS-II Safety and Operations Plan – Field Standing Orders are to be observed during the performance of this procedure. LA9 Personnel should have conducted a cross-check of themselves to ensure compliance.

### 11.3 PERSONNEL REQUIREMENT

This hazardous procedure involves the KTM, PPO, RSO, RCO, UFO, LCO, and IPO.

## 4. PERSONNEL LOCATION

The personnel involved in this procedure will be located in the Launcher area and Blockhouse.

## 5. ARTICLES IN USE

The following tools, appliances and materials are required to complete this procedure:

- Standard wall HDPE 5 gallon transfer bottle
- Heavy wall HDPE 5 gallon vacuum storage bottle / closed cap
- Graduated cylinder, 1000 ml
- DI water, sufficient quantity for required dilution
- Thermocouple gauge, and thermocouple
- Yellow safety suit / gloves / goggles / rubber boots
- Water in the form of fire hose, or water extinguishers (4 gallons min.)
- Custom PE transfer cap with 3 way valve and PE tubing

Vacuum pump - water aspirator 120VAC  
 Water for vacuum pump, approx. 2.5 gallons  
 Honda EU2000i Generator 120VAC w/ fuel  
 Standard Tool Kit

**WARNING**

**HYDROGEN PEROXIDE CAUSES SEVERE SKIN BURNS. PROTECTIVE CLOTHING (COVERALLS), GLOVES AND EYE PROTECTION ARE TO BE WORN BY PERSONNEL INVOLVED IN FUELLING OPERATIONS.**

### 11.6 PROCEDURE

The Launch Sequence Procedure is as shown below. This procedure assumes the following:

- the launcher has been assembled and secured
- the KISS-II sounding rocket has been fully assembled
- the KISS-II sounding rocket is installed on the launcher

Item #	Description	Check
<b>1</b>	<b>Pre-Sequence Checks</b>	
	RCO Check Trial Personnel: KTM, PPO, RSO, RCO, UFO, LCO, IPO	
	KTM Check Equipment: Launcher, KISS-II sounding rocket, Fire Extinguisher	
	KTM Check Consumables: 85% HTP, Nitrogen, Water	
	RSO Check launch apron clear of organic debris	
	KISS-II Pre-Trial Brief (KTM, RSO, PPO)	
	RCO Verify radio equipment operation: Pad <> blockhouse <> observation area	
	UFO Verify that transfer bottle vacuum pump runs	

	KTM Check KISS-II-Launcher installation	
	KTM Check fire & fill/drain valve actuator alignments	
	LCO, RSO Check pressure transducer amplifier is secured to the launcher, powered on, and umbilical secured to rocket and launcher with retraction bungy	
	LCO Check timer breakwire timer start setup for correct installation	
	RSO Check pressurisation slip fitting	
	LCO Check fire control cable from launcher to blockhouse	
	LCO Check pressure transducer cable (coax) from launcher to blockhouse, and pressure display box powered ON in blockhouse	
	RSO Check pressurant line from launcher to blockhouse	
	LCO Ensure pressurant bottle is in blockhouse and valve is SHUT	
	LCO Ensure pressurant bottle regulator set screw is backed out all the way	
	LCO Ensure control cable connected to switch box	
	Remove all vehicles to parking area	
	Emergency vehicle(s) in place	
	Move viewers to observation area	
	Trial personnel move to blockhouse, RSO, UFO to launcher	
	KTM, PPO Road security check	
	KTM, PPO Launch apron security check	
<b>2</b>	<b>RSO Turn ON valve actuator pressure system</b>	
	RSO Ensure actuator gas bottle regulator set screw is backed out all the way	
	RSO Actuator gas bottle valve to OPEN	

	RSO SLOWLY adjust actuator gas regulator pressure to 120 psi	
<b>3</b>	<b>LCO and RSO Test Firing Circuits</b>	
	LCO FIRE VALVE ARM switch to OFF	
	LCO MAIN POWER switch to ON	
	LCO Verify drain valve control circuit “armed” LED is on and yellow	
	LCO Verify drain valve control circuit “continuity” LED is on and green	
	LCO DRAIN switch to OPEN	
	RSO to confirm drain valve open,	
	LCO Release DRAIN switch	
	RSO to close drain valve with special tool	
	LCO FIRE VALVE ARM switch to ON	
	LCO Verify fire valve control circuit “armed” LED is on and yellow	
	LCO Verify fire valve control circuit “continuity” LED is on and green	
	LCO FIRE switch to OPEN	
	RSO to confirm fire valve opened	
	LCO Release FIRE switch	
	RSO to confirm fire valve closed	
	LCO FIRE VALVE ARM switch to OFF	
	LCO MAIN POWER switch to OFF	
<b>4</b>	<b>RSO and LCO Turn OFF valve actuator pressure system</b>	
	RSO to check actuator gas bottle pressure. If actuator gas bottle pressure is below 250 psi, change actuator gas bottle	

	RSO Actuator gas bottle valve to SHUT – Leave regulator set screw at 120 psi setting	
	RSO to blockhouse	
	LCO to give switch box ARM key to RSO	
	LCO Check pressurant bottle pressure. If pressurant bottle pressure is below 1200 psi, change pressurant bottle	
	LCO Pressurant bottle valve to SHUT	
<b>KTM GO/NO GO for peroxide fill</b>		
<b>5</b>	<b>RSO and UFO Fuel KISS-II Tank with 4 Liters of 85% Peroxide</b>	
	UFO into HazMat suit	
	RSO into turnouts	
	UFO & RSO to Launcher	
	RSO to visually verify KISS-II vehicle integrity	
	RSO standing by with water extinguisher	
	UFO With lid tightly on storage bottle, gently shake storage bottle to homogenize	
	UFO Wait 3 minutes for bubbles to dissipate	
	UFO Transfer 4 Liters of HTP in 1 liter increments with graduated cylinder to the transfer bottle	
	UFO On one of the partial transfers, check temp. with T.C. gauge	
	UFO Put cap back onto storage bottle	
	UFO Put 'transfer cap' onto transfer bottle (the one with a 2 way valve, a vacuum connection, a fill connection, and a transfer bottle connection)	
	UFO Bring transfer bottle near the vehicle, along with vacuum pump and generator	



	UFO Attach appropriate fittings from the 'transfer cap' to the vacuum pump, and the fill/dump tube of the vehicle	
	UFO Verify that the 2-way valve setting connects the vacuum pump to the vehicle's tank.	
	UFO Visually make sure fill/dump valve is open	
	UFO Verify special 'tool' for manually closing fill/dump valve is positioned	
	UFO Start generator	
	UFO Start vacuum pump	
	UFO Wait 3 minutes for vacuum to form within the vehicle's tank	
	RSO and LCO to monitor tank pressure reading continually for any pressure increase. If any increase from zero is seen, RSO is to order that the launcher area is cleared immediately and the situation is reviewed prior to any further action.	
	UFO Turn 2-way valve so that it connects the transfer bottle to the vehicle's tank – turn vacuum pump and generator OFF	
	UFO When the HTP is transferred into tank, manually, and immediately, close fill/drain valve with special tool, and remove special tool	
	UFO Remove fittings from vacuum pump and vehicle	
	UFO Remove transfer bottle, storage bottle vacuum pump, and generator to safe area.	
	UFO Remove aluminum foil from engine	
<b>6</b>	<b>RSO Turn ON valve actuator pressure system</b>	
	RSO Actuator gas bottle valve to OPEN	
	RSO Check actuator gas bottle regulator at 120 psi	
<b>7</b>	<b>LCO Prepare Firing Circuits</b>	

	LCO FIRE VALVE ARM switch to OFF	
	LCO MAIN POWER switch to ON	
	LCO Pressure transducer display box power to ON	
	LCO Verify drain valve control circuit “armed” LED is on and yellow	
	LCO Verify drain valve control circuit “continuity” LED is on and green	
	LCO to launcher area, activate recovery electronics	
	RSO, UFO, LCO return to blockhouse	
	<b>KTM GO/NO GO for pressurize</b>	
<b>8</b>	<b>LCO and RSO to Pressurise Tank</b>	
	LCO Pressurant bottle valve to OPEN	
	RSO Visually verify flight tank integrity	
	RSO Visually verify plumbing integrity - check for leaks	
	RSO & UFO return to blockhouse	
	LCO Pressurize flight tank	
	LCO Adjust pressurant bottle regulator set screw to 600 psi – allow time for pressure to stabilize (>580 psi OK)	
	Pressurant bottle valve to SHUT	
	RSO Visually verify tank integrity	
	RSO Visually verify plumbing integrity - check for leaks	
	<b>KTM GO/NO GO for firing</b>	
<b>9</b>	<b>LCO, IPO, RCO Initiate Launch Sequence</b>	
	IPO Video recorders to ON	

	LCO Get ARM key from RSO	
	LCO FIRE VALVE ARM switch to ON	
	LCO Verify fire valve control circuit “armed” LED is on and yellow	
	LCO Verify fire valve control circuit “continuity” LED is on and green	
	RCO advise ‘earplugs in’	
	Note: LCO switch fire valve on and hold on – release when rocket leaves launcher or at T+5 seconds	
	Note: LCO If fire valve does not open, wait 30 seconds and repeat previous step	
	RCO call countdown 5..4..3..2..1..Fire.....	
<b>RCO If fire valve does not operate after second attempt – refer ‘Failure to Fire’ procedure below starting at item 11</b>		
<b>10</b>	<b>RSO, RCO, IPO, LCO Clear Launch Area</b>	
	RCO advise ‘earplugs out’	
	LCO FIRE VALVE ARM switch to OFF	
	LCO MAIN POWER switch to OFF	
	LCO Pressure gauge viewing camera power to OFF	
	LCO Give ARM key to RSO	
	IPO Video records to OFF	
	RSO to launcher area	
	RSO Actuator gas bottle valve to SHUT	
	RSO Water down launcher area	
	RSO to ‘CLEAR’ launcher area	
	RCO to announce “Launcher area CLEAR”	

**Proceed to Section 12: HAZ 4 – Recovery and Re-Work**

**‘FAILURE TO FIRE’ Procedure**

<b>11</b>	<b>KTM, RSO, LCO, RCO Launch Failure Procedure #1</b>	
	LCO FIRE VALVE ARM switch to OFF	
	LCO MAIN POWER switch to OFF	
	LCO Give ARM key to RSO	
	RSO to launcher area	
	RSO to check all cabling and actuator pressure bottle at launcher area	
	LCO to check all cabling and batteries at blockhouse	
	If the fault is detected, conduct field repair and re-enter launch sequence at step 9. If the fault cannot be discovered or field repaired move to the next step.	
	RSO to blockhouse	
	RCO to clear all personnel from the area ‘downwind’ of the launcher.	
	LCO FIRE VALVE ARM switch to OFF	
	LCO MAIN POWER switch to ON	
	LCO Verify drain valve control circuit “armed” LED is on and yellow	
	LCO Verify drain valve control circuit “continuity” LED is on and green	
	LCO DRAIN switch to OPEN – 4 liters of Hydrogen Peroxide will be dumped onto the launch apron. The peroxide will spray forward of the launcher and vapors travel downwind.	
	If the drain valve fails to operate, refer below starting at item 12	

	RSO to launcher area	
	RSO to water down launch apron	
	RSO to 'CLEAR' launcher area	
	RCO to announce "Launcher area CLEAR"	
	LCO to de-activate recovery electronics	
	KTM to organize a failure review team to find and correct the problem prior to another launch attempt.	
<b>Failure of both Fire and Fill/Drain Valves</b>		
<b>12</b>	<b>KTM, RSO, UFO, RCO, LCO Launch Failure Procedure #2</b>	
	RSO & UFO (in full protective gear) to launcher area	
	RSO to provide water safety backup to UFO from a safe distance behind the launcher	
	RCO to clear all personnel from the area 'downwind' of the launcher.	
	UFO to manually open drain valve from behind the launcher with the special tool and immediately retreat rearwards and then upwind – The peroxide will spray forward of the launcher and vapours travel downwind	
	RSO to launcher area after fumes clear	
	RSO to water down launch apron	
	RSO to 'CLEAR' launcher area	
	RCO to announce "Launcher area CLEAR"	
	LCO to de-activate recovery electronics	
	KTM to organize a failure review team to find and correct the problem prior to another launch attempt.	
<b>Return to start of Section 11: HAZ 3 – KISS-II Launch Sequence</b>		



## SECTION 12. HAZ 4 : RECOVERY & REWORK

**WARNING**

**THIS IS A HAZARDOUS PROCEDURE  
FOR AUTHORISED PERSONNEL ONLY**

### 12.1 INTRODUCTION

This hazardous procedure covers ground search, recovery and rework activities leading up to the re-commencement of the launch sequence procedure. In addition to recovering the KISS-II sounding rocket, ERPS has an environmental responsibility to remove surface, and where possible, sub-surface debris resulting from the KISS-II launch activities.

### 12.2 GENERAL SAFETY REQUIREMENTS

The general safety requirements detailed in ERPS Safety and Operations Plan – Field Standing Orders are to be observed during the performance of this procedure. Personnel should have conducted a cross check of themselves to ensure compliance.

### 12.3 PERSONNEL REQUIREMENT

The PPO RSO, KTM, LCO, UFO, IPO are involved in this activity.

### 12.4 LOCATION OF PERSONNEL

All personnel associated with this procedure are located in the impact area and launcher area.

### 12.5 ARTICLES IN USE

The following tools, appliances and materials are required to complete this procedure:

#### **Transporting Equipment**

- (1) 4WD vehicles as available,
- (2) 4 x tie-down straps,

#### **Tools**

- (1) 1 x shovel,

- (2) 1 x pick
- (3) cleaning equipment & fluids and
- (4) 1 x GPS receiver
- (5) Maps & Markers
- (6) KISS-II general tool kit
- (7) Video Camera / Digital still camera

### Personal Protective Equipment

- (1) gloves,
- (2) safety footwear,
- (3) protective clothing, and
- (4) eye protection
- (5) water

### WARNING

**HYDROGEN PEROXIDE CAUSES SEVERE SKIN BURNS. PROTECTIVE CLOTHING (COVERALLS), GLOVES AND EYE PROTECTION ARE TO BE WORN BY PERSONNEL HANDLING THE RECOVERED KISS-II SOUNDING ROCKET.**

## 12.6 PROCEDURE

The following procedure covers KISS-II sounding rocket recovery and rework activities:

Item	Description	Check
	KTM The estimated positions of all items to be recovered are to be calculated having regard to all available information. These positions are to be marked on maps for the benefit of recovery crews.	
	KTM, RSO, LCO, UFO, IPO - Drive recovery vehicle to the observed or predicted impact point using existing tracks wherever possible.	



	IPO to video and photograph the impact area and recovered components	
	LCO record altitude data from RRC2X and then switch off RRC2X and RDAS (RDAS data to be downloaded later).	
	UFO Manually turn the fire valve to the closed position.	
	UFO Verify dump/fill valve is closed	
	UFO, LCO Wipe down rocket surfaces with a very damp cloth or sponge.	
	UFO Check for dirt in engine nozzle or fill/dump tube, clean as required – cover nozzle with aluminium foil.	
	RSO Load KISS-II sounding rocket into recovery vehicle and secure with tie down straps.	
	IPO Establish an accurate impact position of the KISS-II sounding rocket using a Global Positioning System (GPS) Receiver and record the location.	
	RSO Trial debris which is not required by ERPS is to be removed from the MTA and disposed of in accordance with California state laws.	
	Recovery team return to MTA launcher apron.	
	LCO Remove 6 screws, pull off nosecone, and unplug ejection circuit connectors.	
	LCO Disconnect main harness from forward anchor cables.	
	LCO Inspect forward airframe for unfired ejection charges.	
	LCO Remove 6 nuts/washers and remove recovery bulkhead from forward airframe.	
	LCO Remove large O-ring from bulkhead. Remove fired ejection charges.	
	LCO Spray aft face of bulkhead with cleanser (409/Simple Green), rinse thoroughly with warm water, and air-dry.	
	LCO Wipe inside of forward airframe with damp rags to remove any ejection charge residue.	
	LCO Inspect all components and verify suitability for re-use.	
	LCO Remove electronics assembly from nosecone, download data from RDAS, and install fresh, tested replacement batteries.	

	LCO Replace electronics assembly in nosecone, and test.	
	LCO Re-roll and tape main harness. Pack and stow parachute and harness in forward airframe.	
<b>Proceed to Section 13: Post Trial De-Briefing</b>		

## SECTION 13. POST-TRIAL DE-BRIEFING

The KTM is to conduct a post trial de-briefing after each launch. The de-briefing should be conducted immediately after recovery operations are concluded.

The de-briefing is to be used as an opportunity to discuss and report as to matters such as:-

- the outcome of the trials;
- any difficulties encountered;
- any suggested improvements;
- any damage to property;
- any accidents, incidents or mishaps;
- any dangerous or malfunctioning equipment or structure;
- the recorded bearings of impact points
- the expected location of impact points
- the approach to recovery operations
- briefing recovery personnel and persons assisting as to safety, not touching etc

The expected impact points are to be marked on maps for the benefit of recovery crews. At the conclusion of the de-brief, the KTM will stand down all trials personnel.

**For Re-Flight, Return to Section 9: HAZ 2 – Launcher and Vehicle Setup**

**Pack up, Clean up and Leave MTA  
END KISS-II PHASE 1**

## SECTION 14. KISS-II TRIAL PARTS CHECKLIST

### 1. INTRODUCTION

This section provides a ready reference checklist to ensure that all items required to undertake the KISS-II launch campaign at the MTA are accounted for and not forgotten.

### 2. PARTS CHECKLIST

Item	Description	Check
<b>Recovery Module</b>		
1	pyro/tool kit 4F black powder (4 vials) ejection igniter assy (x7) small flat screwdriver #2 philips screwdriver 8mm socket wrench with handle switch operating handle aluminum tape masking tape scissors DMM batteries (9 volt and lithium) pliers X-acto knife w/spare blades safety wire spare 6-32 screws/washers large O-rings spare carabiners spare quick-links	
2	download kit portable PC AltAcc data cable AltAcc remote switch cable	
3	ladder	
4	nose cone electronics shipping sleeve screws/washers 6-32 x6 (in bag - tape to sleeve)	

## SECTION 14.KISS-II TRIAL PARTS CHECKLIST

5	airframe shipping cover main parachute main harness w/3 carabiners pilot chute pilot harness w/2 quick-links bulkhead w/forward cables large O-ring (position on bulkhead) nuts/washers M5 x6 (in bag - tape to airframe)	
6	cleaning supplies rags/paper towels squirt bottle cleanser (409/Simple Green) warm water (prepare in field?)	
<b>Propulsion Module</b>		
	1 factory assembled and tested propulsion module with attached fin can and launch rail lugs	
<b>Launcher</b>		
	1 Bottom tower frame (inc. thrust deflector, actuators, wired solenoids and pressure lines) 1 Mid tower frame 1 Top tower frame 4 Guide Rail sections 3 Guide Rail connectors 4 Guy Cables 4 Steel Stakes w/Cable loop 4 Steel Stakes w/washer and cotter pin 2 Bolt and washer ass'y for tower angle setting Pressure gauge camera post Guy wire support bracket Various bolts, washers, nuts for assembly.	
<b>Launch Control</b>		
	N2 bottles (1 mid & 1 small size @ >2000psi))	
	Actuator pressure tube & regulator (120psi)	
	Pressurant tube & regulator (600psi)	
	Control cable	
	Video cable	
	Control Box + Battery	

## SECTION 14.KISS-II TRIAL PARTS CHECKLIST

	Two transducer readout boxes	
	One transducer amplifier box	
	One transducer pull-away cable & attachments	
	One electronics pull-away cable	
<b>Fuelling Equipment</b>		
	Custom vacuum transfer PE cap with vacuum hose and long aluminum tube	
	Standard wall HDPE 5 gallon transfer bottle	
	Vacuum pump - water aspirator 120VAC	
	Water for vacuum pump, approx. 2.5 gallons	
	Honda EU2000i Generator 120VAC w/ gas	
	Yellow safety suit / gloves / goggles / rubber boots	
	Graduated cylinder, 1000 ml	
	DI water, sufficient quantity for required dilution	
	Thermocouple gauge, and thermocouple	
	Adequate water in the form of fire hose, or water extinguishers	
	Special fill/drain valve manual operation tool	
	Custom PE transfer cap with 3 way valve and PE tubing	
<b>General Equipment</b>		
	General purpose tool kit	
	Drill (mains power) + assorted drills	
	Hack Saw	
	Food & Water	
	Chairs	
	GPS	
	Paper/Pens	
	Area Maps	
	Tape Measure	

## SECTION 14.KISS-II TRIAL PARTS CHECKLIST

	Markers	
	Video Camera + Digital still camera	
	Stop watch	
	Kettle	
	Rope / String	