MIL-T-45379D(AT)
28 April 1986
SUPERSEDING
(See section 6)

MILITARY SPECIFICATION

TANK, COMBAT, FULL-TRACKED, 105MM GUN, M60A3-TTS

This specification is approved for use by US Army Tank-Automotive Command, Department of the Army, and is available for use by all Department and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the construction, performance and inspection requirements for M60A3 full-tracked combat tank equipped with a Tank Thermal Sight (TTS).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

AMSC N/A FSC 2350

SPECIFICATIONS
FEDERAL

TT-E-527	- Enamel, Alkyd, Lusterless

MILITARY

MIL-L-45199	- Lubricating Oil, Internal Combustion Engine (High Output Diesel).
MIL-M-45212	- Mount, Gun; Mount, Howitzer.
MIL-T-45309	- Tank, Combat, Full-Tracked, 105 MM Gun: M60, M60A1, M60A1 (Rise), and M60A3; Processing for Shipment and Storage of.
MIL-H-46170	- Hydraulic Fluid, Rust Inhibited, Fire-Resistant Synthetic Hydrocarbon Base.
MIL-E-52798	- Enamel, Alkyd, Camouflage.

STANDARDS
FEDERAL

FED-STD-595	- Colors.

MILITARY

MIL-STD-130	- Identification Marking of U.S. Military Property.
MIL-STD-193	- Painting Procedures and Marking for Vehicles, Construction Equipment and Material Handling Equipment.
MIL-STD-461	- Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.
MIL-STD-462	- Electromagnetic Interference Characteristics, Measurement of.
MIL-STD-810	- Environmental Test Methods and Engineering Guidelines.
MIL-STD-1474	- Noise Limits for Army Materiel.
MIL-STD-45662	- Calibration Systems Requirements.

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

OTHER PUBLICATIONS

2-2-614	- USA TECOM Material Test Procedure.

DRAWINGS
ARMY

8750019 - Tank Combat, Full-Tracked 105 MM Gun, M60A3 with Tank Thermal Sight.

(Copies of specifications, standards, handbooks, drawings, publications, and other Government documents required by the contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article.

3.1.1 Preproduction model. When specified (see 6.2), a preproduction model(s) of the complete vehicle to be furnished under this specification shall be produced prior to the manufacture or fabrication of vehicles in quantity. The vehicle(s) when completed shall be submitted to the Government for inspections to determine conformance to the requirements of this specification. Vehicle(s) submitted by the contractor shall be fully representative of vehicles proposed to be supplied by the vehicle manufacturer from production facilities and tooling under the supply contract.

3.1.2 Initial production vehicle. An initial production vehicle, which shall be fully representative of vehicles proposed to be furnished under the contract, shall be submitted to the Government for inspection to determine conformance to the requirements of this specification.

3.2 Materials. The contractor shall be responsible for ascertaining that all assemblies and component parts that go into the construction of this vehicle, which require product qualification in accordance with a specification, are listed on respective qualified products lists (QPL) or have been approved for inclusion on such lists. Inspection records shall specifically list such components, name of supplier(s), and number and date of applicable QPL (see 4.6.1 and 6.6).

3.3 Design and construction. Vehicles, components, subassemblies, and assemblies shall be fabricated and assembled into a complete vehicle in accordance with drawings listed or referred to on Drawing 8750019. All parts requiring identification shall be marked in accordance with MIL-STD-130 (see 4.6.2).

3.3.1 Sealing. Unless otherwise specified herein all seats and sealer shall prevent the entrance of water and foreign matter. Static seals shall provide an interference fit of sealing surfaces preventing the loss/leakage of fluids intended to be contained by the seals. Dynamic seals shall prevent fluid leakage in the form of a drip (see 6.5) when the vehicle is standing idle. Evidence of lubricant at seals specifically designed to allow exit of flushed lubricants shall be permitted (see 4.6.2.1).

3.3.1.1 Hatch seals. Hatch seals shall prevent leakage of water into the crew compartment (see 4.6.2.1.1).

3.3.1.2 Vision device/receptacle seals. When installed, the gunner's and commander's periscopes and the driver's vision blocks shall be sealed to prevent any entry of water into the vehicle. The driver's night vision viewer shall not permit water entry in excess of continuous drip into the vehicle (see 4.6.2.1.2 and 6.5).

3.3.2 Hydraulic lines. Provisions shall be made to assure internal cleanliness of hydraulic lines and connections (see 4.6.2.2).

3.3.3 Ventilation system. The ventilation system shall prevent concentration of carbon monoxide (CO) in the occupied portions of the vehicle in excess of 0.01 percent, under any condition of operations (see 4.6.2.3).

3.3.4 Controls. When installed in accordance with applicable drawings, all electrical, mechanical, and hydraulic controls shall operate without malfunction throughout all ranges of operation under all vehicle operating conditions (see 4.6.2.4).

3.3.5 Adjustment mechanisms. When installed and adjusted in accordance with drawings, all adjustment mechanisms shall function properly, and maintain adjustment settings during all vehicle operating conditions (see 4.6.2.5).

3.3.6 Vision devices/receptacles. Provisions shall be made to assure that receptacles incorporated in the vehicle will accept applicable vision devices without binding or interference. The gunner's and commander's periscope receptacles shall accept the periscopes, and, when the periscopes are installed, removed and reinstalled, the line sight of the periscopes shall not deviate more than 0.2 mil from the line of sight of initial installation setting (see 4.6.2.6).

3.3.7 Gas particulate system.

3.3.7.1 Air flow. The air flow shall be 3.0 to 4.5 cubic feet (cu ft) per minute at each crew position outlet when the other crew position hoses are connected to their connector orifice assemblies (see 4.6.2.7.1).

3.3.7.2 Air heater. When the air heater at each crew position is operated, the heater light shall illuminate, and the heater shall warm the air at least 10 degrees Fahrenheit (°F) over ambient within 10 minute period at an input voltage range of 24 to 30 volts (V). Thermostats of each heater shall function to maintain temperature settings of their control knobs (see 4.6.2.7.2).

3.3.8 Stowed equipment. The vehicle shall be capable of stowing all basic issue items (BII) in the spaces provided (see 4.6.2.8).

3.3.9 Electromagnetic characteristics. The vehicle shall meet the requirements RE02, and RS03 of MIL-STD-461, as defined hereinafter (see 4.6.2.9).

3.3.9.1 Radiated emissions. Broadband radiated emissions over the frequency range of 1.5 megahertz (MHz) to 1 gigahertz (GHz) shall not exceed the limits specified in table I at a 6 meter distance from the vehicle. Narrowband radiated interference emissions shall not exceed the limits of requirement RE02 (see 4.6.2.9).

TABLE I. Broadband radiated emission limits.

Subsystem/Equipment Operating	Mode of operation	Limit
Hydraulic pump	Cycling	Figure 1
Radio/intercom	Keying	Figure 2
All other conditions		RE02

3.3.9.2 Radiated susceptibility. The complete vehicle system with its subsystems and equipment installed shall meet the radiated susceptibility requirement (RS03) for sheltered equipment, without experiencing any malfunction or degradation of performance which would impair mission success (see 4.6.2.9).

3.3.9.3 Electromagnetic compatibility. No equipment/subsystem as installed in the complete vehicle system shall experience any malfunction or degradation of performance which would impair mission success when other equipment/subsystems are individually or collectively operated. Simultaneous transient movement of the image and reticle within the viewing area in night vision devices shall not be considered degrading to mission success (see 4.6.2.9).

3.3.10 Noise hazard.

3.3.10.1 Continuous noise level. The noise of vibration and equipment operation shall not exceed the maximum levels specified in table II (see 4.6.2.10).

TABLE II. Maximum acceptable level for continuous noise.

Octave band center Frequency (Hz)	Maximum acceptable noise level (db ref. 0.0002 microbar)
63	121
125	111
250	103
500	102
1000	100
2000	100
4000	100
8000	100

3.3.10.2 Operator's protection. Noise hazard caution signs shall be posted in all crew stations. The signs shall be clearly visible to all personnel (see 4.6.2.10).

3.3.11 Hull.

3.3.11.1 Cooling system. With the vehicle operating in an ambient temperature of 115°F, the engine oil temperature shall not exceed 250°F at the heat exchanger outlet, and the transmission oil temperature shall not exceed 300°F at the heat exchanger inlet (see 4.6.2.11.1 and 4.7.1).

3.3.12 Fuel system.

3.3.12.1 Fuel tanks, and lines cleanliness. Provisions shall be made to assure the internal cleanliness of the fuel tanks and lines prior to initial fueling of vehicle. The fuel tanks shall be free from leakage (see 4.6.2.12.1).

3.3.12.2 Heater fuel feed. With either of the fuel system pumps and the heater pump operating, the vehicle fuel system shall produce a pressure not less than 7 pounds per square inch (psi) at the outlet of the heater pump line (see 4.6.2.12.2).

3.3.12.3 Fuel shutoff valve. The engine shall stop firing and rotating within 30 seconds after the manual fuel shut-off valve is actuated to the OFF position (see 4.6.2.12.3)

3.3.12.4 Fuel system (slope). During engine operation, the fuel system shall maintain fuel supply to the engine when ascending and descending 60 percent grades in forward and reverse gear, and when the vehicle is being operated on 30 percent side slopes, with either side of the vehicle up slope (see 4.6.2.12.4).

3.3.12.5 Fuel tank (rapid fill). The fuel tanks shall be capable of receiving 50 gallons of fuel per minute (see 4.6.2.12.5).

3.3.13 Hatches.

3.3.13.1 Driver's hatch. The force required to breakaway and slide the driver's hatch cover across the opening shall not exceed 50 pounds force foot (lbf ft) at the handle. The force required to lock the driver's hatch cover in the closed position shall not exceed 75 lbf ft at the end of the locking lever (see 4.6.2.13.1).

3.3.13.2 Driver's escape hatch. The force required to operate the handle to release the driver's escape hatch shall be 50 ± 10 lbf ft pull at a point 0.5 inch from the end of the handle (see 4.6.2.13.2).

3.3.13.3 Loader's and commander's hatches. With the hatch closed, the force required to unlock the hatch shall not exceed 20 lbf ft. With the hatch unlocked, the force required to push hatch to its extreme open-latched position shall not exceed 55 lbf ft measured at the hatch closed lock handle. The force required to unlock hatch from an open latch position and rotate to the balanced position shall not exceed 60 lbf ft at the end of the hatch opened lock handle. To lock the hatch in the closed position with the hatch closed lock handle, the downward force shall not exceed 50 lbf ft and the rotational force shall not exceed 20 lbf ft at the end of the handle (see 4.6.2.13.3).

3.3.14 Seats.

3.3.14.1 Driver's seat. With the driver in seated position, the force required to actuate the fore and aft seat adjustment lever shall not exceed 12 lbf ft at the end of the lever. With the driver's seat vacated, the force required to actuate the seat vertical adjustment lever shall not exceed 14 lbf ft at the end of the lever. The force required to trip the seat dumping lever shall not exceed 14 lbf ft at the end of the lever. The driver's seat shall move forward, backward and vertically when the appropriate levers are actuated. There shall be no restriction of movement except with the seat in its lowest position (see 4.6.2.14.1).

3.3.14.2 Gunner's seat. With no load on the seat, the force required to pull the seat adjusting pin shall not exceed 15 lbf ft. The spring shall raise the seat not less than 7 inches without personnel seated (see 4.6.2.14.2).

3.3.14.3 Commander's platform seat and upper swing seat. With no load on the seat and platform assembly, the platform seat shall be capable of sliding upward at least 12 inches with the spring force provided. With no load on seat, the force required to lift the pin for seat adjustment shall not exceed 25 lbf ft measured at end of the lever. The platform latch shall lock securely in up position. The backrest shall be retained in a vertical position when not used as a platform. The seat shall be retained in a vertical position when not being used. The force required to position the seat pin for seat release shall not exceed 15 lbf ft measured at the end of the lever. The force required to rotate the upper swing seat shall not exceed 10 lbf ft when applied to the extreme edge of the seat (see 4.6.2.14.3).

3.3.14.4 Loader's seat. When the loaders seat assembly is properly installed and not in use, the lifting spring shall be capable of raising and retaining the seat base in a vertical position (see 4.6.2.14.4).

3.3.15 Fire extinguisher. The fixed fire extinguisher system, when installed in accordance with applicable drawings shall be readily accessible for operation internally and externally. Actuating the internal controls shall simultaneously stop the supply of fuel to the engine. The maximum effort required to discharge the system either internally or externally shall be not more than 55 lbf ft. A time delay of more than 6 seconds but less than 11 seconds shall occur between actuating of the release mechanism and entrance of carbon dioxide (CO_2) into the engine compartment (see 4.6.2.15).

3.3.16 Battery access door. The latch that holds the battery access door closed shall function properly, and the force required to open the latch shall not exceed 15 lbf ft sliding pressure (see 4.6.2.16).

3.3.17 Electrical system. The vehicle electrical system shall consist of the hull electrical subsystem and the turret and cupola electrical subsystems as described below.

3.3.17.1 Power plant electrical. The engine electrical installation shall contain units necessary to provide engine data in the form of electrical signals to the driver's instrument panel as required and shall include an engine electrical disconnect to facilitate engine removal and replacement, an electrical starter motor capable of starting the engine under all required conditions, and an oil cooled rectified alternator (see 4.6.2.17.1).

3.3.17.2 Lights. The internal and external lights shall operate as specified on applicable drawings through all vehicle operating conditions. All electrical contacts and connections shall maintain positive contact under all vehicle operating conditions (see 4.6.2.17.2).

3.3.17.3 Interior lighting. Each crew position except the commander's cupola shall contain a domelight to provide general illumination to assist with tasks at night or during closed-hatch operation. The domelight shall contain provisions for adjusting light intensity and a red filter for night vision adaptation (see 4.6.2.17.3).

3.3.17.4 Hull-to-turret slipring. The hull-to-turret slipring shall provide power and signal circuits capable of maintaining positive electrical contact between the hull and turret electrical subsystems under all vehicle environments. A sealed air passage in the slipring shall be capable of carrying low-pressure air for the gas particulate subsystem (see 4.6.2.17.4).

3.3.17.5 Cupola slipring. The slipring assembly shall provide uninterrupted continuity of 7 electrical circuits between the turret and the cupola (see 4.6.2.17.5).

3.3.17.6 Alternator voltage. With the engine operating at 1000 revolutions per minute (rpm), the vehicle alternator shall deliver between 26.8 and 30.2 V at the battery, over an ambient temperature range of minus 65 to plus 125°F. The battery voltage shall be not less than 18.5 V when the hydraulic power pack is energized (see 4.6.2.17.6).

3.3.17.7 Driver's night viewer power circuit. The voltage output at the driver's night viewer connector shall be within 0.2 V of the positive battery potential when operating into a 1 ampere (A) load (see 4.6.2.17.7).

3.3.17.8 Air cleaner blower motors. Each air cleaner blower motor shall provide a flow of air through each blower outlet. The air cleaner blower motors shall be wired so they do not operate unless the engine is running (see 4.6.2.17.8).

3.3.17.9 Engine manifold heater. The vehicle wiring for the engine manifold heater shall provide a switch-actuated vehicle battery circuit to the engine. Operation of the pushbutton switch on the purge pump handle, with the starter switch depressed, shall provide vehicular battery voltage to pin "A" of the multiple connector at the engine electrical quick disconnect (see 4.6.2.17.9).

3.1.17.10 Auxiliary outlet. Two outlets [24 V direct current (dc) nominal], one each in the turret and hull, shall be provided which will mate with the BII trouble light assemblies. Each auxiliary outlet circuit shall be protected with a 15 A automatic reset circuit breaker (see 4.6.2.17.10).

3.3.17.11 Personnel heater. The heater shall be capable of starting with the switch in either high or low position. The blower motor shall operate at reduced speed when the heater is turned on. The burner shall ignite within 4 minutes of heater turn on. Subsequent to ignition, the heater shall be capable of generating high and low heat, and the blower motor shall run at full speed. Turning the heater OFF shall cause both the burner to extinguish and the blower motor to shut off within 3.5 minutes (see 4.6.2.17.11).

3.3.17.12 Engine smoke generator. The vehicle shall produce smoke in the left and right exhaust pipes when the engine is running and the smoke generator switch is in the ON position (see 4.6.2.17.12).

3.3.18 Communications system. Requirements for a communications system are as follows (see 4.6.2.18):

a. An AN/VIC-1 (V) intercom set shall be installed and shall be functional for crew communications.

b. Provisions shall be available for the installation of an AN/VRC radio set which shall operate through the intercom set.

3.4 Break-in. The vehicle shall meet the requirements specified herein subsequent to a break-in run. The break-in run will include preliminary checks of suspension, controls, powerpack, etc., and provide wear-in for final adjustments. The break-in run will involve the following activities and conditions (see 4.6.3).

a. Preparation. Prior to break-in run, except for equipment and component installations and servicing performed by the contractor as a final processing of the vehicle for acceptance, the vehicle shall be completely assembled and all adjustments completed. Vehicle, including all applicable components requiring lubrication, shall be lubricated in accordance with Production Lubrication Chart. Engine oil conforming to the applicable seasonal grade of MIL-L-45199 shall be used. Specific applications by grades or types for various expected seasonal temperature ranges shall be specified. Fuel/water separator and primary fuel filter shall be bled of air by removing each respective bleed plug and operating the in-tank fuel pump. After air is bled, replace the bleed plugs.

b. Oil pressure and temperature. Prior to the start of the break-in run, the engine shall be operated at 800 to 1200 rpm until lubricating oil is at operating pressure and temperature. If at any time during the break-in run the engine has been stopped for at least 30 minutes, the engine shall again be operated, as above, before continuing the break-in run. Proper oil pressure and temperature shall be maintained during operation on level ground, 60 percent grades and 30 percent side slopes.

c. Operation and distance. Each vehicle shall be given a break-in run for the distances specified in table III on smooth, level, hard-surfaced roads. The vehicle shall be operated over the undulating section of the road (see figures 3and 4) during a. and b. divisions of the break-in run in both directions. The vehicle shall be operated in the power mode only during a., b., c., and d. divisions of the break-in run with the turret azimuth lock engaged.

TABLE III. Speeds and distances for break-in run.

Division of run	Speed mph	Distance miles	Test conditions
A	0 to 10	10	Track (road)
B	11 to 15	15	Track (road)
C	16 to 20	10	Track (road)
D	21 to Max.	10	Track (road)

d. Reverse operation. After each division of the break-in run, vehicle shall be stopped, the engine allowed to idle for not less than 2 minutes, and the vehicle driven in reverse for a distance of not less than 50 feet (ft) at speeds between 2 and 7 miles per hour (mph).

e. Condition after run. After completion of the break-in run, the engine shall idle between 700 to 750 rpm. Prior to vehicle submission to the Government for acceptance, all suspension wheel bearings shall be checked to determine if adjustments are correct and readjusted, as required. There shall be no defects indicative of damaged components, or maladjustments that may cause faulty vehicle operation.

3.4.1 8-mile road test. After the break-in run each vehicle shall be operated a distance of 8 miles or more by the contractor before the acceptance tests specified in table XIX (see 4.6.3.1).

3.5 Performance.

3.5.1 Vehicle mobility. The complete vehicle, combat loaded or with a simulated load of equal weight (see 3.3.8), and serviced, shall perform as specified herein. Ammunition may be simulated in size and weight. The vehicle, serviced (see 3.4a) and equipped for existing climatic conditions, shall operate as specified without special equipment.

3.5.2 Power plant and power train. The power plant (engine and transmission) shall function throughout all gear and speed ranges without loss of lubricants or damage that may cause failure of vehicle to perform any of the mobility requirements. The power train (power plant, final drives, and track) and associated controls shall be capable of operation throughout all speed and steering ranges without binding of linkages, loss of lubricants, grabbing, chattering, or slippage when controls are applied to steer, stop, and hold vehicle (see 4.6.4.2).

3.5.3 Speeds.

3.5.3.1 Level road speeds. The vehicle shall operate at sustained speeds of 30 mph and at 2.5 mph on level ground without damage to the power plant and power train (see 4.6.4.3.1).

3.5.3.2 Grade speeds. Vehicle shall operate at a sustained speed of 10 mph while ascending a 10 percent grade, and at 20 mph while ascending a 3 percent grade (see 4.6.4.3.2).

3.5.3.3 Level road drift. When traveling between 25 and 30 mph in a straight line without manual steer correction, the vehicle drift shall not exceed 3 ft in 100 ft (see 4.6.4.3.3).

3.5.3.4 Acceleration. The vehicle shall accelerate from a standing start on level ground through a distance of 200 ft within a time period of 13 seconds (see 4.6.4.3.4).

3.5.3.5 Climbing. The vehicle shall ascend longitudinal grades of 60 percent in forward and reverse gear without stalling or damage to power plant and powertrain. The vehicle shall operate on right and left side slopes of 30 percent (see 4.6.4.3.5).

3.5.3.6 Engine starting on grades and slopes. When standing on a 60 percent grade, for not less than 2 minutes, with engine idling under no load between 700 and 750 rpm, the engine shall be stopped for not less than 2 minutes. The engine shall restart in not more than 1 minute when headed either up or down grade. A similar engine stopping and starting test shall be accomplished on 30 percent right and left side slopes (see 4.6.4.3.6).

3.5.4 Braking and drift.

3.5.4.1 Stopping. The vehicle traveling at 20 mph shall stop within 60 ft from the point of brake application, with drift not to exceed 4 ft when stopping (see 4.6.4.4.1).

3.5.4.2 Holding. With the vehicle standing on a 60 percent grade with service brakes applied, the vehicle shall be held stationary when headed either up or down grade. With the parking brake engaged and all other holding devices inoperative, the vehicle shall be held stationary when headed either up or down grade (see 4.6.4.4.2).

3.5.5 Turning. The vehicle shall turn 360° to the right and left in pivot, in neutral steer, within a circle 35 ft in diameter (see 4.6.4.5).

3.5.6 Fording.

3.5.6.1 Shallow water. The vehicle shall ford a level, hard-bottom body of water 48 inches in depth, including wave, without special equipment. With the vehicle standing in water 48 inches in depth for 30 minutes, the accumulation of water shall be not more than 1.5 inches on the hull floor measured in the center of the "V", and there shall be no water accumulation in the left or right brake housings (see 4.6.4.6.1).

3.5.6.2 Deep water. The vehicle shall ford a level, hard bottom body of water 8 ft in depth when a fording kit is installed. With the vehicle standing in water 8 ft in depth for 30 minutes and the bilge pump operating as required, the accumulation of water shall not be more than 3 inches on the hull floor in the center of the "V", and there shall be no water accumulation in the left or right brake housings (see 4.6.4.6.2).

3.5.6.3 Engine starting in shallow water. With the vehicle standing for 30 minutes in water up to 48 inches in depth, the engine operating at 100 rpm for 15 minutes, then stopped for 15 minutes, the engine shall restart in not more than 3 minutes. All accessories shall function satisfactorily during and after fording operations (see 4.6.4.6.3).

3.5.6.4 Shallow water contamination. After fording operations, the water contamination content of the transmission, engine, final drives and suspension system lubricants shall not be more than 2 percent by volume (see 4.6.4.6.4).

3.5.6.5 Inflatable seal and pump. The pump shall be capable of inflating the seal to 25 psi. The force required to operate the pump plunger shall not exceed 50 lbf ft (see 4.6.4.6.5).

3.5.6.6 Drain valves. After unlocking the lever, the force required to operate the front drain valve lever shall not exceed 17 lbf ft at the end of the hand grip to actuate the valve through a 0.375 inch travel. After unlocking the lever, the force required to operate the rear drain valve lever shall not exceed 25 lbf ft at a point just below the knob, to actuate the valve through a 0.6875 inch travel (see 4.6.4.6.6).

3.5.7 Trench crossing. The vehicle shall cross trenches 36 inches in depth and 102 inches in width without stalling or damage to the suspension, gun tube and other vehicle equipment (see 4.6.4.7).

3.5.8 Vertical obstacles. The vehicle shall cross over vertical obstacles 36 inches in height while moving forward without stalling or damage to the suspension and hull floor (see 4.6.4.8).

3.5.9 Turret/cupola.

3.5.9.1 Nylon ballistic shield. The gun mount conforming to MIL-M-45212 with coaxial machine gun mount, MAG 58 machine gun, spent brass and link ejection bag, sighting system and the nylon ballistic shield installed, shall elevate at least between the limits of 200 elevation and 10° depression. No binding shall exist between the machine gun, the sighting system and the nylon ballistic shield, to cause the coaxial machine gun to deflect by more than 0.5 mil and the telescope to deflect more than 0.1 mil (see 4.6.4.9.1).

3.5.9.2 System backlash. With the elevation and traverse power switch on or off, the-control system backlash shall not exceed 1 mil in traverse and 1 mil elevation (see 4.6.4.9.2).

3.5.9.3 Turret and gun control system. The turret and gun control system shall be capable of operating at vehicle supplied 18 to 30 V dc and shall meet all requirements specified herein with the following operating conditions (see 4.6.4.9.3):

a. The turret shall be level within one degree.

b. The vehicle electrical system shall supply at least 26.8 V dc to the turret and gun control system with the engine operating and the generating system ON.

c. The main armament shall be balanced muzzle heavy within a range of 56 to 70 lbf ft.

3.5.9.3.1 Gun elevation speeds. The gun shall be controllable in elevation and depression over a speed range of at least 0.5 mil per second to 71 mils per second (4° per second). The steady speed after acceleration shall continuously increase with increasing handle displacement; these requirements apply to both stabilized and nonstabilized operation and to both gunner and commander power controls (see 4.6.4.9.3.1).

3.5.9.3.2 Turret traversing speeds. The turret shall be controllable over a speed range of at least 0.5 mil per second to 400 mils per second. The maximum tracking speed, 65.2 mils per second, shall occur at a gunner's handle displacement of 50 ± 10°. The steady speed after acceleration shall continuously increase with increasing handle displacement until maximum speed is reached. These requirements apply to both stabilized and nonstabilized operation and to both gunner and commander power controls (see 4.6.4.9.3.2).

3.5.9.3.3 Gun laying on stationary target, vehicle stationary. The average time required to position the periscope reticle within the borders of a 0.25 mil square target shall not exceed the times listed in table IV. These requirements shall be met by the gunner's and commander's controls and by the manual controls (see 4.6.4.9.3.3).

TABLE IV. Gun laying on stationary target.

Layoff - Mils			Average time seconds			
				Level		15° slope
Position	Azimuth	Elevation	Manual operation	Power operation	Stabilized operation	Power and stabilized operation
1	0	10	2.0	2	3	5
2	25	0	3.0	3	4	6
3	25	10	5.0	5	6	8
4	100	0	4.5	4	5	7
5	400	0	13.5	5	7	9
6	800	0		6	8	10
7	1600	0		8	10	12
8	3200	0		13	15	17

3.5.9.3.4 Gun laying on moving target and tracking accuracy. With the tank in a stationary position, the time required to lay the gunsight reticle within the borders of a moving target from an established lead angle shall not exceed 3.5 seconds in any instance as specified in table V. The target shall be as specified in the table and shall be moved over a horizontal crossing course. The lead angle shall be established with the line of sight aimed behind the moving target at which time the line of sight may be stationary or moving at a speed equal to or less than the target speed. After the reticle has been positioned within the borders for the length of the course in accordance with percentage of time on target specified in the table. This requirement shall be met with the gunner and commander power controls for nonstabilized operation, and by the gunner power control for stabilized operation (see 4.6.4.9.3.4).

TABLE V. Gun laying on moving target and tracking accuracy.

Percent of time on target	Traverse rate mils/sec (reference)	Established lead mils	Target size mils (Square)	Target size centi-meters (Square)	Target range meters	Target velocity mph	Length of course meters
90	0.5	1.0	0.25	45.72	1828.8	2.0	45.7
100	1.0	2.0	1.25	228.50	1828.8	4.0	91.4
100	3.3	7.5	1.25	228.50	1828.8	13.5	182.9
100	9.8	20.0	1.25	228.50	1828.8	40.0	182.9
100	19.6	7.5	1.25	34.29	274.3	12.0	365.8
100	32.6	10.0	1.25	34.29	274.3	20.0	365.8
100	65.2	20.0	5.0	137.16	274.3	40.0	365.8

3.5.9.3.5 Operation on slopes. When the vehicle is canted or pitched on slopes up to and including 15° turret attitude, the gun control system shall be capable of gun laying on a 0.25 mil stationary target as specified in 3.5.9.3.3 and table IV, except the time limitation need not be met for manual operation. Turret chatter shall be allowed only when turret unbalance tends to cause turret rotation in the direction of manual traverse. The gun control system performance on level terrain shall not be affected in any manner as a result of vehicle operation on slopes. The combat load may be simulated (see 4.6.4.9.3.5).

3.5.9.3.6 Stability of operation, vehicle stationary.

3.5.9.3.6.1 Non-stabilized mode. With the vehicle in the non-stabilized mode and either level or on slopes not exceeding 15° turret attitude, and turret power activated or deactivated, the gun shall not move more than 0.5 mil in azimuth or elevation during a 1 hour period (see 4.6.4.9.3.6.1 and 4.6.4.9.3.6.1.1).

3.5.9.3.6.2 Stabilized mode. With the vehicle in the stabilized mode, and drift controls properly adjusted, the gun shall not move more than 2 mils in azimuth or elevation during a 60 second period and the rate of drift shall not exceed 1 mil/second at any time during this period (see 4.6.4.9.3.6.2).

3.5.9.3.7 Traverse and elevation limits. The angular 105mm gun movement and vehicle clearance shall be in accordance with the following requirements (see 4.6.4.9.3.7).

a. At positive elevations down to 0°, the gun shall be capable of being traversed for 360° by power and manual controls with the elevation and traverse power switch ON. The traverse shall be accomplished without vehicle interference.

b. At a depression of -10° or lower, the gun shall be capable of being traversed within the zone of 90° on each side of the vehicle front centerline by power and manual controls with elevation and traverse power switch ON. The traverse shall be accomplished without vehicle interference.

c. At a depression of -4° or lower, the gun shall be capable of being traversed within the zone from 90° each side of the vehicle centerline to 25° each side of vehicle rear center line by manual control with elevation and traverse power switch OFF. The traverse shall be accomplished without vehicle interference.

d. In the stabilized or unstabilized mode, at gun full depression and maximum turret traverse rate, the gun shall automatically elevate upon passing the vehicle 180° frontal arc. The elevation angle shall not exceed +2.5° and traverse over the vehicle rear shall be completed without interference.

3.5.9.3.8 Override control. The commander control shall take over instantaneously the power control of the turret and gun and the firing circuits from the gunner control when the override switch in the commander control handle is actuated. Override of the system control by the commander control shall be obtainable at the neutral position regardless of the handle position of the gunner control. With the commander control and gunner control in the neutral position, there shall be no movement of the gun or turret caused by depressing or releasing the override switch in the commander control handle. With the gunner control in neutral position, the gunner control shall regain system control instantaneously when the commander control handle is released. These requirements apply to both stabilized and non-stabilized operation (see 4.6.4.9.3.8).

3.5.9.3.9 Hydraulic pressure limit switch. When power traversing the turret at a rate not to exceed 65 mils per second, the hydraulic pressure switch shall activate the hydraulic control powerpack motor at a control system pressure gage reading of 880 to 1010 psi. With the gunner's and commander's power and manual controls in neutral position, the hydraulic pressure switch shall deactivate the hydraulic powerpack motor at a control system pressure as indicated on the gage between 1150 and 1500 psi (see 4.6.4.9.3.9).

3.5.9.3.10 Turret traverse brake. With the elevation and traverse power switch on, the stabilization switches off, and with the turret stationary, there shall be no traverse movement of the turret when the gunner's power control handle is turned to its stop in a clockwise or counterclockwise traverse direction without actuating the palm switch in the gunner's power control handle (see 4.6.4.9.3.10).

3.5.9.3.11 Elevation shut-off valve. With the elevation and traverse power switch on and with the stabilization switches off, the movement of the main gun shall not exceed 2 mils in the elevation axis when the gunner's power control handle is tilted forward and backward to its stop in either direction without actuating the palm switch in the gunner's power control handle (see 4.6.4.9.3.11).

3.5.9.1.12 Travel locks. With the gun external travel lock and the turret lock disengaged, the turret and gun control system shall act as a holding device for the gun and turret when the vehicle is in motion. With the vehicle moving at a rate of 5 mph in low on a horizontal hard surface road and with the elevation and traverse power switch off, the turret slippage shall not exceed 10 mils in traverse when subjecting the vehicle to a full steer 90° turn in either direction and coming to a sudden stop. With the vehicle moving at a rate of 20 mph on a horizontal hard surface road and with the elevation and traverse power switch on or off, the gun slippage shall not exceed 5 mils in elevation or depression when stopping the vehicle within 60 ft from the point of vehicle brake application. With the hand traverse crank out of detent there shall be no more than 360° movement of the hand traverse crank without engaging the detent nor shall the hand elevation crank show any movement by either turret induced reaction when the vehicle is in motion as specified herein or by power operation of the turret and gun control system. With the gun in external travel lock, the turret lock shall be capable of being placed in the locked position. Engagement of the turret lock shall prevent traversing of the turret in any direction (see 4.6.4.9.3.12).

3.5.9.3.13 Stabilization aim retention.

3.5.9.3.13.1 Azimuth. While operating in the stabilized mode, the control system shall automatically retain the azimuth aim within 9 mils during pivot steer operations at the specified rate and shall return to the original azimuth within 5 mils after completing the pivot steer. This requirement is applicable to hull rotations of 45° or less, at a speed of 4.5° to 9° per second, and shall be met for both clockwise and counterclockwise rotation (see 4.6.4.9.3.13.1).

3.5.9.3.13.2 Elevation. While operating in the stabilized mode, the control system shall automatically retain the elevation aim to within 6 mils during vehicle pitching motions at a rate of 5 to 8° per second, and shall return to the original elevation within 3 mils after hull motion ceases (see 4.6.4.9.3.13.2).

3.5.9.3.14 Control system deadspot. The turret and gun control system deadspot, as measured at the gunner's power control, shall not exceed 7° handle movement from the neutral center position in any direction to initiate gun and turret movement. Deadspot at the commander's power control shall not exceed 14° handle movement from the neutral center position in the traverse direction and 7° handle movement from the neutral center position in elevation. The neutral center position shall be defined as that handle position which divides the initial free handle movement (backlash of linkages) in half. The deadspot angles on each side of the neutral center in the traverse axis shall be equal within 2°, and the deadspot angles in the elevation axis shall be equal within 2° for both the gunner's and commander's power controls. These requirements apply to both stabilized and non-stabilized operation (see 4.6.4.9.3.14).

3.5.9.3.15 105mm gun manual control.

3.5.9.3.15.1 Traverse effort. The torque applied to the hand traverse crank to maintain turret motion shall not exceed 76 pounds force inch (lbf in) (see 4.6.4.9.3.15.1).

3.5.9.3.15.2 Elevation effort. The mean torque required to rotate the hand crank at a uniform rate to maintain gun movement shall not exceed 46 lbf in. No individual reading shall exceed 55 lbf in (see 4.6.4.9.3.15.2).

3.5.9.3.15.3 Elevation response rate. The gun at the horizontal position within plus or minus 1°, shall move at a rate of at least 10 mils per revolution of the handcrank in elevation and depression with the hand crank turned at a rate not less than 10 rpm and not more than 20 rpm (see 4.6.4.9.3.15.3).

3.5.9.3.16 Power and manual control. The manual traverse and power elevation control shall be capable of simultaneous use during non-stabilized operation. The same requirement applies to the power traverse and the manual elevation controls. There shall be no movement of the gun or turret caused by turning the elevation and traverse power switch on or off. The gun firing switches shall function individually with the elevation and traverse power switch on or off and with the main gun and coaxial machine gun selector switches turned on individually or collectively. Movement of the gun or turret caused by turning the stabilization switch on or off shall not exceed 3 mils in elevation or traverse. The stabilization system shall be capable of being turned off by the commander's or loader's stabilization shut-off switch (see 4.6.4.9.13.16).

3.5.9.3.17 Superelevation actuator.

3.5.9.3.17.1 Accuracy. The superelevation actuator shall maintain the gunner's periscope on target within 2 mils after 60 mils superelevation of the gun has been accomplished (see 4.6.4.9.3.17.1).

3.5.9.3.17.2 Gun motion. During superelevation of the gun, changes in gun rate amplitude shall not exceed 25 milliradians per second (mrad/s) peak-to-peak during the period starting after the first cycle of initiation of superelevation and ending with the last peak prior to completion of superelevation. Superelevation shall occur in not more than 4.5 seconds. The time for the gun motion to damp out within the zone of $\pm$ 2.5 mrad/s after completion of superelevation of the gun shall not exceed 1 second (see figure 5). The gun shall be balanced (see 4.5.1). The starting position of the gun shall be within $\pm$ 3° of horizontal and over the front of the tank between the head lamps. The above requirements apply to both elevation and depression ballistic corrections (see 4.6.4.9.3.17.2).

3.5.9.3.17.3 Stabilized mode. When a ballistics correction is fed into the gunner's periscope reticle, the control system shall automatically displace the gun to maintain the gunner's periscope sight on target within 4.0 mils in elevation and deflection (see 4.6.4.9.3.17.3).

3.5.9.3.18 Hydraulic fluid. The hydraulic fluid shall conform to MIL-H-46170 (see 4.6.4.9.3.18).

3.5.9.3.18.1 Cleanliness. When all the requirements of the turret and gun control system have been met, and with hydraulic fluid discharged from the 2 gallon accumulator, the hydraulic fluid in the control powerpack reservoir shall contain no more than 0.1 percent water. This fluid shall have a contamination level of not greater than that of table VI (see 4.6.4.9.3.18.1).

TABLE VI. Maximum contamination limit (100 ml sample).

Particle contamination range (Micrometers)	Number of particles
5 to 15	64 000
15 to 25	11 400
25 to 50	2025
50 to 100	360
Over 100	64

3.5.9.3.18.2 Leakage. Turret and gun control system hydraulic fluid leakage shall be permissible in the form of a weep or seep. There shall be no evidence of fluid 1eakage in the form of a drop or drip other than that specified herein. There shall be no drip from the deck clearance valve assembly. Fluid leakage (drip) from the control power pack at the override linkage control box shall not exceed 1 drop in two minutes. Fluid loss from the main gun recoil mechanism or replenisher shall not exceed 15 drops in a 3 minute period during and immediately after the completion of firing or exercising of the recoil mechanism. No fluid loss in the form of a drip or drop shall be permitted 2 hours subsequent to firing or exercising the main gun (see 4.6.4.9.3.18.2).

3.5.9.4 Cupola weapon control.

3.5.9.4.1 Traverse effort. Azimuth gear box starting torque, for right or left traverse, shall be not more than 30 lbf in to start motion from any position within 360° rotation (see 4.6.4.9.4.1).

3.5.9.4.2 Elevation effort. With the machine gun, flexible feed chute, canvas cover and the periscope linkage installed, the screwjack handle breakaway torque shall not exceed the following (see 4.6.4.9.4.2):

15° depression to 60° elevation, 25 lbf in.
60° depression to 10° depression, 25 lbf in.
10° depression to 15° depression, 35 lbf in.

3.5.9.4.3 Elevation limits. The cradle with machinegun, sighting system, and cradle cover installed shall elevate and depress at least between +60°and -15° (see 4.6.4.9.4.3).

3.5.9.5 Fire control system. Except as otherwise specified herein, the fire control system shall operate and meet all requirements specified herein under operating conditions specified in 3.5.9.3 (see 4.6.4.9.5).

3.5.9.5.1 105mm gun sighting system.

3.5.9.5.1.1 Synchronization. The line of sight in the gunner's periscope, telescope, and commander's rangefinder shall move in synchronization with the centerline of the main gun within the tolerance specified in table VII.

TABLE VII. Synchronization.

Gun position	Gunner's elevation	Periscope deflection	Telescope		Rangefinder	
			Elevation	Deflection	Elevation	Deflection
-5°	± 0.3 mil	± 0.3 mil	± 0.1 mil	± 0.1 mil	± 0.3 mil	± 0.3 mil
0	Boresight	Boresight	Boresight	Boresight	Boresight	Boresight
+5°	± 0.3 mil	± 0.3 mil	± 0.1 mil	± 0.1 mil	± 0.3 mil	± 0.3 mil
+10°	± 0.3 mil	± 0.3 mil	± 0.1 mil	± 0.1 mil	± 0.3 mil	± 0.3 mil
+15°	± 0.3 mil	± 0.3 mil	± 0.1 mil	± 0.1 mil	± 0.3 mil	± 0.3 mil

3.5.9.5.1.2 Elevation backlash. Elevation backlash in the gunner's periscope shall not exceed 0.3 mil for any gun position from 10° depression to 20° elevation. Elevation backlash in the commander's rangefinder shall not exceed 0.3 mil for any main gun position from 10° depression to 20° elevation (see 4.6.4.9.5.1.2).

3.5.9.5.1.3 Boresight knob travel. The main gun boresight knobs on the gunner's periscope (daylight and night vision channels) shall be adjustable, to at least 4 mils down, 2 mils up, 3 mils left and 3 mils right. The boresight knobs on the telescope shall be adjustable to at least 5 mils down, 2 mils up, 4 mils left and 4 mils right. The boresight knobs on the commander's rangefinder shall be adjustable to at least 3.5 mils up, 3.5 mils down, 3.5 mils left, and 3.5 mils right. Knob travel adjustment shall be as measured from the boresight position (see 4.6.4.9.5.1.3).

3.5.9.5.1.4 Thermal vision channel. Actuation of the mode switch on the gunner's display unit to the ON position shall provide thermal sight viewing at the gunner's and commander's display units. The gunner shall be capable of controlling thermal and reticle image brightness and contrast, narrow field of view (NFOV) or wide field of view (WFOV), and image polarity. The thermal and reticle image brightness and contrast shall be maximum with their controls in the extreme clockwise position. Actuation of the gunner's/commander's switch on the commander's display unit to the "COMMANDER" position shall permit the commander to override and control brightness, contrast and polarity (see 4.6.4.9.5.1.4).

3.5.9.5.1.5 Unity sight knob travel. Rotation of the unity channel boresight sight knobs on the gunner's periscope in elevation and in deflection from stop-to-stop shall cause the reticle to travel at least 20 mils on each axis (see 4.6.4.9.5.1.5).

3.5.9.5.1.6 Boresight retention. The gunner's periscope (daylight and night channel), commander's rangefinder, and the telescope shall maintain previously established boresight within the values in table VIII (see 4.6.4.9.5.1.6).

TABLE VIII. Boresight retention.

Periscope		Rangefinder		Telescope	
Elevation	Deflection	Elevation	Deflection	Elevation	Deflection
± 0.25 mils	± 0.25 mils	± 0.40 mils	± 0.50 mils	± 0.15 mils	± 0.15 mils

3.5.9.5.2 Laser rangefinder (LRF).

3.5.9.5.2.1 LRF system power turn on. The LRF system power turn on is accomplished when the XM21 ballistics computer power switch is thrown to ON. Power-on condition of the LRF is indicated by illumination of RESET and FEED switch lights, RANGE SELECTOR switch light, mode light and RANGE and RETURNS readouts. System turn on shall also cause illumination of the commander's RANGE switch light. The light begins flashing within 4 seconds to indicate the laser is armed and ready to fire when laser is in ON or AUTO mode. A fixed range value of 1200 meters (m) (battle range) shall be automatically fed into the computer (see 4.6.4.9.5.2.1).

3.5.9.5.2.2 Mode control switch. Operation of the mode control switch shall cause the LRF to operate in TEST, ON or AUTO mode and shall cause illumination of the corresponding control lamp (see 4.6.4.9.5.2.2).

3.5.9.5.2.3 RANGE switch. With LRF power applied, the laser in either AUTO or ON mode and the RANGE switch flashing periodically, acutation of the RANGE switch shall cause the LRF to perform a ranging operation (see 4.6.4.9.5.2.3).

3.5.9.5.2.4 RESET switch. With laser rangefinder power applied, actuation of the RESET switch shall cause (see 4.6.4.9.5.2.4):

a. The RANGE indicators to show zero.

b. The RETURNS indicator to show zero.

c. The GO and SELECT light to extinguish.

d. The LAST return indicator to illuminate.

e. The RANGE switch light to flash periodically (with laser in ON or AUTO mode only).

f. The laser will be armed (with laser in ON or AUTO mode only).

3.5.9.5.2.5 Range return selector switches. With laser rangefinder power applied, operation of the "1", "2" or LAST range return selector switch shall cause the LRF to select the first, second or last (up to three) range return for display and for automatic insertion into the computer, in the AUTO mode if first or LAST were selected. Upon initial application of LRF power and after each acutation of the RESET switch, the LRF shall automatically select the LAST range return (see 4.6.4.9.5.2.5).

3.5.9.5.2.6 Remote range reset switch. With the RANGE switch light flashing and the LRF in the AUTO or ON mode, actuation of the remote range reset switch on the gunner's left control handle shall cause the LRF to reset and perform a ranging operation (see 4.6.4.9.5.2.6).

3.5.9.5.2.7 Malfunction light. With LRF power applied, the LRF in AUTO or ON modes and the RANGE switch light flashing operation of the RANGE switch or remove range reset switch, shall not cause illumination of the malfunction (MALF) light nor cause illumination of a 2, 3, or 4 on the last digit of the range display (see 4.6.4.9.5.2.7).

3.5.9.5.2.8 GO light. With LRF power applied and the RANGE switch illuminated, operation of the RANGE switch or remote range reset switch shall cause the GO light to illuminate when a target range has been transferred to the computer. All switch buttons except RESET and BATTLE RANGE are inoperative after the GO light has been illuminated (see 4.6.4.9.5.2.8).

3.5.9.5.2.9 SELECT light. With LRF power applied and the RANGE switch light flashing, actuation of the RANGE switch or remote range reset switch shall cause the select light to illuminate when no range has been transferred to the computer (see 4.6.4.9.5.2.9).

3.5.9.5.2.10 FEED switch. With LRF power applied, the SELECT light illuminated, and a range indication of greater than 200 m but less than 5000 m, actuation of the FEED switch shall cause transfer of the indicated range to the computer. The SELECT lamp shall be extinguished and the GO light illuminated. When range indication is outside the specified limits, the FEED switch shall be ineffective (see 4.6.4.9.5.2.10).

3.5.9.5.2.11 LIGHT rheostat. Rotation of the LIGHT control shall vary the illumination level of all panel lights except the RANGE and RETURN readouts. Turning the control fully clockwise to the TEST position shall cause all RANGE and RETURNS readout digits to indicate 8 (see 4.6.4.9.5.2.11).

3.5.9.5.2.12 Emergency power switch. With vehicle power on, but computer power off, operation of the emergency power switch on the electronics unit shall provide LRF power and allow normal operation of the LRF (see 4.6.4.9.5.2.12).

3.5.9.5.2.13 Battle range switch. Battle range switch shall index a fixed range of 1200 meters into the computer and shall cause (see 4.6.4.9.5.2.13):

a. Range readout to read zero.

b. Battle range switch lamp to be illuminated.

3.5.9.5.1.14 Laser self test. With the laser system energized and the laser mode control in TEST position, the indications of table IX shall be observed for the switch activations specified (see 4.6.4.9.5.2.14).

TABLE IX. Self test sequence.

Step No.	Inputs: Press and release switches as indicated	Indications: Range return selector light	Returns readout	Range readout (± 15)	Go light (green)	Select light (yellow)	Range return selector locked up
1	Place MODE control in Test position	LAST	0	000	OFF	OFF	
2	RANGE	LAST	1	850	ON	OFF	YES 1/
3	RANGE	LAST	2	1850	ON	OFF	
4	RANGE	LAST	3	2850	ON	OFF	
5	RANGE	LAST	4	2850	OFF	ON	NO 1/
6	"1"	"1"	4	850	OFF	ON	
7	"2"	"2"	4	1850	OFF	ON	
8	FEED	"2"	4	1850	ON	OFF	YES 1/
9	RESET	LAST	0	0000	OFF	OFF	
10	"2"	"2"	0	0000	OFF	OFF	
11	RANGE	"2"	1	9995 2/	OFF	ON	
12	FEED	"2"	1	9995	OFF	ON	
13	RANGE	"2"	2	1850	OFF	ON	
14	FEED	"2"	2	1850	ON	OFF	YES
15	RESET End of Test sequence	LAST	0	0000	OFF		

1/ Verify by pressing "1", "2" and LAST buttons on RANGE RETURN SELECTOR.
2/ If range readouts read 000 or 9990, reset the system and repeat the test.

3.5.9.5.2.15 Laser system lasing. With laser rangefinder power applied, and with targets exhibiting the properties listed below, the sequence in table X shall be obtained. Laser range indication shall be the measured range to target ± 10 m (see 4.6.4.9.5.2.15).

a. One surface of each target shall be perpendicular to the laser beam within ± 10°.

b. The targets shall be of the following types:

Target #1 – 6 ft wide x 8 ft high, chicken-wire fence section
(Height is dependent on height of laser beam exiting from vehicle).

Target #2 – 6 ft wide x 8 ft high, chain-link fence section.
Target #3 – 6 ft wide x 8 ft high, chain-link fence section.
Target #4 – 8 ft wide x 8 ft high, plywood, painted white.

c. The target shall be designated by number as follows:

Target number	Range (+0.5 m)
1	400
2	600
3	620
4	1075

d. Before performing the target ranging of table X, the laser shall be sighted and fired to verify returns from the 4 targets as indicated by the number "4" or higher on the range returns readout. More than 4 returns may be obtained depending on what other physical obstructions exist between the rangefinder and target #4.

TABLE X. Laser target reading.

Step no	Targets present	Mode select pos.	Range return select	Reset switch	Range switch	Remote range switch	Feed switch	Laser range ind. (meters)	Returns ind.	Go/ select lights 1/	Range return select Backlight 1/
1.	1,4	Auto	1		X			400	2	G	1
2.	1,4	Auto				X		1075	2	G	L
3.	1,4	Auto		X				0000	0	-	L
4.	1,4	Auto	2		X			1075	2	S	2
5.	1,4	Auto					X	1075	2	G	2
6.	1,4	Auto		X				0000	0	-	L
7.	1,2,4	Auto	1		X			400	3	S	1
8.	1,2,4	Auto		X				0000	0	-	L
9.	1,2,4	Auto	2		X			600	3	S	2
10.	1,2,4	Auto		X				0000	0	-	L
11.	1,2,4	Auto			X			1075	3	G	L
12.	1,2,4	Auto		X				0000	0	-	L
13.	1,2,4	On	1		X			400	3	S	1
14.	1,2,4	On	2				X	600	3	G	2
15.	1,2,4	On				X		1075	3	S	L
16.	1,2,4	On		X	X			0000	0	-	L
17.	1,2,3,4	On						620	4	S	L
18.	1,2,3,4	On	2					600	4	S	2
19.	1,2,3,4	On	1					400	4	S	1
20.	1,2,3,4	On					X	400	4	G	1
21.	1,2,3,4	Auto				X		620	4	S	L
22.	1,2,3,4	Auto					X	620	4	G	L

1/ L = LAST
S = SELECT
G = GO

3.5.9.6 Computer system.

3.5.9.6.1 Computer self test.

a. The gunner's computer control unit mode selector switch shall cause all unit malfunction lamps to illuminate, when placed in the LAMP position.

b. The mode selector switch shall cause only the green GO lamp to illuminate when placed in the TEST position (see 4.6.4.9.6.1).

3.5.9.6.2 Common zero and zeroing (see 4.6.4.9.6.2).

a. Elevation. Rotation of the common zero and zeroing elevation knobs from zero to 3.0 mil, shall cause the output unit superelevation counter to change correspondingly by 3.0 $\pm$ 0.30 mil. Rotation of the knob back to zero shall cause the output unit counter to return to the original setting within $\pm$ 0.30 mil. This requirement shall apply to both plus and minus adjustment directions.

b. Deflection. Rotation of the jump or zeroing deflection knobs, from zero to 3.0 mil, shall cause the gunner's reticle to move correspondingly by 3.0 $\pm$ 0.30 mil. Rotation of the knob back to zero shall cause the reticle to return to the original zero setting within $\pm$ 0.30 mil. This requirement shall apply to both plus and minus adjustment directions.

3.5.9.6.3 Ballistics solutions. The fire control system shall meet the requirements and provide the ballistic solutions as specified in tables XI through XVII for the gunner's daylight sight and for the commander's LRF sight. Solutions shall be measured as gun positional changes from a reference zero. The reference zero shall be determined with the computer operating the boresight mode at 1200 m range. The boresight range (1200 m) shall be inserted by means of the battle range switch of the LRF in the test mode (see 4.6.4.9.6.3).

TABLE XI. Basic solutions.

Wind zero (manual mode), ALT zero, Ta +59°F(s): CANT zero (moving mode), range input from rangefinder, laser in test mode, ammo select by gunner as indicated, 1200 m range inserted by laser battle range. Remaining tube life 100% (new).

GUNNER'S STATION

Range	Elevation (Mils)					Deflection (Mils)				
	APDS-A1	APDS-A4	HEAT	HEP	FSDS	APDS-A1	APDS-A4	HEAT	HEP	FSDS
850	2.28±0.50	2.33±0.50	3.80±0.50	9.88±0.55	2.13±0.50	0.11±0.40	0.10±0.40	0.18±0.40	-0.18±0.40	0.21±0.40
1200	2.89±0.50	3.07±0.50	5.40±0.55	14.82±0.55	2.77±0.50	-0.10±0.40	0.11±0.40	0±0.40	-0.54±0.50	0.02±0.40
1850	4.50±0.50	4.80±0.50	9.37±0.55	26.58±0.65	4.20±0.50	-0.31±0.40	-0.32±0.40	-0.15±0.45	-1.13±0.60	-0.14±0.40
2850	7.58±0.55	8.11±0.55	18.61±0.60	52.59±0.90	6.71±0.55	-0.52±0.40	-0.53±0.40	-0.25±0.55	-2.18±0.90	-0.24±0.40

COMMANDER'S STATION

850	2.20±0.60	2.33±0.60	3.80±0.60	9.88±0.65	2.13±0.60	0.32±0.45	0.32±0.45	0.39±0.45	-0.04±0.50	0.42±0.45
1200	2.89±0.60	3.07±0.65	5.40±0.65	14.82±0.65	2.77±0.60	-0.10±0.45	-0.10±0.45	0±0.45	-0.54±0.55	0.02±0.45
1850	4.50±0.60	4.80±0.60	9.37±0.65	26.58±0.80	4.20±0.60	-0.49±0.45	-0.50±0.45	-0.33±0.55	-1.31±0.65	-0.32±0.45
2850	7.58±0.65	8.11±0.65	18.61±0.70	52.59±0.95	6.71±0.65	-0.82±0.50	-0.84±0.50	-0.55±0.65	-2.48±0.95	-0.54±0.50

TABLE XII. Cant correction solutions.

STATIONARY MODE

Wind zero (manual mode), ALT zero, Ta +59°F (s) range input from rangefinder, laser in test mode, ammo select by gunner – HEP, remaining tube life 100% (new).

GUNNER'S STATION

Range	Elevation (mils)		Deflection (mils)	
	-15° Cant	+15° Cant	-15° Cant	+15° Cant
1850	25.42 ± 0.65	25.92 ± 0.65	-8.02 ± 0.60	5.83 ± 0.60
2850	50.28 ± 0.90	51.29 ± 0.90	-15.80 ± 0.90	11.57 ± 0.90

COMMANDER'S STATION

1850	25.42 ± 0.80	25.92 ± 0.80	-8.02 ± 0.65	5.65 ± 0.65
2850	50.48 ± 0.90	51.29 ± 0.90	-16.10 ± 0.95	11.27 ± 0.95

MOVING MODE

Gunner's solutions – Wind zero (manual mode), ALT zero, Ta +59°F (s) range input from rangefinder, laser in test mode, ammo select by gunner – HEP, remaining tube life 100% (new).

GUNNER'S STATION

Range	Elevation, +15 Cant (mils)	Deflection, +15 Cant (mils)
2850	52.9 ± 0.90	-2.18 ± 0.90

TABLE XIII. Manual wind/altitude/air temperature correction solutions.

Wind 30 mph from left (manual mode) ALT 2000, Ta -60°F, moving mode, ammo select by commander -HEAT, range input from rangefinder, remaining tube life 100% (new).

GUNNER'S STATION

Range	Elevation (mils)	Deflection (mils)
1850	9.20 ± 0.55	-3.62 ± 0.45
2850	18.01 ± 0.6	-6.52 ± 0.55

TABLE XIV. Target lead correction solutions, stationary mode, nonstabilized.

Tg OFF, Ta +59°F(s), ALT zero, Wind zero in manual mode, CANT zero, STATIONARY mode, STAB OFF; track at rates of 0, 04, 12, 24 mils/sec. Deflections solutions only. Ammo - HEAT, remaining tube life 100% (new).

GUNNER'S STATION

Range	Deflection at Tracking Rate (Mils)						
	24.0 CW 1/	12.0 CW 1/	4.0 CW 1/	0.0	4.0 CCW 2/	12.0 CCW 2/	24.0 CCW 2/
850	20.09 ± 1.00	-	3.50 ± 0.70	-	-	-9.78 ± 0.85	-
1200	-	14.58 ± 1.00	-	-	-	-	-
1850	-	24.38 ± 1.35	-	-	-	-	-
2850	-	-	-	-0.25 ± 1.35	-15.21 ± 1.65	-	-

COMMANDER'S STATION

Range	Deflection at Tracking Rate (Mils)						
	24.0 CW 1/	12.0 CW 1/	4.0 CW 1/	0.0	4.0 CCW 2/	12.0 CCW 2/	24.0 CCW 2/
850	-	-	-	-	-	-	-19.52 ± 1.1
1200	-	-	-	-	-4.86 ± 0.85	-	-
1850	-	-	7.85 ± 1.00	-	8.51 ± 1.05	-	-
2850	-	-	14.41 ± 1.65	-	-	-	-

1/ CW - Clockwise
2/ CCW - Counterclockwise

TABLE XV. Target lead correction solutions, moving mode, stabilized.

Ta +59°F(s), ALT zero in manual mode, CANT zero, track at rates of 0, 4, 12, 24 mils/sec. Deflection solutions only. Ammo - HEAT, MOVING MODE STAB ON, remaining tube life 100% (new).

GUNNER'S STATION

	Deflection at Tracking Rate (Mils)						
Range	24.0 CW 1/	12.0 CW 1/	4.0 CW 1/	0.0	4.0 CCW 2/	12.0 CCW 2/	24.0 CCW 2/
850	-	-	-	-	-	-	-19.74 ± 1.85
1200	-	-	-	-	-4.86 ± 0.90	-	-
1850	-	-	8.03 ± 1.25	-	8.33 ± 1.30	-	-
2850	-	-	14.71 ± 2.20	-	-	-	-

COMMANDER'S STATION

	Deflection at Tracking Rate (Mils)						
Range	24.0 CW 1/	12.0 CW 1/	4.0 CW 1/	0.0	4.0 CCW 2/	12.0 CCW 2/	24.0 CCW 2/
850	20.30 ± 1.95	-	3.71 ± 0.80	-	-	-9.57 ± 1.20	-
1200	-	14.57 ± 1.60	-	-	-	-	-
1850	-	24.20 ± 2.45	-	-	-	-	-
2850	-	-	-	-0.55 ± 1.15	-15.51 ± 2.25	-	-

TABLE XVI. Automatic wind correction solution.

Test conditions – Manual range, Ta +59 °F (s), CANT zero, ALT zero, moving mode, auto wind, Ammo – HEAT, remaining tube life 100% (new).

GUNNER'S STATION

Range	Elevation at wind speed (mils)		Deflection at wind speed (mils)	
	7.5 mph from right	7.5 mph from left	7.5 mph from right	7.5 mph from left
2850	-	-	1.36 ± 1.25	-1.85 ± 1.25

TABLE XVII. Remaining tube life correction solutions.

Wind zero (manual mode), ALT zero, Ta +59 °F (s), CANT zero, moving mode, range input from rangefinder, laser in test mode, ammo select by gunner, - HEP, 1200 m range inserted by laser battle range, remaining tube life 0%.

GUNNER'S STATION

Range	Elevation (mils)	Deflection (mils)
1200	16.15 ± 0.55	-0.59 ± 0.50

3.5.9.6.4 Ammo select. Upon system turn-on APDS ammunition shall be automatically selected (see 4.6.4.9.6.4).

3.5.9.7 Indirect fire control.

3.5.9.7.1 Elevation quadrant. At zero gun elevation and with the bubble centered in the level vial, the knob scale and the index scale shall be adjusted to read zero. The reading on the elevation quadrant shall correspond to the position of the gun within plus or minus 1 mil at all angles of elevation and depression (see 4.6.4.9.7.1).

3.5.9.7.2 Azimuth indicator backlash. The backlash of the azimuth indicator shall not exceed 0.5 mil at any position of the turret (see 4.6.4.9.7.2).

3.5.9.7.3 Leveling devices. The level on the ballistic drive shall be level within 15 minutes (three graduations) when the gun is at the boresight position and the ballistic drive superelevation input shaft is at the position specified on the ballistic drive input shaft qualification plate (see 4.6.4.9.7.3).

3.5.9.8 Cupola weapon sighting system.

3.5.9.8.1 Synchronization. The line of sight shall be synchronized with the cupola machine gun so that the line of sight of the commander's periscope AN/VSG-2 maintains a given azimuth and elevation relationship (established at horizontal gun position) with the centerline of the machine gun bore within 1.8 mils at all gun positions between 10° depression and 30° elevation, and within 3 mils at all gun positions between 30° elevation and 50° elevation (see 4.6.4.9.8.1).

3.5.9.8.2 Elevation backlash. The elevation backlash of the cupola machine gun sighting system shall be not more than 0.6 mils at any position, exclusive of machine gun free barrel movement (see 4.6.4.9.8.2).

3.5.9.8.3 Boresight knob travel. The boresight knobs on the periscope shall be adjustable to not less than 5 mils down, 2 mils up, 4 mils left and 4 mils right, as measured from the boresight position (see 4.6.4.9.8.3).

3.5.9.8.4 Boresight retention. The line of sight of the commander's periscope shall maintain previously established boresight within 1.5 mils (see 4.6.4.9.8.4).

3.5.9.8.5 Interlock assembly location. The interlock assembly shall be located for azimuth coincidence of the machine gun line of sight and the main armament line of sight at 1200 m within 2 mils (see 4.6.4.9.8.5).

3.5.9.8.6 Night vision. Actuation of the night vision channel switch of the commander's M36E1 (passive) periscope shall remove the shutter from the optical path and shall provide low light level operation, viewing and sighting through the night vision channel. Image brightness shall be maximum with the tube control knob in the extreme clockwise position. The reticle shall not be illuminated with the reticle control knob in the OFF position, and shall be of maximum brightness with the reticle control knob in the extreme clockwise position (see 4.6.4.9.8.6).

3.5.10 Electrical system.

3.5.10.1 105mm gun firing circuits. The 105mm gun firing circuits shall be capable of providing the energy necessary [1.25 A for 100 milliseconds (ms)] to ignite a main round. The firing circuit shall also provide the following (see 4.6.4.10.1).

a. The probe shall be grounded at all times, except during application of the firing voltage.

b. The firing control circuits shall include the "dead man" switching feature which prevents subsequently loaded rounds from detonating until the firing switch "trigger" has been released after the previous round.

c. Interconnections shall be provided to allow firing circuit activation from the alternate emergency switch on the manual elevation pump handle, and provide emergency mode firing as in 3.5.10.2.

3.5.10.2 Emergency mode firing. In the event of a firing circuit failure, the blasting machine shall be capable of firing the round (see 4.6.4.10.2).

3.5.10.3 Coaxial and cupola machine gun firing circuits. The machinegun firing circuits shall be capable of providing the energy necessary (13 A) to operate their respective machinegun solenoids (see 4.6.4.10.3).

3.5.10.4 105mm gun and machine gun circuit controls. The firing circuit controls will be arranged and interlocked to allow the commander to fire the 105mn gun, the coaxial machine gun, the cupola machine gun; and the gunner to fire the 105mm gun and the coaxial machine gun. A safety switch, manually operated from the loader's station, shall open the firing circuit to the 105mm gun from the commander's and gunner's station with the switch in the SAFE position. These circuits shall be closed with the switch in the FIRE position (see 4.6.4.10.4).

3.5.10.5 Smoke grenade discharger circuits.

3.5.10.5.1 Arming. The power-on (ready) lamp in the grenade power box shall illuminate when the master battery switch, the turret power switch, and the grenade system power switch are all ON (see 4.6.4.10.5.1).

3.5.10.5.2 Circuit voltage. Voltage at the smoke grenade discharger firing pins shown in figure 6 shall be as indicated in table XVIII when the power-on (ready) lamp is illuminated and the appropriate firing pushbutton is actuated (see 4.6.4.10.5.2).

TABI.E XVIII. Smoke grenade discharger firing pin voltage.

Firing Pushbutton	Left discharger firing pins	Right discharger firing pins	Voltage
RIGHT	1, 2, 5	3, 4, 6	Vehicle (see 3.3.17.6)
RIGHT	3, 4, 6	1, 2, 5	0 ± 0.5 V dc
LEFT	3, 4, 6	1, 2, 5	Vehicle (see 3.3.17.6)
LEFT	1, 2, 5	3, 4, 6	0 ± 0.5 V dc

3.5.11 Reliability operation. During 4000-mile reliability operational tests, the vehicle combat loaded or with a simulated load of equal weight shall be capable of operating as follows (see 4.6.4.11).

a. 25 percent on paved roads, either concrete or asphalt, or any combination of the two.

b. 25 percent on gravel and dirt roads with at least 10 percent of this distance under mud conditions.

c. 25 percent on level, cross country.

d. 25 percent on hilly cross country.

3.6 Environmental. The vehicle shall operate in ambient air temperature of 115 to -25°F, and with special equipment installed, at temperatures to -65 °F. The complete vehicle, when prepared for storage, shall withstand temperature extremes of 160 to -65°F without deterioration of any component that may cause failure of the systems and/or subsystems (see 4.7).

3.7 Welding repairs. Welding repairs of any type or class shall be made only when, and to the extent, specifically authorized by the acquisition activity (see 4.8).

3.8 Painting. Unless otherwise specified (see 6.2), the exterior and interior of the vehicle and all components, assemblies, subassemblies, and parts that require painting shall be prepared and painted in accordance with MIL-STD-193. Vehicle exterior paint shall be Forest Green Camouflage, lusterless enamel, Alkyd, per MIL-E-52798. The vehicle interior paint shall match color chip 17875 of FED-STD-595. All sliding parts and operating contact surfaces shall be free of paint (see 4.9).

3.9 Identification data plates. All plates shall be in accordance with the applicable drawings (see 4.10).

3.10 Marking. Marking and marking paint shall conform to TT-E-527, lusterless black, color chip 37038 of FED-STD-595 as specified on Drawing 8750019 (see 4.11).

3.11 Workmanship. the workmanship shall be of a quality to assure that the vehicle and components thereof conform to the drawings and detail specifications at time of manufacture and break-in (see 4.12).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform or witness any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Inspection equipment. Unless otherwise specified in the contract (see 6.2), the contractor is responsible for the provision and maintenance of all inspection equipment necessary to assure that supplies and services conform to contract requirements. Inspection equipment must be capable of repetitive measurements to an accuracy of 10 percent of the measurement tolerance. Calibration of inspection equipment shall be in accordance with MIL-STD-45662.

4.2 Classification of inspection:

a. First article inspection (see 4.4).
   1. Preproduction inspection (see 4.4.1).
   2. Initial production inspection (see 4.4.2).

b. Quality conformance inspections (see 4.5).
   1. Acceptance tests (see 4.5.2).
   2. Control tests (see 4.5.3).
   3. Comparison tests (see 4.5.4).

4.3 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be conducted under the following conditions:

a. Air temperature 23 $\pm$ 10 °C
b. Barometric pressure 725 + 50mm Hg
   - 75
c. Relative humidity 50 $\pm$ 30 percent

4.4 First article inspection. First article inspections shall be performed on preproduction or initial production samples as specified herein. Approval of the first article sample by the Government shall not relieve the contractor of the obligation to supply vehicles that are fully representative of those inspected as a first article sample. Any change or deviation of the production units from the first article sample shall be subject to the approval of the contracting officer.

4.4.1 Preproduction inspection. When specified (see 6.2), a preproduction vehicle (see 3.1.1), shall be inspected as specified in table XIX to ascertain vehicle conformance with the requirements of this specification. Inspection shall be performed at a location approved by the Government.

4.4.1.1 Preproduction failure. Failure of a preproduction model to comply with any of the requirements specified shall be cause for refusal by the Government to conduct a retest until corrective measures satisfactory to the Government have been taken.

4.4.2 Initial production inspection. Unless otherwise specified (see 6.2), initial production inspection shall consist of Manufacturer's Inspection and Government Proving Ground Vehicle Test.

4.4.2.1 Manufacturer's inspection.

4.4.2.1.1 Special processes and in-process inspections. A special processes and in-process inspection will be conducted by Government representatives during fabrication of the first production vehicle to evaluate conformance of materials, processes and workmanship. As a minimum, inspection shall cover the following:

a. Materials, welding, surface hardening, heat treating, protective finishes, etc. shall be reviewed and evaluated for records, processing procedures and plan of quality control.

b. The hull and turret shall be inspected individually prior to covering the weldments with paint or other pertinent components or assemblies to verify welding processes and fixture adequacy.

c. Hull assembly, turret assembly and break-in stations shall be reviewed and evaluated for records, procedures and test equipment required by applicable quality assurance requirements.

TABLE XIX. Classification of inspections.

Title	Requirement	Inspection	First article	Quality conformance		
				Acceptance	Control	Comparison
Materials	3.2	4.6.1	X	X		X
Design and construction	3.3	4.6.2	X	X		X
Sealing	3.3.1	4.6.2.1	X	X		X
Hatch seals	3.3.1.1	4.6.2.1.1	X	X	X	X
Vision device/receptacle seals	3.3.1.2	4.6.2.1.2	X	X	X	X
Hydraulic lines	3.3.2	4.6.2.2	X 1/	X 1/		X 1/
Ventilation system	3.3.3	4.6.2.3.1	X	X		4.6.2.3.2
Controls	3.3.4	4.6.2.4	X	X		X
Adjustment mechanisms	3.3.5	4.6.2.5	X	X		X
Vision devices/receptacles	3.3.6	4.6.2.6	X	X	X	X
Gas particulate system	3.3.7	4.6.2.7	X	X	X	X
Air flow	3.3.7.1	4.6.2.7.1	X	X		X
Air heater	3.3.7.2	4.6.2.7.2	X	X		X
Stowed equipment	3.3.8	4.6.2.8	X	X	X	X
Electromagnetic characteristics	3.3.9	4.6.2.9	X	X		X
Radiated emissions	3.3.9.1	4.6.2.9	X	X		X
Radiated susceptibility	3.3.9.2	4.6.2.9	X	X		X
Electromagnetic compatibility	3.3.9.3	4.6.2.9	X	X		X
Noise hazerd	3.3.10	4.6.2.10	X	X		X
Continuous noise level	3.3.10.1	4.6.2.10	X	X		X
Operator's protection	3.3.10.2	4.6.2.10	X	X		X
Hull	3.3.11	4.6.2.11				
Cooling system	3.3.11.1	4.6.2.11.1	X	X		X
Fuel system	3.3.12	4.6.2.12				
Fuel tanks, and lines cleanliness	3.3.12.1	4.6.2.12.1	X 1/	X 1/		X 1/
Heater fuel feed	3.3.12.2	4.6.2.12.2	X 1/	X 1/		X 1/
Fuel shutoff valve	3.3.12.3	4.6.2.12.3	X	X		X
Fuel system (slope)	3.3.12.4	4.6.2.12.4	X	X		X
Fuel tank (rapid fill)	3.3.12.5	4.6.2.12.5	X	X	X	X
Hatches	3.3.13	4.6.2.13				
Driver's hatch	3.3.13.1	4.6.2.13.1	X	X	X	X
Driver's escape hatch	3.3.13.2	4.6.2.13.2	X	X	X	X

TABLE XIX. Classification of inspections - Continued.

Title	Requirement	Inspection	First article	Quality conformance		
				Acceptance	Control	Comparison
Loader's and commander's hatches	3.3.13.3	4.6.2.13.3	X	X	X	X
Seats	3.3.14	4.6.2.14				
Driver's seat	3.3.14.1	4.6.2.14.1	X	X	X	X
Gunner's seat	3.3.14.2	4.6.2.14.2	X	X		X
Commander's platform seat and upper swing seat	3.3.14.3	4.6.2.14.3	X	X		X
Loader's seat	3.3.14.4	4.6.2.14.4	X	X		X
Fire extinguisher	3.3.15	4.6.2.15	X	X	X	X
Battery access door	3.3.16	4.6.2.16	X	X	X	X
Electrical system	3.3.17	4.6.2.17				
Power plant electrical	3.3.17.1	4.6.2.17.1	X	X		X
Lights	3.3.17.2	4.6.2.17.2	X	X		X
Interior lighting	3.3.17.3	4.6.2.17.3	X	X		X
Hull-to-turret slipring	3.3.17.4	4.6.2.17.4	X	X		X
Cupola slipring	3.3.17.5	4.6.2.17.5	X	X	X	X
Alternator voltage	3.3.17.6	4.6.2.17.6	X	X	X	
Driver's night viewer power circuit	3.3.17.7	4.6.2.17.7	X	X	X	X
Air cleaner blower motors	3.3.17.8	4.6.2.17.8	X	X		X
Engine manifold heater	3.3.17.9	4.6.2.17.9	X	X	X	X
Auxiliary outlet	3.3.17.10	4.6.2.17.10	X	X		X
Personnel heater	3.3.17.11	4.6.2.17.11	X	X		X
Engine smoke generator	3.3.17.12	4.6.2.17.12	X	X	X	X
Communications system	3.3.18	4.6.2.18	X	X		
Break-in run	3.4	4.6.3	X 1/	X 1/		X 1/
8-mile road test	3.4.1	4.6.3.1	X 1/	X 1/		X 1/
Performance	3.5	4.6.4				
Vehicle mobility	3.5.1	4.6.4.1	X	X		X
Power plant and power train	3.5.2	4.6.4.2	X	X		X
Speeds	3.5.3	4.6.4.3				
Level road speeds	3.5.3.1	4.6.4.3.1	X	X		X
Grade speeds	3.5.3.2	4.6.4.3.2	X	X		X
Level road drift	3.5.3.3	4.6.4.3.3	X	X		X
Acceleration	3.5.3.4	4.6.4.3.4	X	X		X
Climbing	3.5.3.5	4.6.4.3.5	X	X		X
Engine starting on grades and slopes	3.5.3.6	4.6.4.3.6	X	X		X

TABLE XIX. Classification of inspections - Continued.

Title	Requirement	Inspection	First article	Quality conformance		
				Acceptance	Control	Comparison
Braking and drift	3.5.4	4.6.4.4				
Stopping	3.5.4.1	4.6.4.4.1	X	X		X
Holding	3.5.4.2	4.6.4.4.2	X	X		X
Turning	3.5.5	4.6.4.5	X	X		X
Fording	3.5.6	4.6.4.6				
Shallow water	3.5.6.1	4.6.4.6.1	X	X		X
Deep water	3.5.6.2	4.6.4.6.2	X	X		X
Engine starting in shallow water	3.5.6.3	4.6.4.6.3	X	X		X
Shallow water contamination	3.5.6.4	4.6.4.6.4	X	X	X	X
Inflatable seal and pump	3.5.6.5	4.6.4.6.5	X	X	X	X
Drain valves	3.5.6.6	4.6.4.6.6	X	X	X	X
Trench crossing	3.5.7	4.6.4.7	X	X		X
Vertical obstacles	3.5.8	4.6.4.8	X	X		X
Turret/cupola	3.5.9	4.6.4.9				
Nylon ballistc shield	3.5.9.1	4.6.4.9.1	X	X	X	X
System backlash	3.5.9.2	4.6.4.9.2	X	X	X	X
Turret and gun control system	3.5.9.3	4.6.4.9.3				
Gun elevation speeds	3.5.9.3.1	4.6.4.9.3.1	X	X		X
Turret traversing speeds	3.5.9.3.2	4.6.4.9.3.2	X	X		X
Gun laying on stationary target,vehicle stationary	3.5.9.3.3	4.6.4.9.3.3	X	X	X	X
Gun laying on moving target and tracking accuracy	3.5.9.3.4	4.6.4.9.3.4	X	X		X
Operation on slopes	3.5.9.3.5	4.6.4.9.3.5	X	X		X
Stability of operation, vehicle stationary	3.5.9.3.6	4.6.4.9.3.6				
Non-stabilized mode	3.5.9.3.6.1	4.6.4.9.3.6.1	X	X		
Gun stability, non-stabilized mode	3.5.9.3.6.1	4.6.4.9.3.6.1.1	X			X
Stabilized mode	3.5.9.3.6.2	4.6.4.9.3.6.2	X		X	X
Traverse and elevation limits	3.5.9.3.7	4.6.4.9.3.7	X	X		X
Override control	3.5.9.3.8	4.6.4.9.3.8	X	X		X

TABLE XIX. Classification of inspections - Continued.

Title	Requirement	Inspection	First article	Quality conformance		
				Acceptance	Control	Comparison
Hydraulic pressure limit switch	3.5.9.3.9	4.6.4.9.3.9	X	X		X
Turret traverse brake	3.5.9.3.10	4.6.4.9.3.10				
Elevation shut-off valve	3.5.9.3.11	4.6.4.9.3.11	X	X		X
Travel locks	3.5.9.3.12	4.6.4.9.3.12	X	X		X
Stabilization aim retention	3.5.9.3.13	4.6.4.9.3.13	X	X		X
Azimuth	3.5.9.3.13.1	4.6.4.9.3.13.1	X	X		X
Elevation	3.5.9.3.13.2	4.6.4.9.3.13.2	X	X		X
Control system deadspot	3.5.9.3.14	4.6.4.9.3.14	X	X		X
105mm gun manual control	3.5.9.3.15	4.6.4.9.3.15				
Traverse effort	3.5.9.3.15.1	4.6.4.9.3.15.1	X	X		X
Elevation effort	3.5.9.3.15.2	4.6.4.9.3.15.2	X	X		X
Elevation response rate	3.5.9.3.15.3	4.6.4.9.3.15.3	X	X		X
Power and manual control	3.5.9.3.16	4.6.4.9.3.16	X	X		X
Superelevatin actuator	3.5.9.3.17	4.6.4.9.3.17				
Accuracy	3.5.9.3.17.1	4.6.4.9.3.17.1	X	X	X	X
Gun motion	3.5.9.3.17.2	4.6.4.9.3.17.2	X	X	X	X
Stabilized mode	3.5.9.3.17.3	4.6.4.9.3.17.3	X	X	X	X
Hydraulic fluid	3.5.9.3.18	4.6.4.9.3.18				
Cleanliness	3.5.9.3.18.1	4.6.4.9.3.18.1	X	X	X	X
Leakage	3.5.9.3.18.2	4.6.4.9.3.18.2	X	X		X
Cupola weapon control	3.5.9.4	4.6.4.9.4				
Traverse effort	3.5.9.4.1	4.6.4.9.4.1	X	X		X
Elevation effort	3.5.9.4.2	4.6.4.9.4.2	X	X	X	X
Elevation limits	3.5.9.4.3	4.6.4.9.4.3	X	X	X	X
Fire control system	3.5.9.5	4.6.4.9.5	X	X		X
105mm gun sighting system	3.5.9.5.1	4.6.4.9.5.1				
Synchronization	3.5.9.5.1.1	4.6.4.9.5.1.1	X	X	X	X
Elevation backlash	3.5.9.5.1.2	4.6.4.9.5.1.2	X	X	X	X
Boresight knob travel	3.5.9.5.1.3	4.6.4.9.5.1.3	X	X	X	X
Thermal vision channel	3.5.9.5.1.4	4.6.4.9.5.1.4	X	X	X	X
Unity sight knob travel	3.5.9.5.1.5	4.6.4.9.5.1.5	X	X	X	X
Boresight retention	3.5.9.5.1.6	4.6.4.9.5.1.6	X	X	X	X
Laser range finder	3.5.9.5.2	4.6.4.9.5.2				
LRF system power turn on	3.5.9.5.2.1	4.6.4.9.5.2.1	X	X		X
Mode control switch	3.5.9.5.2.2	4.6.4.9.5.2.2	X	X		X
RANGE switch	3.5.9.5.2.3	4.6.4.9.5.2.3	X	X		X

TABLE XIX. Classification of inspections - Continued.

Title	Requirement	Inspection	First article	Quality conformance		
				Acceptance	Control	Comparison
RESET swtich	3.5.9.5.2.4	4.6.4.9.5.2.4	X	X		X
Range return selector switches	3.5.9.5.2.5	4.6.4.9.5.2.5	X	X		X
Remote range reset switch	3.5.9.5.2.6	4.6.4.9.5.2.6	X	X		X
Malfunction light	3.5.9.5.2.7	4.6.4.9.5.2.7	X	X		X
GO light	3.5.9.5.2.8	4.6.4.9.5.2.8	X	X		X
SELECT light	3.5.9.5.2.9	4.6.4.9.5.2.9	X	X		X
FEED switch	3.5.9.5.2.10	4.6.4.9.5.2.10	X	X		X
LIGHT rheostat	3.5.9.5.2.11	4.6.4.9.5.2.11	X	X		X
Emergency power switch	3.5.9.5.2.12	4.6.4.9.5.2.12	X	X		X
Battle range switch	3.5.9.5.2.13	4.6.4.9.5.2.13	X	X		X
Laser self test	3.5.9.5.2.14	4.6.4.9.5.2.14	X	X		X
Laser system lasing	3.5.9.5.2.15	4.6.4.9.5.2.15	X	X		X
Computer system	3.5.9.6	4.6.4.9.6				
Computer self test	3.5.9.6.1	4.6.4.9.6.1	X	X		X
Common zero and zeroing	3.5.9.6.2	4.6.4.9.6.2	X	X	X	X
Ballistics solutions	3.5.9.6.3	4.6.4.9.6.3	X	X	X	X
Ammo select	3.5.9.6.4	4.6.4.9.6.4	X	X	X	X
Indirect fire control	3.5.9.7	4.6.4.9.7				
Elevation quadrant	3.5.9.7.1	4.6.4.9.7.1	X	X	X	X
Azimuth indicator backlash	3.5.9.7.2	4.6.4.9.7.2	X	X	X	X
Leveling devices	3.5.9.7.3	4.6.4.9.7.3	X	X	X	X
Cupola weapon sighting system	3.5.9.8	4.6.4.9.8				
Synchronization	3.5.9.8.1	4.6.4.9.8.1	X	X	X	X
Elevation backlash	3.5.9.8.2	4.6.4.9.8.2	X	X	X	X
Boresight knob travel	3.5.9.8.3	4.6.4.9.8.3	X	X	X	X
Boresight retention	3.5.9.8.4	4.6.4.9.8.4	X	X	X	X
Interlock assembly location	3.5.9.8.5	4.6.4.9.8.5	X	X	X	X
Night vision	3.5.9.8.6	4.6.4.9.8.6	X	X	X	X
Electrical system	3.5.10	4.6.4.10				
105mm gun firing circuits	3.5.10.1	4.6.4.10.1	X	X		X
Emergency mode firing	3.5.10.2	4.6.4.10.2	X	X		X
Coaxial and cupola machine gun firing circuits	3.5.10.3	4.6.4.10.3	X	X		X

TABLE XIX. Classification of inspections - Continued.

Title	Requirement	Inspection	First article	Quality conformance		
				Acceptance	Control	Comparison
105mm gun and machine gun circuit controls	3.5.10.4	4.6.4.10.4	X	X		X
Smoke grenade discharger circuits	3.5.10.5	4.6.4.10.5	X	X		X
Arming	3.5.10.5.1	4.6.4.10.5.1	X	X		X
Circuit voltage	3.5.10.5.2	4.6.4.10.5.2	X	X	X	X
Reliability operation	3.5.11	4.6.4.11	X	X		X
Environmental	3.6	4.7	X	X		X
Welding repairs	3.7	4.8	X 1/	X 1/		X 1/
Painting	3.8	4.9	X	X		X
Identification data plates	3.9	4.10	X	X		X
Marking	3.10	4.11	X	X		X
Workmanship	3.11	4.12	X	X		X

1/ Perform prior to final inspection.

4.4.2.1.2 Government proving ground vehicle test. After completion of Manufacturer's Inspection on the first completed vehicle, a second vehicle, or vehicles, shall be selected (see 6.2) from the first ten vehicle produced, and shall be subjected to inspections specified in table XIX. Subsequent to these tests, the selected vehicle(s) shall be subjected to the 4000 mile test specified in table XX at a site selected by the Government. This test will be performed by the Government and will establish the baseline for subsequent Inspection Comparison Tests (ICT) during the life of the contract.

TABLE XX. 4000 mile Government proving ground test.

Course	Mileage and speeds
Hard surface roads	1000 miles at varying speeds up to maximum
Gravel or dirt roads	1000 miles at varying speeds up to maximum
Level, cross-country terrain	1000 miles at varying speeds up to maximum
Hilly, cross-country terrain	1000 miles at varying speeds up to maximum

4.4.2.1.3 Initial production failure. Failure of an initial production vehicle because of any deficiency of a workmanship or materials nature during or as the result of initial production inspection and/or test shall be cause for rejection of the vehicle. Further, the Government may refuse to continue acceptance of production vehicles until evidence has been provided by the contractor that corrective action has been taken to eliminate the deficiency. Any deficiency found, during or as a result of the 4000-mile test, shall be evidence that all vehicles already accepted prior to completion of the 4000-mile test are similarly deficient unless evidence satisfactory to the contracting officer is furnished by the contractor that they are not similarly deficient.

4.5 Quality conformance inspections.

4.5.1 Preparation for acceptance tests. Before submitting a vehicle for acceptance tests (see 4.5.2), the contractor shall have performed the following in-process inspections:

a. Parts, components, and assembly inspections in accordance with applicable drawings and specifications.
b. Hull and turret installation (see 4.4.2.1.1).
c. Break-in run (see 3.4).
d. 8-mile road test (see 3.4.1).
e. Welding repairs (see 3.7).
f. Fuel tank and line cleanliness (see 3.3.12.1).
g. Heater fuel feed (see 3.3.12.2).
h. Engine and transmission pre-installation check.
i. 105mm gun balance (see 3.5.9.3.17.2).
j. Hydraulic line cleanliness (see 3.3.2).

4.5.2 Acceptance tests (100 percent). Each vehicle presented for acceptance shall be subjected to the acceptance tests specified in table XIX. After the tests, the vehicle shall be examined for evidence of fuel or lubricant leakage or any other deficiencies.

4.5.3 Control tests. Control tests shall be conducted on the first vehicle off the production line, or one of the first 10 vehicles produced, and thereafter one per month or one vehicle per 100 produced. The vehicle shall be subjected to the control tests specified in table XIX at the manufacturer's facility.

4.5.4 Comparison tests. The Government may select vehicles anytime during the contract production period and subject these vehicles to tests specified in table XIX to reveal deficiencies of manufacture or design that may reduce the effective operation of these items in the field and to compare existing quality with previous standards. These tests shall be conducted over the course specified in table XXI at Government laboratories or proving grounds designated by the contracting officer. Selection of vehicles shall be on a random basis. Comparison test vehicles shall be combat loaded with all BII stowed in their applicable spaces to conform to 3.3.8. Vehicles selected shall not include any vehicle previously tested for conformance to 4.5.3.

TABLE XXI. 2000 mile test combat loaded (Government proving ground).

Course	Mileage and speeds
Hard surface roads	200 miles at varying speeds up to maximum
Gravel and dirt roads	500 miles at varying speeds up to maximum
Level cross country	650 miles at varying speeds up to maximum
Hilly cross country	650 miles at varying speeds up to maximum

4.5.5 Failure. Failure of any vehicle to pass any of the specified inspections shall be cause for the Government to refuse acceptance of the production quantity represented, until action taken by the contractor to correct defects and prevent recurrence has been approved by the Government.

4.6 Methods of inspection.

4.6.1 Materials. Conformance to 3.2 shall be determined by inspection of contractor records providing proof or certification that design, construction, processing, and materials conform to requirements. Applicable records shall include drawings, specifications, design data, receiving inspection records, processing and quality control standards, vendor catalogs and certifications, industry standards, test reports, and rating data.

4.6.2 Design and construction. To determine conformance to 3.3, a visual, dimensional, and functional inspection shall be performed to determine if the vehicle has been constructed to the installations defined on Drawings 8750019. A walk-around inspection of the outside and inside of the vehicle shall be performed and the results entered in the FIR. Record all deficiencies. Visually examine all components for condition, mounting, location, clearance, etc. Manually operate all items where practical.

4.6.2.1 Sealing. Conformance to 3.3.1 shall be determined at various stages of acceptance inspection.

4.6.2.1.1 Hatch seals. To determine conformance to 3.3.1.1 all entry hatches shall be closed and locked and 3 gallons of water sprayed on each hatch over a 3 minute period. All entry hatches shall be checked for leakage. The driver's escape hatch shall be checked in conjunction with 4.6.4.6.1.

4.6.2.1.2 Vision devise/receptacle seals. To determine conformance to 3.3.1.2, the driver's, gunner's and commander's periscopes, and all vision blocks shall be checked for leakage in conjunction with 4.6.2.1.1.

4.6.2.2 Hydraulic lines. To determine conformance to the requirements of 3.3.2, after all road testing, the vehicle shall be given a thorough examination for hydraulic leaks. Any drip that occurs when vehicle has been standing idle with the components at ambient temperature or any leak at a static fit, metal-to-metal, or gasket combination shall constitute failure to comply.

4.6.2.3 Ventilation system. To determine conformance to 3.3.3, an inspection specified below shall be performed as applicable.

4.6.2.3.1 Vent blower. Conformance to 3.3.3 shall be determined during acceptance inspection by observing the operation of the vent blower while performing road tests and when the vehicle is idling.

4.6.2.3.2 Contamination level. To determine conformance 3.3.3 tests shall be conducted in accordance with the procedure specified in USA TECOM Material Test Procedure 2-2-614, dated 18 June 1968, except as follows:

a. Firing tests shall be conducted with the ventilation system and engine operating, and all hatches closed.

b. 105mm gun firing contamination levels shall be determined for one 3-round salvo for each type of ammunition designated for 105mm weapon.

c. Secondary weapon contamination levels shall be determined for one 220-round burst fired from each vehicle machine gun simultaneously.

CAUTION: WHEN CONDUCTING THESE TESTS, SAFETY PRECAUTIONS SHALL BE EXERCISED.

4.6.2.4 Controls. To determine conformance to 3.3.4, all controls shall be operated, adjusted, and checked for functional requirements. The full requirement cannot be met until the vehicle has been subjected to all specified environments and all control functions as specified.

4.6.2.5 Adjustment mechanisms. To determine conformance to 3.3.5, all adjustment mechanisms requiring adjustment shall be checked for proper adjustment, function and proper installation in accordance with applicable drawings.

4.6.2.6 Vision devices/receptacles. To determine conformance to 3.3.6, the vision device receptacles shall be checked for the ability to receive and hold vision devices without binding or interference, the gunner's and commander's periscopes shall be checked for their ability to maintain their sighting capabilities as specified.

4.6.2.7 Gas particulate system.

4.6.2.7.1 Air flow. To determine conformance to 3.3.7.1, the airflow shall be checked at each crew position with the gas particulate system operating.

4.6.2.7.2 Air heater. To determine conformance to 3.3.7.2, the heater shall be checked for illumination of the indicator light and temperature rise when the specified voltage applied and switch actuated. The indicator lights shall be observed during operation for verification that the thermostat is cycling on and off to maintain the chosen temperature.

4.6.2.8 Stowed equipment. To determine conformance to 3.3.8, all BII except ammunition shall be stowed (combat loaded) on the vehicle. Ammunition shall be simulated in size and weight. All items shall fit into the space provide and all fastening devices secured. All BII used shall be of the latest production available to the contractor. The contractor will be permitted to unpackage, install, and repackage BII used for this test.

4.6.2.9 Electromagnetic characteristics. To determine conformance to 3.3.9 through 3.3.9.3, the production vehicle test 4.4.2.1.2 shall include electromagnetic interference tests in accordance with MIL-STD-462, Notice 3. When testing the radio for susceptibility (RS03), care must be taken to assure that any apparent susceptibility is not being caused by harmonics generated on the test source. As an aid to determine intrasystem compatibility, broadband conducted emissions on the 28 V dc bus shall be compacted to the limits of CE07. Broadband radiated emission limits shall be as specified in figures 1 and 2 when measured at a 6.0 +0.1, -0.0 m distance from the vehicle. Test plans shall be approved by the procuring activity.

4.6.2.10 Noise hazard. To determine conformance to 3.3.10.1 and 3.3.10.2, the average of three noise level readings at each octave band shall be determined at each operator's head position under normal operating procedures. The sound level meter, microphone-related equipment and techniques employed shall be in accordance with definition per MIL-STD-1474. Verify that the noise hazard signs are clearly visible to personnel in all crew stations.

4.6.2.11 Hull.

4.6.2.11.1 Cooling system. Conformance to 3.3.11.1 shall be determined during acceptance inspection by observing the engine and transmission oil temperature indicators on the driver's panel at all stages of vehicle operation. With the vehicle operating at ambient temperature, observe the engine and oil temperature indicators on the driver's panel. Verify that the temperature indicators remain in the green area during all stages of vehicle operations as specified in 3.3.11.1.

4.6.2.12 Fuel system.

4.6.2.12.1 Fuel tanks and line cleanliness. Provisions shall be made to assure the internal cleanliness of the fuel tanks and lines prior to initial fueling of vehicle. No leakage of fuel tanks and/or lines is acceptable.

4.6.2.12.2 Heater fuel feed. With either of the fuel system pumps and the heater pump operating, the fuel system shall produce a minimum of 7 psi at outlet of the heater pump line.

4.6.2.12.3 Fuel shutoff valve. To determine conformance to 3.3.12.3, with the engine operating at 2000 to 2200 rpm, the fuel shutoff handle shall be actuated to the OFF position; the engine shall stop operating within the time specified. The test shall be repeated placing the fuel shutoff switch in the OFF position; the engine shall stop operating within the time specified.

4.6.2.12.4 Fuel system (slope). To determine conformance to 3.3.12.4, the vehicle shall be driven up and down 60 percent grades without loss of fuel supply to the engine. Perform this inspection in conjunction with 4.6.4.3.4 and 4.6.4.3.5.

4.6.2.12.5 Fuel tank (rapid fill). To determine conformance to rapid fill requirements of 3.3.12.5, the tank shall be filled at a rate of not less than 50 gallons per minute, and observed for leaks before and after a road test on smooth, level, hard-surfaced road.

4.6.2.13 Hatches.

4.6.2.13.1 Driver's hatch. To determine conformance to 3.3.13.1, a force gage shall be attached to the driver's hatch when it is in the closed position and the hatch shall be pulled to the open position and back to the closed position. The force shall be as specified. With the hatch in a closed position, the force required to lock the driver's hatch cover shall be measured with a force gage attached to the end of the locking lever and shall be as specified.

4.6.2.13.2 Driver's escape hatch. To determine conformance to 3.3.13.2, the driver's escape hatch shall be checked by attaching a force gage to the handle at the point specified, releasing the latch, and noting that the force required is as specified. Caution shall be exercised in making the escape hatch check by assuring that the area under the hatch is free of personnel and equipment before releasing the handle. After performing this test, the shallow waterfording test shall be performed and the hatch checked for sealing ability as specified in 3.3.1.1.

4.6.2.13.3 Loader's and commander's hatches. To determine conformance to 3.3.13.3, attach a force gage to the locking latch and measure the force required to unlock the latch. Measure the force required to push each hatch to its extreme open-latched position. Close the hatch and measure the downward force required to pull the hatch into a locking position and the rotational force required to lock the hatch.

4.6.2.14 Seats.

4.6.2.14.1 Driver's seat. To determine conformance to 3.3.14.1, each driver's seat lever shall be actuated and the seat shall move forward, backward, and vertically as appropriate. A force gage shall be attached to each lever as specified and the force required to actuate shall be measured. All sliding parts and operating contact surfaces shall be examined for absence of paint.

4.6.2.14.2 Gunner's seat. To determine conformance to 3.3.14.2, the gunner's seat (no load) shall be slid through its full range, locked and unlocked, and checked for the minimum distance specified. With no load on the seat, the force required to pull the adjusting pin shall be measured and shall be as specified.

4.6.2.14.3 Commander's platform and upper swing seat. To determine conformance to 3.3.14.3, the platform (no load) shall be slid through its full range, locked and unlocked, and checked for the minimum distance specified. The seat, also with no load, shall be checked for operability through its specified range. The force required to release the seat or to rotate it shall be measured and shall be as specified.

4.6.2.14.4 Loader's seat. To determine conformance to 3.3.14.4, the loader's seat shall be pulled to the seated position and then released to see if it returns to the vertical position.

4.6.2.15 Fire extinguisher. To determine conformance to 3.3.15, the fire extinguisher shall be tested for operation. With the engine idling at 700 to 800 rpm, the internal control shall be pulled with a maximum effort of 55 lbf ft using a force gage. The first shot shall actuate one bottle. After a delay of more than 6 seconds but less than 11 seconds, the engine shall have stopped and the system shall begin discharging CO_2, into the engine compartment and in the center of the engine "V". After returning the handle to its original position, a second actuation shall discharge the remaining two bottles of CO_2 Removal and weighing of each CO_2 bottle after test shall show a minimum of 9 lb of CO_2 discharged during test.

CAUTION: WHEN CONDUCTING THESE TESTS, SAFETY PRECAUTIONS SHALL BE EXERCISED (SEE 6.3.1).

4.6.2.16 Battery access door. To determine conformance to 3.3.16, a force gage shall be attached to the battery door latch and the force required to open the latch shall not exceed that specified. The door shall open and close freely and the latch shall be free of paint.

4.6.2.17 Electrical system.

4.6.2.17.1 Power plant electrical. To determine conformance to 3.3.17.1, during operation of the vehicle, the driver's instrument panel shall be observed for proper display of engine functions as specified.

4.6.2.17.2 Lights. To determine conformance to 3.3.17.2, the internal and external lights shall be tested for operation as specified during and after the 8-mile road test.

4.6.2.17.3 Interior lighting. To determine conformance to 3.3.17.3, the hatches shall be closed and each crew position domelight shall be turned on and the intensity of each raised and lowered. Each light shall perform as specified.

4.6.2.17.4 Hull-to-turret slipring. To determine conformance to 3.3.17.4, the slipring shall be checked for positive electrical contact for 360° of turret rotation.

4.6.2.17.5 Cupola slipring. To determine conformance to 3.3.17.5, the cupola slipring circuits shall be checked for positive electrical contact for 360° of cupola rotation.

4.6.2.17.6 Alternator voltage. To determine conformance to 3.3.17.6 , the alternator voltage shall be checked at the battery at existing ambient temperature with the engine operating at 1000 rpm. The voltage reading shall fall within the limits specified in figure 7 and be not less than 18.5 V when the hydraulic power pack is energized.

4.6.2.17.7 Driver's night viewer power circuit. To determine conformance to 3.3.17.7, connect a one ampere load to the driver's night viewer connector. Activate the master battery control switch and the driver's night viewer switch. Measure the voltage drop between the vehicle battery positive terminal and the night viewer connector. The voltage drop shall be no greater than 0.2 V.

4.6.2.17.8 Air cleaner blower motors. To determine conformance to 3.3.17.8, the air cleaner blower outlets shall be checked for proper air flow during engine operation, and no flow when the engine is not operating properly.

4.6.2.17.9 Engine manifold heater. To determine conformance to 3.3.17.9, the pushbutton switch on the purge pump handle and the starter switch shall be actuated and pin "A" of the engine electrical disconnect shall be checked for proper voltage.

4.6.2.17.10 Auxiliary outlet. To determine conformance to 3.3.17.10, the BII trouble light or suitable voltmeter shall be attached to the auxiliary outlets and checked for operation. The light or suitable voltmeter shall be removed and each circuit overloaded to check circuit breaker operation.

4.6.2.17.11 Personnel heater. To determine conformance to 3.3.17.11 actuate the HI/LO switch to either position and verify reduced speed blower motor operation. Verify that the indicator lamp on the control panel lights within four minutes of turn-on as an indication of burner ignition. Subsequent to ignition, verify that the blower motor is operating at full speed in both the HI/LO switch positions and that the high heat is generated when the HI/LO switch is in the Hi position and low heat is generated when in the LO position. When the HI/LO switch is turned to the OFF position, verify that the indicator light goes out and the blower motor shuts off within 3.5 minutes.

4.6.2.17.12 Engine smoke generator. To determine conformance to 3.3.17.12, when the engine is equipped with an engine smoke generator, activate the smoke generator switch when the engine is warm and operating at 1600 rpm. Verify that both the right and left exhaust ducts emit white smoke.

4.6.2.18 Communications system. To determine conformance to 3.3.18a, each intercom set shall be functionally inspected to ensure proper operation. To determine conformance to 3.3.18b, when a radio set is specified (see 6.2) the radio set shall be functionally inspected through the AN/VIC-1(V) intercom set to ensure proper operation.

4.6.3 Break-in run. To determine conformance to 3.4, each vehicle shall be lubricated and serviced prior to the break-in run. The run shall be on smooth, level, and hard-surface roads for the distance specified in table III. The vehicle shall be operated in reverse after each division.

4.6.3.1 8-mile road test. To determine conformance to 3.4, each vehicle shall be operated a distance of 8 miles or more by the contractor prior to submitting the vehicle for acceptance tests.

4.6.4 Performance.

4.6.4.1 Vehicle mobility.

4.6.4.2 Power plant and power train. To determine conformance to 3.5.2, the vehicle shall be operated throughout all gear and speed ranges as specified herein and checked for functional requirements. The powertrain, final drives, tracks, suspension system, and controls shall be checked throughout all speed and steering ranges and shall perform as specified.

4.6.4.3 Speeds.

4.6.4.3.1 Level-road speeds. To determine conformance to 3.5.3.1, the vehicle shall be operated at maximum speed for not less than 10 minutes and at minimum speed for not less than 5 minutes and checked for function of powerplant and powertrain. Drift shall be not more than that specified in 3.5.3.3. During the maximum speed test cycle, the vehicle shall maintain a speed of not less than 30 mph for a distance of 100 yards 10 consecutive times.

4.6.4.3.2 Grade speeds. To determine conformance to 3.5.3.2, the vehicle shall be operated at a sustained speed of 10 mph while ascending a 10 percent grade and at a 20 mph speed while ascending a 3 percent grade.

4.6.4.3.3 Level road drift. To determine conformance to 3.5.3.3, the vehicle drift shall be checked at break-in (see 4.6.3) when traveling between 25 and 30 mph.

4.6.4.3.4 Acceleration. To determine conformance to 3.5.3.4, the vehicle shall be accelerated from a standing start through a distance of 200 ft and the time checked for performance as specified.

4.6.4.3.5 Climbing. To determine conformance to 3.5.3.5, the vehicle shall be driven in forward and reverse gear up an approved 60 percent grade and on 30 percent side slopes, engine stopped and restarted and observed for functional fuel system and climbing requirements. This test may be performed in conjunction with 4.6.4.4.

4.6.4.3.6 Engine starting on grades and slopes. To determine conformance to 3.5.3.6, the engine shall start and oil pressure and temperature shall be maintained when operating on specified grades and slopes with the fuel tanks filled to no more than 50 percent of capacity. This test may be performed in conjunction with 4.6.4.3.4 and 4.6.4.4.

4.6.4.4 Braking and drift.

4.6.4.4.1 Stopping. To determine conformance to 3.5.4.1, the vehicles shall be operated at 20 mph on dry, level, hard-surfaced roads without loose material, and stopped as specified. The results of three consecutive stopping and drift distances shall be averaged to make this determination. To determine drift, the tank shall be stopped within the specified 60 ft braking distance without manual steering corrections. The distance from the line of travel established at the time braking is initiated shall not exceed 4 feet per 60 feet of measured braking distance.

4.6.4.4.2 Holding. To determine conformance to 3.5.4.2, a load of 6000 lb shall be placed on the vehicle in a position that will not restrict the flow of engine air (intake or exhaust). The vehicle shall be driven up a 60-percent dry; hard grade and the service brakes checked, and then the parking brakes checked for conformance. Checks shall be made with the vehicle headed up and down grade. This test may be performed in conjunction with 4.6.4.3.5 and 4.6.4.3.6.

4.6.4.5 Turning. To determine conformance to 3.5.5, the vehicle shall be operated and turned to the right and to the left in full 360° pivot turn in neutral steer and checked for functional requirements. During this test, the vehicle shall be brought to a full stop before reversing the turning direction. The full turns shall be accomplished within a 35-foot diameter circle.

4.6.4.6 Fording.

4.6.4.6.1 Shallow water. To determine conformance to 3.5.6.1, the chassis shall be driven into water of specified depth with the engine compartment drain valve open and without special equipment. During and after this period, water accumulation in the crew compartment hull floor shall not be more than specified depth. After water fording, verify that there is no water accumulation in the right or left brake housings.

4.6.4.6.2 Deep water. To determine conformance to 3.5.6.2, verify that the following deep water fording features of the vehicle function and conform to applicable drawings:

a. Bilge pump, switch, and indicator light operational.
b. Bilge hose, outlet valve and attaching hardware are as specified.
c. Right fuel tank properly vented into the air cleaner outlet elbow.
d. Air cleaner intake ducts are reversible from the crew compartment side of the bulkhead.
e. Exhaust snorkel mounting faces on engine rear exhaust doors.

When a deep water fording kit is specified for the vehicle (see 6.2), a fording kit shall be installed and the vehicle driven into a hard bottom body of water 8 ft in depth and held at that depth for 30 minutes, with the bilge pump operating as required. The accumulation of water shall be checked and shall be not more than 3 inches in the crew compartment hull floor in the center of the "V". After deep water fording, verify that there is no water accumulation in the right or left brake housings.

4.6.4.6.3 Engine starting in shallow water. Conformance to the starting requirements of 3.5.6.3, shall be checked in conjunction with shallow water fording of 4.6.4.6.1. The engine shall be idled at 1000 rpm for 15 minutes, be stopped, and restarted in not more than 3 minutes with all accessories functioning satisfactorily during and after test.

4.6.4.6.4 Shallow water contamination. To determine conformance to 3.5.6.4, the vehicle, after water fording test, shall be examined for contamination of lubricants of the transmission, engine, final drive, and roadwheels 2, 3, 4, and 5 and one of their corresponding arms, on each side of the vehicle. Contamination shall not exceed two percent by volume.

4.6.4.6.5 Inflatable seal and pump. To determine conformance to 3.5.6.5, a force gage shall be attached to the pump plunger and pump actuated to arrive at the specified pressure as indicated on the inflatable seal pressure gage. The maximum force shall be not more than that specified. The indicated pressure loss during a 30-minute period shall not exceed 5 psi. CAUTION: THE PRESSURE SHALL BE RELIEVED AT THE CONCLUSION OF THIS TEST.

4.6.4.6.6 Drain valves. To determine conformance to 3.5.6.6, a force gage shall be attached to the end of the handgrip of the front valve lever and actuated as specified. The rear valve lever shall also have the gage attached and actuated as specified. The front and rear drain valve levers shall operate at the force specified and the valves checked for functional and dimensional requirements.

4.6.4.7 Trench crossing. The vehicle shall be driven at a speed not to exceed 5 mph without stalling over trenches as specified in 3.5.7. The main gun shall be in the forward, fully elevated position. After the test, the vehicle shall be examined for damage.

4.6.4.8 Vertical obstacles. The vehicle shall be driven forward at a speed not to exceed 5 mph without stalling over vertical obstacles as specified in 3.5.8. The main gun shall be in the forward, full elevated position. After the test, the vehicle shall be examined for damage.

4.6.4.9 Turret/cupola.

4.6.4.9.1 Nylon ballistic shield. To determine conformance to 3.5.9.1, the following tests shall be performed concurrently with synchronization tests of 4.6.4.9.5.1:

a. Coaxial machine gun deflection. With the 105mm gun on its zero aiming point, a simulated machine gun containing a centering aperture shall be installed in the machine gun mount. The mount shall be adjusted to boresight position while viewing the coaxial machine gun target through the centering hole in the simulated machine gun. A deflection measuring device shall be mounted to the gun shield and coaxial machine gun deflection shall be checked at 105mm gun elevation of plus 20° and minus 10°.

b. Gunner's telescope sighting system deflection. With the gunner's telescope set initially in its boresight position, deflection shall be tested by observing the gunner's telescope targets located at plus 15° and minus 5° on the target stand, as the main gun muzzle telescope reticle is superimposed on its appropriate targets.

4.6.4.9.2 System backlash. To determine conformance to 3.5.9.2, the backlash test shall be conducted using the gunner's telescope to measure the amount of backlash. A perpendicular force of 70 lbf ft shall be applied approximately 20 in from the muzzle end of the gun and exerted first in the traverse plane of rotation and then in the elevation plane. Backlash is the angular movement of the gun in traverse and elevation when the applied force is reversed. Before conducting this test, assure that the backlash has been adjusted according to the installation drawing.

4.6.4.9.3 Turret and gun control system. Prior to performing the tests of 4.6.4.9.3 through 4.6.4.9.3.17.3, vehicles shall be completely assembled, serviced with applicable fluids, and lubricants but need not be combat loaded. The following conditions shall also be met.

a. Preliminary examination of nitrogen pressure and oil level.

b. Verification of alternator voltage inspection.

c. The turret shall be level within 1° except for slope tests and moving vehicle tests.

After tests, the vehicle shall be examined for leaks and workmanship deficiencies possibly caused by operation. The turret and electrical system shall be as specified in 3.5.9.3 during these tests.

4.6.4.9.3.1 Gun elevation speeds. Tests shall be conducted to determine the elevation and depression controllability over the speed ranges specified in 3.5.9.3.1. Tests shall be conducted for both the stabilized and non-stabilized modes with both the gunner and commander power handles.

4.6.4.9.3.2 Turret traversing speeds. The turret shall be tested for controllability over the speed ranges specified in 3.5.9.3.2. Tests shall be conducted while operating in the stabilized mode and again in the non-stabilized mode, with gunner and commander power controls, and in both directions of turret rotation. The accumulator shall be fully charged prior to maximum traverse speed tests. Maximum speeds shall be checked by allowing the turret to accelerate approximately 400 mils from stop and observing the time required to complete the next 3200 mils (1/2 revolution) of traverse. The main gun shall be at zero elevation or above during these tests. Tests for gunner's handle displacement shall be conducted in both the stabilized and non-stabilized mode in both directions of rotation. Performance shall be as specified in 3.5.9.3.2.

4.6.4.9.3.3 Gun laying on stationary target, vehicle stationary. To determine conformance to 3.5.9.3.3, tests shall be performed in accordance with the following:

a. Tests with the gunner's controls shall be conducted with the vehicle operating in the power mode. Tests with the commander's controls shall be conducted with the vehicle operating in the stabilized mode. Tests with the manual controls shall be conducted from the gunner's position only.

b. The time requirement shall be met for an equal number of trials right and left traverse or elevation and depression. For combined traverse and elevation/depression layoffs, the time requirements apply to an equal number of trials from each of four directions from the target.

c. For acceptance testing, sighting on the specified target shall be performed for positions 3, 5, and 7 of table IV. Two trials shall be made and the average time shall be used for determination of compliance.

4.6.4.9.3.4 Gun laying on moving target and tracking accuracy. To determine conformance to 3.5.9.3.4, tests shall be conducted in accordance with the following:

a. Testing with the gunner's and commander's controls shall be conducted with the commander's control in the power mode and with the gunner's control in the stabilized mode. A suitable turret tracking instrument with timer, recorder and calibrating device shall be used for performing tests. Tests shall be conducted in both clockwise and counterclockwise directions.

b. For acceptance testing, traverse rates of 0.5, 3.3, 32.6 and 65.2 mils per second as shown in table V shall be used.

4.6.4.9.3.5 Operation on slopes. To determine conformance to 3.5.9.3.5, tests shall be conducted in accordance with the following:

a. The vehicle shall be located on a 15 $\pm$ 2° slope for laying on target as specified in table IV. Tests with the gunner's controls shall be conducted with the vehicle operating in the non-stabilized mode. Tests with the commander's controls shall be conducted with the vehicle operating in the stabilized mode. Manual control tests shall be performed at the gunner's station.

b. For acceptance testing, sighting on the specified target shall be accomplished for positions 3, 5, and 7 of table IV for power and stabilized modes. Two trials shall be made and the average time used for determination of compliance. One trial shall be made for positions 3 and 5 for the manual mode.

4.6.4.9.3.6 Stability of operation, vehicle stationary.

4.6.4.9.3.6.1 Nonstabilized mode. To determine conformance to 3.5.9.3.6.1, for the elevation axis, the following test shall be performed with the turret level, turret electrical power OFF and engine inoperative:

a. Using the gunner's telescope and manual elevation handle, aline the main gun on a target within 1° of horizontal.

b. Install a magnetic base dial indicator with a minimum one-inch range on the turret roof, and set it at a predetermined point on the gun breech.

c. Again using the telescope and manual elevation handle, depress the gun at least 15 mils (without overloading the indicator) and then elevate the gun to the original target (a) without overshoot.

d. Make an indicator reading within 6 seconds after arriving on target and again after a one-hour period.

e. Verify that the breech has not moved more than 0.5 mil in the elevation axis.

4.6.4.9.3.6.1.1 Gun stability, nonstabilized mode. To determine conformance to 3.5.9.3.6.1, the following test shall be performed with the vehicle nose down on a 15° slope, the main gun horizontal and 90° to the vehicle front to rear axis, turret power switch ON and engine inoperative:

a. Using the gunner's telescope and manual elevation handle, aline the main gun on a target within 1° of horizontal.

b. Install a magnetic base dial indicator with a minimum one-inch range on the turret roof and set it at a predetermined point on the gun breech.

c. Install a similar indicator on the race ring and set it at a predetermined point on the race ring gear.

d. Using the telescope and power control handle depress and traverse the gun at least 15 mils off-target (without overloading either indicator) and then return the gun to the original target (a) without overshoot.

e. Read both indicators within 8 seconds after arriving on target and again after a one-hour period.

f. Verify that the gun has not moved more than 0.5 mil in elevation or traverse.

4.6.4.9.3.6.2 Stabilized mode. To determine conformance to 3.5.9.3.6.2, the vehicle shall be placed on a 15 degree slope with the 105mm gun in the stabilized mode and the engine running. The amount of drift shall be measured by noting movement of the periscope reticle on a clearly defined target. When performing any stabilized mode tests, the drift controls shall be adjusted, as specified, just prior to running the test.

4.6.4.9.3.7 Traverse and elevation limits. To determine conformance to 3.5.9.3.7, the elevation and depression limits of the 105mm gun shall be measured for 360° of traverse using power and manual controls as follows:

a. Power and manual controls, elevation/traverse switch ON:

1. Elevate the gun to 20°, first with manual and then with power controls. With the gun at 20° elevation, power traverse the turret for 360°.

2. Depress the gun to -10° and slowly power traverse the turret from the front of the vehicle to the rear. Verify that the gun remains at -10° within the zone of 90° each side of the front centerline of the vehicle.

3. Return the turret to approximately 65° from the vehicle front centerline. Fully depress the gun. Holding the control handle in elevation/depression neutral, traverse the turret at maximum speed to the rear and observe the gun clearance of all portions of the vehicle. The gun shall begin to rise at a point beyond 90° from the vehicle front centerline to clear the rear deck. The gun shall automatically stop elevating at a maximum of 2.5° elevation. Continue traverse over the rear deck to 90° from the vehicle front centerline. Repeat this test in the stabilized mode. Automatic elevation shall be not less than 6°.

4. With the gun at 0° elevation, power traverse the turret from 90° from the vehicle front centerline across the rear deck to the opposite 90° point. The traverse shall be accomplished without vehicle interference.

5. Repeat 2, 3, and 4 with power traversing from the opposite direction.

6. Repeat 2, 3, 4, and 5 except traverse manually and depress the gun with the manual hand pump.

b. Manual controls, elevation/traverse switch OFF:

1. Depress the gun to -4° and traverse the turret from an angle forward of the 90° vehicle transverse centerline, to an angle 25° from the vehicle rear centerline. Approach the 25° limiting angle slowly. Repeat this test from the opposite traverse direction.

4.6.4.9.3.8 Override control. To determine conformance to 3.5.9.3.8, the commander's controls shall be operated in both stabilized and non-stabilized modes and the control and movement of the gun shall be observed for performance as defined. With the commander and gunner controls in the neutral position, testing for gun movement while depressing or releasing the override switch in the commander's control shall be accomplished by observing no apparent movement of the gunner's telescope reticle superimposed on a clearly defined target.

4.6.4.9.3.9 Hydraulic pressure limit switch. To determine conformance to 3.5.9.3.9, the turret shall be traversed as specified and the system pressure gage observed for specified pressure as the powerpack motor comes on. With powerpack motor running and the controls in their neutral position, the powerpack motor shall cut out at the specified system pressure.

4.6.4.9.3.10 Turret traverse brake. To determine conformance to 3.5.9.3.10, the turret shall be placed in a level position and the turret azimuth noted on the azimuth indicator. With the gunner's power switch on and the stabilization switches off, the gunner's control handle shall be turned to its stop in a clockwise direction without actuating the palm switch. The azimuth indicator shall be observed for turret movement. The procedure shall be repeated in the counterclockwise direction. The turret shall then be power traversed at least 10° to the left with the gunner's controls, stopped, the position observed on the azimuth indicator and the gunner's control handle again turned to its right and then left stops without depressing the palm switch. The procedure shall be repeated after power traverse to the right. The azimuth indicator shall show no movement of the turret during any of these checks.

4.6.4.9.3.11 Elevation shut-off valve. To determine conformance to 3.5.9.3.11, the gunner's power switch shall be on, the stabilization switches off and without actuating the palm switch, the gunner's control handle shall be tilted forward and backward to its stop. Gun movement in the elevation quadrant shall not exceed 2 mils.

4.6.4.9.3.12 Travel locks. To determine conformance to 3.5.9.3.12, tests shall be conducted as follows:

a. Turret slippage tests shall be conducted with the turret lock disengaged and with the 105mm gun in a forward position. The vehicle shall then be operated on a smooth, hard-surface road in low gear at a speed of 5 mph and given a full-left, 90° steer. Turret slippage shall be measured with the azimuth indicator. The pivot steer tests shall be repeated in full right, 90° steer.

b. For elevation or depression slippage tests, the 105mm gun shall be elevated 3 to 8° in a forward position. The vehicle shall be driven on a straight-course, hard-surface road at 20 mph, stopped as specified, and the gun slippage measured with the M1A1 gunner's quadrant.

c. The hand traverse crank and the hand elevation crank shall be checked during road tests and during power operation of the turret for movement as specified.

d. The 105mm gun shall be clamped into the external travel lock and the internal turret lock shall be tested for capability of being placed in the locked position. Upon locking, the turret traverse controls shall be actuated and the turret shall remain locked.

4.6.4.9.3.13 Stabilization aim retention.

4.6.4.9.3.13.1 Azimuth. To determine conformance to 3.5.9.3.13.1, the following test shall be conducted:

> With the vehicle on level ground and operating in the stabilized mode, the vehicle shall be put into a right-pivot steer of approximately 45° at a speed of 4.5 to 9° per second and brought to a smooth stop. Just prior to the start of the pivot steer, the aiming point of the gunner's periscope reticle shall be alined on a clearly defined target at least 1000 m distant. During the pivot, the point of aim shall remain on target within 9 mils and at the end of pivot shall return to within 5 mils of the original point of aim. The test shall be repeated in a 45° left-pivot steer.

4.6.4.9.3.13.2 Elevation. To determine conformance to 3.5.9.3.13.2, the following test shall be conducted:

> The vehicle shall be positioned on a slope not to exceed 15° with the front of the vehicle down slope and with the brakes engaged, with the turret operating in the stabilized mode, the aiming point of the gunner's periscope reticle shall be alined on a clearly defined target at least 1000 m distant. The brakes shall be released and the vehicle allowed to coast down the slope to a level position causing vehicle attitude to change at a rate of 5 to 8° per second. During vehicle motion, the point of aim shall remain on target within 6 mils and when vehicle motion ceases shall return to within 3 mils of the original point of aim.

4.6.4.9.3.14 Control system deadspot. To determine conformance to 3.5.9.3.14, the gunner and the commander controls shall be operated as specified and the deflection of the control handles to initiate continuous movement of the gun in the test direction shall be measured with appropriate inspection equipment. When measuring the deadspot angle, the controls shall not be moved toward the neutral center once the gun and turret have begun to move.

4.6.4.9.3.15 105mn gun manual control.

4.6.4.9.3.15.1 Traverse effort. To determine conformance to 3.5.9.3.15.1, a torque gage shall be attached to the hand traverse crank shaft and the turret traversed with the torque gage, observing the effort required to maintain turret movement. The force shall be measured in each direction of rotation at four points throughout 360° of rotation (one in each quadrant). The torque required to maintain turret motion shall not exceed 76 lbf in.

4.6.4.9.3.15.2 Elevation effort. To determine conformance to 3.5.9.3.15.2, a torque gage shall be attached to the hand elevation crank and the torque required to maintain uniform movement shall be measured. The torque reading shall not exceed 45 lbf in mean torque with no individual reading exceeding 55 lbf in.

4.6.4.9.3.15.3 Elevation response rate. To determine conformance to 3.5.9.3.15.3, the main gun hand elevation crank shall be rotated at the rate of 10 to 20 rpm, while observing a mil-scale target through the gunner's periscope. The measured response rate shall be not less than 10 mils per revolution of the handle.

4.6.4.9.3.16 Power and manual control. To determine conformance to 3.5.9.3.16, the following tests shall be conducted: The gun shall be elevated and depressed with the gunner's power control while traversing the turret with the manual controls. The gun shall be elevated and depressed by manual control while traversing the turret with the gunner's power control. The elevation and traverse power switch shall be turned on and off not less than three times and the gun observed for movement. The stabilization switch shall be turned on and off not less than three time and the gun observed for movement. Gun movement shall not exceed the specified amount. With the stabilization system ON verify that the system can be deactivated by the commander's or loader's stabilization shut-off switch. The gun firing, switches shall be tested and shall operate as specified.

4.6.4.9.3.17 Superelevation actuator. To determine conformance to 3.5.9.3.17.1 and 3.5.9.3.17.2, the tests shall be performed utilizing the procedures specified in 4.6.4.9.6.3 for checking the accuracy of ballistic computer solutions. Prior to performing the tests, verify that the gun has been balanced per 4.5.1 and that the battery voltage is not less than 18 V. The dummy round used in balancing the gun shall not be used in the superelevation actuator tests.

4.6.4.9.3.17.1 Accuracy. To determine conformance to 3.5.9.3.17.1, verify the following:

a. With the computer in normal mode, HEP ammunition indexed, all conditions standard, manual range, and the gunner's periscope reticle on target, change the range from 1200 to 3200 m. After gun movement, the periscope reticle shall be on target within a tolerance of 2 mils in elevation.

b. Re-lay the periscope reticle on target and then change the range manually from 3200 to 1200 m. After gun movement, the periscope reticle shall be on target within a tolerance of 2 mils in elevation.

4.6.4.9.3.17.2 Gun motion. To determine conformance to 3.5.9.3.17.2, attach instrumentation to the gun breech to record gun elevation/depression rate-of-change and oscillation amplitudes. Make the following checks with the computer in NORMAL mode, HEP ammo, and MANUAL RANGE.

a. Record gun motion when going from a 1200 m range to a 3200 m range.

b. Record gun motion when going from a 3200 m range to a 1200 m range.

Verify that the requirements specified in 3.5.9.3.17.2, have been met.

4.6.4.9.3.17.3 Stabilized mode. Conformance to 3.5.9.3.17.3, shall be determined in conjunction with 4.6.4.9.6.3, and table XIII solutions. After superelevation, final lay on target in both azimuth and elevation shall not require more than 4 mils.

4.6.4.9.3.18 Hydraulic fluid. To determine conformance to 3.5.9.3.18, the hydraulic fluid shall be tested in accordance with MIL-H-46170.

4.6.4.9.3.18.1 Cleanliness. To determine conformance to 3.5.9.3.18.1, the fluid in the hydraulic power supply reservoir shall be tested for cleanliness of table VI and the water content specified.

4.6.4.9.3.18.2 Leakage. To determine conformance to 3.5.9.3.18.2, the turret and gun control system components shall be wiped clean before performing the test. During or after five cycles of elevating the 105mm gun in the interference zone, the leakage from the deck clearance valve shall not exceed that specified. During or after road tests, the vehicle shall be examined for leakage in the hydraulic system not to exceed the amount specified.

4.6.4.9.4 Cupola weapon control.

4.6.4.9.4.1 Traverse effort. To determine conformance to 3.5.9.4.1, a torque gage shall be attached to the cupola traverse mechanism and the torque measured to start cupola motion. Breakaway torque to start motion shall be as specified.

4.6.4.9.4.2 Elevation effort. To determine conformance to 3.5.9.4.2, a torque gage shall be attached to the screwjack handle and breakaway torque shall be determined for the directions specified. All three characteristics shall be within the limits specified.

4.6.4.9.4.3 Elevation limits. To determine conformance to 3.5.9.4.3, the cupola weapon shall be elevated and depressed to its extreme limits and the angle measured. Elevation and minimum depression limits shall be as specified.

4.6.4.9.5 Fire control system. To determine conformance to the requirements of 3.5.9.5, verify that the requirements specified in 3.5.9.3 have been met.

4.6.4.9.5.1 105mm gun sighting system.

4.6.4.9.5.1.1 Synchronization. To determine conformance to 3.5.9.5.1.1, perform the following test on the vehicle:

a. Position the vehicle on the level ground with a 15° ramp abutting the rear tracks.

b. The gun tube shall be leveled, laying from low to high.

c. Telescope sighting equipment (breechscope) shall be inserted in the gun tube and the turret shall be rotated as required to align the breechscope reticle on a suitable target at 1200 m range.

d. The computer shall be placed in boresight mode of operation at 1200 m with power applied to the system.

e. The reticle of the gunner's periscope (daylight body), gunner's telescope, and laser rangefinder shall be superimposed on its respective zero degree target by adjusting the appropriate boresight knobs.

f. Back the tank up the 15° ramp and realine the 105mm gun on the 1200 m target as viewed through the breechscope. Utilize the gunner's control handles as required to perform this alinement.

g. The three fire control instrument reticles shall be on target within the tolerances specified. This shall be determined by using the boresight knobs to bring the reticle back on target. The knobs shall be returned to their original settings.

4.6.4.9.5.1.2 Elevation backlash. To determine conformance to 3.5.9.5.1.2, backlash tests shall be made in accordance with the following procedure:

a. The 105mm gun shall be alined on a distant point by laying from low to high without overtravel.

b. The line of sight through the gunner's periscope (daylight) and the rangefinder shall be adjusted to superimpose their reticles on the same point as the gun.

c. The 105mm gun shall be realined with the aiming point by laying from high to low.

d. The backlash or the amount that each line of sight lags shall be measured by noting the new position of each reticle on the aiming point. Backlash for the periscope and the rangefinder shall not exceed the amount specified.

e. Backlash shall be checked at gun positions of zero, +5°, +10°, and +15°.

4.6.4.9.5.1.3 Boresight knob travel. Boresight knob travel shall be tested after synchronization requirements have been met. Knob travel shall be measured from a position established with the gun line of sight on a 1200 m distant aiming point laying from low to high and each reticle positioned on the same point. Boresight knob travel shall be as specified in 3.5.9.5.1.3.

4.6.4.9.5.1.4 Thermal vision channel. To determine conformance to 3.5.9.5.1.4, actuate the gunner's display unit mode switch to ON, and view a distant target image at least 5°F above ambient temperature. Verify that the target image is viewable at both the gunner's and commander's display units. Verify on the gunner's display unit that: 1) Thermal and reticle image brightness is maximum with their controls in the extreme clockwise position, 2) Image polarity is reversed when polarity switch is changed, and 3) Field of view changes upon actuation of the field-of-view lever. Actuate the gunner's/commander's switch on the display unit and verify override and control capabilities of the commander for brightness, contrast and polarity.

4.6.4.9.5.1.5 Unity sight knob travel. To determine conformance to 3.5.9.5.1.5, place the unit reticle on the 1200 m distant aiming point described in 4.6.4.9.5.1.3, using the gunner's unity sight knobs. From this position, rotate the unity knobs in elevation and then in deflection from stop to stop, and determine the total knob travel.

4.6.4.9.5.1.6 Boresight retention. To determine conformance to 3.5.9.5.1.6, testing shall be conducted in accordance with the following procedure.

a. Prior to the 8-mile road test, the vehicle shall be positioned at least 1200 m from a clearly defined target.

b. With the computer set for 1200 m boresight mode of operation, the 105mm gun shall be alined on target laying from low to high.

c. The gunner's periscope daylight reticle, the gunner's telescope reticle, and the rangefinder reticle shall be alined on target. Boresight knob positions of the sighting instruments shall be recorded.

d. The 8-mile road test shall be performed.

e. The vehicle shall be returned to the position established in a.

f. The 105mm gun shall be alined on the original aiming point, laying from low to high.

g. The boresight knob (excluding boresight knob backlash) of each sighting instrument shall be used, if necessary, to reposition their reticles on the original aiming point. Any loss of boresight retention shall be noted by the new boresight knob position and shall not exceed the limits specified.

4.6.4.9.5.2 Laser rangefinder (LRF). Prior to conducting the acceptance tests described below, the laser rangefinder shall be disabled as a safety precaution to prevent possible eye damage from the laser beam. Disablement can be accomplished by covering the LRF exit window or by installation of a special test cable which interrupts the trigger signals to the laser

pulse-forming network. The test cable must be removed at the conclusion of LRF tests and the LRF systems returned to its original condition. Since laser beam damage to the human eye is irreparable and may cause blindness, the following precautions are mandatory when the LRF is not disabled:

CAUTION:

1. EXERCISE PARTICULAR CARE WHEN THE RANGE SWITCH IS FLASHING IN EITHER THE "ON" OR "AUTO" MODE. THE LRF IS ARMED AND READY TO FIRE A PULSE OF LASER LIGHT UNDER THESE CONDITIONS.
2. DO NOT DEPRESS THE RANGE SWITCH WHEN IN EITHER THE" ON" OR "AUTO" MODE WITH THE RANGE SWITCH FLASHING.
3. DO NOT DEPRESS THE GUNNER'S LASER SWITCH WHEN IN EITHER THE "ON" OR "AUTO" MODE.

4.6.4.9.5.2.1 LRF system power turn on. To determine conformance to 3.5.9.5.2.1, the XM21 ballistics computer power switch shall be activated to the ON position and the system shall be observed for operation as specified.

4.6.4.9.5.2.2 Mode control switch. To determine conformance to 3.5.9.5.2.2, the mode control switch shall be rotated to the positions specified as the corresponding control lamps are observed for proper illumination.

4.6.4.9.5.2.3 RANGE switch. To determine conformance to 3.5.9.5.2.3, the range switch shall be actuated and the LRF shall be observed for proper ranging operations as specified.

4.6.4.9.5.2.4 RESET switch. To determine conformance to 3.5.9.5.2.4, the reset switch shall be activated as the specified indications are observed for occurrence.

4.6.4.9.5.2.5 Range return selector switches. To determine conformance to 3.5.9.5.2.5, during ranging operation test, the LRF shall be observed for proper operation as specified.

4.6.4.9.5.2.6 Remote range reset switch. To determine conformance to 3.5.9.5.2.6, the remote range reset switch shall be actuated and the system be observed for operation as specified.

4.6.4.9.5.2.7 Malfunction light. To determine conformance to 3.5.9.5.2.7, during ranging operation tests, the malfunction light and range display lights shall be observed for proper operation as specified.

4.6.4.9.5.2.8 GO light. To determine conformance to 3.5.9.5.2.8, the GO light and the specified switch buttons shall be observed for proper operation during ranging operation tests.

4.6.4.9.5.2.9 SELECT light. To determine conformance to 3.5.9.5.2.9, the SELECT light shall be observed for proper operation as specified during ranging operation lights.

4.6.4.9.5.2.10 FEED switch. To determine conformance to 3.5.9.5.2.10, the FEED switch shall be tested for proper operation as specified during ranging operation tests.

4.6.4.9.5.2.11 LIGHT rheostat. To determine conformance to 3.5.9.5.2.11, the LIGHT control shall be operated through its full range while observing the panel lights and range readouts for proper operation as specified.

4.6.4.9.5.2.12 Emergency power switch. To determine conformance to 3.5.9.5.2.12, the computer power shall be turned off, the emergency power switch shall be actuated and the LRF shall be observed for normal operation.

4.6.4.9.5.2.13 Battle range switch. To determine conformance to 3.5.9.5.2.13, the battle range switch shall be actuated as the computer and LRF is observed for proper operation as specified.

4.6.4.9.5.2.14 Laser self test. To determine conformance to 3.5.9.5.2.14, the laser mode control switch shall be placed in TEST position and input as specified in table IX shall be applied while all controls are observed for proper operation. Tests shall be conducted with ranging inputs from the commander's station and from the gunner's control handle.

4.6.4.9.5.2.15 Laser system lasing. To determine conformance to 3.5.9.2.15, targets as described shall be located at the specified distances and lasing operations in accordance with all requirements of 3.5.9.2.15 and table X shall be performed. Tests shall be conducted to verify correct operation from the gunner's and commander's station and with the gunner's remote range switch. During these tests correct LRF operation per the requirements of 3.5.9.5.2.1 through 3.5.9.5.3.14 shall be verified.

CAUTION: WHEN CONDUCTING THESE TESTS, SAFETY PRECAUTIONS SHALL BE EXERCISED (SEE 6.3.2).

4.6.4.9.6 Computer system.

4.6.4.9.6.1 Computer self test. To determine conformance to 3.5.9.6.1, the gunner's computer control unit mode selector switch shall first be placed in the LAMP position and then in the TEST position; the lamps shall be observed for operation as specified.

4.6.4.9.6.2 Common zero and zeroing. To determine conformance to 3.5.9.6.2, each jump and zeroing knob shall be checked as follows:

a. Elevation. The elevation common zeroing knobs of the gunner's control unit shall be rotated at +3.0 and -3.0 mil positions and the output unit superelevation counter shall be observed for a corresponding 3.0 mil count within $\pm$ 0.30 mil. The knob shall be rotated back to zero and the counter again observed, this time for return to its original count within $\pm$ 0.30 mil.

b. Deflection. Rotate the deflection common zeroing knobs as in a. and observe the gunner's periscope reticle for movement in a corresponding direction. The reticle shall be within +0.30 mil of the original setting.

4.6.4.9.6.3 Ballistics solutions. To determine conformance to 3.5.9.6.3, testing shall be conducted after synchronization, backlash and drift requirements have been met. Tests shall be performed in accordance with the following procedure, utilizing a grid board target and telescope alinement equipment for determining 105mm gun position:

a. Set the computer in the boresight mode of operation. Set the LRF in the test mode and introduce a 1200 m range by means of the BATTLE RANGE switch of the LRF. Position the computer zeroing and common zero knobs to their zero scale position.

b. Aline the main gun on zero position on the grid board, laying from low to high without overtravel.

c. Without moving the main gun from its zero position on the grid board, note the reticle position of the gunner's periscope and rangefinder lines-of-sight on the distant aiming points. (Collimators containing simulated aiming points of table XI may be utilized if desired.)

d. Set the computer in normal operation.

e. Set the cant unit on a positioning fixture and position the cant unit to the test angles specified within 1 minute of arc.

f. Establish the conditions specified in table XI.

g. Introduce a range specified in table XI, using the LRF for range input.

h. Realine the gunner’s daylight reticle on its aiming point, laying from low to high and from left to right.

i. The line-of-sight of the 105mm gun should now be checked on the grid board to verify the solution given in table XI is within the tolerances specified.

j. The inspection procedure above shall be followed for each range and ammunition specified in table XI, using the gunner's periscope (TTS) daylight reticle for gunner's solutions and the LRF sighting system for commander's solutions.

k. The above procedure shall be followed for all solutions of 3.5.9.6.3, using the specified conditions and controls for each table. Testing for the solutions specified in tables XIV and XV shall be performed with the turret traversing at the rates specified and in the direction specified. Traverse speed shall be uniform and within 1 percent of the specified speed for each test. The traverse rate shall be maintained at least 2 seconds prior to activating the lead button. Within the subsequent 20-second period, the periscope reticle shall be superimposed on its aiming point, and the main gun position shall be noted on the grid board. Gun position shall be as specified.

l. The coincidence requirement between the daylight and night channels shall be verified using the following procedure:

1. Set the computer on BORESIGHT.

2. Index HEP ammo; LRF Range: 1850 m; Wind: 20 mph from the left (Manual); Cant: Zero (Moving mode); Altitude: Zero; Ta + 59°F; and Remaining Tube Life: 100% (new).

3. Select a distant aiming point (500 m or greater) and by use of the boresight knobs, align the daylight and night reticle coincident up on the aiming point.

4. Set the computer to NORMAL.

5. When the computer solutions completed, lay the daylight reticle back upon the distant aiming point and verify that the night reticle is also coincident on the aiming point within the specified tolerance.

4.6.4.9.6.4 Ammo select. To determine conformance to 3.5.9.6.4, the ammo select test shall be performed in conjunction with the ballistic solution test of 4.6.4.9.6.3. Upon system turn-on verify that APDS ammo selector light is brighter than the other three ammo selector buttons on each ammo select unit. Verify that the 105mm gun goes to the APDS 1200 m solution at system turn-on by turning the system off for at least 5 seconds during HEP tests of table XI and then turning the system back on without actuating any other buttons. Upon system turn-on, the 105mm gun shall automatically settle at the APDS 1200 m solution.

4.6.4.9.7 Indirect fire control.

4.6.4.9.7.1 Elevation quadrant. To determine conformance to 3.5.9.7.1, with the turret in a level position, using a calibrated gunner's quadrant on the breech pads, the gun shall be elevated to 355.55 mils. The reading on the elevation quadrant shall not exceed that specified. The procedure shall be repeated with the gun at a depression of 177.78 mils.

4.6.4.9.7.2 Azimuth indicator backlash. To determine conformance to 3.5.9.7.2, the turret shall be traversed in a CW direction without overtravel and the zero of the outer movable dial positioned in line with the 1 mil pointer. A fixed vertical reference line shall be observed through the gunner's telescope and the corresponding boresight knob position noted. The turret shall then be traversed CW approximately 50 mils and returned to its zero azimuth indicator position without overtravel. The movement of the gunner's telescope boresight deflection knob required to realine the vertical line of sight with its original reference line is backlash error and shall not exceed 0.5 mil.

4.6.4.9.7.3 Leveling devices. To determine conformance to 3.5.9.7.3, the main gun shall be leveled at zero elevation as indicated by a bore leveling gage position in the chamber. The leveling device on the ballistic drive shall be observed for accuracy.

4.6.4.9.8 Cupola weapon sighting system.

4.6.4.9.8.1 Synchronization. To determine conformance to 3.5.9.8.1, synchronization tests shall be conducted in accordance with the following procedure.

a. A telescope adaptor shall be inserted into the machine gun opening.

b. A synchronization fixture shall be attached to the telescope adaptor.

c. A beam splitter and adaptor shall be attached to the periscope eyepiece.

d. Approximate zero gun position shall be established, laying from low to high.

e. The boresight knobs of the periscope shall be adjusted to autocollimate the periscope on the mirror of the synchronization fixture and the boresight knob position shall be recorded.

f. Laying from low to high, the periscope shall be within the synchronization limits specified in 3.5.9.8.1.

NOTE: Synchronization error at any gun position shall be measured by noting the boresight knob movement necessary to superimpose the periscope reticle on its reflected image from the mirror of the synchronization fixture.

4.6.4.9.8.2 Elevation backlash. To determine conformance to 3.5.9.8.2, backlash shall be checked after determining that synchronization requirements have been met. The equipment specified for synchronization checks of 4.6.4.9.8.1 shall be used for testing as follows:

a. Approximate zero gun position shall be established, laying from low to high.

b. The boresight knobs of the periscope shall be adjusted to autocollimate the periscope on the mirror of the synchronization fixture and the boresight knob positions shall be recorded.

c. Approximate zero gun position shall be established, laying from high to low.

d. The boresight knobs shall be moved, if necessary, to superimpose the periscope reticle on its reflected image from the mirror of the synchronization fixture. Boresight knob movement from the positions established in b. above shall not exceed the backlash limits established in 3.5.9.8.2.

e. Backlash shall be checked at gun positions of approximately 0°, 15°, 30°, and 50° elevation and 10° depression.

4.6.4.9.8.3 Boresight knob travel. To determine conformance to 3.5.9.8.3, boresight knob travel shall be tested after synchronization tests have been met. Tests shall be performed according to the following procedure:

a. With the periscope removed from its mount, the synchronization fixture shall be removed from the telescope adaptor and a telescope shall be inserted in the telescope adaptor.

b. The telescope shall be alined on the 105mm gun target of 4.6.4.9.5, laying from low to high without overtravel.

NOTE: The machine gun centerline shall not be disturbed for the remainder of boresight knob travel inspection steps.

c. The telescope shall be removed from its adaptor.

d. The periscope shall be reinstalled.

e. The boresight knobs shall be adjusted to superimpose the periscope reticle on the target in b. above. Boresight knob travel from this position shall be as specified in 3.5.9.8.3.

f. The cupola boresight knobs (excluding boresight knob backlash) shall be used if necessary to reposition the commander's periscope reticle on its original aiming point. Any loss of boresight retention shall be noted by the new boresight knob position and shall not exceed the limits specified.

4.6.4.9.8.4 Boresight retention. To determine conformance to 3.5.9.8.4, boresight retention of the commander's periscope line of sight with respect to the cupola machine gun shall be tested in accordance with the following procedure:

a. Prior to the 8-mile road test, the vehicle shall be positioned at least 1000 m from a clearly defined target.

b. The cupola machine gun centerline shall be alined on target laying from low to high.

c. The periscope reticle shall be alined on target with cupola boresight knobs. Knob position shall be recorded.

d. The 8-mile road test shall be performed.

e. The vehicle shall be returned to position established in a.

f. The cupola machine gun centerline shall be alined on original aiming point laying from low to high.

g. The cupola boresight knobs (excluding boresight knob backlash) shall be used if necessary to reposition the commander's periscope reticle on its original aiming point. Any loss of boresight retention shall be noted by the new boresight knob position and shall not exceed the limits specified.

4.6.4.9.8.5 Interlock assembly location. To determine conformance to 3.5.9.8.5, the following test shall be performed concurrently with the 105mm gun synchronization tests of 4.6.4.9.5.1.1. With the 105mm gun on its zero aiming point, the cupola interlock shall be engaged and the cupola machine gun line of sight shall be checked using a telescope and an adaptor to check vertical centerline of the telescope with a corresponding line on the target.

4.6.4.9.8.6 Night vision. Prior to determine conformance to 3.5.9.8.6, the image intensifier tube of the night vision channel shall be protected against damage from excessive incident light by placing an opaque stop or mask over the objective lens of the night elbow. The hole in the stop should be approximately 1/16 inch diameter and offset 1 inch from the stop's geometric center. Acutation of the right elbow ON-OFF switch to ON shall cause the target image to appear. Rotation of the night vision gain control (TUBE) clockwise shall increase the image intensity. Verify that the reticle is not visible when the reticle control knob is in the OFF position and becomes visible when the knob is rotated clockwise. Reticle brightness shall increase rotation of the control knob and decrease with counterclockwise rotation.

4.6.4.10 Electrical system.

4.6.4.10.1 105mm gun firing circuits. To determine conformance to 3.5.10.1, the following tests shall be conducted:

a. Utilizing a firing circuit tester with a 1.25 A load, verify that the circuits provide sufficient power to fire the 105mm gun as each firing trigger is actuated.

b. Tests shall be conducted for proper probe grounding as specified, the dead man switching feature, and proper interconnections of the emergency switch on the manual elevation pump handle and emergency mode firing with the blasting machine.

4.6.4.10.2 Emergency mode firing. To determine conformance to 3.5.10.2, the blasting machine circuits shall be checked for sufficient power to fire the 105mm gun.

4.6.4.10.3 Coaxial and cupola machine gun firing circuits. To determine conformance to 3.5.10.3, a 13 A load shall be connected at the output of each machine gun firing circuit and the voltage across each load shall be tested for the presence of vehicle voltage as each respective firing trigger is actuated.

4.6.4.10.4 105mm gun and machine gun circuit controls. To determine conformance to 3.5.10.4, the commander's controls and the gunner's controls shall be checked for ability to fire the weapons specified.

4.6.4.10.5 Smoke grenade discharger circuits.

4.6.4.10.5.1 Arming. To determine conformance to 3.5.10.5.1, operate the master battery switch to ON, the turret power switch to ON, and the grenade system power switch to ON, and verify that the power-on (ready) lamp in the grenade power box illuminates. Operate the grenade system power switch to OFF and verify that the power-on (ready) lamp is extinguished.

4.6.4.10.5.2 Circuit voltage. To determine conformance to 3.5.10.5.2, arm the circuit as specified in 4.6.4.10.5.1, and verify that the power-on (ready) lamp is illuminated. Actuate the RIGHT firing pushbutton and verify that the voltage on the smoke grenade discharger pins shown in figure 6 is as specified in 3.5.10.5.2. Actuate the LEFT firing pushbutton and verify that the voltage on the smoke grenade discharger pins is as specified. Return power-on (ready) switch to OFF and verify that voltage is not present on any of the firing pins. When the smoke grenade dischargers and pushbutton unit are not installed on the vehicle, the external firing circuits at the external connector shall be checked on each vehicle by inserting appropriate switching leads at the internal control point. The complete installation shall be checked on a control basis in conjunction with BII tests of 4.6.2.8.

4.6.4.11 Reliability. Vehicle reliability shall be tested to determine conformance to 3.5.11.

4.7 Environmental.

4.7.1 High temperature. To determine conformance to 3.3.11.1 (cooling system) and 3.6, the completed vehicle, properly serviced and equipped, shall be subjected to the high temperatures specified herein and observed for performance heating conditions and cooling system operation. During high temperature performance checks, the engine oil temperature shall be monitored at the oil cooler inlet. Engine oil and transmission oil temperatures shall not exceed that specified in 3.3.11.1. With the vehicle operating in an ambient air temperature of 115°F and a cooling air intake grille restriction not exceed 2-inch H_2O measured between cylinders and with a cooling air exhaust restriction not exceeding 4 inches H_2O measured above the cooling fans, for all transmission gear ranges above 0.3 maximum speed ratio point, the vehicle shall meet the performance requirements. When specified (see 6.2), storage tests in accordance with MIL-STD-810 shall be performed.

4.7.2 Low temperature. To determine conformance to 3.6, the vehicle, properly serviced and equipped, shall be subjected to the specified low temperature operational conditions. When specified (see 6.2), storage tests in accordance with MIL-STD-810 shall be performed.

4.8 Welding repairs. To determine conformance to 3.7, all welding repairs and burning operations shall be examined to determine that slag has been removed and approved procedures have been followed.

4.9 Painting. To determine conformance to 3.8, the exterior and interior of the vehicle shall be examined for app11cation of paint as specified in MIL-STD-193. All sliding parts and operating contact surfaces shall be free of paint as specified.

4.10 Identification data plates. To determine conformance to 3.9, the vehicle shall be examined for proper identification and data plates.

4.11 Marking. To determine conformance to 3.10, the vehicle shall be examined for marking as specified.

4.12 Workmanship. The vehicle shall be visually inspected to determine conformance to 3.11.

5. PACKAGING

5.1 Preparation for delivery. Preparation for delivery and storage shall be level A or level B of MIL-T-45309, as specified by the procuring activity (see 6.2).

6. NOTES

6.1 Intended use. This vehicle is intended for use by the Armed Forces as a combat vehicle.

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Vehicle nomenclature, drawing number, and date.
c. If a preproduction model is required (see 3.1.1).
d. If painting shall be other than as specified (see 3.8).
e. If responsibility for inspection shall be other than as specified (see 4.1).
f. If responsibility of test equipment shall be other than as specified (see 4.1.1).
g. If inspection condition shall be other than as specified (see 4.3).
h. If preproduction inspection is required (see 4.4.1).
i. If initial production inspection shall be other than as specified (see 4.4.2 and 4.4.2.1.2).
j. If a radio set is required (see 4.6.2.18).

k. If deep water fording kit is required (see 4.6.4.6.2).
l. If storage tests are required (see 4.7.1 and 4.7.2).
m. The level of protection required during preparation for delivery (see 5.1).

6.3 Safety precautions.

6.3.1 Fire extinguisher. Caution should be exercised in handling carbon dioxide fire extinguisher cylinders. They should not be dropped, permitted to strike each other, or be handled roughly. Extreme care should be exercised during reinstallation to avoid tripping the fire extinguisher control system since physical injury is highly probable.

6.3.2 Laser rangefinder. All test personnel shall receive a laser safety orientation and periodic eye examinations. All personnel in the immediate vicinity of the laser will wear safety eyewear when the laser is capable of being fired (when the power cable is connected). The laser will be treated as a direct-fire weapon possessing a hazardous range of approximately 20 km. When firing, provisions shall be made for adequate backstops and/or buffer zones. Do not fire the laser at reflective test targets or when reflective surfaces may intercept the beam. Ensure that filters are installed on their respective periscopes and on the telescopes to preclude any possible eye damage from exposure to the laser beam.

6.4 Fuels and lubricants. Fuels and lubricants used for vehicle break-in run and acceptance tests shall be changed as necessitated by seasonal temperature changed as directed by the contracting officer.

6.5 Definitions.

6.5.1 Leaks. The following definitions for leaks shall apply:

a. Weep - Any nonrecurring evidence of fluid beyond the seal.
b. Seep - Any recurring evidence of fluid beyond the seal that does not result in the formation of a droplet.
c. Droplet - Any recurring evidence of fluid beyond the seal that results in the formation of a nonfalling drop.
d. Drop - A drop is defined as a volume of 0.05 cc.
e. Drip - Any recurring evidence of fluid beyond the seal where a droplet forms and falls.

6.6 Recycled materials. The use of recycled materials which meet the requirements of the applicable material specifications without jeopardizing the intended use of the item shall be encouraged (see 3.2).

6.7 Supersession data. This military specification supersedes the requirements of M60PD-T-62289B(AT), dated 8 April 1982 and deletes the requirements of MIL-T-45379C(MO), dated 6 August 1964 and Amendment 2, dated 23 May 1973 in their entirety.

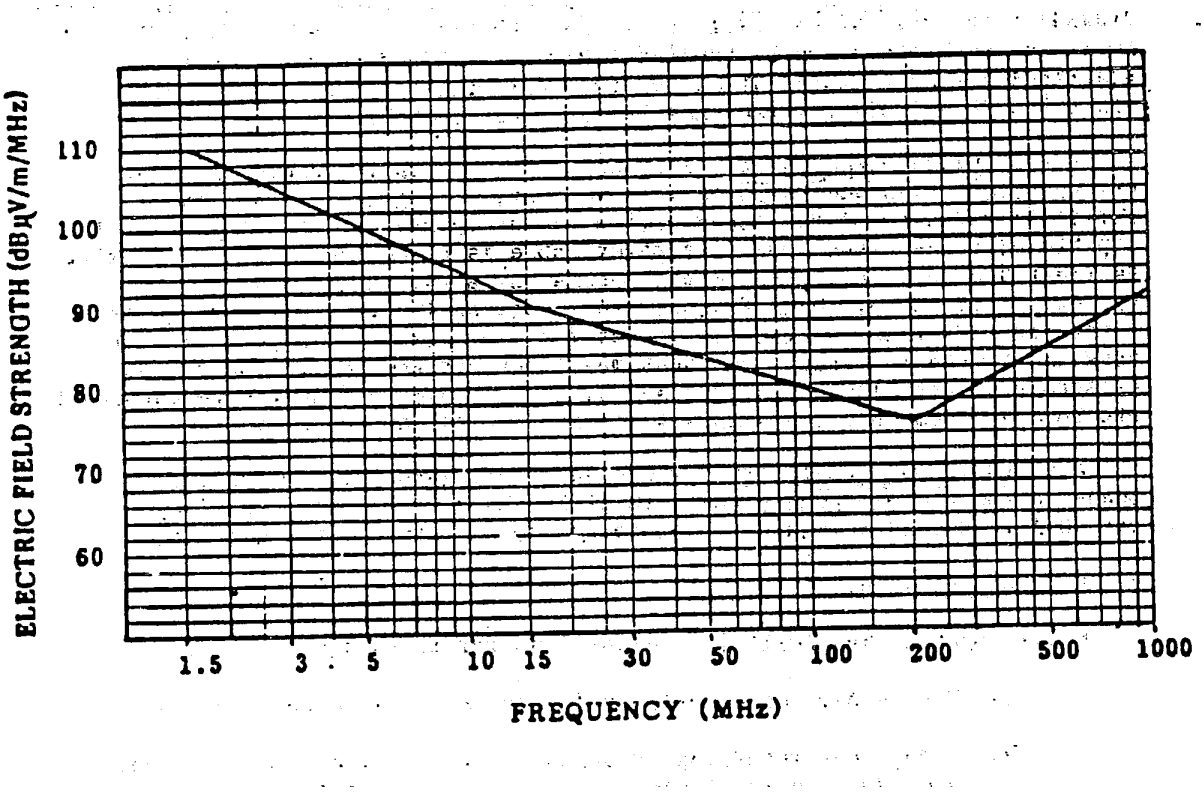

FIGURE 1. Broadband radiated emission limits during hydraulic powerpack operation.

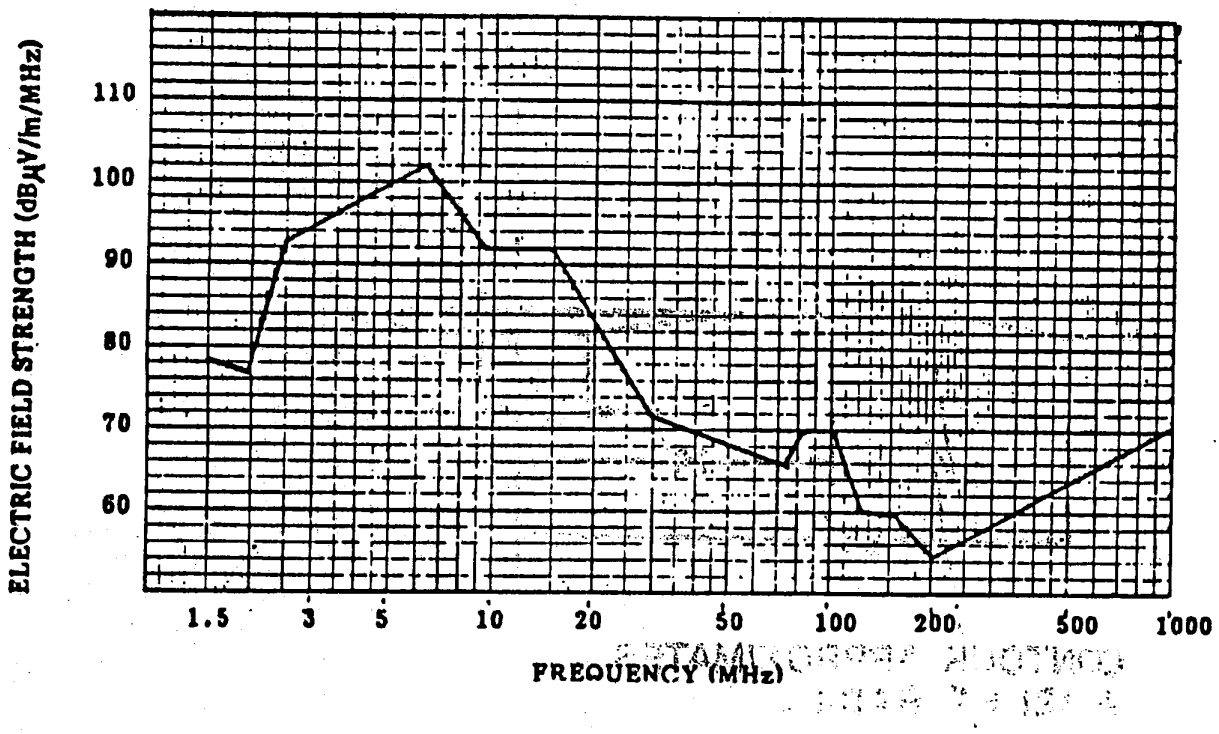

FIGURE 2. Broadband radiated emission limits while keying radio and intercom.

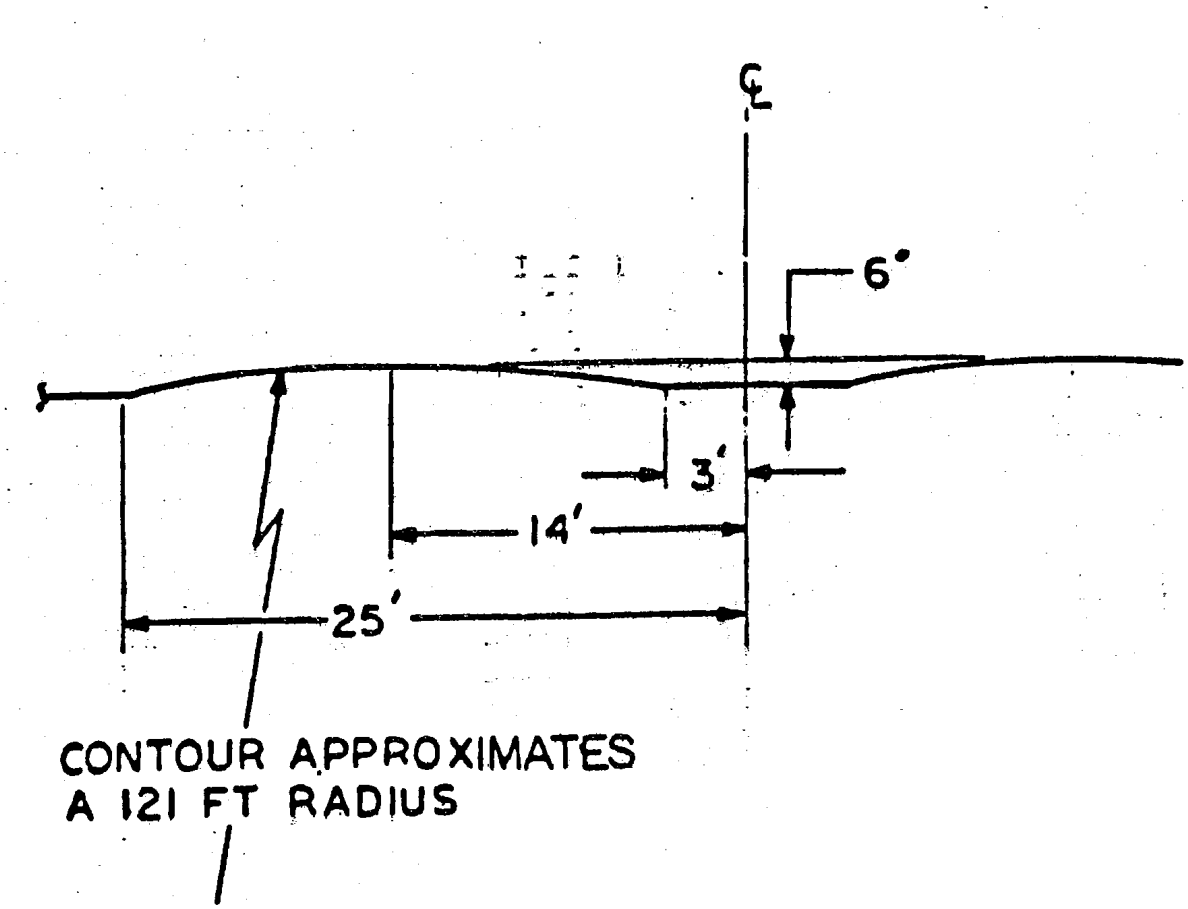

FIGURE 3. Profile of test track (artificial bump).

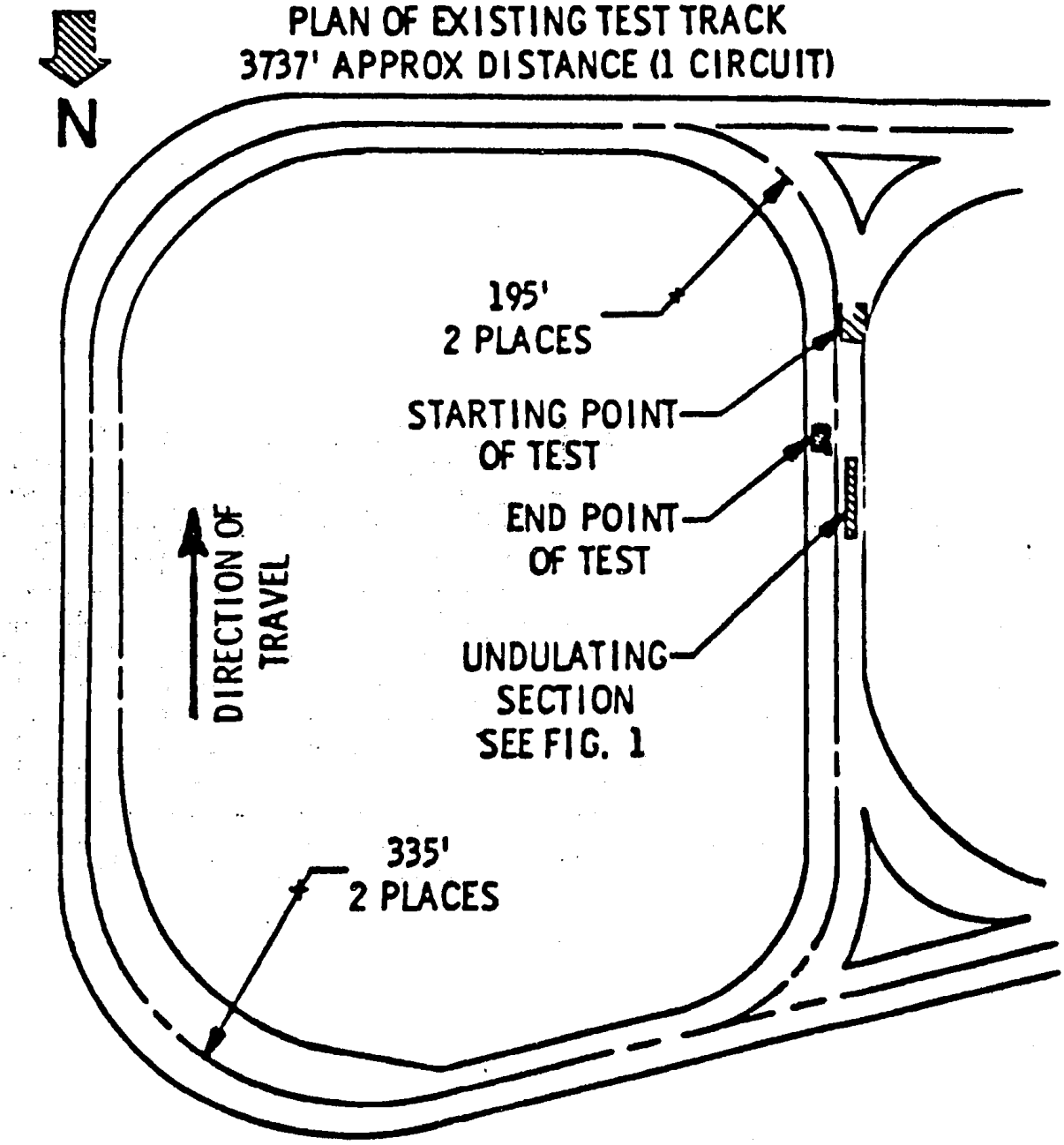

FIGURE 4. Test track (east end).

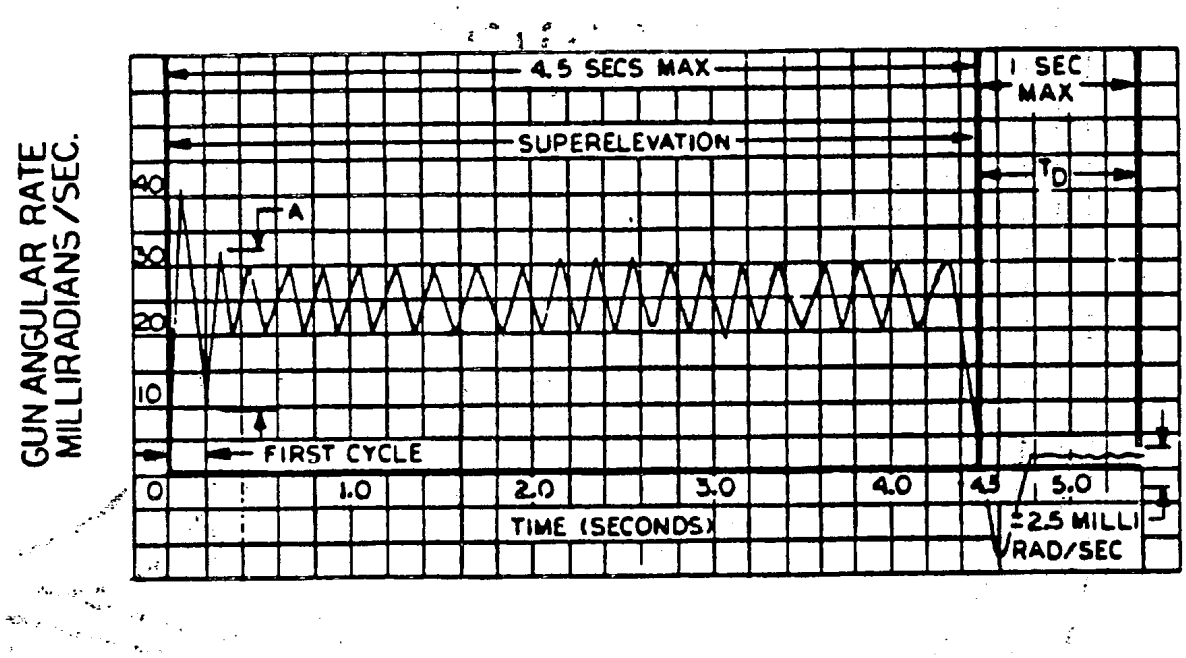

FIGURE 5. Gun transient motion.

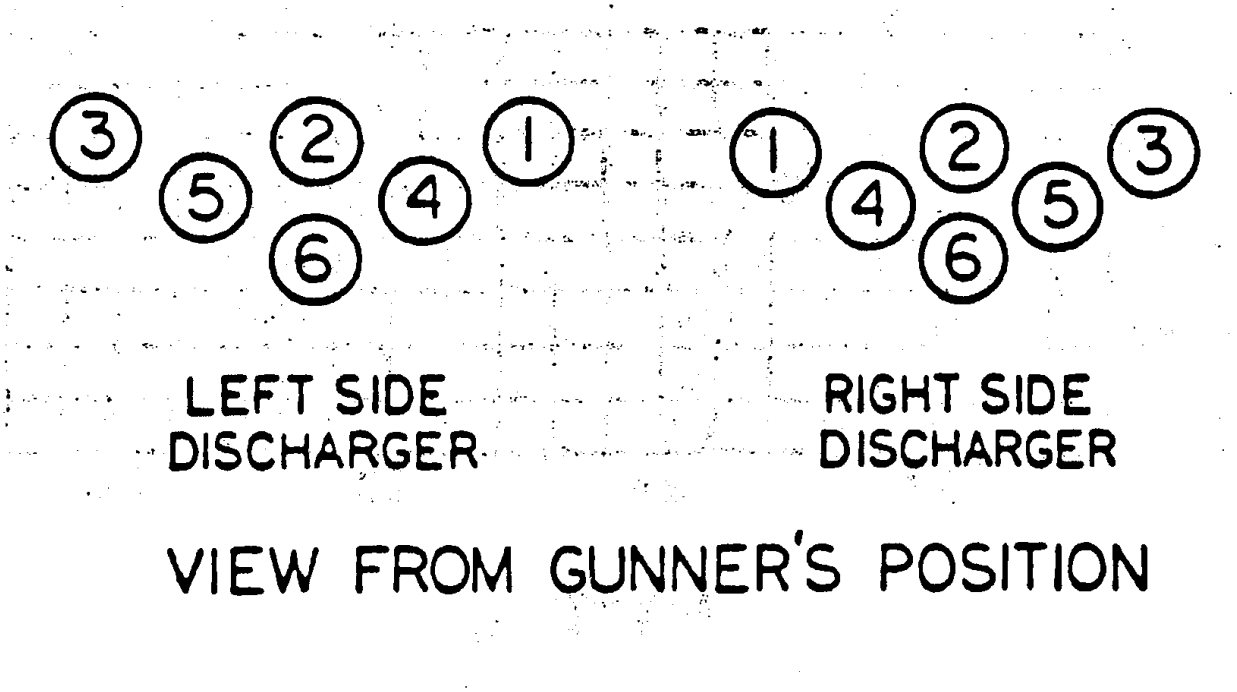

FIGURE 6. Grenade discharge barrel numbering.

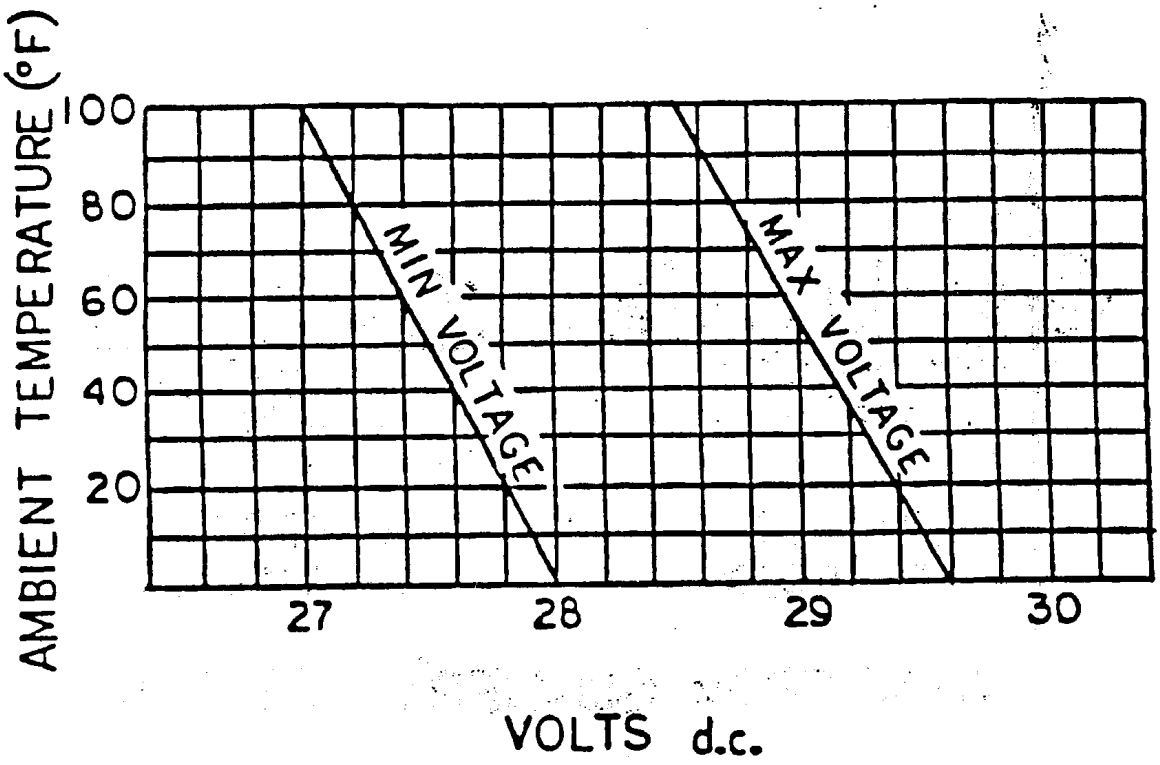

FIGURE 7. Alternator voltage limits.

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Preparing activity
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(Project 2350-A298)