TM 9-2320-209-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

Operator's Manual
For
TRUCK, 2½ TON, 6X6
GASOLINE ENGINE MODELS:

M185	M59	M275
M185A1	M342	M567
M34	V18A/MTQ	M292
M35	V17A/MTQ	M109
M36	M49	M109A1
M36C	M49C	M108
M47	M50	M60
	M48	

MULTIFUEL ENGINE MODELS:
TRUCK, VAN, EXPANSIBLE: M292A1, M292A2, M292A5 (BODY ONLY)

This copy is a reprint which includes current pages from Changes 1 through 11.
The title is changed by C 11 as shown above.

HEADQUARTERS, DEPARTMENT OF THE ARMY
FEBRUARY 1965

OPERATOR'S PRECAUTIONS

WARNING

Use the hand throttle for cold engine starting and warmup only. Do not use for vehicle acceleration.
Page 74

WARNING

Do not put the truck in motion until the low air pressure warning buzzer is silent, and the air pressure gage indicates pressure of at least 65 psi. Satisfactory braking action depends on this minimum pressure.
Page 77

WARNING

Do not park truck with transmission in gear.

WARNING

Exercise extreme care in opening radiator cap, especially when temperature gage reads above 180°F.
Page 152

CAUTION

The starter should not be operated continuously for more than 30 seconds. If the engine fails to start within 30 seconds, wait 10 to 15 seconds before trying again.
Page 75

CAUTION

If the oil pressure does not register within 20 seconds, stop the engine immediately.
Page 76

CAUTION

Do not operate the manifold heater unless the engine is being cranked or is idling.
Page 76

CAUTION

Do not steam clean this vehicle. Clean with water, solvent or mineral spirits paint thinner.
Page 176

CAUTION

The truck must be at a complete stop before shifting into reverse.
Page 80

CAUTION

Do not let the truck coast forward when in reverse gear.
Page 80

CAUTION

Do not exceed the maximum speed in reverse called out on the vehicle instruction and caution data plate.
Page 80

CAUTION

Do not push a disabled vehicle. Tow the disabled vehicle only with a tow bar, cable, or chain.
Page 82

CAUTION

Do not attempt to tow a disabled vehicle with the tow chain wrapped around the front bumper.
Page 81

CAUTION

Make certain that the service brakes are operating on the towed vehicle before towing. Avoid quick starts and jerking.
Page 81

CAUTION

Particular care must be exercised when towing disabled trucks to ensure that no additional damage occurs. If there is known damage to the transfer, axles, or transmission, do not attempt to tow the vehicle. Notify the direct support maintenance unit.
Page 81

CAUTION

Do not operate the front winch with less than four turns of cable on the drum. The cable clamp alone will not hold against a load.
Page 85

DON'TS

- Do not exceed speeds specified on the vehicle instruction and caution data plate, located on the instrument panel directly in front of the driver.
- Do not skip speeds when shifting gears.

Page 38

DO'S

- Select proper transmission driving range for specified driving conditions.
- Avoid rapid acceleration and deceleration.
- Avoid sudden stops (unless in an emergency).
- Avoid prolonged operation of the vehicle under other than normal weather and terrain conditions.
- Avoid sudden or forced engagement of an operating control.
- Avoid overheating the engine.
- Avoid operation of engine or power train to capacity.

Page 38

CHANGE
No. 11

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *15 May 1980*

Operator's Manual
For
TRUCK, 2½ TON, 6X6
GASOLINE ENGINE MODELS:

M185	M59	M275
M185A1	M342	M567
M34	V18A/MTQ	M292
M35	V17A/MTQ	M109
M36	M49	M109A1
M36C	M49C	M108
M47	M50	M60
	M48	

MULTIFUEL ENGINE MODELS:
TRUCK, VAN, EXPANSIBLE: M292A1, M292A2, M292A5 (BODY ONLY)

TM 9-2320-209-10, 8 February 1965, is changed as follows:

The title is changed to read as shown above.

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

Remove pages	*Insert pages*
i and ii	i and ii

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:
J. C. PENNINGTON
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-38, Operator Maintenance requirements for (Code Block Nos. B11, B12, B13).

INSTRUCTIONS

Make the following pen and ink changes in the manual:

Change all references to M49CA1 to read "M49A1C".

Delete all references to Truck, Van: Missile Firing Data Computer, XM472, wherever they appear in the manual.

TECHNICAL MANUAL
No. 9-2320-209-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *8 February 1965*

Operator's Manual
For
TRUCK, 2½ TON, 6X6
GASOLINE ENGINE MODELS:

M185	M59	M275
M185A1	M342	M567
M34	V18A/MTQ	M292
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M36C	M49C	M108
M47	M50	M60
	M48	

MULTIFUEL ENGINE MODELS:
TRUCK, VAN, EXPANSIBLE: M292A1, M292A2, M292A5 (BODY ONLY)

IMPORTANT NOTICE

TM 9-2320-209-10 should be used only for the models listed above. For all multifuel models, including the engine and drive train of models M292A1, M292A2, and M292A5, use only:

TM 9-2320-209-10/1 (Oct 76)
LO 9-2320-209-12/1 (Sep 76)

REPORTING OF ERRORS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA 2028 (Recommended Changes to Publication and Blank Forms), or DA 2028-2 direct to: Commander, US Army Tank-Automotive Materiel Readiness Command, ATTN: DRSTA-MBT, Warren, MI 48090. A reply will be furnished to you.

*** This manual supersedes TM 9-2320-235-10, 21 December 1961, including C3, 11 February 1964; the Operator's portion of TM 9-8022, 17 December 1954, including C3, 2 December 1958, C4, 1 July 1959, C5, 11 December 1959, C6, 7 March 1960, C8, 2 November 1961, C9, January 1963, C10, 8 June 1963, and C11, 19 August 1963, and the operator's portion of TB 9-2320-209-12/1, 21 January 1959.**

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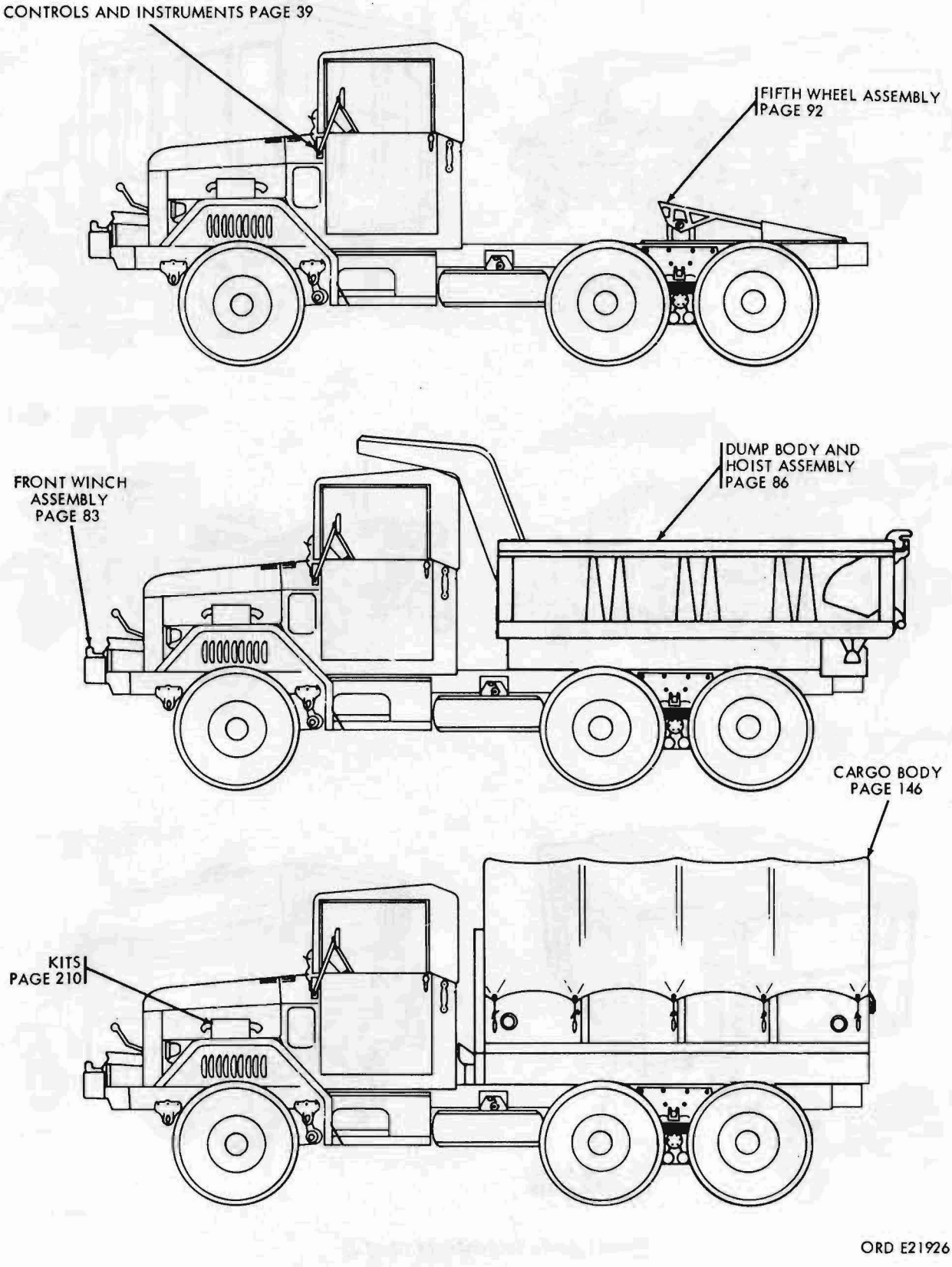
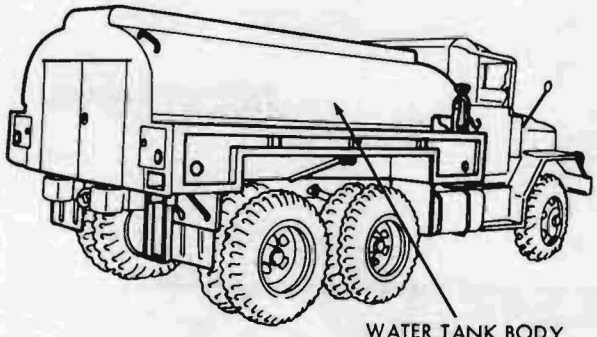
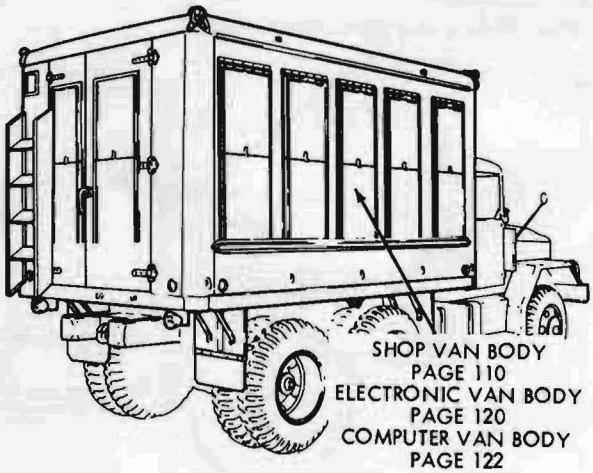
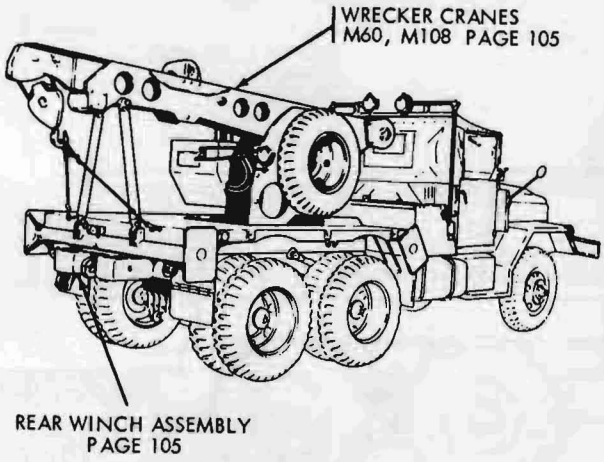
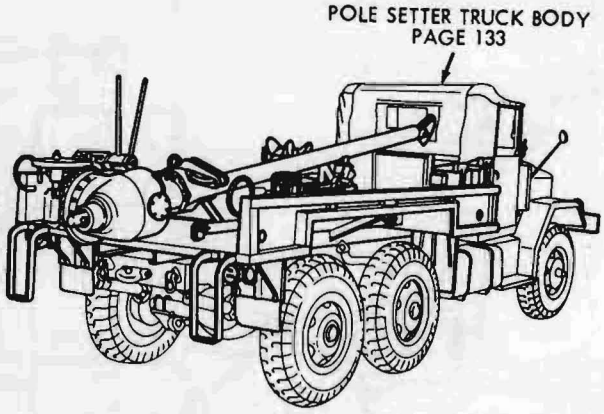


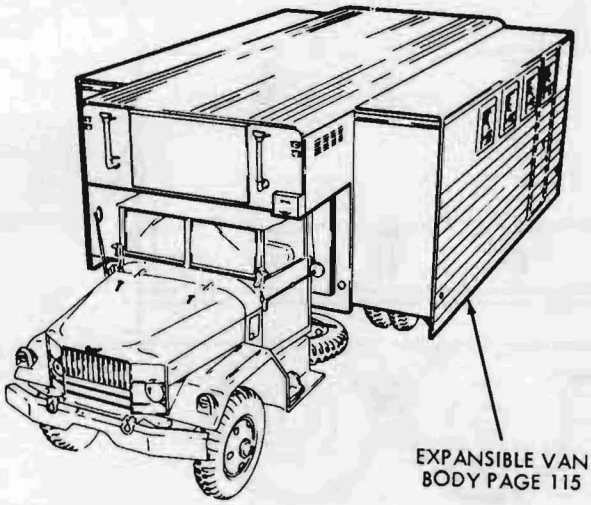
Visual guide to contents (1 of 2)

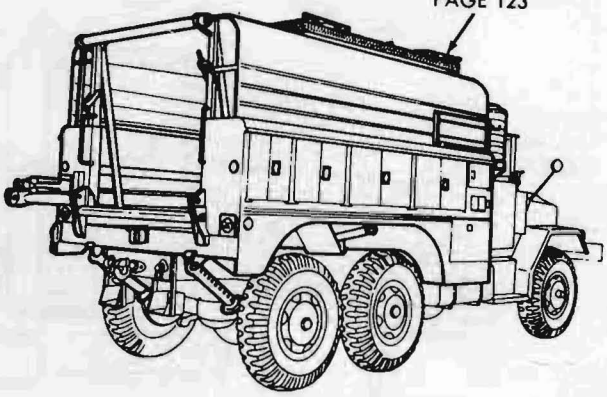










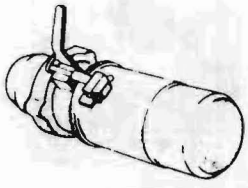


ORD E21927

Visual guide to contents (2 of 2)

STARTER

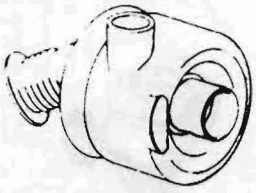
Autolite MBD-4043UT



Maint. and
Parts TM 9-2920-236-35

TURBOSUPERCHARGER

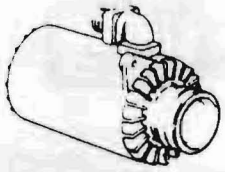
Switzer Model 4-450



Maint. and Parts TM 9-2990-201-45

GENERATOR

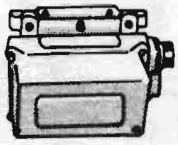
Autolite GHA 4802UT
Delco Remy 1117495



Maint. and Parts
Autolite: TM 9-2920-209-35
Delco Remy: TM 9-2920-214-35

REGULATOR

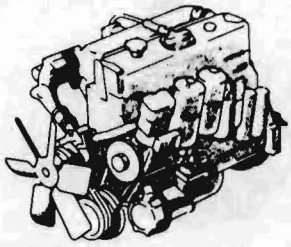
Gov. Standard 8360020
Delco Remy 1118656



Parts TM 9-2320-209-35P

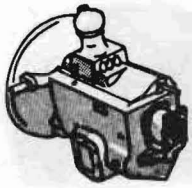
ENGINE AND CLUTCH

Engine-Continental LDS-427-2
Clutch - Long 13 CF



Maint TM 9-2815-204-35
Parts TM 9-2815-204-35P

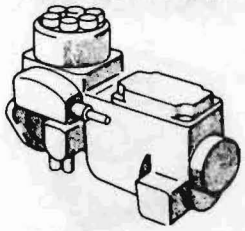
TRANSMISSION, TRANSFER AND POWER-TAKEOFFS



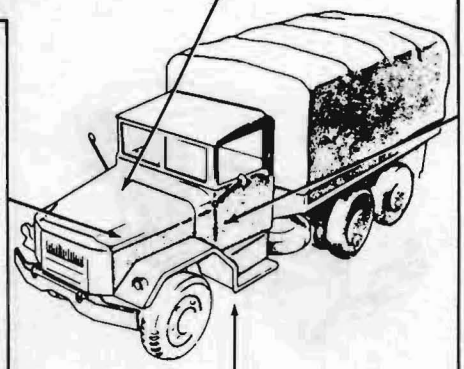
Maint. TM 9-2520-246-35
Parts TM 9-2520-246-35P

FUEL INJECTION PUMP

American bosch PSB-GA



Maint. and
Parts TM 9-2910-223-35



LUBRICATION ORDER	OPERATOR'S MANUAL	ORGANIZATIONAL MAINTENANCE	ORGANIZATIONAL PARTS	DIRECT SUPPORT GENERAL SUPPORT AND DEPOT MAINT.	DIRECT SUPPORT, GENERAL SUPPORT AND DEPOT PARTS
LO 9-2320-209-12	TM 9-2320-209-10	TM 9-2320-209-20	TM 9-2320-209-20P	TM 9-2320-209-35	TM 9-2320-209-35P

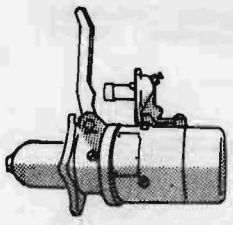
VISUAL PUBLICATIONS REFERENCE

MULTIFUEL ENGINE—M44 SERIES, 2-½-TON, 6 x 6 TRUCKS

ORD E21928

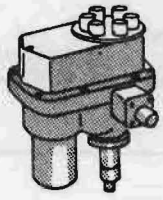
Visual guide to pertinent publications - gasoline engine vehicles

STARTER
Delco 1108575



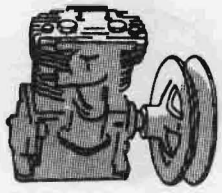
Maint TM9-8627
Parts TM9-2805-222-35P

IGNITION UNIT
Delco 1111556



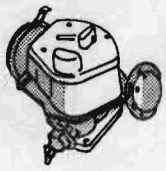
Maint TM9-8627
Parts TM9-2805-222-35P

AIR COMPRESSOR
Air Cooled
Ross Midland 54008
Water Cooled
Bendix Westinghouse 2UE-7-1/4-VW



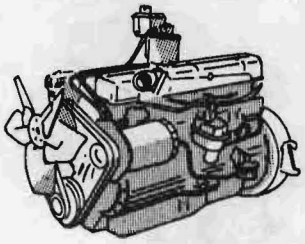
Maint:
Ross Midland TM9-2805-222-35
Bendix Westinghouse TM9-1827A
Parts:
Ross Midland TM9-2320-209-20P
Bendix Westinghouse TM9-2805-222-35P

CARBURETOR WITH GOVERNOR AND GOVERNOR VALVE
Carburator-Holley- 885-FF G
Governor valve-Holley- 1174

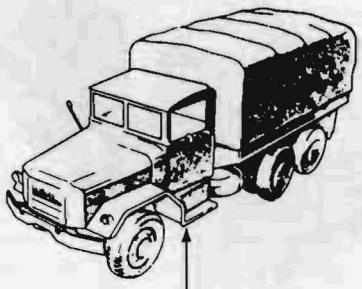


Maint TM9-8647
Parts TM9-2805-222-35P

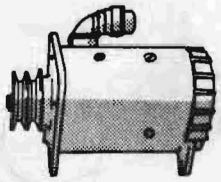
ENGINE AND CLUTCH
Engine-Reo OA-331
Clutch-Long 12-CF



Maint TM9-2805-222-35
Parts TM9-2805-222-35P

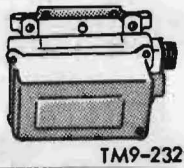


GENERATOR
Autolite GHA 4802UT
Delco 1117495



Maint and Parts
Autolite TM9-2920-209-35
Delco TM9-2920-214-35

REGULATOR
Gov. Standard 8360020
Delco 1118656

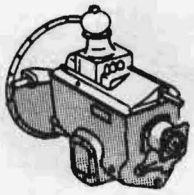


Maint: TM9-2320-209-35P

FUEL PUMP (AC Series CF)

Maint TM9-1828A
Parts TM9-2805-222-35P

TRANSMISSION, TRANSFER AND POWER-TAKEOFFS



Maint TM9-2520-246-35
Parts TM9-2520-246-35P

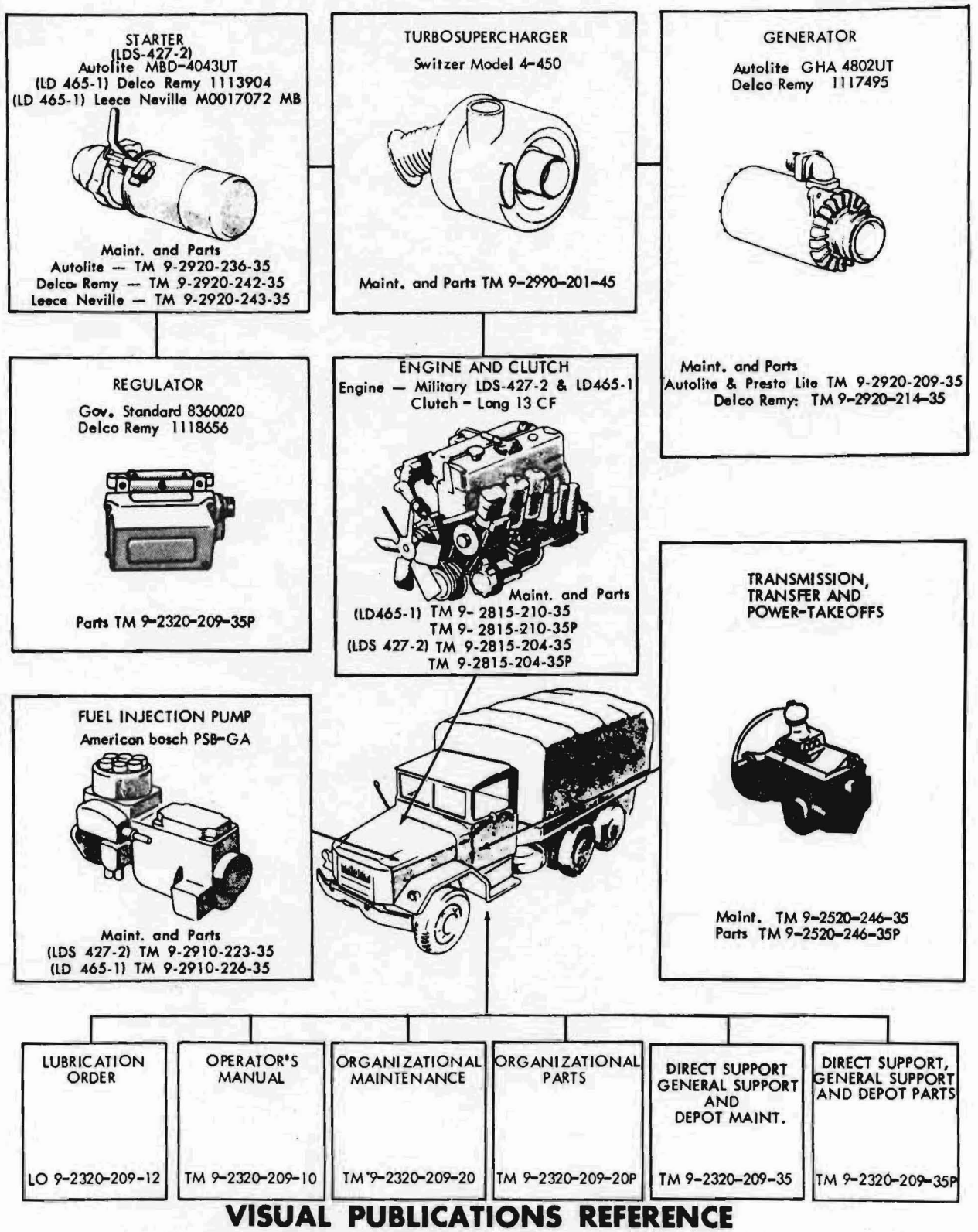
Lubrication Order	Operator's Manual	Organizational Maintenance	Organizational Parts	DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE	DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT PARTS
LO9-2320-209-12	TM9-2320-209-10	TM9-2320-209-20	TM9-2320-209-20P	TM 9-2320-209-35	TM9-2320-209-35P

VISUAL PUBLICATIONS REFERENCE

GASOLINE ENGINE—M44 SERIES, 2-½-TON, 6 x 6 TRUCKS

ORD E21929

Visual guide to publications - multifuel engine vehicles

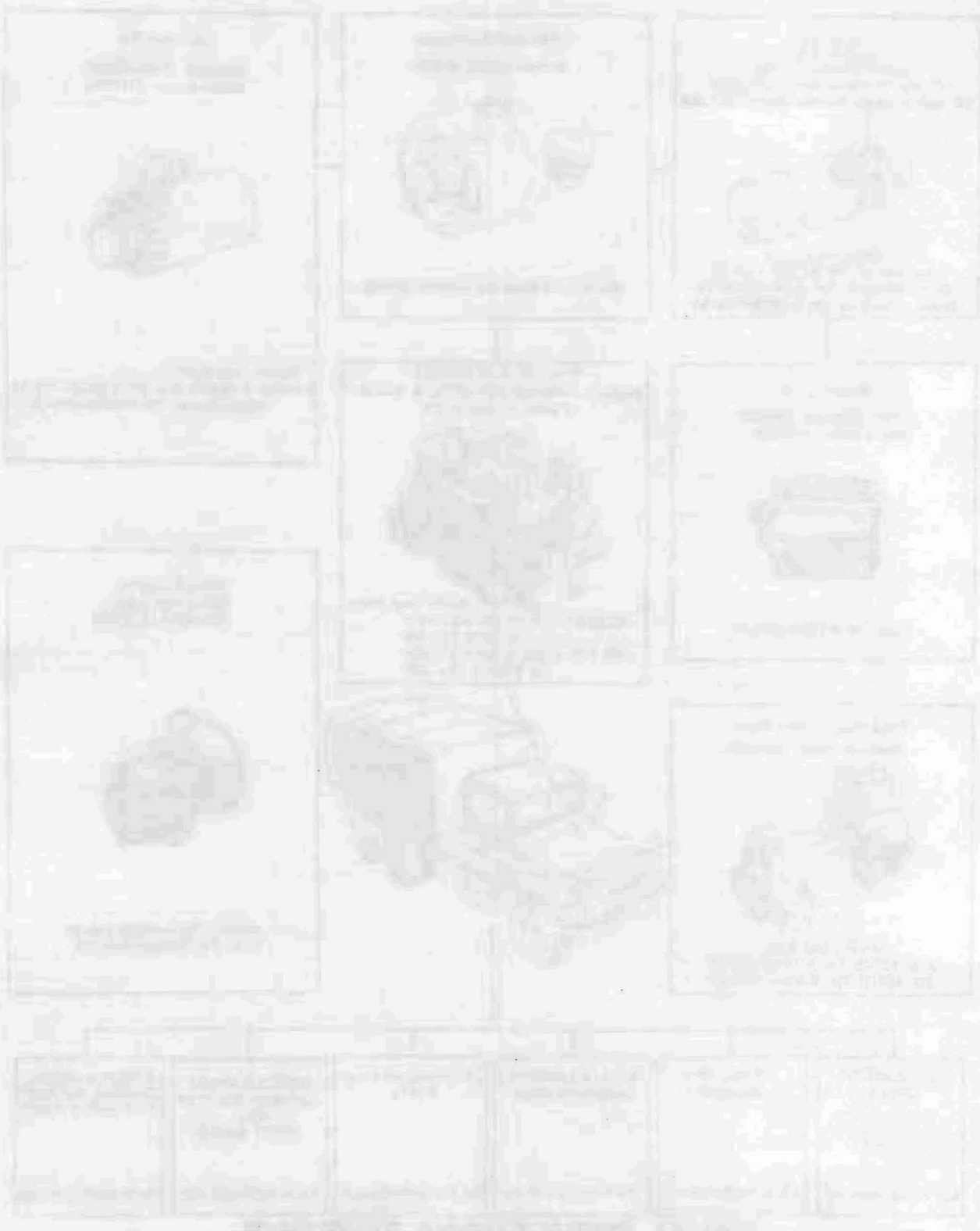


VISUAL PUBLICATIONS REFERENCE

MULTIFUEL ENGINE—M44, M44A1 AND M44A2 SERIES, 2 1/2-TON, 6x6 TRUCKS

ORD E51561

Figure 211. Visual guide to pertinent publications—Multifuel Engines.



CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This technical manual contains instructions for operation and operators' maintenance for the 2-1/2 ton, 6 x 6, M44 series trucks as listed in the title of this manual. It covers both gasoline engine and multifuel engine-equipped vehicles. Also, it provides operating instructions and operators' maintenance for the special purpose kits available for use with these vehicles; -65°F. winterization, -25°F. hot-water personnel heater, hardtop enclosure, and deep-water fording.

b. Before operating any of this series of vehicles, the driver must be familiar with TM 21-305, the Driver's Manual. Also, he should be familiar with AR 385-55 on the prevention of Army motor vehicle accidents.

c. This manual and the lubrication order must be carried with the vehicle at all times; when not in use these publications should be stowed in the glove compartment.

d. Appendix I contains a list of current references, including supply manuals, technical manuals, forms and other available publications applicable to the materiel.

e. Appendix II contains a list of tools, equipment, and publications issued with the vehicle. These items are called "basic issue items," and together with the vehicle make up one complete end item of equipment. Appendix II also contains a list of troop-installed items which are authorized by TOE and TA, and for which provisions have been made for stowage on the vehicle.

f. This technical manual differs from TM 9-8022, dated 17 December 1954 with changes thereto and TM 9-2320-235-10, dated 21 December 1961, with changes thereto as follows:

(1) Revises information and illustrations in accordance with current production standards for both gasoline engine and multifuel engine vehicles.

(2) Consolidates information from two series vehicles and technical manuals into one; SNL G-863 and SNL G-742 vehicles and TM 9-2320-235-10 and portions of TM 9-8022 into TM 9-2320-209-10.

(3) Adds operating instructions for multifuel vehicles in new body types; M292A1, M50A1, M49CA1, M109A2, M275A1 and M185A2.

(4) Revises information on operators' daily preventive-maintenance (PM) services, troubleshooting and corrective maintenance.

(5) Includes operators' instructions for the M292 and M292A1 expansible van (M292 coverage formerly contained in TB 9-2320-209-12/1 dated 21 January 1959).

(6) Adds operators' instructions for vehicles equipped with special purpose kits; fording, -65°F. winterization, -25°F. hot-water personnel heater and hardtop enclosure kits.

g. Any errors or omissions pertaining to this publication will be forwarded on DA Form 2028 direct to the Commanding General, U.S. Army Tank-Automotive Command ATTN: AMSTA-MAPT Warren, Michigan 48090

2. Maintenance Allocation

The prescribed maintenance responsibilities, as allocated in maintenance allocation charts, are reflected in this technical manual. In all cases where the nature of repair, modification, or adjustment is beyond the scope or facilities of the operator, crew, or user, the supporting unit should be informed in order that trained personnel with suitable tools and equipment may be provided or other instructions issued.

3. Forms, Records, and Reports

a. Vehicle Operation and Maintenance. The forms, records, and reports required by the

operator of these vehicles are prescribed in TM 38-750. Additional forms applicable to the driver's operation and maintenance and those to be used with the equipment log book are listed in Appendix I.

b. Field Report of Accidents. Injury to personnel or damage to materiel must be reported to the supporting unit so that reports as required by AR 385-40 can be prepared.

4. Carbon Monoxide Poisoning

Warning: Carbon monoxide is a colorless, odorless, DEADLY POISONOUS gas which, when breathed, deprives the body of oxygen and causes SUFFOCATION. Exposure to air contaminated with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and/or coma. Permanent BRAIN DAMAGE or DEATH can result from severe exposure. It occurs in the exhaust fumes of fuel-burning heaters and internal-combustion engines and becomes DANGEROUSLY CONCENTRATED under conditions of INADEQUATE VENTILATION. The following precautions MUST be observed to ensure the safety of personnel whenever the personnel heater, main, or auxiliary engine of any vehicle is operated for maintenance purposes or tactical use.

a. DO NOT operate heater or engine of vehicle in an enclosed area unless it is ADEQUATELY VENTILATED.

b. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in personnel compartments.

c. DO NOT drive any vehicle with inspection plates, cover plates, engine compartment doors removed unless necessary for maintenance purposes.

d. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE: if necessary, administer artificial respiration.

5. Abbreviations

The abbreviations listed herein are explanations of abbreviations used on the vehicle data and service plates throughout this manual and in the basic issue items list.

adj . . . . . adjust, adjustable, adjusting
approx . . . . . approximately
assy . . . . . assembly (ies)
cap. . . . . capacity
cg . . . . . center of gravity
carb-s . . . . . carbon steel
comb. . . . . combination
c'try . . . . . country
cu ft . . . . . cubic feet
cut. . . . . cutting
dia . . . . . diameter
dble . . . . . double head
em . . . . . empty
equp . . . . . equipment
extn . . . . . extension
F . . . . . Fahrenheit
flex. . . . . flexible
ft . . . . . feet
gal(s) . . . . . gallon(s)
gr . . . . . grade
h . . . . . height
hd . . . . . head
hdl . . . . . handle (d)
hex . . . . . hexagon (al)
hv-duty . . . . . heavy duty
hyd . . . . . hydraulic
id . . . . . inside diameter(s)(dimension)
in. . . . . inch(es)
infl . . . . . inflation
inter . . . . . intermediate
lb . . . . . pound(s)
lg . . . . . long
lo . . . . . lubrication order
lt . . . . . light
lubr . . . . lubricator, lubricating, lubrication
M . . . model (to designate standardized item)
max . . . . . maximum
mech . . . . . mechanic, mechanism
mfd . . . . . manufactured
mfg . . . . . manufacturer
mi . . . . . miles
min . . . . . minimum
MPH(mph) . . . . . miles per hour
MS . . . . . military standards
mtd . . . . . mounted
mtl . . . . . metal
NC . . . . . American National Coarse Thread
NF . . . . . American National Fine Thread
nom . . . . . nominal
NR . . . . . non-expendable and recoverable
oa . . . . . overall
opng . . . . . opening
Ord . . . . . Ordnance
patt . . . . . pattern
phos-ctd . . . . . phosphate coated

p or m . . . . . plus or minus
pr . . . . . pair(s)
pt . . . . . pint(s), point
qt(s) . . . . . quart(s)
qty . . . . . quantity
r.a. . . . . rear axle(s)
rd . . . . . round
rd-pt . . . . . round point
S . . . . . steel
sgle . . . . . single
sgle-hd . . . . . single head
sp . . . . . special
spec . . . . . specification(s)
spg . . . . . spring
sq . . . . . square
std . . . . . standards
stgt . . . . . straight
temp . . . . . temperature
thd . . . . . thread(ed)(s)
thk . . . . . thick(ness)
w . . . . . wide, width, watt(s)
w/ . . . . . with
w/e . . . . . with equipment
w/o . . . . . without
wn . . . . . winch
wt . . . . . weight

Section II. DESCRIPTION

6. General

a. The 2-1/2 ton, 6 x 6, M44 Series trucks are designed as tactical vehicles for use over all types of roads, highways and cross-country terrain. These vehicles will ford hard-bottom water crossings to a depth of 30 inches without the aid of special fording equipment. Vehicle power is supplied by either of two types of engines; a six-cylinder, in-line, liquid-cooled gasoline engine or a six-cylinder, in-line, liquid-cooled multifuel, compression-ignition engine. Engines are conventionally located at the front end of the truck. A five-speed transmission and two-speed transfer provide 10 speed ranges. Normal drive is through the 4-wheel rear bogie. Traction conditions which allow slippage of the rear wheels set up automatic engagement of the front wheel drive mechanism and the truck will be driven by all six wheels simultaneously as long as these conditions prevail.

b. Transmission and transfer are controlled by manual shifting levers in the cab. Service brakes are air-actuated, hydraulic internal expanding type. Cabs are equipped with fabric tops and ventable, lowerable windshields. A towing pintle hook is provided on frame rear crossmembers. Lifting points, two front shackles and a pin located atop each left and right rear spring between the sets of rear wheels, provide ready means of lifting the truck for transportation. A spreader bar should be used with the rear lifting tackle to prevent body damage. Tie-down shackles located on each side of the body together with the front lifting shackles provide ready attaching points for tie-down cables.

Caution: Do not use the tie-down rings on body or safety chain shackles at rear end of frame for lifting.

c. Three basic wheelbase chassis provide for mounting the various body types (cargo, dump, fuel tanker, water tanker, vans, wreckers, telephone maintenance and pole setter) as well as fifth wheel trailer tractor equipment. Figures 1 thru 28 are typically representative of the various models and body equipment.

d. The cargo body is designed for use as a general purpose cargo and troop carrier. Folding seats accommodate the troops and a canvas cover supported by bows serves to protect cargo and/or troops from inclement weather.

e. The dump bodies are designed for rapid unloading of aggregate material. The M342 dump body may be fitted with rack sides and folding seats for use as a troop carrier.

f. The fuel tanker is designed to carry from one to three different types of fuel in its three tanks. A pump and hose provide means of transferring fuel from tanker to using equipment.

g. The water tanker is designed to supply water for various purposes as required. A bypass valve in the engine exhaust system provides for diversion of the exhaust gases for use in heating the water to prevent freezing.

h. Several types of van bodies are provided for such uses as fire control data, repair shop, computers, etc.

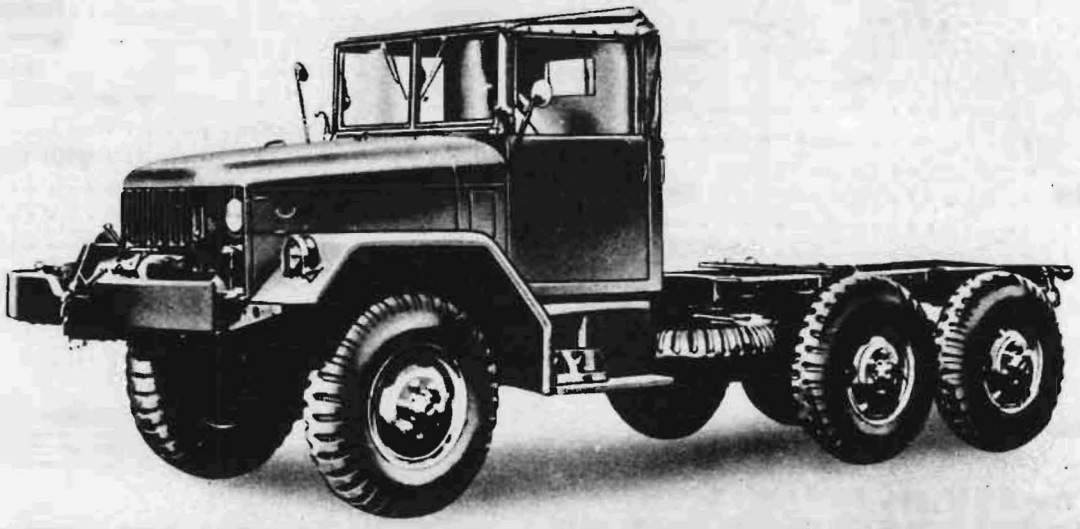
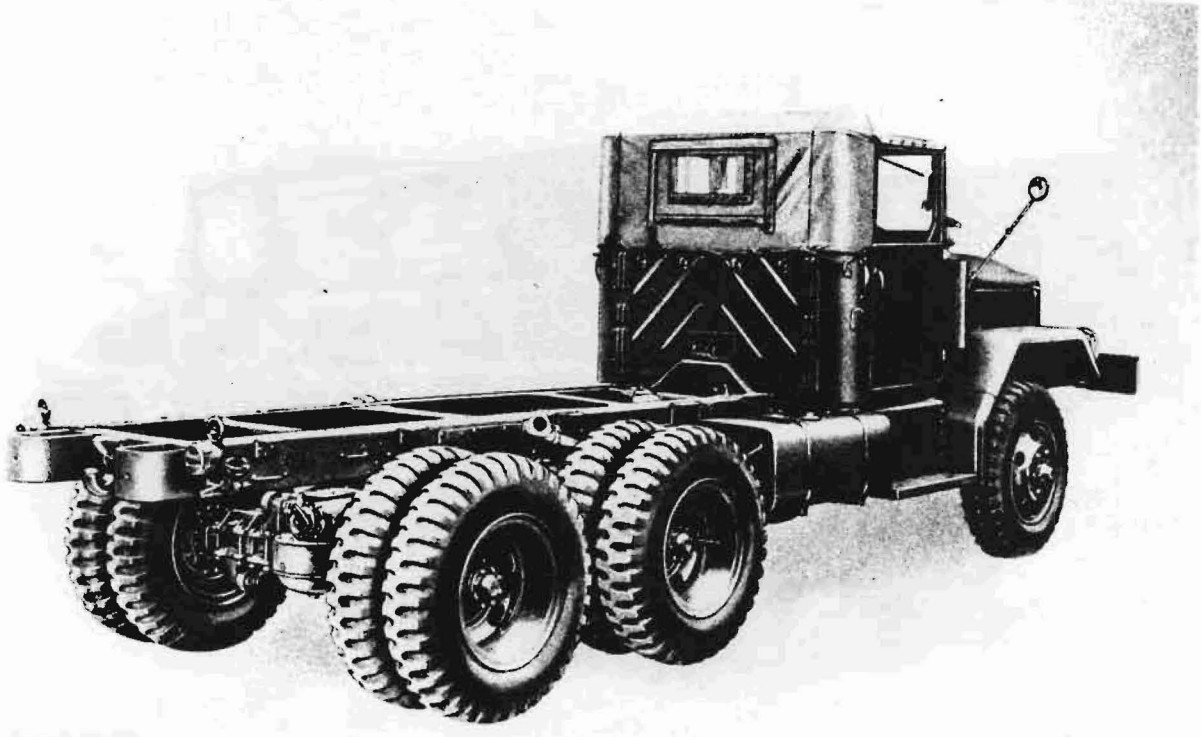


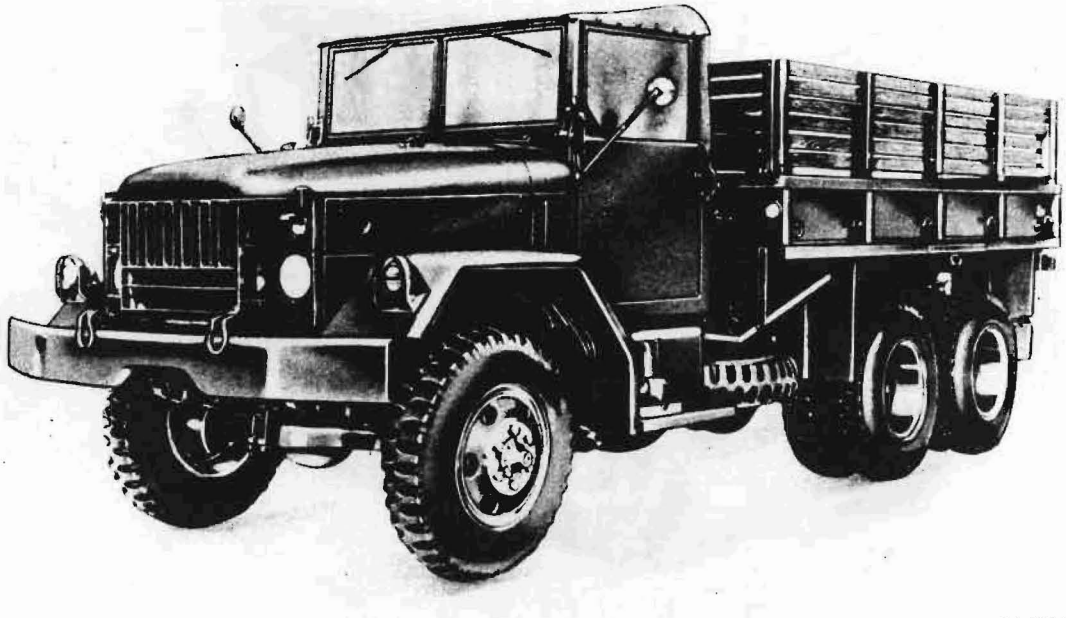
Figure 1. 2-1/2 ton 6 x 6 chassis truck M44 - left front view

Figure 2. 2-1/2 ton 6 x 6 chassis truck M45 - left front view



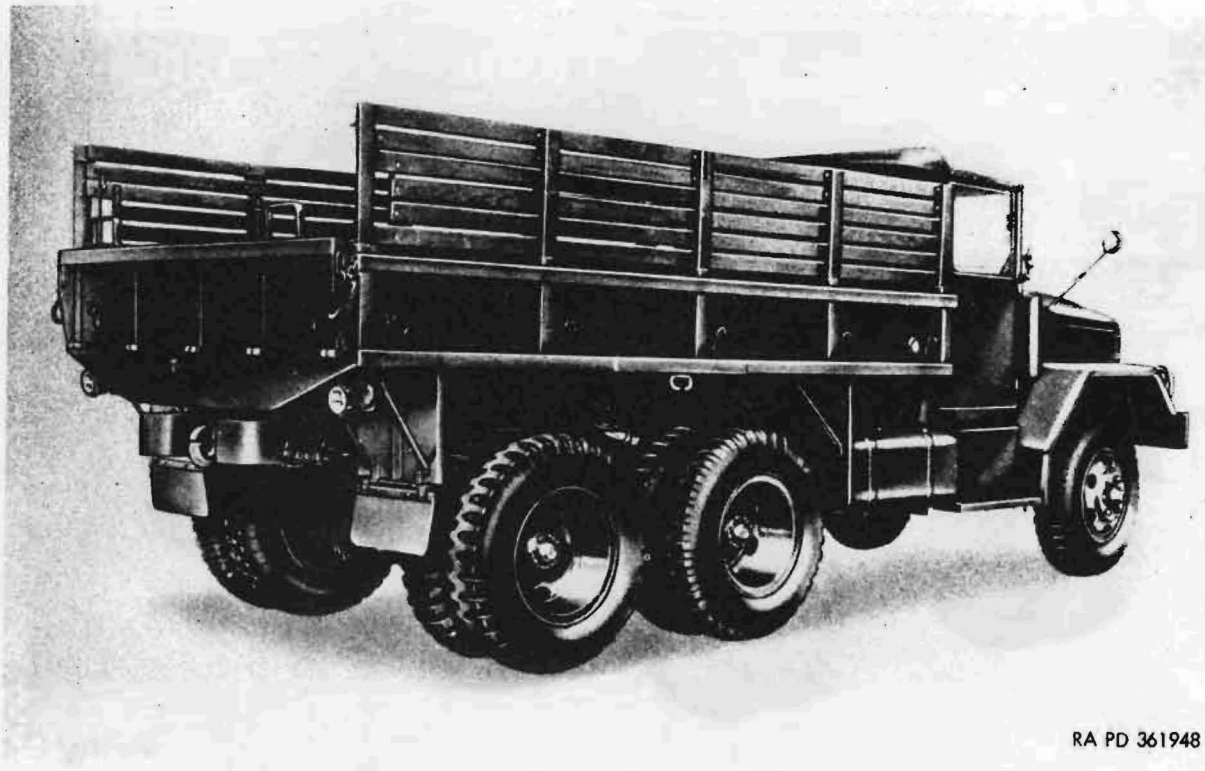
ORD E21471

Figure 3. 2-1/2 ton 6 x 6 chassis truck M45 - right rear view



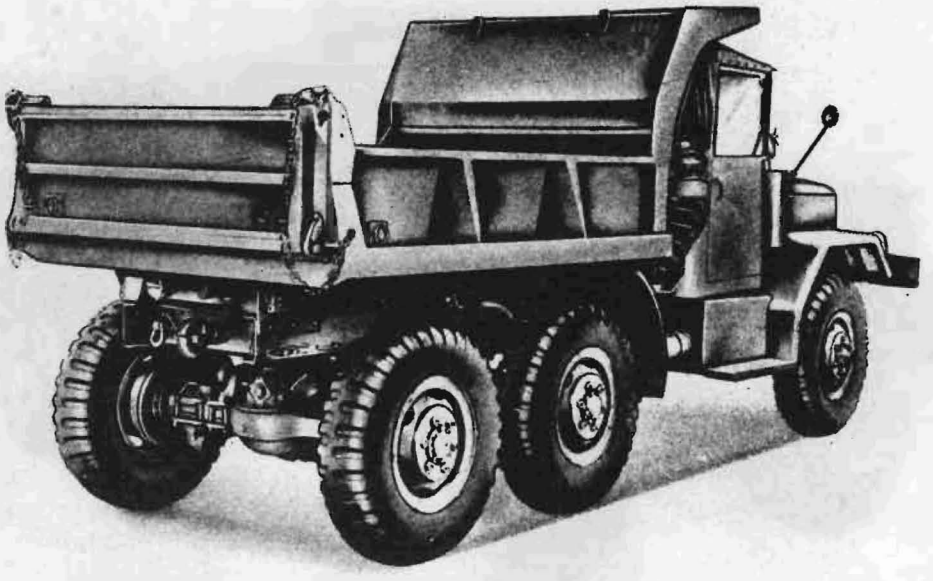
RA PD 362136

Figure 4. 2-1/2 ton 6 x 6 cargo truck M35 - left front view



RA PD 361948

Figure 5. 2-1/2 ton 6 x 6 cargo truck M35 - right rear view



RA PD 119718

Figure 6. 2-1/2 ton 6 x 6 dump truck M47 - right rear view

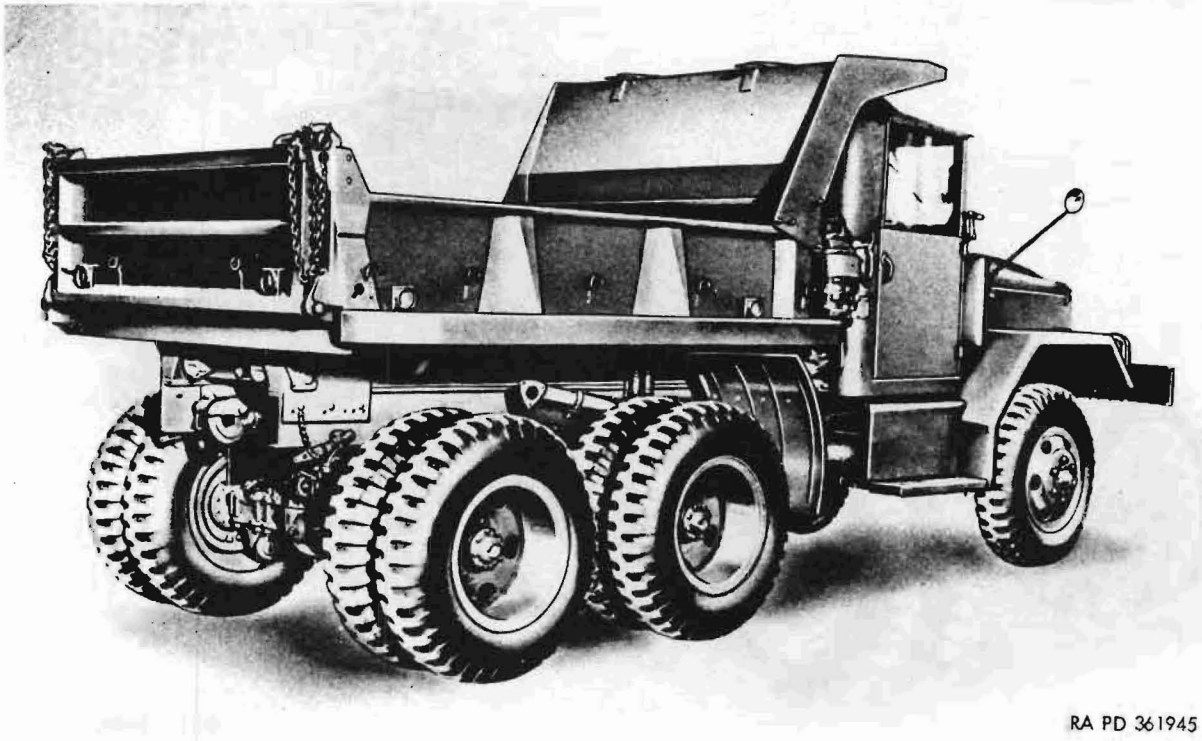
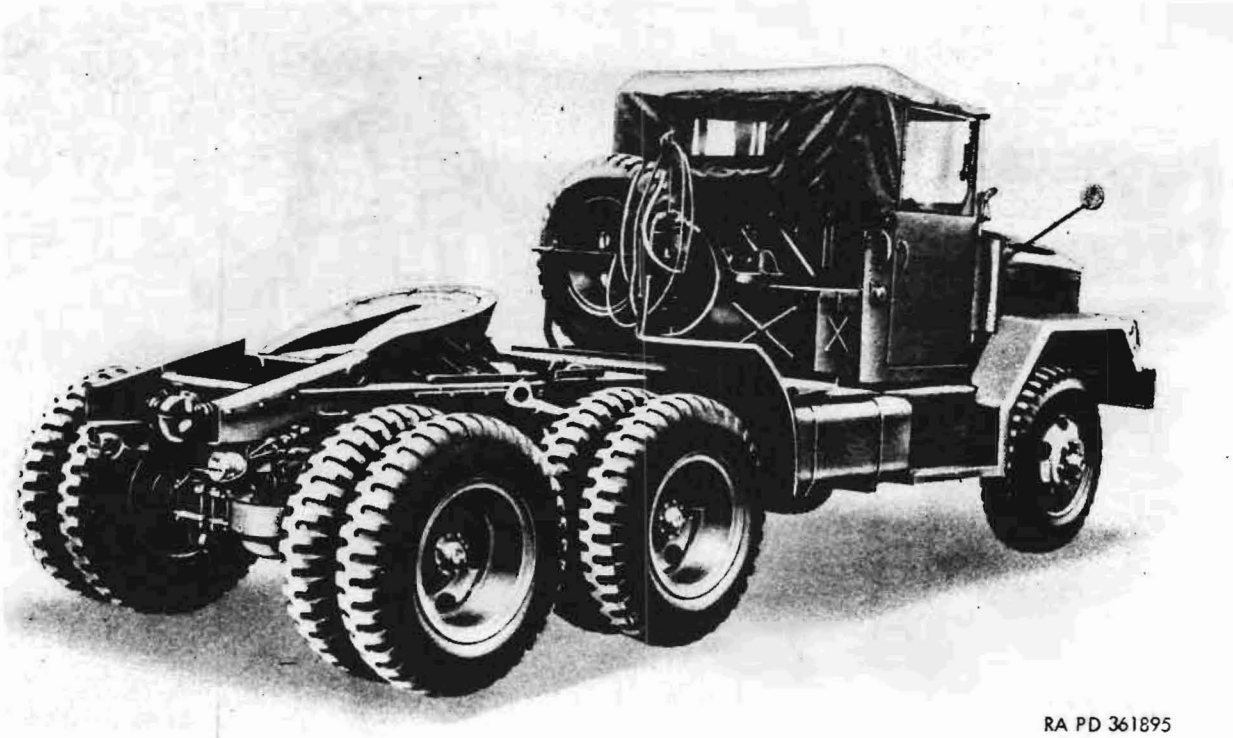


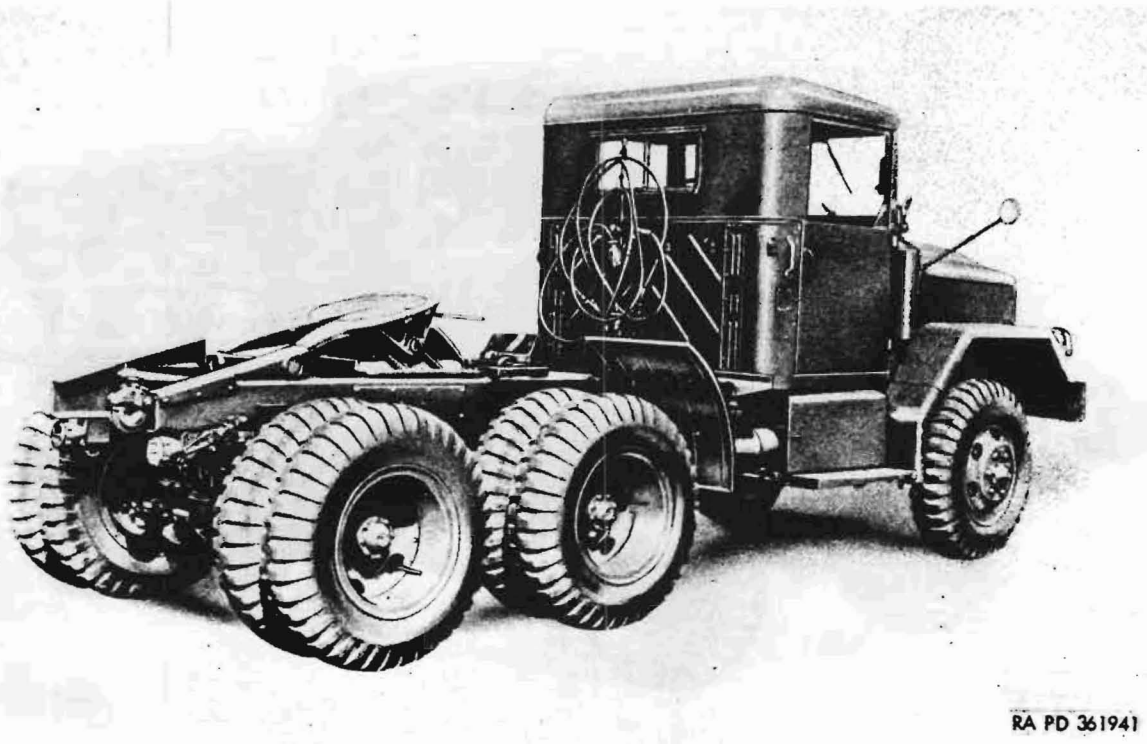
Figure 7. 2-1/2 ton 6 x 6 dump truck M59 right rear view

Figure 8. 2-1/2 ton 6 x 6 dump truck M342 - left front view



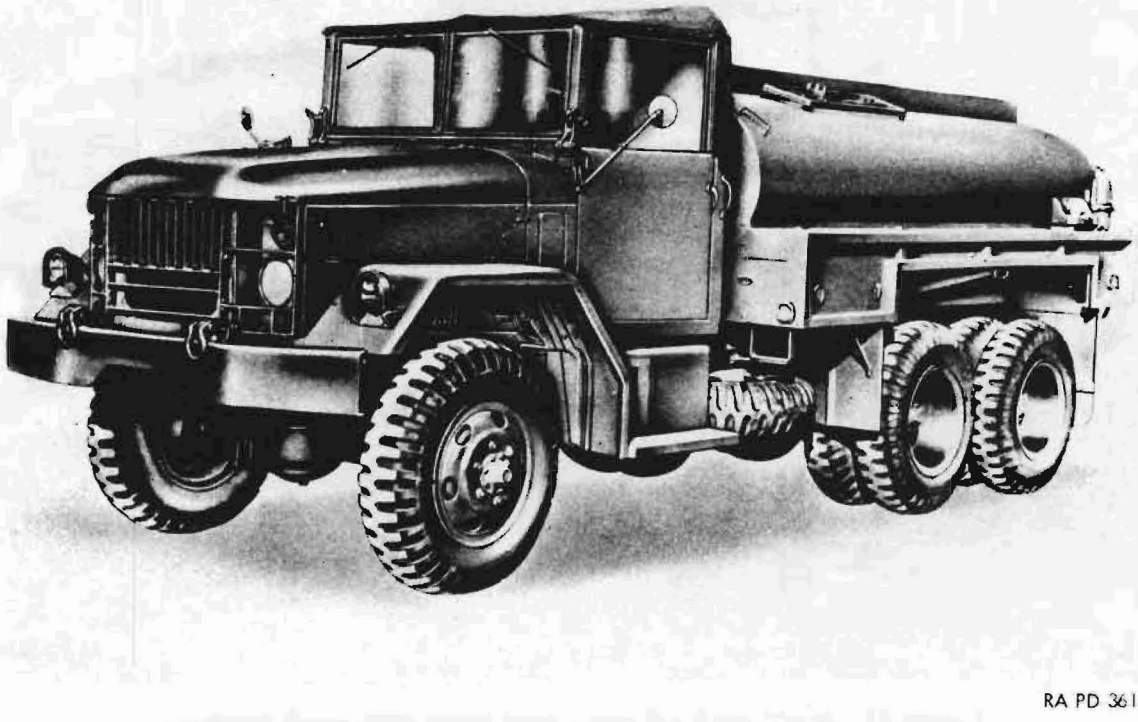
RA PD 361895

Figure 9. 2-1/2 ton 6 x 6 tractor truck M48 - right rear view



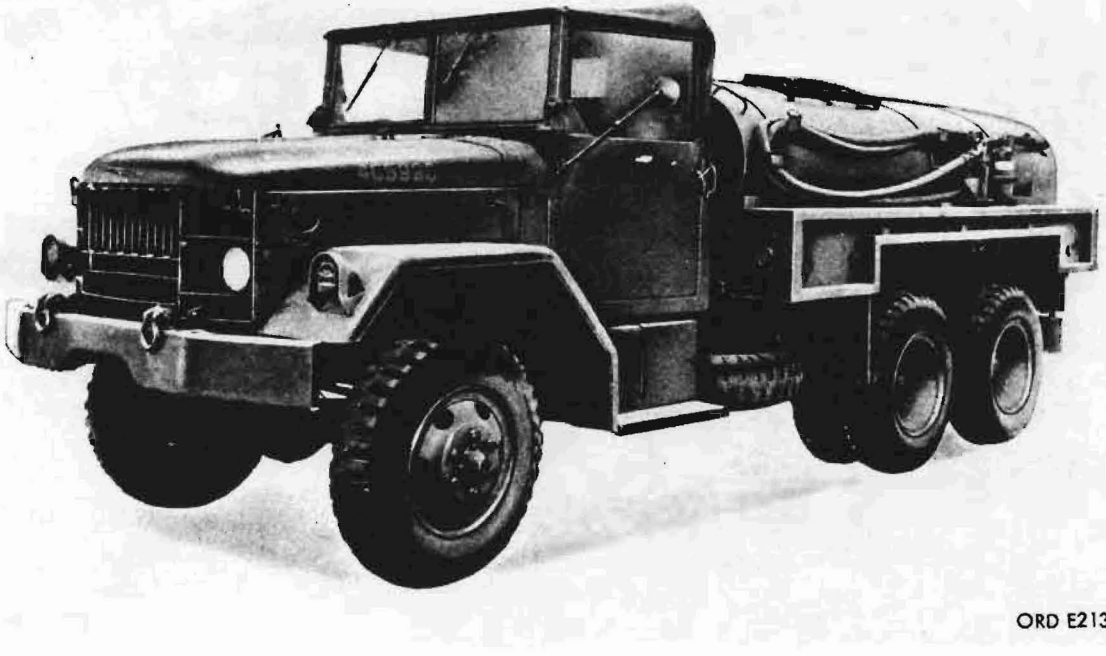
RA PD 361941

Figure 10. 2-1/2 ton 6 x 6 tractor truck M275 - right rear view



RA PD 361896

Figure 11. 2-1/2 ton 6 x 6 fuel servicing tank truck M49 - left front view



ORD E21302

Figure 12. 2-1/2 ton 6 x 6 fuel servicing tank truck M49C - left front view

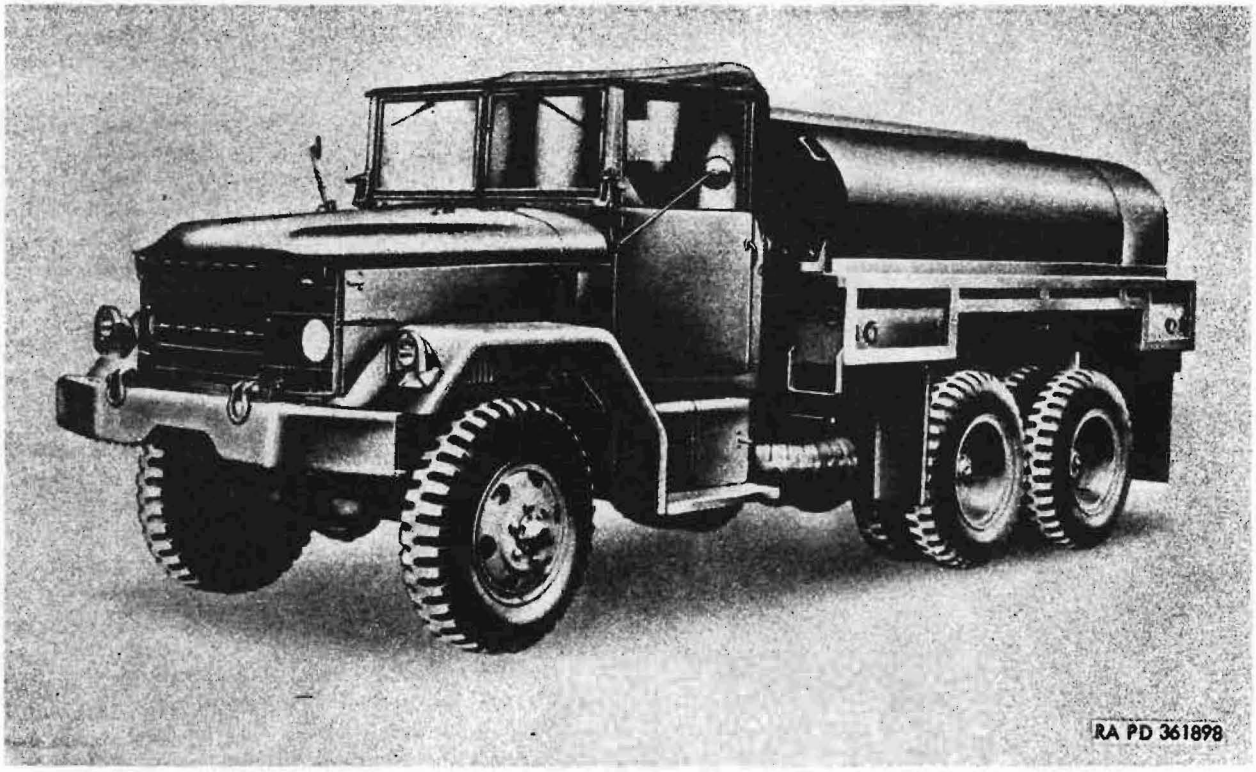


Figure 13. 2-1/2 ton 6 x 6 water tank truck M50 - left front view

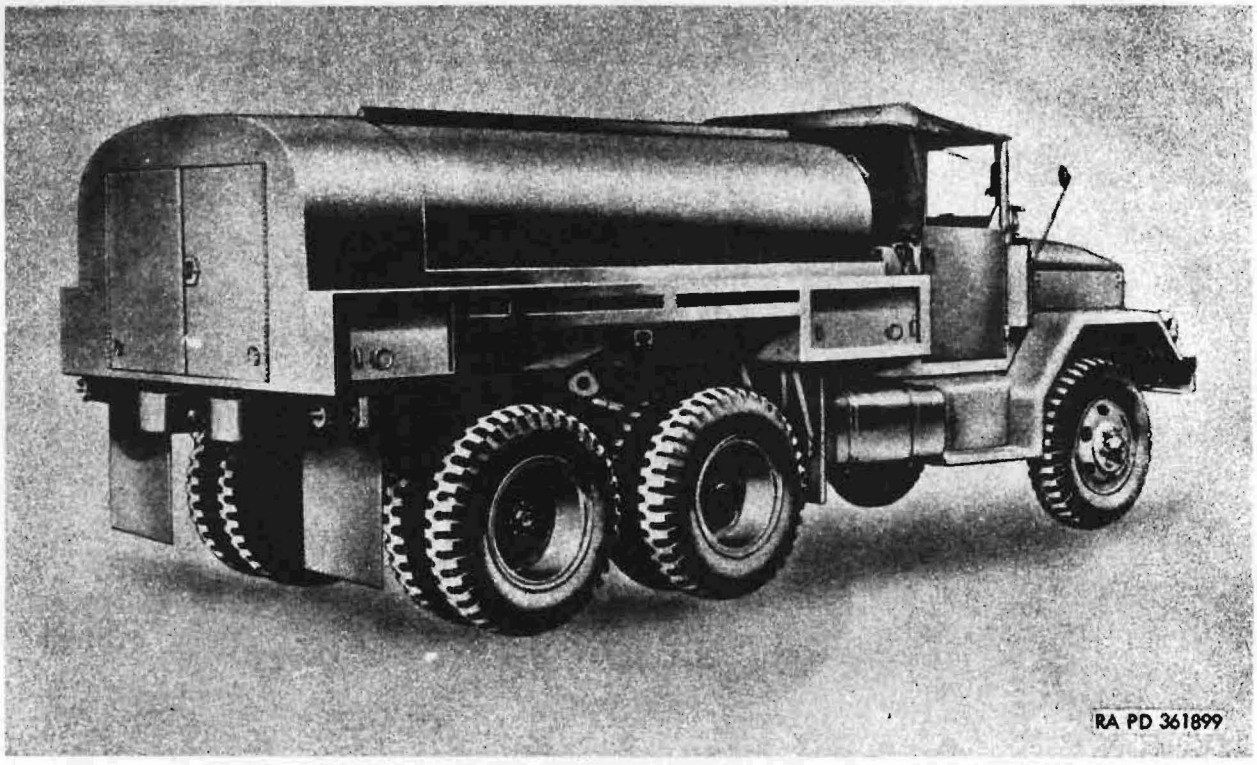


Figure 14. 2-1/2 ton 6 x 6 water tank truck M50 - right rear view

Figure 15. 2-1/2 ton 6 x 6 light wrecker truck M60 - left rear view

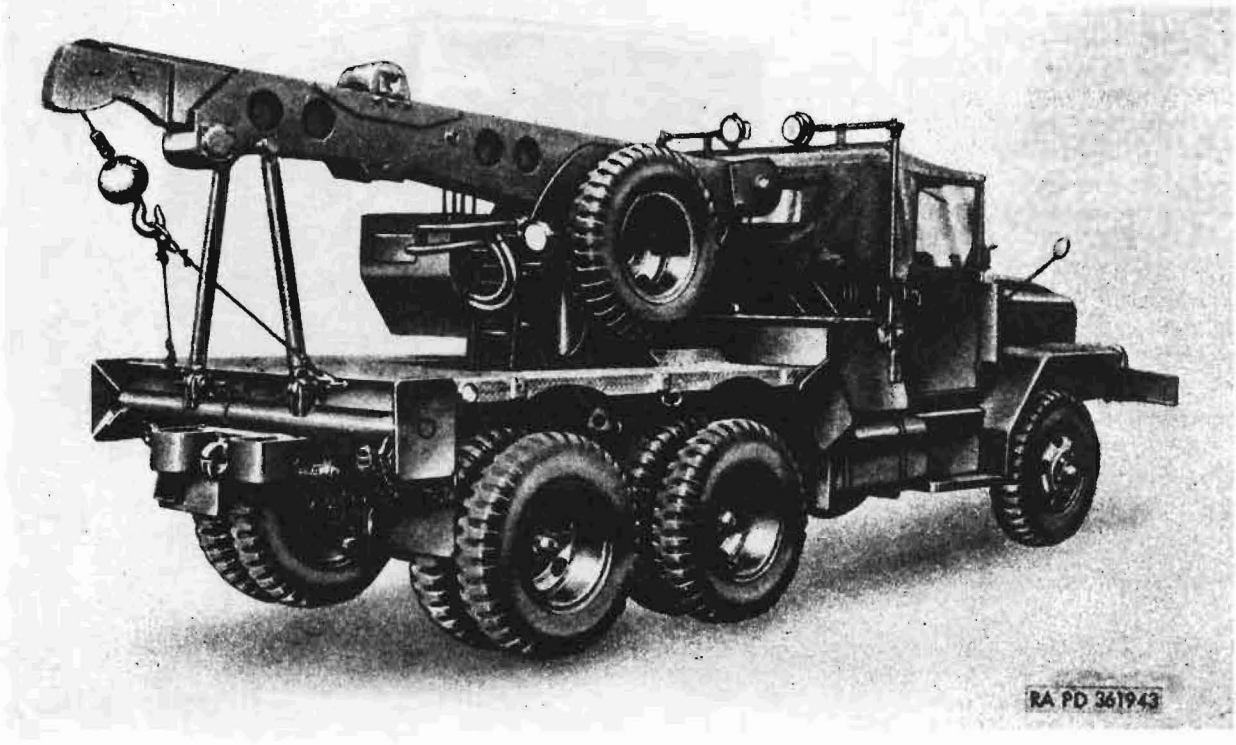
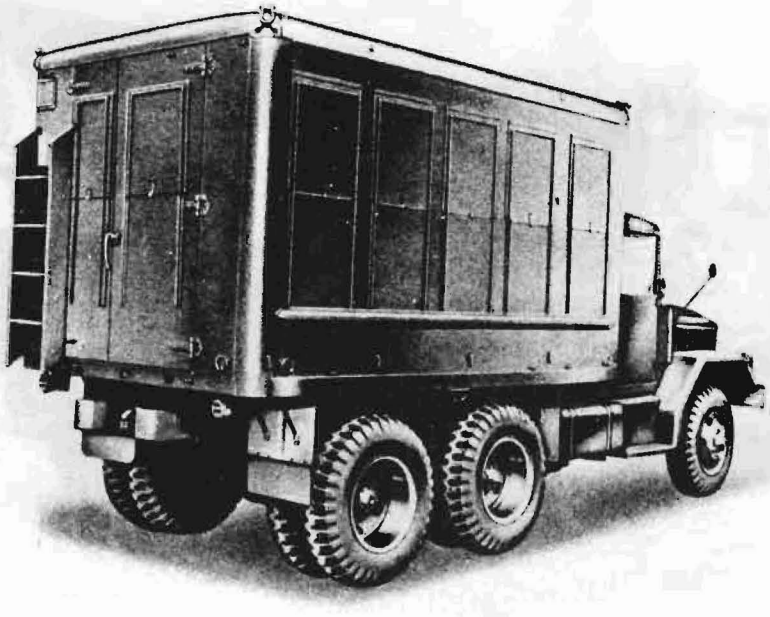


Figure 16. 2-1/2 ton 6 x 6 wrecker crane truck M108 - right rear view



RA PD 361901

Figure 17. 2-1/2 ton 6 x 6 shop van truck M109 - right rear view

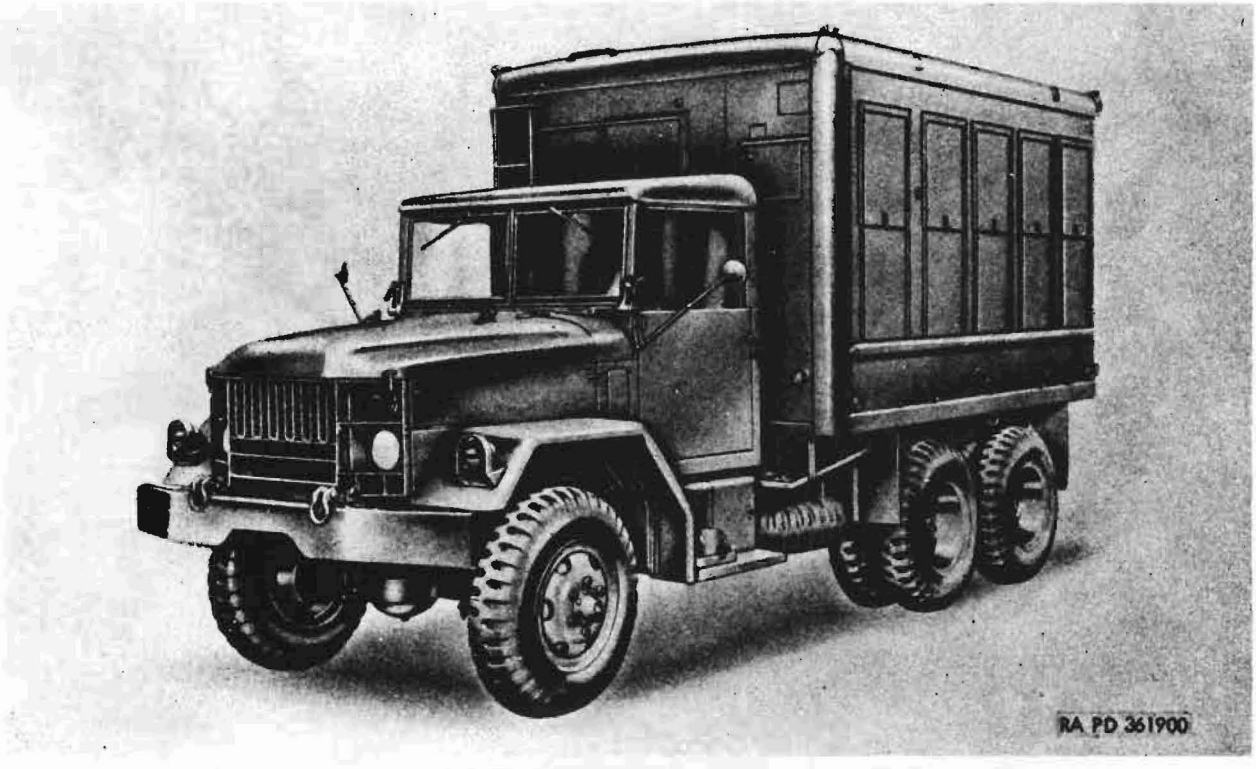
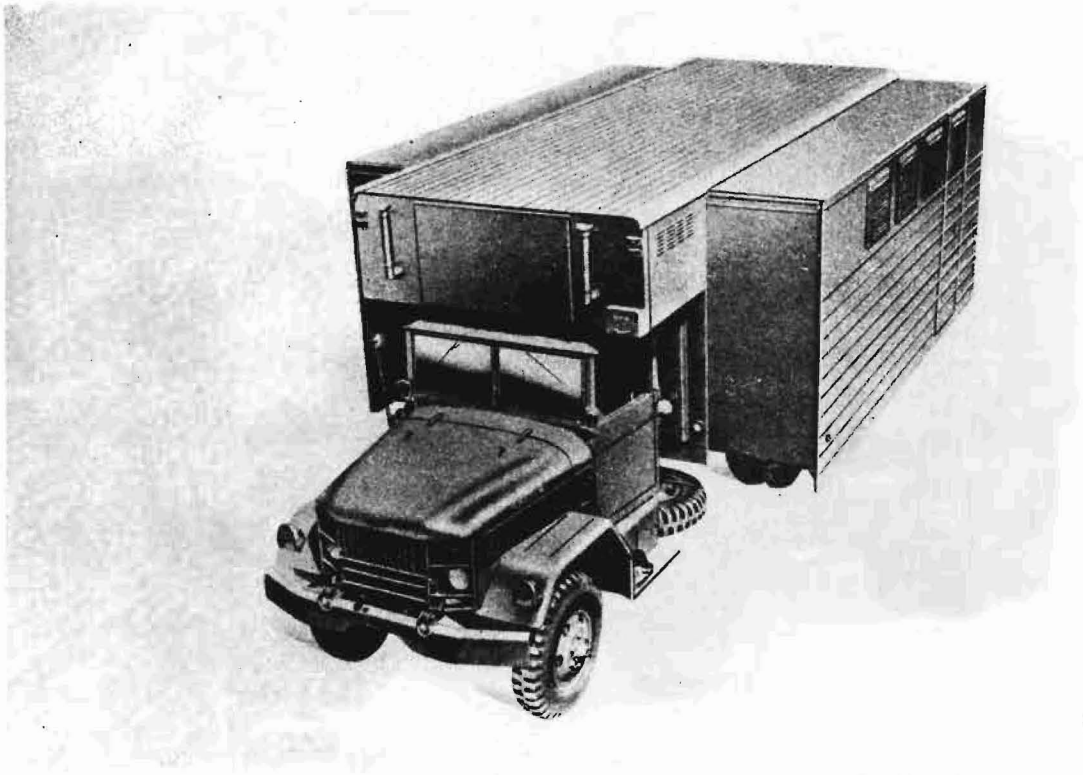
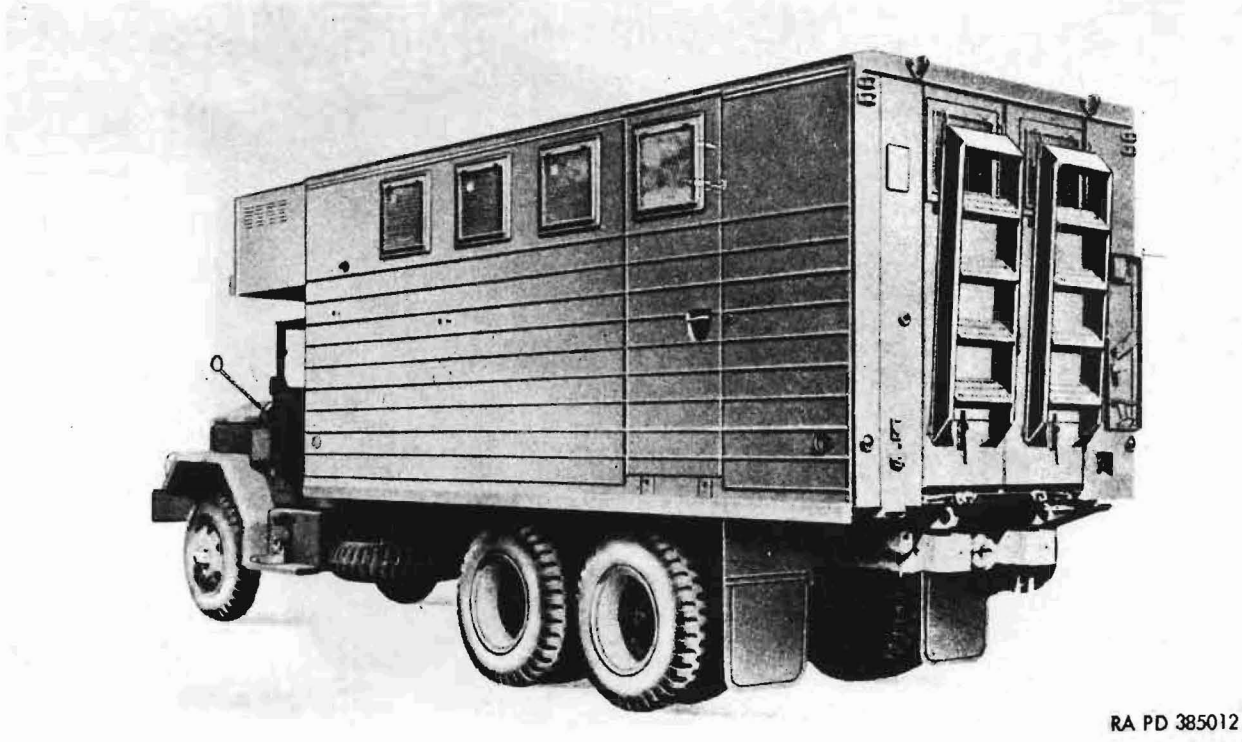


Figure 18. 2-1/2 ton 6 x 6 shop van truck M109 - left front view



RA PD 385011

Figure 19. 2-1/2 ton 6 x 6 expansible van truck M292 - left front view



RA PD 385012

Figure 20. 2-1/2 ton 6 x 6 expansible van truck M292 - left rear view

Figure 21. 2-1/2 ton 6 x 6 electronic van truck XM567 - right front view

Figure 22. 2-1/2 ton 6 x 6 electronic van truck XM567 - left rear view

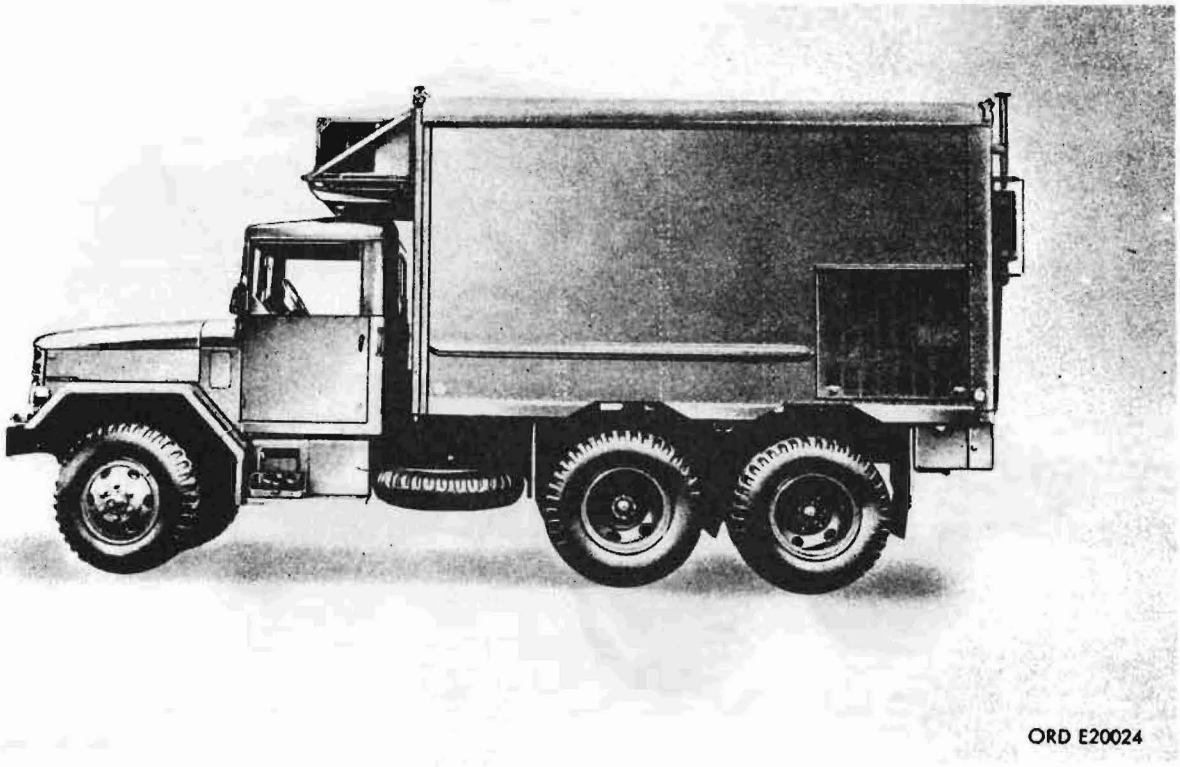


Figure 23. 2-1/2 ton 6 x 6 missile firing data computer van truck XM472 - left side view

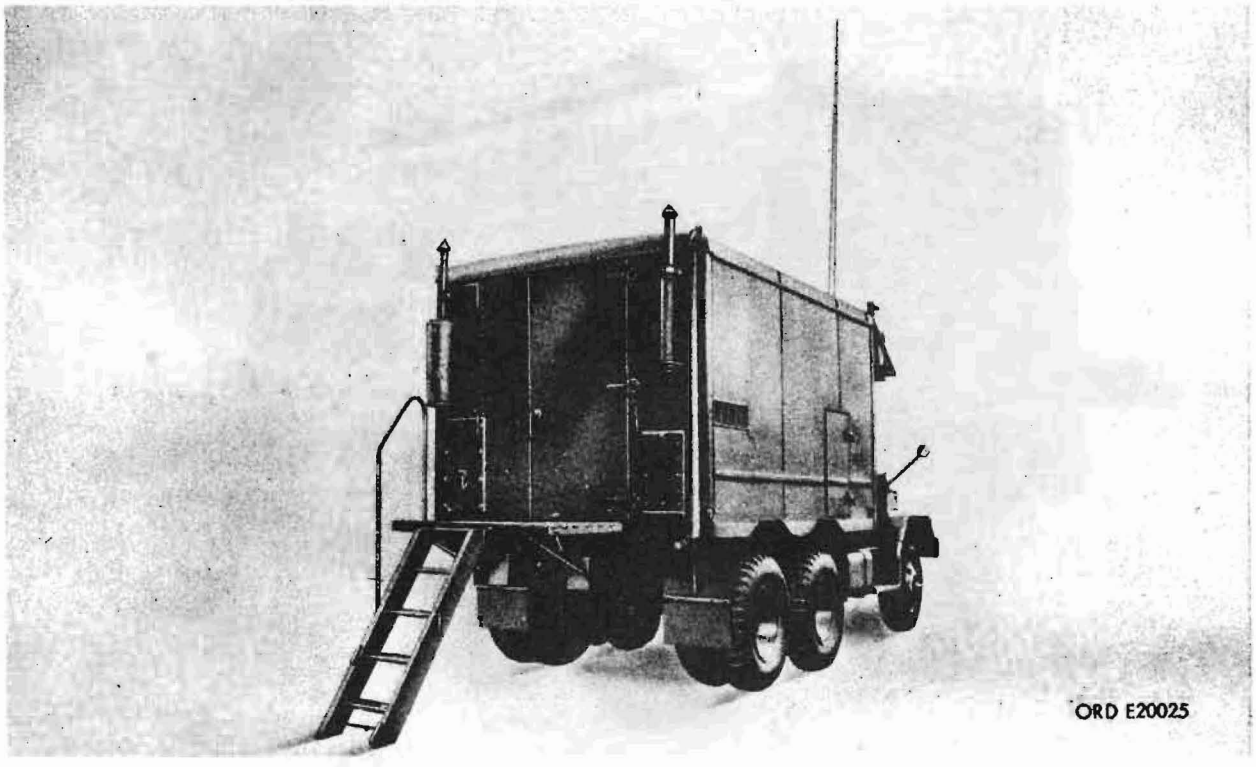


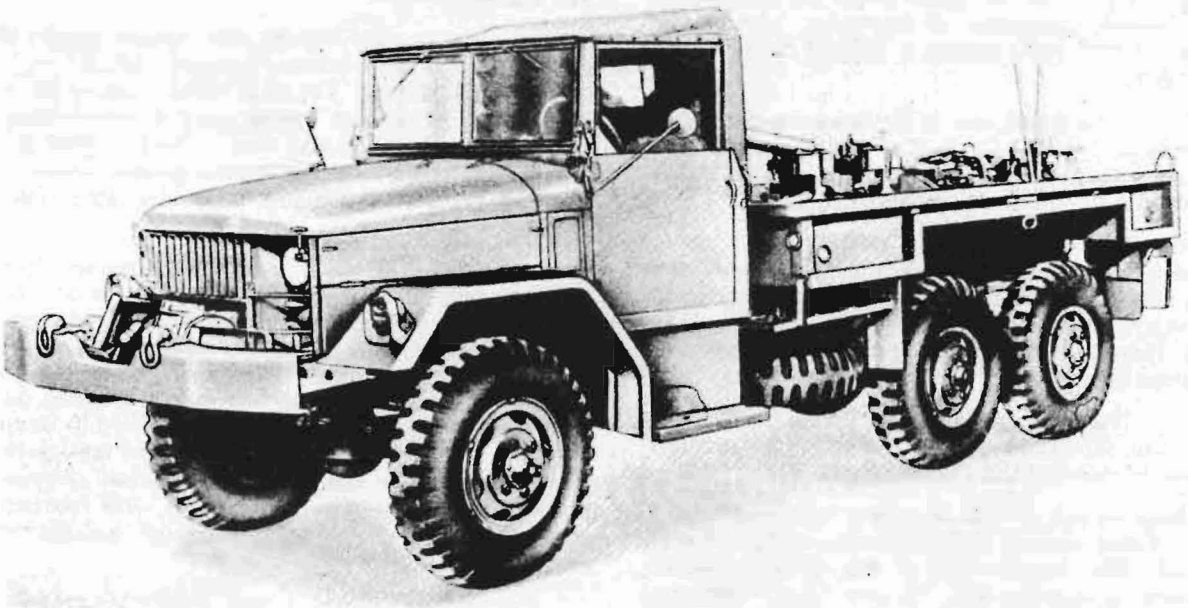
Figure 24. 2-1/2 ton 6 x 6 missile firing data computer van truck XM472 - right rear view

RA PD 204463

Figure 25. 2-1/2 ton 6 x 6 telephone construction and maintenance truck V-17A/MTQ - left front view

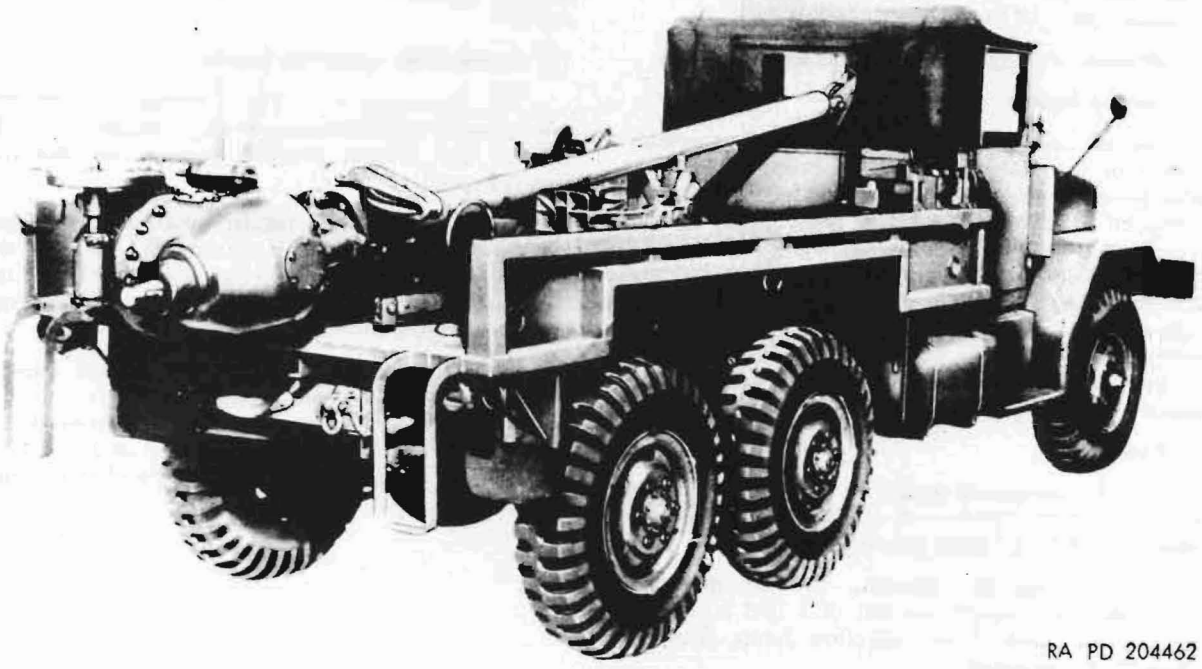
RA PD 204464

Figure 26. 2-1/2 ton 6 x 6 telephone construction and maintenance truck V-17A/MTQ - right rear view



RA PD 204461

Figure 27. 2-1/2 ton 6 x 6 earth boring machine and pole setter truck V-18A/MTQ - left front view



RA PD 204462

Figure 28. 2-1/2 ton 6 x 6 earth boring machine and pole setter truck V-18A/MTQ - right rear view

i. Two types of crane trucks are designed to meet varying conditions of emergency service. The M108 and M60 differ mainly in that the M60 carries a rear winch.

j. A modified van is designed for telephone maintenance and construction work: tools and equipment for repair and construction are built into it or carried as on-vehicle equipment.

k. The pole setter model acts as a complementary truck for telephone repair and construction. A power-driven earth auger with boom and winch provides means for setting telephone line poles. This vehicle will also serve for earth boring for numerous other uses.

l. Tractor models carry standard fifth wheel equipment for handling cargo trailer on long or short hauls or in shuttling and positioning service.

Note. In this manual, the terms "left" and "right" are used with respect to the driver's position. "Left" indicates the driver's side of the vehicle; "right" indicated the opposite side. The term "front" indicates the end in front of the driver; "rear" indicates the opposite end.

7. Engines

Gasoline-powered vehicles are equipped with the OA-331 gasoline engines. Multifuel-powered vehicles are equipped with the U.S. Army LDS 427-2, LD465-1, and LD465-1C multifuel engines. The multifuel engine uses the fuel-injected compression-ignition principle which permits the use of various grades of fuel (LO 9-2320-209-12).

Caution: Do not use aviation grade gasoline.

8. Cooling System

For all engines the sealed-type cooling system consists of the radiator, fan, drive belts, thermostat, water pump, temperature gage, pressure-type filler cap, thermostat bypass line, hose lines, and fittings connecting the radiator to the engine and water pump. Water is drawn from the bottom of the radiator by water pump action, circulated through the engine, and returned to the radiator through the upper connections. Air, drawn through the radiator core by the fan and by truck motion, cools the water to maintain correct engine operating temperature.

9. Fuel System

a. For vehicles powered by the gasoline engine, the fuel system consists of a fuel tank, lines, fuel pump, fuel gage, carburetors, and governors.

b. For vehicles powered by the multifuel engine, the fuel system consists of a fuel tank, fuel lines, supply pump, filters, injection pump, injection nozzles, and connectors.

10. Exhaust System

a. For gasoline engines, the exhaust system is composed of a front exhaust pipe, rear exhasut pipe, muffler, and tailpipe. The M50 water tank truck is equipped with exhaust bypass, and bypass fording valves. The exhaust bypass valve is used to heat the water in the tanks. The bypass fording valve is used to close off the heating chamber under the tanks while fording.

b. For LDS 427-2 multifuel engines, the exhaust manifold empties directly into the turbosupercharger. The pressurized exhaust gases drive the turbosupercharger and pass from the turbosupercharger outlet through an exhaust pipe assembly. The pipe assembly extends back along the right side of the vehicle to the outlet, located between the right tandem wheels. The M50A1 water tank truck is equipped with an exhaust bypass valve and a bypass fording valve. These valves perform the same function as the valves on the M50 water tank truck described in a above.

c. On the LD465-1 and LD465-1C engines, used on the original M44A2 series trucks, the exhaust system was similar to that used on the gasoline engines described in a above. The exhaust pipe is connected directly to the exhaust manifold. The LD465-1 engine, incorporated in the latest M44A2 series truck, except the M50A2 water tanker, utilizes a stack exhaust system. The stack pipe is mounted on the right side of truck and extends above cab top. The M49A2C fuel tanker and M275A2 tractor is equipped with a spark arrestor type muffler which traps exhaust sparks from engine.

11. Power Train and Components

a. Transmission. The manually operated synchromesh transmission assembly, mounted on the rear of the engine, provides one reverse and five forward speeds.

b. Transfer. The transfer assembly, mounted behind the transmission, transmits power from the transmission assembly to the propeller shafts for the front and rear wheels, and provides two driving ratios for each of the transmission speeds.

c. Transmission Power Takeoff. Some vehicles are equipped to provide power for operation of auxiliary equipment. Two types of transmission power takeoffs are used. A single-end unit is used on trucks equipped with a front winch. A double-end unit is used

on dump trucks to drive the front winch and the body hydraulic hoist pump.

d. Transfer Power Takeoff. Some vehicles are equipped with a transfer power takeoff to provide power for the operation of the auxiliary equipment. The transfer power takeoff is attached to the rear of the transfer, and is controlled by a lever in the cab.

e. Propeller and Drive Shaft Assemblies. Propeller shaft assemblies transmit power from the transmission to the transfer, and from the transfer to the axles. Drive shaft assemblies transmit power from the power takeoff assemblies to the auxiliary equipment. With the exception of the water and gasoline tank trucks, all drive shafts are of double universal joint type. The water and gasoline tank truck shafts are solid, and are supported at each end by a flange or pillow block with a bearing assembly.

12. Electrical System

The electrical system is a 24-volt dc system; two 12-volt storage batteries are connected in series with the negative terminal grounded. The engine starter motor operates directly from the 24-volt source. The electrical system utilizes a belt-driven, 24-volt dc generator, having an output capacity of 25 amperes. The electrical system provides operating voltage for the vehicle lighting system, the electrical gages on the instrument panel, horn operation, and manifold heater (multifuel engine only). A trailer electrical coupling is located at the rear of the vehicle.

13. Brake System

a. The service brake system is an air-operated hydraulic system composed of a master cylinder, air-hydraulic cylinder, individual hydraulic wheel cylinders, lines for hydraulic fluid, and linkage to operate the system.

b. The parking brake consists of a brake-drum mounted on the rear-output shaft of the transfer, and inner and outer brakeshoes operated by a single shoe lever. A cable attached to the brakeshoe lever, runs through protective casing to the handbrake lever at the left of the driver's seat.

c. The compressed air system is used for the service brake air-hydraulic cylinder assembly, windshield wiper motor assemblies, trailer airbrakes, and tire inflation. It can also be used for emergency cleaning of the air cleaner on multifuel engine vehicles. The system consists of reservoirs, control valves, couplings, piping, and fittings, and is generally identical on all vehicles. This system actuates the low air pressure warning buzzer when the air pressure is not sufficient to operate the vehicle brakes.

14. Suspension and Steering Systems

a. Suspension System. The front springs are semielliptical with the long leaf on the top and mounted on spring seats resting on the front axle. The hydraulic shock absorbers are connected to the frame side member and lower "U" bolt bracket on the front axle. The front springs on multifuel models are of heavier construction than the front springs of gasoline models. The rear springs are mounted in inverted position as compared with the front springs. They are also semielliptical and mounted on a spring seat cross shaft. The ends are free to slide in guide brackets mounted on the axle housings. Driving and braking forces are transmitted to the chassis by a system of torque rods arranged to maintain vertical position of the rear-axle drives, regardless of uneven road surfaces. Wrecker models M60 and M108 have walking beam spring suspension for distribution of load shocks encountered in operation of the hoisting equipment on these trucks.

b. Steering System. The steering system consists of a steering wheel, a helical cam and lever-type steering gear, pitman arm, drag link, and tie rods. Rotation of the steering wheel, by the driver, is transmitted through the steering gear, pitman arm, drag link, and tie rod to steer the front wheels of the truck.

15. Breather and Ventilation System

The components of the breather and ventilation systems on the gasoline and multifuel engine models are used for ventilation, exhaust, maintenance of atmospheric pressure, prevention of vacuum, excessive pressure and entrance of water during fording. These operations are accomplished by the use of breather lines, ventilating and breather valves, and a crankcase breather. The engine, distributor (gasoline engine models only), air-hydraulic cylinder, master cylinder, and fuel tank are vehicle components affected by this

system. The water and gasoline tank trucks, and the wrecker crane trucks, have an auxiliary governor which is vented to the air cleaner. The tractor trucks have an air brake hand control valve vented to the air cleaner through a breather line. This sealed system is part of the general waterproofing incorporated on these vehicles. The valve rocker arm cover, transmission, transfer, and axles have breather or ventilating valves. The fuel pump on early gasoline engine models is vented to the air cleaner and on later gasoline models is equipped with a breather valve. A deep-water fording kit supplements the breather and ventilation system when deep-water fording is attempted.

16. Controls and Linkages

The controls and related linkages necessary for the operation of the vehicle and mounted equipment include the starter pedal, accelerator pedal, clutch pedal, service brake pedal, handbrake lever, transmission shift lever, transfer shift lever, transmission power-takeoff shifting lever, transfer power-takeoff control lever, windshield wiper motor pressure regulator, throttle control assembly, choke control assembly (gasoline engine models only), and engine stop control assembly (multifuel engine models only). The operation, location, and function of these controls are covered in detail in the operation instructions contained in this manual.

17. Wheel Assemblies and Tires

Wheel assemblies are offset-disk type and are interchangeable on front and rear axles. The tires are military type in two sizes for use depending on whether the truck has single or dual rear wheels.

18. Cab Assembly

The cab is a sheet metal, open-top structure containing driver and companion accommodations and operating controls. Doors on right and left sides of the cab afford ready entrance and egress. These doors are equipped with glass windows which can be raised or lowered to control ventilation to meet strategic conditions as required. The front of the cab supports a windshield which can be lowered or raised. An easily removable cloth cab top is standard equipment. The cab may be modified by the addition of heaters and a metal top to meet severe winter conditions (see Chapter 5).

19. Frame

The frame is constructed of longitudinal pressed-steel channel sections to which gussets, brackets, reinforcements, crossmembers, and supports are riveted. The front bumper, running board brackets, fuel tank support brackets, spare wheel carrier, lifting shackles, pintle, and rear bumperettes are bolted in place. The frame supports the cab and body and ties the front and rear suspension systems and power train together to create a rigid load-supporting unit.

20. Difference Between Models

a. General. The different chassis and general differences between models for vehicles covered in this technical manual are listed in table 1.

(1) Front winch assembly. Some models are equipped with a front winch assembly mounted between the front bumper bar and the radiator. The winch is secured to frame extension members by supporting brackets. Trucks equipped with a front winch have a transmission power takeoff to drive the winch. The service headlight panel assemblies and the front bumper are inverted on these vehicles.

(2) Front winch drive shaft shear pin. Some earliest gasoline models were equipped with a steel-alloy front winch drive shaft shear pin. This shear pin should have been replaced by an aluminum-alloy pin on vehicles equipped with a front winch in accordance with TB 9-819-7.

(3) Transfer power-takeoff assembly. The water and gasoline tank trucks, the wrecker crane trucks, the telephone construction truck, and the earth boring machine truck are equipped with a transfer power—takeoff assembly, mounted on the rear of the transfer, used to drive the auxiliary equipment. The water and gasoline tank trucks, the wrecker crane trucks, the telephone construction truck, and the earth boring machine truck are equipped with an engine auxiliary governor that controls the speed of operation of auxiliary equipment by regulating the engine speed. Multifuel engine vehicles are

Table 1. 2½ Ton, 6×6, Gasoline and M44A1 Series Multifuel Truck Fleet

Vehicle models	Chassis (wheelbase and model)										
	142 Inches		154 Inches						190 Inches		
	•G M57	G M58	•G M44	•M M44A1	G M45	G M45C	G M45G	M M45A1	G M46	G M46C	M M46A1
M47	X										
M59		X									
M342							X				
M34, V-17A/MTQ, and V-18A/MTQ			X								
M35, M48, M49, M49C, M50, M109A1, M185, M185A1 and M567					X						
M60 and M108						X					
M35A1, M49A1C, M50A1, M109A2 and M185A2								X			
M36 and M292									X		
M36C										X	
M292A1											X

M—Multifuel (M44A1 Series)
G—Gasoline

•Vehicles using the indicated chassis, all use single rear wheels with 11:00x20 tires. All other models use dual rear wheels with 9:00x20 size tires.

Table 1.1. 2½ Ton, 6×6, M44A2 Multifuel Series Trucks

Vehicle models	Chassis (wheelbase and model)			
	154 Inches			190 Inches
	M45A2	M45A2 (Modified)	M45A2G	M46A2C
M35A2, M35A2C, M109A3, and M185A3	X			
M49A2C, M50A2, M756A2, and M764		X		
M342A2			X	
M36A2				X

All M44A2 series truck chassis, except the M45A2, are equipped with 9:00x20 single front and dual rear tires.
The M44A2 chassis is equipped with 11:00x20 single front and rear tires.

not equipped with auxiliary governors. Correct engine speed is maintained by the use of the tachometer on these trucks.

(4) *Instrument cluster assembly.* All current production vehicles are equipped with a battery generator voltmeter assembly instead of an ammeter as used on early production vehicles. Current production vehicles are equipped with a mechanical type air pressure gage assembly instead of the electrical type gage used on earlier models. Current production vehicles are equipped with 24-volt gages instead of 12-volt gages common to older models.

(5) *Crankcase ventilation shutoff valve control assembly and breather lines.* Early production vehicles have a crankcase ventilation shutoff valve control assembly, mounted on the instrument panel for use during deep-water fording. Current production vehicles are not equipped with this control, the control now is included in the deep-water fording kit. As a result of production changes, various breather lines, present on some earlier production vehicles, are not installed on current production vehicles. Air pressure relief valves which prevent internal pressure, but prevent the entrance of water, are used on the transmission, transfer, and axle housings.

(6) *Air cleaner assembly.* Early production gasoline engine vehicles were equipped with air cleaners with a nonremovable type filter element. All current production vehicles are equipped with an air cleaner assembly having a removable filter element.

(7) *Shock absorber assemblies.* Early production vehicles are equipped with repairable shock absorbers. All current production vehicles are equipped with nonrepairable welded shock absorbers.

(8) *Slave receptacle assembly.* Early production vehicles are equipped with a slave receptacle mounted on the cab right rear panel. All current production vehicles, except for M108, and all M109 series models, are not equipped with a slave receptacle assembly since they are now supplied as components of the winterization kits.

(9) *Auxiliary power receptacle assembly.* Early production vehicles have an auxiliary power receptacle mounted on the instrument panel. Current production vehicles except M109 and M185 series are not equipped with an auxiliary power receptacle assembly. The power receptacle is obtainable in a kit when required.

(10) *Flywheel housing drain plug.* On earliest production vehicles the flywheel housing drain plug was installed in the drain plug hole in the flywheel housing. On later production vehicles the drain plug was packaged and placed in the instrument panel map compartment. On latest and current production vehicles the drain plug is screwed into a tapped boss on the housing, located to the left and in line with the drain plug hole. The drain plug must be installed before fording the vehicle.

b. Chassis Trucks M44 (fig. 1), M45 (fig. 2 and 3), M45C, M46, M46C, M57, M58. The major differences between the chassis trucks are noted in table 1. The chassis trucks are used with different bodies for special purpose vehicles. Chassis modifications are accomplished for each different special purpose body used (refer to subparagraphs c through *n* below). The multifuel engine chassis trucks (M45A1 and M46A1) are equipped with tachometers for monitoring the engine speed.

c. Cargo Trucks M34, M35 (fig. 4 and 5), M35A1, M36, and M36C. The five cargo truck models differ in wheelbase, tires (size and number), bed size, and engine (see table 1). The M34, M35, and M35A1 have 12-foot beds, and the M36 and M36C have 17-foot beds with lowerable right body side panels. Removable wooden cargo racks may be mounted at the front and sides of the body. The lower portion of the side racks can be lowered for use as seats when the vehicle is used as a troop carrier. Sockets are provided for the installation of top bows and a paulin. The end curtains and lower edges of the paulin are secured with rope lashing. The rear of the body is closed by a hinged end gate.

d. Dump Trucks M47 (fig. 6), M59 (fig. 7), and M342 (fig. 8). The dump trucks are equipped with metal dump bodies, of similar sizes. The body is secured on a subframe to which the hydraulic hoist cylinder is attached. The M342 is equipped with two hydraulic hoist cylinders. The hydraulic oil reservoir is located in the forward crossmember of the subframe. The hydraulic hoist pump is driven from the transmission power takeoff, mounted on the transmission. The hydraulic hoist driver's control lever, for dump body operation, is located in the cab to the left side of the driver's seat. For dump truck payload capabilities, refer to table 11.

e. Tractor Trucks M48 (fig. 9), M275 (fig. 10), and M275A1. The tractor truck is equipped with a fifth wheel assembly, mounted at the rear of the chassis, for attachment of the semitrailer. Air hose and electrical cable for semitrailer service are stowed on the airbrake hose support, mounted behind the cab. The chassis frame is floored with nonskid floor plates between the hose support and the fifth wheel. Pioneer tools are stowed forward of the fifth wheel. Air and electrical connections are provided on the chassis rear crossmember, near the rear pintle, for towing a standard trailer. The airbrake hand-control valve, mounted on the steering wheel column, is used for semitrailer airbrake control. The M275 and M275A1 are not equipped with spare tire assemblies or tool boxes. The tools for

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the M275 and 275A1 are stowed under or behind the companion seat in the cab. The M275A1 model is equipped with a multifuel engine.

f. Fuel Servicing Tank Trucks M49 (Fig. 11), M49C (Fig. 12), and M49CA1. The 1200-gallon gasoline tank body is divided into 200-, 400-, and 600-gallon compartments. Access to each compartment is through a manhole, equipped with a manhole and filler cover assembly. Side skirts and running boards on each side of the tank body have sockets for mounting top bows and top paulin with end covers for camouflage. Tank body sections can be filled or emptied by use of the delivery pump, mounted in the rear compartment. The pump is driven from the transfer power takeoff, mounted on the transfer case. The delivery line gate valve assemblies, and the two gasoline dispensers with nozzle assemblies are provided to control the discharge of gasoline. The tank body shell is extended beyond the rear tank bulkhead to form a pump compartment at the rear of the body. Tank truck M49CA1 is equipped with a multifuel engine.

g. Water Tank Trucks M50 (Figs. 13 and 14) and M50A1. The 1000-gallon water tank body is divided into 400- and 600- gallon compartments. Access to each compartment is through a manhole, equipped with inner and outer manhole covers. Each compartment is filled through a filler cover and strainer. Delivery pump and valve controls are mounted in a rear compartment. Tank sections can be filled or emptied by use of the delivery pump which is driven by the transfer power takeoff. Two delivery line gate valves, two water nozzles, and three discharge hoses are provided to control the discharge of water. An insulated heating chamber below the tank is connected to the engine exhaust system by the exhaust bypass valve, and the fording valve assembly to provide protection against freezing of the tank or pipes during severe weather. Running board and side skirts on each side of the tank have sockets for installation of the top bows and paulin with end curtains for camouflage. On the M50 gasoline engine tank truck, proper engine speed is maintained by the engine auxiliary governor during delivery pump operation. On the M50A1 multifuel engine tank truck, proper engine speed during delivery pump operation is 1000 to 1100 rpm as observed on the tachometer. This is controlled by the operator using the hand throttle.

h. Light Wrecker Truck M60 (Fig. 15), and Wrecker Crane Truck M108 (Fig. 16). The wrecker crane trucks have a body platform with a revolving hydraulic crane. The platform is a steel frame surfaced with welded and bolted safety-tread plate. The crane is positioned in an opening in the center of the platform and is secured to both platform and chassis frames. Sockets are provided along the sides of the platform for installation of top bows and paulin with end curtains for camouflage purposes. Four outriggers are attached to the platform frame, two on each side, to remove the load weight from truck springs and wheels during lifting of heavy loads. The operator's compartment is attached to the crane shipper support. The compartment, containing controls for operating the crane, revolves with crane. Hardtop, windshield and wipers, and cab heater for the operator's compartment can be installed for inclement weather, if necessary. The truck has an engine auxiliary governor to hold engine speed at 1700 rpm during crane operation. Hydraulic pressure for the crane is supplied by hydraulic pump driven from the transfer power takeoff. Two cab floodlights are mounted at the rear of driver's cab and a crane floodlight is attached to the crane shipper support near the spare wheel. An electric brake lock is provided to lock the service brake for additional wheel braking action during crane operation. Lockout bars are installed on the rear springs to relieve springs of extreme weight during lifting and towing operations. Some wrecker crane trucks are equipped with a front winch. M60 light wrecker trucks are equipped with a power-divider and a rear winch.

i. Van Trucks M109 (Figs. 17 and 18), M109A1, M109A2, M109C, M185, and M185A1. Van trucks M109A2 and M185A1 are equipped with the multifuel engine. The trucks have 12-foot van bodies, mounted on subsills to raise the body and eliminate the need for wheel housings. Access doors close the rear of the body. The right access door is equipped with a latch which can be padlocked. The left access door can be opened only from the inside of the body. Ladders are provided for access to the inside of the van; and access to the roof of the van. The body has side windows with screens and blackout curtains, and a front communication door. 24-volt dc and 115-volt ac power is provided for van use. Heating and ventilating accessories are available to provide satisfactory working conditions in temperatures from +125°F. to -25°F. The body is waterproof fording to a depth of 8 feet. All van trucks are equipped with the hardtop-

cab closure. Lifting brackets, by which the completely loaded van body may be supported, are installed on the upper corners of the body.

j. Expansible Van Trucks M292 (Figs. 19 and 20) and M292A1. The expansible van truck has two rear access doors, and single access doors on either side of the body. Two ladders are provided for access purposes. The single side access doors may be used only when the van body is in the expanded position. The expansible van body is designed to expand, under tactical conditions, to about twice the volume it encloses when in the retracted or traveling position. This is achieved by expanding side panels, actuated by expanding and retracting mechanisms, and counterbalanced hinged roof and floor sections. All facilities, including lighting, heating, air conditioning, and blackout protection are available in both the expanded and retracted positions. Four windows, equipped with brush guards, insect screens, and sliding blackout panels, are located in each side panel. Two stationary windows are located in the rear doors. An opening designed to accommodate intercommunication facilities, currently covered by a removable plate, is located on the left rear panel toward the top. The telephone entrance jack and the auxiliary power cable entrance power are located on the left rear panel near the bottom. The pioneer tool bracket and power cable entrance receptacle are located on the right rear panel. A bonnet, extending from the front panel of the van, houses the two heating units and the air-conditioning unit. The electrical system includes a 24-volt dc circuit for vehicular light operation, and 110-volt and 208-volt circuits for auxiliary equipment operation.

k. Electronic Van Truck XM567 (Figs. 21 and 22). The XM567 van body is equipped with two main access doors and a power entrance door on the right side of the van body. A gasoline fuel-burning space heater is mounted inside the van body on the front wall, at upper center. Ventilation of the van body is provided by a ventilator blower and a built-in blower duct in the upper left rear of the body. The van electrical system includes three basic electrical circuits for operation of the van body auxiliary equipment and lights.

(1) The 115-volt-ac, 400-cycle circuit is for operation of the ventilator blower, heater, 115-volt dome lights, and power receptacles.

(2) The 24-volt circuit is for operation of the 24-volt dome lights.

(3) The 24-volt-dc circuit is for operation of the heater fuel pump.

l. Missile Firing Data Computer Van Truck XM472 (Figs. 23 and 24). The van truck XM-472 is a mobile self-contained body, designed to house instruments and personnel for the recording of missile data. Two wheel wells are built into the van body to allow for tire clearance. One main entrance door with a removable ladder is provided for access at the rear of the van. The van body is divided into two sections, the personnel compartment and the vestibule. The personnel compartment is located at the forward end of the van body toward the cab; the vestibule is located toward the rear. These two sections are separated by a wall equipped with a sliding door. A hinged escape hatch is provided on the right side of the personnnel compartment. Two air conditioners and one heating unit are provided for instrument efficiency and personnel comfort. The vestibule houses the instrument panel and related electrical controls, an engine-generator set, the cable reel assembly, and a space heater and air exhaust blower. Desks and chairs are provided for personnel use. Lifting brackets, by which the completely loaded van body may be supported, are installed on the upper corners of the body.

m. Telephone Construction and Maintenance Truck V-17A/MTQ (Figs. 25 and 26). The V-17A/MTQ body is designed for telephone construction and maintenance work and has seven compartments built into the side panels of the body for storage of tools and equipment. The compartments are accessible through hinged doors on the outside of the panels. Other openings in the side panels provide access to the drum shaft and auxiliary shaft of the rear winch assembly for installation of a collapsible cable reel during wire handling operation. A manually rotated revolving platform assembly is mounted on top of the body. The nonelevating platform is supported by a brake ring frame secured to the front end of the body. A guard rail assembly is welded to the platform as a safety measure. The pole derrick assembly is used in the moving, erecting, and pulling of poles. This derrick has three legs, with the center leg consisting of three sections. The top section of the center leg mounts a derrick sheave for use with a

winch line from the rear winch assembly. When the derrick is in the travel position, it is secured in the vehicle by two derrick leg holddown clamp assemblies. The rear winch is mounted in the front end of the body. Power for the rear winch is provided from the transfer power takeoff. Control of the winch is through control lever linkage from the truck cab. The V-17A/MTQ is also equipped with two-wheel chock with chain assemblies, two support legs, and a collapsible cable reel.

n. Earth Boring Machine and Pole Setter Truck V-18A/MTQ (Figs. 27 and 28). The V-18A/MTQ body is an M34 body modified to mount a center-mounted rear winch assembly and an earth boring machine. The rear winch assembly is mounted on the body behind the cab. The earth boring machine is mounted on the rear end of the body platform. The boring machine receives its power from the power-divider. A control lever assembly, mounted on the boring machine, controls the operation of the earth boring machine. The power-divider is operated from the cab through control lever linkage. The V-18A/MTQ is also equipped with two support legs, and two wheel chocks with chain assemblies.

Section III. NAME, CAUTION, WARNING AND INSTRUCTION PLATES

21. Plates

a. General. The name, caution, warning, and instruction plates described in this paragraph are found on all basic trucks of the M44 series. Special plates pertinent to the various bodies are described in paragraphs 22 through 30. Data plates located on the instrument panel of a typical gasoline engine truck are illustrated in figure 29. Data plates located on the instrument panel of a typical multifuel engine truck are illustrated in figure 30. These plates apply to the driver's immediate operational needs.

b. Vehicle Identification and Data Plate. This plate, located on the instrument panel to the right of the instrument cluster, furnishes weight, dimensions, identification, serial number, maximum towed-load information, and indicates whether or not the vehicle is equipped with a front winch. The manufacturer's serial number is found on the frame left-side member, under the left fender in front of the tire.

c. Vehicle Servicing and Publication Data Plate. This plate, located on the extreme right and at the top of the instrument panel, furnishes shipping information, numbers of pertinent publications, SNL number of parts manual, tire inflation data for vehicles with a front winch, and electrical system and lubrication information.

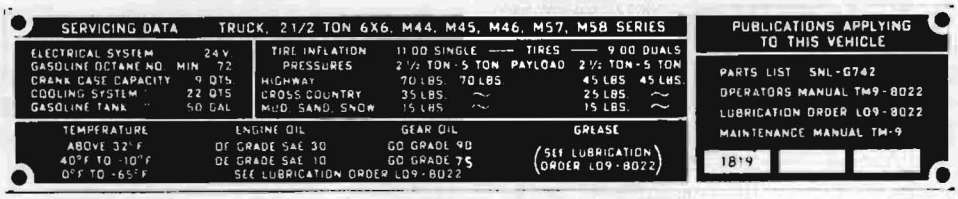
d. Low Air Pressure Warning Data Plate. This plate, located to the left of the instrument panel, carries low air pressure warning and tire inflation data for trucks without a front winch; and low air pressure warning, and transmission power takeoff and front winch operation data for trucks equipped with a front winch.

e. Instruction Data Plate. This plate, located at the top left side of the instrument panel, provides draining instructions for the cooling system, maximum allowable road speeds in various shift positions, transmission and transfer shifting diagrams, and instructions. For multifuel engine vehicles, this plate is called the Vehicle Instruction and Caution Data Plate and is different only in the transmission shifting diagram.

f. Responsible Agency Data Plate. This plate, located to the right of the instrument cluster, supplies information regarding the agency responsible for procurement and depot maintenance of the chassis, body, and mounted equipment.

g. Crankcase Ventilation Shutoff Data Plate. This plate, installed on all vehicles equipped with the crankcase ventilation shutoff valve control for deep-water fording, is located to the right of the instrument cluster. Instructions for operating the crankcase ventilation shutoff valve control when entering and leaving the water are provided.

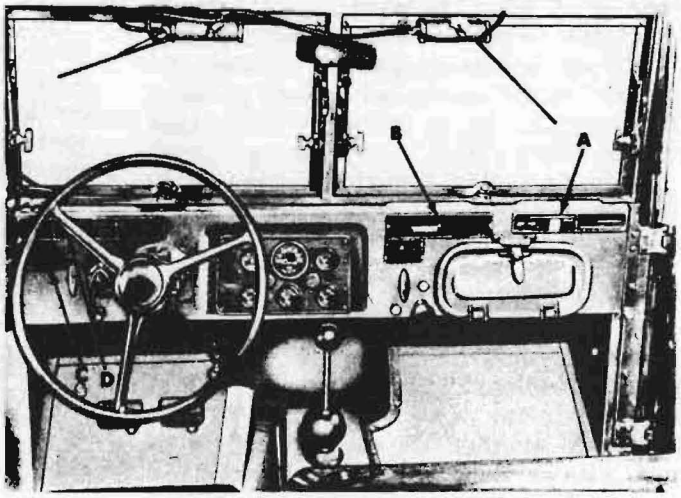
h. Stencil Marking (Starting Procedure). This stencil marking, located on the instrument panel near the starting switch, carries a warning to remind personnel to shut off all electrical equipment prior to starting the engine.

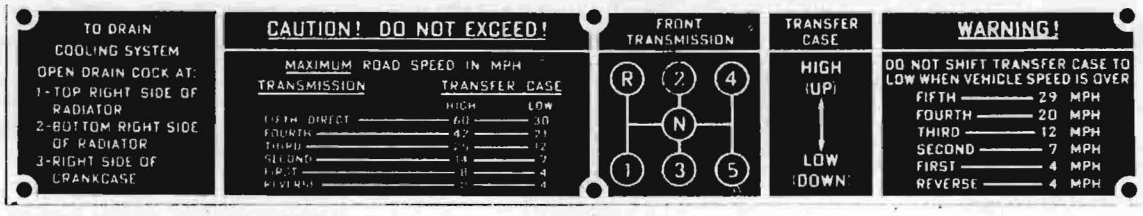


A

B

C





D

ORD E21303

Figure 29. Instrument panel data plates - gasoline engine trucks

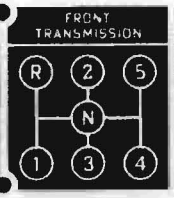
TO DRAIN COOLING SYSTEM REMOVE RADIATOR CAP & OPEN DRAIN COCK AT:
1-BOTTOM RIGHT SIDE OF RADIATOR.
2-LOWER RIGHT SIDE OF CRANKCASE.

CAUTION! DO NOT EXCEED!

MAXIMUM ROAD SPEED IN MPH

TRANSMISSION	TRANSFER CASE HIGH	TRANSFER CASE LOW
FIFTH (OVERDRIVE)	50	28
FOURTH	44	22
THIRD	27	14
SECOND	15	8
FIRST	9	5
REVERSE	9	5

FRONT TRANSMISSION



TRANSFER CASE
HIGH
UP
LOW
DOWN

WARNING!

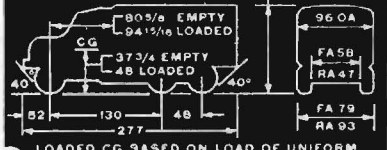
DO NOT SHIFT TRANSFER CASE TO LOW WHEN VEHICLE SPEED IS OVER

FIFTH	28 MPH
FOURTH	22 MPH
THIRD	14 MPH
SECOND	8 MPH
FIRST	5 MPH
REVERSE	5 MPH

A

WEIGHT & DIMENSION DATA — **TRUCK, CARGO 2 1/2 TON, 6X6, M35 A1, W/W** — **IDENTIFICATION DATA**

CG LOCATION BASED ON 5000 LB PAY LOAD W/O CREW



LOADED CG BASED ON LOAD OF UNIFORM DENSITY COMPLETELY FILLING BODY

WEIGHTS W/O CREW	EMPTY	CROSS C'TRY	HIGH WAY
PAY LOAD		5000	10000
FRONT AXLE	6450	6646	6042
INTER AXLE	3540	5942	8344
REAR AXLE	3540	5942	8344
TOTAL LBS	13530	18530	23530
MAX TOWED LOAD (PINTLE TOWED)		6000 LBS	10000 LBS

SHIPPING CUBAGE 1219 CU FT

STOCK NO. 2320-542-5634
SER. NO.
MFD. BY LANSING DIVISION
WHITE MOTOR CO.
LANSING, MICHIGAN, U.S.A.
MFR. SER. NO. MODEL CA-D-54
CONT. NO. YR. MFD. 19
U S PROPERTY

B

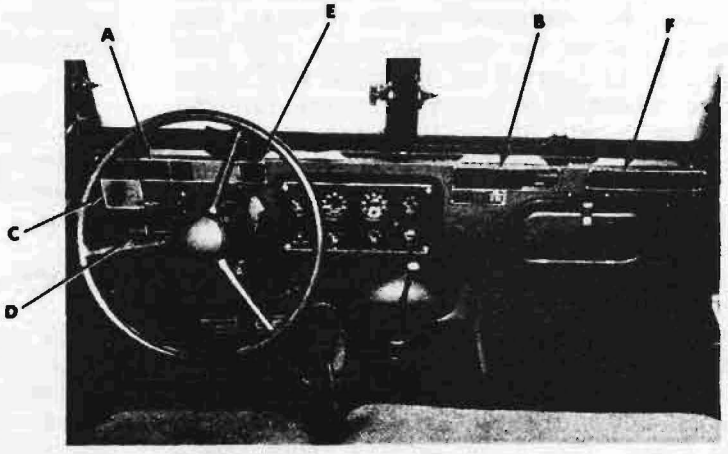
WARNING

BUZZER OPERATION INDICATES THAT AIR SYSTEM PRESSURE IS BELOW SAFE OPERATING PRESSURE. THE CAUSE OF LOSS OF AIR PRESSURE SHOULD BE DETERMINED IMMEDIATELY.

POWER TAKE-OFF AND WINCH OPERATION

WHEN WINCH IS USED TO ASSIST VEHICLE WITH WHEELS DRIVING THE POWER TAKE-OFF SHOULD BE IN LOW SPEED, THE TRANSMISSION IN LOW GEAR, AND THE TRANSFER CASE IN LOW RANGE.

C



SERVICE AIR CLEANER ELEMENT WHEN RED INDICATOR IS IN UP POSITION →

MANIFOLD HEATER SWITCH
OFF ON

ENGAGE HEATER WITH STARTER WHEN TEMPERATURE IS BELOW +20°F USE HEATER INTERMITTENTLY AT IDLE UNTIL ENGINE IS RUNNING SMOOTHLY

CAUTION
DO NOT ENGAGE HEATER UNLESS ENGINE IS BEING CRANKED

D

AUTHORIZED FUELS

VV-F-800 (DIESEL)
MIL-F-45121 (GIE)
MIL-G-3056 (GASOLINE)
MIXING FUELS PERMISSABLE

CAUTION - DO NOT USE AVIATION GRADE GASOLINE

E

SERVICING DATA — **TRUCK, 2 1/2 TON 6X6**

ELECTRICAL SYSTEM 24 V.

CRANKCASE CAPACITY	20 QTS.
COOLING SYSTEM "	34 QTS.
FUEL TANK "	50 GAL.

TIRE INFLATION PRESSURES	11.00 SINGLE — TIRES — 9.00 DUALS			
	2 1/2 TON - 5 TON	PAYLOAD	2 1/2 TON - 5 TON	
HIGHWAY	70 LBS.	70 LBS.	50 LBS.	50 LBS.
CROSS COUNTRY	35 LBS.		35 LBS.	
MUD, SAND, SNOW	15 LBS.		15 LBS.	

TEMPERATURE	ENGINE OIL	GEAR OIL	GREASE
ABOVE 32°F	OE GRADE S.A.E. 30	GO GRADE 90	(SEE LUBRICATION ORDER NO LO 9-2320-235-10)
40°F TO -10°F	OE GRADE S.A.E. 10	GO GRADE 90	
0°F TO -65°F	SEE LUBRICATION ORDER NO LO9-2320-235-10		

PUBLICATIONS APPLYING TO THIS VEHICLE

PARTS LIST TM9-2320-235-20P
OPERATORS MANUAL TM9-2320-235-10
LUBRICATION ORDER LO9-2320-235-10
MAINTENANCE MANUAL TM-9

F

ORD E21304

Figure 30. Instrument panel data plates - multifuel engine trucks

i. Authorized Fuel Data Plate. This plate, located on the instrument panel above the steering column, is applicable to multifuel engine trucks only. It indicates the different grades of fuel that may be used in the multifuel engine.

j. Accessory Switch Data Plate. This plate, located on the instrument panel to the left of the steering column, is applicable to multifuel engine trucks only. It indicates the OFF and ON positions of the accessory switch.

k. Ignition Switch Instruction Plate. This plate, located on the instrument panel to the left of the steering column, is applicable to gasoline engine trucks only. It indicates the OFF and ON positions of the ignition switch.

l. Engine Serial Number Data Plate. This plate, located on the left side of the engine crankcase, is applicable to gasoline engine trucks only. It carries the engine serial number. For multifuel engine vehicles, this plate is called the Engine Name and Data Plate. It is located on the right side of the engine crankcase and carries the engine model No., the engine Serial No., and engine oil specification information.

m. Exciter Coil Warning Plate. This warning plate, located on the exciter coil on the right side of the engine block on multifuel engine trucks, provides information on the correct operation and servicing of the manifold heater exciter coil.

n. Manifold Heater Switch Instruction and Data Plate. This plate, located below and to the left of the steering column, is applicable to multifuel engine vehicles only. It contains information on the use of the manifold heater.

o. Manifold Heater Warning Plate. This plate, located below and to the left of the steering column, is applicable to multifuel engine vehicles only. It provides information on the safe operation of the manifold heater.

p. Generator Regulator Warning Plate. This embossed warning, located on top or right side of the generator regulator, provides a warning for personnel to disconnect the leads at the battery before servicing the unit.

q. Fuel Tank Filler Pipe Cap Warning Decalcomania. On gasoline engine vehicles, either a decalcomania or embossing on the fuel tank filler pipe cap gives instructions and warning for the removal of the pipe cap.

r. Front Winch Drum Lock Caution Plate. This plate, located on the tension top channel over the winch drum, gives instructions for positioning the poppet lock knob before operating the winch.

s. Front Winch Clutch Lever Warning Plate. This plate, located on the front winch, provides information on how to free the drum clutch when it is stuck.

t. Transfer Power-takeoff Instruction Plate. This plate, located inside the post behind the left door, indicates the ENGAGE and DISENGAGE positions of the transfer power takeoff shifting lever.

u. Transmission Power-takeoff Shift Plate. This plate, located on the left side of the intermediate tunnel on the floor of the cab, indicates the positions for the transmission power-takeoff shifting lever.

v. Raised Hood Warning Stencil Marking. This stencil marking, located under the hood, instructs personnel to secure the hood in the up position with a hook before servicing the engine.

22. M47, M59, and M342 Data Plates

The only data plate applicable only to the dump trucks, is the Dump Body Control Lever Instruction Plate. This plate, located on the left door pillar, provides instructions for the operation of the hydraulic hoist driver's control lever.

23. M49, M49C, M49CA1, M50, and M50A1 Data Plates

The following data plates are applicable to the fuel and water tank trucks:

a. M49, M49C, and M49CA1 Operating Instruction Data Plate. This plate, located inside the right door of the rear compartment, provides operating instructions for the gasoline pump.

b. M49, M49C, and M49CA1 Gasoline Tank Compartment Discharge Valve Control Tags. These tags, located in the rear compartment of the tank body behind the discharge valve controls, provide capacity information on the

tank compartments controlled by each valve control operating lever.

c. Delivery Pump Pressure Setting Data Plate. This plate, located on top of the delivery pump, provides pump pressure setting data for all tank trucks.

d. M50 and M50A1 Water Tank Truck Operating Instruction Plate. This plate, located on the right web member in the rear compartment, provides instructions for operation of the pump and controls for filling, discharging, transferring, and draining operations.

e. M50 and M50A1 Exhaust Bypass Valve Control Instruction Plate. This plate, located to the right of and below the instrument cluster, provides instructions for the operation of the exhaust bypass valve control.

f. M50 and M50A1 Exhaust Bypass Fording Valve Instruction Plate. This plate, located on the valve stem of the exhaust bypass fording valve, provides instructions for the operation of the valve.

24. M60 and M108 Data Plates

The following data plates are applicable to light wrecker truck M60, and wrecker crane truck M108:

a. Hydraulic Crane Crowd and Hoist Control Valve Hand Levers Caution Plate. This plate, located on the valve bank cover, provides operating precautions for the crowd and hoist levers.

b. Hydraulic Crane Operation Data Plate. This plate, located on the top of the valve bank cover, provides information on the hydraulic pump, hoist cable, cable hoist and swing motor control valves, relief valve adjustment, crane lubrication, and boom adjustment.

c. Hydraulic Crane Safe Load Data Plate. This plate, located on top of the valve bank cover, provides information on the safe load capacities of the boom at various lengths, with or without the use of outriggers.

d. Hydraulic Crane Boom Control Valve Hand Lever Instruction Plate. This plate, located on the lower panel of the valve bank cover, provides instructions for the positioning of the boom lift cylinder control valve hand lever to control the up and down motion of the boom.

e. Hydraulic Crane Cable Hoist Gearcase Lubricant Instruction Plate. This plate, located on the side of the crane on the gearcase, provides lubricating instructions for the drumcase.

f. Hydraulic Crane Crowd Control Valve Hand Lever Instruction Plate. This plate, located on the lower panel of the valve bank cover, provides instructions for the positioning of the boom crowd control valve hand lever to control extension and retraction of the boom.

g. Hydraulic Crane Hoist Control Valve Hand Lever Instruction Plate. This plate, located on the lower panel of the valve control bank cover, provides instructions for the positioning of the cable hoist motor control valve hand lever to control the running out and taking up of cable.

h. Hydraulic Crane Oil Level Instruction Plate. This plate, located on the hydraulic oil reservoir behind the cab, provides instructions for checking the level of the hydraulic oil.

i. Hydraulic Crane Subzero Operating Instruction Plate. This plate, located on the lower panel of the valve bank cover, provides instructions on warming the hydraulic oil to the proper operating temperature.

j. Hydraulic Crane Swing Control Valve Hand Lever Instruction Plate. This plate, located on the lower panel of the valve bank cover, provides instructions for the positioning of the swing motor control valve hand lever to control the boom side motion.

k. Hydraulic Crane Before Deep-water Fording Warning Plate. This plate, located on the top panel of the valve bank cover, provides instructions for care of the hydraulic oil tank, before and after fording operations.

l. Hydraulic Crane After Deep-water Fording Warning Plate. This plate, located on the top panel of the valve bank cover, provides instructions for draining the pivot post and ring gear housing after submersion.

m. Brake Lock Switch Instruction Plate. This plate, located on the extreme lower left of the instrument panel, provides instructions for the use of the solenoid brake lock to secure the service brakes during crane operation.

n. Floodlight Control Switch Instruction Plate. This plate, located on the instrument panel behind the steering wheel, indicates the ON and OFF positions of the floodlight switch.

o. Hydraulic Crane Oil System Data Plate. This plate, located on the top panel of the valve bank cover, provides information as to the type and weight of hydraulic oil to be used.

p. Hydraulic Crane Nameplate. This plate, located on the right side of the crane near the spare wheel, carries the make and serial number of the hydraulic crane.

q. M60 Rear Winch Automatic Brake Caution Plate. This plate, located on the automatic brake case cover, gives instructions for tightening the brake spring adjusting screw.

r. M60 Rear Winch Cable Tensioner Caution Plate. This plate, located on the rear winch, provides information on the correct handling of the winch line.

25. M109, M109A1, M109A2, M109C, M185, and M185A1 Data Plates

The following data plates are applicable to the van trucks called out above:

a. Converter Selector Switch Instruction Plate. This plate, located on the face of the converter, provides information for the positioning of the converter selector switch.

b. Circuit Breaker Instruction Plate. This plate, located on the cover of the circuit breaker box, provides instructions for the positioning of four circuit breakers.

c. Power Switch Data Plate. This plate, located on the top front of the power switch, provides information on the make, number, current, and voltage of the power switch.

d. Exhaust Blower Switch Instruction Plate. This plate, located on the converter, provides information for the positioning of the exhaust blower switch.

e. Converter Instruction Plate. This plate, located on the converter, provides information on the operation of the converter.

f. Blackout Switch Data and Manufacturer's Nameplate. This plate, located near the top front of the dome-light switch, provides information on the make, type, and ratings of the switch.

g. Blackout Switch Instruction Plate. This plate, located on the lower front of the dome-light switch, provides instructions for the positioning of the dome-light switch.

h. Power Switch Instruction Plate. This plate, located on the lower front of the power switch, provides instructions for the setting of the switch to either 115 or 24 volts.

j. Dome Light and Blackout Dome-light Toggle Switch Instruction and Mounting Plate. This plate, located on the top left rear interior panel, provides instructions for the positioning of the dome light and blackout dome-light toggle switches.

26. M292 and M292A1 Data Plates

The following data plates are applicable to the M292 and M292A1 expansible van trucks:

a. Vehicle Identification Plate. This plate, located on the lower front corner of the right side of the van, identifies the vehicle and states the manufacturer's name, federal stock number, model number, Ordnance contract number, and the delivery date of the vehicle.

b. Transportation Data Plate. This plate, located adjacent to the vehicle identification plate, states the overall length, width, height, shipping weight, and cubage of the vehicle.

c. Vehicle Leveling Warning Plate. This plate, located on the right rear door of the van, warns personnel against expanding or retracting the van while on uneven terrain.

27. XM567 Data Plates

The following data plates are applicable to the XM567 van truck:

a. Heater Combination Identification, Operating Instruction, and Data Plate. This plate, located on the front panel of the heater, carries the name, federal stock number, make, model, serial number, date of manufacture, and contract number for the heater assembly. It also identifies various controls and provides instructions for operating the heater, as well as additional data.

b. Ventilator Blower Identification and Data Plate. This plate, located on the top of the

ventilator blower housing, carries the manufacturer's name, part number, and electrical data.

c. Dome-light Switch (24-v) Identification and Mounting Plate. This plate, located on the interior right rear wall near the floor, identifies the 24-volt dome-light switch.

d. Dome-light Switch and Power Receptacle Data Plate. These two identical plates are located on the left and right interior van walls. They provide 115-volt dome-light switch electrical data, and 115-volt ac, 400-cycle power receptacle electrical data.

e. Circuit Breaker Identification Plate. This plate, located on the front of the 115-volt ac multibreaker assembly cover, identifies the circuits controlled by the four 10-ampere circuit breakers.

28. V-17A/MTQ Data Plates

The only data plate applicable only to the V-17A/MTQ is the rear winch instruction plate. This plate, located on the extreme left of the instrument panel, indicates the rear winch control lever operating positions.

29. V-18A/MTQ Data Plates

The following data plates are applicable to the V-18A/MTQ earth boring machine and pole setter truck.

a. Derrick Tube Caution Plate. This plate, located on the derrick tube near the rack progress sighting holes, provides operating precautions for auger operation.

b. Control Lever Location and Operating Procedure Data Plate. This plate, located on the instrument panel compartment, provides information required for the operation of the earth boring machine, front winch, and rear winch. It also indicates the location of levers on the cab floor and the operating positions of levers for the rear winch, handbrake, transfer power takeoff, transmission, front winch, transfer, and power-divider.

30. Operator's Check List Label

This label, located on the left door panel, provides a check list for multifuel engines.

Section IV. TABULATED DATA

31. Tabulated Data

a. General. Data for the M44 series trucks is detailed in subparagraphs b through *i* below. Detail data is the same for all models except as specifically noted.

b. Engine and Radiator. (Refer to table 2.)

Compression ratio:
- Multifuel models ..... 22.1 to 1
- Gasoline models ..... 6.73 to 1

Oil Filters:
- Multifuel 2
- Gasoline 1

Spark plug gap (gasoline models) ..... 0.030 in.

Breaker points gap (gasoline models) ..... 0.022 in.

Fan and water pump drive belt (set of two matched belts):
- Type ..... Notched V
- Length:
  - Multifuel models ..... 46 in.
  - Gasoline models ..... 54½ in.

c. Electrical System.

Generator:
- Make and model (optional):
  - Autolite GHA-4802UT
  - Delco 1117495
- Capacity ..... 25 amp

Starter:
- Multifuel:
  - Autolite MBD-4043UT
- Gasoline:
  - Delco 1108575

Batteries (2 in series):
- Make ..... Military standard
- Model 6TN23
- Voltage (each) 12
- Ground ..... negative

Generator regulator:
- Make ..... Military standard
- Operating voltage ..... 24-28 v dc

Lamps:
- Taillights ..... Double contact W-1034
- Parking ..... Single contact M2-1247

d. Transmission, Transfer, Propeller Shafts, and Axles.

Transmission:
- Make ..... Spicer
- Model 3053A
- Speeds forward 5
- Speeds reverse 1
- Shifting speeds ..... (Refer to table 3.)

Transfer case:
- Make ..... Rockwell-Standard
- Model T-136-21

Propeller shafts:
- Transmission to transfer ..... Spicer 1500
- Transmission to intermediate axle ..... Spicer 1500
- Transfer to front axle ..... Spicer 1410
- Intermediate axle to rear axle ..... Spicer 1410

Front axle:
- Make ..... Timken
- Model FC-240-M-X1
- Type ..... Double reduction

Rear axle:
- Make ..... Timken
- Model SFD-75-H-X2
- Type ..... Double reduction

e. Suspension.

Springs: front:
- Type leaf ..... Semielliptic

Springs: rear:
- Type leaf ..... Semielliptic

Shock absorbers:
- Location ..... Front only
- Type ..... Direct, double acting

f. Brakes.

Service brakes:
- Type ..... Air over hydraulic

Parking brake:
- Model ..... Timken Duo-Grip mounted on transfer.

g. Steering.

Model ..... Ross TA-66
Type ..... Cam and twin lever

h. Winches and Booms.

Front winch:
- Model ..... CA 514
- Make ..... Gar Wood
- Capacity ..... 10,000 lb

Rear winch (V-17A/MTQ, V-18A/MTQ, and M60):
- Capacity ..... 15,000 lb

Booms (M60 and M108):
- Capacity (boom retracted) ..... 8000 lb
- Tote capacity ..... 4500 lb

i. Fuel Grades (Multifuel Engine Models Only).

Diesel fuel (Grade DFA)
(Spec. VV-F-800) ..... All temperatures
Diesel fuel (Grade DF1)
(Spec. VV-F-800) ..... Do not use below —10° F.
Diesel fuel (Grade DF2)
(Spec. VV-F-800) ..... Do not use below +32° F.
Marine fuel Oil
(MIL-F-16884) ..... Above 10° F.
Jet fuel
(MIL-J-5624)
Commercial aviation
(Jet A and Jet A1)
Combat gasoline
(MIL-G-3056) ..... Emergency fuel

NOTE

Mixing fuels is permissible.
Do not use aviation grade gasoline.

32. Dimensions

(Refer to table 4.)

33. Weights

(Refer to table 5.)

34. Performance

(Refer to tables 6 and 7.)

35. Capacities

(Refer to table 8.)

36. Tire Inflation Data

(Refer to table 9.)

NOTE

Some early model multifuel engine vehicles carry tire inflation data on the vehicle servicing data and publications plate which is different from that given in table 9. When this is encountered, see table 9 for the correct tire inflation data.

Table 2. Engine and Radiator Data

Data	Gasoline engine	Multifuel engines
Model	7538638	U.S. Army (LDS427-2) (LD465-1)
Cylinders (in-line)	6	6
Brake horsepower	146 (gross at 3400 rpm)	140 (gross at 2600 rpm)
Ignition system	Electrical	Compression
Firing order	1-5-3-6-2-4	1-5-3-6-2-4
Cooling	Liquid	Liquid
Radiator	8720584	10876110
Thermostat specifications		
Model	7521868	10911114
Starts to open	160°F	180°F
Fully opened	185°F	200°F

Table 3. Shifting Speeds in MPH

Transmission gear position	Gasoline engine		Multifuel engines	
	Transfer LOW	Transfer HIGH	Transfer LOW	Transfer HIGH
1st gear	4	8	5	9
2d gear	7	14	8	16
3d gear	12	25	14	27
4th gear	21	42	22	44
5th gear	30	60	28	56
Reverse	4	8	5	9

Table 4. Dimensions (inches)

Model No.	Length overall w/wn	Length overall wo/wn	Height overall	Height loading	Height minimum reducible	Width overall	Pintle height	Ground clearance minimum
M44	277	263	99-1/2		82	85	36	14
M44A1	277	263	99-1/2		82	85	36	14
M44A2	277	263	102-1/2*		82	85	37-3/8	12-1/4
M45	275	261-1/2	96-1/2*		81	93	34	11
M45C	276-1/2	263	96-1/2		81-1/2	93	34	11
M45G	277	263	96-1/2		81	93	34	11
M45A1	277	263	96-1/2		80-1/2	93-1/2	34	11
M45A2	277	263	101-1/2*		81	93	36-1/8	10-15/16
M45A2G	257-1/2	243-1/2	101-1/2*		81	93	36-1/8	10-15/16
M46	337	324	97		81	93	36	13
M46C	342-1/2	329	96-1/2		81-1/2	93	35-1/2	12-1/2
M46A1	343	330	99		81	93	37-1/2	12-1/2
M46A1C	343	329	98		81	93	36-1/8	10-15/16
M46A2C	343	329	101-1/2*		81	93	36-1/8	10-15/16
M57	239	225-1/2	97-1/2		82	85	36	14
M58	239	225-1/2	99		80-1/2	93	34	11
M34	275	262	109	44	82	88	36	14
M35	276	263	109	51	80	96	35	12-1/2
M35A1	277	263	112	48	80	96	35	12-1/2
M35A2	278-1/4	264-1/4	112*	52	81	96	36-1/8	10-15/16
M35A2C	278-1/4	264-1/4	112*	52	81	96	36-1/8	10-15/16
M36	342-1/2	324	124-1/2	51	81	96	36	17
M36C	337	324	124-1/2	51	81	96	36	17
M36A2	343-1/2	329-1/2	124-3/8*	53-11/16	81	96	36-1/8	10-15/16
M47	249	236	102-1/2		82	85	37	14
M59	249	235-1/2	101		80-1/2	96	37	11-1/2
M342	273-1/2	260-1/2	104-1/2		82	96	36	13
M342A2	274	260	105*	53	81	96	36-1/8	10-15/16
M60	276-1/2	263	97-1/2		97-1/2	93	33-1/2	13
M108	303	290	99		93	96	34	13
M109	277	263	130	51	130	99	34	13
M109A1	277	263	130	51	130	99	34	13
M109A2	277	263	130	48	130	99	34	13
M109A3	282	268	130*	51	130	98	36-1/8	10-15/16
M567	268	254	128-1/2	51-1/2	128-1/2	97-1/2	36	11
M292	337	324	133	52	132	96	34	13
M292A1	337	324	133	52	132	96	34	13
M292A2		329	133	51-13/16	133	98	36-1/8	10-15/16
M292A5		351	133	51-13/16	133	98	36-1/8	10-15/16
M185	277	263	130	51	130	99	34	13
M185A1	277	263	130	51	130	99	34	13
M185A2	277	263	130	48	90	95	36	13
M185A3	282	268	130*	51	130	98	36-1/8	10-15/16
M50	277	263	97		90	95	36	13
M50A1	277	263	97		90	95	36	13
M50A2	277	263	101-1/2		92	96	36-1/8	10-15/16
M49	277	263	97		88	96	37	12-1/2
M49C	277	263	97-1/2		88	96	37	12-1/2
M49A1C	277	263	97		88	96	37	12-1/2
M49A2C	277	263	101-1/2*		92	96	36-1/8	10-15/16
M48	254	240	97		81	94	35	12-1/2

Table 4. Dimensions (inches)—Continued

Model No.	Length overall w/wn	Length overall wo/wn	Height overall	Height loading	Height minimum reducible	Width overall	Pintle height	Ground clearance minimum
M275	242	228	99		81	93	35	12½
M275A1	242	228	99		81	93	35	13
M275A2	242	228	101½*		81	93	36⅛	10 15/16
V-17A/MTQ	276	262	120		120	94	36	13
V-18A/MTQ	330	317	107		88	88	36	14
M764	305		108*	53	94	96		11
M756A2	287		113*	53	108	96	36½	11

*Denotes M44A2 Series truck with stack exhaust system.

Table 5. Weights

No. Model	Net w/wn	Net wo/wn	W/WN Gross highway	W/WN gross cross-country	Payload highway	Payload cross-country	Towed load highway	Towed load cross-country
M44	10,900	10,490	22,500	17,900	10,000	5,000	10,000	6,000
M44A1	10,250	9,840	20,900	17,900	10,000	5,000	10,000	6,000
M44A2	11,344	10,844	24,344	19,344	13,000	8,000	10,000	6,000
M45	10,840	10,524	22,500	17,900	10,000	5,000	10,000	6,000
M45C	10,935	10,525	24,135	18,335	13,200	7,400	10,000	6,000
M45G	10,524	10,174	22,184	17,584	10,000	5,000	10,000	6,000
M45A1	11,490	11,274	20,900	17,900	10,000	5,000	10,000	6,000
M45A2	11,850	11,350	24,850	19,850	13,000	8,000	10,000	6,000
M45A2G	11,850	11,350	25,850	20,850	14,000	9,000	10,000	6,000
M46	11,270	10,860	24,270	18,470	13,000	7,200	10,000	6,000
M46C	12,690	12,280	25,690	19,890	13,000	7,200	10,000	6,000
M46A1	12,340	12,930	26,240	20,540	13,000	7,200	10,000	6,000
M46A1C	16,107	15,665	23,957	21,107	7,850	5,000	10,000	6,000
M46A2C	11,920	11,805	24,920	19,920	13,000	8,000	10,000	6,000
M57	10,823	10,493	24,223	18,423	13,400	7,600	10,000	6,000
M58	10,851	10,441	24,251	18,451	13,400	7,600	10,000	6,000
M34	12,190	11,775	22,540	17,125	10,350	5,350	10,000	6,000
M35	12,880	12,465	23,230	17,815	10,350	5,350	10,000	5,000
M35A1	13,530	13,115	23,530	18,530	10,000	5,000	10,000	6,000
M35A2	13,920	13,420	23,920	18,420	10,000	5,000	10,000	6,000
M35A2C	13,530	13,000	23,530	18,000	10,000	5,000	10,000	6,000
M36	13,915	13,500	23,915	18,500	10,000	5,000	10,000	6,000
M36C	13,915	13,500	23,500	18,500	10,000	5,000	10,000	6,000
M36A2	15,750	15,340	25,750	20,340	10,000	5,000	10,000	6,000
M47	13,860	13,450	24,210	18,800	10,350	5,350	10,000	6,000
M59	14,460	14,050	24,180	19,400	10,350	5,350	10,000	6,000
M342	15,580	15,170	26,280	21,280	10,000	5,000	6,000	6,000
M342A2	15,500	15,000	25,500	20,000	10,000	5,000	10,000	6,000
M60	23,960	23,550	27,810	25,810	3,500	1,500	10,000	6,000
M108	19,785	19,375	23,635	20,735	3,500	600	10,000	6,000
M109	15,646	15,231	21,292	20,881	7,500	5,000	10,000	6,000
M109A1	16,292	15,881	20,642	20,231	7,500	5,000	10,000	6,000

Table 5. Weights—Continued

Model No.	Net w/wn	Net wo/wn	W/Wn Gross highway	W/WN gross cross-country	Payload highway	Payload cross-country	Towed load highway	Towed load cross-country
M109A2	16,296	15,881	20,642	19,992	7,500	5,000	10,000	6,000
M109A3	15,430	14,930	22,930	19,930	7,500	5,000	8,000	6,000
XM567	14,410	14,000	20,581	18,581	7,500	5,000	8,000	6,000
M292	21,019	20,609	25,959	25,959	5,000	5,000	6,000	6,000
M292A1	21,555	21,145	26,145	26,145	5,000	5,000	10,000	6,000
M292A2		21,209	26,609	26,609	10,000	5,000	10,000	6,000
M292A5		22,929	28,329	28,329	5,000	5,000	10,000	6,000
M185	16,292	15,881	21,292	20,881	5,350	5,000	10,000	6,000
M185A1	16,942	16,531	21,942	21,531	5,350	5,000	10,000	6,000
M185A2	17,487	17,067	22,487	22,067	5,350	5,000	10,000	6,000
M185A3	17,300	16,800	24,800	21,800	7,500	5,000	8,000	6,000
M50	15,594	15,184	23,205	20,534	1,000	400	10,000	6,000
M50A1	15,255	14,845	23,855	20,555	1,000	400	10,000	6,000
M50A2	14,240	13,840			1,000 gal.	400 gal.	10,000	6,000
M49	13,905	13,490	21,755	18,840	1,200	600	10,000	6,000
M49C	15,457	15,015	22,515	20,015	1,200	600	10,000	6,000
M49A1C	16,107	15,665	23,165	20,665	1,200	600	10,000	6,000
M49A2C	14,640	14,140			1,200 gal.	600 gal.	10,000	6,000
M48	11,840	11,430	24,190	18,780	12,000	7,000	10,000	6,000
M275	11,590	11,179	23,940	18,940	12,000	7,000	36,000	17,000
M275A1	12,534	12,124	24,124	19,124	12,000	7,000	36,000	17,000
M275A2	12,226	11,790	24,226	18,790	12,000	7,000	36,000	17,000
V-17A/MTQ	16,550	16,100	22,840	18,390	6,290	2,290	10,000	4,000
V-18A/MTQ	17,150	16,735	23,540	19,125	6,390	2,390	0	0
M764	19,490		21,490	19,990	2,000	500	0	0
M756A2	16,690		24,690	18,690	8,000	2,000	10,000	6,000

Table 6. Turning Radius

Radius w/wn 36 ft. wo/wn 35 ft.	Radius w/wn 37 ft. 6 in. wo/wn 36 ft.	Radius w/wn 46 ft. wo/wn 45 ft.
M44, M44A1, M44A2, M57, M58, M34, M47, M59, M275, M275A1, M275A2, V-17A/MTQ, and V-18A/MTQ.	M45, M45C, M45G, M45A1, M45A2, M45A2G, M35, M35A1, M35A2, M35A2C, M48, M49, M49C, M49A1C, M49A2C, M50, M50A1, M50A2, M60, M108, M109, M109A1, M109A2, M109A3, M185, M185A1, M185A2, M185A3, M342, M343A2, M567, M764, and M756A2.	M46, M46C, M46A1, M46A1C, M46A2C, M36, M36C, M36A2, M292, M292A1, M292A2, and M292A5.

Table 7. Approach and Departure Angles (Degrees)*

24°	34°	40°	44°	73°	84°
M46, M46C, M46A1, M46A2C, M36, M36C, M292, M292, M292A1, M292A2, M292A5	M764	M44A2, M45C,M45G M45A2, M35, M35A1, M35A2, M35A2C, M49, M49C, M49A1C, M49A2C, M50, M50A1, M50A2, M60, M108, M109, M109A1, M109A2, M109A3, M185, M185A1, M185A2, M185A3, M567, M756A2	M34, M44, M44A1, M45, M45A1, M45C, V-17A/MTQ	M47, M59, M48, M275, M275A1, M275A2	M57, M58

*Approach angles for all 2-1/2 ton, 6x6, M44, M44A1, and M44A2 Series trucks is 40° with winch, and 47° without winch.

Table 8. Capacities

Description	Capacity	Vehicle(s)
Cooling system - gasoline	22 qt	All gasoline engine vehicles
Cooling system - multifuel		All multifuel engine vehicles
(LDS 427-2)	34 qt	
(LD 465-1)	28-32 qts	
Crankcase - gasoline	9 qt	All gasoline engine vehicles
Crankcase - multifuel	22 qt	All multifuel engine vehicles
Differentials (each)	6 qt	All vehicles
Fuel tank	50 gal.	All vehicles
Transmission 1. W/PTO	10-1/2 pt	All vehicles
Transmission 2. WO/PTO	8-1/2 pt	All vehicles
Transfer	7 qt	All vehicles
Front winch worm housing	1-1/4 pt	All vehicles equipped with front winch
Front winch end bearing frame	1 pt	All vehicles equipped with front winch
Rear winch worm housing	7 pts	M60, V-17A/MTQ, V-18A/MTQ, and M764
Pillow Block	1/6 qt	M60, and V-17A/MTQ
Power divider	3-1/2 qt	M60, V-18A/MTQ, and M764
Hydraulic hoist oil system	50 gal.	M60 and M108
Earth boring machine intermediate case	5 qt	V-18A/MTQ, M764
Earth boring machine clutch and brake case	5 qt	V-18A/MTQ, M764
Earth boring machine boring case	10 qt	V-18A/MTQ, M764
Outrigger hydraulic system	5 gal	M764
Rear winch cable level winder speed reducer housing	1-3/4 pt	M764
Rear winch jaw clutch housing	1-3/4 pt	M756A2
Rear winch worm gear housing	2-3/4 pt	M756A2

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Table 9. Tire Inflation Data

	Gasoline		*Multifuel*	
Conditions	*11:00×20*	*9:00×20*	*11:00×20*	*9:00×20*
Highway (psi)	70	45	70	50
Cross-country (psi)	35	25	35	35
Mud, snow, and sand (psi)	15	15	15	15

NOTE

In areas where the temperatures reach -50° F. or colder, inflate truck tires 20 pounds above normal for long standby periods or overnight. Before operating the vehicle, reduce the tire pressures to normal.

36.1. Components of End Item

These items are installed in the vehicle at the time of manufacture or rebuild. They are securely fastened, permanently attached, or placed behind a cover. (Refer to table 9.1.)

36.2. Expendable Consumable Maintenance Supplies and Materials

Supplies and materials required for maintenance support of the equipment cover herein are authorized to be requisitioned by SB 700-50. (Refer to table 9.2.)

Table 9.1. Components of End Item

Federal stock number	Description Reference number & mfg code — Usable-on code	Unit of meas	Qty auth
4210-933-2929	BRACKET, FIRE EXTINGUISHER: (M185, M185A1, M185A2, and M185A3) 10924916 (19207).	ea	1
2590-473-6331	BRACKET: 5 gal can (M60) on center of rear floor (water and drum, flammable liquid) 6566675 (19207).	ea	2
	BRACKET, SAFETY GUARD: (M185, M185A1, M185A2, and M185A3) 10897152 (19207).	ea	1
7110-634-2860	CABINET ASSY: Filing (M185, M185A1, M185A2, and M185A3) 7063095 (19207).	ea	2
6545-918-9920	CHEST, FIRST AID: (Size No. 1) (M185, M185A1, M185A2, and M185A3) MIL-C-36033 (80244).	ea	1
	COMPRESSOR, RECIPROCATING: Power driven (M185, M185A1, M185A2, and M185A3) Fed spec M-C-3925, type 1 Style 1.	ea	1
5130-853-4480	DRILL: Electric w/stand, type IV ⅜ drill (M185, M185A1, M185A2, and M185A3) Fed W-O-661.	ea	1
3415-174-9177	DRILLING MACHINE: Utility, type 1, size 7 (M185, M185A1, M185A2, and M185A3) Fed Spec W-G-656B.	ea	1
2540-574-3914	HOLDER: Oiler inside cab (M60) 500883 (21450).	ea	1
7690-489-8322	SIGN: Fire extinguisher (M185, M185A1, M185A2, M185A3) 7053776 (19207).	ea	1
	VISE: Machinist's (M185, M185A1, M185A2, and M185A3) MS15268-2 (96906).	ea	1

Table 9.2. Expendable Consumable Maintenance Supplies and Materials

Federal stock number	Description Reference number & mfg code — Usable-on code	Unit of meas	Qty auth
4930-288-1511	ADAPTER, GREASE GUN: Lubr, flex hose (M60, M108, and M764) 41-A-485-12 (80244) in tool compartment.	ea	1
5110-293-2336	AXE, SINGLE BIT: 4 lb, w/handle 6150925 (19207) in pioneer bracket.	ea	1
5140-722-4142	BAG, TOOL SATCHEL: Empty, canvas, 20¼x18¼ to top of flap, open 41-B-15 (80244).	ea	1
5120-240-6031	BAR, CHISEL: 36 in. lg (M60) 41-C-1140-24 (80244) in right front compartment.	ea	2
5120-242-1390	BAR, CROW: Pinch, pt, 69 in. lg (M60) 41-1247-300-600 (80244) in right center open compartment.	ea	2
5120-244-1384	BAR, PINCH: Bent chisel and taper, 36 in. lg (M60) 41-B284 (80244) in right center open compartment.	ea	1
6135-050-3280	BATTERY: Lantern, 6-volt (M60) SC-BA-200/U (81349).	ea	2
6135-120-1020	BATTERY: Dry flashlight, 2-cell (M60) MS75059 (96906).	ea	4
5130-473-6444	BRUSH: Wire (M185, M185A1, M185A2, and M185A3) in bench drawer L. H. side rear grinder HB771 (81348).	set	1
5110-237-8106	BLADE: Hacksaw, 12 in. lg (M60) 41-B-1157 (80244) in driver's seat tool compartment.	ea	12
7240-222-3088	CAN: Gasoline, 40-C-2140 (80244) in bracket w/strap.	ea	1
7240-242-6153	CAN: Water (M60) 64-C-281 (80244) in bracket on center rear floor plate.	ea	1
4010-473-6166	CHAIN, UTILITY: Single ⅝ in. by 16 ft. lg, grab hook and pear-shaped ring (on vehicles w/front mounted winch) in tool compartment above left running board 8-C-4355 (80244).	ea	1
4010-047-3902	CHAIN, LINK: W/grab hooks, 14½ ft. lg (M60) 7077062 (19207).	ea	1
5110-221-1075	CHISEL, BLACKSMITH: 1½ in. cut (M60) MS16882-2 (96906) in right front closed compartment.	ea	1
5110-188-2524	CLIPPERS: Cutter bolt (M60) 41-C-2283 (80244) in left front closed compartment.	ea	1
5120-278-6641	CUTTER SET: Dresser (M185, M185A1, M185A2, and M185A3) in bench drawer L. H. side MS15996-1 (96906).	set	5
5120-223-9952	DRESSER, ABRASIVE: (M185, M185A1, M185A2, and M185A3) in bench drawer L. H. side near grinder MS15797-1 (96906).	ea	1
5133-449-6775	DRILL SET, TWIST: No. 1 through 60 (M185, M185A1, M185A2 and M185A3) in case in bench drawer L. H. side near drill.	set	1

Table 9.2. Expendable Consumable Maintenance Supplies and Materials—Continued

Federal stock number	Description Reference number & mfg code — Usable-on code	Unit of meas	Qty auth
5120-273-9208	EXTENSION, SOCKET: (M756A2) in tool compartment above L. H. running board GGGW641 (81348).	ea	1
5110-234-6539	FILE, HAND: 12 in. heel to pt (M60) 41-F-863 (80244) in driver's seat tool compartment.	ea	1
6230-264-8261	FLASHLIGHT: 2-cell (M60) 17-F-13485 (80244) in instrument panel compartment.	ea	2
5110-289-9657	FRAME, HAND HACKSAW: 8 to 12 in. cap. (M60) 41-3384 (80244) in driver's seat tool compartment.	ea	1
4930-253-2478	GREASE GUN, HAND: 15 oz. cap. (M60, M108, and M764) 41-G-1344-40 (80244) in tool compartment.	ea	1
5120-230-7843	HAMMER, HAND: blacksmith's dble face, sledge, 20 lb. (M60 and M108) GGG-H-86 (81348).	ea	1
5120-061-8543	HAMMER, HAND: mach, 1 lb. (M34, M35, M35A1, M35A2, M356, M36, M36A2, and M764) in tool compartment.	ea	1
5120-242-3915	HAMMER, HAND: blacksmith's cross peen, 3 lbs. (M756A2) in rear winch and cab protector basket GGG-H-86 (81348).	ea	1
5120-904-0029	HAMMER, HAND: blacksmith's cross peen, 6 lbs. (M756A2) GGG-H-86 (81348) in rear winch and cab protector.	ea	1
5120-288-6574	HANDLE: mattock, pick, pioneer 36 in. 41-H-1286 (80244) in pioneer bracket.	ea	1
4930-266-9182	OILER, HAND: push button, 8 oz. cap. MS15764-1 (96906) in crane cab M60 in tool compartment (M764).	ea	1
8120-285-4763	OXYGEN TANK: w/valve (M60) 3A2265 (80244) in rear front corner clamp.	ea	1
5120-223-7398	PLIERS: comb slip joint, 10 in. lg, w/cutter MS15382-2 (96906) in tool bag.	ea	1
5120-243-2395	MATTOCK: pick, w/o handle, 5 lb. 41-M-722 (80244) in pioneer bracket.	ea	1
5120-197-9473	PUNCH, BLACKSMITH'S: ¼ in. dia. (M60) 41-P-3115 (80244) in right front closed compartment.	ea	1
5110-223-5349	SAW: hand crosscut, 1-man 54 in. blade 2 cutter to 1 raker tooth 41-S-143 (80244) in left center open compartment.	ea	1
5120-222-8852	SCREWDRIVER, FLAT TIP: 4 in. blade, 8 in. lg MS15219-1 (96906) in tool bag.	ea	1
5120-234-8913	SCREWDRIVER, CROSS TIP: phillips, 4 in. lg MS15224-5 (96906) in tool bag.	ea	1
5120-240-8716	SCREWDRIVER, CROSS TIP: phillips, 3 in. lg MS15224-4 (96906) in tool bag.	ea	1

Table 9.2. Expendable Consumable Maintenance Supplies and Materials—Continued

Federal stock number	Description Reference number & mfg code — Usable-on code	Unit of meas	Qty auth
5120-188-8440	SHOVEL: hand, telegraph, 8 ft., size 2 (M764) MS17094-1 (96906) secure in body.	ea	2
5120-947-2243	SOCKET, TORQUE WRENCH: Wheel bearing nut 10897070 (19207).	ea	
5120-293-0094	SOCKET, WRENCH: (M756A2) in tool bag, ¾ sq dr, 1½ in. GGGW641 (81348).	ea	1
4720-177-6157	SPOUT: Can, flex nozzle in tool compartment on left running board 11664467 (19207).	ea	1
5120-293-3336	SHOVEL: Hand, round pt 41-S-3170 (80244) in pioneer bracket.	ea	1
5120-243-1372	VICE: Bench clamp, 2½ in. jaw in table drawer discretion of user GGGV410 (81348).	ea	2
5120-449-8083	WRENCH: Adjustable, open end, sgle-hd, 10 in lg. in tool bag GGGW631 (81348).	ea	1
5120-212-6284	WRENCH: Open end, fixed, 15 deg open end, 1 17/32 in. opng (M60 and M108) 41-W-1419-145 (80244) in tool compartment.	ea	1
5120-203-4801	WRENCH: Open end, 30 deg angle, sgle 1¾ in. opng, 8½ overall (M60, M108).	ea	1
5120-357-8688	WRENCH: Open end, 15 deg angle, sgle 1 1/16 in. (M60 and M108) 41-W-1577-710 (80244) in tool compartment.	ea	1
5120-277-1461	WRENCH, PIPE: Adj jaw, 1 to 2 in. pipe size, 18 in. lg MS16180-5 (96906) in rear cabinet M50, M50A1, M50A2 in right front closed compartment M60.	ea	1
5120-264-3793	WRENCH, AUTO, ADJ: 15 in. lg (M60) MS15743-3 (96906) in right front closed compartment.	ea	1
5920-494-1929	WRENCH: Acetylene tank valve key (M60) in right front closed compartment MIL-T-17637 (81349).	ea	1
5120-650-7829	WRENCH: Socket, ½ in. sq. opng (M292, M292A1, M292A2, M292A5) 8380406 (19207) on lower left rear door, interior.	ea	1
5120-650-7830	WRENCH: Ratchet, w/removable socket, ¾ in. sq dr (M292, M292A1, M292A2, M292A5) 7759181 (19207) on lower left rear door, interior.	ea	1
5120-708-3302	WRENCH, PLUG: Straight bar, sq. ½ in. plug, in tool bag in L. H. running board tool compartment (7083302 (19207).	ea	1
5120-247-3261	WRENCH, RATCHET: Reversible, 24 in. lg V18A/MTQ 41-W-1989-380 (80244).	ea	1
5120-499-8083	WRENCH, OPEN END, ADJ: Opng 1.135 in., 10 in lg in toolbag 41-W-487 (80244).	ea	1
5120-423-6728	WRENCH: Adjustable open end, heavy duty (M764) MS15461-6 (96906) in L. H. running board tool compartment.	ea	1

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

37. General

a. When a new, used, or reconditioned vehicle is first received by the using organization, it is the responsibility of the using organization to determine whether the vehicle has been inspected and prepared for service by the supporting maintenance unit. This will be indicated on DA Forms 2408-5, 2408-6, 2408-7, and 2408-8, which are a record of all services and corrective maintenance. If not previously performed the following services must be accomplished before placing the vehicle into service:

(1) Lubricate the vehicle in accordance with its lubrication order, regardless of interval, excluding gearcases and engine crankcase. Check the processing tag for gearcase and engine oil. If the tag states that the oil is suitable for 500 miles of operation and is of the proper viscosity for local climatic conditions, check the level, but do not change the oil.

(2) Schedule a second S preventive-maintenance service on DD Form 314, Preventive Maintenance Schedule and Record, and arrange for an oil change at 500 miles.

b. Services to be performed by organizational maintenance personnel on receipt of vehicles are designated in TM 9-2320-209-20. Whenever practicable, the operator will assist organizational maintenance personnel in the performance of these services.

38. Break-in Operation

a. General. Prior to operating the vehicle, the operator must become familiar with vehicle controls and operation as contained in paragraphs 39 through 50.

b. Break-in. When break-in of a new or rebuilt vehicle is to be accomplished in normal service, the operator is cautioned to exercise special care in performing all before-operation checks and inspections (table 12). The following precautions must be exercised during break-in:

(1) Do not exceed the speeds specified on the vehicle instruction and caution data plate, located on the instrument panel directly in front of the driver.

(2) Select the proper transmission driving range for specified driving conditions (do not skip speeds when shifting gears).

(3) Avoid rapid acceleration and deceleration.

(4) Avoid sudden stops (unless in an emergency).

(5) Avoid prolonged operation of the vehicle under other than normal weather and terrain conditions.

(6) Avoid sudden or forced engagement of an operating control.

(7) Avoid overheating the engine.

(8) Avoid operation of the engine or power train to capacity.

c. Road Test. All vehicles received by the using organization must be road tested to check their operation and determine their condition. For all new or reconditioned vehicles, except those driven 50 miles or more in the course of delivery, the road test will be of a minimum distance of 50 miles. For used vehicles, and vehicles driven 50 miles or more in the course of delivery, the road test will be of sufficient length to allow for the usual observations as to operation and condition. The operator will observe, as frequently as possible, the instrument panel and gages, for any indication of unsatisfactory vehicle performance. Periodic stops will be made, at least every 10 miles, to allow the operator to inspect the vehicle for possible coolant, oil, fuel, or exhaust leakage, and any evidence that may indicate that engine, transmission, wheel hubs, brakedrums, axle differentials,

or transfer assemblies are overheated. The vehicle must be checked thoroughly for any control difficult to operate and any instrument operating in an erratic manner. Unusual noises and vibrations will be noted. All discrepancies or malfunctions will be reported to the supporting organizational maintenance unit.

Caution: During the road test, do not exceed or operate the vehicle continuously at the maximum allowable speeds indicated on the vehicle instruction and caution data plate.

d. After-road Test. Upon completion of road test, correct those malfunctions within the scope of the operator. All other malfunctions and the general condition of the vehicle, will be reported to the responsible vehicle commander.

Section II. CONTROLS AND INSTRUMENTS

39. General

This section describes, locates, illustrates, and furnishes the operator, crew, or driver sufficient information pertaining to the various controls and instruments provided for the proper operation of the vehicles covered in this manual. For controls pertinent to special purpose equipment (kits), refer to Chapter 4, Sections I through III. Prior to the operation of any vehicle, the operator should review this section and inspect the vehicle at the same time in order to become completely familiar with the location and use of all controls and instruments on the vehicle.

40. Controls

a. Vehicle Controls. Except where specifically noted, the controls listed in this paragraph are generally applicable to all vehicles covered in this manual.

(1) Windshield wiper valve control (DD, fig. 31). The windshield wiper valve, located on the left side of the instrument panel, is turned to actuate the windshield wipers.

(2) Manual windshield wiper levers (A, fig. 31). The manual windshield wiper levers, located on the wiper motors, are a manual method of operating the windshield wipers.

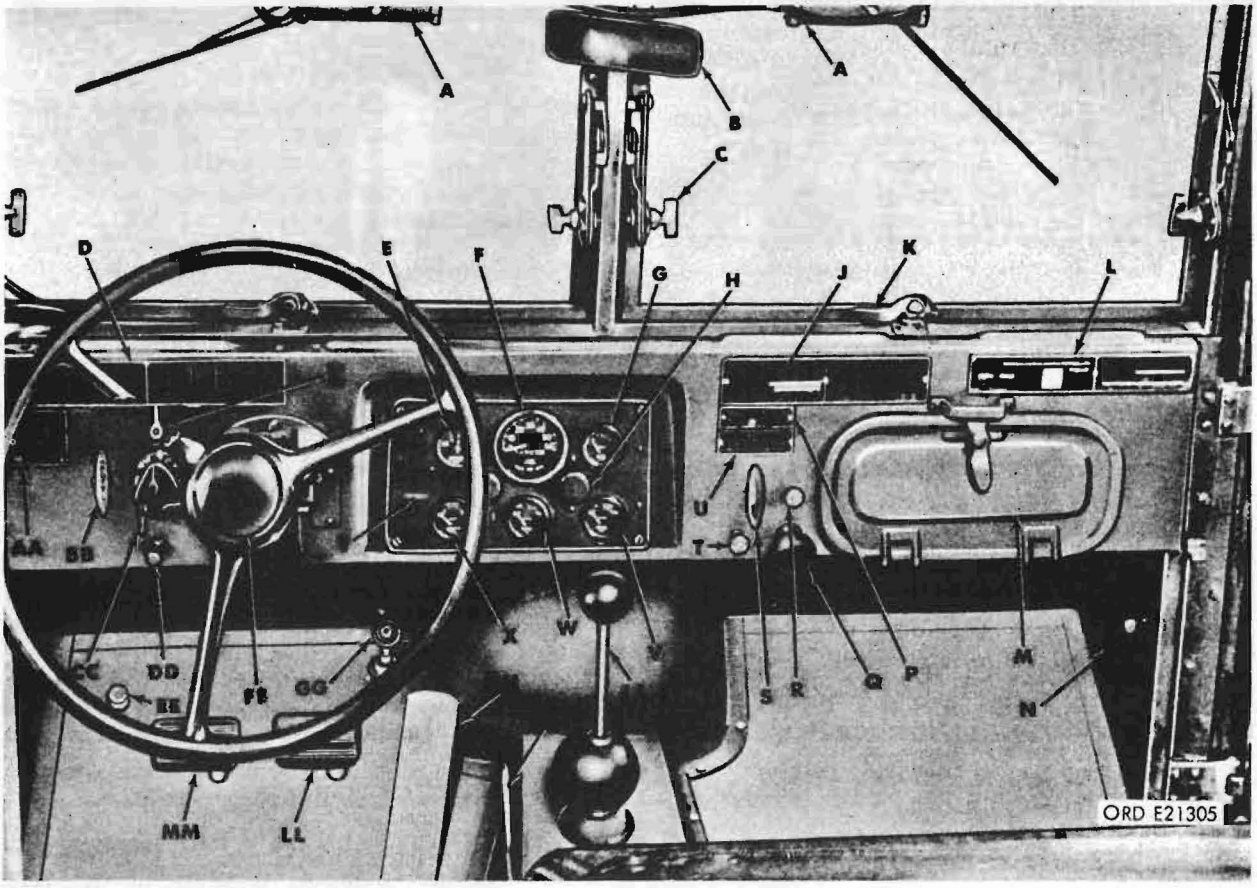
(3) Vehicle lights switch (CC, fig. 31). The vehicle lights switch, located on the left side of the instrument panel, has switch positions which control the operation of the vehicle lights.

(4) Ignition switch (gasoline engine vehicles only) (Z, fig. 31). The ignition switch, located on the left side of the instrument panel, has ON and OFF positions which turn the vehicle electrical system on or off.

(5) Accessory switch (multifuel engine vehicles only) (fig. 32). The accessory switch, located on the left side of the instrument panel, has ON and OFF positions. When the switch is positioned to ON, the starter circuit, the instrument panel gages, the fuel tank fuel pump, and the low air pressure warning buzzer circuits are actuated.

(6) Hand throttle (BB, fig. 31). The hand-throttle control, located on the left side of the instrument panel, is used to set the engine speed at any desired rpm without maintaining foot pressure on the accelerator pedal for fast idle, warmup, or equipment operation. This frees the operator to perform other duties required in operation of vehicular equipment. When the throttle-control knob is pulled out it locks in any desired position. Rotating the knob clockwise or counterclockwise unlocks it for return to a lower speed. Carburetor settings allow the engine to idle slowly with the hand throttle pushed all the way in.

(7) Primer pump control knob (gasoline-engine vehicles only) (Q, fig. 31). The primer pump control knob, when present, is located on the right side of the instrument panel. Pulling the primer pump knob out, then pushing back in, pumps a stream of fuel directly into the intake manifold for priming the engine. This will facilitate cold-weather starting.



Key	Item	Key	Item
A	Windshield wiper motor	U	Crankcase ventilation shutoff data plate
B	Rear view mirror	V	Oil pressure gage
C	Clamping screw	W	Air pressure gage
D	Instruction data plate	X	Water temperature gage
E	Ammeter	Y	Headlight beam indicator
F	Speedometer	Z	Ignition switch
G	Fuel gage	AA	Low air pressure warning data plate
H	Instrument cluster light	BB	Throttle control knob
J	Truck nameplate	CC	Light switch
K	Windshield locking handle	DD	Windshield wiper switch
L	Servicing and publication data plate	EE	Dimmer switch
M	Instrument panel compartment	FF	Horn button
N	Cowl ventilator	GG	Starter pedal
P	Responsible agency data plate	HH	Accelerator pedal
Q	Primer pump control knob	JJ	Transmission gearshift lever
R	Auxiliary power receptacle	KK	Transfer shift lever
S	Crankcase ventilation shutoff valve control	LL	Service brake pedal
T	Choke control knob	MM	Clutch pedal

Figure 31. Drivers' compartment - early production models - gasoline engine

(8) Choke-control knob (gasoline engine vehicles only) (T, fig. 31). The choke-control knob, located on the right side of the instrument panel, is pulled out to provide a richer fuel mixture in the carburetor for cold-weather starting and operation. After the engine is started and has begun to warm up, the choke control knob is pushed back in.

(9) Engine-stop knob (multifuel engine vehicles only) (fig. 32). The engine-stop knob, located on the left side of the instrument panel, is pulled out to stop the engine by cutting off the flow of fuel to the fuel injector pump.

(10) Manifold-heater switch (multifuel engine vehicles only) (fig. 32). The manifold-heater switch, located on the left side of the instrument panel, has OFF and ON positions used to turn the manifold heater OFF or ON. The manifold heater is operated during cold weather to facilitate starting and engine warmup. After the engine is idling smoothly, the MANIFOLD HEATER switch is positioned to OFF. The MANIFOLD HEATER switch should never be positioned to ON unless the engine is cranking or idling.

(11) Dimmer switch (EE, fig. 31). The dimmer switch, accessible to the driver's left foot, is used to raise or lower the headlight beams.

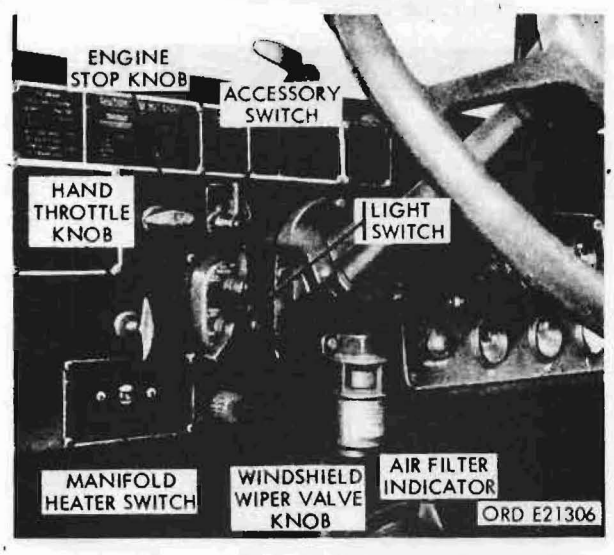


Figure 32. Instrument panel - left side - multifuel engine vehicles

(12) Starter pedal (GG, fig. 31). The starter pedal, above the accelerator pedal, is convenient to the driver's right foot. Pressure on the starter pedal actuates the starter motor. The pedal returns to the normal position when the pressure is removed.

(13) Transmission shifting lever (JJ, fig. 31). The transmission shifting lever, accessible to the driver's right hand, is used to select the various gear ratios or speeds provided in the transmission.

(14) Transfer shift lever (KK, fig. 31). The transfer shift lever, located between the seats convenient to the driver's right hand, is used to shift the transfer to either LOW, HIGH, or NEUTRAL. The transfer is operated to provide two speed ranges for each of the gear ratios in the transmission for use as demanded by different driving situations.

(15) Transmission power-takeoff shifting lever (fig. 33). The transmission power-takeoff shifting lever, located to the left of and behind the transmission-gearshift lever, is used to control the engagement of the transmission power takeoff, which is used to drive the auxiliary equipment.

(16) Parking brake control lever (fig. 34). The parking brake control lever, located to the left side of the driver's

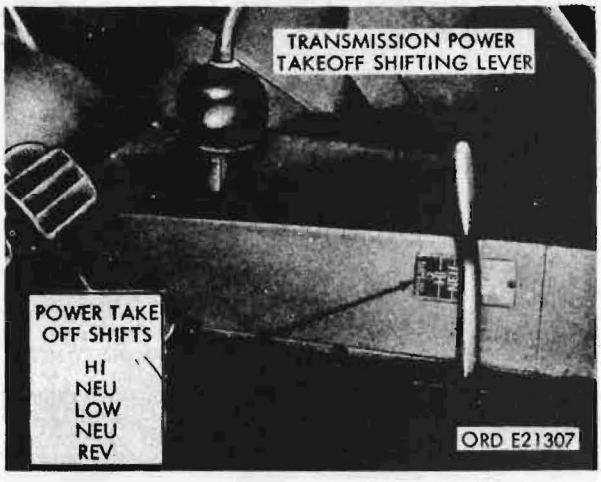


Figure 33. Transmission power-takeoff shifting lever

seat, is pulled up to engage the parking brake. The grip handle is gripped and pushed down to release the parking brake.

(17) Seat adjustment control handle (fig. 34). The seat adjustment control handle, located on the left side of the driver's seat, is lifted to unlock the driver's seat for adjustment. The handle is locked by pushing down until it engages one of the adjustment notches in the seat.

(18) Cowl ventilators (N, fig. 31). The cowl ventilators, located on either side of the vehicle firewall, have knobs which control ventilation to the cab. The knobs are pushed to open and pulled to close the ventilators.

(19) Crankcase ventilation shutoff valve control (gasoline engine vehicles only) (S, fig. 31). Early production model gasoline engine trucks are equipped with this control. The crankcase ventilation shutoff valve control, located on the right side of the instrument panel, is pulled out to close the three crankcase ventilation shutoff valves during fording operations.

(20) Air supply valves (fig. 35). Early gasoline models are equipped with two air-supply valves, one on each side of the upper firewall inside the cab. Newer models have one air-supply valve, located on the upper right side of the firewall inside the cab. They provide a source of compressed air for tire inflation and other uses.

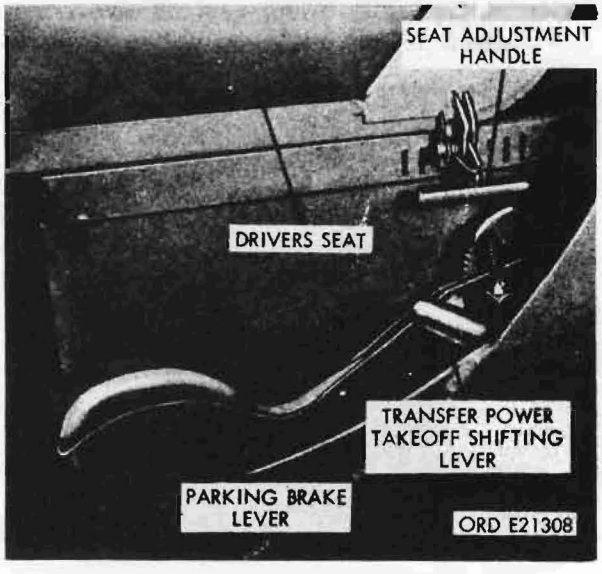


Figure 34. Parking brake lever and transfer power-takeoff shifting lever

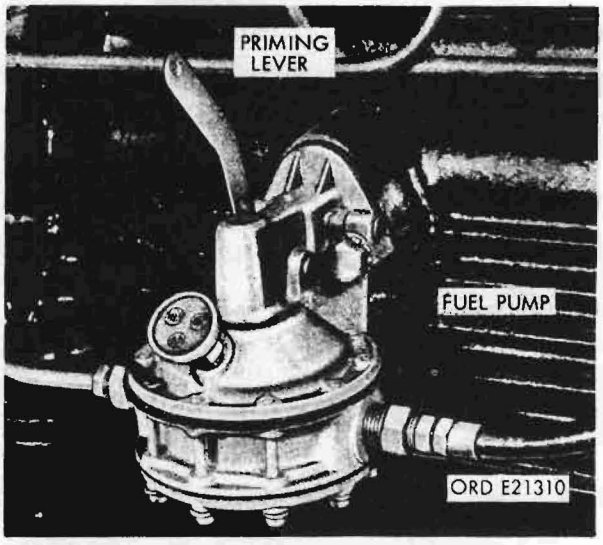


Figure 35. Fuel pump priming lever - gasoline models

(21) Fuel pump priming lever (gasoline engine vehicles only) (fig. 36). This lever, extending from the fuel pump that is located on the left side of the engine, is used to prime the pump after repairs or replacement in the fuel system, causing draining of the pump. A pumping motion of the lever causes fuel to enter the pump.

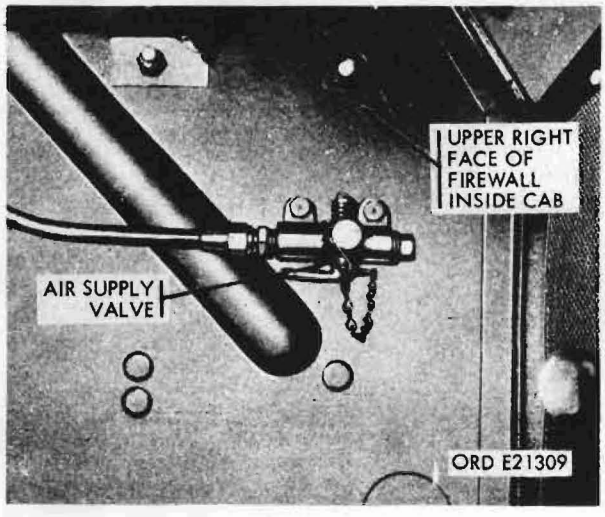


Figure 36. Air supply valve

(22) *Fuel-line shutoff valve (gasoline engine vehicles only)* (fig. 37). The fuel line shutoff valve, located on the left side of the vehicle ahead of the engine left rear mount, is turned right (clockwise) to close the valve, and left (counter-clockwise) to open the valve. This valve is used to isolate the fuel tank from the remainder of the fuel system during repairs to the system.

(23) *Hood and side panel latches* (fig. 38). The hood latch, centrally located between the bars of the brush guard, is pushed in to release the hood. Two hood holddown catches, located on the front corners of the hood, are engaged to lock the hood in the down position. The side panel latches, one on each end of each side panel, are turned to lock the side panels in the raised position.

(24) *Crankcase radiator filler caps* (fig. 39). The crankcase filler cap, located on top of the engine, is removed to add oil when required. The radiator filler cap, located at top of the radiator (left side for multifuel, right side for gasoline) is removed to check coolant level or add coolant. The cap maintains pressure in the cooling system.

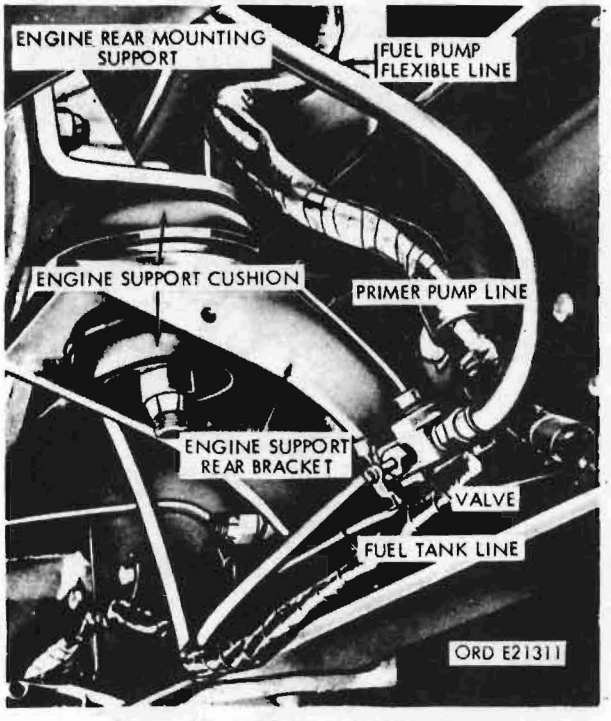


Figure 37. Fuel line shutoff valve.

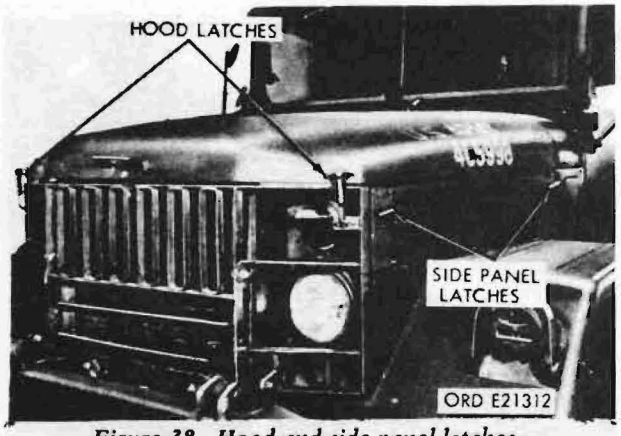


Figure 38. Hood and side panel latches.

(25) *Air-reservoir drain valves* (fig. 40). The air-reservoir drain valves, located on the air reservoirs, are turned to vent the air pressure from the compressed air system and drain the accumulated water from the air reservoirs.

(26) *Multifuel engine oil-level indicator* (fig. 41). The multifuel engine oil-level indicator (dipstick), is located on the right side of the engine block. To check oil, unscrew and remove dipstick. Check should be made on a cold engine, prior to operation. The proper indication on the oil level gage should be in a range from the "full" mark to approximately 1-1/2 inches ABOVE the "full" mark. If oil level is below the "full" mark, add oil to bring level to approximately one-inch above full mark. Oil level should also be checked after engine warm-up and after operation. This check must be made one minute after engine is stopped. Add oil as required by level indicator. Safe operating range is between the "add" and the "full" mark. Note: Do not screw gage in when checking oil. Do not overfill.

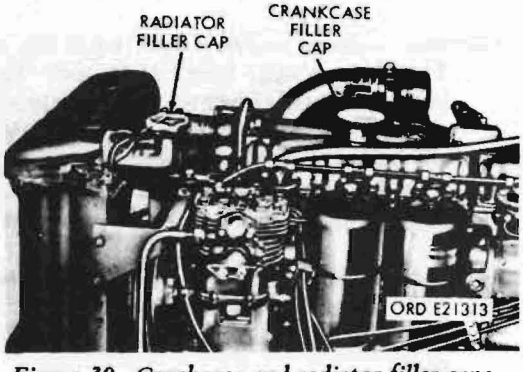


Figure 39. Crankcase and radiator filler caps.

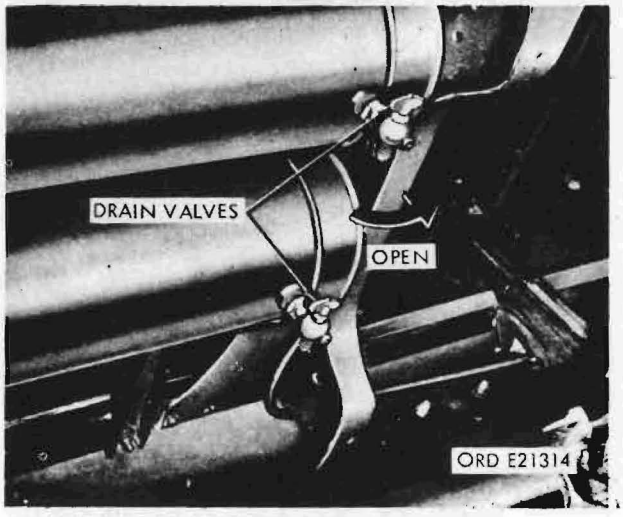


Figure 40. Air reservoir drain valves.

(27) *Gasoline engine oil-level indicator* (fig. 42). The gasoline engine oil-level indicator (dipstick), located on the left side of the engine block, is unscrewed and read to determine the enigne oil level. Oil level should show between L and F on dipstick if the engine is cold. If the engine is running or warmed up, stop the engine and wait 1 minute before checking the oil level.

(28) *Front-winch clutch control lever* (fig. 43). The front-winch clutch control lever, located on the right rear of the front winch, is moved to engage or disengage the front-winch drum clutch.

(29) *Front-winch drum lock knob* (fig. 43). The drum lock knob, located on the right end of the front winch, is pulled and turned to unlock the winch drum. It is pulled and turned to the original position to lock the drum.

(30) *Front-winch level wind lock knob* (fig. 44). The front-winch level wind lock knob, located on the front of the level winding device, is pulled out and turned to unlock the level winding device and pulled out and turned to the original position to lock the level winding device.

(31) *Towing pintle hook* (fig. 45). The towing pintle hook, located on the rear center of the truck, is opened to attach towing bar or chain.

Note. To open pintle hook, pull cotter pin, pull up latch and lift lock.

(32) *Trailer auxiliary power output receptacle* (fig. 46). The trailer auxiliary

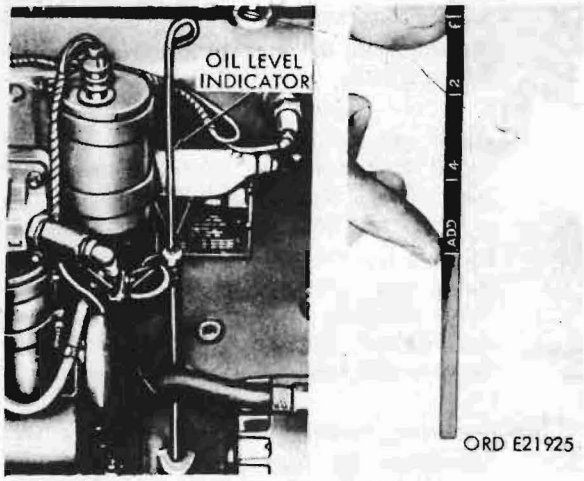


Figure 41. Multifuel engine oil level indicator.

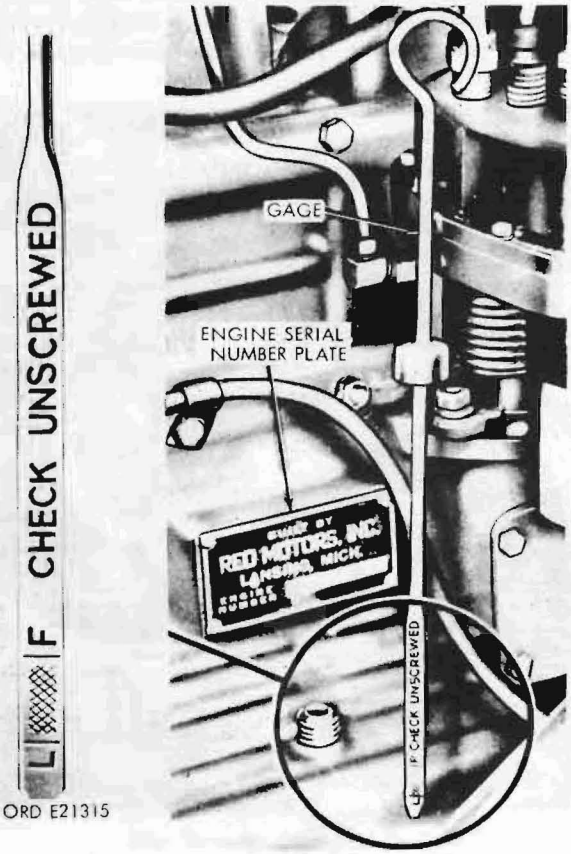


Figure 42. Gasoline engine oil level indicator.

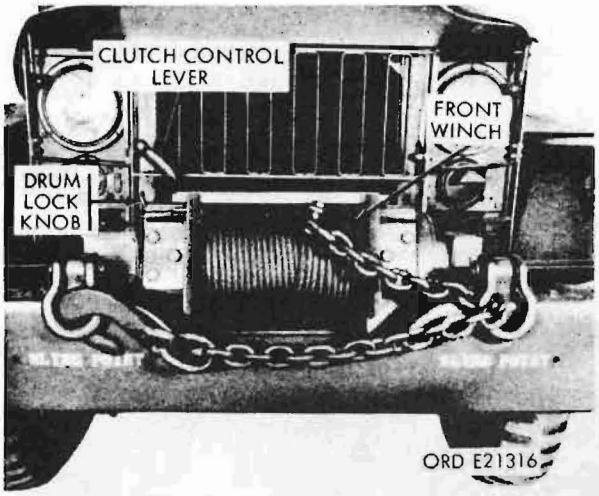


Figure 43. Front winch

power outlet receptacle, located on the rear of the vehicle near the pintle hook, is used to provide power for trailers.

(33) Trailer air couplings (fig. 47). The trailer air couplings, located on the rear of the truck on either side, is used to provide air for the trailer brakes.

(34) Fuel tank filler cap (figs. 48 and 49). The fuel tank filler cap, located on the fuel tank, is removed to add fuel, then replaced.

Note. The fuel tank filler caps on all trucks should carry a decalcomania or embossment which reads PRESSURIZED, OPEN SLOWLY.

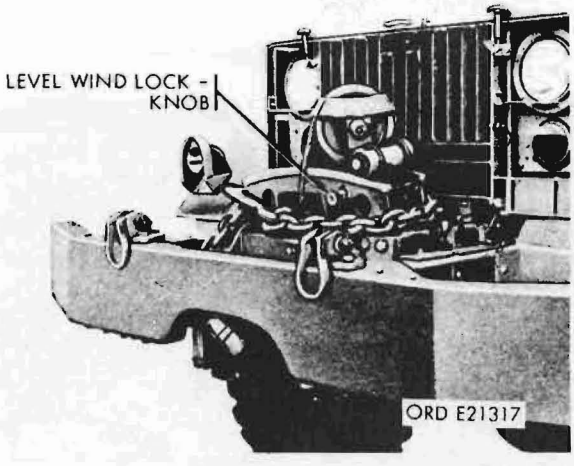


Figure 44. Front winch with level wind device

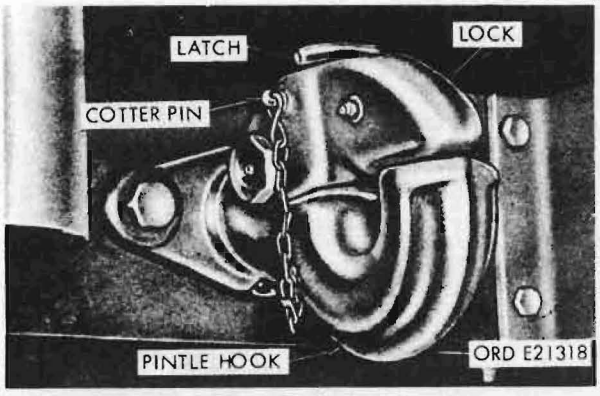


Figure 45. Towing pintle hook

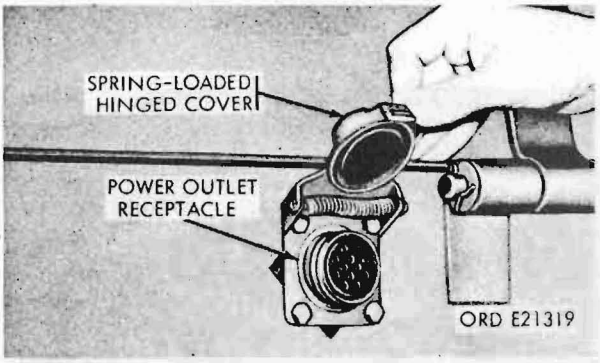


Figure 46. Trailer auxiliary power outlet receptacle

(35) Spare wheel carrier and frame (fig. 50). The spare wheel carrier is located in a different position on each type vehicle (refer to par. 121). The frame is unlocked to remove the spare wheel. The M275 and M275A1 are not equipped with a spare wheel assembly.

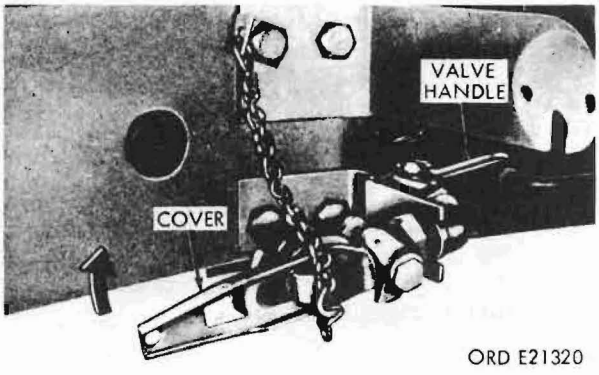


Figure 47. Trailer air couplings

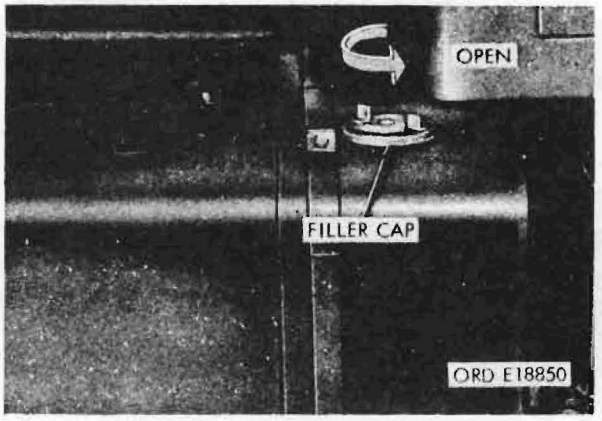


Figure 48. Multifuel engine fuel tank filler cap

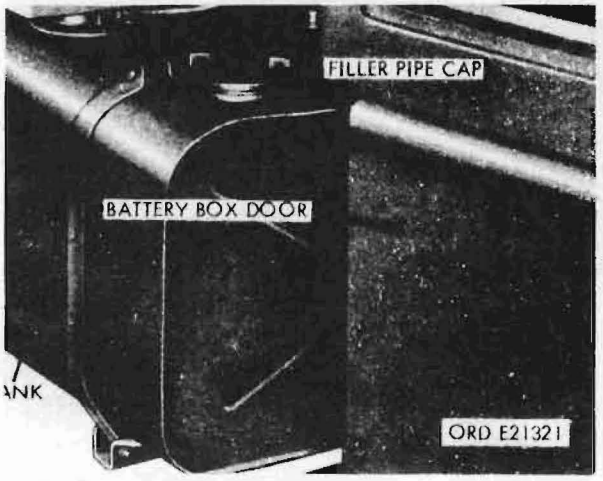


Figure 49. Gasoline engine fuel tank filler cap

(36) Truck jack (fig. 51). The truck jack, in stowed position except when in use, is used to jack up the vehicle for repairs.

(37) Battery filler caps (fig. 52). The battery filler caps, located on the batteries, are removed to check or add electrolyte, then replaced.

(38) Radiator draincock (fig. 53). This draincock, located on the bottom of the radiator, is turned left to drain the coolant from the radiator, then turned right to close.

(39) Coolant level cock (gasoline models only) (fig. 54). This level cock, located in the radiator filler neck adapter, is turned left to open and drain excess coolant, then turned right to close.

(40) Cylinder block draincock (fig. 55). This draincock, located on the lower right rear side of the block, is turned left to open and drain coolant from the cylinder block, then turned right to close.

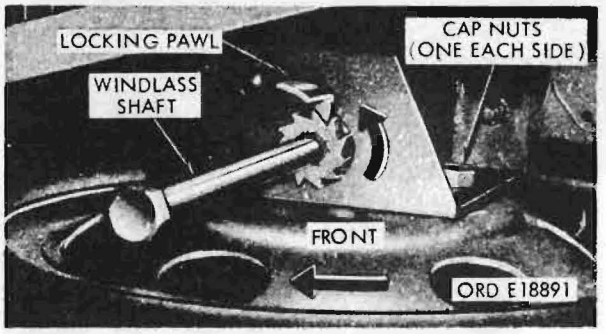


Figure 50. Spare wheel carrier and frame

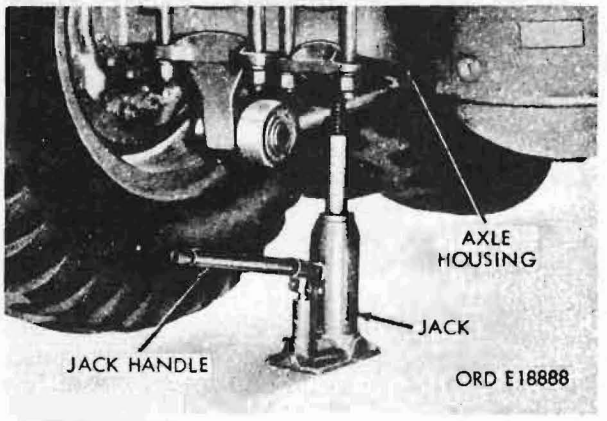


Figure 51. Truck jack

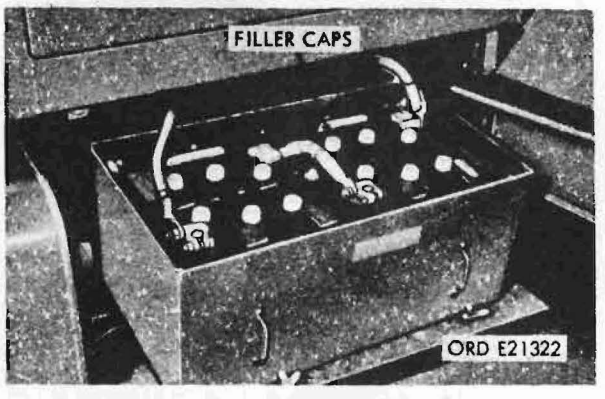


Figure 52. Battery filler caps

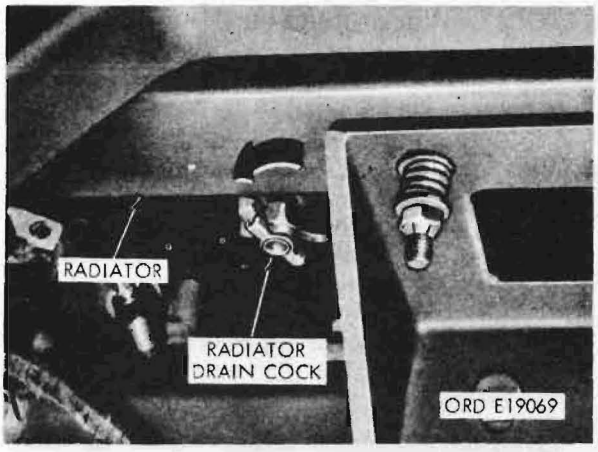


Figure 53. Radiator draincock

b. Dump Trucks Controls (M47, M59 and M342).

(1) Hydraulic hoist driver's control lever (fig. 56). The hydraulic hoist driver's control lever, located to the left of the driver's seat, is moved forward and down to control the position of the dump body.

(2) Dump body endgate hand lever (fig. 57). The dump body endgate hand lever, mounted on the left forward corner of the body, is pulled forward and down to open the dump body endgate, then pushed back to close the endgate.

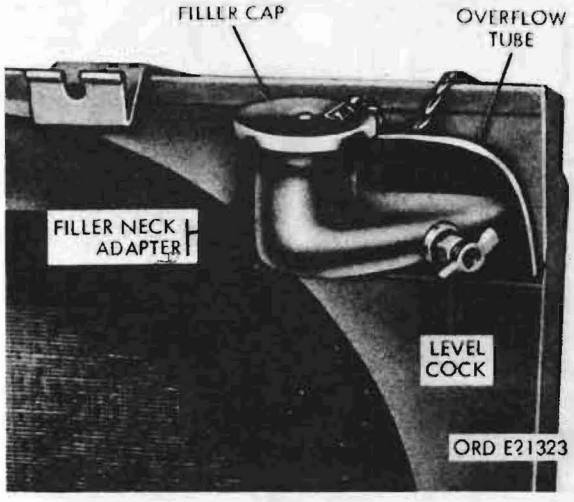


Figure 54. Coolant level cock

(3) Safety braces (fig. 58). The safety braces, attached to the sides of the subframe, are raised to secure the dump body in the up position for maintenance.

(4) Hydraulic hoist subframe reservoir oil level gage (fig. 59). The hydraulic hoist subframe reservoir oil level gage, located in the filler neck of the subframe reservoir, is unscrewed to measure the level of the fluid in the subframe reservoir.

c. Transfer Power-takeoff Shifting Lever (Fig. 34). The transfer power-takeoff shifting lever is applicable to the M49, M49C, M49CA1,

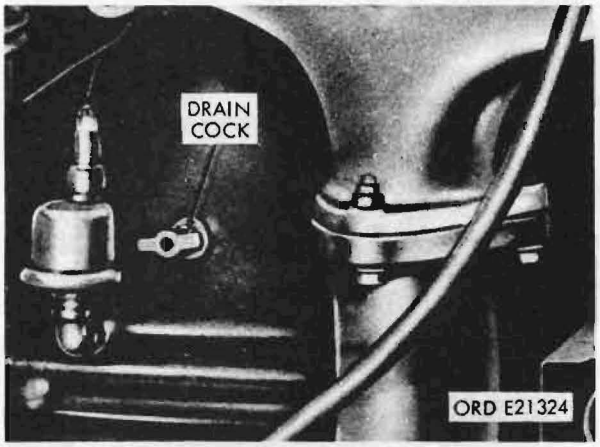


Figure 55. Cylinder block draincock

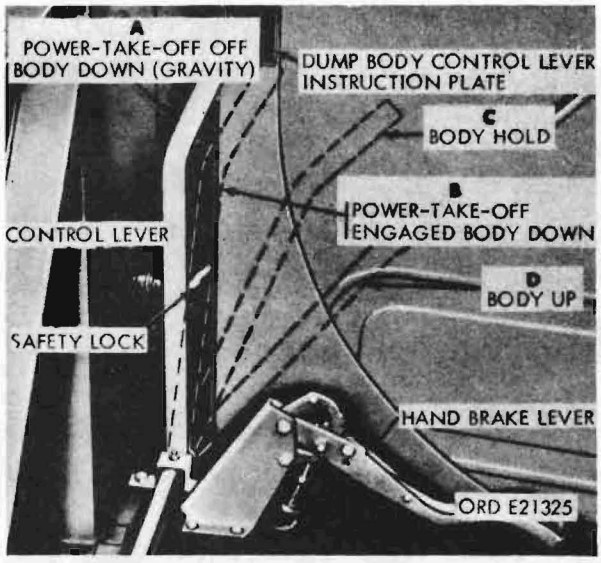


Figure 56. Hydraulic hoist driver's control lever

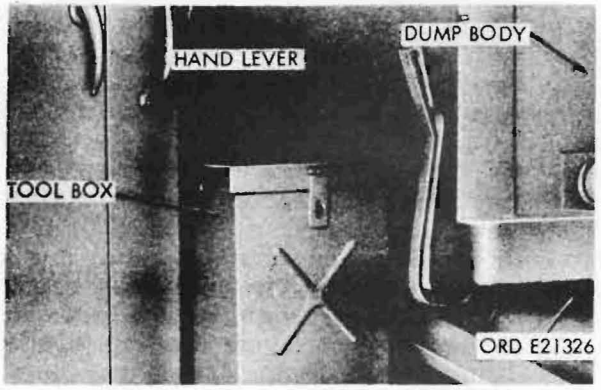


Figure 57. Dump body end gate hand lever

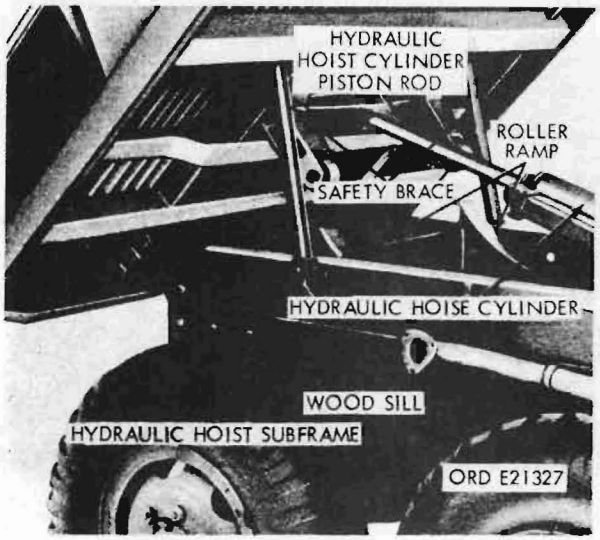


Figure 58. Safety braces

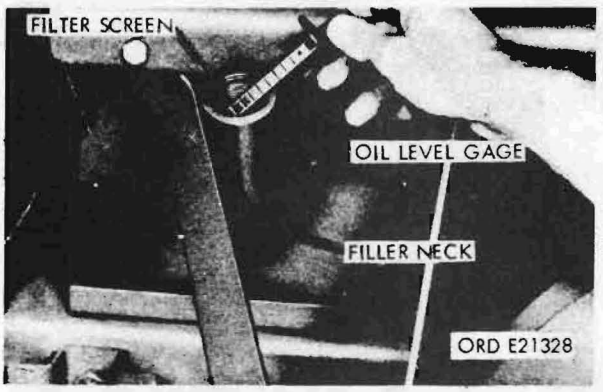


Figure 59. Hydraulic hoist subframe reservoir oil level gage

M50, M50A1, M60, M108, V-17A/MTQ, and the V-18A/MTQ. The transfer power-takeoff shifting lever is located to the left of the driver's seat, near the parking brake; it is used to engage or disengage the transfer power takeoff.

d. Tractor Truck Controls (M48, M275, and M275A1).

(1) Airbrake hose coupling shutoff cocks (fig. 60). The airbrake hose coupling shutoff cocks, located at the base of the airbrake hose support, are turned to supply air to the service and emergency airbrake systems on the semitrailer.

(2) Airbrake hand-control valve (fig. 61). The airbrake hand-control valve, located on the steering column, is moved down to control the semitrailer airbrakes.

(3) Coupler jaw locking plunger operating handle (fig. 62). The coupler jaw locking plunger operating handle, extending from beneath the right side of the fifth wheel, controls the coupler jaws which secure the semitrailer kingpin.

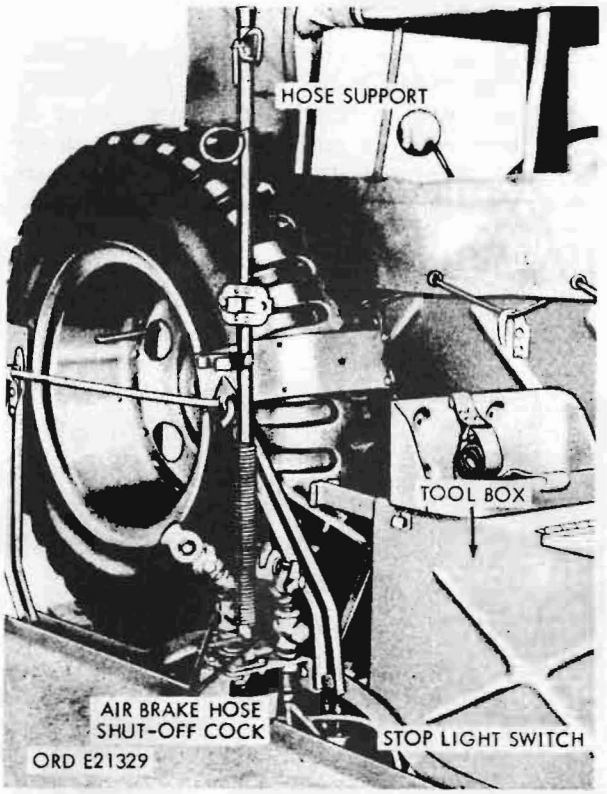


Figure 60. Air brake hose coupling shutoff cocks

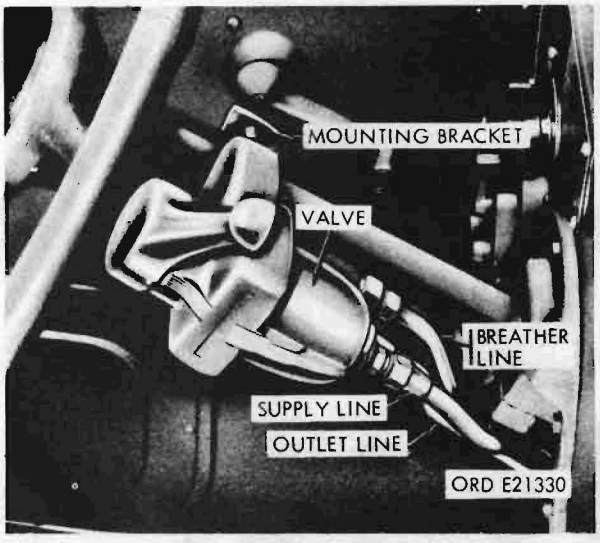


Figure 61. Air brake hand control valve

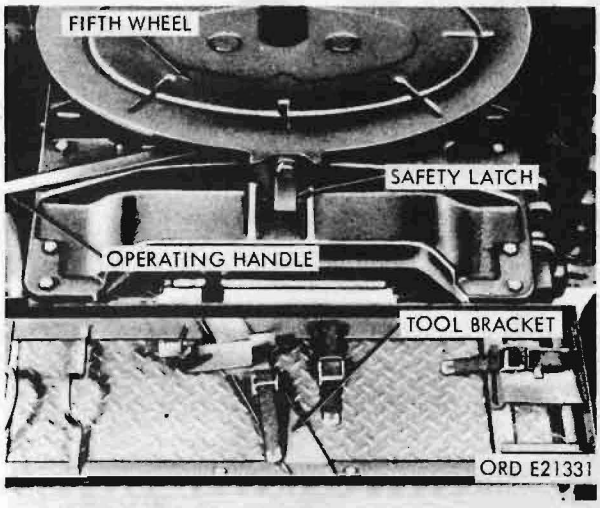


Figure 62. Coupler jaw locking plunger operating handle and safety latch

(4) Coupler jaw locking plunger safety latch (fig. 62). The coupler jaw locking plunger safety latch, located at the top front of the fifth wheel, locks the coupler jaws on the fifth wheel to prevent the unintentional release of the semitrailer kingpin.

e. Van Truck Controls (M109, M109A1, M109A2, M109C, M185, and M185A1).

(1) Circuit breaker box (fig. 63). The circuit breaker box, located on the front panel inside the body, has four circuit breakers which control the body electrical circuits.

(2) Power switch (fig. 63). The power switch, located on the front panel inside the body, controls all power to the shop van-body electrical circuits except the 24-volt ac-to-dc converter for the exhaust blower.

(3) Dome-light switch (fig. 63). The dome-light switch, located on the front panel inside the body, controls the dome lights in the 115-volt ac system.

(4) Blackout dome-light toggle switch (fig. 64). This switch, located on the upper rear panel inside the body, controls the 24-volt dome lights in the blackout condition.

(5) Dome-light toggle switch (fig. 64). This switch, located on the upper rear panel inside the body, controls the 24-volt dome lights under normal conditions.

(6) Converter selector switch (fig. 63). This switch, located on the ac-to-dc converter on the van front inside panel, selects converter circuit operation.

(7) Exhaust blower switch (fig. 63). This switch, located on the ac-to-dc converter on the van front inside panel, controls the power to the exhaust blower.

f. Wrecker-crane Truck Controls (M60 and M108).

(1) Hydraulic crane reservoir oil level gage (fig. 65). This gage, located under the filler cap on the front end of the crane assembly behind the cab, indicates the oil level in the hydraulic crane oil reservoir.

(2) Hydraulic crane control valve hand levers (fig. 66). These four levers, located on the valve bank in the driver's compartment at the rear of the crane, control boom, hoist, crowd, and swing control actions of the crane.

(3) Brake lock switch (fig. 67). This switch, located on the left side of the instrument panel, is used to actuate the solenoid brake lock which holds the

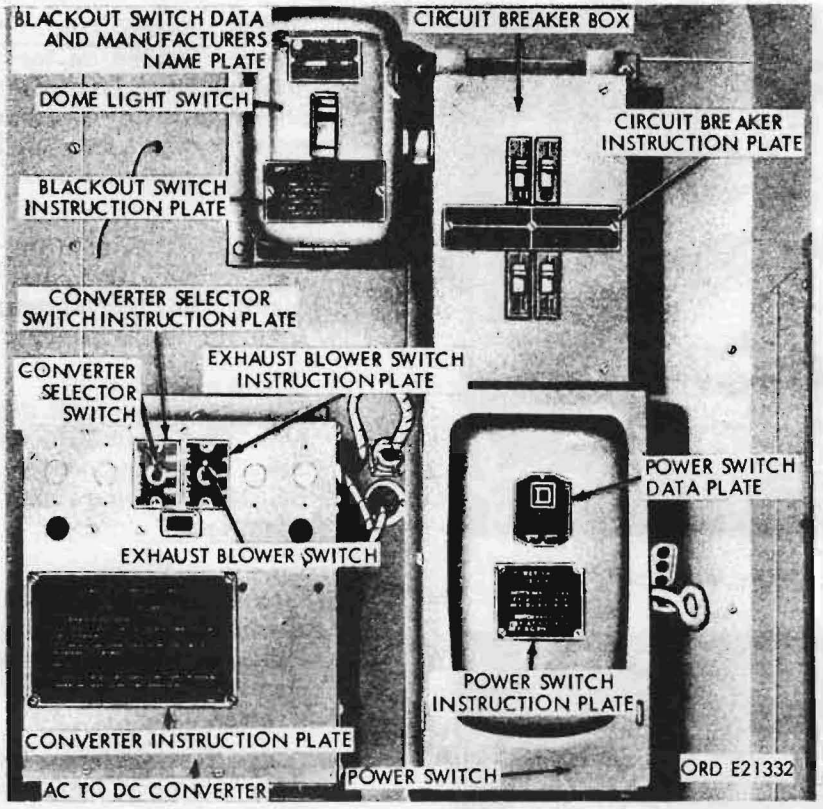


Figure 63. Shop van body front interior panel electrical components

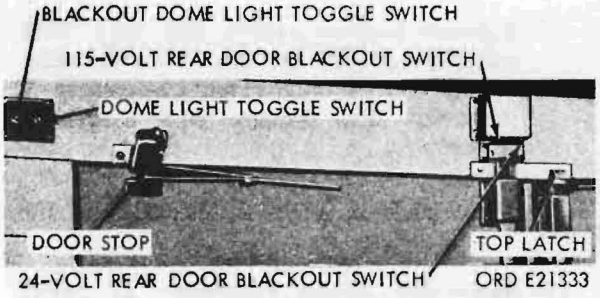


Figure 64. Van body rear interior panel

service brake in the applied position during crane operation.

(4) Floodlight control switch (fig. 67). This switch, located on the left side of the instrument panel, controls power to the cab and crane floodlight switches. Each individual floodlight is also equipped with an on-off control switch, located on the lower rear of the floodlight.

g. Water-tank Truck Controls (M50 and M50A1).

(1) Exhaust bypass fording valve (fig. 68). The exhaust bypass fording valve, located on the tank below the cab, is a

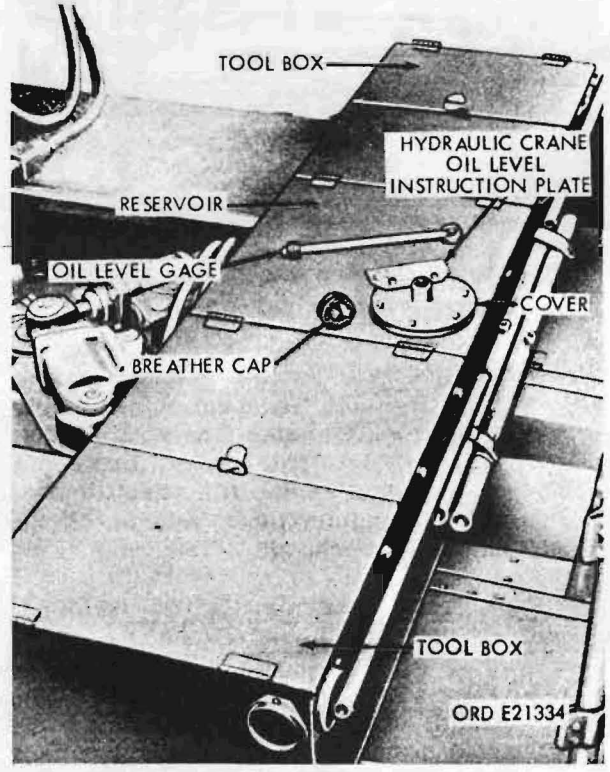


Figure 65. Oil reservoir and related components

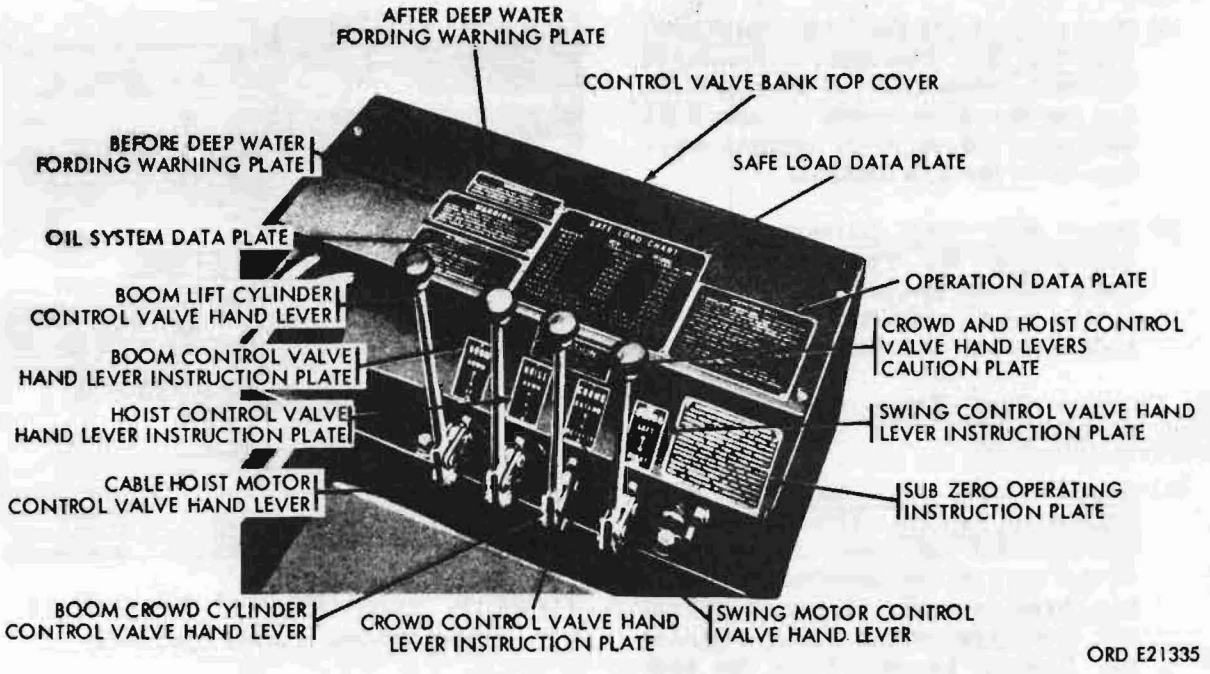


Figure 66. Hydraulic crane control valve hand levers

manually operated gate valve used to isolate the tank heating chamber and the exhaust bypass system during fording.

(2) Exhaust bypass valve control handle (fig. 69). This handle, located on a bracket fastened to the right side of the instrument panel, controls the exhaust bypass valve.

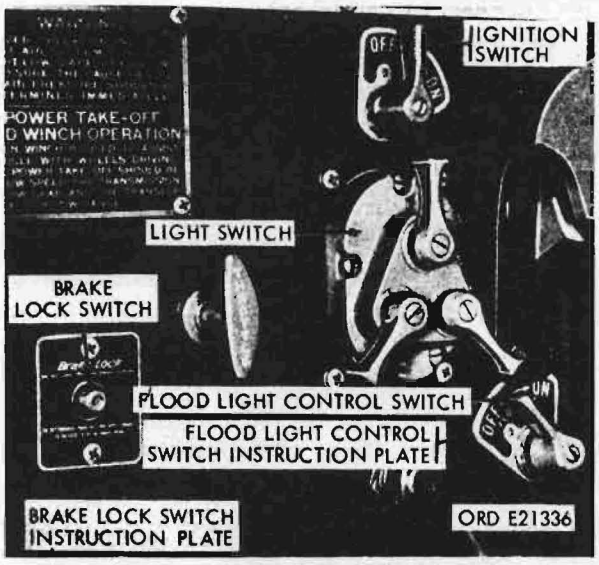


Figure 67. M60 and M108 instrument panel - left side

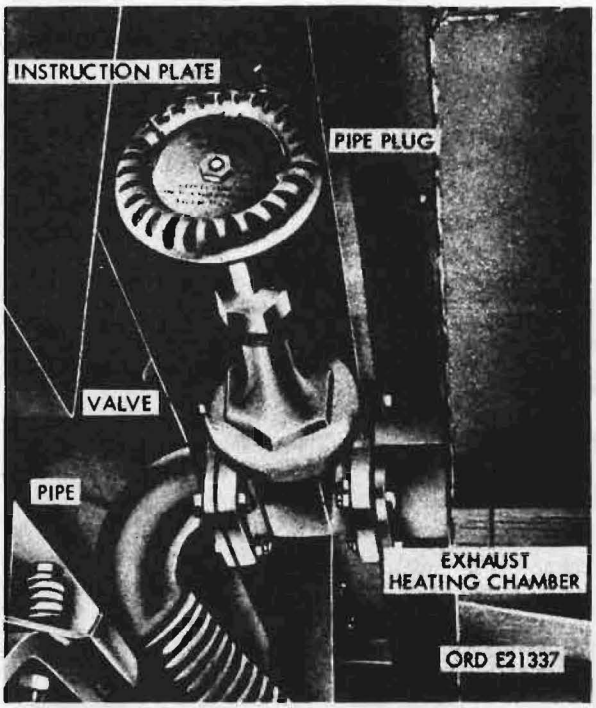


Figure 68. M50 and M50A1 exhaust bypass fording valve

(3) Water tank truck discharge valve control (fig. 70). This control, located in the rear compartment of the tank body, has two operating levers to control the discharge valves which regulate water flow from the tank sections.

(4) Water tank truck delivery line gate valves (fig. 70). The two water tank truck delivery line gate valves, located in the rear compartment of the tank body, control the delivery line flow.

h. Gasoline Tank Truck Controls (M49, M49C, and M49CA1).

(1) Gasoline tank truck discharge valve control (J, fig. 71). This control, located in the equipment compartment at the rear of the gasoline tank body, has three operating levers to control the discharge valves which regulate the flow of gasoline from the tank sections.

(2) Gasoline tank truck discharge valve control remote control (fig. 72). This control, located on the left front of the tank body behind the cab, trips all three operating levers to the closed position when pulled out.

(3) Gasoline tank truck delivery line gate valves (F, fig. 71). These two valves, one located in the equipment compartment, the other located below the equipment compartment at the rear of the tank body, control the flow of gasoline through the suction and delivery lines.

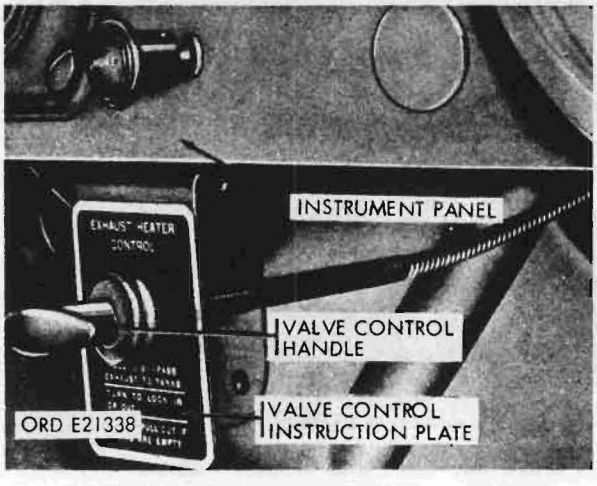


Figure 69. Exhaust bypass valve control

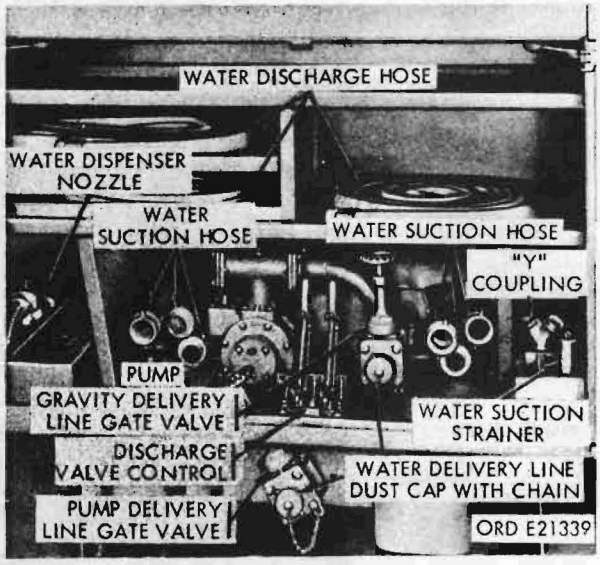


Figure 70. Water tank truck rear compartment showing stowed equipment

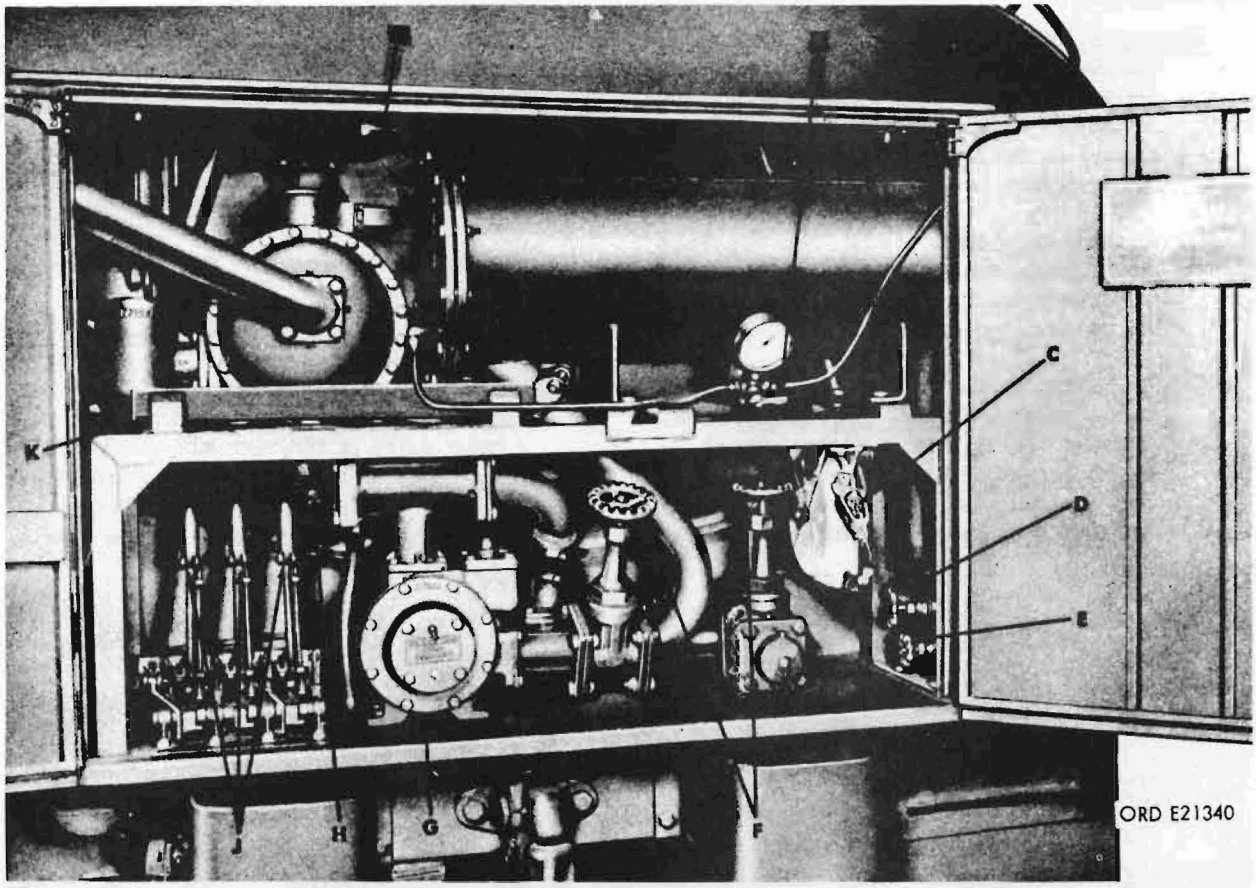
(4) Gasoline dispensers (fig. 73). These three dispensers are provided for gasoline pumping operations. One dispenser is attached to the end of a delivery line which is stowed along the left side of the tank body when not in use. The other two dispensers are stowed in the tank body storage compartments when not in use.

(5) Automatic dump valve drain tube valve knob (D, fig. 71). This knob, located in the rear compartment, is turned to open the automatic dump valve.

(6) Water separator drain valve knob (E, fig. 71). This knob, located in the rear compartment, is turned to drain the water separator tank when maintenance is required.

(7) Meter drain valve knob (H, fig. 71). This knob, located in the rear compartment, is turned to drain the fuel from the meter component when maintenance is required.

(8) Delivery pump draincock (G, fig. 71). This draincock, located under the delivery pump, is opened to drain the fuel from the delivery pump component when maintenance is required.



Key	Item	Key	Item
A	Counter control lever	F	Gate valve handles
B	Pressure gage shutoff valve handle	G	Delivery pump draincock
C	Grounding wire	H	Meter drain knob
D	Dump valve knob	J	Operating levers
E	Drain valve knob	K	Liquid level gage

Figure 71. Gasoline tank truck - rear compartment

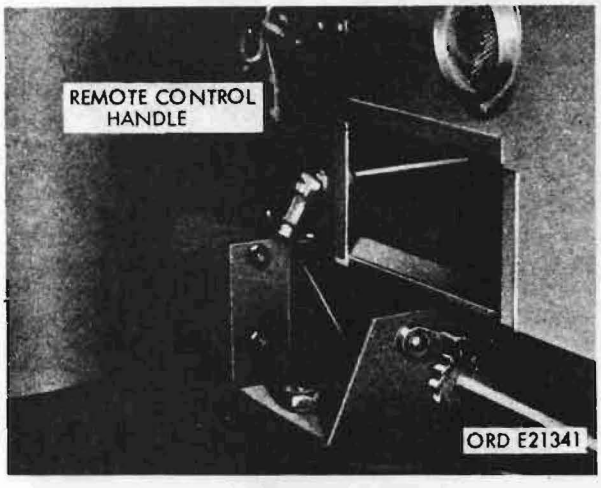


Figure 72. Discharge valve control - remote control

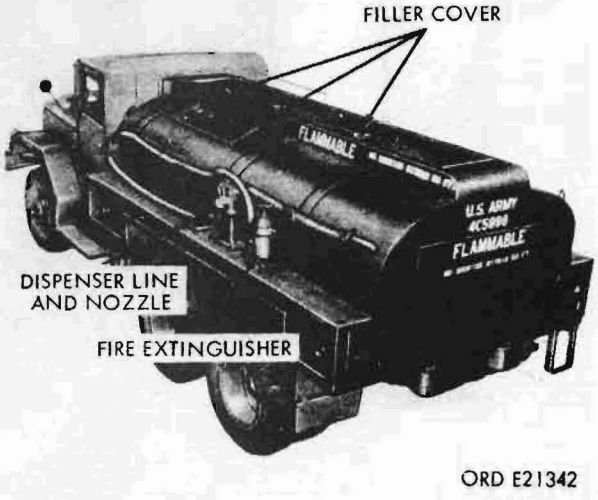


Figure 73. Gasoline tank body components

(9) Grounding wire (C, fig. 71). This wire, located in the rear compartment on a spring-loaded reel, is pulled out and attached to a ground before starting pumping operations. An alligator clip is attached to the end of the wire.

(10) Counter control lever (A, fig. 71). This lever, located on the meter, is moved up and down to move the numbers on the meter back to zero.

(11) Gasoline truck pressure gage shutoff valve control (B, fig. 71). This control, located in the rear compartment of the differential pressure gage, is turned left to obtain a gage reading for the inlet side of the valve, and turned right to obtain a gage reading for the outlet side of the valve. Turning the handle down closes the valve.

(12) Liquid level gage (K, fig. 71). This gage, mounted on clips in the rear compartment, is dipped into the tank sections to measure the liquid level.

i. Expansible Van Truck Controls (M292).

(1) Ladder toggle clamps (fig. 74). The ladder toggle clamps, located on the rear doors of the van, are used to hold the ladders in the stowed position when suspended from the ladder racks located toward the tops of the doors.

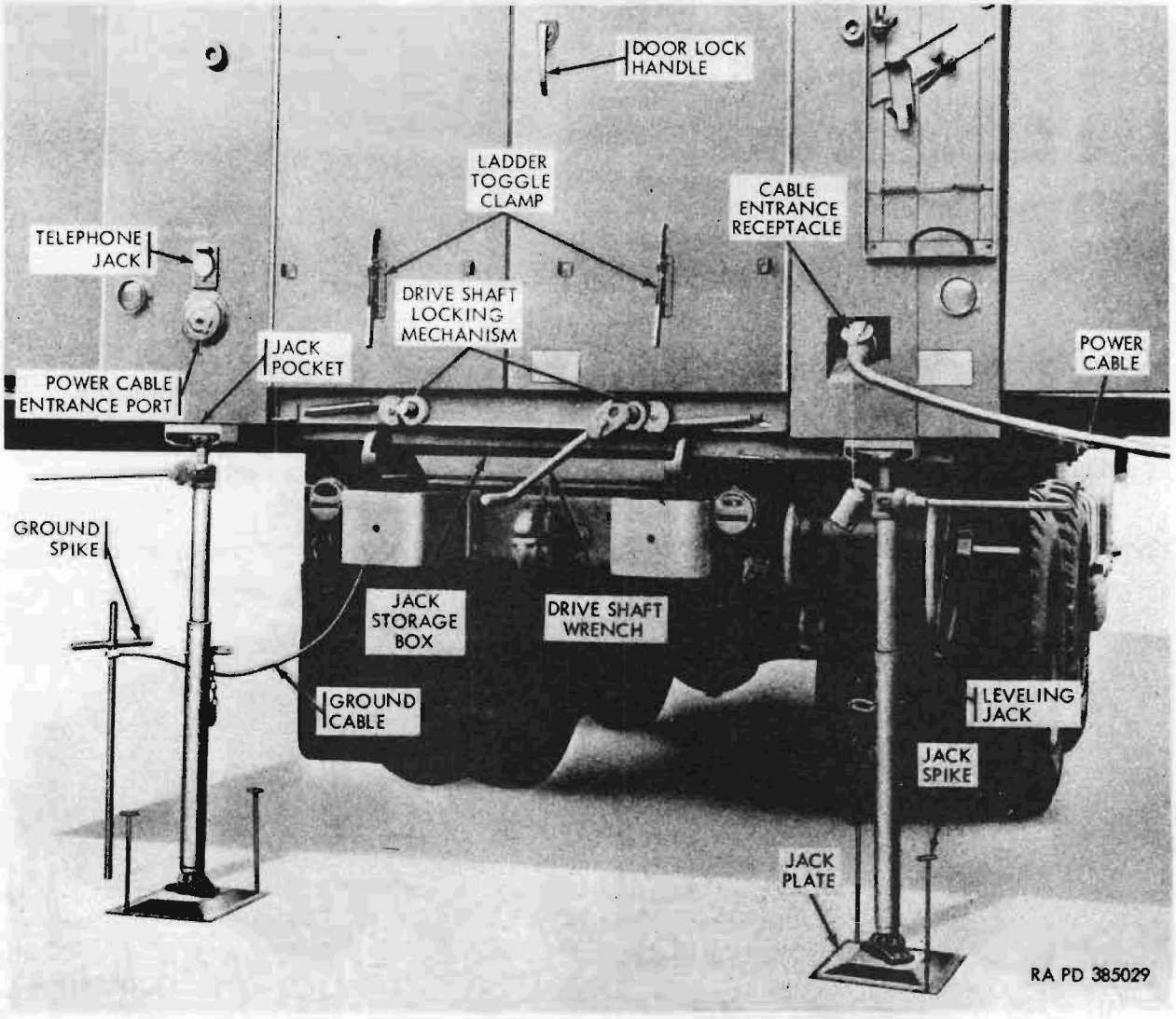


Figure 74. Van in operating position

Each clamp incorporates a toggle device, to which the clamp is attached, and operating handle. The clamp is provided with means for securing it in the closed position with a padlock. To release the ladder, pull the handle upward and permit the clamp to fall free of the ladder. To secure the ladder, suspend it from the ladder rack, place the clamp over the lower crossmember of the ladder, and push the handle downward.

(2) Side and rear door locks (figs. 75 and 76).

(a) The two side doors and right rear doors are equipped with "slam action" locks having the lever-type lock handles on both inside and outside of the doors. Each lock consists of the operating handles, linkage, and three spring-loaded bolts. The outside handles are provided with means for securing them in the closed position with padlocks. To lock doors, slam doors shut.

(b) The left rear door lock consists of an interior handle only, lock mechanism, linkage, and two bolts extended and withdrawn by the handle. The left rear door can be opened only from the inside of the van, and cannot be slammed shut. To unlock the door, push the handle downward. To lock door, return handle to horizontal position.

(3) Van side panel locks. Two side panel locks, located within the wall structure of each side panel, are used to lock the side panels in the retracted position. The locks are operated by means

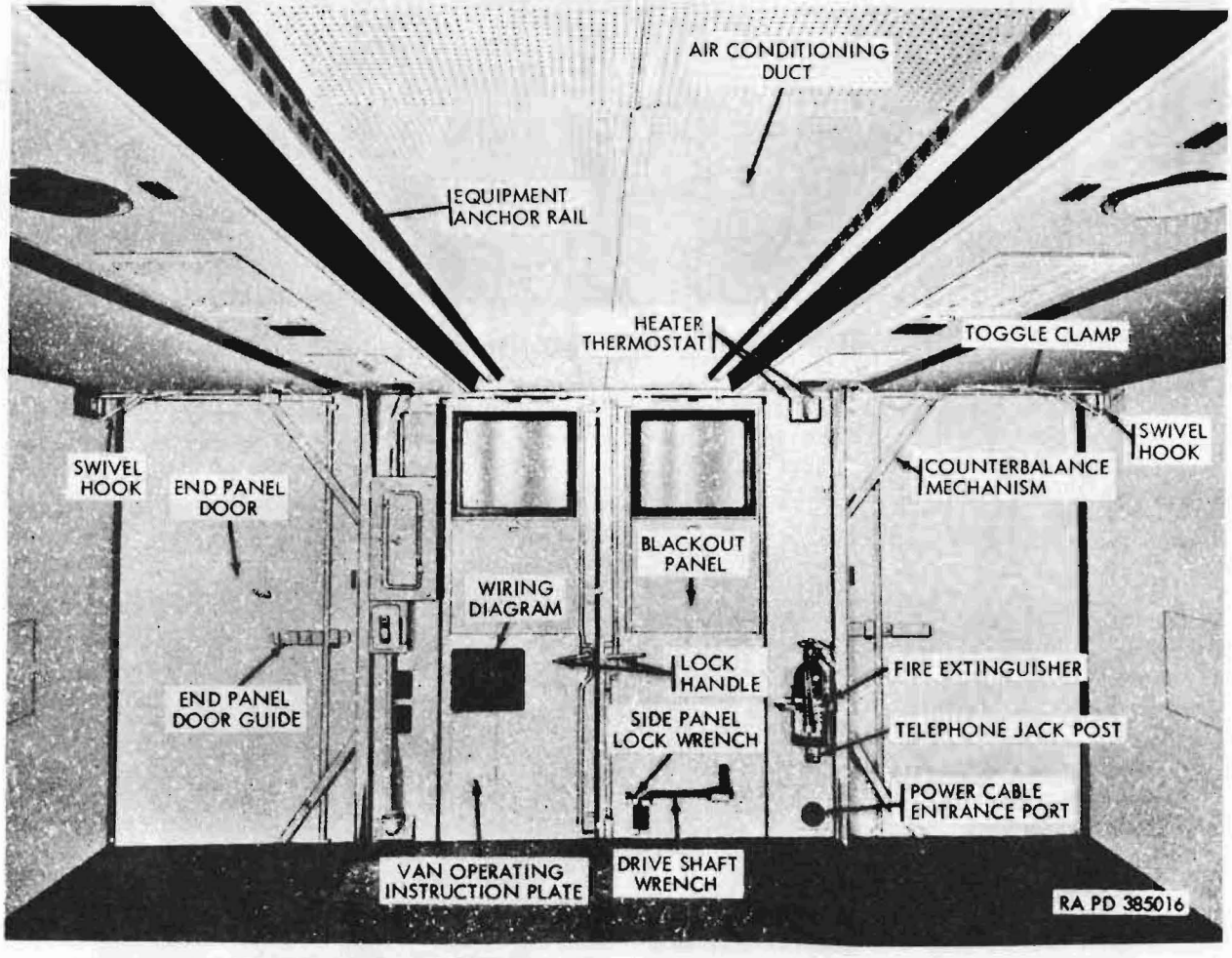


Figure 75. Van body in expanded position rear interior view

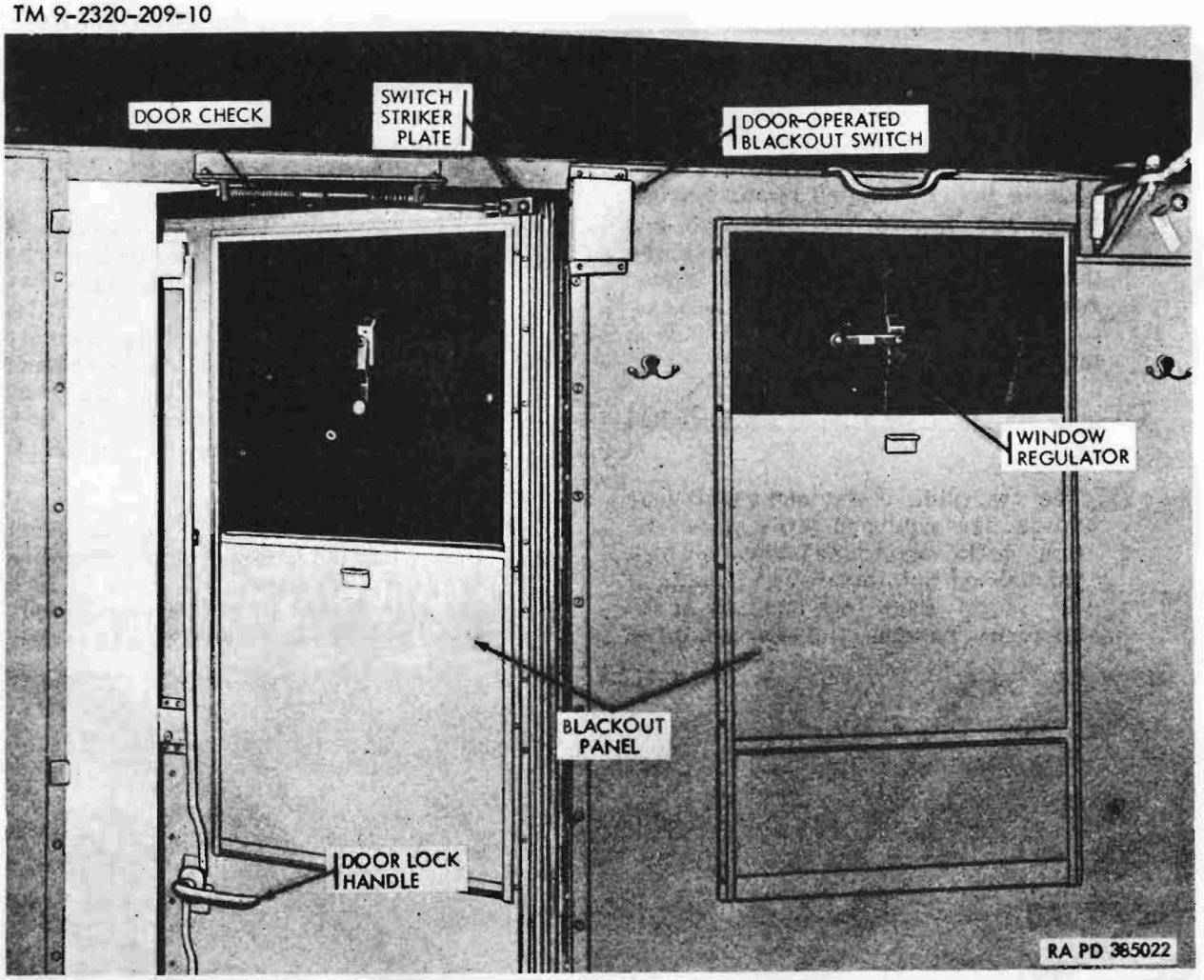


Figure 76. Left side door and window

of a lock wrench (fig. 77) fitted over the lock-operating shafts which protrude from the side panel surfaces. Each lock consists of a rack and pinion device, linkage, and locking bolts. The two forward locks actuate bolts which engage the roof outer edge and the van corner posts. The two rearward locks are equipped with an additional bolt which engages the edges of the side doors to prevent inadvertent opening of the doors with the door handles when the van is in the retracted position. To unlock the side panels before expanding the van, place the lock wrench over the protruding shaft end and turn the wrench one-quarter turn in a counterclockwise direction. To lock the side panels after retracting the van, turn the wrench one-quarter turn in a clockwise direction. The wrench is stowed in a bracket on the inside of the left rear door as shown in figure 75.

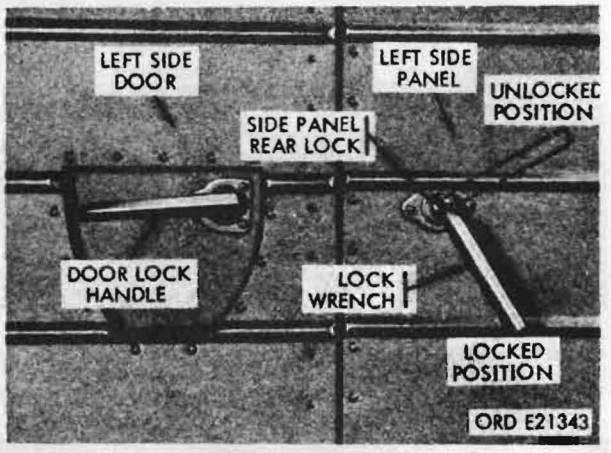


Figure 77. Side panel lock operation

(4) Retractable beam drive shaft-locking mechanisms. Two retractable beam drive shaft-locking mechanisms (fig. 78), attached to the van rear crossmember, are used to secure the side panels in both the expanded and retracted position by locking the beam drive shafts against rotation. Each mechanism consists of a ratchet fixed to the shaft, crescent-shaped pawl, and spring-loaded locking plunger. To release both mechanisms before expanding the side panels, push the locking plungers downward. To lock both mechanisms after the side panels have been expanded or retracted, push the locking plungers upward.

(5) Retractable beam drive shaft wrench. The retractable beam drive shaft wrench (fig. 78) is fitted to the ends of the retractable beam drive shaft protruding from the van rear crossmember to expand and retract the van side panels. To expand the left side panel, fit the wrench to the left shaft end and turn the shaft in a counterclockwise direction. To retract the left side panel, turn the shaft in a clockwise direction. To expand and retract the right side panel, turn the right shaft in clockwise and counterclockwise directions, respectively. The wrench is stowed in a clip on the inside of the left rear door as shown in figure 75.

(6) End panel door guides. The end panel door guides (figs. 75 and 79), located on the front and rear end panel doors of the van, are used to maintain alinement of the end panel doors with the van corner posts during the van expanding procedure. To engage each guide, close the end panel door and pull the corner swivel hook inward until the inner edge of the door is parallel with the corner post, then push the guide bar into the latch on the corner post. To release the guide, withdraw it from the latch.

(7) Hinged roof locks. A hinged roof lock, located centrally in each hinged roof section, is used to secure each roof section in the retracted position. The locks are similar in construction to that of the side panel locks except that the locks are operated by external hinged roof lock handles (fig. 80) instead of detachable wrenches, and the bolts engage the front and rear van corner posts. To release the hinged roof sections (and hinged floor section, which

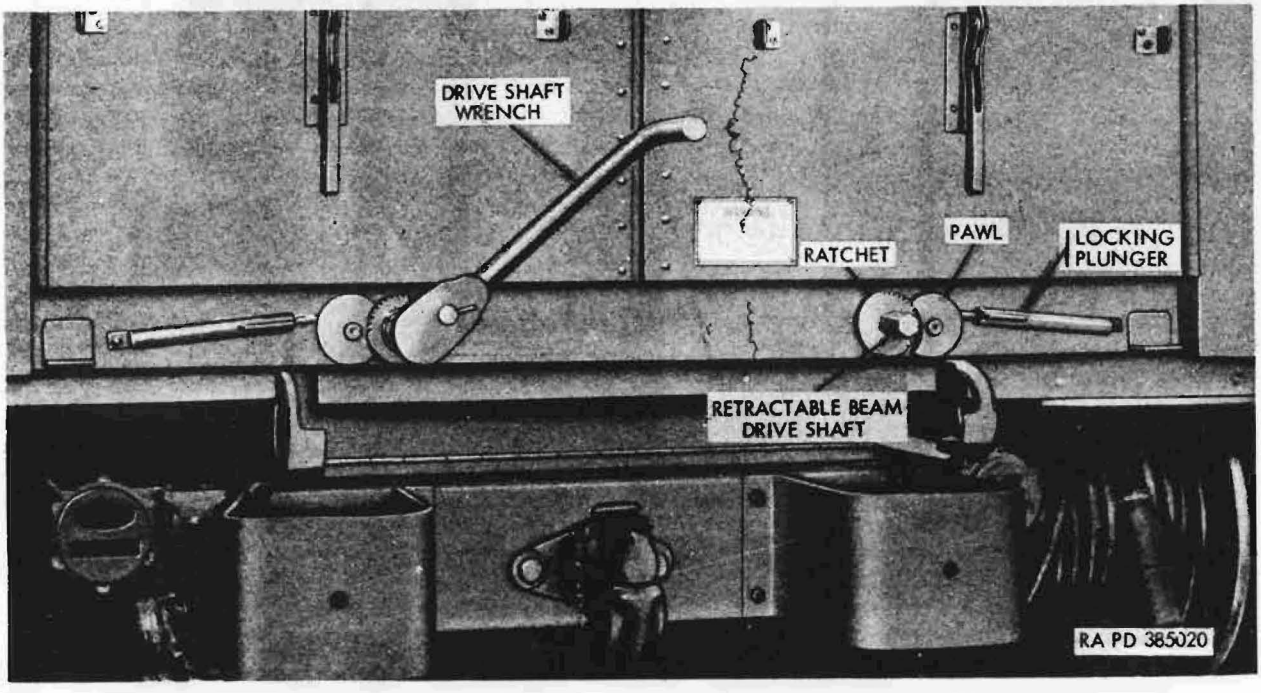


Figure 78. Retractable beam drive shaft locking mechanisms

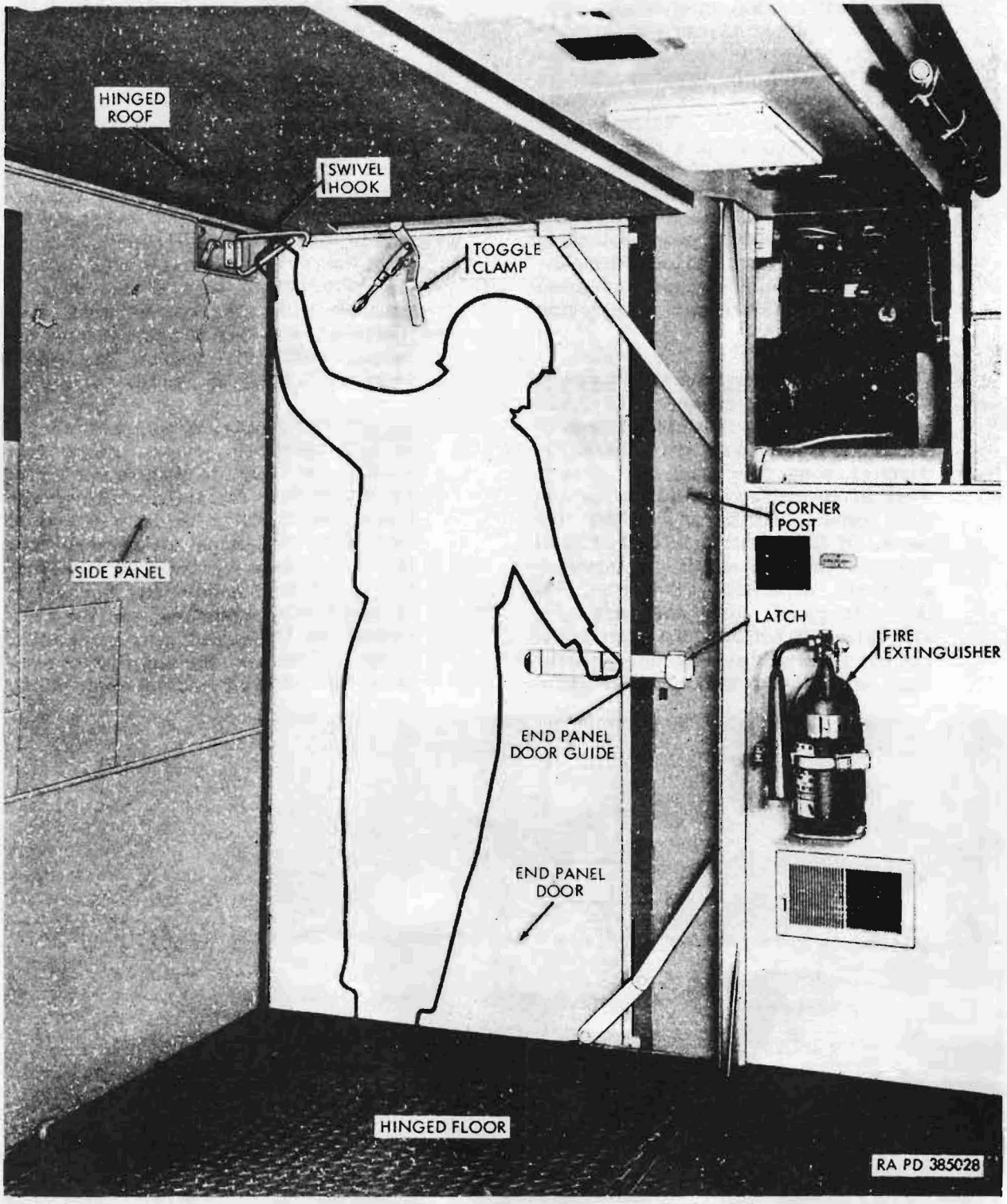


Figure 79. Alinement of front end panel door with door corner post

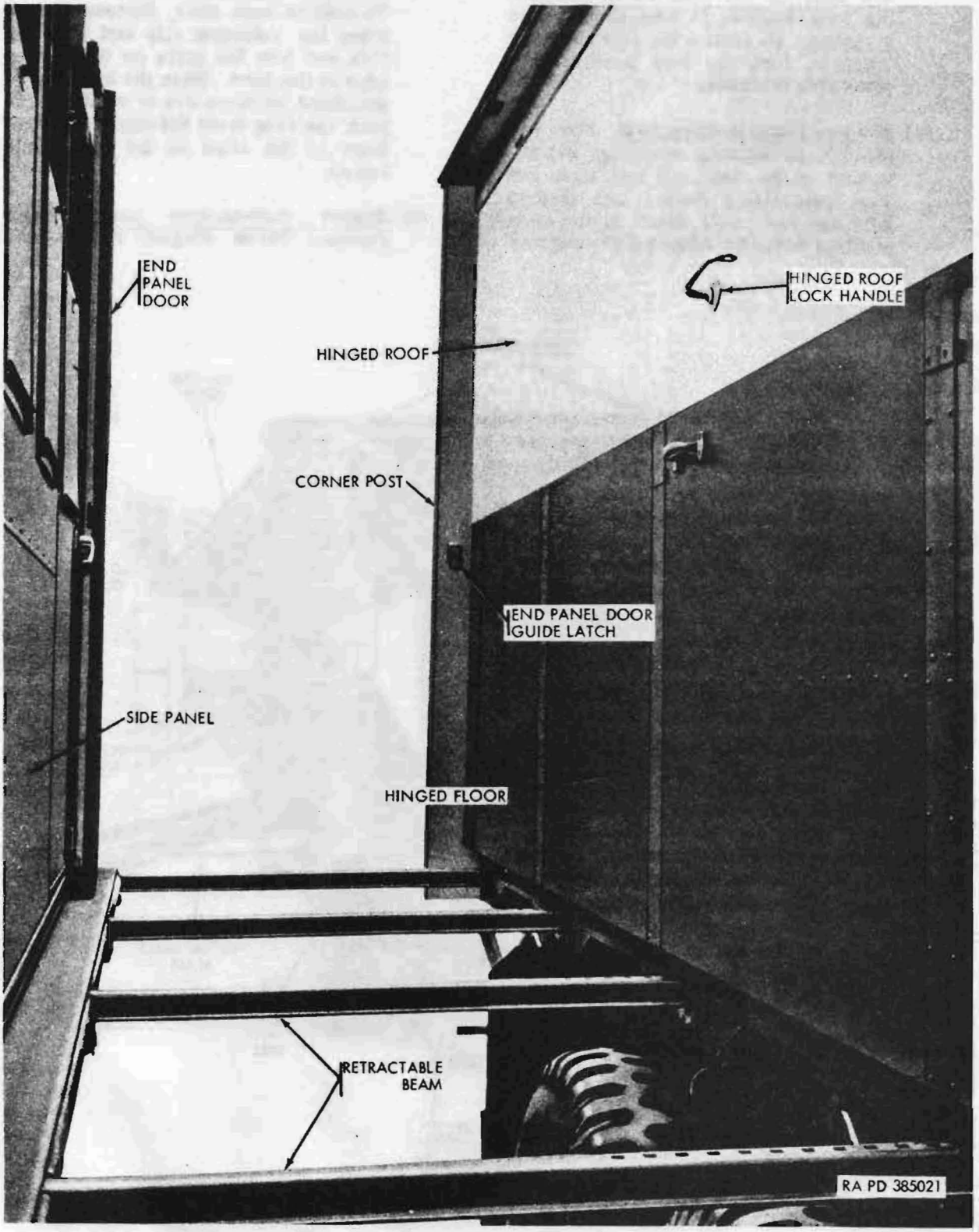


Figure 80. Hinged roof and floor in retracted position

are held by the roof sections), turn the lock handles in counterclockwise direction. To secure the roof and floor sections, turn the lock handles in a clockwise direction.

(8) End panel door-holding rods. Four end panel door-holding rods (fig. 81) attached to the right and left, front and rear retractable beams, are used to hold the end panel doors in the open position while the hinged floor and roof sections are being raised or lowered. To secure each door, remove the rod from the retaining clip and hook the free end into the plate on the bottom edge of the door. When the hinged roof and floor sections are in position, unhook the rods from the doors and stow them in the clips on the retractable beams.

(9) Hinged roof-to-side panel toggle clamps. Three hinged roof-to-side

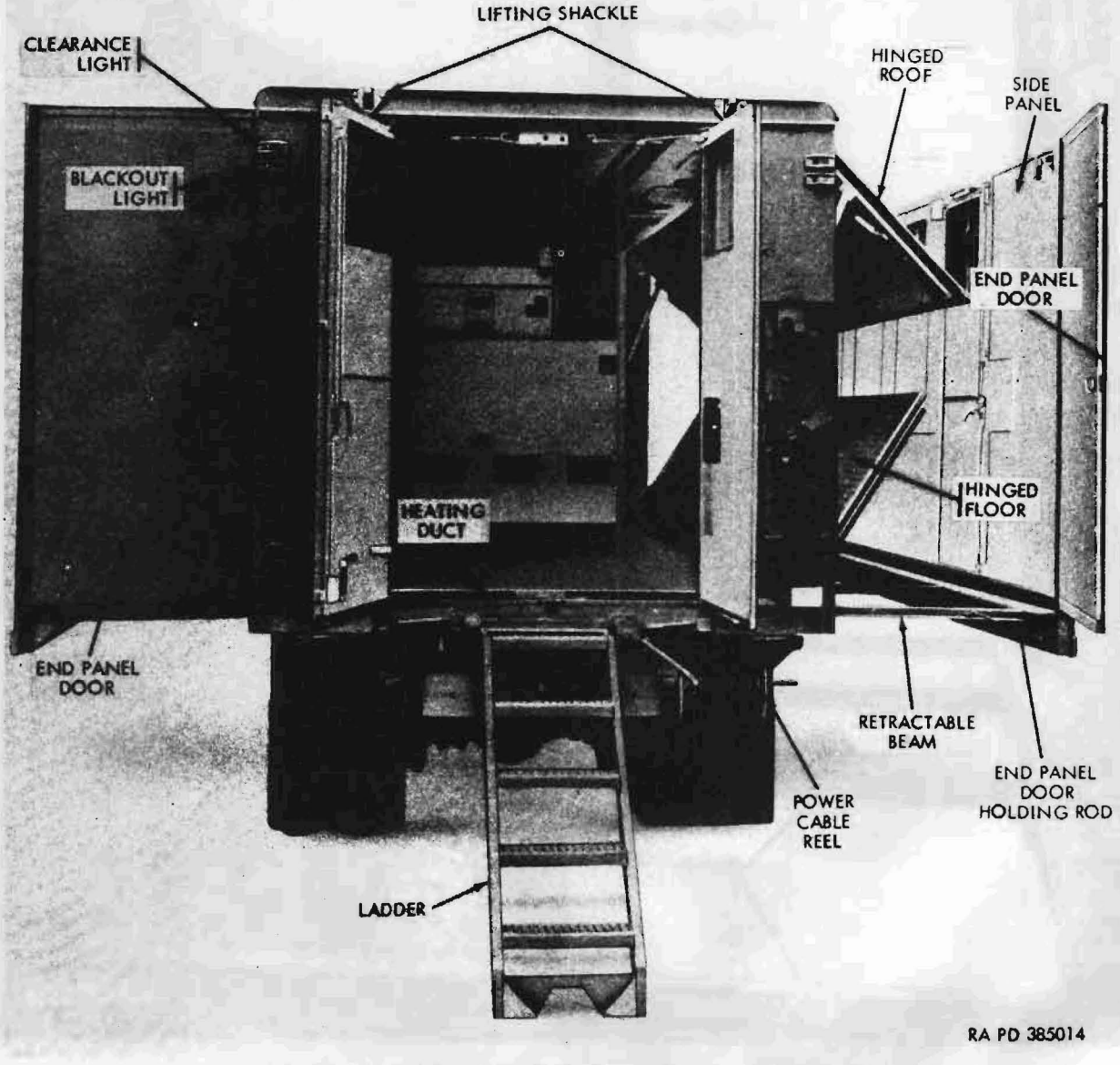


Figure 81. Van body in partially expanded position

panel toggle clamps (figs. 75, 79, 82, and 83), located at the ends and center of each hinged roof section, are used to draw up and hold the sealing edges of the side panels tight against those of the roof sections when the van is in the expanded position. The side panels are equipped with swivel hooks for attaching the clamps. Each clamp consists of a toggle mechanism, adjustable eyebolt, and operating handle. To attach each clamp, aline the opposite swivel hook with the clamp, enter the hook in the clamp eyebolt, and pull the clamp handle away from the swivel hook. To release the clamp, push the handle toward the hook and detach the eyebolt from the hook. To stow the swivel hook, turn it into the niche in the side panel and secure with the spring clip. To stow the toggle clamp, attach the eyebolt to the holder post in the niche in the roof section and close the clamp.

(10) Window regulators. The window regulators (fig. 76), located on the center posts of the side window frames, are used to open and close the windows. Each regulator consists of an operating crank, worm and pinion gears, and telescoping lever arm. One end of the arm is fixed to the pinion gear, while the opposite end is attached to the lower edge of the window. When the crank is turned, the lever arm moves in an arc to swing the window inward or outward. To open the window, turn the crank in a clockwise direction. To close the window, turn the crank in a counterclockwise direction.

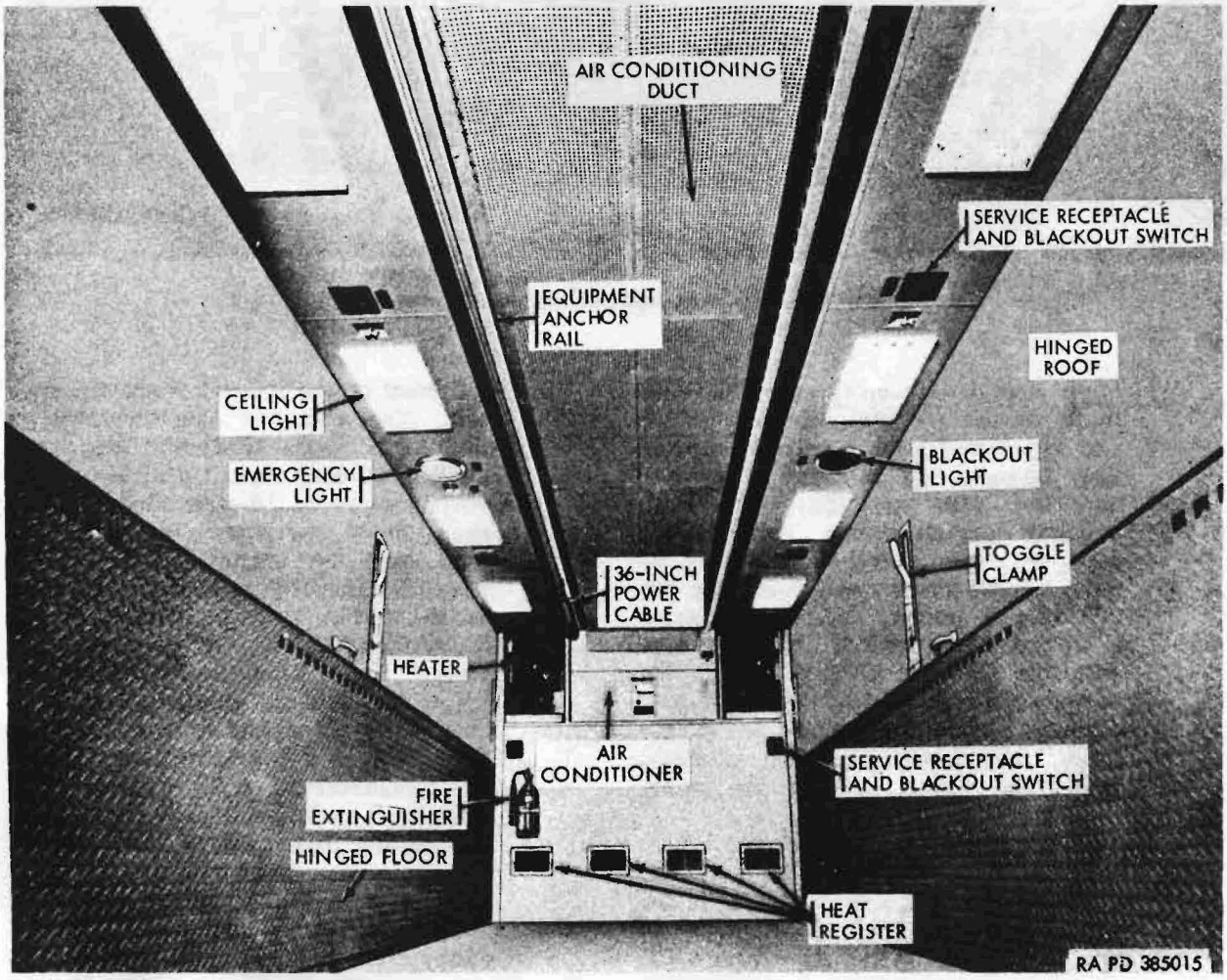


Figure 82. Van body in retracted position - front interior view

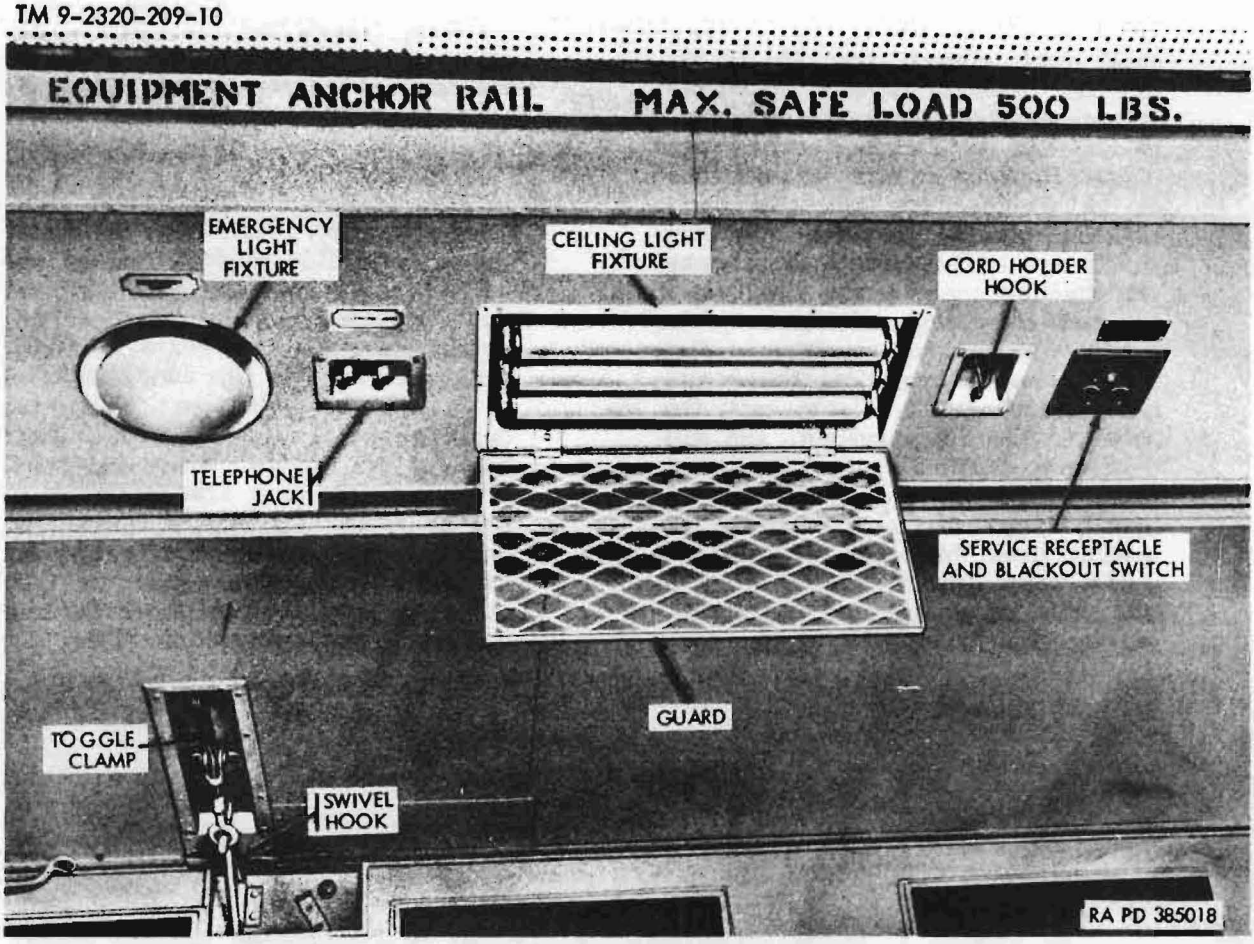


Figure 83. Van left ceiling equipment

(11) Main switch (208-volt). The 208-volt main switch (fig. 84), located on the van right rear wall, controls current flow between the entrance receptacle and the 110- and 208- volt circuit breaker switch boxes immediately above it. The switch is nonfused, 3-pole, single-throw type, designed for 208-volt ac power, and is operated by a rocker-type switch lever marked with the ON and OFF positions. To energize the 110-volt and 208-volt circuits, press the upper end of the lever. To deenergize the circuits, press the lower end of the lever.

(12) 110-volt circuit breaker switches. Twelve 110-volt, push-type circuit breaker switches are contained in the circuit breaker switch box (figs. 84 and 85), located on the van right rear wall. Six of the switches are used to protect and control the 110-volt auxiliary equipment of the present electrical system. The switches are identified by number in figure 85. Switch Nos. 1 and 2 are of 20-amp capacity; all remaining switches are of 15-amp capacity. To energize or deenergize any given circuit, push the switch button inward. The ON and OFF positions are shown on the switch buttons. When a circuit is overloaded the switch breaks the circuit and automatically returns to the OFF position. Control of the various 110-volt circuits is as follows: No. 1 controls the left heater circuit. No. 2 controls the right heater circuit. Nos. 3 and 4 are not used. No. 5 controls the ceiling light and service receptacle circuits when operated in conjunction with No. 8. Nos. 6 and 7 are not used. No. 8 controls the emergency light and main blackout switch circuits. No. 9 is not used. No. 10 controls the blackout relay, then in turn

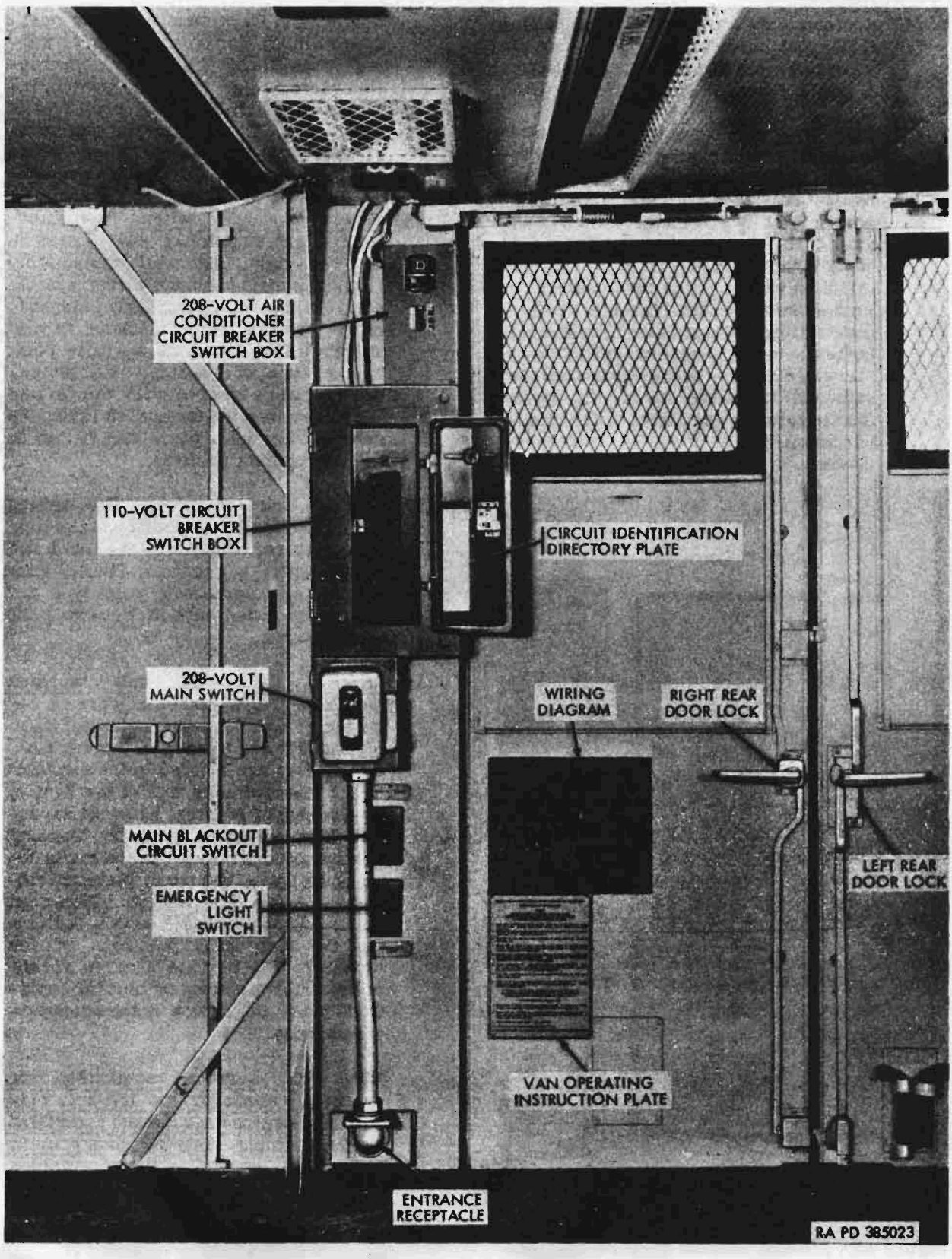


Figure 84. Van electrical controls

controls the blackout light, ceiling light, and service receptacle circuits when operated in conjunction with Nos. 5 and 8. Nos. 11 and 12 are not used.

(13) Main blackout circuit switch. The main blackout circuit switch (fig. 84) is located on the van rear wall immediately below the 208-volt main switch. The switch is a 3-pole, toggle type of 10-amp, 110-volt capacity and is used to control the blackout circuit of the electrical system. In the ON position, the switch includes the blackout relay in the ceiling light and service receptacle circuits so that these circuits are interrupted by the door-operated switches when the doors are opened for operation under blackout conditions. In the OFF position, the switch excludes the blackout relay, thus excluding the function of the door-operated switches for operation under normal conditions. The switch instruction plate, adjacent to the switch, indicates the ON and OFF positions of the switch. To operate the van under blackout or normal conditions, place the switch in the appropriate position.

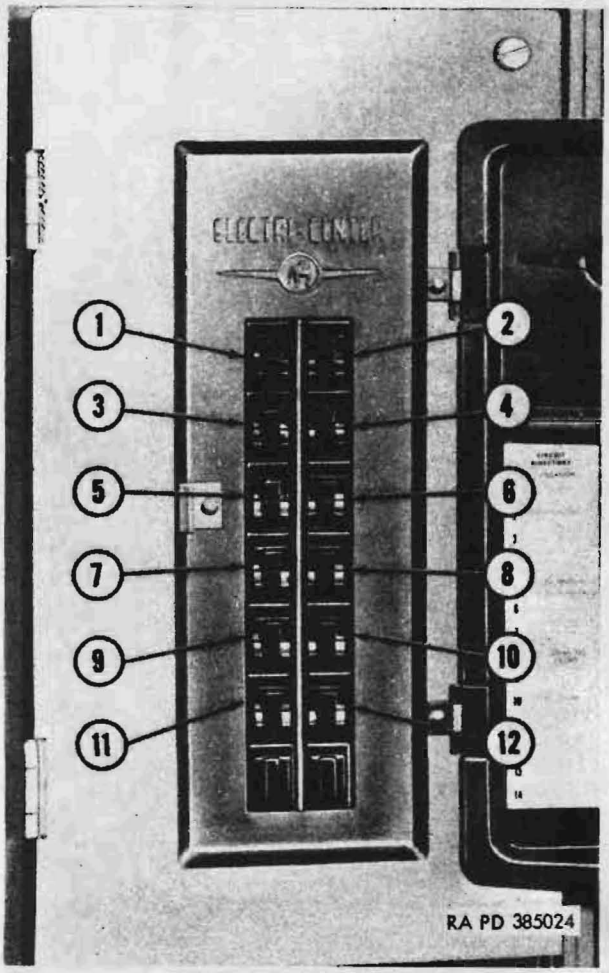


Figure 85. 110-volt circuit breaker switches

(14) Emergency light switch. The emergency light switch (fig. 84), located on the van right rear wall immediately below the main blackout circuit switch, controls the emergency light independently of the main blackout circuit switch. The switch is a single pole, toggle type of 10-amp, 110-volt capacity, and is marked with the ON and OFF positions on the switch lever. To operate the light, place the switch in the appropriate position.

(15) Ceiling light switches. The ceiling light switches are located in the ceiling light fixtures adjacent to the tubes and lamps which they control. The switches are of the commercial push type and can be operated without removing the mesh guards.

(16) Service receptacle and blackout switches. Eight combined service receptacle and blackout switches (figs. 82 and 83) are located in the van ceiling and two are located in the van front wall. The switches are of the 3-pole, toggle type of 10-amp, 110-volt capacity. The switches provide blackout control of their associate circuits independently of the main blackout circuit switch. The switch instruction plates, adjacent to each switch, indicate the ON and OFF positions of the switches. To operate a given receptacle under blackout or normal conditions place the switch in the appropriate position.

Note. The service receptacles are energized whenever the 110-volt circuit is energized and are not controlled by the switches. The switches provide independent control of the receptacles with respect to the blackout circuit.

(17) Heater control switches. The heater control switches (fig. 86) are located on the front faces of the heaters. Each

is a 3-position, toggle-type switch. The positions are marked HEATER, VENT, and OFF on the instruction plate. To circulate unheated air, place the switch in the VENT position. To circulate heated air, place the switch in the HEATER position. To stop the heater, place the switch in the OFF position.

(18) Heater reset buttons. The heater reset buttons (fig. 86) are located on the heater control panels. Each button is essentially a combined circuit breaker switch and timing device which automatically breaks the circuit to the heater, and lights the red warning light when the heater fails to start or run due to fuel or ignition failure. To restart the heater after the malfunction has been corrected, depress the reset button.

(19) Heater ventilating control knobs. The heater ventilating control knobs (fig. 86), located on the front faces of the heaters adjacent to the control panels, are used to control the air entering the heaters by opening and closing the inside and outside air intake louvers. To draw fresh air from the outside of the van, pull the knobs outward. To recirculate air in the van push the knobs inward.

(20) Heater register controls. The heater register controls (fig. 82) are integral with the registers located on the van front wall, and are used to open the registers when it is desirable to heat the van interior quickly. To open the registers, pull the controls upward. To close the registers, push the controls downward.

Figure 86. Heater controls

(21) Heater indicator and warning lights. The heater indicator and warning lights (fig. 86) are located on the heater control panels. The white light is always on when the heater is operating properly. The red light comes on when the heater stops operating due to a malfunction.

(22) Heater thermostats. The heater thermostats (fig. 75), located on the van left rear panel toward the top, automatically control the output temperature of the heaters. The thermostats are graduated in degrees (Fahrenheit) over a range of 50 to 100 and are marked every 10 degrees. To set each thermostat, turn the control knob until the desired temperature is indicated by the pointer.

Note. The heaters will not produce heat unless the thermostat settings are above the temperatures prevailing in the van.

(23) 208-volt air conditioner circuit breaker switch. The 208-volt air conditioner circuit breaker switch (fig. 84), contained in a box located on the van right rear wall immediately above the 110-volt circuit breaker switch box, protects and controls the air conditioner circuit. The switch is a thermal type of 20-amp, 208-volt capacity, marked with ON, OFF, and TRIPPED positions. To energize the air conditioner circuit, place the switch in the ON position. To deenergize the circuit, place the switch in the OFF position. When the circuit has been overloaded, the switch automatically breaks the circuit and moves to the TRIPPED position. To reenergize the circuit when the switch is in the TRIPPED position, first place the switch in the OFF position, then in the ON position.

(24) Air conditioner bonnet front door control handles. The air conditioner bonnet front door control handles (fig. 87), located on either side of the air conditioner, are used to open and close the front door of the bonnet housing the air conditioner, and to open and close the drainage louvers in the bottom of the bonnet. It should be understood that opening and closing the bonnet

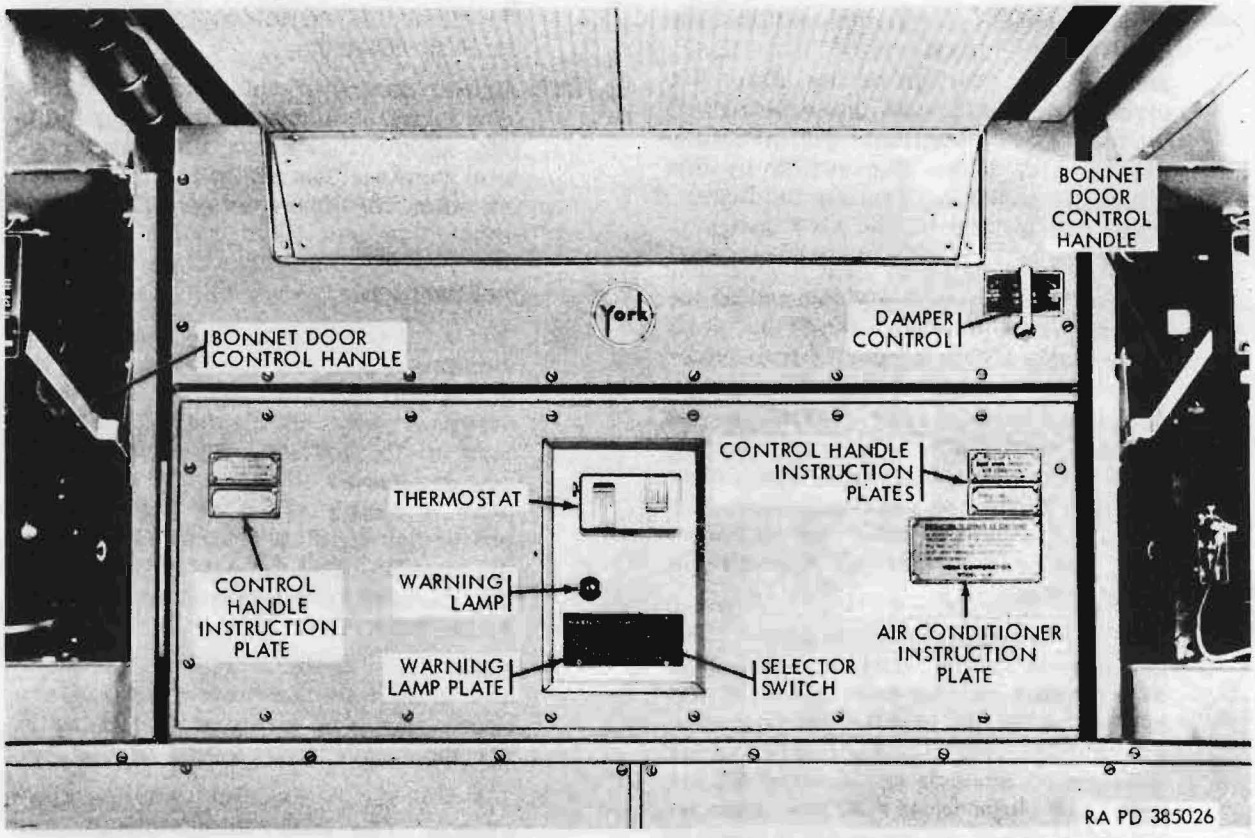


Figure 87. Air conditioner controls

front door automatically actuates the air conditioner cutout switch, shown in figure 88, which controls the operation of the air conditioner warning lamp (fig. 87). The handles are essentially toggle levers attached to linkages which operate the bonnet door and drainage louvers. To open the bonnet front door and drainage louvers, pull both handles simultaneously upward and over to the extent of travel. To close the bonnet door and louvers, pull the handles simultaneously downward to the extent of travel.

Caution: Do not attempt to operate the air conditioner before opening the bonnet front door.

(25) Air conditioner selector switch. The air conditioner selector switch (fig. 87), located on the control panel at the center of the air conditioner, is used to turn the air conditioner on and off, and to select either of its two functions of circulating uncooled or cooled air. The switch is a 3-position, rotating type marked OFF, COOL, and FAN. To circulate uncooled air, place the switch in the FAN position. To circulate cooled air, place the switch in the COOL position. To stop the air conditioner, place the switch in the OFF position.

(26) Air conditioner damper control. The air conditioner damper control (fig. 87), located at the right of the air conditioner face, consists of a lever and linkage which open and close the air conditioner air intake louvers to regulate the proportion of inside and outside air drawn into the air conditioner. The positions of the damper control are shown on the instruction plate immediately above the control as follows: 100% RETURN AIR, NORMAL and 100% FRESH AIR. To vary the proportion of inside and outside air circulated by the air conditioner, place the control in the appropriate position.

(27) Air conditioner reset button. The air conditioner reset button (fig. 88) is located on the starter box of the compressor motor and is accessible through the mesh guard at the front of the bonnet. It is essentially a combined circuit breaker and switch, and is used to restart the compressor motor

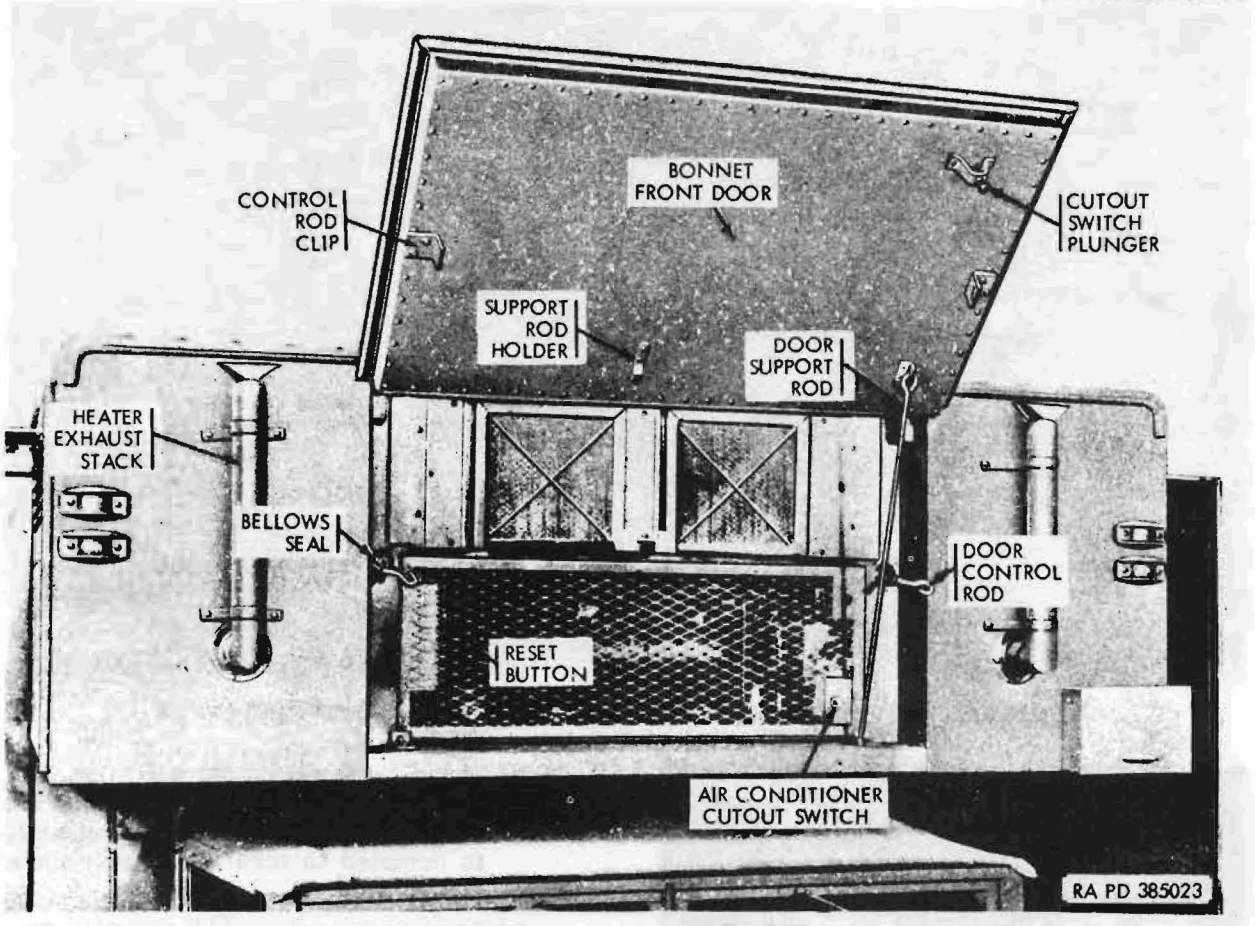


Figure 88. Bonnet door in fully open position

when the motor stops due to improper operation of the air conditioner, e.g., when it is operated with the bonnet front door closed. This condition is indicated by the air conditioner warning light. To restart the motor, depress the reset button with a suitable tool inserted through the mesh guard.

(28) Air conditioner thermostat. The air conditioner thermostat (fig. 87), located on the air conditioner control panel, automatically controls the output temperature of the air conditioner. It is graduated in degrees (Fahrenheit) over a range of 58 to 92 and is marked every 10 degrees. To set the thermostat, turn the control knob until the desired temperature is indicated by the pointer.

Note. The air conditioner will not cool unless the thermostat setting is below the temperature prevailing in the van.

j. Missile Firing Data Computer Van Truck Controls (XM472). Refer to TM 9-1430-350-12/2 for the controls and instruments that apply to the above truck.

k. Electronic Van Truck Controls (XM567).

(1) Heater controls (fig. 89). The heater assembly is located inside the van on the front wall panel. An ON/OFF switch controls the heater operation. The COLD START toggle switch is used as a cold-weather starting aid. The RESET button, at the bottom of the panel is pressed when restarting the heater after it has shut down.

(2) Multibreaker assembly (figs. 89 and 90). The 115-volt multibreaker assembly is located inside the van body on the upper right front panel. Breaker No. 1 controls and protects the power receptacles circuit. Breaker No. 2 controls and protects the ventilator blower circuit. Breaker No. 3 controls and protects the 115-volt dome-light circuit. Breaker No. 4 controls and protects the heater power supply circuit.

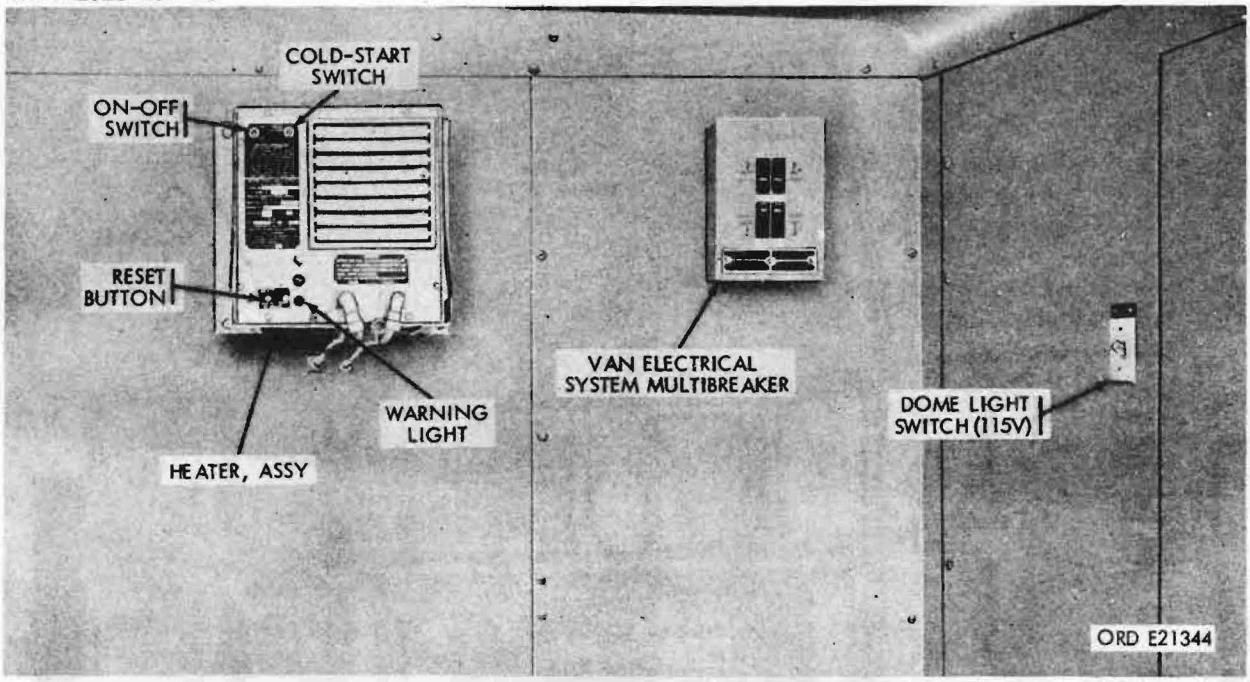


Figure 89. Van body heater multibreaker and 115-volt dome-light switch

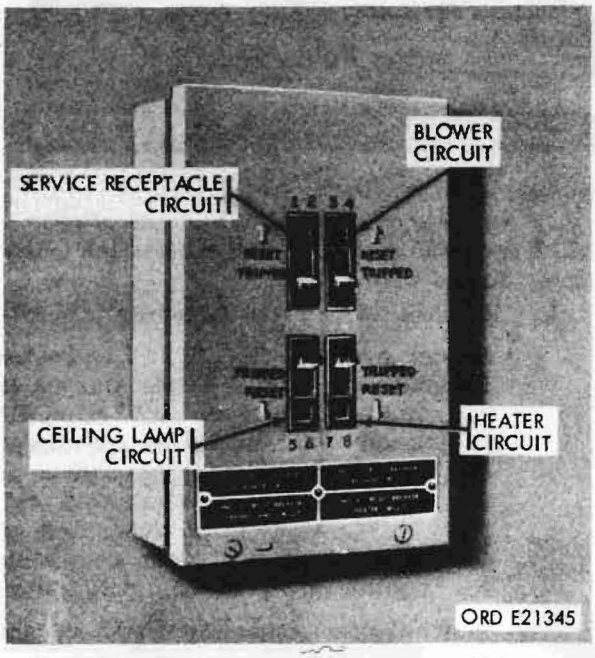


Figure 90. Multibreaker assembly

(3) Circuit breaker (24-volt) (fig. 91). The 24-volt circuit breaker, located on the lower right side of the outer van body behind the cab, is used to provide overload protection for the 24-volt circuit.

(4) Dome lights (D and G, fig. 92). The 24- and 115-volt dome-light controls are as follows:

(a) Dome-light switch (24-volt) (fig. 93). The 24-volt dome-light switch, located on the interior right van wall, is actuated to turn the 24-volt dome lights on or off.

(b) Dome-light switch (115-volt) (fig. 89). The 115-volt dome-light switch, located on the interior right van wall, is actuated to turn the 115-volt dome lights on or off.

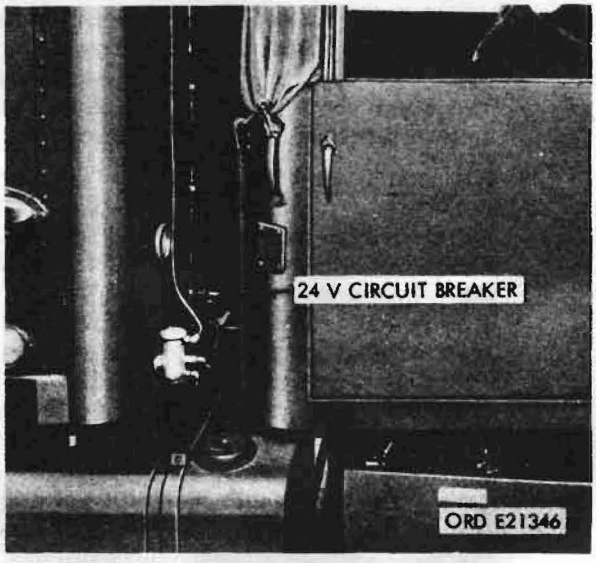


Figure 91. 24-volt circuit breaker and wiring harness

(5) Thermostat control (F, fig. 92). The thermostat control, located on the interior left van wall, is used to control the van body interior temperature.

l. Telephone Construction and Maintenance Truck Controls (V-17A/MTQ).

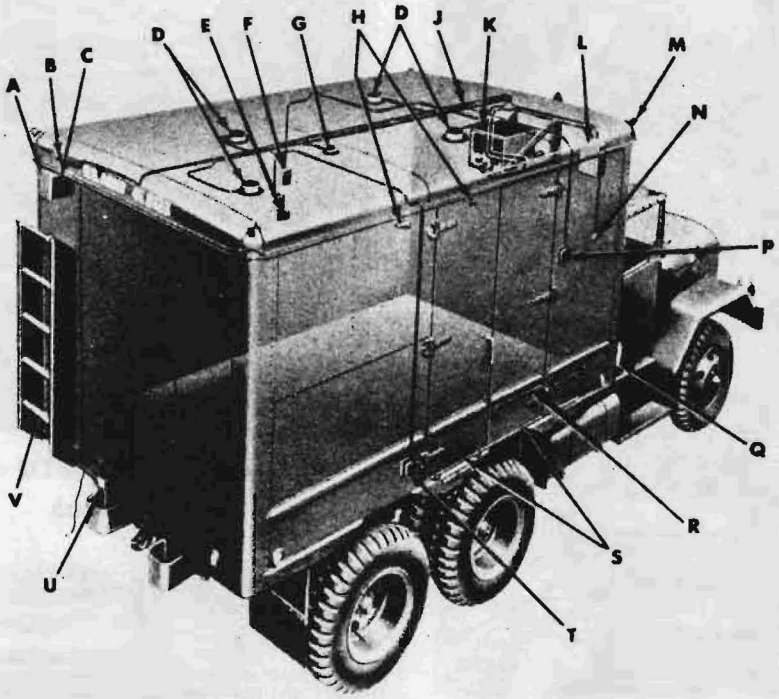
(1) Rear winch control lever (fig. 94). The rear winch control lever, located on the cab floor convenient to the driver's left hand, controls the engagement and disengagement of the winch clutch and brake.

(2) Revolving platform controls (fig. 95). The revolving platform, located on the vehicle roof, has a lockpin to hold the platform in a fixed position, and a brake to hold the platform in any desired position during operation.

m. Earth Boring Machine and Pole Setter Truck Controls (V-18A/MTQ).

(1) Rear winch control lever (fig. 96). This lever, located on the left side of the cab floor, controls the engagement and disengagement of the rear-winch clutch and brake.

(2) Power-divider control lever (fig. 96). This lever, projecting from the intermediate tunnel on the floor of the cab, controls the shifting of the power-divider.



Key	Item	Key	Item
A	Blower duct door	L	Multibreaker
B	Ventilator blower receptacle	M	Lifting eyes
C	Ventilator blower	N	Power receptacle (24-v)
D	Dome light (115-v)	P	Dome light switch (115-v)
E	Power receptacles	Q	Heater fuel pump
F	Thermostat	R	Front door retainer
G	Dome light (24-v)	S	Side doors
H	Rear door holder	T	Dome light switch (24-v)
J	Main body wiring harness	U	Trailer electrical connector
K	Heater, assembly	V	Ladder

Figure 92. Van body miscellaneous components

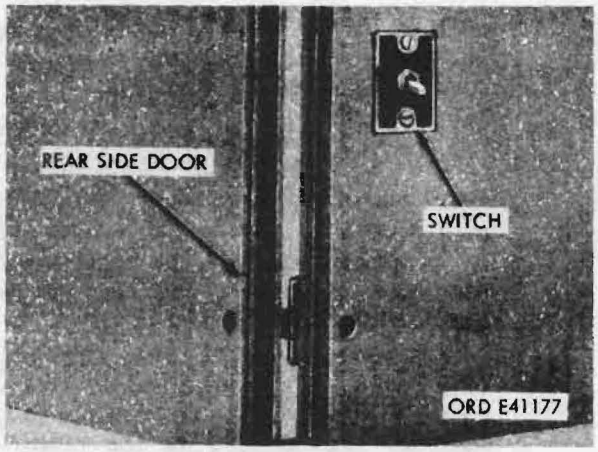


Figure 93. 24-volt dome light switch

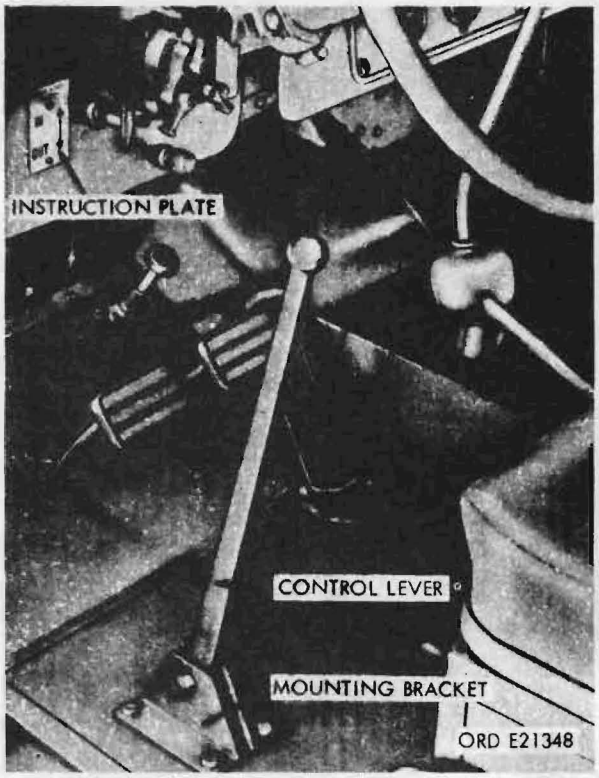


Figure 94. V-17A/MTQ rear winch control lever

(3) Earth boring machine control lever operating handles (fig. 97). The earth boring machine feed and drive control lever operating handles, located on the left side of the feed and drive clutch shaft tube, control the action of the clutch and brake assemblies.

(4) Auger rack lock (fig. 97). The auger rack lock, located in the derrick tube base, secures the auger rack from vertical movement when the earth boring machine is not operating.

(5) Vertical power leveler shifter shaft lever (fig. 97). This lever, located on

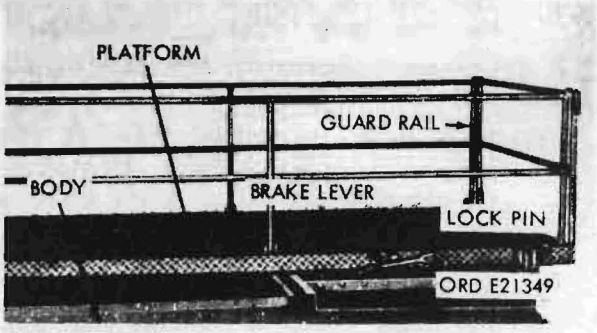


Figure 95. Revolving platform

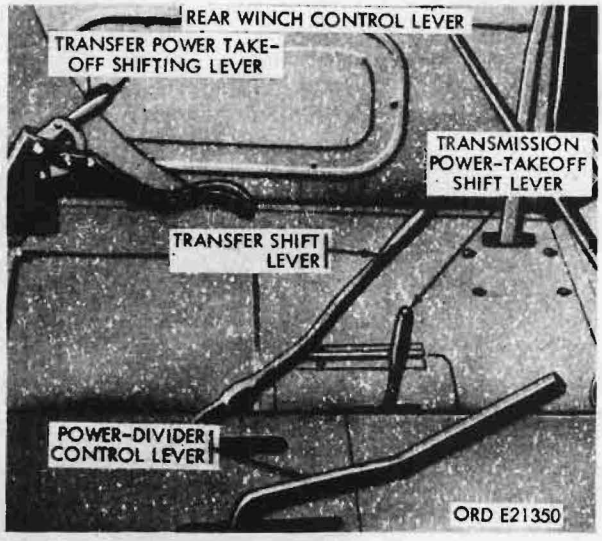


Figure 96. V-18A/MTQ control levers in cab

Figure 97. Earth boring machine controls

the boring machine, is used to engage or disengage the vertical leveler.

41. Instruments

a. Except where specifically noted, the controls listed in this paragraph are generally applicable to all vehicles covered in this manual.

(1) *Speedometer, odometer* (*fig.* 98). The speedometer, odometer, located on the instrument cluster, indicate the vehicle road speed in miles per hour and record total mileage.

(2) *Tachometer* (*multifuel engine vehicles only*) (*fig.* 98). The tachometer, located on the instrument cluster of all late production model multifuel engine vehicles, indicates the engine speed of the truck in revolutions per minute.

(3) *Ammeter* (*E, fig.* 31). The ammeter, located on the instrument cluster of early gasoline model trucks, is marked BATTERY on the gage face. This gage indicates the charging activity of the charging system. The ammeter should indicate a high charge reading when the engine is first started, then if the battery is fully charged, the indication should return to slightly above zero with all lights and accessories turned off. An abnormal discharge reading with the engine at idle speed, with the lights and accessories off, or failure to indicate charge when using all lights, may indicate a deficiency in the charging system. Later production model trucks are equipped with a battery-generator indicator in place of the ammeter.

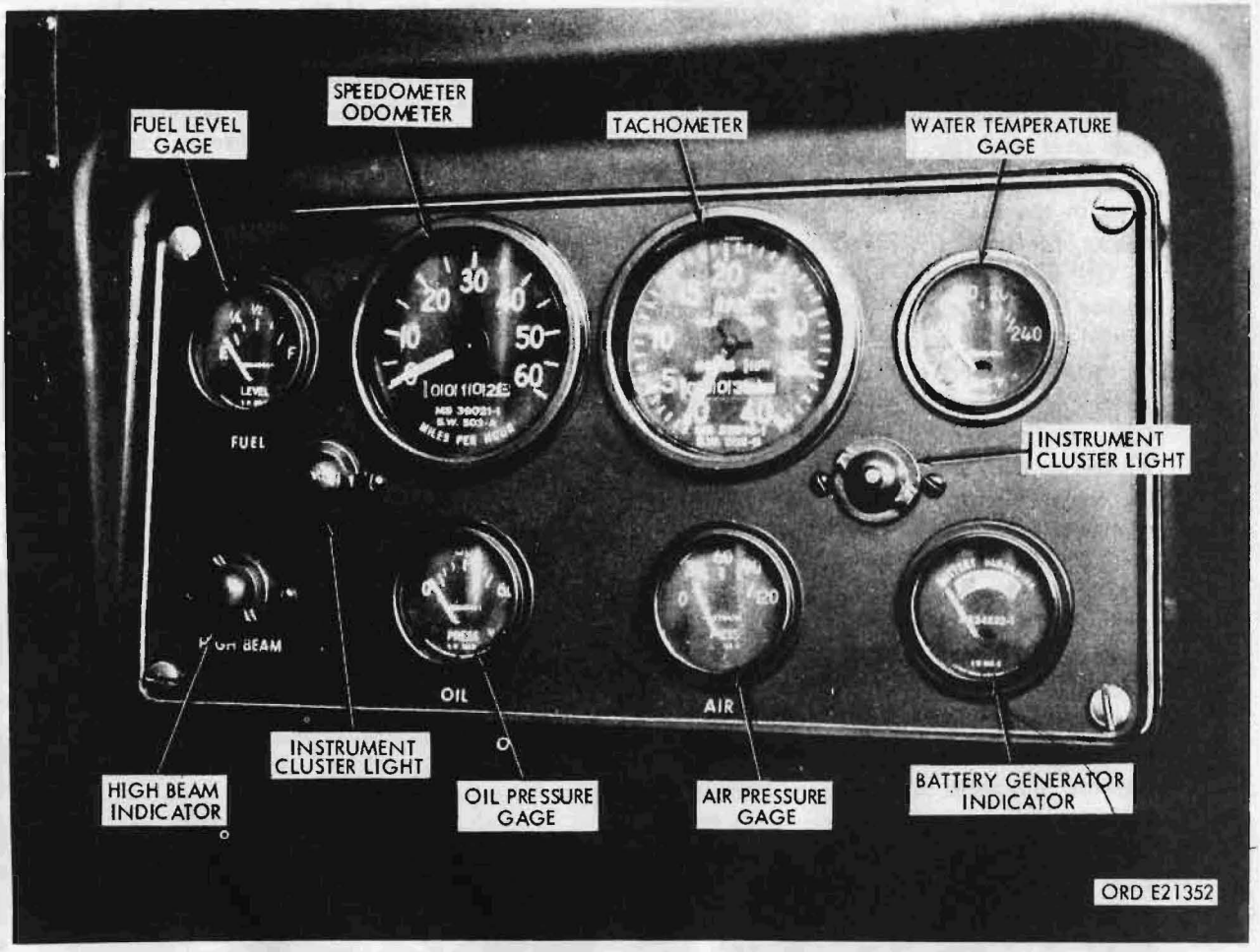


Figure 98. Instrument panel — multifuel engine vehicle.

(4) *Battery-generator indicator* (*fig.* 98). The battery-generator indicator, located on the instrument cluster of later production gasoline model trucks and all multifuel models, is marked BATT GEN INDICATOR on the gage face. This gage indicates the charging activity of the charging system. The gage should indicate GENERATOR (pointer in green arc) when the engine is first started, and continue to indicate charging activity as the engine speed is increased, depending on the amount of electrical power being used. When the battery is supplying normal current to electrical units, the pointer should indicate BATTERY (yellow arc). An abnormal discharge reading (pointer in BATTERY red arc), with the engine running at normal speed indicates a deficiency in the charging system. Failure to indicate a charge reading while using all lights may also indicate a deficiency in the charging system.

(5) *Fuel level gage* (*fig.* 98). This gage, located on the instrument cluster, indicates the fuel level in the fuel tank. On gasoline engine trucks, the ignition switch must be turned to ON to actuate the gage. On multifuel engine trucks, the accessory switch must be turned to ON to actuate the gage.

(6) *Oil pressure gage* (*fig.* 98). This gage, located on the instrument cluster, is marked OIL on the panel under the gage, and PRESS on the gage face. The gage indicates the engine oil pressure when the engine is running. When the engine is started cold, the oil pressure may rise sharply, then recede to normal after the engine is warmed up. When the engine is idling, the pressure gage should indicate approximately 15 psi. With the engine operating at road speeds, the pressure should indicate 45 to 50 psi on the gage. The absence of, or low oil pressure indication during engine operation, indicates a faulty oiling system or an inoperative gage circuit. When the oil pressure gage indicates zero or low oil pressure while the engine is running, the engine should be stopped immediately and the cause of the low indication determined.

(7) *Water temperature gage* (*fig.* 89). This gage, located on the instrument cluster, is marked TEMP F° on the face of the gage. The purpose of the gage is to indicate the temperature of the engine coolant in degrees Fahrenheit. Operating temperatures between 160°F. and 180°F. are satisfactory for normal engine operation. If the temperature rises sharply during warmup or normal operation, stop the engine and determine the cause. Excessively low operating temperatures during normal operation may indicate a faulty cooling system.

(8) *Air pressure gage* (*fig.* 98). This gage, located on the instrument cluster, is marked AIR on the panel under the gage, and PRESS on the gage face. Some air pressure gages are electrical and are actuated by turning on the ignition switch (accessory switch for multifuel engine vehicles). The other type of air pressure gage is air-type which shows the existing air pressure at all times. The purpose of the gage is to indicate the amount of air pressure in the air reservoirs. Full pressure in the system is 100 to 105 psi. With the engine running, the air compressor governor cuts in at approximately 85 psi and builds the pressure up to 100 to 105 psi. The vehicle should not be moved until the air pressure is up to 85 psi. Trucks are equipped with a low air pressure warning buzzer which operates until air pressure is above 65 psi. If during vehicle operation, the low air pressure warning buzzer sounds, the vehicle should be stopped and the cause of the air leakage corrected.

(9) *Air filter indicator* (*fig.* 32) (*multifuel engine vehicles only*). This indicator, mounted on the bottom of the instrument panel beneath the steering wheel, indicates the condition of the engine air filter. When the indicator gage rises and locks in the full red position, insufficient air for proper engine operation is passing through the air filter indicating the filter must be cleaned as soon as possible. The indicator is equipped with a reset button which is depressed after the filter has been cleaned. This will remove the red indication from the indicator.

b. Expansible Van Truck Instruments (*M292*).

(1) *Heater indicator* (*fig.* 86). The heater indicator, located on the heater con-

trol panel, indicates white as long as the heater is functioning normally. If the heater is not functioning normally, the heater indicator goes out.

(2) Heater warning light (fig. 86). The heater warning light, located on the heater control panel, indicates red when there is a malfunction in the heater operation. When the malfunction has been corrected the reset button should be depressed which will cause the warning light to go out.

(3) Air conditioner warning lamp (fig. 87). The air conditioner warning lamp, located on the air conditioner control panel, indicates red when the air conditioner is operated with the bonnet front door closed. When the bonnet front door is opened, and the reset button is depressed, the warning light will go out.

c. Electronic Shop Van Truck XM567 Heater Warning Light (Fig. 89). This light located on the heater control panel, illuminates red when a heater malfunction occurs. After the malfunction is corrected, the reset button should be depressed, the indicator will go out.

d. Gasoline Tank Truck Instruments (M49, M49C, and M49A1C).

(1) Differential pressure gage (B, fig. 71). This gage, located in the rear compartment, indicates pressure differences between the inlet and outlet sides of the segregator tank. This provides information on the condition of the filter elements.

(2) Meter gage (fig. 99). This gage, located on top of the meter, indicates the number of gallons pumped or transferred by the pumping unit.

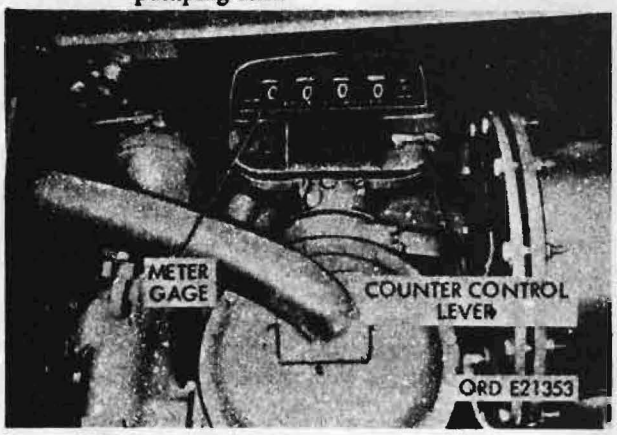


Figure 99. Meter gage

Section III. OPERATION UNDER USUAL CONDITIONS

42. General

This section contains instructions for the mechanical steps to operate the materiel listed in Chapter 1, Section I, under conditions of moderate temperatures and humidity. For operation under unusual conditions, refer to Section XVII. Refer to paragraphs 37 through 41 for information on controls and instruments. The operator should become familiar with the basic differences in operating gasoline engine model vehicles and multifuel engine model vehicles (figs. 31 through 99).

43. Starting the Engine

a. Preliminary Operations Gasoline and Multifuel Engines.

Note. Before attempting to start the engine, the driver must become familiar with the purpose and location of the various instruments and controls described in paragraphs 40 and 41.

(1) Perform the before-operation services given in table 12 before operating the vehicle.

(2) Apply the parking brake (fig. 34).

(3) Place the transmission-gearshift lever (fig. 100) and the transmission power take-off shifting lever (fig. 33) in the NEUTRAL positions. Place the transfer-shift lever (fig. 100) in LOW or HIGH operating range, depending on the expected terrain, load and vehicle speed.

Caution: Allowing the engine to run with the transmission engaged and the transfer case in NEUTRAL may cause bearing failures in the transfer case due to a lack of lubrication. Shift the main transmission to NEUTRAL when running the engine with the vehicle stationary. On trucks equipped with transfer P.T.O., the transfer case can be operated in NEUTRAL with P.T.O. engaged which lubricates the transfer case bearings.

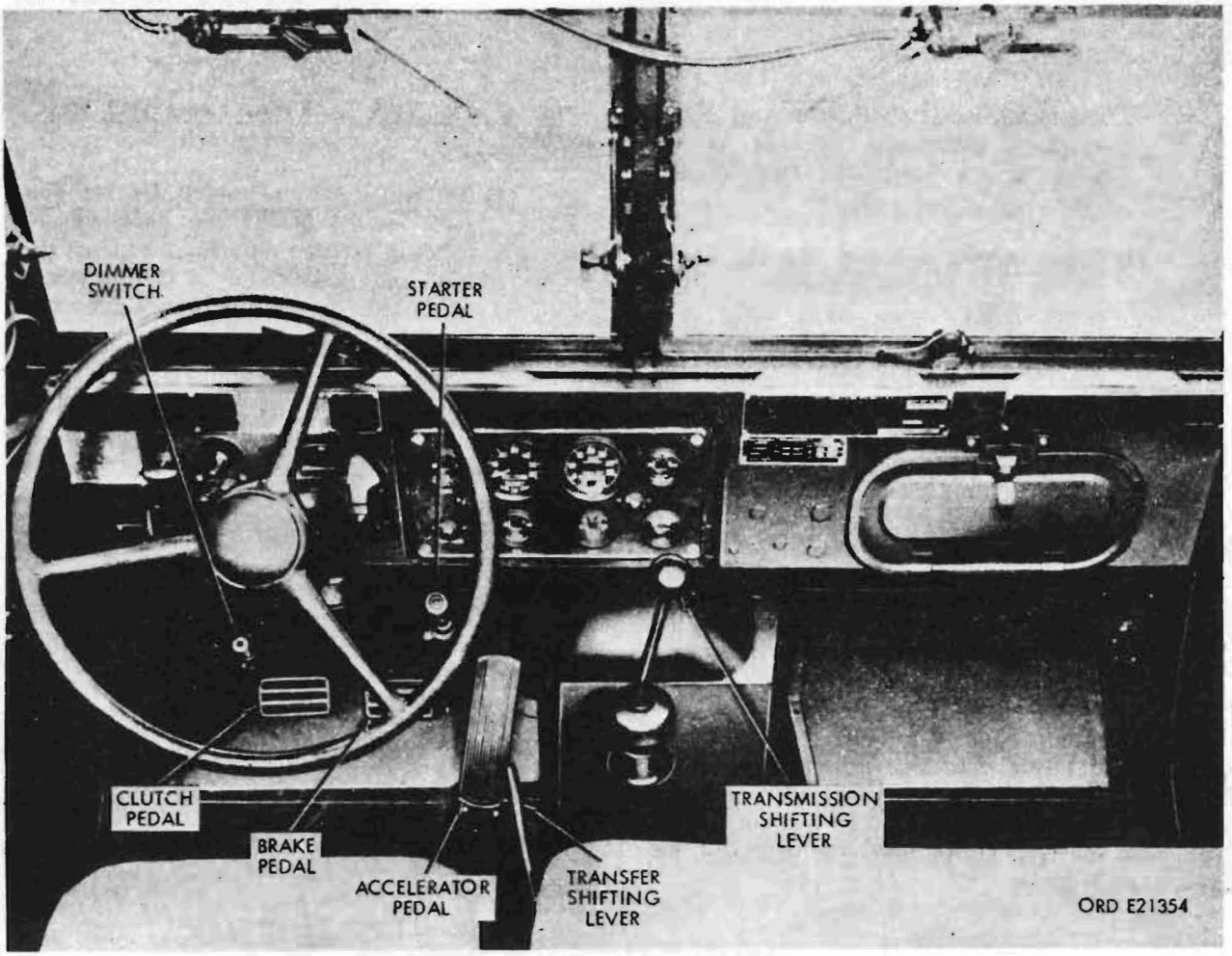


Figure 100. Cab floor controls

(4) On vehicles equipped with the transfer power takeoff, place the transfer power-takeoff shifting lever (fig. 34) in the NEUTRAL position.

(5) On the dump trucks, position the hydraulic hoist driver's-control lever (fig. 56) in the BODY DOWN or "A" position and lock.

b. Starting the Gasoline Engine.

(1) Pull the choke control knob (T, fig. 31) out when starting a cold engine. In warm weather, or when the engine is warm, use the choke sparingly. When starting a hot engine, never pump the accelerator pedal or use the choke. Pull out the hand-throttle knob (fig. 101) one-quarter of its travel.

Warning: Use the hand throttle for cold engine starting and warmup only. Do not use for vehicle acceleration.

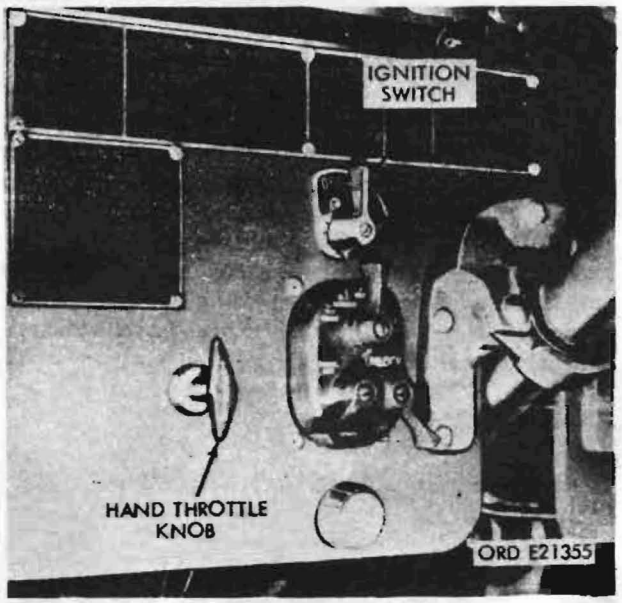


Figure 101. Instrument panel - left side

(2) Turn the IGNITION switch (fig. 101) to the ON position.

Caution: Never start the engine with the headlights on. This is to avoid excessive battery discharge.

(3) Depress the clutch pedal (fig. 100) to disengage the clutch, and hold the pedal down while the engine is started.

(4) Step on the starter pedal (fig. 100) to start the engine. Release the starter pedal as soon as the engine starts.

Caution: The starter should not be operated continuously for more than 30 seconds. If the engine fails to start within 30 seconds, wait 10 to 15 seconds before trying again. If the engine does not start after a reasonable time, determine the cause and correct it (par. 118). If necessary, the engine may be started by towing (par. 49), or slave starting (par. 125).

(5) Release the clutch pedal.

(6) Push the choke-control knob in to a point at which the engine operates without misfiring. As the engine warms up, push the choke-control knob all the way in.

(7) Permit the engine to run slightly above idle through a short warmup period whenever conditions permit. This warmup period allows time for the driver to observe the ammeter (par. 41) or the battery-generator indicator (par. 41), the oil-pressure gage (par. 41), the air pressure gage (par. 41), and the water-temperature gage (par. 41). Check the performance of the engine before the vehicle is placed in motion. If the ammeter or battery-generator indicator does not show CHG or GENERATOR with the engine running at a fast idle, determine the cause (par. 119) and correct it. Stop the engine and investigate the cause if the oil-pressure gage does not show pressure within 30 seconds after the engine starts. Normal engine-operating temperature range is 160°F. to 180°F. As a general rule, the engine speed equivalent to the truck-road speed of five mph should bring the temperature to 160°F. or above. If the temperature rises quickly to 210°F. or more, or if the temperature stays below 160°F., stop the engine and determine the cause of overheating or overcooling (par. 119).

Warning: Never operate the vehicle before the air pressure warning buzzer stops.

c. Starting the Multifuel Engine (Fig. 32).

(1) Turn the ACCESSORY switch to the ON position. Hold the ENGINE STOP knob out in the "fuel off" position while performing step (2) to make certain that the engine is not hydrostatically locked.

Caution: For cold-weather starting below +20°F., observe the manifold heater switch instruction plate on the left side of the instrument panel. Do not use the manifold heater unless the engine is being cranked or idling. Use the heater intermittently at idle until the engine is running smoothly.

(2) Depress the starter pedal and operate for five seconds.

(3) Release the ENGINE-STOP-KNOB (fig. 32) to its normal "Fuel On" position.

(4) Pull the hand throttle (fig. 32) out to one-half of its maximum travel for cold engine warmup.

Warning: Use the hand throttle for cold engine starting and warmup only. Do not use for vehicle acceleration.

(5) Depress the clutch pedal (fig. 100) to disengage the clutch, and hold the pedal down while the engine is started.

Note. Never start the engine with the headlights on. This is to avoid excessive battery discharge.

(6) Step on the starter pedal (fig. 100) to start the engine. Release the starter pedal as soon as the engine starts. Release the clutch pedal.

Caution: Do not operate the starter continuously for more than one minute.

If the vehicle does not start immediately, allow a two-minute cooloff period before operating the starter again.

(7) Check the instrument cluster. The oil pressure gage (fig. 98) should read above 15 psi. The battery-generator indicator (fig. 98) should read in the green area.

Caution: If the oil pressure does not register within 20 seconds, stop the engine immediately by holding the ENGINE-STOP-handle in the "Fuel Off" position.

(8) Check the air pressure. The air-pressure gage (fig. 98) should read above 65 psi.

Warning: The low air pressure warning buzzer should stop soon after the engine has started. Do not operate the vehicle until the buzzer is silent.

d. Cold-weather Starting for Multifuel Engine Trucks (-25°F. to +35°F.).

(1) Accomplish steps (1) through (8) above.

(2) Depress the clutch pedal (fig. 100) to disengage the clutch, and hold the pedal down while the engine is being started.

(3) Step on the starter pedal (fig. 100) and turn the manifold heater switch to the ON position while the engine is cranking.

Caution: Do not operate the manifold heater unless the engine is being cranked or is idling.

Note. The manifold heater should be used when operating on gasoline at ambient temperatures below +20°F., or when operating on compression-ignition fuel, diesel, or turbine fuels at ambient temperatures below 0°F.

(4) Release the engine stop handle to the in, "Fuel On," position and at the same time depress the accelerator pedal to the 2/3 or 3/4 position. The engine should fire and continue running within 30 seconds. If the engine fails to start, stop cranking, turn the manifold heater switch to the OFF position, wait two minutes, and then repeat the above starting procedure.

(5) The manifold heater should be operated as required during the cranking operation.

Note. If the engine misses or does not fire smoothly after starting, use the manifold heater intermittently while the engine is idling and during acceleration, until all of the cylinders are firing.

Caution: Immediately after starting a cold engine, push in the hand throttle until the tachometer indicates 800 rpm. Allow the engine to warm up until the temperature reaches 140°.

44. Placing the Vehicle in Motion (Gasoline and Multifuel)

a. The purpose and use of the transmission and transfer must be understood by the driver before any attempt is made to operate the truck. The truck cannot be moved until the transfer-shift lever is in the HIGH (up) or LOW (down) position (fig. 102). Transmission-gearshift lever positions (fig. 103) do not in any way affect the selection of the transfer range (LOW or HIGH) to be used. The transfer LOW range provides greater power and lower speed in the five transmission speeds to suit heavy loads or difficult terrain conditions. The HIGH range provides greater speed at lower power in the five transmission speeds and is used under normal load and road conditions. The combination of transmission and

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Figure 102. Transfer shifting diagram

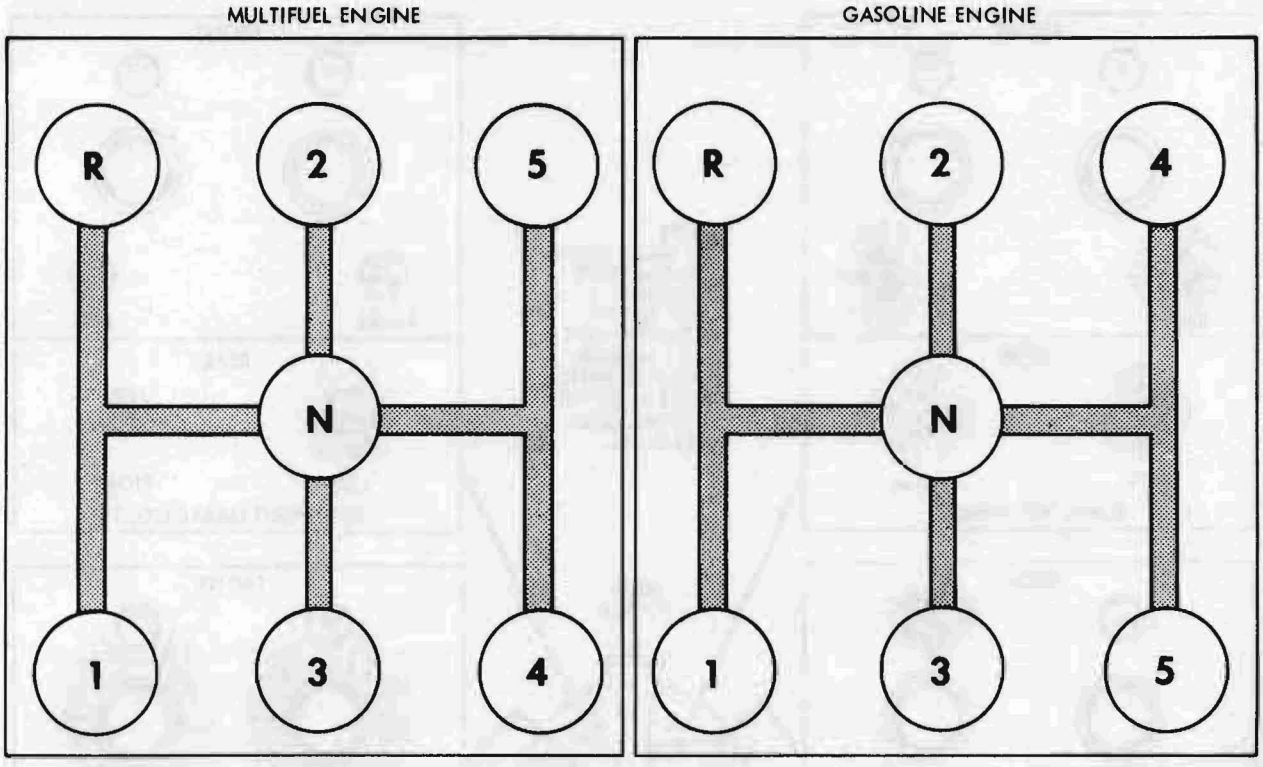

Figure 103. Transmission shifting diagram

transfer gear-ratios gives a total of 10 speeds forward and two speeds reverse.

b. Ensure that the front winch, auxiliary equipment, and tools are locked and stowed for travel.

c. Set the vehicle lights switch for lighting required (Fig. 104).

Warning: Do not put the truck in motion until the low-air-pressure-warning buzzer is silent, and the air-pressure gage indicates pressure of at least 65 psi. Satisfactory braking action depends on this minimum pressure.

d. Set the parking brake by pulling the parking brake lever upward firmly.

e. Depress the clutch pedal (fig. 100), and move the transfer-shift lever to the LOW (down) or HIGH (up) range (fig. 102). The transfer range to be selected depends on the expected terrain, load, and vehicle speed (table 3).

f. Depress the clutch pedal and place the transmission-gearshift lever in the first or reverse operating position depending on the desired direction of travel.

Note. It is mandatory that the first or "low" gear be used to place the vehicle in forward motion under all conditions.

g. When the truck is on level terrain, release the parking brake lever and slowly release the clutch pedal while depressing the accelerator pedal to prevent the engine from stalling and to provide smooth acceleration of the truck. If the truck is on uneven terrain, proceed as follows:

(1) If the truck is headed upgrade, maintain the truck position with the parking brake while depressing the accelerator pedal and releasing the clutch to overcome any tendency of the truck to roll backward. Release the parking brake completely as soon as forward motion is established.

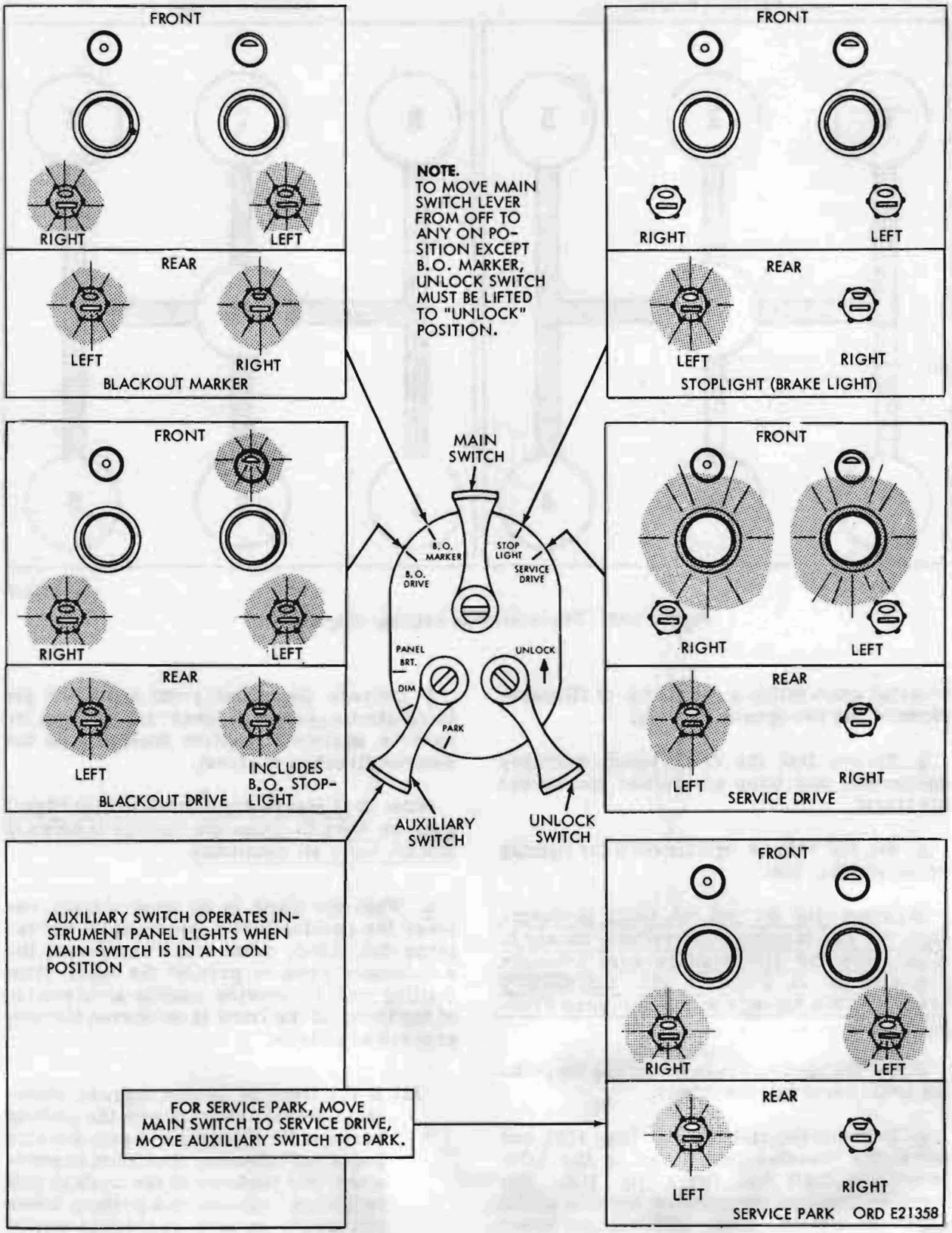

Figure 104. Vehicle lights chart

(2) If the truck is headed downgrade and reverse motion is desired, use the same procedure as (1) above to prevent the truck from rolling forward downhill until reverse motion is established.

Caution: **Do not let the truck coast backward when in forward gear, or coast forward when in reverse gear. This causes the transfer sprag unit (overrunning clutch) to "wind up" and produce a tension which causes difficult transmission shifting. This hard shifting condition will remain until the truck has been driven far enough to permit the front wheels to "overspeed" by the wheels leaving the ground due to bumpy terrain until the tension unwinds. If the truck is on smooth level terrain, the "windup" condition may be relieved by allowing the truck to coast in transmission neutral position for a short time before shifting to a higher gear. This latter procedure should not be attempted while in upgrade motion as the neutral interval could result in loss of forward motion and create a dangerous situation.**

h. As the road speed increases with acceleration and approaches the maximum speed (indicated on the instruction data plate (fig. 29 and 30), depress the clutch and release the pressure on the accelerator. Move the transmission-gearshift lever to the second gear position. Simultaneously release the clutch and depress the accelerator to allow the engine speed to "catch up" to the road speed before the clutch is fully released. Continue to depress the accelerator smoothly until the road speed approaches the maximum speed indicated for the second gear on the instruction data plate. Continue to repeat this process with the third, fourth, and fifth gear positions.

Caution: **Accomplish the shift to the next highest gear position at a road speed just below the allowable maximum for each gear as indicated on the instruction data plate. Shifting too soon or too late causes undue wear on the engine, transmission, and power train components.**

i. When the fifth gear position has been reach, depress the accelerator smoothly until cruising speed has been attained. Vary the pressure on the accelerator to maintain this speed.

j. When driving the truck uphill, or on very rough or soft terrain, the engine will be unable to sustain the cruising speed with the transmission in fifth gear. In order to provide efficient transfer of power from the engine to the rear wheels under these heavy load conditions, the transmission should be shifted to a lower gear position. When shifting to a lower gear position (downshifting), release the accelerator pressure, and depress the clutch pedal quickly to disengage the clutch. Allow the transmission gears to slow down sufficiently to allow quiet smooth gear engagement at a lower gear; increase the engine speed and shift the transmission to a lower gear, and release the clutch pedal slowly. Use the same procedure (downshifting) when driving down a steep grade to reduce the truck speed.

Note. If the operating condition of the truck is such that double-clutching becomes necessary to shift the transmission gears, notify the direct support maintenance unit.

k. If the terrain is nearly all hilly, soft, or rough, and the truck is loaded near its maximum capacity, a better transfer of engine power will be attained by shifting the transfer gears from HIGH to LOW range. The speed of the truck must be reduced below the maximum speed for the gear in which the shift will be made. The vehicle instruction data plate lists these speeds. Depress the clutch pedal and move the transfer-shift lever down to the LOW range. Release the clutch pedal and accelerate to the desired speed. The transfer may be shifted from LOW to HIGH range regardless of truck speed, but be sure to synchronize the engine with the truck speed before releasing the clutch pedal (refer to table 10).

Note. While driving the truck, perform the during-operation services given in table 12.

45. Stopping the Vehicle

a. To stop the truck, remove foot from the accelerator pedal and apply the brakes by depressing the service brake pedal. Do not pump the brake pedal or shift the transmission into the NEUTRAL position. Apply even brake pressure and allow the engine to assist in checking the truck speed.

b. When the truck speed has been reduced to engine idling speed, depress the clutch pedal and move the transmission-gearshift lever to the NEUTRAL position.

Table 10. Transfer Shifting Warning Data

Gasoline		Multifuel	
Warning: **Do not shift transfer case to low when vehicle speed is over—**		***Warning:*** **Do not shift transfer case to low when vehicle speed is over—**	
Fifth	**29 mph**	**Fifth**	**28 mph**
Fourth	**20 mph**	**Fourth**	**22 mph**
Third	**12 mph**	**Third**	**14 mph**
Second	**7 mph**	**Second**	**8 mph**
First	**4 mph**	**First**	**5 mph**
Reverse	**4 mph**	**Reverse**	**5 mph**

c. When the truck has come to a complete stop, apply the parking brake, release the service brake pedal, and release the clutch pedal. Do not let the truck coast backward.

46. Reversing the Vehicle

Caution: **The truck must be at a complete stop before shifting into reverse.**

Depress the clutch pedal and move the transmission-gearshift lever to the reverse position. (The transfer-shift lever may be in either LOW or HIGH range.)

b. Release the parking brake.

Caution: **Do not let the truck coast forward when in reverse gear.**

c. Depress the accelerator and releast the clutch slowly.

Caution: **Do not exceed the maximum speed in reverse called out on the vehicle instruction and caution-data plate.**

47. Stopping the Engine

Note. At the end of the day's operations, perform the after-operations services as outlined in table 12.

a. Gasoline Engine. After the vehicle is at a complete stop, turn the IGNITION switch to OFF, place all switches in the OFF position, and set the parking brake.

b. Multifuel Engine. After the vehicle is at a complete stop, place the ACCESSORY switch and all other switches in the OFF position, pull the ENGINE-STOP-handle out until the engine is no longer operating, and apply the parking brake.

48. Driving Precautions

Note. Perform the necessary services outlined in table 12.

a. Maximum Road Speeds. Table 3, and the vehicle instruction and caution-data plate on the instrument panel, give the maximum speeds at which the truck may be safely operated in various transmission gear-ratios with the transfer in either HIGH or LOW range. Do not exceed these specified speeds. Shift the transmission to the next higher gear when the truck speed approaches the maximum road speed of the gear being used.

b. Descending Steep Grades. It is very important to restrain the vehicle speed while descending a steep grade. In general, go down hill in the same gear or one gear lower than required to climb the hill and keep engine rpm below the red line on the tachometer. It is important to keep the engine from overspeeding by using the foot brake.

Caution: **Multifuel engines CANNOT be used to brake a vehicle on a downgrade or at any other time. Trying to use the engine to brake speed will damage the engine.**

Do not allow the vehicle speed to exceed the speeds specified on the vehicle instruction and caution data plates. Multifuel vehicles should be operated within the following rpm limits:

A	*B*	*C*	*D*
1,200	1,400–1,800	1,400–2,200	2,600

A—Lowest engine rpm that engine should be operated at under load.

B—Low rpm is recommended rpm for downshifting. DO NOT downshift at higher rpm than the high rpm shown.

C—Recommended rpm range for cruising operation.

D—Highest rpm to operate when pulling a very heavy load and when going up a very steep hill.

In addition, observe the following instructions.

(1) Keep vehicle under control at all times.

(2) Take extra precaution when the truck is loaded. The possibility of overspeeding is greatest in this case.

(3) Do not allow the vehicle to exceed the maximum permissible speed for the particular gear ratio in use.

(4) Use the service brake, when necessary, to hold the vehicle below the maximum speed of the gear ratio in use.

Note. The service brake should be applied with an on-and-off motion of the service brake pedal to prevent overheating of the brakeshoe linings when descending steep grades.

(5) The transfer low range may be used to increase the selection of available gear ratios. When shifting the transfer from HIGH to LOW range, the truck speed must be reduced below the maximum speed of the gear into which the shift will be made. Make sure that the engine speed is synchronized with the truck speed before releasing the clutch pedal.

c. Ascending Steep Grades. When ascending steep grades, always shift into a lower gear before the engine begins to labor. The transfer LOW range increases the number of speeds provided by the transmission.

49. Towing the Vehicle

a. Towing To Start the Engine.

Note. For multifuel engine vehicles, approval from the maintenance officer must be obtained before towing to start the engine.

(1) Use a tow chain or line that is long enough to permit maneuverability of both vehicles.

***Caution:* Do not attempt to tow a disabled vehicle with the tow chain wrapped around the center of the front bumper.**

(2) Attach the tow chain to both lifting shackles of the vehicle being towed. Do not attempt a towing operation with the tow line attached to one shackle.

(3) Place the transfer-shift lever in HIGH range.

(4) Place the transmission-gearshift lever in fifth (high) gear.

(5) Pull out the hand throttle three-quarters of an inch.

(6) Pull out the choke-control knob part way (gasoline engines only) if the engine is cold.

(7) Turn the IGNITION switch to the ON position. (For multifuel engines, turn the ACCESSORY switch to ON.)

***Caution:* Make certain that the service brakes are operating on the towed vehicle before towing. Avoid quick starts and jerking.**

(8) Hold the clutch pedal in until the truck speed reaches approximately 10 mph, then slowly let the clutch pedal out to engage the clutch, and depress the accelerator pedal as necessary.

(9) When towing multifuel models during cold weather, move the manifoldheater switch to the ON position after releasing the clutch pedal.

(10) When the engine starts, push in the clutch pedal and move the transmission-gearshift lever into the neutral position.

(11) On multifuel models during cold weather, turn the manifold heater switch OFF and ON intermittently until the engine is warm.

(12) The truck may be pushed to start the engine if towing is impossible. If this is done, use the same procedure as in (3) through (11) above.

b. Towing a Disabled Vehicle.

***Caution:* Particular care must be exercised when towing disabled trucks to ensure that no additional damage occurs. If there is known damage to the transfer, axles, or transmission, do not attempt to tow the vehicle. Notify the direct support maintenance unit.**

(1) Connect the tow bar, chain, or line to the front lifting shackles (fig. 105).

(2) Place the transfer-shift lever and the transmission gearshift lever in the NEUTRAL positions.

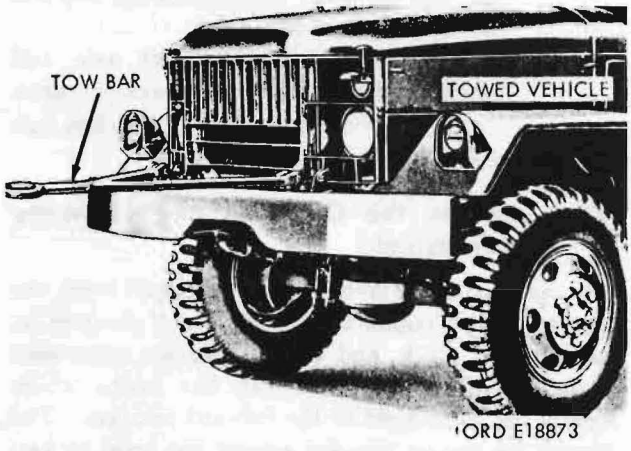

Figure 105. Truck with tow bar attached.

Caution: **Do not push a disabled vehicle. Tow the disabled vehicle only with a tow bar, cable, or chain.**

(3) Release parking brake of the disabled vehicle before beginning towing operations.

Caution: **Do not attempt towing operations with the front or rear wheels of the disabled vehicle off the ground. Notify the direct support maintenance unit.**

c. Vehicle Towing in Storage Area. When pushing or towing a vehicle either forward or backward in the storage area, the transfer case should be shifted into neutral. If the truck is to be pushed forward, the transmission should be shifted into neutral; and if the truck is to be pushed backwards, the transmission must be shifted into reverse.

d. Vehicle Towing on Highway. When towing a vehicle on the highway, use the following procedures to prevent damage to the power train.

(1) Use approved heavy duty towbars or steering cables.

(2) Wire the transfer case shift lever and transmission shift lever in neutral positions.

(3) Mark one corner of mating flanges of the front axle propeller shaft assembly at both the transfer case and front axle with paint, to assure proper assembly.

(4) Remove propeller shaft, bolts, and nuts and store with vehicle.

Note. Make sure that arrow marks stamped on the shaft and sleeve yoke at slip joint are visible. If not, mark both members to assure proper assembly. Protect U-Joints from dirt, etc.

(5) Match mark rear flanges of the forward rear axle propeller shaft (between transfer case and forward rear axle).

(6) Disconnect propeller shaft at axle and fasten securely to cross members of frame.

Caution: **Assure that shaft does not vibrate loose during transit.**

50. Removing the Cab Top and Lowering the Windshield

a. General. The vehicles are equipped with the removable cab paulin top, consisting of the paulin, lashing rope, studs, and various handles, channeled posts and crossbars. The cab has knobs which release the windshield to the forward position. The windshield can be held flat against the hood by two windshield catches.

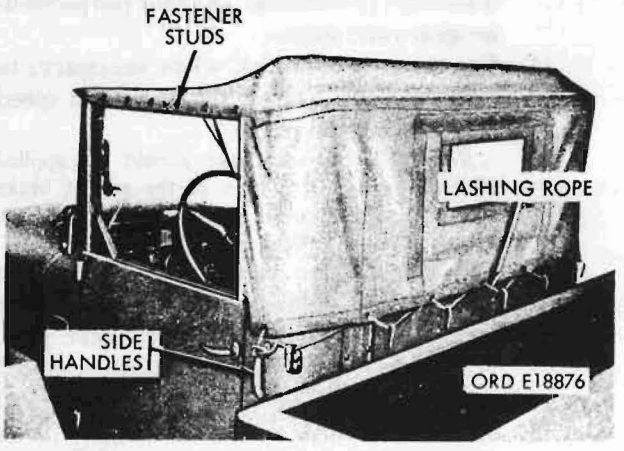

Figure 106. Paulin cab top holddown components.

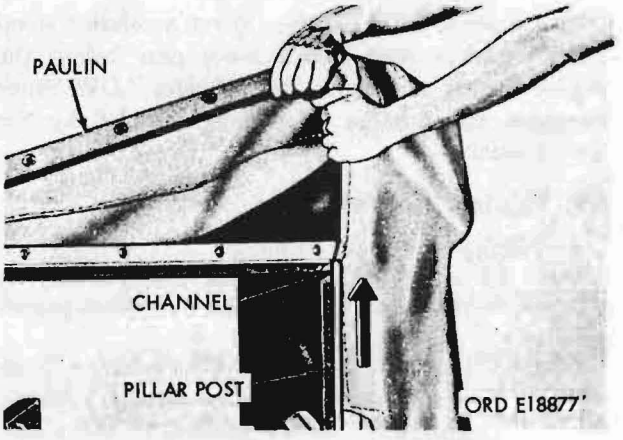

Figure 107. Removing cab top paulin.

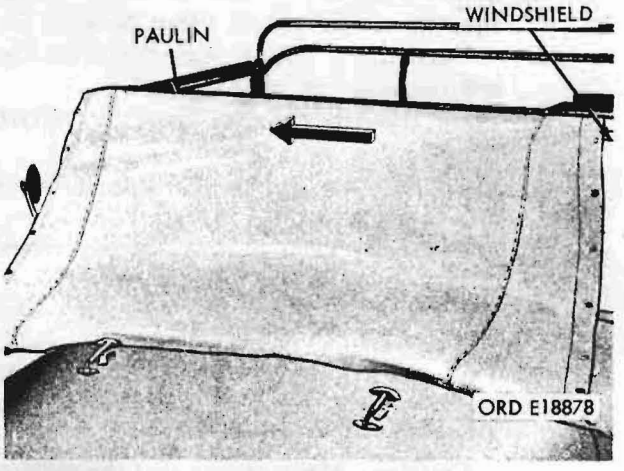

Figure 108. Removing paulin from windshield.

b. Operation.

(1) Release the lashing rope from the side handles and from the hooks at the rear of the cab. Release the paulin from the fastener studs in the side-roof rails (fig. 106).

(2) Slide the paulin up from the channels in the pillar post (fig. 107).

(3) Throw the paulin over the windshield and pull the paulin edge from the channel in the windshield (fig. 108).

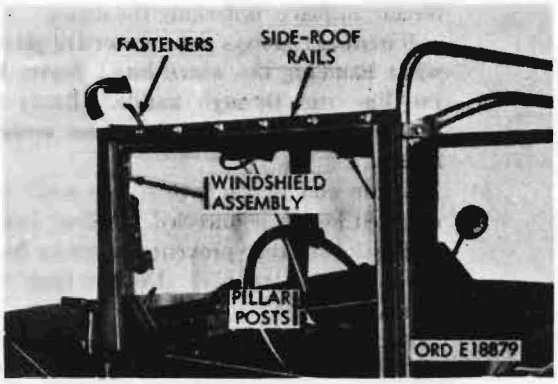

Figure 109. Disassembling cab top frame.

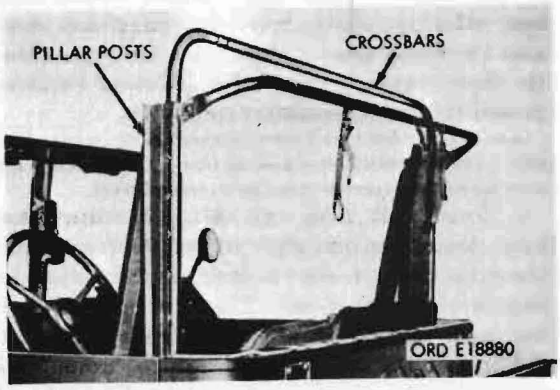

Figure 110. Removing pillar posts and crossbars.

(4) Disengage the side-roof rails from the windshield assembly and fold them in and down to the pillar posts (fig. 109).

Note. To disengage the side-roof rails, lift the fasteners.

(5) Remove the pillar post from the cab and disassemble by removing the crossbars (fig. 110).

Caution: **The inner frame must be closed before lowering the windshield.**

(6) Loosen the two knobs and fold the windshield assembly forward. Secure the windshield with the two catches (fig. 111).

Figure 111. Lowering windshield.

Section IV. OPERATION OF FRONT WINCH

51. General

Any of the 2½-ton 6 x 6 vehicles covered in this manual can be equipped with a front winch (fig. 43). The front winch is a worm gear, jaw clutch, drum-type mounted on the front of the vehicle on support brackets attached to the left and right side rail extensions. Power for operation is obtained through a propeller shaft extending from the transmission power takeoff. The transmission power takeoff has high, low, and reverse gears, with neutral points between these positions. An internal automatic safety brake is provided to sustain the winch load when the power takeoff is being shifted. The front bumper and the service headlight panels are inverted on vehicles equipped with a front winch.

52. Controls

a. Transmission Power-Takeoff Shifting Lever (fig. 33). Engaging and shifting the transmission power takeoff are accomplished by means of the transmission power-takeoff shifting lever, located in the cab to the left of and behind the transmission-gearshift lever. The transmission power-takeoff shifting lever has three operating and two neutral positions, in the following order from the front of the cab toward the rear: HI, NEU, LOW, NEU, and REV (fig. 33). The shifting lever lock hinge is notched to the lock lever to hold the power takeoff in neutral. This hinge should always be down when the front winch is not in use.

b. Clutch Control Lever (fig. 43). The hand-operated clutch control lever, located on the right rear end of the winch, is used to engage and disengage the winch drum. Moving the lever away from the drum engages the clutch. Moving the lever toward the drum disengages the clutch.

Note. Later front winch production models are equipped with a clutch-control lever locking plate. The locking plate must be raised to operate the clutch control lever.

c. Drum Lock Knob (fig. 43). The drum lock knob, located on the right end of the front winch above the drum, is used to lock the drum when the front winch is not in use. This prevents the winch line from unwinding when the truck is moving. Pulling out the lock knob releases the drum. The knob is locked in the out position by pulling out and rotating a quarter turn.

d. Hand Throttle (fig. 101). The hand throttle, located on the left side of the instrument panel, is used to maintain proper engine speed while operating the front winch. By pulling the hand throttle straight out, the notched control rod will lock out at any point to adjust the engine speed. The throttle is closed by turning the hand-throttle knob and pushing in.

Note. Engine speed must be carefully adjusted while using the transmission power takeoff. Excessive or erratic speed can be avoided by the use of the hand throttle.

e. Snatch Block. Every winch-equipped truck is factory equipped with a snatch block and a tow chain which can be used to anchor it. Rig a two-part line to double pulling capacity for a hard pull. Snatch blocks can also be used for changing direction of pull for better alinement of the winch cable where terrain prevents a direct pull.

53. Operation

***Warning:* Ensure that the front winch driveshaft shear pin is aluminum and not steel or any other substance. Do not operate the front winch unless the shear pin is made of aluminum. Always stand clear of the winch line under load. A snapped line can cause serious injury.**

a. Unwinding Winch Line.

(1) Apply the parking brake. Move the transmission-gearshift lever and the transmission power-takeoff shifting lever to the neutral positions.

(2) Move the clutch control lever as far as it will go to the left (toward the driver's side of the truck) to disengage the drum jaw-clutch.

(3) Pull out the drum lock knob and rotate the knob a quarter turn. The knob should remain in place, unlocking the drum.

***Warning:* Always wear protective gloves while handling the winch line. Never let the line run through hands. Rusty or broken wires on the line can cause serious injury.**

(4) Pull the end of the winch line until the required length is uncoiled. A drag brake on the drum flange prevents the drum from unwinding too rapidly. Do not kink the winch line.

Note. Winch power increases proportionally with the amount of cable reeled off the drum. Do not operate the winch with less than four turns of cable on the drum.

b. Lifting or Pulling Load.

Note. Proper alinement of the front winch with the object being recovered is necessary to ensure proper winding of the winch line. This is particularly important when the winch is not equipped with a level winding device. Position the recovery vehicle and the object being recovered in as direct a line as possible. The footbrakes will hold only as much as the shear pin. If brakes can not hold the vehicle, then use the snatch block. Do not anchor truck to a tree or unyielding object.

(1) Securely attach the end of the winch line to the object being recovered.

(1.1) Where conditions permit, take up slack by backing the truck. If conditions do not permit backing the truck, then do it with the winch; but take it easy when the cable becomes taut.

(2) Move the winch clutch control lever to the right (away from the driver's side of the truck) to engage the jaw-clutch. Never use the jaw clutch to control the winch. Always use the PTO lever and engine clutch.

***Caution:* Always use the hand throttle in the locked-out position when operating the front winch to ensure correct engine speed. Operating the winch at excessive or erratic speeds will result in overloading and damage to the winch.**

(3) Start the engine, leaving the transmission-gearshift lever in the neutral position.

(4) Depress the vehicle clutch pedal and place the power-takeoff hinge in the up position. Move the transmission power-takeoff shifting lever to LOW for heavy loads or to HI for light loads. If in doubt, use LOW.

(5) Release the truck clutch pedal and wind in the winch line as required.

Warning: **During all winch operations, direct all personnel to stand clear of the winch line and load. A snapped winch cable or a shifting load can be extremely dangerous. If the load shifts so as to present a hazard, redistribute the winch load and proceed with the operation. If failure of any part occurs, stop winch operation and notify the direct support maintenance unit immediately.**

(6) The crucial moment is the instant that the slack gives out and tension is applied. As the winch begins to operate, adjust the throttle as necessary to allow the winch to operate smoothly at a moderate speed. Rough or jerky operation means sheared pins, broken cable, vehicular damage, or personnel injury.

c. Stopping Winch.

(1) Depress the vehicle clutch pedal and shift the transmission power-takeoff shifting lever to the NEU position.

(2) Release the vehicle clutch pedal.

d. Lowering Load or Unreeling Slack Cable.

Caution: **Do not operate the front winch with less than four turns of cable on the drum. The cable clamp alone will not hold against a load.**

(1) Depress the vehicle clutch pedal and shift the transmission power takeoff to the REV position. Be sure the regular transmission-gearshift lever is in the neutral position.

(2) Release the vehicle clutch pedal.

(3) As the winch begins to operate, adjust the hand throttle as necessary. Allow the winch to operate smoothly at a moderate speed.

Note. When unwinding the winch line under power without a load, it is necessary to maintain manual tension on the winch line to keep the coils tight on the drum. This prevents crossing coils due to the loosening of the winch line.

e. Winding Winch Line on the Drum.

Warning: **Always wear protective gloves when handling the winch line. Do not allow the winch line to run through the hands. Rusty or broken wires can cause serious injury.**

(1) Attach a load on the end of the winch line. If no load is available, attach the cable to a tree or other stationary object on a level with the vehicle.

(2) Depress the vehicle clutch pedal, leaving the transmission in neutral, and shift the transmission power-takeoff shifting lever to the LOW position

(3) Release the parking brake.

(4) Release the vehicle clutch pedal. The front winch will pull the vehicle forward and wind the winch line on the drum. Light pressure on brake pedal will ensure a tight and neat wind.

Note. Make sure that the first layer of line goes on the drum in order and that each additional layer starts back across the drum properly. If necessary, the line can be hammered or pushed in place with a block of wood to ensure that the first layer is closely wrapped. (If the truck is equipped with a level winding device this will not be necessary.)

(5) When fully wound, secure the end of the line.

f. Locking the Front Winch for Travel (fig. 43).

(1) If the winch is equipped with a level winding device (fig. 44), pull the cable chain up through the space between the bumper and the winch. Wind the chain around the back of the level winding frame, then across the front so that the hook can be attached to the right side of the level winding frame.

(2) If the winch does not have a level winding device, position the cable chain above the bumper and through the left lifting shackle (driver's side), then across the bumper and secure on the right lifting shackle. Turn the winch until the cable is taut.

(3) Ensure that the transmission power-takeoff shifting lever is in the NEU position and held by the lock hinge.

(4) Turn the hand-throttle knob and push it in.

(5) Move the winch clutch control lever to the left side of the vehicle (driver's side) to disengage the jaw-clutch.

(6) Pull out, turn, and release the drum lock knob. Allow the plunger to engage the nearest hole on the drum flange.

(7) If the winch is equipped with a level winding device, lock the level wind lock knob (fig. 44). If necessary, move the level wind by hand to allow the lock plunger to engage the hole in the flange.

g. Shear Pin Replacement. When the shear pin fails, slide the universal joint along the winch drive worm shaft to expose the shear pin hole. Remove the broken parts of the shear pin. With the universal joint in position, lubricate and insert a new aluminum alloy shear pin. Install two cotter pins (fig. 111.1). Check the stop collar adjustment *h* below.

***Caution:* Never substitute rivets, bolts, or nonaluminum pins for the authorized aluminum alloy shear pin.**

h. Stop Collar Adjustment. Loosen the setscrew in the collar. Move the collar towards the rear universal joint until ¾-inch exists between the collar and the universal joint yoke. Tighten collar setscrew securely.

Note. This adjustment is important to prevent the universal joint end yoke from backing off the winch drive worm shaft in event of a shear pin failure.

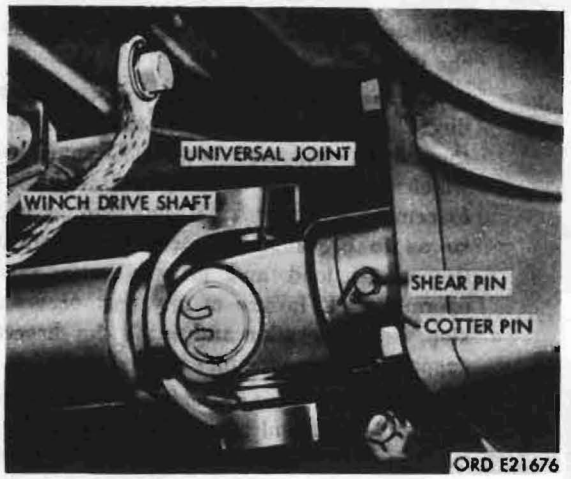

Figure 111.1. Replacing shear pin.

Section V. OPERATION OF DUMP TRUCKS M47, M59, AND M342 AUXILIARY EQUIPMENT

54. General

a. The dump body and hydraulic hoist assembly (fig. 58) are mounted on a subframe secured to the truck chassis frame. Power for operation is obtained from the gear-type hydraulic hoist pump through the hoist pump drive shaft from the transmission power takeoff (fig. 112). Control of body operation is by the hydraulic hoist driver's control lever located to the left of the driver's seat. The dump body endgate is arranged to pivot at the top for normal dumping. The endgate can also be lowered from the top to the horizontal position held by chains. The endgate is held in the closed position by linkage operated by the dump body endgate hand lever mounted at the front left corner of the body. The linkage is self-locking when the lever is up against the body, and the endgate is held closed by latches connected to the linkage.

b. The dump body pivots on two hinge pins, and rests on the subframe when lowered. The body is raised by the hydraulic hoist cylinder (fig. 58) mounted on a transverse base shaft, which pivots in the subframe near the front. The M342 is equipped with two hydraulic hoist cylinders. The piston rod is secured in a crosshead which pivots in lever arms mounted

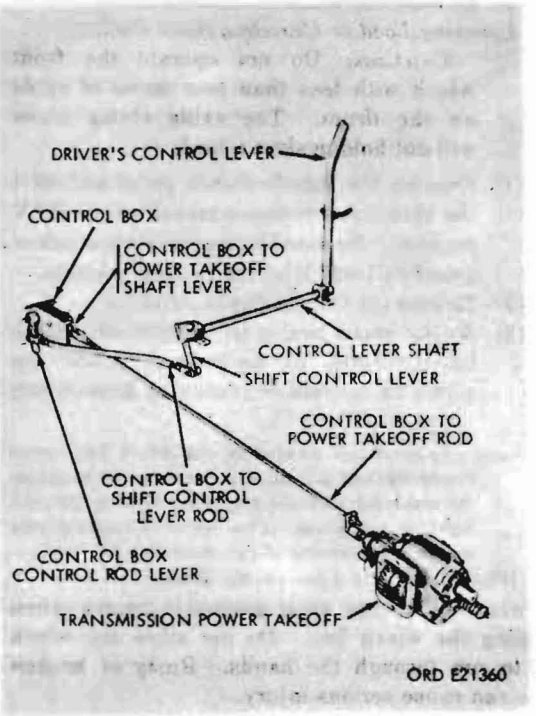

Figure 112. Hydraulic hoist control linkage.

on pin bearings attached to the bottom of the body. The ends of the lever arms are equipped with rollers which engage curved roller ramps on the inner sides of the subframe. The resulting compound motion raises the dump body. (See figure 58.)

c. The hydraulic hoist pump and control valve (fig. 113) are mounted below the forward end of the subframe. The front crossmember of the subframe is a box section which serves as a reservoir for hydraulic oil.

55. Controls

a. Hydraulic Hoist Control Box (Fig. 114). The hydraulic hoist driver's control lever, located left of the driver's seat, operates the control lever shaft and the shift control lever (fig. 112) which extends through the cab floor. The shift control lever is attached to the control box rod, which is connected to the hydraulic hoist control box. The hydraulic hoist control box is located at the front of the hydraulic hoist control valve. The control box contains two cams which are operated by the shift control lever connected to the control lever in the cab. The contour of these cams permits separate positioning of cams according to the position of the driver's control lever in the cab. The power-takeoff lever, mounted on the control box, is connected to a rod which is connected at the other end to the transmission power takeoff. The control box valve shaft levers operate the hoist control valve (fig. 113) which controls body movement. The transmission power-takeoff shifting lever does not have to be moved from the NEUTRAL position to operate the hydraulic hoist mechanism.

b. Hydraulic Hoist Driver's Control Lever (Fig. 56). The hydraulic hoist driver's control lever in the cab has four positions as shown in figure 56. In position A, the body is down or will lower by gravity, and the power takeoff is disengaged. When the control lever is moved downward to position B, the forward arm in the control box is engaged and the shift linkage engages the transmission power takeoff, causing the body to lower under power. To raise the body, the control lever is pushed forward, past position C, to position D. This movement engages the rear cam in the control box, lifts the control valve piston, and raises the body. Body lift may be stopped and held at any point by moving the control lever from position D to position C. Body lowering may be stopped and held at any point by moving the control lever from position B to position C. With control lever in either B or D position, body movement is automatically checked at either up or down position at the limit of travel. The hydraulic hoist driver's control lever is equipped with a safety lock to prevent accidental engagement of the hoist when not in use.

c. Safety Braces (Fig. 58). The safety braces are attached to the sides of the subframe. They are used when body is to be left in the raised position for an extended time.

d. Dump Body Endgate Hand Lever (Fig. 57).

(1) The dump body endgate is normally pivoted at the top. The gate is secured in this position by endgate lockpins inserted through the endgate upper latches. The endgate is held in the closed position by lower latches which are controlled by the dump body endgate hand lever which is located on the front left corner of the body.

(2) To release the endgate for dumping (fig. 115), the hand lever is pulled forward and down. This releases the lower latches and allows the gate to swing open from the bottom as the body lifts. The distance the endgate swings open is controlled by adjustment of the endgate chains in the locking slots.

(3) If necessary, material longer than the body may be carried by closing the lower latches and removing the endgate lockpins from the upper latches. The gate is then supported in the horizontal position by endgate chains which are secured in the upper locking slots. (See figure 116.)

56. Operation

Caution: To ensure relief of hydraulic pressure before removing filler plug, operate the hoist pump with the driver's control lever in the B position for at least one minute.

a. Checking Hydraulic Fluid Level (Fig. 59).

Note. The hydraulic fluid level must be checked with the vehicle on level ground to ensure accurate reading of the fluid level gage.

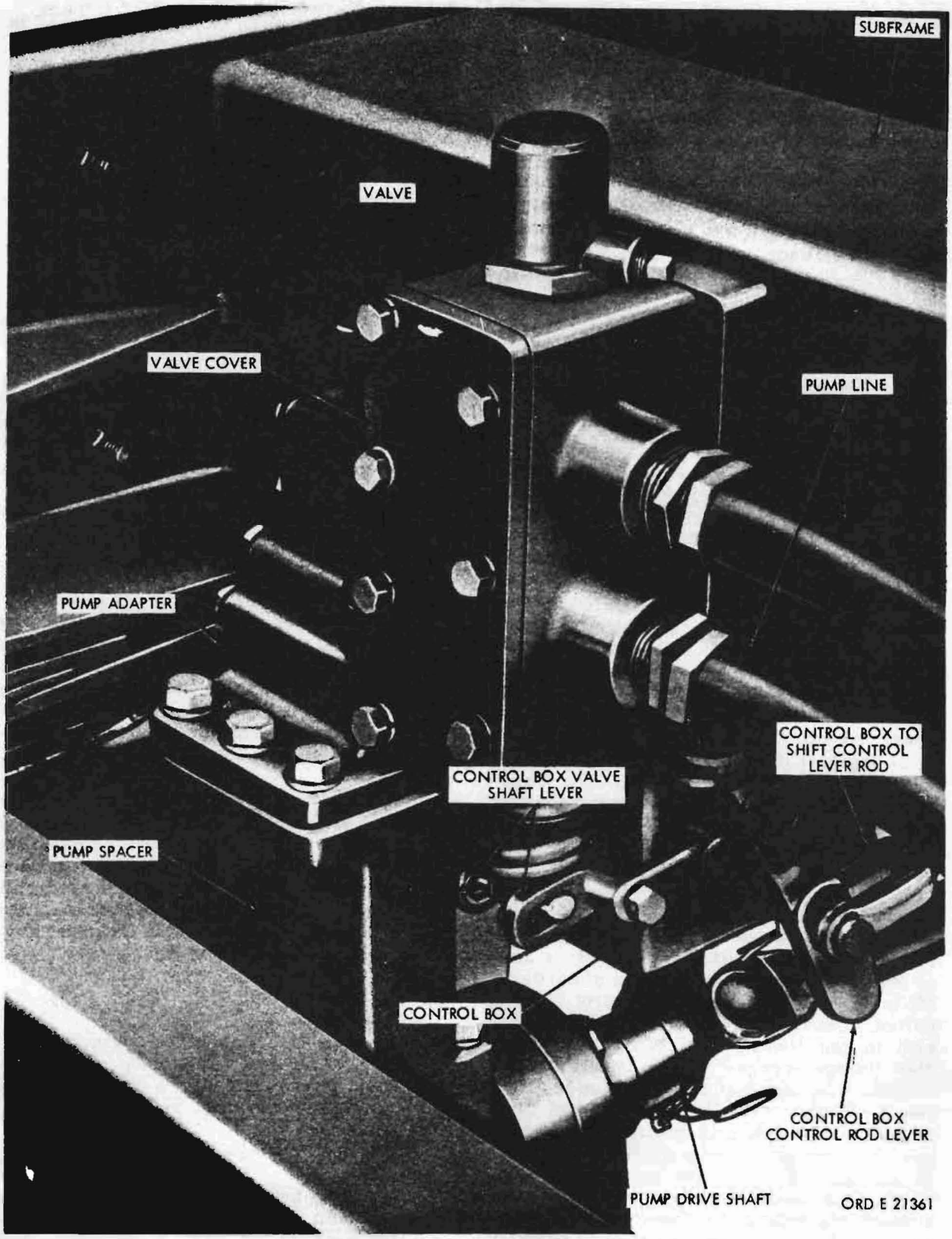

Figure 113. Hydraulic hoist control valve

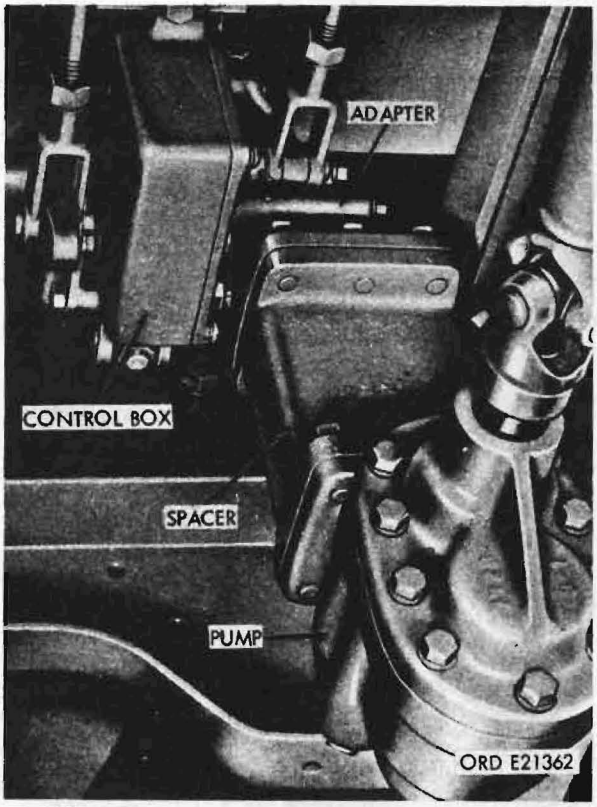

Figure 114. Hydraulic hoist pump and control box - viewed from below

(1) Place the transmission gearshift lever in the neutral position and start the engine.

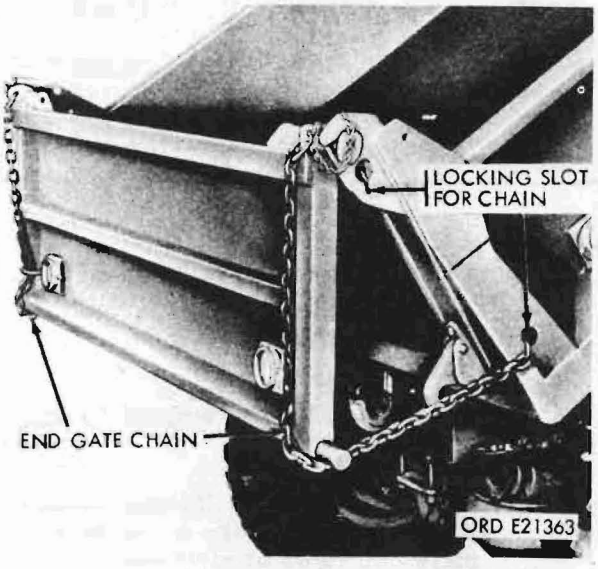

Figure 115. Dump body end gate - open for dumping

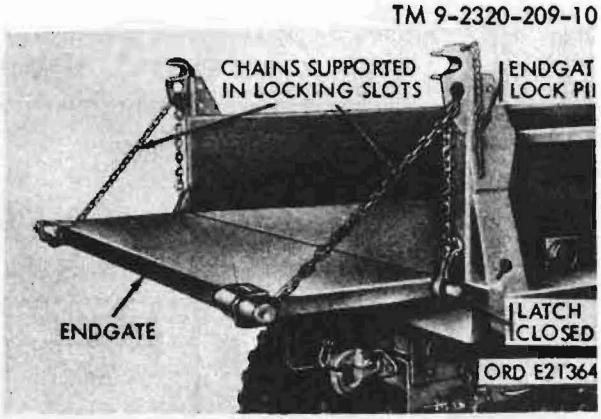

Figure 116. Dump body end gate - horizontal position

(2) Raise and lower body three times, using B and D positions on driver's control lever (fig. 56). Depress accelerator as necessary to prevent stalling.

(3) Place hydraulic hoist driver's control lever in the B position and allow pump to operate for at least one minute.

(4) Remove filler plug, filter screen, and fluid level gage (fig. 59).

(5) Clean and replace filter screen.

(6) Check fluid level gage. If the level is below the fourth mark on the gage, add oil. Refer to LO 9-2320-209-12 for amount and type of fluid to be added.

(7) Insert fluid level gage and screw on filler cap.

(8) Repeat (1) through (7) above.

b. Loading the Dump Body.

(1) General. The dump body may be loaded from either the top or end, depending on the type of load. The body may be used as a cargo carrier when necessary. The payload capacity of the dump body for cross-country operation is 5000 pounds. The capacity for operation on prepared roads is 10,000 pounds. Weight limits for various materials in truck are listed in table 11.

Table 11. Weight of Material in Truck

Material	Weight of material		Capacity-level full 2.51 cu-yd or 67.79 cu-ft	Capacity-heaping full 3.76 cu-yd or 101.5 cu-ft
	Per cu-ft lb	Per cu-yd lb	Loaded weight lb (apprx)	Loaded weight lb (apprx)
Ashes (soft coal)	44	1,188	2,985	4,470
Cinders	46	1,242	3,120	4,675
Clay:				
Dry	63	1,701	4,270	6,400 *
Wet	110	2,970	7,460 *	11,175 †
Coal:				
Anthracite	52	1,404	3,525	5,280
Bituminous	47	1,269	3,190	4,775
Coke	28	756	1,900	2,845
Concrete mix (wet)	124	3,618	9,095 *	13,615 †
Coral rock	25	675	1,695	2,540
Earth:				
Dry or moist (loose)	80	2,160	5,425 *	8,125 *
Dry or moist (packed)	96	2,592	6,510 *	9,750 *
Garbage:				
Wet	47	1,269	3,190	4,775
Dry (paper wrapped)	13	351	881	1,320
Gravel	110	2,970	7,460 *	11,175 †
Limestone (crushed)	95	2,565	6,435 *	9,650 *
Masonry (dry rubble)	122	3,294	8,280 *	12,390 †
Mortar	100	2,700	6,780 *	10,150 †
Mortar (dry rubble)	138	3,726	9,360 *	14,025 †
Mud	115	3,105	7,800 *	11,690
Sand:				
Dry (loose)	98	2,646	6,645 *	9,950 *
Dry (packed)	110	2,970	7,460 *	11,175 †
Wet or moist	122	3,294	8,280 *	12,390 †
Stones (loose)	95	2,565	6,435 *	9,650 *

* Over the rated cross-country payload.
† Over the rated cross-country and highway payload.

(2) Top loading.

(a) Position dump body under loading device.

(b) Apply parking brake and stop the engine.

(c) Load vehicle, observing payload capacity (table 11) and standard safety precautions.

(3) End loading.

(a) Lower dump body endgate to horizontal position.

(b) Position vehicle to loading ramp or platform, being sure not to back vehicle into ramp or platform.

(c) Apply parking brake and stop the engine.

(d) Load vehicle, observing payload capacity (table 11).

c. Emptying the Dump Body.

(1) General. Dump body may be emptied from top or end depending on type of load. Load may be completely or partially dumped or spread along an area.

(2) Emptying from top.

(a) Position body under unloading device.

(b) Apply parking brake and stop the engine.

(c) Unload vehicle.

(3) Emptying from end with dump body down.

(a) Position vehicle to unloading dock or platform.

(b) Apply parking brake and stop the engine.

(c) Lower endgate to horizontal position.

(d) Unload vehicle.

(4) Emptying from end by dumping.

(a) Position vehicle for dumping.

(b) Place transmission gearshift lever in NEUTRAL position.

(c) Apply parking brake.

(d) Pull endgate hand lever (fig. 57) forward and down to open endgate.

(e) Release safety lock on hydraulic hoist driver's control lever (fig. 56).

(f) Depress accelerator pedal maintaining engine speed to prevent stalling, and move driver's control lever slowly forward through its range to BODY UP (D) position. when body has lifted to desired position, move lever to position C to stop lifting and hold body in position.

(g) Dump load.

(h) After dumping load and checking to be sure endgate is clear of load, move driver's control lever to position B to lower body.

(i) After body is lowered, move driver's control lever to position A and secure lever with safety lock.

(j) Push up and back on endgate hand lever to lock endgate closed.

(5) Emptying from end by spreading.

(a) Position vehicle for spreading.

(b) Place transmission gearshift lever in NEUTRAL position.

(c) Apply parking brake.

(d) Adjust endgate chains to control endgate opening distance.

(e) Open endgate by pulling forward and down on endgate hand lever.

(f) Depress clutch pedal and place transfer shift lever in LOW (down) range, and transmission gearshift lever in first speed.

(g) Depress accelerator pedal, maintaining engine speed to prevent stalling, and move hydraulic hoist driver's control lever forward slowly through its range to BODY UP (D) position. When body has lifted to desired position for spreading, move control lever back to C position to stop lifting and to hold body in raised position.

(h) Slowly release the clutch pedal, placing the vehicle in motion and begin spreading load.

Note. Always operate dump truck at slow speeds when spreading load.

(i) Continue to spread load, raising or lowering body, as necessary, by moving control lever to positions D or B.

(j) After completion of spreading operation, stop vehicle.

(k) Lower body completely by moving control lever to position B.

(l) When body is completely lowered, move control lever to position A, and secure lever with safety lock.

(m) Move endgate hand lever up and back to lock endgate closed.

Section VI. OPERATION OF TRACTOR TRUCKS M48, M275, AND M275A1 AUXILIARY EQUIPMENT

57. General

The tractor truck (fig. 9) is equipped with a deck plate and a trailer skid plate, but has no body. The fifth wheel (fig. 117), mounted on the rear of the chassis, provides for attachment of the semitrailer. The airbrake hose and electrical cable, for trailer brake and lighting service, are stowed on airbrake hose support (fig. 118) behind the cab of the vehicle.

58. Fifth Wheel (Fig. 117)

The fifth wheel of the tractor truck pivots end-to-end on the wheel pivot shaft, and cants side-to-side on the base pivot shaft on the walking beam beneath the fifth wheel. This permits the wheel to tilt and cant during coupling or uncoupling of the semitrailer on the vehicle, also during operation of the vehicle with the semitrailer attached.

Note. The fifth wheel is equipped with two adjustable wedges that control tilt and cant movement. The wedges are used in the full-locked position when the vehicle is engaged in highway operation. For off-highway use, wedges should be in the fully withdrawn position. No other adjustment is required.

59. Controls

a. Airbrake Hand Control Valve (Fig. 61). The airbrake hand control valve is mounted on the steering column in the cab. The valve controls the flow of air from the compressed air system, through the service airhose system, to the brakes on the semitrailer.

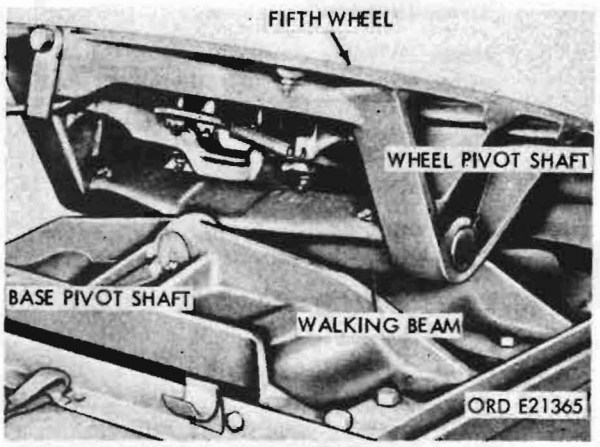

Figure 117. Fifth wheel

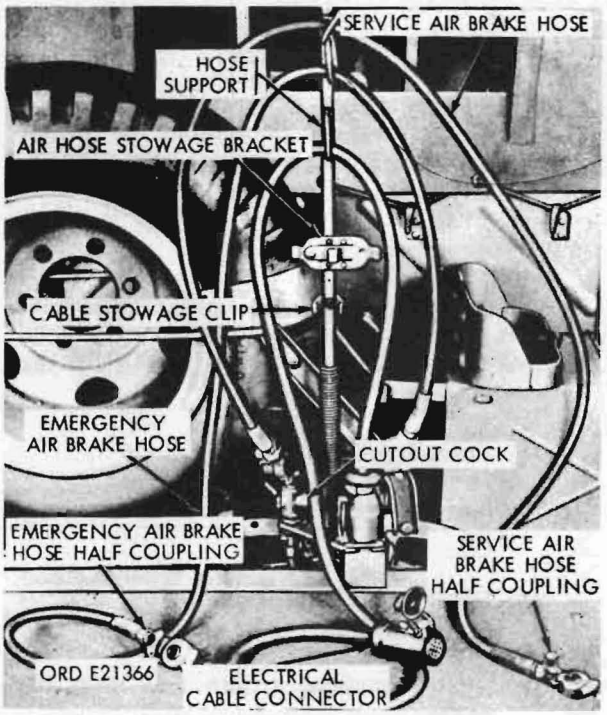

Figure 118. Air brake hose support

b. Airbrake Hose Coupling Cutout Cocks (Fig. 118). The service and emergency airbrake hose coupling cutout cocks serve to turn on or shut off air at the service and emergency airbrake hose couplings. The cutout cocks are turned on after connecting the airhose lines to the couplings, and turned off before removing the lines. The emergency cock is the only manual valve control over emergency air and must not be left turned on with air line removed. The service air line control is maintained by the airbrake hand control valve (a above).

c. Coupler Jaw Locking Plunger Operating Handle (Fig. 62). The coupler jaw locking plunger operating handle, extending from beneath the fifth wheel on the right side, controls the coupler jaws of the fifth wheel by releasing the jaws from the locking plunger. The coupler jaw locking plunger safety latch must be turned to the right or left to free the locking plunger before the operating handle can be moved. After the latch is turned, the operating handle is pulled forward, causing the locking plunger to free the coupler jaws from the locked position. The plunger and handle remain in the forward position, held

by the coupler jaw locking latch, until the coupler jaws are forced closed by the entering kingpin of the semitrailer. The jaws trip the locking plunger locking latch releasing the locking plunger. The locking plunger and operating handle move rearward, the coupler jaws lock around the kingpin, and the safety latch drops into the locked position to prevent the accidental release of the locking plunger.

60. Operation

a. General. The tractor truck is designed to tow a semitrailer attached to the fifth wheel mounted on the vehicle. The maximum towed load for the tractor is 17,000 pounds for cross-country travel and 36,000 pounds for travel on prepared roads.

b. Coupling Semitrailer.

(1) Position tractor ahead of trailer with fifth wheel nearly touching and in line with semitrailer. Set hand brake. Check elevation of skid plate on bottom of trailer in reference to height of tractor's fifth wheel in level position. Trailer should be slightly lower to ensure coupler jaws properly engaging trailer king pin. Elevation of trailer's skid plate can be changed by raising or lowering the trailer's landing gear. Chock trailer wheels if chocks are available.

(2) Turn coupler jaw locking plunger safety latch to right or left, and pull forward on coupler jaw locking plunger operating handle, until handle remains in forward position.

(3) Connect airbrake hoses to semitrailer using the following procedure:

(a) Remove service and emergency airbrake hose from airbrake hose support (fig. 118).

(b) Attach service and emergency airhose to semitrailer airbrake lines by inserting hose half couplings in service and emergency hose half couplings on trailer and turning couplings down to lock in position.

Caution: Be sure to connect service airbrake hose to service coupling on semitrailer and emergency airbrake hose to emergency coupling. Refer to TM 9-1827A for further information.

(c) Turn on both airbrake hose cutout cocks (fig. 118).

(d) Pull down on lever of airbrake hand control valve (fig. 61) to test operation of hand control valve and to check airflow in service airbrake system. Air should be heard passing through control valve.

(4) Back tractor under semitrailer to allow skid plates to engage on fifth wheel plate under front end of semitrailer.

Note. Be sure centerline of tractor is in line with centerline of semitrailer.

Continue to back tractor until fifth wheel plate slides up on fifth wheel and coupler jaws on fifth wheel shut to hold kingpin.

(5) Stop tractor and apply parking brake.

(6) Check coupler jaw locking plunger operating handle and safety latch to make sure they have returned to locked positions.

(7) Place tractor in gear with trailer brakes on and pull to ensure coupler jaws are locked.

(8) Raise trailer's landing gear and remove chocks.

(9) Connect electrical cable (fig. 118) using following procedure.

(a) Remove electrical cable from airbrake hose support by removing cable connector from cable stowage clip.

(b) Insert cable connector in cable receptacle on semitrailer and secure in position.

(c) Check cable connection by turning light switch on and off and depressing service brake pedal. Check stop-and taillights while performing these operations.

c. Uncoupling Semitrailer.

(1) Set trailer brakes and chock trailer wheels if chocks are available.

(2) Lower semitrailer's landing gear if not accomplished.

(3) Disconnect electrical cable from semitrailer by removing cable connector from trailer cable receptacle and secure cable to cable stowage clip on hose support.

(4) Turn coupler jaw locking plunger safety latch to right or left, and pull forward on

on coupler jaw locking plunger operating handle to release coupler jaws.

(5) Place tractor in motion and move slowly forward until kingpin on semitrailer opens and leaves coupler jaws.

(6) Continue tractor in motion until fifth wheel plate on semitrailer clears fifth wheel and skid plates on tractor.

(7) Stop tractor and set handbrake. Turn off trailer brakes.

(8) Disconnect airbrake hose using the following procedures:

(a) Turn off airbrake hose coupling cutout cock (fig. 118).

(b) Remove airhoses from semitrailer by turning airbrake hose half couplings upward and sliding couplings out of half couplings on trailer.

(c) Install airhoses on airhose stowage bracket (fig. 118).

Section VII. OPERATION OF GASOLINE TANK TRUCKS M49, M49C, AND M49A1C AUXILIARY EQUIPMENT

61. General

The gasoline tank trucks (figs. 11 and 12) are equipped with 1200-gallon gasoline tank bodies (fig. 73). Tank sections of 600, 400 and 200 gallons are connected by a manifold and piping system (fig. 119) to the delivery pump (fig. 71) and two delivery lines. One delivery line is used with the pump for pressure or power discharging of gasoline. The other line is used for gravity discharging without pump action, or as a suction line with the delivery pump operating to fill the tank. A manhole and filler cover (fig. 73) is provided on each tank section for cleaning or filling of the section. The M49A1C is equipped with the multifuel engine.

62. Controls

a. General. The delivery pump is connected to the transfer power take-off by three drive shafts. Control of the pump operation is accomplished by movement of the transfer power take-off shifting lever (fig. 34). The engine auxiliary governor regulates the engine speed during pump operation. The flow of fluid from the tank sections is controlled by discharge valves operated by the discharge valve control levers (fig. 120). Delivery lines from the pump and tank sections are regulated by delivery line gate valves.

b. Discharge Valve Control.

(1) General. Control over the discharge valves is by the discharge valve control located in the rear compartment of the tank body. The control regulates the flow from the three tank sections into the manifold and piping system. The discharge valve control is normally operated through the discharge valve control operating levers (J, fig. 71), one lever for each tank section. Remote closing of the discharge valve

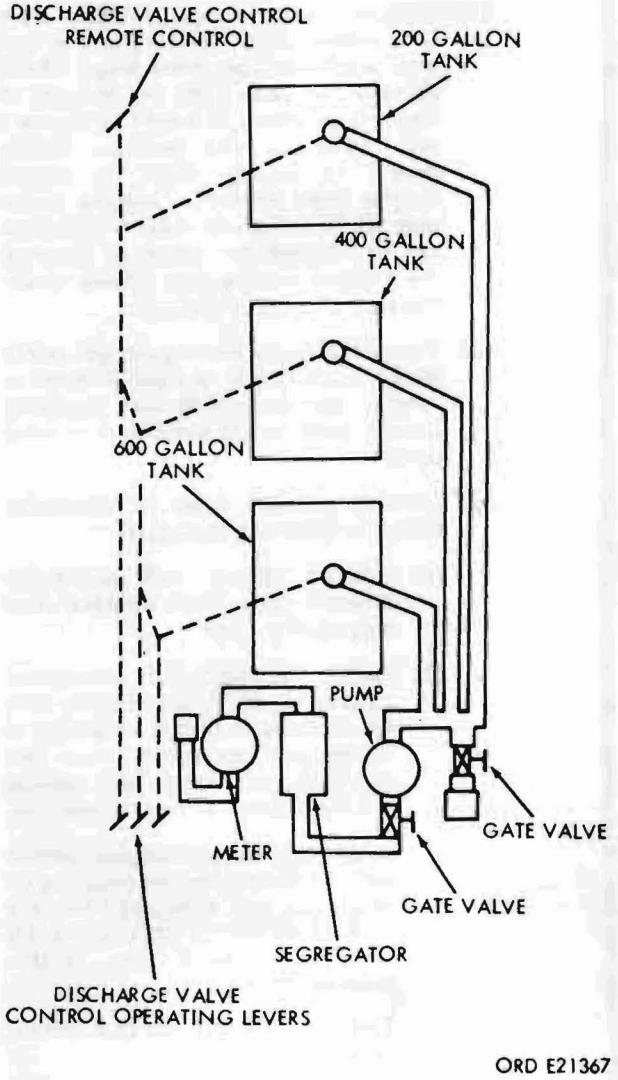

Figure 119. Gasoline tank truck line diagram

control is accomplished by the discharge valve control remote control (fig. 72).

(2) *Discharge valve-control operating levers.* Each discharge valve-control operating lever (fig. 120) controls one discharge valve, located in the manifold under each tank section. The lever is of the trip latch and spring type. Pulling back on the lever opens the discharge valve. The lever is released to the closed position by squeezing the trip rod operating handle mounted on the lever and allowing the lever to move forward. Closing of the rear compartment doors trips all operating handles to insure closed discharge valves during travel.

(3) *Discharge valve control remote control and fusible link.* The discharge valve control remote control (fig. 72) is provided to allow shutdown of all operating levers from the left front end of the tank body. The remote control is operated by pulling on the remote-control cable operating handle. The cable causes the remote control cable release lever to trip the operating levers to the closed position. The discharge valve control is automatically released to the closed position upon the melting of the metal fusible link in event of fire in the rear compartment.

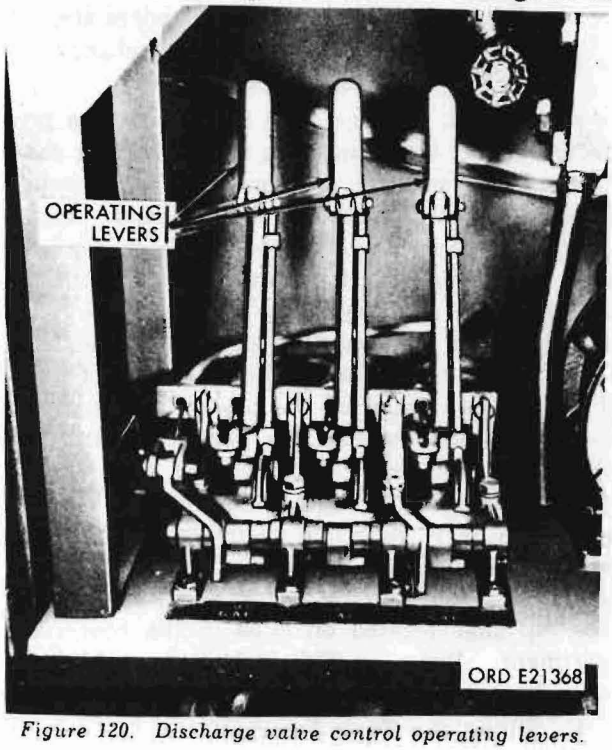

Figure 120. Discharge valve control operating levers.

c. Delivery Line Gate Valves. The two delivery line gate valves (F. fig. 71) are provided to control delivery line gasoline flow. One valve, located on the lower right side of the rear compartment, controls the gasoline flow through the delivery line when used for gravity discharge or for suction input to the delivery pump, depending on the operating conditions. The other valve, located near the right side of the pump, controls the delivery line that is used for power discharging and is stowed on the left side of the tank truck body. The valves are manually turned to the left to open, and to the right to close.

d. Transfer Power-takeoff Shifting Lever. Delivery pump operation is controlled by the transfer power-takeoff through the transfer power-takoff shifting lever (fig. 34). This lever is located in the cab to the left of the driver's seat. The lever is moved backwards to the ENGAGE position which engages the power takeoff, causing the pump to operate. Returning the level to the forward DISENGAGE position disengages the power-takeoff, causing the pump to stop operating.

e. Gasoline Dispenser. Three gasoline dispensers (fig. 73) are provided for gasoline pumping operations. One dispenser is atttached on the end of a 35-foot length of 1½-inch hose which is stowed along the left side of the tank body. The hose and dispenser are permanently connected at the other end to the gate valve, located near the right side of the pump, and are used to discharge gasoline by pump action. The other two dispensers are attached to ten-foot lengths of 1½-inch diameter hose which are stowed in the tank-body storage compartments when not in use. When in use, these hoses are attached at the other end to the gate valve located on the lower right side of the rear compartment. This equipment is used for suction filling, gravity discharging, and fuel transfer operations. Dust plugs and caps protect all open ends.

WARNING

Some models of the M49C truck were equipped with dispenser nozzles, having latch notches in handle. These notches must be removed from the handle before the nozzle is used for refueling.

f. Automatic Pump Valve Drain Tube Valve Knob. (D, fig. 71.) This knob, located in the rear compartment, is turned to open the automatic pump valve. This should be accomplished before starting pumping operations.

g. Water Separator Drain Valve Knob. (E, fig. 71.) This knob, located in the rear compartment, is turned to drain the water separator tank when performing maintenance.

h. Meter Drain Valve Knob. (H, Fig. 71.) This knob, located in the rear compartment, is turned to drain the fuel from the meter component when performing maintenance.

i. Delivery Pump Draincock. (G, fig. 71.) This draincock, located under the delivery pump, is opened to drain the fuel from the delivery pump when performing maintenance.

j. Grounding Wire. (C, fig. 71.) This wire, located in the rear compartment on a spring-loaded reel, is pulled out and attached to a ground before starting pumping operations. An alligator clip is attached to the end of the wire. The M49A2C incorporates a ground wire with two leads: Each lead contains an alligator clip for grounding purposes.

k. Pressure Gage Shutoff Valve Handle. (B, fig. 71.) This valve handle, located in the rear compartment, is turned both ways to obtain a reading on the pressure gage.

l. Meter Gage. (Fig. 99.) This gage, located on top of the meter, indicates the number of gallons pumped or transferred by the pumping unit.

m. Counter Control Lever (A, fig. 71.) This lever, located on the meter, is moved up and down to move the numbers on the meter back to zero.

n. Liquid Level Gage. (K, fig. 71.) This gage, located on clips in the rear compartment, is dipped into the tank sections to measure the liquid level.

o. Safety Devices. The gasoline tank truck is equipped with safety wiring, fire extinguishers, discharge valve control, remote control, discharge valve control fusible link, filler cover vents and fusible plugs. Fire extinguishers are of carbon dioxide type and are mounted one on the rear left side of the tank body and one on the front right side of the body in brackets. The discharge valve control remote control (fig. 72) and fusible link are covered in *b* above. Filler cover vents and fusible plugs provided in the filler covers afford relief of pressure in the tank sections in case of fire.

63. Operation

WARNING

Smoking, flame, sparks, and glowing or hot objects are prohibited in the vicinity of the vehicle during filling and delivery of fuel. Also make sure that the reel and dispenser nozzle grounding wires are properly connected for static discharge prior to the transferring of fuel.

a. General. The gasoline tank truck is a protected means of transporting and delivering gasoline. Tank sections are gravity filled through filler holes in the top of each section. In an emergency, by using one gasoline dispenser hose as a suction line, sections can be filled by suction action of the delivery pump. Pump suction action also can be used to transfer gasoline from one location to another. The discharge of gasoline is accomplished by the power feed from the delivery pump through the delivery line below the pump and/or by gravity flow through the delivery line to the right of the pump. The engine auxiliary governor maintains the engine speed during pump operation. The amount of gasoline in each tank section is checked by using the dip gage located on clips in the rear compartment. Refer to TM 10-1113 for additional operating, safety, and refueling instructions.

b. Filling the Tank Sections.

NOTE

Drain compartments and the piping system, including the filter/separator, when changing to a fuel or grade not usually carried. Flush with 50 gallons of new product, and circulate the product back to each compartment twice. Circulate the product through all fuel handling components, including meter, filter/separator, and hose reels, when applicable. Dispose of this fuel in approved disposal area after flushing.

(1) *Gravity filling.*

(a) Position the gasoline tank truck under a filling device or near a filling hose as required.

(b) Apply the parking brake and stop the engine.

(c) Open the rear compartment and pull out the grounding wire (C, fig. 71.) Clip the grounding wire to a suitable ground. If the truck has a safety chain, make sure that it is touching the ground.

(d) Open the filler covers (fig. 73) on the top of the tank body.

(e) Turn the delivery line gate valves (F, fig. 71) to the closed position.

(f) Move the discharge valve control operating levers (J, fig. 71) to the closed position.

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(g) Turn the meter drain valve knob (H, fig. 71) to the closed position.

(h) Turn the delivery pump draincock (G, fig. 71) to the closed position.

(i) Turn the water separator drain valve knob (E, fig. 71) to the closed position.

(j) Turn the automatic dump valve drain tube valve knob (D, fig. 71) to the closed position.

(k) Fill the tank sections. Do not fill the sections above the level of the liquid level marker located on the underside of each manhole cover.

Note. The payload capacity of the M49C, M49A1C tank truck for "off-the-road" travel is 200 gal. in the center tank and 400 gal. in the rear tank, forward tank is empty. M49A2C "off-the-road" truck is 600 gal. in the rear tank with the forward tank empty. Capacity for operation limited to prepared roads (highway) for M49C, M49A1C is 200 gal. in forward tank, 400 gal. in center tank, 600 gal. in rear tank. M49A2C capacity for prepared roads (highway) is 600 gal. in forward tank and 600 gal. in the rear tank.

(l) After filling each section, secure the filler cover in the closed position.

(m) Disconnect the grounding wire clip and allow the grounding wire to rewind on its reel.

(2) Emergency suction filling.

Note. The following procedure may be used when transferring gasoline from one location to another.

(a) Position the vehicle near the gasoline supply source.

(b) Apply the parking brake and stop the engine.

(c) Open the rear compartment and pull out the grounding wire. Clip the grounding wire to a suitable ground. If the truck has a safety chain, make sure that it is touching the ground.

(d) Remove the cap and install one ten-foot length of hose to the gate opening on the lower right side of the rear compartment. Remove the nozzle and place the end of the hose section in the gasoline supply.

Note. Two ten-foot sections of hose are provided for various uses. If one ten-foot length is not long enough, the two sections may be coupled together to form a longer hose.

(e) Close the discharge valve control operating levers, the meter drain valve knob, the delivery pump draincock and the water separator drain valve knob.

(f) Turn the automatic dump valve drain tube valve knob to open.

(g) Turn the delivery line gate valves to the open position.

(h) Follow the procedures outlined on the caution and instruction plate located on the inside of the pump compartment right door.

(i) Open the filler cover on the tank section to be filled.

(j) Insert the gasoline dispenser nozzle of the discharge line in the mouth of the section to be filled and squeeze the nozzle-operating lever.

(k) Fill the section. Do not fill the section above the liquid level marker located on the underside of the manhole cover.

(l) After filling the section, secure the filler cover in the closed position.

(m) Turn the delivery line gate valves to the closed position.

(n) Turn the throttle control knob to the horizontal position and push in the knob.

(o) Stop the engine.

(p) Place the transfer power-takeoff shifting lever in the DISENGAGE position. Place the transmission gear shift lever in the NEUTRAL position. Remove the hose section from the lower right gate valve. Drain and stow the line.

Caution: Be sure to drain the dispensors and dispose of the drained

gasoline according to authorized procedure.

(q) Disconnect the grounding wire clip and allow the grounding wire to rewind on its reel.

c. Discharging the Tank Sections.

(1) Power discharging.

(a) Position the vehicle near the pumping location and leave the engine running.

(b) Apply the parking brake.

(c) Follow the procedures outlined on the caution and instruction plate located on the inside of the pump compartment right door.

(d) Open the rear compartment and pull out the grounding wire. Clip the grounding wire to a suitable ground.

(e) Close the meter drain valve knob, the delivery pump draincock, and the water separator drain-valve knob.

(f) Open the automatic dump valve drain tube valve knob.

(g) Move the discharge valve control operating lever (J, fig. 71) of the tank section to be discharged to the open (out) position.

(h) Turn the delivery line gate valve knob, located near the right side of the pump, to the open position.

(i) Remove delivery line hose from the left side of the tank body and squeeze the nozzle operating lever to discharge gasoline.

(j) After discharging the gasoline, turn the delivery line gate valve to the closed position.

(k) Move the discharge valve control operating lever to the closed position.

(l) Close the automatic dump valve drain-tube valve knob.

(m) Disconnect the grounding wire clip and allow the grounding wire to rewind on its reel. Close the rear compartment.

(n) Turn the hand throttle to the horizontal position and push in.

(o) Depress the clutch and place the transmission gearshift lever in the NEUTRAL position and place the transfer power-takeoff shifting lever in the DISENGAGE position.

(p) Stop the engine.

(2) Gravity discharging.

(a) Open the rear compartment and pull out the grounding wire. Clip the grounding wire to a suitable ground. If the truck has a safety chain, make sure that it is touching the ground.

(b) Attach a hose section to the gate valve opening located on the lower right side of the rear compartment.

(c) Close the gate valve knob located near the right side of the delivery pump.

(d) Close the delivery pump draincock.

(e) Turn the gate-valve knob to open, on the valve on the lower right side of the rear compartment.

(f) Move the discharge valve control operating lever of the tank section to be discharged to the open (out) position.

(g) Squeeze the dispenser nozzle operating lever to discharge gasoline.

(h) After discharging the gasoline, move the discharge valve control operating lever to the closed position.

(i) Turn the gate-valve knob to the closed position.

(j) Disconnect the hose section from the gate-valve opening located on the lower right side of the rear compartment. Drain and stow the hose section and dispenser.

Caution: Drain the dispenser and dispose of the drained gasoline according to authorized procedure.

(k) Disconnect the grounding wire clip and allow the grounding wire to rewind on its reel. Close the rear compartment.

d. Fording.

(1) Open the rear compartment. Place the dust cap on the gate-valve opening located on the lower right side of the rear compartment.

(2) Refer to paragraph 100 for further information and procedure for fording operations.

(3) After fording, check the delivery lines to ensure that no water has entered. If necessary, drain the manifold pipes, the delivery pump, the meter, the segregator, and the delivery lines.

Section VIII. OPERATION OF WATER TANK TRUCKS M50 AND M50A1 AUXILIARY EQUIPMENT

64. General

The water tank truck (fig. 13) is equipped with a 1000-gallon water tank body. The manifold and piping system connects the 600- and 400-gallon tank sections to the delivery pump and two delivery lines. One delivery line is used with the pump for pressure or power discharge of water through a discharge hose. The other line is used for gravity discharge without pump action, or as a suction line with the pump operating, using the water suction hose and strainer. Manhole and filler openings are provided for filling and cleaning tank sections. An integral heating chamber on the underside of the body is connected to the engine exhaust, through the exhaust bypass valve. The chamber is equipped with an exhaust bypass fording valve to isolate the chamber during fording.

65. Controls

The delivery pump (fig. 70) is connnected to the transfer power takeoff by two delivery pump drive shafts in series. Control of the pump operation is by movement of the transfer power-takeoff shifting lever (fig. 34). The engine auxiliary governor regulates the engine speed during operation. Flow of fluid from the tank sections is controlled by the discharge valves operated by the discharge valve control (fig. 70). The delivery lines from the pump and tank sections are regulated by the delivery line gate valves.

a. Discharge Valve Control.

(1) General. Control over the discharge valves is by the discharge valve control levers (fig. 70), located in the rear compartment of the tank body. The valve control regulates the flow from the tank sections through the discharge and delivery pump (fig. 121). Discharge valve control is normally maintained through discharge valve control operating levers, one lever for each tank section.

(2) Discharge valve control operating levers. The discharge valve control operating levers (fig. 70) control the discharge valves located in the drain line, one under each tank section. The levers are of trip latch and spring type. Pulling back on lever opens discharge valve.

b. Delivery Line Gate Valves. Two delivery line gate valves (fig. 70) are provided to control delivery line flow. One valve, located at the right side in the rear compartment, controls flow through the delivery line used for gravity discharge or for suction input to delivery pump, depending on operating conditions. The other valve, located below the pump with the valve stem wheel adjacent to pump, controls the delivery line located beneath the pump that is used for power discharge. Valves are manually turned to the left to open and to the right to close.

c. Transfer Power-takeoff Shifting Lever. Delivery pump operation is controlled by the transfer power takeoff through the transfer power-takeoff shifting lever (fig. 34). The lever is located in the cab, to left rear of the driver's seat. The lever is moved back to

ENGAGE power takeoff, causing the pump to operate. Returning lever to forward position causes the pump to stop.

d. Exhaust Bypass Valve Control. Exhaust bypass valve control (fig. 69), located in the cab on a bracket below the left side of the instrument cluster, operates the exhaust bypass valve (fig. 122). The exhaust bypass valve is located beneath the vehicle at the front end of the tank. The valve control pulls out to bypass exhaust gases to the heating chamber beneath the tank. Pushing in on the control shuts off the valve, preventing exhaust from entering the chamber. The control locks in or out by turning the control knob to the vertical position. The exhaust bypass valve control is used only during freezing or near freezing temperatures, and only when there is at least 10 inches of water in the sections.

e. Exhaust Bypass Fording Valve. The exhaust bypass fording valve (fig. 68), located on the water tank behind and below the cab, is a manually operated gate valve. The valve is closed to isolate the tank heating chamber during fording operations. The valve handle is turned right to open, and left to close.

f. Discharge Hose and Nozzles (Fig. 70). Two discharge nozzles and three 25-foot lengths of 1-1/2-inch discharge hose are provided for use in discharge of water. The nozzles thread on the discharge hose and are tightened with wrenches provided with the vehicle. Each nozzle is equipped with a flexible nozzle spout and spring-loaded ratchet-type nozzle operating lever for convenience in discharge. The hoses are attached to the delivery line connections by the use of 2 x 1-1/2 reducer couplings and thread into nozzles. A "Y" coupling is provided for using two discharge hoses from one delivery line. The discharge lines can be connected directly to the hydrant with a 2-1/2 x 1-1/2 hydrant reducer which is provided with the equipment. All connections are tightened with wrenches supplied with the equipment. A hydrant wrench is also furnished.

g. Suction Hose and Strainer (Fig. 70). Six 10-foot lengths of 2-inch suction hose, and a suction strainer are provided for obtaining water from low levels. The suction hose and strainer are used in conjunction with a delivery pump mounted on the vehicle, and are used to fill tank sections on the vehicle or to transfer water from one source to another. The suction hose is attached to the delivery line connection at the right of the pump. Wrenches are provided for all connections.

66. Operation

a. General. The water tank is a protected means of transporting and delivering water. The tanksections may be gravity filled through filler holes in the top of each section. Water can be taken from a low level by the use of a delivery pump and suction hose, then pumped into the tank sections, using a discharge hose as a filler hose. The pump suction action also can be used to transfer water from one source to another. Discharge of water is by gravity flow, or by pressure through the delivery pump. The engine auxiliary governor controls engine speed during pumping operations.

Caution: Sanitary precautions must be observed at all times during handling of potable water and equipment used in process. During freezing temperatures, delivery pump must be run 60 seconds with delivery line gate valves open to drain manifold pipes and delivery pump dry (e below).

b. Filling Tank Sections.

(1) Gravity filling.

(a) Position water tank truck under filling device or near filling hose as required.

(b) Open filler covers on top of body.

(c) Check to make sure delivery line gate valves (fig. 70) are in closed position.

(d) Check discharge valve control (fig. 70) to make sure control operating levers are in closed position.

(e) Fill tank sections, as required, using water level gage (fig. 70) to check contents of sections.

Note. The payload capacity for the tank truck for "off-the-road" travel is 400 gal. in the rear tank. The forward tank is empty. Capacity for operations limited only to prepared roads (highway) is 400 gal. in the forward tank and 600 gal. in the rear tank.

(f) After filling each section, secure filler cover in closed position.

(2) Suction filling.

(a) Position vehicle near source of water supply.

(b) Place transmission gearshift lever in NEUTRAL position and apply parking brake.

(c) Attach suction hose to delivery line connection at right of delivery pump.

(d) Attach suction strainer to end of suction hose and place hose and strainer in water source.

(e) Attach the 2 x 1-1/2 reducer coupling to delivery line connection below delivery pump.

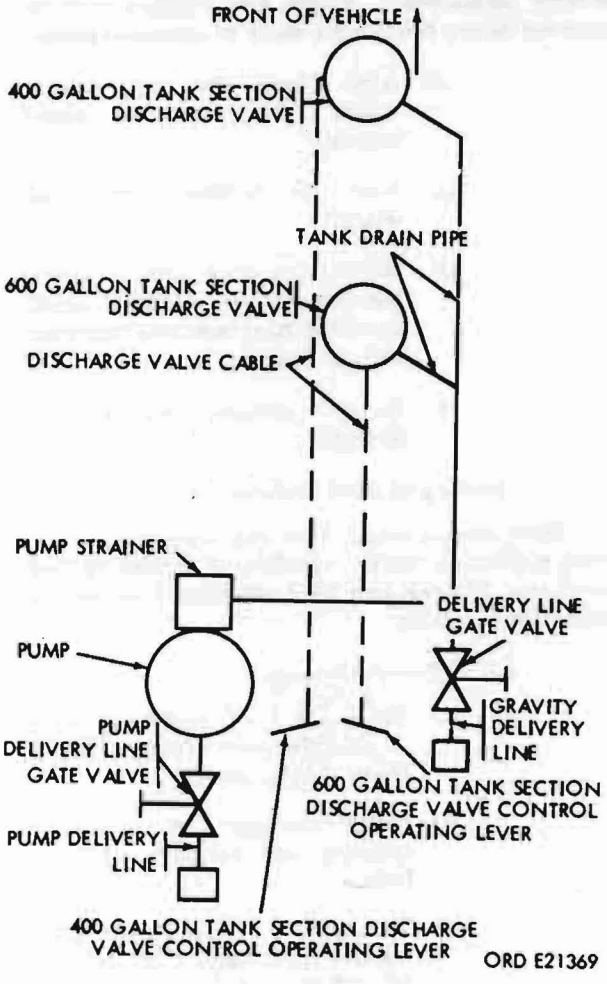


Figure 121. Discharge valve and delivery pump system

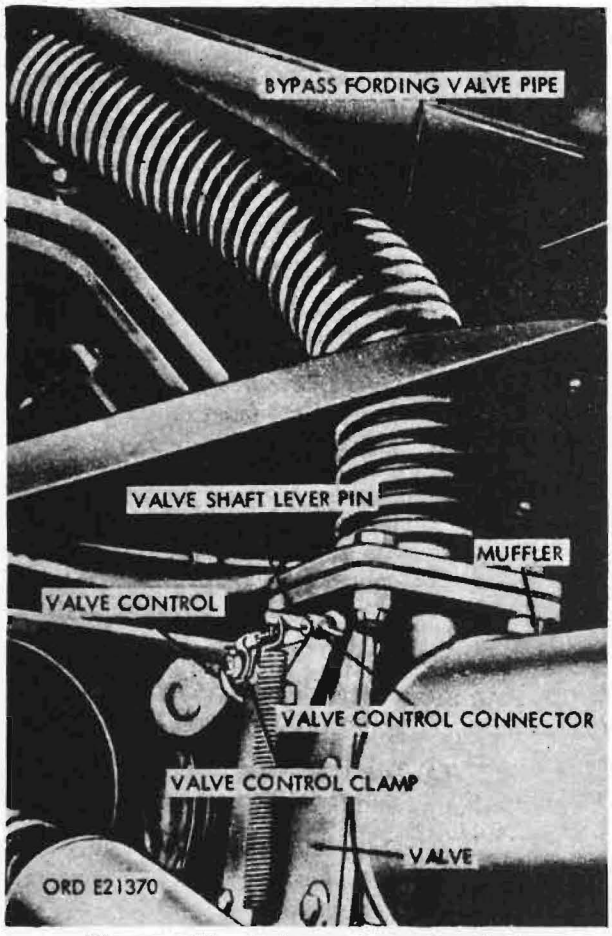


Figure 122. Exhaust bypass valve

(f) Attach discharge hose to reducer coupling and discharge nozzle to hose.

(g) Turn delivery line gate valves (fig. 70) to open position.

(h) Check to make sure discharge valve control operating levers (fig. 70) are in closed position.

(i) Depress clutch, and place transfer shift lever (fig. 100) in NEUTRAL position.

(j) Place transfer power-takeoff shifting lever (fig. 34) in ENGAGE position.

(k) Place transmission gearshift lever in fourth gear position, and release clutch. (For multifuel models, place gearshift in second gear, and release clutch.)

Caution: (Gasoline engine models only). Allowing engine to run with transmission engaged and transfer in neutral without transfer power- takeoff in ENGAGE position will cause bearing failure in transfer case. Shift transmission to NEUTRAL position when not operating transfer power takeoff.

(l) Pull the hand throttle control outward until the engine operates at governed speed.

(m) Open filler cover on tank section to be filled and insert discharge nozzle in opening.

(n) Squeeze discharge nozzle operating lever and fill section, as required, using water level gage to check contents of section. Refer to *b* (1)*(e)* above for allowable payload capacities.

(o) After filling section, secure filler cover in closed position.

(p) Turn delivery line gate valves to closed position.

(q) Turn throttle control knob to horizontal position and push in control knob.

(r) Stop the engine.

(s) Place transfer power-takeoff shifting lever in DISENGAGE position and transmission gearshift lever in NEUTRAL position.

(t) Remove discharge nozzle from discharge hose, and hose from reducer coupling. Drain hose.

(u) Remove reducer coupling from delivery line connection.

(v) Remove suction strainer from suction hose, and suction hose from delivery line connection. Drain suction hose.

(3) *Hydrant filling.*

(a) Position vehicle near hydrant.

(b) Attach 2-1/2 x 1-1/2 reducer coupling to hydrant.

(c) Attach discharge nozzle to discharge hose, and hose to reducer coupling.

(d) Make sure discharge valve control is in closed position.

(e) Open hydrant valve with hydrant wrench provided with vehicle.

(f) Open filler cover of section to be filled.

(g) Place the discharge nozzle in filler hole and depress discharge nozzle operating lever to discharge water into the tank section. Use the water level gage to check content of section. Refer to *b* (1)*(e)* above for payload capacities.

Caution: Before filling tank sections, make sure water is potable or can be made potable according to sanitary requirements. Proper authorization must be obtained before filling with water of unknown purity.

(h) After filling the tank section, secure filler cover in closed position.

(i) Turn off hydrant valve with wrench.

(j) Depress operating lever to relieve pressure, remove discharge nozzle from discharge hose, and hose from reducer coupling.

(k) Remove reducer coupling from hydrant.

c. Discharging Tank Sections.

Note. Always empty front tank compartment first when discharging water, regardless of terrain or road conditions. This will keep the load properly distributed for vehicle operation.

(1) *Power discharging.*

(a) Install 2 x 1-1/2 reducer coupling on delivery line connection located below delivery pump.

(b) Install discharge hose on reducer coupling, and discharge nozzle on hose.

(c) Start engine, depress clutch, place transfer shift lever (fig. 100) in NEUTRAL position.

(d) Place transfer power-takeoff shifting lever (fig. 34) in ENGAGE position.

(e) Place transmission gearshift lever in the fourth gear position, then release clutch. (For multifuel models, place the gearshift lever in second gear, then release the clutch.)

Caution: (Gasoline engine models only). Allowing engine to run with transmission engaged and transfer in neutral without transfer power takeoff in ENGAGE position will cause bearing failure in transfer case. Shift transmission to NEUTRAL position when not operating transfer power takeoff.

(f) Pull the throttle control outward until the engine operates at governed speed.

(g) Move discharge valve control operating lever (fig. 70) of tank section to be discharged to the open position.

(h) Turn delivery line gate valve, located behind and beneath delivery pump to the open position.

(i) Squeeze discharge nozzle operating lever to discharge water.

(j) After discharging water, turn delivery line gate valve to closed position.

(k) Move the discharge valve control operating lever to closed position.

(l) Turn the throttle control knob to horizontal position and push in.

(m) Stop the engine.

(n) Place transmission gearshift lever in NEUTRAL position and transfer power-takeoff shifting lever in DISENGAGE position.

(o) Depress operating lever to relieve pressure, remove discharge nozzle from discharge hose, and hose from reducer coupling. Drain hose.

(p) Remove reducer coupling from delivery line connection.

(2) Gravity discharging.

(a) Attach 2 x 1-1/2 reducer coupling to delivery line connection to right of delivery pump.

(b) Attach discharge hose to reducer coupling, and discharge nozzle to hose.

(c) Make sure the delivery line gate valve beneath the delivery pump is in closed position.

(d) Open the delivery line gate valve on the delivery line being used for gravity discharge.

(e) Move the discharge valve control operating lever (fig. 70) of the tank section to be discharged to an open position.

(f) Squeeze the discharge nozzle operating lever to discharge water.

(g) After discharging the water, move the discharge valve control operating lever to closed position.

(h) Turn the delivery line gate valve to a closed position.

(i) Remove the discharge nozzle from discharge hose, and the hose from reducer coupling. Drain hose.

(j) Remove reducer coupling from delivery line connection.

d. Transferring Water from One Location to Another.

(1) Prepare vehicle, suction hose, and discharge hose according to procedure in b(2)(a) through (l) above for suction filling.

(2) Insert the discharge nozzle in receiving container or tank and squeeze the discharge nozzle operating lever to discharge water.

(3) After transferring water, proceed according to procedure in b(2)(p) through (v) above.

e. Operation During Freezing Temperature.

(1) Operating vehicle during freezing temperature.

Caution: Do not heat water tank with less than 10 inches of water in any sec-

tion. If either section has less than 10 inches, the water level must be raised.

(a) The water level in one section can be raised by transferring water from the second section, provided second section has sufficient water to afford a minimum of 10 inches in both sections. With the delivery line gate valves in closed position, open the discharge valves by moving both discharge valve control operating levers to open position. Use the water level gage to check contents of sections. Close the discharge valves when the low section is above minimum 10 inches.

(b) Drain the manifold pipes, delivery lines, and delivery pump ((2) below).

(c) Make sure the exhaust bypass fording valve (fig. 68) is in open position.

(d) Pull out the exhaust bypass valve control (fig. 69) and turn knob to horizontal position to lock control.

(e) When temperature permits, heating of water in tank sections can be stopped by turning knob of exhaust bypass valve control to vertical position and pushing in knob.

(2) Parking vehicle during freezing temperature.

(a) Make sure the discharge valve control (fig. 70) is in closed position.

(b) Turn the delivery line gate valves (fig. 70) to open position.

(c) Start the engine, depress the clutch, and place the transfer shift lever (fig. 100) in NEUTRAL position.

(d) Place the transfer power-takeoff shifting lever (fig. 34) in ENGAGE position.

(e) Place the transmission gearshift lever in the fourth gear position, and release clutch. (For multifuel engine models, place the transmission gearshift lever in the second gear position, then release the clutch.)

Caution: (Gasoline engine models only). Allowing engine to run with transmission engaged and transfer in neutral without transfer power takeoff in ENGAGE position will cause bearing failure in transfer case. Shift transmission to NEUTRAL position when not operating transfer power takeoff.

(f) Pull the throttle control out almost to its extreme outward position. The engine auxiliary governor will maintain the proper engine speed.

(g) Run the delivery pump 60 seconds at 1100 rpm to drain the delivery lines, compartment drain pipes, manifold pipes, and delivery pump.

(h) Turn the throttle control to horizontal position and push in the control.

(i) Stop the engine.

(j) Place the transmission gearshift lever in NEUTRAL position and the transfer power-takeoff shifting lever in DISENGAGE position.

(k) Turn the delivery line gate valves to closed position.

f. Fording Operations.

(1) Before fording.

(a) Drain the manifold pipes, delivery lines, and the delivery pump ((2) above). Make sure the delivery line dust caps are on securely.

(b) Turn the exhaust bypass fording valve (fig. 68) to closed position.

(2) Fording. Refer to paragraph 100 for information on fording procedure.

(3) After fording.

(a) Drain the integral heating chamber by removing two pipe plugs, one on each end of exhaust heating chamber. Install the plugs.

(b) Start the engine. Open the exhaust bypass fording valve (fig. 68) and then pull out the exhaust bypass valve

control (fig. 69). Run engine to drive out water that may have entered the exhaust system. Shut off the engine and push in the exhaust bypass valve control.

(c) Flush out the manifold pipes, delivery lines, and the delivery pump according to sanitary precautions to prevent possible contamination by forded water.

(d) Refer to paragraph 100 for further information on after-fording procedure.

Section IX. OPERATION OF WRECKER CRANE TRUCKS M60 AND M108 AUXILIARY EQUIPMENT

67. General

The crane trucks (fig. 123) are equipped with a hydraulically operated revolving crane. When removable stops are installed, the crane revolves through an arc of 270 degrees to protect the cab of the vehicle. With stops removed, crane is capable of full circular revolution. The crane boom extends and retracts about eight feet through the action of the boom-crowd hydraulic cylinder mounted within the boom, and raises and lowers through an arc of 45 degrees by action of the boom-lift hydraulic cylinder. The cable hook is raised or lowered by reeling and unreeling of the drum cable from the cable-hoist drum. Control over the boom operation is from the operator's compartment mounted on the left side of the crane.

68. Hydraulic System

Power for the crane operation is obtained from the truck engine through the transmission, transfer and transfer power takeoff to the hydraulic pump. Drive is actuated by the control of the power takeoff through the transfer power-takeoff shifting lever (fig. 34). The engine auxiliary governor limits the engine speed to 1700 rpm. The pump moves the hydraulic oil from the oil reservoir (fig. 65) to the swivel valve (fig. 124). The swivel valve

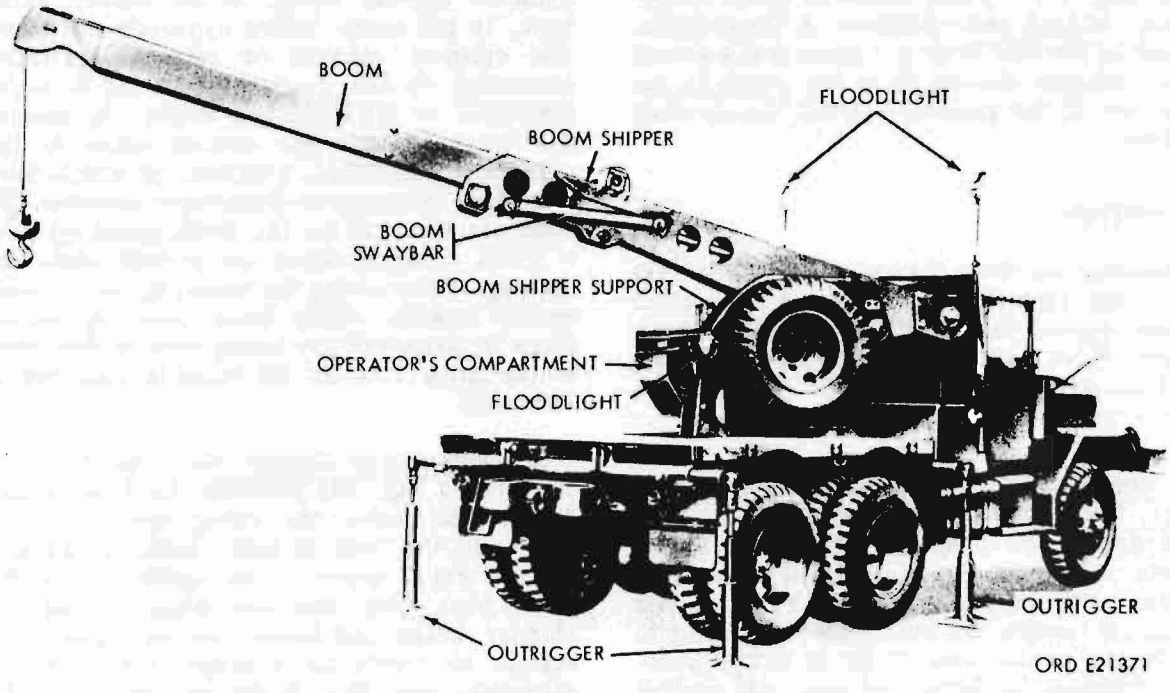


Figure 123. Crane truck M108 - boom extended

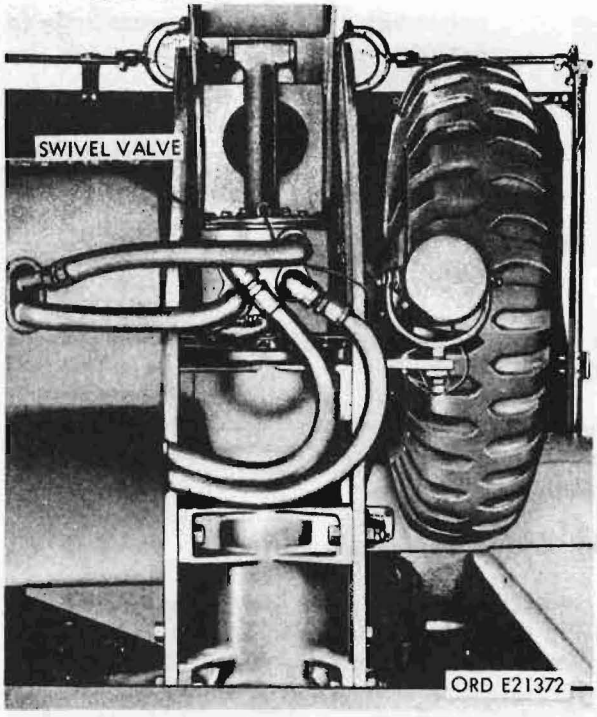


Figure 124. Swivel valve

permits pressurized transfer of oil from the pump, mounted on the oil reservoir, to the control valve bank in the operator's compartment (fig. 123). From there it flows to hydraulic motors and cylinders. A relief valve, located in the line from the pump to the swivel valve, returns the oil from the pump to the reservoir if the pressure in the line exceeds 1200 psi.

69. Controls

Hydraulic oil from the swivel valve (fig. 124) enters the control valve bank and is supplied to four control valves. These valves, through control valve hand levers (fig. 66) regulate the flow of the hydraulic oil to actuating motors and cylinders on the crane.

a. Boom Lift Cylinder Control Valve Hand Lever. This lever (fig. 66) controls the flow of the hydraulic oil from the boom lift cylinder control valve, in the control valve bank, to the boom lift hydraulic cylinder. This cylinder raises or lowers the boom point according to positioning of the lever in UP or DOWN position. Release of lever returns the control valve to center or NEUTRAL position at which time the boom remains stationary.

Caution: When taking up the cable, do not allow the hoist block to jam into the boom head sheave. When paying out cable, stop hoist operation when load reaches the ground to prevent unspooling of cable from grooved hoist drum.

b. Cable Hoist Motor Control Valve Hand Lever. This lever (fig. 66) controls the flow of hydraulic oil from the cable-hoist motor control valve, in the control valve bank, to the cable-hoist hydraulic motor. This motor causes the cable-hoist drum to rotate, paying out or taking up cable according to positioning of the lever in DOWN or UP position. Release of lever returns the control valve to center or NEUTRAL position at which time, the hoist drum stops rotation.

Caution: When extending or retracting the boom, be sure to position the cable-hoist motor control valve hand lever at the same time and in the same direction as the boom-crowd cylinder control valve hand lever, to prevent jamming of the hoist block or hoist weight in the boom-head sheave or unspooling of cable from the hoist drum.

c. Boom Crowd Cylinder Control Valve Hand Lever. This lever (fig. 66) controls the flow of hydraulic oil from the boom crowd cylinder control valve, in the control valve bank, to the boom crowd hydraulic cylinder. The cylinder extends or retracts the boom according to the positioning of the lever in EXTEND or RETRACT position. Release of the lever returns the control valve to the center or NEUTRAL position, at which time the boom remains in stationary position. To maintain the load on the hoist-drum cable at a given distance from the ground when extending or retracting the boom, the cable-hoist motor control valve hand lever (b above) must be moved to pay out or take up the cable at the same rate as the boom is extended or retracted.

d. Swing Motor Control Valve Hand Lever. This lever (fig. 66) controls the flow of hydraulic oil from the swing motor control valve, in the control valve bank, to the hydraulic swing motor. This motor causes the pivot post with attached shipper support, shipper crane and boom, and the operator's station to rotate as a single unit in either direction according to the positioning of the lever in LEFT or RIGHT position. Release of the lever returns the control valve to center

or NEUTRAL position at which time all rotary motion ceases.

e. Brake Lock Switch. This switch (fig. 67), located on the instrument panel at the extreme lower left, holds the service brake in the applied position through the action of the solenoid brake lock. To lock brakes, push in the switch button and depress the service brake pedal at the same time. Remove foot from the pedal before releasing pressure on the button. To release brake, the brake pedal is depressed and released.

Note. Brake lock is not to be used for prolonged parking.

f. Floodlight Controls. The floodlight control switch (fig. 67) mounted on the instrument panel to the right and below the ignition switch, controls power to the crane and cab floodlights (fig. 123). Switch must be in the ON position before the floodlights can be operated. A separate floodlight toggle switch is provided on each floodlight for the local control. A handle is provided on each light for directing the light beam in the desired direction. Each cab floodlight can be lowered to a traveling position by removing the locking pin from the swivel bracket and lowering the light assembly to a horizontal position, where a floodlight holddown is provided to secure light in place.

70. Load Capabilities

a. Outriggers. The crane trucks are equipped with four outriggers (fig. 123) for use during the handling of heavy side lifts which might normally cause tipping of the vehicle. Two outriggers are on each side of the vehicle. Outriggers collapse when not in use, within limits of the width of the crane body platform. Outriggers are of the screwjack type with a pin through the vertical tube as initial adjustment and screw thread for final extension. The use of outriggers prevents most of the twisting stresses placed on chassis by side loads. Each outrigger (fig. 125) is set by removing the retaining pin from the outrigger frame strap located on the extreme end of the outrigger tube near the base. Outrigger is pulled out by the base until the horizontal rod extends 14 inches beyond the tube end. The base is then lowered to the ground. Lining up the holes in the horizontal tube and rod, one retaining pin is inserted through the holes to maintain the outrigger horizontally.

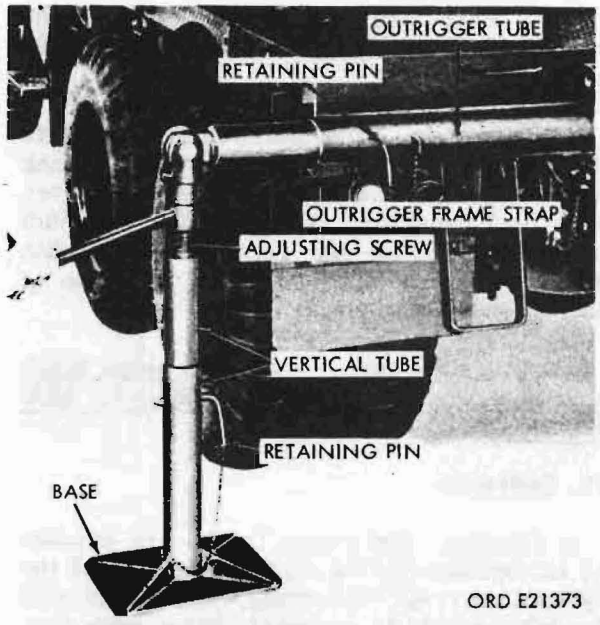


Figure 125. Adjusting outrigger

Holes in the vertical tubes are alined and the other retaining pin is inserted to hold the vertical tubes in an extended position. The adjusting screw is turned with a cranking bar until the base is firmly against the ground as a final adjustment of the outrigger.

b. Spring Lockouts (Fig. 126). The front and rear springs on the vehicle are equipped with spring lockouts to protect springs under the boom loads.

c. Boom Sway Bars (Fig. 123). Boom sway bars are provided to minimize the boom sway during travel with or without a towed load. The boom, with bars in the supporting position is capable of supporting 3500 pounds' suspended weight of the towed load on prepared

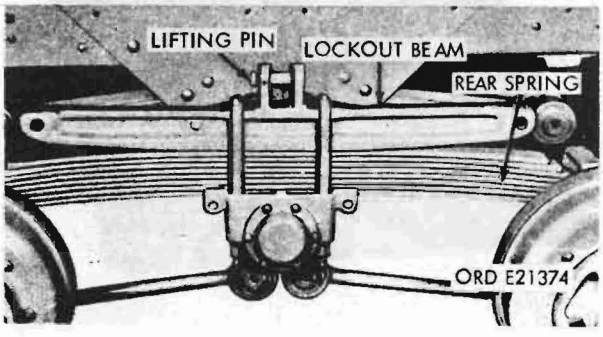


Figure 126. M108 rear spring and lockout beam

roads. Bars are stored during the crane operations. Both bars are held in position by snap pins.

d. Capacities. The safe load data plate (fig. 127) located on the control valve bank top cover (fig. 66) at operator's station, gives safe load capacities of the boom. Maximum lifting capacity of the retracted boom with the sway bars in the supporting position is 6500 pounds to the rear.

Caution: Be sure to use the hoist block with 2-part cable for all loads over 5000 pounds.

71. Operation

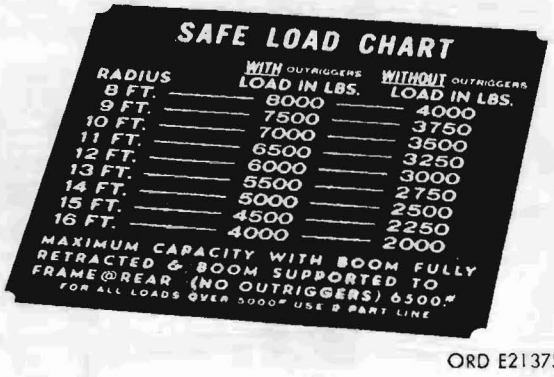
a. General. The crane trucks are capable of lifting and towing loads by means of the hydraulic crane. The crane may be used with the hoist block or weighted lifting hook provided. After the vehicle is prepared for the use of the crane, all control over the crane is from the operator's station.

b. Preparing for Operation.

(1) Before operating the crane, check the hydraulic oil level. To properly check the fluid level, it is necessary to raise and lower, and extend and retract the boom several times before checking. Check the level of fluid with the vehicle on level ground.

(2) Position vehicle near the load.

(3) Place the transmission gearshift lever in neutral position and apply the parking brake.



ORD E21375

Figure 127. Safe-load data plate

(4) Press on brake lock switch, depress the service brake pedal, and release the switch.

(5) Depress clutch and place the transfer-shift lever in NEUTRAL position.

(6) Place the transfer power-takeoff shifting lever in ENGAGE position.

(7) Place the transmission gearshift lever in fifth gear, and release the clutch.

Caution: Allowing engine to run with the transmission engaged and the transfer in NEUTRAL position without the transfer power takeoff in the ENGAGE position will cause the bearing failure in transfer case. Shift the transmission to NEUTRAL position when not operating the transfer power takeoff.

(8) Pull the throttle control all the way out. Engine auxiliary governor will control the engine speed at 1700 rpm.

(9) Attach the proper lifting device to hoist drum cable.

(10) If the load capacity and the load position require, set outriggers in the supporting position (par. 70).

(11) If boom is to be moved from the travel position, remove the sway bars from the supporting position and secure in the stowed position (fig. 128).

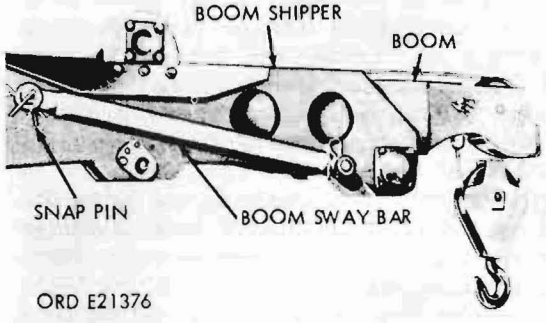


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Figure 128. Boom sway bar - stowed position

c. Operating Crane.

(1) Mount operator's station and operate the crane according to the necessary conditions and within the crane capacity limits as noted on the safe-load data plate (fig. 127).

(2) Pull the boom lift cylinder control valve hand lever back to the UP position to raise the boom. Push the lever forward to the DOWN position to lower the boom. Release the lever to hold.

(3) Push the cable-hoist motor control valve hand lever forward to the DOWN position to pay out the cable-hoist cable. Pull the lever back to the UP position to take up the cable. Release the lever to hold.

(4) Push the boom crowd cylinder control valve hand lever forward to the EXTEND position to extend the boom. Pull lever back to the RETRACT position to retract the boom. Release the lever to hold.

Caution: Be sure to position the cable-hoist motor control valve hand lever at the same time and in the same direction as the boom crowd cylinder control valve hand lever to prevent fouling of the lifting device or cable.

(5) Pull the swing motor control valve hand lever back to the RIGHT position to move the crane to the right. Push the lever forward to the LEFT position to move the crane to the left. Release the lever to hold.

Note. When required, any two control valve hand levers can be operated at same time for hoisting and swinging, lifting and extending, or any other combination of motions as necessary.

d. Securing from Operation.

(1) Operate the control valve hand levers as necessary to retract the boom and position it in travel position.

(2) Attach the sway bars to the truck body to secure the boom in travel position.

(3) Clean and oil cable. Attach the sling cables to the hoist hook and secure the cables to the rear of the truck body.

(4) Take up the slack in the hoist-drum cable by pulling back on the cable hoist motor control valve hand lever momentarily.

(5) Remove the outriggers from the working position and stow for travel.

(6) Turn the throttle control knob to a horizontal position and push in the knob.

(7) Stop the engine.

(8) Depress the service brake pedal to release the brake lock.

(9) Place the transmission gearshift lever in the NEUTRAL position and the power-takeoff shifting lever in the DISENGAGE position.

e. Towing Load with Crane.

(1) Operate crane (c above) to bring load in to the towing position.

Caution: Be sure load is within the towing load capacity of 3500 pounds' suspended weight for prepared roads.

(2) Secure the crane truck from operation according to the procedure in d above, excluding steps (3) and (4).

f. Operation During Subzero Weather.

(1) Before placing the crane in operation, the hydraulic oil and equipment must be warmed sufficiently as given below to operate freely.

(2) Prepare the vehicle for operation (b above).

(3) Pull back on the boom lift cylinder control valve hand lever until the vehicle engine begins to stall or the hydraulic oil relief valve opens. Return the lever to the NEUTRAL position. Push forward on the lever to reverse the hydraulic system action.

(4) Continue to rock the lever back and forth slowly until the control valve operates properly in either position without opening of the relief valve or stalling of the engine.

(5) Repeat above procedure (3) and (4) for cable-hoist motor, boom crowd cylinder, and swing motor control valves.

(6) Check all four functions of the crane to make sure the crane is fully operative.

(7) Operate crane (c above).

g. Fording Operations.

(1) Before deep-water fording, remove the breather cap (fig. 65) from the hydraulic oil reservoir and install the pipe plug provided in the tool box for this purpose. Be sure to tighten the plug to prevent leakage of water into the reservoir.

(2) Refer to paragraph 100 for further information and procedure for fording operations.

(3) After fording, remove pipe plug ((1) above) and install the breather cap on the hydraulic oil reservoir.

(4) Remove the pipe plug from the bottom of the base plate and drain pivot post and ring gear housing of any water. Install plug in base plate.

Section X. OPERATION OF SHOP VAN TRUCKS M109, M109A1, AND M109A2; AND INSTRUMENT REPAIR SHOP VANS M185 AND M185A1

72. General

The shop van truck is basically equipped to serve as a mobile shop. Except where specifically noted, all models listed above are generally identical, with the exceptions of the M109A2 and the M185A1. These two models are equipped with multifuel engines. The M109 (figs. 17 and 18), M109A1 and M185 are equipped with gasoline engines.

73. Shop Van Body Assembly

a. Body. The fabricated steel body (fig. 129), is of insulated steel panel construction. On newer production models, access to the roof of the body is provided by four folding step assemblies (fig. 129). A stepladder is provided for entering and leaving the body (fig. 130), and is stowed in four sockets (fig. 130) when not in use (fig. 131). A communication door

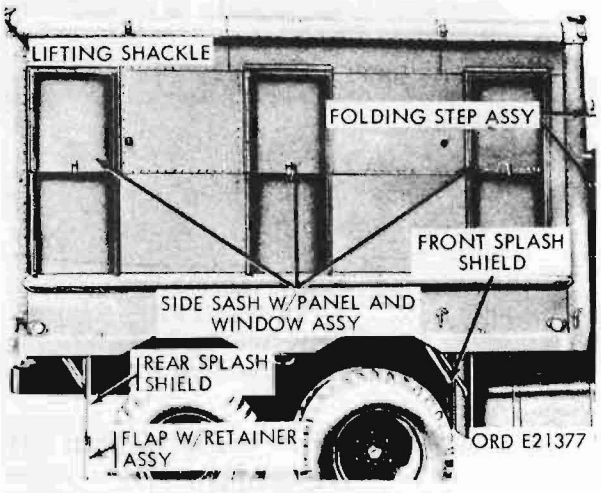

Figure 129. Shop van body assembly - right side view

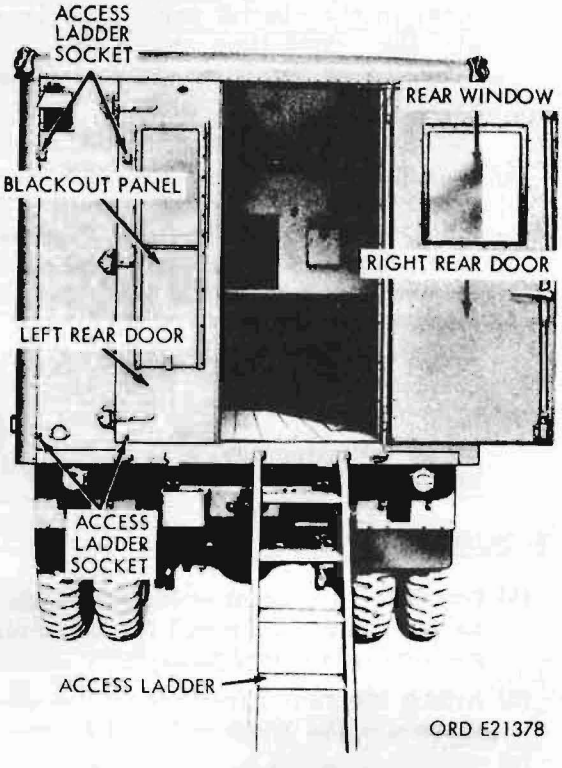

Figure 130. Shop van body - right rear door open

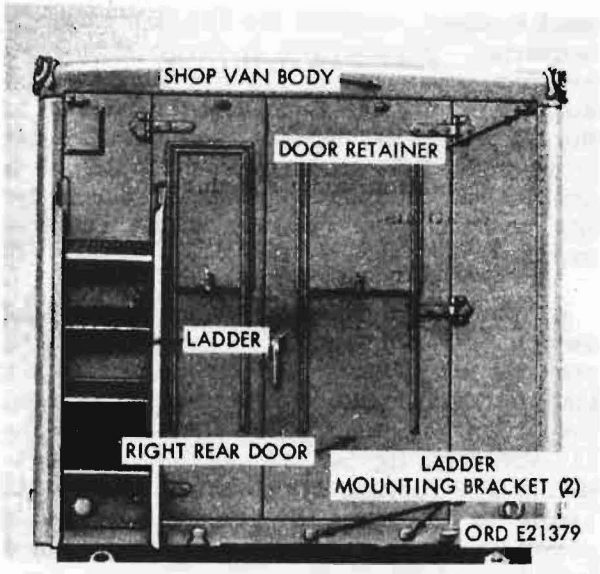

Figure 131. Access ladder - stowed position

assembly is located in the upper left corner of the front wall of the van. Eight-foot long wiremold bases, with five receptacles in each, are installed over the windows on each side of the body for plugging in electrical equipment such as power tools. Rear door blackout switches, mounted above the rear doors on the inside of the body, automatically turn off all dome lights except the 115-volt blackout doom light when the right rear door is opened. Lifting shackles (fig. 129), capable of supporting a fully loaded body, are installed on the roof, one on each corner. The body is equipped with an exhaust blower with duct and damper for body ventilation. Five 115-volt, and two 24-volt interior dome lights are provided, as well as one 115-volt blackout dome light with a blue lens.

b. Window Assemblies. Three pushout-type sash assemblies (fig. 129) are provided on each side of the body. Each side sash assembly contains an insect screen, a double-pane window with weatherseal, and a blackout panel. One fixed-type sash assembly, complete with blackout panel, is provided in the front of the body.

Note. Older production models have five window assemblies on each side, and two window assemblies on the rear of the body.

c. Rear Door Assemblies. Two rear doors (fig. 130) are provided for entrance and exit. Each door assembly is attached to the body with three hinge assemblies, and is held open with a doorcheck. The left rear door is held closed by upper and lower latches. The right rear door is held closed by a lock and two latches. The right rear door has a handle-type latch and can be opened from the outside. The left rear door can be opened only from the inside after the right door has been unlatched.

74. Electrical Equipment and Controls

Warning: Contact with 24 volts or 115 volts can cause severe burns or shock. In the event of any electrical malfunction, disconnect the entrance receptacle and notify the direct support maintenance unit.

a. General. The shop van body is provided with necessary electrical components to permit use of 24-volt dc power or 115-volt ac power to operate the lighting and the exhaust blower in the van body. Power for the 24-volt dome lights (fig. 132) and two blackout light switching circuits is brought from the circuit breaker in the cab to a 24-volt entrance receptacle (fig. 133) behind the folding ladder on the right front end of the van body. Power for the 24-volt exhaust blower is brought from the batteries, through the circuit breaker (fig. 133) on the lower right front end of van body, then to the 24-volt entrance receptacle. The 115-volt entrance receptacle (fig. 133), behind the folding ladder and to right of the smaller 24-volt receptacle, is used for 115-volt input from an external power source. Ac power can be used to operate 115-volt dome lights (fig. 132) and any added 115-volt equipment in the van body, as well as the ac-to-dc

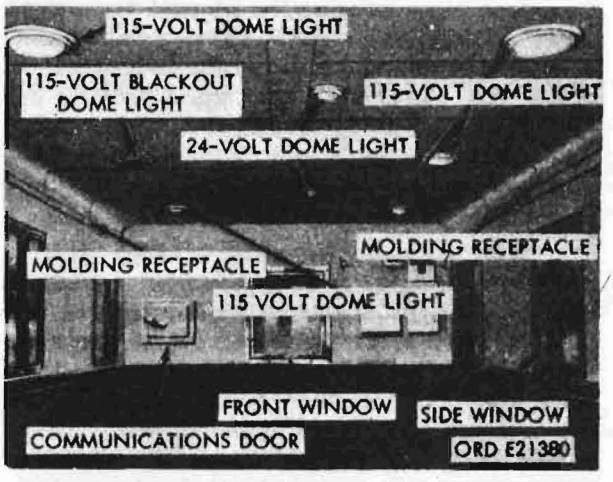

Figure 132. Shop van body dome-light assemblies and wiremold receptacles

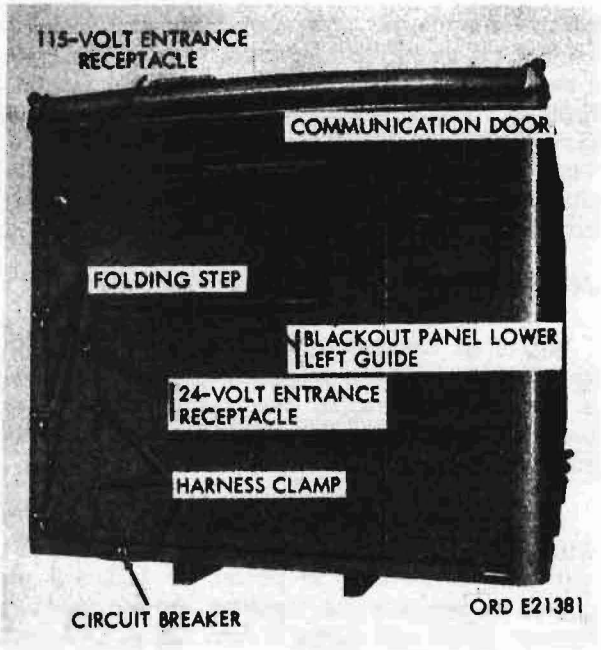

Figure 133. Shop van body assembly - front view

converter furnishing 24-volts' power to run the exhaust blower without drain on the batteries of the vehicle. Circuit breakers, relay, and switches provide control for all equipment.

b. Power Switch. The power switch (fig. 63), located on the right front panel on the inside of the shop van body, controls selection of the 24-volt dc system or the 115-volt ac system. Placing the switch handle in the up position closes the 115-volt switch section in the power switch box supplying ac power to the circuit breaker box for 115-volt needs, at the same time opening the 24-volt dome-light cutoff switch section, in the power switch box. Placing the switch handle in the down position opens the 115-volt circuit while closing the 24-volt dome-light cutoff switch section supplying dc power to the 24-volt dome-light circuit. The blackout dome-light relay is also mounted in the power switch box.

c. Multibreaker Assembly. Four circuit breakers, located in multibreaker assembly box (fig. 63) on the front panel, control and protect four electrical circuits in the shop van body. Circuit breaker No. 1, upper left-hand breaker, controls 115-volt ac power to the molding receptacle (fig. 132) along inside of the body right panel above the windows. Breaker No. 2, upper right-hand breaker, controls the 115-volt power to the left-hand molding receptacle. Breaker No. 3, lower left-hand breaker, controls the 115-volt power to converter. Breaker No. 4, lower right-hand breaker, controls the 115-volt power to the dome-light switch. Each breaker must be in the ON position to complete its circuit. Breaker trips to the OFF position when the circuit is overloaded, and must be manually reset to the ON position after removal of the cause of overload.

d. Dome-light Switch. The dome-light switch (fig. 63), located on the front panel, controls ac power to the 115-volt dome and blackout dome lights. The switch handle in the lower ON position supplies ac power to the 115-volt dome lights. The switch center position is OFF position for all lights. The switch handle in the upper ON position supplies ac power to the 115-volt blackout dome lights and also, through the 115-volt rear door blackout switch and the blackout dome-light relay contacts, to the 115-volt dome lights. In the upper ON position, the switch also supplies 24-volt dc power to the energizing coil of the blackout dome-light relay, through the 115-volt rear door blackout switch.

e. Dome Light and Blackout Dome-light Toggle Switches. The switches (fig. 64) located above and to right of rear right door on inside of rear body panel are used in conjunction with the 24-volt rear door blackout switch, located above right rear door latch, to control power to the 24-volt dome lights. The blackout dome-light toggle switch in the closed or OFF position bypasses the 24-volt rear door blackout switch, leaving control of the 24-volt dome lights to the dome-light toggle switch. With the blackout toggle switch in the open or ON position, the door blackout switch is in series with the dome-light toggle switch. Opening the right rear door under this condition causes the blackout switch to turn out the 24-volt dome lights.

f. Ac-to-Dc Converter. A converter (fig. 63), located on the front interior panel, converts 115-volt ac to 24-volt dc for the exhaust blower, selects the power sources for the exhaust blower, and controls the speed of the exhaust blower motor. Placing the converter selector switch in the 24 V position closes the 24-volt dc input circuit to the exhaust blower switch. Moving the exhaust blower switch into either HI or LO position from the OFF position completes the 24-volt circuit to the exhaust blower for operation of the blower motor. When the selector switch is in the

115 V position, the 115-volt ac circuit is closed to the transformer-rectifier assembly in the converter, and the 115-volt ac power is converted to 24-volt dc power. With the exhaust blower switch in either the HI or LO position, the 24-volt dc power is available to the blower motor converter from 115-volt ac input to the converter. The circuit breaker in the converter protects the blower against overload by large current surges.

g. Exhaust Blower Assembly. The exhaust blower assembly (fig. 134), consists of a 24-volt dc motor with a wheel mounted on the motor shaft. The exhaust blower is mounted inside the body on the exhaust blower duct assembly; it provides ventilation of the body when the doors and windows are closed.

75. Van Body Truck Operation

a. Supplying Power to the Shop Van Body.

(1) Supplying 24-volt dc power. The 24-volt dc power for the exhaust blower circuit and for the 24-volt dome lights and blackout light switching circuits enters the shop van body through the 24-volt entrance receptacle (fig. 133). Make sure the 24-volt cable connector is secured properly in the receptacle.

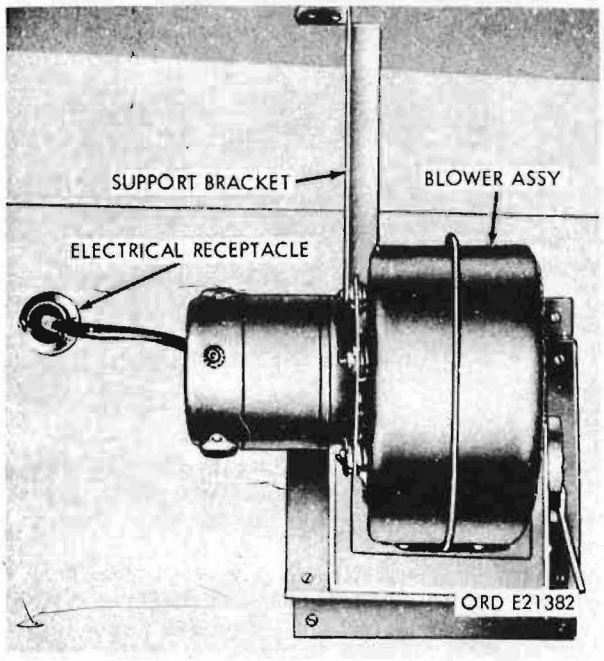

Figure 134. Shop van body exhaust blower assembly

(2) Supplying 115-volt ac power. Unscrew the dust cap from the 115-volt entrance receptacle (fig. 133). Install the 115-volt cable connector from an outside source into the receptacle.

b. Preparing Shop Van Body for Use.

(1) Mounting access ladder.

(a) Unsnap the two catches holding access ladder in stowed position on the rear of the shop van body, and detach the ladder.

(b) Install the ladder in mounting brackets below the rear right door, making sure that lower end of ladder sets firmly on the ground.

(2) Opening rear doors.

(a) With latch unlocked, turn handle right to horizontal position to open the rear right door.

(b) The rear left door is opened by pulling down on the ring of the top latch and lifting up on the lower latch.

(c) A doorstop at top of each rear door, limits the opening of door to 130 degrees. Disengage the doorstop to open the door fully. Press each door against the door retainer on the body to maintain the door in the open position against body.

(3) Opening the blackout panels. To open the blackout panel, lift the blackout panel latch and slide the panel down from over the window.

(4) Opening the side windows.

(a) Side windows can be opened from the inside of the body with the blackout panels in either fully closed or open positions.

(b) Press the sliding member of the window and lift the sliding member ring from the hoop at the top of the window.

(c) Lower the sliding member and move the member outward to open the window while pulling down on the window latch ring.

(d) Release the window latch ring engaging the window latch in proper hole in the sliding member to hold the window in the desired open position.

c. Operating the Exhaust Blower.

(1) Operating from the 24-volt dc source.

(a) Set the converter selector switch in the 24 V position.

(b) Set the exhaust blower switch in the desired HI or LO speed position.

(2) Operating from the 115-volt ac source.

(a) Place the power switch handle in the up position for 115-volt circuit operation.

(b) Place circuit breaker No. 3 on multibreaker assembly in ON position.

(c) Set the converter selector switch in the 115 V position. The pilot light will light.

(d) Set the exhaust blower switch in the desired HI or LO speed position.

d. Operating the Dome and Blackout Dome Lights.

(1) Operating the 115-volt dome lights under normal conditions.

(a) Place the power switch handle in the up position for the 115-volt circuit operation.

(b) Place circuit breaker No. 4 on the multibreaker assembly in ON position.

(c) Place the dome-light switch in lower ON position to operate 115-volt dome lights only.

Note. 115-volt dome lights are not in blackout operating condition.

(2) Operating the 115-volt dome and blackout dome lights under blackout conditions.

(a) Place the power switch in up position for 115-volt circuit operation.

(b) Place circuit breaker No. 4 on the multibreaker assembly in ON position.

(c) Place the dome-light switch in the upper ON position to operate 115-volt dome and blackout dome lights. Opening rear right door causes the dome lights to extinguish, leaving blackout dome light burning.

Note. Be sure the 24-volt dc power is being supplied to the blackout relay from circuit breaker on cab firewall. 115-volt blackout circuit will not operate without this 24-volt power. Open and close rear right door to check relay.

(3) Operating the 24-volt dome lights under normal conditions.

(a) Place the power switch handle in down position to close the 24-volt dome-light cutoff switch in the power switch box, for 24-volt dome-light circuit operation.

(b) Place the blackout dome-light toggle switch (fig. 64) in the OFF position.

(c) Place dome-light toggle switch in ON position.

Note. 24-volt dome lights are not in the blackout operating condition.

(4) Operating the 24-volt dome lights under blackout conditions.

(a) Place the power switch handle in down position to close the 24-volt dome-light cutoff switch, in the power switch box, for 24-volt dome-light circuit operation.

(b) Place the blackout dome-light toggle switch (fig. 64) in the ON position.

(c) Place the dome-light toggle switch in ON position. Opening rear right door causes the 24-volt dome lights to extinguish with no dome lights burning. Open and close the rear door to check blackout action.

e. Supplying power to the Molding Receptacles.

(1) Place the power switch handle in up position for 115-volt circuit operation.

(2) To supply power to molding receptacle on the right side of the shop van, set circuit breaker No. 1 on the multi-breaker assembly to ON position.

(3) To supply power to molding receptacles on left side of the shop van, set circuit breaker No. 2 on the multibreaker assembly to ON position.

Section XI. OPERATION OF EXPANSIBLE VAN TRUCKS, M292, M292A1, M292A2, M292A5 AUXILIARY EQUIPMENT

76. General

This section contains instructions covering the mechanical steps necessary to operate the expansible van body and its auxiliary equipment.

***Caution:* Do not walk on the van roof. The roof is not designed to support additional weight and will be damaged by walking on it.**

77. Van Body Operation

a. Operating Site. Whenever possible, select level terrain for operating site of the vehicle. If necessary, fill in the low areas with rubble, sand or other suitable material.

b. Leveling Van Body (Fig. 74).

(1) Remove four leveling jacks from storage box at rear of vehicle. Remove ground spike from box at this time.

(2) Attach jack plates to lower feet of jacks. Assemble inner and outer tubes of jacks, and adjust jack length with chained pin to approximate height of jack pockets at four corners of van body.

(3) Insert upper feet of jacks in the four jack pockets so that all jacks are vertically suspended. Install jack handles and operate jacks until all jack plates are in contact with ground. Be sure all jacks are vertical, then anchor each jack plate with two jack spikes.

(4) Operate each jack as required until van floor is level.

c. Expanding Van Body.

Note. The following instructions for expanding and retracting the van body are limited to one side of the van body since the procedure is identical for both sides.

(1) Release ladder toggle clamps and remove ladders from van rear doors.

(2) Open rear doors and remove side panel lock wrench and retractable beam drive shaft wrench (fig. 75) from inside left rear door.

(3) Release front and rear side panel locks (fig. 77) with side panel lock wrench.

(4) Release drive shaft locking mechanism with locking plungers (fig. 74).

(5) Expand side panel with drive shaft wrench (fig. 74) to full extent of travel.

(6) Open front and rear end panel doors and secure in open position with end panel holding rods.

(7) Unlock hinged roof and floor panels from outside of van.

***Warning:* Check to make sure that the counterbalance cable is not damaged. Do not open the hinged roof and floor panels from the outside of the van. Serious injury can result if the counterbalance cable is broken.**

(8) Working from inside of van, push hinged roof and floor (fig. 82) outward. Stand on hinged floor and push hinged roof upward until it is possible to swing all swivel hooks under roof edge. Retract side panel slightly to permit swivel hooks to rest on sliding pads at edge of roof.

***Caution:* Hinged roof must be supported by swivel hooks before proceeding with closing of van. Exercise care to prevent damage to seals on edge of hinged roof.**

(9) Unhook end panel door holding rod (fig. 81) from rear end panel door and stow rod on adjacent retractable beam. Push upward on rear corner of roof to prevent damage to roof seal and close rear end panel door. Close front end panel door by same procedure.

(10) Lock drive shaft mechanism with locking plunger (fig. 74).

(11) Grasp swivel hook (fig. 79) at front end of van and pull upper edge of side panel inward until it is possible to enter front end panel door guide in the latch on the adjacent corner post. It may be necessary to retract the side panel slightly to enter the door guide in the latch. Aline and secure rear end panel door by same procedure.

***Caution:* Throughout the procedure for closing the side panels, alinement of the end panel doors with the corner posts must be maintained so that doors and corner posts are always parallel.**

(12) Retract side panel sufficiently to permit attachment of toggle clamps to the swivel hooks, and pull upper edge of side panel inward with handles of toggle clamps. Do not attempt to close clamps at this time.

(13) Continue to retract side panel until lower edge of panel is tight against edge of hinged floor. Then close toggle clamps to pull the upper edge of the panel tight against the edge of the hinged roof.

(14) Tramp heavily on hinged floor to relieve binding and to ensure full engagement of guide pins in hinged roof and side panels.

(15) Stand on handle of drive shaft wrench (fig. 74) to force side panel into closer contact with hinged roof and floor edges.

(16) Install ladders at side doors.

(17) Lower window blackout panels and open side panel windows as desired.

d. Retracting Van Body.

(1) Close side door and side panel windows.

***Caution:* Be sure all side panel windows are closed before retracting van body. Windows cannot be closed when van body is in retracted position.**

(2) Remove ladders if installed at side doors.

(3) Withdraw end panel door guides (fig. 75) at front and rear end door panels.

(4) Release and unhook toggle clamps from swivel hooks (fig. 79).

(5) Release drive shaft locking mechanism with locking plunger (fig. 74).

(6) Expand side panel with drive shaft wrench until edge of hinged roof is supported on ends of swivel hooks.

***Caution:* Exercise care to prevent damage to seals on roof edge.**

(7) Push upward on corners of hinged roof, open front and rear end panel doors, and hold in open position with holding rods (fig. 81).

(8) Push upward on hinged roof and swing swivel hooks (fig. 79) into niches. Then, lower roof and see that hooks are securely retained by spring clips.

(9) Engage eye of each toggle clamp with anchor post in clamp niche and close clamp.

(10) Working from outside of van, push upward on hinged floor until edge of floor is closed with edge of hinged roof. Then secure roof and floor with hinged roof lock handle (fig. 80).

(11) Retract side panel with drive shaft wrench. Stand on wrench handle to force side panel into closer contact with hinged floor edge.

(12) Lock side panel with side panel rear lock wrench (fig 77).

(13) Stow side panel lock wrench (fig. 75) and drive shaft wrench on inside of left rear door.

(14) Close both rear doors. Stow ladders on rear doors and secure with ladder toggle clamps (fig. 74).

(15) Remove the four leveling jacks and stow them in the jack storage box (fig. 74).

78. Electrical System

a. Outside Power Source Connection.

(1) Ground vehicle.

(a) Drive ground spike (fig. 74) into ground adjacent to rear end of van left skid.

(b) Connect free end of ground cable to ground spike connector on van left skid (fig. 135).

(2) Connect power cable.

(a) See that the 208-volt main switch (fig. 84) and all 110-volt circuit breaker switches (fig. 85) are in the OFF position.

(b) Remove canvas boot from power cable reel (fig. 81), unlock reel, and unreel cable.

(c) Connect male end of power cable to outside power source.

(d) Connect female end of power cable to cable entrance receptacle (fig. 74).

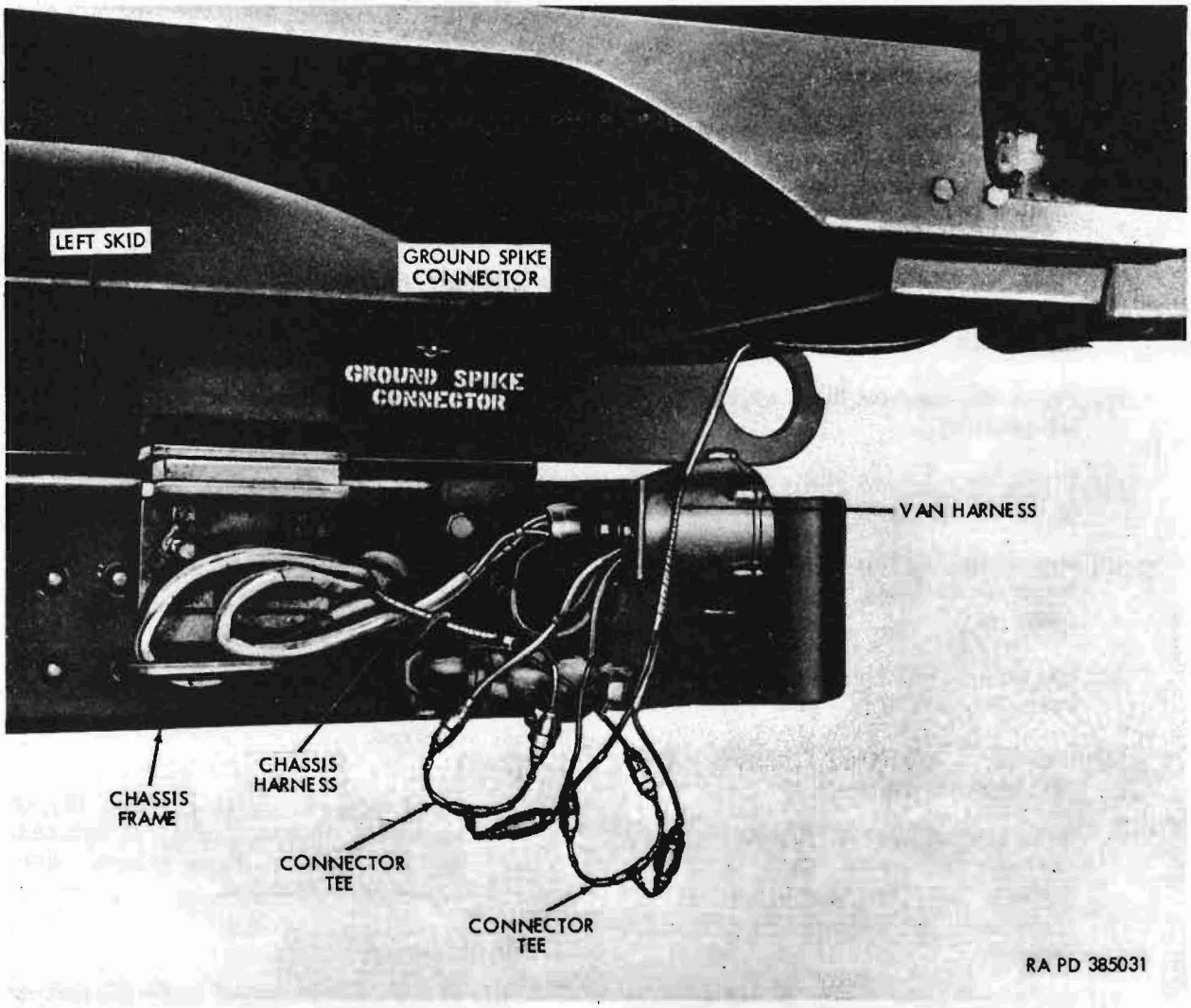

Figure 135. Ground spike connector-van left skid

b. Ceiling Lights and Service Receptacle Operation.

Note. All switches are illustrated in figure 84 unless otherwise indicated.

(1) Normal conditions.

(a) Place the 208-volt main switch in the ON position.

(b) Place the main blackout circuit switch in the OFF position.

(c) Place the service receptacle and blackout switches (fig. 83) in the OFF position.

(d) Depress 110-volt circuit breaker switches 5 and 8 (fig. 85).

(e) Operate individual ceiling light switches as desired.

(f) When operation is completed, depress 110-volt circuit breaker switches 5 and 8, and place the 208-volt main switch in the OFF position.

(2) Blackout conditions.

(a) Raise all side and rear window blackout panels.

(b) Place the 208-volt main switch in the ON position.

(c) Place the main blackout circuit switch in the ON position.

(d) Place the service receptacle and blackout switches (fig. 83) in the ON position.

(e) Depress 110-volt circuit breaker switches 5, 8, and 10 (fig. 85).

(f) Operate individual ceiling light switches as desired.

Note. If power is desired at any service receptacle when doors are opened, place the individual service receptacle blackout switch in the OFF position.

(g) When operation is completed, depress 110-volt circuit breaker switches 5, 8, and 10, and place the 208-volt main switch in the OFF position.

c. Emergency Light Operation.

(1) Place the 208-volt main switch (fig. 84) in the ON position.

(2) Depress the 110-volt circuit breaker switch (9, figure 85).

(3) Place the emergency light switch (fig. 84) in the ON or OFF position as desired.

(4) When the operation is completed, depress the 110-volt circuit breaker 8 and place the 208-volt main switch in the OFF position.

d. Heater Operation.

(1) Starting heaters.

(a) Place the 208-volt main switch (fig. 84) in the ON position.

(b) Depress 110-volt circuit breaker switches 1 and 2 (fig. 85).

(c) Set heater thermostats (fig. 75) to desired temperature.

Note. Heaters will not produce heat unless thermostat settings are higher than the temperature prevailing in the van.

(d) Set heater control switches (fig. 86) to HEATER or VENT position as desired.

(e) Set heater ventilating controls of knob (fig. 86) to vary proportion of fresh air and recirculated air as desired.

(f) Open heater registers (fig. 82) to warm air in van quickly if desired. Close registers when desired temperature is reached.

(2) Stopping heaters.

(a) Place heater control switches in OFF position.

(*b*) Depress 110-volt circuit breaker switches 1 and 2 (fig. 85).

Warning: Do not depress circuit breaker switches 1 and 2 before the purging cycle of the heaters is completed.

(*c*) Place 208-volt main switch (fig. 84) in OFF position.

e. Air Conditioner Operation.

(1) *Starting air conditioner.*

(*a*) Place 208-volt main switch (fig. 84) in ON position.

(*b*) Place 208-volt air conditioner circuit breaker switch (fig. 84) in the ON position.

(*c*) Set air conditioner thermostat (fig 87) to desired temperature.

Note. The air conditioner will not cool unless the thermostat setting is below the temperature prevailing in the van.

(*d*) Open air conditioner bonnet front door with the control handles (figs. 87 and 136).

(*e*) Set the air conditioner selector switch (fig 87) in COOL or FAN position as desired.

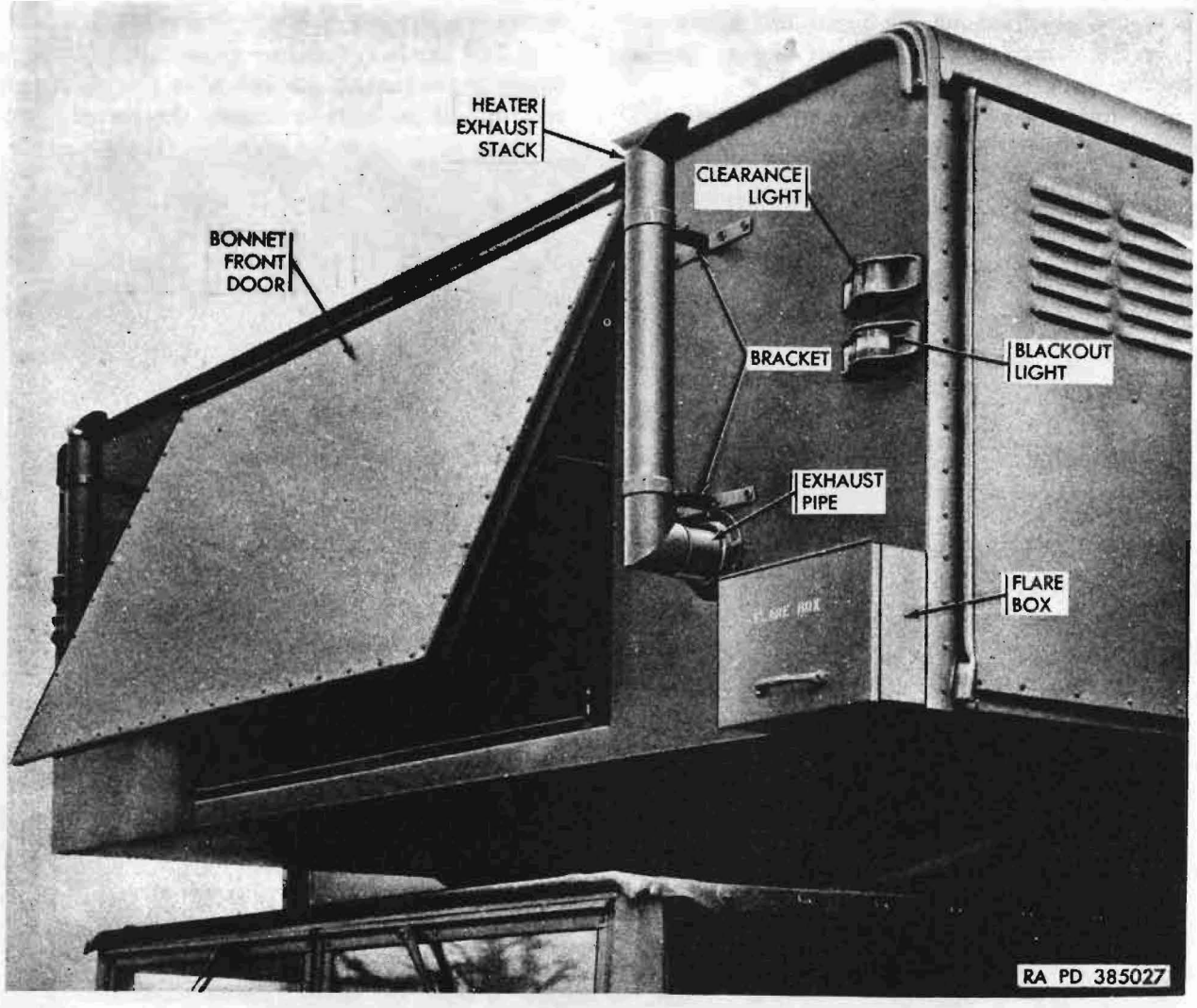

Figure 136. *Bonnet front door in operating position.*

Caution: Do not attempt to start the air conditioner before opening the bonnet front door.

(f) Set air conditioner damper control (fig. 87) to vary proportion of fresh air and recirculated air as desired.

(2) *Stopping air conditioner.*

(a) Place the air conditioner selector switch (fig. 87) in the OFF position.

(b) Place the 208-volt air conditioner circuit breaker switch (fig. 84) in the OFF position.

(c) Place the 208-volt main switch (fig. 84) in the OFF position.

(d) Close air conditioner bonnet front door with control handles (figs. 87 and 136).

78.1. Operation of Powered Lift Gate

a. Set parking brake and start engine. Increase engine speed just above idle.

b. Place transfer shift lever in neutral position.

c. Place transmisssion gear shift lever in the 4th gear position.

d. Open lift gate by pushing opening and closing (horizontal) lever (fig. 136.1) DOWN to release lock hooks. Pull lever to extreme UP position. Gate will stop automatically when reaching the open position.

e. To lower lift gate, push lowering and elevating (vertical) lever (fig. 136.1) FORWARD towards the front of the truck to release the lock hooks. Pull lever BACK to extreme rear position. Gate will stop automatically just above the ground.

f. To elevate lift gate, push lowering and elevating (vertical) lever FORWARD towards the front of the truck. The gate may be stopped at any desired position. When the gate reaches complete elevated position, the lever returns to neutral and the gate is automatically safety-locked into position.

g. For auxilliary electric power operation when engine is not running use switch on the inside right rear wall of the body to activate the electric pump.

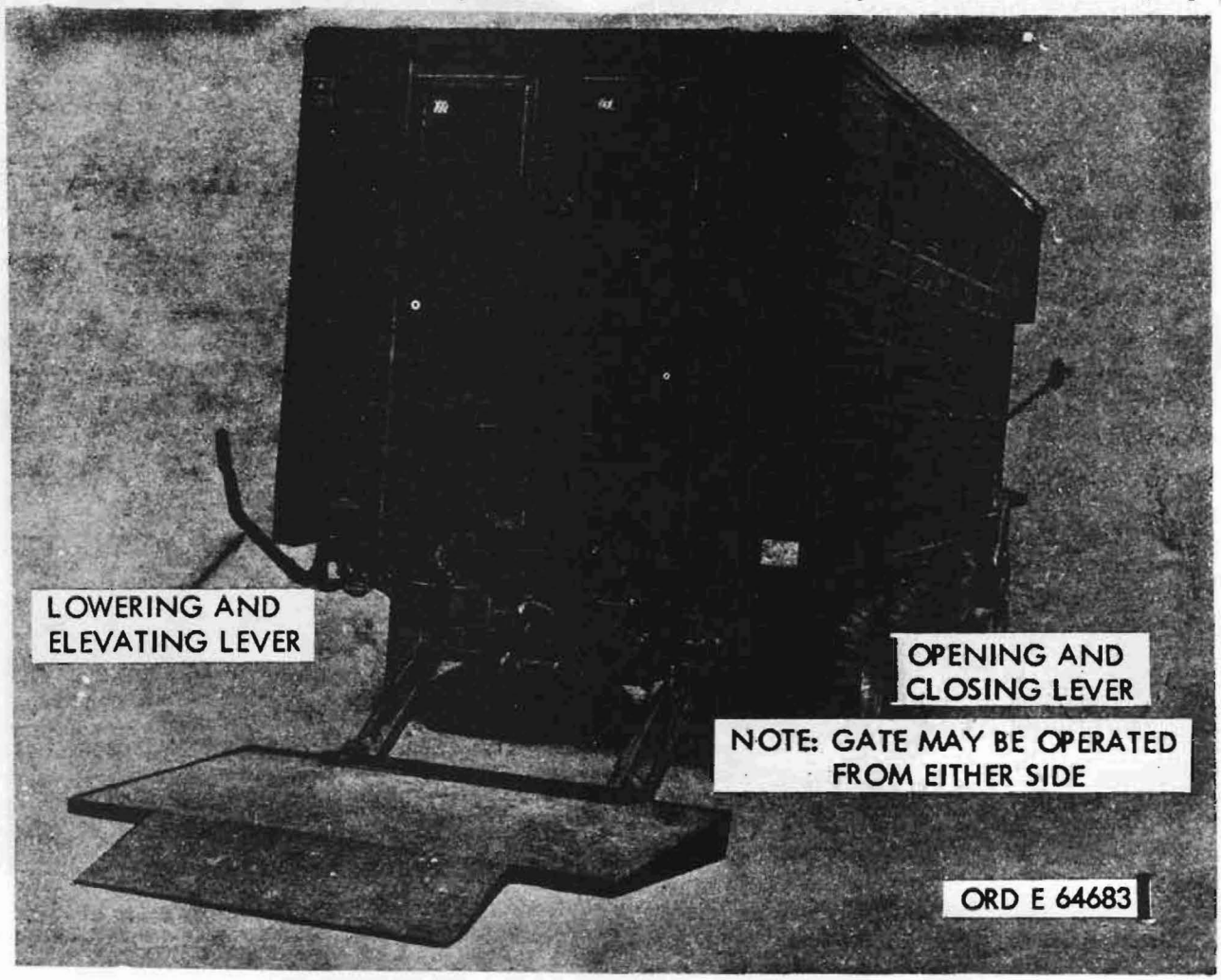

Figure 136.1. Power-operated lift gate — lowered position

Note. Gate must be lowered by engine power and the doors opened to gain access to the switch.

h. The following precautions must be observed during operation of lift gate.

(1) Do not operate PTO and electric-driven pumps in combination.

(2) Do not elevate gate to closed position when doors are open.

(3) Do not overload the gate.

(4) Distribute load evenly on gate.

(5) Do not carry load on gate while in transit.

Section XII. OPERATION OF ELECTRONIC VAN TRUCK XM567 AUXILIARY EQUIPMENT

79. General

This section described, locates, illustrates, and furnishes the operator with sufficient information to manipulate the various controls and instruments provided for the operation of the shop van truck, XM567 (figs. 21 and 22), and auxilliary equipment.

80. Preparing the Shop Van Body for Use

a. Van Body Boarding Ladder. Release the ladder (fig. 137) by lifting upward on the finger loop and allowing the ladder lock to fall free. Lift the ladder from the ladder brackets and install mounting brackets below the rearward side door (fig. 138), making sure the lower end rests firmly on the ground. To secure the ladder, remove from the mounting brackets, suspend ladder from the ladder brackets located on the rear of the van body, pull upward on the finger loop, place the ladder lock over catch, and release the finger loop.

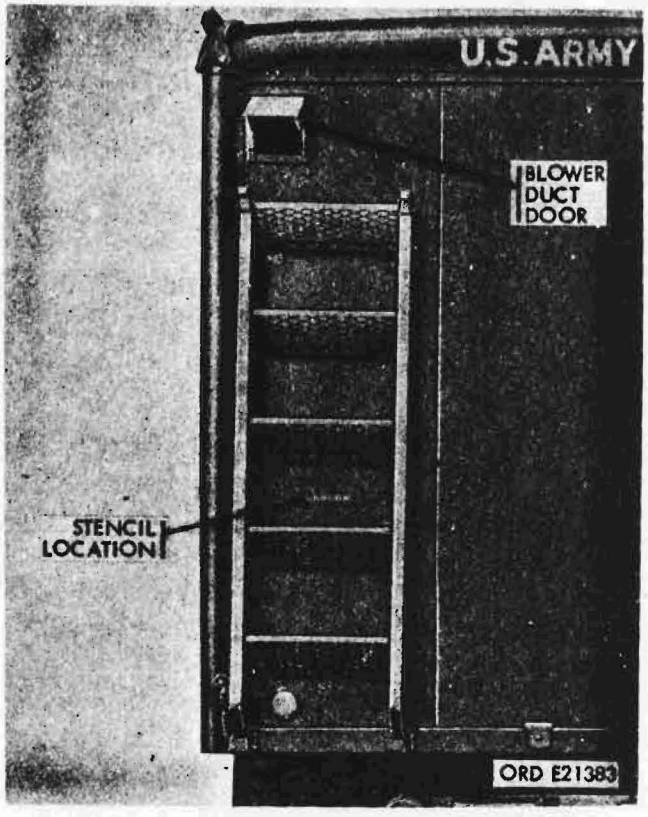

Figure 137. Van body boarding ladder — stowed position

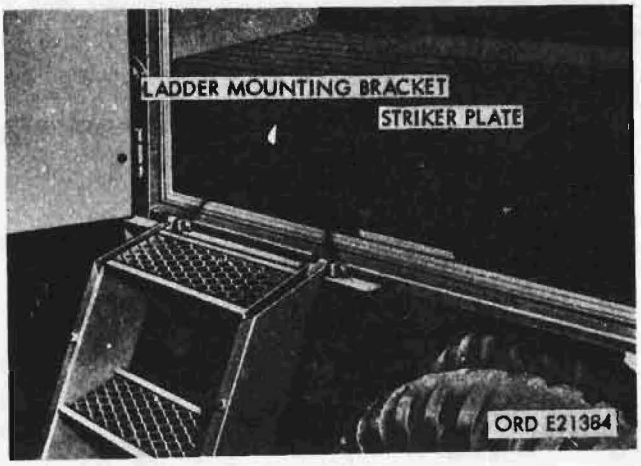

Figure 138. *Van body boarding ladder — installed*

b. Rear Side Door. The rearward side door (fig. 139) is equipped with an outside handle, lock assembly, and two inside lock latches, one at top, and one at the bottom of the door. To open the door, turn the door handle to a horizontal position. The outside handle may be secured in the closed position with a padlock. The rear side door can be swung fully open and held against the body of the rear door holder (fig. 139). To lock the door, close door, and turn the outside handle to a vertical position.

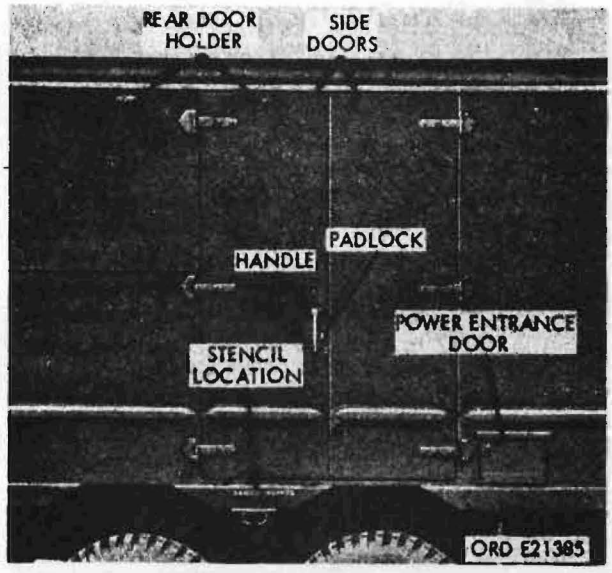

Figure 139. Side door assemblies

c. Front Side Door. The forward side door (fig. 139) is equipped with two "slam action" latches, an upper latch which includes a rod and guide assembly, and a lower latch. To open the door, pull down the ring on the upper latch rod and lift up the lower latch. The front side door can be opened about 120 degrees and retained in position (fig. 140) by disengaging the door brace from the clip on the right side of the door and inserting the forward end of the brace in the brace retainer, on the van body, just above the power entrance door.

d. Power Entrance Door. The power entrance door (fig. 139) is opened by grasping the knurled portion of both door latches and turning the latches one-quarter turn counterclockwise, allowing the door to swing outward and downward. To close the door, swing the door upward to the closed position. To lock, turn both door latches one-quarter turn clockwise.

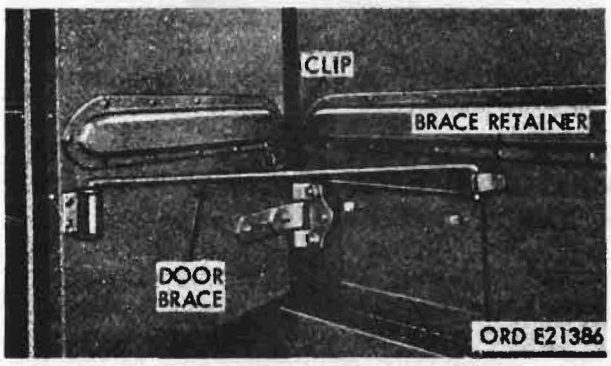

Figure 140. Front side door brace and retainer

81. Electrical Components

a. Dome Light (24V). Power for the 24-volt dome light enters the van body through the 24-volt power receptacle and the 24-volt circuit breaker (fig. 91). The 24-volt dome-light switch (fig. 92) operates the dome light (fig. 92).

b. Multibreaker Assembly. Power for the shop van body 115-volt ac, 400-cycle circuits is controlled by four 10-ampere circuit breaker assemblies in the 115-volt ac multibreaker assembly (fig. 90). Breaker assembly No. 1 controls and protects the power receptacles circuit. Breaker assembly No. 2 controls and protects the ventilator-blower circuit. Breaker assembly No. 3 controls and protects the dome-lights (115v) circuit. Breaker assembly No. 4 controls and protects the heater power-supply circuit. Each breaker must be in the "ON" position to complete its circuit. The breaker goes to a "TRIPPED" position when the circuit is overloaded. It must be moved manually to "RESET" position, after removal of the causes of overload. Power to each circuit is turned off by placing the circuit breaker controlling the circuit in the "OFF" position.

c. Dome Lights (115V). With circuit breaker No. 3 in the "ON" position, the 115-volt dome lights (fig. 92) are controlled by the 115-volt dome-light switch (fig. 89).

d. Power Receptacles. Power to the 115-volt ac power receptacles (fig. 141) is controlled by the circuit breaker No. 1 in the multibreaker assembly (fig. 90).

Caution: Power receptacles are for 115-volt ac, 400-cycle operation only. Damage or destruction of equipment may result from improper use.

e. Ventilator Blower. Power for operation of the ventilator blower (fig. 142) is controlled by circuit breaker No. 2 in the multibreaker assembly (fig. 90).

f. Ventilator Blower Duct. Ventilation of the van body is controlled from inside the van

body by opening the door of the ventilator-blower duct (fig. 137) on the upper left rear of the van body, and placing the ventilator blower in operation.

g. Heater. Power for operation of the van body space heater (fig. 89) is controlled by circuit breaker No. 4 in the multibreaker assembly (fig. 90). For operation of the heater refer to the manufacturer's manual, Corps of Engineers stock no. 7610-C-1-2761.

h. Heater Thermostat. The heater thermostat (fig. 141) controls heat output from the van body space heater. The amount of heat supplied is controlled by setting the plastic dial under the thermostat front cover to the temperature desired. The dial may be locked at any given setting. To lock the dial, open the front cover and remove the socket wrench provided with the thermostat. With the wrench, turn the hex-head setscrew down until the dial is stationary (fig. 143).

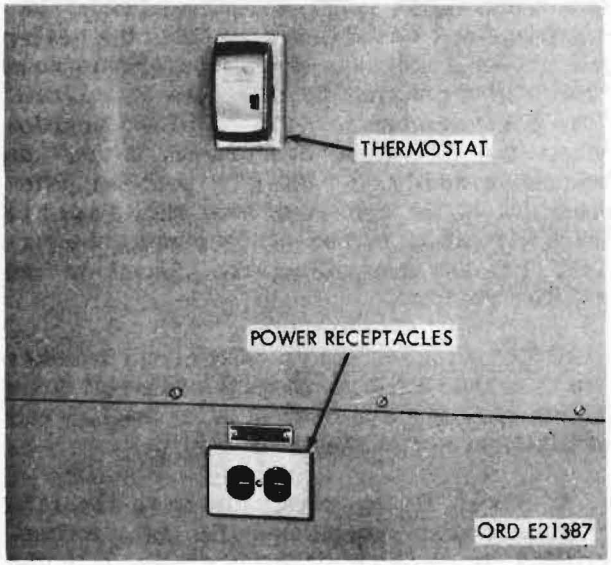

Figure 141. Power receptacles and heater thermostat - left wall

Note. Be careful not to lose the socket wrench, since it makes the adjustment of the thermostat much easier.

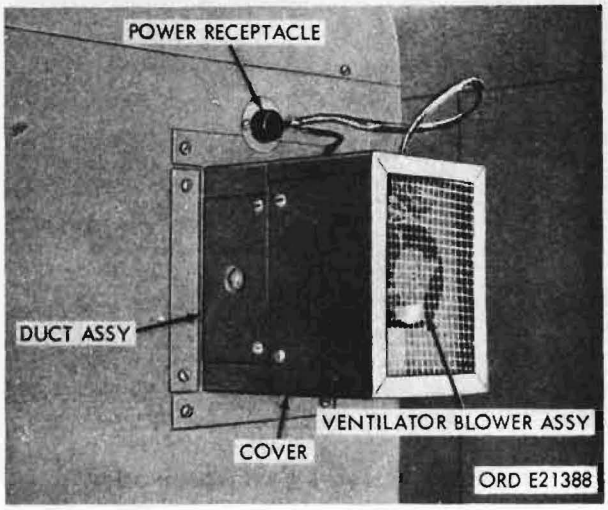

Figure 142. Body ventilator blower assembly

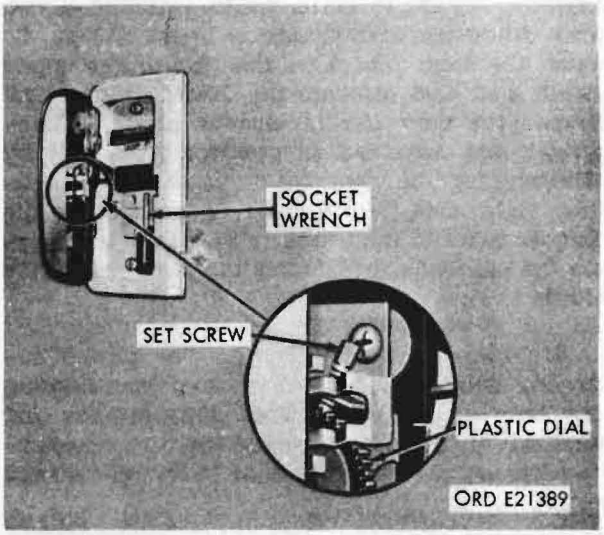

Figure 143. Heater thermostat adjustment

Section XIII. OPERATION OF MISSILE FIRING DATA COMPUTER VAN TRUCK XM472

82. General

The XM472 missile firing and data computer van truck (figs. 23 and 24), is a mobile, self-contained body, designed to house instruments and personnel charged with the responsibility of recording missile data. The body is equipped with two air conditioners and one heating unit for instrument efficiency and personnel comfort. Essentially all components of the van body are operated from the instrument panel, the space heater control panel, the air con-

ditioner control panel, and the engine-generator set control box. Various manual controls are provided to direct the distribution of warm and conditioned air. A telephone, located on the right side of the personnel compartment, is readily accessible to personnel within the compartment. An emergency escape hatch is located forward on the right side of the body.

83. Information

For all information pertinent to the operation and maintenance of the XM472 van truck, refer to TM 9-1430-350-12/2.

Section XIV. OPERATION OF TELEPHONE CONSTRUCTION AND MAINTENANCE TRUCK V-17A/MTQ AUXILIARY EQUIPMENT

84. General

a. V-17A/MTQ Body. The V-17A/MTQ body (fig. 25) is especially constructed for telephone construction and maintenance work. The steel body is semi-inclosed having partially open top and an open rear end. Top opening is covered by a canvas. There are six compartments on right-hand side of body with a seventh on the left-hand side. All compartment doors are hinged and have slam-type locks with pull latches. Compartments are used to store small tools, equipment, and necessary parts. Shelves are provided inside body for large equipment, tools, and material. Also, inside body are locker and rubber goods compartments. A sliding front window (fig. 144) serves for communication purposes between interior of body and cab of vehicle.

Figure 144. Sliding front window

The V-17A/MTQ rear winch and other equipment are either mounted or stowed in or on body.

b. V-17A/MTQ Rear Winch.

(1) The V-17A/MTQ rear winch has a single free winch drum with a tooth-type drum clutch and a friction disk-type drum brake. The drum clutch is used to rotate winch drum. A drum brake is used to retard free spooling of winch drum during unreeling of winch cable by hand, or to stop drum rotation immediately upon release of pulling force on cable. This prevents backlashing of cable. The drum brake should never be used as brake against load on winch cable, since brake is not designed to withstand high torque of loaded drum.

(2) A worm automatic brake, secured to shaft on winch worm, operates automatically when a load is on winch cable. This worm brake operates only during lowering of load on winch cable under power or when suspended load on cable tends to drive drum in reverse direction upon release of power to winch. This braking action is entirely automatic with proper adjustment of worm brake. There is no worm brake action during operation of winch in forward direction or during no-load reverse motion of winch drum such as occurs when unreeling cable by hand.

(3) The rear winch is mounted in the front end of body behind cab of vehicle and is operated from the cab through V-17A/MTQ rear winch control lever (fig. 94).

(4) The rear winch is provided with an auxiliary shaft on which a horizontal

capstan or collapsible cable reel (fig. 145) is mounted during telephone maintenance and construction work. The shaft is driven by auxiliary shaft drive from sprocket on winch drum shaft. An extra drum shaft support (fig. 146) is installed just inside this sprocket to take up this extra load on drum shaft.

(5) The rear winch is driven by winch drive chain from the V-17A/MTQ pillow block assembly (fig. 147) mounted on a supporting frame secured to underside of winch mounting frame. Pillow block assembly, driven by rear winch drive shaft from transfer power takeoff, also serves to adjust tension on winch drive chain.

c. Collapsible Cable Reel. A collapsible cable reel (fig. 145) is used with V-17A/MTQ rear winch for taking up or laying of wire or light cable. The reel, when not in use, is secured on cable reel holder in body on right rear side. Reel has six movable rim segments controlled by handle-operated sliding spider. Turning operating handle causes sliding spider to move along reel spindle. This

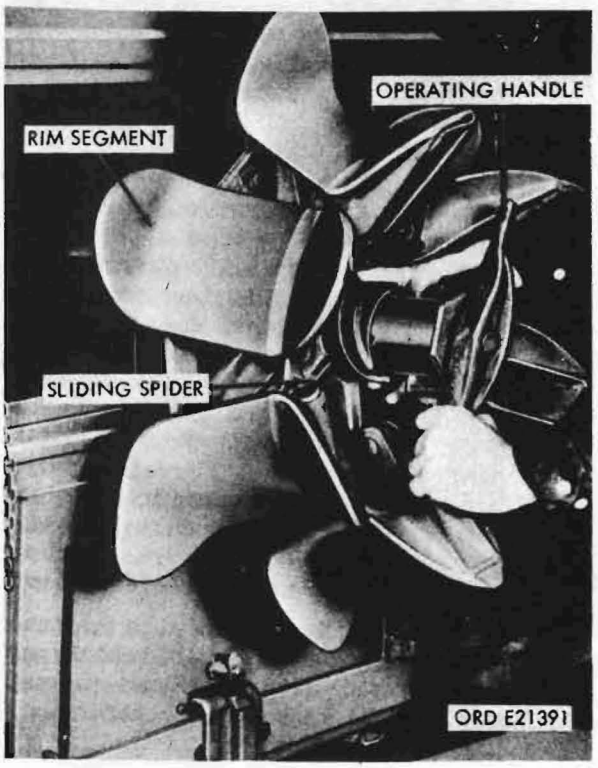

Figure 145. Collapsible cable reel

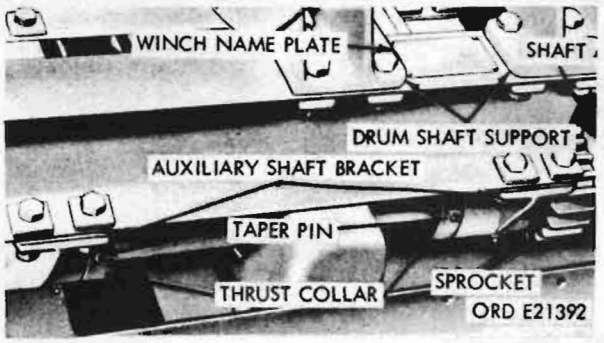

Figure 146. V-17A/MTQ rear winch auxiliary shaft and auxiliary shaft sprocket

causes the segments to tilt and allows coils of wire to be installed on or removed from the reel.

d. Revolving Platform. The revolving platform (fig. 95) mounted on top of body, is of the nonelevating type used for installation and repair of telephone lines and cable. Platform is constructed of steel plate welded to a support ring having rollers and bearings which allow the platform to be turned on the brake ring frame. A platform brake is used to prevent platform turning during use. A lockpin supplements the platform brake in locking platform for travel. Guard rail, provided as safety device for operating personnel, folds to platform in four sections when not in use. Four pins and chains hold rails in open position when platform is in use.

e. Pole Derrick.

(1) The pole derrick (fig. 148) consists of three legs forming a tripod support

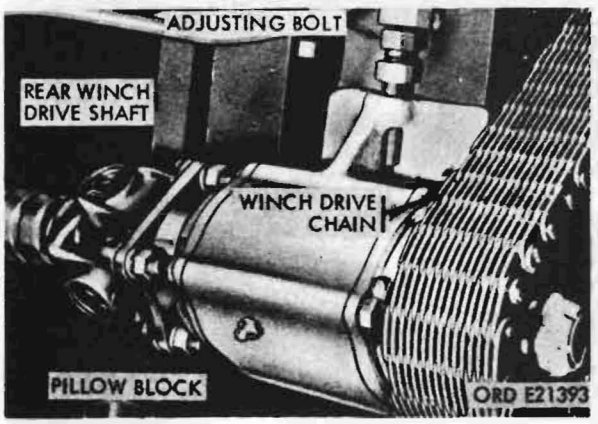

Figure 147. V-17A/MTQ pillow block

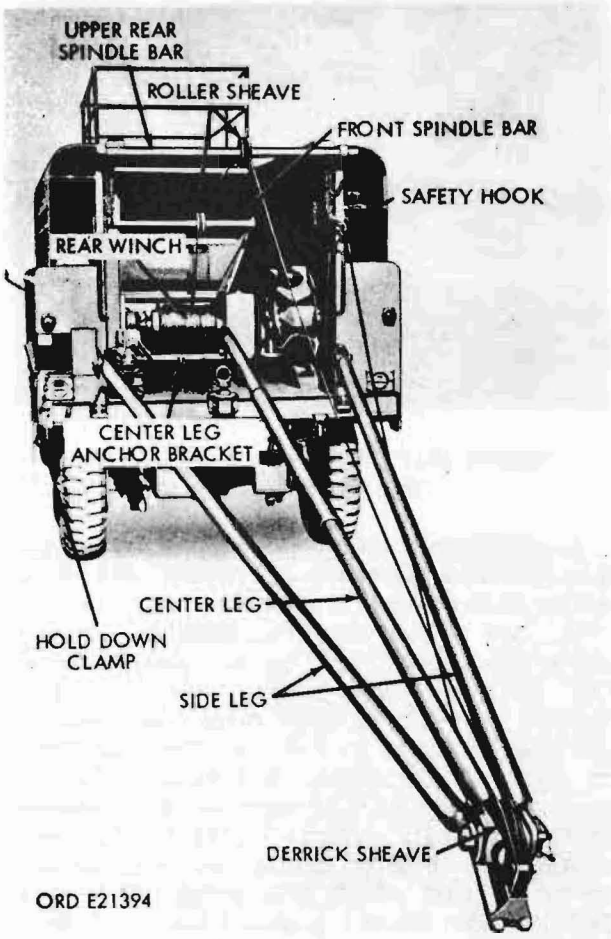

Figure 148. Preparing to erect pole derrick

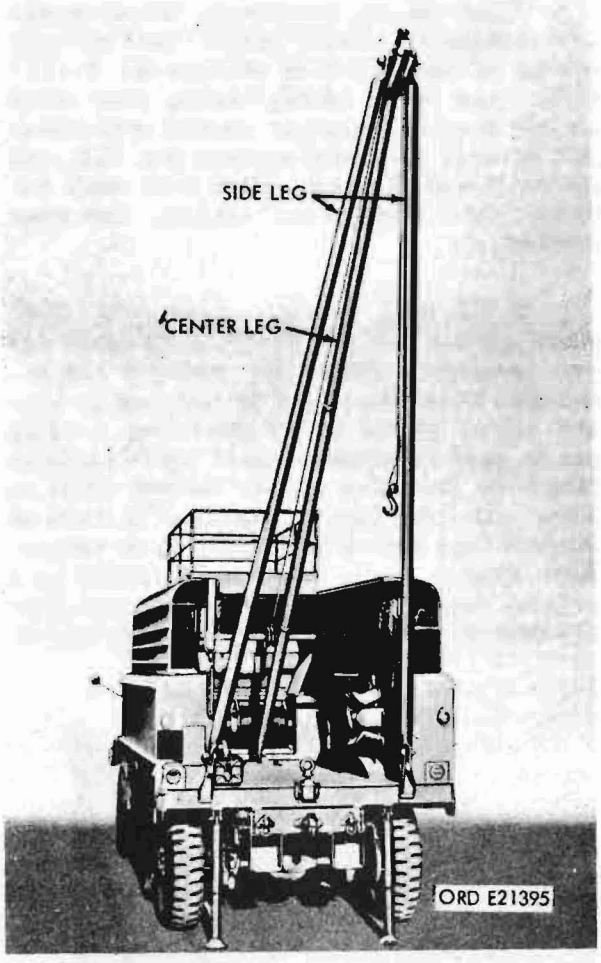

Figure 149. Pole derrick erected as truck - mounted tripod

for use with V-17A/MTQ rear winch. The center leg is composed of three telescoping leg sections, the upper section having derrick sheave mounted on top end. The derrick (fig. 148) can be entirely supported by truck, all three legs being mounted on brackets attached to vehicle; or with side legs (fig. 149) mounted on truck and center leg supported on ground. Two derrick rollers are attached at top of derrick center upper leg to allow winch cable to run smoothly through sheave. The derrick is carried in vehicle body along left-hand side and protrudes from body both front and rear.

(2) The particular arrangement of pole derrick is determined by immediate use. Height can be varied, within limits, by changing length of center leg. Sliding telescoping center leg sections in or out and securing sections with adjusting pins allow variation in derrick height. Erected as a ground supported assembly with center leg perpendicular to ground (fig. 150) the assembly has greater lifting capacity than when truck mounted. In this ground position, the derrick, when used with snatch block, can be used to pull poles from ground.

f. Derrick Leg Holddown Clamps. Two derrick leg holddown clamps (fig. 148) are used on V-17A/MTQ truck to secure legs of derrick in vehicle when derrick is not in use. Each clamp has chain to hold legs of pole derrick in place. One end of chain is spring attached to clamp handle, and other end of chain is held by chain bracket. Handle is used to apply pressure to clamp spring and chain when securing derrick legs in place.

g. Wheel Chocks with Chain. Wheel chocks are triangular wooden blocks used on rear wheels of the vehicle to prevent the V-17A/MTQ truck from moving during rear winch or pole derrick operation. Chocks with chains are secured in stowed position (fig. 151), one on each side of truck, under body shell between rear wheels, by holders and snap catches.

h. V-17A/MTQ Support Legs (Fig. 150). Each support leg for V-17A/MTQ truck has two removable hollow leg sections and removable base. Inner leg is fastened to base and slides in and out of outer leg. Locking pin is used to adjust support leg to required length by insertion of pin through holes in inner and outer legs. Adjustment is made on support legs before load is placed on vehicle. Each support leg is attached to vehicle by a bracket welded to body. When not in use, legs are held off the ground by a chain with a hook.

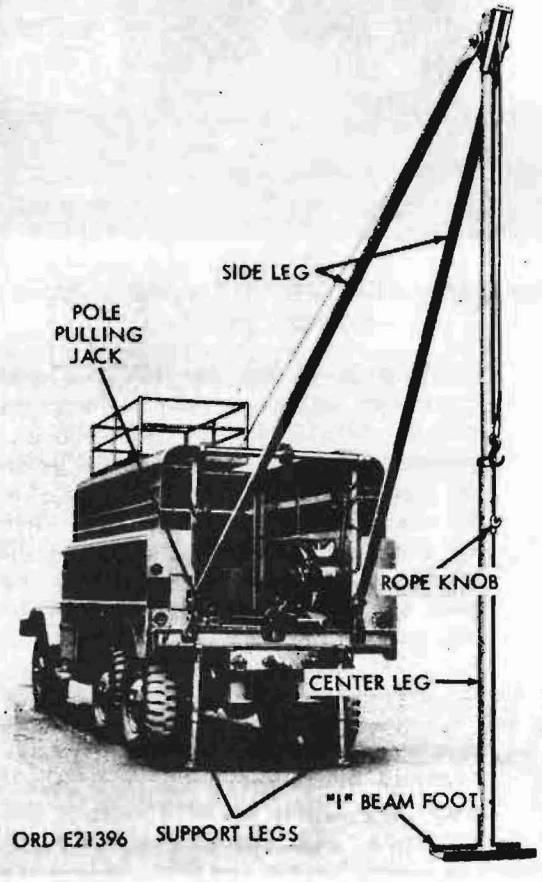

Figure 150. Pole derrick erected with center leg on ground

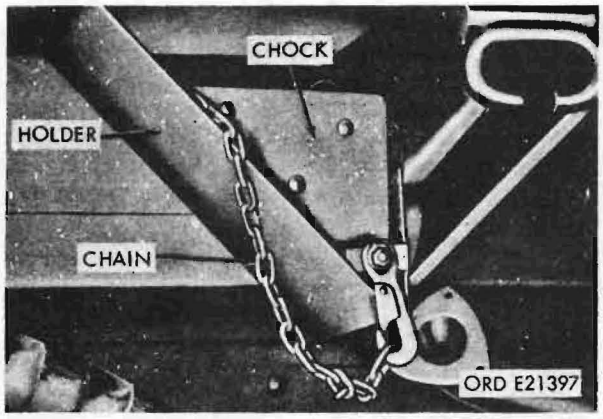

Figure 151. Wheel chock with chain in stowed position

i. Additional Equipment and Accessories. The V-17A/MTQ truck is equipped with three roller sheave spindle bars (two shown in (fig. 148), two roller sheaves, universal sheave block with socket (fig. 152), horizontal capstan (fig. 153), and pole pulling jack (fig. 150). Spindle bars are of solid steel and mount at various locations on vehicle. They are held in place by locking pins. Two sheaves may be used on any two bars at any time. Each sheave is free to move endwise on the bar for convenience in locating during use. Sheaves are made of cast steel with graphited bronze bushing-type bearing press-fitted into hub of sheave. Universal sheave block frame has two shanks. One shank is in line with sheave. Other shank is at 90 degrees to sheave. When

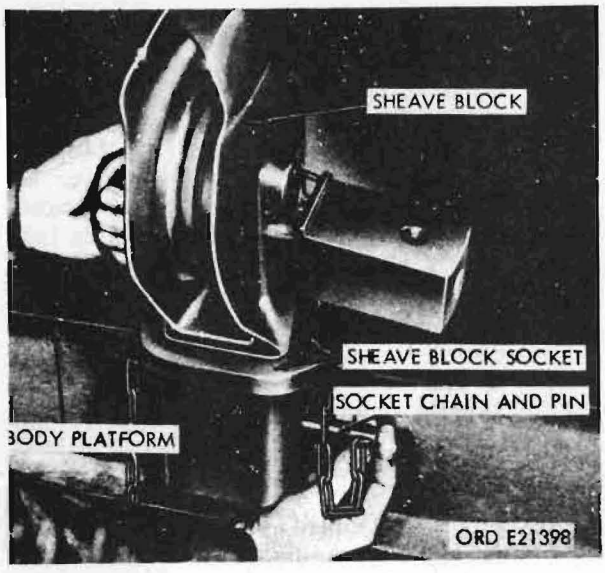

Figure 152. Installing universal sheave block in sheave block socket

mounted in sheave block socket (fig. 152), sheave block may be used for overhead or side pulls during construction work with truck. Socket is overhanging type mounted on rear edge of body. Socket chain and pin are provided on socket for securing sheave frame in socket. The horizontal capstan (fig. 153) is removable. For use, the capstan is slid onto the rear winch drum shaft, pressed in against the spring, and turned into place to be held in position by a dowel pin on shaft. The pole pulling jack is a ratchet-type jack used to straighten or pull poles. Jack ratchet is manually engaged by moving pawl.

85. Controls

a. V-17A/MTQ Rear Winch Control Lever. This lever (fig. 94) protruding from cab floor to left of steering wheel, controls engagement and disengagement of winch clutch and brake. Forward pressure on lever to IN position engages winch clutch, causing winch drum rotation. Clutch is disengaged by pulling back lever to OUT position. Further motion of lever to the rear will cause engagement of winch drum brake. Release of lever causes disengagement of brake.

b. Transfer Power-takeoff Shifting Lever. This shifting lever (fig. 34), located at left rear of driver's seat, engages and disengages the transfer power takeoff. Pulling up on lever to ENGAGE position engages power takeoff and furnishes power to rear winch. Pushing forward and down on lever to DISENGAGE position disengages power takeoff. Lever can be locked in disengaged position by locking bar.

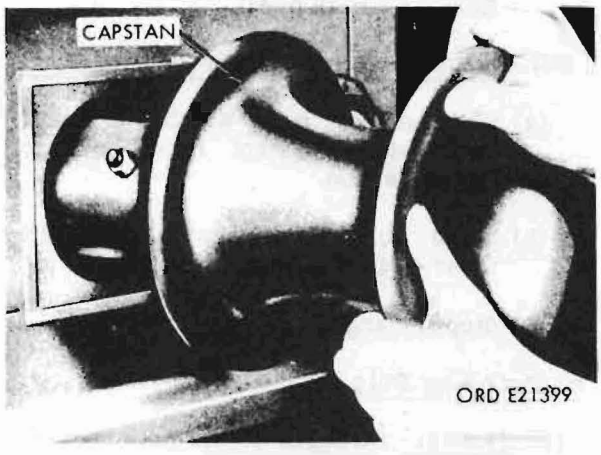

Figure 153. Installing horizontal capstan

c. Revolving Platform Controls. The rotating platform (fig. 95) has a lockpin to hold platform in fixed position during travel, and a platform brake to hold platform in any desired position during operation. Lockpin is spring loaded. Pulling up on lockpin releases platform for rotation. The brake has a brake lever held in place by clips on edge of platform. In this position, brake lining contacts brake ring securing platform from rotating. Lifting handle from clips causes spring to unlock lining from ring and leaves platform free to be turned to any position.

86. Operation

a. Operating V-17A/MTQ Rear Winch.

(1) General. The rear winch normally is used in conjunction with other equipment on the telephone construction and maintenance truck. Before placing winch in operation, vehicle and other necessary equipment should be prepared for use. As circumstances dictate, vehicle should be positioned for winch operation, equipment prepared and laid out for use, and duty surveyed and calculated for winch loads and necessary uses. Preparation of pole derrick should be accomplished, as necessary, before placing winch in operation.

(2) Safety precautions.

(a) Do not allow persons near winch drum cable during operations. Snapping of winch cable is dangerous.

(b) Make sure winch is operating satisfactorily before lifting heavy loads.

(c) Use pole jack during pole pulling operation to loosen pole.

(d) Apply truck parking brake and use wheel chocks to prevent vehicle motion during winch use.

(e) Use support legs to relieve truck springs and body stress during lifting loads or pulling poles.

(f) Always wear leather gloves when handling winch cable to prevent injury to hands by broken or loose wires. Do not let cable slide through hands.

(g) Never disengage winch clutch when load is on winch cable.

(3) Preparing vehicle for winch operation.

(a) Start engine, disengage clutch, and place transfer shift lever (fig. 94) in NEUTRAL position.

(b) Place transfer power-takeoff shifting lever (fig. 34) in ENGAGE position.

Caution: Allowing engine to run with transmission engaged and transfer in NEUTRAL position without transfer power takeoff in ENGAGE position will cause bearing failure in transfer case. Shift transmission to NEUTRAL position when not operating transfer power takeoff.

(c) Place transmission gearshift lever in a forward gear, holding truck clutch disengaged.

(d) Engage clutch slowly and place V-17A/MTQ rear winch control lever in IN position. Return transmission gearshift lever to NEUTRAL position.

(4) Operating rear winch to take up winch drum cable.

(a) Depress clutch pedal and place transmission gearshift lever in one of forward gear positions holding truck clutch disengaged.

Note. Selection of particular forward gear position depends on weight and type of load to be placed on winch cable. Always use low gear when lifting or pulling heavy or awkward loads. This low gear ratio allows slower takeup of winch cable, affording greater control over load and also, causing less stress on engine. Use third gear for average loads.

(b) Release clutch pedal slowly and depress accelerator pedal at the same time to operate winch to take up winch cable.

Note. Depress accelerator pedal sufficiently to keep engine running at effective speed without racing or stalling engine.

(c) To stop winch drum rotation, depress clutch pedal, release accelerator pedal, and move transmission gearshift lever to NEUTRAL position. Release clutch pedal.

(5) Operating rear winch to take off winch drum cable by hand. Winch drum cable can be taken off winch drum by hand without power operation of winch. Winch drumbrake can be used to control unreeling of cable when there is no load on cable. Pulling back on rear winch control lever applies drumbrake to control free spooling of winch drum during removal of cable.

(6) Operating rear winch to lower load or run off winch drum cable under power.

(a) Prepare vehicle for winch operation ((3) (a) and (b) above).

(b) Place transmission gearshift lever in reverse position holding truck clutch disengaged.

(c) Release clutch pedal slowly and depress accelerator pedal to operate winch to lower load or run off winch cable.

Note. Depress accelerator pedal sufficiently to keep engine running at effective speed without racing or stalling.

(d) To stop winch drum rotation, depress clutch pedal, release accelerator pedal, and move transmission gearshift lever to NEUTRAL position. Release clutch pedal.

(7) Securing rear winch from operation.

(a) With no load on the winch cable, pull rear winch control lever back to OUT position.

(b) Make sure transmission gearshift lever is in NEUTRAL position.

(c) Stop the engine.

b. Operating Pole Derrick.

(1) General. Strength of the pole derrick depends on straightness and roundness

of leg tubing. A slight bend or flat surface will greatly decrease maximum capacity of derrick and can cause collapse under load. Each leg and leg section must be carefully examined before use for damage.

Caution: If bent or flat surface is discovered, do not use derrick. Notify organizational maintenance.

(2) Safety precautions.

(a) Do not allow persons to pass under derrick while derrick is being erected, lowered, or carried partially erected.

(b) When raising pole, allow only authorized persons in area.

(c) Make sure adjusting pins extend through both sections of leg tubing when assembling center leg.

(d) When moving vehicle with derrick attached, be sure derrick head sheave will clear all overhead obstacles.

(e) When raising or pulling a pole, attach winch cable at point above center of balance on pole to make pole butt-heavy, thus, preventing pole butt from raising off ground.

(f) When pulling a pole, make sure wood of pole is strong enough to take pull without breaking.

(g) Use pole jack to loosen pole, if necessary, during pole pulling.

(h) Apply parking brake, and use wheel chocks and support legs to prevent movement of truck and to take load weight off truck springs.

(3) Operating pole derrick as truck-mounted tripod (figs. 148 and 149).

(a) Erecting derrick.

1. Pull up on handles of derrick leg holddown clamps and remove chains from chain brackets.

2. Remove pole derrick from the vehicle.

3. Install hooked ends of derrick side legs in brackets on rear of truck and secure in position with nuts and bolts provided.

4. Assemble center leg from three center leg sections, adjusting leg to required length, and securing sections together with adjusting pins. The middle section of the center leg should be installed so that the hook on the side will be up and to the rear when the tripod is raised.

5. Place lower end of center leg in truck body with derrick rollers of sheave end resting on ground.

6. Connect side legs to sheave end by securing side legs with pin. Lock pin in place with key and snap hook provided.

Note. Make sure key draws side legs snugly against sheave housing. Adjust castle nut on opposite end of pin, if necessary, to provide a snug fit that is neither too tight nor too loose. Install cotter pin to hold castle nut in position after adjustment.

7. Install roller sheave on roller sheave front spindle bar, and install spindle bar in roller sheave front spindle bar right and left brackets. Secure spindle bar with pin provided.

8. Install roller sheave on roller upper rear spindle bar, and install spindle bar in roller sheave upper rear spindle bar right and left brackets. Secure spindle bar with pin provided.

9. Unreel winch cable, passing cable over the two installed roller sheaves, through pole derrick sheave from top to bottom and secure cable eye on safety hook on rear of body.

10. Operate rear winch slowly (a(4) above) to take up winch cable. As derrick rises from ground, guide the center leg toward pole derrick intermediate leg anchor bracket on floor of body to rear of winch.

11. When winch cable clears upper rear roller sheave, stop winch, and remove upper rear roller sheave and spindle bar.

12. Place winch in operation, continuing to raise derrick. Guide center leg into anchor bracket until holes are alined and stop winch. Secure leg in bracket with anchor pin provided.

13. Reverse winch to give slack in cable (a(6) above), and remove winch cable eye from safety hook.

(b) Using pole derrick.

1. Attach winch cable to load. Be sure to observe safety precautions (a(2) above).

2. Operate rear winch to take up winch drum cable (a(4) above).

3. To lower load under power, operate rear winch (a(6) above).

(c) Lowering pole derrick.

1. Place winch cable eye in safety hook and operate winch (a(4) above) slowly to take weight of pole derrick off anchor pin holding center leg in pole derrick intermediate leg anchor bracket. Stop winch.

2. Remove anchor pin.

3. Operate winch (a(6) above) to lower pole derrick until center leg is to rear of roller sheave upper rear spindle bar brackets. Stop winch.

4. Install upper rear roller sheave and spindle bar.

5. Operate winch (a(6) above) and lower derrick to ground, guiding upper rear roller sheave under winch cable.

6. Allow winch cable to slacken. Stop winch and remove winch cable eye from safety hook.

7. Remove winch cable from derrick sheave. Start winch and take up winch cable (a(4) above) until cable is fully reeled on winch drum. Secure winch (a(7) above).

8. Remove pin holding side legs to derrick sheave and remove legs.

9. Remove nuts and bolts holding side legs in brackets on rear of truck and remove legs.

10. Remove adjusting pins holding sections of center leg together and separate sections.

11. Stow derrick legs in place in truck body using derrick leg holddown clamps to secure legs in position.

(4) Operating pole derrick with center leg on ground position (fig. 150).

(a) Erecting derrick.

1. Remove pole derrick, assemble, and prepare to erect derrick according to procedure in (3)(a)1. through 9. above, except that lower section of center leg is not attached for this operation.

2. Operate rear winch slowly (a(4) above) to take up winch cable. As derrick rises from ground, carry center leg away from vehicle toward vertical position. When center leg is hanging free, stop winch.

3. Place I-beam foot under suspended center leg and operate winch (a(6) above) to lower center leg. Guide center leg into eye on foot. Stop winch.

Note. Be sure center leg is exactly vertical and that I-beam foot has solid footing.

4. Place slack in winch cable and remove winch cable eye from safety hook.

(b) Using pole derrick. Pole derrick, erected with center leg on ground, can be used with snatch block on winch cable and with winch cable eye attached to derrick leg rope knob (fig. 150) for pole pulling. This method gives mechanical advantage gained by

using cable as 1-1/2-part line. Derrick can also be used for lifting or pulling with winch cable as normal 1-part line by attaching load to cable directly.

1. Attach winch cable (or snatch block, if used) to load. Be sure to observe safety precautions (a(2) above).

2. To raise load, operate rear winch to take up winch drum cable (a(4) above).

3. To lower load under power, operate rear winch (a(6) above).

(c) Lowering pole derrick from ground position.

1. Place winch cable eye in safety hook and operate winch (a(4) above) to raise center leg off of 1-beam foot.

2. Carry center leg up onto truck platform and operate winch (a(6) above) to lower derrick until derrick sheave rests on ground.

3. Take up winch cable (a(4) above) on winch drum and secure winch (a(7) above). Disassemble and stow derrick according to procedure in (3) (c) 8. through 11. above.

c. Operating Collapsible Cable Reel.

(1) General. The collapsible cable reel is operated from V-17A/MTQ rear winch auxiliary shaft extending through first compartment on right side of body. Reel is operated with winch drum disengaged from winch drum shaft. Reel is used to string, lay, or rewind wire or light cable.

(2) Safety precautions.

(a) Before operating collapsible cable reel, make sure reel is properly engaged on rear winch auxiliary shaft.

(b) Do not overload cable reel. Maximum pull on reel must not exceed 4000 pounds.

(c) Stand clear of reel and wire during operation. Do not touch wire unless absolutely necessary.

(d) Run reel at slow reasonable speeds. Do not race engine.

(e) Move vehicle only short distances with reel attached. Be sure reel is clear of obstacles.

(f) Observe capacity of reel. Allowable capacities are 1600 feet of 1/4-inch wire rope or 200-pound coil of wire.

(g) Do not operate reel and vehicle at same time.

(h) Observe transfer operating precaution (a(3) (b) above).

(i) Use wheel chocks to hold vehicle in place when necessary.

(3) Operation.

(a) Remove cable reel from stowed position.

(b) Install cable reel (fig. 145) on auxiliary shaft by pressing reel on shaft to compress reel spindle spring and turning reel counterclockwise to engage shaft dowel pin in grooves in reel spindle shaft.

(c) Prepare vehicle for rear winch operation (a(3) above). Make sure rear winch control lever is in OUT position.

(d) Depress clutch pedal and place transmission gearshift lever in reverse or forward speed, as required.

(e) Release clutch pedal slowly while depressing accelerator pedal to operate cable reel. Do not race engine. Unwind or wind wire or cable, as required.

(f) To stop reel action, depress clutch, release accelerator pedal, and place transmission gearshift lever in NEUTRAL position.

(4) Installation or removal of coils.

(a) Collapse cable reel by rotating reel operating handle (fig. 145) counterclockwise until sliding spider disengages from handle. Manually push

sliding spider in toward fixed spider to complete collapse of reel.

(b) Install coil on, or remove it from rim segments (fig. 145) as required.

Caution: In handling coiled wire, be sure all wire ends are properly secured before moving coil. Failure to do this may result in tangled wire or injury to personnel.

(c) If coil is being installed, push it back against flanges of rim segments.

(d) Pull forward on sliding spider and rotate operating handle clockwise to engage handle legs in spider. After engagement, continue to rotate handle clockwise as far as it will go.

(5) Securing cable reel from operation.

(a) With reel expanded, press reel in toward truck body and turn clockwise to free reel from dowel pin in shaft.

(b) Pull reel off auxiliary shaft of rear winch and stow on cable reel holder inside truck body.

(c) Place transfer power-takeoff shifting lever in DISENGAGE position.

(d) Place transmission gearshift lever in NEUTRAL position.

d. Operating Horizontal Capstan (Fig. 153).

(1) General. The horizontal capstan is operated from drum shaft of rear winch with winch-drum clutch in disengaged position. It is used to "snake" poles, to take up slack in cable or wire that has been laid or strung to string wire, etc.

(2) Safety precautions.

(a) Make sure capstan is properly secured on winch drum shaft.

(b) Run capstan at reasonable speeds. Do not race engine.

(c) When moving vehicle with capstan attached, be sure capstan is clear of obstacles.

(d) Do not operate vehicle and capstan at the same time.

(e) Use wheel chocks, when necessary to hold vehicle in place.

(f) Observe transfer operating precaution (a(3)(b) above).

(3) "Snaking" or taking up slack

(a) Install horizontal capstan on winch drum shaft by sliding capstan in on shaft and turning counterclockwise to engage shaft dowel pin in pin slot in capstan.

(b) Prepare vehicle for rear winch operation (a(3) above). Make sure rear winch control lever is in OUT position.

(c) Depress clutch pedal and place transmission gearshift lever in one of lower forward gear positions.

(d) Release clutch pedal slowly while depressing accelerator pedal to operate capstan at required speed.

(e) Throw one or two turns of snaking rope over capstan leaving free end of rope long enough to handle. Tighten loose end of rope by hand, as necessary, to accomplish the desired pull. Remove rope from capstan.

(f) To stop capstan, depress clutch pedal, release accelerator pedal, and place transmission gearshift lever in NEUTRAL position.

(4) Securing capstan from operation.

(a) Remove capstan from winch drum shaft by pressing in on capstan and turning clockwise to free from dowel pin in shaft.

(b) Place transfer power-takeoff shifting lever in DISENGAGE position.

Section XV. OPERATION OF EARTH BORING MACHINE AND POLE SETTER TRUCK V-18A/MTQ AUXILIARY EQUIPMENT

87. General

a. V-18A/MTQ Body. The V-18A/MTQ truck has an M34 body modified to mount the earth boring machine model HD, and V-18A/MTQ rear winch (fig. 154).

b. Earth Boring Machine, Model HD.

(1) The earth boring machine is designed for boring holes in most kinds of soil, and for setting poles when used in conjunction with the V-18A/MTQ rear winch. Four earth augers (fig. 155) permit power boring of holes 9-, 12-, 16-, and 20 inches in diameter to a maximum depth of 7 feet. Power for the machine is obtained from the truck transfer power takeoff through the power-divider and earth boring machine drive shaft.

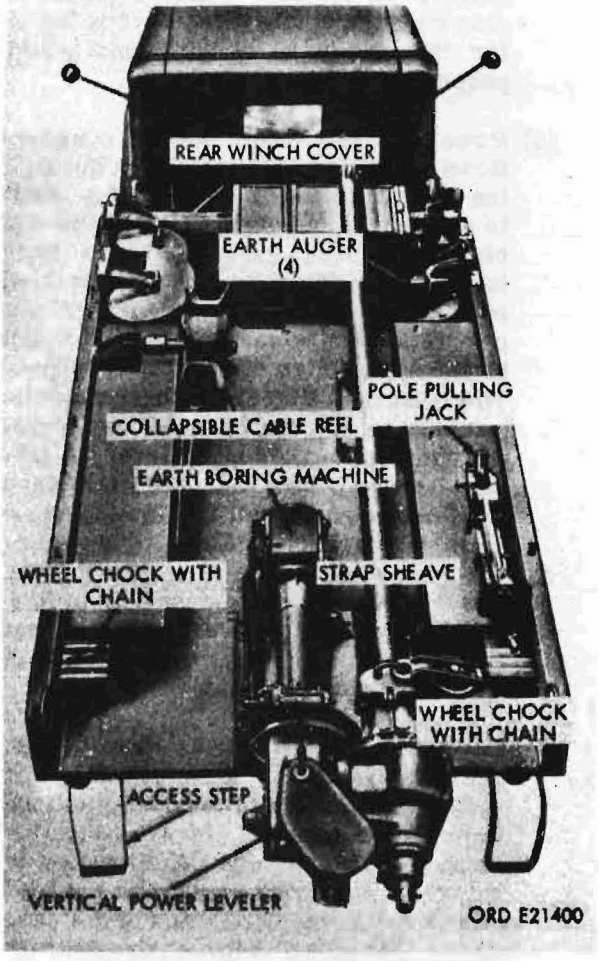

Figure 154. Earth boring machine and pole setter truck V-18A/MTQ - mounted equipment in stowed position

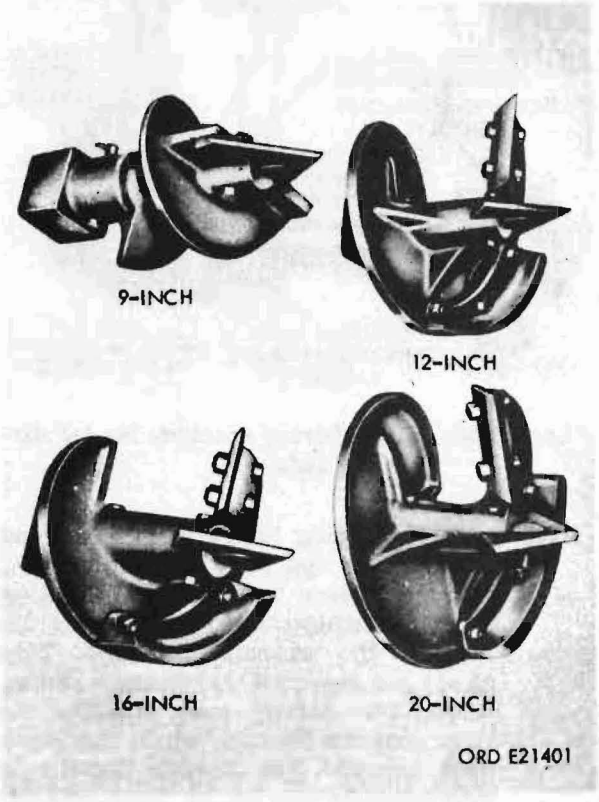

Figure 155. 9-, 12-, 16-, and 20-inch earth augers

(2) Fastened to the boring machine base, the feed and drive clutch shaft tube assembly (fig. 156) supports the major components of the boring machine. The clutch and brake case assembly, connected on the front of the feed and drive clutch shaft tube assembly, contains the input shaft assembly and the clutch and brake assemblies for both the feed and drive. The feed and drive clutch shaft tube, containing the feed and drive clutch shafts, also serves as a mount for the control lever operating handle assembly and horizontal leveling worm assembly. Connected to the rear of the tube is the intermediate

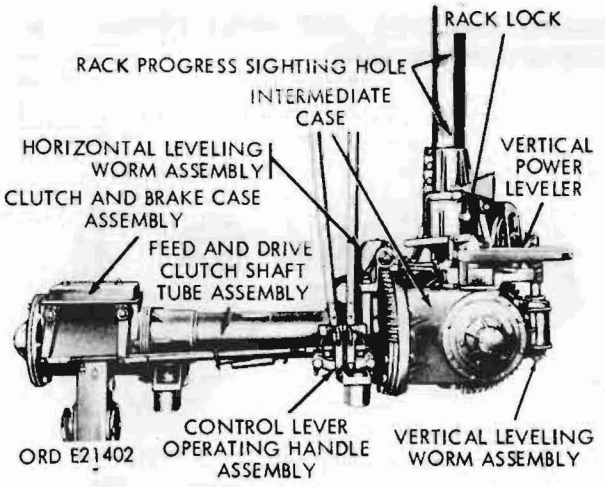

Figure 156. Earth boring machine model HD-left side view

case containing the reduction feed and drive gears and pinions. The vertical power leveler and vertical leveling worm assembly are attached to the rear of the intermediate case. This case also supports the boring case (fig. 157). The boring case contains the rack carrier through which the auger rack passes. The integral derrick is supported by the boring case and includes the derrick tube, plumb bob, tube base, rack lock, derrick sheave, and a snatch sheave.

(3) The strap sheave (fig. 154) is mounted at the rear right-hand side of the truck body. Four earth augers are mounted at the front of the body, two at each side of the rear winch.

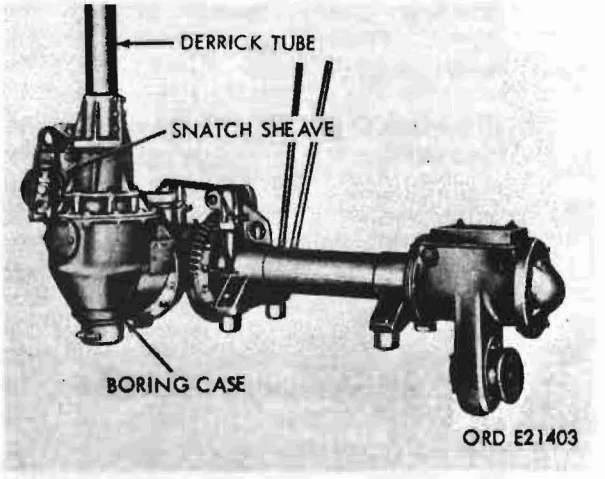

Figure 157. Earth boring machine model HD right side view

(4) The boring machine is of the feed and drive type with the auger rack being raised, lowered, and rotated by the boring case gears. A vertical power leveler adjusts the vertical leveling worm to obtain a vertical position of the derrick and auger rack in a front and back direction. The power leveler is also used to lower and raise the derrick and auger rack to and from the travel position. A hand-operated horizontal leveling worm assembly is used to position the intermediate case with the derrick and auger rack in vertical position in a right and left direction. The combined actions of the two leveling worms permit boring of the vertical holes without regard to position of the vehicle on terrain. This combination also permits boring of nonvertical holes for the guy-wire anchors and other purposes.

(5) Power to the earth boring machine flows from the power-divider through the earth boring machine drive shaft to the clutch and case. Power from the clutch and brake case input shaft gear is transferred by the gears to the feed and drive clutch shafts through the controlled engagement of the clutch and brake assemblies of the feed and drive. The feed and drive clutch shafts, depending on degree of clutch and brake engagement by the control lever operating handles, turn the reduction feed and drive gears in the intermediate case at various speeds. The intermediate case gears turn the boring case gears at selected speeds in forward direction. There is no reversal of the power train gear rotation during normal boring operations.

(6) All actions of the auger rack depend upon the relative speeds of the boring case gears as established by positioning of the control lever operating handles. The various combinations of the clutch and brake action on the feed and drive in the clutch and brake case change the speed ratio of the gears in the boring case. Through this changeable relative motion of the boring case gears, the earth auger may be rotated

or stopped, and the auger rack raised, lowered, or held motionless.

(7) The earth boring machine is not automatic and all the auger rack and earth auger motion will cease upon release of the control lever operating handles. This is an important safety feature of the boring machine.

(8) The derrick tube is used as protective covering for the auger rack. The derrick tube, derrick sheave on top of tube, snatch sheave on tube base, and strap sheave adjacent to boring machine, are used for pole setting operations with the rear winch. A pole-pulling jack is provided for use with the derrick for pole pulling.

c. V-18A/MTQ Rear Winch.

(1) Refer to paragraph 84 for the general description and information on the rear winch. The V-18A/MTQ rear winch is constructed and operates similarly to the V-17A/MTQ rear winch described in the above-mentioned paragraph. The winch is mounted in the front end of the body behind the cab, and is operated from the cab through the V-18A/MTQ rear winch control lever (fig. 96).

(2) The V-18A/MTQ rear winch is driven by the winch drive chain from the power-divider mounted on the frame underneath and slightly to the rear of the winch. The power-divider is driven by the power-divider drive shaft connected to the transfer power takeoff. The chain idler pulley, mounted on the rear member of the winch mounting frame, allows adjusting of tension on the drive chain.

d. V-18A/MTQ Support Legs. Two support legs (fig. 97) are used when setting the poles with integral derrick. Each leg has three telescoping leg sections and a base plate. The stop rings welded to each leg section limit the maximum extension of the leg. A swivel ring welded to the top leg section, and the welded base plate limit retraction of leg. Each leg is attached to the vehicle by a welded mounting bracket. The legs are held in the stowed position by chains. Connection pins are used to adjust the leg length during use. A plunger assembly extending through the inside of each pin assures retention of the pin in the support leg. The pressing plunger at the end of the pin frees the cross bolt which may then be pressed into the side of the pin, allowing removal of the pin from leg. To lock the pin in the leg, the cross bolt is pressed out from the side of the pin and is automatically locked in position by the plunger.

e. Wheel Chocks with Chains. Wheel chocks are triangular wooden blocks used under the rear wheels of the vehicle to prevent it from moving during pole setting operations. Chocks are secured in holders at the rear of each wheel well on the body by chains.

f. Collapsible Cable Reel. A collapsible cable reel (fig. 154) is used with the rear winch for taking up or laying wire and light cable. The reel has six movable rim segments (fig. 145) controlled by a handle-operated sliding spider. Turning the operating handle causes the spider to collapse segments, allowing the installation or removal of wire or cable coil. When in use, the reel fits on the end of the rear winch drum shaft. The reel is stored on the cable reel holder at the left inside the body.

g. Power-divider. A power-divider (fig. 158), mounted on the truck frame, beneath the V-18A/MTQ rear winch, transfers power from the transfer power takeoff to either the rear winch or the earth boring machine. The power-divider control lever (fig. 96) controls output of the power-divider. With the lever in the NEUTRAL position, the power-divider is disengaged from both the rear winch and boring machine. In EARTH AUGER position, the power is transmitted to the boring machine. The rear winch can be run in either forward or reverse direction, depending on positioning

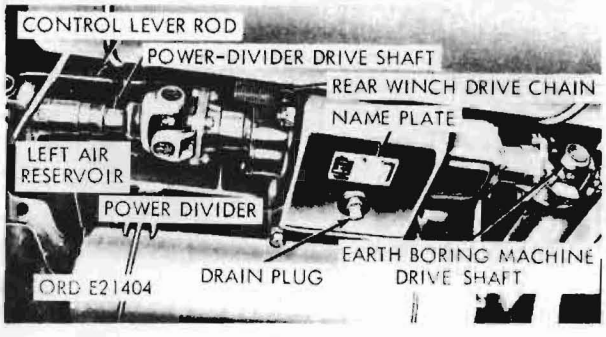

Figure 158. Power-divider installed - bottom view

of the power-divider control lever in REAR WINCH FOR. or REAR WINCH REV. position. These changes are accomplished without the shifting of the truck transmission gears.

88. Controls

a. General. A control lever location diagram and operation procedure data plate (fig. 159) is located on the instrument panel compartment. It details and illustrates the location and positioning of all control levers for the V-18A/MTQ truck, except the feed and drive control lever operating handles for the earth boring machine.

b. V-18A/MTQ Rear Winch Control Lever (Fig. 96). This lever, located forward at left of driver, controls the engagement and disengagement of the rear winch clutch and brake. Forward movement of the lever to ENGAGED position engages the winch clutch, causing the winch drum to rotate. Pulling back the lever to NEUTRAL position disengages the clutch. Further motion of the lever to the rear engages the winch drum brake. Release of the lever causes the disengagement of the drum brake.

c. Transfer Power-takeoff Shifting Lever (Fig. 96). This lever, located at left rear of driver's seat, engages and disengages the transfer power takeoff. Pulling up the lever to ENGAGED position engages the power takeoff, furnishing power to the power-divider. Pushing the lever forward and down to NEUTRAL position disengages the power takeoff. The lever can be locked in NEUTRAL position.

d. Power-divider Control Lever (Fig. 96). This lever, projecting from the intermediate tunnel on the floor of cab, controls shifting of the power-divider. When the lever is in NEUTRAL position, no power is transmitted to the earth auger or winch. Setting the lever in REAR WINCH REV. position shifts the power-divider, causing the rear winch to run in the reverse or cable unreeling direction. The lever in REAR WINCH FOR. position causes the winch to run in the forward or cable reeling direction. Power to the boring machine is obtained by setting the lever to EARTH AUGER position.

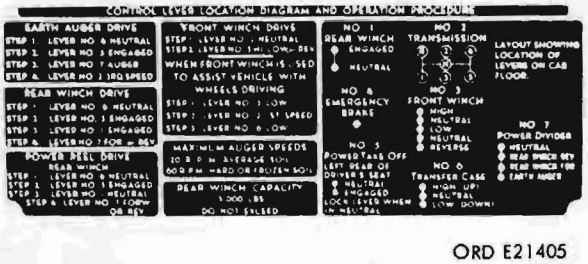

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Figure 159. Control lever location diagram and operating procedure data plate

e. Earth Boring Machine Control Lever Operating Handles.

(1) The earth boring machine feed and drive control lever operating handles (fig. 97), located on the left side of the feed and drive clutch shaft tube, control the action of the clutch and brake assemblies in feed and drive located in the clutch and brake case of the earth boring machine. The degree of clutch and brake plates engagement controls relative speeds of the feed and drive gears in the boring case which, in turn, controls the auger action. The front handle is the feed control lever operating handle. The rear handle is the drive control lever operating handle.

(2) Pulling on the front or feed control lever operating handle, while pushing on the rear or drive control lever operating handle, lowers the earth auger.

(3) Pushing on both the feed and drive control lever operating handles causes the earth auger to rotate and lower under power.

(4) Pulling on the rear or drive control lever operating handle, while pushing on the front or feed control lever operating handle, raises the earth auger without rotation.

f. Auger Rack Lock. The auger rack lock (fig. 160), located in the derrick tube base, secures the auger rack from vertical movement when the earth boring machine is not operating. The rack lock handle, when moved in an upward direction, locks the rack in place. Pulling the handle down unlocks the rack.

g. Vertical Power Leveler Shifter-shaft Lever (Fig. 97). The vertical leveler is engaged and disengaged by movement of the vertical power leveler shifter-shaft lever.

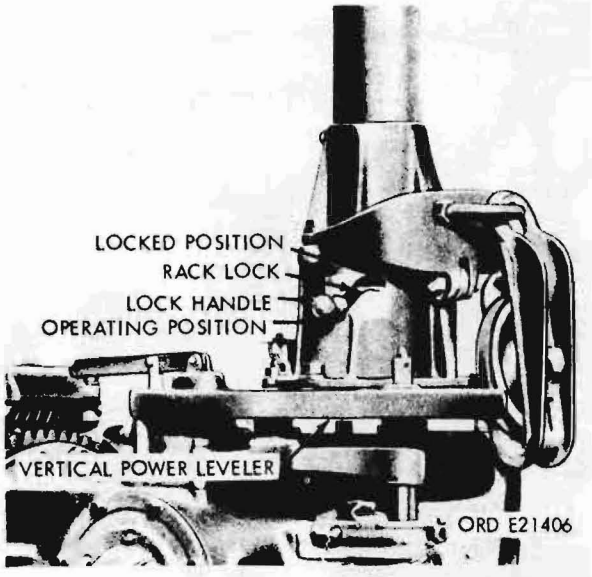

Figure 160. Auger rack lock

Pulling up on the lever engages the power leveler for raising and lowering the derrick before and after operations. Pushing down on the lever disengages the power leveler.

89. Operation

a. Operating Earth Boring Machine.

(1) General. Proper operation of the earth boring machine is essential. Observance of capacities and operating precautions is necessary to protect the machine and personnel from injury and damage. The boring machine is capable of being damaged and deadlined through careless or unskilled operation. Before placing the boring machine in operation, be sure that the machine and all related components are lubricated according to instructions in LO 9-2320-209-12. During and after operation, be sure to lubricate the auger rack and winch cable as required.

(2) Operating precautions.

(a) When attempting to reach the pole or anchor location, or when leveling the earth boring machine to bring the earth auger and derrick tube to plumb position, the auger and top of derrick tube must be clear of obstructions. Do not attempt to move the truck or to plumb the auger rack during boring operation while the auger is still in the hole.

(b) Be sure the transfer shift lever of the truck transfer is in NEUTRAL position, during all boring operations, to avoid movement of truck.

(c) When working on side of hill or at any location where the truck has a tendency to move during boring operation, use the wheel chocks in addition to the truck parking brake. If the chocks on the rear wheels are not sufficient to hold the truck, place a cross arm against the front wheels.

(d) Engage the auger rack lock (fig. 160) at all times when the auger is raised and boring operation is stopped for any reason.

(e) When raising the earth auger, take care to stop it before the auger bumper spring (fig. 97) is compressed. Under no circumstances, clear the auger of soil by allowing the auger to compress the bumper spring fully and bump against the rack thrust plate cage lower cap.

(f) Allow no person other than the operator to stand close to the boring machine while it is in operation; soil spun off the earth auger sometimes contains objects which can inflict serious injuries.

(g) Do not run the auger rack out of the derrick tube so that the auger rack guide will be below the bottom rack progress-sighting hole (fig. 156) in tube.

(h) Do not run the auger over 120 rpm.

(3) Preparation for boring.

(a) When spotting the truck in position for boring hole, position the truck so that the auger point will be directly over the stake which marks the hole location when the earth boring machine is raised from traveling position to boring position.

(b) Set the truck parking brake and chock wheels to prevent movement of truck during boring operation.

(c) When their use is required, such as when digging in heavy clay, unchain the V-18A/MTQ support legs at the rear of the truck, from their fastenings and set them so that they are either directly in contact with the ground or so that any load on the earth auger will bring the support legs into contact with ground with not more than 1 inch of travel.

(d) Raise the earth boring machine to boring position by power from the engine (1. through 11. below).

1. With the engine running at idling speed, disengage the clutch.

2. Make sure the transfer shift lever is in neutral position.

3. Move the transmission gearshift lever to reverse position.

4. Move the transfer power-takeoff shifting lever all the way to rear to ENGAGE position.

5. Place the power-divider control lever in EARTH AUGER position.

6. Engage the clutch slowly.

7. Check and make sure the auger rack lock is in the upper or locked position.

8. Raise the vertical power leveler shifter-shaft lever (fig. 161) to engage power leveler.

Note. If the lever does not readily raise, apply momentary pressure on the drive control lever operating handle (fig. 161).

9. Engage the boring machine drive clutch by pushing the drive control lever operating handle toward the right side of the truck.

10. Accelerate the engine, as necessary, to raise the derrick tube slowly. The derrick can be stopped at any position by releasing the operating handle. When the derrick is raised to the desired position, release the drive control lever operating handle; then, disengage the power leveler by pushing down on the shifter-shaft lever.

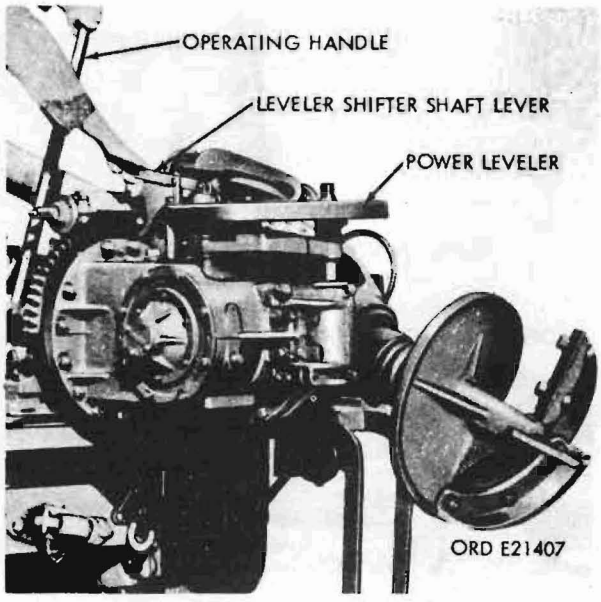

Figure 161. Operating the leveler shifter shaft lever and the drive control lever operating handle

11. Place transmission gearshift lever in NEUTRAL position.

Caution: Allowing the engine to run with the transmission engaged and the transfer in NEUTRAL position without the transfer power takeoff in ENGAGED position will cause bearing failure in the transfer case. Shift the transmission to NEUTRAL position when not operating the transfer power takeoff.

(e) Plumb the boring machine, using the horizontal and vertical leveling worm assemblies (fig. 162) while watching the plumb bob (fig. 97) when plumbing for the vertical holes. A ratchet wrench (fig. 162) is provided which fits over the end of the leveling worm shafts. Turn the leveling worm shafts with the wrench to level the boring machine. The horizontal leveling worm has a ratchet pawl to secure the worm shaft in position.

(f) Remove the proper earth auger from stowed position and attach to the auger

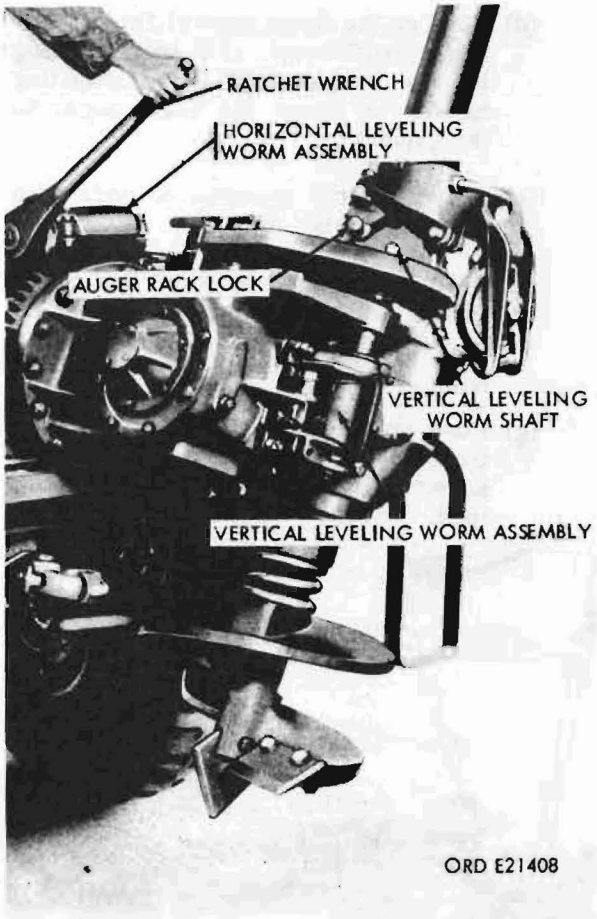

Figure 162. Operating horizontal leveling worm assembly

rack, with pin provided, after placing the auger bumper spring on the rack.

(4) Boring in various soils.

(a) When boring holes in sandy clay or ordinary soil, the earth auger will work best at speed of approximately 120 rpm with the transmission in third gear. In clay or wet soil, take care to prevent overloading the auger. Since there is tremendous suction, and too heavy a load may strain the boring machine, take less load on the auger before lifting it from the hole.

(b) Exercise care when boring in soil containing loose rock and like obstructions to prevent damage to the machine. If rocks are too large to be removed by the earth auger, loosen and remove them by hand. Rocks of small diameter can be picked up by the auger. To remove rocks of this size, lower the auger slowly into the hole, turning it very slowly until the auger comes into contact with the rock and works underneath it. Raise the auger slowly until the rock is at ground level, and lift rock off auger with shovel. If rock is not over 10 inches in diameter, it can probably be loosened and dislodged by first pushing on both levers to rotate and feed auger downward, then quickly raising auger slightly to loosen rock.

(c) Boring in disintegrating shale or similar rock can be accomplished by boring at very slow speed with the auger rotating at about 25 rpm. This type of boring requires sharp auger blades. If the auger blade is slightly worn it is advisable to reverse it; if badly worn, the blade should be replaced. In boring holes in this type of soil, it may be possible to bore only from 5 to 7 holes with the same blade. The auger points may serve for drilling one or two more holes. If it is necessary to replace the worn auger thrust plates, notify the direct support maintenance unit.

(d) Boring in sandstone or frozen ground requires a speed no greater than 60 rpm with sharp blades and points. Place the transmission in first or second gear to rotate the auger at slower speeds with more power.

(e) When starting to bore a hole, regardless of type of soil, keep the auger rotation speed down to about 25 rpm until depth of approximately 18 inches is reached. If no serious obstructions have been encountered, higher speeds may then be selected. This procedure will prevent damage to the earth boring machine, since nature of soil may usually be determined after first 18 inches have been penetrated. Existence of a rocky layer, about one foot thick, just under the surface will often be found. Avoid impact loads on the boring machine when starting boring operations.

(f) When boring in sand, sandy loam, or any soil having tendency to stick in the auger rack teeth, brush teeth out

as often as necessary with wire brush. This will prevent dirt from being carried up into the rack carrier and lodging behind the rack thrust plates with resulting damage to the plates from excessive pressure. Be sure to keep the leveling worms and gears free of sand and dirt.

(5) Boring operation.

(a) Place the transmission in the forward gear. ((4)(a) above).

(b) Pull the throttle control out against the throttle control stop.

(c) Pull the auger rack lock handle to lower the auger rack lock (fig. 160) to unlock position.

Note. If the handle does not move readily, press forward slightly to the feed control lever operating handle (fig. 163) to take the rack weight off the rack lock.

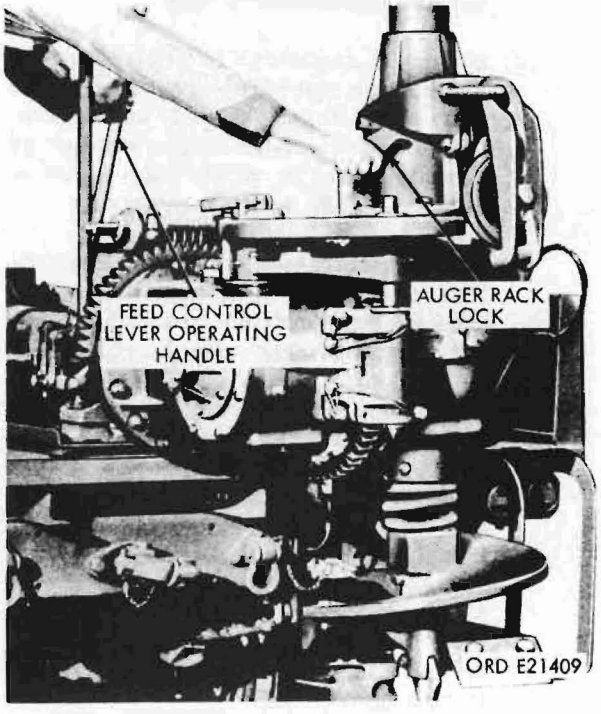

Figure 163. Unlocking auger rack lock while applying momentary pressure on feed control lever operating handle

(d) Push on the drive control lever operating handle (fig. 164) while pulling on the feed control lever operating handle to lower the earth auger to the ground.

(e) Push on both handles to bore with each auger (fig. 165).

(f) Release handles to stop the auger action when the auger is loaded.

Note. Do not load the auger above the bumper spring.

(g) Push on the feed handle while pulling on the drive handle to raise the earth auger (fig. 166) from the ground with load.

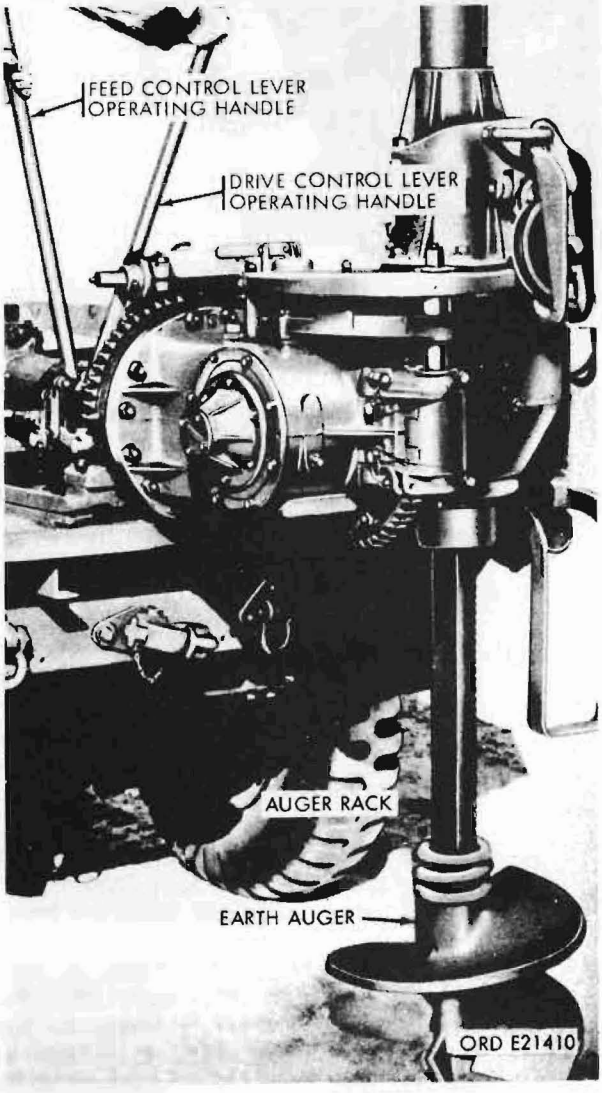

Figure 164. Lowering earth auger to ground

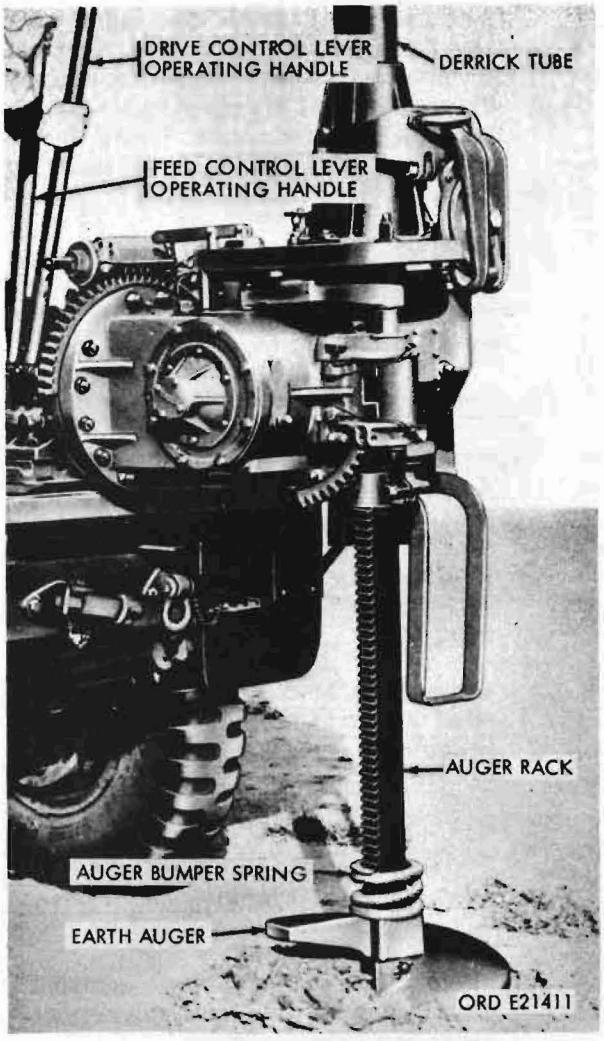

Figure 165. Boring with earth auger

(h) Push on both handles, momentarily, to spin the load off the earth auger (fig. 167).

(i) Repeat procedures (d) through (h) above until the hole is dug to the proper depth.

(j) After the hole is dug, raise the auger rack and push the auger rack lock handle to the locked position.

(k) Remove the earth auger and stow in the auger holder.

(l) Push the throttle control in to the idle position.

(m) Place the transmission in NEUTRAL position.

(6) Preparing boring machine for travel.

(a) With the transfer shift lever in NEUTRAL position, transfer the power-takeoff control lever in ENGAGE position, and the power-divider control lever in EARTH AUGER position; disengage the truck clutch. Move the transmission gearshift lever into first gear position and engage the clutch.

(b) Raise the vertical power leveler shifter-shaft lever to engage vertical power leveler.

(c) Engage the earth boring machine drive clutch by pushing the drive control operating handle lever toward the right side of truck.

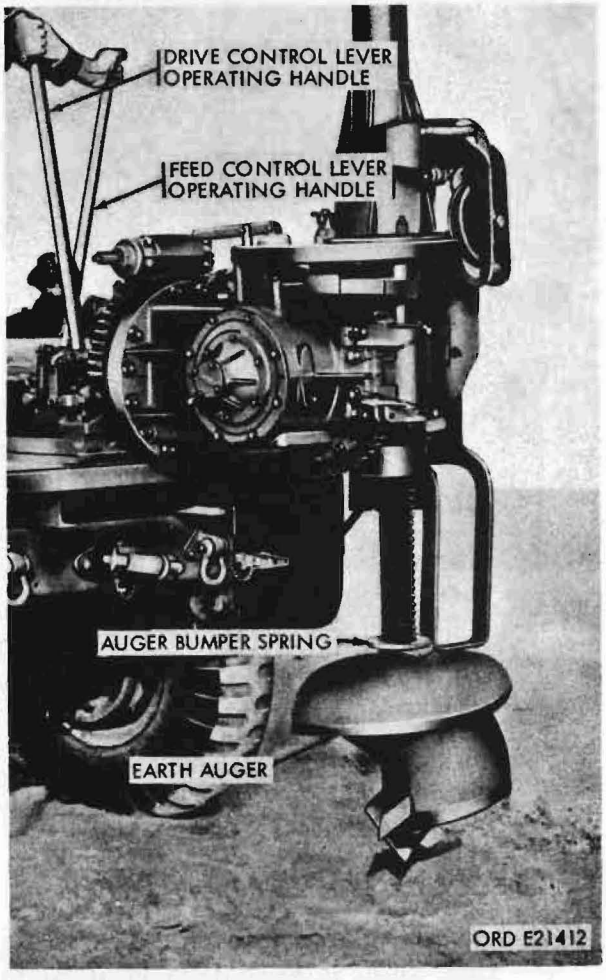

Figure 166. Raising earth auger with load

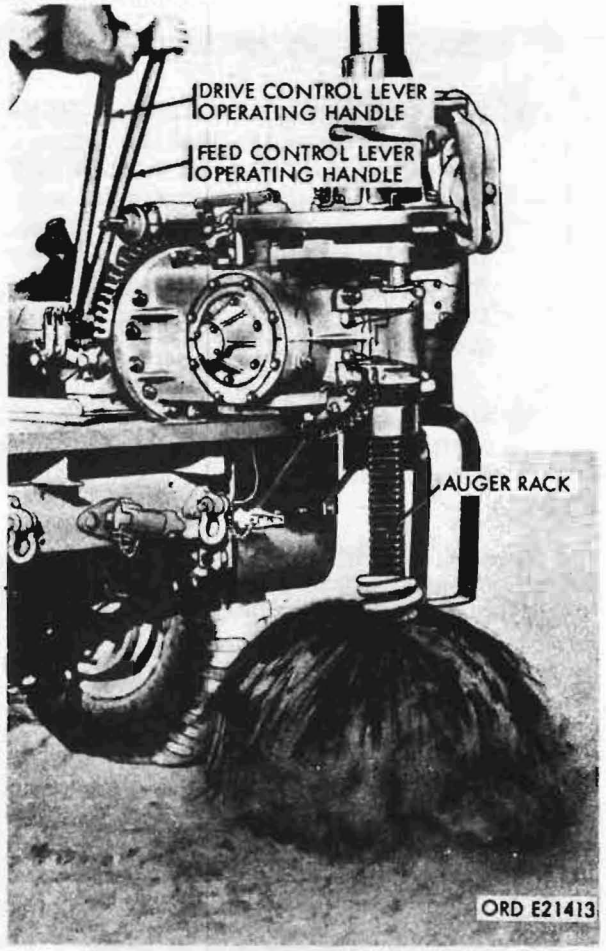

Figure 167. Clearing earth auger of load

(d) Accelerate the engine, as necessary, to lower the derrick tube to its support. Be careful to control the speed of lowering as the derrick tube comes close to the support.

(e) When the derrick rests on its support, release the operating handle.

(f) Disengage the engine clutch, and move the transmission gearshift lever to NEUTRAL position and the transfer power-takeoff shifting lever to NEUTRAL position. Move the power-divider control lever to NEUTRAL position. Stop the engine.

b. Operating V-18A/MTQ Rear Winch.

(1) General. Operation of the V-18A/MTQ rear winch is essentially identical to the operation of the V-17A/MTQ rear winch (par. 84). The V-18A/MTQ rear winch is used with the integral derrick, for pole setting and pulling. A collapsible cable reel is provided for use on the winch drum shaft. There is no auxiliary shaft on the V-18A/MTQ winch.

(2) Safety precautions. Refer to paragraph 86 for safety precautions which are applicable to the V-18A/MTQ rear winch.

(3) Preparing vehicle for winch operation.

(a) Start the engine, disengage the clutch, and place the transfer shift lever in NEUTRAL position.

(b) Place the transfer power-takeoff shifting lever (fig. 96) in ENGAGED position.

Caution: Allowing the engine to run with the transmission engaged and transfer in NEUTRAL position without the transfer power takeoff in ENGAGED position will cause bearing failure in the transfer case. Shift transmission to NEUTRAL position when not operating the transfer power takeoff.

(c) Place the transmission gearshift lever in one of the forward gear positions and engage clutch.

Note. Selection of the particular gear position depends on the weight and type of load to be placed on the winch cable. Always use low gear when lifting or pulling heavy or awkward load. This low gear ratio allows slower takeup of the winch cable, affording greater control over the load and also causing less stress on the engine. Use third gear for the average loads.

(d) Place the V-18A/MTQ rear winch control lever (fig. 96) in ENGAGED position, using the truck clutch to facilitate engagement.

(4) Operating rear winch to lift load or take up winch drum cable.

(a) With the clutch pedal depressed, place the power-divider control lever (fig. 96) in REAR WINCH FOR. position.

(b) Release the clutch pedal slowly and depress the accelerator pedal to operate the winch to take up the winch cable.

Note. Depress accelerator pedal sufficiently to keep engine running at effective speed without racing or stalling.

(c) To stop winch drum rotation, depress the clutch pedal, release the accelerator pedal, and move the power-divider control lever to NEUTRAL position. Release the clutch pedal.

(5) Operating rear winch to pay off winch drum cable by hand. The winch drum cable can be taken off the winch drum by hand without the power operation of the winch. The winch drum brake can be used to control the unreeling of the cable when there is no load on the cable. Pulling back on the rear winch control lever applies the drum brake to control the free spooling of the winch drum during removal of the cable.

(6) Operating rear winch to lower load or run off winch drum cable under power.

(a) Prepare the vehicle for rear winch operation ((3) above).

(b) With the clutch pedal depressed, place the power-divider control lever in REAR WINCH REV. position.

(c) Release the clutch pedal slowly and depress the accelerator pedal to operate the winch. Depress the accelerator pedal sufficiently to keep the engine running at effective speed without racing or stalling.

(d) To stop the winch drum rotation, depress the clutch pedal, release the accelerator pedal, and move the power-divider control lever to NEUTRAL position. Release the clutch pedal.

(7) Securing rear winch from operation.

(a) With no load on the winch cable, pull the rear winch control lever back to NEUTRAL position.

(b) Place the transmission gearshift lever in NEUTRAL position.

(c) Place the transfer power-takeoff shifting lever into NEUTRAL position.

(d) Stop the engine.

c. Operating Integral Derrick.

(1) General. The strength of the integral derrick depends on the straightness and roundness of the derrick tube. A slight bend or flat surface will greatly decrease the maximum capacity of the derrick and can cause collapse under load.

Caution: Examine the tube carefully for damage before using. Replace the damaged tube.

(2) Safety precautions.

(a) When moving the vehicle with the derrick tube erected, be sure the derrick sheave will clear all overhead obstacles.

(b) When raising or pulling the pole, attach the winch cable at the point above the center of balance of the pole to make the pole butt-heavy. This will prevent the pole butt from rising off the ground. If the pole appears to be topheavy, guy the butt of pole with rope before pulling.

(c) When pulling the pole, make sure the wood of the pole is strong enough to take the pull without breaking.

(d) Use the pole-pulling jack, if necessary, to loosen the pole during pole pulling.

(e) Apply the parking brake, use the wheel chocks, and support the legs to prevent truck movement and take the load off the truck springs.

(f) Use the snatch sheave (fig. 168) for "snaking" the poles at a distance of 20 feet or more from the derrick.

(g) Using the vertical power leveler, tilt the derrick tube rearward not more than four feet at the derrick sheave

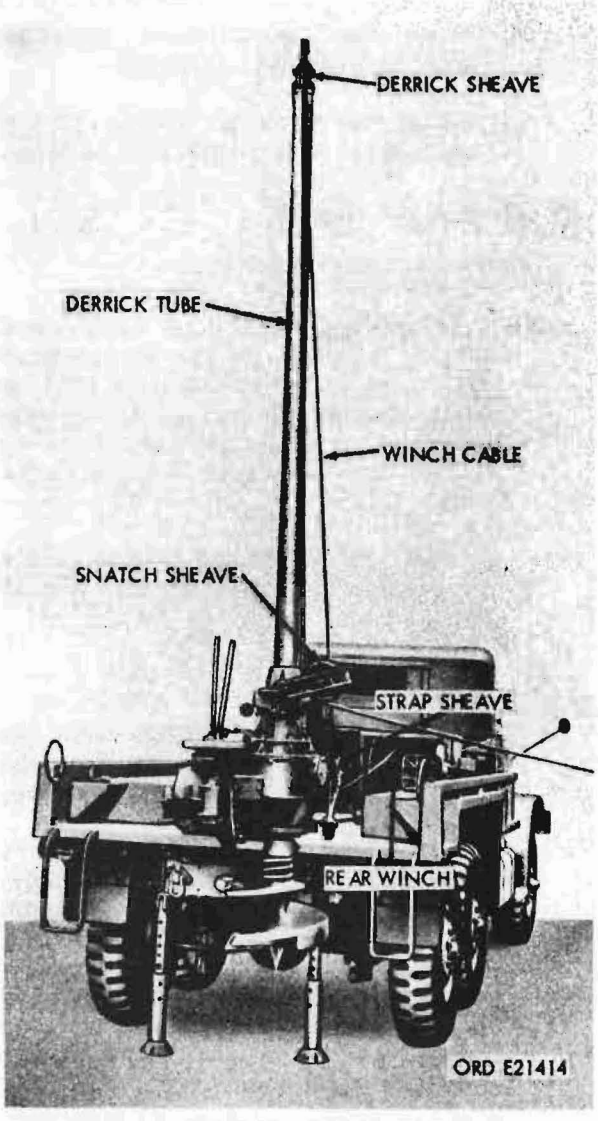

Figure 168. Winch cable hookup for side dragging

before handling the poles. The lesser the tilt, the less danger of damaging the derrick tube. Tilting the tube is necessary to give the clearance between the boring machine and the pole and hole.

(3) Erecting derrick tube.

(a) Unreel the winch drum cable by hand (b(5) above) and pass the cable through the strap sheave (fig. 169) with the cable under the sheave.

(b) Pass the cable over the derrick sheave and down to the base of the derrick tube, making sure there is enough slack in the cable to allow for elevating the derrick tube.

(c) Erect the derrick tube (a(3)(d) above), tilting tube to the rear to allow the winch cable hanging from the derrick sheave to clear the rear of boring machine.

(4) Lowering derrick tube.

(a) Lower the derrick tube (a(6) above).

(b) Remove the winch cable from the derrick sheave and stop sheave.

(c) Operate the rear winch to take up the winch cable and secure the winch from operation (b(7) above).

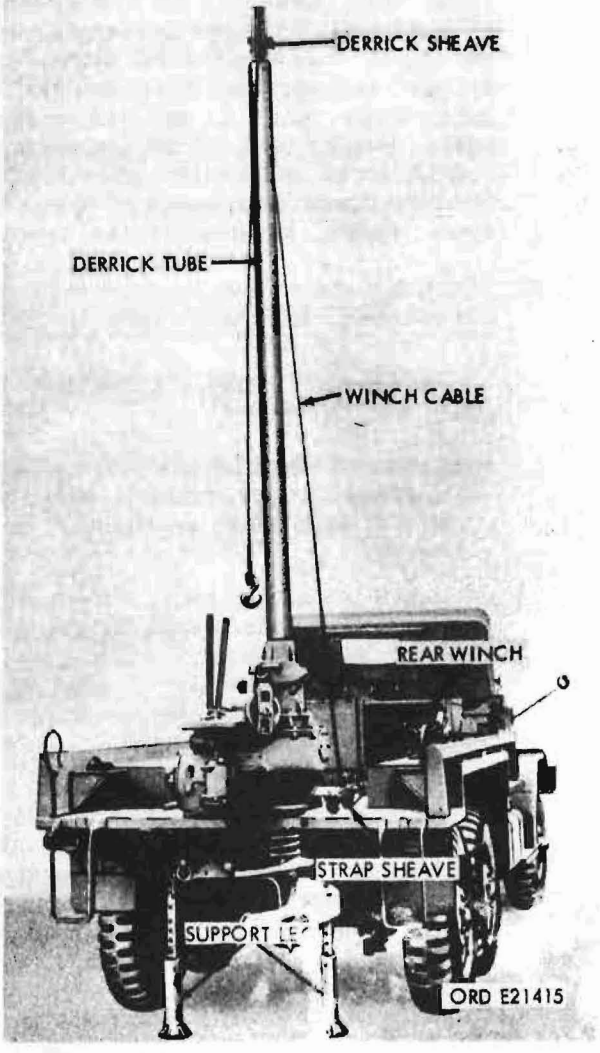

Figure 169. Integral derrick - erected for use with rear winch

(5) "Snaking" or dragging pole (fig. 168). This operation can be performed with the derrick tube either raised or lowered.

(a) Install the winch drum cable around the snatch sheave and connect the cable to the end of pole.

(b) Prepare the vehicle for the rear winch operation (b(3) above).

(c) Operate the rear winch slowly to take up the winch cable (b(4) above).

(d) Guide the pole as it moves close to the vehicle. Stop the winch action when the pole is in position desired.

(e) Operate the winch to slack off the winch cable, and remove the cable from the pole and snatch sheave.

(f) Operate the winch to take up cable, and secure the winch from operation (b(7) above).

(6) Setting poles.

(a) Position the truck, and erect the derrick tube ((3) above) so that the earth auger clears the hole and the derrick sheave is properly placed above the hole.

(b) Prepare the vehicle for rear winch operation (b(3) above).

(c) Secure the winch drum cable to pole slightly above the balance point.

(d) Operate the rear winch slowly to lift the load (b(4) above) and raise pole.

Caution: Extreme care must be taken in setting the pole. Make sure the pole does not get out of hand. Use proper equipment to maintain control of the pole at all times. When the pole is in position for lowering into hole, stop winch action.

(e) Operate the rear winch slowly to lower the load (b(6) above) and lower the pole into hole. When the pole is grounded in hole, stop the winch. Do not slacken the winch cable until the pole is secured in vertical position.

(f) After the pole is secured, operate the winch to run off the winch cable (b(6) above), remove the cable from pole, and lower the derrick tube ((4) above).

(7) Pulling poles.

(a) Position the vehicle and erect the derrick tube ((3) above) so that the derrick sheave is properly placed near pole.

(b) Prepare the vehicle for rear winch operation (b(3) above).

(c) Secure the winch drum cable to pole slightly above balance point of pole.

Note. If necessary, use the pole jack or dig along side of pole to loosen pole.

(d) Place the support legs in position to take weight off the truck springs during pulling operation.

(e) Operate the winch slowly to lift load.

Caution: In removing the pole from hole, great suction can be created under the pole unless pole is loose in hole. This suction places tremendous stress on the winch cable, winch, and vehicle. Be sure to stand clear of the winch cable and to operate the winch at an extremely slow speed. Use proper equipment to maintain control over the pole at all times. After the pole is clear of hole, stop winch action.

(f) Operate the winch to lower load (b(6) above). When the pole is on ground. stop the winch. Do not slacken the winch cable until the pole is secured from rolling.

(g) After the pole is secure, operate the winch to run off the winch cable (b(6) above), remove the cable from pole, and lower the derrick tube ((4) above).

d. Operating Collapsible Cable Reel.

(1) General. The collapsible cable reel can be installed on the winch drum shaft, of V-18A/MTQ rear winch, with the

winch drum disengaged from the shaft. The reel is used to string, lay, or rewind the wire and light cable.

(2) Safety precautions. Refer to paragraph 86c for safety precautions applicable to use of the collapsible cable reel.

(3) Operation.

(a) Remove the cable reel from the stowed position.

(b) Install the reel on the winch drum shaft by pressing the reel on the shaft to compress the reel spindle spring and turning the reel counterclockwise to engage the shaft dowel pin in grooves in the reel spindle shaft.

(c) Prepare the vehicle for V-18A/MTQ rear winch operation (b(3) above). Make sure the V-18A/MTQ rear winch control lever remains in NEUTRAL position.

(d) Depress the clutch pedal and place the power-divider control lever in REAR WINCH FOR. position.

(e) Release the clutch pedal slowly while depressing the accelerator pedal to operate the cable reel. Do not race the engine.

(f) To stop the reel action, depress the clutch pedal, release the accelerator pedal, and place the power-divider control lever in NEUTRAL position.

(4) Installation and removal of coils. Refer to paragraph 86c.

(5) Securing cable reel from operation.

(a) With the cable reel expanded, press the reel in toward truck body, and turn clockwise to disengage the reel from the dowel pin in drum shaft.

(b) Remove the reel from the winch drum shaft and stow on the cable reel holder on body. Secure to the bracket with locking pin.

(c) Place the transfer power-takeoff shifting lever in NEUTRAL position.

(d) Stop the engine.

Section XVI. CARGO BODY AND PARTS

90. Description

a. M34. The M34 truck is provided with 12-foot, open top steel body. The endgate, hinged at the bottom, provides a step for entering the body when the gate is lowered. The gate is raised and locked for travel. Sockets in sides and front of the body permit installation of cargo racks. Tubes in the side racks provide sockets to accommodate bows (fig. 170) for support of the paulin and end curtains (fig. 171). The lower portion of the side racks are hinged at the bottom and can be lowered onto the rear wheel housings for use as troop seats. The end curtains have flaps that can be opened for ventilation. Paulin sides can be folded up and strapped in place for side ventilation.

b. M35 and M35A1. The M35 and M35A1 trucks are provided with a 12-foot, open top, flat bed, steel cargo body (fig. 172), mounted on auxiliary sills. These sills raise the body above the level of the tires and eliminate the wheel housings. The endgate (fig. 173) is hinged at the bottom and has mounting steps for access to the body. The endgate is raised and locked for travel. Sockets in the sides and front of the body permit installation of cargo

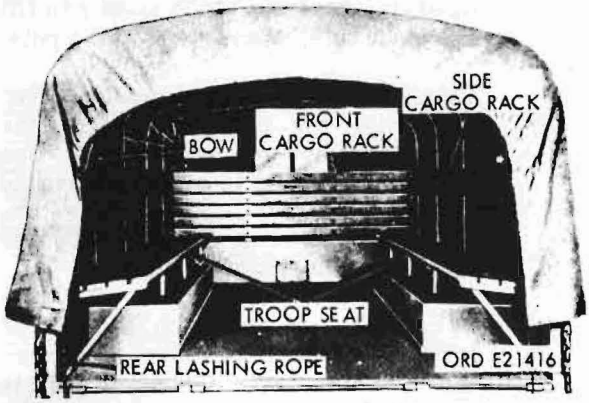

Figure 170. M34 cargo body interior, showing bows

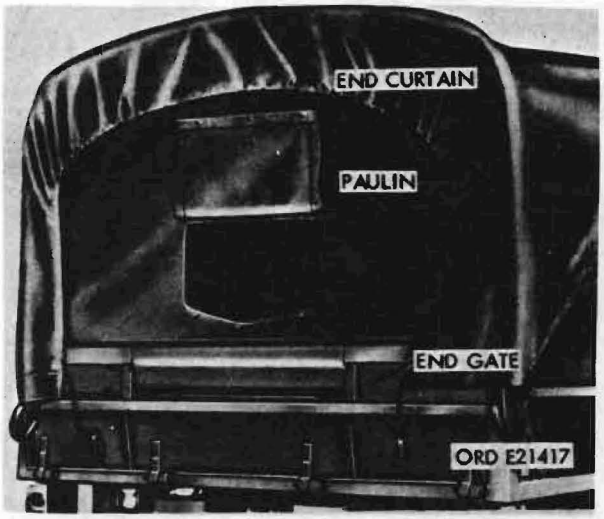

Figure 171. M34 with paulin and end curtain.

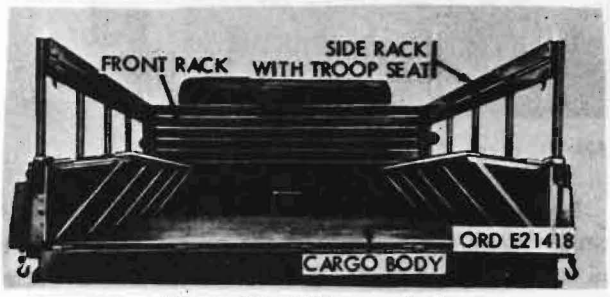

Figure 172. M35 cargo body.

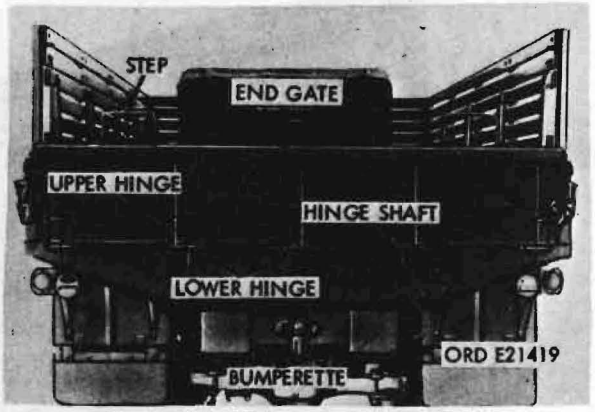

Figure 173. M53 cargo body endgate.

racks. Tubes in the side racks provide sockets to accommodate bows which support the paulin and end curtains. The lower portion of the side racks is hinged at the bottom and can be lowered for use as troop seats. End curtains have flaps that can be opened for ventilation. The paulin sides can be folded up and strapped in place for side ventilation. The M35A1 is equipped with the multifuel engine.

c. M35A2C, M36A2C. Model M35A2C (fig. 173.1) has right and left hand drop sides and model M36A2C has a right hand drop side. All other models have fixed sides.

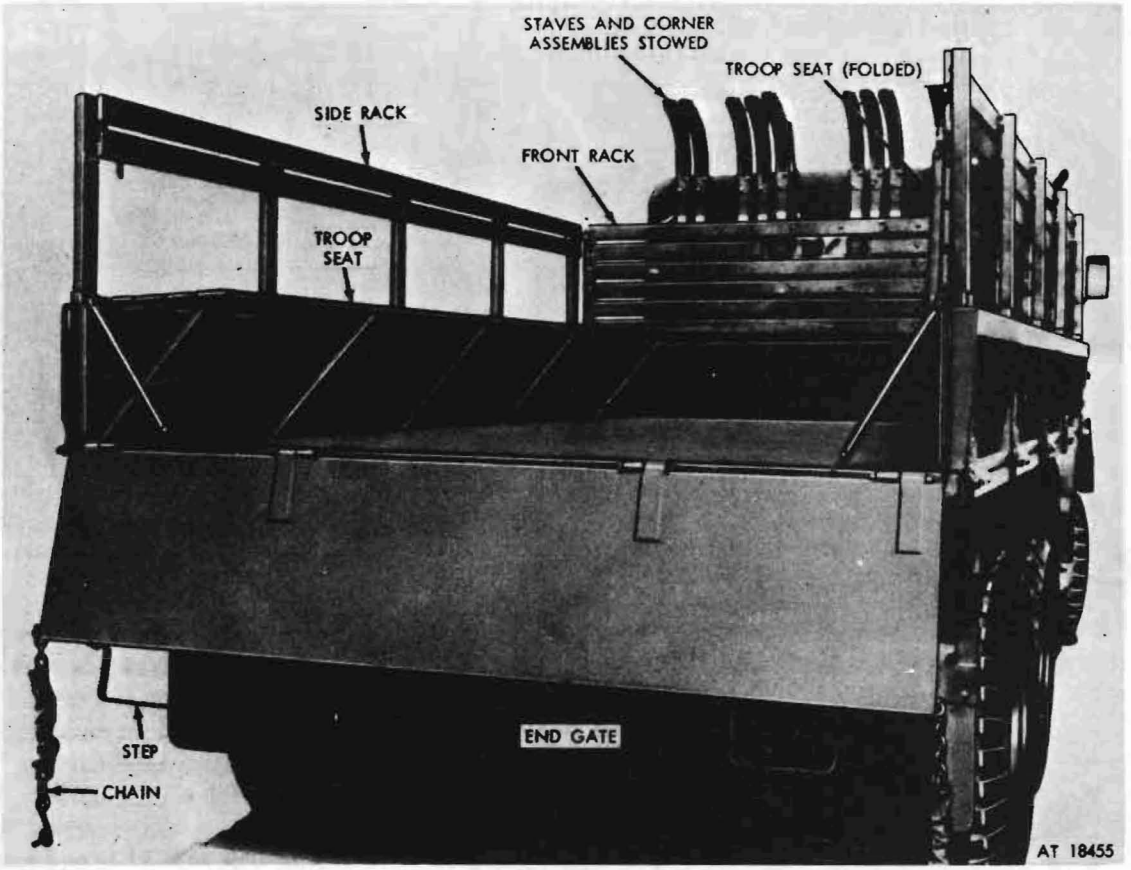

Figure 173.1 M35A2C cargo body.

91. Paulin with End Curtain

(Fig. 173.2.)

a. Removal.

NOTE

Do not fold or stow wet paulin curtains.

Untie all paulin lashing and draw ropes from the lashing hooks. Make the first fold of the paulin on each side lengthwise until the lower edge of the paulin is even with the top buckles. Make the second fold lengthwise on both sides until both folds meet. Bring the one folded side over the other fold. At each end, make an equal fold toward the center. Make another equal end fold until the folded paulin is supported only by the center bow. Remove the paulin from the body. Untie the end curtain front and rear lashing ropes from the lashing hooks. Unwind the lashing ropes from the curtain and end bows and remove the curtains.

b. Installation. Place the end curtain in position. Make certain the center of the lashing rope is in the center eyelet of the curtain: Wind the lashing rope alternately around the bow and through the eyelets in the curtain. Tie the ends of the lashing rope to the lashing hooks. The end curtains will be lashed or tied down, using the bottom eyelets and the nearest lashing hooks.

NOTE

The rear end curtains will not be tied or lashed at the bottom when the vehicle is carrying passengers.

Install the second end curtain in the same manner. Place the folded paulin across the center bow. Locate the end marked **FRONT** and position the paulin so this end will be at the front of the body. Unfold the paulin and pull it tight over the bows with the front and rear ropes. Tie down the paulin lashing ropes to the lashing hooks on the

body to secure the paulin. Tie down the paulin draw ropes to the lashing hooks on the ends of the body.

c. Raising Sides of Paulin for Ventilation. Untie all paulin lashing and draw ropes. Fold the paulin under, three folds on each side. Fasten the paulin in place, using the traps on bows and the buckles on the paulin. Tie the front and rear draw ropes to the lashing hooks at each end of the body.

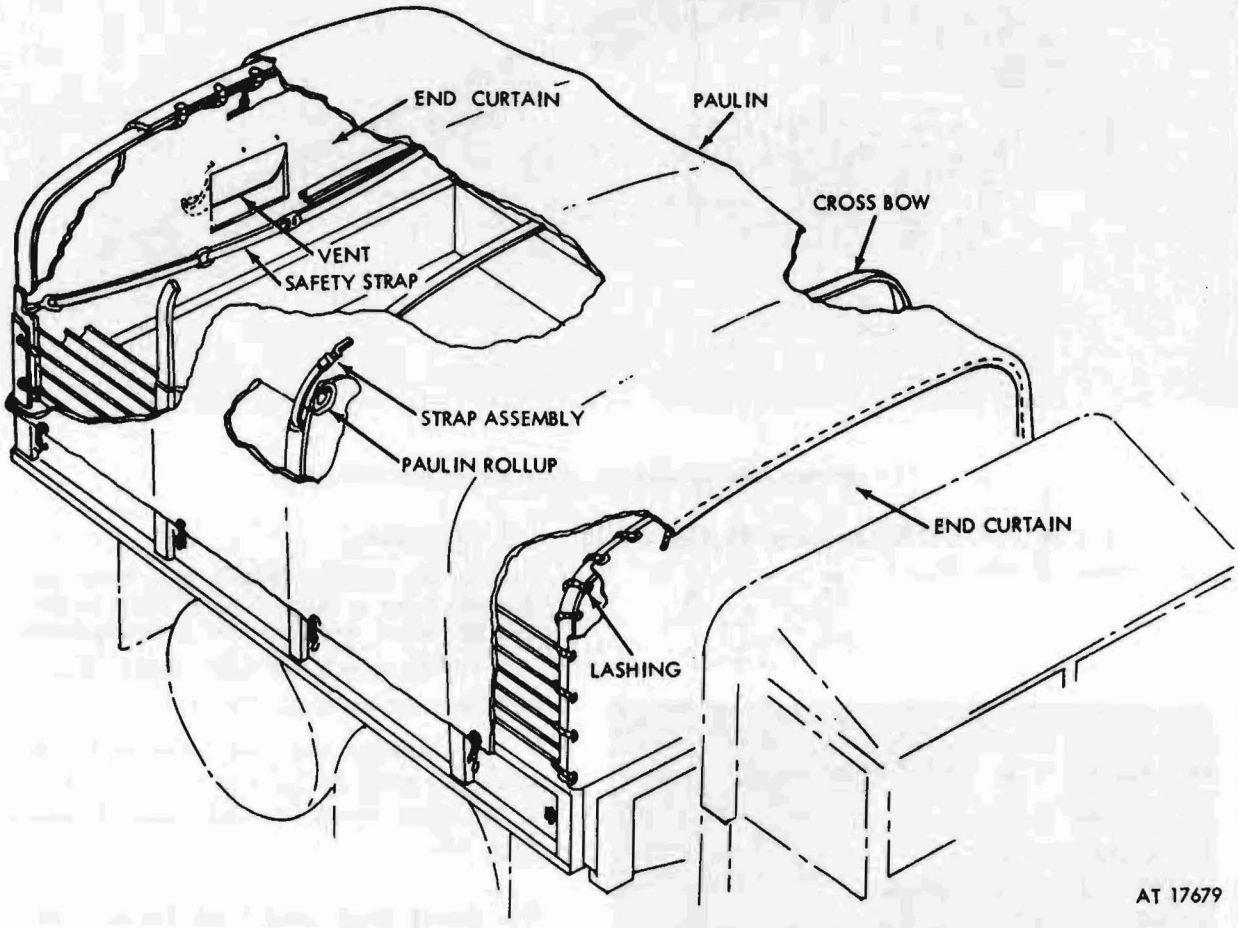

Figure 173.2. Cross bows and paulin.

92. Bows and Staves

a. Removal.

(1) Remove the paulin with end curtains (par. 91), and remove bows from bow stake tubes.

(2) Remove cross bows from stave and corner assemblies (fig. 173.3).

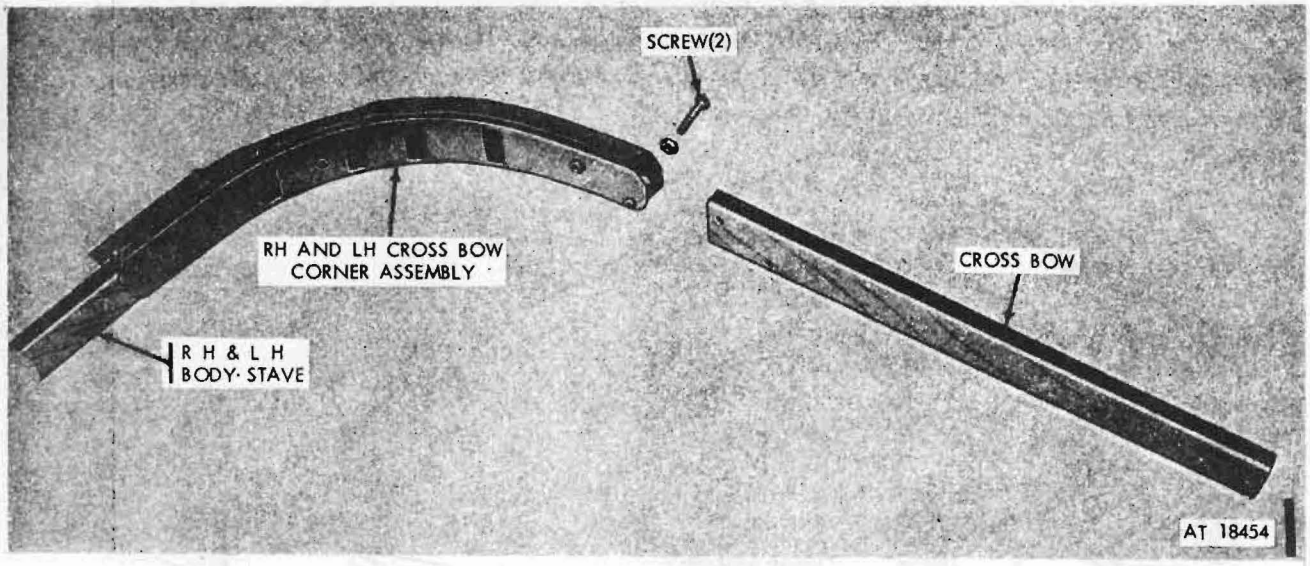

Figure 173.3. *Crossbow, stave and corner assembly.*

(3) Stow stave and corner assemblies (fig. 173.1) and crossbows (fig. 173.4).

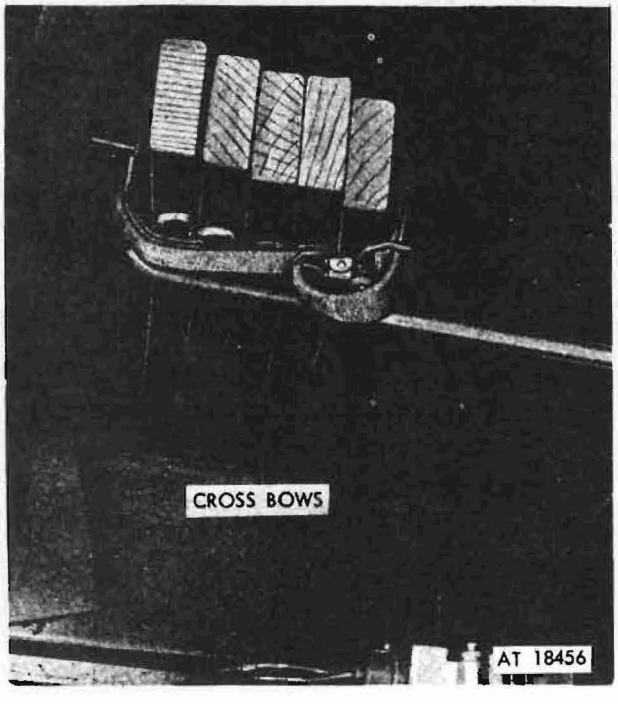

Figure 173.4. *Cross bows, storage.*

b. Installation.

Note. Be sure to install end bows and intermediate bows in proper stake tubes on M34. Bows for all other vehicles are interchangeable.

(1) Remove bows and staves from stowage locations and assemble (fig. 173.3).

(2) Position each bow stake in the bow stake tubes and press the bows down to secure the stakes in the tubes. Install the paulin with the end curtains (par. 91).

93. Front Rack and Side Racks with Troop Seats

(fig. 172)

a. Removal.

(1) Remove the paulin with the end curtains (par. 91).

(2) Remove the end and intermediate bows with the straps (par. 92).

(3) Refer to figure 173.5 and remove stabilizer rod.

(4) Refer to figure 173.6 and remove locking pin.

(5) Fold troop seat and remove rack and troop seat by lifting rack from sockets.

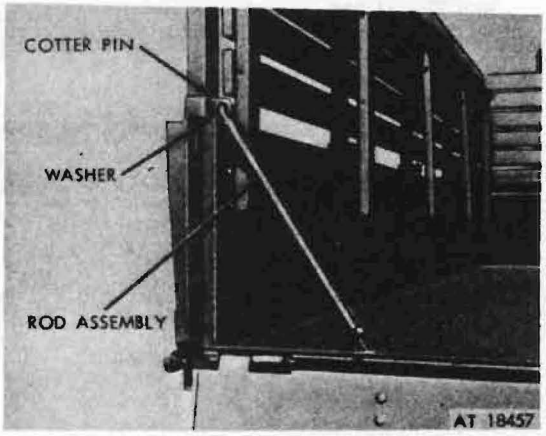

Figure 173.5. Dropside stabilizer rod.

b. Installation.

(1) Position the side racks in the rack sockets and press the racks down into the sockets to secure the racks in place.

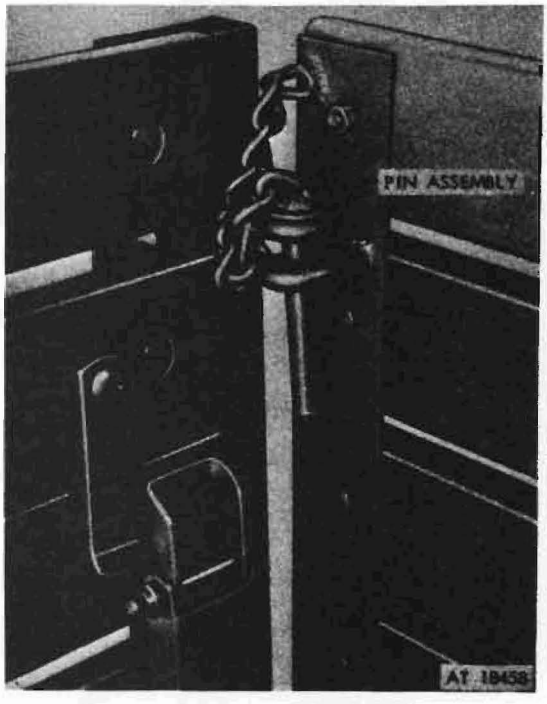

Figure 173.6. Front rack locking pin.

(2) Position the front rack in the rack sockets and press the rack down into the sockets.

(3) Install front locking pin (fig. 173.6).

(4) Install stabilizer rod (fig. 173.5).

(5) Install the end and intermediate bows (par. 92). Install the paulin with the end curtains (par. 91).

94. Dropside Cargo Body.

a. Lowering Tail End Gate. Loosen locking handles to rear of the left and right sides (fig. 173.7). Rotate pin 1/4 turn and pull through slot. From outside cargo body, grasp top of end gate and pull it toward the rear. Do not allow end gate to drop.

b. Lowering Dropside. If side rack is attached remove locking pin (fig. 173.7) and stabilizer (fig. 173.5) before attempting to lower side. Sides may then be lowered with rack attached or removed. Do not allow sides to drop down as it may damage the racks and/or mud guards.

Caution. Sides of dropside cargo body are interchangeable, care must be taken to insure amber reflectors are at the front of the body and red reflectors are located at the rear of the body.

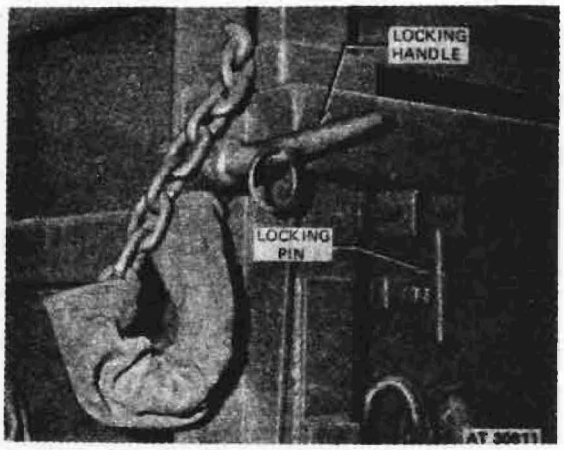

Figure 173.7. Locking handle and locking pin assy.

Section XVII. OPERATION UNDER UNUSUAL CONDITIONS

95. General

a. In addition to the operating procedures described for usual conditions, special instructions of a technical nature for operating and servicing this vehicle under unusual conditions are contained or referred to herein. In addition to the normal preventive maintenance service, special care in cleaning and lubrication must be observed where extremes of temperature, humidity, and terrain conditions are present or anticipated. Proper cleanings, lubrication, and storage and handling of fuels and lubricants not only ensure proper operation and functioning but also guard against excessive wear of the working parts and deterioration of the vehicle.

b. TM 21-300 contains very important instructions on driver selection, training and supervision, and TM 21-305 prescribes special driving instructions for operating wheeled vehicles under unusual conditions.

Caution: It is imperative that the approved practices and precautions be followed. A detailed study of TM's 21-300 and 21-305 is essential for use of this vehicle under unusual conditions.

c. Refer to LO 9-2320-209-12 for lubrication under unusual conditions. Refer to paragraph 117 for preventive maintenance checks and maintenance procedures to be performed by the operator.

96. Extreme Cold-weather Conditions

a. Extensive preparation of material scheduled for operation in extreme cold weather is necessary. Generally, extreme cold will cause lubricants to thicken or congeal; freeze batteries or prevent them from furnishing sufficient current for cold-weather starting; crack insulation and cause electrical short circuits; prevent fuel from vaporizing and properly combining with air to form a combustible mixture for starting. Extreme cold will also cause the various materials or components to become hard, brittle, and easily damaged or broken.

b. The cooling system should be prepared and protected for temperatures below 32° F., in accordance with instructions given in TM 9-207 and TB 750-651.

c. Refer to TM 9-207 for the method of correcting the specific gravity readings of batteries exposed to extreme cold.

d. For description of operations in extreme cold, refer to FM 31-70, FM 31-71 and TM 9-207.

Caution: It is imperative that the approved practices and precautions be followed. TM 9-207 contains general information which is specifically applicable to this vehicle as well as to all other Army materiel. This information must be considered as an essential part of this technical manual, not merely as an explanatory supplement to it.

e. Special winterization equipment is provided for the vehicle when protection against extreme cold weather (0°F. to -65°F.) is required. This equipment is issued as specific kits. Description, data, and operation of available kits are contained in Chapter 4. For general information on winterization equipment and processing, refer to TM 9-207.

97. Extreme Cold-weather Operation

a. General.

(1) The driver must always be on the alert for indications of the effects of cold weather on the vehicle.

(2) The driver must be very cautious when starting or driving the vehicle after a shutdown for extended periods of time. Congealed lubricants may cause failure of parts. Tires may be frozen to the ground or frozen in the shape of a flat spot while underinflated. One or more brakeshoes may be frozen fast. Each condition must be taken into account by the operator in order to prevent damage to the vehicle. After warming up the engine thoroughly, place transmission in first gear and drive vehicle slowly about 100 yards, being careful not to stall the engine. This should heat gears and tires to a point where normal operation can be expected.

(3) The driver must frequently note instrument readings for indication of any malfunction. If any instrument reading continues to deviate from normal, he must stop the vehicle and investigate the cause.

(4) The driver should refer to TM 21-305 and FM 31-71 for special instructions on driving hazards in snow, ice, and unusual terrain encountered under extreme cold conditions (0°F. to -65°F.).

b. At Halt or Parking.

(1) When halted for short shutdown periods, park the vehicle in a sheltered spot out of the wind. If no shelter is available, park so that the vehicle does not face into the wind. For long shutdown periods, if high, dry ground is not available, prepare a footing of planks or brush. Chock in place if necessary. Also, under extreme cold conditions (below -25°F.) exercise care to park the vehicle on a level surface to relieve distortion or body twist. For overnight or extended parking in temperatures at -50°F. or lower overfill tires to 65 lbs. for size 9:00 x 20 or 90 lbs. for 11:00 x 20 size tires to reduce flat spots. Reduce pressure to normal (table 9) before operating vehicle.

(2) When preparing the vehicle for shutdown period, place control levers in the neutral position to prevent them from possible freezing in an engaged position. Freezing may occur when water is present due to condensation.

(3) If no power plant heater is present, the batteries should be removed and

stored in a warm place. However, it is unnecessary to drain engine oil (subzero) as it will remain fluid even though unheated. On multifuel vehicles, drain primary and secondary fuel filters of moisture before the fuel system cools below the freezing point. (Refer to Table 12.)

(4) Refuel immediately in order to reduce condensation in the fuel tanks. Prior to refueling, open fuel tank drain and drain off any accumulated water.

(5) Correct tire inflation pressure is prescribed in table 9.

Note. When checking tire pressure, do not reduce pressure when tires are hot.

(6) When drain plugs have been removed or draincocks opened to remove liquid from the cooling system of any equipment, the drains must be inspected to be sure none are obstructed. If the drain hole has become obstructed by foreign material, a soft wire should be used to clear the hole of the obstruction. This is particularly important before leaving a vehicle that has had the engine drained to protect the block from freezing. The draining of an engine cooling system to prevent freezing will be done only when no approved antifreeze solution is available.

Note. In areas where the temperatures reach -50°F. or colder, inflate truck tires 20 lbs. above normal for long standby periods or overnight. Return the tire pressures to normal when operation is resumed. (Refer to table 9.)

98. Extreme Hot-weather Operation

a. General. Continuous operation of the vehicle at high speeds or under long hard pulls in lower gear ratios on steep grades or in soft terrain may cause the engine to overheat. Avoid the continuous use of low-gear ratios whenever possible. Continuously be alert for overheating, and halt the materiel for a cooling-off period whenever necessary and the tactical situation permits.

b. Cooling System.

(1) Make frequent inspections and servicing of cooling units, oil filters, air cleaner, radiator, and fan. If the vehicle engine is consistently overheating, look for dust, sand, or insects in radiator fins and blow out any accumulation with compressed air. Flush cooling system, if necessary, and be certain the system is filled with coolant when operating in extremely high temperatures.

(2) Formation of scale and rust in the cooling system occurs more rapidly during operation in extremely high temperatures. For this reason corrosion-inhibitor compound should always be added to the cooling liquid. Avoid the use of water that contains alkali which causes scale and rust formations. Fill the radiator with rain water whenever possible. Refer to TB 750-651 for use of engine cleaning compound.

c. Batteries.

(1) In torrid zones, check level of electrolyte in cells daily and replenish with pure distilled water. If distilled water is not available, rain or drinking water may be used. Use of water with a high mineral content which will eventually damage the batteries should be avoided.

Note. The use of water with a high mineral content will result in less damage to the battery than allowing the electrolyte level to drop below the plates. A battery left dry has a short life.

(2) A battery will discharge at a greater rate if left standing for long periods at high temperatures. If necessary to park for several days, remove the batteries and store in a cool place.

d. Body and Cab.

(1) In hot, damp climates, corrosion will occur on the vehicle, especially during rainy seasons. Pitting, paint blistering on metal surfaces, mildew mold, and fungus growth occur on fabrics, rubber, and glass.

(2) Protect all exposed exterior painted surfaces from corrosion by touchup painting. Electrical cables and terminals should be protected by ignition-insulation compound.

e. At Halt or Parking.

(1) Do not park the vehicle in the sun for long periods, as the heat and sunlight will shorten the life of the tires. When practical, park under cover to protect vehicle from sun, sand, and dust.

(2) Cover inactive vehicle with paulins if no other suitable shelter is available. Where entire vehicle cannot be covered, protect window glass against etching by sand, and protect engine compartment against entry of sand.

(3) Correct tire inflation pressure as prescribed in table 9.

Note. When checking tire pressure, do not reduce pressure if tires are hot.

(4) Materiel inactive for long periods in hot, humid weather is subjected to rapid rusting and accumulation of fungus growth. Make frequent inspections and clean and lubricate to prevent excessive deterioration.

99. Operation on Unusual Terrain

a. General.

(1) Operation on snow- or ice-covered terrain or in deep mud requires use of tire chains on the driving wheels.

Caution: Attempted operation, with only one wheel of a driving axle equipped with a tire chain, may result in serious damage to the tire and/or power train.

Select a gear ratio low enough to maintain engine speed above recommended minimum speed (rpm) without causing the wheels to spin. Care must be taken when vehicle is stalled or mired to see that a spinning wheel or wheels do not become buried to the extent that the axle housing rests on the surface of the mud, sand, or snow.

(2) If one or more wheels become mired or begin to spin, it may be necessary for the materiel to be winched or towed by a companion vehicle, or it may be necessary to jack up the mired wheel and insert planking or matting beneath it. Do not jam sticks or stones under a spinning sheel, as this only forms an effective block and will wear the tire tread unnecessarily.

(3) Skidding and the loss of steering and torque traction are the chief difficulties encountered on icy roads. When rear end skidding occurs, instantly turn front wheel in the same direction that the rear end is skidding. Decelerate the engine but do not declutch. Apply brakes very gradually.

(4) The operator must know at all times the exact direction in which the front wheels are steering, as the vehicle may, on ice-covered or slippery terrain, continue in a straight-ahead direction even though the front wheels are turned to the right or left, resulting in a plowing or scuffing action, causing the vehicle to stall or suddenly veer to the right or left.

(5) Lowering tire pressure in cases of sand, ice, mud, and snow will help to increase traction if tire chains are not available.

Note. Do not lower tire pressure to the extent that damage will result. Restore to recommended tire pressure after emergency. (Refer to table 9.)

(6) When negotiating hard baked sand, avoid breaking through crust. A road bed of canvas or planking is suitable on short stretches to ensure against this possibility.

(7) When operating in sand or dust, clean air cleaner and engine oil filters daily.

(8) High altitude operation requires careful maintenance of the cooling system, as the boiling point of the coolant drops in proportion to the altitude reached. The pressurized cooling system of this vehicle will operate at a temperature of 220°F. without loss of coolant if all connections and the radiator filler

cap are maintained in a sealed condition.

Warning: Extreme care must be exercised in removing filler cap when temperature gage reads above 180° F.

b. Recommended Tire Pressures.

(1) Sand. For emergency operations in beach and desert sand, reduce tire inflation as prescribed in table 9.

(2) Rocks and boulders. Tires must be correctly inflated as prescribed in table 9. Overinflated tires will result in an increase in the shock transmitted to the vehicle as it moves over rough or rocky ground. Underinflated tires will cause internal ruptures of the tire and damage to the tube.

(3) Mud and snow. Reduce tire inflation pressure as prescribed in table 9. Keep tires free from ice. If necessary, install tire chains.

c. After-operation Procedures. Remove accumulations of ice, snow, and mud from under the fenders and from the wheels, axles, radiator core, engine compartment, steering knuckles and arms, air cleaner intake, and electrical connections.

Caution: Exercise care when removing such accumulations in order to prevent damage to the affected parts.

100. Fording Operations

a. General. In fording, the vehicle may be subjected to water varying in depth from only a few inches to depths sufficient to completely submerge it. Factors to be considered are spray-splashing precautions, normal fording capabilities, and accidental complete submersion.

b. Normal Fording. All critical units of vehicle are provided at manufacture with water-proofing protection for fording bodies of water to a depth of 30 inches.

(1) Determine depth of water. Do not exceed 30 inches (fig. 174).

(2) Install drain plug in bottom of flywheel housing (fig. 175).

Figure 174. 30-inch measurement on truck

Note. After fording, remove drain plug from port and install in plug stowage boss on all late gasoline engine models and all multifuel engine models. On early and later gasoline engine models, stow in instrument panel compartment or tool kit.

c. Fording Precautions.

(1) Make sure engine is operating efficiently. Do not loosen fan belts as this will stop coolant circulation in the engine. Loosening the belts also impairs generator charging operation.

(2) Enter water slowly, with transmission and transfer shifted into lowest gear speed possible for operating conditions. Increase engine rpm to eliminate possibility of stalling due to lowered

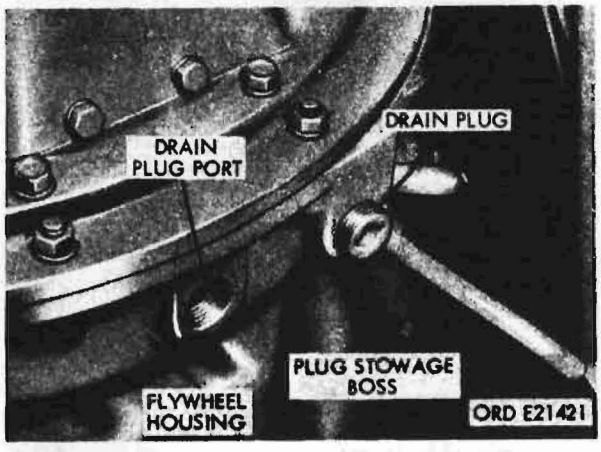

Figure 175. Drain plug and flywheel housing

operating temperature resulting from engine contact with cold water.

(3) If engine stalls, start in usual manner.

(4) Limit speed to 3-4 mph.

(5) Avoid unnecessary use of clutch.

(6) Do not rely on brakes until dried out.

d. Operation after Normal Fording.

(1) Body. Clean all surfaces that have been exposed to water, and touch up paint where necessary. Coat unpainted metal parts with engine lubricating oil (OE).

(2) Power train. Check lubricants in the engine, transmission, differentials and transfer case. If inspection indicates that water has contaminated the lubricant, drain, flush, and refill in accordance with instructions contained in the lubrication order (LO 9-2320-209-12).

Note. Water found in power train components after operation on water will generally be the result of condensation rather than seepage.

(3) Suspension. Clean and lubricate all parts as specified in the lubrication order (LO 9-2320-209-12).

(4) Brakes. Remove water from brake lining by gradual application of brakes upon leaving water until braking can be accomplished without "grabbing."

(5) Instruments. Although most units are sealed, the sudden cooling of the warm interior air may cause condensation of moisture within the cases or instruments. A period of exposure to warm air after operation on water should eliminate this condition. Cases which can be opened may be uncovered and dried.

e. Accidental Submersion. If accidental complete submersion of vehicle occurs, it must be salvaged, temporarily preserved and then sent to direct support maintenance unit as soon as possible for necessary permanent maintenance.