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TM 37-2810

WAR DEPARTMENT TECHNICAL MANUAL

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MOTOR VEHICLE INSPECTIONS AND PREVENTIVE MAINTENANCE SERVICES

WAR DEPARTMENT • MARCH 1945

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WAR DEPARTMENT TECHNICAL MANUAL

TM 37-2810

This manual supersedes TM 9-2810, 21 October 1943; TB 9-2810-1, 29 February 1944; TB 9-2810-2, 17 April 1944; and TB 9-2810-3, 26 July 1944.

MOTOR VEHICLE INSPECTIONS AND PREVENTIVE MAINTENANCE SERVICES

WAR DEPARTMENT • MARCH 1945

United States Government Printing Office

Washington: 1945

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WAR DEPARTMENT
WASHINGTON 25, D. C., 14 March 1945

TM 37–2810, Motor Vehicle Inspections and Preventive Maintenance Services, is published for the information and guidance of all concerned.

[AG 300.7 (20 Jul 44)]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL
Chief of Staff

OFFICIAL:
J. A. ULIO
Major General
The Adjutant General

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For explanation of symbols, see FM 21–6.

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SECTION I

GENERAL

1. Scope

a. PURPOSE. (1) This manual is designed to outline the procedures for use with motor vehicle operation and maintenance forms, records, and reports prescribed by the War Department. It supplements the various vehicle Technical Manuals. Where the vehicle Technical Manual and this manual differ, the vehicle Technical Manual governs. Where no vehicle Technical Manual is available this manual will apply.

(2) The procedures outlined in this manual are, of necessity, general in nature, since they must apply to all types of motor equipment operating under various climatic and field conditions.

(3) The work sequence and the preventive maintenance procedures, which are special for each type of vehicle, have been or will be included in the forthcoming vehicle Technical Manuals. These procedures are listed under item numbers in tabular form similar to the sample shown in paragraph 15. The work sequence for performing a service is prescribed by the order in which the items appear in the manuals. General procedures listed in this manual apply to all vehicles.

b. INSPECTIONS. The primary objective of all inspections of motorized equipment and operating and service personnel is to improve the efficiency of military motor transportation and mechanized combat.

c. PREVENTIVE MAINTENANCE SERVICE. This service provides a means for the svstematic detection and correction of incipient vehicle failures before they occur or develop into major defects, and maintains vehicles in a satisfactory operating condition.

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INTRODUCTION

2. Types of Inspections

The two basic types of inspections are performed: command inspections and technical inspections.

a. COMMAND INSPECTIONS. These inspections are made by unit commanders to determine the condition and adequacy of motorized equipment, tools and supplies, the efficiency of personnel of their commands, economical assignments, pooling, and use of vehicles. This type of inspection may or may not be scheduled, and the exact nature and frequency of the inspection is left to the discretion of the commanding officer. Command inspections may be of either a formal or informal nature or may take the form of a spot check.

b. TECHNICAL INSPECTIONS. These inspections are made by technically qualified personnel to determine whether or not a vehicle should be continued in service, or withdrawn for overhaul or reclamation of component parts. These inspections are also a check on the condition of vehicles at time of transfer, or when a report of survey is required. Technical inspections may take the form of examinations and tests to discover causes of difficulties encountered by combat troops with matériel.

3. Preventive Maintenance Services

a. GENERAL. These services are the responsibility of the commanders of operating organizations. They comprise the scheduled maintenance services performed by the vehicle operators and unit mechanics, who form the first and second echelons of maintenance, respectively. The preventive maintenance services, together with emergency repairs, performed by the first and second echelons is known as "organization maintenance," and the light, medium, and heavy maintenance performed by the third- and fourth-echelon personnel of the Ordnance Department and the precision, line-production work on unit assemblies performed by base shops (fifth echelon) is known as "maintenance."

b. FIRST ECHELON. (1) *Scheduled daily services.* Ordinarily it is the duty of the driver of a motor vehicle to replenish fuel, oil, grease, water, air, and battery liquid; to clean his vehicle and to tighten loose nuts; to care for tools, equipment, tires, and battery; to make emergency repairs as needed; and, under severe operating conditions, to check lubricant levels daily in the axle housings, transmission, and particularly in the transfer case. These maintenance services are performed by the driver daily, before and during operation, at the halt, after operation, and weekly as de-

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scribed in section II.

(2) *Supervision.* Daily and weekly maintenance services are performed under the direction of the section leader, with the supervision of the company officer, to check and supervise the maintenance work of the driver.

(3) *Lubrication.* On tanks and other combat vehicles, oil levels in transmissions and final drive units are serviced by the tank crew as a matter of daily routine, and first-echelon maintenance of armament is also required, in addition to the foregoing.

(4) *Reports.* The driver reports the results of his service to his section leader or other designated individual. Items beyond the scope of the driver's ability, supplies, tools, tactical situation, and available time to correct are referred to the unit mechanics, who make adjustments, minor repairs, and unit replacement within their scope.

c. SECOND ECHELON. (1) The second echelon performs monthly and semiannual maintenance services on wheeled and half-track vehicles; monthly maintenance services on motorcycles; and monthly and quarterly maintenance services on tanks and tanklike wheeled vehicles.* The monthly maintenance service on wheeled and half-track vehicles, and motorcycles, and the monthly service on tanks and tanklike wheeled vehicles are performed by company and detachment second-echelon. The semiannual services on wheeled and half-track vehicles and the quarterly services on tank and tanklike wheeled vehicles are performed by regimental, squadron, and separate battalion, separate company, and separate detachment second echelon. All maintenance services will be performed at the prescribed calendar interval.

(2) These periodic preventive maintenance services will be performed continuously throughout the month so that no large number of vehicles will be tied up at any one time. Approximately one-twentieth of all the organization's vehicles will receive the monthly services each day; one-sixth will receive the semiannual service each month; and one-third will receive the quarterly service each month.

(3) The second echelon refers work beyond its scope to the third echelon, which performs light and medium maintenance, or the fourth echelon, which performs heavy maintenance.

d. Special preventive maintenance services to meet special operating conditions may be performed by first or second echelon, or both. These include seasonal services and maintenance of vehicles

*The term "tanklike wheeled vehicles" is used to describe those vehicles which are equipped with armor plate, hull, turret and gun, hatches, and other features common to tanks. They resemble tanks closely except that they are mounted on wheels instead of tracks. Their preventive maintenance services have been grouped with those for full-track vehicles because of their similarity.

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operating under abnormally dusty, high or low temperature, or other abnormal conditions.

4. Records and Reports

Only those forms, records, and reports required for organizations performing first- and second-echelon maintenance will be described in this manual. Forms and records will be retained in organizational files for periods prescribed in War Department Pamphlet 12–5. Forms are classified generally as first echelon, second echelon, and supply forms.

a. FIRST ECHELON. Except when prescribed otherwise, forms and records listed below will accompany each vehicle while operating on the road.

(1) *Driver's Trip Ticket and PM Service Record (WD Form 48).* Every driver of an individual vehicle on nontactical missions or not in convoy is required to carry WD Form 48, "Driver's Trip Ticket and PM Service Record." (See figs. 1 and 2.) This form is his official authorization for driving the vehicle and when completed, contains a record of his route, destination, load, speedometer readings, and other information pertinent to the trip. In addition, the reverse side of this form lists the items on the vehicle to which the driver must give attention daily, BEFORE-OPERATION, DURING-OPERATION, AT-HALT, AFTER-OPERATION, and WEEKLY SERVICES. While drivers in a convoy are not required to carry a trip ticket, they will use the list on the reverse side of this form as a reminder or check-list for their daily and weekly maintenance activities. Detailed instructions for performing the services scheduled for each of these items are contained in section II of this manual and in the appropirate vehicle Technical Manual. Upon completion of these services the driver will initial the form in the spaces provided. The War Department Lubrication Order number and the date of the order will be entered in the appropriate spaces under Item 83. The driver's initials in the AFTER-OPERATION SERVICE imply that the lubricants prescribed by the WDLO number entered, were applied properly. Entries opposite "Kind of work or route" such as "post administration" or "as directed" are meaningless and should not be used. Entries such as "messenger service," "hauling rations," or "inspection of units" are typical entries. When no gasoline or oil is added during or after a trip, a negative entry such as "none" will be made. Upon releasing the vehicle, the official user, a commissioned or enlisted individual, will sign the form in the space provided. This signature verifies the speedometer or hour meter reading and hour of release. Normally the mileage and time released will not agree exactly with the "time in" or "in" speedometer

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DRIVER'S TRIP TICKET AND P. M. SERVICE RECORD

U. S. A. NUMBER: 456789

DRIVER'S NAME	1/t Smith
DATE	1 Aug 44
REPORT TO	Capt. R.A. Jones
TIME OUT	1300
ORGANIZATION	Regtl. Hq. Co. 12th Inf.
TIME IN	1610
DEPARTMENT OR ADDRESS	Bldg T-2931 - 7th Ave. & 4th St. Post
KIND OF WORK (or route)	Haul Org. Equip. to Whse #4.
REQUESTED BY (Organization or individual)	Capt. R.A. Jones
DISPATCHER'S SIGNATURE	T/5 James A. Brown

SPEEDOMETER IN	SPEEDOMETER OUT	SPEEDOMETER TOTAL MILES	HOUR METER IN	HOUR METER OUT	HOUR METER TOTAL HOURS
10453	10421	32			

FUEL ADDED: 5 GALS.

OIL ADDED: 1 QTS.

I HAVE PERFORMED THE "PREVENTIVE MAINTENANCE SERVICES" OF THIS FORM AND RECORDED ALL DEFICIENCIES AND ANY ACCIDENT

J J Smith
DRIVER'S SIGNATURE

I HAVE NOTED ALL ENTRIES ON THIS FORM AND TAKEN THE NECESSARY ACTION

T/5 James A. Brown
DISPATCHER'S, ETC., SIGNATURE

TRIP OR LOAD RECORD	PASSENGERS OR WEIGHT	SPEEDOMETER OR HOUR METER
FROM Motor Park		10421
TO Bldg. T-291		10423
TO Whse. #4	2½ tons	10430
TO Bldg. T-2931	3 pass.	10437
TO Whse. #4	2½ tons	10444
TO Bldg. T-2931	3 pass	10451
TO Motor Park	—	10453
TO		
TO		

VEHICLE RELEASED AT (Speedometer - Hour Meter, date, hour): 10451 1 Aug 44 1600

OFFICIAL USER (Signature and Grade): A.L. Green T/Sgt

WAR DEPARTMENT FORM 48
APPROVED 15 DECEMBER 1944

Figure 1. WD Form 48 (front), Driver's Trip Ticket and PM Service Record.

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DRIVER'S DAILY PREVENTIVE MAINTENANCE SERVICES

PERFORM THESE SERVICES ACCORDING TO THE INSTRUCTION IN TM 37-2810, OR VEHICLE OPERATOR'S MANUAL.

BEFORE OPERATION SERVICE

1. TAMPERING AND DAMAGE
2. FIRE EXTINGUISHERS
3. FUEL, OIL AND WATER
5. ACCESSORIES AND DRIVES
5. AIR BRAKE TANKS
4. LEAKS - GENERAL
7. ENGINE WARM-UP
8. CHOKE OR PRIMER
9. INSTRUMENTS
10. HORN AND W/S WIPERS
11. GLASS AND R/V MIRRORS
12. LAMPS AND REFLECTORS
13. WHEEL AND FLANGE NUTS
14. TIRES AND/OR TRACKS
15. SPRINGS AND SUSPENSIONS
16. STEERING LINKAGE
17. FENDERS AND BUMPERS
18. TOWING CONNECTIONS
19. BODY, LOAD AND TARPS
20. DECONTAMINATOR
21. TOOLS AND EQUIPMENT
22. ENGINE OPERATION
23. OPERATOR'S PUBLICATIONS
24. AMPHIBIAN ITEMS
24-1. MAT'L'S HANDLING EQUIP ITEMS
24-2. SPECIAL ENGINEER ITEMS
25. DURING OPERATION CHECK

OPERATOR'S INITIALS AAS

DURING OPERATION SERVICE

26. STEERING BRAKES
27. FOOT AND HAND BRAKES
28. CLUTCH
29. TRANSMISSION
30. TRANSFER
91. ENGINE AND CONTROLS
92. INSTRUMENTS
93. STEERING GEAR
94. RUNNING GEAR
95. BODY AND TRAILER
96. GUNS-MOUNTINGS AND ELEVATING, TRAVERSING, GYRO, AND FIRING CONTROLS
97. AMPHIBIAN ITEMS
97-1. MAT'L'S HANDLING EQUIP ITEMS
97-2. SPECIAL ENGINEER ITEMS

OPERATOR'S INITIALS AAS

AT HALT SERVICE

38. FUEL, OIL AND WATER
39. TEMPERATURES - HUBS, BRAKE DRUMS
40. AXLE AND TRANSFER VENTS
41. PROPELLER SHAFTS
42. SPRINGS AND SUSPENSIONS
43. STEERING LINKAGE
44. WHEEL AND FLANGE NUTS
45. TIRES AND/OR TRACKS
46. LEAKS - GENERAL
47. ACCESSORIES AND BELTS
48. AIR CLEANERS
49. FENDERS AND BUMPERS
50. TOWING CONNECTIONS
51. BODY, LOAD AND TARPS
52. APPEARANCE AND GLASS
53. AMPHIBIAN ITEMS
53-1. MAT'L'S HANDLING EQUIP ITEMS
53-2. SPECIAL ENGINEER ITEMS

OPERATOR'S INITIALS AAS

AFTER OPERATION SERVICE

53. FUEL, OIL AND WATER
54. ENGINE OPERATION
56. INSTRUMENTS
57. HORN AND W/S WIPERS
58. GLASS AND R/V MIRRORS
59. LAMPS AND REFLECTORS
60. FIRE EXTINGUISHERS
61. DECONTAMINATOR
62.* BATTERY AND VOLTMETER
63.* ACCESSORIES AND BELTS
64.* ELECTRICAL WIRING
65. AIR CLEANERS AND BREATHER CAPS
66.* FUEL FILTERS
67. ENGINE CONTROLS
68.* TIRES AND/OR TRACKS
69.* SPRINGS AND SUSPENSIONS
70. STEERING LINKAGE
71. PROPELLER SHAFT, CENTER BEARING AND VENT
72. AXLE AND TRANSFER VENTS
73. LEAKS - GENERAL
74. GEAR CASES
75.* AIR BRAKE TANKS
76. FENDERS AND BUMPERS
77.* TOWING CONNECTIONS
78. BODY, LOAD AND TARPS
79. ARMOR AND FRONT ROLLER
80. VISION DEVICES
81. TURRET AND GUN - MOUNTINGS AND ELEVATING, GYRO, TRAVERSING, AND FIRING CONTROLS
82.* TIGHTEN - WHEEL, RIM, AXLE DRIVE FLANGE, AND SPRING U-BOLT NUTS
83.* LUBRICATE AS NEEDED
WDLO NO. _____
DATE _____
84.* CLEAN ENGINE AND VEHICLE
85.* TOOLS AND EQUIPMENT
86.* AMPHIBIAN ITEMS
87.* MAT'L'S HANDLING EQUIP ITEMS
88.* SPECIAL ENGINEER ITEMS

OPERATOR'S INITIALS AAS

*THOSE ITEMS MARKED BY AN ASTERISK (*) REQUIRE ADDITIONAL WEEKLY SERVICES AND IT IS MANDATORY THAT THEY BE PERFORMED AS PRESCRIBED.

RECORD ANY ACCIDENT AND ALL DEFICIENCIES, INDICATING IF CORRECTED:

Windshield wiper blade missing

P.O.D.

Figure 2. WD Form 48 (back), Driver's Trip Ticket and PM Service Record.

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reading. When no accident or deficiency is apparent to the driver, "none" will be entered in space, "Record of any accident and all deficiencies, indicating if corrected." Correction of a reported deficiency will be indicated by initials opposite the corrected deficiency. When the speedometer is inoperative, an estimate of miles traveled will be entered in appropriate spaces.

(2) *Driver's Report — Accident — Motor Transportation (Standard Form 26).* In case of an accident resulting in injury or property damage, this form (fig. 3) will be filled out by the driver on the spot or as promptly as possible thereafter.

(3) *Motor Vehicle Operator's Permit (WD AGO Form 9–74, old OO Form 7360).* This form will be issued by commanders to all operators of motor vehicles who are qualified to operate the particular vehicles noted on the permit. The validity of the permit with or without glasses will be indicated by lining out the word not applicable on the front of the form. Authentication of vehicles the operator is qualified to drive will be indicated by the *signature* and *rank* only of the examining officer. Type vehicles the operator is not qualified to drive will *not* be lined out or initialed. No other type of certification is required on this form other than the authenticating officer's signature and rank. (See fig. 4.)

(4) *War Department Lubrication Order.* The appropriate lubrication order will accompany each vehicle at all times. (See fig. 5.)

(5) *Vehicle Technical Manual.* Each vehicle will have the appropriate vehicle Technical Manual in the vehicle at all times.

b. SECOND ECHELON. These forms consist of operation and inspection forms.

(1) Daily Dispatching Record of Motor Vehicles (WD AGO Form 9–75, old WD OO Form 7361). This form records the status of all vehicles dispatched for any particular day. (See fig. 6.)

(2) Automotive Disability Report of Vehicles Disabled More Than 3 Days (WD AGO Form 13–1, old IGD Form 6). This report is accomplished and submitted as directed in current War Department directives. (See figs. 7 and 8.)

(3) Spot Check Inspection Report for Wheeled and Half-Track Vehicles (WD AGO Form 9–68) (figs. 9 and 10) and Spot Check Inspection Report for All Full-Track and Tanklike Wheeled Vehicles (WD AGO Form 9–69) (figs. 11 and 12) are provided as a record for use by staff officers or representatives conducting this type of command inspection described in paragraph 24.

(4) Preventive Maintenance Roster (WD AGO Form 460). (See fig. 13.) It is fundamental that preventive maintenance services be performed on a regular cycle. At the same time, only a small proportion of the vehicles of an organization can be tied up

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17. Was an investigation made by a policeman (civil or military)? yes If so, state
Name Peter Martin No. 168
Precinct or station N.J. State Police

18. Names and addresses of persons other than driver in Government car:
St. Sgt. E.D. Commers, # 38122508
Hq. Co., 12th Inf. Regt.
Fort Dix, N.J.

19. Names and addresses of other witnesses:
Raymond Bodine, Prince St., Bordentown, N.J., Frank T. Major, 333 So. St., Trenton, N.J.

Walter W. Black
(Signature of driver)

I certify that the above report was delivered to me on the 1st day of August, 19 44, at 2 55 o'clock P.M.

Ralph O. Harvey
(Signature of officer in charge)
Captain Infantry
(Official title)
12th Inf. Regt.
(Government department or establishment)

NOTE.—This report should be attached to report of investigating Officer.

10—1810 U. S. GOVERNMENT PRINTING OFFICE

Standard Form No. 26
Approved by the President
June 10, 1927

DRIVER'S REPORT—ACCIDENT
MOTOR TRANSPORTATION

INSTRUCTIONS TO DRIVERS

In case of injury to person or damage to property:
A. Stop car and render such assistance as may be needed.
B. Fill out this form, ON THE SPOT, so far as possible.
C. Deliver this report promptly to your immediate superior.

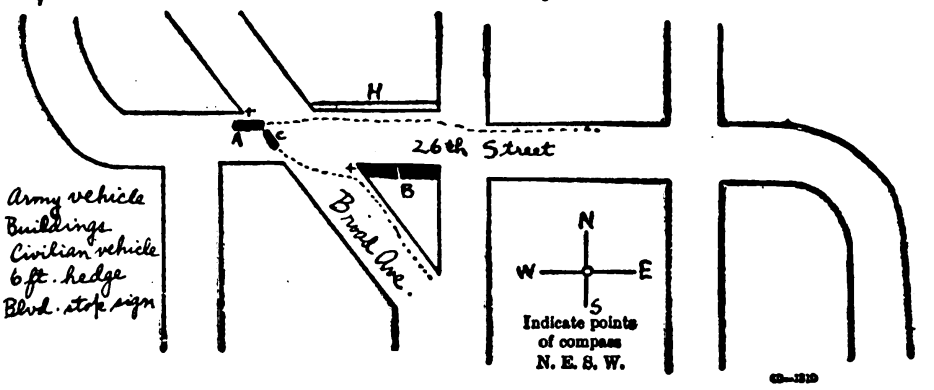
Failure to observe these instructions will result in disciplinary action.

1. Name of Government driver:
Pfc. W.W. Black # 6807757
2. Stationed at 12th Inf. Regt., Ft. Dix, N.J.
3. Make and type of Government vehicle
Truck, 1/4 Ton 4X4
4. Service number W-2147631
5. Name and address of owner of other vehicle (or owner of property damaged) R.S. Sommers
161 West 85th St, Bordentown, N.J.
6. Name and address of driver of other vehicle Daan Sommers, 161 W. 85th St, Bordentown, N.J.
7. License of other vehicle: State N.J. 1944
No. L L-628
8. Place of accident: City Trenton, N.J.
Street 26 St. + Broad Ave.

10—1810

9. Date of accident 1 August, 19 44 Hour 1 30 P.M.
10. Names and addresses of persons injured; nature of injuries:
No one injured. Driver was taken to the hospital by Police Officer for further examination.
11. Describe damage to Government vehicle Bent left rear fender. Wheel and left rear corner of frame badly bent.
12. Describe damage to privately owned vehicle, or other property: Both front fenders, bumper and radiator grill smashed. Engine pushed back and radiator smashed.

13. What signal was given by each driver prior to accident?
I sounded horn 50 ft. from intersection and slowed down to 10 mi. per hr. Other vehicle failed to heed [illegible]
14. State condition of light, weather, and roadway: Bull daylight, visibility good, weather clear Road 4 lane concrete, dry and level.
15. Explain how accident happened: I entered intersection at about 10 mi. per hr. The car on my left failed to heed boulevard stop sign. I tried to speed up to avoid him.
16. Label streets and indicate measurements; show the position of each vehicle at the time of the accident and show by dotted lines the course of each vehicle just before and just after the collision.



60—1810

Figure 3. Standard Form 26 (front and back), Driver's Report—Accident—Motor Transportation.

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NOTES

1. To be issued only after strict and practical examination.
2. Permit will be authenticated by commissioned officer immediately after test for each type of vehicle concerned.
3. Where testing facilities do not permit cross-country driving, permit will be marked "limited" after each type of vehicle concerned.
4. List accidents below. If more than three are charged to the permit holder, his driving ability and mental attitude should be investigated before issuance of new permit.

RECORD OF ACCIDENTS

(List all in which permit holder is involved)

Date ..... (1)
Responsibility and cause .....
Estimated cost of damages .....
Officer's initials .....

Date ..... (2)
Responsibility and cause .....
Estimated cost of damages .....
Officer's initials .....

Date ..... (3)
Responsibility and cause .....
Estimated cost of damages .....
Officer's initials .....

MOTOR VEHICLE OPERATOR'S

PERMIT

Valid { ~~motor~~ without } glasses

Number 6870757
(OPERATOR'S A. S. N.)

U. S. GOVERNMENT PRINTING OFFICE 16-22236-1

3 August, 19 44
(Date of issue)

John J. Doe
(Operator's signature)

I CERTIFY THAT John J. Doe, T/5
(Name and rank)

has demonstrated proficiency in driving (par. 16, A/R 850–15) the types of vehicles listed below as per signed authentication.

TYPE VEHICLE	AUTHENTICATION (Signed by a commissioned officer)
Car, halftrack	
Car, passenger	
Motorcycle	
Tank, heavy	
Tank, light	
Tank, medium	
Tractor	
Truck-tractor (semitrailer)	
Trucks, cargo, ¼–¾-ton	
Trucks, cargo, 1½–2½-ton	R. R. Lee, Capt.
Trucks, cargo, 4-ton and larger	R. R. Lee, Capt.
Trucks, amphibian (all)	
Vehicle, wheeled, combat	—
Special	

W. D., A. G. O. Form No. 9–74
(Old W. D., O. O. Form No. 7360 which may continue in use)
17 June 1944

16—22236-2

Figure 4. WD AGO Form 9–74 (old WD OO Form 7360) (front and back), Motor Vehicle Operator's Permit.

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No. 505

WAR DEPARTMENT LUBRICATION ORDER

ORDNANCE DEPARTMENT

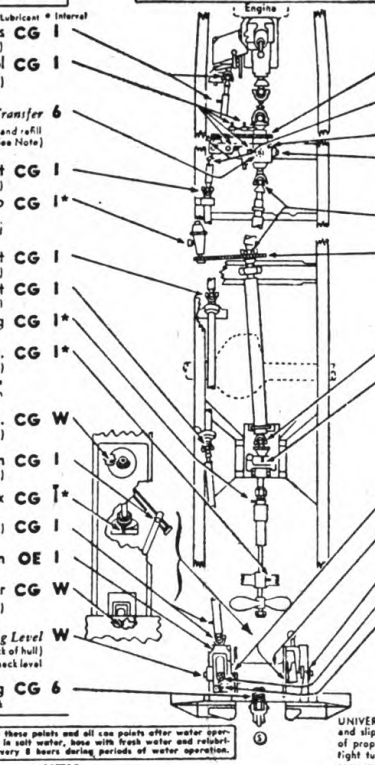
TRUCK, AMPHIBIAN, 2½ TON, 6X6

SNL G-501. (GMC "DUKW 353") For detailed instructions, refer to TM 9-802.

Serviced From Inside Hull, Unless Otherwise Specified

	Lubricant	Interval
Universal and Slip Joints (See Note)	CG	I
Transfer Case Control Levers (Some models)	CG	I
Water Propeller Shaft Transfer Case Drain Drain and refill Cap. 1 pt. (See Note)		6
Universal Joint (See Note)	CG	I
Centrifugal Bilge Pump Turn cup down 1 full turn, refill as required	CG	I*
Universal Joint (See Note)	CG	I
Universal Joint (See Note)	CG	I
Stuffing Box Bearing	CG	I*
Propeller Shaft Strut Brg. (Serviced from under hull) Lubricate immediately before and after water operation	CG	I*
Rudder Shaft Upper Brg. (Some models)	CG	W
Rudder Control Arm Clean and coat grease (Some models)	CG	I
Rudder Stuffing Box	CG	I*
Univ. & Slip Joints (See Note)	CG	I
Shear Pin	OE	I
Rudder Control Lever Swivel (Some models)	CG	W
Winch Worm Housing Level (Serviced from rear deck of hull) Check level		W
Pintle Hook Spring Remove cover, clean and repack	CG	6

NOTE— See Reverse Side for lubrication of CHASSIS points.



Serviced From Inside Hull

Interval	Lubricant	
I	OE	Bilge Pump Drive Chain Clean and oil (Some models)
*I	CG	Bilge Pump
½	CG	If equipped with screw down cup, turn cup down 1 turn every ½ hour of operation
W		*Transfer Case Vent* (See Note)
W	GO	Water Propeller Shaft Transfer Case Fill and Level Check level (See Note)
I	CG	Universal Joints (See Note)
I	OE	Roller Chain Clean and oil
I	CG	Universal Joint (See Note)
I	CG	Midship Shaft Bearing

Serviced From Rear Deck of Hull

I	CG	Winch Drum Bearings
*W	OE	Winch Cable (See Note)
I	CG	Winch Shaft Bearing
W	GO	Winch Worm Housing Fill
I		*Winch Worm Housing Drain* Drain and refill Cap. 1½ pt. (See Note)

*CAUTION: Lubricate these points and all can points after water operation. After operation in salt water, hose with fresh water and relubricate. Also lubricate every 8 hours during periods of water operation.

KEY

LUBRICANTS	LOWEST ANTICIPATED AIR TEMPERATURE		
	above +32°F.	+32°F. to 0°F.	below 0°F.
OE—OIL, engine			
Crankcase	OE SAE 30	OE SAE 10	See OFSB 6-11
Other Points	OE SAE 30	OE SAE 10	PS
GO—LUBRICANT, gear, universal	GO SAE 90	GO SAE 80	GO Grade 75
CG—GREASE, general purpose	CG No. 1	CG No. 0	CG No. 0
WB—GREASE, general purpose, No. 2	All temperatures		
HB—FLUID, brake, hydraulic			
SA—FLUID, shock-absorber, light			
PS—OIL, lubricating, preservative, special			

INTERVALS
½—½ hour
D—Daily
W—Weekly
1—1,000 miles
6—6,000 miles

COLD WEATHER: For Lubrication and Service below 0°F., refer to OFSB 6-11.

NOTES

AIR CLEANERS—Refill with used crankcase oil or OE. Every 1,000 miles, disassemble and wash all parts. From 0°F. to —40°F. use SA. Below —40°F. remove oil and operate dry. Every 1,000 miles, remove Hydrovac cylinder and tire pump air cleaners and tire pump crankcase breather, wash filter element, recoil with used crankcase oil or OE drain excess oil and reassemble. From 0°F. to —40°F. use SA. Below —40°F. wash and replace dry. Weekly, clean dirt from main transfer case breather and wash thoroughly. Weekly, clean dirt from pillow block, steering gear, differential, and water propeller shaft transfer case vents.

CRANKCASE—Drain only when engine is hot. Drain plug is reached through plug hole in bottom of hull.

OIL FILTER—After renewing element, run engine a few minutes and refill crankcase to FULL mark.

GEAR CASES—Drain only after operation. Fill to plug level when hot or to ½ in. below plug level when cold. Fill water propeller shaft transfer case and winch worm housing to plug levels at all times. Drain differentials by removing lower cap screw in housing cover. Plug holes are provided in bottom of hull through which drain plugs for transmission and transfer case may be reached. Clean magnetic drain plugs in transfer case and propeller shaft transfer case. After water operation, check axle housings, if water is present drain and refill.

UNIVERSAL JOINTS AND STEERING KNUCKLE BEARINGS (Front Wheels)—Remove inspection plug and lubricate through fitting underneath joint until lubricant is visible at plug opening. Where two plugs are provided, one on top of joint, the other at front of steering knuckle support, use only plug in steering knuckle support. Every 6,000 miles, remove, wash all parts, dry, reassemble and refill with CG. Do not fill above plug level.

UNIVERSAL JOINTS AND SLIP JOINTS—Lubricate winch drive universal and slip joints with hand gun only. Front axle, forward rear axle, and front of propeller shaft pillow block universal joints are encased in large water-tight tubes and are covered by bellows. To lubricate, slip bellows back on some models. Other models have a plug in tube; remove plug and insert fitting to lubricate joint.

PROPELLER SHAFT PILLOW BLOCK—Fill completely through plug hole on top of unit with GO. Do no use level plug on side of housing. Every 6,000 miles or 100 hours of water operation, drain with suction gun and refill.

DISTRIBUTOR—Every 6,000 miles, wipe breaker cam lightly with CG and lubricate breaker arm pivot and wick under rotor with 1 to 2 drops of OE.

CLUTCH PILOT BEARING — At time of disassembly of clutch for inspection, replacement or overhaul, clean and repack bearing with WB. Also coat ball seat in release fork, groove in release bearing for release fork and clutch shaft spline with WB.

REAR SPRING SEAT BEARINGS — Every 6,000 miles, remove bearing cap. Remove plug, insert fitting and lubricate with CG until all old grease is forced out of bearing. Replace plug and bearing cap.

TIRE PUMP—Drain only after operation. Refill to level of filler plug hole. Tire pump on some models located on left of transmission below driver's seat. Every 1,000 miles, on these models, clean and lubricate tire pump drive chain with OE. Every 6,000 miles on other models, disassemble, clean and repack universal joint drive with CG. Inspect leather sleeve and replace if damaged or worn. Daily, drain moisture from air storage tank. Drain cock located at bottom of tank.

HULL DRAIN PLUGS AND DRAIN VALVES— After water operation, remove and coat hull plug threads and surfaces of drain valves with CG. One drain valve located under left front of engine; one each at rear corners of cargo compartment, under floor plate and one at rear of driver's seat.

WINCH CABLE—After each period of water operation or weekly, unwind cable, clean and oil with used crankcase oil or OE.

OIL CAN POINTS—Every 1,000 miles, lubricate Spark and Throttle Control Rod Ends, sliding surface of Winch Jaw Clutch, Tire Pump Knee-action, Rudder Steering Cable Pulleys, Rudder Control Rod Ends, (some models), Pintle Hook, Transfer Case Control Lever Bushings and Rods, Hand and Foot Brake Control Linkage, Clutch Control Linkage, Tire Pump Shift Control, (some models), Yokes, Clevises, Hinges, Latches, etc., with OE.

DO NOT LUBRICATE—Fan, Water Pump, Generator, Clutch Release Bearing, Winch Drive Shaft Support Bearings, Water Propeller Drive Shaft Center Bearing, Power Take-off, Shock Absorber Links, Engine Governor, Chassis Springs.

LUBRICATED BY ORDNANCE PERSONNEL — Steering Column Upper Bearing, Steering Column Horn Contacts, Engine Breather Restrictor Valve. (Refer to TM 9-1802.)

Copy of this Order will be carried on the materiel at all times. These lubrication instructions are binding on all echelons of maintenance.

By order of the Secretary of War: G. C. Marshall, Chief of Staff.

18 Nov 43

Supersedes all previous issues.

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Figure 5. War Department Lubrication Order (usually referred to as WDLO).

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for these services at any given time. Hence, a control system based on Preventive Maintenance Roster (WD AGO Form 460) is prescribed. This form will be used as described in paragraph 4*c* for scheduling and maintaining a record of motor vehicle maintenance operations.

(5) Preventive Maintenance Service and Technical Inspection Work Sheet for Wheeled and Half-Track Vehicles (WD AGO Form 461). (See figs. 14 and 15.)

(6) Preventive Maintenance Service and Technical Inspection Work Sheet for Full-Track and Tanklike Wheeled Vehicles (WD AGO Form 462). (See figs. 16 and 17.)

(7) Preventive Maintenance Service and Technical Inspection Work Sheet for Motorcycles (WD AGO Form 463). (See fig. 18.)

(8) Preventive Maintenance Service and Technical Inspection Work Sheet for Engineer Equipment (WD AGO Form 464). (See figs. 19 and 20.)

(9) MWO and Major Unit Assembly Replacement Record and Organizational Equipment File (WD AGO Form 478). (See fig. 21.) This form will be kept in possession of second-echelon maintenance personnel and will accompany equipment upon transfer or when evacuated to higher echelon. Personnel completing modification or major unit assembly replacement will keep form posted to date. All essential forms and records on equipment will be filed in jacket of *Organizational Equipment File.* This jacket is to be used by second-echelon maintenance personnel for filing the *Organizational Equipment Files.* (See fig. 22.)

(10) Work Request and Job Order (WD AGO Form 811) and Work Request and Hand Receipt (WD AGO Form 811–1). When work by a higher echelon is desired these forms are made out in quadruplicate by units authorized to perform semiannual and quarterly services. These forms are not used by units subordinate to regimental or separate battalion shops. (See fig. 23.)

c. USE OF PREVENTIVE MAINTENANCE ROSTER (WD AGO FORM 460). Preventive maintenance services will be scheduled continuously throughout the month in accordance with the instructions in paragraph 3c(2). The Preventive Maintenance Roster (fig. 13) will be used for this purpose in accordance with the following instructions:

(1) The inside right-hand page contains 31 columns for the 31 days of a month. The adjacent columns on the left-hand inside page will be used to list (a) Rank and Name, (b) Equipment Nomenclature, (c) Remarks, (d) Unit Serial Number, (e) Accessory, and (f) Equipment Registration Number. Trailers will be listed under the column headed "Equipment Nomenclature," and the remaining columns will be used for appropriate entries indi-

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DAILY DISPATCHING RECORD OF MOTOR VEHICLES

ORDNANCE DEPT.

DISPATCHER: T/5 James A. Brown | STATION: Fort Dix, N. J. | DATE: 1 aug 1944 | SHEET NO. 1

DRIVER'S NAME	U. S. A. REGISTRATION NO.	REPORT TO	ADDRESS	DESTINATION	TIME Out	TIME In	ACCIDENT	REMARKS
Smith, J. J.	496789	Capt. R. A. Jones	Bldg. T 2931 7th ave 4th St.	Whse # 4	1300	1610	No	Windshield wiper blade reported missing
Moore, T. M.	435531	Maj. J. P. Williams	3rd Bn. Hq. Co	Personnel to Range	0745	1700	No	
Miller, J. H.	2237545	Lt. Col. R. M. Smith	Regt. Hqrs.	Messenger	0730	1730	No	
Larney, Wm.	2198731	Lt. Col. R. M. Smith	" "	"	0730	1720	No	
Block, W. W.	2147631	Maj. J. C. Lincoln	1st Bn. Hqrs.	"	0730	1530	Yes	Civilian vehicle struck this vehicle at the corners of 26th and Broad Ave., Trenton, N. J. Damage L.R. Wheel, fender and frame.
Brown, C. C.	437232	M. Sgt. L. W. Holmes	Regt. Supply Office.	Haul Rations	0730	1630	No	

W. D. A. G. O. Form No. 9-75 (Old W. D., O. O. Form No 7361 which may continue in use) 17 June 1944

(NOTE INSTRUCTIONS ON REVERSE SIDE)

16—31863-8

Figure 6. WD AGO Form 9–75 (old WD OO Form 7361) Daily Dispatching Record of Motor Vehicles.

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AUTOMOTIVE DISABILITY REPORT OF VEHICLES DISABLED MORE THAN 3 DAYS

(SEE CIR. No. 231, W. D., 1943)

TO		AS OF
UNIT (or activity)	STATION	STATE
ASSIGNED (or attached) TO		
NUMBER OF VEHICLES ASSIGNED	TOTAL NUMBER OF VEHICLES DISABLED MORE THAN 3 DAYS	TOTAL NUMBER OF DAYS LOST

INSTRUCTIONS (Sections A and B)

(a) Column (1) only will be executed by each basic reporting unit or activity having organic vehicles assigned.
(b) Column (2) will be executed by light or medium maintenance organizations or shops (third echelon) for vehicles evacuated to them. Column (1) will not be used.
(c) Column (3) will be executed by heavy maintenance organizations (fourth echelon) (for vehicles evacuated for fourth echelon repair). (Columns (1) and (2) will not be used.)

Section A

NUMBER OF VEHICLES DISABLED, BY CAUSE OF DISABILITY, AND NUMBER OF DAYS LOST

CAUSE OF DISABILITY	(1) ORGANIZATIONAL MAINTENANCE		(2) LIGHT OR MEDIUM MAINTENANCE		(3) HEAVY MAINTENANCE		DO NOT WRITE IN MARGIN
	Number vehicles	Total days lost	Number vehicles	Total days lost	Number vehicles	Total days lost	
Accident							
Lack of preventive maintenance							
Fair wear and tear							
TOTAL							
DO NOT USE THIS SPACE							

Section B

NUMBER OF VEHICLES DISABLED BY CAUSE OF DELAY OF REPAIR

CAUSE OF DELAY	(1) ORGANIZATIONAL MAINTENANCE		(2) LIGHT OR MEDIUM MAINTENANCE		(3) HEAVY MAINTENANCE		DO NOT WRITE IN MARGIN
	More than 3 days	30 or more days	More than 3 days	30 or more days	More than 3 days	30 or more days	
Lack of facilities such as tools, personnel, shops, etc. (Explain on reverse under "Remarks.")							
Lack of parts (see below).							
Other causes (list on reverse under "Remarks").							
TOTAL							
DO NOT USE THIS SPACE							

Have requisitions for parts been submitted for all vehicles listed as disabled for lack of parts? (Yes ☐ No ☐) If so, indicate requisition numbers and dates submitted on reverse hereof under "Remarks."

W. D., A. G. O. Form No. 13-1
24 September 1944
(OM W. D., I. G. D. Form No. 6, 24 September 1943)

80—37693-2

Figure 7. WD AGO Form 13–1 (old WD IGD Form 6) (front), Automotive Disability Report of Vehicles Disabled More Than 3 Days.

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Section C

DELAY IN LIGHT, MEDIUM, AND HEAVY MAINTENANCE

INSTRUCTIONS

(a) Column (1) to be filled in by shop rendering report (or consolidating headquarters)
(b) Column (2) to be filled in by consolidating headquarters.
(c) Column (3) to be filled in by light or medium, and heavy maintenance activities for vehicles turned over to them for repair (or consolidating headquarters).

16—37493-1

(1) ORGANIZATIONS	(2) NUMBER VEHICLES ASSIGNED	(3) NUMBER DISABLED			
		LIGHT OR MEDIUM MAINTENANCE		HEAVY MAINTENANCE	
		More than 3 days	30 or more days	More than 3 days	30 or more days

REMARKS: (Indicate any unusual causes for vehicles being disabled and reasons for any improvement over previous month).

RECOMMENDATIONS: (To higher headquarters to relieve disability).

SIGNED	GRADE	ARM OR SERVICE	COMMANDING

Figure 8. WD AGO Form 13–1 (back), Automotive Disability Report of Vehicles Disabled More Than 3 Days.

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SPOT CHECK INSPECTION REPORT FOR WHEELED AND HALF-TRACK VEHICLES

(This Form or WD AGO Form 9-49, is to be used for spot check inspections for all equipment coming under the provisions of AR 850-15

MAKE AND MODEL		DATE
U.S.A. REG. NO.		TIME
ORGANIZATION		MILEAGE
LOCATION	DRIVER	

LAST MAINTENANCE OPERATION

DATE	MILEAGE HOURS	TYPE OF LAST MAINTENANCE SERVICE	ARE SERVICES UP TO DATE
			☐ YES ☐ NO

A SPOT CHECK BY STAFF REPRESENTATIVES DISCLOSED THE FOLLOWING CONDITIONS ON THE ABOVE VEHICLE

Select at least three (3) additional items for each of the sections listed below, from the Technical inspection column of WD AGO Forms 461 and 461-3 for wheeled and half-track vehicles, WD AGO Form 462 for motorcycles, WD AGO Form 464 for Engineer equipment, and insert in appropriate space. If satisfactory, mark "✓"; needs adjustment "X"; needs repair or replacement "XX". The specific defect of an item marked "X" or "XX" will be noted briefly under remarks. Instructions for accomplishing all operations are explained in appropriate vehicle technical manuals and in TM 37-2810.

ITEMS	CHECK	REMARKS
CAB OR DRIVERS COMPARTMENT		
1. ACCIDENT REPORT & IDENTIFICATION CARD		
2. WDLO, AGO FORM 478, AGO FORM 478-1 & TM		
3. HORNS & SIREN		
4. FIRE EXTINGUISHER		
5. SERVICE BRAKES		
6. VISION DEVICES, MIRRORS & W/S WIPERS		
7. CLUTCH & GEAR SHIFT LEVERS		
8. INSTRUMENTS & ENGINE PERFORMANCE		
9. LIGHTS & SWITCHES		
10. HAND BRAKES		
11. DOORS & GLASS		
12. FLOOR BOARDS		
13.		
14.		
15.		
16.		
ENGINE COMPARTMENT		
17. HOOD, FASTENINGS & HINGES		
18. ENGINE OIL LEVELS & CONDITION		
19. CARBURETOR & LINKAGE		
20. COOLING SYSTEM, HOSE & FAN BELT		
21. DIST., SPARK PLUGS, IGNITION WIRING		
22. FUEL FILTERS, PUMPS & LINES		
23. VOLTAGE REGULATOR & GOVERNOR SEALS		
24. OIL FILTERS & LINES		
25. BREATHER & AIR CLEANERS		
26. MANIFOLDS & HEAT CONTROL		
27. GENERATOR & STARTING MOTOR		
28. ENGINE & ACCESSORY MOUNTINGS		
29.		
30.		
31.		
32.		

WD AGO FORM 9-68
1 January 1945

Figure 9. WD AGO Form 9–68 (front), Spot Check Inspection Report for Wheeled and Half-track Vehicles.

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ITEMS	CHECK	REMARKS
RUNNING GEAR, POWER TRAIN AND LUBE		
33. STEERING GEAR, ARMS & LINKAGE		
34. SPRINGS, U-BOLTS CLIPS, SHACKLES		
35. SHOCK ABSORBERS & LINKAGE		
36. GEAR CASES, LUBE LEVELS & VENTS		
37. HYDROVAC, AIR CLEANER & VENT		
38. PROPELLER SHAFT, U-JOINTS, CENTER BNG		
39. BRAKE HOSES & CONNECTIONS		
40. EXHAUST PIPE, MUFFLER & BRACKETS		
41. FUEL TANK & CAP		
42. CONSTANT VELOCITY JOINTS & TURNING STOPS		
43. GENERAL TIGHTENING		
44. GENERAL LUBRICATION		
45.		
46.		
47.		
48.		
EXTERNAL AND ARMAMENT		
49. NATIONAL & UNIT MARKINGS		
50. FENDERS & SPLASH GUARDS		
51. CAB & BODY MOUNTINGS		
52. WINCH, CABLES, CHAINS, SHEAR PINS		
53. TAIL GATE & TROOP SEATS		
54. CANVAS, BOWS & STRAPS		
55. TOW HOOKS & PINTLE		
56. FUEL CANS, BRACKETS & NOZZLE		
57. GUN, MOUNTS & LOCKS		
58. SPARE PARTS FOR GUN & MOUNTS		
59. ELEVATING AND TRAVERSING MECHANISM		
60. BATTERY & CABLES		
61.		
62.		
63.		
64.		
WHEELS, SUSPENSION SYSTEM AND ACCESS		
65. WHEELS, RIMS, AXLE FLANGE SCREWS		
66. TIRE PRESSURE, VALVE CAPS, MOUNTING		
67. TIRE PRESSURE ON DASH		
68. WHEEL BEARINGS		
69. TRACK ADJUSTMENT & SPROCKETS		
70. TRACK CONDITION & GUIDES		
71. IDLERS & BOGIE WHEELS		
72. TRACTION DEVICES		
73. PIONEER & VEHICLE TOOLS		
74. VEHICLE APPEARANCE		
75. FRAME & BUMPERS		
76. LIGHTS *(Assist)*		
77.		
78.		
79.		
80.		

REMARKS

INSPECTED BY	GRADE OR TITLE

To be directed to the Commander of the organization concerned for file and follow-up.

Figure 10. WD AGO Form 9–68 (back). Spot Check Inspection Report for Wheeled and Half-track Vehicles.

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SPOT CHECK INSPECTION REPORT FOR ALL FULL-TRACK AND TANK-LIKE WHEELED VEHICLES

(This Form, or WD AGO Form 9-68, is to be used for spot check inspections for all equipment coming under the provisions of AR 850-15)

MAKE AND MODEL		DATE
U.S.A. REG. NO.		TIME
ORGANIZATION		MILEAGE
LOCATION	DRIVER	

LAST MAINTENANCE OPERATION

DATE	MILEAGE HOURS	TYPE OF LAST MAINTENANCE SERVICE	ARE SERVICES UP TO DATE
			☐ YES ☐ NO

A SPOT CHECK BY STAFF REPRESENTATIVES DISCLOSED THE FOLLOWING CONDITIONS ON THE ABOVE VEHICLE

Select at least three (3) additional items for each of the sections listed below, from the Technical inspection columns of WD AGO Form 462 for Tanks, WD AGO Form 464 for Engineer Equipment, and insert in the appropriate blank spaces. If satisfactory, mark "✓"; needs adjustment "X"; needs repair or replacement "XX". The specific defect of an item marked "X" or "XX" will be noted briefly under "Remarks". Instructions for accomplishing all operations are explained in appropriate vehicle technical manuals and in TM 37-2810

ITEMS	CHECK	REMARKS
DRIVERS COMPARTMENT		
1. ACCIDENT REPORT & IDENTIFICATION CARD		
2. TM, WDLO, AGO FORM 478 & AGO FORM 478-1		
3. INSTRUMENTS, SWITCHES, ENG. PERF. & NOISES		
4. STEERING & LINKAGE		
5. CLUTCH & RELEASE BEARING OR LINKAGE		
6. FIRE EXTINGUISHER *(Hand)*		
7. PARKING BRAKE		
8. GEAR CASE LUBE LEVELS, BREATHERS & VENTS		
9. VENTILATION SYSTEM		
10. LIGHTS, SIREN OR HORN		
11. WINDSHIELD WIPERS & VISION DEVICES		
12. TRANS. & TRANSFER SHIFT LEVERS		
13.		
14.		
15.		
16.		
ENGINE COMPARTMENT		
17. WATER PUMP, FAN AND SHROUD		
18. MUFFLERS, PIPES & BRACKETS		
19. DIST., MAGS., CAPS, POINTS & ROTORS		
20. SPARK PLUGS, IGNITION WIRING & COIL		
21. FAN & DRIVE BELTS		
22. RADIATOR & HOSE CONNECTIONS		
23. MANIFOLDS, HEAT CONTROL & GOVERNOR SEAL		
24. ENGINE & ACCESSORY MOUNTINGS		
25. ENGINE OIL LEVELS & CONDITION		
26. ENGINE BREATHER & LINES		
27. FUEL & OIL FILTERS		
28. OIL COOLERS		
29. GENERAL TIGHTENING & APPEARANCE		
30.		
31.		
32.		

WD AGO FORM 9-69
1 January 1945

Figure 11. WD AGO Form 9–69 (front), Spot Check Inspection Report for All Full-track and Tanklike Wheeled Vehicles.

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ITEMS	CHECK	REMARKS
FIGHTING OR CREW COMPARTMENT		
33. AUXILIARY GENERATOR OR COMPRESSOR		
34. BATTERIES, CABLES		
35. OIL RESERVOIR		
36. OIL COOLERS		
37. FIRE EXTINGUISHER & LINES *(Fixed)*		
38. AIR CLEANERS & BREATHERS *(If inside)*		
39. VENTILATING FAN		
40. TURRET, LOCKS, GYRO STABILIZER		
41. VOLTAGE REGULATORS & SEALS		
42. FUEL FILTERS & STRAINERS		
43. GENERAL TIGHTENING		
44. GENERAL APPEARANCE		
45.		
46.		
47.		
48.		
SUSPENSION SYSTEM		
49. SPROCKETS, IDLERS		
50. BOGIE WHEELS, SUPPORT ROLLERS		
51. SUSPENSION SPRINGS, BRACKETS & ARMS		
52. TRACKS, TENSION, BLOCKS & CONNECTIONS		
53. SHOCK ABSORBERS		
54. FENDERS OR DUST SHIELDS		
55. FINAL DRIVES LUBRICANT LEVELS		
56. TIRE PRESS., WHEELS, MOUNTING, CAPS *(WV)*		
57. TIRE PRESSURE ON DASH *(WV)*		
58. PROPELLER SHAFTS, U-JOINTS, CV JOINTS *(WV)*		
59. GENERAL TIGHTENING		
60. GENERAL LUBRICATION		
61.		
62.		
63.		
64.		
TOOLS AND ACCESSORIES		
65. PIONEER & VEHICLE TOOLS		
66. NATIONAL & UNIT MARKINGS		
67. FUEL TANKS, VALVES & COVERS		
68. EMERGENCY ESCAPE HATCH & LATCHES		
69. TARPAULIN & CAMOUFLAGE NET		
70. TRACTION DEVICES		
71. TOWING CABLES, BRACKETS & HOOKS		
72. LIGHTS, CONNECTIONS & MOUNTINGS *(Assist)*		
73. AIR CLEANERS *(If outside)*		
74. HATCHES & COVERS		
75. GENERAL TIGHTENING		
76. GENERAL APPEARANCE		
77.		
78.		
79.		
80.		

REMARKS

INSPECTED BY | GRADE OR TITLE

To be directed to the Commander of the organization concerned for file and follow-up.

Figure 12. WD AGO Form 9–69 (back), Spot Check Inspection Report for All Full-track and Tanklike Wheeled Vehicles.

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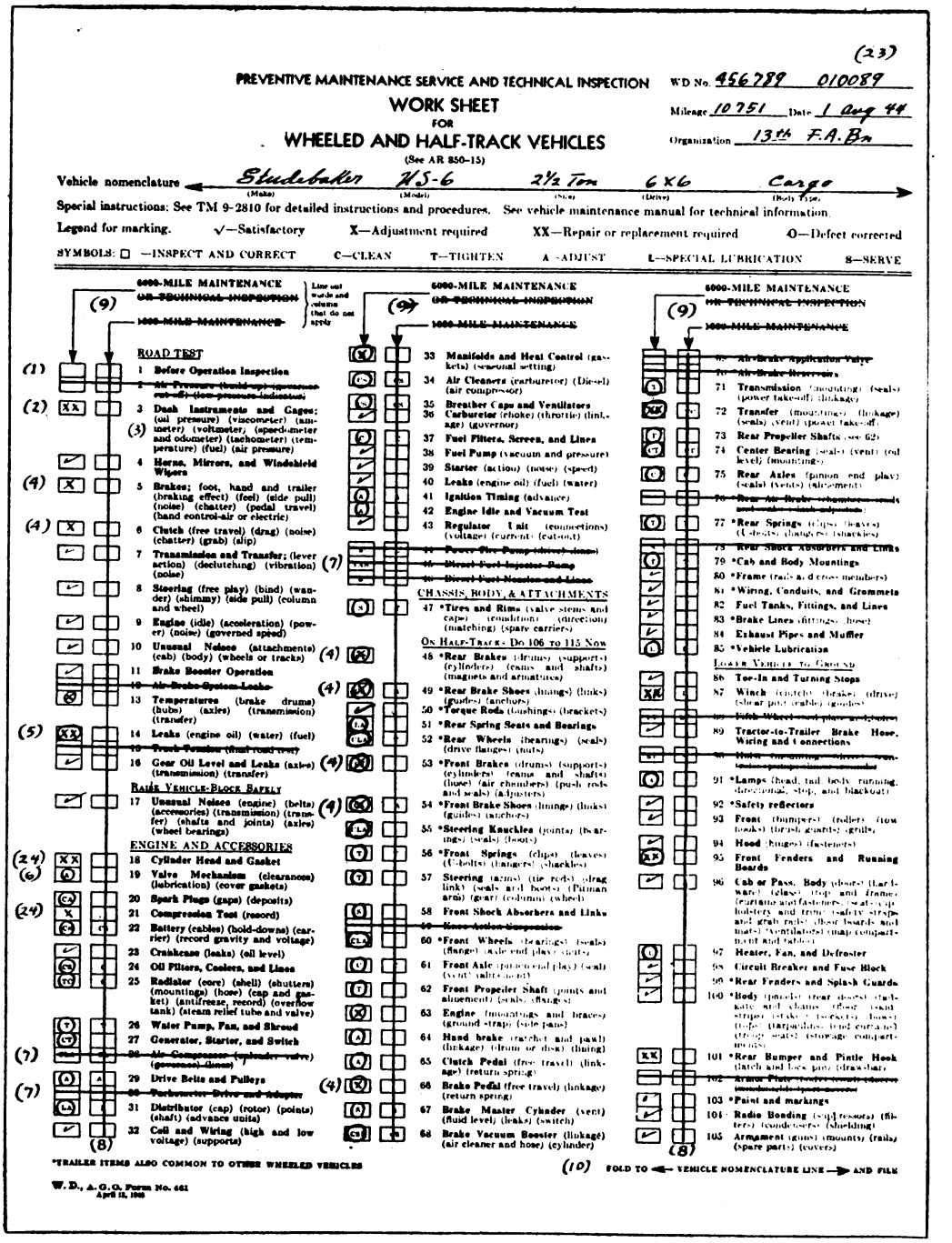
NO.	RANK AND NAME	EQUIPMENT NOMENCLATURE	REMARKS	UNIT SERIAL NO.	ACCESSORY	EQUIPMENT REG. NO.
1	T/4 Jones J.W.	GMC 2½Ton 6x6		11	011069	434561
2	T/5 Moore A.M.	" "		12	010170	435531
3	T/5 Smith C.V.	" "	Transferred	13	011119	436521
4	Pfc Brown A.B.	" "		14		437232
5	T/4 Horne W.O.	" "		15		434215
6	Pfc Greene C.H.	" "	D S	16		438911
7	Pfc White R.M.	" "		17		436321
8	T/5 Miller J.H.	" "		18		438222
9	T/5 Hawk S.A.	" "		19		436057
10	T/5 Elliott W.M.	" "		20		434920
11	T/5 Dubinsky W.A.	Ford ¼Ton 4x4		1		2237545
12	T/4 Light T.M.	" "		2		2374986
13	Pvt Ross T.R.	" "		3	0120701	2296897
14	Pvt Black W.W.	" "		4		2198731
15	Pfc Onofrio M.D.	" "		5	0130621	2339431
16	Pfc Bates J.P.	" "		6		2147671
17	T/5 Del Monte F.D.	" "		7		2147631
18	T/5 Shoemaker W.A.	" "		8		2385362
19	Pvt Collins J.T.	" "		9		2197476
20	Pfc Main J.R.	" "		10		2337852
21	T/5 Greenberg I.S.	Dodge 3/4Ton 4x4		21		2019542
22	Pvt Burger D.A.	" "		22		2019874
23	T/5 Bastian J.P.	" "		23		2022917
24	Pfc Korpa D.L.	" "		24		2013415
25						
26						
27						

PREVENTIVE MAINTENANCE ROSTER — MONTH August — YEAR 1944

NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	NO.
1	M1								W1								W2								W3							1
2		M1							W1						W2							W3							M3			2
3			M3								W1								W2							W3						3
4				S								W1							W2										W3			4
5								M5								W1					A	A	W2	A							W3	5
6				W1							W2						W3							M2								6
7								W3								M1							W1							W2		7
8					W3						W3							M4						W1								8
9							M5							W1							W2								W3			9
10				W3							S	P	P	P				W1							W2							10
11			W3							M1							W1						W1								W3	11
12	W2				O	O	O	W3	O	O	O	O	O		M2							W1							W2			12
13		W3							M3							W1							W2							W3		13
14							W2							W3							M3							W1				14
15				W2							W3							S						W1								15
16		M3							W1							W2							W3							M4		16
17								W3						M4							W1							W2				17
18								W1						W2							W3							M5				18
19		W1							W2							W3							M2							W1		19
20			W1							W2							W3							S							W1	20
21	W1							W2							W3						M1							W1				21
22	M4							W1							W1						W3							M5				22
23			M3							W1							W2						W3							M4		23
24					W1							W2					P	P	W3	P					M3							24
25																																25
26																																26
27																																27

Figure 13. WD AGO Form 460, Preventive Maintenance Roster.

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(23)

PREVENTIVE MAINTENANCE SERVICE AND TECHNICAL INSPECTION

WORK SHEET

FOR

WHEELED AND HALF-TRACK VEHICLES

(See AR 850-15)

WD No. 456789 010089

Mileage 10751 Date 1 Aug 44

Organization 13th F.A.Bn

Vehicle nomenclature Studebaker US-6 (Make) (Model) 2½ Ton (Size) 6X6 (Drive) Cargo (Body Type)

Special instructions: See TM 9-2810 for detailed instructions and procedures. See vehicle maintenance manual for technical information.

Legend for marking. √—Satisfactory X—Adjustment required XX—Repair or replacement required O—Defect corrected

SYMBOLS: □ —INSPECT AND CORRECT C—CLEAN T—TIGHTEN A—ADJUST L—SPECIAL LUBRICATION S—SERVE

6000-MILE MAINTENANCE OR TECHNICAL INSPECTION

1000-MILE MAINTENANCE

Line out words and columns that do not apply

ROAD TEST

1 Before Operation Inspection
2 Air Pressure (build-up, governor cut-off, low-pressure indicator)
3 Dash Instruments and Gages: (oil pressure) (viscometer) (ammeter) (voltmeter, (speedometer and odometer) (tachometer) (temperature) (fuel) (air pressure)
4 Horns, Mirrors, and Windshield Wipers
5 Brakes; foot, hand and trailer (braking effect) (feel) (side pull) (noise) (chatter) (pedal travel) (hand control-air or electric)
6 Clutch (free travel) (drag) (noise) (chatter) (grab) (slip)
7 Transmission and Transfer; (lever action) (declutching) (vibration) (noise)
8 Steering (free play) (bind) (wander) (shimmy) (side pull) (column and wheel)
9 Engine (idle) (acceleration) (power) (noise) (governed speed)
10 Unusual Noises (attachments) (cab) (body) (wheels or tracks)
11 Brake Booster Operation
12 Air Brake System Leaks
13 Temperatures (brake drums) (hubs) (axles) (transmission) (transfer)
14 Leaks (engine oil) (water) (fuel)
15 Front Tension (front road test)
16 Gear Oil Level and Leaks (axles) (transmission) (transfer)

RAISE VEHICLE-BLOCK SAFELY

17 Unusual Noises (engine) (belts) (accessories) (transmission) (transfer) (shafts and joints) (axles) (wheel bearings)

ENGINE AND ACCESSORIES

18 Cylinder Head and Gasket
19 Valve Mechanism (clearances) (lubrication) (cover gaskets)
20 Spark Plugs (gaps) (deposits)
21 Compression Test (record)
22 Battery (cables) (hold-downs) (carrier) (record gravity and voltage)
23 Crankcase (leaks) (oil level)
24 Oil Filters, Coolers, and Lines
25 Radiator (core) (shell) (shutters) (mountings) (hose) (cap and gasket) (antifreeze, record) (overflow tank) (steam relief tube and valve)
26 Water Pump, Fan, and Shroud
27 Generator, Starter, and Switch
28 Air Compressor (cylinder valve) (governor) (hose)
29 Drive Belts and Pulleys
30 Carburetor Drive and Adapter
31 Distributor (cap) (rotor) (points) (shaft) (advance units)
32 Coil and Wiring (high and low voltage) (supports)
33 Manifolds and Heat Control (gaskets) (seasonal setting)
34 Air Cleaners (carburetor) (Diesel) (air compressor)
35 Breather Caps and Ventilators
36 Carburetor (choke) (throttle) (linkage) (governor)
37 Fuel Filters, Screens, and Lines
38 Fuel Pump (vacuum and pressure)
39 Starter (action) (noise) (speed)
40 Leaks (engine oil) (fuel) (water)
41 Ignition Timing (advance)
42 Engine Idle and Vacuum Test
43 Regulator Unit (connections) (voltage) (current) (cut-out)
44 Power Tire Pump (diesel tires)
45 Diesel Fuel Injector Pump
46 Diesel Fuel Nozzles and Lines

CHASSIS, BODY, & ATTACHMENTS

47 *Tires and Rims (valve stems and caps) (conditions) (directions) (matching) (spare carriers)

ON HALF-TRACK: Do 106 to 115 Now

48 *Rear Brakes (drums) (supports) (cylinders) (cams and shafts) (magnets and armatures)
49 *Rear Brake Shoes (linings) (links) (guides) (anchors)
50 *Torque Rods (bushings) (brackets)
51 *Rear Spring Seats and Bearings
52 *Rear Wheels (bearings) (seals) (drive flanges) (nuts)
53 *Front Brakes (drums) (supports) (cylinders) (cams and shafts) (hose) (air chambers) (push rods and seals) (adjusters)
54 *Front Brake Shoes (linings) (links) (guides) (anchors)
55 *Steering Knuckles (joints) (bearings) (seals) (boots)
56 *Front Springs (clips) (leaves) (U-bolts) (hangers) (shackles)
57 Steering (arms) (tie rods) (drag link) (seals and boots) (Pitman arm) (gear) (column) (wheel)
58 Front Shock Absorbers and Links
59 Knee Action Compression
60 *Front Wheels (bearings) (seals) (flange) (axle end play) (nuts)
61 Front Axle (pivots and play) (seal) (vent) (alignment)
62 Front Propeller Shaft (joints and alignment) (seals, flanges)
63 Engine (mountings and braces) (ground strap) (side pans)
64 Hand Brake (ratchet and pawl) (linkage) (drum or disk) (lining)
65 Clutch Pedal (free travel) (linkage) (return spring)
66 Brake Pedal (free travel) (linkage) (return spring)
67 Brake Master Cylinder (vent) (fluid level) (leaks) (switch)
68 Brake Vacuum Booster (linkage) (air cleaner and hose) (cylinder)
69 Air Brake Application Valve
70 Air Brake Reservoirs
71 Transmission (mountings) (seals) (power take-off) (linkage)
72 Transfer (mountings) (linkage) (seals) (vent) (power take-off)
73 Rear Propeller Shafts (see 62)
74 Center Bearing (seals) (vent) (oil level) (mountings)
75 Rear Axles (pinion end play) (seals) (vents) (alignment)
76 Rear Air Brake Actuating Units (diaphragms) (adjustment)
77 *Rear Springs (clips) (leaves) (U-bolts) (hangers) (shackles)
78 Rear Shock Absorbers and Links
79 *Cab and Body Mountings
80 *Frame (rails and cross members)
81 *Wiring, Conduits, and Grommets
82 Fuel Tanks, Fittings, and Lines
83 *Brake Lines (fittings) (hose)
84 Exhaust Pipes and Muffler
85 *Vehicle Lubrication

LOWER VEHICLE TO GROUND

86 Toe-In and Turning Stops
87 Winch (clutch) (brake) (drive) (cable, pins, cable) (guides)
88 Body Mounting (floor and fenders)
89 Tractor-to-Trailer Brake Hose, Wiring and Connections
90 Body, Mounting, Cowl, Hood, Cowl Ventilator, Windshield, Doors, Hardware, Glass, Lock and Hinge Pillars
91 *Lamps (head, tail, body, running, directional, stop, and blackout)
92 *Safety reflectors
93 Front (bumpers) (rollers) (tow hooks) (brush guards) (grill)
94 Hood (hinges) (fasteners)
95 Front Fenders and Running Boards
96 Cab or Pass. Body (doors) (hardware) (glass) (top and frame) (curtains and fasteners) (seat) (upholstery and trim) (safety straps and grab rails) (floor boards and mats) (ventilators) (map compartment and table)
97 Heater, Fan, and Defroster
98 Circuit Breaker and Fuse Block
99 *Rear Fenders and Splash Guards
100 *Body (panels) (rear doors) (tailgate and chains (floor (skid strips) (stake) (sockets) (hooks) (tarpaulins) (tool compartment) (troop seats) (storage compartments)
101 *Rear Bumper and Pintle Hook (latch and lock pin) (drawbar)
102 Armor Plate (windshield) (doors) (windshield sight panels)
103 *Paint and markings
104 Radio Bonding (suppressors) (filters) (condensers) (shielding)
105 Armament (guns) (mounts) (rails) (spare parts) (covers)

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

*TRAILER ITEMS ALSO COMMON TO OTHER WHEELED VEHICLES

FOLD TO ← VEHICLE NOMENCLATURE LINE → AND FILE

W. D., A. G. O. Form No. 461 April 12, 1943

Figure 14. WD AGO Form 461 (front), Preventive Maintenance Service and Technical Inspection Work Sheet for Wheeled and Half-track Vehicles.

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(11) RECORD: Compression pressure: Cylinder No. 1 110 2 110 3 112 4 91 5 92 6 111 7 — 8 — 9 — 10 — 11 — 12 —
(12) BATTERY: Specific Gravity—Cell No. 1 1240 2 1290 3 1245 4 — 5 — 6 — Antifreeze protection to -10 (20) °F.
Voltage—(13) Cell No. 1 1.7 2 1.8 3 1.7 4 — 5 — 6 —
Man hours required for this 1,000 mile maintenance _____ 6,000 mile maintenance 40 (14) or tech. inspection _____
Driver Pfc. J. A. Jones (15) Mechanic or Inspector _____ (16)
Repairs by higher echelon entered on Job Order Request No. 121 (17) Supervising officer _____ (18) Lt. Bn. Mtr. Off.
Repairs requested 4 Aug 44 C.R.Q. Vehicle forwarded 4 Aug 44 C.R.Q. Vehicle returned 7 Aug 44 B.O.C.
(Date) (Initials) (Date) (Initials) (Date) (Initials)

Disposition of work sheets: 1000 Mile—May be retained until completion of next 6000 mile, then destroy
6000 Mile—May be retained until completion of next 6000 mile, then destroy
Technical inspection—May be retained until completion of next 6000 mile, then destroy
(22) EARLIER DESTRUCTION MAY BE ORDERED BY LOCAL COMMAND

(21) REMARKS OR RECOMMENDATIONS:
3 - Replace temperature gauge (ordered 2 Aug 44 Req. No. 121)
18-21- Defective head gasket indicated (ordered 2 Aug 44 Req. No. 121
72 - Seals defective (third echelon) R.A.D.
89- Shear pin broken (ordered 2 Aug 44 Req. No. 121)
101- No lock pin (ordered 2 Aug 44 Req. No. 121)
139- No tow chain (ordered 2 Aug 44 Req. No. 121)
138- No extra shear pins (ordered 2 Aug 44 Req. No. 121)

(1) Check must in six subjects, all items listed in par. 19, TM 9-807 have been completed. (2) XX indicates the temperature gage as defective, requires replacement, but that replacement has not been made. Note entry under "Remarks or recommendations" in lieu of (3). (3) Indicating gauge or unit, item is defective. (4) ✓ indicates an adjustment was required and was made. (5) (XX) indicates the defective part causing the unit to be replaced. (6) (✓) indicates valve mechanism has been adjusted in accordance with item 19, page 100, TM 9-807. (7) Item is listed out since it does not pertain to the type vehicle being inspected, par. 14 c, TM 9-2810. (8) Column is used only since a 6000-mile maintenance is being performed. (9) Listed only since it is not pertinent. (10) Test liquor form is folded. (11) When oil is used as sealing compression readings, as a result of a defect being indicated by the initial readings, they are recorded as shown. (12) Readings are those prior to cleaning of recharging is necessary. (13) Same as (12). Percentages should be entered when using instruments with a percentage scale. (14) Man hours (2 men 20 hours = 40 man hours). (15) If no driver is assigned to the vehicle, make blank space should be lined out. (16) The senior mechanic actually performing the services (17) Used only when vehicle is sent to 3d echelon as a result of this particular service. (18) Signature signifies that the service is complete and that appropriate action has been taken. (19) Both date and initials (20) If antifreeze is not being used, +32° will be entered. (21) Each entry under "Remarks and Recommendations" is initialed when it is corrected and the appropriate item is circled (22) Form is not filed with vehicle records (W.D., O.O. Form No. 7366) until all entries under "Remarks and Recommendations" are completed or until a similar type inspection is made and the uncorrected items noted on the new inspection form. (23) Vehicles assigned trailers may be serviced together. (24) Indicates an adjustment and replacement is required but has not been made. Note entry on reverse of form.

6000-MILE MAINTENANCE
OR TECHNICAL INSPECTION
1000-MILE MAINTENANCE
(9)

ITEMS SPECIAL TO HALF-TRACKS
106 Treads (guides) (tread mats)
CLAT 107 Sprockets (flanges) (bearings) (seals)
CT 108 Brake (drums) (supports) (cylinders)
CA A 109 Brakes Shoes (linings) (links) (guides) (anchors)
CLAT 110 Idlers (flanges) (bearings)
111 Idler Arms (shackles) (shafts) (adjusting rods) (brackets)
T 112 Frame Brackets and Cross Tube
113 Bogie (crab assemblies) (springs and blocks) (guides and slides) (arms and bolts)
CL 114 Bogie Rollers: Upper and Lower (tires) (bearings) (seals) (bolts)
115 Track Tension (on ground)

ITEMS SPECIAL TO AMPHIBIANS
NOTE. The following items 116 to 123 are the required minimum maintenance for amphibian vehicles in land operations. For maintenance requirements for water operations, consult the vehicle maintenance manual

6000-MILE MAINTENANCE
OR TECHNICAL INSPECTION
1000-MILE MAINTENANCE
(9)

116 Rudder and Propeller, Propeller Strut and Bearing
117 Propeller Shaft Housings (seals) (boots) (plugs)
118 Hull (plugs) (rub strakes) (decks) (hatches) (ventilators) (compartments) (bulkheads) (plates) (frame)
TA TA 119 Bilge Pumps (driven) (valves) (controls) (lines) (strainers)
T T 120 Water Propeller (shafts) (joints) (bearings) (stuffing box)
121 Hand Crank Ratchet and Cover
T 122 Rudder (shafts) (arms) (cables) (rod) (brackets) (stuffing-box)
123 Anchor, Hand Bilge Pump and Boat Hook

ITEMS SPECIAL TO TRAILERS
T 124 Tow Hitch (king pin) (5th wheel plates) (lunette) (tongue)
125 Air and Electric Connections
126 Safety Devices (chains) (switch and battery)

8

6000-MILE MAINTENANCE
OR TECHNICAL INSPECTION
1000-MILE MAINTENANCE
(9)

127 Landing Gear (shafts) (wheels) (supports) (hub nut) (gears) (studs)
128 Front and Rear Axles
129 Electric Brake (application and trailer hand control) (master)
130 Parking Brakes (ratchet) (pawl)

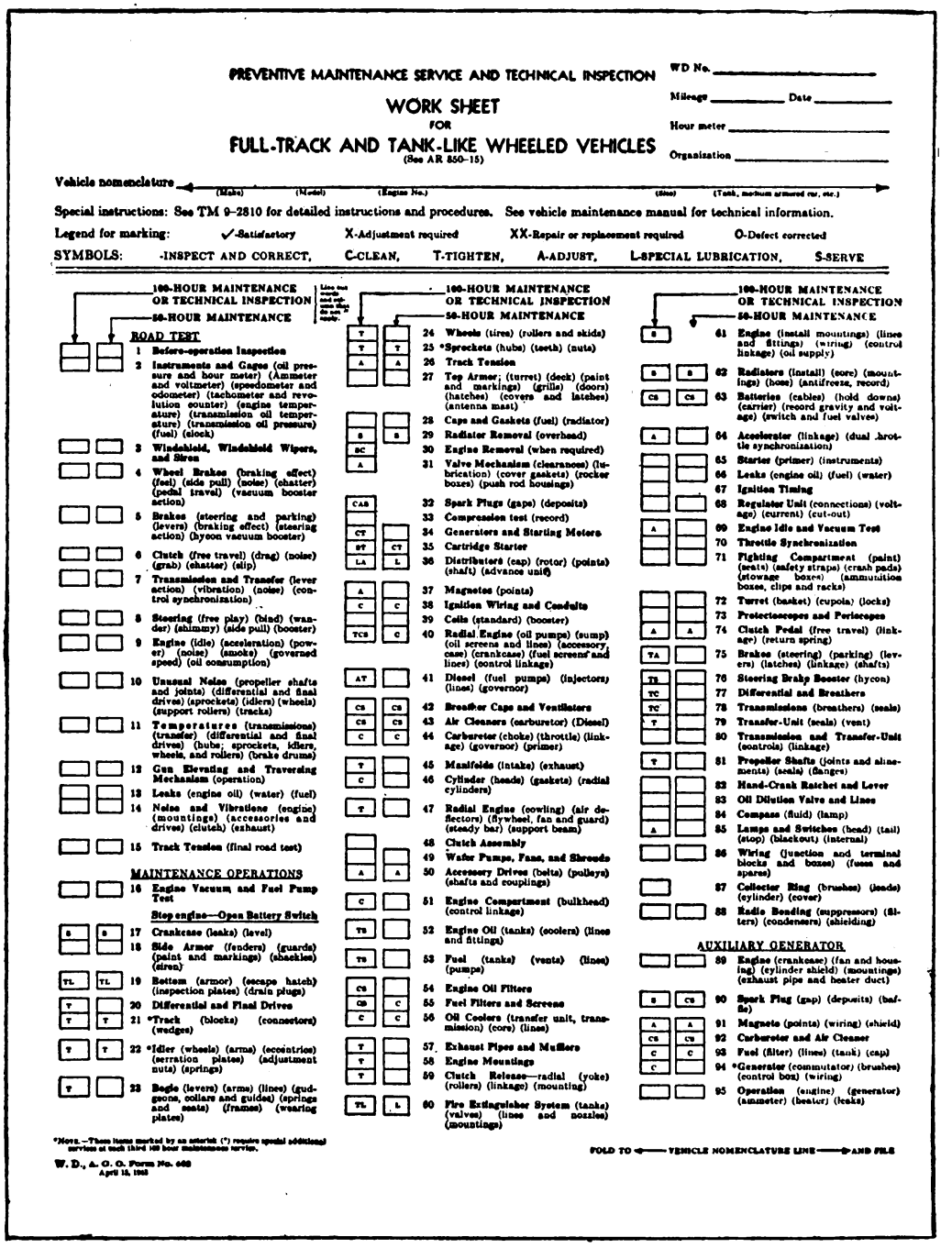
TOOLS AND EQUIPMENT
131 Tools (vehicle) (pioneer)
132 Fire Extinguishers
133 Decontaminator
134 First-Aid Kit (if specified)
135 Publications and Form No. 26
136 Traction Devices (chains) (plates and connectors) (grousers)
XX XX 137 Tow (chain) (cable) (rope) (block)
138 Spare (shearpins) (fuses) (bulbs)
139 Fuel and Water Cans and Bracket
140 Fuel Can Nozzle and Bucket
141 Modifications (FSMWO's completed)
142 Final Road Test (repeat items 2 to 16)

(8)
NOTE. Correct or report all deficiencies found during final road test

U. S. GOVERNMENT PRINTING OFFICE: 1943 O - 522386

Figure 15. WD AGO Form 461 (back). Preventive Maintenance Service and Technical Inspection Work Sheet for Wheeled and Half-track Vehicles.

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PREVENTIVE MAINTENANCE SERVICE AND TECHNICAL INSPECTION

WORK SHEET

FOR

FULL-TRACK AND TANK-LIKE WHEELED VEHICLES

(See AR 850-15)

WD No. _____

Mileage _____ Date _____

Hour meter _____

Organization _____

Vehicle nomenclature _____ (Make) (Model) (Engine No.) (Size) (Tank, medium armored car, etc.)

Special instructions: See TM 9-2810 for detailed instructions and procedures. See vehicle maintenance manual for technical information.

Legend for marking: ✓-Satisfactory X-Adjustment required XX-Repair or replacement required O-Defect corrected

SYMBOLS: -INSPECT AND CORRECT, C-CLEAN, T-TIGHTEN, A-ADJUST, L-SPECIAL LUBRICATION, S-SERVE

100-HOUR MAINTENANCE OR TECHNICAL INSPECTION

50-HOUR MAINTENANCE

ROAD TEST

1 Before-operation Inspection

2 Instruments and Gages (oil pressure and hour meter) (Ammeter and voltmeter) (speedometer and odometer) (tachometer and revolution counter) (engine temperature) (transmission oil temperature) (transmission oil pressure) (fuel) (clock)

3 Windshield, Windshield Wipers, and Siren

4 Wheel Brakes (braking effect) (feel) (side pull) (noise) (chatter) (pedal travel) (vacuum booster action)

5 Brakes (steering and parking) (levers) (braking effect) (steering action) (hycon vacuum booster)

6 Clutch (free travel) (drag) (noise) (grab) (chatter) (slip)

7 Transmission and Transfer (lever action) (vibration) (noise) (control synchronization)

8 Steering (free play) (bind) (wander) (shimmy) (side pull) (booster)

9 Engine (idle) (acceleration) (power) (noise) (smoke) (governed speed) (oil consumption)

10 Unusual Noise (propeller shafts and joints) (differential and final drive) (sprockets) (idlers) (wheels) (support rollers) (tracks)

11 Temperatures (transmissions) (transfer) (differential and final drives) (hubs, sprockets, idlers, wheels, and rollers) (brake drums)

12 Gun Elevating and Traversing Mechanism (operation)

13 Leaks (engine oil) (water) (fuel)

14 Noise and Vibrations (engine) (mountings) (accessories and drives) (clutch) (exhaust)

15 Track Tension (final road test)

MAINTENANCE OPERATIONS

16 Engine Vacuum and Fuel Pump Test

Stop engine—Open Battery Switch

17 Crankcase (leaks) (level)

18 Side Armor (fenders) (guards) (paint and markings) (shackles) (dirt)

19 Bottom (armor) (escape hatch) (inspection plates) (drain plugs)

20 Differential and Final Drives

21 *Track (blocks) (connectors) (wedges)

22 *Idler (wheels) (arms) (eccentrics) (serration plates) (adjustment nuts) (springs)

23 Bogie (levers) (arms) (lines) (gudgeons, collars and guides) (springs and seats) (frames) (wearing plates)

24 Wheels (tires) (rollers and skids)

25 *Sprockets (hubs) (teeth) (nuts)

26 Track Tension

27 Top Armor; (turret) (deck) (paint and markings) (grills) (doors) (hatches) (covers and latches) (antenna mast)

28 Caps and Gaskets (fuel) (radiator)

29 Radiator Removal (overhead)

30 Engine Removal (when required)

31 Valve Mechanism (clearances) (lubrication) (cover gaskets) (rocker boxes) (push rod housings)

32 Spark Plugs (gaps) (deposits)

33 Compression test (record)

34 Generators and Starting Motors

35 Cartridge Starter

36 Distributors (cap) (rotor) (points) (shaft) (advance unit)

37 Magnetos (points)

38 Ignition Wiring and Conduits

39 Coils (standard) (booster)

40 Radial Engine (oil pumps) (sump) (oil screens and lines) (accessory case) (crankcase) (fuel screens and lines) (control linkage)

41 Diesel (fuel pumps) (injectors) (lines) (governor)

42 Breather Caps and Ventilators

43 Air Cleaners (carburetor) (Diesel)

44 Carburetor (choke) (throttle) (linkage) (governor) (primer)

45 Manifolds (intake) (exhaust)

46 Cylinder (heads) (gaskets) (radial cylinders)

47 Radial Engine (cowling) (air deflectors) (flywheel, fan and guard) (steady bar) (support beam)

48 Clutch Assembly

49 Water Pumps, Fans, and Shrouds

50 Accessory Drives (belts) (pulleys) (shafts and couplings)

51 Engine Compartment (bulkhead) (control linkage)

52 Engine Oil (tanks) (coolers) (lines and fittings)

53 Fuel (tanks) (vents) (lines) (pumps)

54 Engine Oil Filters

55 Fuel Filters and Screens

56 Oil Coolers (transfer unit, transmission) (core) (lines)

57 Exhaust Pipes and Mufflers

58 Engine Mountings

59 Clutch Release—radial (yoke) (rollers) (linkage) (mounting)

60 Fire Extinguisher System (tanks) (valves) (lines and nozzles) (mountings)

61 Engine (install mountings) (lines and fittings) (wiring) (control linkage) (oil supply)

62 Radiators (install) (core) (mountings) (hose) (antifreeze, record)

63 Batteries (cables) (hold downs) (carrier) (record gravity and voltage) (switch and fuel valves)

64 Accelerator (linkage) (dual throttle synchronization)

65 Starter (primer) (instruments)

66 Leaks (engine oil) (fuel) (water)

67 Ignition Timing

68 Regulator Unit (connections) (voltage) (current) (cut-out)

69 Engine Idle and Vacuum Test

70 Throttle Synchronization

71 Fighting Compartment (paint) (seats) (safety straps) (crash pads) (stowage boxes) (ammunition boxes, clips and racks)

72 Turret (basket) (cupola) (locks)

73 Periscopes and Periscopes

74 Clutch Pedal (free travel) (linkage) (return spring)

75 Brakes (steering) (parking) (levers) (latches) (linkage) (shafts)

76 Steering Brake Booster (hycon)

77 Differential and Breathers

78 Transmissions (breathers) (seals)

79 Transfer-Unit (seals) (vent)

80 Transmission and Transfer-Unit (controls) (linkage)

81 Propeller Shafts (joints and alinements) (seals) (flanges)

82 Hand-Crank Ratchet and Lever

83 Oil Dilution Valve and Lines

84 Compass (fluid) (lamp)

85 Lamps and Switches (head) (tail) (stop) (blackout) (internal)

86 Wiring (junction and terminal blocks and boxes) (fuses and spares)

87 Collector Ring (brushes) (leads) (cylinder) (cover)

88 Radio Bonding (suppressors) (filters) (condensers) (shielding)

AUXILIARY GENERATOR

89 Engine (crankcase) (fan and housing) (cylinder shield) (mountings) (exhaust pipe and heater duct)

90 Spark Plug (gap) (deposits) (baffle)

91 Magneto (points) (wiring) (shield)

92 Carburetor and Air Cleaner

93 Fuel (filter) (lines) (tank) (cap)

94 *Generator (commutator) (brushes) (control box) (wiring)

95 Operation (engine) (generator) (ammeter) (heater) (leaks)

*NOTE.—Those items marked by an asterisk (*) require special additional services at each third 100 hour maintenance service.

W. D., A. G. O. Form No. 462 April 15, 1943

FOLD TO ← VEHICLE NOMENCLATURE LINE → AND FILE

Figure 16. WD AGO Form 462 (front), Preventive Maintenance Service and Technical Inspection Work Sheet for Full-track and Tanklike Wheeled Vehicles.

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RECORD: Compression pressures: Right engine; Cylinder No. 1____ 2____ 3____ 4____ 5____ 6____ 7____ 8____ 9____

Antifreeze protection to_____°F Left engine; Cylinder No. 1____ 2____ 3____ 4____ 5____ 6____ 7____ 8____ 9____

BATTERY	No. 1 Battery	No. 2 Battery
SPECIFIC GRAVITY:	Cell No. 1____ 2____ 3____ 4____ 5____ 6____	1____ 2____ 3____ 4____ 5____ 6____
VOLTAGE:	Cell No. 1____ 2____ 3____ 4____ 5____ 6____	1____ 2____ 3____ 4____ 5____ 6____

Man hours required for this 50-hour maintenance _____ 100-hour maintenance _____ or technical inspection _____

Driver _____ (Grade or title) Mechanic or inspector _____ (Grade or title)

Repairs by higher echelon entered on job order request No. _____ Supervising officer _____ (Grade or title)

Repairs requested _____ (Date) (Initials) Vehicle forwarded _____ (Date) (Initials) Vehicle returned _____ (Date) (Initials)

Disposition of worksheets: 50-hour—May be retained until completion of the third 100-hour, then destroy
100-hour—May be retained until completion of the third 100-hour, then destroy
Technical inspection—May be retained until completion of the third 100-hour, then destroy

EARLIER DESTRUCTION MAY BE ORDERED BY LOCAL COMMAND.

REMARKS OR RECOMMENDATIONS: _____

100-HOUR MAINTENANCE OR TECHNICAL INSPECTION
50-HOUR MAINTENANCE

ITEMS SPECIAL TO TANK-LIKE WHEELED VEHICLES

ST	S	96	**Steering Gear** (case) (power cylinder, valve and link) (reservoir) (lines) (pumps) (electric motor) (column) (wheel)
BA	A	97	**Clutch** (pedal) (main cylinder) (reservoir) (lines) (slave cylinders) (arms and free travel)
S		98	**Throttle** (treadle) (main cylinder) (reservoir) (lines) (slave cylinder) (arm)
B	B	99	**Brake** (pedal) (master cylinder, boot, and switch) (reservoir and vent) (lines)
CBL	CB	100	***Brake Vacuum Boosters** (air cleaners) (lines and hose) (reserve tanks) (cylinders) (control valves) (leaks)
L		101	***Transmission Controls-Vacuum** (lever and button) (valve) (lines) (cylinder) (shaft and linkage)
A		102	**Hand Brake** (lever) (ratchet and pawl) (linkage) (drums) (linings)
BA	A	103	***Vacuum Pump** (oil) (drive) (lines)
CB		104	***Power Tire Pump** (mountings) (shaft) (lines and dust covers) (air cleaners and filter)

ON THIRD 100-HOUR SERVICE, RAISE VEHICLE AND BLOCK SAFELY

B	T	105	***Tires and Rims** (valve stems and caps) (condition) (direction) (matching) (spare carriers)
CLAT	T	106	***Rear Wheels** (bearings) (seals) (drive flanges) (nuts)
CT		107	***Rear Brakes** (drums) (supports) (cylinders and end covers)

100-HOUR MAINTENANCE OR TECHNICAL INSPECTION
50-HOUR MAINTENANCE

CA	A	108	***Rear Brake Shoes** (linings) (links) (guides) (anchors)
		109	**Torque Rods** (bushings) (brackets)
		110	**Rear Spring Seats and Bearings**
T	T	111	**Rear Springs** (clips) (leaves) (U-bolts) (hangers) (shackles)
S		112	***Rear Shock Absorbers and Links**
C	C	113	**Rear Axles** (pinion end play) (seals) (vents) (alinement) (radius rods) (brake lines and hose)
CT	CT	114	**Propeller-Shaft Center Bearing** (seals) (vent) (end play) (mounting)
CLAT	T	115	***Front Wheels** (bearings) (seals) (flanges) (axle end play) (nuts)
CT		116	***Front Brakes** (drums) (supports) (cylinders and end covers)
CA	A	117	***Front Brake Shoes** (linings) (links) (guides) (anchors)
CLA		118	***Steering Knuckles** (joints) (bearings) (seals) (boots)
T	T	119	**Front Springs** (clips) (leaves) (U-bolts) (hangers) (shackles)
S		120	***Front Shock Absorbers and Links**
C	C	121	**Front Axles** (pinion end play) (seals) (vent) (alinement) (radius rods) (brake lines and hose)
T		122	**Steering** (arms) (tie-rods) (drag-link) (seals and boots) (pitman arm)
		123	**Toe-in and Turning Stops**
		124	**Caster, Camber, Turning Angle**

100-HOUR MAINTENANCE OR TECHNICAL INSPECTION
50-HOUR MAINTENANCE

ARMAMENT

T	T	125	**Bow and Sponson Guns** (37-mm and Smaller) (mounts) (traversing and elevating mechanism) (firing controls)
T	T	126	**Guns** (37-mm and Larger) (mounts) (traversing and elevating mechanism) (firing controls)
		127	**Gyro Stabilizer and Recoil Control**
T		128	**Antiaircraft and Cupola Guns** (mounts) (traversing and elevating mechanism)
		129	**Spare Gun Barrels and Parts**

TOOLS AND EQUIPMENT

		130	**Tools** (vehicle kit) (pioneer)
		131	**Equipment** (check these items against vehicle stowage list)
		132	**Grousers and spare track blocks**
		133	**Spare Oil Supply** (recoil) (hydraulic) (engine) (transmission)
		134	**Decontaminator**
		135	**Fire Extinguisher** (portable)
		136	**Publications and Form No. 26**
L	L	137	**Vehicle Lubrication**
		138	**Modifications** (famwo's completed)
		139	**Final Road Test** (repeat items 2 to 15 inclusive)

NOTE.—Correct any deficiencies found during the road test.

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Figure 17. WD AGO Form 462 (back), Preventive Maintenance Service and Technical Inspection Work Sheet for Full-track and Tanklike Wheeled Vehicles.

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cated by headings. Only one line for each vehicle will be used to record the periodic maintenance services performed on it during the month. At top of inside right-hand page "Month" and "Year" are titled in print, requiring only appropriate entries by maintenance personnel. Auxiliary engines and power equipment such as battery chargers and air compressors will be entered in the preventive maintenance roster similar to vehicles under accessories.

(2) *Recording services.* Services will be recorded on the corresponding line with each vehicle.

(3) *Legend.* In the column representing the appropriate date, the symbol legend, shown on back cover of Preventive Maintenance Roster, will be used as follows:

W, Weekly—to indicate a weekly maintenance service. W1, W2, W3, etc., to indicate the first, second, and third weekly maintenance services since the last monthly maintenance service.

M, Monthly—to indicate a monthly maintenance service. M1, M2, M3, M4, and M5 to indicate the first, second, third, fourth, and fifth monthly maintenance services since the last semiannual maintenance service.

S, Semiannual—to indicate a semiannual maintenance service. All semiannual services are the same; therefore, no numeral number will be placed after the letter S.

F—to indicate a monthly (50-hour) maintenance service for full-track and tanklike wheeled vehicles. F1 and F2—to indicate the first and second monthly services since the last quarterly service.

H—to indicate a quarterly maintenance service (100-hour) for full-track and tanklike wheeled vehicles. H1, H2, and H3—to indicate the first, second, and third (quarterly) services.

P—to indicate equipment deadlined for lack of parts.

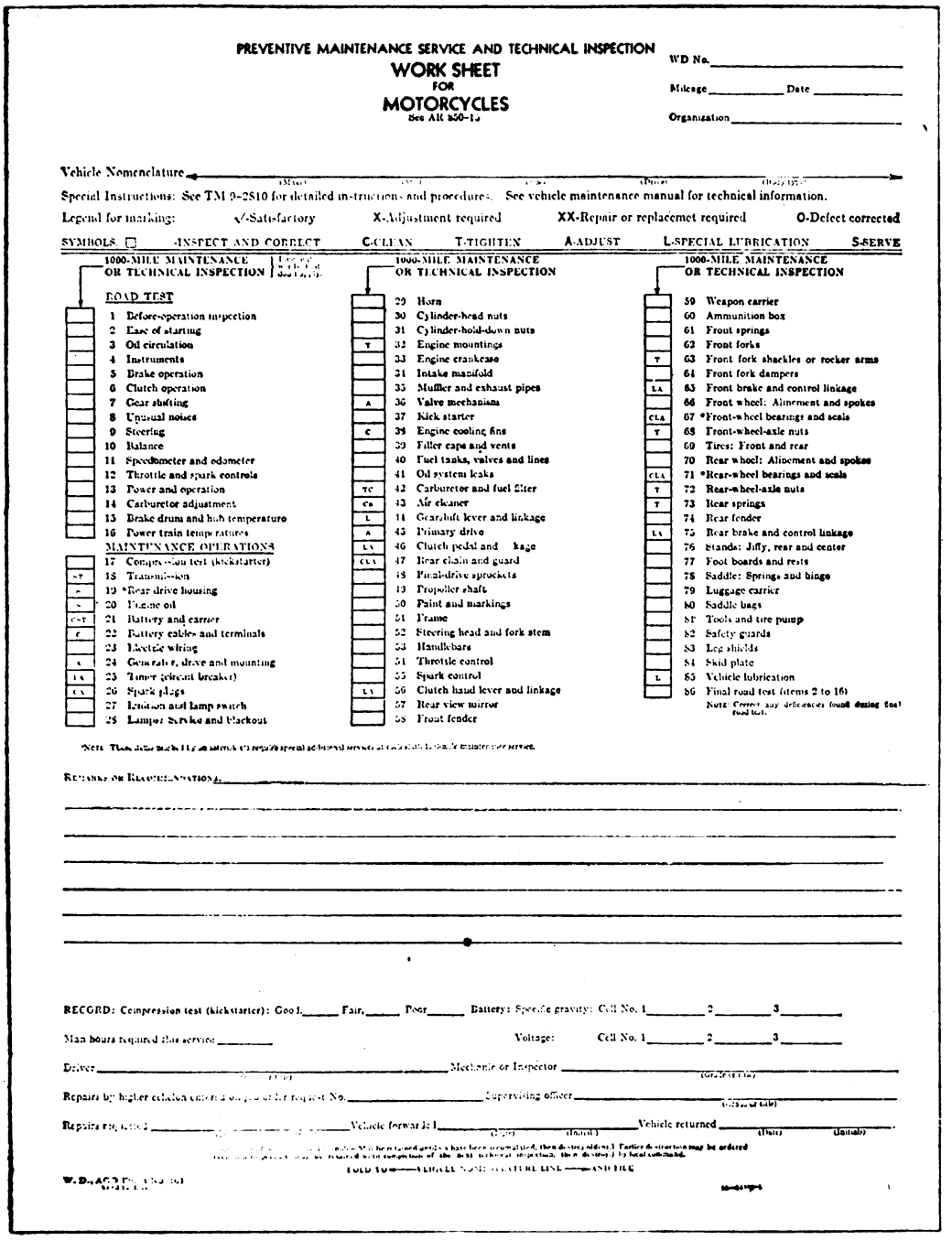
A—to indicate equipment deadlined because of accident.

O—to indicate deadlined in higher echelon shops.

(4) Prior to the date services are due, the motor officer or motor sergeant will determine from the roster which vehicles are scheduled for service.

(5) Entries will be traced in ink when the service is performed. For wheeled and half-track vehicles the following symbols will be used: W1 W2 W3 M1, W1 W2 W3 M2, W1 W2 W3 M3, W1 W2 W3 M4, W1 W2 W3 M5, W1 W2 W3 S. For tanks and tanklike wheeled vehicles the following symbols will be used: W1 W2 W3 F1, W1 W2 W3 F2, W1 W2 W3 H1, W1 W2 W3 F1, W1 W2 W3 F2, W1 W2 W3 H2, W1 W2 W3 F1, W1 W2 W3 F2, W1 W2 W3 H3, W1 W2 W3 F1, W1 W2 W3 F2, W1 W2 W3 H1. Occasionally when scheduling services on a 30-day basis, a W4

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PREVENTIVE MAINTENANCE SERVICE AND TECHNICAL INSPECTION

WORK SHEET

FOR

MOTORCYCLES

See AR 850-15

WD No. _____

Mileage _____ Date _____

Organization _____

Vehicle Nomenclature _____ (Make) (Model) (Year) (Body type)

Special Instructions: See TM 9-2810 for detailed instructions and procedures. See vehicle maintenance manual for technical information.

Legend for marking: √-Satisfactory X-Adjustment required XX-Repair or replacemet required O-Defect corrected

SYMBOLS □ -INSPECT AND CORRECT C-CLEAN T-TIGHTEN A-ADJUST L-SPECIAL LUBRICATION S-SERVE

1000-MILE MAINTENANCE OR TECHNICAL INSPECTION		1000-MILE MAINTENANCE OR TECHNICAL INSPECTION		1000-MILE MAINTENANCE OR TECHNICAL INSPECTION	
ROAD TEST					
	1 Before-operation inspection		29 Horn		59 Weapon carrier
	2 Ease of starting		30 Cylinder-head nuts		60 Ammunition box
	3 Oil circulation		31 Cylinder-hold-down nuts		61 Front springs
	4 Instruments	T	32 Engine mountings		62 Front forks
	5 Brake operation		33 Engine crankcase	T	63 Front fork shackles or rocker arms
	6 Clutch operation		34 Intake manifold		64 Front fork dampers
	7 Gear shifting		35 Muffler and exhaust pipes	LA	65 Front brake and control linkage
	8 Unusual noises	A	36 Valve mechanism		66 Front wheel: Alinement and spokes
	9 Steering		37 Kick starter	CLA	67 *Front-wheel bearings and seals
	10 Balance	C	38 Engine cooling fins	T	68 Front-wheel-axle nuts
	11 Speedometer and odometer		39 Filler caps and vents		69 Tires: Front and rear
	12 Throttle and spark controls		40 Fuel tanks, valves and lines		70 Rear wheel: Alinement and spokes
	13 Power and operation		41 Oil system leaks	CLA	71 *Rear-wheel bearings and seals
	14 Carburetor adjustment	TC	42 Carburetor and fuel filter	T	72 Rear-wheel-axle nuts
	15 Brake drum and hub temperature	CA	43 Air cleaner	T	73 Rear springs
	16 Power train temperatures	L	44 Gearshift lever and linkage		74 Rear fender
MAINTENANCE OPERATIONS		A	45 Primary drive	LA	75 Rear brake and control linkage
	17 Compression test (kickstarter)	LA	46 Clutch pedal and kage		76 Stands: Jiffy, rear and center
T	18 Transmission	CLA	47 Rear chain and guard		77 Foot boards and rests
L	19 *Rear drive housing		48 Final-drive sprockets		78 Saddle: Springs and hinge
L	20 Engine oil		49 Propeller shaft		79 Luggage carrier
CST	21 Battery and carrier		50 Paint and markings		80 Saddle bags
C	22 Battery cables and terminals		51 Frame		81 Tools and tire pump
	23 Electric wiring		52 Steering head and fork stem		82 Safety guards
A	24 Generator, drive and mounting		53 Handlebars		83 Leg shields
TA	25 Timer (circuit breaker)		54 Throttle control		84 Skid plate
CA	26 Spark plugs		55 Spark control	L	85 Vehicle lubrication
	27 Ignition and lamp switch	LA	56 Clutch hand lever and linkage		86 Final road test (items 2 to 16)
	28 Lamps: Service and blackout		57 Rear view mirror		Note: Correct any deficiences found during final road test.
			58 Front fender		

*Note. Those items marked (*) or asterisk (*) require special adjustment services at certain intervals. See vehicle maintenance service.

REMARKS OR RECOMMENDATIONS: _____

RECORD: Compression test (kickstarter): Good _____ Fair _____ Poor _____ Battery: Specific gravity: Cell No. 1 _____ 2 _____ 3 _____

Man hours required this service _____ Voltage: Cell No. 1 _____ 2 _____ 3 _____

Driver _____ (Title) Mechanic or Inspector _____ (Grade and Title)

Repairs by higher echelon entered on work request No. _____ Supervising officer _____ (Grade and Title)

Repairs completed _____ (Date) (Initials) Vehicle forwarded _____ (Date) (Initials) Vehicle returned _____ (Date) (Initials)

Note. Work will not be released until all items have been accomplished, then dated and initialed. Further instructions may be ordered from the next higher echelon of the field technical inspection. The reverse side may be used for detailed instructions.

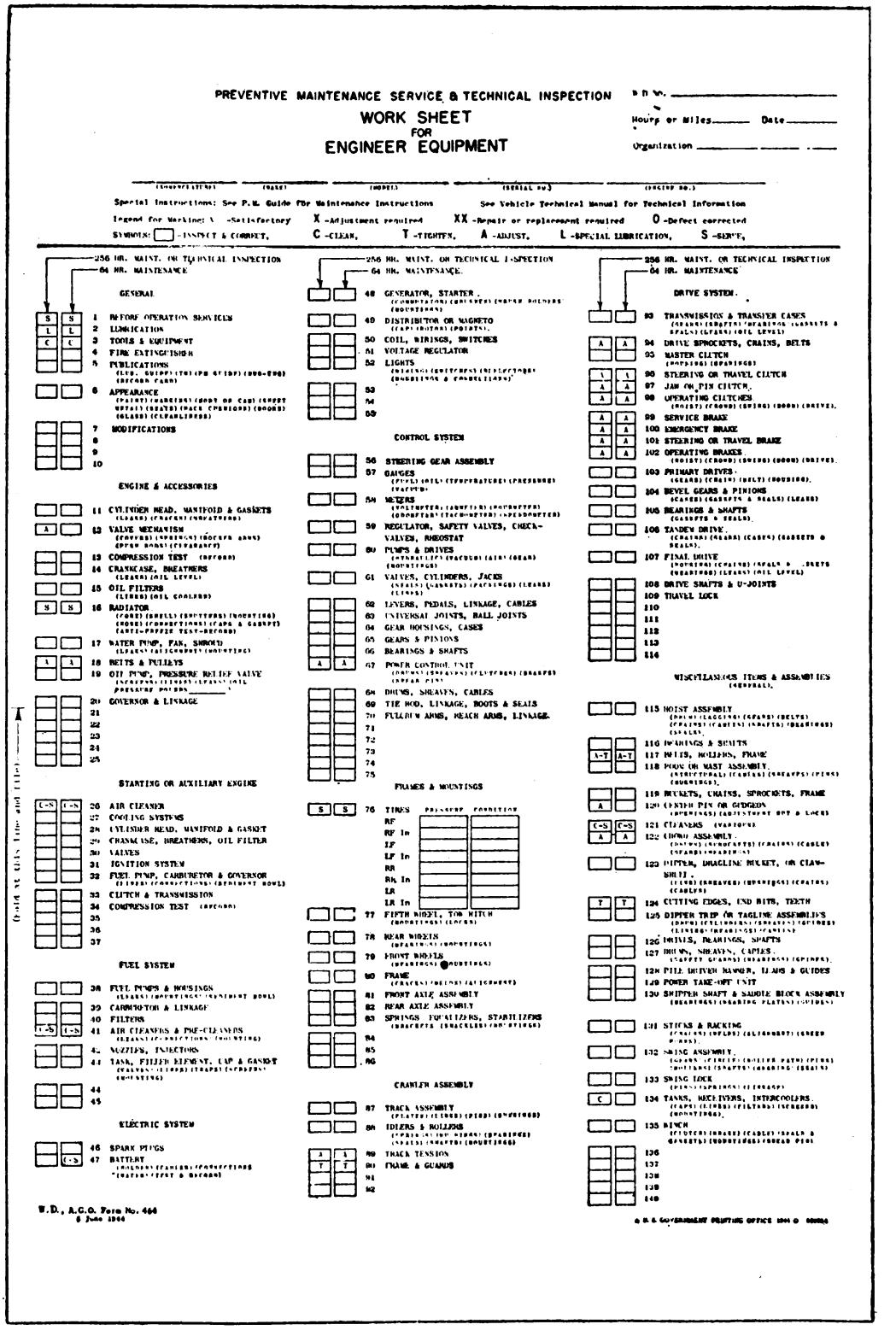
FOLD TO ——VEHICLE NOMENCLATURE LINE—— AND FILE

W.D. A.G.O. Form No. 463

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Figure 18. WD AGO Form 463, Preventive Maintenance Service and Technical Inspection Work Sheet for Motorcycles.



PREVENTIVE MAINTENANCE SERVICE & TECHNICAL INSPECTION

WORK SHEET

FOR

ENGINEER EQUIPMENT

W.D. No. _____

Hours or Miles _____ Date _____

Organization _____

(Nomenclature) (Make) (Model) (Serial No.) (Order No.)

Special Instructions: See P.M. Guide for Maintenance Instructions. See Vehicle Technical Manual for Technical Information.

Legend for Marking: √ -Satisfactory. X -Adjustment required. XX -Repair or replacement required. O -Defect corrected.

SYMBOLS: ☐ -INSPECT & CORRECT, C -CLEAN, T -TIGHTEN, A -ADJUST, L -SPECIAL LUBRICATION, S -SERVE,

256 HR. MAINT. OR TECHNICAL INSPECTION
64 HR. MAINTENANCE

GENERAL

1 BEFORE OPERATION SERVICES
2 LUBRICATION
3 TOOLS & EQUIPMENT
4 FIRE EXTINGUISHER
5 PUBLICATIONS (LUB. ORDER) (TOI (PE OF ID)) (DDE-EDE) (RECORD CARD)
6 APPEARANCE (PAINT) (MARKING) (BODY OR CAB) (SPOT REPAIR) (RUST) (RACE CHROMIUM) (HOOD) (GLASS) (CLEANLINESS)
7 MODIFICATIONS
8
9
10

ENGINE & ACCESSORIES

11 CYLINDER HEAD, MANIFOLD & GASKETS (CLEAN) (CRACKS) (VALVE GUIDES)
12 VALVE MECHANISM (COVER) (SPRINGS) (ROCKER ARMS) (PUSH RODS) (CLEARANCE)
13 COMPRESSION TEST (RECORD)
14 CRANKCASE, BREATHERS (CLEAN) (OIL LEVEL)
15 OIL FILTERS (CLEAN) (OIL COOLER)
16 RADIATOR (CORE) (SHELL) (SHUTTERS) (MOUNTING) (HOSE) (CONNECTIONS) (CAPS & GASKET) (ANTI-FREEZE TEST-RECORD)
17 WATER PUMP, FAN, SHROUD (CLEAN) (ALIGNMENT) (MOUNTING)
18 BELTS & PULLEYS
19 OIL PUMP, PRESSURE RELIEF VALVE (MOUNTING) (LINES) (CLEAN) (OIL PRESSURE POINTS _____)
20 GOVERNOR & LINKAGE
21
22
23
24
25

STARTING OR AUXILIARY ENGINE

26 AIR CLEANER
27 COOLING SYSTEMS
28 CYLINDER HEAD, MANIFOLD & GASKET
29 CRANKCASE, BREATHERS, OIL FILTER
30 VALVES
31 IGNITION SYSTEM
32 FUEL PUMP, CARBURETOR & GOVERNOR (LINES) (CONNECTIONS) (SEDIMENT BOWL)
33 CLUTCH & TRANSMISSION
34 COMPRESSION TEST (RECORD)
35
36
37

FUEL SYSTEM

38 FUEL PUMPS & HOUSINGS (CLEAN) (MOUNTINGS) (SEDIMENT BOWL)
39 CARBURETOR & LINKAGE
40 FILTERS
41 AIR CLEANERS & PRE-CLEANERS (CLEAN) (CONNECTIONS) (MOUNTING)
42 NOZZLES, INJECTORS
43 TANK, FILLER ELEMENT, CAP & GASKET (VALVES) (LINES) (STRAPS) (SUPPORTS) (MOUNTING)
44
45

ELECTRIC SYSTEM

46 SPARK PLUGS
47 BATTERY (HOLDER) (CABLES) (CONNECTIONS (VOLTAGE) (TEST & RECORD)

256 HR. MAINT. OR TECHNICAL INSPECTION
64 HR. MAINTENANCE

48 GENERATOR, STARTER (COMMUTATOR) (BRUSHES) (BRUSH HOLDERS) (MOUNTINGS)
49 DISTRIBUTOR OR MAGNETO (CAP) (ROTOR) (POINTS)
50 COIL, WIRINGS, SWITCHES
51 VOLTAGE REGULATOR
52 LIGHTS (WIRING) (SWITCHES) (RESISTANCE) (HEADLIGHTS & CONDITIONS)
53
54
55

CONTROL SYSTEM

56 STEERING GEAR ASSEMBLY
57 GAUGES (PIPE) (OIL) (TEMPERATURE) (PRESSURE) (VACUUM)
58 METERS (VOLTMETER) (AMMETER) (AMMETER) (TACHOMETER) (SPEEDOMETER)
59 REGULATOR, SAFETY VALVES, CHECK-VALVES, RHEOSTAT
60 PUMPS & DRIVES (THROTTLE) (VACUUM) (AIR) (GEAR) (MOUNTING)
61 VALVES, CYLINDERS, JACKS (PACKING) (GASKETS) (PACKING) (CLEAN) (LINES)
62 LEVERS, PEDALS, LINKAGE, CABLES
63 UNIVERSAL JOINTS, BALL JOINTS
64 GEAR HOUSINGS, CASES
65 GEARS & PINIONS
66 BEARINGS & SHAFTS
67 POWER CONTROL UNIT (PUMP) (RESERVOIR) (CYLINDER) (DRAPER PIN)
68 DRUMS, SHEAVES, CABLES
69 TIE ROD, LINKAGE, BOOTS & SEALS
70 FULCRUM ARMS, REACH ARMS, LINKAGE
71
72
73
74
75

FRAMES & MOUNTINGS

76 TIRES (PRESSURE) (CONDITION)
RF
RF In
LF
LF In
RR
RR In
LR
LR In
77 FIFTH WHEEL, TOW HITCH (MOUNTINGS) (LOCKS)
78 REAR WHEELS (BEARINGS) (MOUNTINGS)
79 FRONT WHEELS (BEARINGS) (MOUNTINGS)
80 FRAME (BRACES) (RIVETS) (ALIGNMENT)
81 FRONT AXLE ASSEMBLY
82 REAR AXLE ASSEMBLY
83 SPRINGS, EQUALIZERS, STABILIZERS (BRACKETS) (SHACKLES) (U-BOLTS)
84
85
86

CRAWLER ASSEMBLY

87 TRACK ASSEMBLY (PLATES) (LINKS) (PINS) (BUSHINGS)
88 IDLERS & ROLLERS (PINS) (BUSHINGS) (BEARINGS) (SEALS) (SHAFTS) (MOUNTINGS)
89 TRACK TENSION
90 FRAME & GUARDS
91
92

256 HR. MAINT. OR TECHNICAL INSPECTION
64 HR. MAINTENANCE

DRIVE SYSTEM

93 TRANSMISSION & TRANSFER CASES (COVERS) (SHAFTS) (BEARINGS) (GASKETS & SEALS) (CLEAN) (OIL LEVEL)
94 DRIVE SPROCKETS, CHAINS, BELTS
95 MASTER CLUTCH (PACKING) (BEARINGS)
96 STEERING OR TRAVEL CLUTCH
97 JAW OR PIN CLUTCH
98 OPERATING CLUTCHES (RIVETS) (CROWN) (SPRING) (SHOE) (SHEAVE)
99 SERVICE BRAKE
100 EMERGENCY BRAKE
101 STEERING OR TRAVEL BRAKE
102 OPERATING BRAKES (RIVETS) (CROWN) (SHOES) (SHOE) (DRIVE)
103 PRIMARY DRIVES (GEARS) (CHAIN) (BELT) (HOUSING)
104 BEVEL GEARS & PINIONS (CASES) (GASKETS & SEALS) (CLEAN)
105 BEARINGS & SHAFTS (GASKETS & SEALS)
106 TANDEM DRIVE (CHAINS) (GEARS) (CASES) (GASKETS & SEALS)
107 FINAL DRIVE (HOUSING) (CHAINS) (SEALS & GASKETS (BEARINGS) (CLEAN) (OIL LEVEL)
108 DRIVE SHAFTS & U-JOINTS
109 TRAVEL LOCK
110
111
112
113
114

MISCELLANEOUS ITEMS & ASSEMBLIES (EQUIPMENT)

115 HOIST ASSEMBLY (DRUM) (CASING) (GEARS) (BELTS) (CLUTCH) (CABLES) (SHAFTS) (BEARINGS) (SHEAVES)
116 BEARINGS & SEALS
117 BELTS, ROLLERS, FRAME
118 BOOM OR MAST ASSEMBLY (STRUCTURAL) (CABLES) (SHEAVES) (PINS) (BUSHINGS)
119 BUCKETS, CHAINS, SPROCKETS, FRAME
120 CENTER PIN OR GUDGEON (OPENINGS) (ADJUSTMENT NUT & LOCK)
121 CLEANERS (VARIOUS)
122 CROWD ASSEMBLY (SHEAVES) (BRACKETS) (CHAINS) (CABLE) (GEARS) (HOUSING)
123 DIPPER, DRAGLINE BUCKET, OR CLAM-SHELL (LIDS) (HOUSING) (BUSHINGS) (CHAINS) (CABLES)
124 CUTTING EDGES, END BITS, TEETH
125 DIPPER TRIP OR TAGLINE ASSEMBLIES (BOOM) (SHEAVES) (BUSHINGS) (LINKS) (BEARINGS) (CHAINS)
126 DRIVES, BEARINGS, SHAFTS
127 DRUMS, SHEAVES, CABLES (CARPET GUARD) (BEARINGS) (PINS)
128 PILE DRIVER HAMMER, LEADS & GUIDES
129 POWER TAKE-OFF UNIT
130 SNUBBER SHAFT & SADDLE BLOCK ASSEMBLY (BEARINGS) (BEARING PLATES) (GUIDES)
131 STICKS & RACKING (CHAINS) (PULLS) (ALIGNMENT) (SPEED REDS)
132 SWING ASSEMBLY (GEARS) (CIRCLE) (OUTER PATH) (PINS) (BUSHINGS) (SHAFTS) (BEARING SEALS)
133 SWING LOCK (PINS) (SPRINGS) (LINKAGE)
134 TANKS, RECEIVERS, INTERCOOLERS (CAPS) (LINES) (FILTERS) (SCREENS) (MOUNTINGS)
135 WINCH (CLUTCHES) (BRAKES) (CABLES) (SEALS & GASKETS) (MOUNTINGS) (SPEED PINS)
136
137
138
139
140

W.D., A.G.O. Form No. 464
8 June 1944

U. S. GOVERNMENT PRINTING OFFICE 1944 O 609884

Figure 19. WD AGO Form 464 (front), Preventive Maintenance Service and Technical Inspection Work Sheet for Engineer Equipment.

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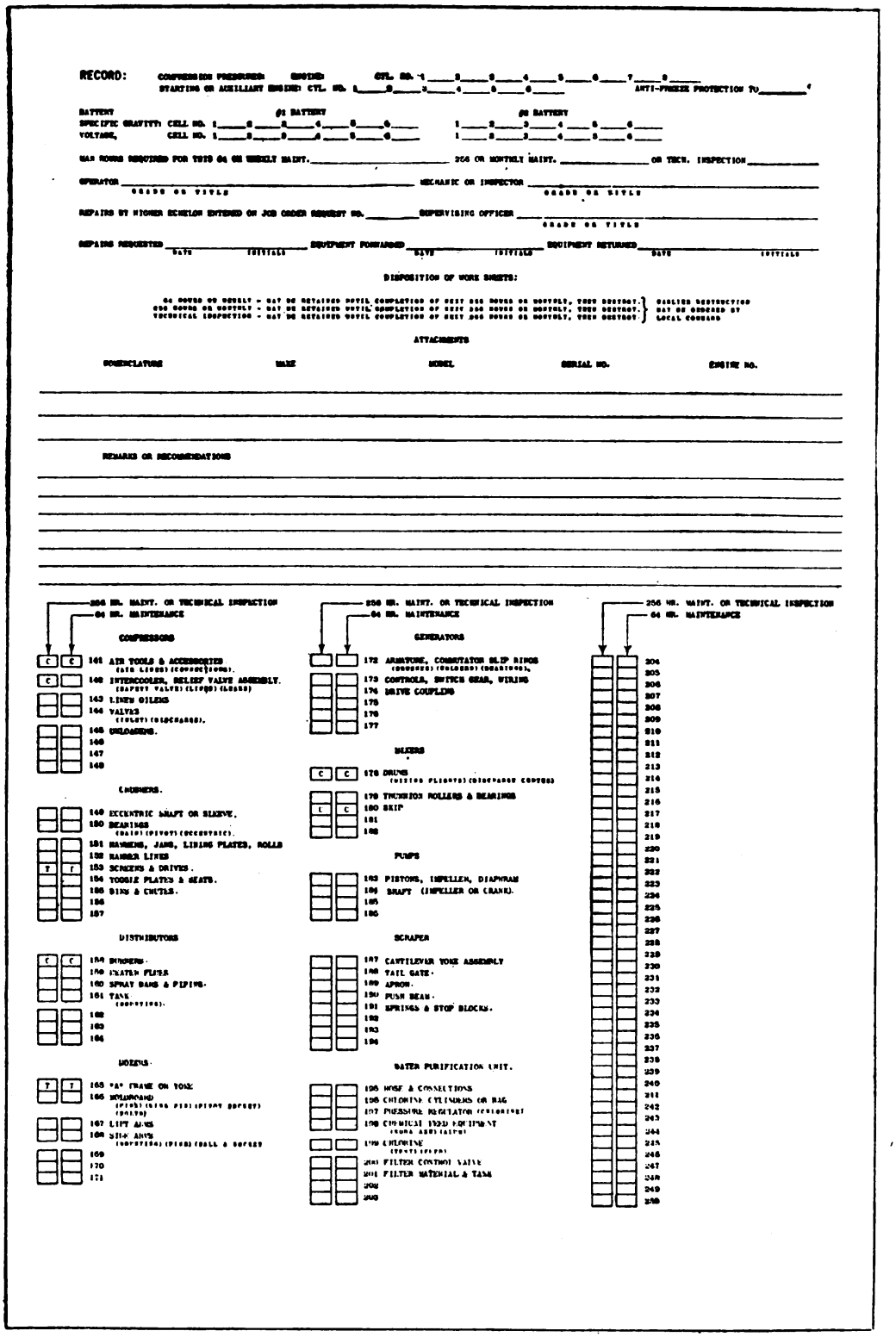


Figure 20. WD AGO Form 464 (back), Preventive Maintenance Service and Technical Inspection Work Sheet for Engineer Equipment.

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REGISTRATION NUMBER: W 424070
SERIAL NUMBER: 8693 Z 14
COMPLETE NOMENCLATURE: G.M.C. 2½ Ton 6 x 6 Cargo W/ow
C.C.K.W. 353 L W B

MWO AND MAJOR UNIT ASSEMBLY REPLACEMENT RECORD

DATE	HOURS, ROUNDS FIRED, MILEAGE, ETC.	MWO NO.	DESCRIPTION OF MWO COMPLETED OR MAJOR UNIT ASSEMBLY REPLACED	INITIALS	DATE	HOURS, ROUNDS FIRED, MILEAGE, ETC.	MWO NO.	DESCRIPTION OF MWO COMPLETED OR MAJOR UNIT ASSEMBLY REPLACED	INITIALS
1 Aug 44	3612	G508-W1	Crankcase Ventilation	[illegible]					

Personnel completing modification or major unit assembly replacement will record clearly description of work completed, and will initial in column provided. When modification is completed, record date, hours, mileage, equivalent rounds fired, etc., and MWO number. When major unit assemblies (engines, transmissions, transfer cases, and tractor) are replaced, record date, hours and/or mileage, and nomenclature of unit assembly. Minor repairs, parts, and accessory replacements will not be recorded.

ORGANIZATIONAL EQUIPMENT FILE

WILL BE KEPT IN POSSESSION OF 3RD ECHELON MAINTENANCE PERSONNEL AND WILL ACCOMPANY EQUIPMENT UPON TRANSFER OR WHEN EVACUATED TO HIGHER ECHELON

WD AGO FORM 478
DECEMBER 194[illegible]

THIS FORM SUPERSEDES WD AGO FORM W/8, 25 OCTOBER 194[illegible], WHICH WILL NOT BE USED AFTER RE EXPT OF THIS REVISION

Figure 21. WD AGO Form 478, MWO and Major Unit Assembly Replacement Record—Organizational Equipment File (form printed on jacket which serves as a file for other vehicle records).

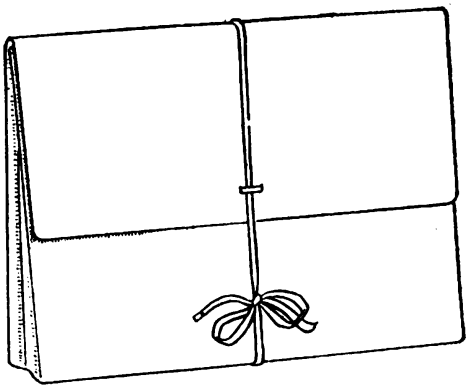
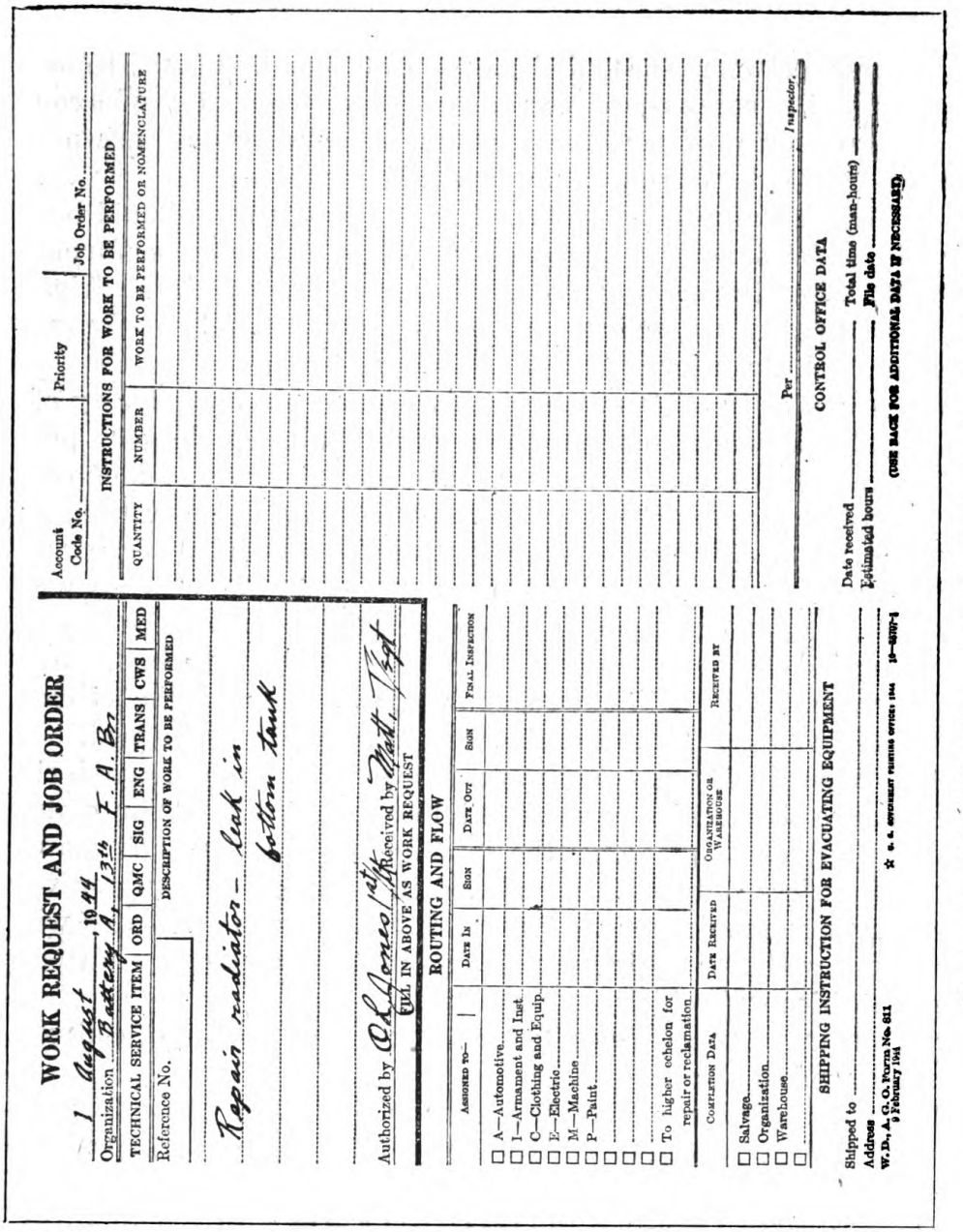


Figure 22. Jacket for filing WD AGO Forms 478.

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WORK REQUEST AND JOB ORDER

Organization 1 August Battery A, 134th F.A. Bn 19 44

Account Code No. | Priority | Job Order No.

TECHNICAL SERVICE ITEM | ORD | QMC | SIG | ENG | TRANS | CWS | MED

Reference No. | DESCRIPTION OF WORK TO BE PERFORMED

Repair radiator - leak in bottom tank

Authorized by Lt. Gomez | Received by Matt Tsgt

FILL IN ABOVE AS WORK REQUEST

ROUTING AND FLOW

ASSIGNED TO—	DATE IN	SIGN	DATE OUT	SIGN	FINAL INSPECTION
A—Automotive					
I—Armament and Inst.					
C—Clothing and Equip.					
E—Electric					
M—Machine					
P—Paint					
To higher echelon for repair or reclamation					

COMPLETION DATA	DATE RECEIVED	ORGANIZATION OR WAREHOUSE	RECEIVED BY
Salvage			
Organization			
Warehouse			

SHIPPING INSTRUCTION FOR EVACUATING EQUIPMENT

Shipped to

Address

W. D., A. G. O. Form No. 811
1 February 1944

☆ U. S. GOVERNMENT PRINTING OFFICE: 1944 16—42007-1

INSTRUCTIONS FOR WORK TO BE PERFORMED

QUANTITY	NUMBER	WORK TO BE PERFORMED OR NOMENCLATURE

Per Inspector.

CONTROL OFFICE DATA

Date received | Total time (man-hours)

Estimated hours | File data

(USE BACK FOR ADDITIONAL DATA IF NECESSARY)

Figure 23. WD AGO Form 811, Work Request and Job Order.

will occur a few days prior to a monthly service. When a vehicle is deadlined in an organizational shop for lack of parts (P) or accident (A), the series of P's or A's will be interrupted, when appropriate, by a service entry as follows: PPPW2, PPP etc., AAAM2, AAAA. In cases where a vehicle is deadlined in a service echelon (third, fourth, or fifth echelon) the entry O will be made in ink over services previously scheduled in pencil. Normally, the next service due after receipt of a vehicle from the appropriate service will be the next pencilled service. The roster will be posted 1 full month in advance, entering proper symbols in pencil showing date and nature of services due in accordance with a prorated

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schedule outlined in paragraph 3c(2). Except for authorized services, spaces between scheduled items will remain blank. In the majority of the cases the days elapsed between services will control the frequency of periodic services. Weekly services are normally spaced 7 days from other or similar services.

(6) When the weekly service is under way, there should be a check to make sure that the daily services are being performed properly. When the monthly service is being performed, the driver should be present to perform his weekly service and supply any necessary vehicle information to the second echelon.

(7) *Regularity of preventive maintenance service.* Every effort should be made to assure that each vehicle undergoes preventive maintenance at the scheduled time. However, under certain conditions, a vehicle may be away from its home station, or may otherwise be prevented from getting the scheduled service on time. When a service is not performed on the day for which it was previously scheduled in pencil, the pencilled symbol will be traced in ink and circled when the services are completed. In such cases subsequent services will be scheduled from date of the circled symbol regardless of date the service was actually performed.

(8) Where it is necessary to control semiannual and quarterly maintenance services as in regimental or separate battalion maintenance sections or platoons, the semiannual and quarterly maintenance services only will be entered in an additional motor vehicle preventive maintenance roster. These services and dates will correspond with the vehicles and dates of the company or battery roster to which the vehicles are assigned.

d. SUPPLY FORMS. Supply forms are used to obtain, control, replenish, and to dispose of property.

(1) *Property Issue Slip (WD AGO Form 446).* This form is accomplished in accordance with TM 38–403 for the purpose of obtaining authorized supplies and equipment. (See fig. 24.)

(2) *Property Turn-in Slip (WD AGO Form 447).* This form, accomplished in accordance with TM 38–403, is used to dispose of unserviceable or excess property. (See fig. 25.)

(3) *Exchange Part or Unit Identification Tag (WD AGO Form 9–81, old Form WD OO Form 7370).* This tag properly filled out in accordance with TM 38–403 will be used to identify and exchange unserviceable automotive equipment. The purpose of this tag is to eliminate the need for a property turn-in slip and property-issue slip when exchanging unserviceable automotive equipment for serviceable; thereby reducing the quantity of proper work in the using unit. (See fig. 26.)

(4) *Locator and Inventory Control Card (WD AGO Form 9–71, old WD OO Form 7356).* This card is used to control stocks

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of spare parts in units. All spare parts on hand in units, regardless of the manner of acquisition, will be recorded on this form. (See fig. 27.)

PROPERTY ISSUE SLIP

TO	SUPPLY OFFICER		TYPE OF ISSUE: INITIAL	REPLACEMENT	MEMO RECEIPT	PAGE OF PAGES		
FOR	ORGANIZATION OR UNIT					VOUCHER NO.		
						ISSUE SLIP NO.		
ITEM NO.	STOCK NO.	NOMENCLATURE	UNIT	AUTHORIZED ALLOWANCE	ON HAND	DUE IN	QUANTITY REQUESTED	ACTION

Issuance of quantity shown in "Quantity Requested" column is authorized. Items marked "due out" will be ordered and when received organization will be notified.

FOR STATION SUPPLY OFFICER:

_____ 194__ _____
(Date)

FOR THE COMMANDING OFFICER:

_____ 194__ _____
(Date) Organization Supply Officer.

QUANTITIES SHOWN IN "ACTION" COLUMN HAVE BEEN RECEIVED:

_____ 194__ _____
(Date) (Authorized Representative)

W. D., A. G. O. Form No. 446
15 April 1944

16—40444-1 ☆ U. S. GOVERNMENT PRINTING OFFICE : 1944

This form supersedes W. D., A. G. O. Form No. 446, 6 August 1943, which may be used until existing stocks are exhausted.

Figure 24. WD AGO Form 446, Property Issue Slip.

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PROPERTY TURN-IN SLIP

To: Supply or Classification Officer

From: Organization or Unit

Page ____ of ____ Pages

Voucher No.

Turn-in Slip No.

Item No.	Stock No.	Nomenclature	Unit	Quantity	Remarks	Action

LEGEND FOR REMARKS

FWT—Unserviceable, due to fair wear and tear
R/S—Unserviceable, report of survey
S/C—Unserviceable, statement of charges
SER—Serviceable
EXS—In excess of authorized allowances
MR—Memorandum receipt property

W. D., A. G. O. Form No. 447
15 April 1944
(This form supersedes W.D., A.G.O. Form No. 447, 6 August 1943, which may be used until existing stocks are exhausted)

I CERTIFY that the articles listed herein are turned in under the circumstances indicated in "Remarks."

FOR THE COMMANDING OFFICER:

(Date) 194__ Organization Supply Officer.

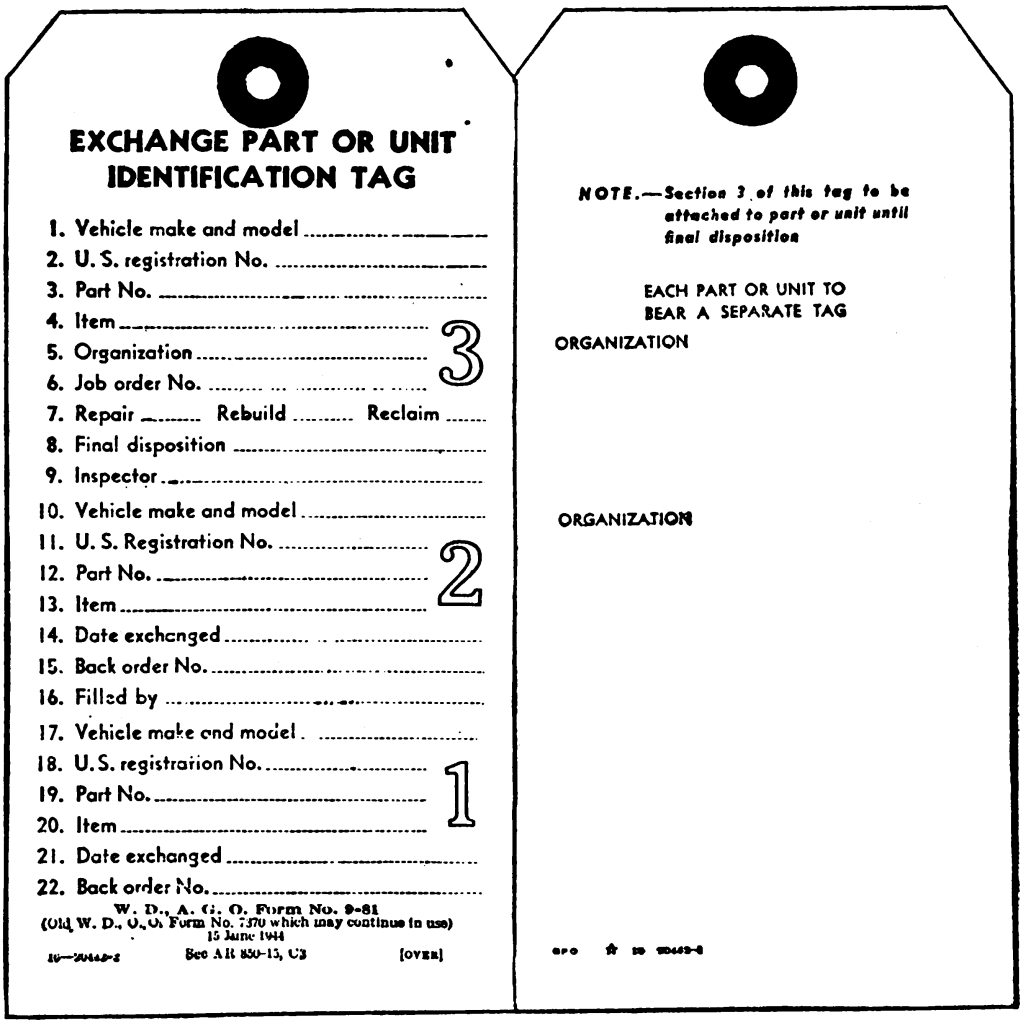
QUANTITIES SHOWN IN "ACTION" COLUMN HAVE BEEN RECEIVED

(Date) 194__ (For station supply officer or classification officer)

U. S. GOVERNMENT PRINTING OFFICE : 1944 16—40951-1

Figure 25. WD AGO Form 447, Property Turn-in Slip.

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EXCHANGE PART OR UNIT IDENTIFICATION TAG

1. Vehicle make and model .....
2. U. S. registration No. .....
3. Part No. .....
4. Item .....
5. Organization .....
6. Job order No. .....
7. Repair ..... Rebuild ..... Reclaim .....
8. Final disposition .....
9. Inspector .....
10. Vehicle make and model .....
11. U. S. Registration No. .....
12. Part No. .....
13. Item .....
14. Date exchanged .....
15. Back order No. .....
16. Filled by .....
17. Vehicle make and model .....
18. U.S. registration No. .....
19. Part No. .....
20. Item .....
21. Date exchanged .....
22. Back order No. .....

3

2

1

W. D., A. G. O. Form No. 9-81
(Old W. D., O. O. Form No. 7370 which may continue in use)
15 June 1944

16—30442-2 See AR 850-15, C3 [OVER]

NOTE.—Section 3 of this tag to be attached to part or unit until final disposition

EACH PART OR UNIT TO BEAR A SEPARATE TAG

ORGANIZATION

ORGANIZATION

o-r-o ★ 30442-2

Figure 26. WD AGO Form 9–81 (old WD AGO Form 7370) (front and back), Exchange Part or Unit Identification Tag.

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PART NO.	NAME OF PART	INTERCHANGEABLE WITH:
G 502-01-94059	Gasket Cyl. Head	

MAKE, MODEL, AND YEAR OF EQUIPMENT: Dodge T 214 1942-43

GROUP	TRUCK	BIN OR CABINET	SHELF OR DRAWER
	3/4 T 4x4	A	1

MINIMUM: 1 MAXIMUM: 2

DATE	ISSUED OR RECEIVED	BALANCE ON HAND	ON ORDER	DATE	ISSUED OR RECEIVED	BALANCE ON HAND	ON ORDER
3-10-44	2	2					
J-2-44	1	1	1				

W. D., A. G. O. Form No. 9-71 4 July 1944. (Old W. D., O. O. Form No. 7356 which may continue in use)

LOCATOR AND INVENTORY CONTROL CARD

16-37062-2

Figure 27. WD AGO Form 9–71 (old WD AGO Form 7356) (Locator and Inventory Control Card).

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SECTION II

FIRST-ECHELON PREVENTIVE MAINTENANCE

5. Role of Driver in Preventive Maintenance

a. The vehicle driver (or crew) is the most important single factor in preventive maintenance. Only through him can the mechanic know what difficulties a piece of equipment is giving. If the driver (or crew) fails to take an interest in the vehicle, the vehicle and the efficiency of the company or unit will suffer.

b. Each driver is required to perform certain daily maintenance services on his vehicle as a matter of regular routine. The faithful performance of these services will do much to prolong the life of the vehicle, to avoid major repairs and overhauled by higher echelons, and will assure the driver that his vehicle will perform its missions consistently and dependably.

c. Preventive maintenance by the driver includes the following:

(1) Inspecting and servicing the vehicle in accordance with those operations listed on WD Form 48. (See par. 6.)

(2) Repairing defects which the driver is capable of repairing, equipped to repair, and authorized to repair.

(3) Reporting defects whose repair is not a function of the driver.

(4) Prevention of vehicle abuse.

6. Driver's Daily Preventive Maintenance Services

a. The items to be inspected and serviced, daily and weekly, by the driver are listed on the reverse side of WD Form 48, "Driver's Trip Ticket and P. M. Service Record." (See figs. 1 and 2.) These items cover both wheeled and half-track vehicles, and full-track and tanklike wheeled vehicles, as well as motorcycles, and are to be inspected and serviced according to those procedures in paragraphs 8–10, inclusive, which apply to the particular vehicle, and according to the manual supplied with each vehicle.

b. Drivers must be trained to be thoroughly familiar with the items listed, and with the manner in which they are to be inspected

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and serviced. During the training period, Form 48 may be used as a check-list, but the items must be memorized so that the services will be performed automatically at the prescribed occasions, either before operation, during operation, at-halt operation, or after operation, as listed.

c. Certain of the items in each service on Form 48 have been capitalized for the purpose of stressing their importance. All services prescribed for every item at each designated interval are to be performed if at all possible. When the tactical situation prevents accomplishment of all services on every item listed, the capitalized item should receive primary consideration.

d. The general inspection and service of each item applies, also, to any supporting member, or connection, and usually includes a check to see whether or not the item is in good condition, correctly assembled, secure, or excessively worn.

(1) The inspection for "good condition" is usually an external visual inspection to determine whether or not the unit is damaged beyond safe or serviceable limits, or if it is in such a condition that damage will result upon operation. The term "good condition" is explained further by the following terms: not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, and adequately lubricated.

(2) The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to determine whether or not it is in its normal assembled position in the vehicle.

(3) The check of a unit to determine, if it is "secure" is usually an external inspection, a hand-feel, a pry-bar, or wrench check for looseness in the unit. Such an inspection should include any brackets, lock washers, lock nuts, locking wires, or cotter pins used in the assembly.

(4) "Excessively worn" will be understood to mean worn close to or beyond serviceable limits, and likely to result in a failure if not replaced before the next scheduled inspection.

7. Necessity for Scheduled Preventive Maintenance

a. BEFORE-OPERATION SERVICES. These services are performed on the vehicle to ascertain whether or not conditions have changed since the last after-operation service. Many things can happen to a vehicle between the last check and the time it rolls again. Sabotage may be attempted; booby traps may be installed; another vehicle may back into it; a limb or some other object may fall on it; tires may go flat; moisture may ground the spark plugs; freezing may occur; engine oil, fuel, or water may leak out. Therefore, at least a quick check is necessary before the vehicle is again put

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into operation. The before-operation service should never be omitted, even in extreme tactical situations.

b. DURING-OPERATION SERVICE. The during-operation service consists of detecting improper performance. On the march, it is important to notice unusual noises or odors, or unsatisfactory performance in vehicle operation, and to take corrective steps before the deficiencies develop to the point of actual breakdown.

c. AT-HALT SERVICE. During halts, the driver has an opportunity to correct or report any condition noticed during operation which was not serious enough to require action at the time. The object of the at-halt service is to detect and correct deficiencies developed during operation. Some troubles are difficult to discover while rolling, therefore, advantage should be taken of every halt to locate and correct anything that may cause a fall-out after the march is resumed. The at-halt service represents the irreducible minimum of preventive maintenance that must be performed to continue operation of vehicle. It may be regarded as minimum "battle maintenance" and should be performed under all tactical conditions, even though the more extensive services must be slighted or omitted altogether. Results of the at-halt service should be reported promptly to the section leader or other designated authority.

d. AFTER-OPERATION SERVICE. The purpose of the after-operation service is to prepare the vehicle to operate again at a moment's notice. This preventive maintenance service is particularly important, because at this time, the driver inspects his vehicle thoroughly to detect any deficiencies that may have developed, and corrects those he is permitted to correct. He should report promptly to his section leader, or other designated authority, the results of his service. If this service is performed thoroughly, the vehicle should be ready to roll again on a moment's notice. The after-operation service should never be entirely omitted even in extreme tactical situations, but may be reduced to the bare fundamental services outlined for the at-halt service.

e. WEEKLY SERVICE. The weekly service is designated to reinforce daily maintenance. It consists of the after-operation services plus additional attention to certain designated items, including a general tightening, cleaning, and lubrication if required. This weekly service should include a detailed check by the section leader, and the company officer on the quality of maintenance performed by the drivers or crews.

8. Before-operation Service

a. GENERAL. This service should never be entirely omitted,

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even in extreme tactical situations. If thoroughly trained, the driver or crew will go through it almost automatically so that a few moments will enable him to size up the condition of the vehicle.

b. PROCEDURES. The before-operation service consists of inspecting the following items according to the procedures described below and correcting any deficiencies, or reporting them to the proper authority. Upon completion of the service, results should be reported promptly to the section leader, or other designated individual.

(1) *Item 1, Tampering and damage.* Check for any injury to vehicle, items of special equipment, or armament. Check for any damage that may have occurred from falling debris, shell fire, sabotage, collision since parking the vehicle, or presence of booby traps. Raise hood, or open engine compartment doors, and look for signs of tampering or sabotage such as loosened or damaged accessories, or drive belts. Dry the spark plugs, distributor, or magnetos and wiring, if they are wet, to facilitate starting.

(2) *Item 2, Fire extinguishers.* Check for security, corroded nozzles, and closed valves. Pay particular attention to extinguisher lines and nozzles in the engine compartment of tanks and tanklike wheeled vehicles, checking for damage and correct aiming.

(3) *Item 3, Fuel, oil, and water.* Check the amount of fuel in the tanks, noting any indications of leaks or tampering. Add fuel if necessary and check the spare fuel cans. Check oil level. Check coolant for correct level and contamination. During period when antifreeze is in use, if considerable amount of water is required for replenishment, have hydrometer test made of coolant and have antifreeze added to meet lowest anticipated temperature.

Note. Any appreciable change in levels since the AFTER OPERATION SERVICE should be investigated and reported to designated authority.

(4) *Item 4, Accessories and drives.* Check all accessories such as carburetors, generators, regulators, starters, fans, shrouds, and water pumps for loose connections or mountings.

(5) *Item 5, Air-brake tanks.* Check the air-brake reservoir tanks to see that they are secure and undamaged, and that all air-line connections are tight. Also be sure that water (condensation) has been drained from the tanks and that pet cocks are closed.

(6) *Item 6, Leaks, general.* Check under the vehicle and in the engine compartment for any indications of fuel, oil, water, gear oil, or brake fluid leaks. Check the cooling system for indications of leaks, paying particular attention to radiator core and connecting hose. Check the engine crankcase, oil filters, oil tanks, oil coolers, and lines for indications of oil leaks. Check the fuel system for indications of leaks. Trace all leaks to their source and correct or report them to designated authority.

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(7) *Item 7, Engine warm-up.* Check item 8. To test for hydrostatic lock on radial engines, before closing master battery switch, crank engines at least two complete revolutions by hand to determine whether any fluid is present in the lower cylinders. If the engine will not turn over readily, report condition to responsible person, and drain fluid from the lower cylinders through spark plug holes or pet cocks.

Caution: As a precaution against fire or explosion, before starting the engine, open the ventilators or hatches to be sure that the hull compartments, particularly engine compartment, are clear of fuel drippings and gas fumes.

Start the engine and note the action of the starter mechanism, particularly whether the starter has adequate cranking speed and engages and disengages properly without unusual noise when the starting control is operated. If oil pressure gauge or signal light does not indicate properly within 30 seconds, the engine should be stopped and the trouble corrected or reported to proper authority. On motorcycles, which do not have an oil pressure indicating device, remove oil tank filler caps and check for proper oil circulation. Set the throttle so that the engine will run at normal (fast idle) warm-up speed and during the warm-up period, proceed with the following before-operation services. *Caution:* Great damage may result if air-cooled engines are placed under load before reaching normal operating temperatures. Water-cooled engines should not be placed under load until properly warmed up, tactical situation permitting.

(8) *Item 8, Choke or primer.* While starting the engine, check the operation of the choke or primer. As the engines warm up, reset the choke as required to prevent overchoking and dilution of engine oil.

(9) *Item 9, Instruments.*

(a) Oil pressure gauge or light indicator. Check the gauge to see whether it indicates properly, and check the light indicator to see whether it fails to go out. If these instruments fail to indicate properly, stop the engine immediately, investigate the cause, and report it to the proper authority.

(b) Ammeter or light indicator. The ammeter should show a high-charging rate for the first few minutes after starting until the generator restores to the battery the current used in starting. After this period, the ammeter should register a zero or slight positive charge with lights and accessories turned off and the engine operating at a fast idle. Any unusual drop or rise in reading should be investigated. A high-charge reading for an extended period may indicate a dangerously low battery or faulty generator regulator. A

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light indicator should go out when the engine is running at fast idle with lights turned off.

(c) Tachometer. Observe whether tachometer is operating properly and indicating the approximate engine revolutions per minute. If there is a revolution counter, it should register the accumulating revolutions.

(d) Fuel gauge. Observe whether gauge is operating properly. Normally, fuel tanks would have been filled after operation, and the gauge should register FULL.

(e) Air-brake pressure gauge. During the warm-up period, operate the engine at fast idle speed and observe whether the brake air pressure builds up at a normal rate to the specified maximum limits, and whether the governor then cuts off to stop compressing action. With the engine at normal idling speed, bleed the air pressure down by repeated brake application, and observe whether the governor cuts in the compressor within the specified limits. Again bleed down the air pressure and observe whether the low pressure indicator signals properly at the specified air pressure. Build up the air pressure again and observe whether the indicator signal stops as pressure is built up above the danger point.

(f) Voltmeter. Note whether voltmeter is operating properly. It should register at least the nominal battery voltage usually indicated by a red line on the face of the instrument.

(g) Temperature gauge. Engine temperature should increase gradually during the warm-up period. Extremely low temperature after a reasonable warm-up period may indicate existing troubles that should be investigated and corrected.

(10) *Item 10, Horn and windshield wiper.* Press the horn or siren button (unless tactical situation prohibits), to see that the signal is normal. Check the windshield wipers for missing or damaged blades or arms, and note whether the blades contact the glass properly. Start the windshield wipers, checking to see that they operate normally through their full stroke.

(11) *Item 11, Glass and rear view mirrors.* Check for damaged glass, frames, or brackets. Clean mirror, and aim it properly; also clean the windshield, door glass, and vision devices.

(12) *Item 12, Lamps (lights) and reflectors.* Within the limits permitted by the tactical situation, check operation of all switches and see that all lamps operate properly. Check to see that the lamps (lights) and warning reflectors are secure, and that lenses are clean and not broken.

(13) *Item 13, Wheel and flange nuts.* Check all wheel mountings and rim and axle flange nuts to see that they are secure.

(14) *Item 14, Tires or tracks.* All tires should be gauged and properly inflated before operation and spares properly secured in

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their carriers. On half- or full-track vehicles, inspect the tracks, bogie wheels and suspensions, rollers, sprockets, and idlers for any damage that may have developed since the last after-operation service, through shell fire, accident, sabotage, or the elements. Also check for loose spring-loaded idler lock nuts, improper track tension, and loose wedge nuts.

(15) *Item 15, Springs and suspensions.* Check the springs to see whether they have abnormal sag, broken or shifted leaves, loose or missing rebound clips, eyebolts, U-bolts, or shackles. Shock absorbers should be secure and not leaking; linkage should not be worn or bent.

(16) *Item 16, Steering linkage.* Inspect the steering gear and linkage to see that they are in condition for safe operation. Pay particular attention to the steering arms and steering linkage, looking for loose or bent parts. Apply both steering levers on full-track vehicles, and observe whether they both meet resistance slightly before or on reaching a vertical position. Check to see that the lever locking devices hold properly.

(17) *Item 17, Fenders and bumpers.* See that they are secure and in good condition.

(18) *Item 18, Towing connections.* See that the truck tractor fifth wheel or pintle and lunette are in good condition. Be sure mountings and locking devices are secure; report any damage or deficiency that may have occurred. Check all towing shackles to see that they are in proper condition for safe operation.

(19) *Item 19, Body, load, and tarpaulins.* Inspect body for looseness and damage. See that ropes are lashed securely to hooks or rings and that load is evenly distributed. Inspect cargo carefully for damage, pilfering, or shifting.

(20) *Item 20, Decontaminator.* Check to see that it is securely mounted and not leaking.

(21) *Item 21, Tools and equipment.* See that tools and equipment belonging to the vehicle are present, serviceable, and properly mounted or stowed. Check against vehicle stowage list.

(22) *Item 22, Engine operation.* If engine has not yet reached normal operating temperature, as indicated by the temperature gauge, normal operating temperature may be assumed when the engine will operate under load with the choke fully released, and when the oil pressure gauge indicates approximate normal operating pressure, during engine acceleration. Gradually accelerate engine several times after it has reached normal operating temperature, and note any unusual noise or unsatisfactory operating characteristics which would indicate trouble. Check dual engine installations as above.

(23) *Item 23, Operators publications.* Operator must make sure

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that all publications that pertain to the equipment, for which he is responsible, are either in his possession or located on the equipment. These will include such publications as Standard Form 26, Driver's Report—Accident—Motor Transportation; War Department Lubrication Order, Equipment Technical Manual and WD Form 48.

(24) *Item 24, Amphibian items.* Perform any additional amphibian services peculiar to the vehicle involved. See vehicle Technical Manual for procedures.

(25) *Item 24–1, Materials handling equipment items.* Perform any additional services peculiar to materials handling equipment. See publications pertaining to specific vehicle involved for instructions.

(26) *Item 24–2, Special engineer items.* Perform any additional services peculiar to special engineer equipment. See publications pertaining to specific vehicle for procedures.

(27) *Item 25, During-operation check.* The during-operation services should start immediately, as soon as the vehicle is put in motion.

9. During-operation Service

a. GENERAL. While the vehicle is in motion, a driver (or crew) should listen for any sounds that may be a sign of trouble, such as rattles, knocks, squeals, or hums. He should look for steam from the radiator, and smoke from any part of the vehicle, and should know and be on the alert for the odor of an overheated generator, overheated brakes, overheated clutch, boiling coolant, fuel vapor from a leak in the fuel system, exhaust gas, or other such signs of trouble. Every time the brakes are used, gears shifted, or the vehicle turned, the driver should consider it a test, and note any unsatisfactory or unusual performance. A driver should check the instruments constantly, and notice promptly if any instrument indicates that some unit may be operating improperly.

b. PROCEDURES. The during-operation service consists of observing the following items according to procedures described below, stopping the vehicle if serious trouble develops, and noting minor deficiencies to be corrected or reported at the earliest opportunity, usually the next scheduled halt.

(1) *Item 26, Steering brakes.* When a full-track vehicle is first driven, after completion of the before-operation service, apply the steering brakes before attempting any appreciable speed to see whether they will stop the vehicle effectively, with the levers in approximately the vertical position, and whether they steer the ve-

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hicle satisfactorily with normal pull on the steering levers. Continue to make similar observations at all times during operation of the vehicle.

(2) *Item 27, Foot and hand brakes.* The foot brakes on wheeled and half-track vehicles should operate smoothly and effectively without pulling the vehicle to one side, leaving a satisfactory reserve of pedal travel available. Failure of brakes to hold vehicle may result from burned-out, wet, or greasy linings, or leaks in hydraulic brake system. When hydraulic brakes are applied in making a quick stop with full load at normal speed, the brake pedal should go no closer to the floorboard than approximately 1 to 2 inches. Make sure the hand brake is fully released when the vehicle is in motion. When the vehicle is stopped, the hand brake should hold the vehicle on a reasonable incline, leaving a reserve of one-third lever travel available.

(3) *Item 28, Clutch.* See that clutch does not grab, chatter, or squeal during engagement, or slip when fully engaged. Clutch pedal must have satisfactory free travel as specified by vehicle Technical Manual before it begins to disengage clutch. Otherwise, clutch may slip when under load. Too much free travel, however, may keep clutch from disengaging fully, thus causing transmission gear teeth to clash and be damaged when shifting.

(4) *Item 29, Transmission.* Gears must shift smoothly, operate quietly, and not creep out of mesh during operation. Jumping out of gear may indicate wear in shifting mechanism or gear teeth, or misalignment of transmission and clutch housing. On multiple transmission installations, all transmissions should be synchronized to shift simultaneously.

(5) *Item 30, Transfer.* Check this unit in the same manner as in item 29.

(6) *Item 31, Engine and controls.* The driver must be on the alert for deficiencies in engine performance such as lack of usual power, misfiring, unusual noise or stalling, indications of engine overheating, or unusual exhaust smoke. Notice whether the engine responds to the controls satisfactorily, and see that the controls are in proper adjustment.

(7) *Item 32, Instruments.* Observe the readings of all instruments frequently during operation to see whether they are indicating properly.

(a) Temperature gauge. See that the gauge reads in normal range (except when operating under unusual conditions). Excessive engine heat may indicate trouble and should be investigated immediately.

(b) Oil pressure gauge. In case of any unusual drop or no oil pressure, stop the vehicle immediately. Report trouble to proper

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authority for correction. Lack of oil pressure may indicate insufficient oil, leaks, loose bearings, or a defective oil pump; and may result in premature wear, or may damage the engine to the extent of failure. Where oil pressure signal light is used, as on a motorcycle, the light should remain off while engine is operating.

(c) Viscometer. See that indicator remains in the normal range section of the dial with engine at normal operating temperature. Report any abnormal reading.

(d) Ammeter. During operation, the ammeter must indicate a zero or a positive reading with all lights and accessories turned off. A discharge reading may indicate a faulty generator or regulator. When a signal light is used instead of an ammeter, the light should be off when the engine is operated at or above a fast idle.

(e) Tachometer. See that tachometer indicates the engine speed and accumulating revolutions (if there is a revolution counter) correctly at all times when the engine is running. The engine speed should not be allowed to exceed that specified on the caution plate. On dual-engine installations, both tachometers must register approximately the same revolutions per minute, which will indicate that the engine controls are synchronized properly.

(f) Air-brake pressure gauge. See that gauge indicates no more nor less than the specified governed air pressure. (See vehicle Technical Manual.)

(g) Fuel gauge. See that gauge continues to indicate the approximate amount of fuel in the tank.

(h) Speedometer and odometer. Speedometer must indicate the vehicle speed correctly at all times. See that vehicle is not allowed to exceed the speed for each gear range as specified on the caution plate. The odometer must register the total accumulated mileage.

(8) *Item 33, Steering gear.* See that there is no excessive pulling to either side (except that due to crown of road) nor excessive wandering or shimmy of the vehicle. This may be caused by low tire pressure, excessive play in steering mechanism, excessive wear, loose parts, maladjustment, loose wheel bearings, improper wheel alignment, or lack of lubrication.

(9) *Item 34, Running gear.* Listen for any unusual noise from wheels, axles, or from tracks and their wheels and supporting rollers.

(10) *Item 35, Body and trailer.* The driver must be on the alert for looseness of body or attachments, shifting load, abnormal sagging or tilting of the vehicle, loose top, tarpaulin or curtains, or unusual weaving of towed loads.

(11) *Item 36, Guns: mountings and elevating, traversing, gyro, and firing controls.* While the vehicle is in operation, but before it is

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used in combat, the designated members of the crew should check both manual and hydraulic turret-traversing and gun-elevating controls, stabilizer controls, and firing controls, to be sure that all mechanisms respond properly.

(12) *Item 37, Amphibian items.* Perform any additional amphibian services peculiar to the vehicle involved. See vehicle manual for procedures.

(13) *Item 37–1, Materials handling equipment items.* Perform any additional services peculiar to materials handling equipment. See publications pertaining to specific vehicle involved for these instructions.

(14) *Item 37–2, Special engineer items.* Perform any additional services peculiar to special engineer equipment. See publications pertaining to specific vehicle.

10. At-halt Service

a. GENERAL. The at-halt service may be regarded as minimum battle maintenance and must be performed under all tactical conditions even though the more extensive maintenance services may be slighted or omitted altogether.

b. PROCEDURES. This service consists of investigating any deficiencies noted during operation, inspecting the following items accordng to the procedures described below, and correcting any deficiencies found. Upon completion of the preventive maintenance service, deficiencies not corrected must be reported promptly to the section leader or other designated individual.

(1) *Item 38, Fuel, oil, and water.* Check the fuel supply to see that it is adequate to operate vehicle to the next refueling point. When refueling, use safety precautions for grounding static electricity, and allow space for expansion in filler neck. Filler cap vents must be open, pressure cap valves must be free, and cap must be replaced securely. Check the crankcase oil level and, if necessary, add oil to proper level. Remove radiator filler cap, being careful of steam, especially if a pressure cap is used. Check coolant to see that it is at proper level, and replenish as necessary. Do not fill to overflowing, but leave sufficient space for expansion. If engine is hot, fill slowly while engine is running at a fast idle.

(2) *Item 39, Temperature: hubs, brake drums.* Place hand cautiously on each drum and wheel hub to see whether it is abnormally hot or cold. On track vehicles, check similarly the hubs, sprockets, idlers, and upper and lower rollers. An excessively hot drum may indicate dragging shoes or improper adjustment. An abnormally cool drum (by comparison with the others) may indicate brake is not functioning. If wheel hubs are too hot to grasp with the hand,

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bearings may be inadequately lubricated, damaged, or improperly adjusted. A regular check of these items will go far to avoid premature failures or possible accidents. Check the transmission, transfer, differential, final drives, and axle housings for excessive oil leaks.

(3) *Item 40, Axle and transfer vents.* Check the vents of these units to see that they are present and not damaged or clogged.

(4) *Item 41, Propeller shafts.* Check for looseness, damage, oil leaks, and foreign material such as wire or brush.

(5) *Item 42, Springs and suspensions.* Check for broken or shifted spring coils or leaves, damaged or loose clips, U-bolts, eyebolts, shackles, shock-absorber linkage, and torque rods. On bogie suspensions, check arms, links, pins, wheels, and rollers for looseness or damage.

(6) *Item 43, Steering linkage.* Examine steering-control mechanism, arms, and linkage for damage or looseness, and investigate any irregularities noted during operation.

(7) *Item 44, Wheel and flange nuts.* Check to see that all wheel mounting and rim nuts and axle flange nuts are present and secure.

(8) *Item 45, Tires and/or tracks.* Check for flats or damage. Remove nails, glass, or stones from treads and objects between duals. (Air pressures that have increased during operation should not be reduced.) On track vehicles, check tracks, bogie wheel tires, and bogies to see that they are secure and not damaged and that track tension is satisfactory. Remove stones and trash from tracks and bogies. Solid rubber tires must be kept free from acids, oils, and grease.

(9) *Item 46, Leaks, general.* Check under the hood or in the engine compartment and beneath the vehicle for indications of leaks. Check to see whether oil is leaking from crankcase, oil tanks, oil coolers, filters, or lines. Check the cooling system for leaks, paying particular attention to the radiator core and connecting hose.

(10) *Item 47, Accessories and belts.* Check to see that fan, water pump, and generator are secure and that all their drive belts are in correct adjustment and not damaged. Driver should adjust belts only in emergencies. Ordinarily he should report them for handling by the second echelon.

(11) *Item 48, Air cleaners.* If operating under extremely dusty or sandy conditions, inspect the air cleaners and breather caps to see that they are in condition to deliver clean air properly. Service if necessary according to instructions on WDLO.

(12) *Item 49, Fenders and bumpers.* Check these items for looseness or damage.

(13) *Item 50, Towing connections.* Check all towing connections

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to see that they are properly fastened and securely locked. Check for frayed or broken cables and damaged or missing attachment plugs. Make sure that support springs hold lines in a way to prevent chafing.

(14) *Item 51, Body, load, and tarpaulin.* Inspect vehicle body and trailed loads for shifting; also check the tarpaulins to see that they are properly secured and not damaged.

(15) *Item 52, Appearance and glass.* Clean windshield, door, and window glass, rear view mirror, light lenses, vision devices, and inspect for damage.

(16) *Item 53, Amphibian items.* Perform any additional amphibian services peculiar to the vehicle involved. See vehicle Technical Manual for procedures.

(17) *Item 53–1, Materials handling equipment items.* Perform any additional services peculiar to materials handling equipment. See publications pertaining to specific vehicle involved for these instructions.

(18) *Item 53–2, Special engineer items.* Perform any additional services peculiar to special engineer equipment. See publications pertaining to specific vehicle involved for these instructions.

11. After-operation and Weekly Service

a. When performing the after-operation service, the driver or crew must remember and consider any irregularities noticed during the day in the before-operation service, during-operation service, and at-halt services. Any units that require inspection or service while they are still at operating temperature should be inspected as soon as possible after parking the vehicle and before any interruption, such as mess or rest, allows the units to cool. The after-operation service should never be entirely omitted even in extreme tactical situations but may be reduced to the bare fundamentals outlined for the at-halt service. Weekly preventive maintenance which is performed in addition to the after-operation service is a general tightening and check of certain factors that may affect vehicle performance. It also covers items that affect appearance but which are not likely to prevent vehicles from operating.

b. PROCEDURES. The after-operation service consists of inspecting the following items according to the procedures described below and correcting or reporting any deficiencies. Those items marked with an asterisk (*) will receive certain additional attention at the time of the weekly service, as described below. Upon completion of these services, results must be reported promptly to the section leader or other designated individual.

(1) *Item 54, *Fuel, oil, and water. (a)* Check coolant for cor-

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rect level. During period when antifreeze is in use, if considerable water is required for replenishment, have hydrometer test made of coolant and have antifreeze added to meet lowest anticipated temperature. Check level of crankcase oil and add as required. (See WDLO.) Refill spare fuel, oil, and water cans. If an unusual amount of oil or coolant is required for engine, check for leaks and correct or report the condition.

(b) Weekly. Have hydrometer test of antifreeze made and add antifreeze solution as required to meet lowest anticipated temperature. If sample of coolant in hydrometer shows unusual contamination, cooling system should be drained and flushed.

(2) *Item 55,* **Engine operation.** Check to see that the engine idles satisfactorily. Accelerate and decelerate the engine, and note any tendency to miss or backfire, or any unusual engine noise or vibration that might indicate worn parts, loose mountings, incorrect fuel mixture, or faulty ignition. Correct or report any unsatisfactory engine-operating characteristics noted during operation.

(3) *Item 56,* **Instruments.** Check all instruments to see that they are securely mounted, properly connected, and undamaged.

(4) *Item 57,* **Horn and windshield wipers.** Check the horn or siren to see that it is securely mounted and properly connected. Check to see that the arms and blades of windshield wipers are in good condition and that the wipers operate properly.

(5) *Item 58,* **Glass and rear view mirrors.** Clean the rear view mirrors, windshield, and other glass, checking to see that they are securely mounted and undamaged.

(6) *Item 59,* **Lamps (lights) and reflectors.** Observe whether the lights operate properly with the switches at all ON positions and go out when switched off. Operate brake pedal and observe whether the stop lamp (light) functions properly. During blackouts, inspect lamps (lights) with the switch in the blackout position only. Be sure that all lamps (lights) are off after they have been inspected. Inspect all lenses and warning reflectors for dirt or damage; clean if necessary.

(7) *Item 60,* **Fire extinguishers.** Check to see that the entire system is in good condition and securely mounted. If the red blow-off seal on the valve head of the fire extinguisher is blown, or if the extinguisher has been used, report it for refill or replacement. Be sure the nozzles are cleaned of any obstructions such as dirt or corrosion.

(8) *Item 61,* **Decontaminator.** Check to see that it is in good condition and securely mounted.

(9) *Item 62,* ***Battery and voltmeter.** (a)* Check the battery to see that it is clean, secure, and not leaking. Cables and vent caps should be clean and secure. Check the voltmeter to see whether it

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registers at least the nominal battery rating. This is usually indicated by a red line on the face of the instrument.

(b) Weekly. Clean dirt from top of battery. If terminal connections or posts are corroded, clean them thoroughly and apply fresh, thin coating of grease. Tighten terminal bolts if loose. Remove vent caps and check level of electrolyte. Add water if required, taking precautions so that battery will not be damaged during freezing temperatures. Battery should be secure, not bulging, cracked, or leaking electrolyte; battery carrier should be secure, clean, free of rust, and well painted. If mountings are loose, tighten them cautiously so as not to damage the battery case. Report any defects to designated authority.

(10) *Item 63,* ***Accessories and belts.** (a)* Check all accessories such as carburetors, generators, regulators, starters, fans, shrouds, and water pumps for loose connections or mountings. Check adjustment of fan and accessory drive belts. Belts should deflect the amount specified in vehicle Technical Manual; loose or unserviceable belts should be reported to proper authority.

(b) Weekly. Tighten or adjust any loose connections, linkage, or mountings on accessories. Examine all belts for fraying, wear, cracking, or presence of oil. Check all belts half-way between their respective pulleys to determine whether the belts are properly adjusted. Loose belts may cause improper operation of accessories and may become damaged. Tight adjustment may cause damage to both accessories and belts. Ordinarily the driver should not adjust belts except in an emergency. Improper adjustment or unserviceable belts should be reported. On tanks and tanklike wheeled vehicles, also check any accessory drive shafts, couplings, or universal joints to see that they are secure and not leaking or damaged.

(11) *Item 64,* ***Electrical Wiring.** (a)* Check all ignition wiring to see that it is securely connected, clean, and not damaged.

(b) Weekly. Check all accessible wiring to see that it is securely connected and supported, that the insulation is not cracked or chafed, and that its conduits and shielding are in good condition and secure. Report any unserviceable wiring.

(12) *Item 65,* ***Air cleaners and breather caps.*** If operating under extremely sandy and dusty conditions, inspect the air cleaners and breather caps to see that they are in condition to deliver clean air properly. Service in accordance with instructions on WDLO.

(13) *Item 66,* ***Fuel filters.** (a)* On Cuno type filters, turn the handle one complete turn. Check all fuel filters for leaks.

(b) Weekly. On vehicles where the fuel tank is above the filter, close the shut-off valve in the fuel line. Remove the drain plug to allow water and sediment to drain out of the filter bowl. Then

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replace drain plug, tighten it securely, reopen shut-off valve in fuel line, and note whether fuel is leaking from the drain plug. On a filter with two plugs in bottom of bowl, the plug to one side is the drain plug.

(14) *Item 67, Engine controls.* Check for worn or disconnected linkage. Also correct or report any unsatisfactory engine control linkage operation noted during operation.

(15) *Item 68, *Tires and/or tracks. (a)* Remove all foreign matter such as nails, glass, or stones from tires or from between duals. Examine tires for signs of low pressure, abnormal tread wear, cuts, position of valve stems, and presence of valve caps. All tires with cuts extending to or into the cord body or worn smooth in center of tread, must be reported immediately to the designated person or authority for corrective action. Examine tracks for worn or bent guides, loose wedge nuts, and proper track adjustment. Solid rubber tires must be kept free from acids, oils, and grease.

(b) Weekly. Check tires for proper matching and irregular wear and change position as required. On tracks, tighten all loose wedge nuts securely. Check track blocks, connectors, and wedges for excessive wear. Check track adjustment according to specifications in vehicle Technical Manual; adjust if necessary.

(16) *Item 69, *Springs and suspensions. (a)* Check the springs to see whether they have abnormal sag, broken or shifted leaves, loose or missing rebound clips, eyebolts, U-bolts, or shackles. Also check shock absorbers and any torque rods to see that they are secure and not damaged. On track vehicles, inspect bogie frame and arms, upper and lower rollers, and solid rubber tires for looseness, wear, or damage. Inspect the sprockets and idler wheels for loose mounting and assembly bolts, and loose spring-loaded idler lock nuts. Check for oil leaks at seals or gaskets. Remove all stones and trash lodged in the assemblies.

(b) Weekly. Tighten or report any springs that have abnormal sag, broken or shifted leaves, loose or missing rebound clips, eyebolts, U-bolts, shackles, and torque rods. On track vehicles, tighten bogie crab, connecting link, arm, roller bolt nuts, and spring-loaded idler lock nuts. Examine condition of the guides, sprockets, idlers, and rollers for wear and damage, and report any defects.

(17) *Item 70, Steering linkage.* Check the steering linkage to see whether parts are bent, loose, or inadequately lubricated. Note and report any steering stop screws which are not serviceable. Also check steering knuckles and steering gear cases for leaks.

(18) *Item 71, Propeller shafts, center bearings, and vent.* Check these items for loose connections, lubricant leaks, and damage, paying particular attention to loose mountings and clogged vents.

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(19) *Item 72, *Axle and transfer vents. (a)* Check all axle housings and transfer vents to see that they are present, in good condition, and secure. Free all breather vents of obstructions.

(b) Weekly. Clean all vents thoroughly. If a vent is equipped with a cleaning element, it should be removed and cleaned in accordance with instructions on WDLO.

(20) *Item 73, Leaks, general.* Check under the hood or in the engine compartment and beneath the vehicle for indications of fuel, oil, or water leaks. Check around brake drums and axle flanges for indications of lubricant leaks. Trace all leaks to their source and correct or report them.

(21) *Item 74, Gear cases.* Check differentials, final drives, transmissions, and transfer units for leaks.

(22) *Item 75, *Air-brake tanks. (a)* Open pet cocks to drain water (condensation). Check to see that tanks and air-line connections are secure.

(b) Weekly. Tighten tank mounting and all air-line connections that are loose. Clean air-line rubber hose of any grease or oil.

(23) *Item 76, Fenders and bumpers.* Check these items to see that they are in good condition and secure.

(24) *Item 77, *Towing connections. (a)* Inspect towing hooks, truck-tractor fifth wheel, or pintle hook and safety chains for looseness or damage. Also check to see that the safety chains are connected correctly to vehicle and trailer.

(b) Weekly. Lower the trailer landing gear, observing whether it operates properly, is adequately lubricated, not damaged, and secure. Unhitch the trailer. Clean the contacting surfaces of the fifth wheel, upper plate, and king pin thoroughly. Inspect them for wear and damage, and apply a fresh coating of clean grease. Tighten all mounting bolts. Rehitch the trailer, noticing whether the hand lever works easily, and whether the latching mechanism closes completely and latches securely.

(25) *Item 78, Body, load, and tarpaulin.* Inspect the cargo body carefully for damage or loose parts. The load should be evenly distributed and secure. Tarpaulin should cover the load to protect it against the elements. All ropes should be lashed securely to hooks or rings. Check tarpaulin and curtains for rips or holes, missing or worn grommets, and ropes.

(26) *Item 79, Armor and front roller.* Inspect for damage, broken welds, and loose mounting bolts, screws, or rivets. Check to see that the front roller can be revolved. Check door and windshield armor shields, compartment doors, and peep-hole and pistol-port covers for damage; also check their hinges, latches, and supports for proper functioning. Check radiator shutters for damage

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and proper operation of controls. Report any damaged or missing parts. Tighten all loose bolts, nuts, or screws securely.

(27) *Item 80, Vision devices.* On combat vehicles, check all periscopes and protectoscopes for damage to covers, lenses, and prisms; see that they are secure in their holders and that all mountings are tight. If necessary, clean lenses and prisms according to specific instructions. See that adequate spares are present, in good condition, and properly stowed.

(28) *Item 81, Turret and gun: mounting and elevating, stabilizer, traversing, and firing controls.* The designated members of the crew should check all mounted guns to see that they are secure on their mounts, clean, lightly oiled, and in condition for immediate use. Check gun-elevating mechanism and firing controls for proper operation. Check the stabilizer and gun-traversing mechanism as follows: Check the level of oil in the reservoir according to instructions on WDLO. Check all exposed wiring to see that it is secure and not damaged. Check packing glands, oil lines, piston and cylinder assembly, and drain plugs for leaks. Check both manual and hydraulic traversing mechanism to see that it is in good condition and operates properly. Report any deficiencies noted to proper authority.

(29) *Item 82, *Tighten: wheel, rim, axle drive flange, and spring U-bolt nuts. (a)* Tighten all loose wheel mountings, rim nuts, and axle drive flange, and spring U-bolt nuts, or any other point where inspection indicates the necessity. Report any damaged wheels, rims, rings, or flanges, or missing nuts and studs.

(b) Weekly. On duals, be sure to tighten the inner nuts as well as outer nuts.

(30) *Item 83, Lubricate as needed.* Lubricate equipment in accordance with instructions on the pertinent WDLO.

(31) *Item 84, *Clean engine and vehicle. (a)* Clean dirt and trash from inside of cab and body. Remove excessive dirt or grease from the exterior of the engine. Thoroughly clean the interior of the fighting compartment on tanks also.

(b) Weekly. Wash the vehicle when possible. If not possible, wipe off thoroughly. Do not rub lusterless paint enough to create a shine that might cause reflection. If the vehicle is washed in a stream, river, or lake, care must be taken to see that water or dirt does not get into the wheel bearings, gear cases, or brakes. On tanks, clean all dirt, trash, fuel, and oil drippings from the engine compartment, being particularly careful to remove dirt and trash from between the lower cylinders of radial engines and the compartment floor. Also clean fighting compartment in same manner, being sure to remove all dirt or grease smears from the walls and floors.

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(32) *Item 85, *Tools and equipment.* *(a)* Check with vehicle stowage lists to see that all tools and equipment assigned to vehicle are present and properly stowed or mounted.

(b) Weekly. Clean all tools and equipment of rust, mud, or dirt and see that they are in good condition. Report missing or unserviceable items to proper authority.

(33) *Item 86, *Amphibian items.* *(a)* Perform any additional amphibian services peculiar to the vehicle involved. See vehicle Technical Manual for procedures.

Note. Check the hull compartments to see that they are properly ventilated and that there is no accumulation of explosive or inflammable gases indicated by strong gaseous odors. If there are any such odors, their source should be located, and the trouble corrected or reported to designated authority.

(b) Weekly. Perform any additional weekly amphibian services peculiar to the vehicle involved. See vehicle Technical Manual for procedures. Clean hull compartments thoroughly of all fuel, oil, or water, so that they will be free of explosive or inflammable gases. Report or correct excessive leaks to designated authority.

(34) *Item 87, *Materials handling equipment items.* *(a)* Perform any additional services peculiar to materials handling equipment. See publications pertaining to specific vehicle involved for these instructions.

(b) Perform any additional weekly services peculiar to the vehicle involved. See pertinent vehicle publications for procedures.

(35) *Item 88, *Special engineer items.* *(a)* Perform any additional services peculiar to special engineer equipment. See publications pertaining to specific vehicle.

(b) Perform any additional weekly services peculiar to the vehicle involved. See pertinent vehicle publications for procedures.

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SECTION III

SECOND-ECHELON PREVENTIVE MAINTENANCE SERVICES AND TECHNICAL INSPECTIONS OF MOTOR VEHICLES

12. General

a. PREVENTIVE MAINTENANCE SERVICES. Regularly scheduled maintenance inspections and services are a preventive maintenance function and are the responsibility of the commanders of operating organizations. An efficient control system (Preventive Maintenance Roster, WD AGO Form 460) is an essential aid in determining when vehicles are due for periodic maintenance services either because of time elapsed or mileage accumulated. These preventive maintenance services include—

(1) Maintenance services by company, detachment, or similar units.

(*a*) Wheeled and half-track vehicles at monthly intervals.

(*b*) Full-track or tanklike wheeled vehicles at monthly intervals.

(*c*) Special engineer equipment at weekly intervals.

(2) Maintenance services by regiment, separate battalion, separate squadron, separate company, or separate detachment.

(*a*) Wheeled and half-track vehicles at semiannual intervals.

(*b*) Full-track and tanklike wheeled vehicles at quarterly intervals.

(*c*) Special engineer equipment at monthly intervals.

(*d*) Motorcycles at monthly intervals.

b. INTERVALS. The frequencies of preventive maintenance services outlined herein are considered a minimum requirement for normal operation of vehicles.

Note. Under unusual operating conditions it may be necessary to perform the maintenance services more frequently.

When preventive maintenance services are performed on materials handling equipment the 48-hour services will be accomplished in accordance with the schedule in the monthly service given on WD AGO Form 461; and the 192-hour services will be accom-

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plished in accordance with the schedule in the semiannual service on WD AGO Form 461.

c. FIRST ECHELON PARTICIPATION. (1) The driver and assistant driver, or the crew, should accompany their vehicles and assist the mechanics while periodic second-echelon preventive maintenance services are performed.

(2) Ordinarily, the driver, or the crew, should present the vehicle for a scheduled preventive maintenance service in a reasonably clean condition; that is, it should be dry and not caked with mud to such an extent as to hamper inspection and services seriously. However, cleaning of the vehicle should be avoided prior to an inspection, since certain types of defects like loose parts and oil leaks may not be evident immediately after washing.

d. TECHNICAL INSPECTIONS. These inspections are performed by technically qualified personnel of third, fourth, and fifth echelon, under direct supervision of technically qualified officers. There are two types of technical inspections, limited and complete.

(1) Complete technical inspections consist of thorough examinations and tests of matériel to determine the serviceability, completeness, and readiness for intended use of the equipment to be issued to troops. (See WD AGO Forms 461, 462, 463, and 464.)

(2) Limited technical inspections consist of examinations to determine the extent of serviceability, and to classify matériel as to general condition. (See WD AGO Form 461–5.)

13. Preventive Maintenance Services and Technical Inspection Work Sheets

a. For purposes of establishing uniform procedures for preventive maintenance services and technical inspection, the many different types and models of motor vehicles have been grouped into four general classifications. A work sheet has been provided for each group as follows:

(1) *WD AGO Form 461, "Preventive Maintenance Service and Technical Inspection Work Sheet for Wheeled and Half-track Vehicles."* (See figs. 14 and 15.) This group includes passenger cars, trucks, trailers, scout cars, light armored cars, half-track cars, materials handling equipment and amphibians.

(2) *WD AGO Form 462, "Preventive Maintenance Service and Technical Inspection Work Sheet for Full-track and Tanklike Wheeled Vehicles."* (See figs. 16 and 17.) This group includes track-laying vehicles such as tanks, self-propelled gun mounts, and tractors, as well as tanklike wheeled vehicles.

(3) *WD AGO Form 463, "Preventive Maintenance Service and Technical Inspection Work Sheet for Motorcycles."* (See fig. 18.) This group includes motorcycles and motor scooters.

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(4) *WD AGO Form 464, "Preventive Maintenance Service and Technical Inspection Work Sheet for Engineer Equipment."* (See figs. 19 and 20.)

b. The general procedures listed below are to be applied to each of the above forms in conducting the maintenance services and technical inspection. The specific procedures for each form explain in detail the manner in which each item listed on the forms is to be inspected and serviced.

c. Due to their similarity, the procedures for the semiannual maintenance service and for the technical inspection, have been listed on the same form. Ordinarily, however, the technical inspection is performed by third or higher echelon, while the semiannual service is performed by second echelon.

d. If instructions other than those contained in either the general or the specific procedures are required for the correct performance of a preventive maintenance service or for the correction of a deficiency, the motor officer or the vehicle manual should be consulted.

14. General Procedures

a. These general procedures are basic instructions which are to be followed when performing the services on the vehicle items listed on the preventive maintenance service work sheet.

Note. Second echelon personnel must be so thoroughly trained in these procedures that they will apply them automatically.

b. All of the required identification data for the vehicle should be entered in the space provided at the top of each form. The vehicle nomenclature should be complete; the U.S.A. registration number, operating organization, date, and mileage reading should also be recorded.

c. In order to indicate on the work sheet whether one of the periodic preventive maintenance services or the technical inspection is being performed, line out all words in the headings that do not apply to the service or inspection to be performed. Items not pertinent to the vehicle inspection will be lined out as shown on sample WD AGO Form 461. (See figs. 14 and 15.)

d. Opposite each item on these work sheets, a rectangle or box is placed, either under the periodic maintenance service heading, under the technical inspection heading, or under both. These boxes indicate which of the maintenance services or inspection is to be performed for each item. Each box indicates that the item is to be inspected and corrected when necessary. Special service symbols like C, T, A, L, or S appear in some of the boxes. These symbols indicate that certain additional mandatory services are to be performed, and are explained in detail in m below.

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e. The items in the column not lined out on each of the above forms should be performed in the sequence in which they appear in the appropriate vehicle Technical Manual, since they have been arranged for economy of motion. When no vehicle Technical Manual is available, the items should normally be performed in the numerical sequence as listed in this manual. When obvious circumstances dictate, the sequence may be altered to meet the requirements of the using organization.

f. All defects should be corrected upon discovery, or reported or evacuated to higher echelon for correction.

g. The condition in which items are found and the correction of defects will be indicated by the following markings:

(1) Mark the box with a (√) if found satisfactory.

(2) Mark the box X if adjustment is required.

(3) Mark the box (X) when adjustment is made.

(4) Mark the box XX if repair or replacement is required.

(5) Mark the box (XX) when repair or replacement is completed.

(6) When a defect is found and not corrected, or if correction is to be made by higher echelon, explain under REMARKS, recording the item number for identification. When such a defect is corrected, either by organization mechanics or by higher echelon mechanics, the symbol X or XX will be circled thus (X) (XX), and the explanation under REMARKS initialed.

(7) Only those items described in (6) above will be recorded under remarks and recommendations.

(8) All mandatory services required at the monthly, semiannual inspections or similar services on WD AGO Forms 461, 462, 463, and 464 will be marked with a circle, thus: (CS) (L) (A) (CLA) indicating that these services have been completed. (See fig. 14.)

h. According to AR 850–15, the following considerations will govern in determining whether a maintenance operation should be referred to a higher echelon, or performed by the operating organization: Repair to motor vehicles will be performed in the lowest echelon of maintenance consistent with—

(1) Nature of repairs.

(2) Availability of authorized spare parts, tools, and equipment.

(3) Capabilities of personnel.

(4) Tactical situation.

i. After a technical inspection, the vehicle should be restored to a safe operating condition, unless it is to be deadlined for repair. Any disassembled parts or assemblies that are damaged in handling during the inspection should be replaced by serviceable ones.

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j. The preventive maintenance services should be performed without disassembling units, unless prescribed in the procedures, or unless disassembly should be made in accordance with instructions in the vehicle manual. Ordinarily, new gaskets should be used when the parts are reassembled.

k. When new or overhauled subassemblies are installed to correct deficiencies, care should be taken to see that they are clean, and properly lubricated and adjusted.

l. The general inspection of each item applies also to any supporting member or connection, and usually includes a check to see whether the item is in good condition, correctly assembled, secure, or excessively worn. The mechanics must be thoroughly trained in the following explanations of these terms.

(1) The inspection for "good condition" is usually an external visual inspection to determine whether the unit is damaged beyond safe or satisfactory limits or whether it is in such a condition that damage will result during operation. The term "good condition" is explained further by such terms as the following: Not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not deteriorated, and adequately lubricated.

(2) The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to determine whether it is in its normal assembled position in the vehicle.

(3) The check of a unit to determine whether it is "secure" is usually an external visual inspection, a hand-feel, a pry-bar or wrench check for looseness in the unit. Such an inspection will always include any brackets, and all lock washers, lock nuts, locking wires, or cotter pins, used to secure the tightening.

(4) The frequently used term, "excessively worn," will be understood to mean worn close to or beyond serviceable limits, and likely to result in failure if not replaced before the next scheduled inspection.

m. Special service symbols, as applied to the items of the periodic preventive maintenance services, indicate that the part is to receive certain mandatory services. For example: An inspection box with a T in it indicates that the part must not only be secure, but that the mounting bolts must be tightened properly with a wrench. These symbols are—

(1) *A, Adjust.* Make all necessary adjustments in accordance with the vehicle Technical Manual, special bulletins, or other current directives.

(2) *C, Clean.* *(a)* Clean units of the vehicle to remove lubricant or dirt, using dry-cleaning solvent. After the parts are cleaned, rinse them in clean fluid and dry them well. Take care to

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keep the parts clean until reassembled. Keep cleaning fluid away from rubber or other material which it will damage.

(b) Clean the protective grease coating from new parts. This material is usually not a good lubricant.

(c) Clean hydraulic brake cylinder parts in clean brake fluids or alcohol. Do not use petroleum base cleaning fluids on such parts.

(3) *L, Special lubrication* applies either to lubrication operations that do not usually appear on the vehicle lubrication chart, or to items that do appear on such charts but should be performed in connection with the maintenance operations if parts must be disassembled for inspection.

(4) *S, Serve* usually consists of performing special operations, such as replenishing battery water, brake fluid, and shock-absorber fluid; draining and refilling units with oil; and changing or cleaning the fuel or oil-filter cartridge.

(5) *T, Tighten.* All tightening operations should be performed with sufficient wrench torque (force on the wrench handle) to tighten the unit according to good mechanical practice, using proper tool without additional extension handle. Use torque-indicating wrench where specified. Do not overtighten, as this may strip threads or cause distortion. Tightening will always be understood to include the correct installation of lock washers, lock nuts, and cotter pins or locking wires provided to secure the tightening.

n. When conditions make it difficult to perform the complete preventive maintenance service at one time, it can sometimes be handled in sections, planning to complete all operations within the week if possible. All available time at halts, rest periods, and in bivouac areas must be utilized if necessary to assure that maintenance operations are completed. When limited by the tactical situation, items marked with special service symbols in the boxes should be given first consideration.

o. If a job order (WD AGO Form 811) is used when a vehicle is sent to a higher echelon for the correction of any defect beyond the scope of organization maintenance, the job order number will be inserted in the space provided on the reverse side of the form.

p. The forms may be reduced to convenient size for filing by folding up to the line marked "Vehicle Nomenclature" but are to be filed only after all items marked X or XX have been corrected.

15. Specific Procedures for Wheeled and Half-track Vehicles

a. USE OF WD AGO FORM 461. (1) The items on this form should be performed in the numerical sequence in which they are listed wherever possible, since they have been so arranged for maximum efficiency and economy of motion. The general order of the listed items is—

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(a) A road test, and items closely related to it.
(b) Maintenance operations.
1. Operations in the engine compartment.
2. A group of chassis, body, and attachment items.
3. A group of items pertaining to half-track vehicles.
4. A group of items pertaining especially to amphibian vehicles.
5. A group of items pertaining especially to trailers.
6. A group of items pertaining especially to materials handling equipment.
(c) Tools and equipment.
(d) Final road test.

(2) Any items on half-tracks, trailers, amphibians, and materials handling equipment which are common to other wheeled vehicles should be serviced and inspected in the same manner as the wheeled vehicles. The trailer items which are common to wheeled vehicles are marked with an asterisk (*) for identification.

(3) If at any time it is necessary to disassemble a unit, any special services indicated on the semiannual maintenance should be performed on the item.

(4) All inspection work sheets will be retained in organizational equipment files (WD AGO Form 478) until the next semiannual or quarterly service is completed. Records of previous inspections will then be discarded. Work sheets for motorcycles will be discarded semiannually. In cases where vehicles are turned in or transferred to other organizations, the current preventive maintenance service and technical inspection work sheets and WD AGO Form 478 will accompany each vehicle.

b. PERFORMING ITEMS ON WORK SHEET. Specific procedures for performing each item on the monthly (48 hours for materials handling equipment) and semiannual (192 hours for materials handling equipment) maintenance services, and in the technical inspection are described in the following pages. Each of these pages of specific procedures has three columns at its left edge, corresponding to the monthly maintenance, the semiannual maintenance, and the technical inspection of WD AGO Form 461, respectively. While the semiannual maintenance and technical inspection are both indicated in the same column on the work sheet, separate columns are provided in the procedure pages for clarification. The detailed procedures for each maintenance service and technical inspection will be found on the following pages opposite the item numbers in the procedure columns. Very often it will be found that a particular procedure does not apply to both the monthly maintenance, the semiannual maintenance, and to the technical inspection. In order to determine which procedures to

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follow, it is necessary simply to follow the item number down the appropriate column opposite the paragraphs whenever they are to be applied.

The following sample from the pages of specific procedures that follow illustrates the manner in which they are to be used. Suppose work is being done on the monthly maintenance service. Item number 20, in this sample, appears in the monthly (M) maintenance column opposite the first paragraph only, indicating the necessary procedure.

Tech. Insp.	S	M	SAMPLE	
		20	**Spark Plugs.** Examine the installed spark plugs to see that their insulators are in good condition and clean; note any evidence of leakage around the insulators or gaskets.	Applies to monthly maintenance only.
20	20		Remove the spark plugs and examine for poor condition, paying particular attention to broken insulators, excessive carbon deposits, and to electrodes which are burned thin. Replace unserviceable plugs. Report excessive deposits or damaged insulators, as these conditions may indicate incorrect heat range.	Applies both to technical inspection and semiannual maintenance.
	20		CLEAN. Clean the deposits from the insulators and electrodes, and check the insulators to see whether they are cracked. If a plug cleaner is not available, install new or reconditioned plugs.	Applies to semiannual maintenance only.
	20		ADJUST. Adjust gaps to specifications by bending the grounded electrodes. After completing item number 21, reinstall the plugs, using new gaskets and taking care not to overtighten them as this may cause distortion and damage.	

Similarly, the figure 20 appears both in technical inspection and in the semiannual (S) maintenance columns opposite the second paragraph, indicating that this procedure is to be performed on both of these operations.

The figure 20 again appears in the semiannual (S) maintenance column only opposite the mandatory special services, *clean* and *adjust*. This corresponds with WD AGO Form 461, where the letters C and A are placed in the semiannual maintenance box opposite item number 20, indicating that the spark plugs must be cleaned and adjusted semiannually.

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ROAD TEST

Tech. Insp.	S	M

The driver of a vehicle is often unaware of defects in his vehicle which have developed gradually, and to which he has become accustomed. The fact that many drivers lack the ability to detect the developing causes of vehicle failures, makes it desirable for the mechanic to road-test the vehicle as part of the periodic preventive maintenance services. During and before this road test, any repairs or adjustments necessary to insure safe operation should be made. The appropriate paragraph in the following service procedures should be consulted. If a defect is found on the road test which does not require immediate correction, note it on the check sheet and make provisions for securing necessary replacement parts or units. The defect can be corrected later during the service.

Note. If the tactical situation does not permit a full road test, perform items 2, 3, 4, 5, 6, 9, 10, 11, 12, and 14 which require slight or no movement of the vehicle. When a road test is possible, it should be for a distance and under conditions suitable to determine condition of vehicle.

Before-operation Service

1	1	1

Perform the before-operation service as outlined in section II as a check to determine whether the vehicle is in a satisfactory condition to make the road test safely, and that it is adequately supplied with fuel, engine oil, and coolant.

Air Pressure Build-up (Governor Cut-off and Low Pressure Indicator

2	2	2

During the warm-up period, operate the engine at fast idle speed and observe whether the brake air pressure builds up at a normal rate to the specified maximum limits, and whether the governor then cuts off to stop compressing action. Observe whether the indicator signal stops as pressure is built up above the danger point.

Dash Instruments and Gauges

3	3	3

Observe as follows:

OIL PRESSURE AND VISCOMETER. Observe oil

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Tech. Insp.	S	M

pressure at frequent intervals and under all conditions of engine speed to see that the oil pressure is as specified in the vehicle manual, and that the viscometer reading is normal.

Caution: If the gauge indicates zero or excessively low oil pressure, stop the engine immediately and investigate the cause.

AMMETER AND VOLTMETER. Observe the ammeter to see that it is indicating normally. With the battery fully charged, the reading should show charge for a short time after starting motor, and then return to slightly above zero with all lights and electrical accessories switched off. If the battery is low, charge will be indicated for a longer period of time. Press the voltmeter switch and observe whether it indicates. The ammeter needle should show only slight fluctuation.

SPEEDOMETER, ODOMETER, AND TACHOMETER. Watch the speedometer and tachometer for proper operation, excessive fluctuation, and unusual noises that might indicate worn or damaged gears or cable. Note whether the odometer is regulating the accumulating mileage satisfactorily.

TEMPERATURE. Note the temperature gauge to see that it indicates in the normal range. The temperature should increase gradually during the warm-up period and normally should not exceed 180°F. The temperature at which the gauge hesitates indicates the opening of the theromstat. Extremely low temperature after a reasonable warm-up period may indicate that the thermostat is stuck open. Temperatures above normal may indicate that the thermostat is stuck closed or that the cooling system is clogged.

FUEL. Observe whether the fuel gauge indicates the approximate amount of fuel in the tank. On combat vehicles throw the fuel gauge switch from one position to the other to see whether it indicates the approximate amount of fuel in each tank.

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Tech. Insp.	S	M
4	4	4

Horns, Mirrors, and Windshield Wipers

If the tactical situation permits, test the horn to see that the signal is normal. Examine the rear view mirrors and the windshield wiper blades and arms to see that they are in good condition and secure. Observe whether the blades make good contact with the glass, and that they operate properly through their complete stroke without indication of loose motor mountings.

Brakes: Foot, Hand, and Trailer

5 5 5

Operate these brakes at varying vehicle speeds throughout the road test.

FOOT BRAKES. Apply brakes sufficiently to stop the vehicle in minimum distance, observing their effectiveness. Note whether vehicle pulls to one side, observe any unusual noises, pedal travel and feel, and pull-back spring action. On air brakes, also operate the brake hand-application valve to see that it functions properly and is securely mounted and connected.

HAND BRAKE. Stop the vehicle on an incline; then apply the hand brake, and observe whether it holds the vehicle effectively, that the application lever has at least one-third of its travel in reserve, and that the ratchet and pawl latch the applied brake securely.

TRAILER BRAKES. Apply the trailer brakes alone, and observe whether they operate effectively, make any objectionable noise, or if there is any sidesway or other indication of unequalized brake action. Stop the vehicle; operate the electric brake safety switch, or disconnect the air brake hose to trailer to determine the action of the trailer emergency brake system.

Clutch

6 6 6

The clutch pedal should have at least minimum free travel (in accordance with the vehicle manual) before meeting resistance other than the pull-back spring. The pull-back spring should hold the pedal firmly against its stop or

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Tech. Insp.	S	M	
			against the under side of the toeboard. Disengage the clutch fully, and, if after a few seconds, the transmission cannot be shifted into gear without clashing, the clutch is dragging. With the transmission in neutral, depress and release the clutch pedal, and with the engine operating at various speeds, listen for noises that would indicate dry or defective release bearings, defective clutch plate, or pilot bearing.
			GRABBING. Disengage the clutch and place the transmission in low gear. Re-engage the clutch normally. Any jerky motion or sudden engagement would indicate chatter or grabbing.
			SLIPPING. With the vehicle in motion, depress the brake and accelerator simultaneously. The engine should slow down; otherwise, the clutch is slipping.
			Transmission and Transfer
7	7	7	With the vehicle in motion, shift through the entire gear range of the transmission and transfer, noting whether the levers move easily and snap into each position. Also operate declutching lever, making the same observations. With the shifting levers in each position, accelerate and decelerate the engine, noting any unusual noises and tendency of the levers to slip into neutral. This would indicate defective units or misalignment. Excessive vibration of the shifting levers may indicate loose mountings.
			Steering
8	8	8	Steering wheel free play with the vehicle moving straight ahead should not exceed 1 inch. Rotate the steering wheel fully in both directions and note any indication of binding or bumpy feel. The vehicle should show a tendency to straighten out of the turn. As the vehicle is operated at normal speeds, observe any tendency to wander, shimmy, or pull to one side. Examine the steering column and steering wheel to see that they are in good condition and secure.

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Tech. Insp.	S	M
9	9	9

Engine

Observe engine-operating characteristics as follows:

UNUSUAL NOISES. Listen for knocks and rattles as the engine is accelerated, decelerated, and while it is under both light and heavy loads.

ACCELERATION AND POWER. Operate the engine at various speeds in all gear ratios, noting whether the vehicle has normal pulling power and acceleration. Note any tendency to stall while shifting. A slight ping during fast acceleration is normal, continued or heavy ping may indicate early timing, heavy accumulation of carbon, or low octane number fuel.

GOVERNED SPEED. With the vehicle in a low gear, slowly depress the accelerator to the toeboard, and by observing the speedometer reading, see if the vehicle reaches, but does not exceed, the governed speed specified on the caution plate. If the vehicle is equipped with a tachometer, observe whether the engine speed exceeds the specified revolutions per minute.

Unusual Noises

10	10	10

Be on the alert continually for unusual noises that would indicate looseness of parts, damaged, or malfunctioning units in the power train, cab, body, wheels, or tracks.

11	11	11

Brake Booster Operation

VACUUM POWER BRAKE SYSTEM. Stop engine. Apply brakes several times to dispel all vacuum in system. Make a light brake application with the left foot and hold in applied position. Start engine. If system is operating satisfactorily, the pedal will be pulled downward. Remove foot from pedal and allow engine to idle a few seconds. Stop engine and again apply brakes. Pedal should require no more physical effort for the same pedal travel than when engine is operating.

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Tech. Insp.	S	M	
			Hydrovac System
11	11	11	Locate the air cleaner of this unit and listen closely for the sound of air movement while the brake pedal is being operated. The engine should be running so that this test may be repeated several times. Also apply this test with the engine stopped as a check for leaks in the vacuum system. If no air rush can be noticed, this is an indication that the system is inoperative.
			Air-brake System Leak
12	12	12	With the air pressure at the governed maximum and the brakes applied, stop the engine. There should not be a noticeable drop in pressure within 1 minute. If any pressure drop occurs during this check, test the air-brake system for leaks by the soapsuds method as described in the vehicle manual.
			Temperatures
13	13	13	After completing the run, note as follows: BRAKE DRUMS AND HUBS. Feel all the brake drums and wheel hubs cautiously for abnormal temperatures. An overheated brake drum or wheel hub is an indication of a dragging brake, or a defective, dry, or improperly adjusted wheel bearing; an abnormally cool brake drum is an indication of an inoperative brake. AXLES, TRANSMISSIONS, AND TRANSFER. Cautiously feel the axle differentials and carriers, transmission, and transfer case for overheating. If any gear case is excessively hot for the distance traveled, an abnormal condition in the unit is indicated. This should be corrected or reported to proper authority.
			Leaks
14	14	14	Look within the engine compartment and underneath the vehicle for engine oil, water, and fuel leaks, and determine their source.
			Track Tension
15	15	15	At the end of the final road test, examine track

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Tech. Insp.	S	M	
			tension to see that it is within the limits specified by the vehicle manual.

Gear Oil Leaks

16	16	16	Observe the axle housings, transmission and transfer to see that they are not leaking.

MAINTENANCE OPERATIONS

Raise Vehicle Block Safely

Caution: Use necessary precautions to block the vehicle so it may be operated safely in gear at reasonable speeds. If facilities are not available for adequately and safely jacking up and blocking vehicle, omit the services which follow that require running the engine in gear.

Unusual Noises

17	17	17	With the engine running, observe as follows: ENGINE, BELTS, AND ACCESSORIES. Accelerate and decelerate the engine momentarily and listen for any unusual noise in these units that might indicate damaged, loose, or excessively worn engine parts, drive belts or accessories. Also be sure to locate, correct, or report any unusual engine noise heard during the road test.

TRANSMISSION, TRANSFER, PROPELLER SHAFTS AND JOINTS, AXLES, AND BEARINGS. With the transmission in an intermediate gear, and front driving axles engaged, operate these units at a constant, moderate speed by use of the hand throttle, and listen for any unusual noise that might indicate damaged, loose, or excessively worn unit parts. Also observe all propeller shafts and wheels for vibrations or run-out, and for vibrations in the other units which may indicate looseness or unbalance. All of the driven wheels should rotate at approximately the same speed. Slow running wheels may indicate tight brakes or wheel bearings. Also be sure to locate, correct, or report to proper authority any noise noted during road test.

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ENGINE AND ACCESSORIES

Tech. Insp.	S	M	
			Cylinder Head and Gasket
18	18	18	Look for cracks or indications of oil, water, or compression leaks around studs, cap screws, and gasket.
			Caution: Cylinder heads should not ordinarily be tightened unless there is a definite indication of looseness or leaks. If tightening is necessary, use a torque-indicating wrench and tighten in the sequence and to the tension specified in the vehicle Technical Manual. When a new gasket is installed, tighten three times as follows: First, upon installation, second, after engine is warmed up, and third, after completing final road test. On valve-in-head engines, adjust the tappet clearances again to specifications after the final tightening of the head nuts.
			Valve Mechanism
19	19	19	On valve-in-head engines, examine valve tappet clearances while hot. Valve tappets, rocker arms, shafts, and springs should appear in good condition, correctly assembled, and secure. Oil should be delivered properly. Also make sure that the valve cover gaskets are in good condition. On L-head engines, perform the above service only as the need for such service is indicated by valve noises or engine performance.
19			REMOVE valve mechanism covers, check valve clearances and condition of valve mechanisms.
	19		ADJUST. Adjust the clearances to specifications, taking care that the lock nuts are secure when the clearances are last noted during the adjustment.
			Spark Plugs
		20	Examine the installed spark plugs to see that their insulators are in good condition and clean, and that there is no leakage around the insulators or gaskets. When operating conditions require, the spark plugs may be removed for service.

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Tech. Insp.	S	M	
20	20		REMOVE the spark plugs and examine for poor condition, paying particular attention to broken insulators, excessive carbon deposits, and to electrodes which are burned thin. Replace unserviceable plugs. Report excessive deposits or damaged insulators, as these conditions may indicate incorrect heat range.
	20		CLEAN. Clean deposits from the electrodes and insulators, and check again for cracks. If a plug cleaner is not available, install new or reconditioned plugs.
	20		ADJUST. Adjust gaps to specifications by bending to the grounded electrodes. After completing item 21, reinstall the plugs, using new gaskets and taking care not to overtighten them, as this may cause distortion and damage.

Compression Test

21	21		With all spark plugs out, insert the compression gauge in a spark plug hole, and with the throttle wide open, rotate the engine at cranking speed until the maximum compression is indicated. Be sure battery is fully charged. Do not crank the engine more than is necessary to obtain the maximum reading. Record the reading in the space provided on the back of the form. Repeat this process for each cylinder. See the vehicle Technical Manual for specified compression pressures and for variations due to altitude and wear. If pressure in a cylinder is appreciably below normal, squirt sufficient engine oil on the piston head to prevent loss of compression temporarily, and recheck.

Note. Be sure no oil gets on valves. Low compression, brought up to normal by oil sealing, indicates piston, ring, or cylinder wear or damage. Low compression, not brought up to normal by this method, indicates valve or gasket leakage.

Battery (Cables, Hold-downs, Carrier, Record Gravity, and Voltage)

22	22	22	Inspect battery case for cracks and leaks. Clean top of battery. Inspect cables, terminals, bolts, posts, straps, and hold-downs for good condi-

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Tech. Insp.	S	M	
			tion. Test specific gravity and record on WD AGO Form 461. Normally specific gravity readings below 1.225 indicate battery should be recharged or replaced. Electrolyte level should be above top of plates and may extend approximately ½ inch above plates.
22	22		PERFORM high rate discharge test according to instructions for (condition) test which accompany test instrument, and record voltage on WD AGO Form 461. Cell variation should not be more than 30 per cent for meters reading in percentages of charge.
			Note. Normally specific gravity must be above 1.225 to make this test.
	22	22	CLEAN AND SERVE. Bring electrolyte to proper level by adding distilled or clean water. Clean entire battery and carrier. Repaint carrier if corroded. Clean battery cable terminals, terminal bolts and nuts, and battery posts. Inspect bolts for serviceability. Tighten terminals and hold-downs carefully to avoid damage to battery. Grease terminal connections lightly.
			Crankcase
23	23	23	With engine idling, examine crankcase, valve covers, timing-gear cover, and clutch housing for oil leaks. Stop the engine and after oil has drained into the crankcase, see whether the oil is at the proper level.
	23	23	*Note.* If an oil change is due, service crankcase according to instructions on WDLO. Do not start the engine again until Item 24 is completed.
			Oil Filters, Coolers, and Lines
24	24	24	Inspect oil filters, coolers, and all external engine oil lines to see whether they are in good condition, secure, and do not leak.
			Radiator (Core, Shell, Shutters, Mountings, Hose, Cap and Gasket, Overflow Tank, and Steam Relief Tube and Valve)
25	25	25	See that these items are in good condition, correctly assembled, securely mounted and connected, and do not leak; note whether the core

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			air passages are obstructed with dirt, insects or trash, and whether the core fins are badly bent; examine the shutter-control linkage to see that it is in good condition, secure, and operates properly; note whether the steam-relief valve operates freely and is in correct position for the prevailing atmospheric temperature. Also examine the coolant to see whether it is so contaminated with rust, oil, or other foreign matter that the cooling system should be cleaned. If cleaning is necessary, clean according to current directives, using only specified cleaner. Refill radiator with coolant, adding specified inhibitor, unless new antifreeze, which contains inhibitor, is used. Do not fill to top; allow room for expansion.
			ANTIFREEZE. If antifreeze is in use, determine its protective value and record in the space provided on the reverse side of the work sheet.
	25	25	CLEAN. Clean the dirt, insects, and trash from the exterior of the core by blowing out with compressed air or with a stream of water applied carefully from the rear side of the core. (Do not use steam.)
			Caution: Use only a suitably shaped piece of wood or blunt instrument in straightening fins; otherwise tubes may be punctured.
	25		TIGHTEN. Tighten all loose radiator mountings and hose clamps.
			Water Pump, Fan, and Shroud
26	26	26	Observe water pump to see that it is in good condition, not leaking, and securely installed. Loosen drive belts and leave them loose until adjustment is made (item 29). Examine shaft for end play and loose bearings. Inspect fan blades to see whether they are in good condition, properly secured to the hub, and whether the shroud is in good condition, properly aligned with the fan, and securely mounted.
	26	26	TIGHTEN. Tighten packing gland nut cautiously. Do not overtighten as this may cause scoring of the shaft and leakage.

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Tech. Insp.	S	M	
			Generator, Starter, and Switch
27	27	27	Note whether these items are in good condition, securely mounted, and whether the wiring connections are clean and secure; see that the starter linkage and retracting spring are in good condition and secure.
27	27		REMOVE the generator and starter inspection covers and see that the commutators and brushes are in good condition and not excessively worn; that the brushes are free in the holders and have sufficient spring tension to hold them in contact with commutator; and that the brush-connecting wires are secure and not chafing.
	27		CLEAN. Clean the commutator end of the generator and starter by blowing out with compressed air. If the commutator is dirty, clean with grade 2/0 flintpaper only, according to instructions in the vehicle manual, and blow out the dust with compressed air.
	27		TIGHTEN. Tighten the starter mounting bolts securely.
			Air Compressor
28	28	28	Examine the air compressor to see that it is in good condition, properly aligned with its drive pulleys, and secure. Observe the unloader valve for satisfactory valve clearance. See that the governor appears to be in good condition and secure; that all the compressor water, oil, and air lines within the engine compartment are in good condition and secure, and that the oil and water lines do not leak.
	28	28	CLEAN. Clean the governor air strainer in dry-cleaning solvent; dry and reinstall.
	28	28	SPECIAL LUBRICATION. Refer to WDLO for instructions.
	28		ADJUST. Adjust unloader valve clearances to specifications.

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Tech. Insp.	S	M	
			Drive Belts and Pulleys
29	29	29	Observe all drive belts for evidence of fraying condition, excessive wear, and deterioration. See that all drive pulleys and hubs are in good condition and securely mounted.
	29	29	ADJUST. Adjust all accessory drive belts to specified tension.
			Tachometer Drive and Adapter
30	30	30	See that they are in good condition, correctly assembled, and secure. Inspect the flexible drive shaft connection for indications of oil leaks.
			Distributor
31	31	31	Observe whether the distributor body and external attachments are in good condition and secure. Examine other parts of the distributor as follows:
			CAP, ROTOR, AND POINTS. Blow or wipe the dirt or dust from the distributor cap, remove the cap, and see that the cap, rotor, and the breaker-plate assembly parts are in good condition, correctly assembled, secure, and serviceably clean. Pay particular attention to cracks in the cap and rotor, corrosion of terminals, and connections in these parts, and to burning of the outer ends of the conductor strap of the rotor. Also see whether the breaker points are in good condition, well aligned, and adjusted to the specifications in the vehicle manual. If the breaker-plate assembly is unserviceably dirty, remove the distributor, clean in dry-cleaning solvent, dry with compressed air, lubricate parts as specified below, and reinstall in its correct position for timing. When cleaning the distributor, remove the wick and lubrication cup, clean and dry them while removed, and reinstall only after the distributor assembly is cleaned and blown dry with compressed air. If the breaker points are pitted, burned, or worn to an unserviceable condition, install a new set of points.

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Tech. Insp.	S	M	
			If the points are badly pitted, replace the condenser also, as it is probably the cause of the pitting. Install the new points so that they are well aligned and engage squarely. If the points are slightly pitted or burned, dress them with a contact point dresser or grade 2/0 flintpaper (do not use emery cloth), and remove the filings with compressed air.
			SHAFT. Test by hand-feel for looseness, to determine whether or not the distributor camshaft is excessively worn in its bushings.
			CENTRIFUGAL ADVANCE. Install the rotor on the upper end of the distributor camshaft and note whether the camshaft can be rotated by finger force through the normal range of movement which is permitted by the centrifugal-advance mechanism. Note also whether it returns to its original position when the fingers are removed from the rotor and that there is no binding or hanging up in the mechanism during this check.
			VACUUM ADVANCE. See that the vacuum-advance mechanism and its vacuum lines are in good condition, correctly assembled and secure; (that the vacuum advance mechanism can be moved by finger force through its normal movement; that, as the finger force is removed, the diaphragm spring returns the mechanism to its original position; and that the mechanism does not bind or hang up during this check.)
	31	31	SPECIAL LUBRICATION. See WDLO for instructions.
	31		ADJUST. Adjust the breaker point gap according to the specifications in the vehicle Technical Manual.

Coil and Wiring

32	32	32	Examine the coil to see that it is in good condition, clean, and securely mounted. All high-voltage ignition wiring, including shielding or conduits, should be in good condition and securely fastened to all support mountings and terminals. See that all insulation and connec-

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Tech. Insp.	S	M	
			tions are clean. Inspect all low voltage wiring in the engine compartment in the same manner.
			Note. Do not tighten wiring connections unless actually loose as overtightening of terminals will cause damage.
			Manifolds and Heat Control
33	33	33	Observe the intake and exhaust manifolds to see that they are in good condition, secure, and that manifold gaskets appear to be in good condition and not leaking. On a manually-operated manifold heat control, determine if it is in good condition, secure, and that the control adjusting pointer is in place and set at the correct seasonal position. If the control is automatic, note whether the bi-metal control spring is in good condition and securely connected to the heat-control valve shaft and mounting; that the shaft operates freely; and that the spring controls the shaft and valve properly.
	33		TIGHTEN. Tighten all manifold assembly, mounting, exhaust pipe, and carburetor connecting flange nuts evenly and securely.
			Air Cleaners
34	34	34	Remove all carburetor, Diesel, or air-compressor air cleaner elements. See that all gaskets, seals, clamps, and any connecting hose or tubes are present and in good condition. Observe the condition of the cleaning elements, baffles, and body. Note the oil in the reservoir of oil-bath cleaners, paying particular attention to the amount of dirt present in the oil. Also see that the oil level is satisfactory.
	34	34	CLEAN AND SERVE. Service air cleaner in accordance with instructions on WDLO. Install air cleaner, being careful that it is pressed firmly into place and that the mounting is secure. If the air cleaner is equipped with an external air baffle, see that it is correctly aligned with the air stream from the fan. Also note whether any connecting hose is in good condition and properly clamped to the air cleaner and air horn.

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Tech. insp.	S	M	
			Breather Caps and Ventilators
35	35	35	See that they are in good condition, correctly assembled, secure, and that the ventilator tubes are open.
	35	35	CLEAN AND SERVE. Refer to WDLO for instructions.
			Carburetor (Choke, Throttle, Linkage, Governor)
36	36	36	See that these items are in good condition, correctly assembled, and securely installed; that the carburetor does not leak; that the control linkage, including the choke and throttle shaft, is not excessively worn; that the choke valve opens fully when the control is in its released position; that the throttle valve opens fully when the accelerator is fully depressed; and that the governor is secure and properly sealed.
			Fuel Filters, Screen, and Lines
37	37	37	Examine all fuel filters and sediment bowls, fuel lines, and connection, to see that they are in good condition, secure, and not leaking.
	37	37	CLEAN. Close the fuel shut-off valve, and remove filter bowls, gaskets, and filter elements or screens; and, without disassembling the disk type filters, clean the filter elements, sediment bowls, and screens in dry-cleaning solvent. Dry the elements thoroughly. Be sure to include any screen or filter element at carburetor fuel line connection or at the fuel pump. Reinstall the removed parts, using new gaskets. Turn on the fuel shut-off valve after assembling, and recheck for leaks.
			Note. If filter element or screen is damaged or clogged beyond cleaning, replace it.
			Fuel Pump
38	38	38	See that the fuel pump and lines are in good condition, secure, and not leaking.
38	38		Attach a fuel test gauge properly and with the engine idling (after starting the engine in Item 39), note whether the pump pressure is within

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			specified limits, which are listed in the vehicle manual. Replace any pump that does not produce proper pressure, being sure to make a similar check of the new pump to see that it is satisfactory.
			Starter (Action, Noise, and Speed)
39	39	39	Start the engine, observing whether the general action of the starter is satisfactory, particularly whether it engages and operates properly without excessive noise and has adequate cranking speed; and whether the engine starts readily. Also, as soon as the engine starts, note whether the oil pressure gauge and ammeter indications are satisfactory.
			Leaks
40	40	40	Look in the engine compartment and under the vehicle for engine oil, fuel, and water leaks. Trace all leaks to their source, and report or correct them.
			Ignition Timing (Advance)
41	41	41	With the engine running and the neon timing light connected, observe the ignition timing. Also note whether automatic controls advance the timing as the engine is accelerated gradually.
	41	41	ADJUST. Adjust the ignition timing to the specification in the vehicle Technical Manual.
			ENGINE IDLE AND VACUUM TEST
			Engine Idle
42			Observe whether the engine idles smoothly at normal idle speed.
	42	42	ADJUST. Connect a vacuum gauge to the intake manifold, adjust the engine to its normal idle speed by means of the throttle stop screw, and adjust the idle mixture adjusting needle until the vacuum gauge indicates a steady maximum reading. If this latter adjustment changes the idle speed appreciably, reset the idle speed and

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mixture until both are satisfactory. If the two adjustments are made simultaneously, time will be saved. On vehicles where a vacuum gauge cannot be connected to the intake manifold, adjust the idle by the following procedure:

Adjust the engine idle speed to specifications by means of the throttle stop screw. Turn the mixture adjusting needle in the direction which "leans" the mixture until the engine idle becomes "rough"; then turn the needle slowly in the opposite direction to enrich the mixture until the "roughness" disappears and the engine idles smoothly. Do not turn further than necessary to smooth out the idle so the engine will not stall. If making this mixture adjustment increases or decreases the engine idle speed from the specified range, reset the throttle stop to obtain the correct idle speed again and recheck the mixture adjustment as described above.

42 42 42 VACUUM TEST. With the engine running at normal idling speed, the vacuum gauge should read about 18 to 21 inches and the pointer should be steady. A badly fluctuating needle between 10 and 15 inches may indicate a defective cylinder head gasket or valve. An extremely low reading may indicate a leak in the intake manifold or gasket. Accelerate and decelerate the engine quickly. If the gauge indicator fails to drop to approximately 2 inches as the throttle is opened, and fails to recoil to at least 24 inches as the throttle is closed, it may be an indication of diluted oil, poor piston ring sealing, or abnormal restriction in the carburetor, air cleaner, or exhaust.

Note. The above readings apply to sea level. There will be approximately a 1-inch drop for each 1,000 feet of altitude.

Regulator Unit (Connection, Voltage, Current, and Cut-out)

43 43 43 See whether it is in good condition and whether all connections, seals, and mountings are secure.

43 43 CONNECT the low voltage circuit tester and observe whether the voltage regulator, current

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			regulator, and cut-out control the generator output properly. Follow the instructions in the vehicle Technical Manual, or those which accompany the test instrument. Replace if test shows faulty operation.
			Caution: This test should be made only after the regulator unit has reached normal operating temperature.
			Power Tire Pump (Drive and Lines)
44	44	44	See that these units, their connecting lines, and the tire hose and fittings are in good condition and secure. Examine the pump drive and its clutch mechanism for good condition, proper adjustment, or excessive wear. Open the drain cock on the tank and drain.
		44	SPECIAL LUBRICATION. See WDLO for instructions.
	44		SERVE. Refer to WDLO for instructions.
			Diesel Fuel Injector Pump
45	45	45	Note whether the pump (including any transfer pump) is in good condition, correctly assembled, securely mounted, and its connections do not leak. Determine the oil level in the pump with the dip stick. Add oil if needed.
	45		TIGHTEN. Tighten all assembly and mounting bolts and cap screws.
	45		ADJUST. Adjust the fuel injector pump timing according to the instructions and specifications in the vehicle Technical Manual.
	45		SERVE. See WDLO for instructions.
			Diesel Fuel Nozzles and Lines
46	46	46	Observe whether these items are in good condition, secure, and do not leak.
46		46	Examine the fuel nozzles for correct delivery and fuel leakage as follows: Remove one nozzle at a time, start the engine, and observe the pattern and condition of the fuel spray as the throttle is opened to full load position momentarily.

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			The spray should be normal. See the vehicle manual for specifications.
			Caution: Take every precaution to keep the spray away from the person to avoid injury.
			Stop the engine and observe whether there is any "after-dribble" from the spray nozzle. If the spray pattern is not normal or a dribble occurs, the nozzle should be replaced.
	46		SERVE. Exchange all spray nozzles for new or reconditioned and tested nozzles, taking care to tighten all fuel nozzle mounting nuts, cap screws, and line connections securely.

CHASSIS, BODY, AND ATTACHMENTS

*Tires and Rims

47	47	47	Inspect as follows:
			VALVE STEMS AND CAPS. Observe whether all valve stems are in good condition and in correct position, and that all valve caps are present and installed securely. Do not tighten with pliers.
			CONDITION: Examine all tires for cuts, bruises, breaks, and blisters. All tires with cuts or injuries extending to or into the cord body, and those worn smooth in center of tread must be removed and exchanged for reconditioned or new ones. Remove imbedded glass, nails, or stones from tires or from between duals. Look for irregular tread wear or for any signs of flat spots, cupping, feather edges, and one-sided wear. Any mechanical deficiencies causing such conditions should be determined and corrected or reported. The wheel positions of tires with irregular wear should be changed to even up the wear. Front tires worn irregularly should be moved to rear wheel positions.
			DIRECTION. Directional tires and nondirectional tires should not be installed on the same vehicle. Directional tires on rear wheels of all vehicles and on front wheels of scout cars and

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			half-tracks should be mounted so that the "V" of the chevron will point down when viewed from the front. Directional tires on all front wheels, with the exception of those on scout cars, half-tracks, and on all trailer wheels, will ordinarily be mounted so that the "V" of the chevrons will point up when viewed from the front.
			MATCHING. With the tires properly inflated, inspect them to see if they are matched according to over-all circumference and type of tread.
			SPARE TIRE CARRIERS. See whether spare tire carriers are in good condition and secured properly.
			RIMS. All rims and their lock rings or flanges should be in good condition and secure.
	47	47	TIGHTEN. Tighten all wheel rim flange or lug nuts securely.
47	47	47	SERVE. With the tires properly inflated, measure the over-all circumference of all tires including spares. Select the tires to be mounted on duals or on driving axles, so that they will not have differences in over-all circumference exceeding the limits specified in current directives and bulletins. Mount all dual tires with the larger tire outside. The valve stem on the inner wheel should point out and the valve stem on the outer wheel should point in, and should be opposite each other.
			Note. The spares must be matched properly and mounted for use on one of the road wheels at intervals not exceeding 90 days. A convenient time to do this is during these maintenance services.
			Tires will be rotated on the M3, during the H and S services.
			Caution: After performing the tire-matching service, do not reinstall the wheels until the wheel-bearing services are completed.
			Note. On half-tracks, perform steps 106 to 115 now.
			***Rear Brakes**
48	48		Remove the rear wheels and inspect and service the brakes as follows:

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	48	

On the semiannual maintenance, the several wheel-bearing and brake items up to and including 52 are group services in which there will be overlap. Perform these services in the best order for economy of mechanic's time and for orderly reassembly.

48 48 DRUMS AND SUPPORTS. Clean all dirt and grease from these parts thoroughly, keeping dry-cleaning solvent away from the brake linings and wheel cylinder boots. Examine the drums and supports to see that they are in good condition, securely mounted, and not excessively worn or scored.

WHEEL CYLINDERS. Observe whether cylinders are in good condition and securely mounted. Pay particular attention to end covers to see that rubber type covers are not deteriorated and that metal type covers and their adjusting screws are not rusted or likely to freeze up. If the adjusting screws are rusted, wipe a thin film of water pump or chassis lubricant on its threads next to the end cover and work the adjustment in and out until it is free. If the metal cover and/or adjusting screw are frozen, replace the wheel cylinder assembly.

Also observe whether the wheel cylinders are leaking, paying particular attention to indications of leaks at the end covers. On rubber-type end covers, look for leaks by slightly pulling the lower part of the end cover away from the cylinder.

Caution: Do not remove the cover. Replace leaking wheel cylinders.

CAMS AND SHAFTS. On air brakes, see that the cams and the surfaces of the brake shoes which the cams contact are not excessively worn, that the camshafts operate freely in their bushings, and whether the camshafts are excessively worn in their bushings.

MAGNETS AND ARMATURES. On trailers equipped with electric brakes, examine these items to see

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			that they are in good condition, correctly assembled, secure, clean, and whether the magnet surfaces are glazed. Pay particular attention to see that the wiring connections to the magnets are secure and that the insulation is in good condition. Remove all dirt or grease from the engaging surfaces of the magnets and armatures. A moderate amount of scoring of these surfaces is not objectionable.
	48		TIGHTEN. Tighten the brake support bolts securely. Also tighten drum mounting bolts if they are not tack-welded.

*Rear Brake Shoes (Linings, Links, Guides, and Anchors)

	49		Examine the linings to see whether they are so worn that the rivet heads may contact the drums within the next month of operation. If the linings are not visible through inspection holes or supports, remove the right rear wheel on 4 x 4 or 4 x 2 vehicles, the right sprocket on half-tracks, and the forward right rear wheel on bogie installations for inspection of the brake linings by the motor officer or motor sergeant to determine whether the linings are so worn that they should be replaced. If the linings on this wheel brake must be replaced, remove all wheels and check their brakes and service if necessary, being sure to clean, lubricate, and adjust all the removed wheel bearings as described in item 52 below for the semiannual service, and to adjust the brakes as described below in this item.
			A similar inspection of the brake linings should be made if the vehicle has recently been operated in deep water, mud, loose sand, or dirt which may have entered the brake drum.
	49		ADJUST. Adjust by minor method if necessary.
49	49		INSPECT (DRUMS REMOVED). Observe whether the linings are in good condition, tightly secured to the brake shoes, in good wearing contact with the drums, free of lubricant or brake fluid, and not excessively worn. Also see that

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			the brake shoes are in good condition; properly secured, and guided by the anchor bolts, connecting links, guides, and springs; and properly returned against their cams or stops by the retracting springs. The thickness of lining above the rivet heads at the most worn section should be sufficient for at least a month of safe operation. If the linings are badly contaminated with lubricant or brake fluid, replace all linings on both brakes of that particular axle. If the linings are only slightly contaminated with lubricant or brake fluid, clean them thoroughly.
	49		CLEAN. Clean all dust from the linings with a wire brush, clean cloth, or compressed air.
	49		ADJUST. After the subsequent related items to 60 inclusive are completed, adjust the shoes by the minor adjustment method, so that the linings have proper clearances from the brake drums. If new linings have been installed, adjust the shoes by the major adjustment method. These adjustment methods are described in the vehicle manual. On air brakes, adjust the slack adjusters so the diaphragm push-rod travel between the released and applied positions of the brake is as specified in the vehicle manual.
			***Torque Rods (Bushings and Brackets)**
50	50	50	These rods must be in good condition, correctly assembled, and secure. Examine metal bushings for wear and rubber bushings for damage or deterioration. Coat the exposed rubber surfaces of such bushings with brake fluid to prevent hardening or cracking.
			***Rear Spring Seats and Bearings**
51	51	51	Inspect them to see that the spring seats are in good condition and secure; that on bushing type spring seats, the bushings and mating parts of the spring seat rocker beam shaft have no end play and are not excessively worn; that the level of lubricant in these seats is proper; and

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			whether there are any indications of excessive oil leaks from the seals.
	51		ADJUST. Adjust the spring seat bearings according to vehicle manual specifications, current bulletins or directives.
	51		SPECIAL LUBRICATION. See WDLO for instructions.

Note. Whenever it is necessary to replace a rear spring on these units, also remove the spring seats, clean and inspect the spring seat bearings, and lubricate the bearings as prescribed in the vehicle manual.

*Rear Wheels (Bearings, Seals, Drive Flanges, and Nuts)

52	52	52	Inspect and service these items as follows:
			WHEELS. Inspect the wheels for good condition.
			BEARINGS AND SEALS. Inspect for looseness of the wheel-bearing adjustment. Revolve the wheels and listen for indications of dry or damaged wheel bearings. Inspect the drive flanges and around the brake supports and drums for lubricant or brake-fluid leaks.
			DRIVE FLANGES AND NUTS. Note whether these items are in good condition.
		52	TIGHTEN. Tighten all drive flange nuts securely.
	52		CLEAN. Disassemble the bearings and oil seals. Clean thoroughly and check the rollers, balls, races, and cages to see that they are in good condition, and that the cups are secure. If the cups appear to be in good condition, it is not necessary to remove them from the hubs unless the bearings must be replaced, in which case new cups should be installed. Also see whether the machined surfaces upon which the bearings are assembled are in good condition.
	52		SPECIAL LUBRICATION. When all of the related items have been performed to the point where the wheel bearings are to be reinstalled lubricate the bearings according to instructions on WDLO.

Caution: Do not pack the large cavity in the wheel hubs between the wheel bearings with

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			lubricant as this will cause leakage past the seals.
	52		ADJUST. After lubricating the wheel bearings, reassemble the hub and drum assemblies into place, and adjust the wheel bearings correctly according to vehicle manual instructions. After the bearings have been adjusted and the adjustment securely locked, the bearings should be neither loose nor tight enough to bind.
			Note. Proper adjustment of the wheel bearings is vital to the life of the bearings and the lubricant retainer seals. If the bearings are adjusted so that they are loose, the lubricant retainer seals cannot seal properly for any extended period. If the bearings are adjusted too tightly, they are likely to become damaged. Be sure to rotate wheel while adjusting bearing.
			***Front Brakes**
53	53	53	On air brakes, the brake hose, brake chambers, push rods and seals, and slack adjusters should be in good condition, correctly assembled, and secure. On hydraulic brakes, note whether the front brake hose are in good condition, properly supported, securely connected, and not chafing or leaking.
53	53		REMOVE the front wheels and inspect and service the brakes as follows:
			On the semiannual maintenance service, the several front wheel bearings and brake items up to and including number 60 are group services in which there will be an overlap. Perform these services in the best order for economy of mechanic's time and for orderly reassembly.
			DRUMS AND SUPPORTS. Clean and inspect in the same manner as in item 48.
			WHEEL CYLINDERS. Inspect in the same manner as in item 48.
			CAMS AND SHAFTS. Inspect in the same manner as in item 48.
	53		TIGHTEN. Tighten the brake support bolts securely. Also tighten drum mounting bolts if they are not tack welded.

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		54	***Front Brake Shoes (Linings, Links, Guides, and Anchors)** Inspect the brake lining thickness in the same manner as the similar inspection on item 49.
		54	ADJUST. Adjust by minor method if necessary.
54	54		Inspect the brake shoes, linings, links, guides, and anchors in the same manner as the similar inspection in item 49 on the semiannual maintenance service and technical inspection.
	54		CLEAN. Clean all dust from the brake lining with a wire brush, clean cloth, or compressed air.
	54	54	ADJUST. Adjust in the same manner as in item 49 after the subsequent related items to 60 inclusive are completed.
			***Steering Knuckles (Joints, Bearings, Seals, and Boots)**
55	55	55	On dead axles, note whether the steering knuckles are in good condition and properly secured by the king pins, and whether the king pins and their bushings are excessively worn.
			On driving axles, see whether the knuckle housings are in good condition; look particularly for cracks around any integral steering arms. The outside seals and dust boots should be in good condition and secure. Remove the lubrication plug from the steering knuckle end of the axle housing and, with a wire rod, obtain a sample of the lubricant from each knuckle; inspect it for contamination. If the lubricant appears to be contaminated, report the condition.
	55		CLEAN. Remove constant velocity universal joint assembly. Wash thoroughly in dry-cleaning solvent and without disassembly of universal joint, inspect parts to see that they are in good condition and not excessively worn. Pay particular attention to universal joint washers, balls and races, axle splines, flanges, and pivot bearings or bushings.
	55		SPECIAL LUBRICATION. See WDLO for instruc-

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			tions. Reassemble steering knuckle taking care to replace any unserviceable lubricant retainer seals, boots, or gaskets.
	55		ADJUST. Use every precaution to reinstall shims and spacers in the original position from which they were removed at disassembly to insure correct pivot bearing and axle end-play adjustment.
			Note. All gear-drive type steering knuckles should be inspected and serviced in accordance with specific instructions contained in the vehicle manual.
			Front Springs (Clips, Leaves, U-Bolts, Hangers, and Shackles)
56	56	56	See that they are in good condition, correctly assembled, and secure. Spring clips and bolts should be in place; spring leaves should not be shifted out of their correct position. This may be an indication of a sheared center bolt. Note whether the deflection of both springs is normal and approximately the same. Test the hangers and bolts for excessive wear by means of a pry bar.
	56	56	TIGHTEN. Tighten all spring U-bolts securely and uniformly.
			Steering (Arms, Tie Rods, Drag Links, Seals and Boots, Pitman Arm, Gear, Column, and Wheels)
57	57	57	See that these items are in good condition, correctly and securely assembled and mounted, whether the steering gear case is leaking lubricant and that the lubricant is at the proper level. Pay particular attention to the pitman arm to see that it is securely mounted and not bent out of its normal shape. Also observe whether the steering system is in good adjustment.
	57		TIGHTEN. Tighten the pitman arm shaft nut securely. Also tighten the steering gear case assembly and mounting nuts or screws, taking care not to disturb the adjusting screws and lock nuts.
			Caution: Loosen the steering-column bracket

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			when tightening the steering case mounting nuts, so column will not be distorted.

Front Shock Absorbers and Links

58	58	58	See that the shock-absorber bodies are secured to frame, that the links which connect their arms to the axle are in good condition and secure, and that there are no fluid leaks.
			Note. If link joints are of the rubber or fabric type, coat the exposed rubber with hydraulic brake fluid.
	58		SERVE. Fill the shock-absorber bodies, except airplane type, with specified fluid. Work the arm several times and add fluid. Repeat this operation until all air is expelled and the reservoir is full.
			After servicing shock absorbers, disconnect the link and observe whether the action is normal. The normal action of a double-acting shock absorber, when its arm is moved by hand, should have resistance in both directions. The resistance on the rebound stroke of the arm is greater than on the compression stroke. A single-acting shock absorber will have a resistance only on the rebound stroke. Airplane type shock absorbers must not be refilled. Replace if leaking or if action is unsatisfactory.

Knee Action Suspension

59	59	59	Note whether the control arms and connections to steering knuckles are in good condition, correctly assembled, secure, and not excessively worn. Also see that the coil springs are in good condition, correctly installed on their seats, and that their bumpers are in place and in good condition.

*Front Wheels (Bearings, Seals, Flange, Axle End Play and Nuts)

60	60	60	Inspect the front wheels, bearings, seals, drive flanges, and nuts in the same manner as in item 52 for the similar rear wheel items.
	60		CLEAN. Disassemble, clean, and inspect the front wheel bearings and oil seals in the same

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manner as described in item 52, taking care to check the universal joint end play as the drive flanges are removed so that the end-play adjustment may be made conveniently when reassembling.

60 SPECIAL LUBRICATION. When all of the related items have been performed to the point where the wheel bearings are to be reinstalled, lubricate the bearings according to instructions on WDLO.

60 ADJUST. After lubricating the wheel bearings, reassemble the hub and drum assemblies into places and adjust the wheel bearings correctly according to vehicle manual instructions. After the bearings have been adjusted and the adjustment securely locked, the bearings should be neither loose nor tight enough to bind.

Note. Proper adjustment of the wheel bearings is vital to the life of the bearings and the lubricant retainer seals. If the bearings are adjusted too loosely, the lubricant retainer seals cannot seal properly for any extended period. If the bearings are adjusted too tightly, they are likely to become damaged. Be sure to rotate wheel while adjusting bearing, and adjust brake shoes. After the subsequent related items to 60 inclusive are completed, adjust the shoes by the minor adjustment method, so that the linings have proper clearances from the brake drums. If new linings have been installed, adjust the shoes by the major adjustment method. These adjustment methods are described in the vehicle manual. On air brakes, adjust the slack adjusters so the diaphragm push-rod travel between the released and applied positions of the brake is as specified in the vehicle manual.

Front Axle (Pinion End Play, Seal, Vent, and Alignment)

61 61 61 On dead front axles, note whether the axle is sprung or bent, and whether it appears to be properly aligned, and securely mounted. If the axle appears to be out of line, measure the distance from the front spring eyebolt to corresponding points on the axle. This distance should be the same on each side.

On live front axles, see that the axle housing is in good condition, securely assembled and mounted, and not leaking; feel by hand to see that the pinion shaft does not have excessive end play and that its seal is not leaking. Check

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			the alignment of this type of axle in the same manner as described above for the dead axle. Observe whether the housing vent is clean and open.
	61	61	CLEAN. If the axle housing vent is threaded, remove the vent, clean thoroughly, and reinstall it. If the vent is connected to a flexible hose, see that the hose is in good condition, securely connected, and open.
			Front Propeller Shaft (Joints, Alignment, Seals, and Flanges)
62	62	62	Be sure that these items are in good condition, correctly and securely assembled and mounted; that the universal joints are properly aligned with each other and are not excessively worn; that the slip joint is free, not excessively worn, and well lubricated according to instructions on WDLO; and that the seals of the universal joints and slip joint do not leak.
	62		TIGHTEN. Tighten all universal joint assemblies and companion flange bolts securely.
			Engine Mountings and Braces, Ground Strap, and Side Pans
63	63	63	These items should be in good condition and securely mounted and connected. Be sure to examine both front and rear engine mountings, and make certain that rubber is not separating from its metal backing on rubber type mountings. If the mounting bolts are loose, tighten them properly, taking care not to overtighten any rubber-spacer type or spring type mountings. Remove oil or grease from rubber type mountings.
			Hand Brake (Ratchet and Pawl, Linkage, Drum or Disk, and Lining)
64	64	64	Note whether the hand-brake ratchet and pawl and linkage are in good condition and secure; whether the brake drum or disk is in good condition and not scored or oily; and whether the brake-shoe lining is oil-soaked or worn thin.

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	64		ADJUST. Adjust the clearance between the brake drum or disk, and lining, to specifications. Take care that the adjustment nuts are correctly locked when the adjustment is checked and completed.
			Clutch Pedal (Free Travel, Linkage, and Return Spring)
65	65	65	See that the pedal free travel is satisfactory, that the pedal is securely mounted on its shaft, and that the clutch-operating linkage is in good condition and secure. Pay particular attention to pedal-adjustment locking devices. Observe whether the external operating linkage is worn excessively, and that the pedal return spring brings the pedal back to its correct released position.
	65		ADJUST. Adjust clutch pedal according to specifications in vehicle Technical Manual.
			Brake Pedal (Free Travel, Linkage, and Return Spring)
66	66	66	Examine to see that the pedal free travel is satisfactory, and that the pedal is in good condition; that the brake pedal operating linkage is securely connected to the pedal, and that its connection is not excessively worn; and that the pedal retracting spring returns the pedal against its stop.
			Brake Master Cylinder (Vent, Fluid Lever, Leaks; and Switch)
67	67	67	The cylinder should be in good condition and secure, with the filler-plug vent open, the boot properly installed, and no indications of fluid leaks. See that the stoplight switch is properly installed and the terminals secured.
	67	67	SERVE. Remove dirt from and around the filler plug, remove plug, and fill the master cylinder reservoir to ½ inch of top. Use only specified brake fluid. Clean the filler plug vent hole and reinstall, using new gasket when necessary.

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			Brake Vacuum Booster (Linkage, Air Cleaner, and Hose, and Cylinder)
68	68	68	See that these items are in good condition and securely assembled and mounted; and that the operating and control linkage is properly adjusted and does not bind. On hydrovac systems, also note whether the brake fluid is leaking from the slave cylinder and relay valve.
	68	68	CLEAN AND SERVE. See WDLO for instructions on air cleaner. *Caution:* If the air cleaner is built into the control valve, take care not to disturb the valve adjustments when servicing the air cleaner, and to replace the pins in the clevises.
	68		SPECIAL LUBRICATION. See WDLO for instructions on lubrication of vacuum power cylinder.
			Air-Brake Application Valve
69	69	69	See that the application valve and linkage are in good condition, correctly assembled, and secure; and that the valve closes fully when the brake pedal is released.
			***Air-Brake Reservoirs**
70	70	70	Observe whether they are in good condition and secure. Open the drain cocks and drain.
			Transmission (Mounting, Seals, Power Take-off, and Linkage)
71	71	71	Note whether the transmission case is in good condition and securely mounted, or whether oil is leaking from its seals or gaskets. Make a similar inspection of any power take-off unit which may be attached to the transmission, and also see that its control linkage is in good condition, properly connected, and secure.
	71		TIGHTEN. Tighten all transmission and power take-off mounting and external assembly bolts and cap screws securely.
			Transfer (Mountings, Linkage, Seals, Vent, and Power Take-off)
72	72	72	See that the transfer case and any attached

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			power take-offs are in good condition and securely mounted; that the control linkage is in good condition and securely connected; that the seals do not leak; and that the transfer case vent is open.
	72	72	TIGHTEN. Tighten all transfer case and power take-off mounting bolts.
	72	72	CLEAN. Remove and clean the vent thoroughly and reinstall it.
	72		TIGHTEN. Tighten all external case and power take-off assembly cap screws and bolts.
			Rear Propeller Shafts
73	73	73	Inspect in the same manner as item 62.
	73		TIGHTEN. Tighten the universal joint and companion flange bolts securely.
			Center Bearing (Seals, Vent, Oil Level, and Mountings)
74	74	74	Examine the rear propeller shaft center bearing (pillow block) for any excessive end play. See that it is adequately lubricated, that its seals are not leaking, that the vent is clean and open, and that the mountings are secure.
	74	74	CLEAN. Remove the center bearing vent, clean and reinstall.
	74	74	TIGHTEN. Tighten the center bearing mountings securely.
			Rear Axles (Pinion End Play, Seals, Vents, and Alignment)
75	75	75	Inspect these items in the same manner as described in item 61 for driving axles.
	75	75	CLEAN. Clean the rear axle housing vents in the same manner as in item 61.
			***Rear Air Brake (Chambers, Rods and Seals, and Slack Adjusters)**
76	76	76	See that these items are in good condition and securely connected and mounted; and that the

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			push-rod seals are in proper position on the push rod.
			***Rear Springs (Clips, Leaves, U-Bolts, Hangers, and Shackles)**
77	77	77	Inspect these items in the same manner as in item 56.
	77	77	TIGHTEN. Tighten all U-bolts evenly and securely, as in item 56.
			Rear Shock Absorbers and Links
78	78	78	Inspect in the same manner as item 58.
	78		SERVE. Make operating check and serve in the same manner as item 58.
			***Cab and Body Mountings**
79	79	79	Note whether these mountings are all in good condition and secure. On cab mountings using coil springs, be sure that the springs are in good condition and properly compressed. These springs should be neither loose nor compressed until solid.
	79	79	TIGHTEN. Tighten the cab mounting bolts securely, taking care to loosen the steering-column clamp before tightening. When tightening spring-loaded mounting bolts, do not compress the springs fully. After completing this service, be sure to tighten the steering-column clamp.
			***Frame (Side and Cross Members)**
80	80	80	Inspect frame, brackets, side rails, and cross members to see that they are in good condition, secure, and correctly aligned. If the frame appears to be out of line, report the condition to proper authority.
			***Wiring, Conduits, and Grommets**
81	81	81	Observe these items underneath the vehicle to see that they are in good condition, properly supported, connected, and secure.
			Fuel Tanks, Fittings, and Lines
82	82	82	Inspect fuel tanks to see that they are in good

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			condition and securely mounted. Examine caps for defective gaskets or plugged vents. See that the filler necks are in good condition and the caps fit securely. Check fuel lines and fittings to see that they are in good condition, securely supported, and not leaking.
	82		Remove the fuel tank drain plugs and drain off the accumulated water and sediment. Drain only until the fuel starts to run clear.
			***Brake Lines (Fittings and Hose)**
83	83	83	Observe brake lines, fittings, and rear brake hose underneath the vehicle and on the rear axle housings to see that they are in good condition and secure. On hydraulic brakes, check these items for leaks.
			Exhaust Pipes and Muffler
84	84	84	Examine the exhaust pipe to see that it is securely attached to the exhaust manifold, that the gasket or packing does not show visible evidence of leakage, and that the other end is clamped securely to the muffler. Inspect the muffler to see that it is in good condition and securely mounted. Check the tail pipe to see that it is securely clamped to the muffler, properly supported, and unobstructed at its outer end. See that the drain holes in the muffler are at lowest point and not clogged.
			Vehicle Lubrication
85			Inspect the lubrication of the entire vehicle and any gun mounts to determine whether they have been receiving proper attention. On any unit where disassembly was necessary for inspection purposes, lubrication must be performed, unless the vehicle is to be deadlined for repair of that unit.
	85	85	LUBRICATE. Lubricate all points of the vehicle and any gun mounts in accordance with instructions in the vehicle Technical Manual, Lubrication Order, current lubrication bulletins or directives, and the following:

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Use only clean lubricant. Keep all lubricant containers and dispensers covered except when withdrawing lubricant.

Lubrication of items on the Preventive Maintenance Service and Technical Inspection Work Sheet that are marked with an L (special lubrication symbol) should be omitted on this Vehicle Lubrication service with the exception of the external lubrication cup of the distributor. This will avoid duplication and, in some cases, overlubrication.

Before applying lubricant, clean the lubrication fitting or plug, so that dirt will not enter with the lubricant. If lubrication fittings, flexible lines, vents or plugs are found missing or damaged, they should be replaced immediately. Clean the hole in which the new fitting is to be installed, install the fittings, and lubricate the unit. On all unsealed bushings or joints, the lubricant should be applied until it appears at the openings. On units such as universal joints, which are provided with lubricant retainer seals, use an appropriate hand-operated grease gun and do not force the lubricant beyond the seals. Open any clogged lubrication passages until lubricant is properly delivered.

When draining oil from the engine, transmission, transfer case, or axle housings, always drain the oil immediately after it has been warmed and agitated to a good draining condition by operation of the engine or vehicle. Refill the units to the correct level with specified oil as soon as the draining is completed, so there will be little hazard that they may be operated without lubricant. The correct cold oil level in the axles, transfer case, and transmission is usually from ½ inch below, to the lower side of the filler plug hole.

Caution: Do not fill to overflowing. Reinstall all drain and filler plugs securely. Take care that any required gaskets are in good condition and in place on the reinstalled plugs.

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Do not apply more than the specified amount of lubricant to generators, starters, distributors, or water pump.

Wipe off excess lubricant that may drip onto brakes, rubber parts, or detract from the vehicle's appearance.

LOWER VEHICLE TO GROUND

Toe-in and Turning Stops

86	86	86

With the front wheels on the ground, in a straight-ahead position, and using a toe-in gauge, determine whether the front wheel toe-in is within specified limits. See that the wheel-turning stops are present and secure. If supplied with lock nuts, be sure they are tight, and that the tack welds are not broken. Turn the front wheels fully in both directions, and see that the turn is limited by the stops. In this position, note whether the tires clear all parts of the vehicle. On front-drive vehicles, if there are any indications that the turning angle exceeds the specified limits, such as loose wheel stops, scuffing of tires against the vehicle, or abnormal front-drive universal joint wear, they should be reported for a check of the turning angle by a higher echelon.

Caution: If toe-in adjustment is necessary, be sure the tie rod is in correct position and well secured after the adjustment is made. Toe-in must be kept within specified limits to avoid unnecessarily rapid tire wear.

Winch (Clutch, Brakes, Drive, Shear Pin, Cable, and Guides)

87	87	87

Observe whether they are in good condition, correctly assembled and secure. See that the clutch moves freely to both the engaged and disengaged positions and latches securely. Examine the drag-brake lining to see that it is in good condition, secure and correctly adjusted to stop the drum. Inspect the automatic brake to see that the lining is secure, not excessively

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			worn, and that the band is in place with its springs and adjusting nuts. Check the propeller shaft in the same manner as in item 62, and also see that the proper shear pin is installed. The propeller shaft front yoke should slide freely on the worm shaft to insure the safety feature of the shear pin. Check safety-collar clearance on winch propeller shaft. If the winch is chain-driven, inspect the chain and sprockets for good condition, excessive wear, and proper adjustment. Inspect the cable for good condition, even winding, and note whether the cable chain and hooks are securely attached and in good condition. Examine the cable guides for good condition and secure mountings. Also check the oil level in the worm gear case.
	87	87	SPECIAL LUBRICATION. See WDLO for instructions.
	87		CLEAN AND SERVE. Unwind cable and inspect it for broken or frayed strands, flat or rusty spots. Clean and oil in accordance with WDLO.

Fifth Wheel (Bed Plate and Bolts)

88	88	88	Observe the fifth-wheel rocker plate and bed plate to see that they are in good condition, securely assembled, and mounted. Examine the king pin lock to see that it operates properly, locks securely, and that the king pin is not excessively worn.
	88	88	TIGHTEN. Tighten all assembly and mounting bolts.
	88	88	SPECIAL LUBRICATION. See WDLO for instructions.

Caution: When the trailer is not attached, the fifth wheel should be covered to prevent accumulation of dirt.

Tractor-to-Trailer Brake Hose, Wiring, and Connections

89	89	89	Observe brake hose or wiring to see that they are in good condition and securely fastened to clips, springs, or brackets so that they will not

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			chafe or interfere with working parts. See that connecting fittings are in good condition, secure, and not excessively worn.
			Hoist (Mounting, Drive, Controls, Pump, Lines, and Cylinder)
90	90	90	Raise the body with the hoist and note whether or not these items are in good condition, correctly assembled, and secure; whether the drive shaft joints, controls, or any lift linkage are excessively worn; and whether or not the pump, lines, or cylinder are leaking. Stop the engine, with body up, and note any tendency of the body to drop. This would indicate a leak past the cylinder piston. Later, when lowering the body, see that it lowers fully and that the guides align the body properly with the frame.
	90	90	SERVE. See WDLO for instructions.
	90		TIGHTEN. Tighten all hoist-mounting and assembly bolts securely. Tighten the piston rod packing nut and any pump and control valve gland nuts, taking care not to overtighten them, as this may score the shafts and cause leaks.
			***Lamps (Lights) (Head, Tail, Body, Running, Directional, Stop, and Blackout)**
91	91	91	Operate the switches and note whether the lamps (lights) respond. Note whether any lamps (lights) remain on with the switches off. Be sure to include the stoplight and to observe whether or not the directional lamps indicate both a right and left turn. See that the foot switch controls the lamp unit beams properly and that they are correctly aimed so as not to blind oncoming traffic.
			Examine all lamps (lights) to see that they are in good condition and secure; check for dirty and broken lenses or discolored reflectors.
	91		ADJUST. Adjust the aim of the lamp unit beams according to specifications.
			***Safety Reflectors**
92	92	92	See that they are all present, in good condition, clean, and secure.

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			Front Bumpers, Roller, Tow Hooks, Brush Guards, and Grilles
93	93	93	See that they are in good condition and secure; that the front roller turns and is properly lubricated, and correctly assembled to its brackets; and that the roller brackets are in good condition and secure.
			Hood (Hinges and Fasteners)
94	94	94	Observe whether the hood, hinges, fasteners, and props are in good condition, secure, and properly lubricated.
			Front Fenders and Running Boards
95	95	95	See that they are in good condition and securely mounted.
			Cab or Passenger Body (Doors, Hardware, Glass, Top and Frame, Curtains and Fasteners, Seats, Upholstery and Trim, Safety Straps and Grab Rails, Floor Boards and Mats, Ventilators, Map Compartment, and Tables)
96	96	96	Inspect these items to see that they are in good condition and secure; that the hardware and ventilators operate properly and are adequately lubricated; and whether or not the doors engage their bumpers and strikers, and latch properly in the closed position. See that the doors are properly aligned with their openings.
			Note. Glass, even if cracked, or if laminated layers are separated, need not be replaced as unserviceable unless its condition constitutes a safety hazard or obstructs the vision of driver or crew.
			Heater, Fans, and Defroster
97	97	97	Note whether or not these items are in good condition and secure. Turn the switches on, see that these items operate properly, and listen for any unusual noise in the heater or fan motors.
	97		SPECIAL LUBRICATION. See WDLO for instructions.
			Circuit Breaker and Fuse Block
98	98	98	Observe whether these items are clean, dry, in

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			good condition, secure, and whether any electrical connections are loose. See that all fuses are held securely by their clips.
99	99	99	***Rear Fenders and Splash Guards** These items should be in good condition and secure.
100	100	100	***Body (Panels, Rear Doors, Tail Gate and Chains, Floor, Skid Strips, Stakes, Sockets, Bows, Tops, Tarpaulins, End Curtains, Troop Seats, and Stowage Compartments)** See that these items are in good condition and secure; that the rear doors or tail gate are properly aligned and fasten securely; that the tarpaulin and end curtains, fasteners or ropes, grommets, and the metal hooks or loops on the body are all present, in good condition and secure; and whether or not all door, tail gate, troop seat, and stowage compartment door hinges and latches are adequately lubricated.
101	101	101	***Rear Bumpers and Pintle Hook (Latch, Lock Pin, and Drawbar)** Observe whether or not they are in good condition and secure. Test the pintle and latch to see that they operate properly, are adequately lubricated, and whether the lock pin is attached with a chain. Pay particular attention to see that the spring is not broken and that the drawbar is not excessively worn.
102	102	102	**Armor Plate (Body, Cowl, Doors, Windshield, and Port Covers)** See that they are in good condition and secure, including peep-hole or pistol-port covers, hinges, and fasteners. Note whether hinges and fasteners are adequately lubricated.
103	103	103	***Paint and Markings** Examine the paint of entire vehicle to see that it is in good condition, paying particular attention to any bright spots in finish that might cause glare or reflection. Inspect vehicle mark-

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			ings and identification for legibility. Include identification plates and their mountings if furnished.

Radio Bonding (Suppressors, Filters, Condensers and Shielding)

104	104	104	Examine all radio bonding to be sure connections are in good condition, clean, secure, and that all items to which the bonding is connected are securely mounted. Be sure all noise suppression bonding straps and internal-external toothed lock washers are inspected for looseness or damage and that all contact surfaces are clean.
	104	104	If objectionable radio noise from vehicle has been reported make tests in accordance with instructions in vehicle Technical Manual to determine the source of the noise. If cleaning and tightening of mountings and connections and replacement of radio noise suppression units does not eliminate the trouble, the radio operator will report the condition to the designated individual in authority.

Armament (Guns, Mounts, Rails, Spare Parts, and Covers)

105	105	105	Observe whether the gun mountings and rails are in good condition, clean, and secure.

Note. Refer all mounted guns, spare gun parts, and covers to the armorer or gun commander for all inspections and service.

ITEMS SPECIAL TO HALF-TRACKS

Tracks (Guides and Tread Wear)

106	106	106	Inspect both tracks to see that they are in good condition and in proper position on the sprockets and rollers; that the guides are all present, in proper position, not excessively worn, and that the guide nuts are secure. Pay particular attention to see whether the tracks are excessively worn, cut, torn, and whether there are breaks between tread lugs or stones embedded in tracks. Also see that there are no stones or

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106	106		other obstructions between the tracks and rollers or lodged in the suspension system.
			Note. On the semiannual maintenance service and on the technical inspection, items 107 to 115 are group services. The tracks should be removed at this time and reinstalled after the related items have been completed in the best sequence for economy of mechanic's time and orderly reassembly. Before disassembly, be sure the suspension system is properly blocked and the bogie properly chained according to instructions in the vehicle manual.
	106		TIGHTEN. Tighten all track guide nuts with a torque-indicating wrench, to the equivalent of 100 foot-pounds.
			Sprockets (Flanges, Bearings, and Seals)
107	107	107	Note whether the sprockets and flanges are in good condition, secure, and whether or not there are any indications of oil leaks from the seals.
107	107		CLEAN. Disassemble and clean the sprocket hubs, bearings, and oil seals. Check the rollers, balls, races, and cages for good condition. If the outer races appear to be in good condition, it is not necessary to remove them from the hubs.
	107		SPECIAL LUBRICATION. After the subsequent related items are completed to a point where the sprocket bearings are ready for reassembly, lubricate according to WDLO.
	107		ADJUST. After properly lubricating the bearings, reinstall them, and adjust them in accordance with specifications in the vehicle manual.
	107		TIGHTEN. When reassembling the sprocket, tighten all hub flanges, sprocket flange, and jack shaft flange nuts securely.
			Brake Drums, Supports, and Cylinders
108	108		Inspect these items in the same manner as for the similar units in item 48.
	108		CLEAN. Clean above items in the same manner as item 48.
	108		TIGHTEN. Tighten above items in the same manner as item 48.

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		109	Inspect in same manner as item 49.
		109	ADJUST. Adjust by minor method if necessary.
109	109		INSPECT (DRUMS REMOVED). Inspect in same manner as item 49.
	109		CLEAN. Clean all dust from linings with a wire brush, clean cloth, or compressed air.
	109		ADJUST. Adjust shoes in same manner as item 49.
			Brake Shoes (Linings, Links, Guides, and Anchors)
			Idlers (Flanges and Bearings)
110	110	110	Observe whether the idler wheels, spring-loaded idler lock nuts, and flanges are in good condition, secure, and whether or not there are any indications of oil leaks from the seals.
	110		TIGHTEN. Tighten all hub and flange nuts and spring-loaded idler lock nuts securely.
			Idler (Posts, Shackles, Shafts, Adjusting Rods, and Brackets)
111	111	111	See that these items are in good condition, correctly assembled, and secure.
			Frame Brackets and Cross Tube
112	112	112	Be sure that these items are in good condition and secure.
	112		TIGHTEN. Tighten all mounting bolts securely.
			Bogie (Crab Assemblies, Springs and Blocks, Guides and Slides, Arms and Bolts)
113	113	113	See that these units are in good condition, secure, and that the guides, slides, and crab rubbing blocks are not excessively worn. Also note whether the springs are in good condition, properly seated in the spring blocks, and whether they have taken a permanent set. If two or more coils are resting on the seat, it indicates that the springs have taken a permanent set. This will be considered a standard for spring replacement.

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			Bogie Rollers: Upper and Lower (Tires, Bearings, Seals, and Bolts)
114	114	114	Observe whether the upper rollers and brackets, and the lower rollers and tires are in good condition, correctly aligned with the track, and secure. See that the tires are secure on the lower rollers and not excessively worn. Pay particular attention to cuts or gouged spots in the tires, and also see that the lubricant is not leaking excessively from the seals.
114	114		CLEAN. Remove and clean the bogie lower rollers, bearings, and seals. Examine the bolts, links, balls, races, and cages to see that they are in good condition.
114	114		SPECIAL LUBRICATION. See WDLO for instructions.
			Track Tension (On Ground). Adjust
115	115		Adjust the track tension according to the procedures and specifications in the vehicle manual.

Note. The above adjustment will be made after reassembly of the track and suspension system when performing the semiannual maintenance service and the technical inspection, after the vehicle has been lowered to the ground.

ITEMS SPECIAL TO AMPHIBIANS

Note. The following items, 11 to 123, are the minimum maintenance requirements for amphibian vehicles during land operations. Consult the vehicle manual for maintenance requirements during water operations.

			Rudder and Shear Pins, Propeller, Strut, and Bearing
116	116	116	These items must be in good condition and secure. Inspect the strut bearing to see whether it is excessively worn.
	116	116	TIGHTEN. Tighten propeller and strut mountings.
			Propeller Shaft Housings (Seals, Boots, and Plugs)
117	117	117	Inspect these items to see that they are in good condition, correctly assembled, and secure. Re-

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			move the housing plugs to see whether or not there is water in the housings or boots.

Hull (Plugs, Rub Strakes, Decks, Hatches, Ventilators, Compartments, Bulkheads, Plates, and Frame)

118	118	118	Examine the hull to see that it is in good condition. Pay particular attention to punctures that might cause leaks, and to bare spots in the paint that might cause rust or reflection. See that the hull drain plugs are in place and secure, and note the condition of the outside rub strake.
			Inspect the decks and hatch covers for good condition. See that the hatch covers are properly aligned with their openings; that the seals are in good condition and secure; and that the fasteners hold the hatch covers tightly against the seals. Check the deck ventilators to the engine compartment for good condition and proper operation; see whether the screens are clogged; whether the cover seals properly when closed; and that the side vents and those back of the driver's seat are in good condition and in place. Examine all hull compartments to see that the hull frame, reinforcement plates and bulkheads are in good condition and secure. Look for indications of water leaks between the bulkheads or in the hull, and see if the compartments and bilges are clean.

Bilge Pumps (Drives, Valves, Controls, Lines, and Strainers)

119	119	119	Inspect the bilge pumps to see that they are in good condition and secure; see that the drive belt and chain are in good condition and properly adjusted; and that the pulleys and sprockets are in good condition, secure, properly aligned, and not excessively worn. Note whether the valve-control linkage is properly connected to the valves and operates them freely. Also see that the bilge pump lines and strainers are in good condition, properly con-

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			nected, and secure. Pay particular attention to see whether or not the strainers are clogged.
	119	119	TIGHTEN. Tighten all pump mounting and assembly bolts securely, and pump-packing nuts cautiously. Overtightening will score shafts and cause leaks.
	119	119	ADJUST. Adjust pump-drive chain or belt according to instructions in the vehicle manual.
			Water Propeller (Shafts, Joints, Bearings, and Stuffing Box)
120	120	120	Observe whether they are in good condition, correctly assembled, and secure. Pay particular attention to the universal joint alignment, the bearing mountings, and the hose connection between the stuffing box and propeller shaft tunnel. See that the propeller drive control and linkage are in good condition, operate correctly, and are not excessively worn. Note whether the thrust or forward bearings are excessively worn.
	120	120	TIGHTEN. Tighten the stuffing box packing nut cautiously. Do not overtighten since this may cause the stuffing box to run hot, score the shaft, and cause leaks.
			Hand Crank Ratchet and Cover
121	121	121	Examine these items to see that they are in good condition, secure, and that the cranking bar and ratchet operate satisfactorily to rotate the engine. Be sure that the cover is reinstalled securely.
			Rudder (Shafts, Arms, Cables, Rod, Brackets, and Stuffing Box)
122	122	122	See that these items are in good condition, correctly assembled, and securely mounted, that the control linkage is adequately lubricated, and whether the stuffing box leaks. Look particularly for worn or broken cable strands. Turn the steering wheel to its maximum right and left positions, and check to see that the rudder lever does not contact the stop clips, and that

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			it has about the same clearance in each position. If the stop lever contacts the stop clips, readjust the cables according to specifications.
	122		TIGHTEN. Tighten all rudder and control assembly and mounting bolts securely. Tighten the rudder shaft stuffing box packing nut cautiously. Overtightening may cause excessive binding and leaks.
			Anchor, Hand Bilge Pump, Boat Hook, and Safety Devices
123	123	123	See that they are present, in good condition, securely mounted, or properly stowed. Operate the hand bilge pump in water, to see that it functions properly. Inspect safety devices such as life preservers and collapsible rafts to see that they are serviceable.
			ITEMS SPECIAL TO TRAILERS
			Tow Hitch (King Pin, Fifth-Wheel Plates, Lunette, and Tongue)
124	124	124	Note whether these items are in good condition, securely assembled and mounted, not excessively worn, and that the king pin and fifth wheel are adequately lubricated.
	124	124	TIGHTEN. Tighten all mounting and assembly bolts securely.
			Air and Electric Connections
125	125	125	These connections should be in good condition, clean, and secure.
			Safety Devices (Chains, Switch, and Battery)
126	126	126	Observe whether they are in good condition and securely connected to the trailer and motor vehicle. Examine the switch to see that it is securely mounted, that the lever moves freely, and is connected to the towing vehicle. See that the battery is in good condition and secure. Apply a test meter across the dry cell battery connections to determine whether the battery will supply sufficient current to operate the

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			brakes satisfactorily. Operate the switch lever, and observe whether the brake shoes can be heard to contact the drum.
			Caution: Do not leave the brakes applied as this will discharge the battery.
			Landing Gear (Shafts, Wheels, Supports, Lock Pin, Gears, and Crank)
127	127	127	See that they are in good condition, correctly assembled, secure, and adequately lubricated, and whether the operating mechanism functions correctly to raise and lower the landing gear.
	127	127	SPECIAL LUBRICATION. See WDLO for instructions.
	127		TIGHTEN. Tighten all landing gear assembly and mounting bolts.
			Front and Rear Axles
128	128	128	Observe whether these axles are sprung or out of line, and that their attachments and mountings are secure.
			Electric Brake (Application Controller, Load Control, and Resistor)
129	129	129	These items should be in good condition, properly assembled, and secure. Pay particular attention to see whether the resistor coil is burned or broken, and that all wiring connections are secure. These items are on the towing vehicle.
	129	129	Disconnect one lead from the brake controller, attach a test ammeter into the circuit, and with the trailer brake wiring connected to the vehicle, make the following current-draw checks: With the brake controller in the OFF position, there should be no current draw. With the load-control rheostat set in its HEAVY position, move the brakecontrol lever through its full range. The current load should increase gradually to the full ON position and should then be not less than 6 amperes nor more than 7.4 amperes for two-wheel trailer brakes.
			Note. In vehicles where the controller is actuated by the brake pedal, be sure the control lever moves to its full ON position when the pedal is depressed for this test.

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			Turn the load-control rheostat knob from the HEAVY to the LIGHT position, and observe whether or not current decreases uniformly.
			Move the test ammeter to one of the trailer wheels, disconnect one wire from the wheel brake, and attach the ammeter into the circuit. With the brake controller fully applied, and the load-control rheostat in the HEAVY position, the draw should be not less than 3.0 amperes nor more than 3.7 amperes. Repeat the process at the other wheel brakes. If the trailer has four-wheel brakes, the readings will be slightly less.
			Parking Brakes (Ratchet and Pawl)
130	130	130	Observe whether these items appear to be in good condition, adequately lubricated, correctly assembled, and securely mounted. Apply the trailer parking brakes, and observe whether they operate to hold the vehicl, leaving a sufficient amount of the total lever travel in reserve. See whether the pawl meshes properly with the ratchet teeth to lock the brake in the applied position. Inspect the ratchet and pawl mechanism for excessive wear.

TOOLS AND EQUIPMENT

Tools (Vehicle and Pioneer)

131	131	131	Check all the standard vehicle and pioneer tools against On Vehicle Material List to see that they are all present. Inspect to see that tools are in good condition, clean, and properly stowed or securely mounted. Also examine the tools which have cutting edges to see that they are sharp. Any tools mounted on the outside of the vehicle which have bright or polished surfaces should be painted or otherwise treated to prevent rust, glare, or reflection.
			Fire Extinguishers
132	132	132	See that they are in good condition, securely mounted, and fully charged. The charge may be determined on gas type extinguishers by weigh-

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			ing with a scale, and on liquid type by shaking. Also be sure the nozzles are free from corrosion.
			Decontaminator
133	133	133	Note whether decontaminator is in good condition, securely mounted, and fully charged. Make the latter check by removing the filler plug.
			Note. The solution must be removed every 3 months, as it deteriorates.
			First-Aid Kit (If Specified)
134	134	134	See that the kit is in good condition, and that all of its items are present and properly packed. Report any deficiencies immediately.
			Publications and Standard Form 26
135	135	135	The vehicle and equipment manuals, Lubrication Order and Standard Form 26, "Driver's Report — Accidents — Motor Transportation," should be present, legible, and properly stowed.
			Traction Devices (Chains, Plates and Connectors, and Grousers)
136	136	136	Observe whether the required chains or traction-device plates and connector links or grousers are all present, in good condition, clean, not excessively worn, protected against rust, and properly stowed.
			Tow (Chain, Cables, Rope, and Block)
137	137	137	Inspect provided towing devices to see that they are in good condition, clean, and properly stowed. Tow chains or cables must be properly protected against rust when not in use. If snatch blocks are furnished, check to see that they operate freely.
			Spare Parts, Shear Pins, Fuses, and Bulbs
138	138	138	Observe whether or not the prescribed number and sizes are present, in good condition, and properly stowed. Be sure to include both winch and amphibian rudder shear pins. Also check all OVM spare parts.

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Tech. Insp.	S	M	
			Fuel and Water Cans, and Brackets
139	139	139	Observe whether they are in good condition, and secure; that the caps fit tightly and are secured to the can with a chain. Note if the cans are leaking.
			Fuel Can Nozzle and Bucket
140	140	140	This equipment should be present, in good condition, clean, and properly stowed.
			Modifications (MWO's)
141	141	141	Inspect the vehicle to determine whether all Modification Work Orders have been completed.
	141	141	Be sure that all modifications and major assembly replacements are entered on WD AGO Form 478.
			Final Road Test
142	142	142	Make a final road test rechecking items 2 to 16 inclusive, and also be sure to recheck the transmission, transfer case, and all driving axles, to see that the lubricant is not leaking. Confine this road test to the minimum distance necessary to make satisfactory observations.
			Note. Correct or report all deficiencies found during final road test.
			Carriage (Backrest, Forks, Rollers, Shoes, and Alignment)
143	143	143	See that backrest is securely affixed to carriage. See that both forks are positioned properly to insure level handling of load, and that they are not bent or damaged. See that locking pins are in place and secure. Examine rollers and shoes for wear, binding, cracks, breaks and adequate lubrication. Inspect carriage for damage or misalignment.
	143	143	TIGHTEN. Tighten all bolts and nuts.
			Control Lever Mechanism, Lift and Tilt
144	144	144	Examine lift and tilt control levers and linkage for damage, excessive wear, proper adjustment,

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Tech. Insp.	S	M	
			adequate lubrication, and see that all connections are secure.
	144	144	ADJUST. If there is excessive play in the linkage, adjust, being careful to maintain correct alignment.
			Lift Chains or Wheel Drive
145	145	145	Examine chains for excessive wear, cleanliness, and adequate lubrication and proper adjustment. See that the locking device is secure. Rollers must not be pitted or broken; see that half-link is in good condition.
	145	145	CLEAN AND LUBRICATE. Steam clean or wash chains thoroughly in dry-cleaning solvent. After drying thoroughly lubricate according to instructions on WDLO. *Caution:* Graphite must not be used on lift chains since it cakes and causes stiffness. Do not apply grease to the outside surface of chains since it does not penetrate into the wearing surfaces.
	145	145	ADJUST. Adjust chain tension in accordance with instructions in pertinent vehicle manual.
			Lift Cylinder (Cover, Packing Gland, Creeping)
146	146	146	Inspect for oil leaks around cylinder cover and packing gland. Pick up a normal load with the vehicle and put the hand-control lever in neutral position. Observe whether carriage creeps down, which indicates excessively worn piston leathers.
	146	146	If piston leathers are excessively worn they must be replaced according to instructions in pertinent vehicle manual.
	146	146	TIGHTEN. Tighten the cover and packing gland.
			Tilt Cylinder (Cover, Packing Gland, Creeping)
147	147	147	Inspect for oil leaks around cylinder cover and packing gland. With normal load on vehicle put the hand-control lever in neutral position. Ob-

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Tech. Insp.	S	M	
			serve whether carriage creeps forward, which indicates excessively worn piston leathers.
	147	147	If piston leathers are excessively worn they must be replaced according to instructions in pertinent vehicle manual.
	147	147	TIGHTEN. Tighten the cover and packing gland.

Hydraulic and Air Leaks

148	148	148	Air leaks in the pump intake connection or in the pump shaft packing and gland, permitting air to enter suction side of pump while it is in operation, will cause the pump to operate with an irregular snapping noise. The air thus drawn into the system will be carried to the cylinders, and often will cause jumping movements of the piston rod. Such leaks may be located by spreading oil over each joint or pump shaft gland successively with an oil squirt can while the pump is operating, and listening meanwhile for a momentary lessening of the abnormal pump noise. The noise will cease if the leak is completely covered with oil, until this oil is drawn in or runs off again so that air is once more allowed to enter. Always inspect the oil in the reservoir for foam or small air bubbles if this method does not show results.

Oil Hydraulic Leaks

149	149	149	Examine the lift cylinder piston and rod for oil leaks. Examine tilt cylinders for oil leaks.

Lift Mechanism

150	150	150	Inspect lifting mechanism. See that chain sprockets and bearings are properly lubricated and not excessively worn. Inspect other moving parts for proper lubrication. Entire lift mechanism should function smoothly without lag or binding.

Mast Assembly

151	151	151	Inspect entire mast assembly for proper alignment.
	151	151	TIGHTEN. Tighten all bolts and nuts; replace any which are broken or missing.

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Tech. Insp.	S	M	
			Pipes and Hose (Oil Connections)
152	152	152	Inspect all pipes, hose and connections for leaks, good condition, and hose for kinks and chafing.
	152	152	TIGHTEN. Tighten all connections and replace any hose that shows damage or unsatisfactory condition.
			Oil Hydraulic Pump
153	153	153	Operate pump, and listen for any unusual noises. Check pump and sump for leaks.
		153	Check oil level in sump and service as required in accordance with instructions on WDLO.
	153		Service oil sump in accordance with instructions on WDLO.
			Tilt Mechanism
154	154	154	Operate tilt mechanism. Mechanism should operate freely with no lag or bind.
			Commutator
155	155		Clean commutator cover and all surrounding parts to prevent dirt from falling into motor. Inspect commutator and see that copper surface has a smooth polish, and is free from copper beads and grease. Examine interior of motor for charred or broken insulation or other injuries. Inspect all connections for good condition and security.
	155		Wipe carbon dust from brush holders and cables. Replace any damaged parts. Clean connections, tighten and paint with armature varnish.
			Caution: Do not lubricate the commutator. The brushes contain sufficient lubrication. A dirty and greasy commutator will collect carbon dust in the grooves between the segments. This condition may cause a short circuit. If the commutator brush surface becomes moderately pitted or burned, it will be cleaned with grade 2/0 flintpaper. Do not use carborundum or emery paper. The commutator brush surface must

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Tech. Insp.	S	M

be kept smooth and concentric with the armature bearings. If the brush surface should become rough, badly burned, or excessively worn, it will be removed and turned down just enough to give a true surface.

Brushes and Brushholders

156 156 Brushes should move freely in the holders and not be stuck with dirt or other foreign substance. Lift the brush pressure arms, and raise and lower brushes in the carbonways to release any dirt that may have been accumulated. Care must be taken not to snap the brush pressure arms as this may chip the brushes. The brush pressure arms should be free from binding in the bodies and should have approximately the same pressure on each brush.

156 Whenever the brushes are worn to the extent that the pressure arm of the lever rests on the top of the brushholder carbonway instead of the top of the brush, the brushes must be replaced.

Controller

157 157 See that all connections are clean and secure. Inspect contact tips for cleanliness and wear. Look for broken springs or shunts. See that controller is adequately lubricated.

157 Blow out all dust and grit with clean, dry, compressed air. Replace any broken springs or shunts. Tighten all loose connections. Any roughness on contact surfaces will be removed with a clean fine file. Replace contact tips that are worn half way through.

Contactor

158 158 Inspect cable and shunt connections to see that they are in good condition and secure. Look for any broken or excessively worn parts. Examine contact tips to see whether they are burned.

159 Blow out all dust and grit with clean, dry, compressed air. Replace any broken or excessively worn parts. When the contact tips are burned, dress down with a fine file. (Do not waste con-

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Tech. Insp.	S	M	
			tact metal.) Replace contact tips when worn half way through.
			Accelerating Resistor
159	159		Examine all connections for good condition and security. See that resistor ribbon and porcelain insulator are not damaged or broken.
	159		Blow out all dust and grit with clean, dry, compressed air. Replace any broken parts.
			Safety and Limit Switches
160	160	160	Inspect all connections for looseness and see that they are in good condition, adequately lubricated and clean. Test all switches (driving, hoisting, booming, and sluing) for proper functioning. Examine contact surfaces for cleanliness and wear.
	160	160	Blow out all dirt and grit with clean, dry compressed air. Remove any roughness on contact surfaces with clean, fine file. Replace any excessively worn, broken, or damaged parts.
			Power Take-off
161	161	161	Examine shaft couplings and sprockets for looseness or damage. See that chain is properly adjusted, that half-link is in good condition, and locking device is secure and holds properly. Inspect reduction gear housing for leaks.
	161	161	ADJUST. Adjust chain according to instructions in vehicle manual.
			Hoisting and Topping Winches and Controls
162	162	162	Inspect clutch lining to see that it is clean and free of grease and oil. Check adjustment of hoist drum clutches. Examine all control levers, handles, and linkage for good condition and security. See that all linkage operates freely, is adequately lubricated, and is not excessively worn.
	162	162	ADJUST. Adjust the hoist drum clutches to prevent any drag, but allow ample movement for operation.

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Tech. Insp.	S	M	
			Sluing Mechanism
163	163	163	Examine sluing mechanism and controls for looseness, adequate lubrication and security. Determine whether the positive limit stops on both sides, which limit the rotation of the crane boom, are in place and secure.
			Boom
164	164	164	Inspect boom heel bolts, traveling sheave and pins, boom head sheaves and pins, and hoisting block sheaves and pins for good condition, security and adequate lubrication.
			Hoisting and Topping Cable
165	165	165	Unwind and examine cable for rust and corrosion, damage, kinks, frayed strands, broken wires and loose or damaged clips or fastenings.
	165	165	*Caution:* Cables with frayed or broken strands must be replaced immediately. Clean with a wire brush and dry cleaning solvent to remove accumulated oil or grease. Dry thoroughly. Oil in accordance with instructions on WDLO.
			Hoist Slip Clutch and Reduction
166	166	166	Inspect for proper lubrication. Lubricate in accordance with instructions on WDLO.
166	166		Test clutch for slipping and excessive wear.
	166		If hoist fails to raise rated capacity load, adjust according to instructions in vehicle manual. Continued slipping after adjustment indicates excessive wear which will require replacement of driving center plate.
			Safety Clutch-Power Take-Off
167	167		Inspect for correct amount of lubricant. (See WDLO.)
	167		SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.

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Tech. Insp.	S	M	Power Swing Cylinder
168	168		Inspect for proper lubrication according to instructions on WDLO.
	168		SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.

16. Specific Procedures for Full-track and Tanklike Wheeled Vehicles

a. USE OF WD AGO FORM 462. (1) *WD AGO Form 462.* The items on this form should usually be performed in the numerical sequence in which they are listed wherever possible, since they have been so arranged for maximum efficiency and economy of motion. The general order of the listed items is—

(a) A road test and closely related items.

(b) Maintenance operations.

1. Items on the exterior of the vehicle.

2. Items in the engine compartment.

3. Items in the fighting compartment.

4. Items pertaining especially to tanklike wheeled vehicles.

5. Armament items.

(c) Tools and equipment.

(d) Final road test.

(2) Any items on tanklike wheeled vehicles which are common to full-track vehicles should be serviced and inspected in the same manner. Line out any items which do not apply to the vehicle being inspected or serviced.

(3) Whenever it is necessary to disassemble a part or assembly during the technical inspection, the special services indicated for the item on the quarterly maintenance service should be performed on the disassembled unit.

b. DISPOSITION. All monthly maintenance work sheets may be held in the organization file until the next third quarterly maintenance work sheet is filed; then destroy. The quarterly maintenance work sheets or technical inspection reports may be held until the next third quarterly maintenance form is filed; then destroy.

c. PERFORMING ITEMS ON WORK SHEET. (1) Specific procedures for performing each item in the monthly and quarterly maintenance services, and in the technical inspection, are described in the following pages. Each of these pages of specific procedures has three columns at its left edge corresponding to the monthly maintenance service, the quarterly maintenance service, and the technical inspection of Form 462, respectively. While the quarterly

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maintenance and technical inspection are both indicated in the same column on the form, separate columns are provided in the following pages for clarification. The detailed procedures for each maintenance service and the technical inspection will be found opposite the item numbers in the procedure columns.

(2) Very often it will be found that a particular procedure does not apply to both the monthly maintenance, the quarterly maintenance, and to the technical inspection. In order to determine which procedures to follow, it is necessary simply to follow the item number down the appropriate column, opposite the paragraphs wherever they are to be applied.

(3) The following sample from the pages of specific procedures that follow illustrates the manner in which they are to be used. Suppose work is being done on the monthly (F) maintenance service. Item number 34, in this sample, appears in the monthly column opposite the first paragraph only, which means that the procedures in this case are to be limited to this only.

(4) Similarly, in the case of the technical inspection the first two paragraphs would apply, and in the case of the quarterly (H) maintenance service, the presence of the number 34 next to each paragraph indicates that all of these steps are to be performed.

(5) When preventive maintenance services or operations are performed on tractors (using WD AGO Form 462) on which the lubrication schedules are set at 8-hour or multiple of 8-hour intervals, the monthly operations will be performed at 48 hours and the quarterly operations at 96 hours.

Tech. Insp.	H	F	SAMPLE	
34	34	34	Generators and Starting Motors. See that they are in good condition and securely mounted; that the wiring connections are tight; and that generators are correctly aligned with their drive belts and pulleys or drive shafts. On radial engines, look for evidence of oil leaks at the generator or starter mounting-pad gaskets.	Applies to all three columns.
34	34		Remove the commutator inspection cover and inspect the commutator to see that it is in good condition and clean. Check to see that the brushes are free in the brush holders, clean, and not excessively worn and that the brush connections are secure. Note whether or not the wires are broken or chafing.	Applies to technical inspection and quarterly maintenance.
	34		CLEAN. Clean the commutator end of the generators and starters by blowing out with compressed air.	Apply to quarterly maintenance only.
	34		TIGHTEN. Tighten the starter mounting bolts securely.	

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Tech. Insp.	H	F

ROAD TEST

Note. If the tactical situation does not permit a full road test, perform items 2, 3, 4, 5, 6, 9, 12, 13, 14, and 15 which require slight or no movement of the vehicle. When a road test is possible, it should be for preferably 3 miles, but not over 5 miles.

Before-operation Inspection

1 1 1 Perform the before-operation service outlined in section II as a check to determine whether the vehicle is in a satisfactory condition to make the road test safely. See that vehicle is adequately supplied with fuel, engine oil, and coolant.

Caution: Observe all starting precautions before starting engines.

Instruments and Gauges

2 2 2 OIL PRESSURE AND HOUR METER. Observe the oil pressure to determine whether it is sufficient for safe operation of the engine, and whether the hour meter registers the accumulating engine running hours. During the road test, continue to observe the oil pressure to see that it is normal throughout the engine speed range. Also observe whether the hour meter continues to register at all times when the engine is running.

Caution: If the oil pressure gauge indicates excessively low oil pressure, stop the engine immediately, and investigate the cause.

AMMETER AND VOLTMETER. Watch the ammeter to see that it is indicating normally. With the battery fully charged, charge should be indicated for a short time after starting the engine (to restore the current used by the starter); the ammeter should return to slightly above zero, with all lights and electrical accessories switched off. When the battery is low, charge will be indicated for a longer period of time. Press the voltmeter switch, and observe whether the voltmeter indicates at least the nominal battery voltage.

SPEEDOMETER AND ODOMETER. Observe the speedometer to see that it operates normally

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without excessive fluctuation or unusual noises that might indicate worn or damaged gears or drive cable. Also see that the odometer registers the accumulating mileage.

TACHOMETER AND REVOLUTION COUNTER. Observe the tachometer to see whether it operates normally without excessive fluctuation or unusual noises that might indicate worn or damaged gears or drive cable. Also observe the revolution counter to see whether it registers the accumulating revolutions.

ENGINE TEMPERATURE. Note whether the gauge operates properly and whether the engine temperature is normal throughout the road test.

Caution: If the engine temperature becomes excessive, stop the vehicle, cool the engine properly, investigate the cause of the overheating, and correct the trouble or report it.

TRANSMISSION OIL TEMPERATURE. Observe whether the gauge is operating properly and whether the transmission oil temperature exceeds the specified maximum at any time during the road test.

Caution: If the transmission oil temperature becomes excessive, stop the vehicle, investigate the cause, and correct the trouble or report it to designated authority.

TRANSMISSION OIL PRESSURE. If the vehicle is equipped with a transmission oil pressure gauge, observing whether it is operating, and indicating in the specified range. If the oil pressure is not satisfactory, the cause should be investigated immediately, and the trouble corrected or reported to proper authority.

FUEL. Observe whether the fuel gauges indicate the approximate amount of fuel in the tanks.

CLOCK. Note whether it is in good condition, secure, and operates properly.

Windshield, Windshield Wipers, and Siren

3	3	3

See that they are in good condition and secure; that the windshield glass is clean; that the wip-

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ers operate correctly through their full stroke without evidence of looseness in their motor mountings; and that the blades contact the glass properly. If the tactical situation permits, sound the siren to determine whether the signal is normal.

Wheel Brakes (Braking Effect, Feel, Side Pull, Noise, Chatter, Pedal Travel and Vacuum Booster Action)

4	4	4

On tanklike wheeled vehicles, check brakes as follows: Make the first checks from low speed when starting the road test, and continue to make similar observations as other stops are made during the road test. Apply the foot brakes sufficiently to stop the vehicle safely at a fast rate. Observe whether the brakes operate effectively to stop the vehicle within a reasonable distance. Observe whether the pedal has a "hard" or "spongy" feeling, whether there is any abnormal tendency of the brakes to pull the vehicle to one side, and whether the brakes make any objectionable noise or chatter. On hydraulic brakes, also note whether the reserve pedal travel at the end of the stop is satisfactory. Observe whether the brake vacuum booster appears to operate properly to assist in the application of the foot brakes.

Brakes (Steering and Parking, Levers, Braking Effect, Steering Action, and Booster)

5	5	5

On full-track vehicles, pull back on both steering-brake levers, and observe whether they meet resistance when the levers reach the vertical position or slightly before. Stop the vehicle, apply the parking brake, and lock it in position. Notice whether it seems to be properly adjusted to hold the vehicle stationary and locks in the applied position. Accelerate the vehicle to a moderate speed in low gear, disengage the clutch and apply both steering brakes. Observe whether they stop the vehicle properly with normal effectiveness, when the levers are in their correct applied position. Apply the steering brakes independently, and observe whether

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Tech. Insp.	H	F

they steer the vehicle properly. On vehicles equipped with a booster, observe whether the booster appears to operate properly to assist in the application of the steering brakes. Continue to observe the functioning of the steering brakes during the entire road test.

Clutch (Free Travel, Drag, Noise, Grab, Chatter, and Slip)

6 6 6 Observe whether the clutch pedal has satisfactory free travel before beginning to disengage the clutch; see that it releases the clutch completely before it is fully depressed; and note whether there are any unusual noises in the clutch-release mechanism that might indicate a dry or defective release bearing. When engaging the clutch, observe whether the clutch grabs, chatters, or squeals; or whether there is any indication of slipping when the clutch is fully engaged. Continue to pay attention to these items during the entire road test.

Transmission and Transfer (Lever Action, Vibration, Noise Control Synchronization)

7 7 7 Shift through the entire gear range of the transmission and transfer unit. Observe whether there are any unusual vibrations that might indicate loose mountings, and whether the gears jump out of mesh. On vehicles equipped with hydra-matic transmissions and a transfer unit, observe whether they appear to shift properly, and whether the transmissions shift simultaneously. Continue these observations throughout the road test.

Steering (Free Play, Bind, Wander, Shimmy, Side Pull, and Booster)

8 8 8 On tanklike wheeled vehicles, observe the free play of the steering gear to see whether there is excessive lash in the steering mechanism. With the vehicle in motion, turn the steering wheel in both directions and observe whether there is any indication of binding. Notice whether the steering booster appears to operate properly to assist the steering mechanism. As the vehicle

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is operated at normal speeds, look for any tendency to wander, any shimmy, or any abnormal pull to one side.

Engine (Idle, Acceleration, Power, Noise, Governed Speed, and Oil Consumption)

9 9 9 IDLE. With the vehicle stopped, observe whether the engine(s) runs smoothly at normal idling speed. At all times during the road test, note any tendency of the engine to stall while shifting gears.

ACCELERATION, POWER, AND NOISE. Observe whether the engine(s) has normal acceleration, pulling power, and operating characteristics in each speed when shifting through the gear range from first to high. Make a similar observation in high gear from low speed with wide open throttle, and listen for any unusual engine noise such as excessive "ping." Listen for other noises that might indicate damaged, excessively worn, inadequately lubricated engine parts or accessories, or loose drive belts.

SMOKE. During operation of the vehicle on the road test, look for any indication of excessive or unusual smoke from the exhaust.

GOVERNED SPEED. With the vehicle in second gear, slowly depress the accelerator to the toeboard, and observe the speedometer or tachometer reading. Notice that the vehicle reaches, but does not exceed, the governed speed specified on the caution plate. If the vehicle is equipped with a tachometer, check to see that the engine(s) speed does not exceed the specified revolutions per minute.

Unusual Noise (Propeller Shafts and Joints, Differential and Final Drives, Sprockets, Idlers, Wheels, Support Rollers, and Tracks)

10 10 10 At intervals, during the road test, listen for any unusual noise in the above items that might indicate damaged, defective or loose parts, or inadequate lubrication.

Note. Any noise from these units may be observed better by someone outside of the vehicle.

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Tech. Insp.	H	F	
			Temperatures (Transmissions, Transfer, Differential and Final Drives, Hubs, Sprockets, Idlers, Wheels, Rollers, and Brake Drums)
11	11	11	Stop the vehicle and test by hand-feel for any abnormal temperature in the above listed items. An overheated gear case, hub, or brake drum indicates a defective, damaged, inadequately lubricated, or improperly adjusted unit. An abnormally cool brake drum indicates an inoperative brake.
			Note. If proper location is selected for this check, time will be saved in performing item 12.
			Gun-Elevating and Traversing Mechanism
12	12	12	Place the vehicle in a position where it is tilted laterally (sidewise) about 10°. Traverse the turret through its full 360-degree range by both the hand and power controls, and observe whether there is any indication of binding. With the gun pointed forward or rearward, elevate it through its entire range with the hand controls, and see whether there is any binding, excessive lash, or erratic action.
			Leaks
13	13	13	Open the engine compartment doors, and look within the compartment and also underneath the vehicle for indications of oil, water, or fuel leaks.
			Noise and Vibrations (Engine, Mountings, Accessories and Drives, Clutch, and Exhaust)
14	14	14	While accelerating and decelerating the engine(s) listen for any unusual noises in the engine(s) or its accessories and accessory drives. Notice whether there is any excessive vibration that might indicate loose engine mountings, or noise that might indicate damaged, loose, or inadequately lubricated clutch parts or release bearings. Note whether there is an unusual amount of smoke at the exhaust outlet or crankcase ventilators.
			Track Tension (Final Road Test)
15	15	15	Determine whether track tension is within specified limits.

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MAINTENANCE OPERATIONS

Engine Vacuum and Fuel Pump Test

16 16 16 VACUUM TEST. With the engine running at normal idling speed, and the engine-compartment door and hatches open, attach the vacuum gauge to the intake manifold. The vacuum gauge should read about 18 to 21 inches and the pointer should be steady. A needle fluctuating between 10 and 15 inches may indicate a defective cylinder-head, gasket, or valve. An extremely low reading indicates a leak in the intake manifold or gaskets. Accelerate the engine with full throttle momentarily. Notice if the gauge indicator fails to drop to approximately 2 inches as the throttle is opened, and recoil to at least 24 inches as the throttle is closed. If so, this may be an indication of diluted oil, poor piston-ring sealing, or an abnormal restriction in the exhaust, carburetor, or air cleaner. Repeat this test on each engine on dual or multi-bank installations.

Note. The above readings apply to sea level. There will be approximately a 1-inch drop for each 1,000 feet of altitude. This test does not apply to Diesel engines.

FUEL PUMP TEST. Attach a fuel pump test gauge properly, and with the engine running at idling speed, determine whether the pressure and vacuum are within the specified limits. This check also applies where electric fuel pumps are used.

Caution: Before stopping air-cooled engines idle in accordance with vehicle Technical Manual instructions.

STOP ENGINE — OPEN BATTERY SWITCH

Crankcase (Leaks)

17 17 17 Examine the crankcase for indications of oil leaks.

17 17 SERVE. If an oil change is due, immediately after stopping the engine and completing the above inspection, drain the crankcase, and refill to the correct level with specified oil. However, in cases where the engine is to be removed,

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			the crankcase should not be refilled until the engine has been reinstalled, as in item 61. While the lower hull inspection plate is removed for the above service, check the crankcase and oil pan for good condition and oil leakage.
			Note. Do not start the engine again until the oil-filter service, item 54, has been completed, so as to avoid contamination of the fresh oil.
			Side Armor (Fenders, Guards, Paint and Markings, Shackles, and Siren)
18	18	18	Inspect these items to see that they are in good condition, that armor, fenders, guards, shackles, and siren are secure, and that towing shackles are not excessively worn. Observe condition of paint for rust or polished surfaces that may cause reflections, and check all vehicle markings to see that they are legible.
			Bottom (Armor, Escape Hatch, Inspection Plates, and Drain Plugs)
19	19	19	See that these items are in good condition and secure; that the bottom escape hatch hinges and latches operate properly and are adequately lubricated; and that all bottom drain plugs are tight.
	19	19	TIGHTEN. All bottom inspection plates must be tightened securely.
	19	19	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
			Differential and Final Drives
20	20	20	Note whether housings are in good condition and do not leak; that lubricant is up to correct level; and that all assembly and mounting bolts are secure.
	20		TIGHTEN. Tighten all external assembly and mounting bolts securely.
	20	20	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
			Track (Blocks, Connectors, and Wedges)
21	21	21	See that these items are in good condition, cor-

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			rectly assembled, and secure. Pay particular attention to dead blocks, loose or excessively worn blocks, connectors and guides, and to bottomed wedges.
			Note. Reverse blocks on full rubber tracks when they are worn to a point where the rubber is even with the edge of the connectors. Replace the track if previously reversed, when the majority of the cross tubes of the frame in each block have been exposed. Replacement should also be made of any wedges and connectors which are damaged or worn near to or beyond serviceable limits.
	21	21	TIGHTEN. Tighten all track-connector wedge nuts securely.
	21		*Note.* Whenever the tracks are disconnected and removed from the sprockets, upper rollers, and idlers, or at each third quarterly maintenance service, the related group items, 22 and 25, marked on the form with asterisks (*), should be inspected as described below in the asterisk-marked procedures. On the regular monthly and quarterly services, the tracks should not be removed unless repairs are needed.
			Caution: Whenever tracks are removed for repair or replacement, do not reinstall until the services marked by the asterisk (*) in items 22 and 25 have been completed.
			Idler (Wheels, Arms, Eccentrics, Serration Plates, Adjustment and Lock Nuts, and Springs)
22	22	22	See that they are in good condition, correctly assembled, secure, and not excessively worn. Also examine the idler bearing seals for leaks, and the relief vents, if used, for clogging.
	22	22	TIGHTEN all assembly and mounting bolts securely.
	22		*In addition to the above, at each third quarterly operation or whenever the track is removed from the idler wheel, try the hub bearings for looseness or end play. End play may be felt by applying force outward and inward on the assembly. Bearing looseness may be determined with the use of a pry bar. Spin the idler wheel and listen for any unusual noise that might indicate a damaged, excessively worn, or an inadequately lubricated bearing. On trailing idlers, block or jack the arm to accomplish the spinning check.

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			Bogie (Levers, Arms, Links, Gudgeons, Collars and Guides, Springs and Seats, Frames and Wearing Plates, Shock Absorbers)
23	23	23	Inspect them to see that they are in good condition, correctly assembled and secure, and that the wearing plates and gudgeon collars and guides are not excessively worn. Also note whether the volute springs have taken an excessive permanent set. If two or more coils are resting on the seat, the spring will be considered to have taken an excessive permanent set. This condition will be considered a standard for replacement. Inspect shock absorbers for leaks, security and wear.
	23		TIGHTEN. Tighten all assembly and mounting bolts securely.
			Wheels, Tires, Rollers, and Skids
24	24	24	Observe whether these items are in good condition, correctly assembled, and secure. Pay particular attention to see whether the tire rubber has separated from the rims, and that the tires are not cut, torn, or excessively worn. Note whether there are excessive lubricant leaks from the wheel bearings, and whether the relief fittings, if used, are present, in good condition, and not clogged.
	24		Using the bogie-wheel lift as described in the vehicle manual, raise each wheel and check the bearings for looseness and end play. End play may be felt by applying force outward and inward on the wheel parallel to the gudgeon pin. Bearing looseness may be determined with the use of a pry bar. Spin the wheel and listen for any unusual noise that might indicate damaged, inadequately lubricated, or excessively worn bearings, and observe whether the spacers appear to be tight and do not turn with the hub.
	24		Raise the track from the support roller with a jack or pry bar and insert a prop to hold the track off the roller while the following check is made: Check the roller bearings for end play and bearing wear. End play may be felt by ap-

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			plying pressure inward and outward on the roller. Bearing looseness may be determined with the use of a pry bar. Spin the roller and listen for any unusual noise that might indicate damaged, dry, or excessively worn bearings.
			Note. Whenever the tracks are removed, the above operations should be performed before the tracks are reinstalled.
	24		TIGHTEN. Tighten assembly and mounting bolts securely.
			Sprockets (Hubs, Teeth and Nuts)
25	25	25	Examine them for good condition and see that all of their assembly and mounting bolts or cap screws are secure. Observe whether the sprocket teeth are excessively worn and whether the flange gaskets or oil seals are leaking lubricant excessively. If so, the sprocket should be replaced or reversed according to the instructions in the vehicle manual.
	25	25	TIGHTEN. Tighten all assembly and mounting bolts securely.
	25		*In addition to the above, at each third quarterly operation, or whenever the track is disconnected and removed from the sprocket, examine the sprocket teeth for excessive wear; see that the sprockets are well secured to the hubs, and that the hub-to-final-drive bolts are secure. Try the sprocket hub bearings for looseness and end play. End play may be felt by applying force outward and inward on the assembly. Bearing looseness may be determined with the use of a pry bar. After checking the above, reinstall the tracks and connect them securely.
			Track Tension
26	26	26	Determine whether the track tension is correct in accordance with the instructions and specifications in the vehicle manual.
	26	26	ADJUST. The track tension must be adjusted to instructions and specifications in the vehicle manual, taking care to tighten all locking devices securely.

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			Caution: On eccentric type adjustments, be sure to apply the force on the wrench handle in the proper direction as described in the vehicle manual.
			Top Armor (Turret, Deck, Paint and Markings, Grilles, Doors, Hatches, Covers and Latches, and Antenna Mast)
27	27	27	Note whether these items are in good condition and secure; see that the door and hatch hinges and latches operate properly, are not excessively worn, and are adequately lubricated. Examine the condition of the paint for rust or polished surfaces that may cause reflections, and all vehicle markings to see that they are legible.
			Caps and Gaskets (Fuel and Radiator)
28	28	28	Observe whether they are in good condition, whether the caps lock securely on the filler necks, and whether their vents are open.
			Radiator Removal (Overhead)
29	29	29	On vehicles where radiators are mounted over the engines, remove them at this time to facilitate the following services and inspections.
			Engine Removal (When Required)
	30		Engines should be removed on the quarterly maintenance service, *only* if the inspections made in items 6, 9, 13 and 14 indicate the need.
	30		CLEAN. The exterior of the engine must be cleaned and dried thoroughly, taking care to keep the dry-cleaning solvent away from electrical wiring and equipment. Hot soap and water, which is not harmful to insulation, should be used when available.
			Note. The above cleaning, and the following services, in items 31 to 60, should be performed in the best possible manner on engines that do not require removal.
			Valve Mechanism (Clearances, Lubrication, Cover Gaskets, Rocker Boxes and Push-Rod Housings)
	31		Observe whether the engine valve clearances are satisfactory. Also see that the engine valve

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tappets, rocker arms and shafts, and springs are in good condition, correctly assembled and secure. Notice if oil is being properly delivered to overhead valve rocker arms and shafts. Observe whether the rocker arms or shafts are excessively worn, or whether the rocker-arm rollers have flat spots. Also examine the rocker box or valve chamber covers to see that they are in good condition; that their gaskets are serviceable; and that radial push-rod housings are in good condition, secure, and not leaking oil.

31 ADJUST. Adjust the valve clearances according to the instructions and specifications in the vehicle manual.

Spark Plugs (Gaps and Deposits)

32 Remove all spark plugs and examine them for good condition; note whether the gaps are satisfactory. Pay particular attention to broken insulators, excessive carbon deposits, electrodes which are burned thin, and clogged cooling fins.

Caution: Aircraft type spark plugs should not, under any condition, be cleaned or adjusted by the using arms. If they are not in condition to give satisfactory service without cleaning or adjustment, they must be replaced with new plugs, or with plugs that have been reconditioned by a higher echelon.

32 CLEAN. On other than aircraft type spark plugs, clean deposits from the insulators and electrodes, and check the insulators for cracks.

Note. Report excessive carbon deposits and burned or cracked insulators, as these conditions may indicate incorrect heat range.

32 ADJUST. Adjust electrode gaps to specifications by bending the grounded electrodes. After completing item 33, reinstall the plugs, using new gaskets. Take care not to overtighten them as this may cause distortion and damage.

32 SERVE. Replace aircraft type spark plugs with new or properly reconditioned plugs.

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Compression Test (Except On Radial and Diesel Engines)

33 With all spark plugs out and engine warm, insert the compression gauge in a spark plug hole, and with the throttle wide open, revolve the engine at cranking speed until the maximum compression is indicated. Record the reading in the space provided on the back of the form. Repeat this process for each cylinder. See the vehicle manual for specified compression pressures and for variations due to condition or altitude. If pressure in a cylinder is below normal, squirt sufficient engine oil on the piston head to temporarily prevent loss of compression, and recheck the compression of the cylinder. Low compression brought up to normal by oil sealing indicates piston, ring, or cylinder wear or damage. Low compression not brought up to normal by this method indicates compression leakage by a valve or gasket.

Generators and Starters

34 34 34 See that they are in good condition and securely mounted; that the wiring connections are tight; and that generators are correctly aligned with their drive belts and pulleys or drive shafts. On radial engines look for evidence of oil leaks at the generator or starter mounting-pad gaskets.

34 34 REMOVE the commutator inspection cover, and inspect the commutator to see that it is in good condition and clean. See that the brushes are clean, free in the brush holders, and not excessively worn; that the brush connections are secure; and note whether the wires are broken or chafed.

34 CLEAN. Clean the commutator end of the generators and starters by blowing out with compressed air.

34 TIGHTEN. Tighten the starter mounting bolts securely.

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			Cartridge Starter (Guiberson Diesel)
35	35	35	Observe whether the breech, starter assembly, and connecting tubing are in good condition, clean, correctly assembled, and secure. Note particularly whether the safety disk is blown. See that the supply of spare cartridges is adequate.
			Note. On the quarterly service, make the above inspection after the new breech and starter assemblies are installed.
		35	CLEAN. Clean the breech barrel and clean out the holes in the safety disk holder.
	35		SERVE. Replace the breech and starter assemblies with new assemblies or those that have been reconditioned by a higher echelon. While the tubing is disconnected for replacement of these units, check to see that they are not clogged.
	35	35	TIGHTEN. Tighten all mounting and assembly screws and tubing connections securely.
			Distributors (Cap, Rotor, Points, Shaft, and Advance Unit)
36	36	36	See that the distributor body and external attachments are in good condition and secure. Inspect other parts of the distributor as follows:
			CAP, ROTOR, AND POINTS. Blow or wipe the dirt or dust from the distributor cap. Remove the cap, and observe whether the cap, rotor arm, and the breaker-plate assembly parts are in good condition, correctly assembled, secure, and serviceably clean. Pay particular attention to cracks in the cap and rotor arm, to corrosion of terminals, and connections in these parts, also, to burning off of the outer ends of the conductor strap of the rotor arm. Also note whether the breaker points are in good condition, well aligned, and that the gap is satisfactory. If the breaker-plate assembly is unserviceably dirty, remove the distributor, clean in dry-cleaning solvent, dry with compressed air, lubricate the

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			parts as specified below, and reinstall the distributor in the correct position for timing. When cleaning the distributor, remove the wick and lubrication cup, clean and dry while removed, and reinstall them only after distributor assembly is cleaned and blown dry with compressed air. If the breaker points are pitted, burned, or worn to an unserviceable condition, install a new set. If the points are badly pitted, replace the condenser also, as it is probably the cause of the pitting. Install the new points so that they are well aligned and engage squarely. If the points are slightly pitted or burned, dress them with a contact point dresser, or grade 2/0 flintpaper (do not use emery cloth), and blow off the filings with compressed air.
			SHAFT. Test by hand-feel for looseness, to determine whether the distributor camshaft is excessively worn in its bushings.
			CENTRIFUGAL ADVANCE. Install the rotor arm on the upper end of the distributor camshaft, and observe whether the camshaft can be rotated by finger force through the normal range of movement which is permitted by the centrifugal advance mechanism, and whether it returns to its original position when the fingers are removed from the rotor arm. There should be no binding or hanging up in mechanism during these movements.
	36	36	SPECIAL LUBRICATION. Lubricate the cam surfaces, the movable breaker-arm pin, the wick, and the camshaft according to the vehicle's lubrication order. Take care to keep lubricant off the distributor points, not to apply more lubricant than is specified, and to wipe the cam clean before lubricating its surface.
	36		ADJUST. Adjust the breaker-point gap to specifications.

Magnetos (Points)

37	37	37	Determine whether they are in good condition, and securely mounted. Note whether there is evidence of oil leaks at the mounting pad

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			gaskets. Remove the breaker point inspection covers and check to see that the points are in good condition and clean, that the breaker points are well aligned, the mating surfaces engage squarely, and that point gaps are satisfactory. Replace unserviceable points.
	37		ADJUST. Adjust the magneto breaker-point gaps according to the instructions and specifications in the vehicle manual.
			Ignition Wiring and Conduits
38	38	38	See that these items are in good condition, clean, correctly assembled and connected, securely mounted, and not chafing against other engine parts.
	38	38	CLEAN. Clean all exposed ignition wiring with a dry cloth.
			Note. Do not disturb connections unless they are actually loose. Overtightening may result in damage to the terminals.
			Coils (Standard and Booster)
39	39	39	Inspect the regular ignition coils, and on engines equipped with magnetos, examine the booster coils to see that they are in good condition, clean, and securely mounted.
			Radial Engine (Oil Pumps, Sump, Oil Screens and Lines, Accessory Case, Crankcase, Fuel Screens, and Lines, and Control Linkage)
40	40	40	See that these items are in good condition and secure; and that oil is not leaking from the oil pumps, sump, and lines attached to the engine, accessory case, and crankcase. Also note that fuel is not leaking from the fuel lines to the engine.
	40	40	CLEAN. Remove the scavenger and pressure oil pump screens, and the oil sump screens; clean them thoroughly in dry-cleaning solvent; dry, and reinstall them. Also remove, clean, dry, and reinstall any fuel pump screen or strainer attached to the engine.

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	40		SERVE. Drain off the old oil from the engine sump.
	40		TIGHTEN. Tighten all assembly and mounting bolts and screws securely.
			Diesel (Fuel Pumps, Injectors, Lines, and Governor)
41	41	41	Note whether they are in good condition, correctly assembled, secure and not leaking.
	41		TIGHTEN. Tighten all pump assembly and mounting bolts and screws securely.
	41		ADJUST. Adjust the fuel-injector timing, and balance according to the instructions and specifications in the vehicle manual. This also applies to injector pumps which are located in the injector assembly, as on the GMC Diesel engine.
			Breather Caps and Ventilators
42	42	42	See that they are in good condition, correctly assembled, and secure, and that the ventilator tubes are open.
	42	42	CLEAN AND SERVE. Remove the cleaner element and service according to instructions on WDLO.
			Air Cleaners (Carburetor Or Diesel)
43	43	43	Remove the air cleaner elements. The oil in the reservoir should be at the proper level and not filled with sediment. Examine the disassembled air cleaner parts and any connecting hose or tubes to see that they are in good condition. Note particularly whether the cleaner element is damaged.
	43	43	CLEAN AND SERVE. Service air cleaner according to instructions on WDLO.
			Carburetor (Choke, Throttle, Linkage, Governor and Primer)
44	44	44	See that they are in good condition, correctly assembled, and securely installed. Be sure the carburetor does not leak; that the control link-

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			age, including the choke and throttle shaft, is not excessively worn; and that the choke valve opens fully when the control is in its released position. See that the throttle valve opens fully when the accelerator is fully depressed; and that the governor is properly sealed. On radial engines, also observe whether the fittings and lines of the priming system, which are mounted on the engine, are in good condition, secure, and are not leaking.
	44	44	CLEAN. Remove the fuel cleaner element from the carburetor fuel inlet, clean it in dry-cleaning solvent, dry, and reinstall it.
			Manifold (Intake and Exhaust)
45	45	45	Note whether the manifolds and their gaskets are in good condition, correctly assembled, secure, and do not leak. Pay particular attention to see that the several stacks and intake pipes on radial engines are secure at their flanges, clamps, and gland-packing nuts. Check for indications of leaks by looking for carbon streaks.
	45		TIGHTEN. Tighten all mounting and assembly bolts and screws securely.
			Cylinder (Heads, Gaskets, and Radial Cylinders)
46	46	46	See that they are in good condition and secure, and note whether there are indications of oil or water leakage or blow-by around studs, cap screws, or gaskets. Blow-by is usually indicated by carbon streaks. Inspect radial cylinders to see whether the cooling fins are clogged. *Caution:* Cylinder head, cylinder pad hold-down nuts or cap screws should ordinarily not be tightened, unless there is a definite indication of looseness or leaks. If tightening is necessary, use a torque-indicating wrench, and tighten in the sequence and to the tension specified in the vehicle manual. If a new head gasket is necessary to stop leaks, tighten three times as follows: first, after installing; second, after engine is warmed up; and third, after complet-

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			ing final road test. On valve-in-head engines, always check to see that the valve-tappet clearances are proper after such cylinder head tightening.
	46		CLEAN. Clean all excess deposits of dirt or grease from, in, and around radial cylinder cooling fins, using care not to damage them.
			Radial Engine (Cowling, Air Deflectors, Flywheel, Fan and Guard, Steady Bar, and Support Beam)
47	47	47	See that they are in good condition, correctly assembled, and securely mounted.
	47		TIGHTEN. Tighten all accessible mounting and assembly bolts or screws securely. If an engine has been removed for repair, or replacement, tighten bracket to hull bolts securely before installing engine.
			Clutch Assembly
	48		On those engines that are removed, disassemble the clutch, clean parts thoroughly, and inspect for excessive wear or damage.
			Water Pumps, Fans, and Shrouds
49	49	49	Observe whether they are in good condition, correctly assembled, secure, and see that the water pumps do not leak. Note particularly whether there is end play or bearing looseness in the water pump or fan, and whether the fan blades are properly aligned so that they will not interfere with the shrouds.
			Accessory Drives (Belts, Pulleys, Shafts, and Couplings)
50	50	50	See that these items are in good condition, correctly assembled, and secure. Pay particular attention to see whether or not drive belts and pulleys are well aligned and not excessively worn. Also note whether they are frayed, oil-soaked, improperly adjusted, or bottoming in the drive pulleys. Check to see that the universal joints of generator drive shafts are not excessively worn, or leaking.

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	50	50	ADJUST. Adjust all drive belts according to instructions and specifications in the vehicle manual, locking all adjustment devices securely.
			Engine Compartment (Bulkhead and Control Linkage)
51	51	51	See that the engine compartment, including the bulkhead, is in good condition, clean, and secure; and that the control linkage in the engine compartment is in good condition, securely connected, and mounted.
	51		CLEAN. Clean the engine compartment as thoroughly as possible. On those vehicles where the engine is removed, clean out all fuel and oil drippings, dirt, and refuse; and swab out the entire compartment with cloths soaked in dry-cleaning solvent, and dry thoroughly.
			Engine Oil (Tanks, Coolers, Lines and Fittings)
52	52	52	Observe whether they are in good condition, correctly assembled, securely mounted, and whether there are indications of oil leaks. Measure the level of the oil in the supply tanks with the bayonet gauge. Inspect the sample of oil on the bayonet gauge for grit, water, or fuel dilution. Rubbing a sample of oil between the fingers may indicate the presence of grit. Also see that the filler cap and gasket are in good condition and seal properly.
	52		TIGHTEN. Tighten all oil tank mountings and oil line support clips or brackets securely.
	52		SERVE. Service oil supply tanks according to instructions on WDLO.
			Fuel (Tanks, Vents, Lines, and Pumps)
53	53	53	See that they are in good condition, correctly assembled, and securely mounted. Note whether the vents are open, and whether there are indications of fuel leaks from the tanks, lines, or pumps.
	53		TIGHTEN. Tighten all fuel tank mountings and fuel line support clips or brackets securely.

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	53	53	SERVE. Drain the water and sediment from each fuel tank by removing the drain plugs or opening the drain cocks and allowing the fuel to drain until it runs clean. Tighten the plugs securely or close the cocks, taking care to prevent leakage. *Caution:* When performing this operation, use a container to catch the drainings, and use every precaution not to spill the fuel. If any fuel does spill, be sure it is swabbed thoroughly dry before turning on the main battery switch.
			Engine Oil Filters
54	54	54	Inspect oil filters to see that they are in good condition, secure, and not leaking.
	54	54	CLEAN AND SERVE. Service filter according to instructions on WDLO.
			Fuel Filters and Screens
55	55	55	Note whether the fuel filters and cleaner bowls are in good condition, secure, and not leaking at gaskets or connections.
		55	CLEAN. Remove fuel screens and cartridge type elements, clean all screens thoroughly in dry-cleaning solvent, dry with compressed air, and reinstall. Observe whether the cartridge type element is in satisfactory condition for further service. If so, clean and replace it, being sure that all element and cover gaskets are in good condition and in place. On disk type filters, turn the handle one complete turn. Remove the plug, and drain the sediment bowl.
	55		SERVE AND CLEAN. On a cartridge type fuel filter, replace the cartridge; also clean all fuel screens. On a disk type filter, remove the element from the cleaner bowl, and wash in dry-cleaning solvent until the disks are clean and free. Clean the bowl thoroughly, and reinstall the element, making sure all gaskets are in good condition and in place. Do not scrape or damage the disks. If the element is unserviceable, replace entire filter assembly.

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			Oil Coolers (Transfer Unit, Transmission, Core and Lines)
56	56	56	Examine these oil coolers, including their cores and connecting lines, to see that they are in good condition, secure, and do not leak. Also check to see that the core air passages are not clogged with dirt and trash.
	56	56	CLEAN. Clean all insects and trash from the core air passages.
	56		SERVE. Service flush coolers (except water circulating type) according to instructions on WDLO.
			Exhaust Pipes and Mufflers
57	57	57	Note whether they are in good condition, securely assembled, and mounted, and whether there are indications of exhaust leaks, usually indicated by carbon streaks. Be sure the drain holes in the mufflers are not clogged, so that all condensate may drain off.
	57		TIGHTEN. Tighten all mounting bolts and connections securely.
			Engine Mountings
58	58	58	Observe all accessible mountings to see that they are in good condition and secure. When engines are removed, this should be done when the engines are out of the vehicle.
	58		TIGHTEN. Tighten all accessible mountings and brackets securely. When engines are removed, perform the tightening of the mount-to-engine and bracket-to-hull bolts while the engines are out of the vehicle.
			Clutch Release—Radial (Yoke, Rollers, Linkage, and Mounting)
59	59	59	These parts of the clutch-release mechanism should be in good condition, correctly assembled, secure, and not excessively worn. Also note whether the yoke rollers are adequately lubricated, and do not have flat spots on their outside diameters.

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	59		TIGHTEN. Tighten all accessible assembly and mounting bolts and screws. When engine is removed, this service should be performed before the engine is reinstalled.

Fire Extinguisher System (Tanks, Valves, Lines, Nozzles, and Mountings)

60	60	60	Inspect the tanks and valves feeding the fire-extinguisher system to determine whether they are in good condition and securely mounted; and whether the tanks are fully charged. The charge may be determined definitely only by weighing. Also examine the control cables and handles to see that they are in good condition and free to operate at a moment's notice. Note whether all lines and nozzles are in good condition and securely mounted and connected, and whether the nozzles are clean and properly aimed at the points most likely to catch fire.
	60	60	If there is any indication that the nozzles are clogged by dirt or corrosion, disconnect the main feed line between the tank control valve and the nozzles, and apply compressed air cautiously. *Caution:* If the fire-extinguisher tanks are not full, they should be reported for recharge or exchanged for fully charged tanks immediately. Any cylinder containing gas under high pressure should never be dropped, struck, handled roughly, or exposed to unnecessary heat.
	60	60	SPECIAL LUBRICATION. See WDLO for instructions.
	60		TIGHTEN. Tighten all assembly and mounting bolts and screws.

Engine: (Install Mountings, Lines and Fittings, Wiring, Control Linkage, and Oil Supply)

	61		SERVE. Reinstall removed engines according to the instructions in the vehicle manual. Take care to tighten mountings securely, and to properly connect all fuel and oil lines, wiring, and

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			control linkage which were disconnected when the engines were removed. Also be sure to refill the engine crankcases with specified oil, or see that the oil supply tank is filled to the proper level.
			Radiators (Install Core, Mountings, Hose, Antifreeze, and Record)
62	62	62	See that they are in good condition, correctly assembled, and do not leak. Note whether the radiator mountings and hose or tubing connections are secure, whether the external air passages of the core are clogged with insects or refuse, or whether the cooling fins are bent. If antifreeze is in use, determine its value and record in the space provided on the reverse side of the form. Also inspect the coolant to see whether it is so contaminated with rust, oil, or other foreign matter that the cooling system should be cleaned.
	62	62	If cleaning is necessary, clean the cooling system according to current directives. Refill radiator with coolant, adding specified inhibitor, unless new antifreeze, which contains inhibitor, is used. Do not fill to top; allow room for expansion. On radiators which are removed, perform this inspection partially while removed from the vehicle, and partially after replacement, as necessary to make the complete inspection properly.
62	62	62	SERVE. Reinstall all removed radiators. Take care to tighten mountings and hose or tubing connections securely. Fill the cooling system afterward, adding antifreeze or inhibitor as required, and recheck the cooling system for leaks.
			Batteries (Cables, Hold-downs, Carrier, Switch, Fuel Valves, and Record Gravity and Voltage)
63	63	63	Inspect the batteries externally to see that their cases, posts, and cell straps are in good condition and secure. Note whether the cases are leaking. Wipe dirt from and around the filler caps, remove, and see that the cap vents are

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			open. Note the level of electrolyte in the cells. This level should be above the top of the plates, and may extend up to ½ inch above the plates. Before adding any water to the cells, test the specific gravity of each cell, with a battery hydrometer, and record the gravity readings in the spaces provided on the reverse side of the work sheet. As the samples of the electrolyte are in the hydrometer for the gravity test, observe whether the electrolyte is discolored to a reddish-brown color, which may indicate that the battery is being overcharged due to improper regulator action. Report any gravity readings below 1.225 and variations of more than 0.025, and any reddish-brown discoloration of the electrolyte. Also take the voltage reading of each cell, and record it in the space provided on the reverse side of the work sheet. Examine the battery cables, terminals, and terminal bolts to see whether they are in good condition, secure, and not corroded; if the battery hold-downs are securing the battery properly; and that the battery carrier is in good condition and secure. If the terminals are corroded, disconnect the cable terminals from the battery, clean, and lubricate the battery posts and terminals, and reinstall them securely.
63	63		Make a high-rate discharge test of the battery to see that the cells are in a satisfactory condition, taking care to make the test according to the instructions for a condition test which accompany the test instrument. Normally a true test cannot be made if the gravity of the battery is below 1.225. If the difference in the readings obtained from the cells is more than 30 percent, for meters reading in percentage of charge, replace the battery.
	63	63	CLEAN. Clean the top of the battery with water or a soda wash if available, and dry with a clean rag or compressed air. Clean the battery carrier in the same way, and paint if corroded; grease terminal connections lightly.
	63	63	SERVE. Bring the electrolyte up to the correct

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			level with distilled water, if it is available. If not available, use any clean water in preference to letting battery run dry.
63	63	63	Close the main battery switch, and open the fuel shut-off valve at this time
			Accelerator (Linkage and Dual-Throttle Synchronization)
64	64	64	See that the accelerator and all of its connecting linkage are in good condition and securely connected. If engines have been removed, press the accelerator completely down to see whether the carburetor throttle opens fully. Also on vehicles equipped with more than one engine, follow the instructions in the vehicle manual, and note whether the accelerator linkage is properly synchronized, so that the throttle valves open and close together. On those vehicles having automatic transmissions and transfer units, check according to instructions in the vehicle manual to see whether the throttle control linkage is properly synchronized with the controls of these units.
	64		ADJUST. On vehicles equipped with automatic transmission and transfer units, follow the instructions in the vehicle manual, and adjust the relationship between controls of these units and the accelerator linkage so that they are properly synchronized.
			Starter, Primer, and Instruments
65	65	65	Observe all starting precautions as outlined in item 1. Start the engine, observing whether or not, on radial engines, the primer operates satisfactorily. Note whether the general action of the starter is satisfactory, particularly whether the starter drive engages and operates properly without excessive noise and has adequate cranking speed, and whether the engine starts readily. Also, as soon as the engine starts, observe whether all instruments operate properly, and particularly if the oil pressure gauge and ammeter indications are satisfactory.

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			Leaks (Engine Oil, Fuel, and Water)
66	66	66	Inspect within the engine compartment for water leaks from the engine cooling system; for oil leaks from the engine, oil filters, or lines; and any leaks from the fuel system parts.
			Ignition Timing
67	67		With the engine running and the neon timing-light properly connected, determine the ignition timing of each engine according to instructions in the vehicle manual or current directives to see whether it is correct. Also observe whether the automatic controls advance the spark as the engine is accelerated gradually. When necessary, adjust the ignition timing to the specifications in the vehicle manual, taking care to see that the distributor is well secured when adjustment is completed. On engines equipped with magnetos, the timing is adjusted when the magnetos are installed.
			Regulator Unit (Connections, Voltage, Current, and Cut-out)
68	68	68	See that they are in good condition and that all connections and mountings are secure.
68	68		Connect the low voltage circuit tester to the regulator correctly, and observe whether the voltage regulator, current regulator, and cut-out control the generator output properly. Follow the instructions in the vehicle manual, or those which accompany the test instrument. *Caution:* This test should be made only after the regulator unit has reached normal operating temperatures.
			Engine Idle and Vacuum Test
69	69	69	ENGINE IDLE. Note whether the engine(s) idles smoothly at normal idle speed. ADJUST. Connect a vacuum gauge to the intake manifold, adjust the engine(s) to its normal idle speed by means of the throttle stop screw, and adjust the idle mixture adjusting needle

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until the vacuum gauge indication becomes a maximum. If this latter adjustment changes the idle speed appreciably, reset the idle speed and mixture until both are correct. If the two adjustments are made simultaneously, time will be saved. On engines where a vacuum gauge cannot be connected to the intake manifold, adjust the idle by the following procedure: Adjust the engine idle speed to specifications by means of the throttle stop screw. Turn the mixture adjusting needle in the direction which "leans" the mixture until the engine idle becomes rough due to misfiring. Turn the needle slowly in the opposite direction to enrich the mixture until the roughness disappears, and the engine idles smoothly. Do not turn further than necessary to smooth out the idle. If this adjustment increases or decreases the engine idle speed from the specified range, reset the throttle stop to obtain the correct idle speed again, and recheck the mixture adjustment as described just above.

69 69 69 VACUUM TEST. With a vacuum gauge connected to the intake manifold and the engine running at normal idling speed, the vacuum gauge should read about 18 inches, and the pointer should be steady. A badly fluctuating needle between 10 and 15 inches may indicate a defective cylinder head gasket or valve. An extremely low reading indicates a leak in the intake manifold or gaskets. Accelerate and decelerate the engine quickly. If the gauge indicator fails to drop to approximately 2 inches as the throttle is opened, and fails to recoil to at least 24 inches as the throttle is closed, it may be an indication of diluted oil, poor piston ring sealing, or an abnormal restriction in the exhaust, carburetor, or air cleaner. Repeat this test on each engine on dual or multibank installations.

Note. The above readings apply to sea level. There will be approximately a 1-inch drop for each 1,000 feet of altitude. This test does not apply to Diesel engines.

Throttle Synchronization

70 70 70 On vehicles with dual-engine installations, de-

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			press the accelerator slowly, and observe whether the tachometers of the two engines indicate the same speed within the limits specified in the vehicle manual, at all speeds up to a safe moderate engine speed. Allow engines to cool properly before stopping the engines at the conclusion of this check.
			Fighting Compartment (Paint, Seats, Safety Straps, Crash Pads, Stowage Boxes, Ammunition Boxes, Clips, and Racks)
71	71	71	See that these items are in good condition and securely assembled and mounted. Be sure that the entire fighting compartment is clean and the paint is in satisfactory condition to reflect light, and that the adjusting mechanism of the seats operates properly and is adequately lubricated. Note particularly whether the dividers and shell pads are all present and properly installed in the ammunition boxes and racks, and that the clips have sufficient tension to hold the shells securely. In vehicles equipped with liquid protected ammunition boxes see that solution in containers is visible at filler plugs, that all plugs are present and secure and that there is no evidence of leaks.
			Turret (Basket, Cupola, and Locks)
72	72	72	Note whether they are in good condition and secure. See that the cupola can be traversed easily when its lock is released, and that the turret and cupola locks apply and release properly.
			Protectoscopes and Periscopes
73	73	73	Inspect the protectoscope prisms and windows to see that they are in good condition, clean, secure in the holders, and that the holders are securely mounted; see that the lever and locking devices operate freely and are not excessively worn. Also see that the periscope prisms are in good condition and secure; and that their traversing, elevating, and locking devices are free and not excessively worn. Examine the spare

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prisms and windows and their stowage boxes to see that they are in good condition, clean, and secure.

Caution: Prisms should be cleaned only with a soft rag or brush. Never use a coarse or dirty rag, as this will damage the surface of the glass.

Clutch Pedal (Free Travel, Linkage, and Return Spring)

74 74 74 Observe whether the clutch pedal is in good condition and securely mounted. Observe if the free travel is satisfactory; if the clutch-operating linkage is in good condition, secure, and not excessively worn at its connections; and whether the pedal-return spring brings the pedal back to its proper released position. On dual installations be sure the clutch linkage is properly synchronized so that the clutches operate simultaneously.

74 74 ADJUST. Adjust the clutch pedal free travel and linkage synchronization on dual installations according to the instructions and specifications in the vehicle manual, taking care to lock the adjustment securely after completion.

Brakes (Steering, Parking, Levers, Latches, Linkage, and Shafts)

75 75 75 Inspect the steering brake levers, linkage, and shafts to see that they are in good condition, securely connected and mounted, and not excessively worn at their connecting joints and mountings. Apply the steering brake levers, and observe whether they both begin to meet resistance before reaching a vertical position. On those vehicles not equipped with a separate parking brake, examine the parking controls and locking device on the steering brake levers to see that they are in good condition, that they operate properly to lock the levers, or whether they are excessively worn. Pay particular attention to the pawl and ratchet teeth. On vehicles equipped with a separate parking brake, note whether its external operating mechanism is in good condition, correctly assembled, secure, and

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			not excessively worn; and that the brake is in good adjustment to hold the vehicle.
	75		ADJUST. Adjust the steering brakes according to the instructions and specifications in the vehicle manual.
	75		TIGHTEN. Tighten all assembly and mounting bolts securely.
			Steering Brake Booster
76	76	76	On those vehicles equipped with a brake booster, see that the pump, lines, connections, and sump are in good condition, correctly assembled, secure, and do not leak. Consult vehicle Technical Manual for further instructions.
	76		TIGHTEN. Tighten booster-unit assembly and mounting bolts or screws, and line-support clips or brackets securely.
	76		SERVE. Service sump tank according to instructions on WDLO.
			Differential and Breathers
77	77	77	Inspect the accessible part of the differential case in the driver's compartment to see that it is in good condition; that all mounting and assembly bolts or cap screws are secure; and see whether or not there are indications of oil leaks. Examine the breathers to see that they are in good condition, secure, and not clogged.
	77		CLEAN. Remove the breathers, clean in dry-cleaning solvent, dry, and reinstall.
	77		TIGHTEN. Tighten all external assembly and mounting nuts and screws securely.
			Transmissions (Breathers and Seals)
78	78	78	Examine all transmissions to see that they are in good condition, securely assembled and mounted, and that their breathers are in good condition, secure, and not clogged. Observe whether there are indications of oil leaks from the case or seals, and whether the lubricant is up to the correct level.

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	78		TIGHTEN. Tighten all external assembly and mounting bolts and screws securely.
	78		CLEAN. Remove the breather, clean in dry-cleaning solvent, dry, and reinstall.
			Transfer Unit (Seals and Vent)
79	79	79	Inspect the transfer unit to see that it is in good condition, securely assembled, and mounted. Note whether oil is leaking from the case or seals; also see that any provided vents are in good condition, secure, and not clogged.
	79		TIGHTEN. Tighten all external assembly and mounting bolts and screws securely.
			Transmission and Transfer Unit (Controls and Linkage)
80	80	80	See that the control levers, linkage, and shafts for these units are in good condition, correctly assembled, and securely connected and mounted. Be sure that their connection joints are adequately lubricated, and not excessively worn.
			Propeller Shafts (Joints and Alignment, Seals, and Flanges)
81	81	81	Inspect all propeller shafts to see that all of these items are in good condition, correctly and securely assembled and mounted. Observe that the universal joints are properly aligned with each other and are not excessively worn; that the slip joint is free, not excessively worn, and well lubricated; and that the seals of the universal joints and slip joint do not leak.
	81		TIGHTEN. Tighten all universal joint assembly and companion flange bolts securely.
			Hand-Crank Ratchet and Lever
82	82	82	Observe that these items are in good condition, secure, and not excessively worn, and be sure that the ratchet cover or guard is in good condition and secure.

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			Oil Dilution Valve and Lines
83	83	83	Observe whether the valve, lines, and controls are in good condition, securely assembled, and supported. Disconnect the fuel line at the connection to the engine oil inlet line, and with someone to observe the flow, open the dilution valve momentarily to see whether fuel is being delivered properly and is not leaking past the valve when closed.
			Compass (Fluid and Lamp)
84	84	84	Inspect the compass to see if it is in good condition and secure; look for low level or indications of bubbles in the fluid bowl. Fill the fluid bowl with ethyl alcohol if needed. Operate the compass lamp, and switch to see whether or not they operate properly.
			Lights and Switches (Head, Tail, Stop, Blackout, and Internal)
85	85	85	When tactical situation permits, turn on the switches of all the above listed lamps (lights). The lamps (lights) should operate properly and go out when the switches are turned off. Pay particular attention to the proper operation of the stop, blackout, and all interior lamps (lights), and to the proper aiming of the headlamp unit beams. See that all lamps (lights) are in good condition and secure, and look for dirty or broken lenses and discolored reflectors.
	85		ADJUST. Adjust the aim of the headlamp unit beams according to the instructions in the vehicle manual.
			Wiring (Junction and Terminal Blocks, Boxes, Fuses, and Spares)
86	86	86	Observe all exposed electrical wiring and conduits to see that they are in good condition, well supported, and whether or not the wiring is securely connected to its terminals. Also make sure that all junction and terminal blocks and boxes are in good condition, secure, and that all necessary fuses and spares are in place and in good condition.

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Collector Ring (Brushes, Leads, Cylinder, and Cover)

With the main battery switch open, remove the collector ring cover, and observe whether these items are all in good condition and clean. Also notice whether the brushes contact the cylinder properly under normal spring tension, and that the leads are securely connected and not chafing. Reinstall the cover securely, and close the battery switch.

Radio Bonding (Suppressors, Filters, Condensers and Shielding)

88	88	88

Examine all radio bonding to be sure connections are in good condition, clean, secure, and that all items to which the bonding is connected are securely mounted. Be sure all noise suppression bonding straps and internal-external toothed lock washers are inspected for looseness or damage and that all contact surfaces are clean.

	88	88

If objectionable radio noise from vehicle has been reported make tests in accordance with instructions in vehicle Technical Manual to determine the source of the noise. If cleaning and tightening of mountings and connections and replacement of radio noise suppression units does not eliminate the trouble, the radio operator will report the condition to the designated individual in authority.

AUXILIARY GENERATOR

Engine (Crankcase, Fan and Housing, Cylinder Shield, Mountings, Exhaust Pipe, and Heater Duct)

89	89	89

See that these items are in good condition and secure. Note whether oil is up to proper level and not leaking; on an engine having the oil supply in the crankcase, note whether or not the heater duct is clean.

Spark Plug (Gap, Deposits, and Baffle)

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Remove the plug and observe whether the baffle

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			is in good condition and clean. See that the plug is in good condition, the gap is satisfactory, and whether or not there are any excessive carbon deposits on the end of the insulator.
		90	CLEAN. Clean the spark plug baffle thoroughly.
	90	90	SERVE. Replace the spark plug with a new or reconditioned one using a new gasket, and make sure the gap is set to specifications.
	90		REPLACE the baffle with a new one.

Magneto (Points, Wiring, and Shield)

91	91	91	See that these items are in good condition, correctly assembled, and securely mounted. Make sure that the interior of the magneto and the rotor arm are in good condition and clean; and that the breaker points are clean, and not uneven or pitted. Note whether the gap is satisfactory.
	91	91	ADJUST. Adjust the breaker point gap to specifications with the points fully open.

Carburetor and Air Cleaner

92	92	92	Observe whether they are in good condition and securely mounted; look for indications of fuel leaks from the carburetor. See that the air cleaner element is in good condition and clean.
	92	92	CLEAN AND SERVE. Close the fuel supply valve, remove air cleaner element and the strainer in the carburetor fuel inlet connection. Clean strainer in dry-cleaning solvent, dry thoroughly, and reinstall. Service air cleaner according to instructions on WDLO.

Fuel (Filter, Lines, Tank, and Cap)

93	93	93	These items should be in good condition, secure, and not leaking.
	93	93	CLEAN. Clean the fuel filter sediment bowl and the screen, and reinstall these units, using a new gasket if necessary. Open the fuel supply valve.

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			Generator (Commutator, Brushes, Control Box, and Wiring)
94	94	94	Remove the brush head cover plate, and check the commutator to see that it appears to be in good condition, clean, and not excessively worn. Observe whether the brushes are clean, free in their holders, properly spring-loaded, and not excessively worn. Inspect the control box and buttons, ammeter, and wiring to see that they are in good condition, correctly assembled and connected, and secure.
	94		*CLEAN. At each third quarterly service, clean the commutator by placing a strip of grade 2/0 flintpaper over a wood block of the correct size; with the engine running slowly, press the flintpaper against the commutator until it is clean. Blow out the dust with compressed air.
			Operation (Engine, Generator, Ammeter, Heater, and Leaks)
95	95	95	Start the engine, observing whether it starts easily and runs at normal speed, and listen for any unusual noise that might indicate excessively worn, loose, or inadequately lubricated parts. Depress the battery button, and check the generator output. With the batteries fully charged, the output should be approximately 5 amperes. Higher outputs will be obtained if the battery is not fully charged, running up to 50 amperes if the battery is fully discharged. Depress the heater button on the control box. The output should be approximately 50 amperes. Also look for fuel or oil leaks with the engine running.

ITEMS SPECIAL TO TANKLIKE WHEELED VEHICLES

			Steering Gear (Case, Power Cylinder, Valve and Link, Reservoir, Lines, Pumps, Electric Motor, Column, and Wheel)
96	96	96	See that all these items are in good condition, correctly assembled, and secure. Note whether the case, power cylinder, reservoir, lines, or

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			pumps are leaking; whether the linkage is excessively worn; also whether the oil in the reservoir is at the proper level. With the engine running, turn the steering wheel in both directions, and observe whether the booster appears to assist properly. Also on those vehicles so equipped, check for any unusual noise or vibration in the electric motor or hydraulic pump.
	96	96	SERVE. Service oil reservoir according to instructions on WDLO.
	96		TIGHTEN. Tighten all assembly and mounting bolts securely.
			Clutch (Pedal, Main Cylinder, Reservoir, Lines, Slave Cylinders, Arms, and Free Travel)
97	97	97	Inspect these items to see that they are in good condition, correctly assembled, and secure. Examine the cylinders, reservoir, or lines for oil leaks, and the pedal and arm connections for excessive wear. Also note the level of the fluid in the reservoirs, and the free travel of the arms. Observe whether the linkage is properly synchronized to operate dual installations simultaneously, and whether the boots on the cylinders are in place and in good condition.
	97		SERVE. Fill the reservoir to the correct level with specified fluid. Service oil reservoir according to instructions on WDLO.
			Throttle (Treadle, Main Cylinder, Reservoir, Slave Cylinder, and Arm)
98	98	98	Inspect these items to see that they are in good condition, correctly assembled, and secure. Note whether the cylinders, reservoir, or lines are leaking, and whether the treadle and arm connections are excessively worn. Also see that the fluid in the reservoir is at the proper level, and note whether the boots on the cylinders are in place and in good condition.
	98		SERVE. Service oil reservoir according to instructions on WDLO.

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99	99	99	**Brake (Pedal, Master Cylinder, Boot and Switch, Reservoir and Vent, and Lines)** Examine these items to see that they are in good condition, correctly assembled, and securely connected or mounted; that the pedal has satisfactory reserve when the brakes are applied; and that the master cylinder, switch, and all accessible lines do not leak. Also check the level of the fluid in the reservoir, and see that the filler plug vent is open.
	99	99	SERVE. Fill the reservoir to the proper level with specified fluid.
100	100	100	**Brake Vacuum Boosters (Air Cleaners, Lines and Hose, Reserve Tanks, Cylinders, Control Valves, and Leaks)** See that they are in good condition, correctly assembled, and securely mounted, or whether there are any indications of fluid leaks at the slave cylinders, control valves, or connecting lines. Attach a vacuum gauge at the power-cylinder inlet, start the engine, and note vacuum reading of gauge. Stop the engine, and observe whether vacuum is retained for a reasonable length of time. A rapid drop in vacuum indicates a leak.
100	100		Examine the air cleaners to see if they are serviceably clean.
	100	100	CLEAN AND SERVE. Remove air cleaner element and service according to instructions on WDLO.
	100		*SPECIAL LUBRICATION. Lubricate the vacuum-power cylinder according to the instructions of the WDLO.
101	101	101	**Transmission Controls (Vacuum, Lever and Button, Valve, Lines, Cylinder, Shaft, and Linkage)** See that they are in good condition, correctly assembled, and securely mounted. Start the engines, and operate the transmission-shifting mechanism, observing whether the vacuum booster properly assists in shifting the gears, and whether the sliding button operates prop-

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			erly to disconnect or connect either transmission from or to the shift mechanism.
	101		*SPECIAL LUBRICATION. Lubricate the vacuum-power cylinder according to the instructions in the WDLO.
			Hand Brake (Lever, Ratchet and Pawl, Linkage, Drums, and Lining)
102	102	102	Observe whether the hand-brake lever, ratchet and pawl, and linkage, are in good condition and secure; that the brake drums or disks are in good condition, not scored or oily; and that the brake-shoe lining is not oil-soaked or worn thin.
	102		ADJUST. Adjust the clearance between the brake drum or disk, and lining, to specifications. Take care to see that the adjustment nuts are correctly locked when the adjustment is checked and completed.
			Vacuum Pump (Oil, Drive, and Lines)
103	103	103	Inspect the pump to see that it is in good condition, secure, properly aligned with its drive belt and pulley, and whether the oil in the sump is at the correct level. Also see that the drive belt and lines are in good condition, and note whether the drive belt is properly adjusted.
	103	103	ADJUST. Adjust the drive belt to the specified tension.
	103		SERVE. Service oil sump according to instructions on WDLO.
			Power Tire Pump (Mountings, Shaft, Lines and Dust Covers, Air Cleaners and Filter)
104	104	104	Inspect these items to see that they are in good condition and that the portable parts are properly stowed in their case. Make sure that the filter and connecting lines are securely mounted, and whether the dust covers are in place on the ends of the lines. Open the filter drain cock to see that it is free of condensate. Examine the air cleaners on the pump to see if the felts are in good condition and clean; also whether the oil in the sump is at the correct level.

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CLEAN. Clean the pump air cleaner felts in dry-cleaning solvent, dry with compressed air, and reinstall. If the crust of dirt on the felts will not wash off, peel off the top layer.

104	104	

*Install the pump on the vehicle, start the engine, and observe whether or not the pump delivers air in sufficient volume to inflate the tires, and whether there are any unusual noises in the compressor.

	104	

SERVE. Service oil sump according to instructions on WDLO.

ON THIRD QUARTERLY SERVICE, RAISE VEHICLE AND BLOCK SAFELY

105	105	105

Tires and Rims

VALVE, STEMS, AND CAPS. Make sure that all valve stems are in good condition, in correct position, and that valve caps are present on all valve stems.

CONDITION: Examine all tires for cuts, bruises, breaks, and blisters. All tires with cuts or injuries extending to or into the cord body, and those worn smooth in center of tread must be replaced with reconditioned or new tires. Remove materials such as imbedded glass, nails, and stones from tires. Look for irregular tread wear and any signs of flat spots, cupping, feather edges, and one-sided wear. Any mechanical defects causing such deficiencies should be determined and corrected. The wheel position of tires irregularly worn should be changed to even up the wear. Front tires worn irregularly should be removed to rear wheel positions.

DIRECTION. Directional tires and nondirectional tires should not be installed on the same vehicle. Directional tires on rear wheels of all vehicles and on front wheels of tanklike wheeled vehicles, should be mounted so that the point of the chevron will point down when viewed from the front.

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MATCHING. With the tires properly inflated, inspect them to see that they are matched according to over-all circumference and type of tread.

SPARE TIRE CARRIERS. Note whether spare tire carriers are in good condition and secure.

RIMS. See that all rims and their lock rings or flanges are in good condition and secure.

105 TIGHTEN. Tighten all wheel rim flange or lug nuts securely.

105 *SERVE. With the tires properly inflated, measure the over-all circumferences of all tires including spares. Select the tires to be mounted on duals or on driving axles, so that they will not have differences in over-all circumference exceeding the specifications of the latest directive on tire care and conservation. Mount all dual tires with the larger tire outside.

Note. The spares must be matched properly and mounted for use on one of the road wheels at intervals not exceeding 90 days. A convenient time to do this is when performing these maintenance services.

Caution: After performing the tire-matching service, do not reinstall the wheels until the wheel-bearing services are completed. Then reinstall them, taking care to tighten all wheel, rim, and lug nuts securely. Tires with cuts or injuries extending to or into the cord body, and those worn smooth in center of tread must be removed and replaced with reconditioned or new tires.

106 106 106 **Rear Wheels (Bearings, Seals, Drive Flanges, and Nuts)**

WHEELS. Inspect the wheels for good condition; rotate them, and observe whether they have excessive run-out.

BEARINGS AND SEALS. Without removing the wheels and the hub caps or axle drive flanges, look for evidence of looseness in the wheel-bearing adjustment. Rotate the wheels and listen for indications of dry or damaged wheel bearings. Inspect the drive flanges and around the brake supports and drums for lubricant or brake fluid leaks.

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			DRIVE FLANGES AND NUTS. See that they are in good condition and secure.
	106	106	On the monthly and quarterly services, if it is known that the vehicle has been operated recently in deep water, which may have entered the wheel bearings, remove the right rear wheel or the forward right rear wheel on bogie installations, and note whether the lubricant of the bearings appears to be contaminated with water. If the lubricant is contaminated, remove the bearings from all wheels and clean, lubricate, and adjust them in the same manner as on the third quarterly maintenance service. If the lubricant is not contaminated, service the bearings of the one removed wheel in this same manner before it is reinstalled. When such inspections of the wheel bearing lubricant are made, also inspect the brake linings to see whether they are excessively worn.
	106	106	TIGHTEN. Tighten all drive flange nuts securely.
	106		*On the third quarterly maintenance service, the several wheel bearings and brake items up to and including 112 are group services in which there will be overlap. Perform these services in the best order for economy of mechanic's time and for orderly reassembly.
106	106		*CLEAN. Disassemble the bearings and oil seals. Clean thoroughly, and check the rollers, balls, races, and cages to see that they are in good condition, and whether the cages are secure. If the cups or outer races are in good condition, it is not necessary to remove them from the hubs unless the bearings must be replaced, in which case new cups should be installed. Also note whether the machined surfaces, upon which the bearings assemble, are in good condition.
	106		*SPECIAL LUBRICATION. When the subsequent related items are completed to the point where the wheel bearings are to be reinstalled, lubricate the wheel bearings according to WDLO. Take care to have all parts clean and dry, and have the hands clean.

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*ADJUST. After lubricating the wheel bearings, reassemble the hub and drum assemblies in place, and adjust the wheel bearings correctly according to vehicle Technical Manual instructions. After the bearings have been adjusted and the adjustment securely locked, the bearings should neither be loose nor be so tight that the bearings bind.

Note. Proper adjustment of the wheel bearings is vital to the life of the bearings and the lubricant retainer seals. If the bearings are adjusted so that they are loose, the lubricant retainer seals cannot seal properly for any extended period. If the bearings are adjusted too tightly, they are likely to become damaged.

107 107

Rear Brakes

*DRUMS AND SUPPORTS. Clean all dirt and grease from these parts thoroughly, taking care to keep dry-cleaning solvent away from brake linings or wheel cylinder boots. Inspect the drums and supports to see that they are in good condition, securely mounted, and not excessively worn or scored.

*CYLINDER. See that the brake wheel cylinders are in good condition and securely mounted. Pay particular attention to end covers, and note whether rubber type covers are deteriorated or whether metal type covers and their adjusting screws are rusted and likely to freeze up. If the adjusting screws are rusted, wipe a thin film of chassis lubricant on its threads next to the end cover and work the adjustment in and out until it is free. If the metal cover and/or adjusting screw are frozen, replace the wheel cylinder assembly. Observe whether the wheel cylinders are leaking, and pay particular attention to indications of leaks at the end covers. On rubber type end covers, examine for leaks by pulling the lower part of the end cover away slightly from the cylinder so that fluid trapped in the boot, indicating a leak, may run out.

Caution: Do not remove the cover.

Replace leaking wheel cylinders.

107 *TIGHTEN. Tighten the brake support bolts se-

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			curely. Also tighten drum-mounting bolts, if they are not tack-welded.
108	108	108	**Rear Brake Shoes (Linings, Links, Guides, and Anchors)** Examine the linings through the inspection holes, openings in the brake drums, or supports, to determine whether they are so worn that the rivet heads may score the drums within the next month of operation. If the linings are not visible in this manner, remove the right rear wheel for inspection of the brake linings by the motor officer or motor sergeant, to determine whether the linings are so worn that they should be replaced. If the linings on this wheel brake must be replaced, remove all wheels and service their brakes similarly. Be sure to clean, lubricate, and adjust all the removed wheel bearings as described in item 106 above for the third quarterly maintenance service, and adjust the brakes as described below. A similar inspection of the brake linings should be made if the vehicle has recently been operated in deep water, mud, loose sand, or dirt which may have entered and damaged the brake drum and the linings.
108	108		*See that the linings are in good condition, tightly secured to the brake shoes, in good wearing contact with the drums, free of lubricant or brake fluid, and not excessively worn. Also note whether the brake shoes are in good condition; properly secured and guided by the anchor bolts, connecting links, guides and springs; and properly returned against their cams or stops by the retracting springs. The thickness of lining above the rivet heads at the most worn section should be sufficient for at least a quarterly period of safe operation. If the linings are badly contaminated with lubricant or brake fluid, replace all linings on both brakes of that particular axle. If the linings are only slightly contaminated with lubricant or brake fluid, clean them with dry-cleaning solvent and dry the sol-

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	108		vent from the linings and shoes thoroughly with a dry, clean cloth or compressed air.
			*CLEAN. Clean all dust from the linings, drums, supports, and operating mechanism with a clean cloth or compressed air.
	108	108	ADJUST. After the subsequent related items up to and including item 112 are completed, adjust the shoes by the minor adjustment method, so that the linings may have proper clearance from the brake drums. If new linings have been installed, adjust the shoes by the major adjustment method. These adjustment methods are described in the vehicle Technical Manual.
			Torque Rods (Bushings and Brackets)
109	109	109	See that they are in good condition, correctly assembled, and secure. Inspect metal bushings for wear, and rubber bushings for damage or deterioration. Coat the exposed rubber surfaces of such bushings with brake fluid to prevent hardening or cracking.
			Rear Spring Seats and Bearings
110	110	110	Observe whether the spring seats are in good condition and secure. On bushing type spring seats, see that the bushings and mating parts of the spring seat rocker beam shaft have no end play and are not excessively worn; observe level of lubricant in these seats; and note whether there are any indications of excessive oil leaks from the seals.
			Note. Whenever it is necessary to replace a rear spring on these units, remove the spring seats, clean and inspect the spring-seat bearings, and lubricate the bearings as prescribed in the WDLO.
			Rear Springs (Clips, Leaves, U-Bolts, Hangers, and Shackles)
111	111	111	See that these items are in good condition, correctly assembled, and secure. Spring clips and bolts should be in place; spring leaves should not be broken or shifted out of their correct position. The latter is an indication of a sheared center bolt. Determine the deflection of both

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			springs, which should be normal and approximately equal. Test the hangers and bolts for excessive wear by working with a pry bar.
	111	111	TIGHTEN. Tighten all spring U-bolts securely and uniformly.

Rear Shock Absorbers and Links

112	112	112	See that shock-absorber bodies are secured to frame, that the links which connect their arms to the axle are in good condition and secure, and that there are no fluid leaks.

Note. If link joints are of the rubber or fabric type, coat the exposed rubber with hydraulic brake fluid.

	112		*SERVE. Fill the shock-absorber bodies with specified shock-absorber fluid. Disconnect the shock-absorber link connections and work the arm several times while adding fluid; continue this operation until all air is expelled and the reservoir is full. Check action of airplane type shock absorbers on the bench.

After servicing the shock absorbers, note whether their action is normal. The normal action of a double-action shock absorber, when its arm is moved by hand, calls for resistance in both directions. The resistance on the compression stroke of the arm is greater than on the rebound stroke. A single-acting shock absorber will have a resistance to hand operation only on the rebound stroke.

*REINSTALL the rear wheels, and tighten the hub flange and mounting nuts securely.

Rear Axles (Pinion End Play, Seals, Vents, Alignment, Radius Rods, Brake Lines, and Hose)

113	113	113	See that the axle housing is in good condition and not leaking; test the pinion shaft by hand-feel to see that it does not have excessive end play, and that the seal is not leaking. Also examine the housing vent to see that it is in good condition and not clogged. Inspect the axle for proper alignment. If it appears to be out of alignment, measure the distance from the spring eyebolt to the center of the axle pad on

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			either side. This distance should be about the same on each side.
	113	113	CLEAN. If the axle-housing vents are threaded, remove the vents, clean them thoroughly, and reinstall. If the vents are connected to flexible hose, check to see if their hose is in good condition and securely connected.
			Propeller Shaft Center Bearing (Seals, Vent, End Play, and Mountings)
114	114	114	Inspect the rear propeller-shaft center bearing for excessive end play. See that its seals are not leaking, that the vent is clean and open, that the oil level is proper, and the mountings secure.
	114	114	CLEAN. Clean the center-bearing vent opening.
	114	114	TIGHTEN. Tighten the center-bearing mountings securely.
			Front Wheels (Bearings, Seals, Flanges, Axle End Play, and Nuts)
115	115	115	Inspect and service the front wheels, bearings, seals, drive flanges, and nuts in the same manner as in item 106 for the similar rear wheel items.
	115	115	TIGHTEN. Tighten all drive flange nuts securely.
	115		*On the third quarterly service, the several wheel bearing and brake items, up to and including item 120, are group services in which there is overlap. Perform these services in the best order for economy of the mechanic's time and for orderly reassembly.
115	115		*CLEAN. Disassemble, clean, and inspect the front wheel bearings and oil seals in the same manner as described in item 106. Be sure to check the universal joint end play as drive flanges are removed, so that end play and adjustment may be made conveniently when reassembling.
	115		*SPECIAL LUBRICATION. Apply lubricant according to instructions on WDLO.
	115		*ADJUST. Adjust front wheel bearings in the same manner as described in item 106.

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			***Front Brakes (Drums, Supports, Cylinders, and End Covers)**
116	116		Clean and inspect in the same manner as item 107.
	116		*TIGHTEN. Tighten these items in the same manner as item 107.
			Front Brake Shoes (Linings, Links, Guides, and Anchors)
117	117	117	Inspect in the same manner as the first inspection procedure of item 108.
117	117		*INSPECT in the same manner as the second inspection procedure of item 108.
	117		*CLEAN. Clean brake shoes in the same manner at the third 100-hour maintenance as for item 108.
	117	117	ADJUST. Adjust shoes in the same manner as in item 108.
			Steering Knuckles (Joints, Bearings, Seals, and Boots)
118	118	118	Examine the knuckle housings for good condition; look particularly for cracks around any integral steering arms. See that the outside seals and dust boots are in good condition and secure. Remove the lubrication plug from the steering knuckle end of the axle housing. If the lubricant appears to be contaminated, report the condition.
	118		CLEAN. Remove constant velocity universal joint assembly. Wash thoroughly in dry-cleaning solvent and, without disassembly of universal joint, inspect parts to see that they are in good condition and not excessively worn. Pay particular attention to universal joint washers, balls and races, axle splines, flanges, and pivot bearings or bushings.
	118		SPECIAL LUBRICATION. Lubricate constant velocity universal joint according to instructions on WDLO and reassemble.
	118		ADJUST. Use every precaution to reinstall shim

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			and spacers in the original position from which they were removed at disassembly, to insure correct pivot bearing and axle end play adjustment.
			Note. All gear type front wheel drives and steering knuckles will be inspected and serviced strictly in accordance with specific instructions contained in the vehicle Technical Manual.
			Front Springs (Clips, Leaves, U-Bolts, Hangers, and Shackles)
119	119	119	Inspect in the same manner as in item 111.
	119	119	TIGHTEN. Tighten above items in the same manner as in item 111.
			Front Shock Absorbers and Links
120	120	120	Inspect in the same manner as in item 112.
	120		*SERVE. Service these items in the same manner as in item 112.
			*REINSTALL the front wheels and tighten the hub flanges and mounting nuts securely.
			Front Axles (Pinion End Play, Seals, Vent, Alignment, Radius Rods, Brake Lines, and Hose)
121	121	121	Inspect in the same manner as in item 113.
	121	121	CLEAN. Clean above items in the same manner as in item 113.
			Steering (Arms, Tie Rods, Drag Link, Seals and Boots, and Pitman Arm)
122	122	122	Note whether these items are in good condition, correctly and securely assembled and mounted; if the steering gear case is properly filled with lubricant and not leaking. Pay particular attention to see that the pitman arm is securely mounted and not bent out of its normal shape. Also see whether the steering gear is in correct adjustment. With the front wheels in the straight-ahead position, the steering gear lash, as it is measured at the rim of the steering wheel, should usually be not more than 1 inch.
	122		TIGHTEN. Tighten the pitman arm shaft nut securely. Also tighten the steering gear case as-

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sembly and mounting nuts or screws and lock nuts. Loosen the steering column bracket before tightening the steering case mounting nuts, so as not to distort the column.

Toe-In and Turning Stops

123 123 123 With the front wheels on the ground in straight-ahead position, and using a proper toe-in gauge, determine whether the front wheel toe-in is within specified limits. Observe whether the wheel-turning stops are present and secure. If supplied with lock nuts, be sure they are tight and the tack welds are not broken. Turn the front wheels fully in both directions and check to see whether the turning stops engage, and if the tires clear all parts of the vehicle in this position. If there is any indication that the turning angle exceeds the specified limits, such as loose wheel stops, scuffing of tires against the vehicle, or abnormal front-drive universal joint wear, it should be reported for a check of the turning angle by higher echelon.

Caution: If toe-in adjustment is necessary, be sure the tie-rod is in correct position, and the ends are well secured when the adjustment is last checked. Toe-in must be kept within specified limits to avoid unnecessary rapid tire wear.

Caster, Camber, and Turning Angle

124 See that they are within specified limits.

ARMAMENT

Bow and Sponson Guns, 37-mm, and Smaller (Mounts, Traversing and Elevating Mechanism, and Firing Controls)

125 125 125 See that they are in good condition, clean, well lubricated, correctly and securely assembled, and not excessively worn. Elevate and traverse each gun through its entire range to see that it operates without binding or looseness. Pay particular attention to excessive lash in the elevating and traversing gears, and at the same time to the wiring, switches, and connections.

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			Operate electric and manual firing controls to see that they function properly.
	125	125	TIGHTEN. Tighten all assembly and mounting nuts and screws securely.
			Guns, 37-mm, and Larger (Mounts, Traversing and Elevating Mechanism, and Firing Controls)
126	126	126	Be sure that they are in good condition, clean, well lubricated, correctly and securely assembled, and not excessively worn. Pay particular attention to electric and manual firing controls, wiring, switches, and connections. Operate each firing control, both electric and manual, to see that it functions properly.
			Operate the hand-elevating controls through the entire range to see that they function properly, and check for free play between the gyro stabilizer control and hand wheel or lash between the worm and worm gear. Traverse the turret by hand to see whether there is any binding, whether the turret can be turned through its entire 360-degree range, and whether the brake is effective when the hand-control brake latch is released. Inspect the hydraulic traversing system, including the motor, pump, reservoir, lines, and operating controls to see that they are in good condition, correctly assembled, secure, operate properly, and are not excessively worn. Note whether there are any oil leaks in the hydraulic system, and see that the oil reservoir is at least two-thirds full. This level must be maintained. Make an operation check of the hydraulic traversing system by closing the motor switch, placing the clutch lever in the power operating position, and turning the pistol grip operating control to the right, left, and neutral positions to see that the traversing mechanism responds properly and any overrun is properly controlled.
	126	126	TIGHTEN. Tighten all assembly and mounting bolts and screws securely. Also tighten the pump packing gland cautiously. Do not overtighten as this may score the shaft and cause leaks.

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			Stabilizer and Recoil Control
127	127	127	Inspect the gyro stabilizer control unit, gear box, connecting oil lines, cylinder and piston, wiring, and control box to see that they are in good condition, secure, correctly assembled, and not leaking oil. Make an operating check of the gyro stabilizer as outlined in the vehicle manual or current bulletins and directives. Defects in the gyro stablizer system should be referred to ordnance maintenance personnel for attention. Examine the recoil cylinders to see that they are in good condition and not leaking oil. Observe whether the level of the recoil oil is as specified.
			Note. Recoil operating checks must be made under firing conditions and in accordance with the instructions in the vehicle Technical Manual.
			Antiaircraft and Cupola Guns: (Mounts, Traversing, and Elevating Mechanism)
128	128	128	Inspect in the same manner as in item 125.
	128	128	TIGHTEN. Tighten all assembly and mounting bolts securely.
			Spare Gun Barrels and Parts
129	129	129	See that they are present, in good condition, and properly stowed.

TOOLS AND EQUIPMENT

			Tools (Vehicle Kit and Pioneer)
130	130	130	All standard vehicle tools and pioneer tools should be present (see stowage lists), in good condition, and properly stowed or mounted. Pay particular attention to see that the pioneer-tool brackets and straps are in good condition and secure; also that tools with cutting edges are sharp. Sharpen if necessary.
			Equipment
131	131	131	Check against vehicle stowage list to see if all items are present, in serviceable condition, and properly stowed or mounted.

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132	132	132	**Grousers and Spare Track Blocks** See that they are all present, in good condition, and properly stowed or mounted.
133	133	133	**Spare Oil Supply (Recoil, Hydraulic, Engine, and Transmission)** Observe whether supply of the listed spare oil is present and properly stowed. This supply should be maintained at all times.
134	134	134	**Decontaminator** Examine decontaminator for good condition, security, and full charge. Make the latter check by removing the filler plug. *Note.* The solution must be renewed every 3 months, as it deteriorates.
135	135	135	**Fire Extinguisher (Portable)** See that the extinguisher is in good condition and secure, and that the red cap on the outlet safety valve is intact. Weigh the extinguisher to determine whether it is fully charged according to instructions in the vehicle manual. If the red safety blow-off seal on the valve head is used and is not intact, it indicates that the cylinder has been discharged due to high temperature. *Caution:* Any cylinder containing gas under high pressure is dangerous. The extinguisher cylinder should never be dropped, struck, handled roughly, or exposed to unnecessary heat.
136	136	136	**Publications and Form 26** Note whether the vehicle Technical Manual, Lubrication Order, and Standard Accident Report (Standard Form 26) are present, legible, and properly stowed.
137			**Vehicle Lubrication** Inspect the lubrication of the entire vehicle, including the armament, to see whether it has been receiving proper attention. On any unit where disassembly was necessary for inspection

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			purposes, lubrication must be performed, unless the vehicle is to be deadlined for repair of that unit.
	137	137	LUBRICATE all points of the vehicle and any gun mounts or accessories and auxiliary equipment in accordance with the pertinent WDLO, vehicle Technical Manual, current lubrication bulletins or directives.
			Use only clean lubricant. Keep all lubricant containers covered except when withdrawing lubricant.
			Before applying lubricant, always wipe dirt off the lubrication fitting or plug, so that it will not enter with the lubricant.
			If lubrication fittings, flexible lubrication lines, or plugs are found to be missing or damaged, replace them immediately. Clean the hole in which the fitting is to be installed, and lubricate the unit after the new fitting is in place.
			Lubricant must be delivered properly. On unsealed bushings or joints, the lubricant should be applied until it is forced out of all openings. On units, such as universal joints, which are provided with lubricant retainer seals, use the proper hand-operated grease gun and do not force the lubricant past the seals. Open any clogged lubrication passages until lubricant is properly delivered.
			When draining oil from the engine, transmission, transfer case, or differential, always drain the oil immediately after it has been warmed and agitated to a good draining condition by operation of the engine or vehicle. Refill the units to the correct level with specified oil as soon as the draining is completed so that there will be little hazard that the units will be operated without lubricant. The correct cold oil level in the differential transfer case, and transmissions is usually one-half inch below the lower side of the filler plug-hole. The level of the oil in these units when it is well warmed and

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			aerated should not be above the lower side of the filler hole.
			Caution: Do not fill to overflowing. Reinstall all drain and filler plugs securely. Take care that any required gaskets are in good condition and in place on the reinstalled plugs.
			Do not apply more than the specified amount of lubricant to generators, starters, distributors, or water pump, as this may cause a failure of the unit.
			Wipe off excessive lubricant that may drip onto brakes and operating surfaces, soil clothes, or detract from the vehicle's appearance.
			Modifications (MWO'S Completed)
138			Inspect the vehicle to determine whether all Modification Work Orders have been completed.
	138	138	Be sure that all modifications and major assembly replacements are entered on WD AGO Form 478.
			Final Road Test
139	139	139	Make a final road test, rechecking items 2 to 15 inclusive, and also be sure to recheck transmissions, transfer unit, differential, and final drives to see that the lubricant is at the correct level and not leaking. Confine this road test to the minimum distance necessary to make satisfactory observations.
			Note. Correct any deficiencies found during the road test.

17. Specific Procedures for Motorcycles

a. USE OF WD AGO FORM 463. The items on this form should usually be performed in the numerical sequence in which they are listed, since they have been arranged for maximum efficiency and economy of motion. Those items which are marked with an asterisk (*) require special additional services at each sixth monthly maintenance service. These additional services will be similarly identified by the presence of the item numbers in the monthly maintenance column.

b. DISPOSITION. All monthly maintenance service forms may

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be held until six have been accumulated; then destroy the oldest. The technical inspection form may be retained until completion of the next technical inspection.

c. PERFORMING ITEMS ON FORM. (1) Specific procedures for performing each item in the monthly maintenance service and in the technical inspection are described in the following pages. Each of these pages of specific procedures has two columns at its left edge, corresponding to the monthy maintenance and the technical inspection of Form 463, respectively. While the monthly maintenance and technical inspection are both indicated in the same column on the form, separate columns are provided here for clarification. The detailed procedure for each maintenance service and the technical inspection will be found on the following pages opposite the item numbers in the procedure columns.

(2) Very often it will be found that a particular procedure does not apply to both the monthly maintenance and the technical inspection. In order to determine which procedures to follow, it is necessary simply to follow the item numbers down the appropriate column, opposite the paragraphs wherever they are to be used.

(3) The following sample, from the pages of specific procedures that follow, illustrates the manner in which they are to be used. Suppose the technical inspection is being performed. Item number 26, in this sample, appears in the technical inspection column opposite the first paragraph only, which indicates the extent of this procedure. For the monthly maintenance service the mandatory services, CLEAN and ADJUST, must be performed in addition since the figure 26 appears in the monthly column opposite each of the paragraphs.

Tech. Insp.	M	SAMPLE	
26	26	**Spark Plugs.** Inspect externally to see that they are in good condition, clean, properly connected, and not leaking around the insulators or gaskets. Look particularly for cracked insulators. If radio shielding is used, see that it is in good condition and secure. Remove the plugs and examine their inner ends for fouled, cracked, or broken insulators, which may indicate incorrect heat range. Inspect the electrodes to see that they are in good condition, not excessively burned, and that the gap is correct.	Applies to both the monthly maintenance and technical inspection.
	26	CLEAN. Clean deposits from the ends of insulators and electrodes.	Apply to monthly maintenance only.
	26	ADJUST. Adjust the gap to specifications by bending the grounded electrode only.	

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ROAD TEST

Note. If the tactical situation does not permit a full road test, perform items 2, 3, 4, 5, 6, 7, 8, 9, 12, and 14 which require slight or no movement of the vehicle. When a road test is possible, it should be preferably 5 and not over 10 miles.

Before-operation Services

1 1 Perform the before-operation services listed on the back of WD Form 48, "Driver's Trip Ticket, and Service Record" (described in Section II), as a check to determine whether the vehicle is in a satisfactory condition to make the road test safely, and that it is adequately supplied with fuel and engine oil.

Ease of Starting

2 2 Start the engine, observe action of kick starter, and note whether the engine starts readily. If not, investigate the cause, and correct or report the condition to designated authority.

Oil Circulation

3 3 Remove the oil tank filler cap and run the engine at a fast idle. Check for oil circulation indicated by surging of the oil at the top of the return tube in the oil tank. Note whether there is excess smoke in the exhaust. Continuous light blue smoke indicates excess oil in the crankcake. (On Harley-Davidson it may be caused by crankcase breather valve being out of time.)

Instruments

4 4 Note whether red oil signal lamp (on most models) indicates correctly. After ignition switch is turned on, and before starting the engine, the red lamp should light, indicating no oil circulation. When the engine is started, and oil is being circulated, the light should go out. With the service lights turned on, and before starting the engine, the green signal lamp should light, or the ammeter (Indian chain-drive model) should indicate discharge. After starting the engine and turning off the lights, increases the engine speed to a medium fast idle. The green signal lamp should then go out, indicating that the generator is charging the battery, or the ammeter (Indian chain-drive model) should indicate charge.

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Caution: Continue these observations at all times when the engine is running during the road test. If the red or green signal lamps should light, or the ammeter fail to show a charge with the engine operating at a medium fast idle, stop the engine and investigate the cause. Correct or report the trouble immediately to designated authority.

Brake Operation

5 5 As the motorcycle is first put into motion, apply the foot brake to see that it stops the cycle safely within a reasonable distance. Also note any squeaks or chatter that might indicate wet, oily, dirty, or loose lining, a damaged drum, or improper adjustment. Apply the hand-operated front wheel brake only in conjunction with the rear brake and observe whether it operates properly in assisting to make a quicker stop.

Caution: Do not use the front brake except to assist the rear brake or to hold the motorcycle while stopped.

Clutch Operation

6 6 Before starting the motorcycle, determine whether the clutch pedal or hand lever has satisfactory free travel before starting to disengage the clutch; that it releases the clutch completely before reaching the end of its travel; and whether there are any unusual noises in the clutch-release mechanism. When starting the vehicle, observe whether the clutch grabs or chatters, and whether there is any indication of slipping when the clutch is fully engaged. Continue to pay attention to these items during the entire road test.

Gear Shifting

7 7 Shift through the entire gear range of the transmission, observe whether the shifter mechanism operates freely without clashing or slipping out of gear, and whether there are any unusual vibrations that might indicate loose transmission or engine mountings. Continue these observations throughout the road test.

Unusual Noises

8 8 During the entire road test, listen for unusual noises that might indicate worn, loose, damaged, or insufficiently lubricated parts in the entire motorcycle, par-

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		ticularly in the engine and accessories, or in the power train. If any unusual noises are heard, stop the motorcycle and engine immediately, and investigate the cause.
		Steering
9	9	With the motorcycle in motion, note whether there is any indication of looseness or excessive binding through the full turning range in both directions. With the hands resting lightly on the handle bars, and the cycle in a vertical position, observe whether there is any tendency to pull to one side when it is operated at a reasonable speed. Also note any indications of steering instability at higher speeds.
		Balance
10	10	If vehicle does not balance properly in operation, inspect for misalignment of rear wheel.
		Speedometer and Odometer
11	11	Observe them for proper operation, excessive fluctuation, and unusual noises that might indicate worn or damaged gears or cable. The odometer must register the accumulating mileage.
		Throttle and Spark Controls
12	12	Set the throttle stop screw and low-speed adjustment so that the engine will operate smoothly and will not stall at idling speed. Turn the throttle-control grip to the OPEN and CLOSE positions, note whether the engine responds instantly to throttle changes, and whether the spark control advances and retards the ignition timer fully.
		Power and Operation
13	13	Observe whether the engine has normal pulling power and good operating characteristics in each speed from first to high gear. Also observe whether the engine misses, stalls, knocks (detonates) excessively, or makes any other unusual noise. If the spark is timed too early, the engine idle will be rough and the engine will "ping" excessively when accelerated or pulling hard. If the spark is timed too late, the engine will

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		lack power, perform sluggishly at usual speeds while not pulling hard, and may overheat.

Carburetor Adjustment

14	14	With the engine under normal load, adjust carburetor high-and low-speed needle valves if necessary, to obtain the best engine performance. (Harley-Davidson, low speed only.)

Brake Drum and Hub Temperatures

15	15	Immediately after completing the run, feel the front and rear brake drums and wheel hubs. An overheated brake drum is an indication of a dragging brake. Overheated wheel hubs indicate defective, dry, or improperly adjusted wheel bearings.

Power Train Temperatures

16	16	Feel the primary drive case, transmission case, and rear drive housing (shaft drive models) for overheating. If any of these units are excessively hot, an abnormal condition is indicated which should be corrected or reported to designated authority.

MAINTENANCE OPERATIONS

Compression Test (Kick Starter)

17	17	With the throttle wide open, test the compression with the kick starter. If there is little or no compression resistance to cranking, the valve-tappet clearance may be insufficient, the valves "burned" or poorly seated, the piston rings or cylinders worn, or the cylinder head gaskets or spark plugs leaking. Record the condition in the space provided at the bottom of the work sheet.

Transmission

18	18	Note whether transmission is in good condition, secure, not leaking, and whether the oil is at the correct level.
	18	SERVE. If an oil change is due, drain and refill the transmission to the proper level with the specified grade of oil according to WDLO.

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	18	TIGHTEN. Tighten all mounting and assembly bolts securely.
		Rear Drive Housing (Shaft Drive Models)
19	19	Check the oil level and add as required.
19		SERVE. Service according to instructions on WDLO.
		Engine Oil
20	20	See that it is at the correct level.
20		SERVE. Service according to instructions on WDLO.
		Battery and Carrier
21	21	Examine the battery externally to see that it is in good condition, clean, and secure, paying particular attention to the battery posts and cell straps. Remove the cell caps. See whether the vents are open. Note the level of the electrolyte, which should be approximately ½ inch above the tops of the plates. Before adding water to the cells, test the specific gravity with a hydrometer, and record the readings in the space provided at the bottom of the work sheet. Report any readings below 1.225 or any variation between cells of more than 0.025. Also take the voltage reading, and record in the space provided at the bottom of the work sheet. Report any irregularity.
	21	CLEAN. Clean the top of the battery with water (or a soda wash, if available) and dry with a clean rag or compressed air. Do this with the caps in place, taking care to keep dirt and cleaning solution out of the electrolyte. Clean the carrier in the same way, and paint if it is corroded.
	21	SERVE. Add distilled water to the correct level. While filling high-level type battery, depress red vent buttons. Release button, and note that level in filled hole drops to ½ inch above plates. If distilled water is not available use any clean water in preference to letting the battery run dry.
	21	TIGHTEN. Tighten the battery hold-down devices and the carrier mountings. Do not overtighten the hold-down devices as this may damage the battery case. Tighten the cell caps fingertight.

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22	22	**Battery Cables and Terminals** See that they are in good condition and secure. Look particularly for spots worn through the cable insulation, and for corroded terminals.
	22	CLEAN. Remove the battery cable terminals from the battery posts, clean the corrosion from these parts, and apply a coating of grease to their engaging surfaces. (On Harley-Davidson, oil felt washers on terminals.) Also examine the clamp bolts and nuts to see that they are serviceable.
		Electric Wiring
23	23	Examine all electric wiring to see that it is in good condition, secure, and properly supported and connected. Look for worn spots in the insulation and for loose or missing grommets.
		Generator, Drive, and Mounting
24	24	Note whether the generator is securely mounted. Remove the generator inspection cover and examine the commutator to see that it is in good condition, clean, and not excessively worn; examine the brushes to see that they are clean, not sticking in their holders, and not excessively worn; and the brush-connecting wires to see that they are secure and not chafing. If the commutator is in bad condition or excessively worn, or if the brushes are excessively worn, replace the generator. If the commutator is dirty, it should be cleaned with grade 2/0 flint paper and the dust should be blown out with compressed air. If the generator is chain-driven, determine whether the chain has correct tension as specified in the vehicle Technical Manual.
	24	ADJUST. Adjust the drive-chain tension to specifications.
		Timer (Circuit Breaker)
25	25	Wipe the dirt from the inspection cover or distributor cap (Indian only). Remove these items and determine if they are in good condition, that the distributor cap is not cracked or its terminals are not corroded, the wiring leads are securely connected to the timer

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or distributor and cap, the ignition wiring and all provided radio shielding are in good condition and secure, and if the inside of the timer or distributor is clean. Also inspect the distributor rotor arm for good condition. See that the breaker points are clean, well aligned, engage squarely, and are not pitted, burned, or excessively worn. The movable breaker arm must be free on its pivot, properly connected to the low-tension wiring, and well insulated from the pivot pin. See whether the movable breaker arm spring appears to exert normal force against the arm. Also test the camshaft by hand-feel to see whether it is excessively worn in its bushings. If the camshaft bushings are excessively worn, install a new timer or distributor. If the points are slightly burned or pitted, dress them with a fine file. If the breaker points are unserviceable, install a new set, taking care to align them and to adjust their gap correctly.

25 ADJUST. Adjust the gap of the circuit breaker points to specifications.

25 SPECIAL LUBRICATION. Lubricate according to instruction on WDLO.

Spark Plugs

26 26 Inspect externally to see that they are in good condition, clean, properly connected, and not leaking around the insulators or gaskets. Look particularly for cracked insulators. If radio shielding is used, see that it is in good condition and secure. Remove the plugs and examine their inner ends for fouled, cracked, or broken insulators which may indicate incorrect heat range. Inspect the electrodes to see that they are in good condition, not excessively burned, and that the gap is correct.

26 CLEAN. Clean deposits from the ends of insulators and electrodes.

26 ADJUST. Adjust the gap to specifications by bending the grounded electrode only.

Ignition and Lamp (Light) Switch

27 27 See that the switch and keyhole cover are in good condition, and whether the key is serviceable.

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		Lights: Service and Blackout
28	28	Examine all lights to see that they are clean, in good condition, properly aimed, and securely mounted. Pay particular attention to lenses and reflectors. With the ignition key in place (if used) turn the switch to each of its positions, observe whether the service and blackout lamps operate properly, and whether they go out when switched off.
		Note the headlight to see whether it is properly aimed. Operate the toggle switch on handlebar to see that it dims the service head lamp. Apply the foot brake to determine whether the stop lamp operates properly.
		Horn
29	29	See that the horn is in good condition, secure, and if the electrical connections are tight. If tactical situation permits, sound the horn to see whether the signal is normal.
		Cylinder Head Nuts
30	30	If the cylinder head gaskets show signs of leakage, the cylinder head nuts should be tightened evenly with a torque wrench to the specified tension, when the engine is cold. If leakage persists, new gaskets should be installed.
		Cylinder Hold-down Nuts
31	31	If these nuts appear loose or the cylinder base gaskets show signs of leakage, tighten the nuts evenly when the engine is cold. If leakage persists, new gaskets should be installed. If hold-down nuts are tightened, perform item 36 before starting engine.
		Engine Mountings
32	32	Observe whether the engine mounting brackets and bolts are in good condition and secure.
	32	TIGHTEN. Tighten engine bracket and mounting bolts securely.
		Engine Crankcase
33	33	Crankcase must be in good condition, secure, and not leaking oil.

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Tech. Insp.	M	
		Intake Manifold
34	34	See that it is in good condition and secure. Pay particular attention to the tightness of manifold nuts.
		Muffler and Exhaust Pipes
35	35	Note whether they are in good condition, not leaking, and secure. Include the tail pipe in the check, and be sure it is not restricted. Leaks are usually indicated by carbon streaks.
		Valve Mechanism
36	36	While the engine is cold, determine whether the valve-tappet clearances are within specified limits. See that the valve springs are in good condition and properly secured, that the valve tappets and their adjusting screws and lock nuts are in good condition, and that the valve covers are in good condition, secure, and not leaking oil.
	36	ADJUST. Adjust valve tappets to specified clearances.
		Kick Starter
37	37	Note whether its pedal, arm, exposed gear sectors, and return spring are in good condition, correctly assembled, and secure. Observe whether the gear sector teeth are excessively worn. The starter must operate properly without binding, and the return spring must bring the starter arm to its disengaged position when foot pressure is removed.
		Engine Cooling Fins
38	38	Make sure they are in good condition and clean. Do not apply paint to cooling fins.
	38	CLEAN. Clean all dirt or foreign material from the engine cooling fins.
		Filler Caps and Vents
39	39	Wipe the dirt and dust from the filler caps of the fuel and oil tanks, and remove them carefully so that dirt does not enter the tanks. Examine the caps and their gaskets to see that they are in good condition and seal tightly. Note whether the vent in the gasoline filler cap is open. Wipe the dust and dirt carefully from

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around the filler neck of each tank and reinstall the caps; observe whether each locks properly on its filler neck.

Caution: Do not interchange the oil tank filler cap with the main or reserve fuel tank filler cap. The former has no vent hole and will, therefore, vacuum-lock or prevent the flow of fuel.

Fuel Tanks, Valves, and Lines

40 40 Note whether they are in good condition, secure, and not leaking.

Oil System Leaks

41 41 See that the oil tank, oil lines, and connections are in good condition, secure, and not leaking.

Carburetor and Fuel Filter

42 42 Inspect them for good condition, secure connections, and leaks. Examine the control linkage for good condition, correct assembly, and excessive wear. On dual carburetors (shaft drive models), the connecting linkage should be synchronized so that the throttle and choke openings are the same for each carburetor.

42 TIGHTEN. Tighten carburetor assembly and mounting nuts or screws securely.

42 CLEAN. Close main and reserve fuel tank shut-off valves. If provided with a drain plug, drain the carburetor bowl of water and sediment, and flush it by opening one of the fuel shut-off valves momentarily. Remove the fuel filter bowl, and clean the filter head by allowing gasoline to flow through it until the gasoline runs clean. Wash the filter bowl in dry-cleaning solvent and reassemble. Be careful not to crush the cork gasket, and use a new gasket if necessary. After reassembling the carburetor drain plug and filter, open fuel tank shut-off valves.

Air Cleaner

43 43 Remove and disassemble the air cleaner, observing whether all gaskets, seals, clamps, and connecting hose are present and in good condition. Examine condition of element and body. Inspect condition of oil, and amount of sediment in reservoir.

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	43	CLEAN AND SERVE. Service according to instructions on WDLO.

Gearshift Lever and Linkage

44	44	See that the gearshift lever (pedal on shaft drive models) and linkage are in good condition, secure, and not excessively worn. See that gearshift lever engages fully in gear corresponding to gear position shifter guide.
	44	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.

Primary Drive

45	45	Remove inspection hole plug from the primary drive case. Inspect the chain for correct tension and for proper lubrication as outlined in the vehicle Technical Manual.
	45	ADJUST. Adjust chain tension to specified limits.

Clutch Pedal and Linkage

46	46	Examine clutch pedal, joints, rods, and clevises to see that they are in good condition and not excessively worn. Observe the free travel of the clutch pedal to see if it is within specified limits as outlined in the vehicle Technical Manual.
	46	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
	46	ADJUST. Adjust clutch pedal free travel to specifications in vehicle Technical Manual.

Rear Chain and Guard

47	47	Observe whether they are in good condition; see that the chain is not excessively worn, and has correct tension; and whether the guard is properly aligned so as not to interfere with the chain. Note whether it is amply lubricated (automatic chain oiler on Harley-Davidson; manual lubrication on Indian). Test rear axle adjusting screws to see if they are in good condition and secure.
	47	CLEAN. Remove chain, wash it thoroughly in dry-cleaning solvent, and hang it up to dry.

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	47	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
	47	ADJUST. Adjust chain to specified tension, using care to turn both right and left adjusting screws an equal amount, so as to keep the wheel in correct alignment, and to tighten axle nuts securely.
		Final Drive Sprockets
48	48	See that they are in good condition, not excessively worn, and in proper alignment. Chain should ride centrally on sprockets. If it is necessary to align the chain and sprocket, be sure that the wheel is properly aligned in the frame and does not have excessive run-out. Inspect sprockets for loose rivets.
		Propeller Shaft (Shaft Drive Models)
49	49	Note whether the propeller shaft is in good condition and the universal joints are not excessively worn. The dust caps protecting the universal joints on the Indian should be tightly in place. The exposed universal joints on the Harley-Davidson should be kept free of foreign material, and the yoke gaskets should retain the lubricant.
		Paint and Markings
50	50	See that they are in good condition, that the paint is not rubbed to a polish, and is without bare spots that might rust or reflect light. Make sure that the vehicle markings are legible.
		Frame
51	51	Observe whether frame is in good condition and not sprung out of alignment.
		Steering Head and Fork Stem
52	52	See that they are in good condition, and observe whether there is up-and-down play caused by loose bearings. Move the handle bars through their complete range and observe if there is any binding, which might indicate improperly adjusted or defective bearings.

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Tech. Insp.	M	
		Handle Bars
53	53	The handle bars must be in good condition and secure.
		Throttle Control
54	54	Note whether the grip is in good condition; see that the throttle valve opens and closes completely as the grip is turned to its extreme positions, and that the control wire and casing are in good condition and secure.
		Spark Control
55	55	Note whether the grip is in good condition; see that the spark is fully advanced and retarded as the grip is turned to its extreme positions, and that the control wire and casing are in good condition and secure.
		Clutch Hand Lever and Linkage (Shaft Drive Models)
56	56	See if they are in good condition, securely mounted, and whether the end of the lever has free travel as specified in vehicle Technical Manual before it begins to disengage the clutch.
		Special Lubrication
	56	Lubricate according to instructions on WDLO.
	56	ADJUST. Adjust length of control cable for free travel as specified in vehicle Technical Manual.
		Rear View Mirror
57	57	See that mirror is in good condition, clean, and securely mounted.
		Front Fender
58	58	See that fender is in good condition, secure, and does not scrape the tire.
		Weapon Carrier
59	59	See that carrier is in good condition and secure.
		Ammunition Box
60	60	The box and cover should be in good condition and secure.
		Front Springs
61	61	Observe whether the springs and their mountings are in good condition, correctly assembled, and secure.

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		Front Forks
62	62	See that forks are in good condition and secure.
		Front Fork Shackles or Rocker Plates
63	63	See that these items are in good condition, secure, and not excessively worn.
	63	TIGHTEN. Tighten shackle bolts (Indian) or rocker plate bolts (Harley-Davidson) securely.
		Front Fork Dampers
64	64	See that the steering damper and ride control damper are in good condition, secure, and operate freely. Note also whether the friction disks are glazed, coated with grease, or excessively worn.
		Front Brake and Control Linkage
65	65	Observe whether control linkage operates freely; see that all connections are tight; and note whether the brake is adjusted so that the end of the hand lever has free travel specified in the vehicle manual, before meeting resistance. Look for any indications of a cracked or excessively worn brake drum and for leaks from wheel-bearing oil seals.
	65	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
	65	ADJUST. Adjust the cable length to provide the free travel specified in the vehicle Technical Manual.
		Front Wheel (Alignment and Spokes)
66	66	Raise the front wheel off the ground by placing a block under the engine skid plate. See that the spokes are all present, in good condition, and tight. If loose spokes are found, tighten them evenly, taking care not to distort the rim concentricity or to cause run-out. Inspect the wheel to see that it is in good condition and secure. Spin the wheel, and note whether the wheel, rim, and tire are properly aligned in the fork and that the wheel has no appreciable run-out. Complete items 66 to 71, inclusive, before lowering the wheel to the ground.

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		Front Wheel Bearings and Seals
67	67	Shake the wheel to see whether bearings are excessively loose. The wheel should have a slight amount of play at the rim. Spin the wheel and listen for any unusual noises that might indicate dry or defective bearings. Also note whether there are any leaks at the grease seals.
	67	*CLEAN. Remove the front wheel, disassemble the axle, bearings, and grease seals and clean them thoroughly in dry-cleaning solvent together with the wheel hub. Inspect the axle, bearings, and seals to see that they are in good condition and not excessively worn. Also inspect the brake drum and lining to see that they are in good condition, secure, and not excessively worn.
	67	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
	67	ADJUST. Reassemble correctly using new oil seals, and adjust the bearings according to the maintenance manual, taking care that the wheel is properly aligned.
		Front Wheel Axle Nuts
68	68	See that the front wheel axle nuts, including pinch bolts are in good condition and secure.
	68	TIGHTEN. Tighten axle nuts and pinch bolts evenly and securely.
		Tires: Front and Rear
69	69	Inspect tires as follows:
		INFLATION. Gauge all tires to see that they are inflated to recommended pressure.
		VALVE STEMS AND CAPS. Observe whether the valve stems are in good condition and correctly installed, and that the valve caps are present and secure. Do not tighten with pliers.
		DAMAGE AND TREAD WEAR. Examine all tires for cuts, bruises, breaks, and blisters. All tires with cuts or injuries extending to or into the cord body, and those worn smooth in center of tread must be removed and

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		replaced with reconditioned or new tires. Remove all imbedded material such as glass, nails, and stones from tires.
		Check for excessive or irregular tread wear. At any inspection when unusual or irregular tire wear is evident, interchange front and rear tires.
		Rear Wheel: Alignment and Spokes
70	70	With the motorcycle on the rear stand, inspect in the same manner as front wheel (item 66). If it is necessary to align wheel in the frame, be sure the sprockets and chains are also in correct alignment.
		Rear Wheel Bearings and Seals
71	71	Inspect bearings and seals in the same manner as front wheel bearings and seals, item 67.
	71	*CLEAN. Clean in the same manner as item 67 and inspect brake drums and linings.
	71	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
	71	*ADJUST. Adjust in the same manner as item 67.
		Rear Wheel Axle Nuts
72	72	See that nuts are in good condition and secure.
	72	TIGHTEN. Tighten rear wheel axle nuts securely.
		Rear Springs
73	73	Observe whether they are in good condition, correctly assembled and secure, and not leaking grease.
	73	TIGHTEN. Tighten pinch bolts and slipper spindle bolts.
		Rear Fender
74	74	Inspect in the same manner as front fender, item 58.
		Rear Brake and Control Linkage
75	75	See that the control linkage operates freely and that all connections are secure. Look for indications of grease around drum due to overlubrication of rear wheel bearings or brake-operating shaft, and for cracked or excessively worn drums. The brake pedal

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		should have free travel as specified in vehicle manual, before the brake begins to meet resistance. Check the linkage for loose or worn pins and clevises.
	75	SPECIAL LUBRICATION. Lubricate according to instructions on WDLO.
	75	ADJUST. Adjust the length of the brake rod at the brake-operating arm to provide the pedal free travel as specified in vehicle Technical Manual.
		Stands: Jiffy, Rear, and Center
76	76	See that these stands are in good condition, and secure, and that latches and springs are present, in good condition, and hold the stands securely.
		Footboards and Rests
77	77	These items must be in good condition and secure.
		Saddle: Springs and Hinge
78	78	Observe whether they are in good condition and secure, paying particular attention to torn leather, ripped seams, sagging or broken springs, and excessive wear in the front hinge.
		Luggage Carrier
79	79	Note whether carrier is in good condition and secure.
		Saddle Bags
80	80	See that they are in good condition, clean, and securely fastened to the motorcycle. Note particularly whether leather is torn, seams ripped, or straps and buckles missing or damaged. Leather should be treated with proper preservative.
		Tools and Tire Pump
81	81	Note whether the tool kit is complete, in good condition, clean, secure, and properly stowed. See that the tire pump is in good condition and securely clamped to the motorcycle frame. See that vehicle Technical Manual, Lubrication Order and Form 26 are present, legible, and properly stowed.
		Safety Guards
82	82	Make sure guards are in good condition and secure.

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Tech. Insp.	M	
		Leg Shields
83	83	See that they are in good condition and secure.
		Note. Motorcycles operating in warm weather should not be equipped with leg shields, as they hamper engine cooling seriously.
		Skid Plate
84	84	See that it is in good condition and secure. The skid plate must be in place to protect the underside of the engine.
		Vehicle Lubrication
85	85	Inspect the lubrication of the entire motorcycle to see whether it has been receiving proper attention. Any unit that required disassembly for inspection purposes must be lubricated correctly, unless the vehicle is to be deadlined for repair of that unit.
	85	LUBRICATE. Lubricate all points of the motorcycle in accordance with instructions in the vehicle Technical Manual, War Department Lubrication Order, current lubrication bulletins or directives.
		Final Road Test
86	86	Make a final road test rechecking items 2 to 16 inclusive, and also be sure to recheck the transmission, primary drive, and final drive to see if the lubricant is at the correct level and not leaking. Confine this road test to the minimum distance necessary to make satisfactory observations.
		Note. Correct or report all deficiencies found during final road test to designated authority.

18. Specific Procedures for Engineer Equipment

a. USE OF WD AGO FORM 464. (1) This form has been developed for use with general construction machinery and other special engineer equipment.

(2) On the front side of this form are listed items which have general application on many types of equipment. These items are grouped according to the major assemblies or systems in which they normally appear. On the back of the form are listed items which have only limited or special application. These items are grouped in accordance with the equipment types on which they

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normally appear. Numbered blank spaces have been provided in all groups to cover any items not listed.

(3) The items on this form should usually be performed in the numerical sequence in which they are listed, since they have been arranged for maximum efficiency and economy of motion. All items applicable to any individual vehicle should be serviced and inspected in accordance with the procedures prescribed on the following pages. Line out any items which do not apply to the vehicle being inspected or serviced.

(4) Whenever it is necessary to disassemble a part or assembly during the technical inspection, the special services indicated for the item on the monthly maintenance service should be performed on the disassembled unit.

b. DISPOSITION. All weekly maintenance work sheets will be held in the organization file until the next monthly maintenance work sheet is filed, then destroy. The monthly maintenance work sheets will be held until the next monthly work sheet is filed, then destroy.

c. PERFORMING ITEMS ON WORK SHEET. (1) Specific procedures for performing each item on the weekly and the monthly maintenance services and the technical inspection are described in the following pages. Each of these pages of specific procedures has three columns at its left edge corresponding to the weekly maintenance service, the monthly maintenance service, and the technical inspection of WD AGO Form 464, respectively. While the monthly maintenance and technical inspection are both indicated in the same column on the form, separate columns are provided in the following pages for clarification. The detailed procedure for each maintenance service and the technical inspection will be found opposite the item instructions in the procedure columns.

(2) Very often will be found that a particular procedure does not apply to both the weekly maintenance, the monthly maintenance and to the technical inspection. In order to determine which procedure to follow it is necessary simply to follow the item number down the appropriate column opposite the paragraphs wherever they are to be applied.

(3) The following sample from the pages of specific procedures that follow, illustrates the manner in which they are to be used. Supposed work is being done on the weekly maintenance service. Item 20 in this sample appears in the weekly column oppo-

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site the first paragraph only, which means that the procedures in this case are to be limited to this only.

(4) Similarly, in the case of the technical inspection the first two paragraphs would apply, and in the case of the monthly maintenance service the presence of the number 20 next to each paragraph indicates that all of these steps are to be performed.

Tech. Insp.	M	W	SAMPLE	
20	20	20	**Governor and Linkage.** Inspect governor and all connecting linkage and see that they are secure and in good operating condition. Check linkage connections to see that they are not excessively worn, do not bind, and are properly adjusted and lubricated. Check governor operation under varying load conditions for signs of surging or other improper operation.	Applies to technical inspection, monthly and weekly maintenance.
20	20		By means of tachometer or other speed indicator check engine governed speed as specified in vehicle Technical Manual.	Applies to technical inspection and monthly maintenance.
	20		ADJUST if necessary.	Applies to monthly maintenance.

GENERAL

Tech. Insp.	M	W	
1	1	1	**Before-Operation Services** Serve, check, and perform the services indicated by items numbered 1, 3, 6, 7, 8, and 22 listed in before-operation services on Form 48. This will determine whether the equipment is in a satisfactory condition to make the operating test safely, and that it is adequately supplied with fuel, engine oil, and coolant.
2			**Lubrication** Inspect the lubrication of the entire equipment to determine whether it has been receiving proper attention. On any unit where disassembly is necessary for inspection purposes, lubrication is necessary for inspection purposes, lubrication must be performed, according to instructions on WDLO unless the equipment is to be deadlined for repair of that unit.

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Tech. Insp.	M	W
	2	2

LUBRICATE, as required at the time of inspection, all points of the equipment in accordance with instructions in the equipment manual, Lubrication Orders, current lubrication bulletins or directives, and the following instructions:

Use only clean lubricant. Keep all lubricant containers and dispensers covered except when withdrawing lubricant.

Before applying lubricant, clean the lubrication fitting or plug, so that dirt will not enter with the lubricant.

If lubrication fittings, flexible lines, vents or plugs are found missing or damaged, they should be replaced immediately. Clean the hole in which the new fitting is to be installed, install the fitting, and lubricate the unit.

On all unsealed bushings or joints, the lubricant should be applied until it appears at the openings. On units such as universal joints, track rollers and antifriction bearings, which are provided with lubricant retainer seals, use an appropriate hand-operated grease gun and do not force the lubricant beyond the seals. Open any clogged lubrication passages until lubricant is properly delivered.

When draining oil from the engine, transmission, transfer case, or axle housings, always drain the oil immediately after it has been warmed and agitated to a good draining condition by operation of the engine or vehicle. Refill the units to the correct level with specified oil as soon as the draining is completed, so there will be little hazard that they may be operated without lubricant. The correct cold oil level in the axle, transfer case, and transmission is usually from ½ inch below, to the lower side of the filler plug hole.

Caution: Do not fill to overflowing. Reinstall all drain and filler plugs securely. Take care that any required gaskets are in good condition and in place on the reinstalled plugs.

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Tech. Insp.	M	W	
			Do not apply more than the specified amount of lubricant to generator, starter, distributors, or water pump.
			Wipe off excess lubricant that may drip on to brakes, rubber parts, or detract from the vehicle's appearance.
			Tools and Equipment
3	3	3	Check all the standard vehicle and pioneer tools against On Vehicle Material List to see that they are all present. Inspect to see that tools are in good condition, clean, and properly stowed or securely mounted. Also examine the tools which have cutting edges to see that they are sharp. Any tools mounted on the outside of the vehicle which have bright or polished surfaces should be painted or otherwise treated to prevent rust. If tactical situation demands see that precautions are taken to prevent any glare or reflection from these items.
			Fire Extinguishers
4	4	4	See that they are in good condition, securely mounted, and fully charged. The charge may be determined on gas type extinguishers by weighing with a scale, and on liquid type by shaking. Also be sure the nozzles are free from corrosion, and not damaged or plugged.
			Publications (Lubrication Order, Technical Manual, Preventive Maintenance Services)
5	5	5	The vehicle and equipment manuals, Lubrication Order, and Form 26 should be present, legible, and properly stowed.
			Appearance (Paint, Marking, Body or Cab, Sheet Metal, Seats, Back Cushions, Doors, Glass, Cleanliness)
6	6	6	Check the body or cab, sheet metal, seats, back cushions, doors, and glass to see that they are securely mounted and are in good condition. See that all doors, hinges, locks, and seats are in good condition and operate properly. Examine the paint of the entire vehicle to see that it

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			is in good condition and that there are no bright spots in the finish which might cause glare or reflection. Inspect vehicle marks and identification for legibility, including all identification plates that are furnished. See that all identification plate mountings are secure and in good condition.
			Modifications
7	7		Inspect the vehicle to determine whether all Modification Work Orders have been completed.

ENGINE AND ACCESSORIES

			Cylinder Head, Manifold and Gaskets (Leaks, Cracks, Breathers)
11	11	11	Look for cracks or indications of oil, water, or compression leaks around studs, cap screws, and gasket. Observe the intake and exhaust manifolds to see that they are in good condition, secure, and that manifold gaskets appear to be in good condition and not leaking. On a manually-operated manifold heat control, determine if it is in good condition, secure, and that the control-adjusting pointer is in place and set at the correct seasonal position. If the control is automatic, note whether the bi-metal control spring is in good condition and securely connected to the heat-control valve shaft and mounting; that the shaft operates freely; and that the spring control the shaft and valve properly. Tighten all manifold assembly mountings, exhaust pipe and carburetor connecting flange nuts evenly and securely.
	11		*Caution:* Cylinder heads should not ordinarily be tightened unless there is a definite indication of looseness or leaks. If tightening is necessary use a torque-indicating wrench and tighten in the sequence and to the tension specified in the vehicle Technical Manual. When a new gasket is installed tighten the cylinder head three times as follows: First, upon installation, second, after engine is warmed up, and third, after completing first week of operation. On

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Tech. Insp.	M	W

valve-in-head engines adjust the valve tappet clearances again to specifications after the final tightening of the head nuts.

Valve Mechanism (Covers, Springs, Rocker Arms, Push Rods, Clearance)

12 12 12 On valve-in-head engines, check valve tappet clearances while hot. Valve tappets, rocker arms, shafts, and springs should be in good condition, correctly assembled, and secure. Oil should be delivered properly. Also make sure that the valve cover gaskets are in good condition. On L-head engines, make the above inspection only as the need for such service is indicated by valve noises or engine performance.

12 ADJUST the clearances to specifications, taking care that the lock nuts are secure when the clearances are last noted during the adjustment.

Compression Test (Record)

13 13 Be sure the battery is fully charged. Record the compression reading in the space provided on the back of the form. With all spark plugs out, insert the compression gauge in a spark plug hole and with the throttle wide open, rotate the engine at cranking speed until the maximum compression is indicated. Do not crank the engine more than is necessary to obtain the maximum reading. Repeat this process for each cylinder. See the vehicle Technical Manual for specified compression pressures on each vehicle and for allowable variations due to altitude and wear. If pressure in a cylinder is appreciably below normal, squirt sufficient engine oil on the piston head to prevent loss of compression temporarily and recheck.

Note. Be sure no oil is squirted on the valves, since this might give readings that would provide a false interpretation of engine condition. Low compression in a cylinder brought up to normal by oil sealing on the piston indicates piston, ring, or cylinder wear or damage. Low compression in a cylinder not brought up to normal by this method indicates valve or gasket leakage.

Crankcase, Breathers (Leaks, Oil Level)

14 14 14 With engine idling, examine crankcase, valve

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			covers, timing-gear cover, and clutch housing for oil leaks. See that crankcase and valve cover breathers are in good condition, correctly assembled, secure, and that the ventilator tubes are open.
	14	14	*Note.* If an oil change is due service crankcase according to instructions on WDLO. Service all oil bath type air cleaners and those where oil is used on the filter element, in accordance with instructions on WDLO. On all other types of cleaners or breathers remove and wash in dry cleaning solvent, dry and reinstall.
			Oil Filters (Lines, Oil Coolers)
15	15	15	Inspect oil filters, coolers, and all external engine oil lines to see whether they are in good condition, secure, and do not leak.
	15	15	*Note.* If service prescribed on WDLO for any type oil filter is due, service in accordance with instructions on WDLO. After an element is cleaned or replaced check carefully for leaks while engine is running.
			Radiator (Core, Shell, Shutters, Mounting, Hose, Connections, Caps and Gasket) (Antifreeze Test-Record)
16	16	16	See that these items are in good condition, correctly assembled, securely mounted and connected, and do not leak; note whether the core air passages are obstructed with dirt, insects or trash, and whether the core fins are badly bent; examine the shutter-control linkage to see that it is in good condition, secure, and operates properly; note whether the steam-relief valve operates freely and is in correct position for the prevailing atmospheric temperature. Also examine the coolant to see whether it is so contaminated with rust, oil or other foreign matter that the cooling system should be cleaned.
	16	16	SERVE. Clean the dirt, insects, and trash from the exterior of the core by blowing out with compressed air or with a stream of water applied carefully from the rear side of the core. (Do not use steam.)
			Caution: Use only a suitably shaped piece of wood or blunt instrument in straightening fins; otherwise tubes may be punctured. If internal

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			cleaning is necessary, clean the cooling system according to current directives. Refill radiator with coolant, adding specified inhibitor, unless new antifreeze, which contains inhibtor, is used. Do not fill to top; allow room for expansion.
			If antifreeze is in use, determine its protective value and record in the space provided on the reverse side of the work sheet. Tighten all loose radiator mountings and hose clamps.
			Water Pump, Fan, Shroud (Leaks, Alignment, Mounting)
17	17	17	Observe water pump to see that it is in good condition, not leaking, and securely installed. Loosen drive belts and leave them loose until adjustment is made (item 18). Examine shaft for end play and loose bearings. Inspect fan blades to see whether they are in good condition, properly secured to the hub, and whether the shroud is in good condition, properly aligned with the fan, and securely mounted.
	17	17	TIGHTEN. Tighten packing gland nut cautiously. Do not overtighten as this may cause scoring of the shaft and leakage.
			Belts and Pulleys
18	18	18	Observe all drive belts for evidence of fraying condition, excessive wear, and deterioration. See that all drive pulleys and hubs are in good condition and securely mounted.
	18	18	ADJUST. Adjust all accessory drive belts to specified tension.
			Oil Pump, Pressure Relief Valve (Screens, Lines, Leaks, Oil Pressure Pounds)
19	19	19	See that these items are in good condition and secure, and that oil is not leaking from the oil pump or lines attached to the engine or crankcase. Record the oil pressure, under normal operating temperatures and speeds, in space provided.

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	19	19	If oil pressure is below normal, clean and check oil pressure relief valve and seat. If oil pan is removed for inspection of engine, or for investigation of trouble check condition of suction screens, lines, and pump. Clean or replace as required.

Governor and Linkage

20	20	20	Inspect governor and all connecting linkage and see that they are secure and in good operating condition. Check linkage connections to see that they are not excessively worn, do not bind, and are properly adjusted and lubricated. Check governor operation under varying load conditions for signs of surging or other improper operation.
20	20		By means of tachometer or other speed indicator check engine governed speed as specified in vehicle Technical Manual.
	20		ADJUST if necessary.

STARTING OR AUXILIARY ENGINE

Air Cleaner

26	26	26	Remove air cleaner and see that all gaskets, seals, clamps, and any connecting hose or tubes are present and in good condition. Observe the condition of the cleaning elements, baffles, and body. Note the oil in the reservoir of oil-bath cleaners, paying particular attention to the amount of dirt present in the oil. Also see that the oil level is satisfactory.
	26	26	CLEAN AND SERVICE air cleaner in accordance with instructions on WDLO. Reassemble, using new gaskets if necessary and see that they are properly placed. Install air cleaner being careful that it is pressed firmly into place and that the mounting is secure. If the air cleaner is equipped with an exterior air baffle see that it is correctly aligned with the air stream from the fan. Be sure that any connecting hose is

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			properly clamped to the air cleaner and air horn.
			Cooling Systems
27	27	27	Inspect to determine general condition and effectiveness of cooling system.
	27	27	SERVE liquid cooled engines as in item 16. Clean cylinder head and cylinder cooling fins, air screens, and fans on air-cooled engines. See that fan and engine shroud are in good condition and securely mounted.
			Cylinder Head, Manifold, and Gasket
28	28	28	Serve as in item 11.
			Crankcase, Breathers, Oil Filter
29	29	29	Serve as in items 14 and 15.
			Valves
30	30	30	Serve as in item 12.
			Ignition System
31	31	31	Serve as in items 46, 49, and 50.
			Fuel Pump, Carburetor and Governor (Lines, Connections, Sediment Bowl)
32	32	32	Serve as in items 20, 38, and 39.
			Clutch and Transmission
33	33	33	Serve as in items 93 and 95.
			Compression Test (Record)
34	34	34	On engines equipped with manual starters test the compression, using the starter, being certain that the throttle is wide open. If there is little or no compression resistance to cranking, the valve tappet clearance may be insufficient, the valves burned or poorly seated, the piston ring or cylinder worn, or the cylinder head gaskets or spark plugs leaking. Record the condition found on the work sheet. On engines equipped with electric starters test compression in manner prescribed in item 13.

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			Fuel Pumps and Housings (Leaks, Mountings, Sediment Bowl)
38	38	38	See that the fuel pump lines and sediment bowl are in good condition, secure, and not leaking.
38	38		Attach a fuel test gauge properly and with the engine idling, note whether the pump pressure is within specified limits, which are listed in the equipment manual.
	38		Replace any pump that does not produce proper pressure, being sure to make a similar check of the new pump to see that it is satisfactory.
	38	38	Close the fuel shut-off valve, and remove filter bowls, gaskets, and screens; and clean sediment bowls and screens in dry-cleaning solvent. Dry the elements thoroughly. Be sure to include any screen at carburetor fuel line connection or at the fuel pump. Reinstall the removed parts, using new gaskets if necessary. Turn on the fuel shut-off valve after assembling, and recheck for leaks.
			Note. If screen is damaged or clogged beyond cleaning, replace it.
			Carburetor and Linkage
39	39	39	See that these items are in good condition, correctly assembled, and securely installed; that the carburetor does not leak; that the control linkage, including the choke and throttle shaft, is not excessively worn; that the choke valve opens fully when the control is in its released position; that the throttle valve opens fully when the accelerator is fully depressed; and that the governor is secure and properly sealed.
	39		TIGHTEN all mounting bolts and cap screws.
			Filters
40	40	40	Note whether the Diesel fuel filters and cleaner bowls are in good condition, secure, and not leaking at gaskets or connections.
	40	40	REMOVE all Diesel fuel screens and cartridge type elements, clean all screens thoroughly in dry-cleaning solvent, dry with compressed air,

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			and reinstall. Observe whether the cartridge type element is in satisfactory condition for further service. If so, clean and replace, being sure that all elements and cover gaskets are in good condition and in place.
		40	On disk type filters, turn the handle one complete turn. Remove the plug, and drain the sediment bowl.
		40	On a cartridge type fuel filter, replace the cartridge; also clean all fuel screens. On a disk type filter, remove the element from the cleaner bowl, and wash in dry-cleaning solvent until the disks are clean and free. Clean the bowl thoroughly, and reinstall the element, making sure all gaskets are in good condition and in place. Do not scrape or damage the disks. If the element is unserviceable, replace entire filter assembly.
			Air Cleaners and Precleaners (Leaks, Connections, Mountings)
41	41	41	Remove air cleaner and see that all gaskets, seals, clamps and any connecting hose or tubes are present and in good condition. Observe the condition of the cleaning elements, baffles, and body. Note the oil in the reservoir of oil-bath cleaners, paying particular attention to the amount of dirt present in the oil.
	41	41	Clean and service air cleaner in accordance with instructions on WDLO. Reassemble, using new gaskets if necessary and see that they are properly placed. Install air cleaner, being careful that it is pressed firmly into place and that the mounting is secure. If the air cleaner is equipped with an exterior air baffle, see that it is correctly aligned with the air stream from the fan. Be sure that any connecting hose is properly clamped to the air cleaner and air horn.
			Nozzles, Injectors
42	42	42	See that these items are in good condition, correctly assembled, securely mounted, and connections do not leak.

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42	42		CHECK the fuel injector, timing and balance according to the instructions and specifications in the equipment manual. This also applies to injector pumps which are located in the injector assembly, as on the GMC Diesel engine.
	42		SERVICE the fuel injector pump in accordance with instructions on WDLO.

Tank, Filler Element, Cap and Gasket (Valves, Lines, Traps, Screens, Mounting)

43	43	43	Inspect fuel tanks to see that they are in good condition and securely mounted. Examine caps for defective gaskets or plugged vents. See that the filler necks are in good condition and the caps fit securely. Check fuel lines and fittings to see that they are in good condition, securely supported, and not leaking.
	43		REMOVE the fuel tank drain plugs and drain off the accumulated water and sediment. Drain only until the fuel starts to run clear.

ELECTRIC SYSTEM

Spark Plugs

46	46	46	Examine the installed spark plugs to see that their insulators are in good condition and clean, and that there is no leakage around the insulators or gaskets. When operating conditions require, the spark plugs may be removed for service.
46	46		REMOVE the spark plugs and examine for poor condition, paying particular attention to broken insulators, excessive carbon deposits, and to electrodes which are burned thin. Replace unserviceable plugs. Report excessive deposits or damaged insulators, as these conditions may indicate incorrect heat range.
	46		CLEAN AND ADJUST. Clean deposits from the electrodes and insulators, and check again for cracks. If a plug cleaner is not available, install new or reconditioned plugs. Adjust gaps to specifications by bending the grounded elec-

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			trodes. Reinstall the plugs, using new gaskets and taking care not to overtighten them, as this may cause distortion and damage.
			Battery (Holder, Cables, Connections, Water, Test, and Record)
47	47	47	Inspect battery case for cracks and leaks. Clean top of battery. Inspect cables, terminals, bolts, posts, straps, and hold-downs for condition. Test specific gravity and voltage and record on WD AGO Form 464. Specific gravity readings below 1.225 normally indicates battery should be recharged or replaced. Electrolyte level should be above top of plates and may extend ½ inch above plates.
47	47		Make a high-rate discharge test of the battery to see that the cells are in a satisfactory condition, taking care to make the test according to the instructions for a condition test which accompany the test instrument. Normally a true test cannot be made if the gravity of the battery is below 1.225. When using a volt meter for testing, if the difference in the readings obtained from the cells is more than 30 percent, replace the battery.
	47	47	CLEAN AND SERVE. Bring electrolyte to proper level by adding distilled or clean water. Clean entire battery and carrier. Repaint carrier if corroded. Clean battery cable terminals, terminal bolts and nuts, and battery posts. Inspect bolts for serviceability. Tighten terminals and hold-downs carefully to avoid damage to battery. Grease terminals lightly.
			Generator, Starter (Commutator, Brushes, Brush Holders, Mountings)
48	48	48	Note whether generator and starter are in good condition, securely mounted, and whether the wiring connections are clean and secure; see that the starter linkage and retracting spring are in good condition and secure.
48	48		REMOVE the generator and starter inspection covers and see that the commutator brushes are

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in good condition and not excessively worn; that the brushes are free in the holders and have sufficient spring tension to hold them in contact with commutator; and that the brush-connecting wires are secure and not chafing.

48 CLEAN the commutator end of the generator and starter by blowing out with compressed air. If the commutator is dirty, clean with flint grade 2/0 paper only, according to instructions in the equipment manual, and blow out the dust with compressed air. Tighten the starter mounting bolts securely.

49 49 **Distributor or Magneto (Cap, Rotor, Points)** Observe whether the distributor body and external attachments are in good condition and secure. Examine other parts of the distributor as follows:

CAP, ROTOR, AND POINTS. Blow or wipe the dirt or dust from the distributor cap, remove the cap, and see that the cap, rotor, and the breaker-plate assembly parts are in good condition, correctly assembled, secure, and serviceably clean. Look particularly for cracks in the cap and rotor, corrosion of terminals, and connections in these parts, and to burning of the outer ends of the conductor strap of the rotor. Also see whether the breaker points are in good condition, well aligned, and adjusted to the specifications in the equipment manual.

49 If the breaker-plate assembly is unserviceably dirty remove distributor, clean in dry-cleaning solvent, dry with compressed air, lubricate parts in accordance with instructions on WDLO and reinstall in its correct position for timing. When cleaning the distributor remove the wick and lubrication cup, clean and dry them while removed, and reinstall only after the distributor assembly is cleaned and blown dry with compressed air. If the breaker points are pitted, burned, or worn to an unserviceable condition install a new set of points. If the points are badly pitted, replace the condenser also as this

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is an indication of a faulty condenser. Install the new points so that they are correctly aligned and gauged squarely. If the points are slightly pitted or burned, dress them with a contact point dresser or 2/0 flintpaper and remove the filings with compressed air.

Note. Do not use emery cloth for dressing points. Test the distributor shaft by hand-feel for looseness to determine whether or not it is excessively worn in its bushings.

Determine whether centrifugal advance is operating properly by installing the rotor on the upper end of the distributor camshaft and rotate the camshaft by finger force through the normal range of movement permitted by the centrifugal advance mechanism and see that it returns to its original position when the fingers are removed from the rotor. Be sure that there is no binding or sluggishness in the rotor during this check.

See that the vacuum-advance mechanism and its vacuum lines are in good condition, correctly assembled and secure; (that the vacuum-advance mechanism can be moved by finger force through its normal movement; that, as the finger force is removed, the diaphragm spring returns the mechanism to its original position; and that the mechanism does not bind or hang up during this check.) Lubricate the cam surfaces, the movable breaker-arm pin, the wick, and the camshaft according to the vehicle's lubrication order. Take care to keep lubricant away from the distributor points, and to wipe the cam clean before lubricating its surfaces.

Note. On Ford distributors which are equipped with a vacuum brake, as on V-8 engines, the only care required by the distributor on the monthly service is the external lubrication of the distributor shaft.

	49	ADJUST the breaker point gap according to the specifications in the equipment manual.
49	49	MAGNETO. Determine whether magneto is in good condition, and securely mounted. Note whether there is evidence of oil leaks at the mounting pad gaskets. Remove the breaker-point inspection covers and check to see that

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			the points are in good condition and clean, that the breaker points are well aligned, the mating surfaces engage squarely, and that point gaps are correctly adjusted.
	49		REPLACE unserviceable breaker-points. Adjust the magneto breaker-point gaps according to the instructions and specifications in the equipment manual.
			Coil, Wirings, Switches
50	50	50	Examine the coil to see that it is in good condition, clean, and securely mounted. All high-voltage ignition wiring, including shielding or conduits, should be in good condition and securely fastened. See that all insulation and connections are clean. Inspect all low voltage wiring in the engine compartment in the same manner.
			Note. Do not tighten wiring connections unless actually loose as overtightening of terminals will cause damage.
			Voltage Regulator
51	51	51	See that it is in good condition and whether all connections and mountings are secure.
51	51		TEST. Connect the low voltage circuit tester and observe whether the voltage regulator, current regulator, and cut-out control the generator output properly. Follow the instructions in the equipment manual, or those which accompany the test instrument. Replace if test shows faulty operation.
			Caution: This test should be made only after the regulator unit has reached normal operating temperature.
			Lights (Wiring, Switches, Reflectors, Mountings, and Connections)
52	52	52	Operate the switches and note whether the lamps (lights) respond. Note whether any lamps (lights) remain on with the switches off. Be sure to include the stoplight and to observe whether or not the directional lamps indicate both a right and left turn. See that the foot

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			switch controls the lamp unit beams properly and that they are correctly aimed so as not to blind oncoming traffic.
			Examine all lamps (lights) to see that they are in good condition and secure; check for dirty and broken lenses or discolored reflectors.
	52		Adjust the aim of the lamp unit beams according to specifications.

CONTROL SYSTEM

Steering Gear Assembly

56	56	56	See that assembly is in good condition, correctly and securely assembled and mounted, whether the steering gear case is leaking lubricant, and that the lubricant is at the proper level. Pay particular attention to the pitman arm to see that it is securely mounted and not bent out of its normal shape. Also observe whether the steering system is in good adjustment.
	56		TIGHTEN the pitman arm shaft nut securely. Also tighten the steering gear case assembly and mounting nuts or screws, taking care not to disturb the adjusting screws and lock nuts.
			Caution: Loosen the steering-column bracket when tightening the steering case mounting nuts, so column will not be distorted.

Gauges (Fuel, Oil, Temperature, Pressure, Vacuum)

57	57	57	See that all gauges operate properly, are securely mounted, and all connections are tight.
57			Pressure gauges on air compressors, gas generator plants, boilers, and similar equipment should be checked against a master gauge where operating pressures must be maintained within reasonably close limits for efficient and safe operation.

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			Meters (Voltmeter, Ammeter, Hourmeter, Odometer, Tachometer, Speedometer)
58	58	58	See that all meters operate properly and are securely mounted.
58			Meters on electric generating plants and similar equipment should be checked against a master meter where the close limits of control are necessary for efficient and safe operation.
			Regulator, Safety Valves, Check-Valves, Rheostat
59	59	59	Observe whether these items operate properly, are securely mounted, and connections tight.
	59	59	CHECK. Safety valves should be carefully checked for proper operation. If there is any question about its operation, the valve should be repaired or replaced.
			Pumps and Drives (Hydraulic, Vacuum, Air, Gear, Mountings)
60	60	60	Inspect these items to see that they are in good condition, securely mounted, do not leak, and all caps or dust covers are in place. On belt driven items inspect for worn, frayed, or deteriorated belts and check adjustment. Belts should be only tight enough to avoid slipping. If belts are too tight excessive bearing wear will result.
	60	60	ADJUST belts to proper tension, clean all filters and screens in dry-cleaning solvent, dry with compressed air, and reinstall.
			Valves, Cylinders, Jacks (Seals, Gaskets, Packings, Leaks, Lines)
61	61	61	See that these items function properly and are securely mounted.
	61	61	CHECK the adjustment of control valves to insure proper operation. Tighten piston rod packing gland but not too tight, as a light film of oil on the rod is necessary. If adjusted too tight, excessive wear and damage to rod and packing will result.

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			Levers, Pedals, Linkage, Cables
62	62	62	Inspect all control linkage for proper operation and adequate lubrication. See that rod pins, clevises, cable bushings, or bearings are properly adjusted, in good condition, and secure. Keeper, cotter pins, and bolts must be in place and secure.
			Universal Joints, Ball Joints
63	63	63	Check control system joints for wear, proper operation, and adequate lubrication.
	63	63	If worn to the point where the looseness affects the functioning of the control, adjust, repair, or replace the parts necessary.
			Gear Housings, Cases
64	64	64	Note whether the housings or cases are in good condition and securely mounted or whether oil is leaking from the seals, bearings, or gaskets.
	64	64	TIGHTEN all housings and case mountings and external assembly bolts and cap screws securely.
			Gears and Pinions
65	65	65	Check inclosed and exposed control gears and pinions for good condition, proper operation, and lubrication.
	65		CHECK the adjustment of these items as instructed in the equipment manual.
			Bearings and Shafts
66	66	66	See that all bearings of the control system are securely mounted and properly adjusted and aligned with shafts. See that shafts are not bent or twisted, and properly aligned with the drivers.
			Power Control Unit (Drums, Sheaves, Clutches, Brakes, Shear Pin)
67	67	67	See that the power control unit assembly functions properly, is securely mounted, and aligned. Check level of lubricant according to WDLO.

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			Inspect for leaking seals, gaskets, and cracks in gear housings. Check drum bushings for wear which may affect the operation of the unit. Cables should be free from dirt, rust, excessive wear, kinks, and broken strands and be properly reeled on the drum. See that sheave bearings and mountings are in good condition, and sheaves are not broken or worn to the point where cable damage will result. See that clutch and brake bands are not excessively worn.
	67	67	ADJUST. Check the adjustment of clutches and brakes in accordance with instructions contained in the equipment manual. See that control linkage, cams, and springs are correctly adjusted as specified in equipment manual.
			Drums, Sheaves, Cables
68	68	68	Inspect for good condition and proper functioning of these items.
	68		CLEAN cables and check them for flat spots, fraying, kinks, and excessive wear. Unserviceable cables should be replaced.
			Tie Rod, Linkage, Boots, and Seals
69	69	69	See that these items are in good condition, correctly and securely assembled and mounted.
	69	69	CHECK the adjustment of tie rods and all connections and adjust as specified in equipment manual, if necessary.
			Fulcrum Arms, Reach Arms, Linkage
70	70	70	See that these items are in good condition, correctly mounted, and operate properly.
	70	70	ADJUST these items according to the equipment manual.

FRAMES AND MOUNTINGS

Tires

76	76	76	Observe whether all valve stems are in good condition and in correct position and that all valve caps are present and installed securely.

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			Do not tighten with pliers. Examine all tires for cuts, bruises, breaks, and blisters, and any injuries extending to or into the cord body. Also examine for tires that are worn smooth in center of tread and those that show irregular wear and watch for any signs of flat spots, cupping, feather edges and one-sided wear. Any mechanical deficiencies causing such conditions should be determined and corrected or reported. The wheel positions of tires that are irregularly worn should be changed to even up the wear. Front tires worn irregularly should be moved to rear wheel positions. Record tire condition and pressures in space provided on WD AGO Form 464.
			Directional tires and nondirectional tires should not be installed on the same vehicle. Directional tires on rear wheels of all vehicles should be mounted so that the "V" of the chevron will point down when viewed from the front. Directional tires on all front wheels, with the exception of those on all trailer wheels, will ordinarily be mounted so that the "V" of the chevrons will point up when viewed from the front.
			MATCHING. With the tires properly inflated, inspect them to see if they are matched according to over-all circumference and type of tread.
			SPARE TIRE CARRIERS. See whether spare tire carriers are in good condition and secure. All rims and their lock-rings or flanges should be in good condition and secure.
	76	76	TIGHTEN all wheel rim flange or lug nuts securely.
	76		SERVE. With the tires properly inflated, measure the over-all circumference of all tires including spares. Select the tires to be mounted on duals or on driving axles, so that they will not have differences in over-all circumference exceeding the limits specified in current directives and bulletins. Mount all dual tires with the larger tire outside. The valve stem on the inner wheel should point out and the valve stem on the outer wheel should point in, and should be opposite each other.
			Note. The spares must be matched properly and mounted for use on one of the road wheels at intervals

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not exceeding 90 days. A convenient time to do this is during these maintenance services.

Caution: After performing the tire-matching service, do not reinstall the wheels until the wheel-bearing services are completed.

Fifth Wheel, Tow Hitch (Mountings, Locks)

77 77 77 Observe the fifth-wheel rocker plate and bed plate to see that they are in good condition, securely assembled, adequately lubricated, and properly mounted. Examine the king pin lock to see that it operates properly, locks securely, and that the king pin is not excessively worn. Observe whether or not tow hitch is in good condition and secure. Test the pintle and latch to see that they operate properly, are adequately lubricated, and whether the lock pin is attached with a chain. Pay particular attention to see that the spring is not broken and that the drawbar is not excessively worn.

77 TIGHTEN mountings thoroughly and adjust spring to proper tension.

Rear Wheels (Bearings, Mountings)

78 78 78 Inspect the wheels for good condition.
Inspect for looseness of the wheel-bearing adjustment. Revolve the wheels and listen for indications of dry or damaged wheel bearings. Inspect the drive flanges and around the brake supports and drums for lubricant or brake-fluid leaks.

Note whether drive flanges and nuts are in good condition.

78 78 TIGHTEN all drive flange nuts securely.

78 DISASSEMBLE the bearings and oil seals. Clean thoroughly and check the rollers, balls, races, and cages to see that they are in good condition, and that the cups are secure. If the cups appear to be in good condition, it is not necessary to remove them from the hubs unless the bearings must be replaced, in which case new cups should be installed. Also see whether the machined

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			surfaces upon which the bearings are assembled are in good condition.
	78		SPECIAL LUBRICATION. When all of the related items have been performed to the point where the wheel bearings are to be reinstalled, lubricate the bearings according to instructions on WDLO.
	78		After lubricating the wheel bearings, reassemble the hub and drum assemblies into place, and adjust the wheel bearings correctly according to vehicle manual instructions. After the bearings have been adjusted and the adjustment securely locked, the bearings should be neither loose nor tight enough to bind.
			Note. Proper adjustment of the wheel bearings is vital to the life of the bearings and lubricant retainer seals. If the bearings are adjusted too loosely, the lubricant retainer seals cannot seal properly for any extended period. If the bearings are adjusted too tight they are likely to become damaged. Be sure to rotate wheel while adjusting bearing.
			Front Wheels (Bearings, Mountings)
79	79	79	Serve as in item 78.
			Frame (Cracks, Welds, Alignment)
80	80	80	Inspect frame, brackets, side rails, and cross members to see that they are in good condition, secure, and correctly aligned. If the frame appears to be out of line, report the condition to proper authority.
			Front Axle Assembly
81	81	81	Inspect this assembly to see that it is in good operating condition, properly aligned, and adjusted.
	81	81	If inspection indicates adjustment is required, consult the equipment manual for detail instructions.
			Rear Axle Assembly
82	82	82	Serve as in item 81.
			Springs, Equalizers, Stabilizers (Brackets, Shackles, Mountings)
83	83	83	See that they are in good condition, correctly

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			assembled, and secure. Spring clips and bolts should be in place; spring leaves should not be shifted out of their correct position. This may be an indication of a sheared center bolt. Note whether the deflection of both springs is normal and approximately the same. Test the hangers and bolts for excessive wear by means of a pry bar.
	83		TIGHTEN all spring U-bolts securely and uniformly.

CRAWLER ASSEMBLY

Track Assembly (Plates, Links, Pins, Bushings)

87	87	87	Inspect assembly to see that all parts are secure and properly aligned. Particular attention should be given to track shoe mounting bolts and master pin to see that they are secure. Inspect track rail and track pins and bushings for excessive wear.
	87	87	REPLACE any broken or badly bent track shoes. Replace track assembly if it is excessively worn.

Idlers and Rollers (Springs, Bushings, Bearings, Seals, Shafts, Mountings)

88	88	88	Inspect these items for good condition, alignment, and secure mounting. Check track roller brackets, bearings, shafts, and seals for condition. See that track rollers rotate freely and that flanges are not excessively worn or broken. Track adjusting screws and springs must be in good condition to permit proper adjustment of track tension.

Track Tension

89	89	89	Check track tension in accordance with equipment manual.
	89	89	ADJUST. Adjust track tension in accordance with equipment manual.

Frame and Guards

90	90	90	Check these items for secure mounting and proper alignment.

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	90	90	If inspection shows any cracks or breaks, repair or replacement should be effected immediately to avoid possible further damage. Tighten all mounting bolts.

DRIVE SYSTEM

Transmission and Transfer Cases (Gears, Shafts, Bearings, Gaskets and Seals, Leaks, Oil Level)

93	93	93	Examine all transmissions to see that they are in good condition, securely assembled and mounted, and that their breathers are in good condition, secure, and not clogged. Observe whether there are indications of oil leaks from the case or seals, and whether the lubricant is up to the correct level.
			INSPECT the transfer unit to see that it is in good condition, securely assembled, and mounted. Note whether oil is leaking from the case or seals; also see that any provided vents are in good condition, secure, and not clogged.
	93		TIGHTEN all external assembly and mounting bolts and screws securely.
			REMOVE the breather, clean in dry-cleaning solvent, dry, and reinstall.

Drive Sprockets, Chains, Belts

94	94	94	Examine them for good condition and see that all their assembly and mounting bolts or cap screws are secure. Observe whether the sprocket teeth are excessively worn and whether the flange gaskets or oil seals are leaking lubricant excessively. If so, the sprocket should be replaced according to the instructions in the vehicle manual. Inspect chains for wear and broken or cracked links or rollers. New chains should not be installed on badly worn sprockets, and vice versa. Check the condition of drive belts and pulleys. On multiple "V" belt drives, see that all belts are matched as to general condition, size, and length.

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	94	94	ADJUST. Adjust the alignment of sprockets and pulleys, and tension of chains and belts as instructions in equipment manual.
			Master Clutch (Housing, Bearings)
95	95	95	Observe the operation of the master or primary equipment clutch and check adjustment. The clutch should engage and disengage freely, hold securely when engaged and not drag when disengaged.
	95	95	If inspection indicates that adjustment is required, adjust clutch in accordance with instructions in equipment manual. Be sure that free pedal or lever movement is set as specified. If clutch has reached limit of its adjustment, clutch facing must be replaced.
			Steering or Travel Clutch
96	96	96	These items cover friction type steering clutches as used on crawler type tractors and positive or jaw type steering clutches generally used on shovels, ditchers, loaders, etc. Friction type clutches should not slip when engaged, not drag when released, and respond readily to controls. Jaw type steering clutches must not be worn to a point where jaws are forced out under heavy loads, controls adjusted so jaws are either fully engaged or disengaged to insure efficient service.
	96	96	ADJUST. On friction type clutches, adjust the control lever and linkage so that the free lever movement when clutch is engaged is as specified in equipment manual. Jaw type clutch controls should be so adjusted that the driving faces are fully engaged or released. See equipment manual for instructions.
			Jaw or Pin Clutch
97	97	97	Adjust and service as in item 96.
			Operating Clutches (Hoist, Crowd, Swing, Boom, Drive)
98	98	98	This item covers not only the operating clutches,

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			but also clutch booster or energizing clutches. Check these items for correct operation and general condition. Inspect lining for wear and replace before rivets damage drums. Check fulcrum arms, pins, links, and anchors for alignment and wear.
	98	98	If inspection of fulcrum arms, pins, links, and anchors shows misalignment or excessive wear, repair or replacement should be made immediately.
	98	98	REMOVE any oil or grease from clutch lining by washing with dry-cleaning solvent. In some instances, removal of the band assembly may be necessary to clean properly. Bands which are oil saturated and glazed or do not hold should be cleaned by a rough file or rasp.
	98	98	ADJUST. Adjust clutches in accordance with equipment manual. Note that some clutches require different adjustment for various types of operation.
			Service Brake
99	99	99	Apply brakes sufficiently to stop the equipment in minimum distance, observing their effectiveness. Note whether equipment pulls to one side, observe any unusual noises, pedal travel and feel, and pull-back spring action. On air brakes, also operate the brake hand-application valve to see that it functions properly and is securely mounted and connected.
	99	99	ADJUST. If operation indicates adjustment is necessary, adjust in accordance with instructions in equipment manual. Linings must be replaced before rivets damage brake drums.
			Emergency Brake
100	100	100	Apply emergency brake, and observe whether it holds the equipment effectively, that the application lever has at least one-third of its travel in reserve, and that the ratchet and pawl latch the applied brake securely.
	100	100	ADJUST. If operation indicates adjustment is

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			necessary, adjust in accordance with instructions in equipment manual. Linings must be replaced before rivets damage brake drums.
			Steering or Travel Brake
101	101	101	These items cover friction type steering brakes as used on crawler type tractors and similar equipment which operate independently or are connected with the operation of steering clutches. See that these items hold securely when fully applied.
	101	101	ADJUST. If operation indicates adjustment is necessary, adjust in accordance with instructions in equipment manual. Linings must be replaced before rivets damage brake drums.
			Operating Brakes (Hoist, Crowd, Swing, Boom, Drive)
102	102	102	Check these items for correct operation and general condition. Inspect lining for wear.
	102	102	Lining must be replaced before rivets damage drums. If inspection of fulcrum arms, pins, links, and anchors show misalignment or excessive wear, repair or replace. Remove any oil or grease from brake lining by washing with cleaning solvent. In some instances, removal of the band assembly may be necessary to clean properly. Bands which are oil saturated and glazed or do not hold should be cleaned by a rough file or rasp.
			ADJUST. Adjust all operating brakes in accordance with instructions contained in equipment manual. Note that brakes are to be adjusted only tight enough to hold the maximum anticipated load.
			Primary Drives (Gears, Chain, Belt, Housing)
103	103	103	See that these items function properly, are secure, and properly adjusted. Pay particular attention to the alignment of sprockets or pulleys. Inspect housings carefully for proper mounting, lubricant level, condition of seals, gaskets, and assembly bolts and capscrews are tight. Inspect

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			inclosed gears, sprockets, and chains for excessive wear. In some instances, this will require partial disassembly for proper inspection.
	103	103	ADJUST in accordance with equipment manual instructions.
			Bevel Gears and Pinions (Cases, Gaskets and Seals, Leaks)
104	104	104	This item covers gears and pinions in intermediate mechanism. Check inclosed and exposed drive gears and pinions for general condition, proper operation, and lubrication.
	104		CHECK the adjustment of these items as instructed in the equipment manual.
			Bearings and Shafts (Gaskets and Seals)
105	105	105	These items cover bearings and shafts in the intermediate mechanisms. See that all bearings are securely mounted and properly adjusted and aligned with shafts. See that shafts are not bent or twisted, and properly aligned with the drivers.
			Tandem Drive (Chains, Gears, Cases, Gaskets, and Seals)
106	106	106	This item covers either chain or gear type tandem drives. Observe the general condition. Inspect the housing for lubricant leaks, loose mounting, or assembly bolts, cracks or breaks, and alignment. Inspect bearings, gears, sprockets, and chains for wear and adjustment.
	106		ADJUST tandem drive assemblies according to equipment manual.
			Final Drive (Housing, Chains, Seals and Gaskets, Bearings, Leaks, Oil Level)
107	107	107	This item covers inclosed gear or chain type final drives as used on tractors, pavers, trucks, and similar items, as well as open gear or chain type final drives such as used on rollers, shovels, loaders, and other slow-moving items.
			INSPECT for lubrication level and leaks, secure

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	107		mounting, and assembly bolts, excessive wear, alignment, and adjustment. ADJUST these items as covered in equipment manual.

Drive Shafts and U-Joints

108	108	108	Be sure that these items are in good condition, correctly and securely assembled and mounted; that the universal joints are properly aligned with each other and are not excessively worn; that the slip joint is free, not excessively worn, and well lubricated; and that the seals of the universal joints and slip joint do not leak.
	108		TIGHTEN all universal joint assemblies and companion flange bolts equally and securely.

Travel Lock

109	109	109	This item is used on crawler mounted cranes and shovels. See that the lock functions properly and is not excessively worn.

MISCELLANEOUS ITEMS AND ASSEMBLIES

General

Hoist Assembly (Drum, Lagging, Gears, Belts, Chains, Cables, Shafts, Bearings, Seals)

115	115	115	See that these items are in good condition, properly aligned, and function satisfactorily. Pay particular attention to drum bearings or bushings for excessive wear and see that seals are in good condition. See that the correct lagging is being used for the particular type of operation. See that hoist cables are not kinked, frayed, nor excessively worn and that there are no flat spots.
	115	115	TIGHTEN all mountings securely.

Bearings and Shafts

116	116	116	This item covers bearings and shafts in secondary or miscellaneous drives. See that all bearings are securely mounted and properly adjusted and aligned with shafts. See that shafts

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			are not bent or twisted, and properly aligned with the drivers.
	116	116	TIGHTEN all mountings securely.

Belts, Rollers, Frame

117	117	117	This item covers conveyor assemblies on loaders, graders, ditchers, etc. See that these items are in good condition, operate properly, and all parts are securely mounted. On belt type conveyors, see that conveyor belt rides correctly and rollers turn freely.
			CHECK condition of belt splices.
	117	117	ADJUST. Adjust belt tension according to equipment manual and see that belt rides correctly after adjustment is made.
	117	117	TIGHTEN. See that all frame bolts and roller bolts are in place and tight.

Boom or Mast Assembly (Structural, Cables, Sheaves, Pins, Bushings)

118	118	118	Inspect these items for general condition. See that members are not bent, all rivets and bolts are in place and tight. Inspect sheaves for excessive wear or broken flanges which might damage cable. See that bushings and pins are not excessively worn and pin retainers are secure. Inspect boom cables for wear, flat spots, kinks, broken or frayed strands. Replace before there is danger of breakage.
	118	118	TIGHTEN all mountings securely.

Buckets, Chains, Sprockets, Frame

119	119	119	These items generally cover bucket type elevators, etc. on ditchers, loaders, rock crushers, asphalt plants, and similar equipment. Check for general condition and alignment of assembly, excessive wear or drainage of buckets, teeth, chains, rollers, and sprockets. See that all frame bolts and rivets are in place and tight.
	119	119	ADJUST as specified in equipment manual.

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			Center Pin or Gudgeon (Bushings, Adjustment Nut, and Lock)
120	120	120	This item covers the center pin or equivalent on revolving shovels or cranes. See that these parts are securely mounted, properly adjusted, locked, and not excessively worn.
	120		ADJUST. Adjustment should be made in accordance with instructions in equipment manual. Be sure that center pin flange mounting bolts or cap screws are tight.
			Cleaners (Various)
121	121	121	This item covers a wide variety of cleaners, such as conveyor belt cleaners, air line or hydraulic system cleaners, or screens, etc. Inspect for good condition, cleanliness, and security and satisfactory operation.
	121	121	CLEAN AND SERVE. See equipment manual for frequency and method of cleaning.
			Crowd Assembly (Drums, Sprockets, Chains, Cable, Gears, Bearings)
122	122	122	Inspect these items for proper operation. See that sprockets or gears are securely mounted, properly aligned, and not excessively worn. See that crowd chains are properly adjusted and not excessively worn. Inspect crowd cables for proper adjustment, wear, flat spots, kinks, and frayed or broken strands.
	122	122	REPLACE cables if condition is questionable.
	122	122	ADJUST. The adjustment of the chains or cables is to be made as specified in the equipment manual.
			Dipper, Dragline Bucket, or Clamshell (Pins, Sheaves, Bushings, Chains, Cables)
123	123	123	Inspect these items for general condition. Note any excessive wear, worn or missing teeth, cracks, and loose or missing bolts or rivets. Inspect sheaves for wear or broken flanges which may damage cable. Inspect bushings and pins for wear and pin retainers.

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	123		See that shovel, dipper, and dragline bucket are adjusted properly for efficient operation.
			Cutting Edges, End Bits, Teeth
124	124	124	These items cover these parts of dozers, graders, scarifiers, rooters, ditchers, shovels, draglines, snow plows, scrapers, and similar equipment. See that these items are not lost or broken, are securely mounted and not excessively worn.
	124	124	TIGHTEN. Cutting edges, end bits, and teeth must be reversed or replaced when excessively worn to prevent wear on the base of the shank. Tighten these items securely.
			Dipper Trip or Tagline Assemblies (Drum, Cylinders, Sheaves, Guides, Lining, Bearings, Cables)
125	125	125	Inspect these items for proper operation, wear, and adjustment.
	125		ADJUST dipper trip or tagline according to instruction in equipment manual.
			Drives, Bearings, Shafts
126	126	126	This item covers drives, bearings, and shafts such as travel shafts, and propel shafts on shovels and cranes. See that all bearings are securely mounted and properly adjusted and aligned with shafts. See that shafts are not bent or twisted, and properly aligned with the drivers.
			Drums, Sheaves, Cables (Safety Guards, Bearings, Guides)
127	127	127	See that these items are in good condition and function properly. See that cable and drum guards or shields are in place and securely mounted. Check drum bearings or bushings for excessive wear and condition of seals.
			Pile Driver Hammer, Leads, and Guides
128	128	128	Inspect pile driver leads and see that guides are

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			not bent and are securely mounted. See that air or steam operated hammers are lubricated and all bolts are kept tight.
	128	128	SERVICE air or steam operated hammers as specified in equipment manual.
			Power Take-Off Unit
129	129	129	See that this item functions properly, is securely mounted, and correctly adjusted. Check seals and gaskets for leaks.
	129	129	TIGHTEN all mounting bolts securely.
			Shipper Shaft and Saddle Block Assembly (Bearings, Wearing Plates, Guides)
130	130	130	Inspect these parts for excessive wear and adjustment. Check the clearance between dipper stick and saddle block assembly. See that gears and sprockets are securely mounted on the shaft and are not excessively worn. Shipper shaft bearings must be correctly adjusted and securely mounted.
	130		This assembly must be adjusted as specified in the equipment manual.
	130	130	TIGHTEN all mounting bolts securely.
			Sticks and Racking (Cracks, Welds, Alignment, Green Horns)
131	131	131	Inspect these items for general condition and alignment. Note any cracks or breaks, loose bolts, or rivets in sticks and loose or broken racking. See that green horns or stops on sticks are in good condition and secure.
	131	131	TIGHTEN all mounting bolts securely.
			Swing Assembly (Gears, Circle, Roller Path, Pins, Rollers, Shafts, Bearing, Seals)
132	132	132	Observe operation of these items with particular attention to the condition of gears, jaw clutches, and seals. Inspect roller bearings, shafts, and surface of rollers for wear and see that rollers rotate freely. Roller path must be clean and smooth.

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	132	132	TIGHTEN all mounting bolts securely.
			Swing Lock (Pins, Spring, Linkage)
133	133	133	See that these items operate properly and are not excessively worn.
			Tanks, Receivers, Intercoolers (Caps, Lines, Filters, Screens, Mountings)
134	134	134	This item covers various water, air, fuel, asphalt, and other tanks as well as receivers, and intercoolers on various types of equipment. Inspect these items for general condition. These items must be drained of any accumulation of oil, or water, and exterior of intercooler must be clean. See that all lines, connections, and valves do not leak and are securely mounted. If air receivers, or other pressure tanks show signs of damage, these items should be pressure tested to see that they are safe to use.
	134		CLEAN. Clean tanks, receivers, and intercoolers according to instructions in equipment manual.
			Winch (Clutch, Brake, Cable, Seals and Gaskets, Mountings, Shear Pin)
135	135	135	Observe whether these items are in good condition, correctly assembled, and secure. Check the operation of the entire unit and see that brakes hold securely. Check the alignment of the sprockets, shafts, or joints for excessive wear. Check the shear pins on units so equipped to see that the proper pins are being used. Inspect the cable for excessive wear, flat spots, kinks, and frayed or broken strands.
	135	135	REPLACE the cable if unserviceable.
	135		ADJUST the clutches and brakes as instructed in equipment manual.
			COMPRESSORS
			Air Tools and Accessories (Air Lines, Connections)
141	141	141	See that air tools operate properly, do not leak,

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			and are in good condition. See that air hose sections are in good condition and that connections are tight and do not leak.
	141	141	CLEAN. Test tools for proper operation by running them slowly for a few minutes. See that tools are properly lubricated and cleaned after testing. If tool fails to operate properly, disassemble and clean. Replace any worn or broken parts. See equipment manual for instructions.
			Intercooler, Relief Valve Assembly (Safety Valve, Lines, Leaks)
142	142	142	Inspect the intercooler for general condition. See that it is securely mounted and that lines and connections are in good condition and do not leak. See that air passages are clean and not damaged. See that relief valve assembly functions properly.
	142		CLEAN. Clean intercooler and relief valve assembly according to instructions in equipment manual.
			Lines Oilers
143	143	143	See that lines oilers are functioning properly and are in good condition.
			Valves (Inlet, Discharge)
144	144	144	Inspect these items for proper operation. If compressor builds up to maximum air pressure slowly, or fails to deliver rated volume of air, or shows an air blow-back through air cleaners, it indicates valves may be defective and require servicing.
	144	144	When necessary to service these valves, see instructions in equipment manual.
			Unloaders
145	145	145	Check operation of unloader valve. Unloader should cut out when maximum rated air pressure is attained and cut in when air pressure drops approximately 10 pounds. See that unit

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			is securely mounted and that lines and connections are in good condition and do not leak.
	145	145	If unloader fails to function properly, clean, service, and adjust as specified in equipment manual. Replace any worn or damaged parts.

CRUSHERS

Eccentric Shaft or Sleeve

149	149	149	These items include eccentric shafts used on jaw crushers and the sleeve type eccentric used on gyratory crushers. Inspect for wear and proper alignment.

Bearings (Main, Pivot, Eccentric)

150	150	150	Inspect these bearings for wear and general condition. See that gaskets and seals do not leak.
	150	150	If reports indicate that bearings have become excessively hot during operation, or if power plant has been operated overloaded, bearings may have been damaged or become defective or excessively worn. Inspect to determine condition and if unserviceable. Adjust or replace as required.
	150		CLEAN, repack with lubricant according to instructions on WDLO, and adjust or replace as specified in equipment manual.

Hammers, Jaws, Lining Plates, Rolls

151	151	151	Inspect these items for wear and secure mounting. These parts must be replaced before damage results to the mounting base. Excessively worn jaws, rolls, or hammers will reduce the efficiency of crushers. On gyratory type crushers check mantle and concaves for wear, condition, and mounting. If these items show signs of looseness, they must be reset.
	151	151	TIGHTEN all mounting bolts securely.

Hammer Links

152	152	152	See that these are in good condition, not excessively worn, and properly secured. If mounting

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			bolt holes are elongated the links should be replaced.
	152	152	TIGHTEN all mounting bolts securely.
			Screens and Drives
153	153	153	Inspect for wear, proper mounting and operation. Check for proper alignment of all items, and see that bolts and rivets are in place and secure.
	153	153	TIGHTEN all mounting bolts securely.
			Toggle Plates and Seats
154	154	154	Inspect these items for wear, cracks, or breaks. See that toggle plate tension spring is properly adjusted. See that wedges and ways are secure, and not excessively worn.
			Bins and Chutes
155	155	155	Check these items for general condition and operation. See that all braces are in place and all bolts and rivets secure. Inspect operation of gates and controls.
	155	155	TIGHTEN all mounting bolts securely.

DISTRIBUTORS

			Burners
158	158	158	Check burner, fuel, and air supply. See that burner tips are in good condition and all accessories are secure. Observe operation of burner.
	158	158	CLEAN. Remove cleaner elements and service according to instructions on WDLO. Reassemble the cleaner and install on blower. If burner flame pattern is irregular, remove any carbon deposits from the tips. Remove and clean burner fuel strainer. Adjust air supply and stack dampers to provide efficient combustion.
			Heater Flues
159	159	159	Inspect heater flues for leaks and general condition. Do not operate burners if a trace of asphalt is leaking into flues.

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			Spray Bars and Piping
160	160	160	Inspect these items for correct assembly, leaks and bent or broken parts. See that joints and couplings operate properly and all nozzles are in place and open. Inspect the condition and adjustment of spray bar support rods or chains.
	160	160	TIGHTEN all mounting bolts securely and adjust pin spot rods or chains if necessary.
			Tank (Mounting)
161	161	161	See that tank is in good condition and securely mounted. Inspect tank filler cover or manhole, gasket, and fastening device. See that tank valves and pipe are securely mounted and do not leak. Observe the condition of the tank jacket and hand rails.
			DOZERS
			"A" Frame or Yoke
165	165	165	Inspect these items for general condition. Check for alignment, breaks, or cracks, and excessive wear of pin holes and brackets. See that all bolts are in place and tight. Repair cracks as soon as possible.
	165	165	TIGHTEN all mounting bolts securely.
			Moldboard (Pins, King Pin, Pivot Socket, Bolts)
166	166	166	Inspect these parts for excessive wear and general condition. See that all mounting bolts are tight and pin keepers are in place. Inspect end bit and cutting edge mounting base for wear and cracks. If running shoes are being used, see that they are securely mounted and not excessively worn. Repair any cracks or breaks as soon as possible.
	166	166	TIGHTEN all mounting bolts securely.
			Lift Arms
167	167	167	See that lift arms are not bent and connecting pin holes and bearings are not excessively worn.

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			Side Arms (Mounting, Pins, Ball and Socket)
168	168	168	Check side arms for alignment and see that connecting pin holes are not excessively worn.

GENERATORS

			Armature, Commutator, Slip Rings (Brushes, Holders, Bearings)
172	172	172	Check armature bearings for wear and lubricant seals for leaks. See that armature and all circulating air passages are free of excess dust, oil, or grease. Check condition of slip rings or commutator and see that brushes are in good condition, properly fitted, and that brush holder is secure. See that all connections are tight.
	172		If commutator or slip rings are corroded or oil or grease are present, clean these items by burnishing or polishing with heavy canvas on a block of wood. Use 00 sandpaper on scored or pitted commutators or slip rings which cannot be made smooth by polishing with heavy canvas.
			Controls, Switch Gear, Wiring
173	173	173	Observe the operation of controls and switch gear for proper functioning. See that all parts are correctly and securely mounted and all electrical connections are tight.
	173	173	TIGHTEN all mounting bolts securely.
			Drive Coupling
174	174	174	See that drive coupling is secure on the shaft, not excessively worn, and that assembly bolts are tight. Inspect coupling disk for cracks and frayed or elongated bolt holes.
	174	174	TIGHTEN all mounting bolts securely.

MIXERS

			Drums (Mixing Flights, Discharge Chutes)
178	178	178	Inspect these items for general condition as to

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			wear and mounting. See that discharge chute functions properly and is securely mounted.
	178	178	CLEAN. Clean mixing flights and discharge chutes thoroughly in accordance with instructions in equipment manual. Tighten all mounting bolts securely. Repair or replace any excessively worn or missing mixing flights.
			Trunnion Rollers and Bearings
179	179	179	See that rollers are smooth, rotate freely, and bearings or shafts are not excessively worn. Inspect all bearings for wear and see that seals are not leaking.
			Skip
180	180	180	Observe operation of skip and note whether or not the automatic clutch throwout (if so equipped) functions properly.
	180	180	CLEAN. Clean the skip thoroughly in accordance with instructions in equipment manual. Repair or replace any bent or broken members.
			PUMPS
			Pistons, Impeller, Diaphragm
183	183	183	This item covers reciprocating, centrifugal, and diaphragm pumps for handling water, road oil, gasoline, etc. Check for wear, secure mounting, and proper functioning of parts indicated.
			Shaft (Impeller or Crank)
184	184	184	This item covers pump shafts used in the different type pumps covered in item 183. Inspect for alignment and excessive wear.
	184	184	TIGHTEN all mountings securely.
			SCRAPER
			Cantilever Yoke Assembly
187	187	187	Inspect this assembly for general condition, alignment, and for wear at pin connecting points.
	187	187	INSPECT for cracks or signs of breakage and repair as required.

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			Tail Gate
188	188	188	Inspect tail gate for proper operation. See that guide rollers are not excessively worn and maintain the gate in proper alignment. See that tail gate return mechanism functions properly and cable is in good condition.
	188	188	INSPECT for cracks or bent members and repair if necessary.
			Apron
189	189	189	Observe the operation of the apron. The apron should close properly without binding. See that cable and sheaves are in good condition.
	189	189	INSPECT for cracks or breaks and repair if necessary.
			Push Beam
190	190	190	See that push beam is not bent or twisted and sheaves and cable are in good condition.
			Spring and Stop Blocks
191	191	191	See that all springs operate properly and that stop blocks are secure.
	191	191	TIGHTEN spring and stop blocks securely.

WATER PURIFICATION UNIT

			Hose and Connections
195	195	195	Inspect all hose and connections for general condition. Note any dents in metal reinforced hose. These dents can not be removed and if the rubber inner lining is damaged, the hose should be replaced. See that all connections function properly and do not leak.
	195	195	TIGHTEN hose couplings if loose and use caution to prevent damage or stripping of threads. Too much pressure will damage the gasket and result in permanent leak.
			Chlorine Cylinders or Bag
196	196	196	See that chlorine cylinders are securely

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			mounted and inspect valves, lines, and fittings for leaks. See that chlorine bags are in good condition and do not leak.
	196	196	If cylinder valve or fusible plug leaks, replace the cylinder.
			Pressure Regulator (Chlorine)
197	197	197	This item covers the compensator and back pressure valve which control the pressure and flow of chlorine from the cylinder. See that these items are clean, in good condition, and securely mounted. Check lines and connections to see that they are in good condition and all connections tight.
	197	197	CHECK these items and their lines and connection for chlorine leaks by passing an open ammonia bottle around the joints. Leaks will show by forming a white smoke. If leaks are detected, see that deficiencies are corrected. If joints or connection show signs of corrosion, clean thoroughly with carbon tetrachloride (carbona), chloroform, or wood alcohol. If these units fail to operate properly, service or replace as instructed in equipment manual. Tighten mountings securely.
			Chemical Feed Equipment (Soda Ash, Alum)
198	198	198	See that these items are in good condition and securely mounted. Examine covers and cover gasket to see that they fit tightly. See that the inside of pots are clean and in serviceable condition. Check lines and connections for damage and leaks.
	198	198	CORRECT all deficiencies that are found during inspection, clean parts thoroughly, and tighten all mountings securely.
			Chlorine (Test, Feed)
199	199	199	This item covers the comparator and the hypochlorinator unit. See that these items are in serviceable condition. Check the hypochlorinator to see that it functions properly and regu-

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			lates the injection of chlorine correctly. See that the comparator is clean and test tubes present.
	199	199	If hypochlorinator fails to function properly follow instructions in equipment manual for servicing, repairing, or replacing.
			Filter Control Valve.
200	200	200	See that valve or valves operate properly and lines and connections are in good condition and do not leak.
	200	200	REPLACE valve or valves if defective.
			Filter Material and Tank
201	201	201	See that tank is in good condition, cover and gaskets fit tightly, and connections, lines, and valves do not leak. See that all cover bolts are secure. Check for adequate supply of filter material and add if necessary.
	201	201	TIGHTEN all loose bolts and mountings thoroughly.
			Water Storage Tanks
202	202	202	Check bottom of canvas water storage tank for mildew and deterioration.
	202	202	DRAIN AND THOROUGHLY CLEAN the storage tanks and allow to dry in air and sunlight with the tank inverted. When thoroughly dry, treat the tank with canvas preservative, exercising care to see that the tank is mounted on a dry footing and one which will insure a maximum circulation of air around the bottom of the tank.

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SECTION IV

COMMAND INSPECTIONS

19. General

The command inspection is a function of all commanding officers. It should be performed frequently enough to make the commander thoroughly familiar with the efficiency of motor maintenance and operation within his unit. Faults discovered during command inspections can be corrected effectively, however, only when a definite maintenance policy as outlined in AR 850–15, FM 25–10 and this manual is carried out faithfully in the unit.

20. Purpose

Command inspections are performed by commanding officers to determine the general condition and efficiency of the personnel and equipment in their organizations. While these inspections need not be based on close technical familiarity with the motor vehicle, they still should be thorough enough to reveal major faults and cases of neglect and carelessness; they should enable the inspecting officer to fix the responsibility for defects noted in maintenance and operation, as well as to discover outstanding performances on the part of the operating personnel which deserve awards of merit.

21. Scope

Since command inspections are not technical in nature, and are not necessarily routine, they do not take the place of preventive maintenance services, spot-check, and technical inspections. During a command inspection it is possible to determine the efficiency of personnel training, the adequacy of the maintenance and operation policy of the unit, and the extent to which the policy is being followed. These inspections bring to light any need for change of policy or methods of instructions, or the need for any additional instruction. Finally, the commander can observe the presence and condition of tools and accessories, and the ability of the vehicles

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to perform their tactical mission without attention of higher echelon. In order to accomplish this, various types of inspections may be used. Command inspections may be either of the formal or informal type, or may take the form of a spot check.

22. Formal Command Inspections

a. These inspections are performed on all vehicles of the unit at intervals determined by the commander.

b. PREPARATION. An order should be issued far enough in advance to allow for preparation of the vehicles, as follows:

(1) Vehicle tools and accessories should be laid out in an orderly manner.

(2) The vehicle compartments should be opened to facilitate inspection.

(3) The vehicle driver or crew should be stationed in an orderly fashion adjacent to the vehicle.

c. PROCEDURE. The inspector should follow a logical sequence around each vehicle, similar to the order employed in the inspection of a soldier's individual equipment.

Note. General conditions such as tightness, lubrication, servicing, cleanliness, and adjustment may be observed as the inspector reaches them in his routine.

Procedure at each vehicle may follow this suggested outline:

(1) Inspect equipment and tools.
(2) Inspect and question the driver and crew.
(3) Inspect the tires or tracks and chassis.
(4) Inspect the engine and accessories.
(5) Inspect the steering, cab interior, and engine starting.
(6) Inspect the vehicle body.

d. STANDARDS. The following general standards may be applied during command inspections, as well as during spot-check and technical inspections. For a definition of these terms, see paragraph 14.

(1) Adequately serviced.
(2) In good condition.
(3) Secure.
(4) Not excessively worn.
(5) Clean.
(6) Adequately lubricated.
(7) Correctly assembled.
(8) Correctly adjusted.
(9) Not leaking.

e. INSPECTING PARTY. (1) The inspecting party of a company may consist of the commanding officer; the first sergeant, acting as recorder; the motor officer and the motor sergeant, act-

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ing as technical assistants. Each member of the party could be assigned certain items or sections of the vehicle for inspection, reporting the condition to the first sergeant for record.

(2) Inspection parties of battalions, regiments, or larger units may consist of the commanding officer, or his appointed staff representative, and other appropriate staff officers in sufficient number to carry on the inspection in a minimum of time.

f. USE OF FORMS. WD AGO Forms 9–68 and 9–69 and WD AGO Forms 461, 462, 463, and 464 may be used as check lists for items to be inspected during command inspection. Pertinent information may be obtained from the vehicle manual or from section III of this manual.

g. Upon completion of the inspection, all findings should be compiled and studied. This information may serve as a basis for determining the over-all operating condition in the organization. Steps may be taken by the commanding officer to arrange for any indicated improvements, and to insure that the maintenance and operation of the motor vehicles within the unit conform with current regulations and standard practices.

23. Informal Command Inspections

a. GENERAL. These inspections are made by commanders at any opportune time, usually without prior notice to the operators of the vehicles. They should be performed continually wherever and whenever the opportunity arises. Very often the informal command inspection may be of considerably greater value than the formal inspection. It can provide an indication of the actual condition of the vehicle during operation and of the proficiency of the operating personnel. Improper operating practices and malfunctioning of the vehicles may be detected promptly and appropriate directive action taken immediately.

b. PURPOSE. Like the formal command inspection, the informal inspection aims to determine the proficiency of the operating personnel, the condition of the vehicle, and the security of the load.

c. CLASSIFICATION. Informal inspections can be divided into three general classes according to the occasion upon which they are inspected:

(1) *Vehicles parked.* The commander may inspect vehicles parked in their usual positions in the motor park to observe whether or not the vehicle has been adequately protected from the elements, any evidence of vehicle abuse, and general serviceability of the vehicle.

(2) *Vehicles halted on road.* The commander may halt his vehicles on the road when the opportunity arises without prior

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announcement, and inspect them for proper loading and servicing, tire pressure, lubricant level, fuel supply, tightness, and security of trailer loads. He may question the driver on such required information as hand signals, maximum speeds, proper use of controls, and similar procedures. He may require the driver to show his driver's permit, vehicle manual, Lubrication Order, the vehicle tools, and equipment. In this inspection, the commander could determine the condition of the vehicle during actual operation and observe the proficiency of the driver.

(3) *Vehicles moving.* The inspecting officer may obtain important information in regard to the maintenance and operation standards in his organization by observing his vehicles as they pass by on the road. Careful observation may often disclose defects or malfunctions which might otherwise be overlooked. A station, either near the top or at the bottom of a sharp hill, is most advantageous for this purpose.

(*a*) *Approaching inspector.* The inspector may obtain valuable information while observing vehicles as they approach him. He may then watch the driver, noting his position, his attention to his job, his manner of operating the vehicle, that is, his steering, engine velocity, gear shifting, and his consideration for other vehicles on the road. The vehicle itself may be observed for malfunctioning parts, such as wobbling wheels, sagging springs, incorrectly inflated tires, incorrectly aligned or missing headlights, rear view mirrors, and other accessories.

(*b*) *Moving away from inspector.* As the vehicle passes the inspector, he may listen for unusual engine noises and speeds. Other noises, such as excessive gear noises, unusual squeaking emanating from propeller shaft universal joint, wheel bearings or similar units, indications of smoke from the exhaust, leakages of various fluids, or foreign matter dragging under the vehicle carriage. After the vehicle has passed, he may observe whether the pintle is operating and locking properly, and whether the safety valves are in position. He may notice whether loads are placed properly and securely, and whether there are any indications of shifting.

24. Spot-check Inspections

a. PURPOSE. Spot-check inspections are made by a staff officer or his representative at any time on motor vehicles and maintenance equipment selected at random, as a means of improving the general efficiency of automotive maintenance and training. The objective may be accomplished by calling attention to deficiencies or irregularities noted, and by advising the interested personnel

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on the performance of their duties in a more efficient manner.

b. WD AGO FORM 9–68. This form, "Spot Check Inspection Report for Wheeled and Half-Track Vehicles," and WD AGO Form 9–69 for "Full-Track and Tanklike Wheeled Vehicles" furnished to serve as a record of such unannounced checks. The findings of the spot check inspections as recorded on this form will furnish the unit commander with a guide as to the status of maintenance in his organization.

c. PROCEDURE. (1) *Spot-checks* should be carried out as informally as possible without prior warning to the unit concerned. Since they are performed at irregular intervals, they should not interfere with the normal routine of the scheduled preventive maintenance services of the first and second echelons or with technical inspections. (See secs. II and III.) The spot-check inspection may be as detailed as time permits, or as brief as the officer considers necessary. For detailed procedures on specific items of inspection, section III may be consulted.

(2) *WD AGO Forms 9–68 and 9–69* list a group of items for inspection under main headings of vehicle maintenance that provide for team inspections, each member of which works concurrently with the others without interference. However, the items under these headings are listed merely as suggestions. Any other suitable item may be decided upon by the officer performing the check and entered in the blank spaces on the form.

(3) *Markings.* If an item is found satisfactory, place a (√) mark in the corresponding box on the form; if it needs adjustment, mark X; if it needs repair or replacement, mark XX. Any items marked X or XX should be explained under REMARKS opposite the item and a general statement on reverse side of form.

(4) *Follow-up.* After these forms are filled out, they are to be sent to the commanding officer or other officer designated by him for follow-up. They will provide an over-all view of the level of efficiency in the organization and may be used as a basis for any necessary improvements or modifications in maintenance and training.

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SECTION V

NEW VEHICLE RUN-IN TEST

25. Purpose

When new or reconditioned vehicles are received, it is necessary for second-echelon personnel of using organizations to determine whether the vehicles will operate satisfactorily when placed in service. For this purpose, they are required to inspect all parts, subassemblies, assemblies, tools, and equipment to see that they are in place and correctly adjusted. In addition, they will perform a run-in test on all vehicles, except trailers, of at least 50 miles, as specified in AR 850–15.

26. Correction of Deficiencies

Deficiencies disclosed during the course of the run-in test will be treated as follows:

a. Any deficiencies within the scope of the maintenance echelon of the using organization will be corrected before the vehicle is placed in service.

b. Deficiencies beyond the scope of the maintenance echelon of the using organization will be referred to a higher echelon for correction.

c. Deficiencies of serious nature should be brought to the attention of the supplying organization.

27. Run-in Test Procedure

a. PRELIMINARY SERVICE. (1) *Fire extinguisher.* See that extinguisher is present and fully charged. On tanks and tanklike wheeled vehicles, check the lines, and see that nozzles are correctly aimed in engine compartment.

(2) *Fuel, oil, and water.* Check coolant level and value of antifreeze. Fill and allow for expansion. Also fill fuel tank and allow for expansion. Check engine oil level.

Caution: If there is a tag attached to the oil filler cap concerning contents of crankcase, follow the instructions on the tag before starting the engine, when item 21 is reached.

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(3) *Fuel filters.* Remove drain plug and allow water and sediment to drain out of bowl. On Cuno-type filters turn handle one complete turn.

(4) *Battery.* Make hydrometer test, and add water if needed. Check terminal connections and bolts. Read voltmeter to see that nominal voltage is indicated.

(5) *Air-brake tanks.* Drain air-brake reservoir tanks. Close valves.

(6) *Air cleaner and breather caps.* Inspect for oil level and cleanliness.

(7) *Accessories and belts.* Examine all accessories for security of mounting and adjustment of belts.

(8) *Electrical wiring.* Examine all accessible wiring for chafing, cracking, and looseness of connections.

(9) *Tires and/or tracks.* Gauge all tires. Remove nails, glass, or stones from threads and objects between duals. (If tires are hot, do not reduce pressures.) Check tracks for bent guides, loose wedge nuts, and improper track adjustment.

(10) *Wheel and flange nuts.* Be sure they are all present and secure.

(11) *Fenders and bumpers.* Examine fenders and bumpers for condition and security.

(12) *Towing connections.* Inspect towing hooks, truck tractor fifth wheel, or pintle hook for looseness or damage.

(13) *Body and tarpaulin.* Inspect these items for damage and presence of ropes.

(14) *Armor and front roller.* Inspect all armor, door, and windshield armor shields, compartment doors, peep-hole and pistol-port covers, and radiator shutters for good condition and security. See that front roller can be revolved.

(15) *Vision devices.* On combat vehicles, be sure they are all present, in good condition, and securely stowed or mounted.

(16) *Lubricate.* Lubricate according to Lubrication Order or vehicle Technical Manual. Perform services 17 to 20 during lubrication.

(17) *Springs and suspensions.* Inspect springs for sag, broken or shifted leaves, loose, rebound clips, eyebolts, U-bolts, and shackles. Inspect bogie frame and arms, upper and lower rollers, and tires for looseness or damage. Inspect sprockets and idler wheels for loose mounting and assembly bolts, and loose spring-loaded idler lock nuts. Look for oil leaks at seals or gaskets.

(18) *Steering linkage.* Inspect steering linkage for loose or damaged parts.

(19) *Propeller shafts, center bearing, and vent.* Check these

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items for loose mountings, connection, and blocked vents.

(20) *Axle and transfer vents.* See that axle and transfer case vents are present and not clogged.

(21) *Engine warm-up.* Investigate presence of gas fumes in hulls of amphibians, tanks, and tractors. Ventilate thoroughly if present, and trace source of any leaks. Start engine and run at fast idle. On radial engines, hand-crank to check for hydrostatic lock.

(22) *Choke or primer.* Observe operation, and reset as required to prevent overchoking.

(23) *Instruments.* Observe oil pressure. If gauge fails to register within 30 seconds, stop engine. Ammeter should show high charge immediately after starting, then return to zero or slight positive (+) charge with lamps and accessories turned off.

(24) *Engine controls.* Note whether engine responds to the controls and whether they are in proper adjustment.

(25) *Horn and windshield wipers.* Test horn and operation of wiper blades.

(26) *Glass and rear view mirrors.* Clean rear view mirror, windshield, and other glass, and focus properly.

(27) *Lamps, lights, and reflectors.* Observe whether all lamps light with switches at all ON positions, and go out with switches in OFF positions; reflectors should be secure and clean.

(28) *Leaks, general.* Inspect under the hood or in engine compartment, and beneath the vehicle, for indications of fuel, oil, or water leaks.

(29) *Tools and equipment.* See that all tools and equipment are present, in good condition, and properly stowed or mounted.

(30) *Amphibian services.* Perform all of the above items which are applicable, and the following special services: Inspect hull for broken seams. See that drain plugs are secure. Observe action of rudder, and make certain it does not interfere with propeller. See that propeller is not obstructed or bent and that strut bearing is lubricated.

Caution: Do not operate propeller before entering water. See that drives of all bilge pumps are in place and adjusted.

b. RUN-IN TEST. During the road test of the vehicle, the following procedures will be consulted and performed. Services 10 to 15 below will be performed at 10-mile intervals with the vehicle halted. On amphibious vehicles, all the services, from 1 to 15 which apply, will be performed, and in addition, special attention will be given to service 16 during water operation and after leaving the water. Amphibious vehicles will be operated 1 hour in water, not to exceed one-half throttle, and 30 miles on land.

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(1) *Air pressure.* Observe whether the brake air pressure builds up at a normal rate to the specified maximum limits and then cuts off.

(2) *Dash instruments and gauges.* Observe all instruments frequently, noting whether they operate within the prescribed limits, temperatures, and pressures.

(3) *Horns and windshield wipers.* See that they operate properly.

(4) *Brakes; foot, hand, and trailer, steering.* Foot brakes should stop vehicles smoothly without side pull within reasonable distance with one-third reserve pedal travel. Hand brake should hold vehicle securely on reasonable incline, with one-third reserve ratchet travel. On tanks, steering brakes should stop vehicle effectively with the levers in approximately the vertical position, and steer the vehicle satisfactorily in response to normal pull.

(5) *Clutch.* Make sure that clutch operates smoothly without chatter, grabbing, or slipping, and has sufficient free pedal travel.

(6) *Transmission and transfer.* Gearshift mechanism must operate smoothly and not creep out of mesh.

(7) *Steering.* Note any excessive pulling to either side, wandering, or shimmy, and whether the steering booster is operating properly.

(8) *Engine.* The engine must respond to controls and have maximum pulling power without unusual noises, stalling, misfiring, overheating, or unusual exhaust smoke.

(9) *Unusual noises.* Be on alert continually for unusual noises that would indicate looseness of parts, damaged or malfunctioning units in the power train, cab, body, wheels, or tracks.

HALT VEHICLE AT 10-MILE INTERVALS FOR SERVICES 10 TO 15 BELOW

(10) *Brake-booster operation.* With engine idling and vehicle stopped, depress brake pedal slowly and note whether the booster can be felt assisting the movement of the pedal. Poor or no booster action indicates leakage in vacuum system. On hydrovac, locate the air cleaner of this unit and listen closely for the sound of air movement while the brake pedal is being operated. If no air rush can be noticed, this indicates that the system is inoperative.

(11) *Air-brake system leaks.* With the air pressure at the governed maximum and the brakes applied, stop the engine. There should not be a noticeable drop in pressure within 1 minute.

(12) *Temperatures.* Hand-feel each brake drum and wheel

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hub, and final drives, hubs, sprockets, idlers, wheels, and rollers for overheating. Look for excessive oil leaks.

(13) *Leaks.* Inspect within the engine compartment and underneath the vehicle for engine oil, water, and fuel leaks, and determine their source.

(14) *Gun-elevating and traversing mechanism.* Place the vehicle in a position where it is tilted laterally (sidewise) about 10°. Traverse the turret through its full 360-degree range by both the hand and power controls, and observe whether there is any indication of binding. With the gun pointed forward or rearward, elevate it through its entire range with the hand controls, and see whether there is any binding, excessive lash, or erratic action.

(15) *Track Tension.* Check the track tension to see if it is within specified limits.

(16) *Amphibian services.* (*a*) *In water.* Operate all bilge pumps, watching for abnormal flow of water from any one compartment, which would indicate excessive leaking. Feel water-propeller shaft bearing for overheating of bearing and excessive vibration.

(*b*) *After leaving water.* Remove weeds and foreign material from propeller and rudder. Inspect strut for damage. Inspect gear cases for water contamination of lubricant. Look for broken or clogged vents. Wipe all water from exposed wiring and connections.

(*c*) Upon completion of the run-in test correct or report any deficiencies noted. Report condition of vehicle to responsible company officer.

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