Recovery Parachute Safety Seminar

R. Nuckolls
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Aviation recovery parachutes have a history that extends nearly to the beginning of aircraft flight testing.

Initially designed to provide escape from a distressed aircraft, variations have been used to restore an aircraft to a controllable condition . . .

. . . or recover a complete aircraft and occupants.

Simplest designs used combinations of springs to eject a drogue which in turn dragged a canopy from the canister on the tail of the aircraft.

Small aircraft parachutes a generally mechanical systems actuated by pull-handle on a release cable.

For parachutes designed to recover from uncontrollable flight conditions, a second mechanism was needed to jettison the parachute after controllability was restored.

The Premier flight test programs used a recovery parachute deployment/jettison system actuated electrically using electro-explosive devices.

An EED is a simple cartridge intended to generate

. . . A low volume, high pressure gas that operates against a piston to move a component of the system such as . . .

- Separation Bolts
- Link & Clamp Separators
- Bolt, Rod and Cable Cutters
- Thrusters
- Pin Pullers

On Premier EEDs were used to initiate ignition of high power gas generator that deployed the parachute from the canister.

Our system uses EEDs to . . . .

- Drive a pin that locks the parachute lanyard to the aircraft
- Pull pins that retain the parachute within the canister
- Drive blades that sever the lanyard thus releasing the parachute from the aircraft.

Popular mythology holds that these devices are an accident looking for a place to happen . . .

". . . They are subject to unintended initiation by radio frequency energy, body static, or 'stray voltages' of unpredictable nature . . ."

In fact, the energy required to melt a bridge wire in the modern initiator is similar to that required to open a 1A fast blow fuse.

Cartridge initiators are generally rated in terms like . . .

1 Amp = No Blow 4 Amps = All Blow

These are not ‘fragile’ or ‘twitchy’ devices . . .

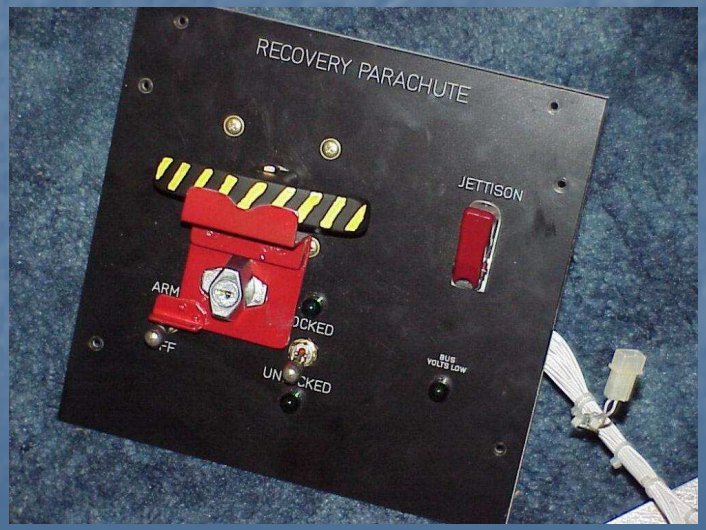
I am aware of only a handful of incidents of un-intended initiation traceable to . . .

- Poor management of ground loops (distant lighting being potential energy source)

- Faulty system design

- All EED systems designed an installed by Beech Targets and Aircraft have benefited from 50 years of legacy design rules, understanding of the physics, and well executed failure modes effects analysis.

The system we're working with today is the fourth in a family of designs that were crafted for Premier, Horizon, AT-6 and now the Bonanza



Pilot controls for the parachute system include

A T-handle for parachute deployment

A system ARMING switch (power ON/OFF)

Switch that controls the mechanical lock for the parachute lanyard

A parachute jettison switch that cuts the lanyard free of the aircraft

Any time ANY light shows on the panel . . .

- There is power from one or more circuit breakers . . . .
- The ARMED/OFF switch is ARMED and . . .
- The SYSTEM IS HOT

HANGAR SAFETY PROTOCOLS

- The Premier program suffered an inadvertent deployment in the hangar. Premier was fitted with a high energy deployment system that made a lot of noise, blew paint off the ceiling, broke windows, and got everybody's undivided attention!
- The incident had root cause in design of the controls by individuals who didn't have a clue . . .
- Design and fabrication of deployment control system was accomplished at the Targets Division.
- Since Premier I, a total of three new systems have been installed on Beech products.

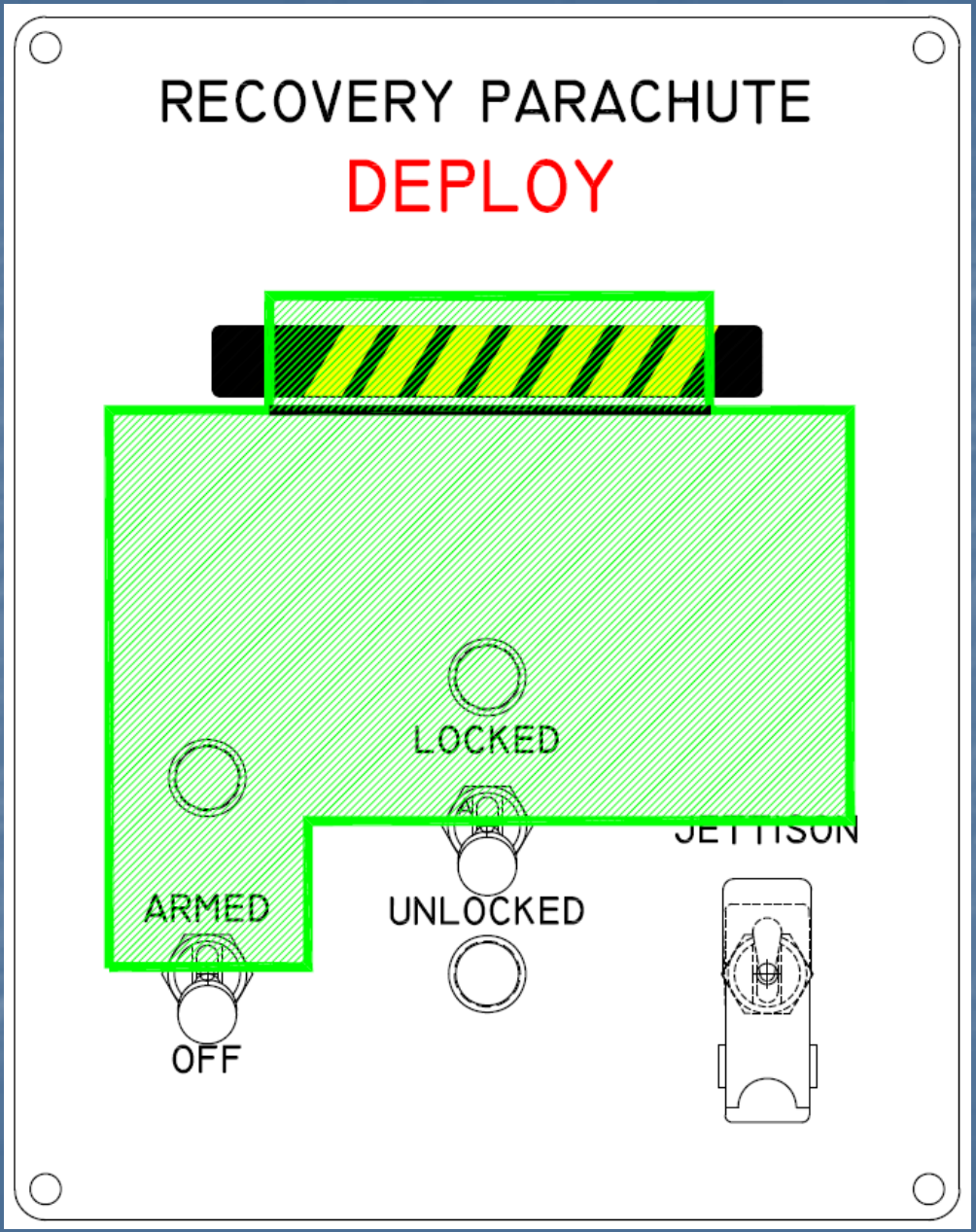
HANGAR SAFETY PROTOCOLS

- The system we're working with is a low-energy, spring-loaded deployment mechanism with little risk for injury. The system is worthy of respect but it's not a bomb waiting to maim and destroy.

- Once the system safing features are in place, the likelihood of inadvertent system initiation is zero.

SYSTEM SAFING

Install controls cover and . . .



SYSTEM SAFING

Pull both circuit breakers and install some means for preventing closure of the breaker. This can be an application specific product . . .

SYSTEM SAFING

. . . alternatively, install tie-wrap on pulled breakers. Make sure the tie-wrap is of sufficient width to prevent closure . . .

PREFLIGHT CHECKS

- Remove system safing features.
- Connected preflight test fixture to system test connector.

PREFLIGHT CHECKS

- Place ARMED/OFF switch at ARMED.
- Observe that red power indicator lamp at ARMED illuminates.
- Observe that white position indicator lamp at UNLOCKED illuminates

PREFLIGHT CHECKS

- Position UNLOCKED/LOCKED switch to LOCKED.
- Observe white UNLOCKED light goes out and after short delay, green LOCKED light illuminates.
- Place UNLOCKED/LOCKED switch at UNLOCKED.
- Observe LOCKED light goes out and after short delay, UNLOCKED light illuminates.

PREFLIGHT CHECKS

- Position preflight test fixture controls as described on Preflight Test Card and observe readings are in tolerance.

PREFLIGHT CHECKS

- Position OFF/ARMED switch to OFF.
- Disconnect preflight test fixture.
- Preflight tests are complete.

INFLIGHT OPERATION

- Position OFF/ARMED switch to ON.
- Position UNLOCKED/LOCKED switch to LOCKED.
- Observe LOCKED light illuminates.

INFLIGHT OPERATION

- If recovery from upset calls for parachuted deployment, PULL the DEPLOY handle.
- When stable condition is achieved, raise cover on JETTISON switch and pull switch down, then release.
- Parachute will have been expended and jettisoned.
- Note: Even if the LOCKED/UNLOCKED switch is at UNLOCKED, pulling the handle will deploy a parachute that is locked to the aircraft.