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Task Force Backs Training to Improve Aircraft Wiring Safety

Cost of new wire inspections may limit them to voluntary compliance

The way forward on aircraft wiring safety is at a critical juncture with enormous implications for manufacturers and operators in terms of the cost and labor burden.

A U.S. government-industry task force is considering two options. One places primary emphasis on technician training, and the second emphasizes new inspections of installed wiring.

The schedule for any wiring-specific inspections is a matter of considerable concern, as the **Federal Aviation Administration** (FAA) is mandating structural inspections of older aircraft, i.e., those with 14 or more years service *(see ASW, Dec. 16, 2002, p. 1)*. To minimize out-of-service time for all affected aircraft, the structural and wiring schedules must be coordinated.

Current Regulations Fall Short

The current regulations do not adequately address requirements for wires in system separation, safety assessments, protection of wires in fire zones, protection of wires in cargo and baggage compartments, and accessibility of wires for inspection, maintenance and repair, etc.

Current requirements also do not clearly define the necessity and method for wire identification. Identifying wire and its components associated with systems necessary for safe flight and landing will aid those performing maintenance, repair, and modification by helping to ensure that these systems are not compromised by the work being performed.

Source: ATSRAC, WSHWG Task 6 Final Report, p. 9

"We will object to any arbitrary interval that will force special visits" of aircraft to maintenance facilities, declared Ric Anderson, who represents the **Air Transport Association** on the government-industry task force known as the **Aging Transport Systems Rulemaking Advisory Committee** (ATSRAC).

Kirk Thornburg of **Northwest Airlines** said that he was "particularly concerned" that the wiring work is done when the airplane is opened up for other activity, such as the aging aircraft structural inspections.

Fred Sobeck, a senior FAA official on ATSRAC, responded, "We are sensitive to that and want to make it easy for the operator to comply with both rules."

Fork in the road

Scheduling ultimately may be less contentious than what the FAA may require to assure the safety of wiring systems in aircraft of any age. Two options were debated vigorously at the ATSRAC's April 24 meeting. That meeting was characterized by revelations that some of the committee members had written the FAA objecting to regulatory changes proposed by the very committee on which they sit, the study of which they had previously voted to undertake. The industry objections strike at the heart of how much emphasis should be accorded in federal aviation regulations (FARs) to wiring as an aircraft-level system, as opposed to wiring as a subset of other systems.

The inspection options under discussion fall short of the ATSRAC's earlier concept. In previous meetings, the ATSRAC endorsed improved training on electrical wiring for maintenance technicians, and it

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called for a new battery of general visual and detailed visual inspections (GVI/DVI) by zone in the aircraft of aircraft wiring. Known as EZAP, for enhanced zonal analysis program, these inspections were envisioned as a subset of a broader activity, including aircraft structure and other systems, known as EAPAS [enhanced airworthiness program for airplane systems].

In its original concept, EZAP envisioned an analysis of all wiring installed in the aircraft, in which a decision matrix would be used, such as whether the wiring is located next to combustible materials, whether it's within two inches of primary and backup flight controls, and so forth, to determine which wires would be identified for added GVI and DVI scrutiny *(see ASW, July 15, 2002, p. 3 box)*. Analyzing all wiring installed during original manufacture, or subsequently retrofitted into the aircraft under supplemental type certificate (STC) modifications, was deemed prohibitively expensive when combined with the recommended technician training. ATSRAC discussions have focused on initial EZAP-type inspections of cockpit wiring, electronic and equipment bay (E&E) wiring, and power feeder cables. For these three areas, the acronym CEEPF applies.

The cost-benefit hurdle

Even with the reduced scope, any regulatory activity for improved maintenance technician training and for conducting EZAP inspections must be justified on cost-benefit grounds.

"We want to implement the full suite of ATSRAC recommendations, but if it's not cost-beneficial, we can't do it," said ATSRAC Executive Director Charles Huber. Huber, who also is an FAA official, said any proposed FAA rulemaking involving costs that exceed benefits "is DOA [dead on arrival] at OMB [**Office of Management and Budget**]."

Producing a credible cost benefit for wiring is particularly challenging, because there is no unique code for recording wiring-specific failures in the service difficulty report (SDR) system and in other maintenance-related databases. Therefore, quantifying the cost of an unscheduled landing – and showing the benefit of avoided unscheduled landings – is a Catch-22. The number of flight diversions or turnbacks cannot be directly attributed to wiring because there is no code for reporting wiring problems.

Moreover, the benefits of any safety initiative typically are related to an accident, and the FAA does not presently have an accident to cite as justification for improved training and inspections related to wiring. The 1996 explosion of **TWA** Flight 800, a B747, was used to justify efforts to improve fuel tank safety. The 1998 crash of **Swissair** Flight 111, an MD-11, was used to justify the change-out of metalized Mylar thermal acoustic insulation blanketing in the fleet of Douglas-built aircraft. While faulty wiring was involved in both cases, and accidents frequently can involve a multiplicity of contributing factors, an accident can only be used once for rulemaking purposes, FAA officials said. EZAP inspections could cost $100 million to $250 million or more. Wiring faults were seminal to the TWA and Swissair disasters. With a combined death toll of 459 passengers and crew, with the statistical value of a life of $3 million, those lives saved (or deaths avoided) would provide more than $1.3 billion in benefit.

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Faulty Wiring – Threat to Safety
One airplane's symptoms – the MD-11

AD No. &, Effective Date	Compliance Time	Situation
AD 2003-08-08 May 27, 2003	Within 6 months	To prevent chafing of electrical wire assemblies above the forward passenger doors and above the entry door (L1) sliding panel of the forward drop ceiling in the passenger compartment, which could result in electrical arcing, and consequent electrical fire in the passenger compartment.
AD 2003-08-09 May 27, 2003	Within 6 years	To prevent electrical arcing and/or heat damaged wires due to improper wire installations during manufacture and/or maintenance of the airplane, and consequent fire and smoke in various areas of the airplane.
AD 2003-04-16 May 27, 2003	Within 18 months	To prevent smoke and/or fire in the avionics equipment compartment due to chafing and arcing as a result of maintenance personnel lying against the removed avionics cooling fan cover and/or insulation blankets that cover the wire harnesses.
AD 2003-04-17 May 27, 2003	Within 6 months	To prevent chafing and consequent arcing or loss of electrical power to associated avionics buses in the upper avionics circuit breaker panel, which could result in smoke and/or fire in the cockpit.

Source: FAA

Of interest, MD-11 wiring faults continue to generate a regular flow of airworthiness directives (ADs) out of the FAA. These directives are replete with references to wiring hazards, such as, "to prevent arcing," to "prevent chafing" and grim consequences such as "loss of electrical power" and "electrical fire in the passenger compartment." A recent batch of such ADs indicate a continuing wiring safety problem in the fleet, where the MD-11 seems particularly plagued *(see box, above)*.

Lacking an "unused" accident and the challenge of producing a credible cost benefit, ATSRAC members are looking at how existing rules can be capitalized upon to make progress.

"If we're making use of an existing rule, we don't have to cost it out," Sobeck said. For example, Part 121 of the FARs, which applies to scheduled carriers, requires them to conduct maintenance training not only for their own personnel but also for maintainers at repair stations to whom maintenance may be "outsourced." These repair stations are covered by Part 145 of the FARs.

Working under the rulemaking radar

This line of thinking lay behind the genesis of the two options. Under Option 1, operators would be required to implement improved wiring-related training for their employees. The training would not be mandated for repair stations or for aviation repair schools.

However, under this option, manufacturers would have to develop the EZAP inspections for all aircraft models. The EZAP requirement would apply to aircraft in production, and for those long out of production but still in service, such as B-727s. This EZAP development process would be required by regulation, but operators would not be under a regulatory requirement to actually conduct the EZAP inspections. Not mentioned is the likelihood that manufacturers would not be liable for wiring failures under this option, as operators would be under no regulatory obligation to conduct the inspections. Under Option 2, the extra training would not be required, the manufacturers would have to develop the EZAP protocols and operators would be required by the FAA to conduct them *(see box, p. 4)*. The costs of Option 1 (to do the training) and Option 2 (to perform EZAP inspections) are similar.

ATSRAC Chairman Kent Hollinger asked, "If you could get training *or* EZAP, which gives the most benefit?"

Anderson said if EZAP is mandated, "Our people have to be trained."

Nick Drivas from **AirTran** said he would vote for the [required] training. "It will undo years of negative training," he said.

Furthermore, even if the EZAP inspections were left optional, it seems reasonable to believe that some inspections would be conducted, and some benefit would result. Operators could do none of them, apply EZAP piecemeal, or conduct all of them.

The committee seemed inclined to Option 1.

But not everybody. Tony Heather, an official from the UK's **Civil Aviation Authority** (CAA) representing Europe's **Joint Aviation Authorities** (JAA), generated a strong reaction by suggesting that training without benefit of requiring EZAP could yield the least safety benefit:

"The FAA economists are now telling us that the 'suite of rules' is too costly and that in order to successfully get through the complete rulemaking process the cost needs to be pegged at a certain figure. The two options presented pretty much meet that pegged figure. This now means that the potential benefits have to be assessed.

"The desired benefits in question have not changed. They remain those stated in the *Federal Register*. What has to be undertaken is which of the two options represents the best chance of achieving those benefits?

"To take some of the subjectivity out of this decision matrix, you can weigh your options against some proven industry statistics:

If your chosen corrective action is a design change … then the statistics indicate that you can expect something like an 85 percent chance of long term success.

If you choose to administer the threat (which could be something like procedural amendments or additional maintenance tasks) than you can expect to achieve approximately a 50 percent long term success.

If you choose just to train selected staff/personnel, then the prognosis of long term success is approximately 15 percent."

The choice, Heather asserted, isn't which of the two options can be more easily passed through the regulatory wickets, but which one provides the better route to achieve the original ATSRAC recommendations.

Wiring Stewardship

Item	Option 1 Require training but not inspections	Option 2 Require inspections but not training
Design	Rulemaking action, to include new subpart H in FARs.	Same.
Training	Rulemaking mandating wiring system inspection training for Part 121 (operators) but not for Part 145 (repair stations) or Part 147 (schools).	Training not required by regulation for Part 121, Part 145 and Part 147.
EZAP [Enhanced zonal analysis program]	Rulemaking directing manufacturers [type certificate, TC, and supplemental type certificate, STC] to develop EZAP; operator inspections optional.	Rulemaking directing manufacturers to develop EZAP and for operators to conduct the additional GVI/DVI (general visual and detailed visual inspections) emanating from the EZAP.

Source: ATSRAC

Some ATSRAC members countered that Heather was citing human factors studies that have been outdated by more recent research, which shows a substantially greater payoff from training.

Anderson said, "We need to be practical in our selection of what we recommend to remain as proposed 'rulemaking' and what we move into the 'other than rulemaking' category."

Anderson argued for training:

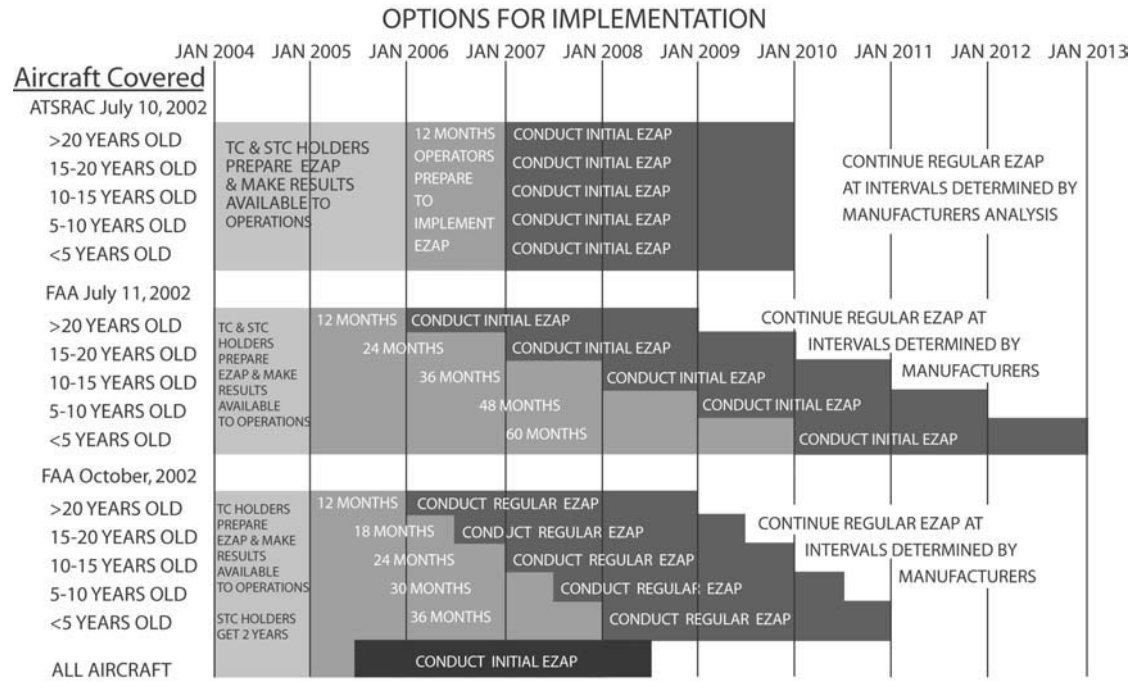
"I believe that simply mandating the development and implementation of EZAP task cards, without training, will not bring about the 'cultural change' we have all said was needed. The AMTs [aviation maintenance technicians] accomplishing the task cards need to understand why they are doing what they have been asked to do.

"Training, in understanding the 'care and feeding' of EWIS [Electrical Wiring Interconnection System] and accomplishment of EZAP inspections, was going to become an integral part of the training of all AMTs and their supervision, not just 'selected' AMTs, and it was going to become an integral part of their recurrent training.

"Additionally, that knowledge will then extend beyond just the EZAP tasks, mandated or not, and [will] become part of the air carrier maintenance 'culture.' "

Tempest over a timeline

Under Option 1, the schedule for conducting and completing the EZAP inspections becomes moot, since the inspections would not be required. ATSRAC had proposed a two-year period for manufacturers to complete EZAP, a year for operators to develop the task cards and other documents for technicians to conduct the EZAP inspections, and three years to complete the inspections. Based on a starting date of January 2004, all aircraft would undergo and complete the inspections by January 2010.



Initial EZAP-type inspections would focus on cockpit wiring, electronics and equipment bay wiring, and power feeder cables (CEEPF). Schedules are still in flux. Shown above, the ATSRAC recommendation of July 10, 2002, and the initial FAA concept of July 11, 2002, which stretched out the time. An FAA modified plan of October 2002 would accelerate the initial CEEPF inspections and start the regular EZAP inspections concurrently. This plan completes CEEPF inspections a year and a half sooner than the original ATSRAC concept, although manufacturers have stated they could not prepare the analyses for all of their models in less than two years. *Source: ATSRAC*

The FAA's Sobeck proposed a sliding timeline in which EZAP inspections for the oldest aircraft would begin first and which would not be completed for the youngest aircraft until 2013 *(see box, above)*. This proposal, described as the "shock and awe" schedule by one ATSRAC member, allowed more time than the ATSRAC concept of having all airplanes, regardless of age, undergo EZAP inspections over a common three-year period. An October 2002 revision to the FAA timeline (suggested last July) proposed performing the CEEPF-related EZAP inspections in a three year period, and the full EZAP inspections of aircraft wiring would commence concurrently, on a staggered but more abbreviated schedule.

It is not clear who would decide between Option 1 and Option 2. Since the ATSRAC is only an advisory body, the FAA could make that decision. Then again, the ATSRAC accepted additional tasks from the FAA at its April 24 meeting, one of which was to provide "alternatives to proposed rulemaking" when specifically asked by the FAA. This development could further internalize ATSRAC into FAA decision-making.

Challenge from industry

If there is a debate over how much of the ATSRAC's training and inspection concept is to be implemented with the force of government regulation, another effort is underway to undo some of its already-completed work.

In the spring of 2001 ATSRAC was asked to review all regulations regarding aircraft wiring and to combine "the existing paragraphs and [create] a new section dedicated specifically to wire systems." ATSRAC members unanimously endorsed this effort.

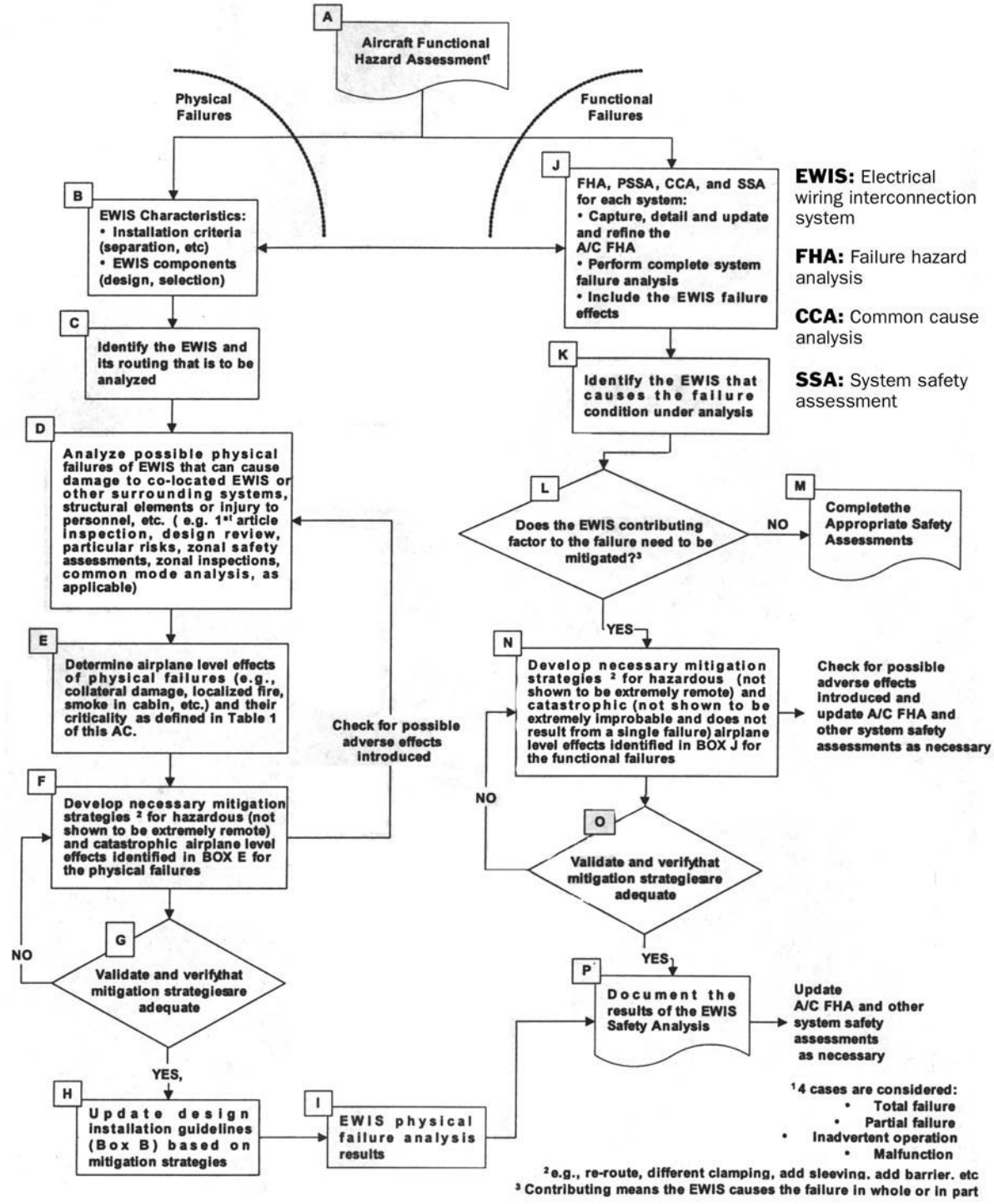
Now some are objecting to the result.

The original task led to the creation of the Wire Systems Certification Requirements Harmonization Working Group (WSHWG). Its October 2002 final report also was approved without dissent by ATSRAC. It provides a further rationale for its recommendations:

"Traditionally, wire has not been looked upon at the same 'level' as the rest of the systems for which it provides the electrical interconnections … Additionally, in the past, system safety assessments … have not always clearly identified the effect a particular wire failure (functional and physical failure) has on other

A New Approach to Wiring System Safety Analysis

Existing guidance deals with functional wiring failures (right half of schematic below). The new guidance proposed by ATSRAC adds consideration of physical failure (see left half of schematic below). This addition now forces an answer to a heretofore unasked question: can a physical wiring failure start a fire?



Source: ATSRAC, WSHWG Task 6 Final Report, page B-18

systems or at the airplane level." Indeed, the WSHWG offered a detailed itemization of shortcomings in the existing FARs *(see box, p. 1)*.

Accordingly, this group created a new section for the FARs, in Part 25 (airworthiness standards) dubbed § 25.17xx. The various subsections of this proposed revision run from 25.1501 to 25.1755 (these subsections, 29 in all, are identified in odd-numbers only so that even numbers are reserved for future changes).

Two of these subsections were entirely new:

§ 25.1709 System Separation – EWIS

§ 25.1711 Electrical Wiring Interconnection System Component Identification.

In an October 15, 2002, letter **Boeing** said these two rules provided added value, but it objected to the remaining 27 draft rules, suggesting that the panoply of new rules could detract from existing rules covering the same subjects. It should be noted that the task was to consolidate all wiring-related rules to increase the visibility of wiring as a system.

A March 12, 2003, letter from the **Aerospace Industries Association** (AIA) and the **General Aircraft Manufacturers Association** (GAMA) raised similar objections to those contained in the Boeing letter. The AIA/GAMA letter asserted that some of the new rules in the new 25.17xx series refer to existing rules in the 25.13xx series, which cover systems, thereby opening the door for inconsistent interpretation and application.

"Our objective is to have a single interpretation so that there is no ambiguity when it comes to safety," said Howard Alyesworth, one of the co-signatories of the AIA/GAMA letter, both of whom voted for the effort to combine all wiring related rules in one section of the FARs.

An example might be the new proposed Subsection 25.1725. It says, "Electrical wiring interconnection system components associated with the electrical distribution system must meet the requirements of § 25.1355."

Capt. Ken Elias, representing the **Air Line Pilots Association**, demurred, saying, "The AIA/GAMA letter suggests more than eliminating duplication. It proposes to throw out a whole lot more."

Hollinger said "thousands of man-hours" were spent developing subpart H and a new associated advisory circular that provides additional amplifying information *(see box, p. 6)*.

At the outset of the last ATSRAC meeting, he expressed his concerns to fellow members of dissenting letters sent to the FAA after apparent agreement on the group's recommendations. During the revelations of these dissenting letters sent by the manufacturing interests, an observer of the proceedings remarked that it was "quite enlightening" to see "how coordinated the effort is to work behind the scenes to squelch improvement."

What one airline (Swissair – now Swiss) felt motivated towards doing after its first wiring-related crash: 7 pages of imagery starting at www.iasa.com.au/ourfirst.htm

Better breakers

In terms of what the FAA may require, arc fault circuit breakers (AFCBs) are another item in the mix. They are seen as a replacement for thermally activated breakers now in aircraft, which may not activate until wire arcing is severe enough to start a fire. The **National Transportation Safety Board** (NTSB) has cited AFCBs as a significant means of improving electrical system safety. Prototype AFCBs are now test flying, but the **Transportation Safety Board** (TSB) of Canada said in its report of the Swissair crash that the specifications for these AFCBs are not being written to "prevent the ignition of flammable materials by arcing phenomena."

"Given the existence of flammable materials used in aircraft construction, it would be prudent to establish AFCB certification criteria based on limiting the arc energy to a level below that necessary to ignite any materials likely to be used in aircraft," the TSB said *(see ASW, April 7, p. 4)*. An industry source involved in the development of AFCB technology disagrees with the TSB, saying it "will provide a significant step-function improvement in the level of aircraft wiring safety."

Huber said, "At this time, we do not have a mandate to install AFCBs." They, too, would have to undergo the test of cost-benefit, since AFCBs with their electronic componentry generally will be more expensive than the mechanical breakers they will replace.

Northwest's Thornburg pointed out that scheduling for AFCB installation also would have to be considered and coordinated in the context of EZAP, aging structure and other emerging FAA requirements.

One source suggested that the industry might be reticent to retrofit AFCB technology into older aircraft by reason of its powerful potential to reveal latent ills in the wiring. "You could have a classic circuit

breaker sit there and tolerate all sorts of electrical shenanigans upstream and downstream, and it would only blow its top once the party got far too wild," he said.

"However, the AFCB would be a stern bouncer with a very low tolerance threshold. Every time it called it quits, the jig would be up and the party would have to be continued in the hangar," he explained.

"What's more," this source added, "Once you start looking, who knows what you might find? A fault that is dormant and quiescent is acceptable, as long as it remains undiscovered. Once it is seen, named, recorded and evaluated, it will need to be fixed. That means a day-long loss of utilization could turn into a week-long bitter experience, or even longer if it's proven to be a general widespread disorder rather than a localized ailment."

By way of a medical metaphor, he said, "You know something's wrong but you can't go to the doctor – because he might tell you it's cancer."

Response to recommendations

Overlaying the whole situation is more than the NTSB's endorsement of AFCB technology. It has issued two important recommendations concerning wiring separation and maintenance standards *(see 'Report Card' below)*. The safety board has deemed the FAA response to date as conditionally acceptable. If too much is left to voluntary compliance, without the teeth of regulatory requirement, the NTSB may consider the final outcome as unacceptable.

Irrespective of whether Option 1 or Option 2, or AFCBs ultimately are mandated for the existing fleet, greater safety standards could be required for new aircraft. Many of the lessons emanating from the ATSRAC effort can be applied to the next generation of flying machines. Their wiring system designs can benefit from safety analyses that consider wiring's fire-creating potential, their electrical design standards could incorporate a valid concept of operational redundancy, their systems could feature more advanced fault detection technology, and all known wiring discrepancies could be less likely in future designs through strict qualification of wire types.

Target dates could be set for incrementally upgrading to the new standards. An analogy might be that of a mother seeing how her smoking and drinking has adversely affected her child and vowing, "Well, I can't do much about that now – but I'm definitely not going to smoke or drink during my next pregnancy." Amortizing any added costs over the full 30- to 40-year life of a new airplane also might be more likely to pacify the cost-benefit dragon blocking the full way ahead. >> *For more information on ATSRAC activities, reports, meeting minutes, etc., see http://www.mitrecaasd.org/atsrac/* << ✈

'Report Card Time'

Status of Safety Board recommendations:

Safe separation

‣ *Safety board, Sept. 19, 2000:* Review the design specifications for aircraft wiring systems of all U.S.-certified aircraft and (1) identify which systems are critical to safety and (2) require revisions, as necessary, to ensure that adequate separation is provided for wiring related to those critical systems (Recommendation #A-00-106).

Additional safety board comments:

✓ Although airplane manufacturers generally provide protection for certain critical electrical circuits, there is no FAA [**Federal Aviation Administration**] regulation that specifies wire separation criteria or identifies which circuits must be protected.

✓ The potential for short circuits to damage nearby wiring (more than 1½ inches away) has been documented in safety board investigations of numerous accidents and incidents.

‣ *FAA response, April 8, 2003:* The **Aging Transport Systems Rulemaking Advisory Committee** (ATSRAC) working groups are … working … to develop and propose improvements as related to electrical wiring separation.

The recommendations obtained from this task should include general requirements for all wire systems regarding wire separation.

Provide recommendations on the need for the special identification of wire and/or wire bundles based on the *airplane-level* effect of failures of systems contained in a given bundle [Emphasis added; wiring failures heretofore had been considered for their effects on systems, but now that wiring is being considered as a system, failures are being considered for their impact on the entire airplane.]

‣ *Status of recommendation:* Open – acceptable response (but in review).

Training, documentation and new technology

‣ *Safety board, Sept. 19, 2000:* Regardless of the scope of the Aging Transport Systems Rulemaking Advisory Committee's eventual recommendations, address (through rulemaking or other means) all of the issues identified in the [July 1988] Aging Transport Non-Structural Systems Plan, including:

- Training maintenance personnel to recognize potentially unsafe wiring conditions.
- Improving documentation and reporting of potentially unsafe electrical wiring conditions, and
- Incorporating new technology, such as arc-fault circuit breakers and automated wire test equipment.

‣ *FAA response, April 8, 2003:* The FAA plans to publish the EAPAS [Enhanced Airworthiness Program for Airplane Systems] NPRM [Notice of Proposed Rulemaking] by December 2003. (*ASW* note: This NPRM will outline the enhanced zonal analysis procedure, EZAP, the required extent of which will be based on whether Option 1 or Option 2 is chosen, as discussed in the body of the story.)

The **Society of Automotive Engineers** (SAE) is developing a design requirement document for arc fault circuit breakers [AFCBs] … and the … SAE specification for AFCBs is nearing completion. (*ASW* note: Canadian investigators who probed the 1998 crash of **Swissair** Flight 111 remarked that the specifications being developed for AFCBs may not go far enough. *See ASW, April 7, p. 4.* In its Flight 111 accident report, the **Transportation Safety Board** [TSB] of Canada remarked, "While the proposed AFCB certification tests will result in improved arc-fault detection capabilities and response times, as written they will not certify the AFCB's ability to prevent the ignition of flammable materials by arcing phenomena. Given the existence of flammable materials used in aircraft construction, it would be prudent to establish AFCB certification criteria based on limiting the arc energy to a level below that necessary to ignite any materials likely to be used in aircraft." See page 223 of the TSB report, at this link: www.tsb.gc.ca/en/reports/air/1998/a98h0003/eReport/Sr111_200303.pdf)

The FAA has developed an issue paper that is currently being used for installation of AFCBs. As the first step, AFCBs are currently being certified and installed on airplanes in non-essential systems to gain experience, collect data, and monitor their performance. (*ASW* note: **Delta Air Lines** is spearheading this effort.)

‣ *Status of recommendation:* Open – acceptable response (but in review). ■

News Briefs

• **Etymology of SARS.** Are the first two letters in the acronym SARS redundant? The acronym stands for "severe acute respiratory syndrome," a particularly virulent form of pneumonia. But severe and acute do not mean the same thing. In the medical profession, acute refers to a sudden rise, and severe is to give a measure of the sudden rise (as opposed to moderate acute respiratory syndrome). ■

• **Thermal screening.** Outbound travelers at Singapore's Changi Airports as well as inbound passengers from SARS-affected countries must pass through a thermal scanner, reports the **Singapore Tourism Board** (*see photo*). The scanners are used to take the temperatures of passengers before they pass through immigration checks; medical staff examines inbound passengers who have an elevated temperature and outbound passengers with a temperature must provide a doctor's certificate that they are not suffering from SARS before being allowed to fly. ■

• **Mark your calendars.** The **National Transportation Safety Board** (NTSB) has announced these upcoming events:

✓ **May 20**, 9:00 a.m., fact-finding hearings into the fatal Jan. 8 crash of **Air Midwest** Flight 5841 at Charlotte, N.C. Hearings are slated for two days into the crash of the **Beech** 1900 twin-turboprop. Contract maintenance and oversight of same are likely to feature prominently in the testimony *(see ASW, Feb. 3, p. 1)*. Location: NTSB boardroom, 429 L'Enfant Plaza, SW, Washington, D.C.

✓ **June 4-5**, Transportation Vehicle Recorder Symposium. Hosted by the NTSB in conjunction with the **Society of Automotive Engineers** (SAE). Starting at 8:30 a.m. each day, the symposium will take place at the Hilton Alexandria Old Town, Alexandria, Va.

Other details and registration are at the SAE website, www.sae.org/recorder. This event is a follow up to a recorder symposium; hosted by the NTSB in 1999 *(see ASW, May 10, 1999, p. 1)*. Video/image recorders will be a topic of this event, an issue of heightened interest given the **Transportation Safety Board** (TSB) of Canada's call for such recording technology as a result of its investigation into the crash of **Swissair** Flight 111 *(see ASW, April 7, p. 1)*. ■

ACCIDENTS AND INCIDENTS [1]				
DATE/SITE	**AIRCRAFT & REGISTRATION**	**CIRCUMSTANCES**	**DEATHS & INJURIES**	**PRELIMINARY ANALYSIS[2]**
Date unconfirmed -reportedly Jan 03	737 of SWA	**2 SWA Pilots sacked – disrobing in cockpit for jest.**	Nil	SWA cites inappropriate conduct as grounds for recent termination.
14 Apr Tokyo-Haneda	777 of JAL	**Suffered eng fail enroute and diverted Haneda Intl.**	Nil	JAL540 from Sapporo (New Chitose) - no further details
18 Apr Lephalale (Ellisras) South Africa	Piper Aztec of Safari Charter Co.	**A/c crashed after take-off when nose luggage compartment door opened.**	5 fatal / 5 on board	Four Spanish game hunters died on flight to Grande Central Airport Johannesburg. Well-known cause of Aztec accidents (no 2nd latching).
20 Apr Reina Sofia A/P Southern Tenerife Canary Islands	757 of Air 2000 Flt: AMM138	**Captain taken ill and incapacitated inflight after leaving Manchester UK. Copilot landed Reina Sofia.**	1 ill / 219 pax and 8 crew	Captain hospitalized and later returned UK.
21 Apr Mexico City Intl	767-300 of AeroMexico	**A/c returned to land (gear retract problems after t/off).**	Nil	No further info. Earlier incident to later one on 23 April *(see last ASW)*
22 Apr evening Dhaka Zia Intl A/P Bangladesh	F-28 A310-300 x 3 737-300 of Biman	**737 and one A310 sltly damaged, rest severely damaged in violent storm (111km/hr winds).**	Nil	Imagery at www.iasa.com.au/blow.htm One third of Biman fleet grounded. Met office forecast 60km/hr winds.
24 Apr 1800L Prince Albert Ca	Beech 99A of TransWest Air Reg: C-FDYF	**A/c enrt Regina to La Ronge pitched up, stalled and may have spun after flaps were deployed in descent.**	5 inj / 6 on board	2nd major crash for Transwest since formation two years ago. A/c recovered, Maydayed & then crash-landed in a field near Prince Albert.
25 Apr Mobile Alabama	TBM-700 of Air Taxi Reg: N705QD	**Eng fire reptd, crashed on final 1500 ft North 18 t/hold.**	1 inj	Wind 150/12, vis 10mls, cloud broken at 2700ft agl.
24/25 Apr Rockhampton Queensland Aust	717 of QANTAS	**Unconfirmed report that a/c had both windscreens broken on landing.**	Nil	Possible birdstrike?
25 Apr Goiana Brazil	737 of Varig	**A/c collided with vulture at 5000ft, declaring emergency for a smashed windscreen.**	Nil / 63 passengers	Incident occurred in climb and flight returned and landed within minutes.
26 Apr Edmonton Alberta Ca	A320-211 of Air Canada Reg: C-FDST Flt: ACA143	**On descent, crew rec'd ECAM stab jammed indicn and lost auto-pitch control.**	Nil	Manual pitch trim used for landing and maintenance changed stabilizer actuator assembly.
26 Apr Bunia Congo	AN-24 (TBC) of United (Congolese)	**Mil Charter landed with tire punctured dept Mongbwallo.**	Nil / 19 troops	Runway blocked. UPDF Military Charter flight.
27 Apr Manchester UK	747 of Pakistan International airlines	**Two adjacent MLG tires burst on landing.**	Nil / 459 on board	Two tires replaced on taxiway and a hyd leak repaired before a/c taxied to terminal and disembarked pax.
27/28 Apr Rotterdam Heathrow	F50 of KLM	**Pilots on review after allowing two female vocalists from the pop group Cheeky Girls into the locked cockpit for landing.**	Nil	KLM officials have admitted that strict security rules were broken.
27 Apr 1142L Lakeland Fla.	Learjet 35 of Corporate Reg: 72LL	**Brakes failed and a/c hit terminal bldg while parking.**	Nil	Substantial damage to a/c.
28 Apr 0820L Orlando Fla.	757 of UAL Flt: UAL705	**A/c unexpectedly encountered moderate turbulence at FL290.**	2 inj / 186 on board	Two flight attendants injured (one serious, one minor).
28 Apr 1814L St Louis Mo.	Jetstream 41 of Trans World Express	**LOF5579 Encountered severe turbulence and F/A injured.**	1 inj	Extent/type of injury unknown.
29 Apr Sheremetyevo Ru	A310 of Pakistan International Airlines	**Diverted to Moscow with eng fail during enroute Heathrow.**	Nil / 188 pax & 12 crew	No further details.
29 Apr 0605L Miami Fla.	727 of Capital Cargo International	**Arriving from Panama, four tires blew after heavy braking and fire erupted in stbd MLG.**	Nil	Two runways closed for debris removal but main runway re-opened after 30mins.
30 Apr RAF Lyneham UK	DC8-63F of Military Freight Charter	**Airfield closed after Military Charter DC8-63F sheared stbd main gear during line-up.**	Nil	Materiel failure – undetected corrosion suspected.
30 Apr Delhi A/P India	747F of Singapore Airlines	**A/c bounced on landing, hit engine-pod, went around and then landed.**	Nil	Pod badly scraped, accessory gearbox damaged and engine change required.

[1] Air carrier accidents, or other incidents involving serious failures or fatal injuries, investigated by National Transportation Safety Boards.
[2] DISCLAIMER: The information obtained from these National Reports is preliminary, possibly incomplete, and may be supplemented by new findings of fact as the inquiry progresses. These assessments, based on a reading of initial reports, are not intended to assert probable cause or liability, but rather are intended to provide insight pending publication of a final report of investigation. [3] A/P=Airport.
- Data compiled from National Aviation Authority's documents. Preliminary analysis by John Sampson, director of aircraft, engineering & technical operations, International Aviation Safety Association.(IASA)