

10. RESPONSIBILITIES.

Responsibilities for and the implementation of this policy, as well as the establishment, participation, and operation of the DRRC, lie with the following officials:

a. The Associate Administrator for Air Traffic Services, ATS-1, is responsible for:

- (1) Establishing and implementing the DRRC.
- (2) Providing approval of the original DRRC Charter and all subsequent changes to the document.
- (3) Ensuring a DRRC Chairperson is assigned.
- (4) Approving the final DRRC package.
- (5) Ensuring that a representative is appointed as a permanent member of the DRRC, as identified in the DRRC Charter.
- (6) Providing subject matter experts (ad hoc members) as required.

b. The Air Traffic Division, AXX-500, shall designate a regional representative. The regional representative is responsible for:

- (1) Providing the requester with FAA Form 1200-5, NAS Data Release Request and associated application procedures.
- (2) Coordinating with appropriate regional offices to ensure NAS Data Release Request forms are completed and final approval packages contain all required information for the DRRC final decision.
- (3) Monitoring continued compliance with conditions identified in the DRRC final decision.
- (4) Ensuring notification to all outside interests for the requirement to reapply, as specified in this order.

c. The Airway Facilities Division, AXX-400, shall designate a regional representative, who is responsible for:

- (1) Ensuring that if AF will maintain the outside interest's equipment, the requirements for maintenance are listed in the Memorandum of Agreement, Section II, Paragraph A. (See Appendix 2, Sample Memorandum of Agreement.)

(2) Adhering to all applicable policies and procedures to escort the outside interest into AF workspace, if the vendor installs, maintains, or removes the equipment.

(3) Providing a method of monitoring, or notifying the outside interest when her/his equipment fails. This method shall be described in the Memorandum of Agreement (MOA), Section II, Paragraph A.

d. The Office of the Chief Counsel, AGC-1, shall review all MOAs for NAS data releases for accuracy, validity, and legality.

II. PROCEDURES.

The process for requesting release of NAS data or use of equipment interfaces is:

a. Requests for release of NAS data or the use of equipment interfaces will be directed to the DRRC through the FAA regional office, AXX-510. If the requesting organization is a Program Office, Product Team, or Integrated Product Team, the request will be given to the DRRC Executive Secretary.

b. The requester will be provided a NAS Data Release Request Form (FAA Form 1200-5) which provides guidance for submitting a request.

c. The DRRC shall meet as required. The DRRC is the reviewing authority for release of NAS data to outside interests. The actions of the DRRC, as established by charter in Appendix 1, Data Release Review Committee Charter, shall result in one of the following decisions to the initial request:

(1) Request Invalidation, along with the supporting rationale, will be sent by the DRRC to the requester with notification to the regional office, as appropriate.

(2) A Request for Clarification, along with the supporting documentation, will be sent to the requester with notification to the regional office, as appropriate. This requires that the requester modify the submission in compliance with the direction provided by the DRRC and resubmit the NAS Data Release Request form for reconsideration.

(3) A Request Validation will be forwarded to the Requirements Branch, AXX-510, with guidance to proceed with a submission of the final package. The package will be prepared between the requestor and the regional office with the appropriate information requested to develop the NAS Change Proposal (NCP, FAA Form 1800-2) and a MOA. The MOA shall be developed in accordance with the Appendix 2.

d. When the final package has been completed, it will be returned to the DRRC for review and consideration. The DRRC actions on the final package will result in one of the following for ATS-1 action:

(1) Recommend Approval. ATS-1 will issue the requester the authority to receive NAS data.

(2) Recommend Disapproval. The disapproval decision from ATS-1, along with the supporting rationale, will be sent by the DRRC to the requester with notification to the regional office, as appropriate.

e. Outside interests shall reimburse the FAA for NAS data using the procedures prescribed in the latest edition of Order 2500.35, Reimbursable Agreements Covering Services and Materiel provided by the FAA.

ORIGINAL SIGNED BY

Jane F. Garvey

Administrator

APPENDIX 1. DATA RELEASE REVIEW COMMITTEE CHARTER.

1. Purpose.

Paragraph 8 of this order outlines the purpose of the DRRC.

2. Authority.

The FAA Administrator shall designate ATS-1 to provide the oversight for the DRRC. ATS-1 will not authorize the DRRC to create lower level review committees. The charter shall be changed only with the approval of ATS-1, and upon recommendation of the DRRC. The DRRC chairperson has the final authority over the operation of the DRRC and all related matters.

3. DRRC Responsibilities.

The responsibilities of the DRRC include, but are not limited to:

a. Performing DRRC functions as established in this order.

b. Maintaining and recommending proposed changes to the DRRC operating procedures.

c. Reviewing, evaluating, and making recommendations for approval or disapproval of data release requests to ATS-1. In reaching decisions or recommendations regarding proposed data release requests, the DRRC will give consideration to improving safety, efficiency, and operational effectiveness, while ensuring NAS system integrity, stated FAA strategic direction for NAS evolution, such as NAS architecture, the Operational Evolution Plan (OEP), and national security.

d. Initiating changes to the current version of Order 1200.22, Release of National Airspace System (NAS) Data and or Interface Equipment to Outside Interests.

e. Ensuring that proposed data release policy changes is communicated to all requesters and coordinated with the affected organizations.

f. Ensuring that all approved data release requirements have been met through Configuration Management and National Change Proposal (NCP) process.

g. Establishing and maintaining the Requester/Data Catalogue.

h. Defining the data elements under the purview of the DRRC, and ensuring that only appropriate data is posted on official or project web sites.

i. Ensuring that data release request documentation under the jurisdiction of the DRRC is approved in accordance with the current version of Order 1200.22.

j. Processing data release requests in accordance with procedures described in the DRRC operating procedures.

k. Documenting and tracking DRRC actions and decisions in accordance with the processes and procedures as defined in the DRRC operating procedures.

4. DRRC Members.

The following contains the organizations and their functions as part of the DRRC:

a. DRRC Chairperson. ATS-1 will appoint the DRRC Chairperson.

(1) Ensuring the DRRC functions are implemented as described in this policy and as outlined in the DRRC Charter.

(2) Providing staffing and assigning an Executive Secretary for the DRRC.

(3) Ensuring concerned Government organizations outside the FAA are invited as permanent members of the DRRC, as appropriate.

(4) Providing recommendation to ATS-1 for FAA Form 1200-5, NAS Data Release Request, and final packages submitted to the DRRC.

b. Executive Secretary. Staffing of this position shall be the responsibility of ATS-1.

(1) Ensures that each FAA Form 1200-5, NAS Data Release Request, is processed and tracked from request initiation to final decision.

(2) Ensures that required DRRC documentation, FAA Form 1200-5, NAS Data Release Request, and the final packages are provided to committee members in advance of the DRRC meetings.

(3) Schedules and coordinates all DRRC meetings dates and arrangements. Absenteeism of DRRC permanent members will be recorded as a concurrence.

(4) Maintains all data pertinent to the functionality of the DRRC.

(5) Develops and maintains a database that tracks the status of all FAA Form 1200-5, NAS Data Release Request, and the DRRC final decisions.

c. Permanent Members. Permanent members of the DRRC shall include a representative from:

(1) Air Traffic Planning and Procedures (ATP).

(2) Office of Information Systems Security (AIS).

(3) Office of Civil Aviation Security Policy and Planning (ACP).

(4) Operations Support (AOS).

(5) NAS Operations (AOP).

(6) Office of Civil Aviation Security Intelligence (ACI).

(7) Joint Radar Planning Group (JRPG).

(8) Office of the Chief Counsel (AGC) This member serves in an advisory capacity and is a non-voting member.

(9) Office of Communications, Navigation, and Surveillance Systems (AND).

d. The DRRC Permanent Members are responsible for:

(1) Participating and/or ensuring proper representation to all scheduled meetings of the DRRC.

(2) Providing their organization's position at the DRRC meetings that will contribute to the final decision.

(3) Coordinating with subject matter experts within their organization to articulate their organization's position during the DRRC meeting, as appropriate.

(4) Ensuring regional compliance within the respective organization, as identified in this policy.

e. The following organizations may have representation as ad hoc, or subject matter expert members:

(1) Department of Transportation, US Coast Guard (USCG).

(2) Department of the Treasury, US Customs.

(3) Department of Defense (DoD).

(4) Department of Justice, Federal Bureau of Investigation (FBI).

f. Ad Hoc Members. Subject matter experts will augment the standing membership on a case by case basis, after coordination with the DRRC Chairperson. Ad Hoc Members are non-voting members who serve in an advisory capacity only and are limited to Federal Government employees.

5. DRRC Administration.

The DRRC Executive Secretary will be responsible for ensuring that FAA Form 1200-5, NAS Data Release Request, and the final packages are provided to committee members in advance of scheduled DRRC meetings.

6. Scheduled Meetings.

The DRRC secretary shall schedule DRRC meetings as follows:

- a. Quarterly.
- b. Whenever an additional meeting is required due to special circumstances.

7. DRRC Recommendations and Decisions.

The DRRC will provide advice or recommendations to ATS-1 for the final decision on the submitted package. The DRRC may ask for additional information or modifications performed on each package to satisfy the committee before forwarding the request to ATS-1.

8. Delegation of DRRC Authority.

The DRRC Chairperson may authorize FAA DRRC members to act as a chairperson via a memorandum to the DRRC Executive Secretary. DRRC permanent members can delegate specific authority (proxy) by a memorandum approved by the DRRC Chairperson. When a time critical or urgent processing of a data release request is necessary, the DRRC Chairperson shall call an emergency meeting of the DRRC. Questions and concerns regarding DRRC decisions will be addressed to the DRRC Executive Secretary and will be presented to the DRRC Chairperson for resolution.

APPENDIX 2. SAMPLE MEMORANDUM OF AGREEMENT.

MEMORANDUM OF AGREEMENT

Federal Aviation Administration

(Insert name of AT Facility)

and the

(Insert name of outside interest)

The (Insert name of outside interest) has requested that the Federal Aviation Administration (FAA) provide the outside interest access to certain flight track data to support the data requirements of the Environmental Impact Statement (EIS) Airport Noise Compatibility Planning under 14 CFR Part 150/Noise Abatement, or _____ for (Insert city and the name of the airport; include the three-letter identification code for the airport). The FAA agrees to provide and

allow the outside interest to use certain data, as set forth in this Agreement. The FAA enters this memorandum of agreement pursuant to 49 United States Code (USC) section 106 (l) 6. Therefore, the FAA and the outside interest agree to the following procedures, restrictions and responsibilities:

I. DESCRIPTION.

A. (Describe and specify the context of the data used, the purpose, and what equipment/system will be used for data collection. Refer to all applicable).

B. This Memorandum of Agreement (“Agreement”) covers the requirements for (i) provision of the Data; (ii) use of the Data; (iii) installation, use and maintenance of the System.

II. FAA RESPONSIBILITIES.

A. (Accurately describe the specific responsibilities for the FAA. Use as many sub paragraphs as needed. For example, modifications to FAA equipment and systems must ensure continued reliable compatibility with the outside interest-owned equipment, etc).

B. Service interruptions may occur due to operational necessity, safety and security concerns, and/or hardware failure. Final authority to deny access to data in accordance with the terms of this agreement shall reside with the Air Traffic Manager, (AT Facility). The (AT facility) shall not be held responsible or retain any legal obligation as to the accuracy, validity, or continued availability of the data.

III. OUTSIDE INTEREST RESPONSIBILITIES – USE OF ATC COMPUTER/RADAR DATA.

A. (The applicable outside interest will provide a narrative of its responsibilities and duties for using the radar or computer data supplied by the FAA. Use as many sub paragraphs as necessary).

1. The outside interest shall supply the FAA with adequate compatible recording devices (discs or tapes).

2. All computer programs and equipment to be installed and operated in the (AT Facility) will be subject to FAA approval.

3. The outside interest shall provide all transportation and associated costs for transporting the discs or tapes.

4. Requests for copies of recorded data must be received by the (AT facility) not later than three days after the date of the requested data.

5. The outside interest shall not release any data or information pertaining to:

(Include any prohibitions developed through coordination with the Office of Civil Aviation Security Operations.)

6. The outside interest shall not release these data for use by law enforcement agencies or for use in any civil litigation, absent Court Order in any civil litigation, except pursuant to court order.

7. The outside interest shall not release these data if advised by the FAA that the data received contain information relating to an aircraft Incident.

8. The outside interest shall not use these data for legal action involving noise abatement regulation enforcement.

9. Indemnification by the outside interest. The outside interest agrees to indemnify and hold harmless the Government, its agencies, officers, and employees, from and against all claims, demands, damages, liabilities, losses, suits, and judgments (including all costs and expenses incident thereto) which may accrue against, be suffered by, be charged to, or recoverable from the Government, its agencies, officers, and employees, arising out of the FAA providing this data, and arising out of acts or the omissions of the outside interest, its agents, contractors, or employees by reason of damage to, destruction of, misappropriation, or loss of property of the Government, its officers, employees and agents arising out of the act of omissions of the outside interest, its employees, and agents under this agreement, whether or not caused or contributed to by negligence on the part of the outside interest or its agents. In the event the outside interest holds or obtains insurance in support of this promise, an original or certified copy of a certificate of insurance shall be delivered to the FAA.

10. The outside interest shall pay the cost, as determined by the FAA contracting officer, of producing and/or supplying any utilities, including telephone lines. The requestor shall also pay for other services furnished by the Government or through Government-owned facilities for the use of the outside interest's proportionate share of the cost of operation and maintenance of the Government-owned facilities by which such utilities or services are produced or supplied. The Government shall be under no obligation to furnish utilities or services.

11. The outside interest agrees that any property of the United States damaged or destroyed incident to the exercise of the privileges herein granted shall be promptly repaired or replaced by the outside interest to the satisfaction of the FAA contracting officer or in lieu of such repairs or replacement, the outside interest shall, if so required by the contracting officer, pay to the United

States money in an amount sufficient to compensate for the loss sustained by the United States by reason of damage to or destruction of Government property.

12. The outside interest shall not release raw, unprocessed FAA data to the public, unless required by law; however, the outside interest may publicly release reports and analyses derived from the data, such as average flight trajectories and average flight events over a given point or track during designated time periods, as well as other derived data of a similar nature subject to the provisions of all other paragraphs of this agreement. At FAA's request, copies of all reports shall be provided to FAA.

13. Additional procedures and restrictions, as required.

14. The outside interest shall direct requests and deliver discs/tapes to: (AT Facility name, address, and phone number).

IV. INTERAGENCY COMMUNICATIONS.

A. The outside interest shall direct communications to: (Provide the complete mailing address for the FAA facility).

B. The FAA shall direct communications to: (Insert the complete mailing address for the outside interest).

V. TERMINATION OF AGREEMENT.

A. Either party may terminate this Agreement by giving the other party ninety (90) days written notification. The duration of this Agreement shall not exceed two years from the date signed by all parties.

VI. ADDITIONAL PROCEDURES AND RESTRICTIONS.

A. (Describe individually, by separate sub paragraph, each additional restriction and procedure that may apply).

VII. DATA COVERED BY THIS AGREEMENT.

For purposes of the Agreement, the "Data" shall be defined as follows:

(Describe the specific data here, and name the location; e.g., XYZ ASR-9).

VIII. SYSTEM REVIEW.

The FAA and the outside interest agree to conduct a review, at the request of either party, to determine whether the system is operating in accordance with the specifications of this Agreement and to examine the need for modifications to this

Agreement or to the operation of the system. The FAA and the outside interest will coordinate the location, time, and agenda of the review sessions. (Insert a time interval here, if applicable)

The FAA and the outside interest concur with the provisions of this Agreement as indicated by the signatures of their duly authorized officials.

FEDERAL AVIATION ADMINISTRATION	OUTSIDE INTEREST (fill in name)
By: _____ (Name and title)	By: _____ (Name and title)
Date: _____	Date: _____
By: _____ (Name and title)	
Date: _____	

APPENDIX 3. FAA FORM 1200-5, NAS DATA RELEASE REQUEST

OMB Approved 2120-0668

NAS DATA RELEASE REQUEST

Paperwork Reduction Act Statement: This data is collected to assess the validity of your request for approval/disapproval. It will take approximately 27 hours or less to complete this form. The collection is mandatory, and all information collected shall be kept confidential. An agency may not collect, and a person is not required to respond to an information collection, unless it displays a currently valid OMB Control Number.

1. Business/Organization Name		2. Business Phone Number	
3. Address (Street, City, State, ZIP Code)			
4. Point of Contact (POC) Name		5. Phone Number	6. Full E-mail Address
7. Are you currently receiving NAS data? Yes No (If no, skip to #10)			
8. Indicate your authority to access NAS Data. Memorandum of Agreement Government Contract Other (Explain) (Attach documentation)			
9. Indicate if you have an approved NCP(s) of file: Yes No If yes, list the case file number(s):			
10a. Type of data you are requesting: Delayed Recorded 10b. Describe the data requested: (Attach additional sheets)			
11. Describe your proposed method for acquiring data: (Attach additional sheets)			
12. Describe the nature of your organization/business and the purpose for this request. (Attach additional sheets)			
13. Describe your sensitive data filtering process. (Attach additional sheets)			
14. List any non-U.S. citizen personnel you will employ for this data request. Explain his/her duties in relation to this data request. (Attach additional sheets)			
FOR OFFICE USE ONLY:		Request Date //	Package Date //
		Issue Date //	Review Date //

FAA FORM 1200-5 (2/02) Local Reproduction Authorized NSN: 0052-00-923-3000

INSTRUCTIONS

If you require additional space to provide your answers, write them on a separate sheet preceded by the item number and attach them to this request.

1. Enter the complete registered name of the business or organization that has authority for all operations.
2. Enter the phone number of the business or organization.
3. Enter the complete address of the business or organization.
4. Enter the Point of Contact (POC) who will have the delegated authority. If this person is the same as the one stated in 3, indicate by entering "same as above."
5. Enter the phone number of the POC. If this person is the same as the one stated in item 4, indicate by entering "same as above."
6. Enter the business or organization's e-mail address.
7. Check the appropriate box. If the answer is "Yes," attach a copy of the appropriate documentation.
8. Check the appropriate box.
9. Indicate whether or not you have an approved NAS Change Proposal (NCP) with the FAA and include that number. If you have more than one NCP, list all NCP numbers.
10. Describe the type of data you are requesting -- location, facility, exact data sought. Be as specific as possible.
11. Describe your method for accessing NAS data. Tell what your equipment will do, how it will operate, the method of filtering, and any other capabilities as required.
12. State the type of business you operate and the specific purpose for using the NAS data.
13. List, in specific detail, your filtering process and data safeguard procedures.
14. Provide the names of any non-U.S. citizen personnel you plan to employ for this data request, along with the scope and nature of work the individual will perform.

NOTE: This form may also be down loaded from the AOP-300 website at:
<http://www.faa.gov/ats/aaf/aop/300/1200.22/>

Appendix D:
ASDE-X Data Distribution User Setup Sheets
(Government and End User)

DD User Setup Sheet- Instructions

General Instructions

All Data Distribution users must complete the setup sheet prior to receiving DD data. To access the form simply click on the tab at the bottom of the worksheet titled "User Setup Form". The setup form provides the necessary informat

G1- Name of End User

This must be the same Corporate name as is provided on your MOA and FAA Form 1200-5. In the case of a Government End User your Agency name and code should be entered here.

G2- End user Point of Contact

This information should be complete and maintained to prevent possible loss of information. This information will be used to follow up on any trouble calls that you initiate.

G3- Have you submitted the following ? MOA

A completed and approved MOA must be on file before you can begin receiving data. If you are a Government End User, skip down to Step F1 after answering this question.

FAA Form 1200-5

A completed and approved Form 1200-5 must be on file before you can begin receiving data

G4- Will you be sharing DD data with End Users who are not part of your company (Y/N)?

You are required to indicate all end users with whom you will be sharing your data, in accordance with the DD MOA. You are also responsible for providing updates to this information as needed.

F1 - Please Indicate in this section what types of information that you want DD to provide.

You should indicate all types of ASDE-X data that you want DD to provide. The fewer boxes that you check, the less data you will need to receive and store. **Note:** Do not forget to check one of the ADS-B data formats if you want to receive ADS-B data.

F2 - Please indicate in this section whether there are areas of the airfield from which you do not want DD data.

This feature allows you to specify region(s) of the airfield that you do not wish to receive data from. An example would be the gate areas not associated with aircraft you are interested in. If you elect to use this feature you will most likely reduce the amount of data that you receive.

ASDE-X Data Distribution Government User Setup Sheet

G1- End Use Government Agency: _____
Program/Dept/Code: _____

End user address
 street _____
 street _____
 city, state zip code _____

G2- End user Point of Contact
 Name _____
 Title _____
 Email Address _____
 Address (if different than above)
 street _____
 street _____
 city, state zip code _____
 Phone 1 _____
 Phone 2 _____

G3- Have you submitted the following (check all that apply)?

- MOA
- NCP NCP Number

G4- Will you be sharing DD data with End Users who are not part of your company? (Y/N)?

If you answered yes, then identify each user below and whether you have signed MOAs on file from them in accordance with the DD MOA

Company Name	Signed MOA on file?	POC Name	POC Phone No.

F1 - Please indicate in this section what types of information that you want DD to provide.

- | | |
|--|---|
| <input type="checkbox"/> Category 11 System Tracks | <input type="checkbox"/> Category10 SMR plots |
| <input type="checkbox"/> Category 10 ASR plots | <input type="checkbox"/> Category 10 MLAT |
| <input type="checkbox"/> Category 10 ADS-B | |
| <input type="checkbox"/> Category 33 ADS-B | |
| <input type="checkbox"/> All of the above | |

F2 - Please indicate in this section whether there are areas of the airfield from which you do not want DD data.
 Are there areas of the airfield from which you do not want to see aircraft or vehicle data? _____

I hereby certify that the information provided above is correct and complete to the best of my knowledge.

Name (please print)

Name (Print): _____

Signature: _____

Date: _____

Title: _____

Technician Setup Sheet

For Government Use Only

This sheet is used to provide a record of the initial setup as well as any changes to the end users setup. If there are changes to an end-users setup then a new sheet should be filled out.

Note: Be sure and provide the local AF office a copy of this for

**Is this a US Government
end-user (pick one)?**

Type of Setup action

User Name

User ID No.

Primary Port

Router Port/Jack Number

IP Address

Secondary Port

Router Port/Jack Number

IP Address

TELCO Circuit ID

The following F1 and F2 sections should be used to provide a record of the setup.

F1- Reports to be provided

Category 11 System Tracks

Category 10 ASR plots

Category 10 SMR plots

Category 10 MLAT

All of the above

Category 10 ADS-B

OR

Category 33 ADS-B

F2- Are there exclusion regions setup for the user?

If the answer to the above question is yes then provide a brief description of the regions

Name of technician

Date of Action (setup,

change, termination)

Notes:

General Instructions

All Data Distribution users must complete the setup sheet prior to receiving DD data. To access the form simply click on the tab at the bottom of the worksheet titled "User Setup Form". The setup form provides the necessary informat

G1- Name of End User

This must be the same Corporate name as is provided on your MOA and FAA Form 1200-5. In the case of a Government End User your Agency name and code should be entered here.

G2- End user Point of Contact

This information should be complete and maintained to prevent possible loss of information. This information will be used to follow up on any trouble calls that you initiate.

G3- Have you submitted the following ?
MOA

A completed and approved MOA must be on file before you can begin receiving data. If you are a Government End User, skip down to Step F1 after answering this question.

FAA Form 1200-5

A completed and approved Form 1200-5 must be on file before you can begin receiving data

G4- Will you be sharing DD data with End Users who are not part of your company (Y/N)?

You are required to indicate all end users with whom you will be sharing your data, in accordance with the DD MOA. You are also responsible for providing updates to this information as needed.

F1 - Please Indicate in this section what types of information that you want DD to provide.

You should indicate all types of ASDE-X data that you want DD to provide. The fewer boxes that you check, the less data you will need to receive and store. **Note:** Do not forget to check one of the ADS-B data formats if you want to receive ADS-B data.

F2 - Please indicate in this section whether there are areas of the airfield from which you do not want DD data.

This feature allows you to specify region(s) of the airfield that you do not wish to receive data from. An example would be the gate areas not associated with aircraft you are interested in. If you elect to use this feature you will most likely reduce the amount of data that you receive.

ASDE-X Data Distribution User Setup Sheet

G1- Name of End User: _____

End user address
 street _____
 street _____
 city, state zip code _____

G2- End user Point of Contact
 Name _____
 Title _____
 Email Address _____
 Address (if different than above)
 street _____
 street _____
 city, state zip code _____
 Phone 1 _____
 Phone 2 _____

Is the End User a US Government Entity?

G3- Have you submitted the following (check all that apply)?

- MOA
- FAA Form 1200-5
- NCP

If the End User is a government agency then you may skip to step F1 after answering this question.

NCP Number

G4- Will you be sharing DD data with End Users who are not part of your company?

If you answered yes, then identify each user below and whether you have signed MOAs on file from them in accordance with the DD MOA

Company Name	Signed MOA on file?	POC Name	POC Phone No.

F1 - Please indicate in this section what types of information that you want DD to provide.

- Category 11 System Tracks
- Category 10 ASR plots
- Category 10 ADS-B
- Category 33 ADS-B
- All of the above
- Category 10 SMR plots
- Category 10 MLAT

F2 - Indicate in this section whether there are areas of the airfield from which you do not want DD data.
Are there areas of the airfield from which you do not want to see aircraft or vehicle data?

I hereby certify that the information provided above is correct and complete to the best of my knowledge.

Name (please print)

Signature:

_____ Date: _____

Title:

Technician Setup Sheet

For Government Use Only

This sheet is used to provide a record of the initial setup as well as any changes to the end users setup. If there are changes to an end-users setup then a new sheet should be filled out.

Note: Be sure and provide the local AF office a copy of this for

Is this a US Government end-user (pick one)?

Type of Setup action

User Name _____

User ID No. _____

Primary Port _____

Router Port/Jack Number _____

IP Address _____

Secondary Port _____

Router Port/Jack Number _____

IP Address _____

TELCO Circuit ID _____

The following F1 and F2 sections should be used to provide a record of the setup.

F1- Reports to be provided

- Category 11 System Tracks
- Category 10 ASR plots
- Category 10 SMR plots
- Category 10 MLAT
- All of the above
- Category 10 ADS-B **OR** Category 33 ADS-B

F2- Are there exclusion regions setup for the user?

If the answer to the above question is yes then provide a brief description of the regions

Name of technician _____

Date of Action (setup, change, termination) _____

Notes:

General Instructions

All Data Distribution users must complete the setup sheet prior to receiving DD data. To access the form simply click on the tab at the bottom of the worksheet titled "User Setup Form". The setup form provides the necessary informat

- G1- Name of End User** This must be the same Corporate name as is provided on your MOA and FAA Form 1200-5. In the case of a Government End User your Agency name and code should be entered here.
- G2- End user Point of Contact** This information should be complete and maintained to prevent possible loss of information. This information will be used to follow up on any trouble calls that you initiate.
- G3- Have you submitted the following ?**
MOA A completed and approved MOA must be on file before you can begin receiving data. If you are a Government End User, skip down to Step F1 after answering this question.
FAA Form 1200-5 A completed and approved Form 1200-5 must be on file before you can begin receiving data
- G4- Will you be sharing DD data with End Users who are not part of your company (Y/N)?** You are required to indicate all end users with whom you will be sharing your data, in accordance with the DD MOA. You are also responsible for providing updates to this information as needed.
- F1 - Please indicate in this section what types of information that you want DD to provide.** You should indicate all types of ASDE-X data that you want DD to provide. The fewer boxes that you check, the less data you will need to receive and store. **Note:** Do not forget to check one of the ADS-B data formats if you want to receive ADS-B data.
- F2 - Please indicate in this section whether there are areas of the airfield from which you do not want DD data.** This feature allows you to specify region(s) of the airfield that you do not wish to receive data from. An example would be the gate areas not associated with aircraft you are interested in. If you elect to use this feature you will most likely reduce the amount of data that you receive.

Glossary of Terms

ADS-B - Automatic Dependent Surveillance-Broadcast subsystem

ASDE - Airport Surface Detection Equipment

ASR - Airport Surveillance Radar

ASTERIX (All Purpose Structured Euro-control Radar Information Exchange) - A Euro-control standard for the exchange of information that is used for the transmission of DD data.

Data Distribution (DD) System - The ASDE-X subsystem, comprised of hardware, software, communications equipment and telecommunications lines, used to receive and transmit surface surveillance data to approved end users.

MLAT (Multilateration) - A key component of the ASDE-X system, MLAT is a technique that uses an array of sensors strategically placed in and around the movement area of an airport to triangulate on transponder transmissions from aircraft and vehicles to track aircraft and vehicle movement.

MOA - Memorandum of Agreement

Movement Area- Those areas of an airport, such as runways, taxiways, and other areas, that are used for airport operations, such as taxiing, takeoff and landing of aircraft and vehicles, excluding ramps, gates and parking areas.

Non-Movement Area - Non-operational areas of an airport, such as ramps, gates, and parking areas.

SMR (Surface Movement Radar) – A Raytheon designed radar sometimes associated with ASDE-X. Generically it may refer to any radar used to monitor the movement area of an airport. Other radars that may be associated with the ASDE-X system in the future include the ASDE-3, SMRi, and SMRid radars.

Third Party - A customer of an Outside Interest (Sensis Corporation), outside the United States Government, interested in receiving NAS data.

ASOE-X
Options

ASOE-X Options for The City of Chicago Department of Aviation

Prepared by: Sensis Corporation
28 May 2006

the non-disclosure of data.
This document contains data that is proprietary to, and the property of, Sensis Corporation, and shall not be duplicated, used or disclosed, in whole or part, for any purpose other than to evaluate its content. If a contract is awarded to Sensis as a result of or in connection with the submission of this data, the Customer shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Customer's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in all pages of this document.



85 Collamer Crossings
East Syracuse, NY 13057
Phone: 315-445-0550
Fax: 315-446-2209
www.sensis.com

Experience

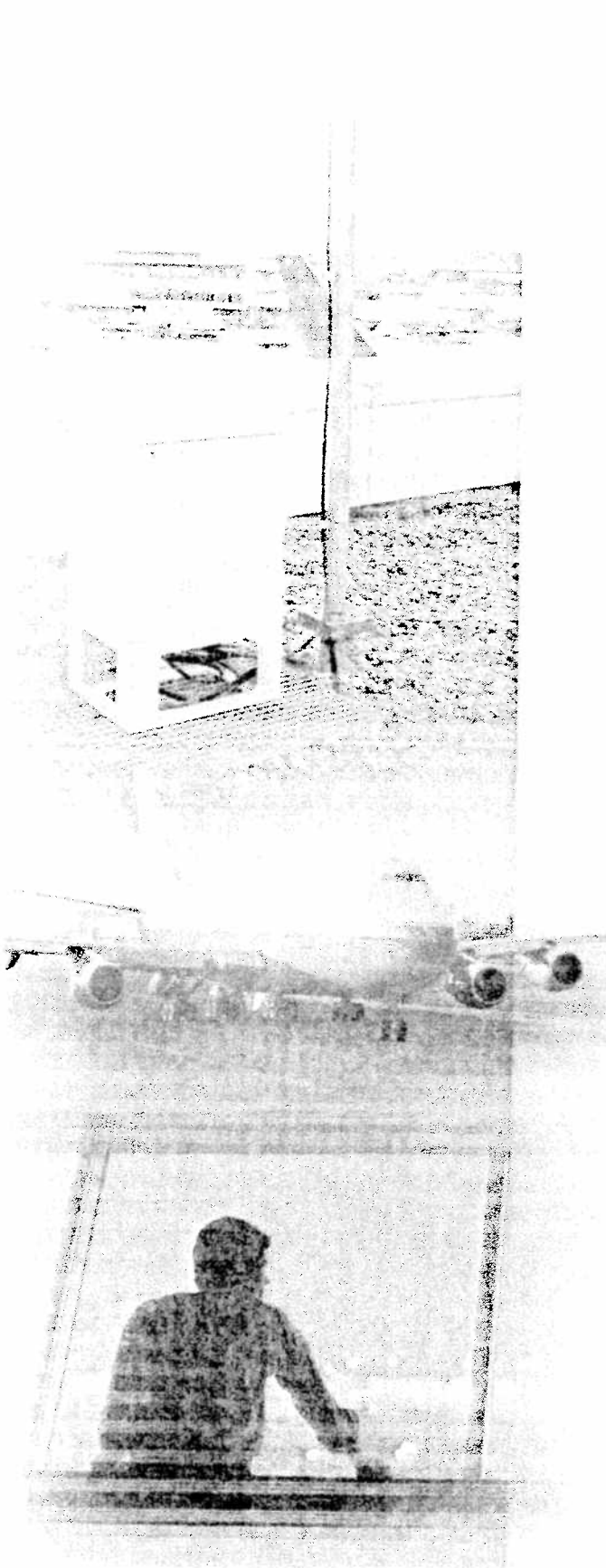


Table of Contents

Overview	1
1. Products and Pricing	2
1.1 Prime Mission Equipment	2
1.1.1 ORD Prime Mission Equipment	2
1.1.2 MDW Prime Mission Equipment	3
1.2 Recommended Spares	4
1.2.1 ORD Spares	4
1.2.2 MDW Spares	4
1.3 Time and Material Support	5
1.4 Payment Terms	5
2. Reference Documents	5
3. Scope of Work and Responsibilities	6
3.1 Data Distribution Cabinet	6
3.1.1 Sensis Responsibilities	6
3.1.2 DOA's Responsibilities	6
3.1.3 FAA's Responsibilities	7
3.2 Display Processor and ATC Display Upgrade	7
3.2.1 Sensis Responsibilities	7
3.2.2 DOA's Responsibilities	8
3.2.3 FAA's Responsibilities	8
3.3 VeeLo NextGen	8
3.3.1 Sensis Responsibilities	8
3.3.2 DOA's Responsibilities	9
3.3.3 FAA's Responsibilities	9
4. Physical Characteristics	9
4.1 Data Distribution Cabinet	9
4.2 Display Processor	10
4.3 Optional ATC Display	10
4.4 Optional ATC Keyboard	11
4.5 Optional ATC Trackball	11
5. Schedule	12
6. Support and Warranty	13
6.1 Warranty	13
6.2 Post Warranty Product Support	13
6.3 Recommended Spares and Maintenance	13
6.3.1 Data Distribution	13
6.3.2 Display Processor and Hi Brite Displays	13
6.3.3 VeeLo NextGen	13



7. Deliverables	13
8. Terms and Conditions of Sale.....	14

Overview

Sensis Corporation is pleased to provide Revision 2 to this Firm Fixed Price Proposal for The City of Chicago Department of Aviation (DOA) consideration. Revision 2 replaces Sensis previous Proposal #10007 dated 21 May, 2008.

The Department of Aviation has requested Sensis prices are in effect for five years; thus allowing the Authority flexibility in making purchases. In response to this request, the prices quoted are stated in 2008 calendar year dollars, representative of the base year, and are subject to an annual escalation rate of 3.5% per year over the five year period.

Sensis proposal is valid for 90 days from the date of original issuance.

If you have any questions or issues please contact the following:

Scott Remillard

Telephone: (315) 445-5056

Email: scott.remillard@sensis.com

1. Products and Pricing

Pricing is provided for Prime Mission Equipment, Spares, and Support.

1.1 Prime Mission Equipment

1.1.1 ORD Prime Mission Equipment

Figure 1 ORD Prime Mission Equipment Pricing

Item	Qty	Name	Description	Unit Price	Price	Delivery
1)	1	Data Distribution Cabinet	Provides a firewall to the operational ASDE-X system isolating the safety critical data from being used by other airport stakeholders. Includes Installation.	\$110,000	\$110,000	26 weeks ARO
2)	3	Display Processor	The processor drives display allowing the ATC to view the equipment vehicles within the movement area. Includes SW license. Comes with a Standard 19-inch LCD display, keyboard, and mouse. Includes SW license.	\$50,000	\$150,000	26 weeks ARO
3)	3	Optional: ATC Display Upgrade	Replaces 19-inch LCD Display, keyboard and mouse with ATC Hi Brite Display, ATC Keyboard and Trackball.	20,500	\$61,500	26 weeks ARO
4)	176	VeeLo NextGen (see notes 2,3)	Magnetically Mounted Vehicle Locator. Allows the ASDE-X system to receive identification as well as position information from vehicles.	\$1,748	\$307,648	90 Days ARO; First Availability Sept 1, 2008
5)	1	VeeLo NextGen PC Software configuration kit	PC Software that will allow the DOA to configure the VeeLos with Mode-S Codes, ID Codes, as well as coordinates that define transmit regions.	\$544	\$544	90 Days ARO; First Availability Sept 1, 2008
6)	1	Set-up and Checkout	Sensis will send a person on-site for one day after the display is installed for a system check-out and overview with the DOA.	\$3,000	\$3,000	<2 weeks after Installation
Total					\$632,692	

Note 1 - Prices quoted above are stated in 2008 calendar year dollars, representative of the base year, and are subject to an annual escalation rate of 3.5% per year over the five year period.

Note 2 - Sensis' latest understanding from the FAA is that the FAA will issue only issue up to 200 Mode-S codes per airport and allow only 50 active in the movement area at a time. The FAA has also suggested some flexibility in those restrictions. *Please note* it is the buyer's responsibility to obtain from the FAA authorization to use this product in an airport environment, as well as the Mode S address that needs to be loaded onto each unit. Contact info was previously provided.

Note 3 - VeeLo NextGen price reflects a quantity discount. VeeLo NextGen pricing for other quantities is as follows: Qty 1-50 \$2,226/ea Qty 51-150 \$2,203/ea and Qty 151+ \$1,748/ea.

1.1.2 MDW Prime Mission Equipment

Figure 2 MDW Prime Mission Equipment Pricing

		Name	Description	Unit Price	Price	Delivery
1)	1	Data Distribution Cabinet	Provides a firewall to the operational ASDE-X system isolating the safety critical data from being used by other airport stakeholders. Includes Installation	\$110,000	\$110,000	26 weeks ARO
2)	1	Display Processor	The processor drives display allowing the ATC to view the equipment vehicles within the movement area. Includes SW license. Comes with a Standard 19-inch LCD display, keyboard, and mouse. Includes SW license.	\$50,000	\$50,000	26 weeks ARO
3)	50	VeeLo NextGen (see notes 5,6)	Magnetically Mounted Vehicle locator. Allows the ASDE-X system to receive identification as well as position information from vehicles.	\$2,226	\$111,300	90 Days ARO; First Availability Sept 1, 2008
4)	1	VeeLo NextGen PC Software configuration kit	PC Software that will allow the DOA to configure the VeeLos with Mode-S Codes, ID Codes, as well as coordinates that define transmit regions.	\$544	\$544	90 Days ARO: First Availability Sept 1, 2008
5)	1	Set-up and Checkout	Sensis will send a person on-site for one day after the display is installed for a system check-out and overview with the DOA.	\$3,000	\$3,000	<2 weeks after Installation
Total					\$274,844	

Note 4 - Prices quoted above are stated in 2008 calendar year dollars, representative of the base year, and are subject to an annual escalation rate of 3.5% per year over the five year period.

Note 5 - Sensis' latest understanding from the FAA is that the FAA will issue only issue up to 200 Mode-S codes per airport and allow only 50 active in the movement area at a time. The FAA has also suggested some flexibility in those restrictions. *Please note* it is the buyer's responsibility to obtain from the FAA authorization to use this product in an airport environment, as well as the Mode S address that needs to be loaded onto each unit. Contact info was previously provided.

Note 6 - VeeLo NextGen price does not reflect a quantity discount. VeeLo NextGen pricing for other quantities is as follows: Qty 1-50 \$2,226/ea Qty 51-150 \$2,203/ea and Qty 151+ \$1,748/ea.

1.2 Recommended Spares

Pricing reflects 2008 base year prices. Pricing beyond 2008 base year will be subject to annual 3.5% escalation..

1.2.1 ORD Spares

Figure 3 outlines the recommended spares.

Figure 3 ORD Spares Pricing

Item	Qty	Name	Description	Unit Price	Price	Delivery
1)	1	Display Processor CPU	Preloaded Spare CPU for the Display Processor, Does not include SW license.	\$ 5,000	\$ 5,000	26 weeks ARO
2)	1	ATC Display	ATC Quality Display Workstation	\$ 18,000	\$ 18,000	26 weeks ARO
3)	1	Trackball	Trackball	\$ 2,000	\$ 2,000	26 weeks ARO
4)	1	Keyboard	Keyboard	\$ 2,000	\$ 2,000	26 weeks ARO
5)	9	VeeLo NextGen <i>(see note 6)</i>	Represents 5% of the 176 VeeLo total for ORD	\$ 2,226	\$ 20,034	90 Days ARO
Total					\$ 47,034	

Note 6 - VeeLo NextGen purchases can be combined to receive a lower quantity discount price.

1.2.2 MDW Spares

Figure 4 outlines the recommended Spares.

Figure 4 MDW Spares Pricing

Item	Qty	Name	Description	Unit Price	Price	Delivery
1)	1	Display Processor CPU	Preloaded Spare CPU for the Display Processor, Does not include SW license.	\$ 5,000	\$ 5,000	26 weeks ARO
2)	3	VeeLo NextGen <i>(see note 7)</i>	Represents 5% of the 50 VeeLo total for MDW	\$ 2,226	\$ 6,678	90 Days ARO
Total					\$ 11,678	

Note 7 - VeeLo NextGen purchases can be combined to receive a lower quantity discount price.

1.3 Time and Material Support

Sensis Customer Support is available in accordance with the category labor rates as depicted below. Management of this effort is best accommodated with a Time and Material line item included in the contract.

- Category 1, Senior Engineer/Manager \$205/hr
- Category 2, Engineer/Manager \$142/hr
- Category 3, Junior Engineer/Technician \$94/hr

Note: Prices quoted above are stated in 2008 calendar year dollars, representative of the base year, and are subject to an annual escalation rate of 3.5% per year over the five year period.

1.4 Payment Terms

Orders provided on a firm, fixed price basis shall be invoiced as follows:

- For orders less than \$250,000 all items will be invoiced immediately upon shipment and payable Net 60.
- For orders greater than \$250,000, a 50% down payment will be invoiced upon receipt of the order and payable Net 60. The remaining balance will be invoiced upon shipment and payable Net 60.
- For services performed on a Time & Materials basis, labor shall be invoiced at the daily rate including travel time specified in section 1.3 and Travel and Living charges shall be invoiced at actual incurred cost plus a 15% administrative fee. Such services will be invoiced ten days following the completion of each assignment and payable Net 60.

2. Reference Documents

FAA Document. Airport Surveillance Detection Equipment – Model X (ASDE-X) Data Distribution (DD) System Guidance Document. May 29, 2007.

3. Scope of Work and Responsibilities

The scope of work and responsibilities are divided into: Data Distribution; Display Processor and Hi-Brite Display Upgrade; and VeeLo NextGen.

3.1 Data Distribution Cabinet

The scope of work and responsibilities are defined by the three major stakeholders: Sensis, the DOA, and the FAA

→ Data Distribution Cabinet

The Data Distribution Cabinet provides a gateway for airport stakeholders to obtain real-time surveillance information to feed value-added services.



Data Distribution (DD) provides a firewall to the operational ASDE-X system isolating the safety critical data from data being used by other airport stakeholders. DD acts as a mechanism to distribute real-time surveillance data to multiple airport stakeholders. Data can be adapted in many ways for multiple users.

3.1.1 Sensis Responsibilities

- Conduct Site Survey
- Execute Site Prep (Power & Communication from the ASDE-X system to the Data Distribution Cabinet)
- Install the Data Distribution system
- Configure System for users
- Verify that the Data Distribution Cabinet is working
- Support the DOA in obtaining MOA (Memorandum of Agreement) from the FAA

3.1.2 DOA's Responsibilities

- Support for Sensis Site Survey and Determine locations for the equipment.
- Support Sensis in implementing the required Power for the Data Distribution Cabinet.
- Connectivity from Data Distribution Cabinet
- Transfer Ownership of the Data Distribution Cabinet to the FAA upon integration into the ASDE-X system.

- Have required spares on-site
- Generate a Memorandum of Agreement with the FAA for the use of the ASDE-X Data. Please refer to the FAA Document; Airport Surveillance Detection Equipment – Model X (ASDE-X) Data Distribution (DD) System Guidance Document, May 29, 2007.

3.1.3 FAA's Responsibilities

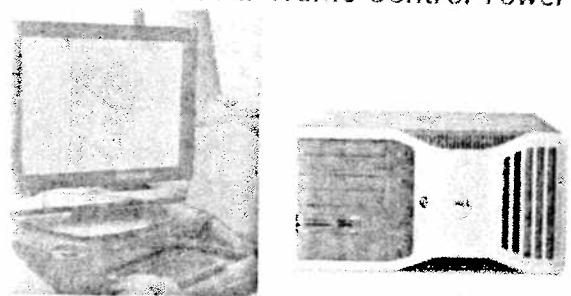
- Maintenance of the Data Distribution Cabinet once ownership is transferred to the FAA
- Approval of the Memorandum of Agreement between the DOA and the FAA.

3.2 Display Processor and ATC Display Upgrade

The work scope and responsibilities are defined by the three major stakeholders: Sensis, the DOA, and the FAA.

➤ Display Processor and Hi-Brite Upgrade

Remote Displays allow other airport users to view the same real-time traffic information that was once limited to the Air Traffic Control Tower



Airport stakeholders can now benefit from the same real-time traffic information that air traffic controllers are seeing as part of ASDE-X. Through DD, users can now receive a display that allows them to view delay-free traffic information unfolding on the movement areas of the airport. Remote Displays provide the Human Machine Interface (HMI) function of the system, which provides users with a full-color, high-bright display and clearly identifies all targets with their associated Flight Identification (ID) in a single integrated picture.

3.2.1 Sensis Responsibilities

- Configure the Display Processors at Sensis (2 for MDW and 2 for ORD)
- Ship the Units to the DOA specified locations

- Come on-site for final configuration and training once the displays are installed

3.2.2 DOA's Responsibilities

- Power
- Communications from the Data Distribution Cabinet to the Displays
- Installation of the Display Processors and the ATC Displays, Trackball, and keyboard.
- In the event of a failure, the DOA will remove and replace with a spare or from a repaired unit.

3.2.3 FAA's Responsibilities

- None

3.3 VeeLo NextGen

The work scope and responsibilities are defined by the three major stakeholders: Sensis, the DOA, and the FAA.

Sensis' latest understanding from the FAA is that FAA will issue up to 200 Mode-S codes per airport and allow only 50 active in the movement area at a time. The FAA has also suggested some flexibility in those restrictions.

→ VeeLo NextGen™ Vehicle Tracking Unit

The Sensis VeeLo NextGen™ is a Mode S based vehicle locator.



The Sensis VeeLo™ is a Mode S based vehicle locator that enables tracking and positive identification of surface vehicles at airports. Compliant with the RTCA DO-260A MOPS for an ADS-B system operating on 1090 MHz frequency, these units transmit ADS-B messages to allow for seamless integration with the MDS infrastructure. These units can be permanently or temporarily mounted and configured for use by airport personnel.

3.3.1 Sensis Responsibilities

- Ship the Units to the DOA specified locations

3.3.2 DOA's Responsibilities

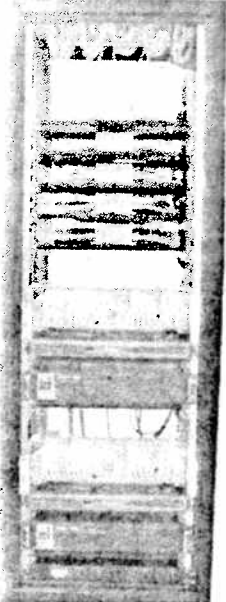
- Obtain blocks of Mode-S Codes from the FAA
- Configuration of the VeeLos for each airport
- Installation of the Units on the Vehicles

3.3.3 FAA's Responsibilities

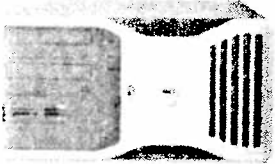
- Issue Mode-S Codes for MDW and ORD

4. Physical Characteristics

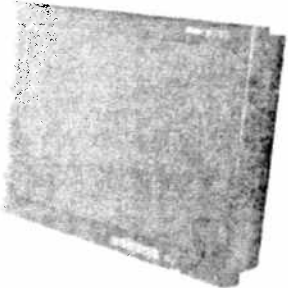
4.1 Data Distribution Cabinet

Data Distribution Cabinet	Unit Size (Inches) (W x D x H)	Unit Weight (pounds)	Max. Power Usage (Amps/Volts)	Unit Interconnection Options
	24x29x72	329 (estimated)	Primary Circuit 7.2A/120V Max 2.4A/120V (Steady State) Secondary Circuit 7.2A/120V Max 2.4A/120V (Steady State) Total 14.4A Max 4.8A (Steady State) Circuit C 20 A/120V (Convenience Outlet)	120 VAC; Ethernet


4.2 Display Processor

<i>Display Processor</i>	<i>Unit Size (Inches) (W x D x H)</i>	<i>Unit Weight (pounds)</i>	<i>Max. Power Usage (Amps/Volts)</i>	<i>Unit Interconnection Options</i>
	17.6 x 6.7 x 18.5	34.3	120V, 750 W (nominal)	LAN; Fiber Optic Video Out; AC Power In

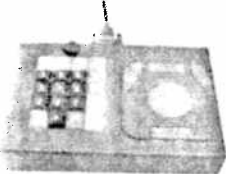
4.3 Optional ATC Display

<i>ATC Display</i>	<i>Unit Size (Inches) (W x D x H)</i>	<i>Unit Weight (pounds)</i>	<i>Max. Power Usage (Amps/Volts)</i>	<i>Unit Interconnection Options</i>
	19.5x5.4x17	40	0.7A/120V (Steady State)	Video In; Serial In; AC Power In

4.4 Optional ATC Keyboard

<i>ATC Keyboard</i>	<i>Unit Size (inches) (W x D x H)</i>	<i>Unit Weight (pounds)</i>	<i>Max. Power Usage (Amps/Volts)</i>	<i>Unit Interconnection Options</i>
	12.8x6.7x2	<5	0.1A/120V	IBM PS2 / Serial Out

4.5 Optional ATC Trackball

<i>ATC Trackball</i>	<i>Unit Size (inches) (W x D x H)</i>	<i>Unit Weight (pounds)</i>	<i>Max. Power Usage (Amps/Volts)</i>	<i>Unit Interconnection Options</i>
	9x6x3	<5	0.1A/120V	Serial Out

5. Schedule

Figure 5 provides timeframes of key project milestones.

Figure 5 Key Project Milestones Schedule

Item	Key Project Milestone	Timeframe
1)	MOU Process Begins	< 1 Week ARO
2)	Request for Mode-S Codes	< 1 Week ARO
3)	VeeLo Next Gen Ships	90 Days ARO; first availability is Sept 1, 2008
4)	Mode-S Codes Received	Before VeeLo Next Gen Configuration
5)	Configure VeeLo Next Gens	After VeeLo NextGen Arrives and Mode-S Codes Received
6)	MOU Complete	Before Installation
7)	Site Survey and Project Kick-Off	< 4 Weeks ARO
8)	Hardware Delivery *	26 Weeks ARO
9)	Configuration and Training	27 Weeks ARO

* - This date may be earlier depending on material lead times. If the equipment is available before ASDE-X is available at MDW, Sensis will hold equipment at Sensis and ship/install at a mutually agreed upon time frame.

6. Support and Warranty

6.1 Warranty

Sensis warrants the products to be free from defects caused by faulty material or poor workmanship for a period of twelve (12) months from the date of delivery for hardware or for spares (if applicable), ninety (90) days for repairs and twelve (12) months from the date acceptance for installed products.

6.2 Post Warranty Product Support

Sensis recommends that Sensis and the DOA have a support contract in place where at the direction of the DOA, Sensis will perform work on behalf of the DOA at standard Sensis rates. *(See Section 1.3.)*

6.3 Recommended Spares and Maintenance

6.3.1 Data Distribution

The spares required by the FAA before the FAA takes ownership of the Data Distribution Cabinet are included in the delivery and installation of the Data Distribution Cabinet.

6.3.2 Display Processor and Hi Brite Displays

Sensis recommends that the DOA purchase one additional Hi-Brite Display and one display processor CPU. See Section 1.2 for more information. In the unlikely event of a failure the DOA would send the failed unit back to Sensis for evaluation and Sensis would prepare a quote for either repair or replacement.

6.3.3 VeeLo NextGen

Sensis recommends that the DOA purchase, as spares, approximately 5% of the total required VeeLo NextGens. See Section 1.2 for more information. In the unlikely event of a failure the DOA would send the failed unit back to Sensis for evaluation and Sensis would prepare a quote for either repair or replacement.

7. Deliverables

There are no deliverables beyond the equipment.

3. Terms and Conditions of Sale

Terms and conditions as mutually agreed by the parties.



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: VEHICLE TRACKING EQUIPMENT:
STANDARDS AND CERTIFICATION

Date: DRAFT 3/23/04

AC No: 150/5220-xx

Initiated by: Safe
Flight 21

Change:

1. PURPOSE.

This advisory circular (AC) provides Federal Aviation Administration (FAA) minimum standards for the certification, installation and operational approval of airport vehicle tracking equipment (VTE) used to provide improved situational awareness of the airport surface.

2. BACKGROUND.

a. **Different Categories of Equipment.** Basic VTE provides an airfield vehicle operator with a moving map display of airport surface features overlaid with the vehicle's global positioning system (GPS)-derived position. The equipment's basic capability can be upgraded with optional capabilities including (1) broadcast of the vehicle's position on an automated dependent surveillance-broadcast (ADS-B) data link and (2) display of proximate aircraft/vehicle targets received via an ADS-B data link. A minimal-function capability is also available for installations that only need to broadcast a vehicle position and do not require a display.

b. **Certification.** It is in the interest of the aviation community that VTE equipment does two things. First, VTE should provide certain minimum benefits. Second, VTE should not have an adverse impact on the National Airspace System (NAS). The minimum standards of this AC are intended to ensure that both of these things occur. The FAA has chosen to develop this AC out of concern that, in the absence of this AC, the marketplace would not necessarily ensure that both of these things occur.

c. **Federal Communication Commission (FCC) Equipment Certification.** Manufacturers must obtain certification from the FCC for new types of transmitting equipment including this vehicle tracking equipment. With equipment that transmits in portions of the radio spectrum allocated to aeronautical use, the FCC relies upon the FAA's judgment on certification standards. This AC constitutes the FAA's judgment on the minimum standards for certification. While this document principally defines basic VTE features, manufacturers may choose to add other features. If the manufacturer adds features not included in this document, the manufacturer must develop a minimum standard and test process for these features. The test process must demonstrate that the additional features provide benefits and do not have an adverse impact on the NAS.

d. **FCC Frequency Authorization.** Nonfederal entities must obtain radio frequency assignments from the FCC. In portions of the radio spectrum allocated to aeronautical use, the FCC relies upon the FAA's judgment for the selection of frequencies and for ensuring that new assignments will not adversely impact with the operation of the National Airspace System (NAS).

3. APPLICATION.

The provisions of this AC apply to systems, or portions thereof, that are submitted for FAA certification. FAA-certificated equipment may be eligible to receive a Federal Communications Commission (FCC) Radio Station license and funding under Federal grant programs. VTE that is *not* FAA-certificated will *not* be eligible for authorization to use aeronautical frequencies or funding under Federal grant programs.

4. CONTENTS OF THIS ADVISORY CIRCULAR

The material in this AC is neither mandatory nor regulatory in nature and does not constitute a regulation. It describes an acceptable means, but not the only means, for demonstrating compliance with the minimum standards. If an applicant elects to present other means of demonstrating compliance, the FAA will consider them. When an acceptable means of compliance is described in this document, terms such as "shall" and "must" are used in the sense of ensuring applicability of the particular method of compliance. While the minimum standards of this AC are not mandatory, they are intended to ensure that VTE equipment provides certain minimum benefits and avoids an adverse impact on the NAS. If the FAA becomes aware of circumstances that convince us that following this AC would not ensure that both of these things would be achieved, we will not be bound by the terms of this AC. Under such circumstances, the FAA may require additional substantiation as a basis for certification.

Steve Brown

Vice President, Operations Planning Services

CONTENTS

CHAPTER 1. INTRODUCTION	1
100. BACKGROUND	1
101. EXPLANATION OF TERMS	1
102. FUNCTIONAL DESCRIPTION	1
103. OPERATIONAL ENVIRONMENT	1
104. VTE CAPABILITY CATEGORIES	1
105. VTE SUBSYSTEM FUNCTIONS	1
106. ADS-B DATA LINK STANDARDS	2
107. RELATED/REFERENCED READING MATERIAL	3
CHAPTER 2. VEHICLE TRACKING EQUIPMENT CERTIFICATION AND INSTALLATION APPROVAL PROCESS	5
200. PROCESS OVERVIEW	5
201. MANUFACTURER SUBMITTALS FOR TYPE APPROVAL	5
202. TEST PROGRAM	5
203. SYSTEM DOCUMENTATION	5
204. CONFIGURATION CONTROL PLAN	6
205. DEPLOYMENT PLANNING	7
206. FLEET COMMISSIONING	7
207. VEHICLE TRACKING EQUIPMENT COMMISSIONING	7
208. ONSITE DOCUMENTATION	8
209. MAINTENANCE PROGRAM	10
CHAPTER 3. PERFORMANCE AND TESTING SPECIFICATIONS FOR VEHICLE TRACKING EQUIPMENT	11
300. GENERAL	11
301. OPERATING ENVIRONMENT	11
302. ADS-B DATA LINK	11
303. GPS RECEIVER	12
304. 1090 MHZ ADS-B TRANSMITTER AND RECEIVER	13
305. UAT ADS-B TRANSMITTER AND RECEIVER	13
306. OTHER RADIO DATA LINKS	15
307. OVERALL VTE SYSTEM PERFORMANCE	15
308. GENERAL DISPLAY FEATURES	16
CHAPTER 4. VEHICLE TRACKING EQUIPMENT MAINTENANCE AND OPERATING APPROVAL REQUIREMENTS	23
400. GENERAL	23
401. DATABASE INFORMATION CURRENCY	23
402. PERIODIC RECERTIFICATION	23
APPENDIX A. TITLE 14 CFR AND TITLE 47 CFR REFERENCES AND RELATED MATERIAL	25
APPENDIX B. ADMINISTRATIVE INFORMATION	27
1. REQUESTS FOR INFORMATION	27
2. HOW CAN I OBTAIN THIS AND OTHER FAA PUBLICATIONS?	27
3. SUBMISSION OF DATA	27
4. CHANGES TO AN APPROVED CONFIGURATION	27
APPENDIX C. ACRONYMS AND ABBREVIATIONS	29

CHAPTER 1. INTRODUCTION

100. BACKGROUND

In an effort to reduce surface vehicle incursions on the airport movement area, various types of equipment can be used to minimize the frequency and severity of occurrences. Installing such equipment on surface vehicles provides the vehicle operator with increased situational awareness and enhanced safety and efficiency. With position information, vehicle operators and others will see where they are on the movement area and, therefore, avoid incursions.

101. EXPLANATION OF TERMS

The following definitions apply to this AC:

- a. **Airport movement area** consists of airport runways and taxiways.
- b. **Almanac data** tell the global positioning (GPS) receiver where each GPS satellite should be located throughout the day. Each satellite transmits almanac data showing orbital information for all satellite in the system.
- c. **Ephemeris data**, constantly transmitted by each satellite, contains the status of the satellite, along with current date and time. This part of the GPS signal is essential to determine receiver position.
- d. **Non-movement area** consists of the aircraft operational areas of the airport other than the runways and taxiways.

102. FUNCTIONAL DESCRIPTION

Several types of equipment are available to provide vehicle operators, pilots, and air traffic control (ATC) with the means to identify and track surface vehicles more effectively. These include devices to broadcast a vehicle's location and to provide maps that show its position as well as that of other vehicles. These devices can also display aircraft and the airport layout. User will determine the type of equipment to be used based on needs.

103. OPERATIONAL ENVIRONMENT

- a. **Geographic Transmission Limitations.** Within an airport movement area, VTE should transmit vehicle position, identification, and other specific information. Upon leaving the airport movement area, VTE should automatically inhibit its transmission.

NOTE: This issue is still under discussion and comments are welcome. One proposal is that transmission should be allowed throughout the airport's airside area.

- b. **Aeronautical Frequencies.** VTE will operate on either one or both of the ADS-B data link systems (1090 MHz Extended Squitter, 978 MHz Universal Access Transceiver) currently approved for use nationwide. This equipment is intended to operate with no more radiated power than is required to function properly. Therefore, transmitter power is to be adjustable, however, this adjustment should not be accessible to the vehicle operator. Transmitter power adjustments are to be performed by maintenance personnel responsible for the equipment. Equipment should also meet standard temperature, humidity, shock, and vibration requirements.

- c. **Other Frequencies.** VTE may operate on non-aeronautical frequencies in addition to one or both aeronautical frequencies. Such operations may support non-ADS-B applications and users not specifically addressed herein. These operations cannot have an adverse impact on the National Airspace System (NAS).

104. VTE CAPABILITY CATEGORIES

The FAA and industry have defined the following four categories of vehicle tracking equipment: a) situation display with own position; b) broadcast of vehicle position; c) situation display with own position and broadcast of vehicle position; and d) situation display of own position, broadcast of vehicle position, and reception of traffic information. This information is summarized in the following table:

	Situation Display with Own-Vehicle Position	Broadcast of Vehicle Position	Reception of Traffic Information
Category 1	•		
Category 2		•	
Category 3	•	•	
Category 4	•	•	•

- a. **Category 1 VTE** shows the vehicle's GPS-derived position on a moving map. This equipment would provide the vehicle operator with location information relative to the airport layout. The moving map must be updated with the latest information available on the runway and taxiways so that its database is accurate and current, allowing the vehicle operator to be aware of any changes to the airport layout (e.g., construction).
- b. **Category 2 VTE** broadcasts the vehicle's position to other users. This equipment would allow ATC, aircraft and other vehicles, and ground personnel to track the position of the vehicle.
- c. **Category 3 VTE** displays own-vehicle position on a moving map in the vehicle and broadcast its position to other users.
- d. **Category 4 VTE** upgrades the Category 3 capability with reception of traffic information pertaining to aircraft and other vehicles on the airport surface. This allows the moving map to display own-vehicle position as well as that of other vehicles resulting in an improved situational awareness particularly beneficial during periods of low visibility. The source of traffic information pertaining to other vehicles can only be an ADS-B data link.
- e. **Optional Capabilities.** While this document principally defines basic VTE features, manufacturers may choose to add other features. If the manufacturer adds features not included in this document, the manufacturer must develop a minimum standard and test process for these features. The test process must demonstrate that the additional features provide benefits and do not have an adverse impact on the NAS. Some users have expressed interest in runway alerting, collision avoidance, NOTAM overlays, building identification, identification of additional airport areas (taxiways, holding positions, ramp areas, etc.), and locations of critical airport equipment (fuel lines, water lines, shutoff valves, hazardous material (HAZMAT) areas, fire extinguishers, electrical switchgear, etc.). Advanced features such as runway alerting and collision avoidance may require extensive documentation and test suites. Optional capabilities are still under discussion and comments are welcome.

105. VTE SUBSYSTEM FUNCTIONS

- a. **Moving map display** for vehicles may be for own-vehicle position only or for own-vehicle and other-vehicle positions.
- b. **GPS Wide Area Augmentation System (WAAS) receiver** identifies the vehicle's location on the moving map display. This map shows vehicle position relative to airport layout, including obstacles, and may be used by personnel to find the most effective route to their destination.
- c. **Vehicle tracking** includes information from various tracking sources that is available for the surface vehicle operators, ATC displays and other airport personnel displays.

106. ADS-B DATA LINK STANDARDS

- a. **All equipment capable of receiving and/or transmitting** surveillance information must be compatible with U.S. standards for ADS-B data link systems.

b. ADS-B equipage classes are defined in RTCA DO-242A [Minimum Aviation System Performance Standards for Automatic Dependent Surveillance-Broadcast (ADS-B)]. Two ADS-B equipage classes pertain to surface VTE: classes B2 and A0. DO-242A equipage class B2 is for transmit-only ground vehicle applications and could be used on a VTE Category 2 or a Category 3 system. DO-242A equipage class A0 is for a system that transmits and receives. Use of the receiver is only appropriate on VTE Category 4 systems.

c. The transfer of information is performed by means of an FAA-approved data link. The 1090 MHz ADS-B transmitter and receiver are defined in DO-260A [Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Services (TIS-B)]. The UAT ADS-B transmitter and receiver are defined in DO-282 [Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B)]. Dual-band equipment capable of simultaneously accessing both of the currently approved ADS-B data link systems results in improved situational awareness.

107. RELATED REFERENCE MATERIAL

The following is a list of documents referenced in this AC. Instructions for obtaining many of these publications are found in Appendix B.

- a. **AC 20-138**, Airworthiness Approval of Global Positioning System (GPS) Navigation Equipment for use as a VFR and IFR Supplemental Navigation System.
- b. **AC 150/5340-19**, Taxiway Centerline Lighting System.
- c. **RTCA DO-181C**, Minimum Operational Performance Standards for Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/MODE S) Airborne Equipment.
- d. **RTCA DO-229C**, Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment.
- e. **RTCA DO-242A**, Minimum Aviation System Performance Standards for Automatic Dependent Surveillance-Broadcast (ADS-B).
- f. **RTCA DO-257A**, Minimum Operational Performance Standards for the Depiction of Navigation Information on Electronic Maps.
- g. **RTCA DO-260A**, Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Services (TIS-B).
- h. **RTCA DO-282**, Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B).
- i. **MIL-STD-810F**, Test Method Standard for Environmental Engineering.
- j. **SAE J1455**, Joint Society of Automotive Engineers (SAE)/Technology and Maintenance Council (TMC) Recommended Environmental Practices for Electronic Equipment Design (Heavy-Duty Trucks).
- k. **FAA Order WA 5200.xx**, Assignment Criteria – Mode S Codes for Airport Surface Vehicles, Obstructions, Skydivers and Parachutists.
- l. **International Electrotechnical Commission (IEC) 60529**, Degrees of Protection Provided by Enclosures (IP Code).

CHAPTER 2. CERTIFICATION AND INSTALLATION APPROVAL PROCESS

200. PROCESS OVERVIEW

To provide confidence that the VTE will perform properly, the FAA has defined a three-part certification and commissioning process.

- a. **Manufacturer Responsibility.** The manufacturer should provide the FAA with the test data and other documentation to demonstrate that the VTE meets the minimum standards of this AC. The FAA reserves the right to witness testing and examine raw data. Upon review of test data and satisfactory completion of all requirements set forth in this document, the FAA may grant approval to the specific equipment documented in the request.
- b. **Airport Authority Responsibility.** When VTE is to be installed, the Airport Authority should closely coordinate plans with the FAA regional Airway Facilities Office.
- c. **Airport Tenant Responsibility.** When an airport tenant plans to install VTE, they should coordinate with the FAA regional Airway Facilities Office.
- d. **FAA Responsibility.**
 - (1) **Commissioning.** After VTE is installed on site, FAA Airway Facilities will conduct a commissioning inspection to verify that the equipment is installed and operating properly and that the airport has the resources to maintain the system in proper operating condition (par. 206, fleet commissioning, and par. 207, vehicle commissioning, of this AC). This process must be successfully completed for VTE to be commissioned by the FAA and authorized for use.
 - (2) **Periodic System Recertification.** The FAA and other technical representatives may make periodic visits to the airport to verify that the system continues to operate correctly. Guidance for these visits may be found in Chapter 4 of this AC.

201. MANUFACTURER SUBMITTALS FOR CERTIFICATION

- a. **Three Submittals.** The FAA grants VTE certification after review and approval of three submittals from the manufacturer.
 - (1) **Requests for certification** should be sent to the FAA Solutions Development Division at the address listed in Appendix B, paragraph 3.
 - (2) **The first submittal** consist of test procedures and data sheets that demonstrate that the proposed VTE meets the minimum hardware and software standards of this AC. This submittal should include a matrix showing each specific minimum standard from this AC, cross-referenced to the specific location (paragraph, page, etc.) within the manufacturer's submittal where the minimum standard has been addressed.
 - (3) **The second submittal** should consist of training and maintenance documents intended to support the vehicle tracking system owner.
 - (4) **The third submittal** should consist of a configuration control plan that identifies the components and options approved for use with the system.

202. TEST PROGRAM

- a. **Chapter 3** of this AC contains the minimum performance and testing standards for VTE. The manufacturer should demonstrate compliance with these minimum standards through performance testing (where a test is specified) or by analysis and inspection. The manufacturer provides all necessary equipment and bears all testing costs.
- b. **Prior to performing tests**, the manufacturer should propose a test plan to the FAA containing detailed procedures for conducting the tests, as well as the name and location of the facility where the tests are to be conducted. Prior FAA review of the test plan should minimize the likelihood of improper test procedures that might result in rejection of the data.

c. **It is the responsibility of the manufacturer** to provide credible test data to the FAA that is based on fact, and representative of the equipment being certified. Submissions should include all data collected during a test. Data should not be omitted because it falls outside of the recommended acceptable limits of the AC. After completion of the tests, the manufacturer should reduce the data to an easily understood format to demonstrate conformity with this AC.

203. SYSTEM DOCUMENTATION

a. **Submission of Draft Documents.** The manufacturer should submit three copies of the draft documentation described in this paragraph to the FAA for review and approval. The System Description Manual, Maintenance Manual, Installation and Checkout Manual, Operating Instructions Manual, Training Program, and the Periodic System Recertification Plan should be provided as separate manuals. These documents are intended to assist the VTE owner in installing, operating, and maintaining the system. The items may be cross-referenced to avoid duplication, but the elements of each document should be clear. (For example, the maintenance procedures that are performed during the periodic system recertification should be explicitly referenced.)

b. **System Description Manual.** The system description manual identifies and catalogs the hardware components to the level of the smallest field-replaceable module and describes computer software. The principles of system operation are described using schematics, block diagrams, and flow diagrams. For peripheral devices, the performance parameters are included along with the name and address of the original manufacturer.

NOTE: Specifically who uses this document and for what purposes?

c. **Manufacturer's Maintenance Manual.** The manufacturer's Maintenance Manual should contain maintenance information and procedures for use by maintenance personnel to ensure reliable and accurate performance over the life of the equipments. As a minimum, the program should define all maintenance activities that are required and a recommended frequency (e.g., quarterly, annually, biennially) for each operation. The following topics should be addressed in the Maintenance Manual:

(1) **Maintenance Procedures.** The manual should contain a step-by-step procedure for each scheduled (i.e., periodic) and unscheduled (i.e., repair) maintenance operation. It should discuss calibration methods, troubleshooting procedures, suggested spare parts, and identify all test equipment required. This document should also include the detailed procedures (e.g., the keystrokes) the maintenance technician follows when using the operator terminal to perform maintenance on a piece of VTE. Note: At the time this AC is being developed, there are no FAA certified stations for the repair of VTE. Maintenance manuals and procedures should distinguish between what tasks can be done by local maintenance personnel and what tasks must be done by others such as the manufacturer's own personnel. If VTE components are to be shipped for repair, the manufacturer should address how and when this should be done. The manufacturer should also develop a list of spare components that are expected to be needed to maintain continuity of service while repairs are underway. Maintenance manuals and procedures should address who is responsible for the various components of a vehicle tracking system. In some cases, we suspect that maintenance responsibilities may be split among the airport authority, an airline corporation, and the FAA.

(2) **System Performance Parameters.** The manual should contain a complete listing of the test points, sensor outputs, waveforms, and other parameters that indicate system performance that may be measured in the field. If these quantities are field adjustable, then an initial value (for use during initial certification) and an operating tolerance (for use during periodic recertification) should be given. The key system parameters should also be identified - those values that best indicate system performance and need to be checked most frequently. The frequency of scheduled maintenance actions (e.g., weekly, monthly, annually, etc.) should also be given.

d. **Installation and Checkout Manual.** This document should thoroughly describe the installation and checkout procedures to be followed by the technician at the installation site. Installation instructions should include details on the proper mounting of the equipment and include details on any areas that could adversely affect system performance (e.g., installing component in close proximity to the engine or another source of possible extreme heat).

e. **Operating Instructions Manual (i.e., a User Handbook).** This document should provide detailed instructions for an equipment operator to use the system.

f. Training Program. The training program should consist of a summary of the knowledge and skills that an equipment operator and a maintenance technician should possess to operate and service the VTE.

g. Periodic System Recertification Plan. This plan should contain the recommended procedures to conduct a periodic inspection of the equipment to verify and document that the equipment is in the approved configuration and operating with tolerance (Chapter 4).

h. Submission of Approved Documents. After the FAA has approved the draft documents, 12 copies should be submitted to the proper FAA Solutions Development Division before certification or system modification approval will be granted. These copies are distributed to other FAA offices as appropriate to keep them apprised of all certificated systems and approved changes. If a manufacturer modifies the initially approved configuration, then three copies of the revised supporting documentation should be submitted for approval. After approval by the FAA, 12 copies of the approved change documents should be submitted to the FAA Solutions Development Division for distribution to other FAA offices. The FAA should receive these 12 copies before certification is granted and the system is offered for sale.

NOTE: The required number of copies to be supplied is still under review.

NOTE: Upon approval by the Solutions Development Division, an electronic copy of the approved documents may be submitted in addition to one printed copy of the approved documents.

204. CONFIGURATION CONTROL PLAN

a. Overview. Due to the modular nature of VTE, many system components may be interchangeable. Since certification is given only to specific components, the manufacturer should establish a configuration control mechanism that would uniquely identify each system containing FAA-approved components.

b. Before certification is granted, the manufacturer should submit a Configuration Control Plan. The configuration control plan should be explained and include the procedures for configuration control of all hardware and software system documentation.

c. The identifying information for each system should be permanently inscribed on a system nameplate.

d. Changes to an approved configuration should be submitted for FAA approval to the FAA Solutions Development Division at the address listed in Par. 4 of Appendix B of this AC. The manufacturer may incorporate minor product improvement changes after notifying and obtaining approval from the FAA. Major changes, such as hardware or major software changes, should be fully supported by documentation and appropriate test data. (Major changes normally require the assignment of a new configuration number.) Every change to an approved type of VTE should be supported by revised configuration controlled documentation.

e. The plan should also address the following:

(1) **The manufacturer's arrangement** for assigning a configuration identification number/symbol/etc. and the means to identify which components are included in a particular system configuration.

(2) **Procedures for notifying system owners** of changes in their type of VTE.

(3) **Procedures for identifying and maintaining** a record of the configuration of each operational system that has been sold and installed by the manufacturer.

(4) **A definition of major and minor** product improvement changes.

(5) **Procedures for the configuration control** of documentation, to include procedures for issuing changes, numbering, and dating pages.

205. DEPLOYMENT PLANNING

All airport operators, sponsors, air carriers, ground service providers, or other parties contemplating purchase and installation of VTE should coordinate with the FAA before the equipment is ordered. Airport sponsors desiring to obtain a grant under the Airport Improvement Program (AIP) to install VTE should also coordinate with the FAA regional Airports Officials that have jurisdiction over the specific geographical area.

206. FLEET COMMISSIONING

The FAA should formally commission an airport's fleet of VTE before it becomes available for use. A fleet can be commissioned as the VTE is received and installed or commissioning can be performed after all of the VTE that is planned for operational use has been received and installed. As the system approaches operational readiness, the

owner should request a commissioning ground inspection by the relevant FAA Airway Facilities Office. This inspection includes participation by the owner or owner's maintenance representative. The commissioning inspection consists of a review of the operations and maintenance documents on file at the facility, the VTE commissioning requirements in paragraph 207 of this AC, and the following fleet commissioning requirements:

- a. User Training.** Verify that operators and maintenance personnel have received the necessary training for the equipment for which they are responsible. As described in paragraph 203.c., the Manufacturer's Maintenance Manual should address the training program and include a summary of the knowledge and skills that an equipment operator and a maintenance technician should possess to operate and service the VTE.
- b. Failure Recognition.** Verify that operators of equipment have sufficient knowledge of the system to recognize equipment failures and know what follow-up procedures are necessary to repair the equipment.
- c. Database Current.** Verify that procedures are in place to receive current database information from an approved source per that source's update cycle and to install the most current information on all applicable vehicles.
- d. Equipment Records.** Verify that the user organization has a record of each installed equipment suite (plus spares) including the manufacturer identification, equipment part number(s) and serial numbers. Federal Communications Commission (FCC) license information for each equipped vehicle, and a running record of the next required recertification inspection for each vehicle installation should also be available.
- e. Frequency Authorization.** Verify that each Category 2 through 4 surface vehicle installation has been licensed for each equipped frequency as appropriate. Licensing can be done either on an individual piece of equipment or on a fleet basis.
- f. Roads Under Runways and Taxiways.** A number of large airports have roads that go under bridges or through tunnels under runways and taxiways. Before a vehicle tracking system can be commissioned at such an airport, testing must demonstrate that tracking units will not create a hazard. A potential hazard could result if a runway or taxiway conflict is indicated when the vehicle is actually approaching a bridge or under the bridge. A potential hazard could result if a runway or taxiway conflict is indicated when the vehicle is approaching an underground tunnel or in the tunnel under a runway or taxiway. Testing should be performed at such airports to verify that vehicles with operational tracking equipment approaching and passing through tunnels or under bridges are detected and responded to properly.

NOTE: In cases where the GPS signal is lost when the vehicle is in a tunnel, alternate means such as a GPS Repeater operating within the tunnel should be considered to avoid the loss of GPS acquisition. The time while the signal is being reacquired upon exit from the tunnel could result in an unnecessary hazard condition.

- g. Fleet Commissioning Letter.** After the commissioning is complete, the proper FAA Airway Facilities Office will issue a copy of the fleet commissioning letter.

207. VTE COMMISSIONING

Each VTE installation must be commissioned as part of the fleet commissioning (paragraph 206) or after the fleet commissioning in those cases where additional vehicles are equipped after the initial commissioning. VTE commissioning consists of the following:

- a. Siting and Installation.** Verify that the VTE is mounted as specified in the Manufacturer's Installation and Checkout Manual. Placement of equipment should not interfere with the use of the vehicle and should be installed to allow proper interaction with the vehicle operator. Installation must be performed in such a manner so that essential displays are in the driver's field of vision without interfering with the driver's view of the roadway or vehicle controls. It should be installed by a technician who is fully qualified in the operations, testing, and maintenance of the VTE, and is either a maintenance technician employed at the manufacturer's factory or has been certified by the FAA. The procedures in the FAA-approved Installation and Checkout Manual should be performed according to this AC (paragraph 203 d). The installation technician should notify the proper FAA Airway Facilities of each vehicle installation.

- b. Performance Test.** The VTE owner's FAA-approved maintenance representative should operate the system and verify the following system performance parameters:

- (1) Data Broadcast (while the vehicle is stationary).** Verify that VTE is operating within tolerances specified by the manufacturer and the specifications contained in Chapter 3. Verify that own-vehicle position is being depicted accurately on the display (if installed) and that the own-vehicle position, velocity,

and identity are being broadcast accurately. Verify that equipment displaying received broadcast position data do so accurately and without any duplicate targets.

(2) Data Broadcast (while the vehicle is in motion). VTE should be tested in motion while installed on the vehicle that the equipment will normally be used with. VTE that is not permanently mounted on a vehicle (e.g., equipment available for transient contractors working on the airport movement area) should be tested using a vehicle similar to the vehicle that could realistically be operated with the equipment.

(a) Move the vehicle and ensure the system is transmitting position, heading, velocity, and identity information per the requirements of each installed ADS-B data link system.

(b) Drive the vehicle around and off/on the airport movement area and verify that VTE operates properly (e.g., does position broadcast properly, does map show position properly, does transmission stop and start as necessary) using the specifications contained in Chapter 3 of this AC and the Manufacturer's Maintenance Manual, as discussed in paragraph 203.c.(2).

(3) Database Current. Verify that procedures are in place to receive current database information from an approved source per that source's update cycle and to install the most current information on all applicable vehicles.

208. ONSITE DOCUMENTATION.

The equipment operator should maintain the following documentation. It should contain all pertinent onsite documentation and is to be maintained and kept at the airport. The FAA will review the documentation at the commissioning inspection.

a. Certification. The onsite documentation should include a copy of the FAA letter to the manufacturer granting certification for the VTE. Certification letters are to be available for the types of VTE in use at the airport. Alternately, a list of equipment that has been certificated by the FAA may be used to satisfy this requirement.

b. License Information. The onsite documentation should include the fleet's FCC-issued license for operation on the installed frequencies and a current record of the identity of each vehicle to which the license applies. If the user has chosen to maintain individual station licenses for each vehicle (as opposed to a fleet license) the user should still maintain a current record of the identity of each licensed vehicle.

c. Manufacturer's Documentation. The onsite documentation should include copies of the VTE System Description Manual, Manufacturer's Maintenance Manual, and Operating Instructions Manual. When changes are made to these documents, the manufacturer should forward revisions to the VTE owner.

d. Operational Procedures. The equipment owner should develop the operational procedures that set forth mandatory site procedures for both routine and nonscheduled situations in the onsite documentation. These procedures may incorporate appropriate sections of the manufacturer's manuals. The following items should be addressed:

(1) Physical security of equipment.

(2) Maintenance and operations by authorized persons, including who should be notified if an equipment specification is discovered out of tolerance or other maintenance is necessary.

(3) Keeping of equipment maintenance logs and other technical reports.

(4) Procedures to determine whether a database is current and how to update the database when necessary.

(5) Procedures for conducting periodic scheduled maintenance.

(6) Procedures for amending or revising the operational procedures.

(7) Procedures to be followed to freeze the vehicle tracking data in an archive file for a specified period before and after the time of a vehicle accident or incursion, and the procedures to be followed to retrieve these data. These procedures should describe the responsibility for accomplishing these actions. They should be automatically accomplished in the event of an accident, incident, or upon the request of a member of the FAA.

NOTE: This issue is still under discussion.

- (8) List of vehicle tracking equipment** on the airport. This list includes the following information:
- (a) Model and serial number of all VTE.
 - (b) Routine inspection of equipment to be performed.
 - (c) Record of license expiration dates for all equipment requiring a license.

(9) A Memorandum of Agreement (MOA) signed by the owner and the FAA Airway Facilities Office. This Memorandum should state that the owner agrees to maintain, repair, and modify the VTE in accordance with the minimum requirements, standards or criteria governing VTE. The owner understands that noncompliance with the specific site's FAA/Sponsor MOA may result in the VTE's removal from service or decommissioning.

NOTE: This issue is up for discussion.

209. MAINTENANCE PROGRAM

The user should establish a maintenance program with properly trained personnel who meet all FCC and FAA requirements, adequate test equipment, and resources to fulfill the manufacturer's recommended scheduled maintenance and calibration procedures defined in the Maintenance Manual. The maintenance program is the owner's responsibility, but can only be performed by a person meeting FAA and FCC requirements. The FAA will issue a verification authority letter to a person who meets FAA and FCC maintenance requirements.

- a. Maintenance Personnel.** The owner should show that the maintenance program adopted has qualified personnel available to maintain the VTE. The personnel should have completed the manufacturer's training program or an FAA-approved exam. They should be able to demonstrate proficiency in accomplishing the required maintenance procedures and using the specialized test equipment. The FAA will issue an unrestricted FAA verification authority letter to the candidate maintenance person if he/she is able to meet the concepts and performance requirements of the VTE and has a FCC general radiotelephone license for maintenance of the associated transmitter.
- b. Test Equipment.** Prior to the time of commissioning, the owner should have available at the facility all test equipment required by the approved maintenance plan for maintenance and calibration of VTE. The owner should have available test equipment that is capable of accurately measuring the appropriate technical standards and tolerances needed for facility verification. Test equipment requiring calibration should be calibrated in accordance with the schedule submitted to (and approved by) the FAA during certification. In case an acceptable test equipment calibration schedule was not included and equipment requires calibration, test equipment will be calibrated as per the test equipment manufacturer's recommendations or the FAA/Sponsor MOA/OMM. Test equipment should be traceable to national standards, and proof of required calibration (e.g., a current calibration sticker) should accompany each piece of test equipment when it is being used. After commissioning, the test equipment should be available when required for scheduled system maintenance and calibration or for repairs after system failure.
- c. Periodic System Recertification Plan.** The owner should plan for complying with the manufacturer's recommended procedure for periodic system recertification (paragraphs 203f. and Chapter 4). This plan should include a list of the procedures to be followed during the recertification and the source of the qualified person to conduct the inspection.

CHAPTER 3. PERFORMANCE AND TESTING SPECIFICATIONS

300. GENERAL

a. **System Components.** For descriptive purposes the system is separated into four main components. The components are as follows:

- (1) GPS Receiver
- (2) Map Display
- (3) Transmitter
- (4) Receiver

NOTE: The goal is to indicate that the system will be made of a combination of these four components. It is implied that the components will be brought together by one or more computers and that the entire system needs to be tested.

b. **Certification of Components.** One or more of these components can be combined to form a system. The following requirements will define the minimum standards the components will be required to meet. For certification the system will only have to meet the requirements of the components in that system. For example: Certification of a Category 2 system would require consideration of only the GPS receiver, the GPS antenna, the 1090 MHz and/or UAT transmitter, and the transmitter's antenna.

c. **Manufacturer's Responsibility.** Some of the requirements may not have a specific test listed. It is still required that functionality be demonstrated before the device is certified. It is up to the manufacturer to develop tests and provide testing documentation that satisfies the certification official.

d. **Transmitter Performance.** This is fully defined in the appropriate RTCA documents, DO-260A for 1090 MHz ADS-B and DO-282 for UAT ADS-B. The manufacturer will be required to obtain an FCC license for manufacture and use of these transmitters. At the time of the writing of this document the output power is being limited to 20 Watts for a 1090 MHz transmitter. As further testing and simulation are performed this power limitation may be modified within this AC. The FAA radio spectrum group has stated that the allowed transmission power must be less than what is currently specified in the RTCA DO-260A and DO-242A, Minimum Aviation System Performance Standards For Automatic Dependent Surveillance Broadcast (ADS-B), MASPS document.

e. **Displays Goals.** There are two major goals that a display is expected to meet.

- (1) The display must represent information clearly and un-ambiguously. The display should be easy to understand.
- (2) The display must have certain standardized features. It is important that the displays made by all manufacturers display certain information, such as target display, using the same symbology and colors. Since it is likely that some of the vehicle drivers will be pilots, it is important that information displayed in the vehicle look the same as a pilot would see in a cockpit. This standardization of the displays is to prevent a potential safety problem. If a pilot trained to use his aircraft display is driving a vehicle that uses symbols similar to what the pilot sees in his cockpit display but they are different in color or meaning, an accident could result.

NOTE: A problem can occur at airports with roads that go under runways. A pilot in an airplane could see a vehicle heading straight for a runway and not know if the vehicle will be going through a tunnel or across the runway surface. This may require changes to airborne systems display of ground maps. The problem is complex and needs to be addressed in greater detail in this AC. We solicit advice from the aviation community on how this should be done.

301. OPERATING ENVIRONMENT

NOTE: After much research, it was found that SAE J1455 (Joint Society of Automotive engineers (SAE)/Technical Management Council (TMC) Recommended Environmental Practices for Electronic Equipment Design (Heavy Duty Trucks)) is a good standard base for all environmental tests. The tests a system will require will be different depending on where it is will be placed in/on the vehicle. The manufacturer decides which environmental tests are to be conducted based on where they intend their system to be placed on/in the vehicle. For example, different tests

are needed for equipment to be installed in the engine area, the trunk, or the dashboard. Additionally, most of these systems will have more than one part. A possible system configuration could be: the antenna on the roof, the display on the dashboard and the transmitter/ receiver in the trunk. The FAA will dictate the level of testing used with the radio-frequency subsystem since transmitter interference could adversely impact the National Airspace System (NAS).

a. Identify Environmental Testing. RTCA DO-260A lists the environment testing required for aircraft certification and refers manufacturers developing vehicle systems to SAE-J1455. All systems developed through this AC are expected to meet SAE-J1455 or equivalent. MIL-STD-810F contains a more robust shock and vibration test set. It is also recommended to consider IP55 for Ingress Protection.

b. Environmental Testing. The manufacturer should demonstrate system reliability through environmental testing designed for each chosen operating environment.

c. Changes in Input Voltage. The system must also have the ability to handle a wide range of input voltage. During the start phase, the voltage may drift as low as six volts. There can be short voltage spikes up to several hundred volts as solenoids operate. Failure modes of the alternator system/ battery system could generate in excess of 100 volts. It is expected that the system will continue operating normally during minor voltage transients should be able to reset itself when excessive power transients occur.

d. Frequency Compatibility. The system will have to function in the presence of other radio systems that are installed in the vehicle and handheld units carried by the operator. The system should be able to function without interruption while these radios are being used. The system should also not interfere with these same radio systems.

NOTE: Additional tests to handle this issue may be added as we learn what is appropriate.

e. Mounting. The system will be mounted in a variety of vehicles. The parts of the system may be mounted in a variety of places on each vehicle. The individual parts of the system will have to be tested for the intended area where they will be mounted. The environmental testing documentation should specify where the device is to be mounted and a test suite should be designed to show suitability for the mounting area. If a device is to be used in more than one place, it is expected that it will be tested in the harshest of the conditions. It is required that the transmitter and the receiver stay within specification over the entire range of environmental conditions. Failure to do so may allow a system to interfere with the NAS system and violate FCC rules. Transmitter and receiver environmental conditions will be defined by this document. It will be up to the manufacturer to show the device is being tested for the area(s) of the vehicle it is intended to function.

302. ADS-B DATA LINK

ADS-B is a cooperative system for aircraft or surface vehicles operating within the airport movement area. Periodically each vehicle transmits its state vector (horizontal and vertical position, horizontal and vertical velocity) and other information (e.g., identity).

a. Data Links. Standards exist for two ADS-B data link systems. These standards define the hardware performance requirements and the protocols for data exchange. These data link systems are (1) the 1090 MHz Extended Squitter and (2) the 978 MHz Universal Access Transceiver (UAT) systems defined by RTCA Documents DO-260A and DO-282 respectively. An FCC license will be required to transmit on these data links and there may be restrictions on allowed output power that are less than you would be allowed to transmit as defined in the appropriate RTCA document.

b. Non-ADS-B Data Links. A manufacturer may choose to design a system that operates on a non-ADS-B frequency in addition to the installed ADS-B frequencies (e.g., for proprietary or other applications not addressed herein). During the certification process, the manufacturer must demonstrate that operation on the non-ADS-B data links does not adversely impact NAS operations.

c. Environmental Considerations. The system, all the wiring, and the mounting hardware must be capable of sustaining the environmental conditions anticipated for the installation. The manufacturer should provide the FAA with a full analysis of the expected environment in which the system is to operate. The manufacturer will show the system is able to comply with the standards found in the respective RTCA MOPS document (DO-260A or DO-282) over the full range of the anticipated operational environment.

303. GPS RECEIVER

NOTE: It should be specified that the GPS receiver should be placed in standby mode when the vehicle is turned off. In this mode, the receiver would continue to receive almanac and ephemeris data, but would not use processing power to continually calculate its position. This would reduce the power drain on the vehicle's battery. This will need to be balanced with the fact that there is a maximum time specified for a GPS start up and the time it will take the computer to boot up. Opinions on this issue are welcomed.

a. Performance Standard.

- (1) **At a minimum**, it is expected that the system will have a 12 parallel channel all in view WAAS corrected receiver.
- (2) **Capable** of using "All in View Satellites".
- (3) **Accurate** to three meters at 95% in both horizontal and vertical.
- (4) **From a warm start** (defined as having the approximate current position and current satellite ephemeris information) it should have acquired satellites and be operating in its best navigation mode in an average of less than or equal to 15 seconds.
- (5) **From a cold start** (defined as cold start in which the receiver has no position or satellite ephemeris information) it should have acquired satellites and be operating in two-dimensional navigation mode in an average of less than or equal to 45 seconds.
- (6) **The GPS** should generate integrity (accuracy) numbers as required by DO-260A and DO-282.
- (7) **Emergency service buildings** should have a GPS repeater so the GPS receiver installed in the vehicle can keep the almanac up to date. This also applies to any vehicle that is parked in a location that does not have a view of the sky.

NOTE: This may need to be moved from this section as an operational issue, but we did not want it forgotten. Also, there will be a minimum time requirement for the computer to come up operating. TBD

b. Performance Testing.

- (1) Manufacturer documentation of the GPS receiver would be proof that the first performance standard has been met.
- (2) Manufacturer documentation of the GPS receiver would be proof that the second performance standard has been met.
- (3) Manufacturer documentation of the GPS receiver would be proof that the third performance standard has been met. In DO-229C there is a Fault Free Accuracy Performance (R.5.4) that describes a test for this.
- (4) Manufacturer documentation of the GPS receiver would be proof that the fourth performance standard has been met.
- (5) Manufacturer documentation of the GPS receiver would be proof that the fifth performance standard has been met.

NOTE: The following is from DO-229C and is slightly rewritten to fit the vehicle application.

- (6) Manufacturer documentation of the GPS receiver would be proof that the seventh performance standard has been met.
- (7) No test required.

304. 1090 MHZ ADS-B TRANSMITTER AND RECEIVER

The 1090 MHz transmitter and receiver are defined completely in DO-260A with the exception of environmental testing and output power. The receiver should only be used on Category 4 systems. The RTCA DO-260A Class A0 is for a non-transponder system that transmits and receives on 1090 MHz would be a VTE Category 4 system. The RTCA DO-260A Class B2 should be used for transmit-only systems that would be a VTE Category 2 or a Category 3 system.

a. Performance Standard.

(1) RTCA Standards. Must follow RTCA DO-260A, except as stated in this document. As of publication of this document the following restrictions have been placed on a 1090 MHz transmitter and may change in the future:

(a) Operations are limited to the airport movement area. Transmissions must cease once the vehicle leaves the airport movement area. Note: This topic is still under discussion. One proposal suggests that transmission should be allowed throughout the airport's airside area.

(b) Transmissions must be in accordance with 1090 MHz ADS-B MOPS (RTCA DO-260A).

(c) The effective radiated power of transmissions is limited to 20 watts.

NOTE: The current 1090 MOPS and FCC/FAA rules disagree on output power and FCC/FAA rules must supercede the MOPS.

(d) Installation of 1090 MHz transmitters are confined to those vehicles that have a need to be on the runway movement area (i.e. snowplows, emergency response vehicles, maintenance vehicles). Installation of 1090 MHz transmitters on vehicles in the ramp areas such as baggage carts and catering trucks is not authorized.

(e) Frequency Transmit Authorizations are obtained for the airports that testing is desired.

(f) Action is initiated through the FAA Office of Spectrum Policy and Management (ASR) to obtain spectrum certification for the 1090 MHz transmitters.

(2) Environment. The transmitter and receiver must be tested to show it will maintain DO-260A specifications in the environment it will be installed. This environment will be defined by the manufacturer using standard methods as outlined in this document or the equivalent.

NOTE: Configuration management sections need to be written to address the issues of system component placement in vehicles to ensure the system is not placed in an area of a vehicle that has environmental extremes outside what the system component is designed to handle.

(3) Unique Vehicle Identification. The International Civil Aviation Organization (ICAO) Mode Select (Mode S) address will be used as the VTE electronic identification. See FAA Order WA 5200.xx for instructions on how to obtain such an identification.

(4) Transmitting Boundaries. The transmitter must stop transmitting when outside the airport movement area. This area will be predefined by maps available from the FAA. Hysteresis must be included so that the system will not constantly switch on and off when near a boundary. It is known that a GPS may drift and a vehicle parked on the boundary line may have its position move enough to cause the transmitter to randomly switch on and off.

NOTE: The issue of how to handle hysteresis will need further discussion. The extent of the problem needs to be examined. There can be unique problems and solutions depending upon the airport in which this system is installed. Some of the potential problems are: (1) a vehicle parked next to a fence, (2) a vehicle driving along the edge on a perimeter road and (3) a vehicle approaching the movement area are orthogonal to the line.

b. Performance Testing.

(1) RTCA Standards. Must follow RTCA-DO 260A test procedures except as stated in this AC. Transmitter output power must not exceed the standard set by this AC.

(2) Environmental conditions. The system must be tested for the environmental extremes as required for intended place of installation.

(3) Unique Vehicle Identification. System must comply with FAA Order WA 5200.xx, Assignment Criteria - Mode S Codes for Airport Surface Vehicle, Obstructions, Skydivers and parachutists.

(4) Transmitting Boundaries. It must be demonstrated that the transmitter will automatically cease transmitting when the position is outside the defined airport movement area. It must also be shown that a system on the border of the airport movement area will not cause the transmitter to randomly turn on and off as the GPS position jitters around.

305. UAT ADS-B TRANSMITTER AND RECEIVER

The UAT transmitter and receiver are defined completely in DO-282 with exception to environmental testing and output power. The receiver will need to be tested or used on Category 4 systems.

a. Performance Standard.

(1) **RTCA Standards.** Must follow RTCA DO-282 except as stated in this AC.

(a) Operations are limited to the runway movement area of the airport. Transmissions must cease once the vehicle leaves the airport movement area. Note: This issue is still under discussion.

(2) **Environment.** The transmitter and receiver must be tested to show it will maintain DO-282 specifications in the environment it will be installed. This environment will be defined by the manufacturer using standard methods as outlined in this document or the equivalent.

NOTE: Configuration Management sections need to be written to address the issues of system component placement in vehicles to ensure the system is not placed in an area of a vehicle that has environmental extremes outside what the system component is designed to handle.

(3) **Unique Vehicle Identification.** The ICAO Mode S address will be used as the VTE electronic identification. See FAA Order WA 5200.xx for instructions on how to obtain such an identification.

(4) **Transmitting Boundaries.** The transmitter must stop transmitting when outside the airport movement area. This area will be predefined by maps available from the FAA. Hysteresis must be included so that the system will not constantly switch on and off when near a boundary. (We know that a GPS may drift and a vehicle parked on the boundary line may have its position move enough to cause the transmitter to randomly switch on and off.)

NOTE: The issue of how to handle hysteresis will need further discussion. The extent of the problem needs to be examined. There can be unique problems and solutions depending upon the airport in which this system is installed. Some of the potential problems are: (1) a vehicle parked next to a fence, (2) a vehicle driving along the edge of a perimeter road and (3) a vehicle approaching the movement area are orthogonal to the line.

b. Performance Testing.

(1) **RTCA Standards.** Must follow RTCA DO-282 test procedures except as stated in this document.

(2) **Environmental conditions.** The system must be tested for the environmental extremes as required for intended place of installation.

(3) **Unique Vehicle Identification.** System must comply with FAA Order WA 5200.xx for assignment of Mode S codes for each vehicle.

(4) **Transmitting Boundaries.** It must be demonstrated that the transmitter will automatically cease transmitting when the position is outside the defined airport movement area. It must also be shown that a system on the border of the airport movement area will not cause the transmitter to randomly turn on and off as the GPS position jitters around.

306. OTHER RADIO DATA LINKS

If the manufacturer develops a system based on a data link other than the two listed in this AC then it will be up to the manufacturer to gain approvals for use. This approval will require full documentation of the systems operation and a full test suite to prove it works as it was designed. The system must be documented and demonstrated to show it will not have a negative impact to the NAS system.

307. OVERALL VTE SYSTEM PERFORMANCE

a. Performance Standard.

(1) **Start Up Time.** The system should be fully functional in 15 seconds from a power off condition. The system is allowed to take an average of 45 seconds to be fully functional when the GPS is doing a cold start.

(2) **Internal Recording.** Systems that display targets should implement recording system for diagnostics and testing. The recorded data should have an accurate time stamp to aid data analysis. Recommended data to record would include:

- (a) Unprocessed target information.
- (b) Processed target information from the tracking algorithm.
- (c) System state data such as position, velocity, display settings, etc.
- (d) The recording system could be included within the system or be a separate device connected to the system.

(3) Filtering and Shielding. The system should be shielded against very high frequency (VHF) communications (refer to AC 20-138 for additional details).

(4) Transient Power. The system should be able to recognize power problems. It should be able to continue running without restart when high current devices may cause the voltage to briefly drop below or jump above normal operating levels. The system should not be allowed to enter a non-functioning state because of a transient power problem. If the system is unable to maintain proper operation then the system should automatically reset itself to return to proper operation with no operator intervention.

b. Performance Testing.

(1) Start Up Time. Turn system on and measure amount of time until the system is fully operational.

(2) Internal Recording. The system should be given a large, known quantity of targets for a long duration of time. The recorder should accurately represent what is input into the system.

NOTE: The following is from DO-229C and is slightly rewritten to fit the vehicle application. This is a copy of the test from the GPS section and was copied to here more as a placeholder until we give more thought on the proper approach to this type of test. Comments gladly accepted on this subject.

(3) Filtering and Shielding. The system should be installed in a vehicle to complete this test. The GPS should be in a WAAS corrected full navigation mode. Using both a handheld radio and a normally installed vehicle mounted radio tune each radio to each of the listed frequencies and transmit for a period of 20 seconds. The individually received satellite signals should not degrade below a point where they cannot be used to find a position. The handheld and vehicle mounted radios are specified because both are commonly found at airports. The following VHF frequencies will be used:

- (a) 121.150 MHz
- (b) 121.175 MHz
- (c) 121.200 MHz
- (d) 131.250 MHz
- (e) 131.275 MHz
- (f) 131.300 MHz

(4) Transient Power. The system should be given voltage higher and lower than the specified limits. The system should be able to handle these. For the case of a power extreme show that the system is automatically reset with no interruption to the operator. The system should not enter a state where it stops operating normally and does not reset or indicate a problem to the operator.

308. GENERAL DISPLAY FEATURES

The minimum standards defined in this paragraph are intended to keep certain features of the display uniform between manufacturers. For safety reasons these minimum standards are also the same as will be used on aircraft mounted displays. We intend to keep the basic displayed information similar between all systems used in the NAS system. Manufacturers should avoid using conflicting symbology that might increase the possibility of an accident. The symbols used to display traffic are the same as what will be used on an aircraft and deviation from these symbols is not recommended. An example of a moving map is shown in Figure 1.

a. Performance Standard.

(1) Failure Indication. The system should have separate indicators clearly showing the vehicle operator that the device is failed. This display must be in the operator's field of view while operating the vehicle. The failure indicator should also indicate which module has failed such as transmitter, GPS, receiver, etc. If the system has a map display, a clear indication of the failure should be shown on the display. A failure

- that does not interfere with the basic moving map display should not prevent the moving map from functioning.
- (2) **Display Range.** The range of the display should be indicated at all times. Range rings should be used so the user is able to better estimate distance.
 - (3) **All displayed symbols and graphics** should be positioned accurately relative to one another such that placement errors are less than one percent of the selected map range and orientation errors are less than three degrees with respect to the values provided by the position and database sources. [From RTCA DO-257 page 16, 2.2.1 (1).]
 - (4) **Lighting Conditions.** The display must be readable in all lighting conditions. Visors, glare shields, or filters are an acceptable means. The display should not degrade the driver's ability to see at night.
 - (5) **Field of View.** The display should be in the driver's field of view. *This is really a configuration management issue and should be removed from this section.*
 - (6) **Heading.** Heading is to be in Magnetic.
 - (7) **Symbols.** All symbols should be discriminable at 30" under the full range of normal illumination conditions. From RTCA DO-257 page 18. *The 30" distance appears in DO-229C also.*
 - (8) **Display Latency.** This should be less than one second.
 - (9) **Orientation.** The display should present the map and traffic information in a track-up orientation. A true North-Up orientation is acceptable in addition to track-up. The default condition should be track-up.
 - (10) **Current Map Orientation.** The current map orientation should be clearly, continuously, unambiguously indicated. (RTCA DO-257 page 25.)
 - (11) **Display Range.** The user should have the ability to manually change the display range.
 - (12) **Automatic Range Control.** If the display has the ability to control the range automatically, the user should be able to easily activate and deactivate the auto map range feature. When automatic ranging is activated, it should be clearly indicated on the display.
 - (13) **Range Scale.** The maximum should be at least five nautical miles. This allows the user to see across an airport and see if anyone is on final approach to a runway the user is about to cross.
 - (14) **Own-Vehicle Position.** Own-vehicle position should be indicated by a symbol at the appropriate location. If a heading is available, direction should be indicated by the symbol. If not, a non-directional symbol should be used.
 - (15) **Own Symbol Priority.** Own - vehicle position should be drawn on top of everything else.
 - (16) **Panning Function.** A panning function may be available. If so, the user should be able to return to an own - vehicle-centered, track-up orientation in no more than two button presses. Also, some sort of indicator of current, own - vehicle position should be provided.
 - (17) **Control Feedback.** All controls should provide feedback. Tactile and visual cues are acceptable, sound cues are not preferred since these systems will be operated in high noise environments. Touch screens or separate switches are acceptable.
 - (18) **Runways.** The display screen should show runways. The runways should be distinguishable from all other map attributes. Note that color as the sole distinguishing feature is not enough. Runways should be depicted as filled areas instead of outlines.
 - (19) **Non-movement Areas.** The display should be able to show non-runway movement areas. The depiction of non-runway movement areas should be different than all other map attributes. Different non-runway movement categories (i.e., taxiways, aprons, etc) may be depicted differently for clarity. Non-runway movement areas should be depicted as filled areas instead of outlines.
 - (20) **Buildings.** The display should have the capability to show buildings. The display of buildings should be different than all other map attributes. Buildings should be depicted as filled areas rather than outlines. It is recommended that buildings use a cross-hatch fill pattern instead of a solid fill.
 - (21) **Other Airport Objects.** The display may have the ability to display other airport objects such as perimeter roads, de-icing areas, etc. These objects should be uniquely identified in such a way that they are clearly discernable yet not cause the display to be difficult to interpret.

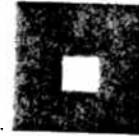
(22) Runway and Taxiway Identifier Labels. These should be depicted if available. Runway and taxiway identifiers should be distinguishable from each other. The colors chosen for runway and taxiway identifiers should be chosen carefully for contrast with background objects to prevent them from blending in with the background.

(23) Warning Colors. The colors yellow and red are generally associated with warnings and alerts and should be used sparingly, if at all, even on systems that do not provide warnings and alerts.

(24) Airborne Aircraft Symbol. This should be a cyan colored arrowhead.



(25) Surface Vehicle Symbol. This should be a light brown colored square.

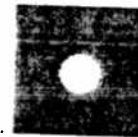


(26) Aircraft on Ground Symbol. This should be a light brown colored arrowhead.



(27) Aircraft with Alert Symbol. It should be a flashing yellow colored arrowhead.

(28) Emergency Vehicle Symbol. It should be a light brown colored circle.



(29) Color Scheme. The color scheme to be used in assigning these colors is the RGB format. This format is commonly used to define color on computer displays. Red, green, blue (RGB) values are specified as RRGGBB where our values will be listed in hexadecimal (base 16). RR defines the red intensity, GG defines the green intensity and BB defines the blue intensity. A value of 0x00 means no intensity and 0xFF means full intensity.

(30) Color Usage. The light brown color selected to identify ground targets is an example of color usage. For all other objects including airport maps, a darker shade of brown should be used. Many shades are acceptable and they must be distinguishable from other objects on the display for all light conditions. A display's color scheme must allow for clear discrimination of all objects under all light conditions.

(31) Light Brown. The color brown is defined by a ratio of blue intensity and green intensity to a red intensity. To express the light brown used for targets, the following ratios should be used:

- The red intensity will be between 0xCC and 0xFF.
- The green component is 70% to 80% of the red value.
- The blue component is 30% to 35% of the red value.

(32) Dark Brown. To express the dark brown used for non-target objects (such as buildings), the following ratios should be used:

- The red intensity will be between 0x40 and 0x99.
- The green component is 60% to 70% of the red value.
- The blue component is 35% to 50% of the red value.

(33) Yellow. The color yellow is defined by a ratio of blue intensity and green intensity to a red intensity. To express the yellow used for targets, the following ratios should be used:

- The red intensity will be 0xFF.
- The green component is 90% to 100% of the red value.
- The blue component is 0% to 85% of the red value.

(34) **Cyan.** The color cyan is defined by green and blue intensity being 0xFF (full intensity) and red intensity will be between 0x00 and 0x80.

(35) **Red.** The color red is defined by having no green or blue intensity.

b. Performance Testing.

- (1) Display should be checked for clutter.
- (2) Display should be checked for coloring to prevent objects from blending with each other.
- (3) All features should be tested for function.
- (4) Table 1 and Table 2 should be filled out. These tables correspond to requirements numbered 4-35.

Table 1. Human Factors Checklist: Usability

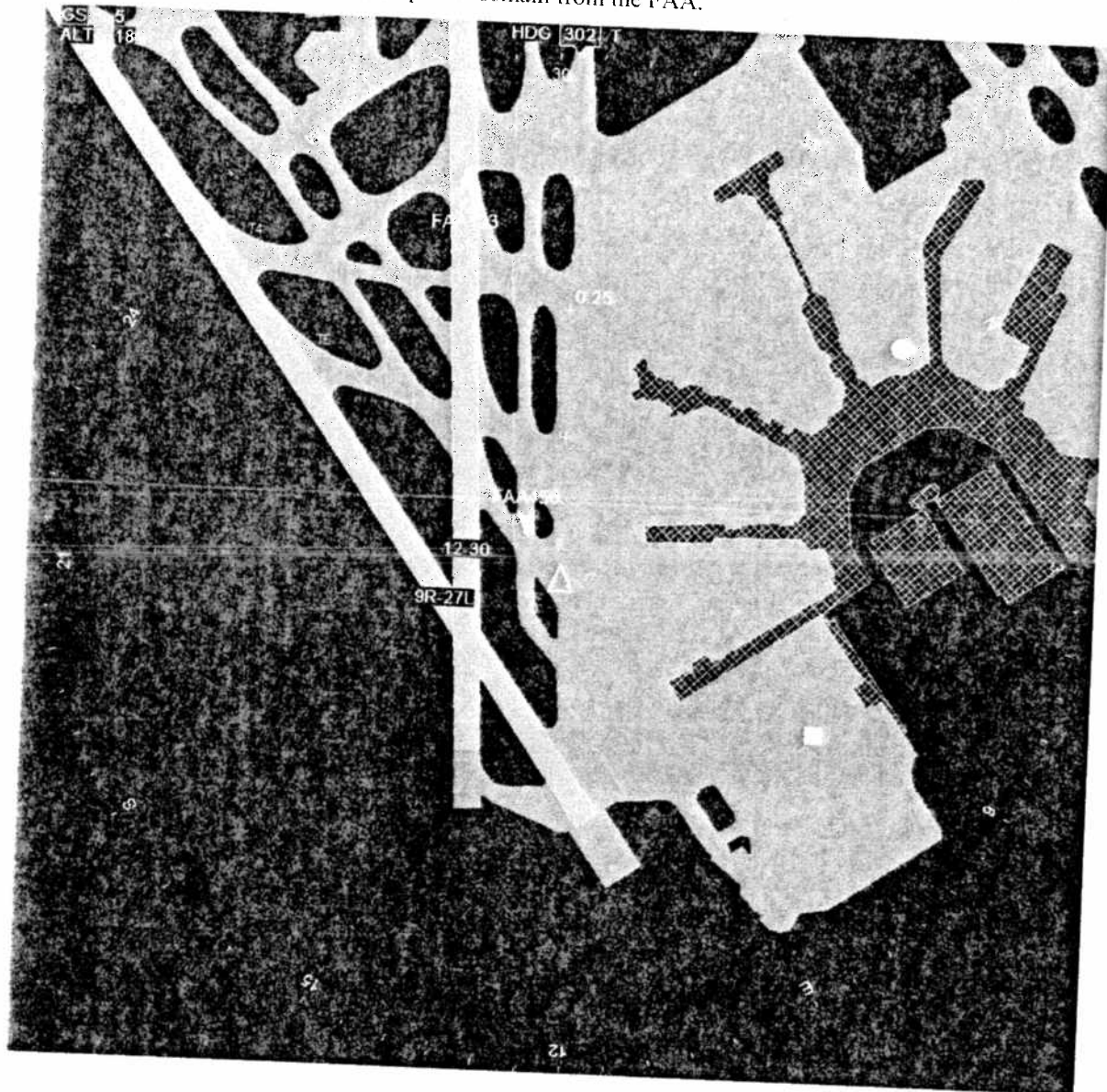
Evaluation Criteria	Pass	Pass/exception	Fail
<p>Display Information</p> <ol style="list-style-type: none"> 1. Display range indication is clear and displayed at all times. 2. Auto-range on/off is clearly indicated. 3. Map orientation is clearly indicated. 4. Current position is clearly indicated in pan mode. 5. Textual information is easily readable. 6. Failure indicators are clear and obvious. 7. Own position is drawn on top of all other displayed data. 8. Display range can go to at least five nautical miles. 			
<p>Moving Map</p> <ol style="list-style-type: none"> 1. Display of each map feature is unique. 2. Labeling is easily readable. 3. Display is not cluttered at any range. 4. For Category 4 only: display is not cluttered with 20 targets distributed evenly within one nautical mile. 5. Displayed data is less than one second old. 6. The default display is in track up. 7. User can easily change displayed range. 8. Pan function (if implemented) can be cancelled in two button presses or less. 9. All the symbols have an appropriate color in all lighting conditions. 			
<p>Controls</p> <ol style="list-style-type: none"> 1. Controls provide adequate feedback. 2. Controls do not obscure display. 3. Control labeling is easily readable. 			

Table 2. Human Factors Checklist: Brightness

Evaluation Criteria	Pass	Pass/exception	Fail
Dark Conditions 1. Brightness adjustments acceptable. 2. Colors clearly distinguishable. 3. Text is readable from 30 inches. 4. Target symbols are distinguishable.			
Indirect Conditions 1. Brightness adjustments acceptable. 2. Colors clearly distinguishable. 3. Text is readable from 30 inches. 4. Target symbols are distinguishable.			
Bright Light 1. Brightness adjustments acceptable. 2. Colors clearly distinguishable. 3. Text is readable from 30 inches. 4. Reflection causes no interference. 5. Target symbols are distinguishable.			

Figure 1. Example Display with Traffic

Please note that this is an example of a cockpit display of traffic information (CDTI) to illustrate a very general concept of a moving map display. This depiction demonstrates one way to distinctly define the different areas on the airport surface. It is not expected that a manufacturers display will look exactly like this. The map was generated from data available in the public domain from the FAA.



CHAPTER 4. MAINTENANCE AND OPERATING APPROVAL REQUIREMENTS

400. GENERAL

Subsequent to the initial certification and installation approval process, equipment will be subject to periodic verification testing and recertification. This testing is the responsibility of the user and is subject to periodic FAA review.

401. DATABASE INFORMATION CURRENCY

The surface map database should contain current information obtained from an approved source. The user should be able to easily verify that current map information has been installed.

402. PERIODIC RECERTIFICATION

To verify that the equipment is being properly maintained and that the equipment continues to operate within specification, the operator should conduct the following ongoing recertification program:

NOTE: The frequency of the recertification testing is up for discussion.

a. Performance/Configuration Recertification. A qualified radio technician should inspect each piece of vehicle tracking equipment annually in accordance with the manufacturer's approved Periodic System Recertification Plan (paragraph 203g.). This inspection should include the items in subparagraphs (1) through (5), and the results should be recorded in a maintenance log specific to each unit of equipment and retained on file at the facility.

(1) **Verify that the Maintenance program** is being followed and properly documented.

(2) **Perform a comprehensive operational verification** annually to verify that system performance is within the limits specified by the manufacturer's documentation and to ensure that every component of the system is operating properly. ADS-B recertification should include tests to insure that the system is still operating within the frequency tolerance and to verify that a valid position is reported. Recertification should include a test performed at a surveyed map reference point. The equipment will be put in operation and observed for proper frequency, transmitted state vector information, and received state vector information. Recertification may take place on vehicle, at a suitable certificated repair station, or at a manufacturer facility. The tests and inspections must be conducted by a certificated repair station properly equipped to perform those functions and holding:

(a) a radio rating, Class III (per 14CFR 145.31); or

(b) a limited rating appropriate to the VTE make and model (per 14CFR 145.33).

(3) **Following any installation or maintenance on VTE** where data correspondence error could be introduced, the integrated system is to be tested, inspected, and found to comply with specifications established in Chapter 3.

(4) **Verify that the VTE configuration is the same** as approved at the time of commissioning or as formally modified in accordance with approved configuration control procedures. Additionally, the FAA representative should determine that all mandatory configuration changes approved by the FAA have been accomplished and documented.

(5) **Verify that a summary of all maintenance (hardware and software) performed** since the last report is on file at the facility.

b. FAA Site Visits. FAA inspectors will periodically visit certified airports with VTE. During the inspection, the FAA inspector will verify the following:

(1) **Verify that the system operates** within tolerance, that all maintenance tasks have been properly performed and documented, and that the FAA has approved the VTE configuration.

(2) **The inspector may review** each VTE unit's maintenance log and other documentation to verify if scheduled (periodic) and unscheduled maintenance, and the documentation of these activities, have been accomplished in accordance with this AC and the manufacturer's Maintenance Manual.

c. Mandatory Configuration Changes. If a defect is found in data transmitted from a vehicle tracking system VTS, then the manufacturer should be notified and the system manufacturer should issue a mandatory service bulletin, to owners of similar systems, requiring removal of the systems found to contain the error from service pending repair. If the manufacturer has a validated repair procedure, the procedure could be included in the same service bulletin. Otherwise, the repair procedure would be in a subsequent service bulletin.

d. Revoking Approval. Product approval may be revoked (or operation at an individual airport may be suspended) if:

(1) **Valid performance** of the operating system cannot be certified.

(2) **Changes** are made to either the software or hardware without FAA approval.

(3) **Transmitted data does not conform** to applicable standards.

(4) **The certifying official detects other problems** with the system that would significantly degrade system performance.

e. Unacceptable Failure Rate. The FAA will remove equipment that proves unreliable from the listing of certificated equipment. The determination of unreliability should be based on judgment and experience with similar equipment.

(1) **Where equipment is determined** to have an unsatisfactory failure rate or is deficient in workmanship or materials, the FAA will notify the manufacturer in writing as to the basis for this determination. The manufacturer should then notify the FAA in writing as to its plan of action for resolving the issue. If the manufacturer does not resolve the problem within a reasonable time (the timeframe would, of necessity, be based on safety considerations and the nature of the problem), the equipment would be removed from the list of certificated equipment.

(2) **The FAA reserves the right** to require the equipment to undergo any or all qualification/calibration tests when the equipment has been determined unreliable or deficient in design, materials, or workmanship.

(3) **The manufacturers must notify** owners of similar VTE of any problems uncovered during their retesting through the configuration control procedure discussed in paragraphs 204 and 402c.

(4) **Failure to meet the criteria** of this program may result in decommissioning the VTE system and withdrawal of the broadcast frequency authorization.

Appendix A. TITLE 14 CFR and TITLE 47 CFR REFERENCES AND RELATED MATERIAL

2000 CFR Title 47, Chapter 1, Part 87, Section 18, Telecommunication Aviation Services.

Sec. 87.18 Station license required.

(a) Except as noted in paragraph (b) of this section, stations in the aviation service must be licensed by the FCC either individually or by fleet.

(b) An aircraft station is licensed by rule and does not need an individual license issued by the FCC if the aircraft station is not required by statute, treaty, or agreement to which the United States is signatory to carry a radio, and the aircraft station does not make international flights or communications. Even though an individual license is not required, an aircraft station licensed by rule must be operated in accordance with all applicable operating requirements, procedures, and technical specifications found in this part.

NOTE: This AC addresses equipment to be installed in airport surface vehicles, not "aircraft stations" (i.e., aircraft). Thus, paragraph (b) does not apply.

APPENDIX B. ADMINISTRATIVE INFORMATION

1. REQUESTS FOR INFORMATION

Further information concerning Vehicle Tracking certification may be obtained from the Solutions Development Division at the Federal Aviation Administration, William J. Hughes Technical Center, Atlantic City International Airport, Atlantic City, NJ 08405 Telephone (609) 485-4404.

2. HOW CAN I OBTAIN THIS AND OTHER FAA PUBLICATIONS?

- a. To request a copy of this AC and other free ACs, contact:
 - U.S. Department of Transportation**
 - Utilization and Storage Section, M-443.2**
 - Washington, D.C. 20590**
- b. You can get the Federal Aviation Regulations and those ACs for which there is a fee from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
- c. You can view a list of all ACs at <http://www.faa.gov/achome.htm>.
- d. You can view the Federal Aviation Regulation at: http://www.access.gpo.gov/nara/cfr/cfrhtml_00/Title_14/14tab_00.html.
- e. To be placed on FAA's mailing list for free ACs, contact:
 - U.S. Department of Transportation**
 - Distribution Requirements**
 - Section, M-494.1**
 - Washington, D.C. 20590**

3. SUBMISSION OF DATA

Federal Aviation Administration, William J. Hughes Technical Center, Atlantic City International Airport, Atlantic City, NJ 08405

4. CHANGES TO AN APPROVED CONFIGURATION

Federal Aviation Administration, William J. Hughes Technical Center, Atlantic City International Airport, Atlantic City, NJ 08405

APPENDIX C. ACRONYMS AND ABBREVIATIONS

AC	advisory circular
ADS-B	Automatic Dependent Surveillance Broadcast
AF	FAA Airway Facilities
AIP	Airport Improvement Program
AND	Office of Communications, Navigation, and Surveillance Systems
ANI	NAS Implementation
ARI	FAA Office of Runway Safety
ARQ	FAA Research & Requirements Development Directorate
ASD	FAA Office of System Architecture and Investment Analysis
ASDE	Airport Surface Detection Equipment
ASDE-X	Airport Surface Detection Equipment Next Generation
ASR	FAA Office of Spectrum Policy and Management
ATC	air traffic control
ATCRBS	Air Traffic Control Radar Beacon System
ATCT	airport traffic control tower
ATP	FAA Air Traffic Planning and Procedures
ATS	FAA Air Traffic Service
CDTI	cockpit display of traffic information
CRS	certified repair station
DO	RTCA document
FAA	Federal Aviation Administration
FCC	Federal Communication Commission
GPS	Global Positioning System
HAZMAT	hazardous material
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Commission
IFR	instrument flight rules
IP55	an IEC ingress protection rating for equipment and enclosures
IPT	integrated product team
MASPS	minimum aviation system performance standards
MHz	megahertz
MOA	memorandum of agreement
Mode S	Mode Select
MOPS	minimum operational performance standards
OEP	Operational Evolution Plan
PSR	primary surveillance radar

NAS	National Airspace System
R&D	research and development
RGB	red, green, blue
RRGGBB	a format for defining color
RTCA	Radio Technical Commission for Aeronautics
SAE	Society of Automotive Engineers
SF21	Safe Flight 21
SMA	surface movement area
SMR	surface movement radar
SSR	secondary surveillance radar
TIS-B	Traffic Information Services - Broadcast
TMC	Technology and Maintenance Council
UAT	universal access transceiver
VFR	visual flight rules
VHF	very high frequency
VPD	vehicle/pedestrian deviations
VTE	vehicle tracking equipment
VTS	vehicle tracking system
WAAS	Wide Area Augmentation System

Xerox WorkCentre Pro Network Scanning Confirmation Report

XEROX

Job Details:

Job Information

Device Name: WCP2654thrfloornorth
Submission Date: 07/03/08
Submission Time: 01:32 PM

Template Information

Name: default
Owner: ---
Description: ---

File Settings

Format: PDF
Images Filed: 0
Bytes Filed: 0

Scan Settings

Images Scanned: 34
Original Type: MIXED
Original Size: AUTO
Auto Exposure: LEAD_EDGE
Lighten/Darken: 4
Contrast: 4
Sharpness: 4
Sides Imaged: ONE SIDED
Resolution: RES 300 x 300
Bits per Pixel: 1
Output Color: BLACK_AND_WHITE
Compression Quality: 128
Compression: MRC_2LAYER_MULTI

Job Status:

0 out of 1 filed successfully.

Destination 1:

Status Details: Status..... **FAILED**
Login failure. Check user password, and/or setups.
Friendly Name: wcp55scans
Server Name: 0.0.0.0:139
Path: \\ow_scan\data\system\public\W
Protocol: SMB
Filing Policy: NEW_AUTO_GENERATE
Document Name:

Destination 2:

Status Details: Status.....
Friendly Name:
Server Name:
Path:
Protocol:
Filing Policy:
Document Name:

Destination 3:

Status Details: Status.....
Friendly Name:
Server Name:
Path:
Protocol:
Filing Policy:
Document Name:

Destination 4:

Status Details: Status.....
Friendly Name:
Server Name:
Path:
Protocol:
Filing Policy:
Document Name:

Destination 5:

Status Details: Status.....
Friendly Name:
Server Name:
Path:
Protocol:
Filing Policy:
Document Name:

Destination 6:

Status Details: Status.....
Friendly Name:
Server Name:
Path:
Protocol:
Filing Policy:
Document Name: