

CHAPTER 4 AMMUNITION

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Section I. GENERAL INFORMATION

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4-1 GENERAL

a. Ammunition for M776 cannon is the separate loading type. The loading of each complete round into the cannon requires three separate operations: loading the fuzed projectile, the propelling charge, and the primer.

b. These components are shipped separately; therefore, the cannon crew must know how to store, unpack, inspect, prepare, and load each complete round every time the weapon is fired.

(1) The SC supervises the loading and preparation duties performed by Cannoneers.

(2) The SC must also see that the Cannoneers and Driver are cross-trained in the specific duties of the care, handling, unpacking, inspection, preparation, and loading of the ammunition components in order to sustain a 24-hour operation or to operate with a reduced crew.

c. It is planned that future ammunition for all new 155mm weapons will be interchangeable. This will enable projectiles and propelling charges of one NATO nation to be fired from the 155mm weapons of all others. Current items of interchangeability are contained in Chapter 5.

WARNING

UNTIL SAFETY AND RELIABILITY TESTING IS COMPLETED, THE USE OF
 AMMUNITION OTHER THAN PRESCRIBED IN THIS MANUAL IS
 PROHIBITED.

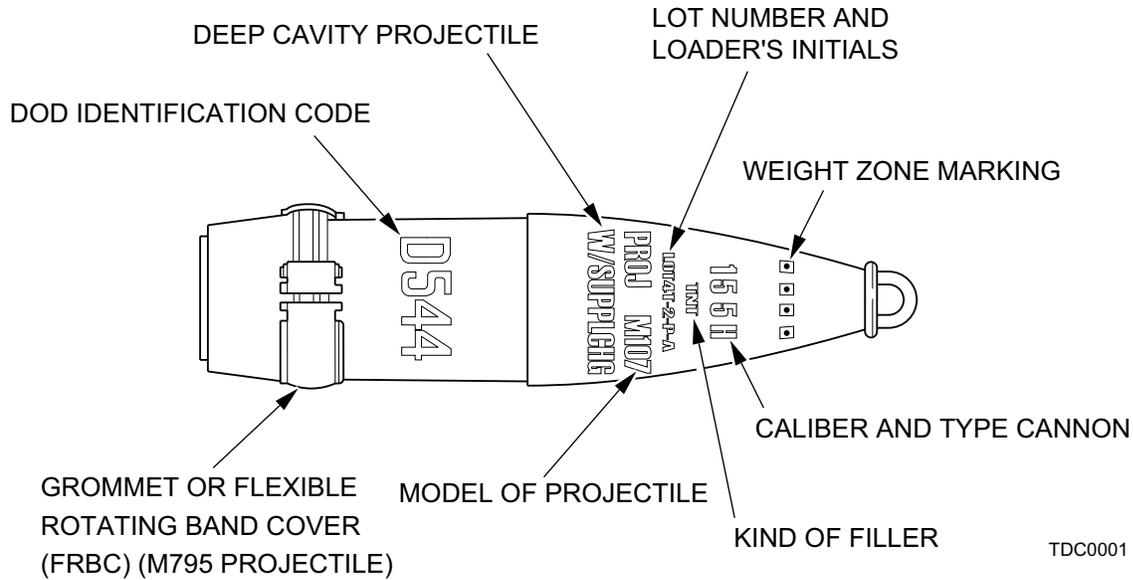
d. Full details of all current 155mm munitions are contained in "155mm ARTILLERY WEAPON SYSTEMS REFERENCE DATA BOOK".

e. Refer to paragraph 4-31 for information on the Loose Projectile Restraint System (LPRS). The LPRS is a divider rack for securing loose unfuzed projectiles for transportation in field artillery companion vehicle.

4-2 IDENTIFICATION

Important information is stenciled on each projectile. New and old projectile colorings and markings are listed on Table 4-1. Knowing the color coding and the meaning of the markings will aid in rapid selection of the required projectile when firing. Know the ammunition!

MARKING OF THE 155-MM HE PROJECTILE



PROJECTILE, 155MM HERA, M549

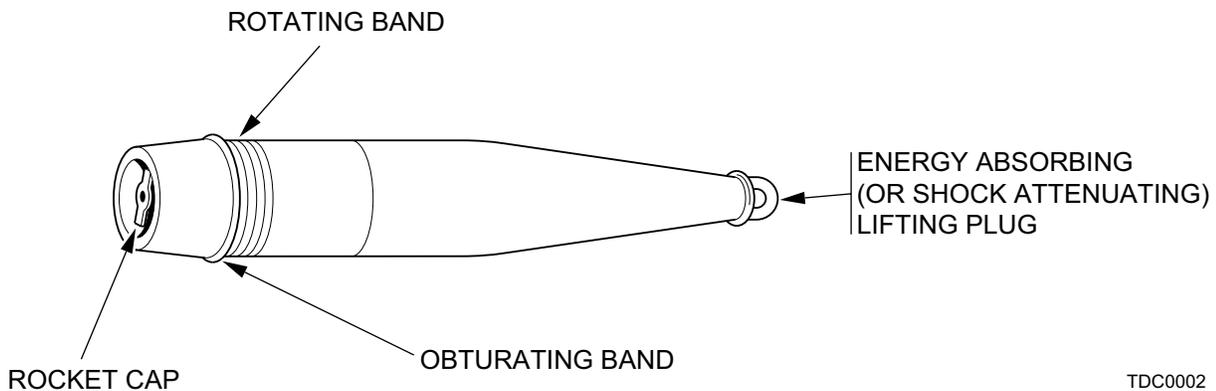


Table 4-1. Model Numbers and Color Coding of Projectiles

| Model Number and Type of Projectile | New Manufacture | | | Old Manufacture | | |
|---|---------------------|----------------------------------|------------|---------------------|-------------------------------|---------|
| | Color of Projectile | No./Color of Bands | Marking | Color of Projectile | No./Color of Bands | Marking |
| M107, HE, comp B and TNT filler w/and w/o suppl charge | Olive Drab | None | Yellow | Olive Drab | None | Yellow |
| M110, Agent (H, HD), w/burster | Gray | 2/Green 1/Yellow ² | Green | Gray | 2/Green | Green |
| M110 (M110E1), M110A1 (M110E2), M110A2 (M110E3), Smoke (WP) | Light Green | 1/Yellow | Red | Gray | 1/Yellow | Yellow |
| M116, M116B1, Smoke BE, (HC) | Light Green | None | Black | Gray | 1/Yellow | Yellow |
| M116, M116A1, Smoke BE, (HC) | Light Green | None | Black | Not Applicable | | |
| M121A1, Agent (GB or VX), w/burster | Gray | 3/Green 1/Yellow ² | Green | Gray Green | GB 1/ Green VX 2/ Green | Green |
| M687, Agent (GB2) w/burster | Gray | 1/Broken Green 1/Yellow | Dark Green | Not Applicable | | |

² Renovated or newly manufactured (post 1976) projectiles will be marked with one green band and, if burstered, one yellow band.

4-2 IDENTIFICATION (cont)

Table 4-1. Model Numbers and Color Coding of Projectiles (cont)

| Model Number and Type of Projectile | New Manufacture | | | Old Manufacture | | |
|--|---------------------|------------------------|------------|---------------------|--------------------|---------|
| | Color of Projectile | No./Color of Bands | Marking | Color of Projectile | No./Color of Bands | Marking |
| M449 series, HE, ICM | Olive Drab | Diamonds ¹ | Yellow | Olive Drab | None | Yellow |
| M483A1, HE, ICM | Olive Drab | Diamonds ¹ | Yellow | Not Applicable | | |
| M864, HE, ICM, DP extended range | Olive Drab | Diamonds ¹ | Yellow | Not Applicable | | |
| M485A1, M485A2, illuminating | Olive Drab | 1/White | White | Olive Drab | None | White |
| M549, M549A1, HERA | Olive Drab | None | Yellow | Not Applicable | | |
| M692, HE (ADAM ³) | Olive Drab | Triangles ⁴ | (L) Yellow | Not Applicable | | |
| M731, HE (ADAM ³) | Olive Drab | Triangles ⁴ | (S) Yellow | Not Applicable | | |
| M718/ M718A1, AT (RAAMS ⁵) | Olive Drab | Triangles ⁴ | (L) Yellow | Not Applicable | | |

¹Row of yellow diamonds between nose and bourrelet of projectile.

³ADAM-Area denial artillery munition.

⁴Yellow triangles between nose and bourrelet of projectile with letters S or L painted inside the triangle.

⁵RAAMS –Remote anti-armour mine system.

Table 4-1. Model Numbers and Color Coding of Projectiles (cont)

| Model Number and Type of Projectile | New Manufacture | | | Old Manufacture | | |
|--|---|------------------------|---------------|---------------------|--------------------|---------|
| | Color of Projectile | No./Color of Bands | Marking | Color of Projectile | No./Color of Bands | Marking |
| M741/ M741A1, AT (RAAMS ⁵) | Olive Drab | Triangles ⁴ | (S) Yellow | Not Applicable | | |
| M712, HEAT (Copperhead) | Black (except window area of cone) | None | Yellow | Not Applicable | | |
| M823, training (Copperhead) | Bronze | None | Black | Not Applicable | | |
| M804, Practice | Blue | 1/Brown | White | Not Applicable | | |
| M804A1, Practice | Blue | 1/Yellow | White | Not Applicable | | |
| M825, M825A1 Smoke (WP) | Light Green | 1/Yellow | Red | Not Applicable | | |

⁴Yellow triangles between nose and bourrelet of projectile with letters S or L painted inside the triangle.

⁵RAAMS –Remote anti-armour mine system.

4-3 AUTHORIZED PROJECTILES

WARNING

UNAUTHORIZED ASSEMBLY AND USE OF PROJECTILES AND PROPELLING CHARGES ARE EXTREMELY DANGEROUS. MAKE SURE PROJECTILES ARE MARKED 155H (NOT G).

- a. Projectile and fuze combinations for authorized rounds are given in Table 4-2.

4-3 AUTHORIZED PROJECTILES (cont)

Table 4-2. Authorized Projectile and Fuze Combinations

| Projectiles | Fuze | | | | | | | | | | | | | |
|------------------------------------|------------------------------|-----------|-------------|------|-------------|------|----------------|-------------|-------------------|----------------|----------------------------|----------------|-------------|------|
| | PD | | | MT | MTSQ | | | | PROX | | | ET | | MOFA |
| | MK 399 ⁷ MOD 1 | M557/M572 | M739 Series | M565 | M501 Series | M564 | M577 Series | M582 Series | M728 ² | M732 Series | M514 Series ^{2,4} | M762 Series | M767 Series | M782 |
| Agent, H, HD, M110 | | X | X | | | X | | X | | | | | X | X |
| Agent, GB, VX, M121A1 ¹ | | X | X | | | | | | P | X | | | | X |
| Agent, GB2, M687 | | X | X | | | | | | | | | | | X |
| HERA, M549/M549A1 ⁶ | X | X | X | | | | | X | | X ⁵ | | | X | X |
| HE, M107 (Normal Cavity) | X | X | X | | | X | | X | | X | | | X | X |
| HE, M107 (Deep Cavity) | X | X | X | | | X | | X | P | X | P | | X | X |
| HE, M795 | X | X | X | | | | | X | | X | | | X | X |
| HE, M449 Series | | | | X | | | X | | | | | X | | |
| HE, M483A1 | | | | | | | X ³ | | | | | X ³ | | |
| HE, M864 | | | | | | | X ³ | | | | | X ³ | | |

WARNING

THE M728 PROXIMITY FUZE SHALL NOT BE USED WITH M203 SERIES PROPELLING CHARGE. PREMATURE MALFUNCTION COULD RESULT.

¹M728 and M732 fired with "VX" projectile in combat emergency only.

²The letter P shows compatibility for proximity fuzes that require removal of the supplementary charge to make room for the long intrusion fuze.

³The M483A1/M864 projectile may be used for self-registration (as a spotting round) by replacing the expulsion charge assembly with a projectile spotting charge added to M577 series or M762 fuzes.

⁴USMC Training Use only. Firing limits 0°F to 120°F (-18°C to +49°C).

⁵Only the M732A2 fuze may be used for this combination.

⁶M549/M549A1 projectile may break-up upon impact with urban structures and bunkers rendering it an ineffective penetrator of these targets.

⁷Refer to the description of the MK399 MOD 1 fuze in paragraph 4-4kj for expected performance against MOUT targets.

Table 4-2. Authorized Projectile and Fuze Combinations (cont)

| | Fuze | | | | | | | | | | | | | |
|--------------------------------------|------------------------------|-----------|-------------|------|-------------|------|----------------|-------------|-------------------|-------------|----------------------------|-------------|-------------|------|
| | PD | | | MT | MTSQ | | | | PROX | | | ET | | MOFA |
| Projectiles | MK 399 ⁷ MOD 1 | M557/M572 | M739 Series | M565 | M501 Series | M564 | M577 Series | M582 Series | M728 ² | M732 Series | M514 Series ^{2,4} | M762 Series | M767 Series | M782 |
| Illuminating, M485 Series | | | | X | | | X | | | | | X | | |
| SMOKE, HC, Colored, BE, M116, M116B1 | | | | | X | | | | | | | | | |
| SMOKE, HC, BE, M116A1 | | | | X | | | X | | | | | X | | |
| SMOKE, WP, M110 Series | | X | X | | | X | | X | | | | | X | X |
| SMOKE, WP, M825/M825A1 | | | | | | | X | | | | | X | | |
| HE, M692/M731 (ADAM) | | | | | | | X | | | | | X | | |
| AT, M718, M718A1, M741, M741A1(RAAM) | | | | | | | X | | | | | X | | |
| PRACTICE, M804 | | X | X | | | X | | X | | X | | | X | X |
| PRACTICE, M804A1 | | X | X | | | X | | X | | | | | X | X |
| HE, M898 (SADARM) | | | | | | | X ⁸ | | | | | | | |

WARNING

ONLY THOSE ITEMS LISTED ARE AUTHORIZED. FIRING OF UNAUTHORIZED PROPELLING CHARGE, PROJECTILE, OR FUZE COMBINATIONS CAN RESULT IN CRITICAL MALFUNCTIONS. CHARGE 1 (M3 SERIES GB) WILL NOT BE FIRED IN THE M776 CANNON. CHARGE 2 (GB) MAY BE USED WITH ANY M100 SERIES PROJECTILE, M449, M804, M804A1 AND M485 PROJECTILE; HOWEVER, STICKERS MAY OCCASIONALLY BE ENCOUNTERED. ALL OTHER PROJECTILES, EXCEPT THE M795, USE MINIMUM CHARGE 3 (GB) OR CHARGE 3 (WB). M795 USES MINIMUM CHARGE 3 (GB) OR CHARGE 4 (WB). FIRING BELOW THESE CHARGES MAY RESULT IN STICKERS.

⁸Use only M577A1 Fuzes DODIC NAI0, NSN 1390-01-462-0661, Lot #HAT 90M033-011 with Projectile, 155mm: HE M898 (SADARM). M577A1 Fuzes are marked "M898 SADARM Compatible".

4-3 AUTHORIZED PROJECTILES (cont)

b. Authorized projectile and propelling charge combinations are given in Table 4-3:

Table 4-3. Authorized Projectile and Propelling Charge Combinations

| Projectiles | Propelling Charge | | | | | | | | | | | | | | | Firing Warnings | | | |
|---|-------------------|----|---|---|---|--------------------------|---|---|---|---|--------|-------------------------|-----------------------|-------------------|---|-----------------|-------------------|----|--|
| | (GB) M3A1 | | | | | (WB) M4A1 and M4A2 | | | | | M119 | M119A1 and M119A2 | M203 and M203A1 | M231 ⁸ | | | M232 ⁸ | | |
| | Charge | | | | | Charge | | | | | Charge | Charge | Charge | Charge | | | Charge | | |
| | 1 | 2 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 7 | 8 | 7,8 ¹ | 8 | 1 | 2 | 3 | 4 | 5 | |
| M107, HE | No ² | x | x | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | |
| M795, HE | No | No | x | x | x | No | x | x | x | x | x | x | x | x | x | x | x | No | |
| M110 agent (H, HD) | No ² | x | x | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | M110 agent burster loaded with tetrytol cannot be stored/fired at temperatures exceeding +125°F (+52°C) |
| M110 (M110E1), M110A1 (M110E2), M110A2 (M110E3), smoke (WP) | No ² | x | x | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | M110 (M110E1) burster loaded with tetrytol cannot be stored/fired at temperatures exceeding +125°F (+52°C) |

¹M119A2 charge 7 is equivalent to M119A1 charge 8. Refer to firing tables for small differences in velocity, which affect range.

²Charge 1 must not be fired in the M776 cannon because of stickers. Firing at charge 2 may result in stickers occasionally.

⁸Do not load or fire M231 charges with M232 charges. Critical malfunction could result.

NOTES

PRIMERS M82 and DM191A1 are the authorized primers and can be used with the M776 cannon.

M203 series charge 8 is not equivalent to M119A1 charge 8.

M232 charge 5 is equivalent to M203 series charge 8.

Table 4-3. Authorized Projectile and Propelling Charge Combinations (cont)

| Projectiles | Propelling Charge | | | | | | | | | | | | | | | | | | Firing Warnings |
|------------------------------|-------------------|---|---|---|---|--------------------|---|---|---|----|--------|-------------------|-----------------|-------------------|---|-------------------|----|----|--|
| | (GB) M3A1 | | | | | (WB) M4A1 and M4A2 | | | | | M119 | M119A1 and M119A2 | M203 and M203A1 | M231 ⁸ | | M232 ⁸ | | | |
| | Charge | | | | | Charge | | | | | Charge | Charge | Charge | Charge | | Charge | | | |
| | 1 | 2 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 7 | 8 | 7,8 ¹ | 8 | 1 | 2 | 3 | 4 | 5 | |
| M116, M116B1, Smoke, BE (HC) | No ² | x | x | x | x | x | x | x | x | No | No | No | No | x | x | x | No | No | Do not fire WP projectiles known to have been stored other than base down. Firing of such projectiles could contribute to in-bore explosions or close-in premature malfunctions. |
| M116A1, Smoke, BE, HC | No ² | x | x | x | x | x | x | x | x | No | x | No | x | x | x | x | No | | |
| M121A1, Agent (GB or VX) | No ² | x | x | x | x | x | x | x | x | No | x | No | x | x | x | x | No | | |

¹M119A2 charge 7 is equivalent to M119A1 charge 8. Refer to firing tables for small differences in velocity, which affect range.

²Charge 1 must not be fired in the M776 cannon because of stickers. Firing at charge 2 may result in stickers occasionally.

⁸Do not load or fire M231 charges with M232 charges. Critical malfunction could result.

NOTES

PRIMERS M82 and DM191A1 are the authorized primers and can be used with the M776 cannon.

M203 series charge 8 is not equivalent to M119A1 charge 8.

M232 charge 5 is equivalent to M203 series charge 8.

4-3 AUTHORIZED PROJECTILES (cont)

Table 4-3. Authorized Projectile and Propelling Charge Combinations (cont)

| Projectiles | Propelling Charge | | | | | | | | | | | | | | | Firing Warnings | | |
|-------------------------------|-------------------|----|----|----|----|--------------------------|----|----|----|---|-------------------------|-----------------------|-------------------|-------------------|---|-----------------|----|---|
| | (GB) M3A1 | | | | | (WB) M4A1 and M4A2 | | | | | M119A1 and M119A2 | M203 and M203A1 | M231 ⁸ | M232 ⁸ | | | | |
| | Charge | | | | | Charge | | | | | Charge | Charge | Charge | Charge | | | | |
| | 1 | 2 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 7 | 7,8 ¹ | 8 | 1 | 2 | 3 | 4 | 5 | |
| M687 agent (GB2) | No ² | No | x | x | x | x | x | x | x | x | x | No | No | No | x | x | No | Firing below charge 3 may result in stickers ³ . |
| M449, M449A1, HE, ICM | No ² | x | x | x | x | No | x | x | x | x | x | No | x | x | x | x | No | |
| M483A1, HE, ICM | No ² | No | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | Firing below charge 3 may result in stickers ³ . |
| M864, HE, ICM, extended range | No ² | No | No | No | No | No | No | No | No | x | x | x | No | No | x | x | No | Firing below charge 3 may result in stickers. The M864 shall be fired to achieve ranges beyond capabilities of the M483A1 projectile or when the M483A1 is not available ³ . |

¹M119A2 charge 7 is equivalent to M119A1 charge 8. Refer to firing tables for small differences in velocity, which affect range.

²Charge 1 must not be fired in the M776 cannon because of stickers. Firing at charge 2 may result in stickers occasionally.

³For bag charges only.

⁸Do not load or fire M231 charges with M232 charges. Critical malfunction could result.

NOTES

PRIMERS M82 and DM191A1 are the authorized primers and can be used with the M776 cannon.

M203 series charge 8 is not equivalent to M119A1 charge 8.

M232 charge 5 is equivalent to M203 series charge 8.

Table 4-3. Authorized Projectile and Propelling Charge Combinations (cont)

| Projectiles | Propelling Charge | | | | | | | | | | | | | | | | Firing Warnings | |
|------------------------------------|-------------------|----|----|----|----|--------------------------|----|----|----|---|-------------------------|-----------------------|-------------------|----|-------------------|---|-----------------|---|
| | (GB) M3A1 | | | | | (WB) M4A1 and M4A2 | | | | | M119A1 and M119A2 | M203 and M203A1 | M231 ⁸ | | M232 ⁸ | | | |
| | Charge | | | | | Charge | | | | | Charge | Charge | Charge | | Charge | | | |
| | 1 | 2 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 7 | 7,8 ¹ | 8 | 1 | 2 | 3 | 4 | 5 | |
| M485A1, M485A2, Illuminating | No ² | x | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | M485A1 and M485A2 projectiles are not reliable when fired at Charges 6, 7 and 8 with fuze settings of 10 seconds or less. |
| M549, HERA ⁵ | No ² | No | No | No | No | No | No | No | No | x | x | No | No | No | x | x | No | The M549A1 may be fired with M203 series charge, but M549 must never be fired with M203 series charge. |
| M549A1, HERA ⁵ | No ² | No | No | No | No | No | No | No | No | x | x | x | No | No | x | x | No | M549 must never be fired with M203 series charge. |
| M692, HE (ADAM) | No ² | No | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | Firing below Charge 3 may result in stickers. ³ |
| M731, HE (ADAM) | No ² | No | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | |

¹M119A2 charge 7 is equivalent to M119A1 charge 8. Refer to firing tables for small differences in velocity, which affect range.

²Charge 1 must not be fired in the M776 cannon because of stickers. Firing at charge 2 may result in stickers occasionally.

³For charge bags only.

⁵Do not fire the M549/M549A1 projectiles if the obturating band is missing or broken. If the band is displaced and can be repositioned and remain in the groove, the projectile can be fired.

⁸Do not load or fire M231 charges with M232 charges. Critical malfunction could result.

NOTES

PRIMERS M82 and DM191A1 are the authorized primers and can be used with the M776 cannon.

M203 series charge 8 is not equivalent to M119A1 charge 8.

M232 charge 5 is equivalent to M203 series charge 8.

4-3 AUTHORIZED PROJECTILES (cont)

Table 4-3. Authorized Projectile and Propelling Charge Combinations (cont)

| | Propelling Charge | | | | | | | | | | | | | | | Firing Warnings | | |
|--------------------------------|-------------------|----|----|---|---|--------------------------|---|---|---|---|-------------------------|-----------------------|-------------------|-------------------|---|-----------------|----|--|
| | (GB) M3A1 | | | | | (WB) M4A1 and M4A2 | | | | | M119A1 and M119A2 | M203 and M203A1 | M231 ⁸ | M232 ⁸ | | | | |
| | Charge | | | | | Charge | | | | | Charge | Charge | Charge | Charge | | | | |
| Projectiles | 1 | 2 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 7 | 7,8 ¹ | 8 | 1 | 2 | 3 | 4 | 5 | |
| M718, M718A1, AT (RAAMS) | No ² | No | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | Firing below charge 3 may result in stickers ³ . |
| M741, M741A1, AT (RAAMS) | No ² | No | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | |
| M712, HEAT (Copperhead) | No ² | No | No | x | x | No | x | x | x | x | x | No | x | x | x | x | No | |
| M804, practice | No ² | x | x | x | x | x | x | x | x | x | x | No | x | x | x | x | No | |

¹M119A2 charge 7 is equivalent to M119A1 charge 8. Refer to firing tables for small differences in velocity, which affect range.

²Charge 1 must not be fired in the M776 cannon because of stickers. Firing at charge 2 may result in stickers occasionally.

³For bag charges only.

⁸Do not load or fire M231 charges with M232 charges. Critical malfunction could result.

NOTES

PRIMERS M82 and DM191A1 are the authorized primers and can be used with the M776 cannon.

M203 series charge 8 is not equivalent to M119A1 charge 8.

M232 charge 5 is equivalent to M203 series charge 8.

Table 4-3. Authorized Projectile and Propelling Charge Combinations (cont).

| | Propelling Charge | | | | | | | | | | | | | | | Firing Warnings | | |
|------------------------|-------------------|----|---|---|---|--------------------------|---|---|---|---|-------------------------|-----------------------|-------------------|----|-------------------|-----------------|----|--|
| | (GB) M3A1 | | | | | (WB) M4A1 and M4A2 | | | | | M119A1 and M119A2 | M203 and M203A1 | M231 ⁸ | | M232 ⁸ | | | |
| | Charge | | | | | Charge | | | | | Charge | Charge | Charge | | Charge | | | |
| Projectiles | 1 | 2 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 7 | 7,8 ¹ | 8 | 1 | 2 | 3 | 4 | 5 | |
| M825 (WP) ⁶ | No ² | No | x | x | x | x | x | x | x | x | x | No | No | No | No | No | No | |
| M825A1, (WP) SMOKE | No | No | x | x | x | x | x | x | x | x | x | x | x | x | x | x | No | |
| HE, M898 (SADARM) | No | No | x | x | x | x | x | x | x | x | x | x | x | x | x | x | No | |

¹M119A2 charge 7 is equivalent to M119A1 charge 8. Refer to firing tables for small differences in velocity, which affect range.

²Charge 1 must not be fired in the M776 cannon because of stickers. Firing at charge 2 may result in stickers occasionally.

³For charge bags only.

⁶M825 projectiles (manufactured Jan 85-May 86) fired at temperatures above +110°F (+43°C) (WP liquefied) have resulted in flight instability and short rounds. This instability does not occur below +110°F (+43°C) (WP solid).

⁷Do not fire M232 charge 5 in M777 howitzer. Safety Testing was not performed.

⁸Do not load or fire M231 charges with M232 charges. Critical malfunction could result.

NOTES

PRIMERS M82 and DM191A1 are the authorized primers and can be used with the M776 cannon.

M203 series charge 8 is not equivalent to M119A1 charge 8.

M232 charge 5 is equivalent to M203 series charge 8.

4.3 AUTHORIZED PROJECTILES (cont)

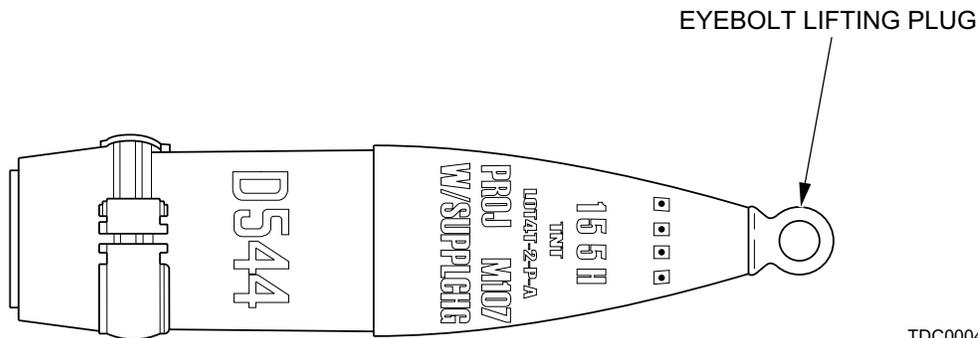
c. Projectiles of current manufacture with deep fuze cavities and supplementary charges of TNT are suitable for use with the long intrusion (M728 or M514 series) or the short intrusion (M732 series) proximity fuzes. The supplementary charge must be removed when the long intrusion proximity fuze is used; it must remain in place whenever any other authorized fuze is used.

d. Deep-cavity projectiles are identified by the words, W/SUPPL CHG, marked on the projectile. Weight zones are indicated on projectiles by one or more squares of the same color as the markings. Four squares indicate normal weight for which no weight corrections are necessary when computing firing data. There may also be punch marks in the center of squares for night identification of weight zones by touch.

e. The authorized projectiles and their characteristics are as follows:

(1) **Projectile, 155-mm, HE, M107.** This High Explosive (HE) projectile is used primarily for blast, fragmentation and mining. This deep or shallow-cavity projectile consists of a steel case loaded with TNT or composition B. A point detonating, time, or proximity fuze may be used. The M107 projectile weighs approximately 95.0 lbs (43.09 kg).

M107 PROJECTILE



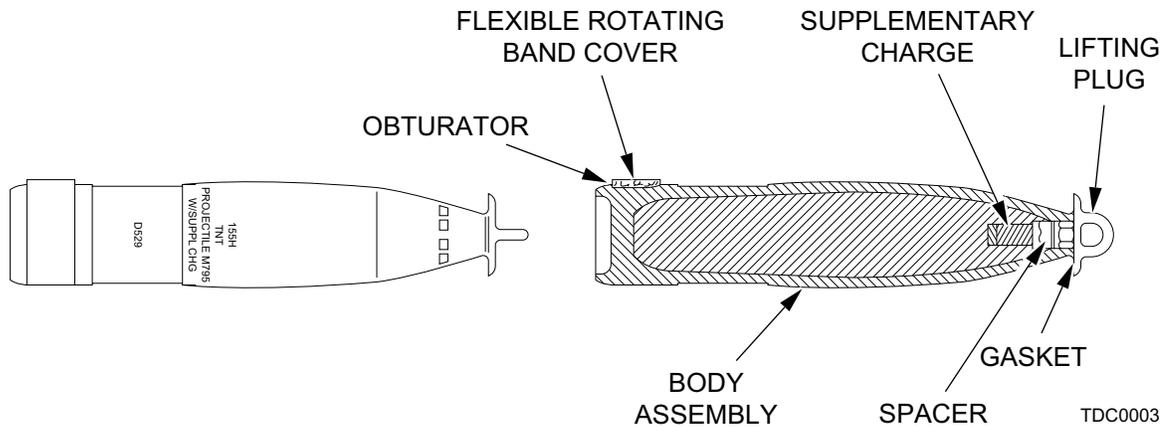
WARNINGS

THE M795 PROJECTILE WILL NOT BE FIRED AT CHARGE 3 (WHITE BAG (WB)). FIRING AT CHARGE 3 WB MAY RESULT IN STICKERS.

THE M795 IS NOT TO BE FIRED IF THE OBTURATOR IS MISSING OR BROKEN AS ROTATING BAND FAILURE AND SHORT ROUND MAY RESULT. IF THE BAND IS DISPLACED AND CAN BE REPOSITIONED AND REMAIN IN THE GROOVE, THE PROJECTILE CAN BE FIRED.

(2) **Projectile, 155-mm, HE, M795.** This high explosive (HE), shallow cavity projectile is used as a registration round for the M483A1 family of cargo munitions. It is also used for harassment and interdiction (H & I), fragmentation, mining, and blast effect. The M795 consists of 23.8 pounds (10.8 kg) of TNT explosive loaded into a 78.1 pounds (35.5 kg) body assembly. A welded rotating band encircles the high fragmentation steel HF-1 body near its base.

M795 HE PROJECTILE



WARNING

SINCE THE BURSTER IN (H) MUSTARD GAS OR (HD) DISTILLED MUSTARD GAS AMMUNITION IS LOADED WITH TETRYTOL, DO NOT STORE OR FIRE AT TEMPERATURES EXCEEDING +125°F (+52°C). TEMPERATURES ABOVE +125°F (+52°C) WILL CAUSE THE TETRYTOL TO MELT AND/OR SEEP, CAUSING PREMATURE FUNCTIONING.

(3) Projectile, 155-mm, Agent, H or HD, M110. This projectile produces a toxic effect on personnel and is also used to contaminate habitable areas. This 93.0 lbs (42.18kg) projectile is filled with mustard gas (H) or distilled mustard gas (HD) and has a burster charge.

WARNING

THE M121 PROJECTILE IS NO LONGER AUTHORIZED. A FEW M121 (BASIC MODEL) PROJECTILES WITH TETRYTOL BURSTERS MAY REMAIN IN SOME STOCK PILES AND SHOULD NOT BE USED, AS INBORE EXPLOSIONS MAY RESULT.

(4) Projectile, 155-mm, Gas Persistent, VX, M121A1. This VX gas projectile produces a toxic effect on personnel. A burster charge breaks the projectile apart. The M121A1 has a composition B filled burster. This projectile weighs approximately 100lbs (45.36kg).

(5) Projectile, 155-mm, Gas, Non-Persistent, GB, M121A1. This projectile is similar to the VX projectile M121A1 described above.

4-3 AUTHORIZED PROJECTILES (cont)

WARNINGS

THE FILLER IN WHITE PHOSPHOROUS SMOKE PROJECTILES MELTS AT +111.4°F (+44.1°C) AND CREATES VOIDS INSIDE THE PROJECTILE. THE WHITE PHOSPHOROUS PROJECTILES MUST BE STORED BASE DOWN SO THAT ANY VOIDS ARE IN THE NOSE OF THE PROJECTILE. DO NOT FIRE WHITE PHOSPHOROUS PROJECTILES, WHICH ARE KNOWN TO HAVE BEEN STORED IN OTHER THAN BASE DOWN POSITION. FIRING OF SUCH PROJECTILES COULD CONTRIBUTE TO IN-BORE EXPLOSIONS OR CLOSE-IN PREMATURE MALFUNCTIONS.

SINCE THE BURSTER IN THE M110 AND M110E1 PROJECTILES IS LOADED WITH TETRYTOL, DO NOT STORE OR FIRE AT TEMPERATURES ABOVE +125°F (+52°C). TEMPERATURES ABOVE +125°F (+52°C) WILL CAUSE THE TETRYTOL TO MELT AND/OR SEEP, CAUSING PREMATURE FUNCTIONING. PRIOR TO FIRING, INSPECT FUZE WELL CUP FOR DENTS IN BOTTOM SURFACE. IF DENTS ARE FOUND OR THE FUZE IS HARD TO SEAT, DO NOT USE THE ROUND.

(6) Projectiles, 155-mm, Smoke, WP, M110 and M110E1. The M110 and M110E1 White Phosphorous (WP) smoke projectiles have a slight burning effect, but are used primarily to produce screening smoke. The projectiles are similar to the M110 gas projectile and have the same characteristics as the M107 HE projectile. Each projectile weighs approximately 98lbs (44.45kg).

(7) Projectiles, 155-mm, Smoke, WP, M110A1 (M110E2) and M110A2 (M110E3). These projectiles are similar to the M110 and M110E1 WP projectiles, except that the burster is loaded with composite B5. These projectiles may be stored and transported at temperatures up to +145°F (+63°C). Inspection of the fuze well cup is required before firing.

(8) Projectiles, 155-mm, Smoke, HC, M116 and M116B1. The M116 and M116B1 smoke projectiles are used for screening, spotting, and signaling purposes and are issued with a filler of HC (white) chemical smoke mixture. These Base-Ejection (BE) rounds contain four smoke canisters. Each projectile weighs approximately 86lbs (39.0kg). These projectiles can use only the M501 series MTSQ fuze.

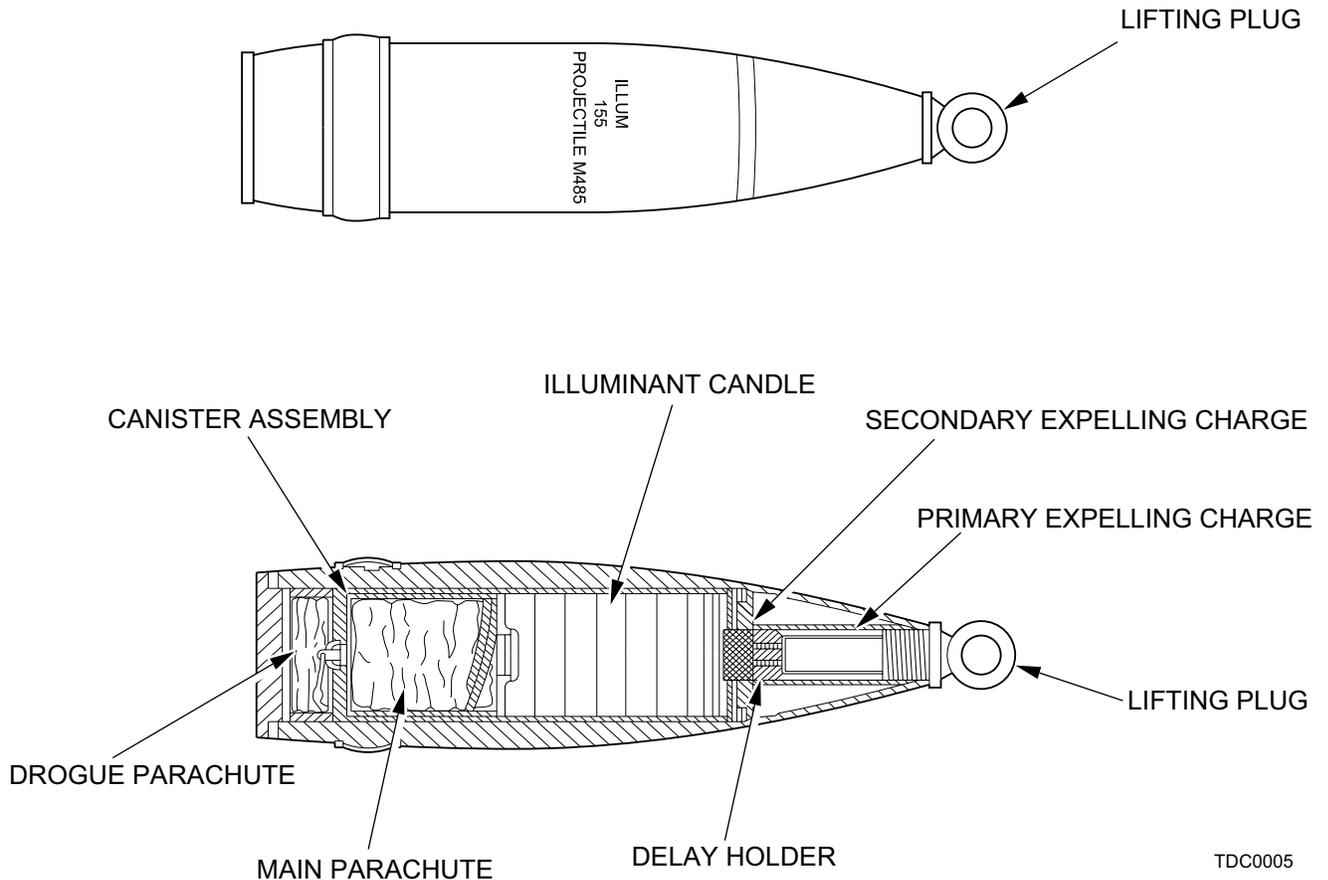
(9) Projectiles, 155-mm, Smoke, HC, M116A1. The M116A1 projectile is a BE type similar to the M116 and M116B1 with the exception that it uses the M565 MT and M577 series MTSQ or M762 ET fuzes, and that it has improved M1 and M2 HC (white) smoke canisters.

WARNING

THE M485A1 AND M485A2 PROJECTILES CAN BE FIRED WITH CHARGE 2 (M3 GB) THRU 8 (M119 SERIES CHARGES) INCLUSIVE. THESE PROJECTILES ARE NOT RELIABLE WHEN FIRED AT CHARGES 6, 7, AND 8 WITH FUZE SETTINGS OF 10 SECONDS OR LESS.

(10) Projectiles, 155-mm, Illuminating, M485A1 and M485A2. These projectiles are used for battlefield illumination. Each projectile has a hollow steel body containing a primary expelling charge, a canister assembly, and a drogue parachute. The canister assembly contains a secondary expelling charge, a delay holder, a light producing chemical, and the main parachute.

PROJECTILE, 155 MILLIMETER: ILLUM, M485 SERIES



(11) Projectiles, 155-mm, HE, Rocket Assist, M549 and M549A1. This is a high fragmentation projectile containing a rocket motor. The protective rocket cap must be removed from the projectile before firing to increase the range over that attainable ballistically. The M549 differs from the M549A1 only in type of explosive filler. The M549 is loaded with composite B, and the M549A1 is loaded with TNT.

4-3 AUTHORIZED PROJECTILES (cont)

WARNINGS

THE M549/M549A1 IS NOT TO BE FIRED IF THE OBTURATOR IS MISSING OR BROKEN BECAUSE IT MAY RESULT IN A SHORT ROUND. IF THE BAND IS DISPLACED AND CAN BE REPOSITIONED AND REMAIN IN THE GROOVE, THE PROJECTILE CAN BE FIRED. THE BASIC M119 CHARGE IS NOT TO BE USED WITH THE M549/M549A1 PROJECTILE AS ITS USE WILL RESULT IN ROCKET MOTOR IGNITION FAILURE, CAUSING LOSS OF RANGE (SHORT ROUNDS). USE M119A1 OR M119A2 CHARGES.

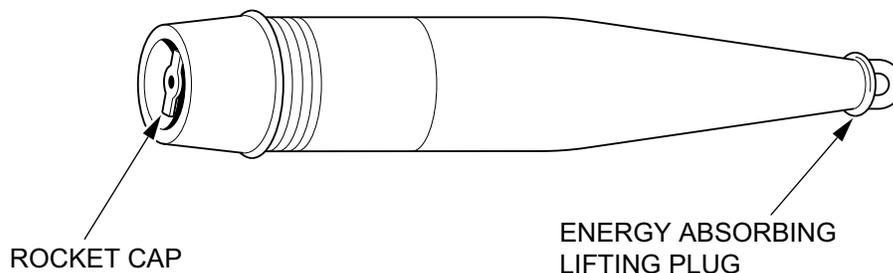
STANDARD PROCEDURES PROHIBIT FIRING THE M549/M549A1 IN THE ROCKET OFF MODE EXCEPT IN COMBAT EMERGENCIES. REMOVE ROCKET CAP BEFORE LOADING TO ACTIVATE THE ROCKET.

A 6000-METER SAFETY ZONE IS REQUIRED **SHORT** OF THE TARGET BECAUSE OF THE POSSIBILITY OF ROCKET MOTOR NON-IGNITION.

IF FIRED ROCKET OFF DUE TO EMERGENCY SITUATION, A 6000 METER RANGE IS REQUIRED **BEYOND** THE TARGET BECAUSE OF THE POSSIBILITY OF ROCKET MOTOR IGNITION.

(a) The M549/M549A1 projectiles have the energy-absorbing lifting plug designed to protect the projectile fuze area against accidental damage. The new plug has an oversized 3.75-inch (9.53-cm) flange. If this lifting plug is broken at the neck area, the threaded portion of the plug will remain in the projectile and the projectile cannot be fuzed. No attempt should be made to extract any portion of a broken plug from a projectile; the projectile is not to be used and should be returned to supply point.

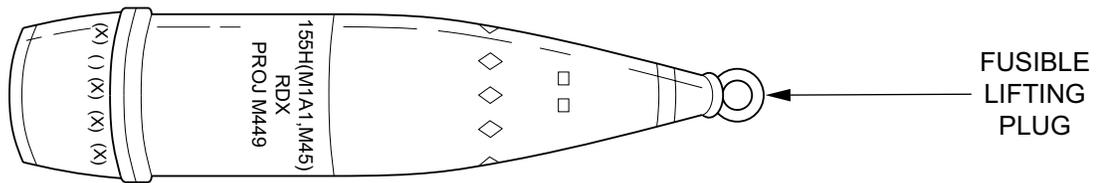
M549 OR M549A1 PROJECTILE



TDC0006

(12) **Projectile, 155-mm, ICM, M449 Series.** These projectiles are Improved Conventional Munitions (ICM) used primarily against personnel. The cargo consists of 60 M43 grenades, which are ejected in flight. The fuze, having been set to function at a predetermined time, initiates the expulsion charge, ejecting the entire cargo from the rear of the projectile. The projectile spins centrifugally and disperses the grenades from the projectile line-of-flight. Upon impact with the target area, an expulsion charge is initiated which propels a high explosive filled sphere upward 4 to 6 feet (1.22 to 1.83 m) above the impact area. The elevated sphere is detonated, sending high-velocity fragments in a spherical pattern. Each projectile weighs approximately 95lbs (43.09kg).

M449 SERIES PROJECTILE



TDC0007

WARNING

THE M483A1 PROJECTILE WILL NOT BE FIRED BELOW CHARGE 3 IN THE M777 HOWITZER. FIRING BELOW CHARGE 3 MAY RESULT IN STICKERS.

NOTE

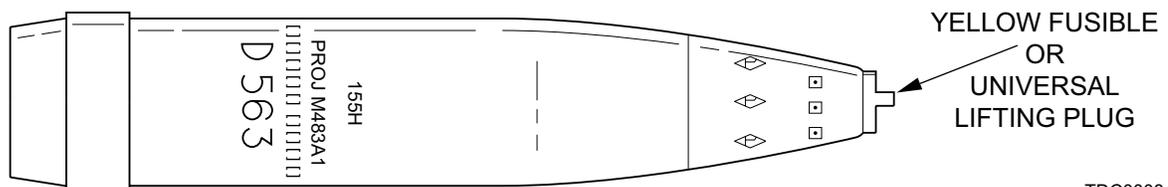
The M483A1 projectile or other projectiles using the M483A1 carrier may not be fired without the obturating band. Reposition band if it is dislodged.

(13) Projectile, 155-mm, ICM, M483A1. The dual-purpose ICM projectile is effective against personnel and light materiel targets. These BE type projectiles consist of a steel body containing an expelling charge and 88 shaped charge grenade sub-missiles. This projectile weighs approximately 103lbs (46.72kg) and uses M577 series MTSQ or M762 ET fuze. It can be used in the fire-for-effect mode or the registration mode.

(a) In the fire-for-effect mode, the expelling charge ejects the 88 sub-missiles from the projectile during flight and they actuate on ground or target impact. A shaped charged jet is expelled downward while the body bursts into a large number of high-velocity fragments. The jet is capable of penetrating approximately 2.75inch (6.98cm) of homogenous armor plate. Anti-personnel effects are obtained by fragmentation of the body.

(b) In the self-registration mode, the expelling charge is removed, and a projectile spotting charge is attached to the time fuze and installed in the projectile. The spotting charge will cause the projectile to detonate all 88 grenades inside the projectile, causing high fragmentation in the same manner as a standard high-explosive projectile. This permits observation of projectile in relation to target. See paragraph 4-12 for additional information on special preparation of the M483A1 projectile for use in the self-registration mode.

M483A1 PROJECTILE



TDC0008

NOTE

The M864 is for extended range only. Use the M483A1 projectile through the M119A2 charge (Zone 7) where applicable. The M864 shall be fired to achieve ranges beyond the capabilities of the M483A1 projectile or when the M483A1 is not available.

4-3 AUTHORIZED PROJECTILES (cont)

| |
|-----------------|
| WARNINGS |
|-----------------|

A 5000-METER SAFETY ZONE IS REQUIRED SHORT OF THE TARGET BECAUSE OF THE POSSIBILITY OF THE BASE BURNER ASSEMBLY NON-IGNITION.

THE M864 IS NOT TO BE FIRED IF THE OBTURATOR IS MISSING OR BROKEN BECAUSE IT MAY RESULT IN A SHORT ROUND. IF THE OBTURATOR BAND IS DISPLACED AND CAN BE REPOSITIONED AND REMAIN IN THE GROOVE, THE PROJECTILE CAN BE FIRED.

FOR M864 PROJECTILES MARKED WITH THREE SOLID WHITE CIRCLES 120 DEGREES APART ON THE OGIVE (ABOVE THE WEIGHT ZONE MARKINGS), AVOID HAZARDS RESULTING FROM GAPS AT THE BASE TO BODY JOINT AND FROM SEPARATION OF THE BASE FROM THE BODY BY FOLLOWING THESE SAFETY PROCEDURES:

- PROJECTILES ARE TO REMAIN PALLETIZED AS LONG AS POSSIBLE PRIOR TO USE.
- DO NOT TRANSPORT PROJECTILES AS LOOSE CARGO.
- DO NOT FIRE PROJECTILES RECEIVED WITHOUT GROMMETS OR WITH EVIDENCE OF DENTS, FLATTENING, OR GOUGES TO THE LIFTING PLUG, GROMMET, ROTATING BAND OR BOATAIL AREA.
- DO NOT FIRE PROJECTILES, WHICH HAVE BEEN DROPPED LOOSE.
- ANY BASE SEPARATIONS SHOULD BE HANDLED BY EXPLOSIVE ORDNANCE DISPOSAL PERSONNEL.

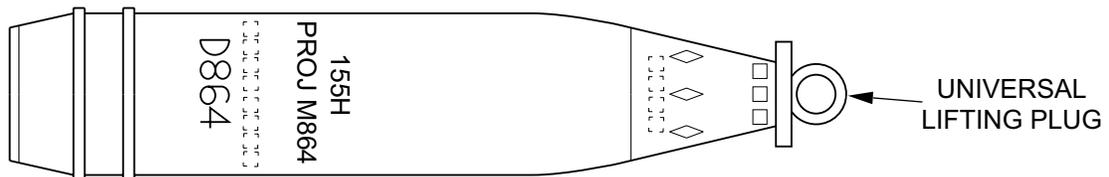
IN THESE SPECIALLY MARKED M864 ROUNDS, A GAP AT THE BASE TO BODY JOINT OF THE PROJECTILE MAY LEAD TO HOT PROPELLANT GASES ENTERING THE ROUND DURING FIRING AND CAUSING AN INBORE EXPLOSION. GAPS ARE NOT DETECTABLE WITH A VISUAL EXAMINATION DUE TO THE PRESENCE OF THE OBTURATOR OVER THE BASE TO BODY JOINT. IN ADDITION, A SEPARATION OF THE BASE FROM THE BODY OF THE PROJECTILE WILL EXPOSE M42 AND M46 GRENADES. ARMING COULD OCCUR AND RESULT IN DEATH AND/OR INJURY.

(14) Projectile 155-mm Extended Range, DP, M864.

(a) This is an extended range dual-purpose, ICM projectile. The M864 is modeled after the M483A1 projectile with the addition of a base burner unit at the projectile's base. The propellant in the base burner ignites upon firing of the projectile, producing gases which reduce the drag on the projectile and extend its range.

(b) This is a base-ejection type projectile with a steel body. The expulsion charge contains 105 grams of M10 propellant. There are 72 shaped charge grenades consisting of 48 M42 grenades and 24 M46 grenades. They are effective against personnel and light materiel targets. This projectile weighs approximately 102lbs (46.27kg) and uses the M577 series MTSQ or M762 ET fuze. It can be used in the fire-for-effect mode or the self-registration mode.

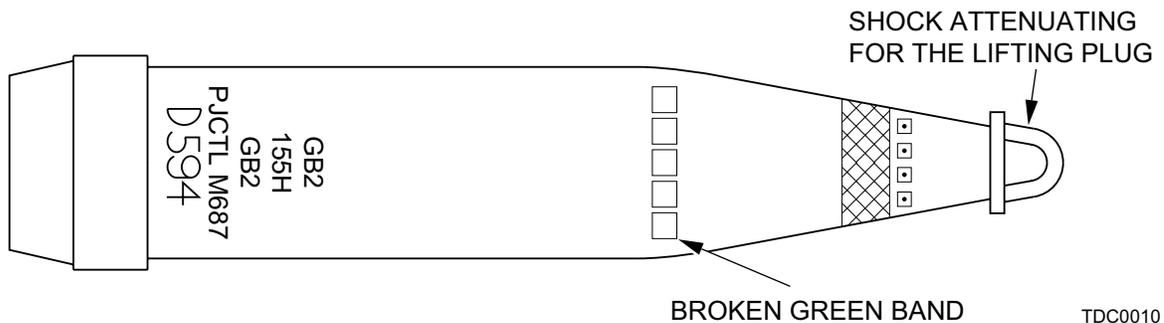
M864 PROJECTILE



TDC0009

(15) Projectile, 155-mm, GB2, M687. These projectiles are used to produce a toxic effect on personnel. The M687 is a binary projectile, which requires assembly of the M20 canister prior to firing. The M20 canister is a separate issue item NSN 1320-00-407-8301 (D001). The M687 is assembled at the Chemical Ammunition Supply Point (CASP) per TM 3-1320-242-10 and will have a broken green band visible. If a rubber sleeve covers the broken green band, assembly of the M20 canister has not been accomplished and the projectile should not be fired.

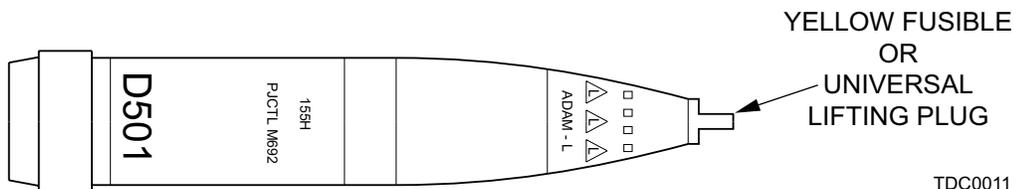
M687 PROJECTILE



TDC0010

(16) Projectile, 155-mm, HE, M692. This HE projectile is known as the Area Denial Artillery Munition (ADAM). It is painted olive drab with yellow markings. The most significant marking on the ogive is the letter 'L' appearing in the triangles, and in later production 'ADAM-L' on the ogive, indicating a long self-destruct time of the antipersonnel mine sub-munitions. The M692 is a BE type projectile and uses the M577 series MTSQ or M762 ET fuze.

M692 PROJECTILE

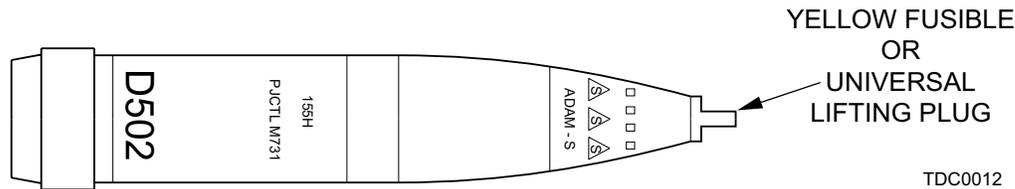


TDC0011

4-3 AUTHORIZED PROJECTILES (cont)

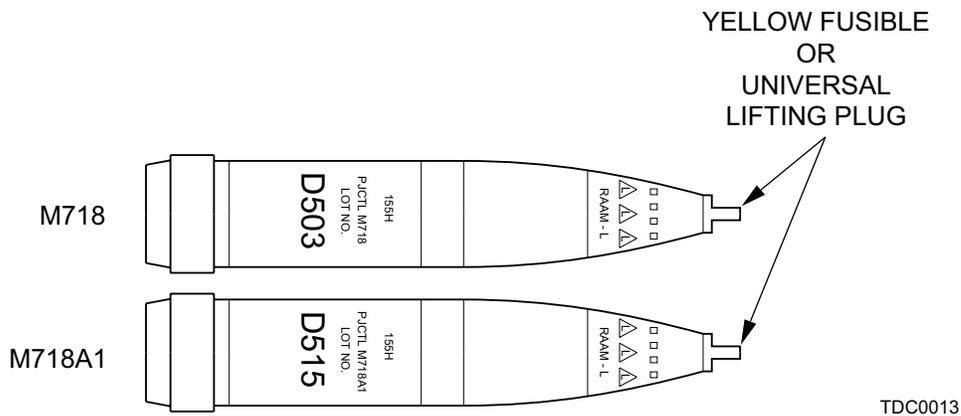
(17) **Projectile, 155-mm, HE, M731.** This projectile is like the M692 projectile, except the letter 'S' appears within the yellow triangles, indicating short self-destruct time of mine sub munitions. This base-ejection type projectile uses the M577 series MTSQ or M762 ET fuze.

M731 PROJECTILE



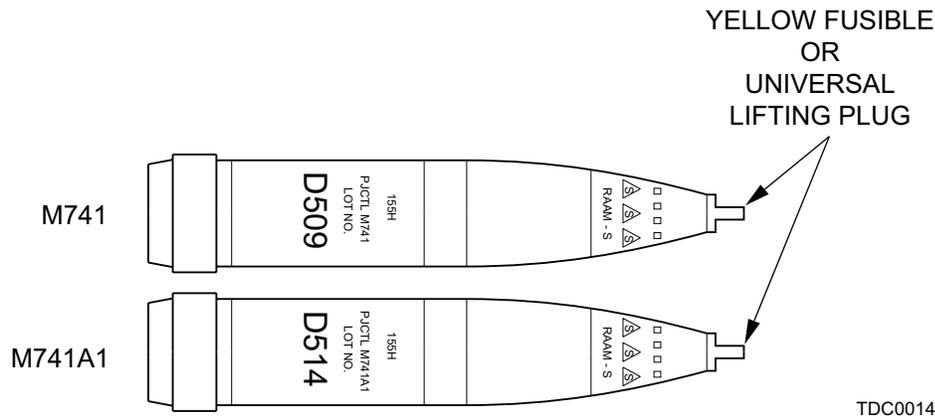
(18) **Projectile, 155-mm, AT, Remote Anti-Armor Mine System, M718/M718A1.** This projectile is used to deliver high-explosive antitank mines in front of enemy armored forces to deny/delay access to a particular area for a specific time period. This projectile is from the family of scatterable mines known as the Remote Anti-Armor Mine System (RAAMS). It is painted olive drab with yellow markings. The most significant markings are the row of yellow triangles between the nose and the bourrelet which contain the letter 'L' and 'RAAM-L' on the ogive that indicates the LONG self-destruct time for the submunition. This is a BE type projectile and uses the M577 series MTSQ or M762 ET fuze. The M718A1 projectile contains internal changes to the submunitions and has a new DODIC (D515); however, the projectile is handled and fired the same as the basic model.

M718/M718A1 PROJECTILE



(19) **Projectile, 155-mm, AT, Remote Anti-Armor Mine System, M741/M741A1.** This projectile is also known as the RAAMS round, and it is exactly like the M718 above except the letter 'S' painted in the yellow triangles and 'RAAMS-S' on the ogive are different to indicate a SHORT self-destruct time. This is a base-ejection type projectile and uses M 577 series MTSQ or M762 ET fuze. The M741A1 projectile contains internal changes to the sub munitions and has a new DODIC (D514); however, the projectile is handled and fired the same as the basic model.

M741/M741A1 PROJECTILE



(20) Projectile, 155-mm, HEAT, M712. This projectile is a cannon-launched guided projectile. It is a High-Explosive Anti-Tank (HEAT) projectile loaded with 14.75 lbs (6.69 kg) of composition B. It is guided to its target by a laser beam directed on the target from a laser designator. The projectile has five time and code switches set by the crew prior to firing. The warhead section of the projectile contains its own base-detonating fuze (M740). The projectile is 54 inches (1 37.1 6 cm) long and weighs 138 lbs (62.60 kg). Details on use of M712 projectile begin on Chapter 4, Section IV.

M712 HEAT PROJECTILE

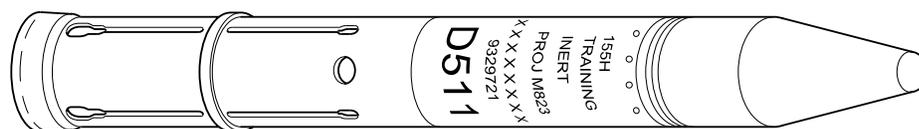


WARNING

THE M823 PROJECTILE MUST NOT BE FIRED. SUCH FIRING COULD BE A HAZARD TO PERSONNEL FORWARD OF THE WEAPON.

(21) Projectile, 155-mm, Training, M823. This projectile is designed to train 155-mm howitzer weapon crews in the handling and setting of the M712 projectile. It simulates the M712 in weight, center of gravity, and external appearance. It contains code and time switches, which are set to simulate prefiring activity by the crew. It is shipped and stored in the same container as the M712, color coded bronze for easy identification. Details on use of M823 projectile begin on Chapter 4, Section IV.

M823 PROJECTILE



4-3 AUTHORIZED PROJECTILES (cont)

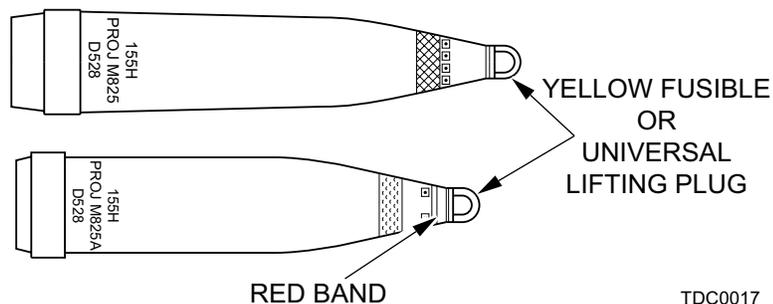
WARNINGS

WHITE PHOSPHOROUS IMPREGNATED FELT WEDGES FROM THE M825/M825A1 ARE NOT TOTALLY CONSUMED WHEN THE WHITE PHOSPHOROUS BURNS. WHEN THE UNBURNED FELT WEDGES ARE CRUSHED OR MOVED, RESIDUAL WHITE PHOSPHOROUS WILL RE-IGNITE, POSING A BURN HAZARD. PERSONNEL SHOULD NOT CONTACT OR MOVE THE UNBURNED FELT WEDGES.

THE M825/M825A1 IS NOT TO BE FIRED IF THE OBTURATOR IS MISSING OR BROKEN AS ROTATING BAND FAILURE AND SHORT ROUND MAY RESULT. IF THE BAND IS DISPLACED AND CAN BE REPOSITIONED AND REMAIN IN THE GROOVE, THE PROJECTILE CAN BE FIRED.

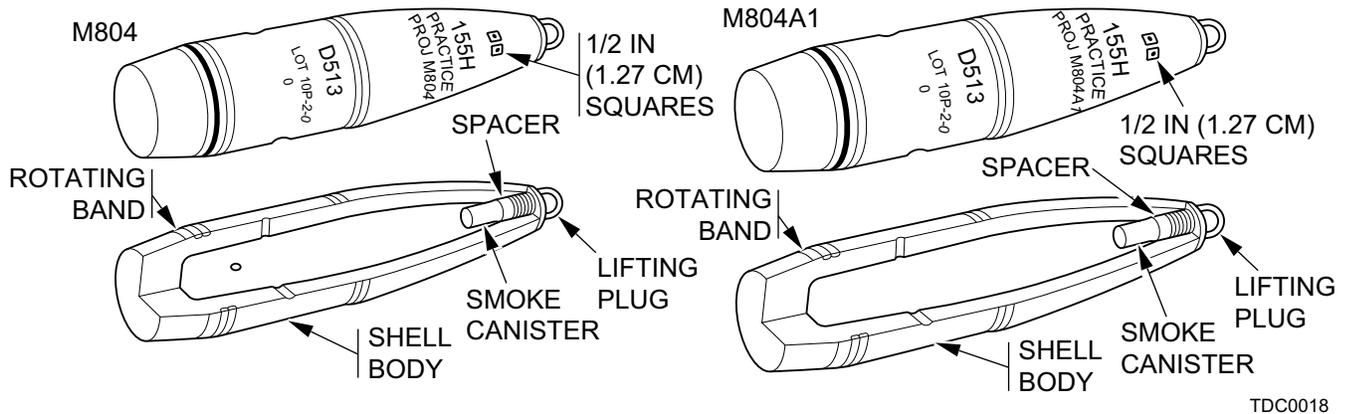
(22) Projectile, 155-mm, Smoke, WP, M825/M825A1. The M825 projectile consists of a modified M483A1 projectile carrier with a payload of WP impregnated felt wedges. In-flight fuze functioning ejects a canister. A burster inside the canister scatters burning wedges over the target area producing obscuring smoke. This projectile uses the M577 series MTSQ or M762 ET fuze. The M825 projectile contains an improved payload and a new base, which have corrected the M825 flight instability. The restrictions imposed on the M825 do not apply to the M825A1.

M825/M825A1 SMOKE PROJECTILE



(23) Projectile, M804/M804A1, Practice. The M804/M804A1 projectile is used in place of the M107 HE projectile in training exercises. The M804/M804A1 contains a small smoke canister in the fuze well, which provides flash and smoke for visual determination of functioning. The M804/M804A1 is similar in weight and external configuration to the M107 HE projectile and can be used in training without the blast and fragmentation, which accompany functioning of an M107 HE projectile. The body of the M804 contains four holes, 90 degrees apart, which serve to disperse smoke on functioning. The M804A1 does not contain any holes and has a larger smoke canister. Both projectile models are handled and fired in the same way.

M804/M804A1 PROJECTILE



TDC0018

4-4 AUTHORIZED FUZES

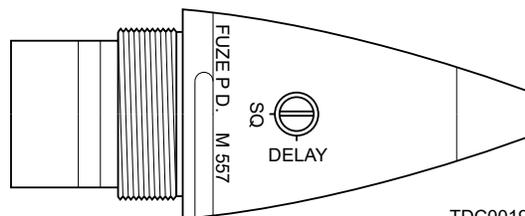
a. Paragraphs b. thru k describes the fuzes to be used with this weapon. They are in model number sequence. For additional information and more detailed descriptions and functioning of the authorized fuzes, see TM 43-0001-28.



THE FIRING OF A FIELD ARTILLERY ROUND WITHOUT A FUZE OR WITH AN UNAUTHORIZED FUZE IS STRICTLY PROHIBITED AS AN INBORE EXPLOSION MAY RESULT.

b. **Fuze, Point-Detonating (PD), M557/M572.** The M557 has a selective superquick delay setscrew. It is packed set for superquick and has a booster attached. Premature functioning can occur when fuzes are fired in heavy precipitation, i.e., heavy rainfall, sleet, snow, or hail. The M572 fuze is the M557 fuze with the addition of epoxy under the windshield. It is handled, set, and fired the same as the M557 fuze.

M557 AND M572 PD FUZE

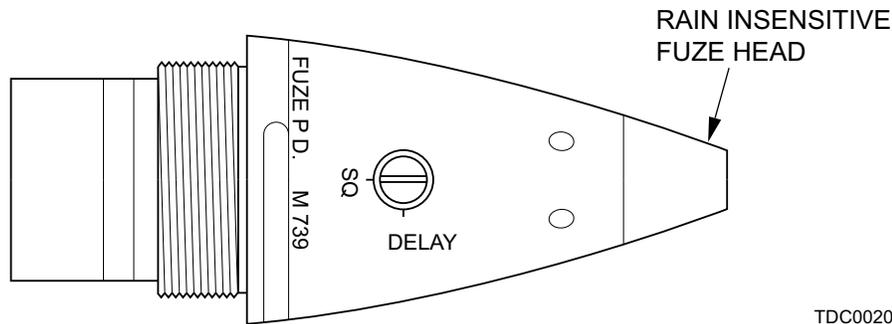


TDC0019

c. **Fuze, PD, M739 and M739A1.** These fuzes are the latest improved versions of the selective impact fuze. These fuzes have solid aluminum bodies with threaded bases. The fuzes contain a rain-insensitive screen so that the fuzes can be fired through a heavy rainstorm without premature functioning of the round of ammunition. These fuzes can be set for superquick or delay action by turning the setscrew. The M739A1 fuze contains a new impact delay module, which provides more effective functioning in the delay mode. In addition to the stamped markings, the M739A1 fuze is anodized green for positive identification of fuze model.

4-4 AUTHORIZED FUZES (cont)

M739 OR M739A1 FUZE

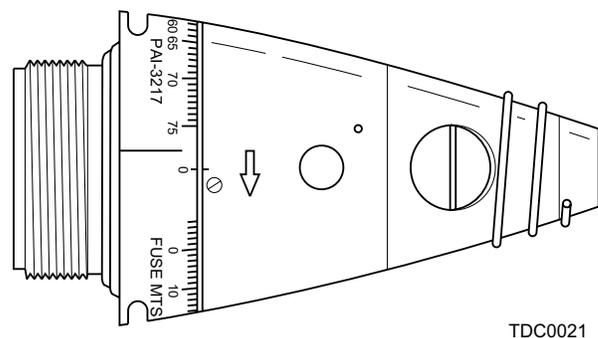


WARNING

DROPPING OR ROUGH HANDLING OF PROJECTILES ASSEMBLED WITH FUZE, MECHANICAL TIME SUPERQUICK, M501/M501A1 MAY RESULT IN FUZE FUNCTIONING AND EXPULSION OF BASE PLATE AND CONTENTS. WHEN HANDLING PROJECTILES ASSEMBLED WITH FUZE, EXERCISE EXTREME CARE TO PROTECT THE FUZE FROM IMPACT. KEEP PULL WIRE ON FUZE IN PLACE UNTIL IMMEDIATELY PRIOR TO FIRING.

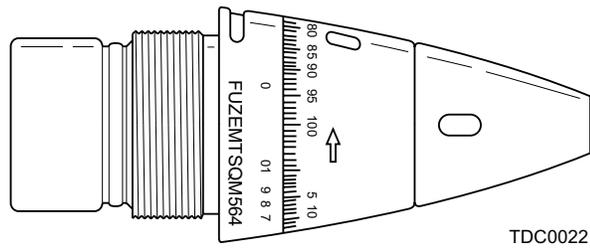
d. Fuze, Mechanical Time and Super-Quick (MTSQ), M501A1 and M501. The M501A1 or M501 fuze is a combination MTSQ fuze with settings for time action (2 to 75 seconds) and an impact element for superquick action. It is used only with the M116 and M116B1 smoke rounds.

M501A1 OR M501 FUZE



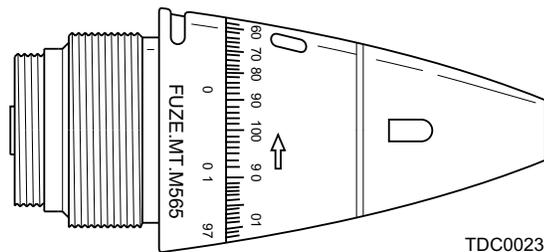
e. Fuze, MTSQ, M564. This fuze is an improvement over the older MTSQ fuzes, because it provides a longer timing mechanism (100 seconds) for functioning at longer ranges. The date of manufacture is stamped on the fuze body before the lot number. Fuzes manufactured through 1969 must be set on 90 seconds if superquick (impact) action is desired. Setting of these fuzes between S and 2 seconds may result in functioning after approximately 2 seconds. Fuzes manufactured from 1970 on may be set as shipped on S for superquick (impact) functioning. Premature functioning of this fuze may occur downrange when the fuze is fired in heavy precipitation, i.e., heavy rainfall, sleet, snow, or hail.

M564 FUZE



f. **Fuze, Mechanical Time (MT), M565.** The M565 MT type is similar to the M564 MTSQ fuze, except that the M565 fuze does not contain the point-detonating assembly or the booster assembly. The M565 fuze can be set from 2 to 100 seconds. Like the M564 fuze, the M565 fuze has a vernier scale to assure a setting accuracy of 0.1 second. The fuze is used with base-ejection projectiles only.

M565 FUZE

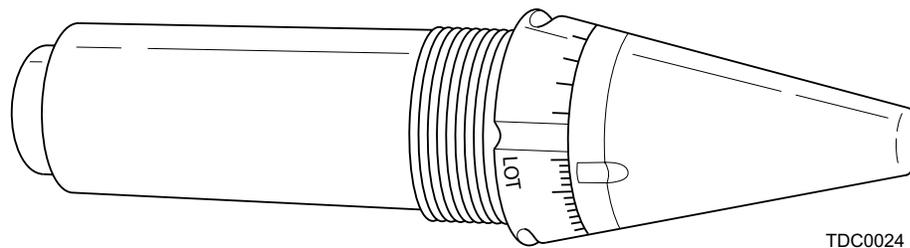


WARNING

THE M728 AND M514 SERIES FUZES ARE NOT TO BE USED WITH THE M203/M203A1 PROPELLING CHARGE.

g. **Fuze, Proximity, Variable Time (VT), M728 and M514 Series.** These proximity VT fuzes are used with deep-cavity projectiles and are essentially self-powered radios and transmitting units. The fuzes can be set from 5 to 100 seconds. The nose of M728 fuze has been painted (black) to reduce static electricity.

M728 FUZE AND M514 SERIES FUZE



4-4 AUTHORIZED FUZES (cont)

h. Fuzes, MTSQ, M577 Series and M582 Series.

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|----------------|
| WARNING |
|----------------|

THE M577 AND M582 SERIES FUZES, WHEN SET FOR A TIME OF LESS THAN 4 SECONDS, WILL ALLOW THE ROTOR TO RELEASE ALMOST IMMEDIATELY, FULLY ARMING THE FUZE, WHICH ENABLES THE FUZE TO EXPLODE AT THE SET TIME. ANY TIME SETTING OF LESS THAN 2 SECONDS IS A DANGER TO CREW AND SHOULD NOT FIRE UNLESS FIRING "KILLER JUNIOR".

(1) These fuzes have a 200-second MT mechanism with three movable digital dials similar to a speedometer. Each fuze has a window through which the dials are viewed. The dials permit setting of the fuze to the nearest tenth of a second. The M577A1 and M582A1 MTSQ fuzes contain a different mechanism for PD action. Externally the major difference is the configuration of the wrench slots. The M577A1 and M582A1 fuzes are handled, set, and fired the same as the basic models. Early manufactured basic and A1 fuzes have black (paint finish) ogives while the later produced A1 fuze has a gold (chromate finish) ogive.

(a) The dial closest to the fuze nose indicates the time in hundreds of seconds. (The triangle (◄) position is a nontime setting).

(b) The second dial indicates time in tens of seconds.

(c) The third dial indicates the nearest second and also tenths of seconds by using the scale on the right edge of the dial.

(2) These fuzes can be set with the M35 fuze setter or a flat-tip screwdriver. The time-setting key is located on the end of the fuze nose. The desired time is set under the hairline. Detailed setting instructions are outlined in paragraph 4-14.

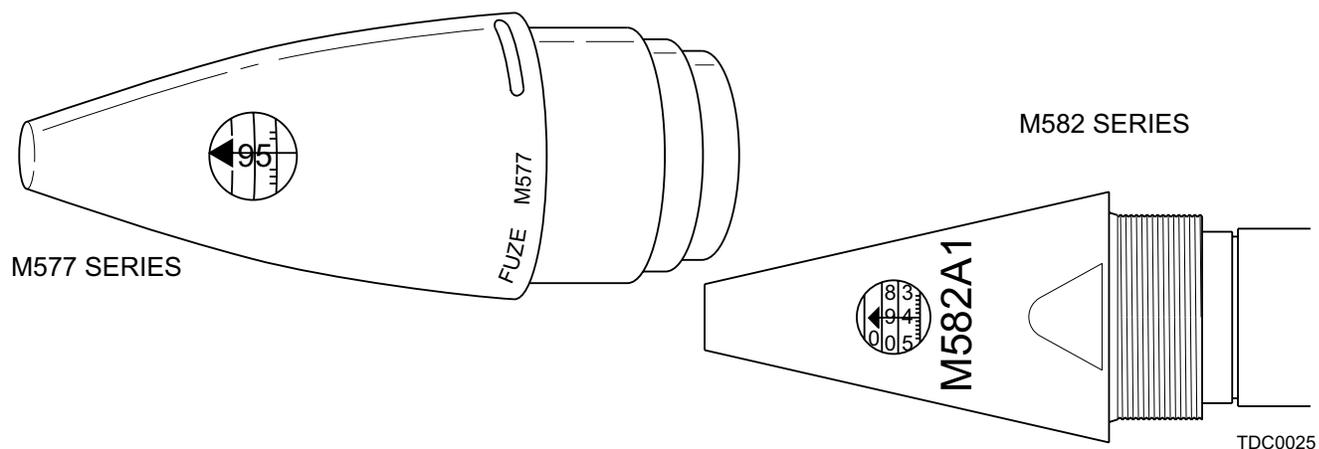
(3) The M577 series does not contain a booster and is used with base-ejection projectiles. The M582 series fuze is fitted with a booster for firing with burster-type and high explosive projectiles. In order to minimize identification problems, current production of the M582A1 fuzes contain a white stencil "M582A1" below the window in the fuze body.

(4) The fuzes are not sensitive to rain.

(5) The M577 series fuze can be used with a spotting charge when firing the M483A1 and M864 projectiles in the self-registration mode.

(6) If M577 series/M582 series fuzes are set for time and the timing mechanism fails, the fuze may or may not function on impact.

M577 SERIES OR M582 SERIES FUZE



i. Fuzes, Electronic Time (ET), M762 and M767 Series.

(1) These fuzes are powered by a reserve lithium battery. The battery is activated manually by rotating the ogive or remotely via inductive auto-set fire controls and M1155 PIAF fuze setter, see paragraph 4-14.i. An electronic subassembly contains integrated circuits that provides controls and logic for 199.9 seconds electronic timing and transmits a fire pulse signal for time function. A Liquid Crystal Display (LCD) provides a visual readout of the fuze setting, as follows:

- (a) The column closest to the base end indicates time in hundreds of seconds (the triangle (◀) position is a nontime setting).
- (b) The second column away from base end indicates time in tens of seconds.
- (c) The third column away from base end indicates time in seconds.
- (d) The fourth column (closest to nose end) indicates time in tenths of seconds.

(2) These fuzes contain an electromechanical Safe & Arming Mechanism (S&A). When set for time function, the S&A provides overhead safety by arming at 50 milliseconds before set time. For this reason, if the fuze impacts before a time setting expires, there will be no PD backup function, For PD setting, the S&A arms the fuzes at 0.45 seconds in flight. Upon impact, a crush switch assembly (contained in the ogive) senses the impact and transmits a fire signal for PD action.

(3) These fuzes can be set either by hand (rotating ogive) and depressing selector and cocking button or remotely by a weapon equipped with auto-set fire control system and M1155 PIAF fuze setter, see paragraph 4-14.i. Detailed setting instructions are outlined in paragraph 4-14. The settings can be changed as many times as required for the duration of the activated life of the battery.

(4) These fuze bodies are anodized gold. The rear portion of the ogive is coated with a gold phosphate finish. The forward portion of the ogive is brown plastic for the basic fuzes and black plastic for the M762A1 and M767A1 fuzes. The nose cap is unpainted bronze for the basic fuzes and stainless steel for the M762A1/M767A1.

(5) The M762 fuze does not contain a booster and is used with base-ejection projectiles. The M767 series fuze is fitted with a booster for firing with burster-type and high-explosive projectiles.

(6) The M762 series fuze can be used with a special spotting charge when firing the M483A1 and M864 projectiles in the self-registration mode. See paragraph 4-12.

(7) If these fuzes fail in the time mode, there is no PD backup.

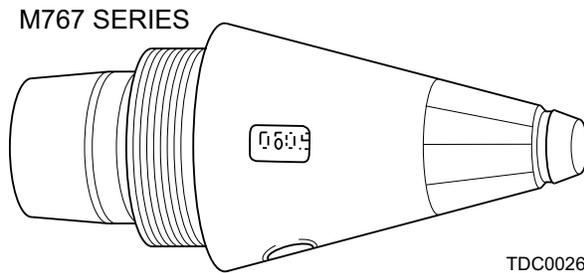
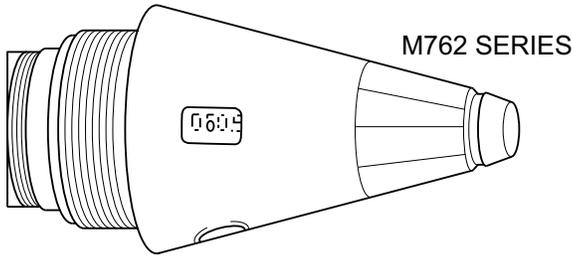
4-4 AUTHORIZED FUZES (cont)

- (8) The fuzes are not sensitive to rain.

NOTE

Once activated, the M762 and M767 cannot be turned off, therefore, the fuzes have approximately 15 days service life before the battery runs down and the LCD goes blank.

M762 AND M767 FUZES

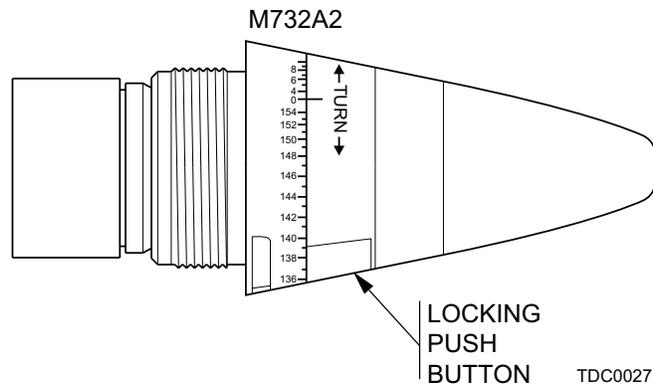
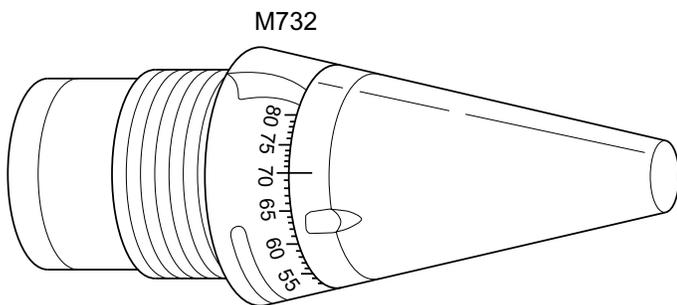


j Fuze, Proximity, VT, M732 series. These proximity variable time (VT) fuzes are short-intrusion fuzes of the same overall length as the standard impact or mechanical time fuze. The supplementary charge must be left in the fuze well for proper functioning of this fuze. The M732 fuze has a time ring that can be set from 0 to 150 seconds. The M732A2 fuze can be set from 4 to 156 seconds. Time settings are used to arm these fuzes 3 to 5 seconds prior to set time for proximity function. The fuzes can also function PD as an option or proximity mode back-up and are always armed for PD at 400 calibers. The M732A2 was especially designed for compatibility with rocket-assisted rounds. The M732A2 is set by simultaneously depressing two pushbuttons in the ogive and rotating the setting ring to the desired position. When the pushbuttons are released, the setting ring is locked into position.

NOTE

The PD setting of the M732 series VT fuzes, when fired into soft impact areas, will produce less lethality than the superquick setting of the M739 series PD fuze.

M732 SERIES FUZE



k. Fuze, PD, MK399, MOD 1. The MK399 MOD 1 MOUT fuze is primarily for use against urban structures (buildings) and other hard targets such as bunkers. Its primary design is for penetration of wood, brick or concrete and function inside the target. It therefore is delivered to the field set in the DLY (delay) mode to accomplish this task. The fuze has a setscrew that can be turned by a flathead screwdriver or M18 fuze wrench to select PD or delay (DLY) function. When set PD, the fuze functions superquick, which is more effective in destroying walls or urban targets and bunkers, can provide a conventional PD fuze role against personnel, and is useful for spotting purposes. The fuze is assembled with a booster pellet and set on the DLY mark for shipping. This fuze is rain sensitive.

Table 4-3.1 Summary Matrix of Expected Performance Against MOUT Targets.

| Obliquity Angle ⇨ | Wood Frame | | | | Single Brick | | | | Triple Brick | | | | Reinforced Concrete | | | |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|----------------|----------------|----------------|
| | 0° | 30° | 45° | 60° | 0° | 30° | 45° | 60° | 0° | 30° | 45° | 60° | 0° | 30° | 45° | 60° |
| 155mm M107/M795 low zone | M ¹ | M ¹ | M ¹ | M ¹ | G | G | G | G | G | G | M ³ | M ³ | G | G | M ³ | M ³ |
| 155mm M107/M795 mid zone | G | G | G | G | G | G | G | G | G | G | M ³ | M ³ | G | G | M ³ | M ³ |
| 155mm M107/M795 high zone | G | G | G | G | G | G | G | G | M ² | M ² | G | G | M ² | M ² | G | G |
| 155mm M549A1 | | | | | P ¹ | P ¹ | P ¹ | P ¹ |

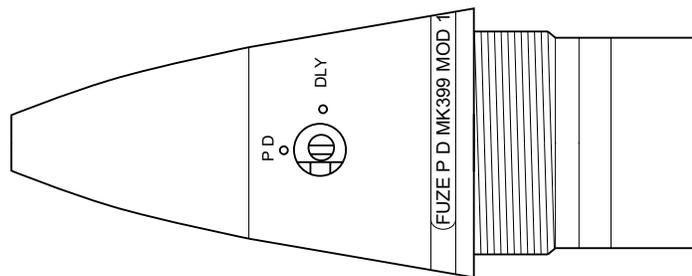
| |
|---------------------------|
| G – good |
| M – marginal |
| P – poor, not recommended |

NOTE

Always be prepared to use multiple rounds to defeat targets.

Obliquity angle 0° = perpendicular to target wall.

MOUT PD FUZE, MK399 MOD 1



TDC0028

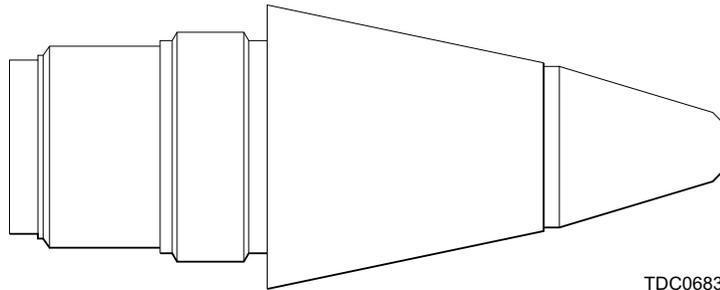
- M¹ – for lighter wood frame construction, at low zone, insufficient impact force may result in duds.*
- M² – perpendicular and near perpendicular impacts against harder targets at high zone can result in functions on the wall before penetration.*
- M³ – at low and mid zones impact angles at and beyond 45 degrees can result in duds.*
- P¹ – RAP rounds not recommended against MOUT targets, projectile may break-up upon impact.*

4-4 AUTHORIZED FUZES (cont)

I. **Fuze, MOFA, M782.** These fuzes are intended for use with fragmentation (HE loaded) and burster-type projectiles. They may only be set with the M1155 Portable Inductive Artillery Fuze Setter (PIAFS) (refer to TM 9-1290-210-12&P). There are four functional modes on these fuzes: point detonating (PD), delay (DLY), variable time (VT), and time (TIME). An electronic subassembly of the fuze, containing integrated circuits, provides control and logic for 199.9 seconds of electronic timing, and transmits a fire pulse signal for time and proximity functions. The mission data transferred from the M1155 PIAFS to the fuze is confirmed by the setter and is displayed on a Liquid Crystal Display (LCD) module found on the setter.

m. MOFA utilizes a standard M739 Safety and Arming (S&A) mechanism that is housed in a retaining cup just below the detonator block. Both setback and spin locks are used to prevent accidental arming of the S&A prior to firing. This S&A mechanism provides a safe separation distance of at least 400 calibers of projectile travel when fired (45.9 yards or 41.97 meters).

n. These fuzes are set by a M1155 PIAFS (refer to TM 9-1290-210-12&P). The setting can be changed as many times as required. This fuze is not sensitive to rain.



4-5 PROPELLING CHARGES

a. The following are authorized propelling charges:

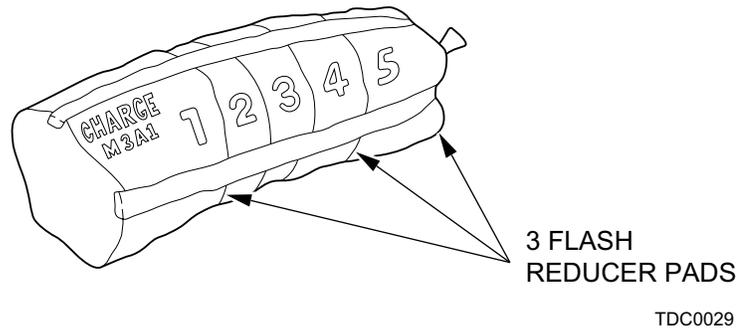
WARNING

SOME PROPELLING CHARGES MAY HAVE PRIMER MK2A4 PACKED INSIDE THE CONTAINER. THIS PRIMER IS NOT AUTHORIZED FOR FIRING IN THE M776 CANNON. DO NOT FIRE THE MK2A4 IN THIS CANNON. TURN THEM INTO THE AMMUNITION SUPPLY POINT.

b. **Propelling Charge, M3A1.** This is a green bag charge divided into a base and four increments for firing in charges 1 thru 5. It has a flash reducer pad assembled in front of the base charge with similar 1-ounce (28.35-g) pads assembled in front of increments 4 and 5. The increment bags are tied together by cloth straps. A clean-burning igniter charge in a red cloth bag is sewn to the rear of the base section.

c. **Propelling Charge, M3.** This is a green bag charge similar to the M3A1 propelling charge, except it is not assembled with flash reducer pads, and black powder is used in the igniter pad.

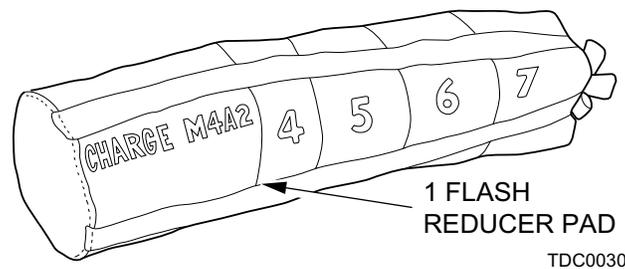
M3A1 PROPELLING CHARGE (GREEN BAG)



d. **Propelling Charge, M4A2.** This is a white bag charge consisting of a base charge and four increments for firing in Charges 3 thru 7. The increments are tied together by cloth straps. A clean-burning igniter charge in a red cloth bag is sewn to the rear of the base section. It has a flash reducer pad assembled in front of the base charge.

e. **Propelling Charge, M4A1.** The M4A1 propelling charge is identical to the M4A2 propelling charge, except that it does not contain a flash reducer, and the base igniter contains black powder instead of a clean-burning igniter charge. The M2 flash reducer may be used with this charge and is a separate item of issue.

M4A2 PROPELLING CHARGE (WHITE BAG)



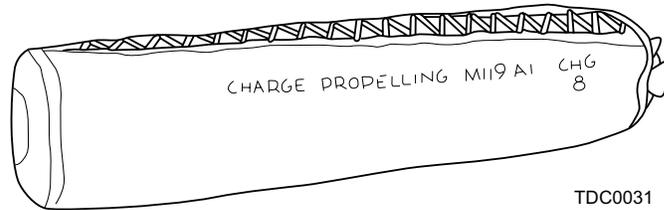
WARNING

A CENTRAL IGNITION CORE IN M119A1, AND M203 CHARGES EXTENDS THROUGH THE CENTER OF THE CHARGE FOR ALMOST IT'S ENTIRE LENGTH. THE M119A1, AND M203 CHARGES MUST BE STORED AND TRANSPORTED IN A HORIZONTAL POSITION SO THAT ANY POSSIBILITY OF DAMAGE TO THE CORE IN THE FORM OF CRACKS OR SPLITS IS ELIMINATED. THE M119 CHARGE IS NOT TO BE USED WHEN FIRING M549/M549A1 PROJECTILES.

f. **Propelling Charge, M119A1.** This charge is identical in appearance to the M119 propelling charge. It is a single charge 8. It contains some design improvements including a modified flash reducer, the modified flash reducer allows firing of this charge with the M549 and M549A1 projectiles. A pull strap has also been added to the M119A1 charge, which provides easier removal from the metal container. This pull strap must be removed from the charge before loading into the weapon tube.

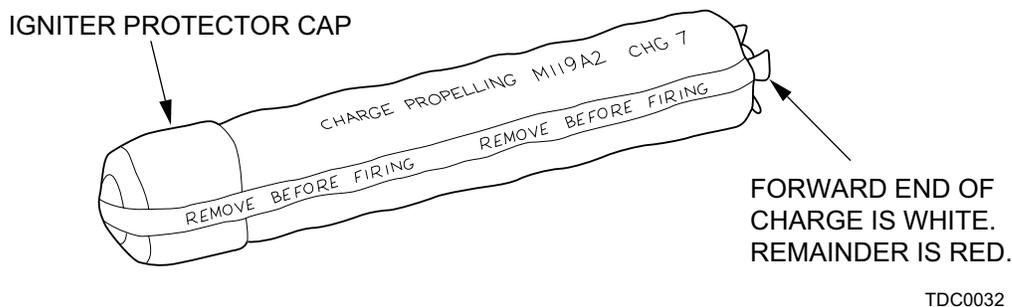
4-5 PROPELLING CHARGES (cont)

M119A1 PROPELLING CHARGE (WHITE BAG)



g. Propelling Charge, M119A2. This charge differs in appearance from the M119A1 in that it has no lacing jacket and the charge bag is red. It is a base ignited zone 7 charge with an igniter pad sewn on the base and a flash reducer, which lines the side of the charge. Like the M119A1, it can be fired with the M549/M549A1 projectile. The igniter protector cap and tie strap must be removed prior to firing the charge. The M119A2 zone 7 is equivalent to the M119A1 zone 8 charge.

M119A2 PROPELLING CHARGE



WARNINGS

WHEN FIRING THE M203 CHARGE (RED BAG) OR M203A1 CHARGE, THE FOLLOWING RESTRICTIONS MUST BE OBSERVED:

- FOAM EARPLUGS MUST BE PROPERLY WORN.
- NO MORE THAN 12 ROUNDS SHOULD BE FIRED IN A GIVEN 24 HOUR PERIOD BY ANY ONE CREW OR ONE INDIVIDUAL CREW MEMBER, IF MORE THAN 12 M203 SERIES CHARGES ARE FIRED, ALL PERSONNEL MUST STAND 25 FEET (7.62 M) OR MORE BEHIND REAR OF CANNON AND A 25-FOOT (7.62-M) LANYARD MUST BE USED.
- ALLOWABLE NUMBER OF ROUNDS PER 24-HOUR PERIOD-BY CHARGE (WITH HEARING PROTECTION).

| | |
|------|---------------|
| M203 | SERIES – 12 |
| M119 | SERIES – 32 |
| M4 | SERIES – 144 |
| M3 | SERIES – 1000 |

NOTE

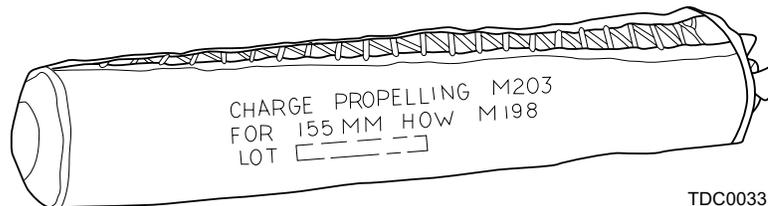
These recommended limits are mutually exclusive; e.g., 12 rounds M203 series, or 32 rounds M119 series, or 144 rounds M4 series, or 1000 rounds M3 series per 24 hour continuous time period.

h. Propelling Charge, M203. The M203 propelling charge is a charge 8 propelling charge developed for extended range in long-tube (M776) 155-mm howitzers. This red bag charge consists of one increment with an igniter bag sewn on its base, a central core igniter extending through the center of the charge, and a flash reducer in front of the charge. The entire length of the charge is encased in a tight-fitting lacing jacket for added strength and stability.

NOTE

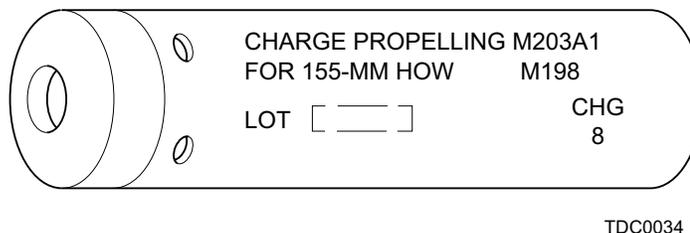
Early production of M203 charges are marked charge 8S (i.e., super). Later production M203 charges are marked charge 8. The charges are ballistically equivalent and should be identified as charge 8 red bag.

M203 PROPELLING CHARGE (RED BAG)



i. Propelling Charge, M203A1. The M203A1 propelling charge like the M203 is a charge 8 propelling charge developed for extended range in long-tube (M776) 155-mm howitzers. This charge consists of one increment of stick propellant and a base igniter pad encased in a full length rigid combustible cartridge case. The charge also contains a wear reducing additive and a lead foil decoppering agent. The M203A1 charge 8 is ballistically equivalent to the M203 red bag charge 8.

M203A1 PROPELLING CHARGE

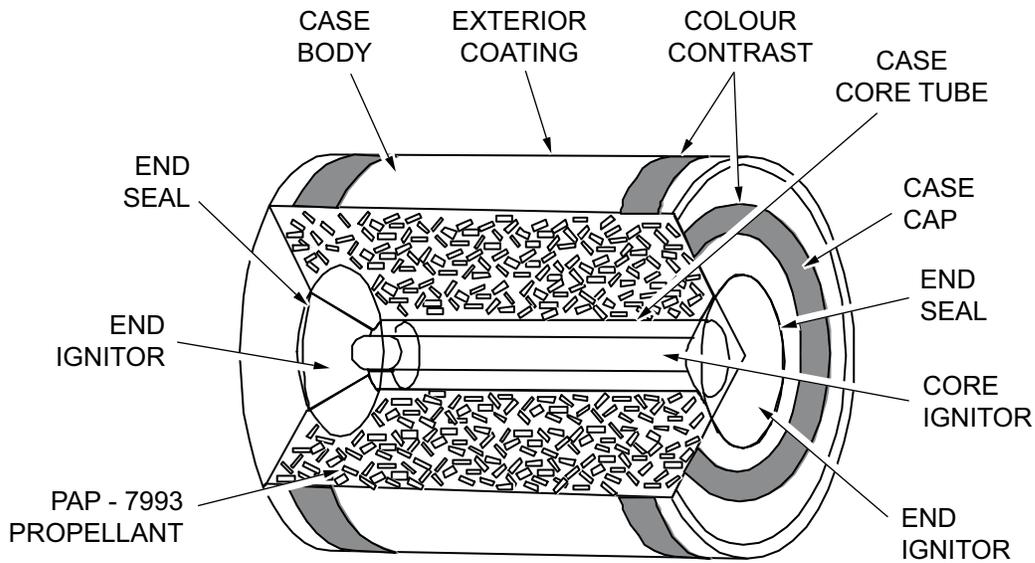


j. Propelling Charge, M231. The M231 propelling charge is comprised of a green-colored, coated, nitrocellulose-based combustible case with black markings and black bands. This charge is bi-directional (can be loaded in either direction). The M231 is fired in increments of 1 or 2 for charges 1 and 2.

M231 PROPELLING CHARGE: MACS (Modular Artillery Charge System)

4-5 PROPELLING CHARGES (cont)

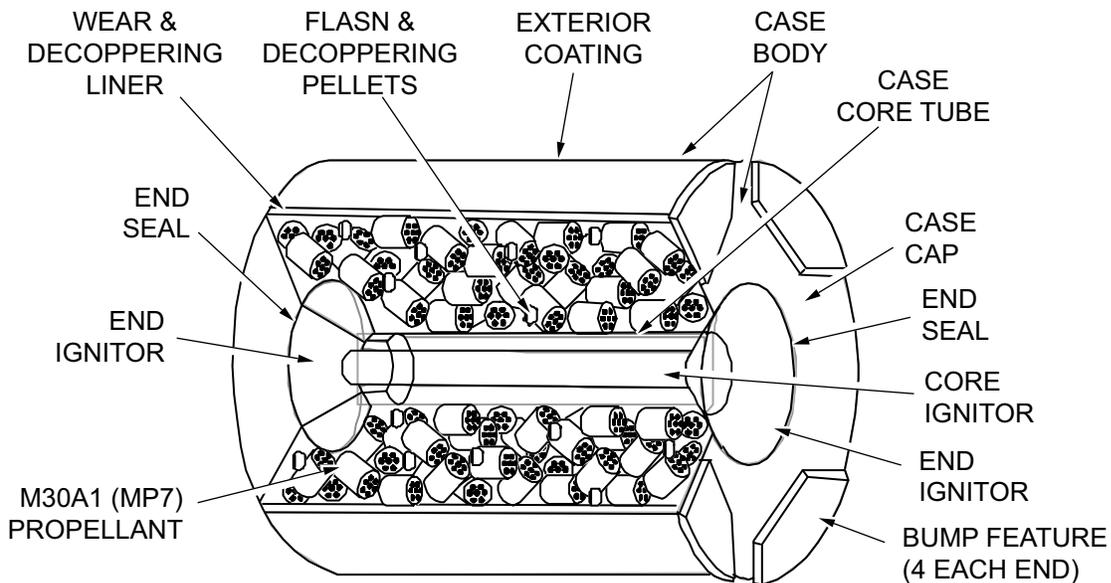
Charge Propelling 155mm: M231 (MACS)



TDC0714

k. Propelling Charge, M232. The M232 propelling charge is comprised of a tan-colored, coated, nitrocellulose-based combustible case with black markings. This charge is bi-directional (can be loaded in either direction). Each end has four raised 1/8-inch bumps. The M232 is fired in increments of 3 through 5 for charges 3 through 5.

Charge Propelling 155mm: M232 (MACS)



TDC0715

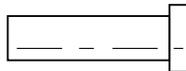
4-6 PRIMER, M82

WARNING

THE M82 AND DM191A1 ARE THE ONLY PRIMERS (SEE CHAPTER 5) AUTHORIZED FOR FIRING IN M776 CANNON. DO NOT FIRE THE MK2A4 IN THIS CANNON. TURN THEM INTO THE AMMUNITION SUPPLY POINT.

a. **The M82 primer**, which is loaded separately from the projectile, is inserted into the primer chamber. When the cannon is fired, the firing pin strikes the primer, which in turn ignites the charge, propelling the projectile forward.

PRIMER, M82



TDC0036

4-7 FLASH REDUCER, M2 (T2)

a. The M2 (T2) flash reducer pads serve to limit breech flashback, as well as muzzle flash and blast overpressure. This flash reducer consists of a red cotton cloth bag 4 inches (10.16 cm) square, containing black powder and potassium sulfate or potassium nitrate. The M2 flash reducer, which is a separate item of issue, may be used with the M4A1 propelling charge if flash reduction is desired. In preparing an M4A1 white bag propelling charge for firing, one flash reducer is added in front of the base charge and one in front of each increment used.

M2 (T2) FLASH REDUCER



TDC0037

Section II. PREPARATION FOR FIRING

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4-8 GENERAL

NOTE

Ammunition components are handled by Cannoneers.

- a. **Temperature Limits.** Unless otherwise specified, observe the following temperature limits when firing:

WARNING

TO ENSURE THAT THE PROJECTILE UPPER TEMPERATURE LIMIT STAYS BELOW +125 °F (+ 52 °C), THE PROJECTILE MUST BE KEPT UNDER SHADE WHEN THE WEATHER TEMPERATURE IS EXPECTED TO EXCEED + 100 °F (+ 38 °C) DURING THE DAY.

- (1) Lower limit is -40°F (-40°C).
- (2) Upper limit is + 125°F (+52°C).

- b. **Temperature Checks Procedures for MACS, M231 and M232.**

NOTE

Temperature will be taken using the standard issue M1A1 powder thermometer. The operating temperature of M231 MACS is -50°F through +120°F.

- (1) Lift the edge of the red seal on either end of the increment and peel the seal back.

WARNING

DO NOT JAB THE ROUND END IGNITER BAG WITH THERMOMETER OR ANY OTHER OBJECT THAT MAY BE USED TO BREAK THROUGH THE EDGE OF THE RED SEAL. BLACK POWDER IS IMPACT SENSITIVE AND FORCEFUL IMPACT OF THE BAG MAY CAUSE AN ACCIDENTAL IGNITION.

NOTE

Do not puncture the combustible case since this makes the increment defective.

(2) Lift the edge of the igniter bag and insert the powder thermometer under the cloth igniter bag and down along the inside of the center core.

(3) The thermometer must stay in the increment until the temperature stabilizes.

c. **Packing and Unpacking Ammunition Components.** Retain packing materials for repackaging, as required.

WARNING

THE M82 AND DM191A1 (SEE CHAPTER 5) ARE THE ONLY AUTHORIZED PRIMERS TO BE USED IN THE M776 CANNON. DO NOT USE THE MK2A4 IN THIS CANNON TUBE. THE PROPELLANT MAY NOT IGNITE.

(1) The M3 series propelling charges are packed two per metal container, with or without the MK2A4 primer. The M4 series, M119, M119A1, M119A2, M203 and M203A1 propelling charges are packed one per metal container.

(2) The M231 is packed with four increments (two per extraction sleeve) in each metal container and the M232 is packed with five per metal container. Increments in extraction sleeves that are not full will be combined to reduce the number of partially loaded containers. These increments will be repacked into their correct type of extraction sleeve and the repacked sleeves returned to their correct container (correct type and lot number) using the following procedures:

NOTE

Unused MACS increments should not be destroyed. They should be repacked, and either fired or turned back in.

(a) Place one of the end cushions into the end of the extraction sleeve and lock in place using the velcro strap.

(b) Slide the correct amount of charges (two for the M231 and five for the M232) into the open end of the extraction sleeve.

(c) Slide the separators between the charges, making sure they slide all the way in. The bumps on the M232 must be aligned for the separators to slide all the way in.

(d) Place second cushion into the open end of the sleeve and lock in place using the second velcro strap.

(e) Slide extraction sleeve with charges into the container and close.

(f) Mark partially loaded containers so that they are not turned in as empty.

(3) The M82 primers are packed one per waterproof bag. Primers are ready for firing when unpacked and should be protected from blows that might cause accidental functioning.

(4) The M2 (T2) flash reducers are packed 200 per metal container (four containers, 800 flash reducers per wooden box).

(5) Fuzes are generally packed in metal boxes. The metal boxes are then packed in wooden boxes.

4-8 GENERAL (cont)

(6) Refer to paragraph 4-24 Unpacking and Inspection procedures for the M712 Copperhead (HEAT) and M823 Training Projectiles.

d. **Procedures.** Inspect ammunition components and verify item identification.

WARNING

INSPECT YOUR AMMUNITION; FAILURE TO ACCOMPLISH REQUIRED INSPECTIONS COULD RESULT IN UNNECESSARY MALFUNCTIONS.

CAUTION

Do not use axes, crowbars, etc., which may damage ammunition or packaging.

- (1) Unpack ammunition and perform inspections indicated in paragraph 4-24.
- (2) Return all defective ammunition to Ammunition Supply Point (ASP).

4-9 GROMMETS

a. **Plastic Grommets.** Provide protection to projectile rotating bands and obturators. One kind of grommet consists of glass filament, wound and impregnated with polyester. Another kind of grommet is made of polycarbonate. In order to remove the polycarbonate grommet from the projectile, the grommet fastener has to be pulled outward to release the tension, which holds the grommet around the projectile body. When installing the polycarbonate grommet, slide the grommet over the projectile until it rests on the rotating band area, then close and push the fastener until it locks.

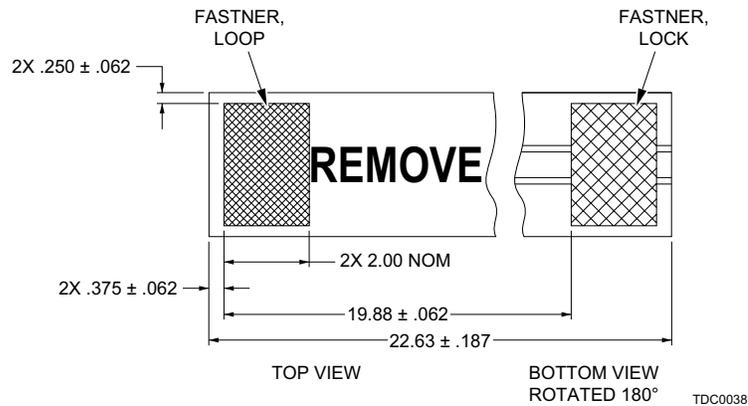
4-10 FLEXIBLE ROTATING BAND COVER (FRBC)

a. **General.** The FRBC, as well as the grommet, is used to protect the rotating band of artillery projectiles for corrosion, dirt, and damage during transportation, handling, and storage. The FRBC can be discarded or replaced in the event of NBC contamination. The FRBC consists of a cloth band with hook and loop attachable ends. Once the FRBC is wrapped around the projectile rotating band, the two ends are pulled until it is tight against the rotating band. The FRBC is then closed by pressing the loop end against the hook end of the fastener with the words "REMOVE BEFORE FIRING" visible in the upright position.

b. **Replacement.** The FRBC should be replaced if any of the following situations occur:

- (1) The FRBC does not stay on firmly with sufficient resistance to opening.
- (2) The FRBC exhibits cuts that expose the rotating band.
- (3) The FRBC marking is unreadable due to age and wear.

FLEXIBLE ROTATING BANDCOVER



4-11 FIELD ARTILLERY PROJECTILE PALLET (FAPP)

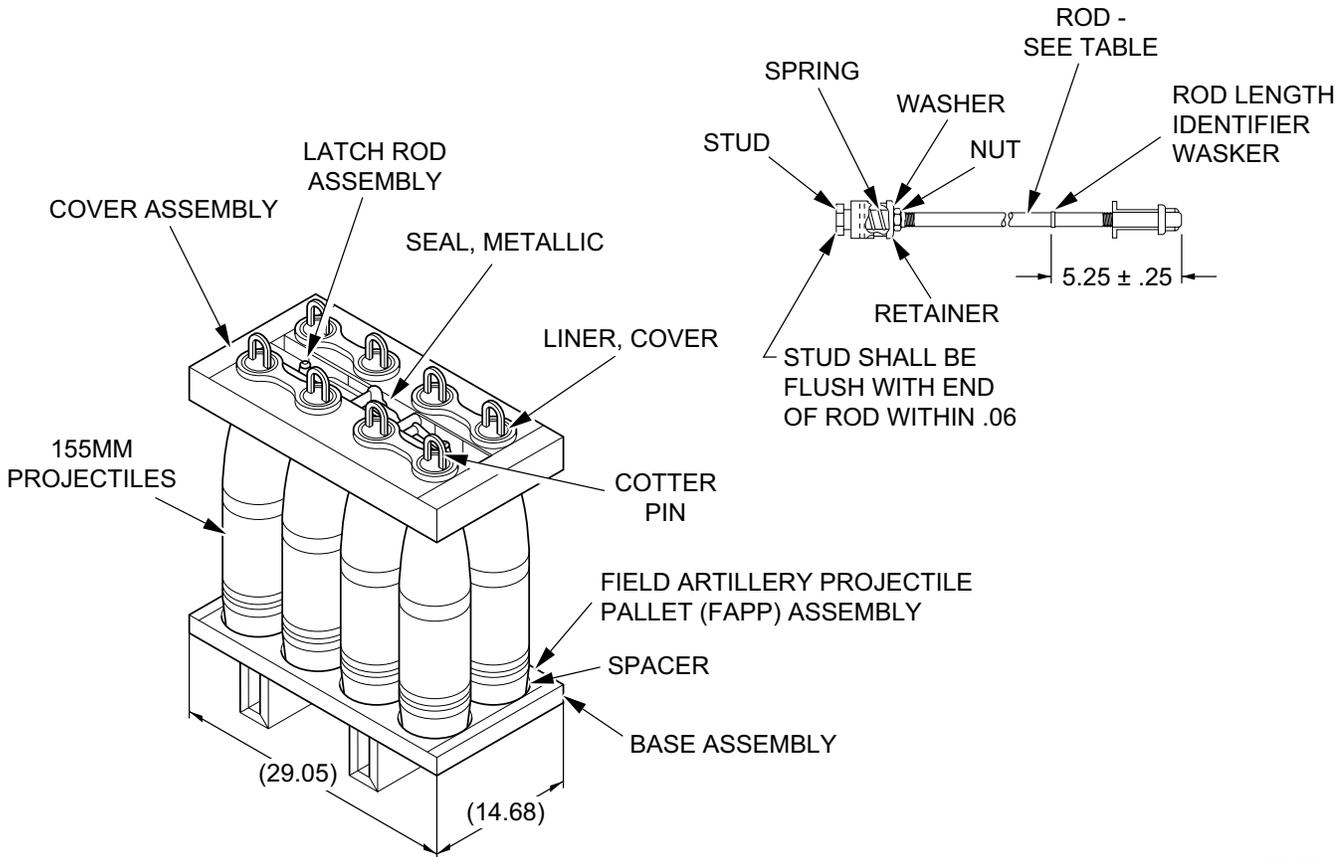
a. General. The FAPP is a NBC decontaminable, non-flammable, reusable metal pallet. It allows for easy repalletization in the field with no special tools required. The FAPP consists of a steel pallet base, steel pallet cover, and two adjustable rods that hold the cover to the base. The two adjustable rods hold the FAPP securely without any banding needed. There are plastic spacers under the base of the projectile and on top of the lifting plug to prevent abrasion. The FAPP holds up to eight 155-mm projectiles, with a minimum of two projectiles, and it accommodates both plastic grommet and the FRBC for rotating band protection. Before loading the FAPP with projectiles, the latch rods must be assembled to the pallet base. The center of the pallet is loaded first to avoid tipping. Once the FAPP is loaded, the pallet cover with the handles in open position is placed over the projectiles. The pallet cover is then closed by pushing the handles down into the locked position.

b. Instructions. Complete instructions for assembling, loading, and unloading the FAPP are found in TM 9-1300-251-20&P and TM 9-1300-251-34&P.

| PROJECTILE | ROD LENGTH | BASE SPACES |
|---|--------------------|--------------------------------|
| M107, M110 SERIES, M449 SERIES, M485A1, M804 SERIES | 24.5 in. (62.2 cm) | 5.5 in. (14.0 cm) wide – Green |
| M795 | 30 in. (76.2 cm) | 5.9 in. (15.0 cm) wide – Black |
| M549 SERIES | 31.5 in. (80.0 cm) | 5.5 in. (14.0 cm) wide – Green |
| M483A1, M692, M718, M731, M741, M864, M898 | 32 in. (81.3 cm) | 5.9 in. (15.0 cm) wide – Black |

4-11 FIELD ARTILLERY PROJECTILE PALLET (FAPP) (cont)

FIELD ARTILLERY PROJECTILE PALLET



TDC0039

4-12 PREPARATION FOR FIRING

a. Preparation for firing. Preparation for firing the four components of a complete round of 155-mm ammunition requires efficient teamwork among the Cannoneers. They must quickly and accurately select, unpack, inspect, and prepare the correct primer, propellant, projectile, and fuze from the fire commands received by the howitzer section. The SC must thoroughly cross-train the entire crew so that any crewman can perform any or all of the duties required of any other members.

b. Primer, M82. Do not open moisture protective bag until ready to use the primer.

c. Propelling Charges. Propelling charges come packed in hermetically sealed metal containers. There is one complete charge in each container of the M4 series, M119 series, and the, M203 series propellants. The M3 series green bag charges are packed with two complete charges in each metal container. Check for the following when preparing the propellant for firing:

(1) Select the right charge announced in the fire command.

(2) Unpack the charge from the metal container, and inspect the charge for torn cloth, loose powder grains, or discoloration of the cloth bags.

(3) For M203A1 propelling charge only, pull pull-straps until the buttons on the base igniter assembly clear the mouth of the container. Grasp charge around the buttons and pull charge out of the container supporting it along its length to avoid dropping the charge. Charges, which have severely crushed or distorted cases and/or contain missing or broken propellant, are not to be fired.

(4) Remove the igniter cap and inspect the red igniter pad; the pad should not be torn or wet. The igniter powder grains are highly hygroscopic (will absorb moisture). The grains could stick together, which could cause misfires. The igniter powder grains should move freely inside the pad to show that they are not stuck together.

(5) Check the smell of the powder charge and its container. There should not be a sour, acid smell as this indicates the charge was previously wet. There should be a sweet, ether-like smell, indicating that the charge is fresh.

(6) Remove any excess powder increments (those increments with a higher number than called for in the fire command), and retighten the tie straps so that all powder increments are secure, with the highest numbered charge (per fire command) on top.

(7) Place the unused powder increments in a secure container and dispose of them later by burning under the supervision of an officer.

d. Modular Artillery Charge System (MACS). The MACS propelling charges are combustible case type charges that are packed in hermetically sealed metal containers. The M231 MACS is packed with four modules (two per extraction sleeve) in each metal container. The M232 MACS is packed with five modules in each metal container. Check for the following when preparing the propellant for firing.

(1) Select the right charge announced in the fire command.

(2) Unpack the charges from the metal container by pulling on the velcro strap removing the sleeve with the MACS enclosed from the container. Remove separator assembly by pulling on the connecting strap. Open the velcro strap and remove end cushions from either end of sleeves. Push the needed amount of MACS from the opposite end of the sleeve through the now open end of the sleeve. Charges that are severely crushed, distorted, or broken are not to be fired.

(3) Check the red mylar seals on the end of the charges. If the seal is torn, punctured or missing, inspect the igniter bag. The pad should not be torn or wet. The igniter powder grains are highly hygroscopic (will absorb moisture; the grains will stick together, which could cause misfires. The igniter powder grains should move freely inside the pad to show that they are not stuck together.

(4) Unused MACS charges are repacked for later use.

e. Projectile. Projectiles for this howitzer normally come packed eight to the pallet, with the top and bottom of the wood pallets banded together or metal pallets (FAPP) secured together with adjustable rods. Each projectile has a lifting plug and a grommet or FRBC attached for protection during handling and shipping activities. See paragraph 4-31 for the LPRS, which is an optional system for securing base, unfuzed projectiles for transportation.

4-12 PREPARATION FOR FIRING (cont)

WARNING

DO NOT REMOVE THE GROMMET OR FLEXIBLE ROTATING BAND COVER FROM THE PROJECTILE UNTIL IT IS READY TO BE FIRED. IF THE GROMMET OR FRBC HAS BEEN REMOVED AND THE PROJECTILE IS NOT FIRED, THE GROMMET OR FLEXIBLE ROTATING BAND COVER SHOULD BE REPLACED. HANDLING OR TRANSPORTING PROJECTILES WITHOUT A GROMMET OR FLEXIBLE ROTATING BAND COVER IS LIKELY TO CAUSE DAMAGE TO THE OBTURATOR BAND AS WELL AS TO THE ROTATING BAND.

NOTE

These procedures apply to all projectiles, except for the M483AI and M864 projectiles when fired in the self-registration mode.

(1) Preparation of projectiles. Select the right projectile announced in the fire commands and prepare it for firing as follows:

(a) Inspect and clean projectile.

1. Verify that the projectile is the type designated by the fire commands.

NOTE

A projectile with a burred rotating band will be put aside until the burrs can be removed with a file.

2. Remove the grommet or FRBC and examine the rotating band to ensure that it is free from all dirt and burrs.

3. Remove the eyebolt lifting plug and gasket and examine the fuze well for leaks or damage to the filler. If any high-explosive filler residue clings to the threads of the fuze well, the round is rejected and another one is used to complete the fire mission.

WARNING

DIRT OR GREASE LEFT ON THE PROJECTILE ROTATING BAND COULD CAUSE FAILURE OF THE PROJECTILE TO SEAT PROPERLY IN THE FORCING CONE. FIRING AN UNSEATED PROJECTILE COULD RESULT IN AN INBORE EXPLOSION CAUSING DEATH OR INJURY.

NOTE

Any sand, dirt, oil, or grease left on the projectile will cause wear, scratches, or gouges in the bore.

4. Examine the entire projectile for defects and check to see that the projectile is not damaged or corroded and is free of dirt, grease, sand, and oil. Slight rust on the projectile is acceptable.

(b) Hold the projectile upright for fuzing and fuze setting.

(2) Special preparation of the M483A1 and M864 projectiles for use in the self-registration mode. When the command for use of the M483A1 or M864 ICM projectile includes the self-registration mode, the expulsion charge inside the nose of the projectile must be removed and a projectile spotting charge threaded on to the fuze as follows:

(a) Remove the fusible or universal lifting plug (1) with attached gasket. When the lifting plug is removed, the compressed coiled pull-wire (2) on the bagged expulsion charge assembly (3) will expand and protrude beyond the fuze well of the projectile ogive. If the projectile is assembled with the cylindrical plastic expulsion charge assembly (4), the tab (5) will pop up.

(b) Remove the bagged expulsion charge assembly (3 or 4) by grasping and firmly pulling the pull-wire (2) or tab (5). Set charge assembly aside for disposal. Visually inspect the fuze well (6) for loose grains of propellant or other foreign material. Remove any loose material.

WARNING

WHEN ASSEMBLING THE PROJECTILE SPOTTING CHARGE (7) ON TO REAR OF THE M577 SERIES FUZE OR M762 FUZE (8) ENSURE THAT SHOULDER OF PROJECTILE SPOTTING CHARGE IS SEATED SQUARELY AGAINST SHOULDER OF FUZE. AN IMPROPERLY SEATED CHARGE COULD CAUSE A MALFUNCTION.

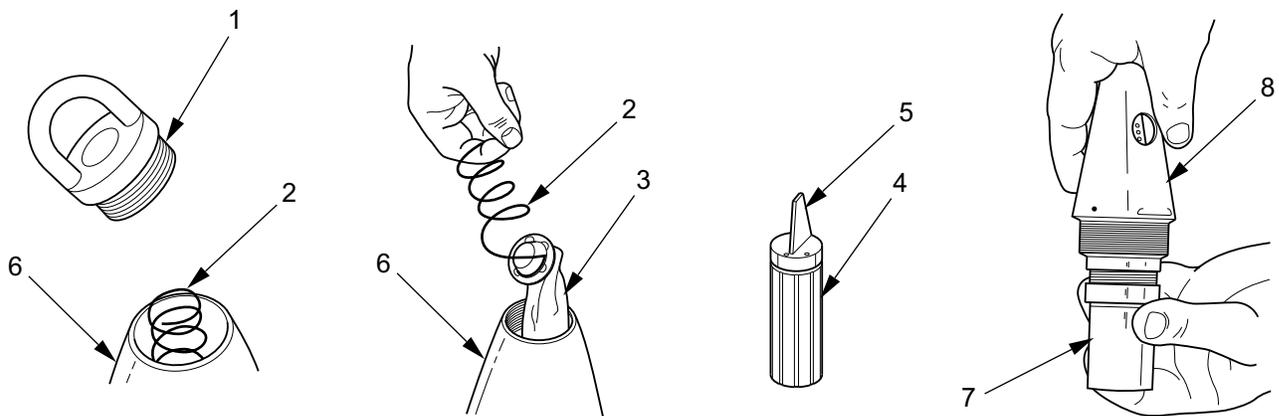
CAUTION

When assembling projectile spotting charge to fuze, take care to avoid damaging threads. If binding occurs, remove spotting charge and inspect charge and fuze threads for damage. If damage has occurred notify EOD.

(c) Obtain an M577 series fuze or an M762 fuze (8) and a projectile spotting charge (7). (1320-00-171-0760 D003).

(d) If firing the M483A1 or M864 projectile in the self-registration mode, screw the projectile spotting charge (7) hand tight onto the M577 series fuze or M762 fuze (8) (left-hand thread).

EXPULSION CHARGE ASSEMBLY – REMOVAL



TDC0040

4-13 FUZES

a. **General.** The four basic types of fuzes are: PD, MT, ET and VT fuzes. On the command, FUZE (type of fuze), Cannoneer No. 5 must select the right type, unpack, inspect, and install it in the projectile, and set it as commanded (TIME, SUPERQUICK, DELAY).

b. **Lifting Plug Removal.**

WARNING

DO NOT USE A PROJECTILE WITH EXPLOSIVE ON THE THREADS OR EVIDENCE OF EXPLOSIVE POWDER SEEPAGE. IT COULD CAUSE DETONATION OF THE PROJECTILE IF FIRED.

(1) Remove plug and inspect the filler beneath the plug.

(2) Inspect the cavity and projectile threads for damage. Remove loose material from cavity. If any high explosive is found stuck to the threaded portion of the projectile throat, do not fire.

WARNINGS

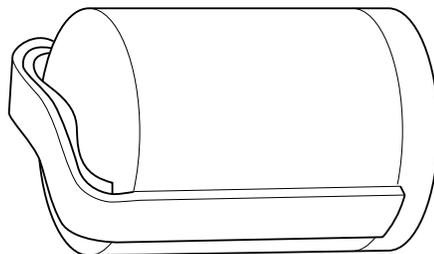
DO NOT USE THE M549/M549A1 PROJECTILE IF THE LIFTING PLUG HAS BEEN BROKEN. DO NOT ATTEMPT TO EXTRACT ANY PORTION OF THE PLUG FROM THE FUZE WELL OF THE PROJECTILE. RETURN PROJECTILE TO THE AMMUNITION SUPPLY POINT.

DO NOT FIRE POINT-DETONATING, MECHANICAL TIME AND SUPERQUICK, ELECTRONIC TIME, OR THE SHORT INTRUSION VARIABLE TIME FUZES IN A DEEP-CAVITY PROJECTILE WITHOUT THE SUPPLEMENTARY CHARGE AS AN INBORE EXPLOSION MAY RESULT.

DO NOT ATTEMPT TO REMOVE SUPPLEMENTARY CHARGE BY ANY MEANS OTHER THAN THE LIFTING LOOP. USE OF SCREWDRIVERS OR OTHER TOOLS TO REMOVE THE CHARGE BY FORCE IS DANGEROUS.

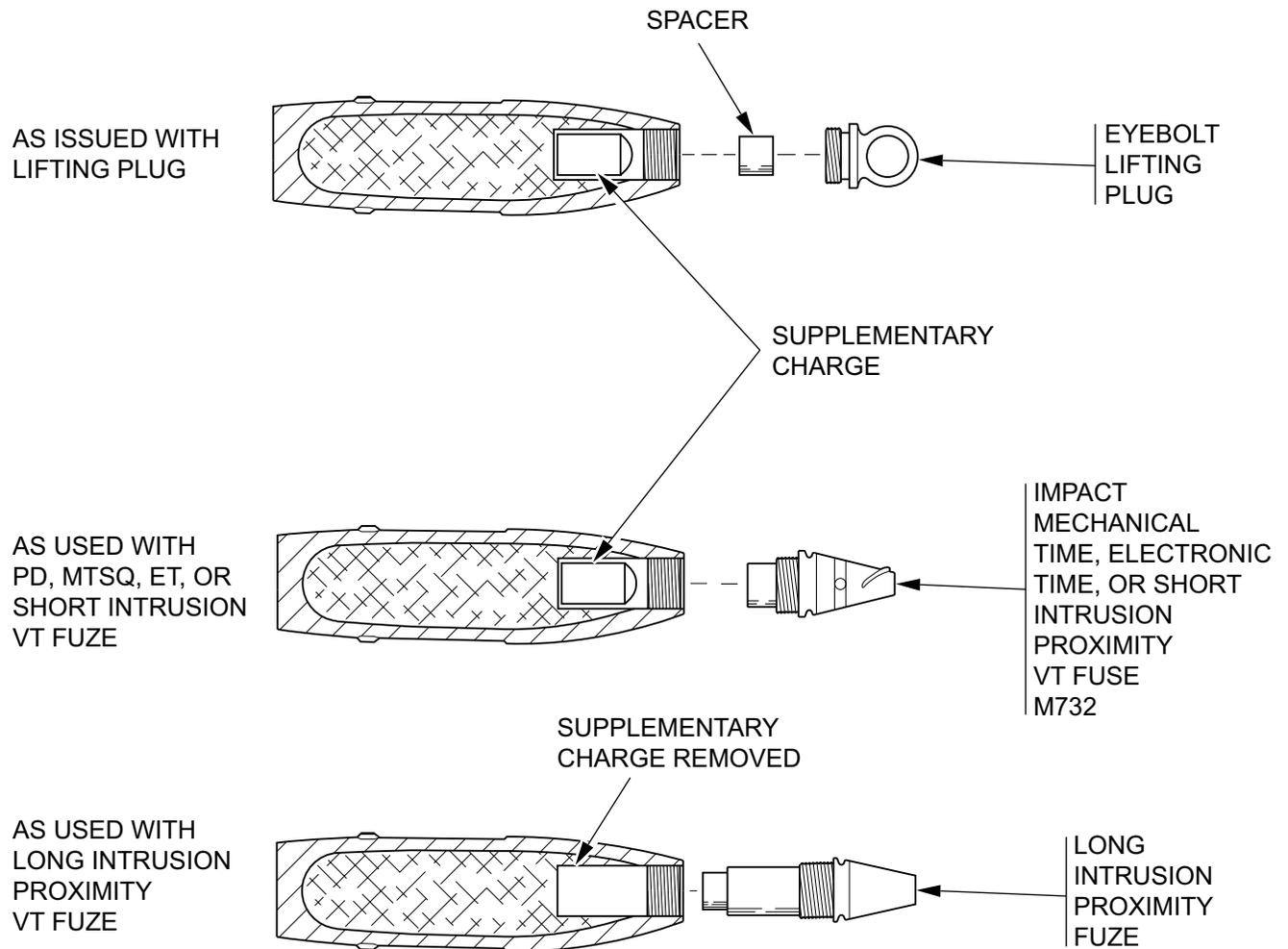
c. **Supplementary Charge.** For the long intrusion proximity fuze firings, remove supplementary charge by means of its lifting loop. If the charge cannot be removed by its lifting loop, either fire with a short intrusion VT, PD, ET, or MTSQ fuze or dispose of the round.

SUPPLEMENTARY CHARGE



TDC0041

TYPICAL DEEP-CAVITY PROJECTILES



TDC0041

d. Fuze Assembly. The following procedures apply to all fuzes. Sub paragraph (2) contains special instructions for the M577 series fuzes.

- (1) Assembly of fuze to projectile.

WARNING

WHEN TIGHTENING FUZE TO PROJECTILE, DO NOT HAMMER ON FUZE SETTER WRENCH OR USE EXTENSION HANDLE ON FUZE SETTER WRENCH. DO NOT STAKE FUZE TO PROJECTILE UNDER ANY CIRCUMSTANCES. SHOCKS TRANSMITTED TO A FUZE DURING ASSEMBLY MAY CAUSE A MALFUNCTION.

- (a) Screw fuze in by hand. If binding occurs, inspect fuze cavity and threads of both fuze and projectile. Reject whichever is at fault.

4-13 FUZES (cont)

WARNING

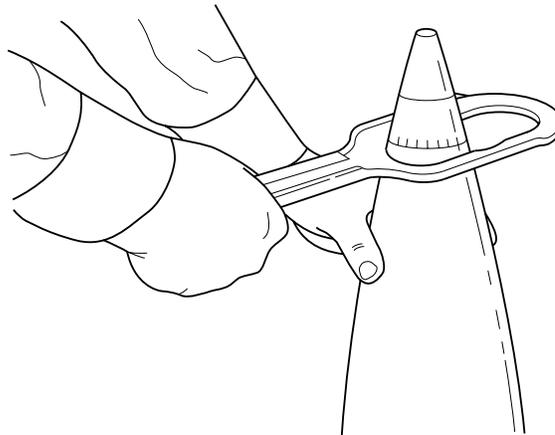
PROJECTILES FIRED WITH AN IMPROPERLY SEATED FUZE MAY FUNCTION PREMATURELY.

NOTE

For long intrusion proximity fuzes with a gap between the fuze shoulder and projectile, either replace the supplementary charge and fire with impact PD, MTSQ, ET, or short intrusion VT fuze or dispose of round.

(b) After assembling fuze by hand, back fuze off 1/4 turn. Using the M18 fuze setter wrench, tighten fuze to projectile with a sharp snap of the wrench so that the fuze shoulder is seated firmly against the projectile nose.

FUZE ASSEMBLY



TDC0042

(2) Special preparation for the M577 Series fuze. Inspect the fuze setting. The fuze will be considered unserviceable if the setting is not between \blacktriangleleft 93.5 and \blacktriangleleft 95.5, the fuze shows signs of damage, or the window is blackened or sooty inside.

WARNING

WHEN SCREWING THE PROJECTILE SPOTTING CHARGE ON TO THE REAR OF THE M577 SERIES FUZE, ENSURE THAT THE SHOULDER OF THE PROJECTILE SPOTTING CHARGE IS SEATED SQUARELY AGAINST THE SHOULDER OF THE FUZE. AN IMPROPERLY SEATED CHARGE COULD CAUSE A MALFUNCTION.

CAUTION

When assembling projectile spotting charge to a fuze, take care to avoid damaging threads. If binding occurs, consider the charge unserviceable and report it for disposal. If binding has occurred, re-inspect the fuze and ensure it is still serviceable.

4-14 FUZE SETTING

a. The following procedures apply to all authorized fuzes. Fuze-setting tools and procedures are listed in Table 4-4.

Table 4-4. Fuze-Setting Tools and Procedures.

| Fuze | | | | | | | | | | | |
|------|---------------|-------------|------------|------|------|-------------|-------------------|------------------|-------------------|-------------------------|-------------------------------|
| MOFA | PD | | | MT | | MTSQ | | Prox | ET | | |
| M782 | M557 and M572 | M739 Series | MK399 MOD1 | M565 | M564 | M501 Series | M577/ M582 Series | M732/ M728/ M514 | M762/ M767 Series | Setter | Procedure Number/ Page Number |
| | X | X | X | | | | | | | Fuze-setter wrench, M18 | 1/4-48 |
| | | | | | | | | X | | M27 | 2/4-41 |
| | | | | X | X | | | | | M34 | 3/4-42 |
| | | | | | | | X | | | M35 | 4/4-45 |
| | | | | | | X | | | | M27 | 5/4-47 |
| | | | | | | | | | X | By hand or M1155 | 6/4-48 |
| X | | | | | | | | | | M1155 | 7/4-8.1 |

b. Procedure Number 1, Fuzes M557, M572 and M739 series, and MK399 MOD 1.

NOTE

Point-detonating (PD) fuzes with superquick (SQ) or delay functioning are shipped for SQ action. The MK399 MOD 1 MOUT fuze is shipped set on DLY (delay) mark.

- (1) If SQ action is desired, check the setting to make sure it is set at SQ or PD mark.
- (2) To set fuzes for DLY action, use screwdriver end of the M18 fuze-setter wrench or similar tool and turn slot 1/4 turn to align with index mark indicating DELAY (or DLY on MK399 MOD 1 fuze).

4-14 FUZE SETTING (cont)

FUZE SETTING PROCEDURE



TDC0043

c. Procedure Number 2, Fuzes M728, M514 Series, and M732 series.

CAUTION

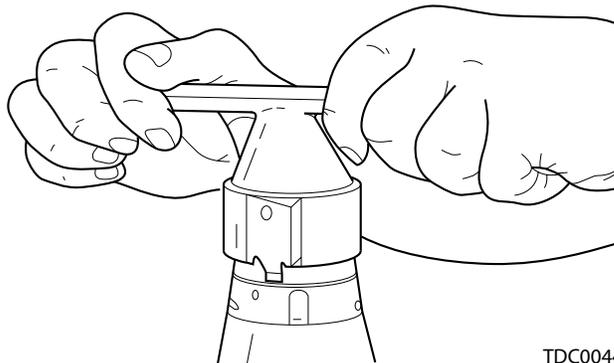
Plastic nose cones rotate with index mark. Damage to plastic will produce duds. However, since there is no backlash, fuze setting can be accomplished or changed one or more turns with no harmful effect. If counter clockwise rotation is used, be sure that the fuze has not come loose from the projectile.

NOTE

M514 series and M728 fuzes are shipped with the index mark on the nose cone set at 10 seconds. M732 fuze is shipped with the index mark aligned with PD. The M514 and M514B1 fuzes are shipped with the index mark aligned with "S". The M514A1 fuze is shipped with the index mark aligned with the shipping line (long, vertical arrow).

(1) The fuze is set when the index line at base of nose cone is aligned with the time, in seconds, engraved on base of fuze.

FUZE SETTING PROCEDURE



TDC0044

NOTE

Rotation of the M732 fuze nose cone has been experienced at top zones (not a safety hazard). If this occurs when M732 is set on time for proximity function, PD function might occur instead. In such instances, set the fuze to a time of 10 seconds less than the time of flight for proximity function. If this occurs when M732 fuze is set on PD mark proximity functioning may occur instead of impact functioning. In such instances, set the fuze to a time equal to the time of flight plus 10 seconds for impact function. The PD setting of the M732 series VT fuze when fired into soft impact areas will be less deadly than the superquick (SQ) setting of the M739 series PD fuze.

(2) To set fuze for proximity action, rotate nose cone with the M27 fuze setter, normally in clockwise direction while looking down on the nose of the fuze, until the index mark coincides with the announced time. The fuze setting can be changed one or more times with no harmful effects.

(3) For impact functioning of the M514 series/M728 fuzes, set fuzes to 90 seconds (100 second line for flight time exceeding 85 seconds). The M732 series fuze remains set on PD for impact function.

WARNING

DO NOT FIRE PROJECTILE UNLESS FUZE IS FULLY SEATED. INBORE EXPLOSION MAY RESULT.

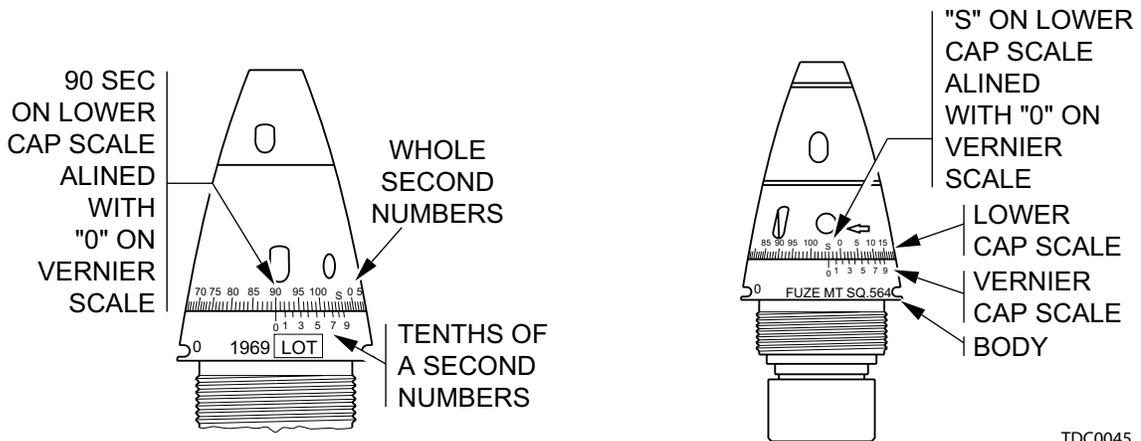
(4) Firing temperature limits for M728 and M732 proximity fuzes are -40°, to - 140°F (-40° to +60°C) and 0° to + 120°F (-18° to +49°C) for M514 series fuzes.

NOTE

Do not attempt to set the fuze until just before firing.

d. **Procedure Number 3, Fuzes, M565 and M564.** The following procedures include instructions for setting the fuze for SQ (impact) action and airburst (time) and for meeting safety requirements. If the M564 fuze is to be fired for superquick action (impact) only, first check the year of manufacture stamped on the fuze body, then follow instructions below, as appropriate.

FUZE SETTING PROCEDURE



4-14 FUZE SETTING (cont)

WARNING

TO AVOID ACCIDENTAL FUNCTIONING OF POINT DETONATING ELEMENT IN M564 FUZE, DO NOT DROP, ROLL, OR STRIKE THE FUZE UNDER ANY CIRCUMSTANCES (PACKAGED, UNPACKAGED, OR ASSEMBLED TO THE PROJECTILE).

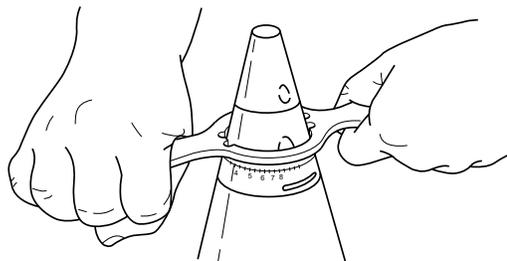
NOTE

Do not attempt to set fuze until just before firing.

(1) **Setting the M564 fuze for SQ (impact) action.** M564 fuzes manufactured before January 1970 must be set on 90 seconds if SQ (impact) action is desired. M564 fuzes manufactured from January 1970 on should be set on "S" for SQ action. The year of manufacture is stamped on the M564 fuze body. These fuzes are shipped with the "S" on the lower cap scale aligned with the "O" on the vernier scale.

(a) M564 fuzes manufactured prior to January 1970. Use M34 fuze setter to rotate the lower cap in the direction of the arrow (CW) from shipping "S" position until the 90-second position on the lower cap scale is aligned with the "O" on the vernier scale.

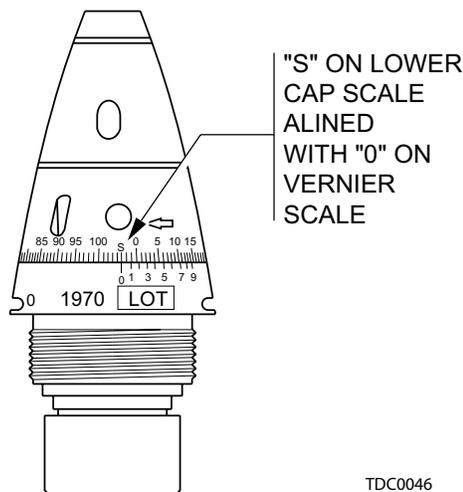
FUZE SETTING PROCEDURE



TDC0046

(b) M564 fuzes manufactured in January 1970 and later. Set the fuze on "S" as shipped for SQ action. Always be sure the "S" on the lower cap scale is aligned with the "O" on the vernier scale.

FUZE SETTING PROCEDURE



TDC0046

(2) **Setting M564 and M565 fuzes for airburst (time).**

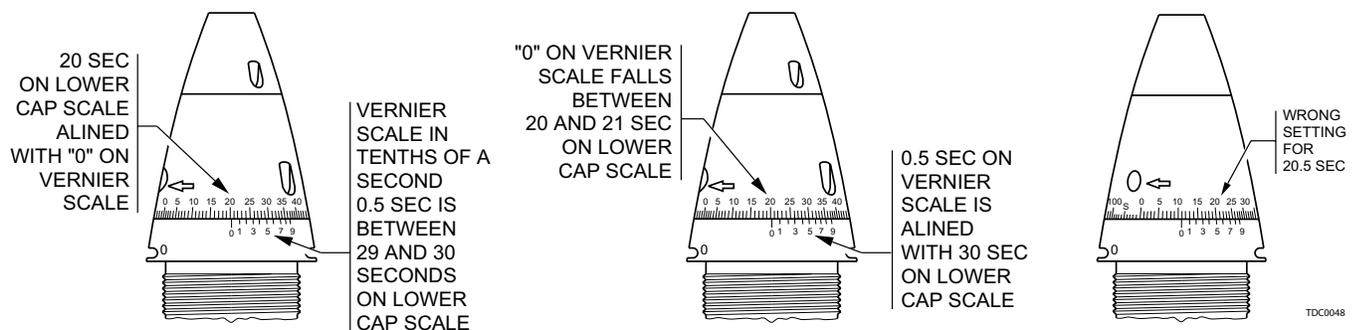
WARNING

INCORRECT SETTINGS OF MT AND MTSQ FUZES CAN AND HAVE RESULTED IN DOWN-RANGE PREMATURE MALFUNCTIONS. THE SAFETY OF PERSONNEL LOCATED DOWN-RANGE OF A WEAPON FIRING MT AND MTSQ FUZES (BETWEEN THE WEAPON AND INTENDED TARGET) IS IN THE HANDS OF THE GUN CREW PERSONNEL ASSIGNED THE JOB OF SETTING THE FUZES.

(a) To set the M564 and M565 fuzes for a whole-second time setting, use the M34 fuze setter to rotate the lower cap in the direction of the arrow (CW) until the desired whole number of seconds (e.g., 20.0 seconds) on the lower cap scale is aligned with the "O" mark engraved on the vernier scale.

(b) To set the M564 and M565 fuzes for a tenth of a whole second (e.g., 20.5 seconds), use the M34 fuze setter to set the fuze for the whole seconds on the lower cap scale. (In this case, the whole is 20 seconds.) Next, find the desired tenth of a second mark on the vernier scale.

FUZE SETTING PROCEDURE



(c) Continue to slightly rotate the lower cap in the direction of the arrow (CW) until the adjacent upper right graduation on the lower cap scale is aligned with the desired tenth of a second mark on the vernier scale. (The 0.5-second mark is now aligned with the 30-second mark on the lower scale).

NOTES

The whole second fuze setting is always indicated by the position of the "O" on the vernier scale. Each vertical mark on the lower cap scale (movable portion of fuze) represents one whole second of time. For other than whole-second settings, the "O" on the vernier scale (nonmovable portion of the fuze) must always be to the right of the whole-second portion of the desired fuze setting and between the whole-second portion of the desired fuze setting and the next one whole-second vertical mark. For example, for a setting of 20.5 seconds, the "O" on the vernier scale is to the right of the 20-second mark and midway between the 20- and 21-second marks on the lower cap scale.

An incorrect fuze setting for 20.5 seconds is shown above. If a fuze is set in this way for 20.5 seconds firing, the fuze is actually set on and will function at 10.5 seconds. This would cause the fuze to function earlier than desired.

Do not attempt to set the fuze until just before firing.

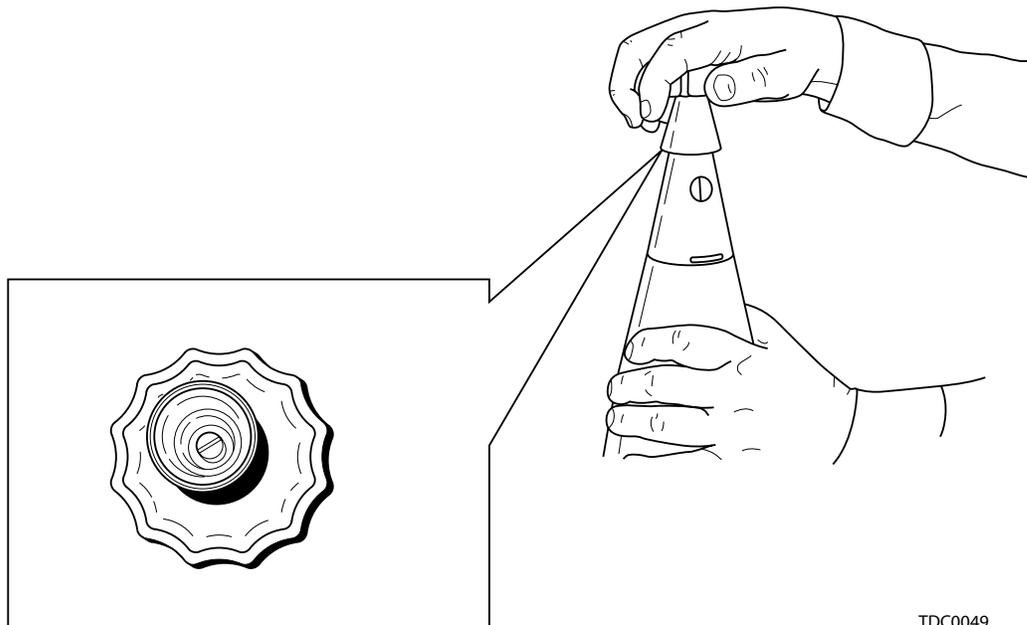
4-14 FUZE SETTING (cont)

(3) **Resetting fuze.** If you miss the setting, use the M34 fuze setter (1) and turn the lower cap in the opposite direction (CCW) 2 or 3 seconds below the desired setting. Then rotate the lower cap in the direction of the arrow (CW) and set the fuze on the correct time. This can also be done by turning the lower cap in the direction of the arrow (CW) all the way around (additional turn) to obtain the desired setting. Always make the final setting from low to high numbers.

(4) **Fuzes not fired.** If the fuze is prepared for firing but not fired, reset the fuze, using M34 fuze setter, by turning the lower cap in the direction of the arrow (CW) until the "S" mark on the fuze lower cap scale is in line with the "O" mark on the vernier scale.

(5) **Fuzes fired in heavy precipitation.** If M564 fuzes are fired in heavy precipitation (heavy rainfall, sleet, snow, or hail), occasional down-range premature functioning may occur. The precipitation necessary to cause malfunctioning is comparable to a heavy downpour, which occurs during a summer thundershower. The premature rate will vary with the charge fired and the density of the precipitation.

FUZE SETTING PROCEDURE



TDC0049

e. **Procedure Number 4, Fuzes M577 Series and M582 Series.** The slotted setting key on the nose of the fuze is used for setting the fuze in the following steps.

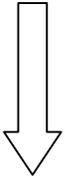
(1) Press the open end of the M35 fuze setter against the setting key.

(2) Turn the knob handle of the fuze setter **CCW**, as viewed from the nose end, until the fuze-setter blade engages fuze-setting key slot. The hairline in the window is used for all settings.

NOTE

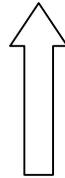
The M577 series or M582 series fuze is set to the desired time by rotating the fuze setter in a **CCW** direction. To return to shipping and storage setting, the fuze setter must be rotated in a **CW** direction.

COUNTER
 CLOCKWISE (CCW)



| | |
|---------------------------------|----------|
| SHIPPING AND STORAGE | |
| SETTING (◀ 93.5 TO ▶ 95.5)..... | 1/4 TURN |
| PD SETTING (◀ 98)..... | 1/4 TURN |
| 000 SECONDS..... | 1/4 TURN |
| 200 SECONDS..... | 20 TURNS |

CLOCKWISE (CW)

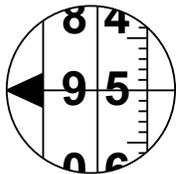


CAUTION

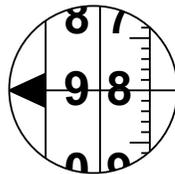
Do not attempt to set these fuzes below ▶ 93, 5 when setting them in the CW direction or above 200 seconds when setting them in the CCW direction. The settings of 000 and/or 200 are not authorized service settings.

(3) When setting the fuze (SQ), start with the shipping and storage position (safe) (▶ 93.5 to ▶ 95.5); then turn CCW to ▶ 98.0 for PD action under the hairline window.

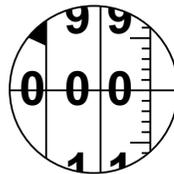
FUZE-SETTING SEQUENCE



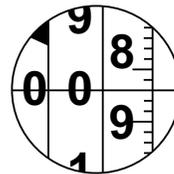
A STORE (SAFE)



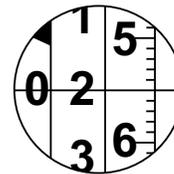
B PD



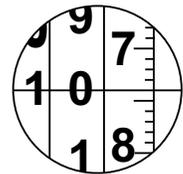
C 000.0



D 8.7



E 25.5



F 107.4

TDC0050

(4) To set the fuze for mechanical time action, turn the fuze setter CCW from safe position (▶ 93.5 to ▶ 95.5) past PD (▶ 98.0), until the triangle (▶) moves off the hairline. This action occurs near a 000 setting. Continue to turn the fuze setter CCW until the desired time appears under the hairline. Maintain a very light turning force against the fuze setter while reading the setting. The sequence is illustrated above for settings of 8.7, 25.5, and 107.4.

(5) To set a lower time on a fuze already set, reseal fuze setter and turn CW (numbers get smaller) to a setting at least 1 second lower than the required setting (for example, at least 24.5 for 25.5). Reverse direction to CCW (numbers get larger.), and set required time under the hairline.

(6) To return fuze to the shipping and storage (safe) position, turn the fuze setter CW (numbers get smaller) until: 000 is passed, and continue to turn until setter stops turning freely. This point should be past the PD setting (▶ 98.0) and between ▶ 95.5 and ▶ 93.5. Notice that the triangle has reappeared in the window. Do not apply excessive force on the fuze setter after it has stopped turning and the setting is between ▶ 95.5 and ▶ 93.5. Return the fuze to the reusable fuze container. The fuze is considered unserviceable after being out of the container for more than 30 days.

(7) For special preparation for M577 series fuze, perform the following procedure. Inspect the fuze setting, consider the fuze unserviceable if the setting is not between ▶ 93.5 and ▶ 95.5, the fuze shows signs of damage, or the window is blackened or sooty inside.

(8) Firing temperature limits for M577 series and M582 series MTSQ fuzes are -35°F to +145°F (-37°C to +63°C).

4-14 FUZE SETTING (cont)

f. Procedure Number 5, Fuze M501 Series.

WARNING

EXERCISE EXTREME CARE WHEN HANDLING AN M501 SERIES FUZED PROJECTILE. MISHANDLING OR DROPPING COULD CAUSE THE FUZE TO FUNCTION, EXPELLING THE BASE PLATE AND CONTENTS, WHEN HANDLING A PROJECTILE ASSEMBLED WITH THIS FUZE, EXERCISE EXTREME CARE TO PROTECT THE FUZE FROM IMPACT. KEEP PULL WIRE ON FUZE IN PLACE UNTIL IMMEDIATELY PRIOR TO FIRING.

CAUTION

Do not use fuzes with cocked or loose lower caps. Mark such fuzes unserviceable and return them to the ammunition supply point.

NOTE

The M501 series fuzes are shipped with the index mark on the lower cap aligned with the "S" engraved on the base.

(1) Time setting.

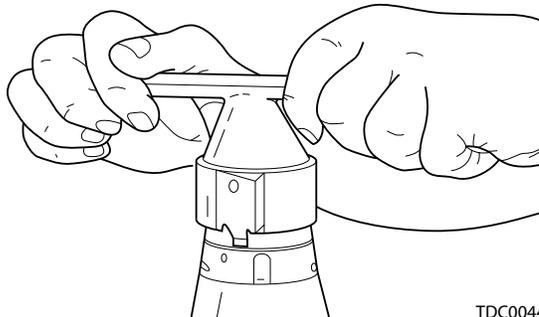
(a) Check fuzes for cocked or loose lower caps.

(b) To remove safety wire before setting, pull end of wire from hole in lower cap, sliding wire off end of fuze.

(c) With the M27 fuze setter, set fuze by rotating lower cap to desired time in CCW direction or in direction of arrow marked on lower cap. The fuze is properly set when the index mark on the lower cap is aligned with desired time, in seconds, engraved on the base.

(d) If the round is not fired after the fuze is set, reset the fuze to the safe (S) position and place the safety wire in its proper position.

FUZE SETTING PROCEDURE



(2) Impact setting. To obtain impact functioning of the M501 series MTSQ fuze, leave the S (shipping mark) aligned with the index mark on the base or set the graduated time ring so that the time setting is greater than the time of flight. Remove the safety wire (pull free end of wire off and out of hole) before firing or setting the fuze.

g. Procedure Number 6, Fuzes M762 and M767. Set these fuzes with M1155 PIAF fuze setter (see paragraph h), by hand, or remotely by a weapon equipped with auto-set fire control system, as follows:

CAUTION

Do not activate these fuzes unless they will be fired before 15 days elapse. Once activated, these fuzes have a service life of approximately 15 days before the battery runs down. Check if LCD is active to determine if fuze is still settable.

(1) Setting by hand:

CAUTION

If the LCD display is blank or shows other displays than indicated after completing steps (a) and (b), the fuze is considered unserviceable and should not be fired.

NOTE

The M762 or M767 fuze ogive will rotate only CW (as viewed from nose end). If a desired digit was passed, continue rotating CW until the desired digit appears again. The ogives of the M762A1 and M767A1 can be rotated bi-directionally to provide quicker manual setting.

(a) Rotate ogive CW at least one quarter revolution to activate the battery. The LCD window will display ◀88.8 indicating that all segments are operating as a visual safety check.

(b) Depress the thumb operated cocking and selector button to clear the LCD display. The LCD window will display _ _ _ _ _ ensuring that no segments are stuck.

(c) Depress the thumb operated cocking and selector button a second time; the LCD window will display 000.0. The cursor under the zero in the hundreds of second's column indicates that this column is ready to be set.

NOTE

The hundreds of seconds column can display 0, 1 or ◀ (blank space for the M762A1 or M767A1) while the tens of seconds, seconds, and tenths of seconds columns each can display 0 through 9.

(d) Each column is set independently. Depress and release the selector button as required to move the cursor to the desired column. At the desired column, keep the selector button depressed and rotate the ogive to select the desired digit or ◀. Release the selector button and depress again to move cursor to the next column to continue setting.

(e) For M762 or M767 PD, set the fuze to ◀98.0. Any other setting with would result in a dud.

(f) For M762A1 or M767A1, place the cursor in the hundreds digit and rotate the ogive until the _ (underline) is selected. At this point, the fuze will be set to the point detonating setting and the display will be "_Pd".

(g) The following are examples of fuze settings.

4-14 FUZE SETTING (cont)

| | | | | | |
|---------------|-----------|-------------|-------------|--------------|-------------|
| M762A1/M767A1 | M762/M767 | | | | |
| - P d | 098.8 | 000.8 | 007.3 | 040.1 | 169.0 |
| | PD | 0.8 SECONDS | 7.3 SECONDS | 40.1 SECONDS | 169 SECONDS |
| | | | | | TDC0051 |

(h) When fuze setting is completed and selector button is released, the ogive can be rotated without changing the fuze setting.

(i) The settings can be changed as many times as required for the duration of the activated life of the battery.

(2) Auto setting is accomplished via an inductive data link between the fuze and a weapon equipped with an auto-set fire control system. The desired fuze setting is input in the setter console and the transmit button is depressed. The fuze will be remotely activated and set and the console will display the actual fuze setting as a safety feature.

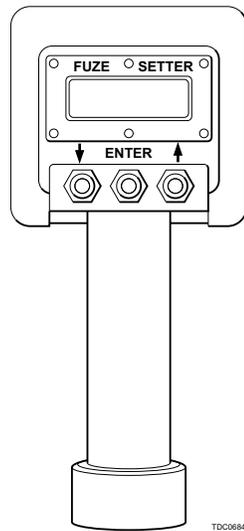
(3) To return fuze to the shipping and storage configuration, reset the fuze to ◀ 88.8. These fuzes should be segregated and used first in subsequent firings.

(4) Firing temperature limits for M762 and M767 ET series fuzes are -45°F to +145°F (-43°C to +63°C).

h. Procedure Number 7, Fuze M782. This fuze cannot be set by hand but can only be set inductively by the M1155 Portable Inductive Artillery Fuze Setter (PIAFS).

i. M1155 Portable Inductive Artillery Fuze Setter (PIAFS). Is a lightweight, hand-held device consisting of a cylindrical handle that houses the batteries that power the device, and a base with a fuze seating area in the back and a display window on the front face. Under the display window are three buttons, and between the buttons and the display window are three indicators or labels for the buttons. The right button is the ↑ button, the center button below the word **ENTER** is the ENTER button, and the left button is the ↓ button. The ↑ and ↓ button will scroll the cursor, which is the arrow (→) to the left of the items in the menu, up or down in the display window.

j. The M1155 PIAFS is designed to permit artillery units to set M762, M767, and M782 series artillery fuzes, and will decrease the time needed to set these fuzes and reduce time setting errors on fuzes equipped with inductive setting features. The M1155 PIAFS seats on compatible fuzes and sets the fuzes to their required operational parameters by electrical induction. Once the M1155 PIAFS is set to the correct fuze, mode and time, it is placed on the fuze to be set and the ENTER button is pressed. The display should then read "FUZE SET – OK".

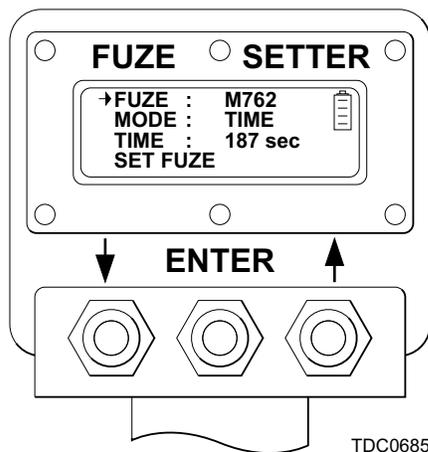


NOTE

When the setter is first initialized it displays the Fuze Menu. Afterwards it remembers where it was last and displays the Fuze Setting Menu with the last fuze set.

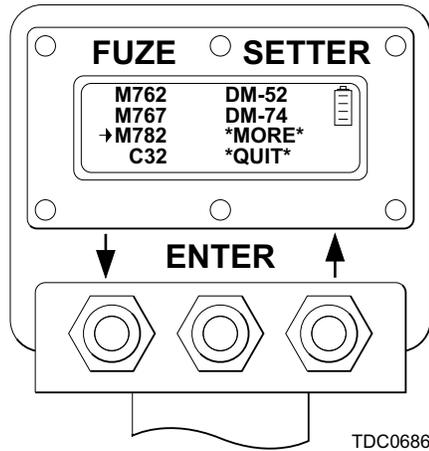
(1) Setting for Point Detonating (PD) mode:

(a) Press the ENTER button to turn on the setter. The last used fuze setting menu will be displayed.



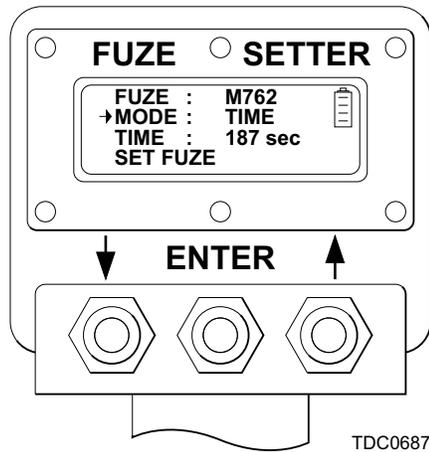
(b) Press the ↑ button or ↓ button if necessary to move the cursor (→) to align with **FUZE** and then press the ENTER button. The Fuze Menu appears.

4-14 FUZE SETTING (cont)



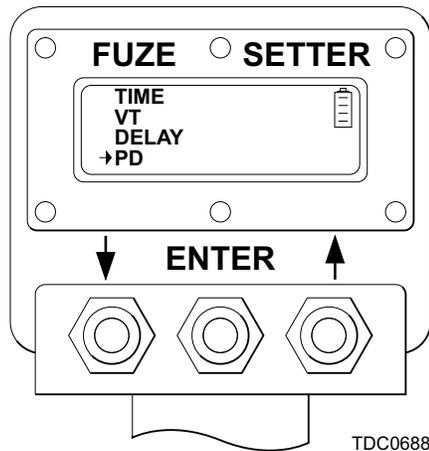
(c) Press the ↑ button or ↓ button as necessary to move the cursor (→) to align with **M782** and press the ENTER button. The Fuze Setting Menu appears with the cursor aligned with **MODE**.

FUZE SETTING MENU



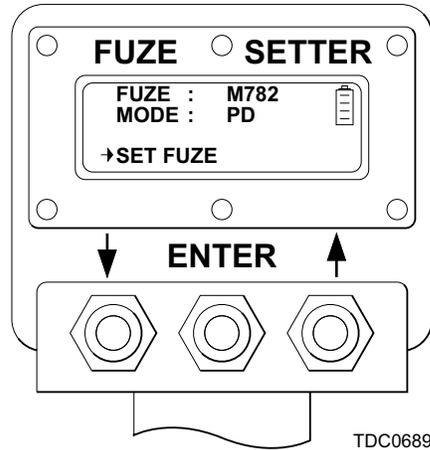
(d) Press the ENTER button. The Mode Menu for the M782 fuze appears.

MODE MENU (FOR THE M782 FUZE)



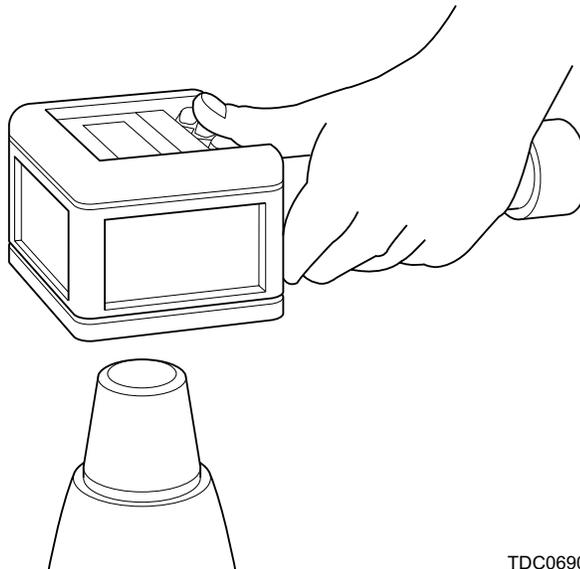
(e) Press the ↑ button or ↓ button as necessary to move the cursor (→) to align with **PD** and press the ENTER button. The Fuze Setting Menu appears with the cursor aligned with **SET FUZE**.

FUZE SETTING MENU



(f) Place the setter on the fuze and press the ENTER button.

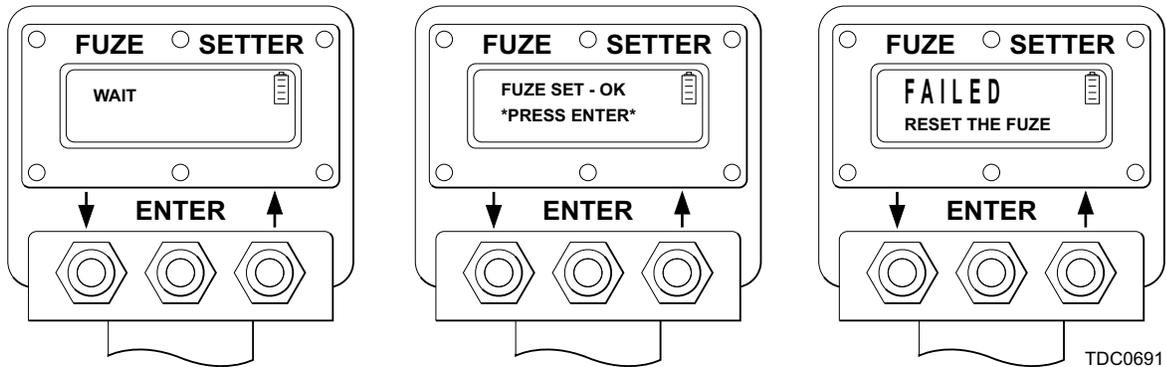
PLACING THE FUZE SETTER



(g) The setter will attempt to set the fuze. After the **WAIT** message is briefly displayed, either the **FUZE SET – OK** message will be displayed, which means that the fuze has been set, or the **FAILED** message will be displayed, which means the fuze has not been set. If the **FAILED** message appears, try setting another fuze. If both fuzes do not accept the setting then replace the fuze setter and retry setting the fuzes.

4-14 FUZE SETTING (cont)

SETTING THE FUZE

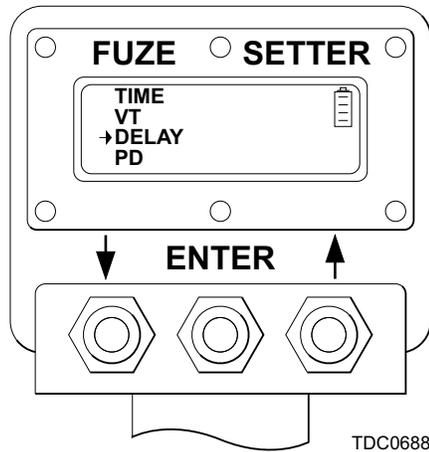


(2) Setting for Delay (DLY) mode:

NOTE

The setting procedures for the Delay mode are the same as those for Point Detonating (PD) mode except at step e. the cursor (→) is to be aligned with **DELAY** instead of **PD**.

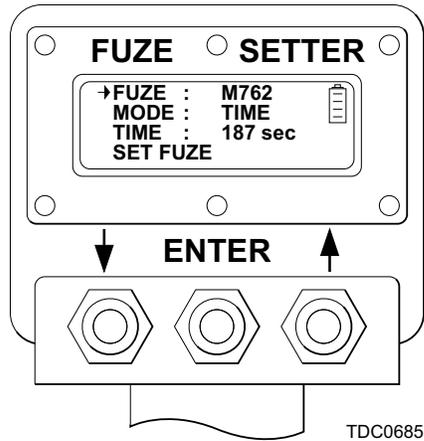
MODE MENU (FOR THE M782 FUZE)



(3) Setting for Variable Time (VT) mode:

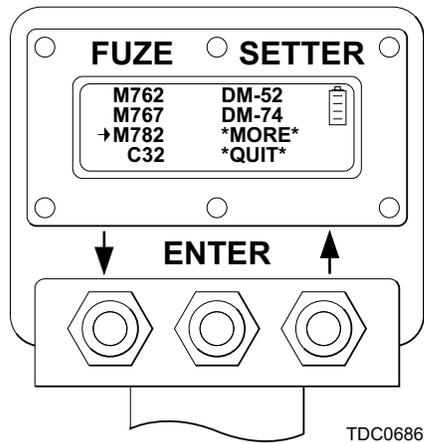
(a) Press the ENTER button to turn on the setter. The last used fuze setting menu will be displayed.

FUZE SETTING MENU



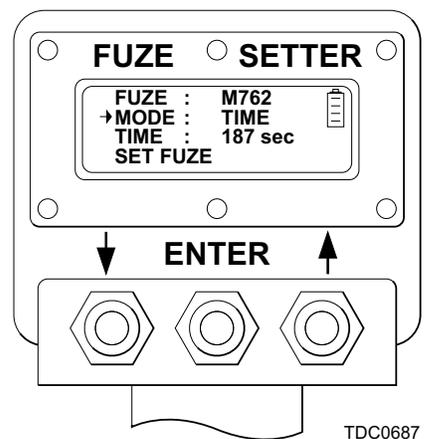
(b) Press the \uparrow button or \downarrow button if necessary to move the cursor (\rightarrow) to align with **FUZE** and then press the ENTER button. The Fuze Menu appears.

FUZE MENU



(c) Press the \uparrow button or \downarrow button as necessary to move the cursor (\rightarrow) to align with **M782** and press the ENTER button. The Fuze Setting Menu appears with the cursor aligned with **MODE**.

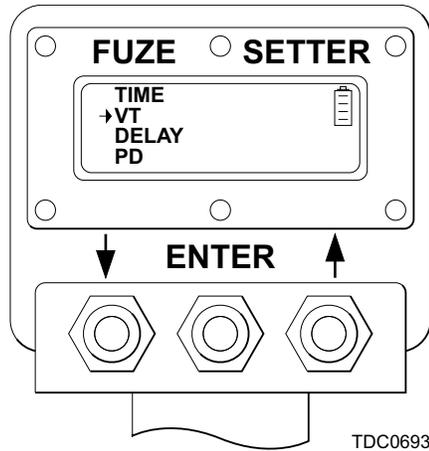
FUZE SETTING MENU



4-14 FUZE SETTING (cont)

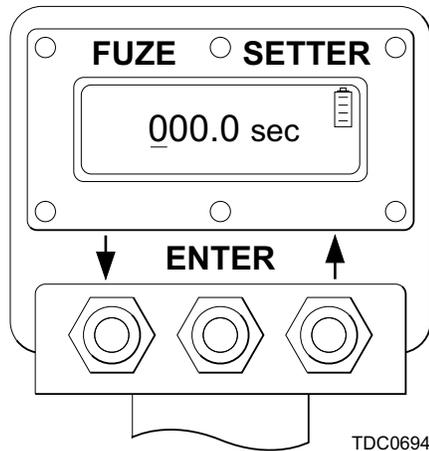
(d) Press the ENTER button. The Mode Menu for the M782 fuze appears.

MODE MENU (FOR THE M782 FUZE)



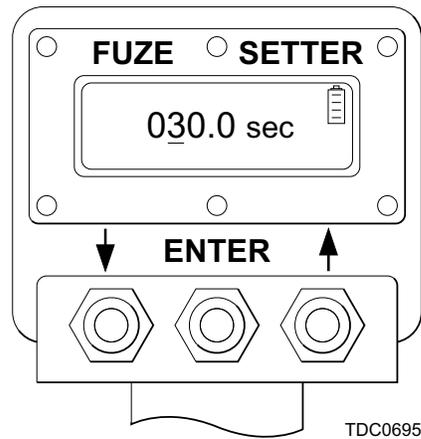
(e) Press the ↑ button or ↓ button as necessary to move the cursor (→) to align with **VT** and press the ENTER button. The Time Menu appears with a line under the hundreds-of-seconds position.

VARIABLE TIME MENU (FOR THE M782 FUZE)



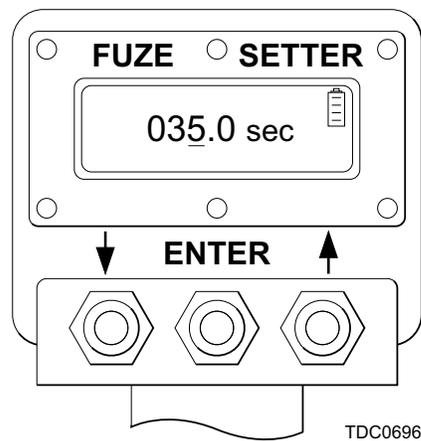
(f) Press the ↑ button or ↓ button to toggle between **0** and **1** for the hundreds-of-seconds digit and press the ENTER button. The underline will move to the tens-of-seconds position.

VARIABLE TIME MENU (FOR THE M782 FUZE)



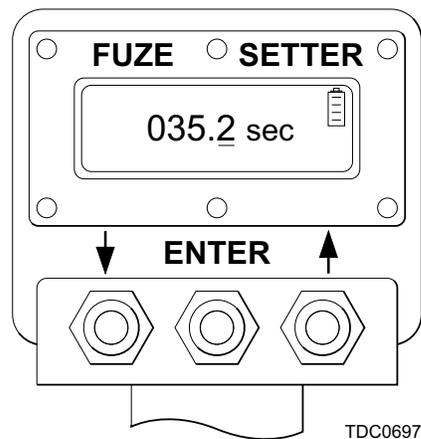
(g) Press the ↑ button or ↓ button or choose the desired number between **0** and **9** for the tens-of-seconds digit and press the ENTER button. The underline will move to the seconds position.

VARIABLE TIME MENU (FOR THE M782 FUZE)



(h) Press the ↑ button or ↓ button to choose the desired number between **0** and **9** for the seconds digit and press the ENTER button. The underline will move to the tenths-of-seconds position.

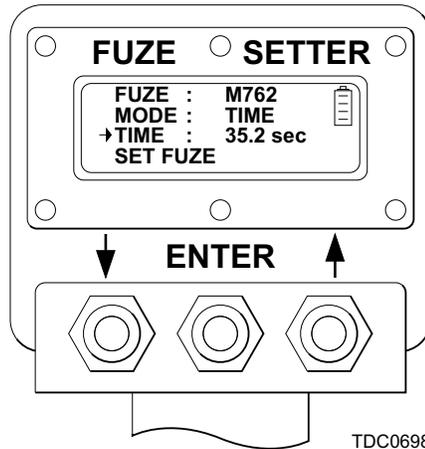
VARIABLE TIME MENU (FOR THE M782 FUZE)



4-14 FUZE SETTING (cont)

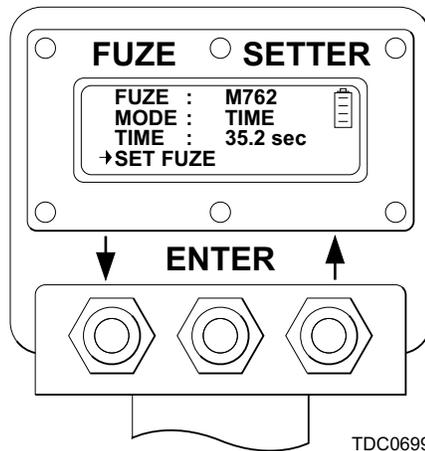
(i) Press the ↑ button or ↓ button to choose the desired number between 0 and 9 for the tenths-of-seconds digit and press the ENTER button. The Fuze Setting Menu appears with the cursor (→) aligned with **TIME** showing the set time.

FUZE SETTING MENU



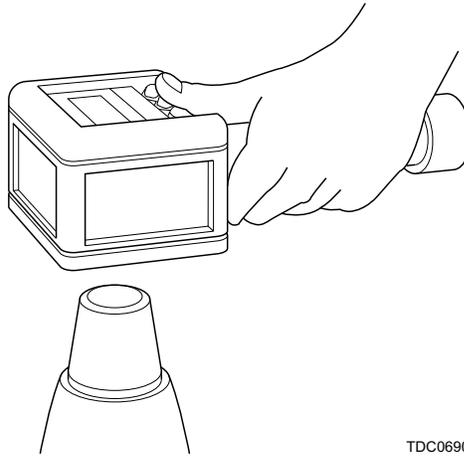
(j) Press the ↓ button to move the cursor (→) to align with **SET FUZE**.

FUZE SETTING MENU



(k) Place setter on the fuze and press the ENTER button.

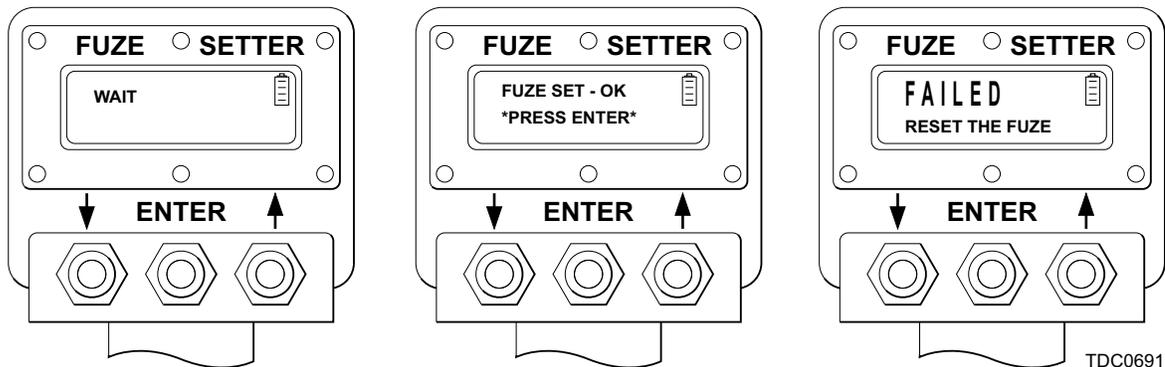
PLACING THE FUZE SETTER



TDC0690

(I) The setter will attempt to set the fuze. After the **WAIT** message is briefly displayed, either the **FUZE SET - OK** message will be displayed, which means that the fuze has been set, or the **FAILED** message will be displayed, which means the fuze has not been set. If the **FAILED** message appears, try setting another fuze. If both fuzes do not accept the setting then replace the fuze setter and retry setting the fuzes.

SETTING THE FUZE



TDC0691

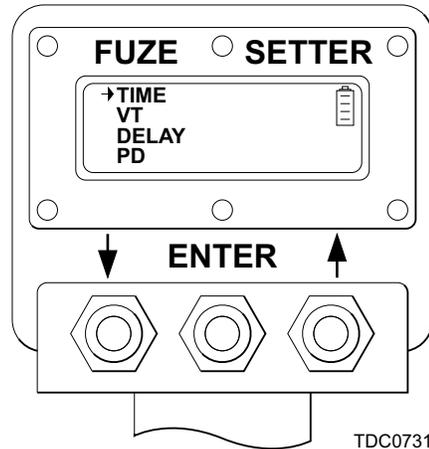
(4) Setting for Time mode:

NOTE

The setting procedures for the Time mode are the same as those for Variable Time (VT) mode except at step e. the cursor (→) is to be aligned with **TIME** instead of **VT**.

4-14 FUZE SETTING (cont)

MODE MENU (FOR THE M782 FUZE)



- (5) Firing temperature for the M782 fuze is -45°F to $+145^{\circ}\text{F}$ (-43°C to $+63^{\circ}$).

4-15 PROPELLING CHARGE PREPARATION

WARNING

UNDER NO CIRCUMSTANCES WILL GREEN BAG AND WHITE BAG CHARGES BE ASSEMBLED TOGETHER FOR FIRING. CRITICAL MALFUNCTION COULD RESULT.

a. **Propelling Charges, M3 Series and M4 Series.** M4A2 and M4A1 white bag charges can be expected to perform within design limits at Charges 5 through 7. However, large dispersions may result when these charges are fired at Charges 3 and 4. It is recommended that M3A1 or M3 green bag charges be used instead of white bag charges at Charges 3 and 4. If green bag charges are not available, use white bag charges, although range dispersions may result.

(1) If required, remove excess increments from charge, and retighten excess strap by twisting and securing ends under straps.

NOTE

Using the M2 flash reducer to reduce muzzle flash is optional, except when TB 9-1300-385-1 or TB 9-1300-385-2 restricts a specific propelling charge lot to use only with flash reducer. The M4A2 propelling charge has a flash reducer assembled in front of the base charge (increment number 3) at the time of manufacture and does not require use of the M2 flash reducer.

(2) In preparing the M4 or M4A1 white bag charge, one M2 flash reducer should be added in front of each increment used. Untie the charge and insert the proper number of M2 flash reducers (i.e., one flash reducer added in front of the base charge and each increment used). Then retie with two interlapping square knots.

b. **Propelling Charges, M119, M119A1, and M119A2.** The M119 and M119A1 are a one-increment, charge 8 white bag propelling charges and are shipped ready for firing. After unpacking and inspection, the only preparation required is removal of the igniter protector cap. This charge is not used in lieu of charge 7, M4 series white bag. M119A2 is a one-increment, charge 7, red bag, propellant charge, shipped ready for firing. The M119A2 charge 7 is equivalent to M119/M119A1 white bag charge 8 except for small difference in velocity.

c. **Propelling Charge, M203 and M203A1.** The M203 series is a one-increment, Charge 8 propelling charge for the M776 cannon. After unpacking and inspection, the only preparation required is removal of the igniter protector cap.

d. **Propelling Charge, M231 or M232 (MACS).** The M231 contains four charges (two per extraction sleeve) in each metal container and the M232 contains five charges per metal container. There is no other preparation needed after unpacking and inspecting the MACS.

4-16 LOADING AND FIRING

WARNINGS

OBSERVE ALL PRECAUTIONS IN FM 6-40, AR 385-63, AND FM 6-50 PARTICULARLY LIMITATIONS REGARDING OVERHEAD FIRE IN TRAINING AND COMBAT.

DO NOT FIRE M110 SERIES WHITE PHOSPHOROUS PROJECTILES, WHICH ARE KNOWN TO HAVE BEEN STORED IN OTHER THAN THE BASE DOWN POSITION. FIRING OF SUCH PROJECTILES COULD CONTRIBUTE TO INBORE EXPLOSIONS OR CLOSE-IN PREMATURE MALFUNCTIONS.

DO NOT LOAD OR FIRE ARTILLERY AMMUNITION WITHOUT THE AUTHORIZED FUZE. FIRING OF SUCH ROUNDS WITHOUT FUZES OR WITH UNAUTHORIZED FUZES COULD RESULT IN IN-BORE PREMATURES AND OTHER HAZARDOUS CONDITIONS.

DO NOT LOAD OR FIRE ROUND IF THE FUZE IS NOT FULLY SEATED.

FIRING OF THE M557, M572, AND M564 FUZES DURING HEAVY PRECIPITATION (HEAVY RAINFALL, SLEET, SNOW, OR HAIL) MAY RESULT IN OCCASIONAL DOWN-RANGE PREMATURES. THE AMOUNT OF PRECIPITATION NECESSARY TO CAUSE FUNCTIONING IS COMPARABLE TO THE HEAVY DOWNPOUR, WHICH OCCURS DURING A SUMMER THUNDERSTORM.

DO NOT FIRE PROXIMITY-FUZED AMMUNITION AT TARGETS CLOSER THAN 820 YARDS (750 METERS) TO FRIENDLY TROOPS.

FIRING THE M100 SERIES, M449, M485, OR M804 AND M804A1 PROJECTILES AT CHARGE 2 MAY OCCASIONALLY RESULT IN STICKERS.

DO NOT ASSEMBLE M3 SERIES GREEN BAG CHARGES WITH M4 SERIES WHITE BAG CHARGES. CRITICAL MALFUNCTION COULD RESULT.

DO NOT LOAD OR FIRE M231 CHARGES WITH M232 CHARGES. CRITICAL MALFUNCTION COULD RESULT. DO NOT LOAD OR FIRE MORE THAN TWO M231 CHARGES OR LESS THAN THREE M232 CHARGES.

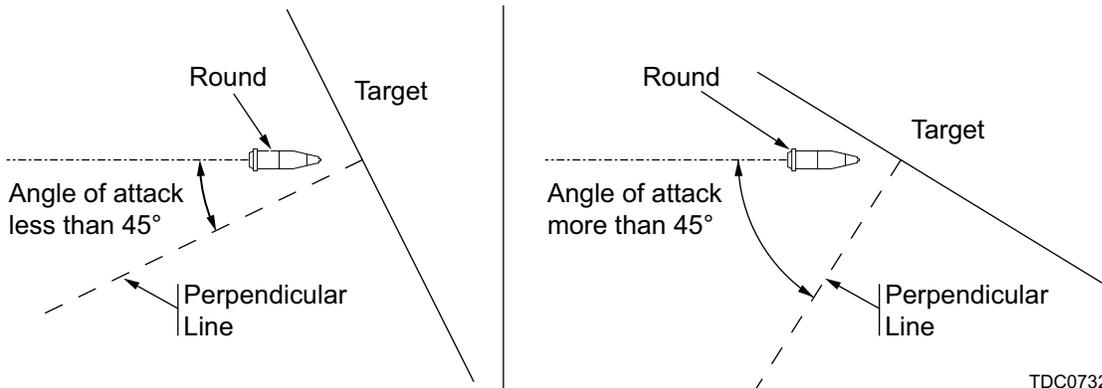
4-16 LOADING AND FIRING (cont)

WARNINGS

DO NOT FIRE M549/M549A1 PROJECTILES IF OBTURATING BAND IS MISSING OR BROKEN. SEPARATION OF THE PROJECTILE AND ROCKET MOTOR MAY OCCUR. (IF THE BAND IS DISPLACED AND CAN BE REPOSITIONED AND REMAIN IN THE GROOVE, PROJECTILE CAN BE FIRED).

MK 399 MOD 1 FUZES SET IN DELAY MODE PERFORM MORE EFFECTIVELY IF THE ANGLE OF ATTACK (THE ANGLE BETWEEN THE ROUND AND THE PERPENDICULAR LINE OF THE TARGET) IS LESS THAN 45 DEGREES. ANGLES OF ATTACK HIGHER THAN 45 DEGREES WILL RESULT IN DECREASED EFFECTIVENESS AND INCREASE THE LIKELIHOOD OF UNEXPLODED ORDNANCE IN THE BATTLEFIELD.

IF A PROJECTILE FIRED WITH MK 399 MOD 1 FUZE IMPACTS A SUBSTANTIAL OBJECT, A HIGH ORDER DETONATION MAY OCCUR EVEN IF THE OBJECT IS WITHIN THE 400 CALIBER MINIMUM ARMING DISTANCE, WHICH COULD RESULT IN DAMAGE TO THE WEAPON AND/OR DEATH OR SERIOUS INJURY TO UNPROTECTED CREW MEMBERS.



WARNINGS

FOR M864 PROJECTILES MARKED WITH THREE SOLID WHITE CIRCLES 120° DEGREES APART ON THE OGIVE (ABOVE THE WEIGHT ZONE MARKINGS), OBSERVE THE FOLLOWING WARNINGS:

- DO NOT FIRE THE M864 IF IT HAS BEEN DROPPED OR IF IT SHOWS EVIDENCE OF DENTS, FLATTENING, OR GOUGES TO THE LIFTING PLUG, GROMMET, ROTATING BAND, OR BOATAIL AREA.
- DO NOT FIRE THE M864 IF IT HAS, BEEN DELIVERED WITHOUT THE GROMMET.
- IF DURING HANDLING AND OR LOADING THE M864 BASE SEPARATES, CALL EXPLOSIVE ORDNANCE DISPOSAL (EOD) PERSONNEL.

DO NOT FIRE THE M864 IF THE OBTURATOR IS MISSING OR BROKEN BECAUSE IT MAY RESULT IN A SHORT ROUND. IF THE BAND IS DISPLACED AND CAN BE REPOSITIONED AND REMAIN IN THE GROOVE, THE PROJECTILE CAN BE FIRED.

- a. Make sure the round is clean and the fuze is present and fully seated.

WARNING

FIRING A ROUND WITH AN OBSTRUCTION IN THE CANNON TUBE CAN CAUSE AN IN-BORE EXPLOSION.

- b. Make sure there are no obstructions in the cannon tube.
- c. Check the firing mechanism to see that the primer expended in previous firing has been removed.
- d. Remove grommet or FRBC cover from projectile.

WARNING

NEVER LOAD A PROPELLING CHARGE INTO THE CHAMBER BY INCREMENTS. ONLY FULLY ASSEMBLED CHARGES WILL BE USED, CRITICAL MALFUNCTION COULD RESULT.

- e. Load fuze projectile into cannon and ram it solidly into the forcing cone of the cannon tube. Round must remain wedged into the forcing cone at all angles of elevation.
- f. Remove the igniter protective cap from the propelling charge and load the propelling charge into the cannon chamber with igniter end (red bag) toward the breechblock assembly.

4-16 LOADING AND FIRING (cont)

WARNING

NEVER CLOSE THE BREECHBLOCK ASSEMBLY UNLESS YOU CAN SEE THE RED IGNITER BAG ON THE BASE OF THE PROPELLING CHARGE. MISFIRES, HANGFIRES, ERRATIC PERFORMANCE, OR OTHER CRITICAL MALFUNCTION COULD RESULT.

- g. Close breechblock assembly.

WARNING

DON'T FORCE PRIMER INTO PRIMER CHAMBER. IF PRIMER WILL NOT GO IN, CHAMBER IS PROBABLY DIRTY. FORCING PRIMER INTO PRIMER CHAMBER MAY CAUSE PRIMER TO PREMATURELY IGNITE POWDER CHARGE, WHICH WILL CAUSE THE HOWITZER TO RECOIL PREMATURELY AND CAUSE SERIOUS INJURY TO CREW.

- h. Insert primer using PFM, cycle to firing position and fire on command of the SC.

4-17 AFTER FIRING

- a. Open the breechblock assembly and secure in the fully open position.
- b. Wipe face of spindle assembly after each round and swab the powder chamber, making sure that all burning fragments of powder charge are removed from powder chamber. Look through the cannon tube. If the cannon tube is clear, announce, BORE CLEAR.
- c. All ammunition fired must be recorded by charge number, type, and total number of each fired, and entered on DA Form 2408-4.

4-18 AMMUNITION PREPARED FOR FIRING, BUT NOT FIRED

WARNING

THE PROJECTILES AND FUZES THAT HAVE BEEN RAMMED AND THEN REMOVED FROM THE CANNON TUBE WILL NOT BE RELOADED OR FIRED, WITH THE EXCEPTION OF M712 COPPERHEAD EXTRACTED FROM A COLD CANNON TUBE. MARK UNSERVICEABLE AND RETURN TO AMMUNITION SUPPLY POINT.

- a. Using applicable fuze setter and procedure (Para 4-14), reset the fuzes of the projectiles prepared for firing but not rammed. Reset time fuzes to safe; reset VT fuzes to initial setting at which they were shipped; reset point detonating fuzes to SQ or PD. All M762 and M767 ET fuzes that have activated and not fired should be reset to ◀ 88.8, segregated, and used first in subsequent firings. When the battery runs down on an activated M762/M767 fuze, the LCD goes blank. These fuzes are unserviceable and should be packed separately, marked unserviceable, and turned in to the ASP. To determine if an M762/M767 fuze has been activated and run down, gently attempt to turn the ogive CW by hand without depressing the selector button. If the ogive turns easily, the fuze has been activated; a fuze that has not been activated should resist the applied torque. Replace safety wires in those fuzes so furnished.

b. Disassemble fuze from projectile and repack in original packing. When a long intrusion proximity fuze is removed from the projectile, replace the supplementary charge in the projectile before assembling the spacer and the correct type of lifting plug.

NOTE

Be sure the correct type of lifting plug is used. (For example, energy-absorbing or shock-attenuating lifting plug for M549 series projectiles, yellow fusible or universal lifting plug for M483 series projectiles, and standard eyebolt lifting plugs for other projectiles).

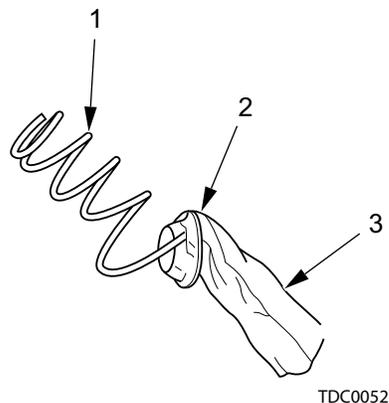
- c. Replace grommet or FRBC over rotating band.
- d. Restore propelling charges to original condition. Make sure all zones (increments) are present, tied, in proper order, in good condition, of the proper lot number, and that igniter caps are replaced.
- e. Replace fuzes, primers, and flash reducers in original packing.
- f. Make sure the lot number of the ammunition corresponds with the lot number on the container.
- g. If rocket cap was removed from the M549/M549A1 HERA projectile, replace cap and tighten hand tight.
- h. Return all projectiles to shaded and protected storage regardless of weather.
- i. Special instructions for the M483A1 and M864 ICM projectile are as follows:

WARNING

USE NO OTHER LIFTING PLUG EXCEPT THE FUSIBLE OR UNIVERSAL PLUG REMOVED FROM THIS PROJECTILE, BECAUSE IT IS DESIGNED FOR SAFE RELEASE OF PRESSURE INSIDE THE PROJECTILE IN CASE OF FIRE DURING STORAGE OR SHIPPING ACTIONS.

(1) Wind the pull-wire (1) under four tabs (2) on the cover of the expulsion charge assembly (3) (1 1/2 turns for proper engagement).

EXPULSION CHARGE ASSEMBLY-INSTALLATION



Section III. MAINTENANCE

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4-19 HANDLING

WARNING

KEEP FIRE AND FLAMMABLE MATERIALS OUT OF THE AMMUNITION AREA. THERE WILL BE NO SMOKING IN THE VICINITY OF AMMUNITION.

SHIELD ALL AMMUNITION FROM HIGH TEMPERATURES (EG. DIRECT RAYS OF THE SUN).

WHEN THE OUTSIDE TEMPERATURE IS EXPECTED TO REACH +100°F (+38°C), FAILURE TO SHADE THE PROJECTILES COULD RESULT IN DAMAGE TO MATERIEL AND LOSS OF LIFE.

- a. Do not expose ammunition and components containing explosives to extreme temperatures. Do not expose to direct sunlight, flame, or other sources of heat.
- b. Do not expose unpacked propelling charges and fuzes to rain, excessive humidity, or ground moisture.
- c. Protect the rotating band and the obturator band by keeping the grommet or FRBC on the projectile while it is being handled and transported.
- d. Prevent rough handling of projectile and fuzes. Do not strike projectiles together and do not offload ammunition by dropping projectile on projectile.
- e. Protect fuzes, primers, and flash reducers at all times from foreign matter and impact. A drop of 4 feet (1.22 meters) may cause the electrolyte vial in a VT fuze battery to break, thus causing a dud.
- f. Do not disassemble fuzes.

4-20 CARE

- a. Ammunition is packed to withstand conditions ordinarily encountered in the field. Keep packing boxes from becoming broken or damaged.
- b. Since ammunition is impaired by moisture, frost, extreme temperatures, and foreign matter (mud, oil, etc.), observe the following:
 - (1) Do not break the moisture-resistant seal on the container until ammunition is to be used.
 - (2) Shield all ammunition from high temperatures (e.g., the direct rays of the sun). When covering projectiles to provide this shield, cover with a tarpaulin. Ensure 18 inches (46 centimeters) of air space over and 6 inches (15 centimeters) of air space on the sides to allow free air flow necessary to keep projectiles cooler in hot weather.

(3) Refer to paragraph 4-30 for information regarding maintenance of the M712 Copperhead (HEAT) projectile.

4-21 MAINTENANCE

WARNING

ALTERATION OF LOADED AMMUNITION OR COMPONENTS IS PROHIBITED. UNAUTHORIZED MODIFICATION OF AMMUNITION COULD CAUSE CRITICAL MALFUNCTION.

NOTE

Proper performance of ammunition maintenance procedures when ammunition is received by using units assures that ammunition on hand is kept ready for use.

a. General.

(1) Inspect ammunition packaging daily. Open boxes or containers, which show evidence of contamination or deterioration and inspect ammunition. Do not open sealed boxes or containers unless defective ammunition is suspected.

NOTE

Procedures for preparing the M712 projectile (Copperhead) for firing begin in paragraph 4-25 as well as the care, maintenance, inspection, unpackaging and repackaging of this projectile.

(2) Inspect unpackaged ammunition and explosive components daily.

(3) Wipe off wet or dirty ammunition at once. Remove light corrosion. Do not polish ammunition to make it look better.

(4) Consider ammunition unserviceable if it has severe rust or propellant contamination, particularly moisture. Do not use except in an emergency.

(5) When repackaging ammunition, put it back into the original containers. If other packing material must be used, the old markings should be transferred to the new containers.

(6) See paragraph 4-31 for the LPRS, which is an optional system for securing loose unfuzed projectiles for transportation.

b. Projectiles.

(1) Visually inspect projectiles for the following defects:

(a) Projectiles without grommets or FRBCs installed; if either is missing, replace immediately.

(b) Distorted, out of round, or damaged body.

(c) Dirt or other foreign material.

(d) Seepage of explosive filler.

(e) Rust through projectile baseplate.

4-21 MAINTENANCE (cont)

(2) Clean dirt or foreign material from projectile by wiping with a damp rag (item 29, Appx D).

(3) Return defective projectiles to ammunition supply point.

(4) Inspect the M549/M549A1 projectile for the following:

(a) Missing or broken obturating bands. The projectile cannot be used if the obturating band is broken or missing. Return projectile to the supply point.

(b) Broken energy-absorbing lifting plugs. When the lifting plug is broken, the threaded area will remain in the projectile. Do not attempt to extract any portion of the broken plug. Return the projectile to the supply point.

(5) The M483A1 projectile can be used if the obturating band is missing or broken. Remove and discard broken obturating bands.

(6) Inspect the M864 projectile for the following:

(a) Missing or broken obturating bands, the projectile cannot be used if the obturating band is broken or missing. Return projectile to the ASP.

(b) Damaged (torn, punctured or peeling) weather seal, the projectile cannot be used if the weather seal is damaged. Return projectile to the ASP.

(7) Inspect specially marked M864 projectiles with three solid white circles 120° degrees apart on the ogive (above the weight zone markings) for the following:

(a) Projectiles that have not been palletized. Projectiles that have been transported as loose cargo. These conditions can cause gaps or separation at the base to body joint resulting in a hazard. Return projectile to the ASP.

(b) Projectiles showing dents, flattening, or gouges to the lifting plug, grommet, rotating band, or boatail area. These conditions can cause gaps or separation at the base to body joint resulting in a hazard. Return projectile to the ASP.

c. Propelling Charge, M3 and M4 Series.

(1) Visually inspect propelling charges for the following defects:

(a) Loose tie straps, allowing separation of the charge into increments.

(b) Missing increment, extra increment, or incorrect sequencing (order) of increments

(c) Increment bags torn or damaged to the extent that black powder or propellant spills out,

(d) Wet propelling charge.

(e) Missing or damaged red igniter pad on base of charge.

(2) Charges requiring retying may be retied as follows:

(a) Assemble increments in correct order.

(b) Tie the four tie straps over top of charge.

(3) Return all defective charges to the ASP.

d. Propelling Charges M119, M119A1, M119A2, M203, M203A1 and M231 and M232.

(1) Visually inspect propelling charges M119A1, M119A2, M203, M203A1 and M231 and M232 for the following defects:

NOTE

Flash reducer is sewn into sides of charge bag on M119A2 charge.

- (a) Missing flash reducer.
 - (b) Charge bag ripped or damaged to the extent that propellant can escape.
 - (c) Black powder leaking from base igniter pad.
 - (d) Base igniter pad not centered with respect to outer diameter of charge, both ends for the M231 and M232 charges.
 - (e) Evidence of broken or damaged central igniter tube (M119, M119A1, M203 and M231 and M232 only).
 - (f) Combustible case for M231 and M232 charges with cut or puncture through case wall.
 - (g) Combustible case for M231 and M232 charges with uneven cap (crooked, tilted or slanted).
 - (h) Combustible case for M231 and M232 charges that cannot be replaced into its sleeve due to exterior damage.
 - (i) Tie straps not tight over forward end of charge.
 - (j) Lacing jacket not secure on charge (M119A1, and M203 only).
 - (k) Cord missing or broken on lacing jacket (M119A1, and M203 only).
 - (l) Crushed or distorted cases or with missing/broken propellant in M203A1 charges.
- (2) If tie straps are loose, retighten the straps at the forward end of the charge.
- (3) Return all defective charges to the ASP.

e. Fuzes.

(1) Inspect fuzes for the following defects:

- (a) Damage to body or threads.
- (b) Loose components.

(2) Return defective fuzes to ASP.

f. Ammunition or Components of Ammunition Prepared for Firing but Not Rammed.

(1) Return such ammunition to the original condition and packing. Mark appropriately, and use first in subsequent firings to keep stocks of open packings to a minimum.

4-21 MAINTENANCE (cont)

(2) Replace the grommet or FRBC in those projectiles that were not fired.

(3) Reassemble the supplementary charge and the correct type of lifting plug (with gasket and spacer) to the projectile to restore it to its original condition. Return fuzes to original condition. Return fuzes to original packing. In reassembling the components, make certain the supplementary charge is properly inserted (felt pad end innermost).

(4) Remove the projectile spotting charge from the M577 series or M762 fuze and replace the expulsion charge assembly and fusible or universal lifting plug with gasket to the M483A1 or M864 projectiles. Replace rocket cap in M549 and M549A1 projectiles.

(5) Reassemble propelling charges prepared for firing and not used. Replace in original containers as follows:

(a) If increment was removed, reinstall and retie.

(b) Replace igniter protective cap.

(c) Repack charge in container (igniter end first), and close and secure container.

(d) Mark container appropriately, and use charge first in subsequent firings.

g. Unserviceable Ammunition.

(1) Conspicuously mark unserviceable ammunition or explosive components "UNSERVICEABLE" and return to ASP personnel for disposition.

(2) Repackage ammunition in original containers. If original container is unsuitable, use available material and transfer all markings. All layers of packing must be conspicuously marked "UNSERVICEABLE".

h. Excess Explosive Components.

(1) Pack supplementary charges removed from projectiles prior to assembling long intrusion proximity fuzes in containers from which proximity fuzes were removed.

(2) Properly mark container and return it to ASP for disposition.

(3) Destroy any unused powder increments or expelling charges left over after round has been fired by burning them in a safe place.

i. Destroying Powder Increments.

NOTE

Unused MACS increments should not be destroyed. They should be repacked, and either fired or turned back in.

(1) Locate proper burning area. Area should be 200 feet (60.96 meters) from any combustible material.

(2) Ensure proper firefighting equipment and personnel are present.

(3) Lay out powder increments parallel to wind direction in 12-inch (30.48-centimeters) wide column.

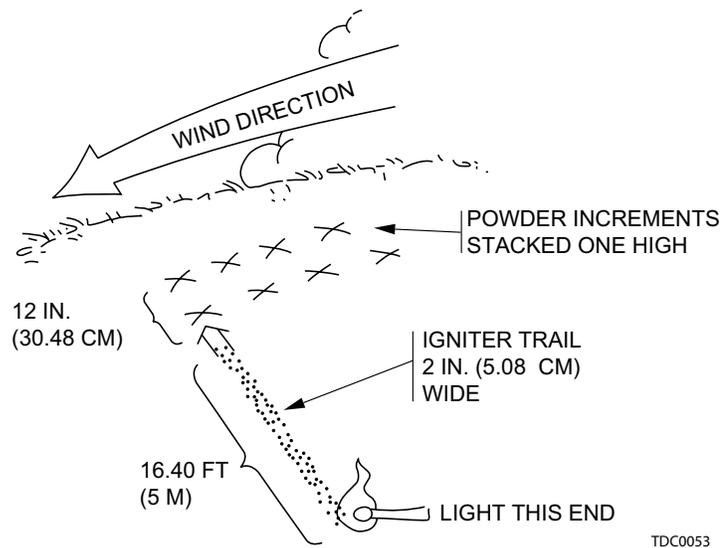
(4) Lay out an igniter trail at the downwind end of the line of increments by opening one powder bag and making a trail of powder at 90 degrees to the powder increments. The igniter trail should be approximately 16.40 feet (5 meters) long and 2 inches (5.08 centimeters) wide. See diagram below.

(5) Light the end of the igniter trail, then move away from the powder increments.

(6) While powder is burning, be alert for sparks or burning fragments caught by the wind.

(7) When powder is through burning, be sure all flames are extinguished and no smoldering ashes remain **“BE SURE ASHES ARE COMPLETELY BURNED”**.

DESTROYING POWDER INCREMENTS



j. Destroying MACS Charge Increments.

(1) Locate proper burning area. Area should be 164 feet (50 meters) from any combustible material.

(2) Ensure proper firefighting equipment and personnel are present.

(3) Prepare MACS propelling charge increments for field destruction:

(a) Peel off both red Mylar covers, exposing igniter end bags.

(b) Remove igniter bags from charge increment (locate ribbon tying bags together and cut, taking care not to cut into bags).

(c) Use one charge increment to make igniter trail. If one increment is cracked, break it open and use propellant to make igniter trail.

(d) If no charge increments are cracked, roll one charge increment on the ground, exerting a downward pressure on the joint of the case of the body. This should break the joint and the exposed propellant can be poured out and used to make the igniter trail.

4-21 MAINTENANCE (cont)

(4) Lay out MACS propelling charge increments parallel to wind direction in 12-inches (30.48 centimeters) wide column (columns of two increments) and lay the removed igniter bag components among the increments.

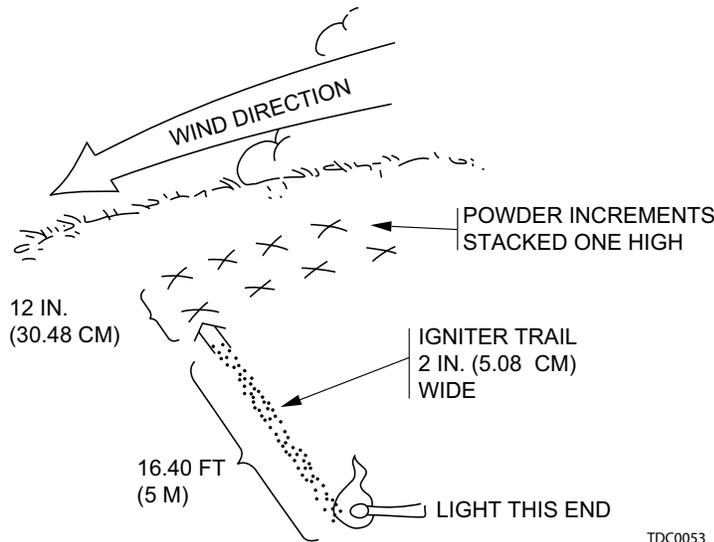
(5) Lay out an igniter trail at the downwind end of the line of increments by either breaking open one increment or by using a cracked or broken increment and making a trail of propellant at 90 degrees to the increments. The igniter trail should be approximately 16.40 feet (5 meters) long and 2 inches (5.08 centimeters) wide. See diagram below.

(6) Light the end of the igniter trail, then move away from the MACS propelling charge increments.

(7) While increments are burning, be alert for sparks or burning fragments caught by the wind.

(8) When increments are through burning, be sure all flames are extinguished and no smoldering ashes remain **“BE SURE ASHES ARE COMPLETELY BURNED”**.

DESTROYING MACS CHARGE INCREMENTS



4-22 STORAGE

WARNING

AMMUNITION EXPOSED DIRECTLY TO SUNLIGHT, OR IN UNVENTILATED CONTAINERS, ENCLOSURES, SHELTERS, FREIGHT CARS, CLOSED VEHICLES, AND SIMILAR STRUCTURES EXPOSED TO DIRECT SUNLIGHT MAY REACH TEMPERATURES EXCEEDING UPPER STORAGE LIMITS. AVOID EXPOSURE OF AMMUNITION COMPONENTS TO DIRECT SUNLIGHT. DO NOT STORE AMMUNITION ASSEMBLED WITH TETRYTOL-LOADED BURSTERS (I.E., PROJECTILES, 155-MM- SMOKE, WHITE PHOSPHOROUS, M110; GAS, AND HAND HD, PERSISTENT, M110) AT TEMPERATURES EXCEEDING +125°F (+52°C).

a. Temperature Limits.

- (1) Except as otherwise specified, observe the following limits:
 - (a) Lower limit is -80°F (-62°C) for period of not more than 3 days.
 - (b) Upper limit is +160°F (+71°C) for periods of not more than 4 hours per day.

WARNING

DO NOT FIRE SMOKE, WHITE PHOSPHOROUS M110 ROUNDS, WHICH ARE KNOWN TO HAVE BEEN STORED IN OTHER THAN BASE DOWN POSITION. FIRING OF SUCH PROJECTILES COULD CONTRIBUTE TO INBORE EXPLOSIONS OR CLOSE-IN PREMATURE MALFUNCTIONS.

- (2) Store or transport projectiles containing WP at a temperature below the melting point of the WP filler (+111.4°F (+44°C)). If this is not practicable, store or transport such projectiles on their bases so that, should the WP filler melt, it will resolidify with the void in the nose of the projectile. This restriction does not apply to the M825/M825A1 WP projectiles.
- (3) Protect proximity fuzes and proximity rounds from long exposure in high humidity. Store M728 in temperatures between -65°F (-54°C) to +145°F (+63°C); store M732 series fuze in temperatures between -60°F (-51°C) and +160°F (+71°C); and store M514 series fuze in temperatures between -30°F (-34°C) and +130°F (+54°C).

WARNING

DO NOT STORE AMMUNITION UNDER TREES OR NEAR TALL BUILDINGS THAT ATTRACT LIGHTNING. WHEN AMMUNITION MUST BE STORED IN THE OPEN, SELECT A STORAGE SITE FREE OF POWER LINES, ELECTRIC CABLES, AND FLAMMABLE MATERIALS. SITES SHOULD NOT BE ADJACENT TO RESERVOIRS, WATER MAINS, ETC. DO NOT STORE AMMUNITION NEAR A LARGE CONCENTRATION OF PERSONNEL.

b. Sites. Store ammunition in the firing area so that it is protected against accidental explosions. Sites should be level and well drained.

c. Provisions.

NOTE

A hardstand of blacktop or gravel and sand is preferable to excessive use of spacing material.

- (1) Use heavy, well supported dunnage to keep bottom tier of stack off the ground and to prevent it from sinking into the ground.
- (2) Allow at least 6 inches (15.24 centimeters) of space beneath the pile for air circulation. Dig trenches to prevent water from flowing under pile.
- (3) Provide nonflammable covers (e.g., tarpaulin) for all ammunition. Maintain air space of approximately 18 inches (45.72 centimeters) between cover and ammunition. Keep cover at least 6 inches (15.24 centimeters) from pile on ends and sides for air circulation.

4-22 STORAGE (cont)

(4) Store M110 series and WP projectile rounds nose up; this does not apply to the M825 WP projectile.

(5) Store ammunition and primer containers with the top side up. Labels or markings on boxes and containers indicate which side should be up.

**Section IV. M712 HEAT, CANNON-LAUNCHED, GUIDED PROJECTILE AND M823
 TRAINING PROJECTILE (COPPERHEAD)**

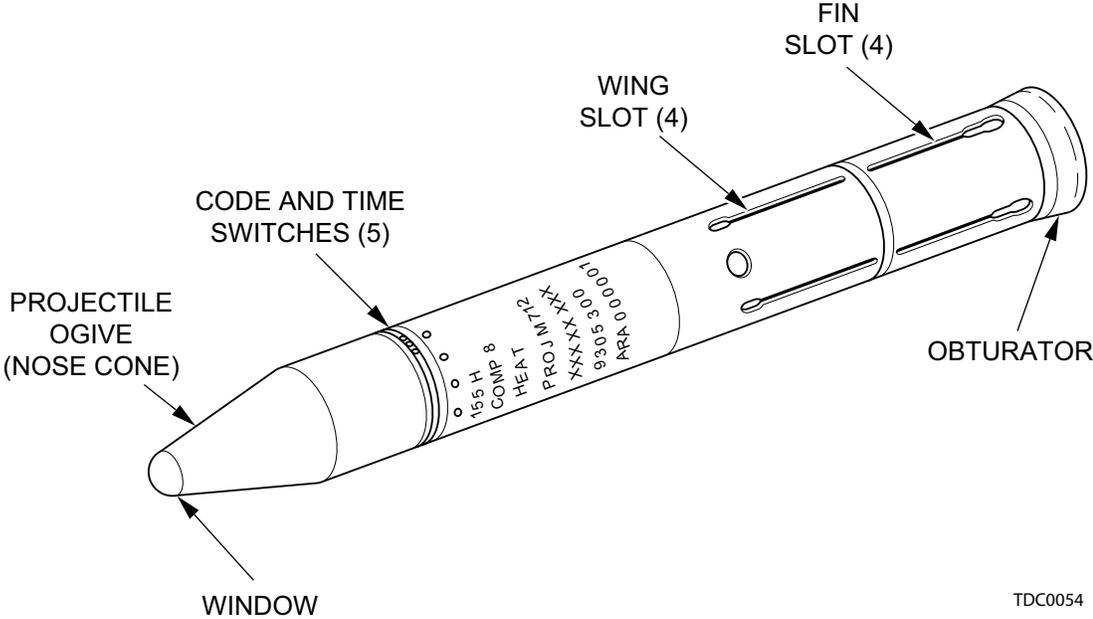
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4-23 DESCRIPTION

a. M712 cannon-launched, guided projectile is a terminally guided system launched from the M198 howitzer into a ballistic trajectory. During flight, the target is illuminated by a laser beam from a laser designator. An onboard computer continuously refines the terminal trajectory and provides guidance to the control surfaces, causing the round to home in on stationary or moving hard-point targets. The M712 projectile is fired in the same manner as conventional projectiles.

M712 PROJECTILE



TDC0054

WARNING

THE M823 TRAINING PROJECTILE MUST NOT BE FIRED. SUCH FIRING
 COULD BE A HAZARD TO PERSONNEL FORWARD OF THE HOWITZER.

4-23 DESCRIPTION (cont)

b. The training round for M712 projectile is M823 projectile. The M823 projectile is designed to train 155mm howitzer weapon crews in the handling and setting of the M712 projectile. It simulates the M712 in weight, center of gravity, and external appearance. It contains code and time switches, which are set to simulate prefiring activity by the crew; however, it does not have the wings or fins. It is shipped and stored in the same container as the M712 projectile and color-coded for easy identification. The containers for both the M712 and M823 projectiles are forest green. Marking for the M712 is yellow; for the M823 it is white. Bronze patches at container ends; also identify the M823 projectile inside.

4-24 UNPACKING AND INSPECTION

WARNING

IF EXUDED COMPOSITION B IS OBSERVED ON THE PROJECTILE OR IN THE CONTAINER DURING THE UNPACKING AND INSPECTION OPERATIONS, MOVE THE PROJECTILE TO A SAFE AREA AND NOTIFY EOD FOR DISPOSAL.

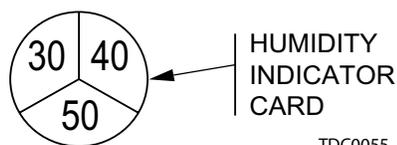
NOTE

Unless the unpackaged M712 projectile is to be fired immediately, it must be protected from the elements (by means of protective bag) as described below. Do not let an unpackaged M712 projectile sit out unprotected.

a. Unpackaging.

(1) A humidity indicator is located in the aft end of the container. The indicator card is the pie-sector type (the M823 training round has a card that resembles the card for the M712 projectile, but 'DUMMY CARD' is printed on its face. These procedures apply only to the M712 projectile).

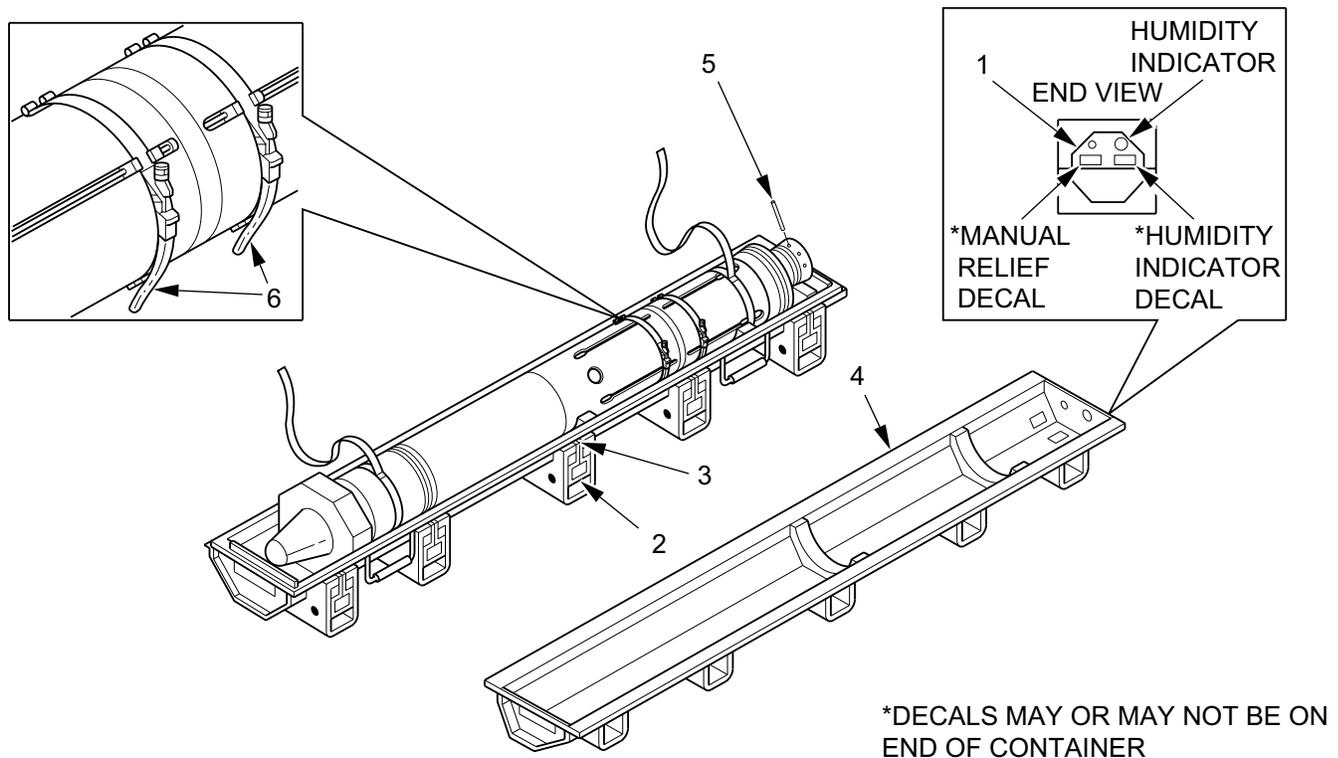
HUMIDITY INDICATOR



TDC0055

(2) Open only those containers whose humidity indicator card shows under 40 percent relative humidity (40 percent sector must be colored blue, 30 percent sector may be blue or pink), and only when a fire mission is planned or anticipated. If the 40 percent humidity section is pink, turn complete item in to ASP. Keep all packaging materials in the container. A protective bag is provided inside each container. When mission requirements dictate a need, the M712 projectile may be removed from the shipping and storage container and placed in the protective bag. The protective bag will protect the round against direct effects of water, sunlight, dirt, and debris. However, it will not protect the round from the elements for more than 30 days at a time. Repackage unfired projectiles within 30 days and turn in to ASP. Projectiles must be repackaged for vehicular transportation. Unpackage the M712 projectile from its container as follows:

UNPACKING



TDC0056

CAUTION

Before unpackaging round from container, make a quick visual inspection of projectile for obvious damage or other conditions that would prevent use. If projectile appears unusable, replace container cover, close latches, and return to ASP.

- (3) Using a screwdriver or equivalent tool, break and remove metallic seal wires (if present) located on center latch on both sides of container.
- (4) Depress manual relief valve (1).
- (5) Release container latches (2), starting at the manual relief valve (aft) end, in pairs. Pull latch handles all the way up, remove barrel nut (T-bolt) (3) from recess in cover, and then push down all the way.
- (6) Separate cover (4) from container body and place upside down on ground alongside body.
- (7) Partially pull torquing rod (5) from rear end of tension mechanism.
- (8) Turn torquing rod CCW to release tension, and then spin tension mechanism by hand until it stops.
- (9) Open stainless steel fin and wing preload bands (6) remove and place in container.

4-24 UNPACKING AND INSPECTION (cont)

CAUTION

Do not let the projectile touch the ground or lay in water. Projectile may be placed on a tarpaulin or may be put down across the top of the open container. Water, dirt, or other materials entering projectile through wing/fin slots may cause projectile to fail during flight. Do not touch or grasp ogive when handling and loading projectile.

(10) Carefully remove projectile (1) from container by lifting it up and to the rear, using lifting straps (2) provided on the projectile.

(11) Place the projectile on a clean, dry surface. The projectile should be shielded from direct sunlight, rain, dirt, and other debris.

(12) Remove lifting straps (2), and place them in the container.

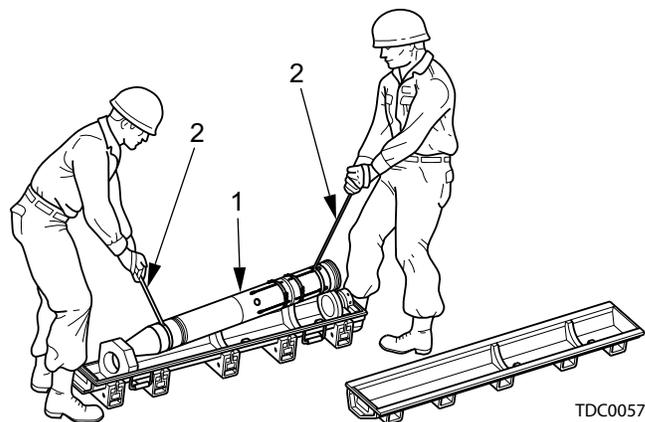
(13) Spin tension mechanism several turns CW by hand to avoid interference of torquing rod with cover when container is closed.

(14) Replace cover on container body.

(15) Starting on the end opposite the humidity indicator, straddle container, place T-bolts in cover recesses, and close corresponding left and right side latches at the same time, in pairs, until all 10 latches are closed.

(16) Keep the container and all packing materials for reuse or return complete container to ASP. Covers and bodies of containers form a set. Do not separate or mix covers and bodies.

PROJECTILE REMOVAL



b. Inspection of M712 Projectile. Perform the following inspection immediately after the projectile is unpackaged from its container. If a projectile is found to be unserviceable, as a result of damage or other defects, as described below, repackage the projectile in its original container, and return to ASP. Attach a tag describing the defects.

(1) Inspect the window area of the nose cone to make sure that it is clean and that there are no cracks, fogging, indications of moisture on the inside of the window, or other damage. Clean a dirty window, using a clean wiping rag (item 29, Appx D). Reject a projectile as unserviceable for any of the following reasons:

- (a)** Window cannot be properly cleaned.
- (b)** Window shows signs of fogging or has moisture on the inside.
- (c)** Window is cracked, broken, or badly gouged.

(2) Inspect code and time switches to make sure that they are free of dirt and that all numbers and index marks are legible. Remove dirt, using a clean wiping rag (item 29, Appx D). Reject a projectile as unserviceable for any of the following reasons:

- (a)** Missing or broken switch dials.
- (b)** Switch dials cannot be properly cleaned to make numbers and index marks legible.

(c) Switches cannot be rotated freely when the firing codes are being set into projectile. Turn switches, using a screwdriver or the tang end of the M18 fuze-setter wrench, to check switches turn. A click should occur at each number.

(3) Reject a projectile as unserviceable if the obturator has a crack or large gouge.

(4) Inspect wing and fin slots to make sure there is no dirt, debris, or other foreign matter in the slots. Reject as unserviceable if foreign material cannot be removed.

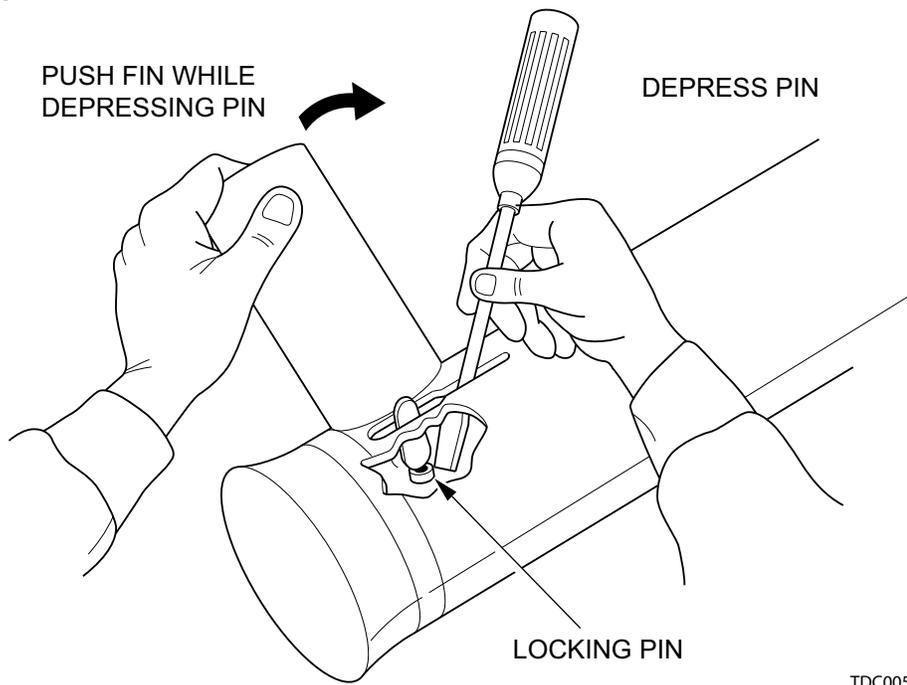
(5) Inspect fins to make sure that they are not in extended position. If they are, perform either (a) or (b) below to relatch fins. Reject projectile as unserviceable if fins cannot be relatched.

(a) If fin is only part way out, gently push fin back into its slot until it locks in place.

(b) If fin is locked in extended position, insert a small screwdriver, knife blade, or similar tool to fin slot as shown. Depress locking pin with tool, and push fin forward at the same time to lock fin in retracted position.

4-24 UNPACKING AND INSPECTION (cont)

FIN INSPECTION



(6) Inspect the overall projectile to make sure that there is no caked-on dirt, excessive corrosion, loose or missing items, such as screws or access covers or other damage. Remove dirt, minor corrosion, and foreign matter using a clean, soft cloth or tissue (item 12, Appx D). Inspect for loose or missing screws. If any splice screw or access cover screw is loose, attempt to make it finger tight, turning by hand. Reject a projectile as unserviceable if there is excessive corrosion or screws missing on access cover. Minor corrosion, minor gouges, burrs on metal projectile body, and/or missing splice screws are acceptable. Screws slightly above flush are acceptable after tightening.

c. **Inspection of M823 Projectile.** Since the M823 projectile will be reused many times, it will be rejected only for the following reasons.

- (1) Nose cone is cracked or broken.
- (2) One or more switches cannot be rotated or will not stay set to a number.
- (3) Severe damage to projectile body which could prevent it from being rammed or extracted and cause damage to the interior of the gun tube.
- (4) Badly damaged or worn obturator, which results in fall back
- (5) Damaged base which prevents proper extraction.

4-25 PREPARATION FOR FIRING

WARNINGS

FORCING CONE IN THE CANNON TUBE MUST BE FREE OF OIL AND GREASE BEFORE RAMMING. OIL OR GREASE MAY PERMIT PROJECTILE FALLBACK.

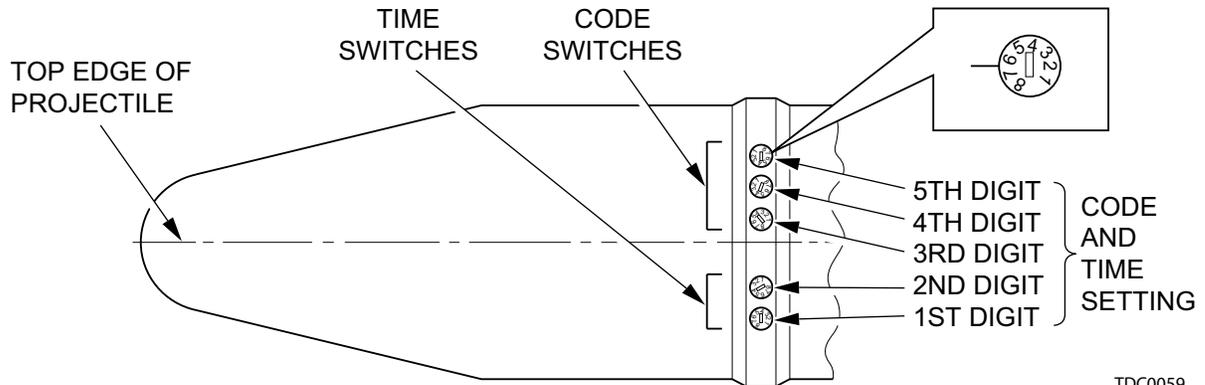
AFTER EXTRACTING AN M712 PROJECTILE FROM A HOT CANNON TUBE, FORCING CONE MUST BE CLEANED OF MELTED PLASTIC. FAILURE TO DO SO MAY RESULT IN PROJECTILE FALLBACK. CLEANING MAY BE ACCOMPLISHED BY FIRING ANOTHER 155MM ROUND IF MISSION REQUIREMENTS PERMIT OR FIRING A PROPELLING CHARGE ALONE.

NOTE

For training purposes, the M823 training projectile will be used instead of the M712 projectile. All operational procedures, which apply to the M712, also apply to the M823 projectile. However, no live propelling charges are to be used with the M823 training round.

- a. Unpackage and inspect M712 or M823 projectile (Para. 4-24).
- b. Make sure that the extractor assembly is set up and ready for use as described in paragraph 4-27.

PREPARATION FOR FIRING



TDC0059

NOTES

Be sure to set switches in correct sequence. Always set first switch on left (looking from base of projectile toward nose) first, then the next switch to the right, etc., until all five switches have been set.

A noticeable click should occur at each number on the switch. This click may be heard and /or felt.

- (1) Rotate switch at least one complete turn, either CW or CCW.
- (2) Continue turning switch past correct number and toward the next adjacent number (but stop before reaching next number).

4-25 PREPARATION FOR FIRING (cont)

(3) Turn switch back the other way and set on correct number. Be sure that number on switch is centered on scribe line.

c. After unpackaging the round, set the code and time switches, using a screwdriver or the tang end of the M18 fuze-setter wrench. The fire direction center announces this setting in the fire command, in the same place as they usually send 'time' for time of VT fuzes. This switch setting will always have five numbers. Switches will be set from left to right as seen when facing the nose of the projectile from the base of the round. The switches are circular dials that can be rotated CW or CCW as many times as required, without damaging the switches. The appropriate number on the switch must be centered on the scribe line.

d. Set the elevation of the cannon tube between 250-500mils for loading the projectile.

| |
|----------------|
| WARNING |
|----------------|

THE M712 PROJECTILE IS NOT ADAPTABLE FOR USE WITH THE CURRENT LOADING TRAY. DAMAGE TO PROJECTILE OR INJURY TO PERSONNEL COULD OCCUR.

e. Carry the prepared projectile to the howitzer. Recheck the nose window and obturator cleanness. If necessary, they are wiped clean, using a clean wiping rag (item 29, Appx D).

f. Visually recheck code and time switches. If numbers are not centered on scribe lines or correct numbers have not been set, set them now following procedures in paragraph c (above). Verify that the steel fin and wing retainer clamps have been removed. If the clamps have not been removed, remove before ramming the round.

g. Insert the M712 projectile into the powder chamber. Ramming and firing of M712 projectiles is the same as for all other ammunition in this manual.

4-26 MISFIRE AND CHECK FIRING PROCEDURES

The precautions and actions associated with misfires and checkfires are the same for the M712 projectile as for other projectiles in this manual.

4-27 OPERATION OF EXTRACTOR TOOL ASSEMBLY FOR PROJECTILES M712 AND M823

a. **General.** The extractor assembly is used to remove the M712 or M823 projectile from the weapon. The following procedures include setting up the extractor assembly in preparation for use and breakdown procedures for stowage.

b. **Setup for Use.**

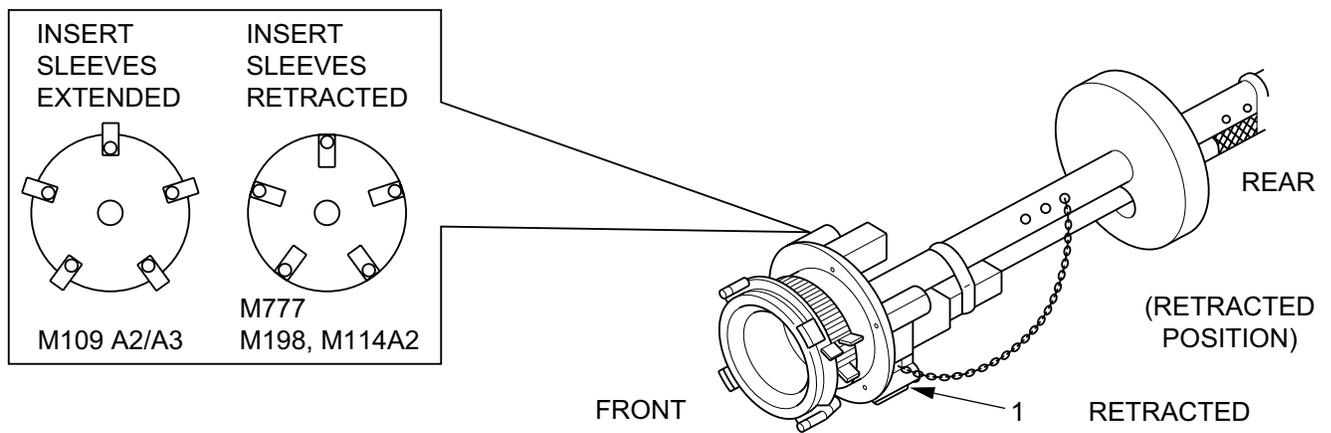
(1) Get extractor assembly from wooden packing box.

NOTE

The 16-inch socket wrench extension will initially be found in the SL-3/BII gear. This extension should be relocated into the box containing the extractor and retained there.

(2) Inspect to make sure that the five insert sleeves (1) in the extractor assembly are retracted for use with an M777 howitzer as shown.

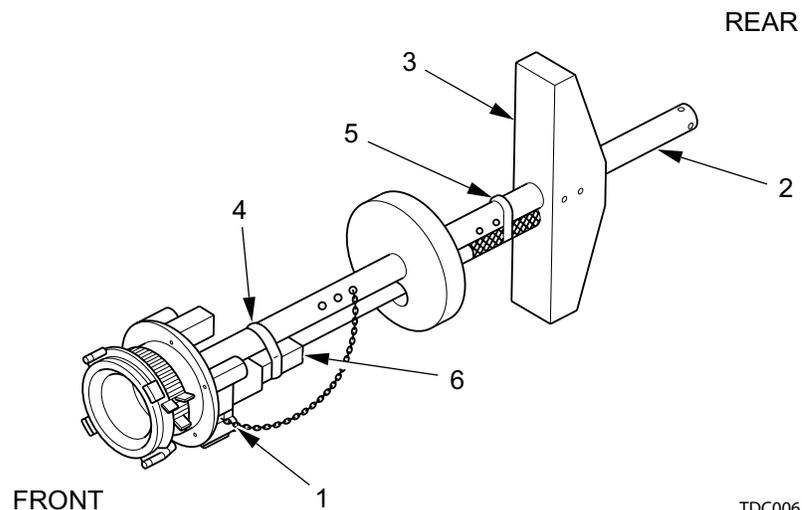
EXTRACTOR TOOL SET UP



TDC0060

- (3) While standing at the rear, loosen drive nut (2) CW to farthest white mark.
- (4) Move brace (3) back.
- (5) Loosen two strap assemblies (4 and 5)
- (6) Remove ratchet (6).
- (7) Disengage locking pin (7).

EXTRACTOR TOOL SET UP



TDC0061

- (8) Extend telescoping solid shaft (1) and hollow shaft (2) until hole (3) in solid shaft (1) aligns with farthest hole in hollow shaft (2).
- (9) Move alignment support (4) forward, midway between locking pin chain screw (5) and two holes (3) and (6), at end of the hollow shaft (2).
- (10) Guide the locking pin (7) through the slot in alignment support (4).

4-27 OPERATION OF EXTRACTOR TOOL ASSEMBLY FOR PROJECTILES M712 AND M823 (cont)

(11) Insert locking pin (7) completely through both shafts (1) and (2), as shown.

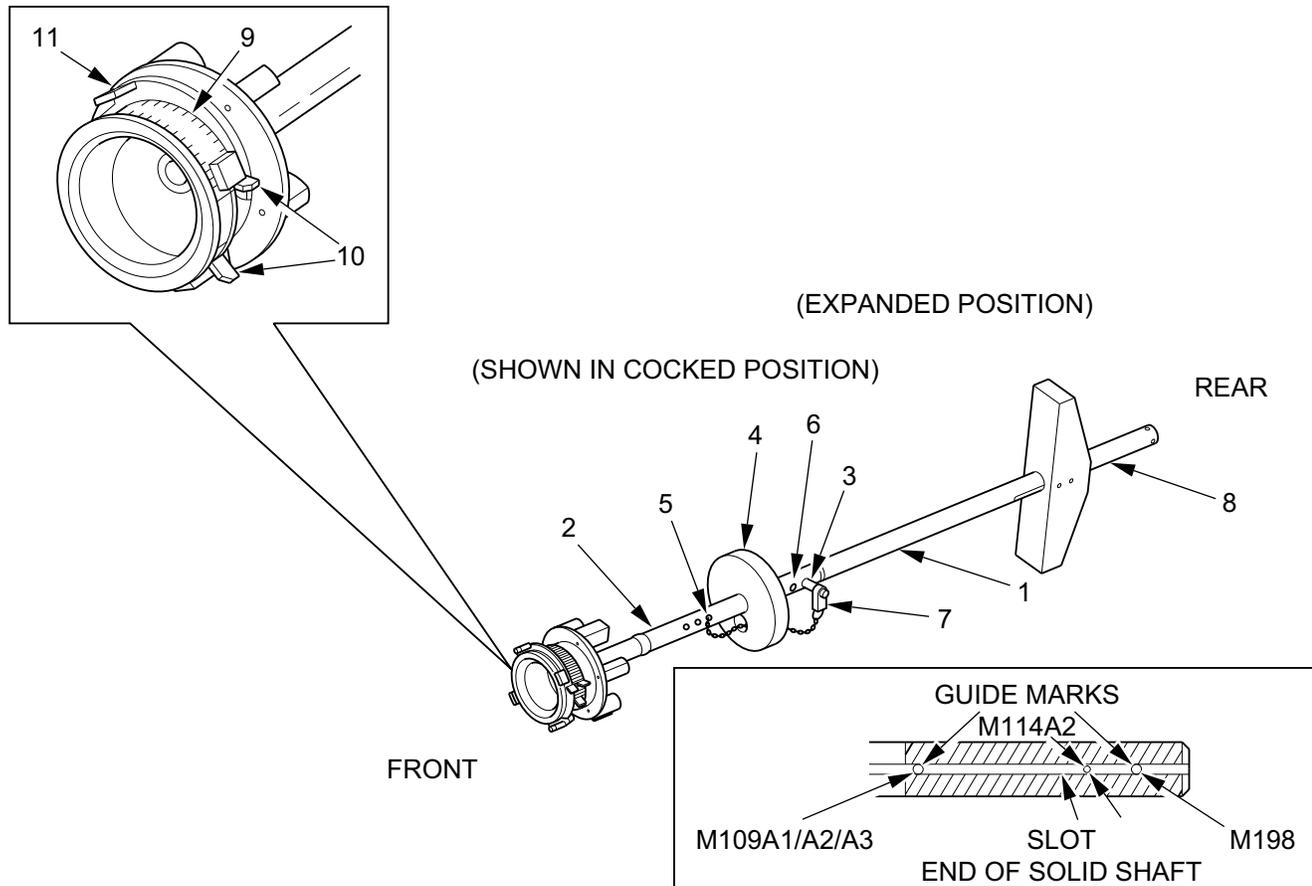
(12) Turn drive nut (8) CCW until forward edge aligns with guide mark (white) on solid shaft (1). Use rear mark for M777 howitzer.

(13) Cock extractor assembly as follows:

(a) Compress expansion ring (9) by squeezing tabs (10) together.

(b) Align cutout in retaining ring (11) with tabs (10) on expansion ring (9), and slide retaining ring forward over expansion ring.

EXTRACTOR TOOL SET UP



TDC0062

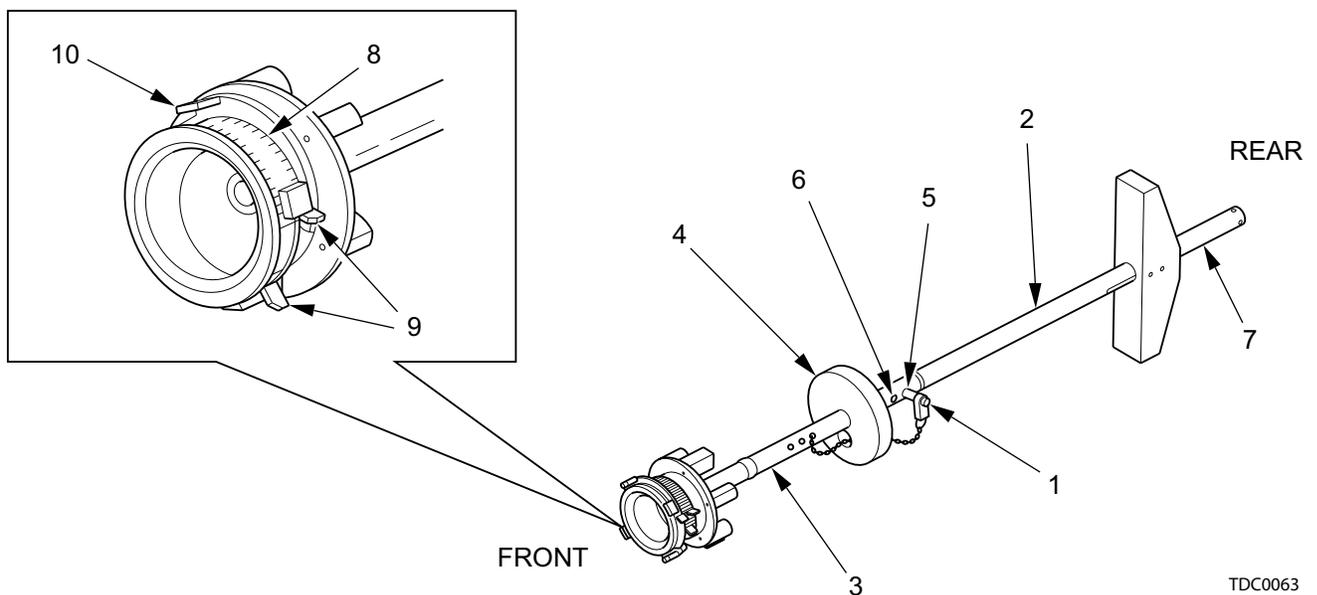
c. Setup for Use Under Conditions of Poor Visibility. If the extractor assembly is being expanded under conditions of poor visibility, the alignment hole and shaft detent may be used as described below.

(1) Disengage locking pin (1), and pull solid shaft (2) from hollow shaft (3).

(2) Move alignment support (4) forward of the two holes (5) and (6), in hollow shaft (3).

- (3) Guide locking pin (1) through the slot in alignment support (4).
- (4) Insert locking pin (1) in the alignment hole (6) (second hole from end of hollow shaft).
- (5) Insert solid shaft (2) in hollow shaft (3), and rotate until alignment detent in end of solid shaft rests against locking pin (1).
- (6) While holding both shafts, to prevent them from turning or sliding, remove locking pin (1) from alignment hole (6); and insert locking pin completely through farthest hole (5) to lock both shafts in extended position.
- (7) Turn drive nut (7) CCW until forward edge aligns with guide mark (white) on solid shaft (2). Use rear mark for M777E1 howitzer.
- (8) Cock extractor assembly as follows:
 - (a) Compress expansion ring (8) by squeezing tabs (9) together.
 - (b) Align cutout in retaining ring (10) with tabs (9) on expansion ring (8), and slide retaining ring forward over expansion ring.

EXTRACTOR TOOL SET UP



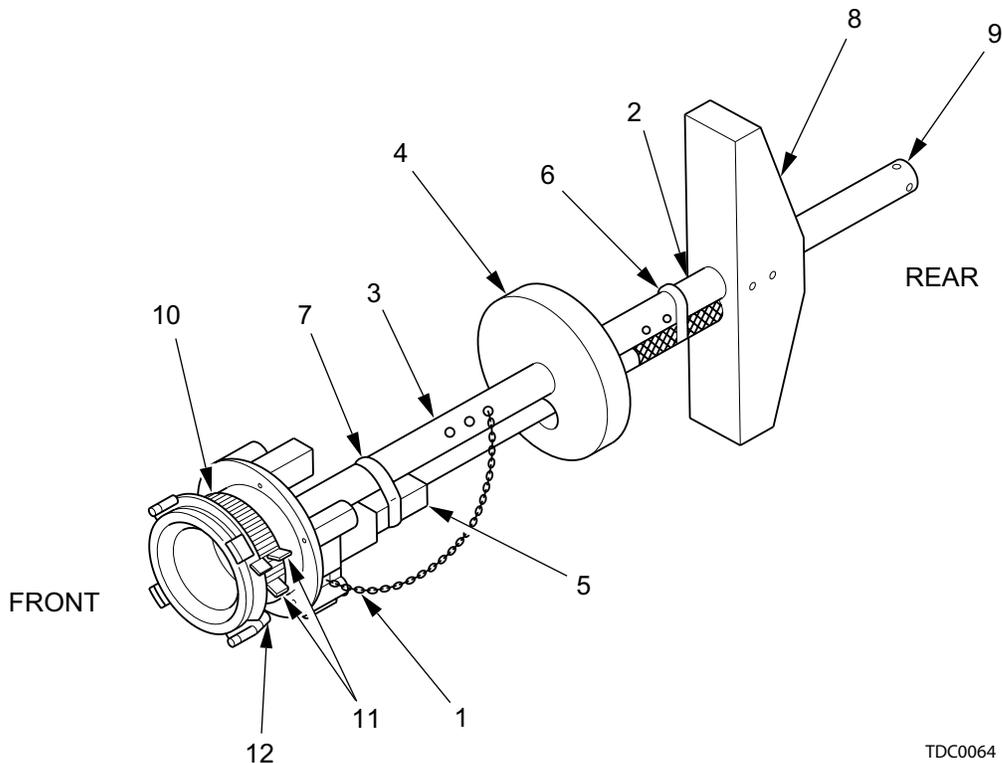
d. Breakdown for Stowage.

- (1) Disengage locking pin (1), and compress telescoping solid shaft (2) and hollow shaft (3) to retracted position.
- (2) Guide locking pin (1) through slot in alignment support (4).
- (3) Insert locking pin (1) completely through solid shaft (2) and hollow shaft (3).
- (4) Remove ratchet (5) and extension, and guide ratchet handle through the slot in alignment support (4).
- (5) Strap ratchet (5) to hollow shaft (3), using the strap assemblies (6) and (7) provided.

4-27 OPERATION OF EXTRACTOR TOOL ASSEMBLY FOR PROJECTILES M712 AND M823 (cont)

- (6) Slide brace (8) forward until it touches end of ratchet handle. Turn drive nut (9) CCW until brace (8) is held firmly against ratchet handle.
- (7) Check to see if extractor is cocked. If it is not cocked, perform the following:
 - (a) Compress expansion ring (10) by squeezing tabs (11) together.
 - (b) Align cutout in retaining ring (12) with tabs (11) on expansion ring (10), and slide retaining ring (12) over expansion ring (10).
- (8) Stow assembly and extension in wooden packing box.

EXTRACTOR TOOL BREAKDOWN FOR STOWAGE



4-28 UNLOADING M712 OR M823 PROJECTILES

CAUTION

Do not use bell rammer to unload M712 or M823 projectile.

a. Removal of Primer and Propelling Charge.

- (1) Remove primer and propelling charge as prescribed in this manual.
- (2) Elevate/depress cannon tube to approximately 300 mils.

b. Unloading M712 and M823 Projectile. Unload M712 or M823 projectile following the steps listed below.

(1) Obtain extractor assembly.

(2) Check to see if extractor assembly is cocked. If expansion ring is cocked, proceed to (3) below; otherwise, cock extractor assembly as follows:

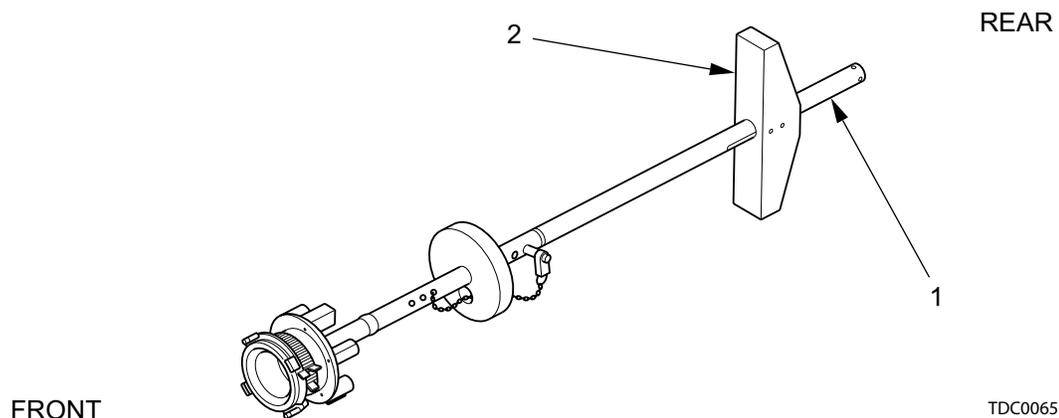
(a) Compress expansion ring by squeezing tabs together.

(b) Align cutout in retaining ring with tabs on expansion ring, and slide retaining ring forward over expansion ring.

(3) Insert extractor assembly through breech ring assembly until forward end makes contact with base of projectile. Push extractor assembly firmly against projectile until expansion ring is seated in the base of the projectile. Pull on extractor assembly to make sure that it is engaged with projectile. If extractor assembly did not engage, remove it from cannon tube and repeat procedures in steps (2) (a) and (b), and this step.

(4) Turn extractor drive nut (1) CCW by hand until brace (2) touches and is centered across face of breech ring assembly.

EXTRACTOR ASSEMBLY



(5) Insert socket wrench extension (1) into ratchet (2). Connect ratchet to end of drive nut. Set ratchet to OFF, and turn ratchet CCW until projectile is pulled free of forcing cone. Remove ratchet and wrench extension from drive nut.

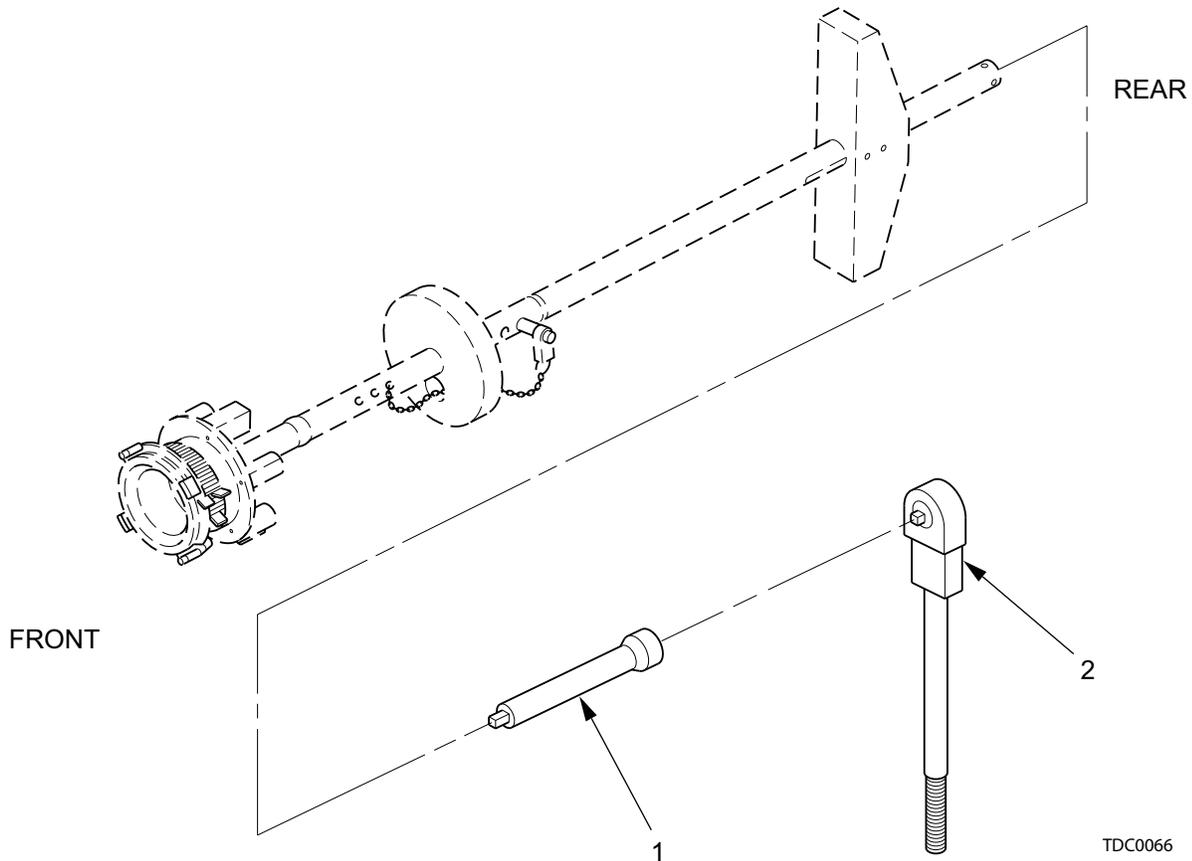
(6) Let projectile and extractor assembly slide slowly out of gun tube until base of projectile has passed through breech ring assembly. Projectile will have to be raised slightly to pass obturator over Swiss groove.

(7) Release extractor assembly by squeezing tabs on expansion ring.

(8) Remove the projectile from howitzer, being careful not to strike plastic nose cone, and repackage the projectile. If the projectile has been unloaded from a hot gun tube, remove it to a safe distance from personnel, and notify EOD for disposal.

4-28 UNLOADING M712 OR M823 PROJECTILES (cont)

PROJECTILE REMOVAL



TDC0066

4-29 AMMUNITION PREPARED FOR FIRING, BUT NOT FIRED

a. General. M712 projectiles that have been unpackaged (in accordance with paragraph 4-24) but not fired will be repackaged within 30 days and returned to ASP for further disposition. Long exposure of the projectile to sunlight and other elements may cause it to fail. Code and time switch settings made during preparation need not be reset. A projectile that has been unloaded from a weapon as a result of a misfire or checkfire will be repackaged as described below.

NOTE

An M712 projectile, which has been rammed and extracted from a cold tube, may be used.

b. Repackaging Projectile. Repackage the M712 projectile as follows:

(1) Using wiping rag (item 29, Appx D), wipe all loose dirt and moisture from projectile.

(2) Locate original container. If container has become unserviceable, replace it. If original container cannot be found or has been replaced for unserviceability, make sure that markings on replacement container match markings on projectile. If not, return to ASP for remarking.

(3) Install projectile into container as follows:

(a) Check red decals, stamp, or stencil (if present) at nose end of container halves to assure numbers on decals match.

(b) Open container, and remove lifting straps. Also remove fin and wing preload bands.

CAUTION

Make sure that all four fins and wing preload bands securely engage fin and wings.

(c) Install fin and wing preload bands (1) on projectile.

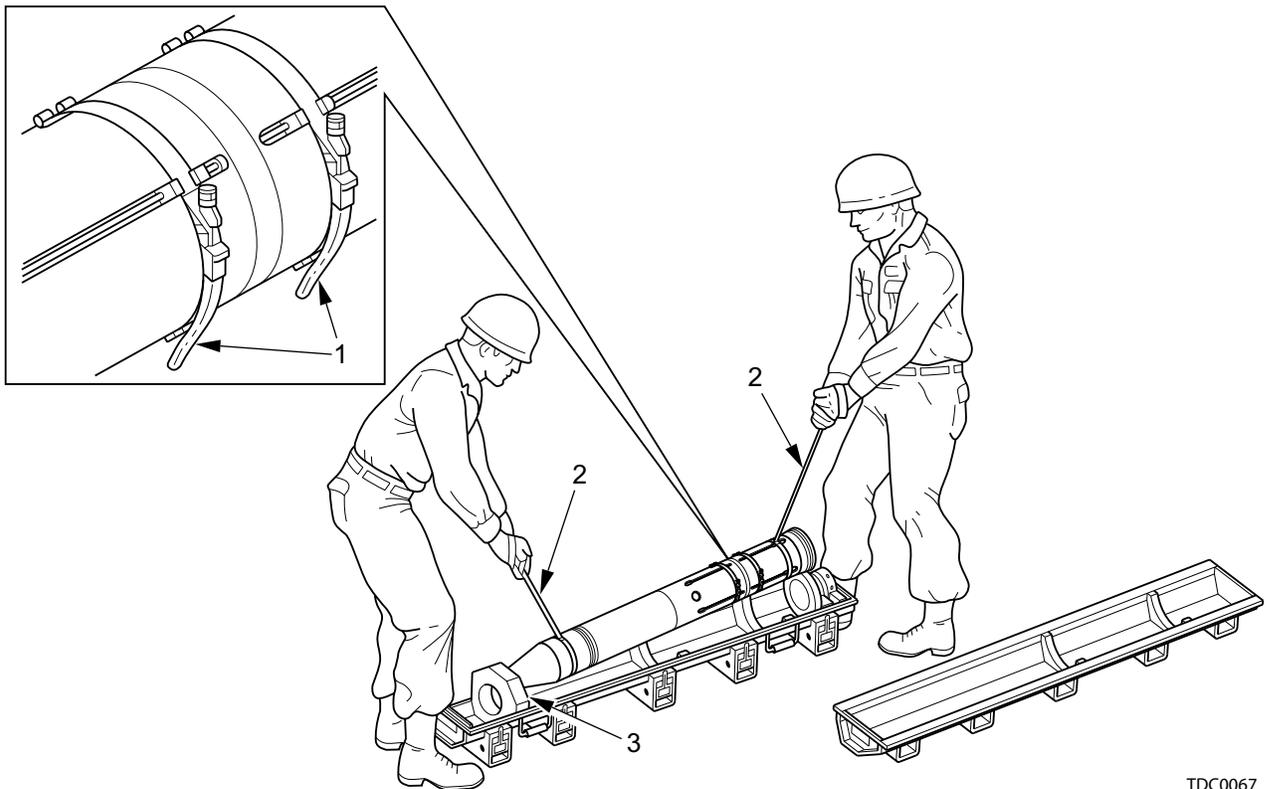
(d) Install lifting straps (2) on projectile.

(e) Spin tension mechanism CCW by hand until it stops.

(f) Lift projectile, and position over opened container.

(g) Carefully lower projectile, guiding nose cone into retainer (3) in the container.

REPACKING PROJECTILE



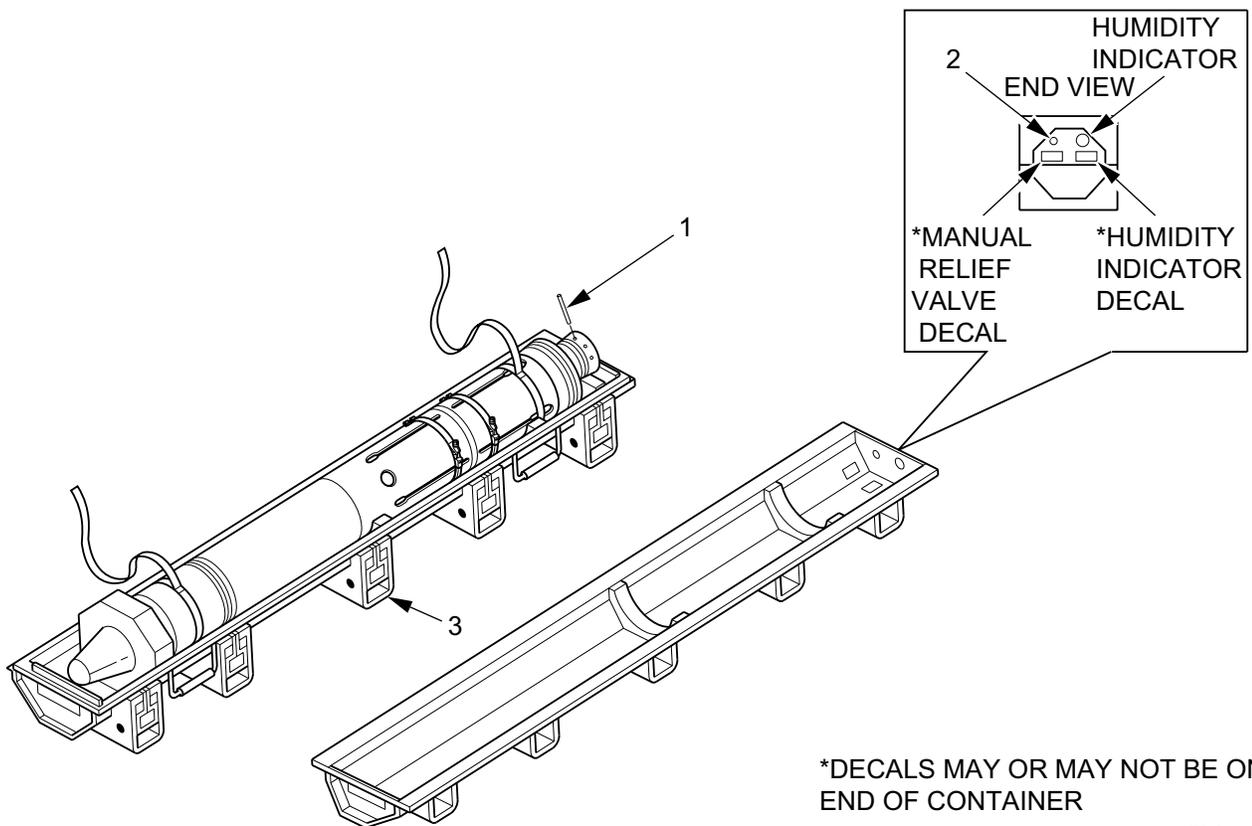
TDC0067

(h) Using torquing rod (1), turn tension mechanism clockwise as far as possible to snug projectile into the retainer ring. Position rod in holes so thread is horizontal (or as close as possible). This is required toward interference with the cover stops inside the cover.

4-29 M712 AMMUNITION PREPARED FOR FIRING, BUT NOT FIRED (cont)

- (i) Be sure that desiccant and protective bag are placed inside container.
- (j) Place container cover on container body in such a manner that the inside cradles are aligned and the manual relief valve (2) and the humidity indicator card are at the rear end of the container.
- (k) Starting on the end opposite the humidity indicator card, straddle container, place T-bolts in cover recesses, and close corresponding left and right side latches (3) at the same time in pairs.

REPACKING PROJECTILE



4-30 M712 PROJECTILE MAINTENANCE

Humidity indicators on package M712 projectiles must be monitored for humidity every 90 days, as a minimum. If relative humidity in the container is 40 percent or greater (40 percent sector of humidity indicator card is not blue), follow instructions in paragraph 4-24.

Section V. HANDLING

Section Index

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4-31 LOOSE PROJECTILE RESTRAINT SYSTEM (LPRS)

NOTE

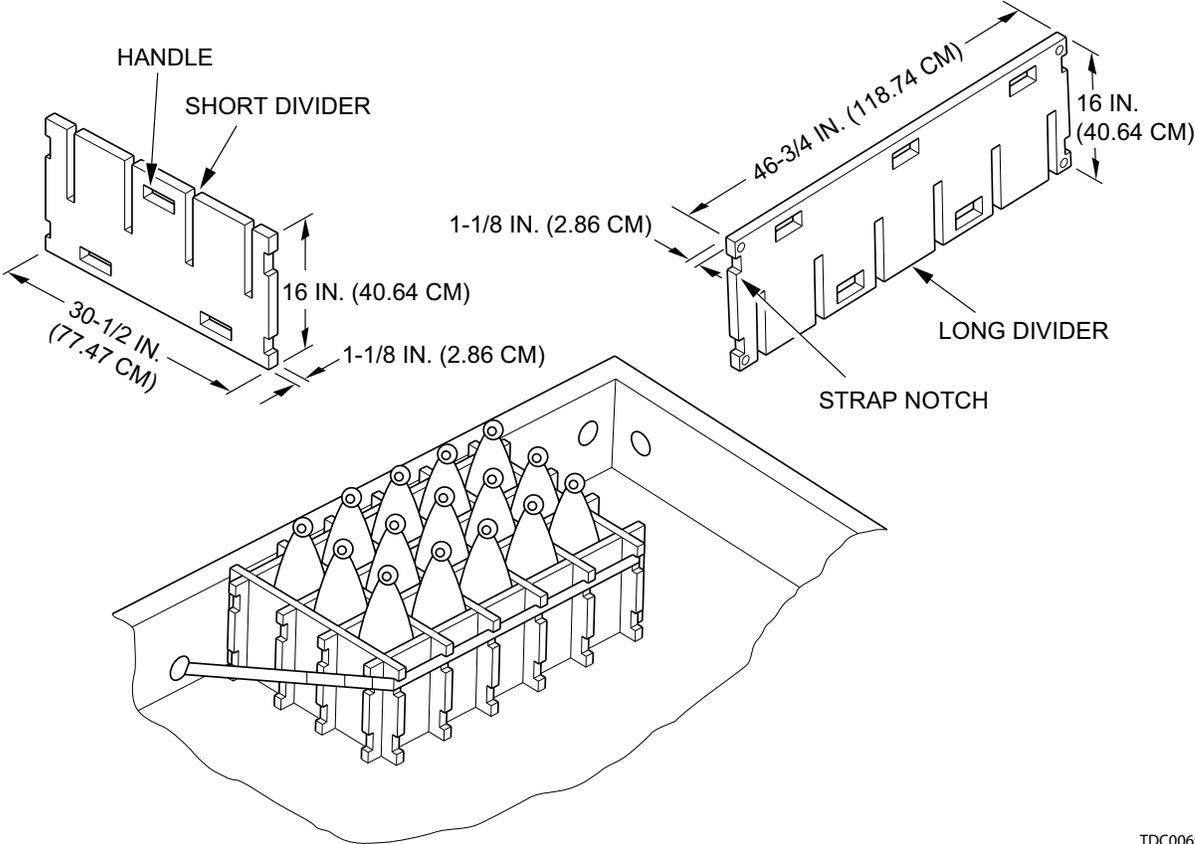
When using the LPRS, ensure proper spacing is used.

a. General. The LPRS is a divider rack that provides a fast, simple method of securing 'loose' unfuzed projectiles for transportation in a field artillery companion vehicle. The rack restrains projectiles from excessive longitudinal and lateral movement and from contact with other projectiles. The rack is easily assembled using a quantity of short and/or long plastic dividers that fit together. Projectiles are then placed vertically in the rack, with the base of each projectile resting on the floor of the vehicle. The assembly is then secured to the sidewall of the vehicle by means of cargo tiedown straps. After use, the rack may be disassembled and stored for reuse.

b. Use of LPRS. Use of LPRS is optional. (Appx D), Expendable/ Durable Supplies and Materials List, lists LPRS components.

c. Instructions. Complete instructions for use of the LPRS are found in TM 9-2590-210-10. Loose Projectile Restraint System (LPRS) for use with Field Artillery Companion Vehicles.

LOOSE PROJECTILE RESTRAINT SYSTEM



TDC0069