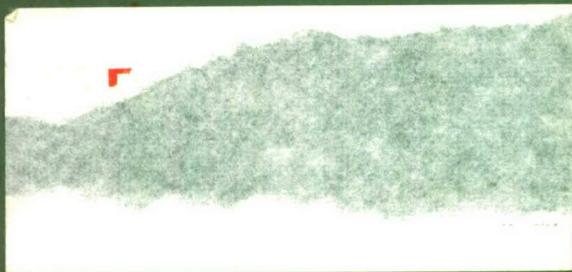


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TECHNICAL REPORT NO. 74-57

40-MM TARGET MARKER (FLOATING), TMF-1



by

Munitions Branch

April 1974

Supplementary Report  
Evaluation by RVNAF Combat Development Test Center

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<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Cartridge, Signal, Ground Flare</td> <td style="width: 50%;">40mm Signals</td> </tr> <tr> <td>Target Marker</td> <td>Flame Signals</td> </tr> <tr> <td>Floating Signal</td> <td></td> </tr> </table>			Cartridge, Signal, Ground Flare	40mm Signals	Target Marker	Flame Signals	Floating Signal	
Cartridge, Signal, Ground Flare	40mm Signals							
Target Marker	Flame Signals							
Floating Signal								
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)								
<p>Under USALWL Task 01-F-68, the US Army Land Warfare Laboratory developed a floatable target marker in a 40mm configuration capable of being fired from either the M79 or the M203 Grenade Launcher.</p> <p>Detailed information on the design, development and testing of the 40mm Target Marker (Floating), TMF-1 is contained in LWL Technical Report No. 71-06, dated May 1971.</p> <p style="text-align: right;">CON'T</p>								

20. ABSTRACT CON'T

This report contains the evaluation conducted by the RVNAF Combat Development Test Center, Republic of Vietnam during the period October 1971 - February 1972.

AD-782110

AVHDO-D

11 SEP 1972

SUBJECT: 40MM Target Marker (Floating), LWL Task No. 01-F-68

Commanding Officer  
USA Land Warfare Laboratory  
Aberdeen Proving Ground  
MD 21005

1. Attached as an inclosure is the RVNAF Combat Development Test Center suitability report on the 40MM Target Marker (Floating), LWL Task No. 01-F-68. The devices were evaluated by the III Corps Coastal Zone Naval Command, Rung Sat Special Sector, and Phong Ding Sector (MR IV) during the period October 1971 through February 1972.
2. The report states that the smoke cartridge proved to be satisfactory except for smoke ejection duration and smoke density. Smoke duration and density were not considered satisfactory to properly mark a target during bad weather.
3. It should be noted that the 60-90 second burn time is comparable to the standard M18 smoke grenade which has a 50-90 second burn time (reference para 6-3, TM 9-1300-200).
4. The marking of a target during periods of bad weather remains a problem with any smoke marker. The possibility of increasing volume and density should be considered. However, the cartridge must remain compatible with the M-203 40MM launcher.
5. Upon investigation of the two deficiencies noted above, and after determination of a US Army requirement for such a device, it should be type classified.

FOR THE COMMANDER:

1 Incl  
as  
CF:  
DA (FDCT) (DARD-DD)  
USARPAC (GPOP-FD)  
MACV (MACTC)  
ARPA RDFU-V

ORIG SIGNED  
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1LT, AGC  
Assistant Adjutant General

R E P O R T

TO

CHIEF OF STAFF/JGS/RVNAF

REPUBLIC OF VIETNAM  
MINISTRY OF DEFENSE  
JGS/RVNAF  
COMBAT DEVELOPMENT  
AND TEST CENTER  
PHONE: 41762  
# 001060/TIM/TNPT

SUBJ: Results of 40mm Smoke Cartridge Used for Making Objectives  
(floating) TMF-1.

REF : Report # 01826/TIM/TNPT, dated 21 Sep 1971

The Chief of Staff os respectfully informed that:

1. The center has completed the testing of 40mm smoke cartridge fired from the M.79 grenade launcher to mark objectives on the surface of the water IAW the plan you approved in the reference report.

2. The test results and evaluation are summarized as follows:

a. Advantages:

- Appropriate weight, volume, presentation and easy, convenient use.
- Objectives can be marked at 300 meters by overhead shooting, or direct fire on flooded area.
- In particular, smoke cartridge will automatically float for ejection of smoke after being directly fired into water or swamp.

b. Disadvantages:

Smoke ejection time and smoke density are insufficient to provide easy observation in bad weather.

In brief, the 40mm smoke cartridge for objective marking (floating) is affirmed to have a very appropriate use for Vietnam battlefield, but it is not considered fully efficient in objective marking. Therefore it requires further improvement study and re-test prior to requesting MAP supply in order to meet the battle.

This is respectfully submitted for your consideration.

APO 4002, 26 May 1972

COL NGUYEN QUY TOAN  
Chief of Combat Development  
and Test Center/JGS  
/Signed and Sealed/

REPUBLIC OF VIETNAM  
MINISTRY OF DEFENSE  
JOINT GENERAL STAFF

COMBAT DEVELOPMENT & TEST CENTER

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COMBAT DEVELOPMENT & TEST CENTER

RECAPITULATION REPORT  
TEST OF USE OF  
40mm SMOKE CARTRIDGE FOR OBJECTIVE MARKING  
(FLOAT) TMF-1

Compiled by: /signed/            01 Apr 1972  
                  NGUYEN HUU CUONG  
                  LT  
                  PLANNING OFFICER

Assisted by: /signed/            01 Apr 1972  
                  NINH PHUC DUAT  
                  LTC  
                  Chief of Test & Evaluation Section

RECAPITULATION REPORT  
TEST OF USE OF  
40mm SMOKE CARTRIDGE FOR OBJECTIVE MARKING  
(FLOATING) TMF-1

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## S U M M A R Y

This test and evaluation plan is designed to affirm the appropriateness and efficiency of the 40mm smoke cartridge marking objectives (floating), TMF-1, fired from the M.79 grenade launcher.

Four hundred (400) cartridges were transferred to Navy Headquarters at 3d Coastal Zone, RUNG SAT Special zone and PHONG DINH Sector/MR4 which are responsible for the test of use during a period of 5 months in swamp and flooded areas.

### The test and the evaluation results:

- Advantages:- Appropriate weight, volume, presentation, and easy, convenient use.
- Objectives can be marked at 300 meters by overhead shooting, or direct fire on flooded area.
  - In particular, cartridges can be floated; in case of being sunk in water or swamp (direct fire) they can also be automatically floated upon ejection of smoke.

Disadvantages: - Smoke ejection time as well as smoke density are insufficient to provide easy observation in case of bad weather.

In brief, the 40mm smoke cartridges marking objective (floating) are affirmed to have appropriate use for Vietnam battlefield since they can mark objectives from afar and float on water or swamp, but they are not considered fully efficient for objective marking due to the aforementioned disadvantage.

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## PART I - INTRODUCTION

### 1.1 PROCESS

In the theater of war in SVN, the target marking (enemy, friendly, medical evacuation, supply, etc.) by FM grenade has become an essential requirement. When used in swampy and flooded areas, the FM grenade may sink in water or into the mud.

Therefore, the US Army Land Warfare Laboratory, since 1970, has studied the implementation of a special type of ammunition to be used for swampy and flooded areas designated as 40mm smoke cartridge target marker (floating) TMF-1. This type of cartridge is used for M-79 grenade launcher or M-203.

The test of 400 cartridges has recently been completed to determine the appropriateness and effectiveness in marking floating targets in swampy and flooded areas.

### 1.2 EQUIPMENT DESCRIPTION:

#### 1.2.1 Component:

The 40mm smoke cartridge target marker (floating) is presented in assembling as follows:

- 40mm cartridge case
- Cartridge body
- Target marking
- Head

#### a. 40mm cartridge container:

Including primer and propellant at the base of the cartridge case.

#### b. Cartridge case:

Including case, separator and retaining disc.

##### (1) Case:

Cylindrical, aluminum

##### (2) Time train:

It is attached to the middle of cartridge base and set to act after 5.5 seconds before detaching the marking device from the cartridge case and burning the smoke mixture.

(3) Retaining disc:

The Retaining disc is fixed inside of base body against the back firing force when the cartridge is fired.

c. Target marking:

The smoke mixture contained in an aluminum tube attached to a water proof cloth bag will become inflated when a portion of smoke comes in. When the cartridge is fired and begins to send out colored smoke, this cloth bag will have the effect of a parachute to reduce the head velocity upon falling and at the same time turn into a float or keep the projectile to rise to the surface upon entering into the water.

5.5 seconds after the cartridge is fired, the smoke gas will detach the target marker from cartridge case and head.

d. Head:

Plastic, fixed on the projectile.

1.2.2 Technical characteristics:

- Weight : 0.39 lb (approx' 180 gr)
- Length : 5 1/4 in (approx' 130mm)
- Diameter : 1604 in (40mm)
- Smoke mixture weight : 55 grs
- Smoke emitting time : 60 - 90 seconds
- Color smoke : 2 colors (yellow and red)
- Firing distance : Maximum 300 meters

1.2.3 Safety:

Apply common safety measured for M-79 grenade launcher or M.203:

- Avoid the utilization of battered or damaged cartridge
- If the cartridge is not discharged upon squeezing, maintain the same firing position in 30 seconds and press the trigger again. If the cartridge is still not discharged, wait 30 seconds before removing the cartridge.

1.3. TESTING PURPOSE:

- Determine the advantages and disadvantages of the 40mm smoke cartridge floating target marker.
- Determine the appropriateness and effectiveness of the 40mm smoke cartridge in marking floating targets in swampy and flooded areas.

#### 1.4 SUMMARY OF RESULTS

The 40mm smoke cartridge, floating target marker has the advantages such as appropriateness in weight, volume, presentation easy and convenient use. Particularly, the cartridge can float on the water surface, including cases in which the cartridge is sunk in the water or in a swamp, it can automatically come up again upon emitting smoke.

However, some disadvantages are also recorded as the smoke ejection time and smoke density is insufficient to enable easy observation in case of bad weather.

#### 15. CONCLUSION:

In short, the 40mm smoke cartridge is appropriate for use, in particular it can mark a distant target and float on the water surface or a swamp but the cartridge cannot be considered perfectly effective in target marking.

#### 1.6 RECOMMENDATION

##### 1.6.1 Improvement study requirement:

The 40mm smoke cartridge, floating target marker is considered essential and useful for units operating in swampy and flooded areas; therefore, it is necessary to continue the improvement study to:

- Increase the smoke ejection time
- Increase the smoke density

##### 1.6.2 Re-testing requirement:

If the above recommendation for improvement is approved and implemented by the US Army Land Warfare Laboratory, 100 cartridges will be adequate for the retesting plan.

## PART 2 - TEST PROCEDURES

### 2.1 INTRODUCTION

The following test procedures have been established for the evaluation of the 40mm floating target marking smoke projectile.

#### 2.1.1 Testing units:

- (1) III Coastal Zone, Naval Command
- (2) Rung Sat Special Sector
- (3) Phong Dinh Sector, MR4

#### 2.1.2 Test period:

Five months, from the beginning of October 1971 to the end of February 1972 (extended due to utilization requirements)

### 2.2. UTILIZATION TEST:

#### 2.2.1 Purpose:

- (1) To determine the general strong and weak points of each part of the 40mm target marking floating smoke projectile.
- (2) To determine its suitability and efficiency in utilization.

#### 2.2.2 Procedures:

- 300 smoke projectiles have been distributed to various testing units (50 yellow projectiles and 50 red projectiles for each testing unit) to be tested in muddy areas:
- Make the testing under various climatic conditions (in rain, sun, fog, with and without wind etc.)

#### 2.2.3 Results of the test:

##### a. Strong points:

- Weight : suitable
- Volume : suitable
- General presentation: suitable
- Cloth bag : thanks to the emission of smoke this bag expands, takes a round and flat form of 15cm diameter, and is used as a parachute to reduce the speed of the projectile while dropping and to float on the surface of the water.
- Handiness : very easy to handle.
- Utilization:

- (1) Guidance: use is easy and similar to that of the M.79 grenade launcher
- (2) Security Perfect
- (3) Delay time: the smoke emission takes place 5 seconds after the projectile is fired. This delay time enables the projectile to reach the surface of the water or the muddy area.
- (4) Smoke emission time: from 1 to 1 and 1/2 minutes. This time is sufficient to determine the target (in fine weather)
- (5) Smoke density : sufficient to determine the target (in fine weather).
- (6) Firing methods: there are two:
  - High angle fire: this angle of fire varies as the distance of the target.
  - Flat trajectory fire ; is acceptable when the projectile is fired directly at the water surface and releases smoke. However an angle of fire of 45° and higher is mandatory and the water must be over 2 meters deep.
- (7) Firing range: target marking may be made by a smoke projectile as accurately as with a M.79 grenade launcher, at a maximum firing range of 300 meters.

b. Deficiencies

- Weather affects : rain, wind, fog, etc. affect target marking seriously due to the rapid dissipation of the smoke.
- Firing method : if the projectile is fired directly at the water surface with an angle lower than 45° and a water depth lower than 2 meters, it will embed itself in the mud and become inoperative (this deficiency is insignificant as it can be avoided)

2.3 MAINTENANCE:

The maintenance procedure is similar to that applied for the M-79 grenade launcher.

PART 3 - ANNEXES

ANNEX A	:	TEST DATA
		A.1.- Illustration
		A.2.- Test Data Report Form
ANNEX B	:	Deficiencies
ANNEX C	:	Distribution

A.2 TEST DATA REPORT

Floating, target-marking, 40mm smoke projectile, TMF-1

I. Tester's Data:

Tester's name : . . . . .  
Grade : . . . . . Position title . . . . .  
Unit : . . . . .  
Test location : . . . . .  
Duration of test : . . . . .

II. Test Data:

1. Have you ever used the M79 grenade launcher?  Yes  No

2. Are the following characteristics of the 40mm smoke projectile suitable?

Weight :                      Yes                       No

Presentation :                Yes                       No

Mode of carrying :            Yes                       No

Employment :                  Yes                       No

3. How many smoke projectiles have you fired during the test period? . . . . .

4. Most suitable angle of fire: . . . . .degrees

5. Did all of the smoke projectiles used function properly?

Yes                       No

If not, indicate the number of defective projectiles and the actions taken: . . . . .

. . . . .

6. Indicate the time elapsing between the firing of the projectile and the smoke release: . . . . . seconds. Do you find this period of time :

too short ? \_\_\_\_\_

average ? \_\_\_\_\_

too long ? \_\_\_\_\_

7. Indicate the time of smoke release: . . . . . seconds

8. Do you find the time of smoke release too short \_\_\_\_\_, normal \_\_\_\_\_, or too long \_\_\_\_\_ for target marking.

9. Effects of weather conditions on the density of smoke released:

. . . . .

10. Effects of the following weather conditions on the height of smoke released:

- Clear, windless weather : . . . . .

- Clear, windy weather : . . . . .

- Rainy, windy weather : . . . . .

11. Does the smoke projectile float or sink on impact with the water or muddy area?

\_\_\_\_\_ Floats \_\_\_\_\_ Sinks

If it sinks, state why . . . . .

12. Does the smoke projectile properly release smoke on impact?

Yes \_\_\_\_\_ No \_\_\_\_\_

13. Is the smoke released dense enough for target marking?

Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, indicate the approximate distance within which the smoke can be seen: . . . . . meters.

14. Is one smoke projectile sufficient for target marking?

Yes \_\_\_\_\_ No \_\_\_\_\_

If not, how many projectiles have you used for each target marking? . . . . . projectiles.

15. Does still or agitated water have an effect on the smoke projectile?

- Still water : has effect \_\_\_\_\_ , no effect \_\_\_\_\_
- Agitated water : has effect \_\_\_\_\_ , no effect \_\_\_\_\_

If the agitated water has an effect on the projectile, estimate the height of the waves : . . . . . centimeters.

16. Have you ever used hand-held smoke grenades? \_\_\_\_\_ Yes, \_\_\_\_\_ No

If yes, state the advantages, disadvantages, suitability, and effectile: . . . . .  
. . . . .

17. Are there any other items you find more effective than this type smoke projectile? Yes \_\_\_\_\_ No \_\_\_\_\_

If so, give details: . . . . .  
. . . . .

18. Your recommendation, if any, for improvement of the smoke projectile . . . . .

\_\_\_\_\_  
Tester's signature

ANNEX B - DEFICIENCIES

<u>Deficiency</u>	<u>Recommended corrective action</u>	<u>Remarks</u>
- <u>Smoke release time:</u> is short	Must be 2 minutes rather than 1 1/2 minutes.	This deficiency is noted during unfavorable weather conditions (rain, wind, fog)
- <u>Density of smoke</u> is low	Increase the current density of smoke	- id -

ANNEX C - distribution

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