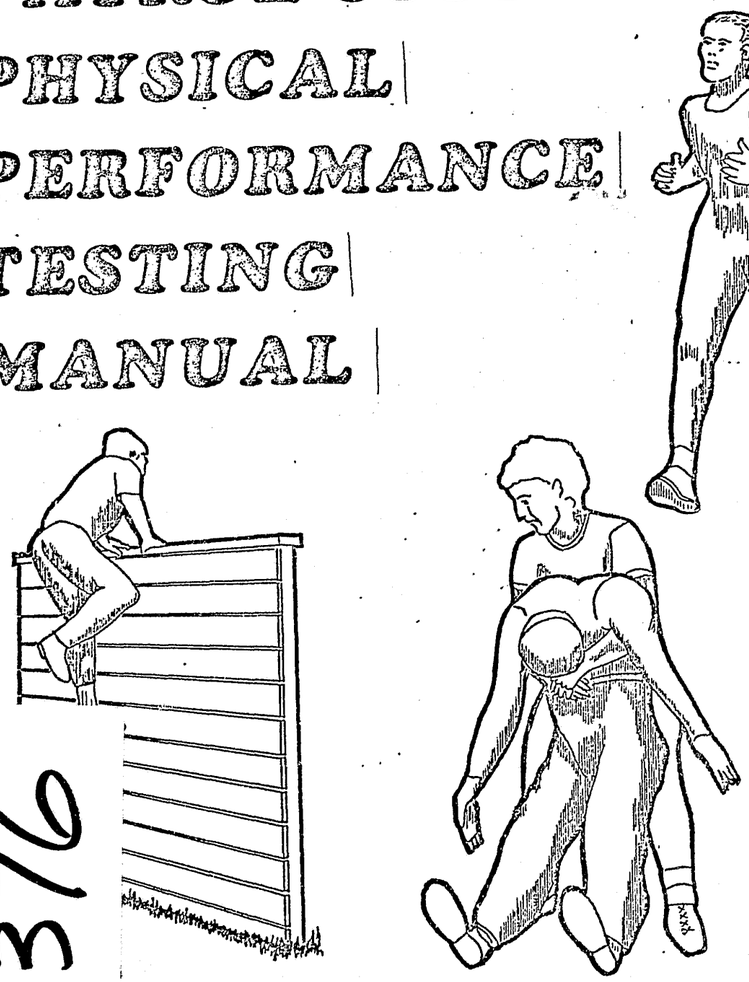
PATROL OFFICER PHYSICAL PERFORMANCE TESTING MANUAL



STATE OF CALIFORNIA

COMMISSION ON PEACE OFFICER STANDARDS AND TRAINING

California
Commission on Peace Officer Standards and Training

PATROL OFFICER PHYSICAL PERFORMANCE TESTING MANUAL

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February 1982

This project was supported in part by Grant Number 78-DF-AX-0046, awarded by the Law Enforcement Assistance Administration, United States Department of Justice. Points of view or opinions expressed in this publication do not necessarily represent the official position of the United States Department of Justice.

Graphics —
Kay Fong

PREFACE

This manual represents the culmination of a major research effort by the California Commission on Peace Officer Standards and Training (POST) to develop job-related tests of physical ability that may be used by local agencies to select entry-level patrol officers. The research was made possible by a grant from the Law Enforcement Assistance Administration. The materials contained in this manual describe the tests which were developed, and provide instruction for administering the tests.

Many people contributed to the success of the project. First and foremost, POST wishes to express its gratitude to the over 600 officers from 22 departments who were directly involved in the test development effort. Without their enthusiastic support and assistance, this project truly would not have been possible.

Special thanks go to those departments that provided test subjects for the purpose of pilot testing the experimental test batteries. They were:

California Highway Patrol
Davis Police Department
Los Angeles Sheriff's Department
Napa Sheriff's Department
Sacramento Police Department
San Francisco Police Department

POST also wishes to thank Dr. Ed Bernauer, and the staff of Human Stress Analysis, Inc., for their technical assistance on the project. Specific credit for the design and conduct of the research goes to John Berner, Ph.D., of POST staff; and to John Kohls, Ph.D., Chief of the Commission's Standards and Evaluation Services Bureau.

POST is proud to be able to offer this manual as a means of assisting local agencies with entry-level physical testing. We are confident that you will find this material useful. Any questions that you may have after reading the manual should be directed to the POST Standards and Evaluation Services Bureau at (916) 322-3492.

Norman C. Boehm

NORMAN C. BOEHM
Executive Director

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PHOTOGRAPHS

INTRODUCTION

Background

In 1979, POST received LEAA funding to develop job-related tests of reading, writing, and physical ability that could be used to select entry-level patrol officers. A survey of California Chiefs and Sheriffs that had been conducted just prior to the awarding of the LEAA grant indicated that local administrators were concerned about finding better methods of screening job applicants on the basis of these abilities. POST was further informed that it could best serve the needs of local law enforcement by developing tests that would be made available to local agencies on a voluntary basis (as opposed to the tests being mandatory for all agencies).[1] In this way, each agency could use the tests in a manner which best suits their local needs. Accordingly, POST undertook to develop job-related tests that could be adopted and used in a manner consistent with local employment practices and conditions. This manual contains information and instructions regarding the tests of physical abilities that were developed to meet this need.

Organization of the Manual

The manual is divided into four major sections. Section I provides an overview of how the tests were developed. Section II discusses the physical job demands which underlie the use of the tests, and addresses the need to substantiate these physical job demands at the local agency level. Specific instructions for administering the tests are found in Section III. Test scoring procedures are explained in Section IV.

Use of the Tests

In recent years, substantial evidence has pointed to the declining physical abilities and well-being of incumbent officers. The most telling indicators of this decline have been the dramatic increases in job-related injuries and disability retirements. As a means of reversing this trend, POST recommends that agencies (especially those that choose to screen applicants for physical fitness) give serious consideration to implementing some sort of physical fitness program for incumbent officers. Such a program will enhance the chances that those persons who are hired on the basis of having the requisite physical abilities to perform the job will maintain those abilities after hire. In this regard, the tests described in this manual may also be used to assess the physical abilities of incumbent officers as part of a physical maintenance program. Several departments have recently initiated large-scale physical fitness programs. Agencies desiring information about these programs can contact the Standards and Evaluation Services Bureau.

[1]As used in the manual, the term "agency" refers to what is more appropriately defined as "jurisdiction".

Uniform Guidelines on Employee Selection Procedures

Throughout the manual reference is made to the Uniform Guidelines on Employee Selection Procedures (1978). These guidelines, which were adopted by those agencies responsible for enforcing federal equal employment opportunity law, outline the technical requirements for developing and using job-related employee selection procedures (tests). It is not possible to address these technical requirements in their entirety in this manual. Agencies that are considering using the POST-developed physical ability tests are therefore encouraged to review and become familiar with these guidelines.

Pilot Testing of the Two Test Batteries

Both sets of tests were administered to 92 basic academy cadets and 49 incumbent officers for purposes of assessing the job-relatedness of the tests.

Work Sample Test Battery

Six of the original seven tests of simulated job tasks were found to be sufficiently reliable to retain in the Work Sample Test Battery. They are:[1,2]

BODY DRAG: Lift and drag 165-pound life-like dummy 21 feet.

SIX-FOOT SOLID FENCE CLIMB: Run 25 yards, climb fence, continue running 5 yards.

SIX-FOOT CHAIN LINK FENCE CLIMB: Run 25 yards, climb fence, continue running 5 yards.

AGILITY RUN: 70-yard course requiring abrupt changes in lateral and vertical movement.

BODY CARRY: Lift and carry 165-pound life-like dummy 90 feet (test proctor lifts and suspends legs of dummy).

550-YARD RUN: 1¼ laps of standard 440-yard running track; no obstacles.

Generic Test Battery

Of fourteen tests of fundamental abilities/characteristics, eight were found to be significantly related to one or more of the Work Sample tests.[3] The following abilities/characteristics are measured by these tests: arm strength/endurance; trunk strength; leg strength/endurance; body composition (% body fat).

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[1]The Work Sample test which was not retained was a Vehicle Push test.

[2]The most frequently reported physical activity in the job analysis was that of controlling a physically-resistant person. Unfortunately, a safe, reliable and realistic simulation of controlling a physically-resistant person could not be developed. Nevertheless, it is believed that many of the physical abilities which are required to control a physically-resistant person (strength, agility, etc.) are measured by the Work Sample Test Battery. Furthermore, specific techniques for controlling resistant persons are taught in basic training.

[3]No tests of flexibility or functional aerobic capacity were found to be related to performance on the Work Sample tests.

It was further determined that performance on the Work Sample Test Battery could be accurately predicted by four of the eight tests of fundamental abilities/characteristics (one test of each of the four abilities/characteristics). These four tests, which constitute the Generic Test Battery, are:

DYNAMIC ARM STRENGTH TEST (one minute arm crank of stationary bicycle)

TRUNK FLEXION TEST (static measure of abdominal strength)

STANDING LONG JUMP

PERCENT BODY FAT (skinfolds)

Comparison of the Two Test Batteries

Results of the research show that both the Work Sample Test Battery and the Generic Test Battery are substantially job-related, and that candidate performance on the two is highly correlated. Thus, both batteries appear to measure a similar combination of underlying physical abilities. Furthermore, there is little difference in the time needed to administer the two test batteries (see Appendices III-B and III-C), and male-female differences in performance on the two batteries appear to be highly comparable (see Appendix IV-B). Consequently, agencies may choose to employ that battery which is most appropriate given their specific needs.

In this regard, information is provided in the manual which is likely to assist agencies in making this choice. The equipment and materials needed to administer the two test batteries are described in Appendices III-B and III-C. Procedures for scoring the two test batteries are described in Appendix IV-A.

Other factors which are likely to influence the choice of test battery include: (1) the perceived risks associated with the two batteries (a matter most appropriately addressed by local medical personnel); and (2) agency practices with regard to where physical testing occurs in the selection process (e.g., as an initial screening device versus part of the pre-employment medical examination). POST welcomes the opportunity to discuss these and other factors with any agency that wishes assistance in choosing between the two test batteries.

II. STATEWIDE APPLICABILITY OF TESTS

In collecting and analyzing the physical job task information which served as the basis for the development of the tests, an attempt was made to follow procedures which would maximize the likelihood of developing tests which are job-related in all police and sheriff's departments throughout the state. Nevertheless, POST recommends that prior to using the tests, each agency review and verify the applicability (job-relatedness) of each individual test at the local level. The nature and extent of this review process will obviously vary, depending upon, among other things, the availability of previously collected agency-specific physical job task information [such as the physical job task information that was collected for each of the 219 departments in the POST Statewide Job Analysis (Kohls, Berner and Luke; 1979)]. Regardless of the procedures that are conducted to carry out such a review, POST believes that each agency should take those steps it considers necessary to confirm that the physical job tasks which underlie each test are performed by officers in the agency.[1]

Perhaps the most thorough means of documenting the job-relatedness of the tests in a given agency would be to conduct an abbreviated job analysis. For those agencies that propose to adopt this approach, an example of the type of survey instrument that might be used for this purpose is presented in Appendix II.

[1]As mentioned previously, the job-relatedness of the Generic tests was substantiated on the basis of empirical evidence which shows that performance on the Generic tests is predictive of performance on the Work Sample tests (which, in turn, simulate job tasks). The specific empirical relationships that were found among the Generic tests and the Work Sample tests are shown in Figure 3, Appendix I. Thus, for purposes of verifying the applicability of the Generic tests in a given agency, it is necessary to show that those Work Sample tests (job tasks) which are empirically related to the Generic tests, are performed in that agency.

III. TEST ADMINISTRATION

This section of the manual consists of general recommendations regarding the administration of the tests, followed by explicit test proctor instructions and other administrative materials for both the Work Sample Test Battery and the Generic Test Battery.

General Recommendations

Prescreening of Test Candidates

Some of the tests in both the Work Sample Test Battery and the Generic Test Battery require significant physical exertion which may present a risk of injury to certain individuals. As a means of identifying those individuals, and thereby minimizing the risks associated with administering the test batteries, POST recommends that all candidates be prescreened prior to taking the tests.[1] Current agency practices with regard to such prescreening vary greatly and are dependent upon, among other things:

- The characteristics of the candidate group (number of candidates; maximum age requirements, if any; etc.).
- The availability of city/county medical personnel (both before and during testing).
- Existing administrative policies/procedures.
- The advice of legal counsel.
- The manner in which physical performance testing is used in the selection process (e.g., as an initial screening device versus part of the pre-employment medical examination).
- The advice of medical consultants.

In light of the differences which exist with regard to these factors, two possible approaches to medical prescreening are briefly described in the hope that these illustrations will serve to assist local agencies in formulating their own policies and procedures. Variations of the first approach have been used by a number of agencies. The second approach is less widely used, but is growing in popularity.

Illustration A: Self-Screening by Candidate.

The most noteworthy feature of this approach is that the candidate provides an initial self-screening, and the results of this self-screening determine whether the candidate must receive a

[1]Prescreening refers to assessing whether a candidate is qualified to take the tests (and not to assessing whether the candidate is medically qualified to be a patrol officer).

medical clearance prior to participating in testing. An example of how this basic approach has been implemented by some agencies is outlined below:

(1) The candidate receives a description of the tests and:

   a. a short self-screening medical evaluation form,

   b. a medical clearance form, which includes a description of the physical performance tests,

   c. an informed consent form.

(2) The candidate is informed that he/she must complete the self-screening medical evaluation form. The candidate is further informed that if he/she responds "yes" to any of the questions on the form, the medical clearance form must be completed and signed by the candidate's personal physician and brought to the test location in order to participate in testing.[1] If the candidate responds "no" to all questions on the self-screening form, the completed and signed self-screening form qualifies the candidate for testing.

(3) As an additional precondition to participating in testing, the candidate is advised that he/she must sign and bring the informed consent form to the test site. By signing this form, the candidate acknowledges that he/she:

   a. has been informed of and understands the physical demands of the tests, and the clinical risks associated with taking the tests.

   b. accepts the risks and consents to take the tests.[2]

[1] In a variation of this approach, medical clearance is provided by the agency's physician.

[2] The exact wording of informed consent forms is usually developed in conjunction with legal counsel.

(4) At the test site, each candidate's resting heart rate and blood pressure (and perhaps other medical information) are recorded. Any person found to have a reading which exceeds normal values is required to obtain a medical clearance (as in (2) above) prior to being permitted to participate in testing.

Persons who fail to satisfy the requirements of (2), (3), or (4) above are precluded from participating in testing until such time as they are able to meet the requirements. Examples of the types of self-screening and medical forms that have been used in this approach are presented in Appendix III-A. These forms are presented for illustration purposes only, and are not intended for blanket adoption by local agencies.

Illustration B: Screening in Conjunction with Pre-Employment Medical Examination. Under this approach, all persons eligible for testing are on an eligibility list. Each individual is prescreened for testing in conjunction with the agency's routine pre-employment medical examination. Those individuals who pass the pre-employment medical exam but are determined to be ineligible for testing due to a current medical condition, are placed in a deferred status until such time as they are found to be medically qualified to take the tests. Those persons who qualify for testing and pass the physical performance tests remain eligible for employment pending satisfactory completion of any additional pre-employment requirements (e.g., background investigation). As in the first approach illustrated, each individual must sign and turn in an informed consent form prior to testing.

This approach is obviously appropriate only in those instances where physical performance testing is incorporated as one of the final steps in the selection process.

Qualifications/Training of Test Proctors

In developing the two physical performance test batteries, an attempt was made to identify/develop job-related tests that can be administered by persons with a minimum of specialized expertise. Furthermore, an effort was made to incorporate into this manual very detailed test proctor instructions that will serve to assist those persons responsible for administering the tests.

As a means of further ensuring that all tests are administered in a consistent and proper manner, POST recommends that all proctors have some background in exercise and exercise testing. Such persons need not have an extensive formal educational background, but should have a working familiarity with the types of tests that are included in the two test batteries. Persons with this type of background may be found in the physical education departments of local high schools and universities, on the physical training staffs of basic academies, on the staffs of privately-owned physical fitness facilities, etc.[1]

POST further recommends that a training session be held for those persons selected to be test proctors. An approach which has been found to be particularly effective for this training consists of having the proctors, as a group, go through the following step-by-step process for each test in the test battery.

1. Review and discuss test proctor instructions.
2. Set up all testing equipment as specified in instructions.
3. Review setup for correctness; note critical features of setup and/or errors made in setup.
4. Administer tests to each other; proctors take turns being test subjects; where appropriate, proctors compare test results obtained for given test subject (e.g., stopwatch readings).
5. Critique and discuss results of trial administrations; note critical features of test administration; resolve all discrepancies identified during trial administrations.
6. Continue steps 4 and 5 as necessary.

At the conclusion of this process, each proctor assumes his/her designated test station, and several volunteers proceed from station-to-station through the entire test battery. This allows the proctors to field test, and identify any revisions that need to be made in, the sequencing of the tests.

Medical Precautions During Testing

Agency policies also vary greatly with regard to the steps that are taken to handle medical emergencies which may occur during testing. Practices range from having a physician and an emergency medical unit present at all times, to having little in the way of a formulated procedure for handling medical emergencies. Many of the factors which influence the approach adopted by an agency are the same factors that were listed in conjunction with the prescreening of test candidates (see page 9). While POST cannot speculate as to what approach is the most appropriate for a given agency, we do recommend that each agency develop specific policies and procedures for handling any medical emergency that could occur during testing. It is anticipated that, at a minimum, such procedures will provide for: (1) the presence of someone who is certified to administer emergency medical procedures; and (2) advance specification of those actions to be taken in the event of a medical emergency (e.g., phone numbers and addresses of medical personnel/facilities to be contacted).

Assisting Candidates to Prepare for Tests

Great variation also exists with respect to the steps taken by agencies to help candidates prepare for physical performance testing. Many agencies merely provide each candidate with a description of the tests. Others supplement the test descriptions with information regarding the types of physical exercises to engage in to help prepare for the tests. Still other agencies provide locations where candidates may go to practice on some of the testing equipment. In some instances, agency personnel are available to assist the candidates at these locations. And finally, some agencies actually test candidates in advance of the formal testing date and work with the candidates over a period of time to improve their test performance.

The advantages of providing this kind of assistance are primarily those of increasing candidate awareness of the physical demands of the tests and decreasing the likelihood of physical injury among those who appear for actual employment testing. It also appears that these types of programs are of special benefit to women, and that as a result of participating in these programs, a greater percentage of women pass the physical performance tests than would otherwise be the case. Weighed against these advantages are the costs associated with these programs and concerns over potential civil liability.

With regard to this issue, POST encourages agencies to provide whatever assistance is possible to encourage candidates to physically prepare for the tests.[1]

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[1]Agencies which adopt the recommendation that resting heart rate and resting blood pressure be taken at the test site (see page 16) should ensure that this information is gathered by someone who is proficient in taking these measurements.

[1]All test announcements should contain the following instructions:

- Wear or bring standard gym clothes (T-shirt, shorts, gym shoes) to the test site. Also, bring something to wear over your gym clothes between tests.
- Do not eat anything for at least two hours before testing.
- Do not smoke or drink coffee, tea, coke, or other stimulants for at least two hours before testing.
- Do not engage in any vigorous exercise the day of testing.
- Do not take any self-prescribed medications (especially medications to relieve congestion) the day of the test.

TEST PROCTOR INSTRUCTIONS
WORK SAMPLE TEST BATTERY

The Work Sample Test Battery consists of the following six tests:

AGILITY RUN: 70-yard course requiring abrupt changes in lateral and vertical movement.

BODY DRAG: Lift and drag 165-pound life-like dummy 21 feet.

SIX-FOOT CHAIN LINK FENCE CLIMB: Run 25 yards, climb fence, continue running 5 yards.

SIX-FOOT SOLID FENCE CLIMB: Run 25 yards, climb fence, continue running 5 yards.

BODY CARRY: Lift and carry 165-pound life-like dummy 90 feet (test proctor lifts and suspends legs of dummy).

550-YARD RUN: 1¼ laps of standard 440-yard running track; no obstacles.

Each test is administered at a separate test station. All tests are timed. With the exception of the 550-Yard Run, each test is administered twice and the time for the fastest trial is used as the candidate's score. A listing of all necessary test materials/equipment is presented in Appendix III-B. Also presented in Appendix III-B are a flow chart which depicts the processing of candidates and a form for recording each candidate's test data. The specific instructions for administering each test follow.

STATION A: INITIAL PROCESSING OF CANDIDATE

Materials:

Stethoscope, sphygmomanometer (blood pressure cuff), watch with second hand, data collection forms.

Procedure:

1. Verify candidate's identity in accordance with agency's administrative procedures.

2. Review all information required to certify candidate's eligibility to participate in testing. (Procedures will vary. See page 9 for discussion of medical prescreening of candidates.)

3. Instructions to candidate:[1] *"The tests you are about to take were developed on the basis of an extensive study of the physical tasks performed by entry-level (Agency Job Title) ... All tests are timed. The faster you perform each test the better your overall score will be. Some tests will be administered more than once. Your best time will be used as your score on these tests.*

The tests will be administered at different test stations. Upon arriving at each test station, the test proctor will read you a description of the test being given at that station. If you have any questions about this information, be sure to ask the proctor for clarification before taking the test.

Prior to beginning testing, I will be taking your resting heart rate and resting blood pressure. This is being done as a safety precaution due to the physical demands of some of the tests.[2]

You will be given a form for recording your test scores which you are to carry from station-to-station. At the end of the testing session this form will be reviewed by a proctor to make sure that all the necessary test information has been collected. Do not leave until you have been informed by the proctor that complete test data has been collected for you.

[1]It is recommended that all instructions to the candidate be read verbatim. As an alternative, agencies may wish to provide each candidate with a written copy of all instructions.

[2]Although not a requirement for properly administering the tests per se, POST strongly recommends that agencies follow this practice.

Do you have any questions? Please remain seated and I will take your resting heart rate and resting blood pressure at this time."[1]

4. Determine candidate's resting heart rate (RHR)[1]

   Instructions: Candidate must remain seated in a quiet location for ten minutes. Place stethoscope just to the left of the sternum between the fourth and fifth intercostal. Begin keeping time on a heart beat. Count "0" for the first beat. Count the number of heart beats that occur in 20 seconds. Multiply this value by three to determine RHR. If RHR is greater than 90, retest candidate at five minute intervals until RHR is less than 90. If after ten minutes RHR remains greater than 90, allow candidate to rest in reclined position for ten minutes before taking final reading. If RHR still exceeds 90, defer candidate from testing pending medical clearance from a physician. Record final RHR on candidate's test form.

5. Measure candidate's resting blood pressure (RBP)[1]

   Instructions: To be taken immediately after RHR. Candidate must remain seated in quiet location. Attach blood pressure cuff snugly to candidate's dominant arm just above the elbow. Make sure there are no folds in cuff. Attach measurement dial to top of cuff. Place stethoscope on the artery which runs next to and outside of the biceps tendon at the elbow. Candidate's cuff arm should be fully extended forward and supported at approximately chest height. Close valve and pump cuff until dial reading is 180-200mm Hg. Open valve and let air bleed slowly while listening for first and last audible heart beats (which correspond to the systolic and diastolic pressures respectively). If systolic reading exceeds 140 or diastolic reading exceeds 95, place cuff on candidate's nondominant arm and repeat procedure. If readings exceed allowable maximums, return cuff to candidate's dominant arm and take readings at five minute intervals. If after ten minutes reading still exceeds 140/95, allow candidate to rest in a reclined position for ten minutes before taking final reading. If blood pressure still exceeds 140/95, defer candidate from testing pending medical clearance from a physician. Record final RBP's on candidate's test form.

6. Direct candidate to next test station.

[1]Although not a requirement for properly administering the tests per se, POST strongly recommends that agencies follow this practice.

Materials:

Stopwatch, measuring tape, traffic cones (16), cord (200'), 6"x6"x3' curbs (3), 34" high obstacle (see test materials description, Appendix III-B).

Setup:

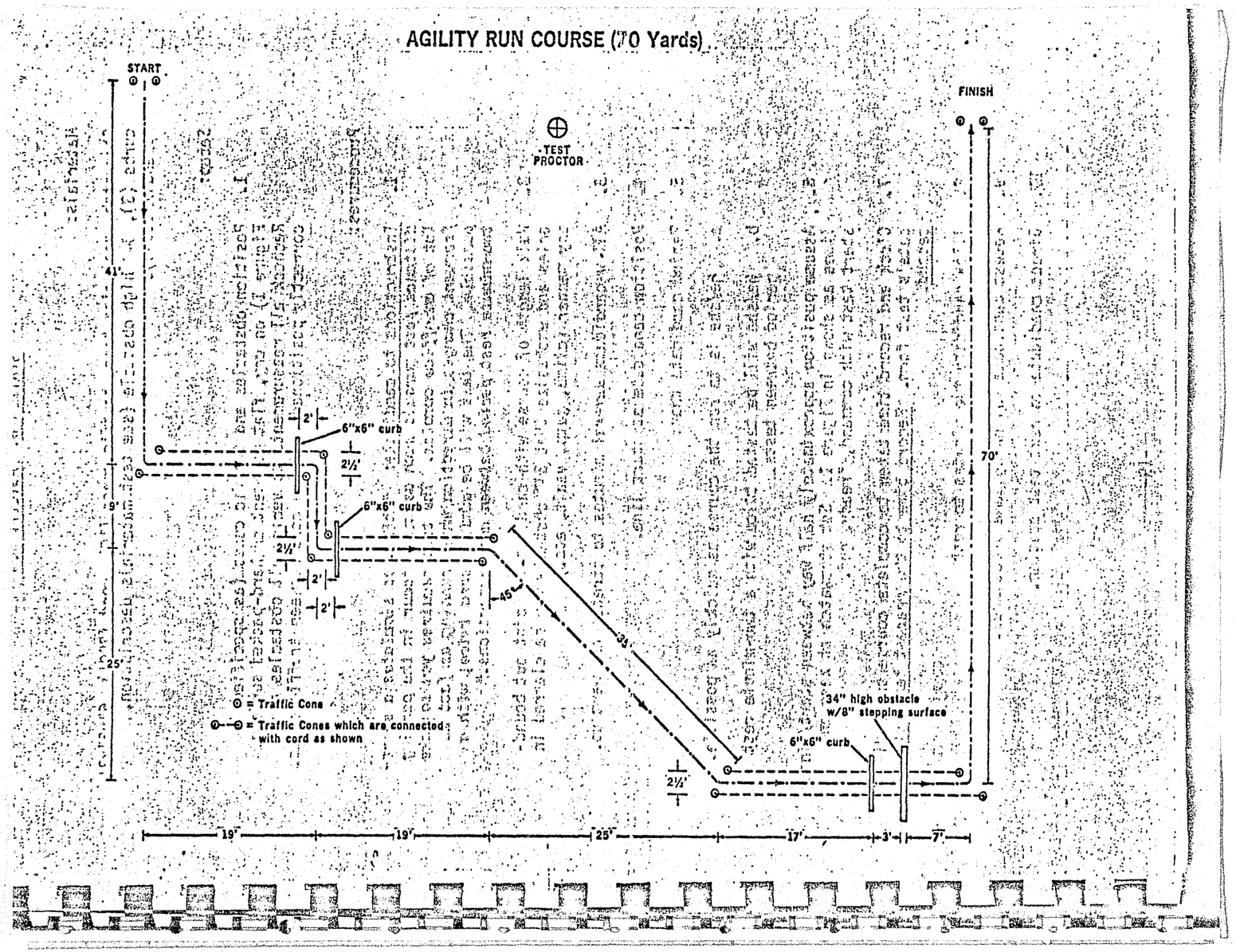
1. Position obstacles and traffic cones (as specified in Figure 1) on dry, flat pavement or hard-packed surface. Recheck all measurements to verify all obstacles are correctly positioned. String cord between traffic cones.

Procedures:

1. Instructions to candidate: *"This test simulates a short-distance foot pursuit such as might occur in the parking lot of an office complex. The test requires you to make frequent changes in direction while running as fast as possible. The test will be administered twice, with a two-minute rest period between administrations."*
2. Walk length of course with candidate. Point out boundaries and emphasize that 34" obstacle may be cleared in any manner (climb, jump, vault, etc.).
3. Allow candidate several minutes to stretch and warm up.
4. Position candidate at start line.
5. Remind candidate that:
   a. he/she is to run the course as quickly as possible.
   b. he/she will be tested twice with a two-minute rest period between tests.
6. Assume position approximately half way between start/finish lines as shown in Figure 1. Set stopwatch at zero and start test with command, "ready, go".
7. Clock and record time taken to complete course on candidate's test form. Record time to the nearest tenth of a second.
8. Allow candidate two minutes to rest.
9. Retest candidate following same procedures.
10. Direct candidate to next test station.

National Institute of Justice
United States Department of Justice
Washington, D.C. 20531

AGILITY RUN COURSE (70 Yards)



STATION C: BODY DRAG

Materials:

Stopwatch, 165-pound dummy, measuring tape, tape to mark start/finish lines.

Setup:

1. Test is to be administered indoors. Measure and mark start/finish lines 21 feet apart. Allow 10-15 feet beyond each line for the candidate to stop at the conclusion of the test. Mark lines with tape.

2. Position dummy face side up with head toward finish line and feet touching start line.

Procedure:

1. Instructions to candidate: *"This test simulates dragging someone who is physically incapacitated. The test requires that you lift and drag a life-like dummy that is lying face up on the floor. The dummy must be dragged 21 feet. The test will be given twice, with a two-minute rest period in between. When lifting and dragging the dummy, please do not grab or pull the dummy by the head or arms as this may damage the dummy."*

2. Demonstrate proper method of grasping dummy (grabbing dummy under arms and lifting dummy's upper body off ground and up against candidate's body while in knee bent, back relatively straight position -- see Photograph 1).

3. Remind candidate that he/she is to drag dummy as fast as possible because the test is timed.

4. Check position of dummy. Instruct candidate to assume starting position. Inform candidate that test will begin with the command, "ready, go".

5. Position self adjacent to candidate. Set stopwatch at zero and start test with command, "ready, go".

6. Clock time that it takes candidate to drag dummy's feet across finish line. Record time to the nearest tenth of a second on candidate's test form.

7. Allow candidate two minutes to rest.

8. Retest candidate following same procedures.

9. Direct candidate to next test station.

Photograph 1

Proper Starting Position for Body Drag Test

STATION D: FENCE CLIMBS

Materials:

Stopwatch, traffic cones (8), matting to cover side supports of fence, fence (see test materials description, Appendix III-B).

Setup:

1. Position fence in center of a stretch of level, dry ground approximately 50 yards in length.[1] Surface must be packed dirt, gravel, or short grass (not pavement or long grass).

2. Measure and mark start lines 25 yards from each side of fence and finish lines five yards from each side of fence. Use two traffic cones to mark each line.

Procedure:

1. Instructions to candidate: *"Two tests of your ability to climb over fences will be administered at this station. Both fences are six feet high. One fence is solid wood and the other is chain link. A statewide job analysis showed that these are the two most common types of fences encountered by entry-level patrol officers.*

   The amount of time it takes you to climb the fences will be recorded. For each test you are to run 25 yards up to the fence, scale the fence, and continue running another five yards to the finish line. Each test will be administered twice with a two-minute rest period between administrations.

   You may use any method you wish to get over the fences. However, you may not use the side supports in any manner to get over the fences. If you do, you will be scored as if you had failed to get over the fence. If you are unsuccessful in your first attempt to get over a fence, continue trying until you succeed."

2. Position candidate at start line for 6' chain link fence climb (25 yards from fence).

3. Inform candidate that he/she:

   a. is to approach and climb fence and run to finish line five yards beyond fence as quickly as possible.

[1]Note: Setup and procedure assume that fence is chain link on one side and solid wood on other side (See Appendix III-B).

   b. may use any method to climb fence as long as side supports are not used.

   c. may continue trying to climb fence if not successful in first attempt.

   d. will be tested twice on each fence.

   e. will be tested twice on the chain link fence before being tested on the solid fence.

   f. will be instructed to start the test with the command, "ready, go".

4. Assume position adjacent to fence, set stopwatch at zero and start test with command, "ready, go".

5. Observe whether candidate uses side supports to get over fence. Consider candidate to have failed to clear fence if he/she uses side support.[1]

6. Clock and record time on candidate's test form. Record time to the nearest tenth of a second.

7. Allow candidate two minutes to rest.

8. Re-administer test following same procedures.

9. Allow candidate two minutes to rest.

10. Position candidate at start line for solid wood fence test.

11. Repeat Steps 4 thru 8.

12. Direct candidate to next test station.

[1]See Appendix IV-A for instructions for assigning test scores to persons who fail to complete a test.

STATION E: BODY CARRY

Materials:

Stopwatch, 165-pound dummy, measuring tape, tape to mark start/finish lines, traffic cone (1).

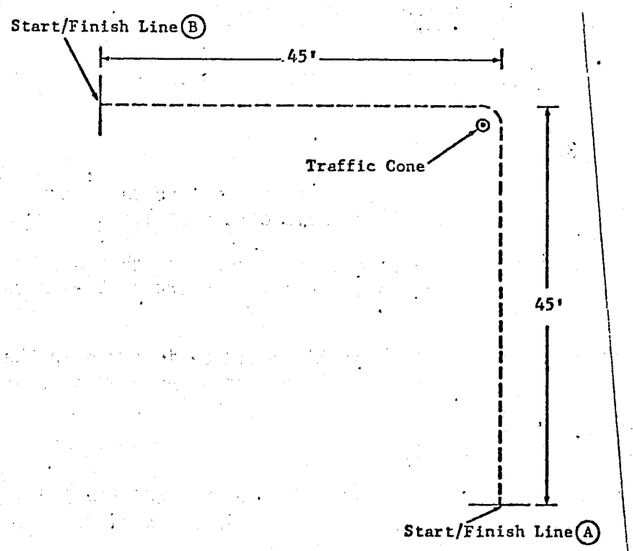
Setup: Note: This Test Requires Two Test Proctors

1. Test is to be administered indoors. Measure and mark 90-foot course with 90-degree turn located at midpoint of course (see Figure 2). Allow 10-15 feet beyond start/finish lines for the candidate to stop at the conclusion of the test. Mark start/finish lines with tape. Mark inside point of turn with traffic cone.

2. Position dummy face side up just behind start/finish line A.

Figure 2

Course Specifications for Body Carry Test



Procedure:

1. Instuctions to candidate: *"This test simulates carrying someone who is physically incapacitated. The test requires that you lift and carry a life-like dummy that is lying face up on the ground. You are to lift the dummy under the arms. Another proctor will lift the legs of the dummy. After you and the proctor have lifted the dummy*

in this fashion, you will be instructed to begin the test with the command "ready, go". You are to carry the dummy by back pedaling as quickly as possible for a total of 90 feet. The time it takes you to carry the dummy will be recorded.

The test will be given twice, with a two-minute rest period in between. When lifting the dummy, do not grab or pull the dummy by the head or arms. This will damage the dummy."

2. Proctor 1: Remind candidate that:

   a. he/she is to grab dummy under the arms and lift and carry the dummy 90 feet while back pedaling.

   b. the second proctor will lift the dummy's feet.

   c. the test will begin with the command, "ready, go", after the candidate has lifted the dummy off the ground and indicated that he/she is ready to begin back pedaling (see Photograph 2 for proper starting position).

   d. he/she is to back pedal as quickly as possible -- the test is timed.

   e. the test will be administered twice, with a two-minute rest period in between.

3. Proctor 2:

   a. Instruct candidate to lift the dummy's upper body; lift legs while candidate lifts upper body.

   b. Upon signal from candidate that he/she is ready to begin back pedaling, start test with command, "ready, go".

   c. Follow behind candidate in a manner that neither restricts nor enhances speed of candidate (keep pace with candidate).

4. Proctor 1:

   a. Grasp head of dummy as candidate lifts dummy to prevent head from hindering lift.

   b. Set stopwatch at zero and begin keeping time upon command of, "ready, go" from Proctor 2.

   c. Clock and record time taken to complete test on candidate's test form. Record time to the nearest tenth of a second.

   d. Assist candidate and other proctor to return dummy to ground.

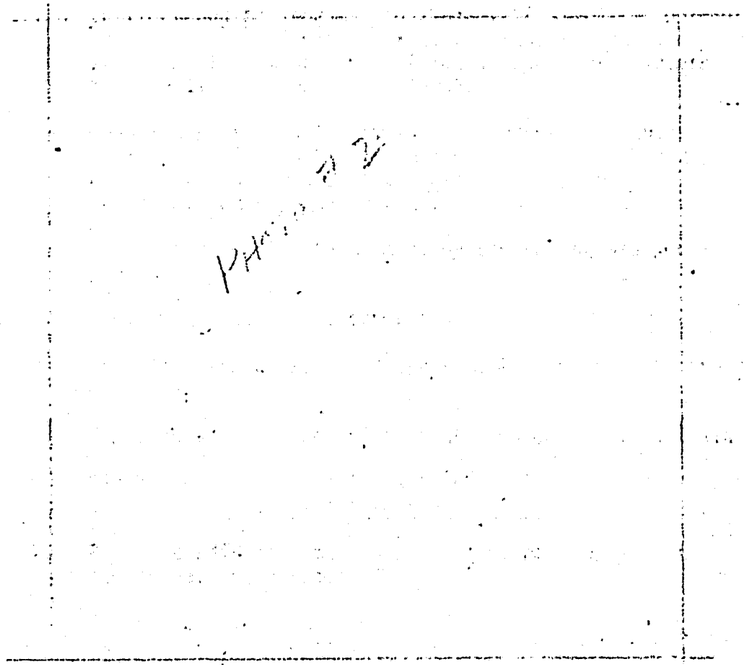
5. Allow candidate two minutes to rest.

6. Re-administer test from start/finish line B following the same procedures.

7. Direct candidate to next test station.

Photograph 2

Proper Starting Position for Body Carry Test



STATION F: 550-YARD RUN

Materials:

Stopwatch, measuring tape, traffic cones (2).

Setup:

1. Test is to be given on a standard 440-yard athletic track. Measure and mark start/finish lines with traffic cones.

Procedure:

1. Instructions to candidate: *"This test simulates a long distance foot pursuit and requires that you run 550 yards. It is the last test you will take. The test consists of running 1¼ laps around the track.*

   When taking the test, try to pace yourself at about 3/4 speed for the first lap (considerably faster than a jog, but slower than a sprint). Do not try to sprint the entire distance. The test will be administered only once."

2. Instruct candidate to warm up by stretching and jogging in place.

3. Position candidate at start line.

4. Set stopwatch at zero and start test with command, "ready, go".

5. Approach finish line as candidate approaches finish line.

6. Clock and record time taken to complete run on candidate's test form. Record time to nearest tenth of a second.

7. Review candidate's test form to confirm that all test scores have been recorded.

8. Observe candidate during cool down. Encourage candidate to walk around. Discourage candidate from lying or sitting down. Notify appropriate personnel if candidate exhibits signs of physical distress (dizziness, nausea, palor, cold sweat, etc.).

9. Dismiss candidate after appropriate cool down.

TEST PROCTOR INSTRUCTIONS
GENERIC TEST BATTERY

The following four tests/measures make up the Generic Test Battery.

STANDING LONG JUMP (standing broad jump)

DYNAMIC ARM STRENGTH TEST (one minute arm crank of stationary bicycle)

TRUNK FLEXION TEST (force exerted by flexing trunk forward; static effort)

PERCENT BODY FAT (estimated from skinfold measurements)

As with the Work Sample Test Battery, the tests are administered at separate test stations. The same types of administrative aids that are presented in Appendix III-B for the Work Sample Test Battery are presented in Appendix III-C for the Generic Test Battery (materials/equipment list, candidate processing flow chart, data collection form). Explicit instructions for administering each test in the Generic Test Battery begin on the next page.

STATION A: INITIAL PROCESSING OF CANDIDATE

Materials:

Stethoscope, sphygmomanometer (blood pressure cuff), watch with second hand, data collection forms.

Procedure:

1. Verify candidate's identity in accordance with agency's administrative procedures.

2. Review all information required to certify candidate's eligibility to participate in testing. (Procedures will vary. See page 9 for discussion of medical prescreening of candidates.)

3. Instructions to candidate:[1] *"The tests you are about ... to take were developed on the basis of an extensive study. Results of this study showed that each of the physical tests you will be taking is significantly related to the ability to perform one or more critical physical job tasks that are performed by entry-level (Agency Job Title).*

   The tests will be administered at different test stations. Upon arriving at each test station, the test proctor will read you a description of the test being given at that station. If you have any questions about this information, be sure to ask the proctor for clarification before taking the test.

   Prior to beginning testing, I will be taking your resting heart rate and resting blood pressure. This is being done as a safety precaution due to the physical demands of some of the tests.[2]

   You will be given a form for recording your test scores which you are to carry from station-to-station. At the end of the testing session this form will be reviewed by a

[1] It is recommended that all instructions to the candidate be read verbatim. As an alternative, agencies may wish to provide each candidate with a a written copy of all instructions.

[2] Although not a requirement for properly administering the tests per se, POST strongly recommends that agencies follow this procedure.

proctor to make sure that all the necessary test information has been collected. Do not leave until you have been informed by the proctor that complete test data has been collected for you.

Do you have any questions? Please remain seated and I will take your resting heart rate and blood pressure at this time."

4. Determine candidate's resting heart rate (RHR)[1]

   Instructions: Candidate must remain seated in a quiet location for ten minutes. Place stethoscope just to the left of the sternum between the fourth and fifth intercostal. Begin keeping time on a heart beat. Count "0" for the first beat. Count the number of heart beats that occur in 20 seconds. Multiply this value by three to determine RHR. If RHR is greater than 90, retest candidate at five minute intervals until RHR is less than 90. If after ten minutes RHR remains greater than 90 allow candidate to rest in reclined position for ten minutes before taking final reading. If RHR still exceeds 90, defer candidate from testing pending medical clearance from a physician. Record final RHR on candidate's test form.

5. Measure candidate's resting blood pressure (RBP)[1]

   Instructions: To be taken immediately after RHR. Candidate must remain seated in quiet location. Attach blood pressure cuff snugly to candidate's dominant arm just above the elbow. Make sure there are no folds in cuff. Attach measurement dial to top of cuff. Place stethoscope on the artery which runs next to and outside of the biceps tendon at the elbow. Candidate's cuff arm should be fully extended forward and supported at approximately chest height. Close valve and pump cuff until dial reading is 180-200mm Hg. Open valve and let air bleed slowly while listening for first and last audible heart beats (which correspond to the systolic and diastolic pressures respectively). If systolic reading exceeds 140 or diastolic reading exceeds 95, place cuff on candidate's nondominant arm and repeat procedure. If readings exceed allowable maximums, return cuff to candidate's dominant arm and take readings at five minute intervals. If after ten minutes reading still exceeds 140/95, allow candidate to rest in a reclined position for ten minutes before taking final reading. If blood pressure still exceeds 140/95, defer candidate from testing pending medical clearance from a physician. Record final RBP's on candidate's test form.

6. Direct candidate to next test station.[2]

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[1]Although not a requirement for properly administering the tests per se, POST strongly recommends that agencies follow this practice.

STATION B: PERCENT BODY FAT (SKINFOLDS)

Materials:

Skinfold Calipers

Setup:

1. Check calibration of calipers.

Procedures:

1. Instructions to candidate: *"Skinfold measurements will be taken at this station by measuring the doublefold thickness of your skin with special calipers. Measurements will be taken at two different body sites. A minimum of two measurements will be taken at each site. The sites for women are the back of the upper arm and the side of the body just above the hip. The sites for men are the front of the thigh and below the shoulder blade. These measurements will be used to estimate your percent body fat, which has been shown to be significantly related to the performance of patrol officer tasks involving running or sprinting."*

2. Instructions to Proctor: All skinfold measurements are to be made on the nondominant side of the body. All clothing must be removed from skinfold measurement sites. Candidate is to stand in relaxed position with feet normally spaced. Measurement sites are as follows:

   Males:

   - Subscapula (the upper back): Immediately (1 centimeter) below the lower tip of the shoulder blade; skinfold running downward and laterally in the natural fold of the skin (see Photograph 3)

   - Thigh: Front of the thigh midway between the knee and hip; vertical skinfold (see Photograph 4)

   Females:

   - Triceps (back of the arm): Midway between the shoulder and elbow; vertical skinfold (see Photograph 5)

   - Suprailiac (hip): Immediately (1 centimeter) above the iliac crest (hip bone); vertical skinfold (see Photograph 6)

   When taking measurements, grasp skinfold between thumb and index finger so as to include two thicknesses of skin and subcutaneous fat, but no muscle

tissue. (Make sure that all skin and fat are pulled away from underlying muscle.) If in doubt regarding the presence of muscle tissue, ask candidate to contract muscle. Apply calipers approximatley one centimeter above fingers. Hold skinfold calipers with slight inward pressure at depth approximately equal to thickness of fold. Release skinfold and repeat procedure. If first two measurements agree within one millimeter, record readings on candidate's test form and proceed to next measurement site. If first two readings differ by more than one millimeter, take a third reading and record all three readings on candidate's test form. After recording readings, direct candidate to next test station.

Photograph 3

Subscapular Skinfold (Males)

PHOTO #3

Photograph 4

Thigh Skinfold (Males)

Photograph 5

Triceps Skinfold (Females)

Photograph 6

Suprailiac Skinfold (Females)

STATION C: TRUNK FLEXION TEST

Materials:

Cable tensiometer, trunk strength apparatus (see description of equipment, Appendix III-C).

Setup:

1. Calibrate cable tensiometer.
2. Assemble trunk strength apparatus.

Procedure:

1. Instructions to candidate: *"This test measures the strength of your abdominal muscles. Scores on this test have been found to be significantly related to the speed with which someone can drag or carry heavy objects, such as an injured or otherwise incapacitated person. The test is taken from a standing position, with your hips fixed and your upper body held in a stationary position. From this position you are to bend forward and exert as much pressure as possible. The amount of force you are able to exert will be measured with a device called a cable tensiometer. The test will be administered three times, and your best score will be counted."*
2. Position candidate on metal plate of trunk strength apparatus facing away from apparatus and with feet spread approximately 14" and parallel. Adjust height of apparatus so that ring belt-harness arrangement is at height of candidate's mid-shoulder blades and forms a straight line with cable attachment.
3. Secure belt-harness around candidate's shoulders -- lock firmly but not tight. Candidate's buttocks must be firmly against padded plate to restrict legs and hip movement (see Photograph 7).
4. Instruct candidate to pull against harness easily to test resistance and to get a feeling for the range of movement involved.
5. Inform candidate that upon signal "ready, go", he/she is to pull forward in a single, continuous, but maximum effort, and hold position until told to stop. Emphasize that pull must be continuous and not a jerking action.
6. Check to see that cable tensiometer is functioning properly.
7. Begin test with command, "ready, go". Instruct candidate to discontinue pulling after he/she has held position for two seconds.

8. Repeat procedure two more times, allowing ten-second rest period between administrations.

9. Record cable tensiometer readings on candidate's test form.

10. Direct candidate to next test station.

Photograph 7

Trunk Flexion Test

STATION D: STANDING LONG JUMP

Materials:

Gym mat, cloth tape measure, tape to secure gym mat and mark start line, yardstick.

Setup:

1. Tape gym mat down to prevent mat from moving.

2. Measure and mark start line two feet from mat.

3. Tape cloth tape measure to floor perpendicular to and extending from starting line.

Procedure:

1. Instructions to candidate: *"The test at this station is a simple test of how far you can jump from a stationary standing position. Scores on this test are correlated with performance on a wide range of critical physical job tasks performed by (Job Title). You will be allowed three jumps. The test will be demonstrated to you prior to your first jump."*

2. Demonstrate jumping technique to candidate, noting that: (1) it is necessary to start with feet placed several inches apart and toes just back of take-off line; (2) the take-off must be from both feet; (3) it is permissible to swing one's arms and bend one's knees but not for one's feet to completely leave the floor prior to jumping; (4) both feet must contact the mat at the same time.

3. Conduct three trials of the test. If candidate slips or falls back while jumping, allow an additional trial. Permit candidate to rest fifteen seconds between trials.

4. For each jump, measure distance from take-off line to point of landing of heel of foot. Measure distance to nearest inch by extending yardstick from point of heel contact to cloth tape measure. Record distances on candidate's test form.

5. Direct candidate to next test station.

STATION E: DYNAMIC ARM STRENGTH TEST

Materials:

Stopwatch, bicycle ergometer with revolution counter and adjustable resistance indicator calibrated in kiloponds, hand grips for pedaling bicycle ergometer.

Setup:

1. Attach revolution counter to bicycle ergometer; verify that revolution counter is working properly.
2. Check calibration of resistance indicator on bicycle ergometer.

Procedure:

1. Instructions to candidate: *"This is the last and most strenuous test you will take. It measures the strength of your arms, which has been shown to be related to successful performance of a number of critical physical job tasks such as climbing fences and lifting and carrying hard-to-move objects. The test requires that you hand crank the pedals of a stationary bicycle as many times as you can in 60 seconds. When taking the test, try to pace your early effort rather than cranking as hard as you can from the start. You will be told when 30 and 45 seconds have elapsed. Prior to taking the test you will be permitted to crank the bike briefly to get a feel for the amount of resistance you will be pedaling against. At the conclusion of the test you will be asked to stand and move about until such time as your test form has been checked for completeness and you are notified that you may go."*
2. Set workload at 2.5 kiloponds while pedaling bicycle.
3. Position candidate for test so that candidate is seated with back against wall and legs outstretched and straddling back of bike frame. (See Photograph 8)
4. Instruct candidate to briefly hand crank bike to get feel for workload.
5. Instruct candidate to discontinue hand cranking and assume a comfortable starting position with top pedal in slightly forward position. (See Photograph 8)
6. Set counter at zero.
7. Remind candidate to pace early effort (first 30 seconds) and then increase speed.
8. Remind candidate that you will indicate when 30 seconds and 45 seconds have elapsed.

9. Position self along side of bike; push down on bicycle seat to prevent bike from sliding.
10. Set stopwatch at zero and begin test with command, "ready, go".
11. Advise candidate when 30 seconds have elapsed.
12. Advise candidate when 45 seconds have elapsed.
13. Discontinue test after 60 seconds by calling out, "stop". Immediately unload resistance on fly wheel and have candidate continue to hand crank bike at relaxed pace until respiration has recovered (usually about one minute).
14. Advise candidate to stand and walk slowly. Notify appropriate personnel if candidate exhibits signs of physical distress (dizziness, nausea, palor, cold sweat, etc.).
15. Record score on candidate's test form.
16. Review candidate's test form to verify that complete test data has been collected.
17. Dismiss candidate after appropriate cool down.

Photograph 8

Proper Starting Position for Dynamic Arm Strength Test

IV. TEST SCORING PROCEDURES

For both the Work Sample Test Battery and the Generic Test Battery, scores on the individual tests are combined to arrive at a total test score for each candidate. Scoring the tests in this manner, as opposed to scoring each individual test on a pass/fail basis, allows the candidate to compensate for performing poorly on one test by performing well on other tests. POST believes that a candidate's total test score is the best indication of his/her overall ability to perform the physical demands of the job.

Prior to combining scores, the scores on each individual test are converted to T-scores. This conversion places scores on the different tests on the same scale of measurement, which is necessary when combining scores to arrive at a total test score.[1] In computing total test scores, differential weights are applied to the T-scores for the individual tests. These weights are shown in Table 1. The weights for the tests in the Work Sample Test Battery reflect the relative frequency with which the tasks simulated by the Work Sample tests were found to be performed on the job (based on the job analysis results). The weights for the tests/measures in the Generic Test Battery are based on a simple count of the number of statistically significant construct-work sample relationships which were found for each test (see Figure 3, Appendix I). Step-by-step instructions for scoring each of the test batteries are presented in Appendix IV-A.

Table 1: Weighting of tests for computing total test score

Work Sample Test Battery		Generic Test Battery	
Test	Weight	Test/Measure	Weight
Agility Run	.22	Percent Body Fat	4
Body Drag	.08	Trunk Flexion Test	2
Chain Link Fence	.23	Standing Long Jump	5
Solid Fence	.32	Dynamic Arm Strength Test	3
Body Carry	.10		
550-Yard Run	.04		

[1]Test scoring procedures necessarily entail the use of statistical formulas requiring a working familiarity with advanced mathematical principles.

Interpretation of Test Scores

POST believes the research evidence shows both the Work Sample and Generic Test Batteries to be job-related. POST is also extremely mindful of the differences in male and female performance on physical abilities measures, and believes that the tests should be used in a manner which minimizes adverse impact against women. To this end, POST recommends that the total score on either of the two test batteries be used in a pass/fail manner, rather than to rank order candidates.

In developing the two test batteries, it was not the intent of POST to attempt to identify a single cutoff score that must be used by all agencies. Minimum cutoff scores are always somewhat arbitrary, and it would be infeasible to even attempt to establish such a cutoff for all agencies in the state without first collecting substantially more test data. Furthermore, local agencies will most greatly benefit from establishing their own cutoff scores on the basis of local circumstances. For example, great differences are found among agencies with regard to such things as selection rates (ratio of job openings to number of candidates), affirmative action plans/policies, court mandated hiring policies, and agency selection policies (use of continuous testing, life of eligibility lists, etc.). Each of these factors should be considered when establishing a cutoff score.

As a general recommendation with regard to establishing minimum cutoffs, POST advocates a normative approach. That is, that consideration be given to test performance norms for certain comparison groups when attempting to establish cutoff scores. Incumbent officers who are currently performing physical job tasks in a satisfactory manner constitute one such comparison group. It would be unreasonable to set a cutoff score which would "fail" a significant percentage of these individuals. Thus, agencies may wish to test a representative sample of their officers as a means of establishing reasonable cutoffs.

Comparison data for males and females is also particularly relevant to the establishment of reasonable cutoffs. This data can be used to estimate the amount of adverse impact the test will have against women.

With regard to the two types of normative data mentioned, all such data collected by POST in the course of developing the tests are reported in Tables 12 and 13, Appendix IV-B. Table 12 contains norms for male and female officers. Table 13 shows the passing rates for male and female cadets at different cutoff scores.[1]

As mentioned in the introduction of the manual, POST is interested in assisting those agencies that wish to use the tests. In this regard, we encourage those agencies that desire greater guidance with respect to establishing minimum cutoff scores to contact the Standards and Evaluation Services Bureau.

[1]Examination of this table appears to indicate that the two test batteries do not differ significantly in terms of female pass rates.

Guilford, J. P., & Fruchter, B. Fundamental statistics in psychology and education. New York: McGraw-Hill, Inc., 1978.

Kerlinger, F. N., & Pedhazer, E. J. Multiple regression in behavioral research. San Francisco: Holt, Rinehart & Winston, Inc., 1973.

Kohls, J. K., Berner, J. G., & Luke, L. K. California entry-level law enforcement officer job analysis. Sacramento: Commission on Peace Officer Standards and Training, 1979.

Physical activity readiness questionnaire (PAR-Q) validation report. British Columbia Ministry of Health, May, 1978.

Sloan, A. W., & De V Weir, J. B. Nomograms for prediction of body density and total body fat from skinfold measurements. Journal of Applied Physiology, 1970, 20, 221-222.

Uniform guidelines on employee selection procedures. Equal Employment Opportunity Commission, Civil Service Commission, Department of Justice and Department of Labor, Washington, D.C., 1978.

APPENDIX I

PROCEDURES FOLLOWED TO DEVELOP AND ESTABLISH JOB-RELATEDNESS OF TESTS

In recognition of these two fundamentally different approaches to establishing job-related physical performance tests, the decision was made to develop two different test batteries -- the first consisting of content valid "work sample" tests and the second consisting of construct valid generic tests of fundamental physical abilities/characteristics.

It was further decided that the content valid "work sample" tests would serve as the criteria against which the generic tests would be evaluated for construct validity. In adopting this approach, it was hoped that ultimately agencies would have the opportunity to choose between two distinctly different test batteries. This objective was considered important because of the relative advantages and disadvantages of the two types of tests. For example, some generic tests provide valuable medical information which can be incorporated into the medical screening process. On the other hand, the administration of generic tests often requires more equipment and greater sophistication on the part of the test proctor than is required to administer "work sample" tests.

Test Development Steps

Job Analysis

An extensive job analysis was conducted to identify the critical physical tasks performed on the job. The job analysis was conducted in three phases. First, a review was made of the physical job task data that had been collected as part of a major statewide job analysis conducted by POST in 1979 (Kohls, Berner and Luke). Patrol officers and patrol supervisors from each of 219 departments participated in this study. Data collected in the study were used to identify the most divergent departments with regard to frequency and importance of physical task performance within each of eight agency size and type (municipal vs. county) categories. Hereafter, these agencies will be referred to as the "sample agencies".

Next, a form was developed (Physical Activity Log) for collecting additional physical job task information in the sample agencies (N=19). The form provided for brief narrative descriptions of significant physical tasks that were performed on patrol. Officers carried the forms on patrol for five consecutive watches. Instructions for completing the forms were as follows:

> *DIRECTIONS: Complete a section of this form every time you respond to a call or handle an event or incident which necessitates that you perform one or more required physical activities. A required physical activity is defined as any physical action involving major muscle movement which, if not performed, would likely result in one or more of the following:*
>
> - *Failure to perform a required duty/service (such as making an arrest, completing a search or investigation, rendering aid, etc.)*
> - *Loss or damage to property*
> - *Failure to apprehend one or more subjects*
> - *Loss of life or injury to self/others*

A total of 628 officers from the sample agencies carried the forms on patrol. A breakdown of the officers by department is listed in Table 2. By surveying departments that greatly differed with respect to their responses to physical task statements in the 1979 job analysis, it was felt that those physical tasks which were frequently reported in these departments would most likely have statewide applicability.

The final phase of the job analysis consisted of interviewing those officers who reported one or more physical events on the Physical Activity Log. A series of interview forms were developed for recording the interview information. The purpose of the interviews was to collect more detailed information about the events reported on the logs. Such detail was considered essential for developing job-related Work Sample tests. Table 3 provides summary data pertaining to the results of the interviews.

Development of Work Sample Tests

The job analysis interview data was analyzed to identify the most "typical" physical activities reported. In general, "typical" was defined in terms of the most frequent or average values for those specifications for which data was collected. For example, it was found that in those instances where an incapacitated person was physically dragged by an officer, the person was most often lying on the ground and the officer most often: (a) received no assistance; (b) lifted and dragged the person by the arms or armpits; and (c) performed no other significant physical activity immediately prior to or after moving the person. The "typical" or average distance the person was dragged was 21 feet. In 25% of the cases, it was important that the person be moved in an expeditious manner. This type of information served as the basis for the development of the test specifications for each Work Sample test.

In developing the Work Sample tests an attempt was made to sample in a representative fashion the full domain of physical job tasks that were reported. Unfortunately, it was not possible to develop a Work Sample test that simulated one of the most prevalent physical tasks reported -- that of physically controlling a resisting person. The development of such a Work Sample test was deemed infeasible for a number of reasons, including: (1) the inability to standardize the degree of resistance that would be offered on the part of the resisting subject; (2) the unacceptably high risk of injury that would be associated with a test of this nature; and (3) the fact that specific techniques for overcoming the physical resistance of another person are acquired during basic training. The possibility of developing a mechanical device that would overcome the standardization problems inherent in this type of test was also examined. A device that would achieve this objective and would also serve to realistically simulate physical resistance was not identified.

Table 2: Agency participation in job analysis

Agency Category	Agency	Officers Surveyed	Officers Reporting One or More Physical Events	Officers Interviewed	Physical Events For Which Interview Data Were Collected
Municipal Departments					
Full Time Sworn:					
1 - 10	Carpinteria	6	5	3	3
	King City	4	2	2	4
	Kingsburg	6	1	1	1
	Oakdale	8	3	2	3
11 - 25	Davis	16	7	6	9
	Larkspur (Twin Cities)	12	6	3	4
	Pittsburg	23	16	10	29
26 - 50	Antioch	21	3	3	3
	Colton	17	6	4	5
	Redondo Beach	30	8	8	14
	Simi Valley	24	16	14	32
51 - 150	Fremont	38	24	20	38
	Stockton	35	15	13	21
Over 150	Los Angeles	135	65	40	88
	San Jose	57	30	18	32
Sheriff's Departments					
Full Time Sworn:					
1 - 40	Trinity	6	1	1	2
41 - 125	Mendocino	19	11	7	12
	Placer	25	15	7	17
Over 125	Los Angeles	146	54	40	71
GRAND TOTALS		628	288	202	388

Work Sample tests were also not developed for the physical activities of balancing and crawling. Insufficient information was available to develop test specifications for a crawling test due to the very low frequency with which crawling activities were reported in the job analysis (see Table 3). Similarly, a sufficient data base did not exist for developing a balancing test that would simulate a "typical" balancing task. Furthermore, POST was advised that individual differences with regard to balancing are extremely dependent upon the specific balancing activity (good versus poor visual cues, elevated versus nonelevated surfaces, etc.).

Table 3: Summary of physical events reported in follow-up interviews

Type of activity	Number of events	Percent of events
Balancing	19	5.0
Climbing	123	32.6
Crawling	5	1.3
Dragging/Pulling (other than subject)	6	1.6
Jumping	26	6.9
Lifting/Carrying (other than subject)	14	3.7
Physically Controlling Subject	154	40.8
Moving Incapacitated Subject (drag, carry, etc.)	56	14.9
Pushing	25	6.6
Running	84	22.3

Identification of Generic Tests

Hypotheses were generated regarding the physical constructs (abilities/characteristics) required to perform each of the Work Sample tests. Specifically, physical constructs were identified which were thought to be limiting factors to performance of each work sample. During this process, reference was made to the research literature regarding: (1) the nature of identifiable physical constructs; and (2) previous findings with respect to the relationships between physical constructs and physical job tasks.

After identifying the hypothesized construct-work sample relationships, decisions were made concerning the specific tests/measures to be used to measure the constructs. The following criteria were used to select the tests/measures:

- Extent of factor analytic and other research evidence that test measures a given construct.
- Time required/ease of administering test.
- Risk of injury associated with taking test.
- Extent of specialized training/experience needed to administer test.

Administration of Preliminary Test Batteries

The choice of test subjects for collecting test data was guided by two sections of the Uniform Guidelines. Section 14B (4) refers to the desirability of collecting test data for subjects who are similar in background to actual job applicants. Section 14B (8)(9b) emphasizes the need to examine the fairness of those tests for which members of a protected group score lower than members of other groups.[1] This section of the guidelines was deemed to be particularly important with respect to identifying tests that are unfair to women.

Other factors which influenced the choice of test subjects were: (1) the desire to collect normative data on incumbent officers which could be used as an aid in setting passpoints; (2) the desire to collect test/retest data for purposes of assessing the reliability of the tests; and (3) the need to collect data from enough subjects to permit using a "holdout group" for purposes of "cross-validating" all statistically significant construct measure-work sample relationships.[2]

The testing of actual job applicants was not considered feasible because of the length of time needed to complete all of the experimental tests (approximately 3½ hours per test subject). However, in an attempt to test academy cadets whose physical attributes most closely represent those of job applicants, attention was focused on testing academy cadets from academies that do not emphasize prescreening on the basis of physical abilities.

A total of 49 officers (31 males, 18 females) and 92 basic academy cadets (51 males, 41 females) were tested. Sixty-four of the cadets were tested twice: at the beginning of academy training and approximately ten weeks later. Descriptive information for the three test samples (Officer Sample, Cadet Sample, Cadet-Retest Sample) is provided in Table 4.

---

[1] An unfair selection procedure is defined as, "A condition in which members of one race, sex or ethnic group characteristically obtain lower scores on a selection procedure than members of another group, and the differences are not reflected in differences in job performance."

[2] A significant test-criterion relationship that is found for one sample of test takers is said to "cross-validate" if it is also found to be statistically significant for a second sample of test takers. Attempts are made to "cross-validate" to ensure that the initial statistically significant test-criterion relationship is not a chance occurrence.

Table 4: Incumbent officer and academy cadet test samples

Test Sample	Age $\bar{X}$/S.D.	Years Tenure $\bar{X}$/S.D.	Weeks Training $\bar{X}$/S.D.
Officer Sample (Officers from the Davis, Sacramento, and San Francisco Police Departments; Napa County Sheriff's Department)			
males (N = 31)	30.3/5.3	4.7/4.6	NA
females (N = 18)	27.3/4.1	2.7/1.8	NA
Cadet Sample (Cadets from the California Highway Patrol, San Francisco Police Department, and Los Angeles County Sheriff's Department Academies)			
males (N = 51)	25.3/3.3	NA	NA
females (N = 41)	24.3/3.9	NA	NA
Cadet-Retest Sample (Cadets from California Highway Patrol and San Francisco Police Department Academies)			
males (N = 43)	25.4/3.2	NA	9.4/0.6
females (N = 21)	24.2/2.9	NA	11.1/1.3

Analysis of Test Data

The test data was analyzed to assess the reliability and validity of each test and to select the final tests for inclusion in the Work Sample and Generic Test batteries. The analyses which were conducted to arrive at the final test batteries are summarized below.

Work Sample Test Battery Correlation analyses were performed to estimate the reliabilities of the Work Sample tests. Both intertrial and ten-week test/retest reliability estimates were computed. Six of the seven Work Sample tests were found to be sufficiently reliable for inclusion in the final Work Sample Test Battery.[1] Descriptions of the tests, as well as the job analysis findings which served as the basis for the tests, are reported in Table 5. Reliability estimates for the tests, as well as for total score on the Work Sample Test Battery, are presented in Table 6.

[1]The test excluded from the final Work Sample Test Battery was a Vehicle Push test.

Table 5: Work Sample tests and associated job analysis findings

Work Sample Test	Job Analysis Findings
BODY DRAG:	
Lift and drag 165 pound life-like dummy 21 feet.	27.9% of incidents which required moving an incapacitated person involved dragging/pulling. Average Distance Moved: 20.7 feet Average Weight of Persons: 164.4 pounds Officer Unassisted: 66.7% Speed Required: 25% Person lying on ground when lifted: 40.4% Person grasped by arms or armpits: 68.5%
SIX-FOOT SOLID FENCE CLIMB:	
Run 25 yards to a 6-foot solid fence, climb over fence, continue running another 5 yards.	59.7% of obstacles climbed were fences/walls. 58.2% of fences/walls were solid fences/walls. 56.3% of solid fences/walls were 6 feet high. Average distance of running activities which preceded fence/wall climbs: 25.5 yards Speed Required: 64.2%
AGILITY RUN:	
Run a 70-yard obstacle course consisting of several sharp turns, a number of curb height obstacles, and a 34-inch high obstacle that must be vaulted/hurdled.	38.1% of running incidents involved other agility-type activities (rapid changes in direction; going around/over/between obstacles; etc.) Average Distance Run: 69.8 yards Average Height of Obstacles Climbed/Jumped Over: 34.5 inches
BODY CARRY:	
Lift and carry 165 pound life-like dummy 90 feet (candidate lifts dummy by upper body, test proctor lifts and suspends legs of dummy).	32.6% of incidents which required moving an incapacitated person involved lifting and carrying. Average Weight of Persons: 164.4 pounds Average Distance Carried: 90.9 feet Officer Assisted: 92.9% Speed Required: 50% Person grasped by arms or armpits: 65.2%

Table 5: (continued)

Work Sample Test	Job Analysis Findings
550-YARD RUN:	
Run 550 yards (1¼ laps of standard 440-yard running track).	32.1% of running incidents involved no other physical activities. 22.2% of runs performed in isolation were over 400 yards. Average Distance: 543.5 yards
SIX-FOOT CHAIN LINK FENCE CLIMB:	
Run 25 yards to a 6-foot chain link fence, climb over fence, continue running another 5 yards.	59.7% of obstacles climbed were fences/walls. 41.8% of fences/walls were chain link fences. 47.1% of chain link fences were 6 feet high. Average distance of running activities which preceded fence/wall climbs: 25.5 yards Speed Required: 64.2%

Table 6: Reliabilities of Work Sample tests[1]

Test	Intertrial[2]	10 Week Test-Retest
Body Drag	.88 (N=118)	.85 (N=44)
Six-Foot Solid Fence Climb	.89 (N=104)	.54 (N=43)
Agility Run	.88 (N=136)	.88 (N=59)
Body Carry	.92 (N=131)	.74 (N=58)
550-Yard Run	NA	.82 (N=57)
Six-Foot Chain Link Fence Climb	.94 (N=116)	.84 (N=44)
TOTAL TEST BATTERY	.97 (N=99)	.91 (N=41)

[1]Sample sizes vary due to inability to administer all tests at certain test locations because of poor weather.

[2]With exception of 550-Yard Run, all tests were administered twice.

Generic Test Battery The same procedures were followed to estimate the reliabilities of each of the Generic tests of fundamental physical abilities/characteristics. Those tests which were found to lack sufficient reliability were excluded from further consideration for the final Generic Test Battery.

The following analyses were conducted to assess the construct validity of the remaining tests:

(1) A linear trend test was used to examine the nature of each hypothesized construct-work sample relationship (Guilford & Fruchter, 1978). This was done to identify any significant nonlinear construct-work sample relationships, which if detected, would violate the linearty assumption underlying correlational analyses. All hypothesized construct-work sample relationships were found to be linear.

(2) Using the data for the Cadet Sample, correlational techniques were used to identify those construct-work sample relationships that were statistically significant. Those relationships that were found to be statistically significant were then further analyzed to ensure that a statistically significant relationship existed for both males and females. Any relationship which failed to satisfy this additional criterion was considered to be indicative of single group validity and, thus, not appropriate for establishing construct validity.

(3) Using the test data for the Officer Sample, correlational techniques were used to "cross-validate" the construct-work sample relationships which were found to satisfy the requirements of (2) above. Those construct-work sample relationships which were found to "cross validate" are shown in Figure 3. The reliabilities of these tests can be found in Table 7.

Figure 3

Hypothesized Physical Construct-Work Sample Test Relationships Which Were Found To Be Significant

	Work Sample Tests[1]					
	Body Drag	6' Solid Fence	Agility Run	Body Carry	550-Yard Run	6' Chain Link Fence
Tests of Physical Constructs[2]						
Leg Strength/Endurance						
Stair Run	X			X		X
Standing Long Jump	X	X	X		X	X
Dynamic Leg	X		X	X	X	
Arm Strength/Endurance						
Shoulder Abduction	X					X
Dynamic Arm	X			X		X
Trunk Strength						
Trunk Extension	X			X		
Trunk Flexion	X			X		
Body Composition						
Percent Body Fat		X	X		X	X

[1]See Table 5 for descriptions of tests.

[2]See Table 7 for descriptions of tests.

Table 7: Reliabilities of tests of physical constructs

Test	Intertrial[1]	10 Week Test-Retest
Leg Strength/Endurance		
Stair Run (timed sprint up a series of stairs having a total vertical rise of approximately 1 meter)	.86 (N=137)	.61 (N=62)
Standing Long Jump	.94 (N=131)	.92 (N=63)
Dynamic Leg Strength (number of pedal revolutions on a stationary bicycle achieved in one minute)	NA	.74 (N=63)
Arm Strength/Endurance		
Shoulder Abduction Test (pounds of force exerted by grasping and pulling with elbows extended laterally at shoulder level; static effort)	.93 (N=130)	.77 (N=50)
Dynamic Arm Strength (number of pedal revolutions achieved by hand cranking a stationary bicycle for one minute)	NA	.90 (N=62)
Trunk Strength		
Trunk Extension (pounds of force exerted by standing with hips fixed and extending trunk backward against a resistive harness; static effort)	.94 (N=134)	.89 (N=52)
Trunk Flexion (analogous to Trunk Extension Test, but a flexion to measure the strength of the abdominal muscles)	.96 (N=135)	.80 (N=52)
Body Composition		
Percent of Body Fat (estimated from skinfold measurements)	.98 (N=35)[2]	.87 (N=63)

[1]Dynamic Arm and Leg Strength Tests were administered only once. All other tests were administered three times. Values reported are averages of intercorrelations among three trials and were computed using the Fisher's Z transformation procedure for averaging correlations. (Guilfor & Fruchter, 1973)

[2]Computed for a subsample of 35 cadets due to the extensive number of calculations required to compute separate body fat estimates.

In an attempt to reduce the amount of time and equipment needed to administer the Generic Test Battery, a reduction in the number of tests to be included in the final battery was sought. Specifically, a subsample of the tests found to satisfy the requirements of (1) thru (3) on page 60 was selected for additional analysis. One test was chosen from each of the four categories of constructs depicted in Figure 3 (Leg Strength/Endurance, Arm Strength/Endurance, Trunk Strength, Body Composition). A number of criteria were considered when selecting a single test from each category. They included: (1) the number of significant statistical relationships found for each test; (2) the reliability of each test; (3) the adverse impact of each test; and (4) the ease of administering each test. Those tests chosen on the basis of these criteria were:

1. Standing Long Jump.

2. Dynamic Arm Strength (as measured by the number of pedal revolutions that are achieved by hand cranking a stationary bicycle for one minute).

3. Trunk Flexion (pounds of force exerted by flexing the trunk forward from a standing position with hips fixed and trunk secured to a resistive harness).

4. Percent Body Fat (estimated from skinfold measurements).

Scores on these four tests were summed and correlated with total scores on the Work Sample Battery yielding very substantial correlations for both the Officer Sample (r=.83, N=39) and the Cadet Sample, (r=.82, N=66). The results indicate that scores on a Generic Test Battery made up of the above four tests are highly related to (predictive of) scores on the content valid Work Sample Test Battery.[1]

Data for both the Officer and Cadet Samples were subsequently analyzed to examine for evidence of differential prediction of work sample performance by the Generic Test Battery. Specifically, a statistical procedure (Kerlinger & Pedhauzer, 1973) for examining group differences (males versus females) in the slopes and intercepts of regression lines was employed. No evidence was found that scores on the Generic Test Battery are differentially related to scores on the Work Sample Test Battery for males and for females.

On the basis of the above analyses and results, it was concluded that the empirical evidence strongly supported the use of the proposed Generic Test Battery as an alternative to the content valid Work Sample Test Battery[2]

---

[1]Subsequent analyses showed that scores on a test battery comprised of all eight of the tests listed in Table 7 are no more highly related to scores on the Work Sample Test Battery.

[2]A more detailed description of the research leading to the development of the two test batteries can be obtained by contacting the Standards and Evaluation Services Bureau and requesting Technical Report Number 5.

APPENDIX II

EXAMPLE JOB ANALYSIS DATA COLLECTION FORM

The Commission on Peace Officer Standards and Training (POST) has recently completed an extensive statewide study to develop job-related tests of physical ability that can be used to select entry-level patrol officers. The purpose of this survey is to assess the applicability of the POST-developed tests for selecting officers in our department. The information you provide will be used for research purposes only, and in no instance will your individual responses be disclosed. It is extremely important that the information you provide be FACTUAL, ACCURATE, and COMPLETE.

DIRECTIONS: On the following pages are listed six distinct physical activities which you might be called upon to perform while on patrol. For each activity listed, you are asked to provide a brief description of the last time you performed the activity <u>when inability to perform the activity could have resulted in one or more of the following</u>:

- o Failure to perform a required duty/service (such as making an arrest, completing a search or investigation, rendering aid, etc.).
- o Loss or damage to property.
- o Failure to apprehend one or more subjects.
- o Loss of life or injury to self/others.

Please return your completed survey in the attached self-addressed envelope. The deadline for returning the survey is _____, 1982. Thank you for your assistance in this matter.

Name: _____ Date: _____

1. PHYSICAL ACTIVITY: RAPIDLY DRAG A NONRESISTING PERSON AT LEAST 20 FEET (no assistance from others).

_____ Check ( ) here if you have never had to perform this activity.

Circumstances in which you last performed this activity (briefly describe in two or three sentences).

_____

_____

_____

Performed activity within last (week, month, etc.) _____

_____

In last year, have performed similar physical activities approximately _____ times.

2. PHYSICAL ACTIVITY: RAPIDLY CARRY A NONRESISTING PERSON AT LEAST 90 FEET (with assistance of one other person).

_____ Check ( ) here if you have never had to perform this activity.

Circumstances in which you last performed this activity (briefly describe in two or three sentences).

_____

_____

_____

Performed activity within last (week, month, etc.) _____

_____

In last year, have performed similar physical activities approximately _____ times.

3. PHYSICAL ACTIVITY: RAPIDLY CLIMB A 6-FOOT SOLID FENCE/ WALL HAVING NO FOOTHOLDS OR HANDHOLDS

_____ Check ( ) here if you have never had to perform this activity.

Circumstances in which you last performed this activity (briefly describe in two or three sentences).

_____

_____

_____

Performed activity within last (week, month, etc.) _____

_____

In last year, have performed similar physical activities approximately _____ times.

4. PHYSICAL ACTIVITY: RAPIDLY CLIMB A 6-FOOT FENCE/WALL HAVING FOOTHOLDS AND HANDHOLDS

_____ Check ( ) here if you have never had to perform this activity.

Circumstances in which you last performed this activity (briefly describe in two or three sentences).

_____

_____

_____

Performed activity within last (week, month, etc.) _____

_____

In last year, have performed similar physical activities approximately _____ times.

5. PHYSICAL ACTIVITY: RUN AT LEAST 70 YARDS, GOING AROUND, OVER OR BETWEEN MINOR OBSTACLES (but not under obstacles or over tall obstacles).

_____ Check ( ) here if you have never had to perform this activity.

Circumstances in which you last performed this activity (briefly describe in two or three sentences).

_____

_____

_____

Performed activity within last (week, month, etc.) _____

_____

In last year, have performed similar physical activities approximately _____ times.

6. PHYSICAL ACTIVITY: RUN AT LEAST 550 YARDS (equivalent to 1½ laps of a standard outdoor running track; continuous run with few or no obstacles).

_____ Check ( ) here if you have never had to perform this activity.

Circumstances in which you last performed this activity (briefly describe in two or three sentences).

_____

_____

_____

Performed activity within last (week, month, etc.) _____

_____

In last year, have performed similar physical activities approximately _____ times.

APPENDIX III-A

EXAMPLE MEDICAL PRESCREENING FORMS

EXAMPLE MEDICAL SELF-SCREENING DEVICE[1]

INSTRUCTIONS TO CANDIDATE: All questions on this form must be answered completely and accurately. Bring your completed form with you to the test. FAILURE TO DO SO WILL DISQUALIFY YOU FROM TAKING THE TEST.

		In the last five years:
Yes	No	Have you been diagnosed as having heart or circulatory problems?
		Have you frequently had pains in your heart or chest?
		Have you often felt faint or had dizzy spells?
		Have you been diagnosed as having high blood pressure?
		Has your doctor told you that you have a bone or joint problem that has been aggravated by exercise, or might be made worse by exercise?
Yes	No	Are you aware of any other reason why you may not be physically fit to take the physical performance tests?

If you answered "Yes" to any of the above questions, you must take this completed form, along with the attached Medical Clearance Form to your personal physician, and obtain a medical clearance to take the tests. You need not obtain a medical clearance if you answered "No" to all of the above questions.

Explain all questions answered "Yes" above.

I HEREBY ATTEST THAT I HAVE ANSWERED ALL OF THE ABOVE STATEMENTS COMPLETELY AND ACCURATELY, AND AUTHORIZE ANY PHYSICIAN, OTHER LICENSED PRACTITIONER, HOSPITAL, CLINIC, OR OTHER INSTITUTION TO RELEASE ALL RECORDS AND FINDINGS REGARDING MY HEALTH AND PHYSICAL CONDITION.[2]

Signature of Candidate Date

[1]Questions adopted from Physical Activity Readiness Questionnaire developed by the British Columbia Ministry of Health (1978).

[2]Section 20,937 of the California Civil Code prohibits the release of medical information to employers without the affected individual's permission.

Dear Doctor _____:

The individual you are examining has been requested to obtain a Medical Clearance to take the physical performance tests described below. Successful completion of the tests is required to qualify for employment as an entry-level _____(Job Title)_____ in the _____(Name of Department)_____. The tests are designed to evaluate an applicant's ability to perform many of the physically demanding tasks which confront entry-level _____(Job Title)_____, and were developed on the basis of extensive research. Please indicate whether, in your opinion, there are any medically-related reasons why the individual should be prohibited from taking any of the tests. A medical self-screening form has been completed by the individual to assist you in making your determination. If you have any questions you wish answered before completing this form, please contact _____(Name of Individual)_____ at _____(Phone Number)_____. Thank you for your assistance.

PHYSICAL PERFORMANCE TESTS[1]

STANDING LONG JUMP (BROAD JUMP): The jump is executed with feet stationary and parallel. The candidate jumps onto a gym mat. The test poses some risk of muscle-skeletal injury due to the explosive nature of the test.

TRUNK FLEXION TEST: A static effort against a resistive harness placed around candidate's mid-shoulder blades. The test is executed from a standing position with the candidate's buttocks held firmly against a padded plate to restrict leg and hip movement. The test requires 1-2 second executions of maximal effort. Since the hips are fixed and little or no movement occurs, the risk of joint stress or injury is minimized.

DYNAMIC ARM STRENGTH TEST: A one minute arm crank of a bicycle ergometer. Candidate completes as many pedal revolutions as possible. The test can raise heart rates and blood pressures to 85% of that observed during treadmill stress tests in some individuals. The response is transitory and heart rates usually return to resting levels in 2 to 4 minutes.

[1]Descriptions of the tests in the Generic Test Battery are presented for illustrative purposes.

Medical clearance to participate in physical performance testing for

(Print Name of Individual)

Having reviewed the above-named individual's medical self-screening form, and having personally examined the above-named individual, and having read the above descriptions of the physical performance tests, it is my professional opinion that:

Check ( ) one:

_____ It is unlikely participation in testing will pose a significant medical risk to the above-named individual.

_____ The above-named individual should not participate in testing.

Comments:

Signature of Physician

Date

APPENDIX III-B

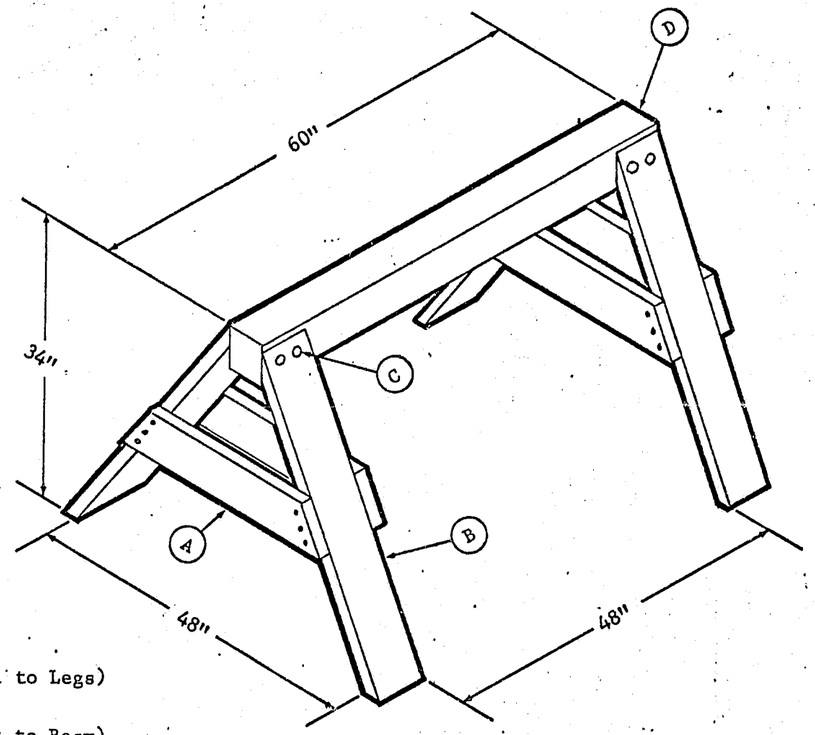
ADMINISTRATIVE MATERIALS FOR WOkK SAMPLE TEST BATTERY

Table 8: Materials and equipment list for Work Sample Test Battery

Test	Setup	Administration	Specifications/Manufacturer of Equipment Used by POST (major equipment only)
Station A: Initial Candidate Processing		Stethoscope, Blood Pressure Cuffs, (small, medium, large), Watch with second hand, Data collection forms	
Station B: Agility Run	Measuring tape, Traffic cones (16), Cord (200 feet), 6"x6"x3' Curbs (3), 34" high obstacle	Stopwatch	(See Attached Diagram)
Station C: Body Drag	Measuring tape, Tape to mark start/finish lines	Stopwatch 165-pound Dummy	Purchased from: K & O Industries Sierra Madre, CA 91024 Approximate cost: $1,100
Station D: Obstacle Climbs	Traffic cones (8), Matting to cover fence supports, Fence	Stopwatch	(See Attached Diagram)[1]
Station E: Body Carry	Measuring tape, Tape to mark start/finish lines, Traffic cone	Stopwatch 165-pound Dummy	(See Above)
Station F: 550-Yard Run	Measuring tape, Traffic cones (2)	Stopwatch	

[1]Note that diagram is for combination chain link and solid fence.

34" High Obstacle

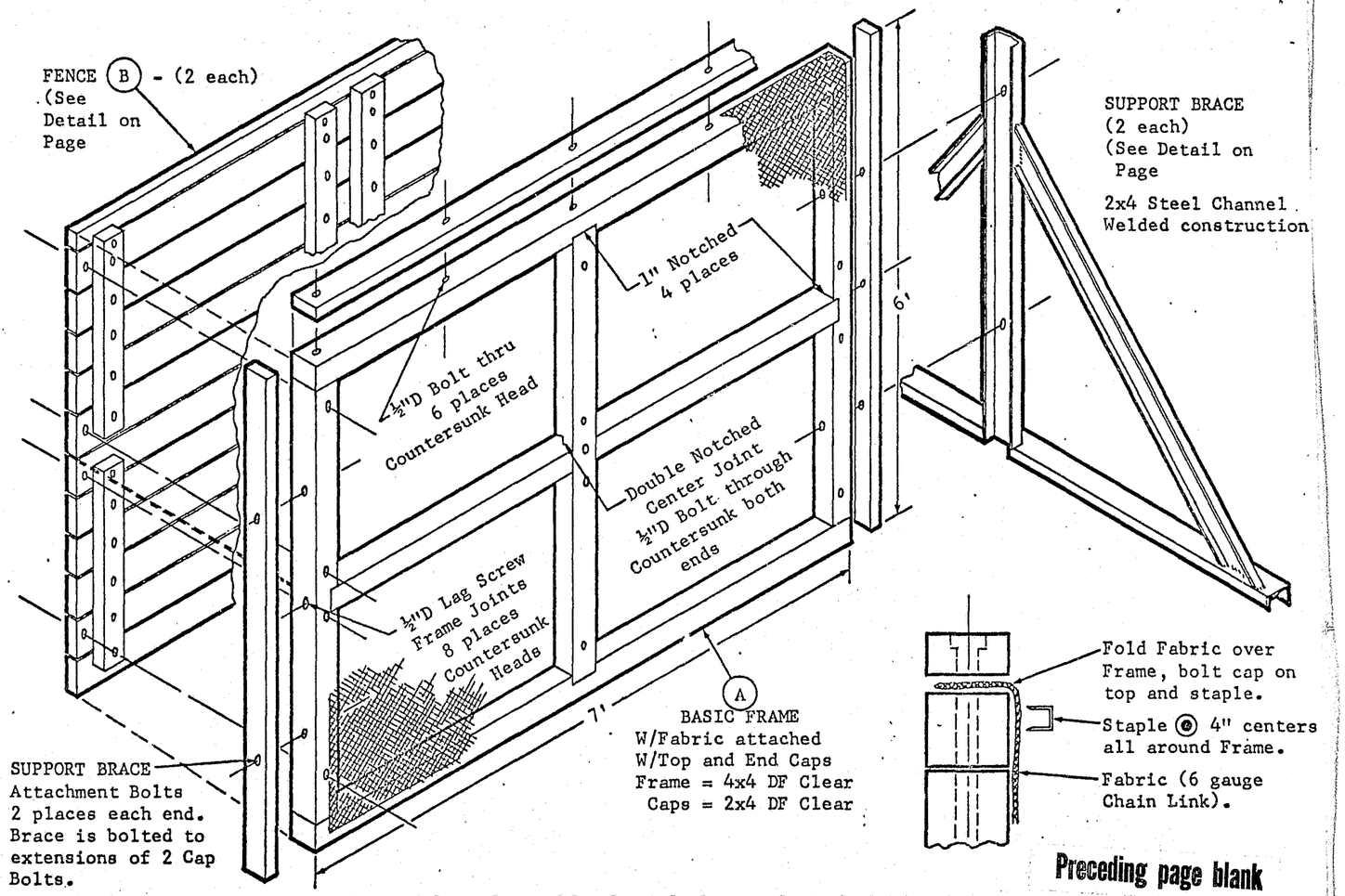


(A) 2"x6"x3' GUSSET
4 required (Nail to Legs)

(B) 2"x6"x3'-6" LEG
4 required (Bolt to Beam)

(C) ½"Dx6" LAG BOLT & FLAT WASHER
8 Required

(D) 8"x8"x5' BEAM
Railroad Tie OK if clear and clean



Combination Chain Link and Solid Fence

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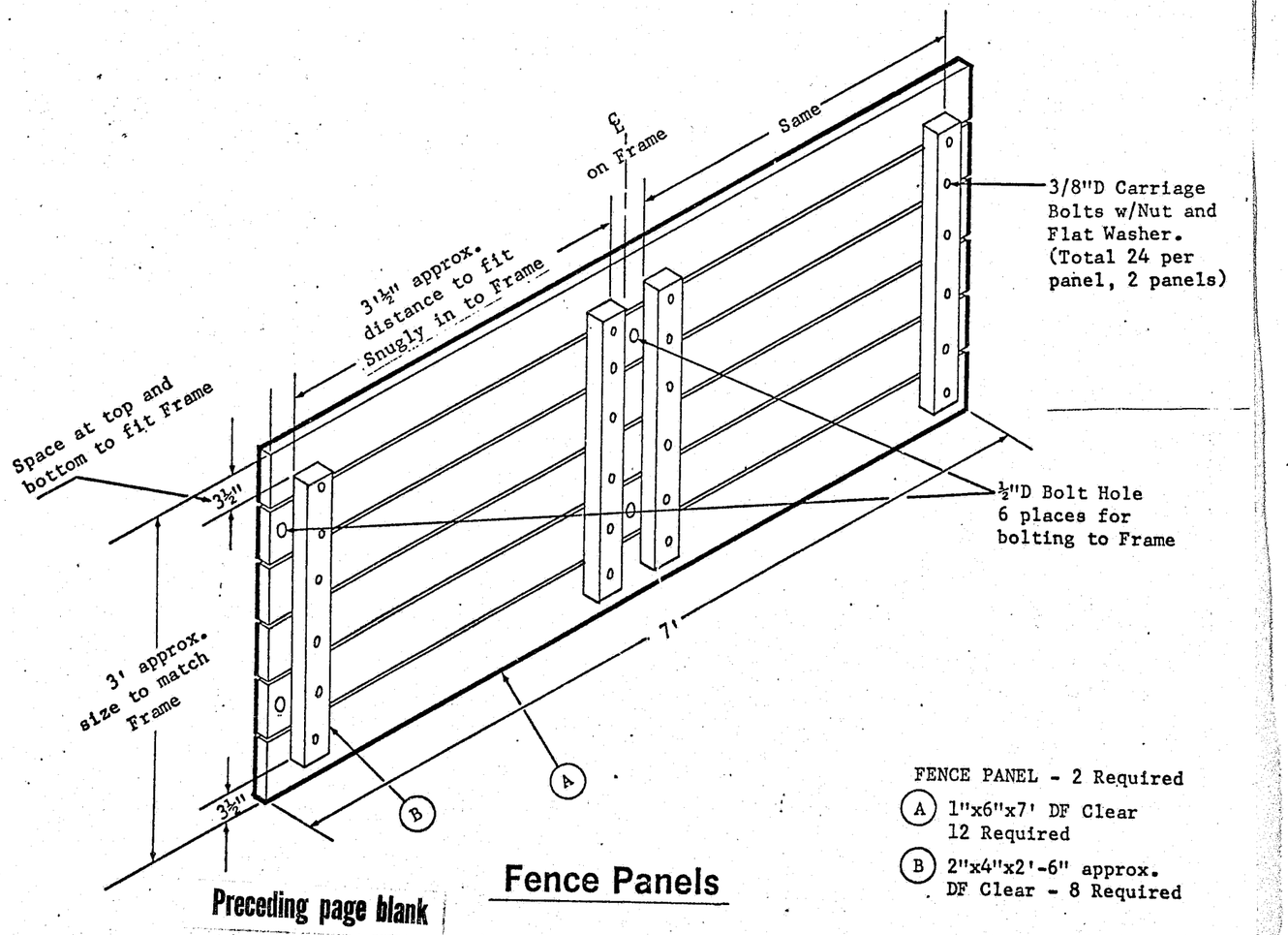


FENCE PANEL - 2 Required

(A) 1"x6"x7' DF Clear
12 Required

(B) 2"x4"x2'-6" approx.
DF Clear - 8 Required

Fence Panels

Fence Support Braces

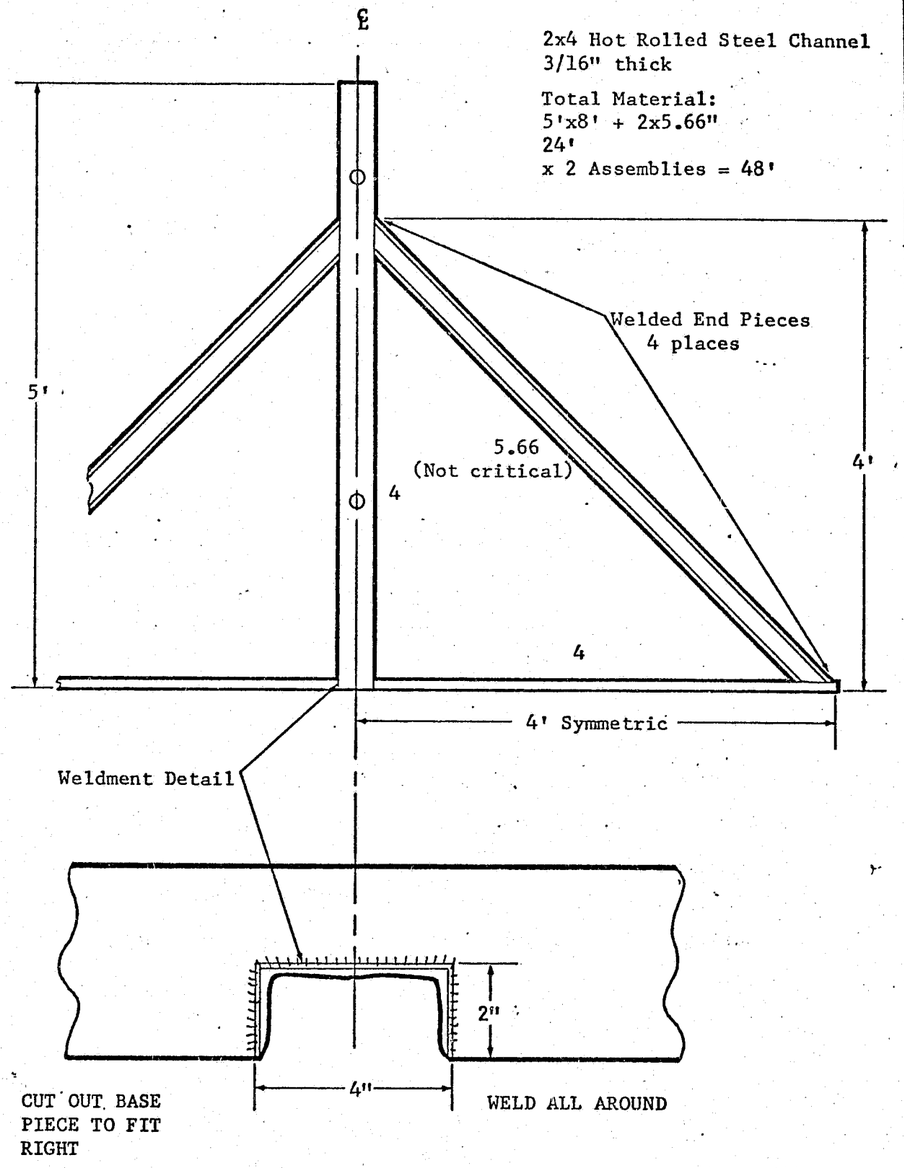


Table 3: Test Flow Chart for Work Sample Test Battery

Monitors[1]	Test Station	Estimated Time in Minutes[2]
1	A: Initial Candidate Processing	5-20[3]
1	B: Agility Run (two trials)	6[4]
1	C: Body Drag (two trials)	6
1	D: Obstacle Climbs Chain Link Fence (two trials) Solid Fence (two trials)	8
2	E: Body Carry (two trials)	6
1	F: 550-Yard Run	10[5]

TOTAL MONITORS: 7

TOTAL TIME TO PROCESS ONE CANDIDATE: 41-56 minutes

CANDIDATE TESTING RATE: 12/hour (candidates tested in groups of 4; new group every 20 minutes)[6]

[1]Each monitor assigned to specific test station for duration of testing.

[2]Estimates assume all test stations will be located in close proximity to each other.

[3]Time will vary depending on agency procedures with regard to prescreening candidates.

[4]Includes two minutes for warm-up.

[5]Includes observation of candidate during "cool down".

[6]Assumes resting heart rate and blood pressure are taken at Station A.

WORK SAMPLE TEST BATTERY

Candidate Name: Date:

Station A: Initial Candidate Processing[1]

RHR: ____ beats per minute

RBP: Systolic _____mm Hg

Diastolic _____mm Hg

Test Scores

Time in Seconds

	1st	2nd	Best
Station B: Body Drag	__.__	__.__	__.__
Station C: Agility Run	__.__	__.__	__.__
Station D: Obstacle Climbs			
Chain Link Fence	__.__	__.__	__.__
Solid Fence	__.__	__.__	__.__
Station E: Body Carry	__.__	__.__	__.__
Station F: 550-Yard Run			__.__

[1]Assumes resting heart rate and blood pressures will be taken.

APPENDIX III-C

ADMINISTRATIVE MATERIALS FOR GENERIC TEST BATTERY

Table 10: Materials and equipment list for Generic Test Battery

Test	Setup	Administration	Specifications/Manufacturer of Equipment Used by POST (major equipment only)
Station A: Initial Candidate Processing		Stethoscope, Blood Pressure Cuffs (small, medium, large), Watch with second hand, Data collection forms	
Station B: Percent Body Fat (Skinfolds)		Skinfold Calipers	Harperden #49423 Purchased from: H. E. Morse Morse, Michigan Approximate cost: $300
Station C: Trunk Flexion Test		Cable Tensiometer	Model #T5-2002-105-00 Purchased from: Pacific Scientific Anaheim, CA 92803 Approximate Cost: $350 Fabricated by: Physical Abilities Technology, Inc. Dixon, CA 95620 Approximate Cost: $1,000[1]
		Trunk Strength Device	
Station D: Standing Long Jump	Gym mat, Cloth tape measure, Tape to secure gym mat, Yardstick		
Station E: Dynamic Arm Strength Test		Stationary Bicycle	Monarch #868 Purchased from: Quinton Instrument Co. Seattle, Washington Approximate Cost: $700 Fabricated by: Electronics Unlimited Sacramento, CA 95819 Approximate Cost: $150
		Electronic Revolution Counter	

[1]Nonportable models may be purchased at somewhat lesser cost.

Table 11: Test flow chart for Generic Test Battery

Monitors[1]	Test Station	Estimated Time in Minutes[2]
1	A: Initial Candidate Processing	5-20[3]
1	B: Percent Body Fat (Skinfolds)	2
1	C: Trunk Flexion Test (3 trials)	5
1	D: Standing Long Jump (3 trials)	3
1	E: Dynamic Arm Strength Test	10[4]

TOTAL MONITORS: 5

TOTAL TIME TO PROCESS ONE CANDIDATE: 25-40 minutes

CANDIDATE TESTING RATE: 12/hour (candidates tested in groups of 4; new group every 20 minutes)[5]

[1]Each monitor assigned to specific test station for duration of testing.

[2]Estimates assume all test stations will be located in close proximity to each other.

[3]Time will vary depending on agency procedures with regard to prescreening candidates.

[4]Includes observation of candidate during "cool down".

[5]Assumes resting heart rate and blood pressures are taken at Station A.

DATA COLLECTION FORM

GENERIC TEST BATTERY

Candidate Name: Date:

Station A: Initial Candidate Processing[1]

RHR: _____ beats per minute RBP: Systolic _____mm Hg

Diastolic _____mm Hg

Test Scores

Station B: Skinfolds

A: Men	1st	2nd	3rd (if necessary)	Average
Subscapula	_____.__mm	_____.__mm	_____.__mm	_____.__mm
Thigh	_____.__mm	_____.__mm	_____.__mm	_____.__mm
B: Women				
Tricep	_____.__mm	_____.__mm	_____.__mm	_____.__mm
Suprailiac (Hip)	_____.__mm	_____.__mm	_____.__mm	_____.__mm

	1st	2nd	3rd	Best
Station C: Trunk Flexion (scale readings)	_____	_____	_____	_____
Station D: Standing Long Jump (inches)	_____	_____	_____	_____

Station E: Dynamic Arm Strength _____ revolutions

[1]Assumes resting heart rate and blood pressure will be taken.

APPENDIX IV-A

INSTRUCTIONS FOR SCORING TESTS

Examples which illustrate the test scoring procedures for the two test batteries immediately follow these instructions.

Step 1: Review test forms to verify that all test data were properly recorded, including "best" score for each test ("average" score for skinfold measurements).[1]

Step 2: <u>Generic Test Battery Only</u>

(1) Calculation of PERCENT LEAN BODY WEIGHT

(a) Convert average skinfold measurements to estimates of percent body fat using attached nomograms. Note that different nomograms are provided for males and females. The nomograms are used by plotting the average skinfold estimates for a given individual on the two outer scales which are labeled according to skinfold site. The plotted points are then connected with a straight edge. That point where the straight edge crosses the middle scale (labeled "Percentage Fat") corresponds to the individual's percent body fat estimate.

(b) Convert each percent body fat estimate to an estimate of percent lean body weight using the formula below.

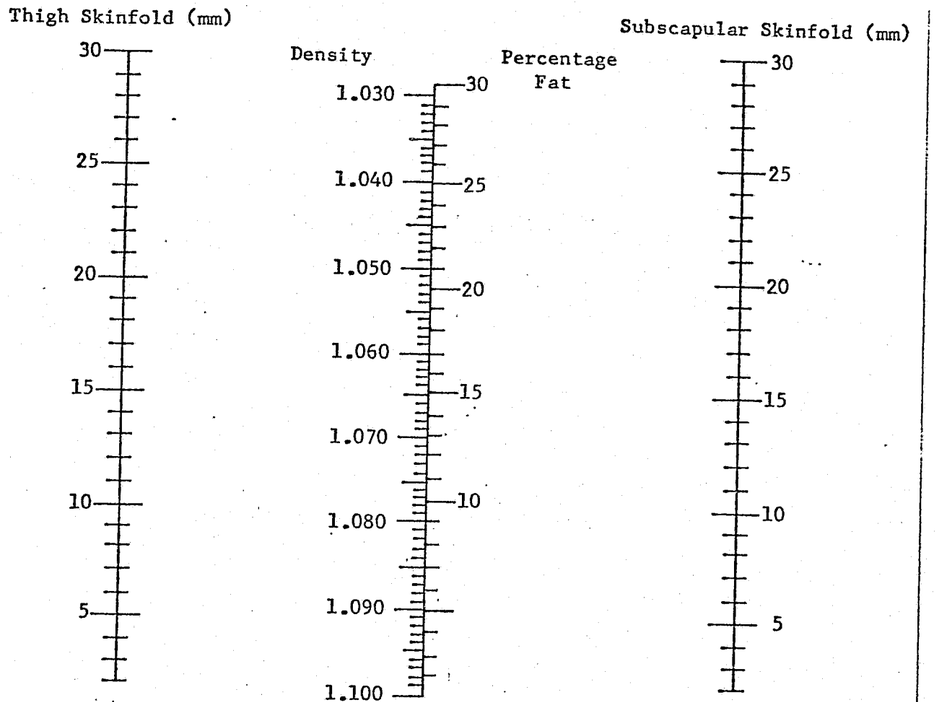
% LEAN WEIGHT = 100 - % BODY FAT

(2) Conversion of cable tensiometer readings for TRUNK FLEXION TEST.

(a) Convert each candidate's "best" cable tensiometer reading to pounds of force by using the conversion table which accompanies the cable tensiometer.

[1] In those instances where candidate was unable to complete a test (e.g., wall climb), it is recommended that the candidate be assigned a T-score in Step 4 that is 5 points lower than the lowest obtained T-score for the test. This procedure assures that no candidate will be disqualified on the basis of failure to complete a single test, and is consistent with the compensatory nature of scoring the test. (A candidate may compensate for poor performance on one test by demonstrating superior performance on the remaining tests.)

Nomogram For Establishing Percent Body Fat of Males[1]



[1]From Sloan and Weir (1970). Based on the following formulas:

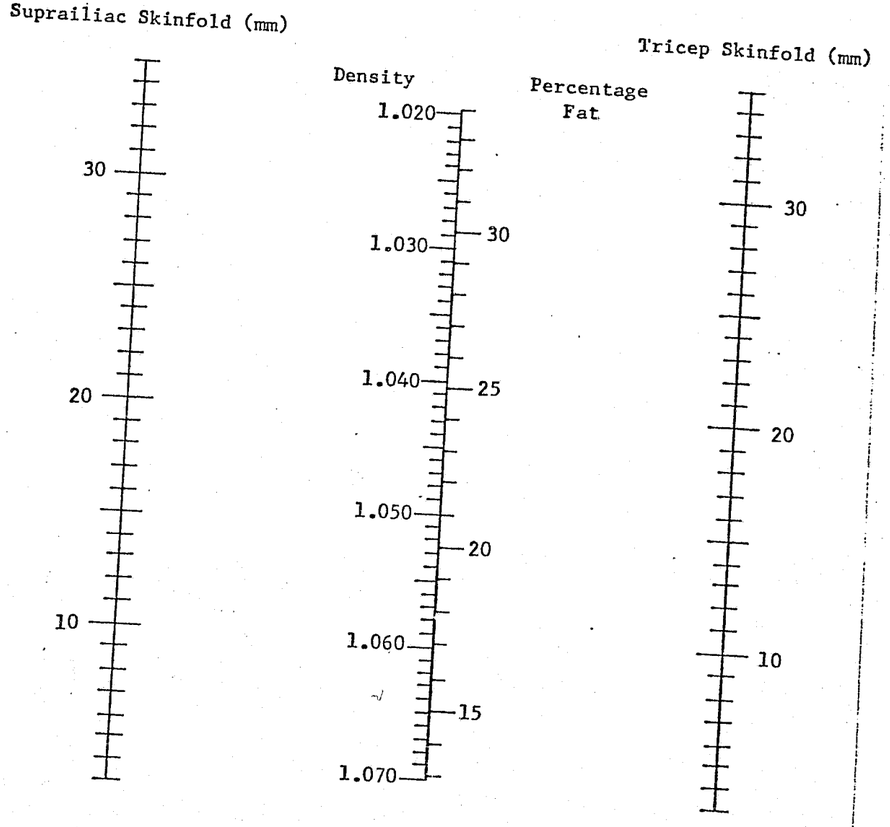
Percent body fat = 100 (4.570/D - 4.142)

where D = body density

Body density = $1.1043 - 0.00133X_1 - .00131X_2$

where X_1 = thigh skinfold (mm)
X_2 = subscapular skinfold (mm)

Nomogram For Establishing Percent Body Fat of Females[1]



[1]From Sloan and Weir (1970). Based on the following formulas:

Percent body fat = 100(4.570/D - 4.142)

where D = body density

Body density = $1.0764 - 0.00081\ X_1 - 0.00088\ X_2$

where X_1 = suprailiac skinfold
X_2 = triceps skinfold

Step 3: Compute the mean ($\overline{X}$) and standard deviation (S.D.) for the scores on each test (6 means and standard deviations for the Work Sample Test Battery; 4 means and standard deviations for the Generic Test Battery).[1] The computational formulas for $\overline{X}$ and S.D. are:

$$\overline{X} = \frac{X}{N}$$

Where Σ = "the sum of"

X = test score

N = number of test scores (candidates)

$$S.D. = \sqrt{\frac{(X-\overline{X})^2}{N}}$$

Where Σ = "the sum of"

X = test score

$\overline{X}$ = mean test score

N = number of test scores (candidates)

$\sqrt{\ }$ = square root

Step 4: Convert the scores on each test to T-scores (6 T-scores for each candidate on the Work Sample Test Battery; 4 T-scores for each candidate on the Generic Test Battery). The formula for computing T-scores is:[2]

$$T = 50 + 10\ \frac{(X-\overline{X})}{S.D.}$$

Where X = test score

$\overline{X}$ = mean test score

S.D. = standard deviation of test scores

Step 5: Using below weights, weight T-scores on individual tests to compute each candidate's overall test score.

Work Sample Test Battery:

Total score = .22 (T-score on Agility Run) +

.08 (T-score on Body Drag) +

.23 (T-score on Chain Link Fence) +

[1]Many hand-held calculators will compute these values.

[2]Many programmable calculators will compute T-scores directly from raw scores, eliminating the need to perform Steps 3 and 4 by hand.

.32 (T-score on Solid Fence) +

.10 (T-score on Body Carry) +

.04 (T-score on 550-Yard Run)

Generic Test Battery:

Total score = 4 (T-score on Lean Body Weight) +

2 (T-score on Trunk Flexion Test) +

5 (T-score on Standing Long Jump) +

3 (T-score on Dynamic Arm Strength Test)

IMPORTANT NOTICE:

Because of the timed nature of the Work Sample Tests, the highest total score on the Work Sample Test Battery corresponds to the poorest performer on the test battery.

Step 6: For those agencies using test norms for other groups (e.g., officers) as an aid in establishing cutoffs

a) Using the below formula, for each test compute the T-score (for applicants) which corresponds to the raw score chosen for the norm group.

$$T = 50 + 10\ \frac{X - \overline{X}}{S.D.}$$

Where X = test score for norm group (raw score)

$\overline{X}$ = mean score for applicant group (raw score)

S.D. = standard deviation of test scores for applicant group (raw score)

Example: $\overline{X}$ and S.D. for applicants on Trunk Flexion Test (lbs.) are 165 and 50. Agency has tested 30 officers and found that 70% of officers have trunk strengths greater than 145 lbs. Agency has decided that, in general, applicants should be able to meet this standard. T-score for applicants which corresponds to 145 lbs. is:

CONTINUED

1 OF 2

$$T = 50 + 10\ \frac{X - \bar{X}}{S.D.}$$

$$= 50 + 10\ \frac{145 - 165}{50}$$

$$= 50 + 10\ \frac{-20}{50}$$

$$= 50 + (-.4)$$

$$= 50 + (-4)$$

$$= 46$$

b. Follow similar procedure for each of the tests in the test battery. Plug T-scores which result into appropriate formula for computing total test score (Step 5). Total score which results is cutoff score for overall test.

EXAMPLE TEST SCORE COMPUTATIONS[1]

WORK SAMPLE TEST BATTERY

Step 3: Computation of Means and Standard Deviations.

	RAW TEST SCORES (Sec.)					
Candidate	Agility Run	Body Drag	Chain Link Fence Climb	Solid Fence Climb	Body Carry	550 Yard Run
A	16.8	3.9	7.5	7.4	12.4	103.4
B	15.9	4.4	7.1	7.4	12.1	129.1
C	17.4	4.3	8.3	9.2	13.4	122.4
D	13.9	3.3	7.5	6.6	11.3	101.0
E	16.3	5.1	7.9	8.5	12.9	111.7
Mean ($\bar{X}$)	(16.1)	4.2	7.7	7.8	12.4	113.5
Standard Deviation (S.D.)	1.19	.59	.41	(.92)	.71	10.81

$$\bar{X} = \frac{\Sigma X}{N} = \frac{16.8 + 15.9 + 17.4 + 13.9 + 16.3}{5} = \frac{80.3}{5} = 16.06 = 16.1$$

$$S.D. = \sqrt{\frac{\Sigma(X - \bar{X})^2}{N}}$$

$$= \sqrt{\frac{(7.4 - 7.8)^2 + (7.4 - 7.8)^2 + (9.2 - 7.8)^2 + (6.6 - 7.8)^2 + (8.5 - 7.8}{5}}$$

$$= \sqrt{\frac{(-.4)^2 + (-.4)^2 + (1.4)^2 + (-1.2)^2 + (.7)^2}{5}}$$

$$= \sqrt{\frac{.16 + .16 + 1.96 + 1.44 + .49}{5}}$$

$$= \sqrt{\frac{4.21}{5}} = \sqrt{.84} = .92$$

Step 4: Conversion of Scores to T-Scores.

Candidate	Agility Run	Body Drag	Chain Link Fence Climb	Solid Fence Climb	Body Carry	550 Yard Run
A	55.9	44.9	45.1	45.6	50	40.7
B	48.3	53.4	35.4	45.6	45.8	64.4
C	60.9	51.7	64.6	65.2	(64.1)	58.2
D	31.5	34.7	45.1	37.0	34.5	38.4
E	57.7	65.3	54.9	57.6	57.0	48.3

$$T = 50 + 10\left(\frac{X - \bar{X}}{S.D.}\right) = 50 + 10\left(\frac{13.4 - 12.4}{.71}\right)$$

$$= 50 + 10\left(\frac{1.0}{.71}\right) = 50 + 10\ (1.408)$$

$$= 50 + 14.08 = 64.1$$

Step 5: Weighting of T-Scores to compute overall Test Score.

Weights	.22	.08	.23	.32	.10	.04	
Candidate	Agility Run	Body Drag	Chain Link Fence Climb	Solid Fence Climb	Body Carry	550 Yard Run	Total Test Score[2]
A	.22(55.9)	+ .08(44.9)	+ .23(45.1)	+ .32(45.6)	+ .10(50)	+ .04(40.7)	= 47.5
B	.22(48.3)	+ .08(53.4)	+ .23(35.4)	+ .32(45.6)	+ .10(45.8)	+ .04(64.4)	= 44.8
C	.22(60.9)	+ .08(51.7)	+ .23(64.6)	+ .32(65.2)	+ .10(64.1)	+ .04(58.2)	= 62.0
D	.22(31.5)	+ .08(34.7)	+ .23(45.1)	+ .32(37.0)	+ .10(34.5)	+ .04(38.4)	= 36.9
E	.22(51.7)	+ .08(65.3)	+ .23(54.9)	+ .32(57.6)	+ .10(57.0)	+ .04(48.3)	= 55.3

[1] Example calculations are shown for circled values.

[2] As noted previously, lowest total test score represents best overall performance on Work Sample Test Battery.

EXAMPLE TEST SCORE COMPUTATIONS[1]

GENERIC TEST BATTERY

Step 3: Computation of Means and Standard Deviations.

RAW TEST SCORES

Candidate	Percent Lean Weight[2]	Trunk Flexion Test[3] (Lbs.)	Standing Long Jump	Dynamic Arm Strength Test (Revs.)
A	84.3	189.2	87.	82.
B	80.9	167.4	79.	68.
C	86.2	173.6	94.	90.
D	84.9	237.1	96.	102.
E	78.4	211.4	83.	87.
Mean $\bar{X}$	82.9	195.7	87.8	(85.8)
Standard Deviation (S.D.)	2.9	25.7	(6.4)	11.1

$$\bar{X} = \frac{\Sigma X}{N} = \frac{(82 + 68 + 90 + 102 + 87)}{5} = \frac{429}{5} = 85.8$$

$$\text{S.D.} = \sqrt{\frac{\Sigma(X - \bar{X})^2}{N}} = \sqrt{\frac{(87 - 87.8)^2 + (79 - 87.8)^2 + (94 - 87.8)^2 + (96 - 87.8)^2 + (83 - 87.8}{5}}$$

$$= \sqrt{\frac{(-.8)^2 + (-8.8)^2 + (6.2)^2 + (8.2)^2 + (-4.8)^2}{5}}$$

$$= \sqrt{\frac{207.56}{5}} = \sqrt{4.52} = 6.4$$

Step 4: Convert Scores to T-Scores.

Candidate	Percent Lean Weight	Trunk Flexion Test (Lbs.)	Standing Long Jump	Dynamic Arm Strength Test (Revs.)
A	54.8	47.5	48.8	46.6
B	43.1	39.0	36.3	34.0
C	61.4	41.4	59.7	53.8
D	56.9	(66.1)	62.8	64.6
E	34.5	56.1	42.5	51.1

$$T = 50 + 10\left(\frac{X - \bar{X}}{\text{S.D.}}\right)$$

$$= 50 + 10\left(\frac{237.1 - 195.7}{25.7}\right)$$

$$= 50 + 10\left(\frac{41.4}{25.7}\right)$$

$$= 50 + 10\,(1.61) = 66.1$$

Step 5: Weighting of T-Scores to compute overall Test Score.

Weights: 4 2 5 3

Candidate	Percent Lean Weight	Trunk Flexion Test (Lbs.)	Standing Long Jump	Dynamic Arm Strength Test (Revs.)	Total Test Score
A	4(54.8)	+ 2(47.5)	+ 5(48.8)	+ 3(46.6)	= 698
B	4(43.1)	+ 2(39.0)	+ 5(36.3)	+ 3(34.0)	= 534
C	4(61.4)	+ 2(41.4)	+ 5(59.7)	+ 3(53.8)	= 788
D	4(56.9)	+ 2(66.1)	+ 5(62.8)	+ 3(64.6)	= 868
E	4(34.5)	+ 2(56.1)	+ 5(42.5)	+ 3(51.1)	= 616

[1] Example calculations are shown for circled values.

[2] Computed by subtracting % Body Fat Estimates from 100 (see Step 2 of instructions).

[3] Cable Tensiometer Readings are converted to pounds of force using conversion table which accompanies Cable Tensiometer.

87.8

APPENDIX IV-B

TEST NORMS

Table 12: Test norms for incumbent officers[1]

	Males[2]		Females[3]	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Work Sample Test Battery				
Agility Run (sec.)	16.80	1.5	18.32	2.0
Body Drag (sec.)	4.71	1.5	7.84	3.4
Chain Link Fence (sec.)	7.65	1.3	10.55	3.2
Solid Fence (sec.)	7.58	1.1	10.71	2.3
Body Carry (sec.)	12.42	1.7	19.22	3.5
550-Yard Run (sec.)	103.40	16.1	125.93	16.6
Generic Test Battery				
Percent Body Fat	15.65	3.9	19.34	2.9
Trunk Flexion (lbs.)	189.80	42.4	107.28	28.6
Standing Long Jump (inches)	87.43	8.4	70.89	6.7
Dynamic Arm Strength (revs.)	82.41	11.5	48.78	8.7

[1]See Step 6, Appendix IV-A, for procedure for converting raw scores to corresponding T-scores for applicants.

[2]N = 28-29 for Work Sample Test Battery, 27-30 for Generic Test Battery

[3]N = 16-17 for Work Sample Test Battery, 18 for Generic Test Battery

Table 13: Comparison of passing rates for male and female cadets

	Percent Passing		
	Overall	Male (N=34)	Female (N=32)
Work Sample Test Battery			
40	79.4	0.0	
45	82.3	6.3	
50	91.2	9.4	
55	94.1	15.6	
60	97.1	21.9	
65	97.1	34.4	
Generic Test Battery			
40	79.4	0.0	
45	85.3	3.1	
50	91.2	6.3	
55	94.1	15.6	
60	97.1	21.9	
65	100.0	31.3	

END