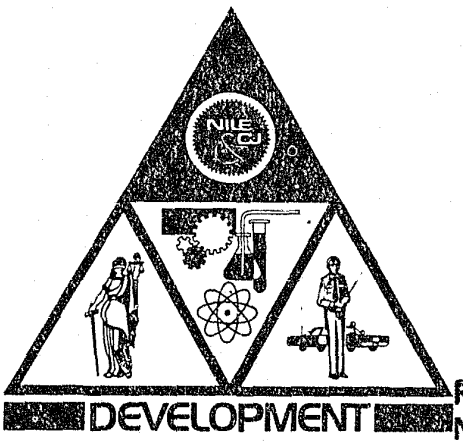
AEROSPACE REPORT NO.
ATR-74(7906)-1

EQUIPMENT SYSTEMS IMPROVEMENT PROGRAM

IMPROVED PROTECTIVE ARMOR WEARABILITY TEST AND EVALUATION PLAN

Law Enforcement Development Group

March 1974



Prepared for

NATIONAL INSTITUTE OF LAW ENFORCEMENT AND CRIMINAL JUSTICE
Law Enforcement Assistance Administration
U.S. Department of Justice

THE AEROSPACE CORPORATION

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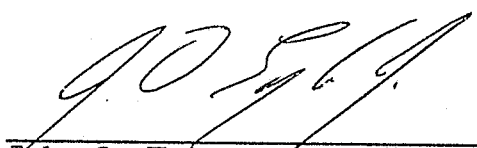

John O. Eylar, Jr., Director
Law Enforcement Development Group

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1. INTRODUCTION

1.1 PURPOSE

The body armor wearability test and evaluation program is an integral phase of the improved protective armor development program. The purpose of this evaluation effort is to investigate the comfort, maneuverability, and appearance of typical garments as tested in an operational and controlled environment. The results of the tests will be used to establish specifications and requirements for future garment development and major field evaluations of protective garments. These are the overall objectives of the test activity:

- Evaluate the appearance of integrated and nonintegrated body armor garments relative to conventional uniforms and garments.
- Evaluate the maneuverability of law enforcement officers with and without armor garments under a variety of scenarios.
- Determine the degree of personal comfort of officers under different operating conditions when wearing typical garments.
- Obtain data on the acceptability/nonacceptability of soft body armor to various functional elements of the law enforcement agencies.
- Evaluate any degradation of the garments and protective material under operational conditions.
- Develop preliminary training aids in the wear, use, and care of body armor garments.

1.2 SCOPE

The test program will be conducted in widely separated geographic and climatic areas. Tentative sites selected include:

New York City, New York
Jacksonville, Florida
Los Angeles Basin, California

Two types of tests will be conducted. In each of the three major metropolitan areas the emphasis will be on operational wearability test and evaluation. This series of tests is the subject of this planning document.

Two types of garments will be fabricated for test purposes. The first is identified as the nonintegrated type which is typically represented by an undershirt design. The second is the integrated type where the ballistic material is incorporated into a standard garment such as a sport coat or uniform. Sufficient garments will be provided to obtain the wearability characteristics of each type under typical operating conditions.

> There is no intention to obtain data on the protective characteristics of the garments since tests on protective and environmental properties have not been completed. Statistically, the sample size is such that it is calculated that the probability of assault on an officer while wearing the garment is very small.

Figure 1 shows the activities to be accomplished in the test program and the responsibilities of the organizations involved.

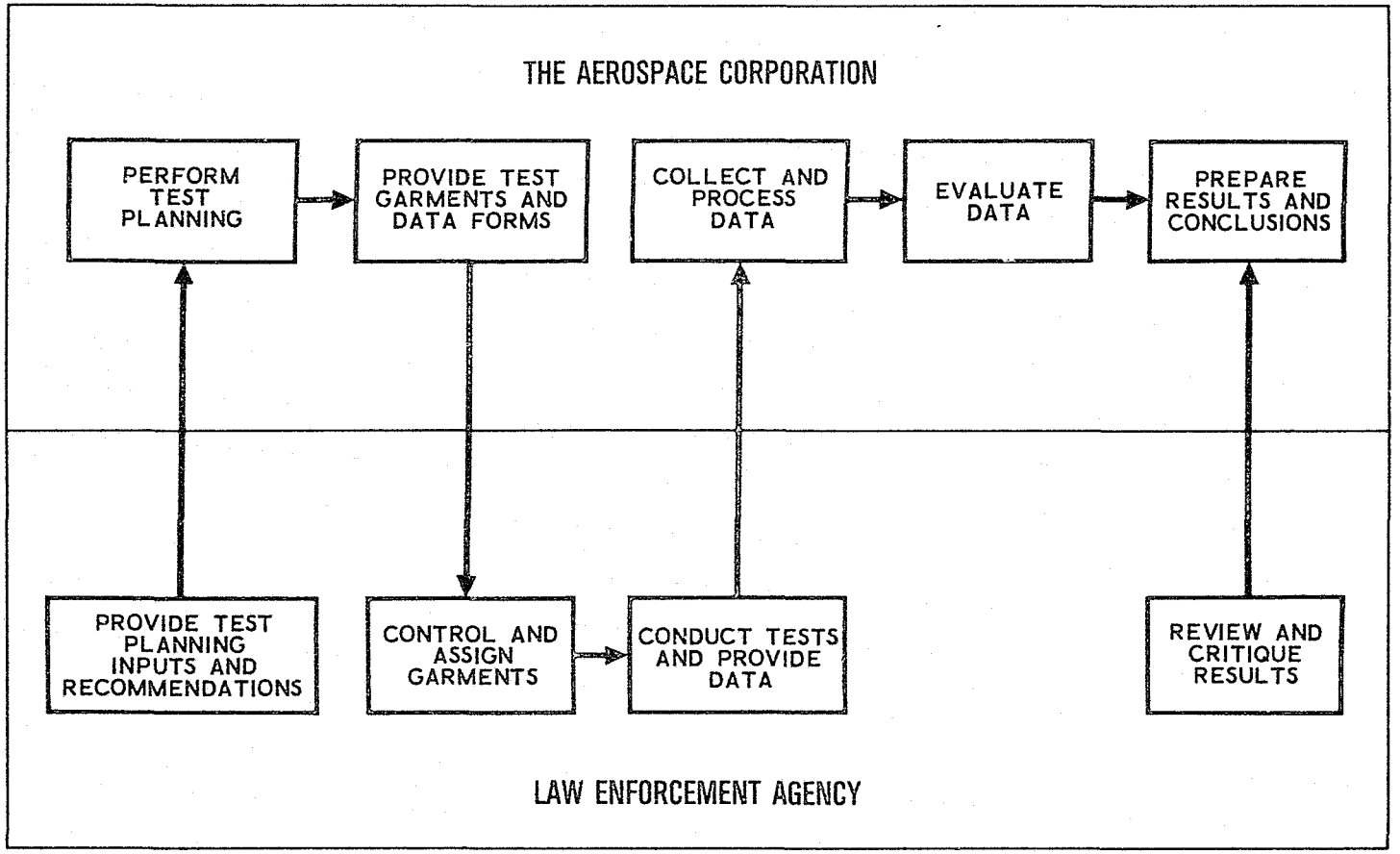

Figure 1. Test Responsibilities

2. BACKGROUND

In September 1972, The Aerospace Corporation, under contract to the National Institute of Law Enforcement and Criminal Justice of the Law Enforcement Assistance Administration (LEAA), initiated a program to develop protective garments. The objective of the program was to develop lightweight garments for public officials which were comfortable and relatively inconspicuous. In July 1973, a follow-on program based on the public official garments was implemented to consider law enforcement personnel subject to assault with firearms (handguns) or cutting weapons.

A review of assault, injury, and fatality cases within the law enforcement community indicated that the majority of assaults which resulted in death or serious injury were accomplished with handguns. A review of data from the FBI, International Association of Chiefs of Police, and metropolitan police departments indicated that handgun assaults with the threat severity of a .38 caliber police special or less comprised a large fraction of the recorded attacks. It appeared, therefore, that protection against the .38 special threat would significantly reduce fatal and serious injury assaults.

The Aerospace Corporation initiated an investigation through the U.S. Army Land Warfare Laboratory to perform ballistic evaluations on approximately 40 candidate materials and to test the blunt trauma effects on animals protected by ballistic materials. Of the materials tested, DuPont Kevlar, an extremely high-strength polymer, exhibited superior ballistic characteristics for penetration protection. Live goats were used to qualitatively test blunt trauma effects. Approximately 50 goats were tested with several Kevlar materials against the .38 and .22 caliber threat with no serious blunt trauma complications. Analytical efforts and additional testing with goats and other animals are continuing to obtain a more quantitative evaluation of the potential blunt trauma effects on humans.

Meetings were held with a number of law enforcement groups to define general guidelines on the type and application of protective garments.

In addition, meetings were held with yarn manufacturers, cloth weavers, and garment manufacturers on the feasibility of fabricating protective garments from Kevlar.

Prototypes of two basic garment types which incorporated this material have been successfully fabricated. In the integrated garment type, the ballistic material is incorporated as either a zip-in liner (leather jacket, car coat, etc.) or is fabricated into the garment (scooter coat, sport coat, etc.). The nonintegrated garment type is characterized by the undershirt or vest. The undershirt is designed for continuous inconspicuous wear while the vest may be slipped on in times of identifiable or potential emergencies. The prototype garments have been worn by several local police representatives, resulting in some minor redesign.

The wearability test and evaluation program discussed in this planning document is designed to be a further step in the development of acceptable lightweight body armor. The results will provide the basis for the specifications for and fabrication requirements for protective garments in the follow-on field evaluation program. It is planned to distribute approximately 5000 garments to a number of law enforcement agencies throughout the country for the conduct of a six- to 12-month operational field evaluation.

Figure 2 presents a functional flow of the total body armor program. The program has been structured to provide a logical progression from conception through system demonstration and to profit from the knowledge and experience of both law enforcement agencies and the armor industry in its planning and execution. Through the cooperation of these agencies it is anticipated that the resultant garments will be acceptable to them for operational use and that the garment will be technically capable of providing the required level of protection.

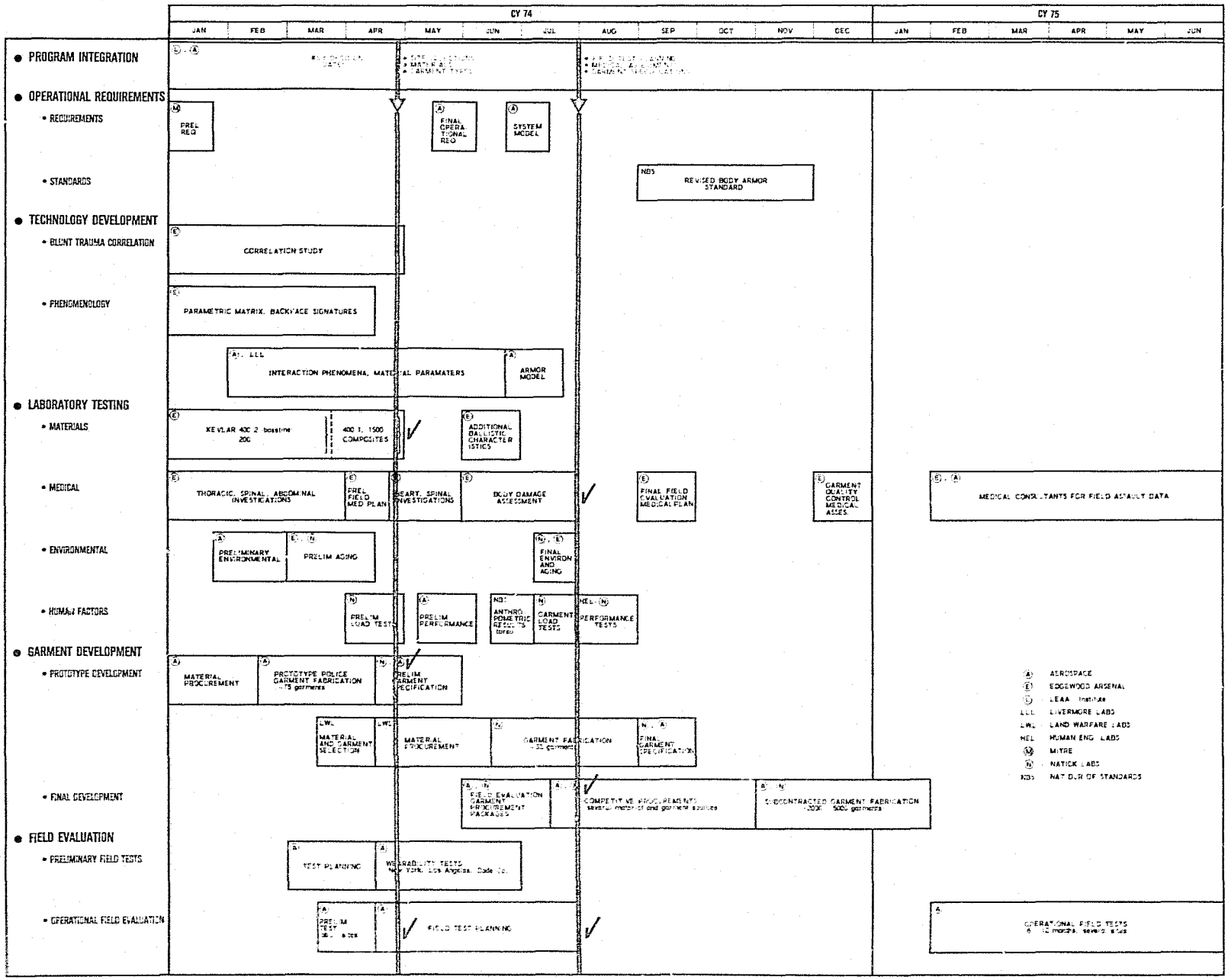

Figure 2. Body Armor Program Overview

3. TEST PLANNING CONSIDERATIONS

3.1 OBJECTIVES OF THE OVERALL BODY ARMOR PROGRAM

The number of felonious assaults on law enforcement and public officials have demonstrated a continuous increase over the past decade. Between 1960 and 1970, police fatalities increased at an average rate of over 14 percent per year. The body armor program is designed to provide equipment to reduce the number of fatalities and serious wounds to public officials from these assaults.

Although there are a number of protective devices on the market, they have been generally characterized as conspicuous, bulky, and uncomfortable for anything more than short-duration wear. Since the statistics demonstrate that the majority of felonious assaults are generally unexpected, it is highly desirable that the protective material be in the form of comfortable and inconspicuous wearing apparel.

Within this context, the overall LEAA program objectives may then be simply stated: to develop protective garments for use by public officials and law enforcement officers which are inconspicuous, inexpensive, and adaptable to a number of clothing needs.

3.2 TEST PROGRAM INTERACTIONS

As noted previously, Figure 2 shows the relationship among the various program elements. This section discusses the rationale for the wearability test program and its relationship to the other development tests and the follow-on field evaluation program.

The initial tests conducted in FY 73 were designed to demonstrate concept feasibility and to select the most appropriate material. FY 74 activities are designed to develop detailed technical data under controlled conditions. Particular emphasis is being placed on evaluating blunt trauma effects and on developing tools whereby these effects can be extrapolated from animal and/or laboratory tests to the human body.

In the latter part of FY 73 and FY 74, a number of prototype garments were fabricated whose design was based on requirements from various law enforcement groups. These garments have been exhibited to a large audience of law enforcement personnel and their comments have been noted. Only a limited number of garments have been subject to field operations and then only on a limited basis. The wearability test and evaluation program is therefore structured to obtain operational personnel evaluation of the garments for a larger sample. This program will then provide the data base for the fabrication of the approximate 5000 garments to be employed in the field evaluation program and will ensure that maximum comfort has been built into them.

3.3 AREA CONSIDERATIONS

Although the number of garments available for the wearability tests are severely limited, it is desirable to obtain as broad a variation in climatic, geographic, and uniform styling conditions as possible. New York City, Florida, and Southern California were recommended by LEAA.

New York presents the extremes in climatic conditions. Summers are hot and humid with additional temperature load contributed by both the lack of undeveloped areas and the high-rise building density. Winters are normally cold and damp.

Florida has a relatively stable climatic situation. Temperature variations are small from summer to winter with a constantly high relative humidity. Garments worn the year around by law enforcement personnel are relatively light in weight.

The Los Angeles Basin was selected on the basis of two considerations. First, seasonal temperature variations are not high, but in the summer months temperatures in the high 90's and low 100's are experienced. These high temperatures are normally associated with low humidity. Also, diurnal variations of 30° to 50° are not uncommon. Second, the city Police Academy has a nearby controlled test area and a number of departments run operational simulations at Universal Studios. These two locations can provide the facilities for the development of training aids.

3.4 GENERAL TEST PHILOSOPHY

The general test program is designed to obtain data on two critical aspects of the improved protective armor. They are the comfort of the garments under continuous wear in typical summer climatic conditions and the assessment of the wear characteristics of the garments under operational conditions.

The evaluation of the comfort of the garments will be based on data obtained from the participants. These data will be collected both through forms completed by the users and, where possible, by use of direct interviews. Comfort will be assessed on the basis of general feel of the garment, coolness, and hindrance both in normal wear and in typical operational situations (interviews, interrogations, traffic violations, arrests, pursuits, stake-outs, etc.). These data will be correlated with the attitudes and physiological characteristics of the user to obtain additional design information.

Because of the short duration of the tests, only limited information is expected on the wear characteristics of the garments. However, both during and at the conclusion of the tests the garments will be inspected for abnormal wear indications. Factors to be considered will include but not be limited to: bunching of the ballistic material; points of high stress on the basic fabric, seams, or fasteners caused by the stiffness of the material; wear or stretching of the material or garment; obvious changes in appearance; and bleeding of the material caused by moisture or perspiration.

During the test period, control and maintenance of the garments will be the responsibility of the individual officer or the participating department, depending upon the individual case. At the end of the test program, all garments will be returned to The Aerospace Corporation for post-test inspection and evaluation.

3.5 ANALYSIS AND EVALUATION

The analysis and evaluation portion of the program is designed to extract both subjective and quantitative data which will be used to improve the wearability of future garments.

During the test program, the main vehicle for data collection will be prepared forms provided to each agency participating in the tests. These forms are designed for rapid recording of data so that a minimum of time is required by the participants.

For those factors which can be quantified, a weighted variable evaluation technique will be employed by Aerospace with values assigned to both the independent and dependent variable. In those instances where the factors are a function of the judgment of the participant, they will be weighted on the basis of his attitude and physiological make-up. This approach will tend to normalize the result to a statistical mean.

4. TEST APPROACH

As stated previously, the objective of the test program is to obtain data on the wearability of selected garments under operational conditions. Statistically, it is not anticipated that a firearm or knife assault on an officer will occur during the program.

4.1 GARMENT DEFINITION

For each locale, a number of garments will be fabricated with ballistic material to the specifications for each area. Every attempt will be made to ensure that outer garments with body armor are identical in appearance to the same garments without the ballistic material. Table 1 shows the number and types of garments to be provided in each area.

Table 1. Test Garment Distribution

New York		Jacksonville		Los Angeles Basin	
No.	Type	No.	Type	No.	Type
1	Reefer Coat	6	Sport Coats	4	Vinyl Jackets
1	Summer Blouse	6	Dress Vests	2	Leather Jackets
2	Leather Jackets	4	Undershirts	4	Undershirts
6	Scooter Coats	4	Short Vests	3	Short Vests
4	Undershirts	2	Body Shirts	2	Body Shirts
4	Short Vests	3	Long Vests	3	Long Vests
2	Body Shirts				
3	Long Vests				

4.2 GARMENT TESTING

Garments selected for wearability testing represent the majority of those worn by the police in each locale. The attempt has been made, within the limitations of the number of garments, to obtain a representative sample based on discussions and inputs from the appropriate divisions within each agency. Standard garments have been emphasized in order to obtain maximum wear during the test period. It is desired that records be maintained on the participants wearing the garment on both a weekly and by incident basis.

During the test program, a data base will be developed against which the analysis and evaluation will be performed. In the operational tests, specific data will be collected against which each test objective can be assessed. Table 2 summarizes the test objectives, the data to be collected, and the method of recording the data.

Appendix I contains sample forms of the type to be used for recording data during the test program. The main source of data will be the forms completed by the participants and collected by the department. Prior to the test, a briefing and demonstration will be given to the participants on the objectives, conduct of the test, and planned follow-on activities. Also, at this time an interview will be held with each participant. At selected times during the test program, in-process reviews will be held with the participating agencies. The purpose of these reviews will be to ascertain the test program progress; collect and review preliminary data; identify, discuss, and resolve any problem areas; review and coordinate on future plans; and provide the vehicle for transfer of findings from one test area to another. These reviews are desired monthly during the course of the test program. A final review will take place at the conclusion of the data analyses and evaluation task to provide each participant with the aggregate findings and results of the total program. Support will be solicited from all participants in terms of future activities and recommendations on the fabrication and use of the garments, and to assist in the planning for the follow-on, large-scale field evaluation program.

Table 2. Operational Test Data

Test Objectives	Data Required	Method of Recording
Evaluate garment in terms of hindrance during running and pursuit	No. of occasions required to run Nature of the incident Description of critical obstacles Effect of protective garment	Participant will record observations on appropriate form at completion of shift
Evaluate participant in subduing adversary or other arrest situation	No. of occasions required to subdue or arrest Inherent difficulty of the situation Effect of garment on ability to perform Cause of increased difficulty (if appropriate)	Participant will record observations and conditions on appropriate form at completion of shift
Determine attitude of the participant on weapon access	General feeling concerning weapon access Specific incidents where access was required Observations pre- and post-incident	Participant will record observations and incidents on appropriate form at completion of shift
Determine attitude of the participant toward body armor in general and soft body armor in particular	Psychological attitude toward body armor before, during, and after test	Interviews with participants Note: It is expected that there will be some correlation between attitude and age, years on force, and previous experience

Table 2. Operational Test Data (Continued)

Test Objectives	Data Required	Method of Recording
Determine mobility of participant during rescue operations	No. of rescues attempted Nature (description) of rescue operation Controlling conditions of operation Effect of garment on performance of duties	Participant will record observation and conclusions on appropriate forms
Obtain data on comfort of garment	Weight compared to similar garments and weight distribution Comparative ease of putting on or taking off garment Effect of ballistic material on garment fit Identification of points of chafing or abrasion Ability to retain or diffuse heat General comfort compared to standard garments Factors which make the garment uncomfortable Willingness to wear garment Factors which hinder wearer during normal activities	Observation of participant, duty assignment, and shift assignment recorded on appropriate form General data on participant recorded on general data form Weather data obtained from local weather bureau

Table 2. Operational Test Data (Continued)

Test Objectives	Data Required	Method of Recording
Obtain data on comfort of garment (cont'd)	Time worn/not worn and reasons for not wearing Weather conditions a. Temperature b. Humidity c. Wind (speed) d. Cloud cover e. Precipitation Duty assignment and shift	
Obtain data on the degradation of the garments under conditions of operational wear and maintenance	Periodic inspection of garment during test phase Identification of abnormal wear or material failure caused by ballistic material Ballistic evaluation at conclusion of test program	Written assessment of garment performance during test Ballistic tests of selected garments subsequent to completion of operational tests with emphasis on penetration resistance and energy absorption relative to new material
Define the requirements for training aids in the use and mainenance of garments	Problem areas and/or deficiencies noted during operational tests	Video tape Motion pictures Still pictures Written and illustrated training material

4.3 GARMENT CARE

A series of experiments are being conducted by Aerospace and the Army to evaluate the effect of laundry and dry cleaning agents on the ballistic characteristics of Kevlar. As a preliminary measure, dry cleaning cycles should be avoided or kept to a minimum. Where the ballistic material is in the form of a zip-in lining, or otherwise removable, it should be removed before cleaning. In the undergarments, where possible, the ballistic material should be removed before laundering. Otherwise, laundering should be done in cold water with Woolite. Oxidizing agents must be avoided. Under no conditions should liquid or powdered bleach, hot water or harsh detergents be used in laundering the garments with the ballistic material in place. The normal wash cycle should be used and the garment dried in a dryer using the air cycle (no heat) setting for delicate items. Drying should be conducted for at least one hour.

4.4 TEST RESPONSIBILITIES

The two key participants in the test program are the local law enforcement agencies and The Aerospace Corporation.

4.4.1 The Local Law Enforcement Agency

Each agency will assist in the planning of the detailed conduct of the test program. This will consist of participation in selection of garment types, identification of participants, assignment of garments to precincts or special forces to the individual level, monitoring the use of garments, dispensing and collecting of data forms, identification and clarification of unusual incidents, maintenance of the garments, and review of program progress and findings. In addition, the departments will participate in the in-process reviews and provide guidance in agency-unique problem assessment.

4.4.2 The Aerospace Corporation

The Aerospace Corporation is responsible for the overall test planning with inputs and support from the local agencies. It will subcontract the procurement of the test garments from approved or capable suppliers with, where possible, both uniform and armor experience. Aerospace will provide all data forms and participate in the pre-test, in-process, and post-test reviews with the local agencies. It will collect the data forms during the test program and perform the analysis and evaluation functions. Test results will be coordinated with and supplied to the participants in a timely manner.

5. ANALYSIS AND EVALUATION

This section discusses the methods to be incorporated by Aerospace in data analysis and evaluation. The information is presented so that the user may have an understanding of the types of analysis and evaluation being planned and which dictate the data forms being provided. Although the total evaluation will not be complete until approximately 60 to 90 days after the test period, preliminary results and observations will be made available as soon as conclusive evidence of a trend or result has been obtained. These results will be used to alert other test areas of potential or real problems or trends.

5.1 DATA ANALYSIS

The data used and the method of analysis will be a function of the individual test objective and the garment being evaluated. Table 3 shows the methods to be incorporated in the data analysis task as a function of the test objectives.

The data analysis task will be structured to convert the raw data by means of suitable processing techniques to a format which can be evaluated.

5.2 DATA EVALUATION

This section presents a set of typical data evaluation formats. No attempt has been made to provide a complete set but only to demonstrate how the collected information will be presented for final evaluation. Figures 3 through 6 show the format to be used for selected items of evaluation.

Table 3. Data Analyses

Test Objectives	Data Analyses
Evaluate garment in terms of hindrance to participant during running and pursuit	The analyses should include a weighting of the severity of the situation and the degree of hindrance under the conditions
Evaluate participant performance in subduing adversary or other arrest situation	The analyses should include a weighting of the severity of the situation and the degree of hindrance under the conditions
Determine the attitudes of the participant in terms of any feeling of degradation of access to weapons	The analyses should include a weighting of the severity of the situation and the degree of hindrance under the conditions
Determine the attitude of the participant toward soft body armor garments	These data will be used to modify or shade the reports submitted by each individual as a means of normalizing the data
Determine the mobility of participant during rescue operations	The analyses should include a weighting of the severity of the situation and the degree of hindrance under the conditions
Obtain data on the comfort of the garment	One of the key factors in garment comfort is the temperature/humidity index [THI = 0.4 (TBD + TWB) + 15] THI ≥ 75 majority of persons uncomfortable THI ≥ 80 nearly all persons uncomfortable Correlation between THI, wear/nonwear, attitude, and psychological make-up of participant will be required. Temperature and humidity data should be obtained from the National Climatic Center

Table 3. Data Analyses (Continued)

Test Objectives	Data Analyses
Obtain data on the comfort of the garment (cont'd	On a garment-by-garment basis, correlate the sources of discomfort, e.g., weight, ease of wear, tightness or constraint, chafing or abrasion points, duty assignment, ease of putting on and taking off
Obtain data on the degradation of the garment under conditions of operational wear and maintenance	Photographic records of garment prior to, during, and after test program Records of number of times ballistic material washed or dry cleaned and conditions Laboratory and ballistic tests on material after test program

EXAMPLE ONLY

TEST OBJECTIVE: EVALUATE GARMENT IN TERMS OF HINDRANCE TO PARTICIPANT DURING RUNNING AND PURSUIT

GARMENT: BODY SHIRT

SITUATION SEVERITY: FELONY IN PROGRESS - 20

TOTAL No. OF INCIDENTS = 33

TOTAL ACCEPTABLE PERFORMANCE = 28

% ACCEPTABLE = 85

POSSIBLE BIASED UNACCEPTABLE = 2

POSSIBLE BIASED ACCEPTABLE = 3

PROBABLE RANGE = 76% TO 91%

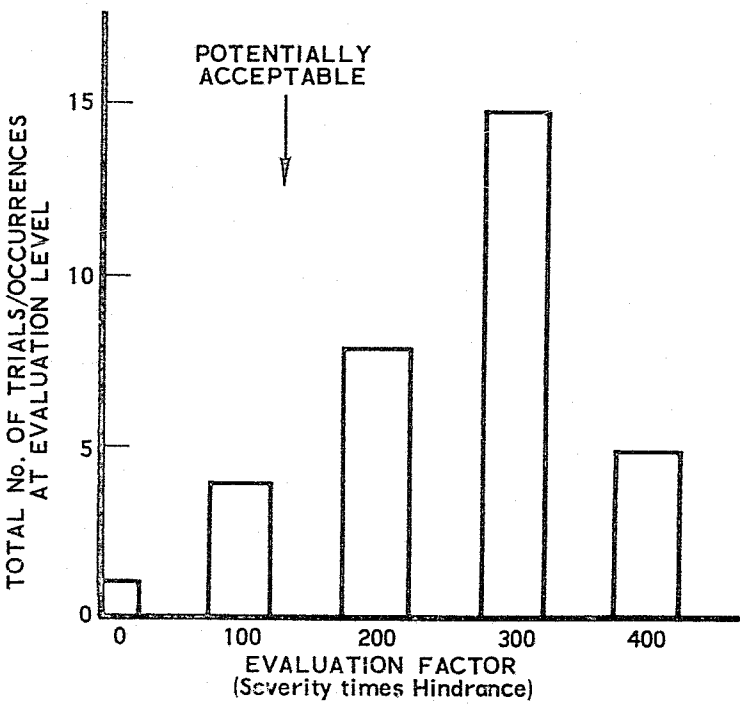

Figure 3. Evaluation During Running and Pursuit, Individual Case (Example Only)

EXAMPLE ONLY

TEST OBJECTIVE: EVALUATE GARMENT IN TERMS OF HINDRANCE TO PARTICIPANT DURING RUNNING AND PURSUIT

GARMENT: BODY SHIRT

SITUATION SEVERITY: COMPOSITE

TOTAL No. OF INCIDENTS = 91

TOTAL No. ACCEPTABLE = 65

TOTAL No. UNACCEPTABLE = 26

% ACCEPTABLE = 71%

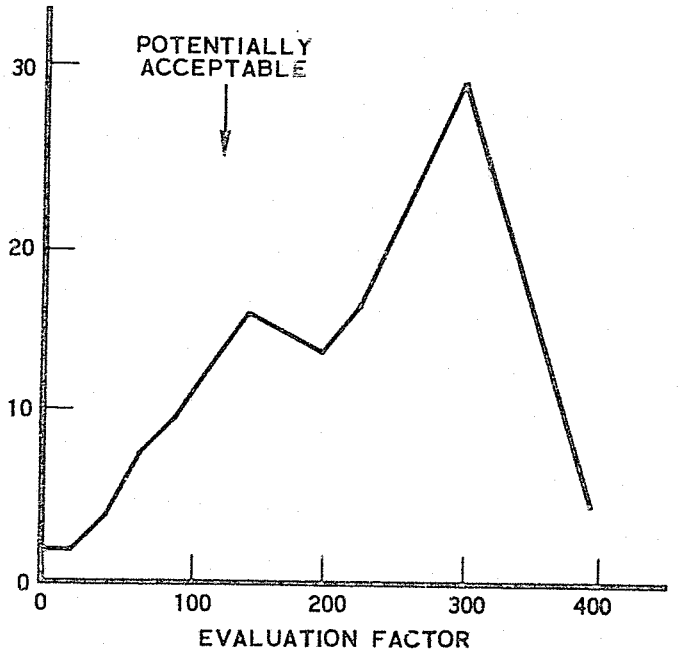

Figure 4. Evaluation During Running and Pursuit, Summary

TEST OBJECTIVE: OBTAIN DATA ON COMFORT OF GARMENT

GARMENT: BODY SHIRT

SITUATION: NORMAL CAR PATROL

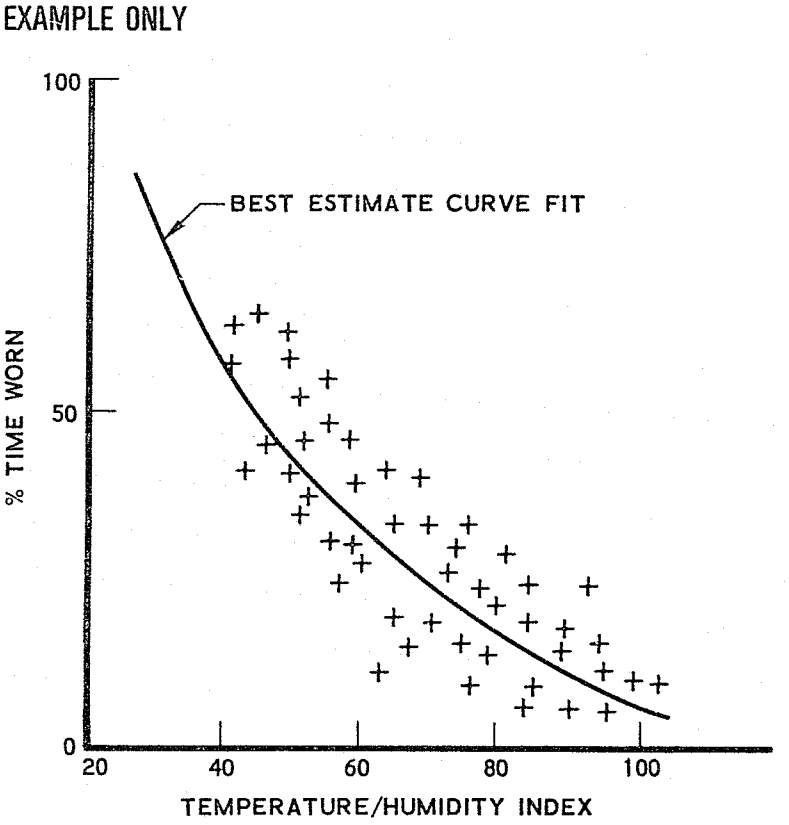

Figure 5. Comfort, Individual Garment

EXAMPLE ONLY

TEST OBJECTIVE: OBTAIN DATA ON COMFORT OF GARMENTS

GARMENTS: ALL (comparative)

SITUATION: NORMAL CAR PATROL

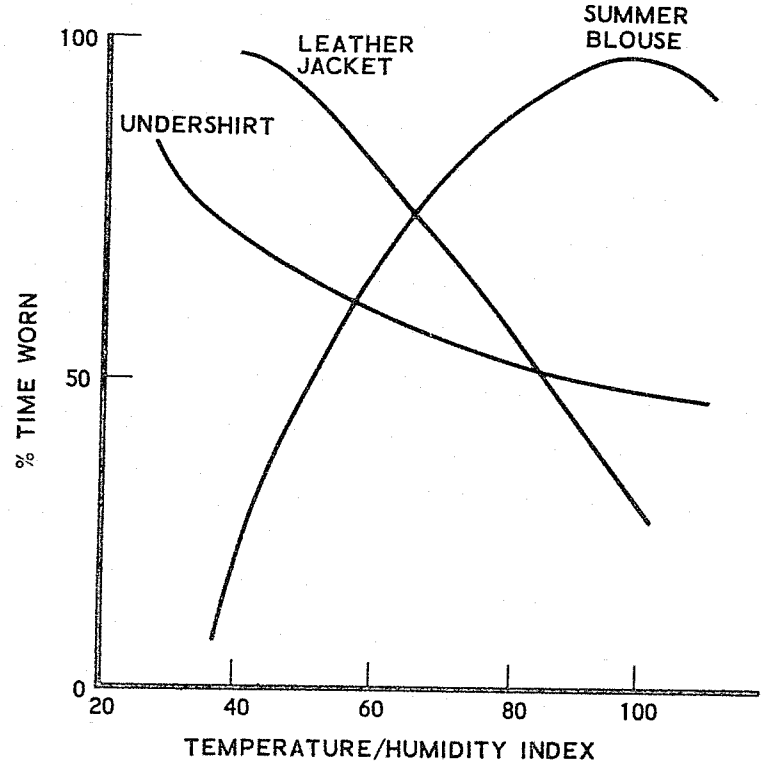

Figure 6. Comfort, Summary

APPENDIX I

TEST DATA FORMS

This appendix contains sample test data forms to be used in the test program. These forms are to be completed at the appropriate times in the program to provide the data base for analysis and evaluation. The following forms are provided:

Form W1	Letter to Participants and Sign Off Interview Information (to be completed at beginning of tests)
Form W2	Post-Test Addendum (to be completed at end of test)
Form W3	Weekly Data Form
Form W4	Incident Report Form (to be completed for each incident)

Although the statistical probability of a weapon assault during the test period is small, a finite possibility does exist.

TO ALL PARTICIPANTS IN THE BODY ARMOR WEARABILITY TESTS

On behalf of the Law Enforcement Assistance Administration (LEAA) and The Aerospace Corporation, we thank you for your willingness to participate in this body armor wearability evaluation.

The garment you have been issued is a prototype of a new development in lightweight body armor. This development was undertaken by the Law Enforcement Assistance Administration to provide improved personal protection to law enforcement personnel for a significant but limited handgun threat.

Data on assaults on law enforcement personnel have indicated that more than one-half of the guns used in these assaults have been of 38 special caliber or less. This garment has been designed to prevent penetration of bullets from weapons in this range.

A series of comprehensive tests has been conducted by U. S. Army Ballistic Laboratories to demonstrate the nonpenetration and protective qualities of the ballistic material contained in these garments. These tests have included the use of animals to ascertain the kind of tissue damage and blunt trauma effects that occur when a bullet strikes but does not penetrate the ballistic material. Although the ballistic material in these garments is designed to provide protection against the handguns listed below, the resulting bruises may be significant and will require a medical checkup.

.22 (1000 fps)	380
.25	38 special (800 fps)
.32	

The material will also prevent penetration of the 45 automatic; however, the blunt trauma effect could be serious if the wound is in a critical area (e.g., the liver, spleen, kidney, lungs or heart). The material will not provide protection against high energy handguns (e.g., 357 mag, 9mm, .44 mag, etc.) or against rifle fire which comprise less than one-fifth of available criminal weapons.

The garment you have been issued is a prototype or advanced model which may eventually be made available to law enforcement personnel through normal uniform or body armor sources. These prototype garments have been provided for the purpose of assessing their wearability only. As prototypes no claim is made for their protection capability other than the ability to prevent penetration of bullets from handguns of 38 special caliber or less, and no responsibility is assumed for any injury which may be sustained by a wearer.

Since you will be responsible for these garments for a period of two to three months, the following procedures should be followed in their maintenance:

- LAUNDER THEM AS INFREQUENTLY AS POSSIBLE. WHEN YOU DO LAUNDER THEM, USE COLD WATER WITH WOOLITE.
- Do not launder the garments in hot water or with harsh detergents.
- Do not use Clorox or similar bleaches.
- Minimize the dry cleaning cycles.
- If dry cleaning is required, request special handling similar to that provided to double knit clothes.
- PLEASE MAINTAIN STRICT RECORDS ON THE CLEANING OPERATIONS. AT THE CONCLUSION OF THE TESTS, BALLISTIC TESTS WILL BE PERFORMED AGAINST SELECTED GARMENTS.

Your critical assessment and constructive comments on these garments is requested. Your comments will help us provide the best possible protection to you and your fellow officers. Three basic forms are provided to assist you in evaluating the garments: 1) The first is an interview form to gather general information; 2) The second will permit you to evaluate the garment weekly and to keep a record of the garment's cleaning history; 3) The third requests data about the garment when you are in a "stress" or high activity situation.

Your evaluation of the garments is important. Your assessment will be used to modify these garments to make them as useful as possible to yourself and other law enforcement personnel.

If you have any problems with the protective garment or are assaulted with a gun while wearing the protective garment, your departmental point of contact is requested to call:

Robert Merkle or Lou King
The Aerospace Corporation
El Segundo, California
Telephone: (213) 648-5000

I have read this statement and understand that the garment issued to me is a prototype garment in the developmental stage only. As consideration for my participation in the body armor wearability evaluation program and the issuance of the garment to me, I voluntarily assume the risk of any injury sustained by me while I am wearing such garment, and agree that neither the Law Enforcement Assistance Administration nor The Aerospace Corporation shall have any liability for gunshot or other injuries sustained while I am wearing the garment.

_____ _____

Participating Officer Date

INTERVIEW QUESTIONNAIRE

1. Name_____
2. Badge Number_____
3. * Precinct_____
4. (2-4) Test I. D. Number_____
5. (5-8) Garment I. D. Number_____
6. (9-13) Date Garment Issued_____ Mo/Da/Yr
7. (14-18) Date Garment Returned_____ Mo/Da/Yr
8. (19-23) Test Begun_____ Mo/Da/Yr
9. (24-28) Test Terminated_____ Mo/Da/Yr
10. (29-31) Height_____ Ft._____ In.
11. (32-34) Weight_____ Lbs.
12. (35-36) Waist_____ In.
13. (37-38) Chest_____ In.
14. (39-41) Coat Size_____ _____
15. (42) Sex M_____ F _____
16. (43) Race:
    - A ___ White
    - B ___ Black
    - C ___ Latin American
    - D ___ Other (Specify)
17. (44) Marital Status:
    - _____ Single
    - _____ Married
18. (45) Number of dependents not counting yourself:
    - A ___ 0
    - B ___ 1 - 2
    - C ___ 3 or more
19. (46) How were you selected to participate in this program?
    - A ___ Volunteered
    - B ___ Selected by higher authority
    - C ___ Other (Specify)
20. (47) Have you ever participated in other experimental programs like this?
    - A ___ No
    - B ___ Once
    - C ___ Twice
    - D ___ 3 or more times
21. (48) If yes, how would you characterize your experience in these experimental programs?
    - A ___ Good
    - B ___ Fair
    - C ___ Poor
22. (49) If you answered poor, please explain.

_____

_____

_____

_____

_____

*Data Processing Purposes

Form W 1

*

23. (50) How would you classify the precinct to which you are assigned?

A _____ Residential - Single Family
B _____ Residential Apartments
C _____ Commercial
D _____ Industrial
E _____ Other (Specify)

24. (51) What is the predominant Racial/Ethnic composition of your precinct?

A _____ White
B _____ Black
C _____ Latin-American
D _____ Other (Specify)

25. (52) How would you characterize the level of crime in your precinct?

A _____ Very high
B _____ High
C _____ About average
D _____ Low
E _____ Very low

26. (53) How long have you been a Police Officer?

A _____ less than 2 years
B _____ 2 to 5 years
C _____ 6 to 10 years
D _____ 11 to 15 years
E _____ more than 15 years

27. (54) What is your present rank?

A _____ Patrolman
B _____ Detective
C _____ Sgt. or Field Supervisor
D _____ Above Sgt.
E _____ Other (Specify)

28. (55) How often do you feel threatened while on duty?

A _____ very often
B _____ often
C _____ occasionally
D _____ seldom
E _____ never

Approximately how many times have you been assaulted in the line of duty?

		Never (A)	1 time (B)	2 times (C)	3 times (D)	More than 3 times (E)
29.	(56) Handguns	____	____	____	____	____
30.	(57) Shotguns and rifles	____	____	____	____	____
31.	(58) Other dangerous weapon	____	____	____	____	____
32.	(59) Hands, arms, fists, etc.	____	____	____	____	____

33. (60) Have any of these assults resulted in hospitalization?

A _____ none
B _____ outpatient
C _____ less than 1 week
D _____ more than 1 week

34. (61) Explain each incident with injury _____

_____

_____

_____

Form W 1 *Data Processing Purposes

Daily (A)	Once a Week (B)	Several Times A Week (C)	Infrequently (D)	Very Infrequently (E)	Never (F)	Don't Know (G)		*	
____	____	____	____	____	____	____	35.	(62)	How frequently have you worn body armor in the past?
____	____	____	____	____	____	____	36.	(63)	While on duty how frequently do you feel a need for some type of protective armor?

37. (64) Do you think wearing soft body armor would make you a more effective officer?

A _____ agree
B _____ disagree
C _____ don't know

38. (65) If soft body armor were made available to you personally, how much would you be willing to spend annually to acquire a coat?

A _____ would not buy
B _____ less than $50
C _____ $51 to $100
D _____ $101 to $150
E _____ $151 to $200
F _____ over $200
G _____ don't know

39. (66-71) In what order would you recommend that your police department acquire the following equipment? (1 - 6)

(66) _____ communication helmet
(67) _____ improved airborne policing
(68) _____ lightweight body armor
(69) _____ active metal - weapon detection system
(70) _____ concealed recording system
(71) _____ routine wear ballistic helmet

40. (72) How do you think effective and lightweight soft body armor might change the way in which you perform your duty as a police officer?

_____

_____

_____

_____

Form W 1 *Data Processing Purposes

POST TEST ADDENDUM

A1. (2-4)* Test I. D. Number _____

A2. (5) Choose the statement which best fits your feeling about the soft body armor you have been wearing.

A. ____ This garment is too much trouble to wear.

B. ____ This garment should be used only for special hazardous duty assignments.

C. ____ This garment should be worn by all patrol car officers.

D. ____ This garment should be part of the patrolman's regulation uniform.

		Agree Strongly (A)	Agree (B)	Neither (C)	Disagree (D)	Disagree Strongly (E)	In general, during the test period.
A3.	(6)	___	___	___	___	___	The body armor garment was comfortable
A4.	(7)	___	___	___	___	___	The garment was easy to put on and take off
A5.	(8)	___	___	___	___	___	The garment allowed free movement
A6.	(9)	___	___	___	___	___	The garment allowed normal maneuverability
A7.	(10)	___	___	___	___	___	The garment allowed access to weapon

A8. (11) If you disagreed or disagreed strongly, please explain:

_____

_____

_____

A9. (12-19) Disadvantages of the garment include (check as many as applicable)

(12) ____ too hot

(13) ____ rides up

(14) ____ chafes

(15) ____ binds

(16) ____ heavy and cumbersome

(17) ____ confining

(18) ____ other _____

(19) ____ none

A10. (20) Describe any improvements or corrections you think would be desirable for the garment you wore.

_____

_____

Form W4

*Data Processing Purposes

WEEKLY DATA FORM

1. * Name_____

2. (2-4) I. D. Number_____

3. (5-9) Date ____/____/____ (Mo / Day / Yr)

4. (10) Duty assignment since last report
   - A. ___ auto patrol
   - B. ___ cycle/scooter
   - C. ___ foot patrol
   - D. ___ traffic
   - E. ___ detective
   - F. ___ other (Specify)

5. (11-13) Shift start time during period
   - ___ A. M.
   - ___ P. M.

6. (14) How would you characterize the level of crime in your duty area during report period?
   - A. ___ very high
   - B. ___ high
   - C. ___ about average
   - D. ___ low
   - E. ___ very low

7. (15) What amount of the time did you wear the garment during the report period?
   - A. ___ all the time
   - B. ___ all but a few hours
   - C. ___ about half the time
   - D. ___ a few hours
   - E. ___ did not wear at all

8. (16) What were the reasons for not wearing the garment?
   _____
   _____
   _____
   _____

9. * (17) Number of times garment was laundered during reporting period.
   _____

10. (18) Number of times garment was dry cleaned during reporting period.
    _____

11. (19) Number of times garment was water soaked during reporting period. (except normal laundering)
    _____

12. (20) If the garment was soaked in any liquid other than water please explain.
    _____
    _____
    _____
    _____

13. (21-30) The garment evidenced wear in the following areas:
    - (21) ___ seams opening
    - (22) ___ fasteners working loose
    - (23) ___ buttons falling off
    - (24) ___ ballistic material bunching up
    - (25) ___ wear at crease locations
    - (26) ___ wear at material edges
    - (27) ___ velcro does not hold well
    - (28) ___ appearance deteriorating
    - (29) ___ other _____
    - (30) ___ none

Form W 2

* Data Processing Purposes

Agree Strongly (A)	Agree (B)	Neither (C)	Disagree (D)	Disagree Strongly (E)	*		
___	___	___	___	___	14.	(31)	Garment was easy to put on and take off.
___	___	___	___	___	15.	(32)	Garment fits well
___	___	___	___	___	16.	(33)	Garment allowed free movement
___	___	___	___	___	17.	(34)	Garment allowed easy access to weapon
___	___	___	___	___	18.	(35)	Garment allowed normal maneuverability

19. (36) If you expressed disagreement with any of statements 14-18, please explain your feelings: _____

_____

_____

(A)	(B)	(C)	(D)	(E)			
___	___	___	___	___	20.	(37)	The garment hindered my movements while pursuing a suspect.
___	___	___	___	___	21.	(38)	The garment hindered my efforts to subdue an adversary.
___	___	___	___	___	22.	(39)	The garment hindered easy access to my weapon.
___	___	___	___	___	23.	(40)	The garment interfered with my efforts during a rescue operation.

24. (41) If you expressed agreement with any of statements 20-23, please explain your feelings: _____

_____

_____

_____

(A)	(B)	(C)	(D)	(E)			
___	___	___	___	___	25.	(42)	There was no change in garment comfort during a shift.

26. (43) If you disagreed, please explain: _____

_____

_____

_____

_____

Form W 2

*Data Processing Purposes

*

27. (44-49) If you were to characterize any discomfort experienced in wearing the garment, it would be (1 or more).

(44) _____ too hot

(45) _____ rides up

(46) _____ chafes

(47) _____ binds

(48) _____ too heavy

(49) _____ too cumbersome

28. (50) Please note any comments you feel are pertinent to your experience with the garment during this reporting period or any changes you would like to see made in the garment.

_____

_____

_____

_____

_____

_____

_____

_____

*Data Processing Purposes

Form W-2

INCIDENT REPORT FORM

1. (2-4) Participant I. D. _____ Name: _____

2. (5-9) Date: Month _____ Day _____ Year _____

3. (10-12) Time of Incident Occurrence _____ A. M. _____ P. M.

4. (13-15) Time of Report _____ A. M. _____ P. M.

INSTRUCTION: For the incident being reported, identify the type or types of activity performed, the degree of severity of each activity, and the degree of hindrance experienced in accomplishing the activity. The hindrance response should be selected from the set:

1. No noticeable hindrance
2. Noticeable hindrance, but no interference with activity
3. Moderate hindrance - activity somewhat impaired
4. Serious hindrance - activity significantly impaired
5. Total hindrance - activity completely impaired

Please respond to as many activities as were performed during this incident:

5. (16) Running and Pursuit

A. ___ Suspect expended little or no effort to escape
B. ___ Suspect expended average or moderate effort
C. ___ Suspect expended strenuous effort

5A. (17) ___ Degree of hindrance (1-5)

6. (18) Subdual of Adversary

A. ___ Suspect presented minor or no resistance
B. ___ Suspect presented noticeable resistance; about average
C. ___ Suspect presented extreme resistance; maximum effort

6A. (19) ___ Degree of hindrance (1-5)

7. (20) Access to Weapon

A. ___ Access required, but plenty of time; more than 10 seconds
B. ___ Intermediate access time; 3-10 seconds
C. ___ Imminent peril requiring immediate access to weapon; 0-3 seconds

7A. (21) ___ Degree of hindrance (1-5)

8. (22) Mobility During Rescue

A. ___ Minor or no danger to life or injury
B. ___ Significant but intermediate danger to life or injury
C. ___ Maximum response required; time-critical danger to life or injury

8A. (23) ___ Degree of hindrance (1-5)

9. (24-31) The Types of Hindrance Encountered During Incident Were In:

(24) ___ Running (26) ___ Climbing (28) ___ Reaching (30) ___ Other
(25) ___ Jumping (27) ___ Stooping (29) ___ Crouching (31) ___ None

10. (32) Briefly Describe the Incident: _____

_____

_____

_____

_____

* Data Processing Purposes
Form W 3

END