SOUTHERN CROSS

’46 HAWK 3.0 Laser Diode Methane Detector

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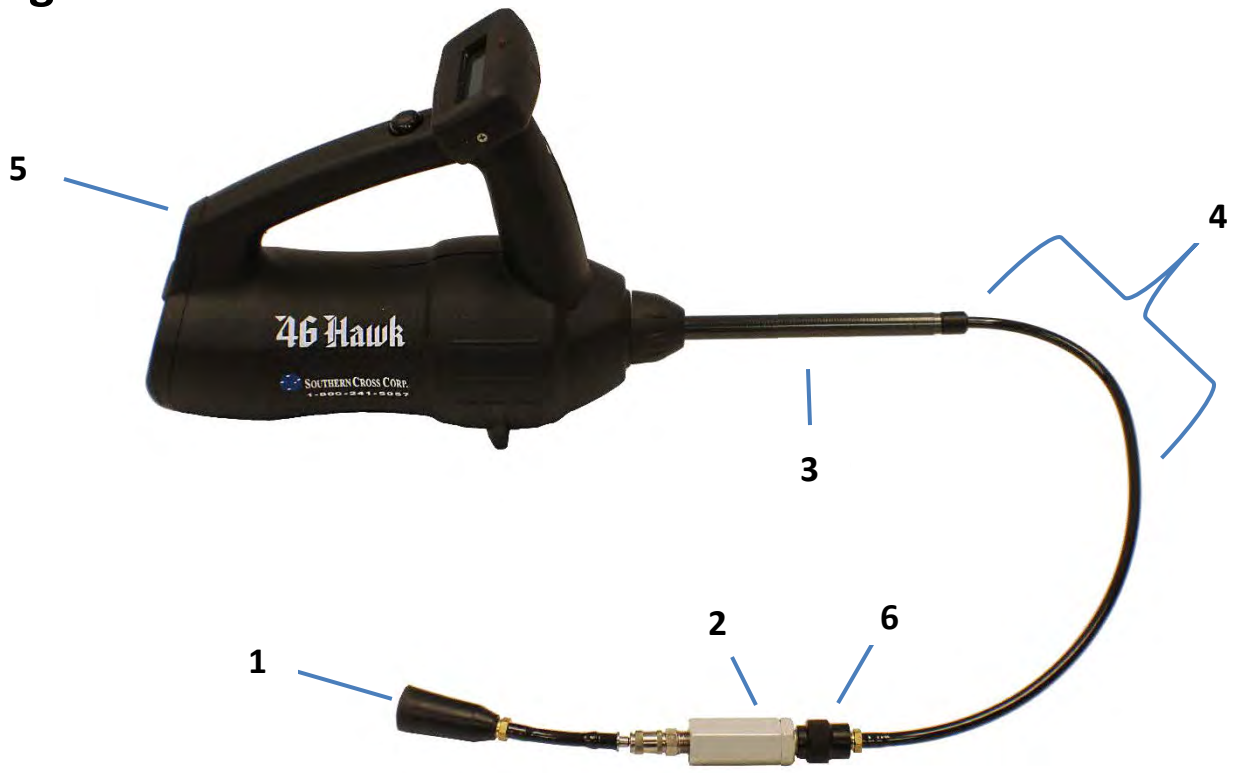
Figure 1: HAWK DIAGRAM

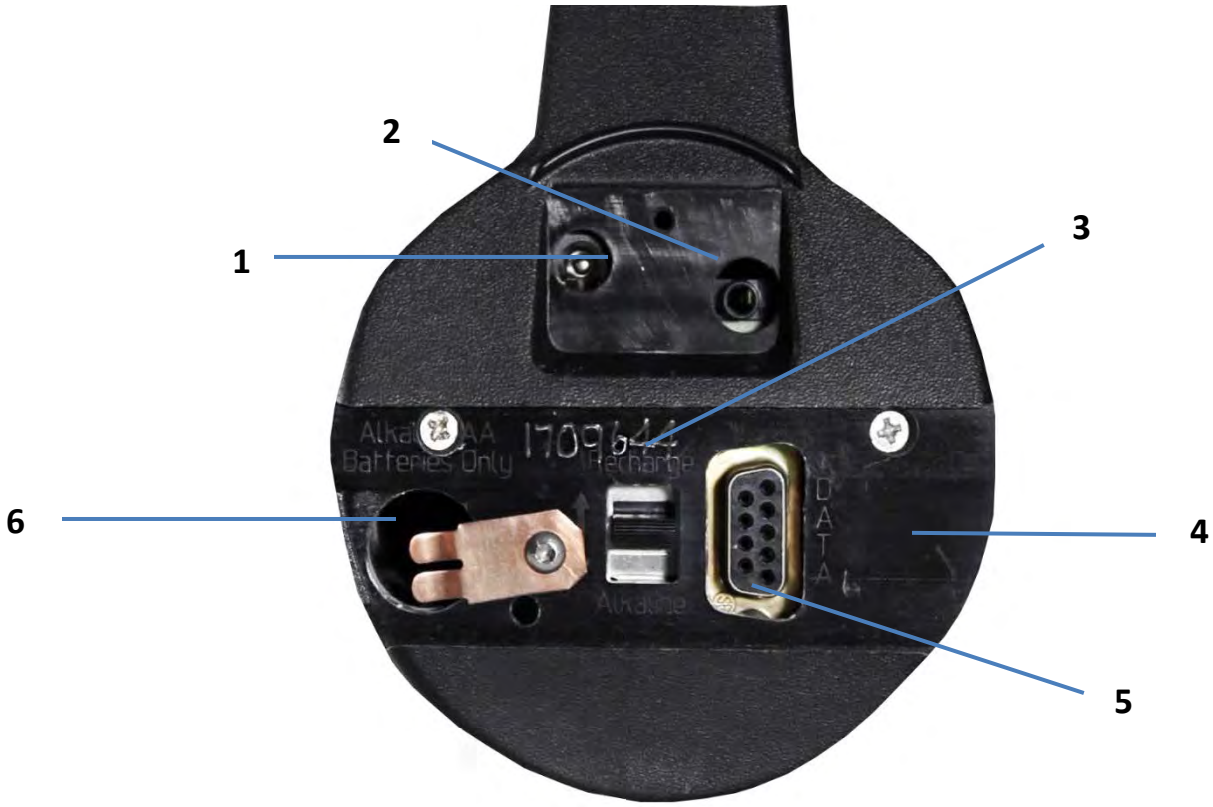


Number	Name	Description
1	Probe Cone	Intake port for air samples. A pleated polyester filter may be placed here under dusty conditions.
2	Filter Housing	Contains filter element that should be changed daily.
3	Probe Stiffener	Stiffens normally flexible probe tubing for greater precision.
4	Probe Assembly	Directs filtered air samples to the laser diode for analysis.
5	Laser Diode Methane Detector	Provides rapid, specific, and accurate detection of methane leaks.
6	Moisture Filter	Prevents moisture from entering unit.

Figure 2: HAWK DIAGRAM (REAR VIEW)

Number	Name	Description
1	Light Emitting Diode (LED)	Lights during operation
2	Liquid Crystal Display (LCD)	Read out for functions
3	Operation Button	Turns on LCD backlight and scrolls through options menu
4	Handle	Handgrip for use
5	Instrument Body	Houses electronic and sampling components
6	Recharge Port	Receptacle for the 110-volt battery recharger. Use only Ault I.T.E. Power Supply PW117RA0903B01.
7	Headset Port	Receptacle for optional alarm earphone headset
8	Rear Panel Door	Slide open to the right for access to backup battery tube, power switch, and computer connection

Figure 3: HAWK DIAGRAM (REAR PANEL)



Number	Name	Description
1	Recharge Port	Receptacle for the battery recharger
2	Headset Port	Receptacle for optional alarm earphone headset.
3	3-Way Power Switch (expanded view)	Place in the upper (Recharge/on) position to power up using rechargeable batteries, middle position (shown above) to turn the unit off, or lower position (Lithium) to run on disposable backup batteries
4	Rear Panel Sliding Door	Provides access when open
5	Data Port	Connects to computer for data logging downloads
6	Backup Battery Holding Tube	Place 4 Lithium batteries in tube with the positive (+) terminals facing inward

1.0: INTRODUCTION

The '46 Hawk revolutionizes gas leak surveying by providing you with the tools required for an efficient survey in one lightweight instrument. The '46 Hawk requires no fuel, thereby eliminating hazmat worries. Your new survey tool operates over 12 hours on rechargeable batteries. Emergency lithium AA batteries provide an additional eight hours of operation.

The '46 Hawk simplifies leak surveys with easy to operate one button operation. After you have selected your alarm point, you can begin your survey. When natural gas is detected, the instrument will automatically range from PPM (parts per million) to %LEL (percent lower explosive level) to %Gas. For in-ground pinpointing, simply attach the probe provided and take the readings. There are no switches or calculations to be made – the '46 Hawk makes the adjustments for you!

2.0: WARRANTY STATEMENT

Southern Cross Corp. will repair any '46 Hawk that develops any problem that is the manufacturer's fault under normal use and service at no charge to the customer for parts and labor. The service policy is limited to repairing a '46 Hawk which proves to be defective, with return transportation prepaid, within **one year of date of purchase**. This does not include consumable items such as batteries, filters, and intake cone components.

This service policy does not apply if the '46 Hawk has been repaired, resold, or altered by unauthorized persons or has been subject to misuse, negligence, or has had serial numbers defaced or removed.

The manufacturer reserves the right to make changes in the design of the '46 Hawk and to make additions or improvements without incurring any obligation to modify any units previously sold.

After the one-year warranty period, the customer is responsible for any '46 Hawk repairs at the current material and labor prices. Other warranty packages may be available.

3.0: FEATURES AND SPECIFICATION

- Designed for above and below ground leak searches and investigations
- Detects methane only
- Detects 1 PPM within 3 seconds
- Renders readings in actual PPMs
- Operates 12+ hours on rechargeable batteries
- Runs up to 8 hours on 4 lithium AA disposable batteries
- Records and stores monthly calibration data that can be downloaded onto any computer with HyperTerminal and Microsoft Excel
- Laser reference and sample diodes are rated to last 5 years
- Pump rated to last 3 years
- Rechargeable batteries are rated to last 2 years
- Carrying case with battery charger, 4 backup batteries, and filters included

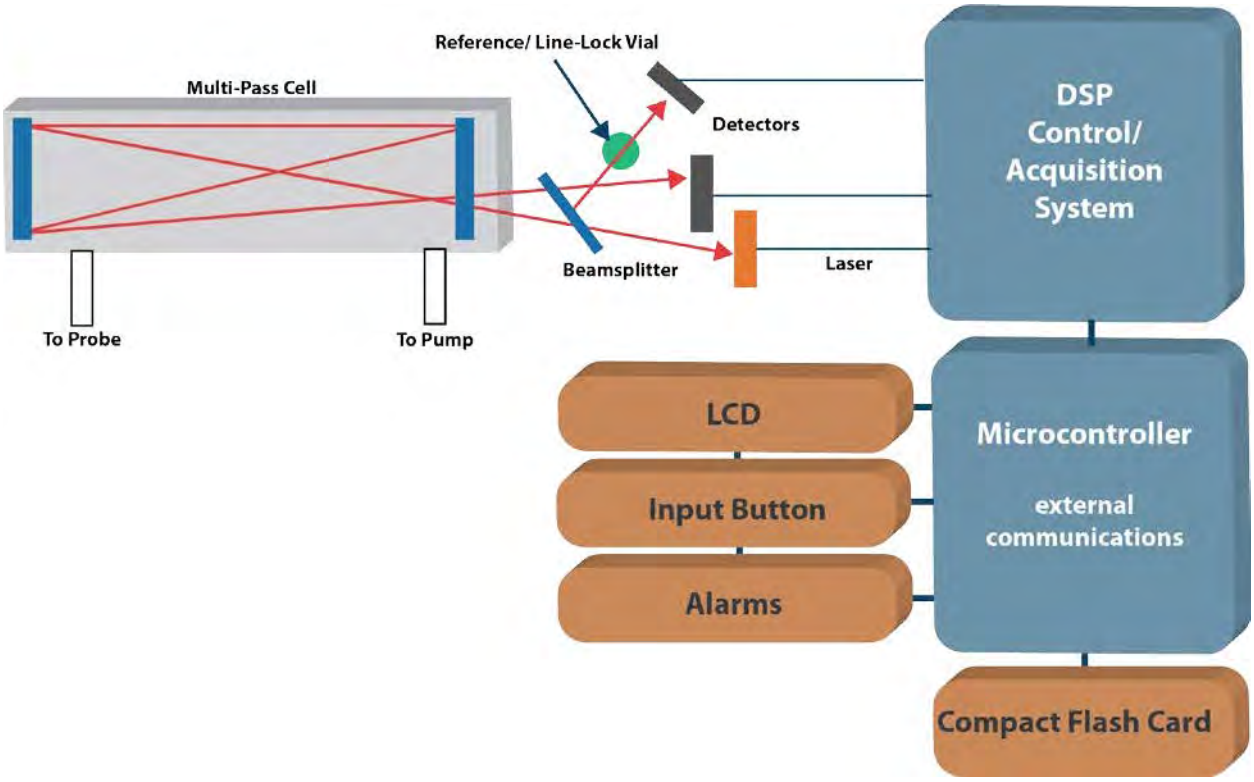
4.0: PRINCIPLES OF OPERATION

Past models of handheld natural gas leak detectors used flame ionization detection technology. This technology called for the burning of sample air and the electronic detection of flame-produced hydrocarbon ions. These instruments required a constant flame powered by a consumable non-hydrocarbon gas supply, which posed some risk in hazardous environments.

Southern Cross utilizes a new generation of laser diode-based handheld natural gas leak detectors, thereby replacing the FI instruments. Advantages to the laser-based instrument include: no need for hazardous fuel supplies, no risk of natural gas ignition by the instrument, and full range (1 PPM to % LEL to % GAS) automatic detection.

The '46 Hawk draws sample air through a chamber where a laser beam is reflected multiple times across two mirrors (see diagram below). This is known as a multi-pass cell. The laser touches a detector, which then communicates data to a digital signal processor (controller) and onto a micro-controller for the alarm systems. This controller looks for absorption of a certain wavelength of laser light that is caused only by methane.

Figure 4: INTERNAL BLOCK DIAGRAM



This results in methane detection only and the elimination of false alarms. The laser diode responds faster than other technologies to presence of methane and recovers faster from exposure to high methane levels than other types of instruments. The '46 Hawk's sensitivity and specificity for methane meets or exceeds that of older technologies.

5.0: SAFETY GUIDELINES

The instrument is inherently safe, as it carries no flame or spark producing components. The instrument operates on very low voltage and has eye safe low intensity laser.

Use Care When Installing Batteries

- The power switch **MUST** be in the Off (middle) position.
- Do not damage terminals.
- Double check battery connections.

Proper precautions for personal safety must be observed as described in the "Survey Procedure" section.

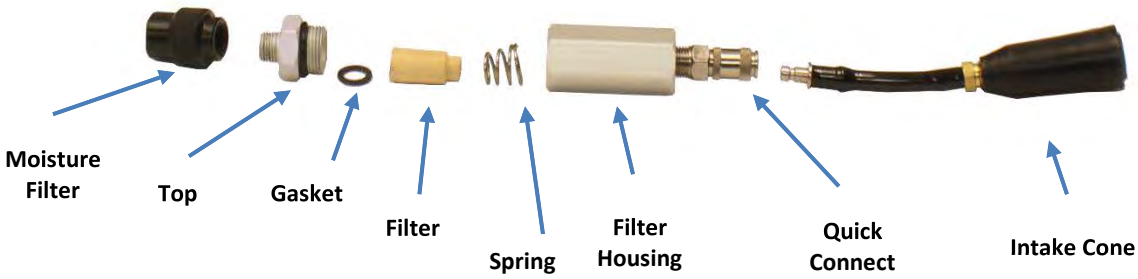
6.0: DAILY IN-LINE FILTER INSTALLATION

It is crucial that the in-line filter be installed correctly each day. Incorrect installation will allow dirt into sample chamber, which could lead to an **ERROR** message and costly repair. The filter housing for the '46 Hawk is located in line in the probe.

Steps to Install In-Line Filter:

1. Unscrew the filter housing. Remove gasket, spring, and micron filter. Gasket may stay in the top section of the filter housing. Be careful not to lose the gasket.
2. Attain clean filter. (Remove dirty filter and replace with clean filter)
3. Install spring with wide end first into filter housing.
4. Install closed end of filter on top of spring (small end of spring) in filter housing.
5. Place gasket at opposite end of filter (see picture below).
6. Assemble both parts of filter housing.
7. Tighten by hand; it is not necessary to use a wrench. The O-ring on the top section of the filter housing will provide a leak-free seal.

Figure 5: EXTERNAL PARTS & ASSEMBLY



A DIRTY FILTER message indicates blockage from the following:

- Dirty filter,
- Moisture,
- Obstruction of the sample flow into the instrument, and/or
- Filter installed incorrectly.

To correct DIRTY FILTER, follow the instructions below:

- Replace moisture filter with a clean, dry filter.
- Inspect probe for obstructions.
- Ensure spring, O-ring, and filter are positioned in filter housing correctly.
- Push Operation Button – The LCD will display **CLEARING CELL** and then 0PPM.

If message does not clear, replace moisture filter. Never operate without both filters.

7.0: PRE-START INSPECTION

Prior to turning on the '46 Hawk, Southern Cross recommends conducting a visible inspection of the unit for damages such as cracks, broken probe, and missing or loose components.

8.0: START-UP

The '46 Hawk will arrive fully assembled and ready to go. Please follow the steps below for startup out of the box or after a complete shutdown.

Warm Up/Initial Set Up

Step 1: To power on, slide rear panel door to the right. Push power switch to upper (recharge) position. Unit will then start. Slide panel back to closed position.

Step 2: The LCD will display **'46 Hawk + current software** on the screen.

Step 3: LCD will display **BATTERY %**.

Step 4: Several seconds later, the LCD will display **WARM-UP**.

Step 5: Choose an Alarm Option. Set your alarm point by pressing the operation button. When you find the desired alarm point, hold operation button and wait for beep.

NOTE: You must choose an alarm point. Unit will repeat alarm choices until alarm is chosen.

Warm Up/Initial Set Up

Step 6: Mute Alarm/Headset. If you do not choose to mute alarm, unit will bypass this option and continue.

Step 7: The LCD will display **CLEARING CELL**. This will last for approximately 1.5 minutes.

Step 8: The LCD will display **START SURVEY** and then display 0 PPM. You are now ready to survey.

NOTE: Bump Testing can be done at this point. See Daily Response Testing in next section.

9.0: DAILY RESPONSE (BUMP) TEST

Step 1: The Survey Technician can perform a Daily Response Test (Bump Test). Once initial warm up/start up is completed and LCD displays **0 PPM**, the response test can be conducted.

Step 2: Twist demand flow regulator onto the 1000-PPM test gas cylinder. Detach Quick Connect between filter housing and cone on probe. Connect demand flow regulator tubing to Quick Connect at cone end of probe.

Step 3: The LCD will display a reading **2%-3% LEL**.

Step 4: Disconnect demand flow regulator and gas cylinder. Assemble probe Quick Connect to cone Quick Connect.

NOTE: If LCD does not display 2%-3% LEL or does not return to 0 PPM, proceed to calibration procedure.

10.0: CALIBRATION PROCEDURE

The Hawk does a self-check calibration on startup. If recalibration is needed, it can be done at the necessary frequency. This should only be needed once a month.

Step 1: Start in Survey Mode. **0 PPM** is displayed on LCD. Press and hold Operation Button. Notice back light is illuminated. Press Operation Button until you see **OPTION MENU**.

Step 2: OPTION MENU will prompt the following:

- **GO TO SURVEY**
- **ALARM LEVEL**
- **MUTE ALARM/HEADSET**
- **CALIBRATE?**

Press and hold Operation Button at **CALIBRATE?** prompt.

Step 3: The LCD will display **CALIBRATION**. Do not press button. This step takes approximately 5 seconds.

Step 4: The LCD will then display **ZERO CHECK** for approximately 1.5 minutes. Do not press Operation Button – wait for next prompt.

Step 5: The LCD will now display **ENTER 1000 PPM**. Connect demand flow regulator to 1000 PPM test gas cylinder. Twist on barbed connected of the demand flow regulator, while attached to gas cylinder, into the probe Quick Connect and leave connected. (See daily response test for connection details.)

Step 6: Once gas and regulator are connected, press and hold Operation Button. The LCD will display **CALIBRATING** for approximately 1.5 minutes.

Step 7: The LCD will display **CAL ACCEPTED**. LCD will display **REMOVE 1000 PPM**. Disconnect demand flow regulator from unit probe cone, then press and hold Operation Button.

Step 8: The LCD will display **CLEARING CELL** for approximately 1.5 minutes.

Step 9: Connect cone Quick Connect to the probe Quick Connect.

Step 10: The LCD will display **START SURVEY** and go immediately to 0 PPM.

Step 11: If LCD displays **CALIBRATION FAIL**, check connections are secure. Check 1000 PPM calibration test gas to be correct type and above 350 psi. Next, press Operation Button for **OPTION MENU**, then choose **CALIBRATE?** and retry calibration. If **CALIBRATION FAIL** occurs again, turn unit completely off and restart in warm up mode, then try to calibrate. Call Southern Cross support if calibration fails more than 3 times at **800-241-5057**.

NOTE: Provided response testing (bump test) is performed daily. Once per month calibration is recommended in a clean air environment. The '46 Hawk is not sensitive to false positive readings or calibration interference from non-methane hydrocarbons.

11.0: OPTION MENU WHILE IN SURVEY MODE

Step 1: To access the **OPTION MENU** while in survey mode, press and hold the Operation Button for at least 3 seconds. You will see **OPTION MENU** displayed on the LCD.

Step 2: The LCD will display **GO TO SURVEY?** If you want to go to survey, press and hold the Operation Button. 0 PPM will appear on the LCD. You are now ready to survey. Not pressing Operation Button will lead to next option screen.

Step 3: Next, the LCD will display **ALARM LEVEL?** If you want to change the alarm level, press and hold the Operation Button. LCD will prompt you to choose alarm level. Press and hold the Operation Button at desired alarm level. Not pressing the Operation Button will lead to next option screen.

Step 4: Next, the LCD will display **REZERO?** If you want to manually perform a zero reset, see section 21, "Troubleshooting", for detailed instructions. Not pressing Operation Button will lead to next option screen.

Step 5: Next, the LCD will display **CALIBRATE?** If you want to calibrate the system, press and hold the Operation Button. Not pressing Operation Button will lead to next option screen.

Step 6: Next, the LCD will display **MUTE ALARM?** Press Operation Button to mute alarm. If you do not want to mute alarm, do not press Operation Button. The next prompt will then be displayed.

Step 7: The LCD will repeat **STEP 1**. Not pressing Operation Button will lead to next option screen.

12.0: SHUT DOWN

Step 1: To shut unit down, move power switch to middle position. Unit will turn completely OFF. The power switch is located behind the back-rear slide panel.

Step 2: Wipe down the instrument with a clean, dry cloth and store it in the case.

Step 3: For daily use, it is best to keep unit running all day. The rechargeable battery will last for more than 12 hours.

Charge unit nightly using the charger provided by Southern Cross. It should have yellow tape around the jack. Do not use a different charger, as it could cause the batter to overheat or undercharge.

13.0: START-UP WHILE IN SLEEP MODE

Step 1: Press and hold Operation Button. The LCD will display '46 HAWK 3.0 (Note: Operation Button will not put unit to sleep mode on version 3.0, but it can wake unit up from sleep mode).

Step 2: The LCD will go through same start up sequence as described in "Warm Up/Initial Start Up" section.

14.0: OPERATIONAL SUGGESTIONS

- The '46 Hawk is manufactured with precision parts. Unnecessary shaking or shock to the instrument should be avoided.
- Keep liquid from entering the '46 Hawk. If the '46 Hawk gets wet for any reason (dropped in water, extensively rained on, etc.), shut unit off, remove backup batteries, and dry instrument completely.

15.0: IN-GROUND PIN POINTER

- To attach the in-ground pinpointer, detach the quick connect below filter housing. The probe is now detached from cone.
- Connect in-ground pinpointer end to the quick connect on probe cone end.
- The '46 Hawk will automatically read in- ground leaks the same as the Hawk reads above ground leaks without switching or changing settings.

Know the Importance of Pinpointing!

- Pinpointing the gas leak using the below ground probe will save time, money, and frustration, while also mitigating potential hazards.
- It is important to have accurate locations of all below-ground gas pipes in the leak. Make use of available maps, drawings, locate marks, and your own expertise.
- Center the leak by determining the highest sustained gas reading at the outer boundaries of the leakage spread.
- Start bar holes at the estimated leak location and work outward along the pipe. The spacing of the bar holes depends on the leak spread. Small spreads could be started with bar holes every 5 feet, while larger spreads may require bar holes every 10 to 15 feet.
- Maintain consistency in the spacing and depth of all bar holes. Bar holes must be taken to probe depth for the most accurate pinpointing. Be careful not to damage the pipe!
- All below-ground readings must be taken at an equal depth. The highest sustained reading usually indicates the leak location. Additional bar holes can be made to narrow the source of the leak.
- In some cases, several bar holes will give equal readings. A useful technique is to measure the concentration at the top of the bar hole. The hole with the highest reading is probably nearest the leak.

16.0: SURVEY PROCEDURE

- The most effective method of survey is to walk slowly with the probe 2-6 inches off the ground. When doing this, the probe stiffener should bepartially retracted.
- Operators should test all likely leak, venting, and visual leak indications.
- Meter sets and above-ground piping can be checked by sampling the mechanical connections. The probe stiffener allows the operator to extend the reach of unit.
- A positive reading triggers the audible alarm, a handle vibrator alarm, and visible alarms – one on LCD screen, and the other on light emitting diode (LED) above the LCD. The audible alarm can be muted, or a set of headphones can be attached through a receptacle on the back of the unit
- The '46 Hawk automatic centering feature allows the user to center on the greatest concentration of gas without having to manually desensitize the unit.
- To eliminate warm up delays after brief breaks away from the unit, it is best to leave the '46 Hawk running, since turning the unit off will require up to 3 minutes to warm back up. There is sufficient battery reserve to get through a routine working day. Place the '46 Hawk in a safe place with temperature and humidity similar to working conditions for that day.
- Leaking gas follows the path of least resistance. Use caution when conducting your survey. Gas does not always vent close to the leak source. Surface and underground conditions may cause gas to vent at a considerable distance from the actual hole in the pipe. Some conditions which may move the vent source from the actual leak source are paving, ice, snow, water, crusted soil, and subsurface paths such as sewer lines and telephone conduits.

17.0: CHARGING BATTERY

The LCD will display a **LOW BATTERY** warning approximately one hour before your rechargeable battery is fully discharged. This allows you time to finish your immediate survey. Attach charger to the port in the back of the instrument. Plug into a 110-volt wall outlet. **Use only Ault I.T.E. Power Supply PW117RA0903B01.** In the event that the rechargeable battery becomes completely discharged, place the power switch in the middle position. Connect charger to a 110-volt power supply for about 15 minutes, then put the power switch in the upper position for continue charging.

18.0: BACK-UP BATTERY USE

Four AA disposable lithium batteries are for backup only in the event that the rechargeable battery is too low to function. Lithium batteries are recommended for optimum performance and should give another 6 to 8 hours of use.

Place the power switch, located under the back plate of the instrument, in the middle position.

***Note**: SC recommends leaving backup batteries out of unit unless in use to prevent battery corrosion.

19.0: DATA LOGGING

- Unlimited monthly calibration data can be stored on your computer. The data port is conveniently located at the rear of the '46 Hawk behind the sliding door.
- Connect the '46 Hawk to a PC serial port. The instrument uses the Excel program to store calibration information, which includes date, time, reading, and acceptance or failure of calibration. Calibration data is stored in the '46 Hawk indefinitely.
- To transfer data from unit to PC, refer to '46 Hawk Calibration Software CD for complete instructions.

20.0: CLEANING AND CARE

Cleaning the ’46 Hawk is essential for proper operation.

1. Blow dirt out of the intake cone if working in a very dusty area. Use oil-free compressed air, P/N 450.050.
2. Properly install a clean filter with the cleanest gasket and spring. Replace top of hosing until the O-ring is engaged and the filter housing does not leak. Do not bend O-ring.
3. Wipe down probe and ’46 Hawk with slightly damp cloth using household cleaning solution. Wipe exposed surfaces. Open probe stiffener and clean.
4. Turn case over and clean out dust and dirt. Wipe out case with damp cloth. Knock dirt and dust out of foam and wipe down. Allow case and foam to dry while cleaning accessories. Be sure case is completely dry before storing unit.
5. To clean sintered bronze filters, fill sink or non-glass container with warm water and use a household cleaner. Wash filters by vigorously shaking them. Vigorously rinse twice by shaking filters in clean water.
6. Allow sintered bronze filters to dry overnight or longer. Use each filter once and then clean before reusing. Filter cleaning is recommended weekly.
7. Do not store the ’46 Hawk in an area that is markedly cooler and drier than the intended use area, especially if the intended use area is hot and humid.

When not in use, the ’46 Hawk can be clipped to your belt with the provided ball and loop belt clip. To attach, loop the cord around the handle of the ’46 Hawk, making sure the ball goes through the loop. Pull the cord tightly to make sure it is secure. Insert the ball into the belt clip groove and attach clip to belt.

21.0: TROUBLESHOOTING

Listed below are common troubleshooting problems with easy-to-fix solutions.

- **Re-Zero:** Use this option to prompt the unit to manually perform a zero reset. This option is useful if you suspect the unit has drifted off zero (i.e. showing low PPM numbers when in know clean air). Press and hold operational button until **OPTIONS MENU** appears on LCD screen. Release operation button. When the prompt REZERO appears, press Operation Button. The LCD will show **CLEARING CELL** and then the LCD will display **START SURVEY** showing 0 PPM.
- **Dead Battery:** If battery is dead and unit stops, open rear back panel. Put power switch in **OFF** (middle) position. Attach charger to unit, plug into 110-volt wall outlet for approximately 15 minutes. Next, turn power switch back **ON** (upper/recharge) position. Typical full charge time is 12 to 15 hrs.
- **Low Battery:** When the **LOW BATTERY** warning is displayed, time remaining is approximately one hour before battery completely discharges. Charging unit before battery is completely discharged is recommended.
- **Dirty Filter:** A DIRTY FILTER message indicates blockage, which can be caused by dirty filter, moisture, or any obstruction of the sample flow into the instrument. To remedy this, replace dirty filter with clean, dry filter. Inspect probe for obstructions. Press operational button once to re-start the '46 Hawk. If message does not clear, replace moisture filter. Never operate without both filters.
- **Error Message:** If **ERROR** message is displayed on LCD, note error code number. Turn off unit; ensure clean filters are installed then restart. If error appears after restarting, call Southern Cross Support at (800) 241-5057 for assistance.

Other helpful troubleshooting techniques:

- Relocate to non-contaminated environment
- Recalibrate
- Shut-off and re-start (Reboot)

***Note:** Contact Southern Cross Support with questions or issues at (800) 241-5057.

22.0: RETURNING EQUIPMENT FOR REPAIRS

1. Ship all components in original carrying case, which includes '46 Hawk, battery charger, filters, and in-ground probes. Install all packing materials provided with '46 Hawk. **DO NOT SHIP TEST GAS.**
2. Enclose detailed Repair Card (included in last page of this manual) indicating '46 Hawk issues, problems encountered, attempts made to solve, troubleshooting issues, and changes in operation characteristics noted in the past few weeks.
3. Include company name, contact person, and contact phone number.
4. If return shipment desired is not UPS Ground, indicate method of return and ship to address on detailed repair card.
5. Remove any backup batteries that may have been installed in the instrument.
6. Include PO # in '46 Hawk case or mail/fax PO # separately authorizing repairs to:

Southern Cross Corporation
3175 Corners North Ct.
Peachtree Corners, GA 30071
Phone: (800) 241-5057
Fax: (770) 662-5228

23.0: REPLACEMENT PARTS

SCC Part #	Item Description
SCC 46HK 301	5 Micron Polyester Filter
SCC 821.401K	10 Micron In-Line Filter
SCC 821.103K	Bar-Hole In-Line Disposable Filter
SCC 46HK 443	Bar-Hole Probe
SCC 46HK 823	Below Ground Probe
SCC 46HK 162	Cable for downloading calibration data
SCC 46HK 164	Cal Gas – 1000 PPM
SCC 46HK 181	Cal Kit
SCC 46HK 275	Case with Foam Insert
SCC 46HK 363	Flash Drive for Calibration Software
SCC 46HK 272	Charger – 120V
SCC 46HK 302	In-Line Filter Housing
SCC 46HK 410	Intake Cone Assembly, Small
SCC 46HK 411	Intake Cone Assembly, Large
SCC 46HK 617	Lithium-Ion AA Batteries (4)
SCC 46HK 211	Manual, Hawk
SCC 46HK 491	Primary Filter Kit Includes: • 5 Sintered Bronze Filters • 1 Spring • 2 Gaskets
SCC 46HK 832 P	Probe Assembly with Telescopic Stiffener
SCC 46HK 406	Quick Disconnect Coupling Plug, 1/8 Male
SCC 46HK 407	Quick Disconnect Coupling Plug, 7/32 Tube

Contact SC to Order Spare Parts

Toll-Free: (800) 241-5057

Fax: (770) 662-5228

E-mail: products@southerncrossinc.com

24.0: SPECIFICATIONS

General Specifications	Impact-resistant glass filled nylon case with telescoping probe
Battery	• Rechargeable battery 12+ hours • Back-up disposable lithium batteries provide 6+ hours • Displays batter charge and low battery warning
Laser	Low intensity laser calibrated to methane only
Pump	Mechanical pump draws 600 cc/minute
Control	One-button operation
Gas Detected	Methane
Sensor Range	• 1-500 PPM • 1%-100% LEL • 5%-100% GAS
Alarm	LCD display – Audible – Handle vibrator – LED displays red light
Weight	3 pounds
Size	• 28" probe (custom sizing available) • 20" Bar-hole probe
Display	2-1/4" x 5/8" digital
Fuel	No fuel required
Reaction Time	Less than 2 seconds
Tests	• Monthly calibration testing with 1000 PPM methane • Daily response testing recommended
Data-logging	Stores calibration data permanently
Operation Temp	-10° F to + 120° F
Warranty	One year