DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY WEAPONS COMMAND
ROCK ISLAND ARSENAL
ROCK ISLAND, ILLINOIS 61202

IN REPLY REFER TO:
AMSWE - AMCPM-RS

8 FEB 1966

JD
25-2

SUBJECT: Minutes of M16/XM16E1 Rifle Technical Coordinating Committee Meeting of 12-13 January 1966

TO: SEE DISTRIBUTION

1. Attached hereto for your retention and necessary action are the minutes of the 12-13 January 1966 meeting of the M16/XM16E1 Rifle Technical Coordinating Committee.

2. The action agencies designated after each paragraph are requested to take aggressive follow-up action to complete assigned tasks. Any delay in completion of the assigned tasks should be reported telephonically to the Project Manager, Rifles.

3. Sufficient copies have been included for each addressee for distribution to personnel listed in inclosure 2 (of the minutes), as well as other interested agencies.

4. Springfield Armory (SWESP-CPM) and Frankford Arsenal (SMUFA B1000) are requested to make telephonic progress reports to the Project Manager, Rifles on the action items in these minutes. Telephonic reports should be made on Friday of each week to Major Underwood (Rock Island Arsenal, telephone 794-6843), until all actions have been completed.

Harold W. Yount

HAROLD W. YOUNT
Lt Colonel, GS
Project Manager, Rifles

1 Incl
as

AMCPM-RS
SUBJECT: Minutes of M16/XM16E1 Rifle Technical Coordinating Committee Meeting of 12-13 January 1966

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14 January 1966

MINUTES
M16/XM16E1 Rifle Technical Coordinating Committee Meeting
Frankford Arsenal, Philadelphia, Pennsylvania
12 and 13 January 1966

1. A meeting of the M16/XM16E1 Rifle Technical Coordinating Committee was held at Frankford Arsenal on 12 and 13 January 1966. The agenda and list of attendees are attached as inclosures 1 and 2.

2. A synopsis of each discussion follows with the action agency responsible for follow-up listed at the end of each paragraph.

a. Increased Cyclic Rate and Fouling with Ball Propellant

As a result of an excessive number of malfunctions experienced with the XM16E1 Rifle during the SAWS evaluation at APG, in which ball propellant was utilized, a special test was conducted at Frankford Arsenal during the month of December 1965. The purpose of the test was to compare the performance of the rifle with cartridges loaded with ball propellant and IMR propellant, to determine if the performance of ball propellant was unsatisfactory, and if unsatisfactory to determine a solution to the problem. The report of test is attached as inclosure 3. Essentially the report concludes that the cyclic rate and fouling of the weapon are increased when using ball propellant as compared with IMR propellant. An increase in malfunctions occurs with the increase in cyclic rate. The important malfunctions are those considered to be stoppages (paragraph e, page 3).

The test did not result in the high malfunction rate experienced by APG during the SAWS test even though the identical lot of ammunition (lot WCC 6089) was used. The test was considered to be valid, and it was concluded that the stoppage rate was not high enough to be unacceptable in the field, but was high enough to warrant correction. Mr. Hutchins (Colt's) proposed a new buffer design which would lower the cyclic rate with both ball and IMR propellant, and would therefore reduce malfunctions caused by high cyclic rate. The committee approved Colt's suggestion that the new buffer design be submitted as an RTA. Colt's was requested to provide 12 buffers (1 PM, 5 AF, and 6 SA) by 21 January 1966 for test. Colt's was also requested to provide the PM with a cutaway model of the buffer. Springfield Armory will test the buffers with ball and IMR propellant and tracer cartridges, and be prepared to act on the RTA when it is received. They were requested to run the cold chamber test in incremental steps, since failure of the rubber parts of the buffer may occur in the vicinity of -65°F.

Colt's agreed to evaluate the proposed buffer design with two new propellant mixtures (currently under test by TECOM) to be provided by Frankford. In addition it was pointed out that the new buffer might cause problems with the performance of the blank cartridge presently being developed. Springfield Armory was requested to evaluate the performance of the blank cartridge with the new buffer design.

As a result of the Frankford test the committee agreed that ball propellant produces more fouling than IMR propellant, but the difference is not significant and does not appear to be related to the malfunction problem.

The committee requested that Frankford Arsenal continue to investigate the problems caused by ball propellant and determine what changes to the ammunition purchase description could be made to define acceptable performance with ball as well as IMR propellant.

ACTION: Colt's, SA, and FA

b. Fouling of the Rifle Due to Type Primers

At the June 1965 Technical Committee Meeting, it was suggested that fouling of the rifle with current ammunition might be the result of an unauthorized change in the cartridge primer ingredients. Frankford Arsenal was requested to conduct a chemical analysis of the primers in an ammunition lot suspected of producing excessive fouling. Mr. Shindler reported that the Frankford analysis of lot WCC 6051 revealed no change in primer composition from that permitted by technical data, and that the primers were acceptable.

c. Changes to XM148 Grenade Launcher Design

Mr. Hutchins discussed the following changes to the launcher design:

(1) Reduction of the cocking force.

(2) Replacement of the cocking button with a cocking lever.

(3) Rear sight changes to permit zeroing at -65°F.

(4) New handguard design for rifle which is also compatible with the grenade launcher.

(5) New cross bolt type safety.

The committee was satisfied with the reduction in cocking force to approximately 22 pounds and with the new cocking lever design.

The committee approved an increase of 1/8 inch in the length of the rear sight zeroing screw to accommodate temperatures to -65°F. It was felt that anything more than this would pose an unacceptable protrusion. It was agreed that an increase of 1/8 inch would permit zeroing at 100 meters and development of a field expedient technique for correlating sight settings with ranges other than 100 meters.

The committee disapproved the proposed rifle handguard design, because it was felt that it would be too risky to adopt the design without testing. Colt's was asked to submit prototype handguards for evaluation as

soon as possible. They were also asked to pursue a secondary effort on a drawing study of a more rectangular shape, but not to produce any hardware unless the first prototypes proved to be unsatisfactory. The project manager stated that he would incorporate inventory controls into the present rifle and grenade launcher contracts, to minimize the handguards on hand at the time the new rifle handguard was approved. In this manner, the new handguard design can be incorporated with the minimum difficulty for both the rifle and the grenade launcher.

The committee disapproved the cross bolt safety design for incorporation into the launcher, because it was considered too risky to adopt without testing. Subsequent to the meeting (14 January 1966), additional information was provided the Project Manager by Colt's concerning the interface between the reduced cocking force and elimination of the old safety design. Essentially the new information explained why it was not possible to have the reduced cocking force and the old safety design in the same launcher. In addition, it was reiterated that the old safety would not be interchangeable, nor would it correct the problem of not being a positive safety. As a result of this additional information, telephonic concurrence was obtained from Mr. Aumen, Major Edmunds, Mr. Packard, and Mr. Thompson (AWC-RD) to adopt the cross bolt type safety subject to satisfactory performance during the Initial Production Test. ACTION: Colt's and PM

d. Tactical Packaging of 5.56mm Ammunition

Tactical packaging of 5.56mm ammunition has been tested and approved by TECOM with a recommendation for immediate type classification and procurement. The committee agreed that the individual parts of the tactical pack would not require type classification, and recommended that ball ammunition be packaged in tactical packaging as soon as possible. Frankford estimates that it will take one year to get the tactical packaging into the system.

The Project Manager recommended that tracer ammunition continue to be packed in cardboard cartons since it would seldom if ever be used in any manner other than as a mixture with ball ammunition, therefore, it would not be necessary for a man to carry a complete bandoleer of tracer ammunition.

The committee approved a request to include tracer ammunition in the tactical packaging specifications, so that if it were ever desirable to pack tracer ammunition that way the specifications would be available.

The committee approved Mr. Charno's request to remove the 5.56mm ammunition test specifications from the ammunition specifications and put it into a separate test manual.

The Air Force stated that they are desirous of procuring ammunition in tactical packaging and requested that OOYEC and OOAMA, Hill Air Force Base, be provided the necessary information at the earliest practiable date upon which to base procurement. ACTION: FA

e. Changes to M16/XM16E1 Rifle Design

Due to the recent Army procurement of XM16E1 Rifles, Colt's had been requested to make certain changes for improvement of the rifle. Mr. Hutchins discussed the following recommended changes:

(1) New Buffer - See discussion under paragraph 2.a.

(2) Protective Shoulder for Magazine Release Button - This feature would protect the magazine release button from being hit accidentally. Air Force tests indicate that the protective shoulder makes it difficult to release the magazine when wearing arctic handgear. The Air Force dropped its objections to this difficulty in favor of the Army's pressing requirement for the change, as indicated by the numerous reports from the field of accidental release of the magazine, and the fact that the weapon is used primarily in the temperate zone. ACTION: Colt's

(3) Closed End Flash Suppressor - The closed end flash suppressor was recommended to alleviate the problem of brush, vines, etc., catching the open prongs of the present design. The Air Force and the Army have tested the new design and found it equally as suitable for flash suppression as the old design with marginal improvements in some respects. It was discovered that the inside diameter of the new flash suppressor was smaller than that of the old flash suppressor, and as a result the Blank Firing Attachment developed by Remington would not fit the new design. The committee approved the new flash suppressor subject to modification of the inside diameter of the flash suppressor to be compatible with the blank firing attachment, and reverification by Springfield Armory that flash suppression is satisfactory. Mr. Hutchins stated that a rough estimate indicated that the new flash suppressor may cost three times as much as the old design. ACTION: Colt's and SA

(4) Drain Hole in Butt Stock Retaining Screw - Reports from the field indicate that when the rifle gets wet, water is trapped in the barrel extension behind the buffer. To alleviate this problem Colt's will put a drain hole in the butt stock retaining screw. ACTION: Colt's

(5) Peening of Bipod Hinge Pin - Reports from the field indicate that the split washer which retains the hinge pin of the bipod is frequently lost. The committee approved Colt's proposal to permanently peen the hinge pin in place since the bipod does not require disassembly for maintenance and is to be replaced, instead of repaired, in the event of damage. ACTION: Colt's

(6) Shot Peening of Bolt - Colt's proposed that the bolt be shot peened during manufacture to add to the life of the bolt. The committee approved submission of this change by RTA. ACTION: Colt's

(7) Separation of Lower Receiver and Extension - Mr. Hutchins explained that at present the lower receiver and barrel extension are pinned together when the rifle is manufactured. They have run tests and concluded

that the extension will stay in place when torqued to 40 pounds and the pin is omitted. Since there have been recent field reports of oxidation of the extension, it is logical to assume that the item is frequently replaced. To simplify replacement of the item and to simplify manufacture of the rifle, Colt's proposed that the base of the extension be made flat sided (so that it could be tightened with a wrench), and elimination of the locking pin. The committee approved submission of an RTA. ACTION: Colt's and PM

(8) Redesign of the Handguard - See discussion under paragraph 2.a. ACTION: Colt's and PM

f. Thirty Round Magazine

The committee was informed that the Army is adopting a 30-round magazine and has taken action to provide a suitable ammunition pouch concurrently. The Air Force is interested in the 30-round magazine and will make their requirements known as soon as possible. Since the conference, CDC has notified the Project Manager that each XM16E1 Rifle will be issued with five 30-round magazines. All riflemen other than automatic riflemen will have five magazines. The automatic riflemen will have seven magazines. Therefore, the ammunition pouch will be designed to carry three 30-round magazines (the seventh magazine is carried in the rifle).

g. Quality Control of Rifle Production

The Air Force reported the following discrepancies discovered in M16 Rifles which appear to be the fault of Quality Control procedures:

(1) Omission of milling slot in hammer and omission of hammer pin retaining spring which fits into the slot.

(2) Bent hammer spring installed in a new unused rifle.

(3) Front sights which loosened after firing 500 - 700 rounds. Apparently caused by oversized taper pin holes.

(4) Frozen selector levers on new weapons apparently caused by a lack of lubrication of the mating parts during final assembly.

(5) Freezing of gas tube in key of bolt carrier on new weapons apparently caused by a lack of lubrication of the mating parts during final assembly.

The Project Manager was given exhibits and they will be referred to AWC Quality Assurance personnel for investigation and corrective action. ACTION: PM

h. Bolt Breakage

The Air Force stated that bolt breakage continues to be their outstanding parts breakage problem and requested corrective action. It was agreed that several actions to increase bolt life are presently in the process

of being incorporated. They include a change to the bolt heat treat, a change in the bolt finish from electrolyzing to parkerizing and the shot peening discussed in paragraph 2.e.(6). Pending incorporation of these changes and verification of the effect upon bolt life, no further changes will be made to the bolt.

i. Status Report on Follow-Up Actions of Previously Approved Items from the June and October 1965 Technical Coordinating Committee Meetings.

The following items from the two previous meetings were discussed:

(1) 40MM Grenade Launcher Ammunition Development - Picatinny Arsenal has received approval to proceed with development of 40mm illuminating and star cluster rounds.

(2) Barrel Erosion Test - The following parts changes tested during the barrel erosion test are now in production: Phosphate finish instead of an electrolyzed finish for the bolt, ejector, extractor, carrier key, and extractor pin. There are production problems involved in producing the gas tube using seamless material and Colt's has decided not to utilize this material.

(3) Cleaning Rod Improvement - Springfield Armory has completed design and fabrication of both a jointed and pull through type cleaning rod for evaluation. Since this program began, a chamber cleaning brush has been developed which utilizes the handle section of the jointed rod. For this reason the pull through type rod is no longer under consideration by the Army. The prototype jointed rods will be shipped to TECOM this week for ET/ST, and the pull through rods will be sent to the Air Force for evaluation since the Air Force is still interested in this type cleaning equipment.

ACTION: SA

(4) Denting of the Lower Receiver - A redesigned bolt stop to alleviate the denting of the bridge in the lower receiver is now in production.

(5) Blank Cartridge and Blank Firing Attachment - Prototypes have successfully passed an Engineering Design Test at Springfield Armory. The ET/ST items are to be available in February for shipment to TECOM. As noted in paragraph 2.a the new buffer may reduce the weapon cyclic rate to the extent that functioning with the blank cartridge may be adversely affected. The committee noted that the new flash suppressor design (paragraph 2.e.(3))is not compatible with the blank firing attachment in two respects. First the inside diameter of the blank firing attachment is too small and secondly, the Bellville Washer in the blank firing attachment is too small. Colt's was requested to make the inside diameter the same as on the present flash suppressor, and Frankford Arsenal was requested to work out with Remington Arms in conjunction with Springfield Armory a satisfactory modification to the Bellville Washer so that it would be compatible with both the old and new flash suppressors.

ACTION: Colt's and FA

(6) Chamber Cleaning Brush - A chamber cleaning brush has been designed and tested. It is now being procured for issue starting in May 1966. The handle section of the jointed cleaning rod (paragraph 2.i.(3)) is utilized as a handle for the chamber brush. The Air Force stated that they were interested in this item, and it was pointed out that it could not be used without the new jointed cleaning rod.

(7) Field Commanders Reports - The final commanders report has now been received from Army units using the XM16E1 Rifle. In general, the reaction to the weapon is favorable. No problems were reported which are not already known by the committee.

(8) Combination Rear Sight - Development work on the rear sight which combines both elevation and windage adjustments has been suspended for two reasons. First, the combined rear sight cannot compensate for the change in center of impact caused by attaching the grenade launcher and secondly, at a coordination meeting held at Springfield Armory on 31 August 1965, it was determined that the user was becoming accustomed to the present sight system and no longer objected to it.

(9) Certification of New Propellants - Two New propellants are now being tested by TECOM. Samples will be sent to Colt's for test and comments, but not to Springfield Armory because there are not enough cartridges available. ACTION: Colt's and FA

(10) New Disconnector - The strengthened disconnector requested by the Air Force is now in production.

(11) Markings on Grenade Launcher Sight - Colt's has revised the design so that all sight markings visible to the gunner will be parkerized instead of filled with white lead. Also all sight markings will be indentations instead of raised markings which are harder to see.

(12) Sight Bar Detent Housing - Colt's has revised the design to incorporate a bottoming feature for the sight bar detent to prevent overtightening of the detent and damage to the spring.

(13) Nylock - Nylock has been incorporated into the following parts:

(a) Elevation Detent

(b) Extractor Cap Screw

(c) Firing Pin

(d) Recoil Plate (Firing Pin Retainer)

(e) Sear Lever Cap Screw

(f) Sight Slide Nut

(g) Trigger Retaining Screw

(14) Anodizing of Sight Disc Detent Notches - The evaluation of the Colt's test data on the hard anodization of the sight disc notches will be done by Springfield Armory by 28 January 1966. Results of this evaluation will be telephoned to the Project Manager and followed in writing.
ACTION: SA

(15) Locktite - Colt's has revised their design to use locktite only in the following places: Sight locking bolt and release button, rear sight windage adjusting screw and button, and sight friction nut.

(16) Sight Locking Bolt & Release Button - Colt's has revised their design to specify limits of tightening of the two parts.

(17) Sight Base Tension Spring - Colt's has revised their design to provide a crimp to this spring after assembly, so that it cannot be lost accidentally.

(18) Sight Slide - The third (outer) position on the sight slide has been eliminated.

(19) Front Mount Holes - The cotter pin holes in the front mount screws have been enlarged to .039" plus or minus .003, so that they will accommodate a paper clip or other field expedient.

(20) Sling Swivel Attachment - Colt's has not completed design of the nut and bolt for retaining the sling swivel. An alternate approach of a clevis and nut was rejected. ACTION: Colt's

(21) Extractor - The extractor has been strengthened to eliminate or reduce breakage during difficult extractions.

(22) Cap Socket Screws - All cap socket screws have been standardized so that there are now only two different types (vary in length).

(23) Counterbalanced Sear Lever - The counterbalanced sear lever has been incorporated into the design.

(24) Grip Lock - The new grip lock design has been incorporated.

(25) Headspace Plunger - The new headspace plunger design has been incorporated.

(26) Flare Round - The receiver housing has been modified to accept the longer flare round now under development.

(27) Land and Groove Changes - Colt's has not completed the coordination with Springfield Armory to study the difference in the lands and grooves and chamber dimensions of the XM148 Grenade Launcher and the M79 Grenade Launcher. This will be done immediately. The results will be telephoned to the Project Manager by Springfield Armory, followed by a written report. Mr. Aumen gave the Army authority to concur for the Air Force in changes to the purchase description occasioned by this design study.
ACTION: Colt's and SA

(28) Finger Protector - The new finger protector design has been incorporated.

(29) Handguard - The new aluminum handguard design with the smaller holes has been incorporated.

(30) Firing Pin, Firing Pin Spring, Recoil Plate, and Chamfer on the Firing Pin Buffer Spring Recess - The design changes to these parts to prevent blown primers, hydraulic effect of water behind the firing pin, loosening of the recoil plate, and misalignment of the firing pin buffer spring have been incorporated. The recoil plate now has 18 threads per inch instead of 12.

(31) Assembly of the Trigger Spring - An access hole has been incorporated into the receiver housing design to facilitate assembly of the trigger spring. In addition a .065" hole has been drilled into the trigger bar 1/16" behind the sear lever notch also to aid in assembly.

(32) Cocking Force - The cocking force has been reduced to approximately 22 pounds. Colt's has asked for a maximum allowable cocking force of 26 pounds to accommodate variations from one launcher to the next.

(33) Optimum Aperture Size - HEL has completed a study to determine the optimum aperture size for engaging quick fire targets. They concluded that the present aperture size is satisfactory and that the primary difference in the time required to engage quick fire targets with the XM148 Grenade Launcher and the M79 Grenade Launcher is due to the difference in weapon configuration and method of reloading, and not due to the aperture size.

j. Butt Plate Retainer

The Air Force reported that they had incidents in which the butt cap screw cut through the butt plate retainer, allowing the stock to move to the rear, allowing the takedown pin detent and spring to move to the rear, with resultant loss of the takedown pin. It is suspected that this problem may be caused by firing rifle grenades or over tightening of the butt cap screw. An exhibit delivered to Colt's on 28 October 1965 is being studied by Colt's, and a recommendation of the cause and corrective action will be made to the Project Manager. ACTION: Colt's

k. Chamber Cleaning Brush

The Air Force reported that during their test of the prototype chamber cleaning brush the threaded end separated from the rest of the brush. Major Underwood explained that the brush drawing specified a pull test in excess of 100 pounds, and that production brushes would be checked to see that they met this test. The Air Force has a definite requirement for the chamber cleaning brush and will make their needs known through channels. It was pointed out that the new cleaning rod handle section is required to operate the chamber brush (see related discussion in paragraph 2.e.(3)).

l. Rifle Cleaning Kit

The Air Force stated that they are interested in field cleaning equipment which can be stored in the M16 Rifle. Major Underwood stated that the pull through cleaning rod design and accessories would be forwarded to Mr. Aumen by Springfield Armory this week for evaluation (see related discussion in paragraph 2.i.(3)). ACTION: SA

m. Blank Firing Attachment and Blank Cartridge

The Air Force is surveying all commands to determine their total requirements for these items and will make their needs known through channels. The prototype items are being fabricated for ET/ST and will be delivered in February 1966. (See related discussion in paragraph 2.a)

n. Ruptured Cartridge Case Extractors

USARPAC has reported ruptured cartridges occurring in XM16E1 Rifles used in Vietnam, and have requested a ruptured cartridge case extractor. A bolt carrier damaged in Vietnam by a ruptured cartridge was exhibited, and the committee was informed that the damage appeared to be the result of excess chamber pressure (more than is achieved with a proof round or by overloading the cartridge). The ruptured cartridge is incidental and the problem is actually to determine the cause of the excess pressure. Mr. Moore stated that APG had experienced this type failure during the rain test conducted with AR15 Rifles several years ago. The committee agreed that this might be the problem in Vietnam. At this time there is insufficient information available to solve the problem.

Since USARPAC requested ruptured cartridge case extractors, they were provided 200 each of two types in January 1966 and the Project Manager will follow-up to see that a standardized ruptured cartridge case extractor is put into the supply system, if required. Several suggestions were made to the effect that ruptured cartridge cases could be removed with the bore brush or the new chamber cleaning brush. This suggestion will be checked out by the Project Manager. ACTION: PM

o. Movement of Charging Handle During Firing

Several reports from various users have been received by the Project Manager, in which it was stated that the charging handle occasionally moved to the rear during firing. One such report from Fort Gordon, Georgia was to the effect that the shooter had two teeth knocked out by the charging handle coming to the rear. Mr. Hutchins stated that Colt's had investigated this report by sending a representative to Ft Gordon and found that the incident had been distorted. Actually no one had been hurt in any of the incidents, but a remark had been made that "a man could lose a couple of teeth". Colt's has studied the problem and determined that the charging handle can unlatch during firing and float to the rear (does not have any force). They recommended that the charging handle latch spring be changed, and the cam surface on the latch changed, so that the latch would be more positively locked. The committee requested that Colt's submit an RTA for these changes. ACTION: Colt's

p. TDP for 5.56mm Grenade Cartridge

The Air Force has provided a MIPR to MUCOM for the preparation of a TDP for the Grenade Cartridge, so that the Air Force can go out on competitive procurement for this item.

q. Blown Primers with 5.56mm Cartridges, Lot WCC 6063

The Air Force reported a high rate of blown primers with Lot WCC 6063 during function and casualty tests at Hill AFB. Samples shown to the committee appeared to be loose primers and not blown primers. The cause appeared to be oversized primer pockets. Frankford agreed to run a function and casualty test and requested that the Air Force send them samples of Lot 6063. ACTION: AF and FA

r. High Dud Rate of M34 WP Grenades when Fired from M16 Rifles

The Air Force reported a high dud rate with M34 WP Grenades (Lot 1021-45-18) (Fuse Lot 3-2) fired from M16 Rifles. Picatinny Arsenal tested this fuse lot and found them to meet the applicable mil spec. The Air Force is continuing to investigate this problem and will forward their results to MUCOM for corrective action. ACTION: AF

s. Dud Rate and Short Rounds with 40MM M406 and M407 Cartridges

The Air Force reported a 20% dud rate with M407E3 cartridges (Lot MA 70-10) fired at Eglin AFB, Florida. During this firing there was also a large number of split cartridge cases. Mr. Chaskes stated that he had checked out the acceptance records on this lot and found it to be an acceptable lot. It appears that the barrel and chamber dimensions of the launcher may be suspected. Mr. Chaskes will run a comparative test utilizing the same Air Force launcher (to be provided by Mr. Aumen), a new launcher (to be provided by Major Underwood), and an M79 launcher. Lot MA 70-10 is not available, therefore, a representative lot will be used. The test results will be forwarded to the Project Manager ASAP.
ACTION: AF, PM, and AMCPM-SA

t. Case Separation and Stretch of 5.56mm Cartridges

The Air Force referred to previous discussions on this subject and requested that a change be made to the cartridge mil spec. The change would more closely control those aspects of the cartridge case which contribute to case separation and stretch. The Air Force is concerned that a small change in contractor process, or by a new contractor, could result in a reoccurrence of the problem which now appears to be under control with the present mil spec. The Air Force request is in consonance with a remark made earlier by Mr. Vee in which he cautioned the committee to take all steps necessary to guarantee a high quality product (weapons and ammunition).

The Project Manager advised the committee that he had been advised by the secretary of defense to put restrictions into production only when there was definite justification for the restriction. At present the

ammunition is being produced satisfactorily under mil spec 9963D, therefore, further restrictions are not in order at this time. Frankford was requested to weigh the pros and cons of the Air Force request and recommend to the Project Manager whether or not justification exists for changes to the mil spec which would place further restrictions on the manufacture of cartridge cases. ACTION: FA

3. After all agenda items were discussed, Mr. Aumen requested that he receive copies of all Army reports concerning the XM16E1 Rifle, XM148 Grenade Launcher and ammunition for each. The Project Manager agreed to provide a copy of all reports to Mr. Aumen. Mr. Aumen also requested that the bibliography of reports on these weapons and ammunition be brought up to date and distributed to the committee members. ACTION: PM

Herbert P. Underwood

3 Incls
as

HERBERT P. UNDERWOOD
Major, GS
Recorder

AGENDA

1. Increased cyclic rate and fouling with Ball Propellant.
2. Fouling of Rifle due to Type Primers.
3. Changes to XM148 Grenade Launcher Design.
4. Tactical Packaging of 5.56mm Ammunition.
5. Changes to M16/XM16E1 Rifle Design.
6. Thirty Round Magazine.
7. Quality Control of Rifle Production.
8. Bolt Breakage.
9. Status Report on Follow-up Actions from June and October 1965 Technical Committee Meetings.
10. Failure of Butt Plate Retainer.
11. Chamber Cleaning Brush.
12. Rifle Cleaning Kit.
13. Blank Firing Attachment and Blank Cartridge.
14. Ruptured Cartridges and Ruptured Cartridge Extractor.
15. Movement of Charging Handle During Firing.
16. TDP for 5.56mm Grenade Cartridge.
17. Blown Primers with 5.56mm Cartridges, Lot WCC 6063.
18. High Dud Rate of M34 WP Grenades when fired from M16 Rifles.
19. Dud Rate and Short Rounds with 40mm M406 & M407 Cartridges.
20. Case Separation and Stretch of 5.56mm Cartridges.

Incl 1

ATTENDANCE AT M16/XM16E1 RIFLE TECHNICAL COORDINATING COMMITTEE MEETING - 12 January 1966 - FRANKFORD ARSENAL

NAME	TELEPHONE NO.	MAILING ADDRESS
L. F. Moore	EX-24148	Frankford Arsenal U4200
Maj M. S. Edmunds	OX-4-1341	Hq USMC (CSY) Wash D. C.
CWO H. H. Schroder	794-5848	Wpns Cmd RIA Rock Island Ill (USMC Liaison)
Lt Col H. J. Witkowski	2-2121	Ground Combat Div-MCLFDC, Quantico, Va 22134
A. E. Whitner	812-854-1325	Wpns Production Engr Center, USNAD Crane, Ind
W. C. Davis	527-4101	Colt's Firearms Div Hartford, Conn
W. J. Hutchins	527-4101	Same (Colt's)
C. J. McGee	EX-5111/7142	Frankford Arsenal U1000
C. E. Shindler	EX-6112	Frankford Arsenal U4300
C. J. Rhoades	EX-6884	AMCPM-RS
Maj F. E. Smith	OR-4-3211 EX-3139	USAF Marksmanship Sch Lackland AFB, Tex
W. S. Aumen, Jr.	EX-882-2488	DAD, RTD, ATWC, Eglin AFB, Fla
H. W. Kline	EX-5514	OOYEC, OOAMA Hill AFB
M. A. Fry	EX-5204	Frankford Arsenal U4000
H. P. Carr	EX-5156	WRAMA (WRNQTCA) Robins AFB, Ga
H. P. Lewis	EX-5955	WRAMA (WRNEMA) Robins AFB, Ga.
L. T. Chaskes	3283258.	USAMC Proj Mgr Sel Ammo Dover NJ AMCPM-SA
C. F. Packard	RE-96911 EX-3157	Springfield Armory SWESP-RED
F. J. Vee	OX-5-59946	OSD (I&L) 3D819 Pentagon
S. W. Spaulding	(AC 201) 328-2269	Hq USAMUCOM, Dover N.J.

Encl 2

CONTINUATION OF ATTENDANCE AT M16/XM16E1 RIFLE TECHNICAL COORDINATING COMMITTEE MEETING 12 January 1966-FRANKFORD ARSENAL

NAME	TELEPHONE NO.	MAILING ADDRESS
Lt Col H. W. Yount	A/C 309 7945546	Hq WECOM RIA, RI, ILL
Maj H. P. Underwood	A/C 809 794/6843	Hq WECOM RIA, RI, ILL
C. L. Crider	278-3608	USATECOM, APG, Md.
J V. Daily	EX 6221	Bldg 235-3 Frankford Arsenal
E. F. Glowacki	EX 24171	" " " "
J. Charno	EX 3241	Frankford Arsenal U4100
A. P. Batezell	Ex 7289	Frankford Arsenal B1000

Production Engineering Division
Small Caliber Engineering Directorate
Frankford Arsenal

Report on
A Test of Cartridge, 5.56mm, Ball, M193,
Lots RA 5074 and WCC 6089 in M16E1 and AR15 Rifles

It was requested by the U.S. Army Weapons Command that a test of the M16 rifle-ammunition system be conducted to investigate reports of high malfunction and breakage rates when using particular cartridge lots. A test plan was developed jointly by personnel of the Weapons Command, Springfield Armory and Frankford Arsenal.

Two cartridge lots were provided for this test. Information on the physical characteristics of the ammunition is given below.

	Weight (grains)				Bullet Pull (pounds)
Cartridge Lot	Case	Bullet	Propellant	Total	
RA 5074	96.5	54.5	25.3	176.3	106
WCC 6089	94.1	55.2	27.5	176.8	126

Lot RA 5074 was assembled with IMR propellant and lot WCC 6089 was assembled with Ball propellant.

The RA 5074 case was slightly harder near the base than the WCC 6089.

The following velocity and pressure data were obtained. Velocity is given in feet/second and pressure in pounds/square inch.

	RA 5074	WCC 6089
Average velocity at 15 feet	3237	3226
Standard deviation of velocity	19	43
Average chamber pressure	47,400	44,800
Standard deviation of chamber pressure	1700	800
Average port pressure	15,200	15,900
Standard deviation of port pressure	300	300

Encl 3

Four new M16E1 and two used AR 15 rifles were subjected to a 12,000-round test. One M16E1 and one AR15 rifles were designated to fire lot RA 5074 only and one rifle of each model were designated to fire lot WCC 6089 only. The two remaining rifles were designated to fire the two lots alternately. The lots were alternated after each 3000 rounds of firing. One rifle was fired first using lot RA 5074 and the other was fired first using lot WCC 6089. The rifles were inspected and the bores were measured prior to firing. The bores were again measured after firing 6000, 9000 and 12,000 rounds. Each rifle was fired five 10-round groups at a range of 100 yards from a Universal accuracy cradle supported in a V block on a Frankford Arsenal machine rest at the start of the test and after each 3000 rounds of firing. The rifles were cleaned, inspected and lubricated after firing each 1000 rounds using a procedure described in TM9-1005-249-14. The rifles were permitted to cool by natural means after each 1000 rounds of firing. Each 100 rounds of firing was conducted as follows:

20 rounds semiautomatically

20 rounds automatically in one burst (cyclic rate recorded)

20 rounds semiautomatically

20 rounds automatically in short bursts (4 or 5 bursts)

20 rounds semiautomatically

The rifles were fired from a bench rest. The gunner supported the rifle by both hands and one shoulder. A particular 100-round phase in each of the six rifles was fired by a single gunner. The gunner was rotated on each 100-round phase.

Summaries of the test are given in Tables 1 and 2.

The following differences in performance between the two cartridge lots were observed in firing:

a. Lot WCC 6089 gave a higher average cyclic rate.

b. Lot WCC 6089 gave a larger muzzle flash but fewer sparklers.

c. Lot WCC 6089 gave more fouling.

d. Lot WCC 6089 gave less bore erosion and consequently a smaller velocity loss.

e. Lot WCC 6089 gave a higher malfunction rate. Lot WCC 6089 gave a malfunction rate of 18.5/1000 rounds and a stoppage rate of 5.2/100 rounds, and lot RA 5074 gave a malfunction rate of 3.2/1000 rounds and a stoppage rate of 0.75/1000 rounds when fired in M16E1 rifles.

The following additional observations were made:

a. A reduction in cyclic rate occurred when firing lot WCC 6089 over 12,000 rounds.

b. The difference in level of velocity between the two lots was greater when fired in the M16E1 rifle than in the test weapon. The average velocity obtained with WCC 6089 was 99 feet/second lower in the M16E1 rifles.

c. There is a relationship between cyclic rate and malfunction rate but these characteristics may be related to a third characteristic which influences both cyclic rate and malfunction rate.

It is concluded that there is a difference in the performance of the two cartridge lots but the cause of this difference cannot be established on the basis of data developed in this test. Therefore, carefully-controlled tests will be required to identify the components which contributed to the difference in performance.

L. F. MOORE

TABLE 1

SUMMARY OF FUNCTION DATA

LEGEND

DF = Two rounds fed from magazine on one forward movement of bolt
FF = Failure to feed round from magazine
FJ = Failure to eject
FS = Failure to strip round from magazine
FX = Failure to extract
BCS = Bolt catch engaged bolt before last round was fired
BOB = Bolt over-rode base of round in feeding from magazine
BUB = Bolt under-rode base of round in feeding from magazine
CHU = Charging handle unlatched during firing
FBR = Failure of bolt to remain at rear after firing last round
FFR = Failure to fire
FML = Failure of magazine to latch
BFE = Bolt failed to engage base of round in magazine

Cyclic rate is given in rounds/minute

	Rifle and Cartridge Lot											
	M16E1 No. 140814 Cartridge Lot RA5074		M16E1 No. 139319 Cartridge Lot WCC6089		M16E1 No. 140595 Cartridge Lot WCC6089		M16E1 No. 139426 Cartridge Lot RA5074		AR15 No. 34787 Cartridge Lot RA5074		AR15 No. 31857 Cartridge Lot WCC6089	
1000 Round Cycle No.	Cyclic Rate	Malfunction	Cyclic Rate	Malfunction	Cyclic Rate	Malfunction	Cyclic Rate	Malfunction	Cyclic Rate	Malfunction	Cyclic Rate	Malfunction
1	846 a	0	961	4 FBR 1 FJ	983	3 FBR 1 BOB	855	0	898 a	5 FBR 1 BOB	997	43 FBR
2	838	3 FBR	931	2 FBR 1 BCS 1 FJ	949	8 FBR 5 CHU	857	3 BOB 1 FS	880 a	7 FBR 1 FF 1 FML	975	1 FFR 40 FBR
3	837	2 FBR	934	1 BOB 5 FBR	945	14 FBR 2 CHU	865	0	909	10 FBR	899	38 FBR
					Cartridge Lot RA5074		Cartridge Lot WCC6089					
4	833	1 BOB	953	1 FS 4 FBR 1 BCS 1 CHU 2 FFR	868	2 CHU	961	1 BOB 1 FJ 8 FBR 5 FF 1 CHU	915	11 FBR	814	1 BOB

	Rifle and Cartridge Lot											
	M16E1 No. 140814 Cartridge Lot RA5074		M16E1 No. 139319 Cartridge Lot WCC6089		M16E1 No. 140595 Cartridge Lot RA5074		M16E1 No. 139426 Cartridge Lot WCC6089		AR15 No. 34787 Cartridge Lot RA5074		AR15 No. 31857 Cartridge Lot WCC6089	
Round	Cyclic		Cyclic		Cyclic		Cyclic		Cyclic		Cyclic	
le No.	Rate	Malfunction	Rate	Malfunction	Rate	Malfunction	Rate	Malfunction	Rate	Malfunction	Rate	Malfunction
5	836	0	949	7 FBR 3 CHU	898	1 FX 5 CHU 1 FS 2 FBR	973	20 FBR 5 BOB 1 FJ 1 FF 1 CHU 3 FX 1 FFR	884	6 FBR 1 BFE	834	4 FS 1 FF
6	841	0	952	12 FBR 4 CHU	907	7 CHU 1 FBR 1 FS 1 FJ	976	22 FBR 1 FF 12 BOB	908	4 FBR	802	2 FS 1 FFR
					Cartridge Lot WCC6089		Cartridge Lot RA5074					
7	854	2 FBR 1 FS	950	8 FBR 8 CHU 2 FS	956	20 FBR 5 CHU 2 FJ 1 FS	832	3 FBR 1 FF 1 BOB	928	11 FBR 1 BOB	735	1 FBR 3 BCS 5 FFR c
8	849	1 FJ 1 FS 1 FBR 1 CHU	959	10 FBR 2 CHU 4 FJ 2 FX 1 FF b	961	31 FBR 4 CHU 2 FFR	851	1 FS	882	4 FBR	725	1 FX 3 FJ 2 FS 5 FFR c 1 FF
9	847	1 FBR	950	6 FBR 6 CHU 4 FJ 1 FS 2 FFR	957	22 FBR 3 FFR 6 CHU 1 FF	875	1 BOB	901	5 FBR	739	8 FFR 2 FS 1 FF 6 BCS

0 Round cle No.	Rifle and Cartridge Lot: M16E1 No. 140814, Cartridge Lot RA5074 — Cyclic Rate	Malfunction	M16E1 No. 139319, Cartridge Lot WCC6089 — Cyclic Rate	Malfunction	M16E1 No. 140595, Cartridge Lot RA5074 — Cyclic Rate	Malfunction	M16E1 No. 139426, Cartridge Lot WCC6089 — Cyclic Rate	Malfunction	AR15 No. 34787, Cartridge Lot RA5074 — Cyclic Rate	Malfunction	AR15 No. 31857, Cartridge Lot WCC6089 — Cyclic Rate	Malfunction
10	830	2 FBR 1 FFR	856	5 CHU 3 FJ 1 FBR	835	1 FBR 2 CHU	973	22 FBR 5 BOB 1 CHU 1 FJ	877	3 FBR 1 FX	740	6 FFR 2 BCS
11	851	1 CHU 2 FBR 1 FFR	676	2 CHU 1 BOB 4 FF 1 FBR	884	6 CHU	970	9 BOB 23 FBR 8 FJ 1 DF 5 CHU 1 FF	857	3 FBR 1 BOB	752	15 FFR 2 BCS 1 FJ
12	858	1 FBR 1 CHU	733	17 FFR 6 CHU 1 FS 1 BCS	909	10 CHU 2 FBR	851	5 FJ 1 FF 1 FS 1 BCS	881	12 FBR 4 FFR	740	21 FFR 1 BUB 1 BCS
bs re-ced ing test	1 magazine 1 extractor spring		1 magazine 1 extractor spring 1 disconnector 1 bolt 1 automatic sear assembly (a new bolt carrier and key assembly was temporarily assembled to fire less than 100 rounds)		1 extractor spring 1 bolt 1 extractor spring		1 magazine 1 extractor spring 1 action spring guide assembly		2 magazines 1 bolt 1 extractor spring 1 hammer spring		2 magazines 1 bolt 1 extractor spring 1 action spring guide assembly d (a new trigger pivot pin was temporarily assembled)	

a - Average of 9 bursts b - Caused by damaged round c - A total of 3 FFR were caused by an improperly assembled trigger pivot pin. d - [illegible] action spring guide [illegible]y was installed after [illegible] 3000 rds.

TABLE 2

SUMMARY OF ACCURACY AND VELOCITY DATA

The average mean radius for 5 10-round targets at 100 yards is given in inches and the average velocity at 15 feet for 50 rounds is given in feet/second

3000 Round Cycle No.	Rifle and Cartridge Lot: M16E1 No. 140814 Cartridge Lot RA 5074		M16E1 No. 139319 Cartridge Lot WCC 6089		M16E1 No. 140595		M16E1 No. 139426		AR 15 No. 34787 Cartridge Lot RA 5074		AR 15 No. 31857 Cartridge Lot WCC 608	
	Accuracy	Velocity	Accuracy	Velocity	Accuracy	Velocity	Accuracy	Velocity	Accuracy	Velocity	Accuracy	Velocity
0	1.14	3173	1.02	3044	1.20[a] 1.28[b]	3185[a] 3089[b]	1.18[b] 1.23[a]	3081[b] 3201[a]	0.88	3186	0.93	3068
1	1.06	3186	0.87	3054	1.42[b] 1.06[a]	3077[b] 3206[a]	1.57[a] 1.18[b]	3193[a] 3076[b]	0.91	3173	1.20	3049
2	1.53	3162	1.69	3037	1.89[a] 1.54[b]	3169[a] 3042[b]	1.26[b] 1.29[a]	3071[b] 3180[a]	1.51	3125	1.40	3006
3	1.66	3126	1.25	3057	2.42[b] 1.68[a]	3073[b] 3151[a]	1.39[a] 1.41[b]	3143[a] 3083[b]	1.62	3077	1.16	3061
4	1.60	3086	1.51	3058	1.35[a] 1.93[b]	3118[a] 3037[b]	1.56[b] 1.44[a]	3056[b] 3153[a]	1.52	3045	1.20	3050

a = RA 5074
b = WCC 6089