To: Holders of component maintenance manual 24-32-26, 605CO1 (Saft 416541)

Subject: CMM Revision No. 6 Dated Aug 22/2022

Effectivity: All Models

HIGHLIGHTS

Replace revised pages by adding or removing the previous CMM pages and using the ones from the current revision dated Aug 22/2022.

NOTE: The CMM can be downloaded from the internet at www.saftbatteries.com

Chapter/Section Page Number	**Description of Change**
Title Page T-1	Updated revision number
Record of Revision ROR-1	Updated revision number and issue information
Service Bulletin List SBL-1	Update SB information
List of Effective Pages LEP-1	Update revisions to applicable pages
List of Illustrations LOI-1	Updated IPL information
Testing and Fault Isolation 1003	Added link for table reference.
Testing and Fault Isolation 1005	Added clarification
Testing and Fault Isolation 1006 - 1008	Corrected item numbers and updated numbering
Testing and Fault Isolation 1010 - 1013	Corrected item numbers and added clarifications
Testing and Fault Isolation 1016	Updated case physical faults
Repair 6003 - 6004	Added clarification and more details
Assembly 7003, 7005, 7006	Added clarification
Special Tool, Fixtures, Equipment, and Consumables 9003	Change range by using “to”
Illustrated Parts List 10004 - 10008	Update figure to include IPL text
Illustrated Parts List 10010 - 10011	Correct indentation

Chapter/Section Page Number	Description of Change
Storage (Including Transportation) 15003 - 15004	Corrected environmental parameters. Remove obsolescent information.

ECCN: EAR99
Cage Code 09052

711 Gil Harbin Industrial Boulevard - Valdosta, Georgia 31601 - USA

COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

AIRCRAFT BATTERY

Battery type 605CO1

SAFT Part No. 416541

BOEING Part No. S281W205-1

EVERSKY

date of creation: Jul 25/2019

24-32-26

Edition 6
Aug 22/2022

RECORD OF REVISION

Rev. n°	Issue date	Inserted		Rev. n°	Issue date	Inserted	
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1	Feb 7/2020	Feb 7/2020	Saft				
2	Jun 8/2020	Jun 8/2020	Saft				
3	Oct 8/2020	Oct 8/2020	Saft				
4	Feb 25/2021	Feb 25/2021	Saft				
5	Jan 28/2022	Jan 28/2022	Saft				
6	Aug 22/2022	Aug 22/2022	Saft				

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RECORD OF TEMPORARY REVISION

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SERVICE BULLETIN LIST

Service bulletin		Date Incorporation or No Effect	Title
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416541-24-01 / 1	Jan 28/2022	No Effect	Battery 605CO1 (P/N 416541) Field Inspection of Cell P/N 026632-000

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INTRODUCTION

1. General

This manual provides the information necessary for an experienced shop technician to maintain Saft nickel-cadmium batteries. It describes the construction of the battery, as well as techniques used to operate, maintain, repair, and general care for the battery. Following these instructions will make sure of optimal performance and life of the Saft batteries.

All aircraft batteries require checking and maintenance in order to make sure they are safe when installed and perform their required functions, especially in emergency conditions on board the aircraft. Maintenance also permit any problems to be identified and corrected. Proper battery maintenance assures a low probability of failure and allows high levels of reliability. Failure prevention onboard the aircraft make sures safe operation, reduces dispatch delays, and operational costs.

Every effort has been made to provide complete and accurate instructions. If a situation should arise that is not adequately described in this manual, please contact Saft via the internet at www.saftbatteries.com/ or at one of the following addresses:

Saft America Inc. (V09052)
711 Gil Harbin Industrial Boulevard
Valdosta, Georgia 31601 - USA
Tel: +1 (229) 247-2331
Fax: +1 (229) 247-8486

Saft (F6177)
26 quai C. Pasqua
92300 Levallois-Perret - France
Tel: +33 1 58 63 16 00
Fax: +33 1 58 63 16 18

NOTE: Please always include the completed logbook with the batteries returned to Saft.

Website All Saft technical documentation, distributors and repair shops can be found at www.saftbatteries.com/

2. Definitions

Warnings call attention to procedures which must be followed precisely to avoid death, injury, or effect safety of flight.

Cautions call attention to procedures which must be followed to avoid damage to equipment or parts.

Notes call attention to procedures which make the job easier.

3. Safety

WARNING: EXCEPT FOR THOSE STEPS THAT REQUIRE THE BATTERY TO BE CHARGED, DO ALL STEPS ON DISCHARGED BATTERIES (REFER TO INITIAL DISCHARGE AND CELL SHORTING) TO AVOID THE POSSIBILITY OF ELECTRIC SHOCK. TIGHTEN ¼ TURN VENT VALVES (250 AND 460) USING T01 PRIOR TO BEGINNING DISCHARGE. BATTERY CELLS DELIVER VERY HIGH CURRENT WHEN SHORT-CIRCUITED. EXERCISE CAUTION. REMOVE RINGS, WATCHES, NECKLACES, METALLIC BELTS AND OTHER JEWELRY TO AVOID ELECTRIC SHOCK.

WARNING: DO NOT TILT THE BATTERY WHILE DOING MAINTENANCE, ANY CONTACT OF SKIN WITH ELECTROLYTE CAN CAUSE SEVERE BURNS.

Safety rules are different from one country to another. Always follow local safety regulations.

There are three types of risks.

3-1. Physical

- The battery is heavy. A single operator should never lift the battery alone. Always use three people or a mechanical lift.
- Bend your legs not your back while lifting.
- As much as possible, use assisted lifting and handling devices such as hoists to lift the battery.
- Wear proper personal protective equipment (PPE) such as heavy-duty gloves, protective shoes.

3-2. Electrical

- Do not wear rings, watches, chains, belt buckles, necklaces, or any other metallic objects.
- Use insulated tools.

3-3. Chemical

- For a complete listing of hazards, refer to the safety information sheet available on Saft's website at www.saftbatteries.com.
- Electrolyte is very corrosive and can damage the skin: use gloves and an apron. If it comes in contact with the skin, flush affected area with large quantity of water. After flushing begins, remove any contaminated clothing.
- Electrolyte is very dangerous to eyes, use protective goggles. If the electrolyte comes in contact with the eyes, flush with water for 15 to 30 minutes. Get medical attention immediately.
- Saft recommends the use of an amphoteric solution (both acidic and basic behavior) and chelator (able to trap cations as a chelate complex) according to the local regulation.
- Electrolyte ingestion can cause damage to the throat and the respiratory tract. Do not try to vomit and get medical attention immediately.
- Skin contact with nickel can cause chronic eczema.
- Inhalation of cadmium oxide can cause dry throat, headaches, vomiting, chest pain, and difficulty breathing. If inhaled, then move the person affected to fresh air. If breathing is difficult, then give oxygen and get medical aid immediately.
- Potassium hydroxide in the electrolyte can cause eczema.

4. Ground Applications

Saft batteries can be used in ground applications for starting gas turbine generators, powering ground mobile or in-shop testing equipment. The same principles used in flight operations apply when the battery is used in ground applications. Ventilation of the battery during ground use can be accomplished through a ventilation system (only in a well-ventilated area). Check with your local authorities for regulations in effect for your area.

5. How to use this document

5-1. Placing a new battery in service

5-1-1. initial commissioning

CAUTION: SAFT BATTERIES ARE SHIPPED DISCHARGED WITH A SHORTING SPRING ACROSS THE CONNECTOR TERMINALS: THEREFORE, THE BATTERY MUST PREPARED AS PROVIDED BELOW BEFORE INSTALLING ON THE AIRCRAFT

NOTE: All new Saft batteries that are receiving the initial commissioning after 12 months of the date of manufacturing, refer to Servicing at end of long-term storage.

- Prepare battery for testing, Visual inspection, Nut tightness, Constant current charge, Adjust electrolyte level, Insulation check, and Battery assembly shall be done prior to the battery being placed into the aircraft for service.

NOTE: T01 and T07 are provided in the original packaging of a new battery. T07 may be retained for use in the transportation of a charged battery and T01 may be retained for maintenance.

5-2. Scheduled and unscheduled removal

Refer to Figure 1001 Battery restoration.

5-3. Units going into or from storage

Refer to STORAGE (INCLUDING TRANSPORTATION).

6. Battery Ratings

6-1. Capacity

Nickel-cadmium batteries are rated in terms of capacity in ampere-hours (Ah) (rated capacity).

American Standard AS8033 defines capacity as "the dischargeable ampere-hours (Ah) available from a fully charged cell/battery at any specified discharge rate/temperature condition".

Other definitions for battery ratings can be found in EN2570, IEC 60952 and RTCA DO 293.

A battery rated for 1.0 C_1 Ah show that the battery is rated at a value based upon a discharge time of 1 hour at +23°C ± 3°C (+73.4°F ± 5.4°F).

7. Recycling

All batteries eventually lose their ability to perform and are eligible for scrapping and recycling. Saft takes environmental matters seriously and advocates proper recycling of nickel-cadmium batteries and their components. To that end, Saft operates recycling facilities in both Europe and North America.

Nickel-cadmium batteries contain nickel, cadmium, and potassium hydroxide and should be disposed of properly. In all cases, rely on local and national regulations for proper battery disposal and/or shipping to an appropriate recycling location.

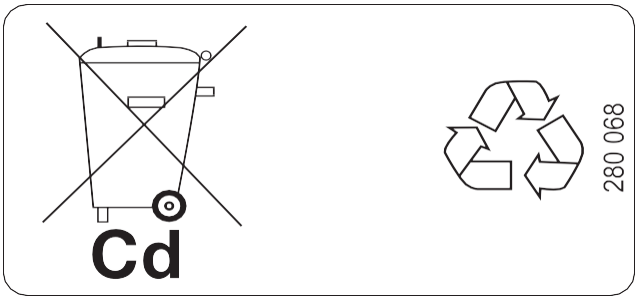

Figure INTRO-1 Universal Recycling Symbols

You can find the nearest recycling collection point on our website at www.saftbatteries.com.

8. End of life cells

EASA and FAA regulations 'Part 145', require that end of life cells must be disposed of in a manner that does not allow them to be returned to service. The following procedure provides a means of complying with these regulations.

While other authority requirements may be less explicit, Saft recommends that the following procedures be adopted in order to make sure that end of life cells cannot be re-used:

Make sure that appropriate protective measures (refer to Safety and the Battery Information Sheet (BIS)) are taken.

Make sure that the cell is fully discharged (refer to Cell shorting)

Put one of the terminals from the cell in a bench vise and bend until the terminal breaks or equivalent method to make the cell unusable. In the event of electrolyte leakage, make sure the appropriate clean up measures are used as described in the Battery Information Sheet (BIS) are observed.

Dispose of the cell in accordance with applicable transport, health, safety, and recycling regulations (Refer to Recycling).

9. Measurements

The measurements which are given in this manual come from the original manufacturer drawings.

This CMM uses the "International System of Units" (S. I.) units for quantities and values. It also gives the U.S. imperial units in parentheses.

9-1. Units of measure

9-1-1. S. I. Units

A	Ampere
Ah	Ampere hours
C_1A	Rated current
C_1Ah	Rated capacity for an hour
g	Gram
m	Meter
min	Minute
N	Newton
N.m	Newton meter
Pa	Pascal

V_{DC}	Volt direct current
°C	Degree Celsius
%	Per cent
Ω	Ohm

9-1-2. U.S. Imperial Units

ft	Foot
in	Inch
inHg	Inch of mercury
lb	Pound
lb_f- in	Pound-force for inch
°F	Degree Fahrenheit
psi	Pounds per square inch

9-1-3. Multiplying Prefixes

µ	Micro
m	Milli
da	Deca
k	Kilo
M	Mega

9-2. Measurement Conversion Table

9-2-1. From S. I. Measurement to U.S. Imperial Units

1 kPa	0.1450 psi
1 bar	14.50 psi
1 cm	0.3937 in
1 cm^2	0.1550 in^2
1 N	0.2248 lb_f
1 g	0.0353 oz
1 kg	2.2046 lb
1 mm	0.0394 in
1 Nm	8.8507 lb_f-in
1 kg/l	0.578 oz/in^3
1 mg/l	5.78 x 10^{-7} oz/in^3

9-2-2. From U.S. Imperial Units to S. I. Measurement

1 psi	6.8948 kPa
1 psi	0.069 bar
1 in	2.54 cm
1 in^2	6.4516 cm^2
1 lbf	4.4482 N
1 oz	28.3495 g
1 inHg	3.3864 kPa
1 lb	0.4536 kg
1 lb_f-in	0.1130 N-m
1 oz/in^3	1.730 kg/l
1 oz/in^3	1.730 x 10^6 mg/l

9-3. Temperature Conversion Table

9-3-1. S. I. MEASUREMENT Degrees Celsius (°C)

Celsius = (Fahrenheit - 32) / 1.8

9-3-2. U.S. Imperial Units Degrees Fahrenheit (°F)

Fahrenheit = (Celsius x 1.8) + 32

9-4. Abbreviations

The abbreviations given below are used in this manual:

AECMA	European Association of Aerospace Industries
ATA	Air Transport Association of America
dia.	Diameter
EASA	European Air Safety Authority
FAA	Federal Aviation Authority
fig.	figure
IATA	International Transport Air Association
IMDG	International Maritime Dangerous Goods
ipl	illustrated parts list
max	maximum
mfg	manufacturer
min	minimum
MTBF	Mean time between failure
MTBUR	Mean time between unscheduled removal
n°	number
OCP	Over Current Protection
PPE	Personal Protection Equipment
p/n	part number
ref.	refer to
s/a	subassembly
TBD	to be defined
V	Voltage

10. Verification and engineering technical review

Testing / Fault Isolation	Verified Jan 30/2020
Disassembly	Verified Jul 15/2019
Assembly	Verified Jul 15/2019
Engineering Technical Review	Completed Jul 18/2019

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DESCRIPTION AND OPERATION

1. Description

1-1. General

The batteries are connected to the aircraft system are used to start the APU or supply power for avionic loads during startup and emergency operations.

2. Technical data

2-1. Characteristics

The most important characteristics are indicated in the table below.

TECHNICAL DATA	VALUES
Type of cells	CKO600KA
Number of cells	20
Nominal voltage	24 V
Rated capacity C_1Ah	60 Ah
Charge or discharge current 1 C_1A	60.0 A
Charge current 0.5 C_1A	30.0 A
Charge current 0.1 C_1A	6.0 A
Vent valve	MS Style (¼ turn)
Electrolyte	Solution of KOH
Electrolyte nozzle length	20 mm (0.79 in)
Consumable volume of electrolyte per cell	90 cm^3 (5.5 in^3)
Battery maximum weight	48.1 kg (108.2 lbs)
J2 connector (battery terminals)	MS3509 connector
Ambient Temperature	+15°C (+59°F) to +30°C (+86°F)
J1 Connector	BACC45FN14-12P

Table 1 Characteristics

3. Description

The Saft Battery type 605CO1 nickel-cadmium battery consists of an upper and lower unit assembled into one case that contains 20 individual CKO600KA cells. Each unit contains 10 cells connected in series. The battery contains an OCP to protect the aircraft wiring during external shorts. individual cells are enclosed in a polyamide container that provides insulation, allowing them to be fitted side-by-side in the battery case. Interconnection of cells is via rigid, highly conductive, nickel-plated copper links. Each link is held in position by nickel plated copper nuts on the cells' terminals. Inside each battery case, individual cells are held in position by partitions, liners, and a cover.

The connector connects the battery to the aircraft DC power.

The cover, which can be removed, is attached to the case by four latches.

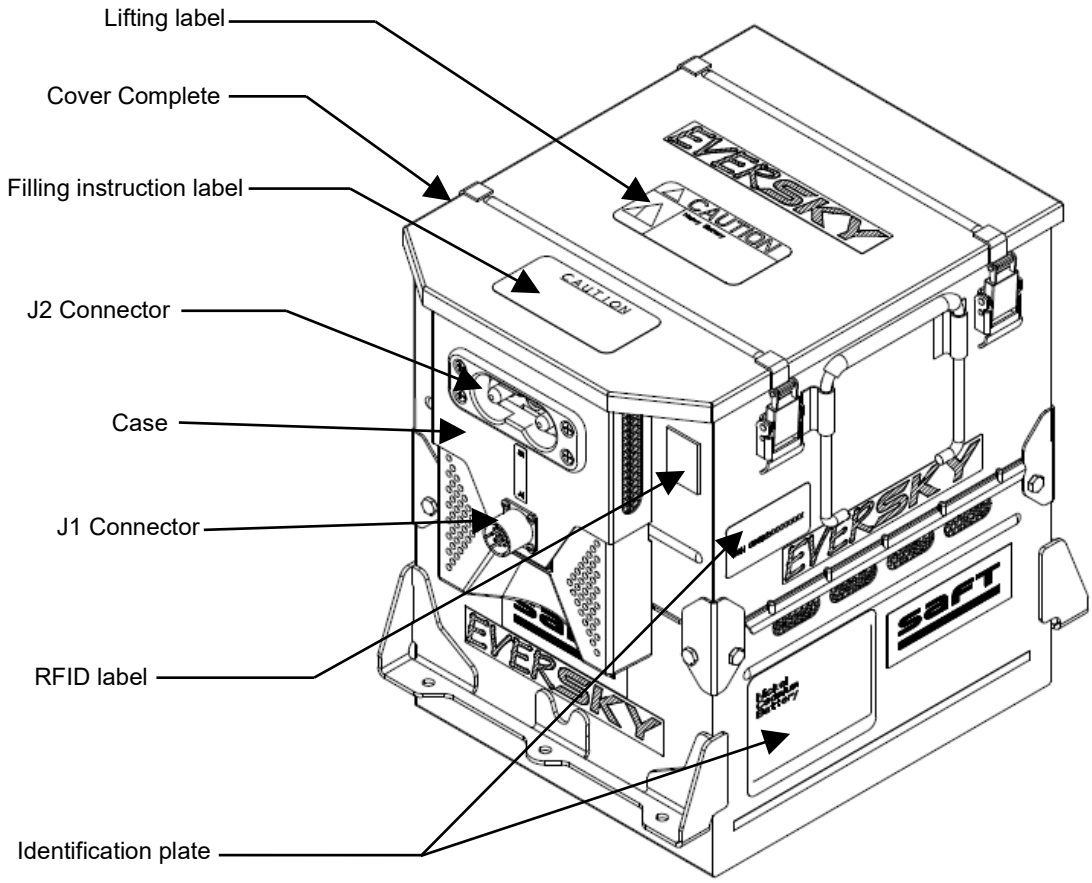


Figure 1 Nickel-Cadmium Aircraft Battery

4. Operation

4-1. Climatic requirement

Unless otherwise stated, use ambient temperature for charge and discharge testing.

4-2. Maintenance

All maintenance, including charging and discharging, should be done specifically in accordance with the instructions contained in this manual.

TESTING AND FAULT ISOLATION

1. Introduction

1-1. General

This section gives the tests and inspections required to find the cause of a fault condition of the unit either removed for unscheduled maintenance or during scheduled maintenance.

For each test refer to the indicated procedures which specify all necessary information.

Refer to Figure 1001 Battery Restoration for all batteries received for scheduled and unscheduled removals.

NOTE: Refer to ILLUSTRATED PARTS LIST for all () part identification item numbers.

2. Maintenance intervals

2-1. Maintenance Interval Basis

The aircraft manufacturer is responsible for the definition of usage and function, and or batteries installed in its aircraft. The maintenance interval has two main factors:

- Energy available for emergency requirements.
- Electrolyte consumable reserve.

Both depend on the battery charging system, battery operating temperature, type of loads, number of starts, flight duration, ground operation, and battery technology

2-2. Maintenance Interval Extensions

In order to validate maintenance intervals and/or extensions, the recommendation is the Operator and Saft review the maintenance records for an acceptable period of months under the same operating conditions with verification that these operating conditions will continue.

The data includes but is not limited to the recording of aircraft flight hours, installation date, removal date, inspection date, off- wing capacity, and water consumption as mandated by this CMM.

As with any maintenance extension, do a continuous subsequent monitoring of the water addition and electrical performance upon removal from the aircraft to detect any adverse effects and, if necessary, re-adjust the maintenance interval accordingly. To determine the electrical performance more readily after aircraft removal, the battery may be floated 31V for 1.5 hours if the aircraft uses a dedicated charger or 28.5V for 1.5 hours if it floats on the aircraft bus before performing the Initial discharge (off-wing capacity) test.

NOTE: Maintenance steps must be completed in a battery shop.

3. Safety

Refer to Safety.

4. Equipment and Materials

4-1. Equipment

NOTE: Equivalent Equipment may be used.

EQUIPMENT	MINIMUM EQUIPMENT SPECIFICATION		SOURCE OR CAGE CODE	REPRESENTATIVE TYPE (MFG MODEL/CAGE)
	CHARACTERISTICS	RANGE ACCURACY TOLERANCE		
Constant current charger	-	0 to 60A DC 40V DC Minimum	Commercially Available	Sorenson Power (Supply DCR-40-70B)
Constant current source with load bank	-	0 to 60A DC 1 to 40V DC	Commercially Available	Sorenson Power (Supply DCR-40-70B) with Ohmite (L225J5ROE)
Megohmmeter	-	0 to 50 MΩ @ 250 V continuous	Commercially Available	Fluke (1507)
Digital multimeter	-	2000 count, accuracy 1% or better	Commercially Available	Fluke (179)
Climatic chamber	-	+15°C to +80°C (+59°F to +176°F)	Commercially Available	Cincinnati Sub-Zero (MCB-1.2-.33-H/AC)
Torque wrench	Insulated	0 to 15 N-m (0 to 133 lb_f-in)	Commercially Available	McMaster-Carr (7936A12)
Universal vent wrench	-	-	V09052 F6177	093365-000 (T01) 413876
Syringe assembly	-	-	V09052 F6177	020916-001 (T02) 416232
Equalizing resistors	-	1 Ω 3 W	F6177	164829 (T03)
Cell puller tool	Fully insulated	-	F6177	416159 (T04)
Vent valve adapter for MS valves	-	-	V09052	024398-000 (T05)
Bench charge harness kit	-	-	V09052	026635-000 (T06)

Table 1001 Table of equipment (Testing)

4-2. Materials

NOTE: Equivalent substitutes are permitted for all items except for those that become part of the configured unit. Equivalent substitutes are not allowed for items marked with a double asterisk (**).

NAME	SPECIFICATION OR PART NUMBER	SOURCE OR CAGE CODE	USE
Distilled or deionized water**	M01	Commercially Available	Water addition
Neutral petroleum jelly	M02	Commercially Available	Lubrication
Cloth, soft clean	-	Commercially Available	Protect from FOD

Table 1002 Table of materials (Testing)

5. Battery restoration procedure

NOTE: Overhaul by some airworthiness authorities is defined as an item that has been disassembled, cleaned, inspected, inspected, repaired as necessary, reassembled, and tested. To identify this process the entire battery must require total disassembly, thorough cleaning, assembly, and testing.

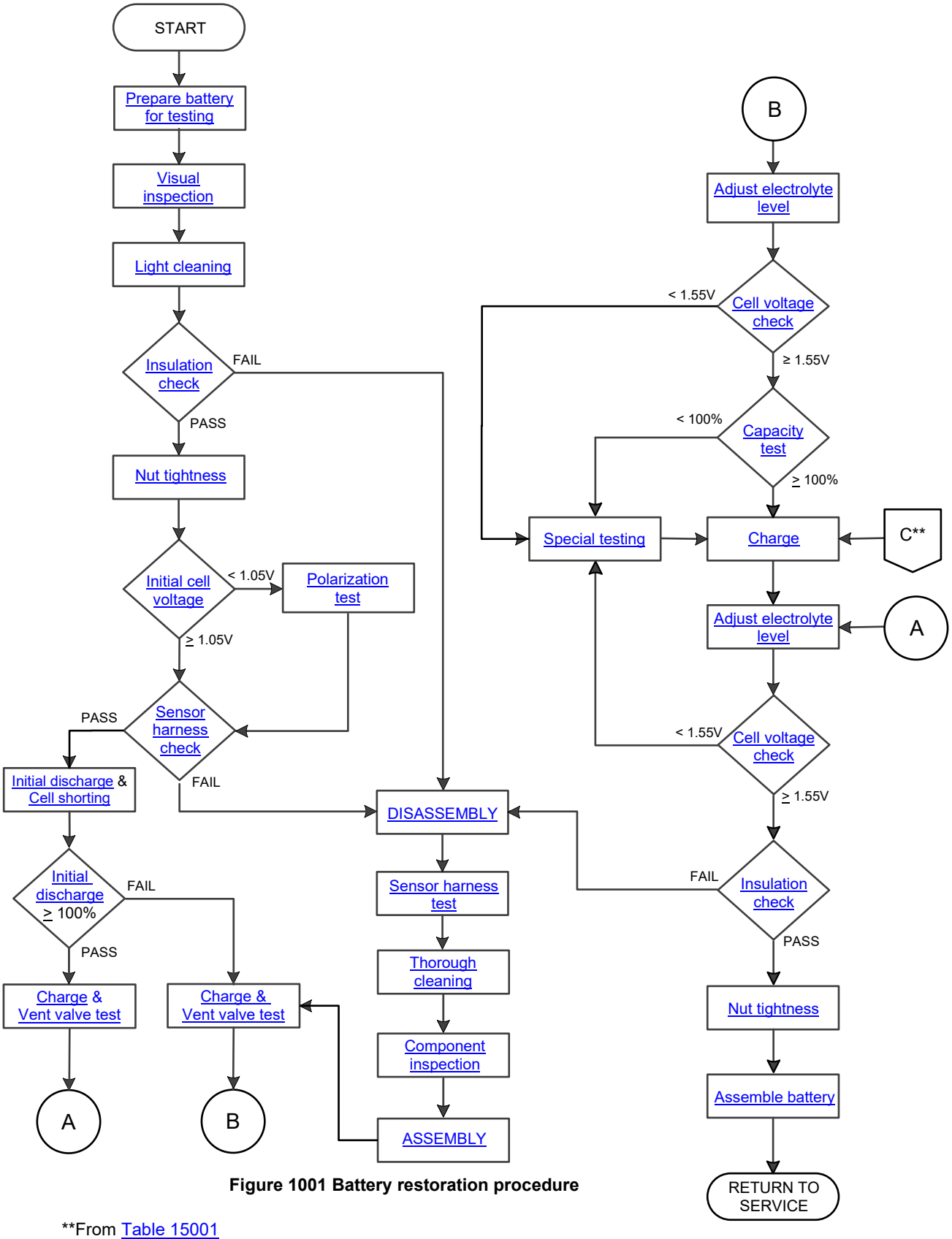


Figure 1001 Battery restoration procedure

**From Table 15001

5-1. Prepare battery for testing

WARNING BATTERY CELL ASSEMBLIES DELIVER VERY HIGH CURRENTS WHEN SHORT-CIRCUITED. EXERCISE CAUTION. REMOVE RINGS, WATCHES AND OTHER JEWELRY. DISCHARGE THE BATTERY COMPLETELY BEFORE REMOVING CELLS.

To do any electrical test, disassemble the upper and lower unit of the battery then connect them together by the cables of T06.

5-1-1. Upper and lower units

– Separate upper and lower units (refer to Disassembly of the battery).

5-1-2. Electrical Setup

– Place the connection cover (030) or an insulator behind the terminals of the upper unit (refer to Figure 1002).
– Connect positive charging cable (R) using screws and washers (T) and (U) to the lower unit (350) positive terminal and upper unit (020) vertical link hanging down from the positive side of the J2 connector.
– Connect negative charging cable (S) using screws and washers (T) and (U) to the lower unit (350) negative terminal and upper unit (020) vertical link hanging down from the negative side of the J2 connector.
– Charge and discharge the battery with upper and lower unit connected together by the cables of T06 using J2.

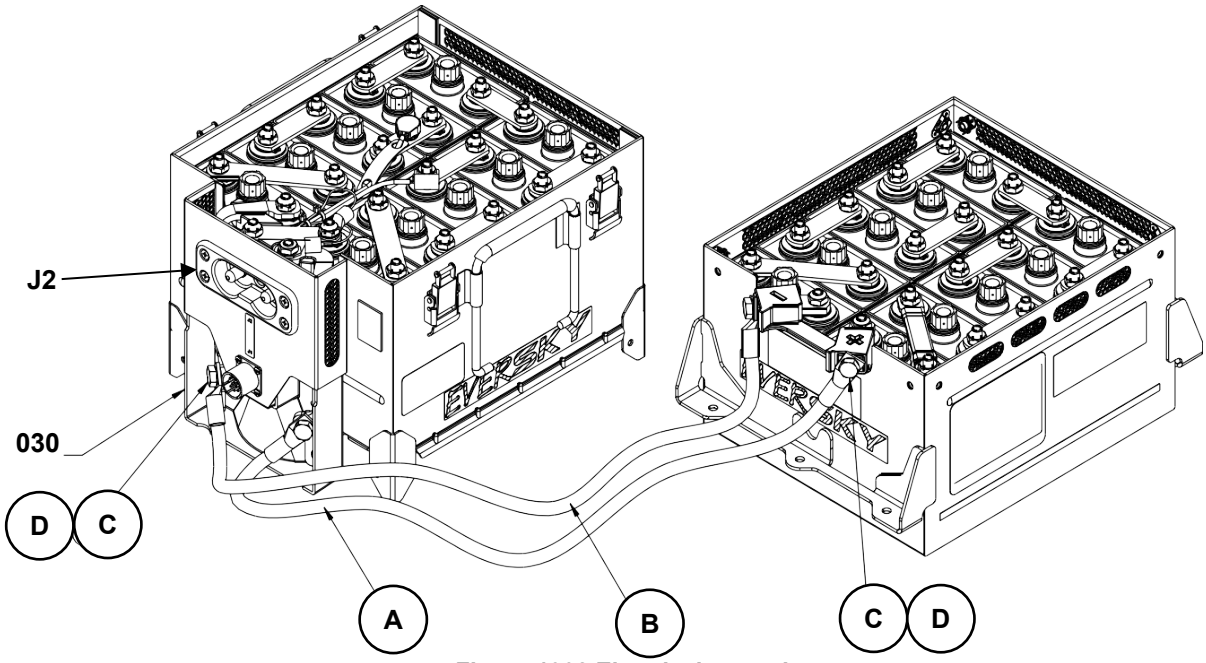


Figure 1002 Electrical procedure setup

ITEM	DESCRIPTION	UNIT PER KIT
A	. positive cable	1
B	. negative cable	1
C	. Screw, M8x1.25	4
D	. Washer, spring	4

Table 1003 T06 (Bench charge harness kit P/N 026635-000)

5-2. Visual inspection

– The upper and lower assemblies shall be prepared for testing (refer to Prepare battery for testing).
– Items found may require doing immediate disassembly while the majority do not. If a finding does not require going to disassembly procedure, then specific instructions are provided after the battery has been received its initial discharge.

CAUTION: IN THE EVENT OF A SHORT-CIRCUIT ON AN AIRCRAFT THAT COULD AFFECT THE BATTERY, THE BATTERY MAY BE DAMAGED.

5-2-1. Fuse link OCP (420)

- Examine the fuse link OCP (420) for any damage. Damage may include but not limited to a broken/open link or any brown coloration of the sleeve, localized and of any size. If damage is found, the battery is no longer serviceable. The battery should be sent back to Saft for battery disposal where the OCP damage effect on internal cell components will be used to later define criteria in future CMM updates.
- Do a continuity test to check the resistance at both ends of the fuse link OCP (420). If the value is higher than 10 ohms, the connection is faulty. If you have any questions regarding any damage to the fuse link OCP (420), you may contact Saft (refer to chapter INTRODUCTION).

5-2-2. Cell assembly

- Examine each cell (240 and 450) carefully for evidence of electrolyte leakage, cracks, corrosion, burns, holes, or cross-threaded terminals. Identify any cells that require replacement.
- Excessive salt around a terminal could be the result of a leakage from the terminal O-ring (314 or 524). Identify any cells with excessive salts for O-ring replacement
- Examine washers (300, 310, 510, 520) and retaining rings (320, 530) for damage or scale. Identify any cells with require washer or retaining ring replacement.
- When electrolyte leakage is observed from the cell vent valve (250) or (460) around the O-ring, replace the defective O-ring (270 and 480), refer to Vent valve O-ring replacement:

5-2-3. Battery hardware

- Do inspection on the nuts (050, 280) and washers (060, 290). For replacement refer to Battery hardware replacement.
- Do an inspection on links (070 to 130), (390 to 410), and (430) for bends, tarnish, loss of nickel plating, corrosion, or burns. For replacement refer to Battery hardware replacement.

5-2-4. Upper case, lower case, and cover

- Do an inspection of insulator upper (140) and lower (440) for cracks, burns, or holes. For replacement do Insulator upper (140) and Insulator lower (440). Verify that all ventilation openings are clean and clear.
- Visually inspection protective cover (030) for cracks, burns, or other defects. For replacement do Protection cover (030)
- Visually examine the battery cover (010) for damage replace as needed, do Cover replacement.
- Visually examine the battery cases (340 and 550) for damage. If found, identify case for replacement.

5-2-5. Power connector

WARNING: A DEFECTIVE BATTERY CONNECTOR CAN CAUSE DANGEROUS OVERHEATING, BATTERY DISCHARGE, AS WELL AS IN SERVICE LOW VOLTAGE.

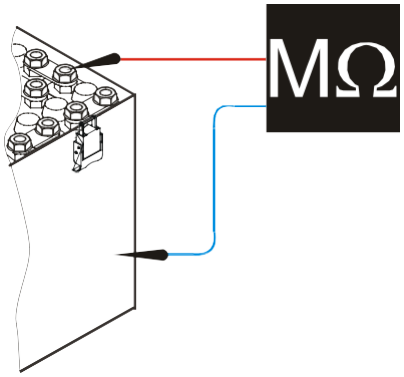
- Examine the power connector (150) for evidence of arching, corrosion, cracks, cross threaded terminals, or other physical defects. Replace the power connector (150) with factory new (refer to Power connector replacement).

5-2-6. Sensor assembly

- Visually examine sensor assembly (180) for damage, loose or broken wire connections, cracks, dents, or other physical defects.
- Visually examine connector of the sensor harness (200) for bent or loose pins, corrosion, cracks, faulty wire connections, and evidence of arcing.
- Examine all wiring for damage to insulation, cracked or broken wire, and other physical defects. Replace the sensor with any evidence of the above conditions, however minor, and replace with a factory new (refer to Sensor harness replacement).
- Visually examine ties (190) for damage or cracks, replace if defective.

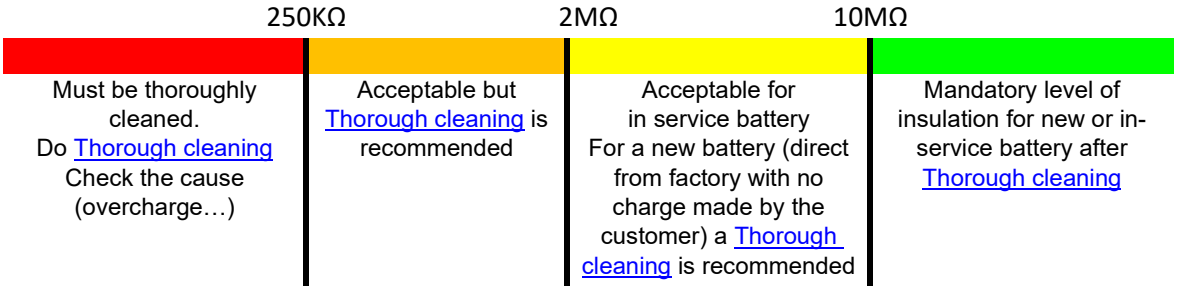
5-3. Insulation check

NOTE: A breakdown in electrical insulation between the cells and the appropriate upper or lower unit case will result in a "leakage" current, which, over a period of time, can discharge the battery.



- Set the megohmmeter to 250 V DC.
- Measure the insulation between the positive terminal of each cell and the battery case (340 and 550),
- Measure the insulation between the J2 connector positive pin and the upper battery case (340),
- Measure the insulation between each pin of J1 and the upper battery case (340).

Refer to the figure below for the acceptance criteria.



If the reading does not meet the above criteria, the insulation should be considered defective. Disassemble, clean, and replace defective components as needed (refer to DISASSEMBLY and Thorough cleaning)

- Verify the insulation between the 2 pins of J2. If found defective, replace it with factory new.
- After cleaning the battery, let all components to dry thoroughly.
- Assemble the battery, refer to ASSEMBLY
- Do the Insulation test and If the insulation resistance is still less than 10 megohms, one or more cells is defective. Identify and replace the defective cell(s), refer Cell replacement.

5-4. Nut tightness

- Verify the upper and lower units are separated (refer to Prepare battery for testing).
- Torque each upper terminal nut (050), (280), and (490) per Torque table).

5-5. Initial cell voltage

- Measure the voltage of each cell (240), (450). If the voltage is less than 1.05 V, do a polarization test (refer to Polarization test).

5-6. Sensor harness check

– Check the sensor harness (200) according to the Table 1004 below. An irregular reading shows a failure and the sensor harness (200) must be replaced.

CHECK OF	BETWEEN	VALUE @ +22.8°C ± 5°C (+73°F ± 9°F)
Resistor (R1)	J2 positive lug - J1 pin 11	29.1 KΩ ±10%
Resistor (R2)	J2 negative lug - J1 pin 6	32.4 KΩ ±10%
Short circuit	J1 pin 1 - J1 pin 8	< 5 Ω
Thermistor (S1)	J1 pin 3 - J1 pin 12	1854 to 3116 Ω
Thermostat (T1)	J1 pin 8 - J1 pin 9	> 10 MΩ

Table 1004 Sensor harness check values

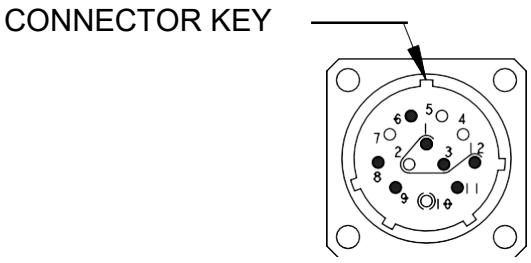


Figure 1003 Sensor check J1 pinout

5-7. Initial discharge (off-wing capacity)

5-7-1. Discharge procedure

– The purpose of this procedure is to discharge the battery to a known state of charge. Tighten ¼ turn vent valves (250 or 460) prior to beginning discharge.

– Battery should be prepared for testing (refer to Prepare battery for testing)

– Discharge the battery at 30.0 A or 60.0 A until the battery reaches 20.0 V.

NOTE: If a cell goes to zero volts or reverses polarity during the discharge, short-circuit the cell terminals using T03 for the rest of the discharge.

NOTE: It is important to keep the discharge current constant. Monitor individual cell voltages periodically during the discharge.

– Stop the discharge when the battery terminal voltage reaches 20.0 V and record the time the first cell reaches 1.0 V.

NOTE: The criteria in the next step will be used for later decision in Figure 1001.

– If the time the first cell reaches 1.0 V equals or exceeds the times shown in Table 1003 Initial discharge / capacity check then battery capacity is ≥ 100%.

DISCHARGE		MINIMUM TIME FOR FIRST CELL TO DISCHARGE TO 1.0 VOLT
RATE (C_1)	CURRENT (AMPS)	
0.5	30.0	122 minutes
1.0	60.0	60 minutes

Table 1005 Initial discharge (off-wing capacity)

5-7-2. Visual inspection findings (items require replacement)

– For items found during the visual inspection that require correction, refer to the REPAIR section

1. If a battery case (340 or 550) was identified for replacement, do Upper case or lower case replacement.
2. For each cell (240 or 450) marked for replacement, do Cell replacement.
3. For power connector (150) requiring replacement, do Connect assembly replacement.

4. Remove and replace as needed nuts (280), (490) and washers (290), (500). Torque nuts (280), (490) per Torque table.
5. For each cell (240 or 450) which had excessive salts around the terminals during visual inspection, do Terminal O-ring replacement.
6. For cells that require terminal hardware (300, 310, 320) or (510, 520, 530) and O-ring (314 or 524) needing replacement, then do Terminal hardware replacement.

5-8. Cell shorting

NOTE: It is not necessary to have a rest period between Initial discharge and Cell shorting.

Continue to discharge the battery, and as each cell reaches 1.0 V, connect a T03 (equalizing resistor) across its terminals. Leave the T03 (equalizing resistor) in place for a minimum of 12 hours to completely discharge the cells.

After the discharge, remove the resistors.

5-9. Vent valve test

5-9-1. Vent valve test procedure

NOTE: Do the vent valve test each maintenance interval of battery operation. This test is not necessary if all the vent valves are replaced with brand new vent valves each maintenance interval or yearly, whichever is longer.

This test should be done while the battery is on charge, just prior to starting the Final charge of Table 1007. Cover the cell holes with a damp, clean cloth to keep out unwanted material.

Visually check each vent valve assembly (250 or 460) for defective O-rings, cracks, or other physical damage. Replace defective O-rings (270 and 480).

Check the operation of the vent valve assembly as follows:

- Place the vent valve (250 or 460) with its O-ring into the T05 (vent valve adapter) of the pressure test fixture.
- Immerse the vent valve in water and slowly raise the air pressure to a 1.38 bar (20 psi) maximum to test the functionally below.
- Test according to the table below and change all vent valves that do not pass the test.

TEST	CHECK
O-ring	No distortion, split or cracks
air pressure < 0.14 bar (2 psi)	Vent valve is closed (no bubble)
0.14 bar (2 psi) < air pressure < 0.69 bar (10 psi)	Vent valve opens (bubbles observed)

Table 1006 Vent valve test criteria

Use only those vent valves found to open in the 0.14 to 0.69 bar (2 psi and 10 psi) range. Soak vent valves that do not open at 0.69 bar (10 psi) in water until they open (refer to CLEANING). Replace vent valves which are not gas tight at low pressure (0.14 bar (2 psi)).

5-10. Charge

5-10-1.Constant current charge

- Allow the battery to cool to ambient temperature before proceeding.
- Battery should be prepared for testing (refer to Prepare battery for testing)
- Loosen all ¼ turn vent valves (250 or 460), but do not remove.
- Charge using one of the methods shown in the table below.

NOTE: Check cell voltages at the beginning of the charge. If any cell shows an immediate voltage rise above 1.5 V, add 5 cm^3 of M01 (distilled or deionized water) to that cell.

- If vent valve test was specified by Figure 1001, then do Vent valve test.
- During the last 15-30 minutes of the Final charge do a Cell voltage check.

CHARGE OF THE BATTERY				
Main charge (step 1)			Final charge (step 2)	
Current	Minimum duration	End of main charge	Current and time	Minimum voltage
0.1C1A (6.0A)	10 h	Every cell > 1.5 V or 12 h whichever comes first	0.1C1A (6.0A) for 4 h	1.55 V / per cell
0.5C1A (30.0A)	2 h	Every cell > 1.55 V or 2.5 h whichever comes first	0.1C1A (6.0A) for 4 h	1.55 V / per cell
1.0C1A (60.0A	1 h	Every cell > 1.57 V or 1.25 h whichever comes first	0.1C1A (6.0A) for 4 h	1.55 V / per cell

Table 1007 Charge table

5-10-2.Other methods of charging

In addition to the constant current method of charging, other methods that fully charge the battery can be used. However, in all cases, individual cell voltage checks (≥ 1.55 V / per cell) and electrolyte adjustments must be carried out using a final over- charge sequence at constant current 6 A of 4 hours. If specific instructions are not given in the charger operating manual, you must first contact Saft.

5-11. Adjust electrolyte level

CAUTION: USING ANYTHING OTHER THAN M01 (DISTILLED OR DEIONIZED WATER) IN NICKEL-CADMIUM CELLS WILL CAUSE ELECTROLYTE CONTAMINATION AND DAMAGE.

Always take appropriate precautions to prevent any foreign substances from entering the cell. Anything other than distilled or deionized water that enters the cells will cause electrolyte contamination and will affect overall performance.

The amount of time that the vent valves are removed from the cells for maintenance should be limited to prevent as much air as possible from entering the cell. Carbon dioxide in the air will combine with the electrolyte to form potassium carbonate. Potassium carbonate will increase the internal resistance of the cells and thus decrease the performance at low temperatures and during high rate discharges. Always make sure that the vent valves are properly secured while the battery is inuse.

– Electrolyte level adjustment must be done during the last 15-30 minutes of the 4 hours final charge at 6 A rate of charge.

WARNING: TAKE CARE NOT TO TILT CELLS WHILE VENT VALVES ARE LOOSENED OR REMOVED. CONTACT OF ELECTROLYTE WITH SKIN CAN CAUSE BURNS. IF CONTACT OCCURS, FLUSH AREA WITH LARGE AMOUNTS OF WATER. ELECTROLYTE IN THE EYES IS VERY SERIOUS. FLUSH WITH WATER 15 MINUTES MINIMUM AND CONTACT A DOCTOR IMMEDIATELY.

CAUTION: THE BATTERY MUST BE FULLY CHARGED BEFORE ADJUSTING THE ELECTROLYTE LEVEL. USE ONLY M01 (DISTILLED OR DEIONIZED WATER). DO NOT RE-USE WATER REMOVED FROM CELLS.

NOTE: Normal consumption during a maintenance interval should be less than consumable electrolyte reserve shown in Table 1 Characteristics. If maintenance data shows continued excessive water consumption, then refer to Cell faults.

– Adjust the level of electrolyte, one cell at a time, using the following instructions:

1. Remove the vent valves (250 or 460) with T01 (vent valve wrench).
2. Check the nozzle length before fitting it to the syringe.
3. Insert T02 (syringe) into the cell opening until the shoulder of the nozzle rests on the vent valve seat

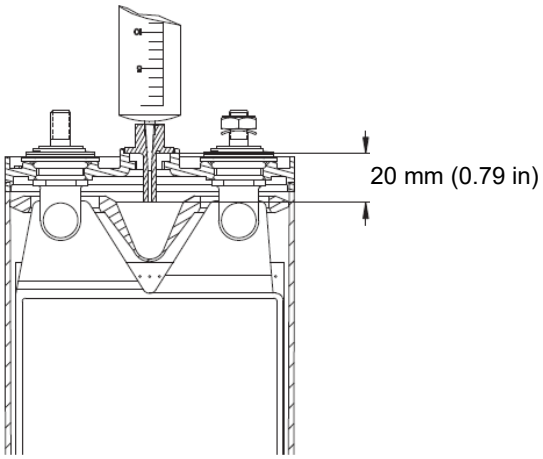


Figure 1004 Position of syringe in cell vent seat

NOTE: Any excess liquid in the cell drawn into the syringe in the next step shows the correct level for the electrolyte. If the liquid level is too low, the syringe will remain empty, indicating that the end of the syringe nozzle did not reach the liquid in the cell. In this case the water in the electrolyte requires replenishing.

4. Withdraw the plunger and check for any liquid in the syringe.
5. Draw 5 cm^3 of the M01 (distilled or deionized water) into the syringe and inject it into the cell.
6. With the syringe nozzle remaining on the vent valve (250 or 460) seat, slowly withdraw the plunger in the syringe.
7. If the syringe remains empty, repeat steps 5 and 6, counting the total number of cm^3 required to achieve the correct level. Record the amount of water in cm^3 added to each cell on the maintenance record.
8. At the point in step 6 when some excess liquid is drawn into the syringe, the correct level for that cell has been reached. Expel the excess liquid into a separate container for disposal. Do not re-use the liquid removed from cells. Check with local authorities for proper disposal of hazardous waste.

– Using T01, tighten the ¼ turn vent valve (250 or 460) securely in place and make sure each is tightened properly.

5-12. Cell voltage check

NOTE: Measure the voltage of each cell (240) and (450) to show the minimum voltage meets the final charge criteria of Table 1007. If the voltage is less than 1.55 V, do Special testing.

5-13. Capacity check

NOTE: The success of these tests depends upon keeping the battery cool. The battery temperature at the start of a charge procedure must be at ambient temperature. A 2-3 hour rest is required following a discharge procedure. The rest period between the end of charge and the start of discharge procedures must be between 1 hour and 24 hours to make sure a valid capacity test.

NOTE: It is important to measure the time accurately.

– Using T01, tighten ¼ turn vent valves (250 or 460) prior to beginning discharge.
– Discharge the battery at one of the current rates shown in the Table 1005 Initial discharge / capacity check until all individual cell voltages fall below 1.0 V. Record the time when each cell falls below 1.0 V.
– If a cell goes to zero volts or reverses polarity during the discharge, short out that cell's terminals using a T03 (equalizing resistor) across its terminals for the remainder of the discharge.
– If the time the first cell reaches 1.0 V equals or exceeds the values shown in the Table 1005, then battery capacity ≥ 100%. If the battery fails the capacity test, do Special testing.
– Allow the battery to rest at least 2 hours.

5-14. Polarization test

Do the following for a battery found to have a cell with a voltage lower than 1.05 V before the Initial discharge:

– Charge the battery at 6 A for 1.5 hours.
– Keep the battery in open circuit for 1 hour.
– Measure the open circuit voltage of each cell. If any cell voltage is zero (0) V or negative polarity, mark for replacement.

5-15. Sensor harness test

Do this test with the sensor harness (200) removed from the case. Check the sensor harness (200) according to the table below. Any reading outside the specified values in the table is a failure and the complete sensor harness (200) must be replaced.

NOTE: The sensor harness (200) is a non-repairable unit.

CHECK OF	BETWEEN	VALUE
Resistor (R1)	J2 positive lug - J1 pin 11	29.1 KΩ ±10% @ +22.8°C ± 5°C (+73°F ± 9°F)
Resistor (R2)	J2 negative lug - J1 pin 6	32.4 KΩ ±10% @ +22.8°C ± 5°C (+73°F ± 9°F)
Short circuit	J1 pin 1 - J1 pin 8	< 5 Ω
Thermistor (S1)	J1 pin 3 - J1 pin 12	1854 to 3116 Ω @ +22.8°C ± 5°C (+73°F ± 9°F)
Thermostat (T1)	J1 pin 8 - J1 pin 9	normally open (≥ 20 MΩ) closes (≤ 10 Ω) on rise @ +71°C ± 5°C (+160°F ± 9°F)
Insulation	Do an insulation check between: Pins of connector J1 - J1 metallic socket. J1 Pins 1, 8 and 9 - Thermostat housing. J1 Pins 3 and 12 - Thermistor lug.	> 10 MΩ @ 250V DC

Table 1008 Sensor harness test values

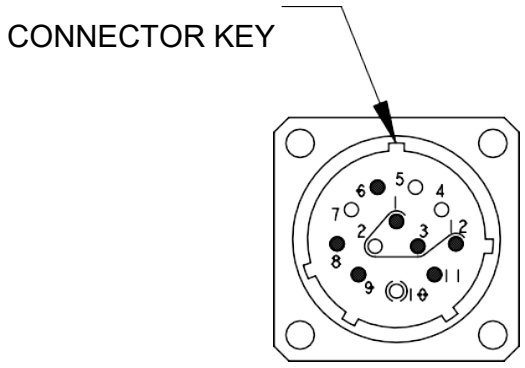


Figure 1005 Sensor test J1 pinout

5-16. Special testing

These procedures are to be followed for a battery not meeting capacity or having cells that were < 1.55 V during the final charge. Refer to Figure 1006

- For a battery with < 100% capacity do Low capacity (Special testing), otherwise do Supplementary test.

NOTE: For a battery from long-term storage, several complete charge/discharge cycles may be required to restore performance.

5-16-1.Low capacity (Special testing)

- Do a Charge, Adjust electrolyte level.
- If the battery contains cell(s) with voltages < 1.55 V during the final charge, then do Supplement test below, otherwise do Capacity test (Special testing).

5-16-2.Supplementary test

- Continue to charge the battery at 6 A for an additional 5 hours.
- Monitor individual cell voltages every 15-30 minutes during the additional charge.
- Mark for replacement any cell with an end of charge voltage of < 1.55 V.
- During the last 30 minutes of the final charge Adjust electrolyte level.
- The ¼ turn vent valve (250, 460) should be tightened on top of each cell.

– If no cells are marked for replacement, then do Capacity test (Special test), otherwise do Cell replacement.

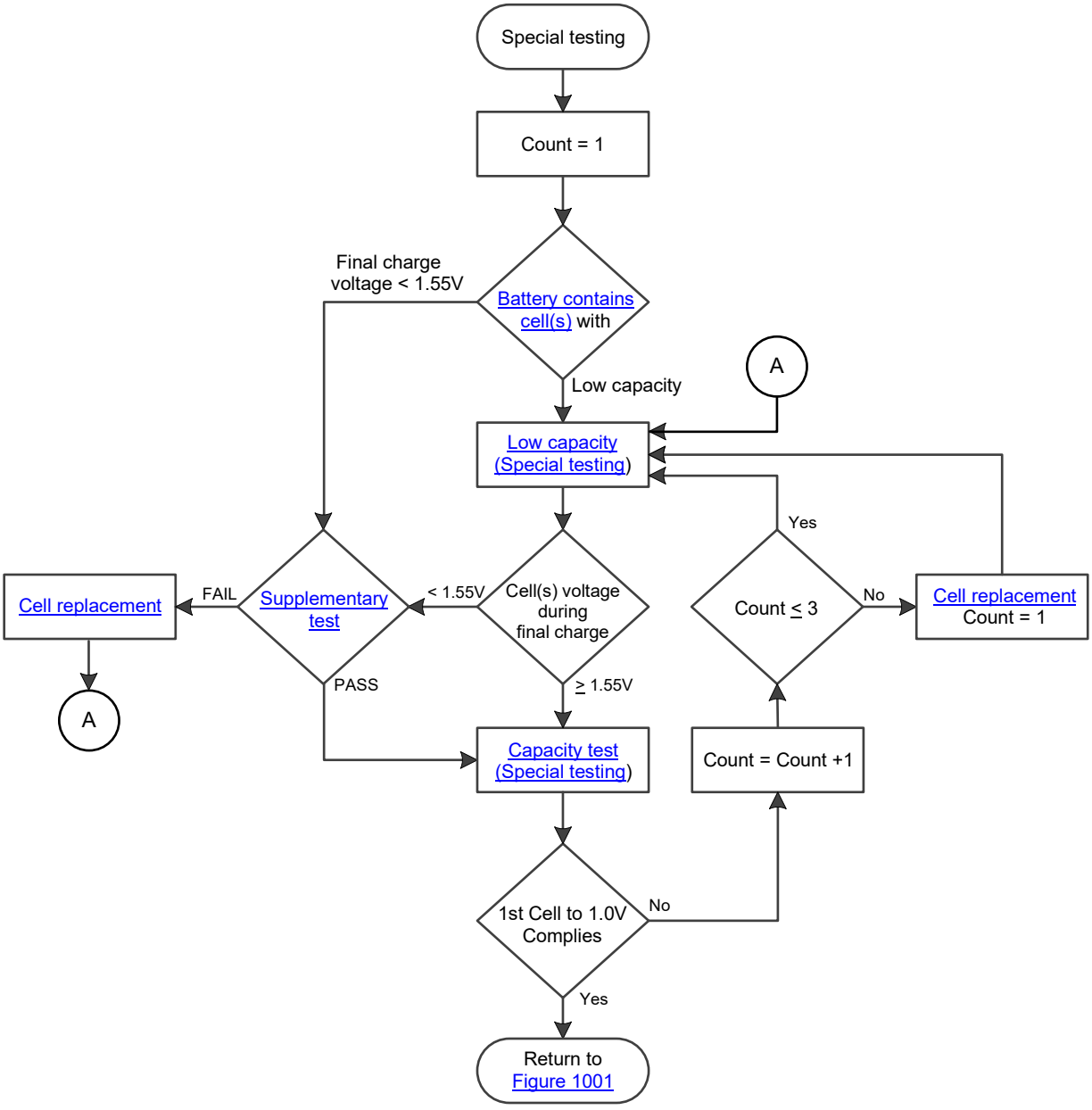
NOTE: If more than one cell (240, 450) was replaced due to low charge voltage during the current maintenance cycle, then the replacement of all cells should be considered.

5-16-3.Capacity test (Special testing)

– Do Capacity check. If successful, return to Figure 1001.

– For battery completing the Capacity test (Special test) 3 times, then replace low capacity cell(s) (240, 450) by doing Cell replacement,

Figure 1006 Special testing flow chart



5-17. Component inspection

5-17-4.Cells (240), (450)

- Visually check for evidence of electrolyte leakage, cracks, corrosion, burns, holes, cross-threaded terminals.
- Excessive salt around a terminal post indicates leakage. Refer to Terminal O-ring replacement if leakage is evident.
- Visually check for terminal hardware (280), (290), (300), (310), (320), (490), (500), (510), (520), or (530) evidence of cracks, corrosion, burns, tarnish. Minor tarnish can be polished off with a fine wire brush. Replace defective hardware do terminal hardware.
- Visually check each cell vent valve (250), (460) for defective O-rings (270), (480) for cracks, or other physical damage. Replace items should be replaced.
- Suspect vent valves (250), (460) should be tested in accordance with Vent valve test.

5-17-5.Battery hardware

- Inspect nuts (050), (280), (490), washers (060), (290), (380), screws (040), (360), (370), plate (160) adaptor links (430), links (090 through 130) and (390 through 410) to ensure free of bends, tarnish, corrosion, burns, or loss of plating (if equipped). Minor tarnish can be polished off with a fine wire brush. Defective hardware should be replaced.
- Inspect vertical links (070), (080) for tarnish, corrosion, burns, or loss of plating on exposed portions of link. Inspected the insulated portion for cracks, or other physical damage. Minor tarnish can be polished off with a fine wire brush. Defective hardware should be replaced.
- Inspect power connector (150) for tarnish, corrosion, burns, or loss of plating on exposed portions.

5-17-6.Sensor harness (200) hardware

- Inspect screws (220) and nuts (210 and 230) to ensure free of bends, tarnish, corrosion, thread damage, or burns. Minor tarnish can be polished off with a fine wire brush. Defective hardware should be replaced.

5-17-7.Liners (330) (540), insulator upper (140) and lower (440) and cover connection (030)

- Inspect for contamination and free of cracks or other physical damage. Replace any defective part.

5-17-8.Check of the Fuse link OCP

- Check fuse link OCP (420) (Refer to Fuse link OCP within Visual inspection).

5-17-9.Check of the upper case (340), lower case (550), and cover (010)

- Inspect upper case (340), lower case (550), and cover (010) to ensure free of bents, corrosion, damage, or burns. Replace any defective part.

6. Battery faults analysis

6-1. Battery electrical faults

TEST STEP	PROBLEM	PROBABLE CAUSE	REMEDY
5-5	1. Zero battery voltage	(a) Defective electrical connector (not making contact) (b) Broken or damaged links	Check electrical contacts, links and tightness of nuts (refer to Visual inspection). Replace if required, Power connector replacement, Battery hardware replacement, or torque Nut tightness
5-3	2. Failure of Insulation check	(a) Leakage of electrolyte	Do Thorough Cleaning, ASSEMBLY, Charge, Adjust electrolyte level).
		(b) Incorrect adjustment of electrolyte level	
		(c) Reverse cell polarity	
		(d) Condensation / Contamination	
		(e) Improper cleaning	
		(f) Loose or damaged vent valve	Tighten or replace ¼ turn vent valve, do Thorough Cleaning, ASSEMBLY, Charge, Adjust electrolyte level).
		(g) Damaged cell case	Do Thorough Cleaning, ASSEMBLY, Charge, Adjust electrolyte level).
		(h) Charge rate too high	Investigate the cause of the excessive charge. Do Thorough Cleaning, ASSEMBLY, Charge, Adjust electrolyte level).
		(i) Missing or broken ring retainer, flat washer, or Belleville washer.	Do O-ring replacement, Terminal hardware and replacement, do Thorough Cleaning, ASSEMBLY, Charge, Adjust electrolyte level).
5-13	3. Loss of battery capacity	(a) Normal wear after long service	Do Special Testing
		(b) Exceptional heavy use	

Table 1009 Battery electrical faults

6-2. Cell faults

TEST STEP	PROBLEM	PROBABLE CAUSE	REMEDY
5-11	1. Water consumed by all cells approaching total electrolyte reserve. .	(a) Unusual operation onboard the air- craft or aircraft charger (high temperature or high voltage). (b) Previous maintenance has not been done or done incorrectly. (c) Maintenance interval may be too long for the typical use profile.	Examine the cause of excessive charge or, if necessary, verify normal test temperatures during next charge (refer to charge) (refer to DESCRIPTION AND OPERATION). Collect representative service data to determine if the duration between servicing must be shortened.
NOTE: Charging a cell with insufficient electrolyte will cause the temperature to increase and could damage the cell.			
5-12	2. A cell has a lower voltage at the end of charge than is defined in Charge chapter DESCRIPTION AND OPERATION.	(a) The cell was operated at temperatures and charge rates outside the limits, and the separator is damaged. (b) Usual wear after long operation	Replace the cell (refer to DISASSEMBLY, ASSEMBLY AND STORAGE (INCLUDING TRANSPORTATION)).
5-13	3. Low capacity cell.	(a) Insufficient balancing (b) Usual wear after long operation. (c) Unusual operation, operation at high temperature or operation with low electrolyte.	Do Special Testing Replace the cell (refer to DISASSEMBLY, ASSEMBLY AND (STORAGE (INCLUDING TRANSPORTATION) Do the applicable procedure (refer to Battery restoration procedure)
5-5	4. Cell with zero voltage when the battery circuit is open.	(a) Short-circuited cell.	Hot spot or bad smell. Replace the cell (refer to DISASSEMBLY). High discharge. Do a Polarization test. Replace the cell (refer to Cell replacement).
5-5	5. 0 V with cell in discharge	(a) Dry Cell.	Replace the cell (refer to Cell replacement).

Table 1010 Cell faults

6-3. Physical faults

TEST STEP	PROBLEM	PROBABLE CAUSE	REMEDY
5-11	(1) Tarnished, discolored, or burned links.	(a) Loose terminal nuts .	Replace links (Refer to Battery hardware replacement)
5-2	(2) Exposed copper material on power connector pin	(a) Mechanical damage	Do Power connector replacement.
		(b) Electrical arcing	Do Power connector replacement.
5-2	(3) Corrosion on the links	(a) Operation in acidic air	Make sure the battery test bench and the storage areas have no materials which can give off acid fumes.
		(b) Mechanical damage to nickel plating	Replace the damaged links (refer to DISASSEMBLY, ASSEMBLY AND STORAGE (INCLUDING TRANSPORTATION)).
5-2	(4) Battery upper, lower case and cover damage with dents, deformations, and visible cracks which affect fit or impede performance.	(a) Various, transport (b) Mechanical stress, drop	Replace defective component. Refer to Case replacement

Table 1011 Physical faults

SCHEMATICS AND WIRING DIAGRAMS

1. General

This section gives the schematic and wiring diagrams required to find the assist in testing of the unit either removed for unscheduled maintenance or during scheduled maintenance.

1-1. Schematics

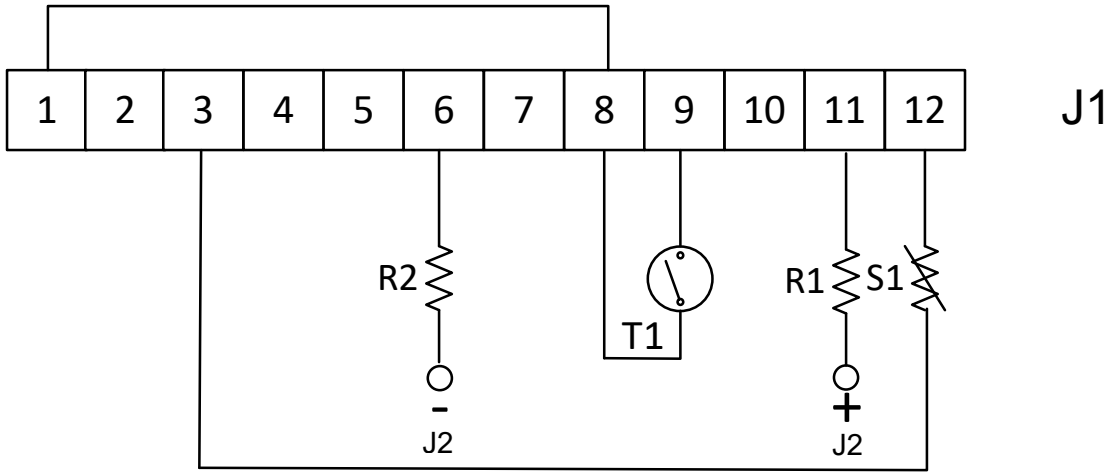


Figure 2001 Sensor Schematic

1-2. Wiring Diagrams

No wiring diagrams required

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DISASSEMBLY

1. Introduction

NOTE: Refer to the chapter TESTING AND FAULT ISOLATION to identify the possible cause of the malfunction, this will give the necessary level of disassembly.

The instructions found in this section are designed to allow a maintenance person to completely disassemble the battery. Some maintenance operations do not require complete disassembly, for these operations only disassemble to the extent necessary for the appropriate repair or replacement.

NOTE: Refer to ILLUSTRATED PARTS LIST for all () part identification item numbers.

2. Safety

Refer to Safety.

3. Equipment and Materials

3-1. Equipment

NOTE: Equivalent Equipment may be used.

EQUIPMENT	MINIMUM EQUIPMENT SPECIFICATION		SOURCE OR CAGE CODE	REPRESENTATIVE TYPE (MFG MODEL/CAGE)
	CHARACTERISTICS	RANGE ACCURACY TOLERANCE		
Universal vent wrench	-	-	V09052 F6177	093365-000 (T01) 413876
Equalizing resistors	-	1 Ω 3 W	F6177	164829 (T03)
Cell puller tool	Fully insulated	-	F6177	416159 (T04)
Bench charge harness kit	-	-	V09052	026635-000 (T06)

Table 3001 Table of equipment (Disassembly)

3-2. Materials

No materials required.

4. Disassembly procedures

4-1. Detailed Instructions

WARNING BATTERY CELL ASSEMBLIES DELIVER VERY HIGH CURRENTS WHEN SHORT-CIRCUITED. EXERCISE CAUTION. REMOVE RINGS, WATCHES AND OTHER JEWELRY. DISCHARGE THE BATTERY COMPLETELY BEFORE REMOVING CELLS.

WARNING: USE CARE NOT TO TILT BATTERY WHILE VENT VALVES ARE LOOSENED. ELECTROLYTE IS VERY CORROSIVE AND CAN DAMAGE THE SKIN: USE GLOVES AND AN APRON.

4-1-1. Disassembly of the battery

- Remove the cover (010) by opening the 4 latches.
- Remove the 8 case screws (360).
- Remove the cover connection screw (040).
- Remove the cover connection (030).
- Remove the 2 screws (370) with the 2 washers (380).
- Put upper unit (020) and lower unit (350) side by side.

4-1-2. Do Electrical setup and Cell shorting prior to continuing.

NOTE: The upper and lower assemblies have the same serial number and they must be kept together.

4-1-3. Disassembly of upper unit (020)

NOTE: Take note of the components placement prior to removal to make sure proper placement during re-assembly. To facilitate ease of removal, remove the center cell in each row first.

- Remove the 2 nuts (050) with the 2 washers (060).
- Remove the 20 nuts (280) with the 20 washers (290).
- Remove the 2 links (070) and (080).
- Remove the 10 links (090, 100, 110, 120, and 130).
- Remove the upper insulator (140)
- Using the T01 (vent valve wrench), loosen the ¼ turn vent valves (250) of all cells to relieve any pressure; then re-tighten vent valves (use only finger pressure on vent wrench when loosening and tightening vent valves).

WARNING: TO PREVENT INJURY CONDUCTIVE DEVICES MUST NEVER BE USED TO REMOVE THE CELLS FROM THE BATTERY

CAUTION: IN ORDER NOT TO DAMAGE CELL TERMINALS THE EXTRACTION FORCE MUST BE EQUALLY DISTRIBUTED ON BOTH TERMINALS OF THE CELL. THE T04 (CELL PULLER) MUST BE ATTACHED TO BOTH TERMINALS WITH THE TWO CROSS SUPPORTS INSTALLED. REFER TO FIGURE 3001.

. **NOTE**: Each cells location should recorded as shown in Figure 7002 and Figure 7004.

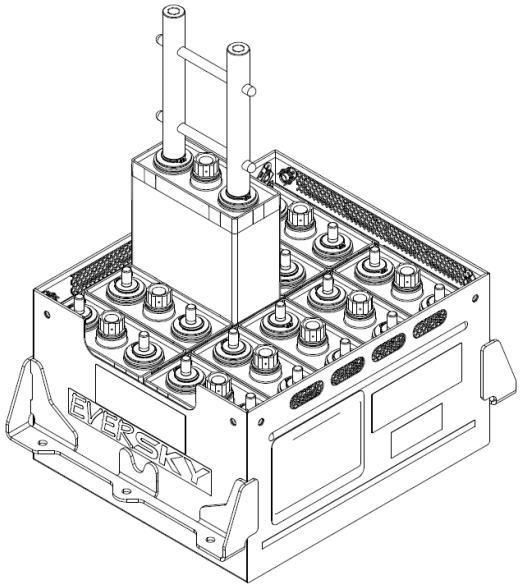

Figure 3001 Cell puller and cell extraction

- Tighten the T04 (cell puller) to each cell terminal and install the cross supports as needed to remove cell assemblies (240) from the upper unit (020) with a pull straight up.
- Remove the 4 J2 connector screws (170).
- Remove the power connector (150) and the connector plate (160)
- Remove the 4 J1 connector screws (220) and nuts (210).
- Remove locking nut (230) to separate sensor harness (200) from link (130).
- Remove sensor harness (200)
- Remove the liner kit (330).

4-1-4. Disassembly of lower unit (350)

NOTE: Take note of the components placement prior to removal to make sure proper placement during re-assembly.

- Remove the 20 nuts (490) with the 20 washers (500).
- Remove the 11 links (390, 400, 410, 420, and 430).
- Remove the lower insulator (440)
- Using the T01 (vent valve wrench), loosen the ¼ turn vent valves (460) of all cells to relieve any pressure; then re-tighten ¼ turn vent valves (use only finger pressure on vent wrench when loosening and tightening vent valves).

WARNING: TO PREVENT INJURY CONDUCTIVE DEVICES MUST NEVER BE USED TO REMOVE THE CELLS FROM THE BATTERY.

CAUTION: IN ORDER NOT TO DAMAGE CELL TERMINALS THE EXTRACTION FORCE MUST BE EQUALLY DISTRIBUTED ON BOTH TERMINALS OF THE CELL. THE T04 (CELL PULLER) MUST BE ATTACHED TO BOTH TERMINALS WITH THE TWO CROSS SUPPORTS INSTALLED. REFER TO FIGURE 3001. TIGHTEN THE T04 (CELL PULLER) TO EACH TERMINAL AND INSTALL THE CROSS SUPPORTS AS NEEDED TO REMOVE CELL ASSEMBLIES (450) FROM THE LOWER UNIT (350) WITH A STRAIGHT UP PULL.

– Remove the liner kit (540).

4-1-5. Disassembly of the vent valve (240 and 450)

NOTE: Do not try further disassembly of the cell subassembly. Cells are non-repairable items and must be replaced if defective.

– Using the T01 (vent valve wrench), loosen and remove the ¼ turn vent valves (250 or 460) from the cells (240 and 450).

– Remove O-rings (270 and 480) from the vent valves (250 and 460).

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CLEANING

1. Introduction

The instructions in this chapter are for the general cleaning of your Saft aircraft battery. The instructions under “Light Cleaning” are to be done each time the battery is sent in for maintenance. The section “Thorough Cleaning” includes the instructions for the cleaning of a totally disassembled battery.

2. Safety

Refer to Safety.

3. Equipment and Materials

3-1. Equipment

NOTE: Equivalent Equipment may be used.

EQUIPMENT	MINIMUM EQUIPMENT SPECIFICATION		SOURCE OR CAGE CODE	REPRESENTATIVE TYPE (MFG MODEL/CAGE)
	CHARACTERISTICS	RANGE ACCURACY TOLERANCE		
Stiff bristle brush.	Nonmetallic	-	Commercially Available	-
Fine wire brush	-	-	Commercially Available	-
Soft brush.	Nonmetallic	-	Commercially Available	-

Table 4001 Table of equipment (Cleaning)

3-2. Materials

NOTE: Equivalent substitutes are permitted for all items except for those that become part of the configured unit. Equivalent substitutes are not allowed for items marked with a double asterisk (**).

NAME	SPECIFICATION OR PART NUMBER	SOURCE OR CAGE CODE	USE
Neutral petroleum jelly	M02	Commercially Available	Lubrication
Mild Soap	M03	Commercially Available	Cleaning
Cloth, soft clean	-	Commercially Available	Protect from FOD

Table 4002 Table of materials (Cleaning)

4. Light cleaning

CAUTION: DO NOT USE SOLVENT, PETROLEUM SPIRITS, TRICHLOROETHYLENE OR OTHER PRODUCTS CONTAINING CHLORIDE FOR CLEANING THE BATTERY. THE USE OF SOLVENTS MAY DEGRADE THE INTEGRITY OF METAL AND PLASTIC PARTS.

NOTE: Refer to ILLUSTRATED PARTS LIST for all () part identification item numbers.

4-1. Procedure

WARNING: TO PREVENT INJURY WHEN USING COMPRESSED AIR, DIRECT AIR STREAM AWAY FROM THE BODY. USE SAFETY GOGGLES TO PREVENT EYE INJURY FROM AIRBORNE PARTICLES.

- Tighten the ¼ turn vent valves (250 and 460) with T01 (vent valve wrench).
- Remove potassium carbonates (white deposits) from the top of all cells (240 and 450) using a stiff bristle, nonmetallic brush.
- Disperse residual salts and dust particles from the battery using blasts of clean, dry compressed air.
- Coat all nuts (050 and 490) and links (070 to 130), (390 to 410), and (430) with M02.

5. Thorough cleaning

CAUTION: DO NOT USE SOLVENT, PETROLEUM SPIRITS, TRICHLOROETHYLENE OR OTHER PRODUCTS CONTAINING CHLORIDE FOR CLEANING THE BATTERY. THE USE OF SOLVENTS MAY DEGRADE THE INTEGRITY OF METAL AND PLASTIC PARTS.

5-1. Procedure

5-1-1. Cells (240 and 450)

Use finger pressure on T01 (vent valve wrench) to tighten ¼ turn vent valves (250 and 460).

CAUTION: DO NOT SOAK THE CELLS IN WATER AS THIS COULD POTENTIALLY DAMAGE THE CELLS.

To easily remove all the electrolyte and mineral salts from the terminals, the cell cover, and the sides of the cell cases: clean in warm water with a soft nonmetallic brush.

Rub the cell with a cloth and let dry.

5-1-2. Upper case (340), lower case (550), and cover (010)

Clean with mild soapy water M03. Rinse well and then rub with a dry clean cloth and let dry.

5-1-3. Nuts (050, 280, 490), screws (040, 360, 370), spring washers (060, 380, 500), plate (160), and links (070 to 130), (390 to 410), and (430)

Clean in mild soapy water M03 with a soft nonmetallic brush, rinse well with clean water and let dry. Tarnish can be polished off with a fine wire brush. Replace any defective links

5-1-4. Liner kit (330 and 540), protective cover (030), upper (140) and lower insulator (440)

Clean in warm water and let dry.

5-1-5. Vent valve (250 and 460)

NOTE: The cleaning of the vent valve (250 and 460) must be done when the cells are assembled in the case.

Remove the vent valve (250 and 460) (Refer to DISASSEMBLY). Cover the cell holes to keep out unwanted material.

Soak the vent valve for some time (during the night, for example) in a container of distilled water to remove all salts from the vent hole.

REPAIR

1. Introduction

This section covers basic battery component replacement procedures.

2. Safety

Refer to Safety.

3. Equipment and Materials

3-1. Equipment

NOTE: Equivalent substitutes are permitted.

EQUIPMENT	MINIMUM EQUIPMENT SPECIFICATION		SOURCE OR CAGE CODE	REPRESENTATIVE TYPE (MFG MODEL/CAGE)
	CHARACTERISTICS	RANGE ACCURACY TOLERANCE		
Universal vent wrench	-	-	V09052 F6177	093365-000 (T01) 413876
Equalizing resistors	-	1 Ω 3 W	F6177	164829 (T03)
Cell puller tool	Fully insulated	-	F6177	416159 (T04)
Small paintbrush	Nonmetallic	-	Commercially Available	
External Retaining Ring Plier	Tip Angle 90° Tip Dia. 1.17mm (0.046 in)	-	Commercially Available	Grainger (3JXN2)
Torque wrench	Insulated	0 to 15 N-m (0 to 133 lb_f-in)	Commercially Available	McMaster-Carr (7936A12)

Table 6001 Table of equipment (Repair)

3-2. Materials

NOTE: Equivalent substitutes are permitted for all items except for those that become part of the configured unit. Equivalent substitutes are not allowed for items marked with a double asterisk (**).

NAME	SPECIFICATION OR PART NUMBER	SOURCE OR CAGE	USE
Neutral petroleum jelly	M02	Commercially Available	Lubrication

Table 6002 Table of materials (Repair)

4. Component replacement

4-1. Cell assembly (240 and 450) replacement

Battery containing cell(s) (240 and 450) that require replacement

4-1-1. All Cell Replacement

Saft strongly recommends changing all the cells or replace the complete battery for either of the following conditions:

- If 3 or more cells are found to be faulty due to low capacity during this maintenance period.
- If 1 or more cells are found to be faulty due to low capacity during this maintenance period and 5 of the original cells in the battery had been previously replaced due to low capacity.

NOTE: This recommendation does not apply to the following failures: mechanical failure such as terminal thread damage, cell leakage, or cell short-circuit.

NOTE: All cells requiring replacement must be replaced with new Saft cells.

4-1-2. Procedure

- Tighten the ¼ turn vent valve (250), 460) on top of each cell (240), (450) with T01.

- Discharge the battery at one of the current rates shown in the Table 1005 – Initial discharge / capacity check until all cell individual voltages fall below 1.0 V.
- Connect a T03 (equalizing resistor) across the terminals of any cell marked for replacement.
- Leave a T03 (equalizing resistor) in place at least 30 minutes.
- On the defective cells remove the nuts (50, 280, 490), washers (60, 290, 500), and links (80, 90, 100, 110, 120, 130, 400, 410, 420, 430) as needed.
- Replace each defective cell with a new Saft cell (240) and (450) considering the All Cell Replacement recommendation. Care should be taken by using the T04 (cell puller) as shown in Figure 3001.
- On each new Saft cell (240) and (450) install the links (80, 90, 100, 110, 120, 130, 400, 410, 420, 430), washers (60, 290, 500), and nuts (50, 280, 490) as needed. Torque hardware according to Torque table.

4-2. Terminal O-ring (314, 524) replacement

Replace the terminal O-ring (314, 524)

CAUTION: CARE SHOULD BE TAKEN NOT TO DAMAGE THE RETAINING RING DURING REMOVAL.

- Using snap ring pliers remove the retaining ring (320 or 530) from the cell terminal.
- Remove all the hardware (300, 310) or (510, 520) and defective O-ring (314) or (524)
- Install new O-ring (314) or (524), flat washer (310) or (520) followed by the 2 Belleville washers (300) or (510), refer to Figure 6001 for Belleville series orientation.

Figure 6001 Belleville series orientation

- Place the retaining ring (320 or 530) onto cone portion of the T08. Refer to Figure 6002. Place the nut portion into the pushing portion, and then screw the nut portion onto the cell terminal until the retaining ring snaps into place on the cell terminal.

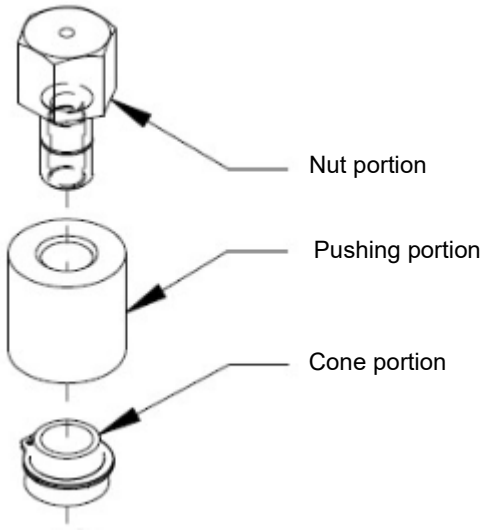


Figure 6002 T08 Hardware tool

4-3. Terminal hardware (300, 310, 320, 510, 520, 530) replacement

Replace the appropriate terminal hardware (300), (310), (320), (510), (520), or (530)

- Using snap ring pliers remove the retaining ring (320 or 530) from the cell terminal and replace defective hardware.

NOTE: When installing the 2 Belleville washers (300) or (510) in series refer to Figure 6001 for orientation.

- Place the retaining ring (320 or 530) onto cone portion of the T08. Refer to Figure 6002. Place the nut portion into the pushing portion, and then screw the nut portion onto the cell terminal until the retaining ring snaps into place on the cell terminal.

4-4. Vent valve O-ring (270 and 480) replacement

Replace the defective O-ring (270 and 480):

- Using T01 (vent valve wrench), loosen and remove the ¼ turn vent valve (250 or 460) from the cell assembly (240 or 450). Cover the cell with a damp, clean cloth to prevent any foreign particles from falling into the cell.
- Remove the defective O-ring (270 or 480) from the vent valve (250 or 460) and install a new O-ring onto the valve.
- Remove the cloth from the cell and insert the vent valve assembly (250 or 460) into the cell assembly (240 or 450). Using T01 (vent valve wrench), tighten the ¼ turn vent valve securely in place and make sure each is tightened properly.

4-5. Sensor harness J1 replacement (200)

- Remove the 4 J1 connector screws (220) and nuts (210).
- Remove R1 and R2 by removing 2 nuts (050) and washers (060) from positive and negative terminals of the connector (150).
- Remove the 2 nuts (280) and 2 washers (290) from link (130).
- Remove the sensor harness S1 lug from cell 18 positive terminal by removing the nut (280) and washer (290)
- Remove the locking nut (230) to separate the sensor harness (200) from the link (130).
- Remove the sensor harness (200).
- Install the sensor harness (200) on link (130) using the locking nut (230) and torque it according to Torque table.
- Install the link (130) according to Figure 7004 with 2 nuts (280) and 2 washers (290) and torque them according to Torque table.

CAUTION: CARE SHOULD BE TAKEN NOT TO DAMAGE SENSOR HARNESS CABLE WIRES.

- Connect the sensor harness S1 lug onto cell 18 positive terminal (refer to Figure 7004) and install the nut (280) and washer (290) and torque them according to Torque table.
- Install the sensor harness lugs R1 and R2 (refer to Figure 7004) to the positive and negative terminals of the connector (150). Torque them according to Torque table.
- Install 4 nuts (280) with the 4 washers (290) and torque them according to Torque table.
- Lightly lubricate the terminals and the links with M02 (use a nonmetallic paintbrush).

4-6. Battery hardware replacement

4-6-1. Nuts and washers

- Replace appropriate nuts (050, 280, 490) and washers (060, 290, 500) by removing and installing. Torque them according to Torque table.

4-6-2. Links

- For replacement of (070, 080, 090, 100, 110, 120, 130, 390, 400, 410, 420, or 430), remove and install the appropriate nuts (050, 280) and washers (060, 290). Torque them according to Torque table.

4-6-3. Insulator upper (140)

- Remove the insulator upper (140) by removing appropriate nuts (280), washers (290), and links (080, 090).
- Replace the insulator upper (140) and installing links (080, 090), washers (290), and nuts (280). Torque the nuts (280) according to Torque table.

4-6-4. Insulator lower (440)

- Replace Insulator lower (440) by sliding it from the adapter links (430) and replacing it.

4-6-5. Protective Cover (030)

- Remove the cover connection screw (040).
- Remove and replace the cover connection (030)
- Install the screw (040) and torque it according to Torque table.

4-7. Power connector assembly (150) J2 replacement

- Remove the 4 J2 connector screws (170).
- Remove 2 nuts (050) and washers (060)

4-8. Upper case, lower case, or cover

4-8-1. Upper case (340)

– Do Disassembly of the battery
– Do Disassembly of upper unit (020)
– Remove and replace upper case (340) and do Assembly of upper unit.
– Do Assemble battery.

4-8-2. Lower case (550)

– Do Disassembly of the battery
– Do Disassembly of lower unit (350)
– Remove and replace lower case (550) and do Assembly of lower unit.
– Do Assemble battery.

4-8-3. Cover (010)

– For cover (010) replacement unlatch and reattach new cover (010).

ASSEMBLY

1. Introduction

This section covers basic battery assembly procedures. In all cases, when reassembling a battery, all components should be clean and dry.

2. Safety

Refer to Safety.

3. Equipment and Materials

3-1. Equipment

NOTE: Equivalent Equipment may be used.

EQUIPMENT	MINIMUM EQUIPMENT SPECIFICATION		SOURCE OR CAGE CODE	REPRESENTATIVE TYPE (MFG MODEL/CAGE)
	CHARACTERISTICS	RANGE ACCURACY TOLERANCE		
Torque wrench	Insulated	0 to 15 N-m (0 to 133 lb_f-in)	Commercially Available	McMaster-Carr (7936A12)

Table 7001 Table of equipment (Assembly)

3-2. Materials

NOTE: Equivalent substitutes are permitted for all items except for those that become part of the configured unit. Equivalent substitutes are not allowed for items marked with a double asterisk (**).

NAME	SPECIFICATION OR PART NUMBER	SOURCE OR CAGE	USE
Neutral petroleum jelly	M02	Commercially Available	Lubrication

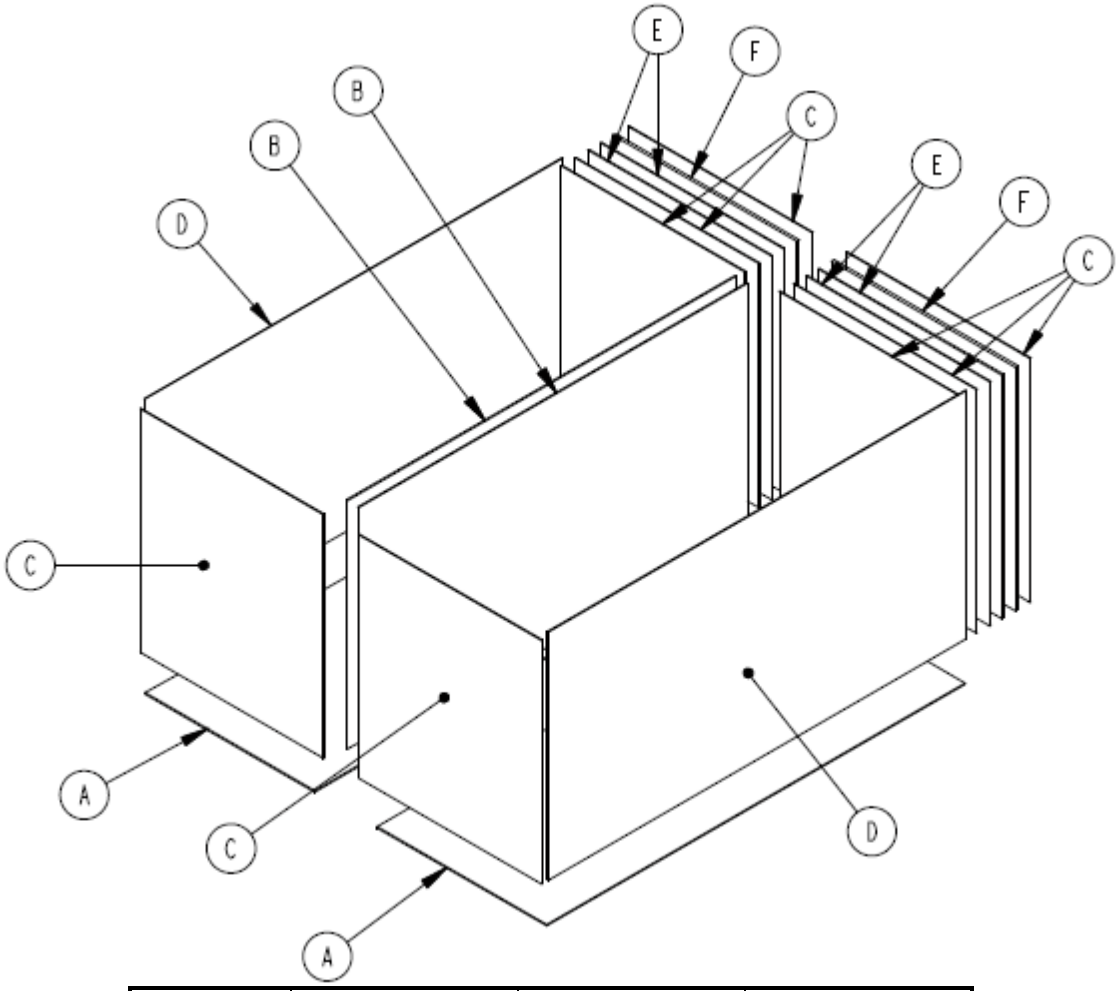
Table 7002 Table of materials (Assembly)

4. Battery Assembly

NOTE: Refer to ILLUSTRATED PARTS LIST for all () part identification item numbers.

4-1. Assembly of lower unit (350)

– Install the liner kit (540) in position in the lower case (550) as shown in Figure 7001.



ITEM	DESCRIPTION	DIMENSION MM (IN)	UNIT PER ASSEMBLY
A	Liner	10.8x26.7x0.08 (4.25x10.5x0.031)	2
B	Liner	13.7x24.8x0.08 (5.4x9.75x0.031)	2
C	Liner	11.7x13.5x0.05 (4.6x5.3x0.02)	8
D	Liner	13.7x26.7x0.05 (5.4x10.5x0.02)	2
E	Liner	11.7x13.5x0.08 (4.6x5.3x0.031)	4
F	Liner	11.7x13.5x0.16 (4.6x5.3x0.062)	2

Figure 7001 Lower unit liner kit installation.

NOTE: There shall be at least one liner between all cells and the battery case

NOTE: The quantity of each item in Figure 7001 are maximum quantities and are installed as required to achieve a tight fit of cells in the battery case.

NOTE: Install the middle cell of each row last and take care to respect cell polarity (ref Figure 7002).

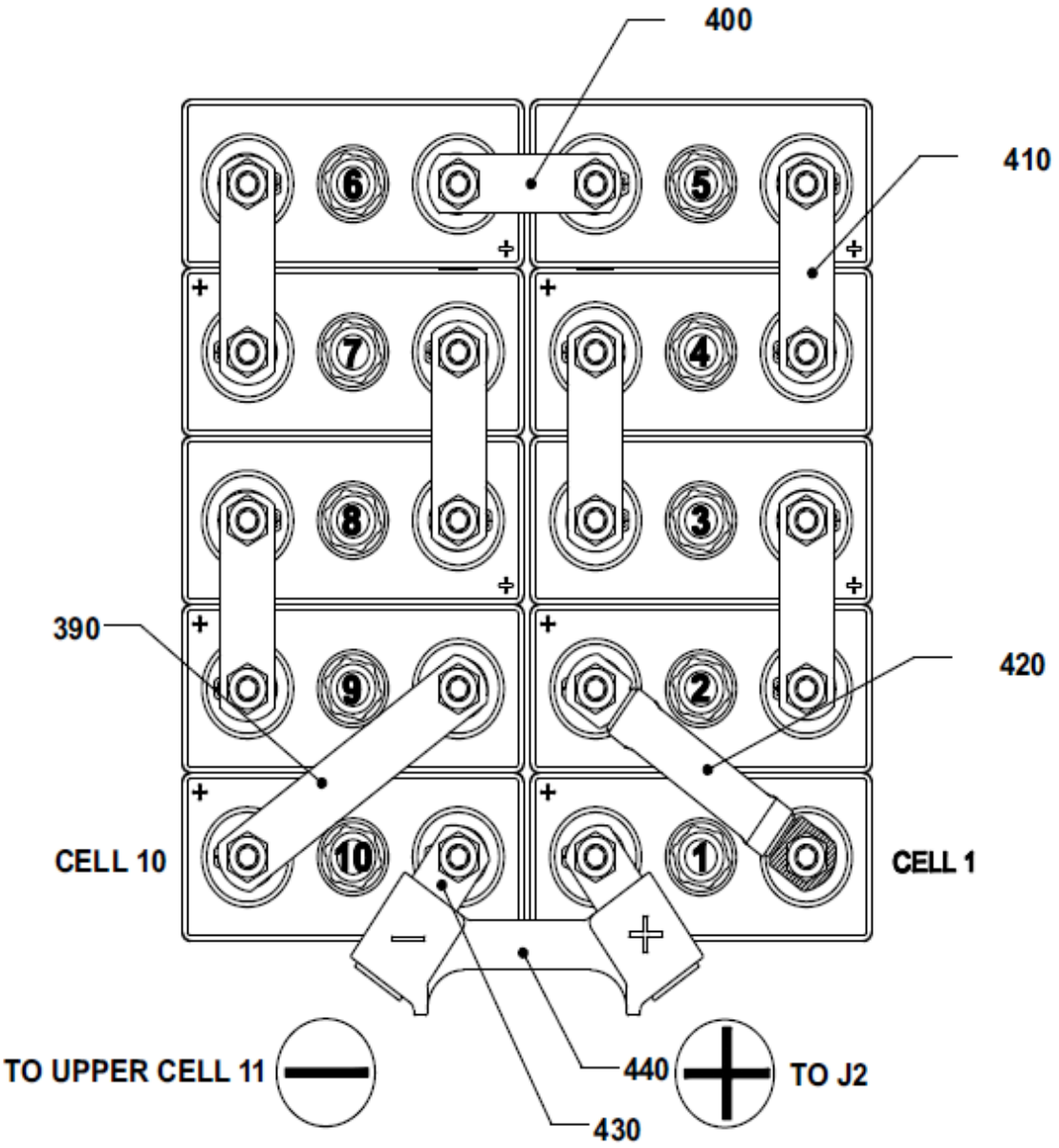
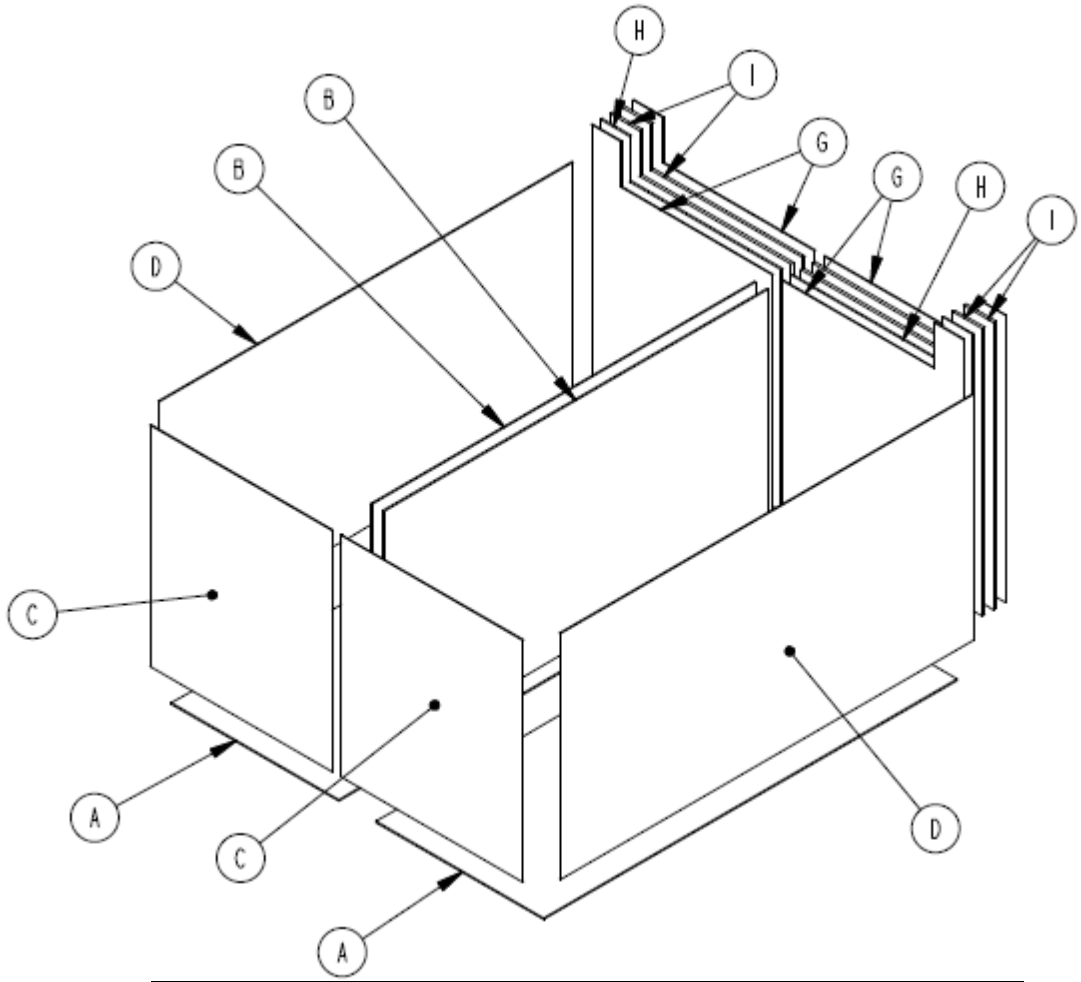


Figure 7002 Lower unit cells installation

- Install the 10 cells (450). Carefully position the last cell (450) in each row and push on the terminals with a piece of soft wood. (if it is difficult to put in the last cell, remove one or two liners).
- Verify the polarity of each cell according to the above figure.
- Lightly lubricate cell (450) terminals, nuts (490), and screws (370) with M02 using a nonmetallic paintbrush.
- Install the 2 links (430) in the lower insulator (440) and install onto battery (Figure 7002).
- install the 9 links (390, 400, 410, 420) according to the above figure.
- Install the 20 nuts (490) with 20 the washers (500) and torque them according to Torque table.

4-2. Assembly of upper unit (020)

– Install the liner kit (540) in position in the lower case (550) as shown in Figure 7003.



ITEM	DESCRIPTION	DIMENSION MM (IN)	UNIT PER ASSEMBLY
A	Liner	10.8x26.7x0.08 (4.25x10.5x0.031)	2
B	Liner	13.7x24.8x0.08 (5.4x9.75x0.031)	2
C	Liner	11.7x13.4x0.05 (4.6x5.3x0.020	2
D	Liner	13.7x26.7x0.05 (5.4x10.5x0.02)	2
G	Liner notched	0.05 (0.02)	4
H	Liner notched	0.08 (0.031)	2
I	Liner notched	0.16 (0.062)	4

Figure 7003 Upper unit liner kit installation

NOTE: There shall be at least one liner between all cells and the battery case
NOTE: The quantity of each item in Figure 7003 are maximum quantities and are installed as required achieve a tight fit of cells in the battery case.

- Install sensor harness (200) and ties (190) into upper case (340) (refer to Figure 7004 and IPL Figure 1)
- Install the 4 screws (220) and nuts (210) and torque them according to Torque table.
- Install the power connector (150) and the connector plate (160) with the 4 screws (170) and torque them according to Torque table.

NOTE: Do not pinch sensor harness (200) wires.

- Install the liner kit (330)

NOTE: Install the middle cell of each row last and take care to respect cell polarity (ref Figure 7004).

- Install the cells (240). Carefully position the last cell (240) in each row and push onto terminals with a piece of soft wood. (if it is difficult to put in the last cell, remove one or two liners).

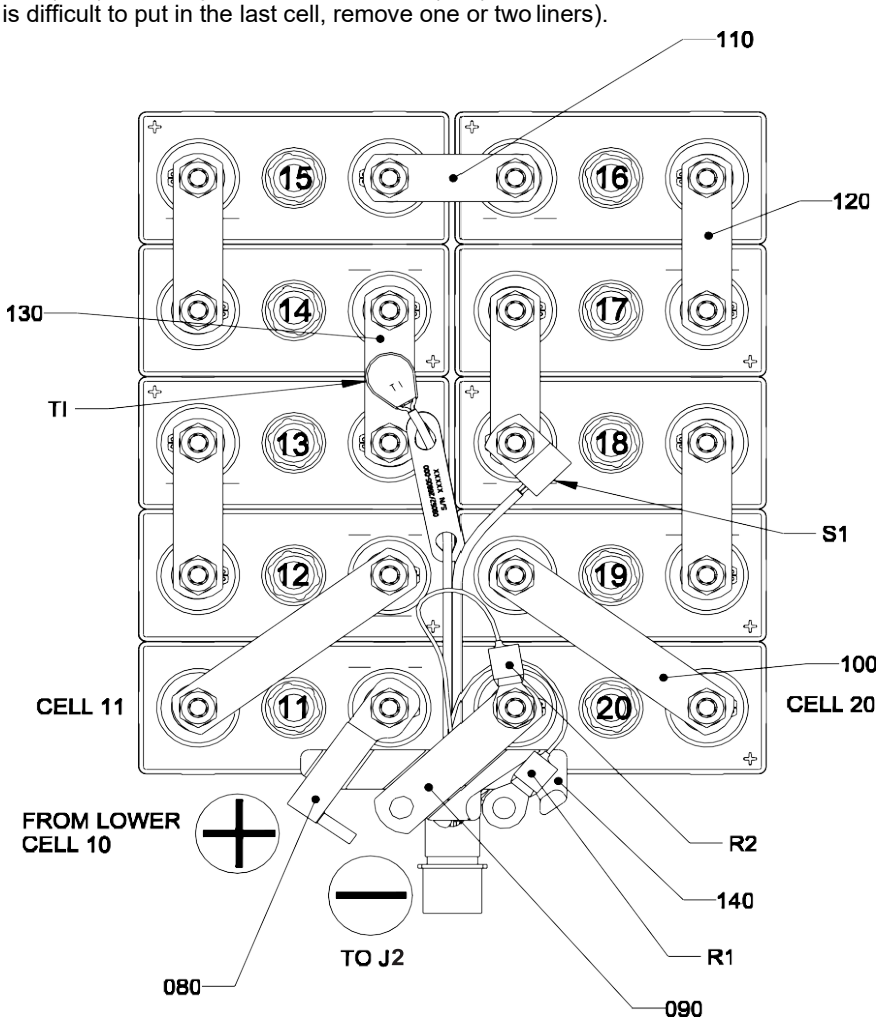


Figure 7004 Upper unit cells installation

- Verify the polarity of each cell according to the above figure
- Install the upper insulator (140) and route sensor harness labeling through center of insulator (140).
- Install sensor harness (200) T1 on link (130) using locking nut (230) and torque it according to Torque table_bookmark137.
- Lightly lubricate cell (240) terminals and nuts (280) with M02 using a nonmetallic paintbrush.
- Install the 9 links (100, 110, 120, and 130) according to the above figure.

NOTE: Verify not to stress or damage sensor harness cable wires.

- Connect sensor harness (200) S1 lug onto cell 18 positive terminal (refer to Figure 7004).
- Install 18 nuts (280) with 18 the washers (290) and torque them according to Torque table.
- Install the 3 links (070, 080 and 090) (refer to IPL Figure 1).
- Install sensor harness (200) lugs R1 and R2 (refer to Figure 7004).
- Install 2 nuts (280) with the 2 washers (290) and torque them according to Torque table.

4-3. Assemble battery

- Loosen each of the two nuts (280) at the tops of the vertical links (070 and 080) just enough so that they can move (they are slotted, and can rotate).
- Put upper unit (020) on the lower unit (350).
- Insert the 8 case screws (360) one corner at a time while applying weight (protect your hand with an isolated plate) to that corner.
- After all eight screws are inserted, torque screws (refer to Torque table) one corner at a time while applying weight again.
- Lightly lubricate nuts (050) and screws (370) using a nonmetallic paintbrush.
- Line up the bottom of the vertical links (070 and 080) with the mating link (430) of the lower case and insert the M8 screws (370) with wave washers (380).
- Torque the nuts (050 and 280) and then the screws (370) per Torque table while maintaining proper alignment..
- Install cover connection (030).
- Install the screw (040) and torque it according to Torque table.
- Install the cover (010) by closing the 4 latches.

4-4. Lubrication

- When the battery is clean (after reassembly of the battery and after installation of the vent valve), coat all cell nuts (050, 280 and 490), the washers (060, 290, and 500), screws (370), and links (090 to 130) and (390 to 410) with M02.

4-5. Recording

- Fill out the log book.

FITS AND CLEARANCES

1. Introduction

The torque values below are “lube torque” values. The thread of the terminals and attaching nuts (or screws) should be lightly greased with M02 prior to assembly and applying torque.

2. Torque table

IPL FIG. ITEM N°	NAME	TORQUE VALUE	
		Nm	lb_f-in
050, 280, 490	connector and cell nut	8.1 to 9.0	72 to 80
360	screw	5.3 to 6.0	47 to 53
040	screw, connection cover	2.0 max	18 max
370	screw	8.1 to 9.0	72 to 80
170	connector screw	2.0 to 2.5	18 to 22
210, 220	temperature harness screw and nut	0.7 to 0.9	6 to 8
230	thermostat nut	1.0 to 1.2	9 to 11

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SPECIAL TOOLS, FIXTURES, EQUIPMENT, AND CONSUMABLES

1. Introduction

This section is divided into two parts:

- The first part provides the list of special tools, fixtures and equipment needed to do the steps listed in the other chapters.
- The second part provides the listing of consumable materials used in this manual.

All listed items are identified in this manual by a standard code number:

- Txx for tools, fixtures, and equipment,
- Mxx for consumable materials.

2. Special tools

NOTE: Equivalent tools can be used.

A special tool kit (P/N 416161) is available from Saft containing all special tools T01, T02, T03, and T04. The tools are housed in a polypropylene case.

- T02 (P/N 416232) is assembled using syringe P/N 105112 and nozzle P/N 104184 or T02 (P/N 020916-001) is assembled using syringe P/N 018327-000 and nozzle P/N 020914-001.

CODE	DESCRIPTION	QUANTITY REQUIRED	F6177 P/N	V09052 P/N
T01	Universal vent wrench (provided in new battery package)	1	413876	093365-000
T02	Syringe assembly (with nozzle 20 mm (0.79 in))	1	416232	020916-001
T03	1 Ω 3 W equalizing resistors	20	164829	-
T04	Universal cell puller tool (fully insulated)	2	416159	-
T05	Vent valve adapter for MS valve	1	-	024398-000
T06	Bench charge harness kit	1	-	026635-000
	. cable assembly, charging, positive and negative	1	-	026701-000
	. Screw, M8x1.25	4	-	80-03728-01
	. Washer, spring	4	-	018124-000
T07	Power connector cap cover (provided in new battery package)	1	166925	018346-000
T08	CKO600KA Hardware Tool	1	-	026754-000

Table 9001 Table of special tools

3. Equipment

NOTE: Equivalent Equipment may be used.

EQUIPMENT	MINIMUM EQUIPMENT SPECIFICATION		SOURCE OR CAGE CODE	REPRESENTATIVE TYPE (MFG MODEL/CAGE)
	CHARACTERISTICS	RANGE ACCURACY TOLERANCE		
Constant current charger	-	0 to 60A DC 40V DC Minimum	Commercially Available	Sorenson Power (Supply DCR-40-70B)
Constant current source with load bank	-	0 to 60A DC 1 to 40V DC	Commercially Available	Sorenson Power (Supply DCR-40-70B) with Ohmite (L225J5ROE)
Megohmmeter	-	0 to 50 MΩ @ 250V DC continuous	Commercially Available	Fluke (1507)
Digital multimeter	-	2000 count, accuracy 1% or better	Commercially Available	Fluke (179)
Climatic chamber	-	+15°C to +80°C (+59°F to +176°F)	Commercially Available	Cincinnati Sub-Zero (MCB-1.2-.33-H/AC)
Torque wrench	Insulated	0 to 15 N-m (0 to 133 lbf-in)	Commercially Available	McMaster-Carr (7936A12)
External Retaining Ring Plier	Tip Angle 90° Tip Dia. 1.2mm (0.046 in)	-	Commercially Available	Grainger (3JXN2)
Stiff bristle brush	Nonmetallic	-	Commercially Available	-
Small paintbrush	Nonmetallic	-	Commercially Available	-
Soft brush	Nonmetallic	-	Commercially Available	-
Safety gloves	-	-	Commercially Available	-
Protective goggles	-	-	Commercially Available	-
Safety shoes	-	-	Commercially Available	-
Protective Apron	-	-	Commercially Available	-
Dry, compressed air source	-	<1.38 bar (20 psi)	Commercially Available	-
Fine wire brush	-	–	Commercially Available	-

Table 9002 Table of equipment

4. Materials and consumables

4-1. Materials

NOTE: Equivalent substitutes are permitted for all items except for those that become part of the configured unit. Equivalent substitutes are not allowed for items marked with a double asterisk (**).

NAME	SPECIFICATION OR PART NUMBER	SOURCE OR CAGE	USE
Cloth, soft clean	-	Commercially Available	Protect from FOD
Eye Wash	-	Commercially Available	Eye rinse

Table 9003 Table of materials

4-2. Consumables

NOTE: Equivalent alternatives can be used for list items.

This paragraph describes the consumables used in the CMM.

CODE	DESIGNATION PART NUMBER AND SPECIFICATION	MANUFACTURER OR SUPPLIER (NAME, ADDRESS, CODE)
M01	Distilled or deionized water (specification @ +20°C ± 5°C (+68°F ± 9°F) Clear, colorless and odorless while boiling Conductivity < 33 µS/cm 5 < pH < 7 Mn-COD < 30 mg/l (1.7 x 10^{-5} oz/in^3) (Chemical Oxygen Demand under potassium permanganate methodology); methodology to evaluate organic or mineral pollution) Chlorines Cl^- < 5 mg/l (2.9 x 10^{-6} oz/in^3) Sulfates SO_4^{2-} < 10 mg/l (5.8 x 10^{-6} oz/in^3) Temperature for analysis and specifications are at +20°C (68°F). STORAGE: dry and clean container without any corrosion and damage. Temperature: +20°C ± 5°C (+68°F ± 12°F). Over 1 year of storage, do an analysis of the liquid.	Local vendor
M02	Neutral petroleum jelly Density @ +60°C (+140°F) Range = 0.840 to 0.866 kg/l (0.486 to 0.501 oz/in^3) Melting Point Range = +46°C to +52°C (+115°F to +126°F) Acidity/Alkalinity = Neutral to Litmus	Mineral Vaseline NATO: S 743 F: AIR 3565 US: VV-P-236A UK: DEF 2333
M03	Mild Soap	Local Vendor

Table 9004 Table of consumables

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ILLUSTRATED PARTS LIST

1. Introduction

1-1. General

The Illustrated Parts List (IPL) contains a list and illustrations of the assemblies and detailed parts of the unit in disassembly sequence.

To find the illustration for a part if the part number is known, refer to the Alpha numerical index and look for the part number and the corresponding figure and item number. Refer to the Detailed part list and look for the first figure and item number found in the Alpha numerical index for that part. If this figure shows the part in a section or system of the equipment other than the one necessary, refer to the other figure numbers listed in the Numerical Index.

To determine the part number of a given part, refer to the illustration showing the assembly including this part. Note the item number of the illustrated part and refer to the Detailed part list which show its part number and identification.

1-2. Alpha Numerical Index

In this index, part numbers are classified from left to right, each character (letter, number, hyphen) being considered separately. The part number column contains all part numbers included in the Detailed part list.

1-3. Detailed Parts List

1-3-1. Figure and Item Number

Each assembly, sub-assembly and part holding a part number and included in the parts list is given as an item number. The figure number linked to the item number is shown on the first line at the top of each page.

Assemblies, sub-assemblies numbered parts included in the list but not illustrated are identified by a hyphen (-) preceding the item number.

An index letter shown before the item number refers to the figure showing the modified portion of the applicable part.

Manufacturer's Part Number: a manufacturer's part number is given to each assembly and detail part, whether illustrated or not.

Nomenclature: the nomenclature is given with an indenture, to show how the parts and the assemblies and related to their next higher assemblies. These are the details:

1 2 3 4 5 6 7

Assembly

. Detailed parts for assembly,

. Sub-assembly

. Attaching parts and/or storage parts for sub-assembly,

* * *

. . Detailed parts for sub-assembly

. . Sub-sub-assembly,

. . Attaching parts and/or storage parts for sub-sub-assembly,

* * *

. . . Detailed parts for sub-sub-assembly.

The attaching parts are shown directly after the assembly of the part thereof. They are listed under the same indent number as the item they are attached to and are identified by the words "Attaching Parts" and are followed by three asterisks.

The manufacturer's code or the abbreviation NP (not procurable) are placed at the extreme right- hand side of the first line of the parts list column.

1-3-2. Effectivity code

An alphanumerical index shows the effectivity of sub-assemblies and detailed parts lists in relation to the next higher assembly (ies) or sub-assembly (ies).

When the effectivity is fully applicable, the usage code column remains blank.

The use code for assemblies and detailed parts refers to the figure/item number of the next higher assembly (ies) or sub-assembly (ies). Example: Effectivity 1A, 1B, 1C is written 1ABC.

1-3-3. Units per Assembly

The units per assembly column shows the quantity of units required for one next higher assembly. In some cases, the information is replaced by the abbreviation RF (for reference) or AR (as required)

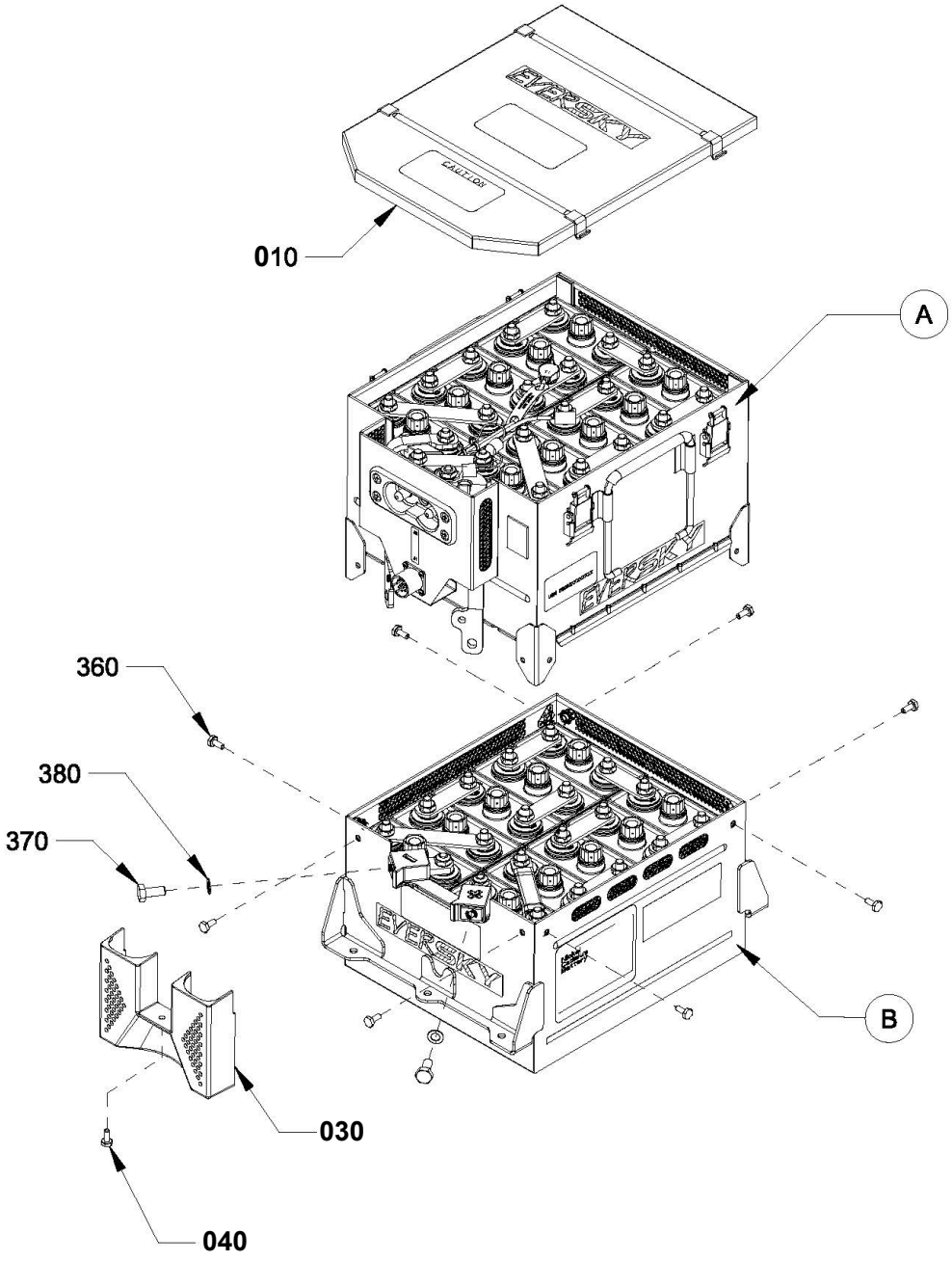
2. Alpha Numerical index

PART NUMBER	AIRLINE STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER	TOTAL QUANTITY REQUIRED
MS21083C04			210	4
MS21083C06			230	1
MS18034-4			190	2
012536-002		1	270, 480	20
015995-000			050, 280, 490	42
018124-000			060, 290, 380, 500	44
021733-000			160	1
023619-000			250, 460	20
024733-001			300, 510	80
024749-000			370	2
026606-005			130	1
026606-004			090	1
026606-003			100, 390	3
026606-002			120, 410	11
026605-000			200	1
026606-001			110, 400	2
026610-000			550	1
026611-000			070	1
026612-000			080	1
026613-000			430	2
026615-000			150	1
026620-000			340	1
026621-000			030	1
026622-000			440	1
026623-000			140	1
026630-000			010	1
026632-000			240, 450	20
026633-000			540	1
026634-000			330	1
090064-000			210	4

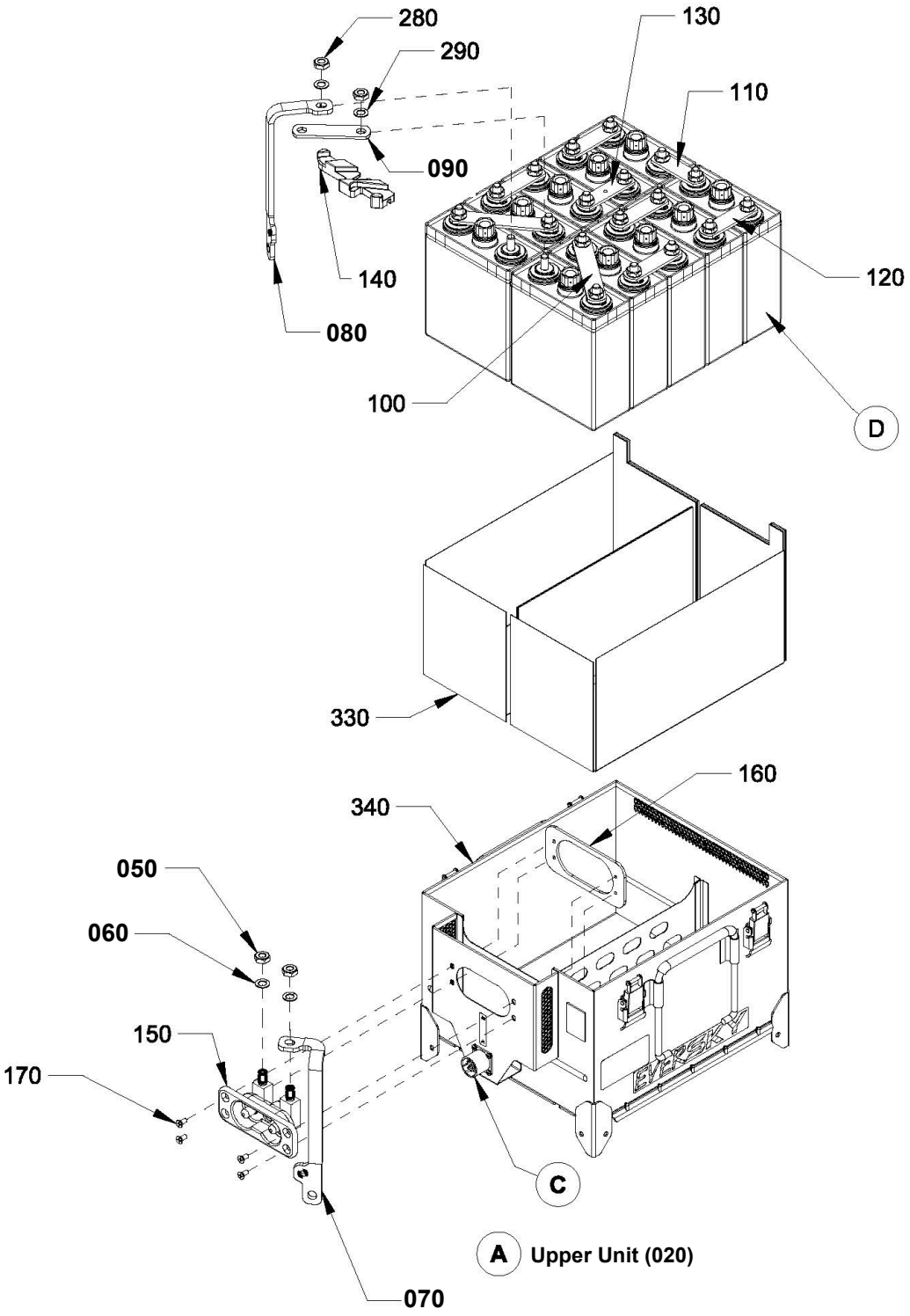
PART NUMBER	AIRLINE STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER	TOTAL QUANTITY REQUIRED
091181-006			314, 524	40
092178-008			220	4
092815-000			190	2
092882-000			040, 360	9
093169-000			230	1
093616-000			170	4
093825-000			320, 510	40
093826-001			310, 520	40
416541			-001	RF

3. Detailed part list

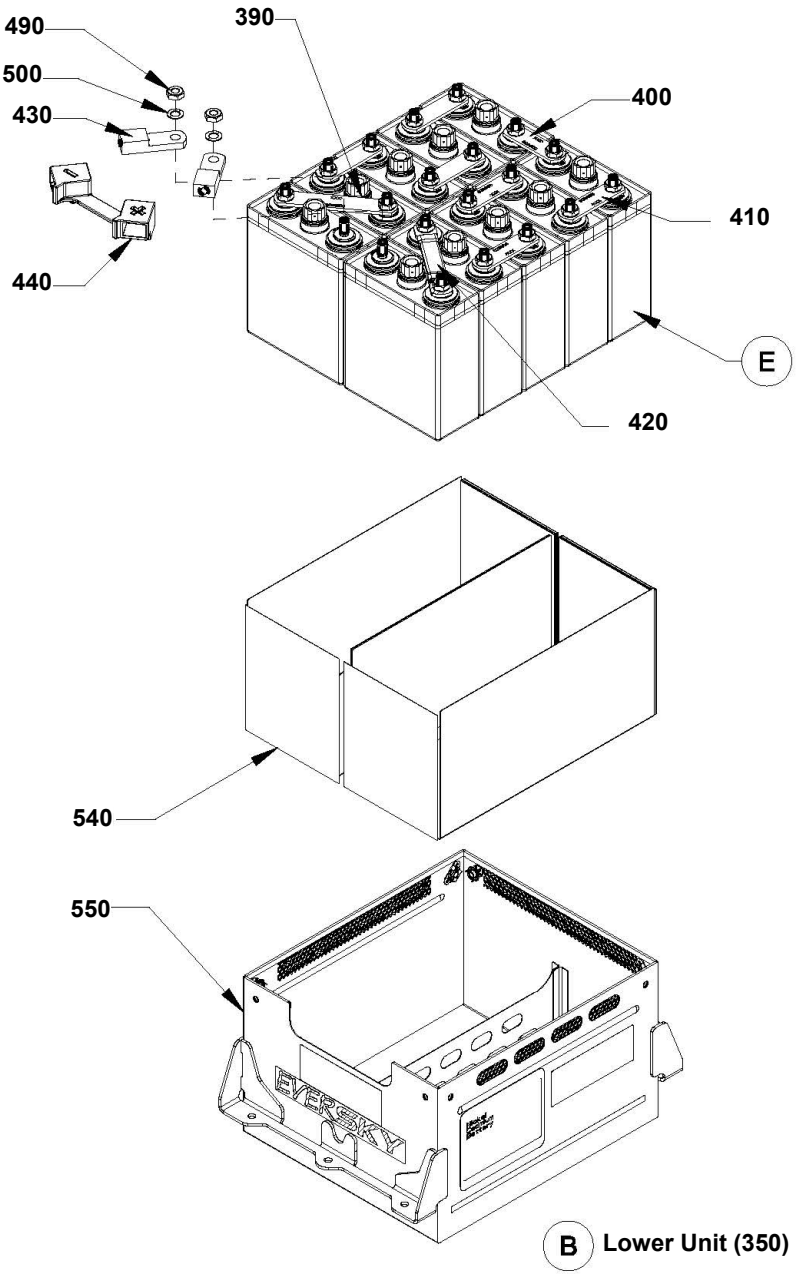
3-1. Battery part list



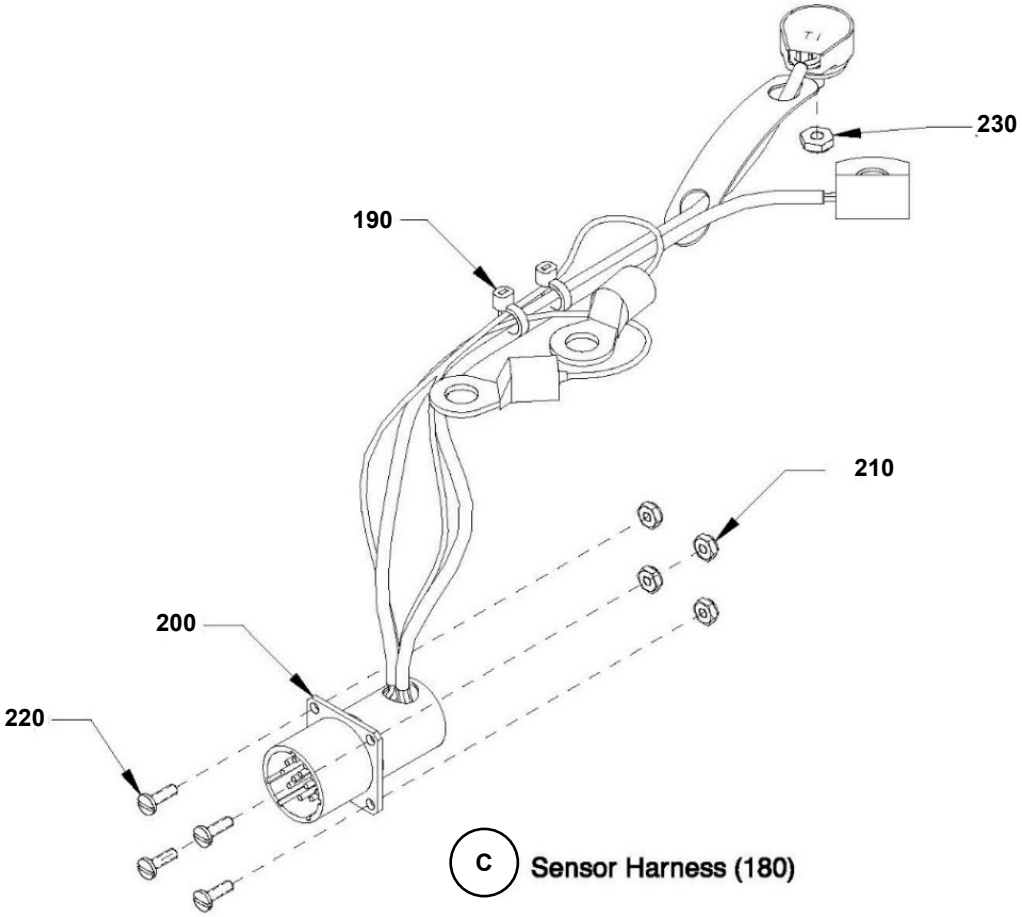
IPL Figure 1 Battery type 605CO1 exploded view (Sheet 1 or 5)



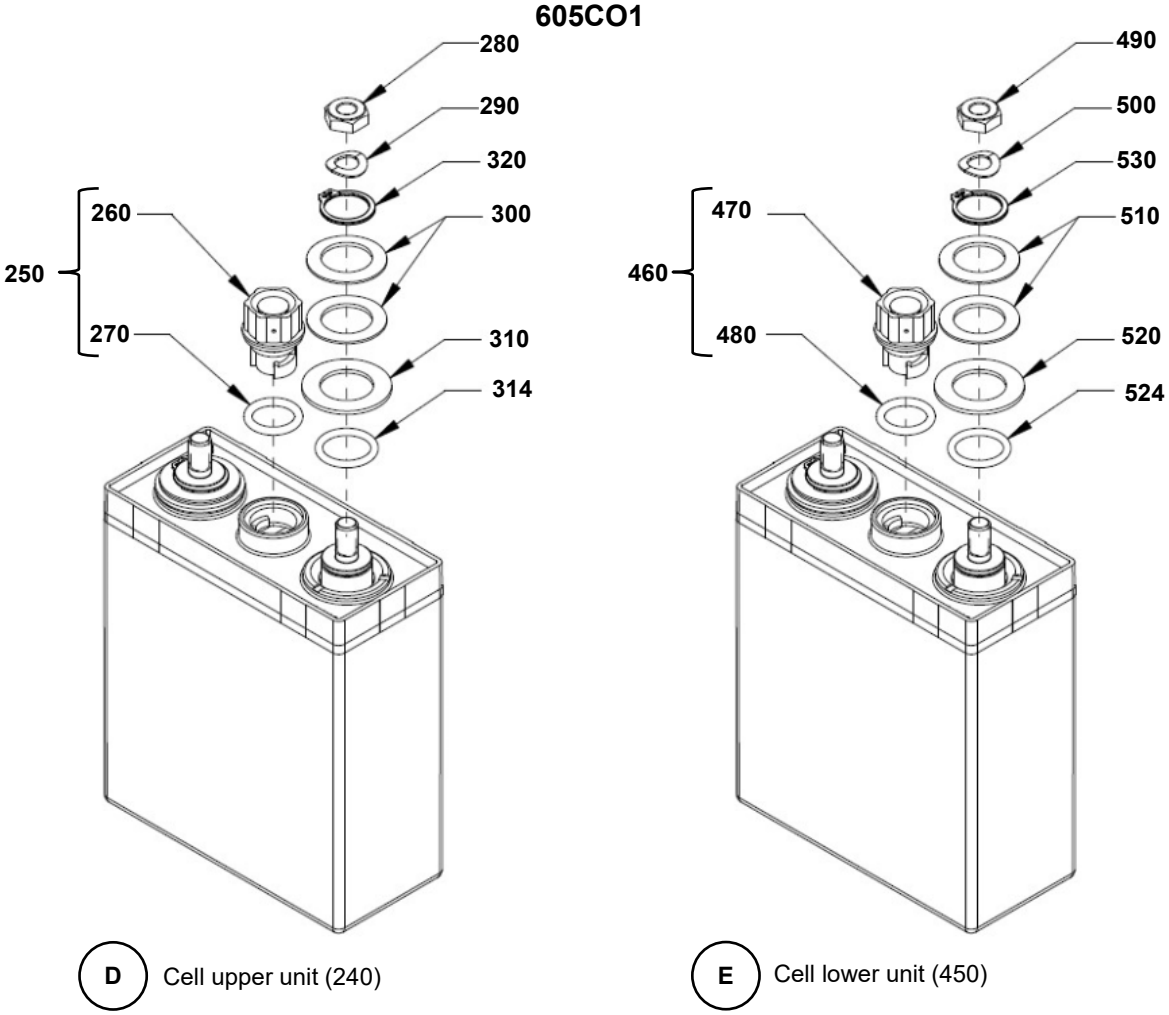
IPL Figure 1 Battery type 605CO1 exploded view (Sheet 2 or 5)



IPL Figure 1 Battery type 605CO1 exploded view (Sheet 3 or 5)



IPL Figure 1 Battery type 605CO1 exploded view (Sheet 4 or 5)



IPL Figure 1 Battery type 605CO1 exploded view (Sheet 5 or 5)

FIGURE NUMBER	ITEM NUMBER	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY.
1	1	416541		BATTERY 605CO1	RF
	010	026630-000		. Cover, Marked	1
	-020	NONPROC1		. Upper unit NP	1
	030	026621-000		. Cover, Connection	1
				Attaching Parts	
	040	092882-000		. Screw, Hex #10-32	1
				* * *	
	050	015995-000		. . Nut, Hex M8X1.25	2
	060	018124-000		. . Washer, Spring	2
	070	026611-000		. . Link, Vertical Pos Insulated	1
	080	026612-000		. . Link, Vertical Neg Insulated	1
	090	026606-004		. . Link	1
	100	026606-003		. . Link	2
	110	026606-001		. . Link	1
	120	026606-002		. . Link	5
	130	026606-005		. . Link, Thermostat	1
	140	026623-000		. . Insulator, Upper	1
	150	026615-000		. . Connector, Power	1
	160	021733-000		. . Plate Connector	1
				Attaching Parts	
	170	093616-000		. . Screw #8-32	4
				* * *	
	180	NONPROC2		. . Sensor Assembly NP	1
	190	MS18034-4		. . . Ties, 092815-000	2
	200	026605-000		. . . Sensor Harness	1
				Attaching Parts	
	210	MS21083C04		. . Locking Nut #4-40, 090064-000	4
	220	092178-008		. . Screw, #4-40	4
	230	MS21083C06		. . Locking Nut #6-32, 093169-000	1
				* * *	
	240	026632-000		. . Cell CKO600KA, Assembly (with hardware)	10
	250	023619-000		. . . Valve Vent	1

FIGURE NUMBER	ITEM NUMBER	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY.
	260	NONPROC3		. . . . Valve Body NP	1
	270	012536-002		. . . . O-Ring	1
	280	015995-000		. . . Nut, Hex M8X1.25	2
	290	018124-000		. . . Washer, Spring	2
	300	024733-001		. . . Washer, Belleville	4
	310	093826-001		. . . Washer, Flat	2
	314	091181-006		. . . O-Ring	2
	320	093825-000		. . . Ring, Retainer	2
	330	026634-000		. . Liner Kit Upper	1
	340	026620-000		. . Case Marked, Upper	1
	350	NONPROC4		. Lower Unit NP	1
				Attaching Parts	
	360	092882-000		. Screw, Hex #10-32	8
	370	024749-000		. Screw, M8X19X1.25	2
	380	018124-000		. Washer, Spring	2
				* * *	
	390	026606-003		. . Link	1
	400	026606-001		. . Link	1
	410	026606-002		. . Link	6
	420	NONPROC5		. . Fuse link OCP, Assembly NP	1
	430	026613-000		. . Adapter Link	2
	440	026622-000		. . Insulator, Lower	1
	450	026632-000		. . Cell CKO600KA, Assembly (with hardware)	10
	460	023619-000		. . . Valve, Vent	1
	470	NONPROC6		. . . . Valve Body NP	1
	480	012536-002		. . . . O-Ring	1
	490	015995-000		. . . Nut, Hex M8X1.25	2

FIGURE NUMBER	ITEM NUMBER	PART NUMBER	AIRLINE STOCK NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	UNITS PER ASSY.
	500	018124-000		. . . Washer, Spring	2
	510	024733-001		. . . Washer, Belleville	4
	520	093826-001		. . . Washer, Flat	2
	524	091181-006		. . . O-Ring	2
	530	093825-000		. . . Ring, Retainer	2
	540	026633-000		. . Liner Kit, Lower	1
	550	026610-000		. . Case Marked, Lower	1

- item non illustrated

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STORAGE (INCLUDING TRANSPORTATION)

1. Introduction

1-1. General

Storage preparation and packaging makes sure that the equipment is protected against any attack by atmospheric agents.

For a battery which has been cleaned and serviced and is not directly put into service on board an aircraft, different methods can be recommended depending on the purpose and the environment conditions of the "storage".

The figure and item numbers are those of the ILLUSTRATED PARTS LIST.

1-2. Storage room

Keep the batteries and spares in a dry and clean room isolated from detrimental agents such as: dirt, dust, dampness, vibration, and corrosive atmosphere.

Lead acid batteries must not be stored in the same room as Saft Ni-Cd batteries.

2. Definitions

Inactive long-term storage is a totally discharged battery not ready for installation on the aircraft.

Inactive standby storage means there is no current flowing into the battery during storage.

Active standby is a fully charged battery being charged by a continuous current device.

3. Inactive long-term storage

NOTE: There is no need to do maintenance during this storage period. It is not necessary that battery be short circuited during the long-term storage

3-1. Procedure

- The following must be done to any battery with prior service history before placing it into inactive long-term storage.
- Charge, Adjust electrolyte level, Vent valve test, and Capacity check.

NOTE: The standard cardboard packaging is considered unsealed and allows 2 years of storage. Storage is allowed for 10 years if the following conditions are met: sealed packaging and isolated from harmful agents (i.e.: dirt, dust, vibrations, or corrosive atmosphere)

- heat sealed, twisted and zip tied bag,
- temperature: +20°C (+68°F) ± 15°C (± 27°F),
- humidity < 95 %,
- normal vertical position,
- Isolated from detrimental agents: i.e. dirt, dust, dampness, vibration, corrosive atmosphere.

Saft Ni-Cd batteries may be stored in temperatures ranging from -55°C to +5°C (-67°F to +41°F) or +35°C to +60°C (+95°F to +140°F) for an accumulated exposure that does not exceed 30 days.

Lead-acid batteries must not be stored in the same room.

3-2. Servicing at end of long-term storage

STORAGE TIME	SERVICING PROCEDURE
Less than or equal to 12 months	Do Visual inspection and return to Figure 1001 Battery restoration entry point "C"
More than 12 months	Do Charge and return to Figure 1001 Battery restoration entry point "START"

Table 15001 Return to service following storage

4. Inactive standby storage

The battery is charged after being serviced then stored fully charged as required by Figure 1001 in a Storage room in such a way that it can be installed in the aircraft without further maintenance except as provided within this section. Refer to Figure 15002.

NOTE: At any time during the Inactive standby storage shown in Figure 15002, the battery may be installed on the aircraft or placed into Inactive Long-Term Storage.

4-1. Standby period

Standby period is the time that corresponds to 80% available capacity shown in Figure 15001 (for example 24 days at +30°C (+86°F)) with a maximum of 90 days.

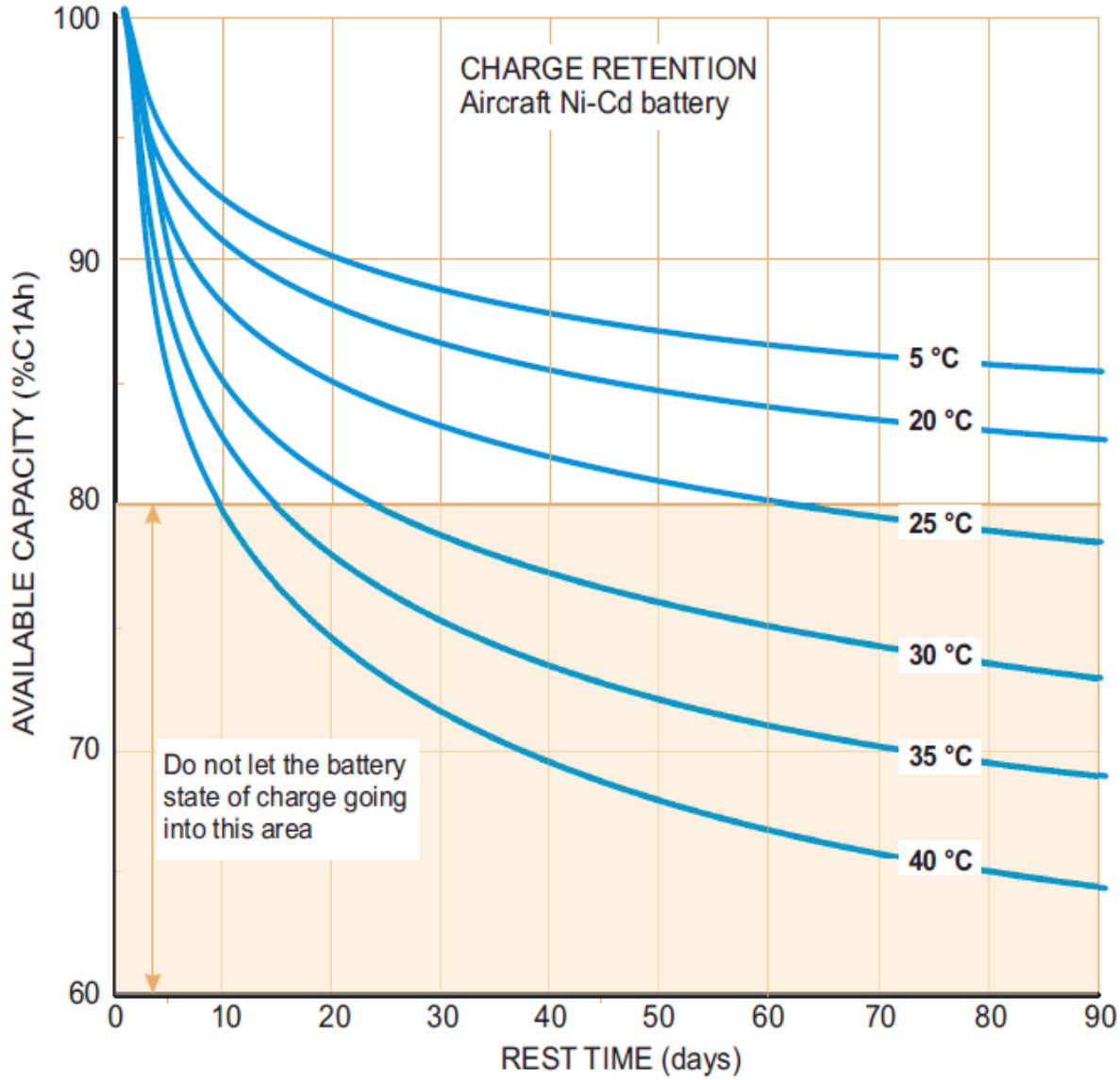

Figure 15001 Standby period

4-2. Refresh charge

Refresh charge as shown in Table 15002 is a constant current charge that can be performed at the end of a Standby period to permit additional standby periods.

CAUTION: THE TIME NECESSARY TO REACH THE REQUIRED VOLTAGE SHOULD BE VERY SHORT. DO NOT DO THE 4 HOURS FINAL CHARGE AT 0.1 C_1A (REFER TO CHARGE) DURING THIS REFRESH CHARGE OPERATION.

CHARGE RATE	VOLTAGE (END OF " REFRESH " CHARGE)
0.1 C_1A	30.0V for 20 Cells
0.5 C_1A	31.0V for 20 Cells
1.0 C_1A	31.4V for 20 Cells

Table 15002 Refresh charge

4-3. Standby duration

Standby duration consists of a maximum of three Standby periods with two Refresh charges in between each standby period. The number of consecutive standby durations is limited to 3. Refer to Figure 15002

4-3-1. For a battery completing the first or second standby duration and not immediately installed in the aircraft, do one of the following below:

1. For environments ≤ +30°C (+86°F), then do Insulation check, Initial discharge, Charge, Adjust electrolyte level, Insulation check, and Assemble battery.
2. For environments > +30°C (+86°F), then do Insulation check, Initial discharge, Cell shorting, Charge, Adjust electrolyte level, Insulation check, and Assemble battery.

4-3-2. For a battery completing the third consecutive standby duration,

1. The battery can go into long-term storage or return to Figure 1001 Battery restoration.

4-4. Standby storage cycle schedule

Standby storage cycle consists of a maximum of 3 consecutive Standby durations, Refer to Figure 15002.

CAUTION: IF THE ABOVE CONDITIONS ARE NOT MET, THERE IS A RISK OF PLACING A BATTERY ON BOARD THE AIRCRAFT THAT DOES NOT MEET THE EMERGENCY REQUIREMENTS. IF THE BATTERY HAS PREVIOUSLY BEEN STORED AT A TEMPERATURE BELOW THAT OF THE AMBIENT, CONDENSATION MAY OCCUR. BEFORE INSTALLING, VERIFY THE INSULATION RESISTANCE.

NOTE: At any time during the standby storage cycle shown in Figure 15002, the battery may be installed on the aircraft, put into long-term storage (refer to Inactive long-term storage), or return to Figure 1001 Battery restoration.

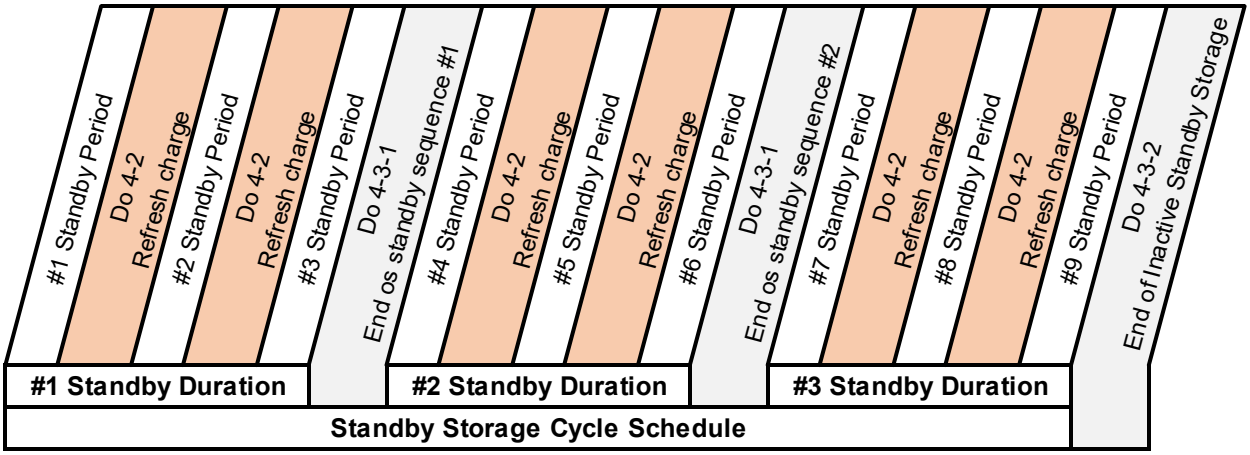

Figure 15002 Inactive Standby Storage Schedule

5. Active standby mode (= use of a trickle charge)

Principle: the battery is continuously charged, in a final charge condition. Saft does not recommend this method, however some operators take responsibility for its use.

This method is not reliable due to quantity and inaccuracy of water consumption, without the electrolyte being leveled.

CAUTION: EXAMPLE OF WATER LOSS DURING TRICKLE CHARGE: IF A 40 AH BATTERY REMAINS ON A CONTINUOUS TRICKLE CHARGE OF 3 MA/AH FOR ONE MONTH, THE TOTAL CONSUMPTION OF WATER IS 35 CM^3/CELL.

6. Spares

6-1. Spare Cells

Spare cells must be stored filled and discharged (in a discharged cell, the electrolyte level is not visible). It is not necessary that they be short circuited. The vent valves must not be removed. The storage conditions are the same as those given in. Inactive long-term storage. No maintenance operation is needed during storage. Before installation in a battery, cells must be visually inspected for damage or leakage and cleaned and repaired as necessary in accordance with the battery maintenance documentation.

6-2. Spare O-rings, gaskets, and vent valves

6-2-1. O-rings and gaskets

6 years of storage with storage conditions from date of manufacture unless otherwise specified on the packaging. They must be protected from exposure of air, light and high humidity (< 70%). Storage life depends on temperature, so it is recommended to store in a cool area < +25°C (+77°F). At +35°C (+95°F), storage life is reduced to 5 years. Before use, O-rings must be inspected and any showing visible signs of damage, distortion or deterioration must be replaced.

6-2-2. Vent valves with O-rings

6 years of storage with storage conditions from date of manufacture unless otherwise specified on the packaging (the limitation is due to the O-ring). Protected from exposure of air, light, and high humidity (< 70%). Storage life depends on temperature, so it is recommended to store in a sealed container (non-PVC) in a cool area < +25°C (+77°F). At temperatures above +35°C (+95°F), storage life is reduced to 5 years. Before use, O-rings must be inspected and any showing visible signs of damage, distortion or deterioration must be replaced.

6-3. Other spare parts

Other spares must be protected from external contamination (i.e., dirt, dust, dampness, vibration, corrosive atmosphere) and high humidity (>70 %), may be stored for unlimited periods. Before use parts must be inspected for any visible signs of damage, distortion, or deterioration. Any defective parts must be replaced.

7. Transportation procedure

The battery is normally discharged before packaging for shipment from the factory. If it is necessary to transport a charged battery, make sure that the output terminals are protected against short circuit by using T07.

The battery should then be packed vertically in its original container. If the original container is not available, the international and/or local packaging regulations applicable to the mode of transport and destination must be followed.

According to the IATA / IMDG dangerous goods regulations, Saft ships all existing nickel-cadmium batteries or cells for aircraft under the classification UN2795 (wet, filled with alkali).