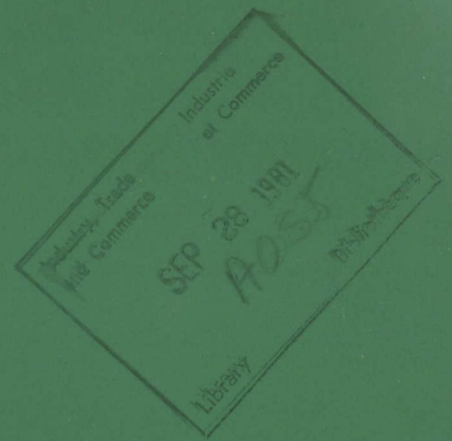


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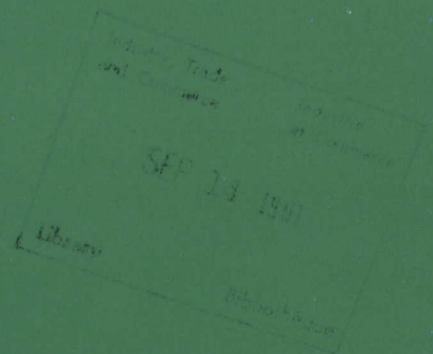
Canadian NBC Equipment

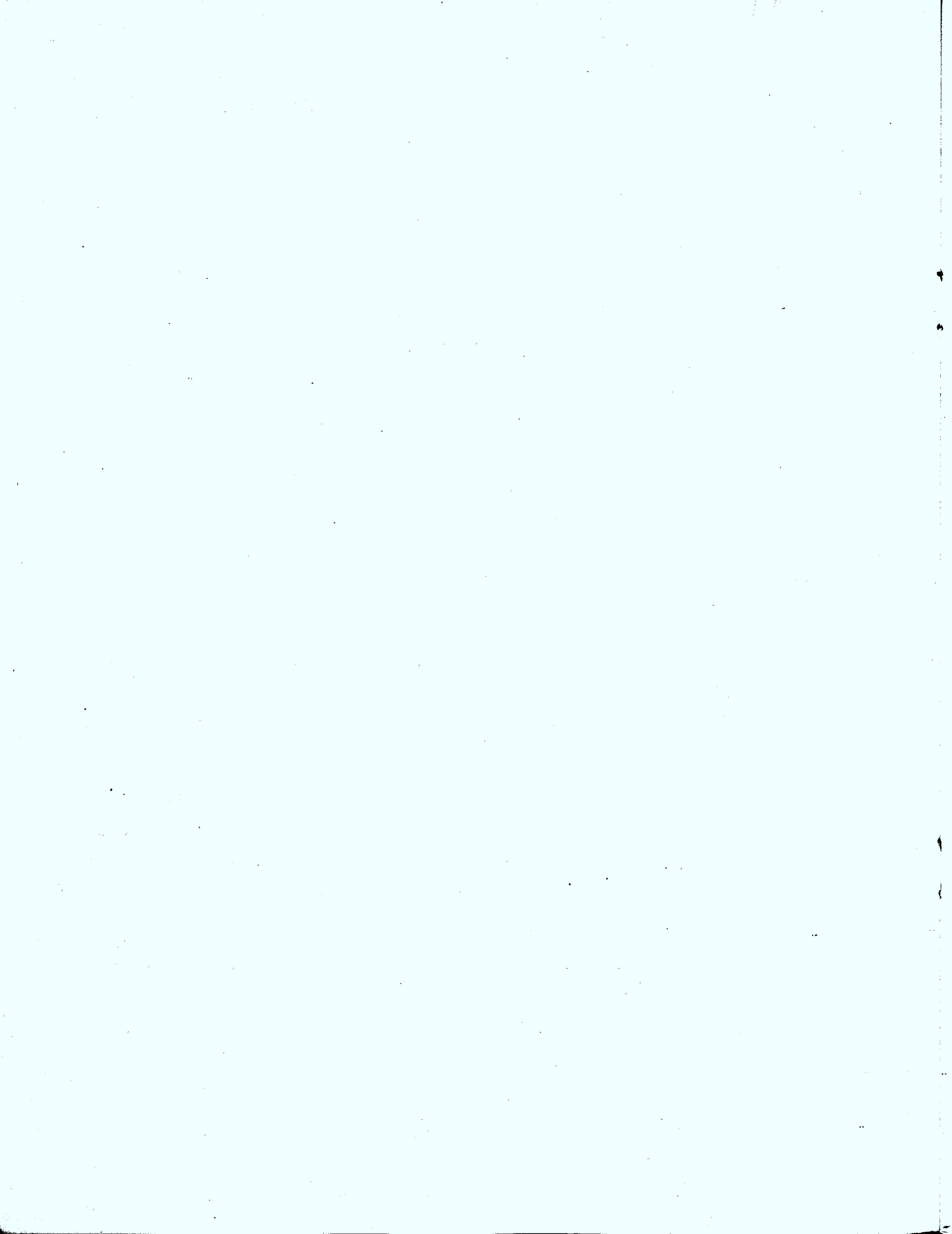


Canadian NBC Equipment



Unless otherwise stated, equipment described in this brochure has been extensively tested, fully meets all existing NATO standards and is in operational use by the Canadian Armed Forces.





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I. GENERAL INTRODUCTION

Ever since World War II, Canada has been developing its own protection and detection equipment to counter the threat of nuclear, biological and chemical (NBC) warfare. Today Canadian-designed and developed NBC equipment ranks high in quality and effectiveness and meets all existing standards set by NATO as well as the military specifications of a number of other countries.

This brochure describes and illustrates these products and has been compiled by the Canadian Department of Industry, Trade and Commerce in collaboration with the Canadian Departments of National Defence and Supply and Service and the co-operation of Canadian industry.

Since a brochure of this nature cannot completely cover the detailed specifications and other relevant data on the equipment portrayed, potential users are invited to direct requests for additional information to:

Defence Programs Branch (32/2)
Department of Industry, Trade and Commerce
235 Queen Street
Ottawa, Ontario, Canada
K1A 0H5

In addition, information may be obtained by contacting any of the companies listed in the back of this brochure or the nearest Canadian Trade Office.

II. THE SOLDIER

From head to toe, the Canadian soldier is completely protected against chemical warfare attack in clothing and equipment developed and manufactured in Canada to the most stringent specifications. For added protection, he carries simple but effective Canadian-developed chemical agent detectors which can detect a wide range of hazardous chemicals. If he needs them, there are specially designed combat spectacles that fit comfortably under gas masks without impairing the masks' effectiveness.

These products have been thoroughly tested and evaluated by the Canadian Armed Forces and are all standard issue to each individual soldier in the field. They include — protective coverall, gloves, overboots and mask; special combat spectacles; decontamination mitt; paper, chemical agent detector, liquid, three-way; detector, chemical agent, nerve vapour.

PROTECTIVE CLOTHING

COVERALL

The coverall, with attached hood, is of one-piece design for maximum resistance to agent entry under all and any movements or gyrations of the wearer. It is intended to be worn in lieu of regular combat clothing. The one-piece style plus a slide fastener and Velcro* front closure ensure the coverall can be donned quickly. Wrist and ankle openings are also closed by Velcro which allows for adjustment. Elastic webbing stirrups are provided on each leg to ensure that a satisfactory overlap of the pant leg and the overboot is always maintained.

The garment comes in a number of sizes and there is a built-in suspender adjustment for height variations within each size. Adequate pockets are provided. The hood is designed to give a close fit around the Canadian Protective Mask but can be and has been modified on request to meet other custom requirements.

Protection provided by the coverall is of an essentially two-stage nature.

The first stage is the outer shell of lightweight 170 g/m^2 50/50 nylon/cotton combat cloth treated with a fluoro-chemical oil and water repellent finish. With this finish, a liquid chemical agent stays on the surface of the shell where it can be blotted up by a field decontamination mitt while the fabric and its interstices remain permeable to air and moisture vapour to maintain normal body heat balance. Any residual agent present after field decontamination is stopped by the second stage of protection under the shell.

The second stage comprises an underlayer of open cell polyurethane foam, 2.4 mm thick, containing re-activated charcoal bonded with latex. The foam layer is lami-



nated to a knitted nylon substrate for added strength and to provide a smooth lining to the overgarment for ease of movement.

Physiological stresses are normal under chemical warfare conditions. To minimize heat stress, the cover-

all materials are highly air permeable while the one-piece design enables the wearer to adjust the number of undergarments to suit ambient temperatures and physical activity.



GLOVES

An integral part of the system of CW protective clothing, the gloves consist of duo-stretch knitted cotton coated with butyl rubber for complete protection, durability and comfort. The soft butyl rubber plus finger and palm of curved configuration give excellent manipulative dexterity and finger tactility together with good durability.

The butyl rubber used is one of the highest in molecular density

which gives it exceptional resistance to penetration by persistent CW agents. Tests have shown that the Canadian glove exceeds the CW resistance of the more common neoprene by some 2½ times.

In manufacture, precut and sewn cotton knit glove blanks are stretched over porcelain formers, predipped into pure rubber latex and then successively dipped into butyl. Each dip is dried and the process repeated until the required

thickness is reached after which the glove is cured.

Olive green in colour, the gloves have a gauntlet type cuff with the gauntlet portion worn under the sleeve of the CW protective coverall. They are provided in a range of sizes from small to extra-large.

Extra thin, unsupported (unlined) dipped butyl gloves are also available to meet the needs of exceptional tactility demanded by certain field operations.

OVERBOOTS

Also part of the system of CW protective clothing, the overboots incorporate the same highly protective butyl rubber as the gloves. Similar in design to high quality rubber winter footwear, the overboot is 28 cm in height, with left and right boots, and made to fit over the combat boot. Closure is designed for security and quick operation.

The overboot upper is of butyl coated duo-stretch nylon fabric while the thicker outsole and upper reinforcing components are made of neoprene rubber. An inner liner, insole cover and back strip are provided to facilitate quick donning and doffing. After lasting, all components are vulcanized together under a differential pressure cure system to ensure maximum integrity.

The overboots are provided in one width and a large range of sizes.



MASK, CML-B10, C3, NSN 4240-21-882-8010

The Canadian-designed mask effectively protects the wearer's respiratory tract, face and eyes against chemical and biological agents, radioactive dust and camouflage smoke. In the Canadian Armed Forces it is the normal issue protective mask; other types are issued to personnel with specialized roles such as air crew or tank crew.

Each step in the evolution of this mask has been thoroughly tested and evaluated. Today it combines effective protection with a high level of user comfort and acceptance while giving a minimum of interference to the combat soldier in the performance of his duties. The mask is completely of non-magnetic materials and will not affect the accuracy of compasses even when they are held close to the face.

The face piece itself incorporates a number of features that have made the mask readily acceptable to a number of nations. The mask meets all the operational characteristics established as firm requirements by NATO.

The mask's components include:
The Face Piece Blank — Made of natural rubber, this is moulded in three sizes, large, medium and small. The rubber itself is formulated to remain soft and pliable at sub-zero temperatures and yet remain non-tacky at 53°C. It has passed cyclic storage tests at temperatures ranging from -55°C to 70°C.

The Eye Piece Assembly — Two eye piece assemblies each consist of a shatter-proof flat glass lens 6.35 cm in diameter with appropriate inner and outer rims, washer and clamp assembly to eliminate

leakage and facilitate replacement. Placed close to the wearer's eyes, the circular eye pieces give a wide angle of vision, allow the use of optical instruments such as binoculars and gun sights and provide distortion-free vision across their entire surface.

Combined Outlet Valve and Speech Transmitter Assembly — This assembly fits into the central opening of the face piece blank. The outlet valve is a circular rubber disc closing against a metal seat. It is protected from both the inside and outside by wire mesh screens to keep out dirt particles that could cause valve leakage. Between the outer valve and the inner screen is a two-ply Mylar* (polyester film) speech diaphragm which is by-passed peripherally by the exhaled air.

The Nose Cup — Fitted to the same opening in the face piece blank as the outlet valve and speech transmitter, the nose cup fits around the mouth and nose of the wearer and is made of moulded natural rubber. Containing a one-way rubber valve, the nose cup assembly is designed to draw cool dry air over the inside of the eye pieces and direct the moist exhaled air out of the mask. The one-way valve (plus the re-entrant nature of the seal between nose cup and face) controls the passage of air from upper part of the face piece into the nose cup during exhalation.

The Canister — Containing a pleated paper particulate filter and an activated impregnated charcoal bed, the canister absorbs toxic gases and removes particles of a size which constitute a toxicological threat. Removable rubber plugs are provided to keep out moisture while the mask is assembled in its carrier. A screw type cap is also provided which, along with the rubber plugs, helps keep the contents dry when the canister is stored separately.

COMBAT SPECTACLES

Eyeglasses, or spectacles, have presented a problem of compatibility with the gas mask for nearly every military force. Their increased general use in recent years, combined with a greater need for unimpaired vision in an even wider spectrum of military trades and specialties, has aggravated the situation. Contact lenses have alleviated the problem but not eliminated it as some persons cannot wear them at all and they have proved impractical for continuous wear.

The Canadian Department of National Defence has resolved this problem by developing spectacle frames suitable for use in all combat conditions but particularly





aimed at providing compatibility with the gas mask.

The frames are made of German silver and have a slightly increased clearance between lenses and nose (a wider bridge) to allow for the gas mask nose cup.

Temple members are straps of moulded nylon, hinged near the top corners of the lens frames and shaped to follow the eye socket contour downward to where they pass over the cheekbone.

Attached to the strap by a hinged clip is a fully closed ear-loop of vinyl tubing enclosing a German silver wire which, in turn, provides a strong connection with the temple straps. The ear-loops are available in 55, 60 and 65 mm sizes.

The spectacles are available in lens sizes of 44, 46 and 48 mm and bridges of 24 and 26 mm.

These combat spectacles have been subjected to exhaustive trials including field training, battle physical training, exercises requiring use of gas masks (with training agents employed), night driving and firing exercises, parachuting and operational flying wearing helmet and oxygen mask.



For evaluation purposes, fitting of these frames must be done by qualified personnel under professional supervision. Lenses ground to individual prescription are required since valid trials can only be made using subjects who normally wear spectacles. Adoption of a new type of spectacle frame by a military force is a major decision requiring considerable operational and medical evaluation. The Canadian combat spectacles have received the benefit of this attention backed by long experience of use.

DECONTAMINATION MITT

The decontamination mitt is designed to meet the need for a ready means of individual decontamination and is used for the quick removal of liquid agents from skin or other surfaces. A pouch type mitt, it encloses the whole hand and wrist, has a thumb opening on each side and is large enough to be worn over protective gloves.

The mitt is made of a very carefully controlled open-weave material with Velcro* fastener at the wrist. Pockets on both faces of the mitt contain a decontaminating powder of natural bentonite clay similar to Fuller's Earth. In use, the powder is dusted onto the contaminated surface through the material of the mitt.

The mitt is expendable and is packaged singly in a sealed barrier bag made of laminated material.



DETECTION DEVICES

PAPER, CHEMICAL AGENT DETECTOR, LIQUID, THREE-WAY

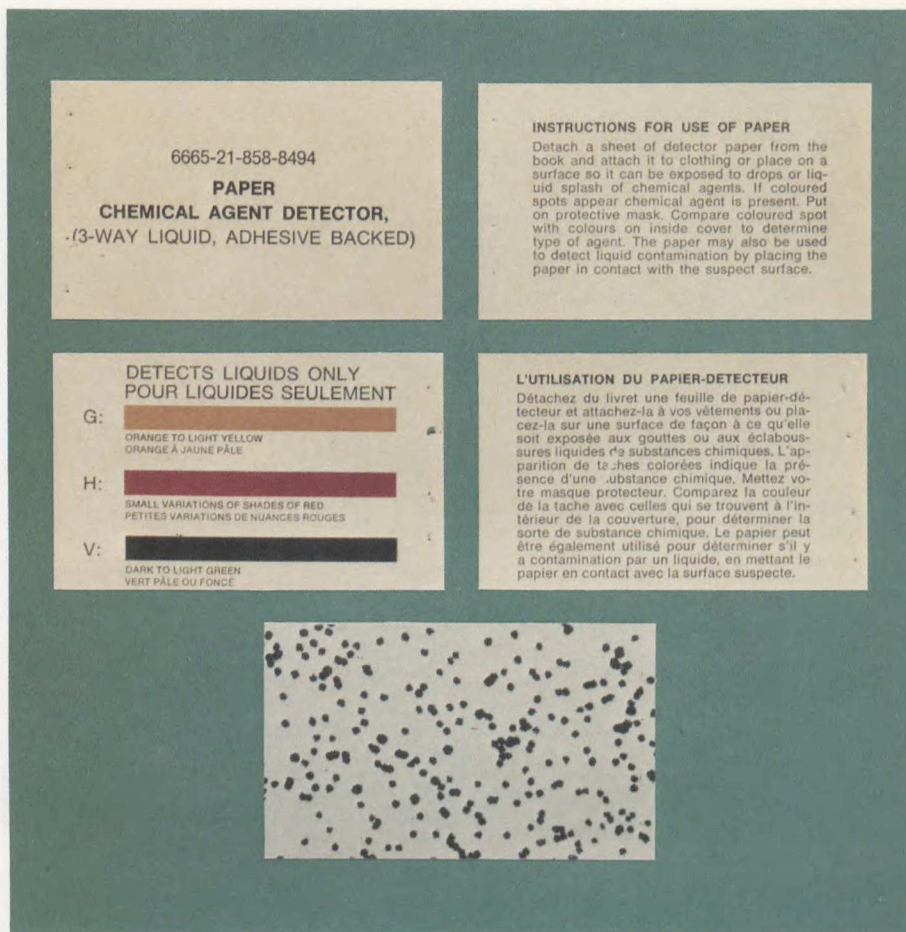
The Paper, Chemical Agent Detector, Liquid, Three-Way (with adhesive backing) was developed for the Canadian Armed Forces to meet the need for a simple and rapid

method of detecting and differentiating between the three major groups of chemical warfare agents which constitute a threat when in liquid form. This "three-way paper" consists of a paper base impregnated with dye-stuff and coated on one side with an adhesive backing. Sheets of the paper are assembled into a booklet, the cover of which gives instructions for use.

The three agent groups detected and differentiated are the "G" and "V" agents (both nerve agents but differing in many characteristics) and the "H" (mustard) agents.

Each type of agent dissolves one of the dyes in the detector paper to produce a distinctive stain on the paper. G agents produce colours that vary from yellow to orange; H agents produce a red colour; and V agents produce colours varying from very dark blue-green to light blue-green. The variations of colour produced depend on the particular G or V agent encountered. The inside of the front cover of the booklet has three panels which show the colours produced by G, H and V agents and bears the legend "Detects Liquids Only". The paper will not change colour with water, gasoline, motor oil, grease or anti-freeze. Some decontaminating agents will cause a colour change in the paper to black but with large drops a brown colour may be seen in the centre of this black spot. This colour change is easily distinguishable from those caused by G, H and V agents.

The detector paper is employed in detecting liquid chemical agents in the form of falling droplets or splash from chemical munitions. The paper is attached to exposed clothing or unscreened surfaces or, where an area is suspected of previous liquid contamination, the paper is pressed or rubbed over the suspected surface such as grass, broad leaves, etc. Following this



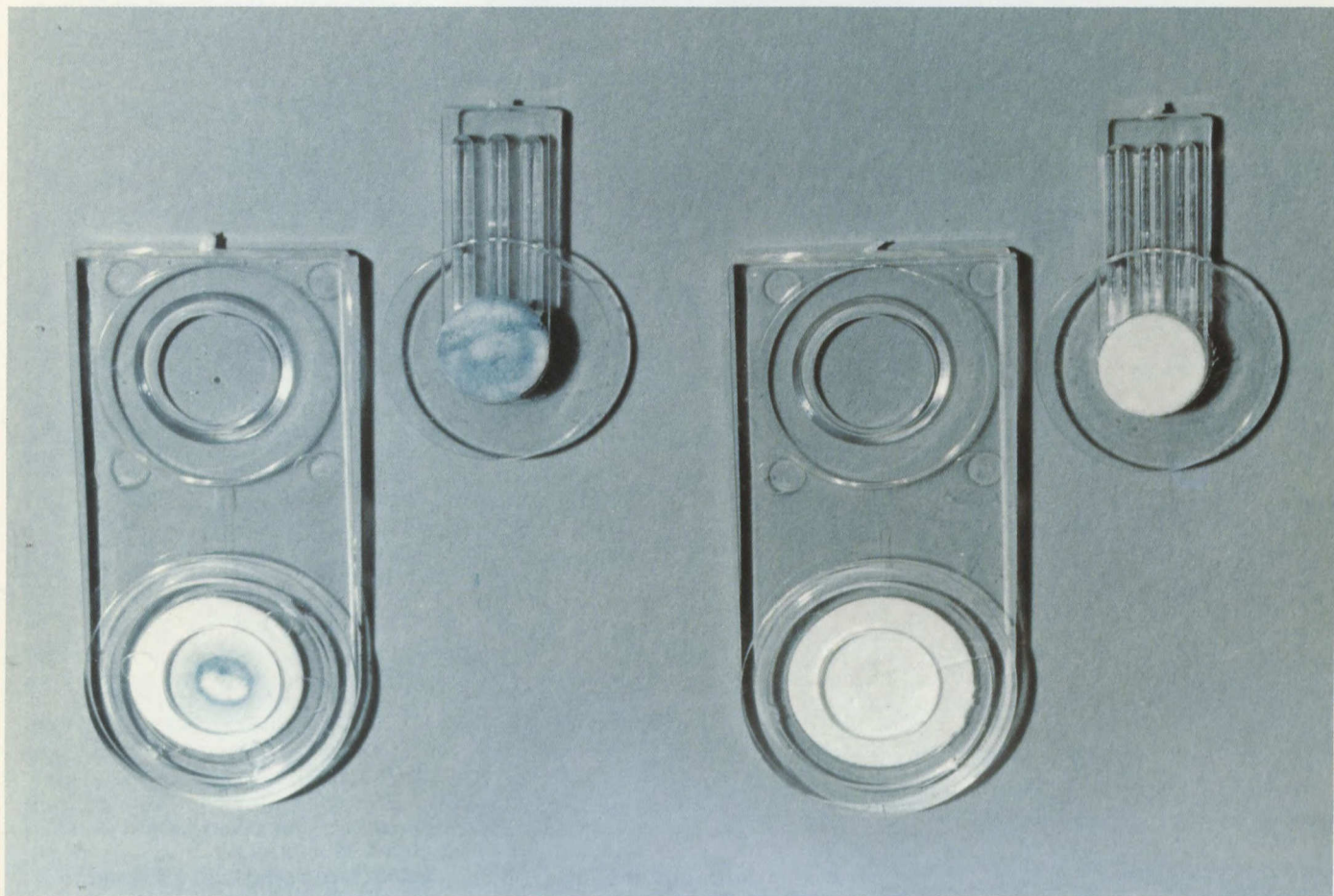
action, if coloured spots or streaks appear on the paper, the troops immediately don their protective masks. The type of agent may then be determined by comparing the colour of the spots or streaks on the paper with the colour chart.

The chemical agent detector is made of a reasonably strong paper with good wet strength and stability in storage when kept dry and away from sunlight. The paper is loaded with three water insoluble dyes to permit detection and differentiation between G, H and V agents. Each sheet of paper is perforated to allow

easy removal from the booklet. There are 12 sheets 6.4 x 10.2 cm assembled in the booklet. The paper's adhesive backing is protected by silicone treated Kraft release paper. This design allows easy attachment to water repellent treated combat cloth as well as practically any other type of surface, with a gloved hand if necessary.

The detector paper can be produced in larger individual sheets or in different sized booklet form. Quotations on these alternatives may be arranged on request.

Supporting the individual soldier in the field are the self-administered tests and commands in which he carries out his own duties and functions in CW protection and detection. It is in these latter functions that more complex and versatile detection equipment can be found along with more general purpose protection equipment and devices. The Canadian Armed Forces has tested and is using a variety of equipment among which are a complete detector kit, chemical agent and a protective canopy bag and protective material kit. Ongoing extensive testing of CW testing devices.



DETECTOR, CHEMICAL AGENT, NERVE VAPOUR

The Canadian Armed Forces has developed and taken into service a simple, inexpensive, expendable device for the detection of dangerous concentrations of nerve gas vapours, which requires a minimum of training to use.

Because this item is on issue to the individual soldier, it is designed to be simple, low cost and small in size. Its use is two-fold:

a) To quickly determine if a chemical attack detected by a "gas alarm" system is dangerous in the

immediate vicinity of the individual;

b) To quickly determine when it is safe for an individual to unmask.

The chemical reaction is of the fail-safe type.

The detector consists of two main parts — a plastic body containing an enzyme impregnated test paper; and a plastic holder containing a chemically impregnated test paper. When the test paper in the body is moistened, exposed to the atmosphere and then pressed in contact with the test paper in the holder, the test paper in the body will change colour to blue or green in

the absence of nerve agent vapour. If nerve agent vapour is present the colour of the test papers will remain unchanged after contact with each other.

The detector, which is 8.9 x 2.9 x 0.65 cm, is packaged in an airtight, moisture-proof foil wrap for protection against environmental conditions until required for use. An instruction sheet and a silica-gel air dryer agent pack are included. These individual units are then packaged in groups of 40 in an airtight, moisture-proof container 9.5 x 9.5 x 5.1 cm.

III. SUPPORT

Supporting the individual soldier in the field are the sub-units, units and commands in which he serves, each with its own duties and functions in CW protection and detection. It is in these larger formations that more complex and versatile detection equipment can be found along with more general purpose protection equipment and devices.

The Canadian Armed Forces has tested and is using a variety of equipment among which are a complete detector kit, chemical agent; and a protective casualty bag and protective material kit. Undergoing extensive testing are CW training devices.



DETECTION EQUIPMENT

DETECTOR KIT, CHEMICAL AGENT (C-2)

The Detector Kit, Chemical Agent (C-2) is designed for issue to a small unit. It is easily operated by one person with a minimum of training. The kit may be used for:

- Determining the presence or absence of chemical agents resulting from an attack;
- Identifying chemical agents;
- Collecting vapour samples of unknown chemical agents for laboratory identification;
- Identifying when it is safe to

unmask for either short ($\frac{1}{2}$ -hr.) or long (12-hr.) periods;

- Testing whether an area is chemically contaminated;
- Monitoring for the expected arrival of a downward vapour hazard;
- Testing for the presence of chemical agent after decontamination operations.

The kit consists of a vinyl coated carrying case designed to withstand prolonged exposure to severe environmental conditions. The case contains:

a) Paper, Chemical Agent Detector, Liquid, Three-Way — used to identify the presence of liquid chemical agents of the G, V and H

types (one booklet of 25 sheets supplied).

b) Detectors, Chemical Agent, Nerve Vapour — to detect the presence of relatively high concentrations of nerve vapour agents. These detectors may also be used in conjunction with the air sampling pump, contained in the kit, to detect low concentrations of nerve agent vapours (20 detectors individually packaged are supplied).

c) Detector Tubes, Plain — used in conjunction with an air sampling pump to detect the presence of and identify the various blister, blood and choking chemical agents (30 tubes packaged in six packets are supplied).

d) Detector Tubes, White Band — used in conjunction with an air sampling pump to collect vapour samples of unknown agents (20 tubes packaged in four packets supplied).

e) Three Bottles of Chemical Reagents — used with the Detector Tubes, Plain, to identify the agent being sampled.

f) Air Sampling Pump — a piston type pump with a head designed to accept Detector Tubes or Detectors, Chemical Agent, Nerve Vapour. Using the nerve vapour detectors with the pump makes them more sensitive to low levels of chemical agent vapour.

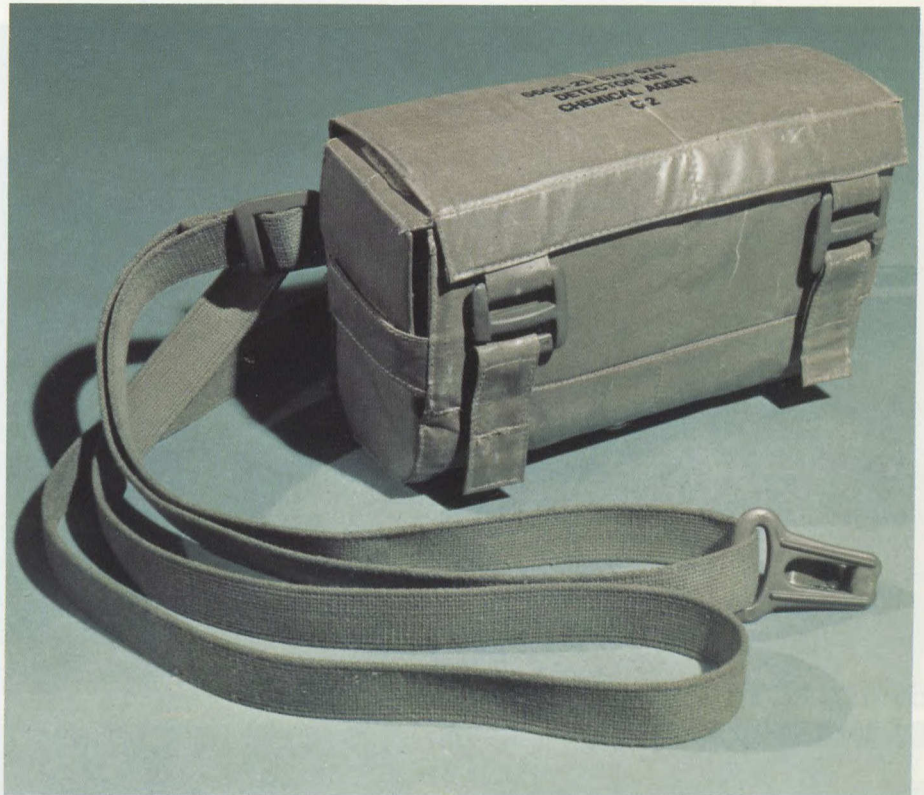
g) Detector Tube Dispenser — a container designed to hold 10 Detector Tubes.

h) Instruction Card Set — instructions for the use of the kit written in a flow diagram format.

i) Miscellaneous Items — pencil, water bottle, antifreeze solution, unknown agent report cards and envelopes.

The Detector Kit may be used to detect and identify the following agents — **Tabum (GA)**, non-persistent nerve type agent in liquid, vapour or aerosol; **Sarin (GB)**, non-persistent nerve type agent in liquid, vapour or aerosol; **Soman (GD)**, non-persistent nerve type agent in liquid, vapour or aerosol; **V-agent (VX)**, persistent nerve type agent in liquid, vapour or aerosol; **Mustard (H, HN, T)**, blister type agent in liquid, vapour or aerosol; **Phosgene oxime (CX)**, blister type agent in vapour; **Hydrogen Cyanide (AC)**, blood type agent in vapour; **Cyanogen chloride (CK)**, blood type agent in vapour; **Phosgene (CG)**, choking type agent in vapour.

The C-2 Kit weighs 1.4 kg and has overall dimensions of 14.8 cm high by 7 cm wide and 23 cm long. It has been extensively tested by the Canadian Armed Forces and is in full operational use.



III. SUPPORT

Supporting the individual soldier in the field are the medical, dental and pharmaceutical services, which with their own stores and facilities in the protection and detection of chemical warfare. It is in these latter formations that many portable and versatile detection equipments can be found along with many general purpose protection equipment and devices.

The Canadian Armed Forces has trained and is using a variety of equipment and facilities which are available designed for chemical warfare and a portable casualty bag and protective material kit (for emergency situations) training its CW training devices.



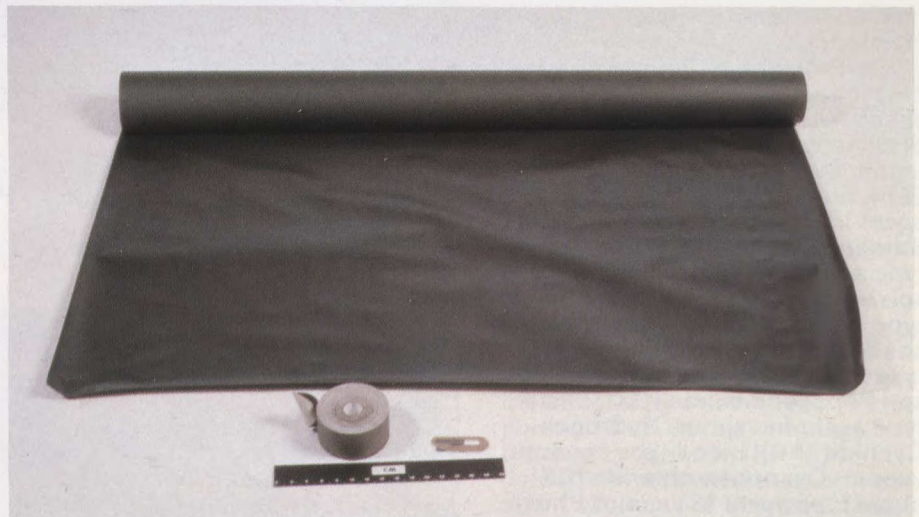
SPECIAL PURPOSE EQUIPMENT

PROTECTIVE CASUALTY BAG

The function of the Canadian-designed protective casualty bag is to provide protection to casualties when facial or head injuries prevent the wearing of a CW mask and/or when clothing is no longer intact.

Olive green in colour, the bag is a container with a zippered closure on one side and half-way across each end so that the casualty may be placed in the bag quickly and with a minimum of discomfort. Laminated plastic windows are provided for patient monitoring. A metal frame to hold the bag away from the face and webbing carrying handles are incorporated. The bag measures 251 cm by 91 cm and weighs approximately 2 kg.

Material used in the outer shell and inner liner is the same as that used in the CW protective overgarment.



PROTECTIVE MATERIAL KIT

The Canadian-produced NBC protective material kit, is intended for use in the field under conditions in which quick protective covering is essential for stores, supplies, material and even personnel in the event

of any NBC attack.

The kit consists of a roll of flexible, laminated, camouflage coloured, coated plastic; rolls of pressure-sensitive tape; a cutting knife; and a set of instructions.

TRAINING DEVICES

At the time of publication of this brochure, the Canadian Armed Forces was testing and evaluating a number of training devices designed to simulate CW attack.

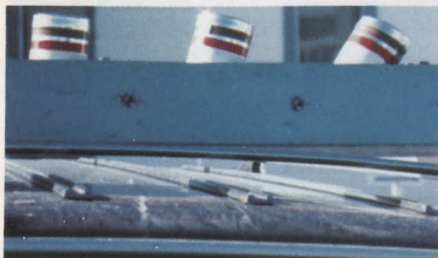
Among the promising devices at an advanced stage were the groundburst and airburst chemical simulators described below.

The **Groundburst Chemical Simulator (SC-300)** was specially designed to simulate a chemical warfare attack by projecting a cloud of chemical powder to a height of six to 10 m which spreads widely downwind. No mortar is required. Firing is electrical and projection can be singly or in groups from the ground or car top.

The simulator is 14.3 cm high and 7.3 cm in diameter. It weighs (overall) 350 g and the weight of filling is 225 g. The pack contains 18 simulators plus spike holders in a plastic foam box 57 x 39 x 18 cm.

Similar to the Groundburst Chemical Simulator, the **Airburst Chemical Simulator (SC-310)** projects a container to a height of approximately 61 m where it bursts and spreads liquid or powder chemical downwind. No mortar is required. Firing is electrical and projection can be singly or in groups from the ground or car top.

The simulator is 14.3 cm high and 7.3 cm in diameter. It weighs (overall) 400 g and the weight of the filling is 165 g. The pack contains 18 simulators plus spike holders in a plastic foam box 57 x 39 x 18 cm.



IV. NUCLEAR SYSTEMS

Canadian Armed Forces soldiers must be trained and equipped to operate in a nuclear environment. Thus, they must possess the necessary capabilities for taking appropriate protective measures against nuclear weapons effects.

In providing these capabilities the Canadian Department of National Defence has developed different types of instruments for detecting, measuring and monitoring radiation dose rates; and for training personnel in the use of these instruments.

The following pages describe equipment which is readily available, some of which has already been sold to other countries.

RADIAC SET, REMOTE MONITORING AND ALARM, AN/FDR-502(V)

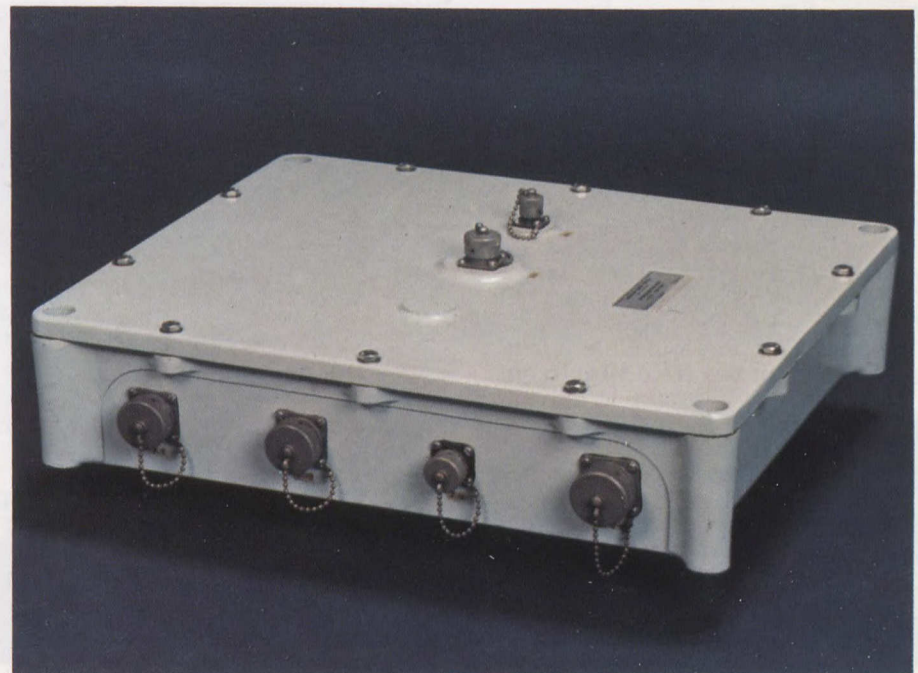
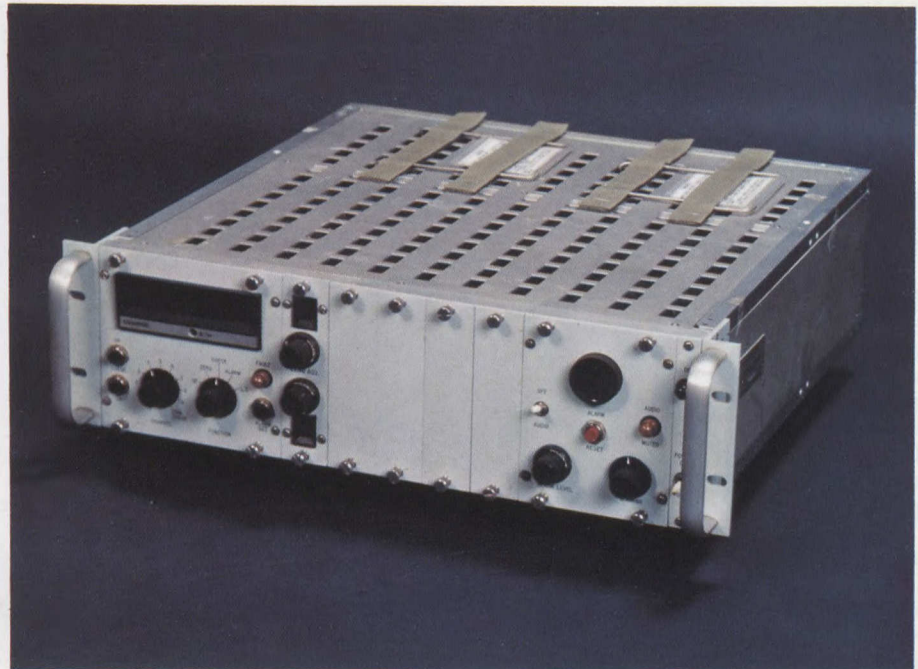
NATO STOCK NUMBER: 6665-21-857-3859

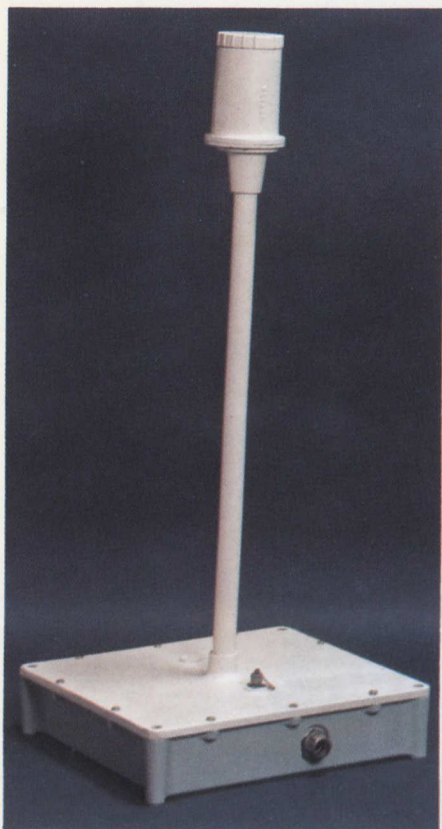
This set is designed to continuously detect and monitor gamma radiation from a mixed energy spectrum at fixed and semi-fixed ground installations, and in ships.

The set consists of a control group mounted in a 48.2 cm rack; up to 10 sensors, each connected to a sensor mount and junction box through a 1 metre length of pipe; up to two interconnecting boxes; associated cables; and a simulator (described separately) for training purposes.

The dose rate is displayed in digital form at the control group; also an audio-visual alarm is incorporated, which can be preset to any dose rate value between 0.1 and 100 rads/hr.

Provision is made for connecting a recording device, to enable a permanent record of dose rates to be kept. The sensors may be located up to 3,048 metres from the control group. The sensors are fully nuclear hardened; the control group is protected against electromagnetic pulses (EMP); and both the interconnecting box and the sensor mount and junction box are protected from lightning strikes.





Physical Details

ITEM	NOMENCLATURE	WIDTH (cm)	HEIGHT (cm)	DEPTH (cm)	WEIGHT (kg)
1	Control Group	440	131	437	13.6
2	Sensor	92 Dia	158	—	1.4
3	Sensor Mount and Junction Box	400	101	464	8.2
4	Interconnecting Box	400	101	464	11.4

Technical Details

Power Source: a. 115 volts, 60 Hz single phase; or
b. 220 volts, 50/60 Hz single phase; or
c. 24 volts, DC (Battery).

Range: 0.1 to 5000 rads/hr. in two ranges with autoranging at 100 rads/hr.

Accuracy: ± 10 per cent of reading ± 1 significant digit.

Type of Radiation Detected: Gamma radiation of mixed energy spectra,
80 Kev to 3 Mev ± 10 per cent.

Sensors: Hermetically sealed, saturated dual ion chambers filled with dry nitrogen at atmospheric pressure.

Response Time: 90 per cent maximum response within 10 secs.

Present Alarm Level: Audio-visual between 0.1 - 99.9 rads/hr. Flashing
channel number indicates alarm in that channel.

Operating Limits: a. Control group, interconnecting box and cable
assemblies -18°C to $+52^{\circ}\text{C}$;
b. Sensors, sensors mount and junction box -45°C to
 $+52^{\circ}\text{C}$.

Storage Limits: All units -62°C to $+72^{\circ}\text{C}$.

Humidity: All units, relative humidity up to 98 per cent.

IV. NUCLEAR SYSTEMS

The purpose of this section is to provide the necessary information for a nuclear system. This section covers the following topics: taking appropriate protective measures against nuclear weapons.

In providing these capabilities the Canadian Department of Postsecondary Education has developed different types of instruments for detecting, measuring and controlling radiation dose rate, and for monitoring and recording the use of these instruments.

The following pages describe equipment which is part of a series, some of which has already been sold to other countries.



SIMULATOR, RADIAC SENSOR SM-5022/FDR-502(V)

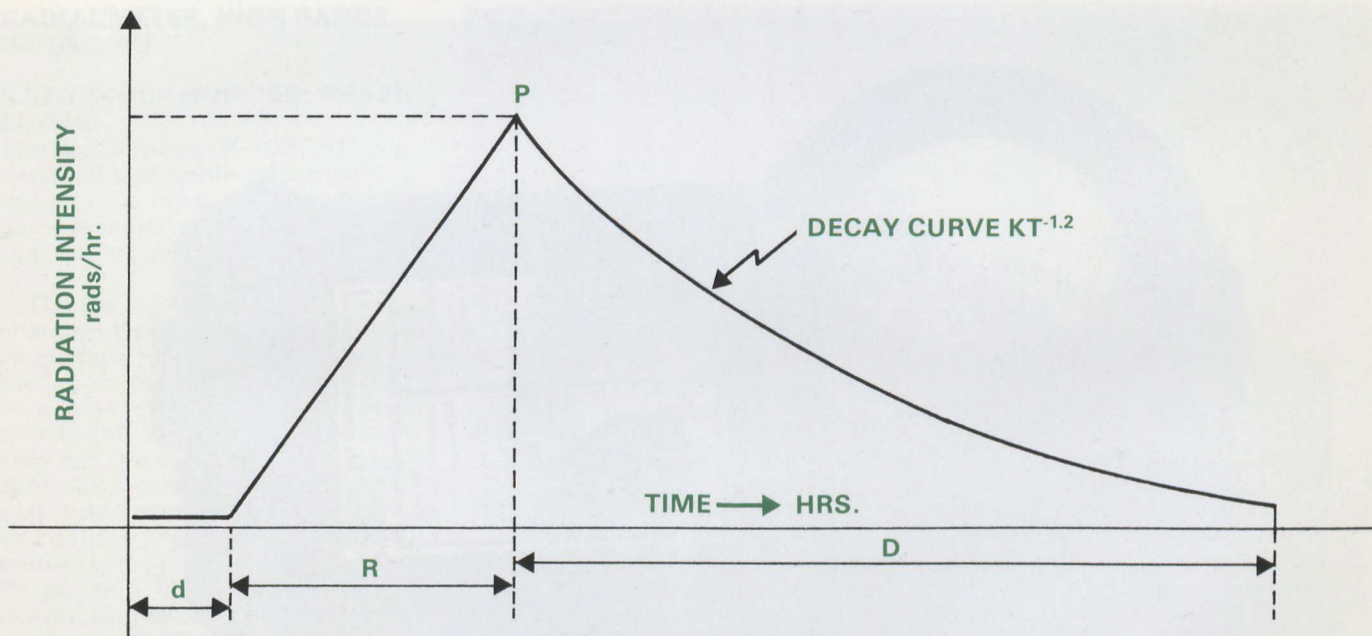
**NATO STOCK NUMBER: 6665-21-
862-7780**

The purpose of the Simulator is to simulate the function and output of the sensor of the Radiac Set, Remote Monitoring and Alarm, AN/FDR-502(V) and provide programmed signals for training operators of the radiac set.

The Simulator is a small hand-portable box which contains the electronic circuitry, a special connector, a cable and a set of four program circuit cards. In use, the Simulator is connected to, and obtains all its DC power requirements from, the interconnecting box of the radiac set, and may be located up to 460 cm from it. The special connector is attached to provide the necessary power con-

nections. A meter, calibrated in rads per hour (rads/hr.), is set into the case, with ranges of 0-100 or 0-1000 rads/hr. selectable by a switch. A second switch allows the instructor to operate the program at 16 times the normal speed, and a pushbutton switch allows him to reset the program to zero.

Each of the four program circuit cards displays the curve it produces, and indicates the specific



- d** — delay time — time from start until first indication of fallout
R — Rise time — time from start of fallout indication to time peak intensity is reached
P — Peak value — maximum intensity of radiation
D — Decay time — period from peak value to the time the program is automatically terminated by the Simulator

Physical Details

ITEM	NOMENCLATURE	WIDTH (cm)	HEIGHT (cm)	DEPTH (cm)	WEIGHT (kg)
1	Case	28	18	18	1.4
2	Cable	.6 Dia	—	460	.225
3	Program Cards	8.9	6.4	.15	.056

Technical Details

Power Source: DC power requirements are all obtained from the Radiac Set, Remote Monitoring and Alarm, AN/FDR-502(V). No other external power is required.

Range: 0-100 rads/hr or 0-1000 rads/hr selected by switch.

Program Circuit Card Parameters:

CARD	d (HRS)	R (HRS)	d (HRS)	P (RADS/HR)
1	1.58	1.19	8.62	440
2	1.19	1.53	11.13	300
3	1.98	1.53	11.13	190
4	1.19	1.15	8.35	1000
5	1.98	1.53	11.13	95
6	1.98	1.15	8.35	490

values of delay time and rise time (in hours), and peak value (rads/hr) of the radiation. Any one of the four program cards may be used singly, or any two together. If two cards are used, a double-peaked curve representing their algebraic sum is produced, which simulates radiation effects from two nuclear explosions. A typical curve is shown below.



RADIACMETER IM-5016/PD

NATO STOCK NUMBER: 6665-21-104-4837

This Radiacmeter is a hand-portable instrument used for the measurement of medium and low-range gamma radiation of mixed energy spectra.

The Radiacmeter is of the Geiger-Mueller type, and is powered by a single 6.75 volt DC mercury battery, type BA 1100/U. Radiation field intensity is indicated on a direct reading meter calibrated in roentgens/hr. (r/hr.) and milliroentgens/hr. (mr/hr.) in two ranges. The meter's high range is .1 to 10 r/hr.; the low range covers from 0-100 mr/hr. The Radiacmeter is housed in a die-cast aluminum case. A single operating control provides OFF, CHECK, HIGH and LOW positions, and is so located on the top of the case to enable the operator

to change the switch's position with the thumb of the hand holding the instrument.

A standard adjustable one-inch web carrying strap with open hooks at each end, fastens to metal loops on the case. Operating instructions

in both French and English are printed on a plate attached to the top of the radiacmeter case.

A non-military, less rugged instrument, the RD-5016, which operates on carbon zinc batteries, is also available.

Physical Details

The instrument including battery weighs 1.65 kg. The dimensions are as follows:

- a. width — 11.11 cm
- b. height — 11.11 cm
- c. depth — 22.86 cm

Technical Data

Power Source: Single 6.75 volt DC mercury battery type BA 1100/U.

Energy Response: 80 Kev to 5 Mev

Range: low — 0-100 mr/hr.
high — .1-10 r/hr.

Accuracy: ± 20 per cent over entire range

Detector: 2 Geiger-Mueller tubes

Operating Environment: altitude — up to 2,438.4 m above sea level
temperature — -40°C to $+52^{\circ}\text{C}$
humidity — up to 100 per cent relative humidity

RADIACMETER, HIGH RANGE IM-108C/PD

**NATO STOCK NUMBER: 6665-21-
870-5440**

The Radiacmeter IM-108C/PD is a hand-held, portable instrument used for the measurement of gamma radiation of mixed energy spectra, in roentgens per hour (r/hr.).

The Radiacmeter is of the ion-chamber type, and is powered by a single type BA30 1.5 volt battery. Radiation field intensity is indicated on a meter scale calibrated from 1 to 500 r/hr. The die-cast aluminum case has two external operating controls: a combined OFF/SET switch and zeroing potentiometer, and a three position CHECK/ZERO switch, spring loaded to the operating position. Operating instructions in both English and French are printed on the instrument. A canvas carrying case is supplied which has a plastic viewing window. The case is fitted with a loop for attachment to the operator's belt and with an adjustable web shoulder strap attachable to the case by two hooks.

A non-military, less rugged instrument, the RD-108D (NSN 6665-21-847-1954) is also available.



Physical Details

The total weight of the radiacmeter is 1.58 kg.

The dimensions are as follows:

width — 10.69 cm

height — 12.06 cm

depth — 17.14 cm

Technical Details

Power Source: Single battery 1.5 volt type BA30

Energy Response: .80 Kev to 5 Mev

Range: 1-500 roentgens/hr.

Accuracy: ± 15 per cent of reading over entire range

Operating Environment: altitude — up to 18,288 metres above sea level

temperature — -54°C to $+65^{\circ}\text{C}$

humidity — up to 100 per cent relative humidity

V. LIST OF CANADIAN MANUFACTURERS

THE ACTON RUBBER LTD.

Case postale 300
881, Landry
Acton Vale (Québec) Canada
J0H 1A0
Tel: (514) 546-2776
Telex: 055-60364

PRODUCTS: Chemical warfare protective gloves and overboots.

ANACHEMIA LTD.-LTÉE

Case postale 147
Lachine (Québec) Canada
H8S 4A7
Tel: (514) 489-5711
Telex: 055-66129
Cable: ANACHEM

PRODUCTS: Chemical warfare detection devices and kits.

AOCO LIMITED

66 Mobile Drive
Toronto, Ontario, Canada
M4A 2R7
Tel: (416) 752-8780

PRODUCTS: Specially designed combat spectacles.

CANADIAN ARSENALS LIMITED LES ARSENAUX CANADIENS LIMITÉE

5, Montée des Arsenaux
Ville de la Gardeur (Québec) Canada
J5Z 2P4
Tel: (514) 581-3080
Telex: 05-24642

PRODUCTS: Chemical warfare protective face mask.

CELANESE CANADA INC.

Case postale 6170, succursale A
800, boulevard Dorchester ouest
Montréal (Québec) Canada
H3C 3K8
Tel: (514) 878-1581
Telex: 055-60728

PRODUCTS: Outer material for chemical warfare protective overgarment.

**GENERAL TIRE & RUBBER CO. OF CANADA
LIMITED**

Industrial Products Division

Welland, Ontario, Canada
L3B 5P7
Tel: (416) 735-5631
Telex: 021-5126

PRODUCTS: Chemical warfare protective face mask and canister.

**HAND CHEMICAL INDUSTRIES
Division of Lorcon Inc.**

221 Nipissing Road
Milton, Ontario, Canada
L9T 1R3
Tel: (416) 878-2831 (Milton)
(416) 925-2119 (Toronto)

PRODUCTS: Simulated chemical warfare airburst and groundburst chemical dispensers for training purposes.

NOR BAKER INDUSTRIES LIMITED

175 Deerfield Road
Newmarket, Ontario, Canada
L3Y 2L8
Tel: (416) 364-6461

PRODUCTS: Specially coated plastic material and kits for nuclear, biological and chemical warfare protection.

R-METRICS LTD.

486 Wyecroft Road
Oakville, Ontario, Canada
L6K 2G7
Tel: (416) 845-6036
Telex: 06-986766

PRODUCTS: Nuclear warfare detection devices and kits.

UNIROYAL LTD.

51 Briethaupt Street
Kitchener, Ontario, Canada
N2H 5G5
Tel: (519) 822-3790 (Guelph Research Laboratories)

PRODUCTS: Inner liner for chemical warfare protective overgarment.

VI. NATO

STOCK NUMBERS

COVERALL	— NSN 8415-21-869-7985
OVERBOOTS	— NSN 8430-21-860-7391
MASK	— NSN 4240-21-882-8010
DECONTAMINATING MITT	— NSN 4230-21-845-6696
PAPER, CHEMICAL AGENT DETECTOR, THREE-WAY	— NSN 6665-21-858-8494
DETECTOR, CHEMICAL AGENT, NERVE VAPOUR	— NSN 6665-21-846-4563
DETECTOR KIT, CHEMICAL AGENT (C-2)	— NSN 6665-21-870-6740
PROTECTIVE CASUALTY BAG	— NSN 8415-21-880-6450
PROTECTIVE MATERIAL KIT	— NSN 4240-21-878-3497
GROUND BURST CHEMICAL SIMULATOR	— NSN 1365-21-875-4488 (4528)
AIR BURST CHEMICAL SIMULATOR	— NSN 1365-21-885-5284 (4530)
RADIAC SET, REMOTE MONITORING AND ALARM, AN/FDR-502 (V)	— NSN 6665-21-857-3859
SIMULATOR, RADIAC SENSOR SM-5022/ FDR-502 (V)	— NSN 6665-21-862-7780
RADIAC METER IM-5016/PD	— NSN 6665-21-104-4837
RADIAC METER HIGH RANGE IM-108C/PD	— NSN 6665-21-870-5440



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