



Tool Code: MBH014

Document: MN-MBH014-E

**Memory Battery Holder**

# PRODUCTION LOGGING

## MEMORY BATTERY HOLDER

**Operational and Maintenance Manual**

**MBH014: 5 cell Sondex/Panex x 1<sup>11</sup>/<sub>16</sub>"**

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## 0 ABOUT THIS MANUAL

### 0.1 MANUAL HISTORY

Date	Issue	Description	Auth	Chk	App
14/5/99	C	Separate manuals created for each MBH type	JB/DF		
02/09/02	D	Manual reformatted to use new templates.	DO		RH
19/08/04	E	Corrections to spec	DO	(SA)	RH

### 0.2 UPDATES USED WITH THIS MANUAL

Date <sup>a</sup>	Update	Description
	none	

<sup>a</sup> Note: this chapter shall be updated to include information on manual updates to be used with this manual, irrespective of current manual issue.

### 0.3 TECHNICAL HELP

For further technical help contact Sondex as follows:

Address: Ford Lane, Bramshill, Hook, Hampshire, RG27 0RH, UK  
 Telephone: +44(0)118 932 6755  
 Fax: +44(0)118 932 6704  
 Email: [support@sondex.co.uk](mailto:support@sondex.co.uk)

### 0.4 FEEDBACK

Please help us to improve future issues of this manual by sending comments or corrections to Sondex as above.

In your feedback please make reference to:

- The manual title, version and section
- Misprints, errors or unclear explanations
- General comments and suggestions.

Thank you.

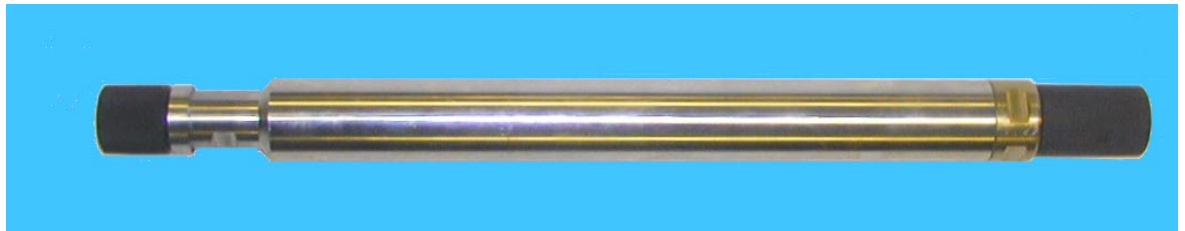
**Photographs and sketches are for illustration purposes only. Depending on the tool model that you have, certain features or dimensions may differ from those shown.**

## **1 EQUIPMENT**

### **1.1 DESCRIPTION**

The type MBH014 Memory Battery Holder houses a motor battery pack used for example with the Sondex ABC Memory Production Logging tool string. The battery pack fitted contains 5 high current 'C' cells.

Sondex or Panex battery packs may be used.



**Figure 1.1 MBH014**

### **1.2 PURPOSE**

Memory logging toolstrings are run on slickline or coiled tubing and do not have electrical power fed from surface. Instead they require their power to accompany the toolstring downhole.

When fitted with a Lithium Chloride battery pack, the Sondex Memory Battery Holder contains sufficient power to run a typical memory PLT string (10 sensors taking 160mA) at 1 second sampling for a maximum of 31 hours.

1.3 SPECIFICATION

Parameter	Specification			Remarks
Pressure (max)	15,000psi			
Diameter	1 <sup>11</sup> / <sub>16</sub> "			
Length	16.6" make-up length			
Weight in air	3.6kg (8lb)			
Battery pack type	Lithium Chloride			Batteries are not supplied as part of the MBH; order batteries separately
	<b>BAT003</b>	<b>BAT004</b>	<b>BAT009</b>	<b>Panex 5 x 'C' cell</b>
Open circuit voltage (+VDC)	18	18	19.5	
Capacity (Amp.hr)	5.5	4.5	6.2	
@ mA	39			
@ °C	25			
Min Temperature (°C)	-40			
Max Temperature (°C)	150	180	165	
End threads (top/bottom)	1 <sup>5</sup> / <sub>16</sub> " – 10 UN male/ Sondex 12tpi stub acme male			
End connectors (top/bottom)	none/single conductor Kemlon male pin			

**NOTE:** Contact Sondex for alternative battery pack availability. See also battery manual [MN-BAT](#).

## 2 SAFETY



**Warning!** **HOT WORK!** Sondex equipment may, under certain circumstances or failure modes, become a potential source of ignition. Using it must therefore be considered "**HOT WORK**" and appropriate precautionary procedures should be followed when testing at surface in areas where there is a risk of gas leaks or other potentially explosive atmospheres.

See Sondex Battery manual [MN-BAT](#).

The Lithium cells incorporated in BAT005 are manufactured by Electrochem and can deliver a high current.

Battery packs supplied by Sondex are fused to prevent explosion should a short circuit occur outside the pack.

**Never** try to repair an open fuse.



**Warning!** Lithium Chloride batteries have the highest energy density of any electrochemical system and **if mistreated are dangerous** and must therefore be handled properly.

**Never** store or operate cells above their maximum rated temperature. Drawing current from a cell increases its temperature. Exceeding the maximum continuous current limit will overheat the cells and run the risk of **permanent damage and even explosion**.

**Do not** crush, puncture or attempt to disassemble any battery pack or cell.

**Do not** use excessive force or hammering to remove batteries from the MBH housing.

**Do not** allow the battery pack to become wet.

Lithium Chloride batteries require special transportation arrangements according to IATA and DOT regulations.

Regulations concerning disposal of Lithium batteries vary. **Lithium is a poison** and must be disposed of correctly. Lithium batteries are not to be burned, thrown away, or handed to uninformed 3rd parties. They may explode if improperly handled. Contact your local Environmental Health office to determine the rules in force governing the use, transportation and disposal of lithium batteries.

## 3 OPERATING PROCEDURE

### 3.1 BEFORE LOGGING CHECKS



**Warning!** If you have not already read [Section 2 Safety](#) then do so now.

#### 3.1.1 MECHANICAL

Ref.: General Assembly drawing

07009

- 1 Clean and grease the O'ring seals (items 14 and 15). Replace if damaged, or after use in gas.

#### 3.1.2 ELECTRICAL

**With the battery pack removed:**

- 2 Check conductivity of through contact  $< 0.2\Omega$ .
- 3 Check insulation of through contact  $> 50M\Omega$ .

### 3.2 CONNECTING TO TOOLSTRING

The battery housing is designed to screw directly onto the top of the Sondex MPL memory section. As soon as this is done the memory section will begin to work. PL sensors may be attached below the memory section before or after connection of the battery pack. If after, ensure the through line never shorts to ground.

After connecting the lowest tool which has a through line, remove the bottom thread protector of the tool and check for correct line voltage.



**Warning!** The MBH014 will screw on to the top of any standard PL tool. This should not be done, as it will damage the pressure feedthrough assembly and may short the battery.

### **3.3 LOGGING**

Maximum logging time can be calculated from the current consumption of the string when switched on, the measurement profile controlling the memory section and the battery capacity. As a guideline, a complete memory PL string consisting of:

- Quartz pressure gauge including sensor temperature
- two flowmeters
- temperature
- radioactive and gradiomanometer fluid density
- capacitance
- gammaray
- CCL
- X-Y caliper

recorded every 1 second can be powered for approximately 30 hours at 100°C on one lithium battery pack of 5 'C' cells.

Refer to the battery manual *MN-BAT* for more details on the reduction of tool current occurring by sampling less frequently than once a second.

### **3.4 POST LOGGING DISASSEMBLY**

Remove the Memory Battery Holder with battery pack from the memory section . Check the open circuit voltage at the centre pin.

Clean the makeup thread and check O'rings. Change if necessary. Grease thread and O'rings.

Screw on the thread protector. Label the holder with the time, current used and temperature of use. Change the battery when the life used has reduced to 3Amp.hr.

### **3.5 TRANSPORT HANDLING & STORAGE**

Store with end threads lightly greased and with water tight thread protectors fitted.

It is not necessary to remove the battery except for replacement or maintenance.

Do not allow internal battery pack to get wet.

Do not subject extreme shock such as dropping or hitting with a hard object.

## 4 MECHANICAL DESCRIPTION

Ref.: General Assembly drawing 07009

### 4.1 OVERVIEW

The MBH014 Memory Battery Holder is a  $1\frac{11}{16}$ "  $\varnothing$  housing to contain a battery pack comprising 5 lithium chloride 'C' cells connected in series. The total voltage of the pack is +18V with a nominal capacity of 5 Amp.hr (4.5 Amp.hr for 180°C type).

The battery pack for use with the MBH014 carries a fuse to protect against explosion or other damage should the battery become short circuited.

Mechanically the positive lead of the battery pack is a 4mm socket insulated and shrouded within the threaded end of the battery pack. The connection between the battery and memory is made by a Kemlon pressure feedthrough located in the lower sub.

The battery return of a Sondex pack is through a lead soldered between the top of the battery and the battery pack thread. This grounds when screwed into the battery lower sub. The battery is positively grounded and located at all times.

Panex battery packs are grounded and held in place in the lower sub by the spring loaded connection at the top of the MBH housing.

There is sufficient free space between the outside of the battery pack and the inside of the housing for normal expansion of the battery pack due to temperature.

The upper connection of the MBH014 is  $\frac{15}{16}$ " - 10tpi UN thread, to connect to slickline or coil-tubing makeup joint.

### 4.2 DISASSEMBLY



**Warning!** If you have not read *Section 2 Safety*, do so now.

During this procedure, take great care not to ground the centre contact or battery live socket even for an instant, as the short circuit will blow the internal fuse.

#### 4.2.1 BATTERY REMOVAL

- 1 Unscrew the lower sub (item 3) from the housing (item 1).
- 2 Allow the spring loaded contact assembly (items 4 - 7, 17) to slide out of the housing.
- 3 Check that the spring loaded contact assembly will compress and extend smoothly.
- 4 Unscrew the pressure feedthrough assembly (item 8) from within the lower sub (item 3).

## 4.3 REASSEMBLY

- 1 Apply silicone grease to the O'rings. Apply Lubriplate grease to the threads on the pressure feedthrough assembly (item 8).
- 2 Screw the pressure feedthrough assembly into the lower sub (item 3).
- 3 Replace O'rings (items 14 and 15) if necessary.
- 4 Sondex type: Screw the battery pack into the lower sub 2.4" until it bottoms out.  
Panex type: Push the battery pack into the lower sub 2.4" until it bottoms out.
- 5 Grease the lower sub threads and O'rings (item 14).
- 6 Slide the spring loaded contact assembly into the housing as shown in General Assembly drawing.
- 7 Screw the lower sub into the battery housing and make up tight.
- 8 Check the battery voltage with a 200 $\Omega$  resistor across the terminals. **Take care not to short circuit the battery.** It may take a little time to depassivate, but should normally be up to full voltage (18 volts) within one minute.

## 4.4 MAINTENANCE

Perform [Section 3.1 Before Logging Checks](#).

Replace O'ring (item 13) every 6 months.

### **With battery pack installed:**

Check open circuit voltage between centre contact and ground. New battery should be >19V.

Place a 200 $\Omega$  resistor across the battery and check the voltage across it. If the battery has not been used for some time it may well depassivate, indicated by a rising battery voltage, but the voltage of a healthy battery will rise to within 1.4 volts of open circuit value within a short time.

**Take great care not to ground the centre contact or battery live socket even for an instant, as a short circuit will blow the internal fuse.**

**APPENDIX A EQUIPMENT AND RECOMMENDED SPARES**

<b>Item</b>	<b>Part no.</b>	<b>Tool Description</b>	<b>Diameter</b>	<b>Remarks</b>
1	MBH014	Memory Battery Holder	1 <sup>11</sup> / <sub>16</sub> "	MK3
2	BAT003 or BAT004 or BAT009	Battery Pack		Not included in MBH: order separately

**A.1 ANCILLARY EQUIPMENT**

**Calibration Fixtures**

<b>Item</b>	<b>Part no.</b>	<b>Description</b>	<b>Qty</b>	<b>Remarks</b>
1	-	Multimeter	1	

**Special Tools**

<b>Item</b>	<b>Part no.</b>	<b>Description</b>	<b>Qty</b>	<b>Remarks</b>
1	91050	Hand Tool kit for all 1 <sup>11</sup> / <sub>16</sub> " tools	1	

**A.2 RECOMMENDED SPARES**

<b>Item</b>	<b>Part No</b>	<b>Description</b>	<b>Qty</b>	<b>Remarks</b>
1	<i>KITB-MBH014</i>	Basic Spares Kit	1	To support 1 run in hole
2	<i>KITR-MBH014</i>	Recommended Spares Kit	1	To support 25 runs in hole
3	LOR101	Grease for O'rings and threads	1	5oz pot
4	LOR101L	Grease for O'rings and threads	1	16oz pot

PARTS LISTING						
Part:		Issue:		Drawn:	Checked:	Approved:
91050		-		NGH	PD	DJF
Description:				Date:	Date:	Date:
Tool Kit for all 1 11/16 Tools SX and GO				14/01/2002	14/01/2002	14/01/2002

CHANGE HISTORY					RELATED DOCUMENTS		
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
-	14/01/2002	Initial Release	PD	DJF			

PARTS LIST							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	91005	-	Spanner Open Ended 42mmx38mm		2	ea	
002	91019	-	Spanner C 50mm 35mm		1	ea	
003	10038	A	Spanner Box 3/8 x 5/16 Modified		2	ea	
004	91028	-	Spanner 3/8x5/16		1	ea	
005	91027	-	Spanner Single Open End 18mm		1	ea	
006	91029	-	Key Hex Metric		1	ea	
007	91030	-	Punch Pin Parallel set		1	ea	
008	00615	A	Assy Spanner PKJ		1	ea	
009	91293	PT1	Screwdriver Parallel tip (3 0 x 75)		1	ea	
010	91105	-	Toolroll With SX Badge Large Black		1	ea	
011	91104	-	Screwdriver Parallel tip (5 5 x 200)		1	ea	
012	91103	-	Pliers Circlip 812 Chrome/Van		1	ea	
013	91102	-	Pliers Mini Flat Nose 5 Inch		1	ea	
014	10037	A	Bar Tommy		2	ea	
015	10051	A	Kemlon tool Sondex - 4BA Hex Socket		1	ea	
016	91280	-	Hammer, 4oz ball pein		1	ea	
017	91130	-	Pin C Spanner 35-50mm		1	ea	

(AR = As Required)

<b>PARTS LISTING</b>						
Part:		Issue:		Drawn:	Checked:	Approved:
KITB-MBH014		A		DMO	RLH	RLH
Description:				Date:	Date:	Date:
Kit, Spares, Basic, MBH014				1/10/2002	1/10/2002	1/10/2002

<b>CHANGE HISTORY</b>					<b>RELATED DOCUMENTS</b>		
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
A	1/10/2002	First Issue	RLH	RLH			

<b>PARTS LIST</b>							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	99124	-	O Ring Viton 90 Type 124		2	ea	
002	99211	-	O Ring Viton 90 Type 211		2	ea	

(AR = As Required)

<b>PARTS LISTING</b>						
Part:		Issue:		Drawn:	Checked:	Approved:
KITR-MBH014		A		DMO	RLH	RLH
				Date:	Date:	Date:
				1/10/2002	1/10/2002	1/10/2002
Description:						
Kit, Spares, Recommended, MBH014						

<b>CHANGE HISTORY</b>					<b>RELATED DOCUMENTS</b>		
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
A	1/10/2002	First Issue	RLH	RLH			

<b>PARTS LIST</b>							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	07306	C	Connector Pressure Feedthrough Mk1 MEM		1	ea	
002	95009	-	O Ring Viton 75 Type 009		2	ea	
003	99124	-	O Ring Viton 90 Type 124		50	ea	
004	99211	-	O Ring Viton 90 Type 211		50	ea	

(AR = As Required)

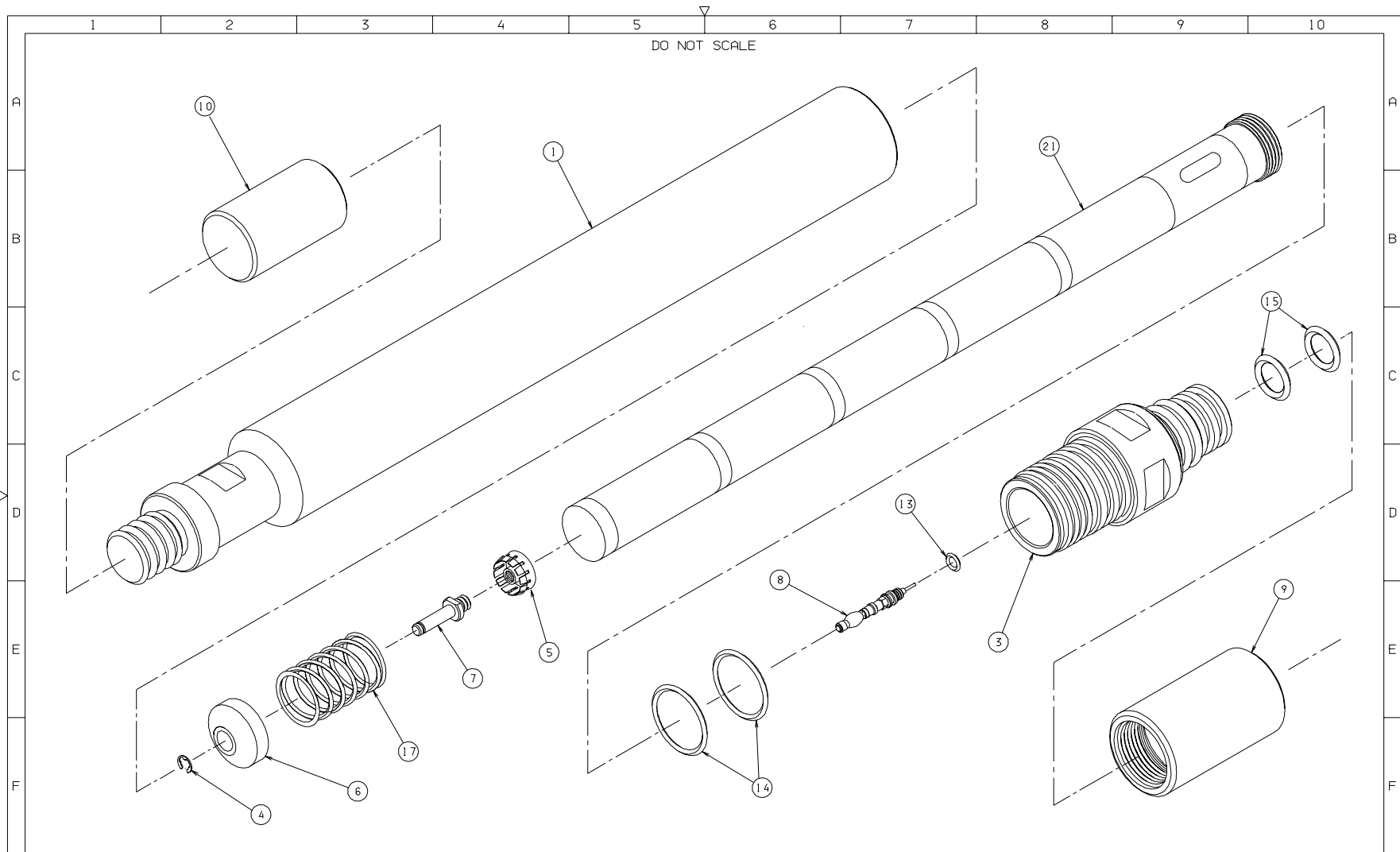
**APPENDIX B DRAWINGS AND PARTS LISTS**

**B.1 MECHANICAL DRAWINGS**

MBH014, 1<sup>11</sup>/<sub>16</sub>", General Assembly

Drawing/Parts List

07009-C



DRAWN NGH	CHECKED AJB	APPROVED DJF	ISS C	DESCRIPTION MINOR DESIGN CHANGES. REFER C/R249	APPD DJF	DATE 04/09/97	<b>Sondex</b> Tel. 0118 932 6755 THIS DRAWING IS THE PROPERTY OF Sondex AND SHALL NOT BE COPIED OR USED WITHOUT PRIOR PERMISSION	MACHINE FINISH 64	USED ON MBH 14	TITLE ASSY $\varnothing 1.11/16"$ MEMORY BATTERY HOLDER 5 C'CELL (SONDEX/PANEX)
DATE 23/01/97	DATE 05/06/97	DATE 04/09/97	B	ITEM 1 & 5 CHANGED. REFER C/R248				GEN TOL 0. X $\pm 0.020"$ 0. XX $\pm 0.010"$ 0. XXX $\pm 0.005"$ ANGLE $\pm 0.5^\circ$	SHEET 1/2	DRAWING No. 07009
DIM IN INCHES	MATL: SEE DETAIL DRAWINGS		A	INITIAL RELEASE			THIRD ANGLE PROJECTION			

SONDEX FM No: F0022

**Memory Battery Holder**

**MBH014**

PARTS LISTING					
Part:	Issue:	Drawn:	Checked:	Approved:	
07009	C	NGH	DJF	DJF	
Description:		Date:	Date:	Date:	
Assy 1 11/16 MBH 5 C Cell SX/Panex		23/01/1997	04/09/1997	04/09/1997	

CHANGE HISTORY					RELATED DOCUMENTS		
Iss	Date	Remarks	Chkd	Appr	# Documents	Issue	Notes
C	21/05/1997	Refer C/R 249			01 AD 07009	C	Assembly Drawing
					02 TP 07009	PT1	Test Procedures
					03 TR 07009	PT1	Test Results

PARTS LIST							
Item	Part No.	Issue	Description	Component Value	Qty	Units	Remarks
001	07326	C	Housing Pressure 1 11/16 SX/PANEX Battery Type		1	ea	
002							
003	07321	A	Sub Lower 1 11/16 SX/PANEX, ABC		1	ea	
004	93250	-	Circlip Radial E 018S SS		1	ea	
005	02957	C	Ring Contact		1	ea	
006	07315	B	Retainer Contact		1	ea	
007	07328	B	Shaft Connecting		1	ea	
008	07306	C	Connector Pressure Feedthrough Mk1 MEM		1	ea	
009	01019	C	Thread Protector, Female, Standard (Lower End)		1	ea	
010	10125	A	Thread Protector, 15/16-10UN, MBHs		1	ea	
011							
012							
013	99008	-	O Ring Viton 90 Type 008		1	ea	
014	99124	-	O Ring Viton 90 Type 124		2	ea	
015	99211	-	O Ring Viton 90 Type 211		2	ea	
016							
017	91047	-	Spring Compression St/St 0.970(OD) x 1.500(FL) 23.0(lb/in)		1	ea	
018							
019							
020							
021							

(AR = As Required)

## **APPENDIX C BATTERY LIFE**

> Memory Tool Battery Life vs. Program Sample Rate (ABC) table (BAT\_LIF4.xls)

Charts (BAT\_LIF4.xls)

> Survey Length vs Time between samples (secs)

> Survey Length vs Time between samples (mins)

> Average Current drain vs time between samples

### ABC Memory Tool Battery Life vs Program Sample Rate

(This review is to determine the APPROXIMATE battery and memory life expectancy for the conditions shown)

Tool	TOOL CURRENT ON/OFF			Total
	Logging	Standby	(1 or 0)	
MPL	45	0.5	1	45
Q-Pressure	10	0	1	10
CCL	2	0	1	2
PGR	20	0	1	20
SPINNER	5	0	1	5
CWH	3	0	1	3
FDP	12	0	1	12
PRT	11	0	1	11
FDR	20	0	1	20
PLC	15	0	0	0
PDC	25	0	1	25
none	0	0	0	0
none	0	0	0	0
SPINNER	5	0	1	5
V Battery	0	0	1	0
<b>Total</b>	<b>173</b>	<b>0.5</b>	<b>158.5</b>	<b>158</b>

BATTERY CHARACTERISTICS		
Temp Rtg deg C	Battery Volts	Max Life Amp.hrs
150	18.35	5.0
180	18.35	4.5

(at 0.05 Amps drain)

Where tool is programmed for sampling at intervals greater than 6 seconds it is on for minimum 5 maximum 6 seconds

#### CALCULATION OF BATTERY LIFE from SAMPLE RATE and CURRENT DRAIN

Hours/ sample	Mins/ sample	Seconds/ sample	Avg Curr (mA)		Minutes / sample	Logging Life (days)		% memory used at end of battery
			min	max		150°C bat	180°C bat	
		0.1	158.5	158.5	0.002	1.3	1.2	637.3%
		1	158.5	158.5	0.017	1.3	1.2	63.7%
		3	158.5	158.5	0.050	1.3	1.2	21.2%
		4	158.5	158.5	0.067	1.3	1.2	15.9%
		5	158.5	158.5	0.083	1.3	1.2	12.7%
		6	158.5	158.5	0.100	1.3	1.2	10.6%
		10	86.75	104.00	0.167	2.0	1.8	9.7%
		20	43.63	52.25	0.333	4.0	3.6	9.7%
	1	60	14.88	17.75	1.00	11.7	10.6	9.5%
	5	300	3.38	3.95	5.00	52.7	47.5	8.5%
	6	360	2.90	3.38	6.00	61.7	55.6	8.3%
	8	480	2.30	2.66	8.00	78.4	70.6	7.9%
	10	600	1.94	2.23	10.00	93.6	84.3	7.6%
	20	1200	1.22	1.36	20.00	152.9	137.6	6.2%
	30	1800	0.98	1.08	30.00	193.8	174.4	5.2%
1	60	3600	0.74	0.79	60.00	264.6	238.1	3.6%
3	180	10800	0.58	0.60	180.00	349.7	314.7	1.6%
6	360	21600	0.54	0.55	360.00	380.2	342.2	0.9%
12	720	43200	0.52	0.52	720.00	397.6	357.9	0.4%
24	1440	86400	0.51	0.51	1440.00	406.9	366.2	0.2%

Hours to fill 4 MByte of memory at 1 sec sampling all 12 channels 49.5

**Note:**

- 1) Used 150 deg C battery life to calculate MBytes of memory filled
- 2) Logging life for both 150 and 180 deg C batteries is calculated using the MAX avg current
- 3) The standard battery pack is 5 x C cells in series

### ABC Memory Tool Battery Life vs Program Sample Rate

