

QQ-B-60D

May 18, 1972

SUPERSEDING

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January 28, 1965

FEDERAL SPECIFICATION

BALL POINT PEN, SINGLE CARTRIDGE

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers single cartridge ball point pens and replaceable ink cartridges (refills).

1.2 Classification.

1.2.1 Ball point pen. Ball point pens covered by this specification shall be the following types, as specified (see 6.2):

Type I - Retractable type with replaceable ink cartridge (refill).

Type II - Non-retractable type with replaceable ink cartridge (refill).

1.2.1.1 Color of pen. Pens, other than metal pens, shall be of the following colors, as specified (see 6.2): BLACK, BLUE, green, or red.

1.2.2 Refill. Refills (ink cartridges) shall be of one type.

1.2.2.1 Color of ink. Refills (ink cartridges) shall be furnished with black, dark blue, green, or red ink, as specified (see 6.2).

1.2.2.2 Points. Each refill (ink cartridge) shall be furnished with medium point or fine point as specified (see 6.2).

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specifications:

- QQ-C-320 - Chromium Plating (Electrodeposited).
- QQ-N-290 - Nickel Plating (Electrodeposited).
- RR-C-271 - Chains and Attachments, Welded, Weldless, and Roller Chain.
- UU-P-21 - Pad, Writing Paper.
- UU-P-63 - Paper, Blotting.
- UU-P-121 - Paper, Bond and Writing, White and Colored.
- UU-P-465 - Paper, Book.
- UU-T-595 - Towel, Wiping, Paper: Industrial and Institutional.
- PPP-B-566 - Boxes, Folding, Paperboard.
- PPP-B-636 - Box, Fiberboard.
- PPP-B-665 - Boxes, Paperboard, Metal Stayed (Including Stay Material).
- PPP-B-676 - Boxes, Set-Up.

Federal Standard:

Fed. Std. No. 123 - Marking for Domestic Shipment (Civil Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FSC 7510 (Refills).
FSC 7520 (Ball Point Pen)

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(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:

MIL-P-116 - Preservation, Methods of.

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors with specific procurement functions, should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Motor Freight Traffic Association, Inc., Agent

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P Street, N.W., Washington, DC, 20036.)

Uniform Classification Committee, Agent

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106 South Riverside Plaza, Chicago, Illinois 60606.)

3. REQUIREMENTS

3.1 Bid samples. Six bid samples shall be submitted for the purpose of examination. The bid samples shall be representative of the ball point pens and refills the supplier proposes to furnish under contract (see 4.2).

3.2 Materials. Materials shall be as specified herein and shall be of a quality which will insure compliance with the performance requirements of this specification. All materials shall be compatible with each other under all conditions encountered in the use of the pens and ink cartridges.

3.2.1 Plastic. Plastic shall be of good quality and of suitable hardness and rigidity, and have low moisture absorption under wide humidity and temperature conditions. The plastic shall retain its design contours without warping, crazing, cracking, or discoloring in service or in storage and shall withstand the accelerated service test described in 4.5.1.1 without change in appearance or in dimensions that will effect serviceability. Plastic used in pen barrels shall be such that the barrels remain straight and rigid after having been subjected to the accelerated service test described in 4.5.1.1 and shall be nonflammable, flame resistant, or slow burning when tested as described in 4.5.15.

3.2.2 Metal.

3.2.2.1 Barrel components.

3.2.2.1.1 Pocket clip. The pocket clip shall be of spring steel capable of meeting the test specified in 4.5.18 and suitable for coating as required by 3.6.

3.2.2.1.2 Helical compression spring. The helical compression spring shall be of high quality spring steel adequate to meet the tests specified in 4.5.17.

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3.2.2.1.3 Other barrel components. All other metal components shall be of metal appropriate for the purpose intended and, except corrosion resistant steel, suitable for coating as required by 3.6.

3.2.2.2 Refill (ink cartridge) components.

3.2.2.2.1 Writing tip. The writing tip shall be of metal which is compatible with all other components and of such quality as to meet the performance requirements specified herein.

3.2.2.2.2 Ball. The chemical composition of the ball shall be tungsten carbide 94.0 ± 0.5 percent and cobalt 6.0 ± 0.5 percent. The successful bidder will be required to furnish, within the time specified by the contracting officer, a certificate from the ball manufacturer specifying the chemical composition of the ball.

3.2.2.2.3 Ink tube. The ink tube shall be brass of such quality as to comply with all requirements specified herein.

3.2.3 Ink. The ink shall be of such chemical composition as to be compatible with all components with which it comes in contact and shall comply with the requirements of 3.5 and the tests specified by 4.5.

3.3 Components.

3.3.1 Type I. Type I pens shall consist of barrel with pocket clip, ink cartridge retraction mechanism, spring, and replaceable ink cartridge.

3.3.2 Type II. Type II pens shall consist of barrel (may include spring) and replaceable ink cartridge. When specified, the pen shall be furnished with chain (see 6.2).

3.3.3 Refills. Replaceable refills (ink cartridges) shall consist of ink tube, ink, and writing tip assembly.

3.4 Design and construction.

3.4.1 Barrel. The barrel shall be designed and constructed to fit and function satisfactorily with the ink cartridge specified in 3.4.2 and figure 1. The barrel shall be made of plastic or metal, or a combination thereof, and shall be smoothly finished. The barrel may be round, hexagonal, or octagonal. The center line of the barrel shall be straight. The barrel shall be smoothly tapered, from the maximum diameter to the writing end, to form a comfortable finger grip. The barrel shall be so constructed so as to provide continuous equalization of air pressure between the non-writing end of installed refill and the outside of the barrel. The barrel shall consist of two sections. The sections shall be provided with matching external and internal threads; which, when joined, form a rigid barrel. Threads shall be of such size and pitch to produce smooth action in joining barrel sections and withstand ordinary conditions of use. Where strength of the joint is dependent upon the threaded parts only, the threaded portion of each section shall be a minimum of $3/8$ inch. Where the design of the sections includes a device, in addition to threaded parts for the purpose of maintaining rigidity and other performance functions, the manufacturer's standard length of threaded parts will be acceptable provided the barrel meets the requirements specified herein. When made of plastic, the writing end of the barrel shall be provided with a metal tip. The outer surface of the metal tip shall be flush with the plastic, shall be tapered, and shall extend beyond the plastic at least $1/4$ inch. The metal tip shall be securely and permanently attached to the plastic in such a manner to assure performance requirements specified herein.

3.4.1.1 Type I barrel. The type I barrel shall have an outside diameter of 0.375 ± 0.030 inch. This diameter shall be determined by measuring the point section at the largest diameter. Length of barrel, exclusive of refill operating mechanism, shall be not less than $4-5/8$ inches. Barrel shall be provided with permanently attached pocket clip and with durable operating mechanism for propelling and retracting the ink cartridge. Proper functioning of the ink cartridge operating mechanism shall not be dependent upon a plug or other device in the open end of the ink cartridge. When replacing the ink cartridge, no part of the propelling and retracting mechanism shall become disassembled by falling apart or dropping from the barrel. Propulsion of the ink cartridge shall be by plunger action and there shall be no failure when tested as specified in 4.5.17. The barrel shall be furnished with a spring having a maximum outside diameter of 0.181 inch for use on the ink cartridge between the crimp and the writing end. The spring shall be adequate for retraction on the ink cartridge and shall have a free length of not less than 1 inch. The ink cartridge writing tip, specified herein, shall project from the barrel at least 0.100 inch, when ink cartridge is propelled; when retracted the ball of the writing tip shall be at least 0.040 inch from the end of the barrel. When both sections of the barrel are made of plastic, the barrel shall be provided with a metal band not less than $1/8$ inch in width. The finished thickness of the band material shall be not less than 0.007 inch. The band shall be flush with both sections of the barrel. The protruding portion of the plunger of the ink cartridge retraction mechanism shall be metal or covered by a metal cap.

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3.4.1.2 Type II barrel. Type II barrel shall have an outside diameter of 0.325 ± 0.030 inch. This diameter shall be determined by measuring the point section at the largest diameter. Length of barrel shall be not less than $4\frac{5}{8}$ inches. At least 0.100 inch of the ink cartridge writing tip shall project from the barrel. When both sections of the barrel are made of plastic the barrel may be provided with a flush metal band not less than $\frac{1}{8}$ inch in width and of a finished material thickness not less than 0.007 inch. The joint of the barrel shall present a good appearance and shall reflect workmanship as required by 3.9

3.4.1.2.1 Chain. When specified, the type II pen shall be furnished with a weldless bead chain which shall be at least 24 inches in length and shall conform to RR-C-271, type II, class 5. The nominal diameter of the beads shall be $\frac{3}{32}$ inches. One end of the chain shall be secured in the non-writing end of the barrel by means of a detachable sleeve. This end of the chain and the detachable sleeve shall be concealed within the barrel. The free end of the chain shall be provided with a fastener having an eye with an inside diameter of at least $\frac{1}{8}$ inch.

3.4.2 Refill (ink cartridge). The refill shall consist of an ink tube, writing tip, and ink, and shall conform to the dimensions specified in figure 1 (all dimension cited in figure 1 are in inches). The design and construction of the refill shall be adequate to prevent retraction of the writing tip when pen is in use. The refill shall not leak during the performance of all tests required by this specification.

3.4.2.1 Ink tube. The ink tube shall be made of brass.

3.4.2.2 Writing tip. The writing tip shall be inserted in the ink tube in a manner which preclude any leakage. The strength of the writing tip shall be such that it will not break when tested as specified in 4.5.2. A ball as described in 3.4.2.2.1 shall be installed in the writing tip. The metal holding the ball shall be formed to produce a smooth even pressed edge when examined microscopically.

3.4.2.2.1 Ball. The diameter of the ball for the medium point shall be within the size range of 0.038 to 0.045 inch with a tolerance of ± 0.0005 inch on the specific size, and for the medium point shall be 0.03125 ± 0.00005 inch. The ball shall have a medium texture surface. The diameter tolerance per ball (the permissible difference between the largest diameter and the smallest diameter measurable on one ball) shall not exceed 0.00001 inch. The successful bidder shall be required to furnish, within the time specified by the contracting officer, a certificate from the ball manufacturer citing the diameter and the diameter tolerance of the ball to be used under requirements of this specification.

3.4.2.3 Ink. The refill shall contain sufficient ink to write a line not less than 5000 feet. (See 4.5.6.3)

3.5 Performance.

3.5.1 Ink tube and ink. The ink tube and ink shall withstand the accelerated service test described in 4.5.1.2 without change that will affect serviceability. After the accelerated service test the ink shall flow freely without leakage or change in color when the refill is subjected to the applicable tests specified herein. The ink shall not corrode the ball or writing tip, and shall contain no undissolved particles of dye or agglomerates of undispersed pigments, except particles necessary to provide reproducibility in black ink (see 4.5.7). The ink shall not be adversely affected by the ink cartridge, or vice versa (when required by the invitation to bid, a certificate to this effect shall be furnished with the bid from a qualified commercial laboratory acceptable to the Government).

3.5.2 Strength of refill (ink cartridge). There shall be no impairment of the refill, when tested as specified in 4.5.2.

3.5.3 Strength of barrel. There shall be no permanent set, breaking, or cracking of the barrel, when tested as specified in 4.5.3.

3.5.4 Smoothness and line continuity. When tested as described in 4.5.4 and 4.5.6, ink cartridges shall write smoothly and easily without excessive pressure, and shall produce writing having good quality, as required by 3.5.4.1 and 3.5.4.2.

3.5.4.1 Hand written. A hand written smoothness and line continuity test shall be conducted, as stated in 4.5.4 to assure good line continuity without splitting, excessive deposits of ink on the paper or writing tip, variations of lines width and intensity, agglomerates of undispersed pigment or other undesirable writing characteristics.

3.5.4.2 Machine written. A machine written smoothness and line continuity test shall be conducted, as stated in 4.5.6 to assure good line continuity without splitting, excessive deposits of ink on the paper or writing tip, variations of lines width and intensity, agglomerates of undispersed pigment or other undesirable writing characteristics.

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3.5.4.2 Machine written. A machine written smoothness and line continuity test shall be conducted as stated in 4.5.6. The combined density variation "units" and skips (see figures 2 and 3) shall not average more than 10 per 1000 feet of writing and shall not exceed 50 for any 1000 foot increment (a density variation "unit" is a length of line written in one machine revolution or less, in which the defect occurs). Blobs (see figure 4) shall not average more than 15 per 1000 feet of writing with a maximum of 25 for any 1000 foot increment. Dotting (see figure 5) shall not be present in more than 10 percent of the written line.

3.5.5 Starting characteristics. When tested as described in 4.5.5, ink cartridges shall start making a line within a distance of 0.5 inch. On subsequent lines, ink cartridges shall start making a line immediately.

3.5.6 Drying time. Writing shall dry within 5 seconds and shall not smear when tested as specified in 4.5.8.

3.5.7 Feathering. Writing shall not feather or spread (see 4.5.9).

3.5.8 Penetration. After 48 hours, writing shall not have penetrated to the reverse side of paper (see 4.5.9).

3.5.9 Non-transferability. Writing shall not legibly transfer when tested as specified in 4.5.10.

3.5.10 Resistance to water. Writing shall not be completely removed after it has been tested as described in 4.5.11.

3.5.11 Resistance to chemical bleach. Writing shall not be completely removed after two applications of chemical bleach when tested as described in 4.5.12.

3.5.12 Resistance to light. Writing made with black, dark blue, and green ink shall retain its color identity and show no more than slight change in intensity when tested as described in 4.5.13. Writing made with red ink shall show no more than slight fading when tested as described in 4.5.13.

3.5.13 Reproduction capability. All colors shall be capable of reproduction by microfilming, and black ink shall be capable of reproduction by thermography, dry copying, and direct-image offset processes. The writing shall be distinct and legibly when examined as specified in 4.5.14.1.

3.5.13.1 Direct-image offset process. Images made on direct-image paper plates, shall reproduce 1000 legible copies by the offset duplicating process. The images shall reproduce clean, sharp impressions free from tone, scum, or filling after a maximum of five duplicating revolutions of the offset machine. There shall not be unsatisfactory copy as a result of spreading or diffusion of the images. (See 4.5.14.2).

3.5.14 Writing capacity. The ink cartridge shall be capable of producing under 125 grams pressure, a line which conforms to the requirements specified herein and which is not less than 5000 feet long (see 4.5.6.3).

3.5.15 Tension of pocket clip. The pocket clip shall have sufficient tension to support the weight of the pen when tested as described in 4.5.18.

3.5.16 Writing on grease capability. The ink cartridge shall be capable of legibly writing through grease areas (see 4.5.19).

3.6 Finish. All external components of metal, other than corrosion resistant steel, shall be coated with a bright, decorative chromium finish conforming to QQ-C-320, class 1, type I, or bright decorative nickel finish conforming to QQ-N-290, class 1, type as appropriate, and shall show no corrosion when tested as described in 4.5.16.

3.7 Identification marking. The manufacturer's name or trademark shall be shown on each pen. The barrel shall be legibly and permanently stamped or marked with "U.S. Government" in letters of durable, contrasting color of 1/16 inch minimum and 1/8 inch maximum height.

3.8 Shelf life. Under normal storage conditions the pens and refills (ink cartridges), shall retain their serviceability as defined by this specification for not less than 12 months from the time of shipment. Suppliers shall make replacement of all pens and refills failing to meet these requirements at no cost to the Government.

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3.9 Workmanship. The pens and refills (ink cartridges) shall be free from defects or imperfections which may adversely affect appearance, impair serviceability, or constitute a hazard to the users.

4. QUALITY ASSURANCE

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Bid samples. Bid samples submitted in accordance with 3.1 shall be examined for the following:

Balance.	General "feel".
Facility of use.	Exterior appearance.
Workmanship.	

4.3 Sampling

4.3.1 Size of lot. All pens and refills (ink cartridge) of the same type, color of pen, color of ink, and point size, or refills only, of the same color of ink, and point size, presented for inspection at one time shall be considered a lot for purpose of examination and test.

4.3.2 Sampling and inspection for acceptance. Sampling and inspection for acceptance shall be performed in accordance with MIL-STD-105, except where otherwise specified.

4.3.3 Sampling for visual and dimensional inspection. Random sample boxes of pens or refill (ink cartridge) shall be taken from each lot in accordance with MIL-STD-105. A sample unit shall be one box of pens, or refills, except that three (3) pens or refills, taken at random from each box, shall be examined for defects listed in table I. The Inspection Levels and the Acceptable Quality Levels (AQL's) shall be as follows:

	Inspection Level	AQL	
		Major	Minor
Visual:	S-4	2.5	---
Dimensional:	S-3	---	6.5

4.3.4 Sampling for preparation for delivery requirements. An inspection shall be made to determine that the packaging, packing, and marking comply with the requirements in section 5 of this specification. Defects shall be scored in accordance with table II. For examination of interior packaging the sample unit shall be one shipping container fully prepared for delivery and selected at random. Sampling shall be in accordance with MIL-STD-105. Defects of closure listed shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot. The Inspection Level shall be S-2 with an AQL of 4.0 defects per hundred units.

4.3.5 Sampling for tests. Random sample boxes of pens or refills (ink cartridges) shall be taken from each lot in accordance with MIL-STD-105. A sample unit shall be one box of pens or refills and shall be tested as specified in 4.5. The Inspection Levels and the AQL's shall be as follows:

	Inspection Level	AQL	
		Major	Minor
Resistance to light (see 4.5.13)	S-1	2.5	---
Barrel strength (see 4.5.3)	S-1	4.0	---
Remaining tests	S-1	6.5	---

4.4 Examination

4.4.1 Visual and dimensional examination. Samples taken in accordance with 4.3.3 shall be examined for defects listed in table I. Any pen or refill (ink cartridge) having one or more defects shall be rejected. If the number of defective units in the sample exceeds the acceptance number for that sample, the entire lot represented by the sample shall be rejected.

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TABLE I. Classification of defects

Examine	Defects	Defects	
		Major	Minor
Material	Not as specified (see 3.2)	X	
Components	Not as specified or missing (see 3.3)	X	
Design and construction:			
Type I Barrel	Not as specified (see 3.4.1 and 3.4.1.1)	X	
Type II Barrel	Not as specified (see 3.4.1 and 3.4.1.2)	X	
Chain (type II only, when specified)	Not as specified (see 3.4.1.2.1)	X	
Refill (ink cartridge)	Not as specified (see 3.4.2, 3.4.2.1, 3.4.2.2, and 3.4.2.2.1)	X	
Dimensions:			
Threaded section	Less than 3/8-inch long, when strength of joint is dependent on threaded part only (see 3.4.1)		X
Metal band	Less than 1/8-inch, when required (see 3.4.1.1 and 3.4.1.2)		X
Metal tip	Does not extend 1/4-inch beyond plastic (see 3.4.1)		X
Diameter of barrel	Not as specified (see 3.4.1.1 and 3.4.1.2)		X
Length of barrel	Not as specified (see 3.4.1.1 and 3.4.1.2)		X
Refill writing tip (type I only)	When propelled, projects less than 0.100 inch (see 3.4.1.1)		X
Refill writing tip (type II only)	Projects less than 0.100 inch (see 3.4.1.2)		X
Refill writing tip (type I only)	Retracts less than 0.040 inch from end of barrel		X
Chain, when required (type II only)	Less than 24 inches long (see 3.4.1.2.1)		X
Chain beads	Nominal diameter not 3/32-inch (see 3.4.1.2.1)		X
Chain eye fastener	Inside diameter less than 1/8-inch (see 3.4.1.2.1)		X

4.4.2 Inspection of preparation for delivery. Samples selected in accordance with 4.3.4 shall be examined for defects listed in table II, to determine that packaging, packing, and marking requirements conform to the requirements of section 5. Any sample having one or more defects shall be rejected. If the number of defective units in the sample exceeds the acceptance number for that sample, the entire lot represented by the sample shall be rejected.

TABLE II. Classification of preparation for delivery defects

Examine	Defects
Markings (exterior and interior)	Omitted; incorrect; illegible; improper size, location sequence, or method of application.
Material	Any component missing or damaged.
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose strapping, inadequate stapling, or distortion of container.
Contents (exterior container)	Number per container is more or less than required; Net weight exceeds requirements.

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4.5 Tests. Samples selected in accordance with 4.3.5 shall be subjected to the following tests. Any pen or refill (ink cartridge) in the sample failing one or more tests shall be considered defective. If the number of defective units in the sample exceeds the acceptance number for the sample, the entire lot shall be rejected. Unless otherwise specified herein, tests shall be conducted in an atmospheric condition of 50 ± 10 percent relative humidity and at a temperature of $70^\circ \pm 10^\circ\text{F}$. Tests involving handwriting and drawing lines shall be conducted with the pens held at an angle approximately 50 degrees from the horizontal. Paper used for test purposes shall conform to the requirements of UU-P-121, type III, 17 x 22 - 1000 sheets, 32 pound weight, unless otherwise specified. When refills (ink cartridges) only are submitted for test, a barrel conforming to the requirements specified herein shall be used. The series of tests described in 4.5.1, 4.5.2, 4.5.4, and 4.5.5 shall be conducted on each ink cartridge tested in the sequence indicated and prior to the remaining tests, except 4.5.3. Sample pens for 4.5.3 shall not be subjected to any other test. The procedure for washing refills shall be as follows:

Materials: Methanal, tetrachloroethylene and paper towels are required for this test. The paper towels shall conform to UU-T-595.

Procedure: Place refills in 50 milliliter beaker containing 20 milliliters of methanal for blue, green and red inks; and 10 parts of methanal to one part tetrachloroethylene for black ink. After a minimum of 30 seconds, individually remove, wipe clean, and dry each refill. Accomplish the wiping and drying by wrapping a tripple thickness of paper towel around the refill writing tip. Rotate the refill while withdrawing it from the towel so that no lint is left on writing tip. Place each refill in a suitable container to protect its writing tip from foreign material and damage.

4.5.1 Accelerated service test.

4.5.1.1 Barrel. The barrels (containing a substitute refill conforming to figure 1) shall be subjected successively to each of the following conditions and examined for compliance with 3.2.1:

24 hours at $160^\circ \pm 2^\circ\text{F}$. in a chamber with the specimen placed horizontally on an insulated shelf at 70-75 percent relative humidity.

24 hours in a chamber at $-40^\circ \pm 4^\circ\text{F}$., starting within 30 minutes after the first step of the exposure cycle has been completed.

24 hours at $160^\circ \pm 2^\circ\text{F}$. in a chamber starting within 2 hours after the second step of the exposure cycle has been completed.

4.5.1.2 Refill (ink cartridge). The refills shall be suspended point down and subjected successively to each of the following conditions (see 3.5.1):

Exposure	Time	Temperature F. $\pm 2^\circ$	Relative Humidity
First	168 hours	140	85-90%
Second	48 hours	28	-----

4.5.2 Refill (ink cartridge) strength test. A sheet of paper shall be placed on a platform scale. A sample pen, with the refill propelled, shall be held between 1-1/4" and 1-1/2" from the writing end and at an angle of 50 degrees from the horizontal without the hand touching the paper. A force of 18 pounds shall be applied gradually and uniformly within a period of approximately 5 seconds and immediately released. The refill shall be examined for compliance with 3.4.2.2 and 3.5.2.

4.5.3 Barrel strength test. A sheet of paper shall be placed on a platform scale. A sample pen with the refill propelled shall be held between 1-1/4" and 1-1/2" from the writing end and at an angle of 50° from the horizontal. A force of 18 pounds shall be applied gradually and uniformly within a period of approximately 5 seconds and immediately released. The barrel shall be examined for compliance with paragraph 3.5.3.

4.5.4 Smoothness and line continuity test. After the protective coating, if any, has been removed from ball, and the refills washed as described in 4.5, the ink cartridge shall be tested by writing numerous fast turns, flourishes, reversals, ovals, and figure 8's on coated book paper conforming to the requirements of UU-P-465 for type III, 25 x 38 - 1000 sheets, 120 pounds, and repeated on paper conforming to UU-P-21. The writing shall then be examined for compliance with 3.5.4.1.

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4.5.5 Starting characteristics test. Rule a vertical line on a sheet of paper 8 by 10-1/2 inches in size, about one inch from left edge. One hour after completion of test described in 4.5.4 with the ball on the ruled line, move pen across paper to the right under approximately 125 grams writing pressure. Draw three such lines. The lines shall be examined for compliance with 3.5.5.

4.5.6 Machine writing test.

4.5.6.1 Test machine. The machine tests shall be conducted on a Model W10, Hartley Pen Company or Model W-10, Anja Engineering Corporation writing machine or equal, at a speed setting of 22 feet per minute.

4.5.6.2 Test paper. The paper used in the test machine shall be 17 x 22 - 1,000 sheets, 32 pound weight, white, bond paper conforming to UU-P-121, type III, except as follows:

1. The paper shall have a maximum smoothness of 30 seconds on the felt side.
2. Water mark is not required.
3. Paper need not compare with standard sample (JCP-G40) as to color.
4. Acidity pH value shall be not less than 4.5.

4.5.6.3 Machine writing. The samples shall be tested for a total line of 5,000 feet at a writing pressure of 125 grams. At the end of 4,000 + 100 feet machine writing, wash refill as described in 4.5. The writing shall comply with the requirements of 3.5.4.2 and 3.5.14.

4.5.7 Homogeneity test. The presence of undissolved particles of dye and undispersed pigments shall be determined by microscopic examination under not less than 300 power magnification (particles necessary to provide reproducibility will be permitted in black inks). This examination shall assure compliance with 3.5.1.

4.5.8 Drying time test. Place a sheet of paper on a smooth, flat surface and partially cover with a second sheet of paper. Place a 100-gram round 3/4-inch diameter weight with plane bottom surface on top of the second sheet. Write a five-letter word on the exposed portion of the bottom sheet. After 5 seconds draw the top sheet and the weight slowly across the writing on the bottom sheet. Examine writing for ink absorption and smearing. The examination shall assure compliance with 3.5.6.

4.5.9 Writing test. Write the equivalent of six five-letter words on a sheet of paper. After 48 hours examine for feathering, spreading and penetration to the reverse side of the paper. The examination shall assure compliance with 3.5.7 and 3.5.8.

4.5.10 Non-transference test. Write several words on one half of a sheet of paper. Approximately five seconds after completing writing, immerse the half of the paper containing the writing in distilled water for approximately 5 seconds, remove and fold in such a manner that the writing shall be in contact with the dry half of the paper. Rub gently several times over the writing, then unfold the paper and examine for any legibly transfer of writing. The examination shall assure compliance with 3.5.9.

4.5.11 Resistance to water test. Write the equivalent of six five-letter words on a sheet of paper. Immerse the paper in distilled water at room temperature for 48 hours. Remove, allow paper to dry and examine for resistance to water. The examination shall assure that the writing is not completely removed in compliance with 3.5.10.

4.5.12 Resistance to chemical bleach test. Write two five-letter words on a sheet of paper. Use a one solution type of ink eradicant meeting the following requirements: pH of between 9.5 and 11.0 as determined electrometrically using a glass electrode; odor of chlorine shall be plainly evident. Apply the solution with a glass rod to the written words, rubbing the writing gently. Blot after five seconds. If the writing is not completely removed, repeat the above test and examine the writing. The examination shall assure compliance with 3.5.11.

4.5.13 Resistance to light test. Draw 20 parallel lines approximately 6 inches long and 1/4-inch apart across the narrow dimension of the paper. The lines shall be continuous and of uniform intensity. Specimens of the writing, so prepared, shall be exposed to the radiation from a glass-enclosed carbon-arc lamp, such as the Fade-O-meter, Type FDA-R, or its equivalent, for 24 hours. Examination shall assure compliance with 3.5.12.

4.5.14 Reproduction capability test.

4.5.14.1 All colors (see 1.2.2.1). Write a minimum of 20 words on a sheet of white paper. Reproduce the writing on microfilm. View the microfilm under the customary magnification. Examine for compliance with 3.5.13.

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4.5.14.2 Black only. Write a minimum of 20 words in black ink on white paper. Reproduce by thermography and dry copying processes. Examine for compliance with 3.5.13. Write the equivalent of six five-letter words and draw lines equivalent to 24 inches in length under approximately 125 grams writing pressure on a direct image paper plate. Allow the ink to dry for a period of at least one hour. Prepare the plate in accordance with the plate manufacturer's instructions and reproduce 1,000 copies on an offset duplicating machine. Examine copies for compliance with 3.5.13.1.

4.5.15 Flammability test. A draft shield shall be used to reduce air current effects. Hold the specimen horizontally within the shield above a Bunsen burner having a 1-inch to 1-1/4-inch blue flame just touching the end of the barrel until the specimen ignites, or for a period of not over 30 seconds. Remove from the flame. If the specimen burns when a contact with the flame but will not continue to burn when removed from the flame, it is flame resistant. If the specimen continues to burn at a rate of less than 2.5 inches per minutes, it is slow-burning. If the specimen bursts into flame immediately, it shall be considered as not meeting the requirements of this specification. This examination shall assure compliance with 3.2.1.

4.5.16 Corrosion resistance test. Metal parts shall be placed in a boiling 10 percent (by weight) aqueous solution of sodium chloride for a period of fifteen minutes. Metal parts upon being removed from this solution shall be immediately immersed for at least one hour in 10 percent (by weight) aqueous solution of sodium chloride at room temperature. They shall then be removed from this solution and, without having the adhering liquid wiped off, allowed to dry for 24 hours at room temperature and then examined for presence of corrosion. This test shall assure of compliance with 3.6.

4.5.17 Retraction mechanism test. Refill shall be propelled and retracted 25 times successively. Examination shall assure compliance with 3.4.1.1.

4.5.18 Pocket clip test. Slide clip over stiff material 0.125 inch in thickness. Repeat for a total of 25 operations. Then slide clip over stiff material 0.016 inch in thickness and invert. Pen shall remain clipped to the material as required by 3.5.15.

4.5.19 Write on grease test. Apply a light 2 inch wide stripe of paraffin oil NF, viscosity 125/135 on an 8" x 10-1/2" sheet of paper conforming to UU-P-121, Type III. Place the oil stripe over a piece of blotting paper 3" x 10-1/2" conforming to UU-P-63, Grade A, supported by a smooth block of wood approximately 3" x 10-1/2", nominal 3/4" thick and place a 5 pound weight on the center of the top block of wood. Allow the treated paper to remain between the weighted blotting paper for not less than 15 minutes. Then remove treated paper and repeat the blotting process with unused blotting paper for not less than 15 additional minutes. Remove treated paper, place on a pad of untreated paper containing not less than 50 sheets and perform the following writing test: A refill cartridge shall be installed in a pen barrel and tested for writing through the oil-treated stripe on the treated paper writing from left to right through the 2 inch dimension of the oil stripe. Write the equivalent of six five-letter words through the oil stripe six times. The writing from beginning to end of each lines shall show the ink to be legibly four out of six of the lines written through the oil stripe. This test shall assure compliance with 3.5.16.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A, B, or C as specified (see 6.2).

5.1.1 Level A. Twelve ball point pens of one type, color and point size or twelve individually wrapped or individually enveloped refills of one color and point size shall be packaged in a close fitting box conforming to PPP-B-566, style II, type D, class 2; PPP-B-665 or PPP-B-676. Alternatively, twelve refills may be packaged in a metal or plastic dispenser. The dispenser shall be designed to permit easy removal of one refill at a time and the remaining refills securely held in the dispenser by means of tension springs or other mechanical means. The dispensers shall provide adequate protection to the refills to insure against damage to the ball points and body of the refills. Each box and dispenser shall be waterproofed in accordance with MIL-P-116, Method I C-2.

5.1.2 Level B.

5.1.2.1 Unit package. Twelve ball point pens of one type, color and point size or twelve individually wrapped or individually enveloped refills of one color and point size shall be packaged in a close fitting box conforming to PPP-B-566, PPP-B-665, or PPP-B-676. The box shall be closed in accordance with the box specification. Alternatively twelve refills may be packaged in a metal or plastic dispenser. The dispenser shall be designed to permit easy removal of one refill at a time and the remaining refills securely held in the dispenser by means of tension springs or other mechanical means. The dispenser shall provide adequate protection to the refills to insure against damage to the ball points and body of the refills.

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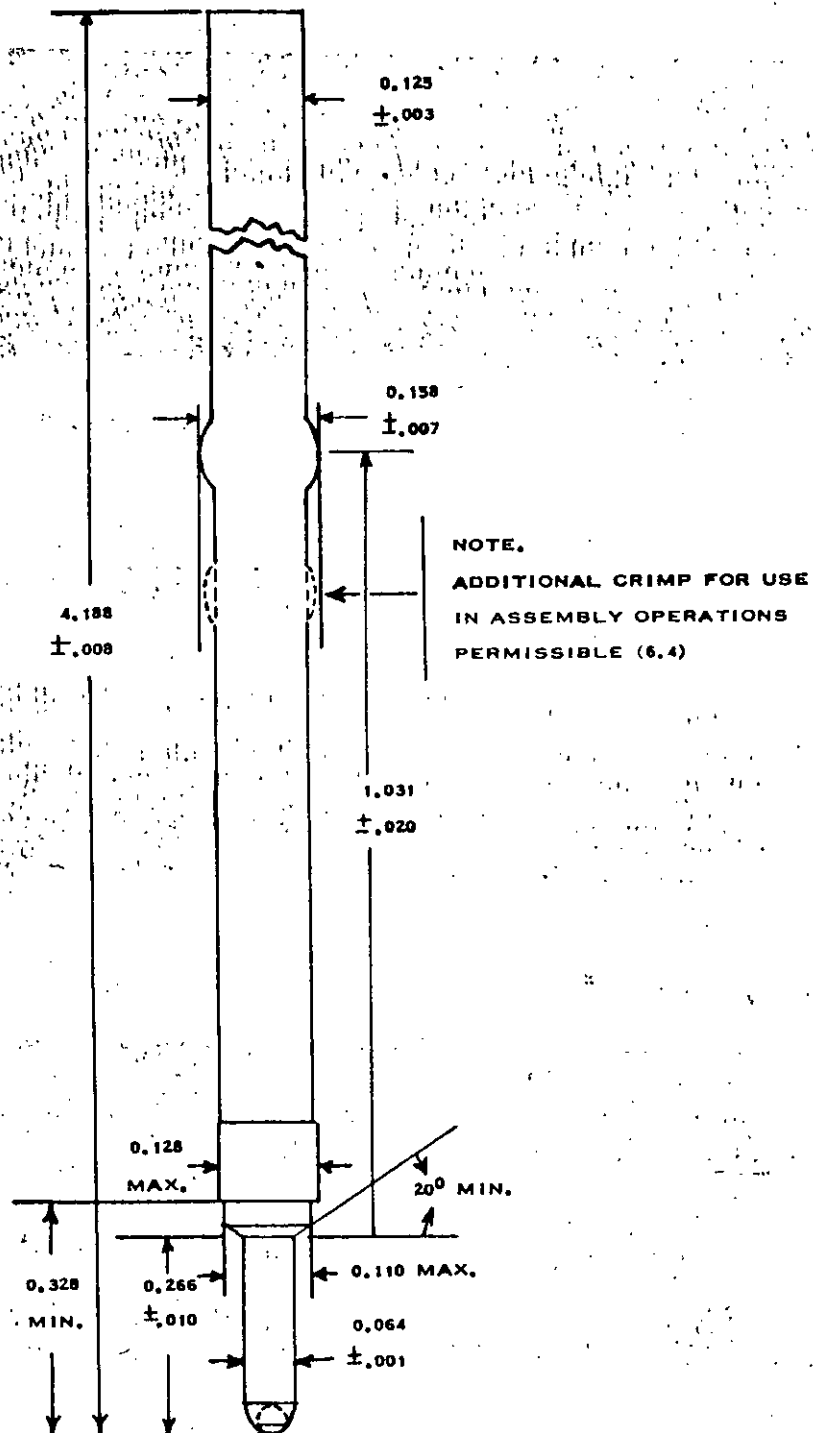


FIGURE 1. REFILL

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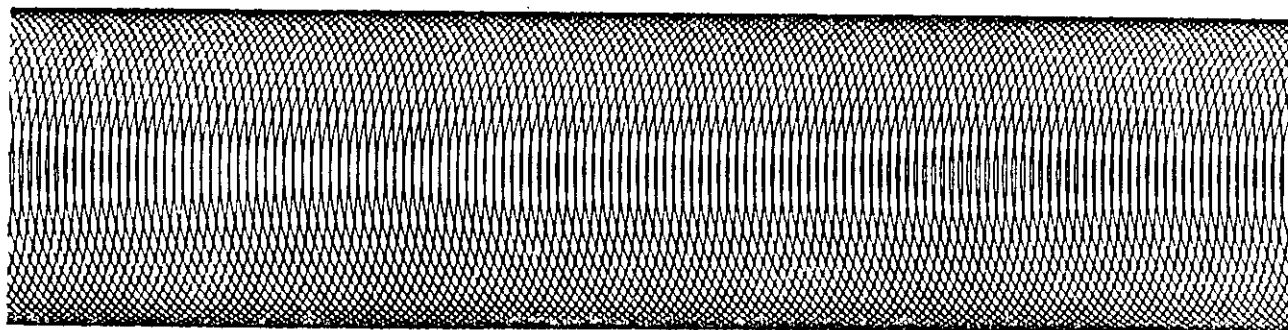
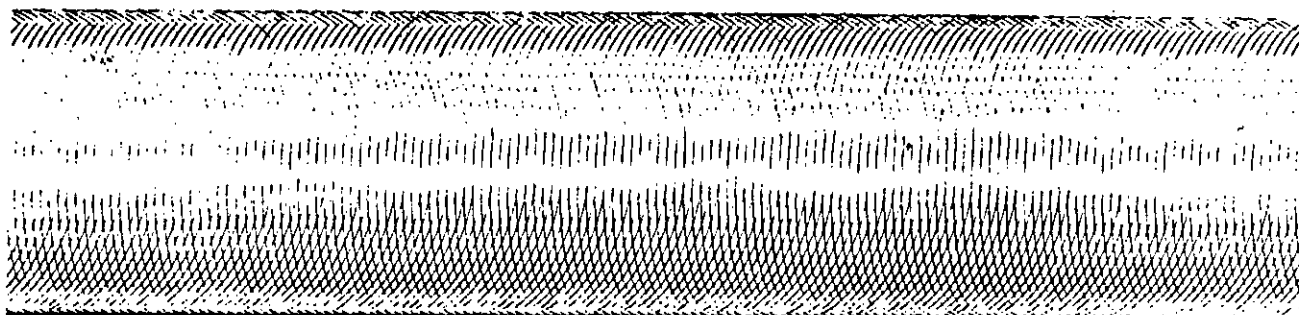
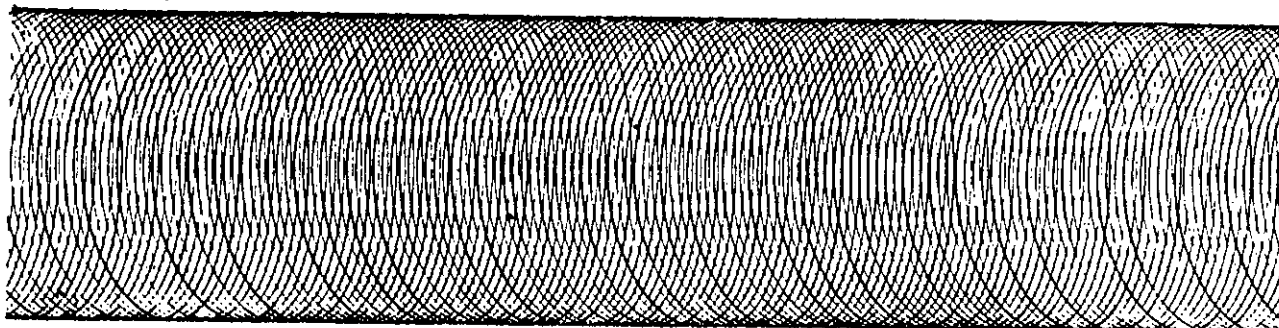


Figure 2 - Density Variations
(bottom example is normal pattern and density.)

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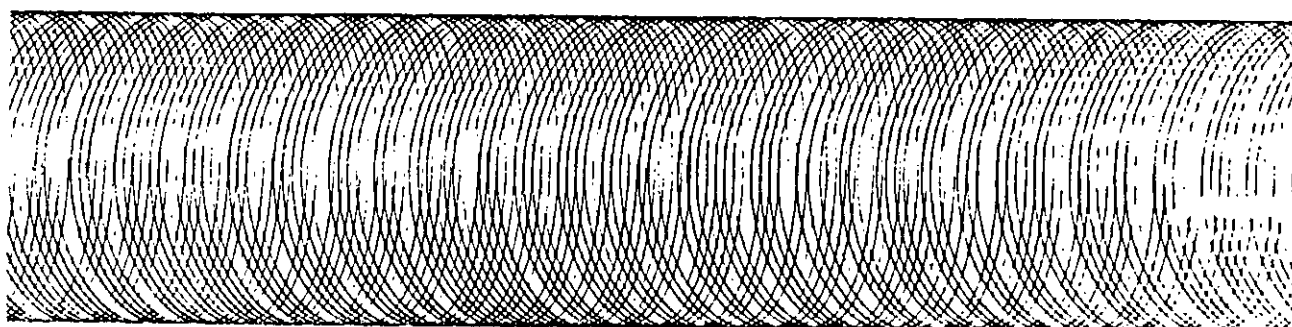
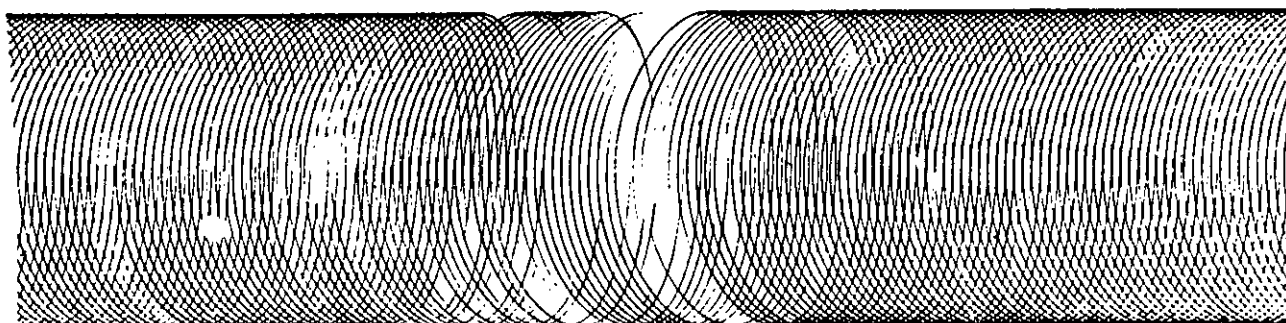
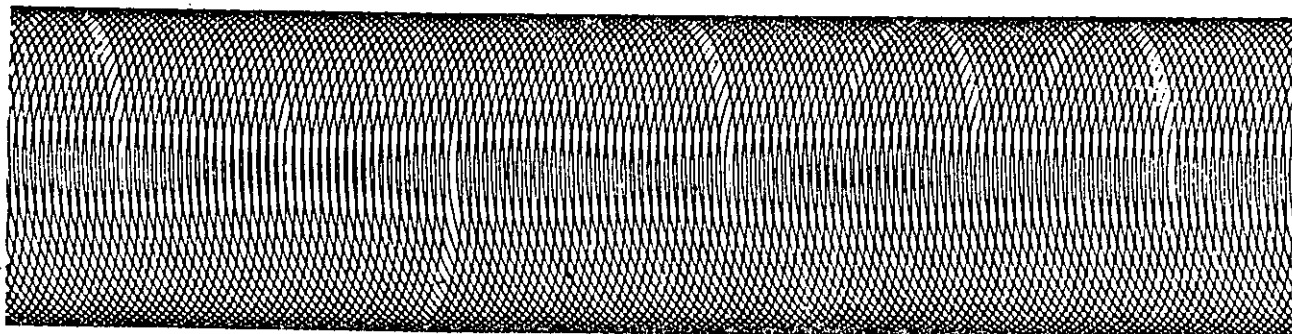


Figure 3 - Skips
advisory - d p m

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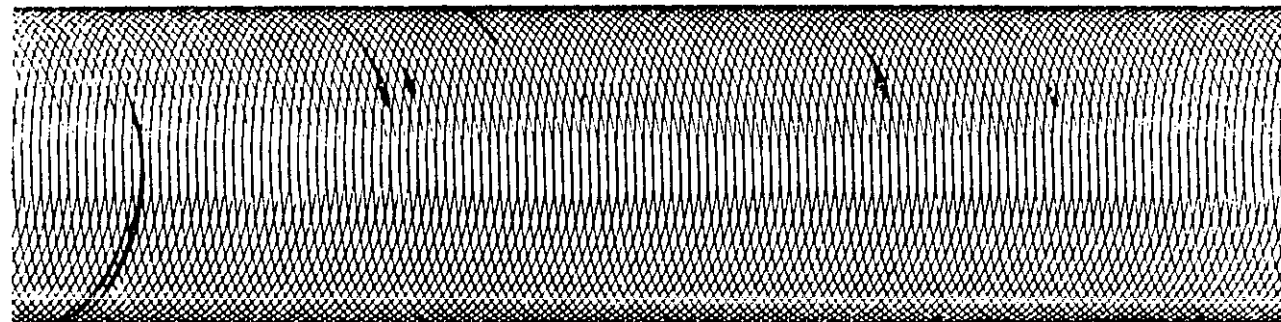
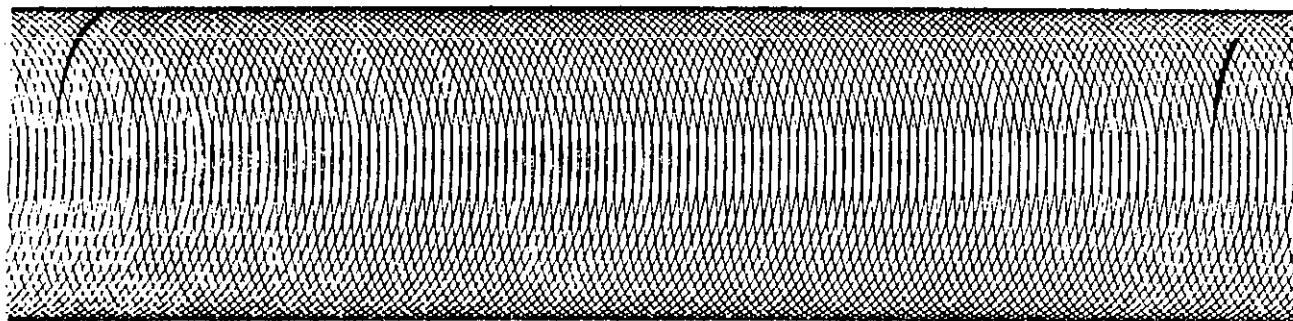
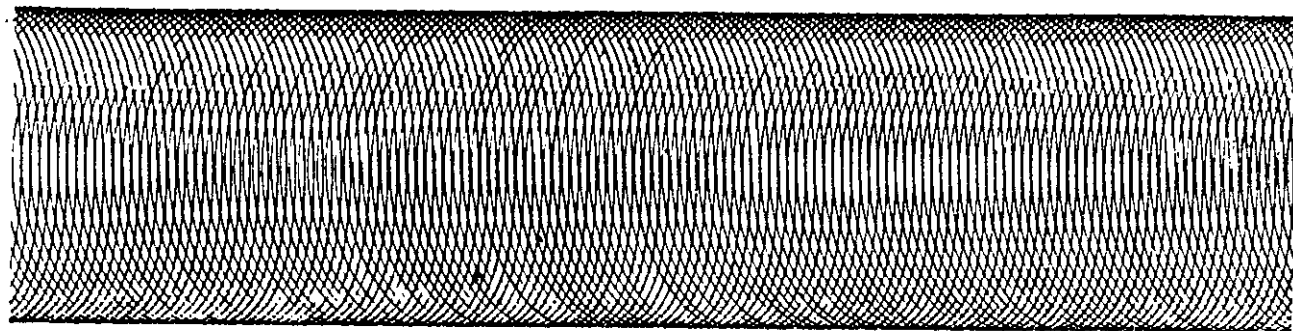


Figure 4 - Blobs

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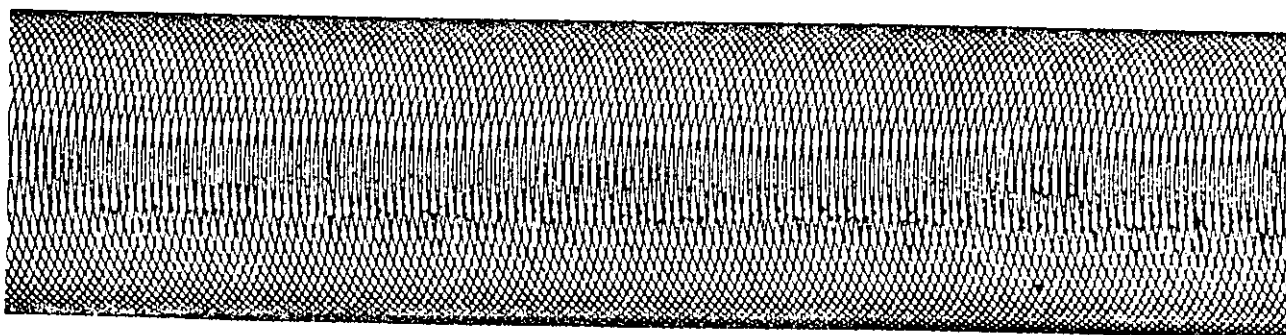
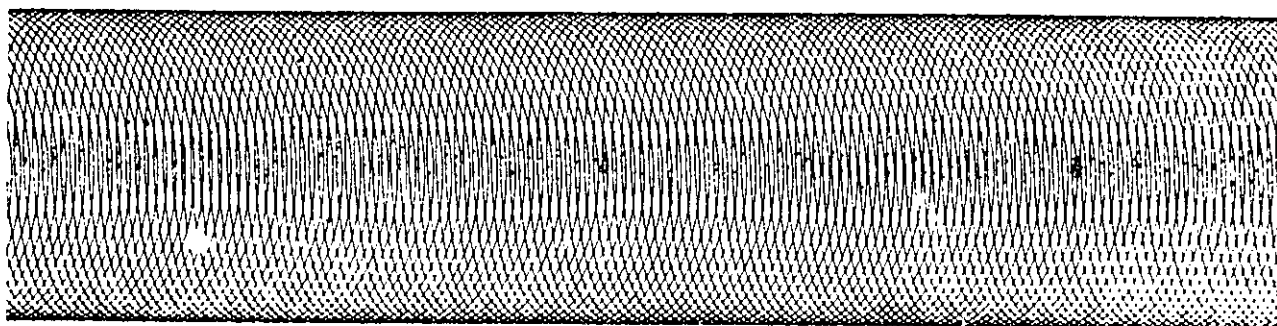
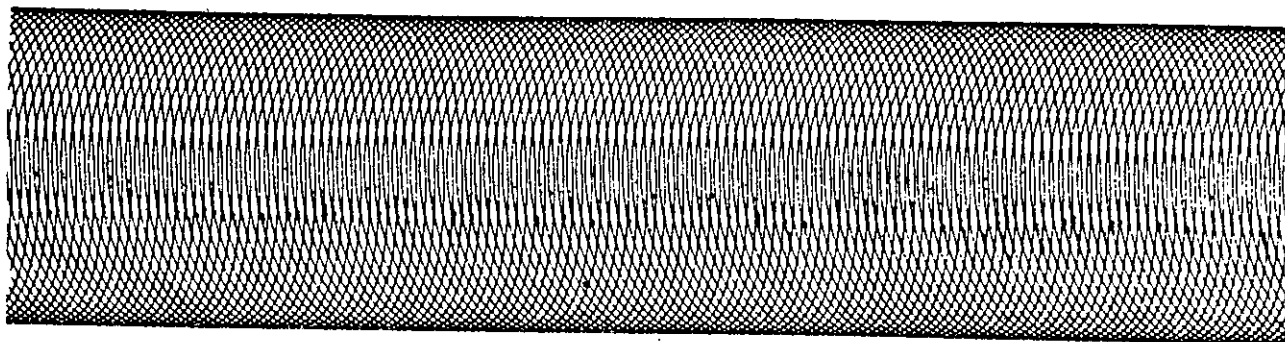


Figure 5 - Dotting

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5.1.2.2 Intermediate package. One hundred and forty four (144) pens or refills, packaged as specified in 5.1.2.1, shall be intermediate packaged in a close fitting box conforming to PPP-B-636, class domestic. The box shall be closed in accordance with the appendix to the box specification. When specified (see 6.2) the box shall conform to PPP-B-636, class weather-resistant, minimum grade W6c. The box shall be closed and sealed in accordance with the appendix to the box specification.

5.1.3 Level C. The ball point pens or refills shall be packaged in accordance with the manufacturer's standard practice, provided that this insures protection for the pens or refills during shipment and provides for safe delivery to their destination.

5.2 Packing. Packing shall be level A, B, or C as specified (see 6.2).

5.2.1 Level A. Ball point pens or refills, packaged as specified in 5.1 shall be packed in close fitting boxes conforming to PPP-B-636, class weather-resistant, grade V3c. Each box shall be closed, sealed and reinforced in accordance with the appendix to the box specification.

5.2.2 Level B. One thousand, seven hundred and twenty eight (1,728) ball point pens or refills, packaged as specified in 5.1.2, shall be packed in a close fitting box conforming to PPP-B-636, class domestic. The box shall be closed in accordance with the appendix to the box specification.

5.2.3 Level C. The ball point pens or refills, packaged as specified in 5.1.3, shall be packed in containers that will assure carrier acceptance and safe arrival at destination in compliance with the Uniform Freight Classification rules and the National Motor Freight Classification rules.

5.3 Marking.

5.3.1 Civil agencies. In addition to any special markings required by the contract or order, all interior packages and shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military agencies. In addition to any special markings required by the contract or order, all interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The ball point pens and refills (ink cartridges) covered by this specification are intended for use in freehand writing.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents.

- a. Title, number, and date of this specification.
- b. Type, point size, color of pen, when applicable, and color of ink (see 1.2.1, 1.2.1.1, 1.2.2.1 and 1.2.2.2).
- c. Whether chain is required for type II pen (see 3.3.2).
- d. Levels of packaging and packing and any special marking required (see 5.1, 5.2, and 5.3).

6.3 A second crimp or bulge (see Figure 1) for use in automatic assembly operations is permissible in the refill, providing it has no adverse effect on functions or performance of pen or refill.

DOD HAS WAIVED COORDINATION INTEREST

Preparing activity:

GSA-FSS

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 15 cents each.