C L A I M S

What is claimed is:

1. A training ammunition projectile comprising a hollow projectile body with a projectile head, designed to withstand the forces applied when the projectile is fired from a weapon and having a frangible ogive designed to burst when the projectile body strikes a target, said projectile further comprising:

(a) a multi-spectral marking agent disposed in the head for marking the position of the target upon release when the ogive has burst upon impact with the target, said marking agent comprising at least one of:

(1) a plurality of first liquid chemical components each received in separate first frangible compartment in the head, said first components being mixed and reacting chemically with each other when the compartments break, causing the mixed components to luminesce, said compartments being designed to be broken by at least one of the initial acceleration and the centrifugal forces acting on the projectile when the projectile is fired from a weapon, while retaining the first chemical components in the ogive so that such components are mixed at the time the projectile is fired from a weapon and luminesce by the time the projectile strikes the target; and

(2) a low density, fine, dry powder material disposed in the head and designed to create a plume for visible marking of the target upon impact; and

(b) a dry thermal material disposed in a second compartment in the projectile body having a frangible barrier wall designed to be broken due to at least one of the initial acceleration and the centrifugal forces acting on the projectile when the projectile is fired from a weapon, exposing the thermal material to at least one of oxygen and air in the projectile body and producing an exothermic reaction that emits heat during flight of the projectile, thereby to increase the temperature of said marking agent during flight and to create a plume for Infrared marking of the target upon impact.

2. The training projectile defined in claim 1, wherein the marking agent includes both (1) the first liquid chemical components and (2) the dry powder material for marking the target.

3. The training projectile defined in claim 1, wherein said marking agent further includes a plurality of second chemical components each received in a separate second compartment in the head, said second components being mixed and reacting chemically with each other, due to at least one of the initial acceleration and the centrifugal forces acting on the projectile, when the projectile is fired from a weapon, causing the mixed second components to create heat for thermally marking the target when the projectile strikes the target.

4. The training projectile defined in claim 1, further comprising a carrier medium containing oxygen disposed in a further, separate compartment in the head which is designed to be opened, and allow the carrier medium to mix with the thermal material, upon at least one of the initial acceleration and the centrifugal forces acting on the projectile when the projectile

is fired from a weapon, thereby causing the thermal material to react and create heat.

5. The training projectile defined in claim 4, wherein said carrier medium is a gas which includes oxygen.

6. The training projectile defined in claim 4, further comprising a third material component, disposed in a third compartment in the head, designed to undergo a phase change at a prescribed temperature, said third component serving to absorb heat at said prescribed temperature and thereby prevent overheating of the marking projectile and the marking agent.

7. The training projectile defined in claim 1. wherein said dry powder material and dry thermal material are arranged in layers in said head.

What is claimed is:

1. A training ammunition projectile comprising a hollow projectile body with a projectile head, designed to withstand the forces applied when the projectile is fired from a weapon and having a frangible ogive designed to burst when the projectile body strikes a target, said projectile further comprising:

(a) a multi-spectral marking agent disposed in the head for marking the position of the target upon release when the ogive has burst upon impact with the target, said marking agent comprising at least one of:

(1) a plurality of first liquid chemical components each received in separate first frangible compartment in the head, said first components being mixed and reacting chemically with each other when the compartments break, causing the mixed components to luminesce, said compartments being designed to be broken by at least one of the initial acceleration and the centrifugal forces acting on the projectile when the projectile is fired from a weapon, while retaining the first chemical components in the ogive so that such components are mixed at the time the projectile is fired from a weapon and luminesce by the time the projectile strikes the target; and

(2) a low density, fine, dry powder material disposed in the head and designed to create a plume for visible marking of the target upon impact; and

(b) a dry, oxidizing, non-pyrotechnic thermal material disposed in a second compartment in the projectile body having a frangible barrier wall designed to be broken due to at least one of the initial acceleration and the centrifugal forces acting on the projectile when the projectile is fired from a weapon, exposing the thermal material to at least one of oxygen and air in the projectile body and producing an exothermic reaction that emits heat during flight of the projectile, thereby to increase the temperature of said marking agent during flight and to create a plume for Infrared marking of the target upon impact.

2. The training projectile defined in claim 1, wherein the marking agent includes both (1) the first liquid chemical components and (2) the dry powder material for marking the target.

3. The training projectile defined in claim 1, wherein said marking agent further includes a plurality of second chemical components each received in a separate second compartment in the head, said second components being mixed and reacting chemically with each other, due to at least one of the initial acceleration and the centrifugal forces acting on the projectile, when the projectile is fired from a weapon, causing the mixed second components to create heat for thermally marking the target when the projectile strikes the target.

4. The training projectile defined in claim 1, further comprising a carrier medium containing oxygen disposed in a further, separate compartment in the head which is designed to be opened, and allow the carrier medium to mix with the thermal material, upon at least one of the initial acceleration and the centrifugal forces acting on the projectile when the projectile is fired from a weapon, thereby causing the thermal material to react and create heat.

5. The training projectile defined in claim 4, wherein said carrier medium is a gas which includes oxygen.

6. The training projectile defined in claim 1, further comprising a third material component, disposed in a third compartment in the head, designed to undergo a phase change at a prescribed temperature, said third component serving to absorb heat at said prescribed temperature and thereby prevent overheating of the marking projectile and the marking agent.

7. The training projectile defined in claim 1, wherein said dry powder material and dry thermal material are arranged in layers in said head.

8. The training projectile defined in claim 1, further comprising a phase change material disposed within the projectile body for preventing excess temperature of the marking agent, said phase change material being operative to melt and absorb thermal energy during flight of the projectile.

9. The training projectile defined in claim **1**, further comprising at least one heat sink disposed within the projectile body for moderating the temperature and creating a more uniform heat distribution therein.