

## **ELECTRICAL SAFETY HAZARDS RESOLVED AT FLEET READINESS CENTER MID-ATLANTIC DETACHMENT, NAVAL STATION NORFOLK, VA**

Fleet Readiness Center (FRC) Mid- Atlantic Detachment is located at Naval Station Norfolk, Virginia. The mission of the FRC is to produce relevant quality airframes, engines, components, support equipment, and services to meet the Naval Aviation Enterprise's Aircraft Units Ready for Tasking (RFT) entitlements at improved efficiency and reduced costs.



FRC Building SP-300 houses multiple work centers in which various aircraft systems are repaired and maintained. As a follow-up to a power systems survey conducted in the building, electrical and power quality specialists from the Navy Mishap Prevention and Hazard Abatement (MPHA) Program Team inspected FRC work centers. The Team is part of the Naval Facilities Engineering Command (NAVFAC), which manages the Chief of Naval Operations MPHA Program. As part of the MPHA Program, NAVFAC oversees and funds the correction of identified high-risk safety and health deficiencies that exceed the funding capabilities of Navy shore activities that request such assistance.

The MPHA Team inspection was conducted to verify and obtain details of the safety hazards and discrepancies previously identified, enable the Team to clearly define a Statement of Work (SOW), and allow the Team to determine funding required to correct the hazards. The inspection revalidated the hazards from the previous survey dealing with improper wiring and grounding measures and incorrect labeling/circuit identification. These hazards could have placed personnel directly involved in the daily repair processes at risk for electric shock and electrocution and cause damage to sensitive electronic equipment.



During the hazard abatement project, the correct wire size and color were installed in the PS1-A power supplies and benches, and neutral circuits were isolated from ground circuits.

Discrepancies and hazards noted during the inspection included:

- Internal workbench wiring not properly color-coded. Typically there are at least three different electrical circuits running through the benches;

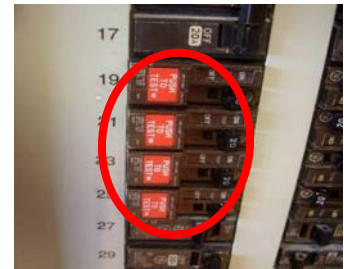
400Hz, 60Hz, and 28V DC. The color coding (see above photos) is meant to allow anyone to easily identify the individual circuits and their associated phases.

- Ground loops that allowed current to flow through equipment housings.
- Approximately 222 workbench sections and 126 Power Output Panels improperly wired.

- Ground Fault Circuit Interrupter (GFCI) protection missing from all electronic workbench 60Hz circuits. (An unintentional electric path between a source of current and a grounded surface is referred to as a "ground-fault." Ground faults occur when current is leaking somewhere; in effect, electricity is escaping to the ground. If a worker's body provides a path to the ground for this leakage, the worker could be electrocuted.



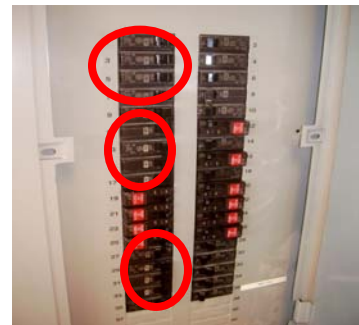
On complex circuits - GFCI Outlets were installed at the bench location to provide shock/fault protection to the bench circuit.



On simple circuits - GFCI Circuit Breakers were installed to provide shock/fault protection to the entire, downstream circuit.

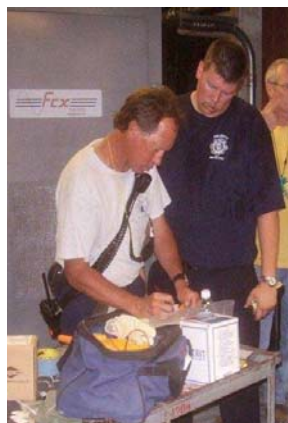
The GFCI constantly monitors electricity flowing in a circuit to sense any loss of current. If the current flowing through the circuit differs by even a very small amount from that returning, the GFCI quickly switches off power to that circuit.)

- Circuit breakers improperly sized for the circuit wiring, which could cause an overload resulting in a fire and/or short to equipment and a shock hazard to personnel.
- Safety straps, used to ground equipment being repaired, missing from all workbenches.
- Loose ground fittings.
- 400Hz frequency inverter (electronic device which inverts DC energy (type of energy found in batteries) into AC energy (type of energy produced by the power company)) not properly bonded to building steel.



All oversized 30 Amp breakers were replaced with proper 20 Amp breakers.

The 400Hz frequency inverter was properly bonded to building steel utilizing a Cadweld connection. Following base safety procedures for *Hot Work*, the base fire department signed off on the readiness of the operation and the contractor personnel involved.



Initial and follow-on MPHA Team visits, resulting reports, and corrective actions were all coordinated through the Commander Naval Region Mid-Atlantic, Sewells Point Safety Office. During a follow-up trip, the MPHA Team reported their findings and delivered the final SOW to the Safety Office and to NAVFAC for their review.

The MPHA Team reviewed a list of local Norfolk electrical contractors compiled from base personnel recommendations and listings in appropriate electrical trade associations. Contractors who qualified to bid for participation in the implementation effort met strict licensing, company, and personnel safety requirements. A walkthrough of the jobsite to examine the hazards described in the SOW was conducted with qualified contractors. Shortly thereafter, bids were received, a competitive cost/benefit analysis was conducted, and the MPHA Team provided a “best value” recommendation to NAVFAC. As a result, a contract was awarded to a local Norfolk contractor to provide qualified personnel and code compliant materials to correct the electrical safety hazards identified in the SOW.

A pre-implementation meeting, attended by representatives from the MPHA Team, the local contractor, all involved FRC shops, and the Sewells Point Safety Office and Security departments, was held at the FRC in mid-May 2008. The purpose of this meeting was to coordinate security, safety, and access requirements to both the base and the spaces involved prior to the start of the work. Corrective actions commenced one week later under the continuous oversight of the MPHA Team.



Green ground wires and clips, used for equipment grounding, were installed at four foot intervals along the workbenches.

The bulk of the repair work centered on rewiring over 220 workbenches to conform to the National Electrical Code, National Fire Protection Association 70E (Standard for Electrical Safety in the Workplace), Space and Warfare Instruction 5100.9 (Navy Shore Electronic Safety Precautions) and Naval Air Systems Command requirements. The entire repair process was completed in less than five weeks, eliminating all the identified hazards with no major disruptions to FRC operations or maintenance activities. The successful completion of the project increased the safety environment for both personnel and equipment in FRC Building SP-300 workshops.

Point of Contact: Mr. David Wiggins, NAVFAC Mishap Prevention & Hazard Abatement Program Manager/Deputy Operations, Safety Division  
Telephone: Commercial (202) 685-9215, DSN 325-9215  
Email: [david.wiggins@navy.mil](mailto:david.wiggins@navy.mil)