NEW AIRCRAFT IN THE

US AVIATION SYSTEM

Testimony Before the Senate Committee on
Commerce, Science, and Transportation
Subcommittee on Aviation

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Good morning. My name is Vern Raburn, and I am President and CEO of Eclipse Aviation Corporation (Eclipse), located in Albuquerque, New Mexico. I appreciate the opportunity to address the Senate Committee on Commerce, Science, and Transportation Subcommittee on Aviation, concerning the incorporation of the very light jet (VLJ) into the national air space (NAS) and into our nation's economy. My goal today is to first summarize Eclipse Aviation, the Eclipse 500 and the current air transportation system. Second, I want to dispel the many myths that the airlines are creating about VLJ integration into the national airspace system. And finally, I will show how the national economy will benefit from a new layer of air transportation.

Sadly, with the exception of the very top end of the market, the spirit of innovation has long been absent in general aviation, where growth contracted dramatically following airline deregulation in 1978. The reality is that general aviation has been sidelined to the domain of the elite few. Since its inception, Eclipse Aviation has demonstrated an unwavering commitment to return innovation and growth to general aviation. I founded Eclipse in 1998 to revolutionize air travel through a low-cost, high-performance jet that will deliver unprecedented levels of performance, efficiency and safety to customers.

Before I go into detail about Eclipse or why we pioneered the VLJ market, I would like to briefly touch on the role of air transportation in our society and national economy. Recently, the U.S. economy has entered what some call a post-industrial phase. Employment growth is primarily in professions and services, and this type of employment is very flexible in its location. Consequently, the U.S. population has begun to shift towards the interior of the nation, where things like quality of life and cost of living are massively, measurably better. High-speed Internet access, express package delivery and the expansion of go anywhere phone numbers (i.e. cellular phone) are enabling this migration.

And so, more than ever before, goods and people must be able to move freely between regions. Companies must have fast, flexible, safe and cost-effective access to destinations across the country. Small and medium communities must have viable links to each other. In short, a robust, broad and deep transportation network is more critical than ever to our nation's economic growth and prosperity.

Yet at the same time, our ground transportation system is weakening. Long distance passenger rails are a thing of the past and commuter trains are rare except in a couple of really specialized areas like Chicago, Boston and New York. The highway transportation system is ever more clogged, difficult and dangerous to navigate. The end result – people are increasingly interested in traveling by air.

Yet in spite of the fact that smaller communities desperately need air transportation to drive business development and economic growth, the reality is that there is significantly less air service available today as measured by communities directly served. Virtually all of these communities have underutilized airports that can be used as economic growth engines. In the face of these challenges and nascent opportunities, the advent of the very light jet (VLJ) is playing a critical role in revitalizing the GA industry and improving our overall air transportation system.

Eclipse Aviation has successfully designed, developed, certified – and is now manufacturing and delivering the world's first VLJ – the Eclipse 500. To create the Eclipse 500, Eclipse used technologies and business practices forged in the technology industry to drive down cost while increasing performance. Eclipse applied innovation across every facet of its business to make the Eclipse 500 significantly easier and less expensive to operate than traditional business aircraft, and more efficient to certify and produce. Some of the groundbreaking innovations that we are applying to the Eclipse 500 include friction stir welding, the PhostrEx fire suppression system, electro-mechanical actuators and digital electronics with integrated software. These technologies are changing the status quo of what we recognize today as general and corporate aviation, and inspiring new and better methods of aviation transportation for the masses.

The resulting Eclipse 500 is a high-performance aircraft with technology and capabilities normally found in jets costing many millions more. With an acquisition cost of one half of today's small jets and the lowest operating cost per mile of any jet, the Eclipse 500 provides the lowest cost of jet ownership ever achieved. This breakthrough has made the benefits of jet transportation available to a broader segment of the population, and inspired an emerging generation of entrepreneurs to bring a new form of air travel to the flying public– the air taxi. It has also opened up a new world of convenient air transportation to a majority of the communities in the U.S. that are simply not served by commercial airlines, thereby enabling significant economic growth.

Potential markets for the Eclipse 500 include owner operators, corporations, airman training institutions, same-day express services, and one of the most promising markets of all, the new air taxi industry. Testimony specific to the new air taxi industry will be presented by DayJet at today's hearing. For small to mid-sized companies, the availability of small affordable jets will open up the convenience and time savings of corporate transportation to new levels of company management. This will create much leaner fiscal operations, while providing new levels of service to customers in the field. These aircraft will also allow owner/operator pilots to conduct business and personal travel in jets offering sophisticated performance and safety features that were previously available only in high-end corporate and transport aircraft.

The operational characteristics of the Eclipse 500 clearly demonstrate the aircraft's versatility. Although certified to operate at 41,000 feet at 370 knots, the Eclipse 500 is very efficient at lower altitudes and speeds. Many of the shorter trip profiles will have operators flying at altitudes from 20,000 to 30,000 feet. For the five hundred mile, two to three passenger trips that will constitute a significant portion of the workload of the Eclipse 500, those often underutilized altitudes will serve as the most efficient. Further, with the ability to land and take off from 2,500 foot runways, the Eclipse 500 can utilize 10,000 (5,000 public and 5,000 private) landing facilities in the U.S. This will allow communities and remote geographic regions of our country that do not enjoy the safety and reliability of twin engine jet aircraft transportation, to become the beneficiaries of modern-day transportation, and the economic benefits that will follow.

Bringing turbine safety to a whole new class of aircraft, the Eclipse 500's standard safety features rival those of aircraft costing millions more and include: autothrottle; color weather radar; a dual-redundant flight management system with sophisticated aircraft performance computer; "smart" electronic checklists and an intelligent crew alert system. The state-of-the-art Eclipse 500 cockpit is designed for safety. For example, to ensure availability of critical flight data, the Eclipse 500 is equipped with redundant, high reliability, solid state electronic sensors and displays. In addition, both Primary Flight Displays (PFDs) and the Multi Function Display (MFD) have a reversionary mode, allowing them to transfer information to one of the other displays if required.

Through digital electronics, the Eclipse 500 incorporates a level of systems integration and safety previously available only in advanced military aircraft and commercial airliners. This extensive level of aircraft systems integration, known as Avio in the Eclipse 500, is delivered through integral, redundant computer systems, and an advanced power distribution system. Avio systems contain extensive build-in-testing capabilities that are used to constantly monitor and ensure the integrity of the aircraft. More than just an integrated avionics and instrument suite, Avio expands integration technology beyond the cockpit and applies it to the entire aircraft. Aircraft systems — including avionics, engine operation, fuel system, flaps, landing gear, cabin pressure and temperature — are centrally controlled by Avio. Avio significantly reduces pilot workload by simplifying tasks, generating useful information, managing systems and assisting with troubleshooting. In fact, the Avio-equipped Eclipse 500 is more capable of operating in our current and future national airspace than most of the aircraft currently used in air carrier operations.

There are a number of faulty assumptions about VLJs, and one of them is that they will be flown by inexperienced pilots. The reality is that the people who are purchasing these airplanes are not just beginning to learn how to fly. They are licensed, seasoned pilots who have earned multi-engine and instrument ratings from the FAA. As I will detail in a moment when I walk you through Eclipse's training process – training will be done through the best aviation

training school in the world. In all cases, the curriculum goes far beyond what the FAA requires and the core curriculum goes beyond all existing airline training programs. Moreover, this is not a matter of simply sitting through a course. Pilots will have to demonstrate proficiency.

As the category leader, Eclipse's comprehensive approach to training demonstrates its unwavering commitment to safety and has set a very high bar for VLJ training overall. In 2005, Eclipse kicked off an unprecedented training partnership with United Airlines, a proven industry leader in cockpit resource management and crew safety innovations. This partnership is designed to provide Eclipse pilots with the most advanced flight training available in general aviation. The training program will provide a level of professional pilot training normally available only to commercial airline pilots. Eclipse takes its responsibility to create an environment for pilot success so seriously, it has committed to refund the deposit of any customer who cannot successfully complete its training program.

Eclipse is actively participating in the FAA's Industry Training Standards (FITS) program. The FITS program uses scenario-based training and case studies of previous aviation accidents and incidents to provide a learning environment that more closely resembles day-to-day flight experiences.

Eclipse's curriculum is unprecedented in the industry and is focused on creating safe pilots. The Eclipse pilot training program consists of multiple phases that provide training experiences from initial introduction to the Eclipse 500 to recurrent training. At the beginning of the Eclipse training program, pilots will have to complete a Flight Skills Assessment in a full-motion simulator focusing on instrument proficiency and airmanship skills. A written Pilot Qualification Review will be completed by each pilot in advance of the Skills Assessment. Each pilot will also be required to take the Myers-Briggs Type Indicator personality test to help tailor the training program to their individual personality type. Based upon the results of the Skills Assessment, supplemental training may be required for some customers prior to beginning the Eclipse 500 Type Rating.

After the flight skills assessment, each pilot will be provided with information on the basics of operating a jet, and will have to complete emergency situations training. The Jet Basics Self-Paced Study Course, in a CD format, provides an overview of jet aircraft and their operating environment. The topics covered in the course are: Introduction to Jet Engines; High Altitude Physiology; High Altitude and High Airspeed Aerodynamics; High Altitude Flight Planning; and, High Altitude Weather and Radar. The emergency situations training will provide hands-on upset recovery training in Eclipse's L-39 jet. Further, in addition to classroom work on physiology and hypoxia, the pilot candidates will experience actual hypoxia training with a mixed gas simulator.

After all of this foundational training is complete, pilots will transition to the Eclipse 500 type certificate transition training. The training is comprised of four parts. They include: self-paced study of the Eclipse 500 aircraft systems; classroom training; simulator training; and, actual flight training in the Eclipse 500. The type rating transition course will provide classroom instruction that emphasizes FITS scenario-based training to build good judgment. Following completion of the type rating course, each pilot will take a type rating examination in the Eclipse 500, or in a full-motion simulator once the simulators are certified.

Depending upon the pilot's experience level, following completion of the type rating examination, some pilots will receive their type rating to fly the Eclipse 500 in single-pilot operations. Others will be required to fly with experienced mentor pilots, which is similar to an airline-style initial operating experience. This pilot mentor program will include operations in high-density traffic areas, the high-altitude weather environment, and will generally ensure that the airman displays the proper proficiency to operate as a single pilot in the jet environment. Completion of the mentor program is not based upon a predetermined number of hours flown with the mentor pilot, but rather is based upon the previously mentioned display of proficiency.

Recurrent training will be required for all Eclipse 500 pilots. The frequency of recurrent training will be determined by individual pilot skill level and experience. For the more experienced pilot, one-year recurrent training will be the norm. For the pilots requiring an initial mentor program experience, six-month recurrent training will be an initial requirement. Recurrent training will also include web-based home study, classroom review and a proficiency check in a simulator.

I would now like to address some of the confusion that is emerging about the integration of VLJs into our national airspace. The FAA and Joint Planning and Development Office (JPDO) are doing very important work to modernize our national air transportation system through the Next Generation Air Transportation System (NGATS) initiative. A recent article by a member of the Strategy, Advanced Traffic Management group, The Boeing Company, illustrated that the need to modernize our Air Traffic Control (ATC) system is necessary to simply move away from the 1950's technology that is in place today, and completely utilize the system efficiencies and increased safety available through NGATS technology. Journal of Air Traffic Control, January-March 2006, (Attachment "1", page 43).

The article also dealt with misconceptions surrounding VLJs and airport congestion. Specific to congestion, the reality is that VLJs will neither require nor seek regular access to major hub airports. The FAA data supports this with general aviation operations accounting for only six percent of the operations at the Operational Evolution Plan (OEP) 35 airports. In addition, there is absolutely no correlation when comparing the 20 busiest general aviation airports to the 20

busiest airports for airlines. As the article states, “The VLJ business model is based on providing convenient, personal point-to-point services through non-congested airports. VLJ passengers will be time sensitive and convenience-minded, and they will use VLJs precisely to avoid the hassles associated with large hubs. Secondly, VLJ aircraft are specifically designed to operate from runways as short as 3,000 feet (including many grass strips). This makes them ideal for providing point-to-point services to most of the 5,000+ U.S. airports serving small to medium sized markets.” Journal of Air Traffic Control, January-March, 2006, (Attachment “1”, page 42).

In fact, even if a VLJ operator decides to operate into a hub airport, that operation will not cause congestion. “The effect of VLJ operations into hub airports will be minimal for a number of reasons: VLJ pilots will need adequate prior experience and will receive rigorous training, equivalent in many cases to that for commercial pilots; VLJ aircraft will have advanced integrated avionics to provide enhanced pilot situational awareness, enable seamless traffic flow integration and optimal spacing with commercial traffic flows; VLJs are capable of operating at speeds compatible to those of commercial jet aircraft, throughout the terminal area and until well inside the final approach fix; VLJ climb and descent rates are compatible with commercial turbojet aircraft; VLJ aircraft can land and depart safely using shorter runways, unusable by commercial jet traffic. Even regional jets require those same longer runways. On intersecting runways, VLJ aircraft are capable of routine (LAHSO) Land and Hold Short Operations; and finally, to enhance traffic integration even more, new procedures that take advantage of VLJ performance and avionics capability can be developed.” Journal of Air Traffic Control, January-March, 2006, (Attachment “1”, page 42).

Some believe that VLJs will clog our airspace and create gridlock in the skies. The reality is that there is significant available airspace to accommodate these new aircraft. Under Marion Blakey, great progress has been made and the transformation to NGATS has already begun. Last year we doubled the capacity of airspace system between FL290 and FL410 with RVSM, so there is plenty of capacity in those altitudes. WAAS is now a reality, and RNAV and RNP are happening. Moreover, it is important to note the airspace is three dimensional. This is not a two lane highway where you are permanently stuck behind the truck in front of you. VLJs are technologically advanced and nimble. They are more than capable of getting out of the way of faster airplanes. Moving around in the airspace is something airplanes do everyday, most often when the commercial airlines go up and down in altitude looking for a smooth ride.

As stated in the Journal of Air Traffic Control, “Commercial jet traffic will continue to dominate in the higher altitudes. VLJ operations will generally be on shorter routes under 600 statue miles and mainly at altitudes below those on longer-range commercial operations. Sometimes, especially on longer stage lengths, VLJs will want or need to operate at the higher altitudes, but even then

VLJs will not disrupt en route traffic flows, even though they cruise at 0.64 mach, slightly slower than commercial airliners. Current Flight Management System (FMS) technology already enables faster moving aircraft to establish offset tracks so as to pass slower aircraft en route." The article goes on to say, "In the ongoing debate about the impact of VLJ operation, the question of VLJ speed compatibility has been raised frequently. In large measure, this is a red herring. The commercial and business fleets of today operate at a variety of climb, cruise, descent, and approach speeds, based not just on aircraft type, weight, and performance differences but also on variations in company policies. Even with today's 1950s ATC technology, controllers are able to integrate traffic of varying speeds quite efficiently, so VLJs will add no significant complexity." Journal of Air Traffic Control, January-March 2006, (Attachment "1", pages 42 & 43).

The current hub and spoke system used by the airlines is reaching capacity regardless of the integration of VLJs into the NAS, and as was established in 1997, it is this airline hub and spoke operation that drives the majority of system cost. VLJs will not change this dynamic. VLJ operators and owner pilots will use their aircraft to go where the airlines don't, avoiding the congestion associated with the hubs. Moreover, when these airplanes are flown by air taxi operators they will pay the commercial ticket tax. Because the air taxi charge will likely exceed a typical coach ticket, the typical air taxi passenger will end up paying more in taxes than the scheduled airline passenger.

It would be irresponsible not to point out the elephant in the room – and that is the fact that airlines see air transportation as a zero sum game and are acting to limit air transportation capacity vs. expand it. In other words, fearing they will lose passengers to VLJ operations, the airlines are propagating a series of myths to impede the air transportation expansion our country so desperately needs. This energy is misdirected and harmful to our economic future. As mentioned earlier, most VLJ passengers want to travel where the airlines do not offer service and will be choosing VLJ air transportation in lieu of their cars. Additionally, the ample airspace capacity and new aircraft capabilities exist to make this expansion possible today. It is clear that the sophisticated technologies that are available on today's VLJs, including ADS-B, WAAS and LPV, are not advancements the airlines are interested in retrofitting on their fleet.

I would like to close by recognizing the significant economic impact of the VLJ market on the nation's economy. At EAA AirVenture 2006, Acting Secretary of Transportation Maria Cino, prior to awarding the Eclipse 500 type certificate, stated that "air travel drives economic growth." At the same event, FAA Administrator, Marion Blakey, said "Eclipse is more than about just building a plane … it's about building a company, it's about building our economy."

A recent study, conducted by CRA International and based upon FAA VLJ market projections, estimated a potential annual VLJ economic impact of $24 billion in output, $6.9 billion in earnings and 178,000 jobs in 2017. Based upon

the unprecedented market acceptance of the Eclipse 500 VLJ, there is a very real potential for higher production of VLJs than the FAA has forecast. Increasing the FAA projection by 50 percent (for a total fleet size of 7,425 aircraft), economic activity in 2017 related to VLJs would total over $32 billion in output, $9.4 billion in earnings, and over 249,000 jobs. If the forecast of VLJ production is increased beyond the FAA projection to reflect an additional increment of corporate sales equal to the level of aircraft purchased by air taxi operators (for a total fleet size of 8,250 aircraft), economic activity in 2017 related to VLJs would total over $35 billion in output, $10.4 billion in earnings, and over 276,000 jobs. The Economic Impact of Very Light Jets, CRA International, May 2006. More specific information on the potential economic impact of the VLJ market on our nation's economy will be presented by CRA International at today's hearing.

Thank you for the opportunity to testify before the Senate Committee on Commerce, Science, and Transportation Subcommittee on Aviation. I hope that my comments have assisted in your understanding of the emerging VLJ market; the potential impact of VLJs on our society and economy; and the incorporation of the VLJ into the NAS.

Respectfully submitted,

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