








KAPTON WIRING
The Silent Menace

By Lt. Jim Schmitt

Perhaps the desert sand of the Middle East has awakened the stray electrons that occasionally cause electrical glitches and failures on our four, permanent-detachment, MH-53E helicopters. But electrical gripes have become more regular, and they're the types that puzzle even the most experienced AE. I read the stories in *Mech* about the E-2's problems [*April-June 2001, "The Resurgence of an Old Enemy" and Fall 2001, "Almost Bitten on a BITS Flight"—Ed.*], and I want to share a few problems I've noticed with the H-53.

Every few days, the caution lights for the fuel-filter bypass intermittently would flash on one of our helos. After troubleshooting the engine, the AEs finally found the light came on only at night. Even more bizarre, they would go out when the switch for the caution-panel lighting was moved from the dim position (normal) to bright. The culprit finally was found; it was bad Kapton wiring behind the caution panel.

Another aircraft had a flickering master-caution light with no other associated caution lights. It would flicker only a couple times during each flight and nearly was impossible to troubleshoot. When tracing the wires, electricians finally found cracked Kapton wiring.

In the past year, our Bahrain detachment has completed 120 maintenance actions and spent more than 400 hours on problems with faulty Kapton wiring. These MAFs were not specific to a single system, but many of the gripes involved mission-critical systems.

Our det has been fortunate to fly hundreds of mishap-free operational missions since it formed more than two years ago. Most of the broken wires were discovered during daily, turnaround, preflight, and phase inspections. The timely recording of gripes led to the repair of faulty wiring before it could cause a major failure. But every flight is the roll of two dice: one to determine which aircraft will have the next failure, and the other to decide which wire will fail. Despite our maintainers' successes in dealing with Kapton wiring, in time, the failures will increase and, unfortunately, could lead to a catastrophic failure or a mishap.

The most difficult part about flying an aircraft with faulty Kapton wiring is the unpredictability of the electrical system. No one knows how a faulty wire will affect any aircraft's electrical system. Because wires crack one at a time, a helo typically will not lose an entire system or component, just parts of it. The wires still carrying current will cause the component to act erratically. Even worse, the failures are intermittent because the crack in the wire opens and closes when an aircraft vibrates and maneuvers. This makes it nearly impossible to troubleshoot and leads to many gripes being signed off as "could not duplicate."

Cracked wires (as opposed to a clean break) are susceptible to arcing and can cause a fire. An in-flight fire especially is bad when flying blue-water ops, which is what the det does most of the time.

Aviation safety and mishap prevention rely on the removal of uncertainty. That is why pilots use checklists and maintainers follow MIMs. Trying to stay safe when dealing with uncertainty requires a lot of skill and a bit of luck. Based on the problems I've seen with Kapton wiring, we have been more lucky than good, and I'm worried our luck eventually will run out.

Lt. Schmitt flies with HM-14.

Flight, Flight-Related and Ground Mishaps

Class A Mishaps 02/07/2002 to 05/20/2002

Aircraft	Command	Date	Fatalities
CH-46D	HC-6	02/07/2002	0
During vertrep, helo entered water and inverted.			
UH-1N	HMM-165	02/11/2002	0
Aircraft struck the ground.			
KC-103F	VMGR-252	02/11/2002	0
During departure phase, aircraft crash-landed.			
UH-1N	HMM-166	02/14/2002	2
Aircraft crashed into terrain during low-level NVG ordnance delivery.			
FA-18D	VMFA(AW)-533	02/17/2002	1
After landing, aircraft was unable to stop. Hook-skipped on long-field arrestment attempt and aircraft departed runway.			
F-14B	VF-143	03/02/2002	1
Aircrew ejected during catapult stroke.			
AV-8B	VMA-214	03/07/2002	0
Aircraft crashed into water during routine carrier-qualification training.			
F-14A	VF-211	03/08/2002	0
Aircraft tailhook separated on landing.			
HH-46D	MCAS Beaufort	03/09/2002	1
Helo crashed at sea during SAR effort.			
SH-60B	HSL-46	03/12/2002	3
Helo went down in the Med while conducting an FCF.			
FA-18A	NSWC FALLON	03/15/2002	0
Pilot ejected safely during 1 v 1 ACM.			
HH-1N	NWTS China Lake	03/28/2002	2
Helo crash-landed in a remote, rocky area.			
MH-53E	HM-14	04/02/2002	0
After an engine failure and fire, aircraft sustained airframe damage while landing.			
QF-4S	NWTS Pt. Mugu	04/20/2002	2
Aircraft struck ground during four-plane diamond break at an airshow.			
SH-60B	HSL-49 Sea Comp	05/04/2002	0
Helo struck water during landing approach to the ship.			
T-39N	VT-86	05/08/2002	7
Two aircraft lost at sea after disappearing from ATC radar.			

continued on page 13