Aviation Battery Shop Setup Guidelines (nickel-cadmium batteries)

The following document is intended to help in planning a battery shop for servicing aviation nickel-cadmium batteries. Variations in equipment may be dictated by local safety regulations, electrical codes, and the type of aviation operation.

The detailed sections which follow address the most significant items, some in greater detail than others. Always consult the battery manufacturer's component maintenance manuals for recommended battery shop set-up, health and safety information, tools and test equipment.

OVERVIEW: An efficient battery shop should be:

a. Clean.
b. Well lighted.
c. Well ventilated.
d. Outfitted with required tools/equipment as specified in battery manufacturer's manuals.
e. Supplied with adequate source of electricity, water and compressed air, as well as sufficient drainage.
f. Provided with a telephone.
g. Conveniently located on a ground floor if possible.
h. Most importantly, staffed with properly trained and knowledgeable personnel.

1) THE SHOP

a. Size

The minimum size should be 10' X 10' x 10' containing all of the recommended equipment listed below. If equipped with RF80-K Charger/Analyzers, the technician should be able to service at least 2 nickel-cadmium batteries per RF80-K, per 8 hour shift. In general, we recommend one operator/technician for every 3 to 5 RF80-K Charger/Analyzers when used in a manual, non-computerized/automated battery shop.

b. Temperature

Battery servicing is best accomplished at temperatures of 25 degrees C (77 F), or less. Air conditioning has proven to be beneficial, since it can speed up servicing due to increased battery cooling during charge and discharge. If air conditioning is not feasible, a cooling fan can be used to remove heat from the batteries and provide ventilation.

c. Ventilation

During charging, nickel-cadmium batteries can produce small amounts of hydrogen and oxygen. The amount of gas generated depends on the charge rate (current) applied during overcharge. In general, some free airflow in the battery servicing area is sufficient to remove the gasses produced during charging. Depending on local safety regulations, electrical codes, fire regulations, occupational health and safety requirements and your company policies/regulations, additional ventilation may be required. This may involve installation of a “flow bench” to draw gasses from the batteries and exhaust from the battery shop.

d. Lighting

Lighting should be well distributed. Emergency battery powered lights should be provided in case of power failure.

e. Floor

The floor should be washable and provided with adequate drainage.

f. Security

The battery shop door should be kept closed and be lockable due to the high value of batteries and tools. It should be posted with signage indicating that entrance should be by authorized personnel only. The door should open out, not in. An alarm system is recommended.

g. Electrical Supply

The AC main supply should be adequate to satisfy all charger/analyzer's operating simultaneously, plus a small percentage safety factor. The RF80 series charger/analyzer requires a maximum current input of 25 amps at 220 volts, single phase, 50/60 hertz.

h.) Compressed Air

Compressed air is needed for routine cleaning of batteries and for testing vent caps when required. An oil filter should be installed to prevent compressor oil from being passed into the cells which can contaminate the electrolyte.

i.) Telephone

At least one telephone should be installed for communications and safety in case of emergency.

j.) Location

The shop should be located on the ground floor if possible due. It should also be convenient to the flight line if applicable. The battery shop should not be located near metal-working areas of have ventilation ducts coming from areas where metal is ground or cut.

k.) Equipment

a. Charger/Analyzer: For vented nickel-cadmium aircraft batteries, the CHRISTIE RF80-K (CE) is the worldwide industry standard for aircraft battery charger/analyzers. With its many user-friendly features, automatic operation, digital timers and displays, quick-charging capability, and selection of charge modes incorporating Christie's ReFLEX charger, the RF80-K is unsurpassed. Adopted by the US Air Force, UK MoD and nearly all major air carriers, the RF80-K is truly the worldwide industry standard.

b. For small, sealed emergency battery pack (e-batts), the six-channel CHRISTIE CASP/2500 reconditions nickel-cadmium batteries and charges and analyzes all rechargeable batteries. It automatically recognizes most common makes and types of batteries, but can also be programmed to accept other batteries, including newly developed batteries. Battery processing results can be captured by an external serial printer or with a PC, using the AB910E CASP Printer Emulator software.

c. Water: Distilled, demineralized, deionized water should be used, readily available in small containers. Standard tap water should not be used and will cause contamination of the battery/cell electrolyte.

d. Automatic Watering Systems: An Automatic Watering System such as the ABTECH Fill-Master 262E is quite useful to add distilled water to each cell quickly, while recording the exact quantity of water added for hard-copy printout or transmission to a PC. Designed for vented nickel-cadmium batteries, the system reduces filling and documentation time to only 2-3 minutes per battery. An adjustable feeder is provided to suit various battery types.

e. Shorting/Resistor Clips: As described in the battery manufacturer's component maintenance manuals, these steel shorting springs are used during the deep cycle process. Another popular approach is the use of 1 ohm, 5 watt resistors with alligator clips.

f. Digital Multimeter: Although most charger/analyzers include an internal voltmeter for individual cell voltage measurements, it is suggested that a separate, calibrated, external multimeter be used. In addition, the cell-to-case leakage test requires current measurement between the case and cell inter-cell links.

g. Torque Wrench: At least one calibrated torque wrench is required for verifying the proper torque value of the screws or nuts which fasten the inter-cell links. Consult the battery manufacturer's component maintenance manual for specific torque values.

h. Brush: A nylon brush is suggested for cleaning batteries. Never use a wire brush.

i. Cell Watering Syringes: These are used to adjust the water level in the individual cells. These syringes are supplied in many battery maintenance kits offered by the battery manufacturers.

j. Visor/eye protection: When adjusting the cell water level at the end of charge, the technician is exposed to corrosive potassium hydroxide and use of a visor or other suitable eye protection is recommended.

k. Thermometer: A nonmetallic thermometer, not containing mercury (such as a glass thermometer containing colored alcohol), can be used to measure internal cell electrolyte temperature.

l. Hand Tools: Standard hand tools should be available for battery disassembly during overhaul and cleaning.

m. Cell Pullers: A helpful tool used to help extract cells from the battery case. Refer to the battery manufacturer's CMM for fabrication instructions or part numbers of available cell pullers.

n. Shop Vacuum: A heavy-duty shop vacuum with a flexible plastic end is helpful for general workshop maintenance, and for cleaning residue off the battery link area.

o. Strainer: A small strainer/colander is helpful when cleaning battery hardware (intercell links, screws, nuts and washers) under running water.

p. Vent Plug Pressure Tester: A helpful tool used to determine if the cell vent caps release within the proper pressure range. Refer to the battery manufacturer's CMM for fabrication instructions or part numbers of available vent pressure testers.

q. Timers with Audible Signal: Mechanical or electronic timers are very helpful to remind the technician when individual cell voltage readings should be taken during discharge and charge.

r. Full-Body Safety Shower with Eye Flusher: It is recommended a Full-Body Safety Shower with Eye Flusher be installed within the battery shop. Check your local fire/safety regulations and company policies to determine specific safety requirements.

s. Fire Extinguishers: The battery shop should contain multiple, fully approved fire extinguishers, installed is a visible, marked and accessible location in accordance with local fire codes, and inspected a minimum of once per year or more frequently if required otherwise.

t. Work Benches: Sturdy work benches with non-metallic tops should be installed. The benches should be able to support the weight of multiple batteries and charger/analyzers.

u. Vent Hoods – Flow Bench: Some local fire/safety regulations or occupational health and safety requirements may require that fumes created during battery charging be extracted from the battery shop with a vent hood or flow bench.

v. Battery Shop Automation: The ABTECH Battery Management System (AMBS) is a state-of-the-art, fully integrated, automatic aircraft battery servicing solution. The system provides automatic PC control of the popular RF80-K Charger/Analyzer, real-time monitoring of battery and cell data, storage of critical battery servicing information and access to various battery management reports. The ABMS includes the AB3000 Controller, ABMS Software (WIN XP), Universal Cell Scanning Harness, Interface Cables and Operator's Manual.