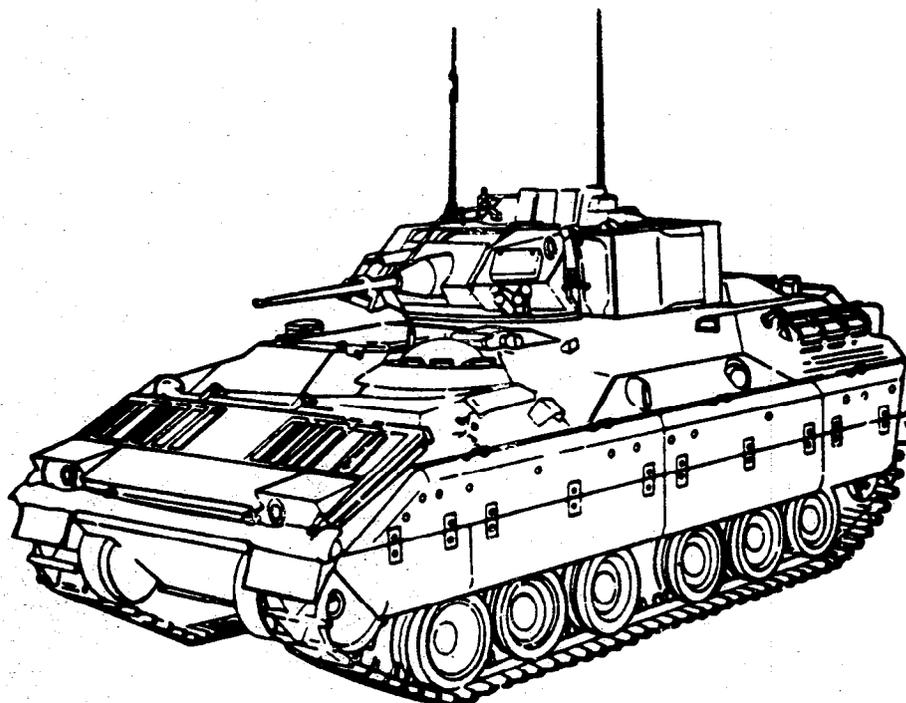


**WEAPONS SYSTEMS DEPARTMENT
U.S. ARMY ARMOR SCHOOL
Cavalry Weapons Systems Division
FORT KNOX, KENTUCKY**



M2/3 Bradley Systems Information Book

1989

M2/M3 BRADLEY
SYSTEMS INFORMATION BOOK

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Section I. Hull and Automotive

PURPOSE

The IFV and the CFV, with long-range mobility and fire power, are for land combat. They are also designed for high first round hit probability and light armor crew protection. Troops can be carried cross country while using the turret and firing port weapons for attack.

CAPABILITIES AND FEATURES

Crew consists of:

CFV (all)

- 2 soldiers in the turret.
- 2 scout observers.
- 1 driver.

IFV

- 2 soldiers in the turret.
- 1 driver.
- 6 man squad in the crew area of the M2 and M2A2.
- 7 man squad in the crew area of the M2A1.

Fully tracked

Light armor protection

High mobility

Swimming capability

Fire power:

- 25mm gun
- Coax machine gun
- Six firing ports for troops (IFV only)
- TOW missiles

Equipped for fire suppression

Day and night vision

Smoke grenade launchers

Stabilized fire control system

I. HULL AND AUTOMOTIVE SYSTEMS

A. SYSTEMS DESCRIPTION

1. Hull components

- a. Hatches - have turret drive inhibitor switches to prevent injury or damage by moving turret with hatch open. Popped position indicates "open hatch" in turret. The M3A1 and the M3A2 have inhibitor switches which will rise the 25mm barrel over the drivers and cargo hatches, but still permit operation.
- b. Access panels, doors - Engine panels allow inspection/maintenance of hourmeter, starter, water pump (v-belt), air cleaner, oil drain lines, various engine parts. Power unit access door allows inspection/maintenance of other engine/transmission components. Intake grill opens for radiator cleaning.
- c. Seats - Adjustable and all have seatbelts.
- d. Periscopes - All personnel have exterior view.

2. Suspension Components

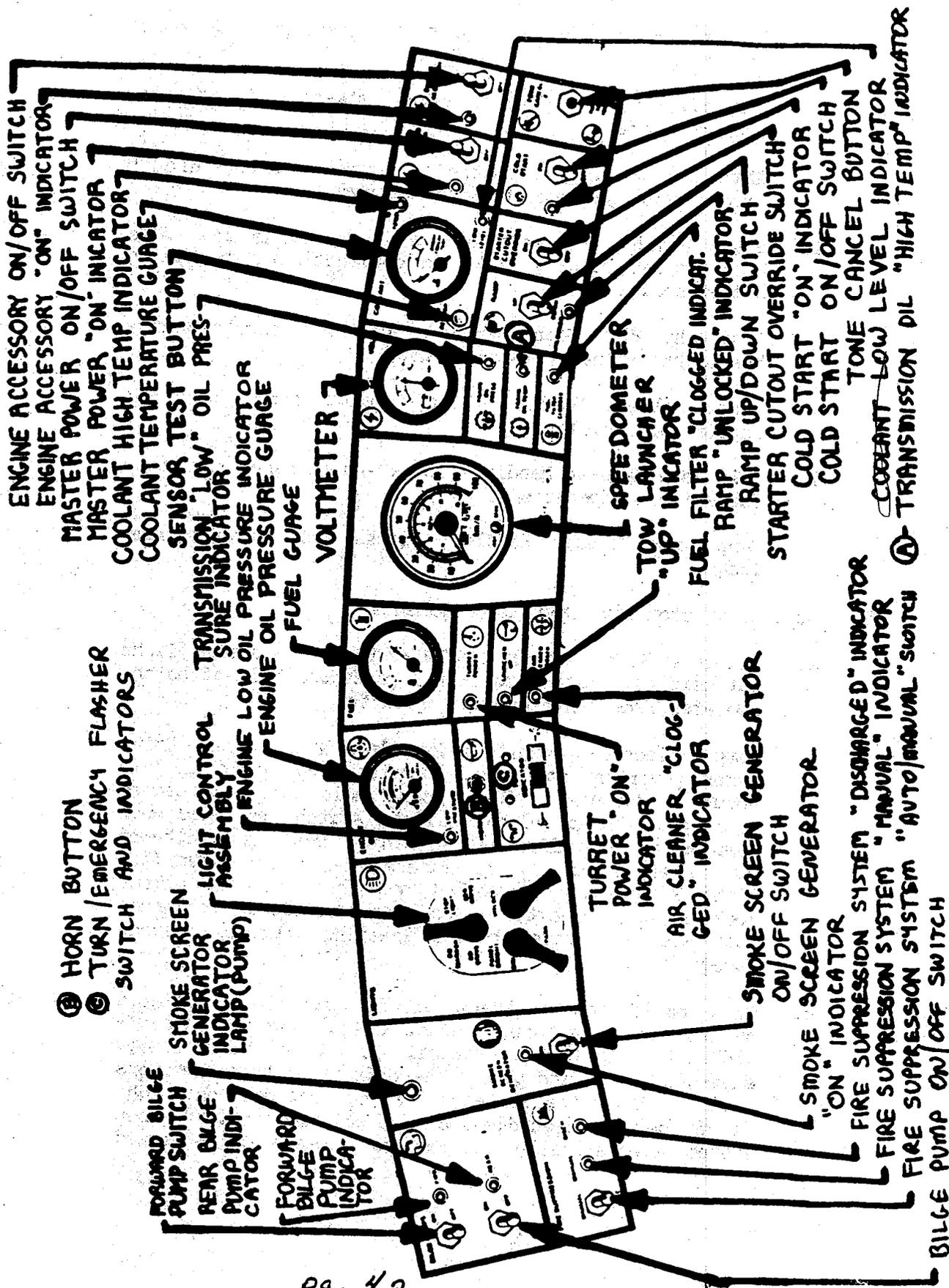
- a. Track - Single pin live track shoes with detachable pads. 83 shoes left, 82 right accounting for torsion bar offset. Track propels vehicle on land and in water. Hardened wear surfaces for longer life. (Nominal Life - 2000 miles).
- b. Roadwheels - 6 pair each side attached to roadwheel arms. Steel wear plates on aluminum wheels. (Rolls on track).
- c. Roadarms - 6 each side to support vehicle and allow suspension movement. (Attached to hull at trunnions).
- d. Torsion Bars - One for each roadwheel arm (12). Anchored at opposite roadarm trunnion (causes offset in suspension symmetry). Different load ratings at front 4, center 4, rear 4, due to vehicle weight distribution. Torsion bars are springing media of suspension.
- e. Shock Absorbers - 4 linear hydraulic each side, at positions 1, 2, 3, and 6. Damping effect to reduce suspension rebounding. Allows up to 14 inches of vertical roadwheel travel (mounted to roadarms and hull).

- f. Idlers - 1 each side at rear. Give tracks easy path back to drive sprockets. Adjustable to maintain track tension by grease-filled track adjusters.
- g. Support Rollers - 1 dual, 2 single each side. Support track returning to drive sprockets and keeps top of track from hitting roadwheels.
- h. Drive Sprockets - 1 each side at front. Transmit final drive torque to track shoes. Hardened wear surfaces with wear indicators. Reversible for double wear life. Equipped with noise reduction carrier pads.
- i. All lube of suspension components is 15W40 wt. oil.
- j. Suspension support provides 18 inch average vehicle ground clearance.

3. Power Unit Components

- a. Basic engine (VGA-903T) - V8, 4 cycle, turbocharged, 500 hp, diesel, water-cooled, 903 cubic inch. Provides power for transmission, generator, cooling fan. Mounted with front toward rear of vehicle and bolted to transmission. Cold start accomplished by fuel preheat in intake manifolds with glow plugs. Starter cut-out circuit above 400 engine rpm (override for cold weather starter). Smoke screen solenoid provides diesel fuel to exhaust manifold which heats to produce white unburned smoke out exhaust. Turbocharged air intake through air cleaner, through intake side of turbocharger through aftercooler, to intake manifolds. Turbocharger forces more air into cylinders for more power. Turbocharger driven by engine exhaust gases. Engine exhaust is mixed with cooling air to dilute exhaust concentration (to minimize thermal signature).
- b. Transmission (HMPT-500) - Hydro-mechanical, power take off 3-speed automatic - controls braking, steering, gear selection in same unit. Transmits engine torque through one reverse and three forward gears (including pivot steer) to final drives. Provides power take-off mounting for generator and cooling fan operation. Pivot steer (tracks moving opposite directions) allows vehicle to turn on its own center for tight maneuvering. TOW position allows vehicle to be moved with another vehicle without disconnecting output shafts. TOW start transmits rotation torque to engine for dead battery, bad starter, etc., starts. Low position maintains transmission in first gear range forward. Drive gear is for normal operation.

- c. Cooling System - Fully integrated on power unit. Surge tank de-aerates coolant. Coolant circulated by coolant pump (only V-belt on power unit) to engine and transmission oil cooler. Two thermostats in transmission oil cooler regulate coolant flow to radiator. Thermostats sense combination of engine and transmission heat. Cooling fan mounted on sponson and driven by variable speed hydraulic coupling on PTO. Fan speed regulated by thermostatic control to PTO which reacts to transmission oil temperature to allow more oil to drive fan-override capability, on fan speed, for maximum cooling. Cooling fan vacuums air through radiator, through engine compartment and forces out through exhaust plenum.
 - d. Final Drives - Mounted on front each side. Gear-driven to transfers transmission torque to drive sprockets.
 - e. All power unit lube is 15W40 wt. oil.
4. Driver's Controls and Indicators (Ref to fig. 1)
- a. Instrument Panel - provides control switches, lights and gauges for controlling and monitoring power unit and auxiliary systems. Arranged by relative importance for mission accomplishment and recurrence of use.
 - b. Range Selector Console - provides positions for transmission range selection and engine start position. Parking brake handle underneath.
 - c. Steering Yoke - controls vehicle direction through transmission. Also incorporates push-to-talk commo switch.
 - d. Engine Fire Extinguisher - contains fire suppressant (Halon 1301). Valve handle must be turned manually to release halon into engine compartment. Gauge indicates bottle pressure at relative ambient temperatures (nominally 750 psi). No automatic sensing units. Fire extinguisher can be discharged from outside vehicle (pull handle).
 - e. Slave Receptacle - used for slave starting this or other vehicles. Has N.A.T.O. connector. Energize button connects vehicle electrical system to slave power cable. Polarity light indicates correct hook-up (Green) or reversed electrical polarity (Red) prior to using energize button.



ENGINE ACCESSORY ON/OFF SWITCH
 ENGINE ACCESSORY "ON" INDICATOR
 MASTER POWER ON/OFF SWITCH
 MASTER POWER "ON" INDICATOR
 COOLANT HIGH TEMP INDICATOR
 COOLANT TEMPERATURE GAUGE
 SENSOR TEST BUTTON
 TRANSMISSION "LOW" OIL PRES-
 SURE INDICATOR
 ENGINE LOW OIL PRESSURE INDICATOR
 ENGINE OIL PRESSURE GAUGE
 FUEL GAUGE
 VOLTMETER

① HORN BUTTON
 ② TURN/EMERGENCY FLASHER
 SWITCH AND INDICATORS

SMOKE SCREEN GENERATOR INDICATOR LAMP (PUMP)
 LIGHT CONTROL ASSEMBLY
 ENGINE LOW OIL PRESSURE INDICATOR
 ENGINE OIL PRESSURE GAUGE
 FUEL GAUGE
 TURRET POWER "ON" INDICATOR
 AIR CLEANER "CLOGGED" INDICATOR
 SMOKE SCREEN GENERATOR ON/OFF SWITCH
 SMOKE SCREEN GENERATOR "ON" INDICATOR
 FIRE SUPPRESSION SYSTEM "DISCHARGED" INDICATOR
 FIRE SUPPRESSION SYSTEM "MANUAL" INDICATOR
 FIRE SUPPRESSION SYSTEM "AUTO/MANUAL" SWITCH
 BILGE PUMP ON/OFF SWITCH

SPEEDOMETER
 TOW LAUNCHER "UP" INDICATOR
 FUEL FILTER "CLOGGED" INDICATOR
 RAMP "UNLOCKED" INDICATOR
 RAMP UP/DOWN SWITCH
 STARTER CUTOFF OVERRIDE SWITCH
 COLD START "ON" INDICATOR
 COLD START ON/OFF SWITCH
 TONE CANCEL BUTTON
 COBERT LOW LEVEL INDICATOR
 TRANSMISSION OIL "HIGH TEMP" INDICATOR

SMOKE SCREEN GENERATOR ON/OFF SWITCH
 SMOKE SCREEN GENERATOR "ON" INDICATOR
 FIRE SUPPRESSION SYSTEM "DISCHARGED" INDICATOR
 FIRE SUPPRESSION SYSTEM "MANUAL" INDICATOR
 FIRE SUPPRESSION SYSTEM "AUTO/MANUAL" SWITCH
 BILGE PUMP ON/OFF SWITCH

pg. 4a.

M2/M3 DRIVER'S INSTRUMENT PANEL

Fig. 1

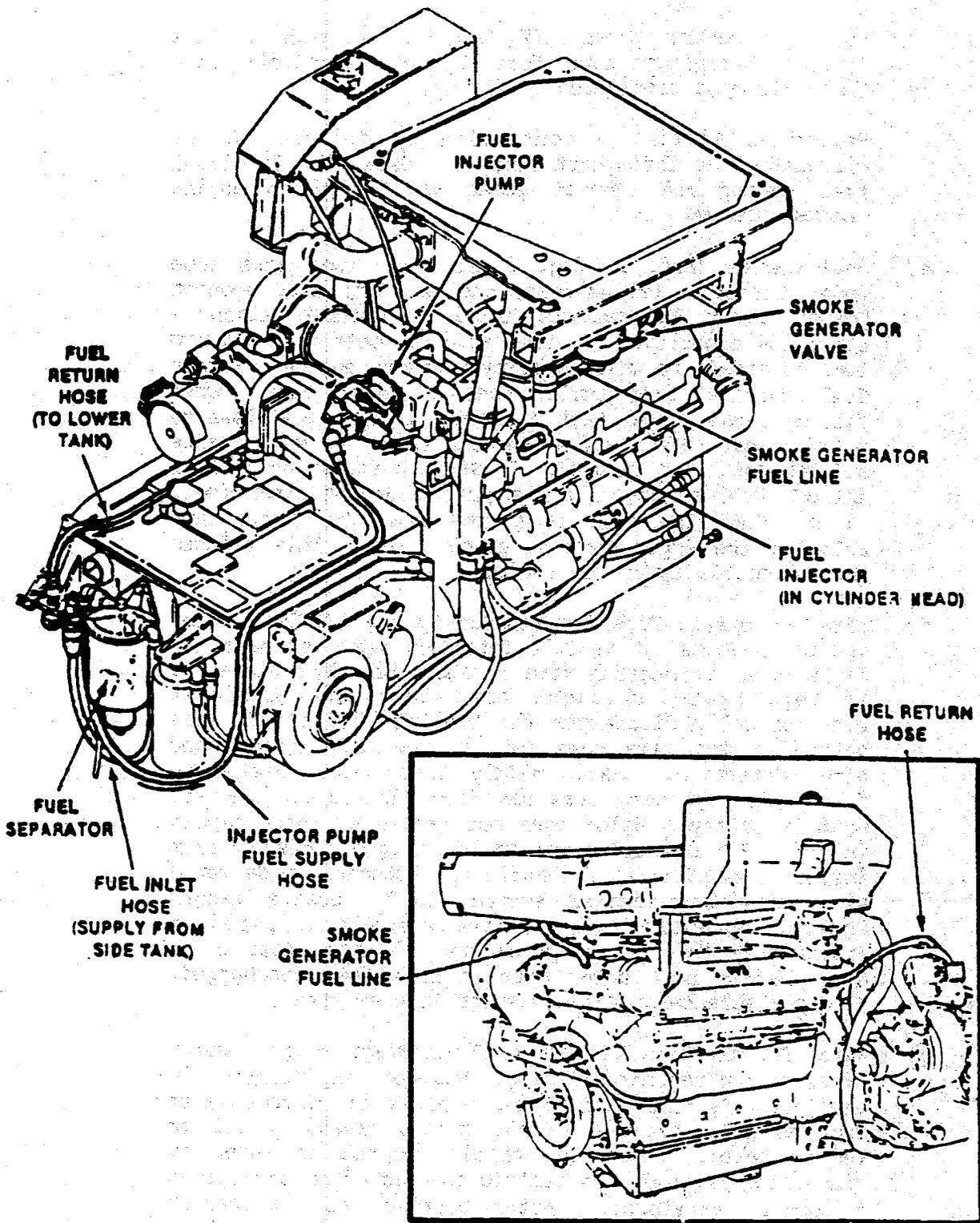
- f. Heater Control Box - starts and regulates personnel heater.
- g. Winterization Kit Control Box - starts and regulates coolant heater.
- h. Throttle Pedal - controls engine speed through transmission governor to injector pump.
- i. Brake Pedal - controls brakes in transmission. Also used to set parking brake in conjunction with parking brake handle.
- j. Headlight High Beam Switch - controls service drive headlight intensity (High or Low).
- k. Hatch Release Handle - opens hatch from inside or outside of vehicle.
- l. Trim Vane Release Handle - locks and releases trim vane for swimming operations.
- m. Ramp Lock Release Handle - locks and releases ramp locks.

5. Auxiliary Automotive Systems Components

- a. Driver's Night Viewer (AN/WVS-2(V)-3) - passive light intensifier. Fits into center periscope hole of hatch. Operates from vehicle power or battery.
- b. Ramp - electro-hydraulic independent from engine. Drive under power up and down. Cycles ramp up or down in about 5 seconds. Ramp locks hold ramp in closed position. "Ramp Unlocked" light switch activated when ramp moves away from hull (Open). Domelight shut-off switch turns of all domelights when ramp opens (for night security). Personnel door has interior combat lock as well as exterior padlock provision. Personnel door must be closed before lowering ramp to prevent damage.
- c. Crew Ventilation - filtered air from exterior circulated by two vent fans (Low, Medium, High). Maximum output - 750 cfm. (No C.B.R protection). Fans automatically shut-off during and plus 15 seconds after turret weapons firing. After the 15 second pause, fans come on "High" for 60 seconds regardless of fan control settings, then system automatically returns fan speeds to selected

speeds on control boxes (Off, Low, Medium, High,). This is used to minimize toxic fumes in vehicle and circulate fresh air upon completion of firing.

- d. Personnel Heating - controlled by driver. Ducts circulate heat throughout vehicle. Uses vehicle diesel fuel supply and exhaust gases are vented to engine exhaust plenum.
- e. Fuel System (Ref. to fig. 2 and 3) - two tanks (one under turret - 150 gallons, one on right side sponson beside turret - 25 gallons, total 175 useable gallons - about 196 capacity). In the basic M3, bottom tank pumps fuel to side tank which gravity feeds to engine. Excess fuel returned from engine goes to lower tank. When filling tanks, upper tank fills first, then overflows to bottom tank. Drain valves on both tanks for maintenance and contamination removal. Constant circulation of fuel through fuel separator and engine maintains clean fuel. In the M3A1 the fuel is pumped from the lower tank allowing the upper tank to empty first. This reduces the vulnerability of the vehicle.
- f. Fixed Automatic Fire Suppression System (FAFSS) - four optical sensors (in vehicle interior) must see heat and light of a hydrocarbon fire of about one foot diameter. If both heat and light are seen, the amplifier electronically discharges the two crew Halon 1301 fire bottles. The fire goes out in less than one second after detection. Halon mildly toxic until heated by fire. In any case, crew has five minutes to evacuate vehicle safely. Halon does not remove or inert oxygen in air. Fired bottles can be discharged manually from inside or outside (pull handles). Automatic mode works with or without master switch "ON." Bottle gauges indicate pressure at relative ambient temperature (nominally 450 psi). System must be reset (switch on distribution box) after bottles have been discharged. (Two portable halon extinguishers in crew area).
- g. Water Barrier/Trim Vane/Drain Plugs/Bilge Pumps - water barrier required for swimming. Made of vinyl/fabric, it encircles the top half of the vehicle to prevent water from entering hatches, intake grill, exhaust grill or vent intakes. Aids in vehicle control in water by dispersing water around vehicle instead of on top (gives a nose-up attitude). Water barrier has transparent panels for driver, and is supported by the trimvane. The sides and rear by tripods and support rods. Water leakage on top of hull drains (at four corners) into



FUEL SYSTEM (POWER PLANT)

Fig. 2

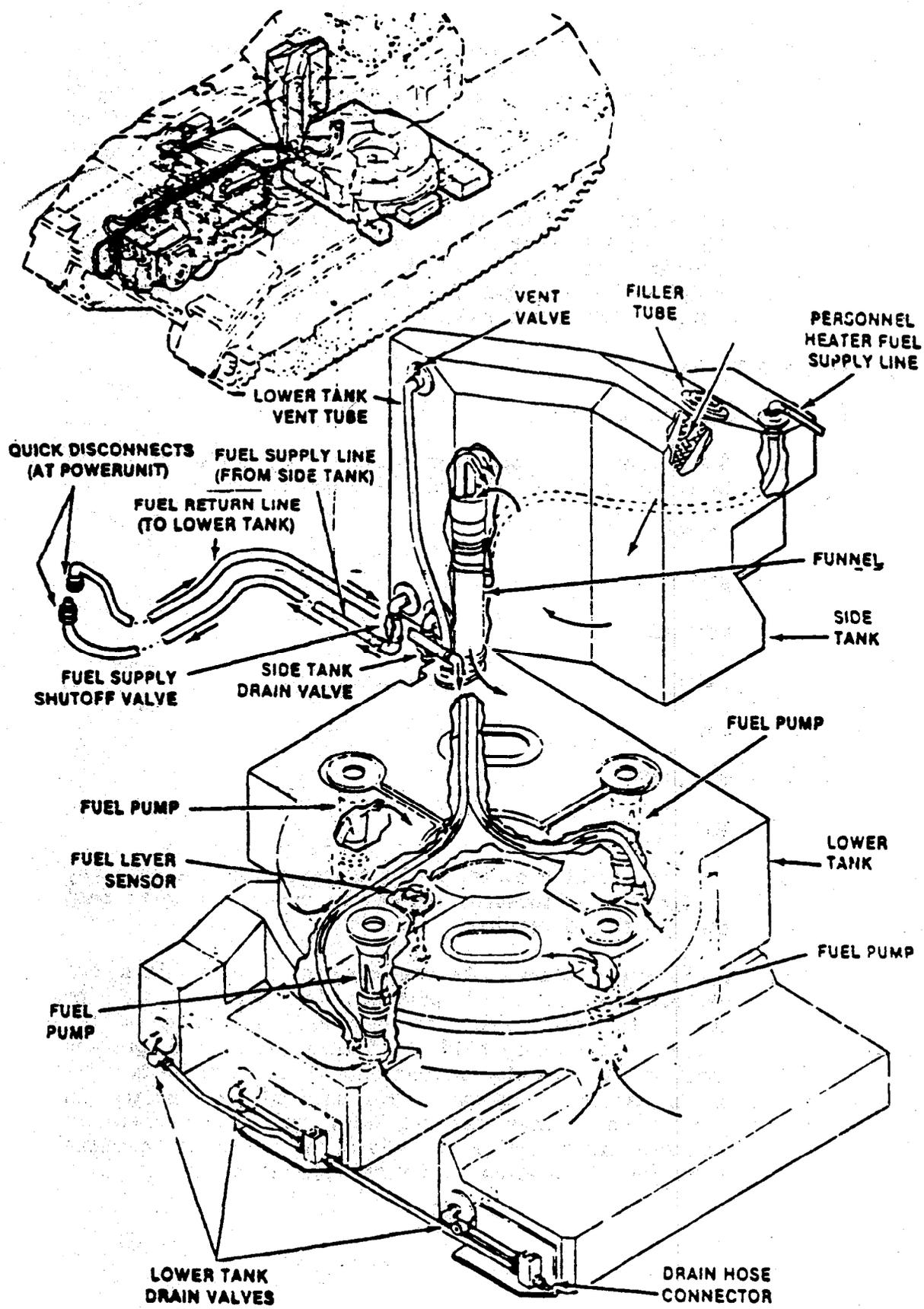


Fig. 3 **FUEL SYSTEM (VEHICULAR)** Page 6b.

bilge. Four bilge pumps (35 gpm each) controlled by two separate switches (one for front - one for rear). Drain plugs for bilges (Front and Rear - 1 each), and drain plugs for final drive hull cavities. Front half of vehicle (forward bilge) separated from rear half (rear bilge).

- h. Communication - all personnel can listen, seats 7 and 9 (IFV only) cannot transmit - others can. Standard military equipment, except for addition of separate push-to-talk switches for TC, gunner, driver instead of going to CVC helmet switch.

B. SYSTEM FUNCTIONS

I. Transmission Operation

- a. Gear Selection - operator initiated by movement of his selector to one of the following positions:

REVERSE

PIVOT

NEUTRAL

DRIVE

LOW

TOW START

TOW

- b. Reverse position operates the transmission the same way a first range forward, except the hydraulic units pump the opposite direction.
- c. Pivot steer allows the vehicle to turn on it's own center. Pivot steer position is spring loaded (to return the gear shift to neutral) and requires the driver to purposely hold it in that position to prevent inadvertent selection which could cause loss of control or transmission damage. The transmission action in pivot steer causes the hydraulic units to operate in opposite directions which drives the tracks in opposite directions (depending on direction of steer input).

- d. Drive position engages an hydraulic clutch (in the transmission) with the engine output torque, but does not transmit this torque through the transmission at idle. Acceleration occurs at about 100 rpm over normal idle speed.
- e. Low position is first range held to prevent shifting. If the transmission is operating in second or third range, shifting to low will not downshift the transmission until the vehicle has slowed to less than 8 mph which is the normal downshift point to first range.
- f. TOW start position transmits final drive rotation through the transmission (in third range) to the engine. When the engine starts, the driver moves the gear selector to drive position to re-engage the transmission torque paths.
- g. TOW position allows the transmission to "freewheel" so that recovery of the vehicle can be accomplished, forward or backward, without disconnecting the output shafts. The service brakes will still operate and lubrication/cooling is accomplished with the TOW pump. TOW position is used as the preliminary to TOW starting. TOW position is selected (with disabled engine starting systems) and the vehicle is then towed at 10-15 mph forward. At this time the gear selector is moved to TOW start.
- h. TOW and TOW start selections should not be made with the engine running (inadvertent selection into these positions is made difficult by gated entries which require operator intent). Stalling of engine and possible engine or transmission damage could result. The other positions are intended for engine running operations.
- i. Steering is a function of varying the hydraulic units output to the output shafts. Steer input in any range causes one side to slow and the other to increase speed. This produces a continuous radius turn at any speed. If steer input exceeds the power available, the transmission will automatically reduce the output to prevent excessive loading of the engine. Low speed turns with high steer input requires the driver to increase throttle input to keep sufficient power flowing through the transmission to allow smooth consistent control of the vehicle.

2. PTO and Thermostatic Cooling Control

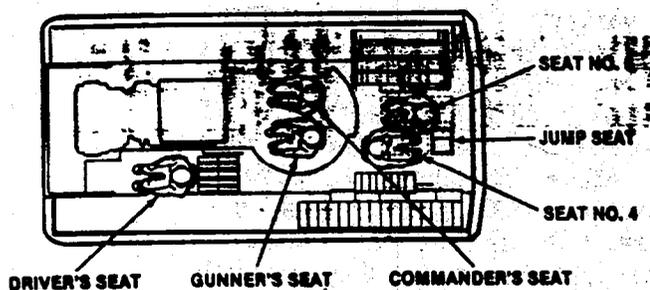
- a. Power Take-Off - gear driven by engine rpm through transmission idler gear. The generator is driven directly by the gearing (No V-belt). Rotation of the fan drive is accomplished by a variable speed hydraulic coupling internal to the P.T.O.
- b. Thermostatic cooling control is accomplished by allowing more transmission oil to be pumped to the hydraulic coupling. Under load, the transmission operates at up to 230°. If sufficient cooling is not accomplished by this control (high ambient temperatures) the driver has the option of using the override, which allows full oil flow to the hydraulic coupling, which will drive the cooling fan at maximum speed (with engine rpm).

FIRE SUPPRESSION SYSTEM. The fire suppression system release halon to quickly put out fires in the squad area and engine compartment. It is automatically activated in the squad area and manually activated in the engine compartment.

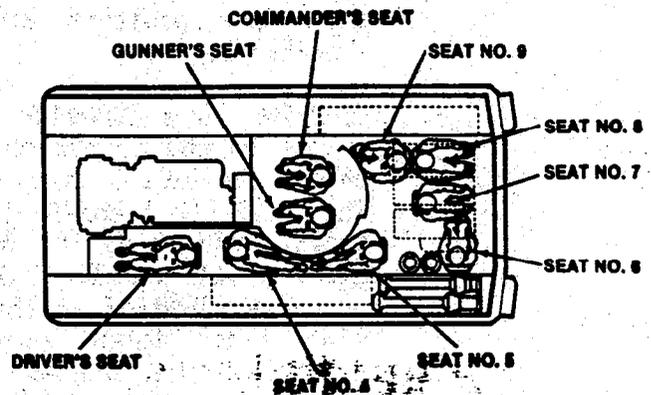
EXTERIOR LIGHTING. Exterior lights include blackout lights, headlights, stoplights, and turn indicator.

SEATS. (Ref to fig 4.) The IFV and CFV are equipped with separate seats for each crew and squad member. The IFV has three seats for crew members and six seats for squad members. The CFV has three seats for crew members, two seats for squad members, and one jump seat.

CFV SEATING



IFV SEATING



Section II. Turret and Fire Control

EQUIPMENT PURPOSE, CAPABILITIES, AND FEATURES

The purpose of the turret is to provide a two man weapon station for the CFV. Because of the turret's fire power and assault features, it can defeat enemy armored vehicles, low flying aircraft, gun emplacements, and other targets.

The turret can traverse in either direction at a high rate of speed. Either the commander or the gunner can select, arm, and fire all organic weapon systems. In addition, two smoke grenade launchers are provided.

An integrated sight unit (ISU) is located in front of the gunner. The ISU allows day and night viewing from inside the turret with 4X and 12X magnification. A relay sight extends from the ISU to the commander's station.

The following items describe the turret components seen in figure #5.

RADIO ANTENNAS. Two antenna mounts are on the turret. One is to the right of the commander's hatch cover. The other is at the rear, on the center line of the turret.

PERISCOPES. Seven wide-vision M17 periscopes and one M27 periscope allow 360° vision at the commander's station. These periscopes have blackout covers. The gunner has two periscopes with blackout covers.

VANE SIGHT. The commander uses the vane sight in order to quickly align the turret with the target.

INTEGRATED SIGHT UNIT (ISU). The ISU has both day and night vision sight relay for the commander and gunner.

BACKUP SIGHT. The backup sight is a mechanical sight used in the event of an ISU failure. It allows aimed daylight firing of 25mm gun and coax.

COAX MACHINE GUN. The coax machine gun uses 7.62mm ammo. It is lightweight, gas operated, and air cooled. It is fed by a metallic link belt.

SMOKE GRENADE LAUNCHER. Two electrically fired smoke grenade launchers are located on the turret, one on the right front and one on the left front. Each launcher fires four smoke grenades simultaneously.

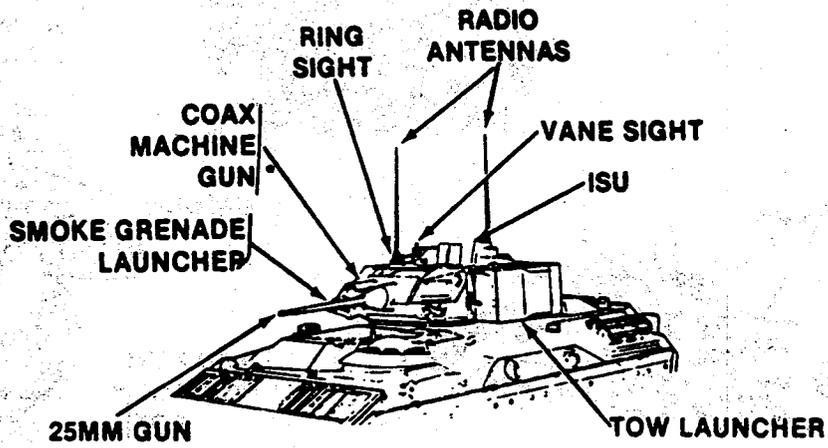
25MM GUN. The 25mm gun is an electrically powered, chain driven weapon. It is controlled for single shot and low and high automatic rates of fire. It is fed by a metallic link belt.

GUNNER'S CONTROLS. Gunner's controls include control handles, levers, and handwheels. They are for either manual or power operation of the turret and weapons. Control boxes, indicator lights, slope indicators, elevation indicators, azimuth indicator.

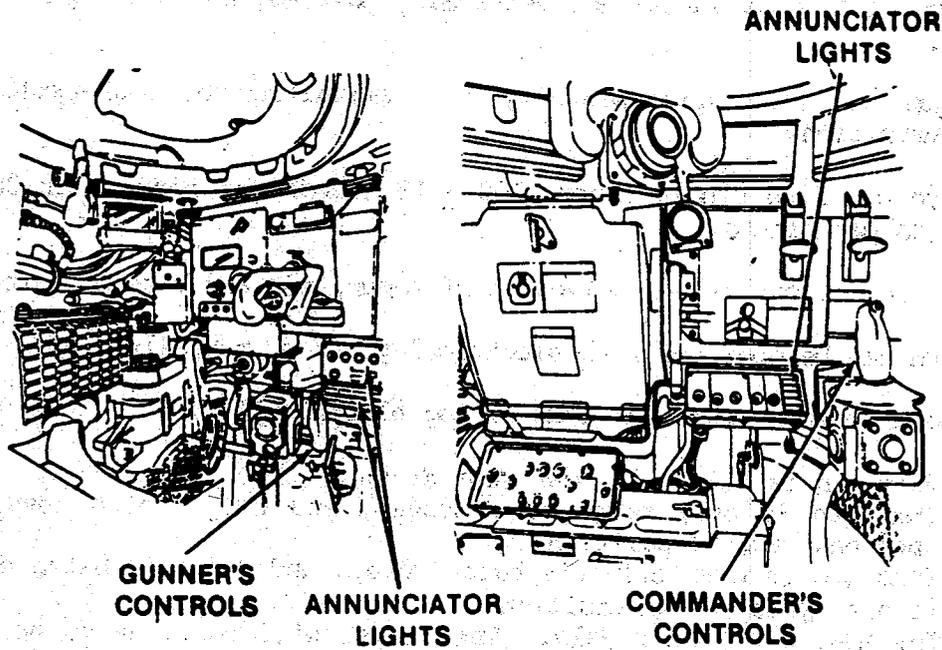
COMMANDER'S CONTROLS. The commander's controls consist of a weapon and turret override control handle, a relay sight eyepiece, and periscopes. Also included are slope indicators, elevation indicators, azimuth indicators, intercom system, turret and weapon control boxes.

ANNUNCIATOR LIGHT SYSTEM. The annunciator light system is a built-in warning light system for the turret. Annunciator lights are located on the turret control box, TOW control box, and annunciator box. The lights indicate something is wrong in the turret.

TOW LAUNCHER. The TOW launcher is located on the left side of the turret. The launcher tube carries two TOW missiles.



Turret Exterior



Turret Interior

Fig. 5

page 11 a.

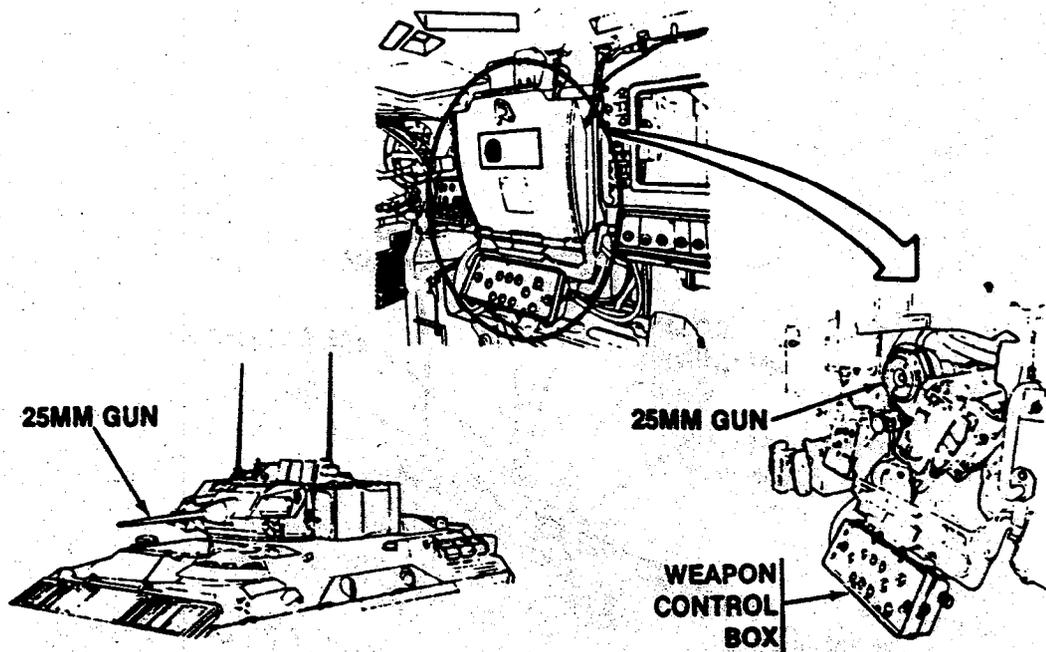


Fig. 6

25mm gun is a rotor installed, externally powered, automatic gun. See Fig. 6.

25mm gun can fire armor-piercing (AP) ammunition or high-explosive (HE) ammunition.

25mm gun can fire single shots, 100 ± 25 rounds per minute, or 200 ± 25 rounds per minute.

Weapon control box allows selection of ammunition and rate of fire.

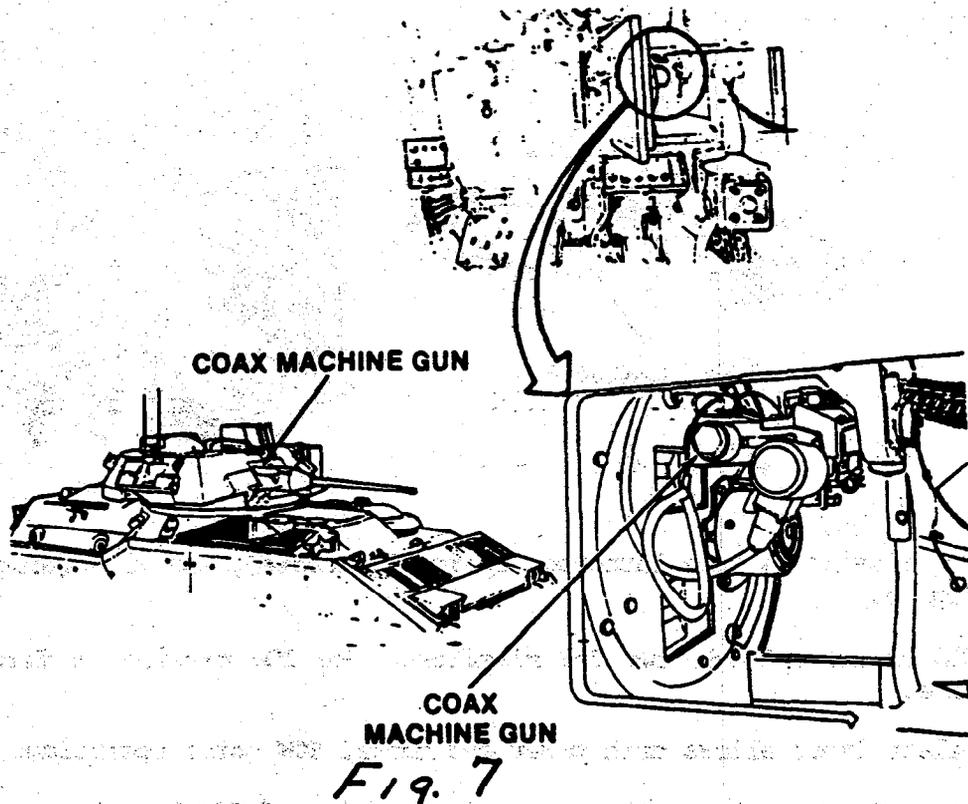
25mm gun can be operated with electrical power or manually.

Interlocks prevent 25mm gun from firing electrically if:

- 25mm gun is below -1° over rear deck
- 25mm gun is over cargo hatch cover, and cargo hatch cover is open past POP-UP position
- 25mm gun is over driver's hatch cover, and driver's hatch cover is open past POP-UP position
- The M3A1 and M3A2 models. The turret will continue to operate while the driver and cargo hatches are open in any position. There are inhibitor switches which will raise the 25mm gun barrel over the hatches.

Use caution when using the combat override switch. When it is in use it deactivates the inhibitor switches.

ISU allows day and night vision for aiming 25mm gun.



Ammo feed system is powered by coax machine gun. See Fig. 7.
 7.62mm, rotor installed, gas operated, air cooled, fully automatic machine gun.

Operated manually or with electrical power.

Interlocks prevent coax machine gun from firing electrically if:

- Coax machine gun is below -1° over rear deck
- Coax machine gun is over cargo hatch cover, and cargo hatch cover is open past POP-UP position
- Coax machine gun is over driver's hatch cover, and driver's hatch cover is open past POP-UP position

ISU allows day and night vision for aiming coax machine gun.

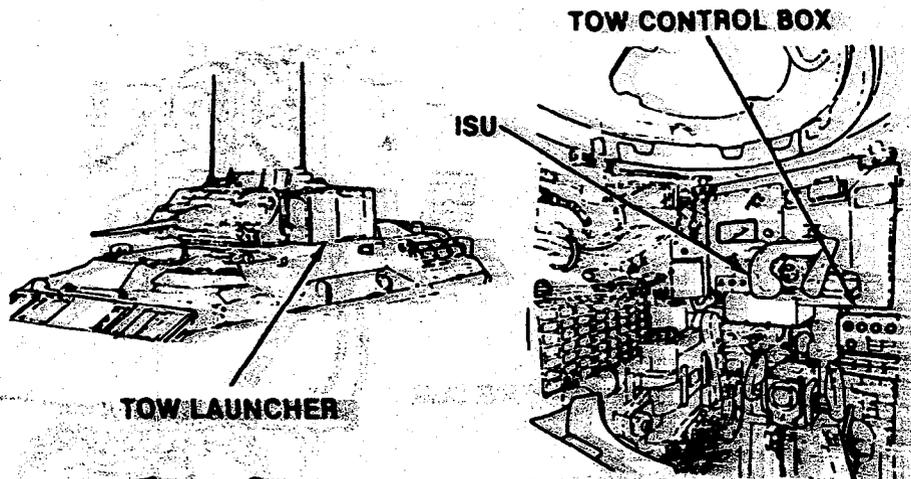


Fig. 8

TOW missile is tube launched, optically tracked, and wire guided. See Fig. 8.

TOW launcher holds two TOW missiles. One TOW missile is fired at a time.

Select lever allows both power and manual TOW rotor operation.

Elevation handwheel allows manual elevation of TOW launcher.

TOW control box allows launcher to be moved electrically to firing or stowed position, missile tube selection, and TOW guidance system testing.

Indicator lights tell when TOW test fails, which system fails, and condition of TOW.

TOW will not fire if:

- TOW is below -13° over rear deck
- Driver's hatch cover or cargo hatch cover are in POP-up or OPEN position.
- Vehicle is moving more than 3 miles per hour
- ISU is not in higher power

ISU allows day and night vision for aiming TOW.

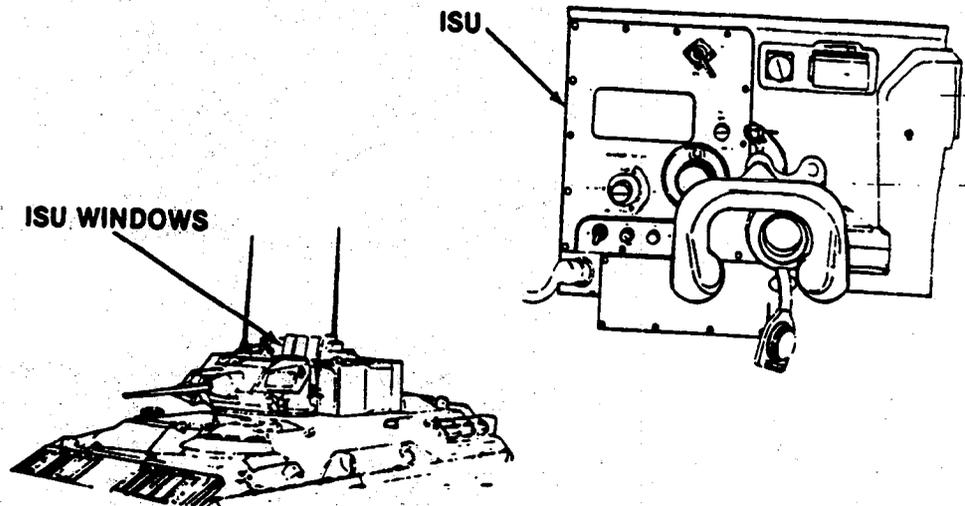


Fig. 9

Night sight unit uses super-cooled circuits. It must be on for 10 minutes before it is used. See Fig. 9.

Day/night viewer moves with weapons when soldier is sighting and aiming.

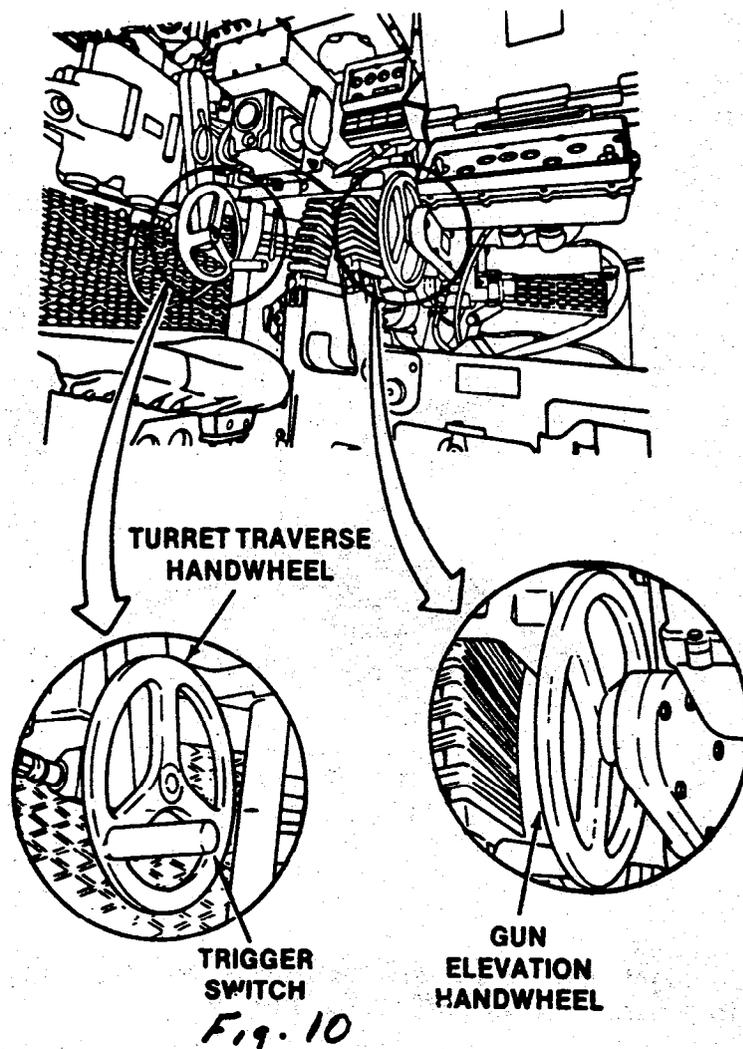
ISU unity window allows locating the target in daylight.

Gunner's and commander's eyepieces magnify target. They enable both the gunner and the commander to see the same thing at the same time.

Select switches allow controlled day and night viewing. Select switches also allow aiming with the use of reticle displays.

Gunner and commander eyepieces display tell which weapon, range, and ammo have been selected.

Boresight controls and kits help you boresight guns and TOW launcher.



Turret can be moved 360° to the right or left. See Fig. 10.

Travel lock allows turret to be locked when not in use.

Select levers permit either manual or power operation of turret.

Handwheels enable manual operation of the turret by the gunner.

Gunner's control handles enable electric power operation of the turret by the gunner.

Drive system power enables the commander to override gunner's control of turret.

Eight periscopes for daylight viewing in all directions by commander.
(Seven with AUXILIARY sight.)

Two periscopes for daylight viewing to right and left of main sight by gunner.

Blackout covers for periscopes. Closed blackout covers prevent the interior light from being seen from outside.

Front ring sight is used when aiming and firing at low-flying aircraft. It is also used as an emergency sight for ground targets.

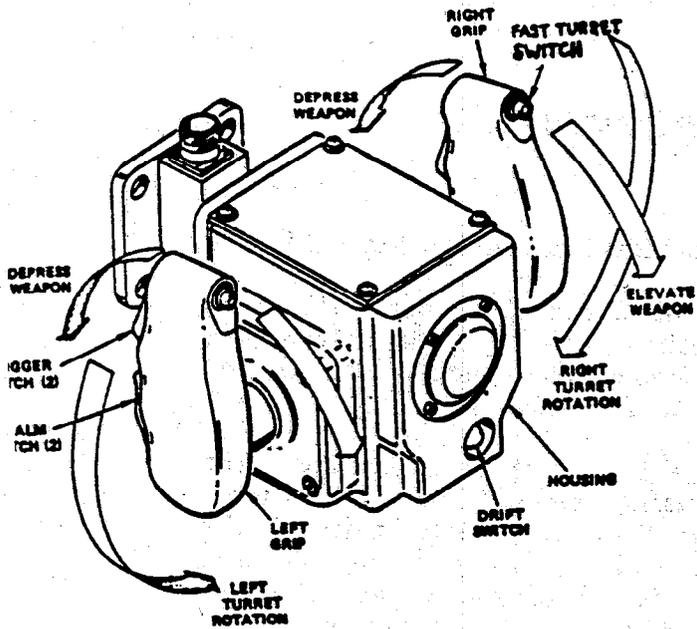
Vane sight is used by commander in order to quickly align turret with target.

TURRET ELECTRICAL SYSTEM. The turret is powered by four 12 volt wet cell batteries located in the hull. Power from the batteries is supplied to the turret through a slip ring. Two 12 volt wet cell batteries provide emergency power to the turret. The two emergency batteries are located in the turret under the left floor plate.

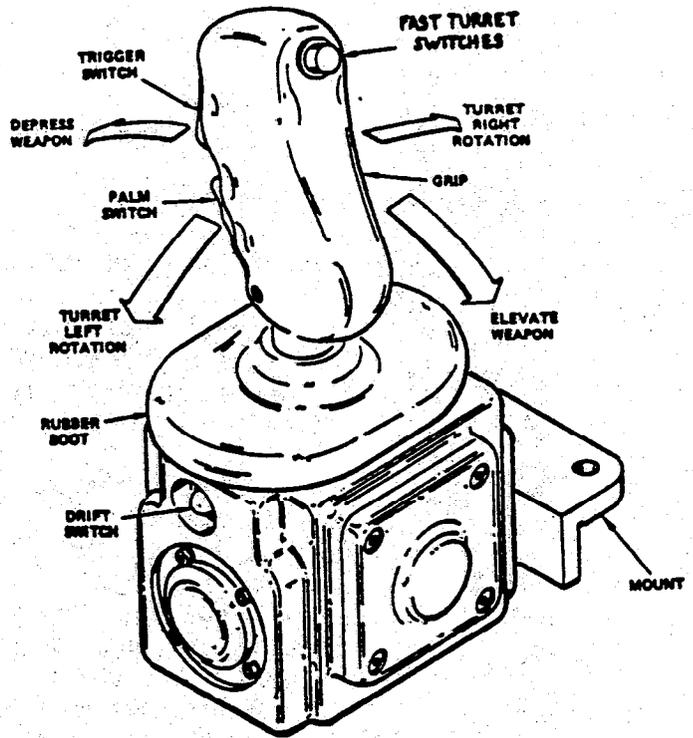
II. TURRET AND FIRE CONTROL

A. COMPONENT DESCRIPTION

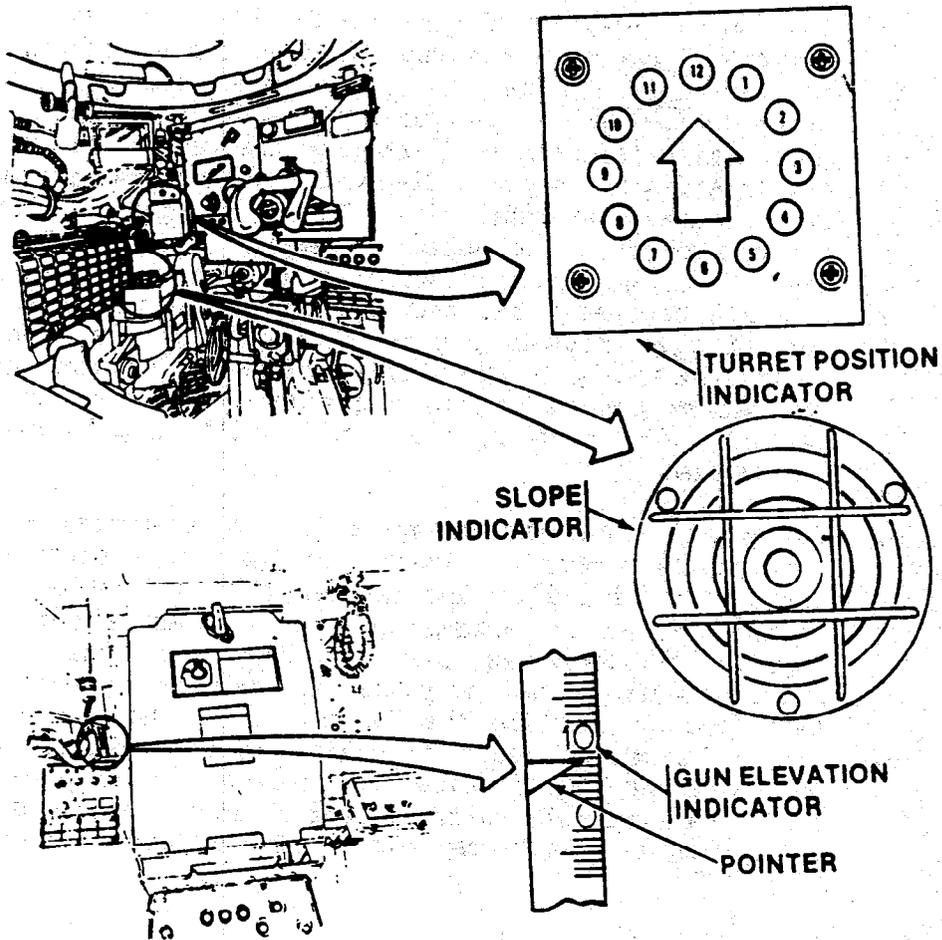
1. Turret Electric Drive and Stabilization (Ref to Fig. 12)
 - a. Drive mode is fully electric and controlled by handstation input. Variable rate input for elevation, traverse or both is sensed by electronic control assembly and sent to respective drive motor(s).
 - b. Gunner's handstation is a dual control which gives the gunner the option of using either hand for turret control operations. (See Fig. 11.) Each grip of the handstation has a palm switch, hi-rate switch and trigger switch. The palm switch is used to energize the drive system and must be used anytime the gunner desires to move the turret. While either palm switch is held, the gunner rotates the handstation left or right to move the turret left or right. The amount of rotation determines the speed of traverse. Rotating the handstation grips forward or backward elevates or depresses the gun rotor (and TOW launcher if raised). The amount of input determines drive motor speed. If additional speed is desired the fast turret button can be used with the palm switch. This puts the turret drive system in the maximum speed mode, but inputs the handstation rotation still control the rate to match the gunner's desired speed. Elevation and traverse movement can be made at the same time. Either trigger switch can be used to fire the selected weapon (25mm, 7.62mm or TOW). If no firing inhibits (hatch open, weapon manually depressed too far) are sensed in the circuit, the trigger signal passes through the electronics control assembly to the turret distribution box where the weapon control circuits are (from there on to the weapon). The triggers are useable without palm switch activation.
 - c. Commander's handstation operation is essentially the same as the gunner's, except that the single control is used. See Fig. 11. The commander's handstation palm switch activation automatically overrides all gunner input. The commander then has control of the turret drive system. The exception is when the gunner has fired and is tracking the TOW missile. The electronic control assembly logic maintains turret control with whichever handstation fired the missile. This prevents inadvertent missile guidance control loss (while missile is in flight). This may happen if the turret is moved

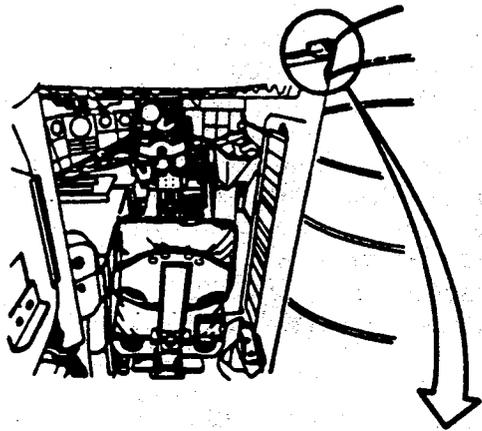


GUNNER'S HANDSTATION

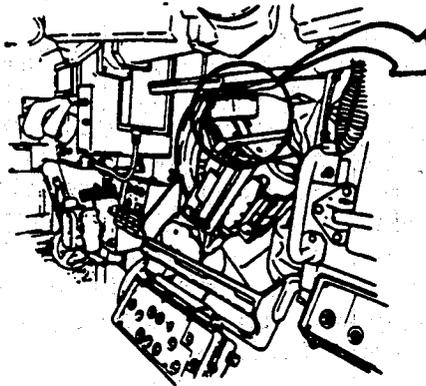


COMMANDER'S HANDSTATION

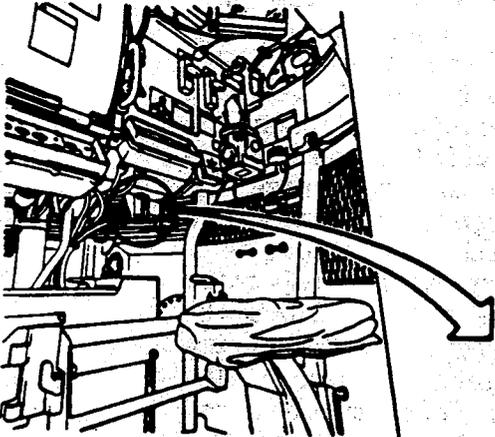
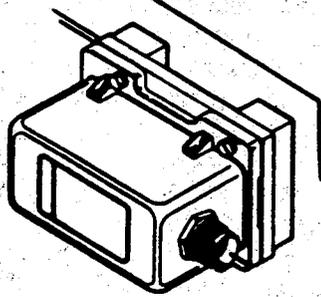
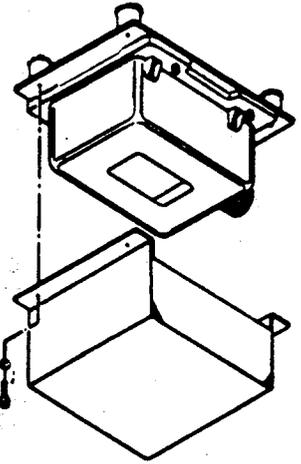




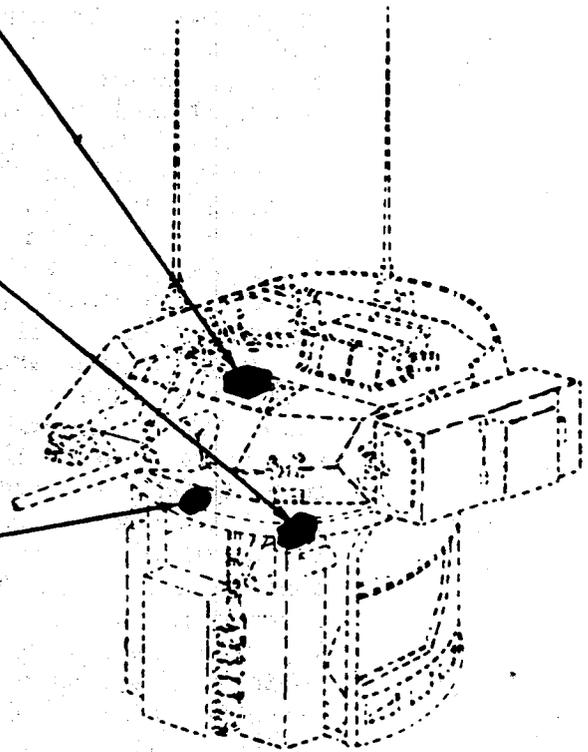
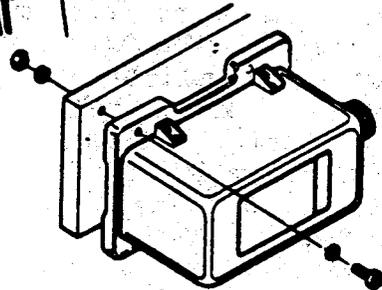
HULL GYRO
(YAW)



GUN GYRO
(ROLL)



TURRET GYRO
(PITCH)



FIRE CONTROL GYRO LOCATION

Fig. 12

by either override control, jerking motion, or by moving the turret in the opposite direction to acquire another target. Though, if the missile is fired from the gunner's station, the commander may override the turret control by aborting the missile. The commander's handstation control logic also requires that the palm switch be depressed to activate the trigger circuit. The gunner is intended to be the primary turret controller, so unintentional trigger activation, by the commander, could result in "friendly" casualties without this logic.

- d. Traverse and Elevation Drives - The drives receive all input signals from the electronics control assembly (ECA/See Fig. 20) and produce tachometer signals back to the E.C.A. for precise control. In power mode, built in brakes hold the drives in position until the palm switch is pressed. In manual mode, the brakes are released continuously. A "no-back" system is used to prevent external forces from delivering reverse rotation to the gunner through his handwheels (prevents injury in case of turret hitting tree in manual mode). A slip clutch is incorporated in the drives to prevent damage in case of contact with the tree while in power mode. The TOW and gun elevation drives also have potentiometers (variable resistors) to allow the E.C.A. to monitor actual elevation positions of each drive. The potentiometers tell the E.C.A. when the drives are approaching and are at their elevation/ depression limits to prevent the motors from driving against the hard stops. The pots also are used to synchronize the two drives. With the two drives being independent (in power mode), they must be aligned with each other, when the TOW launcher is raised, so that their respective angles of elevation will be the same. This allows the gunner to utilize either of the weapons at any time without having to "find" the elevation of each. The launcher is prevented from being used anytime the vehicle is moving over 3 mph. (The TOW missile cannot effectively be used with the vehicle moving and the launcher support is not designed to withstand the load of the launcher over terrain). A sensor in the left final drive causes the TOW elevation drive to depress to -13° when the vehicle speed criteria is exceeded. Raising of the TOW launcher is prevented during vehicle movement. When the vehicle is stationary and the launcher is raised, the stabilization mode is automatically disengaged (goes to drive mode).

- e. Stabilization operation is accomplished by use of rate gyros which sense gun, turret and hull movement. The gyro signals are sent to the E.C.A. which then signals the drive motors to match the rate and direction of change of movement of the respective structures. The turret and guns are then maintained in the same direction and elevation regardless of vehicle and turret roll, pitch and yaw. The weapons are thus easier to hold on target because the system has already reacted to vehicle orientation. The stabilization system is on stand-by when the drive mode is selected and is activated into the drive system when the stab switch is turned on. All the operator has to do is hold the palm switch, with stabilization selected, and the drive system automatically holds the turret and guns in the same orientation as when the palm switch was activated. Releasing the palm switch during vehicle movement will stop the drive system and allow drift to accumulate in the gyros. To correct the drift, a drift compensation switch is provided. Holding the switch on for a few seconds with vehicle stationary, the gyros are neutralled to eliminate any output that would indicate vehicle/turret motion to the E.C.A.
- f. Gyros (Gun, Turret, Hull) See Fig. 12. - sense change and rate of movement of respective structures. Signals fed to electronic control assembly for compensation in stabilization mode. On stand-by in drive mode.

2. Turret Drive and Stabilization Components

- a. Traverse Drive - moves turret through continuous 360° azimuth rotation. Fully electric driven through gearbox (D.C. Motor). Maximum rate 60° per second, minimum .05 mil per second. Manual handcrank with trigger in case of power failure (by using select lever). (See Fig. 13.)
- b. Gun Elevation Drive - drives gun rotor from -10° to $+59^{\circ}$ in power or manual mode. Same rates in power mode as traverse. Weight of gun in rotor balanced by equilibrators (to prevent damage to drive by uneven loading). (See Fig. 14.)
- c. TOW Elevation Drive - drives TOW rotor from -19° to $+29^{\circ}$ in power mode. Manual mode uses gun elevation manual handcrank through an interconnecting drive cable (same limits). (See Fig. 15.)

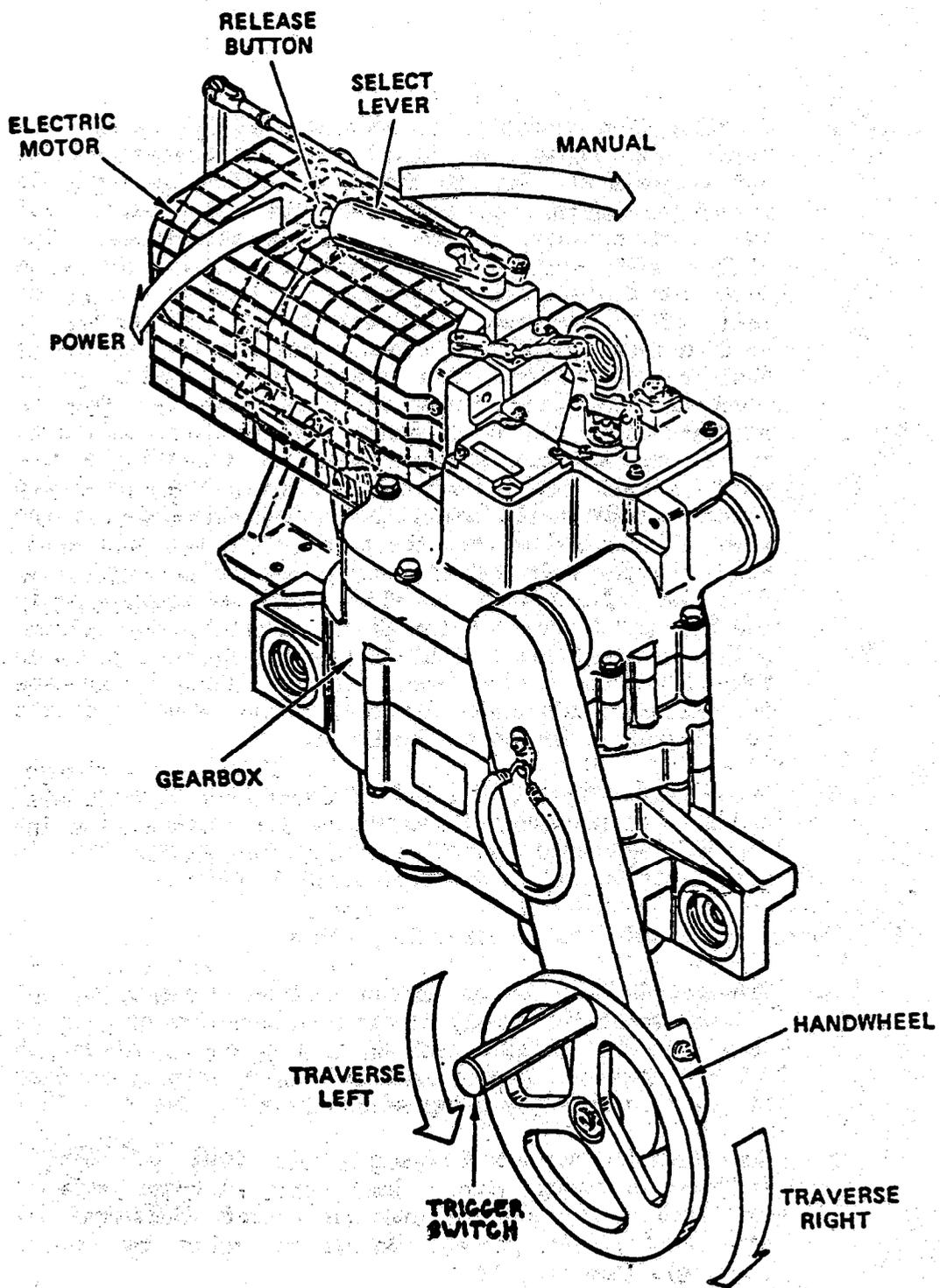


Fig. 13
 TRAVERSE DRIVE ASSEMBLY.
 PAGE - 21.2.

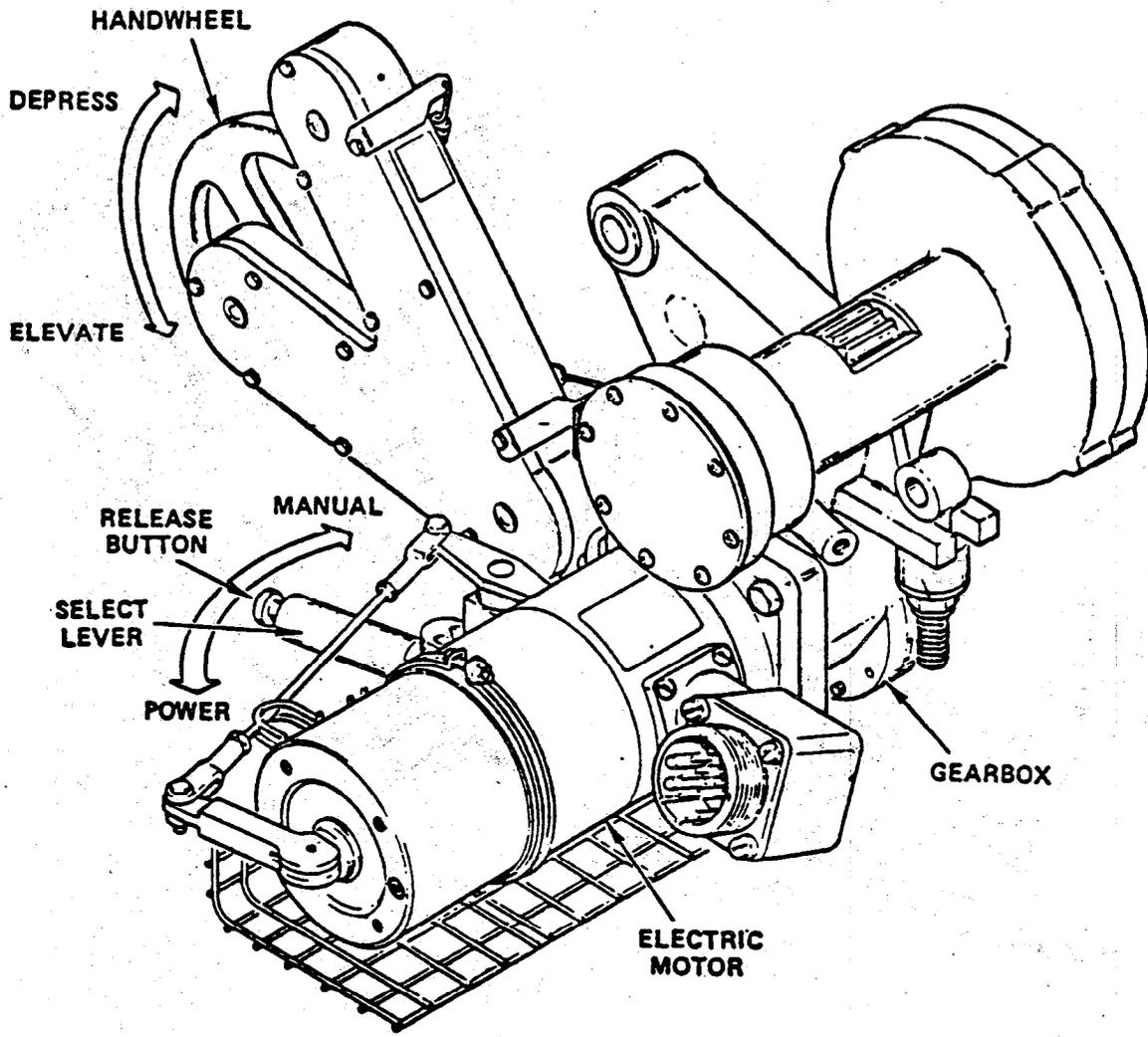


Fig. 14

GUN ELEVATION DRIVE ASSEMBLY

page 121. b.

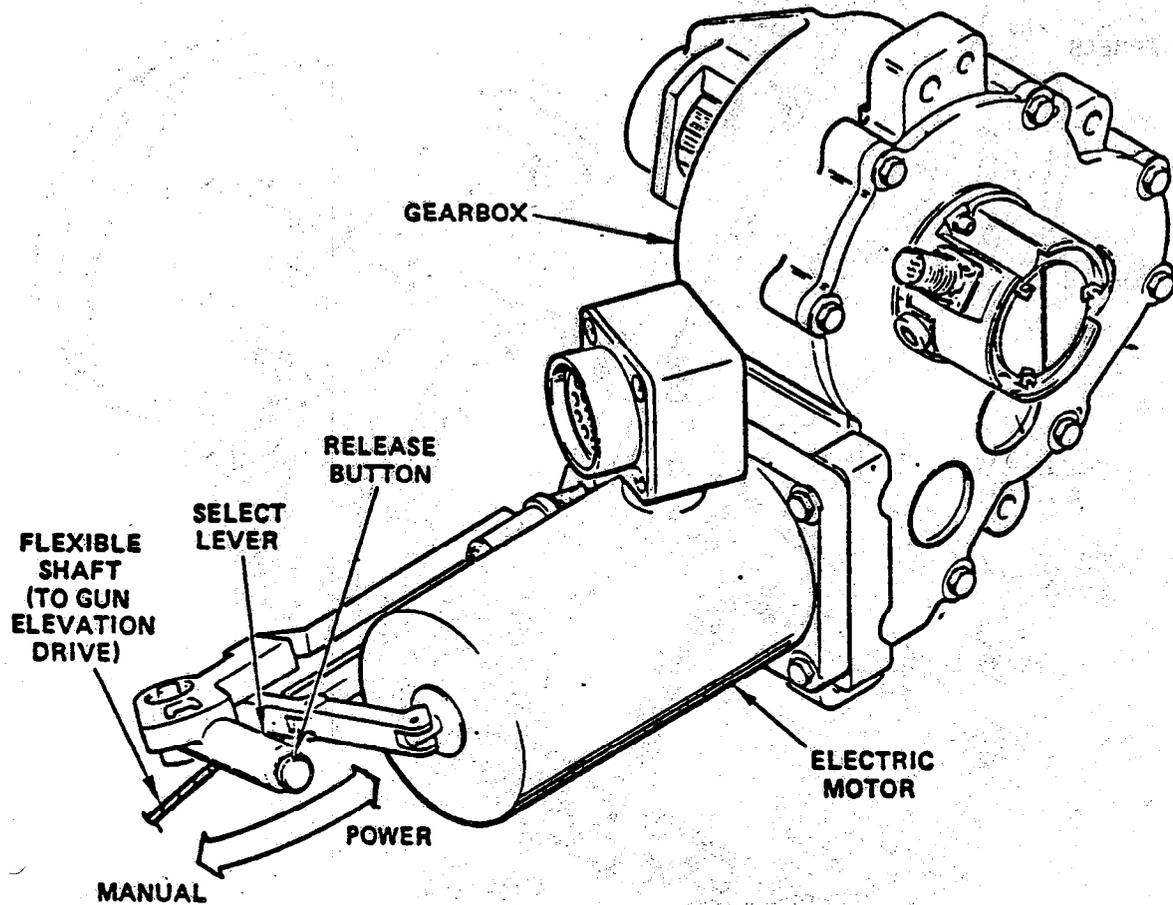


Fig. 15
TOW ELEVATION DRIVE ASSEMBLY.

Page 21.C

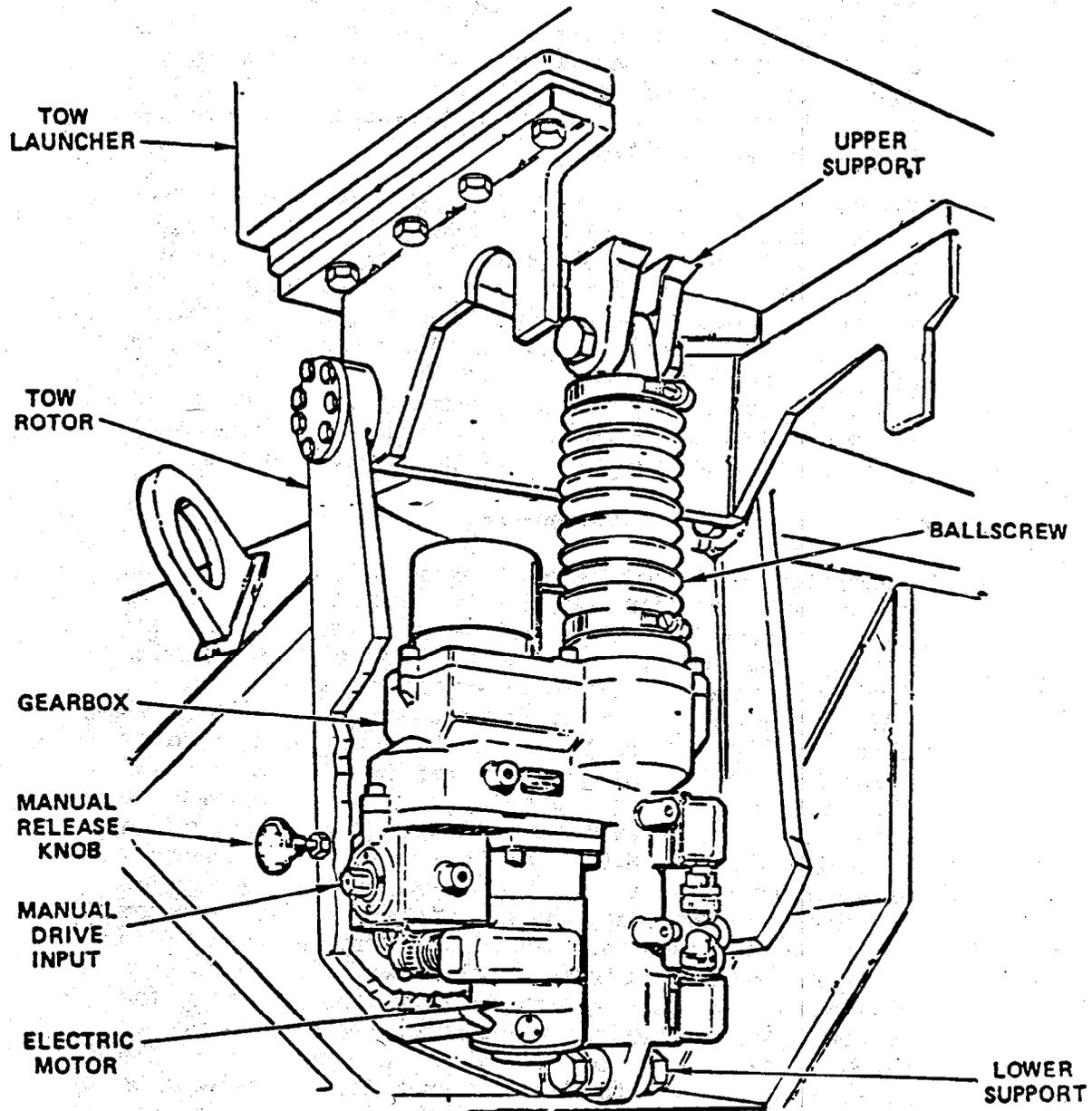
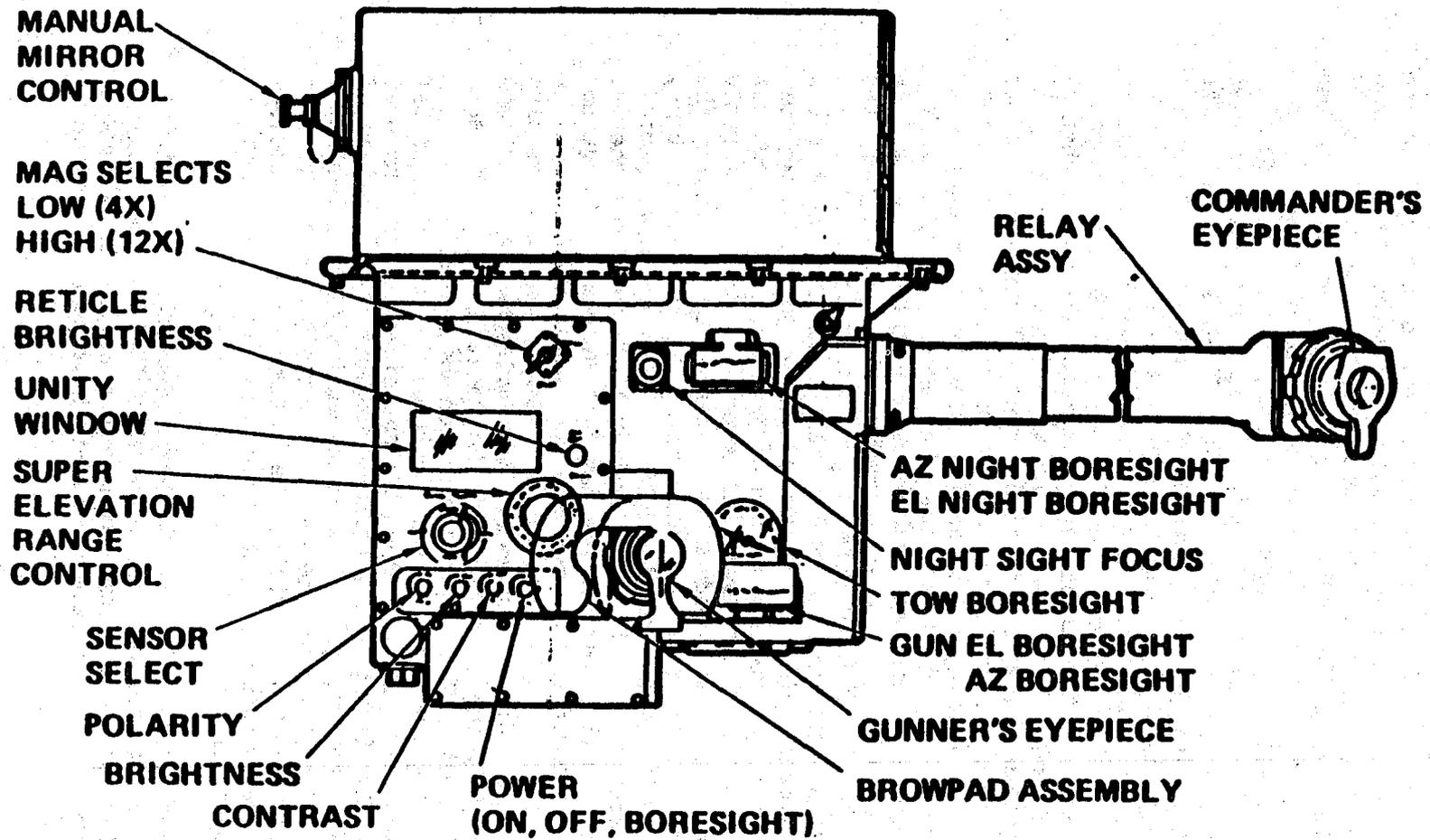


Fig. 16

TOW LIFT MECHANISM ASSEMBLY.

Page 22.2.

- d. TOW Lift Mechanism - raises launcher up to horizontal ready position and stows it in conjunction with TOW elevation drive. Power and manual back-up. TOW system cannot be selected until launcher is up to prevent inadvertent firing. Launcher selected de-activates stabilization. (See Fig. 16.)
 - e. Electronic Control Assembly - receives inputs from handstations, gyros and drive motors. Processes given signals and transmits signals to control drive motors. Processing logic for preliminary weapons firing sequence. Drive system requires vehicle electrical power (18 to 30 vdc). Automatically shuts drive system off if under/over voltage, overheated, or if normal vehicle electrical power is absent (will not operate on turret back-up batteries). Drive system inhibited with hull hatch "Open" can be overridden in combat situation.
3. Sighting and Fire Control components.
- a. Integrated Sight Unit Weapon Control (See Fig. 17) - the gunner and commander use the integrated sight unit to locate, identify, range and engage targets day and night. The ISU is moved with the turret in azimuth (structure mounted) and follows weapon elevation (gun or TOW) by means of a servo driven mirror that is electrically linked to the selected weapon's rotor movement. In TOW mode, the mirror follows movement of the TOW rotor. For precise alignment, boresight adjustment in elevation allows gunner to match line-of-sight of I.S.U. with line-of-sight of launcher. Azimuth adjustment requires physical movement of launcher. In gun mode, the mirror follows the gun rotor elevation/depression. 25mm boresight adjustments in elevation move the mirror to align with 25mm. Azimuth adjustment moves the aiming reticle. Boresighting the 7.62mm requires physical movement of the machine gun to match line-of-sight of ISU (by the operator). The sighting mirror is further adjusted for superelevation by dialing in estimated range. (Superelevation is used to maintain weapon accuracy (25mm and 7.62mm) by adjusting the mirror line-of-sight in elevation to allow for trajectory of the selected ammunition). Alignment of the range estimating stadia lines, on to the target, allows the gunner to approximate a given target's distance from the vehicle. (The stadia lines are designed for use on BMP type target sizes; different size targets require more gunner adjustment or tactical doctrine). The gunner's estimate of range is then dialed into the sight which lowers the mirror's

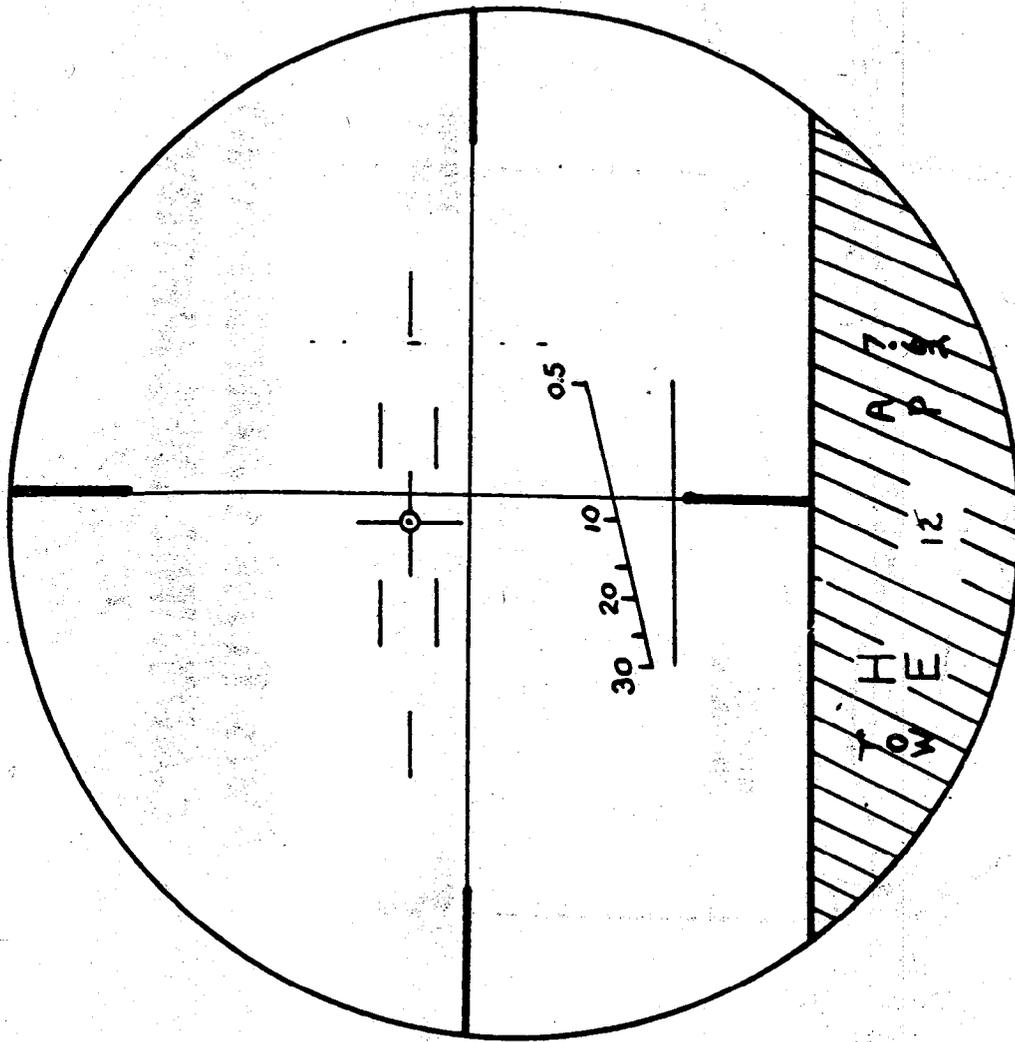


INTEGRATED SIGHT UNIT

Fig. 17
Page 22.b.

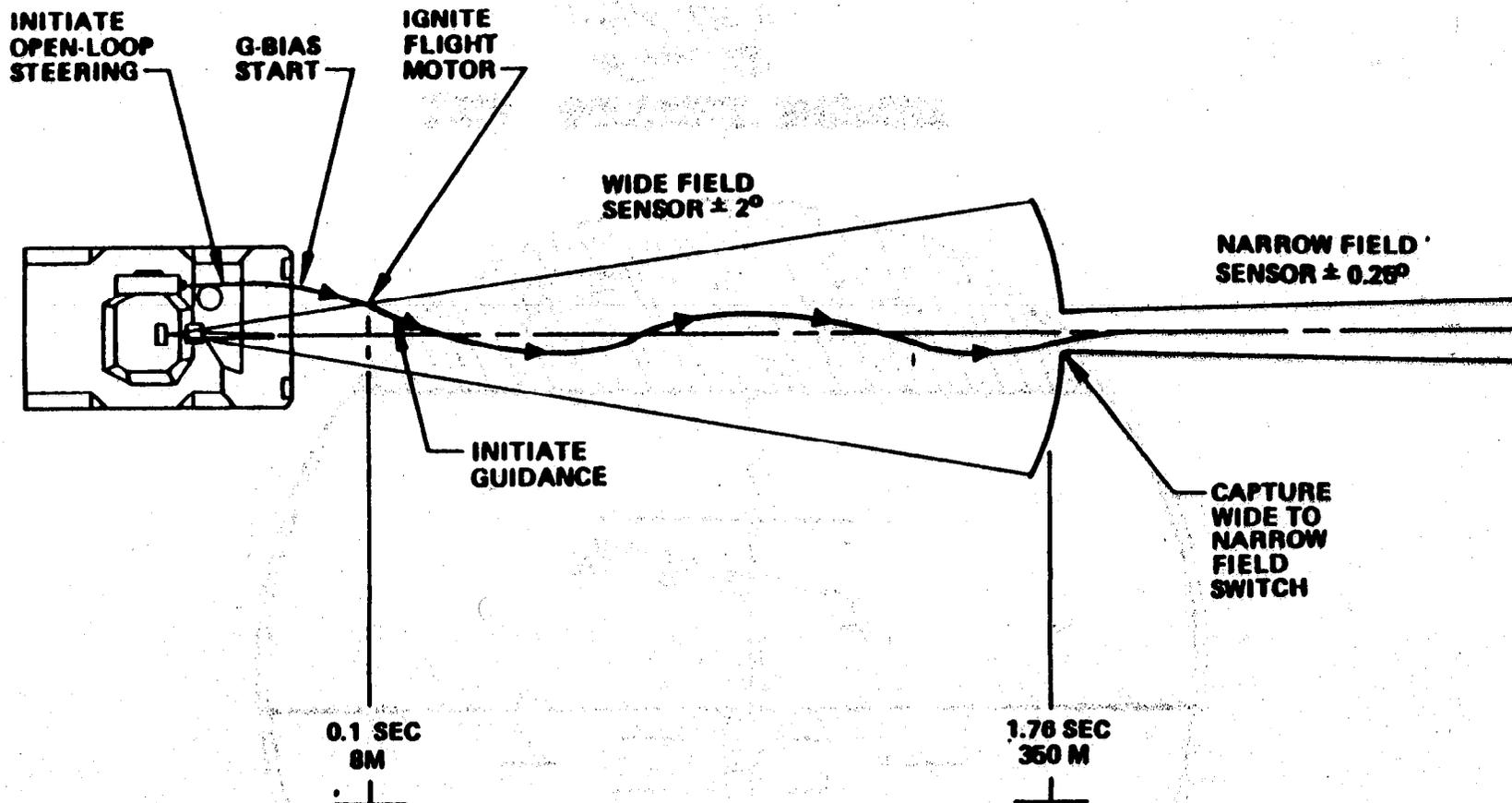
line-of-sight which in turn causes the gunner to elevate the weapon to re-align on target. Superelevation is stepped in 200 meter increments and is displayed in the gunner's and commander's eyepieces using the first two digits (i.e., 2000 meters would be shown as "20," or 200 meters would be "02"). The TOW missile does not use range determination/superelevation so the range dial has no effect on the sighting mirror and the range display is blanked out in TOW mode. Weapon selection is also displayed in the eyepieces (TOW, 7.62, AP or HE). The TOW aiming reticle (cross-hair) is etched on the mirror and is lighted for day and night use (See Fig. 18). The 25mm and 7.62mm reticles are the same and the reticle is light projected onto the display when either weapon is selected. The night sight displays images of thermal differentiating heat sources. Infrared energy is detected (using supercooled detectors) and converted to electrical signals and then converted to visible light for the display. The display clarity is adjustable to achieve the best picture for each gunner/commander. Brightness, contrast and focus adjustments are similar to television type adjustments. The polarity of the display is optional depending on gunner preference. The display can show a heated target as red on a black background (W/H) or target as black on red background (B/H). The cooling system of the night sight requires 10 minutes of cooldown time before the display is ready for use. The cooldown is initiated by activating the night sight power switch. This can be done anytime, even if using the daysight. After cooldown period, selection of night sight mode will display the thermal images and disengage the daysight display. The gunner and commander see exactly the same displays. The auxiliary displays (reticles, range, weapon) are also shown on night sight mode. Both modes have 4X (LOW) and 12X (HI) magnification of the terrain (with the same displays). The LOW mag position is normally used for scanning and the HI mag position is used for actual target engagement. The 12X magnification must be used for TOW firing (an interlock prevents TOW selection if 12X is not engaged). The unity window (1X) is basically a periscope and can be used for terrain scanning or as a back-up sight for firing the 7.62mm. The view follows weapon movement, but does not have gun reticle projection.

- b. TOW Missile Firing and Guidance (See Fig. 19) - missile selection can be made only with TOW launcher raised. Selection of TOW mode connects missiles to subsystem circuits and initiates a self-test of pertinent circuits



ISU RETICLE DISPLAY

Fig. 18
PAGE 23.2



FVS TOW LAUNCH AND CAPTURE GEOMETRY

Fig. 19
PAGE 23.6.

of the power converter, command guidance electronics and ISU tracker. If a failure indication comes up, a re-test can be run to allow the system to re-evaluate itself. Missile selection can then be made (if self-test passed). A flashing missile tube light will come on when there is no missile loaded or after the missile is launched. A steady light shows missile is present. The missile is launched 1.5 seconds after trigger pull. This time delay allows the command guidance electronics to signal the missile flight controls (self-balance, gravity bias) to prepare for launch and returns a signal saying the missile is ready. A launch motor then ignites to move the missile out of the launcher (8 meters) and beyond the front of the vehicle. Once the missile is launched, the control fins extend and the flight motor comes on for a few seconds. The infrared emitter, on the back of the missile, is seen by the ISU tracker/error detector and the flight errors are minimized to provide accurate guidance. The flight path of the missile is compared to the line-of-sight of the I.S.U. TOW aiming reticle and errors are processed by the ISU. The error signals are then sent to the command guidance electronics which in turn develops steer signals. The signals are then delivered to the missile by means of two pay-out wires that connect between the rear of the missile and the missile tube. The guidance is automatic and only requires the gunner to maintain cross-hair alignment on the moving or stationary target. Wire-cut prevents wire entanglement on the vehicle and allows remove of spent missile case from launcher. Firing over water or through trees can cause missile control loss by broken or shorted wires. The missile warhead is armed when the missile has flown about 65 meters (1 second from launch) if the target is missed, the missile will continue to fly (under control) until guidance wire runs out (3000 meters -3750 meters for improved TOW and TOW II). If the ISU is inoperable or self-test fails, launch should not be attempted because of lack of control.

- c. Vane Sight (See Fig. 29) - is used to assist the commander in laying the turret on target.
- d. Back-Up Sight (See Fig. 29) - provides 25mm and 7.62mm (not TOW) sighting control while protected when ISU does not function. Gunner or commander can use swiveling elbow to observe target through eyepiece.

4. Armament Components

- a. 25mm Gun (M242) - externally powered (electric 18 to 30 vdc) main gun. Fires high explosive, armor piercing and training practice ammo. Both AP and HE are belt fed and loaded into gun at same time to provide immediate selection of either ammo. Spent cases and links are discarded to exterior of turret (to prevent waste build-up inside turret). By control of weapon system circuits, gun fires single shot, 100 rounds per minute (Low) and 200 rounds per minute (High) from ammo ready boxes holding 300 rounds. Normal ammo load - 70 AP, 230 HE. Optional loading capability (all AP or all HE). Reversed ammo loading in ready boxes does not affect ISU trajectory compensation by selecting correct ammo type on ammo reverse switches (on ready boxes). Gun and ammo effective against light armor, wheeled vehicles and extended range personnel targets. Main gun capable of defeating 75mm of armor (pointblank) at 0° obliquity and 66mm at 1,000 meters. The staballoy penetrator (AP) will defeat 14mm armor (at 45° obliquity) of BMP turret beyond 800 meters effective range of 73mm smoothbore (BMP). Gun has manual firing capability with handcrank (in case of power failure). Ammo tracer visible in ISU.
- b. 7.62mm (M240C) - gas operated, right-hand feed, belt fed (NATO ammo). Fires with electric solenoid (Normal) or with manual trigger (by commander in case of power failure). Firing rate maintained by adjustment of gas port in adverse weather. Mounted coaxially with 25mm (on same rotor).
- c. Tube Launched, Optically Tracked, Wire Guided (TOW) Missile - twin tubes mounted in launcher armor. Fired by normal triggers.
- d. Deck clearance system automatically elevates guns and TOW to clear cargo hatch. Turret weapon firing automatically prevented if too close to hull or open cargo hatch. Override of firing inhibits in case of hull hatch switch circuit malfunctions (combat override).

5. Turret Controls and Indicators

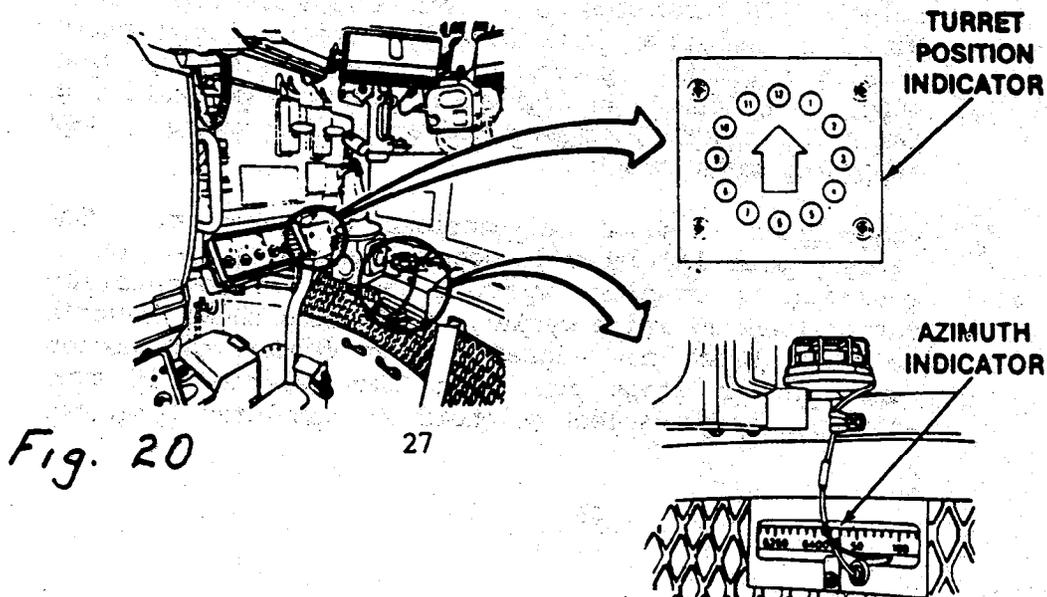
- a. Turret Control Box - controls power to turret, turret drive, stabilization, lamp test/rotor fan. TOW abort switch will cause a missile in flight to nose-dive and cut the control wires. Open hatch light indicates driver's or cargo hatch not closed (drive system will be

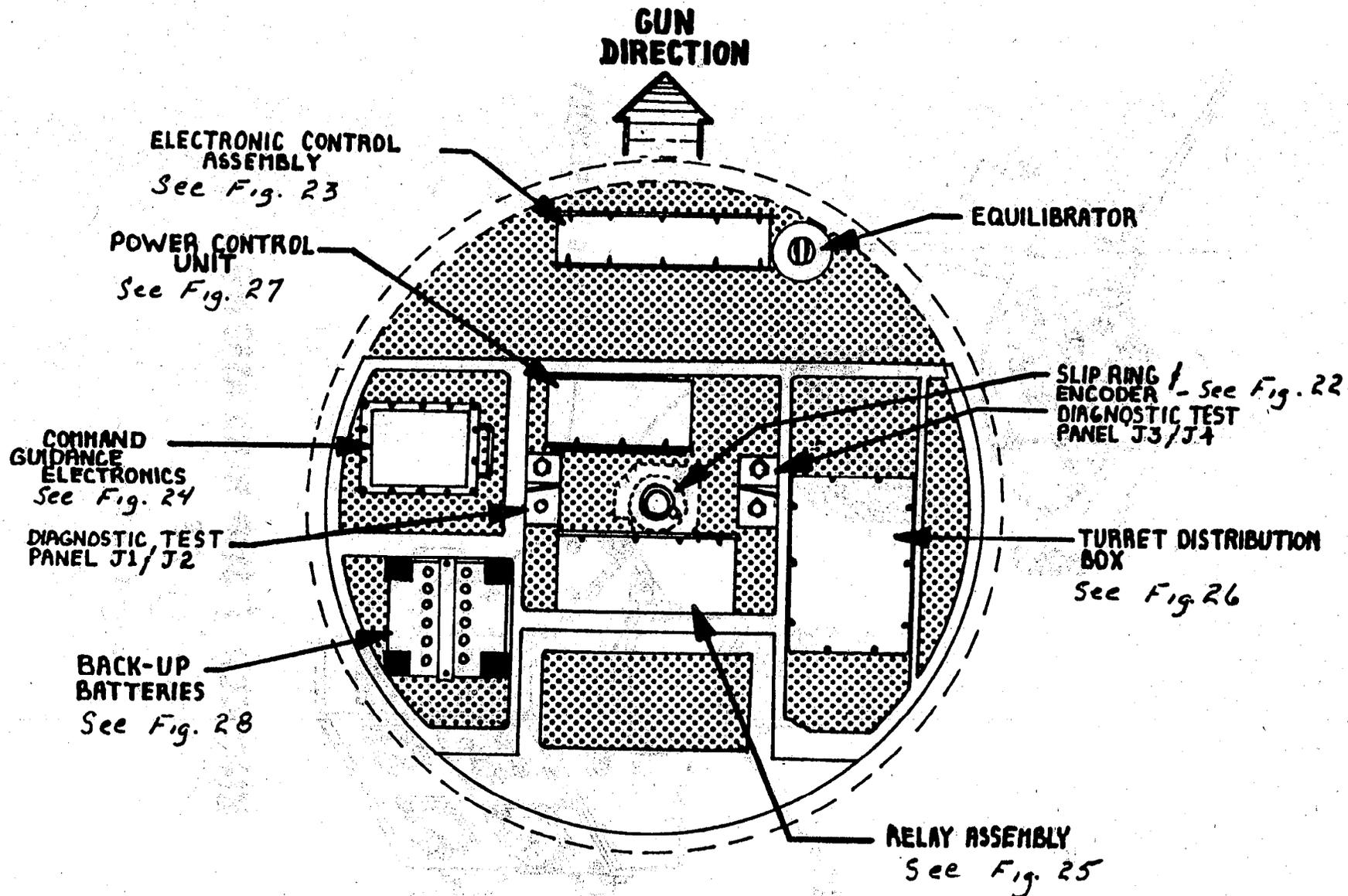
inhibited when hatch is more than popped with no other light indication). Back-up power light shows turret operating on back-up batteries only (drive system power inhibited). No fire zone light (and weapon selected inhibit) activated when driver's or cargo hatch past popped. Light comes on, with 25mm or 7.62mm selected, when gun rotor below -1° over cargo hatch area (can only be done manually). Light activated, with TOW selected, when TOW launcher below -13° over cargo hatch area (accomplished in manual only). No fire zone light comes on only when respective weapon system is selected and deck clearance is violated for that system. Manual drive indicated when either traverse, gun elevation or TOW elevation drive is in manual mode. Drive malfunction light activated when drive system is overheated, under or over voltage.

- b. Weapon Control Box - selects, arms 25mm, 7.62mm and smoke grenades (TOW also armed here). 25mm AP or HE rates of fire selected (SS=Single Shot, LO=100 rpm, HI=200 rpm) individually. 7.62mm selected will clear 25mm selection (cannot select 7.62mm and 25mm). Low ammo light flashing inhibits gun operating and shows respective ammo can is low on ammo. Override allows weapon to continue firing (will show steady light). Sear light flashing indicates 25mm in misfire position. Misfire button allows 25mm to be cycled to sear. Sear light on steady shows 25mm in sear and ready to cycle. Smoke grenade system armed and fired separately from weapon systems. Arming switch activates circuit to triggers, safes weapon selected and clears (Reset) weapon selection. Arm switch automatically moves to safe when turret power is turned off (to prevent inadvertent weapon arming).
- c. TOW Control Box - allows launcher to be raised/stowed. Selects TOW subsystem (and runs subsystem self-test). Missiles selected individually (steady light shows missile present - flashing means no missile in that tube). Malfunction lights activated when self-test fails ISU tracker, command guidance electronics or TOW subsystem power supply.
- d. Annunciator - shows malfunctions or warnings. TOW circuit open indicates launcher linear actuator not in position to complete circuit (stays on momentarily during launcher raise cycle). Open hatch shows driver's or cargo hatch not closed. 25mm feeder malfunction comes on and stops gun (with 25mm selected) if ammo selection by gun select solenoid not completed (jam, bad

circuit, etc.). Manual drive same as commanders annunciator. Ammo switch reverse shows one or both of the ammo switches have been changed to the secondary ammo position (used if loading HE in AP ammo can and vice versa). No fire zone same as TC's annunciator. 25mm gun malfunction shows circuit on gun system malfunctioning (signals on breech lock and sear solenoid not aligned) and stops gun. Drive malfunction same as TC's annunciator.

- e. Turret Position Indicators (See Fig. 20) - show position of turret with respect to vehicle. Arrow represents vehicle. Each number lights to show turret orientation (i.e., 3 o'clock means gun is pointed over the right side of vehicle; 5 to 7 o'clock is over cargo hatch).
- f. Turret Relay Assembly (See Fig. 21) - protects turret systems from power surges. Red light indicates circuit tripped - switch resets circuit.
- g. Elevation and Azimuth Tapes - indicate relative position of gun rotor (elevation) and turret (azimuth relation to hull).
- h. Slope Indicators (Driver, Gunner, Commander) - indicate vehicle cant on slope. TOW missile requires vehicle level within 10° . Bubble outside of outer ring shows vehicle/turret in excess of 10° slope (vehicle need to be leveled).
- i. Travel Lock - used when turret is not being operated (supplement to turret drive system brakes).
- j. Emergency Hatch Release - provides the crew with the ability to open the commander's hatch with the turret in any position other than 6400 mils. This may happen due to inadvertent closing of the hatches or injury to the commander and/or gunner.

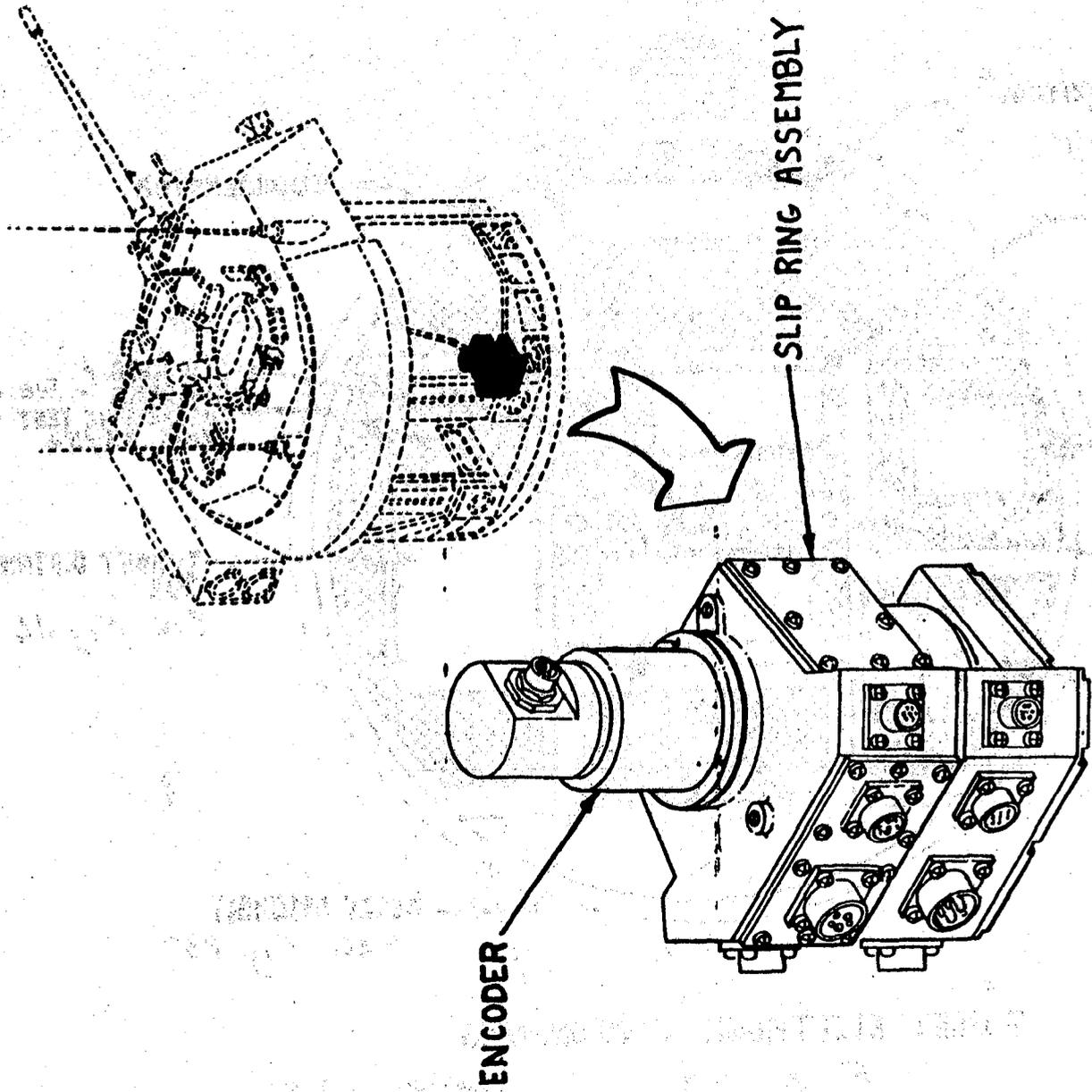




TURRET ELECTRONIC COMPONENTS

Fig. 21

page 27.a.



ENCODER ; SLIP RING ASSEMBLY

Fig. 22

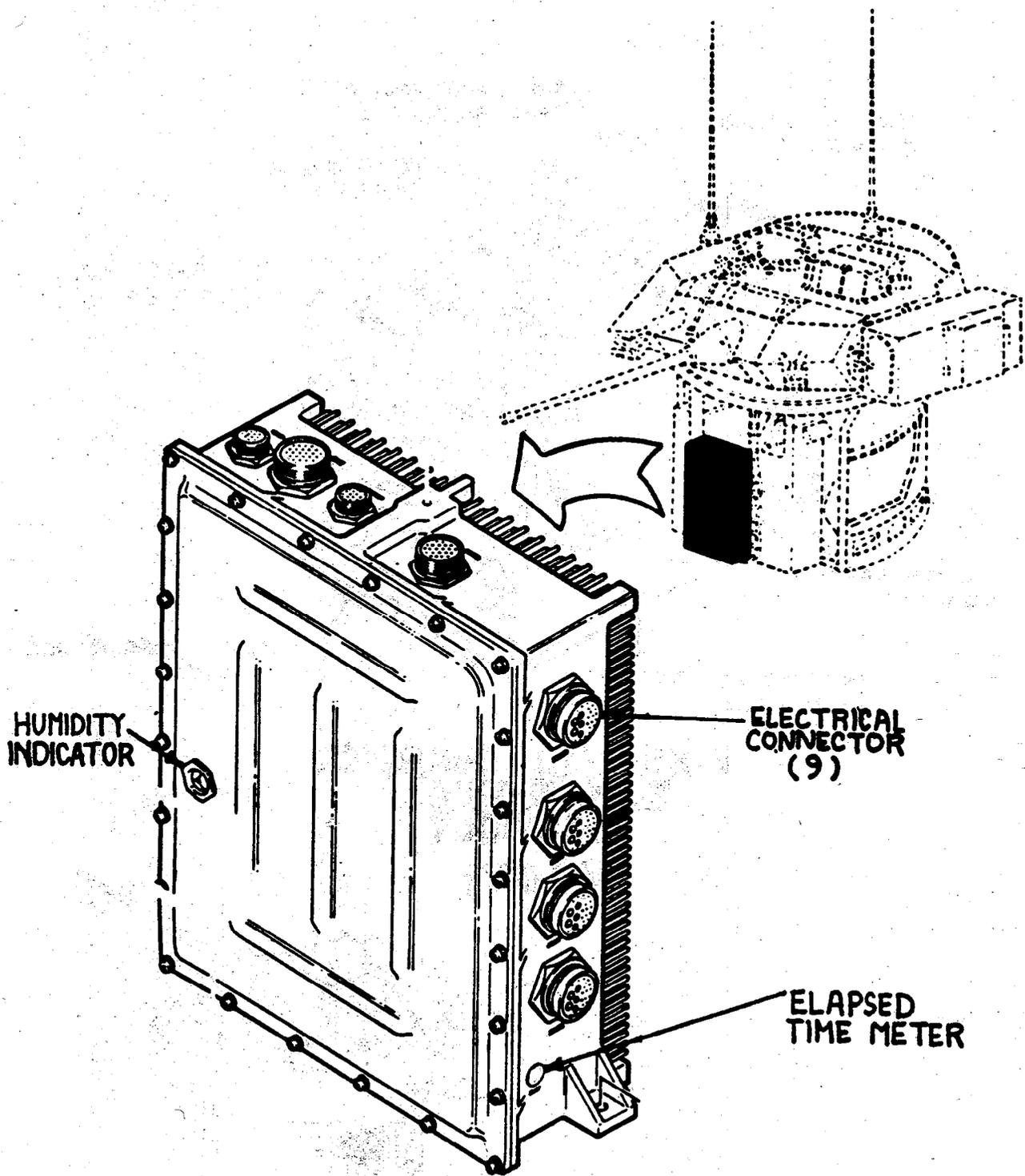
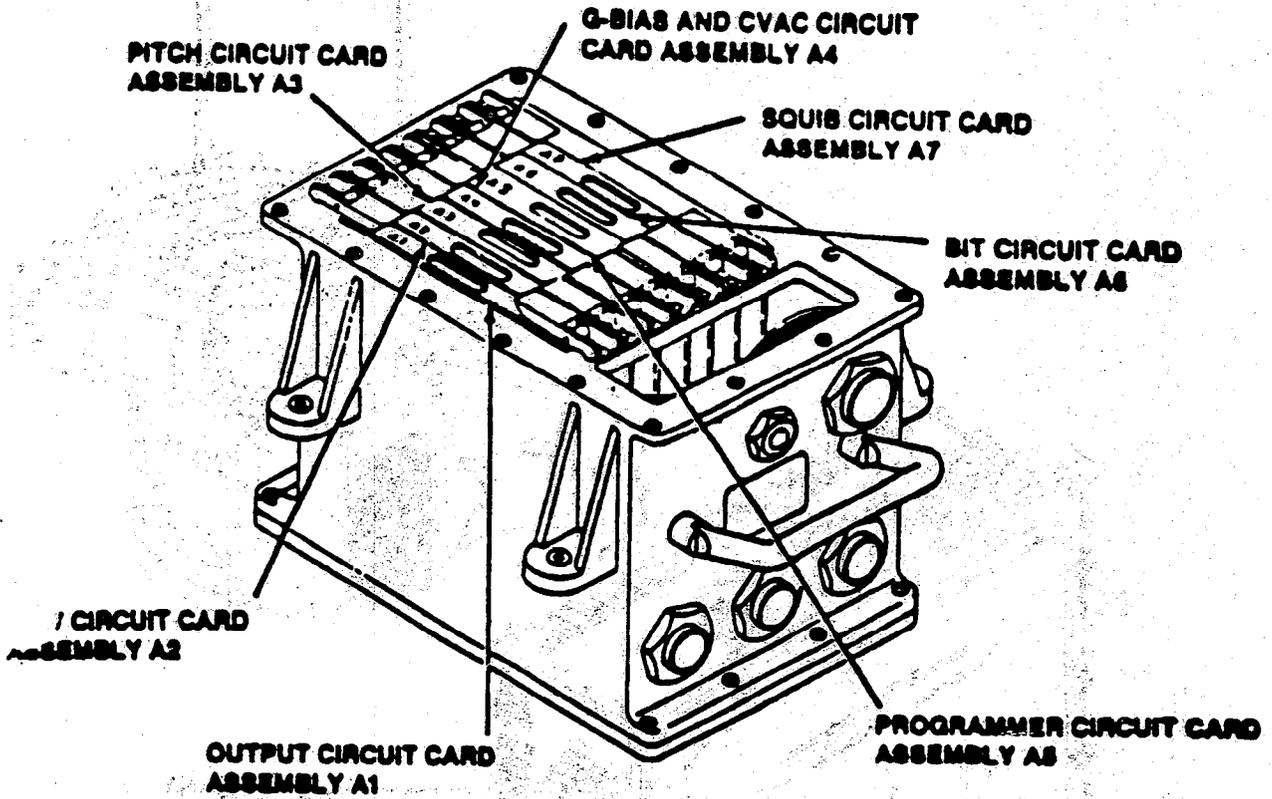


Fig. 23
ELECTRONICS CONTROL ASSEMBLY
(ECA)
PAGE 27. C.



**COMMAND GUIDANCE
 ELECTRONICS
 ASSEMBLY
 (CGE)**

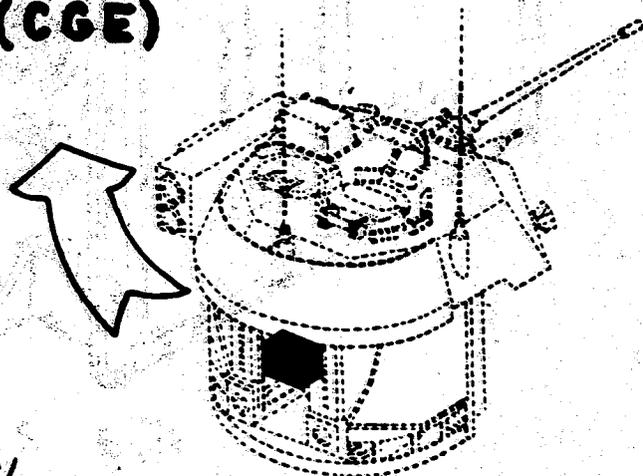


Fig. 24
 Page 27. d.

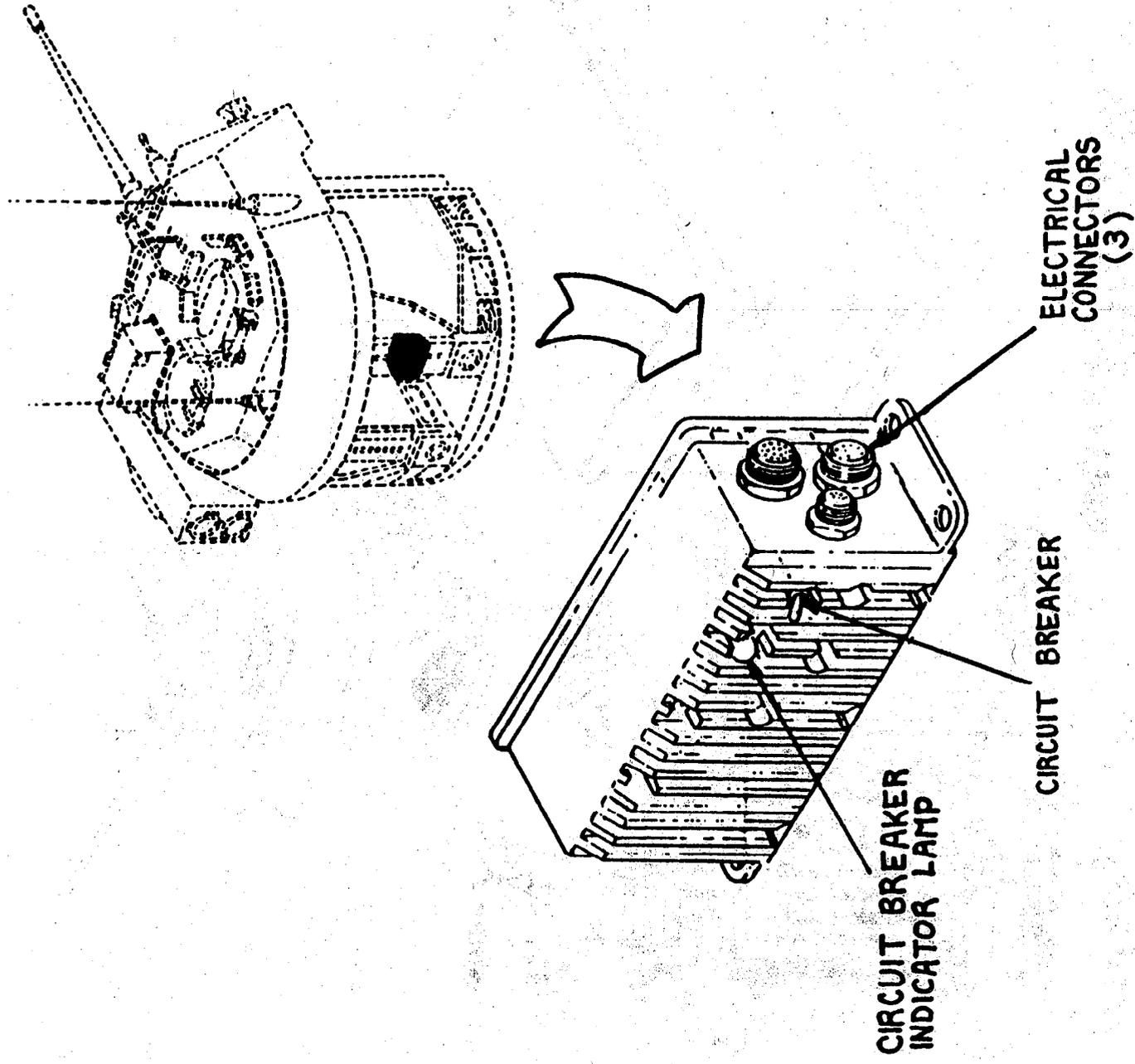
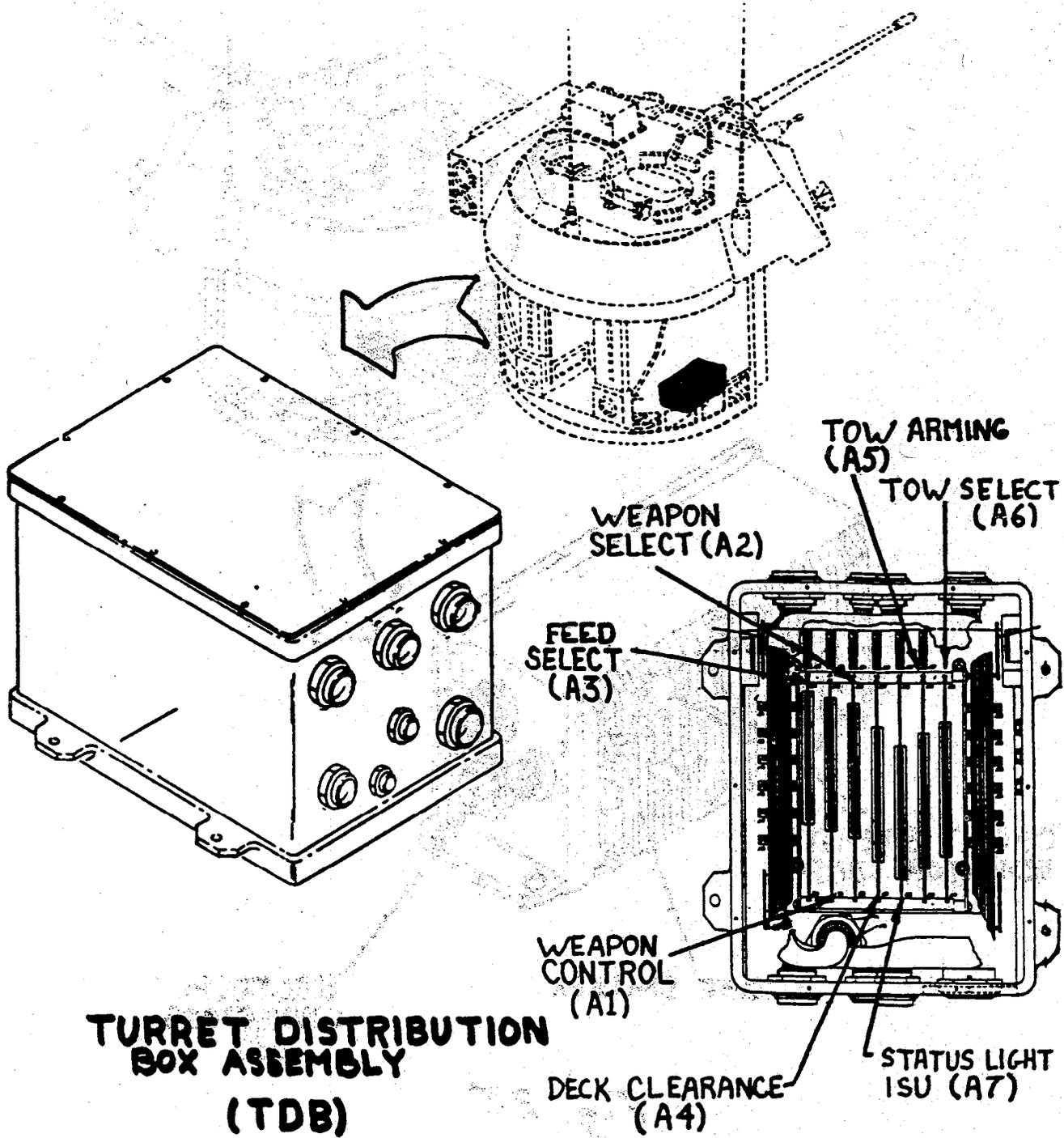
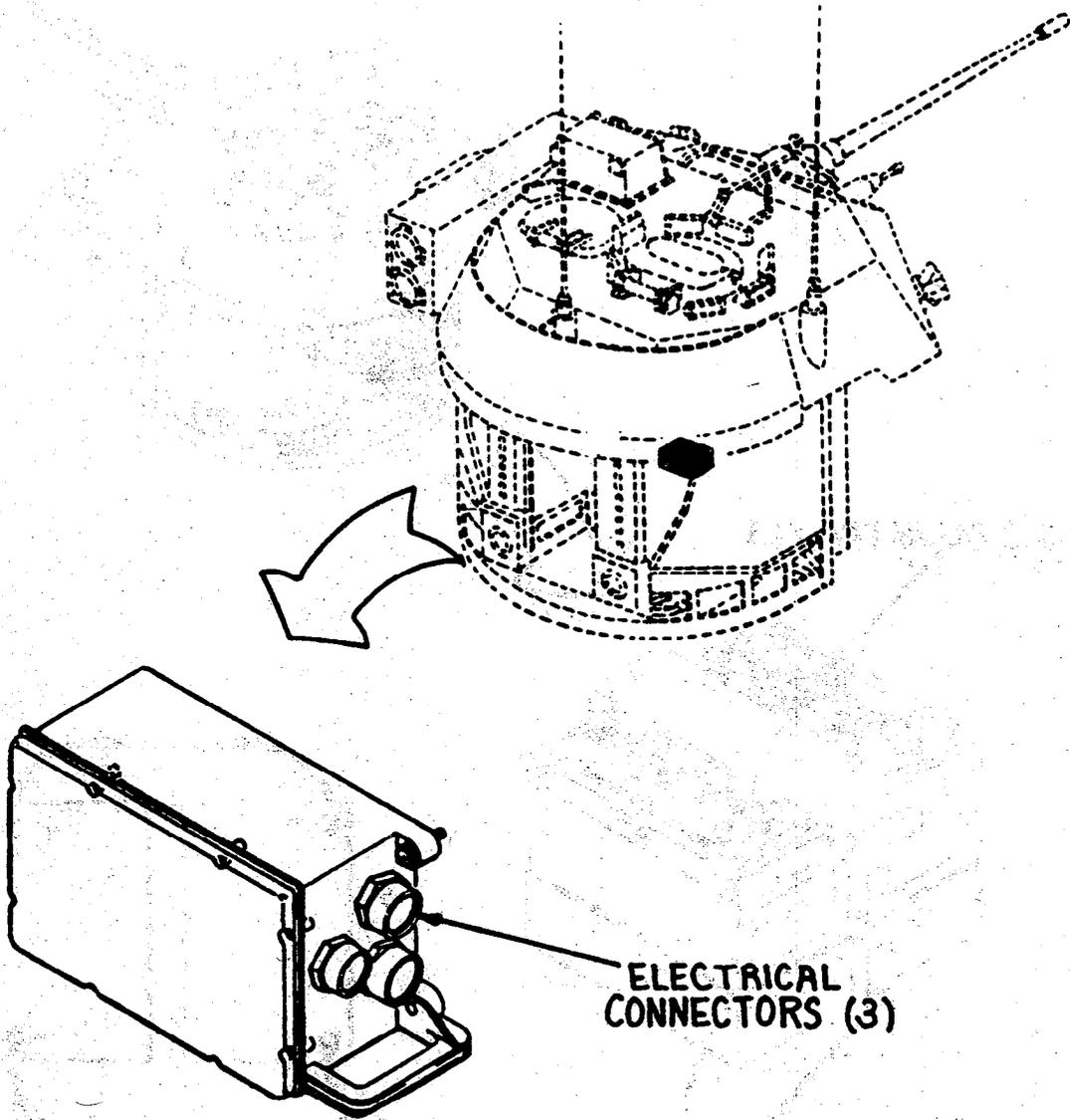


Fig. 25
RELAY ASSEMBLY
(RYA)
page 27 E

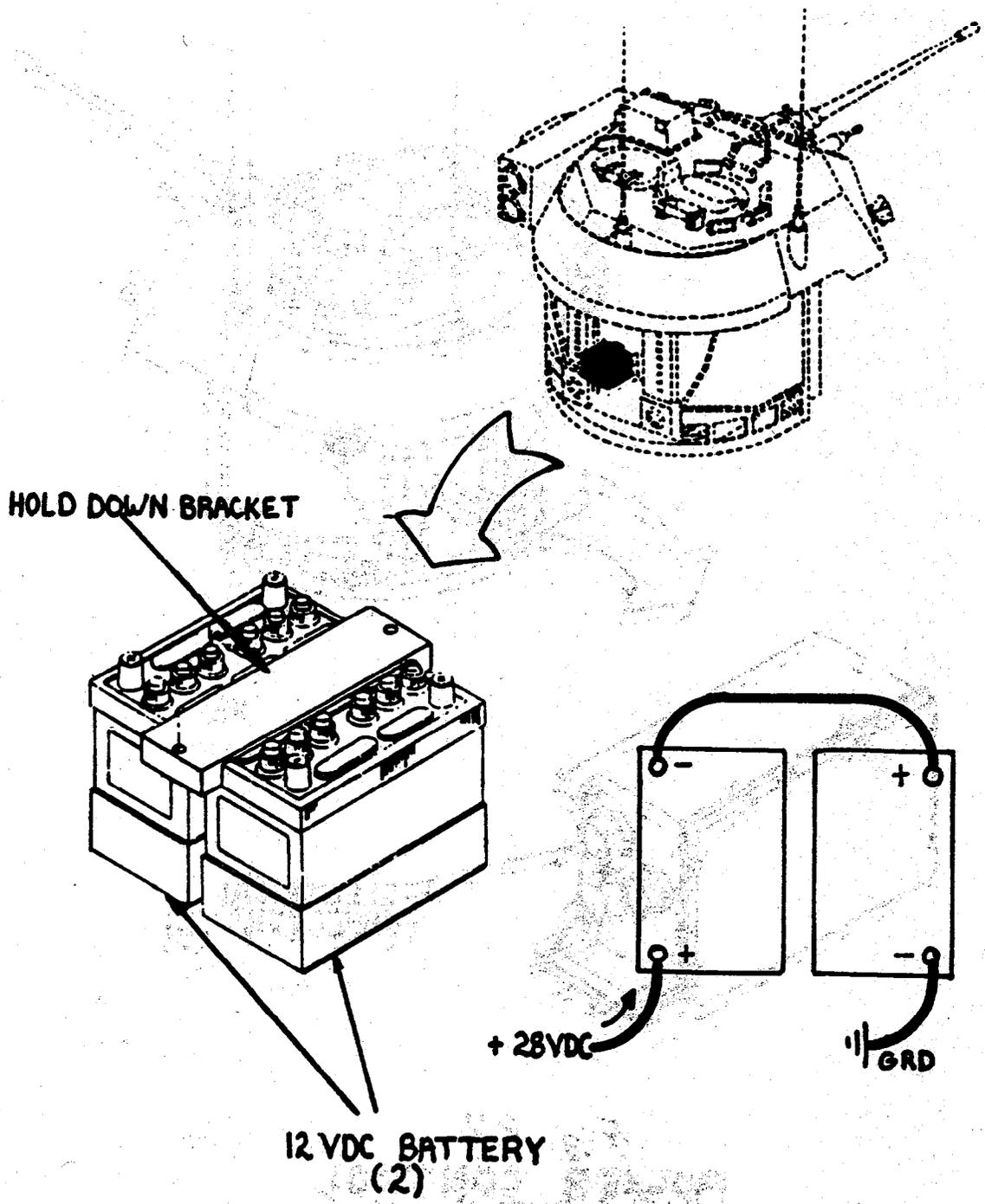


*Fig. 26
page 27.f.*



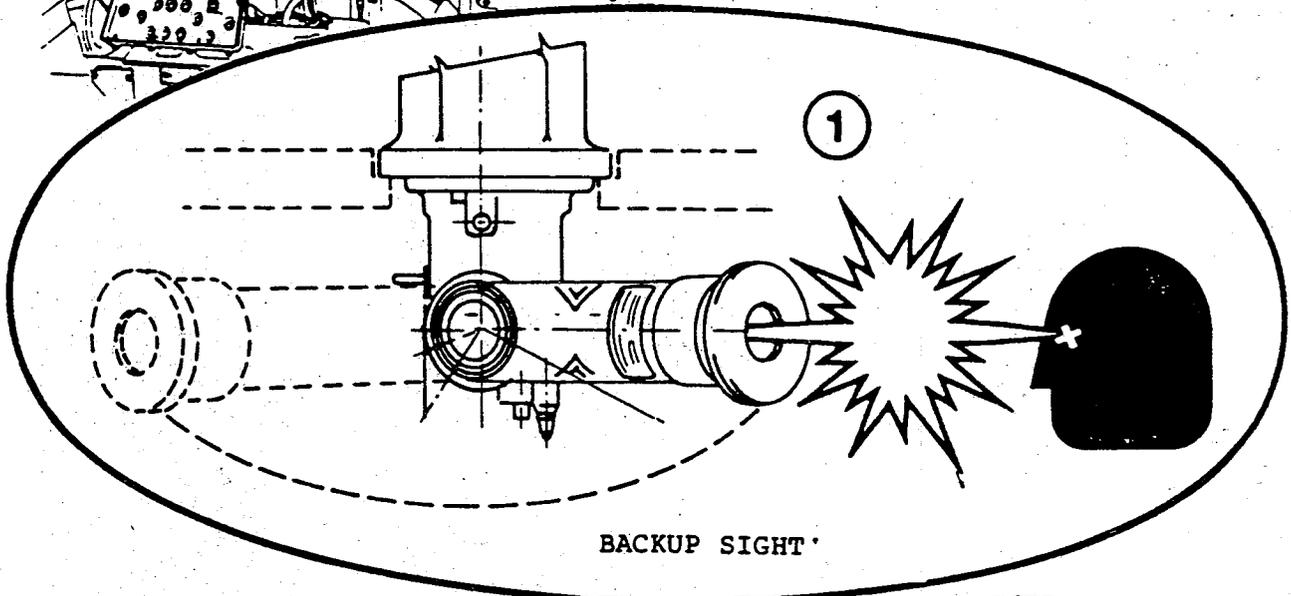
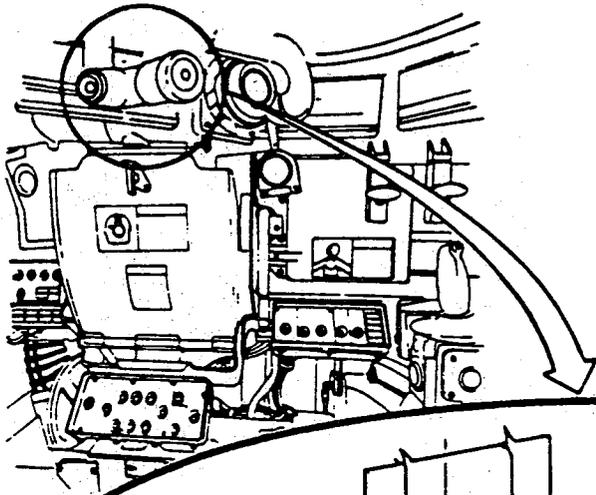
ELECTRICAL
CONNECTORS (3)

Fig. 27
**POWER CONTROL
UNIT
(PCU)**
page 27.g.

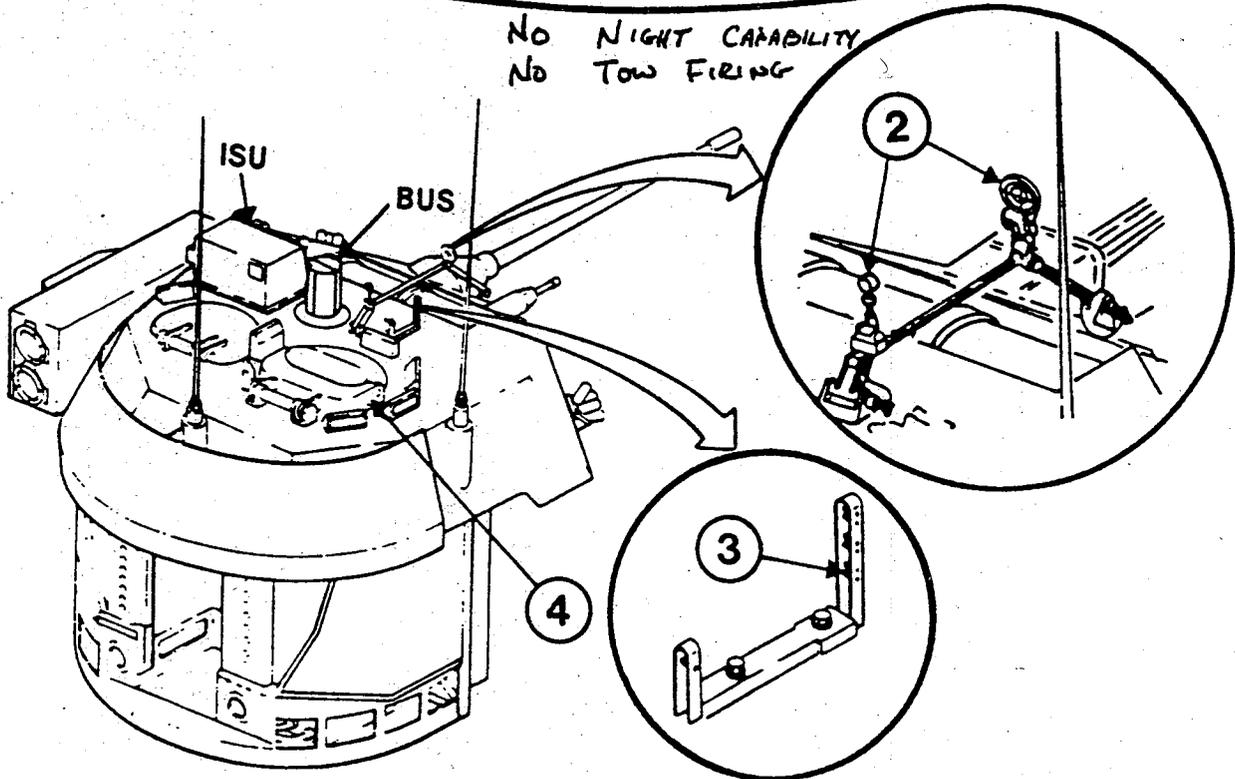


**TURRET EMERGENCY
POWER BATTERIES**
Fig. 28
Page 27. h.

Fig. 29



NO NIGHT CAPABILITY
NO TOW FIRING



SECTION III A

M242 25MM CHAIN GUN

1. Characteristics and Capabilities. The M242 25mm chain gun is an externally powered, dual fed, recoil assisted automatic cannon capable of firing various types of ammunition at selected rates of fire. As the M3 Bradley's primary weapon, the 25mm chain gun is designed to defeat a spectrum of threat targets, specifically the BMP.

a. The 25mm gun can be both electrically and manually fired by the gunner or track commander when installed on the M3. When electrical operation is desired, power drive is provided by an externally mounted 1.5 hp electric motor on the receiver assembly. Manual drive is provided by the gunner or track commander using the manual hand crank, inserted in the manual drive gear located on the rear of the feeder.

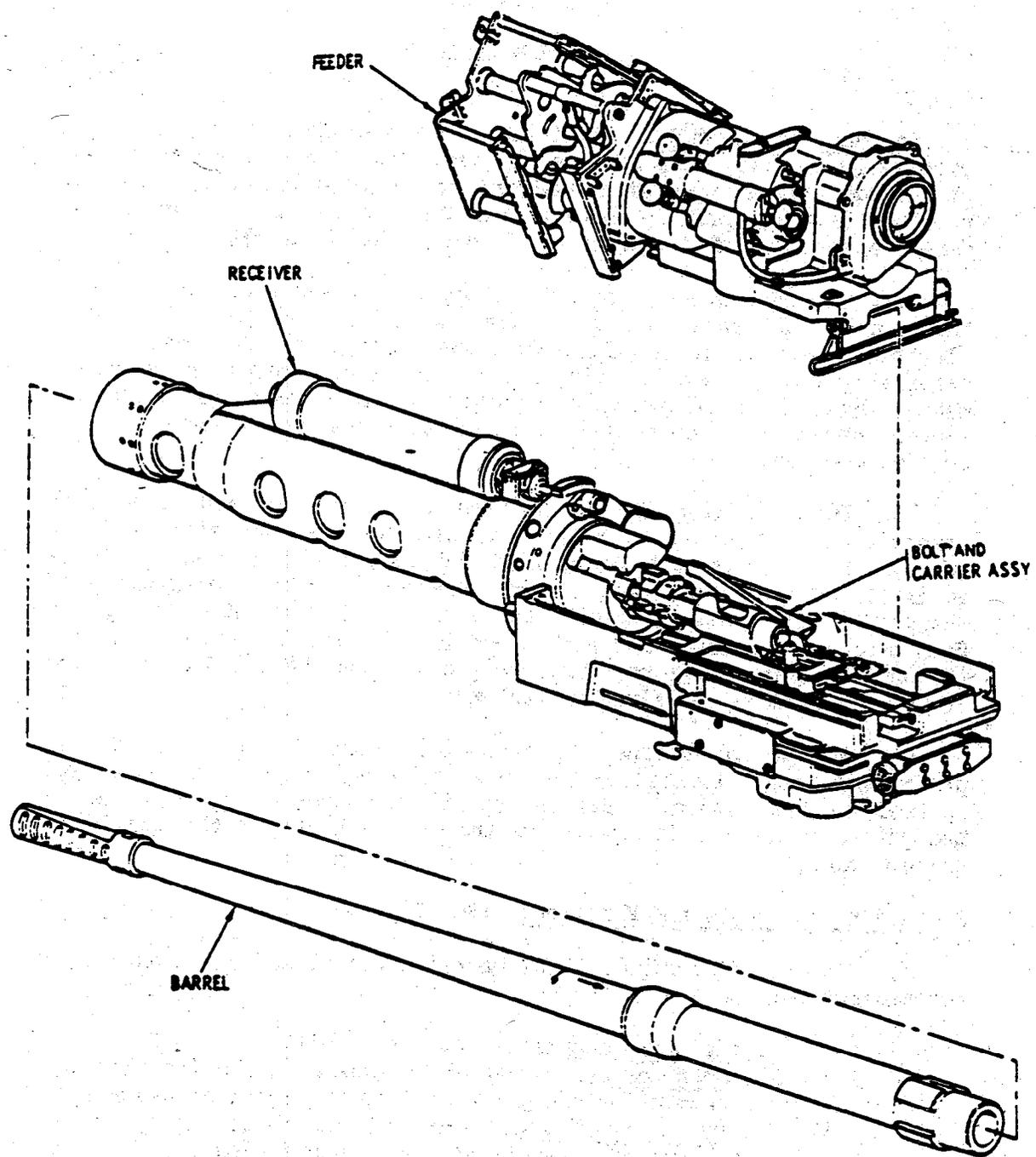
b. Dual feeding is accomplished using two separate feed sprockets and a system of mechanical clutches so that either of the two sprockets can be engaged to feed the selected cartridge. This is accomplished using the feed select solenoid, either electrically or manually. The sprockets positively engage each cartridge during the feed process, and positions each round in the rotor assembly. Feeding is completed when the rotor positively positions the round on the face of the bolt within the fixed extractors.

c. Recoil is absorbed by mechanical spring recoil and damper piston mechanism, located on the receiver barrel support assembly and affixed to the breech. 85% of recoil is absorbed by the recoil mechanism, while 15% is braked by the muzzle brake at the muzzle of the gun barrel.

2. Major Components and Functions. (See Fig. 30)

a. Barrel. (See Fig. 31) The barrel gives directional control to the projectile.

- (1) Muzzle brake suppresses 15% of recoil.
- (2) Alignment arrows are used to assist in the installation and removal of the gun barrel in the receiver assembly.
- (3) The barrel bearing provides for barrel stability during recoil and post recoil movement when firing.
- (4) The barrel locking lugs positively engages the breech assembly when the barrel is installed in the receiver assembly.
- (5) The chamber provides for positive seating of the 25mm cartridge during firing.



Location of Major Components

Fig. 30

Page 28.2

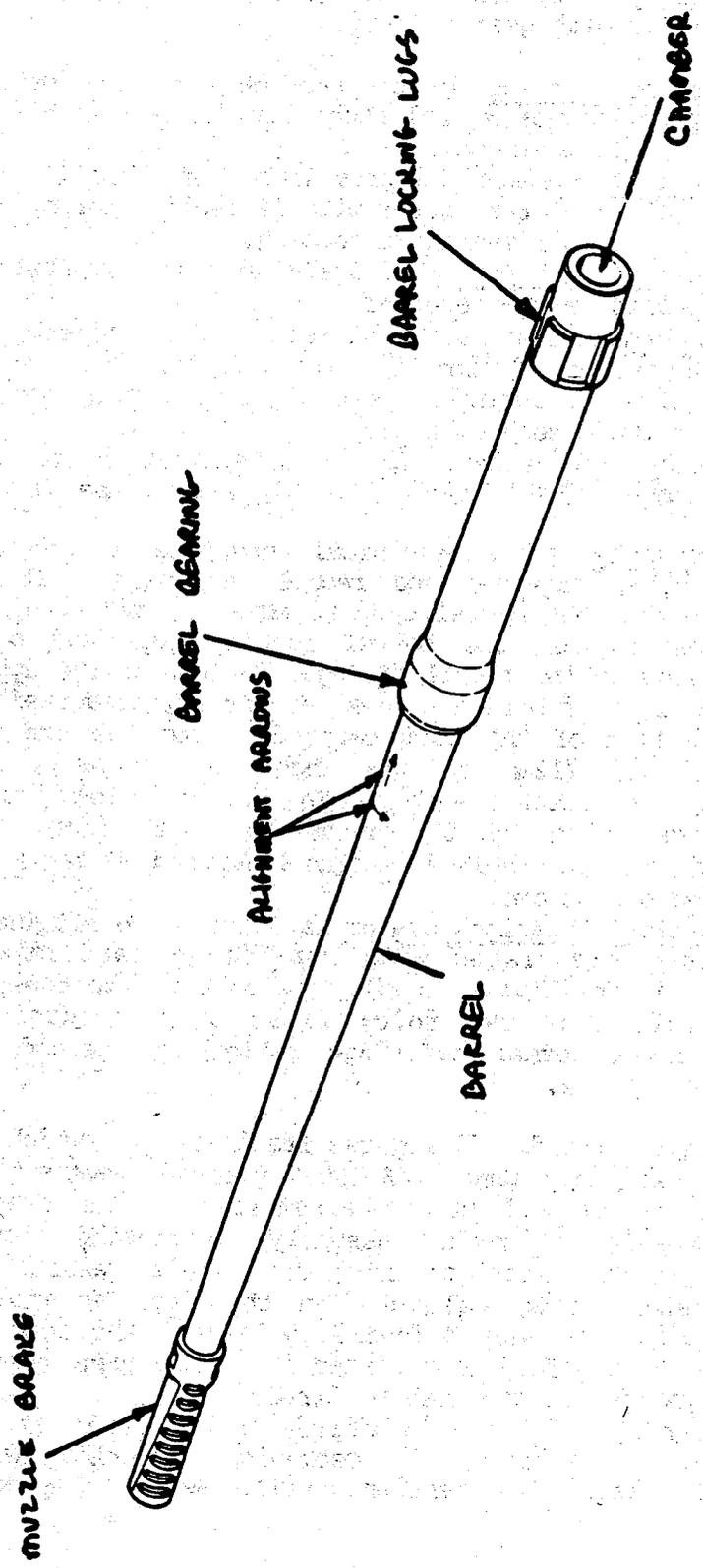


Fig. 31
Page 28.b.

b. Receiver. (See Fig. 32) The receiver assembly consists of the bolt and track assembly, mechanical interlock system, recoil mechanism, and 1.5 hp motor with gear housing.

- (1) Barrel support bearing in conjunction with the barrel bearing provides for barrel stability during its recoil and post recoil movement.
- (2) Barrel support assists in providing stability to the barrel, cooling of the barrel with 11 cooling ports, and includes the recoil mechanism housing.
- (3) Barrel release lock pin positively engages the barrel when installed in the receiver.
- (4) Recoil mechanism absorbs 85% of recoil of the breech and barrel assemblies during firing. It consists of a helical belvedere spring set and a damper piston, and is affixed to the breech assembly.
- (5) Damper piston rod allows for a determination of the correct damper fluid level (DC 510) within the recoil damper.
- (6) Breech assembly is the mechanical interface between the barrel, bolt, receiver and recoil mechanism. It is located within the barrel support assembly and receiver body, and secures the barrel locking lugs and bolt locking lugs during recoil/firing. 2 slots on the upper left and right of breech allows for unrestricted feeding and extraction of the 25mm cartridge from the breech. During recoil (12mm or 1/2 inch) it activates the mechanical interlock assembly. The breech assembly must be replaced when 25,000 rounds has been fired and verified by the 2408-4 Weapons Record Data form maintained on the gun.
- (7) The mechanical interlock system is designed to eliminate any hazard associated with non-firing cartridges, resulting in positively locking the bolt in the breech. Its operation is two fold; first as a mechanical indication of normal cartridge firing and second as cartridge failure.
 - (a) Normal cartridge firing results in recoil, which is approximately 12mm (1/2 inch) rearward movement of the barrel and breech assemblies. The breech depresses the rocker assembly, initiating normal mechanical interlock function. This results in tension being released on the sear assembly, allowing the sear solenoid to retract the sear as the chain safety link passes it. Subsequent normal firing cycles can then be fired.
 - (b) Cartridge failure (misfire) will result in no recoil; therefore, the mechanical interlock will not release the tension on the sear. The sear

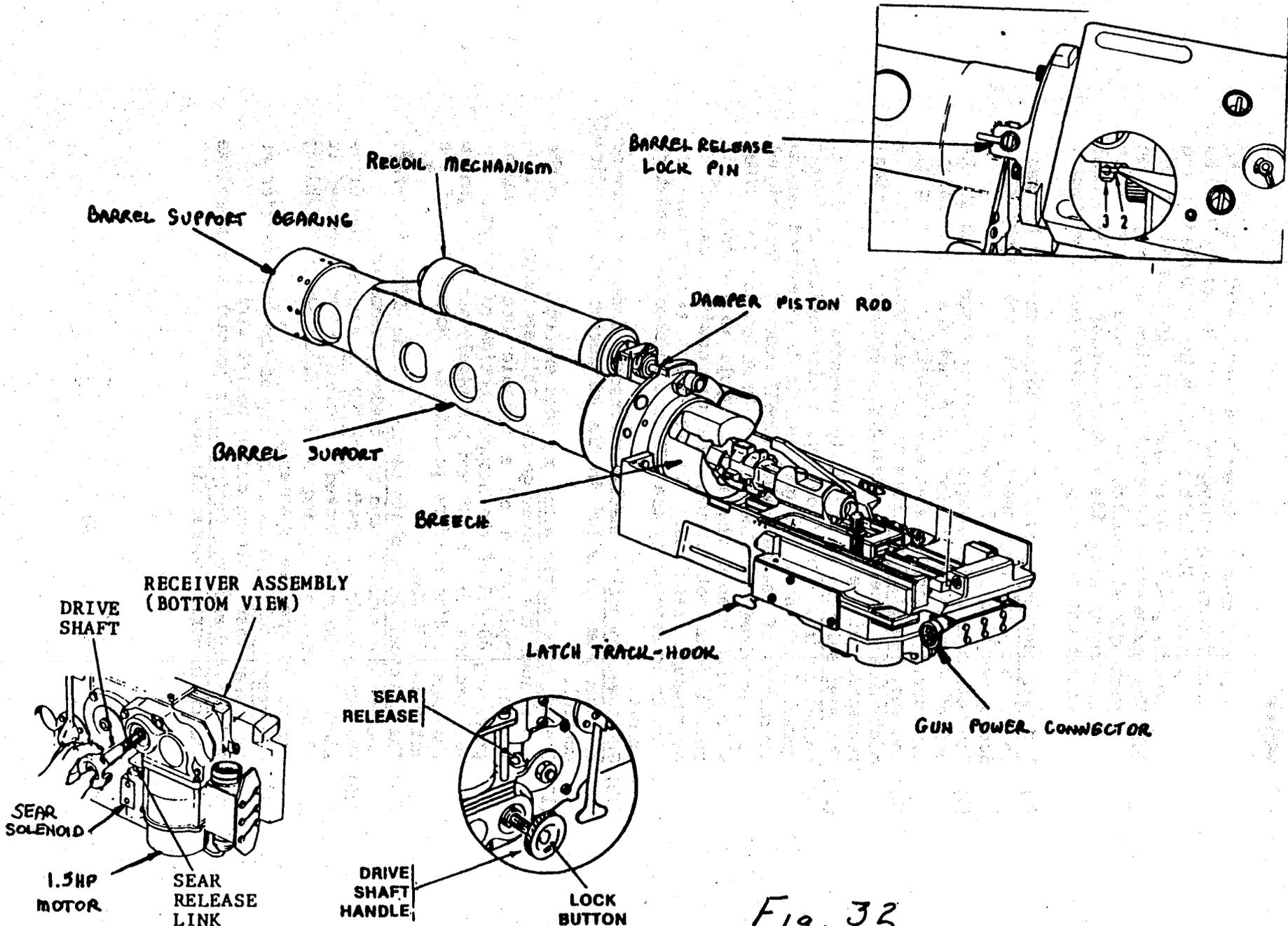


Fig. 32
 PAGE 29.2

solenoid cannot retract the sear, resulting in the sear positively engaging the chain safety link as it passes. The bolt at this point is locked in the breech, precluding an open bolt hangfire situation.

- (c) The mechanical interlock operates in conjunction with the microswitch sensor in the feeder, which electronically identifies normal and abnormal conditions of the gun to the fire control system.
- (8) The sear retractor assembly when locked enables the sear to be retracted from the chain master and safety links during manual firing of the gun.
 - (9) The sear positively engages the chain master link at the end of each normal firing cycle and the chain safety link during a misfire when electrically firing the gun.
 - (10) The sear release link connects the sear solenoid to the mechanical interlock assembly, enabling electrical retraction of the sear.
 - (11) The sear solenoid electrically retracts the sear during normal firing. Additionally, a micro-switch indicates normal function of the gun when it is depressed during retraction of the sear when recoil occurs. This signal is transmitted to the Turret Distribution Box (TDB) which will enable the firing cycle to continue. If recoil does not occur, the microswitch cannot be depressed, resulting in non-sear retraction and electronic sensing by the TDB that an abnormal condition exists.
 - (12) Gun power connector enables electronic interface between the gun when installed in the M3 turret and the fire control.
 - (13) The 1.5 hp electric motor provides external drive to the gun through the receiver gears. It's secondary function is the application of a dynamic braking system, providing 80-85% of the stopping action to the gun. The sear provides for 15-20% and positively stops the gun in the sear and/or misfire positions. Normal RPM of the motor is 7700 RPM.
 - (14) The vertical drive shaft handle is the drive interface between the receiver and the feeder assemblies.
 - (15) The vertical drive shaft lock button engages the drive shaft in the fully locked position. When depressed it allows for the lowering of the drive shaft, enabling removal of the feeder assembly.
 - (16) The rear track insures stability of the bolt carrier at it's rear most position during normal firing.
 - (17) The forward and rear chain guides protect and stabilize the chain during normal firing.

c. The track and bolt assembly (see fig. 33 and 34) consists of a chain and sprocket track and bolt carrier. Its primary operation characteristics are the changing of rotary motion of the chain to reciprocating motion of the bolt during normal firing. The track stabilizes the bolt carrier during its forward movement when chambering a cartridge, locking, firing, unlocking the bolt from the breech, and finally during its rearward movement when extracting the cartridge from the chamber.

- (1) The drive sprocket is the primary driver of the chain assembly, and is of metal construction.
- (2) The idler sprockets (3) provide stability to the chain during normal rotation when firing, and are made of a nylon/teflon material.
- (3) The chain assembly consists of a double linked stainless steel chain with a master link with slider and a safety link.
- (4) The master link provides for the positive stopping of the gun as it is engaged by the sear assembly during normal gun cycling. It also consists of the slider assembly.
- (5) The slider is the primary interface between the chain master link and bolt carrier, converting the rotary motion of the chain to reciprocating motion of the bolt carrier.
- (6) The manual safe handle allows placing a mechanical safety on the gun or allows the gun to be placed in a mechanically safe mode. When in the safe position, it raises a safety pawl, which will not allow the firing pin to go forward and strike the cartridge primer. When in the fire position, the safety pawl is lowered and allows normal firing pin forward movement.
- (7) The bolt carrier houses the bolt and rides the track during its reciprocating movement, as well as ejection of cartridges thru the cartridge eject chute in the feeder.
- (8) The bolt chambers the cartridge and houses the firing pin components.
- (9) The fixed extractors positively secure the cartridge during chambering and extraction.
- (10) The firing pin sleeve houses the firing pin and is affixed to the bolt.
- (11) The firing pin sleeve keeper secures the firing pin sleeve to the bolt.
- (12) The firing pin cam pin stabilizes the firing pin and causes 30° rotation of the bolt during normal gun cycling. Additionally, the cam pin causes locking of the bolt and firing pin fall to occur.

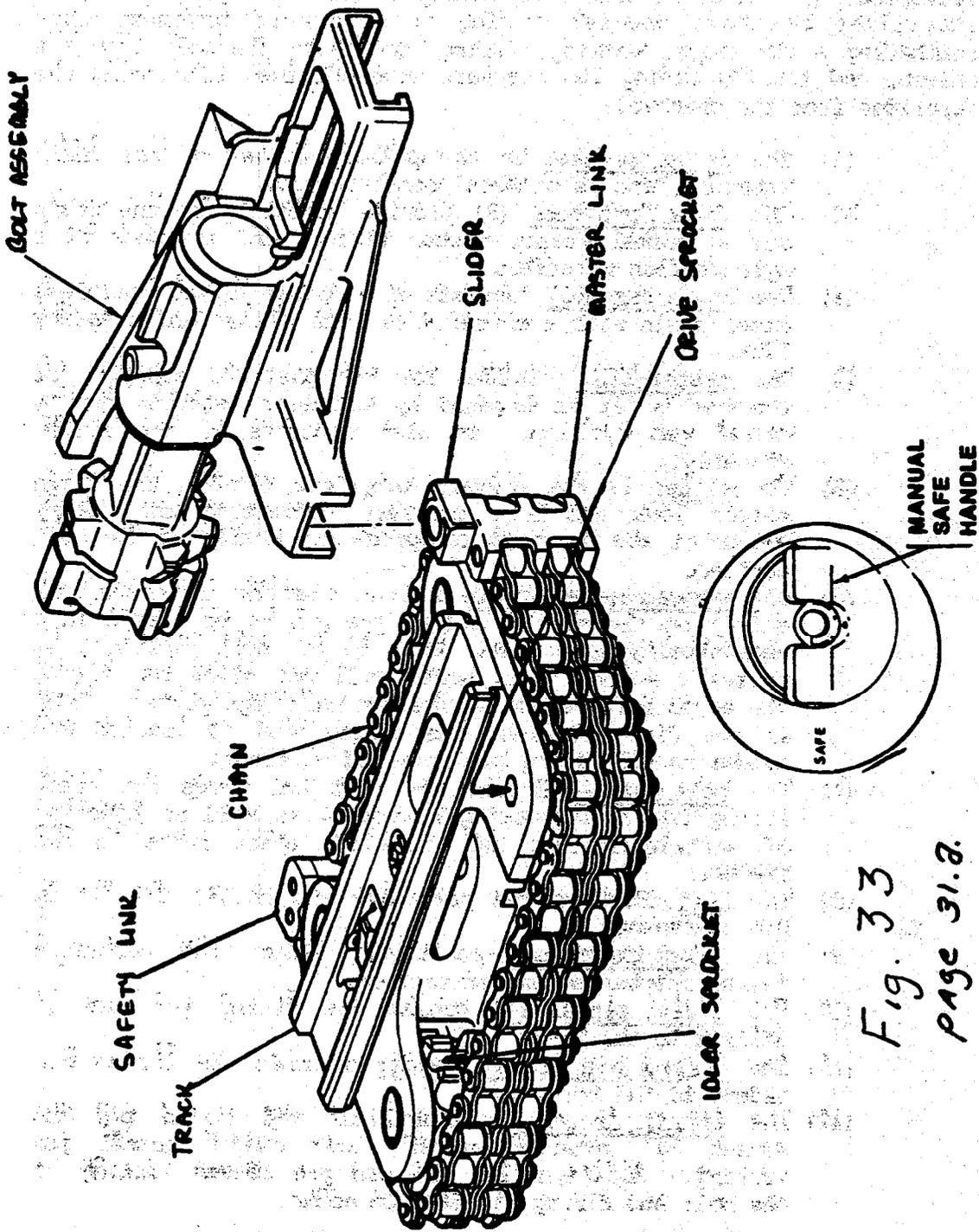


Fig. 33
 PAGE 31.2.

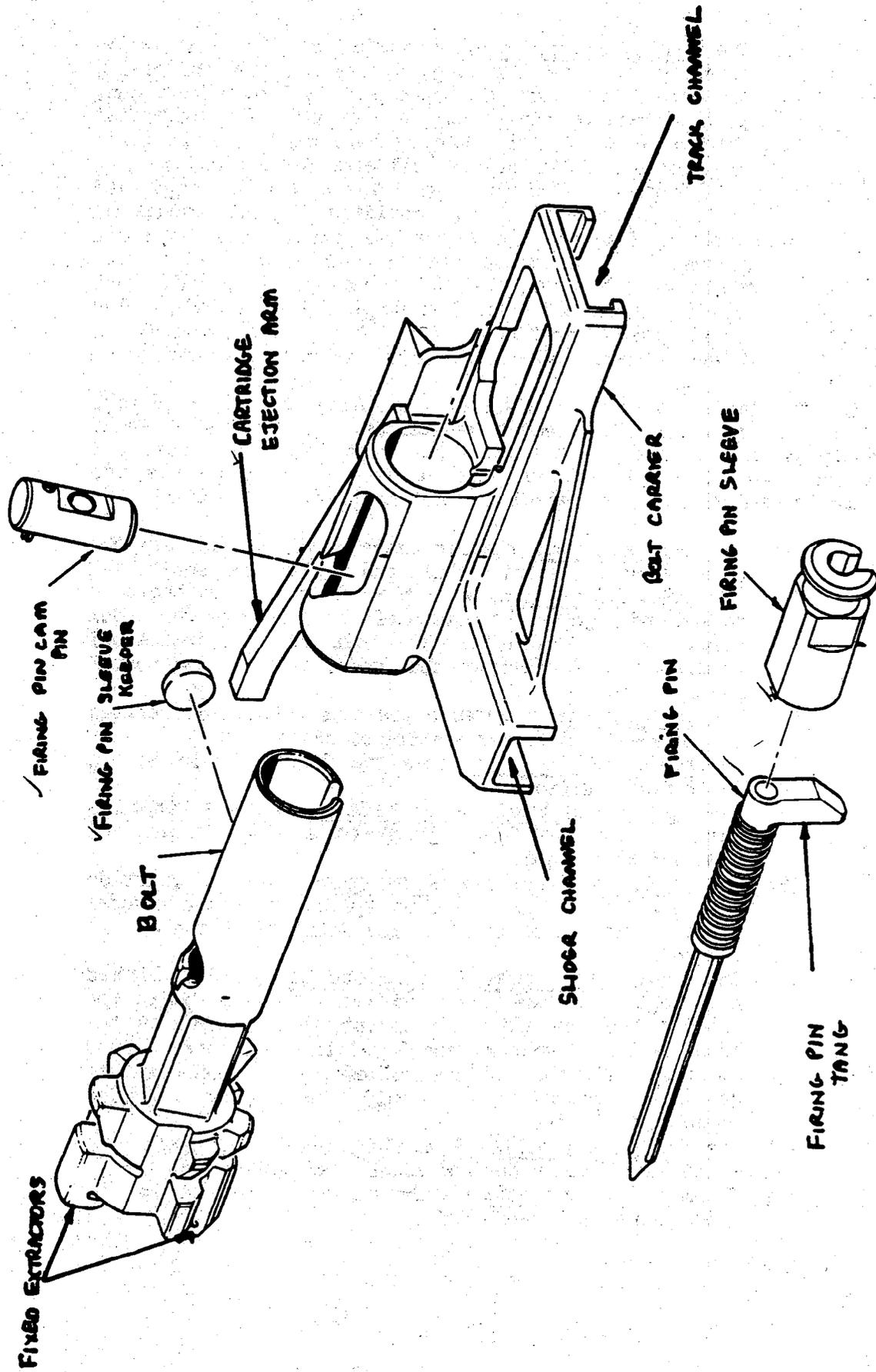


Fig. 34
 PAGE 31. b.

- (13) The firing pin and tang consists of the pin spring assembly and retaining ring, firing pin body and firing pin tang. The tang, during normal cycling of the gun, is held back by the firing pawl as the bolt cam action rotates 30°. If the manual safety handle is in fire, the safety pawl is lowered, allowing the firing pin tang to slide off the firing pawl. The spring is compressed just prior to pin fall, providing 32 inch pounds of striking force to the firing pin tip on the cartridge primer. If the manual safety handle is in the safe position, the safety pawl is raised, precluding the tang as it rotates off the firing pin pawl to fall. The firing pin has an 8000 rd life, which is verified on the 2408-4 Weapons Record Data form, and must be replaced.

d. The feeder assembly consists of 2 competent groups; (see fig. 35) the forward and rear feeder assemblies. The forward feeder assembly primarily concerns the cartridge feed paths and link and cartridge ejection, while the rear feeder assembly houses the electronic sensors and gear assemblies that monitor gun function.

- (1) The worm shaft nut enables drive interface between the receiver verticle drive shaft and feeder worm shaft.
- (2) The timer release rod, when the verticle drive shaft is raised and engages the worm shaft nut, unlocks the index drive cam (located behind the bolt position indicator) to allow free movement of the feeder gears during normal gun cycling.
- (3) The feeder handle insures a positive connection between the receiver and feeder electrical connectors.
- (4) The feeder handle latch locks the feeder handle in the up or down positions.
- (5) The upper and lower feed shaft extensions enables rotation of the feed sprockets during upload and download of the gun.
- (6) The upper and lower feed shaft stops (clutch override handles) insure that the feed sprockets cannot reverse normal direction of feed, unless download of the gun is desired.
- (7) The upper and lower feed sprockets guide linked cartridges into the upper and lower round paths to the round positioner and rotor assemblies, as well as the links through the upper and lower link strippers. Feed sprocket selection is controlled by the feed select solenoid, which enables only the single selected sprocket to rotate.
- (8) The feed select solenoid enables manual and electrical selection of the upper and lower feed sprockets.
- (9) The manual driver gear enables manual cycling of the gun using the manual hand crank.

- (10) The bolt position indicator (BPI) enables visual determination of the gun's status during normal and/or abnormal conditions.
- (11) The upper and lower link strippers guide and enable the links to be stripped from the cartridges as they are fed to the round positioner and rotor assemblies.
- (12) The round position assembly positively seats the cartridge in the rotor assembly.
- (13) The rotor assembly places the cartridge in the fixed extractors on the face of the bolt, and removes the spent cartridge from the bolt to the cartridge eject chute prior to ejection.

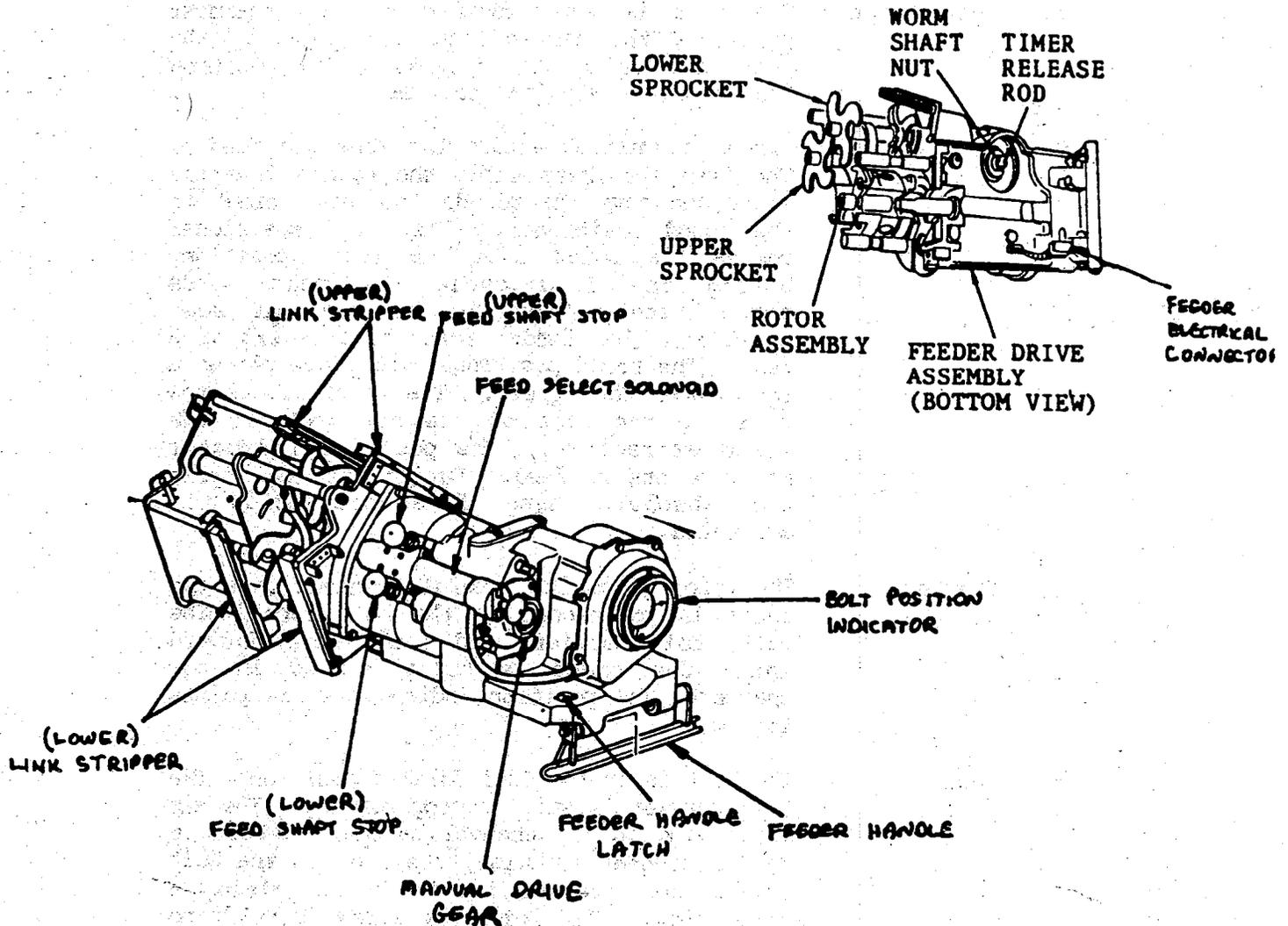


Fig. 35

**25MM CHAIN GUN
PRINCIPLES OF OPERATION**

The 25mm automatic chain gun incorporates 8 cyclic function steps in conjunction with an electrical gun status monitoring system. When the gun is fired electrically, rates of fire, ballistic correction for the ammunition fired, and trigger and arming systems are initiated by the Weapons Control Box (WCB) and controlled by the Turret Distribution Box (TDB).

1. The 8 cyclic functions as related to the bolt position indicator are:

- a. Sear/Charge - The bolt is 25mm forward of its rearmost position, the master link is engaged by the sear, the firing pin is cocked. The position indicator arrow points to sear.
- b. Feed - Linked ammunition enters the 25mm gun feeder. The feed sprockets strip the rounds from the links and move the rounds (one at a time) to the round positioner. The round positioner pushes the round into the ready position. During the feed cycle the bolt moves approximately 25mm to the rear of sear position. The feeder rotor rotates 1/3 of a turn. (the round positioner will have placed a round into the rotor). The rotor places the round in the face of the bolt between the fixed extractors. The position indicator arrow points to feed. During the feed cycle the absolute hang fire protection is activated.
- c. Chamber - The rotor stops its lateral movement once the round is positioned in the bolt face. The bolt, bolt carrier, and round move forward until the round is fully seated in the chamber. The position indicator arrow points to ram.
- d. Lock - The bolt is in the full forward position. The bolt carrier is still moving forward. The cam pin moving in its channel causes the bolt to rotate counterclockwise, the lugs on the bolt engage the recesses in the breech giving a solid lock. The indicator arrow is pointing at the red zone prior to fire.

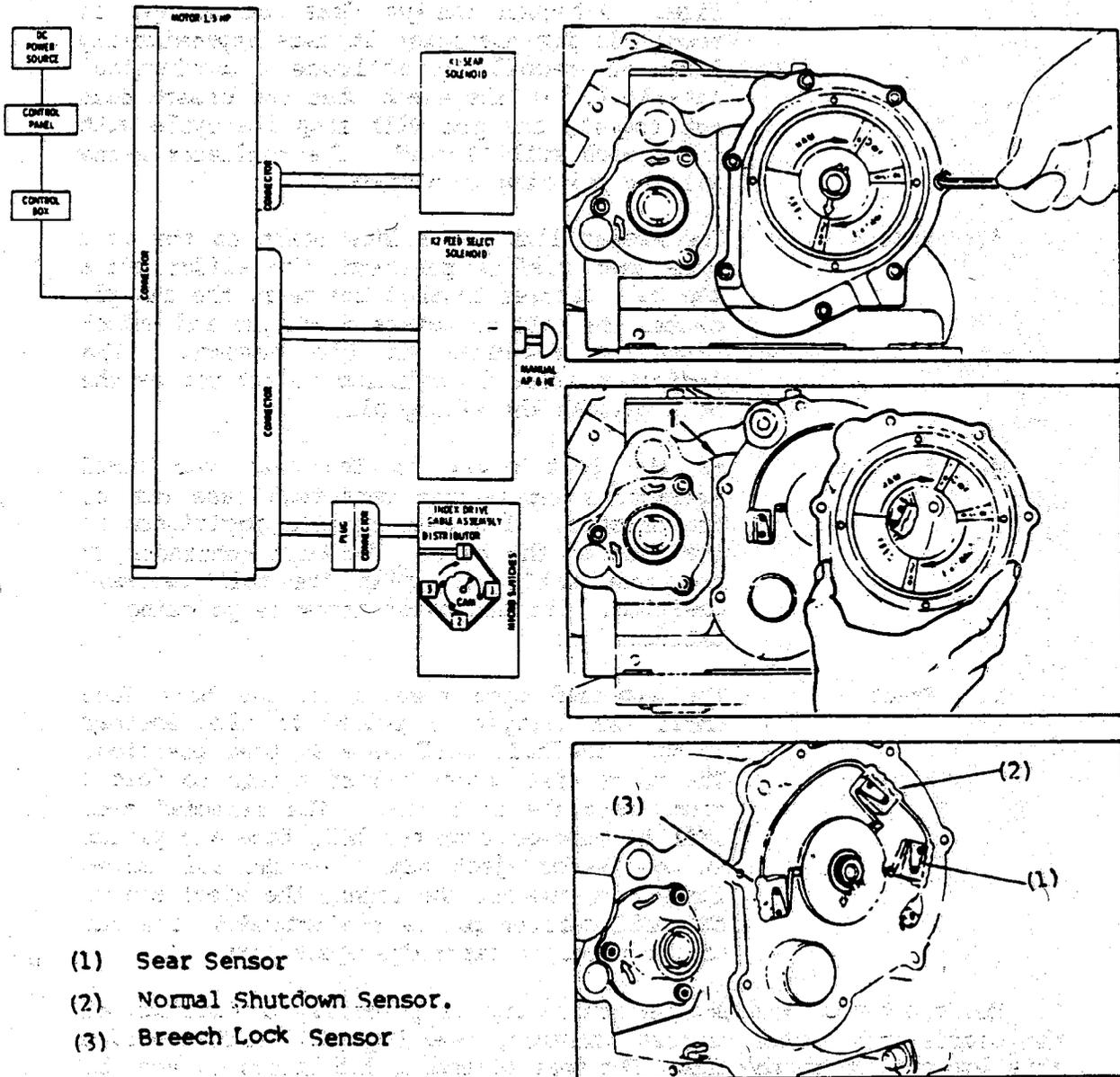
- e. Fire - Final rotation of the bolt pushes the firing pin tang off the sear notch in the track assembly; at this time the firing pin drives forward pushed by the firing pin spring. In the full forward position the tip of the firing pin is protruding through the bolt face. The indicator arrow is pointing to fire. Although the gun does not use gas or recoil in its operation it uses approximately 12mm of recoil to activate a mechanical interlock. In the event that the breech does not recoil, the gun will stop its cycle with the breech still locked. The indicator arrow will be pointing to misfire.
- f. Unlock - The master link and slider start to the rear once past misfire position, the slider pulls the bolt carrier towards the rear, the cam pin causes the bolt to rotate clockwise and unlock from the recesses in the breech. The indicator arrow is pointing to extract as the bolt unlocks the firing pin.
- g. Extract - As the bolt moves to the rear the fixed extractors remove the cartridge case out of the chamber. The case remains positioned in the face of the bolt. The bolt continues to the rear until it is at its full rearward position. The indicator arrow is pointing to extract.
- h. Eject - The expended case remains in the bolt face until the trigger is pulled to fire another round - The bolt will move to feed position. The rotor will rotate 1/3 of a turn to feed a round into the bolt face. The expended case will be removed from the bolt face and placed in the feeder eject tube. As the bolt moves forward to chamber the round, the eject arm on the bolt carrier pushes the expended case out of the receiver cartridge eject port.

2. The electrical gun status monitoring is primarily a function of the microswitch sensor harness assembly, (see Fig. 36) which provides this information to the TDB. The sear solenoid, 1.5 hp motor, and the feed select solenoids are also components of this electrical system.

a. The microswitch sensor harness, located on a CAM behind the bolt position indicator cover, primarily monitors the bolt position during normal cyclic functioning of the gun, providing the TDB 3 sensing signals (Sear Sensor, Breech Lock, Normal Shutdown).

3. The voltage requirement to operate the 25mm gun electrical system is 18-28 Vdc.

ELECTRICAL SYSTEM - OPERATION



- (1) Sear Sensor
- (2) Normal Shutdown Sensor.
- (3) Breech Lock Sensor

Fig. 36
page 35.2.

- (1) Sear Sensor. The sear position of the bolt is monitored only by this microswitch sensor, provided to the TDB. The sear solenoid microswitch provides status indications to the TDB that the sear assembly is extended at this point. The BPI point to SEAR.
- (2) Breech Lock. As the gun begins it's cycle, the sear sensor is opened. As the bolt completes chambering, the breech lock sensor closes, marking the initiation of a time sequence within the TDB firing control circuitry. This time sequence involves the recoil of the gun with mechanical interlock function, sear solenoid operation, and ends with the normal shutdown sensor closure. The time sequence spans 52.2 milliseconds and the following actions MUST occur in sequence or the gun will stop in MISFIRE.
 - (a) Breech lock sensor closes just prior to bolt locking in the breech. BPI points at red zone prior to FIRE.
 - (b) Gun fires and recoil occurs.
 - (c) Mechanical interlock assembly actuates and releases tension on sear assembly within 30 milliseconds.
 - (d) At 30 milliseconds, the sear solenoid extracts the sear, depressing the microswitch in the plunger well. This signifies to the TDB that normal functions have occurred. BPI is pointing at misfire.
 - (e) 22.2 milliseconds after sear solenoid action occurs, the normal shutdown sensor activates the gun shutdown sequence, controlled by the TDB.

Note. If the microswitch in the sear solenoid is not depressed at its prescribed time due to mechanical interlock failure or no recoil, the sear will catch the safety link of the chain. The BPI will point at the misfire position. A system reset must occur to activate the normal shutdown sequence controlled by the TDB. This is done by pressing the misfire button on the weapons control box.

- (3) Normal Shutdown Sensor. Normal shutdown occurs 52.2 milliseconds prior to sear. This sequence occurs when normal gun function is sensed by the TDB and trigger is released, or when after a gun malfunction and recycling of the TDB fire control circuitry occurs. Basically, as the normal shutdown switch closes, the 1.5 hp motor applies a reversed direction stopping motion to the chain, referred to as dynamic braking. This stopping action accounts for 80-85% of the gun stopping power.

The sear assembly catching the master link of the chain assembly insures positive gun shutdown at sear. The BPI points at the sear position.

25MM CHAIN GUN
CLEANING AND LUBRICATION

| | Cleaning | Storage | Prep Firing |
|---------------------|---|--|---|
| Barrel | RBC, dry solvent (ext) | CLP/GMD Barrel bearing, locking lugs, chamber/bore | GMD Barrel bearing, locking lugs |
| Receiver | Rag w/CLP electrical components camel hair brush and dry rag | Exterior housing/ barrel support bearing CLP/GMD (light coat) Breech - GMD Recoil mech/damper piston rod 1 + 1/2 holes 45° - 80° 2 holes 81° + 1 hole 39° - | GMD Heavy on breech locking lugs barrel support bearing (MOD/HVY) GMD rear track (light) GMD |
| Feeder | Rag/Camel Hair Brush | | |
| Bolt and Carrier | RBC/Dry cleaning solvent Alt/CLP | Dry/(unit SOP) Light coat GMD/CLP | Bolt body, bolt housing (carrier) Slider and track channels (light to moderate GMD) Lugs Hvy GMD |
| Track | CLP/Dry cleaning solvent on all except idler sprockets | Dry (Unit SOP) light coat GMD/CLP | Light to moderate GMD rails, slider, interior, drive sprocket light at rear of firing pawl/safety pawl |

Section III B (M240C)

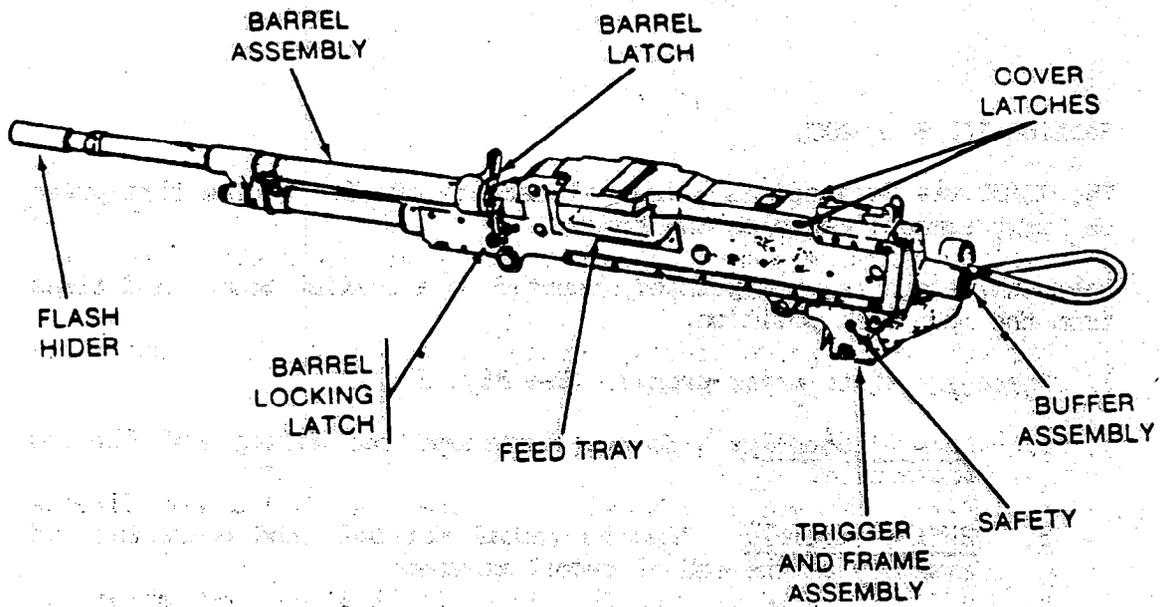
The M240C was designed as a coaxial machine gun for 7.62mm fire power on light armored vehicles and tanks.

The machine gun is gas-operated, mounted on a coaxial mount, and fires from the open bolt position.

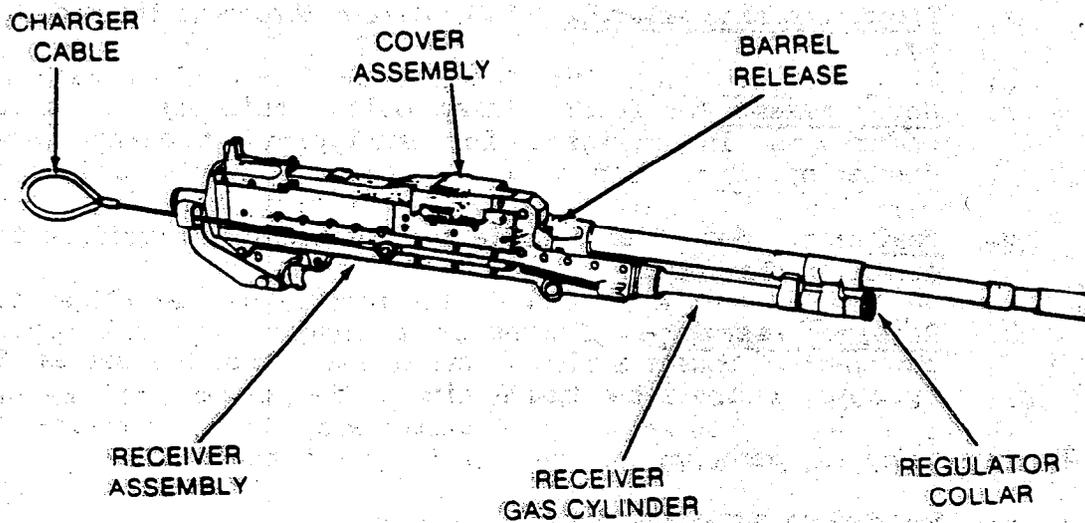
1. There are eight major groups. (See Fig. 37.)
 - a. Barrel assembly: Houses cartridge for firing and directs projectile.
 - b. Buffer assembly: Absorbs recoil for bolt and operating rod assembly at the end of recoil movement.
 - c. Driving spring rod assembly: Provides energy for returning the bolt and operating rod assemblies to the firing position.
 - d. Bolt and operating rod assembly: Provides feeding, stripping, chambering, firing, extraction, and ejection of cartridges using the projectile propelling gases for power.
 - e. Trigger housing assembly: Controls the firing of the machine gun.
 - f. Cover assembly: Feeds linked belt, positions and hold cartridges in position for stripping, feeding, and chambering.
 - g. Feed tray: Serves as a guide for positioning cartridges to assist in chambering.
 - h. Receiver assembly: Serves as a support for all major components. Houses action of weapon and, through a series of cam ways, controls the functioning of the weapon.

2. Principles of Operation

- a. Mounted on a coaxial mount.
 - (1) Fires parallel to turret main gun.
 - (2) Requires no sights on machine gun.
 - (3) Can be fired manually or electrically.
- b. Gas-operated - Recoils with a gas-assist boost. Three gas settings to maintain a consistent rate of fire.
- c. Positive locking of bolt body. Firing pin is part of bolt and operating rod assembly and cannot strike primer until bolt is fully locked.



LEFT SIDE



RIGHT SIDE

Fig. 37
M240C COAX M.G.

- d. Fires from open bolt position. Prevents explosion of cartridge (cookoff) after prolonged firing.

Note: The gas plug has three settings. This design is intended to maintain consistent rate of fire under adverse conditions and not to increase your rate of fire. Preferred setting is number one. Correct setting number faces the barrel.

- (a) Setting number 1 = 650 rds/m approx
- (b) Setting number 2 = average (mean)
- (c) Setting number 3 = 950 rds/m approx

3. Technical Principles of Operation

- a. Coax Machine Gun Feed System. Eight hundred rounds of ammo are stored in the ammo can which is located on the right side of the turret. The ammo is in a belt held together by links and feeds through the forwarder, feed chute, feed tray, and then to the coax machine gun as the projectile is fired through the barrel. The links and expended casing eject into a plenum chamber around the weapon. A sensor detects when the last rounds are about to be fired and stops firing, leaving the end of the belt in a position for easy reloading. The reloader can link a new belt to the old belt. In emergencies the gunner may continue firing by overriding the automatic shutoff.
- b. Coax Machine Gun. A trigger sear releases the operating rod and bolt assembly. The bolt strips a round from the belt in the feed tray and stops when the round is fully chambered. The operating rod forces locking lugs into the receiver, enabling the firing pin to strike the primer. Burning gases go from the barrel through the gas port to the gas piston at the front end of the operating rod. Gas pressure forces the operating rod back which retracts the firing pin, raises the locking levers, and removes the spent case. As the bolt moves to the rear, the spent case is ejected, and the live round moves into the feed tray. The bolt continues to the rear until it strikes the buffer assembly. The cycle is repeated as long as the trigger is held.
- c. Maintenance of M240C. Refer to TM 9-2350-252-10-2.

4. Difference between M240 and M240C.

- a. Difference in models is the direction of feed for ammunition. The M240 model feeds ammunition from the left and the M240C feeds ammunition from the right. All parts are interchangeable between the two models except the cover assembly and feed tray.

Equipment Data

Weight: 10.3 Kg (22.2 lb)

Rate of Fire:

Cyclic: 650 to 950 rounds per minute
change barrel every minute.

Sustained: 100 rounds per minute
(4-5 seconds between bursts)
change barrel every 10 minutes.

Rapid : 200 rounds per minute
(2-3 seconds between bursts)
change barrel every 2 minutes.

Range:

Maximum range: 3,725 meters

Maximum effective range: Tracer burnout approximately
900 meters.

Maximum grazing range: 600 meters.

Section III C M257 Smoke Grenade Launcher

DESCRIPTION

There are two 4-tube electrically fired smoke grenade launchers --- one on each side of the 25mm gun. Each launcher fires four phosphorus smoke grenades that create enough smoke to screen the Bradley within three seconds. Both launchers are fired at the same time by the Bradley commander from inside the turret.

The L8A1/A3 smoke grenades are filled with a red phosphorus and butyl rubber mix. The grenade is propelled from the discharger when the electrical current at the firing contact ignites the fuze. The fuze ignites the propellant and the delay composition within the delay holder and, in turn, the gun powder bursting charge. This bursts the rubber case and ignites the red phosphorus and butyl rubber composition to produce an immediate smoke cloud. The burst is in the direction that the turret is pointed. The bursting radius is a 105-degree fan, 10 meters high and 30 to 40 meters to the front.

Note: To fire smoke grenades ensure all hatches are closed. Move grenade launcher switch on weapons control box to on, then press trigger, all eight smoke grenades will fire at the same time.

Equipment Data

| | |
|----------------|------------------|
| Weight: | 11.2 lb (5.1 kg) |
| Width: | 11.5 in (292mm) |
| Height: | 9.5 in (241mm) |
| Depth: | 6.31 in (160mm) |
| Tubes (4 each) | |
| Length | 7.13 in (181mm) |
| Inner diameter | 2.62 in (67mm) |

Protective Cap

| | |
|----------------|------------------|
| Weight | 0.1 lb (0.05 kg) |
| Outer diameter | 3.37 in (86mm) |
| Depth | 2.75 in (70mm) |

Ammunition

Authorized Round

Grenade launchers, smoke screening RP, L8A1/A3

Number authorized

8 grenades ready, 8 stowed 16 Total

SECTION IIID

TOW WEAPON SYSTEM

The Bradley Fighting Vehicle (BFV) is capable of firing the TOW missile by use of a launcher (mounted on the left side of the turret), the integrated sight unit (ISU) (mounted at the gunners position), command guidance electronics (CGE) and the power control unit (PCU) (both mounted under the floor boards of the turret). The BFV A1 is being updated with digital command guidance electronics (DCGE) for the TOW 2 missile system. Although all TOW missiles may be fired from the BFV (Basic TOW, Improved Tow (ITOW) and the TOW 2), it does not use the full capability of the TOW 2 missile without the DCGE update.

The benefits of installing the TOW missile system on armored vehicles are increased mobility, protection of the crew from artillery airburst shrapnel and small arms fire. Combat effectiveness is greatly enhanced with the TOW 2 system's all weather, night and day operation and EOCM (Electro-optical countermeasures) capabilities. Only the sight and launchers need be exposed during firing.

Advantages of the BRADLEY mounted TOW:

- * Minimize exposure of gunner and crew
- * Designed to utilize maximum range of TOW missile
- * System integration into any armored vehicle of adequate size is simple due to modular design
- * System can be used to fire any automatic cannon or machine-gun as well as TOW missiles
- * Adaptable to a variety of turrets
- * Launcher can be remotely armed from inside vehicle
- * Flexible launcher mounting and location
- * Digital command guidance electronics and power supply installed at any convenient location

Tow 2 is an improved anti-tank guided missile developed to counter and defeat present and future generations of heavy armor (tank) threats.

The TOW 2 warhead is highly effective against armor threats appearing on the battlefield in the late 1980's and early 1990's. It is heavier and larger than the Basic Tow and the ITOW warhead and is one inch larger than the Basic TOW and the ITOW warheads. Like the ITOW, the TOW 2 warhead has a probe that extends after launch to provide standoff detonation and significantly increasing the armor-piercing capability.

The flight motor case contains a propellant which provides 30% greater impulse compensating for the increased weight of the TOW 2. As a result, although heavier and more powerful than the Basic TOW or ITOW, there is no degradation in TOW 2 flight performance.

The guidance improvements for TOW 2 emphasize hardening the guidance link to overcome electro-optical countermeasures (EOCM) and permits operation day or night through dust, smoke and other obscurants encountered on a battlefield. In concert with these improvements are other changes which enhance accuracy, flexibility, and reliability of the guidance system.

The ability to guide the TOW 2 missile precisely, through battlefield obscurants results from modification to the launcher's AN/TAS-4 Thermal Night Sight (used by the gunner to track targets at night) creating a totally independent guidance loop. Part of this improvement is a high intensity thermal beacon added to the aft end of the missile providing an infrared (IR) location input visible to the night sensor.

The xenon beacon's IR wavelength signature controlling the missile in clear visibility conditions is retained on the TOW 2.

For maximum probability of hit, the gunner need only select which of the two sights he will use, based on the tactical conditions. Using either sight, the guidance loop will sense the missile's deviation from the line-of-sight (LOS) to the target. This data is transmitted to the missile guidance set which computes missile variance from LOS. Flight correction data is then transmitted to the missile via the wire link.

The TOW 2 missile guidance is extensively upgraded. Dual digital microprocessors replaced the analog computer of the basic TOW guidance set. This new unit provided much more

powerful computing capabilities and, consequently, more precise guidance. The digital system offers the potential for guidance equations adjustments to meet changing threats through software modifications. Adjustments are not possible with a analog system. Additionally, the digital guidance set incorporates a pre-firing self-test capability with a more thorough and reliable comprehensive diagnosis to facilitate repairs and replacements.

TOW 2 System Advantages and Benefits:

ADVANTAGES;

- * Boost-coast propulsion system leaves minimum signature and minimizes plume interference with missile beacon
- * Combat proven night vision system using NATO standard common modules
- * Digital guidance provides improved accuracy and reliability
- * Cooperative IR source providing superior ECOM capability
- * Ease in upgrading for future system improvements
- * Can use existing TOW launchers
- * Proven long term missile storage life
- * Large airborne launch envelope minimizes capture problems

BENIFITS:

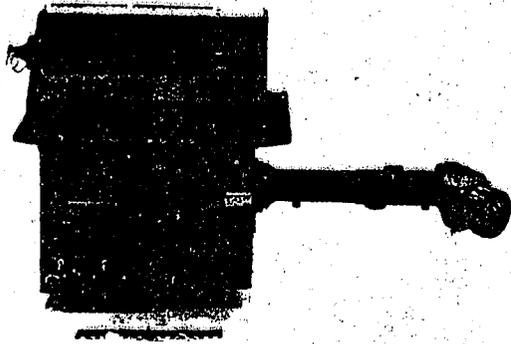
LETHALITY: High probality a target hit is a kill

ACCURACY: High probality of a hit at ranges out to 3750 meters

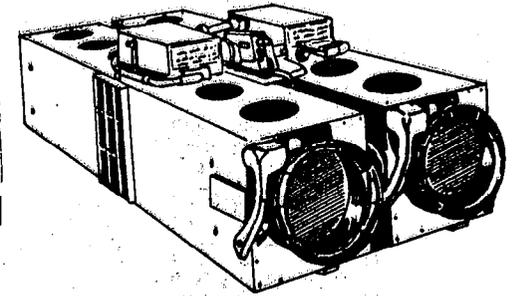
OPERABILITY: Day/night passive operation through obscurant and countermeasure environments

MAINTAINABILITY: 20-year storage life without maintenance

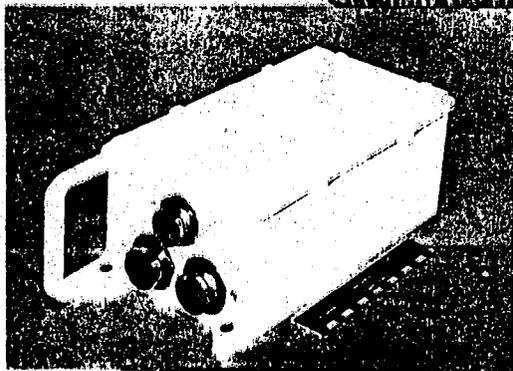
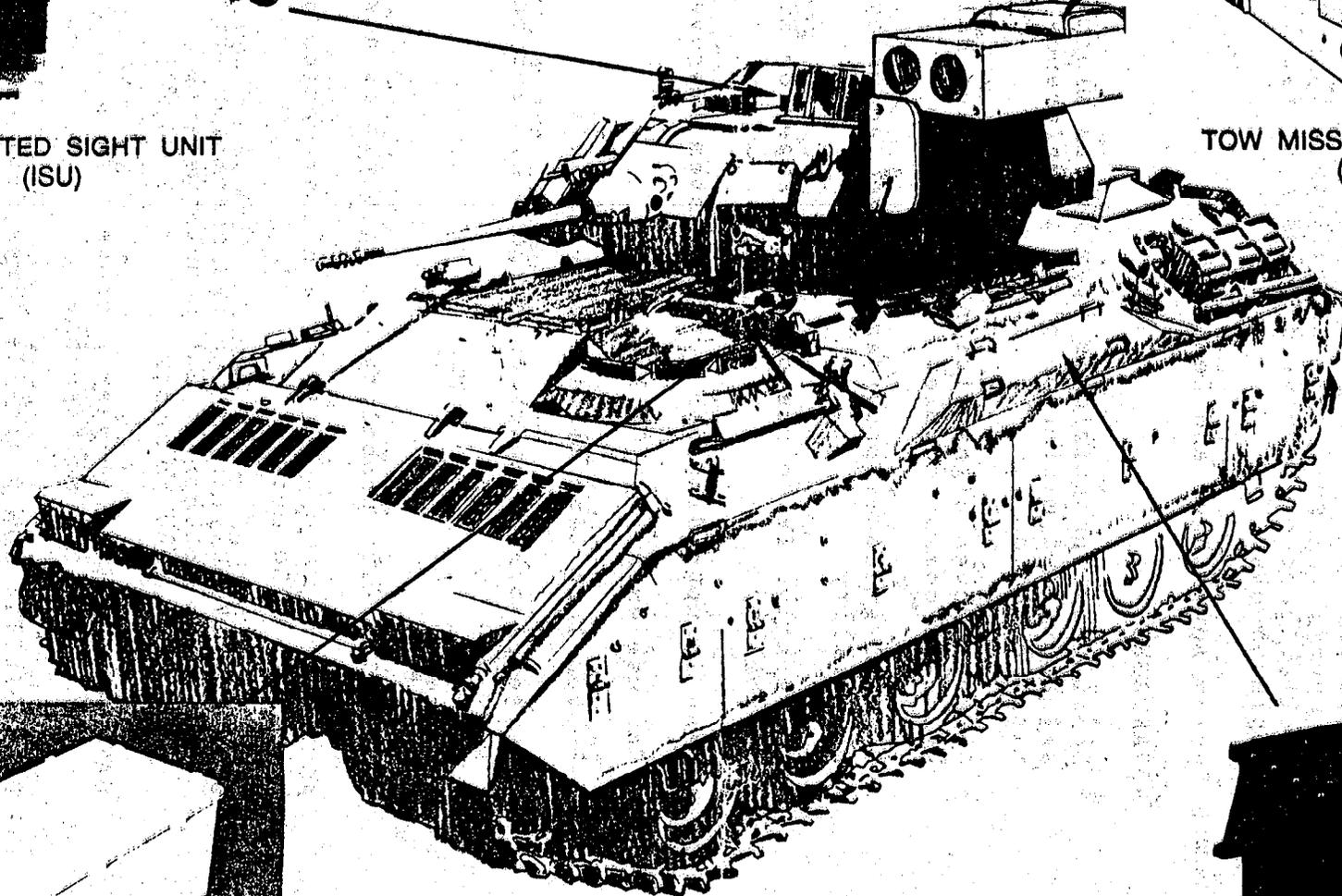
FLEXIBILITY: TOW 2 missile fires from all TOW launch platforms and any TOW 2 launcher can fire any TOW missile



INTEGRATED SIGHT UNIT
(ISU)

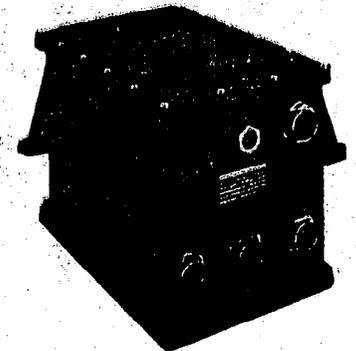


TOW MISSILE LAUNCHER
(TML)



POWER CONTROL UNIT
(PCU)

DIGITAL COMMAND
GUIDANCE ELECTRONICS
(DCGS)



42 d

Section IV Hull and Turret Equipment Data

DIFFERENCES BETWEEN MODELS

| | IFV | CFV |
|---------------|---|---|
| Personnel: | Three crew members Six squad members | Three crew members Two squad members |
| Firing Ports: | Six | None |
| Missiles: | Two ready | Two ready |
| TOW | | 10 stowed |
| TOW/DRAGON | Five stowed, any combination | No Dragons |
| LAW | Three stowed | Three stowed |
| Ammunition: | | |
| 25mm | 300 ready | 300 ready |
| | 600 stowed | 1200 stowed |
| 7.62mm(M240C) | 800 ready | 800 ready |
| | 1540 stowed | 3600 stowed |
| 7.62mm(M60) | 2200 stowed | 5060 stowed |
| 5.56mm(M231) | 4200 stowed | None |
| 5.56mm(M16A1) | 2520 stowed | 1460 stowed |

HULL EQUIPMENT DATA

GENERAL

| | |
|--|------------------------------------|
| Weight (combat loaded) - M3 | 49,945 lb (22,655 kg) |
| Weight (combat loaded) - M3A1 | 50,510 lb (22,911 kg) |
| Weight (combat loaded w/reactive armor) - M3A2 | 66,027 lbs |
| Weight (less fuel, crew, and OVE) - M3 | 41,975 lb (19,040 kg) |
| Weight (less fuel, crew, and OVE) - M3A1 | 43,600 lb (19,777 kg) |
| Weight (less fuel, crew, and OVE) - M3A2 | 49,727 lbs |
| Weight (air transportable) - M3 | 40,755 lb (18,495 kg) |
| Weight (air transportable) - M3A1 | 40,755 lb (18,495 kg) |
| Weight (air transportable) - M3A2 | 43,459 lbs |
| Weight of reactive armor tiles - M3A2 | 6,059 lbs |
| Ground pressure (combat loaded) | 7.7 psi (0.54 kg/cm ²) |
| Personnel capacity: | |
| IFV | 9 |
| CFV | 5 |
| Fuel tank capacity | 175 gal (662 liters) |
| Engine coolant | 22 gal (82.6 liters) |

PERFORMANCE

| | |
|----------------------------------|--------------------|
| Speed on land | 41 mph (66 km/h) |
| Speed on water | 4.5 mph (7.2 km/h) |
| Cruising range | 300 mi (483 km) |
| Turning radius | pivot to infinite |
| Slope | 60% |
| Side slope | 40% |
| Trench crossing | 8 ft 4 9n (2.5 m) |
| Veritcal wall climbing | 36 in. (91 cm) |
| Gross horsepower-to-weight ratio | 20.62 hp/ton |
| Ground clearance | 18 in (45.7 cm) |

ENGINE

| | |
|------------------|---------------------------------------|
| Make and model | Cummins VPA-903T, M3A2 Cummins 600 hp |
| Displacement | 903 cu in (14.8 liters) |
| Type | 4 cycle |
| Fuel | Diesel |
| Gross horsepower | 500 (506 metric) |

TRANSMISSION, AUTOMATIC

| | |
|----------------|---|
| Make and model | M3 and M3A1 - GE HMPT-500, M3A2 - GE HMPT-500-3 |
| Type | Hydromechanical |
| Steering | Hydrostatic |
| Brake | Multidisc, oil-cooled |

RUNNING GEAR

| | |
|-----------------------|--|
| Suspension | Return roller |
| Springing Media | Torsion bar type |
| Number of road wheels | 6 pairs per side |
| Road wheel size: | |
| Diameter | 24 in (61.0 cm) |
| Width | 4 in (10.2 cm) |
| Track type | Steel single pin with detachable rubber pads |
| Shock absorbers | 4 per side |
| Number of track shoes | 83, left side 82, right side |
| Track pitch | 6 in (15.3 cm) |
| Track width | 21 in (53.3 cm) |

ELECTRICAL SYSTEM:

| | |
|------------|--|
| Generator: | |
| Amperes | 220 amp |
| Volts, dc | regulated to 28V |
| Batteries | four each, type 6TN, 100 amp hr 12 V each |

FIRE EXTINGUISHERS:

Fixed:

| | |
|--------------------|----------------------------------|
| Engine compartment | 7 lb (3.2 kg) Halon |
| Squad compartment | two each, 5 lb (2.3 kg) Halon |
| Portable | two each, 2.75 lb (1.2 kb) Halon |

TURRET EQUIPMENT DATA

TURRET (TWO-MAN)

| | |
|---|----------------------|
| Armament | 25mm gun |
| | TOW missile launcher |
| | Coax machine gun |
| Traverse | 360° continuous |
| Elevation | |
| 25mm gun and coax machine gun | +60° to -10° |
| TOW missile launcher | +30° to -20° |
| Slew rate, maximum elevation and traverse | 60°/sec |
| Tracking rate, minimum | 0.05 mil/sec |
| Stabilization system | Electric |
| Ring gear, pitch diameter | 60 in (152.4 cm) |

COMMUNICATIONS (COMMANDER'S VEHICLE)

| | |
|----------------------------|------------------|
| Radio, CFV (standard) | AN/VRC-12, 1 set |
| Other configurations exist | AN/PRC-77, 1 set |

NIGHT VISION EQUIPMENT

| | |
|------------------|-----------------------------------|
| Sight, gunner | Thermal imagery |
| Sight, commander | Optical relay from gunner's sight |

BACKUP SIGHT

| | |
|-----------------------------|------------------------------|
| Depth | 11.62 in (29.5 cm) |
| Width | 5.25 in (13.3 cm) |
| Height | 16.75 in (42.5 cm) |
| Weight | 49.5 lb (22.5 kg) |
| Line of sight, elevation | -10° to +60° |
| True field of magnification | 10° |
| Magnification | 5X |
| Focus | -4° diopters to +4° diopters |

25MM GUN

| | |
|--------------------------------|------------------------------|
| Caliber | 25mm dual feed |
| Weight | |
| Receiver Assembly | 92 lb (41.8 kg) |
| Barrel Assembly | 89 lb (40.5 kg) |
| Feeder Assembly | 54 lb (24.5 kg) |
| Total Gun System | 235 lb (106.8 kg) |
| Dimensions | |
| Length Overall | 107.5 in (2730 mm) |
| Width | 13.0 in (330 mm) |
| Height | 15.0 in (380 mm) |
| Length Behind Front of Feed | 22.2 in (563 mm) |
| Barrel Length | 80 in (2032 mm) |
| Rate of Fire | Single Shot; 100, 200 rdspm |
| Time to Rate | 0.15 sec |
| Time to STOP | 0.12 sec |
| Power Required | 1.5 hp |
| Clearing Method (Cookoff Safe) | Open Bolt |
| Safety | Absolute Hangfire Protection |
| Case Ejection | Forward |
| Peak Recoil Force | 9000 lb/40,032 Newtons |
| Reliability | 1000,000 MRBS |

COAX MACHINE GUN

| | |
|---------------------------------|---------------------------|
| Caliber | 7.62mm |
| Weight | |
| Weapon Complete | 22.2 lb (10.3 kg) |
| Barrel Assembly | 5.92 lb (2.7 kb) |
| Length | |
| Weapon | 41.161 in (1045.5 mm) |
| Barrel Assembly | 24.742 in (268.45 mm) |
| Rate of Fire | |
| Cyclic | 650-950 rdspm |
| Change barrels every minute | |
| Sustained | 100 rdspm (4-5 sec burst) |
| Change barrels every 10 minutes | |
| Rapid | 200 rdspm (2-3 sec burst) |
| Change barrels every 2 minutes | |
| Range | |
| Maximum | 3725 meters |
| Maximum effective | 900 meters |
| | (tracer burnout) |
| Maximum grazing | 600 meters |

SMOKE GRENADE LAUNCHER

Discharger

| | |
|-----------------|------------------|
| Weight | 11.2 lb (5.1 kg) |
| Width | 11.5 in (292 mm) |
| Height | 9.5 in (241 mm) |
| Depth | 6.31 in (160 mm) |
| Tubes: (4 each) | |
| Length | 7.13 in (181 mm) |
| Inner diameter | 2.62 in (67 mm) |

Discharger Cap (1 per discharger tube)

| | |
|----------------|------------------|
| Weight | 0.1 lb (0.05 kg) |
| Outer diameter | 3.37 in (86 mm) |
| Depth | 2.75 in (70 mm) |

TOW MISSILE SYSTEM

Integrated Sight Unit

| | |
|--------|--------------------|
| Weight | 190 lb (86.4 kg) |
| Length | 8.3 in (21.1 cm) |
| Height | 26.2 in (66.6 cm) |
| Width | 41.3 in (105.9 cm) |

Command Guidance Electronics

| | |
|--------|-------------------|
| Weight | 27 lb (12.2 kg) |
| Length | 12.9 in (32.6 cm) |
| Height | 10.3 in (26.0 cm) |
| Width | 8.6 in (21.7 cm) |

Launcher Assembly

| | |
|--------|--------------------|
| Weight | 130 lb (58 kg) |
| Length | 47.5 in (120.7 cm) |
| Height | 13.7 in (34.8 cm) |
| Width | 20.3 in (51.5 cm) |

Power Control Unit

| | |
|--------|-------------------|
| Weight | 18 lb (8.2 kg) |
| Length | 13.5 in (34.2 cm) |
| Height | 5.0 in (12.7 cm) |
| Width | 7.0 in (17.7 cm) |

RADIO SET AN/VRC-46

| | |
|---|---|
| Weight | 56 1/4 lb (25.5 kg) |
| Height | 6 3/4 in (17.2 cm) |
| Depth | 13 3/8 in (34.3 cm) |
| Width | 15 3/8 in (39.4 cm) |
| Frequency range | From 30.00 to 75.95 MHz 0.05-MHz intervals |
| Number of frequency settings | 920 |
| Tuning facility | Manual tuning |
| Operating conditions | Push-to-talk and release-to-receive |
| Modes of operation | Voice (radiotelephone), retransmission (radio relay), and X-mode |
| Audio input and output control facilities | Five-pin panel receptacles; rear mounted receptacle for remove control by radio-intercom and C-2299/VRC; A-mode operation facility |
| Operating power | 22 to 30 volts dc |
| Used in | Vehicles provided with 24 volt battery system |
| Transmission distance (Using whip antenna) | Approximately 5 miles (8 km) |
| Squelch tone signal | Transmitted on all settings of SQUELCH switch except OLD ON position |
| Duty cycle | Capable of operating continuously on high power in 120° ambient temperature with input power of 22 volts dc; and for 1 hour with input power of 30 volts dc |
| Squelch types: | |
| Carrier (operative on OLD SQUELCH) | Responsive to carrier noise |
| Tone (operative in NEW SQUELCH) | Responsive to squelch tone signal |
| Antennas: | |
| Frequency range | 30.00 to 76.00 MHz |
| Antenna type | Whip antenna |
| Frequency matching networks | 10 sets which are automatically selected by tuning controls of receiver-transmitter |

RADIO SET AN/PRC-77

| | |
|--------------------------------------|--|
| Weight | 13 lb (5.9 kg) |
| Height | 4 in (10.2 cm) |
| Width | 11 in (27.6 cm) |
| Depth | 11 in (27.6 cm) |
| Frequency range: | |
| Low band | 30.00 to 52.95 mc |
| High band | 53.00 to 75.95 mc |
| Number channels | 920 |
| Types of transmission and reception: | |
| Transmission | Voice |
| Reception | Voice |
| Distance range | 5 miles (8 kilometers) (Varies with conditions) |
| Types of Antennas: | |
| Long Antenna | Antenna AT-271A/PRC; 10 feet long, multisection whip |

RADIO SET AN/GRC-160

Frequency range:

Low band 30.00 to 52.95 mc
High band 53.00 to 75.95 mc

Number of channels 920

Type of squelch Tone operated
by 150-cps tone

Audio transmission and reception

Capability:

Method Push-to-talk and release-to-receive

Transmission Voice

Reception Voice

Antenna Antenna AS-1729/VRC

Amplifier-Power Supply Groups

QA-3633/GRC and QA-3633A/ GRC:

Weight 21 lb (45.5 kg)

Length 6 1/4 in (15.9 cm)

Depth 12 in (30.5 cm)

Height 12 in (30.5 cm)

Input voltage 22 to 28 volts dc

Output voltage 13 volts dc (regulated);

3 volts dc (regulated);

2.6 volts dc (unregulated)

Frequency response of loudspeaker 300 to 3,000 cps

Major Improvements made for M3A1 and M3A2:

M3A1

TOW 2 subsystem
GAS particulate filter unit
Improved personnel heater system
Improved turret battery
charging system
Fuel pump circuit separation
Hull gyro deleted (VECP)
Fuel system redesign
Fire suppression system

M3A2

Conventional armor
Reactive armor tiles
Automatic fire suppression system
Water barrier
Spall liners
Brake linkage
Engine access door
Radiator mounting
Final drives
Fan speed control valve
Bustle box, turret
M240C machine gun system
Rotor rain cover
Vehicle stowage

REFERENCES:

TM 9-2350-252-10-1/2

TM 9-2350-252-20-1-1/2/3/4/5 (Hull)

TM 9-2350-252-20-2-1/2/3 (Turret)

TM 9-2350-252-34-1-1/2 (Hull)

TM 9-1240-394-34 (ISV)

TM 9-1005-200-20 & P (25mm Gun)

TM 9-1005-200-30 & P (25mm Gun)

Hughes Helicopter Technical Handbook

FMC Systems Handbook

LO 9-2350-252-12 (Hull Lubrication Order)

SECTION V

AMMUNITION DATA

1. 25mm AMMUNITION

- a. APDS-T M791
- b. HEI-T M792
- c. TP-T M793
- d. Dummy M794
- e. TPDS-T M910
- f. APFSDS-T M919

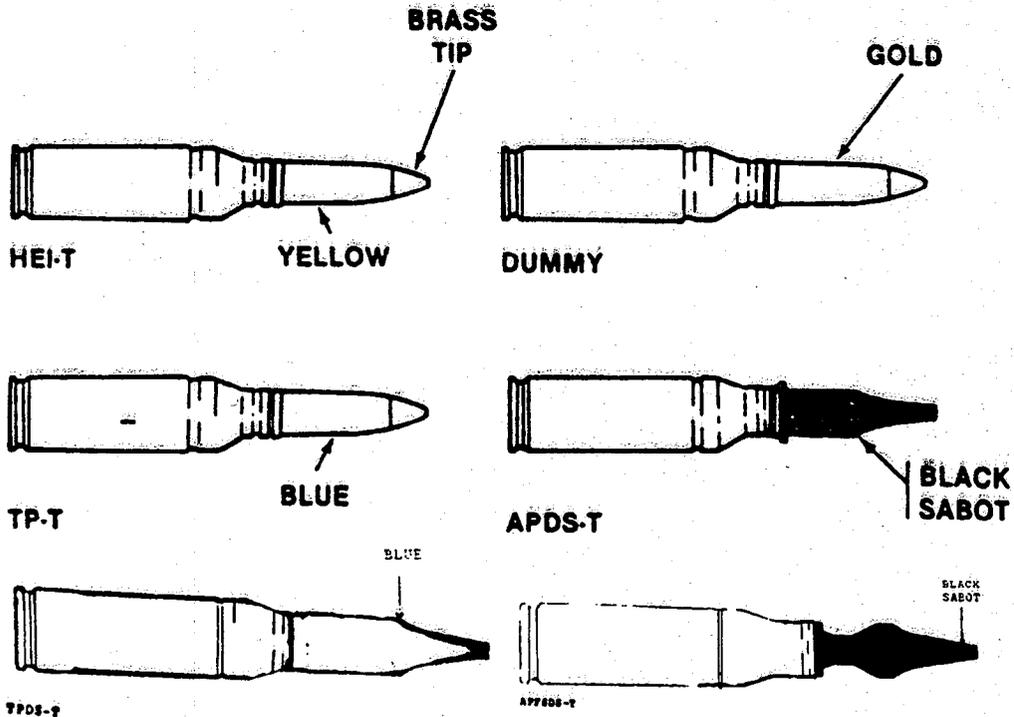
2. 7.62 AMMUNITION

3. TOW AMMUNITION

4. M257 SMOKE GRENADE

25 MM AMMO

| AUTHORIZED | CLASSIFICATION | IDENTIFICATION | FUZE |
|--------------------|---|--|------|
| HEI-T M792 | High-explosive, incendiary tracer | YELLOW | M758 |
| TP-T M793 | Target practice, tracer | Blue projectile | None |
| APDS-T M791 | Armor piercing, discarding sabot, tracer | Black tip | None |
| APFSDS-T M919 | Armor piercing, fin-stabilized, discarding sabot, tracer | Black tip | None |
| TPDS-T M910 | Target practice discarding sabot, tracer | Blue with white markings | None |
| DUMMY M794 | Dummy | Gold projectile | None |
| NUMBER AUTHORIZED: | | 600 rounds stowed, 300 ready, 900 total IFV 1200 rounds stowed, 300 ready, 1500 total CFV | |



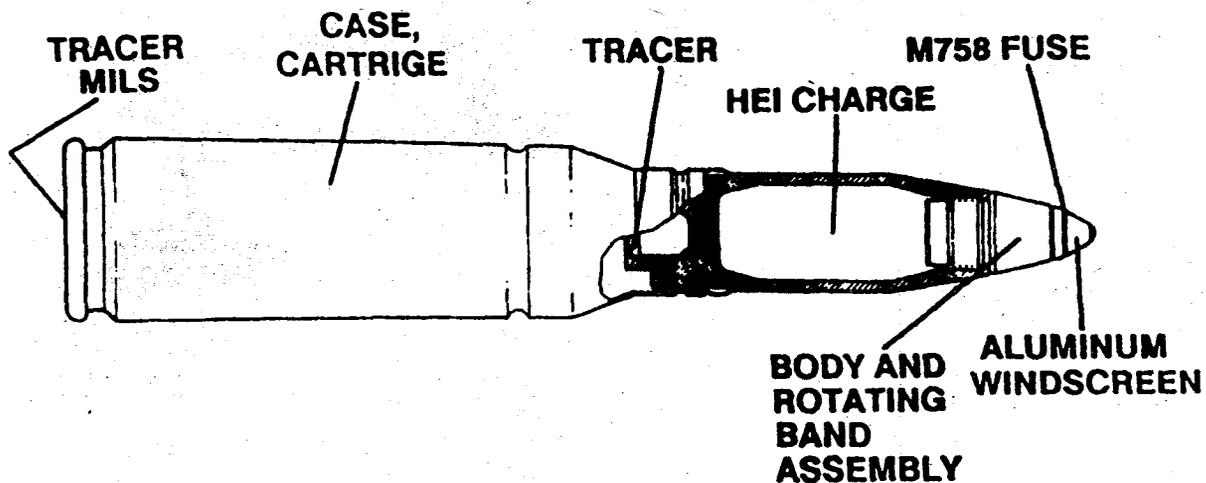


Fig. 1

M792 HEI-T.

(a) The HEI-T cartridge is a fixed-type, percussion primed round. The cartridge consists of an HEI-filled, one-piece projectile body, crimped to a steel cartridge case. The projectile body consists of a hollow-steel body, M758 fuze, 32 grams of an HEI-mix, and pressed-in tracer. The projectile is yellow to orange with a red band, with black markings and a gold tip.

(b) Gases produced by the burning propellant propel the projectile from the gun at 1,100 meters per second (plus or minus 20 meters per second). On impact, the fuze (M758) functions and the HEI filler detonates, dispersing the incendiary mixture in a 5-meter radius.

(c) The maximum effective range for HEI-T is 3,000 meters. This is based on the following factors:

- o The round is designed to self-detonate at 3,000 meters by means of a mechanical fuze (M758).
- o Tracer burnout is 2,000 meters, but the round can be sensed beyond this range by observing the impact of the rounds.
- o Though accuracy severely decreases beyond 1,600 meters, the 5-meter bursting radius and rate of fire allow both point and area targets to be engaged out to 3,000 meters.

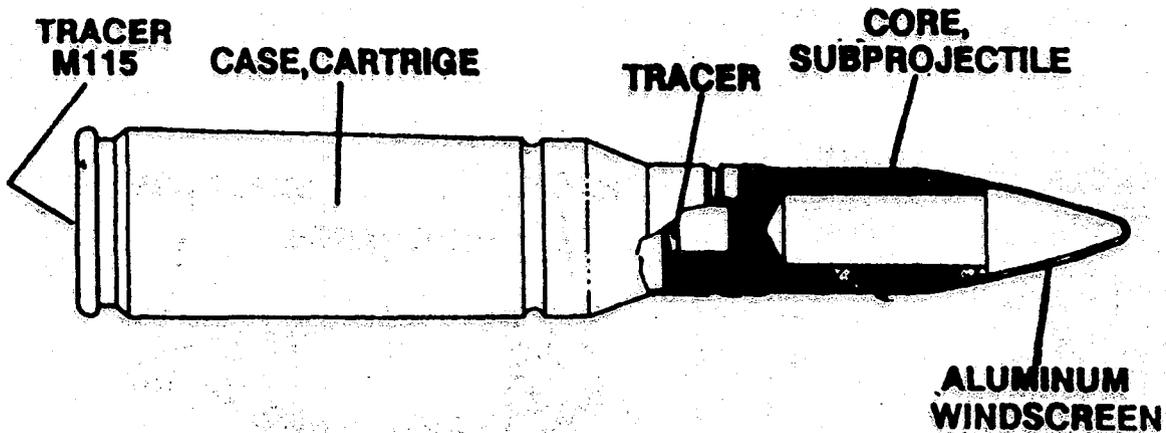


Fig 2

M793 TP-T.

M793 Target practice with tracer. The TP-T cartridge (Figure 2) is a fixed-type, percussion primed training round that is used in place of the HEI-T round. The projectile is blue with white markings.

(a) It is ballistically matched to the HEI-T round. The maximum effective range for point targets is 1,600 meters; area targets, 3,000 meters.

(b) The tracer is visible out to 2,000 meters; however, accuracy is greatly reduced if engaging point targets. Training with the round beyond tracer burnout should only be done to simulate HEI-T area engagements and only as long as the impact of the round is visible.

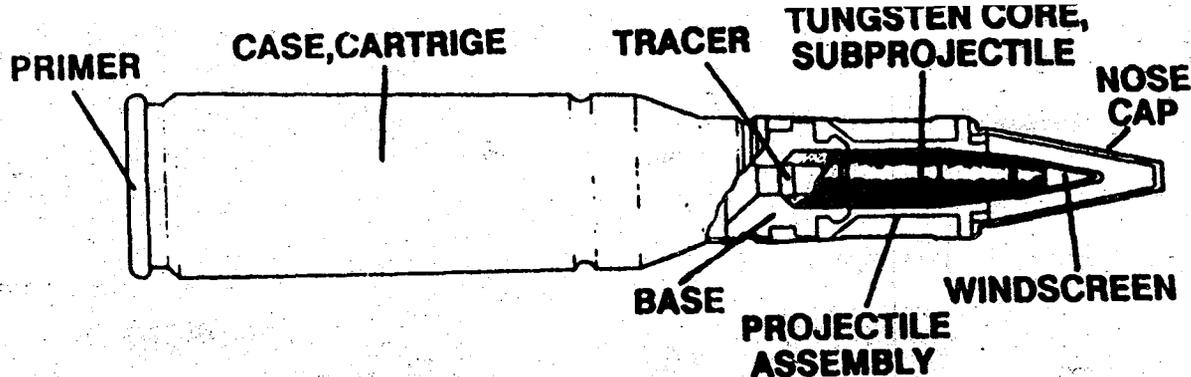


Fig. 3

M791 APDS-T.

(1) M791 Armor-piercing, spin-stabilized discarding sabot with tracer. The APDS-T (Figure 3) penetrates lightly armored vehicles. Examples of lightly armored vehicles are BMPs, BMDs, BTRs, BRDMs, ZSUs, and self-propelled artillery.

(a) The APDS-T is a fixed-type, percussion primed round. It consists of a sabot encapsulated projectile body crimped to a steel cartridge case. The projectile body consists of a solid tungsten alloy penetrator, pressed-on aluminum windshield, pressed-in tracer pellets, molded discarding-type nylon sabot, staked aluminum base, and pressed-on polyethylene nose cap. The projectile sabot and nose cap are black with white markings.

(b) Gases produced by the burning propellant propel the projectile from the gun at 1,345 meters per second (plus or minus 20 meters per second) and ignite the tracer. Setback, centrifugal force, and air pressure cause the sabot to discard on leaving the gun barrel. The discarding sabot leaves the barrel at a 30-degree angle on both sides of the gun-target line for 100 meters. The tungsten penetrator (core) is spin-stabilized and penetrates the target solely by kinetic energy.

(c) The maximum effective range is 1,700 meters. This is based on the following factors:

- o Tracer burnout is 1,700 meters. It is difficult to accurately sense rounds beyond this range. However, in some environments, the ability to observe and adjust rounds extends well beyond tracer burnout, since the impact of the rounds can be observed.

- o Beyond 2,200 meters, the accuracy of the APDS-T decreases sharply. This requires more rounds and more time to hit and kill targets.

- o As range increases, the APDS-T penetration decreases against BMP-1 and BMP-2, especially when these vehicles have applique armor (additional armor layer). While lightly armored targets can be successfully engaged from the flank beyond 1,700 meters, the combined problems of sensing, bullet expenditure, and longer engagement times demand that the BC make a careful estimate of the situation before engaging targets beyond 1,700 meters.

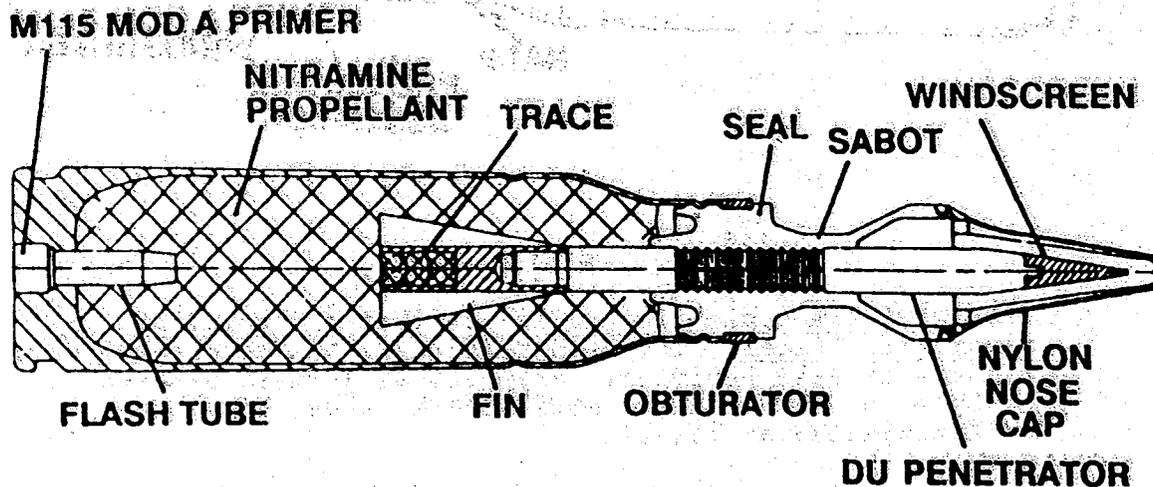


Fig. 4

M919 APFSDS-T.

M919 Armor-piercing, fin-stabilized discarding sabot with tracer. The APFSDS-T *Fig 4* penetrates lightly armored vehicles.

(a) The APFSDS-T is a fixed-type, percussion primed round. It consists of a sabot encapsulated projectile crimped to a steel cartridge case. The projectile body consists of a depleted uranium penetrator; screw-on fins with pressed-in tracer pellets; molded, segmented, discarding-type nylon sabot; and pressed-on polyethylene nose cap. The projectile sabot and nose-cap are black with white obturator.

(b) Basic operation of this kinetic energy round is the same as APDS-T (M791) with an increase in velocity to about 1,420 meters per second. Tracer burnout is beyond 1,700 meters. This round has increased penetration capabilities as well as tracer burn time, which allows engagement of targets at longer ranges and with greater potential to defeat a BMP-2.

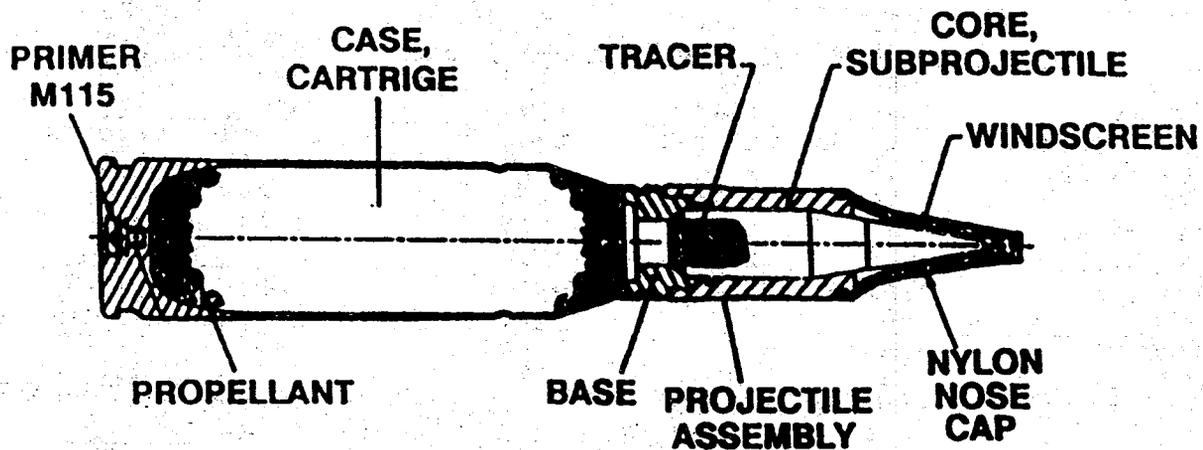


Fig 5

M910 TPDS-T.

(4) M910 Target practice discarding sabot with tracer. The TPDS-T (Figure 5) allows units to practice sabot engagements on limited distance ranges. Instead of the 14,572-meter maximum range for the APDS-T, the maximum range is 6,400 meters.

(a) The TPDS-T cartridge is a fixed-type, percussion primed round. It consists of an encapsulated projectile body crimped to a steel cartridge case. The projectile body is steel, where the APDS-T is tungsten alloy. It has a pressed-on aluminum windshield, pressed-in tracer pellets, molded discarding-type nylon sabot, staked aluminum base, and pressed-on polyethylene nose cap. The projectile sabot and nose cap are blue with white markings.

(b) The TPDS-T cartridge is ballistically matched to the APDS-T with a slight increase in muzzle velocity (about 100 meters per second). All interactions upon ignition are the same as the APDS-T.

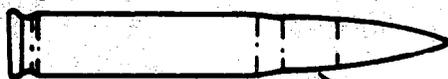
(c) Tracer burnout is 2,000 meters. However, since the round is used to replicate APDS-T, it should only be used out to 1,700 meters.

| | M791 | M919* | M792 | M910 | M793 |
|-------------------------------------|---------|------------|---------------------------|---------|---------|
| | APDS-T | APFSDS-T | HEI-T | TPDS-T | TP-T |
| MUZZLE | mps | mps | mps | mps | mps |
| VELOCITY | 1345 | 1420* | 1100 | 1540 | 1100 |
| TIME OF FLIGHT | seconds | seconds | seconds | seconds | seconds |
| 1,000 meters | 0.8 | 0.8* | 1.2 | 0.76 | 1.2 |
| 1,500 meters | 1.2 | 1.2* | 2.2 | 1.26 | 2.2 |
| 2,000 meters | 1.7 | 1.7* | 3.6 | 1.88 | 3.6 |
| 2,500 meters | 2.2 | 2.2* | 5.3 | 2.72 | 5.3 |
| CARTRIDGE | grams | grams | grams | grams | grams |
| WEIGHT | 458 | 450* | 501 | 415 | 501 |
| PROJECTILE | grams | grams | grams | grams | grams |
| WEIGHT | 105 | 110* | 185 | 94 | 185 |
| TRACER BURN | seconds | seconds | seconds | seconds | seconds |
| TIME | 1.4 | classified | 3.5 | 1.88 | 3.5 |
| BURSTING RADIUS/ ARMING DISTANCE | NA | NA | 5 meters 10-100 meters | NA | NA |
| MAXIMUM EFFECTIVE | meters | meters | meters | meters | meters |
| RANGE | 1,700 | classified | 3,000 | 1,700 | 1,600 |
| TRACER BURN | meters | meters* | meters | meters | meters |
| RANGE | 1,700 | 1,700+ | 2,000 | 2,000 | 2,000 |

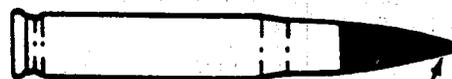
*These specifications are estimated pending final testing.

7.62MM AMMO

| AUTHORIZED ROUNDS | IDENTIFICATION (see picture) |
|---|---------------------------------|
| Cartridge, 7.62mm, Ball, M59 or M80 | None |
| Cartridge, 7.62mm, Tracer, M62 | Orange tip |
| Cartridge, 7.62mm, Armor- piercing, M61 | Black tip |
| Cartridge, 7.62mm, Dummy, M63 | None |
| NUMBER AUTHORIZED: 1400 stowed, 800 cartridges ready, 2200 total for IFV 3400 stowed, 800 cartridges ready, 4200 total for CFV | |



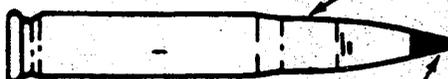
M59
M80



M61

BLACK

4 TO 1
COMBAT MIX



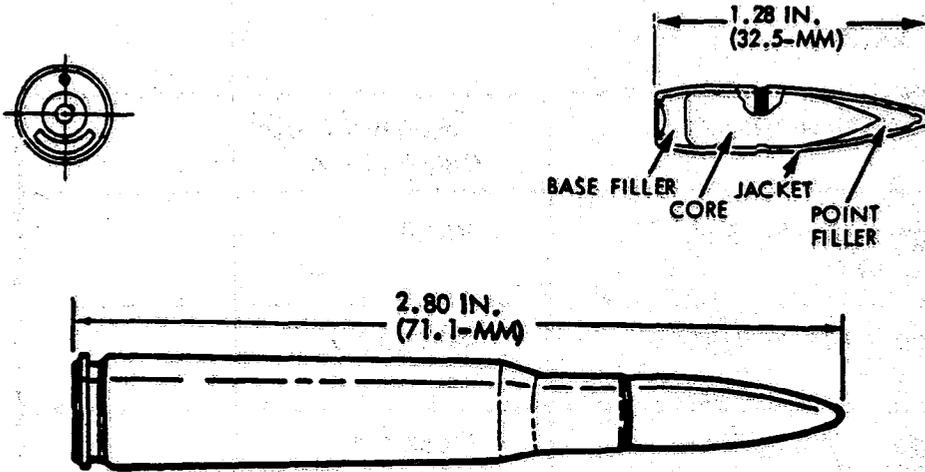
M62

ORANGE



M63

CARTRIDGE, 7.62-MM, BALL, M59



ARD00-0123

Type Classification:

Std - OTCM 36841

Use:

Machine Guns, 7.62-MM, M60 and M219; Rifle 7.62-MM, M14.

Description:

BALL Cartridge. The cartridge is identified by a plain bullet tip.

Purpose:

The cartridge is intended for use against personnel and unarmored targets.

Tabulated Data:

| | |
|--------------|-----------|
| DODAC | 1305-A143 |
| Weight | 393 grain |
| Length | 2.80 inch |
| Tracer | NA |
| Primer | NA |
| Fuze | NA |
| Explosive: | |
| Type | NA |
| Weight | NA |
| Incendiary: | |
| Type | NA |
| Weight | NA |
| Propellant: | |
| Type | WC 846 |
| Weight | 46 grain |

Projectile:

Weight ----- 150.5 grain

Performance:

Chamber pressure ----- 50,000 psi
 Velocity ----- 2750 fps,
 78 ft from muzzle

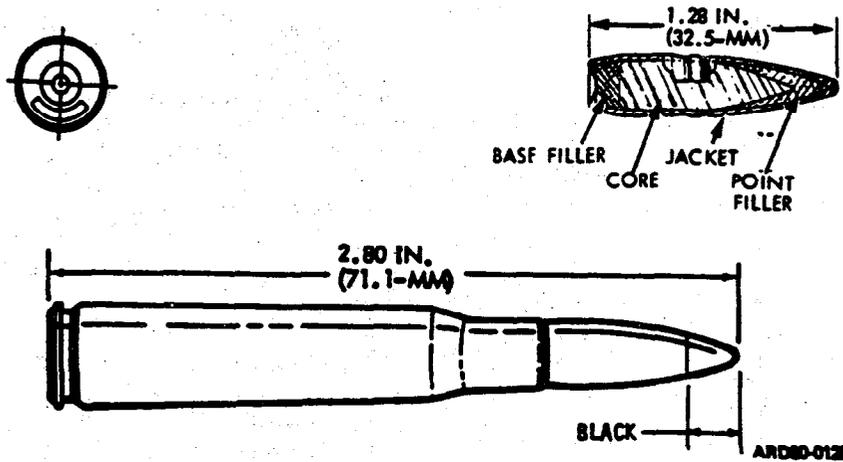
Shipping and Storage Data:

Quantity-distance class/SCG -- 1.4S
 Storage code ----- Class V
 DOT shipping class ----- C
 DOT designation ----- SMALL ARMS
 AMMUNITION
 Drawing number ----- 7553702

References:

TM 9-1005-223-10
 TM 9-1005-223-12P
 TM 9-1005-224-10
 TM 9-1005-233-10
 TM 9-1005-257-12
 TM 9-1005-262-14
 TM 9-1005-298-12
 TM 9-1005-313-10
 TM 9-1300-206
 SB 700-20

CARTRIDGE, 7.62-MM, ARMOR PIERCING, M61



Type Classification:

OBS - MSR - 11756003

Use:

Machine Guns, 7.62-MM, M60, M219 and M240;
Rifle, 7.62-MM, M14.

Description:

ARMOR PIERCING Cartridge. The cartridge is identified by a black bullet tip.

Purpose:

Used in rifles and machine guns against personnel and light armored or unarmored targets, concrete shelters and similar bullet-resisting targets.

Tabulated Data:

DODAC ----- 1305-A120
Weight ----- 393 grain
Length ----- 2.80 inch
Tracer ----- NA
Primer ----- Percussion
Fuze ----- NA
Explosive:
Type ----- NA
Weight ----- NA
Incendiary:
Type ----- NA
Weight ----- NA

Propellant:

Type ----- IMR 4475
Weight ----- 41 grain

Projectile:

Weight ----- 150.5 grain

Performance:

Chamber pressure ----- 50,000 psi
Velocity ----- 2750 fps,
78 ft frc
muzzle

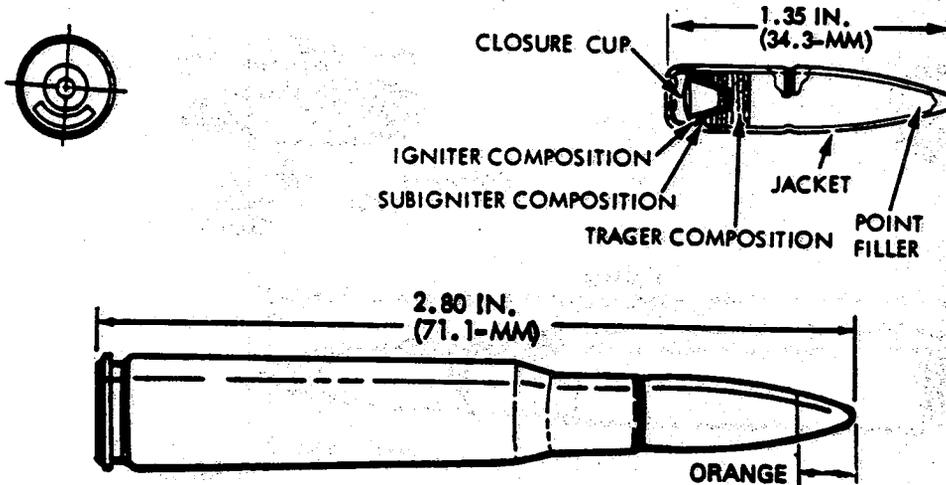
Shipping and Storage Data:

Quantity-distance class/SCG -- 1.4S
Storage code ----- Class V
DOT shipping class ----- C
DOT designation ----- SMALL ARMS
AMMUNITION
Drawing number ----- 7553704

References:

TM 9-1005-223-10
TM 9-1005-224-10
TM 9-1005-233-10
TM 9-1005-247-12
TM 9-1005-257-12
TM 9-1005-262-14
TM 9-1005-298-12
TM 9-1005-313-20
TM 9-1300-206
SB 700-20

CARTRIDGE, 7.62-MM, TRACER, M62



ARD80-0128

Type Classification:

CON - MSR 11756003

Use:

Machine Guns, 7.62-MM, M60, M219 and M240;
Rifle, 7.62-MM, M14.

Description:

TRACER Cartridge. The cartridge is identified by an orange bullet tip.

Purpose:

The tracer is intended to permit visible observation of the bullets in-flight path or trajectory to the point of impact.

Tabulated Data:

DODAC ----- 1305-A124
Weight ----- 383 grain
Length ----- 2.80 inch
Tracer ----- R-284
Primer ----- Percussion
Fuze ----- NA
Explosive:
Type ----- NA
Weight ----- NA
Incendiary:
Type ----- NA
Weight ----- NA

Propellant:

Type ----- WC 846
Weight ----- 46 grain
Projectile:
Weight ----- 142 grain

Performance:

Chamber pressure ----- 50,000 psf
Velocity ----- 2750 fps,
78 ft from muzzle

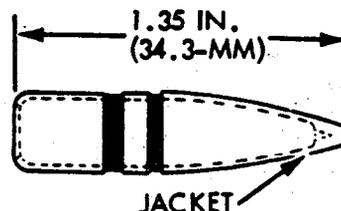
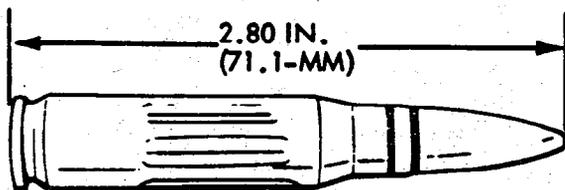
Shipping and Storage Data:

Quantity-distance class/SCG -- 1.4S
Storage code ----- Class V
DOT shipping class ----- C
DOT designation ----- SMALL ARMS
AMMUNITION
Drawing number ----- 10522000

References:

TM 9-1005-223-10
TM 9-1005-224-10
TM 9-1005-233-10
TM 9-1005-243-12
TM 9-1005-247-12
TM 9-1005-257-12
TM 9-1005-262-14
TM 9-1005-298-12
TM 9-1005-313-10
TM 9-1300-206
SB 700-20

DUMMY CARTRIDGE, 7.62-MM, M63



ARD80-0128

Type Classification:

Std - OTCM 36841

Use:

Machine Guns, 7.62-MM, M60, M219 and M240;
Rifle, 7.62-MM, M14.

Description:

DUMMY Cartridge. The cartridge is identified by six longitudinal corrugations (flutings) on the cartridge case. In addition, there is no primer, and no vent hole in the primer pocket.

Purpose:

This is a dummy cartridge used for practice in loading 7.62-MM weapons for simulated firing to detect flinching of personnel during firing and for inspecting and testing the weapon mechanism.

Tabulated Data:

| | |
|--------------|-----------|
| DODAC ----- | 1305-A135 |
| Weight ----- | 258 grain |
| Length ----- | 2.80 inch |
| Tracer ----- | NA |
| Primer ----- | NA |
| Fuze ----- | NA |
| Explosive: | |
| Type ----- | NA |
| Weight ----- | NA |

Incendiary:

Type ----- NA
Weight ----- NA

Performance:

Chamber pressure ----- NA
Velocity ----- NA

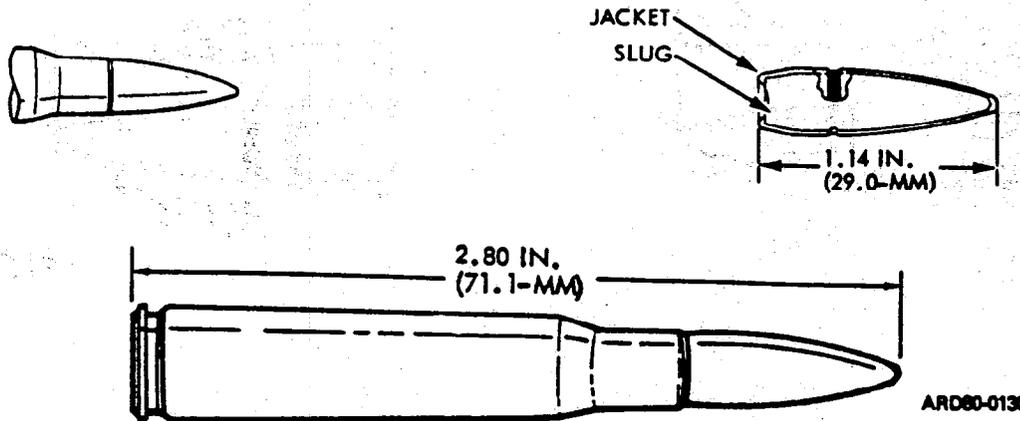
Shipping and Storage Data:

| | |
|--------------------------------|---------------|
| Quantity-distance class/SCG -- | NA |
| Storage code ----- | NA |
| DOT shipping class ----- | NA |
| DOT designation ----- | Non-explosive |
| | AMMUNITION |
| Drawing number ----- | 7553706 |

References:

TM 9-1005-223-10
TM 9-1005-223-12P
TM 9-1005-224-10
TM 9-1005-233-10
TM 9-1005-243-12
TM 9-1005-247-12
TM 9-1005-257-12
TM 9-1005-262-14
TM 9-1005-298-12
TM 9-1005-313-10
TM 9-1300-206
SB 700-20

CARTRIDGE, 7.62-MM, BALL, M80



Type Classification:

Std - MSR 07798001

Use:

Machine Guns, 7.62-MM, M60, M219 and M240;
Rifle, 7.62-MM, M14.

Description:

BALL Cartridge. This cartridge is identified by a plain bullet tip.

Purpose:

The purpose is intended for use against personnel and unarmored targets.

Tabulated Data:

| | |
|--------------------|------------|
| DODAC ----- | 1305-A122 |
| Weight ----- | 392 grain |
| Length ----- | 2.80 inch |
| Tracer ----- | NA |
| Primer ----- | Percussion |
| Fuze ----- | NA |
| <u>Explosive:</u> | |
| Type ----- | NA |
| Weight ----- | NA |
| <u>Incendiary:</u> | |
| Type ----- | NA |
| Weight ----- | NA |

Propellant:

Type ----- WC 846
Weight ----- 46 grain

Projectile:

Weight ----- 146 grain

Performance:

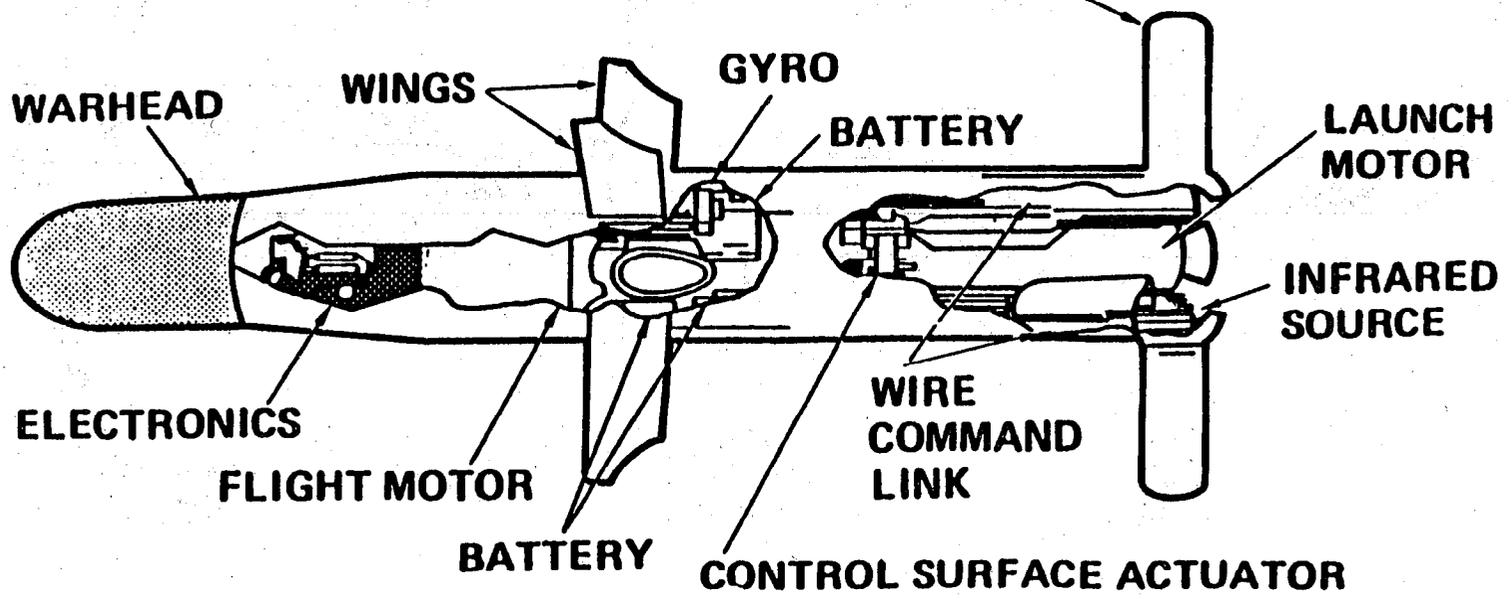
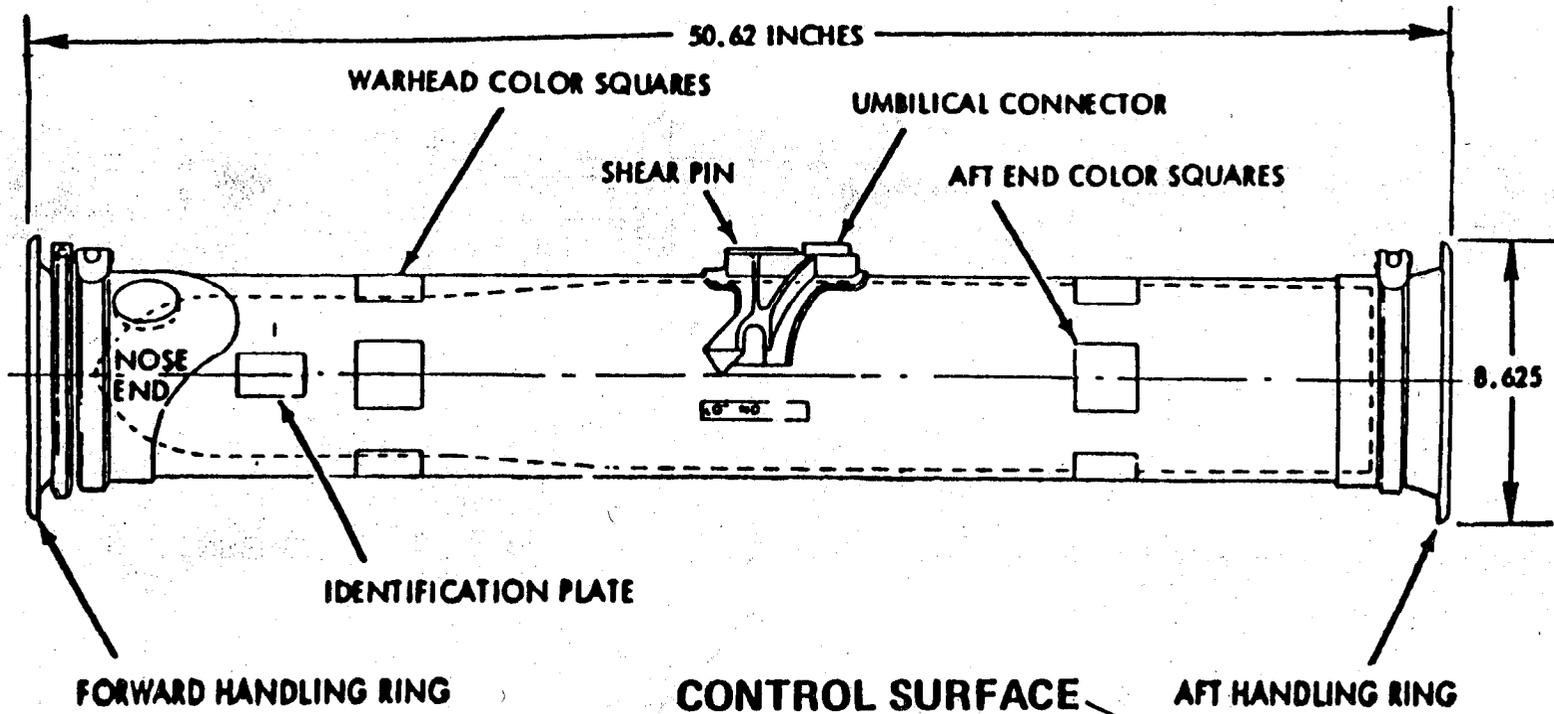
Chamber pressure ----- 50,000 psi
Velocity ----- 2750 fps,
78 ft from muzzle

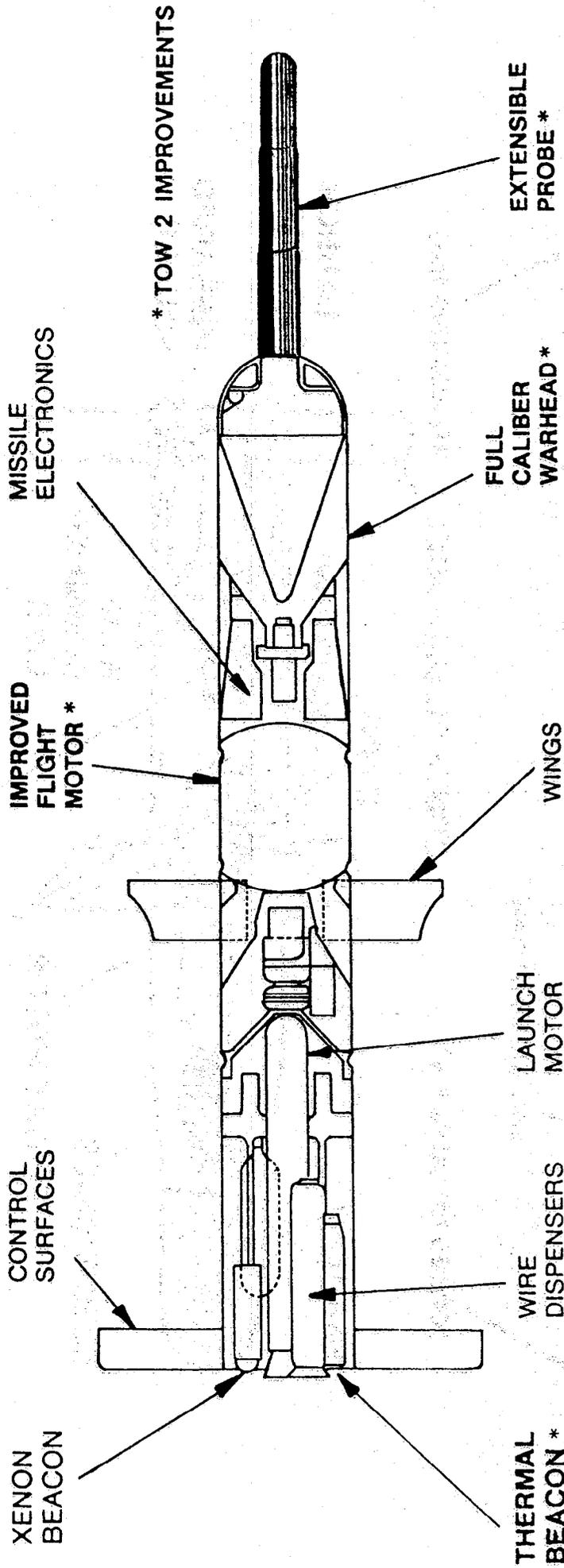
Shipping and Storage Data:

Quantity-distance class/SCG ---- 1.4S
Storage code ----- Class V
DOT shipping class ----- C
DOT designation ----- SMALL ARMS
AMMUNITION
Drawing number ----- 10521998

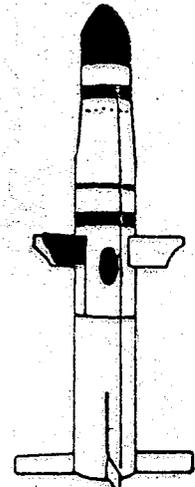
References:

TM 9-1005-223-10
TM 9-1005-224-10
TM 9-1005-233-10
TM 9-1005-243-12
TM 9-1005-247-12
TM 9-1005-257-12
TM 9-1005-262-14
TM 9-1005-298-12
TM 9-1005-313-10
TM 9-1300-206
SB 700-20

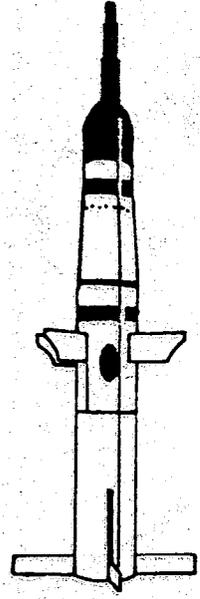




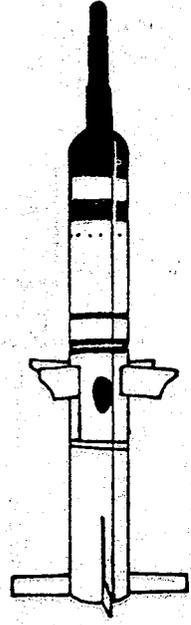
BASIC TOW



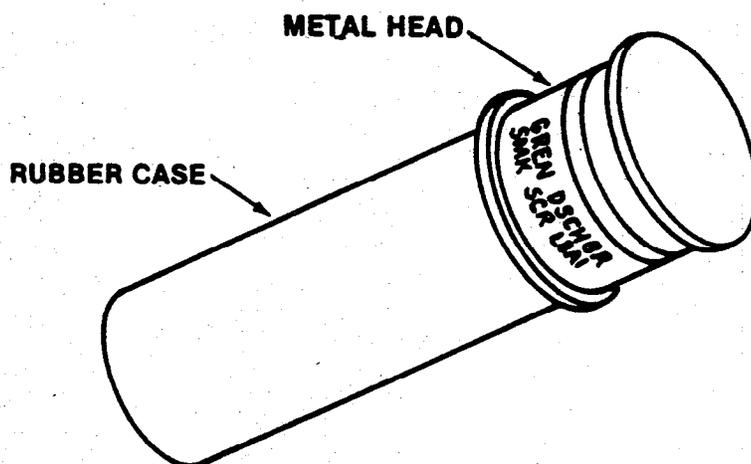
ITOW



TOW 2



| AUTHORIZED ROUND | IDENTIFICATION |
|--|--|
| Grenade Launchers, Smoke Screening RP, L8A1/A3 | See picture |
| NUMBER AUTHORIZED: | 8 grenades ready, 8 stowed, 16 total for IFV 8 grenades ready, 8 stowed, 16 total for CFV |



M 257 SMOKE GRENADE

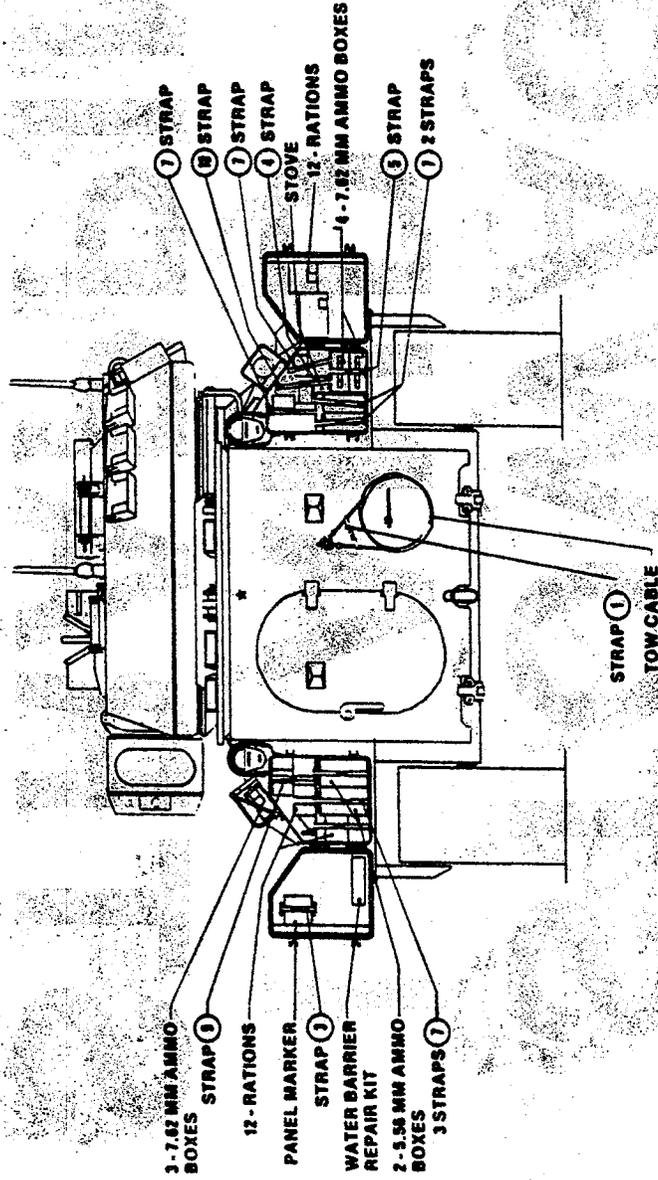


**CFV
STOWAGE
AND
STRAPPING
DIAGRAM**

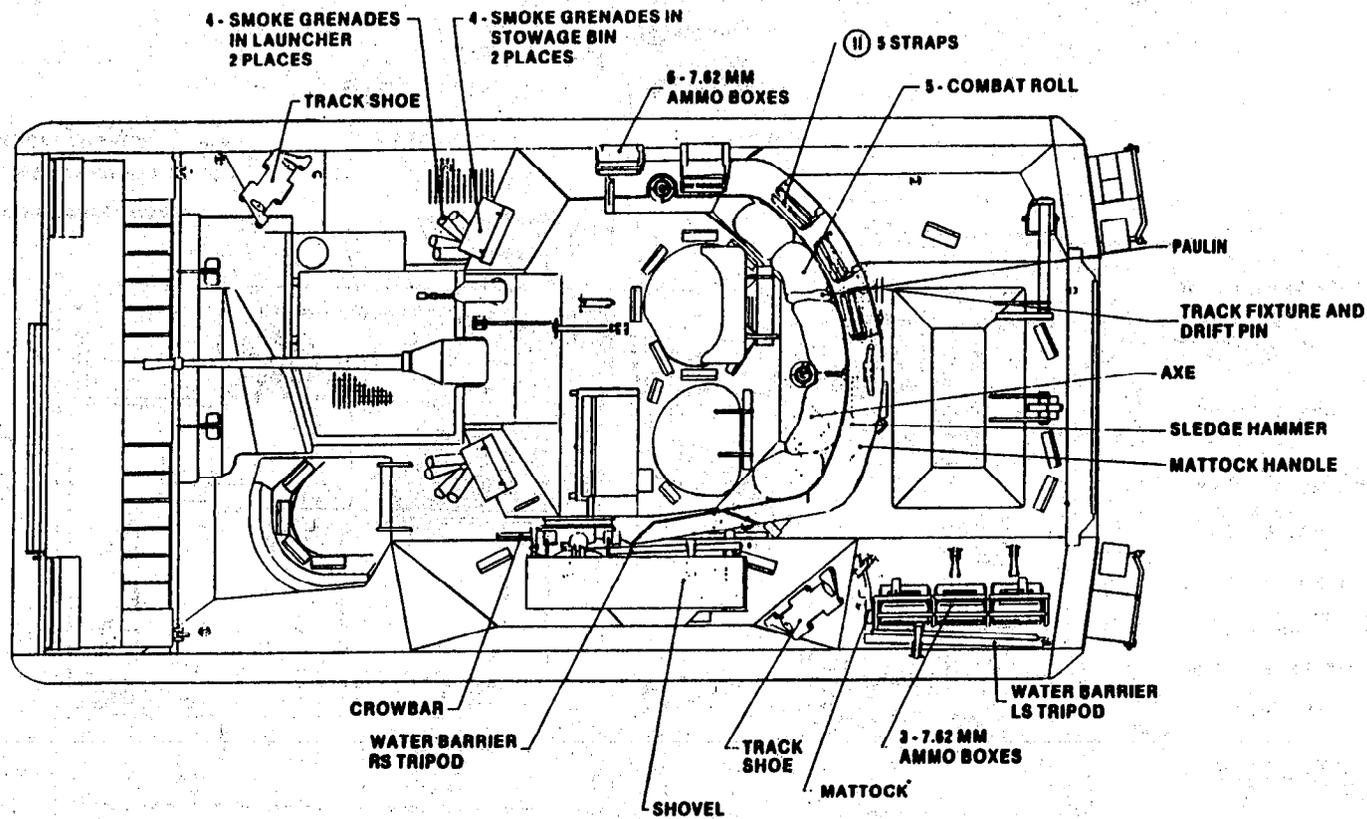
PN 12307494 REV A

STRAP LIST

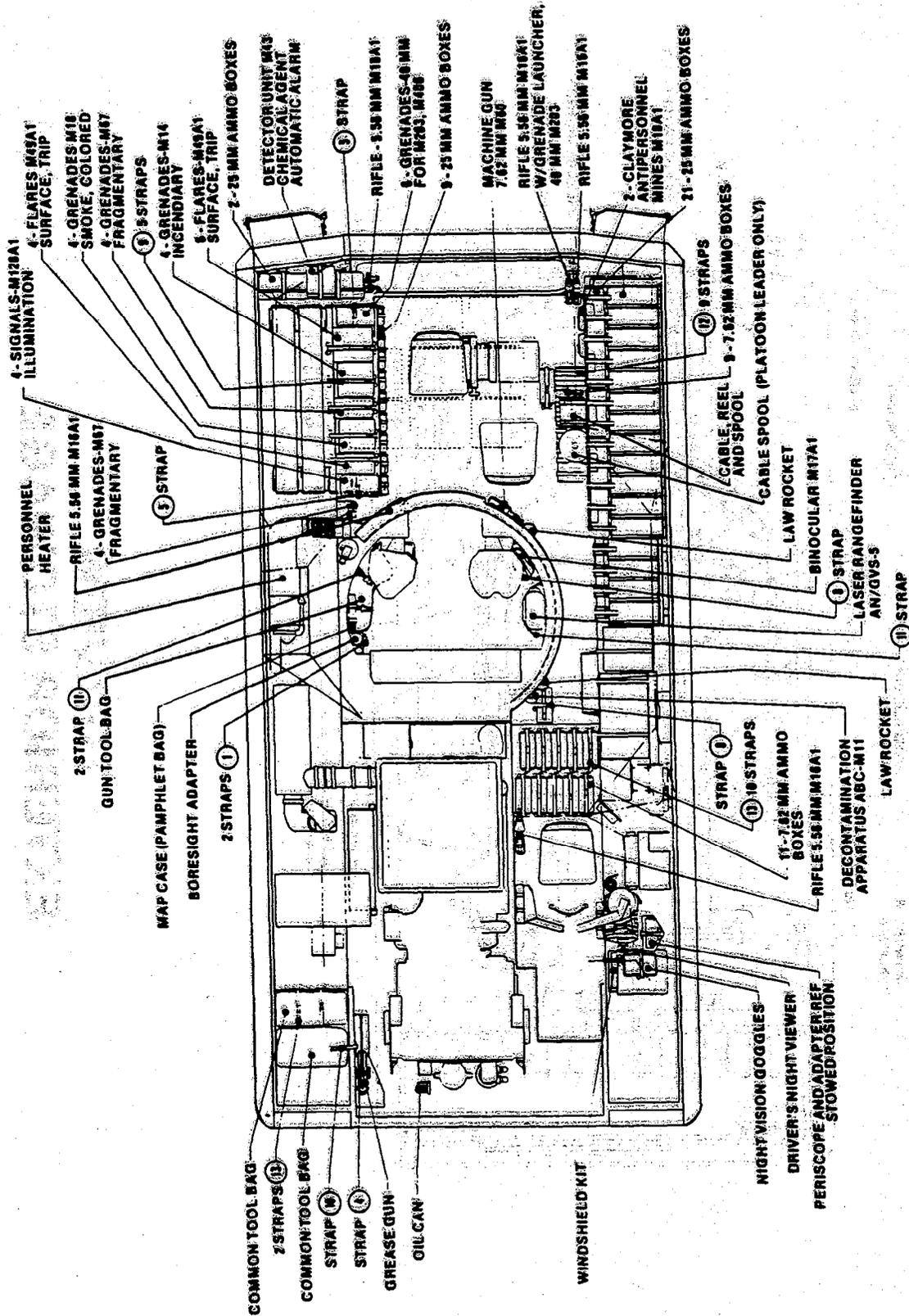
| ITEM | STRAP NO | LENGTH |
|------|----------|--------|
| 1 | 8690465 | 18 |
| 2 | 66 | 20 |
| 3 | 57 | 22 |
| 4 | 68 | 24 |
| 5 | 70 | 28 |
| 6 | 71 | 30 |
| 7 | 72 | 33 |
| 8 | 73 | 36 |
| 9 | 74 | 39 |
| 10 | 76 | 45 |
| 11 | 77 | 48 |
| 12 | 78 | 51 |
| 13 | 79 | 54 |
| 14 | 80 | 57 |
| 15 | 81 | 60 |
| 16 | 82 | 64 |
| 17 | 83 | 68 |
| 18 | 84 | 72 |
| 19 | 86 | 80 |
| 20 | 8690497 | 132 |



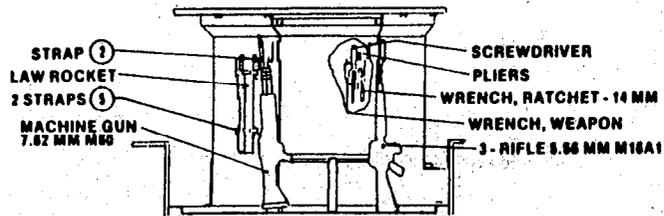
REAR VIEW



**TOP VIEW
EXTERIOR STOWAGE**

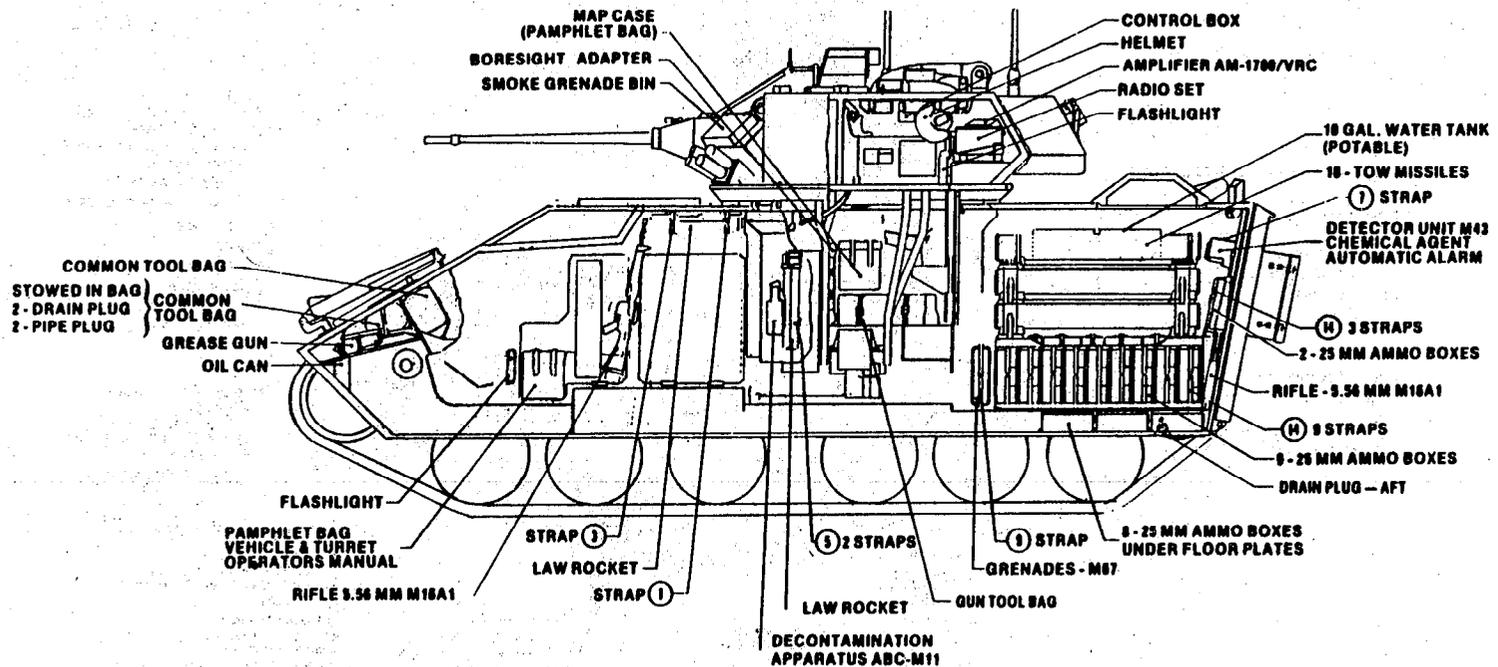


TOP VIEW INTERIOR STORAGE

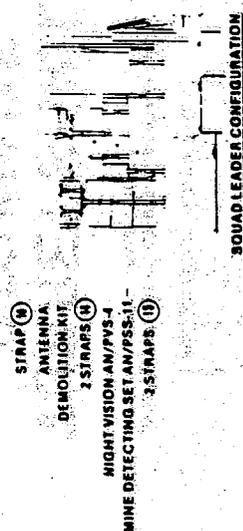
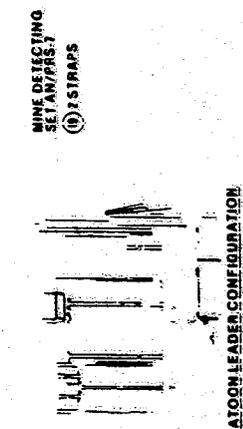
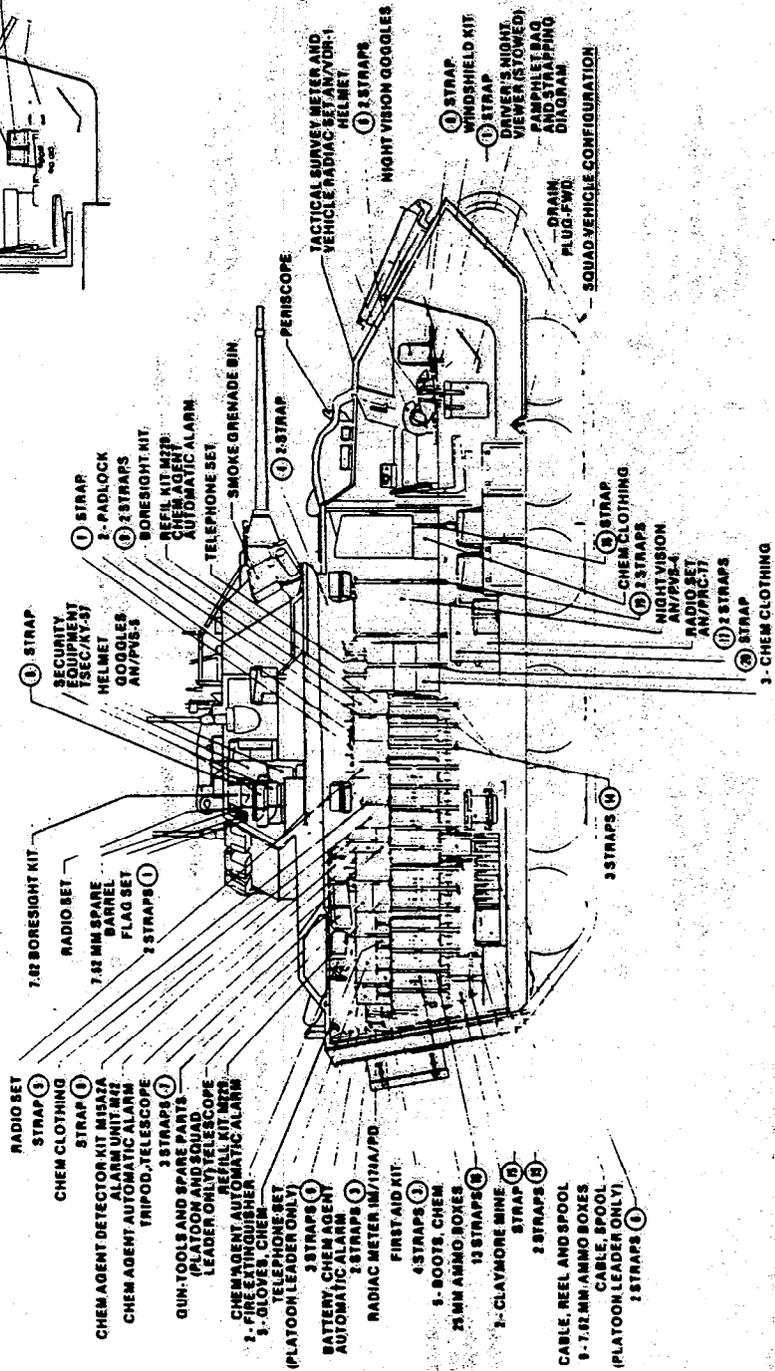
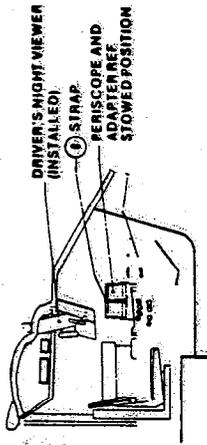


REAR VIEW OF TURRET SHIELD AND PARTIAL VIEW
OF TURRET INTERIOR

TURRET SHIELD STOWAGE



RIGHT INTERIOR STOWAGE

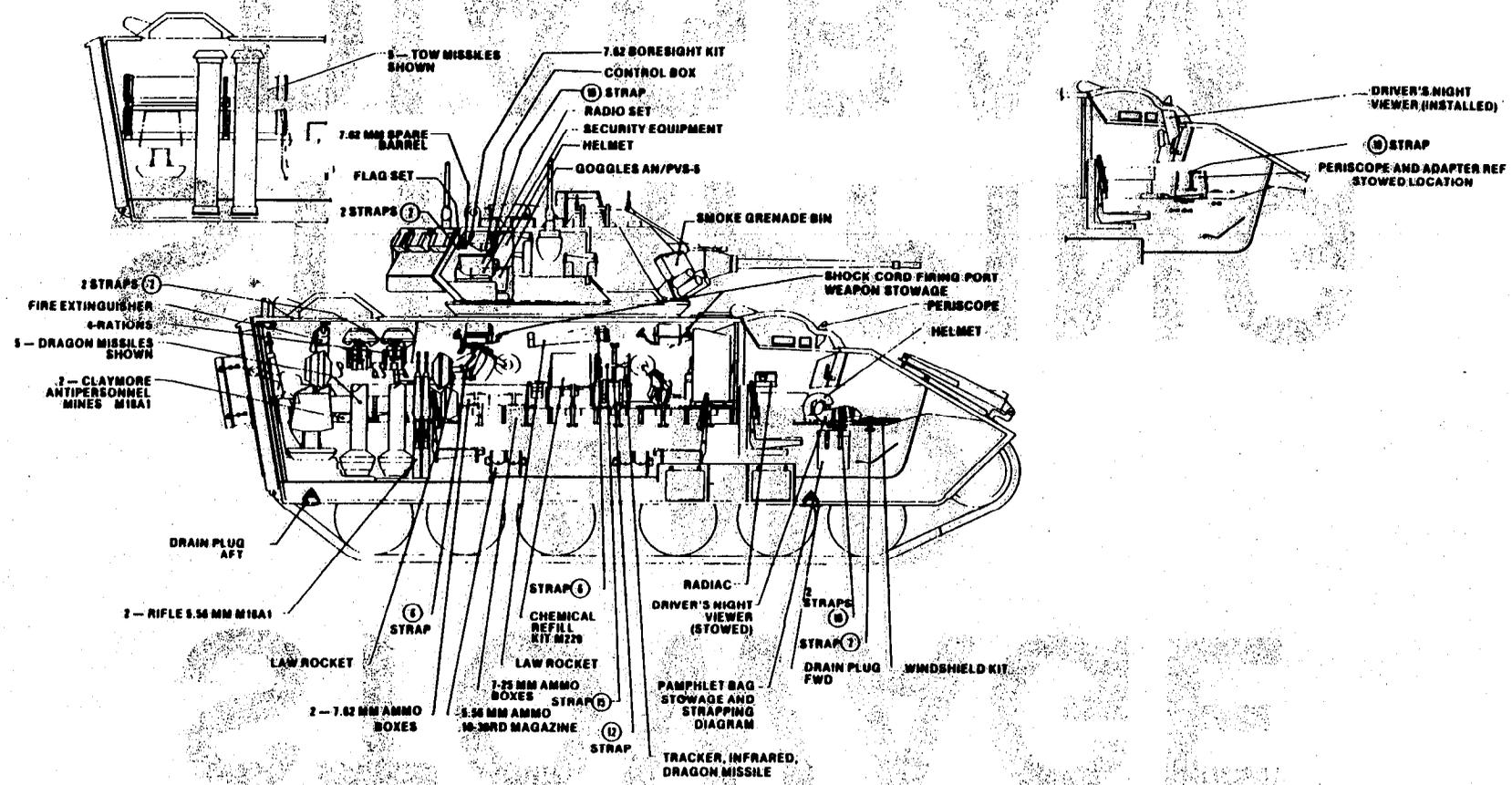


LEFT INTERIOR STOWAGE

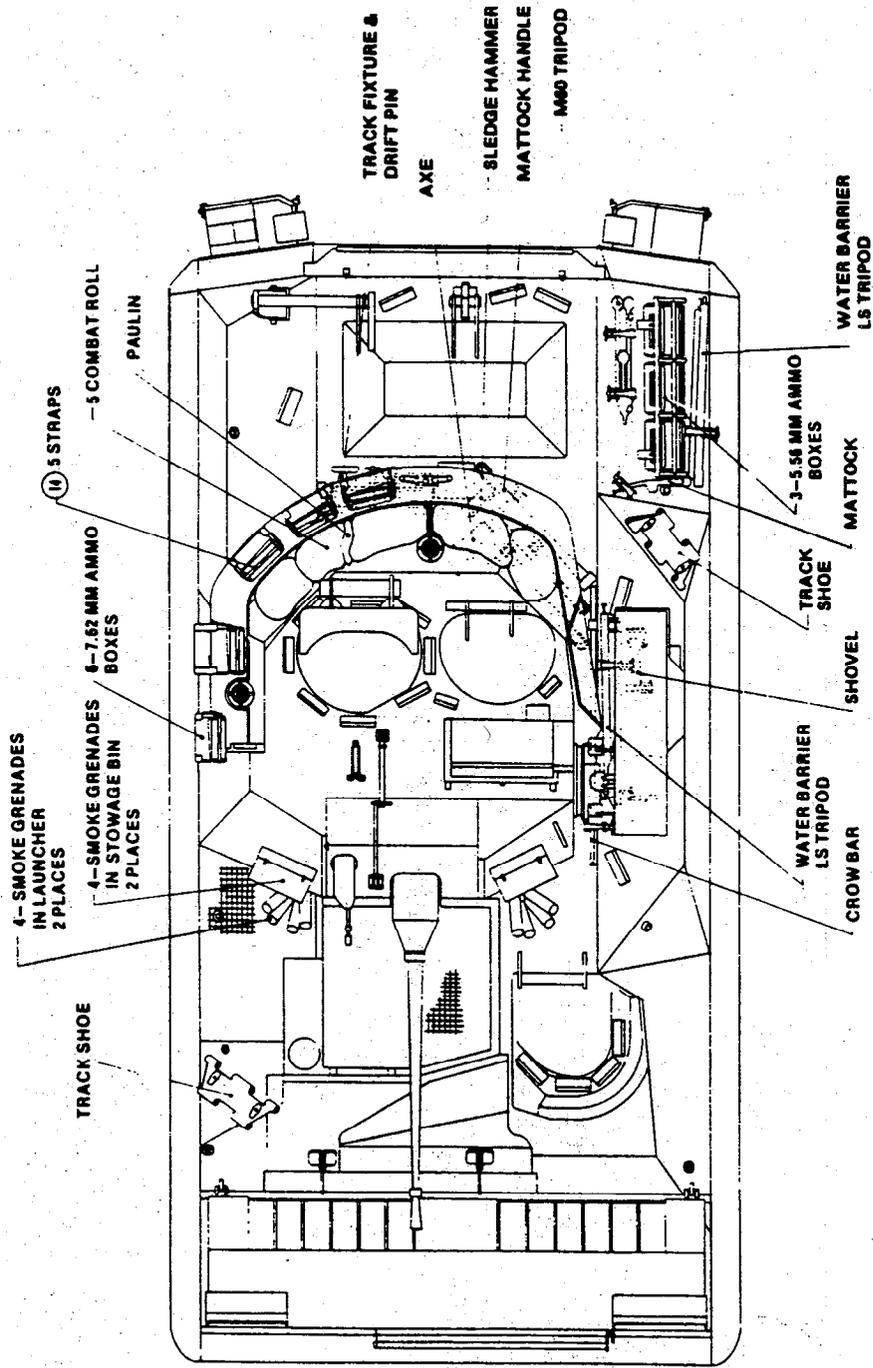
IEV STOWAGE AND STRAPPING DIAGRAM

PN 12307177 REV A

LEFT INTERIOR STORAGE



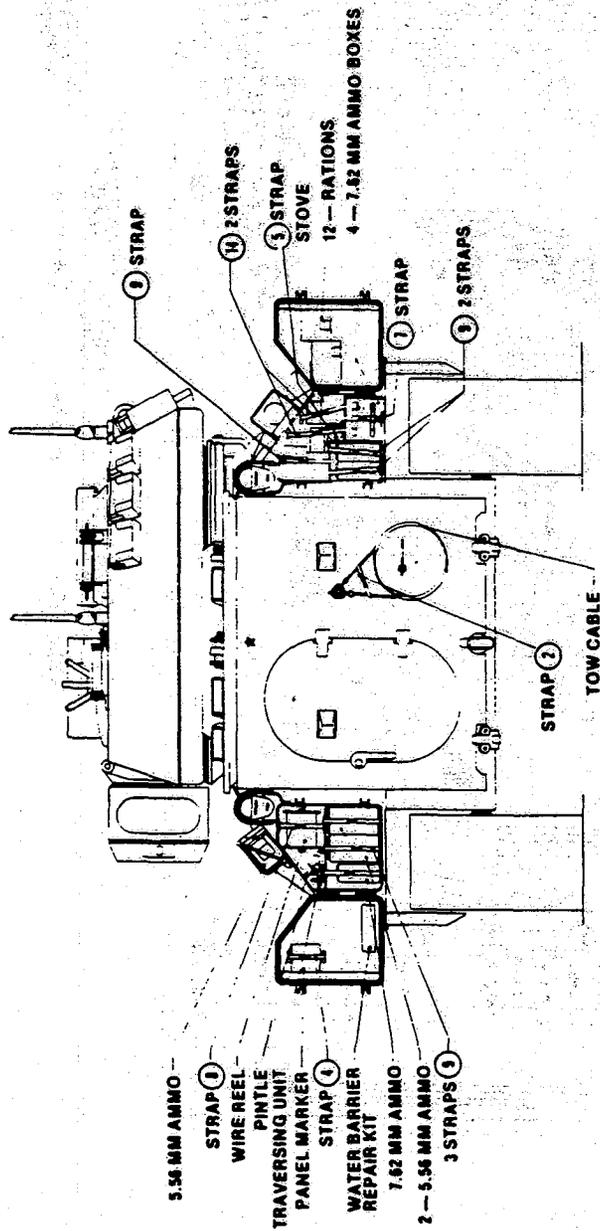
LEFT INTERIOR STORAGE



TOP VIEW EXTERIOR STOWAGE

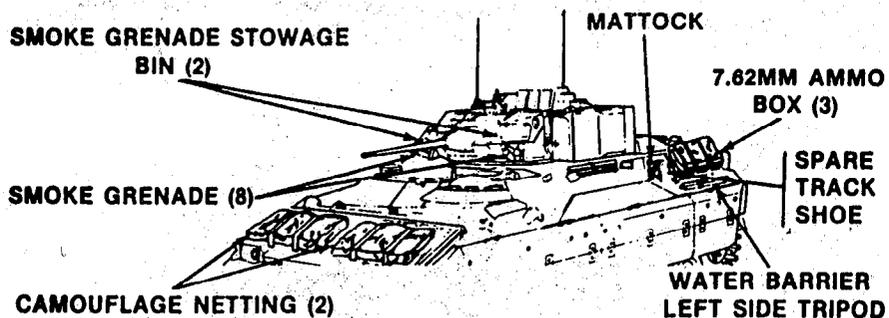
STRAP LIST

| ITEM | STRAP NO. | LENGTH |
|------|------------|--------|
| 1 | 8690484 | 16 |
| 2 | 65 | 18 |
| 3 | 66 | 20 |
| 4 | 67 | 22 |
| 5 | 68 | 24 |
| 6 | 69 | 26 |
| 7 | 70 | 28 |
| 8 | 71 | 30 |
| 9 | 72 | 33 |
| 10 | 73 | 36 |
| 11 | 74 | 39 |
| 12 | 75 | 42 |
| 13 | 76 | 45 |
| 14 | 77 | 48 |
| 15 | 78 | 51 |
| 16 | 79 | 54 |
| 17 | 80 | 57 |
| 18 | 81 | 60 |
| 19 | 82 | 64 |
| 20 | 83 | 68 |
| 21 | 84 | 72 |
| 22 | 87 | 84 |
| 23 | 8690499 | 144 |
| 24 | 10190635-2 | 12 |
| 25 | -4 | 19 |
| 26 | -8 | 22 |
| 27 | 10190635-9 | 30 |

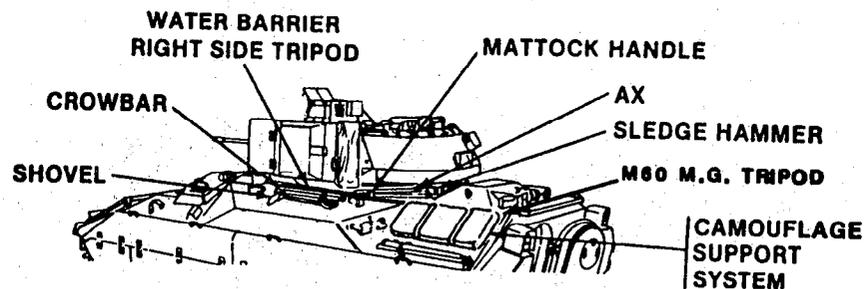


REAR VIEW

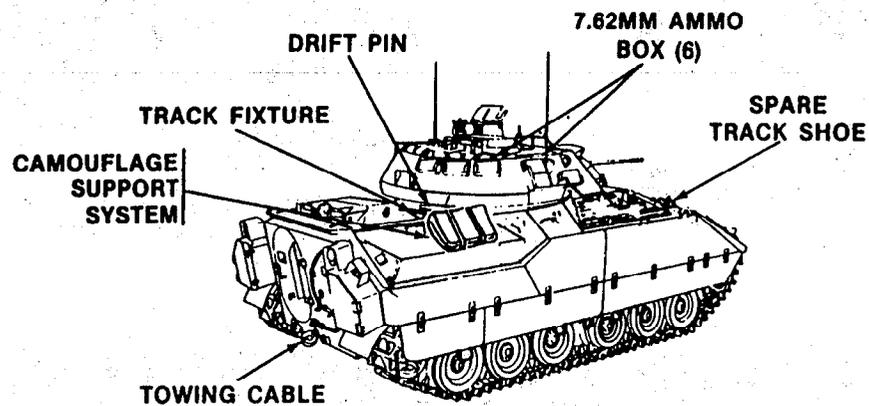
CFV EXTERIOR STOWAGE



HULL — LEFT FRONT VIEW

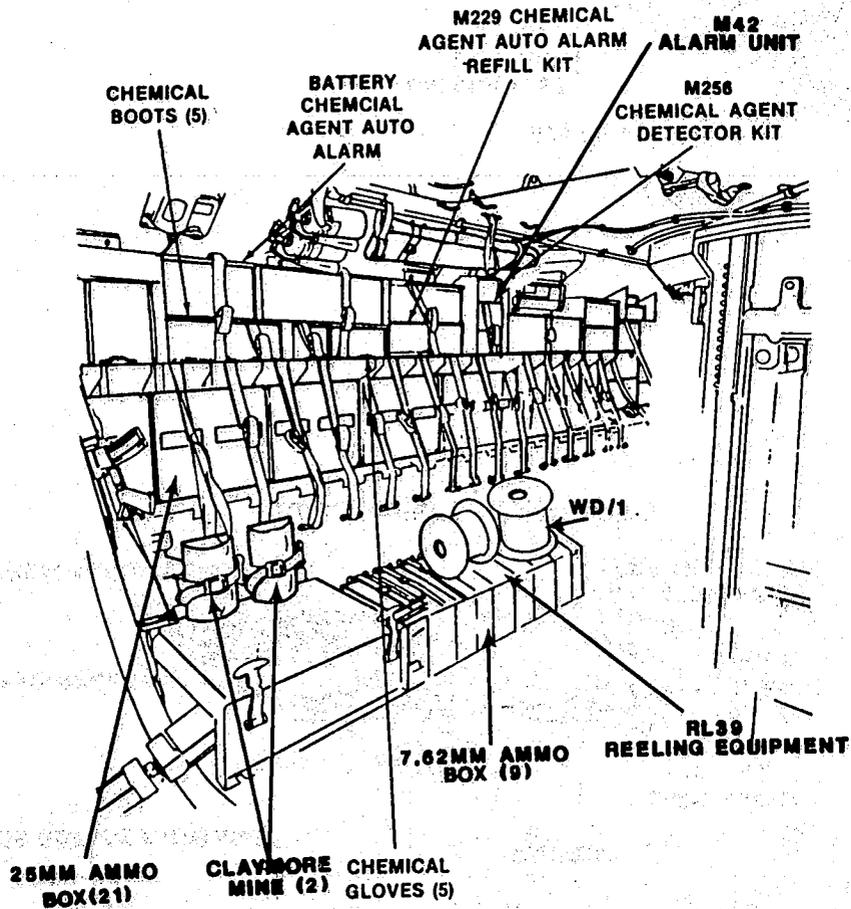


HULL — LEFT REAR VIEW

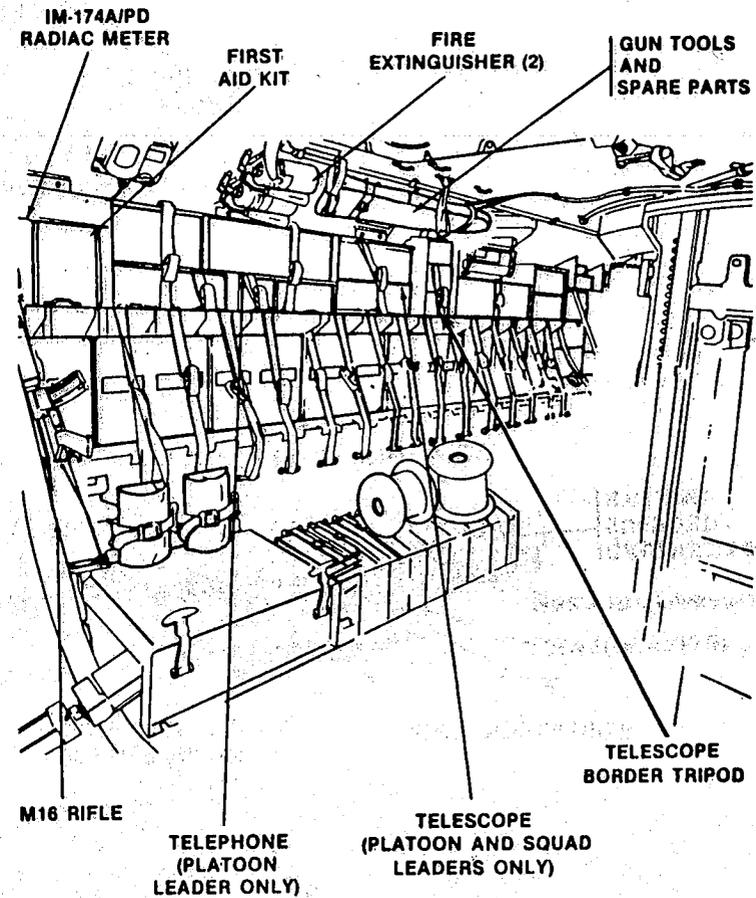


HULL — RIGHT REAR VIEW

INTERIOR LEFT SPONSON

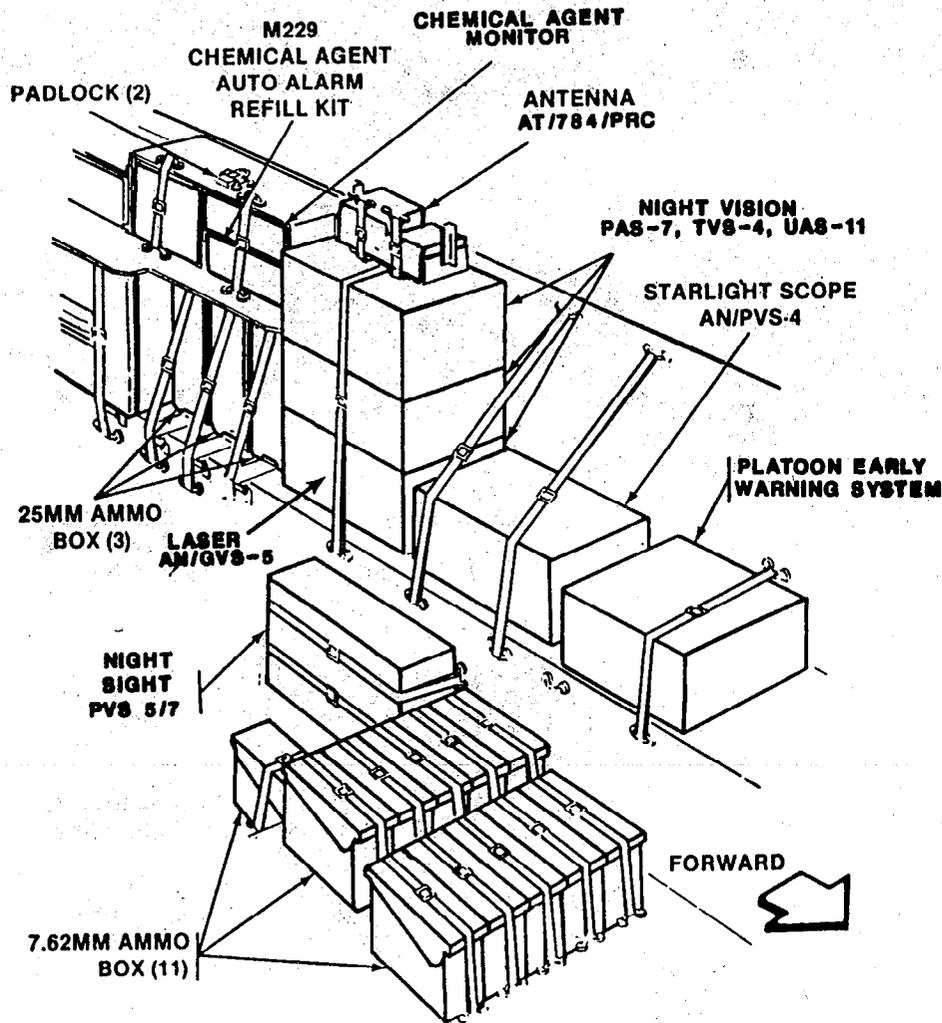


SQUAD AREA — LEFT REAR CORNER

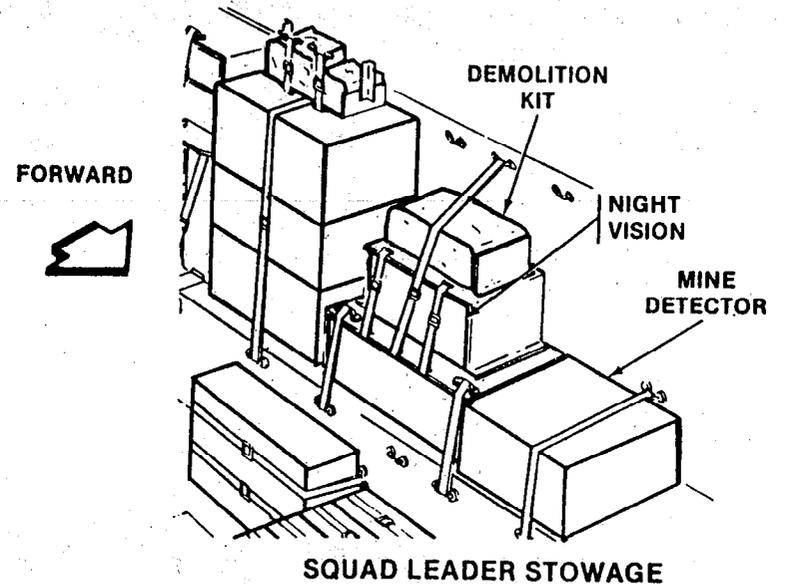
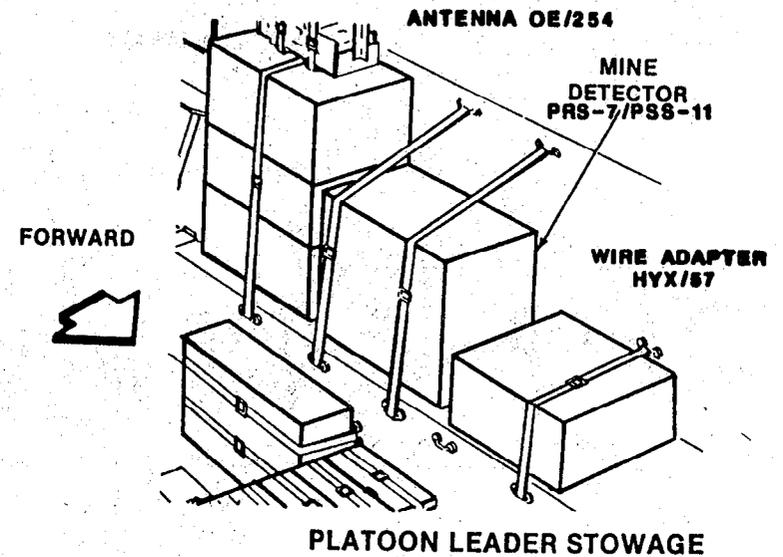


SQUAD AREA — LEFT REAR CORNER

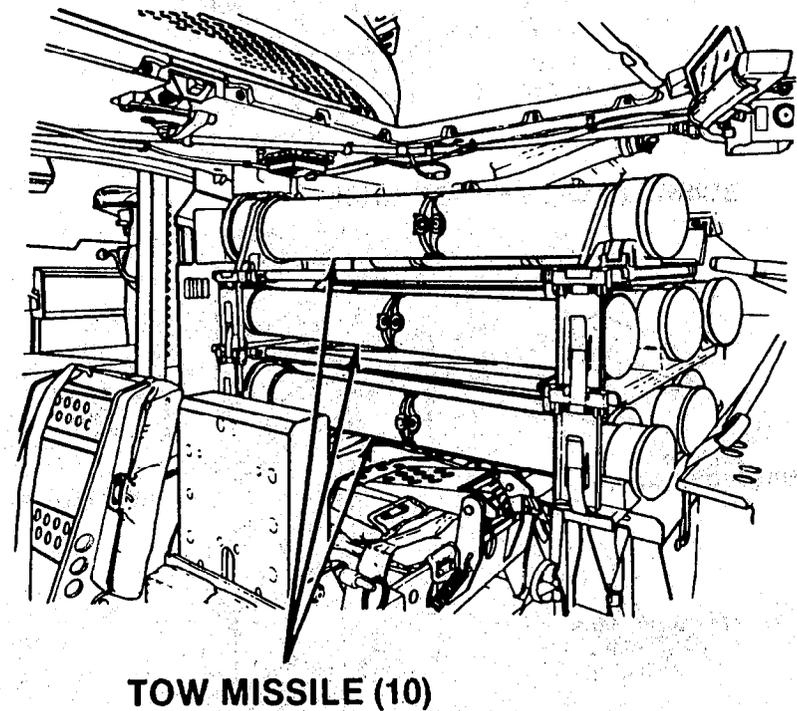
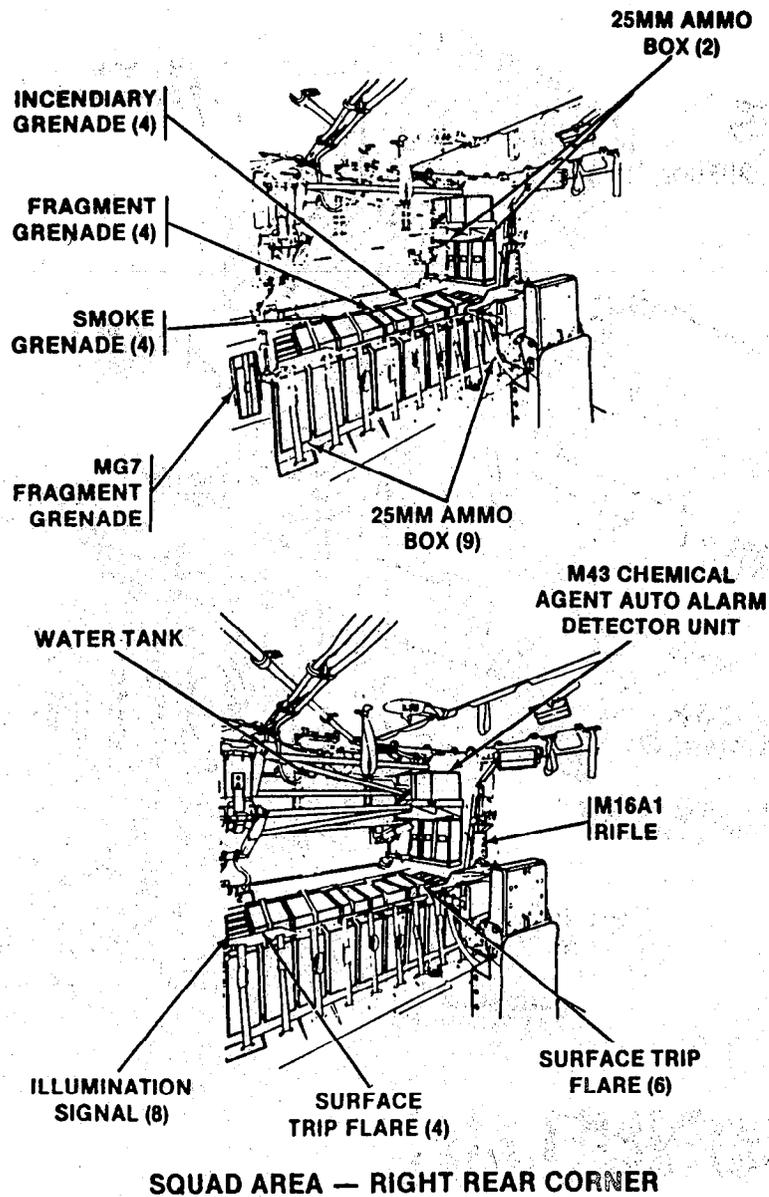
INTERIOR LEFT SPONSON



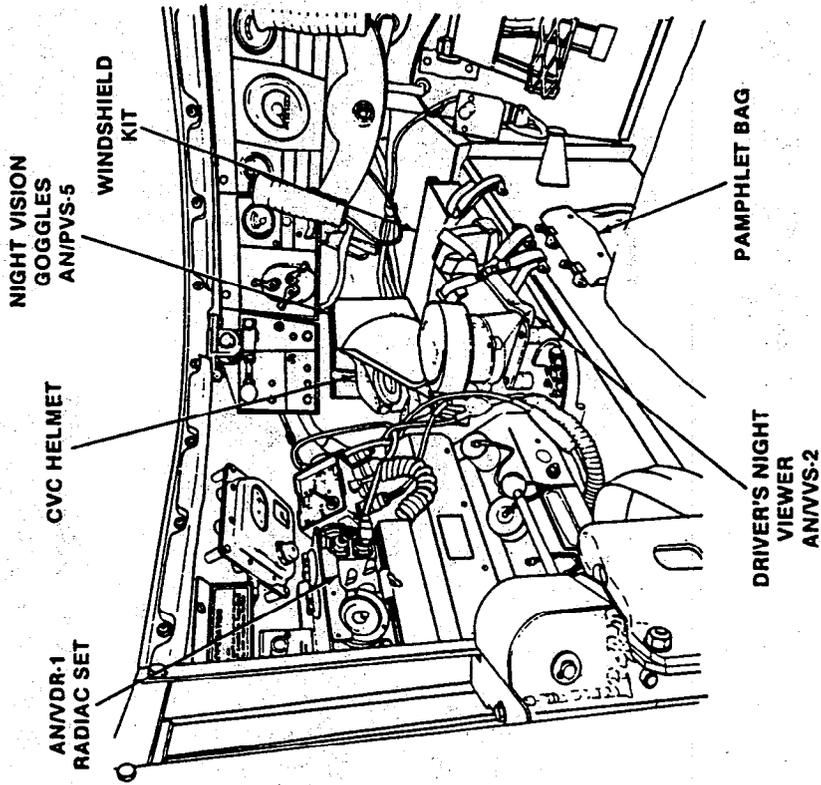
SPONSON — LEFT CENTER



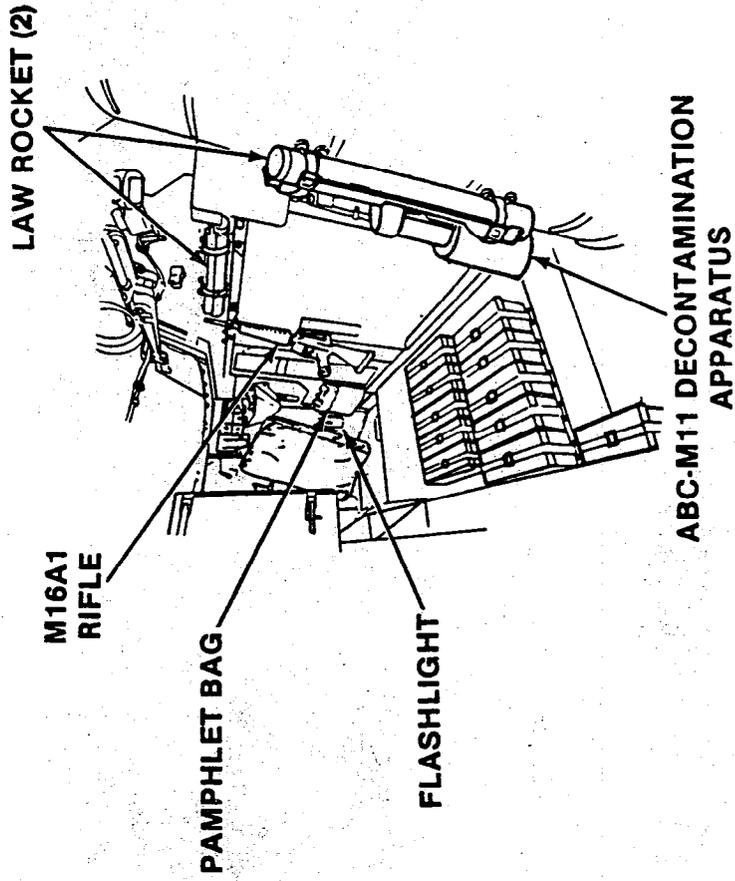
INTERIOR RIGHT SPONSON



M-3 DRIVERS STATION

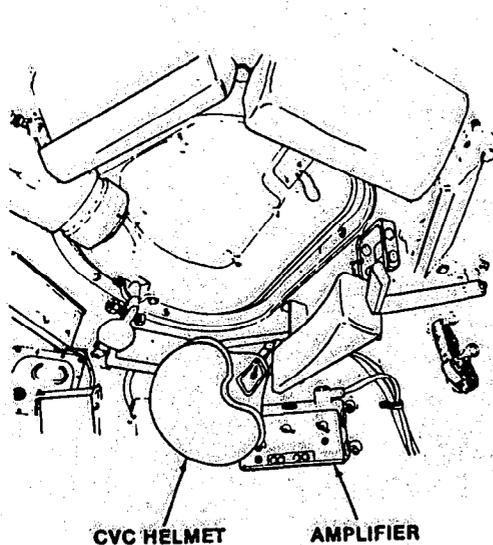


DRIVER'S STATION-LEFT SIDE

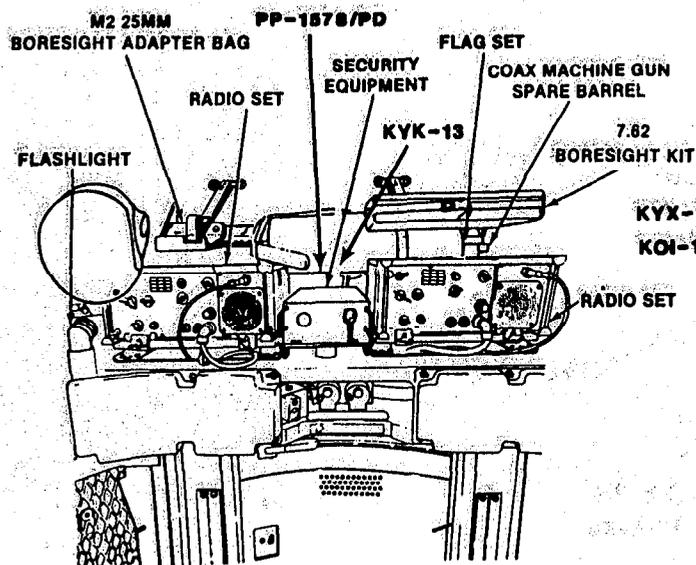


DRIVER'S STATION-RIGHT SIDE

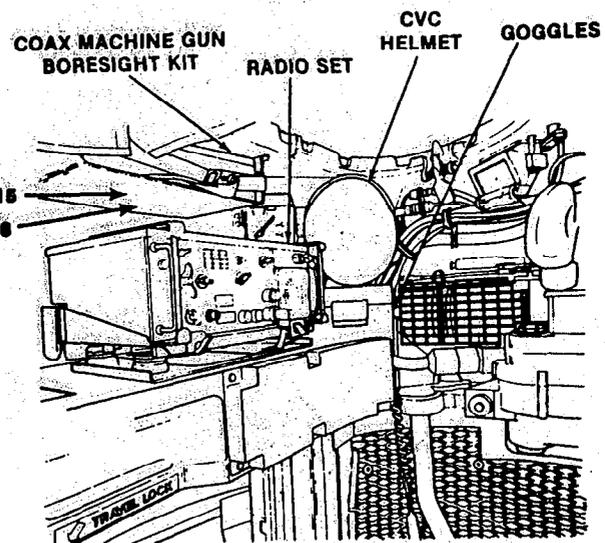
M-3 TURRET INTERIOR



TURRET RIGHT SIDE

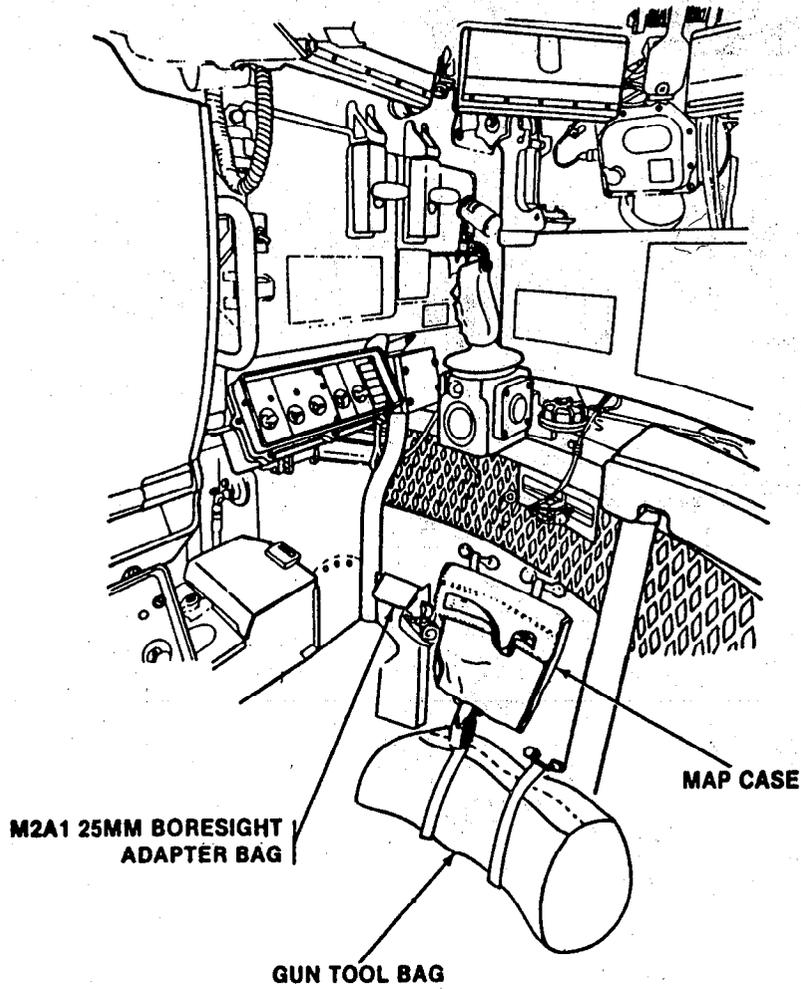


TURRET CENTER REAR

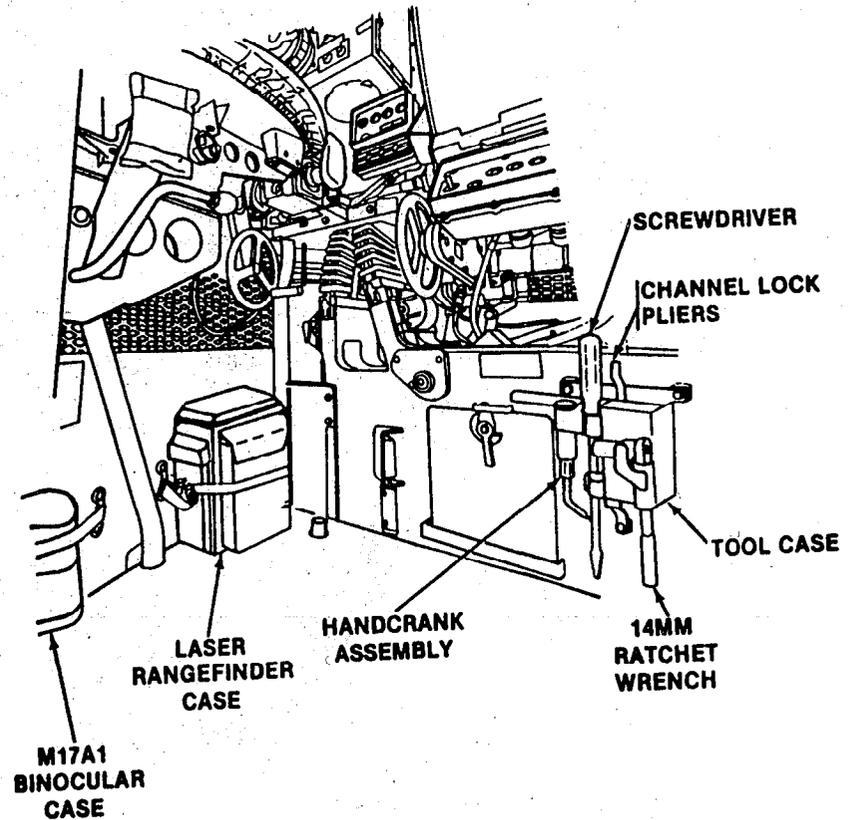


TURRET LEFT SIDE

M-3 TURRET INTERIOR

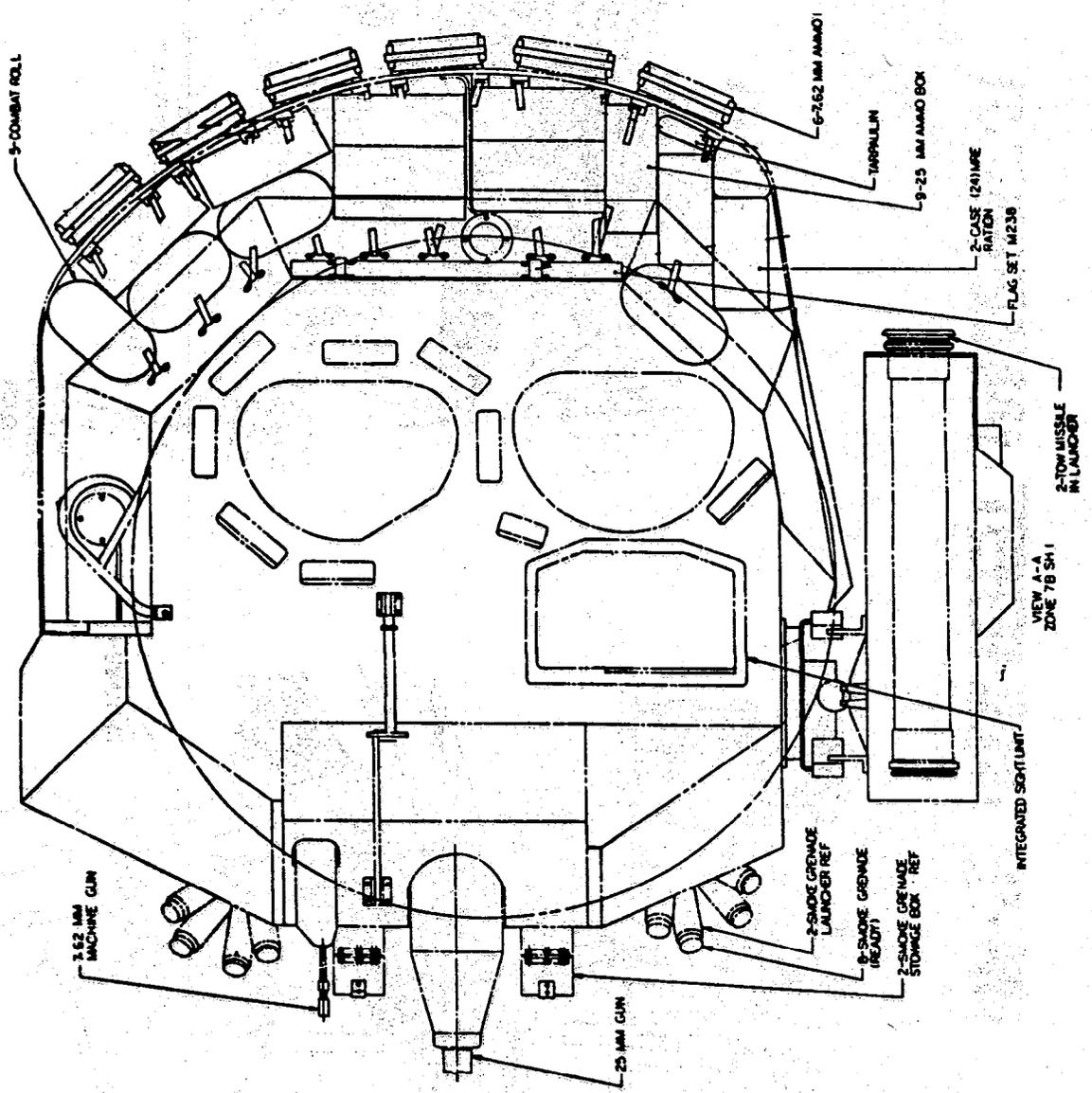


COMMANDER'S STATION

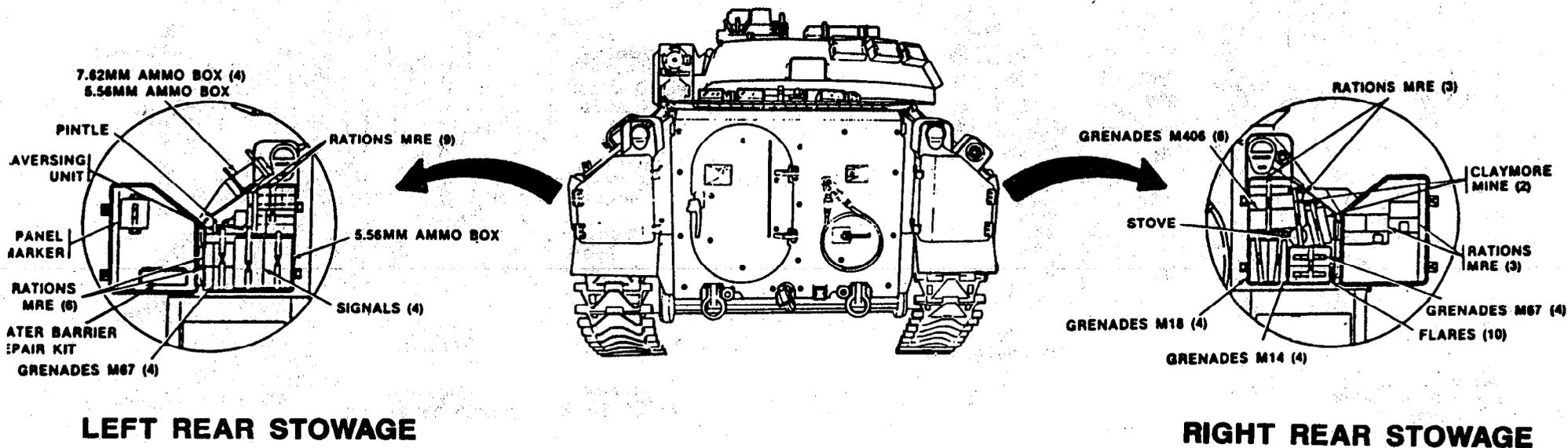


GUNNER'S STATION

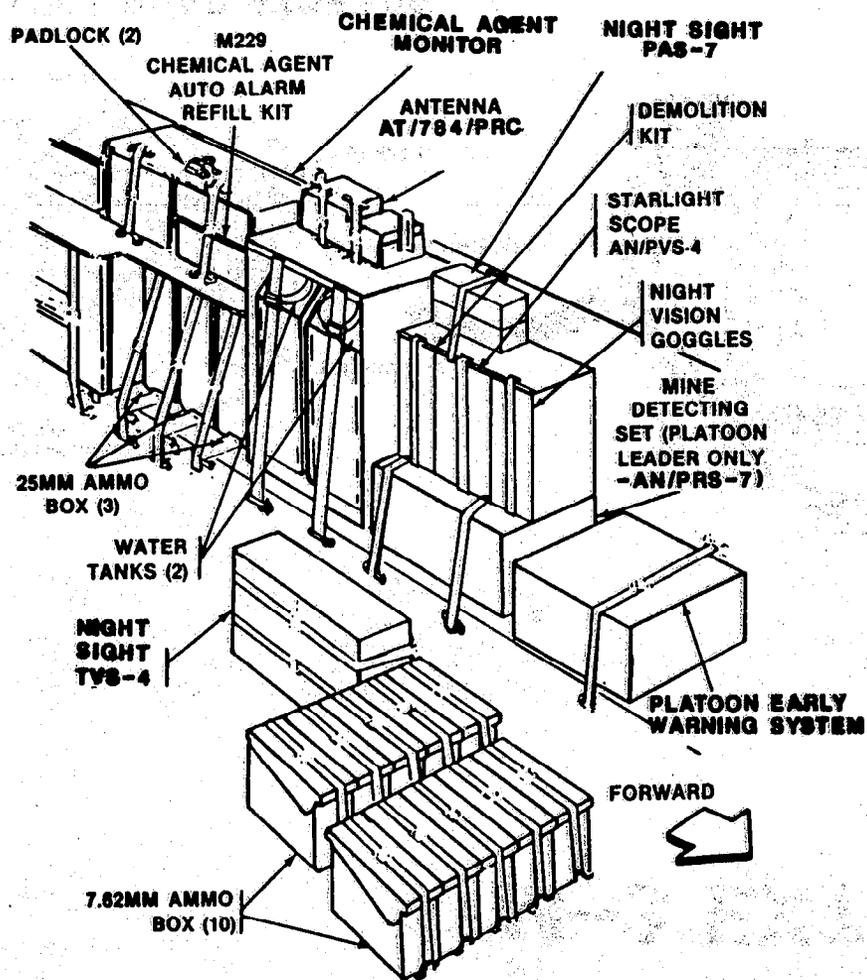
EXTERIOR TURRET STOWAGE



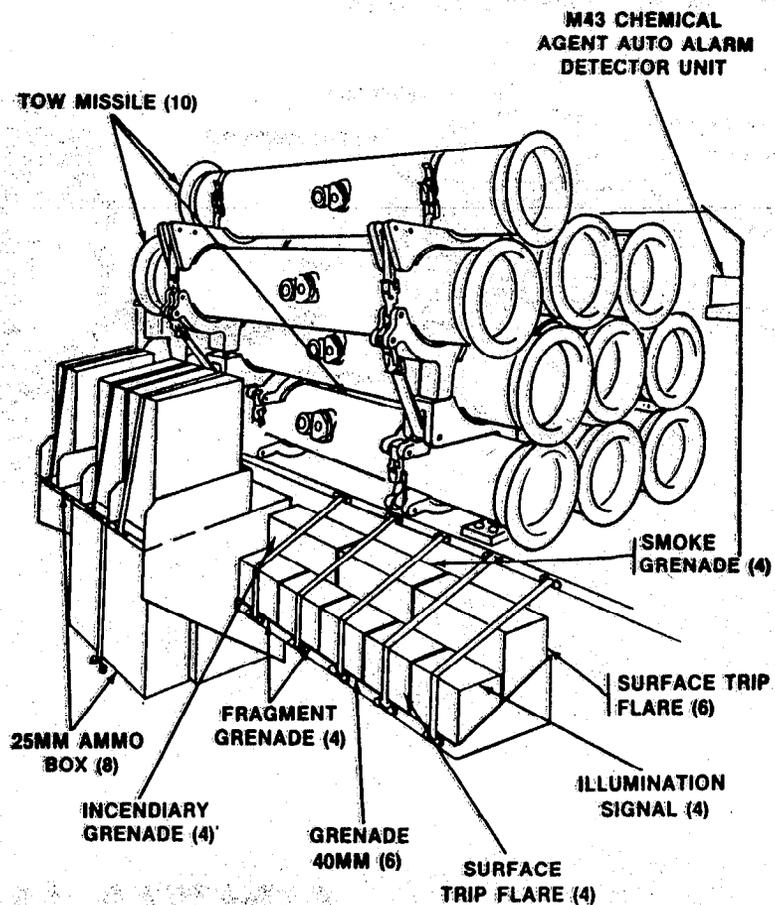
M-3 EXTERIOR REAR



M3A1 INTERIOR STOWAGE



SPONSON — LEFT CENTER



SQUAD AREA — RIGHT REAR CORNER

MISC. STOWAGE

P8-12528-O-Army-Knox-Jan 89-2M

