K910G BUSTER® CONTRABAND DETECTOR

TABLE OF CONTENTS

SECTION ONE - OPERATING INSTRUCTIONS

SECTION TWO - "RAD-AWARE"

SECTION THREE - RADIATION SAFETY

SECTION FOUR - EXTENSION POLE AND REMOTE DISPLAY

WARRANTY

The K910G Buster and its accessory items manufactured by *CSECO* are warranted for parts and labor against factory defects for a period of two years after date of shipment. This warranty does not cover normal wear and tear nor misuse. The warranty is limited only to replacement of parts and labor at the factory. No other warranties, express or implied, are given. *CSECO* is not responsible for the manner in which the device is used or misused.

The device must be returned to the factory freight prepaid to obtain warranty repairs and will be returned to the user freight prepaid by the factory..

Devices sold by *CSECO* but manufactured by others carry the other manufacturers' standard warranties and these manufacturers' warranties are passed on to the end user by *CSECO* without added warranty, express or implied, by *CSECO*.

SECTION ONE - K910G BUSTER OPERATOR'S INSTRUCTIONS

1. GENERAL DESCRIPTION

The K910G Portable Contraband Detector permits trained inspectors to locate hidden contraband inside a suspicious object when the eye can only see the surface of the object.

The K910G also permits the inspector to rapidly clear a suspicious object when no contraband is present, thus avoiding the loss of time in dismantling an object to look inside when there is no contraband present.

2. BASIC EQUIPMENT LIST

K910G BUSTER CONTRABAND DETECTOR with Backlighted Display
Calibration Standard
Headset with cable
Instruction Manual, Test Certificate
Permanent Shipping/Storage Case
Spare Alkaline 9V Battery, Phillips Screwdriver, Mylar Overlay, Velcro Pad

2.1 Optional Equipment

Model K9-150G EXTENSION ARM with Remote Display See Para 6.32

3. INFORMATION FOR GETTING STARTED

- The K910G is always ready to use and requires no mechanical adjustments. A periodic calibration check, performed by the user, is desirable.
- The K910G automatically shuts off when the trigger is released and may be put away immediately when use is completed.
- The external audible "BEEP" is shut off when the headset is plugged in.
- The use of Alkaline Dry Cell Batteries is recommended (see section 8.2).

4. GETTING STARTED - HOW TO USE THE K910G

FIRST: **Read ALL of Paragraph 5.**

Paragraph 5. explains the principles and features of the K910G.

Do not attempt to operate the K910G until you have read through Paragraph 5. Then go to Paragraph 6. which provides a logical sequence of operations for ease of learning.

THEN: **Perform the Experiments in Paragraph 6.**

Paragraph 6. takes the user step by step through the operation of the K910G, and its controls, simulating actual field conditions.

Prepare a Sample

Before running the experiments in Para 6. it is suggested that the user obtain approximately 1/2 to 1.0 kilo (l - 2 lb) of sugar in a strong plastic bag. Form the bag into a compact block and tape the bag firmly to prevent loss. The sugar has approximately the same performance response with the K910G as will most explosives, narcotics, and other organic contraband materials.

A bound 50mm (2") stack of cut paper will simulate money.

An unloaded weapon can be used for a weapon sample.

5. HOW DOES THE K910G WORK? PRINCIPLES OF OPERATION

When the K910G is placed on a suspect surface and the trigger is pressed "ON", a narrow beam of gamma energy is emitted into the suspect object.

If the space beneath the surface of the object is empty and no "mass" or dense material is present, the beam of energy will pass through and disperse. The reflected energy scattered back to the detector will be low and the Liquid Crystal Display (LCD) will read low numbers.

If the space beneath the surface of the object is filled with material, the reflected energy will be high and the LCD will read high numbers.

If the K910G is slowly moved across the surface, changes in density of the material beneath the surface will be displayed by changes in the LCD numbers, (Note that the energy source emits energy in a random fashion and a small amount of variation in the display reading is normal.)

5.1 Three Modes of Operation Are Available:

RAW DATA MODE

Pressing the **Trigger** automatically places the K910G in ***RAW DATA MODE.***

In this mode, the K910G constantly displays a reading proportional to the density of the material below the surface. The "Beeper" does not sound.

SCAN MODE

A single press of the **MODE** Button places the K910G into ***SCAN MODE***.

The density value (LCD number) present at the time of pressing the MODE button is stored as a data base and the Beeper will now alarm if the density of the object significantly changes above or below the stored data base as the K910G is moved across the surface. (Normal random energy variations are ignored.)

ZERO SCAN MODE

A second press of the **MODE** button places the K910G into ***ZERO SCAN MODE***.

The microprocessor substitutes "0" (Zero) on the LCD for the stored density value.

Changes in density in the object as the K910G is moved over the surface, will now be displayed as plus/minus values above and below "Zero" to directly indicate the changes of density.

EXAMPLE:

The following table presents typical LCD readings of a K910G on a normal 1" (25mm) thick wooden desk top, with a hidden object fastened to the underside of the desk top, and with the desk top hollowed out to conceal a hidden material, in each of the three Modes:

	RAW DATA	SCAN MODE	ZERO SCAN
Typical reading on normal desk top	**40**	**40**	**0**
Object hidden under desk top	**60**	**60**	**+ 20**
Hollow space within desk top	**20**	**20**	**- 20**
Beeper On/Off	**Off**	**On**	**On**

5.2 Sensitive Measurement Area

The sensitive measurement area of the K910G is the center one half of the base of the device.

Do not point the base of the K910G towards persons within a distance of 1 Meter (3') when the trigger is pressed.

Radiated gamma energy is emitted directly from the base of the K910G when the trigger is pulled. The radiation cannot be seen or felt but it is there! The radiation is turned off (shielded) when the trigger is released, automatically closing the internal shutter.

5.3 Audible Tone (Beep)

When the K910G is placed in *SCAN MODE* or *ZERO SCAN MODE*, the audible tone, or beeper, is activated. A fast beep will be heard when the density of the object changes more than the normal statistical variation of the energy source. The trip point of the beeper is automatically adjusted by the microprocessor to work equally well on objects of high and low density.

The beeper does not sound when the headset is plugged in.

5.4 Display

The *LCD DISPLAY* provides a numerical read-out of the reflected energy. Various objects will exhibit a characteristic reflected value. With experience, the trained inspector will develop familiarity with the anticipated numerical values from common objects. Unexpected changes in the numerical values of these familiar objects will alert the inspector that something unusual may be present.

LOW NUMBERS	=	Car tires	**20 - 35**	Hollow doors	**15 - 20**
5 to 35		Car doors	**15 - 20**	Trailer walls	**15 - 20**
		Aircraft wings	**5 - 10**	Furniture padding	**10 - 15**
		Hollow spaces behind thin panels			**10 - 20**
		Hollow Spaces behind plaster wallboard			**20 - 35**
HIGH NUMBERS	=	Hidden contraband within above spaces			**30 - 50**
More than 35		Solid table top	**35 - 60**	Solid doors	**35 - 40**
		Large truck tires	**45 - 60**	Thick objects	**30 - 60**

NOTE = Very dense objects (lead shielding or thick steel) will absorb the reflected energy and produce unexpected low values. Such unusual low values indicate that something is suspicious.

5.4.1 Display Backlight

A pushbutton on the side opposite the Trigger lights the *BACKLIGHT* under the Display to provide light for use in a dark space. Frequent use of the Backlight consumes power and shortens the period between battery charges.

5.5 Sample Rate

The object is sampled every 1/4 second. The display is updated every 1/2 second to avoid eye fatigue.

In the SCAN modes, the beeper will sound if any 1/4 second numerical value deviates more than the allowed statistical difference from the stored data base value.

If the K910G is moved across a surface so fast that a change of density cannot be measured

within 1/4 second, the change may be missed. A recommended scan rate is 150 to 300mm (6 to 12 inches) per second.

5.6 Headset

A headset is supplied to permit listening to the beep when the surrounding area is noisy or when the operator may not want others to hear any changes of sound.

The internal beeper is shut off when the headset is plugged in.

6. HOW TO USE THE K910G - EXPERIMENTAL OPERATION

The following instructions provide an opportunity to use the K910G under experimental conditions which approximate field conditions.

Unpack the K910G and charge the batteries if required. Buster is supplied with an alkaline battery which will operate the Buster a year or more under typical use conditions.

(If charging is required, or if the alkaline or lithium dry cells need replacing, the display will indicate "LO BAT".)

Obtain 1/2 - 1 Kg (1 - 2 lb) of sugar in a strong plastic bag, a paperback pocket book, a large metal object (weapon, gun), or experimental samples of actual contraband typical of the user's interest.

6.1 Operating Controls - (Trigger and Two Buttons)

6.1.1 Trigger

When the trigger is pressed, the microprocessor is turned on and the internal shutter is opened, permitting energy to be radiated through the base of the K910G in a narrow cone shaped beam similar to a flashlight beam. (The radiation is invisible.)

Releasing the trigger shuts off the microprocessor and closes the shutter, shielding the radiation source. Any collected information or mode settings are lost when the trigger is released.

The K910G requires approximately 1 second to initialize and start the display when the trigger is pressed. Wait until the startup routine is completed before moving the device or attempting to press the MODE or LOCK button.

EXPERIMENT:

Hold the K910G in the right hand, aim the base towards a corner of the room (into air and away from people), press and hold the trigger.

The LCD will display a very low number, typically 3 to 7, indicating the lack of any material near the sensitive base of the device. This “air” reading is from the normal background radiation always present in our environment. It will increase when the

Buster is used in higher elevation cities, i.e. Denver, Salt lake City, Quito (Ecuador).

Place the device on a table and press the trigger. Note the higher reading because of the mass of the table which reflects energy back into the base of the device.

Place the device on several different surfaces and materials and note the different readings.

6.1.2 Mode Button

Pressing the **MODE** Button, **while the Trigger is pressed**, permits selection of three modes or methods of operation. The first mode is obtained by merely pressing the trigger. The second and third modes require pressing of the Mode Button.

Three modes of display are provided:

RAW DATA = The actual density value of the object is displayed. The
(Press Trigger only) display updates each half second. The beeper does not sound.

The Buster is actually sampling 4 times each second. The Display changes only each half second, unless the Buster observes a significant density change.

As the K910G is moved across a surface, changes in density are indicated by changes in the LCD display values.

EXPERIMENT:

Hold the K910G against the surface of a glass window or door, no sugar present, and, **while holding the trigger pressed,** scan the device across the surface of the glass. Note that the LCD Display value is low, and changes only slightly.

Hold the sugar against the back of the glass and scan the K910G across the empty glass and the sugar. Note the increase in the LCD Display valuess when the device is over the sugar.

Repeat this experiment using other sample items, i.e. a book, metal objects, etc. Note the different valuess with objects of different size and mass.

DATA SCAN = The beeper is added to the RAW DATA MODE. When the MODE
(Press MODE once) button is pressed, the microprocessor stores the numerical value on the display at that moment and uses it as the comparative base for triggering the beeper.

EXPERIMENT:

Repeat the above experiment, but this time, **while holding the trigger pressed**, push the MODE button once with the forefinger. Hold the K910G steady on the surface for 2 seconds to allow the instrument to accumulate a good sample of the location for storage in the microprocessor data base. (The K910G will beep during this two second period. Wait until it stops before moving it.)

The K910G will use the empty glass for the stored data base value. Scan the device across the glass. The Display value changes only slightly and the beeper does not sound an alarm.

(An occasional beep is normal, proving that the signal network is working properly.)

Hold the sugar sample against the back of the glass and scan the K910G back and forth across the glass and the sugar sample.

Observe that the numerical values change in the same manner as before, but this time a fast beep will be heard as the K910G is scanned across the sugar.

Experiment by scanning the K910G faster and faster until the sugar cannot be caught by the beep network.

Experiment with samples of other materials or other objects.

EXPERIMENT:

Repeat the above experiment, but this time place the K910G above the sugar, and THEN press the MODE button. This will insert the higher sugar value as the stored data base.

Now, as the K910G is scanned **away** from the dense sugar to the less dense bare glass, the beeper will sound indicating a change of density in the **minus** direction.

Thus, it is demonstrated that the K910G is sensitive to change in **either direction** from the stored base value.

ZERO SCAN = (Press MODE twice) In this MODE, the display is changed to a "Zero Base" numerical value. The stored data base or beeper trip point value is now displayed as "0" and the LCD displays the changes in density as plus and minus values above and below this "Zero" base.

EXPERIMENT:

Repeat the previous experiments, but this time press the MODE button twice in succession without releasing the trigger.

Observe the changes in the display readings.

6.1.3 Display Lock Button

Pressing the Display *LOCK* button "locks" the display value and temporarily stops the sampling. This permits the K910G to be lifted away from the surface for observation without disturbing the stored values. The device can then be returned to the object and sampling resumed by merely pressing the Display LOCK again.

This mode can be toggled back and forth at any time.

This mode is useful when the K910G is used in awkward spaces, behind tires, under table tops, or behind objects.

The Trigger must remain pressed during this period.

(The Lock button is not required when the Remote Display is attached.)

EXPERIMENT:

Place the K910G on any surface and push the trigger.

Note the reading.

Press the DISPLAY LOCK once while **holding the trigger pressed.**
Remove the K910G from the surface and note that the reading is maintained. Press the DISPLAY LOCK button again to release the lock.

6.2 Depth of Reading

The K910G "sees" approximately 150mm (6") into an object. It is most responsive to the first 100mm (4") of the object. As an example, the K910G can easily "see" into vehicle doors, tires, truck trailer walls, furniture, aircraft structures, and similar spaces.

The K910G will respond to the presence of contraband or other material the size of a small book or a large cigarette package within the depth of measurement. The response will be greatest if the hidden mass is of high density. The response will be small if the object is small or has little mass. The response will be greatest if the mass is close and will decrease if the mass is far [150 mm (6")] away.

For example, the reading from a sugar sample behind the glass is higher than the reading from a pocket book. The reading from a package of cigarettes will be even less than that of the book.

The K910G cannot see into the center of a room or other large space, or look into the center of a large gasoline drum and detect the presence of suspect material. The material will be too far away.

The K910G can "see" into luggage, but the measurement will be of questionable value because of the jumble of items of varying density in the luggage.....shoes, toiletries, clothing, books, and other personal goods.

EXPERIMENT:

1. Stand in the center of a room facing a solid wall. Point the K910G at the wall and press the trigger. Then push the MODE button once to add the beeper.

   Slowly walk towards the wall until the beeper just begins to trip. This distance will be approximately 600mm (2'). Note the low number on the LCD.

   This represents the maximum sensitivity with no intervening material against the base surface to absorb the reflected energy from the very large mass of the solid wall.

   Slowly move closer, noting the steadily increasing number on the LCD as the reflected energy from the wall increases.

   Repeat this same experiment by holding the K910G Buster above the ground. Slowly lower the Buster towards the ground and note when the Display begins to “see” the ground. The large mass of the ground (or concrete floor) will begin to produce a significant Display change as far as 18" (50 cm) from the surface.

2. Repeat the above experiment, except this time, hold the 1 Kg sugar sample more than 1 meter (3') from the device and slowly move the sugar towards the base of the K910G Buster. Note the difference in the distance required to detect the smaller sugar sample as opposed to the larger mass of the wall, or the even larger mass of the earth.

3. Place the K910G on the glass door or window again as in Para 6.12. Press the MODE button once to activate the beeper.

   Slowly approach the other side of the glass with the contraband samples. Observe the distance at which the K910G is able to sense the presence of the samples when a thin layer of material (the glass) is present under the device. The distance will be somewhat less than that observed in test # 2 above.

4. Place the K910G against a thin aluminum baking sheet and repeat the various experiments. This circumstance duplicates an aircraft wing, tail, or other surface. The thin metal readily allows the radiated energy to pass through it.

5. Place the K910G against a solid 25mm (1") door or table top and repeat the above experiments. Observe the difference in numerical values as compared to the glass and the very thin metal surface.

This experiment leads to the next section:

6.3 Thickness and Density of a Surface

The **thicker** the surface is, the less sensitive the device is to something hidden behind the surface.

The **more dense** the surface is, the less sensitive the device is to something hidden behind the surface.

This is because the surface absorbs a small portion of the emitted energy as it leaves the K910G and it absorbs even more of the weakened, reflected energy coming back into the K910G from the object. If the surface is both thick and dense, then a considerable amount of

the total energy is absorbed and only a small portion is left available for detection of the suspect contraband material.

The K910G can look through up to 6.0mm (1/4") of steel and respond to changes of density immediately beneath the steel. The sensitivity is better when looking through 6mm (1/4") of lighter density aluminum than when looking through 6.0mm (1/4") of heavier steel.

Maximum practical thicknesses of material to attempt to search through are:

Steel	6.0mm (1/4")
Aluminum	12.5mm (1/2")
Wood	40mm (1.5")
Lead	Almost any thickness will blank out the signal (an immediate tipoff that something is not legitimate!)

EXPERIMENT

The previous experiment illustrated how the K910G can see through thin materials including up to 25mm (1") of wood. The following experiments are a continuation of the previous sequence.

1. Place the K910G against a 50mm (2") thick wood surface and repeat the above experiments, moving the samples towards the device until a satisfactory detection is obtained.

   Increase the thickness of the wood until the device fails to satisfactorily detect the changes.
2. Substitute a 50mm (2") thick brick for the wood and repeat the experiments.

   The brick should absorb more energy than the wood and the sensitivity should be decreased.

NOTE

If a smuggler attempted to line a car door with lead to shield the contraband from K910G, the device would produce an unusually low reading on the very dense door, and the usual response to internal parts, window mechanisms, etc, would be missing. This would alert the trained inspector that something was wrong.

NOTE

A new or unfamiliar measurement circumstance can be simulated by use of similar materials and simulated contraband samples. The experienced user will build a "library" of test experiments for future training.

6.3.1 Backlight Control

An electroluminescent Backlight Panel is placed behind the Display. A pushbutton is located on the side opposite the Trigger.

The Display will be brightly "backlighted" for use in dark spaces when the pushbutton is pressed AND the Trigger is pressed.

The Backlight consumes power and continual use will drain the battery requiring more frequent replacement or more frequent recharging.

6.3.2 Optional Model K9-150G Extension Aarm with Remote Display

The Model K9-150G Extension Arm permits extending the K910G up to 3 meters (9 feet) from the body for measurement of ceilings, top of vehicle roofs, aircraft surfaces or other remote surfaces. A duplicate K910 display with controls is provided at the base of the arm for the operator's convenience. A cable connects the K910G and the remote display. Contact the factory or authorized dealer for literature and pricing.

6.4 Calibration

For ease of field use, it is desirable that all K910G Buster units read the same on similar objects. However, it is impossible to manufacture the units identically because the energy sources and the detectors have normal production tolerance variances in performance characteristics. Moreover the energy source gradually decays at the rate of 50% in approximately eleven years.

To compensate for these differences, the K910G incorporates a unique ***UNIVERSAL CALIBRATION*** feature.

The K910G is shipped with a **CALIBRATION STANDARD**. This block of non-changing polyethylene will exhibit the same density characteristics in any location and the blocks are interchangeable between devices.

The K910G microprocessor is programmed to store a special reading taken on the Calibration Standard as a *Reference Standard Reading*. The microprocessor then compares each field reading to this stored known reference standard reading and displays the result as a "Ratio". Thus each K910G automatically compensates for its individual characteristics by comparing all readings to a universal standard.

$$\frac{\textbf{Field}\ \text{Reading}}{\text{Stored}\ \textbf{Reference Standard}\ \text{Reading}} = \textbf{Ratio}\quad \textit{(x100 = Display on LCD)}$$

The stored reference standard reading is non-volatile (doesn't become lost when the device is turned off), but can be deliberately changed by the microprocessor, if commanded to do so by the user, during the **RECALIBRATION PROCEDURE**, Para 6.41.

- An initial **CALIBRATION** was made at the factory during production testing, and a reference standard reading is already stored in the microprocessor memory upon shipment. However, the user should recalibrate the K910G periodically to compensate for decay of the gamma energy source, and to compensate for changes in electronic components over time.

- It is suggested that this **RECALIBRATION** be performed monthly or quarterly, or anytime

the instrument has been out of service for a period of several months.

- A **CALIBRATION RECORD LOG** is provided at the back of this K910G Manual to record these periodic recalibrations for use in long term performance evaluation of the K910G.

- A brief Instruction Label is provided on the side of the Calibration Block as a reminder of the procedure to be used. This procedure is discussed in detail in Para 6.41.

6.4.1 Recalibration Procedure

Leave the Calibration Block in the case, or place it on a table or desk *(but not on the ground.)* Place the K910G on the block, resting firmly against the surface of the block.

1. Using the right hand in normal operating position, press the trigger (START).

2. **While holding the trigger pressed**, press *and hold* the MODE button. Then, momentarily **also** press the LOCK button. (Release Lock and Mode, but continue to hold the Trigger.)

   The device now will accumulate a series of forty 1/4 second readings, "beeping" each second during the 10 second sample period, and will beep 2 times when the 10 seconds is over. **Do not release the trigger!**

   The microprocessor will average the 40 samples, and the LCD will display the average for visual comparison to past recalibration values.

   The value typically will be between 55 and 70. It is *not* significant what the value is from one unit to another. It *is* significant that the value remain stable for an *individual* unit over time, with a gradual decay over the years. The value will vary by a digit or two from time to time, due to the normal statistical variations of the reflected energy, but a sustained change of more than a few digits is indicative of a possible component deterioration in the device.

   If the value is within a digit or two of previous recalibrations, then the value is suitable for storage into the microprocessor.

   NOTE: *This value is the actual count reading and is not a ratio. This is the only time the K910G will display an actual count value.*

3. **How to store the new *Reference Standard Reading:***

   While continuing to press the trigger, push the MODE button one more time. Three quick Beeps will indicate that the Calibration Value has been stored.

   This special command sequence will store the new reading and erase the prior stored value. **Release the trigger**. The Recalibration is complete. (If the new reading is not stored, the microprocessor will continue to use the previously stored value.)

4. Press the trigger (START) to test the calibration and resume normal operations.

   The K910G microprocessor will now use this new value for comparison against all

future field readings, compensating the device for any long term changes within the device.

Record the Recalibration Value in the **Calibration Record Log,** in the back of this Operator's manual, for a service record of the K910G's long term performance.

6.4.2 Calibration Verification

Place the K910G back into the Calibration Block and take a normal Raw Data Test by merely pressing the trigger. The LCD will display the value "100" with normal fluctuations between approximately 90 and 110 each 1/2 second. If the displayed value does not fluctuate equally above or below the value of "100", repeat the Recalibration Procedure.

The K910G will read approximately "100" on the LCD anytime it is placed on the Calibration Standard and a routine Raw Data Scan measurement is made. *This permits a fast and simple test of the K910G performance at any time.*

The LCD reads "100" because the microprocessor compares all routine measurements to the stored calibration Reference Standard value and displays the Ratio of the two values. Because the readings on the Calibration Standard should be the same at all times, whether the readings are taken during a Recalibration or as routine, the ***ratio*** of the two readings will always be "1". (The microprocessor adds two "0"s to the ratio to avoid displaying fractions, thus the display will show 100.)

For Example:

Assume that a certain K910G reads approximately 95 ***actual count*** on the Calibration Standard: *(The value that is stored when the MODE Button is pressed.)*

95 (Routine Test Reading taken on Standard)
95 (Stored Calibration Average taken on same Standard) = 1.0 (Ratio)

Ratio x 100 = 100 (LCD Reading)

The reason that the ratio may fluctuate above and below 100 is because the reflected energy varies in a statistically random manner, and the readings are seldom precisely the same.

(As a matter of technical interest, for the mathematically enhanced user, the anticipated standard deviation statistical variation due to the random emission of the gamma energy source, will be plus and minus the square root of the *actual count* being observed by the device.

In the above example, the square root of 95 is 9.7. 9.7 is approximately 10% of 95.

Accordingly, when converted to the 100 base ratio on the LCD Display, this translates into a one standard deviation variation of approximately plus or minus 10, or 90 to 110 on the display with 100 as the average. Occasional values will be higher or lower as variations are experienced at the second and third deviation levels.)

7. TYPICAL EXAMPLES OF FIELD APPLICATIONS

7.1 General Procedure

1. Place the K910G on the suspect surface and press the trigger. Observe the change of readings as the device is moved across the surface.

2. With the K910G on a typical location on the surface, press the MODE button once and then look and listen for changes beneath the surface as the K910G is scanned back and forth.

3. If a change is noticed, slow down the movement rate and observe the changes in numerical values more carefully.

   Outline the suspect area carefully and then make a decision as to possible further action, including dismantling of the object.

7.2 Kilo of Contraband in a Car Door

The car door is normally an empty space and produces low readings because most of the radiation passes through the door.

Contraband will reflect more energy than the hollow door and will produce a beep as the K910G is passed over the hidden material.

EXPERIMENT:

1. Roll up the window, place the K910G in the center of the door, press the trigger, and observe the display to determine if the reading on the center of the door is typical of a car door. Compare the reading on this door to that of readings on other car doors of similar size or model cars.

2. Press the MODE button, wait 2 seconds, and move the K910G across the door.

   Listen for beeps and observe changes in the LCD numbers. If the numbers become unreasonable for a routine car door, it may be necessary to inspect the door more carefully, using a fiberscope, or even dismantling.

   Slight changes will be observed when over the window lift mechanism or over the electric motor on electric lift windows.

   A *major* change will be observed when over a hidden contraband of any significant quantity.

   If the door readings are normal, it is likely that the door has no contraband, and the inspector can move on to other objects.

   The Buster will save lost time by determining that a car door is now “clean”, even though it may have been loaded some time earlier.

7.3 Marijuana in a Car Tire

A vehicle tire is normally an empty space producing a low number. Marijuana packages will increase the reflected signal strongly.

The inspector should become familiar with typical numerical values of different size tires. Most small car tires look the same and most truck tires look the same, although the truck numbers will be higher than the car tire numbers.

A tightly packed car tire may produce a uniform signal around the tire, but the numbers will all be much higher than for a normal tire.

Compare the suspect tire against other tires on the car or against a similar tire on another vehicle.

EXPERIMENT:

Obtain two old tires from a junk yard. One should be a small car tire and the other should be a truck tire.

Using simulated contraband samples, i.e., the bag of sugar, place the samples inside the tires and observe the changes in readings.

It is much easier to experiment with a tire that is not mounted on a rim than with a mounted tire.

Recheck the values with the tire mounted on a wheel rim. (Cut a hole in the side of the tire to insert the contraband test sample materials.

7.4 Cocaine Hidden in a Desk or Table Top

The table top may be solid or hollow. In either case, the cocaine will likely have a different density than the hollow space or the solid wood.

A solid table will have been hollowed out to provide a space for the cocaine. This hollowed location, even though filled with cocaine, will appear less dense than the solid wood.

EXPERIMENT:

Using wooden boards and the sugar bag to simulate the contraband, experiment with different placements.

7.5 Fuel Tanks

Scan the bottom of the tank using the DATA SCAN mode. Listen for beeps as the device is moved up along the side. The fuel level should be consistent with the indicated fuel level on the fuel gauge.

EXPERIMENT:

Half fill a large pail or barrel with water. Scan up and down the side of the container. Observe the liquid level change.

7.6 Contraband in Truck or Lorry Walls

The walls are normally hollow or empty. If insulated, the insulation is usually of low density to keep weight low. Contraband packed into the walls, however, will be densely packed and will produce much higher readings as compared to the normal wall.

It will be possible to locate the vertical support struts in the wall.

EXPERIMENT:

Remove the inside panel from a truck wall. Place several packages of sugar, or other simulated contraband sample, in the wall space. Place the wall panel back in place and scan the K910G over the walls, both inside and outside, observing the differences in readings as this is done.

7.7 Recreational Vehicles or Caravans

There are many spaces to hide contraband in recreational vehicles. All of the previous techniques apply to the testing of such vehicles. If the display values are low, it is unlikely that contraband of significant volume is present, if any at all.

7.8 Small Boat Hulls and Interior Boat Spaces

Small boats commonly used for contraband transportation will have wood or Fiberglass construction, possible with an inner wall for a double hull flotation construction. The outer walls, if wood, may be too thick for the K910G to look through. The inner bulkheads of a wooden boat and the exterior fiberglass of a fiberglass boat are usually thin.

Inner compartments, fuel tanks, and water tanks are tested in the same manner as with other vehicles.

7.9 Aircraft Search

The K910G is especially useful for searching aircraft because of the thin metal surfaces used for aircraft construction. In addition, only a relatively few spaces are accessible to a smuggler for storage of contraband. Most spaces are riveted tightly closed, and it is obvious to the inspector if rivets have been altered.

Wings have inspection plates where contraband can be stored inside, within arm's length reach of the plates. These areas are easily inspected from the outside of the structure with the K910G.

EXPERIMENT:

Remove an inspection plate from underneath a wingtip. Place the sugar inside within arm's reach. Scan with the K910G and observe the changes in readings.

The aircraft manufacturer has spent millions of dollars in designing a light structure. Any high reading is suspect unless it can be determined that a heavy metal structural member is behind that surface.

The inspector will find the K910G to be especially useful on aircraft by taking a series of fast numerical readings on typical contraband hiding areas. Merely hold the trigger and move the K910G from place to place, seat to seat, and observe changes in numbers. All numbers should be very low for most of the spaces within an aircraft.

NOTE

Aircraft tires are a good place to hide contraband. They are easy to test with the K910G.

NOTE

A licensed aircraft mechanic may be required if safety wired screws, bolts, or nuts are to be removed.

8. MAINTENANCE

8.1 Exterior

Clean the exterior with a soft rag moistened with soapy water. Wipe off with a clean rag. Do not allow water to get into the connectors or beeper hole.

Replace the anti-scratch pad on the bottom as required. Order replacement pads, Part # *PAD-VELCRO-K9*, 5 each to a package.

Replacement Velcro adhesive back "Loop" tape is also available from local fabric stores. The 2" wide tape may not be available, but narrow strips may be placed side by side. The "Hook" form of Velcro may also be used, however the Hook material tends to pick up lint, thread, and string. A comb will clear the tape of this foreign matter.

In emergency, "Duct tape" may be used to prevent scratching of tested surfaces by the K910G Buster.

8.2 Batteries

Use of Dry Cells - Preferred Power Source

The K910G Buster is supplied with a 9V Alkaline Transistor Battery accessible through a removable access plate on the side of the bottom cover. A spare battery is provided in the Storage Case.

The K910G uses commonly available Carbon-Zinc, Alkaline, or Lithium 9V Transistor batteries. The power density of dry cells is greater than that of rechargeable NICAD cells and

the K910G will operate longer between battery replacements with the dry cells than with the rechargeable cells. **It is recommended that Alkaline or NiMh cells rather than Carbon-Zinc cells be used for best performance.**

LiON (Lithium-Ion or Lithium-Polymer) batteries can not be used in the Buster as their operating voltage is too low, between 6.5V and 8.4V

Typical routine usage between replacement of alkaline batteries is from to six to twelve months.

Replacement

Remove the Access Plate on the side of the bottom cover. The battery is retained within a Battery Clip to the inside of the Access Plate. Insert a new battery, as required, and replace the Access Plate.

Polarization Protection

The battery contacts inside the K910G are polarized to insure correct plus/minus orientation. If the K910G does not operate after replacement of the battery, turn the battery over and reinsert it.

LO-BAT Indicator

The K910G will operate for several hours after the **LO-BAT** indicator lights when dry cells are used. Carry a replacement during this time. The K910G will shut down when the battery voltage is finally too low for accurate operation.

Use of Rechargeable NICAD 9V Transistor Cells - Optional

Rechargeable NICAD 9V Transistor batteries and chargers are available in the consumer market. NICAD batteries "self-discharge" approximately 1%/day, and recharging may be required if the batteries are stored for more than 60 days. The power density of NICAD batteries is less than dry cells, and the Buster will not run as long between changes of batteries with the NICAD cells. The NICAD cells may be recharged many times, reducing the long term operating cost. Estimated routine usage is two to three weeks.

Charge the new NICAD battery 12 - 14 hours prior to initial use.

The **LO-BAT** indicator is optimized for use with Alkaline cells; a lower set point than is optimal with NICADs. The **LO-BAT** indicator may come on only for a short time, if at all, when the NICAD battery is discharged. NICAD batteries suffer from “Discharge Amount Memory”, meaning that if they are repetedly only partially discharged before being recharged, their capacity decreases to the amount that they are actually being used. If NICADs are to be used it is recommended to purchase a NICAD “Charger/Discharger” instead of just a Charger to prevent this, or be sure to run the batteries down periodically.

Commercial 9V NICAD batteries typically only have 120mAh (Milli-Ampier-Hour) capacity as

opposed to ~500mAh capacity of Alkalines.

Note that the Cadmium in NICAD batteries is a toxic metal and they are banned from use in many European countries. **Please dispose of NICAD batteries properly!**

Use of Rechargeable NiMh 9V Transistor Cells - Optional

Use of NiMh (Nickel Metal Hydride) batteries are preferred over NICAD's as they are less toxic. Depending on the type they may have a greater or lessor self-discharge rate than NICAD's. Most NiMh batteries sold as "9V" batteries are actually only 8.4V batteries and will not work well in Busters. NiMh batteries that are actually 9.6 volts will work fine and are available in 260mAh capacities (as opposed to ~500mAh for Alkalines). Some of these batteries, however, can be slightly 'fatter' than standard 9V cells but will still work in the Buster if the short brackets on the battery holder are bent out a little to accommodate the larger size.

8.3 Electronic Maintenance

The only routine "electronic maintenance" required by the user, is the periodic *"Recalibration Check"* described in Paragraph 6.40 CALIBRATION.

In the event of a failed circuit board or other component, the user should contact the factory for assistance. The electronic components have a very high MTBF, and seldom experience field failure from routine use.

Note that no Buster radioactive source or shutter mechanism has ever been damaged.

The Source/Shutter mechanism is *NOT* field repairable and the Buster *MUST* be returned to the factory or to a factory authorized repair station for service. The Source/Shutter mechanism is identified by the following label:

CAUTION
RADIOACTIVE MATERIAL
100 Ici (0.37 Mbq) or less, BA133
SEALED SOURCE UNDER THIS LABEL

FACTORY SERVICE ONLY
ON THIS COMPONENT

LABEL REMOVAL PROHIBITED

8.4 Diagnostic Check of Electronics

1. **First,** hold down the MODE and DISPLAY LOCK buttons simultaneously.

2. **Then,** press the trigger and hold it. **Now,** release the MODE and DISPLAY LOCK buttons.

The K910G will cycle through an automatic diagnostic check, testing all segments and combinations of display readings. Observe the display for an error in the sequence.

SECTION TWO - RAD-AWARE™

Operating Instructions for

RAD-AWARE™

External Radiation Detection Capability

Effective 1 July 2004, CSECO has activated the *RAD-AWARE* capability in the *Buster*.

- **Prior Busters can be upgraded at a nominal cost. Call 510-864-8010 for an RMA.**
- **Provides an alert to the presence of unknown external radiation**
- **Permits establishment of a safe Operating Perimeter until the Haz Mat Competent Authority arrives**
- **Protects the First Responder at a possible "Dirty Bomb" Scene**

Two Detection Modes:

ACTIVE Detection: Source Open Normal Inspection Operation

PASSIVE Detection: Source Closed Detect External Radiation

Automatic *RAD-AWARE* warning:

- In normal inspection applications, the Buster maximum display value seldom exceeds "150", the value observed when the Buster is placed on concrete or wet earth.
- The Buster with *RAD-AWARE* will commence a steady "Beep - Beep" if the display value exceeds "200". This number can occur only in the presence of external radiation, or if

the Buster is improperly calibrated.

1. ROUTINE *ACTIVE CONDITION* OPERATION :

Follow all prior Standard Operating Procedures for use of the Buster.

The Buster electronics are turned on when the Buster *Trigger* is pressed to open the internal radioactive source.

Buster emits gamma radiation into the suspect object, and responds to the radiation scattered back to the detector from material within the object. The display signal corresponds to the density of the object and its contents.

If the object also contains radioactive material emitting gamma radiation, the display will read higher than normal because of that additional radiation. This response has always been inherent in all Busters.

RAD-AWARE **Beeps continuously if the display reading exceeds "200"** . This can only occur from a second source of radiation, or if the Buster is not calibrated.

How to confirm the presence of an external radiation source:

Release the *Trigger* and press the *Backlight Button* while retaining the Buster on the object. The display reading should revert to the normal Air Reading plus a digit or two. (If the normal Air Reading is 8 or 9, the Buster will read 10 to 12 on the object with the *Trigger* closed and the *Backlight Button* ON).

Buster is now in ***PASSIVE CONDITION*** (See Para 2. below).

If the object contains a hidden radioactive source, it can be anticipated that the additional external radiation will produce an increase in the display reading of several digits.

Confirm the presence of the hidden radioactive source by moving away from the object until the Buster reads a normal Air Reading in all directions with only the *Backlight Button* ON. Then move slowly towards the object. If the Air Reading increases as the Buster is brought to the object, this is confirmation that the object is emitting gamma radiation from an unknown internal source.

RAD-AWARE: **Buster beeps continuously if the display exceeds "200"**.

2. NEW *PASSIVE CONDITION* OPERATION :

In ***PASSIVE CONDITION***, only the Buster electronics are turned on by pressing the *Backlight Button*. The radioactive source remains closed, and does not emit gamma radiation into the object.

The Buster now becomes a highly sensitive external radiation detector, sampling 4 times per second, responding to gamma radiation emitted from the object itself, whether from legal or illegal radioactive materials.

To test for the possible presence of unknown gamma radiation, merely press the *Backlight*

Button and point the measuring surface of the Buster in the direction of the suspect radiation. If the display reads higher than the normal Air Reading, the presence of unknown radiation is suspect. To confirm the reading, point the Buster in the opposite direction, or towards the sky, and compare the readings. If the Air Reading is consistently higher when the Buster is pointed towards the suspect object or area, then external radiation is present.

RAD-AWARE: **Buster beeps continuously if the display exceeds "200".**

3. POSSIBLE NORMAL SOURCES OF UNEXPECTED EXTERNAL RADIATION:

Legitimate radioactive shipment

The vehicle or cargo container may contain a normal, legitimate shipment of radioactive material. Verify this against the shipment manifest.

Medical treatment for an individual

Certain medical diagnostic or therapy treatments involve the use of radioactive pharmaceuticals. The patient may emit a detectible radiation field for a few days as the radioactive pharmaceutical decays with its normal half-life.

4. ACTION UPON CONFIRMING THE PRESENCE OF UNKNOWN RADIATION:

The purpose of the ***RAD-AWARE*** activation is to provide the inspector with an enhanced resource for the detection of the presence of unknown radiation, a means of confirming this presence, and an automatic audible alarm should the presence exceed an arbitrary safety limit.

NOTE: The Buster, with the ***RAD-AWARE*** feature, is ***NOT*** an authorized Survey Meter for accurately monitoring radiation levels or establishing dose levels.

NOTE: The Buster inspector, with this new feature available, does not become a hazardous materials Competent Authority.

The Buster inspector, upon confirming the presence of an unknown source of radiation, should follow the established emergency plan procedures of his jurisdiction and request the immediate assistance of a Competent Authority for the proper handling of the incident.

Local Haz Mat Phone Number: _____

Contact Information: _____

5. Worst case scenario - Possible "Dirty Bomb" nuclear incident:

A ***"Dirty Bomb"*** is a conventional explosive device which has been combined with some form of radioactive materials, so as to distribute the radioactive materials throughout the surroundings upon detonation.

The radioactive materials will be distributed in particle form with the detritus of the bomb, and

as dust and smoke from the explosion. Movement of people and vehicles through the explosion area, and dispersal by wind and water will further carry the radioactive particles away from the immediate area. It is critical that the knowledge of the incident be confirmed immediately, and that appropriate action be taken to minimize dispersal of the residue and injury to individuals.

First responders to a Dirty Bomb incident will not know they are working with a “nuclear incident” until suitable instruments reveal this fact.

It is reasonable to assume that the radioactive materials used in the Dirty Bomb will emit gamma radiation as well as other forms of radiation.

A first responder with a Buster will be able to detect the presence of the radioactive materials, and will be able to establish a temporary Safety Perimeter until the properly trained and equipped Radiation Haz Mat professional arrives on the scene to take control of the radiation hazard aspect.

6. FIRST RESPONDER ACTION UPON ARRIVAL AT THE SCENE OF A SUSPECTED RADIATION INCIDENT:

Under normal conditions, if the Buster is pointed to the sky, in any direction, the display “Air Reading” will be “10" or less, proportional to the normal background environmental radiation of the area.

If a ***DIRTY BOMB,*** or other radiation contamination is suspected, point the Buster away from the scene and press the *Backlight Button*. Note the Air Reading.

Point the Buster towards the scene and note the Air Reading. It is encouraging if the readings remain the same. Radiation may not be involved in the incident.

Approach the scene with the Buster pointed towards the incident,

- If the Air Reading does not change, it is unlikely that radioactive materials are involved in the incident.

- If the Air Reading increases, it is likely that the Buster is observing gamma radiation coming from the scene. Confirm this by pointing the Buster back away from the scene. The Air Reading should decrease. If the Air Reading decreases, it should be assumed that a radiation incident is present.

If the display value changes depending upon direction, the presence of external radioactive material is confirmed.

The First Responder should immediately follow local emergency procedures to obtain professionally qualified and trained Haz Mat Team assistance.

7. ESTABLISHMENT OF A TEMPORARY SAFETY PERIMETER:

Establishment of a **TEMPORARY SAFETY PERIMETER** is achieved by approaching the radiation incident until the Buster display value reads 200 and the *RAD-AWARE* starts "beeping". *[The radiation dose rate at this point is approximately 0.1 mRem/hour (1 uSv/hr), less than the normal background radiation level in a commercial airliner at 35,000 feet (10,600 meters)].*

This is a safe radiation level for establishment of a temporary safety perimeter until the qualified Radiation Control Specialist arrives to manage the scene. The Buster is not useful beyond this extent for further establishment of radiation safety limits.

The radiation level will increase geometrically as one approaches closer to the center of the incident. It will be relatively safe for the first responders to work inside this **TEMPORARY SAFETY PERIMETER** for short periods of time to extricate victims. Such emergency conditions are at the discretion of the responders, and the SOP of the agency.

It is critical that a trained Radiation Control Specialist be brought to the scene as early as possible.

SECTION THREE
RADIATION SAFETY

1. "ALARA" CONCEPT

(See RADIATION SAFETY INFORMATION Page 26 for a definition of terms.)

It is impossible to achieve a zero radiation exposure level because of the normal everyday radiation we accumulate from our natural environmental background. Natural radiation exposure from the environment is approximately **100 mrem/year** at sea level. Due to the loss of natural atmospheric shielding, the natural background radiation at a higher elevation of 5000' (Reno, NV or Tahoe, CA) is approximately **200 mrem/year.**

The calculated annual additional exposure from routine use of the Buster is approximately **1.5 mrem/year**, well within the normal range of everyday environmental variations.

Good practice, however, dictates that we attempt to maintain the radiation exposure **As Low As Reasonably Attainable (ALARA)**. Used properly, the K910G Buster presents no hazard to the user or to the general public.

Film badges or other radiation monitoring methods are not required for the Buster. Wipe or Leak Testing is not required with the Buster under General License distribution, nor with any Buster source not exceeding 100 uCi (3.7 MBq) BA133.

The Buster should not be pointed at any person with the shutter open. No harm would occur, but the action is inappropriate and can be unnecessarily alarming to an untrained person.

If the shutter spring should break and leave the source in the open position, exposing the red alarm button, push the red alarm button back closed. Call the *CSECO* factory for service assistance.

Ph: 510-864-8010 Fx: 510-864-8013 Info@cseco.com

2. TRAINING

CSECO recommends that Buster users attend a CSECO factory training course, or equivalent course. The CSECO course requires one-half day and includes a discussion of radiation safety appropriate for use of the Buster, field application techniques, and hands on operation. Call the CSECO factory for information, costs, and scheduling.

3. EMERGENCY INVOLVING OBVIOUS DAMAGE TO THE BUSTER

3.1 General Information

The operator must protect human life first, then property from damage due to a radiation incident.

We must prevent radioactive material from escaping into the environment.

The radioactive material in the Buster is encapsulated in a welded stainless capsule which is further securely mounted in a tungsten-carbide shield assembly. It is highly unlikely that the radioactive source material could escape in the event of a severe accident or fire. However, our protective program must insure that we plan for the most severe eventuality.

Note that no damage has ever been incurred by a radioactive source or by the shutter mechanism in a K910G Buster.

3.2 First Step

Keep people away from the accident site.

Remain calm and exercise careful thought for each subsequent step.

Call, or send somebody to call for help. See the phone list at the end of this section.

3.3 Second Step - Take the following DECISION ROUTE action:

3.3.1 Minor - External Damage Only:

If the Buster is only superficially damaged, dented, flooded, or otherwise injured and, the Buster is in one piece with only minor cracks in the metal housing, take the following action:

1 Using a stick or tool, turn the Buster over to inspect all sides. Do not walk through the area where the Buster was damaged.

2 If the Buster is intact, pick up the device, place it in its storage/shipping container, and return it to its permanent storage area.

3 Call *CSECO* for assistance in shipping the Buster back to the factory for repair or disposal. *(CSECO: Ph: 510-864-8010 Fax: 510-864-8013 info@cseco.com)*

DO NOT SHIP THE DEVICE WITHOUT FACTORY APPROVAL OR KNOWLEDGE.

3.3.2 Major - Possible Internal Damage to the Buster:

If the Buster is severely damaged, broken apart, burned, or crushed with parts strewn around, or if the source area of the device is visually damaged, take the following action:

1. "Freeze" the site. Rope off the damage site for 10' around. Stop traffic across the damage site. Do not walk through the damage site. (If radioactive material is loose it can be picked up on shoes and tracked elsewhere.)

2. Call the nearest public health or emergency services office for help. The objective is to get an expert radiation technician to the site, along with a proper survey meter, who can take charge.

   CSECO does not recommend that customers purchase their own survey meter for this purpose. There is little likelihood of a severe accident happening to begin with, and the survey meter can only provide a sense of false security in the event of a truly serious accident. The typical device operator will not know how to use the meter properly and may only compound an already bad situation by possibly releasing a potentially contaminated site.

3. The radiation safety expert will determine whether the site is safe, will remove the contamination if there is any, and will prepare the device for shipment to the factory for repair or disposal.

   In the event of severe damage it may become desirable to dispose of the source through an authorized disposal agency. The radiation safety technician will assist in this action, if required. *(See Para 18.00 DISPOSAL)*

4. Call the *CSECO* factory and advise of the accident. We will want to know about the circumstances in order to include such safety information in future training programs.

   As a matter of comfort to the user, small portable devices using radioactive sources seldom incur severe damage requiring extreme recovery actions.

As a matter of record, as of this page revision date, 19 February 2021, no Buster has suffered damage to the radioactive source from any cause.

4. IMPORTANT PHONE NUMBERS (Please enter numbers for your nearest agencies)

PUBLIC HEALTH DEPT _____

EMERGENCY SERVICES OFFICE * _____

* ***United States users please refer to the Emergency Listings for each state included in the Pink Page at the back of this Manual. (This page is not included in Manuals shipped outside of the United States.)***

CSECO FACTORY 510-864-8010

FIRE _____

POLICE _____

Notify the Public Health Office, Police, and our CSECO factory offices immediately in the event of a stolen contraband detector.

5. TRANSPORTATION

U. S. DOT Regulations, **TITLE 49, Parts 17 through 173.421** govern the transportation of radioactive materials on U. S. public access ways. In addition, IATA Dangerous Goods Regulations, govern transport of radioactive materials on aircraft.

The CSECO K910G Buster, when packed in its plastic transport case, meets the special requirements of **49 CFR 173.421** for "Excepted Radioactive Material" and does not require radiation symbol labels on the exterior of the transport case. This is because of the combination of small source, efficient shielding, and design of the case.

This device can be transported on common carriers when packed in its plastic transport case, with or without a cardboard protective overpack, and without radiation symbol labels on the outside of the package.

The case always should be locked or the package sealed during transportation to prevent unauthorized entry to the device.

6. STORAGE

Contraband detectors should be stored in their shipping cases in a locked area with key access only by the authorized operators. CSECO recommends that permanent storage be 1.5 meters (5 feet) from the nearest point of full time work requirements.

CSECO recommends that the local fire department be called in for a review of the storage location and of the nature of the device stored therein. This may preclude frantic phone calls should a fire occur and the fire department not know the nature of the radioactive material.

7. TRANSFER OF THE BUSTER TO A DIFFERENT USER

United States Regulations:

Under the conditions of the CSECO Exempt License,

There is no documentation required by us, user, or state when transferring or disposing of Buster. There is no need to notify the state or health department when in possession of the Buster. The user can dispose of the Buster anywhere after removing the radiation label.

Regulations in Other Countries:

The applicable Radioactive Materials Regulations will vary from one country to another. They generally parallel the U. S. procedures, and the recommendations of the International Atomic Energy Agency (IAEA).

It is the responsibility of the users in each country to insure that they are operating correctly within the rules and regulations of that country.

8. DISPOSAL

The user can dispose of the Buster anywhere after removing the radiation label.

9. RECORDS

Inventory and training records should be maintained.

10. SERVICE AND MAINTENANCE - SHUTTER MECHANISM

See Para 8.0 MAINTENANCE in the Operating Section for general service information.

The Source/Shutter mechanism is NOT field repairable and the Buster MUST be returned to the factory or to a factory authorized repair station for service. The Source/Shutter mechanism is identified by the following label:

CAUTION
RADIOACTIVE MATERIAL
100 uCi (3.7 Mbq) or less, BA133
SEALED SOURCE UNDER THIS LABEL

FACTORY SERVICE ONLY
ON THIS COMPONENT

LABEL REMOVAL PROHIBITED

K9 SN:_____

Sce SN:_____

_____uCi_____Mbq

ASSAY Date:_____

Please note that the radioactive source in standard production Busters is only 7.5 uCi (0.278 mBq) in size.

RADIATION SAFETY INFORMATION

11. DEFINITIONS

11.1 Radiation Exposure

We live in an ocean of radiation. We are constantly exposed to radiation from the soil under us, outer space above us, and from the food we eat and drink. Even some basic elements within our bodies are naturally radioactive and give off measurable amounts of radiation.

REM: Basic unit of accumulated exposure for humans. We are allowed to accumulate up to 500 millirem/year from the use of radioactive materials under General License distribution.

MILLIREM (mrem) 1/1000th of a REM. Normally we are exposed to very small amounts of radiation and we express this small amount in terms of millirems.

MREM/HOUR: Rate of Exposure. Similar to "brightness" of light. (If you work in a radiation level of 0.1 mrem/Hr for 2 hours, you accumulate 0.2 mrem.)

S.I. CONVERSION 1 mrem = 10 microSieverts (10 uSv) in Standard International units.

EXAMPLES OF EVERYDAY RADIATION EXPOSURE:

We accumulate 100 Mrem/Year in our normal life living at sea level.

We accumulate another 100 mrem by simply moving to Denver, Salt Lake City, or any other city at 5000' elevation. (The higher elevation places us closer to outer space and increases our natural radiation exposure.)

We accumulate 0.3 to 0.5 mrem/hr on an average commercial jet flight.

We accumulate up to 20 mrem with each tooth XRay.

We accumulate up to **500 mrem/Year by smoking a pack of cigarettes a day**
a far greater source of radiation than the K9 Buster !!!

K910G BUSTER EXPOSURE: We accumulate only 1.0 - 1.5 mrem/Year by normal full time use of K910G Buster. Less than normal background; much less than from smoking !!!

11.2 Radioactive Source

A “Radioactive Source” is an unstable element which will give off radiation energy as it disintegrates. Some examples are Radium, Uranium, Cobalt 60, Cesium 137, Americium 241, Strontium 90, Barium 133 (used in the K910G Buster), and many others.

CURIE (Ci) Nuclear term for "size" (activity) of a radioactive source. A “Curie” is a "very large" quantity of radioactive material.

MILLICURIE (mCi) 1/1000th of a Curie. Only very small amounts of radioactive material are

used in most industrial devices.

MICROCURIE (uCi) 1/1,000,000 of a Curie. The current model K9 Series Buster devices use only 10 micro curies or less.

BECQUEREL Standard International term for “size” (activity) of a radioactive source. A “Becquerel” Is a very small quantity of radioactive material, in direct contrast to the older term, “Curie”.

S.I. CONVERSION 7.5 uCi = .278 MBq (MegaBecquerels) in **S**tandard **I**nternational Units

Model K9-150 “Buster on a Stick” Extension Pole

Universal Operating Instructions

1. GENERAL DESCRIPTION

The standard **K9-150 Extension Pole System** permits extending the Model K910G Buster away from the body up to a distance of 8', permitting measurement of the outside wall of a 14' high trailer, depending upon the height and reach of the user. Optional pole lengths permit extension up to 16'.

1.1 K9-150 Extension Pole

(End of Pole to Far Edge of Buster)			Length	Extends up to
K9-150-8 Extension Pole	(Standard)	8' option	5'	8'
K9-150-12	(Long)	12' option	7'	12'

The 8' extension is the most useful option for general vehicular work and for use within buildings.

The 12' option is useful for external work with ships and aircraft. The longer options are unwieldy for routine work with automobiles and trucks and are not recommended for such use.

The articulating gooseneck tip on the Pole permits setting the angle of the Clamp Head over a 180 degree range. The Extension Poles have an internal cable for use of the optional Remote Display. The Extension Pole may be used with or without the Remote Display. The Remote Display is not required if the Buster display is within sight of the user.

1.2 VO-150 Clamp Head, with Trigger Lock

The Clamp Head securely holds the Buster. The Trigger Lock maintains Buster in an "ON" condition while it is extended away from the operator.

1.3 RD-150 Remote Display, with belt or pocket clip

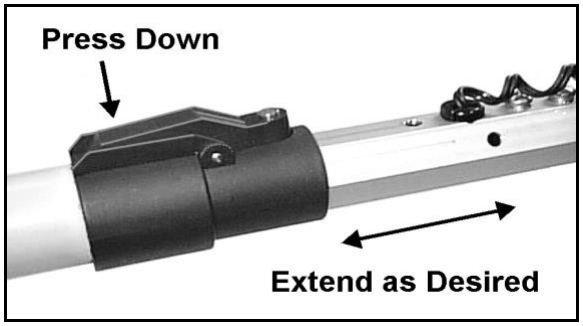
The Remote Display can be clipped to the Extension Pole to permit reading of the Buster when the Buster display is not visible due to the long distance or because of the angle of use.

The Remote Display also can be used with the Buster alone, using the K9-150 Short Cable, for measurements where the hand held Buster is placed in a blind location, i.e. behind dual tires or inside a cabinet or closet or underneath a trailer bed.

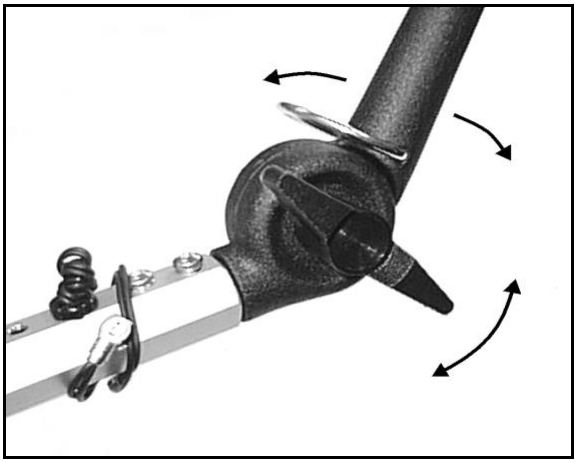
NOTE: If your Buster does not work with the Remote Display:

Busters 8063 and higher have the required internal circuitry and software to work with the Remote Display. Some earlier Busters may have the required *"Limo"* connector but may not have the correct circuitry and software. All Busters sent to the factory for repair are automatically upgraded to the new circuitry and software. See *Para 4.30 Buster Compatibility* on Page 7.

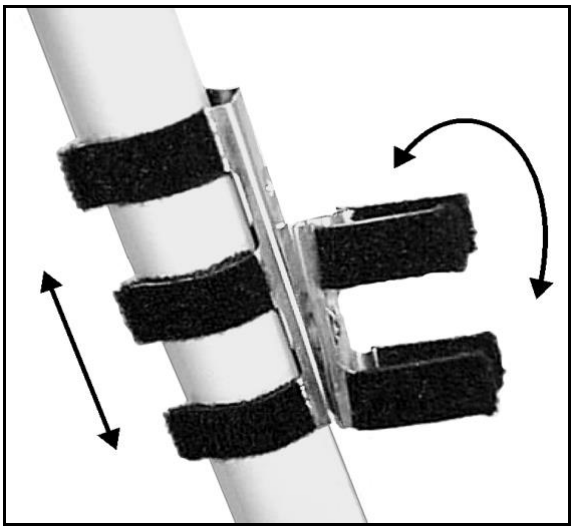
2. K9-150 EXTENSION POLE



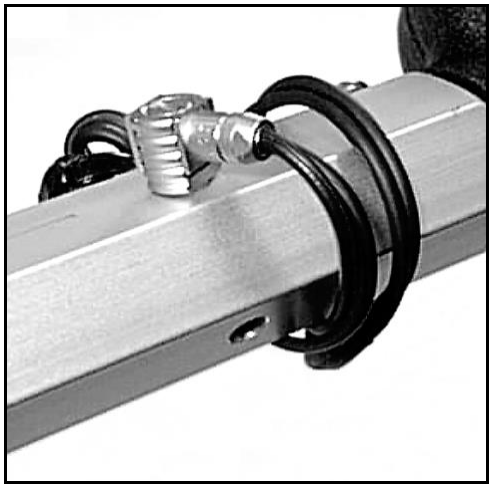
Press the Release Button
to extend or retract the pole



Loosen the Wing Knob to
change the angle of the Knuckle.

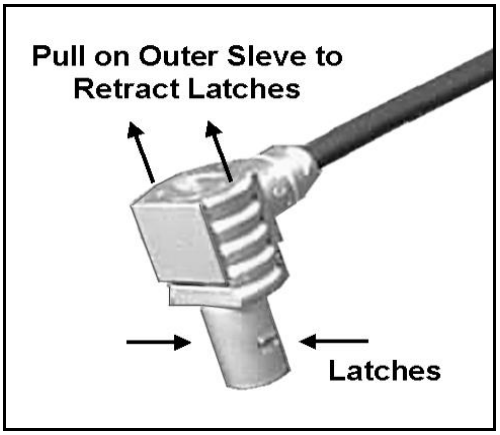


Place the Remote Display
Holder where desired and tilt to suit.



Store cable ends by wrapping around the pole and inserting the connector into the storage hole. Extension end above.

Handle End.

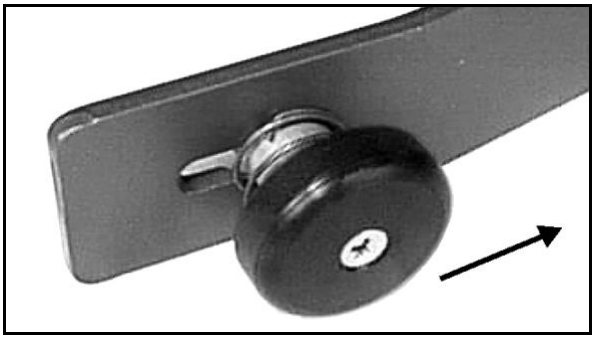


The cable is equipped with special latching "LIMO" connectors. To remove the cable, pull up on the external sleve.

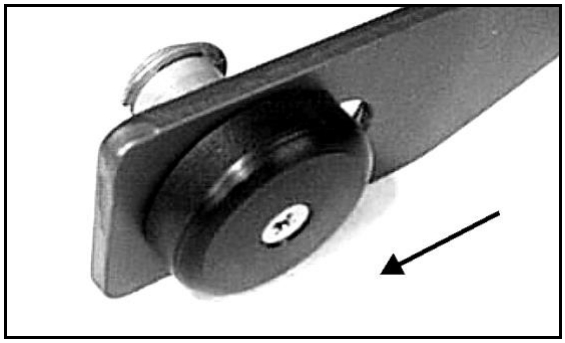
DO NOT PULL ON THE CABLE TO REMOVE IT.

3. VO-150 CLAMP ASSEMBLY

Trigger Lock

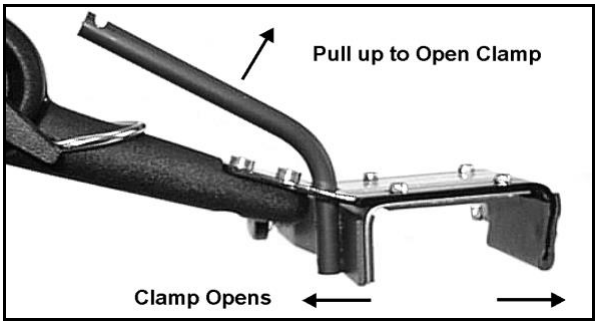


Unlocked

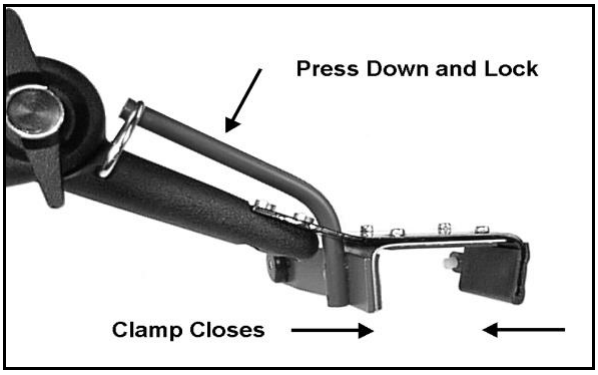


Locked

Clamp Head Action

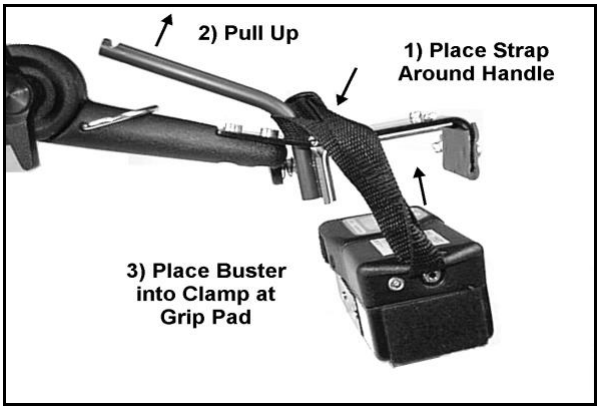


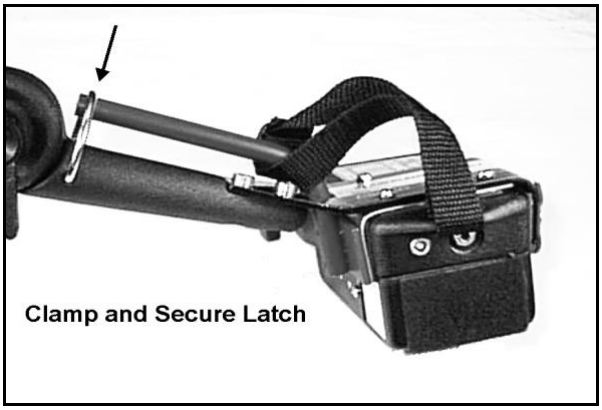
To Open Clamp



To Close Clamp

To Install the Buster



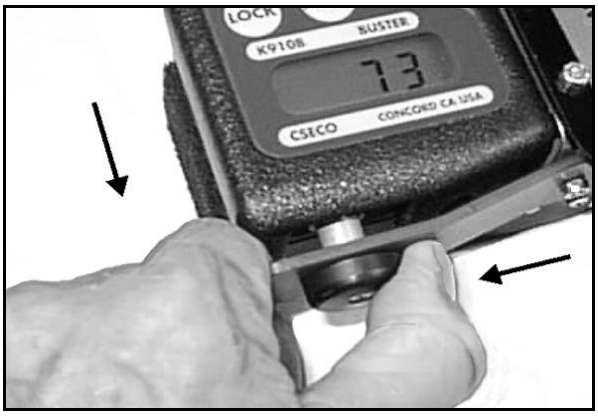


1. Unlock the Trigger Lock. This is important.
2. Slip the Buster Safety Strap over the Clamp Handle.
3. Open the Jaws and place the Clamp over the Buster while aligning the Clamp

directly over the Buster Grip Pad.

4. Press down firmly. This is a close fit.
5. Squeeze the Handle Closed and Lock it with the Lock Ring.
6. Turn the Buster ON with the Trigger Lock.

Turn Buster On and Off



ON

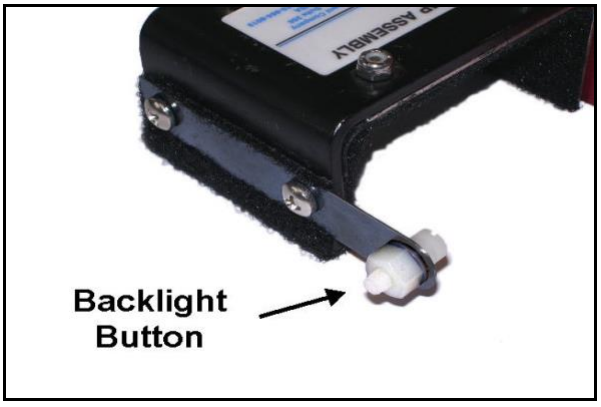
While pulling back on the Trigger Arm, press the Trigger Lock and slide to the left.

OFF

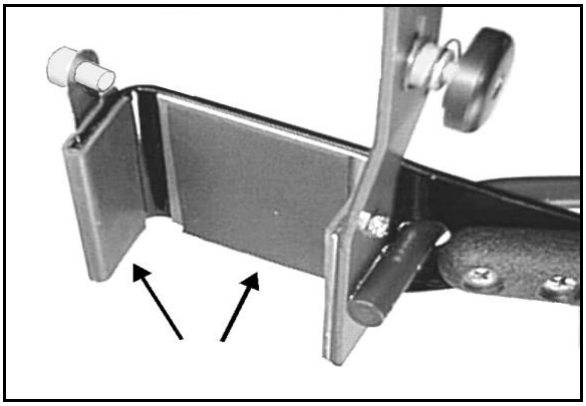
While pulling back on the Trigger Arm, slide the trigger to the right until it releases and retracts.

The Red Trigger Arm provides the spring pressure to keep the Buster "ON". **It is necessary to PULL BACK on the Trigger Arm to relieve this pressure when sliding the Trigger Lock back and forth.**

3.1 Maintenance, Clamp Head



Replace the Backlight Button as needed.

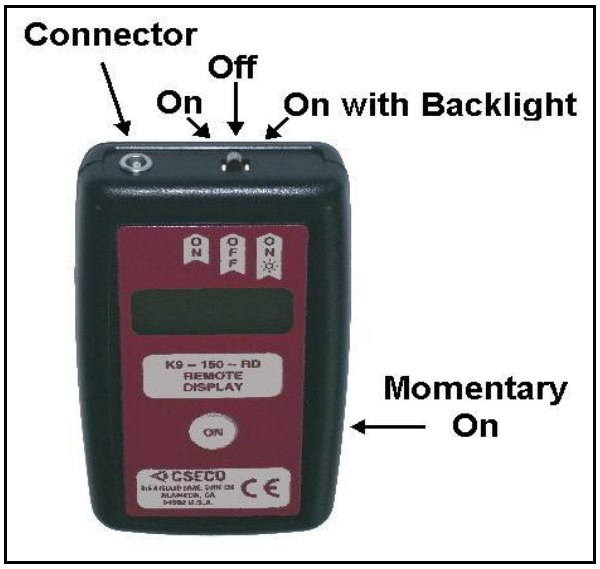


Replace the Padding as needed. Call factory for replacement pad set.

4. REMOTE DISPLAY

Buster and Remote without Pole.

Remote on K9-150 Extension Pole.



Controls and Connector on the Remote.

To Change 9 Volt Battery:

- Alkaline Batteries Recommended.
- Replace when LOBAT is constant. The Remote Display will continue to operate for over an hour after LOBAT is first enunciated.

4.1 Maintenance, Remote Display

Wipe off the outside of the Remote Display if it is dirty. The unit is moisture resistant, not moisture proof. There is no other field maintenance for this unit. If damaged, return to the factory for repair.

4.2 Buster Compatibility for use with the Remote Display

NOTE: Your older Buster may not work with the Remote Display:

- Busters SN-8063 and higher have the required "LIMO" connector and internal circuitry and software to work with the Remote Display.
- Some earlier Busters, generally SN-6000 and above, may have the required "Limo" connector but may not have the correct circuitry and software.
- Older Busters with Cd-Te Detection Systems and radioactive sources larger than 100 microcuries (3.7 mBeq) will not work with the new software. Please contact the factory regarding possible upgrade of an older Buster. Have the Serial Number of your Buster available when you call or fax.

4.3 Free Upgrade to permit use with Remote Display

All compatible Busters sent to the factory for repair are automatically upgraded to the new circuitry and software to permit use with the Remote Display. There is no charge for the upgrade.

Any user wishing to upgrade a compatible Buster may send it to the factory, freight prepaid, for a free upgrade. Please contact the CSECO factory, 510-864-8010, for an RMA and shipping instructions. CSECO will pay the freight back within continental U.S.

5. CABLES

- **K9-150 Short** Used with the Remote Display when not used with the Extension Pole.
- **K9-150 Long** Inside the Extension Pole. Available as a separate item for replacement or unusual application by the user.

The cables are equipped with special latching "LIMO" connectors to prevent the cable from pulling out of the socket when in use. To remove the cable, pull back on the external sleeve which will retract the latches on the connector.

DO NOT PULL ON THE CABLE TO REMOVE IT.

Contact the factory for a Replacement Cable Kit, if needed, or for additional Short Cables.

CALIBRATION RECORD LOG - K9 SERIES

Owner: _____ **Attn:** _____

_____ **Phone:** _____

_____ **Fax:** _____

S/N: _____ **E-Mail:** _____

Date	Recal Value	Operator's Initials & any Comments	Date	Recal Value	Operator's Initials & any Comments

SERVICE RECORD LOG - K9 SERIES

Owner: _____ **Attn:** _____

_____ **Phone:** _____

_____ **Fax:** _____

S/N: _____ **E-Mail:** _____

Date	Notes