



SOUTHERN CROSS

**Flame Pack Series 400
Operation and Service Manual
November 2018**

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OPERATION AND SERVICE MANUAL FLAME PACK SERIES 400



Serial #: _____

Owner: _____

Date: _____

Search: _____

Center: _____



Proprietary Notice

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Southern Cross Inc. reserves the right to make continuous improvement to manual designs and components of its manufactured devices.

This manual supersedes all previous written manuals of the Flame Pack Model 400.

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1.0: Southern Cross Service Policy

Southern Cross will repair a FLAME PACK 400, which under normal use and service develops any problem that is the fault of the Manufacturer, with no charge to the customer for parts and labor. This service policy is limited to repairing a FLAME PACK 400 which proves to be defective with returned transportation prepaid within ONE YEAR from 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 FLAME PACK has been repaired, resold, or altered by unauthorized persons or which 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 FLAME PACK and to make additions or improvements without incurring any obligation to modify any units previously sold.

Repair after the one-year period will be performed on customer's FLAME PACK at current prices for material and labor.

2.0: General Description

The Model 400 Flame Pack is a hydrocarbon gas detector that employs hydrogen flame ionization as the detection method. The Model 400 is designed to be hand carried as a single unit. It eliminates shoulder straps, harnesses, interconnecting tubes, and cords. It is lightweight and small. Its moving parts and controls are kept to a minimum, which reduces downtime for repair. It can be taken anywhere a person can walk, crawl, or climb. In the search range (50 ppm @ full scale), it can detect as low as one part per million (ppm) of hydrocarbons in air. A centering range (5000 ppm @ full scale) is provided to assist in centering leaks. The meter indicates the presence of hydrocarbons. An alarm sounds at a preset point on the search range. **It is recommended that the Flame Pack 400 NOT be taken into confined spaces or inside areas that the atmospheric volatility is unknown.**

The Model 400 Flame Pack utilizes disposable 9-volt alkaline batteries (available almost anywhere) and a 40% Hydrogen/60% Nitrogen fuel mixture.

The Model 400 Flame Pack is adaptable for mobile applications utilizing auxiliary sampling systems.



3.0: Specifications

- Weight (total carried): 5 pounds
- Shipping Weight: 18 pounds
- Reaction Time: 2-3 seconds
- Operating Noise: None
- Fuel Capacity: 300cc @ 1800psi
- Battery Life: 3-4 days (Alkaline)
- Hydrocarbon Readout: Meter (0-100 micro amp)
- Hydrocarbon Alarm: Preset 40 - 50% full scale
- Flame Out Indication: Light emitting diode (LED) and audible Alarm
- Sample Flow Rate: 220-240cc/min
- Warm-up Time: 5 to 15 minutes
- Ignition: Piezoelectric spark
- Batteries: Two - 9V alkaline batteries
- Fuel: 40% hydrogen - 60% nitrogen gas
- Total hydrocarbon less than 0.5ppm as methane
- Fuel Consumption Rate: 225 psi/hr. +/- 20%

NOTE: At 225psi/hr., it will take approximately 8 hours to use 1,800 psi of fuel.

Detection Ranges

Search: 50 ppm methane in air

Center: 5000 ppm methane in air

4.0: Principles of Operation

Detection

When a hydrocarbon is burned, ionization occurs. Ions are electrically charged particles that appear in the flame. In the Model 400 Flame Pack, all hydrocarbons in the sample are burned in a hydrogen flame where an electrical potential has been placed. The presence of ions in the flame changes not only the conductance of the flame, but also the current flow through the flame. This change of conductance and current is processed by the detection circuitry of the Flame Pack. Because of this electrical change, the flame ionization method of hydrocarbon detection has been called **hydrocarbon counting**.

Hydrogen/Nitrogen Fuel

Due to a lack of carbon atoms, the hydrogen and nitrogen in the fuel do not set off the alarm.

Flame Out Indicators (LED & alarm)

A thermocouple is positioned in the flame and produces a voltage dependent upon temperature. This voltage is amplified and switched via an integrated circuit IC. When the temperature reaches a predetermined value, no current can flow through the IC. The light emitting diode (LED) is extinguished and the alarm will turn off. Should the flame temperature drop due to a flame out condition, the LED and alarm will be switched on.

Ignition

Ignition is accomplished via a piezoelectric (electricity resulting from pressure) igniter. When the igniter is pushed, a metallic rod strikes the piezoelectric material in the assembly. The pressure from the impact causes an electrical charge to occur. This charge is transmitted into the cell via the igniter lead, which acts as a spark plug, causing ignition.

Indication of Gas

In the search range	Alarm sounds, LED remains off, meter moves up scale
In the centering range	Meter goes up, alarm does not sound

5.0: Flame Pack Safety Guidelines

WARNING!!

1. No smoking or open flames when filling with fuel.
2. Keep supply cylinder securely mounted with valve protector in place when not in use.
3. Never tighten or loosen fittings under pressure.
4. Flame Pack must not be lit when fueling.
5. Never fill with Flame Pack fuel valve open.
6. Do NOT carry lit Flame Pack into an explosive atmosphere.
7. When the Flame Pack is not lit, its exhaust is a combustible mixture of hydrogen and air. Take the proper precautions.

WARNING!!

Flame arresters are provided to minimize the possibility of ignition in a combustible atmosphere. Do NOT use a flame ionization device in an explosive atmosphere.

IN NO CASE SHOULD THE FLAME PACK BE USED WITH THE EXHAUST FLAME ARRESTOR REMOVED, OR DAMAGED, OR WITHOUT THE QUICK CONNECT (QC) BODY WITH FLAME ARRESTOR INSTALLED.

6.0: Part Identification

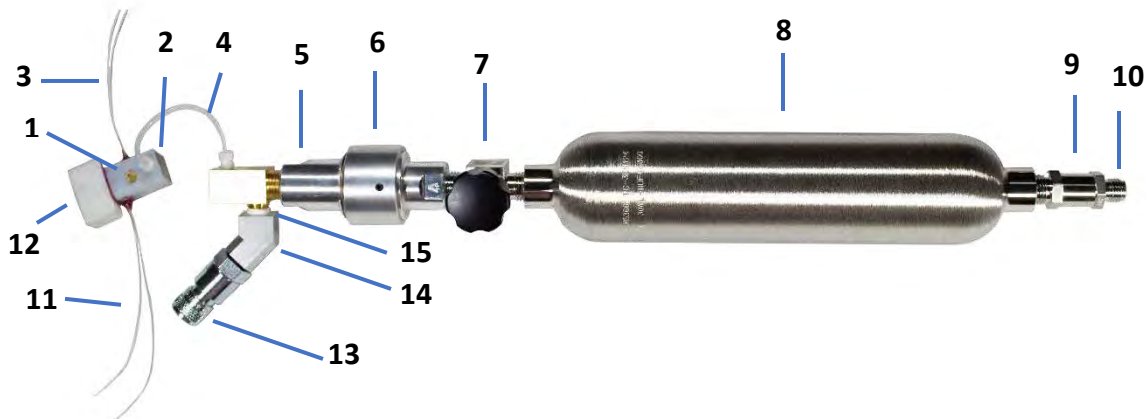


Figure 3: Part Identification

Number	Name	Description
1	SCC 276.400K Detect Probe	Supplies voltage to the cell and detects current flow due to ionization
2	SCC 272.497 Cell and Mount Assembly	Fuel and air mixture burns inside the cell. Ionization occurs within the flame.
3	SCC 265.404 Igniter Lead (replacement kit)	The igniter lead carries electrical energy from the igniter into the cell where it acts as a spark plug, igniting the fuel/air mixture.
4	SCC 282.440K Pump-to-Cell Tube	This is a formed tube that carries the fuel and air from the pump to the cell.
5	SCC 281.435 Pump Assembly (restricted sale)	The fuel moving through the pump mixes with the sample from the probe.
6	SCC 822.420K Regulator	Reduces fuel pressure from the cylinder to an operational level.
7	SCC 823.400K Fuel Valve	Turns the fuel supply to the unit on and off.
8	SCC 846.300K Fuel Cylinder	A stainless-steel cylinder that holds 300 cc of fuel at 1800 psi.
9	SCC 824.211K Check Valve	Provides means of refilling fuel cylinder.
10	SCC 862.065K End Cap	Prevents contamination of the check valve. Protects the check valve threads.
11	SCC 265.151K Thermocouple (TCPL)	Produces an electrical signal dependent upon the temperature in the cell.
12	SCC 281.413K Exhaust Flame Arrestor	Installed into the cell assembly, it provides SOME protection should the Flame Pack Model 400 be used in an explosive atmosphere.

	WARNING: Never use Flame Pack Model 400 with Exhaust Flame Arrestor removed or damaged.	
13	SCC 281.414K Quick Connect (QC) Body with Flame Arrestor WARNING: Never use Flame Pack Model 400 with QC Body and Flame Arrestor removed or damaged.	This is a fitting with an internal check valve (popit), a ¼" male pipe threads, and a flame arrestor. The probe assembly QC stem plugs into the QC body.
14	SCC 276.410K Elbow	It is a 45° fitting that screws onto the pump nipple.
15	SCC 273.355 Elbow Lock and O-Ring SCC 891.009K	
16	SCC 281.443K Probe Assembly	Carries the sample to the Flame Pack Model 400. The lower probe is flexible to prevent hanging up on obstacles.
17	SCC 861.202K QC Stem	Inserts into QC body.
18	SCC 821.400K Filter Housing	Contains the primary filter. Removes dust and dirt from sample.
19	SCC 862.008K Male Connector	Connects the lower probe to the filter housing.
20	SCC 282.405K Probe Stiffener	A probe stiffener is used to make the lower probe rigid.
21	SCC 281.442K Lower Probe	
22	SCC 282.411K Intake Cone	Can be used to hold a second filter, spring, and gasket.
23	SCC 282.412K Plug and Screen	

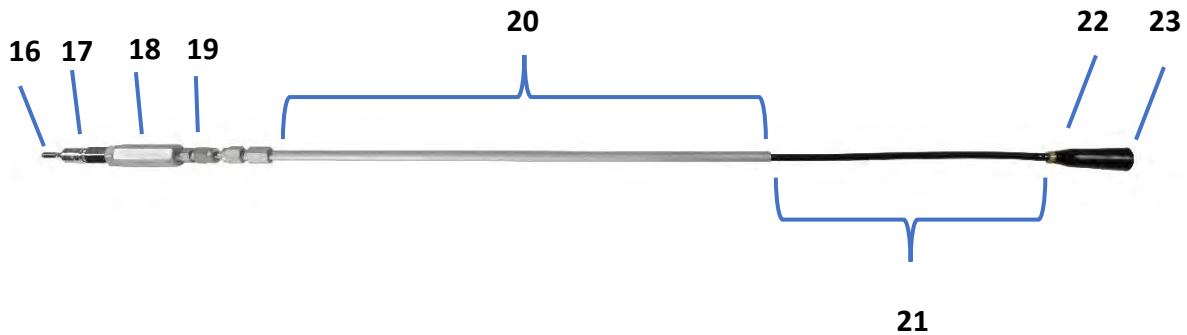


Figure 4: Probe Assembly

7.0: Changing Batteries

1. **MAKE SURE RANGE SWITCH IS OFF.**
2. Loosen $\frac{1}{4}$ turn screw. Pull black handle to remove.
3. Remove spacer. Remove old batteries from battery bracket/handle assembly by pulling each one straight away from contacts.
4. Install fresh batteries.
5. Reinstall spacer.
6. Slide spacer down in between batteries so that the “ears” are resting on the batteries. When replacing the black handle, make sure the spacer attachment string is inside.

NOTE: Although the batteries cannot be installed backwards, a momentary contact in this position with the power on can damage the circuit board.

7. We recommend using 9-volt alkaline batteries because they will provide longer service.



Figure 5: Changing Batteries

CAUTION: NEVER STORE FLAME PACK WITH BATTERIES INSTALLED.

NOTE: REMOVE BATTERIES WHEN STORING OR SHIPPING THE FLAME PACK.

8.0: Filling the Fuel Cylinder

WARNING!

The hydrogen/nitrogen fuel mix is a high-pressure combustible gas. This fuel must be handled with the proper care. Remember, **NO SMOKING** or **OPEN FLAMES** when fueling Flame Pack.

1. Connect the refill assembly to a tank of 40% hydrogen/60% nitrogen fuel (see Figure 6). Verify contents by checking the specification tag or sticker (see Section 20).
2. Crack cylinder valve momentarily to blow dirt and/or water out of the refill assembly.
3. Remove end cap from the Flame Pack's check valve.
4. Make sure the check valve connection is clean.
5. Make sure the Flame Pack is not lit and the fuel valve is closed. Connect check valve to refill assembly. Gently snug fitting. Do not over tighten.
6. Ensure purge ("bleeder") valve is closed (see Figure 6).
7. Stand to the side of the gauge. This safety procedure is to protect personnel in the unlikely event any loose components project. Open the cylinder valve slowly until the pressure gauge reading stops increasing. Observe and note the reading on the pressure gauge.

NOTE: the FP tank may warm up with initially filled. This is normal as the temperature of metal tanks rises slightly when pressurized.

CAUTION: never tighten or loosen fittings under pressure.

8. Close the cylinder valve.
9. Open the purge ("bleeder") valve to relieve pressure in the fill assembly, then close it (see Figure 6).
10. Disconnect the Flame Pack from the fill assembly.
11. Reinstall end cap finger-tight. Slight force using the open-end wrench provided will keep the end cap from coming off while surveying with the Flame Pack. Replace the end cap if lost.
End caps serve two important functions: they protect threads on check valve, and they prevent dirt and debris from entering Flame Pack.
12. Remove intake assembly from FP and unscrew primary filter housing. Remove insert side of QC body, spring, bronze filter, and washer.
13. Place primary filter housing up to fill assembly, manually seal around housing, open valve on fill tank for a quick one-second spray to blow dust and debris from intake assembly.
14. Replace filter.

NOTE: To fully utilize fuel when filling the Flame Pack's cylinder, a cascade fueling system can be used on multiple tanks.

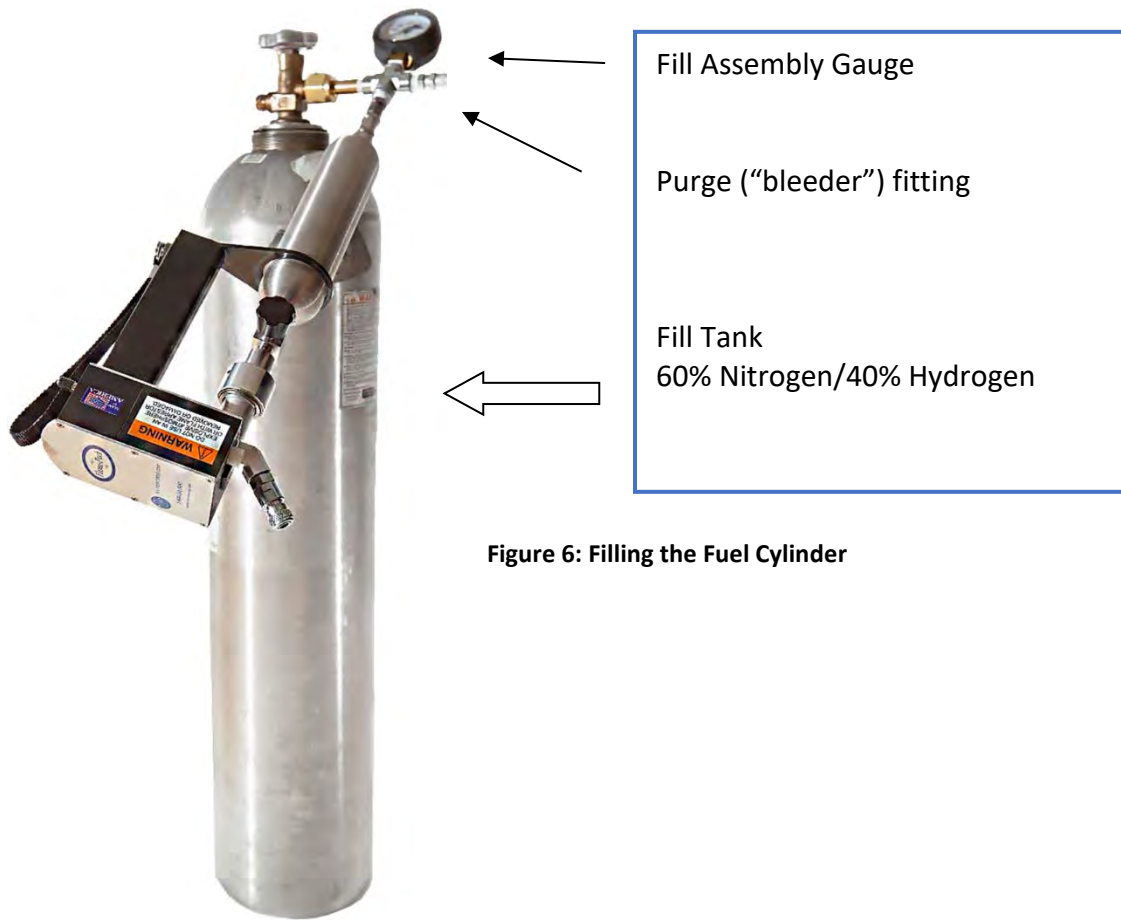
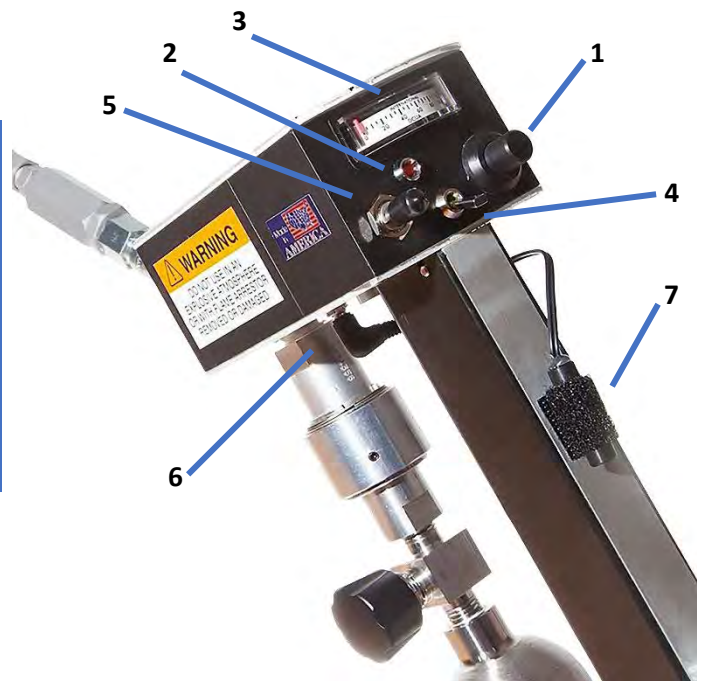


Figure 6: Filling the Fuel Cylinder

Figure 6A: Flame Pack Instruments

1. Igniter
2. LED (visual indicator)
3. Meter
4. Toggle Switch
5. Adjustment Knob (a.k.a. "Zero Adjust")
6. Alarm and Regulator Mount
7. Vibrating Alarm (optional)



9.0: Changing Filters

1. PRIMARY FILTER

Change the primary filter in the filter housing a minimum of once a day.

- a. Place spring into filter housing, large end down
- b. Place the smaller (closed) end of the filter element into the SMALL end of the spring.
- c. Fit the gasket into the upper portion of the filter housing. This will then fit on the top of the OPEN end of the filter when the top is screwed into place.



Figure 7: Primary Filter

2. INSTALLING THE SECONDARY FILTER (OPTIONAL)

In very dusty conditions, it is advised to use an additional filter element in the intake cone. Incorrect installation can cause operational malfunctions.

- a. Remove plug and screen from the intake cone with the hex key.
- b. Install black washer first (make sure it lies flat), then the filter and spring as shown.
- c. Remember, the OPEN END OF THE ELEMENT GOES INTO THE CONE FIRST to fit against the gasket. Install the spring, the SMALL end fitting over the filter. Replace plug and screen and tighten until its top is flush with the intake cone's surface.

For information on filter maintenance, see Section 16.



Note that the order in which the parts are installed is the opposite of how they are installed in the Primary Filter Housing. An easy way to remember the correct order is: the large, open end of the filter ALWAYS points toward the Flame Pack 400.

Figure 8: Secondary Filter

10.0: Pre-Start Check

A calibration test should always be performed in clean air. The test should be preceded by a visual inspection to ensure all components are intact, and an operational test (“bump test”) to ensure all functions are operational.

The following steps should be performed at each start-up, periodically during survey, after any repair, or any time it is suspected that the instrument’s calibration has changed.

1. Look for any physical damage or missing parts, such as the end cap, flame arrestor (inside exhaust vent), or carrying strap. Ensure the Flame Pack has a clean, dry, and properly installed filter.

WARNING: NEVER USE THE FLAME PACK WITH EXHAUST FLAME ARRESTOR REMOVED OR DAMAGED.

2. Fill the fuel cylinder according to proper fueling procedures.
3. With intake probe plugged in, open the fuel valve and listen for a hissing sound to indicate fuel flow. When using the same Flame Pack, if the sound is different than on previous days, it may be an indication that the fuel system needs cleaning or that there is something wrong with the fuel system. IF NO GAS FLOWS, STOP. The Flame Pack needs to be repaired.
4. With the zero adjust fully counterclockwise, turn on the power. The LED should come on and the alarm should sound. Press the igniter; the alarm and LED should go off within 3 seconds. If the LED and alarm remain on, wait 5 seconds and press the igniter again. If the LED and alarm still stay on, the Flame Pack needs to be repaired. If the LED and alarm turn off, proceed. Slowly rotate the adjustment knob clockwise to full scale (100) and then counterclockwise to 0. This is to verify the needle on the meter has full range of motion.
5. Locate and note the alarm point, which should be higher than 40% of scale. Note the alarm point with new batteries. Any time the operator notices that the alarm point has dropped below 40% scale, the batteries need to be replaced. If after replacing the batteries the alarm point is still below 40% scale, the device needs to be repaired.
6. **Perform a leak test on the intake system.** Extinguish the flame by placing your thumb over the intake cone. The LED should come on and the alarm should sound within 3 seconds. This indicates the sample system is airtight. Reignite the Flame Pack. If the Led does not come on and alarm sound, locate and tighten the leak on intake assembly and perform this test again.
7. If any of these tests fail, go to the troubleshooting guide (Section 17).

NOTE: Once the Flame Pack is lit, it is critical that the device remain upright, with the exhaust pointing downward. The hydrogen flame inside the unit will create water vapor and if laid down or with the exhaust pointing upward, it may cause moisture to reach the igniter and cause malfunction.

11.0: Calibration Test Instructions

If the Flame Pack passes visual inspection, proceed with the following calibration test.

1. Ensure fuel cylinder has at least 200 psi of fuel. This is the minimum to operate the instrument.
2. Light Flame Pack and allow to warm up until the meter is stable and not drifting. Warm up normally takes 5 minutes but may take as long as 15 minutes depending on ambient temperature and moisture. Adjust the meter to “floating” zero in clean air. Often, the ambient atmosphere inside garages and workshops contain high ppm levels of hydrocarbons, making them unsuitable testing locations.
3. Place the intake cone over the nozzle of 50 ppm test can. Release a 1- or 2-second spray of gas. The needle on the meter should respond by moving to a minimum of 90% of the meter scale.
4. Allow meter to return to zero and repeat Step 3. If you get the same reading, the Flame Pack is calibrated properly.

NOTE: Readings may vary due to background hydrocarbon level. Readings may also vary due to the amount of 50 ppm gas in the can. A new can has a high velocity, approximately 750ccm. A can that is almost empty has a velocity of about 100ccm. A new can may need only a 1- or 2-second burst of gas, while a near empty can may need a 3-second burst.

5. If the meter fails to go to a minimum of 90%, the Flame Pack needs to be repaired and calibrated.
6. If the Flame Pack passes all pre-start and calibration tests, it is ready to survey.



Figure 9: Calibration Test

12.0: Survey Procedure

1. Perform pre-checks and calibration tests as described in Sections 8 through 11.
2. Using the adjustment knob, set the meter slightly below the alarm point. This setting must be monitored due to changes in background hydrocarbon levels.
3. The most effective method of survey is to walk slowly and drag the intake cone on the ground. When doing this, the probe stiffener should be fully or almost fully retracted. Operators should test all likely leak and venting locations as well as any visual leak indications.
4. In some conditions, such as slight amounts of decaying vegetation, enough hydrocarbons are present to key the alarm. By lifting the intake cone up 1 or 2 inches, this can be significantly reduced. With practice, an operator can readily distinguish between dead vegetation and a pipeline leak. The intake cone should not be dragged through saturated gas or standing water. However, the intake cone should never be raised more than 2 inches from the ground as it will greatly reduce the effectiveness of detection.
5. 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 the Flame Pack if necessary.
6. Pushing the toggle switch to the forward position desensitizes the Flame Pack and allows its user to center the greatest concentration of gas. This is the centering position and the scale is 0-5000 ppm. The audible alarm is inactive while operating in this range and the operator must watch the needle movement for detection.
7. Should it be desirable to leave the Flame Pack lit while it is inactive (for example, to eliminate warm-up delays), the power switch may be turned off to prevent the alarm from activating. The flame will remain lit unless the fuel is turned off or the probe is disconnected. Place Flame Pack in a safe place with the exhaust vent pointing downward. This allows condensation to drip out of the cell.
8. 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 of these conditions are paving, ice, snow, water, dense soil, and subsurface paths such as sewer lines and telephone conduits.

Reference AGA GPTC Guide for Gas Transmission and Distribution Systems 1995-98 Gas Leakage Control Guidelines Appendix G-192-11.

13.0: Shut Down Procedure

1. Place thumb over intake cone. This will put out the flame by stopping the air flow. Both audible and visual alarms should come on within 3 seconds.
2. Turn switch to the off position. Allow the fuel to flow for 15 to 20 minutes with exhaust flame arrestor pointing down. Doing this will dry the cell. Close the fuel valve. **NOTE: after valve is closed, it is normal to continue to hear gas flowing for several seconds as pressure in the Flame Pack is released.**
3. Clean Flame Pack before storage. See “Cleaning the Flame Pack 400”, Section 15.

14.0: Operating Suggestions and Cautions

1. NOTE: ALWAYS TURN THE ADJUSTMENT KNOB FULLY COUNTERCLOCKWISE AND TURN POWER SWITCH ON BEFORE IGNITING THE FLAME PACK. DAMAGE MAY OCCUR TO THE CIRCUIT BOARD IF THE IGNITER BUTTON IS PUSHED WITH THE POWER SWITCH OFF.
2. If the flame is extinguished due to a large leak, move away from the gas. Keep the fuel valve open, allowing the fuel to flow. When the gas has had time to clear out of the Flame Pack, relight. **Do not attempt to relight the Flame Pack in an explosive environment.**
3. Dragging the intake cone in wet grass may allow water to collect in the lower filter, putting out the flame.
4. Dragging the intake cone in dusty areas or in newly cut or fertilized grass may cause false indications. Put a SMALL amount of poly-fill (polyester fiber pillow fill) in the intake cone as a prefilter. It may also extend the life of the primary filter element. Poly-fill can be purchased at cloth stores and department-type stores.
5. Use care when installing batteries (**power switch MUST be off**). Use caution to not damage battery terminals. Visually verify positive battery connections. REPLACE THE BATTERY SPACER. Operation will fail quickly if the spacer between batteries is missing.
6. The hydrogen flame in the Flame Pack will cause the exhaust to normally drip water or expel water vapor. In some conditions, this may condense in the flame arrestor and put out the flame. If this happens, shake out the moisture from the flame arrestor. Allow fuel to flow to help dry out the cell before trying to relight.

WARNING: NEVER USE THE FLAME PACK WITH THE EXHAUST FLAME ARRESTOR REMOVED OR DAMAGED.

7. The Flame Pack 400 will operate about 8 hours when filled to 1800 psi.
 8. If a problem develops with the Flame Pack, take the following steps:
 - a. Fill fuel cylinder
 - b. Change batteries
 - c. Change filters
 - d. Empty intake cone
 - e. See troubleshooting section of manual, Section 17.
 - f. Call Southern Cross Corp. Customer Service Department at (770) 441-0403 or 1 (800) 241-5057.
 9. To decrease the risk of corrosion from perspiration on and in the handle/battery bracket assembly, wear a terry wrist band (sweat band) on the hand holding the Flame Pack.
 10. The Flame Pack 400 is manufactured with precision parts. Unnecessary shaking or shock to the instrument should be avoided.
 11. Keep water from entering the Flame Pack, either up the probe or through other openings.
 12. If the Flame Pack gets wet for any reason (dropped in water, rained on, etc.), remove batteries, dry instrument, and install new batteries.
 13. Do not put wet Flame Pack into case. Do not put wet or dry Flame Pack into a wet case.
-

15.0: Cleaning the Flame Pack 400 and Case

Cleaning the Flame Pack is essential for proper operation.

Perform steps 1 through 5 every day Flame Pack is used!

1. Remove the top of the filter housing, plug, and screen. Remove filter, spring, and gasket. Keep dirty filters separate. They can be cleaned and reused (see Section 16).
2. Blow dirt out of probe if working in very dusty area. Use oil-free compressed air.
3. Properly install a clean filter with the cleaned gasket and spring. Replace top of housing until the O-ring is engaged and the probe does not leak. Use caution as to not damage the O-ring (see Section 9).
4. Visually inspect screen (clean if necessary) and replace plug and screen.
5. Wipe down probe and Flame Pack with a SLIGHTLY DAMP cloth using a common cleaning solution. Wipe all exposed surfaces. Slide stiffener up then down to clean entire probe and stiffener.

INCLUDE 6 through 9 ONCE A WEEK and as needed.

6. Check switch. SWITCH MUST BE OFF. Remove black handle and spacer. Remove batteries by pulling each straight out of their terminals (contacts). This is so the terminals will not be damaged. Wipe down both handles inside and out. Check battery terminals for damage or corrosion. ALLOW TO DRY.
7. Check switch again. SWITCH MUST BE OFF. Reinstall batteries. Make sure they fit terminals snugly. REPLACE BATTERY SPACER and black handle. Put dry Flame Pack into its dry case.
8. To clean probe:
 - a. Remove filter housing top and remove filter, spring, and gasket. Remove plug, screen, and anything in the intake cone.
 - b. Blow out probe with compression air P/N 450.050. Flush with a soap and water solution. Flush out with clean water.
 - c. Blow out with the air again and allow to dry.
 - d. Install clean filter, gasket, and spring before using.
 - e. Reinstall plug and screen after cleaning.
9. To clean case:
 - a. Remove all accessories and all removable foam.
 - b. Turn case over and clean out all dust and dirt.
 - c. Wipe out case with a damp cloth.
 - d. Knock dirt and dust out of foam, then wipe it down.
 - e. Allow case and foam to dry while cleaning Flame Pack and accessories.

Perform cleaning steps as needed during the survey.

16.0: Cleaning the Filters and Intake System

Cleaning the Sintered Bronze Filters:

1. Fill sink or clean non-glass container with very warm water and soap solution.
2. Wash filters by vigorously shaking them.
3. Rinse twice vigorously shaking them in clean water.
4. Allow to dry overnight.

NOTE: The bronze filters are designed to filter out microns of dust. The dust that is found in the primary filter housing will contain fine dust and should be cleaned thoroughly. With proper maintenance and cleaning, these filters can be used indefinitely.

Cleaning the Intake System:

The intake system of the Flame Pack 400 will occasionally require cleaning. A good schedule is about every 2 months depending on the amount of dirt in the Flame Pack is exposed to, how often filters are changed, and other environmental factors. Additional cleaning may be needed when there is an increase in difficulty in lighting, a decreased sound of fuel flow, or an increase in response time.

1. BE SURE POWER SWITCH IS OFF.
2. Remove QC body from elbow. Plug the QC stem into the QC body. If necessary, unscrew the top of the filter housing and use that QC stem from the probe. Blow clean, compressed air through QC body and out of the QC stem to remove as much dust and dirt as possible. Flush QC with cleaner (SCC P/N 452.010K) for approximately 10 to 15 seconds. Shake out and blow clean, compressed air through to remove as much cleaner as possible. Leave QC stem in place for 10 minutes.
3. Open valve to allow fuel to flow. Blow out system with oil-free compressed air (low pressure). You can use SCC P/N 450.050.
4. Place wand of cleaner (SCC P/N 452.010K) through elbow into the hole in the pump intake, up against the pump screen. Flush Flame Pack until cleaner drips from exhaust arrester, approximately 15 seconds. The cleaner will work its way through the system with the fuel. Blow out the system with the compressed air again to help remove the cleaner.
5. Allow fuel to flow for 1 hour to remove the cleaner from the fuel system.
6. Hook up the probe, light Flame Pack, and burn for 1 hour. If the meter pegs at full scale, all the cleaner may not be out of the system.
7. Go through pre-start check and calibration test before using the Flame Pack for surveying (see Sections 10 and 11).

17.0: Troubleshooting Guide

If Flame Pack fails to light (LED and alarm stay on)

1. Is fuel pressure a minimum of 200 psi?
2. Are batteries good?
3. Is valve completely open?
4. Can you hear fuel flowing? Put Flame Pack up to your ear. If no sound is heard, repeat Step 1. Is the O-ring in the check valve blown out?
5. Is the probe assembly obstructed? Check filters for proper installation (see Section 9). Check tube inside the intake cone. It must be completely open.
6. Is the probe assembly plugged in correctly? Remove and reinstall. Did it click into place? Is the QC stem damaged? Check specifically the brass tip of the QC stem. Is it damaged or pushed in?
7. Is the switch in the search range (center position)?
8. Depress and release the igniter.
9. Did the Flame Pack light (LED and alarm went off)? If not, wait 5 seconds and repeat Step 8. If the unit did not light, it needs to be repaired.

LED and alarm are off, but meter does not respond to test gas

1. Have new batteries been installed?
2. Are batteries properly installed? (See Section 7)
3. Are the wires or battery terminals shorted out or broken?
4. Are batteries hot or bulging?
5. If new batteries get hot, there is an internal short and the Flame Pack needs to be returned to Southern Cross for repair.

If assistance is needed, call Southern Cross Customer Service Department at (770) 441-0403 or 1 (800) 241-5057.

WARNING: HOT OR BULGING BATTERIES MAY EXPLODE OR BE HOT ENOUGH TO BURN A PERSON'S SKIN.

CAUTION: MOMENTARY CONTACT OF BATTERIES TO BATTERY TERMINALS WITH THE SWITCH IN THE "ON" POSITION CAN CAUSE DAMAGE TO THE CIRCUIT BOARD.

18.0: Returning Equipment for Repair

Shipping Address	Southern Cross 3175 Corners North Court Peachtree Corner, GA 30071
Suggested Method	UPS or FedEx. Use next day or second day air for quick delivery.

When returning a unit for repair, THE COST AND TIME INVOLVED CAN BE MINIMIZED if you will:

1. INCLUDE ALL COMPONENTS IN THE SHIPMENT, i.e., fill assembly probe, and any parts changed out to repair the instrument yourself. SHIP IN THE ORIGINAL CARRYING CASE.
2. Install all packing material provided with Flame Pack.
3. ENCLOSE A NOTE IN THE FLAME PACK CASE EXPLAINING IN DETAIL the problems encountered, what has been done in attempting to solve or troubleshoot these problems, and any changes in operating characteristics noted in the past few weeks.
4. Include in the above note the name of the contact person along with the telephone number, email address, and hours they can be normally be reached.
5. Include method of payment. If method of payment is a purchase order authorizing repairs to the Flame Pack, you may include in the shipment, or mail purchase order to:

Southern Cross
3175 Corners North Court
Peachtree Corners, GA 30071

Phone: 1 (800) 241-5057

6. Indicate method of return shipment, if other than UPS Ground, and the address the Flame Pack is to be shipped to after the repair is completed.
7. REMOVE BATTERIES AND OPEN FUEL VALVE TO EMPTY FUEL CYLINDER.
8. Secure carrying case.

19.0: Operating Supplies

Operating Supplies	
Number	Name
SCC 100.163	Test Gas, 50 ppm
SCC 211.410K	Manual, 400 FP
SCC 450.050	Aero-Duster
SCC 452.010K	Cleaner, Cleaning Intake System

20.0: Flame Pack Fuel

The Flame Pack uses a mixture of hydrogen and nitrogen as its fuel. Obtaining the correct mixture is important as the instrument will not read correctly or may fail to function altogether with an incorrect mixture. When fuel is purchased, it should be specified as follows:

FLAME IONIZATION FUEL GAS; 40% HYDROGEN/60% NITROGEN TOTAL HYDROCARBONS AS CH₄ LESS THAN 0.6 PPM

Due to the specialized nature of the equipment to produce this gas, it is not available from Southern Cross Corp. it should be purchased directly from a specialty gas supplier such as NexAir, Matheson, Scientific Gas Products, or Linde. Our experience has shown that mixtures purchased from discount suppliers or welding shops are not always reliable and may cause the instrument to malfunction. Some suppliers will furnish cylinders on a rental demurrage plan.

Matheson Tri-Gas (800) 416-2505 www.mathesontrigas.com	NexAir (888) 639-2474 www.nexair.com
Airgas (866) 924-7427 www.airgas.com	Praxair (800) 772-9247 www.praxair.com



Flame Pack Model 400 Operation and Maintenance Video

This 15-minute instructional video on the care and operation of the Flame Pack is a must for your training library.

Topics covered in this video include:

- Theory of operation
- Fuel storage safety
- Refueling
- Battery replacement
- Filter replacement
- Startup procedure
- Response test
- Survey technique
- Shutdown and storage

The video (Part No. SCC 211.004) is available from Southern Cross. To order, call our Peachtree Corners office at (800) 241-5057, order by fax at (770) 662-5228, or email request to sales@southerncrosscorp.com.

The video may also be seen on YouTube if you search for “Flame Pack 400” or use the link: https://www.youtube.com/watch?v=_ZyTBpDnnvE.



www.southerncrossinc.com

(800) 241-5057

All-Terrain Vehicle (ATV) Leak Survey Kit

Leaking gas lines mean lost revenues – Southern Cross is your partner in gas leakage control. Contact Southern Cross today to discuss a cost-effective plan for your company!



- Easy installation on most ATVs.
- Convenient calibration testing in the field with 50 PPM test gas.
- Two 9-Volt alkaline batteries provide a week or more of survey.
- Flame Pack is easily removed for portable survey and CGI/pinpointing



- Survey in rugged or hard to access areas.
- Method of detection is the Southern Cross Flame Pack 400 (not included).
- Blower draws sample into six drag tubes.
- Alarm amplifier mounted inside the case produces a loud sound and activates a bright red signal as the Flame Pack alarms.
- An integral tool in your D.O.T. compliance program, pipeline integrity, and safety program.

TRUCK MOUNTED KITS ALSO!

We have endeavored to make your selection of mobile survey equipment as easy as possible, selecting only the options you need and employing plug and play technology. With either the Fixed or Portable Unit, using a 2" trailer receiver, you have the flexibility of removing much of the equipment and using the truck elsewhere. If you choose the portable unit and decide later you need to add the Sampling Arm, it plugs into the manifold and connectors already in place. This is also the same for the Fixed system. It allows you to quickly remove and add additional options such as Fuel Tank Cradle and Sampling Arm. Our technicians can provide full installations! These options are for use with the Flame Pack Model 400 or the '46 Hawk.

**CALIBRATION TEST KIT
FOR MODEL 400 FLAME PACK**

Now an entire calibration testing kit in an aerosol can for a quick and convenient method of checking the calibration of the Model 400 Flame Pack.



CONVENIENT – Nothing to Assemble

COMPACT – Small Size Makes It Easy to Carry or Store

LIGHTWEIGHT – Less Than 5 Oz. SAFE-50 PPM; Non-combustible

HIGH QUALITY – Certified to Be Within 5% of Stated Contents

ECONOMICAL – 40-50 Tests Each

To use, first adjust the meter to zero in clean air. Then insert can nozzle into intake cone and release a short burst of gas. Meter reading at or near full scale indicates a properly functioning Flame Pack. Readings may vary due to background hydrocarbon level.

FIGURE 16: FLAME PACK TEST GAS



Single Cans

Part # SCC 100.163



3175 Corners North Court
Peachtree Corners, GA 30071
southerncrossinc.com
(770) 441-0403