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# “MILLENNIUM BACKSAVER” DUTY BELT SUSPENDER

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## TECHNICAL MEMORANDUM

Submitted by  
Canadian Police Research Centre

**December, 2000**

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

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# "Millennium Backsaver" Duty Belt Suspender

## EXECUTIVE SUMMARY

In the Fall of 1999, CPRC was approached by Constable Mark Scharfe of the Ottawa Carleton Regional Police Service (OCRPS) who had developed the "Millennium Backsaver" duty belt suspender. CPRC agreed to work with him to have the product and its benefits evaluated by the Canadian police community. In the first six months of the year 2000, CPRC sent out suspender evaluation packages.

Agencies assisting in the evaluation of the duty belt suspenders were Abbotsford Police Department, Bathurst Police Force, Durham Regional Police, Midland Police Service, OCRPS, Royal Canadian Mounted Police, Six Nations Police and Toronto Police Service. Several departments responded that they were not going to evaluate the duty belt suspender because they wore their body armour under the officer's shirt. The suspenders, which are intended to be worn **over the body armour**, would thus be exposed and present a threat to the officer's safety.

Thirty (30) officers from the above agencies took part in the evaluation. This report summarizes their responses.

The average personal indicator of discomfort or pain while not wearing the suspenders, on a scale of zero to ten, was 6.59. This perceived discomfort or pain indicator, on the same scale of zero to ten, dropped to 2.0 with the wearing of the suspenders. The conclusion is that the suspenders quite noticeably reduced personal discomfort or pain.

## SOMMAIRE

À l'automne 1999, l'agent Mark Scharfe, du Service de police régional d'Ottawa-Carleton (SPROC), a présenté au Centre canadien de recherches policières (CPRC) ses bretelles pour ceinturon de service « Millennium Backsaver ». Le CPRC a accepté de travailler avec lui pour faire évaluer le produit et ses avantages par la communauté policière du Canada. Au cours du premier semestre de 2000, le CPRC a donc distribué des bretelles aux fins d'essai.

Les services de police suivants ont participé à l'évaluation des bretelles pour ceinturon de service : service de police d'Abbotsford, service de police de Bathurst, service de police régional de Durham, service de police de Midland, SPROC, Gendarmerie royale du Canada, service de police des Six-Nations et service de police de Toronto. Plusieurs services ont refusé d'évaluer les bretelles parce que leurs membres portent un gilet pare-balles sous leur chemise. Les bretelles, qui doivent être portées **par-dessus le gilet pare-balles**, seraient ainsi exposées et présenteraient un risque pour la sécurité des policiers.

En tout, trente policiers ont participé à l'évaluation. Le rapport ci-joint résume leurs observations.

En moyenne, l'indice personnel d'inconfort ou de douleur sans les bretelles, sur une échelle de zéro à dix, était de 6,59. Sur la même échelle, cet indice a chuté à 2,0 avec le port des bretelles. On peut donc conclure que les bretelles réduisent de façon importante l'inconfort ou la douleur éprouvés par les policiers.

## HISTORY

At Ottawa-Carleton Regional Police Service (OCRPS), the idea of duty belt suspenders arose after the issuing of .40 cal. ammunition, the Glock handgun, the baton, and the remaining equipment which had to be attached to the duty belt. The weight of the duty belt with all issued equipment was / is fourteen (14) pounds.

OCRPS uniformed officers reported back pain, bruised hips, rawness of skin over hips and stomach problems (including acid indigestion). It was suggested that wearing the duty belt, with its fourteen (14) pounds of equipment, was at least somewhat responsible for increased need for chiropractic service and the increased insurance costs associated with this benefit.

In April 1999, four sets of duty belt suspenders were issued to patrol officers.

In May 1999, the Deputy Chief of OCRPS gave authorization for eight officers to be tested at the Montfort Injured Workers Centre in Ottawa. The purpose of the study was to determine if use of suspenders would alleviate any of the complaints and possibly increase physical performance levels. The entire report can be seen in Appendix 'A'.

## EVALUATION

Twenty-eight (28) persons returned completed evaluation forms and two (2) returned only the last page.

The following sixteen questions were posed to the evaluators. Their responses are noted after each question and their personal comments are noted in the following section.

- 1) Do the suspenders take the weight of the duty belt off your hips?
  - 27 or 96.5% responded yes.
  - 1 responded no.
  
- 2) Do the suspenders help take the pressure off your waist?
  - 27 or 96.5 % responded yes.
  - 1 responded no.
  
- 3) Do the suspenders take the pressure off your lower back?
  - 25 or 89.3 % responded yes.
  - 2 or 7.1% responded no.
  - 1 did not answer this question.
  
- 4) When wearing the suspenders in the car, are they smooth or noticeable on your back when pressed against the car seat?
  - 16 or 57.1% responded smooth.
  - 11 or 39.3% responded noticeable.
  - 1 did not answer this question.
  
- 5) Do you find the suspenders easy to attach to your uniform?
  - 24 or 85.7% responded yes.
  - 4 or 14.3% responded no.

- 6) Is running easier with the belt when suspenders are supporting the belt?
- 23 or 82.1% responded yes.
  - 2 or 7.1% responded no.
  - 3 did not answer this question.
- 7) Is climbing flights of stairs easier while wearing the suspenders?
- 24 or 85.7% responded yes.
  - 2 or 7.1% responded no.
  - 2 did not answer.
- 8) When standing for long periods of time do you find less bruising on your hips while wearing the suspenders?
- 23 or 82.1% responded yes.
  - 4 or 14.3% responded no.
  - 1 did not answer.
- 9) Do you find less pressure on your stomach when wearing the suspenders, particularly when sitting?
- 19 or 67.9% responded yes.
  - 9 or 32.1% responded no.
- 10) If the suspenders were issued equipment, would you wear them?
- 24 or 85.7% responded yes.
  - 4 or 14.3% responded no.

The number of respondents is 30, an increase of 2, for questions 11 to 16.

- 11) Does your shirt stay tucked inside your pants when wearing the suspenders?
- 29 or 96.7% responded yes.
  - 1 responded no.
- 12) Do the suspenders interfere with the use of any equipment on the belt, including the firearm, baton, or spray?
- 30 or 100% responded no.
- 13) Does the suspenders help keep your duty belt level?
- 26 or 86.7% responded yes.
  - 4 or 13.3% responded no.
- 14) Have you ever experienced lower back pain while wearing the police duty belt?
- 25 or 83.3% responded yes.
  - 5 or 16.7% responded no.
- 15) If your answer to question number 14 was YES, did you find that the suspenders alleviated some of the pain and discomfort associated with the police duty belt?
- 22 or 73.3% responded yes.
  - 1 or 3.3% responded no.
  - 5 or 16.7% did not answer.

16) On a scale of 0 to 10 (0 being lowest discomfort or pain 10 highest discomfort or pain) indicate your opinion with and without the suspenders:

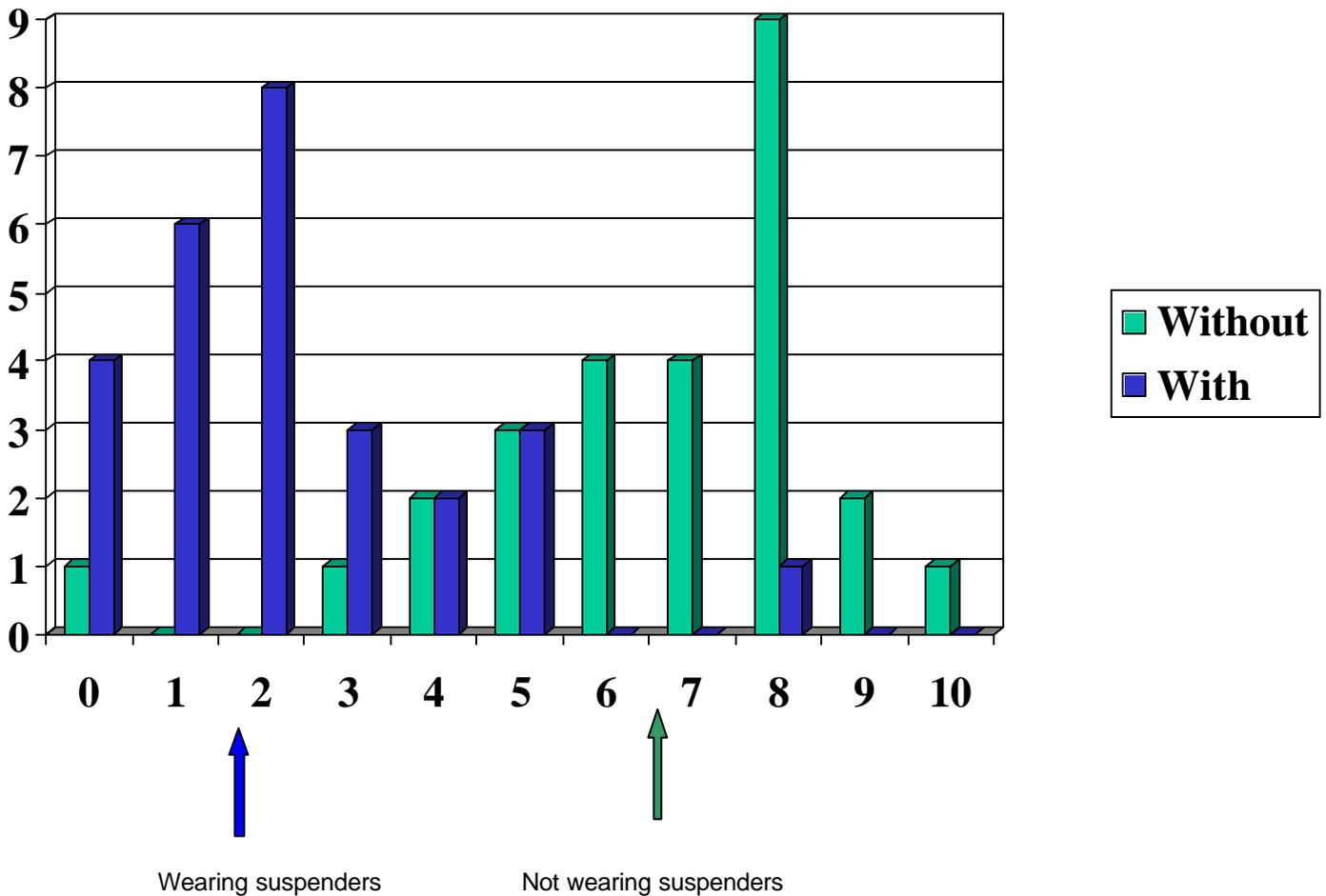
WITHOUT SUSPENDERS DISCOMFORT/PAIN IS \_\_\_\_\_  
WITH SUSPENDERS DISCOMFORT/PAIN IS \_\_\_\_\_

- 27 responded with figures
- 3 did not answer

The following chart indicates the level of discomfort or pain without the suspenders ["Without" being green] and level of pain and discomfort while wearing the suspenders ["With" being blue].

**The average without the suspenders is 6.59.**

**The average wearing the suspenders is 2.0.**



The evaluators were asked for their personal comments and, as one can see, they were not shy about

saying what they thought! See their comments below:

“ Very comfortable – everything stays in place.”

Supervisor’s comment – “I wouldn’t want to be the one to take the suspenders away from him!”

“Very good, work well. Can feel belt loops on back.”

“They work well. Front buckles were sometime irritating.”

“Rear keepers at back come unsnapped, they should just be a loop. I find the suspenders help a lot for a person with lower back problems.”

“Suspenders helped alleviate bruising of my hips, however, the weight of the belt now takes the weight on the shoulders and neck.”

“I found the greatest benefit of the suspenders is to alleviate downward pressure on the trousers.”

“My duty belt has always been a source of discomfort. Since wearing the suspenders I no longer experience a sore lower back, sore hips and my abdomen no longer gets sore. I breathe more freely.”

“The theory of the suspenders is a sound one, but improvements to the existing model are needed.”

“The suspenders were good, however, I did not like feeling them in the middle of my back. They definitely helped to relieve some of the pressure caused by wearing the duty belt!”

“A valuable piece of equipment that should be optional to all police officers!”

“Suspenders take pressure off hips and lower back improving my posture. Will definitely remain a permanent part of my uniform.”

“Wonderful!”

“Would not wear the duty belt without the suspenders.”

“Went half a shift without the suspenders and desperately wanted them back ASAP! My bruising and bursitis are improved by wearing them!”

“The only problem is that you have to wear an outer vest.”

“Good system it - takes the weight off the hips.”

“The suspenders are the best thing about my uniform other than my Glock! They have eliminated numbness in my heel, I would not be without them, my job has improved dramatically and my wife says I am more pleasant and less irritable after a long shift. I don’t think suspenders is a luxury as just sick leave prevention is a huge saving!”

“Took a little getting used too, but makes a big difference. I was always afraid one day I’d sneeze and the whole works would wrap around my ankles... that’d be nice PR, eh?”

“I found that the dome fasteners in the back dug into me and as a result I am not able to wear them.”

“Overall I am very impressed, although the black dye comes off and stains shirts. I found that I can work a 12 hour shift without once having to re-adjust my duty belt. I won’t work without them!”

## **DISCUSSION OF RESULTS**

The evaluation indicated that, in general, the use of the duty belt suspenders gave more comfort to the police officers. It was also interesting that there were a few who did not like the idea at all.

The most interesting feedback was provided by the chart which was created from the evaluators’ responses. The average personal indicator of discomfort or pain while not wearing the suspenders, on a scale of zero to ten, was 6.59. This perceived discomfort or pain indicator dropped to 2.0 with the wearing of the suspenders. The conclusion that can be arrived at is that the suspenders did quite noticeably reduce personal discomfort or pain.

From the comments received, the majority of the officers was very positive regarding the wearing of the suspenders and noted the greater comfort afforded the wearer.

If a second study should be undertaken, it is suggested that the sex of the wearer be indicated on the survey form.

The Canadian Police Research Centre wishes to thank all the police officers who participated in the evaluation. It was interesting to receive so many enthusiastic comments from the police community.

## APPENDIX 'A'

REPORT - The Montfort Injured Workers Centre  
210, boulevard Centrum Boulevard, Suite 110,  
Orleans, Ontario K1E 3V7

April 16, 1999

### Criteria for the evaluation of the Millennium Backsaver Police Duty Belt Suspenders

#### Problem

- complaints (low back, hip and stomach pain) by officers following wearing of utility belt
- male and female officers complain of different pain sites

#### Purpose of Testing Procedure

- to determine whether or not the belt is an aggravating factor for low back/hip pain and to determine if wearing belt supports (suspenders) decreases the incidence or intensity of these problems
- to determine whether or not there is measurable improvement in certain aspects of functional capacity when wearing these suspenders

#### Proposed Testing Procedure:

- 1) Test subjects: 8 - 10 officers currently working full-time regular patrol duties who are not presently under active rehab care
- 2) Functional capacities to be tested with and without suspenders:
  - floor to waist lifting
  - balance
  - stair climbing
- 3) Subjective surveys will be administered comparing comfort with and without suspenders. The survey will be approximately 1 page in length (5 - 6 questions).
- 4) Objective criteria to be measured:
  - heart rate
  - weight lifted
  - errors on balance testing
  - time to perform test item i.e. efficiency
  - muscle recruitment

Report from the Montfort Injured Workers Centre

May 17, 1999

#### Title: "Millennium Backsaver" Police Duty Belt Suspenders with Utility Belts

Dates of testing: May 10, 11, 12, 13, 1999

Testing performed by: Lillian Thibault, B. Sc. (P.T.) and Carol Leach, B. Sc. (P.T.)

**Purpose of Testing:**

1. To determine if there were any measurable differences in physical performance when the police officers performed certain tasks with and without belt support (suspenders) use.
2. To determine if there were any subjective differences in pain level or ease of functioning when the officers were tested with and without suspenders.

**Testing Procedure:**

Eight officers were tested, 2 at a time, over 4 days by 2 physiotherapists with training and with 6 years experience in doing functional capacity evaluation. Each officer performed 3 tests with suspenders and the same 3 tests without. Following each group of tests the officers completed a “comfort” survey related to the tests they had just performed. The tests performed were as follows:

<u>Test Performed</u>	<u>Objective Criteria Measured</u>
Floor to waist lifting: weighted crate (Progressing light to heavy) from floor to waist	Heart rate
Accessory muscle use	Time to perform 5 safe repetitions
Balance testing 6 patterns of gait on a 2" x 4" beam	Errors i.e. foot touching floor Involuntary balance reactions
Stair climbing 100 steps (10 up, 10 down x 10 flights)	Heart rate Time taken to perform

**TEST RESULTS**

**Subjective:**

Seven of eight officers (87.5%) reported that they had less pain in hip, back and stomach and found the testing easier when done with the suspenders. They were asked to rate their pain on a scale of 1 to 10; several officers reported minimal differences (1 - 2 points) while five out of eight (62.5%) reported differences of 4 or more points.

All but one officer reported an increased general ease of function when wearing suspenders.

**Objective:**

On floor to waist testing: 7 to 8 officers showed higher pulse rates, more accessory muscle use and slower times when tested without suspenders.

On balance testing: 6 to 8 officers had more errors and involuntary balance reactions when tested without

suspenders.

On stair climbing: 6 to 8 officers had higher pulse rates and slower times when doing stair climbing without suspenders.

### **Conclusion:**

The overwhelming majority of the officers tested showed objective, measurable improvement in performance when tested wearing the belt supports (suspenders). This correlated positively with subjective findings. Although not all officers reported the same degree of pain relief and ease of function when using belt supports, almost all reported some increased ease and decreased pain.

Similarly, not all officers showed the same degree of objective improvement and only one showed no change at all. However, most showed good to fair objective improvement.

Based on the testing, the use of belt suspenders improved physical performance, decreased pain, and increased self-reported ease of functioning.

### **Synopsis of Tested Officer's Comments**

#### **Officer #1 - Female, 3 years as police officer, 26 years old, 150 lbs., 5 ft. 4 in.**

*The duty belt caused pain in hips and had to continually adjust belt. I went to a chiropractor twice a week. Since wearing the suspenders I did not have any problem with my back - did not have to go to the chiropractor at all. Suspenders balanced the weight of the belt. They were also more inconvenient to use the facilities.*

#### **Officer #2 – Female, 2 years as police officer, 28 years old, 125 lbs., 5ft. 2 in.**

*“The duty belt made my hips sore. With the suspenders, it took the weight off my hips. It made a big difference when standing for long periods and when running.”*

#### **Officer #3 - Male, 19 years as police officer, 39 years old, 225 lbs., 6 ft. 5 in.**

*“Duty belt caused lower back fatigue and had to be regularly adjusted on hip (had to hold belt up with my hands when running). With suspenders, there was a noticeable relief of back fatigue when transferring the weight of the belt to my shoulders - did not have to hold my belt up with my hands when running. Did not have to keep pulling the belt up and adjusting same when wearing suspenders.”*

#### **Officer #4 - Male, 1 month as a police officer, 27 years old, 130 lbs., 5 ft. 2 in.**

*“After 2 weeks of wearing the belt, I had bruised hips and the gun was irritating my side. With the suspenders, it was easy to climb stairs. They took the weight off my hips.”*

#### **Officer #5 - Male, 19 years as police officer, 40 years old, 220 lbs., 5 ft. 10 in.**

*“The belt caused lower back pain, would continually be working downward, and caused me acid indigestion from the pressure on my stomach. I had to continually hold it up with my hands when running and continually had to take the pressure off my hips by holding it up with my hands when standing and walking. My skin would be raw after a strenuous shift and the gun would dig into my side. The suspenders alleviated all these problems. I*

*would not wear the duty belt without them.”*

**Officer #6 - Male, 2 years as police officer, 27 years old, 220 lbs., 5 ft. 10 in.**

*“Without suspenders, my lower back gets sore by the end of the shift. As well, I have to tighten my duty belt and as a result I get marks on my hips from the belt being on so tight. It feels like a tire wrapped around my hips. With the suspenders I can loosen off the duty belt - it makes it much more comfortable. The weight of the belt is shifted from my lower back to my shoulders resulting in no lower back pain. I find it easier to run because the duty belt is kept secure in one place and it does not fall down.”*

**Officer #7 - Male, 2 years as police officer, 26 years old, 180 lbs., 5 ft. 11 in.**

*“Without the suspenders, the duty belt digs into my hip bone. Pain (slight) in Lower back. Duty belt slides down onto pelvic bone. With suspenders, the duty belt is easily adjusted into position (no hitching up belt). Duty belt does not dig into pelvic bone and there is a decrease in the amount of pain felt in the lower back region.”*

**Officer #8 - Male, 22 years as police officer, 46 years old, 230 lbs., 5 ft. 9 in.**

*“I have colitis, however, without suspenders I have to put the duty belt on tight. This irritates the condition causing me extreme irritation. The duty belt gives me a sore back without the suspenders. I have been looking for a long time for suspenders that suit me and these certainly alleviate much of my discomfort and pain. I can keep my pants up and my shirt does not come out of the back of my pants. I do not have to continually keep lifting the duty belt. I do not want to wear the duty belt without the suspenders again.”*

## APPENDIX 'B'

### SPECIFICATIONS / CHARACTERISTICS MILLENNIUM BACKSAVER SUSPENDERS

Canadian Patent Number: 2,279,020

#### SPECIFICATIONS:

2-7-8oz. Black leather strap 1 3/8 x 47" (large size), 41" (medium size), 36" (small size), 53" (X large)

4-7-8oz. Black leather strap 1" x 8 1/2" for keepers

2-7-8oz. Black leather strap 1" x 10 1/2" for loops

2-1" Black leather strap keepers

2-1" Nickel-plated solid D-rings

16 sets - Large black enamel dome fasteners

8 sets - 3/8" Gun metal speedy rivets

1 (2pc) - 1/4" Nickel Chicago Screw

#### CHARACTERISTICS:

- 1) They are designed to take the full weight of the duty belt and all equipment, keep them level on the officer, at the desired position and, when set, they will not move out of adjustment.
- 2) The keepers work best on an expanded nylon duty belt. The keepers keep the belt rigid so it does not move or give when the firearm is drawn.
- 3) The area at the back, where the straps overlap on the officer, are joined with a Chicago Screw. This keeps the support straps in the correct position on the officer when sitting and allows for different sizes of officers to wear the same suspender system. The joint cannot be sewn or the system will bind and put more weight on one shoulder than the other.
- 4) The design of the suspenders keeps everything smooth and flush under a bullet-proof vest. This prevents irritation to the officer and/or unnecessary wear of equipment.
- 5) The quick-attach system at the front of the suspenders permits easy and fast detachment for all officers.
- 6) The width of the suspenders on the top of the shoulders carries the weight of the duty belt without causing irritation to the officer.
- 7) Because the suspenders attach at two places at the back of the belt, the belt system is kept level on the officer and does not pull up in any one particular place.
- 8) The buckle system at the front allows for different sizes of officers. When set, neither side will move thus ensuring that the duty belt stays level.
- 9) Having the support straps made out of leather instead of nylon allows the suspenders to conform to the officers shoulder profile, much the same as a leather shoe conforms to a persons foot.

The "Millennium Backsaver" suspenders' primary purpose is to alleviate lower back pain and aggravation for the patrol officer. Because the duty belt can be loosened, it decreases bruising on the hips of the male and female officers and reduces aggravations such as acid indigestion bowel irritation. By its nature, it transfers as much

weight as is comfortable for the officer onto the shoulders. The duty belt stays where it is set, thus eliminating the space between the bottom of the vest and the top of the belt. This system makes it much more comfortable to stand for hours during the shift. When in foot pursuit, the officer does not have to continually hold up the duty belt with his/her hands. A small benefit is that the officer does not have to continually keep tucking his/her shirt in at the back because the trousers stay up.

**NOTE: When first worn, the officer will feel the weight of the belt on his/her shoulders, however, after becoming accustomed to the system, he/she will find that it is comfortable and beneficial.**

## APPENDIX 'C'

### ADJUSTMENT INSTRUCTIONS – “MILLINIUM BACKSAVER” POLICE DUTY BELT SUSPENDERS

***IMPORTANT – The duty belt suspenders must never be exposed to the Public. They must be worn under a bullet-proof vest, sweater or jacket.***

The “MILLINIUM BACKSAVER” Duty Belt Suspenders are measured by the distance, over the shoulder, from the top front of the officers duty belt (while officer is wearing his/her duty belt) to the top of the back of the duty belt. **IMPORTANT:** Measure the distance at the location where you want the belt to stay. This may be one or two inches higher than where it sits on your hips now.

Sizes:                      Small 30" - 36"  
                                  Medium 36" - 41"  
                                  Large 41" - 47"  
                                  Extra-large 47" - 53"

If an officers size\* is exactly, 36", either small (S) or medium (M) will fit.

If an officers size\* is exactly 41", either a medium (M) or large (L) will fit.

If an officers size\* is exactly 47", either a large (L) or Extra-large (XL) will fit.

**\* Size is from the top of the belt in the front over the shoulder to the top of the belt at the back in inches.**

There is a slot screw that joins the two belts together – this small screw is called a “Chicago Screw”. When suspenders are taken from the box proceed as follows:

- 1) Remove the “Chicago Screw” with a flat screwdriver. It will come apart in two pieces.
- 2) Put the keepers on the belt at the back, approximately six inches apart.
- 3) Cross the straps at the back and bring the shoulder straps over your shoulders.
- 4) Loosen the front buckles, and attach the front keepers onto the duty belt.
- 5) Tighten the suspenders up at the buckles. Be sure to keep the buckles even. There is the same number of holes in the adjustment straps on either side.
- 6) When the belt is in the position that feels comfortable to the officer, get a friend to put the Chicago Screw through the adjustment holes at the back of the suspenders where the two straps cross. If the holes do not match up, pull the straps together until two holes do line up-the leather will work itself into place. Disconnect both straps at the front end of the “Chicago Screw” with a straight screwdriver.

**NOTE: You can prevent the receiving end of the “Chicago Screw” from turning by folding the leather straps back around the receiving end and then tightening the screw with a slot screw driver.**

**NOTE: Over six months, the adjustment will have to be moved up approximately 3 holes on both sides as the new leather stretches and conforms to the officers shoulders. The sizing accounts for this.**

It helps to put separate “keepers” on the inside of each side of the suspenders where they attach to the back of the belt. This will insure the suspenders do not move.

**NOTE: At the front, the suspenders can be unsnapped from the “D” ring which attaches them to the keepers. This option allows the belt to be removed at the end of the shift without taking the keepers off the belt. This also allows the suspenders to be detached at the front when the officer goes to the washroom.**

They have been designed to carry some, or all, of the weight of the duty belt. The concept of the suspenders is to transfer the weight and pressure of the duty belt to the shoulders of the officer. This results in significantly reduced bruising on the hips of female officers. It takes pressure off the lower back and reduces pressure on the auxiliary muscles in the lower back.

The design allows the duty belt to be placed in a position directly below the bullet-proof vest. The duty belt can be loosened off as the suspenders take the weight. The result is less pressure on the stomach, especially when sitting in the cruiser. The suspenders also eliminate the requirement to continually pull up and adjust the duty belt while standing. The officer doesn't continually have to tuck his shirt in at the back, as the pants stay in place.

On all officers, the suspenders reduce irritation of the skin in the hip area of duty belt.

It will take a day or two to become accustomed to the weight of the belt on the shoulders instead of the hips.

## APPENDIX 'D'

Pictures of the duty belt suspender



Vest over top of duty belt suspenders



No vest over suspenders (not recommended)



Wearing suspenders under vest



Without suspenders



Back view of suspenders crossing