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TM-03-97

NOOKLOOKER EVALUATION

**By: Edmonton Police Service
Ontario Provincial Police
Royal Canadian Mounted Police
Revenue Canada Customs and Excise**

TECHNICAL MEMORANDUM

**Submitted by
Canadian Police Research Centre**

October, 1996

**NOTE: Further information
about this report can be
obtained by calling the
CPRC information number
(613) 998-6343**



EXECUTIVE SUMMARY

The Nooklooker is a portable self contained video system that allows the user to look into inaccessible places and dimly lit, dark places such as suspended ceilings and under cars. Pre-production prototypes were offered to the police and security community. Three police organizations (Edmonton Police Service, Ontario Provincial Police and the Royal Canadian Mounted Police in Montreal) as well as two government security organizations (Revenue Canada Customs and Excise and one other who wished to remain anonymous) evaluated the black and white camera version Nooklooker.

RÉSUMÉ

Le Nooklooker est un système video portatif autonome qui permet de regarder dans des lieux inaccessibles et dans des endroits mal éclairés et sombres, tels les plafonds suspendus et le dessous des voitures. On a offert des modèles de présérie à la collectivité policière ainsi qu'aux organismes de sécurité. Trois services de police (Police d'Edmonton Police provinciale de l'Ontario et Gendarmerie royale du Canada - Montreal) ainsi que deux organismes de sécurité gouvernementaux (Revenu Canada Douanes et Accise et un autre service qui souhaite conserver l'anonymat) ont évalué la camera video noir et blanc Nooklooker.

INTRODUCTION

The Nooklooker video system is a portable self contained system that allows the user to look into inaccessible places and dimly lit dark places such as suspended ceilings and under cars. Pre-production prototypes of the Nooklooker were offered to the community. Three police organizations (Edmonton Police Service, Ontario Provincial Police and the Royal Canadian Mounted Police - Montreal) and two government security organizations (Revenue Canada Customs and Excise and one other that wanted to remain anonymous) evaluated the black and white camera version Nooklooker. This report is the result of their evaluations.

Four of the organizations used a CPRC evaluation form(see appendix “A”) while Revenue Canada Customs and Excise used their own internal evaluation form (see appendix “B”).

EVALUATION RESULTS

POLICE EVALUATION - APPENDIX "A"

Edmonton Police Service(EPS), Ontario Provincial Police(OPP) and the Royal Canadian Mounted Police(RCMP) in Montreal, and a government security organization used the evaluation form (see appendix "A). In all, five Nooklooker systems were evaluated(the OPP evaluated two). As can be noted, most all the evaluation categories have a sum of five responses. There was an occasional response where not all five responded to the category; for instance under #14 battery life, there were only four responses.

As can be noted in appendix "A", the evaluation was divided into two areas: general and specific. To assist in quantifying the numbers, the first three columns (Excellent, Very Good and Good) are a positive indication of the criteria being scored, while the last two columns (Fair and Poor) are an indication of the need for improvement, or dis-satisfaction in the criteria being scored. Comments provided by the evaluators are listed.

General Criteria - (see appendix "A")

1 The equipment was considered to be quite effective with an 80% positive indication.

2 Ease of use and manoeuvrability is divided with 2 positive responses and 3 negative. The following suggestions were offered to improve ease of use:

- A longer cord so you can adjust the camera by pulling it back to you, even if the pole is fully extended.
- A screw-on adjustable handle for better pole leverage when fully extended.

#3 The Nooklooker was never meant to interface with other equipment.

4,5 and 6 appearance colour and weight seem appropriate.

7 Comfort is divided. The developer has redesigned how the unit affixes to the person (see appendix "C").

- Shoulder harness a good idea but awkward in actual use as it tends to slip.

8 and 9 Durability and maintenance is a definite problem as indicated by the following comments:

- The equipment is not durable enough, it does not withstand the

bumps and bruises.

Small changes were made to accommodate these problems

- Electronic wiring and circuitry poor - easy to start out, poor charging system**

Both aspects have been surfaced with the developer.

10 There were no accessories with the units and the response should be “not applicable”.

Specific Criteria - (see appendix "A")

The category, Pertaining to Camera, numbered 1 to 7, the evaluators tended to like the present camera arrangement, although one evaluator commented that an adaptor for the camera lens or a fish eye lens might improve the system.

The category, Pertaining to Electronics, numbers 8 to 11, this was a more positive support to the present arrangement. There was an earlier indication that the internal wiring needed to be improved.

The category, Pertaining to extended unit, numbers 12 and 13 indicate that the extension is not a problem.

The category, Pertaining to Battery, numbers 14 and 15 indicate that there are some problems in this regard. The following comments tend to substantiate this:

- Suspect the evaluated unit was an initial proto-type which had severe battery problems.**
- Encountered problems with dependability of the power source.**
- Longer battery life is needed. Either a second power pack or power pack that uses disposable and/or rechargeable batteries is required. If it stops functioning at an occurrence the wait for recharging would be too long.**

These shortcomings were shared with the developer who said that some of the rechargeable batteries sent out with the units were not good. His approach now is to use regular battery packs that can be replaced easily while the unit is in use.

Number 17 Indicates that it would be advantageous to record the image on a VCR. All new units will have this feature. In 3 out of 5 cases, the investigators asked if we could hook up a video recorder. This feature would be of great assistance during our surveys.

The users indicated that the cabling setup(#18) was suitable.

The category, Pertaining to the case, indicates that size, weight and transportability was suitable.

Other comments provided:

- Integrate possibility with monitor for second person to view.
- Colour would be good if it could handle the low light.
- Camera head seemed bothered in high humidity conditions but when sealed this problem was eliminated even in a light mist.
- A better eyepiece which would conform to the shape of the eye, perhaps made of flexible rubber. The problem is that light through the eyepiece was emitted in darkness thus exposing user location.
- On an operational call attempted to look inside a bedroom window under dark conditions. There was not enough illumination depth to make out any features in the room. This could be because the I/R beam is being reflected by the glass window surface or the I/R beam strength is not sufficient (see comment below).
- Remote mount for flashlight/I.R. light near the camera to help offset “splash” off glass and better light output for camera is required. Suggest that Laser Products “Sure Fire” light is a good flashlight with I.R. capability.
- Colour camera and view finder would aid in identifying objects in camera view (black and white images make this harder).
- An on/off switch for the I.R. light or a cover over the I.R. LED's I.R. lights are a waste of power and sometimes hinder views through windows due to the “splash” of light off the glass.
- A better yolk system for mounting the viewing unit to the body.

REVENUE CANADA CUSTOMS AND EXCISE EVALUATION - APPENDIX "B"

Eight Customs and Excise Inspectors evaluated one black and white version of the Nooklooker. The overall impression of the Nooklooker was very positive. Most Inspectors found it to be an invaluable and needed tool for their day to day operations. They used it to examine areas that were not physically or easily accessible, such as above rafters, ceiling vents, lockers, poorly lit areas and other high or confined spaces. From a health and safety point of view, they were glad that they didn't have to crawl under working belts or between pipes to access an area.

The Nooklooker was light and easy to manoeuvre. The clarity and range of view of the visuals was good. The areas examined were clearly seen through the eyepiece.

Recommendations

1. Improvements should be made to the on/off switch (this would avoid the unit being accidentally turned on thus draining the battery).
2. Harness should be re-designed for a more comfortable and secure fit for both male and female officers.
3. Nooklooker should be labelled water-resistant and not waterproof. Officers were advised that it should not be completely submerged in any type of liquid as this would cause damage.
4. There should be a complete instructional manual with every unit.

In appendix "B" the evaluation was broken down into two main criteria; general and specific. As can be observed, most of the evaluation categories have a total of eight responses. An occasional response is missing however. Both the general and specific evaluation criteria was positive as the majority of the scores were good to excellent. The Customs Inspector evaluators were quite pleased as can be noted from their comments:

- The Nooklooker was used to successfully examine areas above rafters vents, tubing and confined spaces.
- Great tool but try to enhance clarity and field of view. Have detachable ends small enough to look into pipes.
- On a Marine Rummage Course successfully used to examine vents, high places on

ships, areas unsafe to enter and poorly lit areas. Vision was excellent. For searching a ship this tool is essential.

- Excellent piece of equipment - could enlarge eyepiece/ viewing screen.**
- An additional lens would be useful and should be waterproof.**
- By far the best piece of equipment I have used for Custom purposes. The clarity of the visual was great. Very good for confined spaces.**
- A tool that can be used often in the marine, rail and commercial highway environment.**
- Unit used to examine the air conditioning room which was not accessible without shutting down the whole ship's air conditioning. From a health and safety point it was great.**
- A needed tool if rummaging through ships. The Nooklooker is invaluable.**
- System once adjusted, felt comfortable.**

SUMMARY

This report addresses the evaluation of a pre-production Nooklooker prototype video system. The Nooklooker is a self contained portable system that assists investigators in viewing areas that would otherwise be either unsafe, or impractical. The participating police and security organizations who submitted their comments found the equipment to be practical, and beneficial.

The following comments resulting from the field testing have been shared with the manufacturer so that modifications can be made in order that an improved product will be readily available to the Canadian police and security community:

- 1. Improve the on/off switch mechanism.**
- 2. Redesign unit fit to the human body.**
- 3. Include complete instructional manual with unit.**
- 4. Improve battery power.**
- 5. Ruggedize unit to withstand operational use.**

As a result of these recommendations, the manufacturer has incorporated the modifications into the colour version unit meant to be used for 12 hours of continuous use in the inspection of ships and hazardous areas.

Appendix "C" presents photographs of this new colour version Nooklooker.

Photograph 1 - Nooklooker fully extended with the operator viewing the monitor.

Photograph 2 - operator viewing the monitor that is velcroed to the Nooklooker vest.

Photograph 3 - complete Nooklooker system. Viewing monitor can be adjusted on the vest. Electronics and battery system are affixed to a waist belt thereby making the system easy to carry and reducing operator fatigue.

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CANADIAN POLICE RESEARCH CENTRE....

CENTRE CANADIEN DE RECHERCHES POLICIERES

TECHNOLOGY PARTNER EVALUATION

Project Title : NOOKLOOKER Evaluation

Objective: To assess under operational conditions the device called the NOOKLOOKER. The purpose of this assessment is to suggest improvements that could be incorporated into future units.

To:

Evaluators name: _____ Phone: _____ Fax: _____

Date Sent: _____ Return to John Arnold, Fax (613) 954-1473

GENERAL CPRC EVALUATION CRITERIA

<u>EQUIPMENT ITEM</u>	NOOKLOOKER	Excellent	Very Good	Good	Fair	Poor	Not Applicable
1) Effectiveness of equipment (for intended purpose)		1	1	2	1	<input type="checkbox"/>	<input type="checkbox"/>
2) Ease of Use / Manoeuvrability		<input type="checkbox"/>	<input type="checkbox"/>	2	3	<input type="checkbox"/>	<input type="checkbox"/>
3) Compatibility with other equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	1	2
4) Appearance		<input type="checkbox"/>	<input type="checkbox"/>	4	1	cl	<input type="checkbox"/>
5) Colour		1	1	3	cl	<input type="checkbox"/>	<input type="checkbox"/>
6) Weight / Size		1	1	3	cl	<input type="checkbox"/>	<input type="checkbox"/>
7) Comfort		<input type="checkbox"/>	1	1	2	1	<input type="checkbox"/>
8) Durability		<input type="checkbox"/>	1	cl	<input type="checkbox"/>	4	<input type="checkbox"/>
9) Maintenance		1	<input type="checkbox"/>	cl	1	2	1
10) Accessories (list each piece)		<input type="checkbox"/>	<input type="checkbox"/>	2	<input type="checkbox"/>	<input type="checkbox"/>	3
11) Overall rated performance		<input type="checkbox"/>	1	2	2	<input type="checkbox"/>	<input type="checkbox"/>
12) Test Conditions..							
13) Additional comments (including any precautions, warnings/cautions)							

CPRC SPECIFIC EVALUATION CRITERIA -

<u>EQUIPMENT ITEM</u>	NOOKLOOKER	Excellent	Very Good	Good	Fair	Poor	Not Applicable
Pertaining to Camera							
1) Camera size		1	1	2	1	<input type="checkbox"/>	<input type="checkbox"/>
2) Camera attachment to unit		<input type="checkbox"/>	1	2	1	1	<input type="checkbox"/>
3) Picture quality		<input type="checkbox"/>	1	2	1	1	<input type="checkbox"/>
4) Picture stability		<input type="checkbox"/>	1	3	1	<input type="checkbox"/>	<input type="checkbox"/>
5) Reaction to light level		<input type="checkbox"/>	1	2	2	<input type="checkbox"/>	<input type="checkbox"/>
6) Use in the dark		1	1	1	1	1	<input type="checkbox"/>
7) Field of view		<input type="checkbox"/>	1	3	1	<input type="checkbox"/>	<input type="checkbox"/>
Pertaining to Electronics							
8) Cabling of camera unit to viewer		<input type="checkbox"/>	2	2	<input type="checkbox"/>	1	<input type="checkbox"/>
9) Attachment to body		<input type="checkbox"/>	2	1	<input type="checkbox"/>	2	<input type="checkbox"/>
10) On/Off switch accessibility		<input type="checkbox"/>	1	3	1	<input type="checkbox"/>	<input type="checkbox"/>
11) On/Off switch durability		<input type="checkbox"/>	1	2	1	<input type="checkbox"/>	1
Pertaining to extended unit							
12) Is unit easily deployable . comment below		Yes 5	No <input type="checkbox"/>	Maybe <input checked="" type="checkbox"/>			
13) Extension capability		<input type="checkbox"/>	4	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>EQUIPMENT ITEM</u>	NOOKLOOKER	Excellent	Very Good	Good	Fair	Poor	Not Applicable
Pertaining to the batteries							
14) Battery life		1	<input type="checkbox"/>	1	<input type="checkbox"/>	2	<input type="checkbox"/>
15) Downtime due to battery charging.		<input type="checkbox"/>	1	1	<input type="checkbox"/>	2	<input type="checkbox"/>
16) Ease of use of battery charger		<input type="checkbox"/>	2	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17) Would a video recorder be useful (comment below)		Yes 3	No 1	Maybe 1			

Pertaining to cables							
18) Cabling setup		1	<input type="checkbox"/>	3	1	<input type="checkbox"/>	<input type="checkbox"/>

Pertaining to equipment case

19) Size	1	<input type="checkbox"/>	3	1	<input type="checkbox"/>	<input type="checkbox"/>
20) Weight	1	<input type="checkbox"/>	3	1	<input type="checkbox"/>	<input type="checkbox"/>
21) Transportability	1	1	2	EI	1	<input type="checkbox"/>

22) Comments on future enhancements desired and are there other systems that the Nooklooker could be integrated with
(Please use additional paper if necessary)

23) Other comments (Please use additional paper if necessary)

THANK YOU FOR PARTICIPATING

APPENDIX B

REVENUE CANADA CUSTOMS & EXCISE
 ENFORCEMENT DIRECTORATE
 TECHNICAL SERVICES

EQUIPMENT EVALUATION

Project Title : NOOKLOOKER Evaluation

Objective: To assess under operational conditions the device called the NOOKLOOKER. The purpose of this assessment is to suggest improvements that could be incorporated into future units.

To:

Phone:

Evaluators name/ Title: _____

GENERAL EVALUATION CRITERIA

<u>EQUIPMENT ITEM</u>	<i>Excellent</i>	<i>Very Good</i>	<i>Good</i>	<i>Fair</i>	<i>Poor</i>	<i>Not Applicable</i>
1) Appearance	1	4	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) Colour	1	5	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) Weight	2	5	1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) Ease of Use / Manoeuvrability	3	3	1	1	<input type="checkbox"/>	<input type="checkbox"/>
5) Compatibility with other equipment	2	4	1	<input type="checkbox"/>	<input type="checkbox"/>	1
6) Comfort	1	4	1	2	<input type="checkbox"/>	<input type="checkbox"/>
7) Durability	1	3	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) Securing of items	<input type="checkbox"/>	5	<input type="checkbox"/>	2	1	<input type="checkbox"/>
9) Vision	5	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) Maintenance Accessories (list each piece) ..	<input type="checkbox"/>	2	3	<input type="checkbox"/>	<input type="checkbox"/>	3

SPECIFIC EVALUATION CRITERIA

EQUIPMENT ITEM	Excellent	Very Good	Good	Fair	Poor	Not Applicable
1)Design structure	1	2	3	<input type="checkbox"/>	<input type="checkbox"/>	2
2) Energy adsorption	<input type="checkbox"/>	1	2	1	<input type="checkbox"/>	3
3)Range of view	3	<input type="checkbox"/>	2	<input type="checkbox"/>	<input type="checkbox"/>	2
4)Range of movement	4	<input type="checkbox"/>	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5)Effectiveness of equipment for intended purpose	4	3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6)Resistance to shattering	<input type="checkbox"/>	3	2	<input type="checkbox"/>	<input type="checkbox"/>	2
7)Quality enhancement of acuity	4	<input type="checkbox"/>	1	<input type="checkbox"/>	<input type="checkbox"/>	2
8)Overall rated performance	4	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9)Test Conditions

11) Additional comments (including any precautions, warnings/cautions)

NOOKLOOKER NEW COLOUR VERSION

Photograph #1 - Colour Nooklooker extended

Photograph #2 - Viewing Nooklooker monitor

Photograph #3 - Complete Nooklooker system unextended



Photograph 1



Photograph 2



Photograph 3