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# STORAGE OF MOTOR VEHICLES AND CONSTRUCTION APPARATUS

	CONTENTS P.												PA	GE
1.	SCOP	<b>E</b> .												1
2.	GENE	RAL												1
3.	MATE	RIALS												1
4.	STORA	AGE S	ITE											2
<b>5</b> .	FAVORABLE AND UNFAVORABLE STORAGE												2	
6.	TYPES	OF T	RE/	ATA	MEN	TS			•		•			2
7.	KIND TO A		REA	TM ·	EN?	r <b>T</b> (	ο ι	JSE	. AI	ND	WI	HEN		2
8.	WASH	IING												2
9.	CHAS	SIS LU	BRI	CA	TIO	N								3
10.	FUEL	SYSTE	M			•					•		•	3
11.	COOL	ING S	YST	EM				•	•		•			3
12.		MOVING VEHICLE INTO ASSIGNED STORAGE SPACE												
					•	•	•	•	•	•	•	•	•	4
13.	POWE	R PLA	NT	•	•	•	•	•	•	•	•	•	•	4
14.	BATTE	RY.	•	•	•	•	•	•	•	•	•	•	•	6
15.	CLUTC	CH AN	D	GEA	AR :	SHI	FT	LEV	ER	•			•	6
16.	INTER	IOR C	F '	VEH	llCl	E.	•		•	•		•		6
1 <i>7</i> .	EXTER	RIOR C	OF '	VEH	HCI	.E		•	•			•	•	6
18.	TIRES				•			•						7
19.	CARE	OF V	EHI	CLE	ES 1	N S	то	RA	GE					7
20.	PREPA	ARING	ST	OR	ED	VEł	HC	LES	FO	R S	ER	۷IC	E	7

1. SCOPE

1.01 Motor vehicles when standing idle for any considerable period of time if not properly cared for are subject to rust and other deterioration, the rate depending upon the climatic and storage conditions. The degree of such rusting and deterioration which may occur will depend upon the care given the vehicle during such idle

periods for the conditions encountered. This section covers the recommended procedure in caring for telephone company vehicles and construction apparatus removed from service so that this equipment will be in a satisfactory condition when again required.

#### 2. GENERAL

- 2.01 Each component part of the vehicle requiring care is taken up separately in this section and the instructions regarding each should be followed in the order in which they are covered herein.
- 2.02 The kind of attention that should be given will depend upon the length of time the vehicle is expected to be idle and the character of the storage conditions, that is whether, as explained later in Part 5, they are "favorable" or "unfavorable."
- 2.03 Construction apparatus such as air compressors, gasoline electric generators, etc, having individual gasoline engines should have their engines, cooling systems, batteries, tires, etc, treated in the same manner and on the same schedule as is indicated in this section for the corresponding motor vehicle parts.

#### 3. MATERIALS

- 3.01 Use only approved materials in performing the operations covered in this section. In the case of lubricating oils and greases use the type and grade recommended for the particular job and seasonal or climatic condition.
- 3.02 Some of the preservative materials required for storage are of a special nature in that they are not ordinarily used in the operation and maintenance of motor vehicles. The pre-

#### SECTION 720-020-012

servative materials which may be required are: preservative grease, cooling system rust inhibitor, moisture-proof paper, moth protection compound and paper for covering the body or tires. If there is any doubt as to whether a material is approved for the particular job being done, consult your supervisor.

#### 4. STORAGE SITE

- 4.01 Whenever practicable, idle motor vehicles should be stored indoors. If the vehicles are stored in rooms where electric generators or battery chargers are used or where harmful fumes are likely to enter, the tires should be removed and stored elsewhere.
- 4.02 The storage space should be such that the tires will not be exposed to direct sunlight, strong air currents, dampness or dirt, and so that they will not be in contact with oil, grease, or gasoline nor in close proximity to hot surfaces.

#### 5. FAVORABLE AND UNFAVORABLE STORAGE

5.01 In general, it will be practicable to store the vehicle in the garage in which it is normally housed or some other indoor location equally good. Such a place if fairly dry, away from salt air exposure and not subject to frequent wide temperature fluctuations may be considered as a "favorable" storage location. If, however, the storage place is damp as in an unheated basement or if the temperature variations are frequent and sufficiently wide to cause air-moisture condensation (sweating) on parts of the vehicle, or if it is near the seacoast where the prevailing winds are, at times off the ocean and apt to carry moist air into the storage space, such a storage location should be considered as "unfavorable."

#### 6. TYPES OF TREATMENTS

- 6.01 Two types of treatments are covered, a Short-Term treatment and a Long-Term treatment.
- 6.02 The Short-Term treatment includes only the indicated operations covered in:

# Part 8. Washing

- 9. Chassis Lubrication (9.01 only)
- " 10. Fuel System
- 11. Cooling System
- 12. Moving Vehicle into Assigned Storage Space
- " 14. Battery
- 18. Tires
- 6.03 The Long-Term treatment includes all the indicated operations covered in Parts 8 to 18 inclusive.

# 7. KIND OF TREATMENT TO USE AND WHEN TO APPLY

- 7.01 A vehicle to be stored for a period not exceeding two months under favorable storage conditions should be given the complete Short-Term treatment at the time it is placed in storage. If Fire Ordinances or other applying regulations do not require it, the fuel system need not be drained.
- 7.02 A vehicle to be stored for a period exceeding two months under favorable storage conditions should be given the Long-Term treatment. The complete treatment need not be given immediately, especially if Fire Ordinances or other applying regulations do not require draining the fuel system. In such cases the operations required by the Short-Term treatment should be given at the time the vehicle is placed in storage and the additionally required operations to complete the Long-Term treatment which includes draining of the fuel system, performed within two months.
- 7.03 Any vehicle to be placed in storage where conditions are unfavorable, should be given the entire Long-Term treatment at the time it is placed in storage.

#### 8. WASHING

8.01 Wash the entire vehicle, particularly the chassis, power plant and undersides of fenders to remove all incrustations of mud which

might retain moisture and thus promote rusting of the metal. The washing should be timed if possible so that the vehicle will be run at least a few miles before being stored in order to dry out the brakes and other parts of the vehicle which may have collected moisture during washing. The vehicle should be dry when put in storage.

#### 9. CHASSIS LUBRICATION

- 9.01 After washing the vehicle, grease all chassis points to drive out any water that might have entered the bearings.
- 9.82 Unless done within the previous 5,000 miles: clean all wheel bearings and repack them with grease, replace the lubricant in all gear cases including the transmission, transfer case, differential, axle housing, winch worm gear case, power takeoff case, and the universal joints if they are not of the permanently sealed type.
- 9.03 Lubricate and thoroughly coat with preservative oil, all operating mechanisms which do not have grease gun fittings, such as, brake linkages, clevis pins, latches, hinges, movable joints, pedal shafts, carburetor linkages, starter linkages, semi-trailer dolly mechanisms and fifth wheels.

#### 10. FUEL SYSTEM

- 10.01 Under certain conditions, explained in 7.01 and 7.02 the gasoline may be left in the vehicle at the time it is stored. If the gasoline is to be left in the vehicle, cover the tank filler cap with moisture-proof paper tightly tied around the neck of the filler pipe. If the gasoline is to be drained, this should be done later at the time indicated in 12.01 or 13.02. When the gasoline is drained it should be done in accordance with the instructions below.
- is removed, tie one end of a small diameter bare metal wire to a convenient metal part of the gasoline tank and the other end to the metal bucket or receptacle into which the gasoline is to be drained. Leave this wire connected until all the gasoline is drained from the tank. This is

done to prevent a static spark. Drain the tank completely and restore the drain plug. When this has been done, run the engine at a fast idle to remove the gasoline remaining in the fuel system. When the gasoline is almost all out of the system, but before the engine stops, operate the accelerator pedal in order to pump out the gasoline from the carburetor accelerator pump. After the engine has stopped, examine the underside of the carburetor float bowl. If it has a drain plug or a main metering jet plug, remove it, allow the residual gasoline in the carburetor to drain out and restore the plug. Drain the gasoline sediment bowl by removing its drain screw or, if not provided with a drain, by removing the bowl. When restoring the parts replace all gaskets removed with new ones.

10.03 Return the drained gasoline to the proper storage. In pouring the gasoline from the bucket or receptacle into the storage tank bring a metallic part of the bucket or receptacle into physical contact with a metallic part of the storage tank and maintain this contact while pouring the gasoline from one to the other. If necessary use a wire. This is done to prevent a static spark.

#### 11. COOLING SYSTEM

- 11.01 It is preferable not to store a vehicle with the cooling system thoroughly drained because the anti-freeze or water additives will minimize engine rusting.
- 11.02 If the cooling system contains an antifreeze, test it with a hydrometer to see if it is of sufficient strength to provide protection. In testing, be sure to make the necessary corrections for the temperature of solution at the time of testing.
- repair all leaks, add sufficient anti-freeze to provide protection against freezing at the lowest temperature to which the vehicle will be exposed while in storage and sufficient inhibitor or reinhibitor to protect the cooling system against corrosion. In order to mix any materials added, run the engine until it reaches its normal operating temperature. When this has been done attach a tag to the steering wheel indicating the kind of anti-freeze in the cooling system, the lowest

freezing temperature protection it provides and the caution not to drain.

11.04 If the system is to be drained this should not be done until later at the time indicated in 12.01 or 13.03. When draining be sure to open all drain cocks and plugs in the cylinder block as well as in the radiator. When thoroughly drained close all drain cocks and restore all plugs removed. Evaporating type anti-freeze solutions (alcohol) should not be mixed with nonevaporating types (ethylene-glycol) either in storage or in the cooling system.

# 12. MOVING VEHICLE INTO ASSIGNED STORAGE SPACE

12.01 In storing a vehicle under conditions requiring the Short-Term treatment only, the vehicle should first be washed and lubricated as covered in 8.01 and 9.01; the fuel system drained if required as covered in Part 10; the cooling system drained if required as covered in 11.08, and the solution disposed of in accordance with the instructions on the anti-freeze tag attached to steering wheel; the appropriate battery operations covered in Part 14 performed; the vehicle pushed or towed into its assigned storage space; and the appropriate tire operations covered in Part 18 performed. If the fuel and cooling systems do not require draining or if they can be drained after the vehicle is in its storage space the vehicle may be run into its storage space under its own power and the required battery and draining operations done there. Attach a tag to the steering wheel bearing the date the vehicle was placed in storage.

12.02 In storing a vehicle under conditions requiring the Long-Term treatment, it should be kept in mind that after performing any of the operations beginning with 13.06 the engine should not again be run. If the engine is operated, all the treatments beginning with 13.06 or 13.13 already completed must be repeated. This, therefore, precludes running the vehicle into its assigned storage space under its own power after treating the engine. Because of this the vehicle should be run into its assigned storage location after washing and lubricating and, if practicable, the remaining operations performed there. In some cases this may be inadvisable because of the lack of adequate ventilating facilities to handle

the exhaust gases and because of the lack of adequate space. In such cases, as many of the operations required for the Long-Term treatment as can be performed more conveniently elsewhere may be done first and the vehicle pushed or towed into its assigned storage space later.

storage location leave sufficient space around it to provide accessibility for the required subsequent operations and inspections. Minimum spacing between outside dimensions should be about 18 inches. Appreciably closer spacing will make very difficult the servicing of the vehicle during long-term storage and preparing it when removing it from storage. Excessive spacing should be avoided to save room.

#### 13. POWER PLANT

13.01 Run the engine in order to bring it up to normal operating temperature, covering the radiator if necessary. Then stop the engine and drain the crank case. While the crank case is draining examine the oil filter. If it is of the type having a replaceable cotton sack filter element, remove the sack and securely close the filter case. Other type filter need not be disturbed. After the crank case is thoroughly drained, restore the drain plug and fill the crank case to the low mark on the dip stick gauge with approved engine oil.

- **13.02** Completely drain the fuel system as covered in 10.02 and 10.03.
- 13.03 If required, drain the cooling system as covered in 11.04. Attach tag to the steering wheel to indicate that cooling system has been drained.

### **Treatment Using Spray Gun**

which follow require the use of a paint spray outfit, such as the DeVilbus Type HM equipped with a tip or nozzle of sufficient length so that it can be inserted through the spark plug openings of the engine. If the spray outfit cannot be obtained or if compressed air is not available skip to 13.11 and proceed from there. If a spray

gun is available, drain off any moisture in the compressed air tank, water trap, air lines, etc, of its compressed air supply system and fill the container of the sprayer with engine oil. Adjust the spray jet to give a fine cone like spray, and perform the operations covered in 13.05 to 13.10 inclusive.

13.05 To perform some of the operations which follow will require cranking the engine with the starter while the ignition switch is off. On vehicles where the starter cannot be operated when the ignition switch is off, remove the distributor cap end of the high tension lead from the ignition coil and ground it securely on the engine in order to prevent sparks which might start a fire while the engine is being cranked with the ignition on. Starter can now be used to crank engine without the spark plugs firing.

13.06 If there is an air-brake compressor, remove its discharge valve retaining plugs, and remove the discharge valve plates and springs. While turning the compressor over with the engine starter, spray oil into each cylinder and on all exposed internal parts for five seconds. Spray the removed valve parts and restore them.

13.07 Remove the engine air cleaner. With the engine throttle wide open and the ignition switch off, crank the engine with the starter and simultaneously spray oil into the carburetor intake for five seconds. Loosen, but do not take out the spark plugs. Blow out all dirt from the recesses around the spark plugs with compressed air or a bellows. Now take out the plugs, and spray oil into each cylinder in turn, inserting the spray nozzle into the cylinder through the plug opening. While spraying each cylinder turn the engine over several times with the starter so that the spray will reach both intake and exhaust valve stems and seats and will be distributed over the cylinder walls, pistons and rings. The quantity of oil used per engine should be from 4 to 8 ounces, the larger quantity on larger engines. When spraying while cranking be careful not to insert the nozzle so far into the cylinder that it will be hit by the moving piston or valves. If ignition switch was turned on and high tension lead to distributor was disconnected, restore to normal. Coat the metal parts of the spark plugs with oil, install and reconnect them.

- 13.08 On valve-in-head engines remove the valve cover and spray the entire valve mechanism at top of cylinder block and in between cylinder block and side plates. Spray the interior of the valve cover and restore it.
- 13.09 Spray engine oil into crank case ventilator, breather and oil filler openings.
- 13.10 Spray oil into gasoline tank for 5 seconds and restore filler cap.

### Treatment Without Spray Gun

- 13.11 If spray equipment described in 13.04 cannot be obtained, follow instructions covered in 13.12 to 13.18.
- that each piston in turn be brought on its power stroke. To determine when piston is on its power stroke, blow out dirt from around spark plugs, remove them, connect them with their respective high tension leads, place them on top of the cylinder head, turn on ignition switch and as each spark plug fires when the engine is turned over its corresponding piston is on its power stroke.
- 13.13 Turn over the engine by hand and as each piston is on its power stroke, stop, measure off 2 ounces of engine oil and pour it into the corresponding spark plug hole. After all cylinders have received oil turn engine over at least 5 revolutions with the starter. Leave spark plugs out.
- chamber cover and slush entire valve mechanism including push rods at side of block with oil. Slush the inside of the valve chamber cover with oil and restore the cover.
- 13.15 If there is an air-brake compressor, remove its discharge valve retaining plugs, discharge valve and springs, and pour one tablespoon of oil in each of the cylinders. Slush or brush oil over all exposed internal valve parts, and turn compressor over at least three revolutions using the engine starter. Dip removed valve parts and retaining plugs in oil and restore them.

13.16 Dip spark plugs into oil, install them and reconnect. Then turn over engine three times by hand to make sure that cylinders have not retained too much oil thus causing very high compression. This should be watched particularly on valve-in-head engines.

# Sealing Engine Openings and Other Openings

13.17 Thoroughly seal all openings into the engine such as crank case breather, ventilator, oil filler and dip stick openings, the end of the exhaust pipe and the carburetor intake, by covering them with a moisture-proof paper securely tied in place to prevent entrance of moisture. Seal gasoline tank filler pipe. If there is an air cleaner on the carburetor intake, cover the entire air cleaner with moisture-proof paper and tie on securely with cord so that openings are airtight. Similarly seal intake strainer opening on air-brake compressor and plug the exhaust ports on all the various pieces of apparatus which constitute the air-brake system. Plug any vent holes in gear cases such as the transmission, drop gear, differential, power-take-off and winch worm housings.

13.18 When the work of treating the power plant is completed attach a tag to the steering wheel indicating that the crank case contains engine preservative oil and the date the power plant was treated.

# 14. BATTERY

- 14.01 Some batteries are equipped with special devices to prevent over filling with electrolyte. Follow the manufacturer's instructions when filling batteries.
- 14.02 Disconnect the battery terminals and take hydrometer reading of each cell.
- 14.03 If the specific gravity is 1.250 or greater when corrected to 60° F. add distilled water, if necessary, covering the plates in each cell at least 1/8 inch, but not more than 3/8 inch and restore the filler caps finger tight. Wash the entire outside of the battery and its carrier with a solution in the proportion of one pound baking soda in one gallon of cold water and flush off with

cold water. Also clean the terminals and connections with the soda solution using a stiff non-metallic brush if necessary. If battery was removed during cleaning operation return it to the vehicle or place in battery pool. Place disconnected cable ends at side of battery away from the battery terminals.

in the south) charge the battery, bringing the liquid up to proper level before charging operation is completed. Then as covered in 14.03, wash the battery and its carrier, clean the terminals and the cable connections and, if the battery was removed, return it to the vehicle and leave disconnected, or place in battery pool.

# 15. CLUTCH AND GEAR SHIFT LEVER

- 15.01 Block clutch out of engagement. This should be done by placing a block of wood between the clutch pedal arm and the underside of the floor board. The block should be only large enough to release the clutch.
- 15.02 Place gear shift lever in high gear.

#### 16. INTERIOR OF VEHICLE

- 16.01 Screen openings in floor boards to prevent rodents from entering interior of body or cab.
- 16.02 Make sure that all rubber floor mats are lying in a normal position on the floor, (not rolled or coiled up).
- 16.03 Close all windows to keep out dust, moths, etc. Spray all woolen upholstery with moth protection liquid of a type which will not damage it, or place a moth exterminating preparation such as paradichlorobenzene crystals inside the car, cover the upholstery with clean paper, and completely close all the doors.

#### 17. EXTERIOR OF VEHICLE

17.01 Any appreciable amount of rust on any part of vehicle should be removed with sandpaper. Damaged painted surfaces should then be touched up with paint and unpainted ex-

posed metal surfaces should be lightly coated with an approved rust preventive grease. All surfaces to which the rust preventive grease is applied should be dry and clean, and if possible they should be warm. Exposed bright metal parts such as bumpers, grills, hub caps, handles, etc, should also be given a light coating of the rust preventive grease. In applying this grease to any part of a vehicle, care should be exercised to avoid getting it on the body paint finish or upholstery.

17.02 If storage space is such that the finish on the top of the vehicle may be damaged by bird droppings or other injurious matter, cover it with paper, using a craft-paper or some other non-sulphite processed paper which will not damage the body finish as a result of chemical action.

#### 18. TIRES

- 18.01 Inflate all tires of vehicles in short-term storage to normal operating pressure and place good valve caps finger tight on all tire valves.
- 18.02 If the vehicle has not yet been moved into its storage space, push or tow it into its assigned storage space at this time.
- 18.03 If the vehicle will be in storage for more than two months it should be placed on firm supports to take all weight off the tires.
- 18.04 Inspect all tires for nails, glass or other harmful materials and grease patches. Remove all nails, glass, etc, and wash off all grease patches with a solvent cleaner such as Varsol or Varnolene and wipe dry.
- 18.05 Release all brakes, chocking wheels on vehicles which are not required to be placed on blocks, if floor is not level.
- 18.06 Vehicles should be stored so that tires are not exposed to direct sunlight, strong air currents, dampness or dirt, and so that they are not in contact with oils, greases, and gasoline, nor in close proximity to hot surfaces, nor where electric generators or battery chargers are used, nor where harmful fumes are likely to enter.

#### 19. CARE OF VEHICLES IN STORAGE

- 19.01 At intervals of one month make a general inspection of the vehicles in storage. Any unusual conditions such as visibly damaged or rusted parts, leakage of oil or undesirable exposure should be remedied or reported to the supervisor.
- 19.02 Any vehicle still in storage after two months which has not been given the Long-Term treatment should be given such treatment, unless it is known that vehicle will be removed from storage soon.
- 19.03 At intervals of two months fully recharge the battery. Any battery showing unusually low hydrometer readings before recharging at the two month intervals should be reported to the supervisor.
- 19.04 At intervals of 3 months, see that gear shift lever is in high gear and rotate both rear wheels simultaneously at least five revolutions first in the same direction and then in oposite directions. Rotate the front wheels at least 5 revolutions in any direction. Rotate the steering wheel from extreme right to extreme left about 3 times and then leave front wheels in straight ahead position.
- 19.05 At intervals of 12 months reconnect the battery, give the power plant another complete treatment as covered in 13.04 to 13.10 or 13.11 to 13.16 inclusive, restore any seals removed in performing these operations and disconnect the battery. When this work is completed indicate the date of the treatment on the engine tag attached to the steering wheel.

# 20. PREPARING STORED VEHICLES FOR SERVICE

- 20.01 Vehicles which have not been in storage long enough to receive the Long-Term treatment will not require any special preparation. Coolant should be placed in radiator if required and the vehicles given a thorough check before they are again placed in service.
- 20.02 The following preparatory operations apply to vehicles in storage which have been given the Long-Term treatment. They

# SECTION 720-020-012

should be performed in the order in which they are covered. In performing some of them it will be necessary for the vehicle to be jacked up. If the storage location affords sufficient space, the operations up to 20.09 should be performed before the vehicle is removed from the blocks on which it was stored thus obviating the necessity of jacking up later. If this is impracticable the vehicle may be removed from the blocks first and the remaining operations performed in the order in which they are covered herein at some more convenient location. In removing the blocks follow the instructions in 20.09.

20.03 If the vehicle has been in storage under unfavorable conditions, for six months or longer, or in unheated storage for twelve months or longer, or in any location where the general condition of the vehicle indicates that the storage conditions were particularly conducive to rusting, remove all the wheels having brake drums and thoroughly clean the drum braking surfaces of any rust. ON HYDRAULIC BRAKES IT IS IMPORTANT NOT TO DEPRESS THE BRAKE PEDAL WHILE THE DRUMS ARE REMOVED. While the drums are removed lubricate the exposed brake operating linkages and see that they are in good working order. Also examine the condition of the wheel bearing lubricant. If it is not thoroughly soft, clean the bearing, repack with new lubricant and restore the wheel.

20.04 On all vehicles stored for twelve months or longer, if not already done under 20.03, remove the hub caps and examine the wheel bearing lubricant at each wheel. If the lubricant is not thoroughly soft, clean the bearing, repack with new lubricant and restore the hub cap.

20.05 On vehicles with air-brakes, remove all the sealing plugs which were applied at the time of storage to all the exhaust ports of the various parts of the air-brake system.

20.06 If the vehicle is equipped with hydraulic brakes bring the liquid in the master cylinder up to the proper level and see that the vent in the filler cap is clear.

20.07 On vehicles with hydraulic brakes, with or without booster depress and release the brake pedal several times and inspect the shoe

action at each wheel to see that the shoes contact and release. Make any corrections found necessary.

20.08 Rotate the steering wheel from extreme left to extreme right several times to see that the steering mechanism operates satisfactorily. Make such corrections as are necessary and leave wheels in straight ahead position.

20.09 Inflate the tires to normal operating pressures, place valve caps on all tires, remove blocks and lower the vehicle to the floor. The vehicle may now be pushed or towed into location more convenient for doing remainder of work, if desired.

20.10 Remove any protective coverings from outside of vehicle and clean preservative grease coated parts using a kerosene moistened rag.

20.11 Remove all vent plugs placed in gear cases, such as the transmission, differential, power-take-off and winch worm housings, and bring oil in each to proper level including steering gear case.

20.12 Remove all seals placed at time of storage from carburetor intake, crank case breather, ventilator and filler openings, exhaust pipe, etc.; also from air compressor intake, if any.

20.13 Clean, service and restore air cleaner and also airbrake compressor air cleaner, if any.

20.14 Check engine oil and fill crank case to proper level.

20.15 If oil filter is of permanently sealed type replace it with a new one. If it is of the replaceable element type, clean out the case and install a new element.

20.16 Remove the block from between the clutch pedal arm and underside of the floor board and place gear shift lever in neutral position.

20.17 Fill cooling system, adding rust inhibitor, or anti-freeze if required.

- 20.18 Remove any seal from gasoline tank filler cap and at least partially fill gasoline tank. See that vent in filler cap is clear and restore cap.
- 20.19 Connect fully charged battery.
- 20.20 Inspect distributor, paying particular attention to the breaker points to see that they are in good condition. Wipe out inside of distributor cap before restoring it. See that all ignition cable connections are in order.
- their gaps. Unless the working space is provided with adequate ventilation to handle the heavy smoke from the exhaust when the engine is started push or tow the vehicle out of doors. Prime each cylinder by pouring a teaspoon of gasoline into the spark plug openings, restore and reconnect the spark plugs and start the engine. A little cranking may be necessary to fill the fuel lines and pump. If, after sediment bowl fills and fuel is being supplied to the carburetor, the engine does not run, determine cause and remedy it.
- 20.22 When engine is running note whether oil gauge indicates normal operation. Examine water, oil and gasoline connections for

leaks, especially at gasoline filter gasket, oil filter gasket and at points where nonmetallic type tubing is used.

- 20.23 On vehicles with compressed air-brakes, note the operation of the air compressor, the governor and the safety valve to see that they are operating satisfactorily.
- 20.24 On vehicles equipped with vacuum booster brakes observe the action of the piston rod to the power cylinder and the action of the rod in the external valve to see that they operate freely and positively.
- **20.25** Check all lights, turning signals, brakes, horn and windshield wiper.
- 20.26 Remove from upholstery any coverings placed at time of storage and clean interior of body or cab. Remove tags from steering wheel. Attach anti-freeze tag, if any, to filler connection on radiator.
- 20.27 Drive vehicle about 1/4 mile to make sure it is in good operating order paying particular attention to steering gear and to service and parking brakes. If driving test is satisfactory, vehicle is ready for regular service.