

**Mr. Ed Block's October Dissenting Opinion To:  
The Final Report Of The FAA's Intrusive Inspection Working Group**

Before commenting on this final report, I feel some historical comments for the record are in order.

- 1.) I was the one that first raised the issue of wire types, and asked that they be noted during ASTF (Aging Systems Task Force) inspections at the first ATSRAC Committee Meeting in January 1999. After much negative debate, it was reluctantly agreed to by the Committee, that this would be done. This decision to note the wire type however, was never done. Instead, on the final report from the ASTF, it was stated that wire type didn't appear to matter in their findings. The fact that there was never any attempt to identify the wire type as originally agreed to, nor any attempt made to ever record this information, totally dismisses this unsupported claim. This was just one of several comments included in my dissenting opinion on that ASTF report. (See Final ASTF Report's Minority Opinion)
- 2.) I gave the Aging Systems Task Force a formal Presentation in Mar 1999 on "Why Wire Type Matters". This resulted in the Intrusive Inspection Group being formed to study wire types.
- 3.) I appeared on the BBC Panorama Show, "Die By Wire" with Mike Nancarrow about Kapton Wiring that lead him to admit that Ed Block was right, wire type does matter.
- 4.) I briefed Tom McSweeney several times on this issue and he totally agrees now that wire isn't wire, and that wire type matters.
- 5.) Based on the above chronology and comments from the former Chairman of the ASTF, I feel directly responsible for the formation of this Intrusive Inspection Group subcommittee.

I have now completed my review of the "fifth" Draft Final Report of the Intrusive Inspection Group Report, that was supposedly prepared by the entire Intrusive Inspection Working Group. In actuality, this report was written exclusively by the Chairman, Christopher Smith. Even though I was involved in the formation of a few paragraphs (arcing and effect of wire type), my words and those of the other members contributing, were quickly changed by the Chairman. This was to negate the direct effect of **wire type** on the flaws found. In the Executive Summary, the reason is given, "The working Group recommends that these conclusions and recommendations be considered when revising best practice documentation and advisory material". This statement came from Beth Erikson directly. She told the FAA Chairman that there would be **no** regulatory action coming out of this report. This manipulation of the final report goes along with the acceleration of the first ASTF report (showing no significant flaws (actually there were 182), as determined by the manufacturers. Here the Chairman of ATSRAC Kent Hollinger told the NEMA representative that the acceleration of the schedules was to counter-balance the NTSB's Report on TWA 800 that would show wire problems in the fleet. Now we are told in advance by the FAA, that there will be no "Regulatory" actions, even though we found arced, burned, chafed power cables, cracked, flammable dust/lint covered, fluid contaminated bundles, aged, and exposed conductors in each of the six aircraft we inspected. My first attempt at review of the first draft document resulted in sixty-five comments. These comments were viewed with obvious disdain by the Chairman, and were referred to as "negative" comments by him at the meeting when reviewed.

This fifth Final Report review has made it apparent that I can no longer contribute in good conscience, anything more to this final report effort. The reasons are as follows:

1. **Findings:** I have received my so-called findings in various formats, some more complete than others.. My own original forms however, were not supplied, nor were any of the original photographs taken, as specified in the protocols, to validate anything. Am I supposed to validate what has been already transcribed without the originals? Am I supposed to simply recall all my original findings, without the use of the photos taken? We were supposed to receive a complete report of all findings and photos taken. We have not. We were asked to simply determine if the flaws found were significant or not. There is no data correlating the significant findings from insignificant ones in this report. Significant was defined as being "squawked" for follow-up action or repair. There was never any discussion on the so-called FISH definition/ determinations discussed in

this report, except for the capitulation to the manufacturers on revising this term to Reportable Significant Condition. I suppose its like being only a little pregnant.

2. **Terminology/Definitions**; we never agreed, as is required, to any of the verbiage contained in this final report. Terms such as FISH (Fleet Imminent Safety Hazard) were never mentioned during any inspection or meeting prior to this report being written by the Chairman. It was changed however, per the protests of Boeing and Airbus, to a “Reportable Significant Condition”, whatever that means. Age related or age independent terms were never included in our inspection criteria. The terms “found by, and “frequency” were also never discussed or defined during our inspections. We never considered nor recorded “service environment” on our inspection forms, nor took note of these so-called conditions. We never considered the words “General Threat Analysis”. We never discussed plausible, or hypothetical situations. My comment #47 for the first Draft Final Report, which said – “Combining the assumptions, multiplied by their probability of existence, divided by the subjectivity and non-standardized training of the inspectors, and then multiplied by the plausible and hypothetical situations = confusion”, for which the Chairman simply responded; “no response”, seems suitable here. All of these newly defined words used above in this description, were taken directly from this final report. We never determined how one would ever discern cracked insulation being from internal stresses in excess of the local strength of the polymer for instance. We were asked, after the inspections and without photographs, to tell if thermal damage was due to fire or elevated temperatures. We are then being asked to discern environments that include our definition of flammable materials, and then to decide (without drawings or schematics), whether or not there were wires that supply current to a system required for flight. We are then asked to discern low humidity, non-flammable conditions and again whether critical wires were present. We are then asked to combine all of these factors or guesstimates that we didn’t inspect for or record, into a table of criticality. How can anyone make assumptions on data not collected? Conditions such as; undesirable, severe, or critical were never discussed nor even estimated by inspectors, nor are they in a position to do so now. We never defined the word explosive or flammable materials (i.e. Mylar). We never reviewed wiring diagrams nor made any attempt to establish what wires were critical, or what would constitute a critical system. In Venice, the Boeing representative acknowledged that all wires are considered critical. Yet we are now being asked to determine these influencing factors such as moisture and temperature, and to then hypothetically determine the consequences of so-called plausible failures. This is not data-driven as originally agreed to by the FAA, but rather simply flawed subjective data.
3. **TESTING**: We had agreed after much debate on certain specific tests to be performed on all the wire samples. This agreement has been replaced by, “some”, “may”, and a lot of subjective analysis by the Chairman, on the validity of these previously agreed upon tests. The testing was already supposedly established but due to some logistic problems, it is now in a state of flux. There is no list of what tests have been conducted on which samples, nor any clear indication presently on what tests will be done. A review of the reports submitted by Lectromec, Eclipse, Sandia, and Raytheon attest to this fact.
4. **PROTOCOLS**: Aircraft were to have been selected by the Working Group, not the Chairman alone. These assessments were not done. Formal decisions were to be recorded by the Chairman. This was not done. The FISH concept was not even developed until after the third inspection was complete, and certainly not referred to as such. The report mentions that no FISH items were found on the L-1011. I personally found exposed conductors in the C/B panels in the cockpit that would have been sufficient to raise to the manufacturer, had there been such a program in place at that time. The concept of what is a safety flaw, significant, FISH, or now the Reportable Significant Condition, seems missed entirely here. If all of these significant items were found after all of the manufacturers’ and operator’s normal systems for maintaining these aircraft in an “airworthy state” apparently failed, how then can you say they would have been typically found and corrected by existing maintenance actions?

5. **INSPECTION/FINDINGS:** There were “FISH”, or Reportable Significant Condition determinations on the second DC-9 not listed in the report including; shorting and burned conductors in the tail cone and wings. There were also sufficient FISH findings found by me on the L-1011 in the cockpit but a vote was not taken. There is no mention of any significant findings being found on any table. The numbers for the Intrusive Inspection Group’s significant items should be defined, and should match those in tables 2.1 and 2.4.
6. **CONCLUSIONS:** This report is still incomplete and flawed for the reasons stated above. The two requirements for this group were to assess the usefulness of visual inspections, and to assess the state of the wiring in aging aircraft. Visual inspections have proven to be totally inadequate. The condition of the wiring in each of the aircraft I inspected was deplorable. Inches high piles of flammable dust and lint were everywhere. Multiple incidences of contamination of wire bundles with blue toilet water were also found. Serious flaws in installation and maintenance practices were clearly evident. Exposed conductors, with evidence of arcing and burning, were found in nearly every aircraft, including those wired with flammable Polyvinyl Chloride, and the severe chafing of explosive Kapton. At the Venice Inspection, Boeing’s representative said that any wire is potentially critical, and I would have to agree. No amount of false categorization, obscure definitions, or the scattering techniques used thoroughly in this report, can diminish the safety of flight issues I witnessed personally. No honest, objective person could ever say that the wiring we inspected, was anything less than dangerous. That is the state of the wiring in aging aircraft, simply dangerous. This report blatantly attempts to camouflage the simple basic truths outlined here, by using misleading definitions and irrelevant categorizations. It may say the significant items would be addressed by existing maintenance practices, but they obviously weren’t. These flaws still existed in these aircraft. I agree with the NTSB’s chief Aviation Investigator, Bernie Loeb where he said, “ It is not rational to say that we can predict all failure modes. Failure modes and effects analyses are not always reliable. They may be based on unrealistic or flawed data. We need more focus on potentially catastrophic results regardless of the probability of failure”. It would seem that Mr. Bernie Loeb has already read this report. This data is flawed, except where it has been determined that there are between 2-5 breaches in insulation/1,000 feet on these aircraft. That would mean that on a typical 747, there would be approximately 3,750 breaches. The FAA’S Beth Erickson may refer to these breaches and the resultant arcing as “otherwise harmless arcs”, but when combined with flammable Mylar insulation, inches of flammable dust and lint, and explosive fuel vapors, it is a recipe for disaster. I ask that this dissenting opinion be attached to the final report. It is sad that there need be no further debate on the issues raised here. If I am wrong then prove it. If I am right, then the lives of those who will be lost due to the watering down of this final report into purely advisory and best practice language, will be upon those who choose to read this and ignore it because the results aren’t pleasant. It is indeed wrong for someone in a crowded theater to yell “FIRE”, that is of course if there is no fire. Here there clearly is a fire and to not yell “FIRE” now, would be criminal.

Respectfully submitted,  
Edward B. Block-Vice Chairman  
IASA-USA.

**Chairman's Response to Mr. Ed Block's  
October Dissenting Opinion To  
The Intrusive Inspection Working Group Final Report**

ATSRAC operating procedures require that a dissenting member "document his position, summarize his understanding of the group's position, and state why he believes his opposing position is superior." In this regard, the text of Mr. Block's document does not constitute a legitimate dissenting opinion. Mr. Block chose, instead, to critique the Chairman, the FAA, and the process by which the working group achieved its results. Though the Working Group is not obliged to respond to such comments its silence should not be misconstrued as implying that it agrees with Mr. Block's description of events or attribution of positions.

**Summary of Mr. Block's Dissent**

In Mr. Block's title he refers to the FAA's Working Group.

Mr. Block prefaced his dissenting opinion with a chronology of events as he understood them.

Mr. Block made and has refused to withdraw the following statement: "In actuality, this report was written exclusively by the Chairman, Christopher Smith." He went on to accuse me and others within the FAA of manipulating the content of the report. Specifically, he suggests that the FAA is intent on dismissing the importance of wire type.

Mr. Block contends the data collection and analysis was seriously flawed, and that the group inappropriately reinterpreted data. Mr. Block claims to have had little or no opportunity to review and validate original data.

Mr. Block contends that there was a lack of

**Chairman's Response**

The Working Group is responsible first and foremost to ATSRAC.

Because this chronology does not address the report, I have no response. This should not be construed to imply that I tacitly support the accuracy of this chronology.

I did, in fact, draft much (but not all of the document). Notwithstanding, the document is representative of the great majority of members. The draft submissions of everyone on the Working Group – myself included – were subject to review and concurrence by the Working Group.

Where Mr. Block's submissions proved to be unsupportable by the data, the text was appropriately changed or omitted. Mr. Block has had and will continue to have full opportunity to argue the merits of his submissions to the Working Group.

Mr. Block would seem to have everyone believe that the Working Group does not acknowledge the effect of wire-type on performance. As the report shows, this is clearly not the case.

Mr. Block's attribution of a statement to Beth Erickson is simply wrong. Ms. Erickson never interfered with the technical nature of the report. Furthermore no statement in the report rules out regulatory action. (It should be noted that, at the suggestion of the ATSRAC, the text containing the recommendation regarding implementation has been replaced with a more detailed discussion of how the several recommendations should be addressed. Aware of this, Mr. Block still chose not to revise his opinion.)

The validation of the findings did take longer than anticipated, but for those findings most relevant to our report (wire findings), the validation exercise was complete. We did have original data sheets and we did have pictures available.

The refinement of terminology to more accurately depict the actions of the working group is perfectly legitimate. Nowhere did we re-invent the data or results.

The Working Group is confident of the rigor of this project's

### **Summary of Mr. Block's Dissent**

rigor in the process exemplified by informal, changing, or imprecise definition of terms.

Mr. Block contends that the testing protocols were not executed rigorously.

Mr. Block contends that the inspection protocols were not rigorously enforced and that the chairman made arbitrary decisions in this regard. In particular, Mr. Block feels that certain findings were not classified appropriately.

Mr. Block concludes that the Intrusive Inspection Working Group Final Report "blatantly attempts to camouflage the simple basic truths outlined [in his dissenting opinion], by using misleading definitions and irrelevant categorizations."

There is clearly little common ground on which we stand. I invite the ATSRAC and other interested parties to read both the report and Mr. Block's dissenting opinion in order to ascertain the merits of each.

Christopher Smith  
Chairman, Intrusive Inspection Working Group

### **Chairman's Response**

execution and the objectivity of the results. The report fully documents the project and its results, and readers can judge for themselves whether or not the Working Group exercised sufficient rigor.

Again the report is clear on what we did and did not do. There is also a statement of how and why testing plans may have required alteration due to circumstance.

There was a de-briefing after each inspection in which we discussed the most significant finds. At each such briefing we discussed whether any of our most significant finds were sufficiently important to bring to the immediate attention of the manufacturer.

**Comments On The Intrusive Inspection Group Report**  
**Submitted By Request 4 December 2000**  
**By: Edward B. Block, Vice Chairman IASA**

The Conclusions and Recommendations Section, as well as table 7.5, require some basic analysis as to what we are trying to present. What are cracks? Are they the source of otherwise harmless arcs that may or may not ignite flammable Mylar or Tedlar insulation Blankets? They are according to the FAA who said in their Airworthiness Directive effective 30 June 2000, "Such insulation blankets could propagate a small fire that is the result of an otherwise harmless electrical arc and could lead to a much larger fire." Are they what the NTSB stated, which allowed stray signals from the ship's wiring to enter the fuel tank wiring of the TWA 800 aircraft? We would first have to consider the environment right? Wrong, the TSB of Canada has stated on 4 December 2000 that, "there are many areas within the fuselage- such as the attic area above the ceiling- that are not "designated fire zones." That means they contain neither detectors nor firefighting equipment, even in places where they contain materials such as wiring and insulation that can sustain smoke or flames." The Intrusive Inspection Group has already determined/recognized that PVC wiring is a flammable material, and that arcing Kapton can ignite Mylar and Tedlar insulation blankets. The FAA actually ran tests in 1991 that proved that fact. Sadly there had to be an SAS aircraft in 1993, and at least four other catastrophic events including Swissair 111, before the FAA gave operators 5 additional years to replace them. The FAA's Aging Transport Non-Structural System Plan declared in 1997, "Generally, a cracked wire does not have to be replaced but a split wire must be replaced or repaired (spliced). A split wire is one where the conductor can be seen through the crack." Beth Erickson declared on October 11, 2000 that, "The cracked wires don't signal an immediate safety problem." The Navy in their FY 1983 request for \$360 million said, "wire insulation embrittlement and cracking have resulted in wire to wire shorts. Some of the wire failures have been observed as spurious signals on control wires causing spoilers to stick in the up position, inadvertent autopilot commands and power shorts which disable the autopilot completely". They also indicated it was a safety change. The NTSB in 1992 asked Boeing to redesign their autopilots because spurious signals were causing uncommanded inputs to the autopilots. It was said that it was unknown where these spurious signals were coming from. In 1995, the FAA said they knew nothing about spurious signals. So what is this elusive crack? The Intrusive Inspection Group Report says that it is, "A breach or partial breach in the wire insulation resulting from excessive embrittlement of the insulation." So what is a breach? This is defined as, "For lack of a better term, we use the word "breach" to indicate any unexpected potentially conductive path through the wire insulation. This may include exposed conductor at the end of a cut wire or non-environmental splices, as well as insulation damage. We differ in our delineation from the earlier ASTF Report where cracked insulation is, "Cracked/Abraded Insulation", and just say cracked. In the next table however, we somehow group these two, previously distinct categories into one; cracked/abraded insulation. Cracking is later used to describe topcoat damage, but not to the conductor. It is finally described in Chapter 7, "A breach in the wire insulation resulting from internal stresses in excess of the local strength of the polymer." In table 7.5 we use this scenario for cracked insulation, "Concentrations of cracks (through to the conductor) may under special circumstances result in arcing or shorting. So I guess it depends on your definition of "is" then as to whether cracks matter. Are cracks down to the conductor? Is a breach a crack? Is a crack a breach? Is a crack defined as abraded insulation? Is split (must be replaced, from the FAA's original report) the crucial word missing here?

What then is a significant finding? In the ASTF report it is defined as a safety of flight issue. In the Intrusive Inspection Group it means that it would be squawked for follow-up action or repair. All significant safety of flight (i.e. in-flight fire), items (182) of the ASTF, were sent to the OEMs for resolution. None were curiously found to be significant. It is pointed out by Boeing however that, "Noted items that were not deemed to be flight-safety issues, but required further analysis, were provided to the airframe manufacturers for evaluation. All the significant items noted during the non-intrusive wiring inspections were corrected on the airplane prior to reentry into revenue service." This would seem there were two classes of significant items in the ASTF when there was actually only one definition used by the ASTF. In the Intrusive Inspection Group Report, there are again two different categories; Significant items, meaning they needed repair, and

RSCs or Reportable Significant Conditions. RSCs supposedly rise to the evaluation level of whether there is a fleet-wide problem, whereas **all** the ASTF's significant findings were sent to the OEMs. So what is a significant item versus a RSC? Was the intent of our representative fleet assessment to find Airworthiness or Service Bulletin issues/concerns? Was the purpose of both these inspections, ASTF and Intrusive, to see what conditions exist, or to only find fleetwide problems? I think finding 7 RSCs out of 6 aircraft inspected is pretty definitive. We found charred, burned, arced, contaminated, exposed conductors, inches high piles of flammable dust and lint, poor installation/maintenance practices, and plenty of SWARF.

The charter for the Intrusive Inspection Group was to assess Visual Inspection, and to assess the state of the wiring in these aging aircraft. The fact that visually we found only a small portion of the total significant items indicates that visual inspection is only useful in assessing a particular zone after it has deteriorated to the point where it is guaranteed that you will positively find multiple problems. It has been found that visual inspection is limited to detecting only certain failure modes. It is apparent that this only refers to the outside of the bundles that are in fact accessible. It is therefore inadequate to discern all the failures that can result in the loss of an aircraft. Jane Garvey already answered this point where she said, "Currently there are no means available to discern a catastrophic wire failure short of the accident investigation phase." What more proof do you need, or is the Administrator incorrect?

The conditions of the aircraft examined ought to give everyone pause. Based on the already identified conditions found, there is no further need to gauge the problem. It is systemic. We have a fleet of aircraft where design criteria and materials choices were based more on politics and personality according to Boeing. We have a problem that goes beyond the cost-benefit analysis evaluations. We have been asleep at the wheel in regard to wire type selections and certifications. If the isolated problem of flammable Mylar, (not the only flammable insulation blanket in use, i.e. Tedlar), is given 5 years to fix, how long will the FAA give the operators to fix the flammable PVC wire problem? How many AirTran's Flight 956 type operators can be brought into existence in Florida where they get to enjoy the benefits of the Boeing exemption, where you can't sue if the aircraft is twenty years old? How many Swissair 111s are needed to expose the arcing problems with Kapton, and the flammability of Mylar (I have 72)? How many wire related incidences/accidents are needed to counter Boeing's claim that, "the condition of wiring found on airplanes at or exceeding 20 years of age is **satisfactory**,"?

Our recommendations should be that the state of the wiring found is, as the White House affirmed, "A National Concern". We need to appoint a National Resource Specialist to wiring. We need to prioritize wiring in regard to wire type. We should at least stop putting wire known to be toxic, flammable, and smoky into the new 777s, 767s, and 747s. We should determine the most likely candidates for grounding and rewiring. It is being done on MD-11s, and L-1011s at about \$4 million/aircraft. If, as the Intrusive Inspection Group found, that PVC is flammable, it should not be allowed on any aircraft flying, regardless of the grand fathering clauses that have been used. If Kapton has been found to be explosive, lets stop using it for power feeders as AC 25.16 says. Lets assess its continued use in the pressurized zones of the aircraft as well. Has there been any MSG-3 testing to see how far a molten BB of Arcing-over Kapton will travel to an isolated circuit? Are current tests adequate to certify aircraft wire? The answer is clearly no. An antiquated flammability test won't due it. Is there an arc-tracking test? A toxicity test? A smoke-generation test? The answer is sadly no. Who is in charge of wiring at the FAA? What is there background/experience? Should OEMs continue to disallow all FAA Advisory Circulars, military and industry testing, and the recommendations of the Intrusive Inspection Group about not mixing different wire types in the same bundle? What is the service life of aircraft wiring? 10K, 50K, based on what? These are but a few of the recommendations and conclusions that should be in this Intrusive Inspection Group Report.

**Chairman's Response to Mr. Ed Block's  
December Dissenting Opinion To  
The Intrusive Inspection Working Group Final Report**

The following response is supplied in accordance with ATSRAC Operating Procedures.

**Summary of Mr. Block's Dissent**

Mr. Block contends that the Intrusive Inspection Working Group has played down the significance of its findings. In particular, Mr. Block contends that any crack in an aircraft wire is a serious threat to aircraft safety.

Mr. Block suggests these courses of action:

1. Declare wiring a "national concern"
2. Appoint a wiring National Resource Specialist
3. Prioritize wiring according to type
4. Prevent the future installation of toxic, flammable, and smoky
5. Ground and re-wire aircraft on a priority basis

Again, I invite the ATSRAC and other interested parties to read both the report and Mr. Block's dissenting opinion in order to ascertain the merits of each.

Christopher Smith  
Chairman, Intrusive Inspection Working Group

**Chairman's Response**

Cracks in wire can be precursors to more serious problems, but in isolation or without other deleterious conditions present they are generally inconsequential. Addressing the issue of cracks as precursors to the development of more serious conditions is consistent with the FAA philosophy of prevention of safety hazards at the earliest possible stage.

Aircraft operators replace any defective wire they find. Small defects may go undetected for some time, but their low detectability correlates well with their lack of significance. As wire defects become more serious they become more obvious allowing the operator to take timely corrective action.

The work of ATSRAC and the Intrusive Inspection Working Group will allow the FAA to improve safety margins even more by enabling the specification of earlier, more effective detection and by establishing effective countermeasures to mitigate the consequences of wire failure.

The Intrusive Inspection Final Report is a rigorous technical document whose conclusions and recommendations are the result of the formal analysis of data collected from six aircraft. The Working Group will not diminish the strength or integrity of this report by incorporating the personal perspective of any of its members.

Moreover, the multifaceted approach suggested by the Working Group will almost certainly do more to ensure the safety of aging commercial aircraft, than Mr. Block's recommendations to appoint a National Resource Specialist and to prohibit certain wire types for new aircraft.

As for grounding and rewiring aircraft, Mr. Block cannot assure us that this drastic invasive action would result in safer aircraft. The magnitude of such an endeavor would almost certainly result in errors, which could introduce more safety hazards than those few posed by small wire defects.

Regarding flammability, the FAA Intrusive Inspection Working Group observed that PVC is less fire-retardant than newer wire types. It made no discovery of fact previously unknown to the aviation community.