TECHNICAL MANUAL

OPERATOR’S MANUAL

FOR

CARRIER, PERSONNEL, FULL TRACKED, ARMORED, M113A2
NSN 2350-01-068-4077

CARRIER, COMMAND POST, LIGHT TRACKED, M577A2
NSN 2350-01-068-4089

CARRIER, MORTAR, 120-MM, M121; SELF-PROPELLED, M1064
NSN 2350-01-338-3116

CARRIER, STANDARDIZED INTEGRATED COMMAND POST SYSTEM,
M1068
NSN 2350-01-354-5657

CARRIER, SMOKE GENERATOR, FULL TRACKED, M1059
NSN 2350-01-203-0188

COMBAT VEHICLE, ANTI-TANK, IMPROVED TOW VEHICLE, M901A1
NSN 2350-01-103-5641

SUPERSEDURE NOTICE — This manual supersedes TM 9-2350-261-10 dated 12 July 1990, including all changes.

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HEADQUARTERS, DEPARTMENT OF THE ARMY
August 2005
WARNING SUMMARY

GENERAL WARNINGS NOT FOUND IN WP PROCEDURES

The following WARNINGs are general safety statements. They are not unique to any specific procedures and, therefore, do not appear elsewhere in this TM. All personnel operating this equipment or working near this equipment must understand and continually observe the precautions in these WARNINGs.

WARNING

Drivers below 62 inches (1.57 meters) in height may not have adequate open hatch vision while properly operating the vehicle controls. Accidents caused from loss of vehicle control could result in death or injury to personnel. Before assuming vehicle driver responsibilities, it must be verified during drivers training that without the use of aids the driver can see the feet of a ground guide 30 feet (9.14 meters) in front of the vehicle and be able to operate all driver controls to their maximum potential.

WARNING

Heater and engine exhaust fumes contain deadly poisonous gases. Severe exposure can cause death or permanent brain damage. Exhaust gases are most dangerous in places with poor air flow.

To protect yourself and other personnel from carbon monoxide poisoning, obey the following rules:
- Do not run heater or engine indoors unless you have very good air flow.
- Do not idle engine for long periods of time unless there is very good air flow.
- Do not drive carrier with any power plant access covers open or removed.
- Be alert at all times. Check for the smell of exhaust fumes. If you notice any fumes, OPEN HATCH COVERS, RAMP ACCESS DOOR, OR RAMP RIGHT AWAY.

Exhaust gas poisoning causes dizziness, headache, loss of muscle control, sleepiness, coma, and death. If anyone shows signs of exhaust gas poisoning, get ALL PERSONNEL out of the carrier. Make sure they have lots of fresh air. KEEP THEM WARM, CALM, AND INACTIVE. GET MEDICAL HELP. If anyone stops breathing, give artificial respiration. See FM 4-25.11 for first aid.

Remember: The best defense against exhaust gas poisoning is good fresh air flow.
WARNING SUMMARY (cont)

WARNING

Noises from carrier or weapons can damage hearing of personnel in carrier. All personnel in carrier must wear DOUBLE HEARING PROTECTION when guns or carrier are operated. Hearing protection devices must be properly worn to provide effective protection.

If DOUBLE HEARING PROTECTION is not worn, the safe level of noise exposure will be exceeded in a short time. Hearing loss occurs gradually. Each noise exposure that exceeds the ear protection guidelines below will cause a temporary hearing loss. Over time, the loss in hearing will become permanent. Plan each day’s operation, and be sure all crew and riders have the required ear protectors. Spare foam earplugs must be available.

Definitions:

DH-132  The "tankers helmet," also called "CVC" helmet. Must be in good condition, with liner and earcups fitted tightly, and chin strap worn at all times.

Earplugs  Only standard issue earplugs are acceptable. All of the dismounted squad soldiers must be trained in how to use them. Since they may be removed and lost, spares must be carried.

Double Hearing Protection  Use of two hearing protection devices at the same time. For this carrier, use earplugs with the DH-132 helmet.

Ear Protection Guidelines:

Driver
Must wear DH-132 helmet at all times.
Must wear DH-132 helmet plus earplugs for operations exceeding 14 miles (23 km) in 24 hours.
Must close hatch immediately if .50 caliber machine gun is fired over front part of carrier.
Hatch may remain open and locked during carrier operation.

Commander
Must wear DH-132 helmet at all times.
Must wear DH-132 helmet plus earplugs for all operations exceeding 14 miles (23 km) in 24 hours.
Hatch may be locked open at all times.

Squad Members
Must wear helmet and ear plugs at all times.

Use of Radio with Earplugs
Wearing foam earplugs in addition to your DH-132 helmet can actually improve your ability to hear the radio in a high noise level area. DO NOT remove the earplugs to use the radio.

LIST OF WARNINGS IN WP PROCEDURES
This list includes all the critical WARNINGs in the WP procedures. Study these WARNINGs carefully. They can save your life and the lives of soldiers with whom you work.
WARNING SUMMARY (cont)

WARNING

Lowering ramp could injure personnel. Make sure not one is in ramp zone before you lower ramp.

Unlocked ramp can fall open suddenly. Personnel can be killed or injured. Check that ramp cable is connected with no slack. Ramp system and hull can get damaged if ramp unlocks when carrier is in operation. Do not operate carrier if locks do not secure ramp properly. Keep away from ramps that have come open during carrier operation.

WARNING

Operating carrier in reverse is dangerous due to limited vision and reversed steering. Always post ground guides before you back up.

WARNING

Unlatched hatch covers can swing and injure personnel. Make sure hatches are latched open or closed and safety pins installed.

WARNING

Do not look directly into infrared lights. You may damage your eyes. Do not touch lens. You can burn your fingers.
WARNING SUMMARY (cont)

WARNING

HIGH VOLTAGE IN THE M19 periscope can cause serious injury or death. To avoid accidents:

ALWAYS connect power cable to periscope BEFORE turning MASTER SWITCH and I.R. power switch to ON.

Always wait at least 2 minutes BEFORE you disconnect the power cable from the periscope when turning I.R. POWER switch and MASTER SWITCH OFF.

NEVER disconnect the power cable from the periscope until the image disappears from the periscope screen.

NEVER touch the end of the cable. Voltage could exceed 16,000 volts.

WARNING

Fire resistant hydraulic fluid (FRH) may contain Tricresyl Phosphate which, if taken internally, can produce paralysis. Hydraulic fluid may be absorbed through the skin. Wear long sleeves, gloves, goggles, and face shield. IF FRH gets in eyes, wash them immediately and get medical aid immediately. If FRH gets on skin, thoroughly wash with soap and water. Wash hands thoroughly prior to eating or smoking.

For artificial respiration and first aid, see FM 4-25.11.

WARNING

When using external power, ensure proper grounding procedures are followed. Failure to do so may result in personal injury and/or damage to the equipment. See TM 11-7010-256-12&P for installing surface wire grounding system.
WARNING

Ramp access door is heavy. It can swing and injure personnel. Do not stand behind ramp access door. Keep hands out from between handle and ramp access door.

WARNING

Always wear eye protection when using a hammer. Eye injury may result if metal chips contact eyes.

WARNING

Vehicle operation during hot weather may result in heat stress to crew members. Crew members should limit their exposure based on TB Med 507. Ramp door should be opened to ensure ventilation is adequate, when appropriate.

WARNING

Ramp access door is heavy. It can swing and injure personnel. Stand clear when you release ramp access door hook.
WARNING

The use of the left hand to grasp and close the ramp access door will expose the thumb to being extended beyond the door’s edge and possible amputation when the door is pulled closed. When using the left hand, use only the center of the handhold and be aware of thumb position.

WARNING

Commander’s hatch cover could fall and injure you. Keep hands clear when you open or close commander’s hatch cover.

WARNING

Unsecured hatch cover could move and hit you in the head. When hatch is closed, secure hatch with exterior locknut.

WARNING

Cargo hatch cover is heavy. It can fall and injure you. When opening or closing cover, keep your head clear of the cover and keep your hands clear of the rim.
WARNING SUMMARY (cont)

WARNING

Power plant access door could fall and injure you. Install door brace before you work under door.

WARNING

Seat can spring up and hit you when vertical control handle is released. Make sure you are sitting in the seat before releasing vertical control handle.

WARNING

Hanging loads could kill or injure you. Keep away from hanging loads and overhead equipment.

WARNING

Engine exhaust gas is deadly poison. Make sure power plant access panels are closed tight before you start engine.
WARNING SUMMARY (cont)

WARNING

Sudden carrier movement can throw you out of seat. Wear seat belt while carrier is in motion. Do not use any seat with missing or inoperative seat belt.

WARNING

Noise levels in carrier could damage hearing. Wear ear protection. Read warning in front of this manual.

WARNING

When starting, carriers can move suddenly and crush personnel. Personnel should stay clear of area between carriers.

WARNING

Electrical slave cable can be improperly connected causing electrical spark or fire. Personnel can be killed or injured. Equipment can be damaged. Match connector guide lug and cable prongs with receptacle hole.
WARNING

Electric sparking can burn you. Equipment can be damaged. Make sure to disconnect slave cable carefully in order to not cause any sparks.

WARNING

Applying brake pressure hard can cause carrier to stop suddenly. Personnel could be injured. Apply brake pressure lightly and with caution.

WARNING

Carrier noise can cause permanent hearing damage. Double hearing protection must be worn. See warning in front of manual.

WARNING

Sticking or failed linkages can cause carrier to crash. Personnel can be killed or injured. If accelerator pedal does not operate smoothly, or engine does not return to idle when accelerator pedal is released, do not drive carrier.
WARNING SUMMARY (cont)

WARNING

When a track vehicle gets out of control and overturns, it is safer to stay in the vehicle than to try to get out while the vehicle is still moving. You may receive slight injuries from being thrown against metal parts; but if you try to leave the vehicle, it may roll over and crush you. Once the vehicle stops moving, get out as fast as possible because spilled fuel and oil may catch on fire. The first thing the driver should do in such an emergency is shut off the engine and turn off the master switch to minimize the fire hazard.

WARNING

Pivot steering can kill or injure personnel and damage equipment. STOP vehicle and CHECK for clearance before operating pivot steer. Always post ground guides before you pivot when near personnel or equipment.

WARNING

Ammunition can explode and kill you. Do not start heater until ammunition and combustible/explosive materials are properly stored at least 30 inches from heater vents. Combustible materials must be stored 12 inches or more from metal surfaces of heater.

WARNING

Heater exhaust fumes contain deadly poisonous gases. Severe exposure can cause death or permanent brain damage. Be alert at all times. Check for smell of exhaust fumes. If you detect or suspect the presence of fumes, open all hatches right away. Shut heater OFF.
WARNING

Fire extinguisher CO₂ can cause suffocation and/or severe burns. Handle the fire extinguisher carefully. Do not bang or drop cylinder.

WARNING

If CO₂ is discharged into engine compartment while engine is running, engine exhaust may be poisonous. Poisonous gas can injure you. Stop engine before you discharge CO₂. If CO₂ is discharged while engine is running, do not breathe engine exhaust.

WARNING

Engine fan can blow away CO₂ before fire is extinguished. Personnel can get burned. Equipment can get damaged. Stop engine before you operate fire extinguisher.

WARNING

Fire extinguisher CO₂ can cause suffocation and/or severe burns. Handle the fire extinguisher carefully. Do not bang or drop cylinder.
WARNING SUMMARY (cont)

WARNING

Do not touch cone when using extinguisher. Hands will be severely burned.

WARNING

Carrier can roll over and kill or injure personnel. Avoid high speeds and sudden turns when driving on hills or rough terrain. Wear seat belts.

WARNING

Carrier can roll over and kill or injure personnel. Do not drive on side slopes steeper than 30%.

WARNING

An inoperable/unsafe ramp can fall and kill you. Do not attempt to manually raise or lower an inoperable/unsafe ramp. Notify unit maintenance to raise or lower an inoperable/unsafe ramp.

WARNING

Use tow bar or two crossed tow cables and use steering levers to stop carrier, when necessary.
WARNING

Steering and braking control are lost when final drive shafts are disconnected. Personnel can be killed or injured. Do not use tow cables when drive shafts have been disconnected.

WARNING

Carrier could roll and kill or injure personnel when final drive shafts are disconnected. Block carrier tracks and connect tow bar to disabled carrier and to tow vehicle before disconnecting drive shafts.

WARNING

Braking from high speeds when you tow with tow cables or tow bar can jackknife vehicles. Jackknife could injure personnel and damage vehicles. Do not tow at speeds over 10 mph (16 km/hr) with tow bar.

WARNING

Tow cables can snap and injure personnel. Close all hatch covers before you use tow cables to tow carrier. Clear personnel out of danger area.
WARNING SUMMARY (cont)

WARNING

Make sure carrier steering levers are locked and carrier tracks are blocked before removing or hooking up tow bar or removing U-joints. Personnel could be killed or injured.

WARNING

Smoke grenades can explode and kill or injure personnel. Handle grenades with care. Do not drop or throw grenades. Do not use damaged grenades. Keep grenades away from electric sparks. Keep containers sealed until you are ready to use grenades.

WARNING

Heat could set off smoke grenades and kill or injure personnel. Do not place smoke grenades on hot surfaces.

WARNING

Electrical trouble could cause smoke grenades to launch and kill or injure personnel. Make sure ARM/OFF switch is OFF before you load smoke grenades. Do not place any part of your body in front of smoke grenade launchers.
WARNING SUMMARY (cont)

WARNING

Electrical trouble could cause smoke grenades to launch and kill or injure personnel. Make sure ARM/OFF switch is OFF before unloading smoke grenades. Do not place any part of your body in front of smoke grenade launchers.

WARNING

Smoke grenades explode and burn. Handle them with care. Except when using your hand to load grenade launcher, never put any part of your body in front of loaded launcher tubes. You could be killed or injured. Check that personnel are clear of firing lines when launching grenades.

WARNING

If misfired smoke grenades launch during unloading, personnel in the area could be killed or injured. Keep carrier pointed down range until grenades are removed.

WARNING

Breathing excessive carbon monoxide gas can kill you. Keep fresh air flow. NBC kit and M42 protective mask will not protect you from carbon monoxide gas nor provide oxygen.
WARNING SUMMARY (cont)

WARNING

When water depth is unknown or deeper than 40 inches, do not attempt to ford stream. Carrier may sink and personnel could drown.

Personnel could be killed or injured if carrier moves with someone under it. Make sure engine is stopped, parking brake set, and carrier tracks blocked before crawling under carrier.

WARNING

Benzene (benzol), paint thinner, gasoline, and diesel fuel oil can burn, poison soldiers, and damage equipment.

Use the approved cleaning agents. See the instructions for this section.

WARNING

If you lose a track (break a track shoe or vehicle throws a track), extreme caution must be exercised in maintaining control. Immediately release accelerator and let the vehicle coast to a stop. Do not apply braking action, i.e. laterals, pivot, or any type of steering controls. This causes the vehicle to pull to the active or good track and could result in a rollover. It is absolutely necessary to apply braking action only and we stress only, if the vehicle is approaching a ravine, a cliff, or if you perceive the outcome to be catastrophic, probably resulting in fatalities. When a rollover is imminent, all crewmembers should immediately withdraw inside the vehicle, tighten seat belts and hold onto a secure fixture, until the vehicle comes to a complete stop.
WARNING

A fire can break out at any time. Personnel could be killed or injured. Equipment could be damaged. Make sure both fire extinguishers are ready to use before you operate carrier.

WARNING

When carrier is moving, pushing down on steering lever lock buttons can cause brake(s) to be locked. Personnel can be killed or injured. Perform steering and braking PMCS only when engine is stopped.

When steering and braking occur before notch 1 or after notch 4 on the quadrant, carrier can skid and crash. Personnel can be killed or injured. If steering and braking is not between notch 2 and notch 3, do not operate carrier. Notify unit maintenance.

If left and right steering lever positions are not within one notch difference when both are pulled to the fully applied position, carrier can skid and crash. Personnel can be killed or injured. Do not operate carrier. Notify unit maintenance.

WARNING

Make sure weapon is clear and safe before loading or testing, to prevent accidental firing of machine gun and injury to personnel.
WARNING

All personnel within 75 feet (22.9 meters) of M1059 during operation must wear personnel hearing devices to prevent hearing damage. Contamination is likely, and loss of hearing could occur. Personnel inside carrier in motion, with smoke generator in operation, must wear double hearing protection. Limit exposure of high noise levels to six hours to prevent hearing damage. Use of yellow/white foam ear plugs is prohibited for personnel operating M1059 carrier.

WARNING

Do not operate personnel heater if any fuel leak is found in heater or in fuel lines.

WARNING

Do not use heater during operation. Injury to personnel may occur.

WARNING

Hot parts can burn you. Let hot parts cool before you start work.
WARNING SUMMARY (cont)

WARNING

Carbon monoxide gas is deadly poison. Make sure operator’s power plant access panel is closed tightly.

WARNING

Fuel is flammable. Always use in area with good air flow, away from heat or flames. Do not breathe fumes. If fuel gets on hands, wash them. If fuel gets in eyes, flush with water and get medical help. Keep fire extinguisher nearby.

WARNING

Make sure carrier is properly grounded before refueling. Fuel can catch fire and burn you. Wipe up spilled fuel.

WARNING

Failure to lock the steering levers and block the road wheel can allow the carrier to move and may result in injury or death. Make sure carrier is on level surface and steering levers are locked to the rear.
WARNING SUMMARY (cont)

**WARNING**

Final drive housings can heat up enough to burn you.

**WARNING**

Roadwheel hubs and idler wheel hubs can heat up enough to burn you.

**WARNING**

Shock absorbers can heat up enough to burn you.

**WARNING**

Sparks from static electricity can cause a fire or explosion. Fuel cans should be removed before being filled. Metal nozzle must touch metal in filler neck when filling or ground wire must be attached to fuel can being filled. Fuel can catch fire and burn you. Do not smoke. Wipe up spilled fuel.
WARNING

Lowering ramp could injure personnel. Make sure no one is in ramp zone before you lower ramp. If tactical situation permits, sound horn before lowering ramp.

WARNING

Battery posts and cables touched by metal objects can short circuit and burn you or injure you. Use caution when you work with tools or other metal objects. Do not wear jewelry when you work on electrical system.

WARNING

Gas from batteries can explode and injure you. Do not allow sparks near batteries. Battery acid can blind or burn you. Do not get acid on your skin or eyes.

WARNING

Failure to open ventilator, when operating carrier with all hatches closed, will result in a serious lack of oxygen.
WARNING SUMMARY (cont)

**WARNING**

Inspect heater fuel lines for leaks. DO NOT operate heater with a bad fuel line. You could be badly burned.

**WARNING**

Driver’s hatch cover could fall and injure you. Keep your head and hands clear when you open or close driver’s hatch cover.

**WARNING**

Unsecured hatch cover could move and hit you in the head. When hatch is open, secure latch with locking pin.

**WARNING**

Diesel fuel can catch fire and burn you. Do not smoke or allow open flame near carrier when refueling.
Lack of air in carrier can cause personnel serious injury or death. When operating carrier with hatch covers closed, make sure personnel compartment ventilator is open.

Trim vane can fall and injure personnel. Make sure trim vane zone is clear when you lower or stow trim vane.

When stowing the eave poles, secure the split sections together. The inner section can extend and be lost or cause injury to personnel.

Failure to decontaminate and wear protective clothing after NBC attack could result in serious health hazards to personnel. Do not service air cleaner or vent system after NBC attack until carrier has been decontaminated.

If NBC exposure is suspected, all air filter medial should be handled by personnel wearing protective equipment. Consult your unit NBC officer or NBC NCO for appropriate handling or disposal instructions.

Unlatched hatch covers can swing and injure personnel. Make sure hatches are latched open or closed.
WARNING SUMMARY (cont)

WARNING

Don't smoke, have open flames, or make sparks around batteries, especially if the caps are off. Batteries can explode and cause injury or death.

Remove all jewelry such as rings, dog tags, bracelets, etc. If jewelry contacts battery terminals, a direct short will result in instant heating of metals, damage to equipment, and injury to personnel.

If batteries are frozen, do NOT attempt to slave start vehicle. Explosion can occur, causing injury to personnel and damage to equipment.

WARNING

You could be injured if track swings out and hits you. Do not stand in front of track being broken.

WARNING

Improper number of track shoes may prevent track from being adjusted correctly, creating a safety hazard.

For carriers with new track, ensure there are 63 track shoes on the left side of carrier and 64 track shoes on the right side of carrier.

For carriers with old track, ensure there are 62 track shoes on the left side of carrier and 63 shoes on the right side of carrier.
WARNING

Do not use the crowbar on the track shoe pins to get leverage. Any scratches may cause the pin to break and cause the track assembly to fall off the vehicle while operating. This may kill soldiers and damage equipment. Use the crowbar as shown to get leverage to install end connectors.

WARNING

Not getting the bolt tight enough may result in death to personnel and damage to equipment if the end connectors fall off during movement of the vehicle. Use the wrench extension over the breaker bar to achieve more leverage when tightening the end connector bolt.

WARNING

Loss of track end connector can cause track throw and loss of vehicle control. Soldiers can be killed or injured. Mark end connector bolts. Notify maintenance to torque bolts.

WARNING

Do not fill fuel can with smoke generator running, while smoking, or when near an open flame. Never overfill the fuel can or spill fuel. An explosion can be caused, and death or injury to personnel may result. If fuel is spilled, clean it up immediately.
WARNING SUMMARY (cont)

**WARNING**

Hot radiator coolant can burn you. Use hand to remove cap only if cool to touch. Turn cap slowly to release pressure. Replace cap by pressing down and turning cap until tight.

**WARNING**

Failure to decontaminate and wear protective clothing after NBC attack could result in serious health hazards to personnel. Do not service air cleaner or vent system after NBC attack until carrier has been decontaminated.

**WARNING**

Rifle bore cleaner can burn and could poison you. Use in well ventilated area. If cleaner gets on your hands, wash them. If cleaner gets in your eyes, flush with water and get medical help immediately.

**WARNING**

An inoperable/unsafe ramp can fall and kill you. Do not remove any device securing an inoperable/unsafe ramp. Notify unit maintenance to remove lifting equipment.
WARNING

Misfired smoke grenades could kill or injure personnel if mishandled. Do not attempt to move a dud grenade.

WARNING

Failure to set parking brake and block wheels can allow carrier to move and could result in personnel injury or death. Always set parking brake and block wheels before performing PMCS.

WARNING

Not having the correct track tension during inspection can cause you to not see defective track parts that could cause track failure and loss of vehicle control. Soldiers can be killed or injured. Adjust track tension before inspecting track assembly and track shoes.

WARNING

Failure to perform track PMCS and not repair or report to maintenance per technical manual procedures can allow you to operate the vehicle with defective track parts that could cause track failure and loss of vehicle control. Soldiers can be killed or injured.

Never operate a vehicle without performing the before mission PMCS track tension adjustment and track inspection per PMCS procedures in the technical manual. Repair or report problems to maintenance per technical manual instructions as outlined in PMCS.
WARNING

Track shoe bushing failure can cause track assembly failure and loss of vehicle control. Soldiers can be killed or injured.

Do not use excessive force that could damage the track shoe bushing while driving in the track pin during assembly.

WARNING

Worn or damaged track components can cause track failure and loss of vehicle control. Soldiers can be killed or injured. If track components are not in satisfactory condition, do not operate vehicle.

WARNING

Track shoe bushing failure due to improper angle of track during pin assembly can cause track assembly failure and loss of vehicle control. Soldiers can be killed or injured.

Make sure track is assembled with the right amount of angle or lift as shown below. Properly assembled track will lay flat. Incorrectly assembled track will bulge upward.