BREAKING UP AEROFLOT: THE RUSSIAN AVIATION INDUSTRY'S POST-SOVIET TRANSFORMATION

by

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B.A., Colorado College, 2019

A thesis submitted to the
Faculty of the Graduate School of the
University of Colorado in partial fulfillment
of the requirement for the degree of
Master of Slavic Studies
Department of Germanic and Slavic Languages and Literatures
2022

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Abstract

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Thesis directed by Assistant Professor Anastasiya Osipova

When the Soviet Union collapsed in 1991, so too did its aviation industry, which was subjected to the trials of privatization. The result was catastrophe on a massive scale, as passenger numbers plummeted and the new Russia became one of the most dangerous places in the world to fly on board a commercial airplane. An analysis of the data along with numerous individual case studies reveals how problems that arose as a direct result of privatization led to this mass reversal of the Soviet Union's once-improving aviation safety record. Simultaneously, deeper social problems which contributed to this systemic breakdown are revealed by applying theories of communication by notable Russian semioticists to the specific conditions of Russian aviation. Together, these two frames of analysis paint a comprehensive picture of how and why aviation in Russia embarked on its disastrous post-Soviet trajectory.

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INTRODUCTION

On a dark night in the fall of 2008, an American-built Boeing 737-500 was minutes from landing in the city of Perm in central Russia when it flew off course, rolled left, and dived directly into the Trans-Siberian Railway, killing all 88 passengers and crew on board.

The ill-fated flight, operated by a subsidiary of Russia's state-owned airline Aeroflot, would later come to be viewed as a microcosm of the problems still afflicting Russia's aviation industry nearly 17 years after the breakup of the Soviet Union. The two pilots at the helm of the Boeing jet had transitioned from Soviet-built airplanes without proper training, and neither spoke English well enough to read the operations manual. The plane had a mechanical problem that caused one engine to generate more thrust than the other, and the airline had failed to fix the issue despite numerous complaints. The captain, already sleep-deprived due to airline schedules that grossly violated duty limits, decided to go out drinking before the flight, and boarded the plane so drunk that he slurred the cabin announcements. When the difference in thrust between the two engines caused the plane to turn off course on approach to Perm, the inexperienced copilot, who barely knew how to fly a Boeing 737, made the situation much worse, accidentally disconnecting the autopilot as he fumbled with the controls. Unable to complete so simple a task as rolling the wings level, he pleaded for his captain's help, and the captain, too drunk to remember that his artificial horizon worked backwards compared to Soviet models, turned the plane the wrong way and crashed into the ground.[1]

Were it not a tragedy which dealt irreparable harm to dozens of aggrieved families, the Boeing's last flight could be called a comedy of errors. But whose errors were they, exactly? The answer is far more complex than it might seem at first glance. In fact, the seeds of disaster were

[1] "Okonchatel'nyy otchet Boeing 737-505 VP-BKO," Interstate Aviation Committee, 21 June 2011, pp. 151-160.

planted deep in the fertile soil of Russia's historical aviation culture, watered by the industry's market reforms in the 1990s, and carefully nurtured by continuing bureaucratic failures throughout the 2000s. The disaster in Perm was but one of countless manifestations of the seemingly never-ending struggle to bring Russia's aviation industry into the modern era, even as the standards for what constitutes "modern" continuously recede over the temporal horizon, a permanent game of catch-up that Russia has been playing since the time of Peter the Great. In the aviation industry, this problem has never been so clearly apparent as in the transition to market capitalism, the breakup of Aeroflot, and the wholesale adoption of Western aircraft and business models, a transformation undertaken in an attempt to solve Russia's chronic debate over how best to get passengers from one place to another.

The consequences of this chaotic transformation included both accidents like the one described above, and logistical problems and bankruptcies which led to the demise of numerous airlines throughout the post-Soviet period. During the 1990s and early 2000s, it was dangerous to be an airline passenger in Russia—in 2006, the deadliest year for Russian aviation, approximately one in every 100,000 people who boarded a Russian commercial airplane did not reach their destination alive. And in the 2010s, even as the industry's safety record improved, it became dangerous to be an airline, as the government began to steadily reverse the privatization drive of previous decades. Now, as Russia's invasion of Ukraine once again upends an industry that had at last begun to stabilize, the lessons of this not-so-distant past are more important than ever.

This inquiry documents the origins, processes, and outcomes of the Russian aviation industry's post-Soviet transformation, assesses the impact of the reforms on airline safety, and explores the cultural underpinnings of both the transition itself and Russia's continuing struggle

to create a civil aviation system that is efficient, effective, and safe. In doing so, it seeks not only to explain why so many people died on board airplanes during the transitional period, but also to articulate the reasons behind Russian aviation's checkered record even in times of stability. Although economic, historical, and engineering-related frames of analysis are sometimes used, this project considers these inadequate to describe a system which is, at its most fundamental level, made up of human beings involved in both individual and collective decisions which are not always based on rational principles. Since the late 1980s, the global airline industry has come to understand that an acceptable level of operational safety can only be achieved by investigating and then transforming the way we communicate with one another within a particular set of institutional boundaries, whether "we" are the pilots in the cockpit, the mechanics in the hangar, or the managers in the corporate headquarters. With the vast majority of airline accidents being attributable to human error, which usually boils down to a lack of effective communication, it is not possible to fully understand the topic at hand without considering theories about the way we communicate, a field known as semiotics. Acknowledging this necessity, the following analysis expands the horizons of aviation-related research by drawing on the work of Russian semioticists, who describe the influence of structures in Russian society on the behavior of subjects acting within them, and applies their work to the particular example of Russia's aviation system. The infusion of semiotic ideas which are rarely, if ever considered in the context of aviation opens new doors to our understanding of flight safety as not only a technical subject, but an anthropological one as well.

These two frames of analysis, technical-historical and semiotic, reveal a dual causality behind Russia's aviation troubles. On the one hand, Russia's poor flight safety record demonstrably resulted from the abrupt reconstruction of a system in the absence of proper

preparation for and capacity to handle the consequent economic and operational incentives. And on the other hand, this failure was deeply rooted in the forms of communication and social action imposed by the institutional structures which existed in Russian and Soviet aviation, which forced subjects into behavioral modes which did not always correspond to constative realities, in an industry where constative action is key.

These findings are relevant as long as airplanes continue to fly and economies continue to evolve. They should serve as a warning to those who may in the future be tasked with overseeing the restructuring of both individual airlines and entire aviation systems, and also to those who merely work within them, as they choose how to react to societal, psychological, and natural forces whose vagaries are largely outside their control. In the field of aviation safety, it is often said that the best way for a pilot to avoid becoming involved in an accident is to read about the mistakes made by previous pilots. If the same can be said of systemic collapse, then the following chapters ought to be required reading for those who wield power over aviation systems, not only in Russia, but around the world.

In Chapter 1, the format and intent of civil aviation under the Soviet Union, including both its triumphs and its shortcomings, will be explained. Chapter 2 will examine how that system was torn down and rebuilt in a wholly new image, focusing on the challenges of the abrupt transition and their consequences. In Chapter 3, a quantitative analysis will show how the changes temporarily made flying in Russia more dangerous, followed by case studies which illustrate the proximate causes of this decrease in safety. Chapters 4 and 5, picking up where Chapter 3 left off, will take a qualitative approach, applying Scott W. Palmer's concept of the "colossalist impulse" and Alexei Yurchak's thesis on performative shift to explain the broader social origins of problems which have afflicted Russia's aviation industry both before and after

1991. And finally, Chapter 6 will consider the relevance of this analysis to the present moment and to the industry's uncertain future, concluding with a reminder that the cultural and economic ingredients for chaos have not disappeared, and that the steady march of progress in aviation safety could, like the Boeing 737 in Perm, turn once again in the wrong direction.

CHAPTER 1: THE SOVIET WAY

When the Bolshevik revolution toppled Russia's imperial government in 1917, the concept of powered flight was still in its infancy. Official accounting is hard to come by, but there were thought to have been a little over 300 aircraft in all of Russia at the time, most of them completely unairworthy,[2] and there were no commercial airlines. As such, the new Soviet government had an opportunity, perhaps unique in history, to create its own aviation system from the ground up, not in concert with but in parallel to the system which was simultaneously emerging in the West. The result, after decades of evolution, would be a self-contained airline industry specially tailored to the needs of a command economy, all aspects of which fell under the purview of the government-controlled mega-organization known as Aeroflot.

Calling Aeroflot an "airline," in the Western sense of the word, would have been a gross understatement. Aeroflot was in fact synonymous with the very concept of civil aviation within the borders of the Soviet Union. It carried every paying passenger, transported all commercial air cargo, owned every civilian airplane and helicopter, ran every airport and control tower,[3] and conducted every non-military task involving an airplane, including but not limited to crop dusting,[4] fish surveying, medical transport, wildland firefighting,[5] aerial mapping,[6] and even taking children to school in areas with no roads.[7] At its height it operated thousands of aircraft,

[2] Palmer, Scott, *Dictatorship of the Air* (Cambridge, UK: Cambridge University Press, 2006), 83.

[3] "Russia's 'New' Aeroflot Seeks Own Identity," *Aviation Week & Space Technology* 140, no. 6 (1994): 39.

[4] Davies, Ron, *Aeroflot: An Airline and Its Aircraft* (Rockville, MD: Paladwr Press, 1992), 82.

[5] Davies 38

[6] Davies 42

[7] Davies 72

employed hundreds of thousands of people,[8] and carried over 100 million passengers each year, far more than any other airline anywhere in the world.[9] Again, however, "airline" was a misnomer; it was in reality a government directorate which happened to oversee passenger air travel, and its de facto head was the Minister of Civil Aviation,[10] so its structure and activities always reflected the economic objectives dictated by the Communist Party.[11] Those objectives were conveyed by means a hierarchical bureaucratic structure with the Minister of Civil Aviation at the top, down through to several dozen regional directorates, each of which was itself a large airline operating hundreds of airplanes.[12]

This structure meant that Aeroflot's mission, and the requirements for that mission, were markedly different from those of capitalist airlines. Whereas a Western airline is expected to make a profit and generate value for its shareholders, Aeroflot, being a government service rather than a money-making enterprise, was under no such obligation. Aeroflot's actual goals were twofold: to provide transportation to as many people as possible, and to improve the image of the Soviet Union abroad.

In accordance with this directive, Aeroflot operated scheduled airline services to every Soviet city and town of any significance, as well as numerous small, rural communities in the far north and east which were not connected to the country's road and rail networks. These routes

[8] Davies 92, 94

[9] "Aeroflot: Russian Airline," *Encyclopedia Britannica*, accessed 23 April 2022, https://www.britannica.com/topic/Aeroflot.

[10] Davies 58

[11] Howie, Clinton, "(Re)learning to Fly: Russian Aviation in the Post-Soviet Era," *Journal of Air Law And Commerce* 61, no. 2 (1995): 468.

[12] Duffy, Paul, "In the Aftermath of Aeroflot," *Air Transport World* 29, no. 7 (1992): 36.

were maintained, regardless of the level of demand, in order to support the centralized transportation network envisioned by the state planning agency Gosplan.[13] That plan was heavily subject to the whims of regional Party officials, who were frequently known to request the addition of direct routes between Moscow and their regional capitals, even in the absence of a viable passenger market, exacerbating the system's inherent bent toward overcapacity and underutilization.[14] However, because it was not interested in making a profit, the inefficiency of its network was not a significant concern for Aeroflot, except that it tied up airplanes which could have been used elsewhere. This left the airline in a position where, despite the fact that most of its planes flew half-empty, it was unable to meet demand on peak routes,[15] such as those between major urban centers and popular holiday destinations, which tended to be the most trafficked routes in the USSR.[16]

This structural inefficiency extended to Aeroflot's international services. Direct Aeroflot service from Moscow was considered a form of diplomatic outreach to the Soviet Union's allies in the Third World,[17] especially in Africa, where the airline had several dozen destinations.[18] These routes also had very low load factors since most Soviet citizens rarely traveled abroad, and most citizens in the destination countries could not afford to fly to the USSR.

Aeroflot's mission also influenced the types of airplanes that it required, and because of its monopoly on air travel, Aeroflot's needs effectively dictated the types of airplanes that were

[13] Howie 471

[14] Howie 472

[15] Ibid.

[16] Davies 89

[17] Howie 469

[18] Davies 87

designed and produced in the first place. The airline needed only small numbers of long-range aircraft, mostly for international routes, since few Soviet cities were more than 4,000 kilometers from Moscow.[19] In contrast, Aeroflot's glut for medium-range jets was insatiable, and at its height the airline operated some 600 three-engine, 150-passenger Tupolev Tu-154s.[20] Furthermore, most aircraft intended for use by Aeroflot would need to contend with harsh conditions and a lack of infrastructure. Many runways at airports served by Aeroflot were uncomfortably short, and some were not even paved, necessitating planes that had excellent takeoff performance and resistance to damage from rough operating conditions. As a result, while most Western airliners used low-wing designs with wing-mounted engines, Soviet airliners generally had engines mounted on the tail, and those which had wing-mounted engines almost always had high-wing designs, where the wings attach to the roof instead of the floor—in both cases, to minimize the risk of ingesting rocks or other debris into the engines while landing or taking off on unimproved airstrips. For the same reason, Soviet airliners tended to be overengineered, with more sets of wheels than their Western counterparts and wider use of stronger, heavier materials. However, this was necessitated in part because Soviet engineers had not mastered the art of predicting how long airplane parts would last in service—a foundation of modern airworthiness regulations—and relied instead on combining robust physical strength with mandatory short service lives in order to avoid mechanical failures.[21]

At the same time, many Soviet aircraft, especially those involved in transporting cargo, were capable of excellent short-field performance. The massive Ilyushin Il-76 four-engine

[19] Davies 95

[20] Davies 94

[21] Duffy, Paul, "Soviet System Carries On," *Air Transport World* 31, no. 3 (1994): 85.

freighter, for example, can take off with 20 tons of cargo from a small airport with a mere 1,700-meter runway and then fly to a destination 7,000 kilometers away.[22] And perhaps most impressive of all was the unassuming Antonov An-2, a 12-passenger biplane, famous for being so slow that it is possible to fly it backwards in a particularly stiff headwind—a characteristic which made it ideal for landing at tiny dirt airstrips in Siberia. As a result of its performance capabilities, the An-2, which was designed in the 1940s, is still in widespread use today.[23]

Additionally, the aircraft operated by Aeroflot did not need to be fuel-efficient, as fuel was heavily subsidized by the government. This stood in stark contrast to the West, where the pursuit of better fuel economy was one of the most significant factors driving the development of new passenger airliners.[24] The Tu-154, for example, was somewhat analogous to the American-built Boeing 727 (another three-engine, mid-range airliner), but despite being developed several years after its American counterpart, the Tu-154's fuel economy was initially even worse than the notoriously thirsty 727.[25] As a result of its noisy and inefficient engines, the 727 went out of production in 1984, having been superseded by a new generation of Boeing and Airbus aircraft which consumed up to 50% less fuel; however, this next generation of jets never truly appeared in the USSR, and the Tu-154 would remain in production through the 2000s.

This lack of incentive to develop more fuel-efficient engines meant that the USSR never mass-produced any long-range, high-capacity jets like the Boeing 747 or McDonnell Douglas DC-10, which were ubiquitous at major airlines in the United States. On the other hand, Aeroflot

[22] Davies 84

[23] Davies 42

[24] Howie 473

[25] "Tu-154," *Tupolev*, accessed 24 April 2022, https://web.archive.org/web/20181209213120/http://www.tupolev.ru/en/civil_aviation/tu-154.

had little need for such huge airplanes, given that its long international routes could not attract enough passengers to justify the use of an aircraft in the 300-400 seat range. As a result, Aeroflot's transatlantic flights used smaller airplanes which continued to make fuel stops in Shannon, Ireland and Gander, Newfoundland, which Western airlines had ceased to do since the introduction of the 747 and its competitors in 1970. The USSR did eventually develop a wide body airliner, the Ilyushin Il-86, which entered service in 1980—ten years after its Western counterparts—but it was still not efficient enough to cross the Atlantic without stopping for fuel, nor was it intended to be. In fact, Aeroflot could fill the 350-seat Il-86 only on the popular routes between vacation destinations in the south and the major urban centers of Moscow, Leningrad, and Kiev, none of which required a long-range airliner, and so the transoceanic capability of the Il-86 was not of significant concern to the Ilyushin design bureau, although in practice it ended up being used on international routes anyway.[26] A longer-range version, the Il-96, was supposed to follow, but its production was interrupted by the collapse of the Soviet Union and very few were built.

This dominance of the domestic market over the international came about due to Aeroflot's role as a form of public transportation. Much like fuel, airfares were heavily subsidized: in 1989, it cost around 20 rubles ($32) to fly on trunk routes between major cities, and 108 rubles ($174) to fly on the longest domestic routes from Moscow to the Far East, a journey longer than New York to Paris.[27] In contrast, a flight from Moscow to Tokyo, which was only marginally farther, cost five times as much. The high fares on international routes enabled the state to more effectively support its subsidies at home, which helped drive the Soviet Union's

[26] Davies 89

[27] Fink, Donald, "Perestroika Spurs Aeroflot to Begin Major Changes in Business Operations," *Aviation Week & Space Technology* 130, no. 23 (1989): 84.

domestic tourism industry by opening air travel to the masses. Despite a relatively low average personal income, most Soviet citizens could easily afford to fly thanks to these artificially low ticket prices.

It is also worth discussing the structure of Aeroflot's symbiotic relationship with other government directorates responsible for designing, manufacturing, and maintaining aircraft, as well as training pilots. Unlike in the West, where privately-owned aircraft manufacturers must produce a fully-finished airplane ready for service with the airlines, the state-run manufacturing process in the USSR was distributed between several different directorates which were each responsible for one stage of the process. For transport aircraft, designs originated mainly from the Tupolev, Ilyushin, and Antonov design bureaus, but as the name suggests, they were not responsible for anything past the design phase. Instead, designs from all three bureaus would be tested by the Gromov Flight Test Center in Moscow, and then assembled in various locations around the USSR.[28] (In contrast, for most of its history Boeing designed, tested, and manufactured all of its aircraft in-house at a single location in Seattle.) Heavy maintenance, on the other hand, was highly centralized, with only one massive maintenance base for each aircraft type—for example, all Tupolev Tu-134 short range jets in need of heavy inspections or major repairs had to go to a single facility located in Belarus.[29] Similarly, all civil pilot training was conducted via four-year higher-education-style vocational programs at three main locations, which imposed a far more rigorous curriculum than in the West, where initial pilot training typically lasts only a few months. The extra training was seen as necessary to compensate for the Soviet Union's poor airport and navigational infrastructure, which forced pilots to fly difficult

[28] Howie 473-474

[29] Duffy, "Soviet System Carries On."

approaches into primitive airports in all kinds of weather. In fact, the Soviet Union had almost no airports which met international standards in terms of ground-based infrastructure which would help pilots land, so the additional training was surely necessary to prevent loss of life in landing accidents from reaching unacceptable levels.[30]

Lastly, it should be noted that Aeroflot was not the primary customer for any of the three big aircraft design bureaus—that honor went to the Soviet military, whose orders always took priority. And while in the West military aerospace technologies often made their way into civilian airplanes over time, this was not the case in the USSR, which considered these technologies strictly confidential, and so there existed a large gap between the technical capabilities of military and civilian aircraft. Furthermore, many civilian airliners were developed from designs intended for military use, including Aeroflot's first jet aircraft, the Tupolev Tu-104, which was based on the frame of a long-range bomber.[31]

All these aspects of civil aviation in the USSR worked together to create a system which, while far from perfect, generally fulfilled its intended purpose. For the price of inefficiency and stunted technological development, Aeroflot and the aircraft design bureaus were able to bring aviation to the masses in a particular manner which would not have been possible without state control and centralized planning. As such, the Soviet Union had created an aviation system which was structurally very different from its Western counterparts and would be better described as a public transportation network than as an airline in the capitalist sense. This fact would come to haunt those who, in the upheaval of Perestroika and privatization, sought to create an airline industry based on the Western model.

[30] Duffy, Paul, "Training—Russian Style," *Air Transport World* 34, no. 10 (1997): 74-77.

[31] Davies 44

CHAPTER 2: PRIVATIZATION

The final years of Mikhail Gorbachev's term as General Secretary of the Communist Party saw him embark on an idealistic crusade to transform every aspect of the Soviet Union's calcified economic and political systems. Between 1988 and 1990, the processes of restructuring (perestroika) and democratization resulted in the opening of Soviet borders, the mass exodus of former allies from the Warsaw Pact, and unmitigated chaos as lower level bureaucrats struggled to interpret Party directives ordering the privatization of state assets. Across almost every domestic industry, state control began to unravel, and despite Gorbachev's dogged belief that privatization would inherently lead to economic growth, the country headed instead toward an economic collapse fueled by the breakdown of the carefully orchestrated systems of production which had been built up over the past seven decades. Naturally, Aeroflot was among the targets of this campaign against the state economic monopoly—a "perestroika of the air" which would ultimately bring catastrophe to Russian civil aviation. The following chapters argue that this catastrophe was the combined result of the introduction of a profit incentive, a lack of infrastructure, outdated regulations, a lack of oversight, poor maintenance of aging aircraft, poor pilot training, and poor pilot understanding of English. These topics should be kept in mind while considering the following narrative of Aeroflot's unraveling.

The Process of Privatization

As perestroika got underway, Aeroflot's future seemed bright. With the end of the Cold War, many more Soviet citizens gained opportunities to travel abroad, leading to a surge in demand for Aeroflot's lucrative international services. Indeed, between 1987 and 1988, the number of passengers flying internationally with Aeroflot jumped 20%, and the airline's total passenger turnover reached a record 125 million. For the first time, Aeroflot began to see a

serious need more capable long-range jets, in particular the still-in-development Il-96. However, it would take time for these aircraft to be produced and delivered, and the possibility of buying Western airplanes had yet to be raised, so Aeroflot cashed in on the boom mainly by expanding code-sharing agreements and other partnerships with foreign airlines.[32]

At the same time, officials in the Ministry of Civil Aviation floated ideas for how to restructure Aeroflot. Initially, decentralization was the priority rather than outright privatization, and during the late 1980s Aeroflot's regional divisions were given wider autonomy, including the authority to independently purchase new aircraft according to their needs.[33] Then in 1989, the Ministry of Civil Aviation proposed creating a second, privately-owned airline which would compete with Aeroflot on the international routes where Aeroflot was struggling to meet demand.[34] The idea got surprisingly far into the planning stages, despite the fact that it represented a fundamental misunderstanding of market competition. A duopoly involving a private company and a state-owned company is by definition anti-competitive, as the former is required to make a profit while the latter has considerably more financial flexibility, and will therefore always prevail over its privately owned counterpart. Furthermore, the proposed financing for this new airline was suspiciously nebulous, and in fact *Aviation Week* wrote at the time that "it is unclear how the new airline will fund its operations or aircraft acquisitions." Officials replied that the airline would be supported using the same solution proposed for all the Soviet Union's economic problems: Western investment.[35] Needless to say, this investment was often ephemeral, and in the end the proposed Aeroflot competitor—at least as the government

[32] Fink 84
[33] Ibid.

[34] "Soviets Attempt to Set Up a Competitor for Aeroflot," *Aviation Week & Space Technology* 131, no. 24 (1989): 42.

[35] Ibid.

envisioned it—never materialized. The Soviet Union's first private airline, Transaero, would begin service in 1991, but it would not become a true competitor to Aeroflot until the 2000s.

Meanwhile, the political unraveling of the USSR began to substantially accelerate the parallel breakup of Aeroflot. In 1989, as the Baltic independence movements gathered momentum, Aeroflot's Lithuania directorate was the first to attempt to become a separate airline,[36] an effort which would eventually precipitate the formation of Lithuanian Airlines, using former Aeroflot aircraft, in 1991. But by then Lithuania would be hardly alone. Especially after the August Coup, the Ministry of Civil Aviation accepted that creating a competitive airline industry would require the complete dismantling of Aeroflot as an entity. On the surface, the plan was simple: every Aeroflot directorate would become an independent for-profit company, while the state would retain direct control only over the international division based at Moscow's Sheremetyevo Airport. In the end, this would prove to be a foolhardy plan built on naïve assumptions. From the vantage point of 1992, Paul Duffy would write in *Air Transport World*, "*[T]o change, almost overnight, a system in which money is regarded as of little importance to one in which it is the most important, along with flight safety, is virtually impossible, particularly when most of Aeroflot's divisions are short of people with financial, marketing and commercial experience.*"[37] This lack of experience, and its dire consequences, would become apparent almost immediately following Aeroflot's breakup.

The final dissolution of the airline was as swift as the dissolution of the USSR itself. As more and more republics declared independence in late 1991, they invariably took their regional Aeroflot directorates with them, creating new state-owned carriers such as Uzbekistan Airways,

[36] Duffy, Paul, "In the Aftermath of Aeroflot": 36.

[37] Ibid.

Kazakhstan Airlines, Belavia, and so on. At the same time, the numerous directorates within the Russian Federation also began to break away, spawning private carriers like Vladivostok Air, Bashkirian Airlines, Vnukovo Airlines, and several dozen others. By February 1992, no less than 69 new airlines had been registered, including 33 former Aeroflot directorates.[38] But turning these directorates into self-sufficient companies would prove to be a difficult undertaking. Despite the large overall number of airlines, Aeroflot's original structure meant that most of them faced little real competition as they inherited geographical fiefdoms within which they controlled all existing airline infrastructure and routes. And yet even with this absence of competition, the new airlines—christened "Babyflots"—found it almost impossible to turn a profit. The reasons for this were manifold and structural in nature.

Privations of the New Market

The first challenge facing the newly privatized airlines was the general economic situation, which was marked by bureaucratic chaos, massive job losses, runaway inflation, and shortages of basic goods. This meant that the new airlines emerged into a market in which the ability of the average citizen to spend money on air travel was severely restricted. The end of fixed prices for commodities and the state's failure to intervene against hyperinflation caused airfares to increase exponentially; the price of a ticket from Moscow to St. Petersburg, for example, went from 19 rubles (about one day's earnings) in 1990 to 1,000 rubles (about ten days' earnings) in 1992.[39] In large part due to these price increases, the total number of airline passengers carried within the Russian Federation fell from 128 million in 1991 to 62 million in

[38] Ibid.

[39] Duffy, "In the Aftermath of Aeroflot:" 36.

1992, a drop of more than 50%, which was followed by a further 50% drop in 1993.[40] Concurrently, airlines cut back on flights—where there had been nine daily flights from Moscow to St. Petersburg in 1991, by July 1992 there were only three.[41] The cutback in flights hit rural areas especially hard, as newly privatized airlines eliminated unprofitable services to remote towns, leading to the closure of rural airports—in fact, by 1999, more than half of all airports in the former Soviet Union had shut down.[42] In some locations, the end of Aeroflot's air taxi services spelled doom, and whole communities were all but abandoned when the closure of their airports cut them off from the outside world, further accelerating Russia's already alarming trend toward rural decline.

Airlines also had to contend with fleets of aging, outdated, and inefficient aircraft inherited from Aeroflot. Soviet aircraft previously did not need to be particularly fuel efficient, but now that they belonged to private airlines with shoestring budgets, their gas-guzzling engines became a serious financial liability. At the same time, the design bureaus, which had also been privatized, were tasked with inventing a new, much more efficient generation of airliners—a huge technological leap—while simultaneously receiving much less government funding. This proved all but impossible, and work on new airliner designs in the former Soviet Union practically ceased for a number of years, despite the manifest need for updated models. The political breakup of the USSR made the problems for airlines even worse, as the Soviet system of single locations for heavy maintenance meant that there were no longer any facilities in Russia capable of providing this critical service to some of Russia's most common airplanes. The only

[40] "Air Transport, Passengers Carried – Russian Federation," The World Bank, accessed 26 April 2022, https://api.worldbank.org/v2/en/indicator/IS.AIR.PSGR?downloadformat=excel.

[41] Duffy, "In the Aftermath of Aeroflot:" 36.
[42] Duffy, Paul, "Suffering on the Steppes," *Air Transport World* 36, no. 5 (1999): 107-108.

other alternative for the airlines was to buy or lease foreign airplanes manufactured by Boeing and Airbus, but this required capital that the new airlines lacked, and by the summer of 1992 the only Western airliner in service in the former Soviet Union was a single Boeing 737 on lease to Lithuanian Airlines.[43]

Consequently, the new Russian airlines had to make do with fleets of former Aeroflot aircraft designed in the 1960s. These airplanes required four pilots, twice the amount needed by Western models, and broke down frequently due to their age— in fact, the average age of the former Aeroflot fleet was considerably greater than 15 years,[44] which is considered somewhat excessive even today, but was a much bigger problem in the late 20th century, when year-on-year technological improvements were greater. These planes were also not designed to handle the continuous, punishing schedule used by Western airlines. A typical Tupolev Tu-134 in the Soviet Union could expect to be in the air for about five hours a day,[45] far less than in the West, where planes were often kept flying for 12 out of every 24. Improving this statistic—known in the industry as aircraft utilization—is a reliable way to increase profits, but airlines in the former Soviet Union had no opportunity to do this due to their low passenger numbers. Even if the airlines could somehow provide the extra maintenance required to handle such a schedule, the only way to increase aircraft utilization would have been to slash fleet sizes, but airlines were reluctant to do this, possibly because airplanes had become appreciating assets—the price of a Tu-154, for example, went from 1 million rubles in 1990 to 200 million rubles in 1992.[46] If the industry were to suddenly turn around, these airlines would be caught with their pants down,

[43] Duffy, "In the Aftermath of Aeroflot:" 36.
[44] Ibid.

[45] Fink 84.

[46] Duffy, "In the Aftermath of Aeroflot:" 36.

unable to purchase new airplanes to capitalize on the rising demand. And there was perhaps also an element of strategic inertia: while Western airlines typically ground aircraft when demand is low, Aeroflot had always instead responded to low demand by maintaining the same size fleet but decreasing aircraft utilization.[47] This strategy worked well enough under the USSR, but it didn't make sense in a for-profit environment, where efficient use of aircraft is a much better indicator of profitability than the sheer size of one's fleet. Nevertheless, it takes time for thinking to change, especially since almost all the managers at the new airlines were former Aeroflot employees with no business training.

The lack of familiarity with market economies among airline executives caused many of the new companies to make mistakes that significantly worsened their already precarious financial situations. A good case study might be Vnukovo Airlines, which was formed directly from Aeroflot's former Vnukovo directorate and operated a fleet of mostly Tupolev Tu-154s on domestic routes out of Moscow's Vnukovo airport. When Vnukovo Airlines was privatized, it issued millions of shares in order to raise capital. But in a typical fashion for Russian businesses in the 1990s, it sold 28% of the shares at deep discounts to current and former staff, and another 29% were exchanged for government vouchers.[48] The vouchers, which could be traded for stocks, were issued to every Russian citizen by the government in order to encourage investment in private businesses, and businesses often accepted them on the assumption that they would retain value, although in the end it turned out that there was nothing backing them up. Consequently, Vnukovo Airlines earned almost nothing from the sale of 57% of its shares.

Despite this, Vnukovo Airlines executives had big plans for how they were going to improve the company. The airline wanted to fit Soviet airframes with Western engines to

[47] "Airclaims Compares NIS, Western Accident Rates," *Aviation Week & Space Technology* 140, no. 24 (1994): 38.
[48] Duffy, Paul, "Independent in the CIS," *Air Transport World* 32, no. 3 (1995): 64.

improve efficiency, build better hangars to improve the ease of maintenance, and increase the capacity of its passenger terminal to improve turnover, but it was unclear where the airline expected to find money for even one of these projects, let alone all of them. For Vnukovo's General Director Yuri Kashitsin, even broader goals prevailed: his objectives for the airline, in descending order, were to maintain its safety record, improve efficiency and reduce costs, find investors, and cultivate competent and flexible management. If Vnukovo Airlines failed to do these things, he said, "[T]hen we have no future."[49] He would turn out to be right, but not for the reasons he hoped. Vnukovo Airlines never managed to improve or replace its fleet of Tu-154s, and the directorate's alleged 60-year run without any passenger fatalities—the safety record to which Kashitsin referred—came to an end in 1996, when a Vnukovo charter flight crashed into a mountain in Svalbard, killing 141 people. In the end, the airline went bankrupt in 2001, fulfilling Kashitsin's prophecy.

The New Aeroflot

At the same time, what remained of Aeroflot also underwent a number of structural changes. Having been relegated to only the former international directorate, the state airline was rebranded as Aeroflot—Russian International Airlines, or ARIA. ARIA was to play a role similar to that of other "flag carriers" around the world—to represent Russia abroad and serve as a gateway to the country, without impinging significantly on the domain of the privately-owned airlines operating in the domestic market. As part of the transition, ARIA inherited all the long-range aircraft belonging to the former international directorate, along with a large amount of ancillary infrastructure, including ground facilities, hotels, and most of the parking slots at the

[49] Ibid.

international terminal at Sheremetyevo Airport.[50] However, this new incarnation of Aeroflot faced a number of challenges which would take years or decades to solve. Much like its private counterparts, hardly anyone at the new Aeroflot had any business experience; its airplanes were uncomfortable and its service was poor, both major problems for an airline tasked with representing Russia abroad; and its infrastructure was ill-equipped to facilitate modernization. For example, passengers wishing to connect from international flights to domestic routes were all but out of luck, as Sheremetyevo's international and domestic terminals were several kilometers apart and there was no public transportation between them, except for taxis. In Soviet times this was not much of a problem because relatively few people connected through Moscow, but in the new economy this had become a liability.

In October 1995, Marshal Yevgeny Shaposhnikov was appointed General Director of ARIA, bringing with him plans reminiscent of those put forward by his counterpart at Vnukovo Airlines. He appointed people with business experience but no aviation background to executive positions, a common practice in the West but a foreign concept in Russia. Simultaneously, he vowed to eliminate the trappings of Aeroflot's Soviet past, declaring that he would eliminate unprofitable routes that only existed for diplomatic purposes; that he would switch from passengers carried to customer satisfaction and profit as the preferred metrics of success; and that he would purchase more Western aircraft, because passengers liked them better and because they could be run harder without breaking. Shaposhnikov's shakeup only continued from there, as he withdrew ARIA from a government-sponsored consortium with aircraft and engine manufacturers because the partnership was not providing sufficient returns on investment. Solidifying his break from the engine manufacturers, he announced his intention to refit

[50] "Russia's 'New' Aeroflot Seeks Own Identity:" 39.

Aeroflot's new long-range Ilyushin Il-96 jets with Western engines, because they offered better performance. And lastly, he proposed adding a complementary bus service between the terminals at Sheremetyevo.[51] All of these changes made him many enemies, both among Sheremetyevo taxi drivers and among politically connected executives at the engine and aircraft manufacturers. Even though his moves were mostly correct from a business perspective, and ARIA was making money again after its nadir in 1992,[52] Shaposhnikov was forced out from his position within two years.

Despite the fact that the general directors of both ARIA and Vnukovo Airlines—and indeed many other airlines—wanted to buy Western planes, the penetration of Western-built airliners into the Russian market was in fact quite slow. Unsurprisingly, it was the state-owned ARIA which had the capital to make that leap first, leasing five wide body Airbus A310 twin-engine jets in 1992.[53] The A310 fulfilled a niche which no Soviet airliner could: the long-range, medium capacity market, with the ability to fly intercontinental routes while having only 200 passenger seats rather than 300 or 400, effectively solving the mismatch between range and capacity which had previously prevented the airline from operating efficiently on international flights. Aeroflot sought to use the A310s to improve its international reputation, offering A310 services connecting Europe and East Asia via Moscow, while providing a higher quality experience, with well-furnished cabins and better food that would contrast with Aeroflot's Soviet-era image. While Paul Duffy of *Air Transport World* wrote that passenger service aboard Aeroflot under the Soviet Union was "more akin to that of a South American railway service,

[51] Duffy, Paul, "Aeroflot—Times Set to Change," *Air Transport World* 33, no. 9 (1996): 39.
[52] "Russia's 'New' Aeroflot Seeks Own Identity:" 41.

[53] "Russia's 'New' Aeroflot Seeks Own Identity:" 39.

than of an airline,"[54] the new A310s were changing the narrative. *Aviation Week* published the following excerpt in February 1994: *"Western businessmen who have used the Russian carrier's A310s said they were impressed with the level of service and professionalism of the crews. 'I've flown with the A310s several times on the London-Moscow-Hong Kong route, and I was pleasantly surprised at the good in-flight service,' said one British contractor with extensive dealings in the former Soviet Union. 'I hope this service level will be transferred to the rest of the 'new' Aeroflot.'"*[55]

The date on which this piece was published is highly significant. Less than two months later, the A310 operating that exact flight—Aeroflot flight 593 from London to Hong Kong via Moscow—plunged from the night sky over Siberia and crashed into a snow-covered mountain, leaving no survivors. In stark contrast to the supposed professionalism described in *Aviation Week*, the cause of the crash turned out to be the accidental disconnection of the autopilot after the captain allowed his 15-year-old son to sit in the pilot's seat and manipulate the controls.[56] Was the businessman who so praised the A310 service among the crash's 75 victims? It is impossible to say, as *Aviation Week* did not mention his name.

The Westernization Dilemma

The crash exposed the difficulty and risk of incorporating Western aircraft into the Russian airline industry, in that outside attention on the company and its operations was much greater than it would have been if a Russian-built airplane had crashed. But while Aeroflot

[54] "In the Aftermath of Aeroflot:" 36.

† The significance of the crash of flight 593 is discussed more extensively in chapter 4.

[55] "Russia's 'New' Aeroflot Seeks Own Identity:" 39.

[56] Zamotin, V. V., "Akt po rezul'tatam rassledovaniia katastrofy samoleta A310-308 F-OGQS, proisshedhei 22 marta 1994 g. v raione g. Mezhdurechenska," Departament vozdushnogo transporta Rossii, 22 March 1995.

attempted to make the leap and reaped the consequences, most airlines never even tried. Transaero followed Aeroflot, becoming the first Russian carrier to use Boeing aircraft in 1993,[57] but besides these two heavy-hitters, the pace of integration was glacial. Whereas Western experts predicted that there would be a market for 1,400 Western airplanes within Russia by the year 2000, the actual number of planes delivered by 1999 was just 54, including eight which had already been returned to their lessors.[58] The vast majority of Russia's airlines continued to use the same old, inefficient Soviet airplanes, even though they were much less cost-effective. This situation was created not only by the economic collapse, but by two additional factors as well: the sheer number of airlines in Russia, and constraints on imports which increased the cost of Western airliners even further.

In the immediate aftermath of the collapse of the Soviet Union, it seemed that there were few things more popular than acquiring a couple of old Aeroflot planes and starting an airline. The original vision of a few dozen independent former Aeroflot directorates quickly fractured into a highly differentiated network; in fact, although exact numbers vary depending on each source's date of publication, it is known that more than 500 airlines had been founded in Russia between 1990 and 1997, of which more than 300 were typically in operation at any given time.[59] This was obviously far more than the market could support, and in fact just 71 of them carried 98% of all traffic, while the rest scraped by running ad-hoc operations with one or two airplanes.[60] The vast majority of these companies couldn't even think about buying Western

[57] "OAO Aviatsionnaia kompaniia 'Transaero'," rbc.ru, 17 May 2013, https://web.archive.org/web/20130620020733/http://www.rbc.ru/companies/transaero.shtml.

[58] Duffy, "Suffering on the Steppes."
[59] Duffy, Paul, "Alliances for Survival," *Air Transport World* 35, no. 5 (1998): 84-85.

[60] Gusev, I. N. and Lodygin A. A., "Sostoianie bezopasnosti poletov v grazhdanskoi aviatsii Rossii," *Vestnik Natsional'nogo issledovatel'skogo irkutskogo gosudarstvennogo tekhnicheskogo universiteta* 60, no. 1 (2012): 91.

aircraft, which required the kind of capital available only to larger carriers. In fact, most of them couldn't even afford to repaint their aircraft to remove the old Aeroflot livery.[61] This extreme fragmentation no doubt contributed to the dearth of Western airliners in Russia during the 1990s, as few airlines were big enough to put together the money to buy them.

Secondly, importing a Western airliner was complicated by red tape. From 1992 until 2022, almost all foreign-built airplanes operating for Russian airlines were leased from holding companies in Bermuda and Ireland in order to avoid steep import tariffs imposed by the Russian government.[62] This meant that the planes had to be maintained according to Western airworthiness regulations, and by maintenance organizations certified by the civil aviation authorities of the United Kingdom and the European Union, of which there were very few (initially none) in Russia.[63] As a result, until 2022, it was common practice for Russian airlines to send their Western-built aircraft abroad for routine maintenance, another expense which increased the barrier of entry. Russian maintenance organizations, which had been privatized alongside the airlines, struggled to fill the gap, because they inherited a Soviet-era bureaucratic structure that could not be quickly adjusted to meet the realities of maintaining Western airplanes.[64]

Instead, the fate of these second- and third-tier airlines was to scrape the bottom of the barrel in a never-ending battle for survival. Many of them struggled simply to pay fuel costs and

[61] Howie 487.
[62] Loh, Chris, "Why Aeroflot's New A350s Are Registered in Bermuda," Simple Flying, 07 December 2020, Accessed 28 April 2022, https://simpleflying.com/aeroflot-airbus-a350-bermuda-registration/.

[63] Kovalev, M. A. and Poddubnyy, I. V., "Problemy tekhnicheskogo obsluzhivaniia sovremennykh vozdushnykh sudov," *Vestnik Samarskogo universiteta: aerokosmicheskaia tekhnika, tekhnologii i mashinostroenie* 18, no. 2 (2019): 142.

[64] Ibid.

airport fees. And despite their ever-increasing numbers, they were competing for fewer and fewer passengers, as the total passenger turnover in Russia fell from 128.8 million in 1991 to just 15.2 million in 1998,[65] significantly less than in Australia, a country with barely one eighth the population. Some of them found creative ways to deal with the situation, from carrying illegal passengers on board cargo flights, to outright carrying illegal cargo, to running shopping charters to foreign countries, operating large planes like the Il-76 with two thirds of the seats empty so that the passengers could fill the remainder with cheap goods acquired abroad.[66] But few of these operations were well run, and within the unique set of circumstances created by the collapse of Aeroflot, they became downright dangerous. The following chapters explore some of the ways in which this occurred, the scale of the consequences, and the roots of the problem in Russian aeronautical culture.

[65] Air Transport, Passengers Carried – Russian Federation."

[66] Duffy, Paul, "The Only Constant is Change," *Air Transport World* 33, no. 10 (1996): 82.

CHAPTER 3: A DANGEROUS PLACE TO FLY

Considering the upheaval described in Chapter 2, common wisdom would dictate that the level of safety in the Russian aviation industry during the 1990s likely worsened significantly. With the majority of Russian airlines perpetually on the brink of bankruptcy, but lacking in more reliable competition, the conditions were ripe for disasters rooted in profit-motivated corner-cutting. Furthermore, barriers such as high costs, old airplanes, a lack of ability to buy or maintain Western aircraft, poor infrastructure, and a bureaucracy staffed with former apparatchiks unused to the pressures of market capitalism would have made achieving a safe operation burdensome if not outright impossible. The following chapter presents a quantitative analysis which supports the hypothesis that safety became worse during this period, and then seeks to explain the result by means of examples which can directly tie the reduction in safety to the aforementioned effects of the breakup of Aeroflot and the transition to a market economy.

The best available measure of safety within a large airline industry is the yearly ratio of total passenger and crew deaths in commercial airplane accidents to the total number of passengers carried, also called a fatality rate, expressed in terms of deaths per million passengers carried. However, this data is necessarily subject to a large margin of error. First of all, data for Russia and the USSR come from different sources which may include slightly different methodologies, and sources from before 1991 do not break up air traffic or fatality data by constituent Republic. Secondly, even in a large country, the total number of serious accidents in any given year is quite low, and whether a year has few fatalities or many can hinge on the occurrence of a single major crash. Furthermore, data sources traditionally organize information about accidents based on the country in which they took place, not the country of the airline involved; therefore, to adequately reflect the safety of Russian aviation in particular, numerous

manual additions and subtractions were made to the data in order to include Russian planes which crashed abroad and exclude foreign planes which crashed in Russia, a process which can introduce error if any accidents were missed. And lastly, fatality statistics combine passenger and crew deaths, while data about total passengers carried excludes crew, so the resulting ratio will slightly overestimate the actual chances of a passenger dying in a crash due to the inclusion of crew in one data set and not the other. In order to reduce the impact of some of these sources of error, the following analysis uses five-year average fatality rates which smooth over large year-on-year fluctuations.

Running the Numbers

For the purposes of the study, data on fatalities and passenger numbers were acquired for the entire period from 1971 to 2020, including the last 21 years of the USSR and the first 29 years of the Russian Federation. Fatality data was sourced from the Bureau of Aircraft Accidents Archives,[67] which catalogues all plane crashes involving aircraft with more than six seats, supplemented by data from the Aviation Safety Network[68] and the International Civil Aviation Organization (for the Soviet period only). The post-1991 data includes all scheduled and charter passenger, cargo, and air taxi operations; non-commercial and military flights were excluded, along with Russian planes destroyed by foreign terrorists on foreign soil. (The Soviet data may include all non-military accidents, as it is not clear whether Aeroflot accidents were included collectively or broken down by type of operation. However, because passenger flights account for the vast majority of the fatalities, any impact to the data should be minimal.) Figures for total

[67] "Accident Archives," Bureau of Aircraft Accidents Archives, accessed 14 March 2022, https://www.baaa-acro.com/crash-archives.

[68] "ASN Aviation Safety Database," Aviation Safety Network, accessed 14 March 2022, https://aviation-safety.net/database/.

passenger numbers in both Russia and the USSR come from the International Civil Aviation Organization (ICAO), although different publications were used for Soviet[69] and post-Soviet[70] data. For each year, the number of fatalities was divided by the total number of passengers carried by all Russian/Soviet airlines to derive the fatality rate. An average fatality rate was then calculated for each five year period, and the results were plotted on the graph in Figure 1.

The graph shows that the number of fatalities per million passengers carried decreased steadily throughout the final two decades of the Soviet Union, from 4.6 in the period 1971-1975

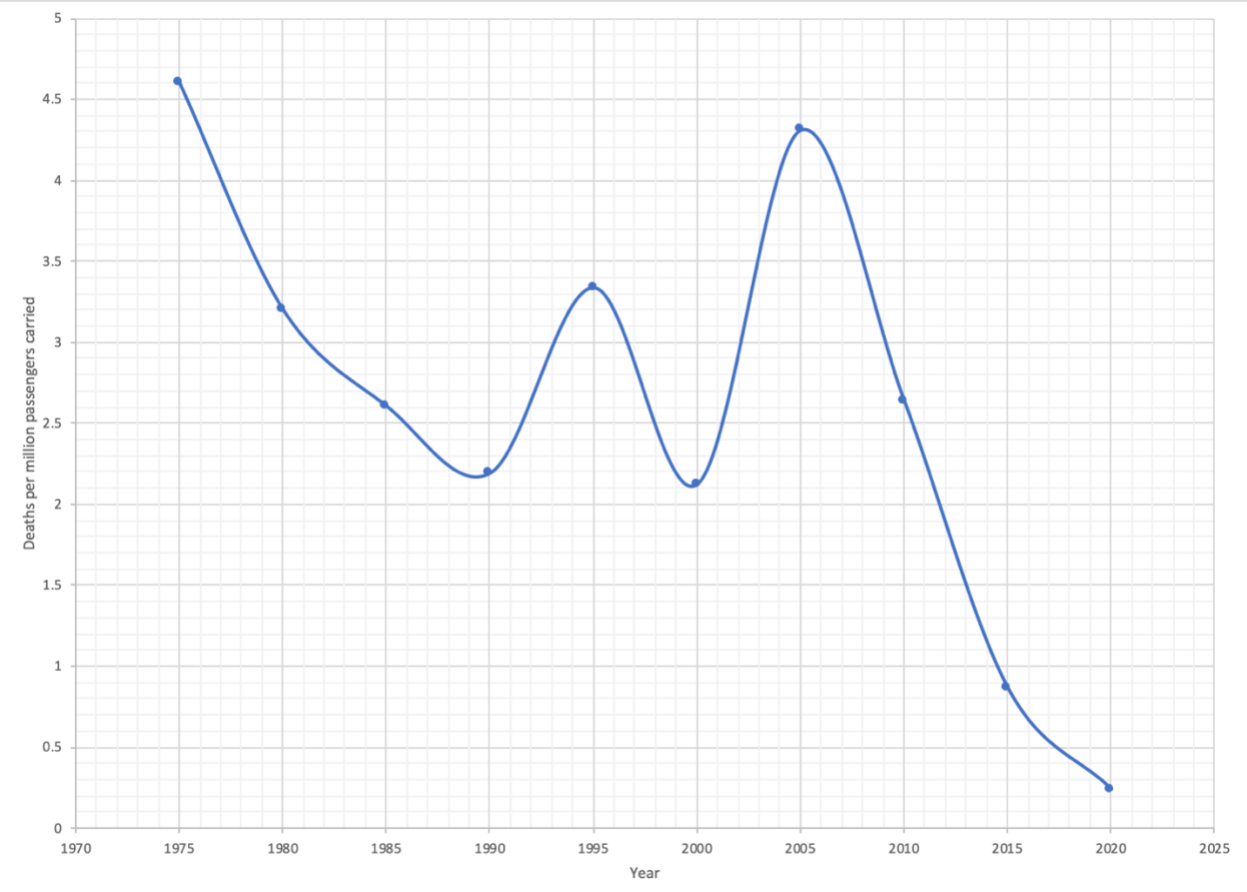

Figure 1: Five year average of deaths per million passengers carried in Russia/USSR, 1971-2020. Each data point represents the average for the five year period ending with the given year.

[69] Huang, Shung, "USSR Civil Aviation Flight Safety Analysis for 1990," *Flight Safety Foundation: Flight Safety Digest* 10, no. 7 (1991): 18-24.

[70] "Air Transport, Passengers Carried – Russian Federation."

to 2.2 in the period 1986-1990. (Visualized differently, a rate of 2.2 deaths per million passengers carried corresponds roughly to a 1 in 450,000 chance of dying every time you board a commercial plane, before accounting for the presence of crewmembers.) However, beginning in the period 1991-1995, this trend completely reversed, as fatality rates increased back to early-1970s levels by 2006 and did not drop back below late-Soviet levels until the period 2011-2015. The worst years were 2001 and 2006, when the chance of death upon boarding a commercial airplane in Russia reached approximately 1 in 100,000. After 2006, however, the steady improvement in safety resumed, picking up the downward trend which had been observed under the Soviet Union, albeit several years late.

One hypothesis is that this change in the trend was due to the departure of the non-Russian Republics from both data sets in 1991. However, because rates are being compared rather than absolute numbers, the removal of these Republics from both total passengers carried and total fatalities should not alter the resulting ratio as long as fatality rates were uniform across all the Republics. Therefore, for their departure to account for the spike, fatality rates in the non-Russian Republics prior to 1991 must have been significantly lower than those within the Russian Soviet Federative Socialist Republic. However, there is no evidence for this hypothesis, nor is there any obvious reason why this should have been the case, because all the Republics operated under the same set of safety regulations, and while each republic did have its own separate Aeroflot directorate, they were still all under the authority of Aeroflot's centralized command structure. Therefore, the weight of the evidence supports excluding this hypothesis as a potential cause of the spike in fatality rates between 1991 and 2006.

Another hypothesis could be that a global phenomenon, rather than a uniquely post-Soviet one, led to the increased fatality rates during this period. However, even with the inclusion of the post-Soviet space in the data set, no such trend was observed for the world as a whole. For a more detailed comparison, a similar graph was produced showing deaths[71] per million passengers carried[72] in the United States during the same period, which was then superimposed on the graph in Figure 1, using the same axes. The resulting graph is shown in Figure 2.

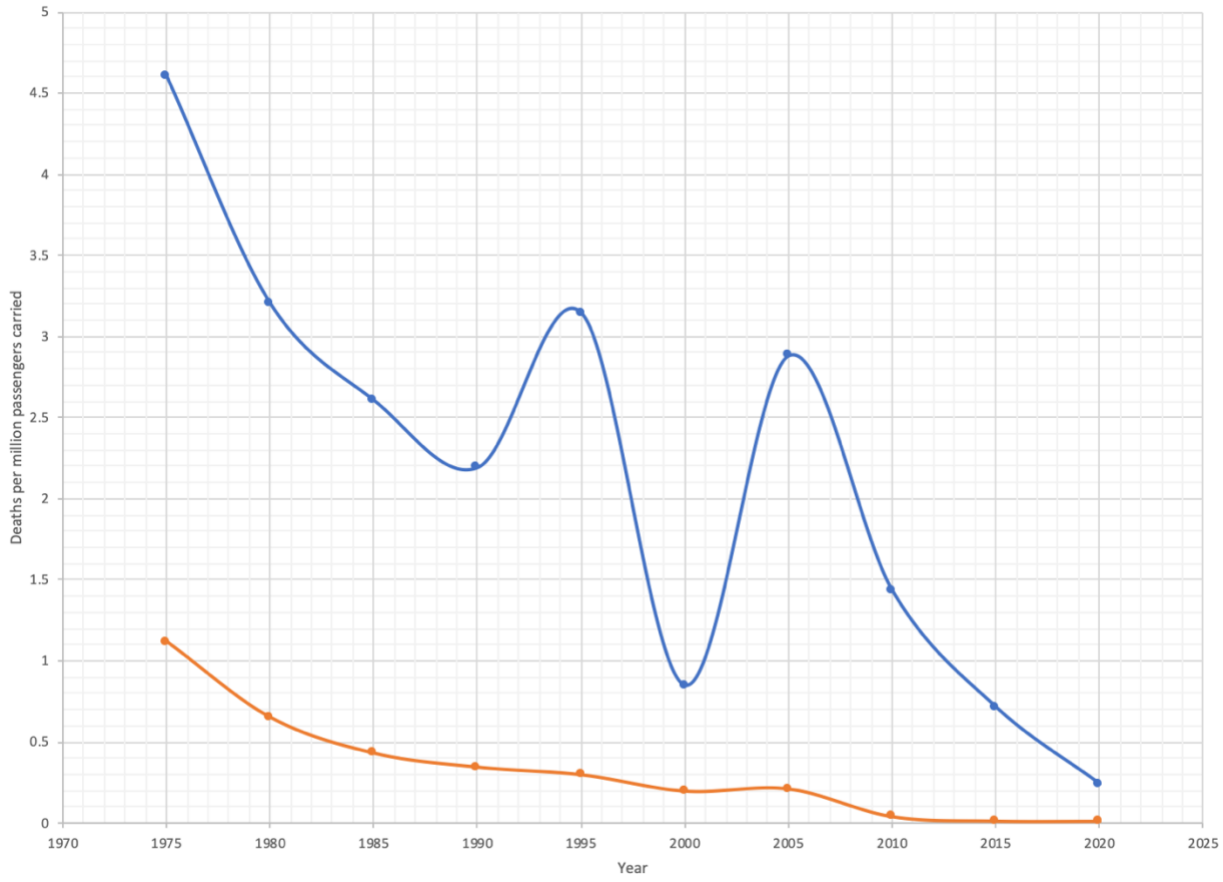

Figure 2: Five year average of deaths per million passengers carried in Russia/USSR (blue) vs. the United States (orange), 1971-2020. Each data point represents the average for the five year period ending with the given year.

[71] "Accident Archives."

[72] "Air Transport, Passengers Carried – United States," The World Bank, accessed 14 March 2022, https://api.worldbank.org/v2/en/indicator/IS.AIR.PSGR?downloadformat=excel.

The comparison shows that there was no increase in fatality rates in the United States during the period 1991-2005, except for a small rise in the final third, most likely due to the several hundred airline passengers and crewmembers who died in the attacks of September 11th 2001. Apart from this minor anomaly, fatality rates in the United States continuously decreased throughout the period from 1971 to 2020. Furthermore, the comparison shows that fatality rates in the USSR and Russia have always been much higher than those in the United States, although the difference has shrunk significantly in recent years as both countries' trend lines converge on zero.

Ideally, proving that the act of transitioning from a command to market economy was the cause of the increased fatality rates would entail a comparison not to the United States, but to another country which also transitioned around the same time. However, any such comparison would run up against a lack of sufficient data. Interpreting data on airline fatalities is already difficult due to the small number of data points (that is, fatal accidents), and becomes even more difficult in smaller countries with limited or non-existent domestic air travel markets. Because fatal accidents are so rare, only countries with large airline industries carry out enough flights to overcome this minute probability and produce a statistically significant number of accidents. Lithuania, for example, has never experienced a serious crash, but it is impossible to say whether this is because flying in Lithuania is exceptionally safe or because few flights operate in the country. As an extreme opposite example, during the year 1993 an incredible one in 6,800 airline passengers in Tajikistan died in a crash, but again, the significance of this data is doubtful. Because there are so few flights in Tajikistan, the probability of a crash in any given year is very low, but when one did occur, the fatality rate briefly spiked to an unrepresentative level.

Unfortunately, no post-Soviet republics other than Russia were large enough to produce meaningful data. Although a comparison could be made to China, which made some market reforms during this period, the majority of air travel in China was never privatized, so its data is not useful in determining whether poor safety was the inevitable result of wholesale privatization in principle, or whether this was a uniquely Russian phenomenon. Instead, the comparison to the United States, for which data is readily available, shows only that the world's largest airline market was unaffected by whatever force caused the increase in fatality rates in Russia.

Having considered these various hypotheses, it is reasonable to conclude that the increase in fatality rates in Russian commercial aviation following the breakup of the Soviet Union was, first of all, real; and second, caused by something which occurred in Russia but not in the United States. While this does not necessarily exclude potential causes other than the transition to a market system, many, if not all, of the individual accidents which make up the data set can be tied, on a case by case basis, to the effects of that transition. Therefore, by means of examples, the rest of this chapter argues that the deterioration in airline safety was the direct result of the changes to the Russian aviation industry described in Chapter 2, and in particular the problems listed in the introduction to that chapter: the appearance of a profit incentive, a lack of infrastructure, outdated regulations, a lack of oversight, poor maintenance of aging aircraft, poor pilot training, and poor pilot understanding of English.

The Profit Incentive

Although the data shows that safety in the USSR was already quite poor relative to the United States, the introduction of a profit motive undoubtedly made the situation worse. A well-established airline in a market economy may, in time, recognize that its long-term viability depends on maintaining a high standard of safety, but making this judgment requires experience

which the leaders of the new Russian airlines generally lacked. This period in Russian history was marked by get-rich-quick schemes and the relentless pursuit of capital for its own sake, and there is evidence that this mentality affected the airline industry. In 1993, the Interstate Aviation Committee (MAK), the international body responsible for aviation safety in most of the former Soviet Union, published a study which found that some airlines in the region were trying to "obtain the most revenue [possible] regardless of concern for flight safety or operational procedures."[73] In an article for Aviation Week, Lenorovitz and Rybak make the same argument, writing, "The 'maximum profit syndrome' is driving some carriers in the former Soviet Union to break weather minimums and push operational limits—which has contributed to the increase in aircraft accidents since the USSR's breakup."[74] Citing the MAK study, they noted that by 1993 the number of accidents involving ex-Soviet airlines in foreign countries had quadrupled compared to the period 1987-1989, which they attributed to higher revenues on international flights incentivizing airlines to land at the destination even if conditions were unsafe. Paul Duffy of Air Transport World backs up this interpretation, writing in 1992 that Russian airlines were desperate to obtain reserves of foreign currency, but did not yet have the expertise to do so effectively or safely.[75]

Some of the unsafe methods which companies used to increase revenue included avoiding diversions in bad weather, under-fueling their planes, and loading additional passengers and cargo beyond what the airplanes were designed to carry.

[73] Lenorovitz, Jeffrey and Rybak, Boris, "Profits Overtake Safety at Some NIS Carriers," *Aviation Week & Space Technology* 140, no. 24 (1994): 36.
[74] Ibid.

[75] "In the Aftermath of Aeroflot."

The minimum visibility required to land at an airport depends on the quality of the approach aids installed at that airport, which help the pilots align with the runway and maintain the proper descent angle. The more sophisticated the aids, the lower an approaching aircraft can fly without being able to see the runway. Most airports in Russia had only primitive approach aids, or none at all, and consequently had high minimum descent altitudes (MDAs), below which pilots are prohibited to fly if the airport is not in sight. This meant that low clouds could preclude landing at a large number of Russian airports, resulting in costly diversions. After all, when a plane can't land at its scheduled destination, the airline will have to pay for the passengers' accommodation and alternative transportation, a considerable expense, and may take a reputational hit as well. And on top of that, many of Russia's airports had been privatized and began charging exorbitant landing fees in order to stay solvent, increasing the price of a diversion even further.[76] None of these pressures had been present under the Soviet system, where the cost of a diversion was absorbed by the state.

In the absence of effective enforcement mechanisms, this situation incentivized pilots to descend below the MDA in an attempt to catch sight of the runway and effect a landing in bad weather. Needless to say, these minimums exist for a reason, and this tactic frequently resulted in planes crashing into the ground short of the runway—a type of accident known in the industry as "Controlled Flight Into Terrain," or CFIT. According to one study conducted in 2011, there were no less than 58 notable CFIT accidents in Russia between 1990 and 2010, of which 34 were caused by pilots violating the minimum visibility required for landing.[77]

[76] Lenorovitz 36.

[77]Gusev 93.

Besides weather delays, another major expense for any airline is fuel. During the 1990s, Russian airlines gained a reputation for playing fast and loose with fuel requirements, mostly because fuel costs at that time had to be paid in cash directly to the airport, unless prior arrangements were made. Any unscheduled fuel stop could therefore turn into a major headache for the crew and the airline, especially considering the rate at which Soviet-made aircraft consumed fuel. The MAK in its 1993 study cited this is a major cause of accidents which had been almost entirely non-existent prior to the breakup of Aeroflot. To illustrate its point, the study cited the case of a Rosvertol Antonov An-12 which ran out of fuel and made a forced landing during a flight between Khabarovsk and Tyumen, apparently because the plane was too heavy and thus consumed more fuel *en route* than the pilots expected. Because diverting to get more fuel would force them to incur additional costs, the pilots continued toward Tyumen despite being aware that they had insufficient fuel for the journey.[78]

Yet another way in which airlines in the former USSR skirted the law to increase revenue was by carrying more passengers and cargo than was normally allowed.[79] Every airplane has a maximum takeoff weight beyond which performance will be severely degraded, and if the margin of exceedance is too great, the airplane simply will not become airborne. Airlines and the pilots who flew for them took considerable risk when taking on this extra weight, which was usually omitted from the official weight and balance forms filled out before each flight in order to hide its illegality. This too was a problem which had been very rare in the Soviet Union, where there was normally no incentive to overfill airplanes, but which became very common during the

[78] Lenorovitz 37-38.
[79] Lenorovtiz 37.

1990s. A report in 1993 found that Aeroflot crews were even boarding additional, unlisted passengers who would pay the pilots directly without the knowledge of the airline.[80]

In one case, a Kuban Airlines Antonov An-26 operating a cargo flight from Krasnodar in southern Russia to Gyumri, Armenia crashed on arrival after it failed to gain altitude during an aborted landing. It turned out that that after the cargo was loaded and inspected and the six legal passengers boarded, an airline dispatcher delayed the takeoff in order to surreptitiously board 25 additional unauthorized passengers and their baggage, which put the weight of the plane more than 2,000 kilograms above the permitted maximum. As the plane approached Gyumri amid fog and poor visibility, the pilots caught sight of the runway too late and realized they couldn't land. However, when they attempted to pitch up and climb to 800 meters to abandon the landing, it turned out that the plane was too heavy to accomplish this maneuver, and it lost speed, stalled, and fell to the ground, killing 35 of the 36 passengers and crew.[81]

Outdated Regulations and a Lack of Oversight

Insuring an airline industry against disasters caused by excessive profit-seeking and cost avoidance requires a strong regulatory framework and government agencies capable of enforcing it. However, in the years following the collapse of the Soviet Union, these institutions were subject to the same disarray which afflicted the industry as a whole. The basic problem was that Russia was still using its Soviet-era air safety regulations, which were written for the realities of a centrally planned system and did not include any safeguards against companies taking risks in order to make more money.[82] Under the Soviet system, every individual within the aviation

[80] Overton, Ellen, "Aeroflot Training Practices," *Proceedings of the Seventh International Symposium on Aviation Psychology* (1993): 615.

[81] "Katastrofa An-26B a/k Avialinii Kubani v a/p Giumri," airdisaster.ru, accessed 1 May 2022, http://airdisaster.ru/database.php?id=229.

[82] Howie 481-482.

industry was eventually accountable to the regulator through a chain of command leading to the Minister of Civil Aviation; as such, there was no need for a mechanism which could provide accountability in a market system where airline employees are answerable only to their company's CEO and not to the government. In the absence of such a mechanism, Russian air safety regulators lost control of large portions of the industry almost immediately.[83] Even though there was an obvious need for a new regulatory body with a clear mandate, the resources allocated for enforcing safety regulations only continued to decrease. Between 1988 and 1994, the number of staff at the State Scientific Research Institute for Civil Aviation, which researches flight safety, fell from 3,500 to 1,500; simultaneously, by 1994 the Department of Air Transportation (a predecessor to today's Rosaviatsiya, the main regulatory agency for aviation in Russia) had just one third of the inspectors it needed to enforce regulations. While the government had previously pledged 6 trillion rubles worth of investment in aviation safety in order to reverse the decline in standards, only 500 million rubles ever materialized.[84] And finally, as if all of that wasn't enough, the collapse of Soviet institutions had made it unclear who was responsible for what,[85] as regulatory and enforcement authority was spread over several different bodies, including the Russian Department of Air Transportation, and the Interstate Aviation Committee (MAK), which was responsible for certifying the airworthiness of airplanes and airports in Russia, a function which normally belongs to the regulator (in this case the Department of Air Transportation). This problem went all the way down to the day-to-day operational level, where the scope of various air-transport related jobs and their requirements

[83] Overton 815.

[84] Howie 480-481.
[85] Howie 481.

were often unclear. This problem persisted well into the 21st century, as evidenced by the findings of an MAK investigation into the crash of a UTAir ATR-72 in Tyumen in 2012. The aircraft stalled and crashed shortly after takeoff, killing 33 of the 43 occupants, due to a buildup of ice on top of the wings, which had gone undetected prior to departure. The pilots had been told by a ground handler that there was no ice on the plane, but the ground handler had not received formal training on the effects of ice or how to detect it on the ATR-72, even though his job description included inspecting planes for ice, a task which required a certification he did not possess, and, bizarrely, was not required to possess in order to hold the job. According to the MAK, this contradiction, which directly contributed to the accident, was made possible by the complete absence of any regulations defining the role of a ground handler, and a lack of any clear distinction between "ground handling" and "maintenance," even though only someone trained in the latter should be making decisions related to whether or not an airplane is capable of flight.[86] This problem dated back to the collapse of the Soviet Union, because a clear distinction between ground handling and maintenance was a concept imported from the West and would have held no meaning in the Soviet system, where all ground support activities, whether related to maintenance or not, were handled by a single organization. The MAK found it somewhat concerning that by 2012 regulations still had not been updated to reflect the fact that "ground handler" and "mechanic" were now different jobs.

In another noteworthy case, the 69 passengers and crew aboard a Bashkirian Airlines charter flight were killed when their Tu-154 collided in midair with a DHL cargo plane over southern Germany in 2002. The collision occurred when the crew of the Russian airliner received conflicting commands about how to avoid the DHL Boeing 757: the air traffic

[86] "Okonchatel'nyi otchet ATR72-201 VP-BYZ," Interstate Aviation Committee, 12 June 2013, pp. 211-218.

controller told them to descend below it, while their automatic Traffic Collision Avoidance System (TCAS) told them to climb above it. The crew decided to follow the controller's order and descended straight into the 757, whose crew was simultaneously following a TCAS instruction to dive. The German investigation into the accident revealed that Russian regulations surrounding the use of TCAS technology were wildly out of step with those in Europe. The point of TCAS is to issue avoidance instructions as a last-ditch measure when air traffic controllers have already allowed two planes to get too close together, and nothing, not even an order from a controller, is supposed to override its commands. However, Russian regulations were at variance with international standards: not only was TCAS not required unless one intended to fly to Europe, federal rules depicted TCAS as an advisory tool which would merely *help pilots make a decision* about an avoidance maneuver, and pilots were told that TCAS commands did not take priority over instructions by air traffic controllers. This discrepancy came about because TCAS was a Western invention which by 2002 had yet to significantly penetrate the Russian market, and regulations had not caught up with its potential value in preventing midair collisions nor with the potential risks associated with misusing it. Without realizing it, regulators had planted the seeds of disaster by interpreting the role of TCAS within a Soviet context where the authority of an air traffic controller was absolute, rather than in the Western context for which it was designed.[87]

Poor Maintenance

The lack of strict enforcement and unclear regulations also led to problems with aircraft maintenance. As mentioned in Chapter 2, most aircraft operating in Russia were quite old, and as such their maintenance requirements were increasing, even as airlines had less and less money

[87] "Investigation Report AX001-1-2/02," German Federal Bureau of Aircraft Accidents Investigation, 2 May 2004.

with which to pay for repairs. The effect of this problem was already apparent by 1993, by which point the share of aircraft accidents caused by mechanical defects had increased to 20% from 10% the previous year.[88] The privatization of the aircraft maintenance sector significantly exacerbated the problem, as newly independent workshops were forced to jack up prices to cover overhead costs,[89] leaving small, money-losing airlines with nowhere to turn.

Some of the worst accidents in Russia during the 1990s had to do with technical faults—in particular the 1994 crash of a Baikal Airlines Tu-154 near Irkutsk, in which all 124 passengers and crew perished after an engine failure triggered an in-flight fire that destroyed all three of the plane's hydraulic systems. The airplane, in fact, never should have been allowed to leave the gate. The crew only managed to start the engines on the fifth attempt, a clear sign of a serious mechanical problem,[90] to which one of the crew allegedly said, "Tell the engineer who prepared these engines that he prepared them very poorly, they won't start."[91] Nevertheless, once they managed to get the engines started, the pilots elected to take off, despite the presence of a warning light, which they believed was false.[92] In light of the evident problems with the engines, this decision was highly suspect, and certainly raises questions about whether the crew had become accustomed to dealing with mechanical problems that should result in the refusal of the aircraft. As for the airline itself, it certainly was not in good financial standing—Baikal Airlines,

[88] Lenorovitz 38.

[89] Kovalev 142.

[90] "Katastrofa Tu-154M a/k Baikal v raione Irkutska," airdisaster.ru, accessed 3 May 2022, http://www.airdisaster.ru/reports.php?id=17.

[91] "Katastrofa Tu-154 pod Irkutskom 3 ianvaria 1994 goda," Irkipedia, accessed 3 May 2022, http://irkipedia.ru/content/katastrofa_tu_154_pod_irkutskom_3_yanvarya_1994_goda.

[92] "Katastrofa Tu-154M a/k Baikal v raione Irkutska."

which had been created from Aeroflot's Irkutsk directorate in 1992, went bankrupt in 1998 and ceased operations in 2002.

Although some of the issues created by the transition to a market economy had begun to resolve themselves by the 2000s, the plague of technical problems did not; instead, it simply began to manifest differently. As the post-2000 economic turnaround prompted newly-solvent airlines to finally start leasing more Western-built aircraft, the airlines experienced difficulty importing all the necessary parts and correcting defects in a timely manner. An MAK investigation into the 2006 crash of an S7 Airlines Airbus A310 in Irkutsk revealed that high import tariffs and red tape had forced the airline to wait months for necessary parts, as a result of which aircraft were dispatched with numerous technical faults, day in and day out. Some of these parts were connected to the thrust reversers which help the A310 slow down on landing. On the aircraft later involved in the accident, both thrust reversers had failed to deploy during a routine landing earlier in 2006, and due to a lack of spare parts, the airline decided to fix one reverser by cannibalizing components from the other. Subsequently, a crew flying this aircraft into Irkutsk botched the procedure for landing with one thrust reverser inoperative, and the aircraft ran off the runway and into a private storage facility, killing 125 of the 203 passengers and crew. Among the MAK's recommendations after the accident was that the Russian government make it easier for airlines to acquire spare parts for Western-built airplanes.[93]

Poor Pilot Training

As these examples imply, however, most accidents—even those involving mechanical problems—typically also involve poor pilot training, and it is this area which arguably had the greatest negative impact on safety in the former Soviet Union. As discussed in Chapter 2, pilot

[93] "Okonchatel'nyi otchet Airbus A310-324 F-OGYP," Interstate Aviation Committee, 19 April 2007.

training in the USSR was conducted in a four-year university format, and while this arrangement persisted for many years, the quality of training did begin to slip. A 2011 study found that by that date, training on Russian-built aircraft was much worse than on Western-built ones,[94] a fact which another study in 2013 attributed to a lack of aircraft and simulators on which to train. According to that study, the number of training aircraft in Russia was 15 times less in 2013 than it was in 1990, and most flight simulators still corresponded to old Soviet aircraft types which were rapidly being withdrawn from service.[95] Furthermore, the number of pilots being trained in Russia underwent a catastrophic collapse in the 1990s, and had not sufficiently recovered by the 2010s to supply the number of pilots which Russian airlines required.[96]

This shortage of pilots appears to have led to questionable practices at training centers in Russia. In 2013, an MAK inquiry into the crash of a Tatarstan Airlines Boeing 737 in Kazan discovered that both pilots had graduated from a 737 training center, run by S7 Airlines, which apparently did not fail a single student between the years 2010-2013.[97] Needless to say, this is a problem, as not everyone is capable of flying a large jet, and at any credible flight school some prospective pilots are bound to fail. Instead, the center seemed to be designed to produce pilots on-demand for other airlines regardless of their skill level. In its scathing report, the MAK wrote that "[T]he training process was like a 'black box' where the airlines put their wishes as to the selected type rating program and the fee, and then after some time received a pilot holding a

[94] Gusev 95-96.

[95] Krikunov, K. N., "Problemy sistemy podgotovki pilotov grazhdanskoi aviatsii," *Vestnik Yuzhno-ural'skogo gosudarstvennogo universiteta* 5, no. 2 (2013): 82-83.

[96] Krikunov 81-82.

[97] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN," Interstate Aviation Committee, 17 January 2016: 256-274.

Training Completion Certificate."[98] The actual quality of these pilots was very low, and many of them were unfamiliar with basic procedures needed to fly the 737 safely, including the captain of Tatarstan Airlines flight 363, who killed himself and 49 others when he botched an attempt to climb away from a failed landing. Furthermore, Tatarstan Airlines had deliberately rushed its pilots' twice-yearly recurrent simulator training, leaving insufficient time to complete all the legally required subjects, because the airline was in dire financial straits and had accrued considerable debt to S7 Airlines for the use of its Boeing 737 simulators.[99] This situation was eerily foreshadowed in 1997, when Valerian Solomatin, First Deputy Director of the Higher College of Training for Civil Aviation (VAU GA) in Ulyanovsk, told Paul Duffy of Air Transport World, "Today, airlines must pay for their training. In Soviet times, this was not necessary. The larger airlines are simply hiring crews who are already rated on the types they need, but eventually, they will need to train their own. They might not have the money."[100]

Poor Pilot Understanding of Western Designs

To further close the gap between pilot supply and demand, many Russian pilots being trained to fly Western aircraft were also sent to flight schools abroad, especially in the United States. It was here that two major training-related problems emerged which would account for many accidents in the 2000s: insufficient appreciation of the conceptual differences between Soviet-built and Western-built aircraft, and a widespread lack of English language proficiency among Russian pilots.

[98] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN:" 196.

[99] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN:" 256-274.

[100] Duffy, "Training – Russian Style."

One of the biggest differences between Western and Soviet airliners was the number of crewmembers needed to fly them. While most Western manufacturers had managed to automate away the flight engineer position by the 1990s, the Soviet Union never produced a large jet designed for a two-person cockpit crew; the Tu-154, Tu-134, and Il-76, for example, each required not only two pilots but also a flight engineer and a navigator, and they sometimes flew with a radio operator as well. Even later designs, such as the Tupolev Tu-204, which entered service in 1990, initially required a flight engineer, a position which Boeing had rendered obsolete with the two-crew 737 clear back in 1968. One possible reason for this is that Soviet studies found a larger crew to be preferable from a safety perspective as opposed to increased automation, a finding which was been contradicted by numerous Western studies,[101] as well as modern experience in general. In any case, as Russian airlines increasingly turned to Western aircraft which used only two pilots assisted by automation, training sometimes failed to appreciate the effect of this change on crew coordination strategies. In the case of the S7 Airlines Airbus A310 which crashed in Irkutsk in 2006, the MAK found that the pilots failed to properly communicate with each other after they discovered that the plane was not slowing down on landing, a failure which the investigators felt had something to do with the absence of training that would teach communication strategies appropriate for a two-person crew, as opposed to the four-crew Tu-154s to which the pilots were accustomed. In fact, the captain had accidentally pushed one engine to takeoff power, causing the plane to accelerate, but identifying the source of the problem on the Tu-154 would have been the responsibility of the flight engineer, a position which did not exist on the A310.[102]

[101] Overton 617.
[102] "Okonchatel'nyi otchet Airbus A310-324 F-OGYP."

The best example of this disconnect may be the crash of Aeroflot Nord flight 821 in Perm in 2008—the accident described in the introduction. The pilots of flight 821 were both trained in the United States to fly the Boeing 737, but did not immediately begin doing so upon their return to Russia. Instead, the captain went back to flying the Tupolev Tu-134 for several months before switching to the 737, without being given any refresher training beforehand—a serious violation of safety regulations. It was this poor transition from a Soviet cockpit to a Western one which may have sealed the fate of flight 821. Notably, on Soviet airliners, the artificial horizon, or attitude indicator—the instrument which displays the orientation of the airplane in pitch and roll—works by moving an airplane symbol against a static image of a horizon. The pilot keeps the plane level in clouds or at night by controlling the plane symbol like a third-person video game. In contrast, Western attitude indicators have a static plane symbol overlaid against a background which rotates, tilting the horizon itself to correspond with what the pilots would see out the window on a clear day. This means that when the 737 entered an uncommanded left turn on approach to Perm, the horizon line on the attitude indicator tilted to the right. In contrast, on a Soviet instrument, the plane symbol would have tilted to the left. Figure 3 shows how these two indications could appear contradictory.

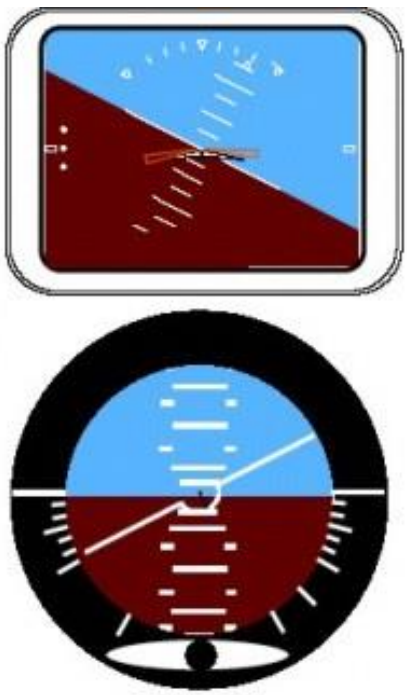

Figure 3: On top is a Western attitude indicator; on the bottom is a Soviet attitude indicator. Both instruments are displaying a left roll. (Image: Pilots of America)

Considering the above, the captain of flight 821, who was drunk, tired, and had improperly switched from the Tu-134 to the 737 without refresher training, evidently acted on instinct. When he saw a line tilting to the right, he rolled the

plane left to return to what he thought was wings-level, not realizing he was turning the wrong way. It was a sobering reminder that even the state-owned Aeroflot was vulnerable to the pitfalls of the transition to Western aircraft.[103]

Poor Pilot Understanding of English

But the most significant source of trouble for Russian pilots during the time of transition, or at least the one most often cited in accident reports, was a lack of adequate English language skills. English is the international language of civil aviation, and all airline pilots around the world are required to speak it when crews of multiple nationalities are operating on the same radio frequency. In the Soviet Union, it was relatively rare for Aeroflot pilots to need to speak English, except for those who flew international routes, and as late as 1997 Russian aeronautical colleges were still giving pilots a choice between English, French, and German.[104] However, as Russian airlines expanded their international services and began operating Western aircraft whose technical documents were written in English, pilots' command of the language became increasingly important. And yet, evidence indicates that language coaching for pilots in Russia had serious problems as late as the 2010s.

The sheer number of accidents in which poor English skills were cited as a contributing factor makes them too numerous to summarize here. In fact, on multiple occasions, Russian pilots holding certificates of their supposedly "advanced" English ability have turned out to lack the skills needed to read the manuals for their own airplanes, a factor which the MAK cited in the crashes of Aeroflot Nord flight 821 (2008), UTAir flight 120 (2012), and Tatarstan Airlines

[103] "Okonchatel'nyy otchet Boeing 737-505 VP-BKO:" 151-160.

[104] Duffy, "Training – Russian Style."

flight 363 (2013), among others not previously mentioned. But two accidents stand out for the manner in which Russian-speaking pilots' poor English skills led directly to disaster.

Inadequate command of English was cited as a contributing factor in the 1996 crash of Vnukovo Airlines flight 2801, a Tupolev Tu-154 which crashed on the Norwegian archipelago of Svalbard after the pilots made a navigational error during a difficult approach in bad weather. The only member of the four-man crew who spoke English well enough to handle radio calls was the navigator, but even his skills were lacking—when he asked to use the simple approach to runway 10 which the pilots had already briefed, he repeatedly used the word "estimate" instead of "request." The Aerodrome Flight Information Service (AFIS) officer on duty at Svalbard Airport Longyear did not interpret this as a request, and told the crew that "the runway in use is runway 28." "Runway in use" is exactly what it sounds like—it is the runway that most planes are using, usually because the wind favors it. The AFIS officer was not an air traffic controller and could not order the crew to use runway 28; in fact he was only giving advisory information. But there was no such thing as an AFIS officer in Russia—even the most remote airfields have a controller with full authority—and so the pilots of flight 2801 thought they were being ordered to use runway 28, a very complicated approach for which they were not prepared. Had the navigator said at any point, "request landing on runway 10," the AFIS officer would have permitted this (and in fact he had no authority to deny it). Instead, however, the navigator said "request runway in use runway 10," a garbled phrase which the AFIS officer interpreted as a request for clarification about which runway was "in use." He repeated that the "runway in use" was runway 28, the pilots accepted this uncritically, and they abandoned their carefully pre-arranged plan, instead choosing on the spur of the moment to shoot an extremely difficult approach which they ultimately failed to complete, as the Tu-154 flew into the side of a

mountain well short of the airport. Had the navigator possessed the English skills to clearly articulate what he actually wanted to do, the crash most assuredly would not have happened.[105]

In another noteworthy case, the Russian-speaking crew of a Kazakh airliner in 1996 inadvertently caused one of the deadliest plane crashes in history when they misinterpreted commands given in English. Kazakhstan Airlines flight 1907, a massive Ilyushin IL-76 carrying 37 passengers and crew on a chartered shopping trip to India,† was descending into New Delhi when an air traffic controller ordered it to level off at 15,000 feet to allow a Saudi Arabian Airlines Boeing 747 to pass underneath it. However, the only member of the crew who spoke passable English was the radio operator, who was not directly involved in flying the aircraft. It so happened that about a minute after the Kazakh plane was told to level off at 15,000 feet, the Saudi jet was told to level off at 14,000, and the Kazakh pilots, muddling their way through the English-language communications, mistakenly thought the message was for them. Despite the fact that the radio operator knew they were supposed to level off at 15,000, and had said as much earlier, the pilots continued descending toward 14,000 feet under the impression that this was the altitude to which they were cleared. Moments later, at almost exactly 14,000 feet, the Il-76 collided head-on with the fully loaded Boeing 747, destroying both aircraft in the air. All 312 passengers and crew aboard the Saudi 747 were killed, along with all 37 aboard the Kazakh Il-76.

Incidentally, the radio operator had noticed the pilots' mistake seconds before the crash, telling them, "Keep to one five zero, do not descend!" But his exhortation came too late, a delay which Indian investigators put down to the fact that the Il-76's altimeters could only display

[105] "Report on the Accident to Vnukovo Airline's Tupolev Tu-154M RA 85621 Near Svalbard Airport Longyear, Norway on 29 August 1996," Aircraft Accident Investigation Board/Norway, July 1999.

† This was precisely the type of shopping trip described in the final paragraphs of Chapter 2.

altitude in meters, and the radio operator had to convert their readings into feet whenever he wanted to check whether the pilots were following ATC instructions.[106] In fact, nearly all countries except for the former Soviet Union and China give aircraft altitude instructions in feet. Russia still uses meters to this day, but modern aircraft have instruments which can display altitude using either measuring system at the click of a button, a feature which the IL-76, designed within the insular world of Soviet aviation, did not include. In this way, the legacy of the Soviet system had the last laugh.

Conclusion

Having considered this lengthy list of examples—which could easily have been three times as long—it is plain to see how the changes which followed the breakup of Aeroflot led to many of the disasters which account for the increase in fatality rates in Russian commercial aviation after 1991. Furthermore, the additional difficulties associated with incorporating Western aircraft into Russian airlines help explain why the fatality rate did not begin to recover until the 2010s. The roots of these problems were manifold, stemming from underinvestment in safety, bureaucratic dysfunction, and a simple lack of experience with a market economy.

But the hard data and findings of official investigations can only go so far. Why did Russia insist on plunging headlong into a transformation which significantly worsened the country's aviation safety record? And why has aviation safety in both Russia and the USSR always been so far behind the West? Here, data is harder to come by and the answers are considerably more speculative. To that end, Chapters 4 and 5 will examine some of the social

[106] Lahoti, R. C., "Report of Court of Inquiry on Mid-Air Collision between Saudi Arabian Boeing 747 and Kazakhstan IL-76 on 12th November, 1996 near Delhi, India (Charkhi-Dadri, Haryana)," Ministry of Civil Aviation of India, 15 July 1997.

and semiotic aspects which informed the way Soviet and Russian aviation were structured, the ways subjects interacted with them, and the ways in which those interactions went awry.

CHAPTER 4: SHADOWS OF COLOSSI

On the 21st of December 1988, the Antonov design bureau unveiled the largest aircraft ever to fly: the An-225 Mriya, an awe-inspiring white bird with six engines, 32 wheels, and a cargo bay longer than the Wright brothers' first flight. The Mriya—Ukrainian for "dream"—was designed to carry the Soviet space shuttle Buran on its back,[107] and when the Buran program collapsed, the Ukrainian colossus lay idle for several years before eventually being pressed into service carrying large payloads around the world, to the delight of aviation enthusiasts everywhere. The need for such a huge aircraft has been questioned by many, and yet its allure is uncompromising. And so when the Mriya was tragically destroyed in its hangar on the outskirts of Kyiv during the opening days of the 2022 Russian invasion of Ukraine, Ukraine's government declared that not only was the 34-year-old plane taken too soon, but that after the war they would raise three billion dollars to build another one.[108]

The more or less explicit subtext is that the Mriya's significance as a symbol was at least as great as its significance as a mode of transport. In fact, the importance of aviation and airplanes as symbols of technological progress, national identity, and state legitimacy within the Soviet space is a central theme of Scott W. Palmer's *Dictatorship of the Air*, a sweeping survey of the first fifty years of Russian and Soviet aviation, and one to which he dedicates the vast majority of the book. Palmer summarizes the particular Soviet manifestation of the phenomenon of *airplane as symbol* using the term "the colossalist impulse"—the urge to build bigger and heavier and fly farther and faster, without paying much heed to quality, consistency, or

[107] Davies 90.

[108] Kulisch, Eric, "The Dream Is Dead: Air Cargo Wonder Destroyed in Ukraine," FreightWaves, 27 February 2022, accessed 5 May 2022, https://www.freightwaves.com/news/the-dream-is-dead-air-cargo-wonder-destroyed-in-ukraine.

efficiency. This chapter will explain the early manifestations of the "colossalist impulse" in Soviet aviation in the 1920s and 1930s, and use Palmer's analysis to draw parallels with the aviation industry's upheaval in the 1990s.

What is Colossalism?

Any such analysis must begin with Palmer's definition of colossalism as it pertained to Soviet aviation. In *Dictatorship of the Air*, he wrote:

> *"The colossalist impulse in aviation mirrored broader trends in Stalinist culture. Like large-scale construction projects that marshaled the forces of nature by damming rivers or forging new waterways, huge airplanes bespoke the Party's ability to conquer the heavens and the earth through the application of technology. Grandiose icons of dawning socialist modernity, they legitimated both the Party's vision and the methods chosen to effect its realization. Intended to overshadow similar aircraft constructed abroad, the "airplane-giants" [samolety-giganty] suggested that the Soviet Union was already surpassing its capitalist enemies. The planes provided striking evidence of the country's ability to exceed, literally, standards established by western aeronautical powers. What the airplanes lacked in technical refinement they made up for in sheer mass. Intended to impress, yet crude and derivative, they were quintessential exemplars of compensatory symbolism."*[109]

The "airplane-giants" to which Palmer refers are not the huge cargo jets of the late Soviet period, but the Stalinist behemoths of the 1930s, many of which were produced specifically to break records without serving any practical (i.e. transportation-related) purpose. In Palmer's opinion, these airplanes served as "compensatory symbolism" intended to present the Soviet Union as a world-class producer of aircraft, despite the fact that its technological progress was built on the back of Western innovations[110] while still lagging behind the West by any meaningful measure of success.

[109] Palmer 205-206.

[110] Palmer 183-186.

One of the most interesting examples of this phenomenon was the Tupolev ANT-20 "Maksim Gorky." Built in 1934, the Maksim Gorky was powered by eight piston engines, could carry 72 passengers, and had a wingspan equivalent to a Boeing 747, making it the largest aircraft in the world at the time. From the very beginning, its value lay in its propaganda potential rather than its ability to transport passengers, as the Soviet air network was not yet developed enough to necessitate the use of such a large airplane. In practice, the sight of the enormous airplane flying over the Red Square was employed to inspire awe in the population and feed media adulation, a valuable tool in promoting the Soviet Union as an advanced aeronautical society.[111] The cost of building the plane was, however, immense, and came despite major problems involving the standard Soviet Air Force aircraft which normally flew alongside it. "*Although the number of aircraft assigned to the Maxim Gorky Squadron expanded to twenty-three by the winter of 1934–5, owing to continuing accidents and mechanical failures only half of these were typically available for use,"* Palmer wrote. *"Given these persistent problems it is easy to question the wisdom of devoting such an inordinate amount of labor and resources to the production [of] a single aircraft."*

The Maksim Gorky was never used for anything except public demonstration flights, and it was on one such flight that it met a tragic end in 1935. Keen to show off in front of a crowd of onlookers, the pilot of a biplane flying in formation alongside the behemoth endeavored to perform several loops around it, only to crash into the Maksim Gorky's wing on the third time around. The collision sent both planes plummeting into a residential area of Moscow, killing all 35 people aboard the Maksim Gorky; the pilot of the biplane; and nine people on the ground, in

[111] Palmer 209.

what was the deadliest air disaster ever at the time.[112] It was a disastrous, but fitting, fate for the world's biggest airplane, brought down by the weight of its own symbolism.

The Airbus A310 as an "Airplane-Symbol"

Some interesting parallels can be drawn between the loss of the Maksim Gorky and the infamous crash of Aeroflot flight 593 just under 59 years later. The five Airbus A310s operating for ARIA were the first Western aircraft to fly for a Russian airline after the collapse of the Soviet Union, and represented the vanguard of Russia's attempt to present a modern face to the world by means of its flagship airline. The A310 operation was explicitly framed as Russia's Western-facing façade, with service, comfort, and reliability designed to match the expectations of Western consumers, who would step off the new planes with the impression that Aeroflot was no longer a sprawling, backward airline filled with clunky old jets and uncomfortable seats—even though the vast majority of their fleet at the time was still exactly that.[113] Ridership on the A310 routes was not particularly high—in fact, the flight that would later crash was less than one third full—but that was secondary to what the A310s *represented.*

For the elite pilots who flew them, the symbolism of the A310s was just as potent as it was for the flying public. A310 captain Yaroslav Kudrinsky was apparently so smitten with the technologically advanced airplane that he simply had to show it to his children, whom he had brought along on the flight to Hong Kong using his employee discount. Reveling in his children's excitement and awe at the new Western machine, Kudrinsky let his 12-year-old daughter and 15-year-old son sit in his seat and hold the controls while he steered the plane using the autopilot heading knob, giving them the illusion that they were flying the aircraft. It was all in good fun, after all, and with the A310's sophisticated automation, it seemed like there was no

[112] Palmer 216-219.
[113] "Russia's 'New' Aeroflot Seeks Own Identity:" 39.

way for anything to go wrong. Of course, events aboard flight 593, and indeed the airplane itself, soon spiraled out of control as 15-year-old Eldar Kudrinsky accidentally disconnected the autopilot's roll channel, then let the plane slip into an uncontrolled corkscrew dive before any of the actual pilots could figure out what was happening. Two minutes later, the plane impacted the ground, killing all 75 passengers and crew.[114] Once again, hubris had brought down the flagship of Russian aviation, the ill-fated A310 becoming a victim of its own symbolic value. Certainly Kudrinsky would not have been so eager to show off the faded, cramped cockpit of a Tu-134 or let his children handle its demanding controls.

In this way, both the ANT-20 Maksim Gorky and Aeroflot's first Airbus were conceived from the beginning as messages to the West, employing what Palmer terms "compensatory symbolism" to prove the modernity of Russian aviation—whether modernity meant size, range, comfort, or safety—and both fell victim to the *belief* on the part of their caretakers that the mere presence of the airplane made that modernity manifest. As the biplane pilot embarked on his ill-advised loop around the lumbering giant and the Airbus pilot let his son sit at the controls of a brand new jet, they were both consumed by the opportunity to demonstrate this modernity and failed to appreciate that behind it lurked the same laws of physics that have haunted aviators since the dawn of powered flight.

Compensatory Symbolism in the Tu-144

Sadly, these two incidents are not the only cases of a Russian airplane's symbolic significance luring it into the jaws of tragedy. Most Westerners are familiar with the Concorde, the supersonic airliner which carried passengers across the Atlantic at Mach 2 from 1976 until 2003, but relatively few realize that the Soviet Union also produced a supersonic airliner, or that

[114] Zamotin.

it first flew and first entered service before Concorde did. The supersonic Tupolev Tu-144 took to the air for the first time on December 31st, 1968—two months before Concorde—and first entered commercial service on December 26th, 1975—this time, one month before Concorde. The closeness of these dates was likely not a coincidence, as the Tu-144's development is thought to have been rushed specifically to beat Concorde into the air.[115]

Unfortunately, disaster struck before the jet had ever carried a single passenger. As befits the present theme, the first crash of the Tu-144 happened at the 1973 Paris Air Show, where both the Tu-144 and its rival Concorde gave demonstration flights before a mass audience. During a flyby in front of the crowd, the Tu-144 came in low over the runway, then climbed steeply, accelerating upward before diving back to earth. As the pilot attempted to pull out of the dive, he overstressed the airframe and the massive plane broke apart in midair, sending debris raining down onto a suburb of Paris. All six crewmembers as well as eight people on the ground were killed. The cause of the crash is disputed to this day, but one of the most popular and credible theories holds that the crew of the Tu-144, which was scheduled to fly after Concorde, simply wanted to impress the crowd and embarked on a maneuver which exceeded the airplane's structural limitations.[116] (*"Just wait until you see us fly, then you'll see something,"* the jet's captain is alleged to have said just after watching Concorde's underwhelming performance, according to a 1973 TIME Magazine piece on the disaster.)[117]

The connection between the crash and the concept of "compensatory symbolism" hardly needs explanation. But the ultimate fate of the Tu-144 also speaks to the "colossalist impulse"

[115] Davies 64.

[116] Davies 64.

[117] "Deadly Exhibition," *TIME Magazine*, 18 June 1973.

more broadly. In service with Aeroflot, the supersonic airliner was plagued by mechanical problems that saw it constantly grounded, it had a nasty tendency to shatter windows for miles in every direction when going supersonic, and it was so loud that it would cause permanent hearing damage to its occupants if they didn't wear ear plugs. These problems restricted passenger service to a single route from Moscow to Alma-Ata. However, after just 55 passenger flights, disaster struck again: in May 1978, a Tu-144 made a dramatic crash landing, killing two of the eight crewmembers, after a wing caught fire during a test flight.[118] After this, passenger flights were halted, and the supersonic airliner was relegated to hauling cargo until it was retired from commercial service entirely in 1983. Ultimately, the plane's mechanical unreliability and the lack of viable routes proved what many had speculated from the beginning: that the jet was not created to fulfill a need, but to act as a symbol of Soviet aeronautical modernity, to show that the USSR could be the first to launch a supersonic airliner. Thus driven by the colossalist impulse, the Tupolev design bureau seemingly focused too much on the words "first" and "supersonic" and not enough on the word "airliner." The result was an aircraft that was more impressive than Concorde on paper, but went on to carry only a tiny number of passengers, while Concorde ultimately carried many tens of thousands over a 27-year service life.

The Continuing Pitfalls of Aircraft as Symbols

This tendency to push the limits while showing off new technology did not end with the collapse of the Soviet Union or even with the improvement in overall safety in the 2010s, and in fact similar accidents continue to happen in Russia to this day. For example, in 2012 a brand new Russian-built Sukhoi Superjet 100 carrying Indonesian airline executives on an advertising flight out of Jakarta crashed into the side of a volcano as the Russian crew was demonstrating the jet's

[118] "Katastrofa Tu-144D Voronezhskogo aviazavoda v Egor'evskom raione Moskovskoi oblasti," airdisaster.ru, accessed 6 May 2022, http://www.airdisaster.ru/database.php?id=1353.

advanced features to a potential customer. Ironically, before the crash the captain boasted about the plane's advanced ground proximity warning system and the detailed global terrain database which informed it—only for the warning to go off for real a few minutes later. Suddenly believing that the warning system might not be so flawless after all, the pilots ignored it. Seconds later, the plane plowed directly into a vertical cliff face, instantly killing all 45 people on board, including the executives who were supposed to buy the Superjet.[119] Needless to say, no Indonesian airlines ordered the model.

In yet another case, this time involving Russian military aviation, a prototype Ilyushin Il-112V transport aircraft crashed in a Moscow suburb in August 2021, killing all three crewmembers. According to investigative findings acquired by Kommersant, the crash was caused by poor design: the plane's engines had not been fitted with enough fire extinguishers, nor were those fire extinguishers properly positioned, and when teething problems with the brand new right-hand engine started a fire inside the engine nacelle during a test flight, the crew was unable to put it out. The fire then spread from the engine into the right aileron, which controls roll, leading to its structural failure; the plane then rolled uncontrollably to the right and dived into the ground. It turned out that the Il-112V was in development hell for a number of years, having completed just 23 flights—mostly of very short duration—by the time of the accident, and it was grounded for an extended period between 2019 and 2021 due to technical faults with the engines. Nevertheless, the Ilyushin design bureau was under pressure to avoid cancelling the plane's scheduled appearance at a major military air show between August 22nd and 28th, 2021, and the company was seemingly in a rush to get it ready, despite numerous problems which

[119] "Aircraft Accident Report: Sukhoi Civil Aircraft Company Sukhoi RRJ-85B; 97004, Mount Salak, West Java, Republic of Indonesia, 9 May 2012," National Transportation Safety Committee of Indonesia, 18 December 2012.

should have precluded any sustained flight.[120] And indeed, this haste proved deadly: just days before it was supposed to perform, the only working Il-112V went down in flames over Moscow, becoming yet another victim of the relentless pursuit of symbolic milestones.

Privatization as a Colossalist Project, and the Dual Value System

These examples show how, time and time again, attempts to orchestrate artificial displays of progress in Russian aviation elevated the symbolic above the practical and led to disaster. But the analogy could be taken even deeper. Was the breakup of Aeroflot and the privatization of Russia's airline industry not itself another example of this exact phenomenon? Could the transformation of an entire industry for purely ideological reasons, leading to incomprehensible tragedy, in fact be the ultimate expression of Palmer's colossalist impulse?

In this respect it would be useful to draw a line between the colossalist impulse and semioticist Yuri Lotman's thesis of Russia's "dual value system." Lotman argued that Russian society is bipolar, in that, from the perspective of someone inside the culture, it appears as a system of values which is periodically rejected in its totality, substituted for an entirely new set of values which take the place of the "holy" while the old values are abruptly transformed into the "sinful."[121] Although Lotman published this thesis in 1977, its applicability to the period of Russian history from approximately 1987-1995 has been widely accepted in scholarly literature, including by Lotman himself, who pointed out the "age-old binary and maximalistic characteristics" of Gorbachev's reforms in his 1992 essay *Kul'tura i vzryv* [Culture and the Explosion].[122] The colossalist impulse shares this totalistic maximalism in its elevation of the

[120] Mashkin, Sergei, "Sdalas' sama mashina, a ne liudi," Kommersant, 1 September 2021, accessed 7 May 2021, https://www.kommersant.ru/doc/4966809.
[121] Lotman, Yu. M. and Uspenskii, B. A., "Rol' dual'nykh modelei v dinamike russkoi kul'tury (do kontsa XVIII veka)," *Trudy po russkoi i slavianskoi filologii* 28 (1977): 3-36.

[122] Noordenbos, Boris, "Breaking into a New Era? A Cultural-Semiotic Reading of Viktor Pelevin," *Russian Literature* 64, no. 1 (2008): 87.

first, biggest, and fastest over all else, employing its own binary value system wherein the failure to satisfy the impulse would represent backwardness, as opposed to the achievement of the artificially imposed colossalist milestones (such as biggest airplane or first supersonic airliner), which represent modernity. On a larger scale, the complete transformation of Russia's airline industry was a fundamentally dualistic action which abruptly elevated the private over the public and the Western over the Russian, in an attempt to demonstrate a vision of modernity which was predicated upon certain symbolic elements rather than on the ability to transport passengers effectively and safely. In a dual-value system as described by Lotman, a transformation made in pursuit of a new modernity could *only* be total, and its totality in turn made it a colossalist project.

The applicability of this concept to the breakup of Aeroflot and the privatization of the Russian aviation industry is plain to see when one considers that there was no practical reason to carry out such a sweeping transformation in the first place. As a system of transport, the Soviet incarnation of Aeroflot may not have been perfect, but it was effective, in that it was capable of carrying 125 million passengers a year, it was widely affordable to the population, and safety was improving at a respectable rate. Although Soviet airliners were less technologically advanced than those in the West, a new generation of modernized planes was scheduled to enter widespread production in the 1990s, promising to solve some of the industry's growing problems. Although some reforms may have been helpful, the foundations of the system did not need to be radically altered in order to improve safety or quality of service. The basis for the industry's complete transformation was thus not practical, but ideological. A transition to market capitalism, in Gorbachev's view, had to be total; there was no room to leave an entire industry

under state control,[123] as this would be seen as an anachronism standing in the way of progress. In the tradition of Lotman, a state-run airline industry was part of a value system which had been superseded.

As established in chapter 3, the abrupt transition to an airline industry based on a new set of values created chaos that reversed 20 years of safety improvements and set back air travel in Russia by decades, a slow-motion disaster precipitated by the relentless pursuit of a new colossus. But while Russia succeeded in creating an airline industry that superficially resembled a Western one—composed of for-profit airlines flying Western-built airplanes—the overall effectiveness of the system was greatly reduced. A symbolic victory had once again been obtained at the expense of the practical.

[123] Zubok, Vladislav, *Collapse: The Fall of the Soviet Union* (New Haven: Yale University Press, 2021).

CHAPTER 5: THE POSTMODERN PILOT

In his landmark 2006 book *Everything Was Forever Until It Was No More: The Last Soviet Generation*, semioticist Alexei Yurchak presented a new interpretation of late-Soviet official culture in terms of ritualistic actions divorced from their original meanings. He argued that the practice of invoking elements of authoritative discourse, such as Party slogans and Komsomol procedures, was used to legitimate oneself within a social structure which had very little to do with the actual content of the slogans or intent of the procedures—a form of ritual behavior which developed organically within a superficially static set of norms imposed from above. Yurchak called this phenomenon "performative shift." This was not to say that acts performatively invoking authoritative discourse were "fake" or "insincere," but rather that their literal meanings were irrelevant to both the subject's intention and the result produced by the act.[124]

In the context of late-Soviet political culture, this phenomenon manifested in the form of meetings which only happened on paper, votes for resolutions which the voters hadn't read, speeches which nobody listened to, and enthusiastic parades in which the marchers carried photos of dignitaries whose names they didn't know. And yet if one asked the average Soviet citizen at the time what they "really" thought about these rituals, they likely would not have understood the question, as the rituals were not interpreted by their participants as acts of support for a political system, but as social expectations which defined the nature of membership in their local communities and circles of friends.[125] This should not be taken to mean that this tendency is somehow inherent to Russian culture, and Yurchak certainly never would have argued this.

[124] Yurchak, Aleksei, *Everything Was Forever Until It Was No More: The Last Soviet Generation* (Princeton, NJ: Princeton University Press, 2006): 14-26.

[125] Yurchak 15-16.

Rather, "performative shift" was the natural consequence of the official structures within which Russian subjects were forced to act.

Performative Capitalism

When the Politburo, as the arbiter of what was considered "authoritative," began to undertake dramatic reforms in the late 1980s, the nature of the authoritative discourse ceased to correspond to the performative acts which had invoked it, and the set of rituals which had defined Soviet political culture lost their value almost overnight. This necessarily raised the question of what would replace them.

Various analyses of Russian postmodern literature (including my own) argue that this "stripping away" of performative rituals did not reveal a more profoundly "true" discourse, but resulted in the imposition of a new set of rituals almost immediately. These new rituals were grounded in a new value system imported from the West and superimposed over existing social relations, wholly displacing the old in the manner described by Lotman. These new rituals included imitations of capitalism which invoked Western authority but did not grasp the intentions behind the original concepts, instead employing them for new purposes within the context of Russian society.[126]

This chapter argues that the late-postmodern trope of stripping away old performative rituals to reveal new ones applies not only to Russian literature but also to Russian aviation. In fact, as Russia sought to copy a Western aviation system, it ritualized many aspects of that system and subjected them to what Yurchak called performative shift—the displacement of an official act from its original meaning and its transformation into a means to an altogether different end. And while the value of this phenomenon in political culture is subjective, the

[126] Dempsey, Kylan, "Ads for Ads' Sake: How Pelevin Captured the Spirit of the Russian 90s," December 2020, 20th Century Russian Literature, University of Colorado Boulder, student paper.

recent history of Russian aviation shows that its effect is demonstrably negative in an industrial context where safety depends to a large extent on clear communication.

In contrast to most other countries that have poor aviation safety records, such as Indonesia and the Democratic Republic of Congo, Russia has a well-developed bureaucratic culture, and this has made it somewhat unique in terms of the applicability of "performative shift" to its aviation industry. However, as explained earlier in this chapter, that bureaucratic culture had already undergone performative shift before the collapse of the Soviet Union, and never truly recovered afterward.

In aviation, performative aspects of the Westernization process were initially seen through attempts to emphasize the capitalist nature of airlines newly divorced from Aeroflot, sometimes by giving them names which invoked capitalist concepts. This was usually accomplished by adding "-Air Enterprise" (aviapredpriiatie) to the name instead of the usual Western modifier "-Airlines" (avialinii), although some companies took the concept even farther, such as Stavropol'skaia Aktsionernaia Avia ("Stavropol Joint-Stock Air"). The specific inclusion of these terms in passenger airlines' public-facing names was a uniquely Russian phenomenon.

In the area of aviation safety, this performative shift largely involved the adoption of Western regulatory frameworks and organizational structures without importing the content or intent of those structures. In perhaps the most egregious example, in 2008 Russia announced that it was bringing its federal regulations into accordance with ICAO guidelines by mandating that every Russian airline have a safety management system, or SMS, a valuable concept which is partly responsible for the good safety record of Western airlines. An SMS is intended to gather large amounts of data about an airline's operations, analyze it for exceedances, safety violations, and recurring problems, identify unsafe trends, and correct those trends before they result in an

accident. But the adoption of the SMS concept in Russia was performative at every level. Although Russia adopted the International Civil Aviation Organization's SMS rule in order to cultivate a modernized appearance, Rosaviatsiya did not actually create an oversight body to monitor Russian airlines' safety management systems, nor was any training center created which could produce personnel who were properly qualified to implement an SMS. In its investigation of the 2013 crash of Tatarstan Airlines flight 363, the MAK found that the airline had submitted an "SMS proposal" which was essentially copy-pasted from the ICAO description of an SMS, without drafting an implementation plan or delegating anyone to oversee it, and Rosaviatsiya rubber-stamped the document as being in compliance with the 2008 regulation. In reality, however, Tatarstan Airlines never had an SMS; it just had a document which said that it did, and which had the correct signature on it.[127] This performative safety management system was not necessarily a failing on the part of individual airline employees, but rather the inevitable result of those subjects acting within a context where the creation an actual SMS was neither attainable nor desired, as evidenced by Rosaviatsiya's lack of interest in enforcing its own SMS-related regulations.

Tatarstan Airlines was not the only company with an SMS which turned out to be performative. In its report on the 2012 crash of UTAir flight 120 in Tyumen, the MAK outlined the case of a major Russian airline (UTAir) that had superficially implemented an SMS which, upon closer examination, turned out to be designed to produce a certain result rather than to genuinely assess the company's operational safety. UTAir's SMS measured the overall level of safety at the airline by using 5-year rolling averages of the number of fatal accidents and non-fatal accidents per million flight hours. However, the MAK pointed out in its report that "*the*

[127] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN": 138-139.

majority of the world's airlines have been operating without accidents for 5 or more years. By using the given indicators of safety over a period of 5 years, the airline will be able to reach a flight safety index of 100% (in accordance with the chosen criterion)."[128] In other words, by choosing to measure safety using the rarest possible type of safety-related event, UTAir was able to produce the desired "safety index" without objectively analyzing the risk of an accident happening in the future.

At the same time, the airline's SMS department claimed in 2011 to have analyzed data from 21,695 flights involving the ATR-72, in the process detecting only 26 deviations from proper procedure across the entire fleet, which they were also proud to announce was a 25% drop from 2010. However, the MAK analyzed the flight data recorder from the accident airplane and detected six deviations from proper procedure on that aircraft alone during the few days before it crashed, raising the question of where the airline got its figure of 26 deviations across the entire ATR-72 fleet for a year.[129] The MAK did not answer this question, but one might speculate that the figures were performative in nature, having lost any correlation with a tangible reality, and were forwarded up the chain of command to make it look like the safety management system was ensuring a low number of deviations with significant year-on-year improvement. In two different respects, therefore, UTAir's SMS was structured in such a way as to produce data which gave a desired result but lacked constative meaning, a hallmark of Yurchak's theory of performative shift.

Having the Right Documents

[128] "Okonchatel'nyi otchet ATR72-201 VP-BYZ": 175.
[129] "Okonchatel'nyi otchet ATR72-201 VP-BYZ": 118-119.

Another aspect of performative shift lies in the significance of "having the right documents." In his 2006 book on the subject, Yurchak focused on the practice within the Komsomol (Young Communist League) of sending in formal reports about events that never took place. *"Among small groups, the required Komsomol meetings were often reported without actually being held,"* he wrote. Providing an example, he cited an interview with a woman who recalled her local Komsomol leader saying, *"Maybe we should just write down that we had a discussion and voted in favor of the resolution, without actually having the discussion? I understand that everyone has things to attend to at home."*[130] This behavior was pervasive throughout Soviet political culture, and in practice it was utterly harmless, because the contents of the meetings and resolutions were not important; rather, the maintenance of one's social status in the Komsomol required only a signed piece of paper stating that the meetings were held and the resolutions passed. Failing to submit the report was far more significant than failing to hold the meeting, which was a complete formality as everyone was expected to vote in favor of the pertinent resolutions anyway.

However, in an aviation context, this type of behavior is incredibly dangerous. Nevertheless, its presence there cannot be denied. This fact is perhaps best exemplified by the story of Captain Rustem Gabdrakhmanovich Salikhov, pilot of the aforementioned Tatarstan Airlines flight which crashed in Kazan in 2013. Salikhov's sordid career as a pilot began at a flight school which was later shut down by Rosaviatsiya for "not complying with certification requirements," and indeed the MAK could not confirm that any of Salikhov's alleged training flights there actually took place, even though they were indicated on his record.[131] Subsequently,

[130] Yurchak 16.
[131] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN": 24-26.

his commercial pilot's license was approved by Rosaviatsiya under extremely murky circumstances. The license indicated that it was granted in September 2008 and was signed by members of the regional Rosaviatsiya pilot qualification board, but when the MAK requested the minutes for the meeting at which this approval allegedly took place, Salikhov's name was not mentioned, and the board members whose signatures were on Salikhov's certificate were not present. Instead, the investigators found that Salikhov's license was actually approved in May 2009—*after* his flight training school was shut down by Rosaviatsiya—and had simply been backdated to 2008. Evidently, the license should never have been issued on account of the fact that Salikhov had graduated from a flight school which was by that time no longer accredited, but a legal loophole meant that pilots who graduated from such schools did not have their licenses automatically revoked. The Rosaviatsiya board allowed Salikhov to take advantage of this loophole by simply writing that his license had been issued before the flight school was closed, even though this was false.[132] Salikhov therefore walked away with all the right documents with the right dates and the right signatures, but without the experience which those documents were supposed to represent. A few months later, he was hired by Tatarstan Airlines to fly the Boeing 737, proving that the presence of the documents really did mean more than Salikhov's actual piloting abilities, which MAK investigators would later judge as atrocious, writing that he lacked basic skills in areas such as manual piloting, situational awareness, and task management.[133]

Salikhov's poor piloting ability should have been detected during his periodic checks at Tatarstan Airlines, but these too had undergone performative shift. Despite the presence of the

[132] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN": 25-26, 217-219.

[133] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN": 217.

related documents with an instructor's signature and a mark of "excellent," the MAK determined that Salikhov's last check ride—a flight with an instructor intended to gauge his competence as a captain—never actually took place.[134] Neither did his most recent theoretical refresher training and written exam, about which the MAK wrote, "*Most probably, [this training] was conducted only nominally, and the instructor just filled in the assessment paper."*[135]

A few weeks later, Salikhov pitched his plane steeply downward during an attempted go-around after a failed landing, sending his 737 plummeting like a lawn dart into the ground. There were no survivors.

Unfortunately, Salikhov's case was not an isolated incident, and a criminal investigation of Rosaviatsiya's pilot qualification process stemming from the crash ultimately resulted in the shutdown of the regional board and the revocation of several dozen pilots' licenses.[136] The widespread nature of the problem testifies to its roots in social pressures rather than individual failings *per se*. In a process invisible to outside observers, subjects acting within Russia's aviation bureaucracy are exposed to certain pressures—such as the need to certify a specified number of pilots in order to meet industry demand—while also contending with a system which prescriptively demands results rather than adjusting its expectations to correspond with reality.

The implications of this finding for the Russian aviation industry as a whole are rather dire. In fact, in a 2021 article on the technical and social causes of the Tatarstan Airlines crash, I wrote:

> *"Within government organs, this could be described as a "rubber stamp" culture, where civil servants dutifully sign papers, issue authorizations, and grant licenses without regard for the reasons the papers must be signed and the*

[134] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN": 23.

[135] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN": 44.
[136] "Okonchatel'nyi otchet Boeing 737-500 (53A) VQ-BBN": 218.

authorizations issued. Their job is to rubber stamp a piece of paper, because the law says that the paper must have their stamp on it. Why it says that is someone else's problem.

"In a way, it was this rubber stamp culture that caused the crash of flight 363. Rosaviatsiya approved Tatarstan Airlines' Safety Management System without caring that it didn't actually exist; their only job was to sign the papers. The captain received his pilots' license despite training at an unapproved facility; the board that approved his license didn't care, their only job was to sign the papers. The instructors did not care whether their trainees had the required skills to [retain] their licenses; their only job was to sign the papers. And so, all across Russia, pilots walked out of flight schools with all the right papers and none of the right skills—because their employers didn't care about the skills, only the papers. One by one, a litany of nameless bureaucrats and corporate middle managers signed away the lives of 50 people. But they go home each night knowing that they were but mindless [cogs] in a vast machine, that they were just doing their jobs, that all the paperwork was there. And so the system grinds onward, spitting out assembly-line certificates decorated with neat, official-looking stamps. And every so often, a plane full of people will crash — but that will be someone else's problem."[137]

This passage is intended to remind us that in aviation, a lot more is at stake than the presence of documents. Lives depend on the assumption that those documents correspond to a constative reality. Performative shift in aviation-related social and organizational structures thereby compromises those assumptions and undermines safety throughout the industry, allowing the consequences of ritualization of formerly constative acts to be passed on to fare-paying passengers. Therefore, while Yurchak may withhold judgment on the rightness or wrongness of performative shift in late Soviet political culture, its effect on flight safety in modern Russia is not nearly as neutral.

Mass Cynicism as Defense Mechanism

A more appropriate framework in which to judge the morality of subjects in a performative system is presented in Natalia Roudakova's book *Losing Pravda: Ethics and the*

[137] Dempsey, Kylan, "Someone Else's Problem: The Crash of Tatarstan Airlines flight 363," Medium, 24 June 2021, https://admiralcloudberg.medium.com/someone-elses-problem-the-crash-of-tatarstan-airlines-flight-363-ff5a6177e180.

Press in Post-Truth Russia. Regarding the ability of "mass cynicism" to compel average citizens to commit immoral acts in their day-to-day lives, Roudakova, writes:

> *"[B]oth cynicism and thoughtlessness become mechanisms through which people can shield themselves from the risk and discomfort of examination—of self and others—and from the pain of making up one's mind (Arendt 2003). Instead … mass cynics end up relying on clichés and stock phrases as banisters to guide their thinking ("There is nothing anyone can do about it," "I was only doing my job"). Because of this lack of interest in critical examination of self and others, both mass cynicism and banal thoughtlessness lead to inertia that prevents people from taking principled moral action."*[138]

This model of thinking about immoral decisions within a complex bureaucratic structure helps explain the formation and perpetuation of performative shift in official actions, such as approving pilots' licenses, which directly affect the safety of others. On some level, the responsible individuals should have known that acts such as backdating a pilot's license to hide the fact that it was issued after the shutdown of his flight school, or marking a recurrent training session as passed when it was never conducted, are not only wrong, but potentially dangerous. Roudakova provides a framework for understanding these decisions as being detached from the subject's sense of self-worth, enabling individuals to rationalize the ritualization of important oversight functions as "just doing my job;" i.e., that "my job" is to sign the papers, and whether the papers correspond to a constative reality is a matter which is either unimportant or above one's pay grade. And on some level they are right, as Yurchak's basic premise holds that this kind of performative shift is not a conscious action but the result of unconscious adaptations by subjects living and working within a rigid system whose nature is beyond their control. It would therefore be a mistake to blame this phenomenon on some nebulous idea of "Russian culture," which was not Yurchak's intention nor mine, as the circumstances which lead to performative

[138] Roudakova, Natalia, *Losing Pravda: Ethics and the Press in Post-Truth Russia* (Cambridge University Press, 2017): 164.

shift and defensive cynicism are imposed from the top down, rather than being created from the bottom up.

Conclusion

To summarize the tale of flight 363, it can be said that performative shift in an inappropriate context led to the deaths of 50 people, through a process which at its zenith produced the Postmodern Pilot, a real person at the controls of a real airplane whose identity consisted of a façade of ritualized legitimacy that served to paper over an absence of constative meaning. The Postmodern Pilot certainly makes for a fascinating case study, but as airline passengers, we would generally prefer our pilots to be constructed in the modernist tradition, where a profound truth still lurks behind the external abstractions of a white coat, three stripes, and an officially approved license.

The existence of the Postmodern Pilot—and Salikhov was hardly the only one—demonstrates the extent to which large-scale social phenomena, and the forms of communication which they engender, can substantially affect real-world aviation safety. The technical investigation into the crash of Tatarstan Airlines flight 363 could tell us how an unqualified pilot ended up flying passengers, but not why. The "why" behind the long series of bureaucratic and corporate failures leading to the accident is better explained by semiotic theory, which can dig into the meanings assigned by subjects to particular actions, whether those actions involve attending Komsomol meetings or approving pilot licenses. This new perspective on the accident, and others like it, allows for a deeper understanding of the social processes influencing poor aviation safety in Russia than would otherwise be possible by using purely economic or historical methods.

CHAPTER 6: TOWARD THE FUTURE

In the years since the disaster in Kazan, airline safety in Russia has improved markedly, with the once-frequent crashes now largely consigned to regional flights in Siberia and the Far East. The safety record of Russian airlines has not caught up with the United States or Europe, but the gap has closed significantly, as time begins to heal the wounds dealt by the sudden uprooting of the system in the early 1990s.

As explained in Chapter 4, that upheaval was rooted in the dual value system—the tendency to reject the old in its entirety upon the arrival of the new—and in the colossalist impulse: the pursuit of symbolic achievements that can prove Russia's aeronautical modernity, but are often reached only at the expense of practical considerations. These changes took place against a social background in which performative shift, as described in Chapter 5, had come to define the participation of individual subjects in official discourse, including in aviation-related bureaucracy. The material consequences of these tendencies, outlined in Chapter 3, were unambiguously disastrous, due to the transition's creation or amplification of problems which included the introduction of a profit incentive, a lack of infrastructure, outdated regulations, poor maintenance of aging aircraft, poor pilot training, and poor pilot understanding of English. The interplay of these factors, and the inability to fix them within a context of performative safety, led to numerous catastrophic accidents, although the relative weight of each factor changed over time, as economic conditions improved and Russia's fleet of airliners became ever more westernized.

It would be a mistake, however, to believe that all the necessary lessons have been learned and that fatality rates on Russian airlines will continue trending asymptotically toward zero. In fact, just when it seemed that the Russian airline industry had achieved some form of

stability, Putin's invasion of Ukraine plunged Russia into what may turn out to be an even bigger aviation crisis than last time.

As was mentioned in Chapter 2, the vast majority of Western-built airplanes in Russia, which make up more than half the combined fleet of major Russian passenger airlines, are registered abroad and leased from holding companies in Europe and the Caribbean. At the outbreak of war in Ukraine on February 24, 2022, these airplanes became subject to strict international sanctions placed against Russia by the countries which owned and manufactured them. Overnight, it became illegal for Boeing Airbus, Bombardier and other Western aircraft manufacturers to supply spare parts to Russian airlines, or for third parties to do so, and the leasing companies were ordered to repossess their planes by March 28th.[139] In response, Russian President Vladimir Putin signed a law allowing airlines to transfer foreign-owned planes to the Russian register, effectively seizing more than 500 commercial jets. By April 7th, leasing companies had managed to repossess 79 airplanes while they were outside of Russia, but most airlines quickly learned not to fly to places where aircraft were likely to be seized. Taking advantage of their new registration, most of the planes continued to fly domestically and to friendly countries.[140]

Nevertheless, Russia's aviation industry is flying on borrowed time. Spare parts for the Western-built airplanes have to be sourced from manufacturer-approved providers, who are all located in the West and cannot export the parts to Russia due to the sanctions. If Russian airlines attempt to source spare parts from the black market, or manufacture them domestically, the

[139] "Russian Law Creates New Hurdle For Plane Lessors," Reuters, 14 March 2022, accessed 7 May 2022, https://www.reuters.com/world/putin-signs-law-registering-leased-planes-airlines-property-tass-2022-03-14/.

[140] Isidore, Chris, "Russia Has Lost 79 Planes to Sanctions," CNN Business, 7 April 2022, accessed 7 May 2022, https://www.cnn.com/2022/04/07/business/russian-airplane-repossession/index.html.

airplanes will be at deviance from their Western-issued type certificates and will cease to be considered airworthy outside of Russia.[141] That in turn will make it almost impossible to insure any international flights. Nor are either of those solutions viable in the short-term or long-term, because the black market is not big enough to supply parts for such a large fleet, and Russia lacks the domestic manufacturing capacity to produce many of the key parts that go into a modern Boeing or Airbus. Some airlines are opting to slash their fleet sizes, grounding dozens of aircraft in order to cannibalize them for parts, but even this will not be sustainable beyond the end of 2022. Furthermore, even if the sanctions are later lifted, any aircraft which were fitted with unapproved parts will become effectively worthless on the international market, since strict regulations about sourcing of spare parts mean that any airplane with an uncertain maintenance history becomes legally unairworthy.[142] And on top of that, the quality and frequency of maintenance is likely to drop, as most Russian airlines relied on regular trips to maintenance bases in Europe which are now off-limits.[143] Collectively, these intractable problems will soon leave Russian airlines with very few operational airplanes.

In the very long term, assuming the sanctions are not lifted, Russian authorities would like to ramp up domestic production of airliners. However, 30 years after the collapse of the Soviet Union, the hard times still haven't ended for Russia's aircraft manufacturing industry. The only remotely successful new model produced since 1991 was the Sukhoi Superjet 100, a regional airliner which has still hardly made a dent in the international market, and was initially plagued by problems with its maintenance support network. Furthermore, up to 50% of the

[141] Ibid.
[142] Klint, Matthew, "The Problems for Russian Airlines Are Just Beginning," Live And Let's Fly, 28 March 2022, accessed 7 May 2022, https://liveandletsfly.com/russian-airlines-spare-parts/.

[143] Freed, Jamie; Lampert, Allison; and Hepher, Tim, "Analysis: Russian Airlines Face Safety Countdown to Secure Parts," Reuters, 16 March 2022, accessed 7 May 2022, https://www.reuters.com/business/aerospace-defense/russian-airlines-face-safety-countdown-secure-parts-2022-03-16/.

original version of the Superjet consisted of Western-made parts, making these planes subject to the same problems as any Boeing or Airbus. Plans were already in place to produce a fully Russified version of the Superjet, but officials say these will not enter production until 2024, at which point Sukhoi will produce 20 airframes per year—a mediocre rate at best. An upcoming Boeing 737 competitor, the Irkut MC-21, suffers from the same problem, and a version with Russian-built engines is also scheduled to begin deliveries only in 2024.[144] The Tupolev Tu-214, a competitor to the Boeing 757, is already made from exclusively Russian components, but Tupolev has said it can only ramp up production to an abysmally slow rate of 10 per year,[145] nowhere near enough to meet demand. Where exactly Russian airlines will get their airplanes before then is unclear, as upcoming Chinese models also contain Western parts that are under sanctions, and those that contain all-Chinese parts are still in the early design phases. There has been some suggestion that Russian airlines should resurrect mothballed Soviet-era planes, although a report that S7 Airlines would bring back the Il-86, widely circulated in Western aviation media, actually originated from a fake story published on Russian parody website Panorama.[146]

In the short term, these issues likely spell disaster for Russia's airline industry. As airlines run out of airworthy planes, they will be forced to cut back on flights, and passenger numbers—which had only recently climbed back above Soviet levels—could plunge again to the dismal figures seen in the 1990s. In the long-term, unless Russia withdraws from Ukraine and the

[144] Petrova, Irina, "V Rostekhe soobshchili, kogda nachnetsia proizvodstvo importozameshchennogo Sukhoi Superjet 100," Profile.ru, 13 April 2022, accessed 7 May 2022, https://profile.ru/news/economy/v-rostehe-soobshhili-kogda-nachnetsya-proizvodstvo-importozameshhennogo-sukhoi-superjet-100-1061089/.

[145] Mehta, Devansh, "Russia Starts Production of 20 Tu-214 Narrowbodies," Simple Flying, 10 April 2022, accessed 7 May 2022, https://simpleflying.com/russia-starts-production-of-20-tu-124s/.

[146] "Aviakompaniia S7 vernula v ekspluatatsiiu pervyi Il-86," Panorama: satiricheskoe izdanie, 23 March 2022, accessed 7 May 2022, https://panorama.pub/news/aviakompaniya-s7-vernula-v-ekspluatacziyu-pervyj-il-86.

sanctions are lifted, the industry will likely return to a quasi-Soviet centralized model reliant on domestic manufacturing.

In fact, Russia has already been making moves in this direction for a number of years. Following the re-nationalization of key industries, including airplane manufacturers, in 2006 and 2007, the Russian government has been steadily reversing the mass privatization of the 1990s, including by expanding Aeroflot's domestic market share beyond 40% through the systematic destruction of its competitors.[147] Russia's sudden international isolation seems likely to accelerate this trend, forcing the state to intervene even more heavily in private industry in order to avoid a complete collapse of the air travel network. The Soviet aviation system will not return—whatever comes out of this will be something new—but the parallels are unmistakable. And as this transformation gets underway, the lessons of the previous transition could not be more important. A significant shift in the way an aviation industry is run requires vigilance, caution, and prudence, without which disaster becomes inevitable, as Russia learned the hard way in the 1990s. Russia will also have to avoid the siren song of colossalism, eschewing the pursuit of symbolic parity with the West to focus instead on creating functional airplanes and an airline industry which is capable of efficiently transporting passengers. If these lessons are not learned, then Russia risks repeating the mistakes of the past. It would be very easy to start breaking the rules to keep planes flying, at the cost of as yet unnumbered lives, a path which would lead to a disaster for commercial aviation mirroring the battlefield catastrophe which necessitated it.

It would be prudent, then, to end with the conclusion that aviation safety is not just about rules and regulations, but also about mindset and modes of communication. In Russian history,

[147] Dempsey, Kylan, "The Rise and Fall of Transaero Airlines and the Reassertion of the Russian State," December 2021, Russia After Communism, University of Colorado Boulder, student paper.

these have been greater barriers to safety than any regulatory shortcomings, because a regulation consists only of words on paper unless we collectively accept that those words are an abstraction of a constative truth that has real consequences. It is the failure to accept that reality, and the failure of the system to engender a sense of individual responsibility, which has been the underlying theme of far too many Russian aviation accidents, from the biplane pilot who did a loop around the ANT-20 Maksim Gorky, to the Rosaviatsiya board members who rubber-stamped a license and created the Postmodern Pilot, to the captain of Aeroflot Nord flight 821, the 737 which crashed in Perm, who chose to fly drunk, and then replied to his first officer's desperate plea for help with the words, "What do you mean ***ing take it? I can't do it either!" And just as the Russian aviation industry in its reformist fervor plunged headlong into the jaws of an avoidable disaster, he finally grabbed the wheel and turned it the wrong way, his first officer's shouting *"Other way! Other direction!"* swept away into the howling wind. He was right that he couldn't do it, but he also never should have allowed such a situation to arise in the first place. And for Russian aviation in both 1991 and 2022, that is perhaps the most important—but least useful—of all possible lessons. Time cannot be turned back, and the aviation industry, like the 737 in Perm, is again being forced off course by the thrust of history. It remains to be seen whether those at the helm, for it is only they who hold the power to shape the actions of those beneath them, will steer it in the right direction.

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