

SECTION 11 86 80 – AIRCRAFT VISUAL DOCKING GUIDANCE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Aircraft Visual Docking Guidance System (AVDGS).

1.2 REFERENCES

- A. The standards and codes applicable to only a portion of the work specified in this section are referenced in the relevant parts or clauses. Standards and codes which are generally applicable to the work of this section, are listed below. The latest applicable version shall apply.
 - 1. NFPA 70 National Electrical Code (NEC).
 - 2. International Civil Aviation Organization ICAO, Annex 14, Part 5.3.22.
 - 3. Institute of Electrical and Electronic Engineers (IEEE) 127 and 519.
 - 4. ICS 6-78 (NEMA) Enclosures for Industrial Control Devices and Systems.
 - 5. ICAO, Aerodrome Design Manual, Part 4, Visual Aids.

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's data indicating, as a minimum, input voltages and amperage, physical characteristics, dimensions, and enclosure details.
- B. Shop Drawings: Provide schematics and interconnection diagrams, indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements. Differentiate between manufacturer-installed wiring and field-installed connections.
- C. Mounting Location Chart: Provide manufacturer's data indicating the mounting location, in reference to the type of aircraft being serviced and distance from reference. Recommended bracket design shall be submitted for approval.
- D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation Data: Include instructions for operating AVDGS and describe operating limits that may result in hazardous or unsafe conditions.
- F. Maintenance Data: Include routine preventive maintenance schedule, recommended spare parts list, and required special tools.
- G. Operation and Maintenance Manuals: Include in ATA 101 format a general description, theory/sequence of operation and specification, schematics and wiring diagrams, check-out instructions, installation and maintenance procedures, parts list, recommended spare parts list, troubleshooting guides, controls and accessories information.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

- I. UL certification per 1.4.B.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with demonstrated successful operation not less than five years of experience.
- B. Only equipment types that conform to and are in full compliance with the ICAO Annex 14 clause 5.3.22 and ICAO Aerodrome Design Manual, Part 4, Visual Aids will be acceptable.
- C. UL Compliance: Units shall be UL, or ETL approved and shall be labeled by a nationally recognized testing laboratory at the time of bid. Submit verification with bid submittals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Handle carefully to avoid damage to components, enclosure, and finish.
- C. Deliver equipment as a factory-assembled unit with protective crating and covering.
- D. Store equipment and material in suitable facilities until delivery, installation, and acceptance by the Owner.
- E. Installing Contractor shall be responsible for coordinating the delivery acceptance of this equipment at the job site. Installing Contractor shall be responsible for receiving, offloading, storing and protecting this equipment until such time as it has been installed by him and accepted by the Owner.

1.6 WARRANTY

- A. Provide TWO (2) year manufacturer warranty for AVDGS inclusive of parts and labor from date of Substantial Completion. Date of Substantial Completion is defined as the date the equipment is turned over for normal operation, per Division 01 Specification Section 01 77 00.01 – Closeout Procedure- System Acceptance.
- B. Labor warranty shall be performed by factory trained technicians. All warranty services shall be at the installation site. Manufacturer shall be responsible for all travel and sustenance expenses necessary to perform warranty services and repairs.
- C. Warranty Services shall be commenced with on site representation, by qualified repair technicians, within 72 hours from the request of the Owner.
- D. The Owner shall have the option of performing any repairs necessary to maintain the unit(s) in an operable condition during the warranty period. Labor expended by the Owner, or the Owner's representative, is to be reimbursed by the manufacturer at the Owner's prevailing labor rate. The Owner's prevailing labor rate will be provided upon request.

1.7 SPARE PARTS

- A. Provide separate pricing for one set of recommended spare parts for use in maintenance of each unit for the Owner's review. The Owner shall consider the recommendations of the equipment manufacturer and purchase such spare parts as it deems necessary.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Provide six (6) bound copies and three (3) electronic copies (external hard drive) of the approved, comprehensive Operation and Maintenance Manual to the Owner fourteen (14) days prior to Substantial Completion.
- B. The manuals shall fully describe each product, system, or subsystem numbered logically and separated into sections and contained in rigid plastic binders with identification inserted in clear plastic pockets on front and spine of each binder. Manuals shall be assembled in accordance with ATA 101
- C. The content of the manuals shall be limited to information and data that specifically apply to products provided and shall include routine normal and special operating instructions and sequences. Also included shall be routine maintenance procedures and guides for troubleshooting, disassembly and reassembly instructions, and recommended spare parts list consisting of current prices and sources.
- D. Wiring diagrams and schematics shall be incorporated into the manuals to clearly show features such as controls, switches, and indicators by name and location.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturers:
 - 1. ADB Safegate Flex unit
 - 2. Substitutions: As approved by Engineer.
- B. All substitutions must be submitted to the engineer, owner, or owner's representative for approval, prior to providing a formal submittal.

2.2 ELECTRICAL RATINGS AND COMPONENTS

- A. Input Voltage Rating: 120 Volts (nominal), 60 Hertz, 1-phase, 2-wire plus ground.
- B. All fuses shall be miniature circuit breaker type.
- C. Equipment manufacturer shall provide a written statement that the total voltage harmonic distortion (THD) from the equipment, as measured from 3rd to 21st harmonic at all branch circuit connection. Will not exceed 5%, and individual harmonic distortion will not exceed 3%, as defined by IEEE 519. If necessary, the equipment manufacturer shall provide harmonic filters to meet these conditions. This shall apply to all microprocessor-based components, equipment containing switch-mode power supplies and all non-linear equipment loads.

D. Main Disconnect

1. A suitably rated disconnect device shall be provided on the unit to allow maintenance personnel the capability of completely removing power from the unit for maintenance purposes.

2.3 CONTROLS AND OPERATIONS

- A. At a minimum, the system shall provide Pilot Display units and Operator Manual Control Panels for each gate per plan, a Central Control Workstation that will integrate with other applicable systems, and Remote Interactive Displays that will allow the FAA Air Traffic Control Tower and Airport Operations to access the available information provided by the AVDGS.
- B. The AVDGS shall provide an accurate and convenient means to direct aircraft to its final docking/parking positions, providing both the pilot and the co-pilot with the required directions and information. The AVDGS shall provide a simple and reliable visual aid to effectively position an aircraft on the designated aircraft stand, providing both azimuth guidance and the stopping position at the stand. All information needed by the pilot to position and park the aircraft shall be displayed on the Pilot's Display Unit to be located at the extension of the centerline on the building face.
- C. The AVDGS shall be compatible with the aircraft fleet mix designated to park at a particular gate.
- D. System measurements used to detect aircraft position during docking shall not rely on sensors mounted to or embedded in the apron.
- E. The AVDGS shall be designed to operate in all weather, lighting, and visibility conditions both day and night. The system shall allow for compensation for different mounting heights.
- F. The system shall be capable of providing a "Clear of Taxi lane" signal to indicate a docking aircraft's tail section is out of the taxi lane safety area. This signal shall be independent of block on/block off indications.
- G. The AVDGS shall be able to be activated either automatically or manually. Automatic activation shall be carried out through a connection with the Airport Traffic Information Management System (ATIS) / Flight Information Display System (FIDS) which monitors airline schedules and equipment. Manual activation is made from an Operator Panel, which is to be mounted on the PBB Rotunda column or from the AVDGS central Control Workstation located within the terminal building.
- H. The AVDGS shall be programmed with the stopping position data for the gate fleet mix. The Central Control Workstation shall allow changing or adding aircraft data into the AVDGS software; the Operator's Manual Control Panel shall allow for personnel to manually enter aircraft. The system shall enforce gate restrictions and limit the serviceable aircraft to those within the predetermined restrictions. Interlocks between dependent gates shall be provided to enforce gate restrictions.

2.4 COMPONENT CHARACTERISTICS

- A. Pilot's Display Unit (PDU)
 1. Cabin flight crew shall receive visual information via the PDU's integral displays confirming the aircraft's distance-to-run prior to reaching its pre-programmed stop position at the

- allocated stand, the correct aircraft type and series has been provided by ATIMS/FIDS or inputted by the gate operator, and the gate is free for docking. The system shall provide azimuth, closing rate, and stop information to the flight deck of the arriving aircraft.
2. The system shall confirm the approaching aircraft matches the type of aircraft scheduled for the gate or manually entered by the gate operator. The system shall display a STOP message if the aircraft lies outside of expected parameters.
 3. The PDU shall be visible from both the pilot and co-pilot positions.
 4. The PDU shall be designed with an LED display to provide three (3) different information indicators: alphanumeric, azimuth and closing rate. The PDU shall be capable of displaying the following messages:
 - a. Aircraft type
 - b. Stand number
 - c. Distance to stop
 - d. Stop OK
 - e. STOP
 - f. Wait
 - g. Too Far
 - h. Slow Down
 - i. Error Codes
 - j. Time and other FIDS information such as flight number, airline designation code, ETA or ETD.
 5. The PDU shall display required information and messages that are readable at a distance of 300 feet under all visibility conditions.
 6. The PDU shall be able to display "SLOW DOWN" if the aircraft speed is too fast. The unit shall be capable of determining aircraft speed within the range of 0.5 feet per second to 30 feet per second.
 7. The PDU shall display "STOP" when the PBB is not clear of the aircraft safety apron.
 8. The PDU shall enforce preprogrammed gate restrictions, including adjacent gate restrictions.
 9. The PDU shall include a sunshade.
 10. Laser scanning PDUs shall include a calibration system to facilitate setting the laser guidance system.

B. Operator Manual Panel

1. The Operator Manual Panel shall be protected from the elements, including dust and humidity in accordance with IP65.
2. The AVDGS shall be provide a programmable 4 digit access code to prevent unauthorized system operation.
3. The Operator Manual Panel shall be controlled by an internal microprocessor unit, connected to the Central Control Workstation via the LAWA LAN.

C. Central Control Workstation (CCW)

1. The CCW shall be capable of controlling and monitoring a minimum of 125 aircraft gate docking positions.

2. The CCW shall be connected to the Airport Traffic Information System (ATIMS) to allow for transmission of aircraft and flight schedule information.
3. The CCW shall integrate with the Ramp Services Monitoring System (RSMS) and provide necessary gate status and fault information.
4. The system shall be capable of storing the last 50 error messages, including associated gate, date and time of occurrence.
5. The system shall be capable of storing software data memory values for at least 150 types of aircraft.

D. Remote Interactive Displays

1. The system shall provide logged information and a graphical display of the gates to two (2) remote interactive displays, one within the Airport Response Coordination Center (ARCC) and one in the FAA Air Traffic Control Tower (ATCT).
2. Displays shall be interactive and allow the user to see in real time the current status of the gated aircraft. Displays shall also allow the user to access the stored event and error logs.
3. The remote displays shall prevent manipulation or creation of data; the display shall only provide access to stored information.
4. The Remote Display Unit shall include a graphical representation of the managed gates, and shall provide indication when an aircraft is clear of the taxilane and within the apron limits.

2.5 ENVIRONMENTAL CONDITIONS

A. The unit shall successfully operate under the following conditions:

1. Ambient Temperature Range: 25 degrees F to 125 degrees F.
2. Relative Humidity: up to 95%, including static cold or hot soak up to 48 hours within this range.
3. Wind: Up to 95 mph

PART 3 - EXECUTION

3.1 ASSEMBLY MOUNTING

- A. The light assembly shall be packaged in such a manner that no damage shall occur as a result of transportation.
- B. ADGU shall be installed per the manufacturer's published data and as indicated in contract drawings.

3.2 EXAMINATION

- A. Verify/perform the following items or tasks.
 1. Verify the site is prepared for installation of Pilot Display Unit.
 2. Make a final check of the security of the power connections.
 3. Re-install any covers removed during installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. The units shall not hinder or restrict the boarding bridge or other ancillary equipment from operating within its full designed operating range.
- C. Arrange installation to provide adequate clearance for service and maintenance.
- D. The unit shall be properly aligned and adjusted before final acceptance.
- E. Commission equipment. Provide complete functional testing to the satisfaction of the Owner. Complete all punchlist items.

3.4 INTERFACE WITH OTHER WORK

- A. Installation of unit shall be coordinated with other trades associated with project.

3.5 FIELD QUALITY CONTROL

- A. Inspect for loose connections, proper grounding connections, and proper sequence of operation.

3.6 STARTING EQUIPMENT

- A. Demonstrate proper operation of equipment to Owner. Operational checkout shall consist of the following:
 - 1. Operator Manual Panel shall be checked for operation and sequence of control.
 - 2. Pilot Display Unit operation shall be verified by visual inspection.

3.7 CLEANING

- A. Clean unit from all construction dust and debris prior to start-up.
- B. Touch up scratched or marred surfaces to match original finish.
- C. Protect the installed unit from subsequent construction operations.

3.8 DEMONSTRATION

- A. Confirm full and partial operational design conditions, including the following:
 - 1. Simulation of designed operational limits (i.e. Detection Range) for each type of aircraft designed to use the gate.
 - 2. Aircraft type/class database
 - 3. Error message library
 - 4. Gate restriction enforcement including adjacent gate interlocks
 - 5. PBB interlocks
 - 6. Identification of tail clear from taxi lane

- B. Confirm each AVDGS unit provides correct operations, including:
1. Range Resolution
 2. Tolerance Limits
 3. Diagnostics
 4. Communications Interface
 5. Aircraft Recognition/Database
 6. Graphics Interface
 7. Emergency Stop Button
 8. Alarms
 9. Internal Power supplies and DC Status (PDU)
 10. Display unit LCD-pixel test
 11. Manual Control panel functionality
 12. Central Control Unit functionality
 13. Display Configuration Mode
- C. After confirming individual unit functions, the system shall have at least 10 hours of operation followed by a complete system inspection for necessary configuration changes or adjustments. Actual operating conditions shall be based on those of typical peak period projections.

END OF SECTION 11 86 80