

STATEMENT OF WORK

PREVENTIVE MAINTENANCE UNINTERRUPTIBLE POWER SUPPLY (UPS) AND MAIN ELECTRICAL GEAR DC POWER SUPPLY KANSAS CITY, VA MEDICAL CENTER

1. The contractor shall furnish all labor, supervision, materials, tools, OEM parts and any specialized test instruments to perform Semi-Annual Maintenance on the Medical Center's 3-Uninterruptible Power Supplies (UPS'S), 48 VDC Power System w/24 Cell Battery Plant and 1, Redundant 125 VDC Battery System. This will include unlimited 24/7 emergency service.

Qty. 3, 50KVA at 120/208V 3Ø Powerware Uninterruptible Power Supplies
Qty. 1, 100KVA at 120/208V 3Ø Powerware Uninterruptible Power Supplies
Qty. 1, 48 Volt Direct Current System, Rectifier
Qty. 1, 125 Volt Direct Current System

Response time for Emergency Service:

Contractor will provide contact numbers for emergency and non-emergency contact. Contractor will respond to the emergency call within 15 minutes of initial telephone contact by the VA. The contractor will be on-site within 4 hours of the initial telephone contact by the VA.

Response time for Non-Emergency Service:

Contractor will respond to calls for non-emergency service, during regular business hours, within 1 hour of initial contact by the VA. If the initial telephone contact is made during non-business hours, the contractor will return the call within 1 hour of the start of the next business day.

Semi-Annual Preventive Maintenance:

Work on the UPS'S will not start until at least 5:00 PM and must be completed by 7:00 AM the following morning. Tasks that require a UPS being put into bypass will be done only when there are no storms in the area. Any work on the Redundant 125 VDC Battery System can be done during normal business hours.

Codes and Standards:

All preventive maintenance performed, will be done in accordance with the most recent edition of all applicable codes and Standards and manufacturers recommendations: NECA 411-2014 Annex B; NFPA 70; NFPA 70B; MTS-2015 7.18.1. In instances where maintenance recommendations differ between applicable standards and manufacturers recommendations; then, the most stringent requirement(s) will be followed.

This contract requires that the contractor provide a minimum of 2 copies (each) of the most recent edition of NECA 411-2014 and MTS-2015. The contractor will provide one copy of each Standard to the COR. The contractor will affix a copy of the respective Standard inside one of the UPS cabinets and inside the battery charger cabinet for the 125VDC Battery System. This copy will be available to technicians and electricians who will be maintaining the equipment. The UPS cabinet that has the NECA 411-2014 Standard will be identified and the other 5 UPS Cabinets will indicate where the copy of the NECA 411-2014 Standard is located. The battery charger cabinet will also be identified as having the copy of the MTS-2015 Standard inside. The means of

identification will be approved by the COR for the contract and will be done using a labeling machine with a minimum of a 3/4" high font.

Capacitor Replacement:

This contract requires all UPS capacitors to be replaced in the first quarter of the base contract year.

Battery Replacement:

This contract requires all UPS batteries to be replaced in the first quarter of the base contract year.

Cooling Fan Replacement:

This contract requires all UPS cooling fans to be replaced in the first quarter of the base contract year.

Firmware Upgrade:

This contract requires all UPS's to have their firmware upgraded to the latest version, in the first quarter of the base contract year.

2.General:

When performing preventive maintenance, the contractor will remove all debris and used components daily. No debris or recyclable materials be left overnight.

Indicate all deficiencies on the Semi-Annual Preventive Maintenance Report. Notify the COR for the contract should issues be identified that require urgent attention.

There will be an estimated yearly cost of \$10,000 in additional labor and materials that will be provided by the contractor in the execution of this contract. This \$10,000 is for the cumulative repair and replacement of any components that are failing or have failed and were identified as being deficient. If costs exceed the \$10,000, the contractor will submit a quote, along with a detailed Statement of Work to the contract COR.

Within 14 calendar days of contract award, the contractor will submit, to the COR for the contract, their proposed Semi-Annual Preventive Maintenance checklist format, as well as their format for submitting the Preventive Maintenance reports.

I. UPS SEMI-ANNUAL MAINTENANCE

Contact UPS and component manufacturers for information on equipment upgrades and recommended revisions.

A. MAINTENANCE TASKS:

- 1) Check the appearance and cleanliness of UPS equipment, the area immediately around the UPS, and the rest of the room. Check that UPS rooms are not used for storage. Check HVAC equipment for proper operation. Check temperature and humidity. Indicate deficiencies on the Semi-Annual Preventive Maintenance Report. Notify the COR for the contract should issues be identified that require urgent attention.
- 2) Inspect UPSs and components externally. Check the condition of UPS equipment air intakes and exhausts, including filters. Check ventilation fans for proper operation, and ensure that ventilation

openings are clean and clear of obstructions. Check for evidence of problems by evaluating sounds, smells, and detrimental environmental conditions such as heat, moisture, and chemicals. Indicate deficiencies on the Semi-Annual Preventive Maintenance Report. Notify the COR for the contract should issues be identified that require urgent attention.

- 3) Check ventilation and the suitability and condition of any electrical equipment near the batteries. Evaluate battery proximity to combustibles and ignition sources. Indicate deficiencies on the Semi-Annual Preventive Maintenance Report. Notify the COR for the contract should issues be identified that require urgent attention.
- 4) Check for spilled electrolyte. Neutralize lead-acid battery spills using bicarbonate of soda solution. Use boric acid solution to neutralize Nickel-Cadmium battery spills.
- 5) Check that UPS control panels indicate NORMAL system operation. Consult the manufacturer for recommendations for system alarms and other abnormal operating conditions.
- 6) Check indicator lamps using the "lamp test" feature. Check all meters to ensure that they are operating properly. Check input, output, and bypass voltage and current. Record meter readings for input and output voltage, current, and frequency. Verify the operational status of the disturbance monitor, if so equipped.
- 7) Check UPS controls to verify that they are operating correctly.
- 8) Check batteries and charger/control equipment to verify that they are in a clean and satisfactory condition, and that no exceptional environmental or other conditions exist that could cause damage or affect performance.
- 9) Check battery containers, covers, and post seals for cracks, structural damage, electrolyte leaks, dirt, and corrosion. Remove all corrosion and dirt, clean battery cell tops, terminals, and intercell connectors, and check terminal connections, battery posts, and cable ends. Clean battery posts in accordance with manufacturer recommendations. Rinse flame arrester-type vent caps with clear water and air dry to clean. Replace damaged units and vent caps. Clean lead-acid battery surfaces with water and sodium bicarbonate to avoid leakage currents caused by electrolyte on the battery. Clean Nickel-Cadmium battery surfaces with a boric acid solution. Do not use cleaners, soaps, or solvents to clean battery containers and covers. Reapply non-oxidizing grease to battery terminals and intercell connectors, if necessary.
- 10) Check plates of clear containers for buckling, warping, scaling, swelling, or cracking, and for changes in color. Replace damaged cells. Check batteries for vibration. Excessive vibration can be detected by observing vibration of plates and sediment in the jar. Note the condition of plates and sediment of free-electrolyte, lead-acid batteries in transparent containers. Determine if electrolyte and cells are clear with minimal deposits, gassing, or rings, and that there is only minor sediment below the plates.
- 11) Check battery electrolyte levels, where applicable, and refill as necessary using manufacturer recommended materials and methods. Measure and record amounts of water added to cells as excessive water consumption can be a sign of overcharging.
- 12) Select approximately one in six battery cells as "pilot cells" to measure and record cell voltage, temperature, and specific gravity for lead-acid batteries. Select alternate pilot cells quarterly to minimize cell electrolyte loss and contamination during testing. Correct the specific gravity readings for temperature. Do not measure specific gravity within 72 hours after applying an equalizing charge or after adding water to the battery.

- 13) Measure and record UPS input and output voltage, current, and frequency, and battery float voltage and charging current. Check the load to ensure that it is within the UPS rating.
- 14) Clean the inside of all UPS equipment enclosures and the components within; including the battery cabinets and batteries.
- 15) Inspect all parts for evidence of overheating, and for physical and thermal damage, including worn insulation, and corrosion. Inspect terminals for loose or broken connections, and burned insulation.
- 16) Check inverters for signs of leaking fluid from the wave-forming capacitors. Check for evidence of liquid contamination, battery electrolyte, and oil from capacitors. Inspect all oil-filled AC capacitors for deformation, swelling or discoloration. Oil-filled AC capacitors have a life expectancy of 6 to 10 years of operation. Replace oil-filled capacitors within six months of the end of their service life.
- 17) Check intercell and terminal connection resistances in a sample of batteries in accordance with manufacturer recommendations. If the sample shows an increase in resistance, check the resistance of all connections. Check cell impedance, conductance, or resistance of valve-regulated lead-acid batteries.
- 18) Measure and record pilot cell temperature of vented lead-acid batteries. Measure and record the cell temperature at the negative terminal of each cell or module for valve-regulated lead-acid batteries. Measure and record the specific gravity of electrolyte in all cells. Correct specific gravity readings for temperature.
- 19) Measure and record individual cell voltages.
- 20) Check battery cable connections and UPS terminals. Examine interconnection cables, cell connectors, and other conductors for wear, contamination, corrosion, and discoloration. Check battery racks for corrosion, cleanliness, and structural integrity.
- 21) Operate the transfer switch test switch.
- 22) Check area HVAC systems, seismic supports, DC circuit overcurrent protection, distilled water supply, alarm circuits, grounding connections, cable clamps, and all other installed protective systems and devices.
- 23) Check electrical connections with a digital low-resistance ohmmeter. Measure voltage drop across all electrical connections. When load testing is possible, infrared scanning under full load can identify possible loose or corroded connections. Where loose connections are detected, torque intercell connectors or links to manufacturer recommended values.
- 24) Perform an infrared scan of batteries. Correct deficiencies in accordance with manufacturer recommendations.
- 25) Inspect battery racks and rack insulating covers for physical damage, loose connections, cracking, dielectric leaks, dirt, corrosion, seismic parts, and spacers. Re-torque battery rack connections.
- 26) Test alarm shutdown functions. Check alarm relays, lights, horns, buzzers, or other audible annunciation devices for proper operation. Check emergency lighting for proper operation.
- 27) Measure and record ripple current and voltage for valve-regulated lead-acid batteries.
- 28) Inspect power semiconductors for corrosion and for damage to the hermetic seal. Replace devices with corrosion or damaged seals.

- 29) Check UPS output voltage and frequency. If necessary, make adjustment settings per manufacturer's specifications.
- 30) Perform a transfer test. Test the static bypass switch to cycle the load to and from the UPS input source. Measure and record transients, maximum and minimum voltages, and transfer times, which should be within manufacturer's recommended limits.
- 31) Perform a synchronization test where synchronization with an alternate source is required. Measure the inverter output voltage and the rate of change of inverter frequency to the reference frequency as it is attenuated. The results should be within manufacturer's recommended limits.
- 32) Perform an output voltage balance test. Measure and record inverter phase-to-phase and phase-to-neutral voltage and phase angles while symmetrical and unbalanced loads are applied from no load to full load. Verify that voltages and phase angles remain within manufacturer's recommended limits.
- 33) Perform harmonic-components test. Measure and record the harmonic content in the output voltage for rated linear and non-linear load conditions. Verify that harmonic content remains within manufacturer's recommended limits.

B. BATTERY DISCHARGE TESTING

- 1) Batteries will be replaced during the base contract year and Option Year 3. On Option Year 1, Option Year 2 and Option Year 4, the contractor will perform a battery discharge test to the point that the UPS(s) shuts down due to low battery voltage. Replace batteries if capacity drops by 20 percent in extended operation.

C. POST-REPAIR TESTING

- 1) Check the battery and associated charger/control equipment immediately following any repair or battery replacement to verify that they are in a clean and satisfactory condition with no exceptional environmental or other conditions that could damage or affect performance.
- 2) When applicable, check electrolyte levels and add distilled water as necessary. Clean and re grease battery terminals and intercell connectors as necessary. Clean cell tops. Check and record individual cell voltages where practical. Check and record the specific gravity of pilot cells where applicable. Note the condition of the plates and sediment of free-electrolyte, lead acid batteries in transparent containers.
- 3) Perform an AC input failure test under connected load for a minimum of five minutes or as specified for the UPS class, whichever is less. Record the UPS output voltage, the battery voltage, and the duration of the test at the beginning and end of the test.
- 4) Check that all indicator lamps, meters, and controls are operating correctly. Check the load value to ensure that it is within the UPS rating.

II. 48 VOLT DIRECT CURRENT SYSTEM, RECTIFIER SEMI-ANNUAL MAINTENANCE

Contact manufacturer for information on equipment upgrades and recommended revisions.

- 1) All maintenance, testing and inspection will be done as per MTS-2015 Chapter 7

III. 125 VOLT DIRECT CURRENT SYSTEM

Contact manufacturer for information on equipment upgrades and recommended revisions.

A. VISUAL AND MECHANICAL INSPECTION:

- 1) Verify the battery ventilation system is operable.
- 2) Verify the existence of suitable eyewash equipment.
- 3) Inspect physical and mechanical condition.
- 4) Inspect battery support racks or cabinets, mounting, anchorage, clearances, alignment, and grounding.
- 5) Prior to cleaning, perform as-found tests.
- 6) Neutralize acid on exterior surfaces and rinse with water.
- 7) Clean corroded/oxidized terminals and apply an oxide inhibitor.
- 8) Inspect bolted electrical connections for high resistance using one or more of the following methods:
 - a. Use of a low-resistance ohmmeter in accordance with MTS-2015 Section 7.18.1.3.B.1.
 - b. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or MTS-2015 Table 100.12.
 - c. Perform a thermographic survey under load in accordance with MTS-2015 Section 9.
- 9) Perform as-left tests.

B. ELECTRICAL TESTS

- 1) Perform resistance measurements through all bolted connections with a low-resistance ohmmeter in accordance with MTS-2015 Section 7.18.1.3.A.8.1.
- 2) Measure negative post temperature.
- 3) Measure charger float and equalizing voltage levels.
- 4) Verify all charger functions and alarms.
- 5) Measure each monoblock/cell voltage and total battery voltage with charger energized and in float mode of operation.
- 6) Measure intercell connection resistances.
- 7) Perform internal ohmic measurement tests.

- 8) Perform an annual load test in accordance with manufacturer's specifications or IEEE 1188, Recommended Practice for Maintenance, Testing and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications.

C. TEST VALUES - VISUAL AND MECHANICAL

- 1) Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
- 2) Bolt-torque levels should be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use MTS-2015 Table 100.12. (7.18.1.3.A.8.2)
- 3) Results of the thermographic survey shall be in accordance with MTS-2015 Section 9. (7.18.1.3.A.8.3)

D. TEST VALUES – ELECTRICAL

- 1) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
- 2) Negative post temperature should be within manufacturer's published data or IEEE 1188.
- 3) Charger float and equalize voltage levels should be in accordance with the battery manufacturer's published data.
- 4) Results of charger functions and alarms should be in accordance with manufacturer's published data.
- 5) Monoblock/cell voltages should be in accordance with manufacturer's published data.
- 6) Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value.
- 7) Monoblock/cell internal ohmic values (resistance, impedance, or conductance) should not vary by more than 25 percent between identical monoblocks/cells that are in a fully charged state.
- 8) Results of load tests should be in accordance with manufacturer's published data or IEEE 1188.

III. DIRECT-CURRENT SYSTEMS, CHARGERS

A. VISUAL AND MECHANICAL INSPECTION

- 1) Inspect for physical and mechanical condition.
- 2) Inspect anchorage, alignment, and grounding.
- 3) Prior to cleaning the unit(s), perform as-found tests.

- 4) Clean the unit(s).
- 5) Inspect all bolted electrical connections for high resistance using one or more of the following methods:
 - a. Use of a low-resistance ohmmeter in accordance with MTS-2015 Section 7.18.2.B.1.
 - b. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or MTS-2015 Table 100.12.
 - c. Perform a thermographic survey under load in accordance with Section 9 of MTS-2015
- 6) Inspect filter and tank capacitors.
- 7) Verify operation of cooling fans. Clean filters if provided.
- 8) Perform as-left tests.

B. ELECTRICAL TESTS

- 1) Perform resistance measurements through all bolted connections with a low-resistance ohmmeter in accordance with MTS-2015 Section 7.18.2.A.5.1.
- 2) Verify float voltage, equalize voltage, and high-voltage shutdown settings.
- 3) Verify current limit.
- 4) Verify correct load sharing (parallel chargers).
- 5) Verify calibration of meters in accordance with MTS-2015 Section 7.11.
- 6) Verify operation of alarms.
- 7) Measure and record input and output voltage and current.
- 8) Measure and record ac ripple current and/or voltage imposed on battery.
- 9) Perform full load testing of charger.

C. TEST VALUES - VISUAL AND MECHANICAL

- 1) Compare bolted connection resistance values to values of similar connections. Investigate values which deviate from those of similar bolted connections by more than 50 percent of the lowest value. (MTS-2015 7.18.2.A.5.1)
- 2) Bolt-torque levels should be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.12. (MTS-2015 7.18.2.A.5.1)
- 3) Results of the thermographic survey shall be in accordance with Section 9. (MTS-2015 7.18.2.A.5.1)

D. TEST VALUES – ELECTRICAL

- 1) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
- 2) Float and equalize voltage settings should be in accordance with the battery manufacturer's published data.
- 3) Current limit should be within manufacturer's recommended maximum.
- 4) Results of load sharing between parallel chargers should be in accordance with system design specifications.
- 5) Results of meter calibration should be in accordance with MTS-2015 Section 7.11.
- 6) Results of alarm operation should be in accordance with manufacturer's published data and system design.
- 7) Input and output voltage should be in accordance with manufacturer's published data.
- 8) AC ripple current and/or voltage imposed on the battery should be in accordance with manufacturer's published data.
- 9) Charger should be capable of manufacturer's specified full load.

3. Contract Administration Data

All contract administration functions will be retained by the Department of Veterans Affairs. The Contracting Officer will be the only person authorized to approve changes or modify any of the requirements under this contract. The Contractor shall communicate with the Contracting Officer on all matters pertaining to contract administration. Only the Contracting Officer will be authorized to make commitments or issue changes that affect price, quantity, or quality of performance of this contract. In the event the Contractor effects any such change at the direction of any person other than the Contracting Officer, the change shall be considered unauthorized and no adjustment will be made in the contract price to cover any increase in costs incurred because of the change.

4. Acronyms and Definitions

CDR: Contract Discrepancy Report. Report issued by the Government to the contractor to document a supply or service found to be unacceptable during contract performance.

CLIN: Contract Line Item Number. Unit of work (or service) to be performed (or delivered) by the contractor as a pay item.

CO: Contracting Officer. A person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings.

COR: Contracting Officer's Representative. An individual, including a Contracting Officer's Representative (COR), designated and authorized in writing by the contracting officer to perform specific technical or administrative functions.

QA: Quality Assurance. Actions taken by the government to assure contracted services meet SOW requirements.

QASP: Quality Assurance Surveillance Plan. A written document specifying the method used for surveillance of contractor performance.

5. Personnel

- a. Non-Personal Services. This is a non-personal services contract. Personnel rendering services under this contract are not subject either by the contract's terms or by the manner of its administration, to the supervision and control usually prevailing in relationships between the government and its employees. The Government shall not exercise any supervision or control over the contract service providers performing services herein. Such contract service providers shall be accountable solely to the Contractor who, in turn, is responsible to the Government.
- b. Contractor Compliance with the Immigration and Nationality Act of 1952. The Contractor shall comply with all legal provisions contained in the Immigration and Nationality Act of 1952, As Amended; its related laws and regulations that are enforced by Homeland Security, Immigration and Customs Enforcement and the U.S Department of Labor as these may relate to non-immigrant foreign nationals working under contract or subcontract for the Contractor while providing services to Department of Veterans Affairs patient referrals.

6. Hours of Operations

- a. Business hours: Monday through Friday, 8:00 a.m. - 4:30 p.m.
- b. Off-duty hours: Friday through Monday, 4:30 pm—8:00am; Monday through Thursday, 4:30 pm—8:00am.
- c. National Holidays: The 10 holidays observed by the Federal Government are:
 - New Year's Day;
 - Martin Luther King's Birthday;
 - Presidents Day;
 - Memorial Day;
 - Independence Day;
 - Labor Day;
 - Columbus Day;
 - Veterans Day;
 - Thanksgiving;
 - Christmas; and
 - any other day specifically declared by the President of the United States to be a national holiday.

7. Quality Control

- a. CONTRACT PERFORMANCE MONITORING. The COR may perform surveillance of services by any of the methods listed below:
 1. Observing actual performance;

2. Inspecting the services to determine whether the performance meets the performance standards; and
 3. Review of any other appropriate records.
- b. When unacceptable performance occurs, the COR shall inform the Contractor and the Contracting Officer. This will normally be in writing unless circumstances necessitate verbal communication. In any case the COR shall document the discussion and place it in the COR file. When the COR determines that formal written communication is required, the COR shall prepare a Contract Discrepancy Report (CDR), and present it to the contractor program manager. The Contractor shall acknowledge receipt of the CDR in writing. The CDR will specify if the Contractor is required to prepare a corrective action plan to document how the Contractor shall correct the unacceptable performance and avoid a recurrence. The CDR will also state how long after receipt the Contractor must present this corrective action plan to the COR. The Government shall review the Contractor corrective action plan to determine acceptability. Any CDRs may become a part of the supporting documentation for any contractual action deemed necessary by the Contracting Officer.
 - c. Pursuant to VAAR Provision 852.270-1, Representatives of Contracting Officer representative(s); The Government shall periodically evaluate the Contractor performance by appointing a Contracting Officers Representative (COR) to monitor performance to ensure services are received. The Government representative(s) shall evaluate the Contractor performance through inspections of observations, inspection of services or any other form of documentation and all complaints from VA personnel. The Government may inspect as each task is completed or increase the number of quality assurance inspections if deemed appropriate because of repeated failures or because of repeated customer complaints. Likewise, the Government may decrease the number of quality assurance inspections if performance dictates. The Government Contracting Officer shall make final determination of the validity of customer complaint(s).
 - d. If any of the services do not conform to contract requirements, the Government may require the Contractor to perform the services again in conformity with contract requirements, at no increase in contract amount. When the defects in services cannot be corrected by re-performance, the Government may require the Contractor to take necessary action to ensure that future performance conforms to contract requirements at no additional cost to the Government.
 - e. Require the Contractor to take necessary action to ensure that future performance conforms to contract requirements at no additional cost to the Government.

8. Contract Security

The C&A requirements do not apply and a Security Accreditation Package is not required.