AMC REGULATION

AMCR 715-505
VOLUME 5

PROCUREMENT

AMMUNITION BALLISTIC ACCEPTANCE TEST METHODS
VOLUME 5
TEST PROCEDURES FOR CAL. .45 CARTRIDGES

U.S. ARMY MATERIEL COMMAND

HEADQUARTERS
UNITED STATES ARMY MATERIEL COMMAND
WASHINGTON, D.C. 20315

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1. Volume 5, AMCR 715-505, is published for the instruction and guidance of all concerned. The use of the test methods and procedures contained in this publication is mandatory. The methods and procedures will be applied in all instances concerning the specific ammunition item except as provided in the paragraph below.

2. If it is found that the instructions contained herein conflict with the contract, drawings, or specifications relating to the specific ammunition item, the contract, drawings, and specifications will govern in the order listed.

(AMCPP)

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CHAPTER 1

BULLET TYPE CARTRIDGES

SECTION 1

WEAPON UNIT GUIDE

1.1 PURPOSE

The inspection, maintenance and cleaning of ballistic equipment is an important part of proof technique. Weapons used for official acceptance tests shall be inspected, maintained and cleaned in accordance with the practices outlined herein. Complete records of the wear history of weapons should be maintained for reference as a possible aid in the interpretation of ballistic results. All weapons shall be controlled by regular inspection and maintenance.

1.2 EQUIPMENT

Equipment listed in the applicable Inspection Equipment List shall be used.

1.3 FIRING-PIN MEASUREMENTS

1.3.1 Before comparability in test conditions can be established between stations, it is necessary that attention be paid to firing-pin diameter and contour, firing-pin protrusion and firing-pin indent of the test weapons and test actions. These measurements shall be made before a weapon or test action is placed in service, after misfires, pierced primers or flowbacks; or whenever a part replacement has been made in the bolt assembly.

1.3.1.1 Firing-pin diameter shall be checked with a micrometer, however, when difficulty is experienced with an unusual series of primer defects, the contour of the firing-pin point should be checked with a templet or visual comparator. The diameter of the firing-pin hole in the face plate should be checked concurrently. A loose fit between firing-pin and firing-pin hole, due to improper diameter of either or both, may cause punchouts of the primer and loss of sensitivity due to eccentric blow.

1.3.1.2 Firing-pin protrusion must be checked frequently to insure against pierced primers or misfires. Pin protrusion is measured with a dial gage of such construction as to be suitable for the particular weapon or action involved.

1.3.1.3 Firing-pin indent shall be measured by placing a copper pressure cylinder in a fixture (drawings of cylinder and fixture are referenced in the applicable Inspection Equipment List), the fixture is then inserted in the chamber of the weapon, the bolt is closed and the firing-pin released. The cylinder is then removed and the distance from the bottom of the indent to the undeformed surface of the cylinder is measured using a dial gage. A point micrometer graduated to .0001", may also be used. If a micrometer is used, the cylinder shall be measured before indentation is made, and again after indentation between the bottom of the indent and the opposite end of the cylinder. This measurement is subtracted from the original measurement, the difference shall be the primer indent measurement.

(NOTE: Firing-pin indent and firing-pin protrusion shall be as shown in the detailed sections of this regulation.)

1.4 MEASUREMENT OF GUN CHARACTERISTICS

1.4.1 Headspace. The headspace of all test and service weapons shall be measured the first time they are put in use during any shift or when fitting new barrels to fixed receivers. All test and service weapons shall conform to the headspace tolerance specified in the detailed sections of this regulation.

1.4.2 The headspace measurement for weapons containing the M1903 receiver is made as follows:

1.4.2.1 The bolt is stripped so that the operator will not be deceived by the drag caused by the extractor or other parts. A headspace gage is then selected by trial and error, which, when inserted into the chamber like a cartridge, will just allow the bolt to close when moderate pressure is applied. The dimension of this gage is the value of the headspace of the weapon. This measurement is checked by removing this headspace gage from the chamber, and inserting the next larger gage (plus .001") which should stop the bolt before it is completely closed.

1.4.2.2 Corrections to headspace shall be made by the gunsmith only.

1.5 CARE AND MAINTENANCE OF WEAPONS

Proper cleaning and lubricating of all ballistic equipment is essential for accurate reproducible proof results.

1.5.1 The bore of the weapon is cleaned as follows:

1.5.1.1 A soft bristle brush is saturated with cleaner and worked through the barrel with a vigorous scrubbing action. A brass brush is then run completely through the barrel in one long continuous stroke. When the brush emerges from the opposite end of the barrel the stroke is reversed and the brush is withdrawn through the barrel.

1.5.1.2 The bore is again swabbed with a soft bristle brush soaked in solvent. A cloth patch soaked in solvent is run through the bore several times. The chamber is carefully wiped with a similar patch.

1.5.1.3 A succession of clean cloth patches is then run through the bore
l it is completely dry and clean. If barrel is not to be used in the immediate ire, a clean patch is immersed in oil and run through the barrel so that a t film covers the chamber and bore.

1.5.1.4 Whenever the construction of the gun permits it, the bore is ned from the breech. When it is necessary to clean from the muzzle, special is necessary in cleaning the chamber in order to remove the dirt, lint and tles deposited therein during cleaning of the bore.

1.5.2 Small metal parts are cleaned by immersing in a bath of solvent or ner and scrubbing vigorously with a brass brush. Large metal parts are ned by wiping with a cloth soaked in solvent, cleaner or light oil.

1.5.3 Frequency of lubricating and cleaning.

1.5.3.1 Special test weapons (Receivers, Pressure Gages, etc.)

1.5.3.1.1 The bore and chamber are cleaned and lightly oiled at the close ach shift in which the weapon is used. All exposed parts of the receiver are d with an oily cloth.

1.5.3.1.2 Once each week, each test action in current use is completely antled, inspected, cleaned and lubricated.

1.5.3.1.3 Metal fouling is removed when it becomes too thick. The time for val of such fouling is left to the judgment of the gunsmith, but the barrel is r allowed to foul to the point where the fouling begins to scale off.

1.5.3.2 Service Weapons

1.5.3.2.1 The chamber and bore are cleaned at the close of firing on each t in which the weapon is used.

1.5.3.2.2 The receiver and bolt groups of each weapon are completely dis-mbled and cleaned at the close of firing on each shift or after 1,000 car-lges have been fired, if more than 1,000 cartridges be fired per shift. The ier and trigger groups of automatic weapons are completely disassembled and ned as needed. Complete disassembly of the trigger and hammer groups each is unnecessary.

1.5.3.2.3 The weapon is lubricated after each cleaning. Lubrication is lied to all moving parts and to the bore.

1.5.4 Inspection of Weapons

1.5.4.1 All of the items listed are checked in the initial inspection of the weapon; items marked (*) are checked daily; and items marked (**) are checked weekly when a weapon is used frequently or continuously.

a. Universal Receivers and assemblies containing the M1903 Receiver

1. Unpack, remove rust preventive
* 2. Disassemble, clean and lubricate
* 3. Inspect chamber and bore
4. Check headspace
5. Check bullet seat (breechbore gage)
6. Examine camming and locking mechanisms
7. Examine striker and bolt
** 8. Check firing-pin protrusion
** 9. Check firing-pin indent
* 10. Hand function, to check smoothness of feeding and ejection.

b. Sub-machine guns

1. Unpack, remove rust preventive
* 2. Disassemble, clean and lubricate
* 3. Inspect chamber and bore
* 4. Examine firing pin and bolt
* 5. Check firing pin protrusion
* 6. Check headspace
** 7. Check firing pin indent (where applicable)
* 8. Assemble and function with dummy ammunition

c. Pistols

1. Unpack, remove rust preventive

* 2. Disassemble, clean and lubricate

* 3. Inspect chamber and bore

* 4. Examine receiver and slide

* 5. Test action with dummy ammunition

1.6 REMOVAL OF METAL FOULING

1.6.1 The solution used for the removal of metal fouling consists of the following:

Ammonium per sulphate, USP	1 oz.
Ammonium carbonate, USP	0.5 oz.
Ammonia water (28% NH_3 oz. vol.) Spec. O-A-451, Class B	6 oz.
Water	4 oz.

It is recommended that this solution be prepared as required.

NOTE: This solution is very corrosive when allowed to dry on a metal surface or if brought in contact with a hot surface of a barrel. Great care should be exercised to see that it does not come in contact with blued metal or with gun actions.

1.6.2 To remove metal fouling, the barrel should be thoroughly cleaned. To remove the last traces of oil, a single cartridge should be fired through it just before introduction of the fouling solution.

1.6.3 A tight fitting stopper is inserted into the bullet seat, and the fouling solution poured into the barrel until it is filled completely up to the muzzle.

1.6.4 If the solution does not completely fill the barrel, a line of corrosion will be formed. Some method must therefore be used to assure the barrel remains completely full. (A rubber tube slipped over the muzzle, a crater of grease built up around the muzzle, or the constant observation and addition of solution as it evaporates.)

1.6.5 After one-half hour, the solution is poured out and the color noted. If the color is a deep blue, the treatment must be repeated. Between each application and after the final one (when the solution shows only a light trace of blue) the barrel is washed out with hot water, then cleaned with a wire brush and dried with cloth patches.

SECTION 2

REFERENCE COMPONENTS AND REFERENCE AMMUNITION

2.1 PURPOSE

Reference cartridges with assessed values, hand-loaded or machine-loaded, are used to establish velocity and pressure levels by which test equipment serviceability and performance may be determined. The correction factors (deviations from assessed values) shall be applied to results of velocity and pressure tests.

2.2 EQUIPMENT

Equipment listed in applicable section of the appropriate Inspection Equipment List shall be used.

2.3 STORAGE AND CARE OF REFERENCE COMPONENTS AND AMMUNITION

2.3.1 An inventory of all reference components (bullets, primed cases and propellant) and reference cartridges (machine-loaded) shall be maintained to show the quantities on hand and the quantities used each month. As additional components or cartridges are needed, they shall be requisitioned from the responsible installation. Bullets and primed cases must be handled with care to prevent damage to dimensions because of the close tolerances to which they are made. Bullets and primed cases may be stored within the building, preferably at a temperature of 70°F. Machine-loaded cartridges shall be stored in an ammunition magazine.

2.3.2 Reference propellants are packed in hermetically tight containers and stored in dry, well ventilated magazines reserved for this purpose. When the propellant is protected in this manner it may be stored for an unlimited time without any change in moisture content.

2.4 MAINTENANCE OF MOISTURE CONTENT OF REFERENCE PROPELLANT

2.4.1 A moisture control chart shall be maintained showing the moisture-volatile content on each propellant sample of current use. When a sample of propellant is removed from the sealed container, the ideal handling method is to employ small containers which can be closed quickly and tightly. Any handling method should be of such a nature as to create the least possible change in moisture-volatile content. The containers shall be identified and the moisture control chart shall indicate whenever a new container is opened. While the propellant is being used from one container, the moisture-volatile content shall be determined at least once each week. It shall also be necessary to determine the moisture-volatile content on the second container, so if the moisture-volatile content of the first sample falls outside the control limits, there will be a replacement available for use.

2.4.2 Once each week a sample of each active propellant shall be selected and sent to the laboratory for moisture-volatile determination in accordance with the test method contained in MIL-STD-286 (Propellants, Standard for Method of Sampling, Inspection and Testing). The moisture-volatile content shall be recorded on the control chart. The moisture-volatile content shall be maintained within ± .05 percent of the assessed value. If the moisture-volatile deviates by more than ± .05 percent, but by less than ± .10 percent, it is permissible to continue using the propellant, but the moisture-volatile content should be adjusted as soon as possible. If the moisture-volatile content is beyond ±.10 percent, then the propellant shall not be used, but shall be replaced by a new container of propellant.

2.4.3 When moisture content falls below the permissible value, it shall be increased by adding a calculated amount of water.

Example equation:

$$\frac{7000WC}{100} = X$$

Where W = Weight of propellant sample, in pounds.
C = Correction desired, in % moisture content.
X = Weight of water (in grains) to be added to propellant sample.

2.4.3.1 Place blotter on scale and balance with proper weights on weight pan, then add weights the equivalent of the weight of water to be added to the propellant. Using an eye-dropper, drop enough water on the blotter to balance the weights on the weight-pan.

2.4.3.2 Place blotter on surface of propellant in container and replace lid. Blotter shall be left in container for approximately sixteen hours.

2.4.3.3 When blotter is removed from container, lid shall be replaced and propellant blended thoroughly by shaking and tumbling.

2.4.4 When moisture content is above the permissible value, it shall be corrected by placing a quantity of suitable desiccant in a container.

2.4.4.1 The container with the desiccant is placed on the surface of the propellant sample, the lid of the propellant container is then replaced, exposing the reference propellant to the desiccant.

2.4.4.2 When desiccant is removed from the propellant container, the lid is replaced and propellant blended thoroughly by shaking and tumbling.

2.4.5 After each addition or removal of moisture, a new moisture determination shall be made in accordance with test method contained in MIL-STD-286 to determine whether further processing is necessary or if the propellant may be used.

2.5 OPERATION OF HANDLOADING REFERENCE CARTRIDGES

When handloaded reference cartridges are required, the cartridges shall be handloaded in a room having a controlled temperature of 70°F. ± 2°F., and a relative humidity of 60 percent, ± 5 percent.

2.5.1 Upon removal from the storage area, all reference components shall be conditioned at a constant temperature of 70°F. ± 2°F., for a minimum of twenty-four hours.

2.5.2 Whenever propellant samples are received in more than one container and it is required to obtain results on the blend, the samples shall be thoroughly blended by pouring the propellant through the blending tower no less than five times.

2.5.3 Components (primed cases, bullets and propellant) are placed at an accessible point to the balance. Cases are placed in a recessed holding block, primer-end down. The amount of propellant exposed to the atmosphere should always be held to a minimum.

2.5.4 Balance is leveled and the correct weights applied for the propellant charge to be weighed. Propellant shall be weighted to 0.1 grain. (When necessary to check weight of propellant in a cartridge, it shall be checked to the nearest 0.01 grain). Balance should be checked at bi-weekly intervals.

2.5.5 The funnel is placed in the mouth of the case and the propellant poured slowly and evenly through the funnel into the case, preferably from a height of approximately three inches above the mouth of the case. Care should be taken that a minimum amount of propellant strikes the sides of the funnel. Propellant shall be poured in this manner to assure that proper air-space is obtained. The funnel is removed and an inverted bullet is placed in the mouth of the case.

2.5.6 After the required number of cases has been loaded, the bullets are removed and then carefully seated to the proper depth, using a bullet-seating press Each cartridge is then measured for overall length and shall be within dimensions shown on the applicable drawing.

2.5.7 Handloaded reference cartridges are not water-proofed.

2.5.8 Handloaded reference cartridges should be used within twenty-six (26) hours after assembly, if practicable; however, it is permissible to use reference cartridges within a seventy-two (72) hour period. Machine-loaded reference cartridges shall be maintained at 70°F., ± 2°F., upon removal from the magazine.

2.5.9 Reference cartridges shall be fired prior to firing the test cartridges. One reference cartridge shall be fired for each cartridge of the test sample to be fired, up to twenty (20) cartridges. When the test consists of more than twenty (20), but not more than forty (40) cartridges, then twenty (20) reference cartridges shall be fired. When the test consists of more than forty (40) cartridges, then one (1) reference cartridge shall be fired for every two (2) test cartridges.

2.6 ASSESSMENT OF REFERENCE CARTRIDGES

2.6.1 Handloaded reference cartridges

Whenever a new component is introduced, e.g. bullet, case, primer or propellant, it is sometimes necessary to fire a complete assessment test. Assessment tests are conducted by U.S. Army Frankford Arsenal; the tests are conducted over a three day period. If satisfactory results are obtained during the assessment, components of the same type as those used for the assessment are forwarded to all interested facilities. Upon receipt of the necessary components, each facility conducts a simulated assessment, following the procedure prescribed in 2.7.

2.6.2 Machine-loaded reference cartridges

U.S. Army Frankford Arsenal procures a complete lot of ammunition which has been accepted at the contractors installation. A complete assessment is then conducted over a three day period. If satisfactory results are obtained during the assessment, cartridges from the same lot as those used for the assessment are distributed to all interested facilities. Upon receipt of the necessary cartridges, each facility conducts a simulated assessment, following the procedure prescribed in 2.7, disregarding handloading operation and moisture determination.

2.7 SIMULATED ASSESSMENT OF REFERENCE CARTRIDGES

Simulated assessment tests are conducted by each proof testing facility involved in the testing of the particular ammunition type, upon receipt of the assessment data from the originating installation. Cartridges or components representing the same lots as those used for the assessment data (primed cases, bullets and propellant) shall be procured from the responsible installation, assembled, and fired immediately upon receipt. If possible, the same lot of copper pressure cylinders shall be used.

2.7.1 The moisture-volatile content which was determined at the originating allation is published with the assessment values. Each container of reference ellant shall contain a slip showing the moisture content. Upon receipt, each lity shall determine the moisture-volatile content of each container of proant in accordance with the test method contained in MIL-STD-286.

2.7.1.1 If the moisture-volatile content obtained is within ± 0.10 percent he assessed value, each facility shall use the propellant for reference firings.

2.7.1.2 If the moisture-volatile content obtained by individual facilities is within ± 0.10 percent of the assessed value, four 2-ounce samples of the proant are placed in glass, rubber-stoppered bottles (2-oz) labelled to show name ropellant, lot number, facility and date. The samples are immediately forwarded he originating installation for moisture-volatile check purposes. The propellant l not be used as a reference propellant until the moisture content has been isted.

2.7.1.3 Check tests of moisture-volatile content shall be made in accordance test method contained in MIL-STD-286 upon active reference propellants by all ig facilities as often as necessary, with a minimum of one test per lot, each :.

2.7.2 Preparation for firing

2.7.2.1 One hundred (100) cartridges shall be selected from the same lot of inition, or handloaded using the same lot of components and propellant charge, hever is applicable, used in the assessment.

2.7.2.2 Five velocity, chamber-pressure barrel assemblies shall be selected. r shall have dimensions within the values prescribed for proof test weapons of type involved. All assemblies shall contain barrels which have fired between and 300 cartridges.

2.7.2.3 The proof technician selects one of the five velocity, chamber-pressure rel assemblies and assembles it in the test fixture, on the mount. The chamber bore of the barrel are wiped dry. The barrel is then boresighted into position.

2.7.2.4 The velocity, pressure-barrel assemblies shall be in accordance with applicable drawings; if the "no-go" gages enter either the upper or lower end the piston hole, the barrel shall be disqualified.

2.7.2.5 The following measurements shall be made before a velocity, pressure-rel assembly is placed in service, after misfires, pierced primers, flowbacks, whenever a part replacement has been made in the bolt assembly:

	Limits
Firing-pin protrusion	.060" - .068"
Firing-pin indent	.011" - .015"
Headspace	.898" - .903"

2.7.2.6 The firing range shall be set up as shown on Chart #1, at end of this section. Lumiline screens are checked for position. It is of the utmost importance that the lumiline screens be placed in their proper positions, measurements must be accurate within 1/4". Distance between screens shall be 25 feet.

2.7.3 Velocity, Chamber-Pressure Firing

2.7.3.1 Twenty copper pressure cylinders shall be measured individually and placed in a recessed holding block. Upon completion of the firing, the cylinders shall be measured again and the decrease in length obtained by subtraction of the actual readings. The decrease in length obtained for each cylinder shall then be applied to the appropriate tarage table (a tarage table is supplied with each box of copper pressure cylinders) and the corresponding chamber-pressure (PSI) shall be recorded on the test report form in such a manner that the velocity of each shot can be identified with the corresponding chamber pressure obtained.

2.7.3.2 The recessed holding block containing the cylinders, the pressure piston and a sufficient quantity of obturating cups (use a new cup for each cartridge) should be placed at a point convenient to the technician.

2.7.3.3 Five warming (fouling) shots shall be fired. To fire the warming (fouling) shots it shall be necessary to service the velocity, chamber-pressure assembly with an obturating cup, the pressure piston, and a copper pressure cylinder. The same cylinder and obturating cup may be used when all warming shots are being fired, the anvil is screwed down on the cylinder following each shot.

2.7.3.4 The recessed holding block containing twenty cartridges is removed from the controlled-temperature room or container and placed at a point convenient to the technician, provided the temperature of the firing room is 70°F., ± 5°F., otherwise the cartridges shall be placed in an insulated box (five cartridges at a time) which has been conditioned at 70°F., ± 5°F., and the box placed at a point convenient to the technician, the cartridges are then removed singly from the insulated box immediately before firing. If an insulated box is not available, then the cartridges shall be removed singly from the controlled-temperature room or box and fired. The controlled-temperature room or container, or both, shall be maintained at 70°F., ± 2°F., and a relative humidity of 60 percent, ± 5 percent.

2.7.3.5 A dummy cartridge is placed in the chamber of the barrel assembly. The obturating cup lubricated with oil, SAE40 or equivalent, shall be placed in the piston hole, mouth end down, and partially seated using the stem of the knock-out tool. The shank of the pressure piston shall be dipped in oil and the oil then be allowed to drain from the piston. The drop of oil adhering to the bottom of the piston shank shall then be removed by touching the bottom of the piston shank to a cleaning patch. The piston shall then be inserted into the piston hole and pressed down on the obturating cup until the piston has reached its correct final position. The head of the piston and bottom of the anvil shall be wiped dry and free of oil. The copper cylinder shall be put in place and centered between the head of the piston and the bottom of the anvil. The anvil shall be screwed down lightly on the cylinder, using the thumb and forefinger, but not under stress. The dummy cartridge shall then be removed from the chamber.

2.7.3.6 In order that the propellant shall be uniformly positioned from cartridge to cartridge before firing, attention to detail is necessary in handling and chambering the cartridge. The cartridge shall first be held vertically, bullet upward, and then rotated slowly, end over end in a vertical plane, stopping the rotation momentarily after 180° of rotation when the bullet is downward, and then continuing through the remainder of 360°, stopping with the cartridge again bullet-end upward. The bullet-end of the cartridge should now be lowered slowly to a position slightly above horizontal. The cartridge shall be chambered very carefully, taking care that the primer-end of the case is not elevated above the bullet-end. (The object is to have the cartridge seated in the chamber ready to fire, with the propellant in a loose condition at the primer end of the case.)

2.7.3.7 The breech-block shall be closed gently. If the technician encounters any difficulty closing the breech-block or engaging the trip lever, the test shall be discontinued until such difficulty is corrected. If any delay should occur after the cartridge is placed in the chamber and the duration of the delay is such that the temperature of the cartridge has changed significantly, that cartridge shall be extracted and removed from the test and another inserted in its place.

2.7.3.8 The technician makes a final check to assure that the anvil is screwed to a snug position on the copper cylinder. Care is taken to see that the copper cylinder is not compressed by the anvil prior to firing. The proper torque to be applied to the thumb-screw is about one pound-inch. (This torque can be estimated with satisfactory accuracy by an experienced technician; to familiarize inexperienced technicians with the desired degree of tightness, a torque-measuring device may be employed. This can be accomplished by drilling and tapping (threading) an axial hole in the knurled head of the anvil (thumb-screw) and inserting a bolt or screw to which a torque-measuring wrench can be attached. The usefulness of the anvil (thumb-screw) is not impaired by this modification.)

2.7.3.9 The trip lever, to which the lanyard is attached, shall be engaged gently with the hammer. The technician retires to a safe position and pulls the lanyard with a smooth firm motion. The velocity of the shot shall be recorded by the chronographer.

2.7.3.10 The breech-block shall be opened, the fired case extracted and visually examined by the technician for possible case casualties. The copper cylinder shall be removed and placed in the recessed holding block. The piston shall be removed from the piston hole. The knockout tool is then used to force the obturating cup from the piston hole into the chamber. The obturating cup is then removed from the chamber either by air or a cleaning rod with cleaning patch attached. The procedure prescribed in 2.7.3.4 shall be repeated. Upon removal of the dummy cartridge, the chamber and bore shall be checked for the possibility of any obstruction remaining in the barrel.

2.7.3.11 The procedure prescribed in 2.7.3.5 through 2.7.3.10 shall be repeated until twenty cartridges have been fired.

2.7.3.12 The copper pressure cylinders whose identities are maintained throughout the test are measured in the same manner as they were prior to the test. The difference in length (set in inches) is then applied to the proper tarage table, the corresponding PSI obtained and recorded on the report form.

2.7.3.13 If the technician observes any abnormality tending to invalidate either the velocity or pressure measurement, it is the technician's responsibility to notify the chronographer immediately. The record of any such shot is noted on the test sheet and then reported to the supervisor. If the technician reports nothing abnormal, yet the recorded velocity appears questionable, the chronographer questions the shot before continuing the test and takes such action as supervision may prescribe.

2.7.3.14 The procedure prescribed in 2.7.3.1 through 2.7.3.13 is then repeated in each of the four remaining velocity, chamber-pressure barrel assemblies. This constitutes the first days' firing.

2.7.3.15 The procedures prescribed in 2.7.2.3 through 2.7.3.14 is then repeated twice more, preferably upon succeeding days.

2.7.3.16 If, during the firing of a simulated assessment, the values differ from the proposed assessment by more than $\pm$ 25 F/S for velocity or $\pm$ 2500 PSI for chamber pressure, in either average results of all weapons or in average results of any three weapons (60 percent of the equipment used), the simulated assessment tests shall be repeated in different barrels.

2.7.3.17 If an individual proof test facility, during firing of a simulated assessment, obtains poor uniformity within the tests or poor reproducibility between the tests, that proof test facility is requested to repeat the tests, and if necessary, is given specialized assistance in an effort to determine the causes thereof.

2.7.3.18 Upon completion of the simulated assessment tests, duplicate copies of the individual ballistic sheets as well as duplicate copies of a summary table of average results shall be forwarded to the installation responsible for publishing the assessment values, where a complete study of the data shall be made.

2.7.3.19 If the average results of the simulated assessment test are within ± 15 F/S for velocity and ± 1500 PSI for chamber pressure of the proposed assessment values, and the general agreement between ranges is acceptable, the assessment becomes official and is published immediately.

2.7.3.20 Should the majority of participating proof test facilities be not in close agreement with the proposed assessment, the assessment and simulated assessment shall be refired. Retests of all tests will be evaluated by the installation responsible for publishing the assessment values, and no official pronouncement made until the differences are reconciled.

2.7.3.21 Upon publication of the official assessment values, the use of the reference cartridges becomes mandatory for all proof test facilities testing ammunition of that type, for use in establishing range or equipment corrections when firing velocity and pressure tests. Handloaded cartridges shall be assembled at time of test.

2.8 ACCEPTANCE OF REFERENCE COMPONENTS

Whenever a new lot of reference components is received, of a type which has been previously assessed into a completed cartridge, it will be necessary to follow the procedure prescribed below:

2.8.1 Handloading

2.8.1.1 Thirty (30) cartridges shall be handloaded using reference component of current use.

2.8.1.2 Thirty (30) cartridges shall be handloaded using the new component plus reference components. The reference cartridge and the component being accepte must be assembled with the same material, except for the one component under test and handloaded in accordance with 2.5.

2.8.2 Preparation for Firing

2.8.2.1 Three velocity, chamber pressure barrel assemblies shall be selected. They must not have corrections greater than ± 35 F/S or ± 3500 PSI respectively, when firing reference cartridges, and shall have normal dimensions within the values prescribed for proof test weapons of the type involved. Test fixtures shall be arranged as shown on the applicable drawings.

2.8.2.2 The firing range shall be set up as shown on Chart #1, at the end of this section. Lumiline screens shall be checked for position. It is of the utmost importance that the lumiline screens be placed in their proper positions, measurements must be accurate within 1/4". Distance between screens shall be 25 feet.

2.8.2.3 The proof technician selects one of the three velocity, pressure-barrel assemblies and assembles it in the test fixture on the mount. The chamber and bore of the barrel are wiped dry. The barrel is then boresighted into position.

2.8.2.4 The copper pressure cylinders shall be measured individually and placed in a recessed holding block, one cylinder for each cartridge to be fired. Upon completion of the firing, the cylinders shall be measured again and the decrease in length obtained by subtraction of the actual readings. The decrease in length obtained for each cylinder shall then be applied to the appropriate tarage table (a tarage table is supplied with each box of copper pressure cylinders) and the corresponding chamber pressure (PSI) shall be recorded on the test report form in such a manner that the velocity of each shot can be identified with the corresponding chamber pressure obtained.

2.8.2.5 The recessed holding block containing the cylinders, the pressure piston and a sufficient quantity of obturating cups (use a new cup for each cartridge) should be placed at a point convenient to the proof technician.

2.8.3 Velocity, Chamber-Pressure Firing

2.8.3.1 Five warming (fouling) shots shall be fired. To fire the warming (fouling) shots it shall be necessary to service the velocity, chamber pressure assembly with an obturating cup, the pressure piston, and a copper pressure cylinder. The same cylinder and obturating cup may be used when all the warming shots are being fired, the anvil is screwed down on the cylinder following each shot.

2.8.3.2 The recessed holding block, containing ten cartridges loaded with current reference components and ten cartridges containing the new component, is removed from the controlled-temperature room or container and placed at a point convenient to the technician, provided the temperature of the firing room is 70°F., ± 5°F., otherwise the cartridges shall be placed in an insulated box (five cartridges at a time) which has been conditioned at 70°F., ± 5°F., and the box placed at a point convenient to the technician, the cartridges are then removed singly from the insulated box immediately before firing. If an insulated box is not available, then the cartridges shall be removed singly from the controlled-temperature room or container and fired. The controlled-temperature room or box, or both, shall be maintained at 70°F., ± 2°F., and a relative humidity of 60 percent, ± 5 percent.

2.8.3.3 The dummy cartridge is placed in the chamber of the barrel assembly. The obturating cup lubricated with oil, SAE40 or equivalent, shall be placed in the piston hole, mouth end down, and partially seated using the stem of the knock-out tool. The shank of the pressure piston shall be dipped in oil and the oil then be allowed to drain from the piston. The drop of oil adhering to the bottom of the piston shank shall then be removed by touching the bottom of the piston shank to a cleaning patch. The piston shall then be inserted into the piston hole and pressed down on the obturating cup until the piston has reached its correct final position. The head of the piston and bottom of the anvil shall be wiped dry and free of oil. The copper cylinder shall be put in place and centered between the head of the piston and the bottom of the anvil. The anvil shall be screwed down lightly on the cylinder, using the thumb and forefinger, but not under stress. The dummy cartridge shall then be removed from the chamber.

2.8.3.4 In order that the propellant shall be uniformly positioned from cartridge to cartridge before firing, attention to detail is necessary in handling and chambering the cartridge. The cartridge shall first be held vertically, bullet upward, and then rotated slowly, end over end in a vertical plane, stopping the rotation momentarily after 180° of rotation when the bullet is downward, and then continuing through the remainder of 360°, stopping with the cartridge again bullet-end upward. The bullet-end of the cartridge should now be lowered slowly to a position slightly above horizontal. The cartridge shall be chambered very carefully, taking care that the primer-end of the case is not elevated above the bullet-end. (The object is to have the cartridge seated in the chamber ready to fire, with the propellant in a loose condition at the primer end of the case.)

2.8.3.5 The breech-block shall be closed gently. If the technician encounters any difficulty closing the breech-block or engaging the trip lever, the test shall be discontinued until such difficulty is corrected. If any delay should occur after the cartridge is placed in the chamber and the duration of the delay is such that the temperature of the cartridge has changed significantly, that cartridge shall be extracted and another inserted in its place.

2.8.3.6 The technician makes a final check to assure that the anvil is screwed to a snug position on the copper cylinder. Care is taken to see that the copper cylinder is not compressed by the anvil prior to firing. The proper torque to be applied to the thumb-screw is about one pound-inch. (This torque can be estimated with satisfactory accuracy by an experienced technician; to familiarize inexperienced technicians with the desired degree of tightness, a torque-measuring device may be employed. This can be accomplished by drilling and tapping (threading) an axial hole in the knurled head of the anvil (thumb-screw) and inserting a bolt or screw to which a torque-measuring wrench can be attached. The usefulness of the anvil (thumb-screw) is not impaired by this modification.)

2.8.3.7 The trip lever, to which the lanyard is attached, shall be engaged gently with the hammer. The technician retires to a safe position and pulls the lanyard with a smooth firm motion. The velocity of the shot shall be recorded by the chronographer.

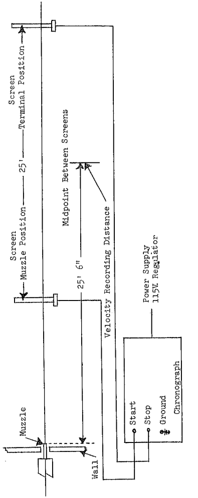
2.8.3.8 The breech-block shall be opened, the fired case extracted and visually examined by the technician for possible case casualties. The copper cylinder shall be removed and placed in the recessed holding block. The piston shall be removed from the piston hole. The knockout tool is then used to force the obturating cup from the piston hole into the chamber. The obturating cup is then removed from the chamber either by air or a cleaning rod with cleaning patch attached. The procedure prescribed in 2.8.3.3 shall then be repeated. The chamber and bore shall be checked for the possibility of any obstruction remaining in the barrel.

2.8.3.9 Following the procedure prescribed in 2.8.3.3 through 2.8.3.8, the two series of ten cartridges each are fired alternately (one old, one new, etc.) until the two series of cartridges have been fired.

2.8.3.10 The copper pressure cylinders whose identities are maintained throughout the test are measured in the same manner as they were prior to the test. The difference in length (set in inches) is then applied to the proper tarage table, and the corresponding PSI is obtained and recorded on the report form.

2.8.3.11 The procedure prescribed in 2.8.2.3 through 2.8.3.10 is repeated in each of the two remaining chamber-pressure barrel assemblies. The average velocity and average pressure of the three barrels are then computed.

2.8.3.12 In order for the new component to be considered acceptable, the average velocity of the three velocity, chamber-pressure barrel assemblies using the new component must not vary from the average velocity of the reference cartridges by more than ± 15 F/S, and the average pressure using the new component must not vary from the average pressure of the reference cartridges by more than ± 1500 PSI.



RANGE EQUIPMENT, VELOCITY TEST FOR BULLET TYPE, CAL. .45

Char

SECTION 3

ACCURACY TEST PROCEDURE

3.1 PURPOSE

The Accuracy Test is fired under controlled conditions at a target located at a specified distance from the weapon to determine the uniformity and dispersion of bullets. In order to minimize weapon inaccuracies, the test shall be fired in a rigidly mounted test weapon.

3.2 EQUIPMENT

3.2.1 Equipment listed in the Accuracy section of the appropriate Inspection Equipment List shall be used.

3.2.2 The target size for Accuracy Tests shall not be less than 24" x 24".

3.2.3 The pier or mount on which the test assembly is mounted shall be of solid construction.

3.3 TEST PROCEDURE

3.3.1 Pre-firing (Preparation for test)

3.3.1.1 The accuracy test weapon is assembled and locked in position on the mount and boresighted into position. It is of prime importance that the assembly be mounted properly so that the weapon maintains its original position from shot to shot.

3.3.1.2 The following measurements shall be made before a test weapon is placed in service, after misfires, pierced primers or flowbacks; or whenever a part replacement has been made in the assembly:

	Limits
Firing-pin Protrusion	.040" - .050"
Firing-pin Indent	.011" - .015"
Headspace	.898" - .903"

3.3.1.3 The test cartridges shall be placed at a point convenient to the technician. It is not necessary to condition the ammunition at a specified temperature, prior to firing.

3.3.1.4 At least two (2) but preferably three (3) weapons shall be used. The number of targets to be fired shall be divided among the number of weapons to be used.

3.3.2 During Firing

3.3.2.1 A sufficient number of unrecorded cartridges of the type of ammunition under test shall be fired to assure that the test weapon is correctly sighted on the target, but in any event a minimum of three (3) cartridges shall be fired to warm and foul the weapon when it is first put into service and after it has been cleaned or cooled. The technician observes the location of the shots on the target so that the alignment of the weapon may be adjusted, if necessary.

3.3.2.2 After the warming (fouling) cartridges have been fired the target shall be changed so as to present a fresh surface for the succeeding target. Thereafter, the target shall be changed after each target of ten cartridges has been fired.

3.3.2.3 Consideration is not given to the position of the propellant in the cartridge case, except that the manner of handling the ammunition from cartridge to cartridge is reasonably uniform. Ten (10) cartridges shall then be fired in even sequence at a rhythmic uniform rate, as rapidly as service of the weapon permits. When firing tracer ammunition, the rate of fire is reduced to permit observations of trace for each individual cartridge.

3.3.2.4 The approximate location of the center of impact and the estimated size (Extreme Vertical and Extreme Horizontal) of the target first fired shall be observed by the technician in order that alignment of the weapon may be adjusted, if necessary.

3.3.2.5 The procedure prescribed in 3.3.2.3 and 3.3.2.4 shall then be repeated until the specified number of targets have been fired in the first weapon, five (5) targets max., or when the exposed metal surface of the test barrel becomes too hot to grasp with the bare hands (approx. 140°F.), at which time the barrel shall be cooled to ambient temperature before the test is continued.

3.3.2.6 After the required number of targets has been fired with the first weapon, that weapon shall be removed from the mount and cooled to ambient temperature.

3.3.2.7 The second test weapon shall then be assembled on the mount and the procedure prescribed in 3.3.2.1 thru 3.3.2.6 is repeated. If a third test weapon be used, the same procedure shall be repeated.

3.3.2.8 If it is necessary to use a weapon after it has been cooled, the chamber and bore shall be cleaned before any additional firing, and three warming (fouling) cartridges shall then be fired.

.3.2.9 The technician shall record all pertinent information relative to t; i.e., misfires, failure to trace, case casualties, etc. Whenever the y of the test is in doubt, test equipment can be checked by firing ammu- of known accuracy.

.4 MEASUREMENT OF TARGET

.4.1 Explanation of Terms

.4.1.1 Diagonal (D) - After drawing a rectangle whose four lines pass the outermost shot-holes on a target, the diagonal (hypotenuse) is meas- the nearest tenth of an inch.

3.4.1.2 Mean Diagonal (M.D.) - The arithmetic mean of all diagonals.

3.4.1.3 Figure of Merit (F.M.) - The arithmetic average of the Extreme al and the Extreme Horizontal.

3.4.1.4 Mean Radius (M.R.) - The arithmetic mean of the distances between nters of all shot-holes and a point of the target called the Center of Impact.

3.4.1.5 Extreme Vertical (Ex. Ver.) - Vertical distance between the center hole made by the uppermost shot and the center of the hole made by the lowe hot.

3.4.1.6 Extreme Horizontal (Ex. Hor.) - Horizontal distance between the of the hole made by the shot farthest to the right and the center of the ade by the shot farthest to the left.

3.4.1.7 Extreme Spread (Ex. Spr.) - Distance between centers of the shot- farthest apart.

3.4.1.8 Center of Impact (C.I.) - Defined as the point at which the alge- sum of the components of the distances to the center of each shot-hole is

3.4.2 The procedure for obtaining the Diagonal (D.) for each target shall follows:

3.4.2.1 On each target, draw a rectangle whose four sides pass through the of the outermost holes (See Drawing III). The top and bottom lines of the ngle shall be horizontal; the vertical lines shall be perpendicular to the ontal lines.

3.4.2.2 The Diagonal (D) of each rectangle shall then be measured to the nearest tenth of an inch. The Diagonal may be measured from the upper left corner to the lower right corner, or from the upper right corner to the lower left corner as illustrated by dotted lines on Drawing III.

3.4.2.3 The Mean Diagonal shall be obtained by adding the individual diagonal measurements and dividing by the number of targets.

3.4.3 Mean Radius for targets shall be determined in the manner indicated and illustrated by the drawings on Page 3-6.

3.4.3.1 Draw a horizontal line, PA, through the center of the lowest shot-hole on the target and extend it horizontally in both directions until its length is equal to or greater than the width of the group of shots comprising the target.

3.4.3.2 Draw a vertical line, PB, through the center of the shot-hole on the extreme left of the target perpendicular to and meeting line PA at P. Extend line PB above PA until the length of PB is equal to or greater than the height of the group of shots comprising the target.

3.4.3.3 Measure (by means of the scale or opisometer) the perpendicular distance Y from the center of each shot-hole on the target to line PA. Add the distances so obtained and divide by the number of shots. The result of this calculation is the average vertical distance of the shot-holes above the base line PA, and is designated by $\overline{Y}$. Similarly, measure (by means of the scale or opisometer) the perpendicular distance X from the center of each shot-hole to line PB, add the distances so obtained and divide by the number of shots. The result is the average horizontal distance of the shot-holes from the vertical ordinate PB, and is designated $\overline{X}$.

3.4.3.4 Location of Center of Impact.- From P, measure along PB a distance, PD, equal to $\overline{Y}$, and along PA measure a distance, PE, equal to $\overline{X}$. At points E and D erect the respective perpendiculars EC and DC to lines PA and PB. The intersection of these perpendiculars is the Center of Impact of the target, C. Steps 3.4.3.1 and 3.4.3.4 inclusive, are illustrated in Drawing I, at the end of this section.

3.4.3.5 Mean Radius (M.R.) - From the Center of Impact, measure the distance to the center of each shot-hole of the target. Add these distances and divide by the number of shot-holes, the result is the M.R. Drawing II, at the end of this section, illustrates the procedures.

3.4.3.6 If one or more shots miss the target in any ten shot series, the entire accuracy test shall be considered invalid and refired at a larger target, as necessary to insure hits.

3.5 RECORDING OF DATA

3.5.1 All test results shall be recorded to the nearest one-tenth of an inch.

3.5.2 Test sheets shall show the following:

a. Results of all specified requirements.

b. Number and type of case casualties.

c. Misfires

d. Failures to trace (if applicable).

e. Stripped bullet.

3.5.3 The following test weapon data shall be recorded:

a. Receiver number.

b. Barrel number.

c. Total number of cartridges fired in barrel prior to test.

d. Headspace measurement.

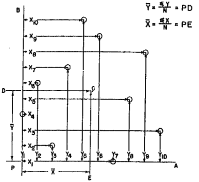
3.6 FACTORS AFFECTING ACCURACY TESTS

3.6.1 The external factors should be controlled as closely as possible in order to obtain results that are representative of the inherent accuracy of the ammunition.

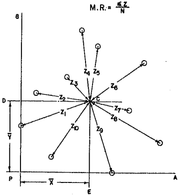
3.6.2 The dimensions and condition of accuracy weapons, as well as the manner of placing the weapon in the rest, are of prime importance.

3.6.3 The technique of test can affect accuracy results. If reproducibili in the manner in which the cartridges are handled, chambered and fired be poor, a larger Mean Diagonal is obtained than if the cartridges are tested in a uniform manner.

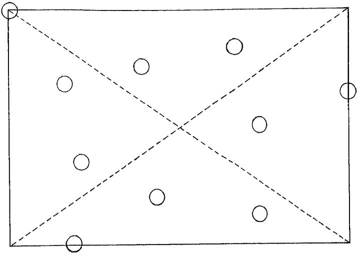
3.6.4 The temperature of the test barrel should be controlled so that the exposed metal surface of the barrel does not become too hot to grasp with the bare hands (approx. 140°F.), at which time the weapon shall be cooled to ambient temperature before the test is continued.



DRAWING I



DRAWING II



DRAWING III

MEAN DIAGONAL

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Accuracy Test at ______ Yds.	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Gun	Receiver	Barrel	Times Fired	Head Space	Pin Protrusion	Avg. MR	

Gun No.	Target No.						

Remarks:

Proof Technician(s)
Date Fired

SECTION 4

BULLET EXTRACTION TEST PROCEDURE

4.1 PURPOSE

The Bullet Extraction test determines the force required to pull a bullet from its cartridge case. It is used as a measure of the uniformity and efficiency in which the bullets are secured in the cases.

4.2 EQUIPMENT

4.2.1 Equipment listed in the Bullet Extraction section of the appropriate Inspection Equipment List shall be used.

4.3 TEST PROCEDURE

4.3.1 Preparation for test

4.3.1.1 The testing machine should be calibrated either weekly or prior to each occasion of use, whichever is less frequent. Calibration points shall include at least 30 pounds, 60 pounds, 100 pounds, 150 pounds and 250 pounds. If calibration errors exceed three pounds at scale readings below 200 pounds or six pounds at scale readings above 200 pounds, then the necessary corrective action shall be taken to reduce the errors below these limits before the bullet-extraction test is conducted. The method of calibration shall be by calibrated proof rings or calibrated spring balances which shall yield values with ± 1% of true values.

4.3.1.2 The number of cartridges as prescribed by the applicable specification are placed in a recessed holding-block which shall be placed at a point convenient to the technician.

4.3.2 Conducting the Test

4.3.2.1 The cartridge shall be inserted into the case-holding block on the pulling head and aligned with the jaws. The jaws shall then be secured to the bullet just above the mouth of the case

4.3.2.2 The load shall be applied.

4.3.2.3 When the bullet has been extracted from the case, the machine shall be stopped. The tensile indicator records the force required to extract the bullet.

4.3.2.4 The case and bullet shall then be removed from the holding block and jaws.

4.3.2.5 The case with the propellant should be placed upright in a recessed holding block and the extracted bullet placed point down in the mouth of the case.

4.4 RECORDING OF DATA

Following data shall be recorded:

4.4.1 Force required to extract each bullet.

4.4.2 Grand average of the individual values.

4.4.3 Minimum value.

4.4.4 Maximum value.

4.4.5 Testing Machine Data

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Bullet Extraction Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Type of Machine
Rate of Loading - Lbs/min.
Rate of travel of Pulling Head - Inches/min.

Calibration Points	30	60	100	150	250
Calibration Error					

Round No.	Extraction weight in lbs		
Average			
Max			
Min			

Remarks:

Proof Technician(s)
Date of Test

SECTION 5

FUNCTION AND CASUALTY TEST PROCEDURE

5.1 PURPOSE

To determine if the ammunition can be expected to perform satisfactorily in the service weapons for which it has been designed under conditions of field usage. Ammunition may be ballistically satisfactory, i.e., it may comply with individual performance specifications such as velocity, pressure, trace, etc., yet be unfit for use in the field because of undesirable characteristics which jeopardize the safety of personnel.

Casualties and malfunctions can be caused either by the ammunition or by the weapon in which it is fired, so that, to a certain extent, these two factors are interdependent. A faulty weapon or a poorly adjusted weapon can cause casualties in normal ammunition, but if the weapon be in proper condition when casualties are encountered, then the fault lies with the ammunition.

5.2 EQUIPMENT

5.2.1 Equipment listed in the Function and Casualty section of the appropriate Inspection Equipment List shall be used.

5.2.2 Weapons shall conform to the dimensions shown on the applicable drawings.

5.3 TEST PROCEDURE

5.3.1 Pre-firing (Preparation for test)

5.3.1.1 Weapons shall be of the latest design or most recent issue. Receivers for submachine-guns shall be discarded when any of the following occurs: (a) 25,000 cartridges have been fired; (b) sufficient wear occurs in non-replaceable receiver components to prevent proper functioning; (c) any unusual behavior proven attributable to the receiver. A pistol shall be retired from further use, regardless of apparent condition, after it has fired 10,000 cartridges.

5.3.1.2 Weapons employed in this test must have barrels in serviceable condition. To assure this, all barrels shall be inspected visually before use and rejected if any defect is discovered. A barrel shall be retired from further use, regardless of apparent condition, after it has fired 10,000 cartridges. Unusual behavior, proven to be attributable to the barrel, may also be reason for discarding of the barrel.

5.3.1.3 The test cartridges shall be examined for obvious defects before being loaded into the applicable magazines. If visual defects are found, the defective cartridge(s) shall be replaced and the defects shall be recorded.

5.3.1.4 The test weapons shall be fired rapid fire, either by hand or in an applicable fixed rest.

5.3.2 During Firing

5.3.2.1 The number of cartridges per burst shall be governed by the capacity of the magazines. The cooling cycle shall be as shown below:

Weapon	Cartridges in Burst	Ctgs before Cooling
Pistol, M1911A1	Full Magzine, 7 ctgs.	70
Gun, Sub-machine M3A1	Full Magzine, 30 ctgs.	90

5.3.2.2 The number of pistols and sub-machine guns used, and the quantity of cartridges to be fired in each weapon shall be as specified in the applicable specification. The procedure for firing each of the weapons specified shall be the same insofar as possible. The magazine shall be inserted into the weapon and the cartridges are fired as rapidly as the action of the weapon permits, after which the magazine is removed and another inserted. A time interval of not more than one-half minute shall be allowed between magazines. After firing the number of cartridges prescribed in 5.3.2.1, the weapon shall be permitted to cool to ambient temperature.

5.3.2.3 Fired cases shall be visually examined by the technician for possible case casualties.

5.4 RECORDING OF DATA

5.4.1 Casualties shall be reported in accordance with terminology specified in 5.6 and the applicable specification.

5.4.2 Misfires shall be recorded and the cause described (See 5.5).

5.4.3 The function and casualty test requires careful attention and alertness, and any unusual occurrence in gun function or appearance of fired cases shall be noted.

5.4.4 Failures of gun parts shall be shown on the ammunition report.

5.5 OPERATIONAL NOTES

5.5.1 In the event any stoppage occurs during firing of the test, a detailed check shall be made to determine whether the ammunition or the weapon is at fault. If the stoppage was caused by a misfire, the check of the weapon shall include measurement of the firing-pin protrusion, firing-pin indent and headspace. To assist in determining whether ammunition or weapon is responsible for a stoppage, it is good practice to test the weapon in question using ammunition of known characteristics, and to test the ammunition in question by firing in another weapon of the same type. If it is established that some faulty condition of the weapon is responsible for the stoppage, the test shall be disregarded, the weapon shall be corrected or replaced, and the tests with that type weapon shall be refired.

5.5.2 If a misfire is encountered, irrespective of the type of test wherein it occurs, the weapon is examined carefully to determine if the cause is attributable to the gun. In any ballistic acceptance test where a misfire occurs, a second attempt to fire a primer shall not be made. It is mandatory that a period of at least five (5) minutes elapse after the misfire occurs before the action of the weapon is opened, whereupon the misfired cartridge is carefully removed in accordance with existing safety regulations, and preserved for further examination. All handling and examinations of misfired cartridges shall be conducted with due regard for the hazards involved. The weapon in which a misfire occurs shall be thoroughly checked; it shall be disassembled and all component parts critically scrutinized. Results of such examination shall be included on the test report as a matter of information.

5.5.2.1 Laboratory examination of the misfired cartridges shall be made to determine the specific cause, the result of the investigation is included on the test report.

5.5.3 Upon completion of firing, all cartridge cases from the test ammunition shall be carefully examined for firing defects. If any defect is found, a detailed check of the weapon shall be made to determine whether the ammunition or the weapon is at fault. If it is established that a faulty weapon is responsible for the firing defect, then the test shall be disregarded, the weapon shall be corrected or replaced, and the tests with that type weapon shall be refired. If it cannot be established that the weapon or other equipment is at fault, then the firing defects shall be charged against the ammunition.

5.6 DEFINITIONS

5.6.1 Misfire.- Failure of a round of ammunition to fire after the initiating blow has been applied to the primer. There are two general categories of misfires:

a. The primer fails to fire when struck by the firing-pin.

b. The propellant does not ignite when the primer fires normally.

5.6.2 Perforated Primer.- One in which the primer cup is entirely perforated by the firing pin. It can be identified by a visible hole through the primer, or, if the perforation be minute, by discoloration of the firing-pin indent caused by burning gas.

5.6.3 Primer Leak.- Discoloration caused by gas leakage around the junction between the primer cup and the primer pocket wall.

5.6.4 Loose Primer.- Looseness, but not so as to permit the fired primer to fall from the primer pocket after the cartridge is fired.

5.6.5 Blown Primer, or a Primer which falls out of the primer pocket.- A blown primer is a primer which, when the cartridge is fired, is separated completely from the head of the cartridge case, and both the head of the case and pocket are enlarged and deformed. A primer which falls out of the primer pocket is in the same category as a blown primer but the distortion to the primer pocket is less obvious.

5.6.6 Ruptured Case.- A circumferential separation of the case wall produced by firing. Ruptures are divided into two categories, partial and complete. A partial rupture is one which extends less than 360° around the case; a complete rupture is one which extends entirely around the case, separating the case into two parts. Ruptures are designated according to position, as indicated on Drawing C7643674.

5.6.7 Split Case.- A longitudinal separation of the metal in the case wall produced by firing. Splits shall be classified as prescribed by the cartridge specification and Drawing C7643674.

5.6.8 Failure to Extract.- The fired case is not removed from the weapon chamber by normal gun action.

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Function and Casualty Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Gun Type	Gun No.	Barrel No.	Times Fired	Fir. Pin Indent	Fir. Pin Protrusion	Head Space

	Ambient Temperature	Stored at Fired at	Stored at Fired at	Stored at Fired at	Stored at Fired at	Total All Conditions
Rounds Fired						
*Defect Type						

* For Legend, see Item Specification; no entry indicates "No Defects".

Remarks:

Proof Technician(s)
Date Fired

SECTION 6

MERCUROUS NITRATE TEST PROCEDURE

6.1 PURPOSE

Mercurous Nitrate test is a visual means of determining if stresses exist in brass cartridge cases that may cause the cases to crack or split under conditions of storage or during service usage.

6.2 EQUIPMENT

Equipment listed in Mercurous Nitrate section of the appropriate Inspection Equipment List shall be used.

6.3 MANDATORY SAFETY REQUIREMENTS

6.3.1 Food shall not be stored or eaten in vicinity in which these tests are conducted.

6.3.2 Acid resistant apron and gloves or the equivalent shall be worn by each test technician.

6.3.3 Face shields shall be worn at all times during the pouring or mixing of acids and water. Safety glasses shall be worn during other phases of this test.

6.3.4 Asbestos or heat insulating gloves shall be worn during the heat volatilization phase of the test to facilitate handling.

6.3.5 During the entire period of volatilization the oven door shall be closed.

6.3.6 Extreme care shall be exercised in the mixing of acid with water; this shall be accomplished by pouring the acid into the water.

6.3.7 Test shall be conducted under a canopy or hood having a forced draft ventilation system to remove the noxious fumes. The disposition of tested components shall be governed by local regulations.

6.4 TEST PROCEDURE

6.4.1 Preparation of Solution

6.4.1.1 Nitric-Acid Solution: Four hundred (400) milliliters of nitric acid (of specific gravity 1.42) are dissolved in five hundred (500) milliliters of distilled water at room temperature. To this solution, distilled water is added to bring the volume of the resulting solution to one liter. (The resultant specific gravity will be 1.25).

6.4.1.2 Mercurous Nitrate Solution: Ten (10) grams of mercurous nitrate and ten (10) milliliters of nitric acid (of specific gravity 1.42) are dis-
solved in four hundred (400) milliliters of distilled water at room temperature. To this solution, distilled water is added to bring the volume of the resulting solution to one liter.

6.4.2 Test of Cartridges

6.4.2.1 The cartridges are positioned in both nitric acid and mercurous itrate solutions in a vertical position, with the head of the case down. The epth of each solution is adjusted until it completely covers the mouth of the ase.

6.4.2.2 One-half of the number of cartridges prescribed in the applicable pecification for the Mercurous Nitrate test is submerged in the nitric acid olution. After thirty (30) seconds the cartridges are withdrawn, rinsed in ater and the excess water removed. The cartridges are then submerged for fif-
een (15) minutes in the mercurous nitrate solution. Immediately upon removal, e surface of the cartridge case is examined under a magnification (10 to 15 diam-
ers) for splits and cracks. All splits and cracks found are reported.

6.4.3 Test of Cartridge Cases

6.4.3.1 The cases (after the bullet and propellant have been removed and e primer fired) are positioned in both nitric acid and mercurous nitrate lutions in a vertical position, with the head of the case down. The depth of h solution is adjusted until it completely covers the mouth of the case but s not rise more than one-half inch above the mouth of the case.

6.4.3.2 Cases from the remaining half of the number of cartridges prescribed the applicable specification for the Mercurous Nitrate test (after the bullet propellant have been removed and the primer fired) are submerged in nitric acid ution. After thirty (30) seconds the cases are withdrawn, rinsed in water and excess water removed. The cases are then submerged for fifteen (15) minutes the mercurous nitrate solution. Immediately upon removal, the mercury on the face of the case is volatilized by the application of heat and the surface then nined under magnification (10 to 15 diameters) for splits and cracks. All its and cracks found are reported.

E: a. A split is defined as a separation of the metal entirely through the wall of the case.

b. A crack is a surface condition and represents a separation of the metal partially through the wall. Cracks are not considered to be splits.

A suggested method for determining cracks and splits follows:

Splits in the cartridge case, after the Mercurous Nitrate test are detected by filling the case with water (water temperature 70°F. to 100°F.) to the mouth until a convex meniscus condition exists and placing the thumb of the hand over the mouth of the case. If the case is split, this exerts sufficient pressure to force the water through the opening.

Splits in the assembled cartridge are not so easily detected unless the split is at the mouth of the case and the bullet metal is seen through the split. If the split is in the body, the only way to determine whether it is a split or crack is to disassemble and follow the procedure used for the case check.

6.5 RECORDING OF DATA

6.5.1 Results of the test shall be recorded.

6.5.1.1 All splits and cracks shall be reported.

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Mercurous Nitrate Test	Ammunition:
Type		
Army Lot		
Charge		Lot
Case		Type
Primer		Caliber
	Spec/Auth	Bullet
		Wt.

Complete Ctgs. Tested	Cracks	Location	Splits	Location

Ctg. Cases Tested	Cracks	Location	Splits	Location

marks:

Technician(s)
of Test

SECTION 7

TRACE TEST PROCEDURE

7.1 PURPOSE

To determine the relative effectiveness of tracer ammunition to disclose the path of bullet flight.

7.2 DEFINITION OF TERMS

7.2.1 Satisfactory Trace.- Trace of bullet is visible to the observers, in accordance with the requirement of the applicable specification.

7.2.2 Partial Trace.- Invisible trace during part of trajectory.

7.2.3 Invisible Trace.- No visible trace during any part of trajectory.

7.3 EQUIPMENT

7.3.1 Equipment listed in the Trace section of the appropriate Inspection Equipment List shall be used.

7.4 OBSERVATION POINTS

7.4.1 Observation for trace performance shall be made at the weapon and along the firing range at points required by the applicable specification. Observer(s) along the firing range shall be in protected areas.

7.5 TEST PROCEDURE

7.5.1 Preparation for Firing

7.5.1.1 Trace tests shall be fired in accordance with the quantity prescribed in the applicable specification. Tests shall be fired after dark or on a darkened range.

7.5.1.2 Weapons shall conform to the requirements shown on the applicable drawings. To assure that a barrel used in the Trace test is within serviceable life, it shall be used for the Trace test only, and shall be disqualified after firing 5,000 cartridges.

7.5.1.3 The test ammunition is assembled in the appropriate magazines.

7.5.1.4 The weapon is assembled in the test fixture on the mount. The pier or mount shall be of solid construction.

7.5.1.5 The ammunition is not conditioned to temperature, but is fired under existing conditions. However, to prevent temperature of weapon from affecting cartridge performance, if any unusual delay in firing occurs after the cartridge is chambered (30 seconds or longer), such cartridge shall be extracted and the next cartridge in sequence chambered and fired.

7.5.1.6 The test barrel shall be at ambient temperature pripr to firing each test.

7.5.2 Firing the Test

7.5.2.1 At least three unrecorded cartridges of the type of ammunition under test shall be fired to sight, warm and foul the weapon prior to each test.

7.5.2.2 The cartridges are fired single-shot in a uniform sequence, with sufficient interval between cartridges to allow the trace of each individual shot to be observed and recorded by each observer.

7.6 RECORDING OF DATA

7.6.1 The trace characteristics of each shot fired shall be recorded by each observer. After the test is completed the observers shall check their respective observations together, shot by shot. Defects reported at more than one point for the same shot shall be recorded as one failure.

7.6.2 The test results are reported as follows:

a. Number of cartridges fired.

b. Satisfactory trace (%).

c. Number and type of defects.

d. Number and type of case casualties.

7.6.3 The following test weapon data shall be recorded:

a. Receiver number.

b. Barrel number.

c. Total number of cartridges fired in barrel (prior to test).

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Trace Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Gun No.	Barrel No.	Times Fired	Fir. Pin Indent	Fir. Pin Protrusion	Head Space	

Type of Defects	Number of Defects	REMARKS

Remarks:

Proof Technician(s)
Date Fired

SECTION 8

VELOCITY, CHAMBER-PRESSURE TEST PROCEDURE

8.1 PURPOSE

The Velocity and Chamber Pressure tests are fired simultaneously and is a precisely controlled test to:

a. Ascertain the velocity uniformity and level of the ammunition lot under test.

b. Determine the chamber pressure exerted, expressed in pounds per square inch, in the chamber of the gun. This test is performed as a safety measure to insure that the pressure developed by the ammunition is safe for firing in the weapons for which it is intended.

8.2 EQUIPMENT

8.2.1 Equipment listed in the Velocity, Chamber-Pressure section of the appropriate Inspection Equipment List shall be used.

8.2.2 The firing range shall be arranged as shown on Chart #1, at the end of this section.

8.2.3 Pier or mount of solid construction on which test fixture assembly shall be mounted.

8.3 USE OF REFERENCE CARTRIDGES

8.3.1 Reference cartridges shall be used to establish range and equipment corrections prior to firing an ammunition lot for acceptance. One reference cartridge shall be fired for each cartridge of the test sample to be fired, up to twenty (20) cartridges. When the test consists of more than twenty (20), but not more than forty (40) cartridges, then twenty (20) reference cartridges shall be fired. When the test consists of more than forty (40) cartridges, one reference cartridge shall be fired for every two (2) test cartridges.

8.3.2 After the required number of reference cartridges has been fired, the actual average velocity and chamber pressure of the reference cartridges shall be compared with the assessed values. If the assessed value is higher than the actual average velocity or chamber pressure, the difference is a plus correction and shall be added to the average velocity or chamber pressure of the test cartridges. If the assessed value is lower than the actual average velocity or chamber pressure, the difference is a minus correction and shall be subtracted from the average velocity or chamber pressure of the test cartridges. If the assessed value and the actual average velocity or chamber pressure are identical, then no correction is applied.

8.3.3 The barrel assembly will be acceptable provided the results obtained with the reference cartridges are within ± 35 F/S for velocity and ± 3500 PSI for pressure, of the assessed value.

8.3.4 It is suggested that control charts be maintained, for record purposes, of the results from each barrel in which reference cartridges are fired. Every correction obtained shall be compared with the previous ones to determine whether the test conditions remain stable to a certain degree.

8.4 MEASUREMENT OF COPPER PRESSURE CYLINDERS

8.4.1 The chamber-pressure shall be determined by using the radial copper pressure cylinders. One cylinder shall be used for each cartridge fired.

8.4.1.1 The copper pressure cylinders shall be measured individually using a properly calibrated micrometer graduated from 0.0001 inch. The cylinders shall be measured prior to firing, measurements recorded and the cylinders placed in a recessed holding block in such a manner that their identity is maintained throughout the test.

8.4.1.2 Upon completion of the firing, the cylinders shall be measured again, and the decrease in length obtained by subtraction of the actual readings. The decrease in length obtained for each cylinder shall then be applied to the appropriate tarage table (a tarage table is supplied with each box of copper pressure cylinders) and the corresponding chamber pressure (PSI) shall be recorded in such a manner that the velocity of each cartridge can be identified with the corresponding chamber pressure obtained.

8.4.2 Whenever a new supply of copper pressure cylinders is received involving the use of different tarage tables, they shall be tested in comparison with the cylinders being replaced by firing forty (40) reference cartridges for chamber pressure in a barrel assembly of known characteristics, using twenty (20) of the new cylinders in alternation with twenty (20) of the old cylinders. The mean chamber pressure obtained with the new cylinders shall not vary by more than ± 800 PSI from the mean obtained with the old cylinders. If this limit is exceeded, the new lot is considered unacceptable and reported to the responsible agency.

8.5 TEST PROCEDURE

8.5.1 Pre-firing (Preparation for test)

8.5.1.1 The required number of test cartridges shall be placed in a vertical position, primer-end down, in a recessed holding block. The test cartridges shall be permitted to come to a temperature of 60°F. to 80°F. prior to being placed in the temperature-controlled container or room. The recessed holding block containing the test cartridges shall be placed in a temperature-controlled container or room in such a manner that all cartridges are subjected to a uniform temperature for a minimum of two hours, prior to firing. The container or room shall be maintained at a temperature of 70°F., ± 2°F., with a relative humidity of 60 percent ± 5 percent, and be of sufficient capacity to allow free circulation of air.

8.5.1.2 The required number of reference cartridges are then handloaded.

8.5.1.3 The barrel assembly is assembled in the test fixture on the mount. The chamber and bore of the barrel are wiped dry. The barrel is then boresighted into position.

8.5.1.4 The barrel assembly shall be in accordance with the applicable drawings, if the "no-go" gages enter either the upper or lower end of the piston hole, the barrel assembly shall be disqualified.

8.5.1.5 The following measurements shall be made before a barrel assembly is placed in service, after misfires, pierced primers, flowbacks, or whenever a part replacement has been made in the bolt assembly.

	Limits
Firing-pin indent	.011" - .015"
Firing-pin protrusion	.060" - .068"
Headspace	.898" - .903"

8.5.1.6 Lumiline screens are checked for position. It is of the utmost importance that the lumiline screens be placed in their proper positions, measurements must be accurate within 1/4". Distance between screens shall be 25 feet.

8.5.1.7 The required number of copper pressure cylinders are measured as prescribed in 8.4.1.1.

8.5.1.8 The recessed holding block containing the individually measured copper pressure cylinders, a sufficient quantity of obturators (a new obturator shall be used for each cartridge to be fired) and the pressure piston should be placed at a point convenient to the technician.

8.5.2 During Firing

8.5.2.1 Five warming (fouling) shots shall be fired. To fire the warming (fouling) shots, it shall be necessary to service the chamber pressure assembly with an obturating cup, the pressure piston, and a copper pressure cylinder. The same cylinder and obturating cup may be used when all the warming shots are being fired, the anvil being screwed down on the cylinder following each shot. Velocity readings should be recorded by the chronographer to assure that the velocity-measuring equipment is functioning properly.

8.5.2.2 The recessed holding block containing the reference cartridges is removed from the controlled temperature room or container and placed at a point convenient to the technician, provided the temperature of the firing room is 70°F., ± 5°F., otherwise the cartridges shall be placed in an insulated box which has been conditioned at 70°F., ± 5°F., and the box placed at a point convenient to the technician; the cartridges are then removed singly from the insulated box immediately before firing. If an insulated box is not available, then the cartridges shall be removed singly from the controlled-temperature room or container immediately before firing. The controlled-temperature room or container shall be maintained at 70°F., ± 2°F., and a relative humidity of 60 percent, ± 5 percent.

8.5.2.3 The dummy cartridge shall be placed in the chamber of the barrel assembly. The obturating cup shall be placed in the piston hole, mouth-end down, and partially seated using the stem of the knockout tool. The shank of the pressure piston shall be dipped in oil and the oil then be allowed to drain from the piston. The drop of oil adhering to the bottom of the piston shank shall then be removed by touching the bottom of the piston shank to a cleaning patch. The piston shall then be inserted into the piston hole and pressed down on the obturating cup until the piston has reached its correct final position. The head of the piston and the bottom of the anvil shall be wiped dry and free of oil. The copper cylinder shall be put in place and centered between the head of the piston and the bottom of the anvil. The anvil shall be screwed down lightly on the cylinder, using the thumb and forefinger, but not under stress. The dummy cartridge shall then be removed from the chamber. Chamber and bore are examined for possible obstruction.

8.5.2.4 In order that the propellant shall be uniformly positioned from cartridge to cartridge before firing, attention to detail is necessary in handling and chambering the cartridge. The cartridge shall first be held vertically, bullet upward, and then rotated slowly, end over end in a vertical plane, stopping the rotation momentarily after 180° of rotation when the bullet is downward, and then continuing through the remainder of 360°, stopping with the cartridge again bullet-end upward. The bullet-end of the cartridge should now be lowered slowly to a position slightly above horizontal. The cartridge shall be chambered very carefully, taking care that the primer-end of the case is not elevated above the bullet-end. (The object is to have the cartridge seated in the chamber ready to fire, with the propellant in a loose condition at the primer end of the case.)

8.5.2.5 The breech-block shall be closed gently. If the technician encounters any difficulty closing the breech-block or engaging the trip lever, the test shall be discontinued until such difficulty is corrected. If any delay should occur after the cartridge is placed in the chamber and the duration of the delay is such that the temperature of the cartridge has changed significantly (30 seconds or longer) that cartridge shall be extracted and another inserted in its place.

8.5.2.6 The technician makes a final check to assure that the anvil is screwed to a snug position on the copper cylinder. Care is taken to see that the copper cylinder is not compressed by the anvil prior to firing. The proper torque to be applied to the thumb-screw is about one pound-inch. (This torque can be estimated with satisfactory accuracy by an experienced technician; to familiarize inexperienced technicians with the desired degree of tightness, a torque-measuring device may be employed. This can be accomplished by drilling and tapping (threading an axial hole in the knurled head of the anvil (thumb-screw) and inserting a bolt or screw to which a torque-measuring wrench can be attached. The usefulness of the anvil (thumb-screw) is not impaired by this modification.)

8.5.2.7 The trip lever, to which the lanyard is attached, shall be engaged gently to the hammer. The technician retires to a safe position and pulls the lanyard with a smooth firm motion. The velocity of the shot shall be recorded by the chronographer.

8.5.2.8 The breech-block shall be opened, the fired case extracted and visuall examined by the technician for possible case casualties. The copper cylinder shall be removed and placed in the recessed holding block. The piston shall be removed from the piston hole. The knockout tool is then used to force the obturating cup from the piston hole into the chamber. The obturating cup is then removed from the chamber using a cleaning rod with a dry cleaning patch attached.

8.5.2.9 The procedure prescribed in 8.5.2.3 through 8.5.2.8 shall be repeated until the required number of reference cartridges has been fired.

8.5.2.10 The velocity correction shall then be obtained as prescribed in 8.3.2

8.5.2.11 The copper pressure cylinders whose identities are maintained through out the test are measured in the same manner as they were prior to the test. The difference in length (set in inches) is then applied to the proper tarage table, and the corresponding PSI is obtained and recorded. The chamber pressure correction shall then be obtained as prescribed in 8.3.2.

8.5.2.12 If the average velocity of the reference cartridges is not within ± 35 F/S, or if the average chamber pressure of the reference cartridges is not within ± 3500 PSI of the official assessed values respectively, the test barrel shall be removed from the test, another test barrel substituted and another series of reference cartridges fired. If this firing fails to produce satisfactory velocity or pressure results, the cause thereof shall be identified and eliminated before resuming the test.

8.5.2.13 Warming (fouling) shots shall be fired in accordance with 8.5.2.1.

8.5.2.14 The test cartridges shall then be fired following the procedure prescribed in 8.5.2.2 through 8.5.2.8.

8.5.2.15 The copper pressure cylinders used with the test cartridges are measured in the same manner as they were prior to the test. The velocity and chamber-pressure corrections obtained with the reference cartridges shall be applied to the average velocity and chamber pressure of the test cartridges, as prescribed in 8.3.2.

8.5.2.16 If any of the personnel conducting the test observes any abnormality that may invalidate the velocity or pressure measurements, the circumstances shall be reported immediately through appropriate supervisory channels and the test suspended until instructions are received from proper authority.

8.6 RECORDING OF DATA

8.6.1 Results of both, reference and test cartridges, shall be recorded. Velocities shall be recorded to the nearest FPS; pressures shall be recorded to the nearest 100 PSI.

8.6.1.1 Reference cartridges.- The individual velocities and chamber pressures, average velocity and chamber pressure, and extreme variation of velocity and chamber pressure shall be recorded.

8.6.1.2 Test Cartridges.- The individual velocities and chamber pressures, average velocity and chamber pressure (not corrected), velocity and chamber pressure corrections, average velocity (corrected), average chamber pressure (corrected), extreme variation of the individual velocities and the individual chamber pressures, nd standard deviation of the individual velocities shall be recorded.

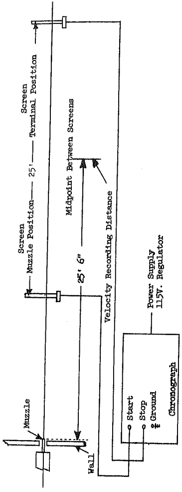
8.6.1.3 Number and type of case casualties.

8.6.2 The following test weapon data shall be recorded:

a. Receiver number

b. Barrel number

c. Total number of cartridges fired in barrel prior to test.



RANGE EQUIPMENT, VELOCITY TEST FOR BULLET TYPE, CAL. .45

Chart #1

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Receiver No.	Barrel No.	Times Fired	Fir. Pin Indent	Fir. Pin Protrusion	Head Space

Shot No									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
Total									
Mean									
Cor Fac									
Cor'd									
Ex. Var									
Std. Dev.									

Remarks:	Ref. Ctg. Data
	Auth
	Case lot
	Bullet lot
	Propellant
	Charge
	Jar #
	Vel. Val.
	Ch. Press. Val.
Proof Technician(s) Date Fired	

SECTION 9

WATERPROOF TEST PROCEDURE

9.1 PURPOSE

To determine the water-tightness of cartridges.

9.2 EQUIPMENT

Equipment listed in the Waterproof section of the appropriate Inspection Equipment List shall be used.

9.3 TEST PROCEDURE

9.3.1 Preparation for Test

9.3.1.1 Convenient configurations for the reservoir and Glass Test Chamber are shown on the drawing referenced in 9.2. The Glass Test Chamber should be at least of sufficient diameter to accomodate five cartridges lying horizontally on a perforated rack or tray, and of sufficient depth to allow a 2 to 2-1/2 inch head of water above the cartridges for the test. The volume of the reservoir should be about five to fifteen times the volume of air remaining in the Glass Test Chamber when the Glass Test Chamber contains sufficient water for conducting the test.

9.3.1.2 The Glass Test Chamber shall contain a sufficient amount of freshly boiled water cooled to room temperature to allow a 2 to 2-1/2 inch head of water above the cartridges. A perforated metal tray shall be placed across the narrow part of the body. The ground glass surfaces on the lid and body and on the glass tap shall be smeared with vaseline or vacuum grease.

9.3.2 Conducting the Test

9.3.2.1 With the Glass Test Chamber closed to the vacuum reservoir and the valve open from the reservoir to the vacuum pump, the vacuum pump shall be set in operation. The pressure in the reservoir shall be reduced until the vacuum gage shows some predetermined reading greater than that specified in the specification; this predetermined reading is the vacuum in the reservoir which will, when the reservoir is connected to the Glass Test Chamber, produce the desired vacuum in both. (The desired vacuum in the reservoir will be approximately one to three inches greater than that required by the specification, and should be determined by experiment with the particular apparatus to be used, and recorded for future reference.) When the desired vacuum in the reservoir has been obtained, the valve from the reservoir to the vacuum pump shall be closed, and the pump operation may be stopped.

9.3.2.2 The ammunition to be tested (not exceeding five cartridges at a time) shall be placed horizontally on the tray in the Glass Test Chamber and the lid placed in position. The glass tap shall be turned to allow the vacuum reservoir to evacuate the Glass Test Chamber to the required pounds per square inch below atmospheric pressure and shall be held at that pressure for the specified time. The number of bubbles liberated from the mouth or primer, or both, of each cartridge shall be observed. At the end of the specified time the vacuum shall be released from the Glass Test Chamber, the lid removed and the ammunition removed.

9.3.2.3 The procedure prescribed in 9.3.2.1 and 9.3.2.2 shall be repeated until the required number of cartridges has been tested.

9.4 RECORDING OF DATA

Results of Waterproof test shall be recorded as follows:

9.4.1 No leak.

9.4.2 Slow Leak.- A series of two or more air bubbles appearing at the primer or mouth of the case, or both, but which are liberated at such a rate that only one bubble from either the primer or the mouth of the cartridge is in transit to the surface at any one time.

9.4.3 Fast Leak.- A series of air bubbles appearing at the primer or mouth of the case, or both, which are liberated at such a rate that more than one bubble from the primer or the mouth of the cartridge case is in transit to the surface at any one time.

9.4.4 Location of leak; identify area of leak with machinist layout ink.

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Waterproof Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Sample Size	Number of Cartridges			Percentage Waterproof
	No Leak	Slow Leak	Fast Leak	

Location of Leaks:

Remarks:

Proof Technician
Date of Test

CHAPTER 2

BLANK CARTRIDGES

SECTION 1

FUNCTION AND CASUALTY TEST PROCEDURE

1.1 PURPOSE

To determine, by firing in weapons of representative types, whether or not the ammunition undergoing acceptance can be expected to perform satisfactorily, under conditions of field usage, in the service weapons for which it has been designed.

Casualties and malfunctions can be caused either by the ammunition or by the weapon in which it is fired, so that, to a certain extent, these two factors are interdependent. A faulty weapon or a poorly adjusted weapon can cause casualties in normal ammunition, but if the weapon be in proper condition when casualties are encountered, then the fault lies with the ammunition.

1.2 EQUIPMENT

1.2.1 Equipment listed in the Function and Casualty section of the appropriate Inspection Equipment List for Blank Cartridges shall be used.

1.2.2 Weapons shall conform to the dimensions shown on the applicable drawings.

1.3 TEST PROCEDURE

1.3.1 Pre-firing (Preparation for test)

1.3.1.1 Weapons shall be of the latest design or most recent issue. Pistols shall be retired from further use, regardless of apparent condition, after it has fired 10,000 cartridges.

1.3.1.2 The test weapon(s) shall be fired rapid fire, either by hand or in an applicable fixed rest.

1.3.1.3 The test cartridges shall be examined for obvious defects before being loaded into the applicable magazines. If visual defects are found, the defective cartridge(s) shall be replaced and the defects shall be noted on the test sheet form.

1.3.2 During Firing

1.3.2.1 The pistol(s) shall be cooled after 70 cartridges (ten magazines) have been fired.

1.3.2.2 The number of pistols and the quantity of cartridges to be fired in each weapon shall be as specified in the applicable specification. The procedure for firing each of the weapons specified shall be the same insofar as possible. The magazine shall be inserted into the weapon and the cartridges fired as rapidly as the action of the weapon permits. The magazine is then removed and another inserted. A time interval of not more than one-half minute shall be allowed between magazines. After firing ten magazines (70 cartridges) maximum, the weapon shall be permitted to cool to ambient temperature.

1.3.2.3 Fired cases shall be visually examined by the technician for possible case casualties.

1.4 RECORDING OF DATA

1.4.1 Casualties shall be reported in accordance with terminology of 1.6 and the applicable specification.

1.4.2 Misfires shall be recorded and the cause determined and described.

1.4.3 The function and casualty test requires careful attention and alertness, and any unusual occurence in gun function or appearance of fired cases shall be noted.

1.4.4 Failures of gun parts shall be shown on the ammunition report.

1.5 OPERATIONAL NOTES

1.5.1 In the event any stoppage occurs during firing of the test, a detailed check shall be made to determine whether the ammunition or the weapon is at fault. If the stoppage was caused by a misfire, the check of the weapon shall include measurement of the firing-pin protrusion and firing-pin indent. To assist in determining whether ammunition or weapon is responsible for a stoppage, it is good practice to test the weapon in question using ammunition of known characteristics, and to test the ammunition in question by firing in another weapon of the same type. If it is established that some faulty condition of the weapon is responsible for the stoppage, then the test shall be disregarded, the weapon shall be corrected or replaced and the tests re-fired.

1.5.2 If a misfire is encountered, irrespective of the type of test wherein it occurs, the weapon is examined carefully to determine if the cause is attributable to the gun. In any ballistic acceptance test where a misfire occurs, a second attempt to fire a primer is not made. It is mandatory that a period of at least five (5) minutes elapse after the misfire occurs before the action of the weapon is opened, whereupon the misfired cartridge is carefully removed in accordance with existing safety regulations, and preserved for further examination. All handling and examinations of misfired cartridges shall be conducted with due regard for the hazards involved. The weapon in which a misfire occurs shall be thoroughly checked; i.e., it shall be disassembled and all component parts critically scrutinized. Results of such examinations shall be included on the test report as a matter of information.

1.5.2.1 Laboratory examination of the misfired cartridge(s) shall be made to determine the specific cause and the results of the investigation included on the test report.

1.5.3 Upon completion of firing, all cartridge cases from the test ammunition shall be carefully examined for firing defects. If any defect is found a detailed check of the weapon shall be made to determine whether the ammunition or the weapon is at fault. If it is established that a faulty weapon is responsible for the firing defect, then the test shall be disregarded, the weapon shall be corrected or replaced, and the tests with that type weapon shall be refired. If it cannot be established that the weapon is at fault, then the firing defects shall be charged against the ammunition.

1.6 DEFINITIONS

1.6.1 Misfire.- Failure of a round of ammunition to fire after the initiating blow has been applied to the primer. There are two general categories of misfires:

a. The primer fails to fire when struck by the firing-pin.

b. The propellant does not ignite when the primer fires normally.

1.6.2 Perforated Primer.- One in which the primer cup is entirely perforated by the firing pin. It can be identified by a visible hole through the primer, or, if the perforation be minute, by discoloration of the firing pin indent caused by burning gas.

1.6.3 Primer Leak.- Discoloration caused by gas leakage around the junction between the primer cup and the primer pocket wall.

1.6.4 Loose Primer.- Looseness, but not so as to permit the fired primer to fall from the primer pocket after the cartridge is fired.

1.6.5 Blown Primer, or a Primer which falls out of the primer pocket.- A blown primer is a primer which, when the cartridge is fired, is separated completely from the head of the cartridge case, and both the head of the case and pocket are enlarged and deformed. A primer which falls out of the primer pocket is in the same category as a blown primer but the distortion to the primer pocket is less obvious.

1.6.6 Ruptured Case.- A circumferential separation of the case wall produced by firing. Ruptures are divided into two categories, partial and complete. A partial rupture is one which extends less than 360° around the case; a complete rupture is one which extends entirely around the case, separating the case into two parts. Ruptures are designated according to position, as indicated on Drawing C7643674.

1.6.7 Split Case.- A longitudinal separation of the metal in the case wall produced by firing. Splits shall be classified as prescribed by the cartridge specification and Drawing C7643674.

1.6.8 Failure to Extract.- The fired case is not removed from the weapon chamber by normal gun action.

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Function and Casualty Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Gun Type	Gun No.	Barrel No.	Times Fired	Fir. Pin Indent	Fir. Pin Protrusion	Head Space

	Ambient Temperature	Stored at Fired at	Stored at Fired at	Stored at Fired at	Stored at Fired at	Total All Conditions
Rounds Fired						
Defect Type*						

* For legend, see Item Specification; no entry indicates "No Defects".

Remarks:

Proof Technician(s)
Date Fired

SECTION 2

SCREEN PERFORATION TEST PROCEDURE

2.1 PURPOSE

To determine if wads, wad fragments, propellant, case particles, or foreign matter will perforate a paper screen, placed in the line of fire at a specified distance from the muzzle of the weapon.

2.2 EQUIPMENT

2.2.1 Equipment listed in the Screen Perforation section of the Inspection Equipment List for Blank Cartridges shall be used.

2.2.2 Firing range of adequate design to permit installation of a paper screen assembly, 48 inches square, in the line of fire at a distance prescribed in the applicable specification.

2.2.3 Weapon(s) shall conform to the dimensions shown on the applicable drawings.

2.3 TEST PROCEDURE

2.3.1 Pre-firing (Preparation for test)

2.3.1.1 Weapons shall be of the latest design or most recent issue. The use of weapons or parts of earlier design is sometimes permitted or required for special purposes.

2.3.1.2 The test cartridges shall be examined for visual defects as they are loaded into the applicable magazines. If visual defects are found, the defective cartridge(s) shall be replaced and the defects shall be noted on the test sheet form.

2.3.1.3 A sheet of paper of the type specified is stretched tightly upon the screen target frame, which shall have a 48 inch square surface area. The screen shall be placed at a distance prescribed in the applicable specification and at a right angle to the line of fire.

2.3.1.4 The pistol is mounted in the proper position in an appropriate rest, or if desired, may be fired off-hand. The bore is aligned upon the approximate center of paper screen.

2.3.1.5 The test cartridges shall be placed at a point convenient to the technician. It is not necessary to condition the ammunition at a specified temperature, prior to firing.

2.3.2 During Firing

2.3.2.1 Firing is conducted at a reasonably rapid rate. Consideration is not given to the position of the propellant in the cartridge case.

2.3.2.2 The appearance and condition of the paper screen is observed during firing in order to detect perforations. Should the paper screen vibrate suddenly after a shot, indicating a hit and a possible perforation, firing is stopped and the paper is examined in detail at close range.

2.3.2.2.1 Should one or more perforations be obtained with any individual cartridge, all such perforations are identified upon the screen immediately after the shot by marking the paper with pencil or crayon. Proper notation is made upon the acceptance record as to whether the perforation was made by this wad, wad fragments, propellant, case particles, or foreign matter.

2.3.2.3 A pistol shall be permitted to come to ambient temperature after ten magazines (70 cartridges) have been fired.

2.4 RECORDING OF DATA

Test sheets shall show the following:

2.4.1 All perforations.

2.4.2 Fired cases are examined and any casualties encountered in the tests as well as any unusual occurrences shall be made a part of the official acceptance reports.

2.4.3 The following test weapon data shall be recorded:

a. Receiver number

b. Barrel number

c. Total number of cartridges fired in barrel prior to test.

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Receiver No.	Barrel No.	Times Fired	Fir. Pin Indent	Fir. Pin Protrusion	Head Space	Stored °F
						Period
						Fired at °F

Results of this test shall be entered under "Remarks".

Remarks:

Proof Technician(s)
Date Fired

SECTION 3

RANGE TEST PROCEDURE (LINE-THROWING CARTRIDGE)

3.1 PURPOSE

To determine if the test cartridges are capable of propelling a line-carrying rod a specified distance.

3.2 EQUIPMENT

3.2.1 Equipment listed in the Range section of the appropriate Inspection Equipment List shall be used.

3.2.2 Test weapon shall conform to the dimensions shown on the applicable drawings.

3.3 TEST PROCEDURE

3.3.1 Pre-firing (Preparation for test)

3.3.1.1 The required number of test cartridges shall be placed in a vertical position, primer-end down, in a recessed holding block. Temperature of the test cartridges shall be 60°F. to 80°F. prior to being placed in the temperature-controlled container or room. The recessed holding block containing the test cartridges shall be placed in a temperature controlled container or room in such a manner that all cartridges are subjected to a uniform temperature for a minimum of two hours, prior to firing. The container or room shall be maintained at a temperature of 70°F., ± 2°F., and a relative humidity of 60, ± 5 percent, and be of sufficient capacity to allow free circulation of air around the cartridges.

3.3.1.2 The test weapon shall be mounted at an angle of elevation of 30 degrees, in a suitable wooden recoil rest.

3.3.1.3 The line-carrying rod(s) and sufficient line shall be placed at a point convenient to the technician.

3.3.1.4 One observer shall be stationed approximately 75 yards down-range. Observation position shall be protected by adequate shield, out of the line-of-fire.

3.3.1.5 In order to simplify and expedite measurements, the firing range should be marked off in 10-yard increments.

3.3.1.6 The flight of the rod is affected to a degree by the direction and velocity of the wind over the outdoor range. Therefore, range tests should not be fired when the velocity of the wind is greater than ten (10) miles per hour, or varying by more than five (5) miles per hour.

3.3.2 During Firing

3.3.2.1 A sufficient number of unrecorded cartridges of the type of ammunition under test shall be fired to assure that the test equipment is functioning properly. It is not necessary to attach the line to the rods when firing these cartridges. The approximate location of the shots fired are reported to the technician in order that alignment of the weapon may be adjusted if necessary.

3.3.2.2 The recessed holding block containing the test cartridges is removed from the controlled temperature container or room and placed at a point convenient to the technician, provided the temperature of the firing room or firing position is 70°F., ± 5°F., otherwise, the cartridges shall be placed in an insulated box (three cartridges at a time) which has been conditioned at 70°F., ± 5°F., and the box placed at a point convenient to the technician. If an insulated box is not available, then the cartridges shall be removed singly from the controlled temperature container or room and fired. The controlled-temperature container or room shall be maintained at 70°F., ± 2°F., and a relative humidity of 60 percent, ± 5 percent.

3.3.2.3 Because the weapon is a break-open type, it will be necessary to remove the weapon from the rest each time a cartridge is to be chambered.

3.3.2.4 The weapon is removed from the rest and broke open. The fired case is removed from the chamber. Although it is not necessary to rotate the cartridge 360° before chambering, the cartridge shall be chambered very carefully. The weapon is then made ready for firing and placed in the rest in firing position.

3.3.2.5 The line-carrying rod, with line attached, is carefully inserted into the barrel from the muzzle end, and gently seated against the mouth of the chambered cartridge. Extreme caution must be taken when performing this operation so that the technician does not place himself in front of the muzzle of the weapon. The line shall be on a spool which is attached to the rest, directly under the muzzle of the weapon.

3.3.2.6 If any delay should occur after the cartridge is placed in the chamber and the duration of the delay is approximately 30 seconds or longer, that cartridge shall be extracted and another inserted in its place.

3.3.2.7 The lanyard is attached to the trigger. The technician shall retire to a safe position and pull the lanyard with a smooth firm motion.

3.3.2.8 The observer marks the spot where the rod strikes the ground and measures the distance, utilizing the 10-yard increment markers as a base. The distance (in feet) is then recorded on the test report form.

3.3.2.9 The test weapon shall be removed from the rest, broke open, the fired case is extracted and visually examined by the technician for possible case casualties.

3.3.2.10 When more than one spool of line is available, it is advantageous to fire that many cartridges before re-winding the line, e.g., if five spools of line are available, five test cartridges can be fired before it is necessary to re-wind the line. Therefore, if only one spool of line is available, the line must be re-wound after firing each cartridge; when this procedure is necessary, only one cartridge at a time shall be removed from the temperature controlled container. It is permissible to use the line-carrying rods until they are damaged.

3.3.2.11 The procedure prescribed in 3.3.2.3 through 3.3.2.9 is followed for each cartrdige to be fired.

3.4 RECORDING OF DATA

3.4.1 Individual distances and average distance (in feet).

3.4.2 Number and type of case casualties.

3.4.3 The following test weapon data shall be recorded:

a. Gun number

b. Total number of cartridges fired in gun prior to test.

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record ______________ Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Receiver No.	Barrel No.	Times Fired	Fir. Pin Indent	Fir. Pin Protrusion	Head Space

Shot No.									
Total									
Mean									

Remarks:

Proof Technician(s)
Date Fired

SECTION 4

TEMPERATURE (HIGH & LOW) TEST PROCEDURE
(LINE-THROWING CARTRIDGE)

4.1 PURPOSE

To determine the ballistic stability of ammunition after being stored at high or low temperature.

4.2 EQUIPMENT

4.2.1 Equipment listed in the Temperature Test section of the appropriate Inspection Equipment List shall be used.

4.2.2 Temperature-controlled container or containers capable of maintaining temperatures within a tolerance of $\pm$ 2°F. (Insulated containers which have been brought to the required temperature may be used to transfer ammunition from controlled-temperature storage to the test weapons if portable controlled-temperature cabinets are not available.)

4.2.3 The temperature-controlled container(s) shall be of sufficient capacity to permit conditioning the ammunition to the desired temperature, and to allow free circulation of air around the cartridges.

4.3 TEST PROCEDURE

4.3.1 Pre-firing (Preparation for test)

The same procedures used in preparation for firing Range Test (Section 3) and Velocity and Chamber Pressure (Section 5) shall be used for this test.

4.3.1.1 For purposes of safety, the Velocity and Chamber Pressure Test shall be conducted prior to firing the Range Test. If the chamber pressure of any individual cartridge exceeds the limit set in the applicable specification, the Range Test shall not be conducted.

4.3.1.2 Temperature of test ammunition shall be 60° to 80°F., prior to conditioning at high or low temperature. The ammunition shall be placed in the temperature-controlled container(s) in such a manner that all cartridges are subjected to a uniform temperature, and held thereat for the time specified.

4.3.2 During Firing

4.3.2.1 The ammunition under test, stored at the temperature specified in the applicable specification is removed from the controlled temperature container and placed in the insulated box (referenced in 4.2.2), which has also been conditioned to the temperature specified. The insulated box is then placed at a convenient point to the technician.

4.3.2.2 The procedures used for firing the Range Test (Section 3) and Velocity and Chamber Pressure Test (Section 5) shall be used for this test with the following exceptions:

Three cartridges are removed from the controlled temperature box and placed in the insulated box. The cartridges are then removed singly from the insulated box, and fired. This procedure shall be followed for either high or low temperature tests.

4.4 RECORDING OF DATA

4.4.1 Results shall be recorded for the individual tests as follows:

4.4.1.1 The individual velocities and chamber pressures, average velocity and chamber pressure, extreme variation of velocity and chamber pressure, standard deviation of the individual chamber pressures. Individual distances for Range Test.

4.4.1.2 Temperature at which test cartridges were stored and fired.

4.4.1.3 Number and type of case casualties.

4.4.2 The following test weapon data shall be recorded:

a. Receiver number

b. Barrel number

c. Total number of cartridges fired in barrel prior to test.

SECTION 5

VELOCITY AND CHAMBER PRESSURE TEST PROCEDURE (LINE-THROWING CARTRIDGE)

5.1 PURPOSE

5.1.1 The Velocity and Chamber Pressure tests are fired simultaneously and are precisely controlled tests to:

a. Determine the pressure exerted, expressed in pounds per square inch, in the chamber of a gun. The test is performed as a safety measure to insure that the pressure developed by the ammunition is safe for firing in the weapons for which it is intended.

b. Ascertain that the velocity value obtained with the cartridge does not exceed the requirement of the specification.

5.2 EQUIPMENT

5.2.1 Equipment listed in the Velocity-Chamber Pressure section of the appropriate Inspection Equipment List shall be used.

5.2.2 The firing range shall be arranged as shown on Chart #2, at the end of this section. The maximum distance between the lumiline screens shall be ten (10) feet.

5.2.3 A pier or mount of solid construction, on which the test fixture assembly shall be mounted, is required.

5.2.4 The Velocity-Chamber Pressure weapon shall conform to the dimensions shown on the applicable drawings.

5.3 MEASUREMENT OF COPPER PRESSURE CYLINDERS

5.3.1 The chamber-pressure shall be determined by using the radial copper pressure cylinders. One cylinder shall be used for each cartridge fired.

5.3.1.1 The copper pressure cylinders shall be measured individually using a properly calibrated micrometer graduated to 0.0001 inch. The cylinders shall be measured prior to firing, the measurements recorded and the cylinders placed in a recessed holding block in such a manner that their identity is maintained throughout the test.

5.3.1.2 Upon completion of the firing, the cylinders shall be measured again and the decrease in length obtained by subtraction of the actual readings. The decrease in length obtained for each cylinder shall then be applied to the appropriate tarage table (a tarage table is supplied with each box of copper pressure cylinders) and the corresponding chamber pressure (PSI) shall be recorded in such a manner that the velocity of each cartridge can be identified with the corresponding chamber-pressure obtained.

5.4 TEST PROCEDURE

5.4.1 Pre-firing (Preparation for test)

5.4.1.1 The required number of test cartridges shall be drilled in a press using a drill jig to assure that the hole is drilled in the specified position. A #47 drill (.0785 inch dia.) shall be used. The drill press shall be so arranged that it can be operated and observed from a protected area.

5.4.1.2 After drilling, the test cartridges shall be placed in a vertical position, primer-end down, in a recessed holding block. Temperature of the test cartridges shall be 60°F. to 80°F. prior to being placed in the temperature controlled container or room. The recessed holding block containing the test cartridges shall be placed in a temperature controlled container or room in such a manner that all cartridges are subjected to a uniform temperature for a minimum of two hours, prior to firing. The container or room shall be maintained at a temperature of 70°F., ± 2°F., and a relative humidity of 60, ± 5 percent, and be of sufficient capacity to allow free circulation of air around the cartridges.

5.4.1.3 The velocity-chamber pressure barrel assembly is assembled in the test fixture, on the mount. The chamber and bore of the barrel are wiped dry. The barrel is then boresighted into position.

5.4.1.4 The velocity-chamber pressure barrel assembly shall be in accordance with the applicable drawings. When the diameter of the piston hole exceeds the wear limit permitted (.2066) at any point along the surface of the hole, the barrel assembly shall be disqualified.

5.4.1.5 Lumiline screens are checked for position. It is of the upmost importance that the lumiline screens be placed in their proper positions, measurements must be accurate. The lumiline screen nearest the muzzle of the weapon shall be of blast-proof construction. The range shall be equipped with a suitable recovery container filled with cotton waste, or equivalent, for stopping and preserving a propelled line-carrying rod, so that recovery can be made. The recovery container should be located at approximately fifteen (15) feet from the muzzle of the velocity-chamber pressure test weapon, in the line of fire.

5.4.2 During Firing

5.4.2.1 When the test is being conducted, the chamber of the weapon shall be empty and the bolt in the open position at all times, until ready to fire. This precaution is necessary because the technician is required to place himself between the muzzle of the weapon and the recovery container during certain operations (See 5.4.2.11).

5.4.2.2 The line-carrying rod(s) is/are placed at a point convenient to the technician. Three warming (fouling) shots having components of the same type as the test cartridges are fired and velocity readings of the line-carrying rods are recorded by the chronographer to assure that the equipment is functioning properly. To fire the warming (fouling) shots, it shall be necessary to service the velocity-chamber pressure assembly with an obturating cup, the pressure piston, and a copper pressure cylinder. The same cylinder and obturating cup may be used when all the warming shots are being fired. The anvil is screwed down on the cylinder following each shot.

5.4.2.3 The recessed holding block containing the test cartridges (reference cartridges are not fired) is removed from the controlled temperature room or box and placed at a point convenient to the technician, provided the temperature of the firing room is 70°F., ± 5°F., otherwise the test cartridges shall be placed in an insulated box which has been conditioned at 70°F., ± 5°F., and the box placed at a point convenient to the technician. Cartridges are then removed singly from the insulated box and fired. If an insulated box is not available then the cartridges shall be removed singly from the controlled temperature room or container and fired.

5.4.2.3.1 When firing cartridges which have been conditioned at either high or low temperature, the cartridges shall be placed in an insulated box which has also been conditioned at the specified temperature. No more than three cartridges shall be placed in the insulated box, at any one time. The insulated box containing the cartridges is then placed at a point convenient to the technician; the cartridges removed singly from the insulated box and fired. If an insulated box is not available, then the cartridges shall be removed singly from the controlled temperature box or room and fired.

5.4.2.4 A dummy cartridge (unprimed, mouth crimped cartridge case) shall be placed in the chamber of the barrel assembly. The obturating cup shall be placed in the piston hole, mouth-end down, and partially seated using the stem of the knockout tool. The shank of the pressure piston shall be dipped in oil and the oil then be allowed to drain from the piston. The drop of oil adhering to the bottom of the piston shank shall then be removed by touching the bottom of the piston shank to a cleaning patch. The piston shall then be inserted into the piston hole and pressed down on the obturating cup until the piston has reached its correct final position. The head of the piston and bottom of the anvil shall be wiped dry and free of oil. The copper cylinder shall be put in place and centered between the head of the piston and the bottom of the anvil. The anvil shall be screwed down lightly on the cylinder, using the thumb and forefinger, but not under stress.

5.4.2.5 The line-carrying rod, without line attached, is carefully placed in the muzzle of the test weapon and gently seated against the mouth of the chambered dummy cartridge. The dummy cartridge shall then be removed from the chamber.

5.4.2.6 Since the cartridges are assembled so that the wad is seated directly on the propellant, eliminating air-space, it is not necessary to rotate the cartridge through 360° prior to chambering. However, the cartridges shall be handled uniformly and carefully when they are being chambered. During chambering, the drilled hole in the cartridge case must be properly aligned with the piston hole in the barrel assembly.

5.4.2.7 The breech-block shall be closed gently. If the technician encounters any difficulty closing the breech-block or engaging the trip lever, the test shall be discontinued until such difficulty is corrected. If any delay should occur after the cartridge is placed in the chamber and the duration of the delay is such that the temperature of the cartridge has changed significantly, that cartridge shall be extracted and another inserted in its place.

5.4.2.8 The technician shall make final check to assure that the anvil is screwed to a snug position on the copper cylinder. Care is taken to see that the copper cylinder is not compressed by the anvil prior to firing. The proper torque to be applied to the thumb-screw is about one pound-inch. (This torque can be estimated with satisfactory accuracy by an experienced technician; to familiarize inexperienced technicians with the desired degree of tightness, a torque-measuring device may be employed. This can be accomplished by drilling and tapping (threading) an axial hole in the knurled head of the anvil (thumb-screw) and inserting a bolt or screw to which a torque-measuring wrench can be attached. The usefulness of the anvil (thumb-screw) is not impaired by this modification.)

5.4.2.9 The trip lever, to which the lanyard is attached, shall be engaged gently with the hammer. The technician retires to a safe position and pulls the lanyard with a smooth firm motion. The velocity of the shot shall be recorded by the chronographer.

5.4.2.10 The breech-block shall be opened, the fired case extracted and visually examined by the technician for possible case casualties. The copper cylinder shall be removed and placed in the recessed holding block. The piston shall be removed from the piston hole. The knockout tool is then used to force the obturating cup from the piston hole into the chamber. The obturating cup is then removed from the chamber either by air or a cleaning rod with a cleaning patch attached

5.4.2.11 The technician then recovers the fired line-carrying rod from the recovery container and examines it carefully. If the rod is not damaged in any way, it shall be used again. Should the rod be damaged in any way, it shall be replaced with a new rod.

5.4.2.12 The procedure prescribed in 5.4.2.4 through 5.4.2.11 is followed for each cartridge to be fired.

5.4.2.13 Upon completion of the firing, the copper pressure cylinders whose identities are maintained throughout the test are measured in the same manner as they were prior to the test. The difference in length (set in inches) is then applied to the proper tarage, and the corresponding PSI is obtained and recorded on the report form in such a manner that the velocity of each cartridge can be identified with the corresponding chamber pressure obtained.

5.4.2.14 If any of the personnel conducting the test observes any abnormality that may invalidate the velocity or pressure measurements, the circumstances shall be reported immediately through appropriate supervisory channels and the test suspended until instructions are received from proper authority.

5.5 RECORDING OF DATA

Results shall be recorded as follows:

5.5.1 Velocity

a. Individual velocities

b. Average velocity

c. Extreme variation.

5.5.2 Chamber Pressure

a. Individual chamber-pressures

b. Average chamber pressure

c. Extreme variation

d. Standard deviation.

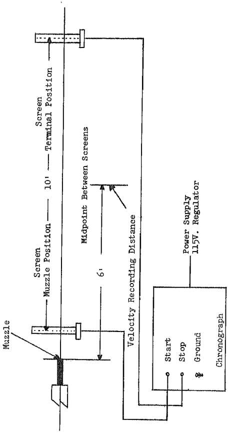
5.5.3 Number and type of case defects.

5.5.4 Test weapon data

a. Receiver number

b. Barrel number

c. Total number of cartridges fired in barrel prior to test.



RANGE EQUIPMENT, VELOCITY TEST FOR CARTRIDGE, CAL. .45, LINE THROWING

Chart #2

SUGGESTED FORMAT

Propellant:	Engineering Proof Testing Record ____________ Test	Ammunition:
Type		Lot
Army Lot		Type
Charge		Caliber
Case		Bullet
Primer	Spec/Auth	Wt. Grs.

Receiver No.	Barrel No.	Times Fired	Fir. Pin Indent	Fir. Pin Protrusion	Head Space

Shot No.								
Total								
Mean								

Remarks:

Proof Technician(s)
Date Fired

SECTION 6

WATERPROOF TEST PROCEDURE (LINE-THROWING CARTRIDGE)

6.1 PURPOSE

To determine the water-tightness of cartridges.

6.2 EQUIPMENT

Equipment listed in the Waterproof section of the appropriate Inspection Equipment List shall be used.

6.3 TEST PROCEDURE

6.3.1 The test cartridges and the water-bath itself must be temperature conditioned at 70°F., ± 2°F. before the cartridges are submerged in the bath.

6.3.2 The cartridges are then placed in the bath in a horizontal position. The depth of the bath is adjusted so that the water surface rises one inch above the top of the rim of the cartridges.

6.3.2.1 The cartridges shall remain in the bath a continuous 24 hours.

6.3.3 After 24 hours have elapsed, the cartridges shall be removed from the bath, wiped dry, placed in a recessed holding block, primer end down, and then placed in a temperature controlled container or room for a minimum of two hours. The container or room shall be maintained at 70°F., ± 2°F.

6.3.4 Upon completion of conditioning, the ammunition shall be fired following the procedures prescribed in Section 3 and 5 of this Chapter (Chapter 2).

6.3.5 Results shall be recorded on suggested formats contained in Section 3 and 5 of this Chapter (Chapter 2).

CHAPTER 3

COMPONENTS

SECTION 1

PRIMER SENSITIVITY TEST PROCEDURE

1.1 PURPOSE

To determine the sensitivity limits within which the primer functions in order to provide assurance that:

a. The primer will be safe to handle.

b. The primer will fire in the cartridge case and weapon(s) for which it is intended.

1.2 EQUIPMENT

1.2.1 Equipment listed in Primer Sensitivity section of the appropriate Inspection Equipment List shall be used.

1.3 TEST PROCEDURE (Complete Run-down test)

1.3.1 Preparation for test

1.3.1.1 This test shall be conducted on empty primed cases. In the event the primed cases must be obtained by disassembly of cartridges, the disassembly shall be accomplished in such a manner as to cause the least possible distortion of the cartridge case.

1.3.1.2 The machine shall have a firing-pin protrusion of .058 inches minimum. This shall be measured by seating the firing pin fully against the shoulder stop in the firing-pin retainer, and measuring the resulting protrusion of the point of the firing pin from the face of the firing-pin retainer. A micrometer, dial indicator, or other suitable measuring instrument shall be used for this purpose. If the firing-pin protrusion is found to be less than the specified dimension, then the firing pin or the firing-pin retainer shall be replaced as necessary to achieve the required firing-pin protrusion.

1.3.1.3 A headspace gage having a dimension of 0.898 inches shall be placed in the case holder. The case holder shall be lowered, if necessary, until the breech-block closes and clamps freely without interference with the headspace gage. The case holder shall then be adjusted by raising carefully until contact is felt between the head of the gage and the firing-pin retainer when the breech-block is fully closed. To verify that contact has been established between the headspace gage and the firing-pin retainer, the retainer shall be coated thinly with some colored compound (such as "Prussian blue" in oil) which will be transferred to the opposing surface upon contact. The breech-block shall be closed and clamped, with the headspace gage in place; the breech-block shall then be opened, and the head of the gage inspected for evidence of contact, and adjustment of the case holder refined as necessary. When the proper adjustment has been achieved, the case holder shall be locked in position by tightening the locking collar, and the adjustment shall be verified again using the colored compound and the headspace gage to assure that the adjustment has not been disturbed by tightening the locking collar. The gage shall then be removed from the case holder, and the face of the firing-pin retainer wiped clean.

1.3.1.4 A primed case shall be inserted in the case holder, and the breech-block closed and clamped. The electro-magnet shall be energized and the ball attached thereto. All measurements shall be made between the head of the firing pin and the bottom of the suspended ball. The method of measurement used for indicating height of drop shall be graduated in inches with an accuracy of ± 1/64 inch. The position of the magnet and ball shall be adjusted so that the height of drop desired can be accomplished. When this adjustment has been completed, the ball shall be removed from the machine.

1.3.1.5 It is suggested that a plumb bob be attached to the magnet and the machine adjusted so that the point of the plumb bob is above the center of the firing pin. The plumb bob shall be removed when this adjustment has been completed. To determine if the drop ball is obtaining central impacts on the firing pin, a small piece of carbon paper may be placed on the head of the firing pin and the ball dropped from various heights. After the ball is dropped each time, the firing pin head shall be inspected to ascertain if the mark left by the carbon paper is in the center of the head. If the ball is not hitting in the center of the head, the cause thereof shall be determined and corrective action taken.

1.3.2 Conducting the test

1.3.2.1 Current is applied to the magnet coil of the drop test machine and the magnet height is set so that distance between bottom of suspended ball and the head of the firing pin, with primed case in position is eight (8) inches.

1.3.2.1.1 Alignment of magnet with firing pin is checked as prescribed in 1.3.1.5.

1.3.2.1.2 Primed case is inserted in holder.

1.3.2.1.3 Breech block is closed and locked.

1.3.2.1.4 Steel ball of appropriate size is suspended from magnet.

1.3.2.1.5 Key is pressed to break circuit and permit ball to fall.

1.3.2.1.6 Performance of primer is noted, that is, whether it fires, misfires or squibs, and result is recorded. Squibs shall be counted as misfires.

1.3.2.1.7 Ball is removed from ball trap.

1.3.2.1.8 Breech block is unlocked and opened.

1.3.2.1.9 Cartridge case is removed from case holder.

1.3.2.2 The procedure prescribed in 1.3.2.1.2 through 1.3.2.1.9 shall be repeated until the specified number of primed cases have been tested at eight (8) inches. The number of primers firing and the number misfiring shall be recorded.

1.3.2.3 The procedure prescribed in 1.3.2.1 and 1.3.2.2 is then repeated at nine (9) inches, ten (10) inches, etc., until a height is reached at which all the primers in the sample fire. The magnet is then lowered to a height of drop of seven (7) inches, then six (6) inches, etc., until a height is reached at which all the primers in the sample misfire. The number firing and the number misfiring, at each height, shall be recorded.

1.3.2.4 The prescribed procedure constitutes a complete run-down test.

1.3.3 Calculation of Sensitivity Characteristics

The primer sensitivity characteristics to be calculated are "$\overline{H}$", "σ" and "a_3". These three statistics can be defined in terms of the data obtained in the drop test as follows:

a. $\overline{H} = \sum p_i + (H_{100\%} + .5)$

b. $\sigma = \sqrt{(\sum p_i k_i) - (\sum p_i)^2}$

c. $a_3 = \dfrac{\sum p_i s_i + 2(\sum p_i)^3 - 3 \sum p_i k_i \sum p_i}{\sigma^3}$

Where

$\bar{H}$ = Mean critical height, or the height at which 50 percent of the primers fire and 50 percent of the primers misfire.

Σ = Sum of individual values

p_i = Decimal fraction of primers misfiring at each individual height

$H_{100\%}$ = First height at which all primers in sample misfire

σ = Standard deviation of the critical heights

k_i = Variance factor

s_i = Skewness factor

a_3 = Skewness value

1.3.3.1 The data obtained in the run down tests are tabulated in the manner illustrated on Figure 1.

a. In Column I "Height of Drop", enter all the intermediate heights of drop, in consecutive order, starting with the lowest height at which some of the primers fire and some fail to fire. The height at which all the primers fire and the height at which all the primers misfire are not included.

b. In Column II "Number Fired", enter the number of primers firing at each height.

c. In Column III "Number Misfired", enter the number of primers which fail to fire at each height.

d. In Column IV "Fraction Misfired", enter the decimal fraction of the primers that fail to fire at each intermediate height. This fraction is designated "p_i", and is obtained by dividing the number of primers that fail to fire by the number of primers tested. Results are recorded to the closest second decimal place.

e. Add numbers contained in Column IV and enter sum as Σp_i. Directly under Σp_i enter $H_{100\%}$ + .5 (the first height at which all the primers in the sample misfired, plus .50). Add Σp_i, and $H_{100\%}$ + .5. The result is $\bar{H}$ (mean critical height).

f. In Column V "Variance Factor", the odd numbers in sequence are written; i.e, 1, 3, 5, 7, 9 etc. Number 1 must be in alignment with the first entry in Column IV.

g. Column VI, the value of the individual entries in Column IV, "p_i" are multiplied by the corresponding individual entries in Column V, "k_i", and the results "$p_i k_i$" are placed in proper alignment in Column VI. For example, if the number in Column IV is .74 and the odd number aligned with it in Column V is 5, then place 3.70 (5 x .74) in Column VI on the same line as 5 and .74. Odd numbers remaining in Column V having no corresponding entries in Column IV are ignored.

h. Add the numbers contained in Column VI and enter the sum as $\Sigma p_i k_i$. Directly under $\Sigma p_i k_i$ enter $(\Sigma p_i)^2$, the square of the sum of Column IV. Write $(\Sigma p_i)^2$ to the nearest second decimal place. Subtract $(\Sigma p_i)^2$ from $\Sigma p_i k_i$. The result is σ^2. Extract the square root of σ^2 to obtain σ, the standard deviation.

1.3.3.2 $\bar{H}$ plus and minus the multiple(s) of σ as prescribed in the applicable specification shall be computed. The results obtained are then compared with the requirements of the specification to determine acceptability.

1.3.3.3 When determination of skewness is required, the following procedure shall be accomplished.

a. Follow procedures prescribed in 1.3.3.1a through 1.3.3.1h.

b. In Column VII "Skewness Factor(s)", the numbers entered are as shown on Figure 1.

c. Column VIII, numbers as shown in Column VII are multiplied by corresponding numbers in Column IV. Results are placed on same line in Column VIII "$p_i s_i$". Ignore numbers in Column VII that have no corresponding entries in Column IV.

d. Add numbers contained in Column VIII and enter sum as $\Sigma p_i s_i$.

e. Cube the sum of Column IV (Σp_i) and multiply by 2.

f. Multiply the sum of Column VI $(\Sigma p_i k_i)$ by the sum of Column IV (Σp_i), then multiply the product by 3.

g. Cube the standard deviation (σ) obtained in Column VI.

h. Calculate skewness value (a_3) by substitution of computed values in the following formula:

$$a_3 = \frac{\Sigma p_i s_i + 2 \ (\Sigma p_i)^3 - 3 \ \Sigma p_i k_i \Sigma p_i}{\sigma^3}$$

1.4 TEST PROCEDURE (TWO HEIGHT TEST)

To employ this method, it must be assumed that the critical heights of the primers are normally distributed or nearly so. Therefore, this method shall be used only when the criteria prescribed in the applicable specification have been satisfied.

1.4.1 Preparation for test

1.4.1.1 Preparation for test shall be as precribed in 1.3.1.

1.4.2 Selection of test heights

1.4.2.1 Available run-down test data on the same or similar primers can be utilized to advantage in selecting the heights for a two-height drop test. If such data are not available, the testing of small samples at several heights may be entailed in order to make the proper selection of two test heights. In either case the following criteria apply:

Call the lower height X_1, the upper height X_2, the fraction firing at the lower height p_1, and the fraction firing at the upper height p_2. If at least some failures and non-failures occur at both heights (i.e., neither p_1 nor p_2 are zero (0) or one (1.0) and if $p_2 - p_1 \geq .20$, the heights are considered satisfactory for conducting the two-height test. If p_1 is zero (0), increase the height and test another sample. If p_2 is one (1.0), decrease the height and test another sample. If $p_2 - p_1 < .20$ increase "d", the difference between the two heights. In addition to the above, it is desirable that X_1 and X_2 be selected so that $p_1 < .50$ and $p_2 > .50$.

1.4.3 Conducting the test

1.4.3.1 Two samples are selected, each containing the number of items prescribed in the applicable specification.

1.4.3.2 Current is applied to the magnet coil to the drop test machine and the magnet height is set so that the distance between bottom of suspended ball and top surface of firing-pin assembly, with primed case in position, is set for the lower height.

1.4.3.3 The procedure prescribed in 1.3.2.1.1 thru 1.3.2.1.9 is then followed until the number specified has been tested at the lower height.

1.4.3.4 The number of primers firing and the fraction thereof shall be recorded on the report form.

1.4.3.5 Following the procedure prescribed in 1.4.3.2 the machine is set for the upper height.

1.4.3.6 The test sample for the upper height is then tested following the procedure prescribed in 1.4.3.3 and 1.4.3.4.

1.5 CALCULATION OF TWO-HEIGHT CHARACTERISTICS

The two-height characteristics to be calculated are "$\overline{H}$" and "σ". These two statistics can be defined in terms of the data obtained in the two-height drop test as follows:

a. $\overline{H} = X_1 + d\ (\overline{H}')$

b. $\sigma = d\ S_1$

Where:

$\overline{H}$ = Mean critical height, or the height at which 50 percent of the primers fire and 50 percent of the primers misfire.

σ = Standard deviation of the critical heights

X_1 = Lower height

X_2 = Upper height

d = Difference between the fixed heights

p_1 = Fraction firing at lower height

p_2 = Fraction firing at upper height

$\overline{H}'$ & S' = Values obtained from tables at the end of this section.

1.5.1 The data obtained in the two-height test are tabulated in the manne: illustrated on Figure 2.

a. In Column I "Height of Drop", enter X_1 (lower height) and X_2 (upper height).

b. In Column II "Number Tested", enter the number of primers testec at each height.

c. In Column III "Number Firing", enter the number of primers firing at each height.

d. In Column IV "Fraction Firing", enter the decimal fraction of the primers that fire at each height. These fractions are designated p_1 and p_2 and are obtained by dividing the number of primers firing by the number of primers tested at each height. Results are recorded to the nearest second decimal place.

1.5.2 If p_1 is zero (0), the lower height is increased and another test sample selected and tested. If p_2 is one (1.0) the upper height is decreased and another test sample selected and tested. If $p_2 - p_1 < .20$, increase "d", the difference between the heights, and test another sample or samples. If $p_2 - p_1 \geq .20$, $p_1 > 0$ and $p_2 < 1.0$, proceed as instructed below:

1.5.3 Using the values of p_1 and p_2 refer to the tables at the end of this section in order to obtain $\overline{H}'$ and S'. The values for $\overline{H}'$ are to be taken as negative for p_1 greater than .50.

1.5.4 Subtract the lower height (X_1) from the upper height (X_2) to obtain the difference, "d".

1.5.5 Compute $\overline{H}$ and σ by substitution of the numerical values for $\overline{H}'$, S' and d in the formulas provided on the Primer Sensitivity Report (Fig. 2).

Example:

a. At 6 inches, 15 out of 50 fired, while at 8 inches, 37 out of 50 fired. Hence, $p_1 = 15/50$ or .30, $p_2 = 37/50$ or .74 and d = 8-6 or 2". Since the difference between p_1 and p_2 is at least .20, we can proceed to the tables.

b. Turn to the page that contains $p_1 = .30$. Under column headed p_2 we find .74; on the same line as .74 we find $\overline{H}' = .4491$ and $S' = .8564$.

c. Substitution in the formulas provided, give the following:

$\overline{H} = 6 + 2\ (.4491) = 6.90$ inches

$\sigma = 2\ (.8564) = 1.71$ inches

1.6 RECORDING OF RESULTS

Results shall be recorded as prescribed in 1.3.3 and 1.5.

1.6.1 The following data shall also be recorded:

a. Headspace

b. Firing-pin protrusion

c. Diameter of ball

d. Number tested at each height

SUGGESTED FORMAT

Machine:	Engineering Proof Testing Record Primer Sensitivity Test	Ammunition:
Headspace		Lot No.
F P Protrusion		Ctg. Type
Dia. of Ball		Caliber
	Spec./Auth.	Primer
		Mfg.

Number of primers tested at each height

I	II	III	IV	V	VI	VII	VIII
Height of Drop "H"	Number Fired	Number Misfired	Fraction Misfired "p_i"	Variance Factor "k_i"	"$p_i k_i$"	Skewness Factor "s_i"	"$p_i s_i$"
				1		1	
				3		7	
				5		19	
				7		37	
				9		61	
				11		91	
				13		127	
				15		169	
				17		217	
				19		271	
				21		331	
				23		397	
				25		469	
				27		547	

Σp_i $H_{100\%} + .5$ $\bar{H}$	$\Sigma p_i k_i$ $-(\Sigma p_i)^2$ σ^2 σ	$\Sigma p_i s_i$ $2(\Sigma p_i)^3$ $3(\Sigma p_i)(\Sigma p_i k_i)$ a_3

$$\bar{H} = \Sigma p_i + (H_{100\%} + .5)$$

$$\sigma = \sqrt{(\Sigma p_i k_i) - (\Sigma p_i)^2}$$

$$a_3 = \frac{\Sigma p_i s_i + 2(\Sigma p_i)^3 - 3\Sigma p_i k_i \Sigma p_i}{\sigma^3}$$

Operator:

Date:

Figure 1

SUGGESTED FORMAT

Machine:	Primer Sensitivity Test Two Height Test	Ammunition:
Headspace		Lot No.
F P Protrusion		Ctg. Type
Dia. of ball		Caliber
	Spec/Auth.	Primer
		Mfg.

I	II	III	IV
Height of Drop	Number Tested	Number Firing	Fraction Firing
X_1 =			P_1 =
X_2 =			P_2 =

$\bar{H} = x_1 + d(\bar{H}')$

$\sigma = d\, s'$

Operator:

Date:

Figure 2

TABLE I
Estimates of the Mean and Standard Deviation
Fraction Firing at Two Heights

$p_1 = .01$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.21	1.531	.6579	.61	.8928	.3837
.22	1.497	.6435	.62	.8839	.3799
.23	1.465	.6299	.63	.8751	.3761
.24	1.436	.6173	.64	.8664	.3724
.25	1.408	.6054	.65	.8579	.3687
.26	1.382	.5942	.66	.8493	.3651
.27	1.358	.5836	.67	.8410	.3615
.28	1.334	.5736	.68	.8326	.3579
.29	1.312	.5641	.69	.8243	.3543
.30	1.291	.5550	.70	.8160	.3508
.31	1.271	.5463	.71	.8078	.3473
.32	1.252	.5380	.72	.7997	.3437
.33	1.233	.5301	.73	.7915	.3402
.34	1.216	.5225	.74	.7834	.3367
.35	1.199	.5152	.75	.7752	.3332
.36	1.182	.5082	.76	.7671	.3298
.37	1.166	.5014	.77	.7590	.3263
.38	1.151	.4949	.78	.7508	.3227
.39	1.136	.4885	.79	.7426	.3192
.40	1.122	.4824	.80	.7343	.3157
.41	1.108	.4765	.81	.7260	.3121
.42	1.095	.4707	.82	.7176	.3085
.43	1.082	.4651	.83	.7091	.3048
.44	1.069	.4597	.84	.7005	.3011
.45	1.057	.4544	.85	.6918	.2974
.46	1.045	.4493	.86	.6829	.2935
.47	1.033	.4443	.87	.6738	.2896
.48	1.022	.4394	.88	.6644	.2856
.49	1.011	.4346	.89	.6548	.2815
.50	1.000	.4299	.90	.6448	.2772
.51	.9893	.4252	.91	.6344	.2727
.52	.9788	.4207	.92	.6234	.2680
.53	.9686	.4163	.93	.6118	.2630
.54	.9586	.4120	.94	.5994	.2577
.55	.9487	.4078	.95	.5858	.2518
.56	.9390	.4036	.96	.5706	.2453
.57	.9295	.3995	.97	.5529	.2377
.58	.9201	.3955	.98	.5311	.2283
.59	.9109	.3915	.99	.5000	.2149
.60	.9018	.3876			

TABLE I (Cont'd)

p_1 = .02

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.22	1.603	.7803	.62	.8705	.4239
.23	1.562	.7605	.63	.8609	.4192
.24	1.524	.7422	.64	.8514	.4145
.25	1.489	.7251	.65	.8420	.4100
.26	1.456	.7090	.66	.8327	.4055
.27	1.425	.6940	.67	.8236	.4010
.28	1.396	.6799	.68	.8145	.3966
.29	1.369	.6665	.69	.8055	.3922
.30	1.343	.6539	.70	.7966	.3879
.31	1.318	.6419	.71	.7877	.3836
.32	1.295	.6305	.72	.7789	.3793
.33	1.273	.6197	.73	.7702	.3750
.34	1.251	.6093	.74	.7615	.3708
.35	1.231	.5994	.75	.7528	.3665
.36	1.211	.5899	.76	.7441	.3623
.37	1.193	.5808	.77	.7354	.3581
.38	1.175	.5720	.78	.7267	.3539
.39	1.157	.5636	.79	.7181	.3496
.40	1.141	.5554	.80	.7093	.3454
.41	1.125	.5476	.81	.7005	.3411
.42	1.109	.5400	.82	.6917	.3368
.43	1.094	.5327	.83	.6828	.3325
.44	1.079	.5256	.84	.6737	.3281
.45	1.065	.5187	.85	.6646	.3236
.46	1.051	.5120	.86	.6553	.3191
.47	1.038	.5055	.87	.6458	.3145
.48	1.025	.4991	.88	.6361	.3097
.49	1.012	.4930	.89	.6261	.3049
.50	1.000	.4869	.90	.6157	.2998
.51	.9879	.4810	.91	.6050	.2946
.52	.9761	.4753	.92	.5938	.2891
.53	.9646	.4697	.93	.5819	.2833
.54	.9534	.4642	.94	.5691	.2771
.55	.9423	.4588	.95	.5553	.2704
.56	.9315	.4536	.96	.5404	.2631
.57	.9209	.4484	.97	.5220	.2542
.58	.9105	.4433	.98	.5000	.2435
.59	.9003	.4384	.99	.4689	.2283
.60	.8902	.4335			
.61	.8803	.4286			

TABLE I (Cont'd)

$p_1 = .03$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.23	1.647	.8757	.63	.8500	.4519
.24	1.601	.8514	.64	.8399	.4466
.25	1.559	.8290	.65	.8300	.4413
.26	1.520	.8081	.66	.8201	.4361
.27	1.483	.7886	.67	.8104	.4309
.28	1.449	.7704	.68	.8009	.4258
.29	1.417	.7534	.69	.7913	.4208
.30	1.387	.7372	.70	.7820	.4158
.31	1.358	.7221	.71	.7727	.4108
.32	1.331	.7077	.72	.7634	.4059
.33	1.305	.6940	.73	.7543	.4010
.34	1.281	.6811	.74	.7451	.3962
.35	1.258	.6687	.75	.7360	.3913
.36	1.235	.6569	.76	.7270	.3865
.37	1.214	.6456	.77	.7180	.3817
.38	1.194	.6348	.78	.7089	.3769
.39	1.174	.6244	.79	.6999	.3721
.40	1.156	.6144	.80	.6909	.3673
.41	1.138	.6049	.81	.6818	.3625
.42	1.120	.5956	.82	.6726	.3576
.43	1.103	.5867	.83	.6634	.3527
.44	1.087	.5781	.84	.6541	.3478
.45	1.072	.5698	.85	.6447	.3428
.46	1.056	.5617	.86	.6352	.3377
.47	1.042	.5539	.87	.6254	.3325
.48	1.027	.5463	.88	.6155	.3272
.49	1.014	.5389	.89	.6053	.3218
.50	1.000	.5317	.90	.5947	.3162
.51	.9868	.5247	.91	.5838	.3104
.52	.9740	.5179	.92	.5724	.3043
.53	.9615	.5112	.93	.5603	.2979
.54	.9493	.5047	.94	.5474	.2911
.55	.9374	.4984	.95	.5335	.2836
.56	.9257	.4922	.96	.5179	.2754
.57	.9143	.4861	.97	.5000	.2658
.58	.9031	.4801	.98	.4780	.2542
.59	.8921	.4743	.99	.4471	.2377
.60	.8813	.4686			
.61	.8707	.4629			
.62	.8603	.4574			

TABLE I (Cont'd)

$p_1 = .04$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.24	1.676	.9575	.64	.8300	.4741
.25	1.627	.9292	.65	.8196	.4682
.26	1.581	.9030	.66	.8093	.4623
.27	1.539	.8788	.67	.7992	.4565
.28	1.499	.8562	.68	.7892	.4508
.29	1.462	.8352	.69	.7793	.4451
.30	1.428	.8155	.70	.7695	.4395
.31	1.395	.7969	.71	.7598	.4340
.32	1.365	.7794	.72	.7502	.4285
.33	1.336	.7629	.73	.7407	.4231
.34	1.308	.7473	.74	.7313	.4177
.35	1.282	.7324	.75	.7219	.4123
.36	1.258	.7183	.76	.7125	.4070
.37	1.234	.7048	.77	.7032	.4017
.38	1.211	.6919	.78	.6939	.3964
.39	1.190	.6796	.79	.6846	.3911
.40	1.169	.6678	.80	.6753	.3858
.41	1.149	.6565	.81	.6660	.3804
.42	1.130	.6457	.82	.6567	.3751
.43	1.112	.6352	.83	.6472	.3697
.44	1.094	.6251	.84	.6377	.3643
.45	1.077	.6154	.85	.6281	.3588
.46	1.061	.6060	.86	.6184	.3532
.47	1.045	.5969	.87	.6085	.3476
.48	1.030	.5881	.88	.5984	.3418
.49	1.015	.5795	.89	.5880	.3359
.50	1.000	.5712	.90	.5774	.3298
.51	.9859	.5631	.91	.5663	.3235
.52	.9721	.5553	.92	.5548	.3169
.53	.9588	.5476	.93	.5426	.3099
.54	.9458	.5402	.94	.5296	.3025
.55	.9330	.5329	.95	.5156	.2945
.56	.9206	.5258	.96	.5000	.2856
.57	.9085	.5189	.97	.4821	.2754
.58	.8966	.5121	.98	.4602	.2629
.59	.8850	.5055	.99	.4294	.2453
.60	.8736	.4990			
.61	.8624	.4926			
.62	.8514	.4863			
.63	.8406	.4802			

TABLE I (Cont'd)

$F_1 = .05$

P_2	$\overline{H}'$	S'	P_2	$\overline{H}'$	S'
.25	1.695	1.031	.65	.8102	.4926
.26	1.642	.9984	.66	.7995	.4861
.27	1.594	.9689	.67	.7890	.4797
.28	1.549	.9415	.68	.7786	.4734
.29	1.507	.9162	.69	.7684	.4671
.30	1.468	.8925	.70	.7583	.4610
.31	1.432	.8703	.71	.7483	.4549
.32	1.397	.8495	.72	.7384	.4489
.33	1.365	.8299	.73	.7286	.4429
.34	1.335	.8114	.74	.7189	.4370
.35	1.306	.7939	.75	.7092	.4311
.36	1.279	.7774	.76	.6996	.4253
.37	1.253	.7616	.77	.6901	.4195
.38	1.228	.7466	.78	.6805	.4137
.39	1.205	.7323	.79	.6710	.4079
.40	1.182	.7186	.80	.6615	.4022
.41	1.161	.7055	.81	.6520	.3964
.42	1.140	.6930	.82	.6425	.3906
.43	1.120	.6810	.83	.6329	.3847
.44	1.101	.6694	.84	.6232	.3789
.45	1.083	.6582	.85	.6135	.3730
.46	1.065	.6475	.86	.6036	.3669
.47	1.048	.6371	.87	.5935	.3608
.48	1.031	.6271	.88	.5833	.3546
.49	1.015	.6174	.89	.5729	.3483
.50	1.000	.6079	.90	.5621	.3417
.51	.9850	.5988	.91	.5509	.3349
.52	.9704	.5899	.92	.5393	.3279
.53	.9562	.5813	.93	.5271	.3204
.54	.9425	.5730	.94	.5141	.3125
.55	.9290	.5648	.95	.5000	.3040
.56	.9159	.5568	.96	.4844	.2945
.57	.9031	.5490	.97	.4665	.2836
.58	.8907	.5415	.98	.4447	.2704
.59	.8785	.5341	.99	.4142	.2518
.60	.8666	.5268			
.61	.8548	.5197			
.62	.8434	.5127			
.63	.8321	.5059			
.64	.8211	.4992			

TABLE I (Cont'd)

$p_1 = .06$

p_2	$\bar{H}'$	S'
.26	1.706	1.097
.27	1.651	1.062
.28	1.600	1.029
.29	1.553	.9986
.30	1.509	.9705
.31	1.468	.9444
.32	1.430	.9199
.33	1.395	.8969
.34	1.361	.8754
.35	1.329	.8551
.36	1.300	.8359
.37	1.271	.8177
.38	1.245	.8004
.39	1.219	.7840
.40	1.195	.7683
.41	1.171	.7534
.42	1.149	.7392
.43	1.128	.7255
.44	1.108	.7124
.45	1.088	.6997
.46	1.069	.6876
.47	1.051	.6759
.48	1.033	.6646
.49	1.016	.6537
.50	1.000	.6432
.51	.9841	.6330
.52	.9687	.6231
.53	.9538	.6135
.54	.9393	.6042
.55	.9252	.5951
.56	.9115	.5862
.57	.8981	.5776
.58	.8851	.5692
.59	.8724	.5611
.60	.8599	.5531
.61	.8477	.5452
.62	.8358	.5375
.63	.8241	.5300
.64	.8126	.5227
.65	.8014	.5154

p_2	$\bar{H}'$	S'
.66	.7903	.5083
.67	.7795	.5013
.68	.7688	.4944
.69	.7582	.4876
.70	.7478	.4810
.71	.7375	.4743
.72	.7274	.4678
.73	.7173	.4613
.74	.7073	.4549
.75	.6974	.4486
.76	.6876	.4423
.77	.6779	.4360
.78	.6682	.4297
.79	.6585	.4235
.80	.6488	.4173
.81	.6391	.4111
.82	.6294	.4048
.83	.6197	.3986
.84	.6099	.3923
.85	.6000	.3859
.86	.5900	.3795
.87	.5799	.3730
.88	.5696	.3663
.89	.5590	.3595
.90	.5482	.3526
.91	.5370	.3454
.92	.5253	.3378
.93	.5130	.3300
.94	.5000	.3216
.95	.4859	.3125
.96	.4704	.3025
.97	.4526	.2911
.98	.4309	.2771
.99	.4006	.2577

TABLE I (Cont'd)

$p_1 = .07$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.27	1.710	1.159	.63	.8164	.5532
.28	1.653	1.120	.64	.8046	.5452
.29	1.600	1.084	.65	.7930	.5373
.30	1.551	1.051	.66	.7815	.5296
.31	1.506	1.021	.67	.7704	.5220
.32	1.464	.9920	.68	.7594	.5145
.33	1.425	.9653	.69	.7485	.5072
.34	1.388	.9405	.70	.7378	.5000
.35	1.353	.9170	.71	.7273	.4928
.36	1.321	.8950	.72	.7169	.4858
.37	1.290	.8742	.73	.7066	.4788
.38	1.261	.8545	.74	.6964	.4719
.39	1.233	.8358	.75	.6863	.4651
.40	1.207	.8180	.76	.6763	.4583
.41	1.182	.8011	.77	.6664	.4515
.42	1.158	.7850	.78	.6565	.4448
.43	1.136	.7696	.79	.6467	.4382
.44	1.114	.7548	.80	.6368	.4315
.45	1.093	.7407	.81	.6270	.4249
.46	1.073	.7271	.82	.6172	.4182
.47	1.054	.7140	.83	.6073	.4115
.48	1.035	.7015	.84	.5974	.4048
.49	1.017	.6893	.85	.5875	.3981
.50	1.000	.6776	.86	.5774	.3912
.51	.9833	.6663	.87	.5671	.3843
.52	.9671	.6553	.88	.5567	.3772
.53	.9515	.6447	.89	.5461	.3701
.54	.9363	.6344	.90	.5352	.3627
.55	.9215	.6244	.91	.5240	.3550
.56	.9072	.6147	.92	.5123	.3471
.57	.8932	.6053	.93	.5000	.3388
.58	.8797	.5961	.94	.4870	.3300
.59	.8664	.5871	.95	.4729	.3204
.60	.8535	.5783	.96	.4574	.3099
.61	.8409	.5698	.97	.4397	.2979
.62	.8285	.5614	.98	.4181	.2833
			.99	.3882	.2630

TABLE I (Cont'd)

$p_1 = .08$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.28	1.709	1.216	.64	.7967	.5670
.29	1.650	1.174	.65	.7848	.5585
.30	1.595	1.135	.66	.7731	.5502
.31	1.545	1.100	.67	.7616	.5420
.32	1.499	1.067	.68	.7503	.5340
.33	1.456	1.036	.69	.7391	.5260
.34	1.416	1.007	.70	.7282	.5183
.35	1.378	.9806	.71	.7174	.5106
.36	1.343	.9555	.72	.7068	.5030
.37	1.309	.9318	.73	.6963	.4956
.38	1.278	.9094	.74	.6860	.4882
.39	1.248	.8883	.75	.6757	.4809
.40	1.220	.8682	.76	.6655	.4736
.41	1.193	.8492	.77	.6554	.4664
.42	1.168	.8311	.78	.6453	.4593
.43	1.144	.8139	.79	.6354	.4522
.44	1.120	.7974	.80	.6254	.4451
.45	1.098	.7816	.81	.6155	.4380
.46	1.077	.7665	.82	.6055	.4309
.47	1.057	.7520	.83	.5956	.4239
.48	1.037	.7381	.84	.5856	.4167
.49	1.018	.7246	.85	.5755	.4096
.50	1.000	.7117	.86	.5653	.4023
.51	.9825	.6992	.87	.5550	.3950
.52	.9655	.6871	.88	.5446	.3876
.53	.9491	.6755	.89	.5339	.3800
.54	.9333	.6642	.90	.5230	.3722
.55	.9179	.6533	.91	.5117	.3642
.56	.9030	.6426	.92	.5000	.3558
.57	.8885	.6323	.93	.4877	.3471
.58	.8744	.6223	.94	.4747	.3378
.59	.8607	.6125	.95	.4607	.3279
.60	.8473	.6030	.96	.4452	.3169
.61	.8342	.5937	.97	.4276	.3043
.62	.8214	.5846	.98	.4062	.2891
.63	.8089	.5757	.99	.3766	.2680

TABLE I (Cont'd)

$p_1 = .09$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.29	1.703	1.270	.65	.7768	.5793
.30	1.642	1.225	.66	.7647	.5704
.31	1.587	1.840	.67	.7530	.5616
.32	1.536	1.145	.68	.7414	.5529
.33	1.488	1.110	.69	.7300	.5445
.34	1.444	1.077	.70	.7189	.5361
.35	1.403	1.047	.71	.7078	.5279
.36	1.365	1.018	.72	.6970	.5200
.37	1.329	.9912	.73	.6863	.5119
.38	1.295	.9659	.74	.6758	.5040
.39	1.263	.9421	.75	.6653	.4962
.40	1.233	.9195	.76	.6500	.4885
.41	1.204	.8982	.77	.6446	.4808
.42	1.177	.8780	.78	.6345	.4733
.43	1.151	.8588	.79	.6244	.4657
.44	1.127	.8405	.80	.6144	.4582
.45	1.103	.8230	.81	.6043	.4507
.46	1.081	.8062	.82	.5943	.4432
.47	1.060	.7902	.83	.5842	.4357
.48	1.039	.7748	.84	.5741	.4282
.49	1.019	.7601	.85	.5640	.4207
.50	1.000	.7458	.86	.5538	.4130
.51	.9816	.7321	.87	.5435	.4053
.52	.9639	.7189	.88	.5330	.3975
.53	.9468	.7062	.89	.5223	.3895
.54	.9303	.6939	.90	.5113	.3813
.55	.9143	.6819	.91	.5000	.3729
.56	.8988	.6703	.92	.4883	.3642
.57	.8837	.6591	.93	.4760	.3550
.58	.8691	.6482	.94	.4630	.3454
.59	.8549	.6376	.95	.4491	.3349
.60	.8411	.6273	.96	.4337	.3235
.61	.8276	.6172	.97	.4162	.3104
.62	.8144	.6074	.98	.3950	.2946
.63	.8016	.5978	.99	.3656	.2727
.64	.7890	.5885			

TABLE I (Cont'd)

p_1 = .10

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.30	1.693	1.321	.66	.7565	.5903
.31	1.631	1.273	.67	.7445	.5809
.32	1.575	1.229	.68	.7326	.5717
.33	1.523	1.188	.69	.7210	.5626
.34	1.475	1.151	.70	.7096	.5537
.35	1.430	1.116	.71	.6984	.5450
.36	1.388	1.083	.72	.6874	.5364
.37	1.349	1.053	.73	.6765	.5279
.38	1.313	1.024	.74	.6658	.5195
.39	1.279	.9977	.75	.6552	.5112
.40	1.246	.9725	.76	.6447	.5030
.41	1.216	.9487	.77	.6343	.4950
.42	1.187	.9262	.78	.6240	.4869
.43	1.160	.9048	.79	.6138	.4789
.44	1.134	.8845	.80	.6036	.4710
.45	1.109	.8651	.81	.5935	.4631
.46	1.085	.8466	.82	.5833	.4552
.47	1.062	.8290	.83	.5732	.4473
.48	1.041	.8121	.84	.5631	.4393
.49	1.020	.7959	.85	.5529	.4314
.50	1.000	.7803	.86	.5426	.4234
.51	.9808	.7653	.87	.5322	.4153
.52	.9623	.7509	.88	.5217	.4071
.53	.9445	.7370	.89	.5118	.3987
.54	.9274	.7236	.90	.5000	.3901
.55	.9107	.7106	.91	.4887	.3813
.56	.8946	.6980	.92	.4770	.3722
.57	.8790	.6859	.93	.4648	.3627
.58	.8639	.6741	.94	.4518	.3526
.59	.8492	.6626	.95	.4379	.3417
.60	.8350	.6515	.96	.4226	.3298
.61	.8211	.6407	.97	.4053	.3162
.62	.8075	.6301	.98	.3843	.2998
.63	.7943	.6198	.99	.3552	.2772
.64	.7814	.6097			
.65	.7689	.5999			

TABLE I (Cont'd)

$p_1 = .11$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.31	1.679	1.369	.67	.7360	.6001
.32	1.616	1.318	.68	.7239	.5902
.33	1.559	1.271	.69	.7121	.5806
.34	1.507	1.229	.70	.7005	.5711
.35	1.458	1.189	.71	.6891	.5618
.36	1.413	1.152	.72	.6779	.5527
.37	1.371	1.118	.73	.6668	.5437
.38	1.332	1.086	.74	.6560	.5348
.39	1.295	1.056	.75	.6452	.5260
.40	1.260	1.028	.76	.6346	.5174
.41	1.228	1.001	.77	.6241	.5088
.42	1.197	.9760	.78	.6136	.5003
.43	1.168	.9523	.79	.6033	.4919
.44	1.140	.9298	.80	.5931	.4835
.45	1.114	.9084	.81	.5828	.4752
.46	1.089	.8880	.82	.5726	.4669
.47	1.065	.8687	.83	.5624	.4586
.48	1.043	.8501	.84	.5522	.4502
.49	1.021	.8324	.85	.5420	.4419
.50	1.000	.8153	.86	.5317	.4335
.51	.9799	.7990	.87	.5213	.4250
.52	.9607	.7833	.88	.5107	.4164
.53	.9422	.7682	.89	.5000	.4077
.54	.9243	.7536	.90	.4890	.3987
.55	.9070	.7395	.91	.4777	.3895
.56	.8904	.7260	.92	.4661	.3800
.57	.8743	.7128	.93	.4539	.3701
.58	.8587	.7001	.94	.4410	.3595
.59	.8435	.6878	.95	.4271	.3483
.60	.8288	.6758	.96	.4120	.3359
.61	.8145	.6641	.97	.3947	.3218
.62	.8006	.6527	.98	.3739	.3049
.63	.7870	.6417	.99	.3452	.2815
.64	.7738	.6309			
.65	.7610	.6204			
.66	.7483	.6101			

TABLE I (Cont'd)

p_1 = .12

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.32	1.661	1.414	.68	.7153	.6088
.33	1.598	1.360	.69	.7032	.5985
.34	1.541	1.311	.70	.6914	.5884
.35	1.488	1.266	.71	.6789	.5786
.36	1.439	1.225	.72	.6684	.5689
.37	1.394	1.186	.73	.6572	.5593
.38	1.351	1.150	.74	.6462	.5500
.39	1.312	1.116	.75	.6353	.5407
.40	1.275	1.085	.76	.6246	.5315
.41	1.240	1.055	.77	.6140	.5225
.42	1.207	1.028	.78	.6034	.5136
.43	1.177	1.001	.79	.5930	.5047
.44	1.147	.9766	.80	.5827	.4959
.45	1.120	.9530	.81	.5724	.4871
.46	1.093	.9306	.82	.5621	.4784
.47	1.068	.9093	.83	.5519	.4697
.48	1.045	.8890	.84	.5416	.4609
.49	1.022	.8696	.85	.5313	.4522
.50	1.000	.8511	.86	.5210	.4434
.51	.9791	.8333	.87	.5106	.4345
.52	.9590	.8162	.88	.5000	.4255
.53	.9397	.7998	.89	.4893	.4164
.54	.9213	.7841	.90	.4783	.4071
.55	.9034	.7688	.91	.4670	.3975
.56	.8861	.7541	.92	.4554	.3876
.57	.8695	.7400	.93	.4433	.3772
.58	.8534	.7263	.94	.4304	.3663
.59	.8378	.7130	.95	.4167	.3546
.60	.8227	.7001	.96	.4016	.3418
.61	.8079	.6876	.97	.3845	.3272
.62	.7937	.6754	.98	.3639	.3097
.63	.7797	.6636	.99	.3356	.2856
.64	.7662	.6521			
.65	.7531	.6409			
.66	.7402	.6299			
.67	.7276	.6192			

TABLE I (Cont'd)

$p_1 = .13$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.33	1.641	1.457	.69	.6943	.6164
.34	1.578	1.401	.70	.6823	.6058
.35	1.520	1.349	.71	.6706	.5953
.36	1.467	1.302	.72	.6590	.5851
.37	1.418	1.259	.73	.6477	.5750
.38	1.372	1.218	.74	.6365	.5651
.39	1.330	1.180	.75	.6255	.5553
.40	1.290	1.145	.76	.6146	.5456
.41	1.253	1.112	.77	.6039	.5361
.42	1.218	1.082	.78	.5933	.5267
.43	1.186	1.053	.79	.5828	.5174
.44	1.155	1.025	.80	.5724	.5081
.45	1.126	.9993	.81	.5620	.4989
.46	1.098	.9747	.82	.5517	.4898
.47	1.072	.9514	.83	.5414	.4806
.48	1.047	.9292	.84	.5311	.4715
.49	1.023	.9080	.85	.5208	.4624
.50	1.000	.8878	.86	.5104	.4532
.51	.9782	.8684	.87	.5000	.4439
.52	.9573	.8499	.88	.4894	.4345
.53	.9373	.8322	.89	.4787	.4250
.54	.9182	.8151	.90	.4678	.4153
.55	.8996	.7987	.91	.4565	.4053
.56	.8818	.7828	.92	.4450	.3950
.57	.8646	.7676	.93	.4329	.3843
.58	.8480	.7528	.94	.4201	.3730
.59	.8320	.7386	.95	.4065	.3608
.60	.8164	.7248	.96	.3915	.3476
.61	.8013	.7114	.97	.3746	.3325
.62	.7866	.6984	.98	.3542	.3145
.63	.7724	.6857	.99	.3262	.2896
.64	.7586	.6734			
.65	.7451	.6615			
.66	.7320	.6498			
.67	.7191	.6384			
.68	.7066	.6273			

TABLE I (Cont'd)

$p_1 = .14$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.34	1.618	1.4975	.70	.6732	.6232
.35	1.554	1.4388	.71	.6613	.6121
.36	1.497	1.3854	.72	.6496	.6013
.37	1.444	1.3362	.73	.6381	.5906
.38	1.394	1.2907	.74	.6268	.5802
.39	1.349	1.2484	.75	.6156	.5699
.40	1.306	1.2092	.76	.6047	.5597
.41	1.267	1.1726	.77	.5939	.5497
.42	1.230	1.1384	.78	.5832	.5398
.43	1.195	1.1063	.79	.5726	.5300
.44	1.163	1.0761	.80	.5621	.5203
.45	1.132	1.0476	.81	.5517	.5107
.46	1.103	1.0205	.82	.5413	.5011
.47	1.075	.9950	.83	.5310	.4915
.48	1.049	.9708	.84	.5207	.4820
.49	1.024	.9477	.85	.5104	.4724
.50	1.000	.9257	.86	.5000	.4628
.51	.9773	.9046	.87	.4896	.4532
.52	.9556	.8846	.88	.4790	.4434
.53	.9348	.8653	.89	.4683	.4335
.54	.9150	.8470	.90	.4574	.4234
.55	.8958	.8292	.91	.4462	.4130
.56	.8774	.8121	.92	.4347	.4023
.57	.8596	.7957	.93	.4226	.3912
.58	.8425	.7799	.94	.4100	.3795
.59	.8260	.7646	.95	.3964	.3669
.60	.8101	.7499	.96	.3816	.3532
.61	.7946	.7355	.97	.3648	.3377
.62	.7795	.7216	.98	.3447	.3191
.63	.7650	.7081	.99	.3171	.2935
.64	.7508	.6950			
.65	.7371	.6823			
.66	.7237	.6699			
.67	.7106	.6578			
.68	.6979	.6460			
.69	.6854	.6344			

TABLE I (Cont'd)

$p_1 = .15$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.35	1.592	1.536	.67	.7020	.6774
.36	1.529	1.475	.68	.6890	.6648
.37	1.471	1.419	.69	.6764	.6526
.38	1.418	1.368	.70	.6640	.6407
.39	1.369	1.321	.71	.6519	.6290
.40	1.323	1.277	.72	.6401	.6176
.41	1.281	1.236	.73	.6284	.6064
.42	1.242	1.198	.74	.6170	.5953
.43	1.205	1.163	.75	.6058	.5845
.44	1.171	1.129	.76	.5947	.5738
.45	1.138	1.098	.77	.5838	.5633
.46	1.107	1.068	.78	.5730	.5529
.47	1.078	1.040	.79	.5624	.5427
.48	1.051	1.014	.80	.5519	.5325
.49	1.025	.9888	.81	.5414	.5224
.50	1.000	.9649	.82	.5310	.5123
.51	.9764	.9421	.83	.5211	.5024
.52	.9538	.9203	.84	.5103	.4924
.53	.9323	.8995	.85	.5000	.4824
.54	.9117	.8797	.86	.4896	.4724
.55	.8918	.8605	.87	.4792	.4624
.56	.8728	.8422	.88	.4687	.4522
.57	.8546	.8245	.89	.4580	.4419
.58	.8370	.8076	.90	.4471	.4314
.59	.8200	.7912	.91	.4360	.4207
.60	.8036	.7754	.92	.4245	.4098
.61	.7877	.7601	.93	.4125	.3981
.62	.7723	.7452	.94	.4000	.3859
.63	.7574	.7308	.95	.3865	.3730
.64	.7430	.7169	.96	.3719	.3588
.65	.7290	.7034	.97	.3553	.3428
.66	.7153	.6902	.98	.3354	.3236
			.99	.3082	.2974

TABLE I (Cont'd)

$p_1 = .16$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.36	1.564	1.572	.68	.6801	.6839
.37	1.501	1.509	.69	.6673	.6710
.38	1.443	1.451	.70	.6548	.6584
.39	1.391	1.398	.71	.6425	.6460
.40	1.342	1.349	.72	.6305	.6340
.41	1.297	1.304	.73	.6187	.6222
.42	1.255	1.262	.74	.6072	.6106
.43	1.216	1.222	.75	.5959	.5992
.44	1.179	1.186	.76	.5847	.5880
.45	1.145	1.151	.77	.5738	.5769
.46	1.112	1.118	.78	.5629	.5660
.47	1.082	1.088	.79	.5522	.5553
.48	1.053	1.059	.80	.5416	.5446
.49	1.026	1.032	.81	.5311	.5341
.50	1.000	1.006	.82	.5207	.5236
.51	.9754	.9808	.83	.5103	.5132
.52	.9519	.9572	.84	.5000	.5028
.53	.9296	.9348	.85	.4897	.4924
.54	.9083	.9133	.86	.4793	.4820
.55	.8878	.8927	.87	.4689	.4715
.56	.8682	.8730	.88	.4584	.4609
.57	.8493	.8540	.89	.4478	.4502
.58	.8312	.8358	.90	.4369	.4393
.59	.8138	.8183	.91	.4259	.4282
.60	.7970	.8014	.92	.4144	.4167
.61	.7807	.7851	.93	.4026	.4048
.62	.7650	.7692	.94	.3901	.3923
.63	.7503	.7545	.95	.3768	.3789
.64	.7350	.7391	.96	.3623	.3643
.65	.7208	.7247	.97	.3459	.3478
.66	.7068	.7107	.98	.3263	.3281
.67	.6933	.6972	.99	.2995	.3011

TABLE I (Cont'd)

$p_1 = .17$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.37	1.533	1.607	.69	.6580	.6896
.38	1.471	1.542	.70	.6453	.6763
.39	1.414	1.482	.71	.6329	.6633
.40	1.361	1.427	.72	.6208	.6506
.41	1.313	1.376	.73	.6089	.6382
.42	1.268	1.329	.74	.5973	.6260
.43	1.227	1.286	.75	.5859	.6140
.44	1.188	1.245	.76	.5746	.6022
.45	1.152	1.207	.77	.5636	.5907
.46	1.118	1.171	.78	.5527	.5792
.47	1.086	1.138	.79	.5420	.5680
.48	1.056	1.106	.80	.5314	.5568
.49	1.027	1.076	.81	.5208	.5458
.50	1.000	1.048	.82	.5104	.5349
.51	.9744	1.021	.83	.5000	.5240
.52	.9500	.9956	.84	.4896	.5132
.53	.9269	.9713	.85	.4794	.5024
.54	.9048	.9482	.86	.4690	.4915
.55	.8836	.9260	.87	.4586	.4806
.56	.8634	.9048	.88	.4481	.4696
.57	.8440	.8845	.89	.4376	.4586
.58	.8254	.8650	.90	.4268	.4473
.59	.8075	.8462	.91	.4158	.4357
.60	.7902	.8282	.92	.4044	.4238
.61	.7736	.8107	.93	.3927	.4115
.62	.7575	.7938	.94	.3803	.3986
.63	.7419	.7775	.95	.3671	.3847
.64	.7269	.7618	.96	.3528	.3697
.65	.7124	.7465	.97	.3366	.3527
.66	.6982	.7317	.98	.3172	.3324
.67	.6845	.7173	.99	.2909	.3048
.68	.6711	.7033			

TABLE I (Cont'd)

$p_1 = .18$

p_2	$\bar{H}'$	S'
.38	1.501	1.640
.39	1.439	1.572
.40	1.382	1.510
.41	1.331	1.454
.42	1.283	1.402
.43	1.239	1.353
.44	1.198	1.308
.45	1.159	1.266
.46	1.123	1.227
.47	1.090	1.190
.48	1.058	1.156
.49	1.028	1.123
.50	1.000	1.092
.51	.9733	1.063
.52	.9480	1.036
.53	.9240	1.009
.54	.9012	.9844
.55	.8793	.9605
.56	.8584	.9377
.57	.8384	.9159
.58	.8193	.8950
.59	.8009	.8750
.60	.7833	.8556
.61	.7662	.8370
.62	.7498	.8191
.63	.7339	.8017
.64	.7186	.7850
.65	.7038	.7688
.66	.6894	.7531
.67	.6756	.7378
.68	.6618	.7230
.69	.6486	.7086

p_2	$\bar{H}'$	S'
.70	.6358	.6945
.71	.6232	.6808
.72	.6110	.6675
.73	.5990	.6544
.74	.5873	.6416
.75	.5758	.6290
.76	.5645	.6166
.77	.5534	.6045
.78	.5424	.5926
.79	.5317	.5808
.80	.5210	.5692
.81	.5105	.5576
.82	.5000	.5462
.83	.4896	.5349
.84	.4793	.5236
.85	.4690	.5123
.86	.4587	.5011
.87	.4483	.4898
.88	.4379	.4784
.89	.4274	.4669
.90	.4167	.4552
.91	.4057	.4432
.92	.3945	.4309
.93	.3828	.4182
.94	.3706	.4048
.95	.3575	.3906
.96	.3433	.3751
.97	.3274	.3576
.98	.3083	.3368
.99	.2824	.3085

TABLE I (Cont'd)

$p_1 = .19$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.39	1.466	1.670	.71	.6134	.6987
.40	1.406	1.601	.72	.6010	.6846
.41	1.350	1.538	.73	.5889	.6708
.42	1.299	1.479	.74	.5771	.6574
.43	1.251	1.426	.75	.5655	.6442
.44	1.208	1.376	.76	.5542	.6312
.45	1.167	1.329	.77	.5430	.6185
.46	1.129	1.286	.78	.5320	.6060
.47	1.094	1.246	.79	.5212	.5937
.48	1.061	1.208	.80	.5106	.5816
.49	1.029	1.173	.81	.5000	.5695
.50	1.000	1.139	.82	.4895	.5576
.51	.9722	1.107	.83	.4792	.5458
.52	.9459	1.077	.84	.4689	.5341
.53	.9210	1.049	.85	.4586	.5224
.54	.8974	1.022	.86	.4483	.5107
.55	.8748	.9964	.87	.4380	.4989
.56	.8532	.9719	.88	.4276	.4871
.57	.8327	.9485	.89	.4172	.4752
.58	.8130	.9261	.90	.4065	.4631
.59	.7942	.9046	.91	.3957	.4507
.60	.7761	.8840	.92	.3845	.4380
.61	.7586	.8642	.93	.3730	.4249
.62	.7418	.8450	.94	.3609	.4111
.63	.7256	.8266	.95	.3480	.3964
.64	.7100	.8088	.96	.3340	.3804
.65	.6950	.7916	.97	.3182	.3625
.66	.6803	.7750	.98	.2295	.3411
.67	.6662	.7588	.99	.2740	.3121
.68	.6524	.7432			
.69	.6390	.7279			
.70	.6260	.7131			

TABLE I (Cont'd)

$p_1 = .20$

p_2	$\bar{\bar{H}}'$	S'	p_2	$\bar{\bar{H}}'$	S'
.40	1.431	1.700	.72	.5908	.7020
.41	1.370	1.628	.73	.5787	.6876
.42	1.316	1.563	.74	.5668	.6734
.43	1.265	1.503	.75	.5551	.6596
.44	1.219	1.448	.76	.5437	.6460
.45	1.176	1.397	.77	.5325	.6328
.46	1.135	1.349	.78	.5215	.6197
.47	1.098	1.305	.79	.5107	.6068
.48	1.063	1.264	.80	.5000	.5941
.49	1.031	1.225	.81	.4894	.5816
.50	1.000	1.188	.82	.4790	.5692
.51	.9710	1.154	.83	.4686	.5569
.52	.9437	1.121	.84	.4584	.5446
.53	.9179	1.091	.85	.4481	.5325
.54	.8934	1.062	.86	.4379	.5203
.55	.8701	1.034	.87	.4276	.5081
.56	.8479	1.007	.88	.4173	.4959
.57	.8267	.9823	.89	.4069	.4835
.58	.8065	.9583	.90	.3964	.4710
.59	.7872	.9354	.91	.3856	.4582
.60	.7687	.9133	.92	.3746	.4451
.61	.7508	.8921	.93	.3632	.4315
.62	.7337	.8718	.94	.3512	.4173
.63	.7172	.8522	.95	.3385	.4022
.64	.7013	.8333	.96	.3247	.3858
.65	.6860	.8151	.97	.3091	.3673
.66	.6711	.7974	.98	.2907	.3454
.67	.6567	.7803	.99	.2657	.3157
.68	.6428	.7638			
.69	.6292	.7477			
.70	.6161	.7321			
.71	.6033	.7168			

TABLE I (Cont'd)

$p_1 = .21$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.41	1.393	1.727	.73	.5682	.7046
.42	1.334	1.654	.74	.5563	.6898
.43	1.280	1.587	.75	.5445	.6753
.44	1.230	1.526	.76	.5331	.6611
.45	1.185	1.469	.77	.5219	.6472
.46	1.142	1.416	.78	.5108	.6335
.47	1.103	1.368	.79	.5000	.6200
.48	1.066	1.322	.80	.4893	.6068
.49	1.032	1.280	.81	.4788	.5937
.50	1.000	1.240	.82	.4683	.5808
.51	.9698	1.203	.83	.4580	.5680
.52	.9414	1.167	.84	.4478	.5553
.53	.9146	1.134	.85	.4376	.5426
.54	.8893	1.103	.86	.4274	.5300
.55	.8651	1.073	.87	.4172	.5174
.56	.8423	1.044	.88	.4070	.5047
.57	.8205	1.018	.89	.3967	.4919
.58	.7998	.9918	.90	.3862	.4789
.59	.7800	.9672	.91	.3756	.4657
.60	.7610	.9437	.92	.3646	.4522
.61	.7427	.9211	.93	.3533	.4382
.62	.7252	.8994	.94	.3415	.4235
.63	.7084	.8785	.95	.3290	.4079
.64	.6922	.8584	.96	.3154	.3911
.65	.6767	.8391	.97	.3001	.3721
.66	.6616	.8204	.98	.2819	.3496
.67	.6470	.8024	.99	.2574	.3192
.68	.6329	.7849			
.69	.6192	.7679			
.70	.6060	.7514			
.71	.5930	.7354			
.72	.5805	.7198			

TABLE I (Cont'd)

$p_1 = .22$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.42	1.354	1.753	.74	.5455	.7065
.43	1.296	1.678	.75	.5338	.6912
.44	1.243	1.610	.76	.5223	.6764
.45	1.194	1.547	.77	.5111	.6618
.46	1.149	1.489	.78	.5000	.6475
.47	1.108	1.435	.79	.4892	.6335
.48	1.070	1.385	.80	.4785	.6197
.49	1.034	1.339	.81	.4680	.6060
.50	1.000	1.295	.82	.4576	.5926
.51	.9685	1.254	.83	.4473	.5792
.52	.9390	1.216	.84	.4371	.5660
.53	.9112	1.180	.85	.4270	.5529
.54	.8849	1.146	.86	.4168	.5398
.55	.8600	1.114	.87	.4067	.5267
.56	.8364	1.083	.88	.3966	.5136
.57	.8140	1.054	.89	.3864	.5003
.58	.7927	1.027	.90	.3760	.4869
.59	.7724	1.000	.91	.3655	.4733
.60	.7530	.9751	.92	.3547	.4593
.61	.7344	.9510	.93	.3435	.4448
.62	.7165	.9279	.94	.3318	.4297
.63	.6994	.9057	.95	.3195	.4137
.64	.6829	.8844	.96	.3061	.3964
.65	.6671	.8639	.97	.2911	.3769
.66	.6518	.8441	.98	.2733	.3539
.67	.6371	.8250	.99	.2492	.3227
.68	.6228	.8065			
.69	.6089	.7886			
.70	.5956	.7712			
.71	.5825	.7544			
.72	.5699	.7380			
.73	.5575	.7220			

TABLE I (Cont'd)

$p_1 = .23$

p_2	$\overline{H}'$	S'	p_2	H'	S'
.43	1.314	1.778	.71	.5717	.7739
.44	1.257	1.701	.72	.5590	.7567
.45	1.205	1.631	.73	.5466	.7399
.46	1.157	1.566	.74	.5345	.7235
.47	1.113	1.507	.75	.5227	.7076
.48	1.073	1.452	.76	.5112	.6920
.49	1.035	1.401	.77	.5000	.6768
.50	1.000	1.354	.78	.4889	.6618
.51	.9671	1.309	.79	.4781	.6472
.52	.9364	1.267	.80	.4675	.6328
.53	.9075	1.228	.81	.4570	.6185
.54	.8804	1.192	.82	.4466	.6045
.55	.8546	1.157	.83	.4364	.5907
.56	.8303	1.124	.84	.4262	.5769
.57	.8073	1.093	.85	.4162	.5633
.58	.7854	1.063	.86	.4061	.5497
.59	.7646	1.035	.87	.3961	.5361
.60	.7447	1.008	.88	.3860	.5225
.61	.7257	.9822	.89	.3759	.5088
.62	.7075	.9576	.90	.3657	.4950
.63	.6900	.9340	.91	.3553	.4809
.64	.6733	.9113	.92	.3446	.4664
.65	.6572	.8896	.93	.3336	.4515
.66	.6417	.8686	.94	.3221	.4360
.67	.6268	.8484	.95	.3099	.4195
.68	.6123	.8288	.96	.2968	.4017
.69	.5984	.8099	.97	.2820	.3817
.70	.5849	.7916	.98	.2646	.3581
			.99	.2410	.3263

TABLE I (Cont'd)

$p_1 = .24$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.44	1.272	1.801	.72	.5479	.7757
.45	1.217	1.722	.73	.5354	.7581
.46	1.166	1.651	.74	.5233	.7410
.47	1.119	1.585	.75	.5115	.7242
.48	1.077	1.524	.76	.5000	.7079
.49	1.037	1.468	.77	.4888	.6920
.50	1.000	1.416	.78	.4777	.6764
.51	.9657	1.367	.79	.4669	.6611
.52	.9336	1.322	.80	.4563	.6460
.53	.9037	1.279	.81	.4458	.6312
.54	.8756	1.240	.82	.4355	.6166
.55	.8489	1.202	.83	.4254	.6022
.56	.8239	1.166	.84	.4153	.5880
.57	.8002	1.133	.85	.4053	.5738
.58	.7777	1.101	.86	.3953	.5597
.59	.7564	1.071	.87	.3854	.5456
.60	.7360	1.042	.88	.3754	.5315
.61	.7166	1.015	.89	.3654	.5174
.62	.6981	.9883	.90	.3553	.5030
.63	.6803	.9632	.91	.3450	.4885
.64	.6633	.9391	.92	.3345	.4736
.65	.6470	.9161	.93	.3237	.4583
.66	.6313	.8938	.94	.3124	.4423
.67	.6162	.8724	.95	.3004	.4253
.68	.6016	.8518	.96	.2875	.4070
.69	.5875	.8318	.97	.2730	.3865
.70	.5739	.8125	.98	.2559	.3623
.71	.5607	.7938	.99	.2329	.3298

TABLE I (Cont'd)

$p_1 = .25$

p_2	$\tilde{H}'$	S'	p_2	$\tilde{H}'$	S'
.45	1.229	1.822	.73	.5240	.7768
.46	1.175	1.742	.74	.5118	.7588
.47	1.126	1.669	.75	.5000	.7413
.48	1.080	1.602	.76	.4885	.7242
.49	1.039	1.540	.77	.4773	.7076
.50	1.000	1.483	.78	.4662	.6912
.51	.9641	1.429	.79	.4555	.6753
.52	.9307	1.380	.80	.4449	.6596
.53	.8996	1.334	.81	.4345	.6442
.54	.8704	1.290	.82	.4242	.6290
.55	.8429	1.250	.83	.4142	.6141
.56	.8171	1.211	.84	.4041	.5992
.57	.7927	1.175	.85	.3942	.5845
.58	.7696	1.141	.86	.3844	.5699
.59	.7478	1.109	.87	.3745	.5553
.60	.7270	1.078	.88	.3647	.5407
.61	.7072	1.048	.89	.3548	.5260
.62	.6883	1.020	.90	.3448	.5112
.63	.6702	.9936	.91	.3347	.4962
.64	.6530	.9681	.92	.3243	.4809
.65	.6364	.9436	.93	.3137	.4651
.66	.6205	.9200	.94	.3026	.4486
.67	.6053	.8973	.95	.2908	.4311
.68	.5905	.8755	.96	.2781	.4123
.69	.5763	.8544	.97	.2640	.3913
.70	.5626	.8341	.98	.2472	.3665
.71	.5493	.8144	.99	.2248	.3332
.72	.5365	.7954			

TABLE I (Cont'd)

$p_1 = .26$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.46	1.184	1.842	.74	.5000	.7772
.47	1.133	1.761	.75	.4882	.7588
.48	1.085	1.686	.76	.4767	.7410
.49	1.041	1.618	.77	.4655	.7235
.50	1.000	1.554	.78	.4545	.7065
.51	.9624	1.496	.79	.4437	.6898
.52	.9276	1.442	.80	.4332	.6734
.53	.8952	1.392	.81	.4229	.6574
.54	.8650	1.345	.82	.4127	.6416
.55	.8365	1.300	.83	.4027	.6260
.56	.8099	1.259	.84	.3928	.6106
.57	.7848	1.220	.85	.3830	.5953
.58	.7611	1.183	.86	.3732	.5802
.59	.7387	1.148	.87	.3635	.5651
.60	.7175	1.115	.88	.3538	.5500
.61	.6973	1.084	.89	.3440	.5348
.62	.6780	1.054	.90	.3342	.5195
.63	.6597	1.025	.91	.3242	.5040
.64	.6421	.9982	.92	.3140	.4882
.65	.6254	.9722	.93	.3036	.4719
.66	.6093	.9471	.94	.2927	.4549
.67	.5939	.9232	.95	.2811	.4370
.68	.5790	.9001	.96	.2687	.4177
.69	.5647	.8778	.97	.2549	.3962
.70	.5509	.8564	.98	.2385	.3708
.71	.5376	.8356	.99	.2166	.3367
.72	.5247	.8156			
.73	.5121	.7961			

TABLE I (Cont'd)

$p_1 = .27$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.47	1.140	1.860	.75	.4760	.7768
.48	1.089	1.777	.76	.4646	.7581
.49	1.043	1.702	.77	.4534	.7399
.50	1.000	1.632	.78	.4425	.7220
.51	.9607	1.568	.79	.4318	.7046
.52	.9243	1.508	.80	.4213	.6876
.53	.8906	1.453	.81	.4111	.6708
.54	.8592	1.402	.82	.4010	.6544
.55	.8298	1.354	.83	.3911	.6382
.56	.8023	1.309	.84	.3813	.6222
.57	.7765	1.267	.85	.3716	.6064
.58	.7522	1.227	.86	.3619	.5906
.59	.7293	1.190	.87	.3523	.5750
.60	.7075	1.155	.88	.3428	.5593
.61	.6869	1.121	.89	.3332	.5437
.62	.6673	1.089	.90	.3235	.5279
.63	.6487	1.059	.91	.3137	.5119
.64	.6309	1.030	.92	.3037	.4956
.65	.6140	1.002	.93	.2934	.4788
.66	.5977	.9753	.94	.2827	.4613
.67	.5821	.9499	.95	.2714	.4429
.68	.5671	.9255	.96	.2593	.4231
.69	.5527	.9020	.97	.2457	.4010
.70	.5389	.8794	.98	.2298	.3750
.71	.5255	.8572	.99	.2085	.3402
.72	.5125	.8364			
.73	.5000	.8159			
.74	.4879	.7961			

TABLE I (Cont'd)

$p_1 = .28$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.48	1.094	1.878	.76	.4521	.7757
.49	1.045	1.793	.77	.4410	.7567
.50	1.000	1.716	.78	.4301	.7380
.51	.9587	1.645	.79	.4195	.7198
.52	.9207	1.580	.80	.4092	.7020
.53	.8856	1.520	.81	.3990	.6846
.54	.8530	1.464	.82	.3890	.6675
.55	.8226	1.411	.83	.3792	.6506
.56	.7942	1.363	.84	.3695	.6340
.57	.7677	1.317	.85	.3599	.6176
.58	.7427	1.274	.86	.3504	.6013
.59	.7192	1.234	.87	.3410	.5851
.60	.6970	1.196	.88	.3316	.5689
.61	.6760	1.160	.89	.3221	.5527
.62	.6561	1.126	.90	.3126	.5364
.63	.6371	1.093	.91	.3030	.5199
.64	.6191	1.062	.92	.2932	.5030
.65	.6020	1.033	.93	.2831	.4858
.66	.5856	1.005	.94	.2726	.4678
.67	.5699	.9778	.95	.2616	.4489
.68	.5548	.9519	.96	.2496	.4285
.69	.5403	.9270	.97	.2366	.4059
.70	.5264	.9032	.98	.2211	.3793
.71	.5129	.8801	.99	.2003	.3437
.72	.5000	.8579			
.73	.4875	.8364			
.74	.4753	.8156			
.75	.4635	.7954			

TABLE I (Cont'd)

$p_1 = .29$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.49	1.048	1.893	.77	.4283	.7739
.50	1.000	1.807	.78	.4175	.7544
.51	.9566	1.729	.79	.4070	.7354
.52	.9168	1.657	.80	.3967	.7168
.53	.8802	1.591	.81	.3866	.6987
.54	.8464	1.530	.82	.3768	.6808
.55	.8149	1.473	.83	.3671	.6633
.56	.7856	1.420	.84	.3575	.6460
.57	.7583	1.370	.85	.3481	.6290
.58	.7327	1.324	.86	.3387	.6121
.59	.7087	1.281	.87	.3294	.5953
.60	.6860	1.240	.88	.3202	.5786
.61	.6646	1.201	.89	.3109	.5618
.62	.6443	1.164	.90	.3016	.5450
.63	.6251	1.130	.91	.2922	.5279
.64	.6069	1.097	.92	.2826	.5106
.65	.5895	1.065	.93	.2727	.4928
.66	.5729	1.035	.94	.2625	.4743
.67	.5571	1.007	.95	.2517	.4549
.68	.5420	.9793	.96	.2402	.4340
.69	.5274	.9530	.97	.2273	.4108
.70	.5135	.9278	.98	.2123	.3836
.71	.5000	.9035	.99	.1922	.3473
.72	.4871	.8801			
.73	.4745	.8575			
.74	.4624	.8356			
.75	.4507	.8144			
.76	.4393	.7938			

TABLE I (Cont'd)

$p_1 = .30$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.50	1.000	1.907	.78	.4044	.7712
.51	.9543	1.820	.79	.3940	.7514
.52	.9126	1.740	.80	.3839	.7321
.53	.8744	1.668	.81	.3740	.7131
.54	.8393	1.601	.82	.3642	.6945
.55	.8066	1.538	.83	.3547	.6763
.56	.7764	1.480	.84	.3452	.6456
.57	.7483	1.427	.85	.3360	.6407
.58	.7220	1.377	.86	.3268	.6232
.59	.6974	1.330	.87	.3177	.6058
.60	.6743	1.286	.88	.3086	.5884
.61	.6525	1.244	.89	.2995	.5711
.62	.6322	1.205	.90	.2904	.5537
.63	.6124	1.168	.91	.2811	.5361
.64	.5942	1.133	.92	.2718	.5183
.65	.5764	1.099	.93	.2623	.5000
.66	.5597	1.067	.94	.2522	.4810
.67	.5438	1.037	.95	.2417	.4610
.68	.5286	1.008	.96	.2305	.4395
.69	.5140	.9801	.97	.2180	.4158
.70	.5000	.9535	.98	.2034	.3879
.71	.4865	.9278	.99	.1840	.3508
.72	.4736	.9032			
.73	.4611	.8794			
.74	.4491	.8564			
.75	.4374	.8341			
.76	.4261	.8125			
.77	.4151	.7916			

TABLE I (Cont'd)

$p_1 = .31$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.51	1.000	1.919	.75	.4237	.8544
.52	.9081	1.831	.76	.4125	.8318
.53	.8682	1.751	.77	.4016	.8099
.54	.8316	1.677	.78	.3911	.7886
.55	.7978	1.609	.79	.3808	.7679
.56	.7666	1.546	.80	.3708	.7477
.57	.7376	1.487	.81	.3610	.7280
.58	.7107	1.433	.82	.3514	.7086
.59	.6855	1.375	.83	.3420	.6896
.60	.6606	1.335	.84	.3327	.6709
.61	.6397	1.290	.85	.3236	.6526
.62	.6188	1.248	.86	.3146	.6344
.63	.5991	1.208	.87	.3057	.6164
.64	.5804	1.170	.88	.2968	.5985
.65	.5628	1.135	.89	.2879	.5806
.66	.5459	1.101	.90	.2790	.5626
.67	.5299	1.069	.91	.2700	.5445
.68	.5146	1.038	.92	.2609	.5260
.69	.5000	1.008	.93	.2515	.5072
.70	.4860	.9801	.94	.2418	.4876
.71	.4726	.9530	.95	.2317	.4672
.72	.4597	.9270	.96	.2207	.4451
.73	.4473	.9020	.97	.2087	.4218
.74	.4353	.8778	.98	.1945	.3922
			.99	.1757	.3543

$p_1 = .32$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.52	.9037	1.931	.60	.6487	1.387
.53	.8613	1.842	.61	.6261	1.339
.54	.8233	1.760	.62	.6049	1.293
.55	.7882	1.685	.63	.5849	1.251
.56	.7559	1.616	.64	.5661	1.210
.57	.7261	1.553	.65	.5483	1.172
.58	.6985	1.493	.66	.5314	1.136
.59	.6728	1.438	.67	.5153	1.102

TABLE I (Cont'd)

p_1 = .32 (Cont'd)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.68	.5000	1.069	.84	.3199	.6839
.69	.4854	1.038	.85	.3110	.6648
.70	.4714	1.008	.86	.3021	.6460
.71	.4580	.9793	.87	.2934	.6273
.72	.4452	.9519	.88	.2847	.6088
.73	.4329	.9255	.89	.2761	.5902
.74	.4210	.9001	.90	.2674	.5717
.75	.4095	.8755	.91	.2586	.5529
.76	.3984	.8518	.92	.2497	.5340
.77	.3877	.8288	.93	.2406	.5145
.78	.3772	.8065	.94	.2312	.4943
.79	.3671	.7849	.95	.2214	.4734
.80	.3572	.7638	.96	.2108	.4507
.81	.3476	.7432	.97	.1991	.4258
.82	.3382	.7230	.98	.1855	.3966
.83	.3289	.7033	.99	.1674	.3579

p_1 = .33

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.53	.8538	1.941	.69	.4701	1.069
.54	.8142	1.851	.70	.4562	1.037
.55	.7778	1.768	.71	.4429	1.007
.56	.7445	1.692	.72	.4301	.9778
.57	.7138	1.623	.73	.4179	.9499
.58	.6854	1.558	.74	.4061	.9232
.59	.6591	1.498	.75	.3947	.8973
.60	.6346	1.443	.76	.3838	.8724
.61	.6117	1.390	.77	.3732	.8489
.62	[illegible]	1.316	.78	.3629	.8250
.63	.5700	1.297	.79	.3530	.8024
.64	.5510	1.253	.80	.3433	.7803
.65	.5331	1.212	.81	.3338	.7588
.66	.5161	1.173	.82	.3246	.7378
.67	.5000	1.137	.83	.3155	.7173
.68	.4847	1.102	.84	.3067	.6972

TABLE I (Cont'd)

p_1 = .33 (Cont'd)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.85	.2980	.6774	.93	.2296	.5222
.86	.2894	.6578	.94	.2205	.5013
.87	.2809	.6384	.95	.2110	.4797
.88	.2724	.6192	.96	.2008	.4565
.89	.2640	.6001	.97	.1896	.4309
.90	.2555	.5809	.98	.1764	.4010
.91	.2470	.5616	.99	.1590	.3615
.92	.2384	.5420			

p_1 = .34

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.54	.8043	1.950	.78	.3482	.8441
.55	.7664	1.858	.79	.3384	.8204
.56	.7320	1.775	.80	.3289	.7974
.57	.7005	1.698	.81	.3197	.7750
.58	.6714	1.628	.82	.3106	.7531
.59	.6445	1.563	.83	.3018	.7317
.60	.6196	1.502	.84	.2932	.7107
.61	.5963	1.446	.85	.2847	.6902
.62	.5745	1.393	.86	.2763	.6699
.63	.5541	1.343	.87	.2680	.6498
.64	.5350	1.297	.88	.2598	.6299
.65	.5170	1.253	.89	.2517	.6101
.66	.5000	1.212	.90	.2435	.5903
.67	.4839	1.173	.91	.2353	.5704
.68	.4686	1.136	.92	.2269	.5502
.69	.4541	1.101	.93	.2185	.5296
.70	.4403	1.067	.94	.2097	.5083
.71	.4271	1.035	.95	.2005	.4861
.72	.4144	1.005	.96	.1907	.4623
.73	.4023	.9753	.97	.1799	.4361
.74	.3907	.9471	.98	.1673	.4055
.75	.3795	.9200	.99	.1506	.3651
.76	.3687	.8938			
.77	.3583	.8686			

TABLE I (Cont'd)

$p_1 = .35$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.55	.7540	1.957	.79	.3233	.8391
.56	.7184	1.865	.80	.3140	.8150
.57	.6859	1.780	.81	.3050	.7916
.58	.6561	1.703	.82	.2962	.7688
.59	.6287	1.632	.83	.2876	.7465
.60	.6033	1.566	.84	.2792	.7247
.61	.5797	1.505	.85	.2710	.7033
.62	.5577	1.448	.86	.2628	.6823
.63	.5372	1.394	.87	.2548	.6615
.64	.5180	1.344	.88	.2469	.6409
.65	.5000	1.298	.89	.2390	.6204
.66	.4829	1.253	.90	.2311	.5999
.67	.4669	1.212	.91	.2232	.5793
.68	.4516	1.172	.92	.2152	.5585
.69	.4372	1.135	.93	.2070	.5373
.70	.4235	1.099	.94	.1985	.5154
.71	.4104	1.065	.95	.1897	.4925
.72	.3979	1.033	.96	.1803	.4681
.73	.3860	1.002	.97	.1700	.4412
.74	.3745	.9721	.98	.1579	.4100
.75	.3635	.9435	.99	.1420	.3687
.76	.3529	.9160			
.77	.3427	.8896			
.78	.3328	.8639			

$p_1 = .36$

.56	.7036	1.963	.64	.5000	1.395
.57	.6702	1.870	.65	.4819	1.344
.58	.6397	1.784	.66	.4649	1.297
.59	.6117	1.706	.67	.4490	1.253
.60	.5859	1.635	.68	.4339	1.210
.61	.5620	1.568	.69	.4195	1.170
.62	.5399	1.506	.70	.4060	1.133
.63	.5192	1.448	.71	.3931	1.097

TABLE I (Cont'd)

p_1 = .36 (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.72	.3808	1.062	.88	.2337	.6521
.73	.3690	1.030	.89	.2261	.6309
.74	.3578	.9982	.90	.2185	.6097
.75	.3470	.9680	.91	.2109	.5884
.76	.3366	.9391	.92	.2032	.5670
.77	.3267	.9113	.93	.1954	.5451
.78	.3170	.8844	.94	.1873	.5226
.79	.3077	.8584	.95	.1789	.4991
.80	.2987	.8332	.96	.1699	.4741
.81	.2899	.8087	.97	.1600	.4465
.82	.2814	.7849	.98	.1486	.4145
.83	.2731	.7617	.99	.1335	.3724
.84	.2649	.7390			
.85	.2570	.7168			
.86	.2491	.6950			
.87	.2414	.6734			

p_1 = .37

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.57	.6529	1.967	.73	.3513	1.059
.58	.6217	1.873	.74	.3403	1.025
.59	.5933	1.788	.75	.3297	.9936
.60	.5671	1.709	.76	.3196	.9632
.61	.5430	1.636	.77	.3099	.9339
.62	.5207	1.569	.78	.3006	.9057
.63	.5000	1.506	.79	.2915	.8785
.64	.4807	1.448	.80	.2828	.8521
.65	.4627	1.394	.81	.2743	.8265
.66	.4458	1.343	.82	.2660	.8017
.67	.4300	1.296	.83	.2580	.7775
.68	.4150	1.251	.84	.2502	.7539
.69	.4009	1.208	.85	.2425	.7308
.70	.3875	1.168	.86	.2350	.7081
.71	.3749	1.130	.87	.2275	.6857
.72	.3628	1.093	.88	.2202	.6636

TABLE I (Cont'd

p_1 = .37 (Cont'd)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.89	.2129	.6416	.97	.1499	.4519
.90	.2057	.6197	.98	.1391	.4191
.91	.1984	.5978	.99	.1248	.3761
.92	.1910	.5757			
.93	.1836	.5531			
.94	.1759	.5300			
.95	.1678	.5058			
.96	.1593	.4801			

p_1 = .38

.58	.6020	1.971	.82	.2502	.8190
.59	.5731	1.876	.83	.2425	.7938
.60	.5467	1.790	.84	.2350	.7692
.61	.5224	1.710	.85	.2276	.7452
.62	.5000	1.637	.86	.2204	.7216
.63	.4792	1.569	.87	.2133	.6983
.64	.4600	1.506	.88	.2063	.6754
.65	.4422	1.448	.89	.1994	.6527
.66	.4254	1.393	.90	.1924	.6300
.67	.4098	1.342	.91	.1855	.6074
.68	.3951	1.293	.92	.1785	.5845
.69	.3812	1.248	.93	.1715	.5613
.70	.3681	1.205	.94	.1642	.5375
.71	.3556	1.164	.95	.1566	.5127
.72	.3439	1.126	.96	.1485	.4863
.73	.3327	1.089	.97	.1397	.4573
.74	.3219	1.054	.98	.1294	.4238
.75	.3117	1.020	.99	.1160	.3799
.76	.3019	.9883			
.77	.2925	.9575			
.78	.2834	.9279			
.79	.2747	.8993			
.80	.2663	.8717			
.81	.2581	.8450			

TABLE I (Cont'd)

$p_1 = .39$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.59	.5511	1.973	.79	.2572	.9210
.60	.5244	1.878	.80	.2491	.8921
.61	.5000	1.790	.81	.2413	.8641
.62	.4775	1.710	.82	.2337	.8370
.63	.4569	1.636	.83	.2264	.8107
.64	.4379	1.568	.84	.2192	.7850
.65	.4202	1.505	.85	.2122	.7600
.66	.4037	1.446	.86	.2054	.7355
.67	.3883	1.390	.87	.1986	.7113
.68	.3738	1.339	.88	.1920	.6876
.69	.3602	1.290	.89	.1854	.6640
.70	.3475	1.244	.90	.1789	.6406
.71	.3354	1.201	.91	.1723	.6172
.72	.3239	1.160	.92	.1658	.5936
.73	.3130	1.121	.93	.1591	.5697
.74	.3027	1.084	.94	.1522	.5452
.75	.2928	1.048	.95	.1451	.5196
.76	.2833	1.015	.96	.1375	.4926
.77	.2743	.9822	.97	.1292	.4629
.78	.2656	.9510	.98	.1197	.4286
			.99	.1071	.3837

$p_1 = .40$

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.60	.5000	1.974	.72	.3029	1.196
.61	.4755	1.878	.73	.2924	1.155
.62	.4532	1.790	.74	.2825	1.115
.63	.4328	1.709	.75	.2730	1.078
.64	.4140	1.635	.76	.2639	1.042
.65	.3966	1.566	.77	.2553	1.008
.66	.3804	1.502	.78	.2470	.9751
.67	.3654	1.443	.79	.2390	.9436
.68	.3513	1.387	.80	.2313	.9133
.69	.3380	1.335	.81	.2239	.8840
.70	.3257	1.286	.82	.2167	.8556
.71	.3139	1.240	.83	.2097	.8281

TABLE I (Cont'd)

p_1 = .40 (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.84	.2029	.8014	.92	.1527	.6029
.85	.1964	.7753	.93	.1464	.5783
.86	.1899	.7498	.94	.1400	.5530
.87	.1835	.7247	.95	.1334	.5268
.88	.1773	.7001	.96	.1263	.4990
.89	.1711	.6757	.97	.1186	.4685
.90	.1650	.6515	.98	.1097	.4334
.91	.1588	.6273	.99	.0981	.3876

p_1 = .41

.61	.4489	1.973	.81	.2058	.9046
.62	.4268	1.876	.82	.1990	.8750
.63	.4067	1.788	.83	.1925	.8462
.64	.3882	1.706	.84	.1862	.8183
.65	.3712	1.632	.85	.1800	.7912
.66	.3555	1.562	.86	.1740	.7646
.67	.3409	1.498	.87	.1680	.7386
.68	.3272	1.438	.88	.1622	.7130
.69	.3145	1.382	.89	.1565	.6878
.70	.3026	1.330	.90	.1508	.6626
.71	.2913	1.280	.91	.1451	.6376
.72	.2808	1.234	.92	.1393	.6125
.73	.2707	1.190	.93	.1336	.5871
.74	.2612	1.148	.94	.1276	.5611
.75	.2522	1.109	.95	.1215	.5341
.76	.2436	1.071	.96	.1150	.5055
.77	.2354	1.035	.97	.1079	.4743
.78	.2276	1.000	.98	.0997	.4384
.79	.2200	.9672	.99	.0891	.3916
.80	.2128	.9354			

TABLE I (Cont'd)

p_1 = .42

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.62	.3979	1.971	.82	.1807	.8950
.63	.3782	1.873	.83	.1746	.8650
.64	.3603	1.784	.84	.1688	.8358
.65	.3438	1.703	.85	.1630	.8076
.66	.3286	1.628	.86	.1575	.7799
.67	.3146	1.558	.87	.1520	.7528
.68	.3015	1.493	.88	.1466	.7263
.69	.2893	1.433	.89	.1413	.7001
.70	.2780	1.377	.90	.1361	.6741
.71	.2673	1.324	.91	.1309	.6482
.72	.2573	1.274	.92	.1257	.6227
.73	.2478	1.227	.93	.1203	.5961
.74	.2389	1.183	.94	.1149	.5692
.75	.2304	1.141	.95	.1093	.5415
.76	.2223	1.101	.96	.1034	.5121
.77	.2146	1.063	.97	.0969	.4801
.78	.2073	1.027	.98	.0895	.4433
.79	.2002	.9918	.99	.0799	.3955
.80	.1935	.9583			
.81	.1870	.9261			

p_1 =.43

.63	.3470	1.967	.75	.2073	1.175
.64	.3298	1.870	.76	.1998	1.133
.65	.3140	1.780	.77	.1927	1.093
.66	.2995	1.698	.78	.1860	1.054
.67	.2862	1.623	.79	.1795	1.018
.68	.2739	1.553	.80	.1733	.9823
.69	.2624	1.487	.81	.1673	.9485
.70	.2517	1.427	.82	.1616	.9159
.71	.2417	1.370	.83	.1560	.8845
.72	.2323	1.317	.84	.1507	.8540
.73	.2235	1.267	.85	.1454	.8245
.74	.2152	1.220	.86	.1404	.7957

TABLE I (Cont'd)

p_1 = .43 (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.87	.1354	.7676	.95	.0969	.5491
.88	.1305	.7400	.96	.0915	.5189
.89	.1257	.7128	.97	.0858	.4861
.90	.1210	.6859	.98	.0791	.4484
.91	.1163	.6591	.99	.0705	.3996
.92	.1115	.6323			
.93	.1068	.6053			
.94	.1019	.5776			

p_1 - .44

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.64	.2964	1.963	.84	.1318	.8730
.65	.2816	1.865	.85	.1272	.8422
.66	.2680	1.775	.86	.1226	.8121
.67	.2555	1.692	.87	.1182	.7828
.68	.2441	1.616	.88	.1139	.7541
.69	.2334	1.546	.89	.1096	.7260
.70	.2236	1.481	.90	.1054	.6980
.71	.2144	1.420	.91	.1012	.6703
.72	.2058	1.363	.92	.0970	.6426
.73	.1977	1.309	.93	.0928	.6147
.74	.1901	1.259	.94	.0885	.5862
.75	.1829	1.211	.95	.0841	.5568
.76	.1761	1.166	.96	.0794	.5258
.77	.1697	1.124	.97	.0743	.4922
.78	.1636	1.083	.98	.0685	.4536
.79	.1577	1.044	.99	.0610	.4037
.80	.1521	1.007			
.81	.1468	.9719			
.82	.1416	.9377			
.83	.1366	.9048			

TABLE I (Cont'd)

$p_1 = .45$

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.65	.2459	1.957	.85	.1081	.8605
.66	.2335	1.858	.86	.1042	.8291
.67	.2222	1.768	.87	.1003	.7986
.68	.2118	1.685	.88	.0966	.7688
.69	.2022	1.609	.89	.0929	.7395
.70	.1933	1.538	.90	.0893	.7105
.71	.1850	1.473	.91	.0857	.6818
.72	.1774	1.411	.92	.0821	.6532
.73	.1702	1.354	.93	.0784	.6244
.74	.1634	1.300	.94	.0747	.5950
.75	.1570	1.250	.95	.0709	.5647
.76	.1510	1.202	.96	.0669	.5329
.77	.1454	1.157	.97	.0626	.4983
.78	.1399	1.114	.98	.0575	.4580
.79	.1348	1.073	.99	.0512	.4078
.80	.1299	1.034			
.81	.1252	.9964			
.82	.1207	.9605			
.83	.1163	.9260			
.84	.1122	.8926			

$p_1 = .46$

.66	.1957	1.950	.78	.1150	1.146
.67	.1858	1.851	.79	.1107	1.103
.68	.1767	1.760	.80	.1065	1.062
.69	.1683	1.677	.81	.1026	1.022
.70	.1606	1.601	.82	.0988	.9844
.71	.1535	1.530	.83	.0952	.9482
.72	.1469	1.464	.84	.0916	.9133
.73	.1407	1.402	.85	.0883	.8796
.74	.1350	1.345	.86	.0850	.8469
.75	.1295	1.290	.87	.0818	.8151
.76	.1244	1.240	.88	.0787	.7840
.77	.1196	1.192	.89	.0756	.7536

TABLE I (Cont'd)

p_1 = .46 (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.90	.0726	.7235	.94	.0606	.6041
.91	.0696	.6938	.95	.0575	.5729
.92	.0666	.6642	.96	.0542	.5402
.93	.0636	.6344	.97	.0506	.5047
			.98	.0466	.4642
			.99	.0413	.4120

p_1 = .47

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.67	.1462	1.941	.83	.0731	.9713
.68	.1387	1.842	.84	.0703	.9347
.69	.1318	1.751	.85	.0677	.8995
.70	.1256	1.668	.86	.0651	.8653
.71	.1198	1.591	.87	.0626	.8321
.72	.1144	1.520	.88	.0602	.7998
.73	.1094	1.453	.89	.0578	.7682
.74	.1047	1.392	.90	.0554	.7369
.75	.1004	1.334	.91	.0531	.7061
.76	.0963	1.279	.92	.0508	.6754
.77	.0924	1.228	.93	.0485	.6447
.78	.0888	1.180	.94	.0461	.6134
.79	.0854	1.134	.95	.0437	.5813
.80	.0821	1.091	.96	.0412	.5476
.81	.0789	1.049	.97	.0384	.5112
.82	.0760	1.009	.98	.0354	.4697
			.99	.0314	.4163

p_1 = .48

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.68	.0969	1.931	.76	.0664	1.322
.69	.0919	1.831	.77	.0636	1.267
.70	.0874	1.740	.78	.0610	1.216
.71	.0832	1.657	.79	.0586	1.167
.72	.0730	1.580	.80	.0563	1.121
.73	.0757	1.508	.81	.0541	1.077
.74	.0724	1.442	.82	.0520	1.036
.75	.0693	1.380	.83	.0500	.9956

TABLE I (Cont'd)

p_1 = .48 (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.84	.0481	.9572	.92	.0345	.6871
.85	.0462	.9203	.93	.0329	.6553
.86	.0444	.8846	.94	.0313	.6231
.87	.0427	.8499	.95	.0296	.5899
.88	.0410	.8162	.96	.0279	.5553
.89	.0393	.7833	.97	.0260	.5179
.90	.0377	.7509	.98	.0239	.4753
.91	.0361	.7189	.99	.0211	.4208

p_1 = .49

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.69	.0482	1.919	.85	.0237	.9421
.70	.0457	1.820	.86	.0227	.9046
.71	.0434	1.729	.87	.0218	.8684
.72	.0430	1.645	.88	.0209	.8333
.73	.0394	1.568	.89	.0201	.7990
.74	.0376	1.496	.90	.0192	.7653
.75	.0359	1.429	.91	.0184	.7321
.76	.0343	1.367	.92	.0176	.6992
.77	.0329	1.309	.93	.0167	.6663
.78	.0315	1.254	.94	.0159	.6330
.79	.0302	1.203	.95	.0150	.5988
.80	.0290	1.154	.96	.0141	.5631
.81	.0278	1.107	.97	.0132	.5247
.82	.0267	1.063	.98	.0121	.4810
.83	.0256	1.021	.99	.0107	.4253
.84	.0246	.9808			

p_1 = .50

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.70	.000	1.907	.78	.000	1.295
.71	.000	1.807	.79	.000	1.240
.72	.000	1.716	.80	.000	1.188
.73	.000	1.632	.81	.000	1.139
.74	.000	1.554	.82	.000	1.092
.75	.000	1.483	.83	.000	1.048
.76	.000	1.416	.84	.000	1.005
.77	.000	1.354	.85	.000	.9649

TABLE I (Cont'd)

$p_1 = .50$ (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.86	.000	.9257	.94	.000	.6432
.87	.000	.8878	.95	.000	.6079
.88	.000	.8511	.96	.000	.5712
.89	.000	.8153	.97	.000	.5317
.90	.000	.7803	.98	.000	.4869
.91	.000	.7458	.99	.000	.4299
.92	.000	.7117			
.93	.000	.6776			

$p_1 = .51$ (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.71	.0475	1.893	.87	.0228	.9080
.72	.0450	1.793	.88	.0218	.8696
.73	.0427	1.701	.89	.0209	.8324
.74	.0406	1.618	.90	.0200	.7959
.75	.0387	1.540	.91	.0191	.7601
.76	.0368	1.468	.92	.0182	.7246
.77	.0352	1.401	.93	.0173	.6893
.78	.0336	1.339	.94	.0164	.6537
.79	.0321	1.280	.95	.0155	.6174
.80	.0307	1.225	.96	.0145	.5795
.81	.0294	1.173	.97	.0135	.5389
.82	.0282	1.123	.98	.0124	.4930
.83	.0270	1.076	.99	.0109	.4346
.84	.0259	1.032			
.85	.0249	.9888			
.86	.0239	.9477			

$p_1 = .52$ (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.72	.0942	1.878	.80	.0634	1.264
.73	.0892	1.777	.81	.0606	1.208
.74	.0846	1.686	.82	.0580	1.156
.75	.0804	1.602	.83	.0555	1.106
.76	.0766	1.524	.84	.0531	1.059
.77	.0729	1.452	.85	.0509	1.016
.78	.0695	1.385	.86	.0487	.9707
.79	.0663	1.322	.87	.0466	.9291

TABLE I (Cont'd)

p_1 = .52 (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.88	.0446	.8890	.96	.0295	.5880
.89	.0426	.8501	.97	.0274	.5462
.90	.0407	.8120	.98	.0250	.4991
.91	.0388	.7748	.99	.0220	.4393
.92	.0370	.7380			
.93	.0352	.7014			
.94	.0333	.6646			
.95	.0314	.6270			

p_1 = .53 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.73	.1400	1.860	.89	.0654	.8686
.74	.1325	1.761	.90	.0624	.8289
.75	.1256	1.669	.91	.0595	.7902
.76	.1193	1.585	.92	.0566	.7519
.77	.1134	1.507	.93	.0537	.7140
.78	.1080	1.435	.94	.0508	.6759
.79	.1029	1.368	.95	.0479	.6371
.80	.0982	1.305	.96	.0449	.5968
.81	.0938	1.246	.97	.0417	.5538
.82	.0896	1.190	.98	.0380	.5054
.83	.0856	1.114	.99	.0334	.4442
.84	.0819	1.088			
.85	.0783	1.040			
.86	.0749	.9950			
.87	.0716	.9513			
.88	.0684	.9093			

p_1 = .54 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.74	.1849	1.842	.82	.1231	1.227
.75	.1748	1.742	.83	.1175	1.171
.76	.1657	1.650	.84	.1122	1.118
.77	.1572	1.566	.85	.1042	1.0[illegible]8
.78	.1494	1.489	.86	.1024	1.021
.79	.1422	1.416	.87	.0978	.9746
.80	.1354	1.349	.88	.0934	.9305
.81	.1291	1.286	.89	.0891	.8880

TABLE I (Cont'd)

p_1 = .54 (Cont'd)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.90	.0849	.8465	.94	.0690	.6875
.91	.0809	.8061	.95	.0650	.6474
.92	.0769	.7458	.96	.0608	.6059
.93	.0729	.7270	.97	.0563	.5616
			.98	.0514	.5119
			.99	.0451	.4492

p_1 = .55 (All $\bar{H}'$ values are negative)

.75	.2290	1.822	.87	.1256	.9993
.76	.2165	1.722	.88	.1197	.9530
.77	.2050	1.631	.89	.1141	.9084
.78	.1944	1.547	.90	.1087	.8651
.79	.1846	1.469	.91	.1034	.8229
.80	.1755	1.397	.92	.0982	.7816
.81	.1671	1.329	.93	.0931	.7406
.82	.1591	1.266	.94	.0879	.6997
.83	.1517	1.207	.95	.0827	.6582
.84	.1446	1.151	.96	.0773	.6153
.85	.1380	1.098	.97	.0716	.5697
.86	.1316	1.048	.98	.0651	.5186
			.99	.0571	.4544

p_1 = .56 (All $\bar{H}'$ values are negative)

.76	.2719	1.801	.88	.1475	.9765
.77	.2568	1.701	.89	.1403	.9298
.78	.2430	1.610	.90	.1335	.8844
.79	.2303	1.526	.91	.1269	.8404
.80	.2186	1.448	.92	.1204	.7973
.81	.2077	1.376	.93	.1139	.7548
.82	.1975	1.308	.94	.1075	.7123
.83	.1879	1.245	.95	.1010	.6693
.84	.1790	1.186	.96	.0943	.6251
.85	.1705	1.129	.97	.0872	.5781
.86	.1624	1.076	.98	.0793	.5255
.87	.1548	1.025	.99	.0694	.4597

TABLE I (Cont'd)

p_1 = .57 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.77	.3136	1.778	.89	.1679	.9522
.78	.2960	1.678	.90	.1596	.9048
.79	.2800	1.587	.91	.1514	.8588
.80	.2651	1.503	.92	.1435	.8138
.81	.2514	1.426	.93	.1357	.7695
.82	.2387	1.353	.94	.1279	.7254
.83	.2267	1.286	.95	.1201	.6809
.84	.2156	1.222	.96	.1120	.6352
.85	.2051	1.163	.97	.1034	.5867
.86	.1951	1.106	.98	.0939	.5327
.87	.1856	1.053	.99	.0820	.4651
.88	.1766	1.001			

p_1 = .58 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.78	.3540	1.753	.90	.1869	.9261
.79	.3339	1.654	.91	.1772	.8780
.80	.3156	1.563	.92	.1678	.8311
.81	.2986	1.479	.93	.1584	.7849
.82	.2829	1.402	.94	.1492	.7391
.83	.2683	1.329	.95	.1399	.6930
.84	.2547	1.262	.96	.1303	.6456
.85	.2419	1.198	.97	.1202	.5956
.86	.2298	1.138	.98	.1090	.5400
.87	.2183	1.082	.99	.0950	.4707
.88	.2074	1.028			
.89	.1970	.9759			

p_1 = .59 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.79	.3929	1.727	.83	.3130	1.376
.80	.3704	1.628	.84	.2966	1.304
.81	.3497	1.538	.85	.2812	1.236
.82	.3307	1.454	.86	.2667	1.173

TABLE I (Cont'd)

p_1 = .59 (Cont'd)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.87	.2530	1.112	.95	.1605	.7055
.88	.2401	1.055	.96	.1493	.6565
.89	.2277	1.001	.97	.1376	.6048
.90	.2158	.9486	.98	.1245	.5475
.91	.2043	.8982	.99	.1083	.4764
.92	.1931	.8491			
.93	.1822	.8010			
.94	.1714	.7534			

p_1 = .60 (All $\overline{H}'$ values are negative)

.80	.4305	1.700	.92	.2199	.8682
.81	.4055	1.601	.93	.2071	.8179
.82	.3825	1.510	.94	.1946	.7683
.83	.3613	1.427	.95	.1820	.7185
.84	.3417	1.349	.96	.1691	.6678
.85	.3234	1.277	.97	.1556	.6144
.86	.3062	1.209	.98	.1406	.5554
.87	.2901	1.145	.99	.1221	.4823
.88	.2748	1.085			
.89	.2602	1.028			
.90	.2463	.9724			
.91	.2329	.9195			

p_1 = .61 (All $\overline{H}'$ values are negative)

.81	.4665	1.670	.93	.2334	.8357
.82	.4390	1.572	.94	.2189	.7840
.83	.4138	1.482	.95	.2045	.7322
.84	.3905	1.398	.96	.1898	.6796
.85	.3689	1.321	.97	.1743	.6244
.86	.3486	1.248	.98	.1574	.5635
.87	.3297	1.180	.99	.1364	.4885
.88	.3118	1.116			
.89	.2948	1.056			
.90	.2786	.9977			
.91	.2631	.9420			
.92	.2480	.8882			

TABLE I (Cont'd)

p_1 = .62 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.82	.5009	1.640	.90	.3129	1.024
.83	.4709	1.542	.91	.2950	.9659
.84	.4433	1.451	.92	.2778	.9094
.85	.4179	1.368	.93	.2610	.8544
.86	.3942	1.291	.94	.2445	.8004
.87	.3721	1.218	.95	.2280	.7466
.88	.3513	1.150	.96	.2113	.6919
.89	.3317	1.086	.97	.1939	.6347
			.98	.1747	.5720
			.99	.1511	.4948

p_1 = .63 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.83	.5333	1.607	.91	.3289	.9911
.84	.5009	1.509	.92	.3092	.9317
.85	.4711	1.419	.93	.2901	.8742
.86	.4434	1.336	.94	.2714	.8177
.87	.4177	1.259	.95	.2527	.7616
.88	.3936	1.186	.96	.2339	.7048
.89	.3710	1.118	.97	.2142	.6456
.90	.3494	1.053	.98	.1927	.5807
			.99	.1664	.5014

p_1 = .64 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.84	.5636	1.572	.92	.3425	.9554
.85	.5288	1.475	.93	.3208	.8950
.86	.4966	1.385	.94	.2996	.8359
.87	.4668	1.302	.95	.2786	.7773
.88	.4390	1.225	.96	.2575	.7182
.89	.4130	1.152	.97	.2354	.6569
.90	.3883	1.083	.98	.2114	.5899
.91	.3649	1.018	.99	.1821	.5081

TABLE I (Cont'd)

p_1 = .65 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.85	.5917	1.536	.93	.3533	.9170
.86	.5543	1.439	.94	.3294	.8550
.87	.5199	1.349	.95	.3058	.7939
.88	.4879	1.266	.96	.2821	.7323
.89	.4580	1.189	.97	.2576	.6686
.90	.4298	1.116	.98	.2309	.5993
.91	.4032	1.047	.99	.1985	.5151
.92	.3778	.9805			

p_1 = .66 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.86	.6176	1.497	.94	.3611	.8754
.87	.5778	1.401	.95	.3347	.8114
.88	.5409	1.311	.96	.3082	.7472
.89	.5067	1.229	.97	.2809	.6810
.90	.4746	1.151	.98	.2513	.6093
.91	.4443	1.077	.99	.2155	.5225
.92	.4155	1.007			
.93	.3879	.9404			

p_1 = .67 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.87	.6407	1.457	.95	.3650	.8298
.88	.5984	1.360	.96	.3355	.7628
.89	.5592	1.271	.97	.3052	.6940
.90	.5226	1.188	.98	.2725	.6196
.91	.4882	1.110	.99	.2331	.5301
.92	.4557	1.036			
.93	.4246	.9653			
.94	.3945	.8969			

p_1 = .68 (All $\bar{H}'$ values are negative)

p_2	$\bar{H}'$	S'	p_2	$\bar{H}'$	S'
.88	.6612	1.413	.96	.3645	.7794
.89	.6163	1.318	.97	.3309	.7076
.90	.5746	1.229	.98	.2948	.6305
.91	.5356	1.145	.99	.2516	.5380
.92	.4989	1.067			
.93	.4639	.9919			
.94	.4302	.9198			
.95	.3972	.8494			

TABLE I (Cont'd)

p_1 = .69 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.89	.6787	1.369	.93	.5060	1.021
.90	.6311	1.273	.94	.4683	.9443
.91	.5869	1.184	.95	.4315	.8703
.92	.5454	1.100	.96	.3952	.7969
			.97	.3580	.7220
			.98	.3183	.6419
			.99	.2709	.5463

p_1 = .70 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.90	.6925	1.321	.94	.5089	.9704
.91	.6423	1.225	.95	.4680	.8924
.92	.5954	1.135	.96	.4276	.8154
.93	.5511	1.051	.97	.3866	.7372
			.98	.3429	.6538
			.99	.2910	.5549

p_1 = .71 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.91	.7028	1.270	.95	.5070	.9161
.92	.6497	1.174	.96	.4622	.8352
.93	.5999	1.084	.97	.4169	.7533
.94	.5526	.9986	.98	.3688	.6665
			.99	.3119	.5640

p_1 = .72 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.92	.7087	1.216	.96	.4990	.8562
.93	.6526	1.120	.97	.4489	.7704
.94	.5995	1.029	.98	.3962	.6798
.95	.5487	.9415	.99	.3342	.5735

TABLE I (Cont'd)

p_1 = .73 (All $\overline{H}'$ values are negative)

p_2	$\overline{H}'$	S'	p_2	$\overline{H}'$	S'
.93	.7100	1.159	.97	.4832	.7886
.94	.6505	1.062	.98	.4252	.6940
.95	.5937	.9688	.99	.3576	.5836
.96	.5385	.8788			

p_1 = .74 (All $\overline{H}'$ values are negative)

.94	.7057	1.097	.98	.4561	.7090
.95	.6422	.9984	.99	.3822	.5941
.96	.5809	.9030			
.97	.5198	.8080			

p_1 = .75 (All $\overline{H}'$ values are negative)

.95	.6950	1.031
.96	.6267	.9291
.97	.5591	.8289
.98	.4890	.7250
.99	.4083	.6054

p_1 = .76 (All $\overline{H}'$ values are negative)

.96	.6762	.9574
.97	.6013	.8514
.98	.5241	.7421
.99	.4359	.6172

p_1 = .77 (All $\overline{H}'$ values are negative)

.97	.6469	.8756
.98	.5618	.7605
.99	.4653	.6299

p_1 = .78 (All $\overline{H}'$ values are negative)

.98	.6025	.7803
.99	.4968	.6434

p_1 = .79 (All $\overline{H}'$ values are negative)

.99	.5305	.6579

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