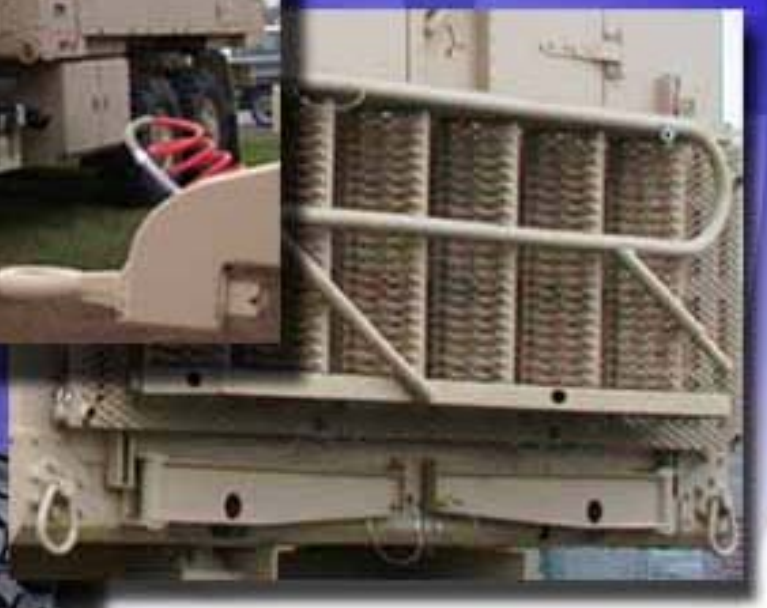
M1087A1 Expansible Van Operation Training Course

The Operator's Guide to the expansible van vehicle



INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN VEHICLE OPERATION TRAINING COURSE

HOW TO USE THIS GUIDE

This guide book includes all the instructor lessons listed in the Table of Contents (next page). **It is strongly recommended that any instructor new to this material take time to go through the lessons completely before conducting a class.**

The Vehicle Training PowerPoint Presentation is a visual training aid that complements the Lesson Guides. Although the information in the presentation corresponds to the lesson, **the presentation may include more graphics for clarification**.

The Instructor Guide includes the same information as the Student Lesson Guide. However, the Instructor Guide also contains the following additional elements to aid the instructor in teaching this course. While the majority of the lessons' pages are identical, the Instructor Lesson Aids may cause the layouts to differ slightly. For this reason, try to use the Training Presentation to keep students on track in lieu of page references whenever possible.

INSTRUCTOR LESSON AIDS:

Instructor's Note

The Instructor's Notes contains important information for the instructor. This information may include important facts to bring to the students' attention, materials to distribute, or tasks to complete during class.

CHECK ON LEARNING

The Check on Learning box contains questions or exercises that will help the instructor evaluate the students' comprehension of the lesson. Sometimes this box may refer to the lesson objectives as a guide.

PRACTICAL APPLICATION

The Practical Application box contains hands-on tasks that complement the lesson objectives.

This mouse graphic will let the instructor know when it's time to switch to the next slide in the media package. When you see this picture, advance to the appropriate slide before discussing the subject in the Instructor Guide. At the end of each lesson, advance to the opening slide of the following lesson.

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN VEHICLE OPERATION TRAINING COURSE

TABLE OF CONTENTS

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 0 – INTRODUCTION/ORIENTATION

LESSON:	0
LESSON TITLE:	INTRODUCTION/ORIENTATION
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION
TIME ALLOTTED:	0.50 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, OPERATOR MANUAL (TM-9-2320-392-10-1 AND TM 9-2320-392-10-2), AND WRITING UTENSILS
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	STUDENTS WILL BE ORIENTED TO THE CLASSROOM LOCATION, TELEPHONE NUMBERS TO CALL, EMERGENCY PROCEDURES, WASHROOM LOCATIONS, TRAINING SCHEDULES, OPERATOR MANUAL, AND STUDENT GUIDE LAYOUT.
CONDITION:	GIVEN A CLASSROOM ENVIRONMENT, STUDENTS WILL REVIEW THE COURSE, CLASSROOM LOCATIONS, AND ADMINISTRATIVE REQUIREMENTS.
STANDARD:	STUDENTS WILL DEMONSTRATE AN UNDERSTANDING OF THE DAILY TRAINING ACTIVITIES, RELATED ADMINISTRATIVE REQUIREMENTS AND HOW TO USE THE OPERATOR TM, INSTRUCTOR GUIDE, AND STUDENT GUIDE.

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 0 – INTRODUCTION/ORIENTATION

1.0 INTRODUCTION

- Distribute instructional materials before the students enter the classroom.
- Assemble the students in the classroom.
- Welcome the students to the class and introduce yourself and any assistant instructors.
- Have the students introduce themselves to the class.

2.0 STUDENT INFORMATION/ORIENTATION

- Distribute student registration forms.
    - Have students fill out and turn in the Student Emergency Information Form located in their lesson guide (show example on page iv).
    - Tell students to print the necessary information in a legible manner.
- Orient the students to the training area, restroom facilities, break area, snack areas, applicable local operating procedures, etc.
- Explain the class policies regarding smoking, eating, attendance, class schedule, breaks, etc.
- Provide a telephone number/name of person to call if the student is unable to attend the class.
- Answer any additional orientation questions students may have.

3.0 TRAINING OVERVIEW

- Present the Course Outline. Use the Table of Contents as a guide.
    - Give a brief overview of each lesson.
    - Point out the allotted time for each lesson.

INSTRUCTOR LESSON GUIDE

M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE

LESSON 0 – INTRODUCTION/ORIENTATION

U.S. ARMY TANK-AUTOMOTIVE & ARMAMENTS COMMAND

New Equipment Training

Student Information

The below information is required to identify individual students and will be used in case of an emergency.

Please attach a copy of your TDY orders to this form (you may block out the SSN if desired).

Full Name_____

Rank/ Grade _____

Local Address_____
(Hotel / Motel)

Phone_____

Unit_____ Supervisor_____

Unit / Work Address_____

Unit / Work Phone_____

Emergency Notification POC

Name_____

Address_____

Phone_____

M1087A1 Expansible Van Operation Training Course

LESSON 1

INTRODUCTION TO M1087 EXPANSIBLE VAN

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 1 – INTRODUCTION TO M1087A1 EXPANSIBLE VAN

LESSON:	1
LESSON TITLE:	INTRODUCTION TO M1087A1 EXPANSIBLE VAN
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	0.50 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, OPERATOR MANUAL (TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), WRITING UTENSILS, OVERHEAD PROJECTOR, SCREEN, AND TWO (2) M1087A1 EXPANSIBLE VANS
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	STUDENTS WILL BE ABLE TO IDENTIFY THE COMPONENTS COVERED IN THIS LESSON ON THE EXPANSIBLE VAN.
CONDITION:	GIVEN AN ACTUAL EXPANSIBLE VAN VEHICLE.
STANDARD:	POINT OUT AND BRIEFLY DESCRIBE THE FUNCTION OF THE COMPONENTS DESCRIBED IN THIS LESSON.

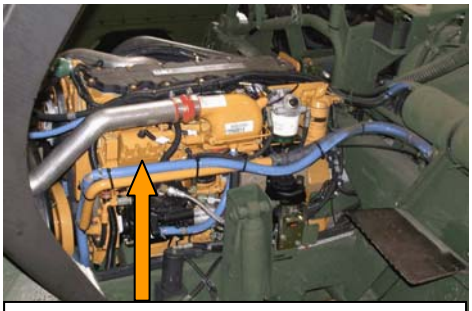
INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 1 – INTRODUCTION TO M1087A1 EXPANSIBLE VAN

1.0 INTRODUCTION

This lesson is being presented to familiarize the student with the FMTV A1 vehicle with an emphasis on the Expansible Van and its characteristics.

2.0 VEHICLE OVERVIEW

Earlier FMTVA1 vehicles were manufactured powered by a Caterpillar 3126B engine while current production models are powered by the Caterpillar C7 with Advanced Combustion Exhaust Reduction Technology (ACERT). Horsepower ratings remained the same at 275 for the LMTV and 330 for the MTV. The Caterpillar C7 with ACERT has incorporated a new Hydraulically-actuated Electronically-controlled Unit Injector (HEUI) oil pump ***(Figure 1-1a)*** and electronics to the turbocharger waste-gate control ***(Figure 1-1b)***. Pipe thread connections have been replaced with straight thread oil ring connections that bring the Caterpillar C7 "leak free" technology. The engine breather tube, mounted on top of the engine on the 3126B engine, has been moved to the left side of the C7 to allow for a lower installation height. The ACERT technology is US EPA Tier 3 compliant for emissions and provides advanced electronic control, precision fuel delivery, and refined air management for outstanding engine performance, reliability, and durability.

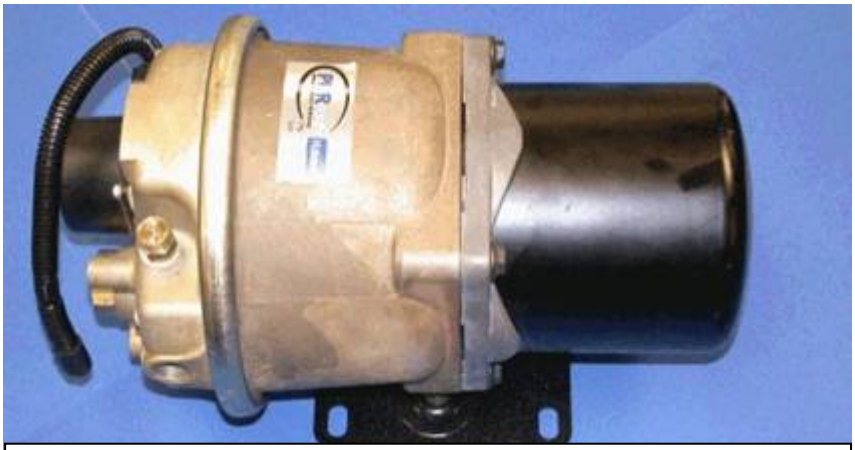


HEUI Oil Pump
(Figure 1-1a)

Wastegate Controlled Turbocharger
(Figure 1-1b)

The C-7 engine is equipped with a Hydraulically Actuated, Electronically Controlled Unit Injector (HEUI) oil pump, which, along with "leak-free technology," provides improved reliability (Figure 1-1a). The HEUI fuel system lowers emissions and decreases engine noise, and the electronic wastegate-controlled turbocharger enhances performance (Figure 1-1b).

The electrical system includes several components such as the power distribution panel, instrument panel, lighted indicator display, dashboard cable assembly, vehicle data computer, LED lights, and SAE wiring. These components will be covered in further detail throughout the course.



Air Dryer
(Figure 1-2)

The air dryer has a multi-treatment cartridge which employs five-stage cleaning to ensure dry system air, easy cartridge maintenance with a slide in-and-out cartridge and a 4-bolt mounting bracket (Figure 1-2).

Two-way Communicator
(Figure 1-3)

The optional two-way communication equipment can be used by the driver or passenger to communicate with troops during troop transport (Figure 1-3).

3.0 M1078A1 MTV EXPANSIBLE VAN

M1078A1 Expansible Van
(Figure 1-4)

The Expansible Van vehicle can be used wherever a climate-controlled power-generating environment is needed. The Cargo vehicle measures 32ft. 6in. long, 8ft. wide and 12ft. 3in. high. The curb weight of this vehicle is 32,276 lbs. It can carry a maximum payload of 5,000 lbs. (Figure 1-4).

Instructor's Note

Proceed to Lesson 2 – General Safety.

M1087A1 Expansible Van Operation Training Course

LESSON 2

GENERAL SAFETY

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 2 – GENERAL SAFETY

LESSON:	2
LESSON TITLE:	GENERAL SAFETY
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION
TIME ALLOTTED:	0.75 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, OPERATOR MANUAL (TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), WRITING UTENSILS, OVERHEAD PROJECTOR, AND SCREEN
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	GAIN KNOWLEDGE OF ALL RELATED SAFETY PRACTICES WHEN OPERATING FMTVS.
CONDITION:	GIVEN BOTH A CLASSROOM DISCUSSION AND A HANDS-ON DEMONSTRATION.
STANDARD:	STUDENTS WILL CONTINUOUSLY DEMONSTRATE SAFE WORKING HABITS AND COMPLETE THE FMTV OPERATOR TRAINING COURSE WITHOUT AN ACCIDENT THAT IS THE RESULT OF AN UNSAFE ACTION.

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 2 – GENERAL SAFETY

1.0 INTRODUCTION

This lesson will inform students of the general safety practices that must be observed while operating and maintaining the vehicles. Failure to practice general safety procedures may result in damage to equipment or serious injury to personnel.

2.0 OPERATING SAFETY

Do not start or operate the vehicle in an enclosed area without proper exhaust ventilation. Improper ventilation may cause a build up of toxic fumes, resulting in serious injury or death to personnel.

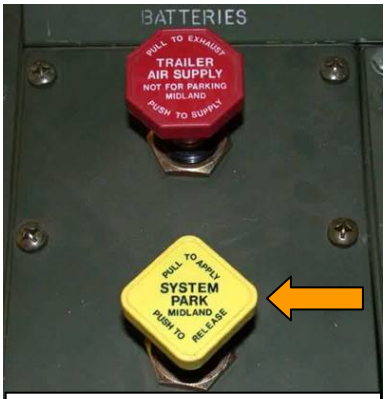
3 Points of Contact (Figure 2-1)

Keep steps and handholds clean and free of debris. Do not jump from cab or bed of vehicle. Use the available steps and handholds to prevent injury.

Three points of contact must be maintained at all times when boarding or departing the vehicle (Figure 2-1).

Operator w/ Seat belt fastened (Figure 2-2)

Do not attempt to start or drive the vehicle from any position other than the driver's seat. Make sure that the seat belt is properly fastened at all times and the seat is adjusted prior to operation. (Figure 2-2).



System Park Brake
(Figure 2-3)

Ensure the parking brake is applied before exiting the vehicle (Figure 2-3).

Fire Extinguisher
(Figure 2-4)

Ensure that the vehicle has a serviceable fire extinguisher and that you know how to operate it correctly and safely. All FMTVs are issued with a fire extinguisher. The Fire extinguisher is located in the cab. (Figure 2-4).

Tire and Wheel Assembly
(Figure 2-5)

Tire and wheel assemblies weigh in excess of 300 lbs. (136 kg) each (Figure 2-5). Handle tire and wheel assemblies carefully. Lifting a tire and wheel assembly into the vertical position should never be attempted by one person.

Oil dipsticks
(Figure 2-6)

When checking oil levels or performing the Driver Daily Inspection, be sure parking brake is applied and wheels are chocked (Figure 2-6).

Cautions and Warnings
(Figure 2-7)

When operating or performing maintenance, always read and heed the cautions and warnings contained in the technical manuals and those posted within the cab and on the engine, chassis, and body of the vehicle (Figure 2-7).

Operators must be aware of the sensitivity of the FMTV A1 model vehicle braking system. When braking, apply continuous pressure to the brake pedal. **Do not pump the brakes.** Use of the engine brake will cause the transmission to go into a programmed downshift, when the driver removes his/her foot from the accelerator pedal, which will quickly slow the vehicle. If the ABS indicator illuminates, the anti-lock braking system ECU has detected a fault. Notify field level maintenance upon completion of the mission. Failure to comply may result in damage to the equipment.

Do not use exhaust brake if operating on a wet or slippery surface; rear wheel lock-up can lead to loss of vehicle control and result in injury to personnel or loss of life. Use of the engine exhaust brake will be discussed in greater detail during Lesson 5.

The transmission incorporates a hold feature to prohibit upshifting above the gear selected during normal driving. For downhill operation, however, the transmission may upshift above the highest selected gear when the engine governed speed is exceeded and damaging engine overspeed is a possibility. On downgrades, vehicle speed may need to be restricted by using the brakes. Failure to maintain a speed within the selected gear may result in an upshifting and in loss of vehicle control.

1. Always use a ground guide when backing the vehicle. The operator has limited visibility when backing.
2. Ensure that you, as the operator, and the ground guide both understand all arm and hand signals that will be used.
3. Be completely familiar with the vehicle and its operation. Safe operation is greatly influenced by the operator's knowledge of the vehicle.
4. Exercise extreme care when making sharp turns with the vehicle. Maximum safe speed for sharp turns is 12 mph (19 km/h).

2.1 VAN OPERATION SAFETY

Keep the following facts in mind when operating the van vehicle:

Van Expanded with Clearance
(Figure 2-8)

When expanding or compressing the van, ensure there is adequate clearance (Figure 2-8).

Van Expanded on Level Ground
(Figure 2-9)

Do not expand the van while the vehicle is parked on an incline. **Do not drive the vehicle while the van is expanded** (Figure 2-9).

Camouflage netting weighs close to 400lbs., and when it is loaded on top of the van, the additional weight will change the center of gravity of the vehicle.

Leveling Jack
(Figure 2-10)

Handrails and Ladder
(Figure 2-11)

Secure the side of the vehicle and the handrails before stepping on the ladder (Figure 2-10, 2-11).

Rear of the Van
(Figure 2-12)

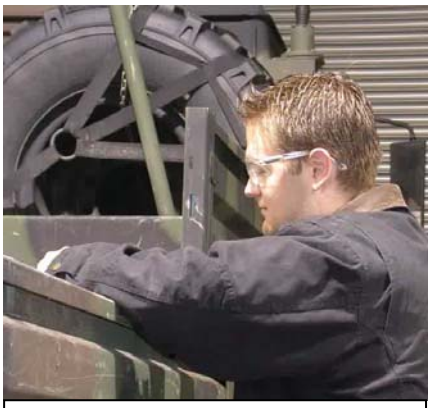
The van is not a personnel carrier. No one should occupy the van while it is in motion (Figure 2-12). When loading cargo into the van, make sure weight is distributed as evenly as possible between the left and right sides of the van. Heavy cabinets must always be mounted as low as possible. Failure to comply decreases the stability of the M1087A1 van and will increase the likelihood of a rollover.

Instructor's Note

The following section contains general safety information for maintenance personnel. This information is also useful for the operators and should be covered during the operator course. Ask the students if they have any questions on the material presented up to this point.

3.0 MAINTENANCE SAFETY

Before performing any maintenance on vehicle, ensure you are wearing proper clothing and jewelry is removed.



Wear Safety Glasses (Figure 2-13)

To prevent eye injury, wear safety glasses or goggles when working on any pressurized air, hydraulic, fluid, etc. system or while under the vehicle (Figure 2-13).

Use extreme care when servicing or performing maintenance on the engine while it is operating. Severe burns could result from hot engine parts and severe injuries may be caused by moving components.

Avoid Improper Hand Placement (Figure 2-14)

Avoid placing hands or fingers between objects which may pinch or crush them (Figure 2-14).

Before performing maintenance under vehicle ensure engine is off, parking brake is engaged, and wheels are chocked.

Do not smoke or allow open flame in the area while fueling the vehicle. Sparks and fire may create an explosion causing damage, injury, or death.

Do not open engine cooling system while engine is hot. Escaping hot coolant and steam may cause severe burns.

Use extreme caution when servicing batteries. Avoid sparks and open flames. Open batteries are extremely volatile and will explode. Electrolyte contains acid that will cause severe injury; avoid contact with skin and eyes.

Flat towing is the recommended means of towing. Lift and tow should only be performed in situations that provide no other means to move the disabled vehicle. Drive shafts must be disconnected if an M1078/M1078A1 or

M1083/M1083A1 series vehicle is flat towed over 100 miles or if the towing speed is over 35 MPH.

If you must lift the vehicle for towing, disconnect and remove drive shafts from the transmission and axles that are on the ground prior to towing. Failure to do so can cause serious transmission damage.
The new driveshaft requires no match-marking before the driveshaft is removed for flat-towing.

3.1 CAB TILTING

Cab Tilted (Figure 2-15)

WARNING: Never tilt cab while occupied. Remove all loose objects from cab interior before tilting (Figure 2-15). Close and securely latch both doors to prevent injury to personnel when tilting cab.

Instructor's Note

Describe to the students what prevents the cab from raising if the parking brake is not set.

Close and securely latch doors before tilting cab. The doors are heavy and will cause serious injury if they swing open during cab raising.

Personal injury or death may result if raised cab were to suddenly fall on operating or maintenance personnel.
Make sure all personnel stand clear and all doors are securely latched when raising the cab. Ensure the cab has completely tilted (over center) before working under the cab.

Never tilt cab when vehicle is parked facing a steep uphill grade, since its center of gravity may not pass forward of the cab hinge. If hydraulic system should fail, cab could fall, injuring maintenance personnel.

Instructor's Note

Inform students to refer to the Technical Manual (TM) for proper procedures.

Re-emphasize that no one should be riding in the van body while the vehicle is being driven.

4.0 SAFETY PRECAUTIONS TO OBSERVE WHEN TRANSPORTING OBJECTS IN THE M1087A1 VAN

Heavy objects/loads, such as tool boxes and heavy parts, must always be carried on the floor with the weight distributed as equally as possible between left and right sides of M1087A1 van. Failure to comply decreases the stability of the M1087A1 van and will increase the likelihood of a rollover.

Heavy cabinets must always be mounted as low as possible with the weight distributed as equally as possible between left and right sides of M1087A1 van. Remember to consider the weight of the items that will be stored in the cabinets. Failure to comply decreases the stability of the M1087A1 van and will increase the likelihood of a rollover.

When placing items inside the M1087A1 van, always keep in mind that heavier items must always be positioned as low as possible and the weight distributed as equally as possible between left and right sides of the M1087A1 van. Failure to comply decreases the stability of the M1087A1 van and will increase the likelihood of a rollover.

CHECK ON LEARNING

Instructors will observe student safety practices during the training course according to the lesson objectives.

M1087A1 Expansible Van Operation Training Course

LESSON 3

INDICATORS AND CONTROLS

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 3 – INDICATORS AND CONTROLS

LESSON:	3
LESSON TITLE:	INDICATORS AND CONTROLS
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	2.5 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, WRITING UTENSILS, OPERATOR MANUAL TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), OVERHEAD PROJECTOR, SCREEN, AND TWO (2) M1087A1 EXPANSIBLE VANS
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	IDENTIFY AND STATE FUNCTION OF ALL OPERATOR RELATED INDICATORS AND CONTROLS ON THE VEHICLE.
CONDITION:	GIVEN CLASSROOM DISCUSSION AND HANDS-ON EXPOSURE TO AN FMTV A1 VEHICLE.
STANDARD:	STUDENT WILL BE ABLE TO IDENTIFY THE TYPE OF INDICATOR AND CONTROL, STATE ITS FUNCTION AND STATE, IF APPLICABLE, THE INDICATORS' SAFE MINIMUM AND MAXIMUM OPERATION LIMIT.

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 3 – INDICATORS AND CONTROLS

1.0 INTRODUCTION

This lesson is being presented to familiarize students with the indicators and controls on the FMTV A1 model. This lesson will review both internal and external indicators and controls.

2.0 INTERIOR INDICATORS AND CONTROLS

2.1 INSTRUMENT PANEL ASSEMBLY

The Ether Start Switch is no longer used on this version of the FMTV.

Instrument Panel Assembly (Figure 3-1a)

Engine Fan Off Switch
The Engine Fan Off switch is only used to disable the fan for deep water fording when water depth is 20 in. or greater. When the switch is actuated, the engine "fan off" indicator light illuminates (amber) on lighted indicator display to notify the driver that the fan is disabled.

Lamp Test Switch
The Lamp Test Switch tests all lights on lighted indicator display.

Lighted Indicator Display
Indicators illuminate to indicate operating characteristics of the vehicle and display visual lighted warnings.
Any indicator light not illuminating when the lamp test switch is utilized should be noted and reported to maintenance.

Instrument Panel Assembly
(Figure 3-1b)

Master Power Switch
The Main Power Switch controls electrical power for engine starting and/or electrical system operation.

Warning Light Switch
The Warning Light Switch operates the vehicle warning light, when installed.

Hazard Lights Switch
The Hazard Lights Switch operates hazard lights. The left and right turn signals' indicators flash when switch is on.

Lo Idle/Hi Idle Switch
The Lo Idle/ Hi Idle Switch is a momentary switch. Press the switch once, and the engine runs at 1350 rpm. Press the switch again, and the engine returns to 700 rpm. This is used to build up air pressure quicker and also aids in engine warm up.

Instrument Panel Assembly
(Figure 3-1c)

WTEC III Transmission Pushbutton Shift Selector (WTEC III TPSS)
The Transmission Pushbutton Shift Selector is used to select forward or reverse range, to set highest gear range, to switch from highway to off-road mode, and to monitor transmission operation.

Fuel Gauge
The Fuel Gage shows the fuel level in the fuel tank.

Oil Pressure Gauge
The Oil Pressure Gage shows engine oil pressure. Normal oil pressure range is 15-80 psi (103-552 kpa).

Front Brake Air Pressure Gauge
The Front Brake Air Pressure Gage shows air pressure (in psi) available to operate front brakes. Normal air pressure range is 75-120 psi.

Instrument Panel Assembly
(Figure 3-1d)

Speedometer/odometer
The Speedometer shows vehicle speed in miles per hour (mph) and kilometers per hour (km/h). The Odometer indicates number of miles the vehicle has traveled.

Water Temperature Gauge
The Water Temperature Gage shows engine coolant temperature in degrees Fahrenheit. Normal temperature range is between 165 and 250°F (74°-110°C).

Rear Brake Air Pressure Gauge
The Rear Brake Air Pressure Gage shows air pressure (in psi) available to operate rear brakes. Normal air pressure range is 75-120 psi.

24 Volts Gauge
The 24 Volts Gage shows battery 24 volt output when engine is not running and alternator 24 volt output when engine is running.

12 Volts Gauge
The 12 Volts Gage shows battery 12 volt output when engine is not running and alternator 12 volt output when engine is running.

Instrument Panel Assembly
(Figure 3-1e)

Starter Pushbutton
The Starter Pushbutton initiates the cranking sequence for starting the engine. The Starter Pushbutton operates only after the master power switch has been positioned to on. Once the engine has started, the pushbutton is disabled to prevent damage to the starter.

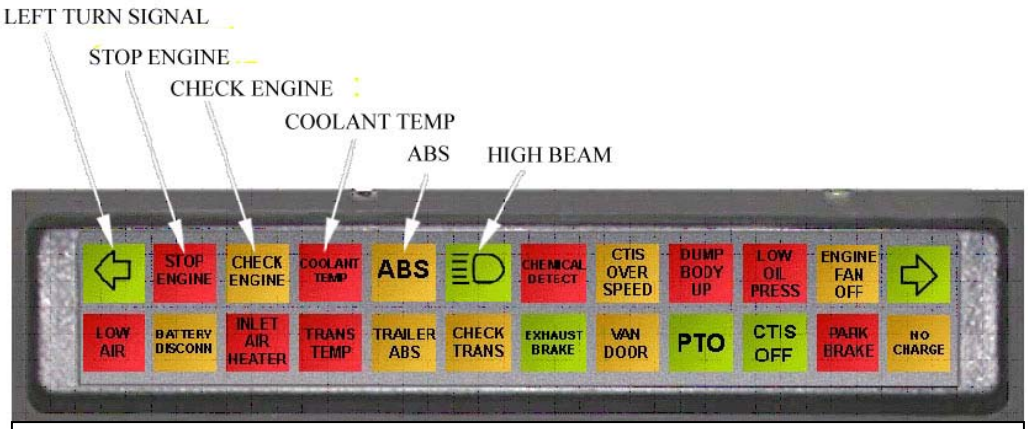
Air Filter Restriction Gauge
The Air Filter Restriction Gauge indicates when air filter is restricted. Diaphragm enters red zone when air filter is clogged and needs service. The reset button on the face of the gauge can be pressed to reset the gauge after the air cleaner is serviced.

Warm-up/Off/Retard Switch
The Warm-up/Off/Retard Switch is a three position switch. Depress the top portion of switch to warm-up engine in temperatures below 32°F (0°C). Depress the bottom portion of switch to engage exhaust brake. When the switch is positioned to the center position, both functions are off.

Main Light Switch
The Main Light Switch controls internal and external lights. This switch also controls the vehicle blackout lights for use during B.O. operation.

Audible Alarm
The Audible Alarm produces a steady tone when air pressure is below 75 psi. On the Van M1087A1 model, the audible alarm also produces a different tone when the van body doors are open.

2.2 LIGHTED INDICATOR DISPLAY



Lighted Indicator Display (Figure 3-2a)

Left Turn Signal
The Left Turn Signal flashes (green) when left turn signal is on.

Stop Engine Indicator
The Stop Engine Indicator illuminates (red) upon engine start, for approximately two seconds. If an engine fault occurs the indicator will flash (red).

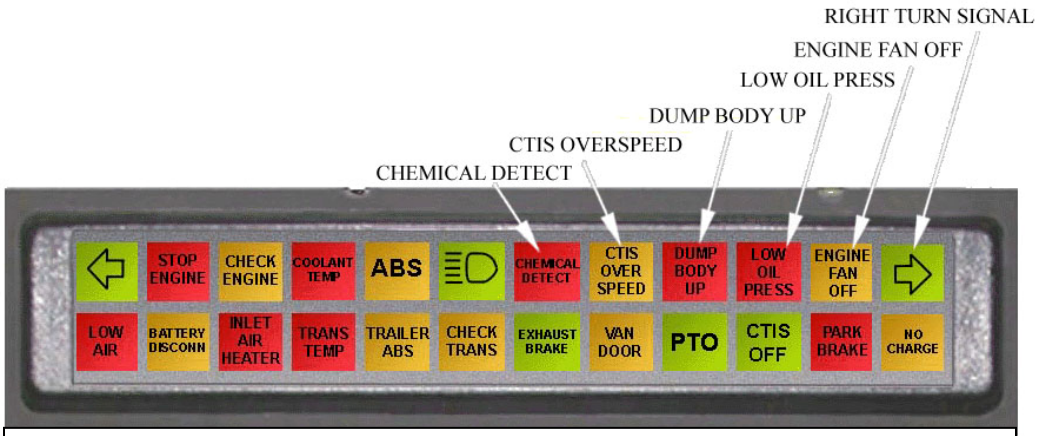
Check Engine Indicator
The Check Engine Indicator illuminates (amber) at ignition, for approximately two seconds. If the electronic control module (ECM) senses an active code indicator will flash (amber).

Coolant Temp Indicator
The Coolant Temp Indicator illuminates (red) when engine coolant temperature is greater than 230ºf.

Note: After servicing anti-locking braking system (ABS), indicator will stay illuminated until vehicle is driven at a speed above 4 mph (6 km/h).

ABS Indicator
The ABS Indicator illuminates (amber) at engine startup and if the anti-lock braking system (ABS) ECU detects a fault at speeds above 4 mph (6 km/h). If the ABS Indicator illuminates, continue with the mission and notify field level maintenance upon completion.

High Beam Indicator
The High Beam Indicator illuminates (green) when high beam headlights are on.



Lighted Indicator Display (Figure 3-2b)

Chemical Detect Indicator
The Chemical Detect Indicator illuminates (red) when M43 chemical detector senses a chemical agent. The M42 alarm sounds when chemical detect indicator is on.

CTIS Overspeed Indicator
The CTIS Overspeed Indicator illuminates (amber) when vehicle speed exceeds safe limit for selected tire inflation pressure.

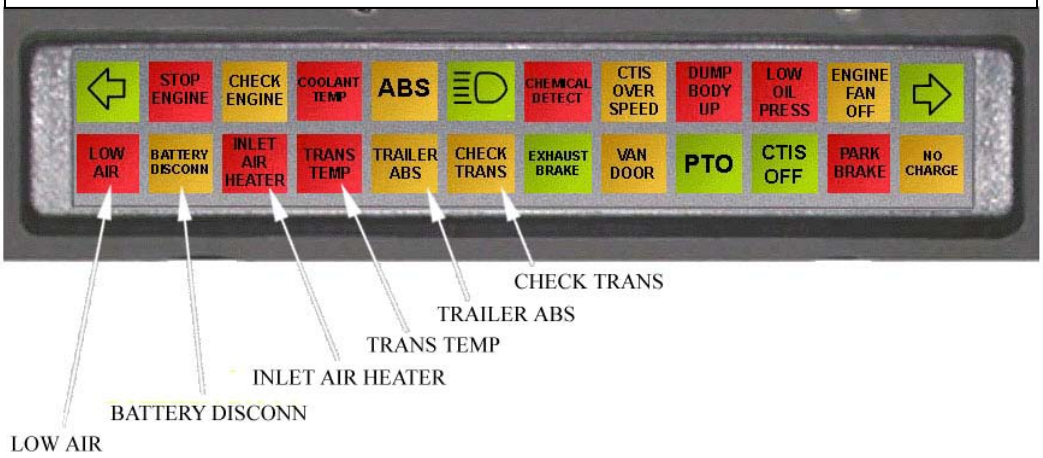
Dump Body Up Indicator (M1090A1 Only)
The Dump Body Up Indicator illuminates (red) when dump body is raised.

Low Oil Pressure Indicator
The Low Oil Pressure Indicator illuminates (red) when engine oil pressure drops below 6 psi. Stop Engine Indicator illuminates when Low Oil Pressure Indicator is on.

Engine Fan Off Indicator
The Engine Fan Off Indicator illuminates (amber) when the engine fan is disabled for deep water fording. Illumination indicates the engine fan off switch is on.

Right Turn Signal
The Right Turn Signal flashes (green) when right turn signal is on.

Lighted Indicator Display (Figure 3-2c)



Low Air Indicator
The Low Air Indicator illuminates (red) when air pressure for the service brakes drops below 75 psi. An audible alarm sounds and stop engine indicator illuminates when low air indicator is on.

Battery Disconnect Indicator
The Battery Disconnect Indicator illuminates (amber) when the batteries are disconnected. The alternator recharges undercharged batteries while they are disconnected and reintroduces them when adequate battery voltage is achieved. The Battery Disconnect Indicator illuminates (red) for approximately 6 seconds after starting engine.

Inlet Air Heater Indicator
The Inlet Air Heater Indicator illuminates (red) briefly when engine coolant and inlet manifold air temperature is below 77ºF.

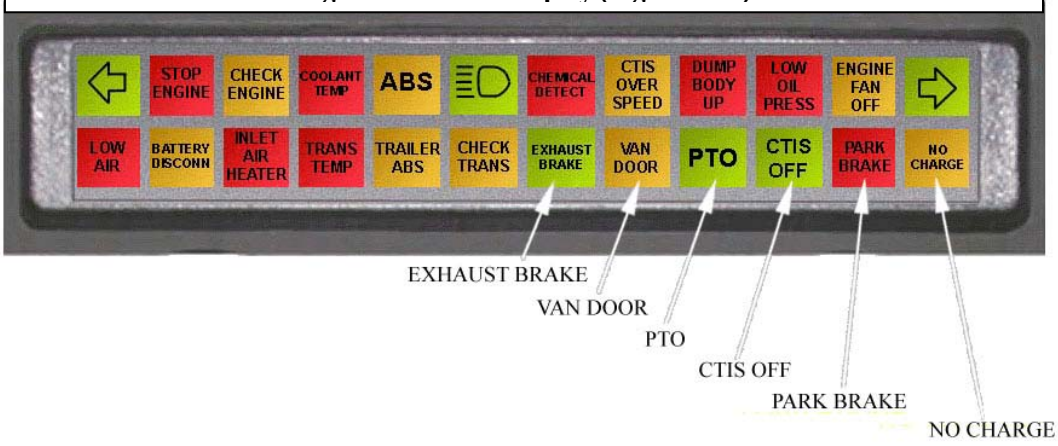
Trans Temp Indicator
The Trans Temp Indicator illuminates (red) when transmission oil temperature is greater than 225ºF.

Trailer ABS Indicator
The Trailer ABS Indicator illuminates (amber) if the trailer anti-lock braking system (ABS) detects a problem with the ABS at speeds above 4 mph (6 km/h). If ABS indicator illuminates, continue mission and notify field level maintenance upon completion of mission.

Note: Depending on the problem with the transmission, the WTEC III transmission electronic control unit (ECU) may or may not respond to WTEC III TPSS requests. Gear shifting capability may be limited.

Check Trans Indicator
The Check Trans Indicator illuminates (amber) any time WTEC III transmission ECU detects a “do not shift” condition. Notify field level maintenance if Check Trans Indicator illuminates. The Check Trans Indicator also illuminates briefly when engine is started.

Lighted Indicator Display (Figure 3-2d)



Exhaust Brake Indicator
The Exhaust Brake Indicator illuminates (green) when Warm-up/Off/Retard switch is engaged in the warm-up position. It does not illuminate when Warm-up/Off/Retard switch is in the retard position, but it does illuminate (green) when exhaust brake is engaged.

Van Door Indicator (M1079A1/M1087A1 only)
The Van Door Indicator flashes (amber) when the M1079A1van body rear door is open or the M1087A1van body rear or side doors are open.

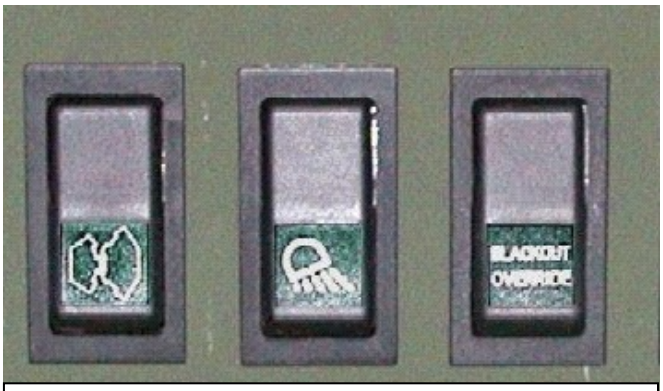
PTO Indicator (M1078A1, M1079A1, M1083A1, M1084A1, M1086A1, M1088A1, M1089A1, M1090A1)
The PTO Indicator illuminates (green) when Power Take-Off (PTO) is engaged.

CTIS Off Indicator
The CTIS Off Indictor illuminates (green) when operator disables Central Tire Inflation System (CTIS).

Park Brake Indicator
The Park Brake Indicator illuminates (red) when parking brake is applied.

No Charge Indicator
The No Charge Indicator illuminates (amber) when the alternator ceases to provide an output. Vehicle continues to operate until 24 VDC batteries discharge to approximately 20 VDC.

2.3 AUXILIARY PANEL CONTROLS AND INDICATORS

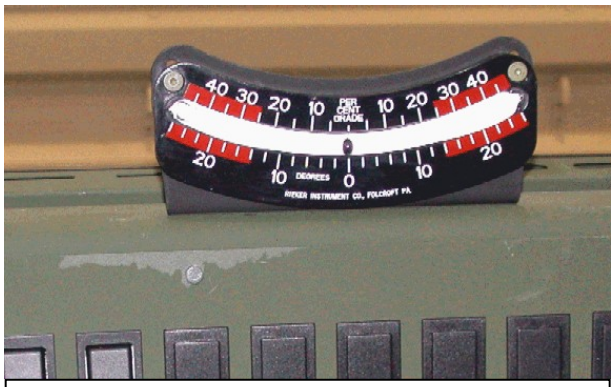


L-R: PTO Switch, Work Lights Switch and Blackout Override Switch (Figure 3-3)

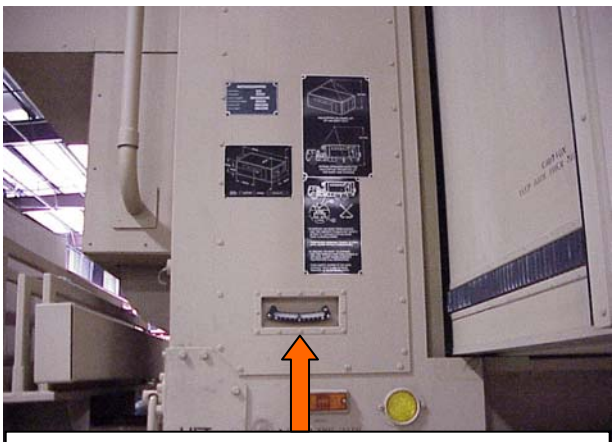
PTO Switch
When the PTO switch is placed to "ON", the engine automatically idles at 1350 rpm and the transmission is locked in neutral.

Work Lights Switch (M1084A1/M1086A1/M1088A1/M1089A1)
The Work Light Switch controls operation of work lights.

Blackout Override Switch (M1084A1/M1086A1/M1088A1/M1089A1)
The Blackout Override Switch allows work lights to operate when vehicle is operating in blackout mode.



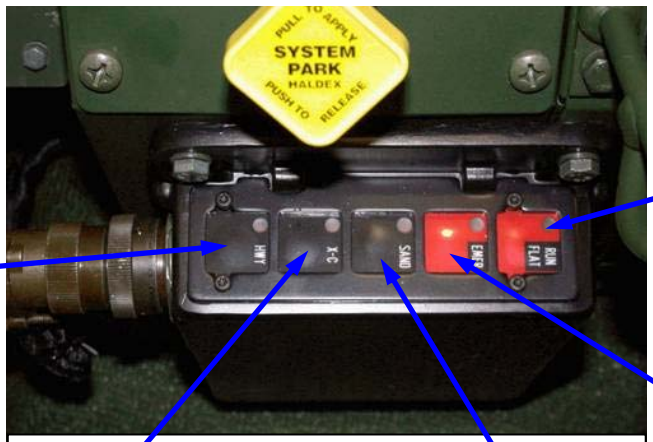
Inclinometer (Figure 3-4a)



Inclinometer on Van body (Figure 3-4b)

Inclinometer
The Inclinometer is used to prevent roll-over. Color zones are used to instantly alert the operator of any danger. The color zones are based on degree and percent of grade settings. (red = roll over danger; blank = safe operation). The Inclinometer may be mounted on the main instrument panel or auxiliary panel (Figure 3-4a). Two Inclinometers are also mounted on the Van body (Figure 3-4b).

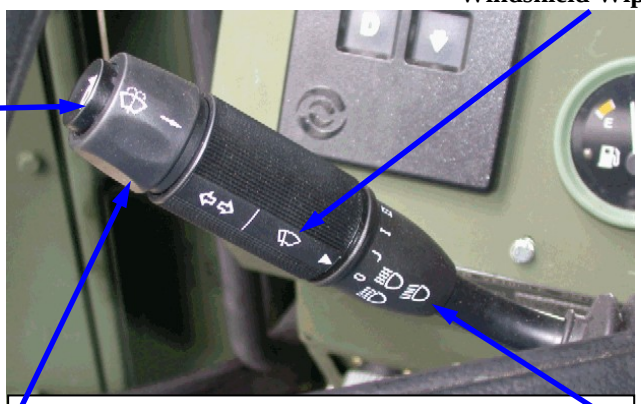
2.4 CTIS ELECTRIC CONTROL UNIT



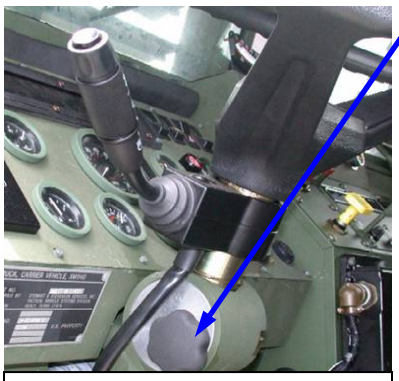
CTIS ECU (Figure 3-5)

The CTIS monitors and adjusts the tire pressure for the vehicle. The air for the CTIS is supplied from the wet tank. The air pressure in the tires is controlled by the CTIS ECU. The CTIS ECU provides for four tire pressure settings: Highway, Cross-Country, Sand, and Emergency. The run flat mode is an enhanced mode used in all four modes.

2.5 STEERING COLUMN CONTROLS



Steering Column Controls (Figure 3-6a)



Steering Column(Figure 3-6b)

Horn Button
The Horn Button sounds the horn when pressed.

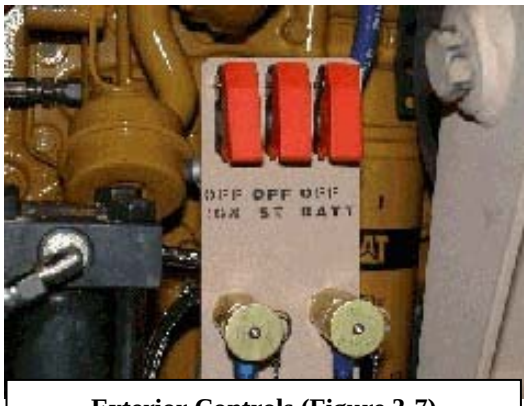
Windshield Washer Switch
The Windshield Washer Switch activates the windshield washer when pushed in.

Windshield Wiper Switch
The Windshield Wiper Switch is a four-position switch used to operate and control the speed of the windshield wipers. Windshield wipers operate intermittently when switch is placed in the "J" position. Windshield Wipers operate at low or high speed when switch is placed in the "I" or "II" position.

Turn Signal/Headlight Dimmer Control
The Turn Signal/Headlight Dimmer Control operates the turn signals and controls the headlight dimming. The right turn signal indicator will flash when the control is pushed up. The left turn signal indicator will flash when the control is pushed down. The headlight dimming is controlled by pulling the control toward the operator. The high beam indicator illuminates when the high beam headlights are on.

Steering Wheel Tilt/Telescope Control
The Steering Wheel Tilt/Telescope Control adjusts angle and height of steering wheel to the need of the operator.

3.0 EXTERIOR CONTROLS



Exterior Controls (Figure 3-7)

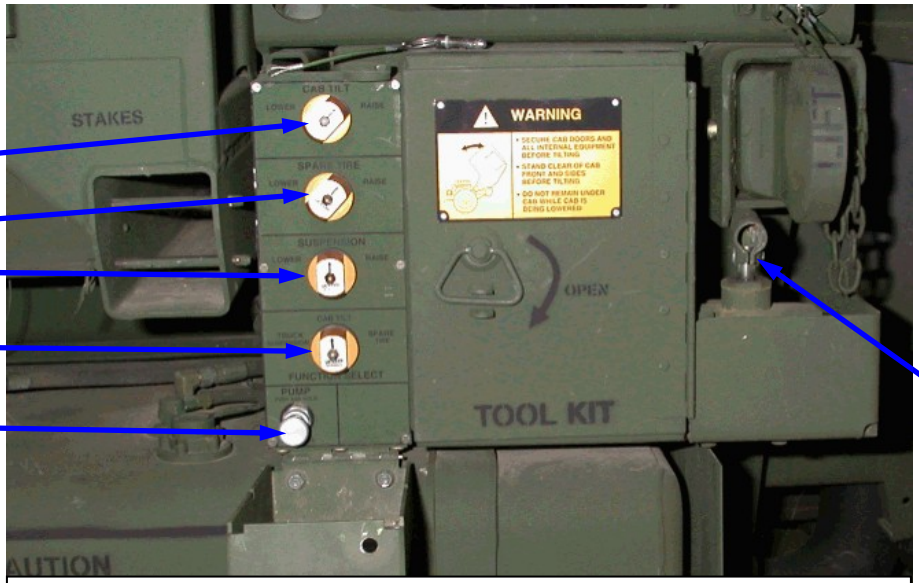
Off IGN Switch
Placing the Off IGN switch to the "ON" position supplies battery power to the 12 VDC and 24 VDC ignition relays.

Off ST Switch
Placing the Off ST switch (momentary) to the "ON" position starts the vehicle.

Off BATT Switch
Placing the Off BATT switch to the "OFF" position supplies a ground signal to the master battery disconnect relay and after a one-second delay, disconnects the batteries from the electrical system. Placing the OFF BATT switch to "ON" reconnects the batteries to the vehicle.

3.1 HYDRAULIC MANIFOLD

The Hydraulic Manifold is used to raise and lower the cab and spare tire, and to compress the suspension for internal air transport. The manifold is located on the right side of the vehicle. A hinged cover door provides protection to the valves during operation.



Air/Hydraulic Manifold (Figure 3-8)

Cab Tilt Knob
The Cab Tilt Knob allows the operator to raise or lower the cab.

Spare Tire Knob
The Spare Tire Knob allows the operator to raise or lower the spare tire.

Suspension Knob
The Suspension Knob allows the operator to raise or lower the suspension.

Function Select Knob
The Function Select Knob allows operator to determine what component will receive hydraulic pressure.

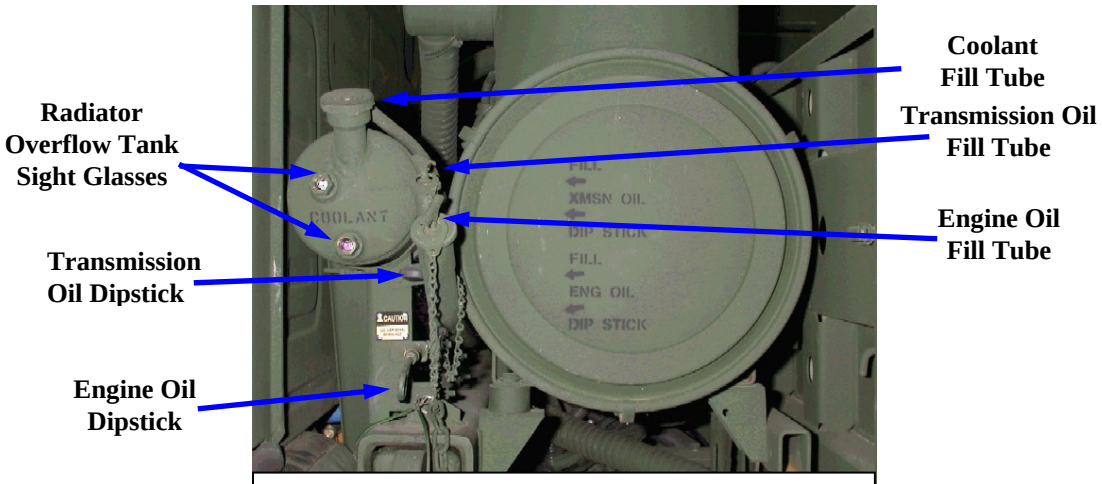
Pump Knob
Pushing in and holding the Pump Knob will activate the pre-selected function: Suspension, Cab Tilt, or Spare Tire. Use the function select knob to select any of the previous functions.

Back-Up Hydraulic Pump
The Back-up Hydraulic Hand Pump provides back-up power in case of failure in the hydraulic manifold.

Manual Battery Disconnect Switch (Figure 3-9)

NATO Receptacle
The NATO Receptacle is used for starting the vehicle using external power and to power-up the SPORT/MSD.

Manual Battery Disconnect Switch
When switched to the "OFF" position, the Manual Battery Disconnect Switch disconnects the batteries from the electrical system.



Oil Fill Tubes (Figure 3-10)

Radiator Overflow Tank Sight Glasses
On the Radiator Overflow Tank, the top sight glass indicates safe coolant level with the engine not running. If coolant is not visible in the lower sight glass, the vehicle should not be operated.

Transmission Oil Dipstick
The Transmission Oil Dipstick indicates the oil level in the transmission.

Engine Oil Dipstick
The Engine Oil Dipstick indicates the oil level in the engine.

Coolant Fill Tube
The Coolant Fill Tube is used to add coolant when necessary.

Transmission Oil Fill Tube
Transmission Oil Fill Tube is used to add transmission oil when necessary

Engine Oil Fill Tube
The Engine Oil Fill Tube is used to add engine oil when necessary.

Instructor's Note

- **Have students proceed to the vehicles and review the indicators/controls on the vehicle with students.**
- **Conduct 'check on learning' objectives using operational checklist and exam at end of course, OR review the following functions:**
- **List of actions to perform to demonstrate control functions.**
- **Ensure that the objectives of the training have been met before completing the hands-on review.**

M1087A1 Expansible Van Operation Training Course

LESSON 4

VAN CONTROLS

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 4 – VAN CONTROLS

LESSON:	4
LESSON TITLE:	VAN CONTROLS
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	1.00 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, WRITING UTENSILS, OPERATOR MANUAL (TM 9-2320-391-10, TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), OVERHEAD PROJECTOR, SCREEN, TWO (2) M1087A1 EXPANSIBLE VANS
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	IDENTIFY AND STATE FUNCTION OF ALL OPERATOR RELATED INDICATORS AND CONTROLS IN THE VAN.
CONDITION:	GIVEN CLASSROOM DISCUSSION AND HANDS-ON EXPOSURE TO THE VAN CONTROLS.
STANDARD:	STUDENT WILL BE ABLE TO IDENTIFY THE TYPE OF INDICATOR AND CONTROL, STATE ITS FUNCTION AND STATE, IF APPLICABLE, THE INDICATORS' SAFE MINIMUM AND MAXIMUM OPERATION LIMIT.

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 4 – VAN CONTROLS

1.0 INTRODUCTION

The purpose of this lesson is to familiarize the student with controls unique to the Expansible Van vehicle.

2.0 DESCRIPTION

2.1 AIR CONDITIONER/HEATER CONTROLS

Air Conditioner

Panels on the AC unit must be removed prior to AC use.

Digital Keypad
(Figure 4-1)

The "F" button on the digital keypad selects degrees Fahrenheit or Celsius (Figure 4-1). The up/down ADJUST arrows select the desired temperature. The SET button sets the temperature.

Fan Controls
(Figure 4-2)

The AUTO position activates the selected temperature. The FAN position circulates room temperature air. The Fan Speed switch controls the speed of the fan and the flow of air in the van (Figure 4-2).

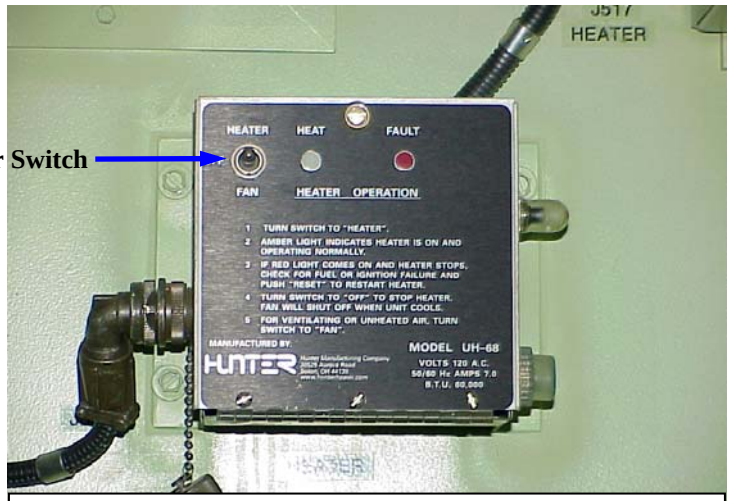
Circulation Knob (Figure 4-3a)

Circulation Knob (Figure 4-3b)

The Circulation Knob circulates outside air when it is pulled out (Figure 4-3a), and circulates inside air when pushed in (Figure 4-3b).

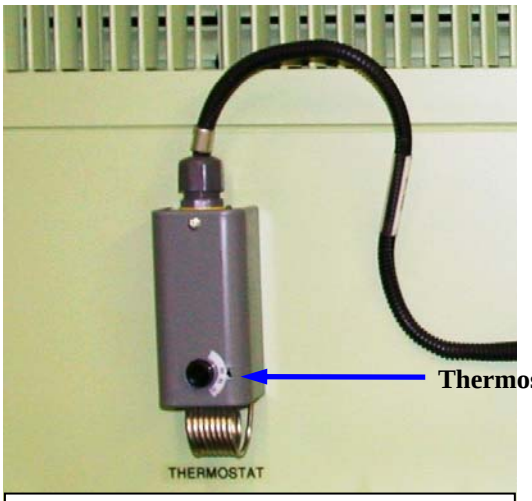
Heater

Prior to Heater use, the vent covers need to be opened on the outside and inside of the van body.



Heater Switch

Heater Control Box (Figure 4-4)



Thermostat

Thermostat (Figure 4-5)

The switch on the Heater Control Box selects the heater function (Figure 4-4). The thermostat controls the heat temperature (Figure 4-5).

2.2 VAN EXPANSION AND COMPRESSION CONTROLS

Handle on Left Gear Lug
(Figure 4-6)

The handle, located on the left side stowage compartment on the vehicle, is used to expand and compress the side walls of the van (Figure 4-6). Rotating the handle clockwise on the left side wall and counter clockwise on the right side wall will expand the sides. The handle is turned in the opposite direction to compress the sides. When expanding or compressing the sides, the handle must be turned until the handle "breaks" into a free spin and reconnects. At this time, the sides are fully extended or compressed.

Leveling Jack
(Figure 4-7)

Four leveling jacks are use to stabilize the van body once it has been expanded (Figure 4-7). These leveling jacks are adjusted until the front and side inclinometers on the van body read level. The leveling jacks are located in the vehicle's left side stowage compartment.

2.3 VAN 24VDC POWER CONNECTION

AC Power Cable

Storage Box
(Figure 4-8)

Ground Rod and Cable
(Figure 4-9)

The Ground Rod, Ground Cable, and AC Power Cable are stored in the Storage Box (Figure 4-8). The Ground Cable is connected to the Ground Receptacle and the Ground Rod (Figure 4-9).

VAC IN Receptacle
(Figure 4-10)

The AC Power Cable is connected to the VAC IN Receptacle in order to supply power from an AC power source to the vehicle (Figure 4-10).

24 VDC Source Switch (Figure 4-11)

The 24 VDC Source Switch selects the power source (Figure 4-11).

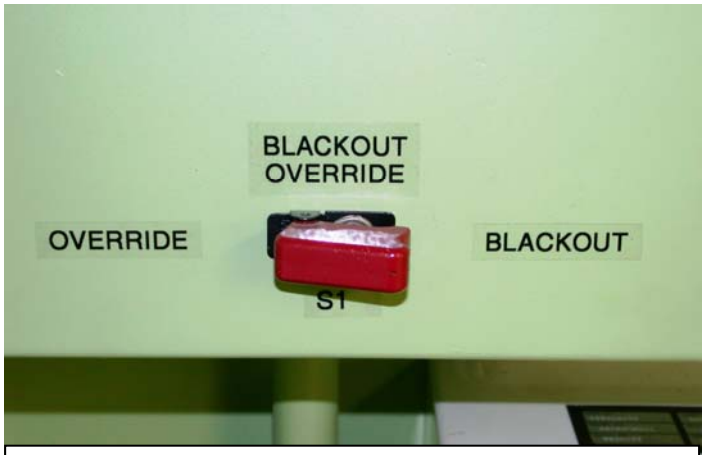
VAC Power Distribution Panel (Figure 4-12)

Main Power Switch (Figure 4-13)

The Main Power Switch on the VAC Power Distribution panel supplies power to the Van from the AC Power source when it is in the ON position (Figure 4-12, 4-13).

2.4 LIGHTING CONTROLS

Interior Lights



Blackout Override Switch
(Figure 4-14)

When the van is in blackout mode, the interior lights will not illuminate with the doors, windows, or blackout shields open (Figure 4-14).

Interior Light Switch
(Figure 4-15)

The Interior Light switch turns on the lights in the Van (Figure 4-15).

Emergency Lights

24 VDC Source Switch
(Figure 4-16)

The emergency lights will turn on if there is no AC Power Source when the Interior Lights Switch is turned on.
Before operating the emergency lights, the 24 VDC Source Switch must be turned to VEHICLE and the Main Power Switch should be in the “OFF” position (Figure 4-16).

Instructor's Note

Have students proceed to the vehicles and point out the Van controls.

CHECK ON LEARNING

Instructor will employ guidance cited in lesson objectives during hands-on vehicle phase to determine student's comprehension of safe/proper use of the Van controls.

M1087A1 Expansible Van Operation Training Course

LESSON 5

C-7 ENGINE, ABS, EXHAUST BRAKE & CTIS DESCRIPTION

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 5 – C-7 ENGINE, ABS, EXHAUST BRAKE & CTIS DESCRIPTION

LESSON:	5
LESSON TITLE:	C-7 ENGINE, ABS, EXHAUST BRAKE & CTIS DESCRIPTION
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	1.25 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, WRITING UTENSILS, OPERATOR MANUAL (TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), OVERHEAD PROJECTOR, SCREEN, AND TWO (2) M1087A1 EXPANSIBLE VANS.
STUDENT UNIFORM:	MILITARY – BDU CIVILIAN – WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	DESCRIBE THE C-7 ENGINE ENHANCEMENTS, STATE FUNCTION AND DEMONSTRATE KNOWLEDGE OF THE PROPER USE OF THE ANTI-LOCK BRAKE SYSTEM (ABS), THE ENGINE EXHAUST BRAKE, AND THE CTIS.
CONDITION:	GIVEN CLASSROOM INSTRUCTION, OPERATOR TM, SG AND HANDS-ON TRAINING.
STANDARD:	STUDENT WILL DEMONSTRATE KNOWLEDGE OF FUNCTION AND PROPER/SAFE USE OF THE C-7 ENGINE, ABS, ENGINE EXHAUST BRAKE, AND CTIS.

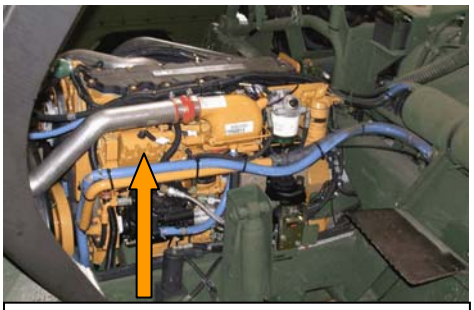
INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 5 – C-7 ENGINE, ABS, EXHAUST BRAKE & CTIS DESCRIPTION

1.0 INTRODUCTION

This lesson covers the C-7 engine enhancements, the Anti-lock Braking System (ABS), the Engine Exhaust Brake, and the Central Tire Inflation System (CTIS).

2.0 DESCRIPTION

2.1 C-7 ENGINE ENHANCEMENTS:



HEUI Oil Pump (Figure 5-1a)

Wastegate Controlled Turbocharger (Figure 5-1b)

1. New Caterpillar-built HEUI oil pump, has “leak-free technology” to improve reliability
2. Lower emissions and decreased engine noise from HEUI fuel system
3. Enhanced performance from electronic Wastegate-controlled turbocharger

2.2 ANTI-LOCK BRAKING SYSTEM (ABS)

The ABS, engine exhaust brake, and the transmission programmed downshift work together to provide the driver maximum control of the vehicle over a wide range of varying road conditions.

A. Operators must be aware of the sensitivity of the ABS. When braking, apply continuous pressure to the brake pedal. **Do not pump the brakes**.

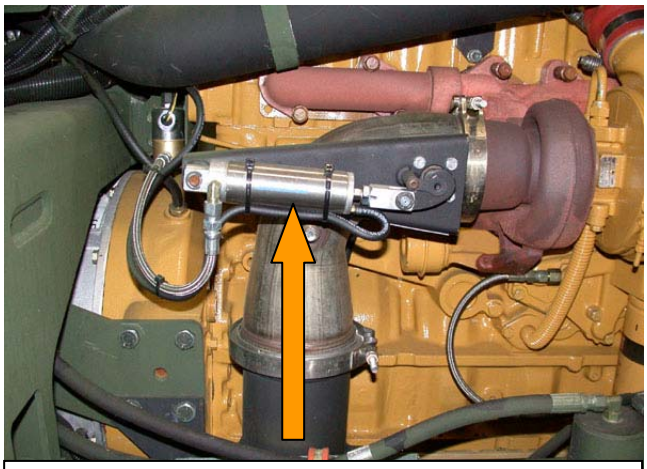
B. **Do not engage engine exhaust brake feature in icy or slippery conditions**. Have students refer to vehicle operation paragraph in the operator manual (TM 9-2320-391-10, or TM 9-2320-392-10-1). Review the engine start steps so the student understands when and how the Warmup/Off/Retard switch is used.

The ABS is an electronic system that monitors and controls wheel speed during braking. ABS monitors wheel speed at all times and controls braking during wheel lock/slippage situations. The system improves vehicle stability and control by reducing wheel lock/slippage during braking.

In the event of a malfunction in the system, the ABS sensor in the affected wheel/wheels will be disabled. Wheels that are disabled still have normal braking capability and all other wheels keep their ABS function. An ABS warning light on the lighted indicator display keeps the driver informed of the system’s status.

The ABS indicator will not illuminate above speeds of 4 mph (6 km/h) unless the ECU senses a fault in the ABS system.

2.3 ENGINE EXHAUST BRAKE

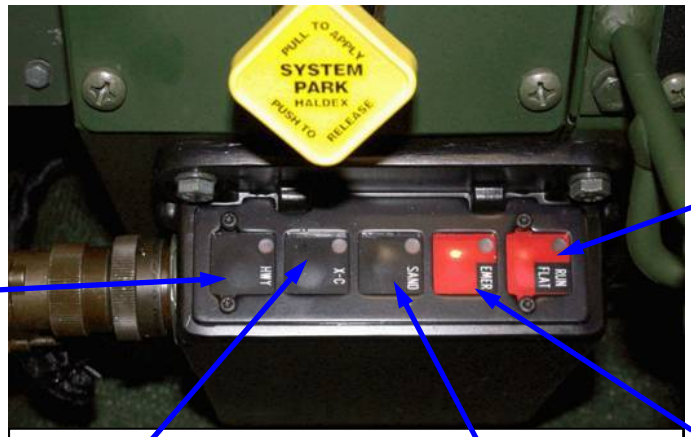


Engine Exhaust Brake
(Figure 5-2)

The Engine Exhaust Brake is installed to aid in driveline braking. This results in quicker and safer stops with less brake lining wear. The engine exhaust brake is installed in the exhaust line behind the turbocharger.

During vehicle start up, if the temperature is 32 degrees or below, place the Warm-up/Off/Retard switch to the warm-up position. This will activate the engine exhaust brake and apply pressure back on the engine, which will assist the engine in warming up quicker. Once the engine has warmed up, place the Warm-up/Off/Retard switch to retard. **If icy or slippery conditions exist,** place the switch to "off." Placing the switch to retard will allow the engine exhaust brake to be activated when the operator removes his/her foot from the accelerator pedal. If no wheel lock/slippage is detected and the transmission is in lock-up--when the torque converter locks itself and allows the transmission to change gears up or down--the engine exhaust brake will activate and assist in slowing the vehicle. **The transmission will then go into a programmed downshift.**

2.4 CENTRAL TIRE INFLATION SYSTEM (CTIS)



HWY Mode Button and Indicator

RUN FLAT Button and Indicator

EMER Mode Button and Indicator

CTIS ECU (Figure 5-3)

X-C Mode Button and Indicator

SAND Mode Button and Indicator

The CTIS monitors and adjusts the tire pressure for the vehicle. The air for the CTIS is supplied from the wet tank. The air pressure in the tires is controlled by the CTIS ECU. The CTIS ECU provides for four tire pressure settings: Highway, Cross-Country, Sand, and Emergency. The run flat mode is an enhanced mode used in all four modes.

Hwy (highway) Mode Button and Indicator – the Hwy Mode button is pressed to set the CTIS to highway mode. The indicator illuminates (red) continuously when the tire pressure is 60 psi. The maximum speed is 55 mph in Hwy Mode.

X-C (Cross-Country) Mode Button and Indicator
The X-C Mode button and indicator is pressed to set CTIS to cross-country mode. The indicator illuminates (red) continuously when the tire pressure is 37 psi. The maximum speed is 40 mph in X-C Mode.

Sand (Soft Terrain) Mode Button and Indicator
The Sand (Soft Terrain) Mode button is pressed to set CTIS to soft terrain mode. The indicator illuminates (red) continuously when tire pressure is 22 psi. The maximum speed is 12 mph in Sand Mode.

EMER (Emergency) Mode Button and Indicator
The EMER mode button is pressed to set CTIS to emergency mode for use when the vehicle is trapped in deep sand or mud. The indicator illuminates (red) continuously when tire pressure is 16 psi. The maximum speed is 5 mph in EMER mode. It only operates for 10 minutes and then must be selected again.

Run Flat Button and Indicator
The Run Flat Button is used to maintain tire air pressure in the event of a leak. The indicator flashes (red) while in run flat. It only operates for 10 minutes and must then be selected again. **Do not use the run flat mode for more than 40 minutes.**

CTIS TIRE PRESSURE AND RESTRICTIONS

Operating Mode	Maximum Speed	Time Restriction	Tire Pressure
Highway (HWY)	55 mph (88 km/h)	NONE	60 psi (414 kPa)
Cross-Country (X-C)	40 mph (64 km/h)	NONE	37 psi (255 kPa)
Sand	12 mph (19 km/h)	NONE	22 psi (152 kPa)
Emergency (EMER)	5 mph (8 km/h)	10 MINUTES	16 psi (110 kPa)

There is no tire pressure in the run flat mode.

Instructor's Note

Have students proceed to the vehicles and point out the C-7 Engine, ABS, Exhaust Brake, and CTIS components.
Re-emphasize proper/safe use of each system.

CHECK ON LEARNING

Instructor will employ guidance cited in lesson objectives during vehicle driving phase to determine student's comprehension of safe/proper use of the C-7 engine, ABS, Exhaust Brake, and the CTIS.

M1087A1 Expansible Van Operation Training Course

LESSON 6

TRANSMISSION DESCRIPTION AND FUNCTION

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 6 – TRANSMISSION DESCRIPTION AND FUNCTION

LESSON:	6
LESSON TITLE:	TRANSMISSION DESCRIPTION AND FUNCTION
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	0.50 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, (TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), WRITING UTENSILS, OVERHEAD PROJECTOR, SCREEN, AND TWO (2) M1087A1 EXPANSIBLE VANS.
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	STATE FUNCTION OF THE MD 3070 PT TRANSMISSION
CONDITION:	GIVEN CLASSROOM INSTRUCTION AND STUDENT GUIDE
STANDARD:	STUDENTS WILL BE FAMILIAR WITH THE FUNCTION OF THE MD 3070 PT TRANSMISSION

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 6 – TRANSMISSION DESCRIPTION AND FUNCTION

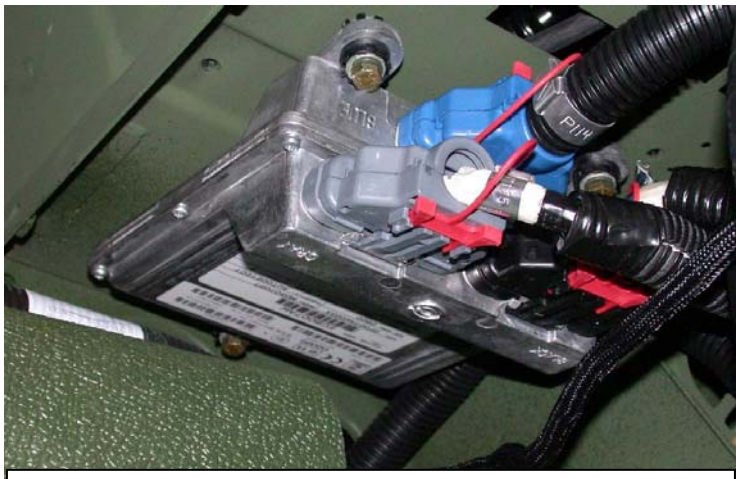
1.0 INTRODUCTION

This lesson covers the description and function of the MD 3070 PT Transmission.

2.0 DESCRIPTION

The FMTV Allison Transmission is a fully automatic, seven-speed transmission designed to be used with a mid-range diesel engine up to 330 horsepower in vehicles designed for on- and off-road use. The transmission incorporates a planetary gear scheme that permits the use of seven forward gear ranges in highway mode. Torque is transmitted from the engine to the transmission through a flexplate. Flexplates are designed to absorb torque shock between engine and torque converter.

2.1 ELECTRONIC CONTROL UNIT



Electronic Control Unit
(Figure 6-1)

The Electronic Control Unit (ECU) is the microprocessor controlling the transmission (Figure 6-1). The ECU receives information from the transmission components. It takes the information, processes it, and then sends that signal to the transmission control module. The action activates/deactivates the solenoid circuits which control the hydraulic circuits, making the transmission up-shift, down-shift, or enter into the lockout functions. The ECU monitors the transmission for proper operation, and can respond automatically to ensure safe operation of the vehicle and the transmission. This is also the item that communicates to the data bus for failure information, which can then be extracted for maintenance repairs.

2.2 WTEC III TRANSMISSION PUSH BUTTON SHIFT SELECTOR

Transmission Push Button Shift Selector (Figure 6-2)

The Transmission Push Button Shift Selector (TPSS) houses the pushbuttons to provide for range and mode selection (Figure 6-2). Once the operator selects a range or mode of operation, the signal is sent to the ECU for processing. The shift selector can also receive information from the ECU and can display that information on its digital display. Types of information displayed include gear selection, mode selected, and diagnostic code readout.

R, N, and D Buttons

The R button on the TPSS stands for Reverse, the N is for neutral, and the D is for Drive. The engine speed must be idle prior to selecting any forward or reverse operating range. When D (Drive) is selected, the default setting operating range is 7.
The vehicle should never be allowed to coast in N (Neutral). If the illumination of the last selected operating range goes out on the display, it means the WTEC III Electronic Control Unit has detected a problem that needs correcting. In this situation, the vehicle must not be shifted to N. The vehicle must be operated at a reduced speed to a safe parking location.

Up and Down Arrow Buttons

The “up” arrow button is used to shift the transmission to a higher operating range. The “down” arrow button is used to shift the transmission to a lower operating range.

MODE Button
The mode button switches the transmission between highway mode and off-road mode. Highway mode allows the transmission to provide 7 forward speeds and one reverse. When in highway mode, the mode button in the upper right corner on the TPSS, will not be illuminated. When operations dictates the use of off-road mode, the transmission will be limited to a 5mph forward and one reverse. The use of the mode button in off-highway position also locks the intermediate axle on a 5 ton MTV.

3.0. MAINTENANCE INFORMATION

3.1 SENSORS

Sensors (Figure 6-3)

Engine sensors and internal transmission sensors help ensure the transmission shifts correctly. Malfunctioning or missing sensors will cause a failure.

Engine Speed Sensor

The Engine Speed Sensor senses the engine RPMs and sends that information to the ECU. Input from this and other sensors allows for proper shifting.

Converter Turbine Speed Sensor

The converter turbine speed sensor is inside the control module that is mounted on the transmission. It measures the internal converter speed sending the information to the ECU.

Output Speed Sensor

The output speed sensor is located on the dropbox. It provides the information needed for the speedometer and other inputs requiring the actual speed of the equipment. It sends that information to the ECU to add to the inputs required for the correct shifting sequence to take place.

Caterpillar Engine Electronic Control Module

The last input for proper shift patterns and sequences is the throttle positioning. This signal is provided from the Caterpillar Engine Electronic Control Module (ECM). The caterpillar ECM is the overall controlling microprocessor for the FMTV A1. It is located on the left side of the engine block.

The transmission oil is cooled by an oil-to-water heat exchanger, located below the front of the engine. It allows for the transmission oil to be circulated through the exchanger as water is circulated through coils in the exchanger, cooling the oil and maintaining a temperature of 190°F.

The transfer case provides the transmission with the seventh gear (low gear or 1 gear) and delivers power from the transmission to the front and rear driveshafts. In normal driving conditions, the transfer case splits the output torque of the transmission, providing 70 percent of the torque to the rear output drive yoke and 30 percent to the front output drive yoke. When "mode on" is selected, the output torque of the transmission is split evenly, with 50 percent going to the front output yoke and 50 percent going to the rear.

3.2 FLUID LEVEL CHECKS

The transmission oil check is performed when the engine is at normal operating temperature, which is 160 - 230˚ F (71-110˚ C). The transmission oil level should be between the HOT ADD line and the HOT FULL line on the transmission oil dipstick. If the transmission oil is below the HOT ADD line, oil should be added until it reaches the appropriate level. See the IETM and the 10 manual for correct oil type. If the transmission oil is over the HOT FULL line, discolored, or milky, notify Field Maintenance personnel.

CHECK ON LEARNING

Using the training objectives and functional descriptions as a guide, determine the student's comprehension of the safe and proper use of the transmission during the hands-on driving portion of the class. Ensure students understand proper shifting of transmission for different driving situations and conditions. Proceed to Lesson 7 Vehicle Grade Capability.

M1087A1 Expansible Van Operation Training Course

LESSON 7

VEHICLE GRADE CAPABILITY

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 7 – VEHICLE GRADE CAPABILITY

LESSON:	7
LESSON TITLE:	VEHICLE GRADE CAPABILITY
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION
TIME ALLOTTED:	0.50 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, OPERATOR MANUAL (TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), WRITING UTENSILS, PROJECTOR, AND SCREEN, TWO (2) M1087A1 EXPANSIBLE VANS.
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

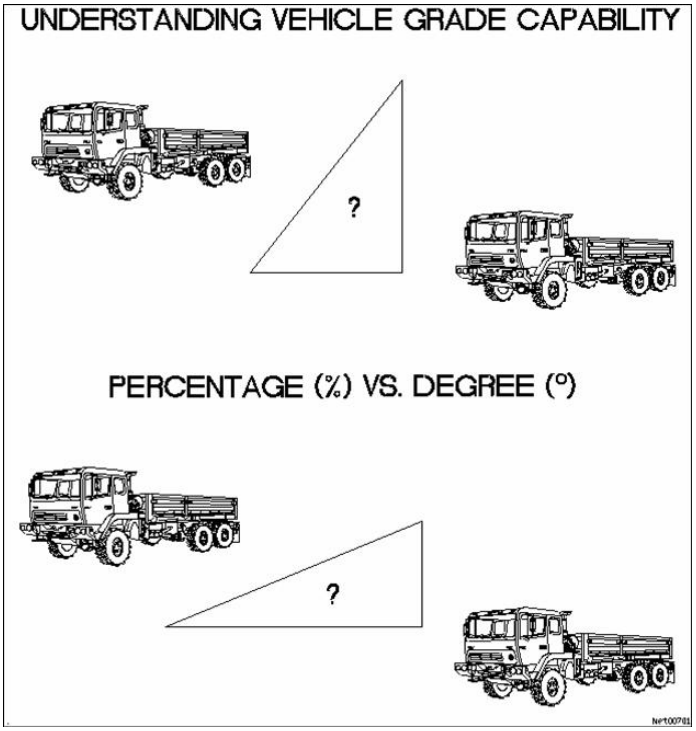
ACTION:	GAIN UNDERSTANDING OF FMTV OPERATIONAL CAPABILITY WHEN NEGOTIATING VARIOUS TYPES OF GRADES/INCLINES/SIDESLOPES
CONDITION:	GIVEN CLASSROOM-RELATED INSTRUCTION AND OPERATOR TM INFORMATION
STANDARD:	STUDENT WILL BE ABLE TO STATE THE DIFFERENCE BETWEEN PERCENT OF GRADE AND DEGREE OF GRADE AND TO LOCATE SOURCE OF FMTV GRADE CAPABILITY INFORMATION IN THE RESPECTIVE OPERATOR TM

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 7 – VEHICLE GRADE CAPABILITY

1.0 INTRODUCTION

This lesson covers the vehicle grade capabilities of the FTMV vehicle.

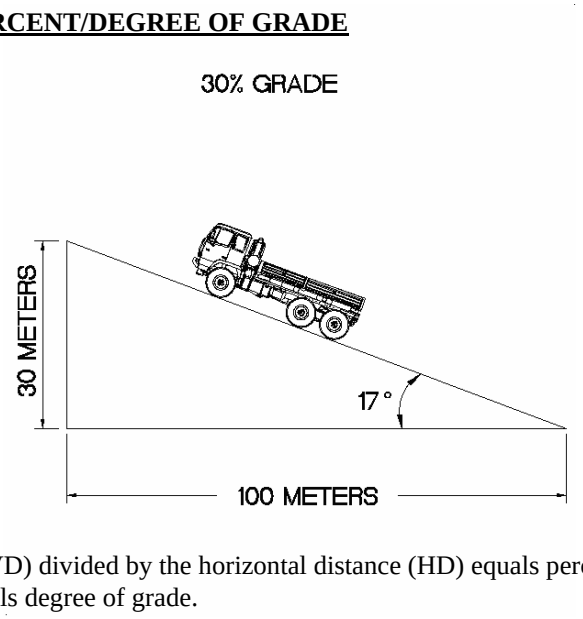
2.0 VEHICLE GRADE CAPABILITY



Most tactical-wheeled vehicle technical manuals describe vehicle grade, incline, or hill climbing capability in terms of percentage. It is important to understand that percentage (%) of grade is drastically higher than degree (°) of grade.

The maximum incline for the M1088A1 Tractor without trailer, the M1087A1 Expansible Van, and the M1089A1 Wrecker without towed vehicle is 30% or 17°. The maximum incline is 22% or 13°for the M1088A1 Tractor with trailer and the M1089A1 Wrecker with towed vehicle. All other vehicles are limited to 60% or 34° incline without tow and 30% or 17° incline with tow.

3.0 CALCULATING PERCENT/DEGREE OF GRADE



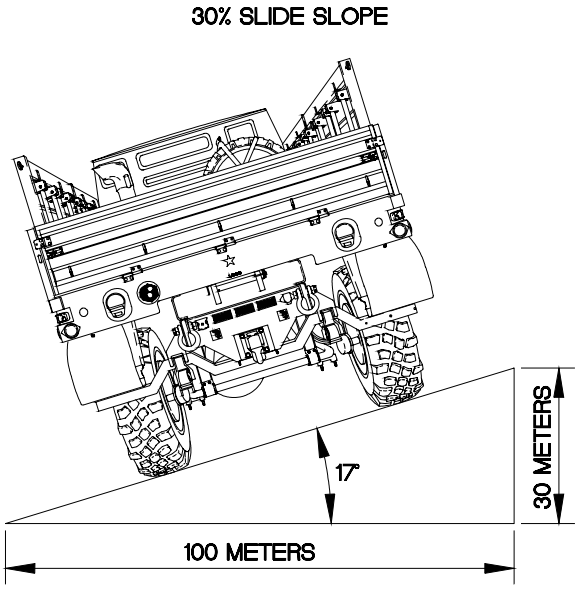
The vertical distance (VD) divided by the horizontal distance (HD) equals percent of grade. The percent of grade multiplied by 0.57 equals degree of grade.

Note: the maximum side slope for all vehicles is 30% or 17°.

3.1 PERCENTAGES (%) VS DEGREE (°)

A. 60% incline is equal to 34°
B. 30% incline is equal to 17°
C. 22% incline is equal to 13°
D. 30% side slope is equal to 17°

3.2 SIDE SLOPE



4.0 ASCENDING AND DESCENDING INCLINES

In normal driving mode the transmission delivers 30% torque to the front axle and 70% torque to the rear axle. When "mode on" is selected, the transmission delivers 50% torque to the front and rear axles. On 5 ton vehicles, when "mode on" is selected, the intermediate axle is locked and all axles provide equal drive force.

Instructor's Note

Talk about the use of the transmission when ascending or descending inclines (mode and down shifting). As an aid to the operator, you may choose to use the "mode on" or "mode off" function while ascending or descending an incline. Until the operator is confident with the equipment (vehicle), the operator should ascend and descend an incline in the same gear.

If you ascend an incline in 2nd gear (selected by manual down shifting) you descend in the same gear. This allows the equipment to aid with the braking and provides better control of the equipment.

Control of descent is done in conjunction with the transmission gear range and braking.

Driving experience is the only way to become efficient in operating the FMTV on steep inclines.

PRACTICAL APPLICATION

If provided, and if time permits, have students practice driving on types of inclines and side slopes during the hands-on driving portion of the course. Ensure that the inclines and side slopes used for operator training are well within the respective vehicle capabilities.

CHECK ON LEARNING

Verbally question students on proper/safe determination of inclines and side slopes during the driving phase of the lesson. Monitor test question results for student comprehension.

M1087A1 Expansible Van Operation Training Course

LESSON 8

VEHICLE PREPARATION FOR AIR TRANSPORT

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 8 – VEHICLE PREPARATION FOR AIR TRANSPORT

LESSON:	8
LESSON TITLE:	VEHICLE PREPARATION FOR AIR TRANSPORT
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	2.0 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, OPERATOR MANUAL (TM-9-2320-392-10-1 AND TM 9-2320-392-10-2), WRITING UTENSILS, OVERHEAD PROJECTOR, SCREEN, AND TWO (2) M1087A1 EXPANSIBLE VANS.
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	GAIN KNOWLEDGE OF THE PROPER AND SAFE PROCEDURE WHEN PREPARING A VEHICLE FOR AIR TRANSPORTAION
CONDITION:	GIVEN BOTH A CLASSROOM DISCUSSION AND A HANDS-ON DEMONSTRATION
STANDARD:	STUDENTS WILL DEMONSTRATE THE KNOWLEDGE OF THE PROPER AND SAFE PROCEDURE TO USE WHEN PREPARING A VEHICLE FOR AIR TRANSPORTAION

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 8 – VEHICLE PREPARATION FOR AIR TRANSPORT

1.0 INTRODUCTION

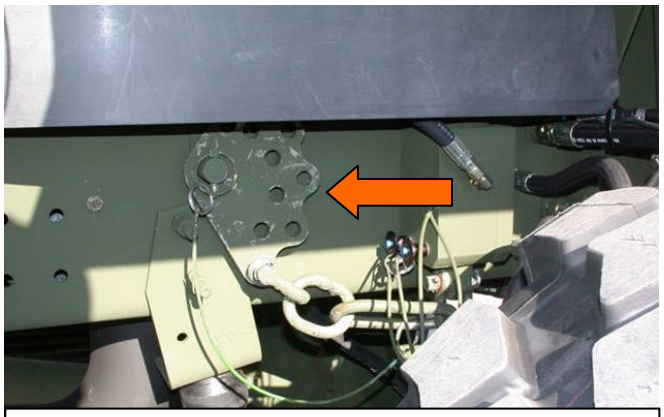
This lesson will cover the procedure to prepare the FMTV vehicle for air transportation. This procedure has been modified for the new A1 variants with serial numbers 100,001 to 199,999. The procedure has not changed for all other variants with serial numbers not within this range.
This procedure is applicable to the M1087A1 Expansible Van only after the van body has been removed.

2.0 DESCRIPTION

2.1 FRONT TIRE DEFLATION

Front tire deflation for vehicles with serial number 100,001 to 199,999 is done inside the cab. This is done by depressing the emergency (EMR) on the CTIS ECU for approximately 5 seconds until lights begin to flash.

2.2 SUSPENSION COMPRESSION



Suspension Compression Plate
(Figure 8-1)

The suspension functions are controlled by the air/hydraulic manifold. These functions allow for proper placement of the suspension compression plates on the axle stud during the procedure (Figure 8-1).

2.3 FOLDING MIRRORS

CAB MIRRORS
(Figure 8-2)

The mirror assembly can be adjusted to turn inward toward the cab to protect them during transport (Figure 8-2).

3.0 SAFETY CONCERNS

When compressing the suspension, it is very important that both suspension compression plates are installed on the axle studs. Failure to comply may result in serious injury or death to personnel.
When decompressing the suspension ensure the area above the cab is adequate before raising the cab. Failure to comply may result in damage to the equipment.
When decompressing the suspension both suspension compression plates must be removed from the axle studs. Failure to comply may result in serious injury or death to personnel.
When deflating the front tires, the vehicle may be driven but it is restricted to first gear and on smooth surfaces. Failure to comply may result in damage to the equipment.

Instructor's Note

During the Practical Application focus on the following tasks:

- **Explain the proper adjustment of the compression plate**
- **Demonstrate the use of the Hydraulic Manifold**
- **Go over the DOs and DON'Ts of the procedure (reference warnings and cautions in the TM)**
- **Demonstrate the Front Tire Deflation (Kneeling function) of the CTIS**

PRACTICAL APPLICATION

Have students proceed to vehicle.
With student assistance, demonstrate proper and safe procedure for air transport preparation (TM 9-2320-392-2; WP-00 59 00).

M1087A1 Expansible Van Operation Training Course

LESSON 9

PMCS

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 9 – PMCS

LESSON:	9
LESSON TITLE:	PMCS
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	2.0 HR
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, OPERATOR MANUAL (TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), MSD/IETM, WRITING UTENSILS, OVERHEAD PROJECTOR, SCREEN, AND TWO (2) M1087A1 EXPANSIBLE VANS.
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	PROPERLY PERFORM BEFORE, DURING AND AFTER PMCS PROCEDURES ON THE FMTV
CONDITION:	GIVEN CLASSROOM INSTRUCTION, HANDS-ON TRAINING, OPERATOR TM AND SG
STANDARD:	STUDENTS WILL BE ABLE TO PERFORM PROPER BEFORE, DURING AND AFTER PMCS PROCEDURES ON AN FMTV, IDENTIFY TYPE AND QUANTITY OF FLUID REQUIRED FOR VARIOUS COMPONENTS/SYSTEMS ON THE FMTV AND IDENTIFY DIFFERENCE BETWEEN A CLASS I, CLASS II AND CLASS III FLUID LEAK. FLM STUDENTS WILL UTILIZE THE MSD/IETM TO PERFORM PMCS.

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 9 – PMCS

1.0 INTRODUCTION

The purpose of this lesson is to ensure that the students are thoroughly familiar with all operator preventive maintenance checks and services required for the FMTV A1 model/models they will be required to operate and maintain.
The full operational capability of this vehicle depends greatly on how well it is maintained on a regularly scheduled basis. As operators of the FMTV A1, it is your responsibility to assure that all scheduled maintenance is performed on time and efficiently.

2.0 PMCS INTERVALS

Before

Before Checks and Services of Preventive Maintenance must be performed prior to placing the vehicle or it components in operation.

During

During Checks and Services of Preventive Maintenance must be performed while the vehicle or its components are in operation.

After

After Checks and Service of Preventive Maintenance is performed upon completion of the mission.

Weekly

Weekly Checks and Services of Preventive Maintenance are performed once every seven days regardless of the operating time of the vehicle during this time period.

Monthly

Monthly Checks and Services of Preventive Maintenance are performed every thirty days regardless of the operating time of the vehicle.

Basic PMCS is the same for all the variants. There are additional PMCS checks to be performed on the Wrecker, Tractor, Dump, and Cargo with Crane.

3.0 PMCS PROCEEDURES

Instructor's Note

Have students refer to TM and explain variant and commonality PMCS tables.

Technical Manual

The PMCS tables in your technical manual (TM 9-2320-391-10 and TM 9-2320-392-10), PMCS must be followed step-by-step to ensure the checks are performed correctly and completely.

Tools

The tools included with your vehicle are to be used by you to perform PMCS. Expendable supplies such as cleaning materials should be provided to you from your motor pool.

3.1 VISUAL INSPECTION

An overall visual inspection of your vehicle is an extremely important part of PMCS. The following are some of the items to look for and correct on a visual inspection:

1. Check all bolts, nuts, and screws. If they are loose, bent, broken, or missing correct the condition.
2. Look for chipped paint and rust. Check for cracked welds. Remove rust. Repair chipped paint (for spot painting) and cracked welds.
3. Inspect electrical wires and connectors for cracked or broken insulation. Also look for bare wires and loose or broken connections. Tighten loose connections. Correct other problems as necessary.
4. Check hoses and fluid lines for wear, damage, and leaks. Make sure clamps and fittings are tight. Repair damage and wear as necessary.

3.2 FLUID LEAKAGE

Wetness around seals, gaskets, fittings, or connections indicates leakage. A stain also denotes leakage.

3.2.1 CLASSES OF LEAKS

Class I

Class I represents leakage indicated by dampness or discoloration not great enough to form drops.

Class II

Class II represents leakage great enough to form drops, but not enough to cause drops to drip from the item being inspected.

Class III

Class III represents leakage great enough to form drops that fall from the item being inspected.

3.2.2 EFFECTS ON OPERATION

Operation is allowable with Class I or Class II leakage. You must consider fluid capacity of the leaking system and the type of fluid that is leaking. When in doubt, notify your supervisor. When operating with leaks, check fluid levels more frequently. Class III leaks must be reported immediately. Failure to do this could result in damage to your vehicle or its components.

3.3 CLEANING

Cleaning is an *After Operation* service performed by the operators, to help keep the vehicle in a high state of readiness. Facilities and materials available to operators for vehicle cleaning can vary greatly in different operating conditions. However, vehicles must be maintained in as clean a condition as available cleaning equipment, materials, and tactical situations permit.

3.3.1 CLEANING PRECAUTIONS

Normal cleaning is accomplished using soap and water. However, more extensive cleaning may require the use of other types of cleaning material which may be hazardous and require adherence to the following precautions:

1. When using solvent or other chemicals, cleaning must be performed in a well-ventilated area with a fire extinguisher readily available.
2. Protective gloves, clothing, and/or respiratory equipment must be worn whenever caustic, toxic, or flammable cleaning solutions are used.
3. Diesel fuel or gasoline must never be used for cleaning.
4. Do not allow cleaning compounds to come in contact with rubber, leather, vinyl, or canvas materials.
5. Do not direct high-pressure water stream at lass surfaces, seals, air intake, exhaust outlet, or any other component of the vehicle that can be easily damaged by a high-pressure

water stream.

6. Do not use high-pressure water or stream to clean the interior of the vehicle.
7. Do not use compressed air for cleaning vehicle intercoms.

PRACTICAL APPLICATION

Have students proceed to vehicles to perform the following:

1. **Locate and point out lubrication points to students during a walk-around of vehicles, refer to TM 9-2320-391-10 or TM 9-2320-392-10.**
2. **Have students perform the following PMCS procedures:**
   - **During – Van Seal Inspection**
   - **After – ISO Locks Inspection/Adjustment**
3. **Review unusual conditions and how this affects PMCS.**

CHECK ON LEARNING

During student driving phase of course, have students follow/perform requirements of lesson objectives.

M1087A1 Expansible Van Operation Training Course

LESSON 10

VAN SETUP AND DRIVING

INSTRUCTOR LESSON GUIDES

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 10 – VAN SETUP AND DRIVING

LESSON:	10
LESSON TITLE:	VAN SETUP AND DRIVING
TYPE PRESENTATION:	CLASSROOM DEMONSTRATION/PRACTICAL APPLICATION
TIME ALLOTTED:	11.0
INSTRUCTORS REQUIRED:	2
INSTRUCTIONAL MATERIALS:	INSTRUCTOR LESSON GUIDE, STUDENT LESSON GUIDE, IETM, OPERATOR MANUAL (TM 9-2320-392-10-1 AND TM 9-2320-392-10-2), WRITING UTENSILS, AND TWO (2) M1087A1 EXPANSIBLE VANS
STUDENT UNIFORM:	MILITARY - BDU CIVILIAN - WORK CLOTHES

TRAINING OBJECTIVE

ACTION:	SAFELY OPERATE THE EXPANSIBLE VAN W/O WINCH
CONDITION:	GIVEN PRELIMINARY CLASSROOM-RELATED INSTRUCTION, ACTUAL EXPANSIBLE VAN ORIENTATION AND THE RELATED OPERATOR TM
STANDARD:	STUDENT WILL BE ABLE TO SAFELY SET UP THE EXPANSIBLE VAN AND OPERATE THE VAN ON PRIMARY, SECONDARY, OFF-ROAD COURSES AND ON INCLINES/ SIDESLOPES.

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 10 – VAN SETUP AND DRIVING

1.0 INTRODUCTION

The purpose of this lesson is to completely familiarize the student with all aspects of the vehicle operation. In order for the Expansible Van to operate at its full potential under usual and unusual conditions, the operator must be thoroughly familiar and comfortable with all the vehicle's operating characteristics.

2.0 OPERATING PROCEDURES

Instructor's Note

Have the students refer to the vehicle operating procedures in the operator's manual. Review the procedures with the class and describe how the engine exhaust brake aids the driver in slowing the vehicle.

3.0 VEHICLE EQUIPMENT OPERATION

Instructor's Note

Before operating the vehicles, the instructor will verify the following:

1. **PMCS checks required before operating the vehicle are conducted correctly.**
2. **The student is able to locate and identify all the components, indicators and controls.**
3. **Operating procedures for equipment to be operated are understood.**

PRACTICAL APPLICATION

- **Have students proceed to the vehicles.**
- **Divide students into two groups: Driving and Van Set-up (one instructor per group)**
- **Students waiting to drive or have completed the driving instruction will observe the van set-up group**
- **Groups will rotate until all students have performed the tasks listed on the Driver Evaluation Checklist.**

INSTRUCTOR LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION TRAINING COURSE
LESSON 10 – VAN SETUP AND DRIVING

DRIVER EVALUATION CHECKLIST
HARD SURFACE OPERATION

STUDENT NAME_____ **DATE**_____

INSTRUCTOR NAME_____ **LOCATION**_____

1.	PERFORM VISUAL INSPECTION OF VAN AND CHECK FOR PROPER LOADING	☐ GO ☐ O-GO
2.	PERFORM "BEFORE" PMCS	GO ☐ NO-GO ☐
3.	PERFORM “DURING” PMCS	GO ☐ NO-GO ☐
4.	OPERATING THE CTIS - RUN FLAT MODE	GO ☐ NO-GO ☐
5.	OPERATING CTIS - RESET CTIS	GO ☐ NO-GO ☐
6.	WARMUP/OFF/RETARD SWITCH – USE THE EXHAUST BREAK IN RETARD POSITION	GO ☐ NO-GO ☐
7.	PREPARATION FOR AIR TRANSPORT – KNEEL THE TRUCK	GO ☐ NO-GO ☐
8.	PREPARATION FOR AIR TRANSPORT – COMPRESS THE SPRINGS	GO ☐ NO-GO ☐
9.	PMCS – CHECK THE TRANSMISSION OIL	GO ☐ NO-GO ☐
10.	PMCS – CHECK THE ENGINE	GO ☐ NO-GO ☐
11.	PMCS – LOCATE OIL LUBRICATION POINTS	GO ☐ NO-GO ☐
12.	INTERIOR LIGHT OPERATION	GO ☐ NO-GO ☐
13.	RUNNING 120V LIGHTS, AIR CONDITIONS, AND HEATER	GO ☐ NO-GO ☐
14.	90 DEGREE RIGHT TURN	GO ☐ NO-GO ☐
15.	90 DEGREE LEFT TURN	GO ☐ NO-GO ☐
16.	BACK VEHICLE SAFELY	GO ☐ NO-GO ☐
17.	PROPER USE OF HAND AND ARM SIGNALS/GROUND GUIDES	GO ☐ NO-GO ☐
18.	DEMONSTRATES KNOWLEDGE OF INCLINES AND SIDE SLOPES	GO ☐ NO-GO ☐
19.	PERFORM "AFTER" PMCS	GO ☐ NO-GO ☐

OVER →

VAN EXPANSION & COMPRESSION CHECKLIST

20. EXPANDING THE VAN

A. EXPAND VAN WALLS	GO ☐	NO-GO ☐
B. INSTALL LEVELING JACKS	GO ☐	NO-GO ☐
C. SET UP VAN PLATFORMS	GO ☐	NO-GO ☐

21. COMPRESSING THE VAN

A. STOWING THE VAN PLATFORMS	GO ☐	NO-GO ☐
B. REMOVE LEVELING JACKS	GO ☐	NO-GO ☐
C. COMPRESS VAN WALLS	GO ☐	NO-GO ☐

M1087A1 Expansible Van Operation Training Course

LESSON 11

COURSE REVIEW/EXAM/CRITIQUE

STUDENT LESSON GUIDES

STUDENT LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION
LESSON 11 – COURSE EXAM

1.0 REVIEW

Your instructor will take this time to review the key points of the course. Your instructor will also answer any last minute questions from the class, before distributing the exam.

2.0 EXAM

This time will be spent taking a short exam which will cover the topics discussed in this course.
Once the class has completed the exams, they will be graded and returned for review.

3.0 CRITIQUE

Upon completion of the course, you will be asked to fill out the evaluation form on the next page. Please give detailed comments about the course. Listen to the instructor's directions prior to the critique.

STUDENT LESSON GUIDE
M1087A1 EXPANSIBLE VAN OPERATION
LESSON 11 – COURSE EXAM

COURSE CRITIQUE SHEET

DATE:_____

YOUR COMMENTS ON THE COURSE ARE WELCOMED AND APPRECIATED. FILL OUT CRITIQUE SHEET AND RETURN TO THE INSTRUCTOR.

1. WERE THE INSTRUCTORS HELPFUL AND INFORMATIVE?

2. WAS THE TIME SPENT ON PRACTICAL APPLICATIONS AND IN THE CLASSROOM SUFFICIENT?

3. SHOULD THERE BE MORE TIME ON ANY SPECIFIC AREA/TOPIC?

4. WERE THE TRAINING AIDS UTILIZED IN THE COURSE HELPFUL TO YOU?

5. ARE THERE ANY ADDITIONAL TRAINING AIDS THAT COULD BE ADDED?

6. ANY ADDITIONAL COMMENTS: