

UNITED STATES MARINE CORPS  
Motor Transport School Company  
Marine Corps Service Support Schools  
Marine Corps Base  
Camp Lejeune, North Carolina 28542

AOMC-III-19  
April 1981

M49A2C FUEL TANKER

Student Outline

LESSON PURPOSE: To acquaint the student with the peculiar design and functional characteristics of certain associated components and systems featured in the Truck, Fuel Servicing, 1200 Gallon, 6X6, M49A2C, and to familiarize him/her with the operation and maintenance repair procedures that are performed on the vehicle's auxiliary equipment at the second echelon maintenance level.

STUDENT REFERENCES:

1. TM 9-2320-209-10-1
2. TM 9-2320-209-20
3. TM 9-2320-209-34

LEARNING OBJECTIVES:

*ALL Refuelers are basically the same  
It takes a special license to operate  
this vehicle. Take time to explain.*

1. After a period of conventional classroom instruction the student, through the medium of a closed book written examination consisting of multiple choice and/or true-false type test items, answers questions or completes statements to:

a. Describe the design characteristics and name the various safety devices incorporated in to the M49A2C, as taught in class and contained in TM 9-2320-209-10-1 and TM 9-2320-209-20.

b. Describe the purpose of and maintenance requirements associated with the auxiliary equipment featured on the M49A2C, as taught in class and contained in TM 9-2320-209-20.

c. Describe the procedures for operating the auxiliary equipment featured on the M49A2C, to include pumping and gravity discharge fueling, as taught in class and contained in TM 9-2320-209-10-1.

d. Describe the procedures for changing from one type of fuel to another and flushing the system prior to entering the shop for maintenance, as taught in class and contained in TM 9-2320-209-10-1 and TM 9-2320-209-34.

e. Describe the methods for filling the tank, to include gravity and suction filling, as taught in class and contained in TM 9-2320-209-10-1.

OUTLINE:

1. A presentation on the design characteristics and safety devices built in to the M49A2C Fuel Tanker. *Slide # 1 2*

a. Design characteristics of the M49A2C Fuel Tanker, is of the same body and chassis as the M35A2C. It has a fuel storage capacity of 1200 Gallons, is a 6X6, 2 1/2 ton Fuel Tank Truck.

b. The capability of carrying 2 types of fuel in the M49A2C Fuel Tanker, is possible, the 1200 gallon tank is divided in to two sections, each section having a 600 gallon capacity. *3 section, last 2ft. is the auxiliary equipment*

(1) Carrying 2 types of fuel, would only be done in an EMERGENCY situation, as the M49A2C has a filtering system. and two different types of fuel should never be pumped through the same filter. *if you pump gas in one tank and diesel into the other you've got to bypass the filter for one*

c. Location of auxiliary equipment is to the rear, a body shell, which has been extended beyond the tank. This extension, houses the pump filter separator, water separator chamber, gate valves, and controls.

(1) Along the side of the tank there are running boards and side skirts. These running boards have sockets which are used to mount over head bows and canvases for the purpose of camouflage.

*Slide # 2*  
(2) Under the side running boards, there is a storage compartment for fuel hoses, which the storage compartment door, opens up in the rear of the vehicle. *check serviceability of hose. "O" rings*

(3) On top of each section of the tank there is a manhole equipped with a cover and a filler cover, surrounded by a walk-way, from the front to the rear of the vehicles tank. The manholes serve as a dual purpose, it provides for CLEANING the tank, and also gaining access in to the tank for FILLING.

*Slide # 3 1*

d. Location and purpose of safety devices is for your protection against the hazard of fire. The M49A2C is equipped with such devices.

(1) There are two FIRE extinguishers mounted on the tank. One extinguisher is mounted on the left rear of the vehicle and the other is mounted on the right front of the body. on fender

(2) These extinguishers should be checked daily, to ensure they are in good operating condition.

(3) The manhole covers are equipped with two safety devices. The first is a Vent so that any excess pressure in the tank will be released in to the atmosphere. The other device is a fusible plug. if fuel heats up the fuel expands so pressure got to go somewhere. and if the fuel get cold tanks can contract and collapse

(a) This fusible plug is made of a metal that has a very low melting point, such as solder. This plug is incorporate in man hole cover.

(b) In case of fire this plug would melt and release pressure built up inside the tank.

Slide #4

(4) A third safety device is known as a FUSIBLE link, and is used on all models of the fuel tanker. 2 tanks, 2 levers, pull to open show draining and and fusible link.

(a) This link is made of two pieces of steel soldered together, that will separate and release the discharge valve control assembly when a fire occurs in the rear compartment.

Slide #5

(b) The M49A2C not only has this link, it also incorporates a safety brace (bar) welded to the inside of the left rear compartment door. In case of fire, just shut the door and the brace will cause the control levers to release and shut off the flow of fuel. Show door bar

Slide #6

(5) Also connected to the discharge valve control assembly is an emergency remote control cable. This cable runs through the body of the left side of the vehicle. By pulling the control handle it will release the discharge valve control assembly and shut off the flow of fuel. Outside cab door driver side pull cable which will in turn pulls levers forward to shut off flow of fuel

(6) The M49A2C is equipped with a rubber impregnated strap. This strap is much safer as it causes no sparks when driving down hard surfaced roads. The impregnated strap should be checked on each PM for continuity by use of an ohmmeter. This is to insure there is good ground connection between the end of the strap and the frame of the M49A2C Fuel Tanker. How do you acquire

electricity? Explain - what would happen if you drag your feet across the carpet and then go to a light switch to turn it on you'd get shocked then the electricity leaves your body and becomes neutralized.

how do you if you're with alot of gas and use it to do  
an tanker way with alot of gas and use it to do  
the run way with alot of gas and use it to do  
asphalt. The vehicle made rods metal. Show did they place

(7) Another means of preventing the accumulation of static electricity is by these of grounding wires (cable). One set of wire is mounted on a spring loaded reel in the rear compartment. Another wire is attached to the nozzle assembly. All wires are equipped with alligator clips for attachment. Show ground cable on training and 2 part cable one to the ground and one to the equipment you are refueling.

(a) Make sure that the ground strap of the M49A2C, makes contact with the ground, and that the reel and dispenser nozzle grounding wires are properly connected, to the object being fuelled, for static electricity discharge before transferring fuel. Ensure to ground the equipment near the filler hole because of what it's made of.

(b) The proper method of connecting the reel cable, is to any good ground, available, and to the tank you are filling. The nozzle ground wire is attached as close to the filler hole of the tank in which you are filling, as possible.

(8) At no time will there be any smoking, open flame, sparks or hot objects within 50 feet of the M49A2C fuel tanker.

2. A presentation on the Purpose of and Maintenance Requirement associated with the auxiliary equipment.

a. Purpose of Auxiliary Equipment, as the fuel flows:

(1) Discharge valves, control: *slide # 8*

(a) The releasing of fuel from the tank to the fuel drain piping.

(b) The M49A2C having two fuel tanks, also has two discharge valves, one for each tank.

(2) Draining Piping, transfers the fuel from the fuel tank discharge valves to the fuel manifold in the rear of the vehicle. *Show back of training and on manifolds Slide # 9*

(3) Fuel Manifold, receives the fuel from the drain piping and transfers it on to the fuel pump manifold.

(4) Pump Manifold, receives fuel from the fuel manifold, and passes it on to the fuel pump strainer, which is attached to the top of the fuel pump. *fuel goes through the manifold then to what we call the strainer. the strainer catches big particles but lets the finer stuff pass.*

(5) Fuel Pump Strainer, receives fuel from the fuel manifold and passes it on to the fuel pump. *on slide, center screen.*

*Strainer is the 4" piping in center of screen*

(6) Fuel Pump, is the source of power for distributing the fuel through the system. *to get pump running vehicle must be running and PTO must be engaged and the gate valve must be open*

(7) Delivery gate valve, controls fuel prior to going through the water segregator.

(8) Water segregator, sediment filters, and fuses.

(a) Water segregator chamber is a two part unit, for filters and fuses.

*slide*

(b) Sediment filters, remove foreign <sup>water</sup> and moisture from the fuel before it passes through the meter and the discharge hose assembly

(c) Fuses located within the filter segregator unit, are three GO NO GO fuses.

(d) The primary purpose of the fuse is to shut off the flow of fuel when solid contaminates, or water exceeds a safe level, this indicates that the filters or water segregator chambers are not performing properly, and should be replaced. *if the filter gets too much water it automatically shuts off the fuel flow*

(9) Automatic Dump Valve, is designed to empty only water from the bottom of the water segregator unit.

*if it dumps fuel ~~out~~ it must be bused.*

(a) The automatic dump valve float is so designed that it will float in water and sinks in fuel. *right side of slide like toilet bowl*  
*not pure water so be careful*

(10) Meter, the gallon indicating meter is a precision measuring device, which must be handled carefully. *slide*

(a) The meter is not a safety device, it measures the amount of fuel flowing through the meter. *two eh. cannot do much wipe glass and check for leaks explain the seal wires.*

(11) Delivery Hose and Nozzle, delivers the fuel from the meter to the tank in which is being fueled. *slide*

(12) Gravity Discharge Valve, discharges fuel from the fuel truck when the power source is not available. *slide*

*If the vehicle is down for belts, batteries, ect. you cannot operate the pump so we use gravity discharge. but by using this method the fuel will not be metered or filtered. Right side training and use stick check for amount of fuel used. (Slide)*

(a) The fuel is not metered while using gravity flow of fuel.

(13) Discharge Control Levers, control the discharge valves which releases the fuel from the fuel tank to the fuel drain piping.

B. Maintenance Requirements.

(1) Checking discharge valve operation, fusible link and fuel leaks.

(a) Each tank compartment discharges fuel through its own discharge valve in the bottom of the compartment, into the discharge pipe manifold. Check all connections for fuel leakage.

*Slide replace seals or O rings as necessary if seals are available*

(b) Checking operation of a fusible link, which is connected to the spring loaded latch, of the discharge valve control levers.

(c) In the event of fire, the fusible link will separate, causing the latch to release both discharge valve control levers, which closes the discharge valves.

(2) Checking the drain piping strainer and connections for fuel leaks.

(3) Checking the fuel manifold, and connections for fuel leaks.

(4) Checking the pump manifold and connections for fuel leaks.

(5) Cleaning fuel pump strainer.

(a) Remove the strainer body cover. Pull the strainer from the strainer body.

(b) Clean the strainer with dry cleaning solvent, mineral spirits or paint thinner. Make sure strainer mesh is free of particles. Dry with compressed air.

(c) Position the strainer in the strainer body and install the strainer body cover.

(6) Lubrication of the fuel delivery pump and PTO drive shaft, and checking the pump for proper operation and leaks.

(a) Lubricating the pump and drive shaft is permissible by a grease fitting.

(b) Checking all gaskets and connections, no leakage is permitted.

(7) Checking delivery gate valve for proper operation and leaks.

(a) Checking the gaskets and connections of the delivery gate valve for leaks.

(b) Checking the delivery line gate valve stem packing for proper operation.

Differential (8) Changing the filters and fuses in the water segregator, and taking a pressure reading. 3 press. reading show on training ad

(a) Replacing the filter elements.

(1) Open the drain valves at the bottom of the water segregator chamber, and drain the liquid into an authorized container for flammable liquids.

(2) Open manhole cover and disconnect air vent line.

Discard (3) Loosen the nut and V-band coupling and remove the cover. the O-ring packing.

(4) Remove three nuts and washers, and remove the support plate.

(5) Using rubber gloves, lift the canisters from the filter elements.

(6) Pull elements off the pedestal, and discard.

(b) Installation.

solvent. (1) Wash containers and interiors of the housing with dry cleaning Use care to prevent damage to the pedestals.

(2) Install new elements.

(3) Position each canister carefully over each element, make sure the plug on top of the canister fits securely in the O-ring seal of the elements.

tighten (4) Install support plate, washers, and nuts. Do not over nuts. Check torque in TM

(5) Install new O-ring packing and replace cover and V-band coupling.

(6) Connect air line vent, and close manhole cover.

is possible to drain the whole system

(c) Differential pressure readings will tell the condition of the filter and fuses.

How  
to DISASSEMBLE  
FUSES & FILTERS

Replace filters & fuses  
once a year.

(1) Start engine.

(2) Transfer power to the pump. How? PTO.

(3) Open discharge valve and delivery gate valve, in order to get fuel pressure to the filters.

(a) Take a pressure reading on inlet side of filter.

position No. 1.

(1) Turn pressure gage control handle (1) right, to

(2) Write the reading down.

if in excess of 20 lbs difference

filter.

(b) Take a pressure reading on the outlet side of the

15 lb

position No. 2.

(1) Turn the pressure gage control handle (1) right, to

(2) Write down the reading.

(c) Take a pressure reading on the internal pressure side of the valve.

(1) Turn the pressure gage control handle (1) right, to position No. 3.

(2) Write down the reading.  
*if any difference*

*15 lb difference from outlet change fuses*

(4) Close the valve by turning pressure gage control handle (1) left and placing the pointer between position No. 1 and position No. 2.

(5) Test result.

(a) Difference between readings taken in position No. 1 (inlet pressure) and position No. 2 (outlet pressure) is more than 20 psi.

(b) Difference between readings taken in position No. 1 (inlet pressure) and position No. 3 (internal pressure) is more than 15 psi.

(c) Difference between readings taken in position No. 2 (outlet pressure) and position No. 3 (internal pressure) is more than 15 psi.

*Slide*

(9) Checking operation of the automatic dump valve.

(a) The automatic dump valve is designed to empty only water from the bottom of the water segregator unit. If large amounts of fuel is drained with the water, or fuel alone is drained, the automatic dump valve should be removed and serviced.

*slide*

(10) Checking meter for operation and leaks.

(a) The gallon-indication meter is a precision measuring device which must be handled carefully. Organizational maintenance procedures are limited to cleaning the meter screen, and replacement of the complete meter assembly if defective.

(11) Determining serviceability of the delivery hose, and checking operation of delivery nozzle.

(a) Checking delivery hose for cuts and breaks.

(b) Checking delivery nozzle for leakage of fuel through the nozzle valve.

(12) Checking gravity discharge valve for proper operation and leaks. Checking all connections for leakage.

(13) Checking discharge control levers, and adjusting discharge control cables.

(a) Discharge control levers should automatically return to closed position when released.

(b) Cable must be of such length that the discharge valve closes just before operation lever reaches forward end of its travel.

3. A presentation on the operation of the auxiliary equipment featured on the M49A2C.

a. Engagement of the pumping equipment.

(1) The operation of the delivery equipment is controlled from the cab of the vehicle.

(2) Just to the left of the drivers seat, there is a control lever. This lever is known as the PTO shift lever.

(3) Engaging the clutch and moving the lever to the rear will start the pump operation, engage the clutch and pull the lever forward.

(4) After the pump is engaged move to the rear of the tanker and open the delivery line gate valve, by turning it to the left.

(5) After the delivery valve is open, pull both discharge valve controls to the rear.

*You don't have to pull both.  
The only time you pull both is when you've got the same type of fuel in both tanks*

(6) Once the discharge valve controls, the pump, and the gate valve is in the proper operating position, fuel will begin to be pumped through the system.

b. Grounding procedures.

(1) One set of wire (cable) is mounted on a spring loaded reel in the rear of the compartment, used for grounding, at all times while refueling.

(2) At all times, you will ground the refueler to the ground first. The second wire, will be attached as close to the filler hole of the tank in which you are refueling.

c. Use of the Meter.

(1) A reset lever is used to run the counter back to zero after individual refuelings. The counter must not be reset while the meter is operating.

(2) The meter is used only for metering the amount of fuel flowing through the delivery pump.

Caution. Do not attempt to disassemble any portion of the meter unit. Extensive damage can be caused to the delicate mechanism inside the unit.

4. A presentation on the procedure for changing from one type of fuel to another type of fuel.

a. Draining the system of all fuel.

(1) Removing of all fuel from the refuelers, fuel tanks.

(2) Draining of delivery lines.

(3) Draining of the segregator.

(4) Draining of the meter.

(5) Draining of the delivery pump

(6) Drainig of the manifold pipes.

(7) Removal of the sediment filter and GO-NO-GO fuses.

(8) Cleaning of the meter screen.

b. Circulating the new fuel.

50 (1) To start the circulation of the new fuel, you would first, put at least 50 gallons of new fuel to each section of the fuel tanks.

*When draining the contaminated fuel where does the old fuel go? (drain + crew) for practice*

(2) Using the procedures covered earlier, you would start the operation of the pump, placing the hoses and nozzle assembly into the manhole cover.

(3) Circulating the fuel for 5 to 10 minutes in each fuel tank compartment.

c. Draining and refilling the tanker.

*When you drain the*

~~contaminated~~

(1) Using the procedures covered earlier on draining of the fuel system, in an authorized area for contaminated fuel.

(2) Use new sediment filters and GO-NO-GO fuses, the fuel tanker is now ready for new fuel.

5. A presentation on the procedures for flushing the tanker.

a. Draining of the system.

*If you're not to work on the vehicle inside the shop you've got to drain the system*

(1) Use procedures covered earlier on draining of the fuel system.

*explain some thing on working on the vehicle*

b. Cleaning the tank.

(1) When instructed, it may be necessary for the mechanic to purge the vehicle, to be free of vapor.

(a) Equip all cleaning personnel with fresh-air respirators, life line and rubber boots and gloves.

(b) Clean tank interior with <sup>warm water</sup> interior, with or without soap. If necessary, very mild nonscratching household powder and soap may be used along with warm water, bristle brushes, and clean cloths. Rinse in clean hot water and dry thoroughly.

*After cleaning it must be checked by an authorized person for fumes*

(c) METAL TOOLS, STEEL WOOL, STEEL BRUSHES, OR COARSE ABRASIVE CLEANING POWDERS MUST NOT BE USED.

6. Presentation on Methods of filling the tanker.

a. Gravity filling.

(1) Start the engine, placing the truck near fuel supply with filler hole in an easy to reach position. Pulling the handbrake lever to the lock position with the engine stop control knob out for engine shut off. Go to the rear compartment door, pull the ground wire out and clip it to a suitable ground.

(2) Put the following components in closed position.

(a) Discharge valve control levers.

(b) Delivery pump draincock.

(c) Meter drain knob.

(d) Pump delivery line gate valve knob.

(e) Gravity line gate valve knob.

(3) Take fuel level gage from stowed position in compartment. Removing filler cover from filler hole. Lift cover clamp to open manhole cover. Making sure dispenser nozzle is properly grounded, place dispenser nozzle into filler hose, pressing operating lever and fill the tank as needed. Use fuel level gage, periodically to check level of the tank.

b. Suction filling.

(1) Start the engine, placing the truck near the fuel supply with the filler hole in an easy to reach position. Pulling hand brake lever to locking position, and setting ACCESSORY switch, and all other switches to the off position. Pull engine stop control knob out to stop engine.

(2) Open rear compartment door, pulling ground wire out, and clip it to a suitable ground. Remove gravity delivery line gate valve dust cap. Open hose compartment doors removing hoses needed, positioning hoses on to gravity delivery valve adapter, and tightening with a spanner wrench. Put other end of hose into fuel supply. Using fuel gage to measure amounts of fuel being transferred.

(3) Put following components in closed position.

- (a) Discharge valve control levers.
- (b) Meter drain knob.
- (c) Water segregator drain valve knob.
- (d) Delivery pump drain cock.

(4) Put following components in open position.

- (a) Automatic dump valve knob.
- (b) Pump deelivery line gate valve knob.
- (c) Gravity delivery line gate valve knob.

(5) Starting engine, polace FRONT TRANSMISSION gearshift lever in position, with TRANSFER CASE shift lever in neutral position. Turn locking bar to off position, and move transfer power take-off lever toward rear of truck to engage, then pull hand throttle out as needed.

(6) Unwind dispenser line and nozzle from mounts, and clip dispenser nozzle ground wire to tank, remove filler cover and open manhole cover. Placing dispenser nozzle into filler hole of tank and filling tank by suction filling.

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