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Approved Screening Devices in Ontario

by

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In this article, the authors discuss the approved screening devices currently in use in Ontario, following the withdrawal from service of the A.L.E.R.T. Model J3A. The A.L.E.R.T. device was removed from the list of approved screening devices in February, 1994. The approved screening devices pursuant to section 254(1) of the Criminal Code now include the Alcolmeter S-L2, the Alco-sur, the Alcotest 7410 PA3 and the Alcotest 7410 GLC. Diagrams of these approved screening devices are provided.

Dans cet article, les auteurs examinent les appareils de détection approuvés actuellement utilisés en Ontario suite à la mise hors service de l'appareil A.L.E.R.T., modèle J3A. L'appareil A.L.E.R.T. a été retiré de la liste des appareils de détection approuvés en février 1994. Les appareils de détection approuvés, conformément au paragraphe 254(1) du Code criminel, comprennent maintenant les modèles suivants: Alcolmètre S-L2, Alco-sur, Alcotest 7410 PA3 et Alcotest 7410 GLC. Cet article présentent aussi les schémas des appareils de détection approuvés.

1. INTRODUCTION

There are currently four approved screening devices in use in Ontario, the Alcolmeter S-L2, the Alco-sur, the Alcotest 7410 PA3 and the Alcotest 7410 GLC. All three employ fuel cells for the detection of alcohol. The A.L.E.R.T. model J3A was removed by the Attorney General of Canada as an approved screening device on February 17th, 1994. It was the only device that used a n-type semiconductor (Taguchi cell) as the detector.

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2. THE FUEL CELL

The fuel cell (electrochemical detector) consists of two electrodes separated by an acid electrolyte. When breath containing alcohol is drawn into the cell, the alcohol is oxidized and an electrical voltage is produced that is proportional to the concentration of alcohol in the sample. The greater the alcohol concentration, the greater the voltage generated.

The current fuel cells are more specific for alcohol and more stable than the n-type semiconductor used in the A.L.E.R.T. model J3A. They do not react with acetone as did the A.L.E.R.T. Nevertheless, smoking several minutes before testing can still result in a falsely high result. As with any breath test, mouth alcohol due to oral ingestion of any alcohol-containing material within 10-15 minutes of testing can also produce an apparently falsely high result.

An alveolar (deep lung) sample must be collected and analysed in order to obtain a reliable blood alcohol concentration ("BAC"). If the subject provides a poor breath sample, the results will be falsely low.

3. THE ALCOLMETER S-L2

The Alcolmeter is shown in Figure 1. There are approximately 70 of these currently in use in Ontario. The device is powered by a 9-volt battery. For operation, the "READ" button is held down for 10 seconds and if the "READY" and "BAT" lights illuminate, the device is ready to take a sample. The "SET" button is then pressed and the mouthpiece is inserted onto the top of the device. If the subject blows with a pressure of a least 7.5 cm of water the "A" light is illuminated; when this pressure is maintained for 2.5 seconds the "B" light is illuminated indicating a proper sample can be collected (1.5 l of breath has been discarded). The "READ" button is pressed and approximately 1 ml of sample is drawn into the fuel cell. The alcohol in the sample is then oxidized, generating an electrical voltage. The BAC ranges are given by different colour lights as follows; the green "READY" indicates a BAC of 0-4 mg/100 ml; an amber "PASS" indicates a BAC of 5-49 mg/100 ml; the amber "PASS" and red "FAIL" lights together indicate a BAC of 50-99 mg/100 ml; and the red "FAIL" alone indicates a BAC of 100 mg/100 ml or

greater. Approximately 30-55 seconds are required for the result to be displayed.

For operations, the device should be at temperatures between 18°C and 36°C. Lower temperatures will cause it to take longer to respond and cause the results to be lower. Higher temperatures cause the device to respond more quickly and to read higher.

4. THE ALCO-SUR

The Alco-sur is shown in Figure 2. There are approximately 100 of these now in use in Ontario. This device also is powered by a 9-volt battery and is similar in appearance to the Alcolmeter S-L2. The main difference is that a proper breath sample is not determined by lights but by a tone. When the subject blows through the mouthpiece a "whistle" is heard; the "READ" button is pressed after about 4-5 seconds or when the tone and intensity of the whistle decreases. The operation and the lights display are similar to the Alcolmeter S-L2.

The Alco-sur has a liquid crystal digital thermometer on the back and should be operated at temperatures between 20°C and 38°C. If the device is operated above or below this temperature range the same limitations apply as for the Alcolmeter S-L2.

5. THE ALCOTEST 7410 PA3 and GLC

The Alcotest 7410 PA3 is shown in Figure 3. There are approximately 830 in use in Ontario. The device is powered by either 3 alkaline batteries (type C, 1.5V), 3 rechargeable batteries or the 12V power supply of a car. This device has the latest technology and includes a microprocessor. It is fully automatic and requires no action by the operator to collect a sample. In addition, the fuel cell is heated so that variations in ambient temperature will not affect it. It can be operated at ambient temperatures between -20°C and 40°C.

The device has only one button to press. To operate, this button, located at the side of the device, is pressed once. The yellow "ON" light is illuminated and the liquid crystal display shows "PA3" or "GLC" (the model designation) followed by "WAIT." When the device is heated to the proper temperature and is ready to receive a sample (usually in less than one minute), the green "READY" light illuminates and a tone sounds.

When the subject blows through the mouthpiece with sufficient pressure (at a flow rate of at least 6 l/min), a continuous tone sounds. After 1.2 l of breath is discarded, the tone ceases, the "READY" light is no longer illuminated and the device activates a piston which automatically draws 1 ml of sample into the fuel cell. The result of the test is shown by the model PA3 on the display by "P" (0-49 mg/100 ml), "A" (50-99 mg/100 ml) or "F" (100 mg/100 ml and above).

A "chip" ("EPROM") of the Alcotest PA3 microprocessor can be replaced and the device will display a digital result for BACs below 50 mg/100 ml. This change is in response to the zero BAC provisions in the graduated licensing legislation. It will allow the police to properly deal with novice drivers whose BAC must be zero (in practice cannot exceed 20 mg/100 ml) and fully licensed drivers whose BAC cannot exceed 49 mg/100 ml. The only differences between the GLC and the PA3 is the change in the EPROM to allow digital results below 50 mg/100 ml; in all other aspects, the devices are identical. The device will show "GLC" on the display when first turned on instead of "PA3."

If the subject does not provide a proper sample, the continuous tone ceases and the message "EO" appears on the display. The device then recycles to the ready condition. The device also displays other error messages if there is a malfunction (for example, "E1" indicates a sensor fault).

The Alcotest 7410 approaches evidentiary standards in breath alcohol testing. In one study (Clasing et al, 1992), in which blood and Alcotest 7410 tests were conducted on 165 drinking drivers, two thirds of the Alcotest results were within 10 mg/100 ml of the actual BAC.

REFERENCES

D. Clasing, G. Bohn & U. Brackmeyer, "Überprüfung der Atemalkoholkonzentration mit dem Alcotest 7410 [Testing of the Breath Alcohol Concentration With the Alcotest 7410]", *Blutalkohol*, 29: 130-133, 1992.

Figure 1
The Alcolmeter S-L2

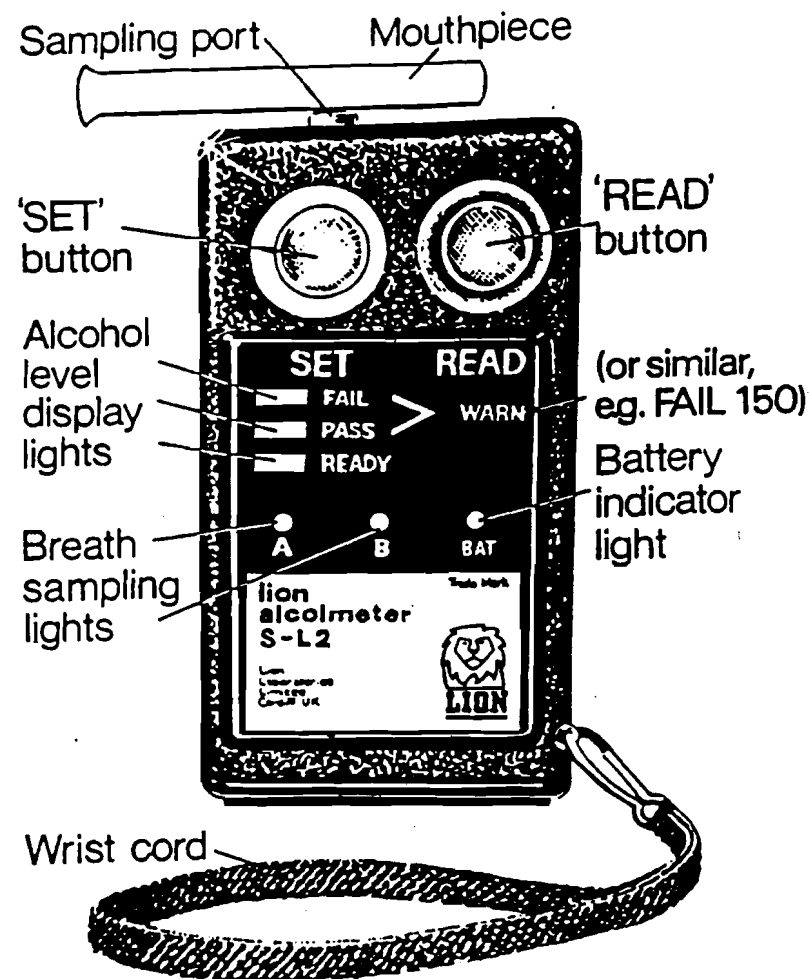


Figure 2
The Alco-sur

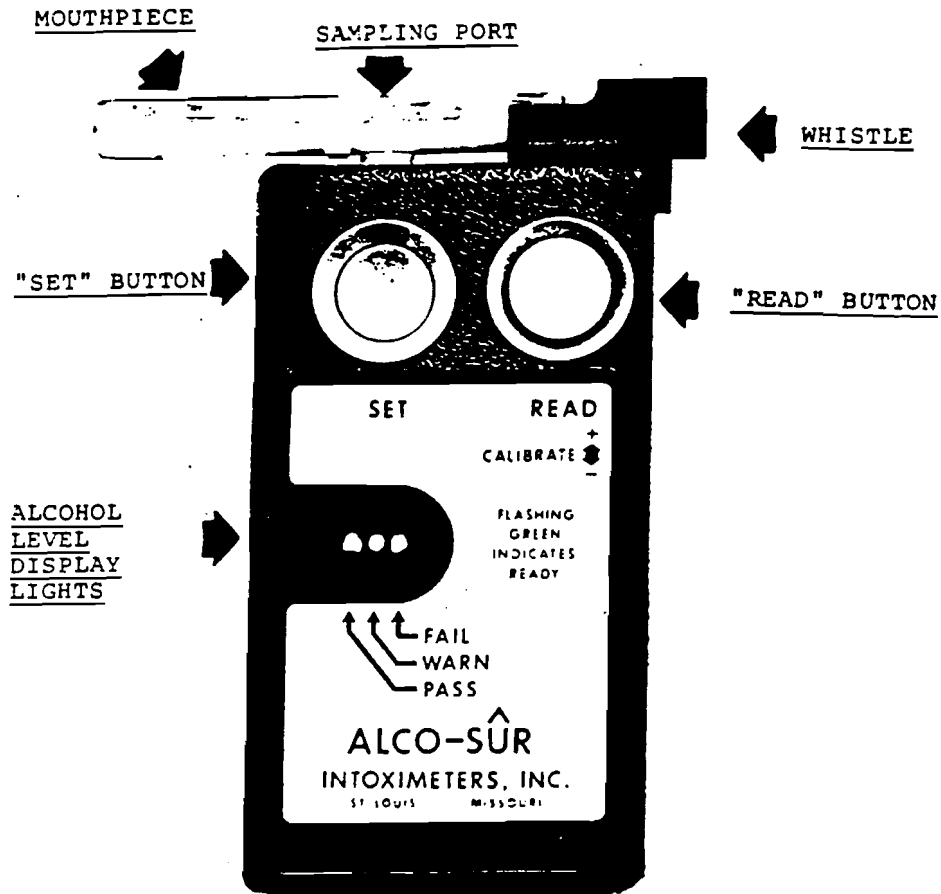


Figure 3
The Alcotest 7410

- 1 Mouth-piece holder
- 2 Yellow On-light
- 3 Green Ready-light
- 4 Display
- 5 Button
- 6 Catch
- 7 Lock

