Surviving The Boeing 737 Max

During February 2019 I rode a Boeing 737 Max from San Francisco, California to Kona, Hawaii. Here is the view from my seat:

What you are looking at is the in-flight entertainment system. Yes, there is no in-flight entertainment system! Instead, they give you a holder for your cellphone that can stream in-flight movies over Wi-Fi. For your cellphone to work you need to download the app. The pilot let us know this and I was able to download the United Airlines app onto my Motorola e5 Android cellphone prior to taking off. Unfortunately, the app does not let you watch the movie. So, for over five hours I had no in-flight entertainment system! Looking around the cabin, I saw many other people in the same situation. Bored with no working entertainment system. The lady in front of me did get it to work:
There is a problem with streaming Wi-Fi from hundreds of devices and that is the issue of Electro-Magnetic Interference (EMI). Hundreds of devices that are plugged in, charging and emitting radio frequencies fills the airplane with electromagnetic energy that can interfere with other electronic products. That interference generally shows up as misbehaving products that appear to be faulty. Airplane electronics are not immune to the effects of electromagnetic interference and can also give problems when the levels of it get excessively high.

The electromagnetic interference environment of the airplane changes with every flight, as it is a function of the total amount of electronic products the flight crew and passengers have plugged in and how much wireless radiation they are emitting. A relatively empty flight would be like a microwave oven on defrost, whereas a full flight with every passenger using their electronic products would be like a microwave oven running at full power.

Sources of electromagnetic interference on airplanes are:

- Engines.
- RADAR.
- Internet router.
- Wi-Fi.
- In-flight entertainment systems.
- Satellite television.
- Communications systems.
- Electronic control systems.
- LED lights.
- Lightning.
- Static.
- Electrical generators.
- Inverters.
- Motors & actuators.
- Initial take off places the airplane with a direct line of sight of most high powered transmitter systems in the area, such as smart meters, cell phone towers, RADAR, television, radio, government and commercial transmitters. This increases the ambient power levels of electromagnetic interference radiation.
- Increasing altitude causes most forms of electromagnetic interference radiation to increase, including radioactive ionizing radiation and radiation from satellites.

Common sources of flight crew and passenger electromagnetic interference on airplanes are:

- Tablet computers.
- Laptop computers.
- Phones.
- Power adapters.
- USB power banks.
- Wireless transmitting devices, such as headphones, fitness trackers, watches, camera’s, and so on.
In general, a single person may have multiple products that are causing electromagnetic interference. An example of this is a single passenger carrying a personal cellphone, a company cellphone, a tablet computer, a laptop computer, USB power bank, wireless headphones and a wireless fitness tracker. These can generate the following forms of electromagnetic interference:

- The power adapters may generate dirty electricity and emit many frequencies of energy.
- Cellphones, tablet computers, laptop computers, USB power banks, wireless headphones and wireless fitness trackers may emit many frequencies of energy.

Here are some videos of dirty electricity and electromagnetic interference:

- Dirty Electricity Alert: Electrical outlets now installed into airplane seats
- Dirty Electricity under passenger seat of airplane
- Dirty Electricity on airplane
- Earthing (Grounding) System Producing Radio Waves - A Human Health Hazard?
- Harmonics & Dirty Electricity - Part 1
- Harmonics & Dirty Electricity - Part 2
- Dirty electricity created by CFL and LED bulbs
- Testing CFL, LED, and Conventional Light Bulbs for RF Emissions
- The Field Emissions of an Inverter with LED and CFL Light Bulbs
- Testing USB Power Adapters for Electromagnetic Interference Emissions
- How to avoid EMF radiation risks from computers, microwaves, cell phones, and other household items
- Is Flat Screen Digital TV Electromagnetic (EMI) Radiation Making You Ill?
- 2011 Laptop Computer EMI Emissions displayed on an Oscilloscope
- Laptop Computer Electric and Magnetic Fields Electromagnetic Interference (EMI) Demonstration
- Laptop Computer Electromagnetic Interference (EMI)
- Is Your Laptop PC Polluting Your Home With Electromagnetic Radiation?(WiFi)
- WiFi radiation exposure on airplane
- Airplane WiFi: How Much RF Radiation?
- You won't believe radiation on an airplane vs Chernobyl - all flight attendance must watch.
- radiation exposure during an intercontinental flight

So how does this affect the electronic systems of the airplane? Electromagnetic interference issues are some of the hardest problems to troubleshoot, as they come and go. An airplane sensor in the sky that is being affected by electromagnetic interference and is giving bogus readings from a full load of passengers with their electronic products may test perfectly fine when it is on the ground, completely empty of passengers and in a low electromagnetic interference environment. The aircraft technician will likely replace the faulty part only for the new part to show the same problems on a later flight that has high electromagnetic interference on it.

How does electromagnetic interference affect people? It can make people feel lousy with the following range of symptoms (Source: https://www.electricsense.com/):

- Prickly skin – your skin feels tingly and itchy, or you might feel a burning sensation when you're around WiFi devices and computers.
• Headaches – you experience strange debilitating headaches, pressure to the head like your head is in a vice or you experience moments when you feel zapped and confused….this is one of the most common symptoms.
• Heart and respiratory problems – heart palpitations and tightness in the chest are common symptoms, you might feel like your heart is pounding or racing.
• Difficulty concentrating – you find it harder and harder to concentrate, experience mental blocks and memory loss.
• Poor digestion – you have stomach pains when you eat certain foods that previously didn’t affect you.
• Difficulty sleeping – this interferes with your daily energy level, mood, and ability to accomplish tasks.
• Dizziness and loss of balance – you feel dizzy and disoriented, especially when talking on a cell phone or around WiFi.
• Tiredness – no matter how much you sleep, you are in a permanent state of fatigue.
• Ear pain and ringing in the ears – you can hear a ringing or buzzing in your ears. A buildup of wax and abnormal growth in the hairs of your inner ear are not unusual as your ear tries to protect itself.
• Pain in joints and muscles – you experience unexplained joint pain and muscular pain.
• Stomach pains – you have an increasing sensitivity to different foods and difficulty digesting.
• Muscle cramps – often in the feet and legs. Muscle spasms, particularly at night, are common too.
• Depression – you experience feelings of hopelessness and despair.
• A metallic taste in the mouth – particularly if you have metal fillings.

It is undesirable for pilots to be in a high electromagnetic interference environment, as it is known to degrade mental functioning and bring on confusion. Not the symptoms that you want the flight crew to display during a crisis!

Most countries grounded the Boeing 737 Max due to ongoing safety concerns after the second fatal crash. The USA left them in service. Why was this? The Federal Aviation Administration (FAA) is widely regarded as a captured government agency that is under the influence of the industry that it is supposed to regulate. It carries out what the industry wants, which is to continue flying suspect airplanes to maximize industry profits. It gambles with many human lives. The Federal Communications Commission (FCC) that regulates electromagnetic interference is also widely regarded as a captured government agency.

I did not experience any of the symptoms on my flight, other than those from my pre-existing conditions. While unhappy that I had no in-flight entertainment, I was also relieved to see that not many people were using the wireless movie system. It was a relatively low electromagnetic interference environment. There were no problems on my flight, other than turbulence. I survived the Boeing 737-Max on this occasion, but will be avoiding traveling on it in the future. The relatively new airplane is currently averaging one total loss per five months and other pilots have filed reports of abnormal loss of altitude behaviors of the airplane.
The USA eventually joined every other country that banned the Boeing 737 Max from flying. It was the last country flying them to do so. Ethiopian Airlines was smart and did not send the black boxes to the USA for analysis and sent them to Europe instead. Suspicion has narrowed down to the elevation control system of the Boeing 737 Max. A similar problem led to the total loss of Alaska Airlines Flight 261 that was traced to poor maintenance.

Interesting Quotes & Internet Links

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Boeing 737 MAX
- “About the Boeing 737 MAX” [https://www.boeing.com/commercial/737max/]
- “Creating The 737 Max” [http://www.boeing.com/commercial/737max/creating-the-737-max/]
• “The Boeing 737 MAX is a narrow-body aircraft series designed and produced by Boeing Commercial Airplanes as the fourth generation of the Boeing 737, succeeding the Boeing 737 Next Generation (NG). The new 737 series was launched on August 30, 2011.[7] It performed its first flight on January 29, 2016.[1] The new series gained FAA certification on March 8, 2017.[8] The first delivery was a MAX 8 on May 6, 2017 to Malindo Air,[9] which placed the aircraft into service on May 22, 2017.[2] The 737 MAX is based on earlier 737 designs. It is re-engined with more efficient CFM International LEAP-1B engines, aerodynamic improvements (including distinctive split-tip winglets), and airframe modifications. The 737 MAX series is offered in four variants, typically offering 138 to 230 seats and a 3,215 to 3,825 nmi (5,954 to 7,084 km) range. The 737 MAX 7, MAX 8, and MAX 9 will replace the 737-700, -800, and -900, respectively. Additional length is offered with the further stretched 737 MAX 10. As of January 2019, the Boeing 737 MAX has received 5,011 firm orders and delivered 350.[10] The 737 MAX 8 has suffered two fatal crashes in October 2018 and March 2019.[11] Many airlines and regulatory authorities have suspended operations of the aircraft, with the notable exceptions of the United States and Canada.” [https://en.wikipedia.org/wiki/Boeing_737_MAX

• “Boeing 737 MAX: a plane of compromise...To make the LEAP engines fit under the wings, the nose landing gear had to be extended to ensure enough distance to the ground. On top of that, the new engines had to be mounted further apart from the outboard wing assembly, and that changed the plane's aerodynamics. This in turn causes the plane to lift its nose, which triggers a compressor stall in the worst case scenario, which in turn can lead to a crash….To counter this possible effect, Boeing uses a special technology called Maneuvering Characteristics Augmentation System (MCAS), which automatically lowers the nose to head off an aerodynamic stall.” [https://www.dw.com/en/boeing-737-max-a-plane-of-compromise/a-47852944

Boeing 737 MAX Crashes

• “On October 29, 2018, Lion Air Flight 610, a 737 MAX 8 registration PK-LQP, crashed into the Java Sea 13 minutes after take off from Soekarno–Hatta International Airport, Jakarta, Indonesia. The flight was a scheduled domestic flight to Depati Amir Airport, Pangkal Pinang, Indonesia. All 189 onboard died. This was the first fatal aviation accident and first hull loss of a 737 MAX. The aircraft had been delivered to Lion Air just two months before.[120][121] Following the Lion Air crash, Boeing issued an operational manual guidance, advising airlines how to address erroneous cockpit readings. The accident is under investigation,[122] with the final report expected to be released between August and September 2019.[123]. On March 10, 2019, Ethiopian Airlines Flight 302, a 737 MAX 8 registration ET-A VJ, crashed approximately six minutes after takeoff from Addis Ababa, Ethiopia,[124] on a scheduled flight to Nairobi, Kenya,[125] killing all 149 passengers and 8 crew members on board. The aircraft was only four months old at the time.[126] The cause of the crash is unclear as of March 10, 2019, though the aircraft's vertical speed after takeoff was reported to be unstable.[127]. On 13 March 2019 it became known that pilots on at least two 2018 US flights filed safety concerns after the nose of a 737 MAX tilted down suddenly when they engaged the autopilot.[128]” [https://en.wikipedia.org/wiki/Boeing_737_MAX#Accidents_and_incidents
Boeing 737 MAX Pilot Complaints

- “U.S. Pilots Reported Issues With the Boeing 737 MAX 8 Last Year...Airline pilots on at least two U.S. flights have reported that an automated system seemed to cause their Boeing 737 Max planes to tilt down suddenly.” [http://time.com/5550449/pilots-boeing-737-max-issues/]
- “Pilots Complained to Feds About Boeing 737 Max 8 Months Before Crash...Pilots voiced safety concerns about the Boeing 737 Max 8 to federal authorities months before the fatal Ethiopian Air crash, The Dallas Morning News reports. At least five complaints were reportedly found about the model in a federal database, all of them concerning a “safety mechanism” which was cited in the preliminary investigative reports of the Lion Air plane crash in Indonesia that killed 189 late last year. More specifically, the complaints reportedly referenced issues pertaining to a takeoff “autopilot system” and situations where the plane is “nose-down” while trying to gain altitude.” [https://www.thedailybeast.com/pilots-complained-to-feds-about-boeing-737-max-8-months-before-crash]
- “The Jump-Seat Pilot and the Boeing 737 Max...The Bloomberg story says that just one day before the fatal Lion Air accident, the very same airplane had suffered a similar pitch-control anomaly. But in this preceding case, an additional pilot, riding in the jump seat of the cockpit, recognized the problem and overrode part of the errant control system. The plane flew on to its destination.” [https://www.theatlantic.com/notes/2019/03/jump-seat-pilot-and-boeing-737-max/585301/]

Grounding The Boeing 737 MAX

- “The world is grounding 737 Max planes. Why isn't Boeing?..."Not grounding the jets puts Boeing in a very bad light," said Mary Schiavo, a CNN aviation analyst and former inspector general for the US Transportation Department.” [https://www.cnn.com/2019/03/12/business/boeing-max-737-grounding/index.html]
- “Chinese air safety regulators gain global influence as FAA refuses to ground Boeing 737 Max...Canada and other long-time American allies, including the U.K. and Australia, broke convention by snubbing an authority that has defined what’s airworthy — and what’s not — for decades. New Zealand, the United Arab Emirates and Vietnam also joined Wednesday in blocking the 737 Max, helping legitimize China’s early verdict on Monday that the plane could be unsafe.” [https://www.latimes.com/business/la-fi-chinese-regulators-faa-boeing-737-max-20190313-story.html]
- “FAA says evidence shows similarities between Ethiopia and Indonesia plane crashes...To date, 385 Max aircraft have been delivered, according to Flight Global, of which 344 are the Max 8 variant.” [https://www.msn.com/en-us/news/us/faq-says-evidence-shows-similarities-between-ethiopia-and-indonesia-plane-crashes/ar-BBUJ1sr?ocid=spartanntp]
- “Trump orders FAA to ground Boeing 737 Max 8, Max 9 planes...The National Transportation Safety Board, considered one of the world's foremost investigative aviation agencies, wanted its experts to analyze the black boxes, but Ethiopian authorities want another country to do it, fearing American analysts may be influenced by the fact Boeing is a major U.S. company.”
Boeing 737 MAX Crash Analysis

- “It Can Fly Itself Into The Ground”: Aviation Expert Warns Boeing 737 Max Planes Defective As President Trump Grounds Aircraft...“It’s a defective product, it’s as simple as that. The Boeing 737 Max 8 is defective, it can fly itself into the ground. The pilot has to overcome those control forces and take emergency action to prevent that from happening. It’s a good thing that it’s grounded,” said Gagliano.”
- “Exclusive: High speed, then a failed climb for doomed Ethiopia flight... Ethiopian Airlines flight 302, which crashed killing 157 people, had an unusually high speed after take-off before the plane reported problems and asked permission to climb quickly, said a source who has listened to the air traffic control recording. A voice from the cockpit of the Boeing 737 MAX requested to climb to 14,000 feet above sea level – about 6,400 feet above the airport – before urgently asking to return...”
  https://www.oann.com/exclusive-high-speed-then-a-failed-climb-for-doomed-ethiopia-flight/
- “U.S. says 737 MAX safe to fly after Ethiopia crash; Boeing shares dip...“The plane was very close to the ground and it made a turn. We looked and saw papers falling off the plane,” Malka Galato, the farmer whose land the plane crashed on, told Reuters. “Cows that were grazing in the fields ran in panic...There was smoke and sparks coming from the back of the plane.” The plane tried to climb but failed, then swerved sharply trailing white smoke and objects including clothes before crashing, said farmer Tamirat Abera.”
- “Black boxes from crashed Boeing 737 Max 8 arrive in Paris after Ethiopia refuses to send them to the U.S...Several pilots in the United States, China, Indonesia and elsewhere have complained of difficulties in controlling the airplane, according to a growing number of media reports from around the world this week.”
- “Why France is analyzing Ethiopian jet’s black boxes...Peter Goelz, a former managing director of the NTSB who is now an aviation consultant, said Ethiopian investigators likely avoided sending the data to the U.S. because its Federal Aviation Administration certified the airworthiness of the Max and has a relationship with manufacturer Boeing. The FAA’s reluctance to ground the planes when most of the world already had done so might also have played a role, Goelz added.”
• “Boeing 737 Max that crashed in Ethiopia was set to dive, a piece of wreckage hints...The so-called jackscrew, used to set the trim that raises and lowers the plane’s nose, indicates that the jet was configured to dive, based on a preliminary review, according to a person familiar with the investigation. The evidence helped persuade U.S. regulators to ground the model, said the person, who requested anonymity to discuss the inquiry.”


• “Recent Boeing 737 MAX Crashes May Be the Result of a Single Faulty Sensor...The sensor in question is an Angle of Attack (AoA) sensor, a small, wing-like mechanism that sprouts from the lower front side of the plane and mechanically detects the angle between the wing and the airflow rushing past the airplane.”

https://jalopnik.com/recent-boeing-737-max-crashes-may-be-the-result-of-a-si-1833380459

• “Ethiopian Airlines black boxes showed 'clear similarities' with Lion Air crash: ministry...Both planes were Boeing 737 MAX 8s, and both crashed minutes after take off after pilots reported flight control problems.”

https://www.reuters.com/article/us-ethiopia-airplane-black-box-idUSKCN1QY0RP

• “Ethiopia and Indonesia crash parallels heap pressure on Boeing...Analysis of the cockpit recorder showed its “angle of attack” data was “very, very similar” to that of the Lion Air jet that went down off Jakarta in October, killing 189 people, a person familiar with the investigation said.”

https://www.reuters.com/article/us-ethiopia-airplane-idUSKCN1QZ1EE

• “Boeing, FAA questioned about safety of 737 MAX safety system days before Ethiopian Airlines crash...An investigation by the Seattle Times included reporters questioning Boeing and the FAA about potentially unsafe practices related to the approval of the controversial Maneuvering Characteristics Augmentation System -- the system that's been at the center of speculation in the Ethiopia crash investigation and the probe of the October crash of a Lion Air jet. The Times said its reporters were pressing officials at both organizations at the beginning of March, mere days before the Ethiopian Airlines crash that killed all 157 people on board.”


• “Crashed jets reportedly lacked key safety features because Boeing charged extra for them...Lion Air Flight 610 and Ethiopian Airlines Flight 302, which crashed within five months of each other, were brand new but were not equipped with an angle of attack indicator or an angle of attack disagree light, the paper said. The angle of attack indicator determines how much the plane's nose is tilted, and the disagree light is activated if the jet's sensors are giving contradictory signals.”

https://www.cnbc.com/2019/03/21/crashed-boeing-jets-lacked-key-safety-features-that-were-add-ons.html

• “U.S. Department Of Transportation To Form Expert Panel Review FAA Certification Of Boeing Max Jets...Boeing has said it is making changes to its software on the Max. The company announced it would now make standard an indicator light that warns pilots of a sensor malfunction that could cause its anti-stall system to activate unnecessarily...A U.S. airline source said that feature would cost roughly $80,000 extra on a plane with a list price of about $120 million.”


• “Regulators knew before crashes that 737 MAX trim control was confusing in some conditions: document...U.S. and European regulators knew at least two years before a Lion Air crash that the usual method for controlling the Boeing 737 MAX’s nose angle might not work in
Boeing’s 'single point failure': Why was there no backup system on 737 Max jet?...mystery still surrounds why the software was designed to be dependent on a single outside sensor though it was equipped with two, triggering a chain of events that led to the crashes of Lion Air and Ethiopian Airlines jetliners less than five months apart. Boeing "violated a basic principle of aircraft design by allowing a single point failure to trigger a sequence of events that could result in a loss of control," said Brian Alexander, an attorney for a law firm specializing in aviation accidents

Boeing Confirms Additional Problems With Boeing 737 Max Flight Controls...Boeing has confirmed that the 737 Max 8 has an additional problem in its flight control software that will require more time to fix. These issues are reportedly separate from the anti-stall system failures believed to have caused the loss of Flight 302. The additional issues affect software controlling flaps and other flight-control surfaces. It is not clear if these additional flaws contributed to the loss of Lion Air 610 or Flight 302.

Boeing Didn’t Advise Airlines, FAA That It Shut Off Warning System.  Accident investigators have linked bad data the system is designed to detect to the deadly Ethiopian Airlines and Lion Air crashes...Boeing Co. didn’t tell Southwest Airlines Co. and other carriers when they began flying its 737 MAX jets that a safety feature found on earlier models that warns pilots about malfunctioning sensors had been deactivated, according to government and industry officials.

A critical sensor linked to the 2 fatal Boeing 737 Max crashes had been flagged to the FAA more than 200 times, report says...The angle-of-attack (AOA) sensor, which measures a plane's angle in the sky, was flagged in 216 incident reports to the FAA. These reports outlined cases in which the sensor failed or had to be replaced or fixed, and in some cases, the planes had to make emergency landings.

Similar Aircraft Problems

“NTSB Determines that Poor Maintenance Practices Led to the Crash of Alaska Airlines Flight 261...The National Transportation Safety Board determined today that the probable cause of the January 31, 2000 Alaska Airlines flight 261 accident was the loss of airplane pitch control resulting from in-flight failure of the horizontal stabilizer trim system jackscrew assembly's acme nut thread. The component failed because of excessive wear resulting from Alaska Airlines' insufficient lubrication of the jackscrew assembly.”

“10th anniversary of Alaska Flight 261...Their grief was compounded over the years by revelations that the crash could have been averted had Alaska Airlines been more vigilant in its maintenance of the plane. Even those who have tried to pry something positive from the tragedy
say that knowledge painted their sorrow with outrage.” https://www.seattletimes.com/seattle-news/10th-anniversary-of-alaska-flight-261/

- “The Recent Deadly Boeing Crash No One Is Talking About...A few weeks ago a Boeing jet was maneuvering near an airport when it abruptly nosedived and plowed into the ground at tremendous speed, killing everyone aboard. This was not the Ethiopian Airlines crash on March 10 that has transfixed the world, however. It was an American plane, a 767, and its destruction in a muddy bay near Houston remains even more mysterious and, consequently, potentially more disturbing in its long-term implications.” http://nymag.com/intelligencer/2019/03/atlas-air-the-boeing-crash-no-one-is-talking-about.html

- “Atlas Air Flight 3591 was a scheduled domestic cargo flight operating for Amazon Air between Miami International Airport and George Bush Intercontinental Airport in Houston. On February 23, 2019, the Boeing 767-375ER(BCF) operating this flight crashed into Trinity Bay during approach into Houston, killing the two crew members and one passenger on board. The accident occurred near Anahuac, Texas, east of Houston, shortly before 12:45 CST (18:45 UTC).[2][3][4] Debris was found in the shallow waters of Trinity Bay, ranging from small articles of clothing to large aircraft parts.” https://en.wikipedia.org/wiki/Atlas_Air_Flight_3591

- “Air France Flight 447 (AF447/AFR447)[a] was a scheduled international passenger flight from Rio de Janeiro, Brazil, to Paris, France, which crashed on 1 June 2009. The Airbus A330, operated by Air France, stalled and did not recover, eventually crashing into the Atlantic Ocean at 02:14 UTC, killing all 228 passengers and crew on board...The BEA’s final report, released at a news conference on 5 July 2012, concluded that the aircraft crashed after temporary inconsistencies between the airspeed measurements—likely due to the aircraft's pitot tubes being obstructed by ice crystals—caused the autopilot to disconnect, after which the crew reacted incorrectly and ultimately caused the aircraft to enter an aerodynamic stall, from which it did not recover.[2][3][p7][4] The accident is the deadliest in the history of Air France, as well as the deadliest aviation accident involving the Airbus A330.” https://en.wikipedia.org/wiki/Air_France_Flight_447

- “Swissair 111, TWA 800, and Electromagnetic Interference...On the evening of July 17, 1996, TWA 800 fell into the ocean seven miles from the Long Island town of East Moriches. The plane had taken off from New York’s JFK Airport and had been bound for Paris, France. All 230 people on board died...the possibility of a short-circuit or some other problem in the plane’s 150 miles of aging wiring. Also included in the inquiry was the possibility of an external ignition source, electromagnetic interference from one, or more than one, of the many military and civilian ships and planes that had been in the vicinity of TWA 800 and that, along with powerful civilian and military transmitters on land, might have produced an adverse electromagnetic environment.” https://www.nybooks.com/articles/2000/09/21/swissair-111-twa-800-electromagnetic-interference/

- “Trans World Airlines Flight 800 (TWA 800) was a Boeing 747-100 that exploded and crashed into the Atlantic Ocean near East Moriches, New York, on July 17, 1996, at about 8:31 p.m. EDT, 12 minutes after takeoff from John F. Kennedy International Airport...All 230 people on board died in the third-deadliest aviation accident in U.S. history...The report's conclusion was that the probable cause of the accident was explosion of flammable fuel vapors in the center fuel tank. Although it could not be determined with certainty, the likely ignition source was a short circuit.[1]:xvi Problems with the aircraft's wiring were found, including evidence of arcing in the Fuel Quantity Indication System (FQIS) wiring that enters the tank. The FQIS on
Flight 800 is known to have been malfunctioning; the captain remarked on what he called "crazy" readings from the system approximately two minutes and thirty seconds before the aircraft exploded.” https://en.wikipedia.org/wiki/TWA_Flight_800

- “Swissair Flight 111 (IATA: SR111, ICAO: SWR111) was a scheduled international passenger flight from John F. Kennedy International Airport in New York City, United States to Cointrin International Airport in Geneva, Switzerland…On 2 September 1998, the McDonnell Douglas MD-11 performing this flight, registration HB-IWF, crashed into the Atlantic Ocean southwest of Halifax International Airport at the entrance to St. Margarets Bay, Nova Scotia...All 229 passengers and crew onboard the MD-11 were killed, making the crash the deadliest McDonnell Douglas MD-11 accident in aviation history...Investigators identified evidence of arcing in wiring of the IFE network, but this did not trip the circuit breakers, which were not designed to trip on arcing. The investigation was unable to determine whether this arc was the "lead event" that was assumed to have ignited the flammable covering on MPET insulation blankets that quickly spread across other flammable materials.[1]:253 After the crew cut power to "non-essential" cabin systems, a reverse flow in the cockpit ventilation ducts increased the amount of smoke reaching the flight deck.[1]:240 By the time the crew became aware of the severity of the fire, it had become so extensive that it was impossible to address as it happened.[1]:254 The rapid spread of electrical power failures led to the breakdown of key avionics systems, and the crew was soon rendered unable to control the aircraft. The pilot-in-command was forced to fly manually because he had no light by which to see his controls after the instrument lighting failed. The fuel-laden plane was above maximum landing weight; as the flight crew dumped fuel as per procedure, they lost all control, and the doomed plane flew into the ocean uncommanded…The TSB made nine recommendations relating to changes in aircraft materials (testing, certification, inspection, and maintenance), electrical systems, and flight data capture, as both flight recorders had stopped when they lost power six minutes before impact. General recommendations were also made regarding improvements in checklists and in fire-detection and fire-fighting equipment and training. These recommendations have led to widespread changes in Federal Aviation Authority standards, principally impacting wiring and fire hardening.” https://en.wikipedia.org/wiki/Swissair_Flight_111

- “Electronic Systems Failures and Anomalies Attributed to Electromagnetic Interference...An Army Sikorsky UH-60 Blackhawk helicopter, while flying past a radio broadcast tower in West Germany in 1987, experienced an uncommanded stabilator movement. Spurious warning light indications and false cockpit warnings were also reported. Subsequent investigation and testing showed that the stabilator system was affected by EM1 from high intensity radiated fields (HIRF).” https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19960009442.pdf

- “Boeing 787 Dreamliner...On July 12, 2013, a fire started on an empty Ethiopian Airlines 787 parked at Heathrow Airport before it was extinguished by the airport fire and rescue service. No injuries were reported.[333][334] The fire caused extensive heat damage to the aircraft.[335] The FAA and NTSB sent representatives to assist in the investigation.[336] The initial investigation found no direct link with the aircraft's main batteries.[337] Further investigations indicated that the fire was due to lithium-manganese dioxide batteries powering an emergency locator transmitter (ELT)...On January 16, 2013, All Nippon Airways Flight NH-692, en route from Yamaguchi Ube Airport to Tokyo Haneda, had a battery problem warning followed by a burning smell while climbing from Ube about 35 nautical miles (65 km) west of Takamatsu, Japan. The aircraft diverted to Takamatsu and was evacuated via the slides; three passengers
received minor injuries during the evacuation. Inspection revealed a battery fire. A similar incident in a parked Japan Airlines 787 at Boston's Logan International Airport within the same week led the Federal Aviation Administration to ground all 787s…The NTSB has criticized FAA, Boeing, and battery manufacturers for the faults in a 2014 report.[412][413][414][415] It also criticized the GE-made flight data and cockpit voice recorder in the same report.[416] The enclosure Boeing added is 185 lb (84 kg) heavier, negating the lighter battery potential.[417]”


• “Custom Aircraft Disasters Essay... Aircraft disasters may occur due to various reasons, both objective and subjective. Subjective reasons may include a maintenance fault, pilot error or a terrorist attack. Objective reasons are dependent on weather conditions, such as lightening, ice and snow, bird strike, hail and dust, volcanic ash, ground damage or electromagnetic interference (Stanley, 2001).” https://essayswriters.com/essays/Exploratory/aircraft-disasters.html

Pilot Training Issues

• “Pilots reportedly received limited training for 737 MAX 8 planes due to Boeing's haste...The New York Times reported on Saturday that U.S. pilots received little physical training before flying Boeing's 737 Max 8 airplane — the same model of airplane involved in both incidents that was grounded worldwide following the crash in Ethiopia — in large part because Boeing was determined to get the plane on the market quickly.” https://theweek.com/speedreads/829719/pilots-reportedly-received-limited-training-737-max-8-planes-due-boeings-haste

• “Pilots trained for Boeing’s 737 Max airplane with “an iPad lesson for an hour”...American Airlines said, “Boeing 737-800 pilots were required to receive some additional training on the MAX 8, which included an hour lesson on some differences. Additional training was not required, as the 737-800 and the MAX 8 have same type certification.”” https://qz.com/1574878/pilots-trained-for-boeing-737-max-with-one-hour-ipad-lesson/

• “Boeing's 737 Max training and FAA's approval of the new jets scrutinized after Ethiopian crash...CBS News has learned that U.S. pilots were initially given 56 minutes of training, on an iPad, about the differences between the new Boeing Max planes brought into service in 2017, and the older 737s.” https://www.cbsnews.com/news/boeing-737-max-training-faa-certification-scrutiny-ethiopian-airways-et302-crash/

• “Pilot Who Hitched a Ride Saved Lion Air 737 Day Before Deadly Crash...After the Lion Air crash, two U.S. pilots’ unions said the potential risks of the system, known as the Maneuvering Characteristics Augmentation System, or MCAS, hadn’t been sufficiently spelled out in their manuals or training. None of the documentation for the Max aircraft included an explanation, the union leaders said.” https://www.msn.com/en-us/news/world/pilot-who-hitched-a-ride-saved-lion-air-737-day-before-deadly-crash/ar-BBUZ0aM?li=BBnbcA1

Technology

• “Why Did Boeing Put So Much Technology in the 737 MAX? To Make Money...President Trump implied that complicated technology might have led to the Boeing 737 MAX disaster (a
point since vigorously attacked), tweeting: “Airplanes are becoming far too complex to fly. Pilots are no longer needed ….and the complexity creates danger. All of this for great cost yet very little gain. I don’t know about you, but I don’t want Albert Einstein to be my pilot. I want great flying professionals that are allowed to easily and quickly take control of a plane!” @realDonaldTrump” https://www.forbes.com/sites/teresaghilarducci/2019/03/16/why-did-boeing-put-technology-in-the-737-max/amp/

Software

• “Boeing 737 Max: Software patches can only do so much...It would be easy to blame the programmers, developers and software processes of the 737 MAX’s MCAS for the two crashes, and that is what a lot of armchair aeronautics engineers are doing. We don't really know what exactly is at fault here. However, what this does reveal is that Boeing went to software as a patch for the modification to address performance flaws in a pre-existing systems architecture. It should have designed a completely new aircraft for this purpose.” https://www.zdnet.com/article/boeing-737-max-software-patches-can-only-do-so-much/
• “The Boeing 737 Max crisis goes way beyond software...Software is easy to blame, because for many people computer science is a mystery. But these crashes emerged from an experience we’re all familiar with: the pressure to deliver on a tight timetable, the temptation to cut corners, and the hope that in a big, complex world, one little kludge won’t mess up the whole program.” https://qz.com/1577986/the-boeing-737-max-crisis-goes-way-beyond-software/

Airplane Electrical Power Generation

• “More Electric Aircraft: How does electricity work on a plane?...The Boeing 787 is the most electric aircraft currently in service. It has two alternators for each of its two engines, each alternator generating 250 kW. Maximum production capacity is 1,000 kW, enough to light and power all the homes in a town with a population of around 2,000. The electricity generated on the Boeing 787 supplies its large air conditioning compressors, as well as the cabin pressurization system, the brakes and the wing de-icing system.” https://www.safran-electrical-power.com/media/20151109_more-electric-aircraft-how-does-electricity-work-plane
• “Where does electricity come from on an airplane?...Mostly their engines are equipped with large 3 phase 115 VAC rotary generators (20–100 KW). And most of the electrical equipment is driven by 3 phase electric motors. These generators are rectified to create DC buses. Some aircraft put a battery on this line, some do not. Large aircraft also may install an APU (Auxiliary Power Unit) to run systems on the ground without running engines, when there is no ground power available.” https://www.quora.com/Where-does-electricity-come-from-on-an-airplane
Airplane Electrical Outlets


- “How to See if a Flight Offers Wi-Fi and Power Outlets...Power outlet availability varies. If your flight offers power outlets, you may have an outlet dedicated to your seat alone, or you may have to share one or two outlets with the people sitting next to you. You may have a full-size AC power outlet that you can plug a laptop into, or you may only have USB power outlets you can connect phones and tablets to. Often, you may have both.” [https://www.howtogeek.com/220446/how-to-see-if-a-flight-offers-wi-fi-and-power-outlets/](https://www.howtogeek.com/220446/how-to-see-if-a-flight-offers-wi-fi-and-power-outlets/)

- “EmPower (aircraft power adapter)...EmPower is a 110 volt universal connector type found on many commercial airlines designed to provide power to travelers' electronic devices. The system is limited to 200VA. The EmPower universal AC Outlet Unit is compatible with plugs from over 170 countries and is designed such that 110VAC power is not present at the outlet until a suitable plug is fully inserted...The AC EmPower system converts aircraft AC 400 Hz or wild frequency power to standard AC 60 Hz.” [https://en.wikipedia.org/wiki/EmPower_%28aircraft_power_adapter%29](https://en.wikipedia.org/wiki/EmPower_%28aircraft_power_adapter%29)


Electrical Harmonics

- “Harmonics...most electronic power supply switching circuits such as rectifiers, silicon controlled rectifier (SCR’s), power transistors, power converters and other such solid state switches which cut and chop the power supplies sinusoidal waveform to control motor power, or to convert the sinusoidal AC supply to DC. Theses switching circuits tend to draw current only at the peak values of the AC supply and since the switching current waveform is non-sinusoidal the resulting load current is said to contain Harmonics.” [https://www.electronics-tutorials.ws/accircuits/harmonics.html](https://www.electronics-tutorials.ws/accircuits/harmonics.html)

- “Harmonics (electrical power)...In an electric power system, a harmonic is a voltage or current at a multiple of the fundamental frequency of the system, produced by the action of non-linear loads such as rectifiers, discharge lighting, or saturated magnetic devices. Harmonic frequencies
in the power grid are a frequent cause of power quality problems. Harmonics in power systems result in increased heating in the equipment and conductors, misfiring in variable speed drives, and torque pulsations in motors.” [https://en.wikipedia.org/wiki/Harmonics_(electrical_power)]

- “What’s Your Shield? Managing Harmonics and EMI...Harmonics aren’t new; they have always been a factor with these types of electronics. However, as the use of VFDs and LEDs become more common, harmonics are increasing in our electrical systems. Another problematic factor is found in the number of communication elements being added into plants, as these are more susceptible to interference from this noise. Equipment is running on Ethernet communications or low-voltage communication systems to pull back more information. This is great for operating facilities, but these signals are prone to having problems when harmonics are present.” [https://www.interstates.com/whats-your-shield/]

- “A Review of Power Quality Problems, Standards and Solutions...Power quality has become a major area of concern in present era due to the increase in modern sensitive and sophisticated loads connected to the Distribution System. The electrical devices or equipments are prone to failure when exposed to one or more power quality problems. The electrical device might be an electric motor, a transformer, a generator, a computer, a printer, communication equipment, or a household appliance reacts adversely to power quality issues depending on the severity of problems.” [https://www.irjet.net/archives/V4/i1/IRJET-V4I1353.pdf]

**Dirty Electricity**

- “Dirty Electricity can travel into your house on the local electricity supply and it will also be generated by some devices in your home. In the UK, the incoming supply is normally quite clean so the majority of DE is generated by internal devices, though large blocks of flats and similar multi-occupancy living spaces can have a lot of shared DE sources. Common large DE contributors include induction cooker hobs, dimmer switches, televisions, fluorescent light bulbs (including CFLs, or energy efficient bulbs) and computers. Any modern device that has a "switched mode power supply" will create some DE. Solar panel inverters that generate the 230 volts to feed into the electricity supply usually generate a large quantity of dirty electricity. Many links have been published associating Dirty Electricity with a wide variety of negative health effects, including cancer, asthma, chronic fatigue syndrome, diabetes, ADD, autism and a number of neurological disorders.” [https://emfields-solutions.com/howto/what-to-do-about-dirty-electricity.asp]

- “Dirty electricity is erratic spikes and surges of electrical energy traveling along power lines and building wiring where only standard 50/60-Hertz AC electricity should be. Also called electrical noise, line noise, and power line EMI, it is one fast-growing source of electro-pollution in homes, schools, and businesses today.” [https://greenwavefilters.com/dirty-electricity/]

- “Is Dirty Electricity Dangerous?...Protecting Against Dirty Electricity. There are a few ways to protect yourself and your family from dirty electricity, but nothing is more effective than
eliminating or minimizing the use of devices that are the primary cause of it. It is a good idea to eliminate dimmer switches, replace CFL bulbs with traditional light bulbs, replace your smart meter with an analog one whenever possible (rarely possible, believe me), and reducing the use of Wi-Fi in the home however possible.”

https://emfacademy.com/dirty-electricity-dangerous/

• “17 Ways to Minimize Exposure to Dirty Electricity & EMFs...Dirty electricity is introduced into our homes through electrical wiring but also through plumbing, the ground itself, and a number of appliances. A big source of dirty electricity is from cell towers. These towers run on direct current (DC) but current arrives to them as alternating current (AC). In the process of inverting, dirty electricity is produced by inverters and is sent back into our houses via electrical wiring. Health problems connected to dirty electricity include diabetes, migraine, anxiety, multiple sclerosis, muscle and joint problems, and even suicide.”

https://thetruthaboutcancer.com/dirty-electricity-emf/

• STETZERiZER®-Related Research. Here you will find an ever-expanding list of research on the subjects of electrical pollution, dirty electricity, ground currents and voltages (“stray voltage”), and studies on the application of STETZERiZER® products to remediate these electrical problems. Research is also available on how electrical pollution, dirty electricity, and ground currents and voltages affect the health of human beings and animals.”

http://www.stetzerelectric.com/category/research/

Electromagnetic Pulses

• Crash: October 29, 2018, Lion Air Flight 610, a 737 MAX 8:

  ◦ “Sunday, Oct. 28, 2018...TWO HOLES IN THE SUN'S ATMOSPHERE: NASA's Solar Dynamics Observatory has detected two holes in the sun's atmosphere. One has turned to face Earth, and the other is not far behind...These are "coronal holes"--places where the sun's magnetic field has opened up, allowing solar wind to escape. They look dark because the glowing-hot plasma normally contained there is gone.”


  ◦ “Monday, Oct. 29, 2018...ARCTIC-GREEN HALLOWEEN: A stream of solar wind flowing from a small hole in the sun's atmosphere is approaching Earth. Estimated time of arrival: Oct. 31st. The gaseous material could create ghostly-green skies around the Arctic Circle for Halloween.”


  ◦ “Tuesday, Oct. 30, 2018...ARCTIC-GREEN HALLOWEEN: A stream of solar wind flowing from a small hole in the sun's atmosphere is approaching Earth. Estimated time of arrival: Oct. 31st. The gaseous material could create ghostly-green skies around the Arctic Circle for Halloween.”


• Crash: February 23, 2019, Atlas Air Flight 3591, a 767:
“Friday, Feb. 22, 2019...GEOMAGNETIC UNREST TODAY: A stream of solar wind is buffeting Earth’s magnetic field, and this is causing geomagnetic unrest around the poles. First contact with the gaseous material on Feb. 21st produced a "crazy outburst" of auroras over Alaska. More high-latitude auroras are possible on Feb. 22nd as solar wind speeds approach 500 km/s. ATMOSPHERIC COSMIC RAYS ARE INCREASING: Cosmic rays in the stratosphere are intensifying for the 4th year in a row. This finding comes from a campaign of almost weekly high-altitude balloon launches conducted by the students of Earth to Sky Calculus. Since March 2015, there has been a ~13% increase in X-rays and gamma-rays over central California, where the students have launched hundreds of balloons...Why are cosmic rays increasing? The short answer is "Solar Minimum." Right now, the 11-year solar cycle is plunging into one of the deepest minima of the Space Age. The sun's weakening magnetic field and flagging solar wind are not protecting us as usual from deep-space radiation. Earth to Sky balloon launches in multiple countries and US states show that this is a widespread phenomenon. Cosmic rays are of interest to anyone who flies on airplanes. The International Commission on Radiological Protection has classified pilots as occupational radiation workers because of cosmic ray doses they receive while flying. A recent study by researchers at the Harvard School of Public Health shows that flight attendants face an elevated risk of cancer compared to members of the general population. They listed cosmic rays as one of several risk factors. There are also controversial studies that suggest cosmic rays promote the formation of clouds in the atmosphere; if so, increasing cosmic rays could affect weather and climate.”


“Saturday, Feb. 23, 2019...ATMOSPHERIC COSMIC RAYS ARE INCREASING: New data released by the Earth to Sky Calculus high-altitude ballooning program show that atmospheric cosmic rays are intensifying for the 4th year in a row--an ironic side-effect of the decaying solar cycle. The new results are of interest to everyone from astronauts to air travelers...IT'S BACK! A BIG HOLE IN THE SUN'S ATMOSPHERE: During solar minimum, long-lasting holes open in the sun's atmosphere, releasing streams of solar wind into space. One of those holes is turning to face Earth now, and it's a big one...We've seen this hole before. It opened in the summer of 2018 and has been spinning around as the sun rotates, lashing Earth with solar wind approximately once a month. The last time our planet felt its gaseous emissions, in late Jan. 2019, bright auroras surged around the Arctic Circle and some of the lights even spilled into the USA. G1-class geomagnetic storms are likely on Feb. 26th or 27th when the solar wind returns.”


“Sunday, Feb. 24, 2019...SOLAR EXPLOSION MISSES EARTH: Earlier today, Feb. 24th, a magnetic filament on the sun became unstable and erupted. The blast hurled a coronal mass ejection (CME) into space. NOAA analysts have modeled the expanding storm cloud,
and they say it will miss Earth. No geomagnetic storm will result from the explosion...IT'S BACK! A BIG HOLE IN THE SUN'S ATMOSPHERE: During solar minimum, long-lasting holes open in the sun's atmosphere, releasing streams of solar wind into space. One of those holes is facing Earth now, and it's a big one...We've seen this hole before. It opened in the summer of 2018 and has been spinning around as the sun rotates, lashing Earth with solar wind approximately once a month. The last time our planet felt its gaseous emissions, in late Jan. 2019, bright auroras surged around the Arctic Circle and some of the lights even spilled into the USA. G1-class geomagnetic storms are likely on Feb. 27th when the solar wind returns. Stay tuned for Northern Lights.”


• Crash: March 10, 2019, Ethiopian Airlines Flight 302, a 737 MAX 8:
  ○ “Saturday, Mar. 9, 2019...THE CMEs ARE COMING. MAYBE: Earth is about to be sideswiped by a pair of coronal mass ejections (CMEs). Maybe. The two solar storm clouds left the sun on March 8th when sunspot AR2734 erupted, producing a C1-class solar flare. NASA's Solar Dynamics Observatory recorded the blast”

  ○ “Sunday, Mar. 10, 2019...For such a small sunspot, AR2734 is surprisingly active. On March 10th, the sunspot's magnetic field became unstable and erupted for the second time in as many days. NASA's Solar Dynamics Observatory caught the sunspot hurling a dark filament of magnetism into space. Play the video and keep an eye on the circled material”

  ○ “Monday, Mar. 11, 2019...CHANCE OF STORMS TODAY: NOAA forecasters say there is a 55% chance of G1-class geomagnetic storms on March 11th when Earth has a close encounter with two coronal mass ejections (CMEs). The solar storm clouds left the sun on March 8th when sunspot AR2734 produced a C1-class solar flare. Neither CME is heading directly for Earth, but a double glancing blow could produce beautiful Arctic auroras.”

• “We Must Prepare for an Electromagnetic Disaster...Electricity and magnetism are tightly linked. Change an electric field – for example by moving charge – and a magnetic field appears. Change a magnetic field – for example by rotating a magnet – and electric fields appear. This is why electromagnets, generators and antennas work. Electromagnetic waves, whether radio, light or X-rays, are just oscillating fields.”
  https://www.realclearscience.com/articles/2014/08/11/we_must_prepare_for_an_electromagnetic_disaster_108784.html

• “ELECTROMAGNETIC PULSE...According to Dr. Graham, who headed up a commission of EMP experts, spoke before the House Armed Services Committee in July 2008, and stated "The
electromagnetic fields produced by weapons deployed with the intent to produce EMP have a high likelihood of damaging electrical power systems, electronics, and information systems upon which American society depends. Their effects on critical infrastructures could be sufficient to qualify as catastrophic to the Nation.”

https://disaster-survival-resources.com/emp.html

Wireless Movie Streaming

- “In-flight entertainment” https://en.wikipedia.org/wiki/In-flight_entertainment
- “How Does In-Flight Wi-Fi Really Work?...Tucked behind the wall panels of an aircraft, lining one side of the plane and set slightly above the windows, a series of black boxes (not to be confused with flight recorders) serve as in-flight Wi-Fi access points.” https://thepointsguy.com/2015/11/how-in-flight-wi-fi-works/
- “Pixel doesn't work for United Airlines in-flight entertainment.” https://www.reddit.com/r/GooglePixel/comments/5mkiaw/pixel_doesnt_work_for_united_airlines_inflight/
- “United is making passengers BYOD for entertainment and it just doesn't work. A tale of buffering at 35,000 feet.” https://www.theinquirer.net/inquirer/opinion/3009515/united-is-making-passengers-byod-for-entertainment-and-it-just-doesnt-work

Systems Electromagnetic Interference (EMI)

- “Electromagnetic interference (EMI), also called radio-frequency interference (RFI) when in the radio frequency spectrum, is a disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction.[1] The disturbance may degrade the performance of the circuit or even stop it from functioning. In the case of a data path, these effects can range from an increase in error rate to a total loss of the data.[2] Both man-made and natural sources generate changing electrical currents and voltages that can cause EMI: ignition systems, cellular network of mobile phones, lightning, solar flares, and auroras (Northern/Southern Lights). EMI frequently affects AM radios. It can also affect mobile phones, FM radios, and televisions, as well as observations for radio astronomy. EMI can be used intentionally for radio jamming, as in electronic warfare.” https://en.wikipedia.org/wiki/Electromagnetic_interference
- “Electromagnetic Interference Sources and Their Most Significant Effects...As the density of the electromagnetic environment continues to increase, the concern about its effects from sources producing EMI also increases. Advances in technology and the number of products produced are having a significant effect on the efforts aimed at maintaining the required operation and interoperability of products and systems used in our society. These events had
added challenges for those who are responsible for keeping pace with the effort needed to maintain the required level of electromagnetic compatibility (EMC) in these products and systems.” [https://interferencetechnology.com/electromagnetic-interference-sources-and-their-most-significant-effects/]

- “The Dark Force Of Evil In Electronics: Electromagnetic Interference...Is there an electronic product or circuit that’s not susceptible to electromagnetic interference (EMI)? For that matter, are any devices EMI-free? Simply put, no. EE's wish it wasn’t the case, of course, but it’s a fact of life in electrical engineering— and it’s one of those things they typically don’t teach you in school.” [https://www.electronicdesign.com/communications/dark-force-evil-electronics-electromagnetic-interference]

- “Electromagnetic Interference with Aircraft Systems: why worry?...Passengers use electronic devices on board aircraft, including some such as cellular phones that they shouldn't in any case be attempting to use, and pilots have reported anomalies with their navigation equipment that seem to correlate with use of personal electronics in the cabin...Five crashes of Blackhawk helicopters shortly after their introduction into service in the late 1980's were found to be due to electromagnetic interference from very strong radar and radio transmitters with the electronic flight control systems (1). So concern about this phenomenon is not purely the result of speculation. It has actually happened, and it is appropriate to be concerned about the possibility of similar phenomena in transport aircraft.”[http://www.rvs.uni-bielefeld.de/publications/Incidents/DOCS/Research/Rvs/Article/EMI.html]

- “Electromagnetic interference (EMI) in E-vehicles...Electric propulsion brings with it high voltages which challenge vehicle electrical/electronic architecture...The cabling system in a car is comparable to the human nervous system. As long as it works perfectly, no one recognizes it. If it fails, it's a disaster. Often several processes and applications are impacted or stop functioning altogether.”[https://www.eenewsautomotive.com/content/electromagnetic-interference-emi-e-vehicles]

- “Electromagnetic Fields Eyed in Toyota Woes... recent recalls of more than eight million vehicles - due in many cases to instances of sudden unintended acceleration - a debate has been revived over the effects of electromagnetic fields on cars' electrical systems. Electromagnetic fields, or EMFs, are produced in varying frequencies due to their source: electric currents, power lines, radio and microwave antennas, airport radar, even cell phones. Cars also produce low-frequency magnetic fields. According to one theory, electric signals can briefly interfere with the electronic controls of cars. As Toyota issued recalls over the matter of sudden unintended acceleration - blaming faulty pedals or obstructive floor mats - the possibility of interference by EMFs with Toyota's electrical systems has been raised.”[https://www.cbsnews.com/news/electromagnetic-fields-eyed-in-toyota-woes/]

- “Smart Meters Interfering With Home Electronics...About 200 customers of the Central Maine Power Company recently noticed something odd after the utility installed smart meters in their homes: in some cases other wireless devices stopped working, or behaved erratically.” [https://www.securityweek.com/smart-meters-interfering-home-electronics]

**Human Electromagnetic Interference (EMI)**

- “Dirty Electricity tells the story of Dr. Samuel Milham, the scientist who first alerted the world about the frightening link between occupational exposure to electromagnetic fields,
electromagnetic pollution, and human disease. Milham takes readers through his early years and education, following the twisting path that led to his discovery that most of the twentieth century diseases of civilization, including cancer, cardiovascular disease, diabetes, and suicide, are caused by electromagnetic field exposure. Dr. Milham warns that because of the recent proliferation of radio frequency radiation from cell phones and towers, terrestrial antennas, Wi-Fi and Wi-max systems, broadband internet over power lines, and personal electronic equipment, we may be facing a looming epidemic of morbidity and mortality. In Dirty Electricity, he reveals the steps we must take, personally and as a society, to coexist with this marvelous but dangerous technology.” [http://www.sammilham.com/]

“One day out of the blue I developed an unpleasant reaction to my cell phone. It immediately became very painful to use it. Then it was my office computer, my TV, the radio in my car, I was even reacting to my landline telephone at one point. I got very sick.” [https://www.electricsense.com/about/]

“Welcome to the ElectroSensitivity UK website. Our aim is to provide unbiased and balanced information to help those who have become sensitive to mobile and cordless phones, their masts, wifi, and a multitude of common everyday electrical appliances.” [http://www.es-uk.info/]

“Cancer Mortality near Air Force Bases...WIFI ON AIRPLANES AND AT AIRPORTS. The most recent change on airplanes is the introduction of WiFi. A friend who recently flew on a commercial flight with WiFi complained of feeling unwell. Flying is a dangerous business and it is become more dangerous with all of this additional exposure to radiation at the airport and on the aircraft. Wonder how long it will take for the airline industry to recognize that the lower the levels of radiation the safer the flight for the crew and passengers alike?” [https://magdahavas.com/cancer-mortality-near-air-force-bases/]

“Lyon, France, May 31, 2011 ‐‐ The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma, a malignant type of brain cancer, associated with wireless phone use.” [https://www.iarc.fr/wp-content/uploads/2018/07/pr208_E.pdf]

“Environmental Radiation LLC...Electromagnetic Interference (EMI)...is known for its harmful health effects and is poorly regulated in the USA. There are many biologically toxic products on sale that may make you sick with long term exposure to them. EMI is so good at making people sick that the modern military weaponized it decades ago and calls them “Electromagnetic Weapons” or “Silent Weapons”.” [http://www.environmentalradiation.com/]

**Detecting Electromagnetic Interference (EMI)**


“Best EMF Meters for Measuring Electromagnetic Fields” [https://www.bestadvisor.com/emf-meters]

“The 7 Best EMF Detectors of 2019” [https://www.fabathome.net/best-emf-detector/]

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“Best Sellers in EMF Meters”
https://www.amazon.com/gp/bestsellers/industrial/5011676011/ref=zg_b_s_5011676011_1/ref=pd_day0_hl_0_bsb_1/142-7005379-3315914?ie=UTF8&pd_rd_i=B0754VVW4W&pd_rd_r=0cff5da0-51ea-11e9-a105-8d4a86831872&pd_rd_w=fwuNi&pd_rd_wg=hY9v8&pf_rd_p=ad07871c-e646-4161-82c7-5ed0d4c85b07&pf_rd_r=0TNQQ8T4Z8R3AHV6K3ZQ&refRID=0TNQQ8T4Z8R3AHV6K3ZQ

Social Aspects

“53% American adults say they don’t want to fly on a Boeing 737 Max...53.1% of respondents said they would reschedule. Of those, the survey found that 18.7% of respondents would reschedule their flight only if it didn't require a fee. Another 4.4% of respondents said they would pay to reschedule their flight up to a certain monetary fee, which they then typed in. A full 30% of people would cancel or reschedule their flights, regardless of the cost to them.”

“'Clear' Similarities Between Ethiopian And Indonesian Plane Crashes, Official Says...Relatives told news wires prior to the funeral that they were given small sacks of scorched earth from the site of the crash in place of remains, which are expected to take months to identify. Some relatives, including Muslim families, expressed frustration that they could not yet bury their dead, as dictated by their religious beliefs."The soil came as it became impossible to identify bodies and hand over remains to family members," one family member told The Associated Press. "We will not rest until we are given the real body or body parts of our loved ones.""
https://www.npr.org/2019/03/17/704223209/mass-funeral-held-for-ethiopian-airlines-crash-victims-as-investigation-continue

“Psychological Issues Loom Large in Wake of Boeing 737 Max Crashes...Psychology drives how people react to risk, especially when the stakes are high; and the stakes associated with Boeing’s 737 Max planes are high... If the past is prologue, the kinks in the 737 Max will eventually get worked out. It is just that human psychology makes the process that much more expensive, both in dollars and in lives lost.”

Safety Concerns

“Pilot: Can pilots trust Boeing again?...I am also disappointed in another departure for Boeing, away from redundancy. Airplanes are carefully designed with layers of safety features so that one failure alone won't cause a crash. For example, a Boeing 777, among other airliners, has a ram-air turbine, a propeller-looking device that deploys automatically if the plane's hydraulic systems fail completely. It supplies both hydraulic pressure and electricity in the event of a dual engine failure.”
• “China Suspends Airworthiness Certificate for Boeing 737 Max”
• “Boeing Drifts Lower as Emergency Landing for 737 MAX Raises New Safety Concerns...Southwest Airlines Co....said pilots flying a passenger-less 737 MAX plane to a storage facility in California were forced to make an emergency landing in Orlando, where the plane departed, after experiencing engine trouble shortly after take-off.”
• “U.S. launches probe of FAA's training of Boeing 737 Max inspectors..."In light of recent 737 crashes in Indonesia and Ethiopia, the committee is investigating any potential connection between inadequate training and certification of Aviation Safety Inspectors who may have participated in the FSB evaluation of the 737 MAX," Sen. Roger Wicker, chairman of the committee, wrote to FAA Acting Administrator Daniel Elwell on Tuesday.”

Financial

• “After Crashes, At Least 1 Airline Wants to Cancel Its Boeing 737 Max 8 Order...“After reviewing the latest development, especially the increasing customer concerns toward Max 8, we have lost the confidence in the product,” Danadiputra said.”
  http://time.com/5551731/garuda-indonesia-boeing-737-max-8-cancels-order/
• “Why Investors May Be Underestimating Boeing’s Problems...Boeing shares are down another 2% Monday after falling 10% last week in the aftermath of the tragic Ethiopian Air accident that killed 157 people.”
• “American Airlines Is Canceling 90 Flights A Day Because Of 737 Max Grounding”
  https://pittsburgh.cbslocal.com/2019/03/24/boeing-737-max-american-airlines/
• “American, Southwest canceling hundreds of daily flights as world awaits 737 Max fix...Dallas-based Southwest, which has 34 MAX aircraft, is making cancellations five days in advance, with an average of 130 daily cancellations. On Saturday, it also began to ferry all its MAX aircraft to a facility in Victorville, California, without passengers, to free up space at the airports where they had been parked.”
• “Southwest cuts revenue outlook on Boeing 737 MAX groundings. Southwest Airlines trims its first-quarter revenue growth forecast to no more than 3 percent from up to 4 percent. The company says it has lost $150 million in revenue from the 737 MAX groundings, soft demand and maintenance issues.”
• “Cost of Boeing groundings rises as TUI takes $200 million-plus hit...TUI said it was planning for the planes to remain grounded until at least the middle of July, costing it upwards of 200 million euros ($224 million) in core profit, with “considerable uncertainty” about when the 737 MAX would return to service.”
  https://www.reuters.com/article/us-ethiopia-airplane-investigators-idUSKCN1RA0E1
“Ethiopian Airlines crash: Boeing reduces 737 production...Production will drop from 52 planes a month to 42 from mid-April, Boeing has said in a statement. The decision is a response to a halt in deliveries of the 737 Max - the model involved in the two accidents. The plane is currently grounded as preliminary findings suggest its anti-stall system was at fault.”

“Airlines have completely stopped ordering the 737 Max...Boeing (BA) released data Tuesday that showed only 10 of the planes were ordered in the first two months of 2019. There were no orders in March, the month that a 737 Max jet flown by Ethiopian Airlines pilots crashed in that country, killing everyone aboard. It was the second fatal crash involving a Max in recent months. That small number compares to 112 orders for the plane in the first quarter of 2018. At that time, Southwest Airlines (LUV) had ordered 40 of the jets, while Ryanair ordered 25.”

Compensation

“Ethiopian Plane Crash: Survivors Victim May Claim $3 Million Compensation Each...Survivors of the victims of the crashed Ethiopian plane have chances of pocketing as compensation per victim between $2 Million to $3 million as insurance claims if they choose to sue Boeing, the manufacturer of the troubled 737 MAX 800 Aircraft in United States. However, the firm may have a respite if the victims survivors choose to sue in Ethiopia where they are only entitled to a $200,000 compensation...On top of this, Boeing would have to pay around $50 million insurance cover for the crashed Ethiopian plane.”
https://optimumtimes.com/ethiopian-plane-crash-survivors-victim-may-claim-3-million-compensation/

“Norwegian Air demands Boeing compensate it for grounded 737 Max planes...European discount carrier Norwegian Air is seeking compensation from Boeing for its grounded fleet of 737 Max 8 jets. Norwegian is the first airline to say publicly it will demand that Boeing pay for lost flight time. It is expected other airlines will follow suit...During the 787 problems in 2013, All Nippon Airways reported that it lost revenue of nearly $1 million for each of its 17 grounded planes in just the two weeks of the shutdown. It said it would seek compensation from Boeing to cover that loss.”

“Boeing Sued Over Ethiopia Crash as Plane Orders in Asia Waver...Boeing faces the prospect of substantial payouts to the families of passengers if it’s found responsible for both the Indonesia and Ethiopia crashes. But legal experts say the second one could prove even more damaging for the company. That’s because plaintiffs will argue the manufacturer was put on notice by the earlier tragedy that there was something dangerously wrong with its planes that should have been fixed.”
Government Regulator Problems

- “Regulators challenge Boeing to prove its Max jets are safe...Aviation regulators worldwide laid down a stark challenge for Boeing to prove that its grounded 737 Max jets are safe to fly amid suspicions that faulty software might have contributed to two crashes that killed 346 people in less than six months. In a key step toward unearthing the cause of the Ethiopian Airlines crash, flight recorders from the shattered plane arrived Thursday in France for analysis, although the agency in charge of the review said it was unclear whether the data could be retrieved. The decision to send the recorders to France was seen as a rebuke to the United States, which held out longer than most other countries in grounding the jets.”
  https://apnews.com/76abfe5f6bdd4570ba5487271ce5e772

- “After two fatal Boeing plane crashes, the world turned on the US...The inaction from the U.S. had drawn criticism from some, like former Transportation Secretary Ray LaHood, whose FAA grounded the Dreamliners in 2013, before the FAA made the call that it should have grounded the planes. "Safety can never be compromised," he told CNBC.”

- “Flawed analysis, failed oversight: How Boeing and FAA certified the suspect 737 MAX flight control system... the original safety analysis that Boeing delivered to the FAA for a new flight control system on the MAX — a report used to certify the plane as safe to fly — had several crucial flaws...pilots criticized Boeing for providing no information about MCAS, or its possible malfunction, in the 737 MAX pilot manuals.”

- “FAA on Sullenberger criticisms of Boeing 737 Max: Certification process ‘consistently produced safe aircraft designs’...In an exclusive article for MarketWatch, Capt. Sullenberger wrote, “Boeing and the FAA have been found wanting in this ugly saga that began years ago but has come home to roost with two terrible fatal crashes, with no survivors, in less than five months, on a new airplane type, the Boeing 737 Max 8, something that is unprecedented in modern aviation history.””

- “Europe and Canada are investigating the Boeing 737 Max themselves rather than trusting the US — another apparent snub of American regulators...The Associated Press reported, referring to EU and Canadian plans to carry out their own probes: "Those reviews scramble an ambitious schedule set by Boeing and could undercut the FAA’s reputation around the world.”

Deregulation

- “The Boeing 737 Max Story Shows That Deregulation Is Dangerous...As Boeing hustled in 2015 to catch up to Airbus and certify its new 737 MAX, Federal Aviation Administration
(FAA) managers pushed the agency’s safety engineers to delegate safety assessments to Boeing itself, and to speedily approve the resulting analysis. But the original safety analysis that Boeing delivered to the FAA for a new flight control system on the MAX — a report used to certify the plane as safe to fly — had several crucial flaws.”


- “Report: Self-Regulation of Boeing 737 MAX May Have Led to Major Flaws in Flight Control System...According to the Seattle Times, the FAA has made a habit of delegating parts of the regulation process to Boeing due to cuts in funding. For the 737 MAX, FAA managers reportedly pressured the agency’s safety engineers to hand over safety assessments to Boeing itself, and to green-light the company’s findings. Remarkably, the paper was working on the report prior to the crash of the Ethiopian Airlines flight, which killed all 157 occupants onboard: “Both Boeing and the FAA were informed of the specifics of this story and were asked for responses 11 days ago, before the second crash of a 737 MAX last Sunday.”” http://nymag.com/intelligencer/2019/03/report-the-regulatory-failures-of-the-boeing-737-max.html

Regulatory Capture

- “Regulatory capture is a form of government failure which occurs when a regulatory agency, created to act in the public interest, instead advances the commercial or political concerns of special interest groups that dominate the industry or sector it is charged with regulating.[1] When regulatory capture occurs, the interests of firms or political groups are prioritized over the interests of the public, leading to a net loss for society. Government agencies suffering regulatory capture are called "captured agencies".”
  https://en.wikipedia.org/wiki/Regulatory_capture

- “Aviation Impacts & FAA’s Regulatory Capture: the Reasons the aiReform.com Website was Created...Today’s FAA has the same regulatory capture problem. And, as can be expected for any captured regulatory agency, FAA and its predecessor agencies has a long (and continuing) history filled with scandal, disaster, arrogant dismissal and disservice by regulatory officials only pretending to regulate.”
  http://aireform.com/about-the-person-who-started-this-website/aviation-impacts-faas-regulatory-capture-the-reasons-the-aireform-com-website-was-created/

- “Leaked Audit: Manufacturers and FAA Allowing Defective Parts on Planes Insufficient Oversight of Foreign and Domestic Outsourcing...The Project On Government Oversight has obtained a Transportation Department Inspector General (IG) report dated February 26, 2008 and not yet released to the public, which finds that “neither manufacturers nor FAA inspectors have provided effective oversight of suppliers; this has allowed substandard parts to enter the aviation supply chain.” (Page 4) These suppliers include those that provide parts critical for safe flight on both civilian and military aircraft.” https://www.pogo.org/press/release/2008/leaked-audit-manufacturers-and-faa-allowing-defective-parts-on-planes-insufficient-oversight-of-foreign-and-domestic-outsourcing/

- “Captured Agency. How the Federal Communications Commission Is Dominated by the Industries It Presumably Regulates...Captured agency. That’s a term that comes up time and time again with the FCC. Captured agencies are essentially controlled by the industries they are supposed to regulate. A detailed look at FCC actions—and non-actions—shows that over the
years the FCC has granted the wireless industry pretty much what it has wanted. Until very recently it has also granted cable what it wants. More broadly, the FCC has again and again echoed the lobbying points of major technology interests.” [http://ethics.harvard.edu/files/center-for-ethics/files/capturedagency_alster.pdf]

Political

- “The Boeing scandal is an indictment of Trump’s corporate America...There is growing alarm in the US that Capitol Hill’s bonfire of the regulations has led to hundreds of deaths. It may be a turning point.” [https://www.theguardian.com/commentisfree/2019/apr/07/boeing-737-max-regulation-corporate-america]

Criminal Investigation?

- “Boeing 737 Probe Takes Highly Unusual Turn As New Claims Emerge...The Justice Department is looking into the development of the Boeing 737 Max, a highly unusual probe, involving a prosecutor in the criminal division's fraud section, according to the Wall Street Journal. Typical safety probes are civil cases handled by the Transportation Department's inspector general, according to the report. A grand jury also issued a subpoena March 11 to at least one person involved in the 737 Max's development, the Journal said.” [https://www.investors.com/news/boeing-737-max-criminal-probe-grand-jury/]
- “FBI joining Boeing 737 Max probe: report...The FBI has joined the criminal investigation into Boeing...737 Max certification, The Seattle Times reported late Wednesday, citing people familiar with the matter. The federal grand jury investigation is reportedly looking into safety approvals for the plane, involved in two fatal crashes in less than five months.” [https://www.marketwatch.com/story/fbi-joining-boeing-737-max-probe-report-2019-03-20]
- “The Pentagon's Watchdog Is Investigating Whether the Acting Defense Secretary Boosted Boeing...The Department of Defense Office of Inspector General confirmed it has launched an investigation into whether Acting Secretary of Defense Patrick Shanahan has violated any ethics rules by promoting his former employer Boeing while serving in the Trump Administration.” [http://time.com/5555186/patrick-shanahan-defense-ethics-probe/]

“Airplanes have turned into very high electromagnetic interference (EMI) environments in the advent of wireless movie streaming.” — Steven Magee - Author of Toxic Electricity