



INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

MAINTENANCE MANUAL SUPPLEMENT

CONCORDE FLOODED LEAD ACID MAIN BATTERY

This document must be used in conjunction with the basic Maintenance Manual for the aircraft when the Concorde Lead Acid Battery is installed. This Maintenance Manual Supplement modifies/augments the portions of the basic Maintenance Manual.

The data/information contained herein has been reviewed and approved for general release on the basis that this document contains no export-controlled information.

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RECORD OF REVISIONS

Rev. No.	Description	Date	Appd
A	<ol style="list-style-type: none"> 1. Corrected page number 2. Corrected metric torque 3. Deleted paragraph a, recharging on the aircraft 	11/28/00	JBT
B	<ol style="list-style-type: none"> 1. Add note on watering 2. Add hydrometer & SG readings 	11/30/01	JBT
C	<ol style="list-style-type: none"> 1. Revised format 2. Assigned drawing number 3. Minor text revisions 4. Add notes on inspection requirement 	6/20/02	JBT
D	Completely revised	7/3/03	JBT
E	<ol style="list-style-type: none"> 1. Rev activation instructions 2. Delete taper and CP charging 3. Rev CP charging voltage 	10/19/04	JBT

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1. Scope: This Maintenance Manual Supplement provides the additional data required to insure satisfactory operation, maintenance, and repair of the Concorde flooded lead acid battery installation. Scope: This Maintenance Manual Supplement provides the additional data required to insure satisfactory operation, maintenance, and repair of the Concorde flooded lead-acid battery installation. Scope: This Maintenance Manual Supplement provides the additional data required to insure satisfactory operation, maintenance, and repair of the Concorde flooded lead-acid battery installation. Scope: This Maintenance Manual Supplement provides the additional data required to insure satisfactory operation, maintenance, and repair of the Concorde flooded lead-acid battery installation. Scope: This Maintenance Manual Supplement provides the additional data required to insure satisfactory operation, maintenance, and repair of the Concorde flooded lead-acid battery installation.

2. Purpose: This manual sets forth the instructions for determining continued airworthiness of a Concorde flooded lead acid battery.

3. Application: Concorde dry charged (flooded) aircraft batteries - CB series.

4. Definitions:
 - a. Flooded battery - A lead acid battery that contains liquid electrolyte. For aircraft, these are equipped with aerobatic vent caps to prevent the spilling of acid during maneuvers requiring a change in attitude of the battery.
 - b. Rated capacity C1 - Quantity of electricity in Ampere-hours (Ah) which the cell or battery is capable of delivering in 1 h, throughout its normal service life, after full charge, under conditions defined with regard to temperature and end discharge voltage.
 - c. End Point Voltage (EPV) - Unless otherwise stated, during discharge the battery voltage corresponding to a mean voltage per cell of 1.67 Volts for lead-acid batteries.

5. Precautions:
 - a. **CAUTION:** Aircraft batteries are certified to have certain minimum capacity for emergency operations in the event of a electrical generator system failure. Never "Jump Start" an aircraft that has a discharged or "Dead" battery.
 - b. **WARNING: ELECTRIC SHOCK HAZARD.** Do not touch uninsulated portion of the connector or the battery terminals. A possibility of serious electrical shock exists.
 - c. **WARNING: ELECTRIC SHOCK HAZARD.** Do not lay tools or other metal objects on the battery as arcing or explosion could occur. Remove conductive jewelry before working around battery, charger, or test equipment.

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- d. **CAUTION: ELECTRIC BURN HAZARD.** Do not wear conductive rings, belt buckles, or other jewelry when working with batteries, chargers, or test equipment. Do not lay tools or other metal objects on the battery as arcing and severe burns could occur.
 - e. **WARNING:** Batteries on charge or discharge produce hydrogen gas, which can explode if ignited. Do not smoke, use an open flame, or cause sparking near a battery. Charge, service or test a battery only in a well ventilated area. The use of exhaust fans may reduce the risk of explosion.
 - f. **WARNING:** Batteries contain sulfuric acid which will cause burns. **DO NOT TOUCH EYES AFTER TOUCHING BATTERY.** Do not get acid in your eyes, or on your skin, or clothing. In the event of acid in the eyes, flush thoroughly with clean cool water for several minutes. Get professional medical attention. Refer to battery MSDS for additional information.
 - g. **WARNING:** Wear proper eye, face and hand protection at all times when working with batteries. Know the location and use of emergency eyewash and shower nearest the battery charging area.
 - h. **CAUTION:** To prevent damage to the connector, arc burns, or explosion, batteries should never be connected or disconnected while being charged or discharged. Batteries must be connected or disconnected only when the circuit is open. Ensure the aircraft battery switch, external power source, or the charger/analyzer is in the **OFF** position before connecting or disconnecting the battery. Battery terminal protectors should be installed whenever the battery is not connected in the aircraft or to the test equipment.
 - i. **CAUTION:** Batteries contain hazardous materials. Know the location and proper use of emergency response materials. Refer to battery Material Safety Data Sheet (MSDS) for additional information.
 - j. **Caution / Warning:** Only constant potential charging may be done on the aircraft. **DO NOT** constant current charge a battery on the aircraft. There may be a serious risk of injury to personnel and / or damage to the aircraft or aircraft systems due to high voltage and generation of explosive gases when charging constant current.
6. Airworthiness Limitations: There are no airworthiness limitations associated with the installation of a Concorde flooded lead acid battery in an aircraft.
7. Activation of Dry Charged Batteries:
- a. Remove the sealing tape from the vents and remove the vent caps.
 - b. Fill each cell with 1.285 SG electrolyte to a height just above the top of the plates and separators.
 - c. Let the battery stand until it cools to room temperature or for one hour. Then, add more electrolyte to 1/4 inch above the top of the plates and separators. **Do not overfill.**

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- d. Install vent caps.
- e. Boost charge the battery Constant Current (CI) charge at 1/10 of the C1 rate for 20 hours.

NOTE: The battery is fully charged when the voltage stabilizes or decreases slightly and the SG of the electrolyte stabilizes for three successive readings taken at one hour intervals.

WARNING: Complete charging after activation is required for satisfactory performance. Do not allow the battery temperature to exceed 120° F.

- f. After the battery is fully charged, it may be necessary to adjust the electrolyte SG of each cell to 1.285 by diluting higher SG cells with approved water and by filling the lower SG cells with stronger electrolyte. Install vent caps.

NOTE: Add water only when the battery is warm, such as immediately after charge or flight. **Do not overfill.**

- g. Wash and dry outside of battery before installation.

8. Installation and Removal:

NOTE: The following instructions are generic. See airframe manufacturer's maintenance manuals or STC for instructions specific to a particular aircraft model. For removal and replacement of a nickel cadmium battery, see airframe maintenance manual or STC.

a. Installation procedure:

i. Remove old battery:

- (1) Set Master Switch to the **OFF** position.
- (2) Disconnect any external power supply
- (3) Open battery compartment access panels.
- (4) Disconnect battery quick disconnect plug or remove terminal bolts and disconnect battery cables from battery terminals. Always disconnect the ground cable first.
- (5) Disconnect battery ventilation tubes, if any.
- (6) Unlock battery hold down clamps or remove battery hold down bars. Disengage battery.
- (7) Carefully remove battery.

WARNING: Batteries are heavy. Use appropriate lifting devices or equipment. Use battery handles where provided.

ii. Install new battery:

- (1) Set Master Switch to the **OFF** position.
- (2) Disconnect any external power supply.
- (3) Open battery compartment access panels.
- (4) Ensure the battery container or tray is clean and dry.
- (5) Install battery in battery container or tray.

WARNING: Batteries are heavy. Use appropriate lifting devices or equipment. Use battery handles where provided.

- (6) Engage battery hold down hardware, torque and safety wire

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- per airframe manufacturer maintenance manual.
- (7) Connect battery vent tubes to aircraft ventilation system, if any.
 - (8) Connect battery quick disconnect plug, or for ring terminals, install with bolt and bevel lock washer provided with the battery. Torque terminal bolts as noted on the battery label. Always install the ground cable last.

CAUTION: Use an open end wrench on the flats of the battery terminal while torquing the terminal bolts. Failure to do so may result in the rupture of the battery seal at the terminal and premature failure of the battery.

CAUTION: Use only the hardware provided with the battery. Do not place any stainless steel or steel washers between the ring terminal and the battery terminal.

- (9) Replace electrical compartment access panel.
- (10) Update aircraft weight and balance data, if necessary.
- (11) Perform an operational test.
- (12) Annotate log book with battery serial number and date of installation.

9. Inspection Requirements and Overhaul Schedule:

a. Inspection Requirements:

NOTE: If the battery is used to satisfy the essential power requirement, it must be capacity tested. If the battery is not used for essential power, there is no requirement for periodic capacity checks.

i. Scheduled inspections:

- (1) An initial check of the emergency capacity is required 12 months after installation or after 600 hours of operation, whichever occurs first.
- (2) After the initial check, a check of emergency capacity is required after 12 months or after every additional 200 hours of operation.

NOTE: The inspection schedule may be adjusted after the useful battery life is established in a particular operation. After the useful life of a battery is established for a particular aircraft or operating mode, the actual useful life period in months or hours may be substituted for the above schedule.

b. Inspection Procedure:

i. Charge the battery:

- (1) Special tools:
 - (a) Advanced Power Products Beta D-50 Aircraft Battery Analyzer, P/N 4126 or equal.
 - (b) Advanced Power Products Alpha C-25 Battery Charger, P/N 4142 or Advanced Power Products Activator 282 Battery Charger, P/N 4105 or equal.

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- (c) Advanced Power Products CA-1550 Charger / Analyzer P/N 4159 or equal.
- (d) Hydrometer P/N 9295 or equal.
- (2) Depending on the type of charger available, charge the battery Constant Potential (CP). Charge at 14.4 volts for 12 volt batteries or 28.8 volts for 24 volt batteries until the charge current stabilizes for 1 hour.
- (3) The battery is fully charged when the voltage stabilizes or decreases slightly and the SG of the electrolyte stabilizes for three consecutive successive readings taken at one hour intervals.
- ii. Capacity test:
 - (1) Stabilize the battery at 15°C (59°F) or higher. The battery must be at the temperature for at least 24 hours.
 - (2) Discharge the battery at the C1 rate to an end point voltage of 10 volts for 12 volt batteries or 20 volts for 24 volt batteries, or the rate and end point voltage (EPV) specified by the airframe manufacturer for essential power.
 - (3) Record the time to EPV.
 - (4) The battery is acceptable for continued use if the ampere hour capacity (actual hours of discharge x ampere rate of discharge) is greater than 85% of the nominal rated capacity (C1) shown on the label (i.e. 51 minutes or more). If the battery passes return it to service. If the battery fails replace it.
- NOTE:** Airframe or accessory equipment manufacturers may specify a higher capacity requirement.
- (5) If the battery gets very hot (external case temperature greater than 55°C / 130°F) during charging, it should be replaced.
- c. Overhaul Schedule: No component overhaul required for this type product.

10. Troubleshooting:

Symptom	Probable Cause	Corrective Action
Low voltage / no voltage	Battery partially or fully discharged	Charge in accordance with Section 11
Battery does not hold charge	Battery beyond serviceable life	Replace battery
Battery gets hot while recharging	Battery beyond serviceable life	Replace battery

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11. Servicing discharged batteries:
- a. Recharging dual (parallel) batteries on the aircraft should be done individually.
 - b. Recharging a single battery on the aircraft:
 - i. Special tools:
 - (1) Advanced Power Products Activator 282 Battery Charger, P/N 4105, or equal constant potential charger.
 - (2) The Activator 282 is fully automatic. Connect to battery and initiate charging. If using a constant potential charger, follow instructions below.

Caution / Warning: Only constant potential charging may be done on the aircraft. Ensure the charging area is well ventilated. DO NOT constant current charge a battery on the aircraft. There may be a serious risk of injury to personnel and / or damage to the aircraft and aircraft systems.
 - ii. Set the charger for 2.4 volts per cell (14.4 volts for a 12 volt battery, 28.8 volts for a 24 volt battery).
 - iii. Set the current limit to the C1 rate.

NOTE: If current on external power unit is not adjustable, do not charge the battery in the aircraft
 - iv. The battery is fully charged when the voltage stabilizes or decreases slightly and the SG of the electrolyte stabilizes for three consecutive successive readings taken at one hour intervals.
- c. Uninstalled recharging:
 - i. Remove the battery from the aircraft.
 - ii. Special tools:
 - (1) Advanced Power Products Alpha C-25 Battery Charger, P/N 4142; Advanced Power Products CA-1550 Charger / Analyzer P/N 4159; or equal.
 - iii. Depending on the type of charger available, charge the battery Constant Potential (CP), Constant Current (CI), or with a taper charger
 - (1) If Constant Potential, charge at 14.4 volts for 12 volt batteries or 28.8 volts for 24 volt batteries until the charge current stabilizes for 1 hour.

NOTE: Batteries that have been allowed to stand in a deeply discharged state may not accept a CP recharge. See conditioning procedure in paragraph 14.c for handling those batteries.
 - (2) If Constant Current, the maximum charge rate in Amperes is the C1 rate on the label divided by 3.

Warning: Constant current charging must be monitored. Charge current must be reduced or charging discontinued when the battery gets hot. Electrolyte lost due to charging must be replaced with water.
- iv. The battery is fully charged when the voltage stabilizes or

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decreases slightly and the SG of the electrolyte stabilizes for three consecutive successive readings taken at one hour intervals.

12. Replacement / Repair:
 - a. Repairs should be performed only by a Concorde approved battery shop.
 - b. Replacement may be made by removing and installing a new battery in accordance with the instructions in this supplement.

13. Facilities:
 - a. Flooded lead-acid batteries must be serviced in a shop designated for lead-acid servicing.

14. Storage Limitations:
 - a. Batteries should be stored in a cool and dry place.
 - b. Dry charged batteries may be stored for an indefinite period prior to activation.
 - c. After activation,
 - i. For maximum battery life, boost charge when open circuit voltage is below 25.0 volts for 24 volt batteries and 12.5 volts for 12 volt batteries.
 - ii. Batteries that have not been recharged when stored for long periods are to be conditioned (14.e) and tested (9.b.ii) before being placed in service.
 - d. Boost charging procedure:
 - i. Special tools:
 - (1) Advanced Power Products Alpha C-25 Battery Charger, P/N 4142; Advanced Power Products Activator 282 Battery Charger, P/N 4105; Advanced Power Products CA-1550 Charger / Analyzer, P/N 4159; or equal.
 - ii. Depending on the type of charger available, charge the battery Constant Potential (CP). Charge at 14.4 volts for 12 volt batteries or 28.8 volts for 24 volt batteries until the charge current stabilizes for 1 hour.
 - e. Conditioning procedure:

Warning: The battery must be removed from the aircraft prior to performing a conditioning charge.

 - i. Special tools:
 - (1) Advanced Power Products Beta D-50 Aircraft Battery Analyzer P/N 4126 or equal.
 - (2) Advanced Power Products Alpha C-25 Battery Charger P/N 4142 or equal.
 - ii. Procedure:
 - (1) Discharge the battery at the C1 rate to an end point voltage of 9 volts for 12 volt batteries and 18 volts for 24 volt

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batteries.

- (2) Constant current charge at 1 /10 of the C1 rate for 16 hours.

WARNING: This procedure may damage the battery if performed on a repetitive basis.

- (3) Adjust the electrolyte level by adding approved water only.
- (4) Allow the battery to cool down for 8 hours.
- (5) Test the battery following the inspection procedure (9.b.ii).

15. Disposal:

- a. Batteries contain lead, sulfuric acid, and other hazardous materials.
- b. Lead acid batteries are recyclable.

CAUTION: Some aircraft batteries are encased in aluminum containers. These containers must be removed prior to recycling.

- c. Dispose of all spent batteries in accordance with local laws and regulations. See battery Material Safety Data Sheet (MSDS) for additional information.

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