

IMPROVED BLANK FIRING SYSTEM

FOR

RIFLE, 5.56mm M16A1

A. J. GRANDY

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ADVANCED CONCEPTS AND COVERT ACTIVITIES BRANCH
AMMUNITION DEVELOPMENT AND ENGINEERING LABORATORIES



**UNITED STATES ARMY
FRANKFORD ARSENAL
PHILADELPHIA, PA.**

AUTHORITY

Work reported in this brochure was performed under authority noted
in:

1. Letter, 18 April 1968, signed Project Manager, Rifles
Rock Island Arsenal, "Gas Tube Clgging Studies, Rifle,
5.56mm M16A1".
2. Letter, 26 May 1969, signed Project Manager, Rifles,
Rock Island Arsenal; "Magazine For Blank Cartridge,
5.56mm M200".

INTRODUCTION

MAGAZINE:

Recent testing at Frankford Arsenal has indicated that the present blank firing system for the M16A1 rifle requires improvement in two specific areas. The first area is centered on the incompatibility of the standard magazine with short length, M200 blank cartridges in the M16A1 rifle. The second area involves solution of the gas tube clogging tendency of the M200 round.

Early testing of M200 blank ammunition disclosed that it was virtually impossible to maintain firing continuity using the standard endurance schedules specified for the M16A1 rifle as noted in SAPD-253F. Excessive malfunctions, (50% to 80%) attributable to the magazine, were encountered. These malfunctions (primarily "stubbing") occurred in both the single shot and automatic firing modes.

The M200 blank cartridge is approximately 3/8 inches shorter than the standard ball, M193 cartridge. Thus, there can be a random orientation (longitudinal) of the blank cartridges when loaded into the standard magazine. As a result, the bolt will contact the base of the round differently for each chambering action.

If the total blank cartridge load is oriented rearward in normal fashion during the magazine loading process, this will not eliminate the stubbing problem. Forward motion of the bolt during chambering will cause forward motion of the round beneath the round being chambered. This is caused by the frictional forces existing between rounds in the magazine. When the bolt cycles on the succeeding round it strikes the base with sufficient energy to misalign it with the chamber. This will either stub the round against the chamber teeth or magazine or jam it somewhere within the ejection port.

To overcome this unpredictable cartridge position in the magazine, a filler was inserted into the forward part of a standard magazine. This filler was sufficiently long to accommodate the shorter length M200 cartridges. Firing tests using these magazines reduced the malfunction rate from 50% to 80% down to 0%. No malfunctions attributable to the magazine have been encountered since.

Based on the success of the initial tests, 20 standard magazines were fitted with a formed front filler and a shortened follower. The magazine housing was engraved with the word "BLANK" and the complete assembly was anodized red to match the color of the BFA. The assembled M16A1 rifle with BFA and improved magazine is shown in Figure 1. Figure 2 shows the blank firing system disassembled from the rifle. Figure 3 shows the component parts of the standard magazine and improved magazine as well as a view of each loaded with M200 cartridges. Figure 4 shows the improved magazine in the assembled and loaded condition as well as disassembled and empty.

100 additional prototype models of the improved blank magazine have been obtained to continue gas tube clogging studies of the M200 blank cartridge.

M200 BLANK CARTRIDGE:

Firing tests have been initiated to determine gas tube clogging characteristics of M200 blank ammunition in standard M16A1 rifles. Clogged gas tubes have resulted after firing as little as 2300 rounds. Preliminary analyses of the fouling residue in sample gas tubes show that the major constituents include Barium, Potassium and Titanium with small amounts of Antimony and Lead.

These are characterized as Barium Titanate, Potassium Carbonate and Lead Sulfide. The probable sources of these fouling agents are the Cellulose Nitrate mouth waterproofing lacquer, (Titanium Dioxide in the White Pigment) the HPC13 propellant

using Potassium Sulfate as a flash suppressant and the No. 195 primer (K75 primer mix - Barium Nitrate, Antimony Sulfide and basic lead styphnate).

Present plans are to first investigate the mouth waterproofing lacquer as the main contributor to fouling. Dependent upon the outcome, further studies will be conducted using HPC13 propellant with varying quantities of Potassium Sulfate; this to be followed by substitution of the No. 195 primer with the No. 41 Frankford Arsenal normal lead styphnate primer.

Current test plans include firing of four special lots of M200 blank cartridges in standard M16A1 rifles with improved magazines and the XM15 blank firing attachment.

<u>LOT NUMBER</u>	<u>LOT DESCRIPTION</u>
A - (22,800 rds)	Mouth Waterproofed with Standard White Cellulose Nitrate Lacquer in current use at TCAPP.
B - (22,800 rds)	Mouth Waterproofed with Transparent/Clear (No Pigment) Cellulose Nitrate Lacquer.
C - (22,800 rds)	Mouth Waterproofed with Experimental Cellulose Nitrate Lacquer Formulated Using a violet Organic Die as a Coloring Agent.
D - (22,2800 rds)	Mouth Waterproofed with Black Cellulose Nitrate Lacquer formerly used for production at TCAAP.

The above ammunition was received from TCAAP on 2 October 1969 with firing tests scheduled to commence during week of 13 October 1969 at Frankford Arsenal.



IMPROVED MAGAZINE FOR
CARTRIDGE, BLANK, M-200

BFA

FIGURE 1. RIFLE 5.56MM M16A1 WITH IMPROVED
BLANK FIRING SYSTEM



FIGURE 2. RIFLE 5.56MM M16A1 WITH IMPROVED
BLANK FIRING SYSTEM

EXCESS SPACE

FILLER



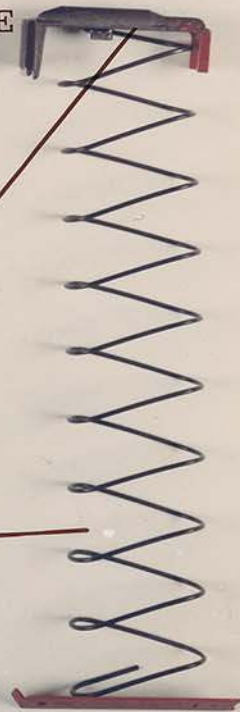
STANDARD M16A1 RIFLE MAGAZINE LOADED WITH M-200 BLANK CARTRIDGES

IMPROVED MAGAZINE LOADED WITH M-200 BLANK CARTRIDGES



STANDARD M16A1 RIFLE MAGAZINE DISSASSEMBLED

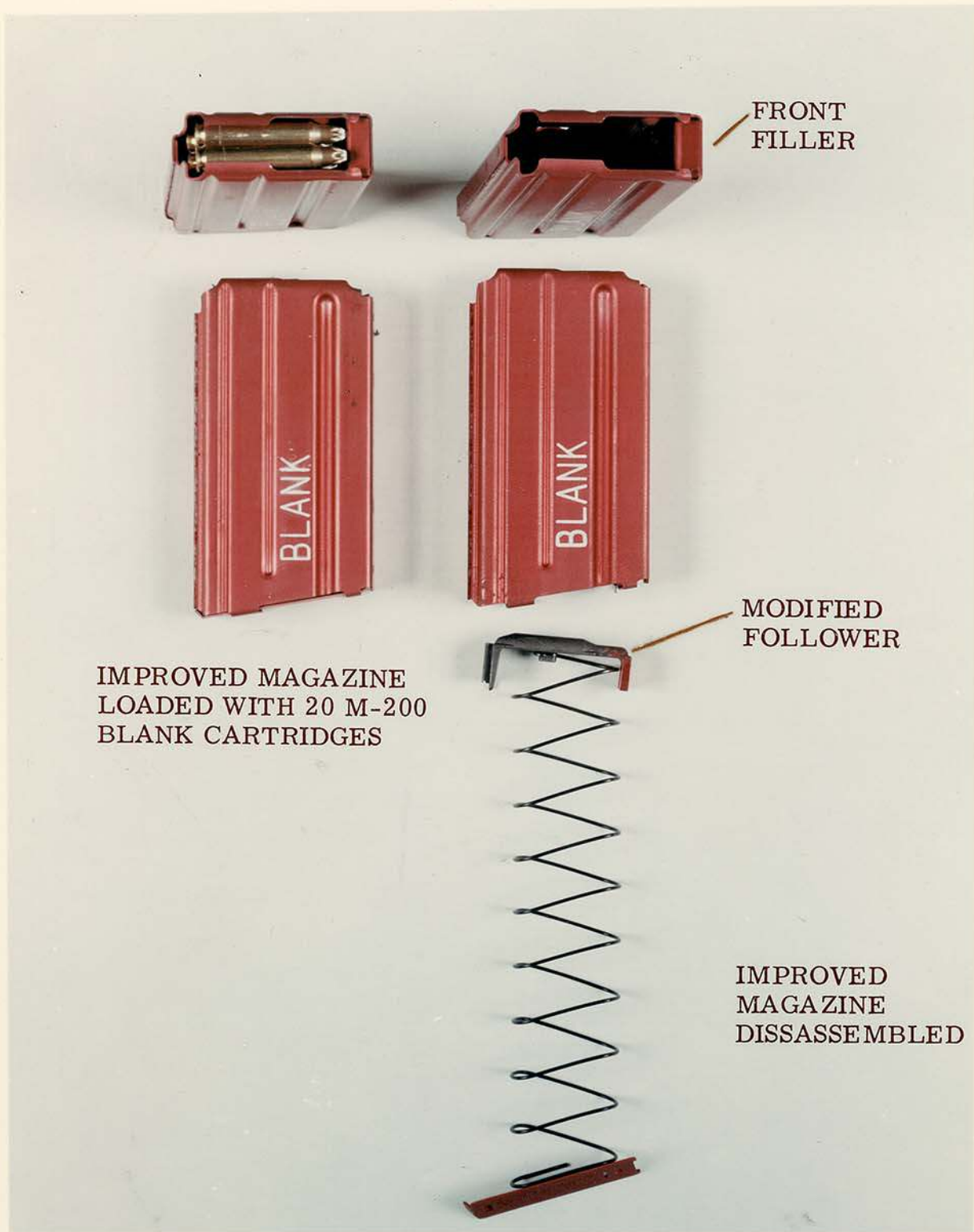
MODIFIED FOLLOWER



IMPROVED

IMPROVED MAGAZINE DISSASSEMBLED

FIGURE 3. STANDARD AND IMPROVED MAGAZINES WITH M-200 BLANK CARTRIDGES FOR RIFLE 5.56MM M16A1



IMPROVED MAGAZINE
LOADED WITH 20 M-200
BLANK CARTRIDGES

FRONT
FILLER

MODIFIED
FOLLOWER

IMPROVED
MAGAZINE
DISSASSEMBLED

FIGURE 4. IMPROVED MAGAZINE FOR BLANK FIRING SYSTEM RIFLE 5.56MM M16A1