

**ENERSYS INC
HAWKER**

TECHNICAL MANUAL

ARMASAFE PLUS BATTERY

NSN 6140-01-485-1472

HAWKER Part No 9750N7025

MAINTENANCE GUIDE

LIST OF EFFECTIVE PAGES

Insert latest pages; dispose of superseded pages in accordance with applicable regulations.

Dates of issue for original and changed pages are:

Original issue 0 dd Mmm 20YY

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 13, CONSISTING OF THE FOLLOWING:

Page No.	Change No. *
Title	0
A.....	0
i-vi.....	0
1-1.....	0
1-2.....	0
1-3.....	0
1-4.....	0
1-5.....	0

* Zero in this column indicates an original page.

TABLE OF CONTENTS

Section		Page
	TITLE PAGE	
	LIST OF EFFECTIVE PAGES	A
	TABLE OF CONTENTS	i
	LIST OF ILLUSTRATIONS	ii
	LIST OF TABLES	ii
	WARNINGS AND CAUTIONS	iii
	INTRODUCTION	iv-vi
1	MAINTENANCE PROCEDURES	1-1
	Receipt of New Material	1-1
	Storage	1-1
	Test Equipment	1-2
	Commissioning	1-2
	Charging Procedures	1-3
	Deep Discharge Recovery Procedure	1-3
	Capacity Test Procedure	1-4
	Inspection, Off-Vehicle	1-4
	Failed Batteries	1-5
2	TROUBLESHOOTING	
	General	1-5

LIST OF ILLUSTRATIONS

Figure		Page
1	Sealed Lead-Acid Battery 6140-01-485-1472	iv
2	Charge Retention during Storage	1-1
3	Date of Initial Installation Label	1-2
4	State-of-Charge vs OCV	1-4

LIST OF TABLES

Table		Page
1	Charging Equipment	1-2
2	Constant Voltage Charge Duration	1-3
3	Fault Isolation	1-5

INTRODUCTION

1. PURPOSE OF THIS MANUAL

Provides maintenance instructions if required for servicing of the Armasafe Plus Battery NSN 6140-01-485-1472, Hawker P/N 9750N7025.

2. SCOPE OF THIS MANUAL

Provides start-to-finish, step by step maintenance actions such as Incoming inspection, commissioning, recharging; capacity testing, and trouble shooting.

3. BATTERY DESCRIPTION

This Hawker lead acid battery is a sealed, valve regulated system. Under normal operating conditions no servicing is required however should the need arise this manual outlines the necessary instructions.

The battery is maintenance free with respect to electrolyte replenishment. Under no circumstances should any attempt be made to introduce any substances, e.g. acid, distilled water or alkali to the battery.



Sealed Lead Acid Battery 6140-01-485-1472
HAWKER Part No 9750N7025

Figure 1

The battery consists of six 2v cells connected in series contained in a polypropylene container. Electrical connection is via the positive and negative terminal posts.

Leading Particulars are :-

Nominal Voltage	12V
Electrical Capacity	120Ah (20 Hour) 110Ah (10 Hour) 100Ah (5 Hour) 80Ah (1 Hour)
CCA (S.A.E)	1225A
Reserve Capacity	240 Minutes
Mass	86lb (39Kg)
Storage	2 years at 20°C (before recharge)
Overall Length	10.51" (267 mm) Max
Overall Width	11.26" (286) mm Max (including handles)
Overall Height	9.05" (230 mm) Max
Case Material	Polypropylene
Terminals	Posts to SAE J537

Hawker Military Batteries have been independently tested to, and are classified as Non-Spillable and exempt from hazardous goods transportation requirements, in accordance with :-

- a) ICAO/IATA Packing Instruction 806, Special Provision A67.
- b) IMDG Class 8, UN ID 2800, exemption for Non-Spillable batteries.
- c) USA Dept of Transportation - 49 CFR Section 173.159 para d.

When securely packaged and protected against short circuits.

4. NON-STANDARD ABBREVIATIONS

The following non-standard abbreviations are used in this manual:

SLAB	Sealed Lead Acid Battery
OCV	Open Circuit Voltage

5. CHANGE RECOMMENDATIONS

Recommendations concerning changes to this manual should be submitted to the manufacturer :-

ENERSYS INC
Formerly HAWKER
617 N. Ridgeview Dr.
Warrensburg, MO 64093
United States of America

Tel (800) 964-2837

Fax (800) 283-2948

SECTION 1

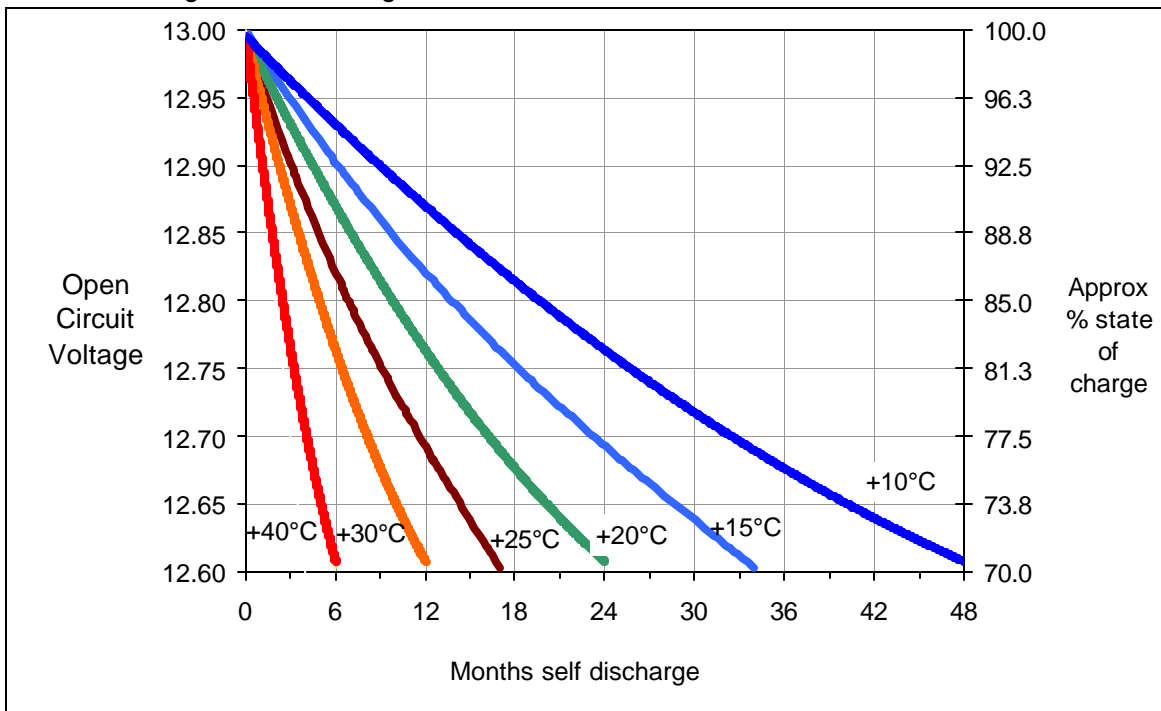
MAINTENANCE PROCEDURES

1-1. RECEIPT OF NEW MATERIAL

- All batteries are despatched from the manufacturing plant in a fully charged condition, the date of the latest charge being marked on the outer packaging and on the battery identification label. The only acceptance check required immediately upon receipt is to look for signs of damage in transit. Unpacking and detailed examination is unnecessary and should be left until the battery is removed from storage.

1-2. STORAGE

- It is recommended that the fully charged battery should be stored in the original carton, in a cool dry place, ideally below 77°F (25°C). The battery charge retention will be reduced with increased temperature.
- The graph in Figure 2 demonstrates typical capacity retention of the battery during storage without regular boost charges.



Charge Retention During Storage
Figure 2

- The battery may be stored up to 5 years without degradation of performance provided that an OCV check is conducted every 12 months. When stored in temperatures in excess of 95°F

(35°C), the battery should be inspected every 6 months. If the OCV falls below 12.6V, the battery should be charged in accordance with para 1-5.

1-1

1-3. TEST EQUIPMENT

1. Electronic Multimeter. 0 - 50 Volts, precision $\pm 0.5\%$ or better.
2. Charge/Discharge Connection Lead.
3. Discharge Unit. This must be capable of discharging the battery at a constant current of $20A \pm 0.5A$ over a voltage range of 13 to 10 V.
4. Charger. Acceptable charger requirements are shown in Table 1.

METHOD	EQUIPMENT
Constant Voltage	Voltage Regulated Battery Charger capable of 14.25V, and 20A Minimum

Charging Equipment
Table 1

5. The batteries are sealed and therefore do not require a dedicated lead acid battery room. A normal electrical workshop or a nickel-cadmium battery room can be used.

1-4. COMMISSIONING

1. When required for use, remove the battery from storage and perform the checkout detailed below.
2. Visually inspect the exterior of the battery for signs of damage, cracks, corrosion etc. If the condition is unsatisfactory, quarantine the battery and inform the manufacturer.
3. Measure the OCV.
4. If the OCV is greater than or equal to 12.75 volts, the battery can be prepared for issue.
5. If the OCV is less than or equal to 12.75 volts, charge in accordance with para 1-5.
6. Wipe the battery external surfaces clean with a soft dry cloth.
7. Prior to issue for installation, mark each new battery permanently with the date of initial installation (month/year) on the lid label.



Figure 3

1-2

1-5. CHARGING PROCEDURES

1. Charging should be conducted at a temperature between +68° and 86°F (+20° and 30°C). Charging can be accomplished by two methods.
(N.B. Constant Voltage is the preferred method.)
2. Constant Voltage. Charge at a constant voltage (14.25 +/- 0.25 Volts), with a charger with a minimum current availability of 20 amps, for 6 hours.

NOTE: The higher the available current the faster the battery will recharge. The charge may be discontinued when current falls to ≤ 0.50 A. Typical durations are shown in Table 2.

Current Available	Charge Time
10A	14 Hours
20A	7 Hours
30A	5 Hours

Constant Voltage Charge Duration
Table 2

3. Constant Current
As mentioned above constant voltage charging is the preferred method recommended by the manufacturer, if the only option available is constant current charging the manufacturer needs to be contacted for advice on the correct procedures.

1-6. DEEP DISCHARGE RECOVERY PROCEDURE

1. If a battery is heavily discharged, usually due to a low current drain, it is said to be in a deeply discharged state. This becomes apparent when the OCV is less than 10 volts.
2. Constant voltage charge, using a standard charger set at 14.25v +/- .25v. Restrict the maximum available current to 5 amps, initially the battery may appear as if it is not accepting charge, (this is due to the sulphation barrier that builds up within a deep discharged battery) but after approximately 20 minutes the current should begin to flow.

This is the safest method of recovery but can take 36 hours or more to fully recover the battery.

3. Perform a Capacity test in accordance with para 1-7. A battery that provides less than 300 Minutes (100%) duration but in excess of 240 Minutes (80%) is still suitable for use and may benefit from additional charging.
4. If the discharge duration is less than 240 Minutes, it may be assumed that the battery is unlikely to be recovered and it should be rejected.
5. Recharge in accordance with para 1-5.

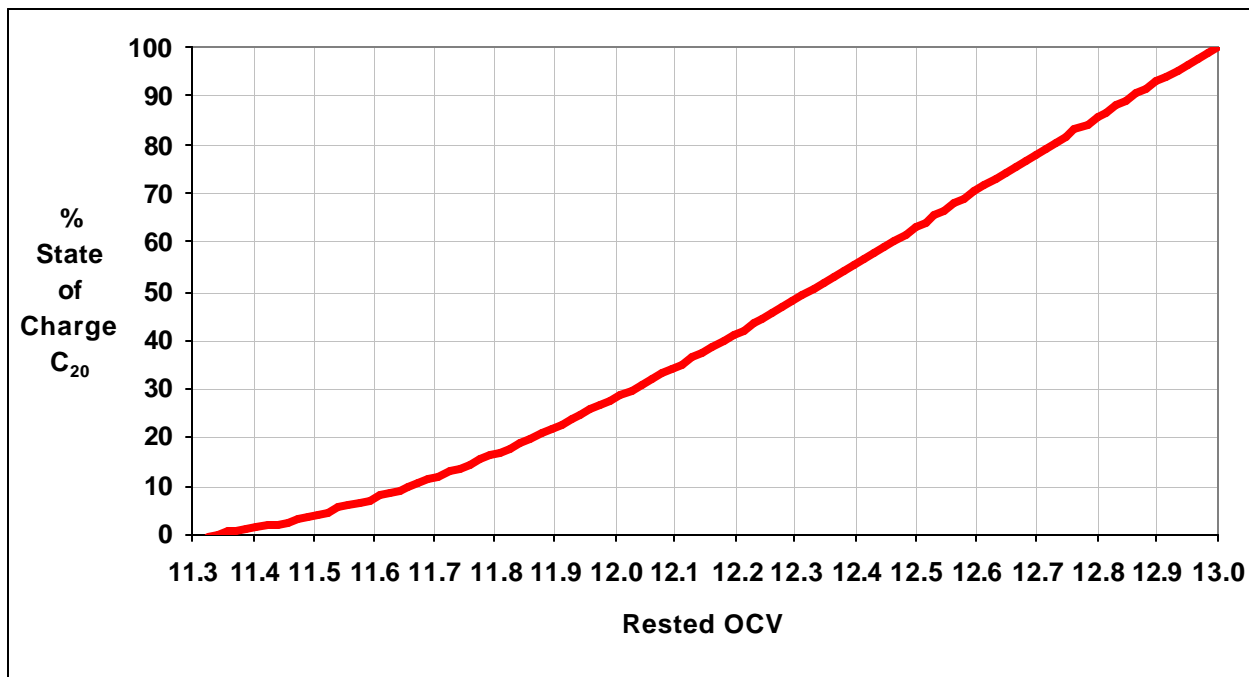
1-3

1-7. CAPACITY TEST PROCEDURE

1. Allow the battery to stabilise for 4 Hours after charging or after exposure to ambient temperature of less than +68°F (+20°C).
2. The discharge test should be conducted with the battery at a temperature of between 68° and 77° F (+20° and +25°C).
2. Discharge the battery at 20A for 300 Minutes or to 10V whichever occurs first.
3. Recharge in accordance with para 1-5.

1-8. INSPECTION, OFF-VEHICLE

1. Visually inspect the exterior of the battery for signs of damage, cracks, corrosion etc. If the condition is unsatisfactory, reject the battery.
2. Measure the OCV of the battery. Figure 3 gives an approximate guide to the battery's state-of-charge.



State-of-Charge vs OCV
Figure 4

If the OCV is less than 10V but above 4V, carry out Deep Discharge Recovery in accordance with para 1-6. Otherwise, charge in accordance with para 1-5.

5. Perform a Capacity Test in accordance with para 1-7. Charge the battery in accordance with para 1-5. If the discharge duration is equal to or in excess of 240 minutes, prepare the battery for issue.
6. Otherwise, repeat step 5, twice if necessary, to achieve 240 Minutes discharge duration.
7. If the battery still fails to achieve 240 Minutes minimum, reject the battery.

1-4

1-9 FAILED BATTERIES

1. The battery is a non-repairable unit, and is covered by a limited warranty. To determine warranty status, read the date of commissioning marked on the battery. If less than one year has elapsed, the battery is still under warranty.
2. Failed batteries that are under warranty should be fully charged if possible, and notification, together with service history and fault particulars, sent to the manufacturer.
3. Failed batteries that are not under warranty should be disposed of in accordance with Federal, State & Local regulations. The battery contains some hazardous materials.

SECTION 2

TROUBLESHOOTING

2.1 General

Use Table 3 as a guide to fault isolation.

TROUBLE	POSSIBLE CAUSE	ACTION
Zero battery Voltage	Broken or loose terminal connections, or open-circuit battery.	Reject battery
Low Volts off vehicle	Charger malfunction	Check charger
	Discharged battery	Service in accordance with manual
	Defective battery cell	Reject battery

Fault Isolation
Table 3