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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2016-9226; Directorate Identifier 2016-SW-065-AD; Amendment 39-18910; AD 2017-11-11]

RIN 2120-AA64

Airworthiness Directives; NavWorx, Inc. Automatic Dependent Surveillance Broadcast Universal Access Transceiver Units

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: We are adopting a new airworthiness directive (AD) for NavWorx, Inc. (NavWorx), Automatic Dependent Surveillance Broadcast (ADS-B) Universal Access Transceiver Units (unit). This AD requires removing, disabling, or modifying the ADS-B unit. This AD was prompted by a design change that results in the unit communicating unreliable position information. The actions in this AD are intended to address an unsafe condition on these products.

DATES: This AD is effective July 11, 2017.

Examining the AD Docket

You may examine the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2016-9226; or in person at the Docket Operations Office between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, Supplemental Type Certificate (STC) No. SA11172SC, the economic evaluation, any comments received, and other information. The street address for the Docket Operations Office (phone: 800-647-5527) is U.S. Department of Transportation, Docket Operations Office, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Kyle Cobble, Aviation Safety Engineer, Fort Worth Aircraft Certification Office (ACO), Rotorcraft Directorate, FAA, 10101 Hillwood Pkwy, Fort Worth, TX 76177, telephone (817) 222-5172, email kyle.cobble@faa.gov; or Michael Heusser, Program Manager, Continued Operational Safety Branch, Fort Worth ACO, Rotorcraft Directorate, FAA, 10101 Hillwood Pkwy, Fort Worth, TX 76177, telephone (817) 222-5038, email michael.a.heusser@faa.gov.

SUPPLEMENTARY INFORMATION:

Discussion

On October 20, 2016, at 81 FR 72552, the Federal Register published our notice of proposed rulemaking (NPRM), which proposed to amend 14 CFR part 39 by adding an AD that would apply to NavWorx ADS-B Model ADS600-B units, part number (P/N) 200-0012 and P/N 200-0013, and Model ADS600-EXP units, P/N 200-8013. The NPRM proposed to require removing the ADS-B unit before further flight and proposed to prohibit installing the affected ADS-B unit on any aircraft. The NPRM was prompted by a design change that resulted in the ADS-B units broadcasting a Source Integrity Level (SIL) of 3 instead of 0. A broadcast of SIL 0 is required because of the uncertified Global Positioning System (GPS) source included in the unit. The proposed actions were intended to prevent an ADS-B unit from communicating unreliable position information to Air Traffic Control (ATC) and nearby aircraft and a subsequent aircraft collision.

Comments

We gave the public the opportunity to participate in developing this AD. We received approximately 200 comments, mostly from individuals but also from NavWorx and organizations such as the Aircraft Owners and Pilots Association (AOPA), the Experimental Aircraft Association (EAA), and the Aircraft Electronics Association (AEA). The following presents the comments received on the NPRM and the FAA's response to each comment.

A. Support for the NPRM

Five individual commenters supported the NPRM.

B. Comments Regarding the FAA's Justification of the Unsafe Condition

Several commenters, including AOPA, requested that the FAA provide more information about the events that prompted this AD and the technical aspects surrounding the unsafe condition. We agree.

Request: AOPA requested the FAA clarify whether the internal position source in the ADS-B units meets the performance requirements in Appendix B to Advisory Circular (AC) 20-165B. In support of this request, AOPA stated the FAA's contention that NavWorx did not present any data substantiating its SIL change is contrary to NavWorx's public statements that its testing verified the position source met the integrity levels required by the regulations. Similarly, NavWorx commented on the AD and maintained it has provided the FAA with data demonstrating the internal GPS met the requirements to transmit a SIL of 3.

FAA Response: NavWorx has not demonstrated to the FAA that the internal position source meets the performance requirements in Appendix B to AC 20-165B¹ for a SIL of 3. The design specifications for NavWorx's P/N 200-0012 and 200-0013 ADS-B units identify the internal GPS source for those units as an uncertified SiRF IV GPS. The SiRF IV is a commercial grade chipset not manufactured under an FAA Technical Standard Order (TSO). AC 20-165B requires the SIL be set at 0 when the ADS-B is integrated with an uncertified GPS source. When NavWorx submitted its software upgrade changing the SIL value from 0 to 3, no hardware design changes associated with the SIL value change were made to the ADS-B units and no testing data substantiating that SIL change was provided to the FAA. The only justification NavWorx cited for the software change was the FAA's termination of Traffic Information Service–Broadcast (TIS-B) services to aircraft broadcasting ADS-B with a SIL of 0. This data is available for review in Docket No. FAA-2016-9226.

¹ http://rgl.faa.gov/Regulatory_and_Guidance_Library/.

Request: AOPA requested the FAA clarify its meaning of “uncertified GPS source” since NavWorx has design approval through STC No. SA11172SC to install the ADS-B unit with the internal GPS on type-certificated aircraft, and since a compliant position source does not need to meet a specific TSO to meet the requirements set forth in Appendix B of AC 20-165B.

Some commenters requested the FAA explain why it approved NavWorx's ADS-B units at all if the internal, uncertified GPS source is objectionable. Many commenters stated the NavWorx ADS-B units meet the performance and accuracy/integrity standards of TSO C-154c; others noted that NavWorx has stated its testing showed the units meet the requirements to broadcast a SIL of 3. Several commenters disagreed with the AD because the GPS source is not required to be certified separately from the ADS-B unit.

FAA Response: The commenters, including NavWorx, are correct that the position source only needs to meet certain performance requirements and does not need to be certified under a TSO. However, despite NavWorx's statements and comments to the contrary, NavWorx has presented no data to the FAA—test plans and test results—that demonstrate the affected units with the internal SiRF IV GPS meet the performance standards to transmit a SIL of 3. Similarly, NavWorx has never demonstrated to the FAA that the affected units meet the 14 CFR § 91.227 requirements to broadcast a SIL of 3 when using the internal SiRF IV GPS.

NavWorx's TSO-C154c authorization and STC were approved based on the P/N 200-0012 and 200-0013 units broadcasting a SIL of 0 when using the internal uncertified GPS position source. NavWorx documented this as a limitation in the Aircraft Flight Manual Supplement (AFMS) for NavWorx's STC for ADS600-B installations. Section 2.6 of the AFMS, titled “Uncertified GPS Receiver (P/N 200-0012 and 200-0013),” states:

The ADS600-B has an internal uncertified GPS WAAS receiver which does not meet the 14 CFR 91 FAA-2007-29305 rule for certified GPS position source. If the ADS600-B is configured to use the internal uncertified GPS as the position source the ADS-B messages transmitted by the unit reports: A Source Integrity Limit (SIL) of 0 indicating that the GPS position source does not meet the 14 CFR 91 FAA-2007-29305 rule.

While 14 CFR § 91.227 requires a SIL of 3, TSO-C154c (the TSO under which the affected units are produced) does not. Thus, when the affected units broadcast a SIL of 0, they are TSO-compliant. Until the performance requirements of 14 CFR § 91.227 become effective on January 1, 2020, the FAA does not find the internal uncertified GPS source objectionable, as long as the ADS-B unit is correctly broadcasting a SIL of 0. It is NavWorx's change of the SIL setting in these units to 3, without any qualification of the internal uncertified GPS position source to support broadcast of SIL 3, that the FAA finds unacceptable. In this condition, the units are transmitting to ATC and to nearby aircraft that they have 14 CFR § 91.227-compliant position source integrity, when their position source integrity is actually not compliant with that rule, or is unknown. We discuss the safety effects of this condition in greater detail below.

Request: AOPA requested the FAA further explain its finding that the affected units create an unsafe condition. Many commenters questioned the FAA's determination that the units present an unsafe condition, and asked whether any units have actually caused a collision or safety incident. Many other commenters stated they have been operating with the NavWorx unit and find it accurate and reliable. Several commenters stated the NavWorx units increase safety and noted that the National Transportation Safety Board has recommended ADS-B units to the flying public.

FAA Response: The FAA's safety concern is primarily that of integrity, and not necessarily accuracy, with respect to the NavWorx ADS-B unit's performance requirements. Accuracy refers to

the probability of the unit's true position in relation to its reported position.² Integrity refers to the trust that can be placed in the correctness of the information provided by the unit and is specified by a SIL value. The SIL value is set based on design data from the GPS position source manufacturer and reflects the probability that the position source will provide incorrect data without providing an alert. This depends on whether the GPS has fault detection and exclusion, where the equipment will detect a faulty satellite and exclude it from the navigational calculations. If the GPS does not have fault detection and exclusion, the probability that the position source will provide incorrect data increases. Commercial position sources, such as the SiRF IV GPS used in the NavWorx P/N 200-0012, 200-0013, and 200-8013 units, do not have fault detection and exclusion capabilities. This is significant in the event a GPS satellite signal fails or a GPS "signal-in-space error" occurs.

² Accuracy of an aircraft's reported position is specified as Navigation Accuracy Category for Position, or NACP. A unit that complies with 14 CFR 91.227 has a NACP corresponding to an accuracy of better than 0.05 nautical miles. The NavWorx units' compliance with the 14 CFR 91.227 NACP (accuracy) performance requirements is not the concern that prompted this AD.

The unsafe condition relates to the potential for the NavWorx unit to incorrectly report its own position to other aircraft and to ATC, by 0.2 nautical miles (NM) or more, without providing an alert.³ It may also result in ATC providing incorrect and inappropriate separation instructions or traffic advisories to other aircraft for avoidance of the ADS600-B-equipped aircraft, based on the erroneous position being reported by the ADS600-B. In this situation, the pilot of the ADS600-B-equipped aircraft would be unaware that his or her aircraft's ADS-B Out unit is broadcasting an erroneous position (possibly in excess of 0.2 NM), since the ADS600-B would not be providing an alert for this condition. Depending on operating conditions, these effects may occur in instrument meteorological conditions where see-and-avoid is not possible. In view of these factors, this condition poses an unacceptable hazard to other users of the National Airspace System (NAS).

³ 0.2 NM is the minimum integrity containment radius around the aircraft's reported position required by 14 CFR § 91.227 (c)(1)(iii).

Although there have been no reported cases of a collision or safety incident resulting from an incorrect transmission by a NavWorx ADS-B unit to date, the potential for the unsafe condition exists as long as the units mislead ATC and nearby aircraft by broadcasting a SIL of 3 that they have not been shown to meet. This AD action addresses that potential unsafe condition.

The fact that commenters have made flight tests with satisfactory ADS-B performance monitor reports from the FAA, or that commenters' individual units have been operating successfully, does not negate the existence of an unsafe condition. Flight tests with the ADS-B performance monitor are designed primarily to show that the ADS-B equipment in an individual aircraft performs correctly as installed. These tests are of relatively short duration and occur in fault-free conditions. They are not engineering tests designed to evaluate the unit's ability to handle GPS signal-in-space errors and cannot be used to draw inferences about the unit's position source integrity.

Although the FAA recognizes the benefits of ADS-B equipage and understands that the NavWorx units may work a large percentage of the time for an individual user, the FAA must consider the effect on the entire NAS. Since failure is based on a statistical probability, the odds that a unit will have a failure increase as more units are introduced into the NAS and operate for a longer period of time. The probability of a failure also increases when there is a GPS satellite malfunction, which could affect many aircraft since the information is used by ATC and ADS-B In equipped aircraft for separation. Therefore, despite any benefit to individual owners when the unit works without failure, the FAA has determined that an unsafe condition with the NavWorx units exists and requires corrective action because of the hazard they pose to other users of the NAS.

Request: AOPA requested the FAA produce for public inspection the Small Airplane Risk Analysis (SARA) documentation.

FAA Response: As part of our risk assessment, we initially performed a SARA. However, the SARA assumes failure on one airplane. The issue with the NavWorx ADS-B units poses risk to the NAS. Specifically, a malfunction at the satellite level could result in transmission of hazardously misleading position information from the ADS600-B-equipped aircraft to ATC and to other aircraft. It could also cause such malfunctions in all aircraft with the affected ADS-B units installed that are using the signal from the malfunctioning satellite to determine their position. Thus, we determined the SARA results provided questionable value, and that it was more appropriate to use the safety risk methodology from the ADS-B program, as documented in Safety Risk Management Document (SRMD) Critical Services: Standard Terminal Automation Replacement System (STARS) with Automatic Dependent Surveillance Broadcast (ADS-B) Only Addendum, SBS-036C, Revision 1, dated August 26, 2014 (SBS-036C).

In SBS-036C, we analyze safety risk as a composite of two factors: The potential “severity” or worst possible consequence or outcome of an adverse effect that is assumed to occur, and the “likelihood” of occurrence for that specific adverse event. We assess both factors independently and then enter each as separate inputs into a risk matrix, which yields an overall level of risk for the event as Low (acceptable), Medium (acceptable with mitigation), or High (unacceptable). The corrective action, if any, is driven by the assessed overall risk. Figure ES-1 of SBS-036C contains the risk matrix the FAA used for this AD.

The FAA considered an undetected position error event of 0.2 NM or more for a single aircraft as a “Position error outside containment bound for single aircraft undetected by airborne equipment/ground automation” hazard, which has a classified severity of “hazardous” per Table ES-1 and Appendix B of SBS-036C. Hazardous is defined in AC 23.1309-1E, System Safety Analysis and Assessment for Part 23 Airplanes,⁴ as resulting in a large reduction in safety margins, physical distress or higher workload, or serious or fatal injury to an occupant other than the flight crew. A large position error (0.2 NM or more) may lead to loss of separation, increased ATC workload, a reduction in safety margins, and a near midair collision. These are unsafe conditions that warrant a “hazardous” severity level for risk assessment purposes.

⁴ http://rgl.faa.gov/Regulatory_and_Guidance_Library/.

From Table ES-1 of SBS-036C, the likelihood of this failure for a properly functioning system was assessed as extremely improbable. Figure ES-1 in SBS-036C is a risk matrix that yields an overall risk based on the severity classification and the assessed likelihood of occurrence. A severity classification of “hazardous” and an assessed likelihood of “extremely improbable” yields an overall risk of “Low,” which is an acceptable risk.

However, the likelihood assessment of “extremely improbable” in Table ES-1 is based on the aircraft’s GPS receiver having either fault detection or fault detection and exclusion, which is required in order to meet the ADS-B Out position integrity requirements of 14 CFR 91.227. A GPS receiver with fault detection detects a faulty satellite signal and provides an alert of the fault. If the GPS receiver has fault detection and exclusion, it additionally excludes the faulty satellite signal from the position computation. Because the GPS position source in the NavWorx ADS600-B units has no demonstrated fault detection or exclusion features, the FAA determined the appropriate likelihood should be based on the GPS constellation fault rate of 10^{-4} per hour (that is, a probability of 0.0001 occurrences per flight hour). As a result, the FAA elevated the risk of the hazard and assessed a likelihood of “remote.”⁵ Using the severity classification of “hazardous” and an assessed likelihood of “remote” yields an overall risk of “High” in Figure ES-1. This is an unacceptable risk.

⁵ Although the CARB assessed a likelihood of “remote,” Figure 2 of AC 23.1309-1E assesses a likelihood between “remote” and “probable,” depending on the class of aircraft, for a probability of 10\|-4\|. Either likelihood classification would yield a High overall risk on the Figure ES-1 risk matrix.

These determinations are documented in the meeting minutes from the FAA's Corrective Action Review Board (CARB) held on September 19, 2016. In accordance with FAA Order 8110.107A, Monitor Safety/Analyze Data, the CARB considered this safety issue on that date and determined that an unsafe condition existed with the units. This documentation is available for review in Docket No. FAA-2016-9226.

Comment: A few commenters, including NavWorx, noted the FAA approved software revisions 4.0.7, 4.0.8, and 4.0.9, which included the software changes for the units to broadcast a SIL of 3.

FAA Response: The commenters are correct that the FAA approved NavWorx's software changes identified as 4.0.7, 4.0.8, and 4.0.9. However, none of these changes identified on NavWorx's submittals affected the SIL value or referenced the SIL value change in 4.0.6. The FAA's approvals did not alter the FAA's previous written statements to NavWorx advising the equipment must report a SIL of 0 to remain compliant with TSO-C154c. This documentation is available for review in Docket No. FAA-2016-9226.

C. Requests To Allow Alternative Actions

Request: Many commenters, including AOPA, requested that, since the internal GPS is the issue with the NavWorx unit, the AD allow the ADS-B units to use an external GPS position source or, similarly, that the AD not apply to units using an external GPS position source.

FAA Response: We agree. The only external GPS position source approved by the FAA for interface with the ADS600-B is the Accord NexNav mini LRU GPS Receiver P/N 21000 (Accord external GPS).⁶ We revised the AD to allow interfacing the ADS-B unit with an Accord external GPS as an optional corrective action. For operators who wish to interface with other external position sources, under the provisions of paragraph (f) of this AD, we will consider requests for approval of an Alternative Method of Compliance (AMOC) if sufficient data is submitted to substantiate that the unit would provide an acceptable level of safety.

⁶ Some commenters stated or implied that other external GPS sources, such as the Garmin 530W, the Garmin GNS 430W, the Garmin GNS 480, and the Garmin GTN 650, are approved for installation in the ADS600-B. Contrary to any documentation these commenters may have from NavWorx, the only FAA-approved external GPS source is the Accord NexNav mini P/N 21000. Documentation of this is available for review in Docket No. FAA-2016-9226.

Request: Several commenters, including AEA, requested the AD allow disabling the unit rather than removing it.

FAA Response: We agree. We revised the AD to allow disabling the unit as an optional corrective action.

Request: Several commenters, including AOPA, requested the AD allow changing the SIL from 3 to 0 as an alternative to removing the unit.

FAA Response: We agree. We did not include this option in the NPRM because NavWorx has stated it will not provide its customers with software to change the SIL to 0. However, we revised the AD to allow changing the SIL to 0 as an alternative to removing the unit in the event such software becomes available and is approved by the FAA.

Request: One commenter requested that the AD not apply to units with software versions prior to 4.0.6, because these units broadcast a SIL of 0 and thus are not subject to the unsafe condition.

FAA Response: We agree. We considered excluding units with software prior to version 4.0.6 when we issued the NPRM. We did not exclude them because our understanding of the units is that there is no recordkeeping, marking, or indication from the unit itself that allows an operator to identify the current software version. However, changes to the AD in response to other comments render this exclusion unnecessary.

Request: AOPA requested that we allow the units to remain in service if NavWorx upgrades the internal position source with a position source that meets the requirements of Appendix B to AC 20-165B. Similarly, several commenters requested that we allow NavWorx to re-certify the unit.

FAA Response: We agree. Should NavWorx upgrade its internal position source with a position source that meets the performance requirements of Appendix B to AC 20-165B, or demonstrate that the internal SiRF IV GPS meets those requirements, under the provisions of paragraph (f) of this AD, we will consider requests for approval of an AMOC.

Request: Several commenters requested that we allow more time for compliance. Two of those commenters requested that we delay compliance until 2020, when the ADS-B operational rules become effective.

FAA Response: We agree with extending the compliance time. We determined that safety will be maintained if the corrective actions are implemented within six months of the effective date of the AD, and we revised the AD accordingly.

We disagree with delaying compliance until 2020. The FAA's ADS-B ground station network is already operational and in use by ATC nationwide, and ADS-B In is also widely used in general aviation aircraft for traffic awareness. Therefore, the fact that ADS-B Out will not be required equipment until 2020 does not negate the unsafe condition that exists from those units currently operating in the NAS.

Request: Many commenters requested that the FAA withdraw the NPRM and instead work with NavWorx to address the unsafe condition. Some commenters inferred a failure by the FAA in this regard because it appeared it took the FAA six months to respond to NavWorx's design change notification. A few commenters expressed disappointment and outrage at the FAA's handling of the certification process with NavWorx and requested we constructively and immediately resolve this situation.

FAA Response: We agree it is desirable to work with manufacturers to resolve differences of opinion regarding product compliance and correct identified safety concerns. The FAA made numerous efforts, in a variety of forms and over a considerable period of time, to resolve this situation with NavWorx. Those efforts were unsuccessful.

After receiving NavWorx's design change, the FAA advised NavWorx that it could not manufacture the units as TSO C-154c units because NavWorx had not provided acceptable data to substantiate modifying the SIL value of the internal SiRF IV GPS to 3. Initially, NavWorx agreed to return the SIL to 0 and requested 60 days to effect this change. Instead, over two months later, NavWorx informed the FAA that it would not be returning the SIL value to 0 after all. The FAA continued to advise NavWorx, both verbally and in writing, that the SIL change rendered the units non-compliant with the TSO. The FAA also continued to request that NavWorx voluntarily return the SIL to 0, but NavWorx refused. The FAA met with NavWorx and explained the means of compliance in our existing guidance for certifying the SiRF IV GPS to broadcast a SIL of 3, as well as the process for submitting an alternate or equivalent means of compliance for approval. While NavWorx indicated its desire to initiate one of those processes, it did not. Instead, NavWorx continued to sell and ship the part-numbered 200-0012 and 200-0013 units with the unapproved design change, and continued to furnish product software upgrades through its Web site to existing owners that contained the unapproved design change. When the FAA repeatedly requested to conduct a routine inspection of NavWorx's facility, in part to review NavWorx's units and data supporting its design change, NavWorx refused.

After determining the situation created by NavWorx resulted in an unsafe condition, and without NavWorx's cooperation to correct the unsafe condition, the FAA found it necessary to issue an AD. Documentation of these events is available for review in Docket No. FAA-2016-9226.

Request: One commenter requested the FAA allow a temporary, alternative solution in which operators would periodically validate the units by flight test.

FAA Response: We disagree. Validation flight tests are not engineering tests and are not designed to evaluate the unit's position source integrity. The commenter's requested method of compliance would not correct the unsafe condition.

Request: One commenter requested we exclude ADS-B units that are already installed from the requirements of the AD.

FAA Response: We disagree. The FAA has determined an unsafe condition exists on the affected ADS-B units and that removal or correction of the units is required.

Request: Two commenters request the AD not apply to aircraft operating under visual flight rules (VFR).

FAA Response: We disagree. The FAA has determined that an unsafe condition with the NavWorx units exists and requires corrective action because of the hazard they pose to other users of the NAS. The NavWorx unit broadcasting a SIL of 3, when it is only authorized to broadcast a SIL of 0, has the potential to incorrectly report its own position to other aircraft and to ATC by 0.2 NM or more, without providing an alert. Even in visual meteorological conditions, this could result in the pilot of another aircraft visually searching the wrong sector of sky for the incorrectly reporting ADS600-B-equipped aircraft or incorrectly assessing the ADS600-B-equipped aircraft as not being a collision threat, based on the depicted relative position of the ADS600-B aircraft on its ADS-B In traffic display.

Request: EAA and two individual commenters requested the AD not apply to experimental or light sport aircraft, since they are not regulated in the same manner as type-certificated aircraft. EAA states the FAA should address any valid airworthiness concerns with parts intended for experimental aircraft through a Special Airworthiness Information Bulletin (SAIB) or safety alert for operators (SAFO). Two commenters requested the AD apply to experimental aircraft, because those aircraft operate in the same airspace as type-certificated aircraft and should use equipment with the same integrity. A few commenters, including AOPA, requested we clarify whether the AD applies to experimental aircraft.

FAA Response: We agree to clarify this issue. We confirm that the AD applies to all aircraft, including experimental, and we revised the AD to clarify the applicability. We made this AD applicable to the ADS600-EXP P/N 200-8013 units because the design of the Model ADS600-EXP P/N 200-8013 is substantially identical to the Model ADS600-B P/N 200-0012 and 200-0013, specifically with regard to the internal GPS and the SIL setting. While some commenters are correct that the FAA has chosen to minimize regulations on experimental aircraft because of the level of the safety risk, these risks normally apply to the individual airplane and do not affect the overall NAS. The safety risks defined in this AD extend beyond one aircraft and could affect many other aircraft as well as ATC. Therefore, we find it necessary to include experimental aircraft in the AD's applicability.

We do not agree that an SAIB or SAFO would be an appropriate solution. These documents contain information and recommended actions that are voluntary and not regulatory. Moreover, an SAIB is issued only for airworthiness concerns that do not rise to the level of an unsafe condition.

The mission of the FAA is aviation safety. ADs are used by the FAA to correct known safety defects. It would be contrary to the intent of the FAA's mission and statutory authority to exclude certain aircraft when we have determined that a part installed on those aircraft has a safety problem.

D. Comments Regarding Costs of Compliance With This AD

Request: Many commenters stated that the cost to comply with this AD is underestimated or inaccurate and requested the FAA revise its cost estimate. These commenters stated the cost should include the cost to replace the unit with a new ADS-B unit and costs associated with loss of utility; should increase the number of labor hours to account for indirect costs such as removal and reinstallation of associated equipment, research, and paperwork; and should increase the labor rate.

FAA Response: We disagree. The cost analysis in AD rulemaking actions typically includes only the costs associated with complying with the AD. In this AD, the only required action is the removal of the unit, the deactivation of the unit, the coupling of the unit with an approved external GPS source, or the upgrading of the software in the unit to broadcast a SIL of 0. These actions are estimated to take 1 work-hour each, except for coupling the unit with an approved external GPS source, which is estimated to take about 4 work-hours. The costs of associated required actions such as installing a placard or revising the flight manual are nominal. ADS-B Out equipment is not required for operation until January 1, 2020, and is only required for operation in certain specified airspace after that date. Individual operators are in the best position to determine whether they will need to install this equipment for the airspace they intend to operate in. Therefore, replacement of the unit is not necessary to comply with this AD.

The labor rate of \$85 per hour is provided by the FAA Office of Aviation Policy and Plans for the FAA to use when estimating the labor costs of complying with AD requirements.

Request: Several commenters requested the FAA revise its determination that the AD is not a significant regulatory action. One commenter requested the FAA analyze the costs of the AD under the Regulatory Flexibility Act.

FAA Response: We disagree. An AD is economically significant when the cost may have an annual effect on the economy of \$100 million or more.⁷ Even if we were to include labor for indirect costs and the cost of replacing the unit with a new unit in our estimate, at an estimated cost of \$10,000 per aircraft and \$8 million for the U.S. fleet over the next three years, the AD would not rise to level of economically significant. In addition, ADs correct identified unsafe conditions, rather than raise an already adequate level of safety, and cannot be assessed in terms of benefits balancing costs, as would be the case for rulemaking that amends airworthiness standards.

⁷ A “significant regulatory action” is defined in Executive Order 12866 (58 FR 51735, October 4, 1993).

The Regulatory Flexibility Act of 1980 (Pub. L. 96-354) (RFA) establishes as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve that principle, the RFA requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The RFA covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the agency determines that it will, the agency must prepare a regulatory flexibility analysis as described in the RFA.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the RFA provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The FAA did make such a determination for this AD. The basis for this determination is now discussed.

The FAA uses the Small Business Association (SBA) criteria for determining whether an affected entity is small. For aircraft manufacturers, aviation operators, and any business using an aircraft, the SBA criterion is 1,500 or fewer employees.

NavWorx is a small entity, and this AD could have an adverse impact on its business interests. Besides NavWorx, the largest number of affected small entities would most likely be operators of ADS600-B-equipped aircraft. Based on the estimated number of units in service, and assuming each unit is owned by a different small entity, the largest number of small entities affected is 800.

The FAA estimates that there is a total population of 210,000 general aviation and air taxi aircraft in the United States.⁸ Of these, approximately 70,300 (33.5%) are flown primarily for some

type of business or commercial use and thus are potentially operated by a small entity. Aircraft flown primarily for personal use would not be operated by a small entity as defined by the SBA.

⁸ Based on the FAA General Aviation and Air Taxi Activity Survey for calendar year 2015 (the most recent year of data available), table 1.2, General Aviation and Air Taxi Number of Active Aircraft by Primary Use.
http://www.faa.gov/data_research/aviation_data_statistics/general_aviation/CY2015/media/2015_GA_Survey_Chapter_1_Tables_16SEP2016V2.xlsx.

The FAA assumed all 70,300 commercial use aircraft are operated by small entities and that each small entity operates an average of 6 aircraft,⁹ which yields an estimated number of 11,700 small entities. We also assumed that of the 800 affected units, 33.5% (270) are used in commercial operations.¹⁰ This equates to a maximum of 2.3% (270/11,700) of small entities affected by this rule. This is not a substantial number of small entities under the RFA.

⁹ We based this assumption on the sanction guidance in Appendix B of FAA Order 2150.3B, FAA Compliance and Enforcement Program, which classifies air carriers and operators by operating revenue, pilots employed, and aircraft operated for purposes of determining civil penalty amounts.
http://rgl.faa.gov/Regulatory_and_Guidance_Library/.

¹⁰ This assumption in particular is grossly high. First, some of the affected units are installed on experimental aircraft, which are prohibited from commercial operations and therefore could not be used by a small entity under the RFA. Second, of the approximately 200 comments we received on the NPRM, only six commenters (NavWorx, a charitable aircraft operator, and four avionics installation businesses) could be presumed to be commercial entities. The remaining comments were submitted by individuals.

Request: A few commenters requested or implied the FAA fund the costs of the AD.

FAA Response: We disagree. The FAA, as a federal agency, is responsible for all directives, policies, and mandates issued under its authority. Although we have determined that an unsafe condition exists with the design change to the ADS-B unit, the manufacturer is responsible for the design change. Additionally, the FAA's budget does not include allocations to cover AD costs incurred in modifying privately-owned equipment.

E. Comments to the FAA's Rulemaking Process

Request: Several commenters questioned the FAA's motive in proposing the AD. Some believed that the FAA is colluding with other ADS-B manufacturers or industry organizations. Others suggested the FAA is unfairly targeting NavWorx and would not be taking this action if it involved a larger manufacturer. We interpret these comments as requesting we withdraw the NPRM.

FAA Response: We disagree. The FAA has not communicated with any other ADS-B product manufacturer or industry organization regarding the compliance or safety of NavWorx products. In issuing this AD, we followed established policy and procedures, including the public notice and comment procedures of the Administrative Procedures Act, as well as the DOT's ex parte policy, which can be found in Appendix 1 to 14 CFR part 11. We placed all ex parte comments in the rulemaking docket and considered all comments we received.

We also disagree that we are unfairly targeting NavWorx. We have determined an unsafe condition exists on a NavWorx product and we are requiring corrective action accordingly. If the FAA identifies similar problems and determines that an unsafe condition exists on other ADS-B products, whether manufactured by NavWorx or other companies, we would take appropriate action to correct the unsafe condition.

Request: An individual commenter questioned whether we intended to issue an AD against ADS-B transponders manufactured by Trig or Dynon. According to the commenter, the Trig transponder allows the installer to manually set the SIL value, and the commenter claims installers will improperly set the SIL at 3 to obtain traffic information. The commenter also states the Dynon ADS-B uses the same GPS source that is the subject of this AD.

FAA Response: We are issuing this AD to correct an unsafe condition that we have determined exists on a NavWorx product. This AD is not applicable to Trig Avionics (Trig) or Dynon Avionics (Dynon) ADS-B units. In the case of the older Trig units, installers are responsible for setting the SIL appropriately based on the qualification of the position source used. Additionally, neither the Trig units nor the Dynon units use the SiRF IV position source.

Request: Several commenters noted they purchased a NavWorx unit because the FAA originally listed them as eligible for the ADS-B Rebate Program. We interpret these comments as requesting we withdraw the NPRM.

FAA Response: We have considered the comment. When the FAA rebate program Web site activated, it listed the ADS600-B as an eligible unit without distinction by part number. This was consistent with NavWorx's Web site, www.navworx.com, which advertised the ADS600-B for sale without distinguishing between the four different unique transceiver part numbers comprising that model series. P/N 200-0112 and P/N 200-0113 are 2020 compliant, as these units contain a TSO-C145c approved Accord NexNav Mini internal GPS. P/N 200-0012 and P/N 200-0013, which are the subject of this AD, are not 2020 compliant because these units contain the uncertified SiRF IV GPS. Once the FAA rebate program office realized that the P/N 200-0012 and 200-0013 units were not eligible for the rebate, it changed the Web site to identify the ADS600-B model by P/N and listed only the P/N 200-0112 and P/N 200-0113 units as ADS600-B equipment selection options. While the FAA regrets any inconvenience these actions caused, what occurred with the rebate program Web site is not relevant to whether this AD is necessary to resolve the unsafe condition presented by the NavWorx units that improperly transmit a SIL of 3. We did not change the AD based on these comments.

Request: One commenter states the proposed AD is contrary to the FAA's Compliance Philosophy because we did not cooperate with NavWorx or provide NavWorx a reasonable time to work on a corrective action. The commenter requests we withdraw the NPRM, unless we can collect technical data confirming a safety issue, in which case the commenter requests any AD be issued in a non-punitive manner.

FAA Response: We disagree. The FAA's Compliance Philosophy applies to enforcement actions taken for regulatory violations. It does not apply to ADs, which are rulemaking actions taken to correct unsafe conditions found in aeronautical products. Notwithstanding, we also disagree with contentions that we failed to cooperate with NavWorx or provide NavWorx with a reasonable amount of time to correct the unsafe condition. The FAA clearly and repeatedly explained to NavWorx the safety concerns with its ADS-B units and requested that NavWorx voluntarily make the units TSO-compliant. NavWorx's failure to do so created an unsafe condition, for which AD action is necessary.

Comment: An individual commenter stated that owners of experimental aircraft could simply remark the affected part with a new part number so that the AD wouldn't apply. The commenter reasoned that since the builder of an experimental aircraft is also the manufacturer, he could alter the part to a new design and mark it with a new part number.

FAA Response: If the FAA identifies similar problems and determines that an unsafe condition exists on other part-numbered ADS-B products, we would take appropriate action to correct that unsafe condition. Also, simply changing the part number of the unit, without performing any other corrective action, will not correct the unsafe condition that we have determined exists in the unit. Since the unsafe condition remains in the unit, operating an aircraft with such a unit (that has only had the part number modified with no other corrective action taken) would therefore be a violation of 14 CFR 91.7(a), which states that no person may operate a civil aircraft unless it is in an airworthy condition. Any individual taking such action is subject to a civil penalty for a violation of the Federal Aviation Regulations.

F. Comments on the Negative Impact of the FAA's Actions

Request: Several commenters stated that the AD would create confusion or skepticism in the flying community, and will prevent aircraft owners from adopting new technologies promoted by the FAA in the future. Some commenters stated that because of the AD people will quit flying; many others stated aircraft owners will choose to operate without ADS-B equipment. These commenters requested or implied that we withdraw the NPRM.

FAA Response: We disagree. Although the FAA sympathizes with owners who became early adopters of this technology in good faith and unfortunately are now adversely affected by a situation not of their making, the potential for this action to create skepticism and distrust of the FAA among aircraft owners does not negate the need to correct the identified unsafe condition. The FAA's failure to take action to correct this unsafe condition could lead to accidents, which would also reasonably result in skepticism and distrust of the FAA, not only on the part of the flying community but of the public at large. We did not change the AD based on these comments.

Request: A few commenters stated the FAA created this problem by suddenly and unilaterally changing the operational ADS-B rules to deny TIS-B data to aircraft broadcasting a SIL of 0. Two of these commenters noted that NavWorx initially submitted data to substantiate a SIL of 3, but the FAA refused to grant NavWorx TSO authorization unless the units broadcast a SIL of 0. The commenters request the FAA provide TIS-B data to all aircraft, regardless of SIL.

FAA Response: We disagree. The FAA's changes to only provide TIS-B services to aircraft broadcasting a SIL greater than 0 were neither sudden nor unilateral. The changes were announced on March 31, 2015, and became effective in early 2016.¹¹ However, they were initiated several years prior, as the result of an FAA study to determine a low risk, cost-effective, technically beneficial strategy for modification of the FAA TIS-B service. During this study, we consulted with the current manufacturers of ADS-B systems (both certified and uncertified) designed to use TIS-B information, including Accord Technologies, Dynon, FreeFlight Systems, Garmin, Honeywell, NavWorx, Rockwell Collins, and Trig. Like other manufacturers, NavWorx had the opportunity to make and obtain approval for appropriate design changes to its equipment so its customers could receive TIS-B traffic after the service change. NavWorx chose instead to only change the SIL setting from 0 to 3 in software without demonstrating the existing GPS position source's qualification to broadcast of a SIL of 3. Since that time, the FAA has been requesting NavWorx submit testing data supporting its conclusion that the SiRF IV GPS meets the performance requirements to broadcast a SIL of 3. NavWorx has not provided the FAA with this data.

¹¹ A copy of the FAA's announcement of its decision to make changes to the TIS-B service is available for review in Docket No. FAA-2016-9226.

We also disagree with the contention that NavWorx initially submitted data to substantiate a SIL of 3. NavWorx's TSO-authorized design for its P/N 200-0012 and P/N 200-0013 ADS-B units has always identified the internal GPS source for those units as an uncertified SiRF IV GPS. The SiRF IV is not manufactured under an FAA TSO. The FAA approved this equipment and its installation to transmit a SIL of 0 because that is what is required by RTCA Document DO-282B (the performance standard for TSO-C154c and the NavWorx units) and AC 20-165B.

The commenters' request to provide TIS-B data to all aircraft, regardless of SIL, would not correct the unsafe condition. We did not change the AD based on these comments.

G. Comments Beyond the Scope of the NPRM

Request: A few commenters expressed disagreements with the ADS-B mandate. One commenter stated compliance with the rule would put him out of business, because he did not fly often enough to justify the cost. Another commenter requested the mandate not apply to aircraft operating under VFR

in certain airspace. The third commenter stated that because of the mandate, the FAA is unable to manage the increase in ADS-B technology development or deal with the market.

FAA Response: Comments about the 2020 mandate are beyond the scope of this AD. The rules mandating ADS-B Out usage, 14 CFR 91.225 and 91.227, were promulgated through notice and comment rulemaking that began with an aviation rulemaking committee. An NPRM was issued in 2007 (72 FR 56947, October 5, 2007) and the comment period was subsequently re-opened for an additional 30 days in 2008 (73 FR 57270, October 2, 2008). The final rule published on May 28, 2010 (75 FR 30160) and considered approximately 240 comments from air carriers, manufacturers, associations, and individuals. All documentation of this rulemaking is available for review in Docket No. FAA-2007-29305.

Request: Some commenters requested or implied they should be given until 2025 to comply with the AD because compliance with the ADS-B mandate is not required for air carriers until 2025.

FAA Response: Comments about the 2020 mandate are beyond the scope of this AD. It appears the commenters are referring to Exemption No. 12555, which is not a blanket 5-year extension for all air carriers. Exemption No. 12555 applies only to those operators who submit a request to use it and who comply with its conditions and limitations. Exemption No. 12555 allows the use of current ADS-B Out systems that are not fully compliant with the rule until fully compliant systems are installed on or before January 1, 2025. Documentation concerning Exemption No. 12555 is available for review in Docket No. FAA-2015-0971.

Comment: One commenter described a safety of flight issue he encountered with a Garmin ADS-B transponder that he has previously reported to the FAA.

FAA Response: The comment is not relevant to whether this AD is necessary to correct the unsafe condition presented by the NavWorx ADS-B units broadcasting a SIL of 0. We did not change the AD based on this comment.

Comment: A few commenters expressed criticism of the FAA in general, without requesting specific changes to this AD.

FAA Response: The comments are not relevant to whether this AD is necessary to correct the unsafe condition presented by the NavWorx ADS-B units broadcasting a SIL of 0. We did not change the AD based on these comments.

FAA's Determination

We have reviewed the relevant information, considered the comments received, and determined that an unsafe condition exists and is likely to exist or develop on other products of this same type design and that air safety and the public interest require adopting the AD requirements as proposed with the changes described previously. These changes are consistent with the intent of the proposals in the NPRM (81 FR 72552, October 20, 2016) and will not increase the economic burden on any operator nor increase the scope of the AD.

Related Service Information

We reviewed NavWorx AFMS for ADS600-B as installed under STC No. SA11172SC, approved May 4, 2014; NavWorx Installation Manual for ADS600-B Part 23 AML STC 240-0021-00-07, Revision 7, dated May 4, 2014; and NavWorx STC Master Drawing List 240-0013-00, Revision 10, dated May 29, 2014. This service information identifies the internal GPS position source for the NavWorx Model ADS600-B P/N 200-0012 and P/N 200-0013 as uncertified and not compliant with 14 CFR 91.225 and 91.227.

Costs of Compliance

We estimate that this AD affects approximately 800 ADS-B units installed on various aircraft of U.S. registry. Operators may incur the following costs in order to comply with this AD based on an

average labor rate of \$85 per work-hour. Removing the ADS-B unit, disabling the ADS-B unit, or revising the software of the ADS-B unit will take about 1 work-hour, for a total of \$85 per aircraft. Coupling the ADS-B unit with an approved external GPS will take about 4 work-hours for a total of \$340 per aircraft.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866;
- (2) Is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979);
- (3) Will not affect intrastate aviation in Alaska to the extent that it justifies making a regulatory distinction; and
- (4) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

We prepared an economic evaluation of the estimated costs to comply with this AD and placed it in the AD docket.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39—AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive (AD):



2017-11-11 NavWorx, Inc.: Amendment 39-18910; Docket No. FAA-2016-9226; Directorate Identifier 2016-SW-065-AD.

(a) Applicability

This AD applies to the following NavWorx, Inc., Automatic Dependent Surveillance-Broadcast (ADS-B) Universal Access Transceiver units (unit) installed on aircraft certificated in any category, including experimental:

- (1) Model ADS600-B part number (P/N) 200-0012;
- (2) Model ADS600-B P/N 200-0013; and
- (3) Model ADS600-EXP P/N 200-8013.

(b) Unsafe Condition

This AD defines the unsafe condition as an ADS-B unit incorrectly broadcasting a Source Integrity Level (SIL) of 3 instead of its authorized SIL of 0. This condition could result in the unit communicating unreliable position information to Air Traffic Control and nearby aircraft and a subsequent aircraft collision.

(c) Effective Date

This AD becomes effective July 11, 2017.

(d) Compliance

You are responsible for performing each action required by this AD within the specified compliance time unless it has already been accomplished prior to that time.

(e) Required Actions

- (1) Within 6 months, comply with either paragraph (e)(1)(i), (ii), (iii), or (iv) of this AD:
 - (i) Remove the ADS-B unit.
 - (ii) Disable and prohibit use of the ADS-B unit as follows:
 - (A) Pull and secure the circuit breaker and disconnect the internal GPS antenna connector from the ADS-B unit and secure.
 - (B) Install a placard in view of the pilot that states “USING THE ADS-B SYSTEM IS PROHIBITED.”
 - (C) Revise the Limitations section of the Aircraft Flight Manual supplement (AFMS) by inserting a copy of this AD or by making pen-and-ink changes to add the following: “USING THE ADS-B SYSTEM IS PROHIBITED.”
 - (iii) Revise the software so the ADS-B unit broadcasts a SIL of 0.
 - (iv) Couple the ADS-B unit with an approved external GPS as follows:
 - (A) Interface the ADS-B unit with an Accord NexNav mini LRU GPS Receiver P/N 21000.
 - (B) Revise the Limitations section of the AFMS by inserting a copy of this AD or by making pen-and-ink changes to add the following: “OPERATION USING THE INTERNAL POSITION

SOURCE IS PROHIBITED. USE OF THE ACCORD NEXNAV MINI P/N 21000 EXTERNAL POSITION SOURCE IS REQUIRED.”

(2) After the effective date of this AD, do not install an ADS-B unit Model ADS600-B P/N 200-0012, Model ADS600-B P/N 200-0013, or Model ADS600-EXP P/N 200-8013 on any aircraft unless you have complied with the requirements of paragraph (e)(1)(ii), (e)(1)(iii), or (e)(1)(iv) of this AD.

(f) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Fort Worth Aircraft Certification Office, FAA, may approve AMOCs for this AD. Send your proposal to: Kyle Cobble, Aviation Safety Engineer, Fort Worth Aircraft Certification Office, Rotorcraft Directorate, FAA, 10101 Hillwood Pkwy, Fort Worth, TX 76177, telephone (817) 222-5172, email kyle.cobble@faa.gov; or Michael Heusser, Program Manager, Continued Operational Safety Branch, Fort Worth Aircraft Certification Office, Rotorcraft Directorate, 10101 Hillwood Pkwy, Fort Worth, TX 76177, telephone (817) 222-5038, email michael.a.heusser@faa.gov.

(2) For operations conducted under a 14 CFR part 119 operating certificate or under 14 CFR part 91, subpart K, we suggest that you notify your principal inspector, or lacking a principal inspector, the manager of the local flight standards district office or certificate holding district office before operating any aircraft complying with this AD through an AMOC.

(g) Additional Information

NavWorx Airplane Flight Manual Supplement for ADS600-B as installed under Supplemental Type Certificate (STC) No. SA11172SC, approved May 4, 2014; NavWorx Installation Manual for ADS600-B Part 23 AML STC 240-0021-00-07, Revision 7, dated May 4, 2014; and NavWorx STC Master Drawing List 240-0013-00, Revision 10, dated May 29, 2014, which are not incorporated by reference, contain additional information about the subject of this AD. For service information identified in this AD, contact NavWorx Inc.; telephone (888) 628-9679; email: support@navworx.com or at www.navworx.com. You may review a copy of this information at the FAA, Office of the Regional Counsel, Southwest Region, 10101 Hillwood Pkwy, Room 6N-321, Fort Worth, TX 76177.

(h) Subject

Joint Aircraft Service Component (JASC) Code: 3452, ATC Transponder System.
Issued in Fort Worth, Texas, on May 30, 2017.

Lance T. Gant,
Manager, Rotorcraft Directorate,
Aircraft Certification Service.