Addendum No. 1 – June 23, 2011

All Bidders shall include with their bid submittal a signed statement indicating they have reviewed and accepted Addendum #1, dated June 23, 2011 as part of the bid documents.

Item 1.

Part II:
Add attached specification section for “COMBINED 28 VDC/400 HZ SOLID STATE FREQUENCY CONVERTER”
COMBINED 28 VDC/400 HZ
SOLID STATE FREQUENCY CONVERTER

1.0 GENERAL

1.1 DESCRIPTION

This section covers designing, manufacturing, testing, furnishing of a combined 28VDC and 60 Hz to 400 Hz Pulse Width Modulated (PWM) frequency converter to conform with MIL-STD-704E standard for aircraft ground power systems. Basis of design is PWM/IGBT technology. Only the following PWM configurations will be accepted: Sine PWM (Natural), Interactive PWM, Optimum PWM (Multiple Inversion), Flash PWM (optimum), Phase Shifted PWM. Step conversion and/or bi-polar transistors will not be acceptable. Converters shall be designed to be mounted on the underside of a Passenger Boarding Bridge, and shall be provided with all necessary support structure. Alternate installation at apron level on a mounting stand will be considered acceptable if it does not interfere with aircraft movements or ramp parking.

1.2 APPLICABLE CODES AND STANDARDS

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:

- MIL-S-19500.................. Semiconductor devices.
- MIL-STD-461............... Electromagnetic emission and susceptibility requirements for the control of electro-magnetic interference.
- DFC-400. ..................... 400 Hz aircraft ground power.
- ST-20-1972 (R-1978)........ Dry type transformer for general application.
- IEEE 127..................... Aerospace equipment and frequency rating.
- IEC 146...................... Semiconductor converters.
- ISO-1540..................... Aerospace characteristics of aircraft electrical systems.
- ATA-101...................... Ground equipment technical data.
- ARP-1940 (1986)........... Solid state frequency converters.
- ISO-6858.................... Aircraft ground support electrical supplies.
- NFPA 70...................... National Electrical Code.

1.3 SUBMITTALS

The following submittals shall be required:
1. Manufacturers Data.
2. Connection Diagrams and Outline Drawings.
4. Spare parts list.
5. List of required Special Tools.
6. Operational and Maintenance Manuals.
8. Test Reports.

2.0 PRODUCTS

Provide frequency converter consisting of modular construction. Solid-state components for 28VDC /60 to 400Hz conversion, input / output devices and ancillary control devices. The frequency converter shall be the manufacturer’s latest design that complies with the specification. Only PWM design units (as identified in Section 1.1) are acceptable; units to be designed with switching devices using IGBT technology, a maximum of 12 switching elements shall be used. No step conversion or bi-polar transistor units will be considered. Both the 28VDC and 400 Hz Frequency conversion section shall be housed in a single self-enclosed cabinet. Cabinet enclosure shall be identical to the enclosure for a stand alone 90KVA Solid State frequency converter unit. Both output sections shall be supplied by a single input power source and shall be fed via a single transformer, with common driver and control printed circuit boards. Unit shall incorporate an interlock permitting for single output operation, either 28VDC or 400 Hz only.

All frequency converters provided shall be products of the same manufacturer, complying with requirements as stated herein.

Acceptable Manufacturers: INET Airport Systems
JBT Aerotech
FCX Systems
or approved equal

Note that companies wishing to bid as an equal will be required to obtain approval of equipment. Bidder will be responsible for all costs associated with approval by Owner. Costs may include sample unit and testing by independent laboratory; tests to be witnessed by Owner representative.

2.1 DESIGN REQUIREMENTS

The Combined 28VDC/400 Hz output solid state pulse width modulated frequency converter shall be complete with components and accessories coordinated so that the complete unit shall function as specified and shall be capable of continually running under full load conditions per specification. Unit shall be configured with a maximum of 4 printed circuit boards. Unit shall be designed so that under full load conditions all points on printed circuit boards shall be accessible without interruption to the power. The frequency converter
enclosure and accessories shall be manufacturer’s standard design.

MAXIMUM WEIGHT .............................................3,000 Pound
2.1.1 VENDOR CERTIFICATION TO BE PROVIDED WITH PROPOSAL

The following information regarding the units being proposed shall be completed by the converter manufacturer and included with the proposal. Failure to submit this certification will cause the proposal to be deemed non-responsive and the vendor’s proposal will not be considered.

ATTACHMENT A TO BID DOCUMENT – VENDOR EQUIPMENT CERTIFICATION

Bidder is to provide the following information as part of his quotation. Bids received without this form will be considered non-responsive and will not be considered.

<table>
<thead>
<tr>
<th>Converter PWM technology:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit efficiency:</td>
<td></td>
</tr>
<tr>
<td>Input Current Harmonics:</td>
<td></td>
</tr>
<tr>
<td>Output Voltage Harmonics</td>
<td></td>
</tr>
<tr>
<td>Maximum Input Amps at full load</td>
<td></td>
</tr>
<tr>
<td>Maximum Input Inrush Current</td>
<td></td>
</tr>
<tr>
<td>Number of Printed Circuit Boards</td>
<td></td>
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<tr>
<td>Pulse Rectification Configuration</td>
<td></td>
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<tr>
<td>Number of Switching Elements (Output)</td>
<td></td>
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</tbody>
</table>

We certify that our Company is proposing the above described units. If awarded a contract associated with this quotation we will supply units meeting the specification, with the above listed parameters.

Date

Name

Company
2.2 PERFORMANCE

2.2.1 SUPPLY INPUT POWER (Common to both 28VDC and 400 Hz Output)

1. INPUT VOLTAGE:
   Nominal voltage  480v

2. Input phase connection (not phase sensitive).

3. INRUSH CURRENT: Shall not exceed 100% of rated full load current and shall be equipped with a fully automatic input soft start circuit. Manufacturer shall identify as part of submittals the design and circuitry utilized to provide a true input soft start feature. This feature shall be demonstrated as part of factory acceptance testing.

4. PROTECTION: The frequency converter shall be equipped with the following input power protection:
   - Phase loss protection.
   - Phase sequence protection.
   - Over\Under voltage protection.
   - Thermal Overload protection.
   - Overcurrent protection.
   - Short circuit protection.

5. VOLTAGE OPERATING RANGE. The frequency converter output voltage shall be capable of being adjusted over a range of ±10% from rated voltage.

6. INPUT CURRENT HARMONICS: When connected to a 60 Hz power supply Input current harmonics shall not exceed 5% within normal load range. The converter must be equipped with a minimum 24 pulse rectifier at input to lower the harmonic current distortion at the mains. Harmonic traps or filters are not acceptable, as they would also be effecting other electrical equipment. Input current harmonics shall be demonstrated as part of the factory acceptance test. Units that do not meet the specified harmonics at time of factory testing shall not be accepted for shipment. Units that do not meet the specified harmonics under actual field conditions will be removed and replaced at Manufacturer’s expense.

7. INPUT POWER: input power for 28VDC/90 KVA unit shall be 105-115Amps at full output load (0.8 p.f.) with 480V input. Input power shall be confirmed at time of factory acceptance test. Units that require more input current than specified shall not be accepted.
2.2.2 OUTPUT POWER (400 Hz Output Section)

1. OUTPUT POWER RATING. Load capacity of the frequency converter shall be 90 kVA continuous at 0.8 power factor lagging.

2. OUTPUT VOLTAGE. The output voltage shall be 115/200 volt, 3 phase, 4 wire, with grounded neutral in accordance with the international aircraft electrical power requirements.

3. OUTPUT PHASE ROTATION. Shall be 3 phase, 4 wire, wye, ABC (clockwise) rotation.

4. OUTPUT FREQUENCY. Shall be 400 Hz (constant under all load conditions).

5. VOLTAGE REGULATION. Voltage regulation from no load to rated load and from rated load to no load shall not be more than 1% of nominal voltage and shall be maintained with input line voltage variations of ±10%.

6. VOLTAGE MODULATION. Voltage modulation shall not exceed 0.5% at any load from 0 to 100%.

7. VOLTAGE RECOVERY. Transient voltage recovery shall meet or exceed MIL-STD-704D (not more than 50 mSec for 100% load change).

8. VOLTAGE PHASE BALANCE. With frequency changer operating at any load within the rated kVA the maximum difference in all line-to-neutral voltages shall not exceed 1% for balanced loads and shall be within 2.5% for 25% unbalanced load.

9. PHASE VOLTAGE DISPLACEMENT. Shall be 120% ±1.0% for balanced loads 120%±2.0% for 33% unbalanced.

10. VOLTAGE TRIM ADJUSTMENT. The output voltage trim adjustment shall be ±15% of nominal output span.

11. CREST FACTOR. Shall be 1.414 ±5%.

12. FREQUENCY REGULATION. Shall be 400 Hz ±0.1 Hz and shall not be affected by load.

13. HARMONIC DISTORTION. The maximum total harmonic distortion at 100% load at 0.8 pf shall not exceed 1.5% when measured line-to-line or line-to-neutral. Any single harmonic shall be less than 1%.

14. LINE DROP COMPENSATION. Shall be 0 to 5% of voltage span and shall be adjustable.
15. OVERLOAD CAPACITY. After reaching stabilized temperature at full load, the frequency converter shall be capable of carrying the following overloads: 125% for 1 hour, 150% for 20 min., 200% for 1 min., 300% for 20 sec.

16. EFFICIENCY. The efficiency of the frequency converter shall be 94% or better at full load. Efficiency shall be demonstrated as part of factory acceptance testing. Efficiency shall be demonstrated immediately following a full load 24-hour heat run, before the converter is shut down.

17. OVER/UNDER VOLTAGE PROTECTION. An over/under voltage output protection shall be provided to automatically isolate the converter output power from the aircraft when it is exceeding limits of the MIL-STD-704E.

18. OVERLOAD/SHORT CIRCUIT. The frequency converter shall be isolated from the aircraft load by over-load/short circuit protection specifically rated for 400 Hz operation. The converter shall be equipped with an instantaneous electronic overload alarm circuit designed to operate at not less than 250% of rated capacity.

19. NO BREAK POWER TRANSFER. The frequency converter shall be designed with an energy management system that will provide continuous, trip free operation of aircraft designed for No Break Power Transfer operations during ground servicing at the gate.

The frequency converter manufacturer shall provide documentation in the form of test results and letters, which demonstrate this equipment, has been tested by aircraft manufacturers and has performed satisfactorily in tests on wide-body aircraft having No Break Power Transfer requirement.

2.2.3 28VDC Output Section

1. The combined 28VDC/400 Hz unit shall be rated for 1000 Amp continuous operation at 28VDC. The unit shall include two separate on/off selection switches, one for the 400 Hz and one for the 28VDC outputs.

Each ground power unit shall be designed to transform a conventional 480V 3 Ph 60 Hz supply to 28Volt Direct Current or 400 Hz 3 Phase 200/115Volt power

The 28VDC output shall be capable of:

Steady state operation at 1,000 Amps
Peak Current at 2,000 Amps for 1 second,
Continuous overload at 1,500 for 1 minute without collapsing the DC Voltage
2. Converter rectification shall be 24 pulse PWM technology with Isolated Gate Bipolar Transistors (IGBTs).

3. Line current distortion shall be less than 10% free mains voltage.

4. Power Factor
   From 50% to 100% rated load input, power factor shall not be less than 0.95 (leading or lagging).

5. Inrush current shall not exceed 100% full load current at rated output.

6. Power Interruption
   Frequency Converter Unit shall be designed to withstand a 20msec power interruption without shutting the system down of effecting the output voltage and frequency.

7. Output power
   1000 Amps at 28VDC (nominal)

8. Output Voltage
   28VDC

9. Output Voltage Ripple (DC)
   Less than 1%

10. Output Voltage regulation (DC)
    Less than 0.5% (0 to nominal load)

11. Output Voltage adjustment ± 10% (DC)

12. Output voltage transient recovery (DC)
    For 100% load change, less than 8% and response time less than 10 ms

13. Overload of rated capacity (DC)
    2000 Amps for 3 seconds (min)
    1500 Amps for 1 minute (min)
    1000 Amps Steady State

14. Efficiency shall be greater than 90%

2.2.4 ENVIRONMENTAL

    The solid state pulse width modulated frequency converter shall successfully operate under the following conditions:
1. AMBIENT TEMPERATURE RANGE -40 C to 55 C.
2. HUMIDITY..............................10% to 100% with condensation.
3. ALTITUDE..............................0 to 2000 meters w/o derating.
4. WIND ....................................Up to 145 km/hr.
5. AUDIBLE NOISE LEVEL.............Shall be not more than 65 dB at 1 meter (3 feet).

2.2.4 CONTROL CIRCUITS

1. CONTROLS.

The frequency converter shall be designed to start and stop by means of depressing momentary push buttons, mounted on the inside of the converter control section. There shall be provisions for remote operation. All control and metering functions shall be located inside the converter. The frequency converter shall be equipped with a fused, isolated 28 VDC power supply for operation of all control and indication devices. All fuses shall be suitably marked as to the circuit designation.

2. OUTPUT CONTACTOR.

The frequency converter output shall be connected to output contactors of sufficient capacity to handle rated load and overload specified. The output contactors shall be electrically interlocked with input circuitry so that frequency converter will be immediately isolated when converter is being shut down. The operating push-buttons and associated light indicators shall be mounted on the inside of the control section.

3. LINE DROP COMPENSATION.

The voltage regulation means shall include an electronic line drop compensation circuit for maintaining the voltage regulation at a single point distance from the converter and shall be adjustable at full load to at least 5% of rated output voltage.

4. AIRCRAFT INTERLOCK CIRCUIT.

The E and F interlock circuit shall instantaneously isolate the converter output in the absence of a 28 VDC signal from the aircraft. The E and F interlock circuit indicator shall be provided to display the status of E and F interlock.

5. AIRCRAFT BYPASS SWITCH.

For testing purposes an aircraft bypass switch shall be provided inside the converter to allow the unit to deliver the output power without the 28 VDC power from the aircraft. An indicator shall be provided to indicate that the BYPASS circuit has been selected.
6. OUTPUT VOLTAGE ADJUST.

A voltage adjusting potentiometer shall be provided to permit adjustment of the converter output voltage. Range of adjustment shall be ±15%.

7. BRIDGE CONTROL INTERLOCK.

For frequency converters installed on passenger loading bridges, the converter shall be interlocked with the bridge control circuit so that the bridge cannot be moved away from the aircraft while frequency converter is plugged into the aircraft.

8. ALARM INDICATOR RESET.

A push-button shall be provided to reset all indicators from cleared alarm signals.

2.5 METERS AND INDICATORS

1. Unit shall be designed with a communications port capable of metering the following functions:

   A. VOLTAGE
   B. VOLTAGE SELECTOR SWITCH.
   C. AMPACITY.
   D. AMMETER SELECTOR SWITCH.
   E. FREQUENCY METER. Output frequency meter.

2. ELAPSED TIME METER. Shall be non-resettable type with 0 to 99,999 hrs.

3. STATUS INDICATORS. The following status shall be provided: "POWER ON", "MODULE FAULT", "INPUT VOLTAGE FAULT", "OUTPUT VOLTAGE FAULT", "CONVERTER ON".

4. DIAGNOSTIC INFORMATION. The solid state frequency converter shall be equipped with a complete diagnostic system including alarm message system. All of the converter's vital function shall be continuously monitored by the diagnostic system. Additionally the converter shall be capable of diagnosing status of the aircraft cable assembly.

5. SYSTEM INDICATORS. The frequency converter shall be equipped with a Light Emitting Diode (LED) status package to provide monitoring of the proper system modules operation.
2.2.6 PHYSICAL CHARACTERISTICS

1. DESIGN AND CONSTRUCTION

a. The frequency converter shall be so designed that under full load conditions all points on the printed circuit boards shall be accessible without interruption of power. Converter shall be so constructed that parts will not work loose in service. It shall be design to withstand the strains, jars, vibration and other conditions incident to shipping, storage, installation and service.

b. The converter and inverter sections of the frequency changer shall be modularized solid state IGBT components. The standard construction shall have no moving parts and shall require a minimum service or maintenance. The unit shall be designed with a minimum number of components. No more than 4 printed circuit boards shall be permitted for unit operation. Boards shall have self diagnostics to indicate failure. Two levels of diagnostics shall be provided. One level shall indicate non-critical component failures. A second level shall indicate critical failures. All cards shall be equipped with vibration resistant latching mechanism.

c. Components shall be cooled by convection, natural draft cooling, use of heat sinks, or by forced draft cooling provided the overall efficiency of the unit is not reduced by the use of fans. All fans shall be equipped with permanent, washable aluminum mesh air filters. Maximum of six fans rated 250 cfm shall be utilized. Under conditions of fan failure and full load, the converter shall operate for 15 minutes without failure. This feature shall be demonstrated during factory acceptance test. Units that do not meet this requirement shall not be accepted.

d. The power transformers shall be mounted in separate compartments from the solid-state equipment.

e. The electronics shall be completely sealed from the environment. The electronic compartment shall be equipped with environmentally safe vapor type corrosion inhibitors.

f. The frequency converter shall be equipped with approved weather tight fittings for all wiring that passes through the weather tight compartments to preclude the entrance of moisture and dust into the isolated electronic compartment.

g. All printed circuit boards shall be conformably coated to protect against the effects of humidity, corrosion and salt fog. All integrated circuits shall be interconnected with PCB connectors to simplify repair.
h. The frequency converter shall be so constructed that adjustments and repairs can be easily made by maintenance personnel.

i. All major components and sub-assemblies shall be stenciled or labeled with identification number or letter code on or near the device. The code shall be readily visible when servicing the frequency converter.

2. CABINET

a. The cabinet enclosure shall be designed to be suitable for the intended environmental conditions. The cabinet shall be designed in such manner that no damage will occur as a result of transportation. The complete frequency changer shall be designed for lifting and transporting by forklift. Means shall be provided for easy access to all components and sub-assemblies.

b. Suitable warning labels or covers shall be provided where internal voltages decay slowly after shutdown.

c. The control panel shall be mounted inside the converter cabinet. Provision shall be included for attaching remote controls to operate the frequency converter from a remote location.

3. FINISHES

a. Steel surfaces shall be zinc coated (hot galvanized) per ASTM A 123, and then finished with a tough 2 part polyurethane topcoat with a heavy texture surface.

b. Aluminum surfaces shall be anodized per ASTM B 580 or coated with manufacturer’s standard coating.

c. Unless otherwise specified, color or finishes shall be manufacturer’s standard.

d. Color of exposed surfaces of frequency converters installed on passenger loading bridges shall match the adjacent surfaces of such bridges.

4. WORKMANSHIP

The frequency converter, including all parts and accessories shall be fabricated and finished in a workmanlike manner. Particular attention shall be given to freedom from defects, burrs, sharp edges, quality of soldering, welding, brazing, painting, wiring, riveting, alignment of parts and tightness of assembly screws, bolts, etc.
2.2.7 FACTORY TESTS

1. A factory Test Report shall be furnished for each frequency converter including test results, instrument used, test procedures, and final conclusions. Each Test Report shall be dated and signed by authorized personnel and shall be neat, readily legible and self-explanatory.

2. Factory testing shall be witnessed by two (2) Owner’s representatives. Bidder shall include all costs of Owner witness in their price.

3. Manufacturer shall submit proposed factory acceptance test for review a minimum of 60 days before original unit test is scheduled. Factory testing is not to be done until procedure is approved by Owner’s representative. Delay in shipment due to delay in submittal of an acceptable test procedure shall be the responsibility of the contractor.

4. Each converter shall be tested at no load and full load conditions and shall be given a "burn-in" test for at least 24 continuous hours.

5. In addition to load tests the following tests shall be performed:
   - OUTPUT VOLTAGE WAVE FORM
   - TRANSIENT VOLTAGE RECOVERY TIME (for 50% and 100% load shocks).
   - OUTPUT VOLTAGE REGULATION.
   - EFFICIENCY TEST at 100% load
   - OUTPUT VOLTAGE BALANCE.
   - OUTPUT FREQUENCY REGULATION.
   - OVERLOAD CAPABILITIES.
   - OPERATION OF SAFETY AND CONTROL DEVICES.
   - LDC CIRCUIT.
   - INPUT CURRENT HARMONICS
   - OPERATION WITHOUT FANS @ 90°F

2.2.8 INSTALLATION

1. General: All equipment, wiring and installation shall be in accordance with current, applicable codes and per current industry standards.

2. Packaged frequency converters: The frequency converters shall be delivered to the site completely assembled and tested. The furnished PBBs shall provide all necessary structural capacity and connections for mounting the frequency converters and accessories.

3. Final Connections: The Contractor shall make final electrical connections from the pre-wired utility connections on the PBBs.
4. Final Field Test: After the PBB installation is complete, the frequency converter manufacturer, in the presence of the Owner’s authorized representative, shall operate each unit to verify performance compliance relative to output voltage, control functions and operating controls.

2.2.9 RELATED COMPONENTS

Each unit shall be supplied with the following related components:

1. Input power cable for connection to input junction box. Junction box to be supplied and installed by PBB Manufacturer.

2. Two Tunnel mounted cable hoists with brackets

   A. Provide a cable hoist assembly to raise the 400 Hz Output flexible aircraft cable (connected to the converter mounted on the passenger loading bridge) to a stowed position along the side of the bridge out of the path of moving vehicles. Provide operator controls via remote pushbutton to allow raising and lowering the cable to power aircraft at the gate.

   B. Provide a cable hoist assembly to raise the 28VDC Output flexible aircraft cable (connected to the converter mounted on the passenger loading bridge) to a stowed position along the side of the bridge out of the path of moving vehicles. Provide operator controls via remote pushbutton to allow raising and lowering the cable to power aircraft at the gate.

   C. The hoists shall be designed for mounting on top of or on the side of the bridge.

   D. The hoist cabinets shall be welded number 10 gauge steel. The finish shall be two coats of primer and one coat of white polyurethane paint. The unit shall be rated NEMA 3R. The hoists shall be constructed with removable or hinged covers for ease of maintenance and access to major components.

   E. Motor

      1. Provide an electric open drip proof gear motor rated at ½ HP, 480VAC, 60 Hz, 3PH. The gear reducer shall be NEMA rated Class D.

      2. Provide a magnetic disc brake to prevent the wire rope drum from unwinding when the hoist is shut off.
F. Controls:

1. A 600V, 3 pole 10 amp manually operated disconnect isolation switch shall be provided.

2. Provide a reversing contactor and control circuitry.

3. Provide a 24 volt adjustable counter to control the IN and Out limits of the wire rope.

4. A step down transformer shall be provided for the low voltage circuits.

5. Provide a single drum with flanges to contain the wire rope.

6. Provide 3/16 inch diameter nylon coated stainless steel braided wire rope of sufficient length to raise the aircraft cable level with the underside of the bridge.

7. Provide two cast aluminum cable saddles and clamps to attach to the aircraft cable. One clamp is to be attached about 14 feet from the cable head and the second approximately 18 feet from the cable attachment on the bridge. This will allow the aircraft cable to be festooned on the side of the bridge.

8. During the “down cycle”, the hoist lowers the aircraft cable to a ground handling position. The operator uncouples both swivel clamps from the saddles which allows the aircraft cable to be extended and attached to the aircraft.

9. The return of the aircraft requires the operator to pull the cable back to a position where the cable clamps can be reattached to the hoist wire rope. The “raise” push button on the aircraft cable head or the lift column returns the aircraft cable to the stowed position.

10. The cable hoist counter disconnects power from the motor when the travel limit, “raise” or “lower”, has been reached.

3. A remote pushbutton stationshall be provided for each cable hoist for mounting on PBB lift column. Unit to include On/Off/Up/Down controls.
4. Aircraft cable assembly

   A. The 400 Hz Aircraft Cable shall be of a banded configuration suitable for nominal 200/115 volt, 3 phase, 4 wire, 400 Hz power. Cable shall include E&F control wiring as required for aircraft applications. Cable shall be 60 feet long as required to reach aircraft connection point.

   B. Cables shall include a molded head with replaceable nose section.

   C. Cables shall include On/Off and Raise/Lower pushbuttons in the cable head.

   D. Weight shall not exceed 2 pounds per foot.

   E. Acceptable Manufacturers

       INET Airport Systems
       JBT Aerotech
       FCX Systems
       or Approved Equal

5. Aircraft cable assembly

   A. The 28VDC Aircraft Cable shall be of a banded configuration. Cable shall include E&F control wiring as required for aircraft applications. Cable shall be 50’ as required to reach aircraft.

   B. Cables shall include a molded head with replaceable nose section.

   C. Weight shall not exceed 2 pounds per foot.

   D. Acceptable Manufacturers

       INET Airport Systems
       JBT Aerotech
       FCX Systems
       or Approved Equal

6. All required connectors and other things required to completely install equipment and related components.

2.2.10 DESIGN LIFE

   The converter shall be designed for a life of not less than 10 years.
2.2.11 WARRANTY SERVICE AND PARTS

1. Manufacturer shall warrant that its products and work shall meet all applicable specifications, codes and other specific product and work requirements (including those of performance) and shall be free from defects in material and workmanship for a period of one year from commissioning. Upon submittal of a warranty claim, Contractor shall repair or replace items necessary to restore the GPU to satisfactory condition. This warranty does not include consumables. The terms and stipulations of the warranty period shall be submitted with the proposal.

2. In addition to the proposal for fabrication, delivery and installation of systems, the Proposer shall provide a recommended spare parts list, the cost for each part, the extended cost, the consigned cost, and any terms and conditions applicable to this proposal.

2.2.12 OPERATION AND MAINTENANCE MANUALS AND TRAINING

1. A complete manual in a protective binder or cover shall be provided for each converter and shall contain the following information:
   - Converter description, theory of operation and specification.
   - Installation and maintenance procedures.
   - Starting, Operation, Maintenance and Troubleshooting instructions.
   - Schematics and Connection wiring diagrams.
   - Recommended Spare Parts list.

2. Operation and Maintenance Manuals shall follow the intent of the Air Transportation Association (ATA) Specification 101 or acceptable manufacturer’s standard. Included in the manuals shall be preventative maintenance requirements and problem solving procedures.

3. Operator training and maintenance training shall be provided at scheduled times during commissioning prior to beneficial use. Training shall include a combination of over-the-shoulder and classroom training. 16-Hours of classroom training is to be provided at the job site. Owner shall provide classroom space and training tools as required by Manufacturer. Optional training at manufacturer’s facility to be provided at additional cost if requested by Owner.

END OF SECTION