DETAIL QUALITY CONTROL MANUAL

FOR

M-16 AND XM16E1 RIFLE

SUBJECT

REVISIONS AND ADDITIONS
DETAIL QUALITY CONTROL MANUAL
M-16 & XM16E1 RIFLE

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1.1.1 The following procedure will be used by Inspection to report the inspection results for incoming production materials.

1.1.2 Received materials shall be count checked by the Receiving Department and noted on receiving report (Copy of purchase order). A copy of the receiving report shall accompany the material to the Receiving Inspection Department.

1.1.3 The Receiving Inspection Department shall inspect the parts in accordance with inspection instructions, drawings and purchase orders and record inspection results on Form C-1161. Sampling will be in accordance with MIL-STD-105D, Level II, unless otherwise specified.

1.1.4 Disposition:

1.1.4.1 Accepted material shall be recorded on the receiving inspection report and approval stamped. Unfinished parts will be forwarded to production accompanied by inventory copy (green) of Form 220-227. Finished parts will be sent to Parts Stores accompanied by Acceptance Tag Form C-1168.

1.1.4.2 Distribution of the receiving inspection reports will be noted on the form.

1.1.4.3 Defectives from an accepted lot shall be withheld and forwarded to a hold area identified by the Rejection Tag (C-1166).

1.1.4.4 Rejected lots shall be forwarded to the hold area identified by the Rejection Tag (C1166).

1.1.4.5 The receiving inspection report for defectives or for rejected lots shall not be completed until disposition is made by the Material Review Committee.

1.1.5 Government Property:

When material is furnished by the Government, the receiving inspection procedures shall consist of:

a. Examination upon receipt, consistent with practicability to detect damage in transit.

b. Inspection for completeness and proper type.

c. Record results of inspection on Form C-1161.

1.1.6 Miscellaneous Materials:

Miscellaneous materials purchased to Mil Specs shall be visually inspected for identity and completeness and to detect damage in transit.

A certificate of compliance with the applicable specifications or contract requirements shall be furnished by the vendor and kept on file by Receiving Inspection.

1.2.1 Receiving shall forward a copy of the receiving report to Receiving Inspection with certifications upon receipt of material.

1.2.2 Material Stores shall attach a white "Raw Material Inspection" two part tag Form C-1169, to each bundle, bin or pallet of raw material stock.

1.2.3 Receiving Inspection shall select a random sample of pieces in accordance with Quality Instructions and shall verify that raw material inspection tag has been attached to each bundle, bin or pallet. The samples shall be delivered to the Metallurgical Control Laboratory for tests accompanied by steel sample Form C-1094.

1.2.4 The Receiving Inspector shall take an additional random sample of raw material requiring dimensional checks in accordance with Quality Control Instructions.

1.2.5 The Receiving Inspector shall inspect the sample(s) in accordance with Inspection Instruction sheets, drawings and/or specifications and, on receipt of Metallurgical Control test results, shall issue an inspection report, Form 220-227 complete with all pertinent information. The Laboratory report made on 220-227 shall be filed with the inspection report.

1.2.6 Upon acceptance of raw material, the Receiving Inspector shall stamp the upper portion of the raw material inspection tag and remove the lower portion, thus verifying acceptance of material.

1.2.7 Rejected material shall be identified by reject tag Form C-1166 and diverted from production flow for disposition.

1.2.8 The Receiving Inspection Report of defective or rejected material shall not be completed until disposition is made by the Material Review Committee.

1.3.1 Prior to placement of a purchase order, Quality Assurance Engineering shall review the purchase orders to insure that all requirements are specified. A survey of the vendor or subcontractor shall then be performed by one of two methods: 1. Plant Survey or 1. Past quality history. The vendor or subcontractor shall be furnished prints, specifications and inspection instruction sheets. Gage drawings shall be supplied if requested by the vendor through Purchasing.

1.3.2 When a subcontractor or vendor is approved, the survey findings shall be recorded on Form C-1176.

1.3.3 On all new purchase orders, a pre-production sample shall be submitted by the vendor or subcontractor for approval by Quality Assurance Engineering prior to or concurrent with the first shipment on the order.

a. If the pre-production samples are acceptable, 1/2 the sample shall be returned to vendor, and one-half of the sample shall be retained by Colt's Receiving Inspection as standards.

b. If the pre-production samples are not acceptable, the samples shall be returned to the vendor listing the cause for rejection.

1.3.4 The quality history of each vendor shall be reviewed monthly by Quality Assurance Engineering using the data from Receiving Inspection Report (Form C-1161).

a. When the quality history indicates that a vendor's performance is substandard, corrective action shall be taken. This will be accomplished by initiating a Vendor's Corrective Action Report (Form C-1142) or by a plant visitation.

b. If the vendor's quality fails to satisfactorily improve, the Purchasing Department shall be notified to remove the vendor from the approved vendor list.

1.3.5 Direct contact with a representative of the vendors shall be made at least once every six months by Quality Assurance Engineering either at the vendor's or contractor's plant.

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FIRST PIECE & IN-PROCESS INSPECTION	7-12-66		2.1
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2.1.1 First Piece Approval of Operation:

2.1.1.1 The inspector shall verify, prior to First Piece Inspection, that all gages assigned to each operation are available and in accordance with the latest revision of the Standard Operation Instruction Sheet (Form #732). The inspector shall check the weekly Metrology memo on gages due for re-calibration, and also the weekly memo from Metrology on gages overdue for calibration. Under no circumstances shall an inspector use a gage listed on the overdue gage memo until it has been re-certified. All gages listed on the memo of overdue gages shall be picked up and re-certified by the Metrology Department.

2.1.1.2 When a set-up of an operation has been completed by the set-up man and parts are being produced in accordance with applicable part prints and/or specifications, the in-process inspector shall inspect 5 pieces on all of the required gages. If any defects are found, the operation is to be shut down and a red "Operation Stoppage Tag" (Q.C. Form C-1156) shall be attached to the machine and the foreman notified. A set-up is defined as a tool change, fixture adjustment or a new operation.

2.1.1.3 The operation shall not proceed until a satisfactory sample has passed, at which time the inspector shall initiate a green in-process tag (Q.C. Form C-1158) and attach to the machine.

2.1.1.4 The accepted first piece sample parts will be held at the work station for one shift, after which they will be returned to the production lot. Sample size, date and inspector's stamp shall be shown on the green tag (Form C-1158).

2.1.1.5 All parts machined during the set-up, prior to acceptance, shall be inspected by the operator or set-up man to determine compliance with the Standard Operation Instruction Sheet.

2.1.1.5.1 Rejected parts shall be withheld and forwarded to the material review hold area identified by rejection tag (Form C-1166).

2.1.1.6 When a set-up is broken down, the green tag shall be removed.

2.1.2 In-Process Inspection:

2.1.2.1 The inspector shall periodically inspect work being processed at sufficiently frequent intervals to assure that the operation is producing parts which conform to the specifications. Frequent intervals are a minimum of 4 checks in any one shift per operation running.

2.1.2.2 Five (5) pieces shall be selected at each visit to the machine and inspected on all of the required gages as shown on the Standard Operation Instruction Sheet (Form 732).

2.1.2.3 If two (2) or more pieces are found out of specifications the operation shall be shut down and a "Red Stop Tag" (Form C-1156) attached to the machine, indicating corrective action is necessary.

2.1.2.4 If one (1) piece is found to be out of specification, in the first sample, an additional sample of five (5) pieces shall be selected and inspected. If one (1) additional defective piece from the second sample is found, the operation will be shut down and a "Red Stop Tag" attached to the machine, indicating corrective action necessary.

2.1.2.5 If an operation is shut down by the in-process inspector, he shall notify the Production Foreman of the shut down.

2.1.2.5.1 Parts produced subsequent to the previous in-process inspection shall be inspected to assure compliance with the Standard Operation Instruction Sheet.

2.1.2.6 If an operation is shut down by manufacturing due to production of defective parts, the in-process inspector shall be notified and disposition of parts produced shall be in accordance with 2.1.2.5.1.

2.1.3 Disposition:

2.1.3.1 Inspection approval of the operation shall be identified by the inspectors stamp on the "Green In-Process Tag" for the operation.

2.1.3.2 Rejected parts shall be withheld and forwarded to the material review hold area identified by rejection tag (Form C-1166).

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TOLL GATE INSPECTION	7-12-66		2.2
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2.2.1 Requirements:

To establish control at designated critical stages of manufacturing operations and to assure completion of inspection of machining and processing operations or other quality criteria as assigned by the Standard Operation Instruction Sheet (Form 732).

2.2.2 Inspection Method:

The inspector shall verify by means of visual inspection or by gages that operations have been performed in accordance with the Standard Operation Instruction Specifications (Form 732) for the part number and inspection operation required.

2.2.2.1 Sampling shall be in accordance with MIL-STD-105D, Level II.

2.2.3 Disposition:

Accepted lots shall be identified by a Transfer Slip (Form 390) and released to the next stage of manufacturing.

Rejected lots shall be withheld and moved to the material review hold area identified by Rejection Tag (Form C-1166).

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
SUB-ASSEMBLY INSPECTION	7-12-66		2.3
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2.3.1 Requirements:

2.3.1.1 A sample of five (5) pieces of each sub-assembly shall be inspected at least four (4) times per shift in accordance with the Inspection Instruction Sheets.

2.3.1.2 Results of the sub-assembly inspection shall be recorded on Sub-Assembly Inspection Report C-1170.

2.3.2 Disposition:

2.3.2.1 Acceptance of material shall be identified by the inspector's stamp on the Sub-Assembly Inspection Report C-1170.

2.3.2.2 Rejected parts shall be withheld and forwarded to the repair area identified by the Reject Tag (Form C-1166).

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. #
XM16E1, M16 & SMG MAGNETIC PARTICLE INSPECTION BOLT & BARREL	8-9-66		2.4
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2.4.1 Requirement:

The barrel sub-assembly and the bolt shall be magnetic particle inspected after proof testing in accordance with Specification MIL-I-6868B and the contract requirements.

2.4.1.1 All magnetic particle inspection personnel shall be certified in accordance with Specification MIL-STD-410A.

2.4.1.2 The magnetizing apparatus used shall be constructed to provide uniform, controlled operation. The magnetic flux shall be produced by direct current. The apparatus shall be capable of inducing in the piece under inspection a magnetic flux of suitable intensity in the desired direction.

2.4.1.3 The wet process will be used. The suspension shall consist of fluorescent magnetic substance of sufficient concentration in the oil vehicle to provide 0.10 to 0.40 ounces by weight of solids per gallon of liquid as delivered to the test piece. The oil used shall conform to Specification VV-K-220. The suspension shall be applied by hosing so that all surfaces to be examined are thoroughly covered.

2.4.1.4 The surface of test pieces shall be free from grease or other matter which might interfere with inspection

2.4.2 Magnetic Particle Inspection:

Inspection will be performed under black light for evidence of cracks, seams and other injurious defects.

2.4.2.1 Each barrel shall be magnetic particle inspected using a current of 400 to 500 amperes for circular continuous magnetization.

2.4.2.2 Each bolt shall be magnetic particle inspected using a current of 200 to 300 amperes. Circular continous magnetization (head shot) and longitudinal continous magnetization (coil shot) shall be used. Parts will be demagnetized between shots when necessary to obtain proper indication of defects.

2.4.3 Identification Marks:

2.4.3.1 Stamp letter "M" on accepted barrels in location shown on the component drawing using marking fixture T-32409.

2.4.3 Identification Marks: (Cont.)

2.4.3.2 Electro-etch letter "M" on accepted bolts in location shown on the component drawing employing fluids and application methods satisfactory to the Government Inspector.

2.4.4 Disposition:

2.4.4.1 Accepted bolts and barrels shall be satisfactorily demagnetized, washed and released to the subsequent operation.

2.4.4.2 Rejected bolts and barrels shall be forwarded to a material review hold area, identified by rejection tag (C-1166).

2.4.5 Maintenance:

2.4.5.1 Once each month, 3 bolts and 3 barrels with known defects as previously determined by magnetic particle inspection will be tested to establish the effectiveness of the equipment and procedures being used. A daily check with a standard test block may be performed in addition to the above.

2.4.5.2 The machines will be drained, thoroughly cleaned and refilled with clean suspension whenever the suspension becomes discolored by oil or contaminated with lint or other foreign substance which will interfere with the proper distribution and concentration of the suspension or the intensity, character or definition of the deposit of the magnetic substance.

2.4.5.3 The inspection suspension as delivered on the piece shall be tested daily for magnetic substance content using the procedure of paragraph 8.2.2.2 of MIL-I-6868B:

(a) Fill an ASTM 100-ml pear-shaped graduated centrifuge tube as specified in D96-60T to the 100-ml mark with suspension directly from the hose which is used for pouring it over the piece in making a test. The suspension must have been thoroughly agitated. Demagnetize the suspension if considered necessary and let it stand for 30 minutes to precipitate, or until the solid matter is apparently all down.

(b) The volume of the precipitate in the graduate shall be 0.1 to 0.5 milliliters.

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
XM16E1, M16 & SMG HIGH PRESSURE RESISTANCE TEST	8-9-66		2.5
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2.5.1 Requirement:

Conduct the high pressure resistance test on each barrel sub-assembly and bolt after inspection acceptance for prior operation as shown on Standard Operation Instruction Sheet.

2.5.2 Test Method:

2.5.2.1 Check headspace of barrel sub-assembly and bolt using Go Gage T-27738 and No-Go Gage T-34674.

2.5.2.2 Place accepted barrel sub-assembly and bolt in test fixture and fire one high pressure test cartridge.

2.5.2.3 Remove expended cartridge case and visually examine for bulges, splits, rings, and other defects caused by defective barrels and/or bolts.

2.5.2.4 Recheck headspace of accepted barrel sub-assembly and bolt using No-Go Gage T-34674.

2.5.2.5 Stamp "P" in center of accepted barrel sub-assemblies between front sight shoulder and muzzle of barrel using marking fixture T-32409.

2.5.2.6 Electro-etch the letter "P" on accepted bolt in location shown on the component drawing. Use neutralizer after electro-etching.

2.5.3 Disposition:

2.5.3.1 Forward accepted barrel sub-assemblies and bolts to magnetic particle inspection.

2.5.3.2 Identify reject barrel sub-assemblies and bolts as to cause of rejection and forward to material review hold area for disposition.

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HEAT TREAT INSPECTION	7-12-66	1	3.1
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3.1.1 Hardness Testing:

3.1.1.1 Hardness testing shall be performed as required by Inspection Instruction Sheets as part of the Final Component Inspection (Q.C.I. #4.1) or Receiving Inspection (Q.C.I. #1.1) for purchased parts.

3.1.1.2 Hardness testing shall be performed on equipment certified by Gage Control per Q.C.I. #6.1.

3.1.1.3 Prior to each day's testing, the hardness tester shall be checked using test block and procedures approved by the Gage Control group.

3.1.2 Sampling:

3.1.2.1 Sampling for final inspection shall be in accordance with MIL-STD-105D, Level I, A.Q.L. 1.0% unless otherwise specified by the Inspection Instruction Sheets.

3.1.2.2 Sampling for purchased parts shall be in accordance with MIL-STD-105D, Level II, A.Q.L. 1.0% unless otherwise specified by the Inspection Instruction Sheets.

3.1.3 Test results shall be recorded on the inspection sheets and on the Metallurgy Lab heat treat certificate of compliance.

3.1.4 The results of hardness testing shall be reviewed by Inspection to assure compliance with the applicable specification.

3.1.5 Disposition shall be made by Inspection in accordance with Q.C.I. #1.1 Receiving Inspection or Q.C.I. #4.1 Final Component Inspection.

3.1.6 Case Depth Testing:

3.1.6.1 For each day's production for each batch furnace or salt pot used, case depth and carburizing compliance with drawing requirements shall be recorded by the Metallurgy Lab.

3.1.6.2 Test Method:

The test specimen shall be a component, a scrap component, or a test piece of similar cross section. It shall be cut perpendicular to the cased surface and the cut surface shall then be prepared by grinding and/or rough polishing to remove the effects of the original cut. Etching will be done with a 5 to 10% Nital solution and for sufficient time to develop a contrast in case and core structure. The depth of case shall be the total distance of penetration from the surface to the nearest point of uniform core structure as measured on a polished and etched specimen at a magnification not lower than 10 diameters.

SUBJECT

PHOSPHATE COATING INSPECTION
THICKNESS AND SALT SPRAY TESTS

ISSUED	REV. NO.	Q.C.I. NO.
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3.2.1 Phosphate coating thickness check:

3.2.1.1 The inspector shall check a minimum of six (6) pieces at random selected after one hour's running time of phosphate coating bath each day.

3.2.1.2 The thickness of the phosphate coating shall be determined by a Dermitron, non-destructive thickness checker or equivalent.

3.2.1.3 Prior to any thickness checks, the inspector shall calibrate the Dermitron meter using the specific calibration procedure from the Dermitron manufacturer and samples of parts being checked.

3.2.1.4 The thickness of phosphate coating shall be .0002 to .0003. This thickness is standard for all phosphate coated parts.

3.2.1.5 The acceptance of the sample for thickness shall release the first hour's run and all subsequent work for the day.

3.2.1.6 Test results shall be recorded by inspector on Dermitron Inspection Report Form C-1173.

3.2.1.7 Rejected material shall be identified and withheld for review by Quality Assurance Engineering.

3.2.2 Salt Spray:

3.2.2.1 The inspector shall pull a sample of six (6) pieces at random selected from the first hour's operation of Phosphate coating each day.

3.2.2.2 The samples shall have a minimum of handling particularly on significant surfaces and shall be prepared for test immediately before exposure.

3.2.2.3 The samples shall be subjected to vapor-phase degreasing with trichlorethylene to free them of oil and grease and air dried.

3.2.2.4 The samples shall be racked and placed into salt spray tank whose temperature is 95° F + 2° F - 3° F for an exposure time of 1 hour.

3.2.2.5 At the completion of the test, the inspector shall examine the samples for rust or corrosion.

3.2.2.6 The acceptance of the sample for Salt Spray Test shall release the first hour's run and all subsequent work for the day.

3.2.2.7 Test results shall be recorded by inspector on Salt Spray Test Report Form C-1167.

3.2.2.8 Rejected material shall be identified and withheld for review by Quality Assurance Engineering.

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HARD ANODIZE INSPECTION	7-12-66	1	3.3
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3.3.1 Requirement:

To assure compliance to specification drawings and inspection instruction sheets for dimensional size control and to define quality standards of finish.

3.3.2 Test Method:

3.3.2.1 Thickness shall be determined by Dermitron testing of six (6) pieces to requirements of part specification drawing. The six (6) pieces shall be selected at random from the first hour's operation each day. Record results of inspection on Dermitron Inspection Report (Form C-1173).

3.3.2.2 Visually inspect anodetic coating of each lot to assure a continuous, smooth, adherent, uniform finish which shall be free from powdery area discontinuities, such as breaks, scratches or other damage.

3.3.3 Disposition:

3.3.3.1 Acceptance of the sample shall release the first hour's run and all subsequent work for the day.

3.3.3.2 Rejected material shall be identified and withheld for review by Quality Assurance Engineering.

3.3.4 For purchased parts, the sample shall be in accordance with MIL-STD-105D for inspection per paragraph 3.3.2.2. Receiving Inspection shall check that a vendor's certificate of compliance to drawing requirements is included in the inspection folder. Disposition of lots shall be in accordance with Q.C.I. #1.1 - Sub-contractor & Part Inspection.

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
ELECTROFILM INSPECTION XM16E1, M16 & SMG	8-9-66	1	3.4
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3.4.1 Requirement:

To assure the continuity and thickness of electrofilm application to the requirements of the detailed specification drawing. Electrofilm is applied over hard anodize coat or parco-lubrite coating.

3.4.2 Test Method:

3.4.2.1 The inspector will check coating thickness in the following manner using the Dermitron Plating Thickness tester. At the start of each day's processing, randomly select six pieces and record Dermitron readings on form C-1173 prior to the Electrofilm application. Upon completion of Electrofilm application, record Dermitron readings for the same six piece sample. Dimensional difference equivalent must comply with drawing specification.

3.4.2.2 Visually inspect a sample per MIL-STD-105D from each lot of finished parts for uniform color, freedom from blisters or irregularities. With no trace of grit, rough particles nor separation of ingredients. Scratches which have penetrated through the pre-treated surface of the base metal shall be rejected.

3.4.3 Disposition:

Accepted lots shall be forwarded to the next operation accompanied by Inspection Acceptance Form C-1168.

Rejected lots shall be withheld and moved to the material review hold area identified by rejection tag (Form 270-002)

3.4.4 For purchased parts, the sample will be in accordance with MIL-STD-105D for inspection per paragraph 15.2.2. Receiving Inspection will check that a vendor's certificate of compliance to contract requirements is included in the inspection folder. Disposition of lots will be in accordance with Q.C.I. 1.1 Receiving Inspection.

3.5.1 Requirement:

3.5.1.1 Conduct visual inspection of the packaging of Rifle, Basic Issue Items, Repair Parts, Bipod and Bipod Case. Sampling inspection to be in accordance with Inspection Level I of MIL-STD-105D.

3.5.2 Inspection Method:

3.5.2.1 Marking - AQL - 1.0

Visually inspect the markings for correctness and legibility such as the identification markings, digit markings and overseas address. Marking must comply with MIL-STD-129 as to size, location and method of application.

3.5.2.2 Basic Issue Items (BII) - AQL-- 1.0

Prior to closure of the box, the unit package shall be visually inspected for completeness of Basic Issue Items (BII).

Rifle (Item 1a)		Rifle (Item 1b)	
Magazine Assembly	(1)	Magazine Assembly	(7)
Sling	(1)	Sling	(1)
		Brush & Grease	(1)
		Cleaning Rod	(1)
		Bipod	(1)
		Case, Bipod	(1)

3.5.2.3 Cleaning and Drying - AQL - 1.5

Visually inspect the items for proper cleaning and drying. Surfaces shall be free from dirt corrosion, oil, grease and similar foreign residues.

3.5.2.4 Preservation Application and Immunize - AQL - 1.5

Visually inspect the items for continuity and appearance of preservatives after application. Coatings shall be uniform and homogeneous.

3.5.2.5 Packaging - AQL - 1.5

Prior to closure of the package, visually inspect for proper cushioning, sealing and wrapping in accordance with the packaging instruction sheets.

3.5.2 Inspection Method (Cont.)

3.5.2.6 Packing - AQL - 1.5

Visually inspect the exterior shipping container for proper closure, blocking and bracing in accordance with the packing instruction sheets.

3.5.2.7 Record the results of the packaging inspection on form C-1179.

3.5.3 Disposition:

3.5.3.1 Notify the shipping foreman if the packaging is acceptable.

3.5.3.2 Notify the Quality Assurance Engineering Group if the packaging is rejected. Corrective action will be initiated by the Quality Assurance Engineering Group.

3.5a.1 Requirement:

3.5a.1.1 To provide a method of inspection and reporting results of packaging tests.

3.5a.1.2 Sample size shall be in accordance with MIL-STD-105D, Level 5-3, Table I, Normal Sampling 4.0 A.Q.L.

		A.Q.L. 4.0	
Lot Size	Sample Size	Acc.	Rej.
2 to 150	3	0	1
151 to 3200	13	1	2
3201 to 35000	20	2	3

3.5a.2 Waterproofness Test:

3.5a.2.1 Sealed packages shall be immersed in water at a temperature approximately 40° F cooler than the package for 15 minutes. The package shall be immersed so that the top surface is 1 inch below the surface of the water. After removal, the package shall be opened and inspected.

3.5a.2.2 Evidence of moisture within the barrier shall be cause for rejection.

3.5a.3 Vacuum Retention Test:

3.5a.3.1 The flexible barrier enclosing the item shall be sealed except for an opening at one end to accommodate a tube which is connected to a vacuum producing apparatus. A vacuum of 9mm ± 1mm of mercury or 5 inches ± 1/2 inch of water measured by gage or manometer shall be drawn on the sealed package and the tube closed. The vacuum may be drawn more than once to insure that equilibrium within the barrier has been reached.

3.5a.3.2 A loss of vacuum from the sealed system shall not exceed twenty-five percent of the original vacuum after remaining undisturbed for 10 minutes.

3.5a.4 Heat Seal Test:

3.5a.4.1 After the heat sealed seams are thoroughly cooled, sections of the heat seals 1 inch in width cut perpendicular to the line of the seal shall be obtained from the test specimens. The length of the legs is not critical. The sections shall be unfolded and clamped with the line of the seal perpendicular to the direction of the load application.

3.5a.4.1 (Cont.)

The seams shall be positioned midway between the jaws of the testing clamps. A static load of 8 oz. shall be applied slowly and uniformly without impact and allowed to act 5 minutes at ambient room temperature. Any separation at the heat sealed area shall be noted without disturbing the seal, after 2 minutes, and at the end of the 5 minute interval.

3.5a.4.2 Partial separation of the heat seal is acceptable within the first two minutes of the test to allow areas of partial fusion adjacent to the actual seal to pull apart. Delamination of laminated barrier material after application of the static load shall be cause for rejection. Any separation of the heat sealed area during the final three minutes of the test shall be cause for rejection.

3.5a.5 Quick Leak Test:

3.5a.5.1 Sealed packages shall be tested for leakage by submerging the filled sample bag(s) in water contained in a vacuum vessel and drawing a vacuum. For heat sealed packages, a vacuum differential of 216mm (8-1/2 inches) of mercury from ambient conditions shall be held for 30 seconds (minimum) while observir for leakage of air.

3.5a.5.2 Observation of evolution of air bubbles shall be made at each position of sample. Bubbles which appear on surface of package but are not released are not to be construed as an indication of failure. A steady stream or recurring succession of bubbles from any surface or seam shall be cause for rejection.

3.5a.6 Record Results of all Tests on Q.C. Report

3.5a.7 Disposition:

3.5a.7.1 Accepted lots shall be identified by inspection acceptance tag and forwarded to parts stores.

3.5a.7.2 Rejected lots shall be withheld and forwarded to material review hold area identified by the rejection report for review.

SUBJECT

FINAL COMPONENT INSPECTION

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4.1.1 Final inspection shall be performed on finished components prior to delivery to Part Stores in accordance with the following procedure:

4.1.1.1 Sampling will be in accordance with MIL-STD-105D.

4.1.1.2 The finished component shall be inspected in accordance with the inspection instruction sheets for all specified characteristics. Inspection results shall be recorded on Inspection Report (Form C-1161).

4.1.2 Disposition:

4.1.2.1 Accepted lots shall be forwarded to Part Stores accompanied by Inspection Acceptance Form C-1168.

4.1.2.2 Defective parts from samples shall be withheld and forwarded to a material review hold area identified by Rejection Tag C-1166.

4.1.2.3 Rejected lots shall be moved to the material review hold area identified by Rejection Tag C-1166.

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
PRE-FUNCTIONAL INSPECTION XM16E1, M16 & CAR-15 (SMG)	8-9-66	1	4.2
	APPROVED 1 1-10-67		PAGE 1 of 4

4.2.1 Requirement:

The following requirements are established to assure an acceptable quality level of the assembled product to preclude range malfunctions and subsequent re-inspections, and as a safety precaution to functional testing.

4.2.2 Test Method:

4.2.2.1 Safety Group

(a) Manually examine safety action for positive engagement of spring loaded plunger when safety is in safe, semi, and auto positions.

(b) Visually and manually examine safety actions.

(b.1) With the hammer cocked and the safety on "safe" the trigger shall not release the hammer when trigger is pulled.

(b.2) With the safety on "semi", charge the bolt with charging handle maintaining pressure on trigger, when bolt enters battery position, the hammer shall not have fallen, but shall be retained in cocked position by the disconnect. Releasing finger pressure on trigger shall allow hammer to disengage from disconnect but not from trigger. Pulling of trigger shall then cause hammer to fall.

(b.3) With the safety set on "auto" charge the bolt with charging handle maintaining pressure on trigger, hammer shall fall when bolt is permitted to return to battery position. Charge bolt with charging handle with trigger released, release bolt, pulling of trigger shall cause hammer to fall.

4.2.2.2 Charging Handle Assembly

(a) Manually examine spring loaded latching action of handle assembly to upper receiver. Handle assembly shall have positive latching action in forward travel without manual assist to latch. Unlatching for rearward travel shall require manual action on the spring loaded latch.

4.2.2.3 Bolt Assembly

(a) Visually examine for secureness of all parts.

(b) Visually examine bolt for proof mark and magnetic particle inspection mark.

4.2.2.3 Bolt Assembly (Cont.)

(c) Visually and manually examine free movement of firing pin in bolt. Firing pin shall drop in bolt hole and striker point shall protrude at bolt face.

(d) Firing pin protrusion will be inspected by using Gage No. T-35422.

4.2.2.4 Bolt Carrier and Key Assembly

(a) Visually and manually examine for secure retention and proper seating of key to body and for proper staking of socket headscrews.

(b) Visually examine key for burrs, cracks, or mutilations.

4.2.2.5 Headspace

(a) Each rifle will have the takedown pin removed to disengage the receiver action from the bolt carrier.

(b) With receiver action disengaged, the bolt and carrier shall be displaced to the rear to permit placement of the headspace gages T-27738 (minimum) and T-34674 (maximum) into the chamber.

Go Gage Method

Insert Go Gage T-27738 seated properly in the chamber, actuate the bolt carrier from the rear of upper receiver, using hand pressure only, allowing the bolt lugs to engage the lugs of barrel extension accepting the Go Gage.

No Go Method

Insert No Go T-34674 (maximum) into the chamber until properly seated, actuate the bolt carrier from the rear of upper receiver, using slight hand pressure only allowing the bolt to engage the lugs of barrel extension. Bolt shall not fully engage.

4.2.2.6 Trigger Pull

After partial or completed trigger pull, the trigger shall return to its normal forward position under spring action. The trigger pull shall be free of creep and shall be within the range of 5.5 pounds. Creep shall be interpreted to mean any perceptible rough movement between the time the trigger slack is taken up and the hammer is released.

4.2.2.6 Trigger Pull (Cont.)

The rifle shall be cocked and the selector shall be in the "semi" position. The load shall be gradually applied to the center of the trigger and exerted in a line parallel to the axis of the barrel bore. When the minimum load is applied, the hammer shall not release and when the maximum load is applied the hammer shall release. The rifle shall be re-cocked each time after a load is applied. The trigger pull shall also be checked for creep by applying pressure manually to the trigger at a uniform rate of increase over a period of not less than 3 seconds.

4.2.2.7 Visual Examination

(a) Visually examine rifle to be sure all component parts are assembled correctly and all markings are legible.

4.2.2.8 Barrel Assembly

(a) Check bore with go bore plug T-35730. (For XM16 & M16 only)

(b) Check suppressor and barrel with go bore plug CG-1260. (For Sub-Machine Gun only)

4.2.2.9 Front Sight Post Group and Rear Sight Group

(a) Manually examine to assure sight adjustment can be made by depressing spring loaded detent and rotating sight post. The front sight post shall be flush with or not more than 0.030 inch below the front sight flange. Twenty clicks of downward travel shall remain from flush setting.

(b) Manually examine ability of rear sight drum to be rotated when spring loaded detent is depressed. Drum shall be capable of rotating six (6) complete revolutions, moving rear sight from extreme left to right. While in extreme left and right position, rear sight shall be capable of pivoting to vertical position for normal and long peeps. Return sight to zero windage setting.

4.2.3 Record results of the pre-functional inspection on Test Report (Form C-1172).

4.2.4 Disposition:

4.2.4.1 Stamp acceptance on Rifle Tag (C-1157) for accepted rifles and release to next operation.

4.2.4.2 Identify rejected rifles with the defect on Tag C-1157 and forward to repair department.

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
FUNCTION FIRING TEST	8-9-66	1	4.3
XM16E1 & M16	APPROVED 2	1-10-67	PAGE 1 of 2

4.3.1 Requirement:

4.3.1.1 Rifles shall operate without malfunctions or unserviceable parts and the cyclic rate of fire for a 20 round continuous burst shall be within 650 and 850 rounds per minute.

4.3.2 Test Method:

4.3.2.1 Test method for rifles with 20-round magazines.

Each rifle shall be tested for functioning requirement, with the rifle held in an approved firing stand simulating shoulder firing. The rifles shall be function fired as follows: Two bursts of approximately 3 rounds each shall be fired and the remaining rounds in the magazine shall be fired in one burst. During the interrupted burst firing, rifles shall be checked to assure that firing stops immediately when the trigger is released. The cyclic rate of fire shall be taken and recorded by firing an additional 20 rounds in one burst on a rifle randomly selected from every ten rifles tested as specified herein using an approved timing gage. Rifles failing to meet the requirement shall be rejected. Failure of any sample rifle to meet the cyclic rate of fire requirement shall be cause for measurement of the cyclic rate of fire on the other nine rifles represented.

4.3.2.2 Test method for rifles with 30-round magazines.

Each rifle to be shipped with 30-round magazines shall be tested with the rifle held in an approved firing stand simulating shoulder firing. The rifle shall be function fired as follows: Three bursts of approximately 3 rounds each shall be fired and the remaining rounds in the magazine shall be fired in one burst. During the interrupted burst firing, rifles shall be checked to assure that firing stops immediately when the trigger is released. The cyclic rate of fire shall be taken and recorded on a rifle randomly selected from every ten rifles while firing the remaining rounds in the magazine using an approved timing gage.

4.3.2.3 Record the results of the function firing test on test log (Form C-1174) and on Traveler Tag (Form C-1157).

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
FUNCTION FIRING TEST XM16E1 & M16	8-9-66	1	4.3
	APPROVED 2	1-10-67	PAGE 2 of 2

4.3.3 Disposition:

4.3.3.1 Stamp inspection approval on Traveler (Form C-1157) and forward accepted rifles to targeting.

4.3.3.2 Identify rejected rifles with the cause of malfunction on Form C-1157 and forward to a material review hold area for disposition.

4.4.1 Requirement:

4.4.1.1 Firing of rifles for targeting and accuracy may be conducted at a range of 50 yards or 100 yards. Maximum utilization shall be made of the 100 yard range. Cartridges for targeting and accuracy testing shall be in accordance with MIL-C-9963 and shall be certified by the Government to be of a quality within a mean radius of 1.2 to 1.4 inches at 200 yards as measured in accordance with the applicable specification. The type of magazine to be shipped with the rifle (20 round or 30 round) shall be used.

4.4.1.2 100 Yards. A series of 10 rounds fired from the rifle at a range of 100 yards shall be within an extreme spread of 4.8 inches to qualify for accuracy, and all shots shall be within the targeting area specified on Figure I to qualify for targeting.

4.4.1.3 50 Yards. A series of 10 rounds fired from the rifle at a range of 50 yards shall be within an extreme spread of 2.4 inches to qualify for accuracy, and all shots shall be within the targeting area specified on Figure I to qualify for targeting.

4.4.2 Test Method:

4.4.2.1 Each rifle shall be tested for targeting and accuracy requirement, with the rifle held in an approved firing stand simulating shoulder firing and using Government standard ammunition. Firing of not more than three warmup shots off the target shall be allowed before the rifles are fired for targeting and accuracy. The normal rear peep sight shall be used and shall be set at zero windage, plus or minus two clicks. The front sight shall be set with the top of the front sight flange flush with or not more than 0.030 inch below the front sight slot, and the rifle sights aligned on the point of aim specified on Figure I. With the safety selector in "safe" position, pull trigger to assure that rifle will not fire. A series of 10 shots shall be fired with the rifle set for semi-automatic. During firing, each rifle shall be checked to assure that no double shots are fired. (i.e., two shots fired with a single trigger pull). Rifles firing double shots or evidence of a flyer or keyhole shall be cause for a repeat test by firing a 10 round complement. Rifles firing double shots or evidence of a flyer or keyhole in the second test shall be cause for rejection of the rifle. A "flyer" is defined as a shot hole which is a greater distance from the nearest shot hole than the extreme spread of the other nine shot holes (including the shot hole nearest the flyer).

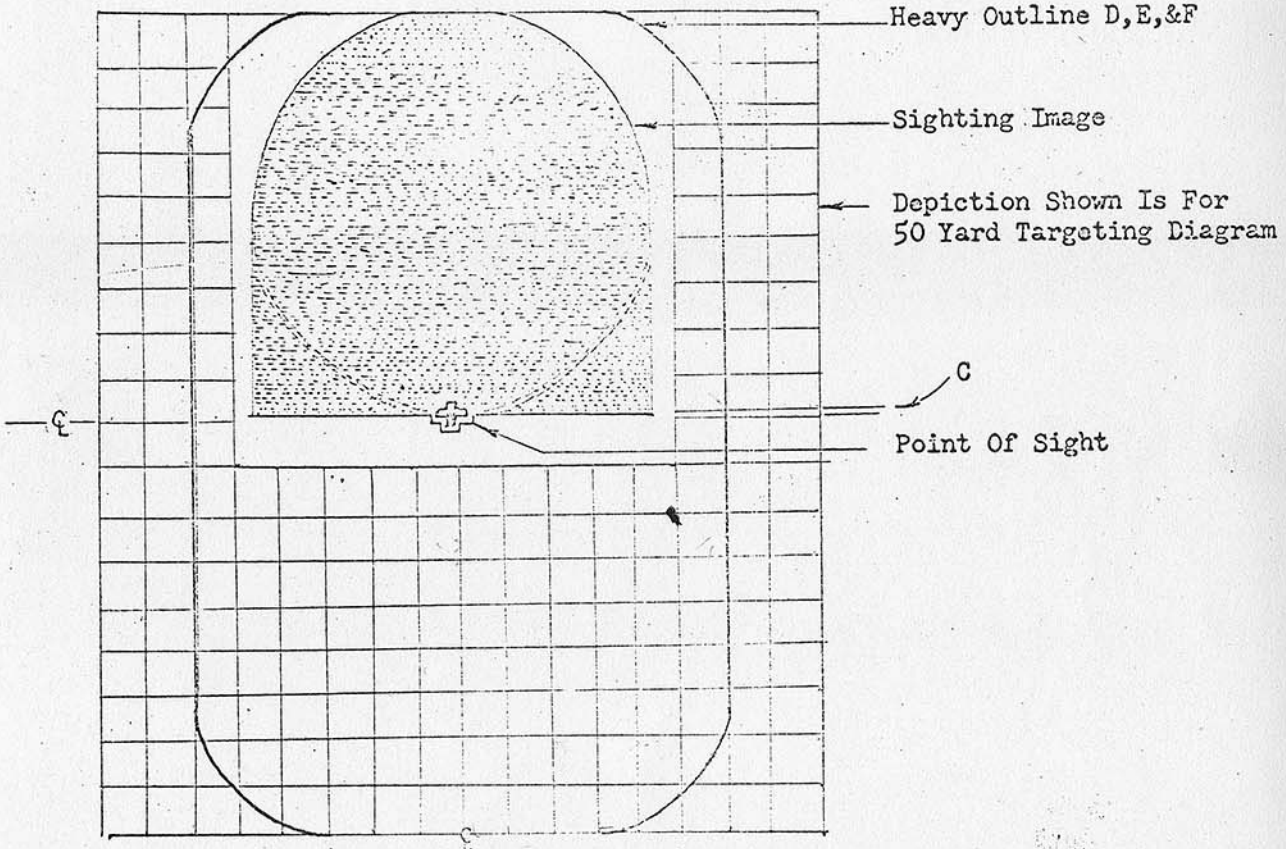
4.4.2.2 Measure and record the extreme spread of rifles meeting the targeting and accuracy requirement and record on log (Form C-1175). Rifles failing to meet the requirements shall be rejected. Rejected rifles may be subjected to retest with or without reconditioning the rifles. Copies of records shall be kept complete and made available to the Government upon request.

4.4.3 Disposition:

4.4.3.1 Stamp inspection approval on Tag (Form C-1157) and release accepted rifles to cleaning and final examination.

4.4.3.2 Identify rejected rifles with cause of rejection and forward to a material review hold area for disposition.

Figure 1.



A = 10 Shot Group Diameter
D = Sighting Image Diameter
C = Distance Bottom Of Sighting Image Above Horizontal ℄ Of Heavy Outline
D = Height Of Heavy Outline
E = Width Of Heavy Outline
F = Radius Of Corners Of Heavy Outline
G = Grid Dimensions

TARGET DIAGRAM FOR		DIMENSIONS IN INCHES						
		GROUP	IMAGE		HEAVY OUTLINE			GRID
METERS	YARDS	A	B	C	D	E	F	G
91.4	100	4.8	8.0	0.5	17.6	11.6	2.8	1.00
45.7	.50	2.4	4.4	0.14	8.95	5.95	1.5	.50

4.5.1 Requirement:

4.5.1.1 Final examination of each rifle shall be performed after completion of testing, after cleaning and just prior to preservation and packaging. Final acceptance of lots shall be subject to approval of Firing Pin Indent Test, Reliability Test, Interchangeability Test and the Final Examination Test. Results of the Final Examination Test will be recorded on Final Examination Report (Form C-1162).

4.5.1.2 Each rifle shall be examined as specified below. Each step in the examination shall include a visual examination for proper cleaning and presence of the specified protective coating and to determine the general quality, completeness of manufacture, assembly, clarity and legibility of markings, and workmanship.

4.5.2 Test Method:

4.5.2.1 Lower Receiver Pistol Grip and Stock Assembly Group

(a) Manually examine free pivoting of upper receiver group on pivot pin, when takedown pin is withdrawn to stop position.

(b) Disassemble lower receiver assembly group from upper receiver assembly group, manually examine its ready disassembly when pivot pin is withdrawn.

4.5.2.2 Automatic Sear Group

(a) Visually examine hammer catch surface and bolt contact of sear for burrs, cracks, or mutilations.

(b) Visually examine sear spring for mutilations or distortion.

4.5.2.3 Hammer Group

(a) Visually examine trigger, disconnect and automatic sear catch surfaces for burrs, cracks, or mutilations.

(b) Visually examine firing pin striking surface for burrs, cracks, or mutilations.

(c) Visually examine hammer spring for mutilations or distortions.

4.5.2.4 Trigger Group

(a) Visually examine hammer catch surface and safety contact surfaces for burrs, cracks, or mutilations.

4.5.2.4 Trigger Group (Con't)

(b) Visually examine trigger spring for mutilations or distortion.

(c) Visually examine the hammer catch surface and safety contact surface of the disconnect for burrs, cracks, or mutilations.

(d) Manually examine spring action of disconnect.

4.5.2.5 Safety Group

(a) Manually examine safety action for positive engagement of spring loaded plunger when safety is in safe, semi, and auto positions.

(b) Rotate safety and visually examine stop surfaces for burrs, cracks, or mutilations.

4.5.2.6 Bolt Catch Group

(a) Visually and manually examine function of bolt catch. Pressing of lower button of catch shall pivot catch upward, and releasing of button shall allow catch to return under spring load.

(b) Visually examine bolt catch surface for burrs, cracks, or mutilations.

4.5.2.7 Trigger Guard Assembly

(a) Visually and manually examine trigger guard release, pivot and retention actions. Trigger guard shall be capable of being released by depressing spring loaded plunger at front end. It shall be pivoted to stop position against pistol grip and retained in this position without manual assistance. The trigger guard shall be returned to its locked position and shall be locked by spring loaded plunger.

4.5.2.8 Takedown Pin

(a) Visually and manually examine takedown pin for secure assembly to lower receiver by engagement of spring loaded pin in groove.

4.5.2.9 Buffer Retainer Group

(a) Remove buffer group, manually examine spring loaded action of buffer retainer.

(b) Visually examine top of buffer retainer for burr, cracks, or mutilations.

4.5.2.10 Buffer Group

(a) Visually examine action spring for mutilations or distortion.

(b) Visually examine action spring guide assembly for burrs, cracks, or mutilations.

4.5.2.11 Pistol Grip

(a) Visually and manually examine for secure retention of lower receiver and for presence of lockwasher.

(b) Visually examine pistol grip for cracks or mutilations.

4.5.2.12 Stock Assembly

(a) Visually and manually examine for secure retention to lower receiver.

(b) Visually examine for cracks or mutilations.

(c) Manually examine secure retention of swivel assembly to stock and pivot action of swivel.

4.5.2.13 Lower Receiver

(a) Visually examine magazine well and trigger mechanism housing for burrs, cracks, and mutilations.

(b) Re-assemble buffer assembly to this group.

4.5.2.13.1 Receiver Pivot Pin Assembly

(a) Visually and manually examine receiver pivot pin assembly for secure assembly to lower receiver by engagement of spring loaded pin in groove.

4.5.2.14 Charging Handle Assembly

(a) Manually examine spring loaded latching action of handle assembly to upper receiver. Handle assembly shall have position latching action in forward travel without manual assist to latch, and unlatching for rearward travel shall require manual action on the spring loaded latch.

(b) Disassemble charging handle assembly and bolt from upper receiver, manually examining their free disassembly without binding.

(c) Visually examine latch, carrier key engagement, and guides for burrs, cracks, or mutilations.

4.5.2.15 Bolt and Bolt Carrier Group

(a) Disassemble firing pin and visually examine firing pin retaining pin for burrs, cracks, or mutilations.

4.5.2.16 Firing Pin

(a) Visually examine firing pin for cracks, burrs, or mutilations.

(b) In addition, visually examine striker point for pits and erosion.

4.5.2.17 Bolt Cam Pin

(a) Rotate bolt cam pin, disassemble cam pin and bolt assembly from carrier, and visually examine cam pin for burrs, cracks, or mutilations. (Cam pin shall be capable of being disassembled without removal of carrier key.)

4.5.2.18 Bolt Assembly

(a) Visually examine for secureness of all parts.

4.5.2.19 Extractor

(a) Manually examine spring load action of extractor.

(b) Visually examine extractor catch lip for burrs, cracks, or mutilations.

4.5.2.20 Ejector

(a) Manually examine spring load action of ejector.

(b) Visually examine ejector tip for burrs, cracks, or mutilations.

4.5.2.21 Bolt Rings

(a) Visually examine bolt rings for mutilation or distortion and proper position. (Rings shall not be positioned with slots in line.)

4.5.2.22 Bolt

(a) Visually examine bolt for burrs, cracks, or mutilations. Particular attention shall be given locking lugs area.

(b) Visually examine bolt face for pits and erosion.

(c) Manually examine cam pin hole in bolt to assure against radially reversing bolt assembly. With the ejector side of bolt assembly facing inspector, the bolt cam pin shall not be capable of entering cam pin hole in bolt.

(d) Visually examine bolt for proof mark and magnetic particle inspection mark.

(e) Visually and manually examine free movement of firing pin in bolt. Firing pin shall drop in bolt hole and striker point shall protrude at bolt face.

4.5.2.23 Bolt Carrier and Key Assembly

(a) Visually and manually examine for secure retention and proper seating of key to body and for proper staking of socket headscrews.

4.5.2.24 Bolt Carrier Key

(a) Visually examine key for burrs, cracks, or mutilations.

4.5.2.25 Bolt Carrier

(a) Visually examine bolt carrier for burrs, cracks, or mutilations. Particular attention shall be given the bolt cam area.

(b) Reassemble the bolt and carrier group and examine firing pin protrusion using Colt's gage no. T-35422.

4.5.2.26 Hand Guards, LH and RH

(a) Visually examine hand guards for cracks and mutilations.

(b) Visually examine for secure assembly of shield to guards.

(c) Manually examine spring action of hand guard slip ring.

4.5.2.27 Flash Suppressor

(a) Visually and manually examine flash suppressor for cracks, burrs or mutilations and for its secure assembly to barrel with lockwasher in place.

4.5.2.28 Front Sight Group

(a) Visually and manually examine front sight group for its secure assembly to barrel.

4.5.2.29 Front Swivel

(a) Visually and manually examine for retention of swivel to sight, and ability of swivel to be pivoted.

4.5.2.30 Front Sight Post Group

(a) Visually examine front sight post for burrs or mutilations.

4.5.2.31 Front Sight

(a) Visually examine front sight for burrs or deformations.

(b) Visually examine for proper marking of front sight.

(c) Manually examine assembleability of bayonet to bayonet lug by using a suitable gage.

4.5.2.32 Gas Tube

(a) Visually and manually examine for secure assembly of gas tube; it shall be securely assembled to front sight with no relative movement between tube and receiver, and tube and sight.

(b) Visually check for damage or distortion of gas tube.

4.5.2.33 Barrel Assembly

(a) Visually examine barrel bore for pockets, rings, bulges or other deformations. Particular attention shall be given flash suppressor shoulder area of bore for rings or bulges.

(b) Visually examine bolt locking lugs for burrs, cracks or mutilations.

(c) Visually examine for proof marking, and magnetic particle inspection.

(d) Examine grenade launching diameter of suppressor using Government approved gage.

(e) Check bore with go bore plug T-35730.

4.5.2.34 Ejection Port Cover Assembly Group

(a) Visually examine for burrs or deformations.

(b) Visually and manually examine spring action of latching plunger and spring action of opening spring.

(c) Visually examine for presence of retaining ring on port cover pin.

4.5.2.35 Rear Sight Group

(a) Visually examine drum for proper markings.

(b) Visually examine rear sight for proper markings.

4.5.2.36 Upper Receiver

(a) Visually examine upper receiver for burrs, cracks or deformations.

(b) Manually examine function of forward assist assembly for ability to be depressed and returned to extended position under spring action without binding. (For XM16 Rifles only)

(c) Manually examine pawl (62269) for ability to be depressed and returned under spring action without binding. (For XM16 Rifles only)

(d) Visually examine catch surface of pawl (62269) for burrs or deformations. (For XM16 Rifles only)

4.5.2.37 M-16 Rifle Assembly

(a) Reassemble upper receiver assembly and bolt assembly groups and examine headspace using Government approved gages. The bolt shall fully lock on minimum plug and shall not lock on maximum plug. Sighting for headspace requirement shall be through magazine opening of upper receiver. (Go Gage T-27738, No Go T-34674)

(b) Reassemble major groups into complete rifle assembly assuring that all parts are secure and assembled properly. Particular attention shall be given the hammer, trigger and sear pins for secure assembly.

(c) Visually and manually examine cyclic hand functioning using one dummy round in magazine assembly. Insert magazine, assuring its retention, charge bolt, charging shall cause ejection port cover to open. Allow bolt to return to battery, bolt shall strip cartridge from magazine and feed it into chamber. Charge bolt, charging shall cause extraction and ejection of the dummy cartridge and cause follower of magazine to activate bolt catch to retain bolt in rear. Pressing of bolt catch button shall allow release of bolt.

4.5.2.37 M-16 Rifle Assembly (Cont.)

(d) Visually examine receiver markings. (Serial number, manufacturer's identification, etc.)

(e) Visually and manually examine safety actions.

e.1 With the hammer cocked and the safety set on "safe" the trigger shall not release the hammer when trigger is pulled.

e.2 With the safety on "semi" charge the bolt with charging handle maintaining pressure on trigger, when bolt enters battery position, the hammer shall not have fallen, but shall be retained in cocked position by the disconnect. Releasing finger pressure on trigger shall allow hammer to disengage from disconnect but not from trigger. Pulling of trigger shall then cause hammer to fall.

e.3 With the safety set on "auto" charge the bolt with charging handle maintaining pressure on trigger, hammer shall fall when bolt is permitted to return to battery position. This is evidenced by failure of trigger to be pulled. Charge bolt with charging handle with trigger released, release bolt, pulling of trigger shall cause hammer to fall.

f. Manually examine function of bolt assist.

4.5.2.38 Headspace:

(a) Each rifle will have the takedown pin removed to disengage the receiver action from the bolt carrier.

(b) With receiver action disengaged, the bolt and carrier shall be displaced to the rear to permit placement of the headspace gages T-27738 (minimum) and T-34674 (maximum) into the chamber.

Go Gage Method

Insert go gage T-27738 seated properly in the chamber, actuate the bolt carrier from the rear of upper receiver, using hand pressure only, allowing the bolt lugs to engage the lugs of barrel extension accepting the go gage.

No Go Method

Insert no/go T-34674 (maximum) into the chamber until properly seated, actuate the bolt carrier from the rear of upper receiver, using slight hand pressure only, allowing the bolt to engage the lugs of barrel extension. Bolt shall not fully engage.

4.5.2.39 Trigger Pull:

After partial or completed trigger pull, the trigger shall return to its normal forward position under spring action. The trigger pull shall be free of creep and shall be within the range of 5.5 pounds to 8.5 pounds. Creep shall be interpreted to mean any perceptible rough movement between the time the trigger slack is taken up and the hammer is released.

The rifle shall be cocked and the selector shall be in the "semi" position. The load shall be gradually applied to the center of the trigger and exerted in a line parallel to the axis of the barrel bore. When the minimum load of 5.5 lbs. is applied the hammer shall not release and when the maximum load of 8.5 lbs. is applied the hammer shall release. The rifle shall be recocked each time after a load is applied. The trigger pull shall also be checked for creep by applying pressure manually to the trigger at a uniform rate of increase over a period of not less than 3 seconds.

4.5.3 Disposition:

4.5.3.1 Rifles which have passed all examinations after successful completion of testing shall be rubber stamped by the contractor with the Department of Defense complete inspection approval stamp. The Government Representative will observe the stamping operation and control the stamps used for such stamping on the lower right side of the Lower Receiver.

4.5.3.2 Rejected rifles shall be identified with the cause of rejection on the back of the Inspection Traveler (Form C-1157) and forwarded to the Repair Department.

4.5.4 When the following parts are either replaced or reworked to the extent that the rework will affect the function firing and/or targeting and accuracy of the rifle, the rifle shall be resubmitted to the function firing test and/or targeting and accuracy test as indicated by asterisks.

	Function Firing Test	Target & Accuracy Test
1. Barrel	*	*
2. Gas Tube Assembly	*	
3. Front Sight Assembly	*	*
4. Bolt Carrier Assembly-Carrier & Key	*	
5. Bolt	*	
6. Extractor	*	
7. Extractor Spring	*	
8. Ejector	*	
9. Ejector Spring	*	
10. Firing Pin	*	
11. Bolt Catch	*	
12. Bolt Catch Spring	*	
13. Disconnect	*	
14. Disconnect Spring	*	
15. Hammer Assembly	*	
16. Automatic Sear Assembly	*	
17. Buffer Spring	*	
18. Action Spring Guide Assembly	*	
19. Safety Selector	*	
20. Rear Sight		*
21. Flash Suppressor & Lockwasher		*
22. Lower Receiver Assembly	*	
23. Upper Receiver Assembly	*	*
24. Front Sight Post		*

5.1.1 Requirement:

5.1.1.1 Rifles shall be capable of passing a 6000 round reliability test as specified below with not more than the number of malfunctions and unserviceable parts allowed in Table I. In addition, the average cyclic rate of fire for the entire test shall be within the limits specified in 4.3.1.1.

Malfunctions and unserviceable parts

Table I

Malfunctions (Note I)	Number permitted in the 6,000-round reliability test
Failure of forward assist (Note 2)	0
Failure of bolt to lock	3
Failure of bolt stop to hold bolt open (last round of each magazine)	3
Failure to eject cartridge case	4
Failure to feed (cartridge visible)	4
Failure to feed (cartridge not visible)	3
Failure to fire semiautomatic (single rounds)	3
Light blow	3
Other malfunctions	1
Total malfunctions - above malfunctions combined	11

Unserviceable parts (Note I)	Number permitted in the 6,000-round reliability test	
	First 3,000 rounds	Second 3,000 rounds
Magazine Assembly	0	1
Ejector Spring	0	1
Extractor	0	1
Extractor Spring	0	2
Other Parts (Note 3)	0	1
Total unserviceable parts - above unserviceable parts combined	0	3

5.1.1 Requirements: (Cont.)

Note I When malfunctions are traceable to particular parts, it is permissible to replace such parts and record them as unserviceable, subject to Table I limitations. When it is definitely established by the Government Representative that previously recorded malfunctions are attributable to an unserviceable part, such malfunctions shall not be counted against the rifle being tested, provided that they occurred not more than 200 rounds prior to replacement of the unserviceable part. These 200 rounds shall have been fired with the unserviceable part. However, such malfunctions shall remain recorded and properly identified. An unserviceable part is one that causes malfunctions or impairs the safety of the weapon. Malfunctions attributable to ammunition shall not be counted against the rifle; however, such malfunctions shall be recorded.

Note 2 In the event of any failure of bolt to lock, the forward assist assembly shall be operated. Failure of the forward assist assembly to remain engaged with the bolt carrier assembly during manual attempt to lock the bolt shall be counted as a failure of forward assist assembly to assist bolt closure malfunction. All failures of bolt to lock shall be counted as malfunctions.

Note 3 One unserviceable part other than those specified shall be allowed if in the judgement of the Government Representative the failure does not represent an unsafe or defective condition which is prevalent throughout the lot of items involved.

5.1.2 Test Procedure:

5.1.2.1 One rifle and 12 magazines selected by the Government Representative from each reliability lot shall be tested for reliability. The magazines shall be selected from accepted magazines in the Contractor's inspection sample of current production lots.

5.1.2.2 The contractor shall provide replacement parts as required to complete the tests, and retests if required, at no additional cost to the Government. If the reliability requirements are not met the represented lot shall be rejected. The results of the reliability test shall be evaluated by the Government Representative to determine if the cause of failure indicates serious defects in the item. A serious defect is defined as a defect that affects safety. If the cause for failure is not attributed to a serious defect, a reliability retest of two rifles from the same lot shall be made with or without reconditioning of the lot. If the cause for failure is attributed to a serious defect, contractor correction shall be effected on all rifles in the lot and the lot of rifles shall be resubmitted as a reconditioned lot. A reliability retest of two other rifles from the reconditioned lot shall be made. Failure of either rifle in the retest of the same or reconditioned lot to meet the requirements shall be cause for rejection of the represented lot.

5.1.3 Test Method:

5.1.3.1 Testing of rifles by the contractor for reliability requirement shall be accomplished with the rifles held in an approved firing stand simulating shoulder firing.

5.1.3.2 In the event the number of malfunctions or unserviceable parts listed in Table I are exceeded during the initial reliability test or during the retest, the contracting officer shall have the option to suspend the test. Any unauthorized testing after suspension or additional tests other than specified in 5.1.2.2 shall be at the contractor's expense.

5.1.3.3 Testing of rifles with 20-round magazines. Sequence of testing shall be as follows:

(a) Check headspace.

(b) Fire rounds 1 through 2,000 in sequence of 60 rounds semi-automatic (at a rate of 20 to 30 rounds per minute), 20 rounds automatic (in bursts of approximately 5 rounds each), and 20 rounds automatic (in one burst). The instrumental velocity, at 20 feet, shall be taken and recorded for the first 10 rounds fired semiautomatic. The cyclic rate of fire shall be taken and recorded for the first and every tenth 20-round burst thereafter. The barrel may be cooled after each 100 rounds. Cleaning of the rifle, if necessary, shall be accomplished after 1,000 rounds.

(c) Check headspace.

(d) Fire rounds 2,001 through 4,000 in sequence specified in step "b", except that the adverse handling test shall be conducted for rounds 2,001 through 2,040 outside of the approved firing stand by firing semiautomatic with weapon held loosely in hands, not touching shoulder and the instrumental velocity shall not be taken.

(e) Check headspace.

(f) Fire rounds 4,001 through 6,000 in sequence specified in step "b" except that instrumental velocity shall be taken and recorded as specified in step "g".

(g) Record instrumental velocity for rounds 6,001 through 6,010 at 20 feet.

(h) Fire for targeting and accuracy for rounds 6,011 through 6,020.

(i) Check headspace. (Headspace shall not exceed 0.005 inch over maximum.)

5.1.3.4 Testing of rifles with 30-round magazines. Sequence of testing shall be as follows:

(a) Check headspace.

(b) Fire rounds 1 through 1,920 in sequence of 60 rounds semi automatic (at a rate of 20 to 30 rounds per minute), 30 rounds automatic (in bursts of approximately 5 rounds each), and 30 rounds automatic (in one burst). The instrumental velocity, at 20 feet, shall be taken and recorded for the first 10 rounds fired semiautomatic. The cyclic rate of fire for a 20-round burst shall be taken and recorded for the first and every eighth 30-round burst thereafter. The barrel may be cooled after each 120 rounds. Cleaning of the barrel, if necessary, shall be accomplished after each 960 rounds.

(c) Check headspace.

(d) Fire rounds 1,921 through 3,840 in sequence specified in step "b", except that the adverse handling test shall be conducted for rounds 1,921 through 1,950 outside of the approved firing stand by firing semiautomatic with weapon held loosely in hands, not touching shoulder and the instrumental velocity shall not be taken.

(e) Check Headspace.

(f) Fire rounds 3,841 through 6,000 in sequence specified in step "b" except that instrumental velocity shall be taken and recorded as specified in step "g".

(g) Record instrumental velocity for rounds 6,001 through 6,010 at 20 feet.

(h) Fire for targeting and accuracy for rounds 6,011 through 6,020.

(i) Check headspace. (Headspace shall not exceed 0.005 inch over maximum.)

5.1.3.5 Fully loaded magazines shall be used and they shall be used in rotation so that approximately the same number of rounds will be fired from each. Should a given magazine be cause for more than one malfunction, it shall be removed, tagged and subsequently examined for defects. During semiautomatic firing, rifles shall be checked to assure that no doubling occurs (i.e., two shots fired with a single trigger pull; and during the interrupted burst firing, rifles shall be checked to assure that firing stops immediately when the trigger is released (uncontrolled fire shall be recorded as a malfunction).

5.1.3.6 At the close of each day's firing, the rifles shall be protected against corrosion.

5.1.3.7 No parts shall be altered and only parts broken or worn to the extent that they are unserviceable shall be replaced.

5.1.3.8 Complete accurate records shall be kept for each reliability test, showing each malfunction and part replacement including the number of the round at which each occurred, and all measurements taken during the test shall be recorded. Use Form C-1171 Quality Assurance Test Report - Reliability.

5.1.4 Disposition:

5.1.4.1 Forward the rifle to Quality Assurance Engineering for evaluation by the contractor and Government Representative.

5.2.1 Requirement:

5.2.1.1 Unless otherwise specified on the drawings, all parts shall be interchangeable. (In normal assembly operations there shall be no objections interposed to preferential assembly of parts provided that all parts are dimensionally acceptable.) Rifles and repair parts shall be capable of meeting the interchangeability tests specified below.

5.2.2 Test Procedure:

5.2.2.1 A sample of ten rifles from each inspection lot shall be tested for interchangeability. Rifles taken for interchangeability testing shall have been found satisfactory in all other examinations and tests. The ten rifles shall be tested for, and shall comply with, the requirements for headspace, firing pin indent, and trigger pull before and after interchange of parts. In addition, the rifles shall be tested for functioning and targeting and accuracy requirements after interchange of parts. Hand refinement of parts will be allowed on not more than two rifles during interchange of parts provided that no part is altered beyond drawing requirements. No malfunctions shall be allowed in the functioning firing test and failure of not more than two rifles shall be allowed in the targeting and accuracy firing test. However, rifles failing in the targeting and accuracy test within the limitations above shall be corrected to meet the targeting and accuracy requirements before they are returned to the represented lot for final acceptance. Failure of the interchangeability test shall cause retest or rejection of the represented lot. At the discretion of the Government Representative, an interchangeability retest may be allowed without reconditioning the lot of rifles. Failure in the retest shalll cause rejection of the represented lot subject to reconditioning and further test as a reconditioned lot. A sample of 20 rifles from each retest or reconditioned lot shall be tested using the same procedure described above except that hand refinement and failure in the targeting and accuracy firing will be allowed on not more than 4 rifles.

5.2.3 Test Method:

5.2.3.1 Rifles shall be tested for interchange of parts by disassembling and then reassembling parts using the parts and prearranged system prescribed below. Interchange of parts shall be accomplished by dividing the parts of each rifle into 10 groups of nonmating parts as shown below and distributing the groups into 10 different trays until each tray contains a complete rifle. Groups of parts from rifle number 1 shall be taken in order and placed in trays 1 through 10; groups of parts from rifle number 2 shall be taken in order

5.2.3 Test Method: (Cont.)

and placed in trays 2 through 10 to 1; groups of parts from rifle number 3 shall be taken in order and placed in trays 3 through 10 to 2, etc. The rifles shall be reassembled using only those parts which are in the same tray.

Groups of Nonmating Parts

Group I

Takedown Pin Detent (61698)
Receiver - Upper (62278) FA
Ejection Port Cover Assembly (62112)
Rear Sight Windage Drum Pin (95101)
Extractor Spring (61568)
Magazine Catch Spring (61759)
Trigger (61955)

Group II

Lower Receiver (62222) FA
Rear Sight Detent Spring (61754)
Barrel & Sight Assembly (62206)
Front Sight Post (61706)
Extractor Pin (61563)
Butt, Cap Screw (92601)
Lockwasher (90001)

Group III

Bolt (61538)
Ejection Port Cover Pin (61658)
Barrel Nut (61902)
Front Sight Detent (61705)
Trigger Guard Pivot Pin (95106)
Trigger Spring (61657)
Takedown Pin (61655)
Magazine Catch Button (62032)
Plunger Cap (62267) FA

Group IV

Takedown Pin Detent Spring (61692)
Key and Bolt Carrier Ass'y (62286) FA
Buffer Retainer (61582)
Snap Ring, Cover Hinge Pin (90402)
Hand Guard Slip Ring (61901)
Ejector & Safety Detent Spring (61569) (2)
Trigger and Hammer Pin (61654) (2)
Magazine Assembly (62103)
Front Sight Detent Spring (61709)

Group V

Stock Assembly - Molded (62193)
Ejection Port Cover Spring (61518)
Hand Guard Slip Ring Spring Assembly (61962)
Front Swivel (62280)
Ejector Pin (95102)
Magazine Catch (61604)
Disconnect (62334)
Plunger (62268) FA

Group VI

Buffer Assembly (62339)
Rear Sight (61700)
Hand Guard Snap Ring (90403)
Spring, Disconnect (61925)
*Front Swivel Pin (95103)
Bolt, Cam Pin (61704)
Bolt Catch (62301)
Pistol Grip (62194)
Rear Swivel Roll Pin (95111)

Group VII

Ejector (61564)
Rear Sight Spring (61708)
Pistol Grip Screw (92701)
Gas Tube Detail Assembly (61645)
Hammer Assembly (62317)
Flash Suppressor (62348)
Firing Pin Retaining Pin (62335)
Bolt Catch Plunger (62178)
Bipod Case (62137)
Pawl (62269) FA

Group IX

Rear Sight Windage Drum (61703)
Charging Handle Assembly (62290)
*Bolt Ring (61540) (3)
Bolt Catch Pin (95105)
Hammer Spring (61697)
Receiver Extension (61574)
Safety (61959)
Bipod Assembly (62122)
Bolt Spring (50381)

Group VIII

Receiver Pivot Pin (62221)
Firing Pin (62294)
Rear Sight Windage Screw (61702)
Gas Tube Pin (95108)
Hand Guard Assembly, LH (62196)
Flash Suppressor, Lock Washer (62126)
Bolt Catch Spring (62177)
Automatic Sear Pin (61615)
Rear Swivel Assembly (62282)
Pawl Detent (62270) FA

Group X

Extractor (61562)
Rear Sight Detent (61755)
Hand Guard Assembly, RH (62198)
Trigger Guard Assembly (61970)
Automatic Sear Assembly (61622)
Buffer Retainer Spring (61694)
Action Spring (61581)
Safety, Detent (61785)
Bayonet Assembly (Gov't Furnished)
Plunger Spring (62271) FA

*These parts damaged during disassembly shall be replaced without penalty to the interchangeability test.

FA - Forward Assist - XM16E1. For M-16 rifles, the lower receiver part number becomes 62297, key and bolt carrier assembly becomes 61826, upper receiver becomes 62306, and the following parts are not used: Plunger Cap (62267), Plunger (62268), Pawl (62269), Pawl Detent (62270), and Plunger Spring (62271).

5.2.4 Concurrent Repair Parts:

Five parts of each part shall be selected for the interchange test below.

(a) Concurrent repair parts shall be tested by disassembling 5 rifles previously accepted and reassembling them using the repair parts. No hand refinement will be allowed. The rifles shall operate and function properly after the interchange of parts.

(b) Failure of any part to meet the requirement shall be cause for the rejection and reconditioning of the part. Ten reconditioned parts shall be interchanged with ten rifles as described above.

5.2.5 Interchangeability Control Test:

Interchangeability control test shall be performed every 90 days. Five rifles selected the first week of the first month's production shall be held in reserve and tested by the Government Representative for interchangeability of parts with five rifles selected the last week of the third month's production. The rifles shall be interchanged in a manner identical to the detailed plan specified in 5.2.3.1. In removal of the Front Sight, 62068, and Taper Pins, 62086, from the Barrel, they shall maintain their identity and be reassembled to the same Barrel. The rifles shall be tested for and shall comply with the requirements for headspace, firing pin indent, and trigger pull before and after interchange of parts. In addition, the rifles shall be tested by the contractor for functioning and targeting and accuracy after interchange of parts. Rifles meeting the requirements of the interchange, functioning, target and accuracy test shall be returned to the contractor for final acceptance and presented in a current inspection lot. The contractor will be informed of any failure of the rifles to meet the requirements and shall take corrective action as necessary.

5.2.6 Record results of interchangeability test on form C-1163.

5.2.7 Disposition:

5.2.7.1 Forward accepted rifles to Final Examination with Traveler (C-1157).

5.2.7.2 Forward rejected rifles to the Quality Assurance Engineering Group for evaluation by the contractor and Government Representative.

Distribution Process:

Gun #	1	2	3	4	5	6	7	8	9	10
Box 1	I	X	IX	VIII	VII	VI	V	IV	III	II
Box 2	II	I	X	IX	VIII	VII	VI	V	IV	III
Box 3	III	II	I	X	IX	VIII	VII	VI	V	IV
Box 4	IV	III	II	I	X	IX	VIII	VII	VI	V
Box 5	V	IV	III	II	I	X	IX	VIII	VII	VI
Box 6	VI	V	IV	III	II	I	X	IX	VIII	VII
Box 7	VII	VI	V	IV	III	II	I	X	IX	VIII
Box 8	VIII	VII	VI	V	IV	III	II	I	X	IX
Box 9	IX	VIII	VII	VI	V	IV	III	II	I	X
Box 10	X	IX	VIII	VII	VI	V	IV	III	II	I

5.2.8 Part numbers followed by FA in paragraph 5.2.3 are used only on XM16E1. Bolt Carrier for M-16 is P/N 61826 and Upper Receiver is P/N 62306.

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
FIRING PIN INDENT TEST M-16, XM16E1 & CAR-15 (SMG)	8-9-66	1	5.3
	APPROVED 1	1-27-67	PAGE 1 of 2

5.3.1 Requirement:

5.3.1.1 When the bolt is closed and the firing mechanism is released, the firing pin indent shall be not less than 0.020 inch, and it shall not be off center more than one-half the diameter of the firing pin point.

5.3.1.2 When the bolt is closed and the firing mechanism is not released, the firing pin indent shall be not more than 0.008 inch.

5.3.2 Test Method:

5.3.2.1 A sample of twenty (20) rifles from each inspection lot shall be tested for firing pin indent requirement approved inspection equipment similar to Drawings C7318984 and D7271741.

5.3.2.2 The rifles shall be tested for firing pin indent requirement specified in 5.3.1.1 as follows: The rifle shall be held in a vertical position (muzzle down) and the muzzle end of the rifle supported. The bolt shall be held open and the copper compression cylinder holding fixture containing the copper compression cylinder shall be inserted in the barrel chamber. The bolt shall be manually returned to battery position and the trigger pulled to release the hammer and indent the copper cylinder. The holding fixture shall be removed from the rifle and the depth of the indent in the copper cylinder computed by measuring the distance from the original surface of the copper cylinder (before indentation) to the bottom of the firing pin impression. The location of the indent shall not be off center more than one-half the diameter of the firing pin point as evidenced by visual examination.

5.3.2.3 The rifles shall be tested for firing pin indent requirement specified in 5.3.1.2 as follows: The rifle shall be held in a vertical position (muzzle down) and the muzzle end of the rifle supported. The bolt shall be held fully open and the copper compression cylinder holding fixture containing the copper compression cylinder shall be inserted in the barrel chamber. The bolt shall then be released from the full open position and under spring action allowed to go into battery position. (The trigger shall not be pulled to release the firing mechanism.) The holding fixture shall be removed from the rifle and the depth of the indent in the copper cylinder computed by measuring the distance from the original surface of the copper cylinder (before indentation) to the bottom of the firing pin impression.

5.3.2 Test Method (Con't)

5.3.2.4 Record the results of the firing pin indent test on Quality Assurance Interchangeability Report (Form C-1163).

5.3.3 Disposition:

5.3.3.1 Return accepted rifles to the represented lot.

5.3.3.2 Failure of two (2) or more rifles in the sample of twenty (20) to meet the test requirements shall cause rejection of the inspection lot and shall be cause to screen the represented lot and correct the noted deficiencies. Failure of one (1) rifle in the sample of twenty (20) to meet the test requirements shall cause a second sample to be tested. The second sample shall consist of forty (40) rifles, exclusive of the first twenty (20), (cumulative, 60 rifles). Failure of one (1) rifle of the second sample to meet test requirements shall be cause to screen the represented lot and correct noted deficiencies.

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
LOT SIZE XM16E1, M-16 AND SMG (CAR-15)	2-28-67		5.4
	APPROVED 1		PAGE 1 of 1

5.4.1 Inspection lot size for acceptance testing of weapons shall be as follows unless otherwise specified:

The first five lots shall each consist of 500 rifles or a month's production, whichever is smaller. When five successive lots meet the requirements, the lot size shall be increased to 5,000 rifles or a month's production, whichever is smaller. When five successive lots of the increased size have met the requirements, the lot size shall be further increased to 10,000 rifles or a month's production, whichever is smaller. If rejection of a lot occurs at any time, the next smaller test lot size criteria shall be reinstated and the above procedure repeated in returning to the larger lot size.

6.1.1 Each new gage shall be inspected 100% by the Metrology Laboratory with standards traceable to the National Bureau of Standards.

6.1.2 Two tool and gage control and calibration record cards (Colt's Form No. 239-005) shall be made out for each gage. One card shall be marked Master, the other marked Traveler.

The cards shall have the following information:

a. Gage nomenclature

b. Calibration frequency

c. Calibration expiration date

d. Drawing specifications and actual dimensions

e. Re-calibration history

f. Calibrating inspector's acceptance mark

The Master card shall be filed in the Metrology Laboratory by drawing number. The Traveler card shall accompany the gage to the Gage Control Crib where the Traveler card shall be filed by re-call date.

6.1.3 Each gage shall be permanently identified with the following information:

a. Gage number (Latest Eng. Chg. Letter)

b. Gage function

c. Final inspection gages shall have the letter "F" before the T-number, Ex: FT-12345.

d. All gages shall be followed by a consecutive letter, A, B, C, D, etc. This will distinguish identical gages from one another, Ex:

FT-4000-A Rev. B

6.1.4 Each newly inspected gage shall have an inspection sticker which certifies calibration and gives the calibration expiration date and inspector's mark.

6.1.4.1 Only certified gages calibrated by the Colt's Metrology Department shall be in use and used by manufacturing and inspection personnel.

6.1.4.2 Each week, a memo shall be issued by the Matrology Department to all production and inspection foremen listing those gages due for calibration the following week. These gages shall be submitted, prior to their expiration date, to the Metrology Laboratory for re-certification.

6.1.4.3 A memo shall be issued each week by the Metrology Department listing the gages which have exceeded the re-calibration date. It will be the responsibility of the inspection foremen to insure that these gages are not being used for inspection of the product until they have been re-certified by the Metrology Department.

6.1.5 The Gage Control Crib shall be responsible for the following:

a. Maintain a complete calibration re-call filing system.

b. Sending rejected gages with control cards and drawings to the Metrology Laboratory for disposition.

c. Providing storage area for active and inactive gages.

6.1.6 Re-calibration frequency list:

NOTE: These calibration frequencies shall be subject to change as determined by frequency of use and compiled wear date. At no time shall the calibration frequencies exceed 1 year.

INSPECTION EQUIPMENT

GAGE NOMENCLATURE	CALIBRATION FREQUENCIES
All T Gages	6 mos.
Hardness Testers	6 mos.
Optical Comparators	6 mos.
Optical Charts	1 year
Surface Roughness Comparators	3 mos.
Plain Plug Gages	2 mos.
Air Gages	6 mos.
Mass, Force and Torque Equipment	6 mos.
Non-destructive Test Equipment	6 mos.
Electronic Equipment	3 mos.
Gage Blocks	6 mos.
Micrometer - All Types	2 mos.
Standard Miscellaneous Equipment such as Surface Plates, Angle Irons, "V" Blocks, Bench Centers, etc.	6 mos.

METROLOGY LABORATORY EQUIPMENT

GAGE NOMENCLATURE	CALIBRATION FREQUENCIES
Master Blocks	1 year
Inspection Blocks	6 mos.
Sine Plates	6 mos.
Surface Plates	1 year
Bench Centers	6 mos.
Hardness Tester	3 mos.
Surface Roughness Comparator	3 mos.
Electronic Equipment	6 mos.
Micrometers - All Types	6 mos.
Height Gaging Equipment	6 mos.
Thread and Plain Plugs (Masters)	6 mos.

6.1.7 The Quality Assurance Engineering Group shall determine the method and type of gaging required to insure product conformance to contract requirements.

6.1.8 Gage facilities shall be in accordance with Mil Handbook-52.

Gage inspection procedures shall be in accordance with

(a) Mil-Std. 120 (Gage Inspection).

(b) Metrology Lab Calibration Procedures.

6.1.9 Gage Wear Allowance:

All gages beyond the gage drawing tolerance shall be rejected. However, when review of the rejected gage by Metrology supervision and the cognizant engineer indicates that the gage will continue to accept conforming parts and reject non-conforming parts, the gage shall be allowed to stay in use. With such gages the re-calibration cycle shall be reduced to more closely monitor the wear factor.

6.1.10 The care, use, maintenance and handling of gages shall be in accordance with Section 6 of Mil-Std-120.

6.1.11 Employee-owned measuring equipment shall not be used for inspection of the product.

6.1.12 Production jigs and fixtures shall be inspected by the Metrology Laboratory prior to use. Complete records will be maintained on all jigs and fixtures.

6.1.13 The verification of sub-contractors' gage calibration control system shall be provided for in Form #C1155 (Colt's Quality Assurance survey of sub-contract facilities).

6.1.14 The Manufacturing Engineering Department is responsible for the design of tools and gages.

6.1.15 Metrology Lab Equipment:

a. Two sets of dial bore gages from .057 to 1.400 (.0001 increments).

b. Eleven black granit surface plates (.00005 accuracy).

c. Eight dial test indicators (.0001 increments).

d. One 14" optical comparator (.0002 accuracy).

e. One electrolimit supermicrometer (.00002 increments).

f. One P & W sigmatic comparator (.00001 increments).

6.1.15 Metrology Lab Equipment (Cont.)

g. Ten height gages.

h. Three height set gages (.0001 accuracy).

i. Two sets of master gage blocks.

j. Six sets of inspection work blocks.

k. One set of thread measuring wires.

l. One hardness tester.

m. Four sine plates (within 0°0'05")

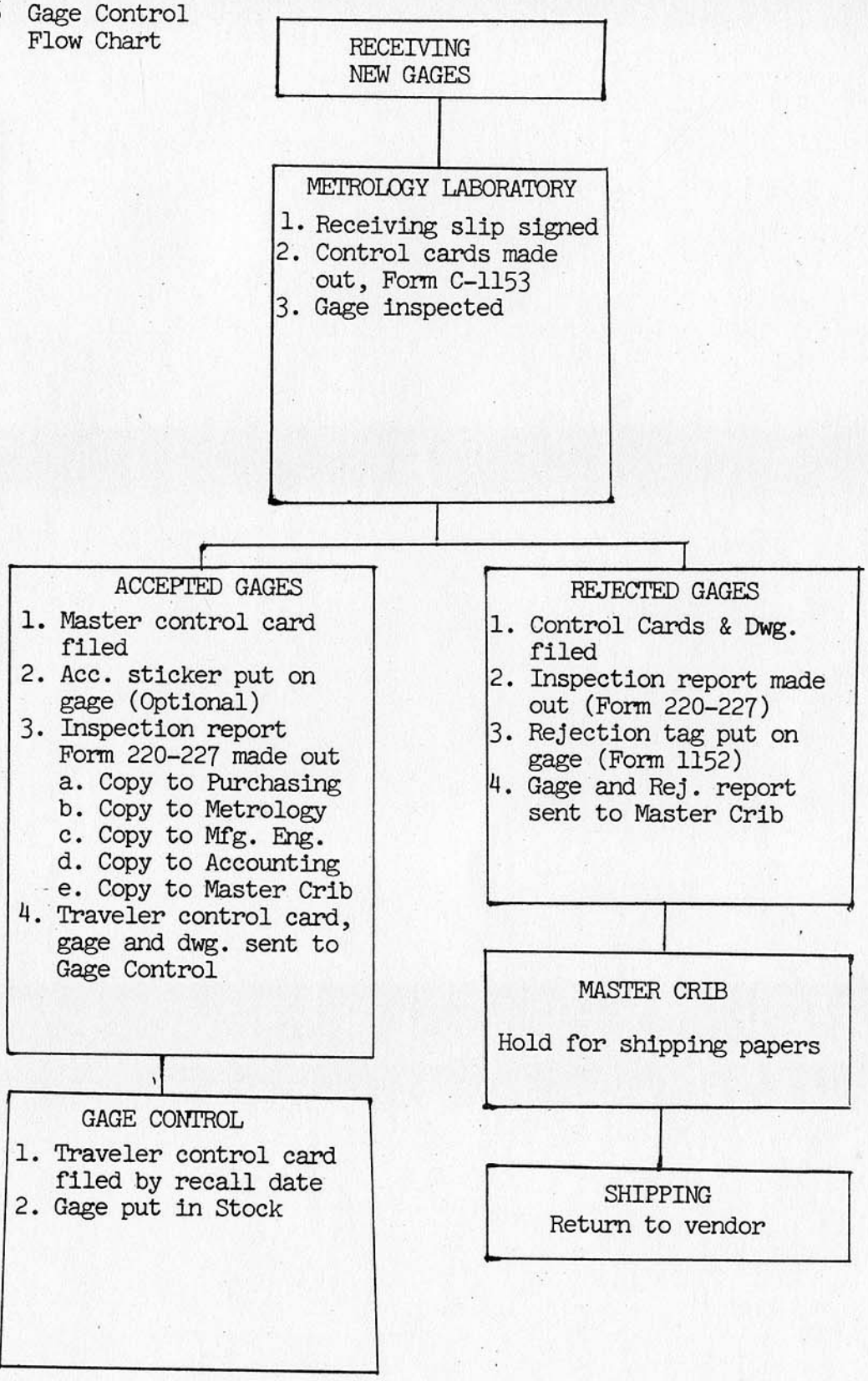
n. Standard miscellaneous equipment such as angle irons, "V" blocks, etc.

o. One electrolimit internal comparator.

NOTE: The above listed equipment shall be confined in the Metrology Laboratory. This Laboratory to have a controlled temperature that will not exceed ½° variation in one hour and a humidity control not to exceed 50%.

The calibration of our master standards shall be performed at a Government approved Metrology Laboratory, such as P & W Calibration Center.

6.1.16 Gage Control Flow Chart



SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. #
MATERIAL REVIEW PROCEDURE	7-12-66		6.2
	APPROVED 0 WD		PAGE 1 of 2

6.2.1 Requirement:

The Material Review Procedure establishes the criteria for a uniform policy to isolate and identify material containing departures from specified requirements to enable analysis and prompt corrective action to prevent recurrence.

6.2.2 Non-conforming material of both in-plant manufactured and supplier manufactured, shall be reviewed by a Material Review Representative and applicable action taken.

6.2.3 Rejected Material:

6.2.3.1 Material found to be non-conforming to technical requirements shall be rejected and a red reject tag, Form C-1166, shall be initiated and completed with all pertinent information, signed by the inspector.

6.2.3.2 The rejected material shall then be routed to a Material Review area. Items that cannot be moved to a Material Review area shall be isolated from regular production.

6.2.4 Material Review Procedure:

6.2.4.1 The rejected material shall be reviewed by a representative of the Quality Control Department. He shall make a decision as to scrap or rework to specification with the assistance of the following, if necessary:

1. Representative of Manufacturing
2. Representative of Manufacturing Engineering
3. Representative of Production Control

6.2.5 Material to be reworked to specification shall have a rework order Form C-1160 initiated and completed with all pertinent information and signed by the quality control representative.

6.2.5.1 Distribute rework order copies as noted on each copy of rework order.

6.2.5.2 The material to be reworked shall be routed to the proper operation for rework. (If corrective action is deemed necessary, Quality Assurance Engineering shall initiate request for corrective action to the responsible department.)

6.2.5.3 When rework operation is completed, the reworked material shall be routed through normal inspection channels.

6.2.5 (Cont.)

6.2.5.4 Accepted reworked material shall be considered as acceptable normal material and shall continue being processed.

6.2.6 Material to be scrapped shall be positively segregated, identified and scrap ticket, Form 427, shall be initiated and completed with all pertinent information. Material that is scrapped shall be stored in a restricted area and disposed of as soon as practicable.

6.2.7 Non-conforming material, which the contractor's Quality Assurance and Product Engineering Departments feel would not adversely affect the end use of the product, will be presented for Government acceptance in accordance with prescribed Government procedures.

SUBJECT	EFFECTIVE DATE	REV. NO.	Q.C.I. NO.
GENERAL INSPECTION INSTRUCTIONS	7-12-66		6.3
	APPROVED 0		PAGE 1 of 2

6.3.1 Material shall be presented for inspection in a clean condition in well-kept containers, and steel parts that do not have a protective finish shall be covered with a very light coat of oil. In order to prevent gage wear, inaccurate gaging, or corrosive action, material presented in an unsatisfactory condition of cleanliness shall be returned for cleaning.

6.3.2 Inspection for Workmanship shall include examination for missing operations and the presence of nicks, cracks, burrs, scratches, tool marks, deformations, or other signs of poor workmanship on important areas. Pieces shall be carefully compared with a specimen of known acceptable quality, and shall conform with the requirements of para. 3.8 of MIL-W-13855.

6.3.3 Where "Visual" is specified as the method of dimensional inspection, the sample shall be either scaled or compared with a specimen of known acceptable quality.

6.3.4 The following notes shall apply for visual inspection of protective coating:

a. Where "Visual" is specified as the method of inspection for protective coating, the finish must be complete, uniform in color and free from pits, corrosion or scratches and worn areas incurred during handling or assembly operations. Sparkle or glitter of phosphate coatings in sunlight indicates a questionable large crystalline structure. Final determination of acceptability of such questionable components shall be by the accelerated corrosion test.

b. Where surfaces requiring 32 and finer Roughness Height Rating have been processed after application of final protective finish, bright areas on surfaces so processed are permissible.

c. Where bright surfaces resulting from assembly operations such as riveting, staking, driving screws, etc. have been covered by use of touch-up paint when specifically permitted, the resulting finish shall blend in color and appearance with the protective coating of the assembled parts.

6.3.5 Where "Visual-Measure" is specified as the method of inspection in determining surface roughness requirements, inspection shall be performed using Type II, Surface Roughness Scale, Stock No. 7949998, as specified in Military Standard, MIL-STD-639. If the protective finish or the location of the surface make the determined roughness height rating questionable, the contractor shall use a component which has been measured by a surface roughness measuring instrument and found to possess maximum acceptable surface roughness as a visual standard, or shall by use of a surface roughness measuring instrument, measure the questionable components.

6.3.6 Hardness testing shall comply with the requirements of paragraph 3.5.4 of MIL-W-13855 and the following:

a. When hardness readings are taken on cylindrical surfaces whose diameters are less than 0.700 inches and on which no flat has been ground, a correction factor must be added to the observed reading to obtain the true hardness. This correction factor may be obtained from a chart contained in Ordnance Inspection Handbook on Metals, ORD-M608-1. (Paragraph 545.7)

b. On parts on which a true hardness reading cannot be obtained, the following destructive hardness test shall be performed:

Select three (3) samples from each inspection lot and perform the Rockwell test on a flat ground on each piece. Failure of any sample to pass the test shall cause rejection of the lot. Actual hardness readings, one (1) of each piece, shall be recorded.

6.3.7 Dimensional and visual examination shall be accomplished on the finished part wherever practicable. Where disputes on borderline defects arise relative to protective coating build-up, final determination of dimensional and surface roughness acceptability shall be on the basis of bare metal conditions. Where the deviation appears to be slight, and the number of pieces outside the tolerance limit would cause rejection of the lot, it is permissible for the contractor to remove the protective coating from the questionable pieces in the sample, so that they may be reinspected. If the total number of sample pieces outside tolerance limits is then less than the rejection number, the lot may be accepted.