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295417

UNITED STATES ARMY ARMOR BOARD
Fort Knox, Kentucky

STEBB-ST

29 JAN 1968

SUBJECT: Report of USATECOM Project No LF-3216-42, Evaluation of
Computer, Ballistic, M13A1D, with Improved Illumination
for M60 Series Tanks

CATALOGED BY ASTIA
AS AD NO.

TO:

Commanding General, US Army Materiel Command, Washington 25, D.C.
Commanding General, US Army Combat Developments Command, Fort
Belvoir, Virginia
Commanding General, US Army Frankford Arsenal, Philadelphia 37,
Pennsylvania
Commandant, US Army Armor School, Fort Knox, Kentucky
Director, USMC Landing Force Development Center, c/o USMC Liaison
Officer, US Army Armor Board, Fort Knox, Kentucky
Commanding Officer, US Army Armor Combat Developments Agency,
Fort Knox, Kentucky
British Liaison Officer, USATECOM, c/o Director of Munitions,
British Embassy, 3100 Massachusetts Avenue, N. W., Washington, D.C.
Canadian Liaison Officer, US Army Materiel Command, Washington 25,
D. C.
Commander, Armed Services Technical Information Agency, APTIN:
TIPCR, Arlington Hall Station, Arlington 12, Virginia

The subject report and copy of Headquarters, US Army Test and Evaluation
Command action letter is furnished for your information and retention.

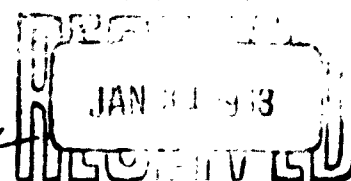
FOR THE PRESIDENT:

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L. F. Carney

L. F. CARNEY
Lt Col, CE
Secretary



TUSA

A

**HEADQUARTERS
U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND**

AMSTE-BB 3216-42

21 January 1963

**SUBJECT: Report of USATECOM Project No. 1F-3216-42, Evaluation
of Computer, Ballistic, M13A1D, with Improved Illumination
for M60 Series Tanks**

**TO: Commanding General
US Army Weapons Command
ATTN: AMSWE-RD
Rock Island Arsenal, Illinois**

- 1. Inclosed is a copy of subject report prepared by the US Army
Armor Board.**
- 2. This headquarters concurs in the conclusion contained in para-
graph 7 of the report and the recommendations in paragraph 8 as amended
and restated below.**
- 3. Headquarters, US Army Test and Evaluation Command recom-
mends that:**
 - a. Ballistic Computer, M13A1D, with modifications as
applied to computer, Serial Number 3966, be considered suitable for US
Army use, in M60 series tanks.**
 - b. The computer be further modified, if practical, to correct
the shortcoming stated in paragraph 5b of the report.**
 - c. The modified computer be phased into M60A1 tank pro-
duction at the earliest practicable date without further testing.**

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AMSTE-BB 3216-42

21 January 1963

SUBJECT: Report of USATECOM Project No. 1F-3216-42, Evaluation of
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for M60 Series Tanks

d. No program be initiated to modify or retrofit, the ballistic
computers in existing M60 or M60A1 tanks.

FOR THE COMMANDER:

2 Incl

1. Rept of Test (dup)
2. Distr List

/s/ John W. Rodgers
/t/ JOHN W. RODGERS
Colonel GS
C, Admin Div

AMSTE-BB 3216-42

SUBJECT: Report of USATECOM Project No. 1F-3216-42, Evaluation of
Computer, Ballistic, M13A1D, with Improved Illumination for
M60 Series Tanks

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3. CG, US Army Test and Evaluation Command	5	
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5. CG, US Army Mobility Command, ATTN: AMCPM-M-60	2	Note 3
6. CO, Aberdeen Proving Ground, ATTN: STEAP-DS	1	Note 1
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9. President, US Army Arctic Test Board	1	Note 1
10. Commandant, US Army Armor School	2	Note 1
11. Director, USMC Landing Force Development Center	2	Note 1
12. British Liaison Officer, USATECOM, c/o Director of Munitions, British Embassy, 3100 Massachusetts Ave., N.W., Washington, D. C.	6	Note 1
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UNITED STATES ARMY ARMOR BOARD
Fort Knox, Kentucky

STEBB-CV P-1F-3216-42

10 JAN 1963

SUBJECT: Report of USATECOM Project No 1F-3216-42, Evaluation
of Computer, Ballistic, M13A1D, with Improved Illumination
for M60 Series Tanks

TO: Commanding General
United States Army Test and Evaluation Command
Aberdeen Proving Ground, Maryland

1. AUTHORITY.

a. Directive. Line Item No 354, Annex B, USCONARC
Pamphlet No 705-1, Materiel Developments Program, Fiscal Year
1963 (U), July 1962.

b. Purpose. To evaluate modifications designed to im-
prove illumination on the M13A1D ballistic computer.

2. REFERENCES.

a. USCONARC LN REPT, OTAC, 823-59, 6 Nov 59, FIRE
CONTROL LIGHTING, w 1 incl.

b. Ltr, ORDMX-LA 413.68, USCONARC LO, USA, Ordnance
Arsenal Detroit, 9 Dec 59, subject: Transmittal of Minutes, Second Tank
Night Vision and Sighting Conference (U), w 1 incl.

c. Ltr, ORDMX-LA 413.68, USCONARC LO, USA Ordnance
Arsenal Detroit, 1 Apr 60, subject: Minutes of Meeting Night Lighting
Conference, w 1 incl.

d. Ltr, ATDEV-2 451.6, HQ USCONARC, 6 Jun 62, subject:
Report of Project No 2202-7, Evaluation of M13A1D (Modified) Ballistic
Computer for M60A1 Tanks, w 1 incl.

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3. DESCRIPTION OF MATERIEL. The test item is a standard M13A1D ballistic computer which has been modified to incorporate illumination for the superelevation counter and improved illumination for the range scale. A folding ammunition selector handle has been provided in order to increase the gunner's elbow room in the M60A1 tank. This computer differs from the model tested under reference 2d in that the method of illuminating the range dial has been altered to improve the visibility of the inner and outer index marks. In addition, the conventional reset button and indicator light have been restored. Inclosure 1 is a photograph of the test item.

4. BACKGROUND.

a. References 2a, b, and c document expressions of dissatisfaction by the US Army Armor School and the US Army Armor Board regarding the illumination of the M13A1 computer. In mid 1960, a rheostat was installed in M13A1D computers to control the intensity of light, but no changes were made to facilitate viewing the numerals on the range dial.

b. In March 1962, this board received a modified M13A1D computer for evaluation. The modified computer incorporated lighting for the superelevation counter, illumination of the numerals on the range scale, and had the reset function accomplished by the superelevation hand crank. The reset button and indicator light were eliminated. Inclosure 1 to reference 2d is this board's report of evaluation on the modified computer. Faults noted in the report include poor illumination of range scale index marks, uneven light intensity among the bulbs controlled by the rheostat, inadequate size of the ammunition selector handle, and sufficient durability on superelevation hand crank incorporating reset function. HQ USCONARC recommended (reference 2d) that as many as practicable of these faults be corrected and the modified computer be returned to this board for further evaluation.

c. A remodified M13A1D computer, serial no 3966, was sent to this board for an evaluation of corrective action taken as a result of recommendations in reference 2d.

5. SUMMARY OF TESTS. Tests were conducted by Major Wallace C. Steiger, Jr., Armor, assisted by other personnel of the Combat Vehicle Division. Results were as follows:

a. Range Dial Illumination. The white concentric rings with black strips surrounding the index marks reflected sufficient light to provide adequate illumination for both the range scale and the index marks.

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b. Light Intensity. A single rheostat controls the intensity of all illuminating bulbs in the computer. When light intensity is set at the desirable level for reading the range dial, light omitted from the ammunition index tab window is excessive. This fault is considered a shortcoming.

c. Ammunition Selector Handle. The size and configuration of the folding ammunition selector handle are acceptable. Improvement of the handle by enlarging it is precluded by the location of the reset button indicator light.

6. DISCUSSION.

a. The condition whereby proper illumination of the range dial results in excessive light from the ammunition index tab window was reported in reference 2d and not corrected in the present test item.

b. The decision, first, to eliminate the reset button and indicator light and, then, to return them to their original location were made by the design agency on their own initiative. Leaving the reset button and light in their normal location has the advantage of reducing the amount of modification necessary to improve the computer.

c. Production M60A1 tanks are presently equipped with a ballistic computer designated M13A2. This computer incorporates the range dial illumination system tested in reference 2d. However, the ammunition selector handle, reset button, and reset indicator light are identical with the test item in this evaluation. Although the test item is better than any of its predecessors, the degree of improvement is not significant enough to justify retrofitting existing stocks.

7. CONCLUSION. US Army Armor Board concludes that the remodified M13A1D ballistic computer is suitable for Army use in M60 series tanks.

8. RECOMMENDATIONS. US Army Armor Board recommends that:

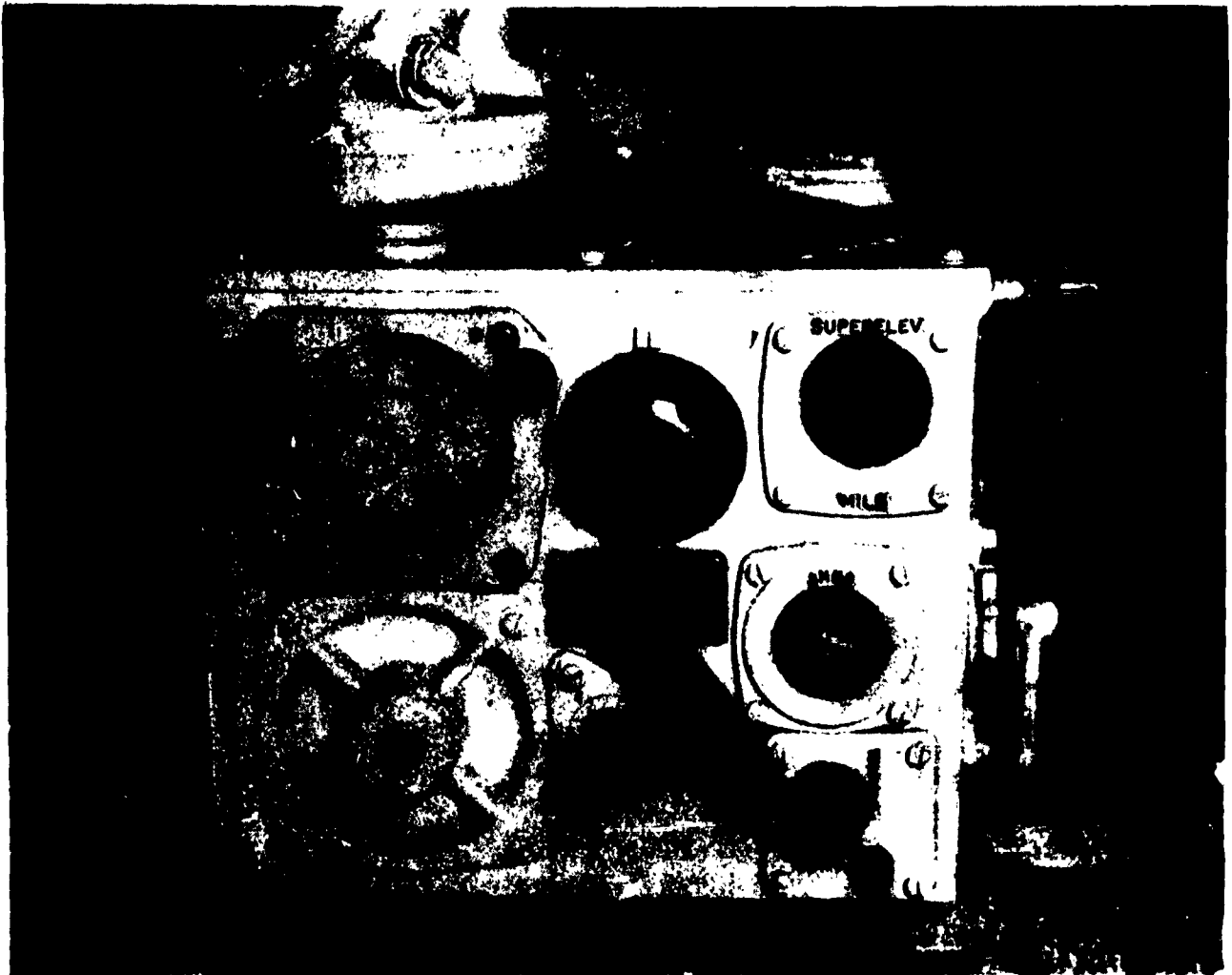
a. The remodified M13A1D ballistic computer be further modified, if practical, to correct the shortcoming noted in paragraph 5b.

b. The computer be phased into M60A1 tank production at the earliest possible date without additional testing by this board.

c. No modification kit be released for computers in existing M60 or M60A1 tanks.

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FRANK F. CARR
Colonel, Armor
President



UNITED STATES ARMY ARMOR BOARD P-3216-42 PHOTO NO 62-1877 FT KNOX, KY
IF-3216-42

COMPUTER, BALLISTIC, M13AID, WITH IMPROVED ILLUMINATION

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