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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https://www.environmentalradiation.com/
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-AVJ, 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.” [link]
- “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.” [link]
- “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.” [link]
- “Pilot of Crashed Jet Reported Flight-Control Problems” [link]

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.” [link]
• “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/faa-says-evidence-shows-similarities-between-ethiopia-and-indonesia-plane-crashes/ar-BBUITsr?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.” [https://www.upi.com/Top_News/World-News/2019/03/13/Trump-orders-FAA-to-ground-Boeing-737-Max-8-Max-9-planes/8181552483619/]

• “From 8,600 Flights to Zero: Grounding the Boeing 737 Max 8...All 47 airlines that have the Max 8 in their fleets are believed to have stopped flying it.” [https://www.nytimes.com/interactive/2019/03/11/world/boeing-737-max-which-airlines.html?action=click&module=RelatedCoverage&pgtype=Article&region=Footer]

• “Boeing 737 Max aircraft grounded 'until May at least’...The aircraft will not fly until a software update can be tested and installed, the US regulator said.” [https://www.bbc.com/news/business-47567039]

• “A Boeing 737 Max being moved across Europe made a forced landing after being denied entry into German airspace...A spokeswoman for Deutsche Flugsicherung, which runs air-traffic control in Germany, told Business Insider that Germany extended its ban on all 737 Max flights through its airspace from Wednesday until September 8... the jet was denied entry to German airspace and was instructed by French air-traffic controllers to land the plane in France” [https://www.insider.com/boeing-737-max-denied-german-airspace-entry-made-land-relocation-2019-6]

• “Beyond the Boeing 737 MAX: A Brief History of Aircraft Groundings” [https://thepointsguy.com/news/history-of-aircraft-groundings/]

**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.” [https://philadelphia.cbslocal.com/2019/03/13/president-trump-emergency-order-ground-boeing-737-max-planes-ethiopians-airlines-crash/]

• “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...”

• “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.”

• “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.”

• “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.”

• “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.”
- “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 conditions similar to those in two recent disasters, a document shows.”
- “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.”

“Boeing altered key switches in 737 MAX cockpit, limiting ability to shut off MCAS”

“FAA reportedly didn’t review crucial safety assessments of Boeing 737 Max system before fatal crashes...The Federal Aviation Administration’s internal probe of Boeing’s 737 Max approval process has reportedly found that senior agency officials failed to review key safety assessments of the plane’s flight-control system that was later implicated in two fatal crashes.”

“Flawed: Why the Boeing 737 Max Should Be Permanently Grounded...The 737 Max is a flawed design. Instead of building a new plane to meet the needs of a specific market, Boeing’s senior executives, including CEO Dennis Muilenburg, made the decision to upgrade the 737 in an attempt to get the plane to market sooner to prevent its largest competitor, Airbus, from securing orders for its own aircraft. When testing revealed that the heavier engines and the forward placement location of the engines on the 737 Max created new and unsafe flight characteristics, did Boeing shut down the program? No. Boeing made the decision to come up with a software fix to force a solution to the fact that the company had pushed the original design of the 737 far past its limit.”

“Fatal flaw in Boeing 737 Max traceable to one key late decision... The Max wasn’t handling well when nearing stalls at low speeds. Wilson told engineers that the issue would need to be fixed...The change proved pivotal. Expanding the use of MCAS to lower-speed situations required removing the G-force threshold. MCAS now needed to work at low speeds so G-force didn’t apply. The change meant that a single angle-of-attack sensor was the lone guard against a misfire...they did not test what would happen if MCAS activated as a result of a faulty angle-of-attack sensor – a problem in the two crashes.”

“Boeing reportedly left engineers, officials unaware of 737 Max changes...Boeing's overestimation of the 737 Max's safety may have been prompted in part by a simple but dangerous problem: many of the people involved weren't aware of the changes. The New York Times has claimed that some engineers, testers and regulators were unaware Boeing had made the jet's MCAS anti-stall system far more aggressive. They operated on the assumption the technology relied on two sensors when it was using just one, and a "compartmentalized approach" to development left key engineers without a full understanding of how the system worked. Moreover, the aircraft maker reportedly didn't disclose the MCAS changes to FAA
• “Officials responsible for determining pilot training requirements.”
  https://www.environmentalradiation.com/

• “‘Sully’ Sullenberger Says He Struggled To Recover Boeing 737 MAX In Flight Simulation... The Bay Area pilot who orchestrated the dramatic plane landing in the Hudson River 10 years ago told a congressional panel Wednesday that he can “see how crews could have run out of time” during the recent Boeing 737 MAX crashes after he struggled to recover the plane in a simulator running recreations of the doomed flights.”
  https://www.engadget.com/2019/06/02/boeing-left-737-max-teams-unaware-of-full-changes/

• “‘Sully’ Sullenberger Says He Struggled To Recover Boeing 737 MAX In Flight Simulation... The Bay Area pilot who orchestrated the dramatic plane landing in the Hudson River 10 years ago told a congressional panel Wednesday that he can “see how crews could have run out of time” during the recent Boeing 737 MAX crashes after he struggled to recover the plane in a simulator running recreations of the doomed flights.”
  https://www.environmentalradiation.com/

• “A key question about emergency maneuvers could throw a wrench in Boeing’s plan to get the 737 Max back in the sky...The process of approving the Boeing 737 Max to return to commercial service in the US has been delayed over concerns about the strength required to turn a crank in the cockpit during an emergency...The crank reportedly allows a pilot to alter the vertical angle of the plane's nose by changing the direction of a horizontal panel on the tail. But there are some situations that could make the process of turning the crank very difficult, which has made the Federal Aviation Administration (FAA) concerned about whether some pilots would be physically strong enough to handle those situations, according to The Journal.”

• “New flaw discovered on Boeing 737 Max, sources say...In simulator tests, government pilots discovered that a microprocessor failure could push the nose of the plane toward the ground. It is not known whether the microprocessor played a role in either crash. When testing the potential failure of the microprocessor in the simulators, "it was difficult for the test pilots to recover in a matter of seconds,” one of the sources said. "And if you can't recover in a matter of seconds, that's an unreasonable risk.””

• “Boeing’s 737 Max Software Outsourced to $9-an-Hour Engineers...The Max software -- plagued by issues that could keep the planes grounded months longer after U.S. regulators this week revealed a new flaw -- was developed at a time Boeing was laying off experienced engineers and pressing suppliers to cut costs. Increasingly, the iconic American planemaker and its subcontractors have relied on temporary workers making as little as $9 an hour to develop and test software, often from countries lacking a deep background in aerospace -- notably India.”

• “Boeing 737 Max Reportedly Has An Autopilot Problem...The European regulators also found that the plane’s autopilot fails to disengage in certain emergencies. This could lead to problems for pilots when they want to take over from the autopilot system in the event of an emergency. The FAA hasn’t highlighted this issue as yet so it’s unclear at this point in time how much more time Boeing would require to address this as well.”

• “Boeing says 737 Max flaw rooted in software not hardware...the newly discovered problem was not triggered by MCAS, according to Bloomberg. It was instead triggered by multiple erroneous data streams in a flight computer that occurred simultaneously. It was simulated in tests even though it has never been documented to have occurred during flight...When the newly discovered computer failure began trimming the nose down in the recent test, it was more
difficult than expected for test pilots to counteract.”

“FAA regulators knew of Boeing Max risk after first crash: WSJ...Previously unreported analysis by the Federal Aviation Administration of the first Boeing Max crash suggests it “didn’t take that much” for a sensor to malfunction and that a similar disaster was possible...One regulator told the Journal that the FAA’s goal was: “Get something out immediately and then mandate something more permanent.””

“Boeing is redesigning the flight-control system of the 737 Max to deal with a new flaw the FAA uncovered, reports say...Boeing was making a fundamental change to the flight-control software in the Max after the FAA in June flagged a new issue with the plane that could cause it to go into a dive. With the change, the planes would take inputs from both of its flight-control computers during a flight instead of just one, a system that has been standard on 737 planes for decades”

“Boeing 737 Max Safety System Was Vetoed, Engineer Says...A senior Boeing engineer filed an internal ethics complaint this year saying that during the development of the 737 Max jet the company had rejected a safety system to minimize costs, equipment that he felt could have reduced risks that contributed to two fatal crashes...Many current and former Boeing employees have privately discussed problems with the design and decision-making process on the 737 Max, outlining episodes when managers dismissed engineers’ recommendations or put a priority on profits. The engineer who filed the ethics concerns this year, Curtis Ewbank, went a step further, lodging a formal complaint and calling out the chief executive for publicly misrepresenting the safety of the plane.”

“FAA under fire after independent report found systematic failures in approval of Boeing 737 Max...The investigation found that the FAA itself was “not fully aware” of a new system on the plane that contributed to two fatal crashes, and the FAA “delegated a high percentage of approvals,” allowing Boeing to certify much of its own work.”

“Congress Ramps Up Scrutiny of Boeing Executives, Board. Survey at plane maker showed some workers felt undue pressure to approve systems...Survey at plane maker showed some workers felt undue pressure to approve systems. U.S. lawmakers probing the 737 MAX jet crisis are ratcheting up scrutiny of Boeing Co. leaders as new details point to management pressure on engineers and pilots in its commercial-aircraft unit.”

“Boeing expresses regret after former test pilot’s messages on 737 Max software plunge company into new crisis...In the messages from November, 2016, then-chief technical pilot Mark Forkner tells a colleague that what’s known as the MCAS anti-stall system – the same one linked to deadly crashes in Indonesia and Ethiopia – was “running rampant” in a flight-simulator session. At another point, he says: “I basically lied to the regulators”
(unknowingly).” ...a 2016 Boeing survey that found nearly 40 per cent of 523 employees handling safety-certification work perceived “potential undue pressure” from managers, such as bullying or coercion.”

- “Boeing promises to change 737 Max software as Indonesia releases Lion Air crash report...A summary of the report blames the crash on faulty "assumptions" made during the design and certification of the 737 Max about how pilots would respond to malfunctions by the Maneuvering Characteristics Augmentation System (MCAS).”

- “Lawmaker blames investors for Boeing’s race to sell troubled 737 Max: ‘This all starts on Wall Street’...Investors pressured Boeing to quickly build its fuel-efficient 737 Max planes to top European rival Airbus, a key lawmaker said before the manufacturer’s CEO appears before Congress on two fatal crashes of the beleaguered planes. “This all starts on Wall Street,” Rep. Peter DeFazio, an Oregon Democrat and chair of the House Committee on Transportation and Infrastructure. Boeing CEO Dennis Muilenburg faces that committee on Wednesday and a Senate panel a day earlier as lawmakers seek answers about what brought down two of Boeing’s best-selling airplanes.”

- “Boeing papers show employees slid 737 Max problems past FAA... A newly released batch of emails and text messages shows Boeing employees raising doubts among themselves about the safety of the 737 Max and talking about hiding problems from regulators. The documents came to light Thursday, nearly 10 months after the aircraft was grounded over two catastrophic crashes. They are likely to fuel allegations that the aircraft manufacturer put speed and cost savings ahead of safety in rolling out the Max.”

- “Boeing finds new flaw on grounded 737 MAX jet...The troubled 737 MAX passenger plane has a software fault that causes an indicator light to light up at the wrong time, Boeing said on Thursday...The light is linked with the "stabilizer trim system," which adjusts the stabilizers at the tail of the plane.”

- “Boeing Argues It Doesn’t Need to Move 737 Max Wiring Bundles...The planemaker found in an audit last year of the 737 Max that wires were bundled improperly in a way that could trigger a failure similar to what happened in two crashes of the plane in which a total of 346 people died.”

- “The DOJ is reportedly probing whether Boeing’s chief pilot misled regulators over the 737 Max...Federal prosecutors issued a subpoena to Forkner last year for documents related to the plane’s development, and Forkner invoked the Fifth Amendment right against self-incrimination, according to The Seattle Times. Forkner described "egregious" problems with MCAS in 2016 messages to another Boeing employee, Patrik Gustavsson, saying the software was "running rampant in the sim," in reference to flight-simulator tests. In another message, he suggested that he had unintentionally misled the FAA about the issue. "I basically lied to the regulators (unknowingly)," he said.”
House investigation finds Boeing’s 737 Max was ‘marred’ by technical problems, lack of transparency...The report found that the Federal Aviation Administration’s review of the aircraft was “grossly insufficient” and that the agency “failed in its duty” to find safety problems.  
https://www.cnbc.com/2020/03/06/house-investigation-finds-boeings-737-max-was-marred-by-technical-problems-lack-of-transparency.html

“Boeing to separate 737 MAX wire bundles before jet's return to service...The FAA and Boeing first said in early January they were reviewing a wiring issue that could potentially cause a short circuit on the 737 MAX, and in certain remote circumstances lead to a crash if pilots did not react in time.”  

“The ancient computers in the Boeing 737 Max are holding up a fix...In June 2019, Boeing submitted a software fix to the FAA for approval, but subsequent stress-testing of the Max’s computers revealed more flaws than just bad code. They are vulnerable to single-bit errors that could disable entire control systems or throw the airplane into an uncommanded dive. They fail to boot up properly. They may even “freeze” in autopilot mode even when the airplane is in a stall, which could hamper recovery efforts in the middle of an in-flight emergency. Despite all of this, Boeing insists that it can fix everything with software. Boeing has elected not to go with a new, more powerful computer or to add more of them to the two already there, in order to better distribute the workload. For comparison, Airbus’ A320neo has computers of similar vintage — but it has seven of them.”  

“FAA explains why it's taking so long to fix the grounded Boeing 737 jetliner...Boeing's effort to get the 737 Max flying again has turned out to be "a much more ambitious project" than initially expected. That helps explain why the jetliner has remained grounded for more than a year, the Federal Aviation Administration's chief said Wednesday.”  

“Boeing whistle-blower says original FAA review of 737 Max reckless, ignored safety concerns.  A Boeing engineer told the US Senate Committee that the original certification was done with hand-waving and deception to hide flaws in the 1960s-era design of the 737...“The 737 Max’s original certification was accomplished with hand-waving and deception to hide the numerous ways the 1960s-era design of the 737 does not meet current regulatory standards or a modern concept of aviation safety,” Ewbank wrote. He faulted Boeing and the FAA for “allowing such reckless disregard of regulations and aviation safety.””  

“U.S. House probe of 737 MAX finds ‘disturbing pattern’ of Boeing failures and ‘grossly insufficient’ FAA oversight...He called it “mind boggling” that the MAX, which had two crashes that killed 346 people within five months, was originally certified by both Boeing and the FAA as compliant with all safety regulations. “The problem is, it was compliant and not safe. And people died,” DeFazio said, “Obviously the system is inadequate.”...The House investigation concludes that “excessive FAA delegation to Boeing has eroded FAA’s oversight capabilities.”...It reaches back 16 years to cite former CEO Harry Stonecipher — after he joined the leadership following the 1997 merger with McDonnell Douglas — boasting that he deliberately shifted Boeing’s longtime culture “so it’s run like a business rather than a great
“In unusual move, FAA chief test flies 737 Max; says more fixes needed...The daughter of Joseph Waithaka, who was killed in the Ethiopian Airlines Flight 302 crash, called the flight a "gimmick." "It's nothing but a clown in a suit to reassure the public that everything is fine," Zipporah Kuria said in an email shared by her attorney. "It's clearly a PR stunt for the FAA and a free endorsement for Boeing."

He also said concerns about the plane's safety raised earlier this month by the FAA's own safety engineers are under consideration by the officials certifying the plane. The safety engineers, in a document submitted to the FAA by their union, said additional work is needed before the jet should be cleared for passenger flights.”

“Boeing's 737 Max cleared to fly in the US after crashes...Safety regulator, the US Federal Aviation Administration (FAA), said the clearance would not allow the plane to "return immediately" to the skies. Alongside the software and wiring changes, pilots will also need training. The FAA said the design changes it had required "have eliminated what caused these particular accidents"...The US is the first to reverse the grounding orders, which hit the firm around the world in March 2019. European aviation officials have said they are close to making a similar decision...The crashes in Indonesia and Ethiopia came within five months of each other and together killed 346 people. They have been attributed to flaws in automated flight software called MCAS, which prompted the planes to nosedive shortly after take-off...A US congressional report last month said Boeing's rush to production, a decision to ignore internal safety concerns and concealment of key changes to the plane, including pilot training needs, contributed to the accidents. It also faulted the FAA for oversight lapses, including "excessive delegation to Boeing".”

“FAA certifies troubled Boeing 737 Max to fly again, but critics fear jetliner's 'basic aerodynamic problem'...Critics say the changes are not enough. Consumer advocate Ralph Nader, whose 24-year-old niece died in the Ethiopian Airlines crash, wrote Dickson on Nov. 13, saying the 737 Max is fundamentally flawed and should never be allowed to fly. There's no "ignoring the basic aerodynamic problem of the plane's 'quick and dirty' engine position/fuselage mismatch," he wrote, and "human factors and the unstable aerodynamics of the 737 MAX have made it inherently unsafe."..."It doesn't seem real. How could this happen?" asked Naoise Ryan, whose husband, Michael Ryan, died in the crash along with six colleagues in the United Nations World Food Program. "Not a single person has been held to account" and "aviation should not be a trial-and-error process."”

Other Boeing Aircraft Problems

“Boeing May Have Software Problems Beyond the 737 Max...Pilots flying Boeing aircraft in recent years have reported flight-control problems they blamed on malfunctioning software — not on the company’s maligned 737 Max jets, but widely used earlier versions of the plane that
are still in the air. Commercial pilots flying Boeing’s NG, or “Next Generation,” models have registered concerns on a variety of computer problems through the Aviation Safety Reporting System, a database administered by NASA. In the past three years, pilots on different flights reported a range of issues, including losing airspeed on takeoff in some cases or the plane’s nose pitching downward without their command.” [https://skift.com/2019/06/28/boeing-may-have-software-problems-beyond-the-737-max/](https://skift.com/2019/06/28/boeing-may-have-software-problems-beyond-the-737-max/)

- “Pilots Flagged Software Problems on Boeing Jets Besides Max...Pilots flying Boeing aircraft in recent years have reported flight-control problems they blamed on malfunctioning software -- not on the company’s maligned 737 Max jets, but widely used earlier versions of the plane that are still in the air...In October 2018, a captain of an NG aircraft was flying on autopilot when the plane suddenly rolled sharply to the right and then even more strongly to the left, after which it gained speed and then nosed down. The pilots were able to get the plane under control, but reported on ASRS that “this is the fourth write-up of this issue in a few days.”” [https://www.bloomberg.com/news/articles/2019-06-27/boeing-pilots-flagged-software-problems-on-jets-besides-the-max](https://www.bloomberg.com/news/articles/2019-06-27/boeing-pilots-flagged-software-problems-on-jets-besides-the-max)

- “U.S. Delves Into 787 Factory Issues as Boeing Probe Expands...The inquiry, which was first reported by the Seattle Times, has expanded to include a look into manufacturing of the 787 Dreamliner at a new Boeing plant in North Charleston, the person said. Whistleblowers cited in media reports have warned of tools and other debris left inside jets and a culture of intimidation at the non-union plant, the only commercial final assembly line outside of Boeing’s Seattle industrial hub.” [https://www.bloomberg.com/news/articles/2019-06-28/doj-expands-boeing-probe-include-787-dreamliner-reports-says](https://www.bloomberg.com/news/articles/2019-06-28/doj-expands-boeing-probe-include-787-dreamliner-reports-says)

- “Airlines flying Boeing's 787-10 Dreamliner are complaining about quality they say is 'way below acceptable standards'...KLM Royal Dutch Airlines described the factory's quality control as "way below acceptable standards" when talking about a new 787-10 delivered in spring. Among several issues noted were loose seats, missing and incorrectly installed pins, nuts and bolts not fully tightened, and a fuel-line clamp left unsecured. Notably, while the airline privately expressed concerns related to the plane — "who looks at quality in this facility?" the airline asked” [https://www.businessinsider.com/boeing-787-dreamliner-airline-complaints-quality-production-2019-8](https://www.businessinsider.com/boeing-787-dreamliner-airline-complaints-quality-production-2019-8)

- “Boeing 787s must be turned off and on every 51 days to prevent 'misleading data' being shown to pilots. US air safety bods call it 'potentially catastrophic' if reboot directive not implemented...According to the directive itself, if the aircraft is powered on for more than 51 days this can lead to "display of misleading data" to the pilots, with that data including airspeed, attitude, altitude and engine operating indications. On top of all that, the stall warning horn and overspeed horn also stop working.” [https://www.theregister.co.uk/2020/04/02/boeing_787_power_cycle_51_days_stale_data/](https://www.theregister.co.uk/2020/04/02/boeing_787_power_cycle_51_days_stale_data/)

- “The Boeing 777X Was On Last Test For FAA Certification — Then This Happened...A key test phase was suspended over the weekend after an explosion blew out the doors of a Boeing 777X, hitting the already delayed program.” [https://www.investors.com/news/boeing-777x-explosion-rocks-delayed-program/](https://www.investors.com/news/boeing-777x-explosion-rocks-delayed-program/)

- “Boeing has new safety problems with an older version of the 737 airplane...Structural cracks have been discovered in 38 737 NG's, or Next Generation jets. The cracks were found in inspections ordered by the Federal Aviation Administration a week ago. According to Boeing, as of Wednesday there had been 810 planes inspected, and 38 jets require repairs. That is
roughly 5% of the planes that were inspected.”

- “Boeing to fix engines on 7,000 jets after fatal accident probe...The National Transportation Safety Board, which investigated the accident, recommended Tuesday that Boeing redesign part of the outer covering of the planes’ jet engines to prevent it from flying into the plane should a fan blade break free on a future flight. It said that all Boeing 737 Next Generation series airplanes should be retrofitted with whatever fix Boeing comes up with.” https://www.cnn.com/2019/11/19/business/boeing-737-ng-fix-southwest-airlines-fatality/index.html
- “Boeing, FAA Say No 737 Max Wiring Fixes Needed, WSJ Reports...Experts at the European Union Aviation Safety Agency want certain wires moved to reduce the risk of short circuits, which could disrupt flight-control systems in a worst-case scenario, according to the people. Boeing engineers and senior Federal Aviation Agency managers say moving the wiring isn’t necessary, one of the people said.” https://www.bloomberg.com/news/articles/2020-02-01/boeing-faa-say-no-737-max-wiring-fixes-needed-wsj-reports
- “Boeing faces another probe after 12-inch crack found on 737 jet...Federal air-safety officials are investigating the Boeing 737 model after the “skin” of a Southwest Airlines Boeing 737 cracked Monday night during a flight from Las Vegas to Boise, Idaho. The 12-inch break in the outer aluminum surface caused the craft to lose cabin pressure and drop 20,000 feet, according to the Wall Street Journal. No one was injured.” https://nypost.com/2020/03/14/boeing-faces-another-probe-after-12-inch-crack-found-on-737-jet/
- “U.S. FAA issues emergency directive on 2,000 Boeing 737s parked in pandemic...The Federal Aviation Administration (FAA) on Friday issued an emergency airworthiness directive for 2,000 U.S.-registered Boeing 737 NG and Classic aircraft, warning of possible corrosion on parked planes that could lead to a dual-engine failure. Inspectors found compromised air check valves when bringing aircraft out of storage following four recent reports of single-engine shutdowns on planes that had been parked, prompting the directive for aircraft not operated for seven or more straight days. Alaska Airlines <ALK.N> said one of its aircraft is likely one of the four incidents, noting a recent engine shutdown issue.” https://finance.yahoo.com/news/faa-issues-emergency-directive-2-123931045.html

Similar Aircraft Crashes

- “Boeing faces more trouble after crash of a Ukrainian 737 jet in Iran...A three-year old Boeing 737-800 jet operated by Ukraine International Airlines crashed soon after takeoff from Tehran's international airport early Wednesday, killing all 176 people on board.” https://www.cnn.com/2020/01/08/business/boeing-iran-crash/index.html
- “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.” https://ntsb.gov/news/press-releases/Pages/NTSB_Determines_that_Poor_Maintenance_Practices_Led_to_the_Crash_of_Alaska_Airlines_Flight_261.aspx
• “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. 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.”

• “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 Cointрин 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. 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. 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. 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.”

• “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).”

• “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. The fire caused extensive heat damage to the aircraft. The FAA and NTSB sent representatives to assist in the investigation. The initial investigation found no direct link with the aircraft's main batteries. 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]  

“NTSB Investigates Fatal Hawaii King Air Skydiving Crash...NTSB investigators have arrived at the scene of a fatal June 21 crash of a Beechcraft King Air A90 in Mokuleia, Hawaii. The 11 persons onboard, including several employees of operator Oahu Parachute Center, perished when the aircraft hit terrain immediately after takeoff from Dillingham Airfield (PHDH) at approximately 6:30 p.m. local time. “This is the deadliest accident involving a civil airplane in the U.S. since 2011,” NTSB member Jennifer Homendy told reporters Sunday.”  

“10 killed in small plane crash at Texas airport...The Beechcraft BE-350 King Air crashed into a hangar while it was taking off from the Addison Airport, said Mary Rosenbleeth, a spokeswoman for the city, north of Dallas.”  

“2 dead, 1 injured after small plane crashes into SUV in Florida...The Beechcraft Baron had just taken off from Ocala International Airport for a maintenance flight before it "crash landed" on a six-lane road, hitting power lines and the SUV, authorities told ABC News. According to air traffic control audio, around 11:30 a.m. local time, the pilot radioed to the tower that they "need[ed] to return to the field."”  

“3 Killed In West Texas Plane Crash, Authorities Say...Federal Aviation Administration spokesman Lynn Lunsford said the twin-engine Beechcraft BE20 Super King Air disappeared from air traffic radar just before 6 a.m. Feb. 20. Officials said the pilot was trying to return to an airport because of an electrical problem.”  

“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).”  

Rising Air Crashes  

“After 900% Increase In 2018, Airline Fatalities Rising Again...In 2017, there were a total of 59 deaths attributed to airline accidents. In 2018, there were 561. When I did the math, I was taken aback; deaths attributed to airline accidents had jumped 900% year-over-year. And if present
trends are not reversed, it appears that airline deaths will rise further in 2019.”

• “U.S. Bizav Accident Fatalities Skyrocket in 1H19...The high number of fatal accidents and fatalities involving U.S.-registered turbine business airplanes in the first half of this year might set an all-time record for a six-month period, with June clearly being the deadliest 30-day time frame. According to preliminary statistics gathered by AIN, 21 people died in five business jet crashes and 36 lost their lives in eight turboprop crashes during the first half of this year. All but two of the fatal accidents occurred while operating under Part 91.”

• “Plane crash deaths rise in 2020 despite Covid pandemic...Dutch aviation consultancy To70 found that 299 people were killed in commercial crashes worldwide last year, rising from 257 in 2019.”

Manufacturing Issues

• “Boeing says some of its 737 Max planes may have defective parts...Boeing on Sunday said some of its 737 planes, including many 737 Max aircraft, may have faulty parts on their wings. It's the latest problem Boeing faces as it tries to get its most important and popular airplane, the grounded 737 Max, back in the air.”

• “Work on production line of Boeing 737 Max ‘not adequately funded’..."The goal was to show that those differences were so similar to the previous design that it would not require a major design classification in the certification process. There was a lot of interest and pressure on the certification and analysis engineers in particular, to look at any changes to the Max as minor changes."...He said that downplaying the changes reduced scrutiny in a way that could impact safety. Now even his own family have fears about the plane's safety. "My family won't fly on a 737 Max. It's frightening to see such a major incident because of a system that didn't function properly or accurately."”

• “FAA proposes Boeing $5.4 million fine for defective 737 Max parts...The Federal Aviation Administration is seeking a $5.4-million fine against Boeing for faulty wing parts on dozens of 737 Max planes.”

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.”
• “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.””

• “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

• “Regulators can't decide how much training pilots need to fly the Boeing 737 Max, and it could result in even longer delays to the aircraft's return...Regulators are considering whether pilots need to fly on a simulator or just complete computer-based training, and the decision could determine when the 737 Max, already a source of frustration for airlines who have have had to ground the plane for the last two months, can return to the skies.”

• “Captain Sullenberger tells Congress, Boeing 737 Max crashes "should never have happened"...Sullenberger detailed how the failure of a single "angle of attack" sensor on the Boeing 737 Max 8 flights quickly caused "multiple instrument indication anomalies" and "false warnings," as an automated flight-control system called MCAS overrode pilots' commands..."Again, the failure was Boeing did not disclose the existence of MCAS to the pilot community around the word," said Captain Daniel F. Carey, president of the Allied Pilots Association, who testified alongside Sullenberger. "Therefore robust training was not conducted.””

• “Boeing 'misjudged 737 Max pilot reactions'..."I think the crew were just overloaded with information'. This was what a pilot in Ethiopia told me earlier this year when we were discussing the 737 Max that crashed near Addis Ababa. The NTSB's recommendations seem to bear out that theory. It says that during simulator tests, Boeing assessed pilot responses to a generic MCAS failure. But it did not incorporate the kinds of problems that could lead up to such a failure. This meant that when the real thing happened, pilots were faced with a variety of alerts and warnings that had not occurred in the simulator - linked to the sensor failure that caused MCAS to deploy at the wrong time. As a result they did not respond in the way Boeing had assumed they would, and did not immediately take the steps it had assumed they would take. Given that those assumptions underpinned the manufacturer's own safety analysis, it is a worrying conclusion, and potentially one with wider implications.”
“On Deadly 737 Max Jet, Captain Had the Flu and Copilot Was a Sub...The report found that Boeing Co.’s poorly considered design of the now-grounded 737 Max and inadequate oversight by U.S. regulators resulted in the crash off the coast of Jakarta, killing all 189 aboard. Among the criticisms: a failure to adequately consider the human equation and how pilots respond to a fast-moving emergency in a chaotic cockpit. The investigators showed sympathy for the pilots, saying that they were never told about the Maneuvering Characteristics Augmentation System that sent their plane bobbing through the air and that they were faced with a confusing barrage of failures.”

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”

“The Boeing 737 Max crashes have revived decades-old fears about what happens when airplane computers become more powerful than pilots...both sets of pilots struggled to control a malfunctioning automated system that forced plane noses toward the ground, and pilots as far away as the US have said they were totally unaware of the system. Staff with some airlines now say they don't want to fly the 737 Max, and Boeing and airlines around the world are hemorrhaging millions of dollars as the planes sit idle until an update is approved by regulators, all of which is causing Boeing to lose its crown as the world's biggest planemaker.”

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.”

“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.”
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](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](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. These 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

“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.”

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."
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

• "HUGE ‘SUPERFLARE’ COULD BE HURLED OUT OF THE SUN AND THREATEN EARTH, SCIENTISTS WARN. Intense blasts of energy could destroy electronics and cause blackouts across the world..."If a superflare occurred 1,000 years ago, it was probably no big problem. People may have seen a large aurora," Notsu said. "Now, it's a much bigger problem because of our electronics."

Wireless Movie Streaming

- “In-flight entertainment” [https://en.wikipedia.org/wiki/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/](https://thepointsguy.com/2015/11/how-in-flight-wi-fi-works/)
- “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](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](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/](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
“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.”

“Ask the Captain: Is it OK to rat out passengers for phone use during takeoff and landing?...Q: When the cabin door closes and the cabin staff announces for all cellular devices to be placed in airplane mode or turned off, some passengers feel this announcement does not pertain to them. They keep talking. Is it acceptable to rat them out to cabin staff? – Allen Har, Asheville, North Carolina. A: I agree, there are passengers who do not comply and get belligerent when a flight attendant does their job of reminding them of the rule.”

“Could Your Cell Phone Really Crash Your Flight? On 2 Popular Boeing Jets, There's a Risk...U.S. government officials in 2014 revealed an alarming safety issue: Passenger mobile phones and other types of radio signals could pose a crash threat to some models of Boeing 737 and 777 airplanes. More than 1,300 jets registered in the U.S. were equipped with cockpit screens vulnerable to interference from Wi-Fi, mobile phones and even outside frequencies such as weather radar, according to the Federal Aviation Administration, which gave airlines until November 2019 to replace the units made by Honeywell International Inc. Honeywell estimates that 70 or fewer planes with cockpit screens in need of repair are still flying.”

“Plane-Crash Risk Seen Rising on FCC Expansion of 5G Spectrum...A plan to redeploy spectrum for super-fast 5G wireless networks is sparking concern among aviation safety experts that it could result in interference with the electronics on aircraft, potentially leading to crashes...But the RTCA, formerly known as the Radio Technical Commission for Aeronautics, produced a 217-page study laying out potential hazards, including the potential for planes to crash near airports such as Chicago’s O'Hare International...Aviation regulators in France have gone further and have slowed the deployment of 5G around airports while they study the matter.”

“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.”
“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.”

“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.”

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.”

“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.”

“Tuning in to Microwave Sickness From Wireless Radiation. How wireless technology can trigger a devastating illness...scientists have documented evidence of an illness from sub-thermal microwave exposure for decades. The condition used to be known as “microwave sickness” or “radio frequency sickness,” but today, it’s usually called electromagnetic sensitivity (ES).”

“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.”

“Cockpit Electromagnetic Fields May Be Harming Pilots, The U.S. Military Fears...But what’s significant about DARPA's new project is that the suspected culprit isn’t just high-powered radar anymore. Pilots of cutting-edge aircraft, such as the F-35 stealth fighter, are encased in an electronic cocoon of powerful sensors, audiovisual displays, and special high-tech helmets. And
it’s not just U.S. pilots: European, Russia, Israeli and other pilots of advanced aircraft also use this technology – and faced potential exposure to hazardous radiation. Equally significant is that the Pentagon is admitting a disturbing possibility: that cockpit radiation may be affecting the mental judgment of pilots so badly that it’s causing them to crash their aircraft.”


- “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?”


- “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.”


- “Commission to Study The Environmental and Health Effects of Evolving 5G Technology”

http://www.gencourt.state.nh.us/statstudcomm/committees/1474/reports/5G%20final%20report.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/

**Problems That May Be Related To Electromagnetic Interference (EMI)**

- “‘We are dropping like flies.’ Ex-fighter pilots push for earlier cancer screenings...Former Air Force and Navy fighter pilots are calling on the military to begin cancer screenings for aviators as young as 30 because of an increase in deaths from the disease that they suspect may be tied to radiation emitted in the cockpit. “We are dropping like flies in our 50s from aggressive cancers,” said retired Air Force Col. Eric Nelson, a former F-15E Strike Eagle weapons officer. He cited prostate and esophageal cancers, lymphoma, and glioblastomas that have struck fellow pilots he knew, commanded or flew with.”


- “Flight attendants keep getting sick. It’s likely because of their uniforms...Rashes, blisters, and hair loss have all been reported. So has vomiting, migraines, and shortness of breath. All of these — and more — are symptoms reported by flight attendants after their airlines got new uniforms. But no one knows why...The problem was first reported after employees at Alaska Airlines got new uniforms toward the end of 2010 and beginning of 2011. Flight attendants
began to report rashes and eye irritation, and documented hives, blisters, and scaly patches...Flight attendants reported rashes, blisters, open sores, and swelling...Skin symptoms were the most common complaints, but flight attendants also described vomiting, migraines, shortness of breath, and hair loss, among other symptoms...flight attendants’ working conditions may make them particularly vulnerable to chemicals present in their uniforms, and that flight attendants’ reactions may be acting as a warning bell for others.”

Detecting Electromagnetic Interference (EMI)

- “Best Sellers in EMF Meters” [https://www.amazon.com/gp/bestsellers/industrial/5011676011/ref=zg_b_bs_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](https://www.amazon.com/gp/bestsellers/industrial/5011676011/ref=zg_b_bs_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.” [https://www.businessinsider.com/americans-dont-want-to-fly-boeing-737-max-survey-2019-3](https://www.businessinsider.com/americans-dont-want-to-fly-boeing-737-max-survey-2019-3)
- “'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."

**Who were the victims of the Ethiopian Airlines crash?...**

Passengers of more than 35 nationalities were among the 157 people killed after an Ethiopian Airlines flight from Addis Ababa to Nairobi crashed six minutes after takeoff on Sunday morning. The Boeing 737 Max 8 plane was believed to be carrying 149 passengers and eight crew members. The passengers included 32 Kenyan citizens, 18 people from Canada, nine from Ethiopia, nine from the UK, eight from each of Italy, China and the US, and seven from France.

**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.

**Ralph Nader Says Boeing 737 Max Is Flawed and Should Never Fly Again...**

Consumer advocate Ralph Nader said the larger engines mounted to the Boeing 737 Max represented a design flaw and called for the plane to be permanently grounded. The 737 Max “must never fly again,” Nader said. “It’s not a matter of software. It’s a matter of structural design defect: the plane’s engines are too much for the traditional fuselage.”...the automated flight system that malfunctioned in two fatal crashes by the 737 Max since October, killing 346 people, including Nader’s grandniece…Nader also said Boeing’s top leaders should resign, adding, “Good heavens, they would’ve resigned in 24 hours in Japan out of shame.”

**Boeing 737 Max Seen as ‘Airplane Non Grata’ by Wary Travelers...**

At least 20% of U.S. travelers say they will definitely avoid the plane in the first six months after flights resume, according to a study led by consultant Henry Harteveldt. More than 40% said they’d be willing to take pricier or less convenient flights to stay off the Max. A separate UBS Group AG survey found that 70% would hesitate today to book a flight on Boeing’s best-selling jet. “Travelers aren’t merely scared of the 737 Max, they’re terrified of it,”
• “Families of 737 Max crash victims say Boeing has not contacted them, offered support, or apologized since the disasters...Families of those killed in two fatal crashes involving Boeing 737 Max planes say they have not received any contact from Boeing since the disasters, with no apology or offer of support from the manufacturer. The parents of a woman killed on one of the flights told Business Insider they had received "no condolences" and "no direct communication" from Boeing despite numerous public apologies by the plane maker and said Boeing CEO Dennis Muilenburg "talks to other people but not us, the victims' families."”

• “Man whose family died in Boeing 737 Max crash: Scrap the jet...A man who lost his wife, mother-in-law and three young children in the crash of a 737 Max in Ethiopia says Boeing should scrap the plane and top executives should resign and face criminal charges. Paul Njoroge, who is due to testify before Congress in the U.S. on Wednesday, said in an interview that 737 Max planes should have been grounded after a deadly crash off the coast of Indonesia in October. Instead, they kept flying until another crashed five months later near Addis Ababa, Ethiopia, shortly after takeoff, claiming the lives of his family and 152 others. If Boeing and the Federal Aviation Administration had done their jobs properly, Njoroge said, "these planes would have been grounded in November and today I would be enjoying summer with my family, I would be playing football with my son.”

• “737 Max Grounding Leads to American, Southwest Bumping More Passengers...The number of passengers who were bumped from flights on American Airlines and Southwest Airlines increased dramatically in the first half of the year, largely due to the grounding of the Boeing 737 Max aircraft.”

• “Crash Victim's Family Pushes To Keep Boeing 737 Max From Flying Again Too Soon...The company has also said it hopes to have the plane back in the air by the end of this year. But the Stumo family and other victims' relatives say that's too soon, and they've become a driving force in the campaign to keep the plane out of the air. They testified on Capitol Hill in July and met with Transportation Secretary Elaine Chao in September…"[The] people that made the decisions that killed my daughter, they should no longer make those decisions," he says. "Both at FAA and Boeing the people that made the decisions that ended up causing these crashes, they're still there."

• “Ralph Nader, whose grandniece died in a 737 Max crash, says Boeing CEO Muilenburg and entire board need to go...“Your mismanagement is replete with documentation. Management
was criminally negligent, 346 lives of passengers and crew were lost. You and your team should forfeit your compensation and should resign forthwith,” he wrote in an open letter published on his website.” https://www.cnbc.com/2019/10/21/ralph-nader-calls-for-removal-boeing-ceo-muilenburg-entire-board.html

- “THE 737 BUILT SOUTHWEST, AND THE 737 MAX COULD BE ITS UNDOING. How Boeing’s 737 Max debacle threatens your favorite budget airlines...In June, 70 percent of those surveyed by UBS said that they would “hesitate” to book a flight on a 737 Max; another survey run by Atmosphere Research Group found that 40 percent of likely flyers would be willing to take more expensive or “less convenient” flights to avoid the Max, and 20 percent would wait six months before flying one.” https://www.theverge.com/2019/10/23/20927213/boeing-737-max-southwest-planes-crash-budget-airlines-grounded-cost-maintenance

- “Why I Will Never Fly on a 737 MAX...Will anyone want to fly in a plane produced by an untrustworthy company and ungrounded by an untrustworthy regulator — a plane that has already led to the preventable deaths of 346 people? It’s time for Boeing to change the name of the 737 MAX. The brand is tarnished beyond repair. And I, for one, would rather walk than step foot on this aircraft.” https://www.ccn.com/why-i-will-never-fly-on-a-737-max/

Re-branding

- “Southwest updates safety information cards to avoid Boeing 737 Max confusion...Southwest Airlines used to tuck the same safety information card into the seat back pockets of its Boeing 737-800s and Boeing 737 Max 8s...passengers who saw Max 8 in bold yellow letters on the safety card bombarded Southwest flight attendants and the airline's social media representatives with questions about whether they were on the troubled plane. As the grounding dragged on, the airline had to repeatedly reassure customers that, no, they weren't on a Max 8.” https://www.usatoday.com/story/travel/flights/2019/07/10/boeing-737-max-southwest-changes-safety-information-cards-to-avoid-passenger-confusion/1691808001/

- “Boeing 737 Max ordered by Ryanair undergoes name change. Decision fuels speculation that troubled plane will be rebranded once it is given all clear to fly...Photos have emerged of a 737 Max in Ryanair colours outside Boeing’s manufacturing hub, with the designation 737-8200 – instead of 737 Max – on the nose. The 737-8200 is a type name for the aircraft that is used by aviation agencies.” https://www.theguardian.com/business/2019/jul/15/boeing-737-max-ordered-by-ryanair-undergoes-name-change

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.”

• “American’s 757-200s, Southwest’s 737-700s Among Jets Sticking Around Longer Because of the MAX...American is postponing the retirement of aircraft, while Southwest is both postponing retirements and cancelling destinations to mitigate the loss of the MAX. American has pushed back the retirement of some Airbus A320, 737-800 and Boeing 757-200 aircraft”

Flying Old Planes

• “The 737 MAX Grounding Is Such A Disaster That Airlines Are Leasing 30-Year-Old 737-200s...With hundreds of 737 MAX planes still on the ground following two fatal crashes, airlines are frantically trying to lease available 737s to fill gaps left by the MAX. They’re so desperate that they’re leasing 737-200s, a variant that was discontinued in 1988.”
https://jalopnik.com/the-737-max-grounding-is-such-a-disaster-that-airlines-1837144886

Airplane Storage

• “United Airlines to move its grounded 737 Max planes to Arizona...United Airlines will relocate its fleet of grounded Boeing 737 Max jets to Arizona for long-term storage, the airline announced Wednesday. The aircraft were grounded worldwide in March after two deadly crashes outside the United States. Similar problems were found in both crashes that killed 346 people. United has 14 of the 737 Max aircraft currently being stored in Los Angeles and Houston. The move was prompted by construction in Los Angeles and the hurricane season in
737 Max Production Halted

- “Boeing just halted production of the 737 Max...In a move that isn’t particularly surprising to anyone who has been following the woes of aircraft manufacturer Boeing, the company has now officially halted production of the troubled 737 Max aircraft. As CNN reports, the manufacturer has frozen the assembly facility that was constructing the popular planes.” [https://bgr.com/2020/01/21/737-max-production-halted-boeing/]
- “‘The only ones not paying for Boeing’s mistakes is Boeing’: laid-off supply workers voice their anger. Thousands of US workers have suffered job cuts and loss of hours – while Boeing’s former boss walks away with $62m...In addition to 2,800 jobs cut at Spirit, the logistics company DB Schenker laid off 255 workers also in Wichita and 144 workers in St Peters, Kansas.” [https://www.theguardian.com/business/2020/feb/01/boeing-workers-spirit-layoffs-future-unsure]
- “Boeing supplier Spirit Aero halts 737 Max work...Boeing Co. has told its biggest supplier to freeze a recently restarted production of parts for the 737 MAX to prevent creating a glut of new jets for airlines adjusting to the slump in demand amid the coronavirus pandemic. Spirit AeroSystems Holdings Inc, which makes the fuselage and other parts for the MAX, said late Wednesday it had been asked by Boeing to halt efforts on four MAX jets and avoid starting work on 16 more planes. The moves highlight a sharp industry divide over how many planes Boeing and rival Airbus SE should make. Executives are split over whether airlines will opt for new planes or hold onto older aircraft as they recover from depressed demand.” [https://www.marketwatch.com/story/boeing-supplier-spirit-aero-halts-737-max-work-2020-06-11]

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.” [https://www.barrons.com/articles/boeing-shares-drop-as-more-bad-news-arrives-51552932463]
- “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
• “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.” [https://www.cnbc.com/2019/03/27/southwest-cuts-revenue-outlook-on-boeing-737-max-groundings-shares-slide.html](https://www.cnbc.com/2019/03/27/southwest-cuts-revenue-outlook-on-boeing-737-max-groundings-shares-slide.html)

• “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](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.” [https://www.bbc.com/news/business-47834556](https://www.bbc.com/news/business-47834556)

• “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.” [https://www.cnbc.com/2019/04/09/business/boeing-737-max-deliveries/index.html](https://www.cnbc.com/2019/04/09/business/boeing-737-max-deliveries/index.html)

• “Boeing Reported Zero New Orders For Jets In April...Not only did the troubled 737 Max receive zero new orders since it was grounded March 13. Boeing’s other jets, such as the 787 Dreamliner or the 777, also did not get any new orders last month, according to a company report released Tuesday.” [https://baltimore.cbslocal.com/2019/05/14/boeing-reported-zero-new-orders-for-jets-in-april/](https://baltimore.cbslocal.com/2019/05/14/boeing-reported-zero-new-orders-for-jets-in-april/)

• “U.S. Isn't Rushing Boeing 737 Max Back to Flight, FAA Chief Says...“If it takes a year to find everything we need to give us the confidence to lift the order, then so be it,” Elwell said to reporters on Wednesday, a day before a meeting with global regulators was set to begin.” [https://www.bloomberg.com/news/articles/2019-05-22/u-s-isn-t-rushing-boeing-737-max-back-to-flight-faa-chief-says](https://www.bloomberg.com/news/articles/2019-05-22/u-s-isn-t-rushing-boeing-737-max-back-to-flight-faa-chief-says)

• “Exclusive: U.S. airlines expect Boeing 737 MAX jets need up to 150 hours of work before flying again...The preparations were discussed at a meeting between Boeing and MAX customers in Miami earlier this week, and include a list of items ranging from fluid changes and engine checks to uploading new 737 MAX software. The estimated time frame does not include pilot training, they said.” [https://www.reuters.com/article/us-ethiopia-airplane-boeing-airlines-exc-idUSKCN1ST2BG](https://www.reuters.com/article/us-ethiopia-airplane-boeing-airlines-exc-idUSKCN1ST2BG)

• “FAA Makes No Promises About Lifting Boeing 737 Max Ban...We’ve heard some U.S. airline CEOs say the Boeing 737 Max could return to service this summer. But the FAA is making no promises. This could take a while...Elwell has said he hopes other regulators will lift their bans on the plane soon after FAA does. However, regulators in China, the European Union, and Canada have said they plan to conduct their own reviews of Boeing’s software changes and the
need for additional pilot training.”

• “Better Buy: General Electric vs. Boeing...Neither stock is worth buying if you don't believe the Boeing 737 MAX is going to get back in service. The grounding of the airplane in the wake of two crashes within six months and the need to upgrade the Maneuvering Characteristics Augmentation Systems (MCAS) software and achieve certification has hit both companies, and if the 737 MAX doesn't get back into service, both companies face a threat to their future earnings prospects.”

• “Boeing slides after report says the 737 Max will be out of commission until at least August (BA)...Boeing's 737 Max aircraft will be out of commission until at least August, according the head of an industry trade group...Boeing shares slid down more than 2% on the news. "We do not expect something before 10 to 12 weeks in re-entry into service," said Alexandre De Juniac, CEO of the Montreal-based International Air Transport Association (IATA). The IATA represents 290 airlines or 82% of total air traffic.”

• “Malaysia Air Reviews $2.75 Billion Boeing Max Order Amid Concern...The Malaysian carrier's situation adds to the growing number of airlines wavering on Boeing's fastest-selling jet. Garuda Indonesia has said it no longer wants to buy the 737 Max planes it ordered, while Lion Air is said to be seeking to drop its order. In 2016, Malaysia Airlines agreed to buy 25 737 Max 8 jets from Boeing, with an option to double the order, which would bring the total value of the deal to $5.5 billion. None of the planes has been delivered yet.”

• “American Airlines extends Boeing 737 MAX cancellations through September 3...The largest U.S. airline had previously said it was cancelling flights Aug. 19 after the Boeing Co plane was grounded worldwide in March following two deadly crashes in Indonesia and Ethiopia. American Airlines said Sunday it is extending those cancellations through Sept. 3. Boeing has et to complete a certification test flight and formally submit its software upgrade and training hanges to the Federal Aviation Administration (FAA) for approval.”

• “Southwest Airlines Extends Cancellations Of Boeing 737 Max Flights...Southwest is now canceling all flights involving the Boeing 737 Max through Sept. 3.”

• “The FAA says Boeing's troubled 737 Max may not fly again until December — far later than many expected...The FAA is under pressure to help the jets return to service while also working to preserve its reputation for safety, which has come under fire as people question how the 737 Max was certified to fly. EASA and other regulators also say that they want to do their own checks, and have their own requirements for when the plane returns. This could mean it starts to fly in some parts of the world before others. Both the FAA and Boeing face a number of investigations into how the plane was able to take to the skies, including federal investigations that could change how the FAA certifies aircraft.”
• “It looks like the return of the Boeing 737 Max has been delayed again, and it could still be months until it's allowed back in the air...A newly identified software flaw in the Boeing 737 Max will take months to fix, according to several outlets, making it unlikely that the embattled aircraft will return to the skies before October. The US Federal Aviation Administration on Wednesday said it had recently found a "potential risk" with the Max that Boeing must address before the aircraft can return to service. Sources told Reuters that the risk was discovered during a simulator test last week.” https://www.businessinsider.com/boeing-737-max-software-problem-months-away-from-fix-2019-6

• “More Boeing 737 Max travel trouble: Southwest cancels flights into October...Southwest Airlines is removing the grounded Boeing 737 Max from its schedule through Oct. 1, a move that will cancel 150 daily flights.” https://www.usatoday.com/story/travel/flights/2019/06/27/southwest-cancels-flights-into-october-because-boeing-737-max-woes/1582494001/

• “Boeing setback after Saudi airline scraps $5.9bn order for 737 MAX planes...Flyadeal has now had a rethink about the provisional Boeing order and decided instead to take delivery of a fleet of 30 rival Airbus A320neo jets. The Saudi airline said: "This order will result in flyadeal operating an all-Airbus A320 fleet in the future."” https://news.sky.com/story/boeing-setback-after-saudi-airline-scrap-5-9bn-order-for-737-max-planes-11758393

• “Airbus Poised to Overtake Boeing as Biggest Plane Maker. Boeing reported no new orders of 737 MAX aircraft for third straight month following two fatal crashes...Boeing Co. is poised to lose its place as the world’s largest plane maker to Airbus SE after a reign of seven years, as its jetliner deliveries fell by more than a third in the first half of 2019 with the grounding of its 737 MAX aircraft.” https://www.wsj.com/articles/boeing-737-max-grounding-hits-jetliner-deliveries-11562686324

• “5000 More Boeing 737 Max Flights Canceled By United...The Boeing 737 Max remains grounded across the globe as additional issues were discovered which will need to be fixed. Subsequently, airlines that were operating flights on this plane have had to cancel thousands of them because they can’t fly the aircraft unless regulators give the all-clear. United Airlines is one of them and it has extended its cancellation of Boeing 737 Max flights until November 3rd at least. This will impact 5,000 flights from September through October this year.” https://www.ubergizmo.com/2019/07/5000-more-boeing-737-max-flights-canceled-by-united/

• “American cancels more flights as Boeing’s 737 Max fleet may stay grounded for longer than expected...American Airlines said Sunday that it will keep the Boeing 737 Max plane off its schedule until Nov. 3, which is two months longer than it had planned…The announcement Sunday marked the fifth time that American Airlines has pushed back the expected time that the Max would resume flying.” https://www.marketwatch.com/story/boeings-737-max-fleet-may-stay-grounded-for-longer-than-expected-2019-07-14

• “Here's When The Boeing 737 Max Must Return To Service, Or Else...Boeing (BA) need the 737 Max to return to service by the fourth quarter or else airlines could make plans without the jet in 2020. But there's growing concern that the Boeing 737 Max will remain grounded into next year.” https://www.investors.com/news/boeing-737-max-service-return-warning/

• “Boeing Drifts Lower After WSJ Says 737 Max Planes Could Be Grounded Until Next Year...Even if airliners receive the green light to resume 737 Max flights in January the companies will need another 45 days to prepare”  https://m.benzinga.com/article/14073619?utm_referrer=http%3A%2F%2Fwww.smartnews.com%2F&utm_source=http%3A%2F%2Fwww.smartnews.com%2F
• “Boeing Shares Tumble on 737 MAX Delays, Pentagon ICBM Contract Retreat...Boeing shares were further pressured by the extended grounding of its 737 MAX aircraft and the impact it's having on U.S. commercial carries. Southwest Airlines (LUV - Get Report) said Thursday it isn't likely to return the plane into its fleet until next year, while American Airlines (AAL) said the grounding will clip its full-year earnings by around $400 million.”  https://www.thestreet.com/investing/stocks/boeing-shares-tumble-on-737-max-delays-pentagon-icbm-contract-retreat-15032982
• “American Airlines Loses World’s Largest Airline Title to Delta and United...The Fort Worth, Texas-based carrier’s drop in the rankings come as it faces challenges on multiple fronts. The company has idled 24 Boeing 737 MAX 8 aircraft since the type was grounded in March, costing it at least $400 million in pre-tax income this year and prompting the cancellation of thousands of flights including the suspension of its Dallas/Fort Worth-Oakland route.”  https://thepointsguy.com/news/american-airlines-loses-worlds-largest-airline-title-to-delta-and-united/
• “Southwest Cancels 737 Max to 2020, Adds Flights to Hawaii, Mexico...Southwest Airlines on Thursday became the first carrier to extend its cancellation of the Boeing 737 Max into 2020, while at the same time making a critical logistics move to counter the effects of not being able to use the aircraft. The Dallas-based carrier said it will not fly the 737 Max until at least January 5...the carrier is pulling out of Newark-Liberty International Airport and will consolidate its New York City-centric operations solely at LaGuardia Airport.”  https://www.travelpulse.com/news/airlines/southwest-cancels-737-max-to-2020-adds-flights-to-hawaii-mexico.html
• “Boeing warns it may stop 737 Max production...Boeing is warning that it might have to halt production of the 737 Max if grounding continues much longer. The company reported its largest-ever quarterly loss of $3.4bn (£2.7bn) on Wednesday due to the troubled plane. If hurdles with regulators worldwide continue, Boeing said it would consider reducing or shutting down production of the 737 Max entirely.”  https://www.bbc.com/news/business-49108807
• “FAA has no timeline for lifting grounding of Boeing’s 737 Max...U.S. aviation regulators have no timeline for returning Boeing's grounded 737 Max to service and won't act until they are sure it is safe, the nation's top transportation official said Thursday. The Federal Aviation Administration has to be assured that a fix being developed by Boeing in the wake of two fatal crashes will prevent any future accidents, Transportation Secretary Elaine Chao said in a speech in Washington. "The FAA will lift the aircraft’s prohibition order when it is deemed safe to do so," Chao said. "That is the bottom line: There is no timeline."”  https://www.mysanantonio.com/news/local/article/FAA-has-no-timeline-for-lifting-grounding-of-14105797.php
• “Air Canada Cancels 737 Max Flights Into 2020...Air Canada, like Southwest Airlines, has removed 737 Max flights from its schedule into 2020. According to a report in Bloomberg, Canada’s largest air carrier will reduce capacity and curb earnings for the 3rd quarter even as it
beat forecasts in the second.” https://www.environmentalradiation.com/

- “Boeing reports no new orders of 737 Max as worldwide grounding enters sixth month...Boeing, yet again, received no new orders for its troubled 737 Max jets last month as the worldwide grounding of its best-selling plane enters its sixth month. The dearth of Max orders in July marked the fourth straight month without any new orders for the planes, Boeing said Tuesday.” https://www.cnbc.com/2019/08/13/boeing-reports-no-new-orders-of-737-max-as-grounding-enters-sixth-month.html

- “New FAA Boss Says Boeing 737 MAX Won't Return Until Completely ‘Safe’...Just weeks after taking the reins of the Federal Aviation Administration (FAA), Stephen Dickson said the grounded Boeing 737 MAX fleet would not be permitted to fly again until “I'm completely assured that it is safe to do so.” According to ABCNews.com, Dickson was confirmed as the new FAA administrator in July and has been fielding questions about the impacted Boeing planes since being sworn in on Monday. He said during the ceremony the FAA is not following any timeline for returning the aircraft to service.” https://www.travelpulse.com/news/airlines/new-faa-boss-says-boeing-737-max-wont-return-until-completely-safe.html

- “Russian firm sues Boeing over 737 MAX jet, citing negligence...A Russian state-owned aircraft leasing company is suing Boeing, accusing the plane maker of hiding defects in its 737 MAX passenger jet. Owned by Rostec, Avia Capital Services ordered 35 of the jets in 2012 but now wants to cancel the deal and get a $35 million deposit refunded, including interest...The lawsuit alleges Boeing misrepresented the jet’s airworthiness and was “negligent in how it designed and built the plane and convinced the Federal Aviation Administration to approve it,”” https://americanmilitarynews.com/2019/08/russian-firm-sues-boeing-over-737-max-jet-citing-negligence/

- “United Airlines delays return of Boeing 737 Max planes until late December...United Airlines on Friday extended its grounding of Boeing 737 Max aircraft through December, days after it relocated its fleet of the jets to Arizona for long-term storage... United said it relocated its 14 Max planes to Arizona because of construction in Los Angeles and hurricane season in Houston.” https://www.upi.com/Top_News/US/2019/08/30/United-Airlines-delays-return-of-Boeing-737-Max-planes-until-late-December/3681567197488/

- “Boeing slides on report the 737 Max could remain grounded into crucial holiday travel season...Shares of Boeing fell 2.7% on Tuesday after The Wall Street Journal reported that the 737 Max may not be back in service in time for holiday travel. The report said Federal Aviation Administration officials are frustrated with the level of cooperation from Boeing as it tries to get its plane approved to fly once again.” https://www.cnbc.com/2019/09/03/boeing-slides-on-report-the-737-max-could-remain-grounded-into-crucial-holiday-travel-season.html

- “American Airlines cuts Boeing 737 Max from schedules until Jan. 16 as grounding continues...American Airlines pulled the Boeing 737 Max from its schedules until mid-January, delaying its return longer than any U.S. airline, as the prolonged grounding of the troubled plane disrupts year-end holiday travel. Regulators have not said when they will allow airlines to operate the Max jet again. The plane hasn’t been allowed to fly since mid-March after two crashes within five months of each other killed 346 people. The grounding has forced airlines to cancel thousands of flights, driven up costs and dented airlines’ profits. American said Wednesday that the 9,475 flights it canceled in the third quarter reduced its pretax income in the

• “United scraps Boeing 737 Max flying until January with no end in sight to grounding...United Airlines on Friday joined other U.S. carriers in scrapping Boeing 737 Max plans to return to service until January, canceling hundreds more flights as the worldwide grounding from two fatal crashes enters its eighth month. United removed the Max from its schedule until Jan. 6. On Wednesday, American Airlines extended cancellations from the plane’s grounding until Jan. 16. Southwest in July said it would remove the plane from its schedules until Jan. 5.” [https://www.cnbc.com/2019/10/11/united-airlines-takes-boeing-737-max-from-its-schedules-until-january.html

• “Costs pile up for airlines as Boeing 737 Max grounding enters eighth month...The worldwide grounding of the Boeing 737 Max, now in its eighth month, is driving up costs for airlines as they cancel thousands more flights into 2020. American and United this week joined Southwest in removing the planes, grounded since mid-March after two fatal crashes killed 346 people, from their schedules until January. Boeing executives have said they expect aviation regulators to clear its best-selling plane to fly again in the fourth quarter, but the Federal Aviation Administration said it has no firm timeline for lifting the grounding. That has forced airlines to repeatedly push back when they expect the planes to return to their fleets. The resulting lost revenue is denting airline profits and dashing their growth plans. The capacity constraints are also becoming a bigger headache for travelers, which in addition to facing canceled flights, are getting bumped more frequently.” [https://www.cnbc.com/2019/10/13/boeings-737-max-grounding-enters-eighth-month-driving-up-airline-costs.html

• “Southwest Airlines removes Boeing 737 Max from schedule until February...Southwest Airlines on Thursday took the Boeing 737 Max out of its schedules until Feb. 8, later than any U.S. airline, as the low-cost carrier called the timeline for the plane’s return to service “still uncertain.” That’s a month later than it previously expected.” [https://www.cnbc.com/2019/10/17/southwest-airlines-removes-boeing-737-max-from-schedule-until-february.html

• “’737 MAXs not bought to remain grounded,’ THY head calls for solution...He further stressed that "due to 737 MAXs, we had a 40% cut on domestic flights and 60% on international flights.” Ayçi pointed out that the grounding of the aircraft led them to revise some figures in the 2019 targets, stressing that despite this, they are working hard to close the end of the year with a profit without any excuses. Accordingly, the expectation of 80 million passengers for the year-end has been revised to 76 million, said the chairman. The capacity increase was pulled from 7.5% to 4%. The consolidated sales revenue target was revised from $14.1 billion to $13.4

- “Airline chiefs grow frustrated as 737 Max grounding costs near $1 billion...The grounding of the 737 Max after two fatal crashes continues to drag on, frustrating airline executives as the carriers miss out on close to $1 billion in revenue this year alone.” [https://www.cnbc.com/2019/10/24/airline-chiefs-frustrated-as-boeing-737-max-grounding-cost-nears-1-billion.html](https://www.cnbc.com/2019/10/24/airline-chiefs-frustrated-as-boeing-737-max-grounding-cost-nears-1-billion.html)

- “Boeing’s Woes Can Get Worse. Just Ask This CEO...Southwest CEO Gary Kelly had a lot to say about Boeing’s 737 Max crisis when the airline reported third-quarter results this week. The jet’s more than seven-month grounding in the wake of two fatal crashes has wiped out $435 million from Southwest’s operating income. Southwest expects the damages to grow through 2020, given the length of time needed to reintroduce existing Max jets into its fleet and the pushout of fresh deliveries. Kelly made a repeated point – in the earnings release, on the call and in interviews with CNBC and Bloomberg Television – of noting the company hadn’t yet agreed on a settlement with Boeing. 1 That’s notable in light of Boeing’s decision to hold its estimate for customer compensation at $5.6 billion, net of insurance, and avoid another big charge in the third quarter. “We did not see a change” this quarter in compensation liabilities, Boeing’s CFO Greg Smith said on the company’s own earnings call this week. “That does not mean that we could not see a change going forward.” You can say that again.”[https://www.bloomberg.com/amp/opinion/articles/2019-10-25/southwest-airlines-boeing-rethink-shows-long-term-max-risk-k26i39vc#referrer=https%3A%2F%2Fwww.google.com&app=amp&referrer=https%3A%2F%2Fwww.google.com&%7Ctf=From%20%251%24s](https://www.bloomberg.com/amp/opinion/articles/2019-10-25/southwest-airlines-boeing-rethink-shows-long-term-max-risk-k26i39vc#referrer=https%3A%2F%2Fwww.google.com&app=amp&referrer=https%3A%2F%2Fwww.google.com&%7Ctf=From%20%251%24s)


- “The cost of the Boeing 737 Max crisis: $18.7 billion and counting...Problems with the Boeing 737 Max took the lives of 346 people. They have cost the aircraft maker at least $18.7 billion. And on Tuesday's anniversary of the jet's second fatal crash, it is becoming apparent that the price tag could go significantly higher.”[https://www.fliegerfaust.com/boeing-737-max-8-2645468912.html](https://www.fliegerfaust.com/boeing-737-max-8-2645468912.html)

- “Boeing 737 MAX: Wave Of Cancellations Hits...During the month, we saw various customers cancelling orders for 41 Boeing 737 MAX aircraft. These orders represent 1% of the Boeing 737 MAX order book. Obviously, not a big number, but if you keep losing 1% of your order book for a year each month, then, at the end of the year, you already lost over 10% of your unfilled orders.”[https://seekingalpha.com/article/4333997-boeing-737-max-wave-of-cancellations-hits?utm_source=smartnews.com&utm_medium=referral](https://seekingalpha.com/article/4333997-boeing-737-max-wave-of-cancellations-hits?utm_source=smartnews.com&utm_medium=referral)

- “Opinion: Boeing’s 737 MAX problem is a symptom of another widespread illness plaguing Wall Street...Many have alleged that Boeing’s culture evolved from one run by safety-conscious engineers to one dominated by MBAs whose primary focus was financial engineering. For this
column, I am more interested in why Boeing’s culture may have evolved in this way. While most blame Boeing’s executives for either promoting it or letting it happen, that’s only part of the story. Responsibility also rests with a Wall Street investment community that demands a briskly rising stock price with minimal volatility.”

“Airlines Cancel 150 Orders for Boeing 737 MAX...Of the 150 cancellations, 75 came from the aviation leasing firm Avolon and 34 had been ordered by Brazilian airline Gol. CNBC noted there were 31 orders for passenger planes and military aircraft in March, meaning the net cancellations were 119. Still, that means net cancellations for the first three months of the year are now at 307 planes.”

“Another Blow for Boeing as GE Cancels 737 Max Orders...GE Capital Aviation Services (GECAS), a unit of General Electric (NYSE:GE), has announced that it is canceling orders for 69 737 Max aircraft from Boeing Co. (NYSE:BA). The move to "rebalance" its order book for the 737 Max comes just days after Boeing reported that it had received 150 order cancellations for the 737 Max in March alone.”

“Boeing Reports More Cancelled Orders But Pace Slows; Tanker Hits New Delay...On Tuesday, Boeing reported nine orders and 18 cancellations last month. Of the cancellations, the Boeing 737 Max accounted for 14 with the rest for widebody aircraft. The new orders were for freight aircraft. Boeing's backlog fell to 4,744, the lowest since 2013.  In April, Boeing 737 Max saw 108 additional net order cancellations, as airlines rushed into survival mode. In March, Boeing customers canceled a total of 150 Boeing 737 Max orders.  The cancellations come as airlines face a collapse in air travel due to the coronavirus, while the Boeing 737 Max remains grounded after two fatal crashes.”

“Boeing Finally Admits That Aircraft Demand Is Basically Zero.  The aerospace giant has dramatically reduced its 2020 production plans for the 737 MAX….Six months ago -- before the COVID-19 pandemic -- Boeing (NYSE:BA) announced that it would suspend 737 MAX
production in January. Its top-selling plane had been grounded since March 2019, following a pair of fatal accidents. Due to Boeing's decision to continue building the 737 MAX while waiting for regulators to recertify the model, the company had built up an inventory of about 400 undelivered 737 MAX jets and was running out of places to store them. Since then, aircraft demand has plummeted, as the COVID-19 pandemic caused global air travel to dry up.

Nevertheless, Boeing restarted 737 MAX production in late May, with plans to ramp up output gradually over the remainder of the year. Given that few (if any) airlines want new planes right now, this decision didn't make much sense. It didn't take long for Boeing to come to its senses, though. Recently, the company told a major 737 MAX supplier to virtually halt production again.”

• “More Boeing 737 Order Cancellations Pile Up As Key Flights Continue...Aircraft leasing company BOC Aviation said it's canceling an order for 30 Boeing 737 jets, after Norwegian Air announced late Monday that it's nixing its 737 Max and 787 orders. Boeing (BA) stock fell. Singapore-based BOC will also defer the deliver of other 737 Max jets, adding that recently it has replaced some orders on the purchase-and-leaseback market. Meanwhile, Norwegian Air said it canceled 92 737 Max jets and five widebody 787 Dreamliners. The cancellation also included the service agreements with the aircraft company. Last month, the Boeing 737 Max saw just 14 net order cancellations. But Boeing booked 108 net order cancellations for the 737 Max in April and 150 in March.”

• “Boeing: No orders, more cancellations for grounded 737 Max...The giant aircraft maker said Tuesday it it sold no new airliners in July, and customers canceled orders for 43 of its 737 Max jetliners...In June, Boeing reported it sold only one plane while customers canceled orders for 60 of the grounded Max jets. The company also dropped orders for 123 other planes from its backlog because it wasn't sure the deals would go through...Boeing delivered just four planes last month, compared with 19 in July 2019. The company depends on deliveries to generate cash.”
would have to be a “substantial improvement in the demand environment” to justify taking the jets before then. Southwest, the largest Max customer, said it, too, may restructure its order after already agreeing to take no more than 48 of the planes through December of next year.”

- “Air Canada Cancels 12 Airbus A220 And 10 737 MAX Orders...We are deferring delivery of new Boeing 737-8 and Airbus A220 aircraft scheduled for delivery in 2021 and 2022 and cancelling 10 Boeing 737-8s and 12 Airbus A220s, representing about 40 per cent of the remaining scheduled deliveries.”
- “Boeing’s 737 MAX White-Tail Problem: Will Any U.S. Airlines Help?...Boeing’s (NYSE:BA) inventory of 737 MAX white tails -- jets that have been assembled but no longer have a buyer lined up -- represents a major problem for the plane maker...Given that none of these airlines are particularly eager to buy what Boeing is selling, the aerospace giant may have to offer extremely deep discounts to move its unclaimed 737 MAX inventory in a timely fashion. That's just one of the many reasons why Boeing faces a difficult post-pandemic recovery.”
- “Boeing's 737 Max debacle could be the most expensive corporate blunder ever...What's clear is that the $20.7 billion in costs that Boeing has detailed is only the starting point. Bank of America puts the costs at more than $25 billion...If financial damage from the 737 Max remains in the $20 billion range, that would not put it in the running for the most expensive mistake by a company. Volkswagen has spent €32 billion, or $38 billion, on its emissions cheating scandal. The most expensive mistake to date is the $68 billion cost to BP of the Deepwater Horizon explosion and oil spill of 2010. But BP lost little or no sales because of Deepwater Horizon, and VW suffered only a minor, short-term loss of sales from the emissions scandal. By contrast, it's clear that Boeing has suffered a huge loss in sales in the wake of the 737 Max grounding...Discounting many of the 3,300 other Max orders still on the books could make Boeing's total cost of its 737 Max debacle climb even higher, perhaps past the $68 billion price tag of Deepwater Horizon.”
- “Boeing reports more 737 Max cancellations as airlines prepare to return the plane to service...U.S. and Brazilian officials last month cleared the planes to fly again after a 20-month grounding after crashes of nearly new Max jets in 2018 and 2019 that killed all 346 people on the two flights. Boeing said customers including Virgin Australia and lessor Air Lease canceled orders for 88 Max planes. Virgin Australia, however, changed its order to include 25 of the 737 Max 10, a larger model, which it expects will be delivered starting in mid-2023.”

**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."
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.”

- “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.” [https://www.cnn.com/2019/03/13/investing/boeing-airline-compensation/index.html](https://www.cnn.com/2019/03/13/investing/boeing-airline-compensation/index.html)

- “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.” [https://www.bloomberg.com/news/articles/2019-03-28/boeing-sued-over-ethiopia-crash-as-planemaker-s-crisis-deepens](https://www.bloomberg.com/news/articles/2019-03-28/boeing-sued-over-ethiopia-crash-as-planemaker-s-crisis-deepens)

- “Behind Boeing's offer to settle with victims' families in the 737 Max crash is a hardball legal strategy that could leave them with nothing...The hardball legal strategy — which an independent expert said could render the cases "worthless" — is to switch the jurisdiction of the families' lawsuits from the US to Indonesia, where outcomes for the plaintiffs are likely much worse. Fighting the case overseas would also likely place Boeing under less scrutiny for its conduct around the crash, given the different legal culture and the logistical difficulty of meaningfully prosecuting Boeing thousands of miles from its US base.” [https://www.businessinsider.com/boeing-737-max-cases-worthless-if-moved-indonesia-ethiopia-lawyers-2019-6](https://www.businessinsider.com/boeing-737-max-cases-worthless-if-moved-indonesia-ethiopia-lawyers-2019-6)

- “Southwest pilots to seek compensation for Boeing 737 Max impact...The pilots’ union says it will be “seeking compensation and reimbursement from Boeing for every dollar legally available to be challenged, when the Max issues are resolved.” The union hasn’t said exactly how much the grounding of the Max has cost pilots. A person familiar with the matter estimates Southwest pilots lose $8.5 million per month not flying the Max.” [https://www.cnbc.com/2019/06/19/southwest-pilots-to-seek-compensation-for-boeing-737-max-impact.html](https://www.cnbc.com/2019/06/19/southwest-pilots-to-seek-compensation-for-boeing-737-max-impact.html)
“Boeing hit with lawsuit for 'unprecedented cover-up'...Boeing was slapped with a class-action lawsuit from more than 400 pilots who say the company covered up design flaws in its 737 Max planes. The Australian Broadcasting Company (ABC) reported Saturday that the lawsuit alleged that Boeing engaged in an "unprecedented cover-up" of the "known design flaws" in the 737 Max planes, which were grounded worldwide following two deadly crashes that killed more than 300 people in total.” https://thehill.com/policy/transportation/449883-boeing-hit-with-lawsuit-for-unprecedented-cover-up

“Boeing Offers $100 Million ‘Outreach’ for Max Crash Victims...The pledge -- described as an “initial outreach” -- underscores the high stakes for Boeing as it navigates one of the worst crises in its 103-year history. The Chicago-based planemaker has come under scrutiny from wary passengers, investors, customers and regulators after a pair of fatal crashes prompted the grounding of its marquee Max jet family...Settling lawsuits on behalf of victims could cost Boeing about $1 billion, Bloomberg Intelligence estimated, although legal experts have said payouts could be higher if evidence shows that Boeing knew about flaws in the planes before the tragedies.” https://www.bloomberg.com/news/articles/2019-07-03/boeing-offers-100-million-to-families-of-737-max-crash-victims

“Boeing to Spend $50 Million for MAX Crash Victims’ Families. Boeing will use half of a $100 million fund for near-term financial aid for families of the victims killed in two crashes involving the troubled 737 MAX jet...The Chicago aerospace giant also said it retained Kenneth Feinberg and Camille Biros to design and administer the fund. Boeing said funds distributed by Feinberg and Biros "will be independent from any resolution provided through the legal process." Feinberg was appointed special master of the U.S. government's September 11th Victim Compensation Fund.” https://www.thestreet.com/investing/stocks/boeing-to-spend-50-million-for-max-crash-victims-families-15022976

“Boeing sued in Seattle over 737 MAX...A Seattle law firm filed what is believed to be the first lawsuit over the Boeing 737 MAX crisis in King County Superior Court. King County includes Seattle and Renton, where Boeing’s Commercial Airplanes division is headquartered...The lawsuit claims fraud, material misrepresentation of fact and breach of contract. It also claims violation of the Washington consumer protection act and product liability of the Washington Product Liability Act.” https://leehamnews.com/2020/02/13/boeing-sued-in-seattle-over-737-max/

“Boeing is sued for $336M over canceled 737 Max order...Boeing was sued for $336 million on Wednesday by a Kuwaiti leasing company that accused it of wrongly refusing to return advance payments on a now-canceled order for 40 of its troubled 737 Max planes. In a complaint filed in Chicago federal court, ALAFCO Aviation Lease and Finance accused Boeing of breach of contract for keeping the payments despite being unable to deliver the planes or provide a revised delivery schedule. ALAFCO said it canceled its order on March 6 after Boeing failed to
deliver nine aircraft on time. It said Boeing has resisted its claim that the problems amounted to a “non-excusable delay” that would justify repayment.”

https://www.cnbc.com/2020/04/22/boeing-is-sued-for-336m-over-canceled-737-max-order.html

**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.”

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“Global Airlines Worry About Havoc Caused by a Boeing 737 Max Regulatory Rift... Different governments regulate various industries in their own ways. Some have more tolerance for risk than others. But aviation is global, and airline executives expect, for the most part, the rules in one country will be the same as in another. It’s why many airline executives, including those whose airlines do not fly the Max, said in Seoul that they’re concerned about this trend, with regulators making their own decisions about what is safe.”

“A Boeing 737 Max panel will reportedly tell the FAA to revise how it certifies new planes...The Joint Authorities Technical Review, or JATR, was formed following the crashes to review the certification process that allowed the 737 Max to enter commercial service despite the twice-fatal flaw in an automated system meant to compensate for the larger engines on the existing 737 airframe. The panel comprises US officials and representatives from nine other countries’ aviation safety agencies. The JATR is in the final stages of completing its work, according to CNN's source, and will issue its report as early as next week. It is not clear whether the FAA would accept and implement the recommendations, nor whether the JATR or FAA would publicly disclose them.”

“Boeing Wants to Bring Back Its 737 Max This Year—But a Spat Between Regulators Could Thwart It...Europe’s insistence on an independent review reflected an erosion of trust in the FAA after officials signed off on a software system that went haywire on the Max because of a faulty sensor. The so-called Maneuvering Characteristics Augmentation System, or MCAS, pushed the Max’s nose down in both crashes until pilots lost control. In total, 346 people were killed.”

“Investigation called for after FAA whistleblower says bosses blocked him from inspecting Hawaii helicopters before fatal crash...U.S. Sens. Brian Schatz and Mazie Hirono called for an investigation into the Federal Aviation Administration following a “troubling report” that details complaints alleging the agency ignored serious concerns raised about the safety of tour helicopters in Hawaii prior to two fatal crashes. “For the past year, we have raised concerns that the FAA has ignored warnings about the safety of aircraft operations. This report exposed troubling new accounts about how the FAA failed to take action on warnings about the safety of helicopters in Hawaii – warnings that could have saved lives,” Schatz said in a statement today. “With more than a dozen helicopter accidents in Hawaii over the last five years, it is clear that we need answers from the FAA and stronger protections to keep people safe.”

“The Company That Operated Kobe Bryant’s Helicopter Reportedly Had Multiple Run-Ins With The FAA Over Safety Concerns... A Federal Aviation Administration operations inspector assigned to oversee the company, then under a previous owner, had been pushing for more stringent safety practices, according to federal records. The company’s president at the time pushed back, asking the F.A.A. to assign a different inspector. The inspector, Gary Lackey, who agreed to step aside, said he was concerned that the company seemed unwilling to spend the money necessary to improve safety beyond what was minimally required. “Everything that involves safety usually involves money also,” Mr. Lackey, who is now retired, said in an
interview. “I think they were trying to cut corners.””

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.””

- “FAA’s lax oversight played part in Boeing 737 Max crashes, but agency is pushing to become more industry-friendly...The Federal Aviation Administration’s deferential, industry-friendly approach to oversight allowed Boeing to submit documentation that obscured the dangers of its 737 Max, which was involved in two deadly crashes, documents, interviews and the findings of investigations have shown. However, instead of trying to reclaim its oversight powers after the deaths of 346 people over the past year, the FAA has instead been pressing ahead with plans to further reduce its hands-on oversight of aviation safety, current and former officials said.”

- “Disasters In the Making: Boeing 737 Max 8 and Lac-Mégantic. Both disasters were the deadly consequence of a decades-long trajectory of deregulation in the aerospace and railway industries...In both cases, regulatory agencies were captive to their regulated industries. A revolving door of senior agency officials — moving from industry to regulator and back to lucrative industry lobbyist positions — aided and abetted the deregulation process.”

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.”


• “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

Safety

• “Boeing CEO to Congress: ‘We understand and deserve this scrutiny’...Senators pressed Muilenburg on how Boeing allowed the faulty design, which was based on a single sensor with no redundancy, to market, and concerns the company and Federal Aviation Administration have an inappropriately close relationship. "We cannot have a race for commercial airplanes become a race to the bottom when it comes to safety," Sen. Maria Cantwell, the committee's top Democrat, said. Sen. Jon Tester, a Montana Democrat, said the company "shouldn't be cutting corners," and said, "I would walk before I would get on a 737 MAX." And Sen. Ted Cruz, a Texas Republican, told him, "The buck stops with you."

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](https://www.theguardian.com/commentisfree/2019/apr/07/boeing-737-max-regulation-corporate-america)

Government Bailout (Free Taxpayer Money)

- “The Boeing 737 MAX Bailout...In this report, I want to find out whether you can connect the Boeing 737 MAX crisis to the $60B that Boeing requested. I will do that by considering liabilities, pre-delivery payments and what Boeing could potentially need to refund were the Boeing 737 MAX never to fly again. I will also consider the other scenario, one in which the Boeing 737 MAX will fly again. Neither of these scenarios considers COVID-19.” [https://seekingalpha.com/article/4339778-boeing-737-max-bailout](https://seekingalpha.com/article/4339778-boeing-737-max-bailout)

Alleged Collusion

- “Southwest and Boeing had a 'reckless, greedy conspiracy' to keep the 737 Max flying despite knowing about its flaws, a new lawsuit alleges...A new lawsuit from passengers accuses Boeing and Southwest Airlines of having a "reckless greedy conspiracy" to launch the 737 Max plane and keep it flying despite safety defects. The lawsuit says that Southwest, which has a fleet made up entirely of Boeing planes, has a unique relationship with Boeing and that it made consistent profits despite struggles in the industry through a "collusive relationship" with Boeing. It was filed by 11 Southwest passengers on Thursday in the US District Court for the Eastern District of Texas.” [https://www.businessinsider.com/737-max-lawsuit-alleges-conspiracy-with-southwest-keep-jet-flying-2019-7](https://www.businessinsider.com/737-max-lawsuit-alleges-conspiracy-with-southwest-keep-jet-flying-2019-7)

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/](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.”

“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.”

“Boeing CEO to face heat in Congress over 737 Max crashes: ‘The whole world’s watching’...Boeing CEO Dennis Muilenburg is facing two congressional hearings this week to answer questions about the design, certification and marketing of its flagship 737 Max planes — his first public appearances on Capitol Hill since two fatal crashes within five months of one another killed 346 people. The crashes prompted a worldwide grounding of the 737 Max, Boeing’s bestseller. They also spurred probes of certification methods used by the air safety regulators that handed over more tasks to the manufacturer, with the blessing of lawmakers themselves. The Department of Justice is among those investigating. Lawmakers will quiz Muilenburg about production pressure on Boeing staff and how the company marketed the plane around the world, touting that it didn’t require time-consuming training for pilots to switch from older models.”

“FAA says it will invite global Boeing 737 MAX pilots to simulator tests...The U.S. Federal Aviation Administration said on Thursday it would invite Boeing 737 MAX pilots from across the world to participate in simulator tests as part of the process to recertify the aircraft for flight following two fatal crashes... the FAA said it had not specified the number of required hours of flight experience, but said the candidates would be a cross-section of line pilots and must have experience at the controls of the MAX.”

“Where Did GOL’s Boeing 737 MAX Fly On Its First Day In Service...The Brazilian airline GOL Linhas Aereas yesterday resumed its commercial services using the Boeing 737 MAX. It became the first carrier to operate the troubled narrowbody again since it was grounded in March 2019.”

“The Boeing 737 Max returns to US skies next week with American Airlines — here's how to tell if you're flying on one...The Boeing 737 Max will fly paying passengers in the US for the first time in 21 months next week as American Airlines is set to fly the first scheduled flight from Miami to New York on December 29...Flyers on American, United, Alaska, and Southwest are the only ones that need to be concerned about potentially flying on the Max...The telltale sign that you're flying on a Boeing 737 Max is going to be its engines...What gives them away, however, are the chevrons on the back edge. No other Boeing narrow-body jets are equipped
with this type of engine or have chevrons on the engine, letting you know that this is a Boeing 737 Max engine…Any pilot, flight attendant, or customer service agent can tell you the type of aircraft on which you’re flying and they often have the most up-to-date information. When in doubt, just ask.”

“Boeing 737 Max returns to the skies in the US...Boeing’s 737 MAX has resumed passenger flights in the US with an American Airlines flight between Miami and New York...American Airlines is the third carrier globally to resume flights following Brazilian low-cost carrier Gol Linhas Aereas Inteligentes and Grupo Aeromexico earlier this month.”

**Boeing Management Changes**

- “How bad are things for Boeing? Investors are about to find out...Out of a job is Kevin McAllister, who had been president and CEO of Boeing Commercial Airplanes, the unit that builds its passenger jets. He is being replaced by Stan Deal, the head of Boeing Global Services, the unit of the company that provides engineering, analytics, supply chain services and training support to the aircraft maker’s customers.”
- “No bonuses for white-collar Boeing employees this year...Boeing will not pay annual bonuses to its management, executives or unionized engineers and white-collar workers next February, payouts that for many years have pumped millions of extra dollars into the accounts of employees in the Puget Sound region and beyond.”
- “New Face of Boeing Jets Tries to Win Back 737 Max Buyers...Days after Stanley Deal took the helm of Boeing Co.’s jetliner business last month, he was winging across the globe to meet with the airline bosses most shaken by the deadly crashes that have plunged the manufacturer into crisis... His next task is to soothe airlines and lessors dismayed at the abrupt exit of his predecessor, Kevin McAllister.”

**Aviation News**

- “Aviation safety - BBC News”
- “Aviation Safety Network”
- “Aviation Safety Net”
- “Aviation Tribune”
- “Federal Aviation Administration News”
“Airplanes have turned into very high electromagnetic interference (EMI) environments in the advent of wireless movie streaming.”

Steven Magee - Author of Toxic Electricity