TECHNICAL MANUAL

OPERATORS INSTRUCTIONS
AND
ORGANIZATIONAL MAINTENANCE MANUAL

SIMULATOR, PROJECTILE AIRBURST,
LIQUID: M9
(NSN 1370-01-047-3479)

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1980
WARNINGS

The actuating charges (actuators) may be initiated by static electricity, Radio Frequency (RF) signals, or Electromagnetic Radiation (EMR). To protect yourself from injury, heed the following warnings:

DO NOT use SPAL during electrical storms.

Do NOT set up SPAL within 300 feet (approximately 100 meters) of radio transmitter or Electromagnetic Radiation transmitter.

DO NOT remove actuating charges from their containers until ready to place them inside filled bottles at the launch site.

Before removing actuating charges from their containers, kneel and touch the ground with your bare hand. This will ground static electricity in your body and clothing.

Leave insulated leads twisted together and taped to base of actuating charge until ready to thread leads through bottle cap.

Keep all parts of the body clear of the loaded SPAL barrels.

To protect yourself against fragmentation hazards, heed the following warnings:

Fire the SPAL in a vertical position.

Stand at least 25 meters (approximately 80 feet) away from SPAL launch point at the time of firing.

Turn away when you see the airbust.

Wear steel helmets if within 300 feet (approximately 100 meters) of SPAL launch site.

Actuating charges containing black powder must be handled with care at all times. If the actuating charges are dropped, thrown, tumbled, or dragged, an explosion may result, causing death or injury and destruction of equipment.

DO NOT attempt to dismantle a SPAL that has failed to launch.

DO NOT attempt to dismantle a projectile bottle that has failed to burst in the air.

The simulant is toxic only if consumed. DO NOT drink the simulant. Serious illness or death may result.

Avoid being burned or shocked, if firing with a 24-V battery. Do not handle bare ends of firing line leads when touching them to battery posts. Hold the insulated portion of the leads.
The purpose of this change is to revise the safety warnings and to add first-aid instructions. TM 3-1370-100-12, 31 October 1980, is changed as follows:

1. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the identification number.

2. Remove old pages and insert new pages as follows:

   Remove pages                                      Insert pages
   Inside front cover ........................................ A and B (front of manual)
   I and II........................................................ I and ii
   1-1 through 1.4 .............................................. 1-1 through 1-4
   2-1 through 2-4 .............................................. 2-1 through 2-4
   2-7 and 2-8 .................................................. 2-7 through 2-8
   2-11 through 2-14 .......................................... 2-11 through 2-14
   6-11(6-2 blank) ............................................. 6-11(6-2 blank)
   A-1/(A-2 blank) ........................................... A-1/(A-2 blank)

3. File this transmittal sheet in front of the publication.
By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-28 Organizational Maintenance requirements for Simulators, Training.
WARNINGS

The actuating charges (actuators) may be initiated by static electricity, Radio Frequency (RF) signals, or Electromagnetic Radiation (EMR). To protect yourself from injury, heed the following warnings:

- DO NOT use SPAL during electrical storms.
- Be sure launching site is safe distance from transmitting devices and energized power transmission lines.
- DO NOT remove actuating charges from their containers until ready to place them inside filled bottles at the launch site.
- Always use bare hands to handle actuating charges and make all wiring connections.
- Before removing actuating charges from their containers, kneel and touch the ground with your bare hand. This will ground static electricity in your body and clothing.
- Leave insulated leads twisted together and taped to base of actuating charge until ready to thread leads through bottle cap.
- Keep all parts of the body clear of the loaded SPAL barrels.

To protect yourself against fragmentation hazards, heed the following warnings:

- Fire the SPAL in a vertical position.
- Stand at least 25 meters (approximately 80 feet) away from SPAL launch point at the time of firing.
- Wear goggles to protect your eyes.
- Wear steel helmets if within 300 feet (approximately 100 meters) of SPAL launch site.

Actuating charges containing black powder must be handled with care at all times. If the actuating charges are dropped, thrown, tumbled, or dragged, an explosion may result, causing death or injury and destruction of equipment.

- DO NOT attempt to dismantle a SPAL that has failed to launch.
- DO NOT attempt to dismantle a projectile bottle that has failed to burst in the air.

Avoid being burned or shocked, if firing with a 24-V battery. Do not handle bare ends of firing line leads when touching them to battery posts. Hold the insulated portion of the leads.

- DO NOT drink the simulant. It could make you sick.
- DO NOT splash simulant in your eyes. It could cause severe irritation.

Change 1 A
REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS-C, Aberdeen Proving Ground, MD 21010. A reply will be furnished to you.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Paragraph</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I.</td>
<td>General Scope</td>
<td>1-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forms, Records, and Reports</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administrative Storage</td>
<td>1-3</td>
</tr>
<tr>
<td>1</td>
<td>II.</td>
<td>Description and Data</td>
<td>1-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description of Purpose, Function, and Features</td>
<td>1-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description of Major Components</td>
<td>1-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equipment Table</td>
<td>1-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tabulated Data</td>
<td>1-7</td>
</tr>
<tr>
<td>2</td>
<td>I.</td>
<td>Preparation for Operation</td>
<td>2-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General</td>
<td>2-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>First Aid Instructions</td>
<td>2-1.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preliminary Inspection</td>
<td>2-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unpacking</td>
<td>2-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preparation and Setup Procedures</td>
<td>2-4</td>
</tr>
<tr>
<td>2</td>
<td>II.</td>
<td>Operation of SPAL</td>
<td>2-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Preoperational Procedures</td>
<td>2-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operational Procedures</td>
<td>2-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repacking SPAL</td>
<td>2-7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operating Principle of SPAL</td>
<td>2-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interrupted Mission</td>
<td>2-9</td>
</tr>
<tr>
<td>2</td>
<td>III.</td>
<td>Post-Operational Procedures</td>
<td>2-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Misfires</td>
<td>2-13</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>OPERATOR/CREW MAINTENANCE INSTRUCTIONS (Not required)</td>
<td>4-1</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>ORGANIZATIONAL MAINTENANCE INSTRUCTIONS (Not required)</td>
<td>6-1</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>MAINTENANCE OF MATERIEL USED IN CONJUNCTION WITH ITEM (Not required)</td>
<td>A-1</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>ADMINISTRATIVE STORAGE</td>
<td>5-1</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td>REFERENCES</td>
<td>A-1</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>MAINTENANCE ALLOCATION CHART (Not required)</td>
<td>GLOSSARY 1</td>
</tr>
<tr>
<td>Figure Number</td>
<td>Title</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>1-1</td>
<td>Simulator, Projectile Airburst. Liquid: M9 and Associated Equipment (Sheets 1, 2, and 3)</td>
<td>0-2</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>Projector Assembly</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>Actuating Charge</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td>Chemical Agent Simulant and Pail</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>Accessories</td>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td>2-1</td>
<td>Filling Bottle with Simulant</td>
<td>2-2</td>
<td></td>
</tr>
<tr>
<td>2-2</td>
<td>Stripped End of Telephone Cable</td>
<td>2-3</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>Layout of Extension Leads. Firing Line Lead, and Projector Barrels</td>
<td>2-4</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>Removing Actuating Charge from Containers</td>
<td>2-5</td>
<td></td>
</tr>
<tr>
<td>2-5</td>
<td>Preparing Bottle at Launch Site</td>
<td>2-6</td>
<td></td>
</tr>
<tr>
<td>2-6</td>
<td>Proper Installation of Screw Cap</td>
<td>2-8</td>
<td></td>
</tr>
<tr>
<td>2-7</td>
<td>Assembled Projector</td>
<td>2-8</td>
<td></td>
</tr>
<tr>
<td>2-8</td>
<td>Recommended Setup for SPAL</td>
<td>2-9</td>
<td></td>
</tr>
<tr>
<td>2-9</td>
<td>Extension Leads Connected to Firing Line Lead at Point A</td>
<td>2-10</td>
<td></td>
</tr>
<tr>
<td>2-10</td>
<td>Checking Serviceability of M51 Blasting Cap Test Set</td>
<td>2-11</td>
<td></td>
</tr>
<tr>
<td>2-11</td>
<td>Firing the SPAL</td>
<td>2-12</td>
<td></td>
</tr>
<tr>
<td>2-12</td>
<td>Operating Principle of SPAL</td>
<td>2-14</td>
<td></td>
</tr>
</tbody>
</table>

Change 1 ii
Figure 1-1. Simulator, Projectile, Airburst, Liquid: M9 and Associated Equipment (Sheet 1 of 3).
Figure 1-1. Simulator, Profectile, Airburst, Liquid: M9 and Associated Equipment (Sheet 2 of 3).
Figure 1-1. Simulator, Projectile, Airburst, Liquid: M9 and Associated Equipment (Sheet 3 of 3).
CHAPTER 1
INTRODUCTION

Section I. GENERAL

1.1. Scope
a. Operator, who will operate the SPAL
   [fig. 1-1].
b. Organizational personnel who will inspect
   the SPAL. The manual covers preliminary inspection,
   unpacking, and set-up procedures, the operation of the
   SPAL, and post-operational procedures. The manual
   also contains inspection procedures to be performed by
   organizational personnel.

1.2. Forms, Records, and Reports
Maintenance forms, records, and reports which are to be
used by maintenance personnel at all maintenance
levels are listed in TM 38-750.

1.3. Administrative Storage
See Chapter 6.

Section II. DESCRIPTION AND DATA

1.4. Description of Purpose, Function, and
Features
a. Purpose. The SPAL, when fired, simulates
   a toxic rain attack. It provides realistic chemical defense
   training for Army troops.

b. Function. Five fired projector assemblies
   will produce a 50-meter-wide band of toxic agent
   simulant, 100 meters downwind (approximately 150 by
   300 feet).

c. Features.
   (1) Major Components.
      (a) Projector Assemblies (20 ea.).
      (b) Actuating Charges (20 ea.).
      (c) 5.5 gallons (21 liters) of
          containerized chemical agent simulant.
      (d) Accessories.
   (2) Portable.
   (3) Expendable.
   (4) Can be fired in winds up to 15 knots.

d. Differences in End Item Nomenclature. The
   shipping box is marked with US nomenclature (para (1)).
   The projector assemblies are marked with UK
   nomenclature (para (2)).
   (1) United States: Simulator, Projectile
       Airburst, Liquid: M9.
   (2) United Kingdom: Simulator, Projectile,
       Airburst, Liquid, Chemical Agent, L1A2.

1.5. Description of Major Components
a. Projector Assembly. The projector
   assembly [fig. 1-2] consists of:
   (1) Barrel. Controls direction of bottle
       when fired. Has threaded bushing in center of base for
       implanting spike.
   (2) Barrel Lid. Protects inside of barrel,
       and secures bottle and obturator within barrel when not in
       use.
   (3) Obturator. A split cylinder located in
       bottom of barrel to prevent gases from escaping on
       firing.
   (4) Implanting Spike. Is screwed into
       threaded bushing in base of barrel. Pushed into ground
       to ensure retention of barrel in vertical position.
   (5) Bottle with Screw Cap. Holds the
       simulant and the actuating charge.
   (6) 0 Sealing Ring. Seals the simulant in
       bottle when actuating charge is inserted in bottle.

b. Actuating Charge. The actuating charge
   [fig. 1-3], when in firing configuration and electrically
   charged, propels a simulant-filled bottle (fig. 1-2) into
   the air. A one-second, burn-through delay fuse sets off a
   burster charge. This ruptures the bottle in the air to
   produce a cloud of spray from the simulant.

   c. Chemical Agent Simulant. Chemical Agent
      Simulant [fig. 1-4], composed of 90 parts by weight
      technical grade polyethylene glycol 200 and 10 parts by
      weight water, is a substitute for liquid chemical agents. It
      causes color changes in chemical agent detector paper
      in much the same way as liquid toxic chemical agents.
      The 5.5 gallons (21 liters) of simulant is contained in a 6-
      gallon pail. The pail has a threaded plug which is
      removed for installation of a faucet [fig. 1-5]. The faucet
      is used to transfer simulant to projector assembly bottles
      [fig. 1-2].

   d. Accessories.
      (1) The cap/plugs [fig. 1-5] seal the
          bottles [fig. 1-2] when filled in an area away from launch
          site.
      (2) The faucet [fig. 1-5] screws into the
          pail [fig. 1-4] when plug is removed. It is used to
          transfer simulant from pail to projector assembly bottles
          [fig. 1-2].
1-6. Equipment Table

Equipment furnished is listed in paragraph 1-5a. through d. Equipment required, but not supplied, is listed in Table 1-1 and shown in Figure 1-1, sheet 3 of 3 (except hand tools and materials).

Figure 1-2. Projector Assembly.

Change 1 1-2
Figure 1-3. Actuating Charge.

Figure 1-4. Chemical Agent Simulant and Pail.

Change 1 1-3
### Table 1-1. Equipment Required But Not Supplied.

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>SHORT FORM NOMENCLATURE</th>
<th>NATIONAL STOCK NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ea</td>
<td>Battery, Storage, 24 volts</td>
<td>6140-00-059-3528</td>
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<td>1 ea</td>
<td>Blasting Machine, metal case, handle operated, 10 cap*</td>
<td>1375-00-782-5541</td>
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<tr>
<td>1 ea</td>
<td>Blasting Machine, metal case, handle operated, 10 cap</td>
<td>1375-00-212-4614</td>
</tr>
<tr>
<td>1 ea</td>
<td>Blasting Machine, lexan case, handle operated, 10 cap, (M32)*</td>
<td>1375-00-935-9173</td>
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<td>1.320 ft</td>
<td>Cable, Telephone, WD-1/TI (813491, 2 conductor field wire, stranded No. 21 AWG, insulated.</td>
<td>6145-00-226-8812</td>
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<tr>
<td>1 ea</td>
<td>Pliers, Slip Joint, 8-inch</td>
<td>5120-00-240-6217</td>
</tr>
<tr>
<td>1 rl</td>
<td>Tape, Pressure Sensitive, 1/2-in w</td>
<td>8135-00-266-6716</td>
</tr>
<tr>
<td>5 yd</td>
<td>Cloth, Cheesecloth</td>
<td>8305-00-266-6716</td>
</tr>
<tr>
<td>1 ea</td>
<td>Test Set, Blasting Cap. M51</td>
<td>4925-00-999-3454</td>
</tr>
<tr>
<td>1 ea</td>
<td>Bar, Wrecking, 3/4 by 24 in</td>
<td>5120-00-224-1393</td>
</tr>
<tr>
<td>1 ea</td>
<td>Crimping Tool. Terminal Hand</td>
<td>5120-00-278-2423</td>
</tr>
<tr>
<td>1 ea</td>
<td>Goggles, Industrial</td>
<td>4240-00-816-3819</td>
</tr>
</tbody>
</table>

*These blasting machines are components of the Demolition Equipment Set, Explosive Initiating, Electric and Non-Electric (NSN 1375-00-47-3750)

**Change 1 1-4**
1-7. **Tabulated Data (Approximate)**

a. **SPAL Effective Range Downwind Coverage.**

   **NOTE**
   In recommended setup of five projector assemblies each.
   (1) Width 50m (164 ft)
   (2) Length 50 to 100m (164 to 328 ft)

b. **Projector Assembly.**
   (1) Weight
      (a) Empty 0.45 kg (1 lb)
      (b) Filled (one liter chemical agent simulant) 1.6 kg (3.5 lb)
   (2) Dimensions
      (a) Height 30.5 cm (12 in)
      (b) Diameter 10.7 cm (4.2 in)

c. **Packaging Data.**
   (1) SPAL Shipping Box
      (a) Weight 70 kg (155 lb)
      (b) Length 69 cm (27 in)
      (c) Width 58 cm (23 in)
   (2) Projector Assembly Shipping Container
      (a) Number in container 20 ea
      (b) Weight 11 kg (25 lb)
      (c) Length 56 cm (22 in)
      (d) Width 33 cm (13 in)
      (e) Height 46 cm (18 in)
   (3) Actuating Charge Ammo Container
      (a) Number in container 20 ea
      (b) Weight 4 kg (9 lb)
      (c) Length 30 cm (12 in)
      (d) Width 15 cm (6 in)
      (e) Height 20 cm (8 in)
   (4) Chemical Agent Simulant Shipping Pail
      (a) Number in container 20 ea
      (b) Weight 27 kg (60 lb)
      (c) Length 56 cm (22 in)
      (d) Width 33 cm (13 in)
      (e) Height 46 cm (18 in)
   (5) Accessory Shipping Container
      (a) Volume 21 liters (5.5 gal)
      (b) Height 38 cm (15 in)
      (c) Weight 27 kg (60 lb)
      (d) Diameter 30 cm (12 in)
Chapter 2
Operating Instructions

Section I. Preparation for Operation

2-1. General
The normal employment of SPAL will be five projectors. This number will produce at least a 50-meter wide band of simulant, 100 meters downwind (approximately 150 by 300 feet).

2-1.1. First Aid Instructions
The chemical agent simulant should be used only as described in this manual.

a. If simulant gets in the eyes, flush with large amounts of water.
b. If simulant is swallowed, seek medical attention immediately.

2-2. Preliminary Inspection

WARNING
Do NOT use SPAL during electrical storms. The actuating charges may be initiated by static electricity.

a. Check weather conditions. Be sure no electrical storms are in or near the launching site. Be sure no electrical storms are expected.

WARNING

Be sure launching site is safe distance from transmitting devices and energized power transmission lines. Actuating charges may be initiated by static electricity, Radio Frequency (RF) signals, or Electromagnetic Radiation (EMR).

b. To be sure launching site is safe distance from transmitting devices and energized power transmission lines, consult chapter 18 of AR 385-63 or table 2-1, para 2-9 of FM 5-25.

2-3. Unpacking

a. Stop vehicle a safe distance upwind (approximately 100 yards) from firing source location.
b. Remove lid (fig. 1-1, sheet 1 of 3) from shipping box with a wrecking bar (table 1-1).
c. Remove all contents of shipping box (fig. 1-1, sheet 1 of 3). Turn shipping box bottom up. This will provide a work surface.
d. Place separator partition (from shipping box) with strips up (fig. 1-1, sheet 1 of 3) on top of box. The separator partition is the cradle for the pail.
e. Open projector assembly shipping container (fig. 1-1, sheet 2 of 3) and remove five projector assemblies. Lay aside until needed.
f. Open accessory shipping container. Remove faucet and cap/plug bag. Lay aside until needed.

2-4. Preparation and Setup Procedures

a. Preparing Pail of Chemical Agent Simulant.
   (1) Use pliers to remove plug from pail (fig. 1-4). Cut bung seal with knife. Save plug.
   (2) Screw faucet into opening and hand tighten (fig. 2-1).
   (3) Make sure faucet is closed before performing step (4).
   (4) Place pail on separator partition.

b. Preparing Bottles.
   (1) Untape and remove barrel lid (fig. 1-2).
   (2) Remove bottle from barrel. Remove O sealing ring from bottom of bottle and tape it to inside of barrel lid.
   (3) Unscrew and remove bottle cap. Fill bottle to fill line with chemical agent simulant (fig. 2-1).
   (4) Place barrel lid back on bottle.

WARNING
Do not drink the simulant. It could make you sick. Do not splash simulant in your eyes. It could cause severe irritation.

NOTE
Make sure bottle is tightly sealed. Figure 2-6 shows the right and wrong ways of putting the cap on the bottle.

b. Extension Leads and Firing Line Lead. Use telephone cable for extension leads and firing line lead (table 1-1). Pace off each length of cable (one pace equals approximately 3 feet). Use crimping tool (table 1-1) to cut:

Change 1 2-1
Figure 2-1. Filling Bottle with Simulant.

Change 1 2-2
(1) Two pieces, approximately 75 feet long (25 meters).
(2) Two pieces, approximately 55 feet long (18 meters).
(3) One piece, approximately 45 feet long (15 meters).
(4) One piece, approximately 125 feet long (40 meters).
(5) Use crimping tool to strip ends of all leads [fig. 2-2].

Twist strands of each bare conductor together.

d. Setting Up Projector Barrels.

**WARNING**
To protect yourself against fragmentation hazards, projector assemblies must be fired in a vertical position. Be sure that barrels cannot be tilted or knocked over.

(1) Carry five projector assemblies, all leads, and ammunition container to emplacement site.
(2) Place projector assemblies in straight line 30 to 35 feet apart (approximately 10 meters). Pace off distance between barrels [fig. 2-3].
(3) Remove lid from barrel [fig. 1-2]. Save lid.
(4) Remove bottle from barrel. Set bottle aside.
(5) Remove spike from lid and screw into bushing in base of barrel. Use pliers if necessary.

**NOTE**
Be sure base of barrel sits flat on ground.
(6) Push spike into ground until base of barrel sits flat on ground [fig. 2-3].
(7) Repeat steps (3) through (6) for remaining four barrels.

e. Laying Out Extension Leads and Firing Line Lead

(1) Start with center barrel [fig. 2-3]. Lay out shortest extension lead to Point A.

**NOTE**
Point A is the junction (meeting) point of all five extension leads.
(2) From outermost barrels, extend longest extension leads to Point A.

(3) Lay out remaining extension leads to Point A.
(4) Lay out firing line lead from Point A to firing source.
(5) Twist bare ends of firing line together at firing point [fig. 2-3].

f. Preparing Bottle at Launch Site.

**WARNING**
The actuating charges may be initiated by static electricity, Radio Frequency (RF) signals, or Electromagnetic Radiation (EMR). To protect yourself from injury, heed the following warnings:

DO NOT remove actuating charges from their packing containers until ready to place them inside filled bottles. Before removing actuating charges from their packing containers, kneel and touch the ground with your bare hand. This will ground static electricity in your body and clothing.

Leave actuating charge leads twisted together and taped to base of actuating charge until ready to thread leads through bottle cap.

**NOTE**
The DOT marking label on the ammunition box reads: "Explosive Power Devices, Class C, Handle Carefully, Keep Fire Away."

(1) Don goggles. See table 1-1 for national stock number.
(2) Remove one actuating charge container from ammunition container [fig. 2-4].
(3) Remove screw cap and cap/plug from bottle [fig. 2-1].
Figure 2-3. Layout of Extension Leads, Firing Line Lead, and Projector Barrels.
Figure 2-4. Removing Actuating Charge from Containers.
Figure 2-5. Preparing Bottle at Launch Site.
(4) Kneel, untape and remove container cap. Remove actuating charge from its container.  
(5) Remove tape securing actuating charge leads to charge. Unwind leads from the body of the charge. Bring leads up to top of charge. 
(6) Remove O sealing ring from inside barrel lid. Slide O sealing ring over end of actuating charge. 
(7) Press actuating charge down through neck of bottle until flange of charge sets firmly on O sealing ring. 
(8) Thread leads through screw cap. 
(9) Screw cap firmly down to seal bottle and actuating charge. 

**CAUTION**

If screw cap is not on straight, cap and actuating charge may separate from bottle on launch. Be sure cap is on straight and fully seated. 
(10) Turn bottle upside down and check for leaks. If bottle leaks, remove actuator by performing steps (6), (7), and (8) in reverse order. With actuator out of bottle, perform steps (6), (7), and (8) in proper order. If bottle continues to leak, replace projector assembly. 
(11) Check that split obturator is in bottom of barrel with bevelled edge up. If bevelled side is not up, turn obturator over. 
(12) Run actuator charge leads up side of bottle. Hold leads in position while sliding bottle into barrel.

**WARNING**

To avoid injury, keep all parts of body clear of loaded barrels. 

**CAUTION**

Do not pass actuator charge leads over bottle.

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Section II. OPERATION OF SPAL

2-5. Preoperational Procedures

a. **M51 Blasting Cap Test Set Serviceability Check.** The M51 Test Set is a self-contained unit with a magneto-type impulse generator, an indicator lamp, a handle to activate the generator, and two binding posts for attachment of firing leads. Test set is waterproof. It may be used at temperatures as low as -40°F.  
(1) Cut piece of cable, approximately 6 inches long. Strip ends, and connect between binding posts. 
(2) Firmly depress handle while observing indicator lamp. If set is operative, indicator lamp will flash.

Do not replace lid on barrel. These may cause malfunction of equipment. 
(13) Repeat steps (1) through (11) for remaining four bottles.

b. **Testing Firing Circuit.**

To avoid injury, keep all parts of body clear of loaded barrels. Before connecting actuating charge leads to extension leads, kneel and touch the ground with your bare hand. This will ground static electricity in your body and clothing. 
(1) Attach conductors of actuating charge lead to conductors of extension lead for all five projector assemblies. 
(2) Make sure bare connections are separated to avoid electrical short.

---

TRUE
Figure 2-6. Proper Installation of Screw Cap.

Figure 2-7. Assembled Projector.

Change 1 2-8
Figure 2-8. Recommended Setup for SPAL.
Figure 2-9. Extension Leads Connected to Firing Line Lead at Point A. (Illustration exaggerated for clarity.)
2. Check and be sure connections at point A are properly connected and separated from each other as shown in figure 2-9. Correct improper connection.

**NOTE**
Make sure bare connections are separated to avoid electrical short and misfire.

3. Check and be sure extension leads and actuating charge leads are properly connected and separated from each other (fig. 2-9). Correct improper connection.

4. Depress test set handle. Indicator lamp should flash. Disconnect test set and proceed with firing (para 2-6).

5. If indicator lamp fails to flash, check for broken conductor in firing line lead (b) below.

   (b) Firing Line Lead Continuity Test.
   1. Disconnect test set from firing line lead. Twist disconnected ends together.
   2. At point A (fig. 2-9) disconnect firing line lead from extension leads.
   3. Connect one wire of firing line lead to each binding post of the test set.
   4. Depress test set handle. Indicator lamp should flash.

6. Connect firing line lead to extension leads (fig. 2-9).

7. Connect new firing line lead to test set.

8. Depress test set handle. Indicator lamp should flash. Disconnect test set and proceed with firing (para 2-6).

9. If indicator lamp fails to flash, check for a faulty extension lead (c) below.

   (c) Extension Lead Continuity Test.
   1. Disconnect test set from firing line lead.
   2. Disconnect extension leads from each other at point A (fig. 2-9).
   3. Connect one wire of one extension lead to each binding post of the M51 test set. Depress test set handle; indicator lamp should flash. Repeat on each extension lead until faulty lead is found.
   4. When faulty extension lead is found, disconnect from actuating charge lead. Twist bare ends of extension leads together.
   5. Depress test set handle. If indicator lamp fails to flash, replace extension lead. If indicator lamp flashes, replace actuating charge.

6. Reconnect SPAL electrical circuit (para 2-4g and h).

---

**Figure 2-10. Checking Serviceability of M51 Blasting Cap Test Set. (ARA80-0049).**

Change 1 2-11
2-6. Operational Procedures

WARNING
To protect yourself against fragmentation hazards, heed the following warnings: Wear goggles to protect your eyes when operating the SPAL.
Fire the SPAL in a vertical position.
Stay at least 80 feet (approximately 25 meters) away from the SPAL launch point at the time of firing.
Wear steel helmets if within 300 feet (approximately 100 meters) of SPAL launch site.

a. Firing Sources. Use a 10-cap blasting machine or a 24-volt battery [fig. 2-11]. Table 1-1 lists several types of blasting machines and a battery that may be used. Instructions for operating blasting machines are given in FM 5-25 and TM 91375-213-12.
b. Connecting SPAL Firing Line to Firing Source.

NOTE
Do not fire until circuitry checks and checks for proper connections have been performed successfully.

CAUTIONS
Touching firing line ends (conductors) to battery posts FIRES the SPAL.
If blasting machine is used instead of battery, do not connect firing line to blasting machine until ready to fire.

(1) At first point, untwist firing line ends.

WARNING
Avoid being burned or shocked, if firing with a 24-V battery. Do not handle bare ends of firing line leads (conductors) when touching them to battery posts. Hold the insulated portion of the leads.

(2) If firing with a 24-V battery, take insulated portion of firing line lead and touch conductors to battery posts.

(3) If firing with blasting machine, connect bare ends to connector posts of blasting machine. Operate blasting machine to fire.

2-7. Repacking SPAL

a. Set pail on end with faucet on top [fig. 1-4]. Remove faucet.
c. Place pail and remaining SPAL contents in shipping box.

Figure 2-11. Firing the SPAL. (ARA80-0050).
2-8. Operating Principle of SPAL

(a) On applying electric power to firing circuit, current flows through the leads to the electric fuze. The fuze ignites the propellant charge which in turn sets off the delay. The gases from the propellant charge propel the simulant-filled bottle into the air.

(b) The delay, after burning for approximately 1 second, sets off the burster charge. This ruptures the bottle to produce a cloud of spray at a height of approximately 35 to 40 feet. The droplets extend over an area at least 150 feet wide and 150 to 300 feet downwind from the point of burst. The droplets are large enough to be detected by chemical agent detector paper.

2-9. Interrupted Mission

If mission is cancelled, dismantle SPAL setup [fig. 2-8].

WARNINGS

Use bare hands to handle the actuating charges and make all wiring connections.

Wear goggles to protect your eyes.

Before disconnecting firing line leads, extension leads, or actuator leads, kneel and touch the ground with your bare hand. This will ground static electricity in your body and clothing.

To avoid injury, keep all parts of body clear of loaded barrels.

Actuating charges containing black powder must be handled with care at all times. If the actuating charges are dropped, thrown, tumbled, or dragged, an explosion may result, causing death or injury and destruction of equipment.

(a) If blasting machine is used, kneel and disconnect firing line lead at blasting machine. Twist ends together.

(b) At Point A [fig. 2-9], kneel and disconnect extension leads from firing line lead. Twist end of firing line lead together.

(c) Kneel and disconnect leads and twist ends together.

(d) Kneel and disconnect actuating charge leads [fig. 2-8] from extension leads. Twist ends of actuator leads together.

(e) Twist ends of extension leads together.

(f) Roll up firing line lead and extension leads for future use.

(g) Pull barrel from ground.

(h) Turn barrel upside down and remove bottle.

(i) Unscrew spike from barrel base and tape to inside of barrel lid [fig. 1-2].

(j) Unscrew screw cap and remove actuating charge from bottle [fig. 2-5].

(k) Remove O sealing ring from actuating charge.

(l) Insert cap/plug [fig. 2-1] in bottle and install screw cap.

(m) Tape O sealing ring to inside of barrel lid.

(n) Wipe actuating charge with cheesecloth.

(o) Repeat steps g. through n. for remaining projector assemblies.

(p) After actuating charges have been dried, coil leads [fig. 1-3] around actuating charge and tape to base.

(q) Place actuating charge in aluminum container [fig. 2-4] and replace cap.

(r) Repeat steps p. and q. for each actuating charge.

(s) Place actuating charge containers in ammunition container.

(t) Set pail on end with faucet on top [fig. 1-4]. Remove faucet.

(u) Remove screw cap and cap/plug from bottle [fig. 2-1].

(v) Pour chemical agent simulant into pail..

(w) Screw cap on bottle and place cap/plug in bag.

(x) Repeat steps u. through w. for each chemical agent simulant filled bottle.

(y) Reinstall plug in pail [fig. 1-4]. Hand tighten.

NOTE

Be sure obturator is in barrel.

(w) Place bottle in barrel, neck down, and install lid on barrel. Tape lid to barrel.

(aa) Repack SPAL in shipping box.

Section III. POST-OPERATIONAL PROCEDURES

2-10. Misfires

(a) Projector Assemblies That Fail to Fire.

WARNINGS

Actuating charges containing black powder must be handled with care at all times. If the actuating charges are dropped, thrown, tumbled, or dragged, an explosion may result, causing death or injury and destruction of equipment.

Do not attempt to dismantle a projector assembly that has failed to fire.

1) In the event that one or more projector assemblies fail to fire, check connection at the power source. Attempt to fire a second time.

Change 1 2-13
(2) If a projector assembly still fails to fire, disconnect firing line from the power source, twist the ends of the firing line together, and contact EOD.

b. Bottles That Fail to Burst. When projector assemblies fire and one or more projects a bottle that fails to burst, note ground impact location of the bottle. Call EOD personnel.

Figure 2-12. Operating Principle of SPAL.
Organizational personnel are authorized to open shipping box and inspect the contents (fig. 1-1, sheet 1 of 3). Table 4-1, "Service Upon Receipt," contains inspection instructions.

Table 4-1. Service Upon Receipt--M9 SPAL

<table>
<thead>
<tr>
<th>Container</th>
<th>Item</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wooden Shipping</td>
<td>SPAL</td>
<td>Inspect shipping box. If broken or crushed, reject SPAL. Report in accordance with TM 9-1300-206. Remove lid. Inspect contents for moisture (water) if found, reject SPAL. Report in accordance with TM 9-1300-206.</td>
</tr>
</tbody>
</table>

4-1
CHAPTER 6
ADMINISTRATIVE STORAGE

Storage as Required for Operational Necessity. The packaged M9 SPAL is designated Class 1.4 ammunition for storage purposes. Consult chapter 4, TM 9-1300-206, Ammunition and Explosives Standards, for storage of Class 1.4 ammunition.

Change 1 6-1/(6-2 blank)
APPENDIX A
REFERENCES

A-1. Scope

This appendix lists forms, field manuals, and technical manuals referenced in this manual.

A-2. Forms

Recommended Changes to Publications and Blank Forms.................................................. DA Form 2028
Recommended Changes to Equipment Technical
Publications ................................................................................................................... ........  DA Form 2028-2

A-3. Field Manual

Explosives and Demolitions ......................................................................................... FM 5-25

A-4. Technical Manuals

Ammunition and Explosives Standards.......................................................................... TM 9-1300-206
Army Maintenance Management System (TAMMS)................................................... TM 38-750
Operator’s and Organizational Maintenance Manual
   (Including RPSTL), Demolition Materials ................................................................... TM 9-1375-213-12

A-5. Army Regulation

Policies and Procedures for Firing Ammunition for Training,
   Target Practice, and Combat .................................................................................... AR 385-63

   Change 1 A-1/(A-2 blank)
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General, United States Army  
Chief of Staff

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### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAL Simulator, Projectile, Airburst, Liquid: M9</td>
<td>Sometimes referred to in the manual as projector. An electrically operated, muzzle-loading, barrel-type apparatus used to project the simulant into the air.</td>
</tr>
<tr>
<td>Actuating Charge</td>
<td>Sometimes referred to as actuator. A self-contained power transmitting device designed to convert electrical energy into a controlled mechanical force.</td>
</tr>
<tr>
<td>Chemical Agent</td>
<td>Referred to as simulant throughout the manual. Used in training exercises to simulate toxic agents.</td>
</tr>
<tr>
<td>Blasting Machine</td>
<td>An item, key- or hand-operated, which is used to generate an electrical impulse to initiate an explosive charge.</td>
</tr>
</tbody>
</table>

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