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APPENDIX 11

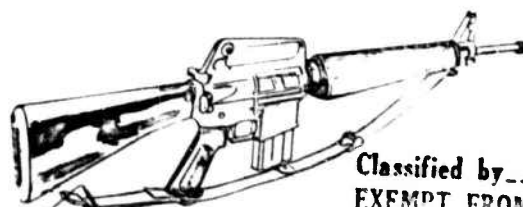
**REPORT
OF THE
M16 RIFLE REVIEW PANEL**

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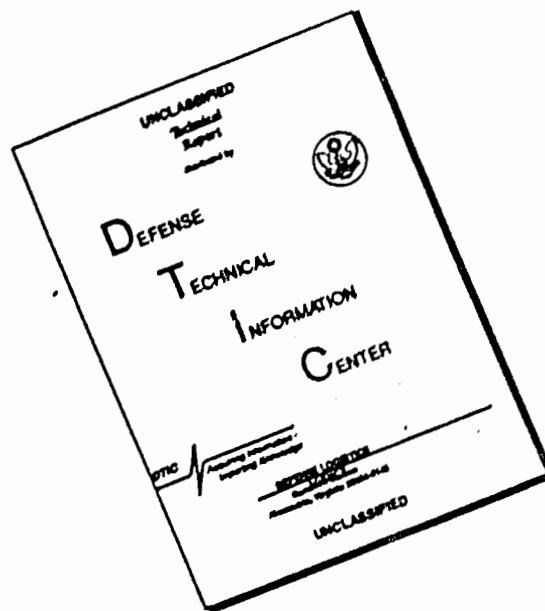
M16, PRODUCT IMPROVEMENT MODIFICATIONS

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FOR RESEARCH, DEVELOPMENT, AND ACQUISITION
WASHINGTON, DC 20310

REPLY TO
ATTENTION OF

DAMA-WSW

1 FEB 1968

MEMORANDUM FOR THE RECORD

SUBJECT: Declassification Action - Report of the M16 Rifle Review Panel (C)
dated 1 June 1968. [REDACTED]

1. The Report on the M16 Rifle Review Panel dated 1 June 1968 was prepared for the Office of the Chief of Staff of the Army, by the Office of the Director of Weapons System Analysis. The Ground Combat Systems Division, Office of the Director of Weapons Systems, Office of the Deputy Chief of Staff for Research, Development and Acquisition, is the successor to the originator of the report.
2. This office has completed a review of subject report and appendices 1 through 11 and has determined classification of Confidential is no longer needed. The report is now Unclassified. Selected extracts of the report are at Enclosure 1.
3. Notification of this declassification will be forwarded to all distribution addressees and a declassified copy will be forwarded to the Defense Technical Information Center, Cameron Station, for file.

1 Encl
as


WILLIAM O. COOMER
Colonel, GS
Chief, Ground Combat Systems
Division

File


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M16 PRODUCT IMPROVEMENT MODIFICATIONS

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1 June 1968


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APPENDIX 11

M16 PRODUCT IMPROVEMENT MODIFICATIONS

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John W. Phillips



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APPENDIX 11

M16 PRODUCT IMPROVEMENT MODIFICATIONS

A. Introduction

The following two sections of this appendix summarize 165 requests by Colt's to the U.S. Army Weapons Command for technical action on the M16A1 weapon system or for waivers on production lots of M16A1 rifles on government contracts DA-11-199-AMC-508 and DAAFO3-66-C-0018, respectively. Only requests for technical action (RTA's) and requests for waiver (RFW's) that affect the rifle in terms of dimensions, materials, and performance characteristics are included. The concluding two sections of the appendix analyze modifications made to date and cite modifications that are under consideration as future product improvements.

The data in sections B and C are extracted from the RTA's and RFW's submitted by Colt's. The numbers in the left hand column are those assigned the RTA or RFW. Blocks of numbers were frequently skipped, and in one instance a number was used twice. The date in the second column is the date Colt's signed the RTA or RFW. The description of the request is as given on the RTA or RFW, except that for a few cases when the description was technical and lengthy, Colt's description was abridged. The rationale in each instance

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is as stated by Colt's except that the statement that the proposed modification would not affect adversely the function, safety, service life, interchangeability or reliability of the rifle has been deleted. The Government approval of Colt's request reflected in successive indorsements by Springfield Armory, Weapons Command, and Defense Contract Administration Services, where granted, was subject to the provision that Colt's absorb any price increases or give the Government cost consideration. Information as to Government disposition of Colt's requests of 27 October 1967 to modify a series of 18 drawings in order to improve dimensional control and to depict the part as produced was not available at the time this report was prepared.

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B. REQUESTS FOR TECHNICAL ACTION ON CONTRACT 508

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE FINAL ACTI
5	8 Apr 64	Bolt	Use bolts without .062 ± .005 diameter drain hole located 1.06 ± .010 from cartridge seat.	To make use of bolts without drain hole. Hole was to be added when tooling became available.	Approved.	17 Apr 6
8	21 Apr 64	Barrel	Use barrels with internal camfer at muzzle end .010 over .005 - .015 X 45° basic drawing requirement.	To use finished barrel assemblies considered acceptable.	Deviation granted after Government representatives witnessed target and accuracy tests.	28 Apr 6
9	21 Apr 64	Magazine Bottom Plate	Use magazine bottom plates which are not anodized.	To correct error in drawing 62193. The bottom plate had never been anodized.	Approved.	23 Apr 6
10	21 Apr 64	Front Sight	Use front sights heat treated to Rc 26-32.	To revise drawing to specify heat treat requirement which had been removed inadvertently.	Approved.	23 Apr 6
11	23 Apr 64	Bolt Carrier	Permit .530 ± .005 inside diameter to be .530 ± .010.	To revise engineering drawing to conform with manufacturing operation instruction sheets which allow a ±.010 tolerance.	Approved.	30 Apr 6
12	23 Apr 64	Magazine Assembly	Bow in sides of magazine assembly not to exceed .910 maximum outside dimension.	To provide clearance in lower receiver magazine well. Bow was caused by the forming operation.	Approved.	23 Apr 64)
13	24 Apr 64	Cyclic Rate Specification	Accept rifles with cyclic rate of fire up to 900 rounds per minute.	To formalize agreement at 24-25 Mar 64 meeting of the AR15/M16 Rifle Technical Coordinating Committee.	Approved.	30 Apr 64
17	5 May 64	Magazine Follower	Change drawing requirement for black anodize finish to Iridite finish.	To conform to existing processing methods.	Approved.	11 May 64
18	5 May 64	Box Magazine	Eliminate specification Barrol 79-85, Brinell 90 to 115, and substitute T6, minimum Brinell 80 or equivalent 35,000 psi.	To use standard T6 material as agreed upon at Springfield Armory meeting on 28 Apr 64.	Approved.	12 May 64

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE	
						FINAL (	ACTI
20	7 May 64	Cyclic Rate Specification	Accept rifles with cyclic rate of fire up to 900 rounds per minute.	To accept rifles with cyclic rate of fire up to 900 rounds per minute until Frankford Arsenal tests are completed.	Deviation granted by PM-RS 13 Apr 64 tele-type.	12 May 64	
21	14 May 64	Front Sling Swivel, Trigger Guard Spring, Bolt Carrier, Firing Pin Retaining Pin, Extractor, Extractor Spring, Ejector and Safety Detent Spring, Receiver Extension, Buffer, Buffer End Ring, Buffer Outer Ring, Buffer Inner Ring, Action Spring Guide Assembly, Action Spring Guide, Buffer Retainer Spring, Pistol Grip, Bolt Catch, Automatic Sear Spring, Gas Tube, Gas Tube and Plug Assembly, Gas Tube Plug, Take-down pin, Detent Spring, Latch Cover Spring, Front Sight, Rear Sight, Front Sight Detent Spring, Rear Sight Detent Spring, Magazine Catch Spring, Charging Handle Latch Spring, Disconnect Spring, Butt Stock, Butt Stock Cap, Charging Handle, Trigger, Safety Selector Lever, Barrel, Hammer Assembly, Hammer, Plunger Cap, Plunger Spring, Lower Receiver, Upper Receiver, Bipod Spring, Bipod Case, Bipod Leg, Roll Pin, Rear Sight and Gas Tube Assembly.	Revise drawings for the listed components.	To incorporate changes in the listed components which will result in a better product and will eliminate certain malfunctions. Colt's had by tests and manufacturing experience proven the desirability of the proposed changes. Drawings were voided which had been found to be in error on certain dimensions received from the Fairchild Company.	Approved.	15 May 64	

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOV ACTION
23	27 May 64	Spring Cover, Action Spring Guide, Gas Tube and Plug Assembly, Gas Tube Assembly, Trigger Spring, Cam Pin, Disconnect, Hammer, Trigger, Handguard Slip Ring Spring Weld Assembly, Plunger, Upper Receiver, Bipod Case.	Revise drawings for the listed components. Void 12 May 64 change to action spring guide drawing 61580.	To incorporate changes in the listed components which will result in a better product and will eliminate certain malfunctions.	Approved.	27 May 64
26	12 Jun 64	Extractor, Receiver Extension, Action Spring Guide, Gas Tube and Plug Assembly, Takedown Pin, Charging Handle, Receiver Pivot Pin, Upper Receiver, Lower Receiver	Modify drawings for the listed components.	To incorporate changes in the listed components which will result in a better product and will eliminate certain malfunctions. This RTA represented continuation of the review initiated under RTA 21, and subsequently continued under RTA 23. It reflected purification of the drawings which would culminate as a result of experience gained in the field and through manufacturing of a better product, specifically in the areas of functioning performance and interchangeability.	Approved.	12 Jun 64
30	25 Jun 64	Cyclic Rate Specification	Accept rifles with cyclic rates up to 900 rds/min in July 1964.	To accept rifles with a cyclic rate of fire up to 900 rounds per minute until Frankford Arsenal tests are completed.	Approved.	30 Jun 64
31	6 Aug 64	Front Sling Swivel, Bolt Carrier Key, Ejector and Safety Detent Springs, Receiver Extension, Action Spring Guide, Pistol Grip, Hammer, Trigger, Front Sight, Stock (Swivel).	Modify drawings for the listed components.	To incorporate changes in the listed components which will result in a better product and will eliminate certain malfunctions.	Approved.	25 Aug 64
32	18 Aug 64	Magazine Assembly	Use magazine assemblies which have been seam-welded in lieu of spot-welded.	To rework magazines on which one or two spot-welds were defective.	Deviation rejected.	22 Sep 64

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF	
						FINAL GOVT	ACTION
33	23 Sep 64	Barrel Extension	Add drawing dimension $22\frac{1}{2} \pm 0.030$ for angular location of feed lips from timing hole and modify timing hole diameter.	To clarify the drawing and to conform to present processing. The hole diameter change is to insure drive fit of the timing pin.	Approved.	1 Oct 64	
34	8 Oct 64	Hammer	Modify dimensional specifications on drawing 61946.	To provide a more realistic manufacturing tolerance without affecting the quality of the end product.	Approved.	10 Nov 64	
35	8 Oct 64	Ejector and Safety Detent Spring	Modify specifications on drawing 61569.	To improve the ejection function of the rifle.	Approved subject to Colt's absorbing all costs.	12 Oct 64	
36	19 Oct 64	Bolt Carrier Key	Change from 63 to 125 microinch surface finish for all machined surfaces unless otherwise specified.	To allow more reasonable limits.	Cancelled at Colt's request.	11 Dec 64	
37	27 Oct 64	Ejection Port Cover Assembly	Revise ejection port cover assembly. Modify drawing 61955.	To provide design improvement and a cost reduction (\$.20 per unit).	Approved.	6 Nov 64	
38	28 Oct 64	Trigger	Change .156-.158 diameter of spring hole to .155-.159 on drawing 61562.	To eliminate ambiguous callout since the tolerances on critical dimension adequately control machined surface locations.	Approved.	16 Nov 64	
39	29 Oct 64	Extractor	Modify drawings 61645, 61643, and 61789.	To standardize drilling tolerance.	Approved.	9 Nov 64	
40	10 Nov 64	Gas Tube Assembly, Gas Tube and Plug Assembly, Gas Tube	Modify drawings 61645, 61643, and 61789.	To provide the dimension and hardness requirements necessary when stainless steel alternate material is used.	Approved.	11 Dec 64	
41	24 Dec 64	Upper and Lower Receiver	Modify drawings.	To provide design improvement by reducing the stress concentration in fillet areas, strengthening the trigger guard area, and eliminating possible interference with the upper receiver at the pivot lug. This change would beneficially affect function, service life, reliability, and interchangeability of the weapon.	Approved.	8 Jan 65	

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOVT ACTION
42	6 Jan 65	Safety Selector Lever	Add .005-.015 radius at two places between sear cam surface and the semi-automatic trigger stop.	To strengthen the post.	Approved.	19 Jan 65
43	7 Jan 65	Cam Pin	Add parco-lubrite to drawing 61704.	To clarify ambiguity in drawing.	Approved.	21 Jan 65
44	7 Jan 65	Barrel Extension	Change $1/8 \pm 1/64$ width of .993 $\pm$.005 diameter relief cut to $5/32 \pm 1/64$.	To improve quality and workmanship of the barrel extension.	Approved.	31 Jan 65
45	7 Jan 65	Bolt Carrier Key	Revise drawing 61547 for bolt carrier key.	To strengthen the key by increasing rigidity of the tube section and to improve staking of key to bolt carrier by decreasing mean diameter of counter-bore.	Rejected. Subsequently approved. See RFA 48.	4 Feb 65
46	13 Jan 65	Front Sight	Change .630-.670 dimension to .690-.730.	To provide sufficient material on forcing to eliminate break-through under all tolerance conditions when drilling .375-.380 diameter counterbore .200-.240 deep.	Approved.	26 Jan 65
47	20 Jan 65	Bolt	Tighten drawing requirement for staking cam pin hole.	To provide dimensions to control the depth of staking. To improve interchangeability.	Approved.	21 Jan 65
48	22 Jan 65	Bolt Carrier Key	Revise drawing 61547 for bolt carrier key.	To provide design improvement by strengthening the key by increasing the rigidity of the tube section to provide more stability during machining operations and greater durability in the weapon. The change also reduced the minimum diameter, applied recommended tolerance on socket screw counterbores to conform to recommended screw standards, and applied finish requirements to various surfaces which reflect careful consideration of component functional requirements without in any way decreasing weapon effectiveness.	Approved.	24 Feb 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL COM ACTION
49	25 Jan 65	Upper Receiver	Add alternate method to machine drawing to provide for use of 62,278 XM16E1 upper receiver forgings by milling off the forward assist boss.	To provide for use of 62,278 XM16E1 forgings when necessary to meet M16 USAF production schedules.	Approved.	1 Feb 65
50	26 Jan 65	Bolt Carrier	Modify dimensional specifications on drawing 61544.	To provide a design improvement by restricting concentricity requirement between functionally related diameters. To increase clearance for firing pin shoulder. To provide additional clearance for the magazine. This action resulted from Springfield Armory and Colt's technicians' study of modifying certain bolt carrier dimensions to improve firing pin and magazine performance.	Approved.	1 Feb 65
51	5 Feb 65	Upper Receiver	Fabricate M16 rifles for USAF using XM16E1 upper receiver with bolt closure boss milled off at no cost to the Government.	To meet February delivery requirements for the USAF, due to delayed vendor shipments.	Approved.	17 Feb 65
52	19 Feb 65	Front Sight	Modify dimensional specification on drawing 62068.	To modify machining drawing at front sight bayonet lug to insure positive ability to assemble with the M7 bayonet.	Approved providing Colt's bear all costs involved and delivery schedules are not delayed.	6 Mar 65
53	25 Feb 65	Ejector and Safety Detent Spring	Modify specifications on drawing 61569.	To improve ejection pattern of the rifle and to reduce the possibility of ejection failures.	Approved.	9 Mar 65
54	25 Feb 65	Pistol Grip	Add Fiberite FM 3510 as an alternate material.	To provide for an alternate material of equal cost and greater strength.	Approved.	10 Mar 65
55	1 Mar 65	Trigger	Change sear radius on trigger from .010 + .005R to .010 ± .005R.	To reduce mean dimension, thus insuring more positive catch on the hammer to decrease the number of rifles which double-fire on semi-automatic.	Approved.	11 Mar 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE FINAL ACTION
58	8 Mar 65	Extractor	Modify drawing 61562.	To obtain more consistent extraction by providing for a more uniform machine cut. Testing performed by the contractor indicated that this change would not adversely affect safety, function, service life, reliability, or interchangeability of the weapon.	Approved.	29 Mar 65
59	8 Mar 65	Handguard (Left and Right Halves)	Add FM 8130 as an alternate material.	To provide a material that has a better tensile strength than the original (4030-190) material and to provide an additional source of supply.	Approved.	19 Mar 65
60	8 Mar 65	Barrel and Front Sight Assembly	Modify drawing.	To update drawing in accordance with previously approved changes in component parts.	Approved.	19 Mar 65
61	8 Mar 65	Rear Sight Adjusting Screw	Add 4140 as an alternate material.	To provide an alternate material at no sacrifice in quality.	Approved.	19 Mar 65
62	8 Mar 65	Automatic Sear	Change .156-.158 diameter to .1555-.1585 on drawing 61590.	To specify standard drilling tolerance.	Approved.	19 Mar 65
63	8 Mar 65	Bolt Carrier	Add view to drawing 61544 showing possible mismatch resulting from grinding keyseat.	To clarify the drawing by showing the mismatch resulting from grinding the keyseat to meet surface finish and flatness requirements.	Approved.	29 Mar 65
64	25 Mar 65	Bolt Carrier	Add AISI 4140 steel as an alternate material. Harden and temper Rc 47-51 for 4140 material only.	To provide alternate material for greater flexibility in steel procurement.	Returned without action 1 Apr 65 verify statement of no sacrifice in quality, safety, function, or service life of the weapon.	
65	19 Mar 65	Rear Sight Windage Drum	Add sintered steel alloy 210 as an alternate material.	To provide potential cost reduction and procurement flexibility on future contracts.	Rejected as not being applicable to contract. See RTA 72.	1 Apr 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL CC ACTION
66	25 Mar 65	Upper Receiver	Fabricate M16 rifles for USAF using XM16E1 upper receivers with bolt closure boss milled off at no cost to the Government.	To meet April delivery requirements to the USAF.	Approved.	1 Apr 65
67	22 Mar 65	Bolt Carrier	Use quantity of not more than 600 bolt carriers with 125 microinch surface finish on rear face.	Parts were already electropolished with greater than the required 63 roughness on the rear face. The defect would not adversely affect safety, function, reliability, or interchangeability of the weapon.	Waiver granted.	1 Apr 65
68	31 Mar 65	Barrel Extension	Add AISI 8620 steel as an alternate material. The part is to be carburized to produce .010-.015 case and heat treated to produce case hardness Rc 60-62.	To provide alternate material for greater flexibility in steel purchasing.	Approved, subject to satisfactory evaluation of initial production lot.	23 Jun 65
69	31 Mar 65	Bolt Carrier	Add AISI 8620 steel as an alternate material. The part is to be carburized to produce .010-.015 case and heat treated to produce case hardness Rc 60-62.	To provide alternate material for greater flexibility in steel purchasing.	Approved, subject to satisfactory evaluation of initial production lot.	23 Jun 65
70	14 Apr 65	Flash Suppressor	Modify dimensional specifications on drawing 62182.	To permit flexibility in drilling before tapping $\frac{1}{2}$ - 28 UNEF - 28 thread so as to insure obtaining the required minimum full thread.	Approved.	26 Apr 65
71	20 Apr 65	Magazine Assembly	Add alternate method in accordance with drawing CX-5860.	To provide greater suitability for magazine lip dimensions which will improve the reliability and functioning of the magazine.	Rejected as the removal of two surfaces on the drawing adversely affected use of the 10-round ammunition stripper clip.	28 Apr 65
72	26 Apr 65	Rear Sight Windage Drum	Add sintered steel alloy 210 as an alternate material.	To add alternate material to drawing for flexibility in procurement.	Rejected as not being applicable to contract. Subsequently approved (see RTA 99).	13 May 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	NATIONALE	USAWECOM ACTION	DATE OF FINAL GOVT ACTION
73	26 Apr 65	Barrel Nut	Change surface roughness specification from 63 to 125.	To provide a specification compatible with the function of the part.	Approved.	13 May 65
74	26 Apr 65	Lower Receiver	Modify dimensional specifications on drawing 62300.	To redimension hole depths to reduce total variation with respect to related dimensions.	Approved subject to cost negotiation and implementation without obsolescence.	3 Sep 65
75	7 May 65	Bolt	Parco-lubrite instead of electrolyze.	To provide a functionally adequate protective coating.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
77	7 May 65	Extractor	Parco-lubrite instead of electrolyze.	To provide a functionally adequate protective coating.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
78	7 May 65	Ejector	Parco-lubrite instead of electrolyze.	To provide a functionally adequate protective coating.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
79	7 Jun 65	Firing Pin Retaining Pin	Revise in accordance with engineer drawing GX-5977.	To provide improved service life.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
80	7 May 65	Extractor Pin	Parco-lubrite instead of electrolyze.	To provide a functionally adequate protective coating.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
81	7 Jun 65	Hammer	Modify dimensional specifications on drawing 61946.	To apply parallelism restriction to seat surfaces, and to insure ability to assemble the hammer pin retainer.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAFECOM ACTION	DATE OF FINAL ACTION
83	12 May 65	Handguard Cap	Change .186 ± .001 dimension on drawing 62087 to .186 ± .003 and ± .001.	To allow for heat treat changes.	Approved.	21 May 65
84	17 May 65	Lower Receiver	Modify dimensional specifications on drawing 62300.	To specify locating dimensions which will provide for positive control of forging dimensions.	Approved.	4 Jun 65
85	24 May 65	Socket Head Cap Screw	Add additional procurement sources to drawing 92201.	To insure positive staking of cap screw to bolt carrier key.	Approved.	10 Jun 65
86	25 May 65	Trigger Spring	Change .325 interior dimension to .360.	To allow for permissible variation in trigger, and to improve interchangeability.	Approved.	4 Jun 65
76	2 Sep 65	Bolt Carrier Key	On drawing 61547, change electroplate exterior to chrome plate interior and Parco-lubrite all remaining surfaces.	To provide an adequate protective coating in place of electroplating and to prevent seizing in .1805 diameter for improved functioning.	Approved provided there is no increase in contract price and no delay in delivery.	15 Sep 65
87	26 May 65	Handguard Liner	Add 3903-A14 aluminum as an alternate material.	To provide a second source of material.	Approved.	10 Jun 65
88	26 May 65	Buffer	Change .050 typical (±.005) to .05 typical (±.010) on drawing 61576.	To redimension the buffer so as to avoid sharp corners and fillets at bearing lands and to allow for normal variation in the extrusion process.	Approved.	10 Jun 65
89	27 May 65	Bolt	Change hardness from Rc 60-62 to Rc 57-61.	To increase the strength of the bolt. Tests showed an approximately 30% improvement in bolt life expectancy.	Approved.	16 Jun 65
90	1 Jun 65	Magazine Assembly	Revise box magazine in accordance with drawing 62332. Obsolete drawings 62121 and 61922.	To provide greater stability for magazine lip dimensions which will improve reliability and function of the magazine.	Approved provided final protective finish is hard anodize .0008 to .0010 film thickness or equivalent. Costs to be borne by Colt's.	17 Jun 65
91	7 Jun 65	Front Sight	Change .728-.730 counterbore diameter to .725-.730 on drawing 62028.	To provide tolerance for the handguard cap counterbore which conforms to good machine shop practice.	Approved.	13 Jun 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOVT ACTION
92	25 Jun 65	Bolt Carrier	Change the finish to chrome plate the interior dimensions and parcolor the outer dimensions. Change the surface finish on both ends to 125.	To allow for more than one source for plating and to provide a functionally adequate finish.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
93	25 Jun 65	Firing Pin	Add 8640 steel as an alternate material.	To provide alternate sources of material.	Approved subject to cost negotiation and implementation without obsolescence.	3 Sep 65
95	unknown	Bolt Catch	Add AISI 3310 steel as an alternate material.	To provide an additional source for steel, based on suitability of application and satisfactory performance in test guns. The chemical composition of 3310 is equivalent to that of the current material.	Approved.	23 Jul 65
96	5 Aug 65	Barrel Extension	Add AISI 8620 steel as an alternate material. Part is to be carburized to produce .010-.015 case and heat treated to produce case hardness Rc 60-62.	To provide alternate material for greater flexibility in steel purchasing at no sacrifice in quality. To supercede and cancel RTA 68.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
97	5 Aug 65	Bolt Carrier	Add AISI 8620 steel as an alternate material. Part is to be carburized to produce .010-.015 case and heat treated to produce case hardness Rc 60-62.	To provide alternate material for greater flexibility in steel purchasing at no sacrifice in quality. To supercede and cancel RTA 69.	Approved subject to cost negotiation and implementation without obsolescence.	2 Sep 65
98	18 Aug 65	Bolt Catch	Change 45° to 40° and modify dimensional specifications on drawing 61599.	To increase bearing area on lower receiver for increased service life.	Approved subject to cost negotiation and implementation without obsolescence.	1 Sep 65
99	26 Aug 65	Rear Sight Windage Drum	Add sintered steel alloy 210 as an alternate material.	To add alternate material to drawing for flexibility in procurement.	Approved subject to cost negotiation and implementation without obsolescence.	1 Sep 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOVT ACTION
100	1 Sep 65	Cyclic Rate Specification	Provided 5.56mm ammunition loaded with Western ball powder (WC846) is supplied by the Government for testing, (1) modify SAPD-253, Amendment 2, dtd 20 Sep 63, to read cyclic rate to be 650 to 900 instead of 650 to 850 rounds per minute. (2) Eliminate failure of the bolt to lock as a malfunction in the 6000 round reliability test until the actual number can be determined. (3) Add one bolt failure to the list of unserviceable parts allowable after 3000 rounds. (4) Add one extractor spring failure to the list of unserviceable parts allowable in the first 3000 rounds; and two during the second 3000 rounds. (5) Specify that traces of graphite in the interior diameter of the bolt carrier and bore shall not be cause to reject the rifle.	Tests conducted by the contractor with 5.56mm ammunition containing WC846 propellant demonstrated the cited adverse effect on the weapon's performance.	Rejected.	15 Sep 65
101	2 Sep 65	Disconnect	Revise in accordance with drawing 62334.	To strengthen the disconnect so as to prevent breakage experienced in certain field applications.	Approved provided there is no increase in contract price and no delay in delivery. (There was a cost increase of \$242.60 for 2426 units.)	15 Sep 65
103	14 Oct 65	Bipod Assembly	Use 12,000 bipod assemblies with slight evidence of oxidation at edges of spot-welded reinforcement bracket.	The corrective action taken was to conduct an intensive investigation into various means of inhibiting corrosion in subject area and of improving quality control measures.	Waiver granted.	15 Oct 65
104	11 Oct 65	Bipod Assembly	Revise bipod assembly with respect to the pivot pin and snap ring on drawing 62122. Replace the snap ring by a spacer.	To eliminate the field problem of disengagement of the snap rings.	Approved. The price increase was \$0.16.	21 Oct 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USARECOM ACTION	DATE OF FINAL GOV ACTION
105	14 Oct 65	Front Sight	Use 278 pieces with .362 to 450 camfer actually .300 to 450 camfer.	This waiver would permit the use of parts with excessive camfer.	Waiver granted.	9 Dec 65
106	20 Sep 65	Buttstock Assembly	Use a quantity of 5,200 buttstock assemblies on which 1.120 + .005 diameter is .010 oversize on vertical axis only.	This waiver would permit use of parts with a deviation which will not affect safety, interchangeability, function, service life, or reliability of the weapon.	Waiver granted.	15 Oct 65
108	27 Oct 65	Disconnect	Change Rc 46-48 to Rc 46-50 on drawing 62334.	To provide proper tolerance for the part.	Approved.	9 Dec 65
109	27 Oct 65	Buttstock Assembly	Change 1.120 + .005 diameter thru to 1.120 + .010 diameter thru on drawing 61933.	To provide tolerance compatible with materials and manufacturing methods.	Approved.	9 Dec 65
111	3 Nov 65	Barrel	Use barrels with Rockwell C hardness, one point low on 20% of the lot and two points low on 5% of the lot for inspection lots 780 and 781. (Lot size was 360.)	This was an after-the-fact waiver to permit use of parts with a defect, not adversely affecting safety, function, service life or interchangeability. The vendor was notified, and larger samples were to be taken to detect discrepant material.	Waiver granted.	4 Nov 65
112	8 Nov 65	Pistol Grip	Change .367/.377 to .364/.388 and .102/.112 to .099/.115 on drawing 61593.	To provide tolerance for part compatible with material and application.	Approved.	15 Dec 65
113	11 Nov 65	Hammer Spring	Use parts with .325 + .005 inside diameter .331 to .333 for this lot (Number 18) only.	This was an after-the-fact waiver. The spring load requirement meets drawing specifications. The vendor was notified of the failure to meet dimensional specifications.	Waiver granted.	9 Dec 65
115	23 Nov 65	Gas Tube Assembly	Change unit packaging for repair parts from IA-8 method with preservative P-9, P-18, notes 1 and 4 to IC-1 method with preservative P-9, P-18, notes 1 and 3.	This was a before-the-fact waiver, requested because of inability to obtain specified material in time to make the shipment of repair parts.	Waiver granted.	9 Dec 65

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF	
						FINAL GOVT	ACTION
116	30 Nov 65	Bolt Carrier Key	Permit use of bolt carrier keys on which surface roughness exceeds 125 microinch on .250 - .005 diameter for .300 length.	This was after-the-fact waiver. Corrective action would be to change hand-feed hollow mill operation to automatic-feed.	Waiver granted to the extent indicated on the sample hand-carried to Springfield Armory.	9 Dec 65	
117	8 Dec 65	Bipod Spacer	Add steel AISI 1010 as an alternate material. Change .182/.192 to .192 ± .010.	To provide dimensions and material compatible with standard washer specifications.	Approved.	21 Dec 65	
118	8 Dec 65	Bipod Pivot Pin	Add steel AISI 1010 as an alternate material.	To permit greater latitude in procurement.	Approved.	21 Dec 65	
119	9 Dec 65	Firing Pin Retaining Pin	Cancelled by 6 Jan 66 RTA.		- - -		
120	20 Dec 65	Plunger Cep	Change material specification from SAE 4620 or 8620 to AISI 4620 or 8620 for for cost parts only; AISI 1137 for milled-from-bar parts.	To clarify specifications and to provide alternate source when parts are machined from bar stock.	Approved.	18 Jan 66	
123	6 Jan 66	Takedown Pin	Add alternate material AISI 8620, leaded.	To provide alternate material and improve case quality.	Rejected material as requested. Approved Steel AISI 8620 or 8620, .15-.35 lead permitted.	20 Jan 66	
124	6 Jan 66	Receiver Pivot Pin	Change material specification to read steel AISI 8620 leaded. Change heat treatment specification from carburize .010/.020 to read carburize case depth .010/.015.	To provide better core and case properties. To respond to Army request to provide pin that could not be removed readily.	Rejected material as requested. Approved Steel AISI 8620 or 8620, .15-.35 lead permitted. Approved .010/.015 core depth provided the Rockwell hardness is 15W (89-91).	20 Jan 66	

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOV ACTION
125	6 Jan 66	Bolt	Steel shotpeen entire circumference in area designated SSP. Scatter peening acceptable in areas designated SPA. Peening to be done after heat treat and grinding and before any surface coating.	To increase fatigue life. Test results with steel shot have been better than with glass shot.	Rejected. Satisfactory firing test results of bolts processed in this manner should be furnished to substantiate requirement. Also, data are needed on the cost impact. See RTA 17 on contract 0018.	20 Jan 66
126	6 Jan 66	Firing Pin Retaining Pin	Change material specification from 1030 or 1035 steel to AISI 1038. Change hardness specification.	To improve quality and reliability.	Approved.	20 Jan 66
127	14 Jan 66	Butt Cap Screw	Add .076/.086 diameter through longitudinal axis of screw. Add .175 minimum dimension to bottom of nylon locking plug.	To respond to Government request to provide drainage for butt stock (ref 13 Jan 66 Rifle Technical Committee Meeting).	Approved.	23 Jun 66
128	14 Jan 66	Lower Receiver	Change selected dimensions on drawing 62300.	To respond to Army request to provide protective boss around the area of the magazine (ref 13 Jan 66 Rifle Technical Committee Meeting).	Approved.	16 May 66
129	20 Jan 66	Rifle Blind Assembly	On drawing 62337, change .070 $\pm$.010 to .040 $\pm$.005.	To insure positive clearance when assembled to the rifle and to provide dimensional control of riveting.	Approved.	28 Jan 66
132	26 Jan 66	Extractor Pin	Change "Re 59-60 Draw Temp 2750 - 300°F at heat for one hour" to read "Oil quench from 1600°F, temper not lower than 275°F to equivalent Re 58-61".	To provide more realistic heat treatment tolerance.	Approved.	16 Feb 66
134	24 Jan 66	Bolt Carrier Key	Change surface roughness requirement on base of key as shown on drawings.	To specify a standard grind finish in order to control flatness more closely.	Approved.	16 Feb 66

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAMCOM ACTION	DATE OF FINAL GOVT ACTION
135	26 Jan 66	Takedown Pin, Receiver Pivot Pin	Modify hardness specification block on subject drawings. Remove note "Cold draw shafting .370-.375 diameter". Add, ".375 ± .005 diameter" to head diameter.	To provide the same hardness specification for both pins. To remove unnecessary material restriction on the takedown pin.	Approved.	15 Feb 66
136	26 Jan 66	Rear Sight	Change .078/.082 diameter to ".075/.085, out of round not to exceed .004". Remove .163/.167; add .007 ± .002 on drawing.	To specify the offset between sight holes which will limit the possible spread, thereby permitting more realistic hole diameter tolerance.	Approved.	16 Feb 66
140	1 Feb 66	Bolt	Change .840 dimension to .860. Change .840 Ref to .860 Ref. Change .15 dimension to .13 on the drawings.	To improve control of the extractor pin hole location by eliminating a possible cause of drill run-out.	Approved.	15 Feb 66
141	1 Feb 66	Extractor	Remove "5030' Ref. Typ."; ".098 - .102 at intersection with 17°30' angle". Change ".025R typ" to ".015 - .020R Typ" on the drawings.	To reduce the possibility of interference between the extractor lug and barrel extension lugs.	Approved.	15 Feb 66
144	1 Mar 66	- - -	Phosphate coat in accordance with MIL-P-16232C, dtd 31 Jan 64, with the attached exception, in lieu of MIL-P-16212B, dtd 9 Jul 58.	To update phosphate coating procedures in accordance with the latest Government requirements.	Approved with qualifications.	20 Apr 66
145	1 Mar 66	Front Sight	Open bipod slot and lower bayonet lug angle.	To provide greater clearance for bipod.	Approved.	7 Apr 66

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C. REQUESTS FOR TECHNICAL ACTION ON CONTRACT 0018

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOVT ACTION
1	28 Apr 66	Barrel	Change dimensional specifications.	To allow for increased utilization of existing machine capacity in support of increased production requirements. The proposed .045 maximum width and .555 minimum diameter predicated a condition whereby no relief is permissible at maximum metal.	Rejected.	25 Oct 66
2	13 Jul 66	Lower Receiver Marking	Accept rifles with illegible "XM16E1" and "Cal. 5.56mm" markings on lower receiver.	This was an after-the-fact waiver.	Waiver granted.	28 Jul 66
2	22 Mar 66	Bolt Catch Spring	Modify dimensional specifications and other characteristics on drawing 62177.	To improve the bolt catch action by reducing possible bounce during operation.	Approved.	17 Aug 66
3	22 Mar 66	Lower Receiver and Receiver Extension	Torque receiver extension to lower receiver in lieu of drilling and pinning.	To improve assembly method resulting in cost reduction, improved interchangeability, and simplified replacement of the receiver extension. \$.15 per unit cost reduction. Five XM16E1's, made to proposed specifications, were test fired 10,000 rounds each with no degradation of the receiver extension and no loosening of the assembly.	Approved by M16 Technical Committee, 13 Jan 66.	1 Aug 66
4	18 Mar 66	Charging Handle Latch	Modify dimensional specifications on drawing 61942.	To insure a more positive locking of the charging handle latch during firing. Resulted in one-time cost increase of \$1500.00.	Approved.	9 Aug 66
5	15 Apr 66	Latch Spring	Increase wire diameter with higher assembled load and rate.	To insure a more positive locking of the charging handle during firing.	Approved.	21 Jul 66
6	4 Mar 66	Action Spring Guide Assembly	Replace action spring guide assembly 62119 with buffer assembly 62339.	To improve the function of the XM16E1 by reducing the cyclic rate and to eliminate possible carrier bounce. Approved by Springfield Armory on 17 May 66. Resulted in a \$.27 per unit cost reduction.	Approved subject to a reduction in the contract price.	16 Jul 66
7	12 May 66	Rifle Biped Assembly	Modify dimensional specifications on drawing 62122.	To produce a permanent assembly at less cost than that being supplied. Resulted in a \$.12 per unit cost reduction.	Approved.	1 Aug 66

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOV ACTION
8	29 Apr 66	Bolt Carrier Key	Change .359 - .363 to .358 to .364 on drawing 61547.	To provide a tolerance compatible with materials and manufacturing methods.	Approved.	2 Jul 66
9	6 Jul 66	Handguard Cap	Add .025R minimum to inside periphery of barrel hole.	To insure clearance of cap with barrel at assembly.	Rejected.	9 Dec 66
10		Extractor	Change .005 flat permissible to .025 maximum flat permissible on both sides of extractor pin hole.	To allow for increased utilization of existing machine capacity in support of increased production requirement.	Approved.	19 Aug 66
12	5 Jul 66	Front Sight Post Selector Lever	Add lubra-plate to front sight post and selector lever at assembly.	To insure ease of function, as requested by the military.	Approved.	9 Sep 66
13	6 Jul 66	Pistol Grip Screw and Lockwasher	Change from stainless steel screw and lockwasher to a pre-assembled slotted fillister head screw with internal tooth lockwasher fabricated from carbon steel with phosphate finish.	To provide a more readily available standard component.	Rejected.	29 Nov 66
14	5 Jul 66	Extractor	Change Rc 59-61 draw temperature 275°F - 300°F at heat for 1 hour to read oil quench from 1600°F temper not lower than 275°F to equivalent Rc 58-61.	To provide a more realistic heat treatment tolerance.	Approved.	17 Nov 66
15	5 Jul 66	Barrel Extension	Change lug diameter from .567 + .005 to .572 + .005 on drawing 61575.	To insure positive clearance of extractor and extension during charging operation.	Approved.	17 Nov 66
16	6 Jul 66	Front Sight	Change .147 - .157 to .152 + .015 on drawing 62068.	To allow for increased utilization of existing machine capacity in support of increased requirements.	Approved.	17 Nov 66

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAMCOM ACTION	DATE OF FINAL GOV ACTION
17	24 Jun 66	Bolt	Steel shot peen entire circumference in area designated SSP. Scatter peening acceptable in areas designated SPA. Peening to be done after heat treat and grinding and before any surface coating.	To increase fatigue life. This was a resubmission of RTA 125 on contract 508 with substantiating test results.	Approved.	13 Sep 66
18	22 Aug 66	Muzzle Velocity Specification	Cease to measure muzzle velocity in 6,000 round reliability tests.	To eliminate the requirement since this requirement was for informational purposes only and data on 105 lots were available.	Rejected. Velocity data was still required.	25 Oct 66
19	1 Sep 66	Flash Suppressor	Utilize closed end flash suppressor.	To respond to military request for closed end suppressor to prevent the suppressor's being caught on brush.	Approved.	8 Sep 66
21	2 Dec 66	Barrel	Add alternate view to drawing 62069 specifying an optional configuration.	To allow for increased utilization of existing machine capacity in support of increased production requirements. To omit a ground relief on the barrel.	Approved, provided specified or .021 max be changed to .010 + .011 R.	19 Dec 66
22	16 Dec 66	Ejector	Delete sand blasting and add shot peening. Clarify heat treat requirements.	To improve fatigue life and to clarify the heat treat requirements. Cost increase is \$.01 per unit.	Approved.	26 May 67
23	16 Dec 66	Extractor Pin	Delete sand blasting and add shot peening. Clarify heat treat requirements.	To improve fatigue life and to clarify the heat treat requirements. Cost increase is \$.01 per unit.	Approved.	26 May 67
24	5 Jan 67	Buttstock Molding	Change material from Fiberite FM926 (cotton fiber filled) to Fiberite FM9130 (glass fiber filled).	To result in a more durable and fungus resistant buttstock assembly, as requested and tested by the Army. Estimated cost increase was \$.87 per unit.	Approved.	20 Apr 67
26	25 Jan 67	Charging Handle	Redimension the angle cut on drawing MX7027.	To permit positive fit of the handle with the receiver. To insure engagement of the latch at assembly.	Approved.	17 Mar 67

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOVT ACTION
27	25 Jan 67	Front Sight	Drill thru front sight post and tap drill hole as on drawing X47064.	To insure positive Parco-Lubrite coating for the entire length of the thread.	Approved.	17 Mar 67
28	25 Jan 67	Barrel Assembly and Barrel Extension	Change proofmark and magnetic article inspection symbol.	To facilitate manufacturing in support of increased production requirements.	Approved.	10 Apr 67
30	16 May 67	Firing Pin	Hard chrome plate in lieu of electroplated finish.	To allow for more than one source of plating. To provide a functionally adequate finish.	Approved, provided the Government receives cost consideration.	24 Jul 67
36	13 Mar 67	Lower Receiver	Change front pivot clearance cut length from 3/4" to 1/2".	To provide sufficient clearance for pivoting the upper receiver without removal of excess material from the lower receiver.	Approved.	2 May 67
40	12 Apr 67	Barrel and Barrel Extension Assembly	Add chrome plating to the chamber.	To increase corrosion resistance and thereby reduce the tendency of the cartridge and residue to stick in the chamber under adverse environmental conditions. Cost increase was \$1.37 per unit.	Approved subject to confirmation of chromed chambers with existing dimensional requirements.	26 May 67
41	24 May 67	Lower Receiver	Add drain hole to pivot detent hole.	To insure positive hard coating of interior dimensions and to aid drainage of pivot detent hole. Cost increase was estimated as \$.13 per unit.	Approved.	7 Aug 67
43	13 Jan 67	Bolt Carrier	Increase diameters J, K, L by 0.004.	To salvage parts with holes out of tolerance.	Waiver granted.	24 Jul 67
45	16 Aug 67	Front Sight	Change diameter of gas tube hole from .1810 - .1815 to .1805 - .1815.	To provide a more reasonable tolerance and at the same time to decrease the minimum clearance of the tube to the sight at assembly.	Approved.	12 Sep 67

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE OF FINAL GOVT ACTION
46	21 Aug 67	Barrel	Change the surface finish requirements on the outer dimensions of the barrel.	To provide a more realistic finish requirement. To facilitate the process procedure in support of increased production requirements.	Approved.	23 Sep 67
48	30 Aug 67	Firing Pin		The same as RTA 30, except that now the Government states price adjustment should not be sought.	Approved.	23 Sep 67
51	27 Oct 67	Lower Receiver	Modify drawing 62300.	To improve dimensional control and to depict the part as produced.		
52	27 Oct 67	Upper Receiver	Modify drawing 62306.	To improve dimensional control and to depict the part as produced.		
53	27 Oct 67	Upper Receiver	Modify drawing 62278.	To improve dimensional control and to depict the part as produced.		
54	23 Oct 67	Barrel and Barrel Extension Assembly	Modify drawing 62515.	To improve dimensional control and to depict the part as produced.		
55	23 Oct 67	Barrel and Barrel Extension Assembly	Modify drawing 62180.	To improve dimensional control and to depict the part as produced.		
56	23 Oct 67	Receiver Extension	Modify drawing 61574.	To improve dimensional control and to depict the part as produced.		
57	23 Oct 67	Chamber	Modify drawing 62189.	To improve dimensional control and to depict the part as produced.		
58	27 Oct 67	Magazine Follower	Modify drawing 62100.	To improve dimensional control and to depict the part as produced.		
59	27 Oct 67	Front Sight	Modify drawing 62068.	To improve dimensional control and to depict the part as produced.		
60	27 Oct 67	Charging Handle	Modify drawing 62288.	To improve dimensional control and to depict the part as produced.		

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NO.	DATE	PART	DESCRIPTION OF REQUEST	RATIONALE	USAWECOM ACTION	DATE
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61	27 Oct 67	Front Sight Forging	Modify drawing 62068.	To improve dimensional control and to depict the part as produced.		
62	27 Oct 67	Bolt Carrier Key	Modify drawing 61547.	To improve dimensional control and to depict the part as produced.		
63	27 Oct 67	Flash Suppressor	Modify drawing 62348.	To improve dimensional control and to depict the part as produced.		
64	27 Oct 67	Bolt Carrier	Modify drawing 62274.	To improve dimensional control and to depict the part as produced.		
65	27 Oct 67	Bolt Carrier	Modify drawing 61544.	To improve dimensional control and to depict the part as produced.		
66	27 Oct 67	Extractor	Modify drawing 61562.	To improve dimensional control and to depict the part as produced.		
67	27 Oct 67	Barrel	Modify drawing 62181.	To improve dimensional control and to depict the part as produced.		
68	27 Oct 67	Bolt	Modify drawing 61538.	To improve dimension control and to depict the part as produced.		

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D. Analysis of Request for Technical Action Data

Colt's initiated production of the M16 and the XM16E1 rifles in March 1964, under contract DA-11-199-AMC-508, having obtained the rights from the Armalite Division of the Fairchild Corporation.^{1/} In April and May 1964 eight RTA's were submitted to allow dimensional and material or surface treatment changes, and two RFW's to permit acceptance of weapons with cyclic rates of fire up to 900 rounds per minute. Cyclic rate apparently was not a major area of concern in 1964, as no test evidence substantiated the AR15-M16 Rifle Technical Coordinating Committee's approval of the specification change, nor was cyclic rate measured in the engineer design test of propellants conducted during this period of time at Aberdeen Proving Ground. In May 1964 two RTA's requested revision of the drawings, as obtained from Armalite, for 58 parts in order to incorporate changes in the subject components to provide a better product and to eliminate certain malfunctions. These requests were followed by two more proposals in June and August 1964 to modify the drawings for 19 components. Again in June 1964 Colt's requested and received a waiver to produce M16's with cyclic rates up to 900 rounds per minute.

Provision was made for the use of stainless steel for the gas tube and gas tube assembly in November 1964.

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29,000 M16 rifles had been procured in fiscal years 1961-1963 (See Appendix 5).

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In January, February, and March 1965, Colt's subcontractor for the M16 upper receiver forgings was behind his delivery schedule. In order to meet the deliveries scheduled for the U.S. Air Force, Colt's requested and received permission to utilize XM16E1 upper receiver forgings (with the bolt assist device) in fabricating M16 upper receivers by milling off the forward assist boss. Most other RTA's in the 1964 and 1965 time period proposed small dimensional changes, alternate materials, or surface finish modifications. Significant among the latter was a series of requests in May 1965 to parco-lubrite instead of electrolyze the bolt, ejector, extractor, and extractor pin. This was the change from the "shiny" to the "black" bolts, and was reported to improve wear resistance and service life. In June 1965 the bolt carrier finish was changed from electrolyzed to a chrome-plated interior and a parco-lubrited exterior. Three months later the electrolyzed bolt carrier key was replaced by one chrome-plated on the inside and parco-lubrited on all remaining surfaces. A further change in the bolt finish was requested in January 1966 with initiation of steel shot peening to increase the fatigue life. The only published test report on the efficacy of the bolt finishes is a February 1966 Lackland Air Force Base report. The Colt's January 1966 request was rejected until such time as satisfactory firing test results with shot-peened bolts substantiated the value of the

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requested improvement. After the Air Force tests, Colt's again submitted the RTA to shot-peen bolts on 24 June 1966, and it received final approval on 13 September.

Colt's requested permanent change in the cyclic rate upper limit specification from 850 to 900 rounds per minute in September 1965, if they were to be required to continue to utilize ammunition loaded with WC846 ball propellant for rifle acceptance testing. The Colt's request was rejected on 15 September 1965. Two months elapsed before the Project Manager - Rifles, acting on preliminary reports from the Army Small Arms Weapons Systems (SAWS) Study sites directed Frankford Arsenal to conduct a comparative evaluation of typical lots of 5.56mm ammunition loaded with ball and extruded-grain propellants.

The first of the two major product improvement modifications made to the M16 since Colt's began production in March 1964 was to change the action spring guide (buffer) assemblies, replacing the original nested-spring design by a variable impact buffer utilizing sliding weights separated by rubber washers. Modification of the buffer had been proposed by Colt's at the 12-13 January 1966 meeting of the M16 Rifle Technical Coordinating Committee. At this meeting Frankford Arsenal representatives reported on their December 1965 test of the SAWS ammunition lots.^{2/}

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Frankford Arsenal, A Test of Cartridge 5.56mm, Ball, M193 Lots RA5074 and WCC6089 in Rifles, 5.56mm XM16E1 and AR15, February 1966

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In this test the increased cyclic rate with WC846 ball propellant and the association of high cyclic and malfunction rates were confirmed. Colt's data had given similar results. The Committee approved Colt's suggestion that new buffer designs be tested. These tests were undertaken at Springfield Armory. On 4 March 1966 Colt's submitted a formal request to change the buffers. The request was approved by Springfield Armory on 17 May 1967 and by the Project Manager - Rifles on 6 July 1966. On 16 July the contracting officer notified Colt's of governmental approval subject to a reduction in the contract prices. Rifles utilizing the new buffer design were first received in December 1966.

On 12 April 1967 Colt's proposed chrome plating the chamber to increase corrosion resistance and thereby to reduce the tendency of the cartridge and burning residue to stick in the chamber under adverse environmental conditions. Approval was granted on 26 May 1967 without Army test. On 4 April 1967 the Air Force had reported favorably on its test at Lackland Air Force Base on six chrome-chambered M16 rifles. Meanwhile, the Army shipped 12 M16A1 rifles with chrome-plated chambers to Vietnam for evaluation. When a USAWECOM technical team visited Vietnam in May 1967, it could locate only two of these rifles, and no useful information could be obtained as to the efficacy of the chrome-plated chamber.

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In May 1967 the firing pin was changed to provide for hard chrome plating in lieu of electroplating. This modification has been the last in a series begun in November 1964, with introduction of stainless steel for the gas tube, to make the weapon system less susceptible to solid particles of residue contained in the propellant gases.

In October 1967, when the Army was obtaining production rights and engineering drawings for the M16, Colt's submitted 18 RTA's to modify drawings for the stated purpose of improving dimensional control and depicting the part as produced. These RTA's confirm the fact that dimensional tolerances on weapons as produced can and have deviated from the drawings over a period of time. Similarly RTA's which result in dimensional modifications on drawings may or may not result in a significant modification of production parts.

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E. Pending Product Improvements

In March 1968 the U.S. Army Weapons Command and Colt's were considering twelve product improvement modifications, which had not yet been formally proposed in an RTA.

1. Buttstock. Change the filler material and provide space for storage of the four-piece cleaning rod and other cleaning equipment.
2. Magazine. Change the configuration to provide for a thirty-round capacity.
3. Magazine. Develop new plastic materials and a new follower assembly to permit issue of disposable, pre-loaded magazines.
4. Magazine Spring. Make the spring of stainless steel to prevent rust and corrosion, thereby increasing magazine life and reliability.
5. Upper and Lower Receiver. Shot peen the surfaces to provide a more durable finish and to aid in the prevention of exfoliation and inter-granular corrosion.
6. Handguard Slip Ring and Spring. Redesign the slip ring to allow easier removal of the handguard and cadmium coat the spring.
7. Ejection Port Cover and Pin. Use stainless steel for these parts to prevent rusting.

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8. Barrel. Chrome plate the barrel to improve resistance to corrosion and metal fouling deposits.

9. Extractor Spring. Utilize nested springs to provide for longer spring life.

10. Magazine Cover. Utilize a plastic bag or cap cover to protect magazines from adverse environments. (As of 19 April 1968, two million magazine covers had been delivered from the contractor, 693,089 shipped to Vietnam, and another two million were still on contract.)

11. Rear Sight. Provide for a center index "0".

12. Charging Handle Latch. Add Delrin to the charging handle latch material to prevent wear of the upper receiver.

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F. Conclusions

1. RTA's are submitted by Colt's, most often at Colt's initiative, but also in response to Army requests for modifications to the system.
2. The majority of RTA's have been relatively minor -- calling for dimensional and surface or material finish changes. Many of these were to correct drawings, making them compatible with the parts being produced.
3. Between November 1964 and May 1967, a series of modifications were introduced to make reliable functioning of the M16A1 system less susceptible to solid particles of residue contained in the propellant gases.
4. Colt's recognized as early as September 1965 the increased cyclic rate effects of WC846 (ball) propellant.
5. There was a delay of five months between final approval of the redesigned buffer and its introduction into production.
6. RTA's were often not supported by detailed test data. Even the major modification to chrome plate the chamber was not tested by the Army. Tests of the redesigned buffer prior to its introduction were limited, despite the eleven-month lapse of time between Colt's proposal to modify the buffer and its being introduced on production rifles.

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