

## Lifeloc FC20 BTS Manual



Idaho State Police Forensic Services  
Version 0/February 2008

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## FC20 Messages

Messages that may appear on the display:

- 1. Warning Cal Expiring:** This means the instrument must be sent to the ISP laboratory for inspection. First appears 14 days prior to expiration, but there is no numerical countdown. At the end of that time the instrument will be locked and will not run any further tests until recalibrated and checked by the laboratory. On a new instrument, this calibration lockout will be set at approximately 6 months from the date of initial certification. Following recalibration by the lab, the lockout will be set for a longer time period.
- 2. Air blank time out:** After the air blank runs, there is a 2 minute window. If the breath test isn't begun within that window, "air blank timeout" shows on the display and it requests another air blank.
- 3. Air Blank Failed:** If an air blank is anything other than 0.000. Instrument goes into a two-minute countdown, runs another air blank automatically. If this one also fails **Aborted: 2 air blank failures** appears. Press Exec to get back to the Subject ID display.
- 4. Log full in 10 tests.** (9, 8,7, etc.) This means there is log space for only 10, or fewer, tests. If the log is not cleared after those 10 tests, "Log Full" will appear and no tests can be run.
- 5. Low Li Battery-** means the internal battery that powers the real-time clock is getting low. The instrument will have to be sent to Lifeloc for battery replacement.
- 6. Warning Low Battery-** The four AA cells need to be replaced before any further testing.
- 7. External Interference -** Detection of high levels of RF typically or can occur near the end of a fuel cell's life.
- 8. Printer Error -** unit can't communicate with the printer-possibly bad cable.
- 9. Excessive Alcohol -** the unit received more alcohol than it can measure-normally this would occur with high levels of mouth alcohol.
- 10. Temperature-** the unit is too hot or too cold to take a test.
- 11. Pump reset needed:** Follow displayed instructions or turn unit off, then on again. This message should appear rarely if at all. If it shows up repeatedly the instrument must be removed from service and sent to Lifeloc for examination.

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BTS Manual

The Lifeloc FC20 is a fuel-cell instrument made by Lifeloc Technologies in Wheat Ridge, Colorado. Phone: 800-722-4872. The FC20 is included in the NHTSA Conforming Products List of Evidential Breath Measurement Devices.

FC20 with mouthpiece in place:

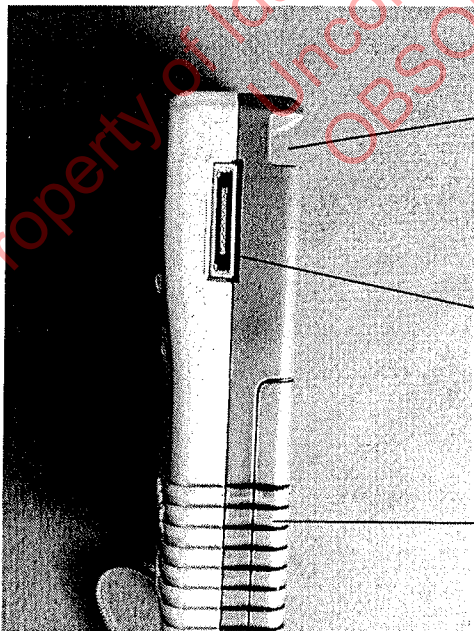


Exec. is used for actions within a menu option, along with the small + and - buttons.

Sensor that detects local lighting conditions.

Function takes you thru various menu options.

On/off button. Pressing it briefly takes you back to the start of the testing sequence.



Mouthpiece slot

Printer/Data Port

Battery compartment  
Should last 120-140 hours

## Principle of Operation

The FC20 is a fuel cell based instrument. Alcohol introduced into the fuel cell is broken down and produces an electrical current that is proportional to the concentration of the alcohol in the sample. The instrument will not accept another test (“Wait” period) until all the alcohol has cleared from the fuel cell.

## Menu Navigation

Once the instrument is turned on, there are five major menu screens used for testing or various instrument settings. They are accessed by pressing **Function**. To get out of a menu and back to subject testing press **Power** briefly.

1. **Testing**. The testing sequence appears when instrument power is turned on. Subject testing can begin immediately.
2. **Printing**. At the conclusion of testing, the print icon appears above the **Exec** button. It also shows up after pressing **Function** twice after powering on the instrument.
3. **Calibration**. In the field this menu is used to run calibration checks, also known as Wet Checks. Actual recalibration and adjustment of the instrument is done by the ISP labs and is password-protected.
4. **Settings**. This includes time, date, shutoff time, ID settings, testing mode, print settings, and display settings.
5. **Status**. Status includes the software version, test log status, battery condition, instrument temperature.

## Subject Testing

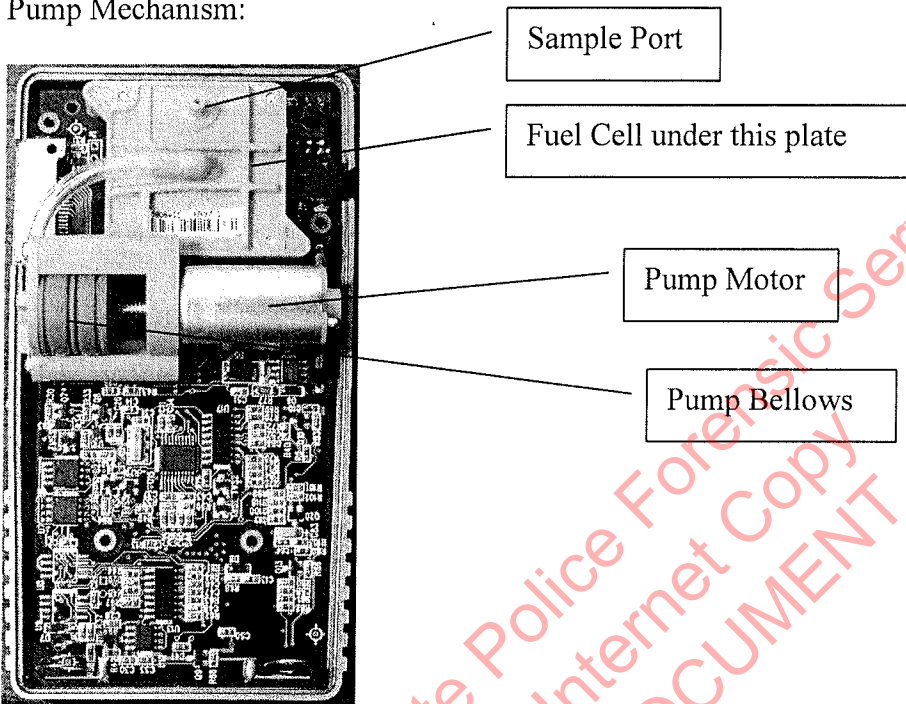
The instrument should be operated with the automatic “Sequence Mode On” as set in the Settings menu. The sequence provides for air blank, breath test, air blank, and second breath test. Once the first air blank is run, the display reads “Auto-Test” and the subject should deliver the first breath sample. If the first two tests do not agree within .020 a third test is required by the software. If the operator decides the subject cannot or will not deliver a proper sample, Manual Override is available by pressing **Exec**.

The use of Subject ID is recommended because the information entered prints out on the hard copy of the results.

When a breath sample is delivered, the instrument draws approximately 1 cc of breath into the fuel cell by means of a pump; the sample is collected in approximately 160 milliseconds. The software requires delivery of a minimum of 1.3 liters of breath, and then checks for a drop-off of about 30% from the peak breath pressure before taking the sample. It also checks for positive pressure within the mouthpiece after the pump is run to make sure the subject did not stop blowing while the pump was running. If one or both of the first two tests (samples) is “insufficient”, a third test will be requested by the software. The test log will store approximately 250 tests that may be printed at a later date. When the test log is nearly full, a warning message will appear advising that space for 10 tests remains. Once the log is full, no further tests can be run until the log is cleared.

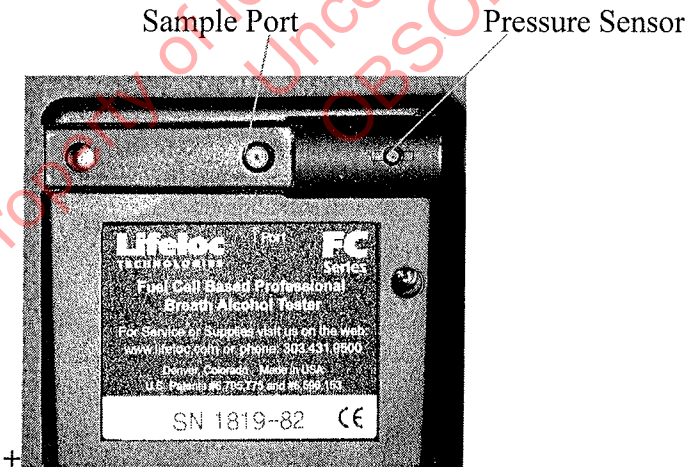
The manufacturer states the instrument is accurate to +/- 0.005 at readings up to 0.100, then +/- 5% from 0.100 to 0.400 BrAC.

**Pump Mechanism:**



**Mouthpiece**

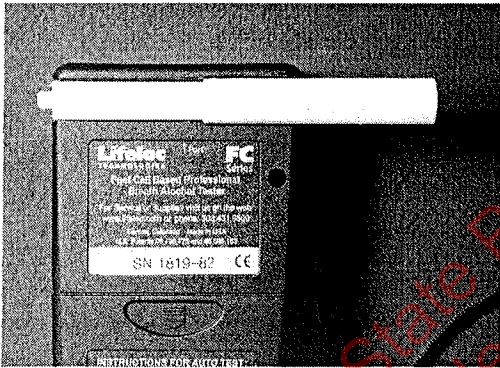
The mouthpiece fits over two ports on the back of the instrument:



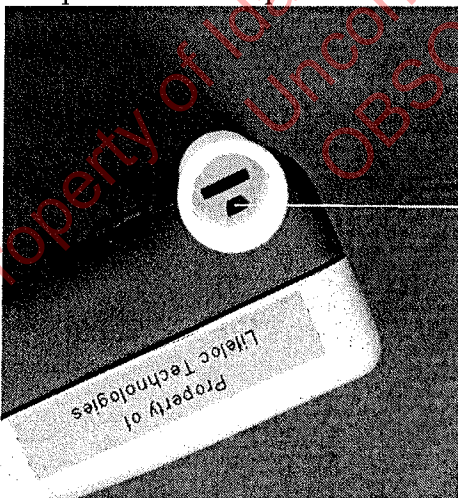
The openings on the mouthpiece must line up with these ports:



Be certain the mouthpiece fits the instrument tightly:



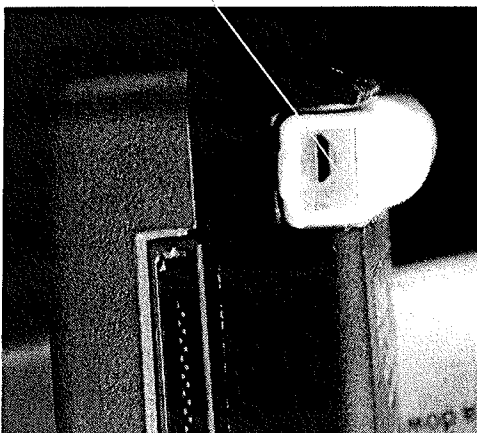
The pressure sensor port is seen near the mouthpiece opening:



Pressure sensor



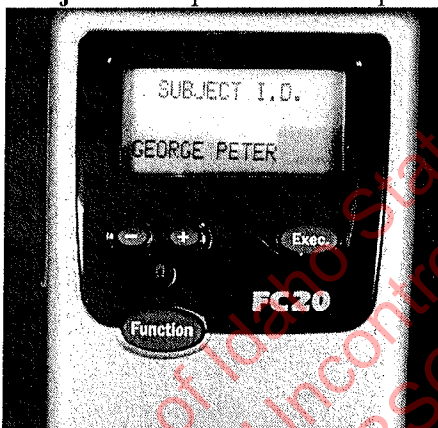
The pump/sample port is in the rectangular portion of the mouthpiece:



### Typical Operation—Auto Test Mode

Power on

**Subject ID** Alphanumeric capability.



Use the + and – keys to select desired letters or numbers.

Select the desired character, press **Exec** to move to the next space.

When all the information has been entered, press **Function**.

To by-pass subject ID, press the **Function** button.

Air Blank---Wait

Air Blank Sample—press the “Exec” button

Air blank results should be displayed at 0.000. Anything other than 0.000 is a failure.

Auto Test

Install new mouthpiece

Subject blows

Results displayed

**Remove mouthpiece for the second air blank.** Due to residual alcohol from a positive test possibly remaining in the mouthpiece, the air blank may fail if the mouthpiece is left attached. Officers may elect to discard the first mouthpiece and replace it with a new one for the second breath sample.

2-minute delay before second air blank (automatic)  
Results 0.000. If an air blank fails, (exceeds 0.000), it will run another air blank. If the second one also fails, the test sequence is aborted.  
Replace the mouthpiece  
Auto Test  
Results displayed  
Event number XX with test results displayed  
Printer icon; use “Exec” to print. If the printer is not currently attached, the test can be printed later.

### **Manual Override**

Used if subject cannot or will not activate the Auto Test.

Power on

Air blank---wait

Air Blank Sample---press the “Exec” button

Air blank results display at 0.000

Auto Test XX-X displayed

Subject blows as long as possible

Operator presses “Exec.” button to take sample (When to take the sample is determined by the operator)

Results displayed

### ***Remove mouthpiece for the second air blank***

Two minute wait for air blank

Air Blank Sample (automatic)

Air blank results displayed

Replace the mouthpiece

Auto Test displayed

Subject blows as long as possible

Operator presses “Exec” button if necessary for manual override.

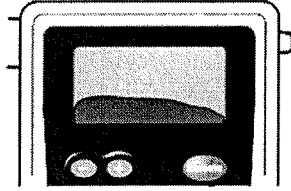
Results displayed with printer icon

**Air blank time out:** After the air blank runs, there is a 2 minute window. If the breath test isn't begun within that window, “air blank timeout” shows on the display and it requests another air blank.

**Air Blank Failed:** The air blank is greater than 0.000. The instrument will start a two-minute countdown and run another automatic air blank. If this one also fails, **Aborted: 2 air blank failures** appears. Press “Exec” to get back to the Subject ID display.

## Breath Flow

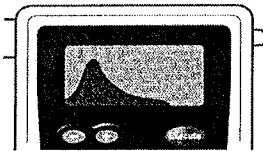
As the subject blows into the mouthpiece, the FC20 will show a graph of the breath flow on the display.



**The shape of this graph is not an actual indication of the breath alcohol concentration present! It is presented only as a visual aid to show breath flow. It is possible for a sober subject to produce an impressive-looking graph while blowing.**

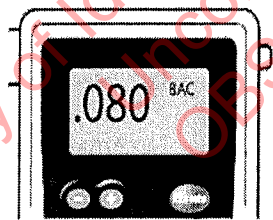
## Alcohol Curve

If the FC20 detects alcohol, the alcohol level is graphed and will be displayed before the result.



The graph is a visual aid, not a true indicator of breath alcohol concentration.

## Test Result



After analysis, the test result is displayed as grams alcohol/210 liters breath. Results are stored in memory and may be printed. The memory (test log) will store approximately 250 tests. A test is typically two samples. When the log is nearly full, "Log full in 10 tests" will appear on the display. Once the log is full the instrument will not allow testing until the log is cleared.

## Printing

At the end of a test sequence, the printer icon appears.



To print this test, press **Exec.** If the printer is not currently attached, the test may be printed later.

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Lifeloc Technologies, Inc.			
Sequence		v6.24c	
Serial No.		01095	
Units:		BrAC	
-----			
Event No.:		57	
Date:		12/27/2007	
#	Type	Time	Result
1)	Air Blank	11:20	.000
2)	Auto Test	11:20	Insuf.
3)	Air Blank	11:22	.000
4)	Auto Test	11:23	.000
5)	Air Blank	11:25	.000
6)	Auto Test	11:25	.000
-----			
Subject			
I.D. DAVE 60259			
-----			
Operator			

Idaho uses the impact printer. If your FC20 came with a thermal printer, you may have problems with long-term storage of the test record.

The printer uses rechargeable NiCad batteries. Once these batteries reach the end of their service life they must be replaced at Lifeloc.



The printer cable must be correctly oriented to connect with the FC20:



Notches face forward

Screws face up!

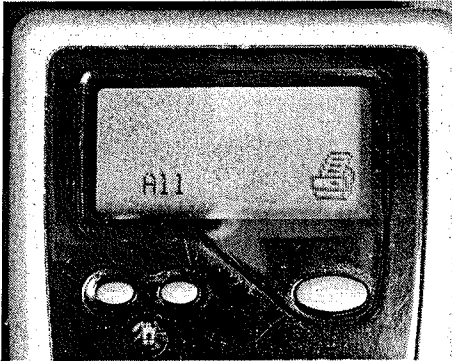
Be sure the printer is turned on and then press **Exec.** to print the displayed test results.

Possible error message: Printer Error. This means the unit can't communicate with the printer. It might be due to a bad cable.

### Printing Options

**To access the print screen: Power On/Function/Function.**

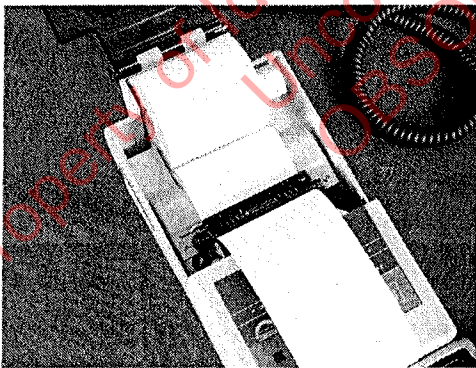
There are two ways to print stored test results. In the print screen simply use the + and – buttons to find individual stored tests, then press **Exec.** to print the test(s). Another option is pressing the (+) button until the display shows “All”, then press **Exec.** to print. This will print all the stored tests. The tests will **not** be deleted from memory by printing.



To print stored calibration data, use the +/- keys to get this screen:  
Press **Exec** to print.



### Changing Printer Paper

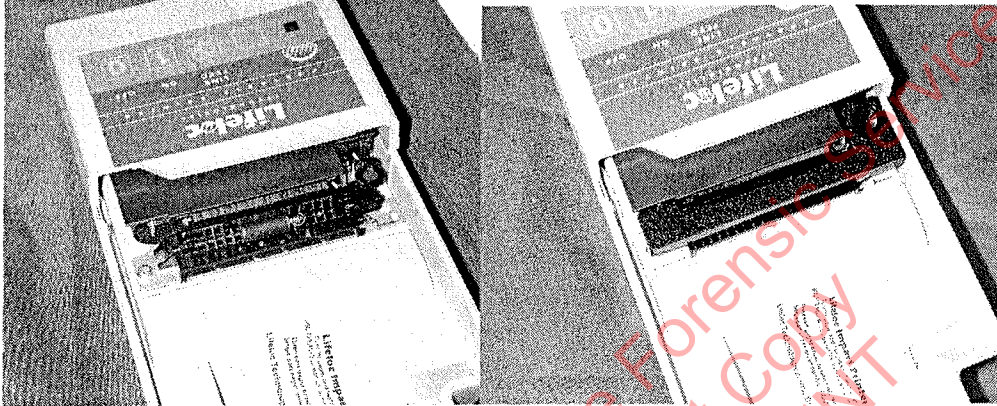


To change paper, use the “Feed” button on the printer to run the remaining paper out of the mechanism. Pulling the paper may damage the printer. Then simply put the new roll in, with the paper end square cut, and feed it through the mechanism while pressing the “Feed” button.

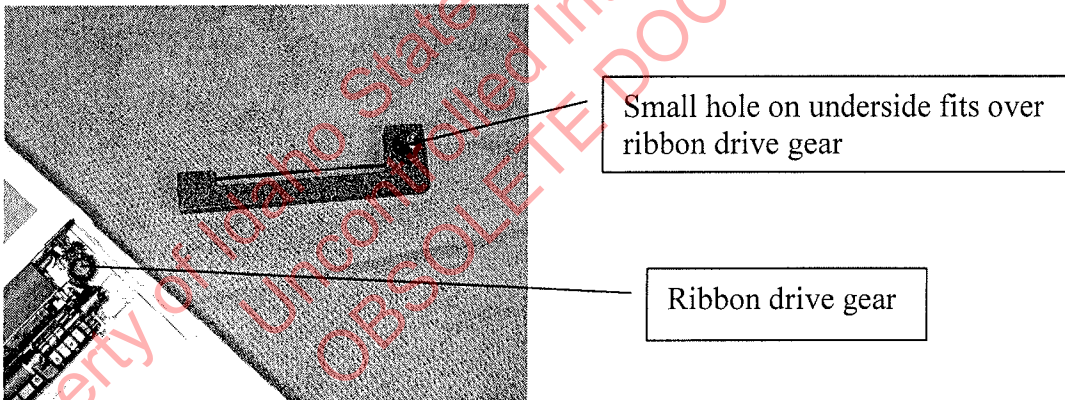
### Impact or Ink?

There are two options with this printer, using the three-ply impact printer paper without a ribbon, or single ply paper with a ribbon. As of January 2008, single ply paper is \$2.00/roll, the three ply is \$3.00/roll. The printer ribbon, for use with single ply paper, is \$7.00.

This is the impact printer without and with a ribbon:



Installing the ribbon:



Simply position the ribbon over the drive gear, being sure the ribbon fits in the paper feed slot.

## Testing Situations

### Uncooperative Subject

If a subject decides not to provide one or more of the samples, you can press **Exec.** to manually take a sample. The following printout shows a test sequence in which the subject delivered the first sample, was uncooperative for the second sample, then decided to provide a third:

```
-----  
Lifeloc Technologies, Inc.  
Sequence      v6.24c  
Serial No.    01895  
Units:       Br#C  
-----
```

```
Event No.:     59  
Date:         12/28/2007
```

```
# Type      Time  Result  
1) Air Blank 08:09  .000  
2) Auto Test 08:09  .024  
3) Air Blank 08:11  .000  
4) Manual Test 08:11  .000  
5) Air Blank 08:13  .000  
6) Auto Test 08:14  .134
```

Manual Override used by Operator

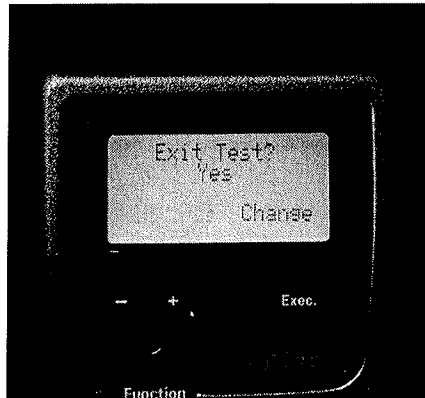
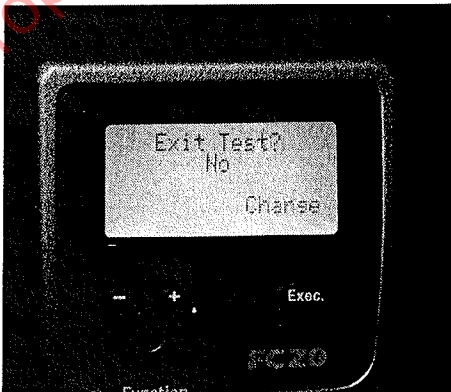
```
-----  
Subject
```

```
I.D. TEST
```

"Subject ID" information.

```
-----  
Operator
```

Another possibility: The subject states he will not provide a sample. Press the **Power** button briefly, the screen will say **Exit Test? No**. Press **Exec.** to change the **No** to **Yes**, then press **Function**.





Now select the reason: Operator Termination or Subject Refusal. Use **Exec.** to select one or the other, then **Function**. The print icon will appear. Use **Exec.** to print.



Lifeloc Technologies, Inc.  
 Sequence v6.24a  
 Serial No. 01819  
 Units: BrAC

---

Event No.: 132  
 Batch: 7804  
 Date: 12/28/2007

#	Type	Time	Result
1)	Air Blank	08:53	.000
2)	Auto Test	08:53	.180
3)	Air Blank	08:55	.000
4)	Subj. Refused	08:56	

---

Subject

---

I.D.

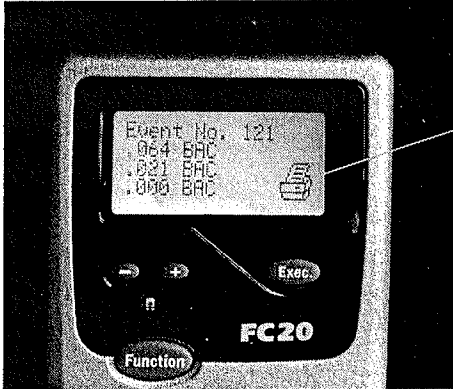
---

Operator

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### Mouth Alcohol/0.02 Agreement

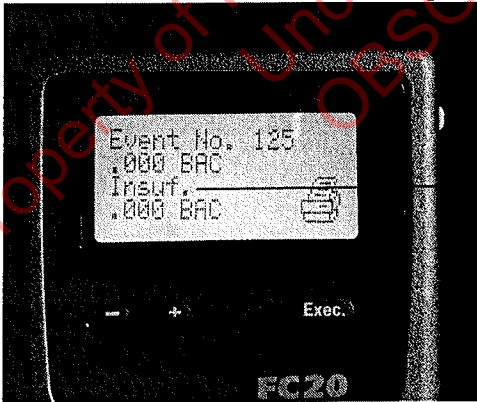
If the first two tests don't agree within 0.02, the instrument will request a third test. The instrument does not have the ability to flag a mouth alcohol sample, but the combination of the 15-minute waiting period before testing and the 0.02 agreement capability provides protection against mouth alcohol. The results shown here are due to the presence of mouth alcohol and illustrate what happens if the first two samples exceed the required 0.02 agreement:



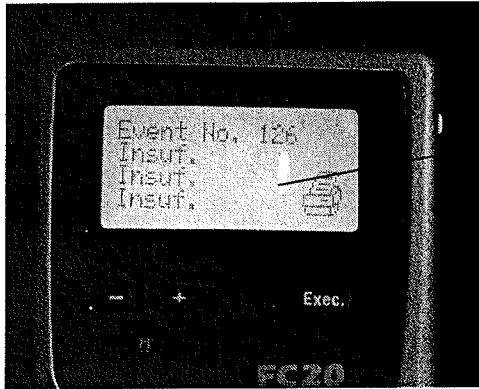
Ready for printing.

### Insufficient Sample:

For a satisfactory sample, a minimum blow of 1.3 liters of breath is required, with a drop-off of about 30% from the peak breath flow at the end of the sample. There must also be positive pressure present after the pump is run to make sure someone did not stop blowing while the pump was sampling. If the sample does not meet these criteria, the display will show "Insufficient Sample" and the instrument will proceed to the next air blank. If the first two breath samples are insufficient, the instrument will request a third.



Second test "Insufficient"



All three tests were "Insufficient"

If the subject inhales through the mouthpiece instead of blowing, no test is taken and the Auto-Test screen remains visible. A short "puff" of breath will trigger "Insufficient Sample".

### Temperature

The FC20 will run tests if the instrument temperature is between 50° F and 104° F. If the instrument temperature is outside those limits, it will not operate and a "Temperature" alert will appear in both the subject testing and wet check screens. Even though the surrounding temperature may be within the acceptable range, it may take time for the internal instrument temperature to stabilize and reach the acceptable range.



### Radio Frequency Interference: (RFI)

The instrument is physically shielded as well as electronically protected against RFI. If RFI is detected, the RF causes the unit to display "wait" and not allow a test. If it detects high RF after the pump has run it will display an "external interference" prompt and not a result.

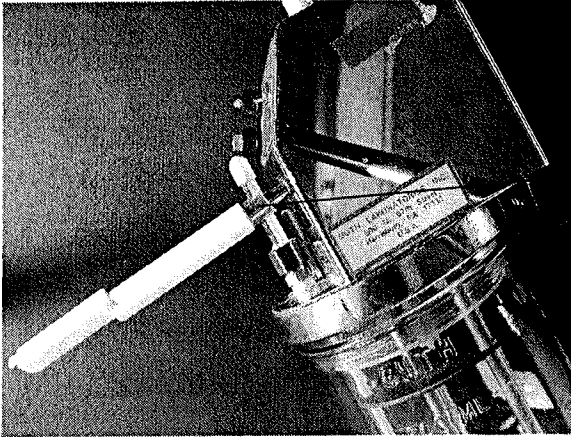
### Calibration

The instrument must have calibration checks as specified in the ISP Standard Operating Procedure for breath alcohol testing. Actual **calibration and adjustment** is done in the ISP laboratories and is password-protected. From power on, press **Function** until the Calibration screen appears, then press **Exec.**

### Calibration Check Procedure (Wet Check)

The simulator must be warm, running for at least 15 minutes. The connection between the instrument and the simulator must be tight.

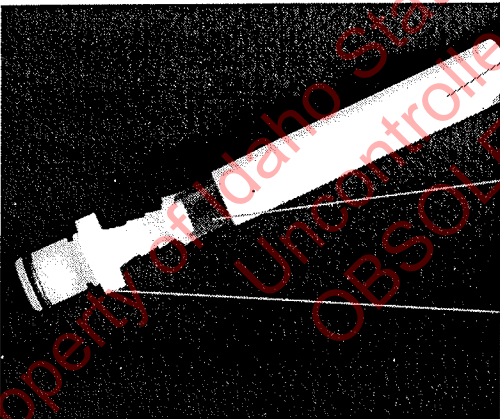
Older model simulators:



Short piece of clear tubing on “vapor out” tube of simulator.

Connection to the Mark IIA (green top simulator) would be similar.

Newer Models of Guth:

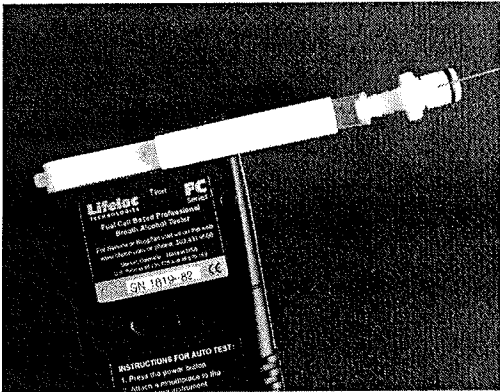


Mouthpiece

Short piece of clear tubing. Push it on all the way! Heating the fittings with a hair dryer helps.

“Plug-in” fitting available from ISP lab.

Calibration set-up:



This fitting should be inserted farther into the clear tubing. It is this way for display purposes only.

### Running a Calibration Check:

Press "Function" until the Calibration display appears:



Better view of the light sensor.

Next, press **Exec.** to get to the Wet Check screen.



Now the display shows “Wet Check” and the target value of the standard. Use the + and – keys to adjust the value to the target of the solution you’re using. This value comes from the **certificate of analysis** issued by ISP and might be slightly different from what the bottle label shows.

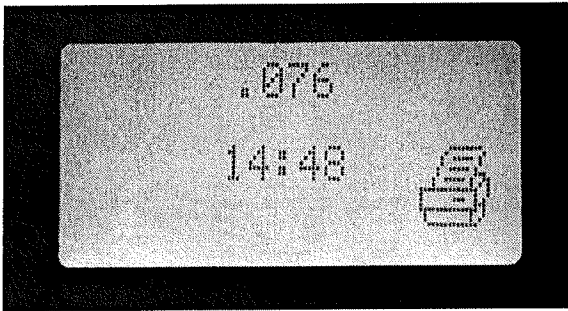
If you press **Function** while in this screen, the Security Code screen appears, asking for a pass code. This screen is used by ISP personnel to access other functions of the instrument including recalibration (adjustment) of the instrument. Press **Function** then **Exec.** to get back to the Calibration screen.

Connect the instrument to the simulator and blow through the simulator. The graph will appear on the display:



After blowing for about 4 seconds, press “Exec.” *and continue blowing* for another 4 seconds. The instrument will take a sample of the vapor flowing through the mouthpiece.

The results will appear:



Press "Exec." to print.  
Air blanks do not run between the checks.

**You must print or log *each* wet check result as soon as the result appears. The instrument can store *only* the most recent result. The Wet Check screen reappears automatically during the printing process, so several samples may be run in sequence.**

This means that if you run three wet checks with a 0.08 solution and do not press **Exec** to print until after the third one, *only* the third one will print.

-----  
Lifeloc Technologies, Inc.  
Sequence v6.24d  
Serial No. 99201895  
Units: BrAC  
-----

Instrument Serial Number

-----  
Last Calibrated:  
Cal Standard: .080  
Time: 11:49  
Date: 02/13/2008  
-----

Date of most recent instrument  
calibration adjustment

-----  
Last Check:  
Cal Standard: .206  
Result: .200  
Time: 11:53  
Date: 02/13/2008  
-----

Target value, result, date of most recent  
wet check

Once finished with calibration checks, momentarily press the **on/off** button to get back to the Subject ID screen. Or press and hold the **on/off** button to shut off the instrument.

If the results after a total of three checks (two vapor samples per check) are not within acceptable range, the instrument must not be used for evidentiary testing until the problem is corrected.

## The 0.20 Calibration Check

The instrument must have a wet check using a 0.20 simulator solution once each calendar month. The 0.20 calibration check consists of running two consecutive samples.

If the results after a total of three checks (two vapor samples per check) are not within acceptable range, the instrument must not be used for evidentiary testing until the problem is corrected.

### 0.20 Calibration Check Procedure

Press **Function** until the Calibration screen appears, then press **Exec.** to go to Wet Check. The current Standard value will be displayed. Use the + /- keys to adjust the value to the target for the 0.20 solution, for example 0.200.



Connect the instrument to the simulator and run the calibration check, pressing **Exec.** to take the sample.

**When the print icon appears, press Exec to print.**

The Wet Check screen will appear again during the printing process. Repeat to run additional 0.20 samples.

Final step: Reset the Std= value to the target for the 0.08 simulator solution.



## Instrument Settings

### 1. Date/Time/Auto shutoff Settings:

The instrument does not automatically adjust for daylight savings time. Press **Function** until “Settings” appears, then press **Exec.** The time appears with the hour digits flashing. Use the + and – buttons to adjust the time, press “Next Digit” to move from hours to minutes. When finished, press **Function** again to bring up the date. Adjust the date the same way. Press **Function** again to get out of time/date settings. “Shutoff Time” will appear. Adjust this to set a time interval after which the instrument will automatically shut off to save batteries.

### 2. ID/Batch Settings:

Press **Function** again, ID settings appear. The options are “Off”, “Subject”, “Batch”, and “Subject + Batch”. If selected, Subject ID can be used to enter identifying information for the tested subject, such as a driver’s license number. This will print with breath test results. Batch could be used to identify an operator (ID or badge number) or agency. Once entered, Batch need not be re-entered with each individual test or calibration check. It will appear on the printouts.

### 3. Test Mode:

Pressing **Function** once more brings up a window marked “Sequence Mode On”. This is the basic Idaho testing mode. *This must not be changed; leave it “on”.*

### 4. Print settings:

Press **Function** again to get to Print Settings.

**Exec. :** Number of copies, 1,2, or 3.

**Function:** Print Format, Long or Short. The long format will include information on the last date of instrument calibration adjustment and the most recent calibration check (wet check) run **prior to** the subject test.

**Function:** Printer selection. Select the model number of your printer; the impact printer is DP1014 or the AP892 thermal printer.

**Function:** Exit.

### 5. Display Settings:

**Function:** Display Settings.

**Exec.:** Display contrast; adjust with the +/- buttons.

**Function:** Test Order: “Auto-Man-Passive”. *This must not be changed.*

**Function:** Results Format: Numeric.

**Function:** Pass Level and Fail Level; not relevant to DUI testing.

**Function:** Exit.

**On/Off:** button: back to Subject ID/start of the testing sequence.

### 6. Status:

Once in the Status window, you can check the following:

**Status/Exec.:** Software version and the date of installation.

**Function:** Test Log Status; how many tests remain available (See the next page).

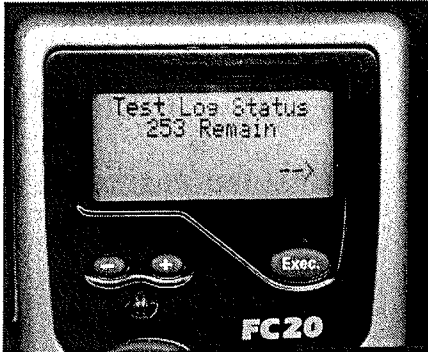
**Function:** Battery Status.

**Function:** Instrument temperature in both Centigrade and Fahrenheit.

**Function:** Exit from Status.

## The Test Log

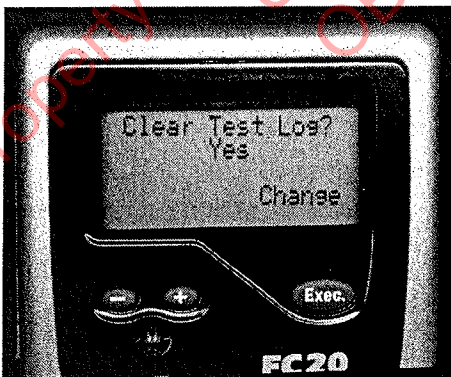
The instrument will store approximately 250 tests. Pressing **Function** in the **Status** window will take you to Test Log Status:



From this window, pressing **Function** takes you to the Battery Status display. Pressing **Exec.** while in the Test Log Status window takes you to this display:



Pressing **Exec.** changes the choice from "No" to "Yes":

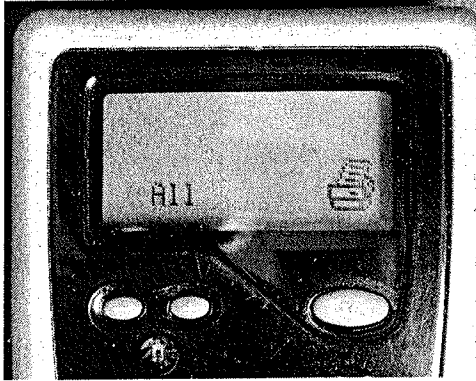


If you press **Function** while in this display, *the test log will be erased.*

To get out of this window without clearing the log, press **Exec.** to change the "Yes" to "No", then press **Function.** *Or* simply press the On/Off button briefly.

Clearing the log *clears all the test information*, but it does not clear the calibration and calibration check information currently in the unit.

You can print out all tests stored in the log. In the print screen press the +/- buttons until it reads "All". Then press **Exec.** to print all the tests.



To print just calibration data, press the +/- buttons until the display reads "Cal/Cal Check" and you can print out the last calibration and calibration check data.



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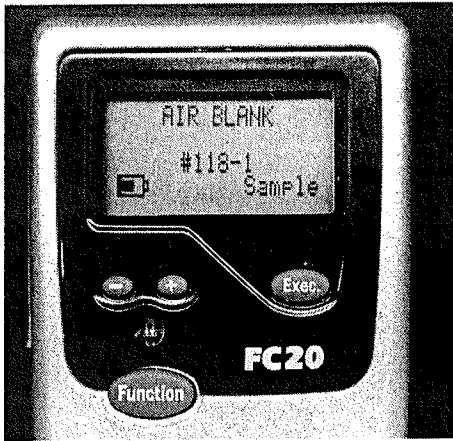
Lifeloc Technologies, Inc.	
Sequence	v6.24a
Serial No.	01819
Units:	BRAC
-----	
Last Calibrated:	
Cal Standard:	.000
Time:	13:14
Date:	01/31/2008
-----	
Last Check:	
Cal Standard:	.000
Result:	.070
Time:	14:14
Date:	02/06/2008
-----	

Most recent calibration adjustment

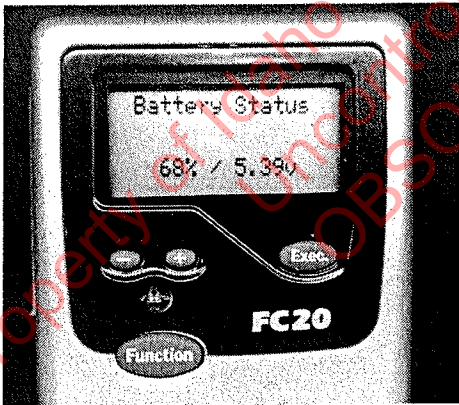
Most recent Wet Check (Yes, the results are low)

### Battery Status

A set of fresh alkaline batteries should last for approximately 130 hours of operation. There is a battery-shaped symbol in the Air Blank screen that is an indicator of battery condition.



To get a more accurate indication of battery condition, press **Function** repeatedly until the **Status** window appears, then press **Exec./Function/Function** to see the actual battery voltage. At 4.4 volts the instrument will no longer operate and the display will show "Warning Low Battery". Replace with fresh alkaline batteries.



Press **Function** again and the instrument temperature is shown. Press **Function** again and the display reads **Exit**. Pressing **Exit** takes you back to the **Status** window; press **Function** again and the **Subject ID** window appears.

## **Instrument Storage**

Fuel cells like moisture, so if the instrument is stored for the winter, for example, try to run a test on it occasionally. Breath (alcohol is not necessary) or a simulator solution may be used. This will extend the life of the fuel cell.

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