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 D. Kerr	7 NOV. 2012	ECL ENGINEERING
PREPARED BY:			
CHECKED BY:	C. Timmins C. Timmins	7th NOV, 2012	ECL ENGINEERING
CHECKED BY:	M. Merritt M. Merritt	2012-11-08	ECL QUALITY ASSURANCE
APP'D / ACCEPTED (Civil A/W Authority)	SEE COMPLIANCE CHECKSHEET C. Timmins	19th NOV 2012	TCCA
RELEASED BY:	R. Manson R. Manson	23 NOV 2012	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)	D. Kerr 13 Aug., 2010	C. Timmins 13 Aug., 2010	TCCA 28 Oct., 2010	R. Manson 1 Nov., 2010
10	1 through 53 A to A11 B1 to B61	Provide reference to SB 53.00.43 for MOD OP-4309. Wiring drawings revised. Revised Appendix A as per Concorde Component Maintenance Manual Revision L. Section 8 revised. Tail boom ballast label revised. (Pages 4 to 6, 8, 10 to 20, 23 to 29, 31 to 36, 38 to 41 & 43 to 53, all Appendix A)	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 5.

NOTE: Refer to SB No. AS350-53.00.43 for MOD OP-4309 to improve tailboom thermal protection on lengthy hover flight manouvers for the AS 350 B3.

The Battery Relocation consists of the following main components:

Detachable Provisions

- Battery Tray Assembly (Refer to Figure 2)
- Battery (Refer to Figures 5 and 6)
- Battery Harness (Refer to Figure 2)
- Access Door (Refer to Figures 11 and 12)

Fixed Provisions

- Skin Doublers (Refer to Figure 2)
- Base (Refer to Figures 7, 8, 9 and 10)
- LH and RH Frame (Refer to Figures 3 and 6)
- FWD and AFT Stiffener (Refer to Figures 7, 8, 9 and 10)

For AS 350 PRE AMS 07-3273 and 3274, the fuse holder assembly is located in the tailboom. Refer to Figure 3.

For AS 350 B2/B3 AMS 07 4280 the fuse holder assembly is removed from the tailboom.

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 10.

For AS 350 Harness routing in the tail boom for PRE AMS 07-3273 and 3274 refer to Figure 7. For AS 350 Harness routing in the tail boom for POST AMS 07-3273 and 3274 refer to Figure 8.For AS 350 Harness routing in the tailboom for MOD AMS 07-4280 (AS 350 B3) refer to Figure 9. For AS 355 Harness routing refer to Figure 10.

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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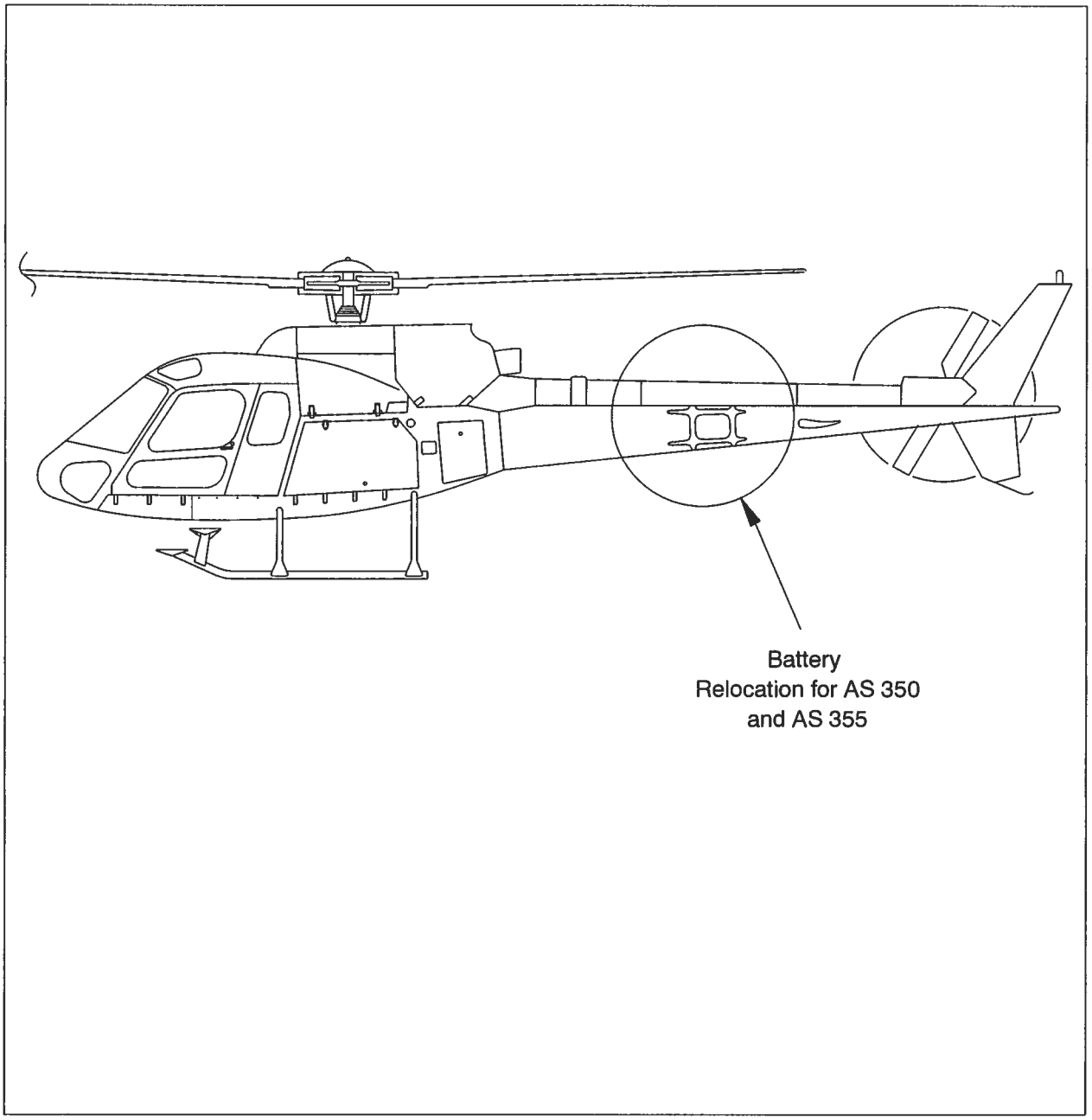

Figure 1 General Layout

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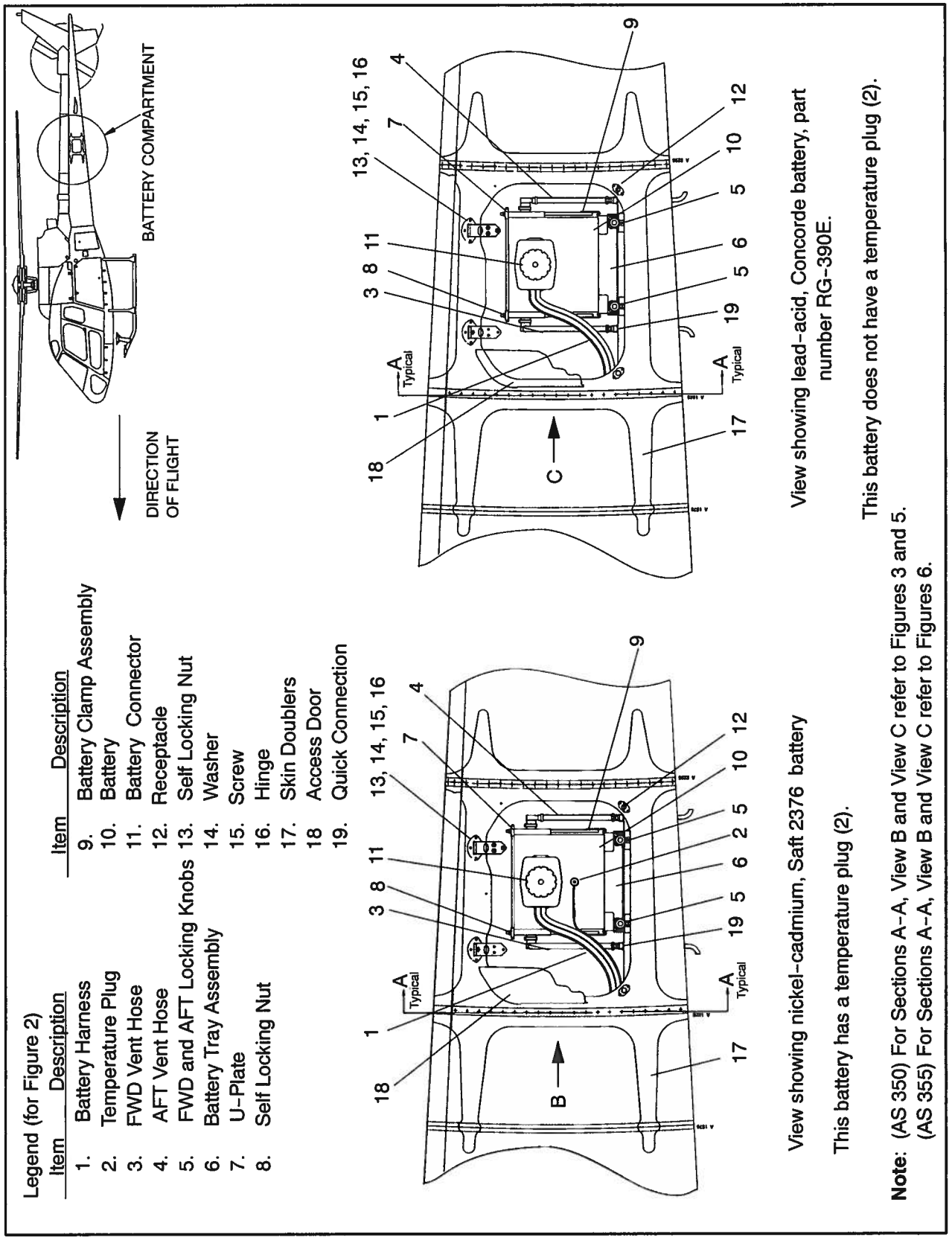

Figure 2 AS 350 and AS 355 Battery Compartment (main views)

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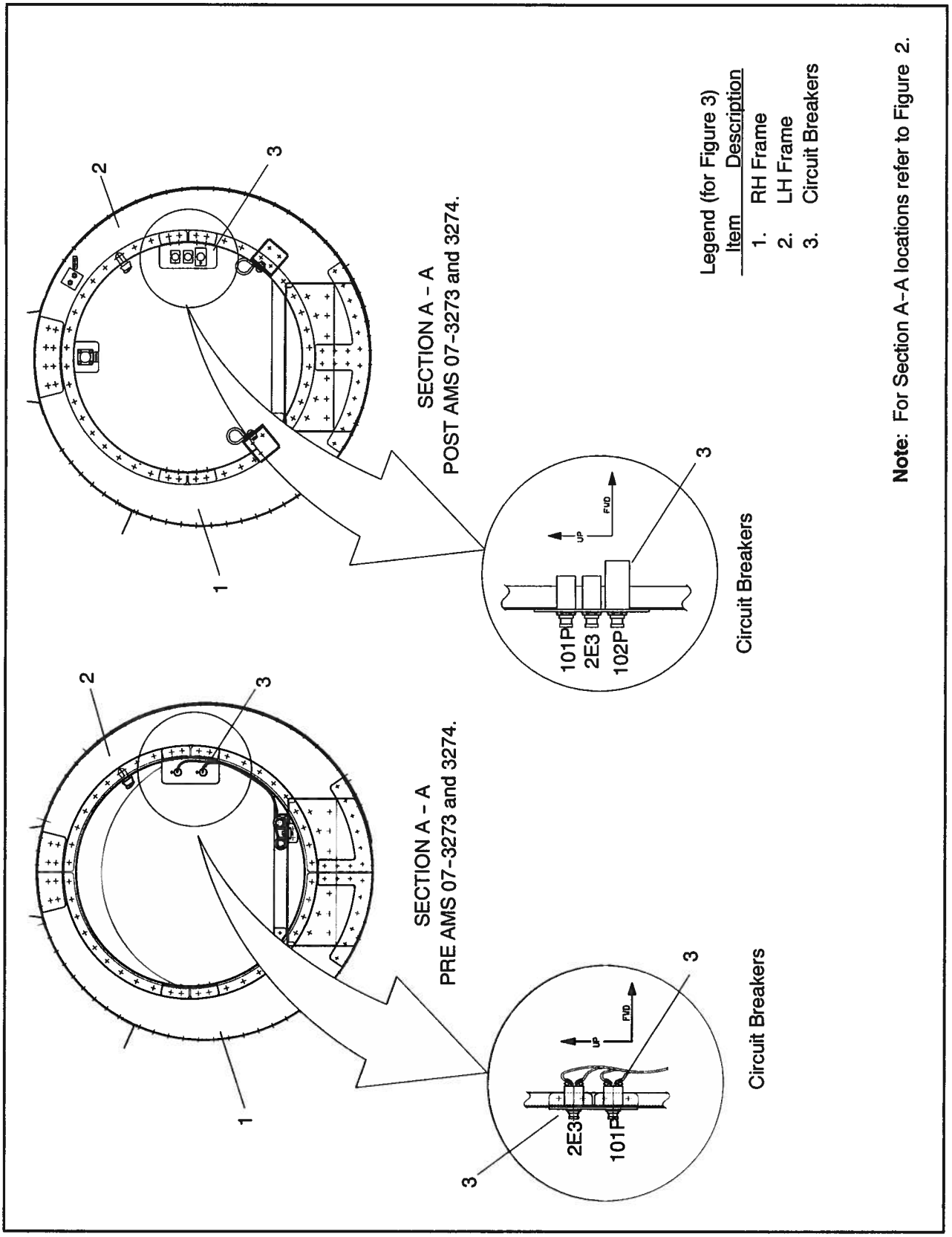

Figure 3 AS 350 Battery Compartment PRE and POST AMS 07-3273 and 3274 (detail views STN A 1825)

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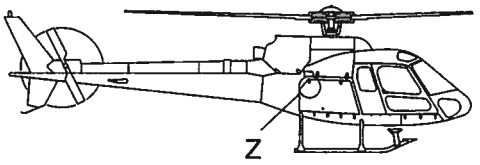
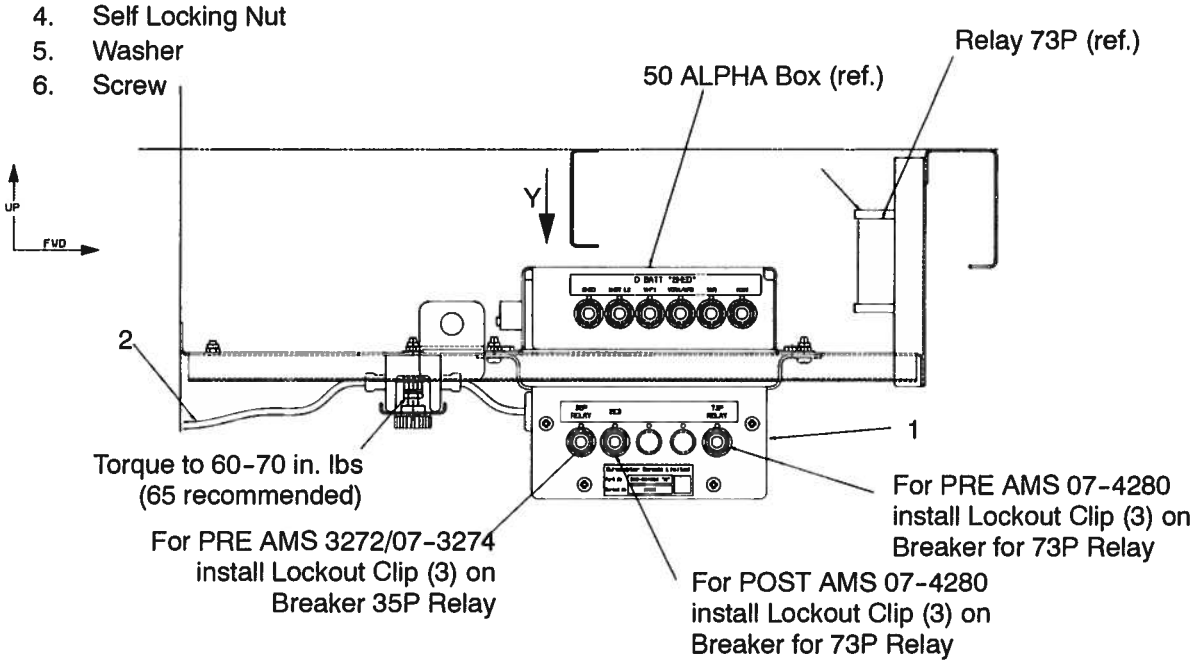
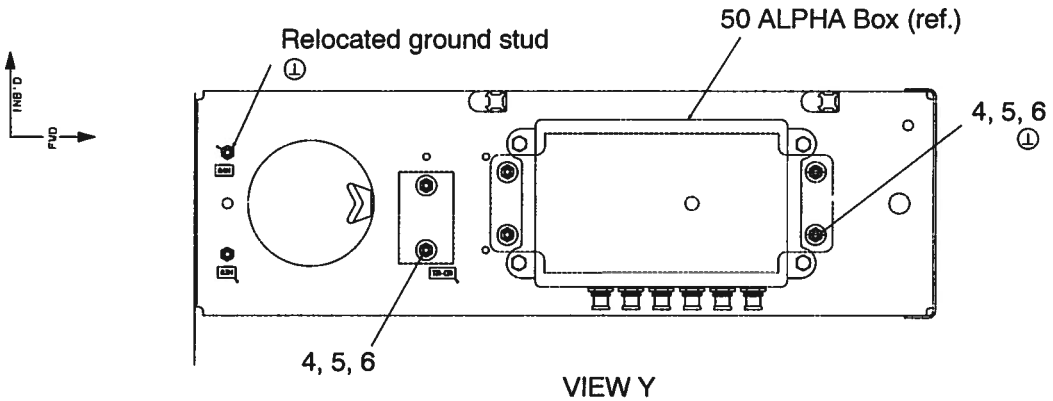
Legend (for Figure 4)

Item	Description
1.	Direct Battery Bus Circuit Breaker Box (part of Battery Harness, item 2)
2.	Battery Harness
3.	Lockout Clip
4.	Self Locking Nut
5.	Washer
6.	Screw





VIEW Z
Looking inboard at the Direct Battery Bus Circuit Breaker Box



VIEW Y
Looking down on Shelf

⏚ Contact between mating surfaces to be free from protective coating. Before installation, apply electrical joint compound.

NOTE:

Figure 4 AS 350 Direct Battery Bus Circuit Breaker Box (POST AMS 07-4280)

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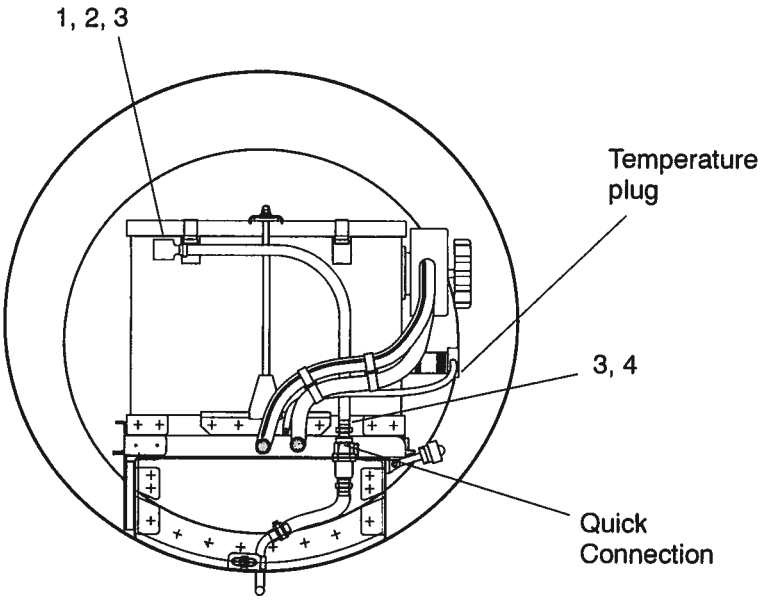
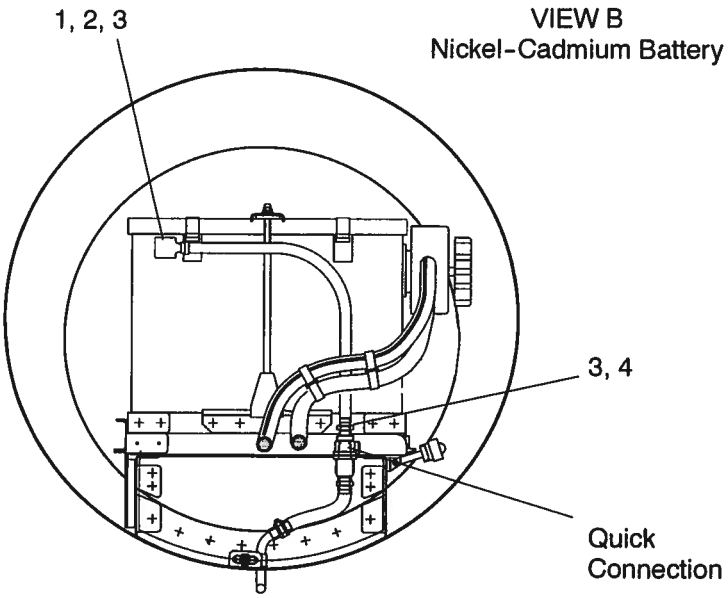
Legend (for Figure 5)

Item	Description
1.	Elbow
2.	Hose Clamp
3.	Tywrap
4.	Hose Barb



VIEW B
Nickel-Cadmium Battery



VIEW C
Lead-Acid Battery

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

NOTE:

Figure 5 AS 350 Battery Compartment (detail views)

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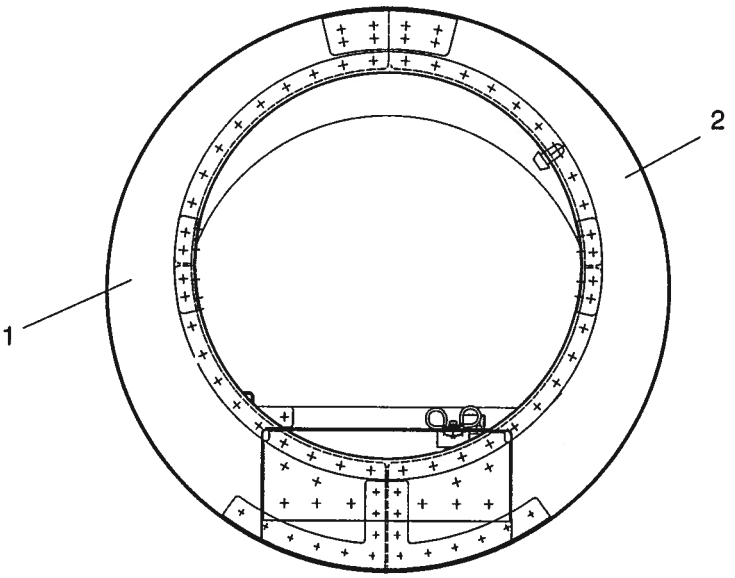
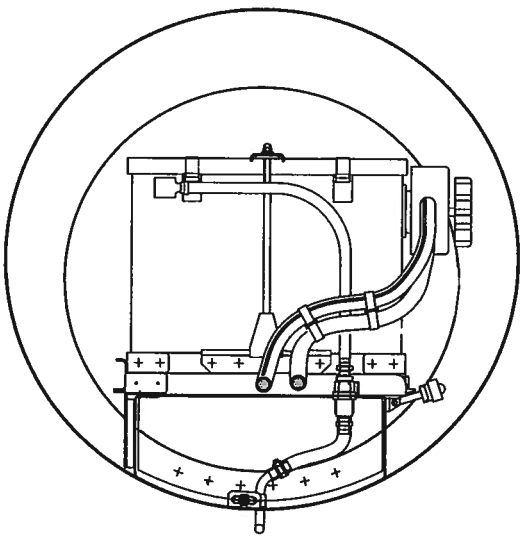
Legend (for Figure 6)

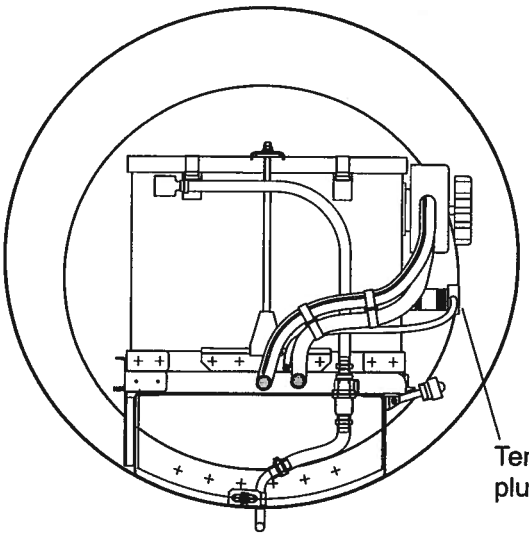
Item	Description
1.	RH Frame
2.	LH Frame



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 6 AS 355 Battery Compartment (detail views STN A 1825)

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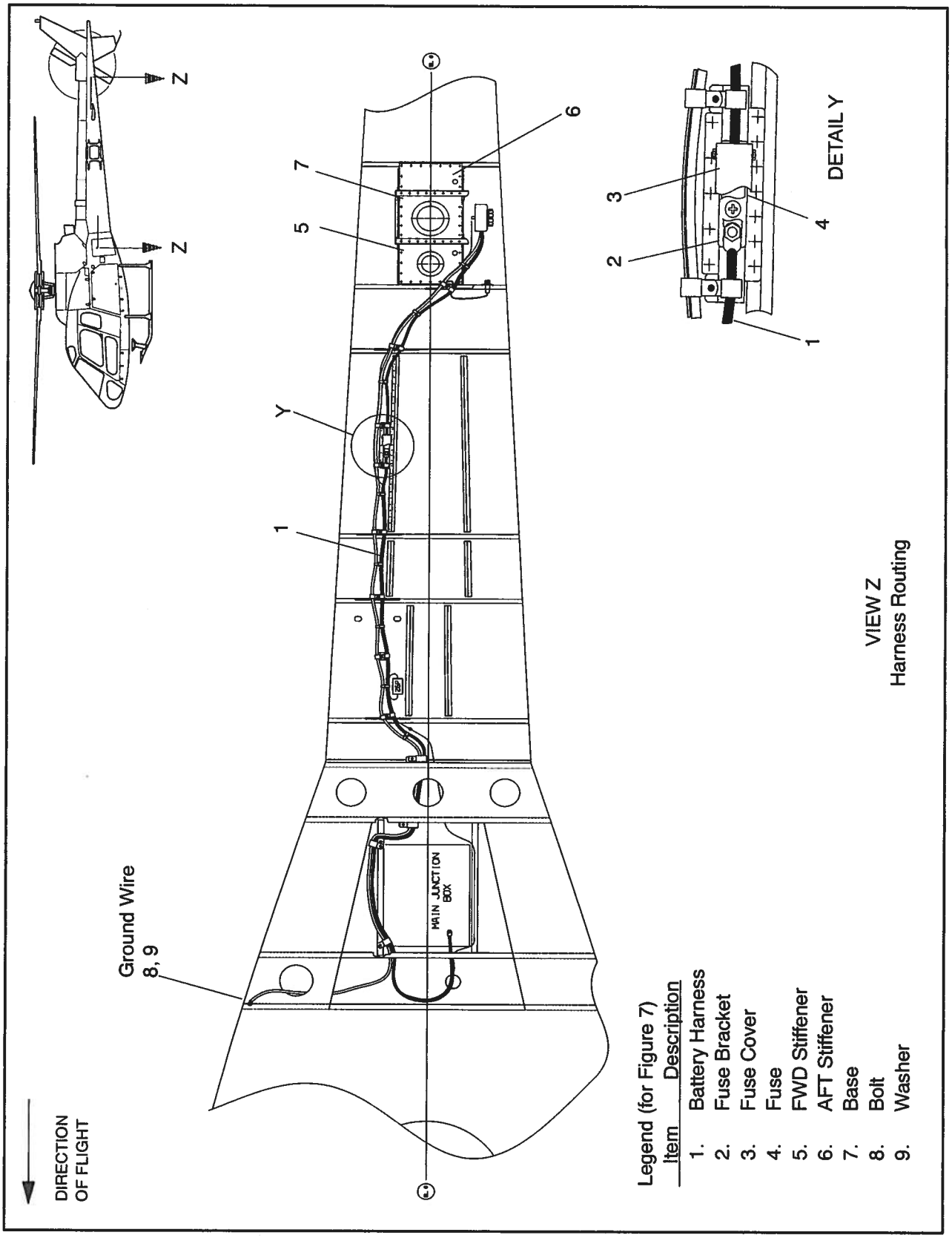

Figure 7 AS 350 Harness Routing - Tail Boom PRE AMS 07-3273 and 3274

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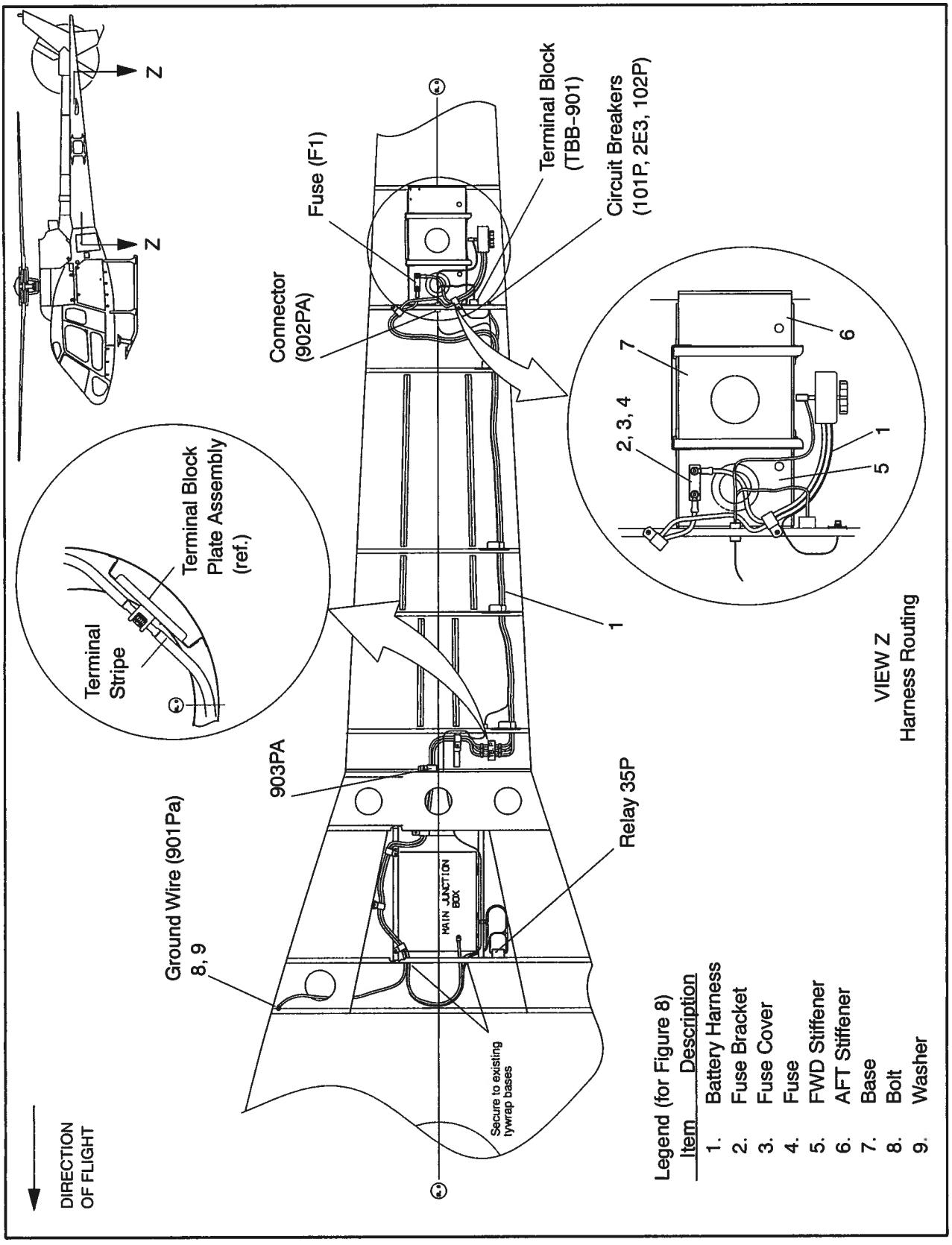

Figure 8 AS 350 Harness Routing - Tail Boom POST AMS 07-3273 and 3274

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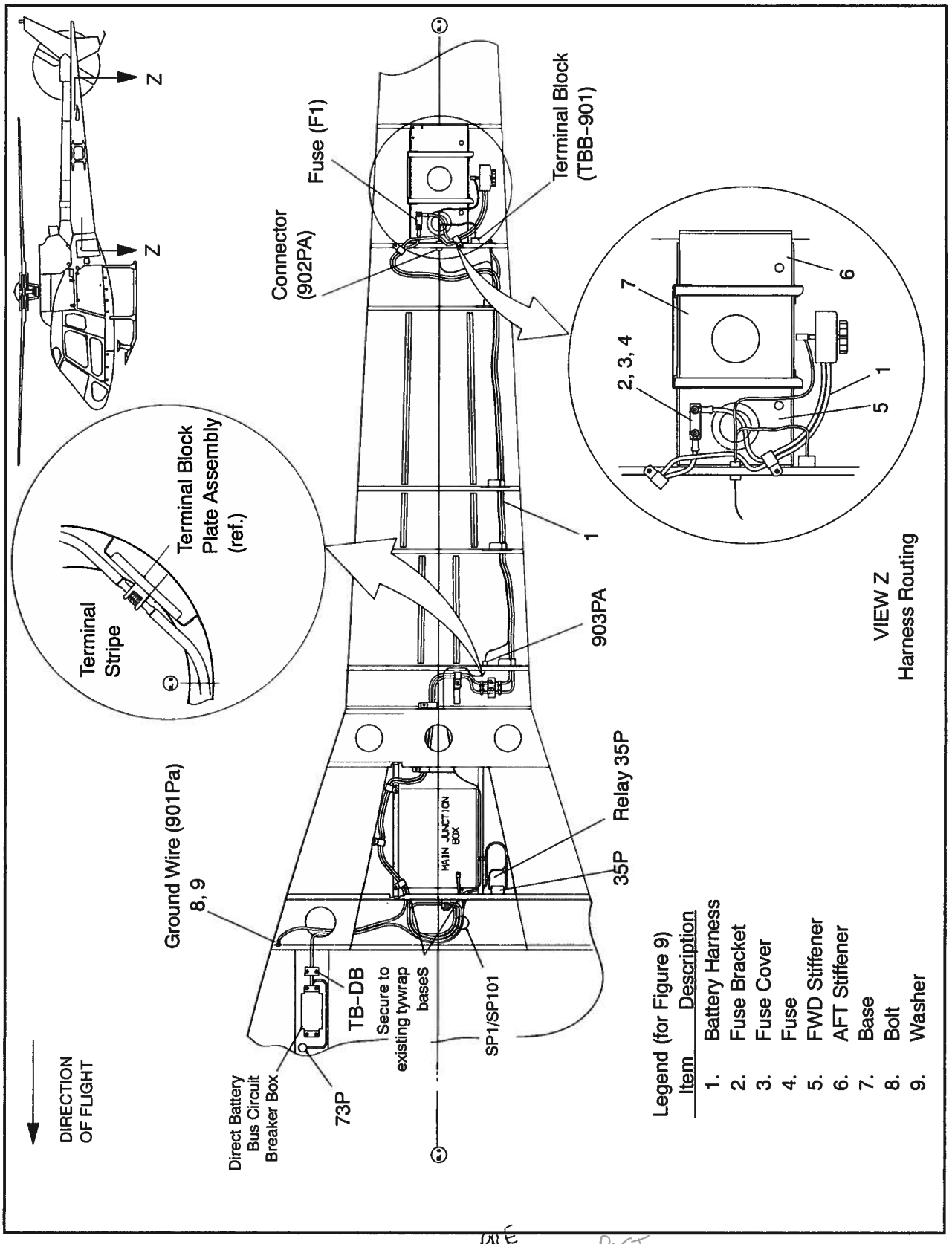

PRE POST

Figure 9 AS 350 Harness Routing - Tail Boom MOD AMS 07-4280 (AS 350 B3 only)

Transport Canada - Accepted

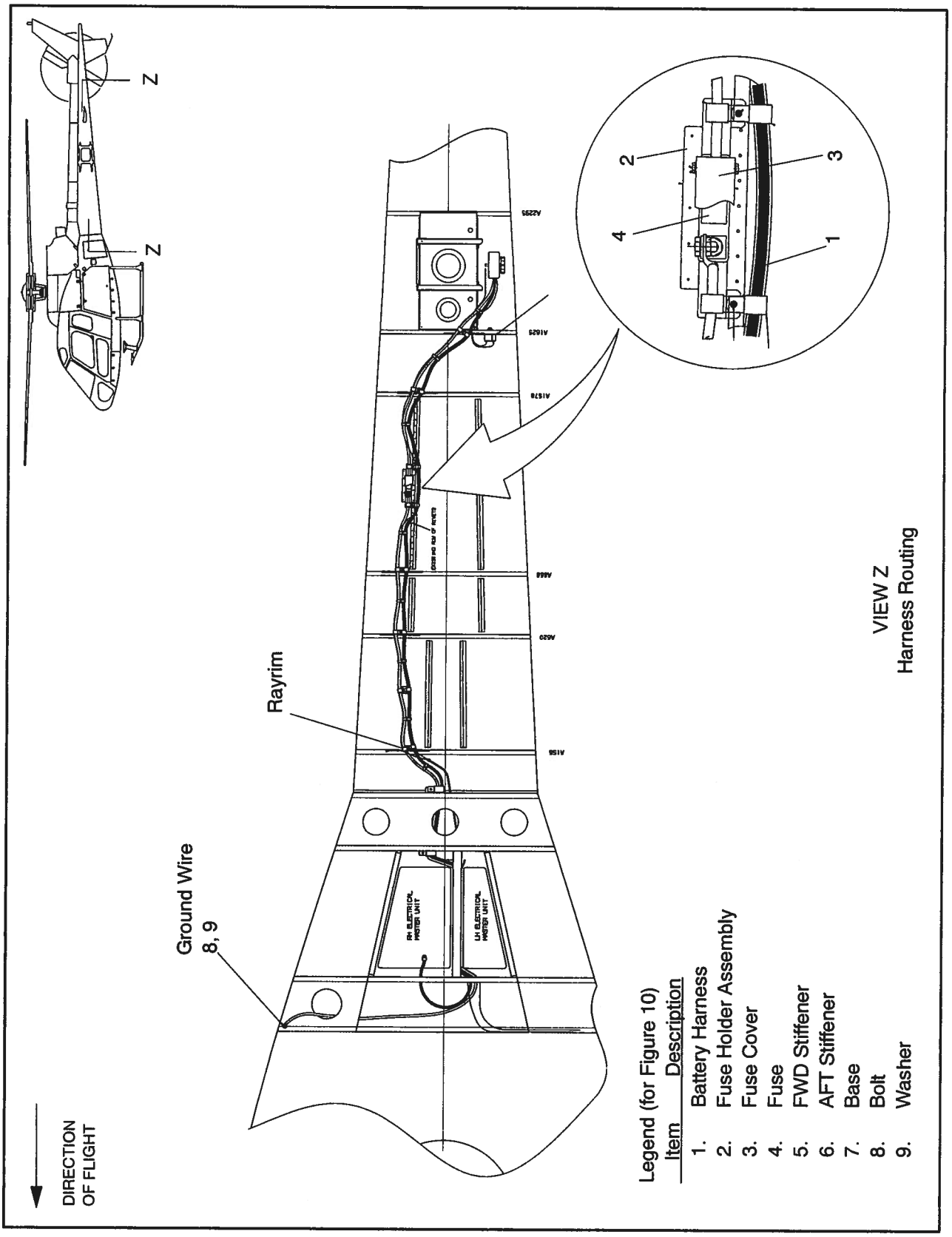

Figure 10 AS 355 Harness Routing - Tail Boom

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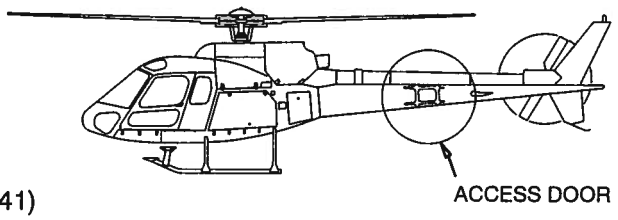

Legend (for Figure 11)

Item	Description
1.	Access Door
2.	Neoprene Closed Cell Sponge (P/N SC41)
3.	1/4 Turn Fastener
4.	Retaining Ring
5.	Plastic Washers (on newer version of the access door only)
6.	Sealant (P/N PR 1422-B2)

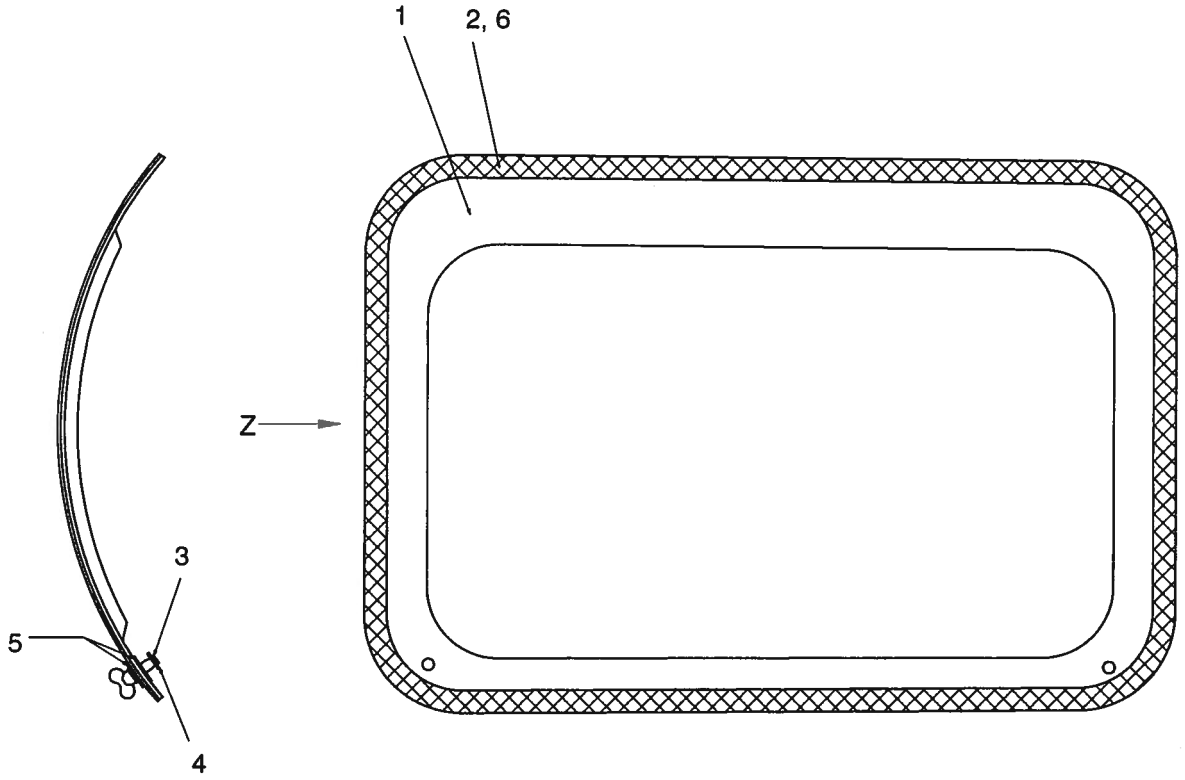

Figure 11 Access Door

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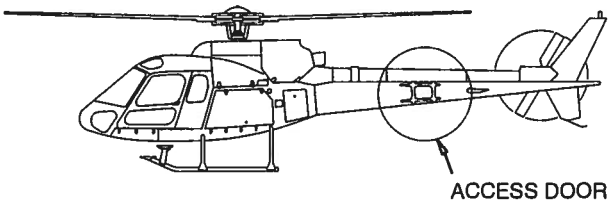
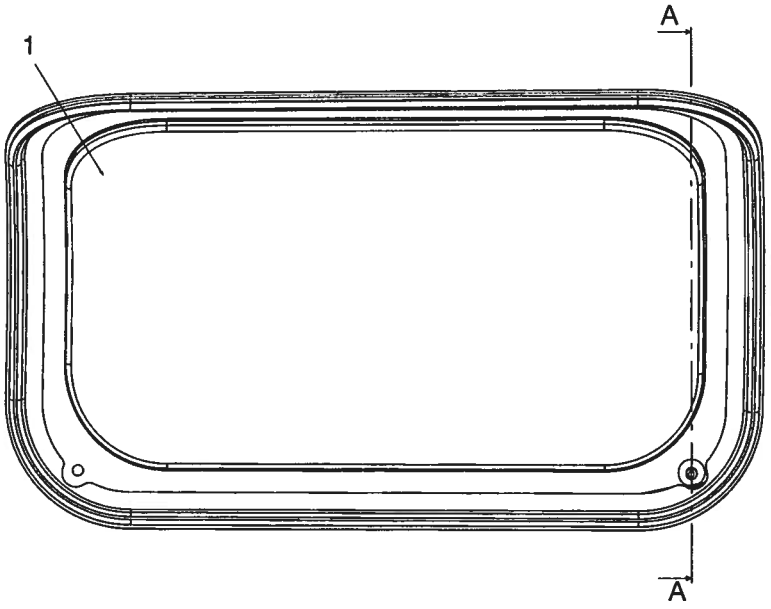
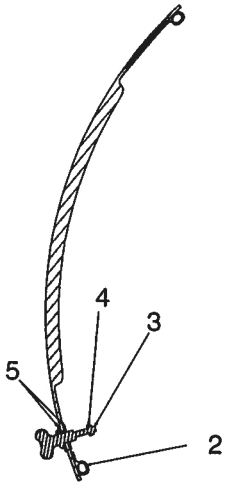


Legend (for Figure 12)

Item	Description
1.	Access Door
2.	P-Seal (P/N 1952)
3.	1/4 Turn Fastener
4.	Retaining Ring
5.	Plastic Washers (on newer version of the access door only)
6.	Adhesive (P/N 3M1300L or 3M1300)



FRONT VIEW



SECTION A - A

Figure 12 Access Door (continued)

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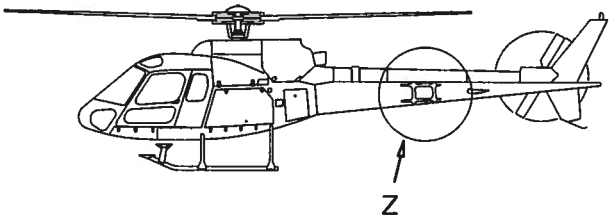
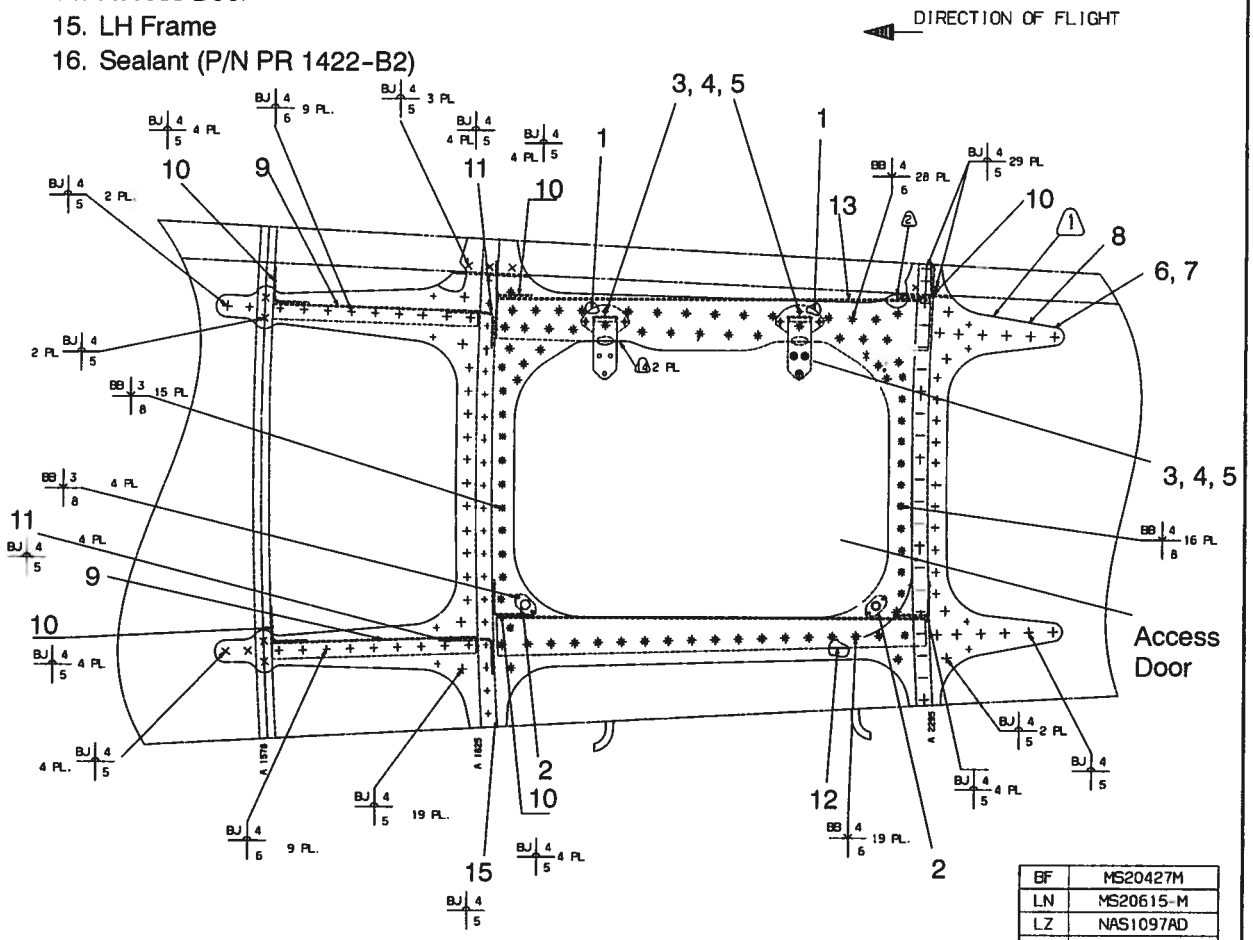
Legend (for Figure 13)

Item	Description
1.	Hinge
2.	Receptacle
3.	Self Locking Nuts
4.	Washers
5.	Screws
6.	Outter Skin Doubler
7.	Inner Skin Doubler
8.	Sealant (P/N PR 1422-B2)
9.	TC Stiffener
10.	Stiffener Clip
11.	Stiffener Clip
12.	Lower Stiffener
13.	Upper Stiffener
14.	Access Door
15.	LH Frame
16.	Sealant (P/N PR 1422-B2)





BF	MS20427M
LN	MS20615-M
LZ	NAS1097AD
BB	MS20426AD
BJ	MS20470AD
CODE	RIVET TYPE
RIVET CODE PER NAS 523	

VIEW Z
Showing Doublers, Access Door and Receptacles

⚠1 Seal Seam using sealant (16).

NOTE:

Figure 13 Tailboom Details

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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
AMS 07 4280	Avis de Modification Serie 07 4280 Option of Modification Series AMS 07 4280
AMM	Aircraft Maintenance Manual
IP-ECL-6	Installation Procedure, Battery Relocation
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

D. ABBREVIATIONS & DEFINITIONS

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

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1. **GENERAL** (continued)

E. **UNITS OF MEASUREMENT**

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

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.

For information on operating the Concorde RG® Series Main Aircraft Battery, refer to the Concorde Battery Corporation, Component Maintenance Manual, Document Number 5-0171, ATA 24-30-71, March 11, 2011 (Appendix A).

For information on operating the nickel-cadmium battery SAFT 2376 Series, refer to the SAFT Component Maintenance Manual with Illustrated Parts List, Document Number 25-35-06, October 30, 1990 (Appendix B).

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 the Concorde RG® Series Main Aircraft Battery, refer to the Concorde Battery Corporation, Component Maintenance Manual, Document Number 5-0171, ATA 24-30-71, March 11, 2011 (Appendix A).

If operating with the nickel-cadmium battery SAFT 2376 Series, refer to the SAFT Component Maintenance Manual with Illustrated Parts List, Document Number 25-35-06, October 30, 1990 (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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4. **INSPECTION SCHEDULE AND MAINTENANCE ACTION** (continued)

4.1.4. Every 150 FH or 12 M (Margin: 15 FH or 36 D) to coincide with the 150 FH or 12 M helicopter inspection) whichever occurs first:

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. If damaged, contact ECL for replacement parts. Refer to Section 8 for removal and replacement of the battery connector.
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. Also refer to EC, AS 350 (except B2/B3) and AS 355, MET, Chapter 24.30.00.201. For the AS 350 B2/B3 refer to EC, AMM 24-33-00, 2-1.
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. Refer to Section 8 for removal and replacement of vent hoses.
E	- 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. Refer to Section 8 for removal and replacement of battery tray.

Table 4 Inspection Schedule and Maintenance Action
Every 150 FH or 12 M to coincide with the 150 FH or 12 M helicopter inspection, whichever occurs first
(continued on following page)

4. **INSPECTION SCHEDULE AND MAINTENANCE ACTION** (continued)

4.1.4. Every 150 FH or 12 M (Margin: 15 FH or 36 D) to coincide with the 150 FH or 12 M helicopter inspection) whichever occurs first:

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
F	- Check battery tray assembly, item 6 in Figure 2 for:	
	a. security	a. Re-tighten as required.
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. Refer to Section 8 for removal and replacement of U-plate and battery clamp.
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. Refer to Section 8 for removal and replacement of mounting hardware.
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.

Table 4 Inspection Schedule and Maintenance Action
Every 150 FH or 12 M to coincide with the 150 FH or 12 M helicopter inspection, whichever occurs first
(continued on following page)

4. **INSPECTION SCHEDULE AND MAINTENANCE ACTION** (continued)

4.1.4. Every 150 FH or 12 M (Margin: 15 FH or 36 D) to coincide with the 150 FH or 12 M helicopter inspection) whichever occurs first:

ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
J	- Visually inspect skin doubler, 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. Refer to Section 8 for removal and replacement of skin doubler.

Table 4 Inspection Schedule and Maintenance Action
Every 150 FH or 12 M to coincide with the 150 FH or 12 M helicopter inspection, whichever occurs first
(continued on following page)

4. **INSPECTION SCHEDULE AND MAINTENANCE ACTION** (continued)

4.1.4. Every 150 FH or 12 M (Margin: 15 FH or 36 D) to coincide with the 150 FH or 12 M helicopter inspection) whichever occurs first:

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 Concorde RG® Series Main Aircraft Battery, Component Maintenance Manual.	Refer to the Concorde RG® Series Main Aircraft Battery, Component Maintenance Manual, Appendix A.
L	- Visually inspect circuit breakers (PRE & POST AMS 07-3273 and 3274), item 3, in Figure 3, for:	
	a. secure mounting	a. Secure as required.
	b. general condition (physical damage)	b. Contact ECL for replacement parts.
M	- Check mounting hardware, items 4, 5 and 6 securing the 50 ALPHA Box in Figure 4, for:	
	a. Secure mounting	a. Secure as required.
N	- Visually inspect Battery Harness, item 1 in Figures 7, 8, 9 and 10 for:	
	a. cracks, fraying, burns and chaffing	a. Contact ECL for replacement harness and refer to IP-ECL-6 for installation instructions.
	b. loose connections	b. Re-tighten as required
	c. security	c. Re-tighten as required.
O	- Visually inspect access door seal, item 2 , in Figure 11 and 12, 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.
P	- Check access door latching hardware, items 3, 4 and 5 in Figure 11 and 12, for:	
	a. proper latching	a. Check for freedom of movement

Table 4 Inspection Schedule and Maintenance Action
Every 150 FH or 12 M to coincide with the 150 FH or 12 M helicopter inspection, whichever occurs first
(continued on following page)

4. **INSPECTION SCHEDULE AND MAINTENANCE ACTION** (continued)

4.1.4. Every 150 FH or 12 M (Margin: 15 FH or 36 D) to coincide with the 150 FH or 12 M helicopter inspection) whichever occurs first:

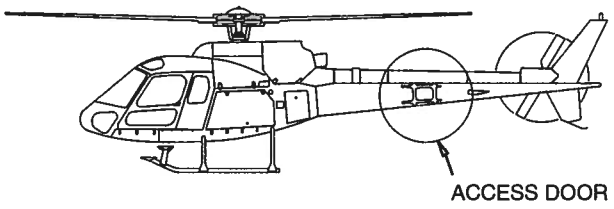
ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
Q	- Visually inspect access door, item 1, in Figure 9 for: a. cracking, depression, delamination or a hole	 a. No cracking, depression, delamination or holes allowed. Minor repairs may be accomplished in accordance with EC, MTC, Chapter 20.03.07.101 or AC-43.13-1B, Chapter 3, Section 3.1 to 3.4. For major repairs, contact ECL for repair information.
R	- Check placards and markings (refer to Section 10) for: a. legibility b. secure mounting	 a. If placard has become illegible, contact ECL for replacement parts. b. Secure or reattach placards as required.

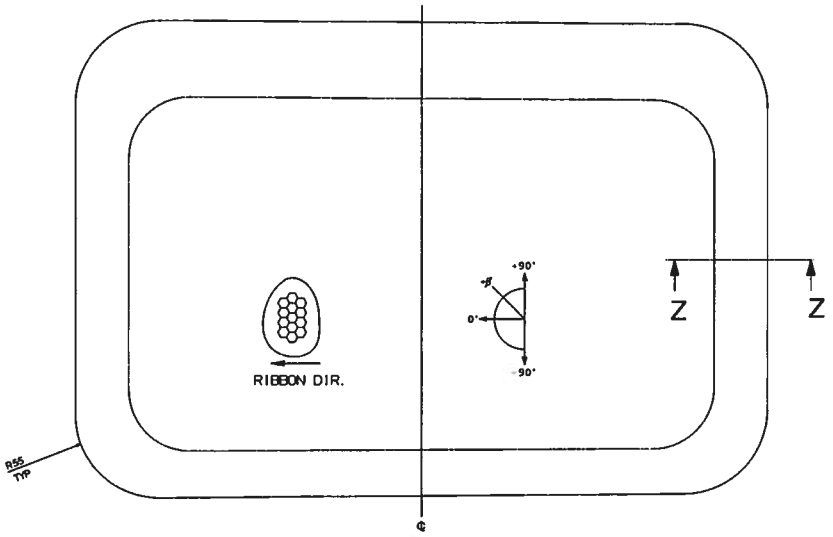
Table 4 Inspection Schedule and Maintenance Action
Every 150 FH or 12 M to coincide with the 150 FH or 12 M helicopter inspection, whichever occurs first

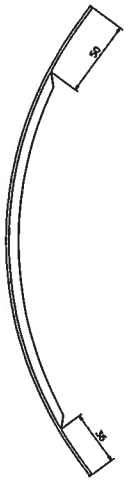
4.1.5. Every 600 FH or 24 M (Margins: 60 FH or 73 D)to coincide with the 600 hrs or 24 months helicopter inspection, whichever occurs first:

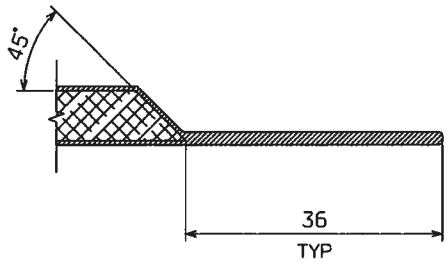
ITEM	INSPECTION OR MAINTENANCE WORK	CORRECTIVE ACTION
A	- If nickel-cadmium, Saft 2376 battery type is installed, VIEW B in Figure 4, check temperature sensor harness connection and condition, check "BATT TEMP" warning light on warning caution panel.	Check battery temperature sensor in accordance with EC, AS 350 (except AS 350 B2/B3) MET, Chapter 24.30.00.502. For AS 350 B2/B3 refer to EC, AMM, 24-33-00, 5-1.
B	- Visually inspect battery ground wire hardware in rear cargo hold, items 8 and 9 in Figures 7, 8, 9 and 10 for: a. security	 a. Secure as required.

Table 5 Inspection Schedule and Maintenance Action
Every 600 FH or 24 M to coincide with the 600 FH or 24 M helicopter inspection, whichever occurs first









SECTION Z - Z
(NOT TO SCALE)

Figure 14 Access Door - Composite Layup

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5. REPLACEMENT COMPONENTS AND REPAIR / OVERHAUL INFORMATION

For overhaul requirements of the Concorde RG® Series Main Aircraft Battery, refer to the Component Maintenance Manual, Document Number 5-0171, ATA 24-30-71, March 11, 2011 (Appendix A).

For overhaul requirements of the nickel-cadmium battery SAFT 2376 Series, refer to the SAFT Component Maintenance Manual with Illustrated Parts List, Document Number 25-35-06, October 30, 1990 (Appendix B).

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

If battery fails to perform to specification, refer to the Concorde Battery Corporation, Component Maintenance Manual, Document Number 5-0171, ATA 24-30-71, March 11, 2011 (Appendix A) or the SAFT Component Maintenance Manual with Illustrated Parts List, Document Number 25-35-06, October 30, 1990 (Appendix B).

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.

ITEM	TROUBLE / SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1	"BATT TEMP" warning light on the Warning Caution Panel illuminates during flight.	Faulty battery	Refer to Component Maintenance Manual for battery troubleshooting information.
		Faulty Relay (27P). Refer to Figure 2.	Replace relay.

Table 6 Troubleshooting Guide

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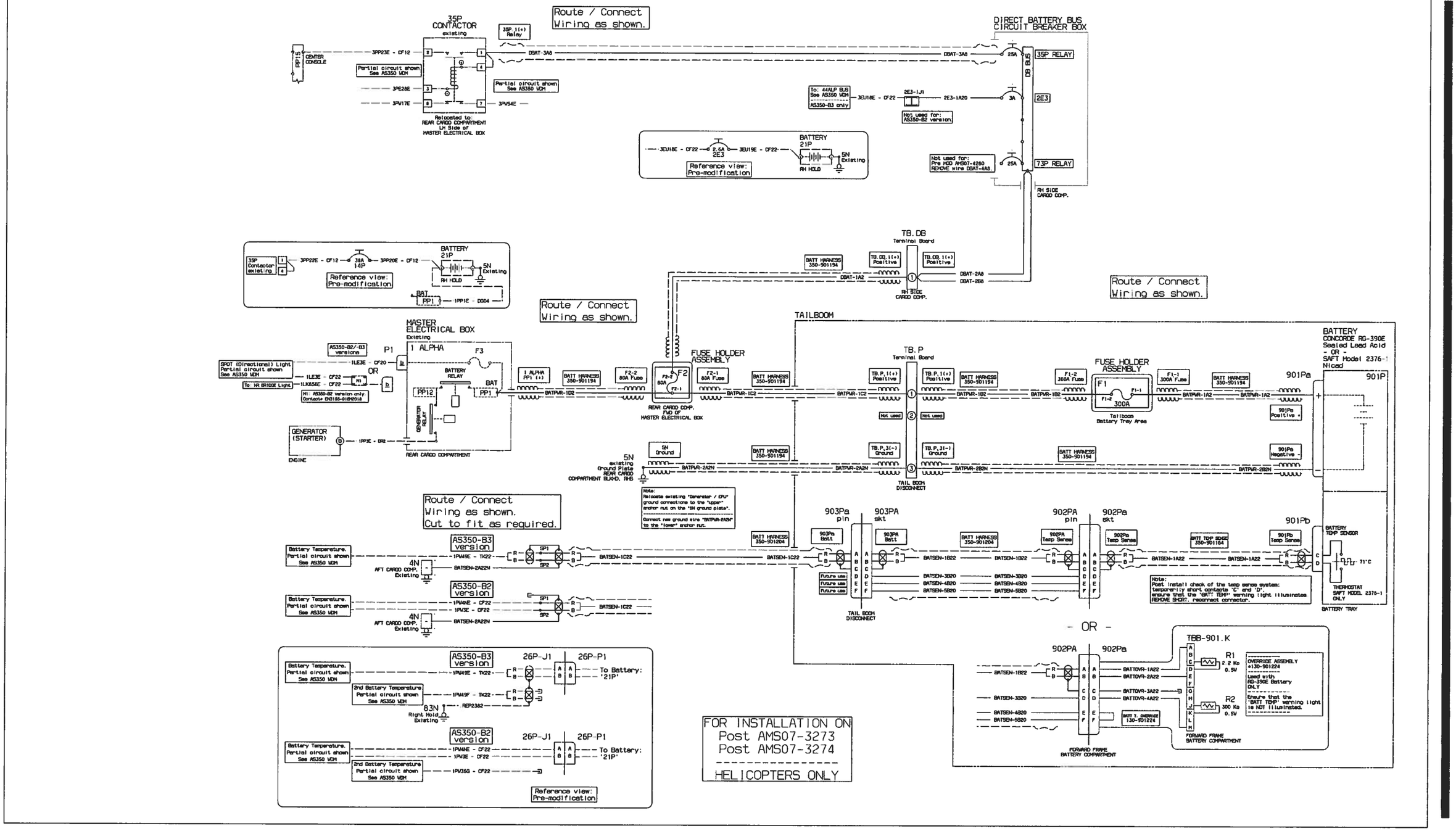

Figure 15 AS 350 Battery Relocation, Wiring Diagram

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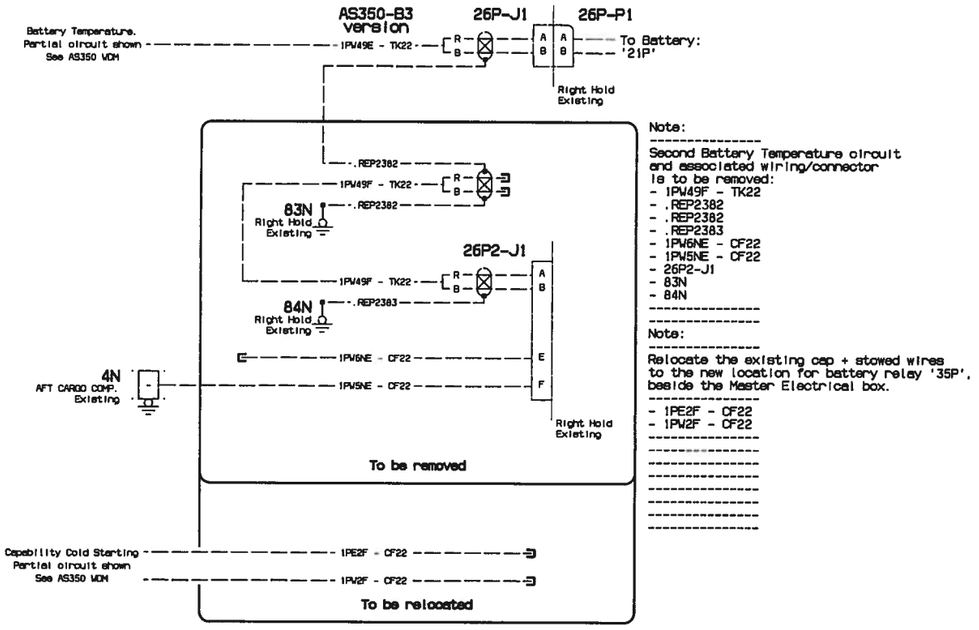

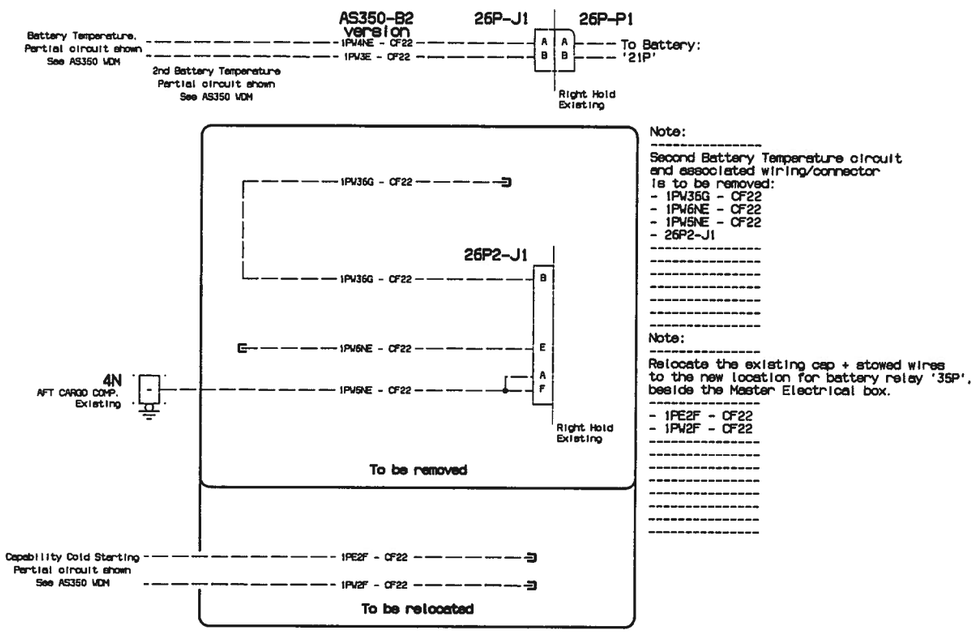

FOR INSTALLATION ON
Post AMS07-3273
Post AMS07-3274

HELICOPTERS ONLY

Figure 16 AS 350 Battery Relocation, Wiring Diagram (continued)

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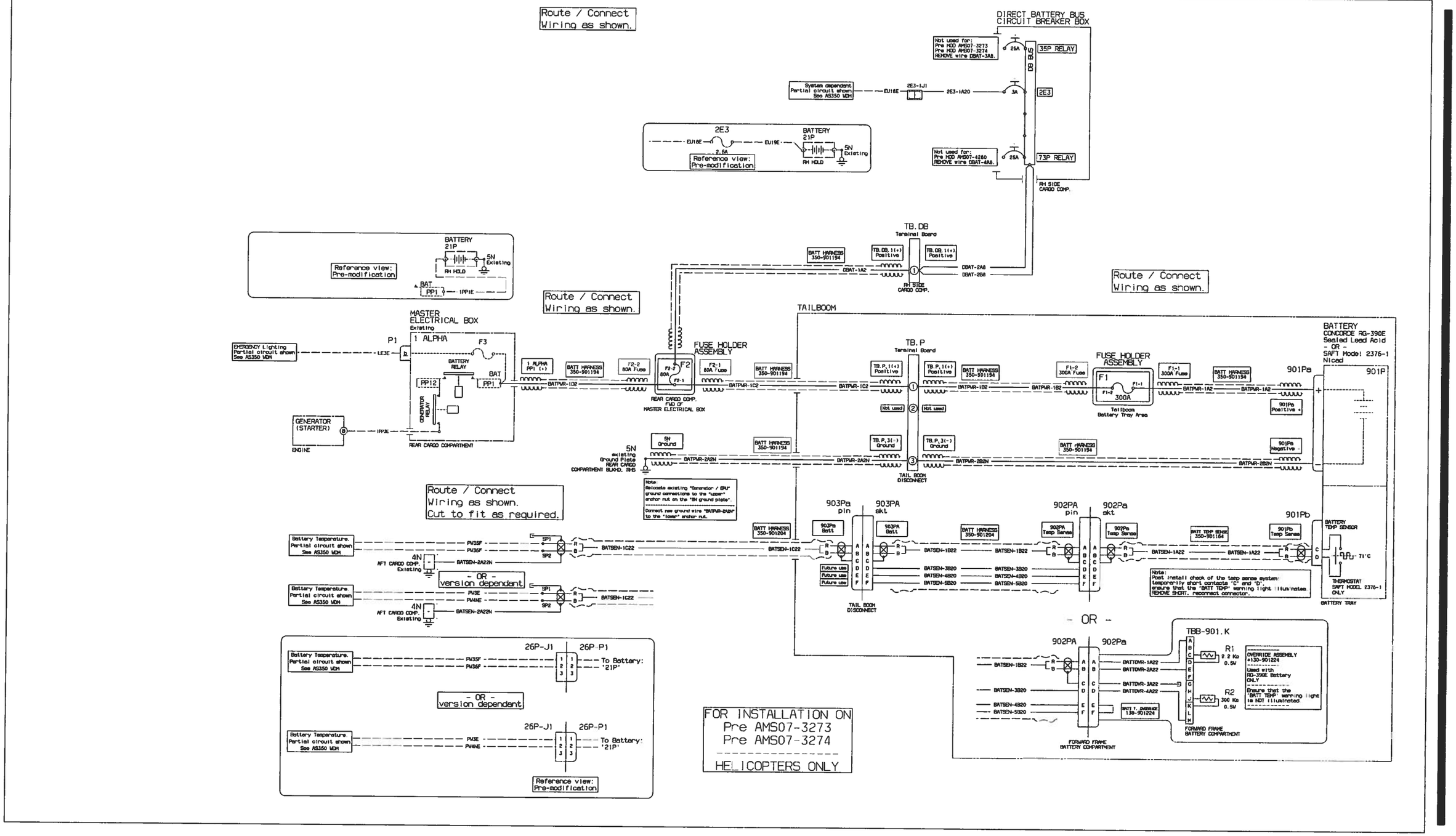

Figure 17 AS 350 Battery Relocation, Wiring Diagram (continued)

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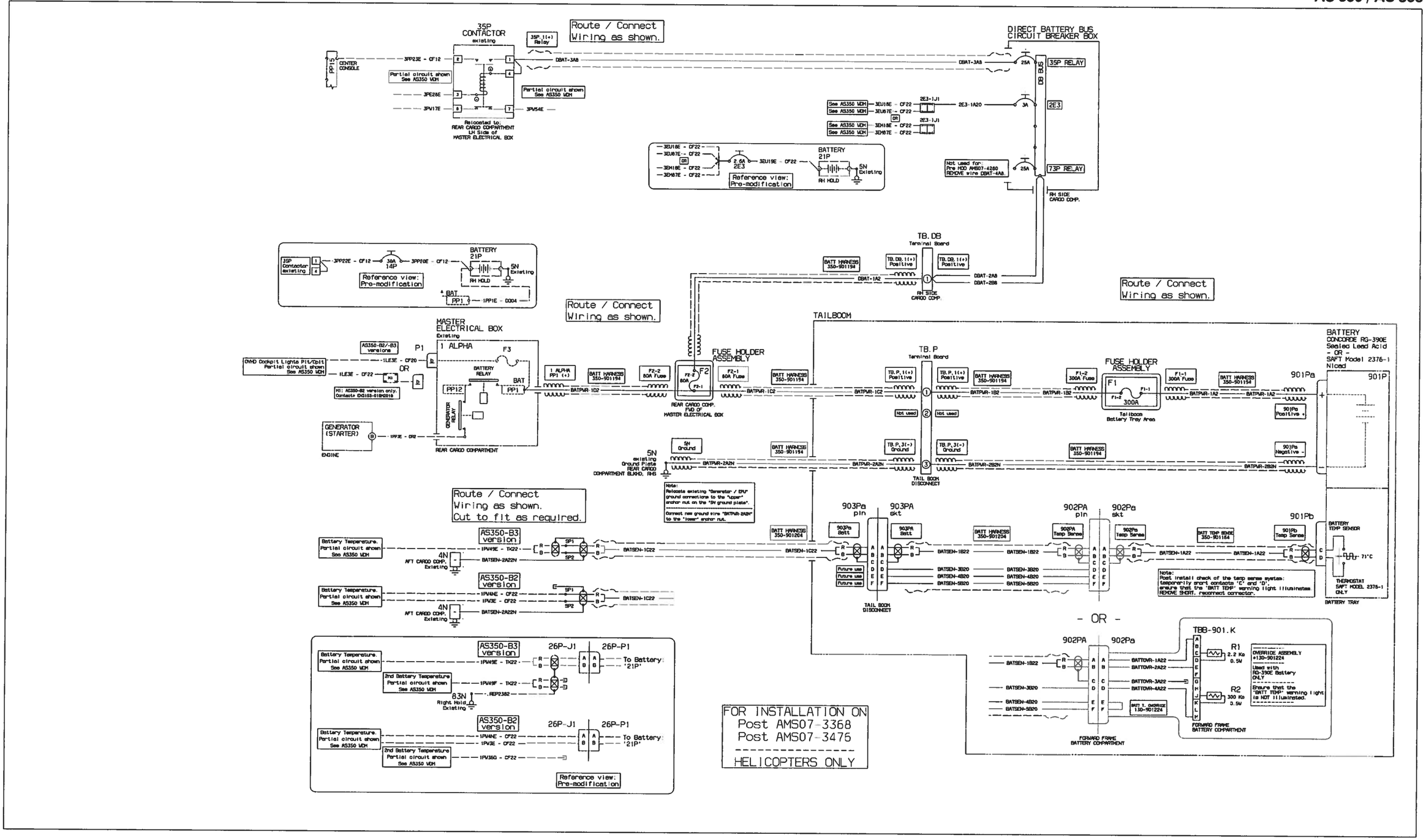

Figure 18 AS 350 Battery Relocation, Wiring Diagram (continued)

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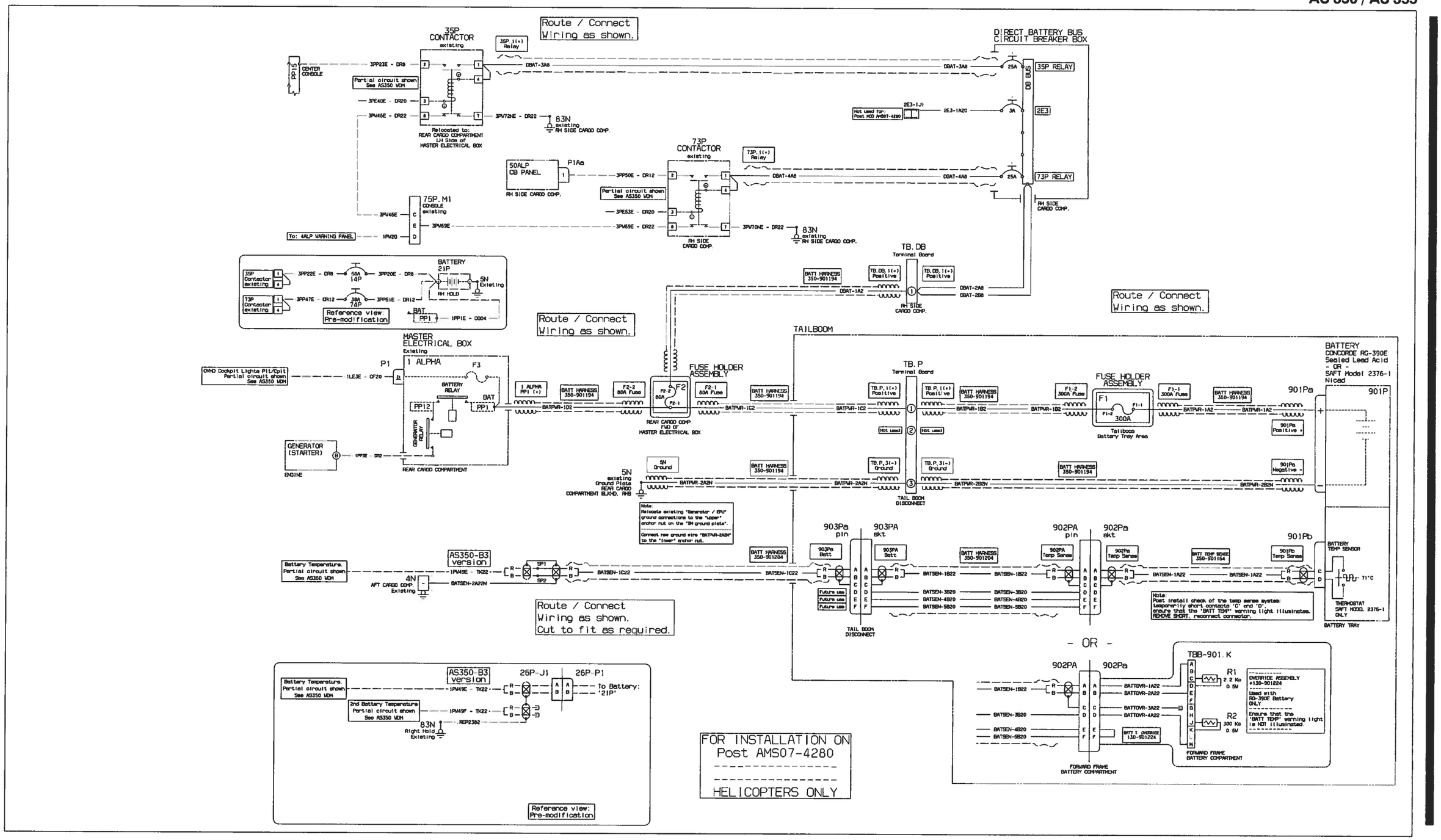

Figure 19 AS 350 Battery Relocation, Wiring Diagram (continued)

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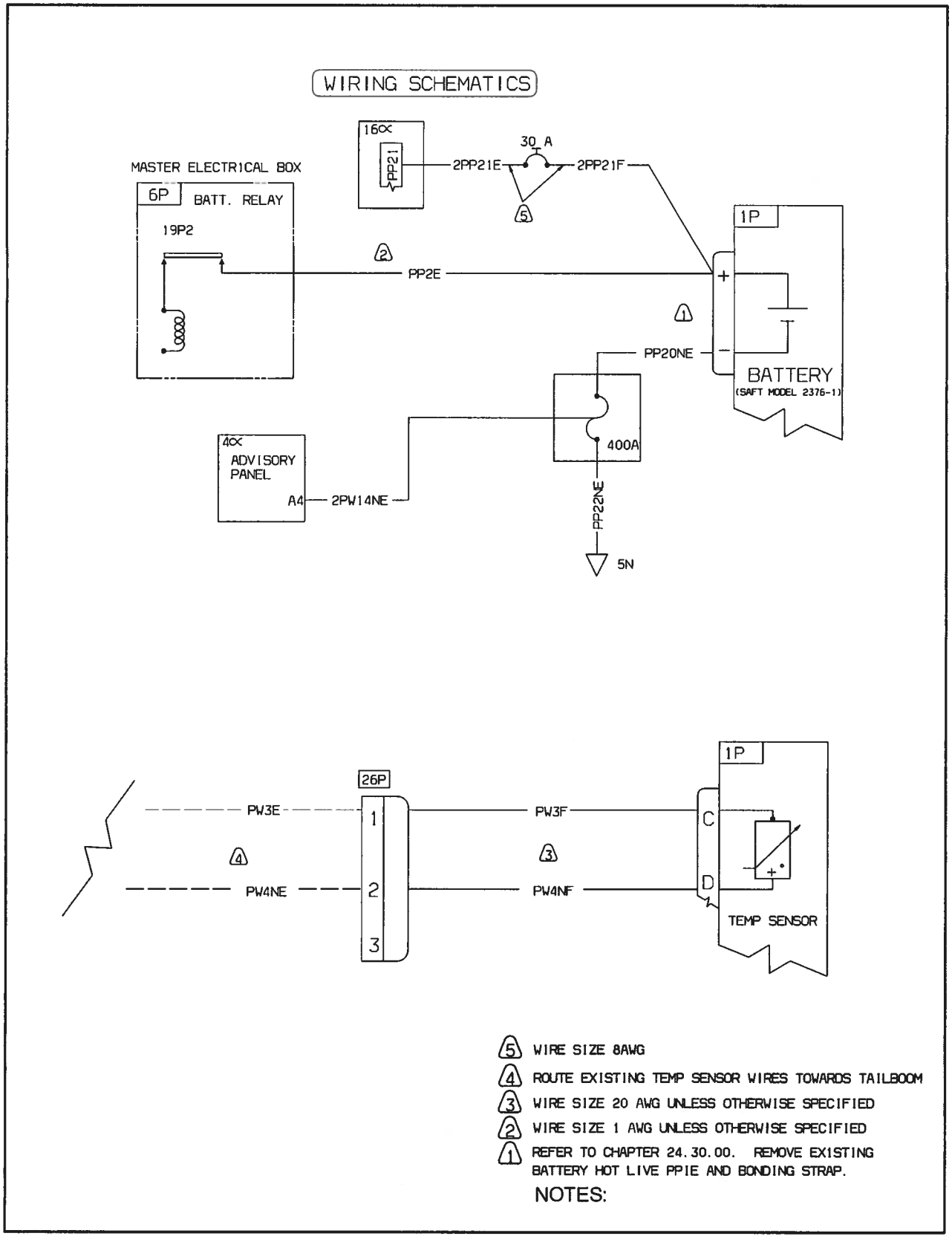

Figure 20 AS 355 Battery Relocation, Wiring Diagram

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7. SPECIAL TOOLING

For special tooling requirments for the Concorde Battery, refer to the Concorde Battery Corporation, Component Maintenance Manual, Document Number 5-0171, ATA 24-30-71, March 11, 2011 (Appendix A). For special tooling requirements for the SAFT Battery, refer to the SAFT Component Maintenance Manual with Illustrated Parts List, Document Number 25-35-06, October 30, 1990 (Appendix B).

8. REMOVAL AND REPLACEMENT

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

PRELIMINARIES

A. For AS 350 D, B, BA, B1:

- Read the General Electrical Instructions (refer to AS 350 Maintenance Manual, Chapter 24.00.00.301).
- set the "D.BAT" push button to "OFF"
- set the "EXT PWR BAT" pushbutton to "OFF" (refer to Electrical Power AS 350 Maintenance Manual, Chapter 24.00.00.301)
- disconnect the external power unit and battery (refer to Removal/ Installation AS 350 Maintenance Manual, Chapter 24.30.00.401)

B. For AS 350 B2/B3:

- Read General Safety Instructions - Electrical Power Supply System (refer to AS 350 B2/B3 Aircraft Maintenance Manual, Chapter 24-00-00, 3-1)
- Read Electrical Power Supply on the Ground (refer to AS 350 B2/B3 Aircraft Maintenance Manual, Chapter 24-00-00, 2-1)
- disconnect the external power unit and battery (refer to Removal/Installation, AS 350 B2/B3 Aircraft Maintenance Manual, Chapter 24-33-00, 4-1)

C. For AS 355:

- Read the Electrical Power Generation System (refer to AS 355 Maintenance Manual, Chapter 24.00.00.301).
- set the "D.BAT" push button to "OFF"
- set the "PARC-BATT" pushbutton to "OFF" (refer to Electrical Power Generating System, AS 355 Maintenance Manual, Chapter 24.00.00.301)
- disconnect the external power unit and battery (refer to Removal/Installation AS 355 Maintenance Manual, Chapter 24.30.00.401)- set "EXT PWR BAT" push-button to "OFF" position

D. Remove circuit breakers/fuses from corresponding circuits.

E. Open battery compartment access door located in tailboomLH side by releasing the two camlocks.

NOTE: Follow safety precautions in the Concorde Battery Corporation, Component Maintenance Manual, Document Number 5-0171, ATA 24-30-71, March 11, 2011 (Appendix A) and SAFT Component Maintenance Manual with Illustrated Parts List, Document Number 25-35-06, October 30, 1990 (Appendix B) before removing/installing battery.

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8. **REMOVAL AND REPLACEMENT** (continued)

A. REMOVAL

General Repair Instruction Unriveting principle - refer to MTC, Chapter 20-03-01-102.

1) BATTERY (Refer to Figure 2 and 5)

a) Disconnect battery harness (1). If nickel-cadmium battery is installed, disconnect the temperature plug (2).

b) Disconnect FWD and AFT vent hoses (3 and 4) from the quick connection (19) on the battery base.

NOTE: If replacing fwd or aft vent hose remove tyrap (3) and disconnect hose clamp (2). Remove hose. Refer to Figure 5.

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

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

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

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

NOTE: Follow storage procedures in Concorde Battery Corporation, Component Maintenance Manual, Document Number 5-0171, ATA 24-30-71, March 11, 2011 (Appendix A) and SAFT Component Maintenance Manual with Illustrated Parts List, Document Number 25-35-06, October 30, 1990 (Appendix B)

2) BATTERY CONNECTOR (Refer to Figure 2)

a) Remove bolts securing the harness to the battery connector. Retain bolts for reinstallation.

3) ACCESS DOOR SEAL (Refer to Figures 11, 12 and 13)

a) Close access door and remove the self-locking nuts (3), washers (4) and screws (5) from the door. Remove door to workbench and carefully remove damaged seal (1) from around inside of door.

4) CIRCUIT BREAKERS (PRE & POST AMS 07 3273 and 3274) (Refer to Figure 3)

a) Remove screws securing terminals to circuit breaker and remove circuit breaker.

5) DOUBLER (Refer to Figure 13)

a) Remove the self-locking nuts (3), washers (4) and screws (5) securing the access door to the tailboom.

b) Remove rivets securing doubler (17) to the tailboom.

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8. **REMOVAL AND REPLACEMENT** (continued)

B. REPLACEMENT

Replacement of rivets - refer to MTC, Chapter 20-03-02-101.

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

1) CIRCUIT BREAKERS (PRE & POST AMS 07 3273 and 3274) (Refer to Figure 3)

   a) Secure terminals to circuit breaker and secure using screws.

2) DOUBLER (Refer to Figure 13)

   a) Position doubler (17) on tailboom and secure using pilot holes in aft ends of aft vertical fingers.

   b) Match drill existing holes from tailboom into doubler, remove doubler and deburr holes.

   c) Reposition doubler and resecure upper and lower stiffeners (12 & 13) to tailboom using rivets (MS20426AD4-5).

   d) Resecure LH Frame (15) STN 1825, and frame at STN 2295 to tailboom using rivets (MS20470AD4-5).

   e) Secure upper and lower TC stiffener clip (9) to tailboom using rivets (MS20470AD4-5).

   f) Secure around opening using rivets (MS20426AD3-8 & MS20426AD4-8).

   g) Secure aft and fwd vertical fingers using rivets (MS20470AD4-5).

   h) Reinstall both receptacles using rivets (MS20426AD3-8).

   i) Bead seal edges with sealant (16).

   j) Reposition access door and secure using self-locking nuts (3), washers (4) and screws (5).

3) ACCESS DOOR SEAL (Refer to Figures 11 and 12)

   a) Carefully position new seal (1) around inside of door.

   b) Secure using adhesive (6).

4) BATTERY (Refer to Figure 2)

   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.

NOTE: If fwd or aft vent hose is being replaced, ensure hose is correct length. Once cut to fit, secure to hose clamp (2) using tywrap (3). Slide hose over hose barb (4) and secure using tywrap (3). Refer to Figure 5.

5) BATTERY CONNECTOR (Refer to Figure 2)

   a) Secure the harness to the battery connector using previously retained botls.

   b) Close battery compartment door and secure door camlocks.

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8. **REMOVAL AND REPLACEMENT** (continued)

B. REPLACEMENT

6) Close all areas opened for service in the PRELIMINARIES paragraph of this section.

AS 350 / AS 355:

1) Apply external power unit and battery. Refer to AS 350/AS 355 Maintenance Manual, Chapter 24.30.00.401.

2) Perform functional test in accordance with AS 350/AS 355 Maintenance Manual, Chapter 24.30.00.501.

AS 350 B2/B3:

1) Before energizing the aircraft power supply system, read safety instructions (refer to General Safety Instruction - Electrical Power Supply System, AS 350 B2/B3, Aircraft Maintenance Manual, Chapter 24-00-00, 3-1).

2) Reconnect the external power unit and battery (refer to Removal/Installation AS 350 B2/B3 Aircraft Maintenance Manual, Chapter 24-33-00, 4-1).

3) Perform functional test - DC Power Supply System in accordance with AS 350 B2/B3 Aircraft Maintenance Manual, Chapter 24-30-00-5-1.

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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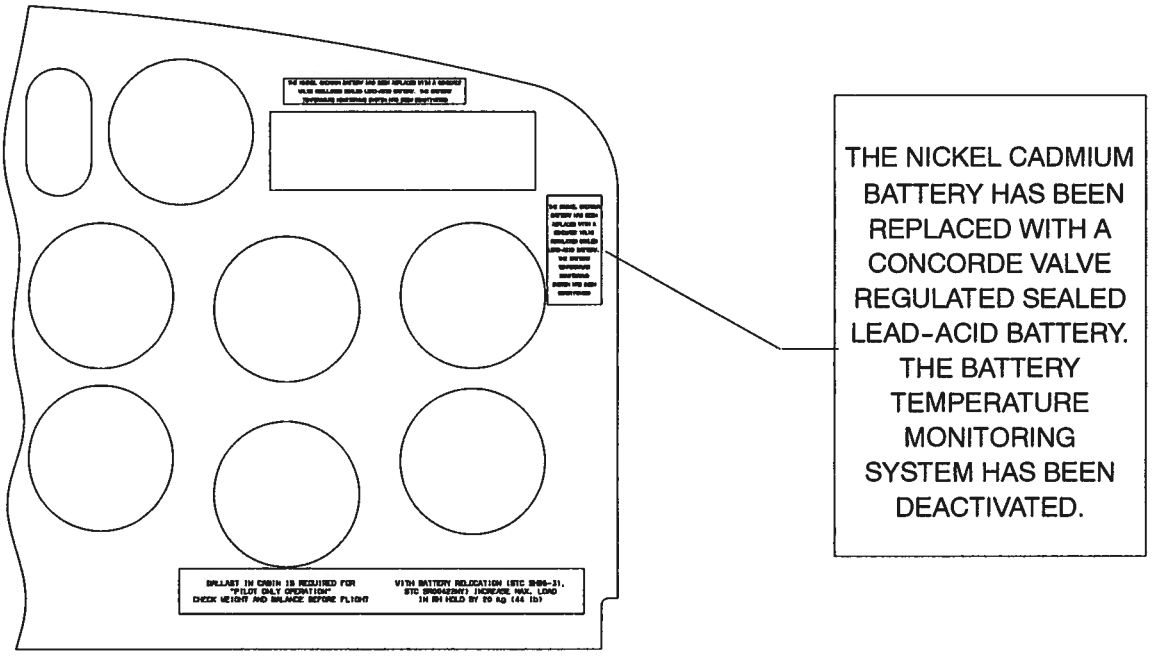
10. **PLACARDS AND MARKINGS**



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

Figure 21 Placard location on typical AS 350 Instrument Panel for RH Pilot Configuration (Lead-Acid Battery only)

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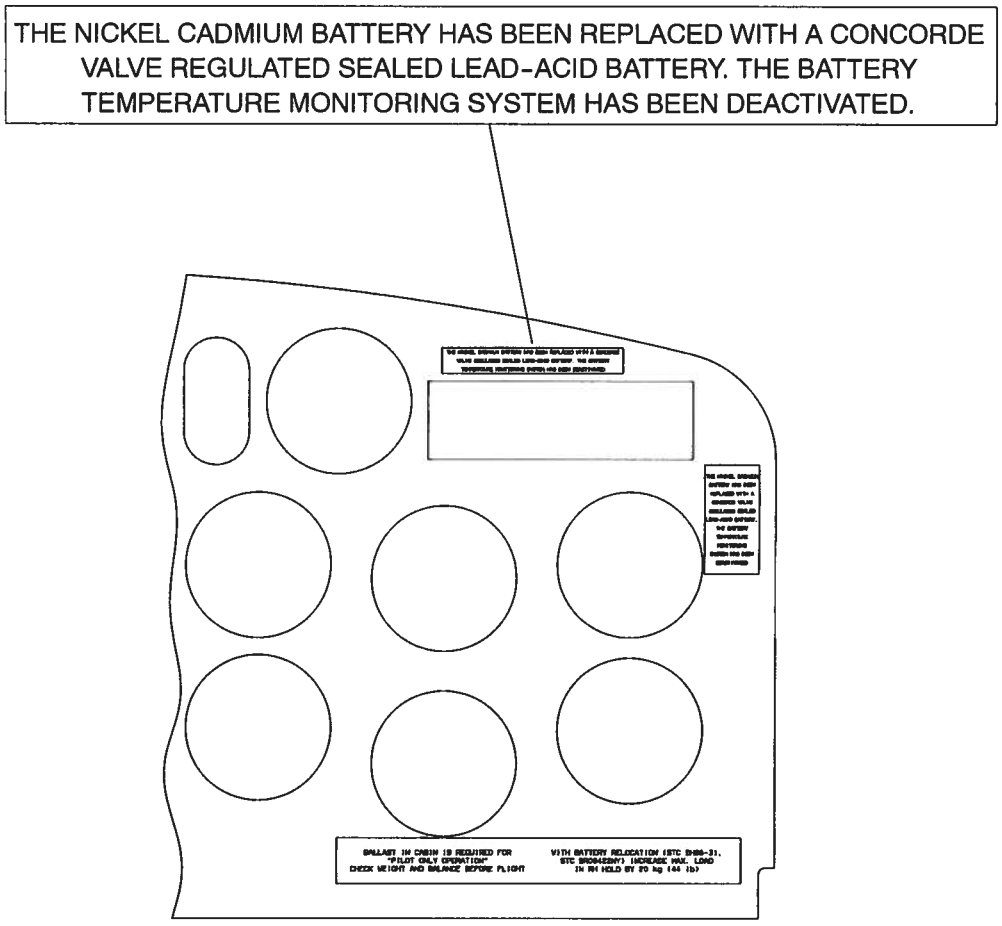
10. **PLACARDS AND MARKINGS** (continued)



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

Figure 22 Placard location on typical AS 350 Instrument Panel (Lead-Acid Battery only) RH Pilot configuration

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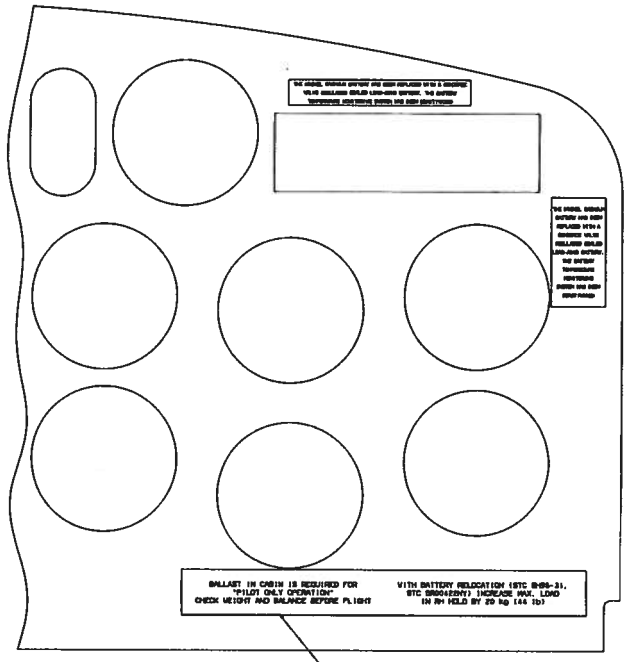
10. **PLACARDS AND MARKINGS** (continued)



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

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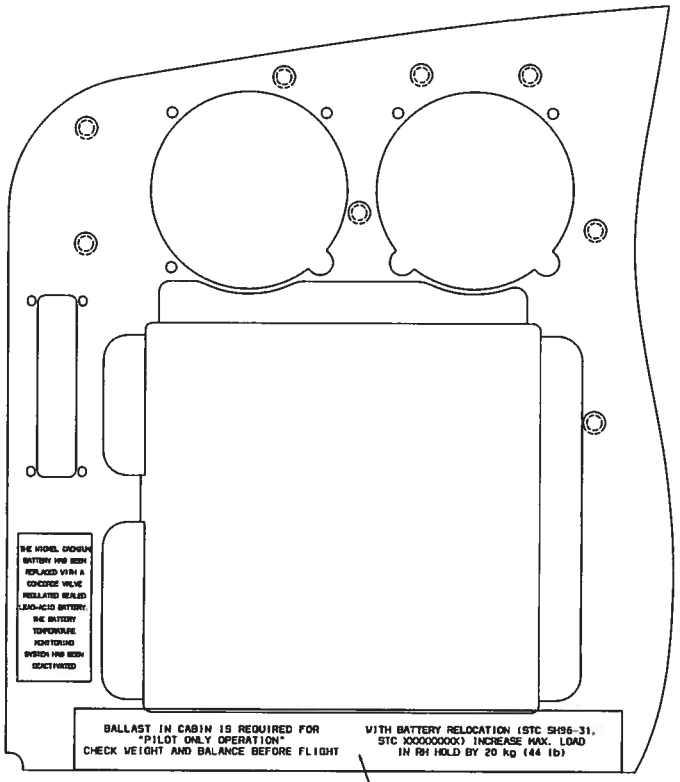
10. **PLACARDS AND MARKINGS** (continued)



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 24 Placard location on typical AS 355 Instrument Panel

10. PLACARDS AND MARKINGS

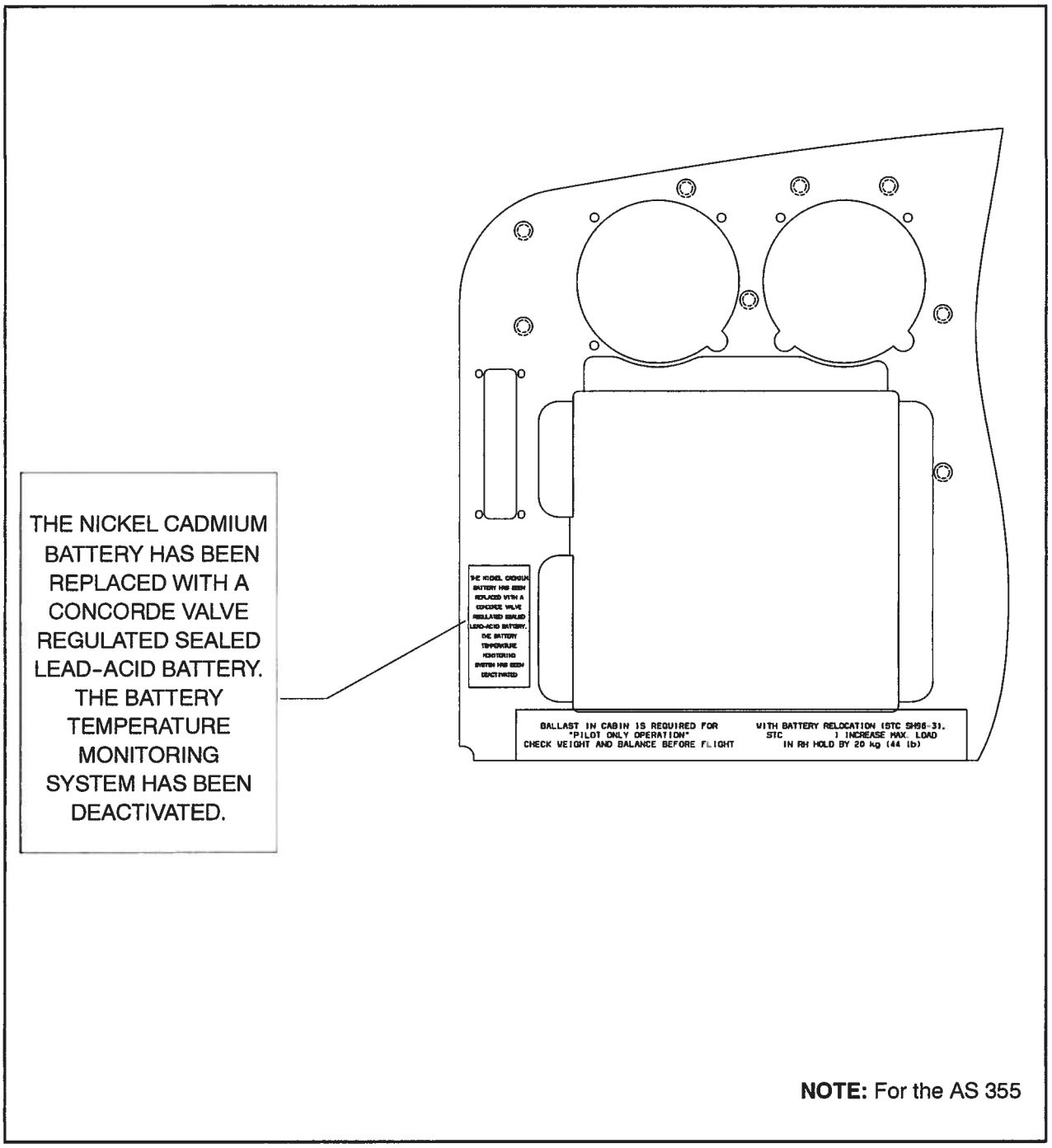


Figure 25 Placard location on typical AS 355 Instrument Panel
(Lead-Acid Battery only)

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

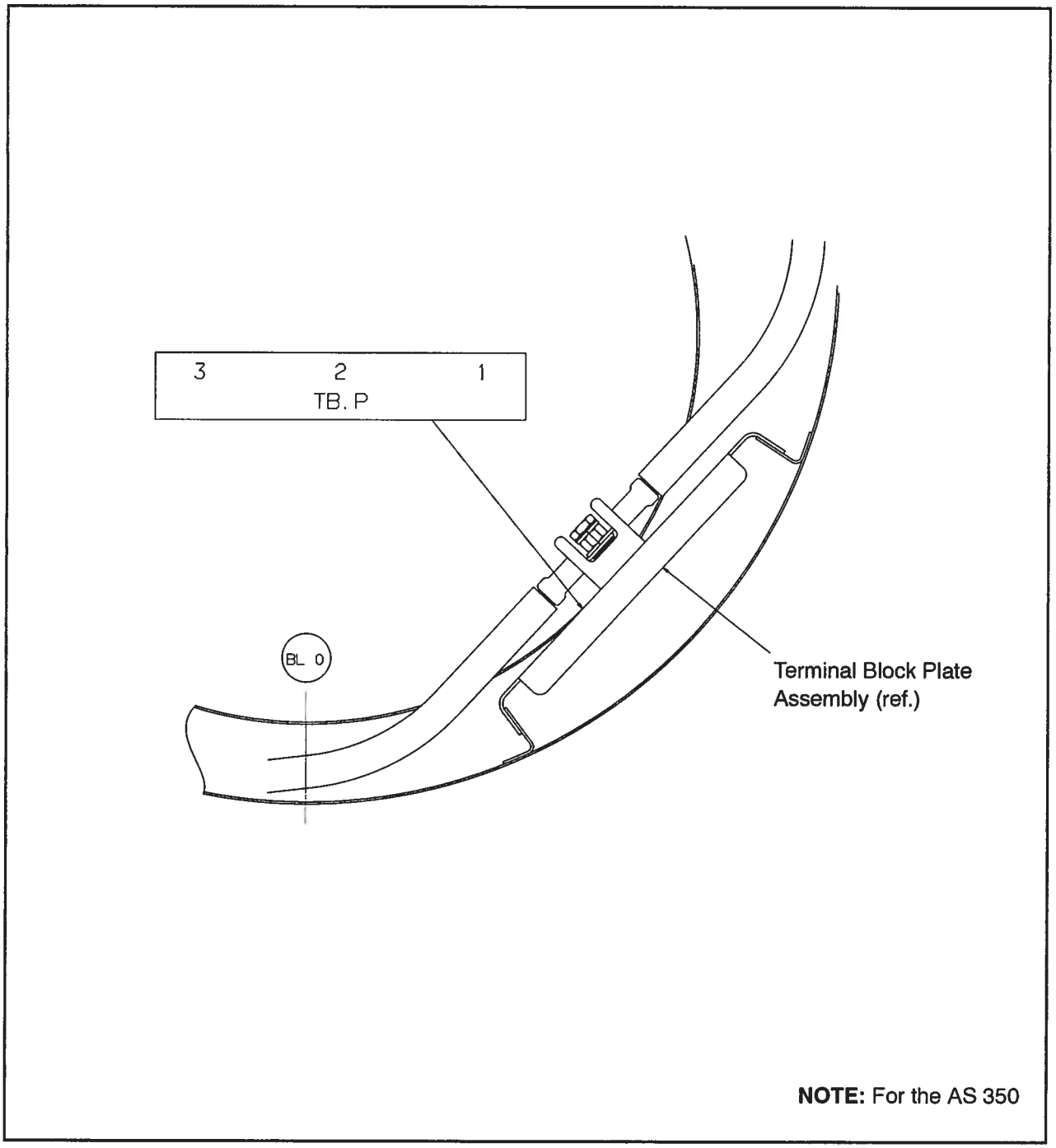

Figure 26 Marking location on AS 350 terminal block plate assembly for the terminal block plate (TB.P) at STN A156 POST AMS 07-3273 and 3274

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

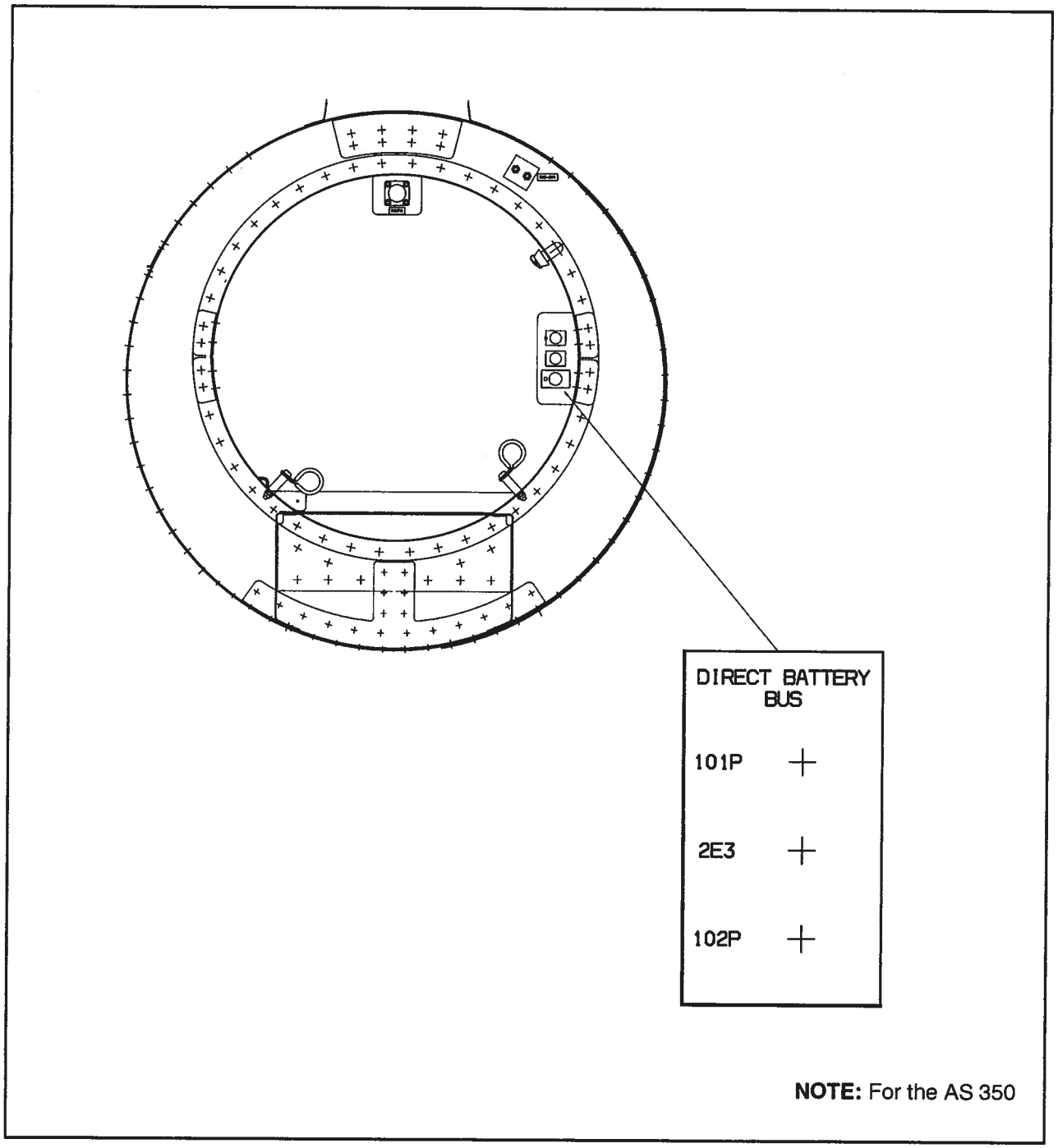


Figure 27 Marking location on the AS 350 circuit breaker bracket at STN A1825
POST AMS 07-3273 and 3274

Transport Canada - Accepted

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

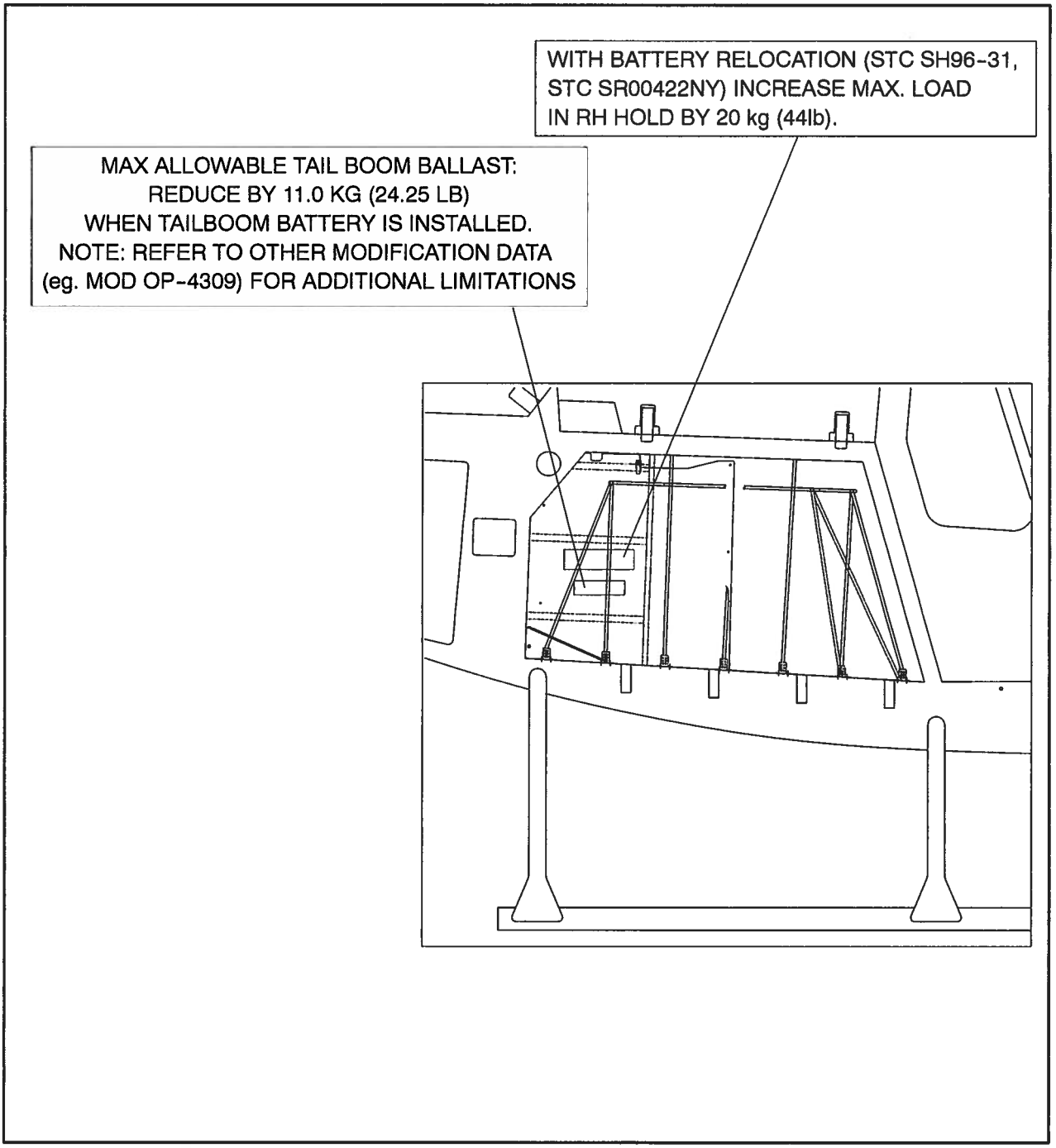
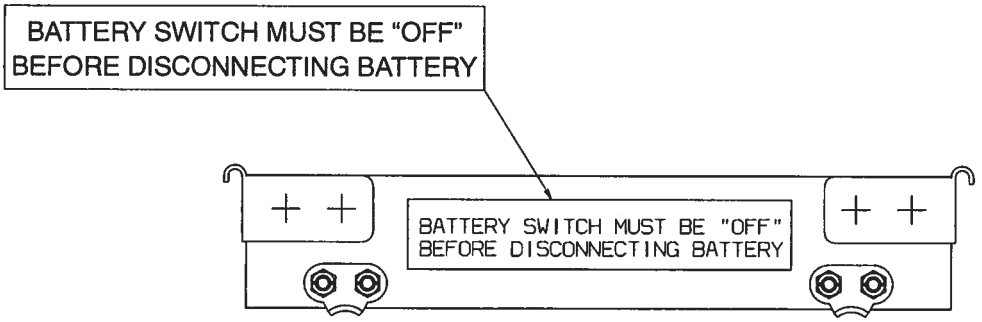


Figure 28 Placards in RH Cargo Compartment

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



NOTE: For the AS 350 and AS 355

Figure 29 Placard on front of the Battery Tray Assembly

Transport Canada - Accepted

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CONCORDE BATTERY CORPORATION
2009 San Bernardino Road
West Covina, CA 91790
Phone: 626-813-1234
www.concordebattery.com

RG® SERIES MAIN AIRCRAFT BATTERY

COMPONENT MAINTENANCE MANUAL

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APPLICABILITY

THIS CMM IS APPLICABLE TO RG® SERIES MAIN AIRCRAFT BATTERIES INCLUDING BATTERIES AUTHORIZED UNDER TSO-C173. REFER TO DOCUMENT NO. 5-0403 FOR A LIST OF TSO AUTHORIZED BATTERIES. THE LATEST REVISION OF DOCUMENT NO. 5-0403 IS POSTED ON OUR WEBSITE. IF INTERNET ACCESS IS NOT AVAILABLE, A PRINTED COPY WILL BE FURNISHED UPON REQUEST.

NOTE: This CMM supersedes Document No. 5-0142 (Instructions for Continued Airworthiness, Concorde Valve Regulated Lead-Acid Main Battery) and all other maintenance instructions for RG® Series main aircraft batteries issued prior to 2008.

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

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RECORD OF REVISIONS

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NOTE: THE LATEST REVISION OF THIS CMM IS AVAILABLE FOR DOWNLOAD FROM CONCORDE'S WEBSITE IN PDF FORMAT. IF YOU ARE UNABLE TO ACCESS THE INTERNET, CONTACT CONCORDE AND A PRINTED COPY WILL BE SENT TO YOU (SEE FRONT PAGE OF THIS CMM FOR WEBSITE AND COMPANY CONTACT INFORMATION).

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Title Page	TP-1	Mar 11/2011
Record of Revisions	ROR-1	Mar 11/2011
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Service Bulletin List	SBL-1	Mar 11/2011
List of Effective Pages	LOEP-1	Mar 11/2011
Table of Contents	TOC-1 and TOC-2	Mar 11/2011
Introduction	INTRO-1 thru INTRO-3	Mar 11/2011
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Storage (Including Transportation)	1501 thru 1503	Mar 11/2011
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INTRODUCTION

1. Scope and Purpose
   A. This Component Maintenance Manual (CMM) has been prepared in accordance with Air Transportation of America (ATA) Specification 100. It provides instructions for proper storage, servicing, replacement, repair, and disposal of RG Series valve regulated lead-acid main aircraft batteries manufactured by Concorde Battery Corporation.

2. Application
   A. Batteries covered by this CMM are designed for engine starting applications and may also be used as an emergency power supply.
   B. The test procedures specified in this CMM apply to batteries that are in a workshop environment. These test procedures are not intended to be performed while batteries are installed in an aircraft.
   C. Batteries covered by this CMM have no field-replaceable components. Batteries with field-replaceable components will have a dedicated CMM with an illustrated parts list.

3. Definitions
   A. Valve regulated lead-acid (VRLA) battery - A lead-acid battery in which there is no free electrolyte and the internal pressure is regulated by a pressure relief valve. This battery requires no maintenance of the liquid level and recombines the gases formed on charge within the battery to reform water. The battery may be used in any attitude without danger of leakage or spilling of electrolyte.
   B. Rated C1 capacity - The nominal capacity, expressed in Ampere-hours (Ah), obtained from a fully charged battery when discharged at the one hour rate to the specified end point voltage at a temperature of 21 - 25°C (70 - 77°F).
   C. C1 rate – The rate, in amperes, equal to the battery's rated C1 capacity. For example, the C1 rate of a battery rated at 3.5Ah is 3.5 amperes.
   D. End Point Voltage (EPV) - The voltage at which the discharge current is terminated when measuring battery capacity. Unless otherwise stated, the EPV is equal to 20.0 volts (10.0 volts for 12 volt batteries).
   E. Open Circuit Voltage (OCV) – The voltage of the battery at rest (no charging or discharging current present). A stable OCV requires a rest of at least four hours.

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4. Safety Precautions
   A. **WARNING: LOW CAPACITY HAZARD.** Aircraft batteries are certified to have a certain minimum capacity for emergency operations in the event of a electrical generator system failure. Never use a battery that has less than 80% of rated capacity.
   B. **WARNING: ELECTRIC BURN HAZARD.** Lead-acid batteries are capable of delivering high currents if the terminals are shorted. The resulting heat can cause severe burns and is a potential fire hazard. Take the following precautions:
      - Do not place tools or metal objects across battery terminals.
      - Do not wear conductive rings, belt buckles, watches or other jewelry when servicing batteries.
      - Wear insulated gloves and use insulated tools when servicing batteries.
      - Install battery terminal protectors whenever the battery is not connected in the aircraft or to the test equipment.
   C. **WARNING: DANGER OF EXPLODING BATTERIES.** Lead-acid batteries can produce explosive mixtures of hydrogen and oxygen while on charge or discharge, which can explode if ignited. Take the following precautions:
      - Do not smoke, use an open flame, or cause sparking near a battery.
      - Wear proper eye and face protection when servicing batteries.
      - Make sure work area is well ventilated.
      - Do not constant current charge a battery when installed in an aircraft.
      - Connect cables securely to the battery terminals to avoid arcing.
   D. **WARNING: DANGER OF CHEMICAL BURNS.** Lead-acid batteries contain sulfuric acid which can cause severe burns to body tissue. Take the following precautions:
      - Never remove or damage vent valves.
      - Avoid contact of the electrolyte with skin, eyes or clothing.
      - Do not touch eyes after touching battery.
      - In the event of acid in the eyes, flush thoroughly with clean cool water for several minutes and get professional medical attention immediately.
      - Refer to battery MSDS for additional information.
   E. **CAUTION: DANGER OF EQUIPMENT DAMAGE.** 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.

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5. Airworthiness Limitations
   A. For batteries covered by TSO-C173 the following limitation applies: The conditions and tests for 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.
   B. For batteries not covered by TSO-C173, there are no airworthiness limitations associated with the installation of a Concorde valve-regulated lead-acid battery in an aircraft.

NOTE: THE AIRWORTHINESS LIMITATIONS SECTION IS FAA APPROVED AND SPECIFIES MAINTENANCE REQUIRED UNDER 14 CFR §§ 43.16 AND 91.403, UNLESS AN ALTERNATIVE PROGRAM HAS BEEN FAA APPROVED.

6. Deviations
   A. TSO-C173 dated May 2/2005 references RTCA/DO-293 dated Jul 29/2004. Batteries covered by this CMM are approved based on Change 1 to RTCA/DO-293 dated Dec 13/2006 or RTCA/DO-293A dated Dec2/2009.

7 Personnel
   A. Only personnel authorized by the FAA to perform battery maintenance are permitted to service Concorde aircraft batteries (see FAR 43.3).

8. Shop Verification
   A. The following sections of this CMM were verified by actual performance:
      - Testing and Fault Isolation – verified 5/14/10.
      - Disassembly – not applicable.
      - Assembly – not applicable.

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DESCRIPTION AND OPERATION

1. General

A. Cell Construction:
Concorde aircraft batteries are valve-regulated, recombinant gas, absorbed electrolyte, lead acid batteries. The cells are sealed with a pressure relief valve that prevents gases within the battery from escaping. The positive and negative plates are sandwiched between layers of glass mat consisting of glass micro fibers of varying length and diameter. This blend features superior wicking characteristics and promotes maximum retention of the electrolyte. Electrolyte is absorbed and held in place by the capillary action between the fluid and the absorptive glass mat (AGM) fibers. By design, the AGM separator is only about 90-95% saturated with electrolyte. The void space provides the channels by which oxygen travels from the positive to the negative plates during charging. When the oxygen gas reaches the negative plate, it reacts with lead to form lead oxide and water. This reaction at the negative plate suppresses the generation of hydrogen that otherwise would come off the negative plate. In this manner, virtually all of the gas is recombined inside the cell, eliminating the need to add water, resulting in "maintenance free" operation.

B. Grids and Plates:
Each cell of a storage battery has positive and negative plates arranged alternately, insulated from each other by separators. Each plate consists of a framework, called the grid, and a lead paste compound called active material. The grid is cast from a lead alloy. A heavy outside frame adds strength to the plate for good vibration and shock durability. The small horizontal and vertical wires support the active material. These wires also act as conductors for the current. The lead paste compound (active material) is applied to the grid in much the same manner as plaster is applied to a lath wall. A different paste formula is used for the positive and negative plates.

C. Plate Groups:
Plate groups are made by joining a number of similar plates to a common terminal post by means of a plate strap. The capacity of a battery is determined by the number and size of plates in a group. Each plate is made with a lug at the top which is fused to the strap. A positive group consists of a number of positive plates connected to a plate strap and a negative group consists of a number of negative plates connected in the same manner. The two groups meshed together with separators between the positive and negative plates constitute a cell element.

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D. Separators:
The main separator material is made of glass microfibers and is commonly called absorptive glass mat (AGM). This material is extremely porous so it retains a high volume of electrolyte and provides a minimum of resistance to the ions passing through it. It is also highly wettable and resists chemical attack from the electrolyte. The AGM is wrapped around the positive plates to insulate them from the negative plates. An extra layer of micro porous polyethylene surrounds the AGM layer to impart extra puncture resistance and improve battery durability. This dual AGM/polyethylene separator system is a unique feature of Concorde's RG Series batteries.

E. Cell Containers
After the cell elements are assembled, they are placed in a container made of plastic. The plastic used is selected for its high resistance to sulfuric acid, low gas permeability and high impact strength. In many battery models, the container is comprised of a monoblock that houses multiple cells in a single container (for example, 4, 6 and 12 cell monoblocks are common).

F. Cell Covers
The assembled cell or monoblock has a cover made of plastic material similar to that of the cell container. The cell or monoblock cover has holes through which the terminal posts extend and it also includes the pressure relief valve(s). The cover is permanently sealed to the cell or monoblock container after the plate groups are installed.

G. Electrolyte
The assembled cell or monoblock contains an electrolyte consisting of a mixture of sulfuric acid and water. The electrolyte is absorbed within the pores of the plates and AGM separator. Unlike flooded (vented) cells there is no "free" electrolyte. Therefore, the battery is nonspillable even when turned upside down.

H. Theory of Operation
A chemical reaction takes place when a battery is being charged or discharged, as represented by the following equation:

Simplified lead acid electrochemical reaction

Discharge → **← Charge**

$$PbO_2 + Pb + 2H_2SO_4 \Leftrightarrow 2PbSO_4 + 2H_2O$$

On discharge, lead dioxide (PbO_2) of the positive electrode and sponge lead (Pb) of the negative electrode are both converted to lead sulfate ($PbSO_4$) freeing two electrons. On charge, the lead sulfate in the positive electrode is converted to lead dioxide (PbO_2) (with oxygen evolution on charge) and the lead sulfate in the negative electrode is converted to sponge lead (with hydrogen evolution on charge). The electrolyte, sulfuric acid (H_2SO_4), is an active component in the reaction at both electrodes.

When flooded (vented) batteries are on charge, the oxygen generated at the positive plates escapes from the cell. Concurrently, at the negative plates, hydrogen is generated from water and escapes from the cell. The overall result is the gassing of the cells and water loss. Therefore, flooded cells require periodic water replenishment.

CAUTION: DO NOT REMOVE THE PRESSURE RELIEF VALVES ON AN RG BATTERY AND DO NOT ADD WATER OR ELECTROLYTE. THE RECOMBINANT GAS DESIGN ELIMINATES THE NEED TO REPLENISH WATER AND ELECTROLYTE. REMOVING THE PRESSURE RELIEF VALVE VOIDS THE WARRANTY.

When valve regulated batteries are on charge, oxygen combines chemically with the lead at the negative plates in the presence of sulfuric acid to form lead sulfate and water. This oxygen recombination suppresses the generation of hydrogen at the negative plates. Overall, there is minimal water loss during charging. A very small quantity of water may be lost as a result of self discharge reactions. However, such loss is so small that no provision need be made for water replenishment. The battery cells have a pressure relief safety valve that may vent if the battery is overcharged.

Characteristics of RG Series Main Aircraft Batteries

A. The RG Series of main aircraft batteries consist of 6 or 12 cells connected in series to make a nominal 12 VDC or 24VDC battery, respectively. The cells are contained in a plastic or metallic container equipped with an electrical receptacle for mating to the aircraft. In some models, temperature sensors are present that interface to the aircraft charging and/or electrical system. Also, some models contain heaters to warm the batteries for operation in extreme cold temperature environments.
B. Technical characteristics of the various models are detailed on Concorde's website (see front page of this CMM).
C. If internet access is not available, contact Concorde for assistance (see front page of this CMM).

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TESTING AND FAULT ISOLATION

1. Capacity Testing to Verify Continued Airworthiness
   A. Batteries Used to Start Turbine Engines:
      1. Operating less than 1000 hours per year.
         a. Initial check at 12 months after initial installation (± 1 month).
         b. As long as the capacity is above 90%, subsequent capacity checks every 6 months in service (± 1 month).
         c. If the capacity is between 85 and 90%, subsequent checks every 3 months in service (± 1 month).
         d. If the capacity is less than 85%, remove battery from service.
      2. Operating 1000 hours per year or more:
         a. Initial check at 1000 hours after initial installation (± 100 hours).
         b. As long as the capacity is above 90%, subsequent capacity checks every 500 hours in service (± 100 hours).
         c. If the capacity is between 85 and 90%, subsequent checks every 250 hours in service (± 100 hours).
         d. If the capacity is less than 85%, remove battery from service.
   B. Batteries Not Used to Start Turbine Engines:
      1. Operating less than 1000 hours per year:
         a. Initial check at 12 months after initial installation (± 1 month).
         b. As long as the capacity is above 90%, subsequent capacity checks every 12 months in service (± 1 month).
         c. If the capacity is between 85 and 90%, subsequent checks every 6 months in service (± 1 month).
         d. If the capacity is less than 85%, remove battery from service.
      2. Operating 1000 hours per year or more:
         a. Initial check at 1000 hours after initial installation (± 100 hours).
         b. As long as the capacity is above 90%, subsequent capacity checks every 1000 hours in service (± 100 hours).
         c. If the capacity is between 85 and 90%, subsequent checks every 500 hours in service (± 100 hours).
         d. If the capacity is less than 85%, remove battery from service.

NOTE: THE CAPACITY CHECK INTERVALS SPECIFIED ABOVE ARE GENERAL RECOMMENDATIONS SUITABLE FOR MOST APPLICATIONS. THE INTERVALS MAY BE ADJUSTED FOR A SPECIFIC AIRCRAFT OR FLEET ONCE THE AVERAGE BATTERY LIFE IS ESTABLISHED.

WARNING: CAPACITY CHECKS PROVIDE ASSURANCE OF CONTINUED AIRWORTHINESS OF THE BATTERY. ADJUSTMENTS TO THE FREQUENCY OF CAPACITY CHECKS SHOULD BE BASED ON CAREFUL CONSIDERATION OF FACTORS THAT AFFECT BATTERY LIFE. THESE FACTORS INCLUDE OPERATING PATTERNS, ENVIRONMENTAL CONDITIONS, AND CONFIGURATION OF THE AIRCRAFT ELECTRICAL SYSTEM. IF ANY OF THESE FACTORS CHANGE, THE BATTERY LIFE SHOULD BE RE-ESTABLISED USING THE ORIGINAL CAPACITY CHECK SCHEDULE.

2. Externally Mounted Components
   A. Temperature Sensors: Some battery models are equipped with externally mounted temperature sensors. Instructions for inspection and testing of Concorde temperature sensors are contained in separate maintenance manual supplements for each type of temperature sensor. These maintenance manual supplements are available on Concorde's website (see front page of this CMM). If internet access is not available, contact Concorde for assistance.
   B. Heater Control Units: Some battery models are equipped with externally mounted heater control units (HCUs). Instructions for inspection and testing of Concorde HCUs and the associated heating element within the battery are contained in separate maintenance manual supplements. These supplements are available on Concorde's website (see front page of this CMM). If internet access is not available, contact Concorde for assistance.

3. Testing Discharged Batteries
   A. If a battery is discharged below the recommended end point voltage of 20 volts (10 volts for 12V batteries) and is not recharged within 24 hrs, it should be subjected to a capacity test to assure airworthiness (see Paragraph 7).
   B. After airworthiness is verified, the capacity test schedule may be adjusted using this new date and equipment flight hours as the starting point for the next capacity check interval.

4. Test Facilities
   A. Concorde valve regulated lead-acid (VRLA) batteries may be serviced in any battery facility, including nickel-cadmium service facilities. VRLA batteries are sealed to prevent cross contamination of the electrolyte.

WARNING: LEAD-ACID BATTERIES CAN PRODUCE EXPLOSIVE MIXTURES OF HYDROGEN AND OXYGEN WHILE BEING CHARGED OR DISCHARGED. NEVER SERVICE BATTERIES IN AN AIRTIGHT OR SEALED ENCLOSURE AND MAKE SURE WORK AREA IS WELL VENTILATED.

5. Tools, Fixtures, Equipment and Consumables
   A. Refer to Table 101 for required test equipment for 12 volt batteries.
   B. Refer to Table 102 for required test equipment for 24 volt batteries.
   C. Refer to Table 103 for mating connectors.

NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR THESE ITEMS.

CAUTION: CONTACT CONCORDE FOR ASSISTANCE WITH SELECTION OF BATTERY CHARGING EQUIPMENT. SOME BRANDS OF BATTERY CHARGERS WILL DESTROY THE BATTERY.

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Table 101. List of Test Equipment for 12 Volt Batteries

Description	Source	Part Number	Purpose
Electronic Load, capable of constant current at C1 ADC and 10-14 VDC with EPV termination at 10 VDC.	Commercially Available	N/A	Capacity Testing
Constant Voltage Power Supply, capable of 14.00 – 14.25 VDC and at least C1 ADC output.	Commercially Available	N/A	Constant Potential Charging
Constant Current Power Supply, capable of C1/10 ADC and at least 17 VDC output.	Commercially Available	N/A	Constant Current Charging
Digital Multimeter (DMM), capable 9-17 VDC with accuracy of 1% or better.	Commercially Available	N/A	Measuring OCV
Mating Connector	Various	See Table 103	Connect Battery to Test Equipment

Table 102. List of Test Equipment for 24 Volt Batteries

Description	Source	Part Number	Purpose
Electronic Load, capable of constant current at C1 ADC and 20-28 VDC with EPV termination at 20 VDC.	Commercially Available	N/A	Capacity Testing
Constant Voltage Power Supply, capable of 28.00 – 28.50 VDC and at least C1 ADC output.	Commercially Available	N/A	Constant Potential Charging
Constant Current Power Supply, capable of C1/10 ADC and at least 34 VDC output.	Commercially Available	N/A	Constant Current Charging
Digital Multimeter (DMM), capable of 18-34 VDC with accuracy of 1% or better.	Commercially Available	N/A	Measuring OCV
Mating Connector	Various	See Table 103	Connect Battery to Test Equipment

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6. Test Set Up
   A. Refer to Figure 101 for a schematic of the test set up.
   B. Make the interconnect cabling locally using mating connectors shown in Table 103.

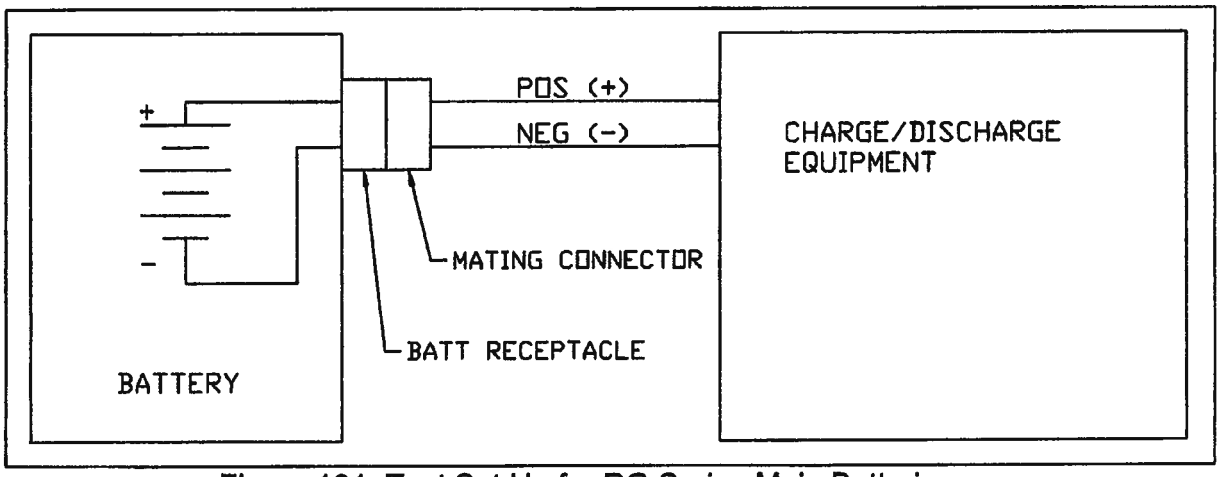

Figure 101. Test Set Up for RG Series Main Batteries

Table 103. List of Mating Connectors

Battery Receptacle (Shown on envelope drawing)	Mating Connector (Obtain locally)
IEC 60952-2 Type A or B BAC Type 102	BAC Type 215
IEC 60952-2 Type C	MS3349-3
IEC 60952-2 Type Q MS3509	MS25182-2 or MS3349-2
IEC 60952-2 Type R	14mm or 0.550" diameter pins
M8 Threaded Terminals	8mm or 5/16" ring terminals

NOTE: IF BATTERY RECEPTACLE IS NOT LISTED ABOVE, CONTACT CONCORDE FOR ASSISTANCE.

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7. Capacity Test Procedure
   A. Stabilize the battery at 20°C (68°F) or higher. The battery must be at this temperature for at least 20 hours.
   B. Charge the battery at constant potential per Paragraph 8.
   C. Connect the battery to the discharge equipment and discharge at the C1 rate on the label (ie, 42 Amps for a 42 AH battery).
   D. Discharge the battery to an EPV of 20 volts (10 volts for 12 Volt batteries) or other EPV specified by the airframe or equipment manufacturer.
   E. Record the time to the EPV. The battery passes the capacity test if the time to the EPV is 51 minutes or greater (85% of rated C1 capacity or greater).

      NOTE: AIRFRAME OR ACCESSORY EQUIPMENT MANUFACTURERS MAY SPECIFY A DIFFERENT CAPACITY REQUIREMENT, WHICH SHOULD TAKE PRECEDENCE.

   F. If the battery passes the capacity test, charge at constant potential per Paragraph 8 and return battery to full state of charge. The battery is acceptable for installation.
   G. If the battery fails the capacity test, perform the conditioning procedure given in Paragraph 9. After the battery has been conditioned repeat the capacity test.
   H. If the battery passes the second capacity test, return it to service. If the battery fails the second capacity test, repeat the conditioning charge and repeat the capacity test.
   I. If the battery passes the third capacity test, return it to service. If the battery fails the third capacity test, the battery should be replaced.
   J. If the battery gets very hot (external case temperature greater than 55°C/130°F) during charging, the battery should be replaced.

8. Constant Potential Charge Procedure

   NOTE: CONSTANT POTENTIAL CHARGING IS THE PREFERRED METHOD OF CHARGING THE BATTERY. IF THE BATTERY DOES NOT PASS THE CAPACITY TEST, THE CONDITIONING CHARGE PROCEDURE SHOULD THEN BE USED.

   A. Connect the battery terminals to the constant potential charging equipment.
   B. Apply a constant potential of 28.25 ± 0.25 volts (14.125 ± 0.125 volts for 12 Volt batteries) with a current capability of at least C1 amperes.
   C. Continue charging until the charge current remains constant (within 10%) for 3 consecutive hourly readings.
   D. Allow the battery to cool down for at least one hour before any other tests are performed.

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9. Conditioning Charge Procedure

WARNING: THIS PROCEDURE SHOULD ONLY BE DONE IN A WELL VENTILATED AREA BECAUSE A SIGNIFICANT AMOUNT OF HYDROGEN GAS MAY BE RELEASED FROM THE BATTERY.

CAUTION: THIS PROCEDURE WILL CAUSE THE BATTERY VOLTAGE TO GO AS HIGH AS 34 VOLTS WHICH COULD DAMAGE ELECTRONIC CIRCUITS CONNECTED TO A BATTERY BUS. DO NOT PERFORM A CONDITIONING CHARGE WHILE THE BATTERY IS INSTALLED IN AN AIRCRAFT.

CAUTION: A CONDITIONING CHARGE IS ONLY NECESSARY IF THE BATTERY FAILS THE CAPACITY TEST. THIS PROCEDURE MAY SHORTEN THE BATTERY'S LIFE IF PERFORMED ON A REPETITIVE BASIS.

NOTE: IF A BATTERY REQUIRES A CONDITIONING CHARGE TO PASS THE CAPACITY TEST, SUBSEQUENT CAPACITY CHECKS SHOULD BE AT THE INCREASED FREQUENCY SPECIFIED IN PARAGRAPH 1 OF THIS SECTION (3 MONTHS/250 HOURS FOR TURBINE ENGINE BATTERIES OR 6 MONTHS/500 HOURS FOR ALL OTHER BATTERIES).

A. Discharge the battery at the C1 rate to an EPV of 20 volts (10 volts for 12 Volt batteries). If the battery has already been discharged to the EPV, skip this step.
B. Connect the battery to the constant current charging equipment.
C. Charge at a constant current rate of C1 /10 (i.e., 4.2 Amps for a 42 Ah battery) until the voltage on charge is 31.0 volts (15.5 volts for 12 Volt batteries) or higher for 4 hours, then discontinue charging.

CAUTION: IF THE BATTERY BECOMES HOT (ABOVE 55°C/130°F) DURING THIS CHARGE, STOP THE CURRENT AND ALLOW THE BATTERY TO COOL TO ROOM TEMPERATURE BEFORE CONTINUING THE CHARGE.

D. After charging, allow the battery to cool down for at least 8 hours before any other tests are performed.

10. Fault Isolation Summary

Symptom	Probable Cause	Corrective Action
Low voltage / no voltage.	Battery partially or fully discharged.	Perform capacity test.
	Battery fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
Battery capacity less than 85% of rating.	Battery cells beyond serviceable life.	Replace battery.
Battery does not hold charge.	Battery cells beyond serviceable life.	Replace battery.
Battery gets hot while recharging.	Battery cells beyond serviceable life.	Replace battery.

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SCHEMATIC AND WIRING DIAGRAMS

1. General
   A. Schematic diagrams and/or polarity markings are shown on the envelope drawing of each specific battery model.
   B. The latest approved envelope drawings are available on Concorde's website (see front page of this CMM).
   C. If internet access is not available, contact Concorde for assistance (see front page of this CMM).

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DISASSEMBLY

1. General
   A. Batteries covered by this CMM have no field-replaceable components and are not designed for disassembly/re-assembly.
   B. Some battery models are equipped with externally mounted temperature sensors. Instructions for replacing temperature sensors are contained in separate maintenance manual supplements for each type of temperature sensor. These maintenance manual supplements are available on Concorde's website (see front page of this CMM). If internet access is not available, contact Concorde for assistance.

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CLEANING

1. General
   A. This section contains general cleaning instructions for Concorde aircraft batteries.
   B. Clean battery when it is being serviced for capacity testing.
   C. Batteries do not need to be disassembled for cleaning.

   CAUTION: DO NOT USE ANY TYPE OF SOLVENT TO CLEAN THE BATTERY. SOLVENTS MAY DAMAGE THE BATTERY.

2. Tools, Fixtures, Equipment and Consumables
   A. Consumables: Lint-free shop cloth (commercially available) and tap water (commercially available).

3. External Cleaning
   A. Clean the outside surfaces of the battery with a lint-free shop cloth that is clean, dry, and free of oil.
   B. If the battery has caked-on dirt or grime, use a cloth dampened with tap water, then wipe dry.

4. Internal Cleaning:
   A. Internal cleaning is not required.

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CHECK

1. General
   A. This section contains general checking instructions for Concorde aircraft batteries.
   B. Check battery when it is being serviced for capacity testing.
   C. Batteries do not need to be disassembled for checking.

2. Tools, Fixtures, Equipment and Consumables
   A. None required.

3. External Checking
   A. Check the outside surfaces of the battery and electrical connector(s) for deterioration or corrosion that may affect the battery's operation.
   B. Check the battery for loose or missing fasteners.
   C. Check the identification and informational labels to ensure they are legible and securely attached.
   D. If the above checks reveal items that need attention, repair or replace battery as appropriate.

4. Internal Checking
   A. Internal checks are not required.

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REPAIR AND DISPOSAL

1. General
   A. Batteries covered by this CMM have no internal components that are repairable. The battery assembly must be replaced when internal components (i.e., battery cells) fail or wear out.
   B. Refer to the Section on TESTING AND FAULT ISOLATION to determine if the battery assembly needs to be replaced.
   C. The battery assembly should be replaced after 4 years of service life.
   D. If external repairs are needed to the battery assembly, have it serviced in an authorized repair facility or contact Concorde for assistance (see front page of this CMM).

2. Disposal
   A. Concorde aircraft batteries contain lead, sulfuric acid, and other hazardous materials. Never discard batteries in the trash or in a landfill.
   B. Dispose spent batteries and assemblies in accordance with local ordinances and regulations.
   C. Some batteries are encased in aluminum or titanium containers, which need to be removed before the battery cells are sent to the lead smelter for recycling. Make sure the recycling collector is aware of this requirement.
   D. See battery Material Safety Data Sheet (MSDS) for additional information.

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ASSEMBLY

1. General
   A. Batteries covered by this CMM have no field-replaceable components and are not designed for disassembly/re-assembly.
   B. Some battery models are equipped with externally mounted temperature sensors. Instructions for replacing temperature sensors are contained in separate maintenance manual supplements for each type of temperature sensor. These maintenance manual supplements are available on Concorde's website (see front page of this CMM). If internet access is not available, contact Concorde for assistance.

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FITS AND CLEARANCES

1. General
   A. Refer to the envelope drawing for each specific battery model. The envelope drawing provides overall dimensions, mounting provisions, and maximum weight of the battery.
   B. The latest approved envelope drawings are available on Concorde's website (see front page of this CMM).
   C. If internet access is not available, contact Concorde for assistance (see front page of this CMM).

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SPECIAL TOOLS, FIXTURES, EQUIPMENT AND CONSUMABLES

1. Tools
   A. Not applicable.

2. Fixtures
   A. Not applicable.

3. Equipment
   A. Refer to Tables 901, 902 and 903.

   NOTE: EQUIVALENT SUBSTITUTES MAY BE USED FOR THESE ITEMS.

4. Consumables
   A. Lint-free cloth (commercially available).
   B. Tap water (commercially available).

Table 901. List of Test Equipment for 12 Volt Batteries

Description	Source	Part Number	Purpose
Electronic Load, capable of constant current at C1 ADC and 10-14 VDC with EPV termination at 10 VDC.	Commercially Available	N/A	Capacity Testing
Constant Voltage Power Supply, capable of 14.0 – 14.25 VDC and at least C1 ADC output.	Commercially Available	N/A	Constant Potential Charging
Constant Current Power Supply, capable of C1/10 ADC and at least 17 VDC output.	Commercially Available	N/A	Constant Current Charging
Digital Multimeter (DMM), capable 9-17 VDC with accuracy of 1% or better.	Commercially Available	N/A	Measuring OCV
Mating Connector	Various	See Table 903	Connect Battery to Test Equipment

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Table 902. List of Test Equipment for 24 Volt Batteries

Description	Source	Part Number	Purpose
Electronic Load, capable of constant current at C1 ADC and 20-28 VDC with EPV termination at 20 VDC.	Commercially Available	N/A	Capacity Testing
Constant Voltage Power Supply, capable of 28.0 – 28.5 VDC and at least C1 ADC output.	Commercially Available	N/A	Constant Potential Charging
Constant Current Power Supply, capable of C1/10 ADC and at least 34 VDC output.	Commercially Available	N/A	Constant Current Charging
Digital Multimeter (DMM), capable of 18-34 VDC with accuracy of 1% or better.	Commercially Available	N/A	Measuring OCV
Mating Connector	Various	See Table 903	Connect Battery to Test Equipment

Table 903. List of Mating Connectors

Battery Receptacle (Shown on envelope drawing)	Mating Connector (Obtain locally)
IEC 60952-2 Type A or B BAC Type 102	BAC Type 215
IEC 60952-2 Type C	MS3349-3
IEC 60952-2 Type Q MS3509	MS25182-2 or MS3349-2
IEC 60952-2 Type R	14mm or 0.550" diameter pins
M8 Threaded Terminals	8mm or 5/16" ring terminals

NOTE: IF BATTERY RECEPTACLE IS NOT LISTED ABOVE, CONTACT CONCORDE FOR ASSISTANCE.

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STORAGE (INCLUDING TRANSPORTATION)

1. Storage Conditions
   A. Batteries are serviced and charged at the factory prior to shipment.
   B. To prolong shelf life, batteries should be stored in a cool location, ideally below 20°C (68°F).
   C. The open circuit voltage (OCV) of a fully charged battery is approximately 26.0 volts (13.0 volts for 12 Volt batteries). As the battery state of charge drops due to self-discharge, its OCV also declines.
   D. Batteries should be boost charged per Paragraph 6 when the OCV declines to 25.0 volts (12.5 volts for 12 Volt batteries).
   E. Batteries with an OCV below 25.0 volts (12.5 volts for 12 Volt batteries) due to improper or inadequate boost charging must be capacity tested per Paragraph 7 before being placed in service.

CAUTION: WHEN BATTERIES ARE INSTALLED IN AIRCRAFT DURING STORAGE (OR EXTENDED PERIODS OF NON-USE), IT IS BEST TO DISCONNECT THE BATTERY CONNECTOR. THIS PRACTICE WILL ELIMINATE UNNECESSARY DRAIN ON THE BATTERY WHEN PARASITIC LOADS ARE PRESENT. OTHERWISE, THE BATTERY SERVICE LIFE MAY BE ADVERSELY AFFECTED.

2. Storage Facilities
   A. Concorde valve regulated lead-acid aircraft batteries may be stored and serviced in any battery facility, including nickel-cadmium service facilities. These batteries are sealed to prevent cross contamination of the electrolyte.
   B. Lead-acid batteries can produce explosive mixtures of hydrogen and oxygen while being charged or discharged. Never service batteries in an airtight or sealed enclosure and make sure the work area is well ventilated.

3. Tools, Fixtures, Equipment and Consumables
   A. Refer to Table 101 for 12 volt batteries and Table 102 for 24 volt batteries.
   B. Refer to Table 103 for mating connectors.

4. Test Set Up
   A. Refer to Figure 101.

5. Preparation for Installation
   A. Remove battery from the shipping carton and visually inspect the battery for signs of damage. Do not use the battery if it appears to be damaged, contact Concorde for assistance.
   B. Measure the battery's open circuit voltage (OCV) with a DMM.
   C. If the OCV equals or exceeds 25.5 volts (12.75 volts for 12 Volt batteries), the battery can be installed in the aircraft without boost charging.
   D. If the OCV equals or exceeds 25.0 volts and is less than 25.5 volts (12.5 and 12.75 volts for 12 Volt batteries), apply a boost charge per Paragraph 6. The battery can then be installed in the aircraft.

E. If the OCV is below 25.0 volts (12.5 volts for a 12 volt battery), perform a capacity test per Paragraph 7 before installing in the aircraft.

6. Constant Potential Charge Procedure

NOTE: CONSTANT POTENTIAL CHARGING IS THE PREFERRED METHOD OF CHARGING THE BATTERY. IF THE BATTERY FAILS THE CAPACITY TEST, THE CONDITIONING CHARGE PROCEDURE SHOULD BE USED.

A. Connect the battery terminals to the constant voltage charging equipment.
B. Apply a constant potential of 28.25 ± 0.25 volts (14.125 ± 0.125 volts for 12 Volt batteries) with a current capability of at least C1 amperes.
C. Continue charging until charge current remains constant (within 10%) for 3 consecutive hourly readings.
D. Allow the battery to cool down for at least one hour before any other tests are performed.

7. Capacity Test Procedure

A. Stabilize the battery at 20°C (68°F) or higher. The battery must be at this temperature for at least 24 hours.
B. Constant potential charge the battery per Paragraph 6.
C. Connect the battery to the discharge equipment and discharge at the C1 rate on the label (ie, 42 Amps for a 42 AH battery).
D. Discharge the battery to an end point voltage of 20 volts (10 volts for 12 volt batteries) or other EPV specified by the airframe or equipment manufacturer.
E. Record the time to the EPV. The battery passes the capacity test if the time to the EPV is 51 minutes or greater (85% of rated C1 capacity or greater).

NOTE: AIRFRAME OR ACCESSORY EQUIPMENT MANUFACTURERS MAY SPECIFY A DIFFERENT CAPACITY REQUIREMENT, WHICH SHOULD TAKE PRECEDENCE.

F. If the battery passes the capacity test, charge at constant potential per Paragraph 6 and return battery to full state of charge. The battery is acceptable for installation.
G. If the battery fails the capacity test, perform the conditioning procedure given in Paragraph 8. After the battery has been conditioned repeat the capacity test.
H. If the battery passes the second capacity test, it is acceptable for installation. If the battery fails the second capacity test, repeat the conditioning charge and repeat the capacity test.
I. If the battery passes the third capacity test, it is acceptable for installation. If the battery fails the third capacity test, the battery should be replaced.
J. If the battery gets very hot (external case temperature greater than 55°C/130°F) during charging, the battery should be replaced.

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8. Conditioning Charge Procedure

WARNING: THIS PROCEDURE SHOULD ONLY BE DONE IN A WELL VENTILATED AREA BECAUSE A SIGNIFICANT AMOUNT OF HYDROGEN GAS MAY BE RELEASED FROM THE BATTERY.

CAUTION: THIS PROCEDURE WILL CAUSE THE BATTERY VOLTAGE TO GO AS HIGH AS 34 VOLTS WHICH COULD DAMAGE ELECTRONIC CIRCUITS CONNECTED TO A BATTERY BUS. DO NOT PERFORM A CONDITIONING CHARGE WHILE THE BATTERY IS INSTALLED IN AN AIRCRAFT.

CAUTION: A CONDITIONING CHARGE IS ONLY NECESSARY IF THE BATTERY FAILS THE CAPACITY TEST. THIS PROCEDURE MAY SHORTEN THE BATTERY'S LIFE IF PERFORMED ON A REPETITIVE BASIS.

A. Discharge the battery at the C1 rate to an EPV of 20 volts (10 volts for 12 Volt batteries). If the battery is already discharged to 20 volt EPV, skip this step.
B. Connect the battery to the constant current charging equipment.
C. Charge at a constant current rate of C1 /10 (i.e., 4.2 Amps for a 42 Ah battery) until the voltage on charge is 31.0 volts (15.5 volts for 12 Volt batteries) or higher for 4 hours, then discontinue charging.

CAUTION: IF THE BATTERY BECOMES HOT (ABOVE 55°C/130°F) DURING THIS CHARGE, STOP THE CURRENT AND ALLOW THE BATTERY TO COOL TO ROOM TEMPERATURE BEFORE CONTINUING THE CHARGE.

E. After charging, allow the battery to cool down for at least 8 hours before any other tests are performed.

9. Transportation
A. If the OCV is less than 25.5 volts (12.75 volts for 12 Volt batteries), charge the battery per paragraph 6 before shipment.
B. The battery should be packaged in its original container. If the original container is not available, follow local packaging regulations applicable to the mode of transport.
C. RG Series batteries are classified as a "NONSPILLABLE BATTERY" and comply with Special Provision A67 of the International Air Transport Association (IATA) Dangerous Goods regulations. As such, they can be shipped as non-hazardous by any means.

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F6177

CADMIUM-NICKEL STORAGE BATTERY

P/N

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

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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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RECORD OF REVISIONS

REV No.	ISSUE DATE	DATE INSERTED	BY
1	NOV 30/84		
R 2	OCT 09/90		

REV No.	ISSUE DATE	DATE INSERTED	BY

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R	Title page	1/2	OCT 30/90		111	JUL 15/79	
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R	Record of temporary revisions	1/2	OCT 30/90		113	JUL 15/79	
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					115	JUL 15/79	
					116	JUL 15/79	
R	Record of revisions	1/2	OCT 30/90				
				Disassembly	301	OCT 30/90	R
					302	OCT 30/90	R
R	List of	1	OCT 30/90				
R	effective pages	2	OCT 30/90	Cleaning	401	JUL 15/79	
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	IPL	1001	JUL 15/79			
R	Fig. 1	1001-0	OCT 30/90			
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R		1001-2	OCT 30/90			
R		1001-3	OCT 30/90			

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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.

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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

	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 R (1) Electric storage batteries SAFT P/N 2376, 2376-1, 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)).

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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.).

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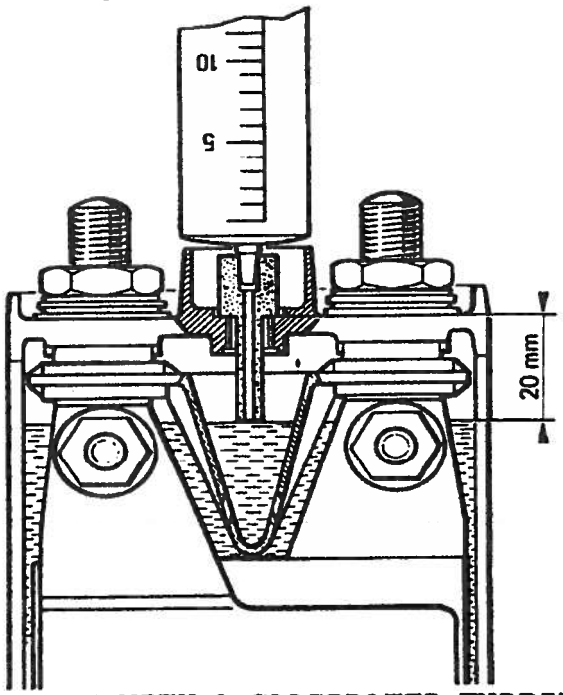
Any addition of liquid under any other conditions might result in electrolyte overflow in normal operation.

- 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).

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)).

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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).

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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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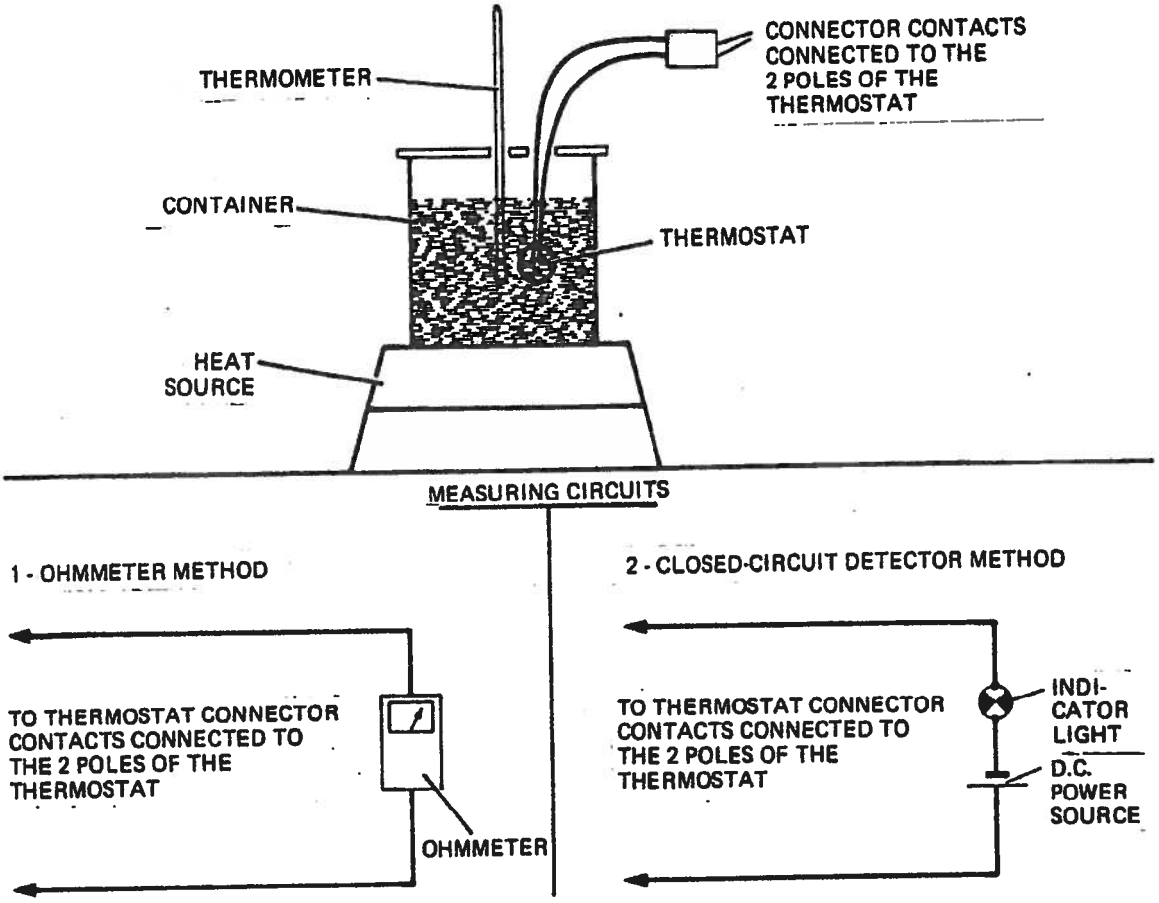

CHECKING THE THERMOSTAT
FIGURE 501

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- 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.

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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.

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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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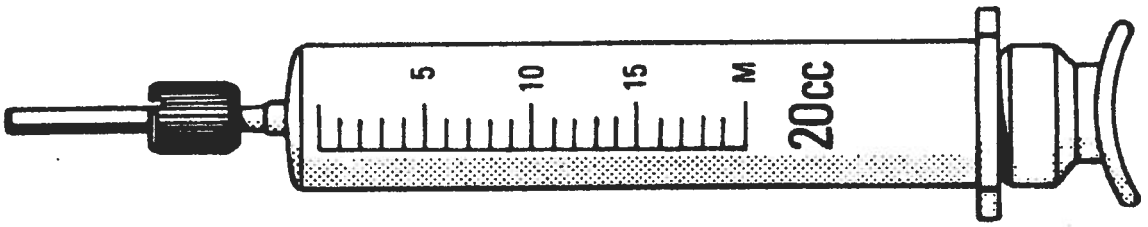
POLYAMID VALVE WRENCH
FIGURE 901



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

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

- ITEM NOT ILLUSTRATED

SAFT

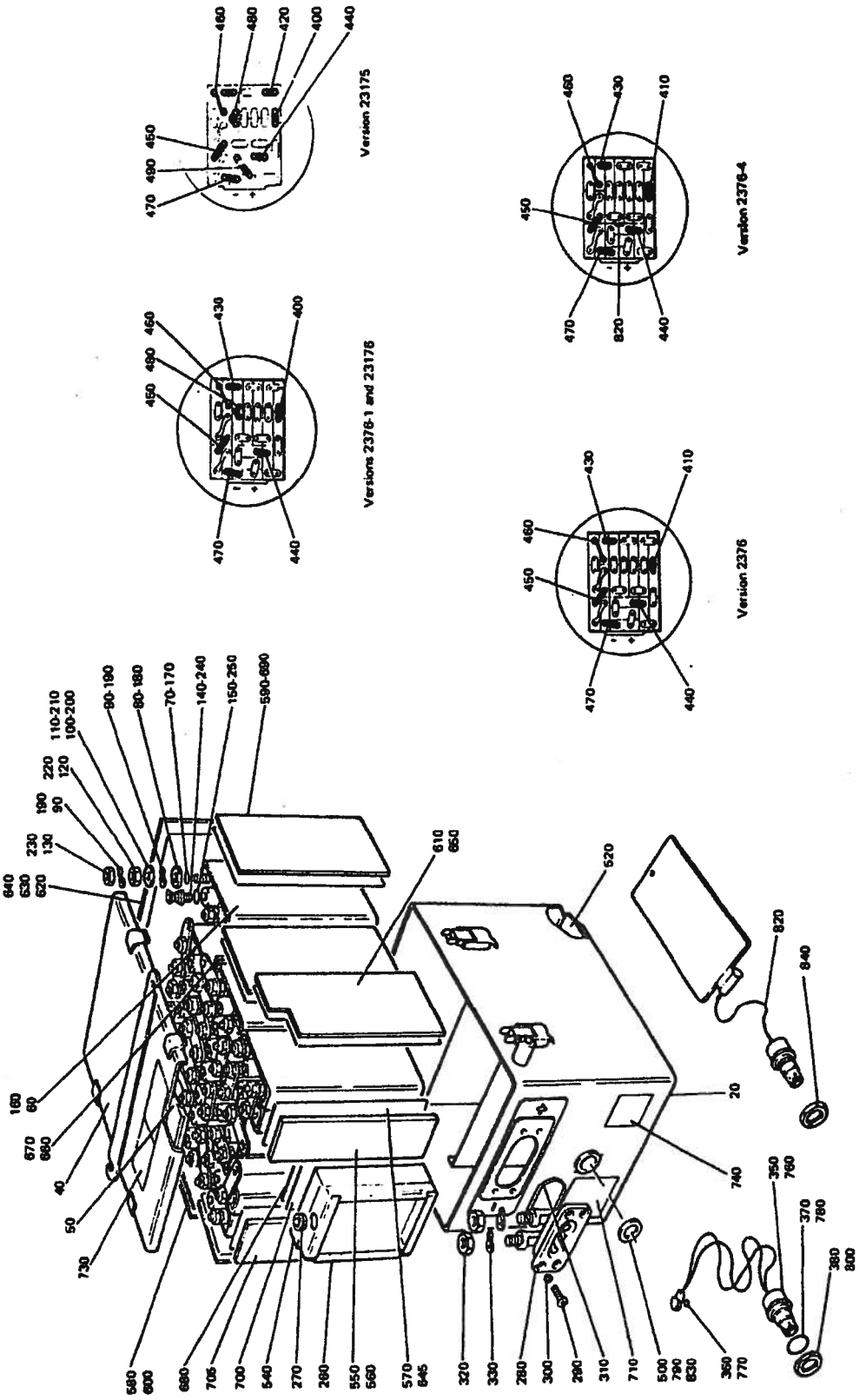
PART NUMBER	AIRLINE PART NUMBER	FIG.	ITEM	TTL REQ	
102990		1	645A	2	R
103489		1	490A	1	
105405		1	360A	1	
		1	770A	1	R
112696		1	260A	1	
112965		1	380A	1	
112967		1	370A	1	
112977		1	-510A	1	R
113442		1	-390A	1	
113604		1	50A	1	
114301		1	- 10B	1	
114318		1	- 30A	1	
114557		1	- 10A	1	
114722		1	-750A	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



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