SOURCE DATA
FOR
CATALYST GENERATORS
WMU-1/B, WMU-2/B, AND WMU-6/B

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1-1. CATALYST GENERATOR WMU-1/B.

1-2. Intended Use. The Catalyst Generator WMU-1/B is intended to be launched from Dispenser, Cartridge SUU-53/A(XCL-1) (under development). It may also be expended from the LB-11A ASW photographic store and RF-4 or P-3A or -3B aircraft in which the Type A-6 or Model 9A (LAU-308) Photoflash Cartridge Ejectors have been reconfigured with longer, pointed, contact pins (Lambert Engineering Co., St. Louis, Mo. Part No. LE1560). The WMU-1/B catalyst generator, when launched, ejects a pyrotechnic material, which upon burning, forms nuclei that induce freezing of super-cooled water.

1-3. External Features. External features are shown in figure 1-1. The catalyst generator is a cylindrical 40mm aluminum cartridge case, rimmed at one end and crimped at the other. An XM102E-1 recessed Electrical Primer is mounted in the rimmed end. A descriptive marking is stenciled on the cartridge case and a 1-inch explosive color band (light green No. 34558) is located approximately 1 inch from the crimped end. A 0.02-inch, T-shaped groove is machined 1 1/2 inches from the rimmed end. The catalyst generator is approximately 7.7 inches long and weighs approximately 0.78 pound.

1-4. Internal Features. Internal features are shown in figure 1-2. A 2-gram black powder charge is located behind the electric primer and is held in place by a paper disc and spacer. An ignitor, held in place by a compression cup, fits between the spacer and the safing and arming housing. The ignitor contains a pyrotechnic mix of tetra-red lead oxide and a time-delaying igniter material. Inserted in the safing and arming housing is a spring-loaded firing train.
Figure 1-1. Catalyst Generator WMU-1/B, External Features
Figure 1-2. Catalyst Generator WMU-1/B, Internal Features
interrupter called a safing and arming pin. Spin-welded to the other end of the safing and arming housing is a plastic tube, called the candle assembly. A wrap of fish paper Insulation MIL-I-695 Type F covers part of the outside of the candle assembly. Within the candle assembly is the candle, consisting of three increments. The first two increments are pyrotechnic ice-phase nucleic material, designated TB-2. Pressed to the safing and arming housing end of the first increment of TB-2 is a time-delaying material identical to that found in the ignitor except it is made of a coarser grain. The third increment of the candle is made of a flare-burning material. Elements of the candle assembly and firing train are held in place by a candle cap and cartridge assembly, respectively. A decal giving warning information is affixed to the outside of the candle assembly.

1-5. Functional Description. The catalyst generator is ignited by an electrical current relayed by the cartridge ejector from the launching aircraft to the XM102E-1 Electric Primer. The electric primer ignites the black powder charge which in turn ignites the ignitor. Expanding gases from the black powder ignition also propel the ignitor, safing and arming housing, and candle assembly as a unit from the cartridge assembly. Removal of the unit from the cartridge assembly causes the safing and arming pin to be ejected, allowing the ignitor charge to ignite the time-delay ignition material pressed on the safing and arming housing end of the TB-2. Ignition of the TB-2 creates combustion gases; some of which are expelled through the cavity left vacant by the safing and arming pin. The action of these gases causes the candle assembly to tumble in free flight which ensures a consistent trajectory. Uniform end
burning of TB-2 is ensured by the fish paper wrap which prevents side burning of the plastic candle assembly. The flare-burning material is ignited following burnout of TB-2 to ensure that remnants of the candle assembly are disintegrated.

**WARNING**

The catalyst generator contains Class B explosive.

1-6. **Handling and Storage.** The catalyst generator shall be handled and stored in accordance with the general provisions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 1, Section 1-6.

1-7. **Safety Precautions.** The catalyst generator contains Class B explosive. Safety features include a recessed primer, time-delaying ignition material in the ignitor and TB-2 pyrotechnic nucleic material, and a T-shaped groove in the cartridge case. The recessed primer prevents inadvertant contact with the primer electrode thereby precluding accidental static discharge through the primer. The time-delaying ignition material provides time for a safe separation from the launching aircraft before ignition of TB-2. The T-shaped groove allows the cartridge case to rupture in a predetermined manner, when the candle assembly ejection is restricted, thus preventing an accidental uncontrolled explosion. The safety precautions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter, Section 1-8 shall apply.
1-8. **Reporting Accidents, Incidents, and Malfunctions.** All accidents, incidents, and malfunctions involving the catalyst generator shall be reported in accordance with the provisions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 2.

1-9. **Shipping Containers.** Shipping Container drawing 30003 LD 2816244 is used. The Shipping Container is a twin-shelled, molded polystyrene unit (measuring 24 17/32 x 20 17/32 x 3 5/16 inches) secured with waterproof pressure-sensitive tape. The shipping container holds 26 catalyst generators and weighs approximately 24 pounds when filled.

1-10. **Palletization and Loading.** Palletized domestic unit loads consist of 44 containers, weigh approximately 1165 pounds with pallet, and displace 50.7 cubic feet. Palletization procedures for domestic unit loads are given in WR-53/803. Palletized fleet-issue unit loads consist of 44 containers, weigh approximately 1170 pounds with pallet, and displace 49.8 cubic feet. Palletization procedures for fleet-issue unit loads are given in WR-54/207. Procedures for loading trucks with palletized unit loads are given in WR-51/3. Procedures for loading railroad cars with palletized unit loads are given in WR-52/100.

1-11. **Identification Data.** The catalyst generator is listed under drawing 30003 DL 2128033, specification AS 1190, FSN (to be supplied later), and DOD Code (to be supplied later). The descriptive marking on the cartridge case conforms to the standards set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 1, Section 1-4.
1-12. **Pyrotechnic Weight.** The aggregate weight of the black powder, time-delay ignition material, TB-2, and flare-burning material is approximately 188 grams (0.5 pound).

1-13. **Service Life.** Service life of the catalyst generator is estimated to be 5 years.

1-14. **Maintenance.** None.
1-1. **Catalyst Generator WMU-2/B**

1-2. **Intended Use.** The catalyst generator, WMU-2/B is designed for vertical seeding of cumulus clouds that require richer concentrations of ice phase nuclei than is obtainable from the WMU-1/B catalyst generator. It is intended to be used as the active component in a system comprised of VA, VP, or VF aircraft, and the Cartridge Dispenser, SUU-53/A. It may also be expended from the LB-11A photographic store.

1-3. **External Features.** External features are shown in Figure 1-1. The WMU-2/B catalyst generator has the same external configuration and dimensions as the WMU-1/B; it is housed in a cylindrical, 40mm diameter, aluminum cartridge case, rimmed at one end and crimped at the other. An XM102E-1 recessed electric primer is mounted in the rimmed end. A descriptive marking is stenciled on the cartridge case, and a 1-inch color coding band (light green, color 34558 or 34449) is located approximately 1-inch from the crimped end. A 0.02-inch, T-shaped groove is machined 1 1/2-inches from the rimmed end. The catalyst generator is approximately 7.7 inches long and weighs approximately 520 grams (1.12 pounds).

1-4. **Internal Features.** Internal features are shown in Figure 1-2. The igniter configuration is the same as is used in the WMU-1/B. The only significant changes to the internal features from those depicted for the WMU-1/B is the length of the insulating tube and the weight and composition of the pyrotechnic charge. The safing and arming mechanisms are identical.
NOTE
CROSS HATCHED AREA
INDICATES TIME DELAYING
IGNITION MATERIAL

Figure 1-2. Catalyst Generator WMU-2/B, Internal Features
to the WMU-1/B, the igniter configuration is the same, and the candle ignition system is the same as the WMU-1/B, as shown in NAVORD OP 2213/NAVAIR 11-15-7. The candle is composed of four segments of TB-1 pyrotechnic material weighing 300 grams. The WMU-2/B does not have a flare burning material, since the increased quantity of pyrotechnic material in the WMU-2/B assures complete burning of all candle components. Elements of the candle assembly and firing train are held in place by a candle cap and a case assembly, respectively. A decal, depicting warning information is externally affixed to the cartridge.

1-5. Functional Description. The catalyst generator is ignited by an electrical current relayed by the cartridge ejector from the launching aircraft to the XM102E-1 Electric Primer. The electric primer ignites the black powder charge, which in turn ignites the ignitor. Expanding gases from the black powder combustion ejects the ignitor, safing and arming housing, and candle assembly as a unit from the case assembly. Ejection of the unit from the case assembly frees the spring loaded safing and arming pin; upon release from the constraints of the cartridge case, the safing and arming pin is expelled, thus allowing the burning ignitor to ignite the ignition material that is pressed on the end of the TB-1 composition. Some of the gaseous products of combustion of the TB-1 are expelled through the cavity left vacant by the expulsion of the safing and arming pin. The action of these gases causes the candle assembly to tumble in
free flight, which ensures a consistent trajectory. Uniform end burning of TB-1 is ensured by the paper insulating tube which prevents side burning of the plastic candle assembly.

**WARNING**

The catalyst generator contains Class B explosive.

1-6. **Handling and Storage.** The catalyst generator shall be handled and stored in accordance with the general provisions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 1, Section 1-6.

1-7. **Safety Precautions.** The catalyst generator contains Class B explosive. Safety features include a recessed primer, time-delaying ignition material in the ignitor and TB-1 pyrotechnic nucleic material, and a T-shaped groove in the cartridge case. The recessed primer prevents accidental contact with the primer electrode, thereby precluding accidental static discharge through the primer. The time-delaying ignition material provides time for a safe separation from the launching aircraft before ignition of the TB-1 composition. The T-shaped groove allows the cartridge case to rupture in a predetermined manner, in the event that the candle assembly ejection is restricted, thus preventing an accidental uncontrolled explosion. The safety precautions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 1, Section 1-8 shall apply.

1-8. **Reporting Accidents, Incidents, and Malfunctions.** All accidents, incidents, and malfunctions involving the catalyst generator shall be reported in accordance with the provisions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 2.
1-9. **Shipping Containers.** Shipping Container drawing 30003 LD 2816244 is used. The Shipping Container is a twin-shelled, molded polystyrene unit (measuring 24 17/32 X 20 17/32 X 3 5/16 inches) secured with waterproof pressure-sensitive tape. The shipping container holds 26 catalyst generators and weighs approximately 29 pounds when filled.

1-10. **Palletization and Loading.** Palletized domestic unit loads consist of 44 containers, weigh approximately 1165 pounds with pallet, and displace 50.6 cubic feet. Palletization procedures for domestic unit loads are given in WR-53/803 (Revision A). Palletized fleet-issue unit loads consist of 44 containers, weigh approximately 1170 pounds with pallet, and displace 49.8 cubic feet. Palletization procedures for fleet-issue unit loads are given in WR-54/207 (Revision A). Procedures for loading trucks with palletized unit loads are given in WR-51/3. Procedures for loading railroad cars with palletized unit loads are given in WR-52/100.

1-11. **Identification Data.** The catalyst generator is listed under drawing 30003 DL 593AS200, specification AS 1190, FSN (to be supplied later), and DOD Code (to be supplied later). The descriptive marking on the cartridge case conforms to the standards set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 1, Section 1-4.

1-12. **Pyrotechnic Weight.** The aggregate weight of the black powder, time-delay ignition material, and TB-1 pyrotechnic composition is approximately 317 grams (0.697 pounds).

1-13. **Service Life.** Service life of the catalyst generator is estimated to be five years.
1-1. **CATALYST GENERATOR WMU-6/B.**

1-2. **Intended Use.** The Catalyst Generator WMU-6/B is intended to be launched from Dispenser, Cartridge SUU-53/A(XCL-1). It may also be expended from the LB-11A ASW photographic store and RF-4 or P-3A or -3B aircraft in which the Type A-6 or Model 9A (LAU-308) Photoflash Cartridge Ejectors have been reconfigured with longer, pointed, contact pins (Lambert Engineering Co., St. Louis, Mo. Part No. LE1560). The WMU-6/B catalyst generators, when launched, eject a pyrotechnic material, which upon burning, forms nuclei that induce freezing of super-cooled water.

1-3. **External Features.** External features are shown in figure 1-1. The catalyst generator uses a cylindrical 40mm aluminum cartridge case rimmed at one end and crimped at the other. An XM102E-1 recessed electric primer is mounted in the rimmed end. A descriptive marking is stenciled on the cartridge case and a 1-inch explosive color band (light green No. 34558) is located approximately 1 inch from the crimped end. A 0.02-inch, T-shaped groove is machined 1 1/2 inches from the rimmed end. The catalyst generator is approximately 7.7 inches long and weighs approximately 0.92 pound.

1-4. **Internal Features.** Internal features are shown in figure 1-2. A 2-gram black powder charge is located behind the electric primer and is held in place by a paper disc and spacer. An ignitor, held in place by a compression cup, fits between the spacer and the safing and arming housing. The ignitor contains a pyrotechnic mix of tetra-red lead oxide and a time-delaying ignition material. Inserted in the safing and arming housing is a spring-loaded firing train.
Figure 1-1. Catalyst Generator WMU-6/B External Features
ATALYST GENERATOR WMU-6/3

FORMULATION T8-15.1

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<th>INGREDIENT</th>
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</tr>
</tbody>
</table>

WARNING
HIGHLY COMBUSTIBLE MATERIAL
NOTIFY
NEAREST MILITARY AUTHORITY

Figure 1-2. WMU-6/3, Internal Features
interrupter called a safing and arming pin. Spin-welded to the other end of
the safing and arming housing is a plastic tube, called the candle assembly.
A wrap of fish paper insulation, MIL-I-695, type F covers part of the outside of
the candle assembly. The candle assembly consists of a pyrotechnic fuse and
a nucleate generating candle. The initiation of the primer ignites the
black powder expellent charge that ejects the candle assembly and ignites
the pyrotechnic fuse. The fuse contains a boreriding, spring loaded firing
train interrupter that prevents ignition of the candle in the cartridge case.
The pyrotechnic fuse contains a delay element and an incinerating charge that
erodes the web of the candle ignition end and ignites the candle ignition
composition. The candle contains 100 grams of nucleating composition that
burns for 17 to 26 seconds and 30 grams of flare composition that burns for
4 to 8 seconds and incinerates the remnants of the candle assembly.

1-5. Functional Description. The catalyst generator is ignited by an electrical current relayed by the cartridge ejector from the launching aircraft to the XM102E-1 Electric Primer. The electric primer ignites the black powder charge which in turn ignites the ignitor. Expanding gases from the black powder ignition also propel the ignitor, safing and arming housing, and candle assembly as a unit from the cartridge assembly. Removal of the unit from the cartridge assembly causes the safing and arming pin to be ejected, allowing the ignitor charge to ignite the time-delay ignition material pressed on the safing and arming housing end of the TB-15.1 candle composition. Ignition of the TB-15.1 creates combustion gases, some of which are expelled through the cavity left vacant by the safing and arming pin. The action of these gases causes the candle assembly to tumble in free flight which ensures
a consistent trajectory. Uniform end burning of TB-15.1 is ensured by the fish paper wrap which prevents side burning of the plastic candle assembly. The flare-burning material is ignited following burnout of the TB-15.1 to ensure that remnants of the candle assembly are disintegrated.

**WARNING**

The catalyst generator contains Class B explosive.

1-6. **Handling and Storage.** The catalyst generator shall be handled and stored in accordance with the general provisions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 1, Section 1-6.

1-7. **Safety Precautions.** The catalyst generator contains Class B explosive. Safety features include a recessed primer, time-delaying ignition material in the ignitor and TB-15.1 pyrotechnic nucleic material, and a T-shaped groove in the cartridge case. The recessed primer prevents inadvertent contact with the primer electrode, thereby precluding accidental static discharge through the primer. The time-delaying ignition material provides time for a safe separation from the launching aircraft before ignition of the candle composition. The T-shaped groove allows the cartridge case to rupture in a predetermined manner, when the candle assembly ejection is restricted, thus preventing an accidental uncontrolled explosion. The safety precautions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter, Section 1-8 shall apply.
1-8. **Reporting Accidents, Incidents, and Malfunctions.** All accidents, incidents, and malfunctions involving the catalyst generator shall be reported in accordance with the provisions set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 2.

1-9. **Shipping Containers.** Shipping Container drawing 30003 LD 2816244 is used. The Shipping Container is a twin-shelled, molded polystyrene unit (measuring 24 17/32 x 20 17/32 x 3 5/16 inches) secured with waterproof pressure-sensitive tape. The shipping container holds 26 catalyst generators and weighs approximately 24 pounds when filled.

1-10. **Palletization and Loading.** Palletized domestic unit loads consist of 44 containers, weigh approximately 1165 pounds with pallet, and displace 50.7 cubic feet. Palletization procedures for domestic unit loads are given in WR-53/803. Palletized fleet-issue unit loads consist of 44 containers, weigh approximately 1170 pounds with pallet, and displace 49.8 cubic feet. Palletization procedures for fleet-issue unit loads are given in WR-54/207. Procedures for loading trucks with palletized unit loads are given WR-51/3. Procedures for loading railroad cars with palletized unit loads are given in WR-52/100.

1-11. **Identification Data.** The catalyst generator is listed under drawing 30003 DL 593AS217, specification AS 2625, FSN (to be supplied later), and DOD Code (to be supplied later). The descriptive marking on the cartridge case conform to the standards set forth in NAVORD OP 2213/NAVAIR 11-15-7 (Second Revision) Chapter 1, Section 1-4.
1-12. **Weight.** The weight of the WMU-6/B catalyst generator is 415 grams/0.92 pounds.

1-13. **Service Life.** Service life of the catalyst generator is estimated to be 5 years.

1-14. **Maintenance.** None.