*TM 9-2355-335-10

OPERATOR MANUAL

FOR

MINE RESISTANT AMBUSH PROTECTED ALL TERRAIN VEHICLE (M-ATV)

M1240

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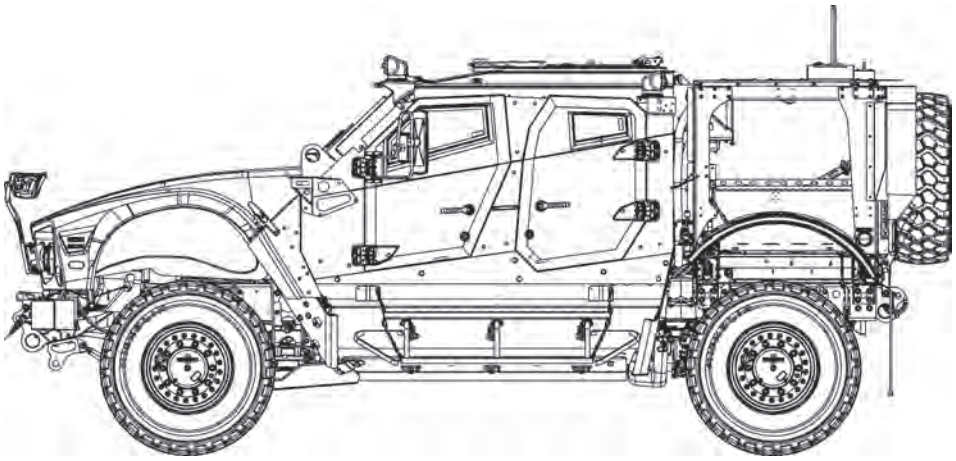

*This manual supersedes TM 9-2355-335-10, dated 31 March 2011.

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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SAFETY SUMMARY

SCOPE

This section is a guide to safe handling of the MRAP-All Terrain Vehicle (M-ATV). It is imperative that safety be considered at all times while handling the M-ATV. It is important that the M-ATV Operator's Manual be thoroughly read and understood before driving the M-ATV. The operator must become accustomed to the "feel" of the M-ATV and learn its capabilities and limitations in order to maintain control while driving this vehicle. Strict attention must be paid to maximum speeds and load combinations for road conditions and operation in unusual conditions. Review the M-ATV Operator's Manual thoroughly and often to maintain vehicle and passenger safety. Operation beyond the limits specified in this M-ATV Operator's Manual could result in injury death or to personnel.

This section provides the unique handling characteristics of the M-ATV so that it can be operated safely.

WARNING

- **DO NOT OPERATE unless you are TRAINED and have read and understood the M-ATV Operator's Manual. Read all WARNINGS and CAUTIONS before operating. Failure to comply may result in serious injury or death to personnel.**
- **If you have any questions or are unsure of how to operate this vehicle, DO NOT OPERATE this vehicle. Failure to comply may result in serious injury or death to personnel.**

CENTER OF GRAVITY

CENTER OF GRAVITY (CG) is defined as the point in a vehicle where the weight is concentrated. The CG will change depending on the cargo weight and distribution. An M-ATV has a higher CG when compared to automobiles and light trucks

SAFE VEHICLE OPERATION

WARNING

DO NOT operate the M-ATV beyond its design capabilities. Failure to comply may result in serious injury or death to personnel.

Always keep within maximum speeds and load combinations adjusted for on-road or off-road conditions.

Make sure vehicle speed is reduced enough by braking before a corner or curve so that you can accelerate slightly through the corner or curve to maintain control.

The weight of the M-ATV plus the weight of the cargo and passengers must not exceed the M-ATV's GVWR.

SAFETY SUMMARY (CONTINUED)

SIDE SLOPE OPERATION

WARNING

- **DO NOT attempt maneuvers on a side slope unless you have carefully and slowly developed experience. Start at slow speeds. Gradually and systematically learn the limits of the vehicle by slowly increasing the speed and sharpness of turns under controlled conditions with adequate safety precautions. Failure to comply may result in serious injury or death to personnel.**
- **Pay attention to the side slope surface. The more unstable the surface is, the slower the speed you must drive, the turns you can safely make are reduced, and the side slope angle capabilities are lessened.**
- **The specified side slope capability has been verified only on hard-surfaced slopes with known gradients and under tightly controlled testing circumstances.**
- **Failure to comply may result in the vehicle rolling down hill causing serious injury or death to personnel.**

Do not drive on side slopes beyond the M-ATV's capability. Side slopes are a major factor that can cause loss of control and rollover accidents, which can result in death or serious injury.

- All side slope operations require extreme caution and close attention.
- Based on information you receive as you drive, you must decide:
  - Whether the surface of the side slope is stable enough to drive and turn on.
  - What percent of side slope gradient is safe to drive on.
  - What speed you can safely drive.
  - How sharply you can turn the steering wheel relative to both the speed and the side slope gradient without losing vehicle control.
- As a general rule, make every effort NOT TO turn up-slope. To go UP a slope, start at a small (i.e., up to 10 percent) side slope, and turn to drive straight up the hill.
- DO NOT attempt to climb a hill by driving across its side slope.
- DO NOT turn on a slope unless necessary, and then turn SLOWLY AND GRADUALLY DOWNHILL, if possible. Always turn slowly. If you feel the vehicle begin to slide or tip or roll excessively, IMMEDIATELY turn the steering wheel DOWN SLOPE. Do not accelerate.

SAFETY SUMMARY (CONTINUED)

This list summarizes critical warnings and cautions in this technical manual. They are repeated here to let you know how important they are. Study these warnings and cautions carefully. They can save your life and the lives of personnel you work with as well as preventing damage to equipment. If there is any doubt or questions contact your Supervisor.

WARNING

Air drain valves may be under extreme pressure. Do not allow face to be in front of air drain valves while draining air reservoirs. Open air drain valves slowly to prevent sudden blast of air. Failure to comply may result in injury to personnel.

WARNING

All personnel must stand clear, at least twice length of deployed winch cable, during winch operations. Snapped winch cable may cause injury or death to personnel.

WARNING

Always have top securing shackle or securing pins in place when using the 5th seat and gunner's platform. Failure to comply may result in injury to personnel.

WARNING

Always install the hatch safety pins when the hatch covers are opened. Failure to comply may result in injury to personnel.

WARNING

Always use an assistant to stow winch cable. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Always use seat belts when vehicle is in operation. Failure to comply may result in injury or death to personnel.

WARNING

Always use turret gunner restraint system when vehicle is in operation. Failure to comply may result in injury or death to personnel.

WARNING

Always wear heavy leather gloves when handling winch cable. Never let cable run through hands. Broken wire will cause injury to personnel.

WARNING

Antennae emit radio frequency radiation. Avoid contact with active antennae and maintain proper standoff distances from active antennae. Ensure that radios are powered off before conducting fueling operations or maintenance activities. Failure to comply may result in injury to personnel.

WARNING

Any slack in the harness anchor straps will reduce the effectiveness of the restraint. Remove all slack from harness anchor straps. Failure to comply may result in injury or death to personnel.

WARNING

Avoid exposure to contents of fire extinguisher if wearing contact lenses, have respiratory illnesses, or have skin allergies. In case of contact with agent, flush the affected area with clean, cool water. Failure to comply may result in injury to personnel.

WARNING

Avoid quick, jerking winch operation. Keep all personnel well away from vehicle involved in winching operation. Snapped cable or shifting load may cause injury or death to personnel.

WARNING

Ballistic glass may become very hot when exposed to sun or when in a hot environment. Avoid contacting hot ballistic glass with hands or skin. Failure to comply may result in injury to personnel.

WARNING

Be alert at all times for the smell of fuel. Hot engines and components can ignite fuel. If fuel smell is detected while operating vehicle, shut down vehicle immediately and notify Field Maintenance. Failure to comply may result in injury or death to personnel and/or damage to equipment.

WARNING

Before operating vehicle, verify optical sensors are in position, are clear of dirt and dust, and are not obstructed by occupants or equipment. Failure to comply may result in injury or death to personnel.

WARNING

Blue transportation caps must be removed from aerosol generators prior to vehicle operation. Failure to comply may result in injury or death to personnel.

WARNING

Cable is not fully mission capable and cable may break if: Cable has more than three broken wires per inch on same strand, or cable has more than six broken wires on all strands in one inch of cable. Maximum number of broken wires shall not occur in any two consecutive inches of cable. For example, if six wires are broken in one inch of cable, none would be allowed in next consecutive inch. Failure to comply may result in damage to equipment or injury to personnel.

WARNING

Cable is under tension when wrapped around drum. Keep hands away from drum when operating winch. Failure to comply may result in injury or death to personnel.

WARNING

Camera glass may become very hot when exposed to sun or when in a hot environment. Avoid contacting hot glass with hands or skin. Failure to comply may result in injury to personnel.

WARNING

Canisters are considered hazardous material and must be handled with care and disposed of in accordance with current directives. Failure to comply may result in injury or death to personnel.

WARNING

Capsule interior fire suppression system activation rapidly releases highly pressurized gas. Never put fingers inside of or look directly into fire suppression cylinder. Do not leave equipment or other objects near the cylinders. Failure to comply may result in injury to personnel.

WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not smoke or have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

WARNING

Capsule interior fire suppression system uses optical fire detectors. Do not have open flame inside the capsule, as fire suppression system may activate. Failure to comply may result in injury to personnel.

WARNING

Care should be taken when operating door. Door may cause injury if fingers, hands, or feet are caught between door and capsule. Failure to comply may result in injury to personnel.

WARNING

Cooling system components are very hot and pressurized during vehicle operation. Let cooling system cool before checking hoses. Failure to comply may result in burns to personnel.

WARNING

Cooling system components become pressurized and extremely hot during normal operation. Use extreme care when working around hot components. Failure to comply may result in injury or death to personnel.

WARNING

Diesel fuel is flammable. Do not fill the fuel tank while the engine is running, while smoking, or near open flames. Avoid overfilling the fuel tank and immediately clean up spilled fuel. Avoid operating electrical equipment, such as radios and personnel heaters, while refueling. Failure to comply may cause explosions and fire, and may result in injury or death to personnel and damage to equipment.

WARNING

DO NOT attempt maneuvers on a side slope unless you have carefully and slowly developed experience. Start at slow speeds. Gradually and systematically learn the limits of the vehicle by slowly increasing the speed and sharpness of turns under controlled conditions with adequate safety precautions. Failure to comply may result in serious injury or death to personnel.

WARNING

Do not attempt to ford water deeper than 36 inches. Ensure bottom surface under water is hard. Reduce speed during fording. Ensure brakes are dry and operating correctly upon completion of fording operation before commencing normal driving. Failure to comply may result in injury to personnel or damage to equipment.

WARNING

Do not back up without a ground guide. Failure to comply may result in damage to vehicle or injury or death to personnel.

WARNING

Do not discharge a fire extinguisher in a person's face. Failure to comply may result in injury or death to personnel.

WARNING

Do not disengage winch under load. Failure to comply may result in injury or death to personnel.

WARNING

Do not drive the vehicle further than 30 mi (48 km) or exceed speeds of 30 mph (48 km/h) while operating on the run-flat inserts. Failure to comply may cause a tire fire and/or loss of vehicle control, which may result in injury or death to personnel and damage to equipment.

WARNING

Do not incinerate fire extinguisher as this may cause explosion. Failure to comply may result in injury or death to personnel.

WARNING

Do not inhale the dry chemical agent. Failure to comply may result in injury or death to personnel.

WARNING

Do not perform fuel system checks while smoking or near flames, fire, or sparks. Fuel could ignite, causing damage to vehicle, severe injury, or death to personnel.

WARNING

Do not remove chain from tackle block while under load. Release tension on winch cable. Failure to comply may result in injury or death to personnel.

WARNING

Do not remove tackle block while under load. Failure to comply may result in injury or death to personnel.

WARNING

Do not smoke or have open flame inside engine compartment, as fire suppression system may activate. Failure to comply may result in injury to personnel.

WARNING

Do not smoke or use open flame near batteries. Batteries may explode from spark. Failure to comply may result in injury or death to personnel.

WARNING

Do not use tackle block for recovery of any vehicle. Winch cable may snap and cause injury or death to personnel.

WARNING

Do not wear watches, rings, or other jewelry when servicing batteries which could short out battery terminals. Do not smoke or use open flame around batteries. Batteries can explode from sparks. Battery acid is harmful to skin and eyes. Failure to comply may result in injury to personnel.

WARNING

Doors are heavy. Ensure that no one is standing directly behind the door before opening and closing it. Ensure that hands and feet are clear for the area before closing the door. Use caution when opening or closing doors especially when the vehicle is parked on an incline. Failure to comply may result in injury to personnel.

WARNING

During operations, the ventilation system(s) must remain on to provide adequate ventilation to the vehicle occupants. Failure to comply may result in injury to personnel.

WARNING

Engine components become extremely hot during normal operation. Use extreme care when working around hot components. Failure to comply may result in injury to personnel.

WARNING

Engine cooling system is hot and pressurized. Do not remove radiator cap while engine is hot; steam and hot coolant can escape and burn personnel. Allow the system to cool and remove cap slowly to relieve pressure. Failure to comply may result in serious injury or death to personnel.

WARNING

Engine must be shut off prior to removing engine oil fill cap. Failure to comply may result in injury or death to personnel.

WARNING

Ensure all personnel are clear of vehicle before engine start is attempted. Operator must visually check to see that all areas of vehicle are clear of personnel prior to attempting to start engine. Failure to comply may result in injury or death to personnel.

WARNING

Ensure auxiliary mirrors are adjusted to allow for full range of view prior to operating vehicle. Failure to comply may result in injury or death to personnel.

WARNING

Ensure battery disconnect switch is in OFF position. Failure to comply may result in injury or death to personnel.

WARNING

Ensure side view mirrors and auxiliary mirrors are adjusted to allow for full range of view prior to operating vehicle. Failure to comply may result in injury or death to personnel.

WARNING

Ensure to keep speeds within limits of road conditions. Failure to comply may result in injury or death to personnel.

WARNING

Ensure vehicle battery disconnect switch is OFF before inspecting engine compartment fire suppression system. Failure to comply may result in injury or death to personnel.

WARNING

Ether canister contains diethyl ether with carbon dioxide as a propellent. Keep away from heat and flame. NEVER smoke near contents. Do not incinerate or puncture container. Do not store at temperatures above 120ºF (49ºC). Avoid contact with skin and eyes. Avoid breathing of fumes. Do not store spare containers in capsule. If swallowed, do not induce vomiting. Contact physician immediately. Failure to comply may result in injury or death to personnel.

WARNING

Exposure to a dry chemical fire extinguishing agent can result in breathing difficulty. Immediately evacuate the vehicle upon indication of a fire and discharge extinguishers from outside the cab. Open hatches and doors for ventilation and wash down the cab before re-entry. If respiratory irritation, skin or eye contact, or ingestion occurs, seek medical attention. Failure to comply may result in injury to personnel.

WARNING

Fuel is flammable and can explode. Keep fuel away from open flame and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Smoking is prohibited while working with fuel. Failure to comply may result in injury or death to personnel.

WARNING

Fuel is flammable and can explode. To avoid injury or death, keep fuel away from open flame and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. Smoking is prohibited while working with fuel. Failure to comply may result in injury or death to personnel.

WARNING

Gunner hatch is extremely heavy. Use caution when opening and closing. Keep arms and hands clear of gunner hatch when closing. Gunner hatch can only be opened or closed when vehicle is stationary and on a level surface. Do not attempt to open or close hatch when vehicle is in motion. Make sure latch locks are secured into place in the open or closed positions before vehicle starts moving. Ensure gunner hatch is completely locked in open position before moving vehicle with gunner in position. Use extreme caution when standing in gunner hatch while vehicle is in motion. Gunner should be holding onto support to maintain stability at all times and shall wear a gunner's restraint when vehicle is in motion. Failure to comply may result in serious injury or death to personnel.

WARNING

Hood support must be used and installed properly whenever hood is in upright position. Wind or sudden shifting of vehicle may cause hood to fall. Failure to comply may result in injury or death to personnel.

WARNING

If engine has been running for any period of time, it may be hot. Ensure engine is cooled prior to contact. Failure to comply may result in injury to personnel.

WARNING

If the operator leaves the vehicle, even momentarily, when engine is running, the transmission MUST be in N (neutral), PARKING BRAKE must be engaged, and wheel MUST be chocked. Unexpected and sudden vehicle movement may occur causing injury or death to personnel.

WARNING

In extreme temperature environments, follow work-rest schedules as well as the guidance of TB-MED 507 Heat Stress Control and Heat Stress Management and TB-MED 508 Prevention and Management of Cold Weather Injuries. Failure to comply may result in injury to personnel.

WARNING

Increased effort will be required to turn steering wheel if there is a failure of hydraulic steering system or engine stops running. Stop vehicle as soon as road conditions permit. Operating vehicle with impaired steering could result in injury or death to personnel.

WARNING

Keep all personnel away from winch cable during winch operation. Failure to comply may result in injury or death to personnel.

WARNING

Keep hands and clothing clear of moving parts in engine compartment. Rotating parts can cause severe injury to personnel. Ensure that all guards are in place and do not wear loose clothing when conducting maintenance. Always check to ensure that area is clear of personnel and obstructions before starting engine. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from any pinch point area of the capsule door assembly. Hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from any pinch point areas of the 5th seat assembly and gunner's platform, hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from any pinch point areas of the 5th seat assembly. Hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of cargo doors. Hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of hatch covers. Hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of side steps. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point area of the arm rest assembly. Hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of the cargo door assembly. Hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of the litter door assembly. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers away from pinch point areas of the spare tire assembly, hands and fingers could get pinched. Failure to comply may result in injury to personnel.

WARNING

Keep hands and fingers clear of hatch and capsule contact area. Failure to comply may result in injury to personnel.

WARNING

Keep hands clear of winch area when winch is reeling in cable. If hands are caught in winch or cable, severe injury or death may result.

WARNING

Lead-acid batteries contain sulfuric acid, which can cause severe burns. Avoid contact with skin, eyes, or clothing. Wear safety goggles and gloves. If battery electrolyte is spilled, take immediate action to stop its corrosive (burning) effects. If battery acid is spilled on clothing or vehicle, wash immediately with cold water. Neutralize with baking soda or household ammonia solution. If battery acid comes in contact with skin, flush with cold water to remove acid. If eyes are contacted, flush with cold water for at least 15 minutes. If swallowed, drink large amounts of water or milk, follow with milk of magnesia, beaten egg, or vegetable oil. Seek immediate medical attention.

WARNING

Make sure both air pressure gauge needles read at least 120 psi (827 kPa) and that LOW AIR indicator lights have gone out and warning alarm has quit sounding before pushing in PARKING BRAKE control valve and driving vehicle. If LOW AIR indicator light comes back on and warning alarm sounds when PARKING BRAKE control valve is pushed in, pull PARKING BRAKE control valve out and allow more air to build up in system. Do NOT drive vehicle until PARKING BRAKE control valve can be pushed in without LOW AIR indicator light coming on and warning alarm sounding. Failure to comply may result in damage to equipment or injury to personnel.

WARNING

Maximum braking requires 85 psi (586 kPa) or more air pressure for service brakes, as indicated by red needle of air pressure gauge. If air pressure drops below 100 psi (690 kPa), braking ability will be reduced. If air pressure continues to drop, air system is malfunctioning. Operating vehicle with reduced air pressure may result in injury or death to personnel.

WARNING

Never winch a load with less than five wraps of cable on winch drum. Failure to comply may result in injury or death to personnel.

WARNING

Operating vehicle with items on dashboard is dangerous and may result in injury to personnel.

WARNING

Operator MUST fully understand how to use the CTIS system. Misuse of CTIS system can result in loss of control of vehicle. Failure to comply may result in injury or death to personnel.

WARNING

Pay attention to the side slope surface. The more unstable the surface is, the slower the speed you must drive, the turns you can safely make are reduced, and the side slope angle capabilities are lessened.

WARNING

Perform this task with the aid of an assistant while ground guiding. Failure to comply may result in injury or death to personnel.

WARNING

Prior to performing brake test, ensure area 30 ft. (9 m) to front of vehicle is clear of objects and personnel. Failure to comply may result in injury or death to personnel.

WARNING

Rapid operation of service brakes will consume compressed air supply and cause automatic spring brake application. Always observe air pressure gauges. Failure to comply may result in damage to equipment or injury to personnel.

WARNING

Rapid operation of service brakes will consume compressed air supply. If red needle of air pressure gauge reads approximately 45 psi (310 kPa) or less, spring brakes will be applied automatically, causing vehicle to stop rapidly. Always observe air pressure gauge. Failure to comply may result in damage to equipment or injury to personnel.

WARNING

Release service brakes slowly. Fast release of service brakes may allow vehicle to roll before parking brakes engage. Failure to comply may result in injury to personnel.

WARNING

Remove all jewelry, such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminal or positive electrical circuit, a direct short may result in instant heating of tools, injury or death to personnel, or damage to equipment.

WARNING

Single hearing protection is required in and around an operating vehicle. Double hearing protection is required during weapons firing. Failure to comply may result in injury to personnel.

WARNING

The driver is responsible for the safety of the personnel riding on their vehicle. Drivers will refuse to move a vehicle if anyone is in an unsafe position or the vehicle has too many passengers. Failure to comply may result in injury or death to personnel.

WARNING

The driver's field of view is limited. Ground guides must be used when operating in congested areas or when operating in reverse. Ground guides must stand clear of the vehicle and remain within view of the driver. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

The seat belts must be worn during driving operation. Avoid twisting the straps when putting the seatbelt on and be sure to remove slack. Failure to comply may result may result in serious death or injury to personnel.

WARNING

The specified side slope capability has been verified only on hard-surfaced slopes with known gradients and under tightly controlled testing circumstances.

WARNING

The vehicle has a high center of gravity. Slow down for turns and other maneuvers. Approach slopes head on and avoid side slopes when possible. Failure to comply may result in injury or death to personnel and damage to equipment.

WARNING

To prevent arcing, do not allow tools to contact batteries or other battery terminals. Failure to comply may result in injury or death to personnel.

WARNING

Towbar assembly weighs 70 lbs. (31.7 kg). Do not attempt to lift or move towbar assembly without the aid of an assistant. Failure to comply may result in injury to personnel.

WARNING

Use care when working around ether canister as ether canister is pressurized and is flammable. Failure to comply may result in injury or death to personnel.

WARNING

Use exhaust brake/retarder only when vehicle tires have good traction. Use of exhaust brake/retarder on slick or loose surfaces can cause vehicle to skid and cause injury or death to personnel.

WARNING

Use extreme care not to short out slave receptacle terminals. Remove all jewelry such as rings, ID tags, bracelets, etc. prior to working on or around slave receptacle. Jewelry and tools can catch on equipment, contact positive electrical circuits, and cause severe burns or electrical shock. Failure to comply may result in injury or death to personnel.

WARNING

Use heavy leather gloves when checking winch cable. Injury to hands can result if gloves are not worn. Failure to comply may result in injury or death to personnel.

WARNING

Use only front, rear, and side tiedown eyes to secure the vehicle. Do not use bumpers, axles, towing pintles, or tow eyes as points of attachment. Failure to comply may result in injury or death to personnel or damage to equipment.

WARNING

Wear safety goggles, acid-proof gloves, and a rubber apron when performing battery maintenance. Failure to comply may result in injury or death to personnel.

WARNING

When connecting to a quick-disconnect coupling, hold the end of the air hose(s). Air hoses are under pressure and can fly out at a fast rate of speed causing injury to personnel.

WARNING

When entering or exiting capsule, use three-point contact system. Doors may cause injury if fingers, hands, or feet are caught between doors and capsule. Failure to comply may result in injury to personnel.

WARNING

When operating the vehicle in the transmission limp home mode, the operator must not rely on the parking brake to hold the vehicle in place. The service brakes must also be applied. Failure to comply may result in injury or death to personnel.

WARNING

When parking on steep grades, the CTIS must be in MSS or EMER setting in order to lock transfer case and create more stability. Driveline must be in full lock condition prior to shutting off engine. Failure to comply may result in injury or death to personnel.

WARNING

Winch components become hot during normal operation. Use care when operating winch. Failure to comply may result in injury to personnel.

CAUTION

Adequate air pressure is required to begin or continue any pressure-changing sequence. Failure to comply may result in damage to equipment.

CAUTION

All guidelines set forth for maintaining corrosion preventive compounds must be adhered to. Failure to follow these guidelines will negatively impact the corrosion control integrity of the vehicle and result in damage to equipment.

CAUTION

All snow and ice should be removed from vehicle as soon as possible. Snow and ice may slow or stop movement of crucial parts if allowed to pile up. Failure to comply may result in damage to equipment.

CAUTION

Always place the side steps in an upright position when not in use. If the EFP kit is installed, side steps in the lowered position will NOT allow the passenger door to fully open. Failure to comply may result in damage to equipment.

CAUTION

Always place the side steps in an upright position when not in use. If the Explosively Formed Penetrator (EFP) kit is installed, side steps in the lowered position will NOT allow the passenger door to fully open. Failure to comply may result in damage to equipment.

CAUTION

An accurate fluid level check cannot be made unless the engine is idling (500 to 800 rpm) in N (neutral), the transmission fluid is at the proper temperature, and the vehicle is on a level surface. Failure to comply may result in damage to equipment.

CAUTION

An assistant is required to keep tension on cable until clevis is 3 in. (76 mm) from cable guide.

CAUTION

Ballistic glass must only be cleaned with a lint-free cloth and a mild solution of warm water and soap. Failure to comply may result in damage to equipment.

CAUTION

CTIS increases tire pressure when vehicle speed exceeds the allowable speed for each setting. When an increase in speed is required, maintain the lower speed until tires are inflated to correct pressure (WP 0031). Failure to comply may result in damage to equipment.

CAUTION

CTIS must be set in MUD, SAND, SNOW while snow chains are installed. Failure to comply may result in damage to equipment.

CAUTION

CTIS settings must not be changed once snow chains are installed. Failure to comply may result in damage to equipment.

CAUTION

Do not allow engine speed to go above 2600 rpm when driving downhill, or damage to engine can result.

CAUTION

Do not allow vehicle to coast in N (neutral). This can result in severe transmission damage and unsafe operation.

CAUTION

Do not change CTIS controller or driveline lock settings while vehicle is turning or wheels are slipping. Damage to equipment may occur.

CAUTION

Do not change the CTIS controller terrain settings while turning a corner or wheels are slipping. Damage to driveline may result.

CAUTION

Do not crank engine for longer than 10 seconds. Failure to comply may result in damage to equipment.

CAUTION

Do not hold steering wheel at full left or full right for longer than 10 seconds. Oil overheating and pump damage can result. Failure to comply may result in damage to equipment.

CAUTION

Do not loosen fuel lines at filter housing to bleed fuel system. Periodic loosening of fittings will result in increased wear of threads. Failure to comply may result in damage to equipment.

CAUTION

Do not move camera shields by hand. Failure to comply may result in damage to equipment.

CAUTION

Do not operate vehicle at more than 10 mph (16 km/h) when all differential and transfer case driveline locks are engaged. Failure to comply may result in damage to equipment.

CAUTION

Do not overfill fuel tank or fuel spillage will occur. Failure to comply may cause damage to equipment.

CAUTION

Do not permit dirt, dust, or grit to enter transmission filler tube. Thoroughly clean dipstick handle and end of filler tube. Serious internal transmission damage can result if transmission is contaminated.

CAUTION

Do not turn ignition switch to START position while engine is rotating, or damage to equipment may result.

CAUTION

Do not turn ignition switch to START position while engine is rotating. Failure to comply may result in damage to equipment.

CAUTION

Do not use an abrasive brush to wash vehicle. Failure to comply may result in damage to equipment.

CAUTION

Do not use cool water when cleaning hot ballistic glass. Putting cool water on hot ballistic glass may cause window to crack or delaminate. Failure to comply may result in damage to equipment.

CAUTION

Do not use first gear to move M-ATV if tires are frozen to ground or brakes are frozen to drums. Failure to comply may result in damage to driveline.

CAUTION

Do not use first gear to move vehicle if tires are frozen to ground or brakes are frozen to drums. Failure to comply may result in damage to driveline.

CAUTION

Do not wipe dirt off vehicle when vehicle is dry. Dirt, stones, or debris can scratch paint off the vehicle. Failure to comply may result in damage to equipment.

CAUTION

During first five miles of driving operation, all cornering should be performed slowly and carefully. Failure to comply may result in damage to driveline components.

CAUTION

Engine must run for at least 10 minutes with minimum coolant temperature of 160°F (71°C) prior to shutting off engine. Failure to comply may result in damage to engine.

CAUTION

Ensure battery disconnect switch is turned OFF prior to performing battery maintenance. Failure to comply may result in damage to equipment.

CAUTION

Ensure both air pressure gauges read at least 120 psi (827 kPa) prior to performing Step (8). Failure to comply may result in damage to equipment.

CAUTION

Ensure camera shields are closed on both cameras. Failure to comply may result in damage to equipment.

CAUTION

Ensure vehicle is stopped prior to using the driveline lock switch. Failure to comply may result in damage to equipment.

CAUTION

Excessive wheel slippage while traveling up steep grade could cause driveline damage. When wheel slippage is detected, stop vehicle immediately.

CAUTION

For transport, auxiliary mirrors should be rotated to the transport position. Do not transport vehicle with auxiliary mirrors in deployed position. Failure to comply may result in damage to equipment.

CAUTION

Fuel/water separator should be drained of water before topping off fuel tank. Keep fuel tank as full as possible during cold operations. Water forms in empty fuel tank as it cools. Water in fuel system could freeze and block fuel system. Failure to comply may result in damage to equipment.

CAUTION

Glass must only be cleaned with a lint-free cloth and a mild solution of warm water and soap. Failure to comply may result in damage to equipment.

CAUTION

If a circuit breaker trips again after being reset, report problem to Field Maintenance. Failure to comply may result in damage to equipment.

CAUTION

If a substantial amount of winch cable is payed out, tension must be maintained on winch cable while reeling in winch cable. Failure to comply may result in tangled winch cable and damage to equipment.

CAUTION

If engine fails to start after five start attempts, refer to Troubleshooting. Failure to comply may result in damage to equipment.

CAUTION

If engine fails to start in two minutes, turn ignition switch to OFF position. Allow starter to cool at least two minutes before trying again. Failure to comply may result in damage to starter.

CAUTION

If engine fails to start within 30 seconds, turn ignition switch to OFF and allow starter motor to cool at least two minutes before trying again. Failure to comply could result in damage to starter.

CAUTION

If engine fails to start, wait 15 seconds prior to next start attempt to allow starter to cool. Failure to comply may result in damage to equipment.

CAUTION

If engine oil needs to be drained, contact Field Maintenance. Failure to comply may result in damage to equipment.

CAUTION

If engine runs rough, continue to let engine idle. Do not raise engine RPM until engine is running smoothly. Failure to comply may result in damage to equipment.

CAUTION

If oil pressure gauge does not show appropriate engine oil pressure within 10 to 15 seconds after starting engine, shut off engine immediately and refer to Troubleshooting Symptoms. Lack of lubrication will damage engine.

CAUTION

If oil pressure gauge does not show engine oil pressure within 10 to 15 seconds after starting engine, shut off engine immediately and refer to Troubleshooting Symptoms. Lack of lubrication will damage engine.

CAUTION

If overheating occurs when operating in the transmission limp home mode, the operator should stop the vehicle (do not turn off the engine) and allow the transmission and engine to cool down to normal operating levels. If the engine and transmission do not cool down or overheating reoccurs, the operator should turn off the engine and notify Field Maintenance. Failure to comply may result in damage to equipment.

CAUTION

If the audible alarm comes on when operating the vehicle in the EMER (Emergency) position, the operator should reduce vehicle speed and/or shift the CTIS controller to an appropriate terrain setting for the vehicle speed. Failure to comply may result in damage to vehicle.

CAUTION

If the CTIS controller flashes the four terrain setting indicators as well as the run flat indicator, the operator should stop the vehicle and refer to sections Run Flat Feature and OVER SPEED CHECK TIRES LIGHT of this work package. Failure to comply may result in damage to equipment.

CAUTION

If the operator has selected the EMER (Emergency) setting and the audible over speed alarm comes on, the operator should reduce vehicle speed and/or shift the CTIS controller to an appropriate terrain setting for the vehicle speed. Failure to comply may result in damage to equipment.

CAUTION

If the OVER SPEED CHECK TIRES indicator comes on, the operator should stop the vehicle and refer to OVER SPEED CHECK TIRES LIGHT section of this work package. Failure to comply may result in damage to equipment.

CAUTION

If the OVER SPEED indicator blinks, and the operator has not selected the EMER (Emergency) setting, the operator should reduce vehicle speed and/or shift the CTIS controller to an appropriate terrain setting for the vehicle speed. Failure to comply may result in damage to equipment.

CAUTION

If the OVER SPEED indicator comes on solid without audible alarm, the operator must assume that the automatic Over Speed Protection feature is no longer operable and caution must be used to not exceed speed parameters. Continue with mission and notify Field Maintenance when mission is completed. Failure to comply may result in damage to vehicle.

CAUTION

If the RUN FLAT indicator light comes on, the operator should be aware that tire damage may be present and that the CTIS is attempting to compensate for this damage. Perform troubleshooting. Failure to comply may result in damage to equipment.

CAUTION

If transmission fluid is too high and needs to be drained, notify Field Maintenance. Failure to comply may result in damage to equipment.

CAUTION

If two terrain setting indicators turn on solid, the operator should stop the vehicle and refer to the troubleshooting section of this work package. Failure to comply may result in damage to equipment.

CAUTION

If wheels start to slip when CTIS controller is in EMERGENCY position, stop vehicle and set CTIS controller to MUD, SAND, SNOW position. Failure to comply may result in damage to equipment.

CAUTION

If winch does not move vehicle, stop using winch. Failure to comply may result in damage to equipment.

CAUTION

Maximum governed engine speed with transmission in N (neutral) is approximately 2600 rpm. Never allow engine speed to exceed this figure. Under load, governed speed is approximately 2600 rpm. If engine is allowed to go over governed speed, engine damage can result.

CAUTION

Maximum speed for vehicles equipped with snow chains is 24 mph (39 km/h) off road and 10 mph (16 km/h) on highway. Failure to comply may result in damage to equipment.

CAUTION

Observe instrument panel closely. If there are any unusual readings, stop vehicle and shut off engine. Check immediately to prevent damage to equipment.

CAUTION

Prior to operating the CTIS in temperatures below 0°F (-18°C), the CTIS will need to be disabled (refer to WP 0046). Failure to comply may result in damage to equipment.

CAUTION

Prior to shutting off engine, run engine at 800 to 1000 rpm with transmission in N (neutral) for three minutes to allow turbocharger to slow down and cool off. Engine components may be damaged if not allowed to cool off. Failure to comply may result in damage to equipment.

CAUTION

Prolonged or continuous use will overheat the winch. Do not continue to run a "stalled" winch. Failure to comply may result in damage to equipment.

CAUTION

Remove spotlight covers prior to operation. Failure to comply may result in damage to equipment.

CAUTION

Rotate universal joint to obtain access to the fitting. Forcing the grease gun onto the fitting can result in broken or damaged fitting.

CAUTION

Select the appropriate CTIS controller settings before entering an area where poor traction conditions are likely to occur. Failure to comply may result in damage to equipment.

CAUTION

Service brake pedal must be applied and vehicle stopped when shifting among D-N-R shift selections. Failure to comply may result in damage to equipment.

CAUTION

Snow chains must not be used when driving on hard surfaces where there is no wheel slippage. Failure to comply may result in damage to equipment.

CAUTION

Snow chains must only be installed on rear tires. Failure to comply may result in damage to equipment.

CAUTION

Support DVE display prior to loosening T-handles. Failure to comply may result in damage to equipment.

CAUTION

The blackout spotlight switch has a switch lock, and cannot be pushed up unless the switch lock is pushed up. Failure to comply may result in damage to equipment.

CAUTION

The CTIS controller cargo load setting must be changed as required immediately upon adding or removing cargo from the vehicle. Failure to comply may result in damage to equipment.

CAUTION

The EMER (Emergency) button is for extreme conditions only and should not be used for normal driving. Damage to driveline may result.

CAUTION

The Emergency mode is for extreme conditions only and should not be used for normal driving conditions. Failure to comply may result in damage to equipment.

CAUTION

The Run Flat feature should not be used in an attempt to inflate tires with substantial damage. Using the Run Flat feature in these circumstances may result in other tires losing pressure, resulting in damage to equipment.

CAUTION

The transmission must not be operated for extended periods of time until Hot Check has verified proper fluid level. Transmission damage can result from extended operation at improper fluid level conditions.

CAUTION

Use extreme care when cleaning radiator fins, charge air cooler fins, and A/C condenser fins to prevent damage to equipment.

CAUTION

Use care when stowing BII and COEI to ensure items are not broken or deformed. Failure to comply may result in damage to equipment.

CAUTION

When installing dipstick, ensure fill cap is inserted all the way into tube prior to tightening. Failure to comply may result in damage to equipment.

CAUTION

When lowering and raising the 5th seat, ensure the wire harness attached to the arm rest is clear, to avoid rubbing.

CAUTION

When operating vehicle, there are two speed limitations imposed. One limitation comes from the CTIS terrain setting. The other comes from the driveline lock setting. The lower speed limitation of the two must be adhered to. Failure to comply may result in damage to vehicle.

CAUTION

When positioning auxiliary mirrors for operation or transportation, apply pressure to attachment arm, not mirror assembly. Failure to comply may result in damage to equipment.

CAUTION

When using 395/85R20 tire, travel no more than a distance of 300 miles (482 km) at a maximum speed of 30 mph (48 km/h). Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean cab interior, keep nozzle of pressure washer away from vehicle or components a distance of 5 ft. (1.5 m) or more. Failure to comply may result in damage to equipment.

CAUTION

When using a pressure washer to clean vehicle, do not allow stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.

CAUTION

When using EMERGENCY mode on CTIS, top speed should not exceed 5 mph (8 km/h). Use extreme care as steering response is limited due to driveline lock configuration. Failure to comply may result in damage to equipment.

CAUTION

When using the winch, do not allow the cable to deviate more than 30 degrees from straight ahead of the vehicle. The winch efficiency will degrade. Winch fairlead is located so the winch cable, when properly used, will not contact vehicle components. Do not winch vehicle if 30 degrees in front of the vehicle cannot be maintained. Failure to comply may result in damage to equipment.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: This manual supersedes TM 9-2355-335-10 dated 31 March 2011. Zero in the “Change No.” column indicates an original page or work package.

Date of issue for the original manual is:

Original 17 August 2012

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 50 AND TOTAL NUMBER OF WORK PACKAGES IS 72, CONSISTING OF THE FOLLOWING:

Page/WP No.	Change No.	Page/WP No.	Change No.
Chp 5 Title page	0	WP 0067 (2 pgs)	0
WP 0060 (2 pgs)	0	WP 0068 (20 pgs)	0
WP 0061 (6 pgs)	0	Chp 6 Title page	0
WP 0062 (2 pgs)	0	WP 0069 (2 pgs)	0
WP 0063 (2 pgs)	0	WP 0070 (20 pgs)	0
WP 0064 (4 pgs)	0	WP 0071 (4 pgs)	0
WP 0065 (2 pgs)	0	WP 0072 (2 pgs)	0
WP 0066 (4 pgs)	0	Back Cover	0

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 17 August 2012

OPERATOR MANUAL

for

MINE RESISTANT AMBUSH PROTECTED ALL TERRAIN VEHICLE (M-ATV)

M1240

NSN: 2355-01-575-9632 (EIC 1UT)

M1240A1

NSN: 2355-01-596-1330 (EIC 1ZW)

M1245

NSN: 2355-01-586-8070 (EIC 1VE)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet on the TACOM Unique Logistics Support Applications (TULSA) Web site. The Internet address is https://tulsa.tacom.army.mil. Access to all applications requires CAC authentication, and you must complete the Access Request form the first time you use it. The DA Form 2028 is located under the TULSA Applications on the left-hand navigation bar. Fill out the form and click on SUBMIT. Using this form on the TULSA Web site will enable us to respond more quickly to your comments and to better manage the DA Form 2028 program. You may also mail, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LCL-MPP/ TECH PUBS, MS 727, 6501 E. 11 Mile Road, Warren, MI 48397-5000. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 786-1856 or Commercial (586) 282-1856. A reply will be furnished to you.

*This manual supersedes TM 9-2355-335-10, dated 31 March 2011.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

HOW TO USE THIS MANUAL

This single volume manual is divided into CHAPTERS and WORK PACKAGES. For a specific Chapter or Work Package, refer to the TABLE OF CONTENTS (page iii).

This manual contains operating instructions for the M1240, M1245, and M1240A1.

Items or instructions unique to a specific model or configuration are called out through the use of titles, NOTE's, or Steps. If no specific variant is called out the procedure is valid for all three M-ATV variants.

Air Force Personnel: This manual was written for the Army Two-Level Maintenance Concept. Should a maintenance task/procedure in this manual exceed the expertise of your Air Force Specialty Code (AFSC), defer the task/procedure to appropriate maintenance personnel. Do not attempt to perform maintenance tasks or procedures outside of the qualifications of your AFSC.

The TABLE OF CONTENTS lists the titles of each Chapter and Work Package.

CHAPTER 1 provides general information, equipment description, and theory of operation.

CHAPTER 2 provides operator instruction procedures. These work packages are used to learn more about the operations of the vehicle.

CHAPTER 3 provides troubleshooting procedures. These work packages are used to determine causes of malfunctions encountered when operating the vehicle.

CHAPTER 4 provides Preventive Maintenance Checks and Services (PMCS) Instructions.

CHAPTER 5 provides operator maintenance instructions. These work packages are used to perform maintenance on the vehicle.

CHAPTER 6 provides supporting information.

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION FOR M1240, M1240A1, AND M1245

GENERAL INFORMATION

PURPOSE

This manual is provided to maximize use of the M-ATV by presenting clear operating and maintenance instructions. Read these instructions thoroughly before operating vehicle.

SCOPE

This manual contains instructions for operation and operator performed maintenance of the M-ATV and associated equipment.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your M-ATV needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance.

All non-Aviation/Missle EIRs and PQDRs must be submitted through the Product data Reporting and Evaluation Program (PDREP) Web site. The PDREP site is: http://www.pdrep.csd.disa.mil/.

If you do not have Internet access, you may sumbit your information using an SF 368 (Product Ouality Deficiency Report). You can send your SF 368 using email, regular mail, or fax using the addresses/fax numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. We will send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastic, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or braking. SF FORM 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

The form should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

DESTRUCTION OF MATERIAL TO PREVENT ENEMY USE

Procedures for destruction of equipment to prevent enemy use can be found in TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment To Prevent Enemy Use (U.S. Army TACOM Life Cycle Management Command).

ABBREVIATIONS/ACRONYMS

Abbreviations and acronyms used in this manual are listed below:

AAL . . . . . Additional Authorization List
ABS . . . . . Anti-lock Brake System
A/C. . . . . Air Conditioner
AEPS . . . . . Army Electronic Product Support
amp . . . . . Ampere
AR . . . . . Army Regulation
ATC . . . . . Automatic Traction Control
ATTN: . . . . . Attention
BII . . . . . Basic Issue Items
B.O. . . . . Blackout
C . . . . . Celsius
CA . . . . . Container, Tubular
CAGEC . . . . . Commercial And Government Entity Code
CARC . . . . . Chemical Agent Resistant Coating
CC . . . . . Cross Country
CCA . . . . . Cold Cranking Ampere
cm . . . . . Centimeters
cm^2. . . . . Centimeter Squared
cm^3. . . . . Cubic Centimeter
CN . . . . . Container
COEI . . . . . Components of End Item
CPC . . . . . Corrosion Prevention Control
CTIS . . . . . Central Tire Inflation System
D . . . . . Drive
DA . . . . . Department of the Army
DR . . . . . Drum
DSN . . . . . Defense Switched Network
DTC . . . . . Diagnostic Trouble Code
DVE . . . . . Driver’s Vision Enhancer
ea. . . . . Each
ECM . . . . . Electronic Control Module
EFP . . . . . Explosively Formed Penetrator
EIR. . . . . Equipment Improvement Recommendation
EMER . . . . . Emergency
etc. . . . . and so forth (Et Cetera)
F . . . . . Fahrenheit
FM . . . . . Field Manual
ft. . . . . Feet
GAA . . . . . Grease Automotive and Artillery

gal . . . . . Gallon
GAWR. . . . . Gross Axle Weight Rating
GFE . . . . . Government Furnished Equipment
GL. . . . . Gallon
GO . . . . . Gear Oil
GVW . . . . . Gross Vehicle Weight
GVWR . . . . . Gross Vehicle Weight Rating
hp . . . . . Horsepower
HVAC . . . . . Heating, Venting, and Air Conditioning
HWY . . . . . Highway
IAW . . . . . In Accordance With
in. . . . . Inches
in.^{2}. . . . . Inches Squared
in.^{3}. . . . . Inches Cubed
in.h20 . . . . . Inches of Water
kg . . . . . Kilogram
km . . . . . Kilometer
Km/h . . . . . Kilometer per Hour
kPa . . . . . Kilopascals
kW . . . . . Kilowatt
L . . . . . Liter
lb-ft . . . . . Pounds - Foot
lbs. . . . . Pounds
LCD . . . . . Liquid Crystal Display
LED. . . . . Light Emitting Diode
LI. . . . . Lubrication Instructions
m. . . . . Meter
(m) . . . . . Mode
m/min . . . . . Meters Per Minute
M-ATV. . . . . MRAP All-Terrain Vehicle
Max. . . . . Maximum
MED . . . . . Medium
mm . . . . . Millimeter
mph. . . . . Miles Per Hour
MSS . . . . . Mud/Sand/Snow
N . . . . . Neutral
N•m. . . . . Newton-Meters
NATO . . . . . North Atlantic Treaty Organization
NSN . . . . . National Stock Number
No. . . . . Number
OE/HDO . . . . . OIL Engine/Heavy Duty Oil
OLI . . . . . Overload Interrupt Module
PAM . . . . . Pamphlet
PMCS . . . . . Preventive Maintenance Checks and Services
POL . . . . . Petroleum, Oils, and Lubricants
POL . . . . . Polarity
PQDR . . . . . Product Quality Deficiency Report
psi . . . . . Pounds Per Square Inch
qt . . . . . Quart
qty . . . . . Quantity
R . . . . . Reverse
rpm . . . . . Revolutions Per Minute
rqr . . . . . Required
SAE . . . . . Society of Automotive Engineers

SOCOM . . . . . Special Operations Command
SOP . . . . . Standard Operating Procedure
SPD . . . . . Speed
SST . . . . . Start-Up Self Test
(t) . . . . . Trip
T-Case . . . . . Transfer Case
TACOM . . . . . Tank-Automotive and Armament Command
TAMMS . . . . . The Army Maintenance Management System
TBD . . . . . To Be Determined
TC . . . . . Traction Control
TCM . . . . . Transmission Control Module
TEMP . . . . . Temperature
TGRS . . . . . Turret Gunner Restraint System
TM . . . . . Technical Manual
TU . . . . . Tube
UI . . . . . Underbody Improvement
U/I . . . . . Unit of Issue
UV . . . . . Ultraviolet
VCW . . . . . Vehicle Curb Weight
VDC . . . . . Volts Direct Current
VIN . . . . . Vehicle Identification Number
w/ . . . . . With
WCA . . . . . Warranty Claim Action
WP . . . . . Work Package

END OF WORK PACKAGE

EQUIPMENT DESCRIPTION AND DATA

PHYSICAL DESCRIPTION

The M-ATV is designed for use on all types of roads, highways, and cross-country terrain. These vehicles also operate in extreme conditions and temperatures. Major subsystems of the vehicles are capsule, engine, transmission, drivetrain, suspension, electrical system, pneumatic (air) system, and Central Tire Inflation System (CTIS).

FUNCTIONAL DESCRIPTION

1. The M-ATV is capable of operating in temperatures from -25 to 130°F (-32 to 54°C).
2. The M-ATV is capable of fording 36 in. (91.4 cm) of water. It can also travel at 65 mph (105 km/h) on paved surfaces.
3. The M-ATV (M1240/M1245) is capable of traversing a 60% grade and a 40% side slope up to 5 mph (8 km/h).
4. The M-ATV (M1240A1) is capable of traversing a 60% grade and a 30% side slope up to 5 mph (8 km/h).

NOTE

The M-ATV is capable of traveling 65 mph (105 km/h). However, the operator MUST adhere to the speed limits set by unit Standard Operating Procedure (SOP).

5. The M-ATV is provided with sufficient tiedown points located so that the vehicle can be restrained in all directions for shipment.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (M1240/M1240A1)

Major components and accessories found on the M1240 and M1240A1 are illustrated in Figure 1, Figure 2, and Figure 3 and are described as follows:

1. **ENGINE.** Engine supplies power to move vehicle and operate equipment and accessories.
2. **CAPSULE.** Provides protection from weather for crew, vehicle controls, gauges, and indicators. The capsule also has environmental control capability and provides blast protection for the crew.
3. **GLADHANDS.** Couples air supply to towed vehicle or trailer.
4. **PINTLE HOOK.** Allows connection to a towed vehicle or trailer.
5. **AXLE NO. 2.** Transmits power to hubs to turn wheels.
6. **FUEL TANK.** Stores fuel to operate vehicle.
7. **BATTERY BOXES.** Stores four batteries for normal operating conditions and auxiliary equipment. Two battery boxes are located underneath cargo deck.
8. **WINCH.** Used to move obstacles and debris. The winch is located on front of vehicle.
9. **EXHAUST PIPING.** Used to direct exhaust fumes from engine.
10. **TOWING EYES.** Attachment points for safety chains, towing shackles, and vehicle towing.
11. **AXLE NO. 1.** Controls direction of vehicle when in motion. Transmits power to hubs to turn wheels.
12. **AIR CLEANER.** Filters out dust and debris from entering air induction system.
13. **TIEDOWN EYES.** Attaching points for securing the vehicle for shipment.
14. **CHECK-6 CAMERAS.** Provide crew with a view rear of vehicle.
15. **NATO SLAVE CONNECTOR.** Used to help start vehicle with depleted batteries.
16. **B PILLAR HANDLES.** Used to help crew get in and out of vehicle.
17. **AUXILIARY MIRRORS.** Provides driver with increased field of view. Auxiliary mirrors are located on the hood.

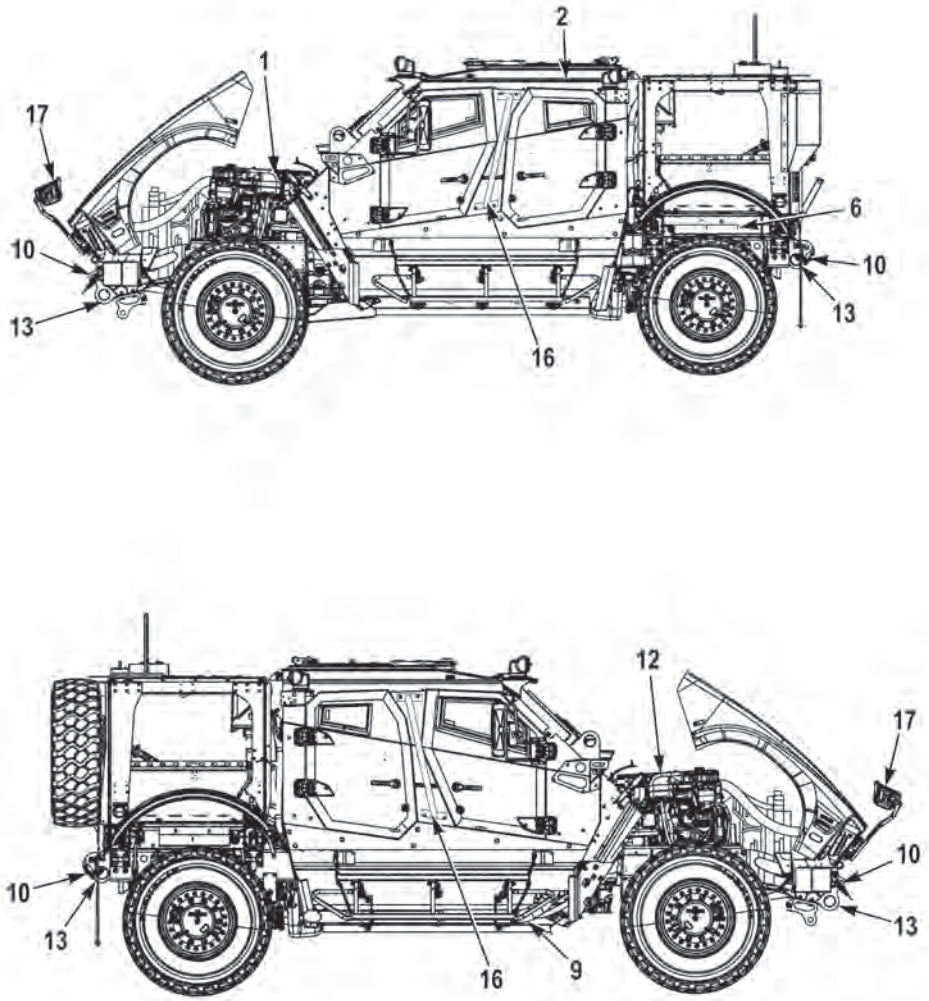

Figure 1. Location and Description of Major Components.

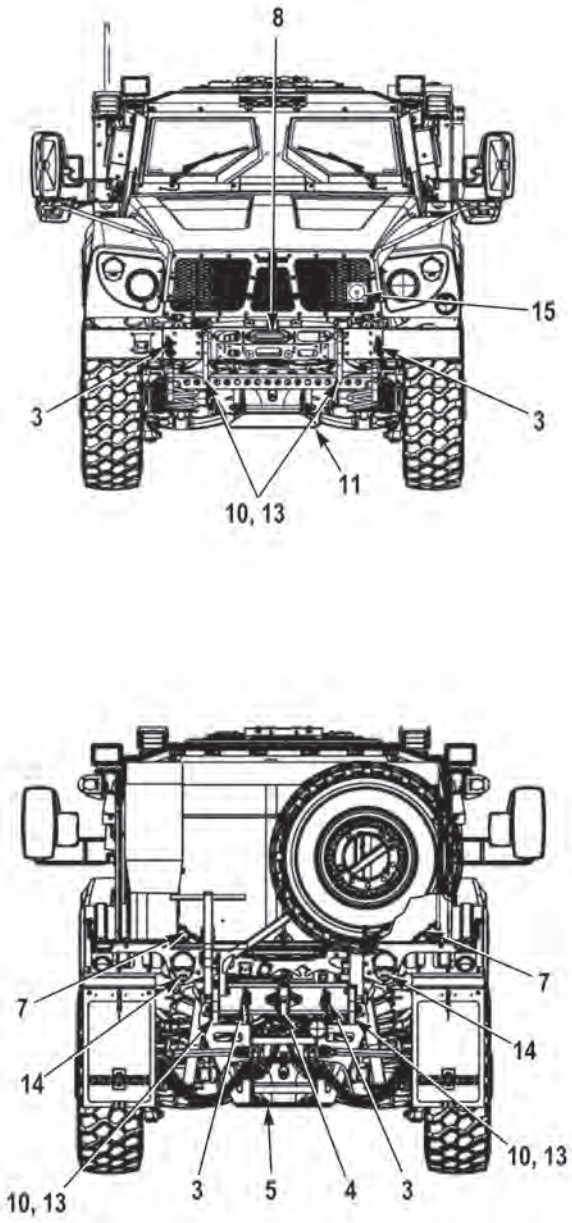

Figure 2. Location and Description of Major Components.

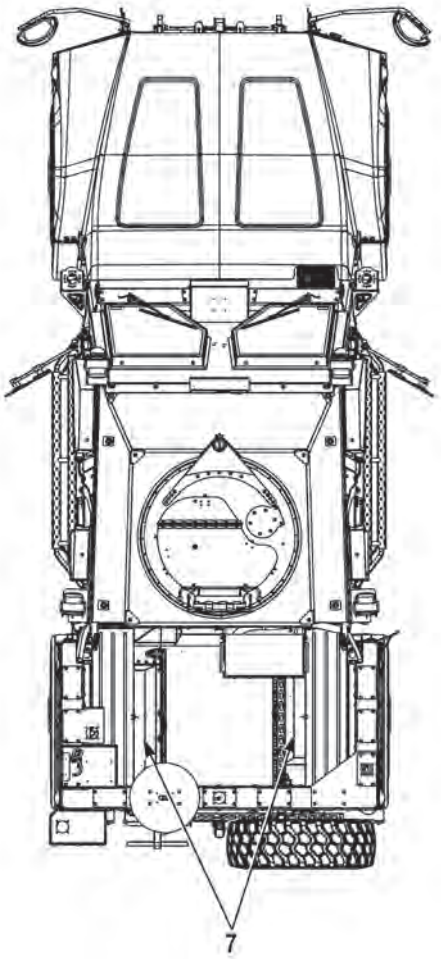

Figure 3. Location and Description of Major Components.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (M1245)

Major components and accessories found on the M1245 are illustrated in Figure 4, Figure 5, and Figure 6 and are described as follows:

1. **PUSH BUMPER.** Heavy duty bumper able to withstand higher forces than the standard bumper.
2. **COMBAT LOCK KEY.** Emergency tool used to disengage the combat lock from outside the vehicle.
3. **SIDE LITTER DOOR.** Side doors to facilitate the extraction of the litter from rear cargo deck.
4. **LEFT BATTERY BOX.** Stores two batteries for engine operation.
5. **RIGHT BATTERY BOX.** Stores two batteries for operation of Government Furnished Equipment.
6. **HOOD ACCESS STEPS.** Side steps and hard point on hood to allow access to the capsule roof.
7. **INFRARED (IR) LIGHTS.** Lights used to provide infrared light.
8. **REAR CARGO DOOR.** Rear door allowing access to the cargo deck.
9. **DYNEEMA PANELS.** Removable panels used for protection of rear cargo deck.
10. **FIRE EXTINGUISHERS.** Dry chemical fire extinguisher used to extinguish liquid and electrical fires.

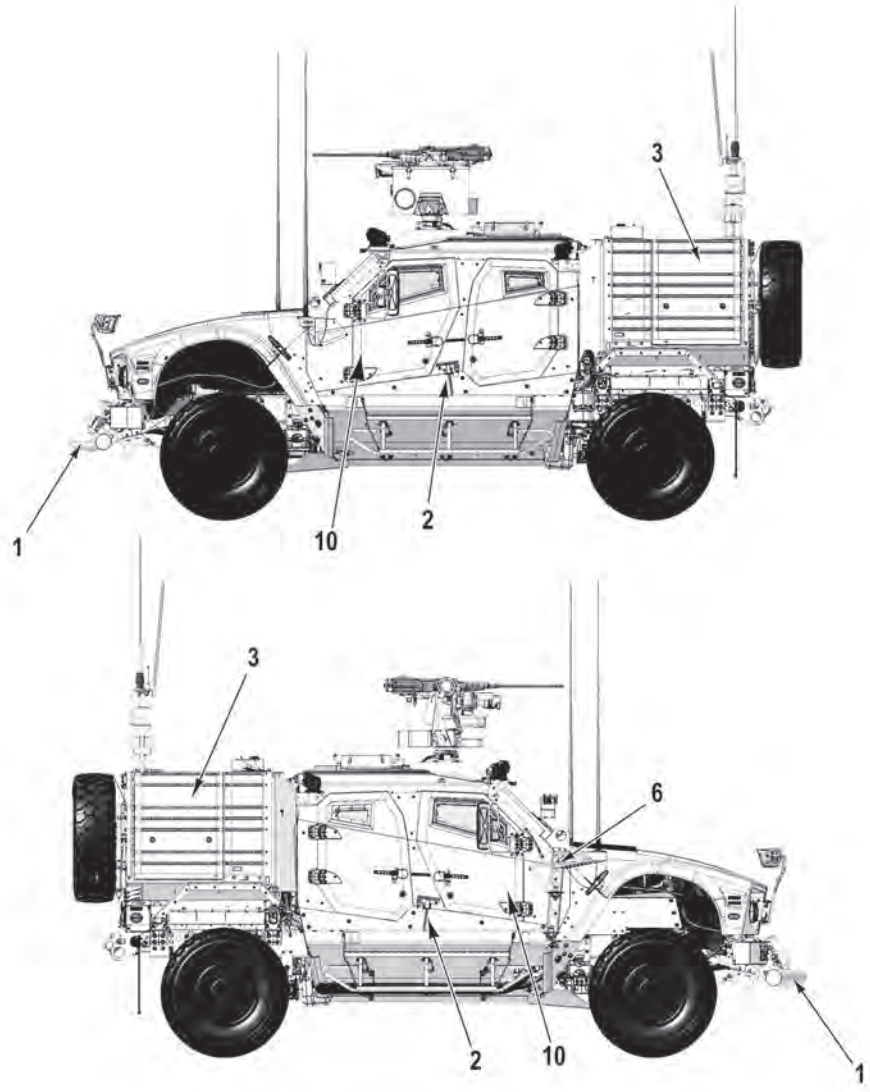

Figure 4. Location and Description of Major Components (M1245).

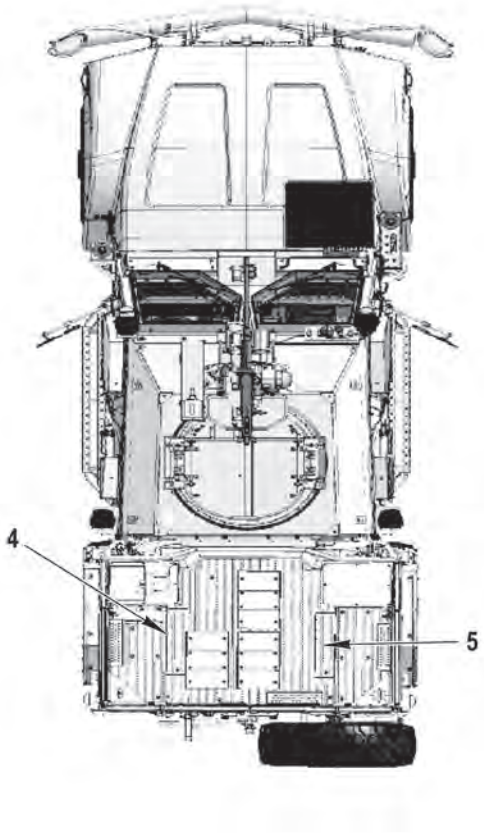

Figure 5. Location and Description of Major Components (M1245).

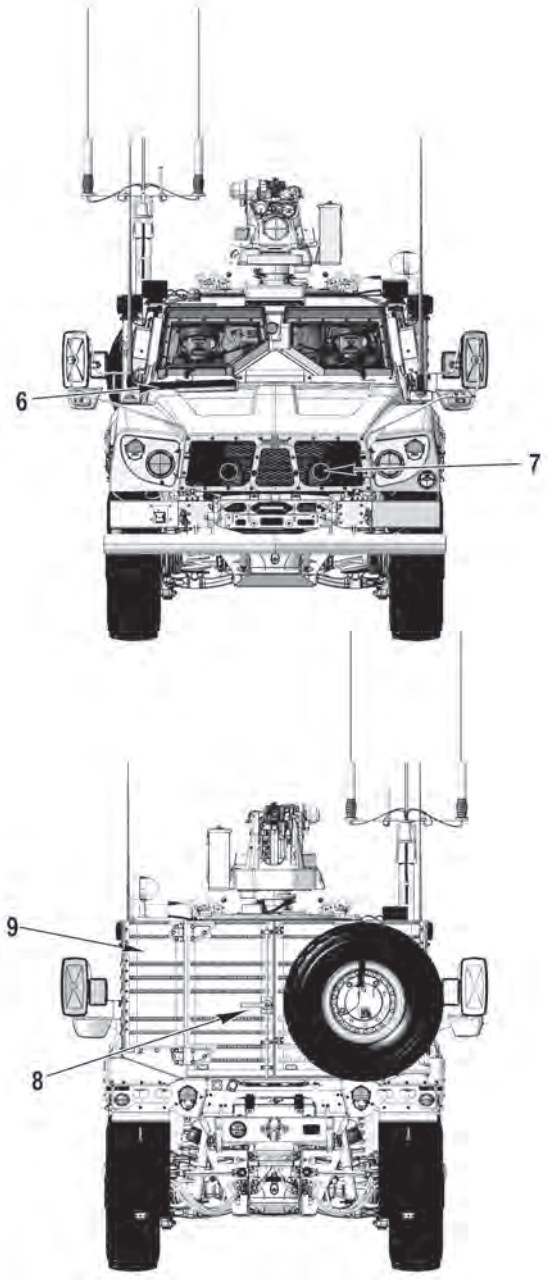

Figure 6. Location and Description of Major components (M1245).

REFERENCE DATA TABLES

Refer to the following tables for specific equipment data:

Table 1. Dimensions.

Item	Specification
Width	98.0 in. (248.9 cm)
Height (M1240)	102 in. (259 cm)
Height (M1240A1)	108.9 in. (276.6 cm)
Height (M1245)	105 in. (266.7 cm)
Length (M1240/M1240A1)	246.8 in. (626.9 cm)
Length (M1245)	265.1 in. (673.4 cm)

Table 2. Weight.

Item	Specification
Vehicle Curb Weight (VCW) (M1240)	24,500 lbs. (11 123 kg)
Vehicle Curb Weight (VCW) (M1240A1)	28,500 lbs. (12 940 kg)
Vehicle Curb Weight (VCW) (M1245)	27,174 lbs. (12 325 kg)
Gross Vehicle Weight Rating (GVWR)	37,000 lbs. (16 798 kg)

Table 3. Performance.

Item	Specification
Gradient (Grade)	
Longitudinal (Up Slope)	60%
Side Slope (M1240/M1245)	40%
Side Slope (M1240A1)	30%
Environmental Operation	-25 to 130°F (150°F storage) [-32 to 54°C (66°C storage)]
Speed, Maximum GVW Road	65 mph (105 km/h)
Fording	36 in. (91.4 cm)
Cruising Range	320 miles (515 km) (M1240)
Turning Radius	66.5 ft. (20.3 m) wall to wall 31.6 ft. (9.6 m) curb to curb

Table 4. Axles.

Item	Specification
Axles Configuration	4 x 4 - Two axles
Make	Oshkosh - Defense
Rated Capacity	
Front Axle	17,000 lbs. (7 718 kg)
Rear Axle	20,000 lbs. (9 080 kg)
Type	Full-time all-wheel drive
	Fixed center differential and planetary hub reduction
Interaxle Differential Lock	CTIS-controlled terrain selection with manual override
Intraxle Differential Lock	Controlled by CTIS terrain selection on all axles with manual override

Table 5. Parking Brakes.

Item	Specification
Type	Spring brakes on Axle No. 2 Modulated emergency system
Make	Arvin Meritor

Table 6. Service Brakes.

Item	Specification
Type	Drum with internal shoe Dual actuator air wedge
Make	
Front Axle	Meritor RDA type - 12 wedge
Rear Axle	Meritor RDA type - 12 wedge

Table 7. Capsule.

Item	Specification
Construction and Accessories	Welded Armor Steel Hull
	Replaceable Underbelly Armor
	Two-Piece Armored Windshield
	Replaceable Armored Side Doors
Instrumentation	Modular Dash Panels
	Multiplex Gauge Control
	J1708 and J1939 Data Bus Communications
	US/Metric Color Band Gauges

Table 8. Central Tire Inflation System (CTIS).

Item	Specification
Type	Eaton, electronic controlled, terrain and payload biased, automatic upon operator selection
Control	Transfer case and rear axle side-to-side lockup control, with manual override
Features	Preset tire pressures for highway, cross-country, mud/sand/snow, and emergency
	Over speed function with warning and automatic tire pressure and driveline lock corrections
	Run flat function provides continuous air to punctured tire
	Utilizes SAE J1708 and 1939 data bus for external control functions
Tire Pressure Settings	Refer to Tables 16 and 17 for all tire pressure settings

Table 9. Air System.

Item	Specification
Air Governor	Bendix
Air Dryer	HALDEX #N500 11 H

Table 10. Cooling System.

Item	Specification
Type	Cross flow fin and tube type radiator, includes internal transmission cooler and external charge air cooler
Frontal Area	810 in² (5 226 cm²)
Construction	One piece assembly with integral side tanks
Fan	32 in. (81 cm), nine blade, serpentine belt driven
Fan Clutch	Temperature controlled

Table 11. Electrical System.

Item	Specification
Alternator	570 amp
Voltage	24 volts with 12 volt accessory provision in capsule
Battery	Four, 12 volt (800 CCA ea. at -18°F [-28°C])

Table 12. Steering System.

Item	Specification
Type	R.H. Shepard integral power steering with booster and separate fluid reservoir includes primary and secondary gears
Steering Gear Ratio	18:1

Table 13. Engine.

Item	Specification
Make and Model	Caterpillar C-7 electronic control
Type	4-stroke, in-line, six cylinder, electronic
Bore	4.33 in. (11 cm)
Stroke	5 in. (12.7 cm)
Displacement	441 in^3 (7.2 L)
Maximum Horsepower	370 hp (276 kW)
Peak Torque	925 lb-ft (1 254 N•m)
Exhaust brake/retarder	PAC engine brake

Table 14. Suspension.

Item	Specification
Type	Oshkosh Modular Independent Suspension, coil spring, control arm
Wheel Travel	
Front Axle	16 in. (40.6 cm)
Rear Axle	16 in. (40.6 cm)

Table 15. Tires.

Item	Specification
Type	395/85R20 (M1240/M1245) 16.00 R20 XZLTLRM (M1240A1)
Quantity	Four
Additional Capability	Run flat capability in case of flat tire where CTIS cannot maintain pressure.

Table 16. Tire Pressures (M1240/M1245).

LOAD		TERRAIN			
		HWY	**CC**	**MSS**	**EMER**
CURB WEIGHT	Front	61 PSI	42 PSI	23 PSI	18 PSI
	Rear	57 PSI	40 PSI	21 PSI	16 PSI
LOADED NO EFP	Front	71 PSI	50 PSI	27 PSI	21 PSI
	Rear	91 PSI	65 PSI	36 PSI	28 PSI
EFP ARMOR	Front	84 PSI	59 PSI	33 PSI	26 PSI
	Rear	96 PSI	71 PSI	40 PSI	32 PSI
	MAX. SPD. MPH	65	40*	15	5
NOTE: All tire pressures are ± 3 PSI.					
*When CTIS setting is CROSS COUNTRY and CURB WEIGHT, MAX. SPD. is 45 mph.					

Table 17. Tire Pressures (M1240A1).

LOAD		TERRAIN			
		HWY	**CC**	**MSS**	**EMER**
CURB WEIGHT	Front	48 PSI	32 PSI	16 PSI	13 PSI
	Rear	50 PSI	33 PSI	17 PSI	14 PSI
LOADED NO EFP	Front	50 PSI	33 PSI	16 PSI	14 PSI
	Rear	64 PSI	45 PSI	24 PSI	18 PSI
GVW NO EFP	Front	51 PSI	34 PSI	17 PSI	14 PSI
	Rear	72 PSI	51 PSI	28 PSI	20 PSI
	MAX. SPD. (MPH)	65	40*	15	5
NOTE: All tire pressures are ± 3 PSI.					
*When CTIS setting is CROSS COUNTRY and CURB WEIGHT, MAX. SPD. is 45 mph.					

Table 18. Transfer Case.

Item	Specification
Make and Model	Marmon - Herrington MVG - 750
Type	Three-shaft, two-speed with Neutral
Ratio	1:1 High 2:1 Low
Torque Split (unlocked drive line)	30% Front, 70% Rear

Table 19. Transmission.

Item	Specification
Make and Model	Allison 3500 SP, automatic electronic control, GEN IV
Type	Six-speed automatic with TC 418 torque converter, second gear start
Ratios	
Sixth	0.65:1
Fifth	0.75:1
Fourth	1.0:1
Third	1.5:1
Second	2.3:1
First	4.6:1
Reverse	5.0:1

Table 20. Wheels.

Item	Specification
Type	Two-piece bolt together, aluminum disc
Size	20 x 10 in. (50.8 x 25.4 cm)

Table 21. Winch.

Item	Specification
Make and Model	WARN Severe Duty 18
Wire Rope	8 Strand Steel Cable
Diameter	0.44 in. (11.2 mm)
Length	75 ft. (22.9 m)
Deployment	Front only
Maximum Load Rating	18,000 lbs. (8 172 kg)
Drum Barrel Diameter	4 in. (10.16 cm)
Overload Interrupt Module	Digital Limiter
Sensing Current (Set Point) Range	50 to 400 amps
Supply Voltage	8.5 to 32 VDC

Table 22. Winch Electric Performance Data.

Line Load (First Layer) lbs.	Line Load kg	Line Speed Layer 1 ft./min.	Line Speed Layer 1 m/min.	Motor Current amps
0	0	18.5	5.6	58.1
3000	1362	11.0	3.4	104.0
6000	2724	8.6	2.6	137.8
9000	4086	7.1	2.2	169.4
12000	5448	6.0	1.8	209.7
15000	6810	4.9	1.5	253.2
18000	8172	4.6	1.4	278.2

Table 23. Winch Performance Data.

Layer 1 Line Speed ft./min.	Maximum Line Load lbs.	Layer 2 Line Speed ft./min.	Maximum Line Load lbs.	Layer 3 Line Speed ft./min.	Maximum Line Load lbs.	Layer 4 Line Speed ft./min.	Maximum Line Load lbs.
18.5	0	22.6	0.0	26.7	0.0	30.8	0.0
11.0	3000	13.4	2454.5	15.9	2076.9	18.3	1800.0
8.6	6000	10.5	4909.1	12.4	4153.8	14.3	3600.0
7.1	9000	8.7	7363.6	10.3	6230.8	11.9	5400.0
6.0	12000	7.3	9818.2	8.6	8307.7	9.9	7200.0
4.9	15000	6.0	12272.7	7.1	10384.6	8.2	9000.0
4.6	18000	5.6	14727.3	6.6	12461.5	7.7	10800.0

Table 24. Petroleums, Oils, and Lubricant (POL) Capacities.

Item	Specification
Engine	20 qt. (18.9 L) With Filter
Transmission	26 qt. (24.6 L) Drain and Refill
Transfer Case	5.1 qt. (4.8 L)
Power Steering Reservoir	9.5 qt. (9 L)
Cooling System	31 qt. (29.3 L)
Axles No. 1 and No. 2	10.5 qt. (9.9 L)
Wheel Ends	1.6 qt. (1.5 L)
Fuel Tank	47 gal. (177.9 L)

Table 25. Recommended Modes of CTIS Operation.

	CTIS SETTING			
Road Condition	**HWY**	**CC**	**MSS**	**Emer**
Highway/Paved & Smooth	X			
Gravel/Smooth	1	2		
Gravel/Dirt W/ Potholes or Washboard		X		
Cobblestone/ Belgium Block	X			
Mud/Sand/Snow		1	2	
Fording-Hard Bottom		X		
Fording-Soft Bottom		1	2	
Grade-Slight (<10%)	X			
Grade-Moderate (10%-25%)		X		
Grade-Steep (>25%)		1	2	

Where more than one CTIS terrain setting is identified above, first try choice 1. If wheelspin occurs, remove power to stop the spin and try choice 2.

Where conditions are a combination of the above classifications (such as a moderate grade with mud/ sand/snow), it is likely that choice 2 will be needed to complete the required task.

This table cannot cover all possible terrain and considerations. If you do not see a table choice that addresses your particular situation, choose a terrain/road condition CTIS setting that suggests a worse environment than the one you will encounter.

END OF WORK PACKAGE

MECHANICAL THEORY

This work package explains the mechanical theory of operation for the M-ATV.

The engine generates power to move the vehicle. This power is transferred to the transmission, which converts the power into a controllable speed. The transmission transfers this controlled speed to the transfer case, which transfers this speed to the axles. The axles then transfer this speed to the right and left wheels of the vehicle.

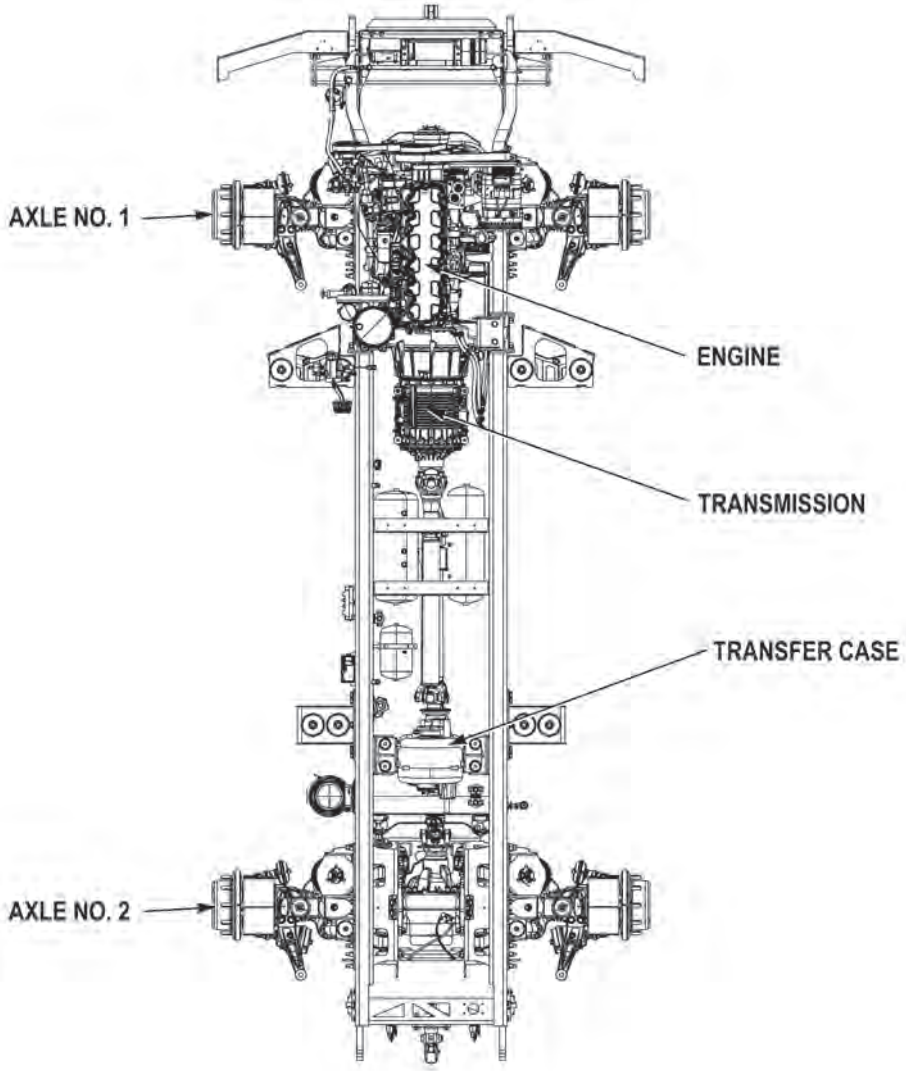

Figure 1. Mechanical Theory.

CAPSULE

The capsule features a full width configuration and is positioned rearward of axle No. 1. The capsule controls and operating mechanisms are designed to accommodate a crew of up to five. Heating, ventilation, noise control, and vibration and shock control are provided to the occupants. The capsule also provides blast protection for the crew as well as protection from small arms fire. The capsule contains all of the driving controls, gauges, and warning lights and indicators.

DRIVE TRAIN

Power for the M-ATV is provided by a diesel engine, which is coupled directly to an automatic transmission. Power from the transmission is transferred to the transfer case and onto the drive and drive/steering axles through a series of prop shafts and universal joints. The M-ATV drive train is enhanced through the use of electronic control modules for both the Caterpillar engine and Allison transmission.

TRANSFER CASE

The transfer case incorporates a differential. The transfer case differential provides full time, all wheel drive, and supplies torque to the front and rear axles. The differential has an operator controlled, air actuated, driveline lock mechanism, which consists of a sliding lockout collar that locks the differential housing to the output shaft. The differential driveline lock mechanism provides increased mobility in adverse operating conditions.

SUSPENSION

The M-ATV incorporates TAK-4® independent suspension system with battle tested technology. This suspension system incorporates half-shafts, springs, shock absorbers, jounce bumpers, rebound bumpers, and upper and lower control arms in the independent suspension design. This suspension system design maintains tire/ground contact under adverse terrain profiles and conditions. This design equalizes loads between axles and provides roll stability. The half-shafts incorporated into this design move up and down independently of each other. This independent motion allows for a smoother ride than a standard walking beam suspension design.

AXLES

The M-ATV incorporates four half-shafts in the vehicle's independent suspension design. The half-shafts of the front axle work in conjunction with the wheel ends and hub assemblies to drive and steer the vehicle. The half-shafts of the rear axle work in conjunction with the hub assemblies to drive the vehicle. The four half-shafts incorporated into this design move up and down independently of each other. This allows the half-shafts to maintain tire/ground contact under adverse terrain profiles and conditions.

COOLING SYSTEM

The pressure type cooling system protects the engine by removing heat generated by the engine during the combustion process. Pressure within the cooling system is regulated by a pressure release in the filler cap. The hot coolant flows from the engine to the radiator and through the radiator core where a stream of air removes heat from the coolant. This stream of air is drawn through the radiator core by the engine fan. The water pump on the engine draws the coolant from the radiator, pushes it through the engine, past the thermostats, and back onto the radiator. This process is repeated continuously.

AIR INTAKE SYSTEM

The air intake system consists of a dry-type air cleaner, ducting, turbocharger, and charge air cooler. Engine exhaust gases flow through the turbocharger driving a turbine wheel. A compressor wheel on the opposite end of the turbine shaft rotates and draws in fresh air through the air cleaner. The air is then compressed by the turbocharger and pushed into the charge air cooler to cool the compressed air. The air then flows into the intake manifold of the engine to be used for combustion.

If the air pressure inside the turbocharger reaches a predetermined pressure, the wastegate on the turbocharger will open to relieve excess pressure. When the pressure returns to the safe operating range, the wastegate will close.

FUEL SYSTEM

In the fuel system, fuel is drawn from the fuel tank, through the fuel/water separator, and into the fuel pump. The fuel pump then pushes the fuel through a fuel filter and into the engine. Surplus fuel from the electronic injectors is returned to the fuel tank through a return line.

PNEUMATIC (AIR) SYSTEM

The air system consists of an engine driven air compressor and either two or four air reservoirs. The system includes valves and air lines to control the vehicle's air-operated devices, including the brakes. Pressurized air from the air compressor is passed through the air dryer to the reservoirs. The air dryer removes moisture and dirt from the compressed air.

STEERING SYSTEM

The steering system power is suppled to the steering gears by a hydraulic steering pump. The steering wheel, which is mechanically linked to the primary steering gear, manipulates and controls the hydraulic pressures in the steering gear. The primary steering gear is hydraulically connected to the secondary steering gear. The secondary steering gear mirrors the movements of the primary steering gear. The steering gear's pivot pitman arms, which in turn move a tie rod and two toe control links. This action causes the tires to move left or right causing the vehicle to steer left or right.

ANTILOCK BRAKE SYSTEM

The brake system for the M-ATV incorporates an Antilock Brake System (ABS) into its design. ABS controlled braking ensures optimum vehicle stability while minimizing stopping distance.

When applying the service brakes, the ABS monitors all wheels on the vehicle for a wheel lock condition. If wheel lock occurs, the ABS makes a new assessment of the conditions and will adjust the air pressure to the service brakes to eliminate wheel lock. The ABS will in effect, pulse the brakes, through four ABS valves, to eliminate wheel lock. Once the ABS detects that the wheel lock condition is eliminated, it will stop adjusting the air pressure to the service brakes.

END OF WORK PACKAGE

ELECTRICAL THEORY

The alternator generates electricity and distributes the load as necessary (i.e., to batteries, lights, winch, etc.). The batteries store generated electricity which is used to start the vehicle. The electricity then transfers to the circuit breakers, which safeguards the electrical components from power surges. From there, the electricity is distributed throughout the vehicle. The main electrical components are comprised of six components.

The subordinate circuits operate all the lights, the winch controls, heater controls, etc. The engine Electronic Control Module (ECM) primarily controls the fuel injection by monitoring temperature, oil pressure, rpms, etc. The CTIS system operates tire inflation, deflation, and driveline lockups. The Antilock Brake System (ABS) prevents tires from locking up during braking and aids in traction control. The Transmission Control Module (TCM) controls the shifting for the GEN IV transmission. The J1708/J1939 data bus is used for diagnostic purposes.

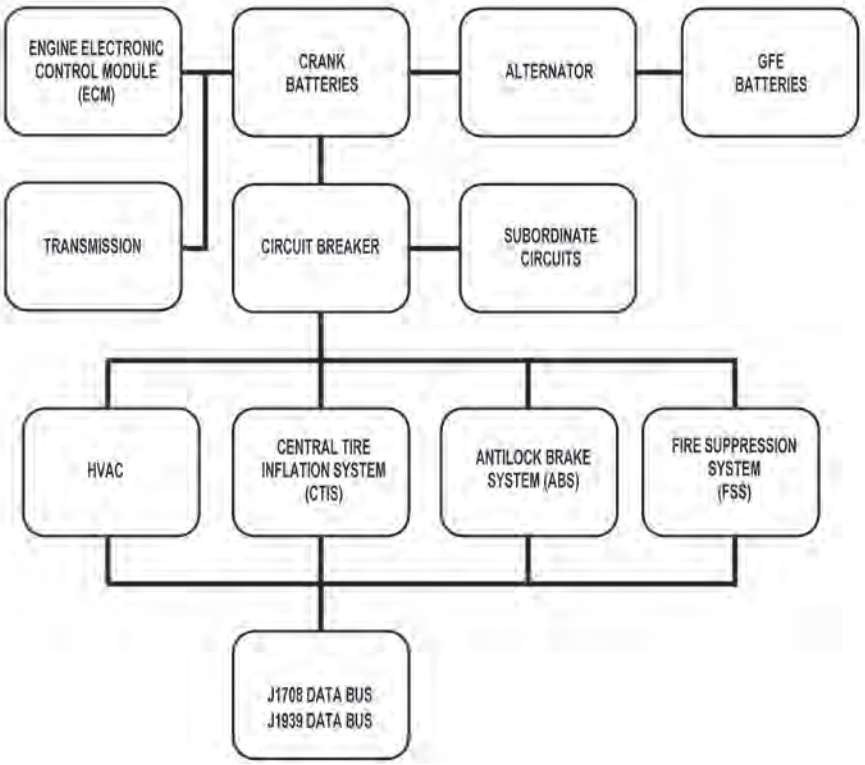

Figure 1. Electrical Theory (M1240/M1240A1).

ANTILOCK BRAKE SYSTEM (ABS)

NOTE

When operating vehicle in CC, MSS, or EMER CTIS settings, ABS and ATC systems are disabled.

The brake system for the M-ATV incorporates an ABS into its design. ABS controlled braking ensures optimum vehicle stability while minimizing stopping distance.

When applying the service brakes, the ABS monitors all wheels on the vehicle for a wheel lock condition. If wheel lock occurs, the ABS makes a new assessment of the conditions and will adjust the air pressure to the service brakes to eliminate wheel lock. The ABS will, in effect, pulse the brakes to eliminate wheel lock. Once the ABS detects that the wheel lock condition is eliminated, it will stop adjusting the air pressure to the service brakes.

AUTOMATIC TRACTION CONTROL (ATC) LIGHT

The ATC light will illuminate steadily when the ignition switch is turned on. The light will remain on until the service brake pedal is engaged for the first time. The light will then turn off.

When operating the vehicle with CTIS set to HWY terrain setting, the ATC light will remain off unless the ATC system detects a wheel slip condition and activates. The light will then flash rapidly until the wheel slip condition is no longer present.

If the ATC light illuminates steadily when operating the vehicle in the HWY CTIS setting, the ATC is malfunctioning.

NOTE

If the ATC light indicates a malfunction, the ATC and possibly the ABS system may be disabled. If the ATC and/or ABS is disabled, the emergency and service brake systems remain functional.

The ATC light will illuminate steadily when CTIS is set to CC, MSS, or EMER terrain settings to indicate that the ATC system is disabled. This indication is normal and does not indicate a malfunction in the ATC.

ENGINE

The M-ATV is equipped with a Caterpillar, diesel engine, Model C-7. The Caterpillar engine incorporates an electronic control system.

The main components of the electronic control system are the Engine Control Module (ECM) and multiple engine sensors. The ECM is the computer that controls the engine.

The electronic controls on the engine serve as the engine governor. The electronic controls determine when and how much fuel to deliver to the cylinders, based on the actual and desired conditions at any given time.

The governor uses a sensor on the throttle pedal to determine the desired engine speed and compares this to the actual engine speed as determined by the engine crankshaft position sensor. If the desired engine speed is greater than the actual engine speed, the governor injects more fuel to increase engine speed. If desired engine speed is less than the actual engine speed, the governor injects less fuel to decrease engine speed.

Once the governor has determined how much fuel is required, it must next determine when to inject the fuel. Injection timing is determined by the ECM after considering input from the coolant temperature sensor, intake manifold air temperature sensor, atmospheric pressure sensor, and boost pressure sensor.

The ECM determines where top dead center on cylinder number one is located from the engine camshaft position sensor signal. The ECM decides when injection should occur relative to top center and provides the signal to the injector at the desired time. The ECM adjusts timing for best engine performance, fuel economy, and white smoke control.

The ECM controls the amount of fuel injected by varying high voltage signals to the injectors. The injectors will pump fuel only when the injector solenoid is energized. By controlling the timing and duration of the high voltage signal, the ECM can control injection timing and the amount of fuel injected.

Included with the ECM is an engine monitoring system. The Caterpillar engine monitoring system monitors engine oil pressure, coolant temperature, and intake manifold air temperature. If the engine monitoring system detects a sensor reading outside of the normal operating parameters, the ECM causes the Warning Lamp to turn on and the Check Engine Lamp to flash to indicate a problem has been detected.

TRANSMISSION

The M-ATV uses an Allison 3500 series, six speed, automatic transmission. The transmission is directly coupled to the Caterpillar C-7 engine. The main components of the transmission are the transmission assembly, Transmission Control Module (TCM), and Transmission Range Selector.

The TCM, which contains the microprocessor based electronics, is located in the dash near the circuit breaker/ relay panel. The TCM receives information, in the form of signals from switches and sensors, processes the information, and sends electrical signals to the appropriate solenoids inside the transmission. These solenoids control the operation to the transmission. The TCM also protects the transmission from cold weather start-ups by inhibiting normal shifting functions until a minimum sump oil temperature of 19°F (-7°C) is attained.

The Transmission Range Selector is totally electronic. When the M-ATV is started, the Range Selector automatically defaults to N (neutral). Range selection is achieved by means of six buttons located on the face of the Transmission Range Selector. When D (drive) is selected, the truck will start in first gear and will automatically up shift to a high gear as output speed increases. As the truck slows down, output speed decreases and the transmission automatically downshifts to the appropriate gear. When R (reverse) is selected, the transmission will shift to reverse and the range selector will also activate the reverse light and reverse alarm.

By using the up arrow button or down arrow button on the Transmission Range Selector, the operator can adjust the range of gears he wishes to operate in.

ELECTRICAL

The M-ATV has a 24 VDC electrical system that is waterproof and includes a 12 VDC auxiliary receptacle located on the dash, inside the cab. Manual and automatic resetting circuit breakers are used throughout the system. The voltage of the electrical system is indicated by a voltmeter located on the dash, inside the capsule.

The electrical system is powered by four 12-volt batteries located in the cargo deck. Two batteries are for cranking power and two batteries power GFE (Government Furnished Equipment) in silent watch mode.

A battery disconnect switch is located inside the capsule between front of driver seat and passenger seat. The battery disconnect switch provides power to operating and control circuits throughout the vehicle.

A 570 amp alternator delivers up to full alternator output on demand to any single or combined 24 VDC load requirement. The alternator provides sufficient amperage to operate all electrical components and charge the batteries when the engine is running.

A connector is provided at the rear of the truck to supply power to towed loads. Another connector is located at the front of the truck to provide access for incoming auxiliary power when vehicle is being towed.

Part of the electrical system includes a heavy-duty starting motor mounted on the engine flywheel housing. The starting motor provides the cranking power necessary for starting the engine.

CENTRAL TIRE INFLATION SYSTEM (CTIS)

The CTIS is designed to adjust the pressure of all tires on the truck for different terrain conditions. The CTIS controller has four terrain settings, three load settings, and a run flat setting which the operator selects and activates in the capsule. The main components of the CTIS consist of control valves for air supply and distribution, a dash mounted electrical controller that adjusts tire pressure, associated air tubing, and electrical cables.

The driveline lock controls are integrated with the CTIS to simplify operation of the M-ATV. The CTIS will engage a specific driveline lock configuration based on the terrain and load settings chosen by the operator.

AUTOMATIC TRACTION CONTROL (ATC)

The brake system for the M-ATV incorporates an Automatic Traction Control (ATC) system. The ATC system helps improve traction on slippery or unstable driving surfaces by reducing drive wheel slippage.

The ATC system constantly monitors the wheel for a wheel slip condition. If a wheel slip condition occurs, the ATC system activates and throttles back the engine to help reduce wheel slip. If the vehicle is traveling at a speed of less than 25 mph (40 km/h), the ATC will also pulse the service brake system, through the Traction Control Valve, to aid in reducing wheel slip. Once the ATC system detects that the wheel slip condition is no longer present, it will return the engine and service brake system to normal operating condition.

FIRE SUPPRESSION SYSTEM

The M-ATV incorporates three fire suppression systems into its design: capsule, engine compartment, and undercarriage fire suppression systems.

The capsule fire suppression system covers the interior of the capsule. It is triggered by sensors that monitor for hot spots and air particles (smoke) inside the capsule. When triggered, it disperses a fire suppression agent throughout the interior of the capsule.

The M-ATV has one of two different engine compartment fire suppression configurations listed below:

- The engine compartment fire suppression system covers the interior of the engine compartment. It is triggered by thermosensors that monitor the temperature of the engine compartment. When triggered, they activate four aerosol generators which disperse a fire suppression agent throughout the interior of the engine compartment.

or

- The engine compartment fire suppression system covers the interior of the engine compartment. It is triggered by a sensor wire that monitors the temperature of the engine compartment. When triggered, it activates five aerosol generators which disperse a fire suppression agent throughout the interior of the engine compartment.

The M-ATV has one of two different undercarriage fire suppression configurations listed below:

- Undercarriage fire suppression system covers the underside of vehicle. It is triggered when a fire burns through a sensor hose. The sensor hoses run under the vehicle and are slightly pressurized with nitrogen. Once pressure is released from a hose, the fire suppression system will disperse a fire suppression agent to extinguish fires under the vehicle.

or

- Sensor wires are routed under vehicle, wheel wells, fenders, differentials and are coated in a heat sensitive polymer. Once the polymer melts, two wires within the detection line touch and complete the circuit. The fire suppression system will then disperse a fire suppression agent to extinguish fires under the vehicle.

END OF TASK

END OF WORK PACKAGE

PREPARATION FOR USE

HANDLING

Check equipment against packing slip to ensure that shipment is complete. Clean all external surfaces as needed. If paint scratches are found, notify Field Maintenance. Remove all Basic Issue Items (BII). Conduct a complete inventory against BII list then stow in accordance with Stowage Guide.

END OF TASK

SERVICING

1. **Removal of Protective Components**.

   Upon receipt of the M-ATV, inspect vehicle for obvious damage. Undo any tiedowns, shackles, or banding that are securing the M-ATV.

2. Cleaning.

WARNING

Ballistic glass may become very hot when exposed to sun or when in a hot environment. Avoid contacting hot ballistic glass with hands or skin. Failure to comply may result in injury to personnel.

CAUTION

- **Do not use cool water when cleaning hot ballistic glass. Putting cool water on hot ballistic glass may cause window to crack or delaminate. Failure to comply may result in damage to equipment.**
- **Do not wipe dirt off vehicle when vehicle is dry. Dirt, stones, or debris can scratch paint off the vehicle. Failure to comply may result in damage to equipment.**
- **Do not use an abrasive brush to wash vehicle. Failure to comply may result in damage to equipment.**

a. Use a clean cloth, wash vehicle with cool or warm water. Do not use strong detergents or abrasives.

b. While cleaning vehicle, look closely for rust or corrosion, bare metal, or other damage. Report damage to Field Maintenance.

c. Air intake opening may be covered with tape, and windshield may be protected with packing material. Remove any protective tape and packing material and follow the procedure for preparing the vehicle after transport.

CAUTION

- **When using a pressure washer to clean vehicle, do not allow stream to contact dash, dash components, or other electrical components. Failure to comply may result in damage to equipment.**
- **When using a pressure washer to clean cab interior, keep nozzle of pressure washer away from vehicle or components a distance of 5 ft. (1.5 m) or more. Failure to comply may result in damage to equipment.**

d. Use clean cloth, wipe loose dust and dirt from cab interior.

e. Clean seats and seatbelts using a mild solution of warm water and soap solution. Never use solvents or abrasives.

3. **Lubrication.**

Refer to Lubrication Instructions (WP 0068) for all lubrication requirements for the M-ATV.

END OF TASK

INITIAL CHECKOUT AND ADJUSTMENT

This paragraph includes instructions for the initial checkout and adjustment values for the M-ATV. Complete inspection of the vehicle must be performed to ensure there are no loose wires or bent pin contacts that would cause a short circuit when power is applied.

1. Make complete visual inspection to ensure that required tools, publications, accessories, and attachments are with vehicle.
2. Perform all "B" (Before Operation) PMCS (WP 0059).
3. Rotate auxiliary mirrors to deployed position (WP 0015).
4. Visually inspect entire vehicle for loss of parts or damage which may have occurred during loading, removal, or shipment.
5. Check tires for proper inflation, refer to Central Tire Inflation System (CTIS) (WP 0031).
6. Check radiator shroud to ensure shroud is free of dents or other damage from shipment.
7. Inspect muffler, air cleaner, oil filter, fuel filter, and fan for visible damage.
8. Inspect all visible wire connectors for firm connections.
9. Inspect starter and alternator for loose connections and insecure mounting.
10. Examine winch connections for visible signs of damage.
11. Visually inspect all piping, lines, hoses, and wiring for cracks or damage, loose connections, or missing parts. Ensure all drain plugs are securely tightened.
12. Check front and rear undercarriage fire suppression detection tube pressure gauges if equipped for proper pressure (indicator in the green zone on dial) (WP 0059).
13. Inspect fuel tank for signs of damage.
14. Inspect taillights, headlights, clearance lights, spotlights, and blackout lights for proper operation.

15. Check fan belt and alternator belt for proper tension. Belt has proper tension when belt can be depressed approximately one-half inch by normal pressure (10 to 15 lbs. [4.5 to 6.8 kg]).

NOTE

Perform Step (16) for M1245 only.

16. Check rear capsule doors for proper operation, refer to Rear Capsule Operation (WP 0040). Inspect door tracks and seals for damage.

NOTE

- Perform Step (17) for M1240 and M1240A1 combat lock operation.
- Perform Step (18) for M1245 combat lock operation.

17. Check doors in the combat locked and combat unlocked position, refer to Capsule Doors Open/Close (WP 0010). Inspect latches and hinges for damage.

18. Check doors in combat locked and combat unlocked position refer to Combat Lock Key Operation (M1245) (WP 0011). Inspect latches and hinges for damage.

NOTE

Perform Step (19) for M1245.

19. Inspect Dyneema Panels for signs of damage and improper mounting.

END OF TASK

END OF WORK PACKAGE

PREPARATION FOR SHIPMENT

PREPARATION

Before vehicle is shipped, perform the following tasks:

NOTE

Notify Field Maintenance for tasks that cannot be performed with BII tools.

(1) Perform all Preventive Maintenance Checks and Services (PMCS).

(2) Correct all deficiencies noted during inspection if facilities are available.

(3) Store and secure Basic Issue Items (BII).

(4) Conduct a visual inspection of the vehicle. Check lubricant levels and tire pressures. Correct any discrepancies.

(5) Completely lubricate the chassis and all subordinate equipment in accordance with Lubrication Instructions.

(6) Clean batteries and battery cables. Keep the batteries fully charged and clean.

(7) Clean the exterior, interior of cab, engine, and undercarriage. Wash any oil, grease, or mud from tires.

END OF TASK

END OF WORK PACKAGE

CHAPTER 2

OPERATOR INSTRUCTIONS
FOR
M1240, M1240A1, AND M1245

LOCATION AND FUNCTION OF CONTROLS AND INDICATORS

This section shows the location and describes the function of controls and indicators used to operate the M-ATV.

Know the location and proper function of every control and indicator before operation of the M-ATV. Use this section to learn about each control and indicator to be used. Separate illustrations with keys are provided for each group of controls and indicator.

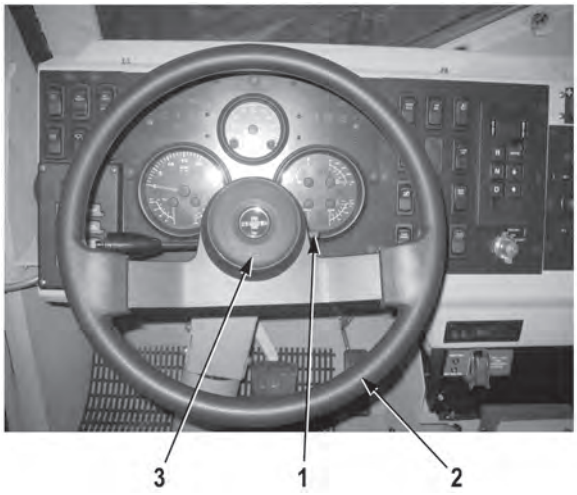

Figure 1. Steering Column Mounted Controls (Sheet 1 of 2).

Key Fig. 1	Control or Indicator	Function
1	Emergency Flasher Control	Turns hazard warning flashers on and off. Push red switch inward to turn on hazard warning flashers. Pull switch out to turn off hazard warning flashers.
2	Steering Wheel	Controls direction of vehicle.
3	Horn	Button sounds horn when pressed.

Figure 1. Steering Column Mounted Controls (Sheet 2 of 2).

Key Fig. 1	Control or Indicator	Function
4	Turn Signal Lever	Push up to signal right turn. Pull down to signal left turn. When turn is completed, lever will automatically return to center position.
5	High Beam	Push button to turn high beams on or off. High beam indicator will light (blue) when high beams are on.

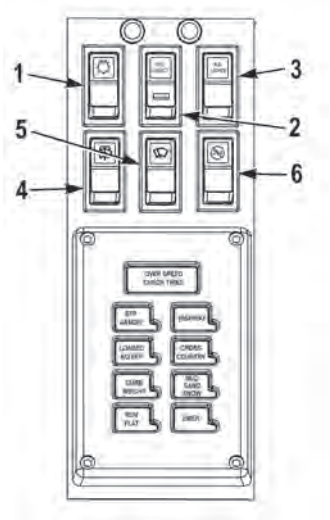

Figure 2. Instrument Panel Controls and Indicators (Sheet 1 of 16).

Key Fig. 2	Control or Indicator	Function
1	Headlights/Clearance/Marker Lights (3-way rocker switch)	Turns headlights and clearance/marker lights ON and OFF. CENTER position operates clearance/marker lights and parking lights. UP position adds headlights. DOWN position turns headlights and clearance/marker lights off.
2	Blackout Select (2-way rocker switch)	Selects between normal and blackout mode. Press smaller bottom switch up and hold while pressing main switch up (blackout light mode) or down (normal mode). Releasing small switch locks main switch in selected position. In blackout mode, backup alarm will not operate.
3	Blackout Light (3-way rocker switch)	Turns blackout drive lights ON and OFF. CENTER position turns blackout composite lights on. UP position adds blackout headlights. Press switch DOWN to turn blackout composite lights and headlights off.
4	Windshield Washer Switch	Controls function of windshield washer. For operation refer to (WP 0030).
5	Windshield Wiper Switch	Controls function of windshield wipers. For operation refer to (WP 0030).
6	CTIS OFF Switch	This switch is used to partially disable the CTIS when operating in temperatures below 0°F (-18°C) (WP 0046). The switch should normally be in the DOWN or OFF position.

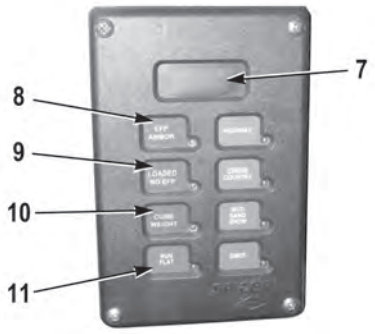

Figure 2. Instrument Panel Controls and Indicators (Sheet 2 of 16).

NOTE

For 1240A1 only, EFP Armor button is replaced with GVW NO EFP button.

Key Fig. 2	Control or Indicator	Function
7	OVER SPEED CHECK TIRES Light (Amber)	When OVER SPEED indicator is lit, indicator alerts driver that vehicle speed exceeds maximum allowable speed as determined by CTIS. An audible alarm will also come on with OVER SPEED indicator. When CHECK TIRES indicator is lit, indicator alerts operator that substantial damage may have occurred to one or more tires.
8	EFP ARMOR Button (M1240 and M1245)	Selects preset system tire pressure for full load conditions. Switching load setting results in pressure check.
8	GVW No EFP Button (M1240A1)	Selects preset system tire pressure for full load conditions. Switching load setting results in pressure check.
9	LOADED NO EFP Button	Selects preset system tire pressure for partial load.
10	CURB WEIGHT Button	Selects preset system tire pressure for empty conditions.
11	Run Flat Button	Used when vehicle has sustained minor tire damage.

Figure 2. Instrument Panel Controls and Indicators (Sheet 3 of 16).

Key Fig. 2	Control or Indicator	Function
12	HIGHWAY Button	Selects tire pressure for travel over improved paved roads.
13	CROSS COUNTRY Button	Adjusts tire pressure for travel over nonpaved, secondary roads and hard-packed surfaces.
14	MUD SAND SNOW Button	Selects automatic tire pressure for travel on soft surface trails and other unimproved surfaces.
15	EMER Button	Selects adjustment for very low tire pressure to help free a stuck vehicle or to travel short distance over terrain known to require very low tire pressure.

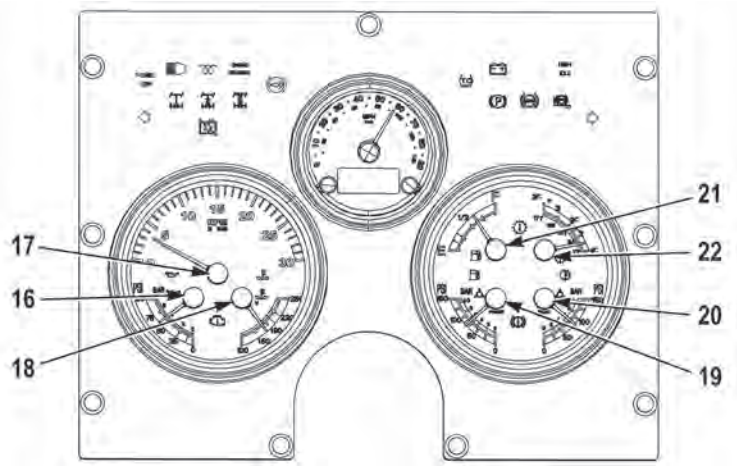

Figure 2. Instrument Panel Controls and Indicators (Sheet 4 of 16).

Key Fig. 2	Control or Indicator	Function
16	Engine Oil Pressure Gauge	Indicates engine oil pressure.
17	Tachometer	Indicates engine operating speed (rpm x 100).
18	Water Temperature Gauge	Indicates engine coolant temperature.
19	Front Air Pressure Gauge	Indicates front brake air pressure.
20	Rear Air Pressure Gauge	Indicates rear brake air pressure.
21	Fuel Gauge	Indicates amount of fuel in fuel tank.
22	Transmission Oil Temperature Gauge	Indicates transmission oil temperature.

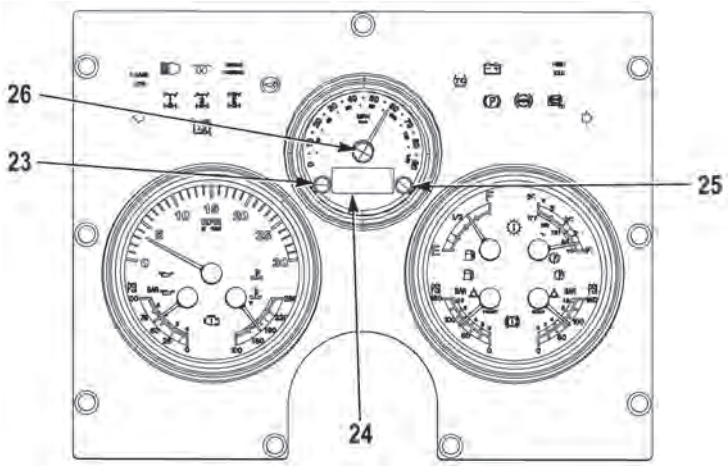

Figure 2. Instrument Panel Controls and Indicators (Sheet 5 of 16).

Key Fig. 2	Control or Indicator	Function
23	(m) Button	Multifunctional button for mode selection and scrolling.
24	LCD Instrument Panel Display	Displays odometer, trip odometer, hour meter, voltage reading, tests gauges, and indicator lights. Odometer indicates total miles traveled on vehicle. Trip odometer indicates total miles traveled since last time trip odometer was reset. Hour meter displays hours that engine has run. Gauge and indicator lights test, tests each gauge and indicator light on instrument panel for proper operation.
25	(t) Button	Multifunctional button for menu selection and scrolling.
26	Speedometer	Indicates vehicle travel speed.

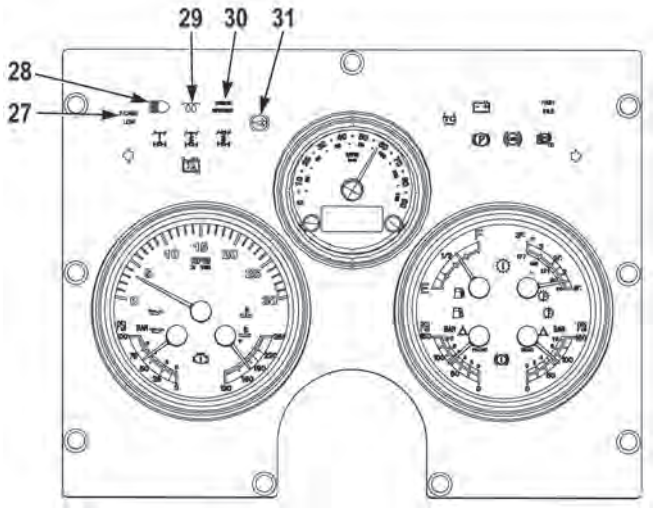

Figure 2. Instrument Panel Controls and Indicators (Sheet 6 of 16).

Key Fig. 2	Control or Indicator	Function
27	T-Case Low Indicator (green)	Illuminates when T-case is in low.
28	High Beam Indicator (blue)	Illuminates when vehicle lights are on high beam.
29	Wait to Start Indicator (yellow)	When illuminated, indicates engine intake heater is warming up in preparation to start engine. When indicator goes out, engine start can be attempted.
30	Engine Warning Indicator (red)	Illuminates when coolant temperature reaches 217ºF (103ºC) or when oil pressure is low (dependent on engine rpm) (audible alarm).
31	Exhaust Brake Indicator (green)	Illuminates when exhaust brake is ON.

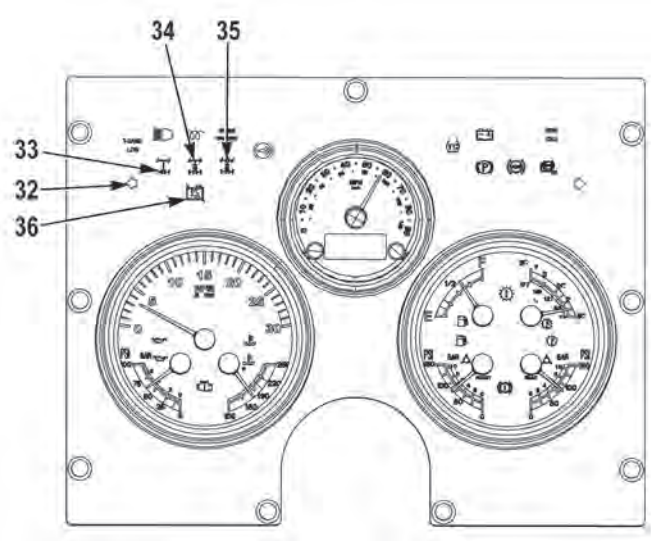

Figure 2. Instrument Panel Controls and Indicators (Sheet 7 of 16).

Key Fig. 2	Control or Indicator	Function
32	Left Turn Indicator (green)	Flashes when left turn signal is on.
33	DRIVELINE Lock Indicator (green)	Indicates transfer case lock is engaged.
34	DRIVELINE Lock Indicator (green)	Indicates transfer case and side-to-side lock on axle No. 2 are engaged.
35	DRIVELINE Lock Indicator (green)	Indicates transfer case and side-to-side lock on both axles are engaged.
36	Fan OFF Indicator (yellow)	Illuminates when engine cooling fan is OFF.

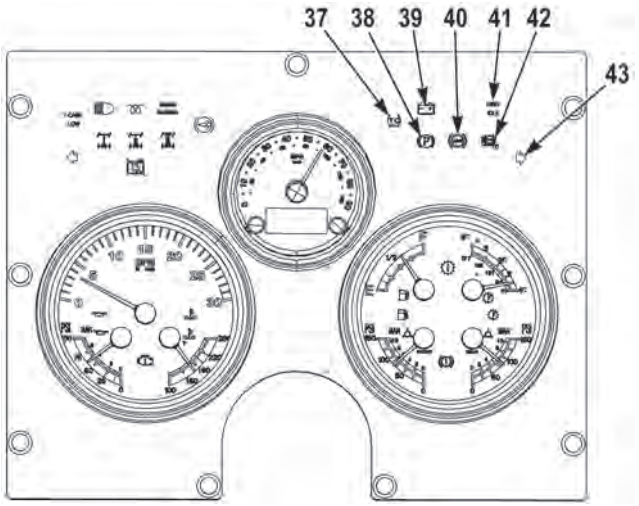

Figure 2. Instrument Panel Controls and Indicators (Sheet 8 of 16).

Key Fig. 2	Control or Indicator	Function
37	Traction Control Indicator (yellow)	Illuminates at key-on and remains lit until operator presses brake pedal when system is configured for TC. TC indicator flashes/ blinks while changing to CC or EMER mode. Once cycle is complete, indicator stays illuminated.
38	Park Brake Indicator (red)	Illuminates when parking brake is activated.
39	Charge Indicator (red)	Illuminates when alternator is not charging.
40	Antilock Brake System (ABS) Indicator (yellow)	Under normal conditions, ABS indicator illuminates steadily for a two-second bulb check whenever ignition switch is ON. Light turns OFF after bulb check when no ABS malfunctions are present. Illuminates steadily when ABS is malfunctioning. Blinks fault codes when diagnostic codes are activated.
41	HIGH IDLE Indicator (yellow)	Illuminates when engine is in HIGH IDLE mode.
42	Trailer Antilock Brake System (ABS) Indicator (yellow)	Illuminates when trailer ABS is malfunctioning.
43	Right Turn Indicator (green)	Flashes when right turn signal is on.

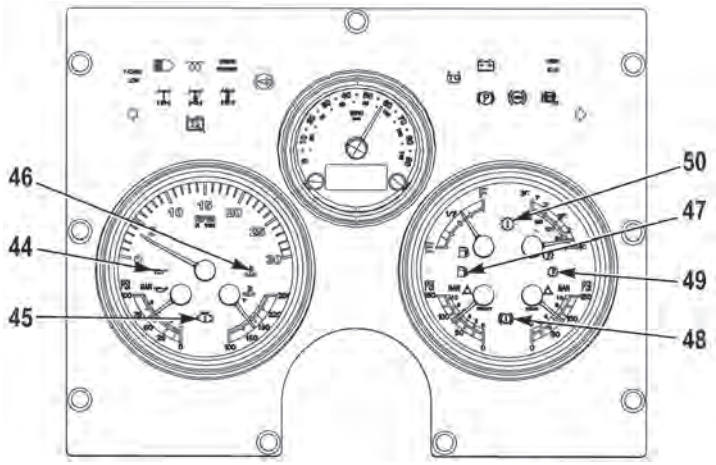

Figure 2. Instrument Panel Controls and Indicators (Sheet 9 of 16).

Key Fig. 2	Control or Indicator	Function
44	Oil PSI Warning Indicator (red)	Illuminates when engine oil pressure is below 5 psi (34 kPa) (audible alarm).
45	Check Engine Indicator (yellow)	Illuminates when fault is detected in engine.
46	Water Temperature Indicator (red)	Illuminates when coolant temperature reaches 235ºF (113ºC). Audible buzzer also sounds. Cooling system fan turns ON when coolant temperature reaches 205ºF (96ºC) (audible alarm).
47	Low Fuel Indicator (yellow)	Illuminates when fuel level is low.
48	LOW AIR Warning Indicator (red)	Illuminates when either front or rear air system pressure drops between 64 and 76 psi (441 and 524 kPa) (audible alarm).
49	Transmission Temperature Indicator (red)	Illuminates when transmission fluid temperature reaches 300ºF (149ºC) (audible alarm).
50	Check Transmission Indicator (yellow)	Illuminates when transmission indicates a problem (sinking input).

Figure 2. Instrument Panel Controls and Indicators (Sheet 10 of 16).

Key Fig. 2	Control or Indicator	Function
51	HIGH IDLE (momentary)	Toggles high idle system between ON and OFF with each upward activation of switch.
52	EXH BRK (2-position switch)	Turn exhaust brake/retarder ON when switch is in UP position.
53	Driveline Lock Switch	Allows operator to manually override CTIS by sequentially engaging locks for transfer case and axles.
54	TOW MODE	Unlock transfer case solenoids so transfer case can be put in neutral.
55	T-Case LOW/HIGH	Toggles between T-Case in LOW setting and T-Case HIGH setting.

Figure 2. Instrument Panel Controls and Indicators (Sheet 11 of 16).

Key Fig. 2	Control or Indicator	Function
56	Fan Ford (2-position) Switch	Turns engine fan ON and OFF. Fan OFF light will illuminate when switch is turned ON.
57	ABS Diagnostics (2-way momentary switch)	Turns ON and OFF Antilock Brake System (ABS) diagnostics. ABS light will illuminate when ON.
58	REAR HVAC Switch	Turns ON and OFF REAR HVAC system.
59	Engine Ignition Switch	Turns engine ON and OFF.

Figure 2. Instrument Panel Controls and Indicators (Sheet 12 of 16).

Key Fig. 2	Control or Indicator	Function
60	Dash Light Dimmer Switch	Toggles dash lights from bright to dim.
61	Dome Light Dimmer Switch	Toggles dome lights from bright to dim.
62	Dome Light Switch	3-way switch turns dome lights ON and OFF. • Select dome lights (up) for normal operation. • Select center position to turn dome lights OFF. **NOTE** Dome lights (up position) will not work while in blackout mode. • Select B.O. dome lights (down) for dome lights during blackout operation.

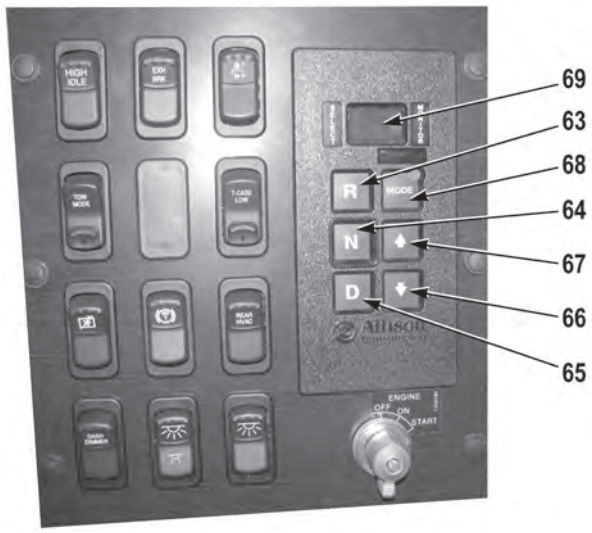

Figure 2. Instrument Panel Controls and Indicators (Sheet 13 of 16).

Key Fig. 2	Control or Indicator	Function
63	R (Reverse)	Use for backing vehicle.
64	N (Neutral)	Use this position when starting engine, parking vehicle, or if vehicle is unattended while the engine is running.
65	D (Drive)	Use for all normal driving conditions. Transmission will upshift and downshift automatically. Transmission will start in first gear.
66	Down Arrow	Depress when in DRIVE to request next lower speed range. Continuously press arrow to reset in lowest range available.
67	Up Arrow	Depress when in DRIVE to request next higher speed range. Continuously press arrow to reset in highest range available.
68	MODE	Use for selecting Diagnostic Trouble Codes (DTC).
69	Digital Display	Shows highest attainable and current speed range, diagnostic codes logged, and transmission fluid level.

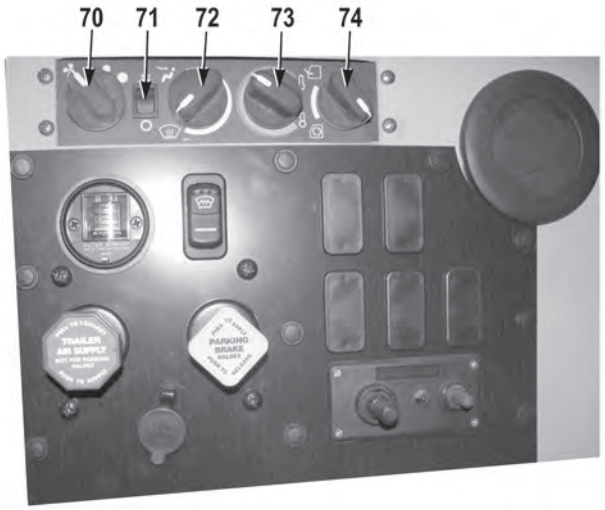

Figure 2. Instrument Panel Controls and Indicators (Sheet 14 of 16).

Key Fig. 2	Control or Indicator	Function
70	Fan Control Switch	Controls speed of fan (LOW/MED/HIGH). Lowest setting turns fan OFF.
71	Air conditioning (A/C) Control	Turns A/C ON or OFF.
72	Cab Air Directional Control Switch	Controls direction of air. Turn switch to direct air to defroster louvers. Turn switch to direct air to floor.
73	Temperature Control Switch	Controls temperature level or amount of heat entering cab.
74	Vent Control Switch	Bottom position recirculates air throughout cab. Top position controls amount of outside air entering cab through fresh air vent.

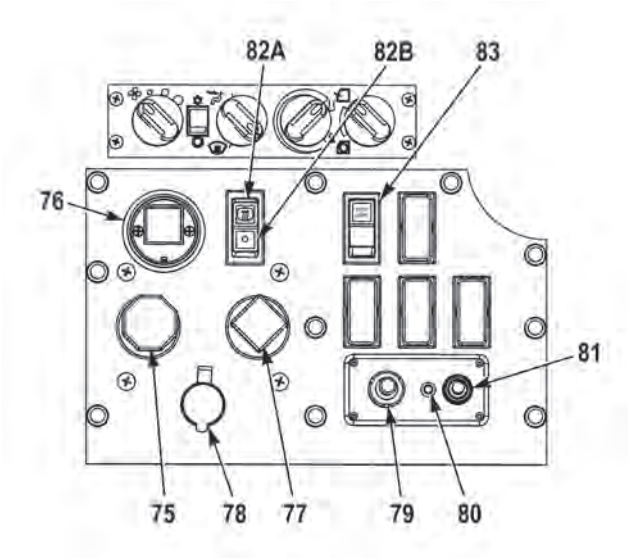

Figure 2. Instrument Panel Controls and Indicators (Sheet 15 of 16).

Key Fig. 2	Control or Indicator	Function
75	TRAILER AIR SUPPLY	Push to supply air to trailer air system. Pull to shut off trailer air.
76	Air Filter Restriction Indicator	Shows condition of air filter. Push button to reset.
77	PARKING BRAKE Control	Push to release vehicle brakes. Pull to apply vehicle and trailer brakes.
78	12 VDC AUX Receptacle	Power supply for 12-VDC AUX components.
79	Front Spotlight Joystick	Controls position of front spotlight.
80	Front Spotlight Indicator	Illuminates red when front spotlight is activated.
81	Front Spotlight ON/OFF Switch	Turns front spotlight power ON and OFF.
82A	DEICER ON/OFF Switch	Turns DEICER ON and OFF. DEICER system warms windshield to help remove snow and ice. • UP position turns DEICER ON. • DOWN position turns DEICER OFF.
82B	DEICER ON/OFF Indicator	Illuminates when DEICER is activated.
83	Spotlight ON/OFF Switch (M1240 and M1240A1)	Turn front and rear spotlights ON and OFF.

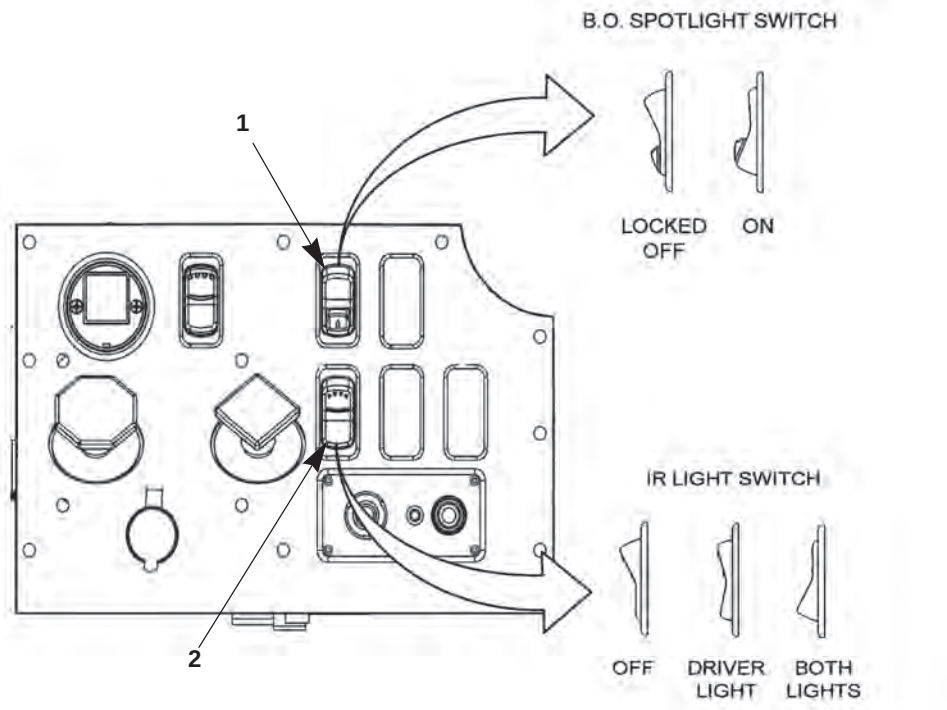

Figure 2. Instrument Panel Controls and Indicators (M1245) (Sheet 16 of 16).

Key Fig. 2	Control or Indicator	Function
1	B.O. (Blackout) Spotlight Switch	Toggle switch ON, (up position) to place spotlights in blackout mode.
2	Infrared (IR) Switch	Toggle switch to the center position to activate the driver side IR Light. Toggle switch to the up position to activate both IR Lights.

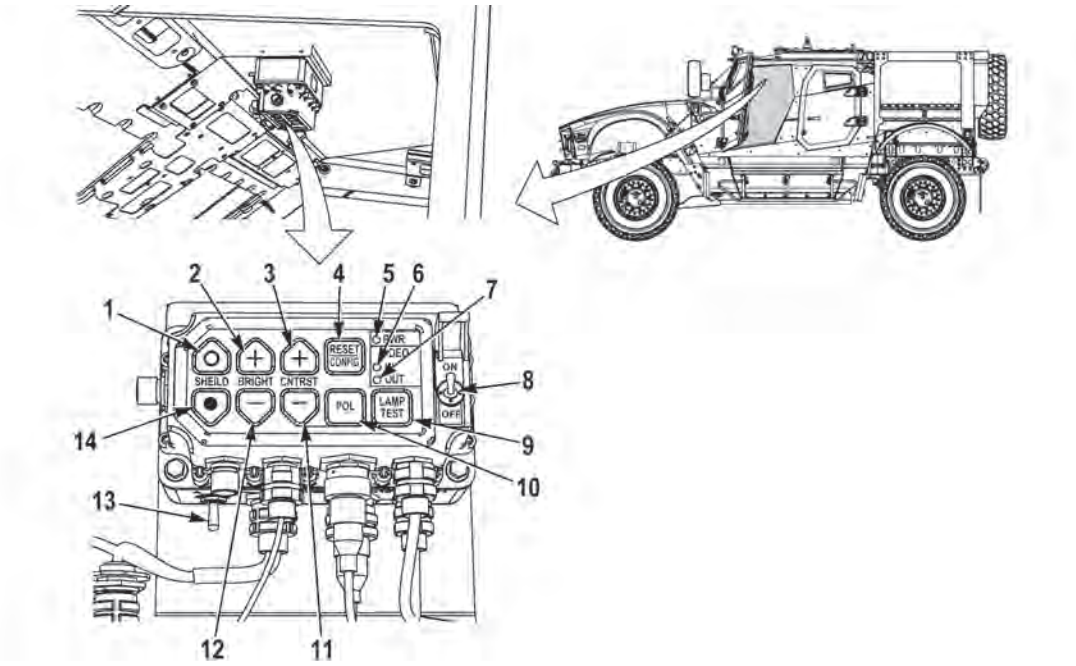

Figure 3. Check-6 Control Boxes (M1240/M1240A1 If Equipped).

Key Fig. 3	Control or Indicator	Function
1	Protective SHIELD Button	Opens protective shield on camera.
2	BRIGHT + Control	Increases the brightness of video display.
3	CNTRST + Control	Increases the contrast of video display.
4	RESET/CONFIG Button	Is a dual functionality button. RESET brings the system back to default settings. CONFIG enables the selection of various system background overlays.
5	PWR Indicator	A green colored LED is illuminated indicating power to the system.
6/7	VIDEO IN/OUT Indicator	An amber colored LED that is not illuminated unless loss of video signal is detected.
8	Power Switch	Turns power ON and OFF to components of Check-6 system.
9	LAMP TEST Button	Illuminates all three LEDs (PWR, VIDEO IN, VIDEO OUT) as a check that they are operational.
10	POL Button	Adjusts the infrared display from a white-on-black to black-on-white display.
11	CNTRST - Control	Decreases the contrast of video display.
12	BRIGHT - Control	Decreases the brightness of video display.
13	Camera Toggle Switch	Activates selected camera by switching between “A” and “B”.
14	Protective SHIELD Button	Closes protective shield on camera.

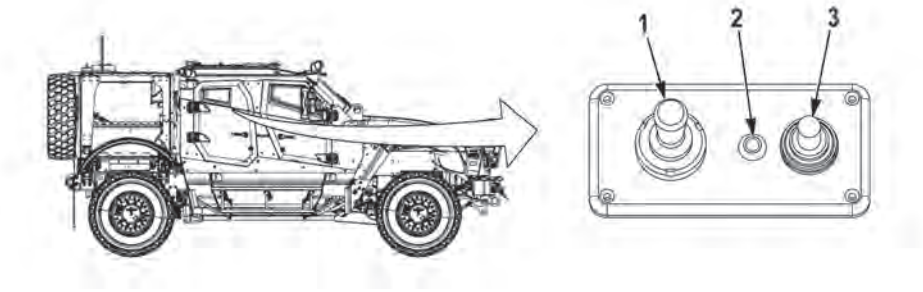

Figure 4. Rear Spotlight Controls.

Key Fig. 4	Control or Indicator	Function
1	Rear Spotlight Joystick	Controls position of rear spotlight. Located above door.
2	Rear Spotlight Indicator	Illuminates red when rear spotlight is activated. Located above door.
3	Rear Spotlight ON/OFF Switch	Turns rear spotlight power ON and OFF. Located above door.

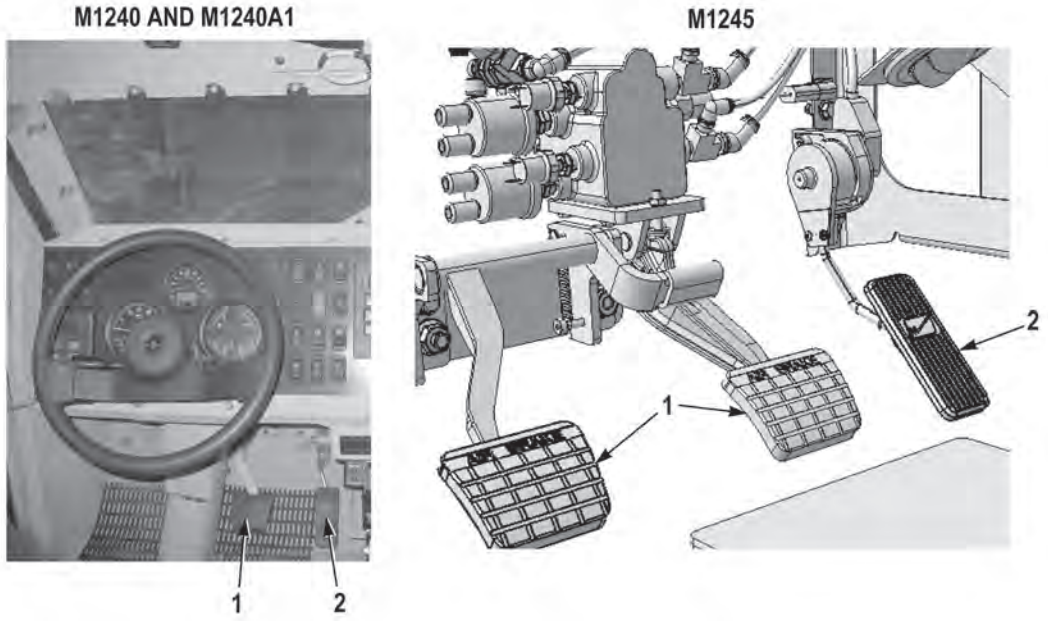

Figure 5. Capsule Mounted Foot Controls.

Key Fig. 5	Control or Indicator	Function
1	Service Brake Pedal	Applies service brakes.
2	Throttle Control	Controls engine speed.