U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Consolidated to include Change 2

Subject: Airport Ground Vehicle Automatic Dependent Surveillance - Broadcast (ADS-B) Out Squitter Equipment

Date: 11/14/2011
Initiated by: AAS-1

AC No: 150/5220-26
Change:

1. Purpose of the Advisory Circular.

This Advisory Circular (AC) provides guidance on the development, installation, testing, approval, and maintenance of Automatic Dependent Surveillance – Broadcast (ADS-B) Out squitter units for airport ground vehicles. Using this AC, airports will be able to acquire approved and authorized airport ground vehicle ADS-B squitter units that are compliant with Title 14 Code of Federal Regulations (CFR), Part 91, Automatic Dependent Surveillance-Broadcast (ADS–B) Out Performance Requirements to Support Air Traffic Control (ATC) Service, as well as the initial set of ADS-B applications. Please note that the technical specifications for manufacturing ADS-B squitter units for airport ground vehicles are published in the FAA's document, FAA-E-3032, Vehicle Automatic Dependent Surveillance - Broadcast (ADS-B) Specification, published January 7, 2015.

2. To Whom this AC Applies.

a. All airport ground vehicle ADS-B squitter units must meet the requirements stated in FAA-E-3032, Airport Ground Vehicle ADS-B Specification, January 7, 2015.

b. Airport and vehicle operators should follow the operational guidance in this AC to ensure proper operation of airport ground vehicle ADS-B units. While such units are not currently required, the FAA strongly encourages airport operators to voluntarily equip appropriate vehicles with airport ground vehicle ADS-B squitter units.

c. In general, use of this AC is not mandatory. However, use of this AC is mandatory for all Part 139 certificated airports using this equipment, as well as projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charge (PFC) Program. See Grant Assurance No. 34, Policies, Standards, and Specifications, and PFC Assurance No.9, Standards and Specifications.

d. The AC is required for vendors developing, installing, testing, and seeking approval of ADS-B units in airport ground vehicles.

e. It is also recommended for vendors, airport operators, and other personnel who will implement, monitor, and use the airport ground vehicle ADS-B squitter units on the

airport. ADS-B squitter units used must meet the technical specifications of this AC. The FAA will issue a separate AC on operational use of ground vehicles equipped with ADS-B squitter units in the future.

f. The primary locations for installation of ADS-B squitters on vehicles are the 35 airports equipped with ASDE-X and the nine airports scheduled to receive ASSC upgrades to their ASDE-3 systems. ASDE-X and ASSC systems are needed to receive the ADS-B squitter signals for use on ATC displays. Airport Operators at these 44 airports (as shown in Appendix A) are encouraged, but not required, to equip their vehicles with ADS-B squitters in order to enhance safety and situational awareness. In the future, FAA may deploy ASSC or ADS-B surface surveillance volumes to additional airports that could then be appropriate sites for equipage of vehicles with ADS-B squitters. Information on grant funding eligibility is addressed in FAA Order 5100-38, the Airport Improvement Program Handbook, (http://www.faa.gov/airports/aip/aip_handbook/media/aip-handbook-order-5100-38d.pdf).

g. Airports without FAA deployed surface surveillance may choose to equip their vehicles with ADS-B squitters. Aircraft equipped with ADS-B in avionics and Cockpit Display of Traffic Information (CDTI) will enable pilots to see ADS-B equipped vehicles location on in cockpit moving maps. This equipage is expected to become more widespread in future years. Airports without FAA deployed surface surveillance should consider current and near-term equipage of the aircraft using their airport when deciding on investments in ADS-B vehicle squitters.

3. Background.

Every year, there are incidents and accidents involving aircraft and vehicles at airports that have potentially serious consequences. Many of these events occur in periods of reduced visibility, which can result in a loss of situational awareness for flight crews and air traffic controllers. The FAA is in the process of deploying several systems and technologies to help reduce the number and severity of these incidents. Automatic Dependent Surveillance – Broadcast (ADS-B) has been identified as a cornerstone technology in the FAA's Next Generation Air Transportation System (NextGen) initiative to modernize the safety, efficiency, and capacity of the National Airspace System.

ADS-B will provide improved surveillance in the terminal, en route, and on surface environments, and will provide equipped aircraft with shared situational awareness via a cockpit display of proximate traffic. In order to achieve the benefits of ADS-B on the airport surface, surface vehicles and aircraft should be equipped with the ability to transmit ADS-B messages.

At airports with no surface surveillance, ADS-B can serve as a means to improve situational awareness for both air traffic control and aircraft operators equipped with the ability to receive and display ADS-B messages. This capability provides for a high level of safety. The inclusion of airport vehicles into the surface surveillance picture gives air traffic controllers and operators one more way to identify traffic issues, understand the most

efficient way to proceed on the airport surface, and avoid incursions.

At airports already equipped with surface surveillance, such as Airport Surface Detection Equipment – Model X (ASDE-X), ADS-B will provide pilots with improved communication with air traffic control and efficiency of operations. ASDE-X information is fed into the Traffic Information Service-Broadcast (TIS-B) service and could provide pilots with a complete surface picture. This situational awareness can be employed to provide supplemental benefits to existing surface surveillance and provide an additional resource for future applications of ADS-B in the surface environment.

a. ASDE-X and ASSC. The FAA has deployed the ASDE-X to 35 airports. The FAA is also upgrading existing Airport Surveillance Detection Equipment-Model 3 (ASDE-3) sites at 9 airports with multi-lateration (MLAT) capability to produce an Airport Surface Surveillance Capability (ASSC). This will give air traffic control the ability to maintain surveillance of ground targets. The ASDE-X system was designed to support safe ground operations at an airport by providing reliable and accurate information on the location of aircraft and ground vehicles. It does this through a combination of technologies, including airport surface movement radar (SMR), airport surveillance radar (ASR), MLAT, and ADS-B. ASSC provides this capability using MLAT and ADS-B.

Due to the inherent problems associated with radio frequency and radar transmissions, a single sensor surveillance system may not provide a complete and accurate depiction of a target to the controller. The ASDE-X system mitigates this problem by fusing the data from several different sources, primary and secondary radar including MLAT and ADS-B, to provide the most accurate target information as compared to single sensor systems. The ASDE-X system receives the ADS-B position report, the radar return, and MLAT position report and "fuses" them into a single accurate target report. Data fusion provides the most complete and accurate picture of the intended target's position and motion. For example, fused data, combining data from the SMR, MLAT, and ADS-B, would provide controllers with the aircraft's size, identification, and position whereas each data source alone could only provide a piece of this information. These systems also can alert controllers to potential conflicts so they can take appropriate action to prevent surface incidents.

The radar component of the ASDE-X system can detect aircraft and vehicles in and around the airport operational area without the use of airport ground vehicle ADS-B squitter units. However, during periods of heavy and sustained precipitation, the precipitation may attenuate the radar, thus reducing the probability of vehicle detection. In these cases, vehicles equipped with airport ground vehicle ADS-B squitter units can be tracked by two additional sources of position data, ADS-B and MLAT, thus increasing the accuracy and probability of detection. Additionally, the ADS-B message set provides identification data that is not available from the ASDE-X or ASSC systems.

ADS-B differs from MLAT in the method in which position data is computed. An MLAT system depends on a series of receivers on the surface calculating the difference in the time of arrival of a signal from targets to determine position. At least four sensors are necessary to provide position information that is both accurate and has a high level of integrity. ADS-

B transmits a signal, much like a transponder, but the position information is satellite based, such as those in the Global Positioning System (GPS) constellation. The position and identification information derived from the ADS-B is transmitted to air traffic control and fused with ASDE-X surveillance sources. ADS-B can serve to supplement existing MLAT surveillance for air traffic control, and MLAT can be used as an input to the TIS-B service to provide a more complete traffic picture to operators who have equipped with the ability to display ADS-B.

b. ADS-B. The ADS-B system is an advanced surveillance technology that combines a satellite positioning service, aircraft avionics, and ground infrastructure to enable transmission of more accurate information between aircraft and air traffic control. The system enables equipped aircraft and ground vehicles to continually broadcast information, such as identification, current position, altitude, and velocity. ADS-B uses information from a position service, e.g. GPS, to determine the aircraft/vehicles location, thereby making this information more timely and accurate than the information provided by a conventional radar system. ADS-B also can provide the platform for aircraft to receive various types of information, including ADS-B transmissions from other equipped aircraft or vehicles. ADS-B is automatic because no external interrogation is required, but is "dependent" because it relies on onboard position sources and onboard broadcast transmission systems to provide surveillance information to air traffic control and ultimately to other airport users.

The capability of transmitting ADS-B information is referred to as "ADS-B Out". ADS-B Out can provide a more accurate and timely position report that includes identity and other information, but it does not provide operators with any new services or information. Operators can voluntarily equip with the equipment necessary to receive ADS-B messages and other broadcast services, such as TIS-B, and display that information in the cockpit. The receive function of ADS-B is referred to as "ADS-B In"; ADS-B In is not required by the final rule but can provide significant benefits.

The ADS-B system provides aircraft/vehicle position information using data provided by the unit's GPS navigation system and transmitted via Mode S Extended Squitter (ES) or Universal Access Transceiver (UAT). ADS-B equipment receives highly accurate GPS signals and uses them to determine the precise location of the aircraft/vehicles on the airport surface. The system converts that position into a unique digital code and transmits it, along with a unique identification code, to locate and identify the exact aircraft/vehicle. The broadcast of the ADS-B position provides a signal for MLAT, providing two separate sources of position data. This precise data also enables other ADS-B applications, including Airport Traffic Situation Awareness (ATSA with Indications and Alerts). Airport Traffic Situation Awareness involves the use of a cockpit display that depicts the runway environment and displays traffic from the surface up to approximately 1,000 feet above ground level on final approach and is used by the flight crew to help determine runway occupancy. This application also is designed to reduce the potential for deviations, errors, and collisions by increasing flight crew situational awareness while operating an aircraft on the airport. This application also provides an alerting function to assist in the identification of conflicts and/or the avoidance of runway incursions. Flight crews will use a cockpit

display and possible aural notifications to increase awareness of other traffic positions in the squitter area.
The vehicle ADS-B squitter units will support the following ADS-B applications:

- Air Traffic Control (ATC) Surveillance for Airport Situation Awareness;
- Airport Traffic Situation Awareness; and
- Airport Traffic Situation Awareness with Indications and Alerts.

Airport ground vehicle ADS-B squitter units are being deployed to further enhance the ability to reduce the risk of runway incursions and conflict between aircraft and vehicles operating in the airport. The airport ground vehicle ADS-B squitter units utilize an ADS-B transmitter to broadcast a highly accurate position (GPS based), which is received by various ground stations and aircraft on or near the airport and presented on a display. Additionally, the ADS-B system provides a mechanism for the delivery and display of an integrated surface picture to airport operators through an additional display capability. While ATC surveillance benefits are only applicable to airports that currently have ASDE-X or ASSC, airport ground vehicle squitter units may be deployed at any airport. These airports could still derive benefit from airport ground vehicle squitter units through ADS-B cockpit applications and through airport operator displays.

The airport ground vehicle ADS-B squitter unit will utilize a sensor navigation source capable of providing highly accurate position data as outlined in the specification. The airport ground vehicle ADS-B squitter units can operate on either the 1090 ES link or the 978 MHz/UAT link; however, due to the 1090 MHz spectrum congestion and use by numerous other systems, the FAA strongly prefers the use of the 978 MHz/UAT link. The existing terminal radar secondary surveillance system, many aircraft transponders, and several other systems currently use the 1090 MHz frequency. The extensive use of the 1090 MHz frequency has the potential to cause numerous degradations to any system using 1090 MHz.

Whether the unit is capable of transmitting on just one link or both (1090 and 978 MHz), the unit must only transmit on one link at any given time. The airport ground vehicle ADS-B squitter transmissions will only be active when the vehicle position is within the defined squitter transmit area. The ADS-B equipment will contain a transmit map that will control the unit on/off function based on position of the vehicle on the airport.

The FAA will authorize the airport operator and potentially other entities to deploy the airport ground vehicle ADS-B squitter units. The vehicles equipped with the ADS-B squitter units will include airport vehicles, fire and rescue vehicles, other vehicles authorized by the airport operator, and FAA vehicles.

c. Airports Eligible for Early Implementation. The Federal Communication Commission (FCC) is pursuing a rulemaking to allow vehicles to transmit on 1090 MHz. The FCC approved the waiver request on February 12, 2010 in DA 10-259. The use of 978 MHz is already approved for use on vehicles.

Table 1. Airports with Existing or Planned FAA Surveillance Systems.

The future use of vehicle units at airports other than those equipped with FAA surveillance systems is not yet defined. Below is a table of airports currently equipped or planned to be equipped with FAA surveillance systems by 2017.

Identifier	Airport
ASDE-X equipped airports	
BWI	Baltimore-Washington International Thurgood Marshall Airport
BOS	Boston Logan International Airport
BDL	Bradley International Airport
MDW	Chicago Midway Airport
ORD	Chicago O'Hare International Airport
CLT	Charlotte Douglas International Airport
DFW	Dallas-Ft. Worth International Airport
DEN	Denver International Airport
DTW	Detroit Metro Wayne County Airport
FLL	Ft. Lauderdale/Hollywood Airport
MKE	General Mitchell International Airport
IAH	George Bush Intercontinental Airport
ATL	Hartsfield-Jackson Atlanta International Airport
HNL	Honolulu International –Hickam Air Force Base Airport
JFK	John F. Kennedy International Airport
SNA	John Wayne-Orange County Airport
LGA	LaGuardia Airport
STL	Lambert-St. Louis International Airport
LAS	Las Vegas McCarran International Airport
LAX	Los Angeles International Airport
SDF	Louisville International Airport-Standiford Field
MEM	Memphis International Airport
MIA	Miami International Airport
MSP	Minneapolis St. Paul International Airport
EWR	Newark International Airport
MCO	Orlando International Airport
PHL	Philadelphia International Airport
PHX	Phoenix Sky Harbor International Airport
DCA	Ronald Reagan Washington National Airport
SAN	San Diego International Airport
SLC	Salt Lake City International Airport
SEA	Seattle-Tacoma International Airport
PVD	Theodore Francis Green State Airport
IAD	Washington Dulles International Airport
HOU	William P. Hobby Airport
Airports to be equipped with ASSC (2014-2017 timeframe)	
SFO	San Francisco International Airport
CLE	Cleveland/Hopkins International Airport
PIT	Pittsburgh International Airport
PDX	Portland International Airport

ADW	Andrews Air Force Base
ANC	Anchorage International Airport
CVG	Cincinnati/Northern Kentucky International Airport
MSY	Louis Armstrong New Orleans International Airport
MCI	Kansas City International Airport

d. Definitions. In this AC, the words "must", "should", and "may" are used to define different levels of requirements:

(1) Must: Conveys a requirement.

(2) Should: Describes a recommendation.

(3) May: Denotes a permissible practice or action, but not a requirement.

(4) Airport Ground Vehicle ADS-B Equipment: The navigation source, processing, and ADS-B transmission equipment that determines the position of the surface vehicle in which it resides and broadcasts that information on one of the two ADS-B data links (978 MHz UAT or 1090 MHz ES).

(5) Squitter: Output pulses from an airport ground vehicle ADS-B squitter unit generated by an internal triggering system rather than by external interrogation pulses.

(6) Squitter Transmit Map for Airport Surface: The squitter maps of the airport surface will define where the squitter unit will be active by controlling the squitter transmit out. The FAA will generate the squitter transmit maps and post them online for download. All airports with ASDE-X will have a Squitter Transmit Map available for download on the website for no charge. Squitter Transmit Maps for Airport Surface will be derived from ASDE-X maps.

4. Developing Equipment to Specification.

a. Airport Ground Vehicle ADS-B Process Diagram. The following process flow diagram (Figure 1) provides an overview of the steps and processes necessary to complete the vehicle ADS-B project.

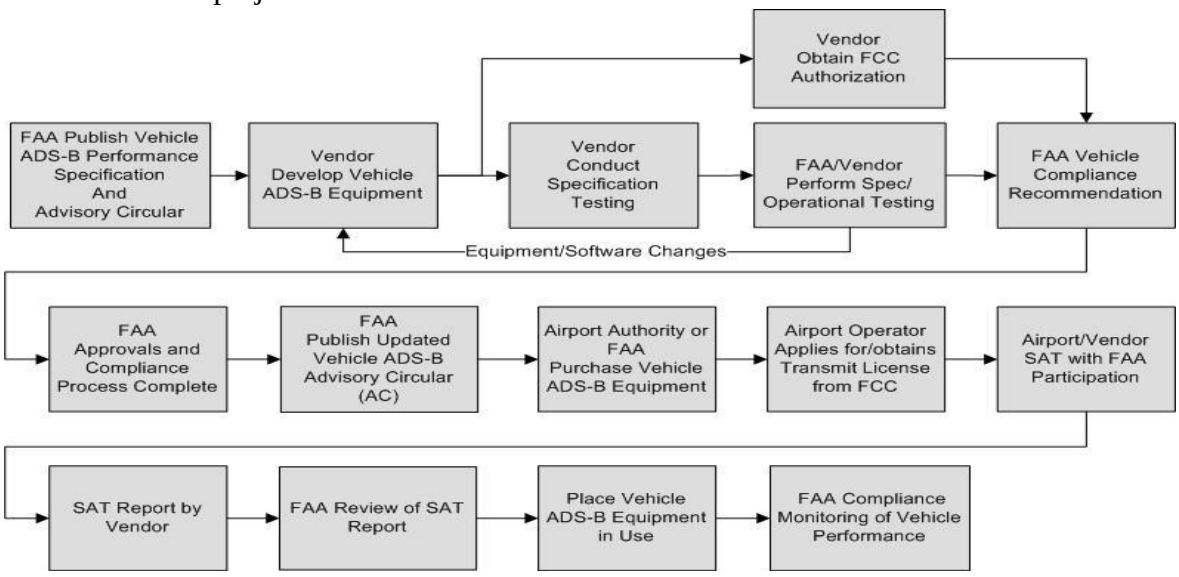

Figure 1. Vehicle ADS-B Process Diagram

b. Airport Ground Vehicle ADS-B Specification. The vehicle ADS-B squitter specification document details requirements for the vehicle units residing in airport surface vehicles, which are necessary to determine the position of the surface vehicle in which it resides and broadcast that information on one of the two ADS-B data links. This document provides the requirements for both 978 MHz UAT and 1090 MHz ES transmissions. Vendors producing equipment for surface vehicles must adhere to the requirements stated in the document.

The document addresses the broadcast of ADS-B only (the reception and display of ADS-B data in the vehicle is not addressed). Additionally, the document addresses testing and compliance of the airport ground vehicle ADS-B squitter units and includes guidelines for verification.

c. FAA Specification Testing. The airport ground vehicle ADS-B Factory Acceptance Test (FAT) plan and Site Acceptance Test (SAT) plan will outline the test procedures and processes necessary for the vehicle units to demonstrate compliance with the specification document. The airport ground vehicle ADS-B squitter units will be tested to verify they meet the functional and performance requirements. Testing includes the bench tests and environmental tests outlined in the specification document. Requirements for unit level testing are described for both 1090 MHz ES and 978 MHz UAT equipment. These tests are performed at the vendor's facilities as approved by the FAA. Integration testing of the airport ground vehicle ADS-B unit, including the navigation system and the ADS-B transmitting system, is conducted to verify system performance. The vendor submits test documentation to the FAA verifying successful completion of the specified tests. The FAA reserves the right to witness specific test procedures at the vendor's facility.

d. Subsequent to obtaining approval for the bench and environmental test results, the vendor will make a unit available to the FAA for additional testing at the FAA Technical Center. The FAA will conduct additional testing of the unit for an operational equivalent to a first article test. This testing will consist of limited bench testing of key requirements to verify performance. The FAA may require the vendor to provide test tool support similar to the capabilities that the vendor may have used for the factory bench testing to enable specific tests or provide access to internal test points for verification. Also, the unit will be subjected to testing at a specified test facility that verifies the operation at an airport location. The FAA will provide information to the vendor to generate a squitter transmit map for the airport surface to support the testing. The equipment will be tested to verify the squitter transmit map for the airport surface requirements within and outside of the squitter area. This test will consist of operating the equipment and subjecting the equipment to scenarios similar to those that would be encountered at the airport within which the vehicle is intended to operate.

The FAA Technical Center has developed test plans, which will reference the testing requirements in the specification document, additional equipment-level tests that may be required at the FAA facility, and a Site Acceptance Testing (SAT) Checklist that will provide a detailed description of the SAT procedures that are required to demonstrate vehicle unit compliance.

Additionally, equipment manufacturers shall provide the FAA Technical Center evidence of a

quality control program for production of their airport ground vehicle ADS-B units when submitting the factory test report.
If the FAA authorizes the equipment, the FAA will update this AC to list the manufacturers whose vehicle units are authorized to operate on the airport surface.

5. Equipment Testing.

a. Vendor Site Acceptance Testing (SAT). The vendor will conduct Site Acceptance Testing (SAT) with assistance from the airport at each airport that implements the airport ground vehicle ADS-B units. The FAA will verify SAT compliance of the units for any airport installing and utilizing the vehicle units. Subsequent SAT events at the same airport may be approved via post-SAT report submittals. This operational testing will require manufacturers to validate that the airport ground vehicle ADS-B squitter units are installed properly, updated squitter transmit maps are in all equipment units, all squitter airport map boundaries are correct, International Civil Aviation Organization (ICAO) codes are properly entered, and the airport ground vehicle ADS-B units operate properly. Successful completion of this phase of testing will verify compliance of the equipment.

Upon completion of the SAT report, the vendor must submit a copy of the report to the FAA for review.

b. FAA Airport Ground Vehicle ADS-B Validation of SAT. All units must undergo SAT. The vendor must submit the SAT report to the FAA, who will evaluate the submitted report and associated data for any deficiencies to determine whether the airport ground vehicle ADS-B units at the airport are ready for operation. The FAA may participate in each airport's SAT upon delivery of the airport ground vehicle ADS-B squitter units or choose to evaluate the vendor-provided SAT report only.

If deficiencies are found during SAT, the FAA will notify the vendor, which must take corrective actions to make the units compliant with the SAT. The vendor must submit a follow-up SAT report to the FAA, who will decide whether the system has passed the SAT and can be put into operation.

6. Requirements to Operate Equipment.

a. FCC Equipment Authorization. Vendors are required to obtain FCC Equipment Authorization in accordance with 47 CFR Part 2, Subpart J. FCC form 731 must be filed for each unique product identifier and a unique FCC identifier is required on the product label. Product documentation must accompany the application, fees must be submitted, and descriptions of the required test data must be provided. Paragraph 2.1033(c) lists the requirements for equipment types other than those operating under Part 15 or Part 18 of the FCC rules.

Test requirements for equipment types other than those operating under Part 15 or Part 18 are described in the paragraphs listed in paragraph 2.1041. Paragraph 2.947 outlines the measurement procedure. The following paragraphs list measurement data requirements:

- 2.1046 – RF power output
- 2.1047 – Modulation Characteristics
- 2.1049 – Occupied Bandwidth
- 2.1051 – spurious emissions at antenna terminals
- 2.1053 – Field strength of spurious radiation (substitution method)
- 2.1055 – Frequency stability
- 2.1057 – Frequency spectrum to be investigated
- 2.1091 – RF radiation exposure evaluation: mobile devices
- 2.1093 - RF radiation exposure evaluation: portable devices

Applications for equipment authorization must be submitted electronically and the required exhibits must be in one of the following electronic file types : Adobe Acrobat (pdf), JPEG, Microsoft Excel, Microsoft Word, WordPerfect, or plain text. FCC requires up to 13 different exhibit types:

1. Identification label and location information
2. Attestation statements
3. External photos
4. Block diagrams
5. Schematics
6. Test Report
7. Test setup photos
8. User's manual
9. Internal photos
10. Parts list and tune-up information
11. RF exposure information
12. Operational description
13. Cover letters

All applications can be submitted to FCC via its OET Laboratory Division electronic filing site at https://fjalfoss.fcc.gov/oetcf/eas/. The application begins with the form 731 after which attachments are submitted. The web site automatically provides a fee form 159. Fees can be paid on-line via credit card or by mail using a hard copy of the form. Reviews take 5–10 weeks to complete.

b. FCC Transmit Authorization. Airport authorities or entities approved by the FAA to use Ground Vehicle ADS-B Out Squitter Equipment are required to obtain a license to transmit prior to operating. Title 47 CFR Part 87 governs the licensing and operation of equipment transmitting within aviation frequency bands. The applicable parts of 47 CFR Part 87 and references contained within shall be followed.

Applications for a transmit license can be filed through the FCC's Universal Licensing System (ULS). The ULS can be accessed at http://wireless.fcc.gov/ULS/index.htm?job=home. Airport authorities or entities approved by the FAA can apply to operate up to 200 vehicle squitters under a single application. A waiver adopted by the FCC on February 12, 2010 under DA 10-259 governs the use of 1090 MHz extended squitter on vehicles. Applications for a transmit licenses

shall be filed under the station class MOU for Aeronautical Utility Mobile Stations.

Prior to filing with the FCC, the applicant is required to coordinate with the applicable FAA Regional Frequency Management Office (FMO). The Regional FMO will provide a coordination number that should be included in the application to the FCC. Contact information and geographic areas of responsibility can be found at http://www.ntia.doc.gov/files/ntia/publications/d_5_11.pdf

7. Airport Ground Vehicle ADS-B Operational Guidance.

a. Compliance Monitoring/Airport Ground Vehicle ADS-B Performance Compliance. The FAA will perform compliance monitoring throughout the life cycle of the airport ground vehicle ADS-B squitter units.

FAA will perform compliance monitoring of the units at airports where airport ground vehicle ADS-B units are installed. If system performance is degraded such that repair/replacement is required, the QRO will be notified. The airport operator will be notified to cease operating the nonfunctional airport ground vehicle ADS-B unit until the unit is operating within the specified requirements.

b. Airport Requirements. At airports implementing airport ground vehicle ADS-B squitter units, certain limitations will be imposed to maximize the benefits of this system. These limitations include the following:

(1) The FAA will only authorize the use of ADS-B squitter units by airport Operator or entities approved by the FAA and coordinated with the FCC and FAA Spectrum Office.

(2) The FAA will authorize a maximum of 200 total (1090 ES and UAT) airport ground vehicle ADS-B squitter units per location to ensure the performance of other FAA surveillance systems operating on the 1090 MHz frequency is not degraded. While any combination of 200 total units per airport is allowed, the FAA encourages airports to use the UAT units rather than the 1090 ES units due to potential congestion of the 1090 MHz spectrum.

(3) Vehicles equipped with the airport ground vehicle ADS-B squitter units must meet the requirements outlined in FAA-E-3032, Airport Ground Vehicle ADS-B Specification, January 7, 2015.

(4) The operation of aircraft ground vehicle ADS-B squitter units is confined to the airport movement area. For vehicles equipped with 978 MHz UAT squitter units, this includes operations in transit to the movement area. Use of the proper Squitter Transmit Map will ensure compliance with this requirement.

c. Airport Ground Vehicle ADS-B Squitter Unit Maintenance. The FAA will monitor compliance of the airport ground vehicle ADS-B squitter unit with the specification

document through the SBS Compliance Monitor system. Any failures to comply will result in maintenance/replacement of the unit. Any observed issues with the airport ground vehicle ADS-B squitter units at the airport should be reported to FAA, who will in turn report the deficient unit to the local airport operator. The airport operator is responsible for coordinating with the vendor to ensure the airport ground vehicle ADS-B squitter units are repaired or replaced.

d. Obtaining Current Airport Maps. The vendor-supplied user interface software will upload an airport ground vehicle ADS-B squitter transmit map for the airport surface to the airport ground vehicle ADS-B unit. The FAA must supply the vendor and airport with the current squitter transmit map for the airport surface in a .kml format from which the vehicle squitter transmit map for the airport surface should be created and uploaded to the airport ground vehicle ADS-B unit. The squitter transmit map for the airport surface must be used to control the airport ground vehicle ADS-B squitter on/off function of the vehicle unit.

The FAA will provide a website where the current squitter transmit map for the airport surfaces can be downloaded. If there is an updated squitter transmit map for the airport surface, the FAA will notify the airport operator.

e. Radio Call Sign Assignment. The airport ground vehicle ADS-B squitter units will be programmed with the vehicle radio call signs. The radio call signs are used in Air Traffic Control communications and will also be displayed on the ASDE-X display. A call sign is limited to a maximum of eight (8) characters. An example of possible call sign designators are as follows:

- CTYxxx is a city vehicle (xxx is number)
- ARFxxx is the aircraft rescue and fire fighting department vehicle
- FAAxxx is an FAA vehicle
- APTxxx is an airport operator vehicle

f. Vehicle 24-Bit ICAO Code Assignment. Each vehicle that is equipped with an airport ground vehicle ADS-B squitter unit must be uniquely identifiable. This will be accomplished by programming and storing the appropriate 24-bit ICAO identification and vehicle identification information into the unit in accordance with instructions provided by the manufacturer. Airport operators may request a block of 200 24-bit ICAO identification codes from the FAA Aircraft Registration Branch.

The block of 200 ICAO identification codes will enforce the limit of 200 airport ground vehicle ADS-B devices (total of 1090 ES and UAT) per airport.

To obtain the 24-bit ICAO identification codes, approved airport authorities must send a signed and dated letter that indicates the following:

- Request is for airport ground vehicle ADS-B equipment
- Number of 24-bit ICAO codes required
- Point of contact

- Name and address of the airport where equipment will operate

Airports should send their requests to the following addresses:

Via U.S. Postal Service:
Aircraft Registration Branch, AFS-750 PO Box 25504
Oklahoma City OK 73125

Via express courier:
Aircraft Registration Branch, AFS-750 6425 South Denning Ave
Registry Building
Oklahoma City OK 73169
866-762-9434

g. Training. The airport ground vehicle ADS-B equipment manufacturer must provide a detailed training manual as part of the FAA specification compliance process. The FAA will review the training material to ensure all training plans and materials are properly developed for use by the FAA and airports that purchase the equipment.

8. Obtaining FAA and Other Publications.

a. RTCA Documents. Obtain RTCA documents from RTCA, Inc., 1828 L Street NW, Suite 805, Washington DC 20036, (202) 833-9339, or from the RTCA website at http://www.rtca.org.

(1) RTCA/DO-260B, Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance Broadcast (ADS-B) and Traffic Information Services - Broadcast (TIS-B), December 2, 2009.

(2) RTCA/DO-282B, Minimum Operational Performance Standards for Universal Access Transceiver Automatic Dependent Surveillance - Broadcast Revision B, December 2, 2009.

b. Title 14 of the Code of Federal Regulations (14 CFR), Aeronautics and Space. Obtain copies of 14 CFR Parts 21, 23, 25, 27, 29, 43, and 91 from the Superintendent of Documents, Government Printing Office, PO Box 979050, St. Louis MO 63197. For general information, call 202-512-1800, fax 202-512-2250, or visit http://www.gpo.gov/fdsys/ (select "Code of Federal Regulations").

(1) 14 CFR Part 91, Automatic Dependent Surveillance-Broadcast (ADS–B) Out Performance Requirements to Support Air Traffic Control (ATC) Service, Final Rule, May 28, 2010, http://www.gpo.gov/fdsys/pkg/FR-2010-05-28/pdf/2010-12645.pdf.

c. FAA Advisory Circulars. Access copies of ACs on the FAA website at http://www.faa.gov/regulations_policies/advisory_circulars/.

d. FAA Technical Standard Orders (TSO). Find a current list of technical standard orders at http://www.airweb.faa.gov/rgl. You will also find the TSO Index of Articles at the same location.

e. ARINC, Inc. Obtain copies of ARINC documents from ARINC, Inc., 2551 Riva Road, Annapolis MD 21401, 800-633-6882 (telephone), 410-956-5465 (fax), or at http://www.arinc.com.

f. SAE International. Order SAE documents from SAE International, 400 Commonwealth Drive, Warrendale PA 15096-0001, 724-776-4970 (telephone), 724-776-0790 (fax) or at http://www.sae.org.

Michael J. O'Donnell
Director of Airport Safety and Standards

APPENDIX A. QUALIFIED PRODUCTS

FAA Approved Model Number: FDL-978-GTX/E
Name: V-MAT (Vehicle Movement Area Transmitter)
ADS-B data link: 978 MHz Universal Access Transceiver
Vendor: Harris Corporation
Manufacturer: FreeFlight Systems
Contact: Harris Corporation
(855) 890-5137
CAS@Harris.com
www.symphonycdm.com

FAA Approved Model Number: FDL-978-GTX/A
Name: External Mount VMAT (Vehicle Movement Area Transmitter)
ADS-B data link: 978 MHz Universal Access Transceiver
Manufacturer: FreeFlight Systems
Contact: FreeFlight Systems
(800) 487-4662
info@freeflightsystems.com
www.freeflightsystems.com

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