



BULLETIN

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DTIC QUALITY INSPECTED 8

Lucas Turreted Tround Gun System

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Background. The Lucas Aerospace Actuation Division located at Wolverhampton, England, has been involved with the design and development of a gun system primarily intended as a self-defense capability for transport, surveillance, and support helicopters.

Currently, the company has achieved success in qualifying the system on two Bell helicopters – the 412SP and the 212 model. The 412SP effort was the result of a joint engineering program between Bell and Lucas in 1986/87 and the 212 model effort was a joint association between Lucas and the Austrian Air Force, who provided the helicopter. This work was completed in September 1988, and the aircraft is now undergoing extensive in-country evaluation in winter conditions.

In both instances Lucas provides a complete system – sight, turret, gun, auxiliary power, etc. To attract the interest of US Forces, Lucas, using private venture capital, has been developing a modified version of a standard Lucas Turret using the novel open chamber Tround machine gun. Lucas would like to have the US Armed Forces conduct an evaluation (FWE) of their system in FY-90. This weapon system could be fitted to a UH-1H helicopter or similar. The aircraft could be used to demonstrate the turreted Tround gun system in an air-to-ground mode for many aircraft applications including the V-22 Osprey.

System Description. The Lucas Gun Turret System comprises the following:

- Lucas gun turret
- Tround open chamber machine gun
- Gun drive motor
- On-turret magazine
- Linkless ammunition handling system
- Turret electronic control unit
- Aircraft control panel
- Ferranti helmet pointing system plus electronics
- Electrohydraulic motor/pump unit
- Helicopter adaptor kit

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The Tround gun featured in the Lucas helicopter gun turret is a unique weapon which fires standard 0.50 caliber projectiles from

triangular section cartridges (Figure 1) in place of the normal brass material. This gives significant improvements in performance, cost, and weight. The design provides for a gun with a shorter receiver, fewer parts, lighter weight, lower life-cycle costs, and improved reliability (only nine wearing parts).

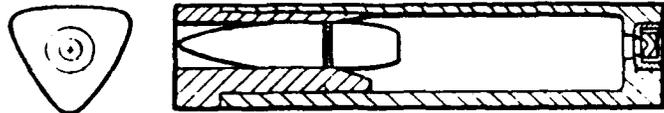


Figure 1. Tround 0.50 Caliber MK 9 Ammunition.

Development work which has already commenced on barrel design and propellants should provide improvements in muzzle velocity of 30 percent when compared with conventional 0.50 caliber ammunition.

The open chamber design of the gun removes the need for a reciprocating breech action, and the rounds are fed laterally into the revolving chamber. External power through a cam mechanism rotates the barrel, and a central drive operates the firing pin mechanically while the chamber is momentarily stationary and the round in line with the barrel. The spent cartridge is also ejected laterally.

The single-barrelled Tround machine gun has been extensively tested at the Naval Weapons Center, China Lake, California, and is capable of a firing rate of 2,000 rounds per minute.

The Tround plastic cartridge-case ammunition provides for lighter weight and increased performance. It is of significantly lower cost than brass ammunitions and has attractive insulating properties and improved insensitive munition characteristics, which have been demonstrated.

Lucas had to design and manufacture a linkless ammunition storage and handling system to suit the Tround installation (Figure 2), which had to accommodate vertical movement of the weapon and also linear movement of the breech during recoil. The ammunition handling system is driven by the gun motor and incorporates a slipping clutch which, when the firing button is released, halts and allows the gun chamber to rotate and fire the entrained

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