Alcotest 7410 GLC

Operator Manual

Prepared By:

Toxicology Services
National Forensic Services
(Amended April 2011)

Table of Contents

Note:

The instructions, procedures and policies included in this manual were in effect at the time of its writing. They are subject to revisions imposed by amendments to the Criminal Code, Saskatchewan Traffic Safety Act or the Vehicle Administration Act, case law decisions, manufacturers instructions and changes to RCMP or other police department policies.

Introduction

A peace officer must have reasonable and probable grounds to believe a person has committed an offence under Section 253 of the Criminal Code before demanding an evidentiary breath test. This means the peace officer must believe that the person was driving while either 1) impaired or 2) the blood alcohol concentration exceeded 80 mg% (milligrams of alcohol in 100 millilitres of blood). It is important for the peace officer to understand the distinction between these two possibilities.

Grounds for impaired driving are acquired by observing the driving pattern, physical appearance and other symptoms displayed by the subject. Sobriety tests can be useful, too, although you may need to give a warning to the subject to avoid admissibility issues in court. Obtaining grounds this way is often time-consuming and dependent on the experience and judgement of the peace officer. Also, individuals experienced in the consumption of alcohol may show few or no effects and avoid detection.

The average blood alcohol concentration (BAC) of drivers apprehended this way is in the range of 160 to 170 mg%, well beyond the legal limit. This means that mostly **intoxicated** drivers are apprehended in this manner and not **impaired** drivers. (Intoxicated drivers are severely impaired and demonstrate gross physical symptoms. Impaired drivers show few symptoms but still represent a high risk of being responsible for a motor vehicle accident.) To detect impaired drivers, the peace officer needs to use the second means of acquiring reasonable and probable grounds. This is a roadside test that allows the peace officer to form the belief that the BAC exceeds 80 mg%.

The development of accurate and rapid scientific instruments capable of being used at the roadside was a major milestone in impaired driving enforcement. The first **approved screening device** (ASD) was introduced in 1977. Several different instruments are currently included in the **Approved Screening Devices Order.** Among them are the **Alcotest 7410 PA3** and the **Alcotest 7410 GLC.** Both of these are distributed and serviced in Canada by Dräger Canada of Mississauga, Ontario. The PA3 and GLC are identical except that the PA3 gives analog readings only (PASS-ALERT-FAIL) while the GLC gives a digital readout in the PASS range.

NOTE: Saskatchewan uses the GLC model almost exclusively and reference will be made throughout this manual to the GLC. Unless otherwise indicated, all information also applies to the PA3. For conciseness, "GLC" is sometimes used as an abbreviation for "Alcotest 7410 GLC."

A peace officer should have thorough

knowledge of the GLC before using it to obtain grounds for an approved instrument demand. The following material will describe the operation, some theoretical considerations, and law and policy concerning the use of the Alcotest 7410 GLC.

Physiology of Breath Testing

This brief chapter is included to explain how **breath** samples are used to determine the **blood** alcohol concentration.

When a person consumes an alcoholic beverage, it passes from the mouth and esophagus to the stomach and small intestine where it is absorbed into the blood stream. The absorption of alcohol is quite rapid, generally taking 20 to 30 minutes after consumption to reach the maximum reading. The absorption time is affected by the type and amount of food in the stomach and the type of beverage consumed. Once in the blood stream, the alcohol is distributed to all parts of the body including the lungs, brain and liver. It is the depressant action of alcohol in the brain that causes impairment and intoxication.

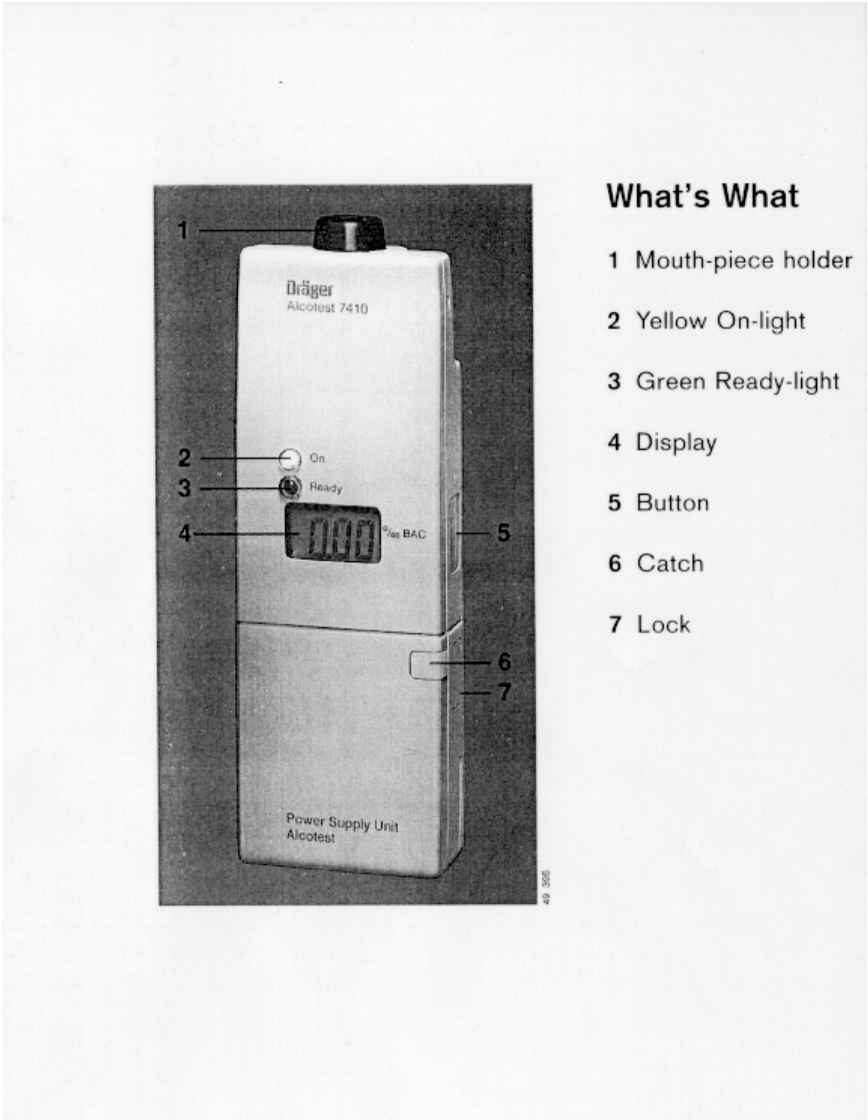
Elimination of the alcohol begins immediately after it has entered the blood. Most of the alcohol (90 – 98%) is eliminated by metabolism in the liver. The remainder (2 – 10%) is eliminated unchanged through urine, sweat, **breath** and other body fluids. Unlike absorption, the elimination rate is 15 mg% per hour.

The basis for all breath test instruments is that alcohol is eliminated unchanged in the breath. There is a fixed and known relationship between the amount of alcohol in the breath and the amount of alcohol in the blood. This relationship (essentially the principle of breath testing) is:

2100 parts of deep lung air contain the same amount of alcohol as one part of blood.

Because this ratio has been well established in scientific experiments, it is possible to collect a measured volume of breath, analyze it for alcohol and convert the result to a blood alcohol content. This principle is used by all breath test instruments, including the GLC.

Description



Operation of The Alcotest 7410 GLC

Before using the GLC, the operator should be aware of the calibration and battery charge status.

A. Calibration Status

The calibration of the GLC is checked every two weeks to ensure proper results are obtained. This duty can only be performed by a designated **calibrator** who has taken the required training. Upon completing the calibration process, the calibrator affixes a sticker showing the date of the last calibration. If the current date is more than two weeks from the last calibration date, do not use the GLC. Return the device to a calibrator.

B. Battery Charge

The power supply for the GLC is either a rechargeable nickel cadmium (NiCd) battery pack or a non-rechargeable alkaline battery pack containing three disposable C-size 1.5 volt batteries. Regardless of what power supply is used, the device has a **"Lo Bat"** indicator which will appear in the lower left hand corner of the liquid crystal display (LCD). The device must be turned on to see this indicator. If you are using NiCd batteries, a "Lo Bat" indicator means battery power is low and operation can be continued for only a few minutes. Return the device to the charging unit. If you are using disposable alkaline batteries, "Lo Bat" will come on as part of the normal operational cycle. It does not indicate that the batteries must be replaced. When there is insufficient power to conduct a test, the instrument will automatically shut off.

NOTE: The users must be aware of which device they have. Only GLCs which have rechargeable batteries should have the charging unit at your detachment. The type of batteries your device has should be confirmed with the calibrator. This is important not only for operational reasons, but for safety reasons as well. Do not attempt to charge a GLC that has non-rechargeable batteries.

C. Operational Procedure

Once you have determined the calibration and battery charge status, you are ready to proceed into the normal operational cycle. This cycle consists of the following:

1. Press the button (shaded grey) on the right side of the device **once.**
2. The **yellow** "On" light illuminates and a self test is carried out.
3. A brief indication of the display option for the device is shown, followed by the model designation (GLC).
4. This is followed by the display **" - - - wait "**
5. After 10 to 30 seconds the **"wait"** indication goes out and the green

"Ready" light comes on (below the "On" light). It is accompanied by a short audible tone.

6. Attach a new mouthpiece into the grommet at the top of the device.
7. Instruct the person to blow. The sample must be of sufficient force and continuous. Instructions similar to "Blow long and hard until I tell you to stop" are appropriate. A proper sample is indicated by a continuous audible tone.
8. If a proper sample is provided, the green light goes out and the tone ceases. This may take 4 to 12 seconds, depending on the sample.
9. In 10 - 25 seconds the measured value is displayed. Note and record the result.
10. Turn off the device by pressing the side button **twice**.

D. Improper Sample

If the sample was interrupted, too short or too weak, an **"E0"** indication is briefly displayed. The **"Ready"** light goes out and the tone ceases, followed by two short audible signals. When the **"Ready"** light reappears, instruct the person to blow again. No results will be displayed until a proper breath sample is received.

E. Alcotest 7410 GLC Results

The GLC model gives digital results from 0 to 49 mg%. An "A" is displayed when the BAC is from 50 to 99 mg% , and an "F" when the BAC is 100 mg% or higher.

Digital results	=	0 to 49 mg%
"A"	=	50 to 99 mg%
"F"	=	100 mg% and greater

The action a peace officer takes after each of these test results is discussed in the chapter on "Law and Field Use of the Alcotest."

Theoretical Considerations

The Alcotest 7410 GLC measures the alcohol concentration in the breath using an electro-chemical sensor called a fuel cell. This fuel cell is heated as part of the "READY" process. When the "Ready" light appears the subject blows into the device. After a specified volume of breath (greater than 1.2 litres at a flow of more than 6 litres per minute) has been provided, a pump supplies a small volume of this deep lung breath to the fuel cell for analysis.

If the sample contains alcohol, a chemical reaction occurs where the alcohol is converted to acetaldehyde. This reaction involves a release of electrons, resulting in an electric current in the fuel cell. A microprocessor evaluates this current to determine the BAC. The BAC is displayed in the LCD window. Normally the result is provided in 10 to 25 seconds.

As indicated, there are two reaction processes. The first reaction is fast and allows the BAC to be measured quickly. The second reaction is slow and must go to completion before another test can be conducted. The time interval before the next test can be performed depends on the magnitude of the previous reading. If it was high, the build-up of acetaldehyde and electrons is greater and it will take longer for the second reaction to complete.

A schematic of these reactions is shown in the figure below.

The time necessary before the GLC is "Ready" for the next test is proportional to the size of the previous reading. Normally, such a recovery time can be expected to range from as little as 20 seconds to as much as three minutes depending upon the last reading.

$$\underset{\text{breath}}{\textit{Alcohol}} + \textit{Fuel Cell} \xrightarrow[\text{fast}]{\text{Reaction 1}} \textit{Acetaldehyde} + \textit{Electrons} \xrightarrow[\text{slow}]{\text{Reaction 2}} CO_2 + H_2O$$

Precautions When Using The GLC

1. Mouth Alcohol

All deep lung breath samples originate in the lower part of the lungs and pass through the mouth before entering the Alcotest. Any alcohol present in the mouth during this time will contaminate the breath sample. The *raw* alcohol, because of its high concentration, saturates the breath sample and produces a high result. For example, an "F" might be obtained when the true result should be an "A" or "P." Mouth alcohol occurs after recent consumption of alcoholic beverages or if a belch or burp brings up alcohol from the stomach. This residual alcohol disappears rapidly, usually in fifteen minutes or less.

Try to establish the time of the last drink and ensure fifteen minutes has passed from that time before conducting the test. This will minimize the possibility of a falsely high ASD test.

NOTE: High alcohol concentrations obtained from mouth alcohol could shorten the life of the electro-chemical sensor.

2. Smoking

Tobacco smoke in the expired air can cause damage to the electro-chemical sensor. If the subject taking the test is smoking, it is important that you have the person stop. Then wait for at least three minutes before taking a breath sample.

3. Radio Frequency Interference

The GLC should not be used within 30 cm of the antenna of any police radio equipment in use. It is permissible to use it in the police vehicle.

4. Vent

The vent at the rear of the instrument (below the mouthpiece grommet) must not be blocked or it will disrupt normal sampling.

5. Temperature

Cold temperatures ($\leq$ 5°C) could affect the operation of the instrument. Use of the GLC should be restricted to the inside of the police vehicle.

6. Handling

Do not allow the subject to hold the instrument. It is recommended that the police officer use the wrist strap. Store the instrument carefully to prevent damage.

Discrepancies Between the ASD and Evidentiary Results

There may be occasions when the GLC result does not correspond with the results from the subsequent evidentiary test. For example, an "F" result (indicating a BAC greater than 100 mg%) was obtained on the ASD but the subsequent result on an approved instrument was less than 100 mg%. These discrepancies are due to one (or a combination) of three reasons:

1. Time delay

There is a delay between the time of the GLC test at the roadside and the time of the breath test at the detachment. The BAC of the subject does not remain constant during this time. It will normally decline due to the elimination process (approximately 15 mg%/hr). So the BAC at the time of the GLC test is normally higher than at the time of the evidentiary test, particularly if the time delay is large.

2. Mouth alcohol

Mouth alcohol was discussed earlier. If the observation period was not properly observed, there may be residual alcohol in the mouth at the time of the GLC test. This will cause the ASD test to be higher than the evidentiary test.

3. Tolerance of the instruments

All scientific instruments have a distinct precision. It is often called the **tolerance** and is expressed with a plus and minus value (e.g. ± 10 mg%). No instrument will give exactly the same result when analyzing the same sample time after time (if that was possible). The instrument will give one result most of the time, but also results which can be either slightly lower or higher than the most common result.

The tolerance of an approved instrument and the Alcotest 7410 GLC is ± 10 mg% of the observed result. Any comparison of results from these two instruments must consider their tolerances. An apparent discrepancy can occur when the tolerance of either one or both of the units is at the extreme. It is important to realize that a discrepancy in this case does not mean an error exists in either the ASD or the evidentiary instrument.

Error Messages And Maintenance

Although the Alcotest 7410 GLC is a reliable instrument, there can be occasional problems. Some of them will require maintenance or repair. If so, the calibrator will be responsible for co-ordinating service of the device. The following table lists error codes which may be encountered by the Operator.

Problem	Cause	Remedy
Instrument switches off automatically	• Power supply unit discharged • Instrument has been left ready for more than 4 minutes	Charge power supply unit or replace batteries (refer to Calibrator)
"On" light is not lit after switching on, or is only faintly lit; the display shows incomplete symbols	Power supply unit is completely flat, or 12-Volt connection defective (if applicable)	Recharge power supply unit or replace batteries. Replace 12 V. connection if indicated. **
Ready light not lit after switching on and 4 minute interval	Instrument malfunction	Refer to calibrator for possible return to Dräger Service.
No continuous tone when blowing into the instrument	Instrument not ready for measurement	Wait until green Ready-light is lit.
E0	Subject not blowing hard or evenly enough	Remind subject how to blow
E1	Sensor fault	Switch device off and on. If E1 re-appears, sensor must be replaced by Dräger Service. Advise calibrator.
E5	Fault in sampling system	Repeat measurement. If E5 re-appears, advise calibrator. Call Dräger Service.
E6	Instrument malfunction	Advise calibrator. Call Dräger Service.

** The power supply for the GLC can be rechargeable NiCd batteries or disposable C-size batteries. The manufacturer's specifications indicate the NiCd pack can provide up to 300 tests between charges, while the disposable alkaline batteries can produce 600 tests before replacement. An optional 12 V adaptor is also available for in-vehicle use. Replacement NiCd battery packs are available from the manufacturer, and alkaline batteries can be replaced locally.

Law and Field Use of the Alcotest 7410 GLC

The use of approved screening devices in Canada is governed by the Criminal Code. The user should be familiar with those sections of the Code that deal with approved screening devices and drinking-driving in general. There is also operational policy in place to ensure a uniform approach to drinking-driving enforcement throughout the province. This section discusses the law and policy related to the use of ASDs. Although this manual deals with the Alcotest 7410 GLC, the law and policy are the same for all ASDs.

A. Criminal Code Sections

The sections dealing with the use of ASDs are listed below. These sections should be well known to peace officers who have been involved in previous drinking-driving investigations. They are reviewed here for completeness and continuity.

Section 253(1)(a) C.C. - the offence of impaired driving.

Section 253(1)(b) C.C. - the offence of exceeding 80 milligrams of alcohol in 100 millilitres of blood.

Section 254(1) C.C. - definitions section for the drinking-driving offences.

> **"approved screening device" means a device of a kind that is designed to ascertain the presence of alcohol in the blood of a person and that is approved for the purposes of this section by order of the Attorney General of Canada;**

The key here is that before any screening device can be used, it must be **approved** for use and appear on the **Approved Screening Devices Order.** The Alcotest 7410 GLC is included on this order and is therefore approved for use. For court purposes, the user must know exactly which device and model was used.

Section 254(2)(b) C.C. - the demand section for an ASD.

This section gives the peace officer the authority to **demand** a breath sample for analysis by an ASD on reasonable suspicion that the person has alcohol in the body.

Section 254(3)(a)(i) C.C. - the demand section for a breath sample into an approved instrument.

Before this demand is made, there must be reasonable grounds to believe a person has committed an offence under Sec. 253 C.C. within the previous three hours. It is here that the peace officer uses the results from the ASD test taken under Section 254(2)(b) C.C.. The "F" (FAIL) indication on the ASD means the BAC exceeds 80 mg% and thus provides the reasonable grounds to believe that the person has committed an

offence under Section 253(1)(b) C.C.. When there is no ASD test, a peace officer must have obtained reasonable grounds to believe an offence under Section 253(1)(a) C.C. was committed. These grounds are obtained through observation of driving and physical behaviour.

Section 254(5) C.C.- the offence of refusing a demand.

This applies to the fail or refusal to comply with a demand for an ASD test, approved instrument test or blood sample.

B. Traffic Safety Act

An ASD test result is also useful for the enforcement of the *Saskatchewan Traffic Safety Act (T.S.A.).* Sec 146(1) & 146(3) T.S.A. says that a person with a **BAC of 40 mg% or greater** is liable to a license suspension of 24 hours. The "A" (ALERT) and "F" (FAIL) indications on the GLC are the evidence for this suspension.

Under subsection 78.2 of the *Saskatchewan Vehicle Administration Act (V.A.A.)* the licence of a **"new driver"** is subject to suspension for thirty days if the BAC exceeds 40 mg%.

C. Policy Considerations

Besides the Criminal Code, the ASD user must be aware of Division or departmental policy related to ASD use. The Operational Manual and "F" Division policy should be consulted regularly for up-to-date policy. Some of the highlights in policy are presented here. Municipal police officers should consult their own department policy manuals. For reference, policy sections dealing with ASD use are:

Operational Manual 5.2 and APPENDICES 5-2-1& 5-2-2

"F" Div. Supplements 5.2

Conditions of use -

1. "Reasonably Suspect" there is alcohol in the body pursuant to Sec. 254(2)(b) C.C.
2. Not to be used if reasonable and probable grounds for an AI demand can be obtained from observations and circumstances alone.
3. Avoid use when it will interfere with treatment of a hospitalized suspect.
4. Suspect smells of liquor.
5. Observe suspect drinking or observed by another witness.
6. For demonstrations or instructional purposes.

Voluntary Use - any use of the ASD other than Section 254(2)(b) C.C. must be with the consent of the subject. This includes testing passengers to determine if they are able to operate the motor vehicle once the driver has been suspended under Sections 146(1) or 146(3) T.S.A..

Rights to Counsel - If suspect is not under arrest or detention, Sec. 254(2) C.C. does not establish a right to legal counsel. If the subject requests counsel prior to providing an ASD, explain to him/her that it is just a screening device, a "fail" will not automatically result in a charge and he/she will be able to seek the advice of counsel prior to providing an Evidentiary Breath test.

Time before ASD test -
If you have reason to believe the suspect has consumed alcohol within 15 minutes of being stopped, inform the suspect a 15 minute delay will be required before administering the test.

Course of Action After ASD Result -
although circumstances could dictate variations, the following actions are normally taken:

1. 0 to 49 mg% on the GLC —
Investigate possibility that drugs or illness are responsible for condition. OR Release suspect, unless grounds exists for suspension under graduated licensing.

2. "A" (ALERT) — suspend licence under Sec 146(1) & 146(3)T.S.A. or Sec. 78.2 V.A.A. if applicable. Release driver.

3. "F" (FAIL) — demand an evidentiary breath test in accordance with Section 254(3)(a)(i) C.C. and suspend licence according to provincial legislation.

If the subsequent approved instrument result is 100 mg% or greater, charge under Section 253(1)(b) C.C. and suspend the licence for 24 hours. A secondary charge of Sec. 253(1)(a) C.C. can be laid if grounds exist, e.g. driving & physical evidence.

If the subsequent evidentiary test result is between 50 and 90 mg%, suspend licence and release the driver. A charge of Sec. 253(1)(a) C.C. can be laid if grounds exist, e.g. driving & physical evidence, evidence of poly-drug use.

Glossary and Abbreviations

ASD	*approved screening device pursuant to the Criminal Code (e.g. Alcotest 7410 GLC)*
BAC	*blood alcohol concentration*
C.C.	*Criminal Code*
evidentiary instrument	*an approved instrument pursuant to the Criminal Code (e.g.Intoxilyzer 5000C or Intox EC/IR II)*
GLC	*Alcotest 7410 GLC*
T.S.A.	*Traffic Safety Act*
V.A.A.	*Vehicle Administration Act*
mg%	*milligrams of alcohol in 100 millilitres of blood*