SUBJECT:

Required maintenance for the Battery Relocation (P/N 350-700324 and 355-700324)

APPLICABILITY :

Aircraft with the subject modification embodied in accordance with TCCA STC No. SH96-31 or any relevant foreign approvals.

	NAME AND SIGNATURE	DATE	COMPANY DEPARTMENT
PREPARED BY:	D. Kerr	13 Aug., 2010	ECL ENGINEERING
PREPARED BY:			
CHECKED BY:	C. Timmins	13th August 2010	ECL ENGINEERING
CHECKED BY:	M. Merritt	2010-08-13	ECL QUALITY ASSURANCE
APP'D / ACCEPTED (Civil A/W Authority)	AS PER ICA COMPLIANCE CHECKSHEET	28th Oct 2010	TCCA
RELEASED BY:	R. Manson	1 NOV '10	ECL ENGINEERING

RECORD OF REVISIONS

Rev.	Pages at this Revision	Description, Reason Changed Pages	Prepared (name and date)	Checked (name and date)	App'd/Acc'd (Civil A/W Authority) (name and date)	Released (name and date)
0	1 through 14	Original Issue	D. Kerr 29 July 2004	C. Timmins 29 July 2004	N/A	R. Manson 4 Aug., 2004
1	1 through 15	Changes to pages 1 to 15. Revised General, Inspection Schedule and all Figure titles as per TCCA request.	D. Kerr 8 Sept., 2004	C. Timmins 8 Sept., 2004	TCCA E. Cheung 8 Sept., 2004	R. Manson 8 Sept., 2004
2	1 through 23	Format revised. More detail added to Sections 1, 3, 4, 6, 7, 8, and Weight and Balance. (Pages 4, 5, and 7 to 23)	D. Kerr 27 June 2005	C. Timmins 27 June 2005	N/A	R. Manson 19 July 2005
3	1 through 24	Weight and Balance chart corrected, access door composite layup (Figure 6) added, Control and Operation and placard maintenance clarified, Figure numbers after Figure 6 changed. (Pages 7, 12, 15 and 19 to 24)	D. Kerr 19 Juy 2005	C. Timmins 19 July 2005	TCCA E. Cheung 19 July 2004	R. Manson 19 July 2005
4	1 through 24 A1 to A10 B1 to B61	Updated references to Appendix B to reflect document change (Pages 7, 11, 12, B1 to B61)	D. Kerr 9 September 2007	C. Timmins 13 September 2007	TCCA E. Cheung 22 September 2005	R. Manson 27 September 2005
5	1 through 26 A1 to A10 B1 to B61 C1 to C49	Template updated, SAFT Battery maintenance schedule included (Pages 3 to 6, 9, 10, 12 to 16, 19, 20, 22 to 26 and C1 to C49)	D. Kerr 14 June 2007	C. Timmins 14 June 2007	N/A	R. Manson
6	1 through 27 A1 to A10 B1 to B61 C1 to C98	Put in complete Nickel-Cadmium Aircraft Batteries Operating and Maintenance Manual into Appendix C.	D. Kerr 6 August 2007	C. Timmins 7 August 2007	TCCA F. Eaves 23 August 2007	R. Manson 23 August 2007

NOTE: Revisions to this document will be distributed to operators of this equipment by the STC holder.

NOTE: Revised portions of affected pages are identified by a vertical black line in the margin adjacent to the change.

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RECORD OF REVISIONS

Rev.	Pages at this Revision	Description, Reason Changed Pages	Prepared (name and date)	Checked (name and date)	App'd/Acc'd (Civil A/W Authority) (name and date)	Released (name and date)
7	1 through 34	Relocation of relay 35P, and Fuse Holder Assembly. Addition of circuit breaker 102P at STN A1825 and of terminal block plate (TB.P) at tailboom disconnect to coincide with basic a/c configuration. Placards and markings revised. (Pages 4 to 6, 9 to 11, 13, 17, 18, 21 to 25, 27 to 32)	D. Kerr 26 February 2008	C. Timmins 26 February 2008	TCCA F. Eaves 27 February 2008	R. Manson 27 February 2008
8	1 through 34 A1 to A11	Appendix A revised to Revision J. Record of Revisions updated. (Page 4 and Appendix A)	D. Kerr 7 July 2008	C. Timmins 7 July 2008	TCCA F. Eaves 15 Juky 2008	R. Manson 20 July 2008
9	1 through 44 A to A11 B1 to B61	Incorporated AS 355 information into document. New tail boom ballast limits provided and corresponding placard. Wiring diagram revised for a/c with spotlight. Section 4, Inspection Schedule and Maintenance Action revised, 500 flight hours to 600 flight hours. New carbon fibre door available for tailboom. Weight and Balance chart revised. Removed Appendix C. (Pages 4 to 16 18 to 30, 32 to 44)	See page 1.	See page 1.	See page 1.	See page 1.

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CONTENTS

FIGURES

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FIGURES

TABLES

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1. GENERAL

A. The existing nickel cadmium battery (15 Ah) is removed from the RH cargo compartment and a high capacity nickel cadmium battery (22 Ah) or a lead-acid battery (28 Ah) is installed in the tail boom. This eliminates or reduces the need for tail boom ballast and increases the usable volume in the RH cargo compartment. The battery is mounted on a removable tray and is accessible through a cutout approximately 300 mm wide x 420 mm long (11.8 in. wide x 16.5 in. long) in the LH side of the tail boom skin between STN's A 1578 and A 2295. The cutout is locally reinforced by the addition of externally mounted sheet metal doublers. The battery can be accessed through a composite door attached to the tail boom with two hinges and secured with two latches. With this revision a new battery access door fabricated from carbon fibre is available. Refer to Figures 1 and 2.

The nickel cadmium, Saft 2376 battery type comes with a temperature sensor. The lead-acid, Concorde battery, part number RG-390E is a sealed, valve regulated battery. Refer to Figure 4.

This revision also highlights new tail boom ballast limits resulting from the introduction of the AS 350 B3 series helicopter with dual-hydraulic system (MOD OP 3346). The maximum allowable tail boom ballast for the AS 350 B3 dual-hydraulic only (POST MOD 07 3369) is 4.0 kg (8.8 lbs.). Refer to Figure 22.

Following a re-calculation, it is now possible to increase the tail boom ballast for the AS 350 and for AS 355 (all variants) (PRE MOD 07 3254) from 7.5 kg (16.5 lbs) to 9.8 kg (21.6 lbs). Refer to Figure 23 for the AS 350 and Figure 24 for the AS 355.

The Battery Relocation consists of the following main components:

Detachable Provisions

- Battery Tray Assembly (Refer to Figure 2)
- Battery (Refer to Figures 4 and 5)
- Battery Harness (Refer to Figure 2)
- Access Door (Refer to Figure 9)

Fixed Provisions

- Skin Doublers (Refer to Figure 2)
- Base (Refer to Figures 6, 7 and 8)
- LH and RH Frame (Refer to Figures 3 and 5)
- FWD and AFT Stiffener (Refer to Figures 6, 7 and 8)

Addition of a new circuit breaker on the AS 350 bracket located at STN A1825. Refer to Figure 3.

For AS 350 PRE AMS 07-3273 and 3274, the fuse holder assembly is located in the tailboom. Refer to Figure 6.

For AS 350 POST AMS 07-3273 and 3274, the fuse holder assembly is located on the battery tray. Refer to Figure 7.

For AS 355 the fuse holder assembly is located in the tailboom. Refer to Figure 8.

For AS 350 Harness routing in the tail boom for PRE AMS 07-3273 and 3274 refer to Figure 6. For AS 350 Harness routing in the tail boom for POST AMS 07-3273 and 3274 refer to Figure 7.For AS 355 Harness routing refer to Figure 8.

For instructions for initial installation, see IP-ECL-6.

B. These Instructions for Continued Airworthiness are applicable to aircraft with the subject modification embodied.

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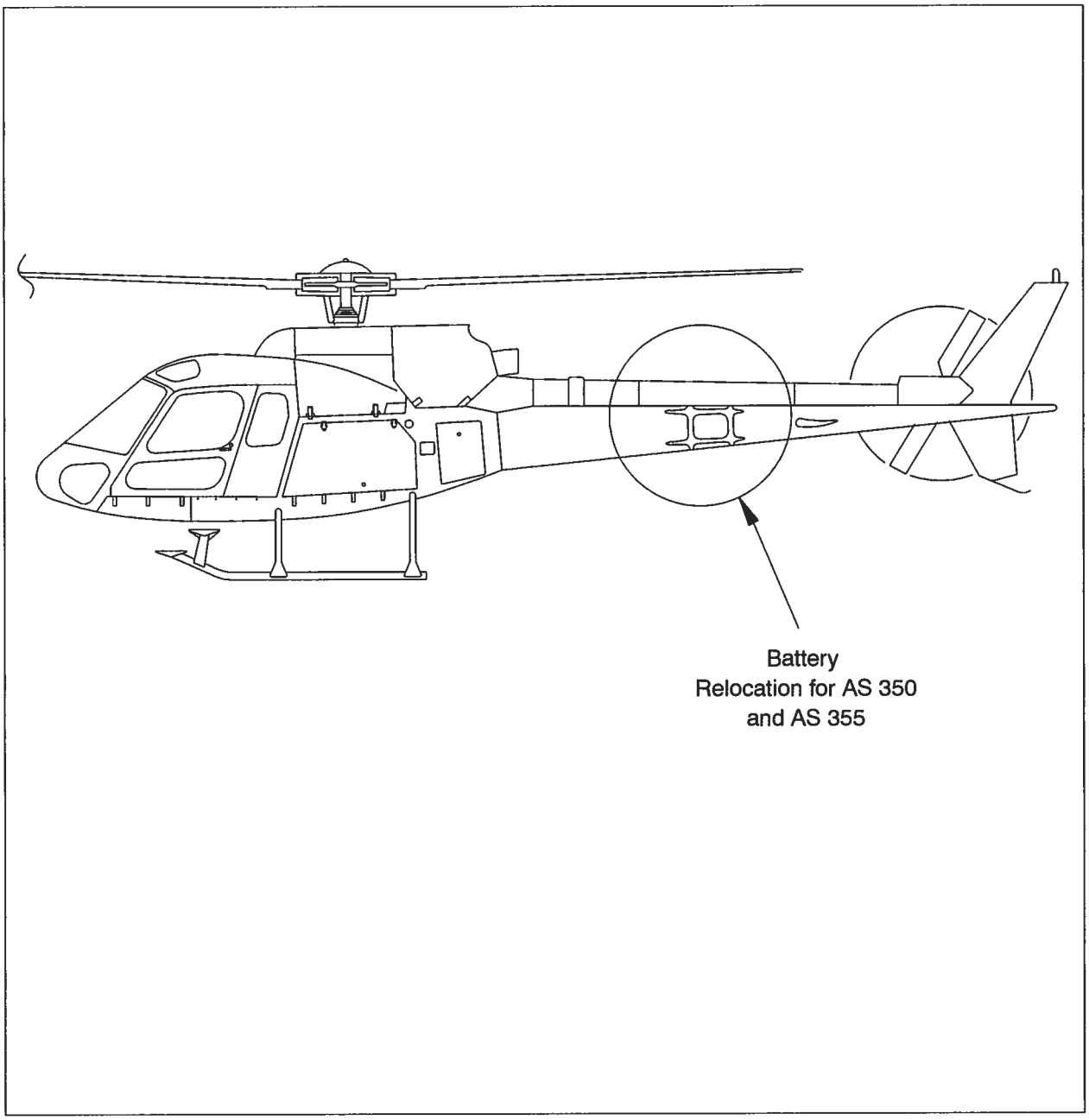

Figure 1 General Layout

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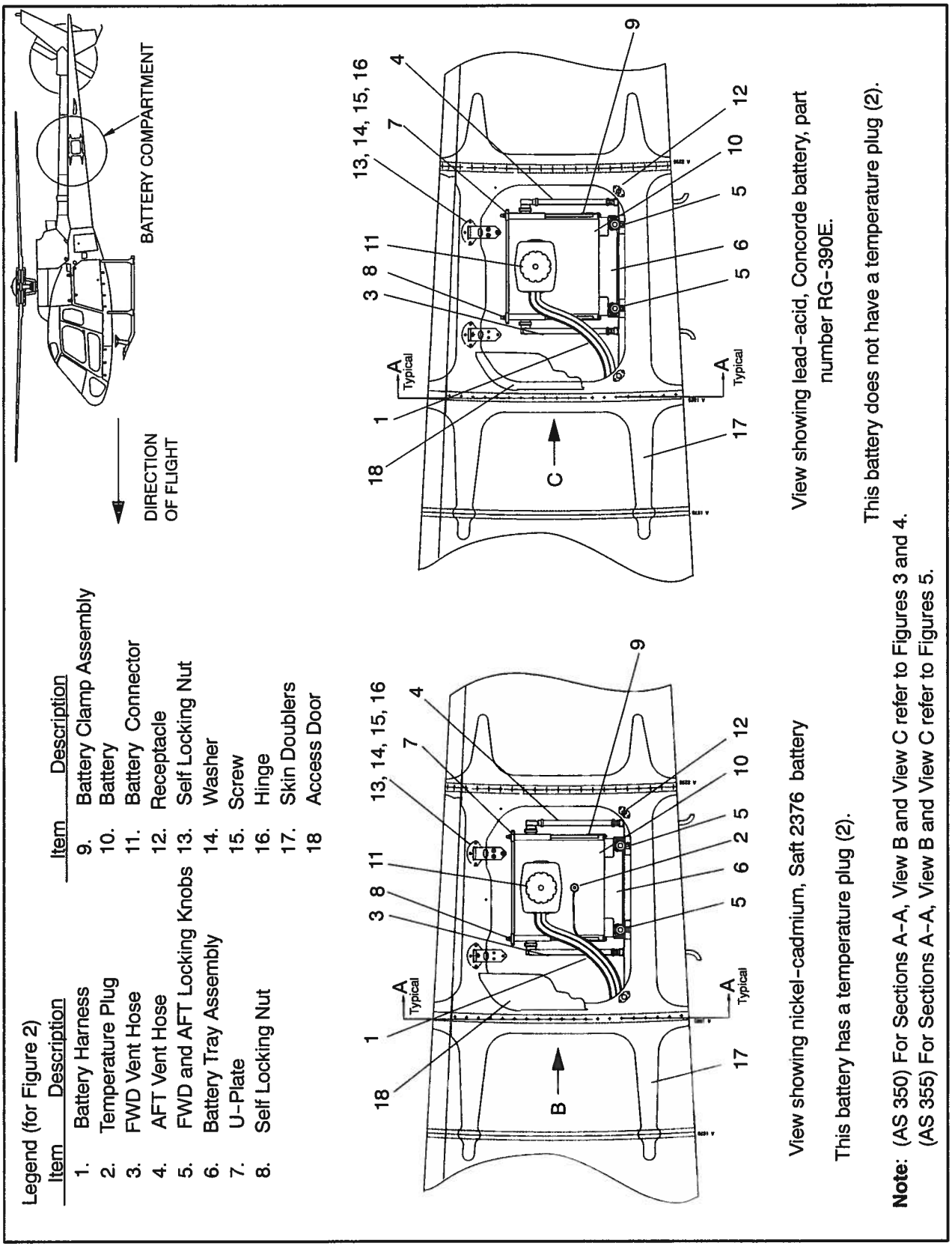

Figure 2 AS 350 and AS 355 Battery Compartment (main views)

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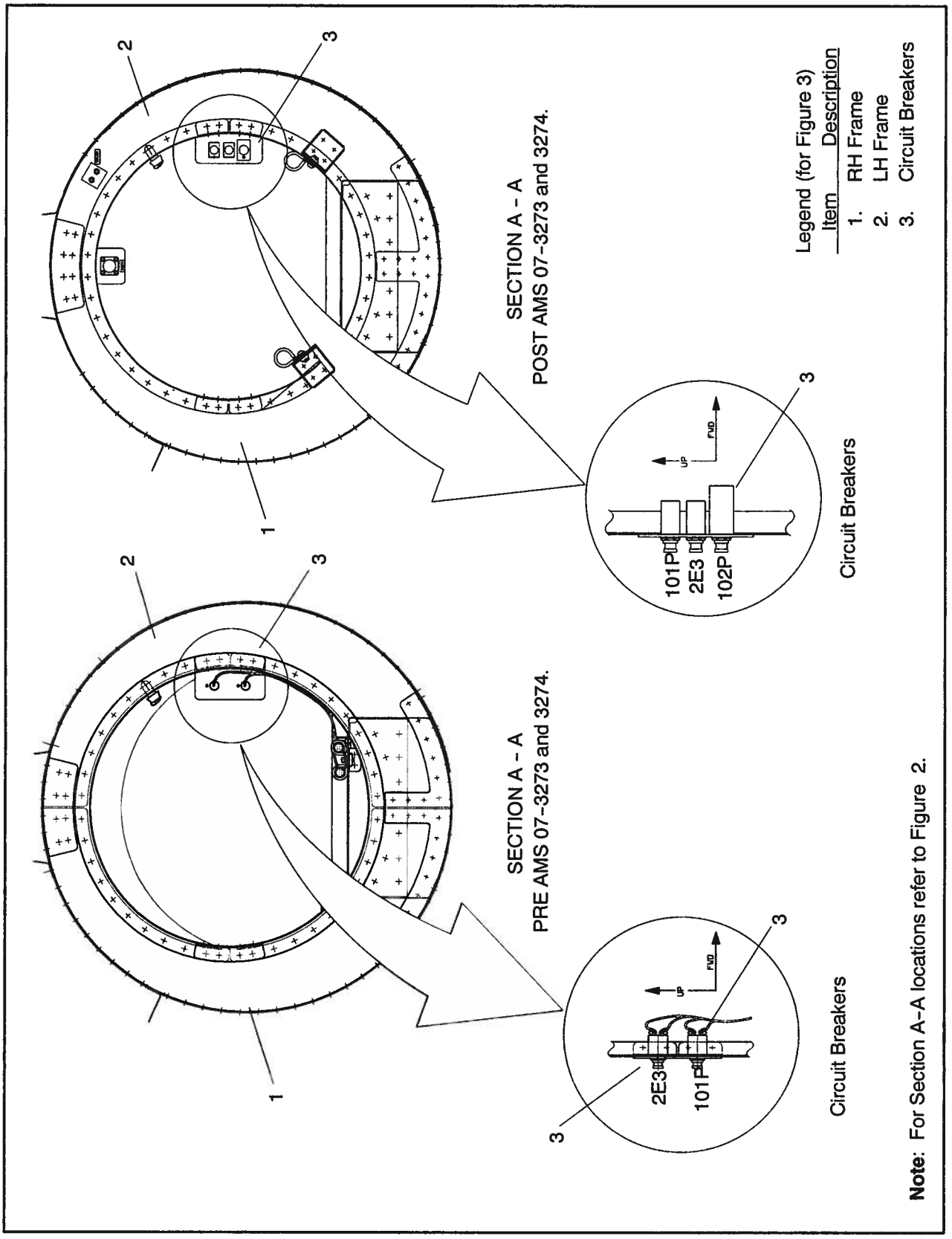

Figure 3 AS 350 Battery Compartment PRE and POST AMS 07-3273 and 3274 (detail views STN A 1825)

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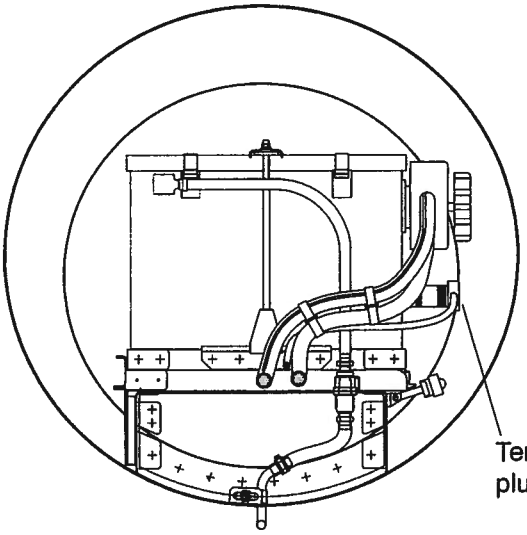
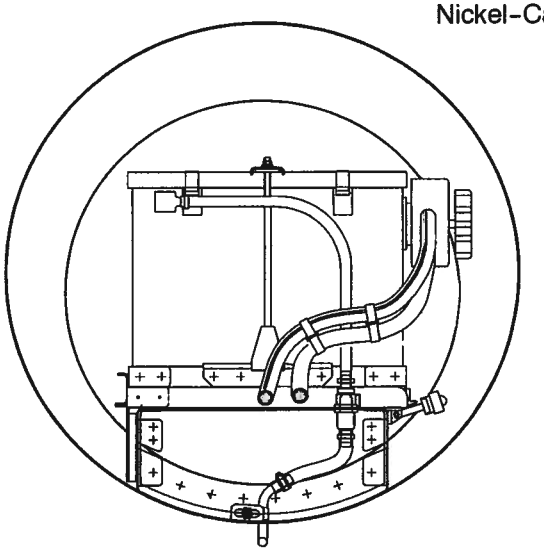


VIEW B
Nickel-Cadmium Battery



VIEW C
Lead-Acid Battery

Note: For VIEW B and VIEW C locations refer to Figure 2.

Figure 4 AS 350 Battery Compartment (detail views)

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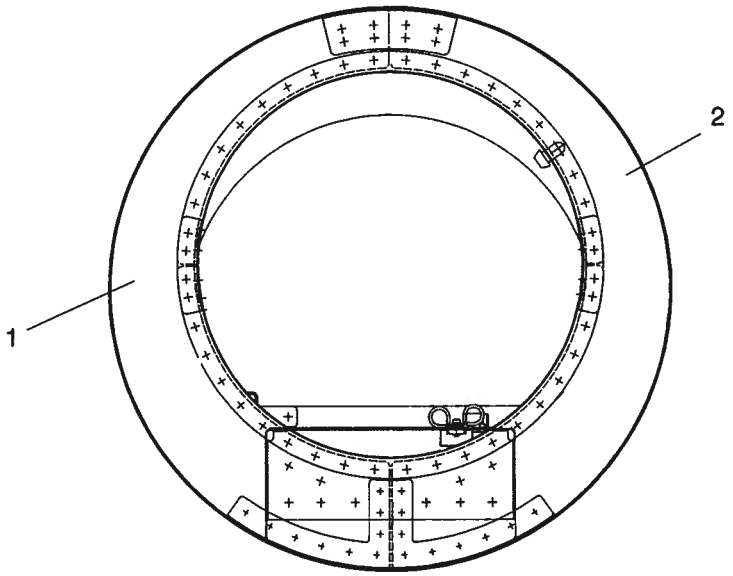
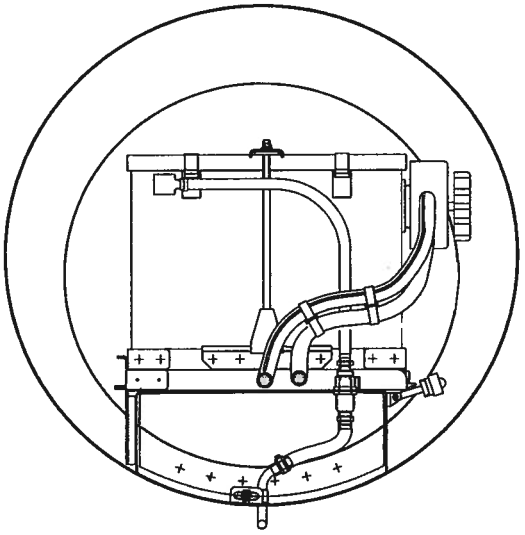
Legend (for Figure 5)

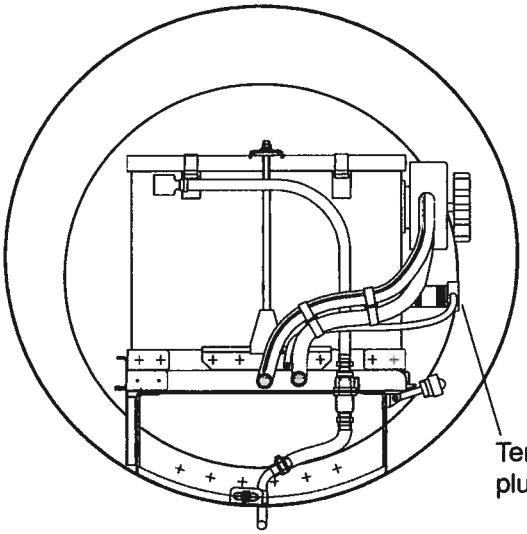
Item	Description
1.	RH Frame
2.	LH Frame



SECTION A - A
At STN A 1824



VIEW C
Lead-Acid Battery



VIEW B
Nickel-Cadmium Battery

Note: For Section A-A, VIEW B and VIEW C locations refer to Figure 2.

Figure 5 AS 355 Battery Compartment (detail views STN A 1825)

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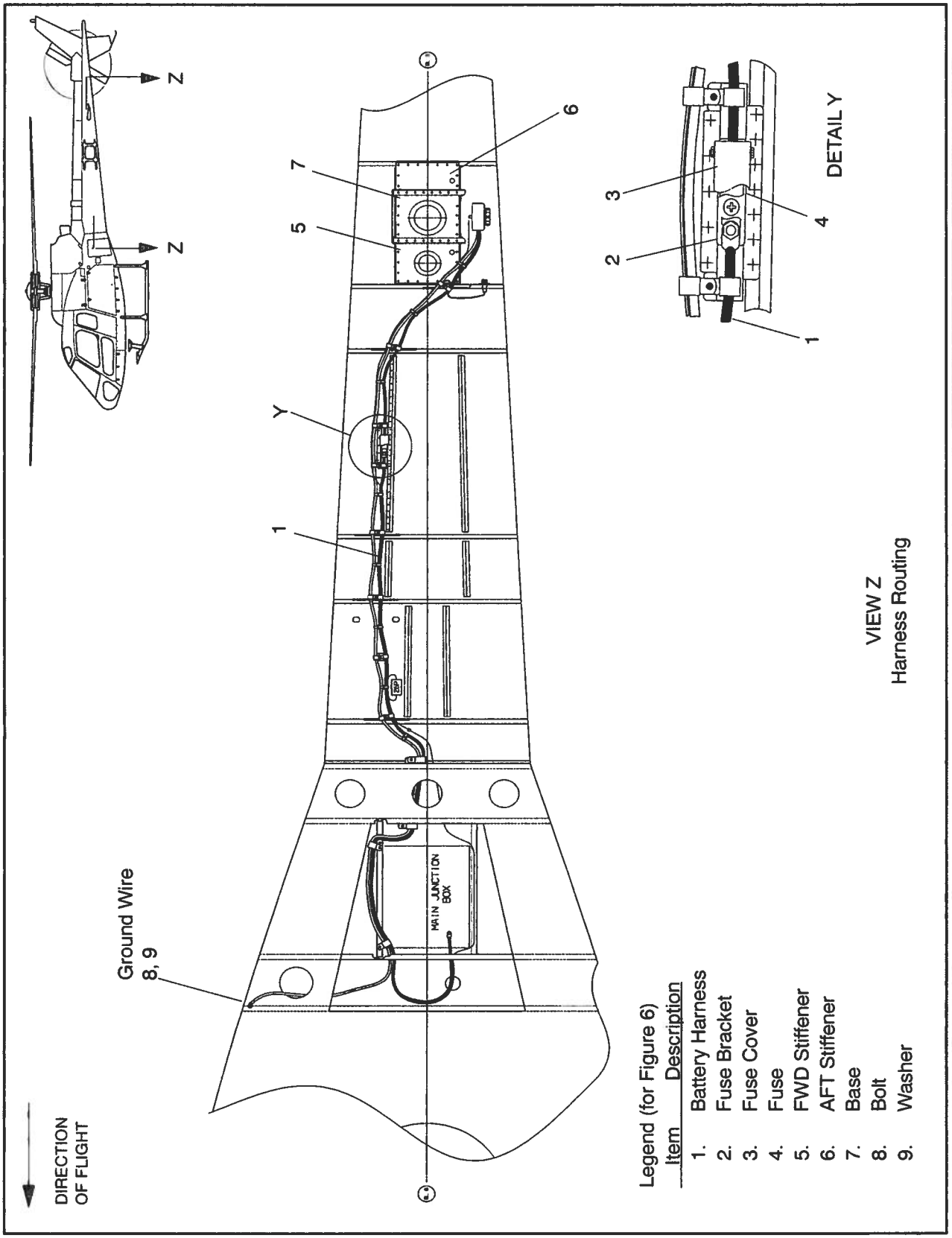

Figure 6 AS 350 Harness Routing - Tail Boom PRE AMS 07-3273 and 3274

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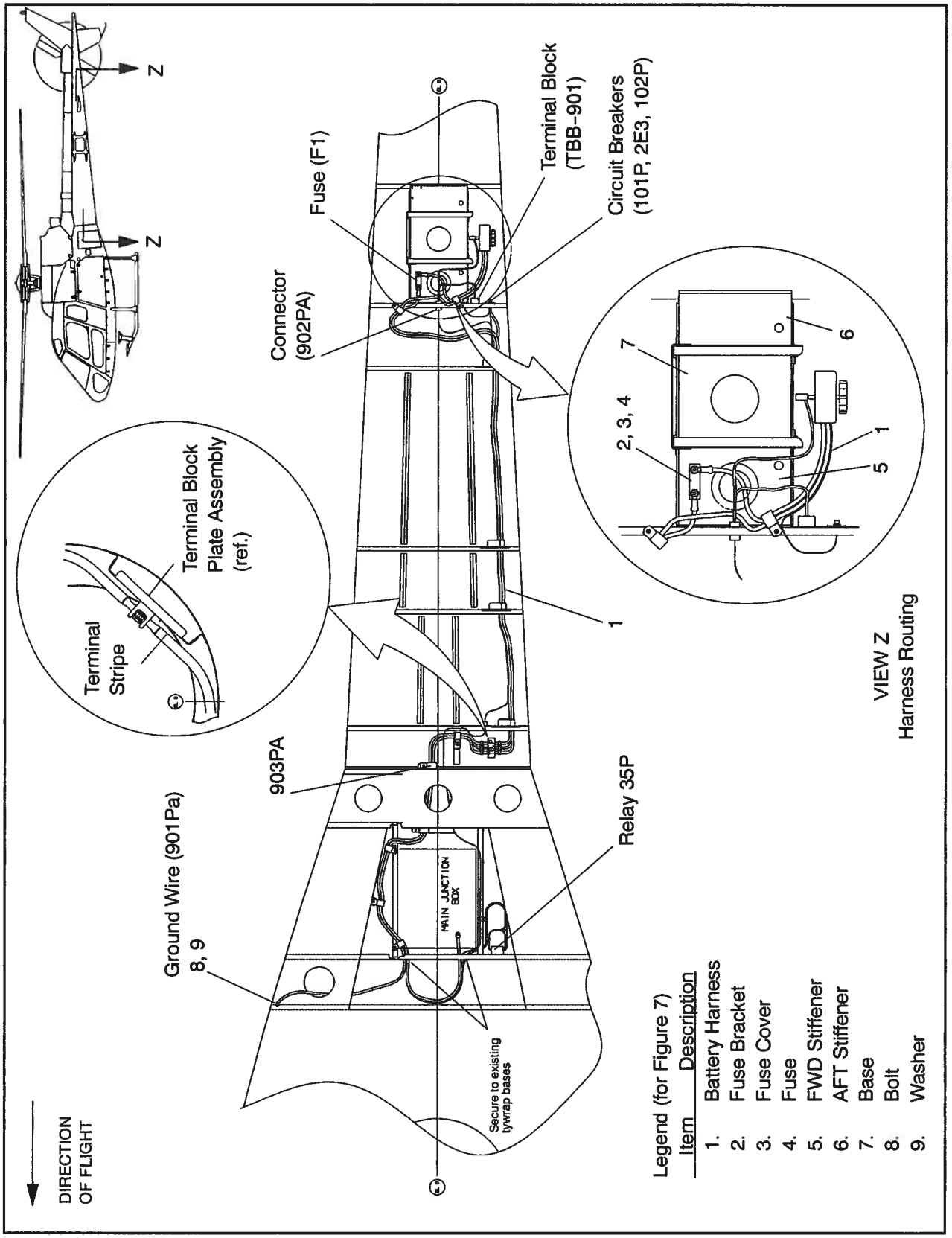

Figure 7 AS 350 Harness Routing - Tail Boom POST AMS 07-3273 and 3274

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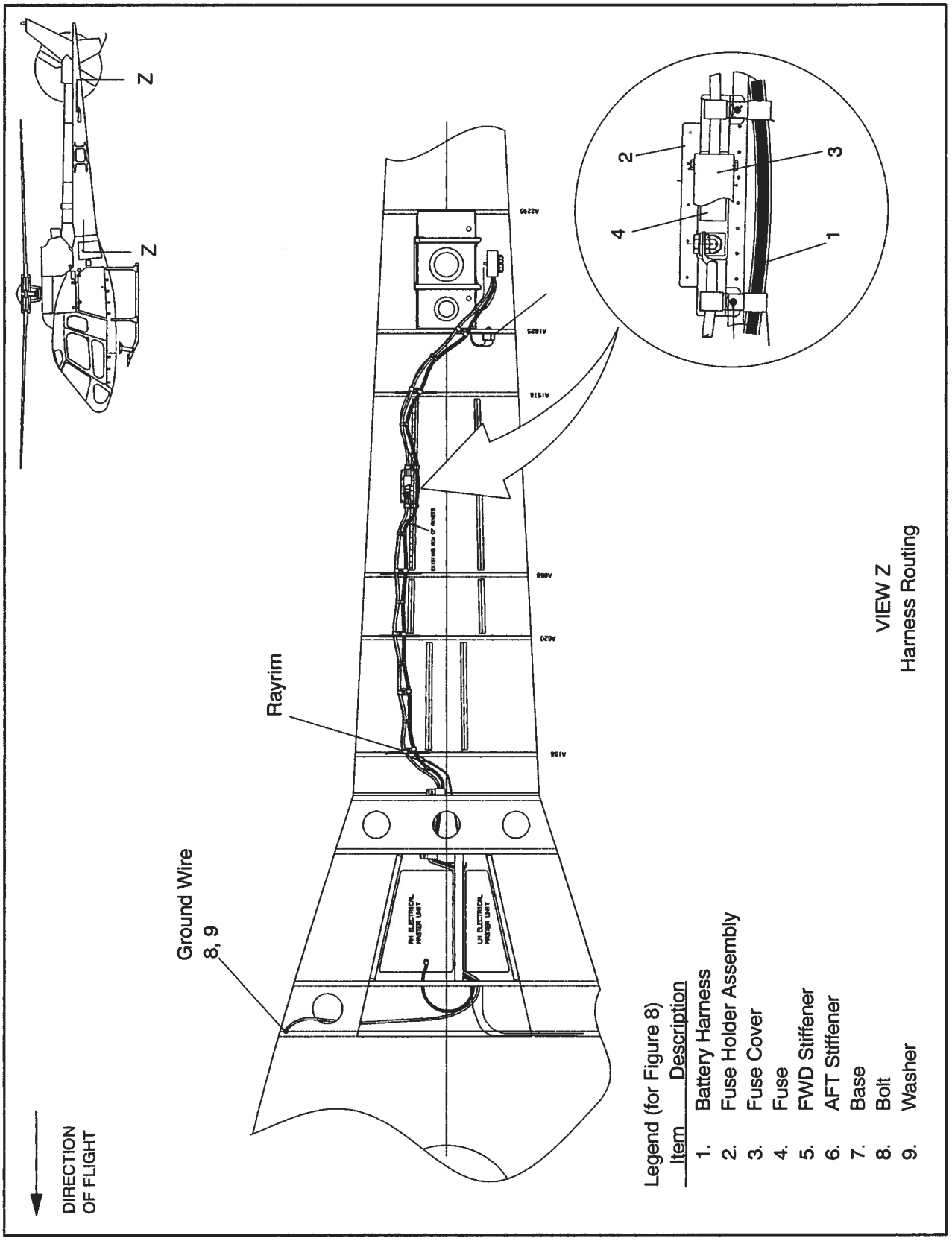

Figure 8 AS 355 Harness Routing - Tail Boom

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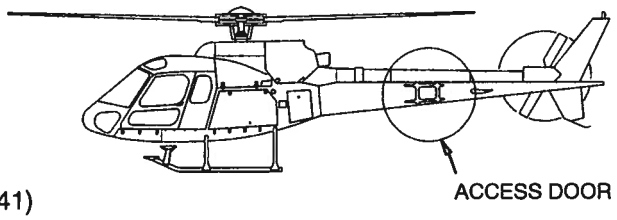
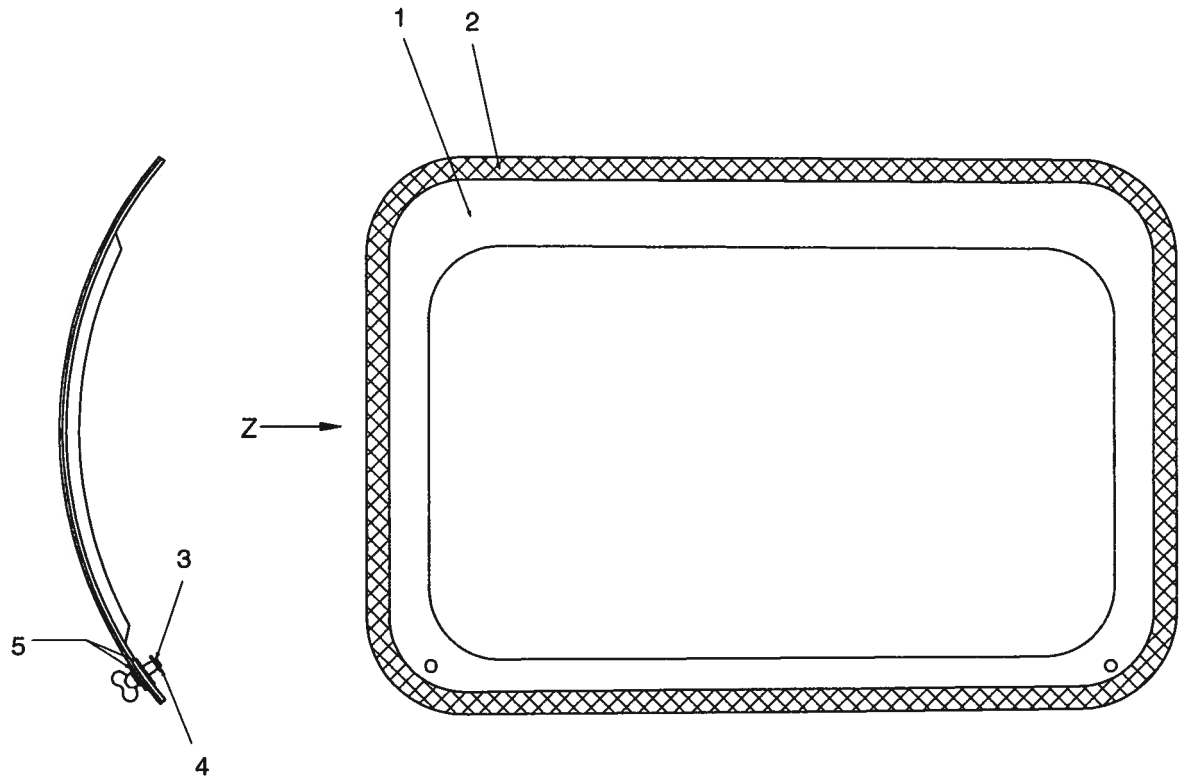


Legend (for Figure 9)

Item	Description
1.	Access Door
2.	Neoprene Closed Cell Sponge (P/N SC41)
3.	1/4 Turn Fastener
4.	Retaining Ring
5.	Plastic Washer (on newer version of the access door only)



VIEW Z

INSIDE VIEW LOOKING OUTWARDS

Figure 9 Access Door

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C. REFERENCES

DOCUMENT	DOCUMENT TITLE
AC-43.13 - 1B	Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair
AMS 07 3273	Avis de Modification Serie 07 3273 Option of Modification Series AMS 07 3273
AMS 07 3274	Avis de Modification Serie 07 3274 Option of Modification Series AMS 07 3274
IPC	Illustrated Parts Catalog
MET	Maintenance Manual
MOD OP 3346	Modification Optional Equipment 3346
MTC	Standard Practices Manual
MRR	Repair Manual
POST MOD 07 3369	POST Modification 07 3369
PRE MOD 07 3254	PRE Modification 07 3254
IP-ECL-6	Installation Procedure, Battery Relocation

D. ABBREVIATIONS & DEFINITIONS

ABBREVIATION	DEFINITION
Ah	Amphere hour
EC	Eurocopter (France)
ECL	Eurocopter Canada Limited
FWD	Forward
EXT PWR BAT	External Power Battery
BATT TEMP	Battery Temperature
P/N	Part Number
RH	Right-Hand
LH	Left-Hand
hrs	hours
Vol.	Volume
FAA	Federal Aviation Administration
T/B	Tail Boom
STN	Station

E. UNITS OF MEASUREMENT

ABBREVIATION / SYMBOL	UNIT OF MEASUREMENT
kg	kilogram
lb	pound
m	meter
mm	millimeters
in	inch

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2. AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is approved by the Minister and specifies maintenance required by any applicable airworthiness or operating rule unless an alternative program has been approved by the Minister.

No airworthiness limitations associated with this installation.

3. CONTROL AND OPERATION

Apart from the following, control and operation of the aircraft remains unchanged: if operating with the lead-acid battery, the aircraft "Batt Temp" warning light is inoperative on the Instrument Panel.

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4. INSPECTION SCHEDULE AND MAINTENANCE ACTION

CAUTION: PRIOR TO WORKING ON THE BATTERY OR BATTERY CIRCUIT ENSURE THAT THE AIRCRAFT ELECTRICAL SYSTEM IS NOT ENERGIZED.

For battery inspection schedule and functional test refer to the appropriate Manufacturer's instructions.

If operating with the lead-acid battery Concorde Battery Corporation Series RG-390E, refer to the Instructions for Continued Airworthiness, Concorde Valve Regulated Lead-Acid Main Battery (Appendix A).

If operating with the nickel-cadmium battery SAFT 2376 Series, refer to the SAFT Component Maintenance Manual with Illustrated Parts List (Appendix B). Also, refer to the SAFT Nickel-Cadmium Aircraft Batteries Operating and Maintenance Manual. See Section 5 of this document for more information.

NOTE: Use torque per EC, MTC, Volume 2, Chapter 20.02.05.404, unless otherwise specified.

4.1. INSPECTION SCHEDULE

4.1.1. Before the first flight of each day:

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
A	- Visually inspect battery connector, item 11 in Figure 2 for: a. security	 a. Secure as required.

Table 1 Inspection Schedule and Maintenance Action
Before the first flight of each day

4.1.2. Every three months:

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
A	- Perform routine maintenance in accordance with the battery manufacturers recommendations.	For more information contact Saft for the SAFT Nickel-Cadmium Aircraft Batteries Operating and Maintenance Manual.

Table 2 Inspection Schedule and Maintenance Action
Every three months

4.1.3. Every six months:

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
A	- Perform routine maintenance in accordance with the battery manufacturers recommendations.	For more information contact Saft for the SAFT Nickel-Cadmium Aircraft Batteries Operating and Maintenance Manual.

Table 3 Inspection Schedule and Maintenance Action
Every six months

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INSPECTION SCHEDULE AND MAINTENANCE ACTION (continued)

4.1.4. Every 100 flight hrs or 12 months (to coincide with the 100 hrs or 12 months helicopter inspection):

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
A	- Perform routine maintenance in accordance with the battery manufacturers recommendations.	For more information contact Saft for the SAFT Nickel-Cadmium Aircraft Batteries Operating and Maintenance Manual.
B	- Visually inspect battery connector, item 11 in Figure 2 for: a. general condition	 a. Contact ECL for replacement parts.
C	- Visually check battery compartment, view shown in Figure 2 for: a. spilled electrolyte and alkaline deposits	 a. Remove battery and neutralize spills as required in accordance with AC43.13-1B, Chapter 11-20.
D	- Check FWD vent hose, item 3 and AFT vent hose, item 4 in Figure 2 for: a. clogging and kinking b. cracking	 a. Clean and adjust as required. b. No cracking is allowed. If cracking is found, contact ECL for replacement parts.
E	- Check battery tray assembly, item 6 in Figure 2 for: a. security	 a. Re-tighten as required.
F	- Visually inspect battery tray assembly, item 6 in Figure 2 for: a. cracks and deformation b. corrosion c. scoring	 a. No cracks or deformation are allowed. If cracks or deformation are found, contact ECL for replacement parts. b. No corrosion is allowed. If corrosion is found, contact ECL for replacement parts. c. No scoring is allowed. If scoring is found, contact ECL for replacement parts.

Table 4 Inspection Schedule and Maintenance Action
Every 100 flight hrs or 12 months
(continued on following page)

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INSPECTION SCHEDULE AND MAINTENANCE ACTION (continued)

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
G	- Visually inspect U-plate, item 7, and battery clamp assembly, item 9 in Figure 2 for:	
	a. cracks or deformation	a. No cracks or deformation are allowed. If cracks or deformation are found, contact ECL for replacement parts.
	b. corrosion	b. No corrosion is allowed. If corrosion is found, contact ECL for replacement parts.
	c. scoring	c. No scoring is allowed. If scoring is found, contact ECL for replacement parts.
H	- Visually inspect mounting hardware, self-locking nuts, item 8 and FWD and AFT locking knobs, item 5 in Figure 2 for:	
	a. security	a. Re-tighten as required.
	b. corrosion	b. No corrosion is allowed. If corrosion is found, contact ECL for replacement parts.
	c. scoring	c. No scoring is allowed. If scoring is found, contact ECL for replacement parts.
I	- Visually inspect access door mounting hardware, items 12, 13, 14, 15, and 16 in Figure 2 for:	
	a. security	a. Re-tighten as required.
	b. corrosion	b. No corrosion is allowed. If corrosion is found, contact ECL for replacement parts.
	c. scoring	c. No scoring is allowed. If scoring is found, contact ECL for replacement parts.

Table 4 Inspection Schedule and Maintenance Action
Every 100 flight hrs or 12 months
(continued on following page)

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INSPECTION SCHEDULE AND MAINTENANCE ACTION (continued)

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
J	- Visually inspect skin doublers, item 17 in Figure 2, and the tail boom skin in the area of the cutout for:	
	a. scratches	a. No scratches exceeding 0.004 inches (0.1 mm) deep and 1.18 inches (30 mm) long are allowed. If scratches are found within tolerance, repairs may be accomplished with EC, MTC, Vol. 3, Chapter 20.03.05.402. For scratches found outside tolerance, contact ECL for replacement parts.
	b. cracks	b. No cracks exceeding 0.60 inches (15 mm) long are allowed. If cracks are found, repairs may be accomplished with EC, MTC, Vol. 3, Chapter 20.03.05.404. For cracks found outside tolerance, contact ECL for replacement parts.
	c. perforation	c. No perforation exceeding 0.12 inches (3 mm) diameter is allowed. If perforation is found, drill to a diameter of 0.20 inches (5 mm) in order to remove any developing cracks; deburr carefully. For perforation found outside tolerance, contact ECL for replacement parts.
	d. skin deformation	d. No skin deformation allowed. If skin deformation is found, contact ECL.
	e. corrosion	e. No corrosion exceeding a maximum depth of 10% of the sheet metal thickness after corrosion removal is allowed. If corrosion is found, repairs may be accomplished with EC, MTC, Vol. 3, Chapter 20.04.03.401. For corrosion found outside tolerance, contact ECL for replacement parts.

Table 4 Inspection Schedule and Maintenance Action
Every 100 flight hrs or 12 months
(continued on following page)

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INSPECTION SCHEDULE AND MAINTENANCE ACTION (continued)

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
K	- If lead-acid, Concorde battery, part number RG-390E battery is installed, VIEW C in Figure 3, inspect as per Instructions for Continued Airworthiness, Concorde Valve Regulated Lead-Acid Battery.	Refer to the Concorde Instructions for Continued Airworthiness, Appendix A.
L	- Visually inspect circuit breakers, item 3, in Figure 4 for:	
	a. secure mounting	a. Secure as required.
	b. general condition (physical damage)	b. Contact ECL for replacement parts.
M	- Visually inspect Battery Harness, item 1 in Figures 6, 7 and 8 for:	
	a. cracks, fraying and burns	a. Contact ECL for replacement parts.
	b. loose connections	b. Re-tighten as required
	c. security	c. Re-tighten as required.
N	- Visually inspect access door seal, item 2 , in Figure 9, for:	
	a. cuts or cracking	a. If cuts or cracking is evident, contact ECL for replacements parts.
	b. debonding or loss of elasticity	b. If debonding or loss of elasticity is evident, contact ECL for replacement parts.
O	- Check access door latching hardware, items 3, 4 and 5 in Figure 9 for:	
	a. proper latching	a. Check for freedom of movement
P	- Visually inspect access door, item 1, in Figure 9 for:	
	a. cracking, depression, delamination or a hole	a. No cracking, depression, delamination or holes allowed. Contact ECL for repair information.
Q	- Check placards and markings (refer to Section 10) for:	
	a. legibility	a. If placard has become illegible, contact ECL for replacement parts.
	b. secure mounting	b. Secure or reattach placards as required.

Table 4 Inspection Schedule and Maintenance Action
Every 100 flight hrs or 12 months

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INSPECTION SCHEDULE AND MAINTENANCE ACTION (continued)

4.1.5. Every 600 flight hrs or 24 months (to coincide with the 600 hrs or 24 months helicopter inspection):

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
A	- If nickel-cadmium, Saft 2376 battery type is installed, VIEW B in Figure 4, check temperature sensor harness connection and condition, check "BATT TEMP" warning light on warning caution panel.	Check battery temperature sensor in accordance with EC, MET, Volume 2, Chapter 24.30.00.502.
B	- Visually inspect battery ground wire hardwre, items 8 and 9 in Figures 6, 7 and 8 for: a. security b. corrosion	 a. Secure as required. b. No corrosion is allowed. If corrosion is found, contact vendor for replacement parts.

Table 5 Inspection Schedule and Maintenance Action
Every 600 flight hrs or 24 months

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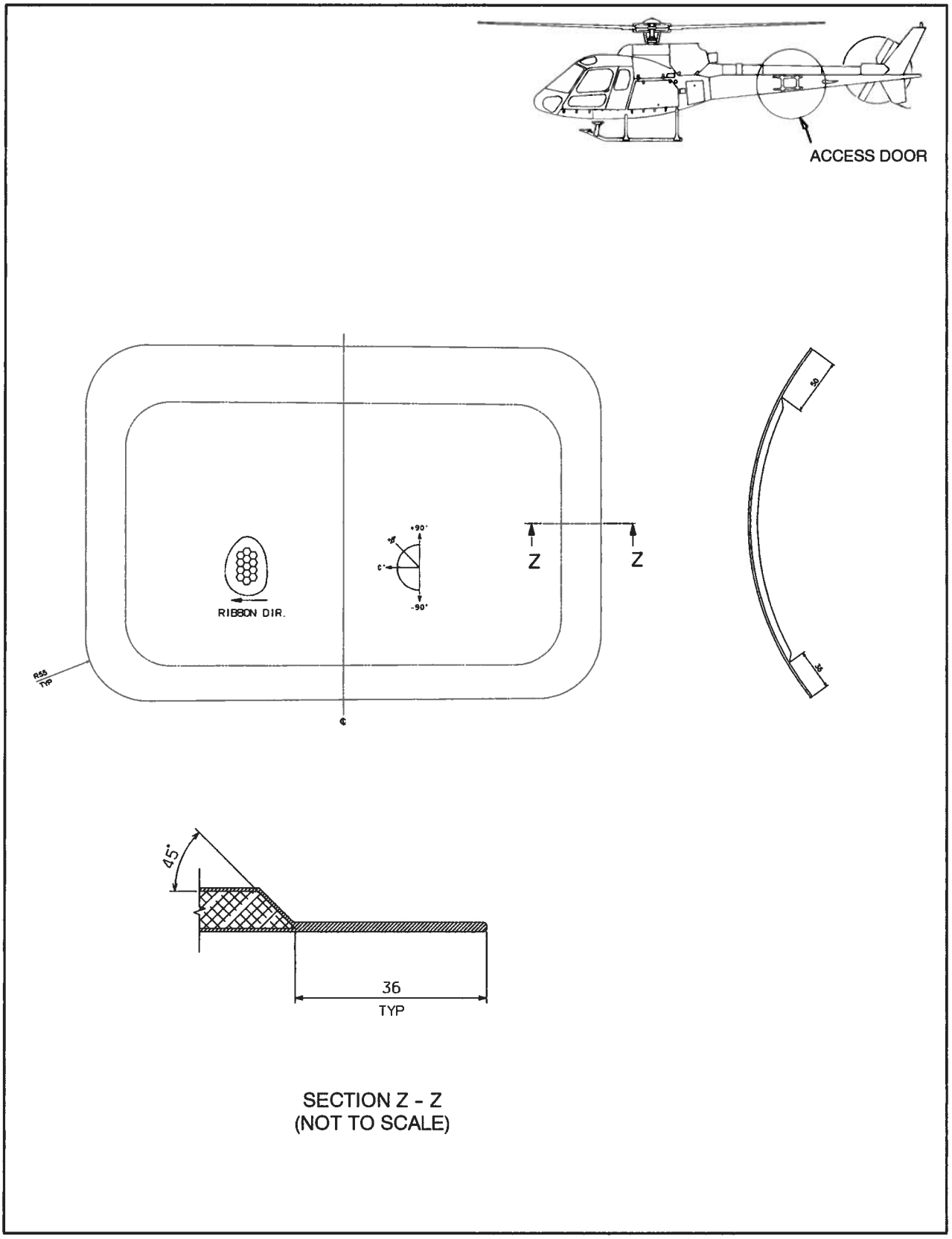

Figure 10 Access Door - Composite Layup

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5. REPLACEMENT COMPONENTS AND REPAIR / OVERHAUL INFORMATION

For overhaul requirements on the Lead-Acid Concorde Battery, refer to the Instructions for Continued Airworthiness, Concorde Valve Regulated Lead-Acid Main Battery.

CAUTION DO NOT REPAIR OR OVERHAUL THE SAFT BATTERY. CONTACT SAFT FOR INFORMATION ON COMPONENT MAINTENANCE OR REPAIR

For replacement components and repair / overhaul information of the nickel-cadmium battery SAFT P/N F6177 Series contact:

Saft
12, rue Sadi Carnot
93170 Bagnolet - France
Telephone: +33 (0) 1 49 93 19 18
Fax: +33 (0) 1 49 93 19 56

Website: www.saftbatteries.com

6. TROUBLESHOOTING

There are no unique characteristics which require special troubleshooting techniques; standard techniques are adequate.

For electrical system troubleshooting for the AS 350, refer to Figures 11, 12 and 13, Battery Relocation, Wiring Diagram.

For electrical system troubleshooting for the AS 355, refer to Figure 14, Battery Relocation, Wiring Diagram.

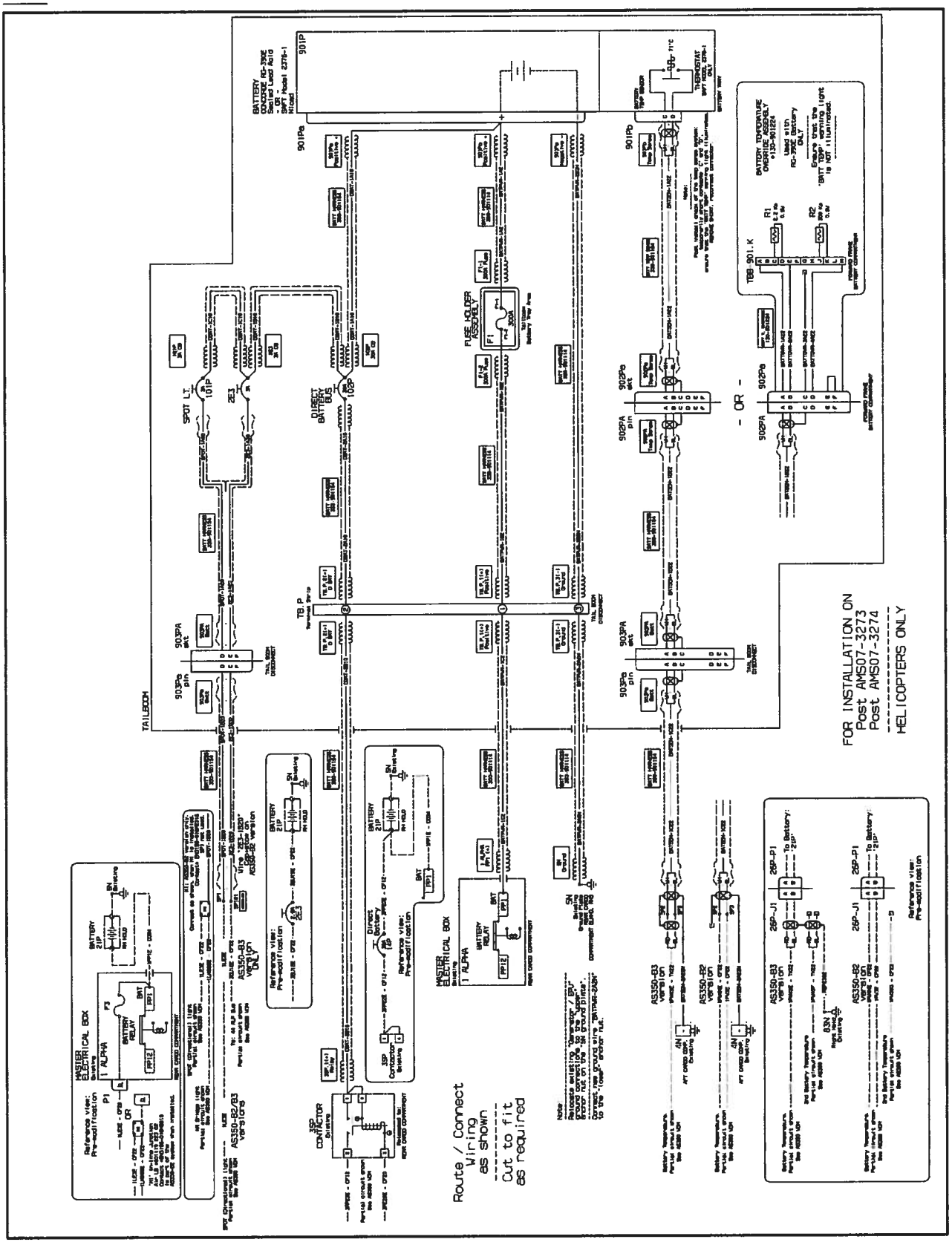

Figure 11 AS 350 Battery Relocation, Wiring Diagram (Sheet 1 of 4)

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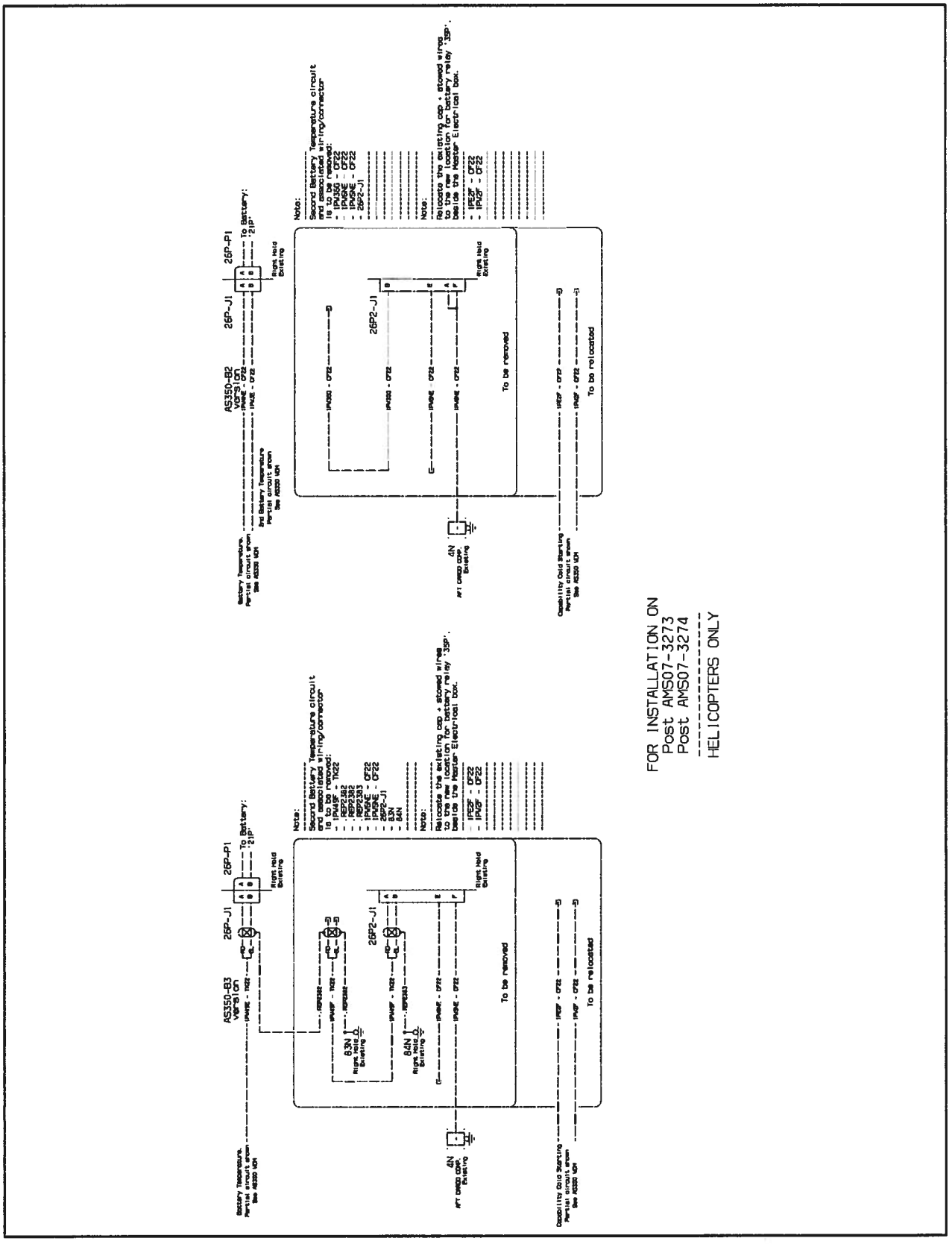

Figure 12 AS 350 Battery Relocation, Wiring Diagram (Sheet 2 of 4)

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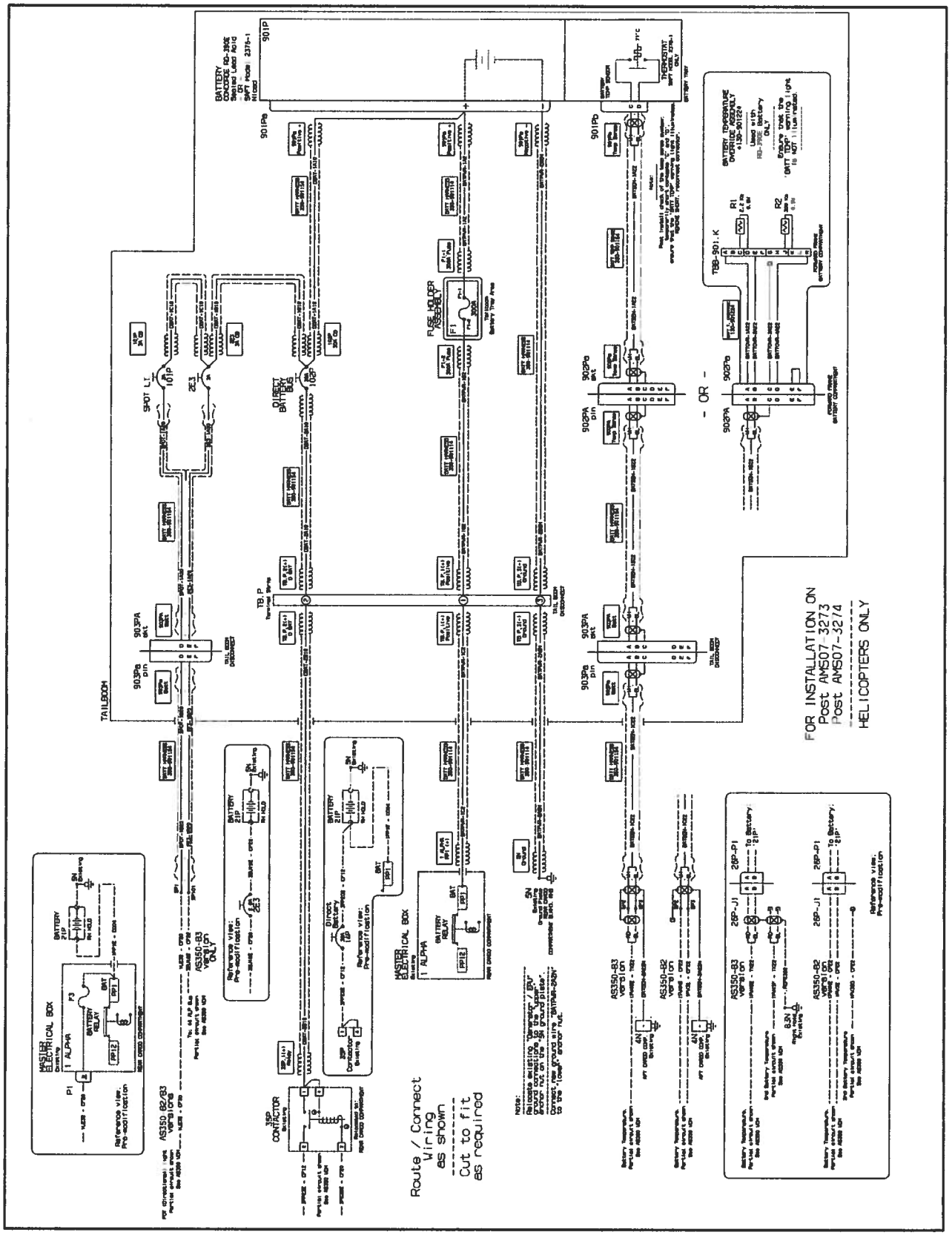

Figure 13 AS 350 Battery Relocation, Wiring Diagram (Sheet 3 of 4)

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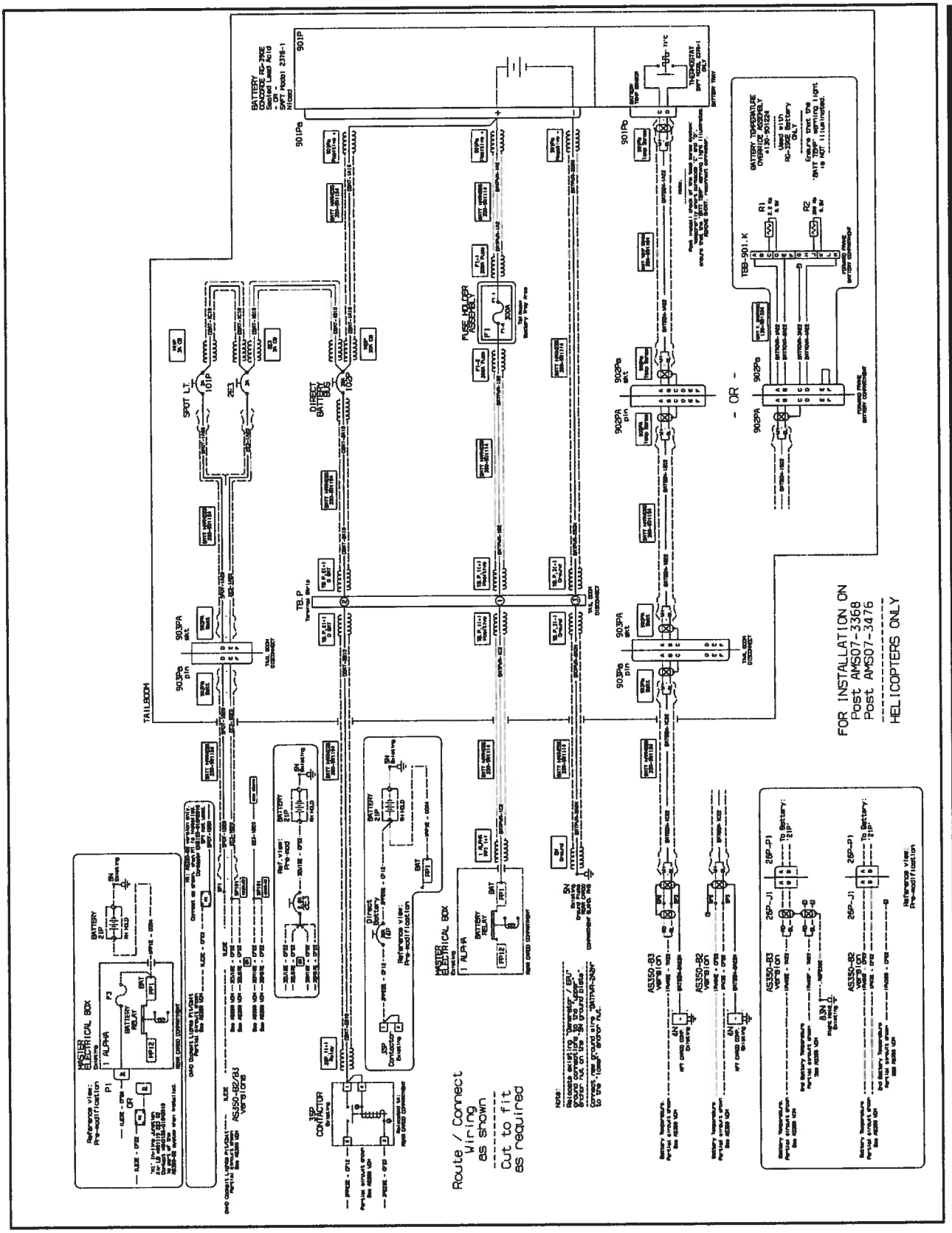

Figure 14 AS 350 Battery Relocation, Wiring Diagram (Sheet 4 of 4)

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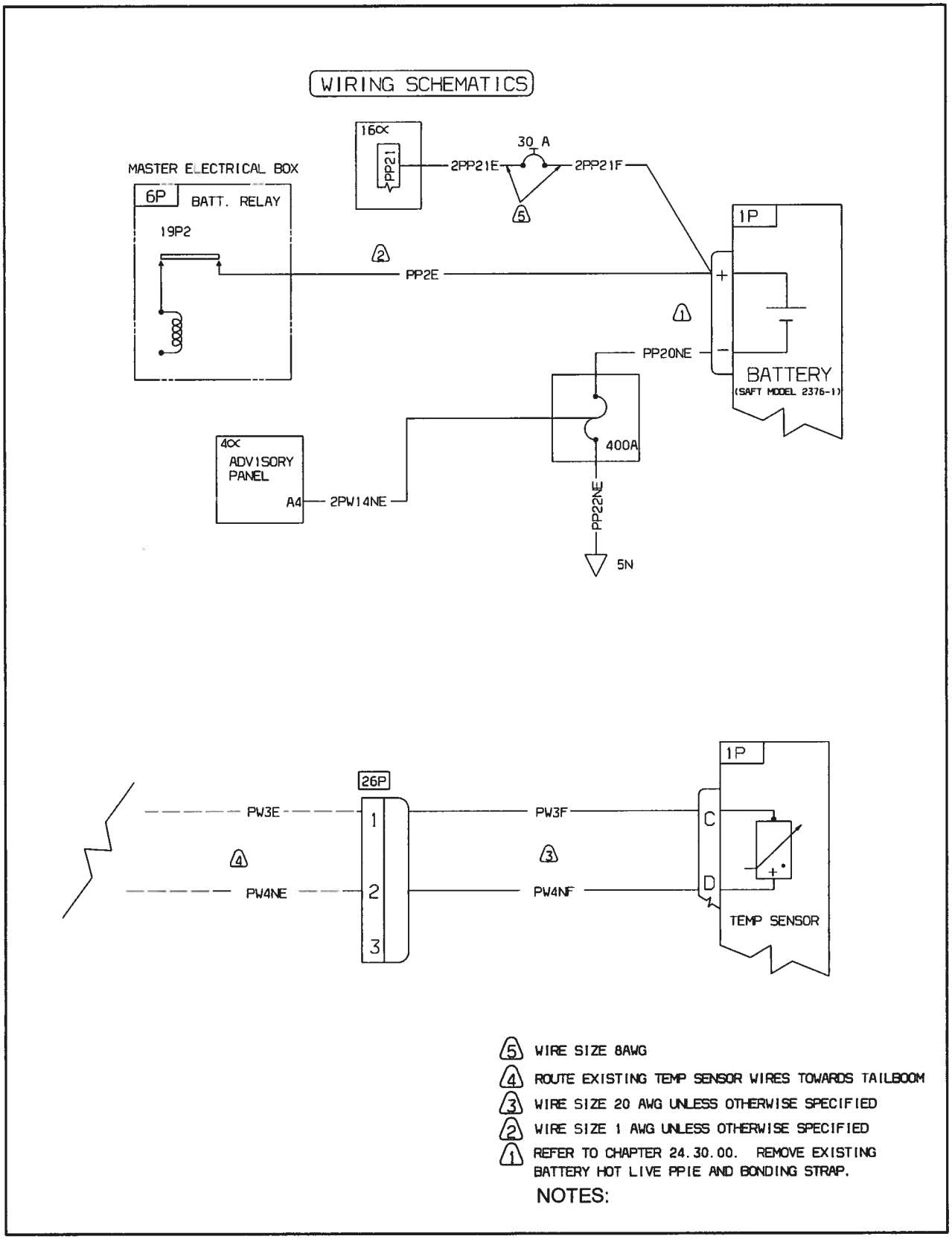

Figure 15 AS 355 Battery Relocation, Wiring Diagram

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7. SPECIAL TOOLING

No special test equipment or tools are required. Standard tools are adequate.

8. REMOVAL AND REPLACEMENT

Proceed as follows if any of these items need to be removed.

Refer to Figure 2 for component removal and replacement.

Preliminaries

- set "EXT PWR BAT" push-button to "OFF" position

- disconnect the external power unit

A. REMOVAL

1) Battery

a) Open battery compartment door located in tail boom LH side by releasing the camlocks.

b) Disconnect battery harness (1) and temperature plug (2, used only if nickel-cadmium battery is installed).

c) Disconnect FWD and AFT vent hoses (3 and 4) from the quick connection on the battery base.

d) Loosen both FWD and AFT locking knobs (5) on the battery tray assembly (6).

e) Carefully slide the battery tray assembly (6) out of the tail boom.

f) Remove u-plate (7) by loosening the self locking nut (8) and remove the battery clamp assembly (9).

g) Carefully remove battery (10) from battery tray assembly (6).

B. REPLACEMENT

NOTE Use torque per EC, MTC, Volume 2, Chapter 20.02.05.404, unless otherwise specified.

1) Battery

a) Carefully place battery (10) on battery tray assembly (6) and ensure correct seating.

b) Slide battery tray assembly (6) into position and secure with the two locking knobs (5).

c) Install the battery clamp assembly (9) and secure by sliding the u-plate (7) down until it meets the battery (10) and secure using the self locking nut (8).

d) Connect battery harness (1) and battery temperature plug (2, used only if nickel-cadmium battery is installed)

e) Connect FWD and AFT vent hoses (3 and 4) to the quick connect on the battery base.

f) Perform functional test in accordance with MET, Volume 2, Chapter 24.30.00.501.

g) Close battery compartment door and secure door camlocks.

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9. WEIGHT AND BALANCE DATA

Lead Acid Battery (Concorde) Installation

A. Removed Items

DESCRIPTION	WEIGHT		ARM		MOMENT	
	kg	lbs	m	in	kg m	lb in
Battery	-15.00	-33.1	3.85	151.6	-57.75	-5018.0
Tray	-2.00	-4.4	3.85	151.6	-7.70	-667.0
Total	-17.00	-37.5	3.85	151.6	-65.45	-5685.0

B. Added Items

DESCRIPTION	WEIGHT		ARM		MOMENT	
	kg	lbs	m	in	kg m	lb in
Lead Acid Battery (Concorde)	28.12	62.0	7.15	281.5	201.06	17453.0
Tray	16.00	35.3	7.15	281.5	114.40	9937.0
Total	44.12	97.3	7.15	281.5	315.46	27390.0

Nickel-Cadmium Battery (SAFT) Installation

A. Removed Items

DESCRIPTION	WEIGHT		ARM		MOMENT	
	kg	lbs	m	in	kg m	lb in
Battery	-15.00	-33.1	3.85	151.6	-57.75	-5018.0
Tray	-2.00	-4.4	3.85	151.6	-7.70	-667.0
Total	-17.00	-37.5	3.85	151.6	-65.45	-5685.0

B. Added Items

DESCRIPTION	WEIGHT		ARM		MOMENT	
	kg	lbs	m	in	kg m	lb in
Nickel-Cadmium Battery (SAFT)	25.00	55.1	7.15	281.5	178.75	15510.7
Tray	16.00	35.3	7.15	281.5	114.40	9937.0
Total	41.00	90.4	7.15	281.5	293.15	25447.6

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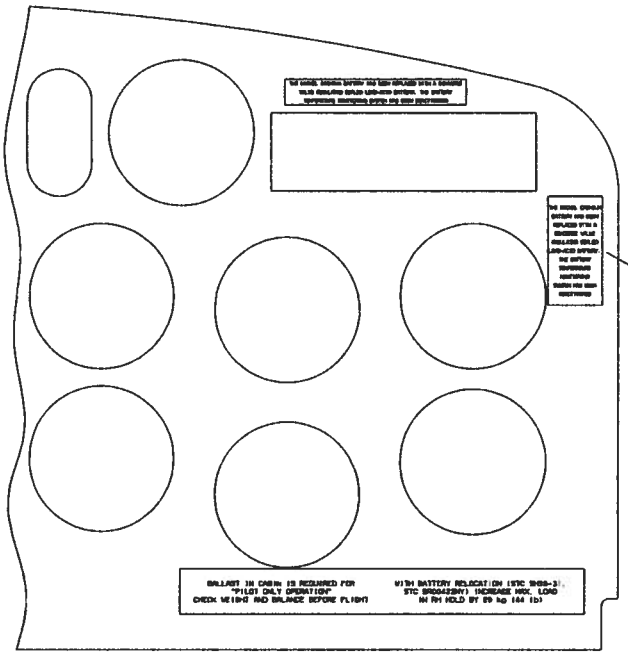
10. PLACARDS AND MARKINGS



THE NICKEL CADMIUM BATTERY HAS BEEN REPLACED WITH A CONCORDE VALVE REGULATED SEALED LEAD-ACID BATTERY. THE BATTERY TEMPERATURE MONITORING SYSTEM HAS BEEN DEACTIVATED.

NOTE: For the AS 350 B2/B3 RH Pilot shown, LH Pilot similar/opposite

Figure 16 Placard location on typical AS 350 Instrument Panel for RH Pilot Configuration (Lead-Acid Battery only)

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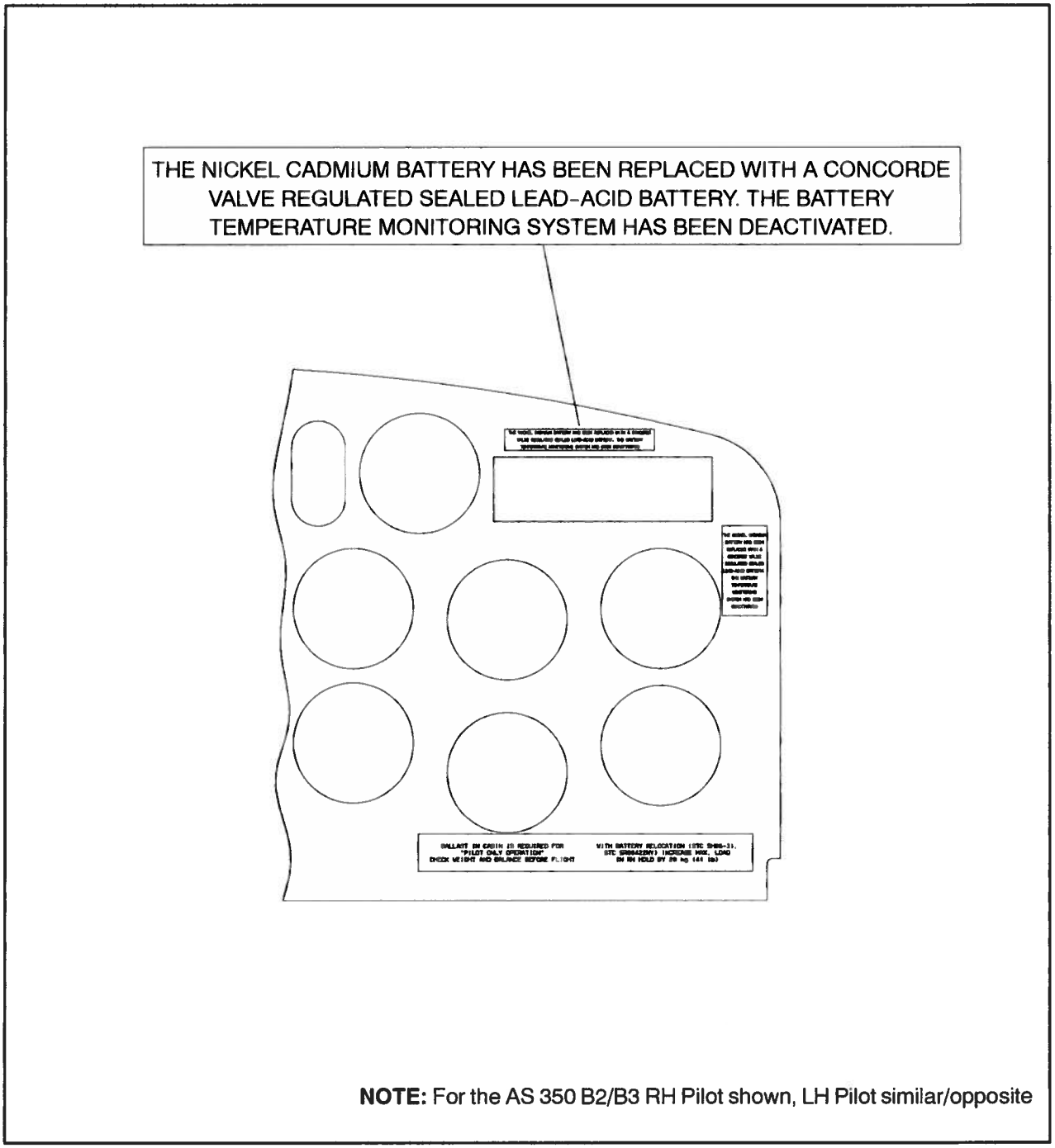
10. **PLACARDS AND MARKINGS** (continued)



NOTE: For the AS 350 B2/B3 RH Pilot shown, LH Pilot similar/opposite

Figure 17 Placard location on typical AS 350 Instrument Panel (Lead-Acid Battery only) RH Pilot configuration

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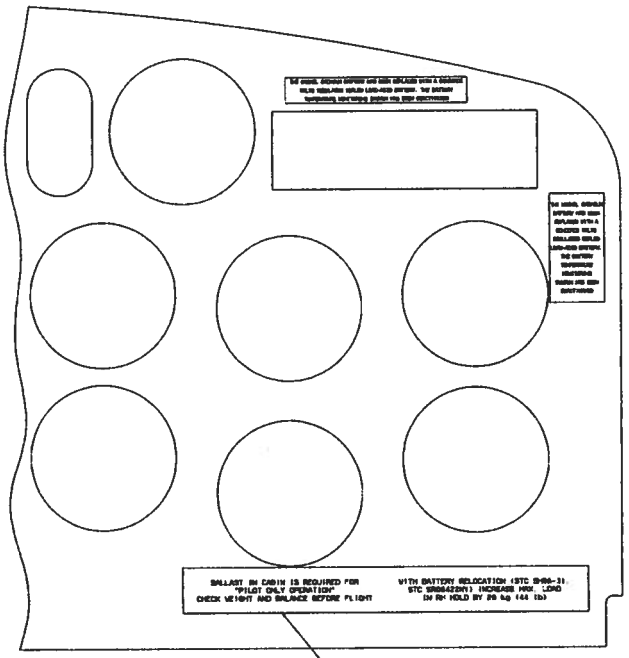
10. **PLACARDS AND MARKINGS** (continued)



BALLAST IN CABIN IS REQUIRED FOR "PILOT ONLY OPERATION" CHECK WEIGHT AND BALANCE BEFORE FLIGHT	WITH BATTERY RELOCATION (STC SH96-31, STC SR00422NY) INCREASE MAX. LOAD IN RH HOLD BY 20 kg (44 lb)

NOTE: For the AS 350 B2/B3 RH Pilot shown, LH Pilot similar/opposite

Figure 18 Placard location on typical AS 350 Instrument Panel, RH Pilot configuration

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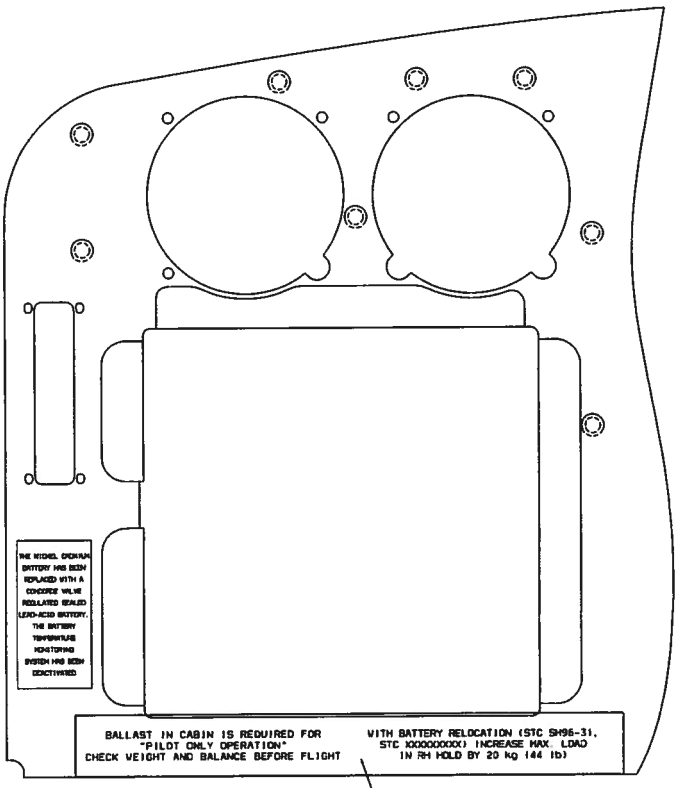
10. **PLACARDS AND MARKINGS** (continued)



BALLAST IN CABIN IS REQUIRED FOR "PILOT ONLY OPERATION" CHECK WEIGHT AND BALANCE BEFORE FLIGHT	WITH BATTERY RELOCATION (STC SH96-31, STC SR00800NY) INCREASE MAX. LOAD IN RH HOLD BY 20 kg (44 lb)

NOTE: For the AS 355

Figure 19 Placard location on typical AS 355 Instrument Panel

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10. PLACARDS AND MARKINGS

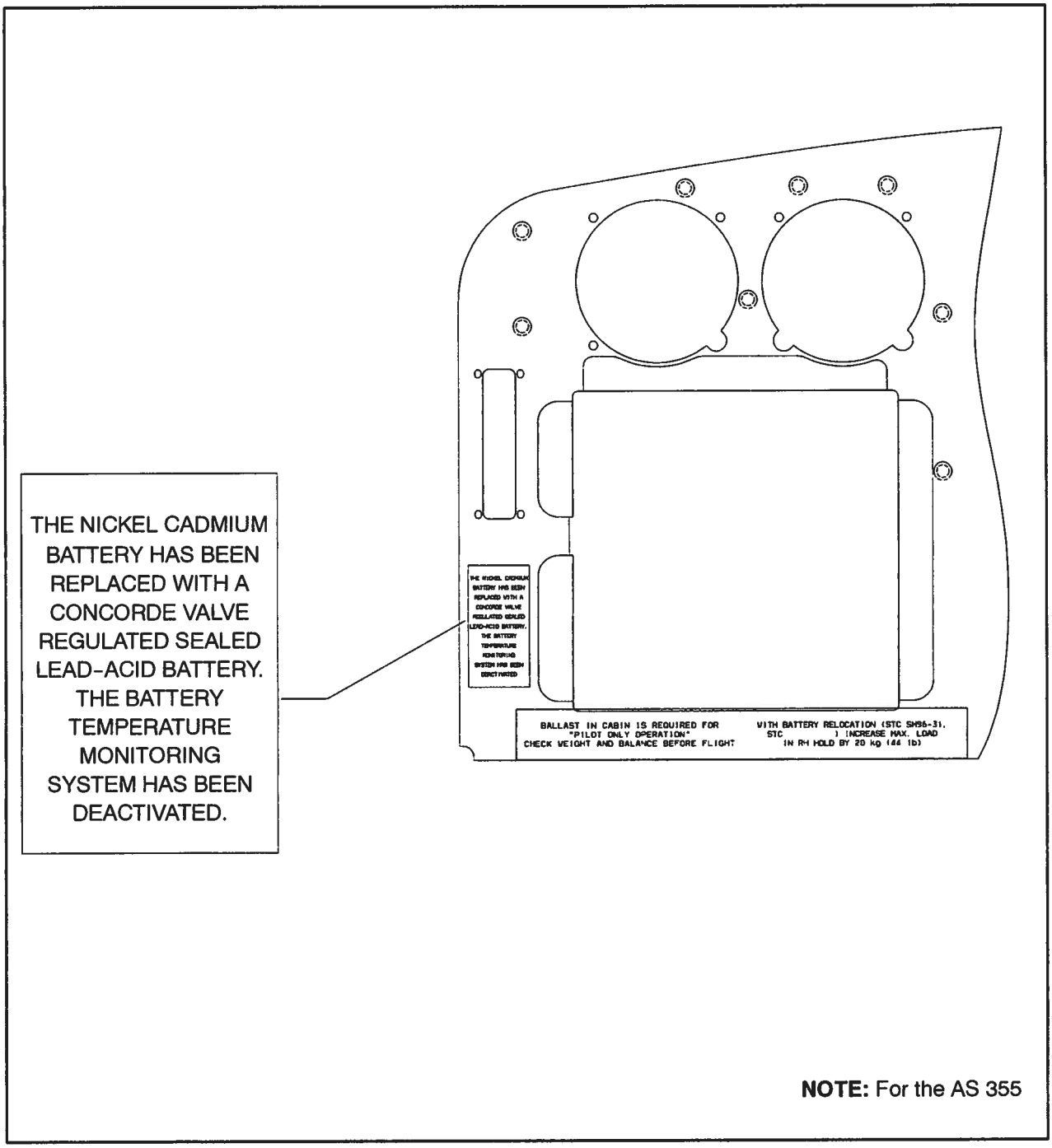

Figure 20 Placard location on typical AS 355 Instrument Panel
(Lead-Acid Battery only)

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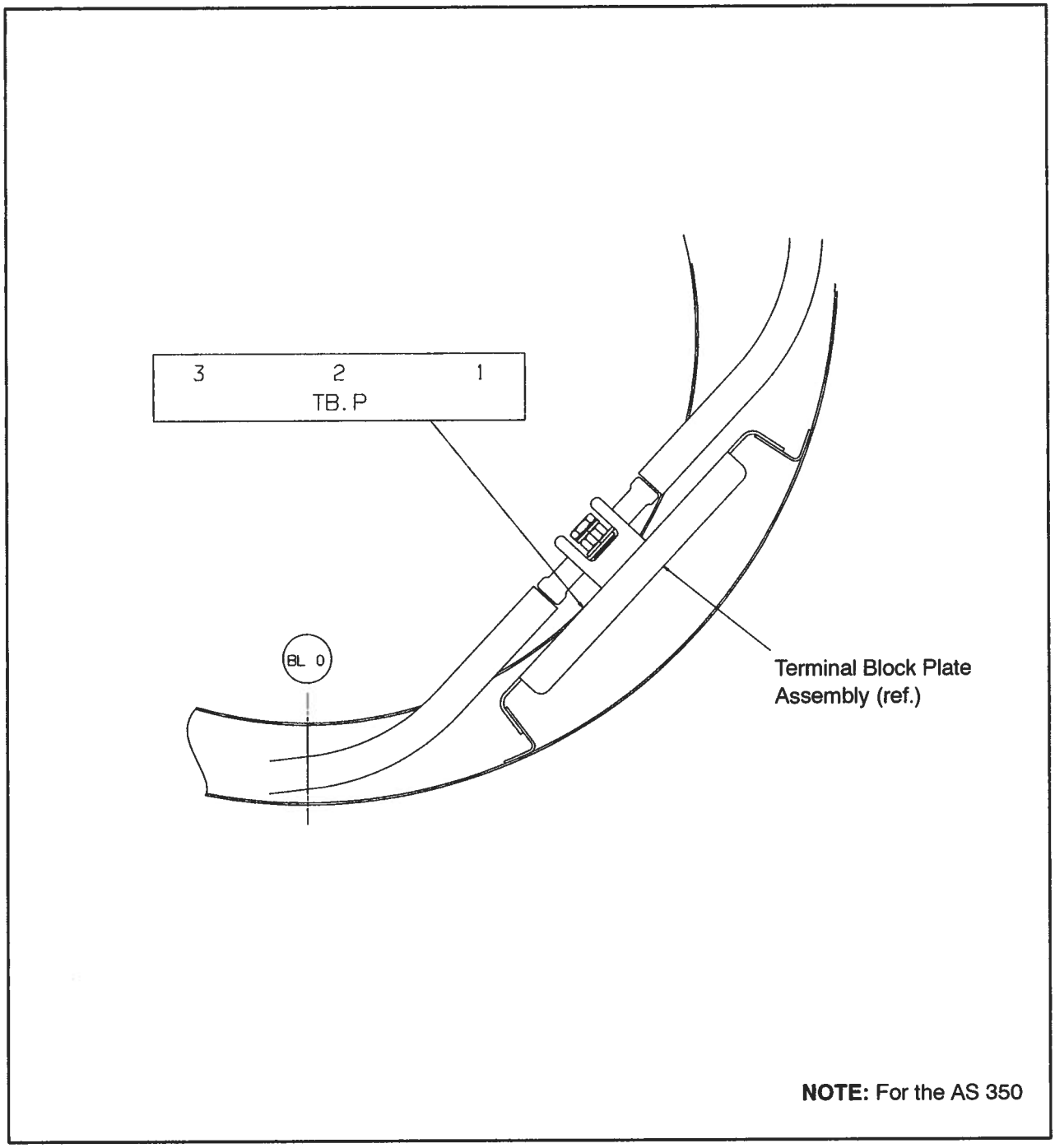
10. **PLACARDS AND MARKINGS** (continued)



NOTE: For the AS 350

Figure 21 Marking location on AS 350 terminal block plate assembly for the terminal block plate (TB.P) at STN A156 POST AMS 07-3273 and 3274

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10. **PLACARDS AND MARKINGS** (continued)

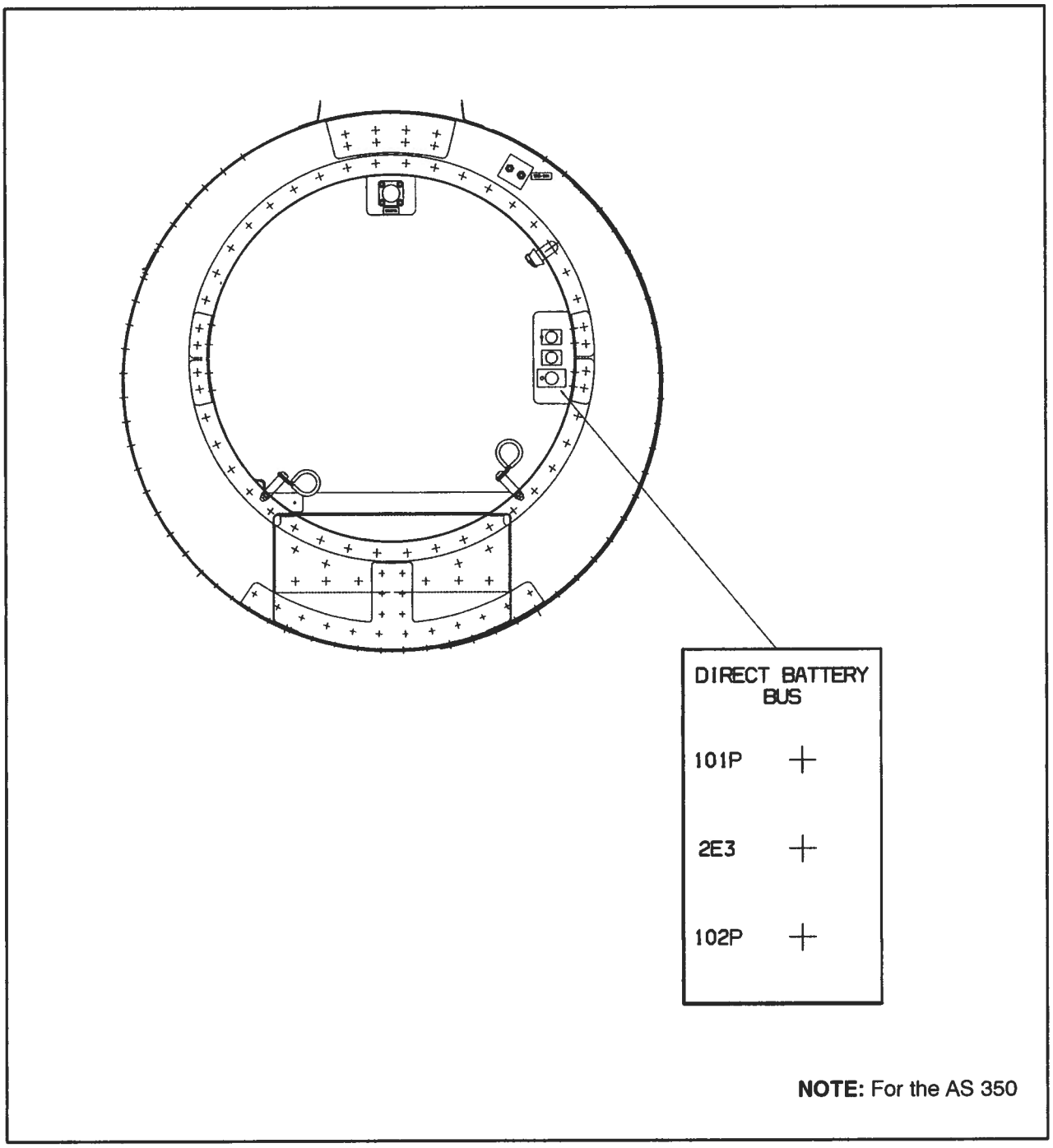

Figure 22 Marking location on the AS 350 circuit breaker bracket at STN A1825
POST AMS 07-3273 and 3274

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10. **PLACARDS AND MARKINGS** (continued)

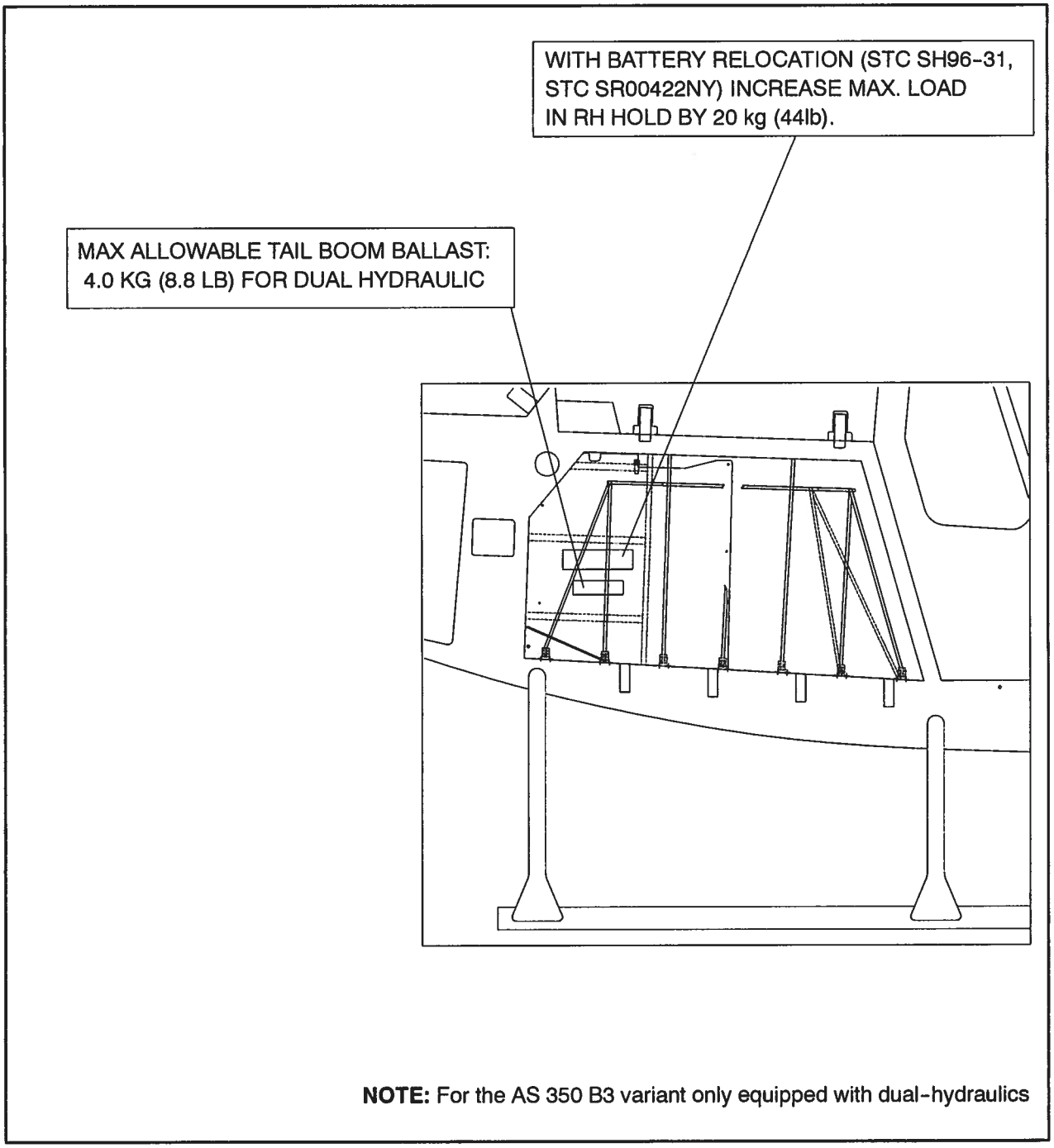

Figure 23 Placards in RH Cargo Compartment AS 350 B3 variant only equipped with dual-hydraulics

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10. **PLACARDS AND MARKINGS** (continued)

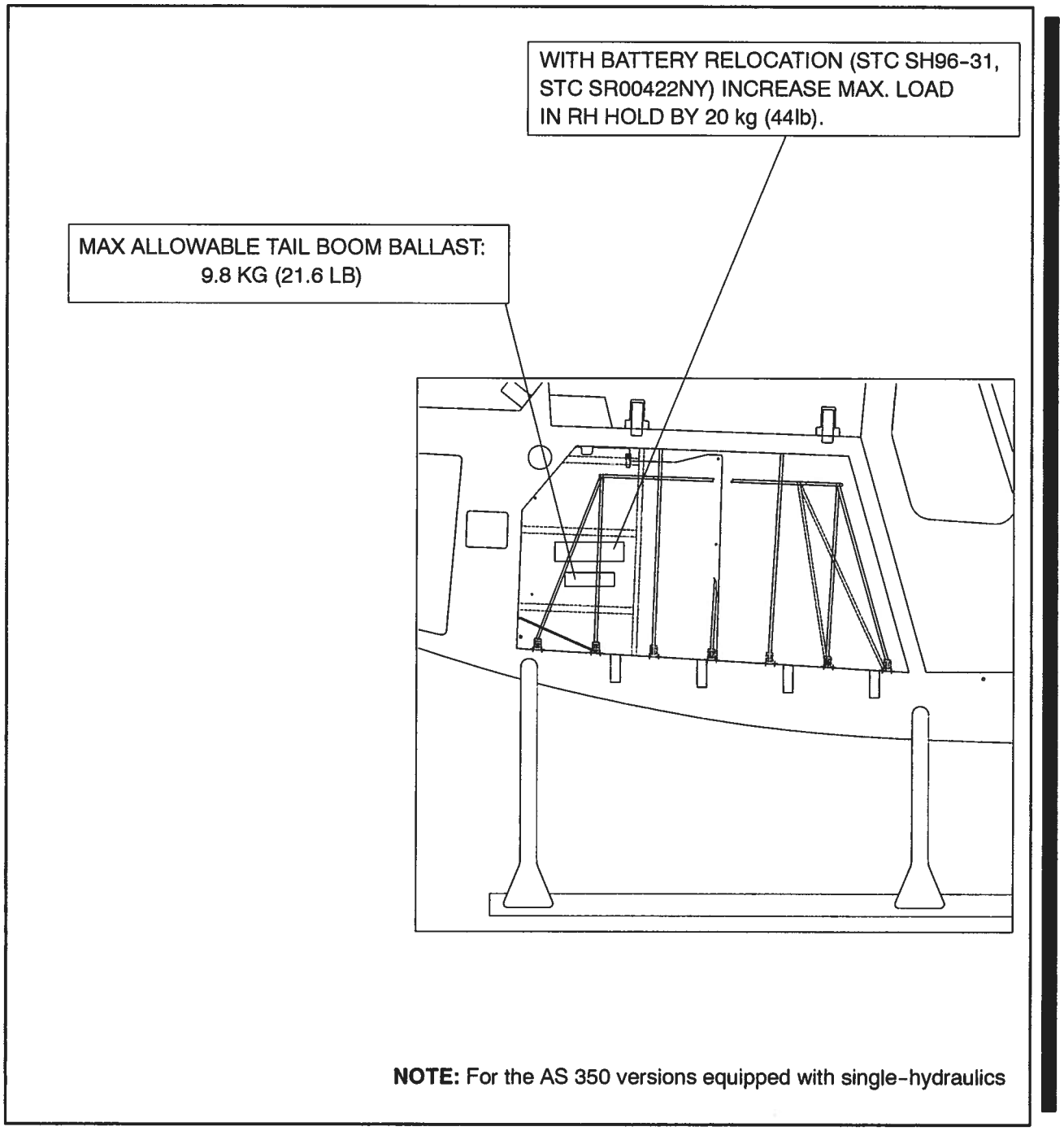

Figure 24 Placards in RH Cargo Compartment AS 350 versions equipped with single-hydraulics

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10. **PLACARDS AND MARKINGS** (continued)

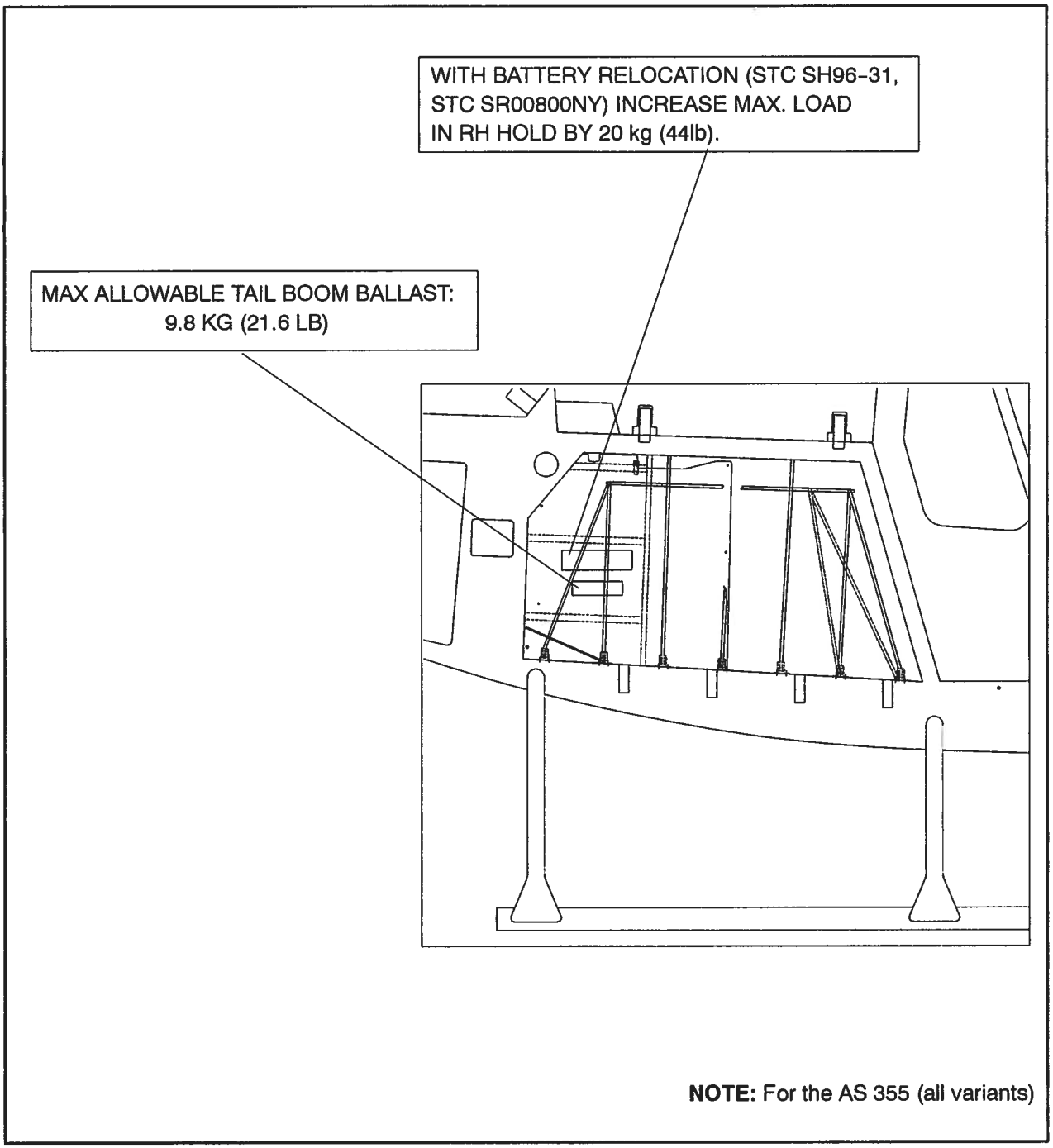

Figure 25 Placards in RH Cargo Compartment AS 355 (all variants)

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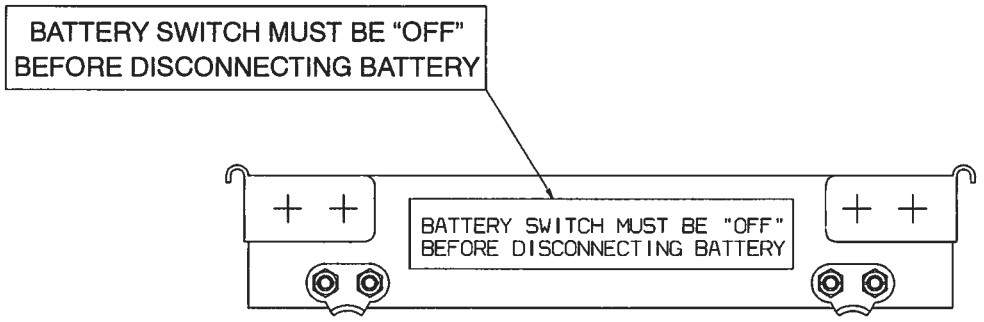
10. **PLACARDS AND MARKINGS** (continued)



NOTE: For the AS 350 and AS 355

Figure 26 Placard on front of the Battery Tray Assembly

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CONCORDE
...the heart of your aircraft®

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

MAINTENANCE MANUAL SUPPLEMENT

CONCORDE VALVE REGULATED LEAD-ACID MAIN BATTERY

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

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

TITLE				DWG NO.	REV
Instructions for Continued Airworthiness, Concorde Valve Regulated Lead-Acid Main Battery				5-0142	J
CAGE CODE 63017	DRAWN JBT 6/20/02	CHECKED EFK 6/20/02	APPROVED JBT 6/20/02	ISSUED NS 2/20/07	SHEET 1 OF 11

RECORD OF REVISIONS

Rev. No.	Description	Date	Appd
A	1. Delete flooded batteries, 2. Revised inspection interval, 3. Add mandatory removal interval, 4. Deleted flooded battery facility requirement.	2/16/99	JBT
B	1. Revised inspection interval 8, 2. Removed 282 Charger from 8.(b). 10.b ii (1) and 13.C i (a).	4/20/99	JBT
C	1. Revised installation instructions 2. Revised note on experience rating 3. Add note on deeply discharged batteries 4. Revised servicing instructions. 5. Added non scheduled inspections	9/5/00	JBT
D	1. Revised Installation and removal notes. 2. Revised torque specifications. 3. Revised battery charger types.	6/18/01	JBT
E	1. Rev cap test to C1 rate. 2. Rev cutoff voltage for conditioning procedure 3. Add warning re conditioning charge.	1/30/02	JBT
F	1. Revised format 2. Assigned Drawing Number 3. Minor text revisions	6/20/02	JBT
G	Delete reference to warranty, para 13	1/16/03	JBT
H	Completely revised	6/12/03	JBT
J	Add limitation specified in **TSO-C173** Add full charge voltage to storage limitations. Add export review statement.	2/20/07	JBT

CONTENTS

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

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

3. Application: Concorde valve regulated aircraft batteries - RG series.

4. Definitions:
   a. Valve regulated battery - A lead-acid battery in which there is no free electrolyte. This battery requires no maintenance of the liquid level and recombines the gases formed on charge within the battery. The battery may be used in any attitude without danger of leakage or spilling of electrolyte.
   b. Rated capacity C1 - Quantity of electricity in Ampere-hours (Ah) which the cell or battery is capable of delivering in 1 h.
   c. End Point Voltage (EPV) - Unless otherwise stated, during discharge the battery voltage corresponding to a mean voltage per cell of 1.67 Volts for lead-acid batteries. (10 EPV for 12 volt and 20 EPV for 24 volt batteries).

5. Precautions:
   a. **CAUTION:** Aircraft batteries are certified to have certain minimum capacity for emergency operations in the event of a electrical generator system failure. Never "jump start" an aircraft that has a discharged or 'dead' battery.
   b. **WARNING: ELECTRIC SHOCK HAZARD.** Do not touch uninsulated portion of the connector or the battery terminals. A possibility of serious electrical shock exists.
   c. **WARNING: ELECTRIC SHOCK HAZARD.** Do not lay tools or other metal objects on the battery as arcing or explosion could occur. Remove conductive jewelry before working around battery, charger, or test equipment.
   d. **CAUTION: ELECTRIC BURN HAZARD.** Do not wear conductive rings, belt buckles, or other jewelry when working with batteries, chargers, or test equipment. Do not lay tools or other metal objects on the battery as arcing and severe burns could occur.
   e. **WARNING:** Batteries on charge or discharge produce hydrogen gas, which can explode if ignited. Do not smoke, use an open flame, or cause sparking near a battery. Charge, service or test a battery only in a well ventilated area. The use of exhaust fans may reduce the risk of explosion.
   f. **WARNING:** Batteries contain sulfuric acid which will cause burns. **DO NOT TOUCH EYES AFTER TOUCHING BATTERY.** Do not get acid in your eyes, or on your skin, or clothing. In the event of acid in the eyes, flush thoroughly with clean cool water for several minutes. Get professional medical attention. Refer to battery MSDS for additional information.
   g. **WARNING:** Wear proper eye, face and hand protection at all times when

working with batteries. Know the location and use of emergency eyewash and shower nearest the battery charging area.

h. **CAUTION:** To prevent damage to the connector, arc burns, or explosion, batteries should never be connected or disconnected while being charged or discharged. Batteries must be connected or disconnected only when the circuit is open. Ensure the aircraft battery switch, external power source, or the charger/analyzer is in the "OFF" position before connecting or disconnecting the battery. Battery terminal protectors should be installed whenever the battery is not connected in the aircraft or to the test equipment.

i. **CAUTION:** Batteries contain hazardous materials. Know the location and proper use of emergency response materials. Refer to battery Material Safety Data Sheet (MSDS) for additional information.

j. **Caution / Warning:** Only constant potential charging may be done on the aircraft. DO NOT constant current charge a battery on the aircraft. There may be a serious risk of injury to personnel and / or damage to the aircraft or aircraft systems due to high voltage and generation of explosive gases when charging constant current.

6. Airworthiness Limitations:
   a. There are no airworthiness limitations associated with the installation of a Concorde valve-regulated lead-acid battery in an aircraft.
   b. For batteries covered by TSO-C173 the following limitation applies:
   Note: The conditions and tests for this TSO approval of this battery are minimum performance standards. Those installing this battery, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only according to 14CFR part 43 or the applicable airworthiness requirements. Nickel-cadmium and lead-acid battery safety concerns include the possibility of fire and venting violently.

7. Installation and Removal:
   NOTE: The following instructions are generic. See airframe manufacturer's maintenance manuals or STC for instructions specific to a particular aircraft model. For removal and replacement of a nickel- cadmium battery, see airframe maintenance manual STC.
   a. Installation procedure:
      i. Removal:
         (1) Set Master Switch to the **OFF** position.
         (2) Disconnect any external power supply.
         (3) Open battery compartment access panels.
         (4) Disconnect battery quick disconnect plug or remove terminal bolts and disconnect battery cables from battery terminals. Always disconnect the ground cable first and install the ground cable last.

(5) Disconnect battery ventilation tubes, if any.
(6) Unlock battery hold down clamps or remove battery hold down bars. Disengage battery.
(7) Carefully remove battery.

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

ii. Installation:

(1) Inspect the battery for damage. Cracks in metal or plastic containers are not permitted. Dents in metal containers that impinge on the interior plastic container are not acceptable.
(2) Set Master Switch to the **OFF** position.
(3) Disconnect any external power supply.
(4) Open battery compartment access panels.
(5) Ensure the battery container or tray is clean and dry.
(6) Install battery in battery container or tray.

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

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

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

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

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

8. Inspection Requirements and Overhaul Schedule:
   a. Scheduled inspections:
   NOTE: If the battery is used to satisfy the essential power requirement, it must be capacity tested. If the battery is not used for essential power, there is no requirement for periodic capacity checks.

i. If the battery is being used to start a turbine APU or a reciprocating engine, the battery can be operated for 24 months or 1200 hours of operation whichever occurs first before the initial capacity check. Subsequent capacity checks are due each additional 12 months or 200 hours of operation, whichever occurs first.

ii. If the battery is used to start a Turbine engine, regardless of whether or not it is also being used to start a turbine APU, the initial capacity check is at 12 months or 600 hours of operation, whichever occurs first. Subsequent capacity checks are due each additional 3 months or 200 hours of operation whichever occurs first.

iii. Two (2) or more batteries operated in parallel should be replaced together for maximum reliability. Replacing only one battery in a parallel string results in unequal charge acceptance as the resistance of the new battery is much different than the resistance of the older battery.

NOTE: The initial recommended inspection schedule may be adjusted to coincide with the airframe or engine manufacturer's inspection interval so long as the operating time does not exceed the above limits by more than 10% or 60 hours. **The inspection schedule may be adjusted after the useful battery life is established in a particular operation. After the useful life of a battery is established for a particular aircraft or operating mode, the actual useful life period in months or hours may be substituted for the above schedule.**

b. Non-scheduled Inspections:
   i. Capacity check if abnormal slow engine starting performance is noted.
   ii. Capacity check if abnormal high charging current is required to maintain the battery at buss voltage.

c. Inspection Procedure:
   i. Charge the battery:
      (1) Special tools:
         (a) Advanced Power Products Beta D-50 Aircraft Battery Analyzer, P/N 4126, or equal.
         (b) Advanced Power Products Alpha C-25 Battery Charger, P/N 4142, or equal.
         (c) Advanced Power Products CA15-50 Charger/analyzer P/N 4159, or equal.

      Warning: Contact Concorde for determination of equal test equipment. Some brands of battery chargers will destroy the battery.

      (2) Depending on the type of charger available, charge the battery Constant Potential (CP). Charge at 14.1 volts for 12 volt batteries or 28.2 volts for 24 volt batteries until the charge current stabilizes for 1 hour.

      Caution / Warning: Only constant potential charging may be done on the aircraft. DO NOT constant current charge a battery on the aircraft. There may be a serious risk of injury to personnel and / or

damage to the aircraft or aircraft systems.

ii. Capacity test:
   (1) Stabilize the battery at 15°C (59°F) or higher. The battery must be at the temperature for at least 24 hours.
   (2) Discharge the battery at the C1 rate on the label to an end point voltage of 10 volts for 12 volt batteries or 20 volts for 24 volt batteries, or the rate and end point voltage (EPV) specified by the airframe manufacturer for essential power.
   (3) Record the time to EPV.
   (4) The battery is acceptable for continued use if the ampere hour capacity (actual hours of discharge x ampere rate of discharge) is greater than 85% of the nominal rated capacity (C1) shown on the label (i.e. 51 minutes or more). If the battery passes the capacity test return it to service. If the battery fails the capacity test perform a conditioning procedure (13. c.). After the battery has been conditioned perform a second capacity test. If the battery passes return it to service. If the battery fails replace it.

NOTE: Airframe or accessory equipment manufacturers may specify a different capacity requirement.

iii. Return to service: Charge the battery as above. If the battery gets very hot (external case temperature greater than 55°C (130°F)) during charging, it should be replaced.

d. Component Overhaul Schedule: No component overhaul required for this type product.

9. Troubleshooting:

Symptom	Probable Cause	Corrective Action
Low voltage / no voltage	Battery partially or fully discharged	Charge in accordance with Section 8
Battery does not hold charge	Battery beyond serviceable life	Replace battery
Battery gets hot while recharging	Battery beyond serviceable life	Replace battery

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

charging. If using a constant potential charger, follow instructions below.

Caution / Warning: Only constant potential charging may be done on the aircraft. Ensure the charging area is well ventilated. DO NOT constant current charge a battery on the aircraft. There may be a serious risk of injury to personnel and / or damage to the aircraft and aircraft systems.

Warning: Contact Concorde for determination of equal test equipment. Some brands of battery chargers will destroy the battery.

ii. Set the charger for 2.35 volts per cell (14.1 volts for a 12 volt battery, 28.2 volts for a 24 volt battery).

iii. Set the current limit to the C1 rate.

NOTE: If current on external power unit is not adjustable, do not charge the battery in the aircraft

iv. Initiate charging and continue to charge until the charge current stabilizes for 1 hour.

c. Uninstalled recharging:

i. Remove the battery from the aircraft.

ii. Special tools:

(1) Advanced Power Products Alpha C-25 Battery Charger, P/N 4142; Advanced Power Products CA15-50 Charger/analyzer P/N 4159; or equal.

Warning: Contact Concorde for determination of equal test equipment. Some brands of battery chargers will destroy the battery.

iii. Depending on the type of charger available, charge the battery Constant Potential (CP). Charge at 14.1 volts for 12 volt batteries or 28.2 volts for 24 volt batteries until the charge current stabilizes for 1 hour.

NOTE: Batteries that have been allowed to stand in a deeply discharged state may not accept a CP recharge. See conditioning procedure in paragraph 13.c for handling those batteries.

11. Repair / Replacement:

a. Repairs should be performed only by a Concorde approved battery shop.

b. Replacement may be made by removing and installing a new battery in accordance with the instructions in this supplement.

c. The battery should be replaced after 3 years or 1800 hours of operation or whichever occurs first.

12. Facilities: Valve regulated batteries may be serviced in any battery facility, including nickel-cadmium service facilities. The battery is sealed to prevent cross contamination of the electrolyte.

13. Storage Limitations:
    a. Batteries are serviced and charged at the factory prior to shipment.
        i. For maximum battery life, boost charge when open circuit voltage is below 25.0 volts for 24 volt batteries and 12.5 volts for 12 volt batteries. The normal voltage for a fully charged battery is approximately 26 volts for 24 volt batteries and 13 volts for 12 volt batteries.
        ii. Batteries that have not been recharged when stored for long periods are to be conditioned (13.c) and tested (8.c) before being placed in service.
    b. Boost charging procedure:
        i. Special tools:
            (1) Advanced Power Products Alpha C-25 Battery Charger, P/N 4142; Advanced Power Products Activator 282 Battery Charger, P/N 4105; Advanced Power Products CA15-50 charger/analyzer, P/N 4159; or equal.
        ii. Depending on the type of charger available, charge the battery Constant Potential (CP). Charge at 14.1 volts for 12 volt batteries or 28.2 volts for 24 volt batteries until the charge current stabilizes for 1 hour.
    c. Conditioning procedure:
    Warning: The battery must be removed from the aircraft prior to performing a conditioning charge.
        i. Special tools:
            (1) Advanced Power Products Beta D-50 Aircraft Battery Analyzer P/N 4146 or 4159, or equal.
            (2) Advanced Power Products Alpha C-25 Battery Charger P/N 4142 or 4159, or equal.
            Warning: Contact Concorde for determination of equal test equipment. Some brands of battery chargers will destroy the battery.
        ii. Procedure:
            (1) Discharge the battery at the C1 rate to an end point voltage of 9 volts for 12 volt batteries and 18 volts for 24 volt batteries.
            (2) Constant current charge at the C1 /10 rate for 16 hours.
            WARNING: This procedure may damage the battery if performed on a repetitive basis.
            (3) Allow the battery to cool down for 8 hours.
            (4) Retest the battery following the inspection procedure (8.c).

14. Disposal:
    a. Batteries contain lead, sulfuric acid, and other hazardous materials. Dispose of all spent batteries in accordance with local laws and regulations. See battery Material Safety Data Sheet (MSDS) for additional information.
    b. Lead acid batteries are recyclable.
    CAUTION: Some aircraft batteries are encased in aluminum containers. These containers must be removed prior to recycling.

CONCORDE BATTERY CORPORATION
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TITLE Instructions for Continued Airworthiness, Concorde Valve Regulated Lead-Acid Main Battery		DWG NO. 5-0142	REV J
CAGE CODE 63017		SHEET 11 OF 11	

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F6177

CADMIUM-NICKEL STORAGE BATTERY

P/N

R **23175, 23176, 2376,**
R **2376-1, 2376-4**

COMPONENT MAINTENANCE MANUAL

WITH

ILLUSTRATED PARTS LIST

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RECORD OF TEMPORARY REVISIONS

	TEMPORARY REVISION No.	PAGE NUMBER	ISSUE DATE	BY	DATE REMOVED	BY
	1	504	JAN 30/86	AMD-BA	OCT 30/90	DA
R	2	108	SEP 30/91	DA		
R	2	502	SEP 30/91	DA		
R	2	701	SEP 30/91	DA		

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R	Title page	1/2	OCT 30/90		111	JUL 15/79	
					112	JUL 15/79	
R	Record of temporary revisions	1/2	OCT 30/90		113	JUL 15/79	
					114	JUL 15/79	
					115	JUL 15/79	
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R	Record of revisions	1/2	OCT 30/90				
				Disassembly	301	OCT 30/90	R
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	IPL	1001	JUL 15/79			
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INTRODUCTION

1. General

This equipment maintenance manual has been prepared in compliance with ATA specification No.100 by the (AIR TRANSPORT ASSOCIATION OF AMERICA). Its purpose is to describe the procedures, applied in the manufacturer's shops to enable a mechanic, unfamiliar with the equipment, to set it back to operating condition or overhaul it.

The operations described must be carried out in maintenance shops using special tools and test benches.

This manual does not cover standard techniques, maintenance intervals nor details which are likely to vary depending on the shop facilities available.

2. Format

A. The page numbering system of the manual consists in using a page number block for each section as follows. As concerns small basic items of equipment, more than one section can be covered on the same page.

1-100	DESCRIPTION AND OPERATION
101-200	TESTING AND TROUBLESHOOTING
201-300	(NOT ASSIGNED)
301-400	DISASSEMBLY
401-500	CLEANING
501-600	INSPECTION
601-700	REPAIR
701-800	ASSEMBLY AND STORAGE
801-900	FITS AND CLEARANCES
901-1000	TOOLS AND SPECIAL EQUIPMENT
1001-1100	ILLUSTRATED PARTS LIST

B. In general, all values are expressed in units of International System (meter, kilogram, second) or multiples and sub-multiples of same.

In some particular cases more appropriate units are employed.

3. Revision

With each revision issued for the manual, detailed instructions are supplied cross-referring to the page numbers concerned for insertion and deletion. The revised, added or deleted material is indicated by the letter R printed in the margin.

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LIST OF PRODUCTS

NOTE : Equivalent products may be used in place of those listed.

	DESCRIPTION PART NUMBER OR SPECIFICATIONS	SUPPLIER NAME ADDRESS	USE					
			TESTING	DISASSEMBLY	CLEANING	INSPECTION	REPAIR	ASSEMBLY STORAGE
R R R R	Neutral petrolatum AIR 3565 (VVP-236)	NYCO 51, rue de Ponthieu 75008 PARIS (FRANCE)						X

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LIST OF EQUIPMENT MODIFICATIONS

AMDT	BRIEF DESCRIPTION	APPLICABLE TO VERSION
	BASIC ISSUE	ALL VERSIONS

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DESCRIPTION AND OPERATION

1. Description

A. General

R Storage batteries 2376, 2376-1, 2376-4 and 23176 consist of 20 semi-open type cadmium-nickel storage cells VP 230 KH in sealed polyamid trays. Storage battery 23175 has only 19 storage cells VP 230 KH.

The storage batteries are used in the aircraft power system to :

- start the engine,
- supply the D.C. powered aircraft services :
  - either on the ground before the aircraft power system is normally energized,
  - or in flight in the case of trouble or failure in the normal power source.

B. Characteristics

(1) Dimensions and weights

R

	2376	23175	2376-1 23176 2376-4
Max. overall dimensions in mm (in.)	269 x 254 x 224 (10.59 x 9.998 x 8.818)	276 x 254 x 224 (10.864 x 9.998 x 8.818)	276 x 254 x 224 (10.864 x 9.998 x 8.818)
Max. base dimensions in mm (in.)	198 x 254 (7.794 x 9.998)		
Weight in kg (lb)	25.5 (56.2)	24.2 (53.3)	25.5 (56.2)

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(2) Technical features

	2376	23175	23176	2376-4	2376-1
Rated voltage	24 V	22.8 V	24 V	24 V	24 V
Rated 1-hour capacity	22 Ah	22 Ah	22 Ah	22 Ah	22 Ah
Connector	In compliance with MS 18093 and NFL 56205 (ELCON BR8-1 or equivalent)				
Connection to aircraft power system	Connector plug in compliance with MS 25182				
Connector : (thermostat or probe)		AMPHENOL 48.13R.10.5.P. (102)		MIL C 26482 or NFL 154 125	MIL C 26482 or NFL 54 125
Thermostat or probe		Closing thermostat 57 ± 3°C (134.6 ± 5.4°F) (Rising temperature)		Probe R = 49.9 kΩ ± 1% Thermistance R = 300 kΩ at 25°C (77°F)	Closing thermostat 71 ± 3°C (159.8 ± 37.4°F) Rising temperature
Electrolyte :	KOH solution. Specific gravity 1.30				
Consumable volume of electrolyte :	21 cm^3 (1.281 cu.in.) (per storage cell)				
Operating temperature	- 30 to + 50°C (- 86 to + 122°F)				
Maximum instantaneous power (at + 23°C (+ 73.4°F))	12.9 kW at 12 V	12.25 kW at 11.4 V	12.9 kW at 12 V	12.9 kW at 12 V	12.9 kW at 12 V

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C. Detailed description

R (1) Electric storage batteries SAFT P/N 2376, 2376-1,
R 2376-4, 23175 and 23176 are contained in rectangular parallelepiped boxes, made of stainless steel. Their sizes comply with the specifications of Standard MS 24497.

The assembly basically consists of a box assembly and a cover assembly. A flexible seal is cemented to the periphery of the cover on the inside and provides for tightness between the two components. This tightness is ensured by four snap fasteners. These fasteners are arranged and welded to the upper part of the box in a parallel pattern on each side of the front and rear panels.

The storage battery is secured by a suitable fastener to the stirrup welded onto the upper part of the cover.

The upper part of the box is provided with two venting tubes.

R A flush-mounted sealed connector, complying with the specifications of Standard MS3509, is attached by four screws to the upper part of the front panel. This connector provides in conjunction with a connector plug complying with the specifications of Standard MS 25182, the connection either to the aircraft services or to the D.C. power source for recharging the storage battery.

The following are cemented on the front panel of the box :

- a nameplate which shows the following information :
  - equipment part number,
  - serial number,
  - rated voltage in V,
  - capacity in Ah,
  - weight,
  - date of manufacture,
  - manufacturer's name and address,

- a modification index plate.

Two placards, one cemented on the box and the other on the cover, specify the procedure to be used for topping up the electrolyte level in the storage cells.

R Storage batteries P/N 23175, 2376-1 and 23176 are also
R provided with the thermostat connector and storage
R battery 2376-4 is provided with the probe connector,
R on their front panels, below the main connector.

(2) Battery temperature monitoring provisions

In order to comply with FAA Directives (72-19-4) concerning the installation of a temperature monitoring system for the cadmium-nickel storage
R batteries, storage batteries 23175, 23176-1 and 23176
R are equipped with a thermostat and battery 2376-4 is
R equipped with a probe.

Inside the storage battery, the thermostat is attached by a self-locking nut to a special lead interconnecting two storage cells in the middle of the
R storage battery (batteries 2376-1, 23175 and 23176).

A standard cable connects the thermostat to a connector receptacle located under the main connector.

Through its connector, the thermostat is connected to an aircraft cable leading to an indicating device in the cockpit.

This indicating device is operated when the storage battery temperature reaches 57 ± 2.8°C (134.6 ± 5°F) (thermostat closing temperature).

R Inside battery 2376-4, the probe is installed between
R two components as indicated in IPL Fig. 1 and is
R connected via the wiring to the connector located
R below the main connector (see tables in para. 1. B.).

2. Operation

A. Principle of operation

The storage battery plates store electric power supplied by a charging source and supply power when the battery is connected to a load circuit, i.e. when it discharges.

During charge, nickel hydroxide Ni $(OH)_2$ of the positive plates is oxidized and is transformed into superior hydroxide Ni O OH ; cadmium hydroxide Cd $(OH)_2$ of the negative plates is reduced and is transformed into cadmium metal (Cd). Reverse reactions take place during discharge and active materials return to their initial state. The electrolyte (potassium solution) does not undergo any chemical change.

For a storage battery with a given volume, the rated capacity of the battery discharged in 1 hour is determined by the quantity of electricity (Ah) the battery can supply.

The efficiency of the battery, in terms of quantity of electricity, is 71.5%. This means that, in order for a 22 Ah to supply 100% of its capacity, it must store a quantity of electricity of 31 Ah, i.e. 140% of Cl (case of recycling) (see "Testing and Troubleshooting" section, para. 1. B. (2)). It is only on this condition that complete chemical transformation of the active materials will take place.

B. Operation in normal use

(1) Charging

Charging the battery in an aircraft is achieved by connecting it in parallel with the aircraft generator(s), or with one or more transformer rectifier(s) supplied by one or more alternator(s).

Should the charging sources be not accurately regulated, the water consumption of the storage cells should be closely watched, at least at the beginning of the operating period. Moreover, it is advisable to check at regular intervals that the charging voltage supplied by the different devices does not exceed 1.425 ± 0.025 V per storage cell (for a temperature of + 20 ± 5°C (68 ± 9°F)) in steady state.

NOTE : - When a battery, in which the active materials have been fully transformed, is subjected to an extended charging operation, the battery becomes overcharged and the current which passes through it can only generate the decomposition of the electrolyte water content into its two elements : oxygen and hydrogen (the rate of decomposition is 1 cm^3 (0.061 cu.in.) of water for each 3 Ah of overcharge). Water consumption under overcharging conditions is proportional to the value of the overcharging current.

R

NOTE : - When a battery is charged from a constant voltage supply, the value of the end-of-charge current depends only on the voltage of this supply and the temperature of the battery.

Within the standard limits, the charging system voltage should be lowered when the internal temperature of the batteries often remains high.

The rule to be applied consists in lowering the charging voltage by 1 V for each 15°C (27°F) of rise in the stabilized temperature (above 25°C (77°F)) in the 20 storage cells.

- The battery is designed to withstand, for short periods of time, large accidental variations in the overcharge current, on condition that the electrolyte levels within the storage cells are correct.

(2) Discharging

R The rated capacity C_1 of the storage battery corresponds to a 1-hr rate of discharge ; that is, the storage battery can supply a 22 A current for 1 hour (when it is 100% charged).

However, the storage battery can, without danger, supply currents greatly exceeding the rated discharged current. For instance, a storage battery with a 22 Ah rated capacity can supply peak currents about twenty times as high as its capacity, or 440 A at a voltage of 19 ± 0.5 V at + 25°C (77°F).

The storage battery is designed to withstand complete discharge (as much as C_1, for instance, under "Emergency" conditions). However, at the end of the discharge, the current applied to the weakest storage cells can reverse their polarity (unbalance) (see "Testing and Troubleshooting" section, para. 1. B. (2)).

TESTING AND TROUBLESHOOTING

NOTE : Tools and special equipment to be used are listed under "Tools and Special Equipment".

1. Testing

A. Setting into service

(1) Ground maintenance

(a) Operating voltage

The rated charging voltage at 20°C (68°F) is 28.5 V for the 20-cell storage batteries and 27.5 V for the 19-cell storage batteries which determines an end-of-charge current compatible with water consumption.

Should the water consumption be excessive, i.e., more than 25 cm^3 (1.525 cu.in.) per storage cell (see para. B. (1)), check the voltage above, or the usual temperature of the storage batteries in service (see Aircraft Maintenance Manual).

(b) Insulation

Electrolyte condensation or overflow may lower the insulation resistance between the electric circuit of the storage battery (connector disconnected) and the box.

The insulation resistance value, as measured at 45 V D.C., should be greater than 10 megohms.

(c) Charge condition

The battery can be charged in flight up to 90%. In this state, the open-circuit voltage is close to 1.3 V per storage cell.

When the off-load voltage of the storage battery after an idle period is more than 1.275 V per storage cell, the storage battery can be considered as 50% charged. Perform complementary fast-charging if required (see Aircraft Maintenance Manual) (see para. (2) (d)).

(d) Maintenance periods

Maintenance in the aircraft is defined by the corresponding specifications.
The workshop maintenance periods and removal conditions are covered in the Aircraft Manuals and determined by the operators with the operating conditions taken into account.

The maintenance operations can be broken down as follows :

- the complementary fast-charging operations above,

R - the charging and adjustment of the electrolyte
R level (see para. B. (1)),
R

- the recycling (see para. B. (2)),
- the reconditioning (see para. B. (3)).

(2) Charging in a workshop

- Normal fast-charging.
- Slow charging.
- Complementary charging.

(a) General conditions

- Equipment required :
  - battery charger,
  - valve wrench.

CAUTION : CHARGING SHOULD BE PERFORMED ONLY IN CLEAN AND VENTILATED PREMISES WHICH SHOULD NOT BE USED FOR LEAD-ACID BATTERIES (ACID ATMOSPHERE).

THE COVER SHOULD BE REMOVED FROM THE STORAGE BATTERY AND THE VALVES UNSCREWED (USING THE VALVE WRENCH) BUT NOT REMOVED SO AS TO ALLOW THE GAS PRODUCED BY THE ELECTROLYSIS PROCESS TO DISCHARGE WITHOUT PLACING THE ELECTROLYTE IN CONTACT WITH THE AMBIENT AIR (RISKS OF CARBONATION).

NOTE : After charging for 5 min. a discharged battery, add 10 to 15 cm^3 (0.61 to 0.915 cu.in.) of distilled water in very dry cells if their voltage is more than 1.5 V (see para. B. (1)).

When this can be foreseen, it is advisable to check the voltage of each storage cell at the beginning of the charging operation.

- In the course of charging, particularly near the end of the charging operation, production of foam may occur. This phenomenon is generally due :
  - either to the presence of greasy matter inside the storage cell (i.e. grease or oil which could have accidentally been introduced through the valve discharge holes),
  - or to a large decrease in the specific gravity of the free electrolyte above the plates. This can happen particularly when distilled water is added to a storage cell in which all the free electrolyte (or more) has been consumed. In this case, it is necessary to add a large volume of distilled water which does not immediately mix with the concentrated electrolyte remaining in the storage cell.

To stop this phenomenon, it is generally sufficient to interrupt the charging operation and to perform a discharge allowing the electrolyte to mix. The next charging operation will still improve electrolyte homogenization, and the phenomenon should then disappear.

In the case where foaming is due to the presence of a greasy matter inside the storage cell, practically nothing can be done except preventing the foam from spreading over the covers and flowing in between the storage cells. This can easily be performed by substituting an absorbent cotton-wool swab for the valve.

(b) Slow-rate, low-current charging

On the initial setting into service (new storage battery), after important balancing operations and after removal of discharged storage batteries from storage, this type of charging is recommended to ensure homogeneous charging of all storage cells.

Charge the storage battery at a constant current of 2.2 A until the voltage across the terminals equals 1.5 V x n (number of storage cells), then continue at the same rate of 2.2 A for 4 hr.

This type of charging can be performed in two steps provided that the first charging period lasts at least 8 hr.

Do not interrupt the charging operation for the last 5 hr (to ensure normal rise of the electrolyte levels).

Total charging time : 14 hr. min., 16 hr max.

(c) Fast-rate charging (discharged battery)

This charging operation is performed at two successive regulated current rates :

R - first method :

- first charge at 11 A up to 1.55 V x n (number of storage cells) (2 hr. 30 min. max. depending on the actual capacity of the storage battery),

- then charge at 2.2 A for 4 hr. (the voltage is then close to 1.6 V x n (number of storage cells),

or :

R - second method :

- first charge at 22 A up to 1.57 V x n (number of storage cells), (1 h 15 min. max. depending on the actual capacity of the battery),

- then charge at 2.2 A for 4 hr.

NOTE : The high current phase is limited by the voltage in order not to overcharge (or undercharge) storage batteries having excessively different capacities, and to completely charge the storage battery in about 6 hr.

(d) Partial fast-rate charging

- Charge at 11 A until the storage battery voltage reaches an average value of 1.55 V x n (number of storage cells) without however exceeding a charging time of 2 hr. 15 min.

- Or charge at 22 A until the storage battery voltage reaches 1.57 V x n (number of storage cells) without however exceeding a charging time of 1 hr. 15 min.

The storage battery can be charged to about 80% of its capacity by either method.

In an emergency, the storage battery may be installed in this condition in an aircraft where the end of charging is completed by the aircraft power system.

NOTE : Such a procedure should however not be used during normal storage battery maintenance.

B. Operations to be performed in a workshop

(1) Charging an electrolyte level adjustment

(a) Charging

- Perform residual discharge at 19 A until the voltage across the storage battery terminals is 1 V per storage cell on an average.

- As soon as the storage battery temperature has become normal again (+ 20 to + 25°C (+ 68 to + 77°F), charge at constant current as per the charging procedure detailed in paragraph A. (2) (c), first method.

- During the last hour of charging above and while charging current is still flowing through the storage battery, adjust the electrolyte level in the storage cells and measure their individual voltages (meter of class 0.5). Also record the amount of distilled water added in each storage cell.

Actually, the electrolyte level varies as the state of charge of the storage battery and reaches the highest point only when the storage battery is fully charged. Everything takes place as if the plates absorbed part of the electrolyte during discharge to restore this absorbed electrolyte during charging.

The level check will therefore not be valid unless it is performed at the end of charging and while the storage battery is still being charged.

(b) Electrolyte level adjustment

Filling is correct when the empty space, as measured under these conditions between the valve seat and the electrolyte surface is 20 mm (0/79 in.).

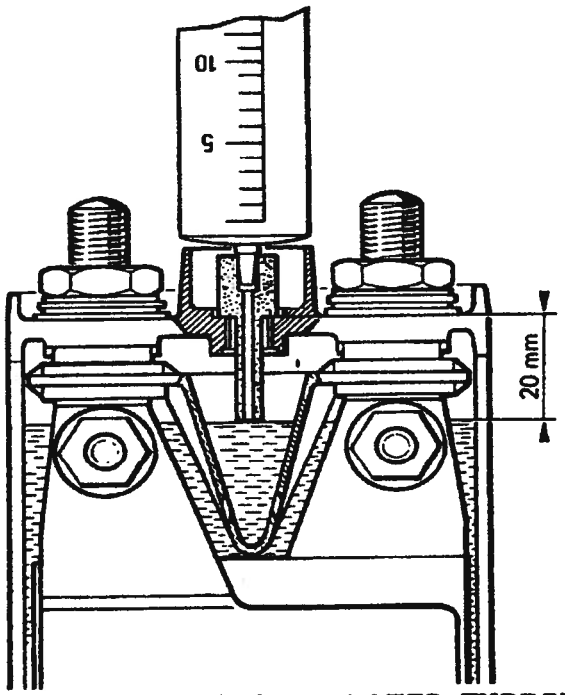
Any addition of liquid under any other conditions might result in electrolyte overflow in normal operation.

- If necessary, top up to the desired level by adding distilled water.

CAUTION : NEVER USE ACID OR A SOLUTION OF ACID AND WATER TO ADJUST THE ELECTROLYTE LEVELS IN THE CADMIUM-NICKEL STORAGE CELLS. ANY TRACE OF ACID, HOWEVER SMALL, WILL IRREMEDIABLY DAMAGE THE STORAGE BATTERY.

The most simple and convenient instrument for level adjustment purposes is a plastic syringe similar to those used for hypodermic shots and fitted with a plastic cylindrical endpiece which is force-fitted onto the taper end of the syringe.

The length of the endpiece which is introduced into the storage cell should be 20 mm ; this length corresponds to the empty space to be left between the valve seat and the electrolyte level (see Fig. 101).



FILLING PRINCIPLE WITH A CALIBRATED ENDPIECE SYRINGE
FIGURE 101

Hold the shoulder of the syringe endpiece in contact with the valve seat and pull the piston of the syringe to immediately determine whether filling is correct.

- Too low a level will result in the absence of liquid sucked by the piston being raised.

- Any liquid in excess will be sucked into the syringe until the level is flush with the tip of the endpiece.

If this check shows that the level is too low in the storage cells, suck distilled water into the syringe and inject it into the storage cells (owing to the small capacity of the syringe, this operation may have to be repeated several times for each storage cell).

The level is correct when, after injecting water into the storage cell, with the shoulder of the syringe endpiece in contact with the valve seat, excess liquid is sucked back into the syringe when the piston is pulled.

(c) Conclusions to be drawn from the preceding operations

- Everything is correct when :
  - the individual voltages of the storage cells, measured during the last hour of charging at 2.2 A, are equal to or greater than 1.5 V,
  - the quantities of distilled water added in each storage cell are substantially the same and less than 21 cm^3 (1.282 cu.in.).

- If the quantities of distilled water added in each storage cell are all greater than 21 cm^3 (1.282 cu.in.), it is recommended to check that the charging power source voltage versus temperature is correct and to plan level adjustments at shorter time intervals.

- If the quantities of distilled water added in one (or more) storage cells are quite different from the average quantity added to the other storage cells, either more or less, or if the individual voltages measured at the end of charging at 2.2 A are less than 1.5 V (see para. 2.), subject the storage battery to reconditioning (see para. (3)).

(d) During the level adjustment operation, clean the valves (see "Cleaning" section).

(e) Visual inspection of the thermostat (see "Inspection").

(2) Recycling

(a) Carry out all the operations in paragraph (1).

(b) Check the tightness of the connector nuts.

Make sure that the connector locknuts are correctly tightened.

R The tightening torque to be applied is 8 ± 2 N.m (5.904 ± 1.476 ft.lb).

(c) Check the insulation (see para. A. (1) (b)).

(d) Check again the thermostat for operation (see "Inspection").

(e) Test the storage battery under the following conditions :

- perform residual discharge at 19 A until the voltage across the storage battery terminals is 1 V per storage cell on an average,

- record the discharge time, i.e. the time elapsing from the beginning of the discharge and the moment when the voltage reaches 20 V (for a 20-storage cell battery or 19 V for a 19-storage cell battery),

- continue discharging with a 1 ohm (approximately) resistor connected to each storage cell. These resistors may have their leads terminated by aligator clips for quick attachment to the terminals of the storage cells,

- leave the resistors in position at least overnight ; this operation is intended to rebalance the storage cells.

R (f) Remove all the resistors then charge the storage battery (see para. A. (2))

During the last hour of charging above and while charging current is still flowing through the storage battery, adjust the liquid level in the storage cells (see para. 1. B. (1) (b)) and measure their individual voltages.

Also record the quantity of distilled water added to each storage cell.

- As soon as charging is completed and liquid has been added, again discharge the storage battery at a constant current of 19 A, stopping the discharge when the voltage reaches 20 V for a 20-storage cell battery or 19 V for a 19-storage cell battery. At this moment, measure the voltage across the terminals of each storage cell.

Record the duration of this second discharge.

R (g) Conclusions to be drawn from the preceding operations

- Everything is correct when :
  - the first discharge (see para. 1. B. (2) (c)) lasts more than 30 min.,
  - the second discharge (see para. 1. B. (2) (d)) lasts one hour or more,
  - the individual voltages of the storage cells during the last hour of charging at 2.2 A are greater than 1.5 V (meter of class 0.5),
  - the quantities of distilled water added to each storage cell are substantially the same and less than 21 cm^3 (1.282 cu.in.),
  - if the time of the first discharge is less than 30 min. whereas the time of the second discharge is correct (1 hr minimum), it may be concluded that the storage battery was in good condition but incompletely charged at the time of its removal from the aircraft.

  This condition may be due to an insufficient charging in the aircraft or also to a discharge resulting from the untimely supply of power to aircraft services after landing.

The battery must be subjected to reconditioning (see para. 1. B. (3)) when :

- the time of the second discharge is less than 1 hr. or when some of the storage cells have a voltage below 1 V or a reversed voltage before 1 hr. of discharge,

- the individual voltages of the storage cells measured during the last hour of charging at 2.2 A are less than 1.5 V,

- the quantities of water added in one (or more) storage cells are quite different from the average quantity added in the other storage cells.

NOTE : The consumption of distilled water in a storage cell depends on the overcharge to which it is subjected.

This should therefore be approximately the same for all of 20 storage cells of a same storage battery.

The fact that the water consumption of one (or more) storage cell(s) of a same storage battery is positively greater or smaller than that of the other storage cells denotes a defective operation.

- Greater water consumption is generally due to a leak.

- Lower water consumption results from a partial damage of the separator.

- Water consumption is considered as becoming abnormal when it varies by more than 25% of the average quantity.

(3) Reconditioning

Proceed as follows :

- disassemble the battery,

- clean,

- check,

- repair as required,

- assemble the battery.

This operation is carried out during recycling, after checking the capacity and before final charging.

It is either scheduled or to be performed when the storage cells are to be replaced or when the insulation resistance is insufficient.

(4) Complementary test before repair

It may happen that the first checking charge is little effective because of an abnormally low level of electrolyte in the storage cells (as a matter of fact, the electrolyte level is adjusted at the end of this first charge only). If the behavior of the storage battery is unsatisfactory, perform a second test including :

- charging as per one of the methods detailed in the "Description and Operation" section (para. 2. B. (1)) with distilled water added as required during the last hour of charging,

- checking of the individual storage cell voltages during the last hour of charging,

- 19 A discharge down to an average voltage of 1 V per storage cell.

Upon completion of this test, the storage cells still having a defective behavior and to be replaced are the following :

- those storage cells which have an end-of-charge voltage less than 1.5 V (meter of class 0.5),

- those storage cells which have a voltage dropping below 1 V before one hour of discharge during the last checking discharge,

- those storage cells which are shorted (zero voltage).

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2. Troubleshooting

FAILURE	POSSIBLE CAUSES	REMEDIAL ACTION
Zero voltage in charging battery circuit.	Connections loose or open.	Check the good condition of the electrical contacts and connections and correct tightness of the lock-nuts (see para. 1.B.(1)(e)).
Zero voltage in discharging battery circuit.	Battery fully discharged.	Charge the battery (see para. 1.A.(2)). Check the insulation (see para. 1.A.(1)(b)).
	Battery circuit open or having bad contacts.	Check the condition of the contacts and connections and tightness of the terminal nuts (see "Inspection" section, para. 3. and 4.).
	Storage cell completely dry.	See below.
Electrolyte overflowing.	Level adjustment performed incorrectly.	Disassemble and clean the battery (see "Disassembly" and "Cleaning" sections). Check the electrolyte levels (see para. 1.B.(1)).
	Storage cell polarity reversing during a high-current discharge (during an engine start for instance).	Check the aircraft charging circuit.
		Disassemble and clean the battery (see "Disassembly" and "Cleaning" sections). Check the electrolyte levels (see para. 1.B.(1)).

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FAILURE	POSSIBLE CAUSES	REMEDIAL ACTION
	Overcharging in hot condition or currents too high.	Check aircraft charging circuit and, if necessary, adjust it to match the normal operating temperature. Disassemble and clean the battery (see "Disassembly" and "Cleaning" sections). Check the electrolyte levels (see para. 1.B.(1)).
Traces of potassium in the box.	A storage cell is defective.	Replace by a new storage cell then see below.
	Electrolyte overflowing.	Disassemble and clean the battery (see "Disassembly" and "Cleaning" sections). Check the electrolyte levels (see para. 1.B.(1)).
Excessive distilled water consumption in all storage cells of a same battery.	Excessive overcharging or overcharging at too high a temperature.	Check aircraft charging circuit and, if necessary, adjust it to match the normal operating temperature.
Storage cell(s) having a water consumption quite different from that of the other storage cells of a same battery : - greater than average quantity,	Storage cell(s) leaky.	Replace by a new storage cell.

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FAILURE	POSSIBLE CAUSES	REMEDIAL ACTION
- equal to or less than 25% of average quantity.	Storage cell(s) having their separator(s) damaged.	Perform a complementary test (see para. 1.B.(4)). If necessary, replace by a new storage cell.
Connections corroded.	Operation in acid atmosphere.	Make sure that the premises where the batteries are tested (or the storage premises) are free of any product liable to give off acid vapors.
	Nickel plating attacked by mechanical effects.	Replace the defective leads (see "Disassembly" section).
Traces of heat on the connections.	Terminal nuts loose.	Check tightness of nuts (see "Inspection" section, para. 3. and 4.).
Storage cell having a voltage abnormally high at the beginning of charging.	Storage cell dry.	As soon as this abnormal voltage is noticed, immediately add 10 cm3 (0.61 cu.in.) of distilled water in the storage cell. Adjust the level with greater accuracy at the end of charging only. NOTE : a storage cell being charged with too low an electrolyte level may also have a large temperature rise during charging.

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FAILURE	POSSIBLE CAUSES	REMEDIAL ACTION
Storage cell having too low a voltage at the end of charging (less than 1.5 V at 2.2 A and 20°C (68°F)).	Storage cell having operated at too high temperatures or charging currents and having its separator damaged.	Replace the storage cell.
Storage cell capacity insufficient (voltage of reversed polarity or of normal polarity but less than 1 V before the end of the 1-hr. discharge at 19 A).	Normal wear due to a long service life.	Replace the storage cell.
	Operating conditions particularly severe : frequent self-powered engine starts, operation in hot environment, low electrolyte level, etc.	Perform a complementary test (see para. 1.B.(4)).
Storage cell tray swollen.	Storage cell having operated with an insufficient electrolyte level, resulting in damage to the separators and to the plates.	Replace by a new storage cell.
Storage cell having zero off-load voltage.	Storage cell shorted.	Replace by a new storage cell.
Insulation resistance insufficient.	Electrolyte overflowing.	Disassemble and clean the battery (see "Disassembly" and "Cleaning" sections). Check the electrolyte level (see para. 1.B.(1)).

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NOTE : During maintenance operations or during reconditioning, if a storage battery shows abnormal conditions :

- end-of-charge voltages too low,
- charging voltages too high,
- capacity insufficient,
- abnormal electrolyte consumptions,

perform a complementary test (see para. 1. B. (4)).

SAFT

DISASSEMBLY

NOTE : - See "Testing and Troubleshooting" to determine the condition of the unit or the most likely cause of faulty operation.

- Tools and special equipment to be used are listed under "Tools and Special Equipment".

1. Disassembly (See IPL, Fig. 1)

CAUTION : ALL THESE OPERATIONS MUST BE CARRIED OUT ON A STORAGE BATTERY WHICH IS FULLY DISCHARGED.

A. General

First remove cover (40) from the storage battery.

B. Removing a safety valve (140 or 240)

- Loosen the safety valve using special wrench 15528.

- Remove the valve complete with its preformed packing (150 or 250).

C. Removing a storage cell (60 or 160)

- Unscrew nuts (130 or 230) attaching the leads which connect the storage cell to be replaced to the neighbouring storage cells.

- Release leads (400 to 490) from the storage cell terminals.

- Fully screw a threaded socket wrench 14735 onto one of the storage cell terminals and pull vertically.

R D. Removing a thermostat assembly (350) (batteries 23175 and
R 23176) or (760) (battery 2376-1)

- Remove lead (480) on which the thermostat is installed.

- For battery 2376-1, unscrew self-locking nut (360 or 770) which secures the thermostat on its lead.

E. Removal of probe (820) (battery 2376-4)

- Remove the five connections (410) of the first four storage cells (160).

- Remove connection (470).

- Screw special tool 14735 home onto one of the terminals of the four storage cells, pull vertically and remove the latter from their recess.

- Remove the power connector (280).

- Remove the connector from the probe.

- Extract the assembly consisting of probe and connector (820).

N

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CLEANING

NOTE : The products to be used are listed under "List of Products".

1. Partial cleaning

- If a source of compressed air is available, and provided that it is properly filtered, the most simple and fastest means of cleaning storage cells consists in blasting air on the covers so as to blow outside the box all dust and salt deposits which might have accumulated.

- To avoid making short-circuits, blast with a rubber hose or a hose with an insulated endpiece.

2. Complete cleaning

After disassembling the storage battery (see "Disassembly" section), clean all the component parts.

A. Storage cells

- Remove all traces of potassium or the salt deposits from the terminals, the covers and the walls of the tray, using lukewarm water and a soft bristle brush.

- Make sure that the safety valve is correctly tightened.

- Do not allow the storage cells to soak in water.

- First wipe dry then allow to dry in open air.

B. Box

- Wash with water and allow to dry in open air after wiping it dry.

C. Nuts, spring washers, leads

- Clean with lukewarm water by brushing and allow to dry in open air.

D. Blocking parts

- Clean with lukewarm water and allow to dry in open air.

E. Valves

- Remove the valves (see "Disassembly" section).

- Blank off the storage cell ports to prevent any ingress of foreign matter.

- Dip the valves in a container filled with distilled water (or, if not available, with very clean ordinary water) for several hours (one night, for instance) to cause salt deposits to dissolve which could otherwise accumulate within valve venting ports.

WARNING DANGER : THE USE OF A CHLORATED SOLVENT IS STRICTLY FORBIDDEN.

- Before reinstalling the valves on the storage cells, check their correct operation (see "Inspection" section).

- Reinstall the valves (see "Assembly and Storage" section).

3. Lubrication

After cleaning the storage battery, with the valves reinstalled, lightly coat the terminals and the leads with neutral (acid-free) petrolatum or light machine oil applied with a brush.

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INSPECTION

NOTE : Tools and special equipment to be used are listed under "Tools and special Equipment".

1. Visual inspection

- Inspect the box on the outside, and make sure it does not show any trace of impact.

- Check the storage cells for condition in order to detect any electrolyte leakage around the terminals, traces of shorting, corrosion by potassium, cover lifting, cracked storage cells, etc.

- Localize the corroded parts, if any.

2. Valve check

- Remove the valve.

- Screw the valve fitted with its seal on a metallic tube fitted with an 8 mm (0.315 in.) diameter, 100 pitch threaded endpiece.

- Connect this tube to a compressed air line or a compressed air cylinder through an adjustable pressure reducing valve.

- Adjust the pressure to 0.5 bar (7.25 psi) and dip the valve in a container filled with water. If the valve is in good condition, air bubbles should come off.

- If there are no bubbles, increase pressure until the air escapes, then gradually decrease pressure to 0.5 bar (7.25 psi) and note the pressure at which the air stops escaping.

- Discard any valve whose operating pressure is greater than 0.7 bar (10.15 psi) after the "lifting" operation is performed, and replace the valve by a duly tested spare valve. Discard also any valve whose operating pressure is less than 0.14 bar (2 psi).

- Reinstall the valve using only the knurled upper part of the valve wrench.

- Check the preformed packing for condition.

3. Nut tightness check

Check that all nuts are correctly tightened :

R - terminal lower nuts, tightening torque : 5 ± 0.5 N.m (3.69 ± 0.369 ft.lb),

R - terminal nuts, tightening torque after assembly : 8 ± 2 N.m (5.904 ± 1.476 ft.lb).

4. Connector check

Check the connector contacts for condition and replace the connector if the contacts show any trace of arcing or excessive oxidization.

5. Visual check of the thermostat (storage batteries 2376-1, 23175 and 23176)

Visually check the thermostat and the thermostat connector for condition.

Check in particular that :

- the thermostat is secured to the battery lead,

- the leads or the connecting cable between the connector receptacle and the thermostat are not damaged.

6. Thermostat operational check (storage batteries 2376-1, 23175 and 23176)

This check should be performed on the discharged battery during its presence in a workshop (see Fig. 501).

A. Checking the thermostat operation

- Remove the lead on which the thermostat is installed.

- Dip the thermostat and lead assembly in a 0.5 l (0.109 Imp. Gal. ; 0.132 US Gal.) container, filled with water to three quarters of its volume. Make sure that the thermostat is not in contact with the container walls.

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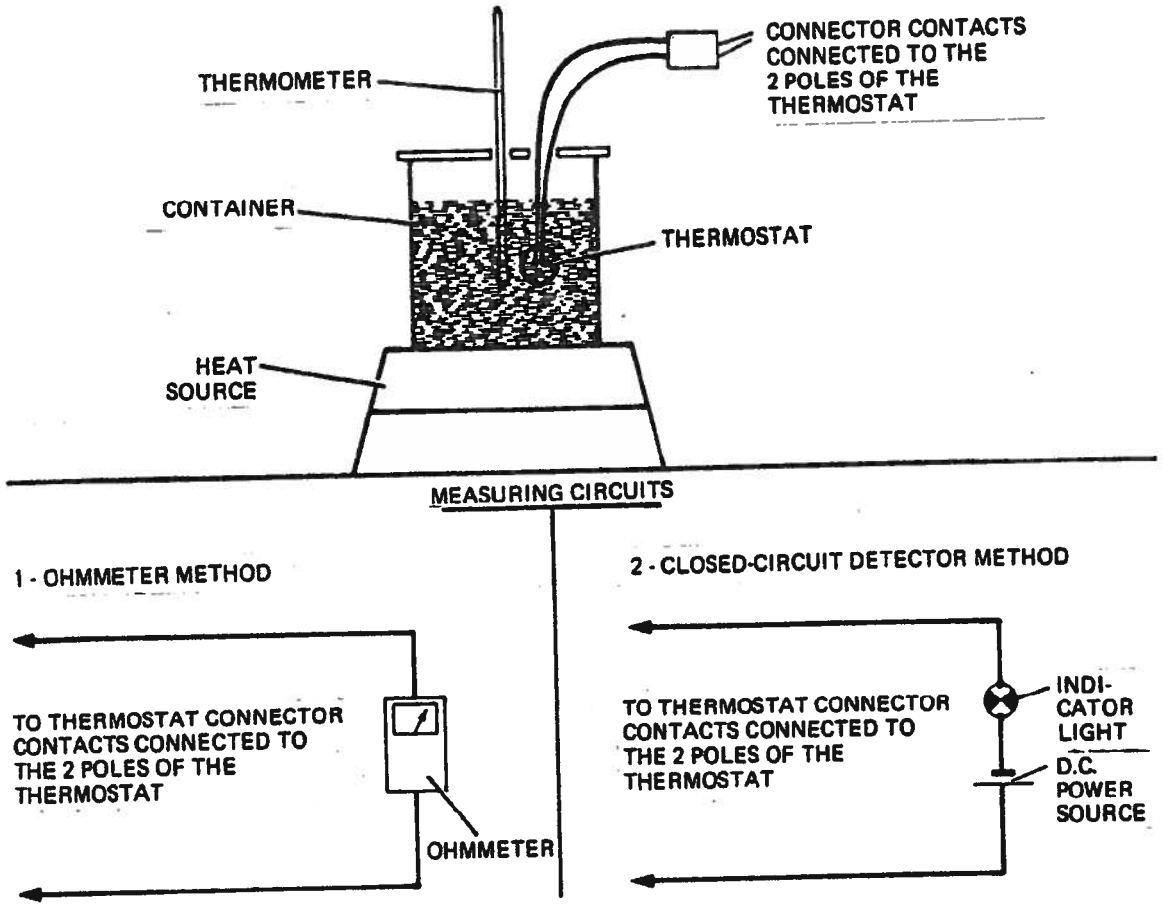

CHECKING THE THERMOSTAT
FIGURE 501

SAFT

- Dip a thermometer in the container so that the thermometer bulb is in the close vicinity of the thermostat.

- Connect the measuring circuit (ohmmeter or closed-circuit detector) to the two contacts 1 and 2 of the connector of the thermostat assembly.

- Slowly heat up the water in the container, taking care to maintain the water temperature at about 50°C (122°F) for about 10 min. This period of time is necessary to bring all the thermostat components to the same temperature as the water.

- Continue heating up the water very slowly and note the thermometer reading when the thermostat operates (increasing temperature).
Thermostat closing is indicated by the ohmmeter pointer moving from the "infinite" position to the "0" position, or by the illumination of the closed-circuit detector light.

R R R The thermostat operation is correct when the temperature reading is within the range from + 68 to + 74°C (+ 154 to + 165°F) (battery 2376-1).

- As soon as thermostat closing is observed, stop heating up the water and place the 0.5 l (0.109 Imp. Gal. ; 0.132 US Gal.) container in a 1 l (0.219 Imp. Gal. ; 0.264 US Gal.) container. Pour cold water in it until the water levels are at the same height in both containers.

- Note the temperature at which the thermostat contacts open (decreasing temperature). At the moment the contacts open, the ohmmeter pointer returns to the "infinite" position or the closed-circuit detector light goes off.

R The thermostat operation is correct when the difference between the closing and opening temperatures is between 4 and 10°C (7.2 and 18°F).

- Should the operating temperatures fall outside the limits, repeat the tests described above.

- Withdraw the thermostat and lead assembly from the container and dry it thoroughly.

R 7. Check of the temperature probe (battery 2376-4)

R The temperature probe can be checked only after battery 2376-4 R is removed.

R - Check at + 25 ± 2°C (+ 77 ± 35.6°F) that the resistance value R across studs B and C of the connector is comprised between 333 R and 270 kΩ.

R - Check at + 70 ± 2°C (+ 158 ± 35.6°F) that the resistance R value across studs B and C of the connector is comprised R between 48.6 and 37.8 kΩ.

R - Check at + 25 ± 2°C (+ 77 ± 35.6°F) that the resistance value R across studs A and B of the connector is equal to 49.9 kΩ ± 1%.

R

R 8. Check of temperature probe insulation

Using the ohmmeter, check the insulation of each pole of the thermostat relative to its metal case.

The measured insulation resistance should be greater than or R equal to 30 megohms at 500 V D.C.

SAFT

REPAIR

1. Box

Straighten the walls of the box and remove the distortions produced by impacts, if any.

2. Storage cells

Repairing mainly consists in replacing the storage cells deemed defective after testing. The new storage cells should be previously discharged.

SAFT

ASSEMBLY AND STORAGE

NOTE : - The products to be used are listed under "List of Products".

- Tools and special equipment to be used are listed under "Special Tools and Equipment".

1. Assembly (See IPL, Fig. 1)

A. Installing a valve (140 or 240)

- Check preformed packing (150 or 250) for condition and replace it if it shows any traces of wear.

- Screw in the safety valve using the knurled upper part of special wrench 15528 to avoid applying an excessive torque.

B. Installing a storage cell (60 or 160)

- Insert the storage cell (discharged) in its recess, making sure beforehand that the positions of the poles are correct.

- Slowly push on the terminals using a soft wood wedge.

- Install the rigid leads, scrupulously observing the following order :
  - rigid leads,
  - spring washers (90 or 190),
  - upper nuts (130 or 230).

R - Tighten nuts (130 or 230) to a torque of 8 ± 2 N.m
R (5.904 ± 1.476 ft.lb).

C. Assembling a storage battery

- Insert the connector of thermostat (350) for batteries 23175 and 23176 or (760) for battery 2376-1 through the inside of the box and attach.

R - Insert thermostat (350 or 760) through the hole provided for this purpose then position the box shim (260). Make sure grommet (270) is in position on this hole.

- Position the various insulating and blocking parts inside the box.

R - Install the storage cells, scrupulously observing the position of the poles (except the first four in the case of battery 2376-4) (see para. B.).

R - Secure thermostat (350 or 760) onto special connection (480) using locknut (360 or 770) (batteries 23175, 23176 and 2376-1).

R - Install special lead (480) (Batteries 23175, 23176 and 2376-1).

R - Install rigid connections.

R Case of battery 2376-4

R - Secure the connector of probe (820) by inserting in the box.

R - Place the probe in its place.

R - Install the four remaining storage cells.

R - Install the rigid connections of the four storage cells (410 and 470).

Before installing cover (40) on the storage battery, lightly lubricate the storage cell terminals and leads by applying neutral petrolatum with a brush.

2. Storage

A. Preparing the storage battery for storage

- Adjust the levels (see "Testing and Troubleshooting" section, para. 1. B. (1)), discharge the battery at a constant current of 11 A until the voltage across the terminals of each storage cell reaches 1 V on an average (20 V for a 20-storage cell battery and 19 V for a 19-storage cell battery).

- Apply a light coat of neutral petrolatum or light machine oil on the nuts, leads and all parts likely to be corroded by weather agents.

- Reinstall the cover. Make sure the battery is in the normal upright position.

B. Storage place

The place intended for storing batteries should be free of dust and humidity.

C. Temperature conditions

The storage batteries can be stored between - 60 and + 60°C (- 76 and + 140°F).

However, the most favorable storage temperatures lie between 0 and + 30°C (32 and 86°F).

D. Shelf life

Illimited.

E. Packing

The storage batteries are normally packed in carton boxes.

For prolonged storage or for overseas shipping, a heat-sealing plastic packing is recommended.

F. Transportation

It is essential to take all necessary precautions so that the storage batteries are transported in normal upright position. For this purpose, the packings should bear clearly legible inscriptions : "THIS SIDE UP" and "THIS SIDE DOWN".

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TOOLS AND SPECIAL EQUIPMENT

NOTE : Equivalent items of equipment may be used in place of those listed.

PART NUMBER	DESCRIPTION	USE					
		TESTING	DISASSEMBLY	CLEANING	INSPECTION	REPAIR	ASSEMBLY STORAGE
15528	Polyamid valve wrench (see Fig. 901)		X				X
16544	Syringe endpiece (see Fig. 902)	X			X		
105112	20 cm^3 (1.22 cu.in.) syringe (see Fig. 902)	X			X		
14735	Storage cell extractor socket wrench		X				

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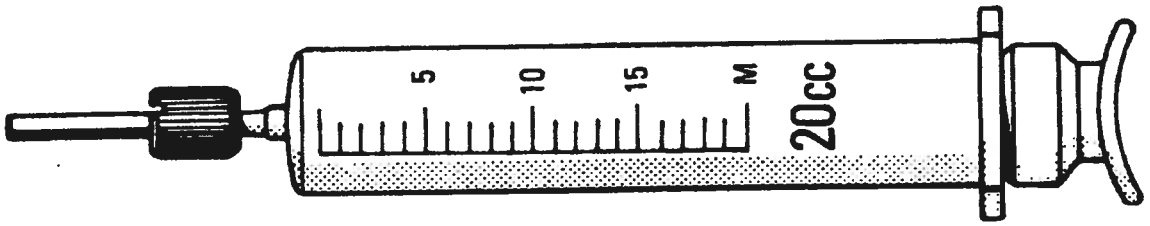
POLYAMID VALVE WRENCH
FIGURE 901



SYRINGE WITH ENDPIECE
FIGURE 902

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ILLUSTRATED PARTS LIST

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ILLUSTRATED PARTS LIST

INTRODUCTION

1. General

The Illustrated Parts List (IPL) is prepared in compliance with ATA 100. The IPL is intended to identify all the components of the unit.

The Illustrated Parts List contains the following sections :

- Introduction
- Vendors Code List
- List of Circuit Symbols (if applicable)
- Alphanumeric Index of Manufacturer's Part Numbers
- Detailed Parts List

2. How to use Detailed Parts List

The Detailed Parts List includes the nomenclature and illustrations of the unit components.

The Detailed Parts List columns are arranged as follows :

- 1st column : Fig. Item - Figure and Item number.
- 2nd column : Part Number - Manufacturer's part number.
- 3rd column : Nomenclature.
- 4th column : Usage code - Effectivity.
- 5th column : Units per Assy. - Quantity per next higher assembly.

A. Figure and Item numbers

The figure number, covering items listed, is indicated on the first line at the top of each page.

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Each part-numbered assembly, sub-assembly or item listed in the parts list is assigned an item number followed by a letter identifying the variant. The basic variant is lettered A.

Assemblies, sub-assemblies and parts listed, but not illustrated, are identified by a dash (-) preceding the corresponding item numbers.

A "lettered index" appearing before the item number is a cross reference to the illustration of the variant called out from the corresponding main figure.

B. Manufacturer's part number

Each of the assemblies, sub-assemblies and detail parts, illustrated or not, is assigned a manufacturer's part number.

When the manufacturer's actual part number exceeds 15 characters, an equivalent assigned part number is listed in the "Part Number" column preceded by the following annotation :

ORDER OVERLGTH... MADE BY V...

Both part numbers are listed in the Alphanumeric Index in their logical order ; the actual overlength part number is cross-referenced to the assigned part number preceded by the annotation, "SEE...".

C. Nomenclature

The nomenclature is indented to show the relationship between the parts listed, as follows :

```
1  2  3  4  5  6  7

Assembly
. Detail parts for assembly
. Sub-assembly
. Attaching parts and/or storage parts for sub-assembly
  + + +
. . Detail parts for sub-assembly
. . Sub-sub-assembly
. . Attaching parts and/or storage parts for sub-
    sub-assembly
    + + +
. . . Detail parts for sub-sub-assembly
      etc.
```

A vendor code is indicated for all items or articles not made by the prime manufacturer of the assembly.

This vendor code or the abbreviation "NP" (non procurable) is placed at the extreme right-hand side of the 1st line of the nomenclature.

D. Effectivity (Usage code)

An alphanumeric usage code indicates the applicability of sub-assemblies and detail parts to the next higher assembly(ies) or sub-assembly(ies).

When the applicability is general, the "Usage Code" column is left blank.

The usage code corresponds to the figure/item number of the next higher assembly(ies) or sub-assembly(ies). e.g., effectivity 1A, 1B, 1C is written 1ABC.

E. Units per assembly

The "Units per Assy" column shows the number of units required for the next higher assembly.
In some cases this information is replaced by the letters RF (reference) or AR (as required).

3. Terms and abbreviations used

- AR : As required
- ATTACHING PARTS
- DELETED
- DET : Detail
- LH and RH : Left and right
- MADE BY
- MADE FROM
- MATCHED PART
- MODIFIED FROM
- NHA : Next higher assembly
- NP : Non procurable
- OPT TO : Optional parts
- ORDER OVERLGTH MPN : Actual part number exceeding 15 characters

- OVERSIZE : Oversize repair parts

R - POST SB : After applying Service Bulletin instructions

- POST AMDT : After incorporation of the Amendment
- R : Modified
- RF : For reference
- SEE
- SEL FROM : Select from parts
- STORAGE PARTS
- SUPSD BY : Superseded by
- SUPSDS : Supersedes
- UNDERSIZE : Undersize repair parts

4. Updating

When an item is revised, added or deleted, the letter "R" is shown in the RH margin (the page date of issue changes).

The letter "R" appears in the RH margin opposite the page number when all the item numbers are changed.

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VENDOR CODE	NAME-ADDRESS
F6117	DASSAULT - BREGUET AVIATION (AVIONS MARCEL) SA 'AMD-BA' 33 R DU PROFESSEUR PAUCHET 92420 VAUCRESSON FRANCE
F6177	SAFT (STE DES ACCUMULATEURS FIXES ET DE TRACTION) SA DPT ACCUMULATEURS 156 AV DE METZ 93230 ROMAINVILLE FRANCE

SAFT

PART NUMBER	AIRLINE PART NUMBER	FIG.	ITEM	TTL REQ	
R00800X190A21A7		1	70A	38	
		1	150A	19	
		1	170A	40	R
		1	250A	20	R
		1	-530A	1	R
043114					
SUPSDS 43114		1	90A	76	
100111		1	190A	80	R
		1	330A	2	
		1	40A	1	
100417		1	20B	1	
100419		1	620A	4	
100422		1	630A	4	R
		1	640A	6	R
		1	705A	2	R
100424		1	300A	4	
100430		1	290A	4	
100431		1	80A	38	
100479		1	180A	40	R
		1	100A	19	
100695		1	200A	20	R
		1	110A	19	
100696		1	210A	20	R
		1	310A	1	
100713		1	270A	1	
100841		1	470A	1	
100880		1	400A	6	
101228		1	410A	7	R
		1	420A	6	
101229		1	430A	8	R
		1	440A	1	
101230		1	450A	1	
101231		1	280A	1	
102226		1	680A	1	
102375					
SUPSD BY 102376		1	690A	3	R
102376					
SUPSDS 102375		1	540A	1	R
102823		1	570A	4	R
102927					R
102940					
SUPSD BY 102944		1	700A	1	R
102941		1	590A	4	R
102942		1	610A	2	R
102943		1	650A	2	R
102944					
SUPSDS 102940		1	580A	4	
102945					

- ITEM NOT ILLUSTRATED

SAFT

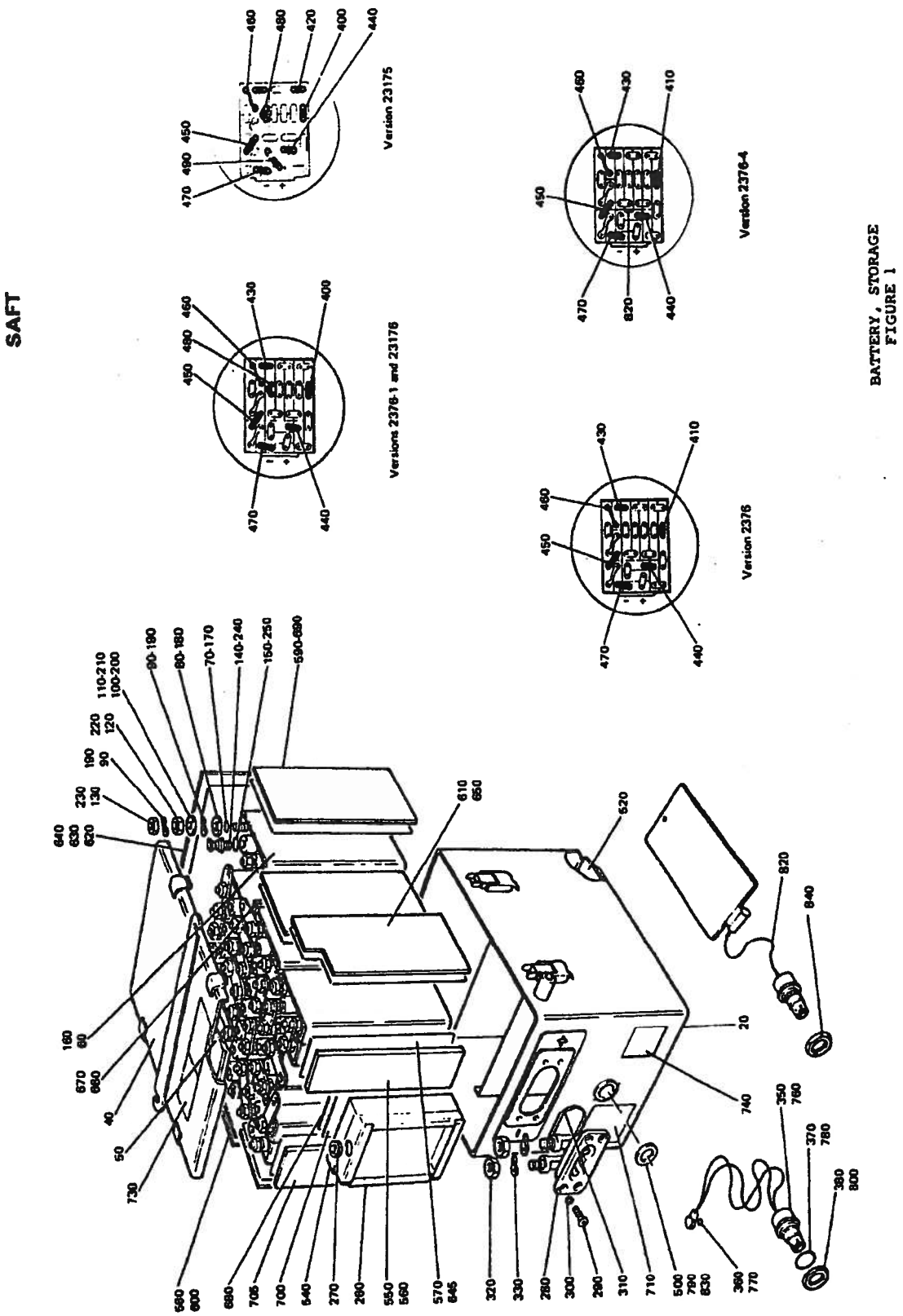
PART NUMBER	AIRLINE PART NUMBER	FIG.	ITEM	TTL REQ	
102990		1	645A	2	R
103489		1	490A	1	
105405		1	360A	1	
		1	770A	1	R
112696		1	260A	1	
112965		1	380A	1	
112967		1	370A	1	
112977		1	-510A	1	R
113442		1	-390A	1	
113604		1	50A	1	
114301		1	- 10B	1	
114318		1	- 30A	1	
114557		1	- 10A	1	
114722		1	-750A	1	R
114724		1	790A	1	R
114735		1	480A	1	
115266		1	-810A	1	R
115731		1	20C	1	R
115763		1	800A	1	R
115764		1	780A	1	R
115807		1	760A	1	R
115917		1	- 10C	1	R
115922		1	660A	2	
115923		1	670A	1	R
116311		1	350A	1	
116312		1	-340A	1	R
116390					R
SUPSD BY 411108					
116733		1	500A	1	
116767		1	20A	1	
116778		1	550A	2	
117013		1	560A	4	R
117026		1	-720A	1	R
161703		1	260B	1	R
166859		1	840A	1	R
166861		1	-850A	1	R
166900		1	820A	1	R
166925		1	-305A	1	R
18170		1	600A	2	
19167		1	520A	1	R
23175		1	- 1A	RF	
23176		1	- 1B	RF	
2376		1	- 1C	RF	
2376-1		1	- 1D	RF	R
2376-4		1	- 1E	RF	R
31282		1	730A	2	
34031		1	740A	1	

- ITEM NOT ILLUSTRATED

SAFT

PART NUMBER	AIRLINE PART NUMBER	FIG.	ITEM	TTL REQ	
410535		1	20D	1	R
410536		1	- 10D	1	R
411108		1	710A	1	R
SUPSDS 116390					
411426		1	-515A	1	R
43114					R
SUPSD BY 043114					
57012		1	460A	3	
62000		1	130A	38	
		1	230A	40	R
		1	320A	2	
62023		1	120A	38	
		1	220A	40	R
63415		1	60A	19	
		1	160A	20	R
7788		1	830A	1	R
80010		1	140A	19	
		1	240A	20	R

- ITEM NOT ILLUSTRATED


SAFT
Version 23175
Versions 2378-1 and 23176
Version 2376-4
Version 2376
BATTERY, STORAGE
FIGURE 1

SAFT

FIG. ITEM	PART NUMBER	NOMENCLATURE 1234567	USAGE CODE	UNITS PER ASSY	
1 - 1A	23175	BATTERY,STORAGE		RF	
- 1B	23176	BATTERY,STORAGE		RF	
- 1C	2376	BATTERY,STORAGE		RF	
- 1D	2376-1	BATTERY,STORAGE		RF	R
- 1E	2376-4	BATTERY,STORAGE		RF	R
- 10A	114557	.BATTERY BOX	1AB	1	
- 10B	114301	.BATTERY BOX	1C	1	
- 10C	115917	.BATTERY BOX	1D	1	R
- 10D	410536	.BATTERY BOX	1E	1	R
20A	116767	..BATTERY BOX	10A	1	
20B	100419	..BATTERY BOX	10B	1	
20C	115731	..BATTERY BOX	10C	1	R
20D	410535	..BATTERY BOX	10D	1	R
- 30A	114318	..COVER,ACCES		1	
40A	100417	...COVER,BATTERY BOX		1	
50A	113604	...GASKET		1	
60A	63415	.BATTERY,STORAGE	1A	19	
70A	R00800X190A21A7	..PACKING,PREFORMED . . VF6117		2	
80A	100479	..WASHER,FLAT		2	
90A	100111	..WASHER,SPRING TENSION . . .		4	
100A	100695	..WASHER,NONMETALLIC		1	
110A	100696	..WASHER,NONMETALLIC		1	
120A	62023	..NUT,PLAIN,HEXAGON		2	
130A	62000	..NUT,PLAIN,HEXAGON		2	
140A	80010	..FILLER CAP,BATTERY		1	
150A	R00800X190A21A7	..PACKING,PREFORMED . . VF6117		1	
160A	63415	.BATTERY,STORAGE	1BCDE	20	R
170A	R00800X190A21A7	..PACKING,PREFORMED . . VF6117		2	R
180A	100479	..WASHER,FLAT		2	R
190A	100111	..WASHER,SPRING TENSION . . .		4	R
200A	100695	..WASHER,NONMETALLIC		1	R
210A	100696	..WASHER,NONMETALLIC		1	R
220A	62023	..NUT,PLAIN,HEXAGON		2	R
230A	62000	..NUT,PLAIN,HEXAGON		2	R
240A	80010	..FILLER CAP,BATTERY		1	R
250A	R00800X190A21A7	..PACKING,PREFORMED . . VF6117		1	R
260A	112696	.BLOCK	1ABCD	1	R
260B	161703	.CHANNEL,STRUCTURAL	1E	1	R
270A	100841	.GROMMET,NONMETALLIC	1ABD	1	R
280A	102226	.CONNECTOR,RECEPTACLE, ... ELECTRICAL		1	
		ATTACHING PARTS			
290A	100431	.SCREW		4	
300A	100430	.WASHER,LOCK		4	
		* * *			
-305A	166925	.GUARD,ELECTRICAL CONNECTOR .		1	R
310A	100713	.PACKING,PREFORMED		1	

- ITEM NOT ILLUSTRATED

SAFT

FIG. ITEM	PART NUMBER	NOMENCLATURE 1234567	USAGE CODE	UNITS PER ASSY	
1 320A	62000	.NUT,PLAIN,HEXAGON		2	
330A	100111	.WASHER,SPRING TENSION		2	
-340A	116312	.SWITCH,THERMOSTATIQUE	1AB	1	R
350A	116311	..THERMOSTAT ASSEMBLY		1	
360A	105405	..NUT,SELF-LOCKING,HEXAGON . .		1	
370A	112967	..PACKING,PREFORMED		1	
380A	112965	..NUT,PLAIN,HEXAGON		1	
-390A	113442	..COVER,ELECTRICAL CONNECTOR		1	
400A	101228	.LINK,BATTERY TERMINAL	1ABD	6	R
410A	101228	.LINK,BATTERY TERMINAL	1CE	7	R
420A	101229	.LINK,BATTERY TERMINAL	1A	6	
430A	101229	.LINK,BATTERY TERMINAL	1BCDE	8	R
440A	101230	.LINK,BATTERY TERMINAL		1	
450A	101231	.LINK,BATTERY TERMINAL		1	
460A	57012	.LINK,BATTERY TERMINAL		3	
470A	100880	.LINK,BATTERY TERMINAL		1	
480A	114735	.LINK,BATTERY TERMINAL	1ABD	1	R
490A	103489	.LINK,BATTERY TERMINAL	1A	1	
500A	116733	.WASHER,FLAT	1AB	1	
-510A	112977	.BLOCK	1A	1	R
-515A	411426	.KIT,SPACER	1E	1	R
520A	19167	.INSULATOR,PLATE		1	R
-530A	043114	.INSULATOR,PLATE		1	R
540A	102823	.INSULATOR,PLATE		1	R
550A	116778	.INSULATOR,PLATE	1ABE	2	R
560A	117013	.INSULATOR,PLATE	1C	4	R
570A	102927	.INSULATOR,PLATE		4	R
580A	102945	.INSULATOR,PLATE		4	
590A	102942	.INSULATOR,PLATE		4	R
600A	18170	.INSULATOR,PLATE		2	
610A	102943	.INSULATOR,PLATE		2	R
620A	100422	.INSULATOR,PLATE	1A	4	
630A	100422	.INSULATOR,PLATE	1BD	4	R
640A	100422	.INSULATOR,PLATE	1CE	6	R
645A	102990	.INSULATOR,PLATE		2	R
650A	102944	.INSULATOR,PLATE		2	R
660A	115922	.INSULATOR,PLATE	1ABD	2	R
670A	115923	.INSULATOR,PLATE	1ABD	1	R
680A	102375	.INSULATOR,PLATE		1	R
690A	102376	.INSULATOR,PLATE		3	R
700A	102941	.INSULATOR,PLATE		1	R
705A	100424	.INSULATOR,PLATE	1D	2	R
710A	411108	.PLATE,INSTRUCTION		1	R
-720A	117026	.PLASTIC STRIP,PRESSURE SENSITIVE ADHESIVE COATED		1	R
730A	31282	.LABEL		2	
740A	34031	.LABEL		1	

- ITEM NOT ILLUSTRATED

SAFT

FIG.ITEM	PART NUMBER	NOMENCLATURE 1234567	USAGE CODE	UNITS PER ASSY	
1 -750A	114722	.THERMOSTAT ASSEMBLY	1D	1	R
760A	115807	..THERMOSTAT ASSEMBLY		1	R
770A	105405	..NUT,SELF-LOCKING,HEXAGON . .		1	R
780A	115764	.PACKING,PREFORMED	1D	1	R
790A	114724	.WASHER,FLAT	1D	1	R
800A	115763	.NUT,PLAIN,HEXAGON	1D	1	R
-810A	115266	.CAP-PLUG,PROTECTIVE,DUST AND MOISTURE SEAL	1D	1	R
820A	166900	.TEMPERATURE SENSOR	1E	1	R
830A	7788	.WASHER,FLAT	1E	1	R
840A	166859	.NUT,PLAIN,HEXAGON	1E	1	R
-850A	166861	.CAP	1E	1	R

- ITEM NOT ILLUSTRATED