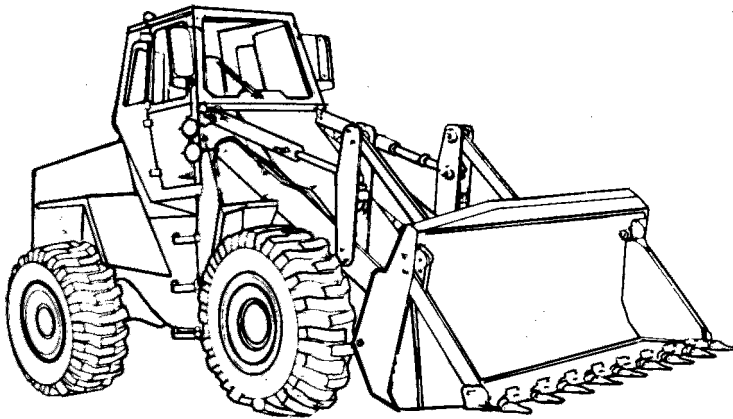


**TECHNICAL MANUAL
ORGANIZATIONAL MAINTENANCE**



**LOADER, SCOOP TYPE, DED
4x4, ARTICULATED FRAME STEER,
2-1/2 CUBIC YARD
(J.I.CASE MODEL MW24C)
(NSN 3805-01-150-4814)**

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DISTRIBUTION STATEMENT A: Approved for public release. Distribution is unlimited.

WARNING

EXHAUST GASES CAN BE DEADLY

Exhaust gases can produce symptoms of headache, dizziness, loss of muscular control, or coma. Permanent brain damage or death can result from severe exposure. You can insure your safety by following these rules: DON'T operate the heater or engine in an enclosed area unless it is properly ventilated. DON'T drive with any of the loader's inspection plates, cover plates, or the hood off unless necessary for maintenance. If you notice exhaust odors or exposure symptoms, IMMEDIATELY VENTILATE the area.

If symptoms persist, remove the affected people and treat them:

- Expose them to fresh air.
- If necessary, give artificial respiration.
 - Keep them warm.
- DON'T permit physical exercise.

Refer to FM 21-11, First Aid for Soldiers, for first aid treatment of injured personnel.

WARNING

ROTATING FAN BLADES

Before working in area between radiator and engine, be sure engine is turned off. Failure to do so could cause serious injury to fingers or hand by rotating fan blade. If you injure your fingers or hand, obtain medical aid immediately.

WARNING

OIL UNDER PRESSURE

Hydraulic reservoir is pressurized. Shut off engine and operate hydraulic control valves before removing hydraulic reservoir fill cap. Failure to do so could cause serious injury or death.

WARNING

RETAINING/SNAP RINGS UNDER SPRING TENSION

Exercise care when removing retaining/snap rings. Some of these parts are under spring tension. Severe injury may result by the part striking your eye if you don't observe this precaution. If your eye is struck by a foreign object, seek medical aid immediately.

WARNING

Toxic /FLAMMABLE

Dry cleaning solvent P-D-680 used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes and clothes and don't breathe vapors. Do not use near open flame or excessive heat and don't smoke when using it. Failure to do so could cause serious injury. If you become dizzy while using cleaning solvent, get fresh air and medical attention immediately. If contact with skin or clothes is made, flush with large amounts of water. If contact with eyes is made, wash eyes with water and get medical aid immediately.

Starting fluid is toxic and highly flammable. Container is pressurized to act as an expellent. Don't heat container and don't discharge starting fluid in confined areas or near open flame. Don't discard used container in an open flame. To do any of the above will cause an explosion. Don't breathe ether vapor or allow ether to come in contact with your skin. To do so will cause severe injury or death.

WARNING

ELECTRICAL SHOCK HAZARD

Always disconnect battery ground cable before working on electrical components of this equipment. Death or severe injury may result if you fail to observe this precaution. If you receive an electrical shock, seek medical aid immediately.

WARNING

HIGH VELOCITY AIR

Compressed air used for cleaning purpose will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc). Failure to do so could cause serious injury to eyes and possible blindness. If you hurt your eyes or if a foreign object is blown into your eyes, seek medical attention immediately.

WARNING

FALLING EQUIPMENT

When using chain hoist to remove or install parts, be sure chain hoist is securely fastened to the part and that all slack in chain is taken up. Failure to do so could cause serious injury due to the part falling on you. If you are injured by falling equipment, obtain medical aid immediately.

WARNING

NOISE HAZARD

Noise level exceeds 85 dB when operating loader with cab windows open or performing maintenance with engine operating. All personnel shall wear a hearing protective device when operating loader with windows open or performing loader maintenance with engine operating to prevent hearing loss.

WARNING

EXPLOSIVE HAZARD

Don't use jumper cables connected to battery terminals to start engine or charge batteries. Always use slave receptacle. Failure to do so could cause serious injury due to batteries exploding caused by improper connection of jumper cables to battery terminals.

WARNING

STEAM UNDER PRESSURE

Remove radiator cap slowly to relieve pressure before completely removing when engine is hot. Failure to do so could cause severe burns due to hot steam scalding. You. If you are scalded by hot steam, seek medical aid immediately.

WARNING

TIRE INFLATION

Check that tire is correctly mounted before inflating tire. Failure to do so may result in severe injury or death due to explosive separation of the tire and rim parts. If necessary, remove tire and install in a tire inflation cage. Always stand behind tire tread when inflating tire.

Do not inflate tire more than 40 psi. To do so may result in severe injury or death due to explosive separation of tire and rim parts. Stand behind tire tread and be sure personnel are not standing at side of tire before adding air. Failure to do so could cause severe injury or loss of life due to explosive separation of tire and rim parts.

WARNING

TIRE DEFLATION

Deflate tire completely before removing tire from rim. Refer to manual to completely deflate tire. Failure to follow this procedure could cause serious injury. If you are injured by not completely deflating tire, seek medical help immediately.

WARNING

JACKING LOADER

Make sure that loader will not roll or shift and that transport/service link is engaged before jacking loader. Secure with chock blocks. Death or serious injury may result by your failure to follow this procedure due to loader turning and slipping off jack or jack stands. If you are injured, obtain medical help immediately.

WARNING

Before starting engine, check and be sure that transport/service link is in released position. Failure to do so will cause loss of steering control which may result in serious injury or death and extensive property damage.

WARNING

Always use hand rails and steps when you mount or dismount loader. Don't use steering wheel or controls as a hand rail. Any other method of mounting or dismounting loader could make you slip and fall causing serious injury to yourself.

WARNING

Before moving loader up ramps, remove all ice, oil or grease from ramp to prevent loader from falling and causing death or serious injury and extensive damage to loader. Tell personnel to move away from loader.

WARNING

Don't allow personnel in or near the loader when it is being towed with the engine stopped. To do so could cause serious injury or death.

WARNING

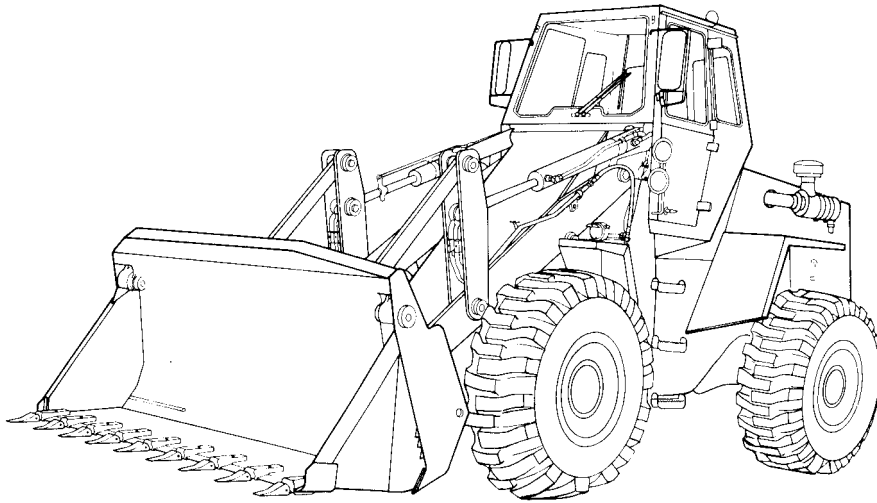
Diesel fuel is highly combustible. Do not smoke or allow open flames or sparks into the area. Death or severe injury may result if personnel fail to observe this precaution. If you are burned, obtain medical aid immediately.

WARNING

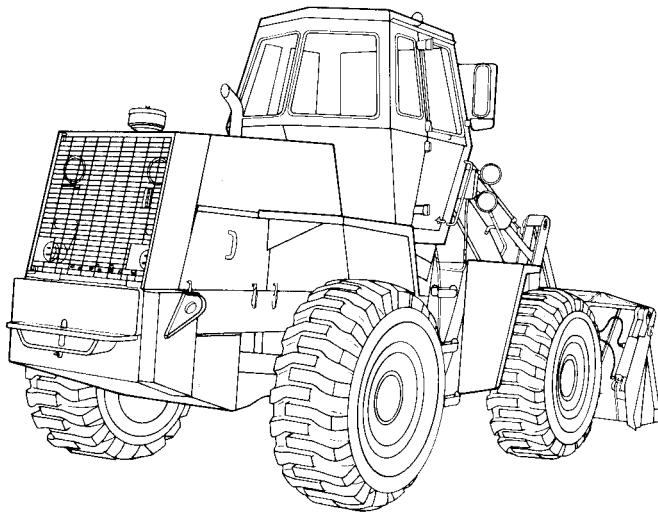
Before performing any loader maintenance that requires servicing in area between front and rear chassis, be sure that transport/service link is engaged. Failure to do so could cause serious injury or death due to chassis pivoting and crushing you when you are working in area between front and rear chassis.

WARNING

Whenever a component or line in the brake system is disconnected for servicing, the air must be bled from the brake system. Failure to do so could cause serious injury or death due to loss of braking control.



Left Front View



Right Rear View

MW24C Loader

**TECHNICAL MANUAL
NO. 5-3805-262-20**

**HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 01 September 1987**

ORGANIZATIONAL MAINTENANCE

**LOADER, SCOOP TYPE, DED, 4 X 4, ARTICULATED FRAME STEER,
2-1/2 CUBIC YARD**

**(J.I.CASE MODEL MW24C)
(NSN 3805-01-150-4814)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <https://aeps.ria.army.mil>. The DA Form 2028 is located under the Public Applications section in the AEPS Public Home Page. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, E-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LC-LMPP/TECH PUBS, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The E-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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* This technical manual, in combination with TM 5-3805-262 series (-10, -24P, and -34) supersedes TM 5-3805-262-14&P-1 and TM 5-3805-262-14&P-2 in its entirety

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HOW TO USE THIS MANUAL

This manual is designed to help you operate and maintain the MW24C loader. It's divided into chapters, sections, and appendices. Chapter 1 contains general information, equipment description and data, and principles of operation of the loader. Chapter 2 contains data applicable to service to be performed on receipt of the loader, FMCS, and procedures to be followed when moving to a new work site. Chapter 3 contains troubleshooting information consisting of a symptom index and detailed troubleshooting procedures. Chapters 4 through 12 contain detailed maintenance procedures.

Appendices contain supplemental information which you require to maintain the loader.

Procedures in this manual tell you several things:

..... how to perform your PMCS and how often
 what tools you need to perform the job
 materials or parts required
 what condition the loader is to be in before work is started.

In addition to the text, you'll have either an assembled view or an exploded view illustration of the associated parts. Sometimes, the illustration will be keyed by an arrow to an overall view of the loader to help you determine the approximate location of the parts. The illustration is keyed to the text by numbers and shows you how to take the part off and put it on.

The following problem will show you some of the features of this manual:

PROBLEM

An operator brings his loader into the shop with an engine problem: The engine stalls frequently or doesn't develop full power. The best way to solve his problem is by using your manual. This is what you do:

1. How do you start?

Look at the cover of the manual.

On the cover you'll find a listing for TROUBLESHOOTING SYMPTOM INDEX. It tells you to go to page 3-1. To find page 3-1 fast, open the manual by using the black tab that lines up with the listing on the cover.

2. What kind of problem do you have?

Find it in the symptom index.

The symptom index is a list of problems covered by the section. It tells you that your problem "engine stalls frequently or doesn't develop full power" is covered in paragraph 3-4 MALFUNCTION entry number 6 on page 3-23. Directly beneath the MALFUNCTION entry number you'll also see a number enclosed in parentheses. This number refers to the paragraph and MALFUNCTION entry number where troubleshooting your problem is also covered using STE/ICE equipment if available. This troubleshooting using STE/ICE is covered on page 3-225.

HOW TO USE THIS MANUAL (CONT)

3. How do you determine what is causing the problem?

Go to page 3-23 or page 3-225 if you have STE/ICE, MALFUNCTION entry number 6.

There you'll find the troubleshooting procedures you'll need. The procedure has columns with the headings MALFUNCTION, TEST OR INSPECTION, and CORRECTIVE ACTION. Starting at step 1, read the procedure. Each step tells you what to do and what to look for. Follow the steps, in order, until you find your problem. When you find the problem, the CORRECTIVE ACTION column will tell you how to fix it.

4. Let's assume you've found that the air compressor is bad causing excessive drag on the engine. The procedure tells you to go to page 7-88. The procedure contains all the information you need to replace the air compressor. First check the introductory material. It tells what you'll need before you start the job. Within the detailed procedural text are illustrations showing you how to take out the air compressor and how to put it back in.

5. If on the other hand, you know what the problem is and its cause, refer to the alphabetical index located at the rear of this manual and find the name of the part to be replaced and its page number where maintenance procedures will be found. For example, the engine is overheating and on filling the radiator with water you see that water is pouring out the bottom radiator hose indicating that the hose requires replacement. Referring to the alphabetical index under the listing hoses, cooling system, page 4-74 is referenced. Turn to this page for hose removal procedure and following page(s) for installation procedure.

This manual has been designed so that you can quickly locate data you are looking for. Either look in the ALPHABETICAL INDEX for the subject matter, refer to the front cover index, table of contents, chapter index, or section index to locate the data.

CHAPTER 1 INTRODUCTION

CHAPTER OVERVIEW

The purpose of this chapter is to provide you with standard data required in all manuals, to familiarize you with the purpose and capabilities of the vehicle and to give you a brief description of its different systems and components.

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Section I. GENERAL INFORMATION

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Official Names and Nomenclature . .	1-6	Special Tools, TMDE, and Support Equipment	1-11
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NOTE

The equipment described herein is non-metric and does not require metric common or special tools; therefore, metric units are not supplied. Tactical instructions for sake of clarity will also remain non-metric.

1-1. SCOPE

- a. Type of Manual. Organizational Maintenance Manual.
- b. Model Number and Equipment Name. MW24C 2-1/2 Cubic Yard Articulated Frame Steering 4 by 4 Diesel Engine Driven Scoop Type Loader.
- c. Purpose of Equipment. Loading trucks from stockpiles, stockpiling materiel, and excavating undisturbed and compacted soil. Unit also used as a clamshell to handle irregular shaped objects, as a dozer for general bulldozer work, and as a scraper.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Refer to TM 750-244-6.

1-4. PREPARATION FOR STORAGE OR SHIPMENT

Refer to TM 5-3805-262-10 for preparation for storage and page 2-13 of this manual for preparation for air transport instructions.

1-5. QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control shall be in accordance with MIL-STD-109 and MIL-M-38784.

1-6. OFFICIAL NAMES AND NOMENCLATURE

The nomenclature, names, and designations used in this manual are in accordance with MIL-HDBK-63038-2 .

1-7. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your MW24C loader needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, US Army Tank-Automotive Command, ATTN: AMSTA-MV, Warren, MI 48397-5000. We'll send you a reply.

1-8. WARRANTY INFORMATION

The MW24C loader is warranted by J.I. Case Company, Racine, Wisconsin for 15 months or 1500 hours of operation, whichever occurs first. Warranty starts on the date found on DA Form 2408-9 in the logbook and/or the equipment warranty data plate. Report all defects in material or workmanship to your supervisor who will take appropriate action.

1-9. ORIENTATION

The loader bucket is mounted at the front of the MW24C and the engine faces the rear. Controls for operating the bucket (lift, tilt, clam) are located to the right when you are sitting in the operator's seat. All references to right, left, front, or rear are from your viewpoint when you're sitting in the operator's seat.

1-10. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

1-11. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

No special tools are required. Tools, TMDE, and support equipment are listed in Section III of Appendix C.

1-12. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list TM 5-3805-262-24P covering organizational, direct support, and general support parts for the MW24C loader.

1-12.1 MODIFICATIONS

Refer to DAPAM 310-1 and DA PAM750-10 for all published Modification Work Orders which apply to the MW24C Scoop Loader. Refer to Department of the Army Modification Work Order MW05-3805-262-25-001 (effective 1988) for Installation of Alcohol Evaporator.

Section II. EQUIPMENT DESCRIPTION AND DATA

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Location and Description of Major Components and Plates	1-14
Equipment Data	1-15
Safety, Care, and Handling	1-16

1-13. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

a. Purpose of MW24C Loader. Loading trucks and railcars from stockpiles, stockpiling materiel, and excavating undisturbed and compacted soil. Unit also used as a clamshell to handle irregular shaped objects, as a dozer for general bulldozer work, and as a scraper.

b. Capabilities and Features.

- (1) Two and one-half yard capacity bucket.
- (2) Operates over rough terrain.
- (3) Four speed ranges in forward; two speed ranges in reverse.
- (4) Declutch pedal disengages transmission during loader operation to provide maximum hydraulic power when needed.
- (5) Diesel engine driven.
- (6) Power steering.
- (7) Power assisted air over hydraulic brakes.
- (8) Enclosed operator's compartment.
- (9) Auxiliary steering automatically cuts-in if primary steering is disabled.
- (10) Bucket height control to automatically stop loader lift arms at a preselected dump height.
- (11) Bucket return-to-dig control to automatically return bucket to preselected position.
- (12) Four-in-one bucket used as a scraper, blade, clamshell, or standard bucket .
- (13) Ford depths up to 30 inches.
- (14) Collapsible steering wheel for air transport.

1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS AND PLATES

a. Location and Description of Major Components.

ENGINE. J.I. Case Model A504BD Diesel engine having a displacement of 504 cubic inches. Accessories mounted on and considered a part of the engine include the alternator, air compressor, starting motor, fuel injection pump, and fuel filters.

FUEL SYSTEM. Consists of fuel injectors, fuel injection pump, electric fuel pump, air cleaner, fuel filters, and cold start kit.

EXHAUST SYSTEM. Consists of muffler and exhaust pipe. Muffler mounted on top of engine.

COOLING SYSTEM. Includes radiator mounted in rear of loader, thermostat and housing, engine driven water pump, and fan.

1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS AND PLATES (CONT)

a. Location and Description of Major Components.

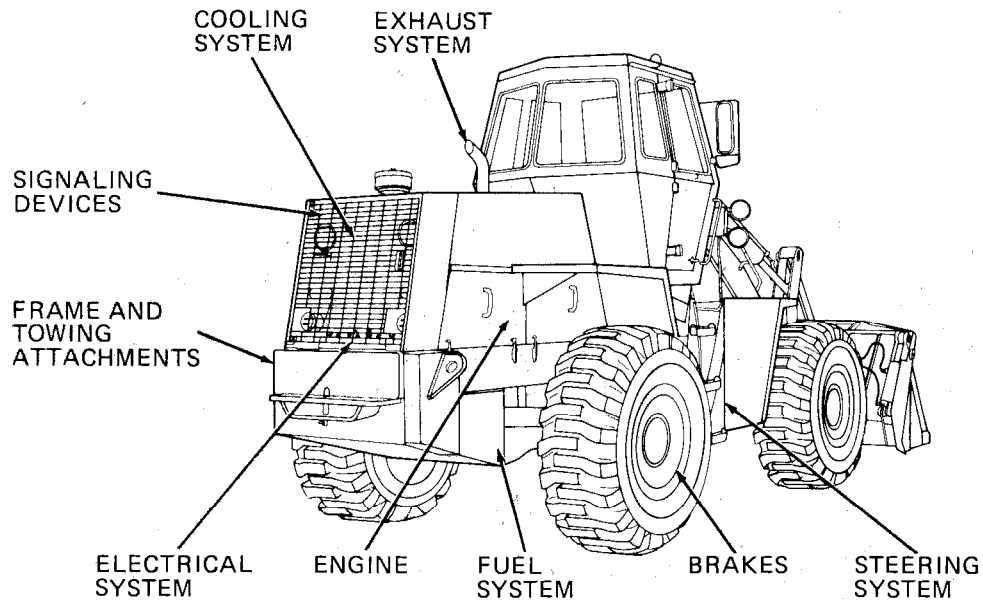
ELECTRICAL SYSTEM, 24 volt, negative ground, Includes engine driven alternator, starter motor, instrument panels, light system, and two 12 volt batteries connected in series,

BRAKES. Disk brakes, air over hydraulic. Air actuated drum type parking brake located on transmission output shaft.

STEERING SYSTEM. Consists of steering wheel, steering column and gear, and two steering cylinders. Power assist provided by hydraulic pump mounted on and driven by transmission. Also includes auxiliary steering system.

FRAME AND TOWING ATTACHMENTS. Two section frame consisting of front and rear chassis; drawbar pin located at rear of loader.

SIGNALING DEVICES, Consists of back-up alarm and turn signals. Back-up,alarm located at rear of loader; sounds when transmission is shifted into reverse. Turn signals located at top of cab; turn signal switch mounted on steering column.



1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS AND PLATES (CONT)

a. Location and Description of Major Components (Cont).

TRANSMISSION AND DRIVE SHAFTS. Four speeds in forward and two speeds in reverse. Has declutch feature which permits neutralizing transmission. Three drive shafts used to transmit power to front and rear axles.

AXLES AND WHEELS. Standard planetary axles; pneumatic tires.

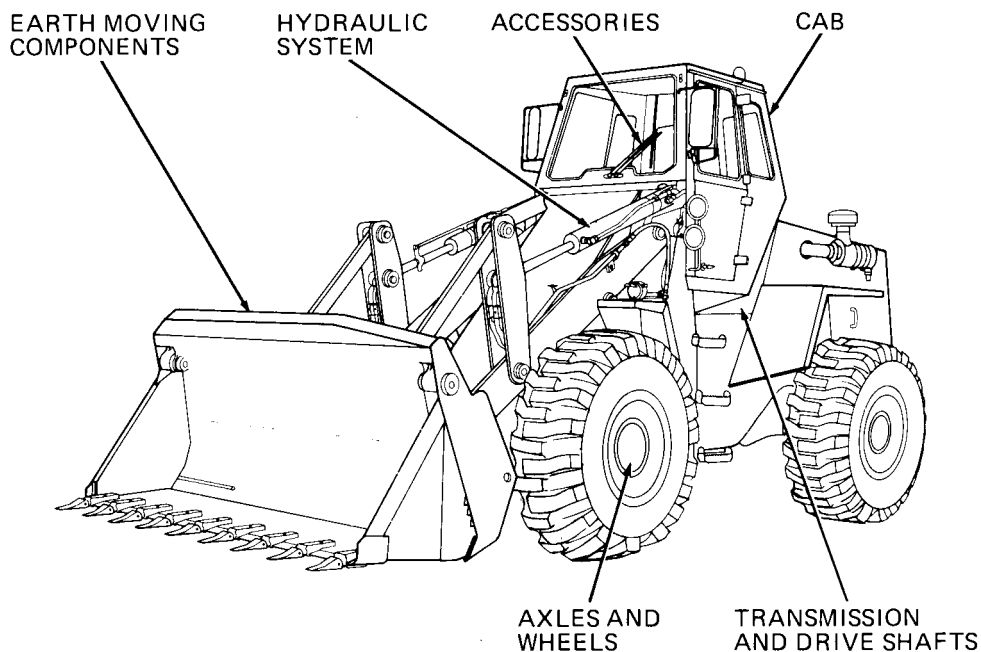
CAB. Fully enclosed and removable for shipment purposes when necessary. With doors, windows, and front and rear windshields.

ACCESSORIES. Includes air horn and control valve, windshield washer and wiper, outside mirrors, heater, and fan defrosters.

HYDRAULIC SYSTEM. Consists of hydraulic main pump assembly/steering pump, control valve assembly, hydraulic cylinders (lift arm, bucket tilt, and clam), hydraulic reservoir, and hydraulic filter.

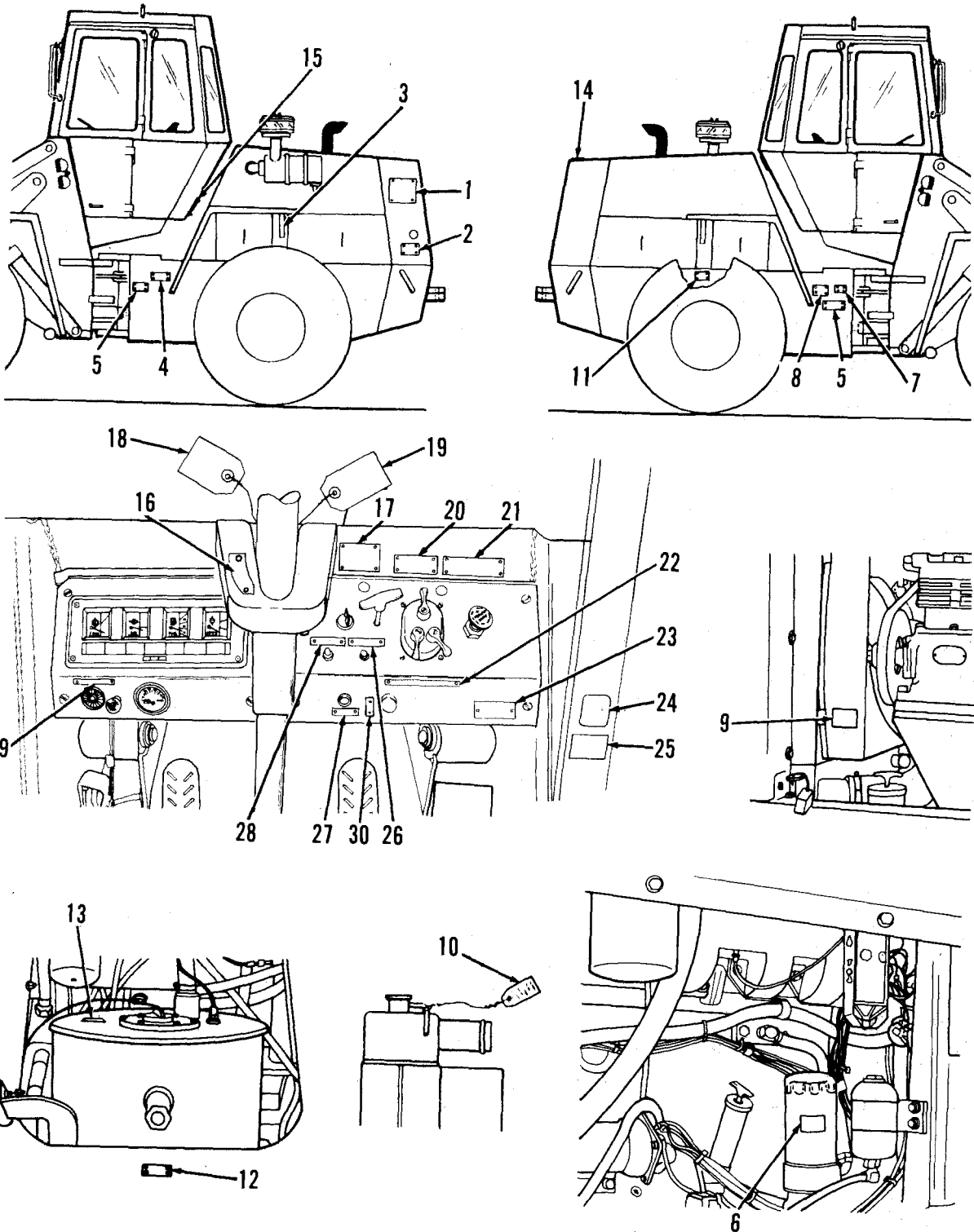
EARTHMOVING COMPONENTS. Includes bucket lift arms and pivot assemblies and loader bucket assembly.

b. Location of Identification, Instruction, and Warranty Plates. For location of identification, instruction, and warranty plates, refer to illustrations on following pages.



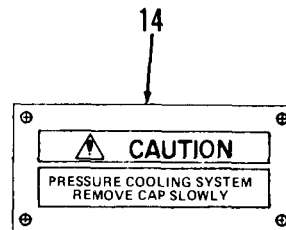
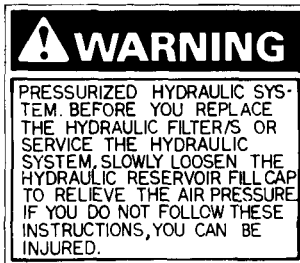
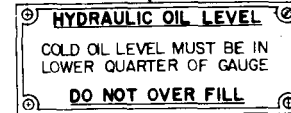
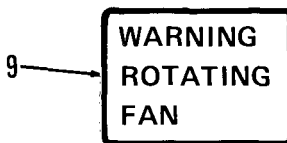
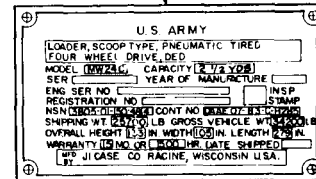
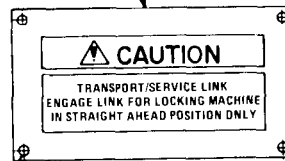
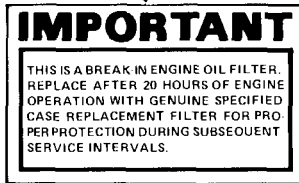
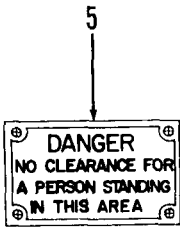
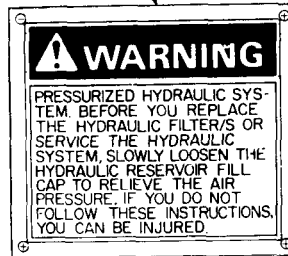
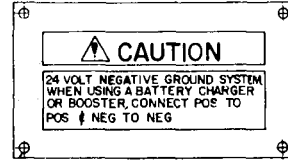
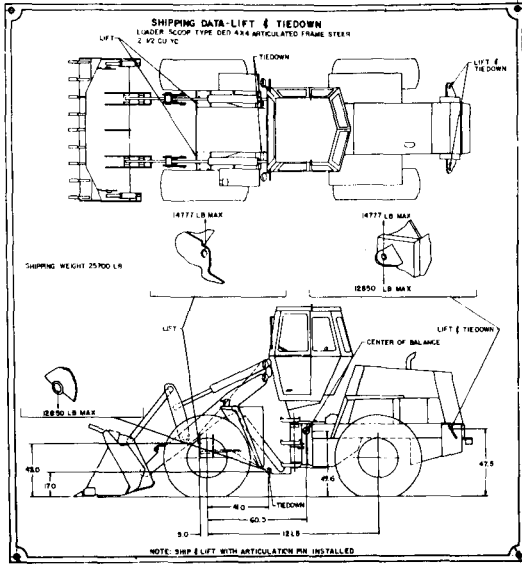
1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS AND PLATES (CONT)

b. Location of Identification, Instruction, and Warranty Plates (Cont).



1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS AND PLATES (CONT)

b. Location of Identification, Instruction, and Warranty Plates (Cont).



1-14. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS AND PLATES (CONT)

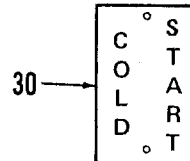
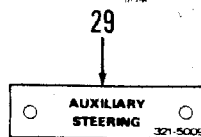
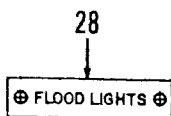
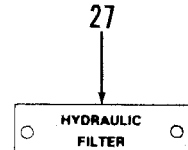
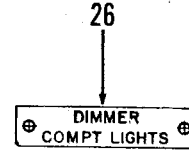
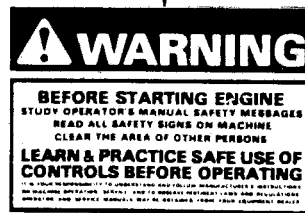
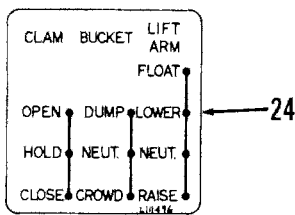
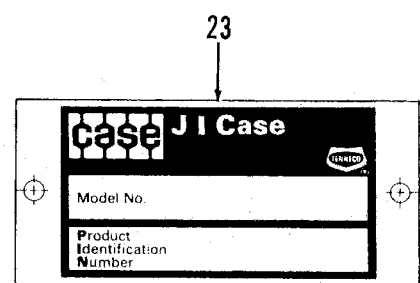
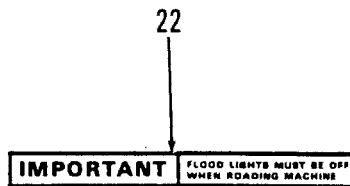
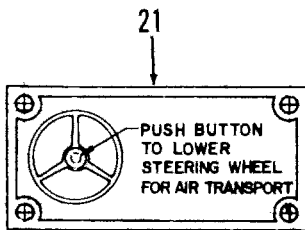
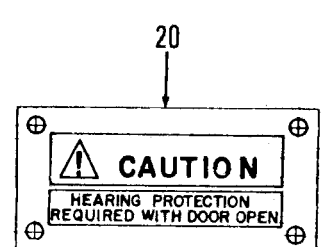
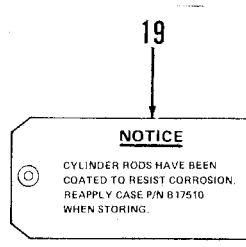
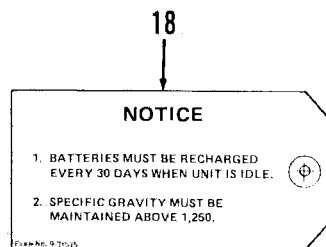
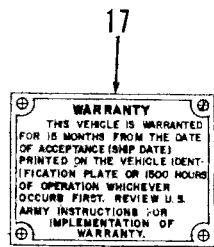
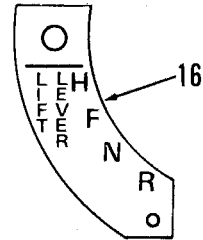
b. Location of Identification, Instruction, and warranty plates (Cont).

MAINTENANCE SCHEDULE
MODEL MW24C LOADER

ITEMS	INSTRUCTIONS	NOTES
AFTER FIRST 20 HOURS WITH NEW MACHINE		
19. ENGINE DRAIN/CASE OIL	DRAIN AND REFILL	SEE LUBRICATION CHART
18. ENGINE OIL FILTER	REPLACE FILTER	EVERY OTHER OIL CHANGE
22. HYDRAULIC OIL FILTER	REPLACE FILTER	SEE LUBRICATION CHART
AFTER EVERY 10 HOURS OR DAILY		
1. LOADER PIVOT POINTS	GREASE	MIL-G-10024
2. ENGINE DRAIN/CASE OIL LEVEL	CHECK	SEE LUBRICATION CHART
3. RADIATOR COOLANT LEVEL	CHECK	SEE LUBRICATION CHART
4. AIR RESERVOIR	DRAIN/RESTART	SEE LUBRICATION CHART
5. REAR AXLE TRANSMISSION PIVOTS	GREASE	MIL-G-10024
6. HYDRAULIC OIL LEVEL	CHECK	ADD OIL IF NECESSARY
AFTER EVERY 30 HOURS OR WEEKLY		
7. FUEL SEDIMENT BOWL	DRAIN/REFILL	SEE LUBRICATION CHART
8. UPPER AND LOWER CHASSIS PIVOTS	GREASE	MIL-G-10024
9. STEERING COLUMBER PIVOTE	GREASE	MIL-G-10024
10. DRIVE SHAFT UNIVERSALS AND SLIP SPLIN	GREASE	MIL-G-10024
11. FRONT SHAFT SUPPORT BEARING	GREASE	MIL-G-10024
12. BALL JOINT LEVELS	CHECK	SEE LUBRICATION CHART
13. TRANSMISSION OIL LEVEL	CHECK	BOTTLED WATER
14. MASTER BRAKE CYLINDER	CHECK	MIL-G-46104
AFTER EVERY 150 HOURS OR SEMI-MONTHLY		
15. ENGINE DRAIN/CASE OIL	DRAIN AND REFILL	SEE LUBRICATION CHART
16. ENGINE OIL FILTER	REPLACE FILTER	EVERY OTHER OIL CHANGE
AFTER EVERY 250 HOURS OR MONTHLY		
17. AXLE AND PLANETARY OIL LEVEL	CHECK	SEE LUBRICATION CHART
18. CONTROL LEVER PIVOTE	GREASE	MIL-G-10024
AFTER EVERY 500 HOURS		
19. DRIVE BELT TENSION	CHECK	CHANGE WORN BELTS
18. FIRST AND SECOND STAGE FUEL FILTERS	REPLACE FILTERS	SEE LUBRICATION CHART
20. ELECTRIC FUEL PUMP FILTER	CLEAN	SEE LUBRICATION CHART
21. TRANSMISSION OIL FILTER	REPLACE FILTERS	SEE LUBRICATION CHART
22. HYDRAULIC OIL FILTER	REPLACE FILTERS	SEE LUBRICATION CHART
AFTER EVERY 1000 HOURS OR 6 MONTHS		
21. HYDRAULIC SYSTEM OIL	DRAIN AND REFILL	SEE LUBRICATION CHART
22. TRANSMISSION OIL	DRAIN AND REFILL	SEE LUBRICATION CHART
23. TRANSMISSION OIL STRAINER	CLEAN	SEE LUBRICATION CHART
24. TRANSMISSION OIL PLATE	CLEAN	SEE LUBRICATION CHART
25. AXLE AND PLANETARY OIL	CLEAN	SEE LUBRICATION CHART
26. HYDRAULIC RESERVOIR SUCTION SCREEN	CLEAN	SEE LUBRICATION CHART

LUBRICATION CHART

TEMPERATURE RANGE	30° TO 40° F		40° TO 50° F		50° TO 60° F		60° TO 70° F		70° TO 80° F		80° TO 90° F		90° TO 100° F	
	ENGINE OIL	HYDRAULIC OIL	AXLE OIL	STEERING OIL	AXLE OIL	STEERING OIL	AXLE OIL	STEERING OIL	AXLE OIL	STEERING OIL	AXLE OIL	STEERING OIL	AXLE OIL	STEERING OIL
ENGINE OIL	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30
HYDRAULIC OIL	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30
AXLE OIL	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30
STEERING OIL	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30	SAE 30



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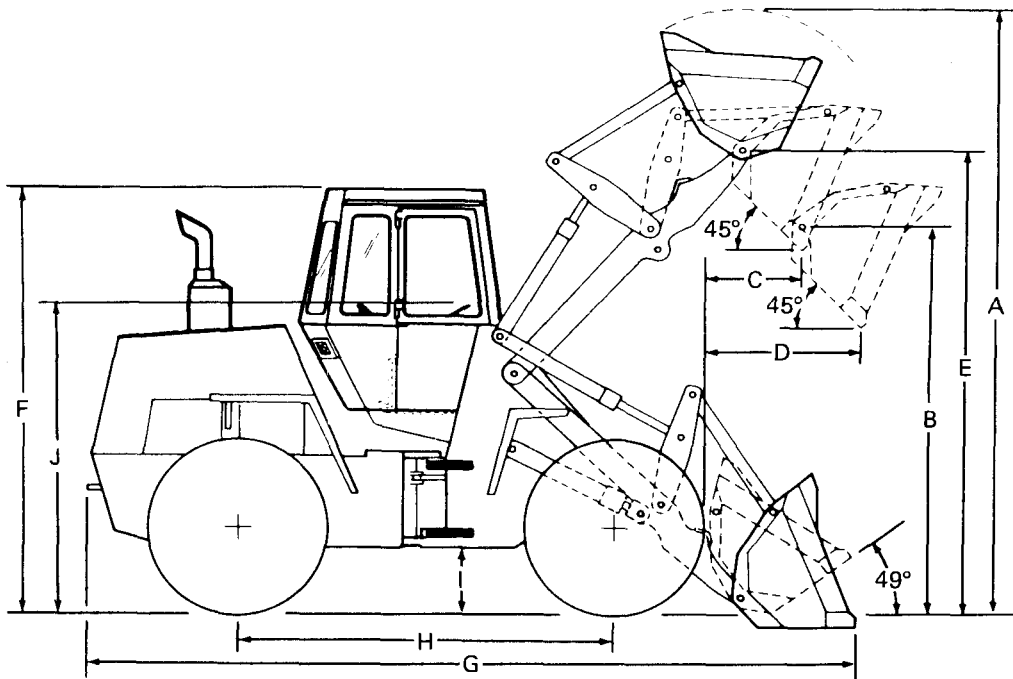
1-15. EQUIPMENT DATA

Equipment data is tabulated below.

Manufacturer J.I. Case
 Model MW24C

DIMENSIONS AND WEIGHT

Overall operating height (A)	16 feet, 1-1/2 inches
Dump clearance at maximum height, 45 degrees dump (B)	9 feet
Dump reach at maximum height, 45 degrees dump (C)	3 feet, 1 inch
Dump reach at 7 feet dump height, 45 degrees dump (D)	4 feet, 5 inches
Height to bucket hinge pin (E)	12 feet, 2-1/2 inches
Maximum shipping height (F)	10 feet, 10-1/2 inches
Overall length, bucket on ground (G)	22 feet, 5-1/2 inches
Overall width	94-1/2 inches
Wheel base (H)	10 feet, 1-1/2 inches
Tire tread	77 inches
Ground clearance (I)	16 inches
Height to top of steering wheel (J)	106-1/2 inches
Overall height without cab	106-1/2 inches
Width overtires	100 inches
Total weight	25,900 pounds
Front axle weight	12,750 pounds
Rear axle weight	13,150 pounds
Center of gravity location	44 inches high; 61.7 inches back from center of front axle



1-15. EQUIPMENT DATA (CONT)

ENGINE LUBRICATING SYSTEM (CONT)

Type System Pressure and Spray Circulation
Oil Pump Gear Type
Oil Filter Full Flow Turn on Type

FUEL SYSTEM

Fuel Injection Pump Robert Bosch, Type PES Multiple Plunger
Pump Timing 27 Degrees Before Top Dead Center (Port Closing)
1st Stage Fuel Filter Full Flow Turn on Type
2nd Stage Fuel Filter Full Flow Turn on Type
Operating Pressure 20 to 30 psi

ALTERNATOR

Manufacturer Delco-Remy
Part Number 1100077
Rating 65 ampere

AIR COMPRESSOR

Manufacturer Midland Ross
Part Number N5303AA
Number of Cylinders 2

RADIATOR

Manufacturer General 22-4173
. Young E299000

ELECTRICAL SYSTEM

Electrical system voltage 24volts
Batteries (2) 12 volt
Replacement Bulbs Bulb Number
Warning lamp for hydraulic filters 1895R
Cab lamp 93 or 1591
Stop and tail lamp 1683
Instrument panel lamp 363
Directional and flasher lamp 307
Driving lamps 4880
Flood lamps 4578
Instrument cluster lamps 194

BUCKET

Width 104 inches
SAE Rated Capacity 2.5 yards

HYDRAULIC SYSTEM

Reservoir Positive pressurization
Control Valve
Manufacturer Parker
Model VDPS24DRF36
Type Open center series
Relief Valve Setting 2300 psi

1-15. EQUIPMENT DATA (CONT)

HYDRAULIC SYSTEM (CONT)

Hydraulic Pump

Manufacturer Commercial Shearing Inc.
 Model 313-9622-451
 Flow at 2200 rpm and 2300 psi 52 gallons per minute
 Pressure 2500 psi

Steering Pump

Flow at 2200 rpm and 2000 psi 23 gallons per minute
 Pressure 2000 psi

Hydraulic Cylinders

Tilt 4.50 inch diameter x 29.50 inch stroke x 2.50 inch rod
 Lift 5.0 inch diameter x 34.625 inch stroke x 3.0 inch rod
 Steering 3.0 inch diameter x 15,0 inch stroke x 1.25 inch rod
 Clam 4.0 inch diameter x 10.5 inch stroke x 2.,0 inch rod

Auxiliary Steering Motor and Pump

Manufacturer Parker Hannifin
 Part Number D27AR1A-022
 Type 24 volts/6.4 gpm @ 2000 psi

AIR CLEANER

Manufacturer Donaldson
 Part Number FHG09-0023
 Type Dry - 2 Stage

STARTER

Manufacturer Delco-Remy
 Part Number 1114872
 clutch Sprag type

TRANSMISSION

Manufacturer Allison
 Model TT-2421-1
 Type Full power shift
 Ratio
 Forward Low Range - 1st 2.6 MPH
 Forward Low Range - 2nd 6.5 MPH
 Forward High Range - 3rd 11.4 MPH
 Forward High Range - 4th 22.2 MPH
 Reverse 1st 3.6 MPH
 Reverse 2nd 8.7MPH

TORQUE CONVERTER

Manufacturer Allison
 Model Integral TT425
 Stall Ratio 4.92:1

AXLES

Manufacturer Rockwell
 Model
 Front Standard planetary, disk brakes
 Rear Standard planetary, disk brakes

1-15. EQUIPMENT DATA (CONT)

AXLES (CONT)

Part Number

Front PRC 676-N200
Rear PRC 673-N203

BRAKES

Service Brakes

Type Disk; air over hydraulic; four wheels
Master Cylinders Two
Manufacturer Wagner Electric Co.
Part No. FE98841

Brake Calipers

Manufacturer Goodyear Co.
Part No. 9650303

Parking Brake

Type Drum Style
Application Air actuated mechanical
Location Transmission output shaft

TIRES

Size 20.5x 25
Normal Tire Pressure 40 psi
Type Tubeless, 12 ply, tread style L2

1-16. SAFETY, CARE, AND HANDLING

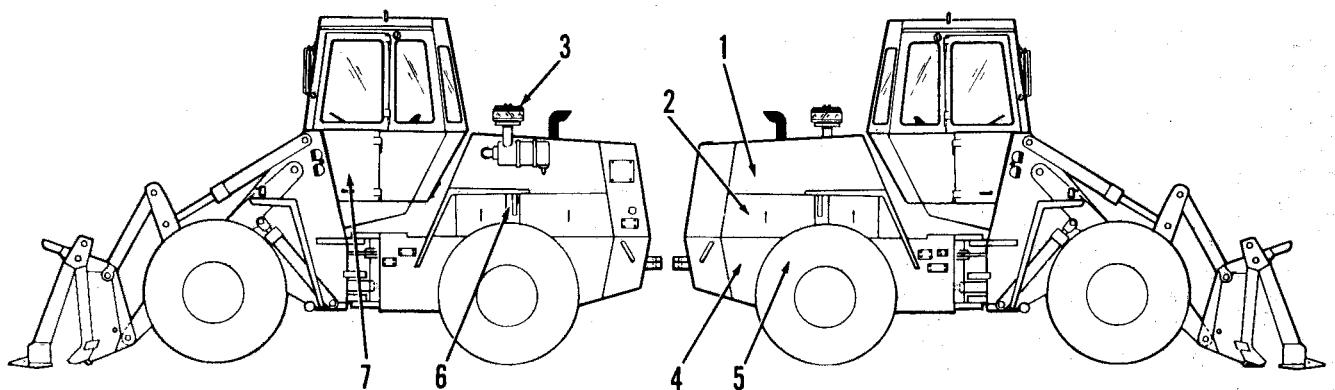
- a. Safety. Before operating the loader, read the operator's manual and, if necessary, learn and practice safe use of controls before operating the unit. The loader is a heavy piece of equipment and can cause serious injury to personnel and extensive property damage if operated by an inexperienced operator. Before operating the unit, check the terrain and any obstacles that may exist. Remember, you do not want to be the cause of serious injury to yourself or other personnel or cause serious property damage.
- b. Care. Refer to the operator's manual and Chapter 2, Section II, of this manual for preventive maintenance procedures to be performed. Perform these procedures to care for the unit properly.
- c. Handling. When handling (operating) the unit, be sure that you know what you are doing. When performing maintenance, pay attention to all notes, cautions, and warnings. Be aware of all situations that could cause a serious safety hazard to you and other personnel in the immediate area.

Section III. PRINCIPLES OF OPERATION

	Para		Para
Engine	1-17	Brakes	1-26
Fuel System	1-18	Steering System	1-27
Exhaust System	1-19	Frame and Towing Attachments	1-28
Cooling System	1-20	Body and Cab	1-29
Electrical System	1-21	Accessories	1-30
Left Instrument Panel	1-22	Hydraulic System	1-31
Right Instrument Panel	1-23	Back-up Alarm	1-32
Transmission and Drive Shafts	1-24	Turn Signals	1-33
Axles and Wheels	1-25	Earthmoving Components	1-34

1-17. ENGINE

The engine is a J I Case Model A504BD Diesel engine. It is a six cylinder, four stroke cycle valve-in-head engine having a displacement of 504 cubic inches. Equipment mounted on the engine include the alternator, air compressor, starting motor, fuel injection pump, and fuel filters.



1-18. FUEL SYSTEM

1. FUEL INJECTOR NOZZLES. Six used; one in each cylinder located in cylinder head. Directs a metered quantity of fuel received from injection pump to combustion chamber. Each charge of fuel must be delivered into the combustion chamber with a definite spray pattern to ensure complete combustion and efficient engine performance.

2. FUEL INJECTION PUMP AND LINES. Fuel injection pump delivers accurately metered quantities of fuel under high pressure to fuel injectors. This delivery must be accomplished with accurate timing in relation to engine firing order and for a definite period of time in relation to load and engine speed requirements. Fuel is routed to six fuel injectors from fuel injection pump through rigid metal tubes. Return fuel (leak-off) from fuel injectors is routed through rigid metal tubes connected between each fuel injector and then routed through one rigid metal tube back to fuel injection pump.

1-18. FUEL SYSTEM (CONT)

3. AIR PRECLEANED AND CLEANER. Two stage filter containing a primary filter and a secondary filter. Air routed to cylinders is filtered through both these filters. Thus, dust and dirt reaching engine is held to a minimum. Air compressor receives its input air via air cleaner by a fitting connected to air cleaner adapter mounted on intake manifold.

4. FUEL TANK AND LINES AND FITTINGS. Fuel tank holds approximately 58 gallons of Diesel fuel; located at rear of loader. Fuel filler neck and removable cap located at right rear of loader and is accessible by removing right rear side panel. Drain plug located at bottom of fuel tank. Fuel lines and fittings connect fuel tank to electric fuel pump, first and second stage fuel filters, and to fuel injection pump.

5. ELECTRIC FUEL PUMP. Pumps Diesel fuel from fuel tank to fuel filters then to fuel injection pump. Mounted on front center of fuel tank. With ignition key switch in on position, fuel pump will emit a slight buzz indicating proper operation. Pump consists of coil, plunger, and breaker points. With coil energized, plunger moves in plunger bore which opens and closes breaker points. With plunger at top of plunger tube, breaker points are closed. Coil is then energized, and plunger is pulled to bottom of plunger tube compressing plunger spring. Check valve in plunger opens and fuel flows through plunger. With plunger at bottom of plunger tube, breaker points are opened and coil is deenergized. Plunger spring returns plunger to top of plunger tube. During up stroke of plunger, check valve is closed and fuel is pushed into fuel line. Valve at bottom of plunger tube opens and fuel flows into bottom of plunger tube for next cycle.

6. COLD START KIT. Consists of push type switch mounted on right instrument panel, solenoid mounted on cold start cylinder, and atomizer installed in engine intake manifold. Cold start cylinder mounted in engine compartment, on left post near engine. COLD START switch operates only when ignition key switch is in Start position. Depressing COLD START switch energizes solenoid, spraying ether into engine intake manifold only when engine cranked.

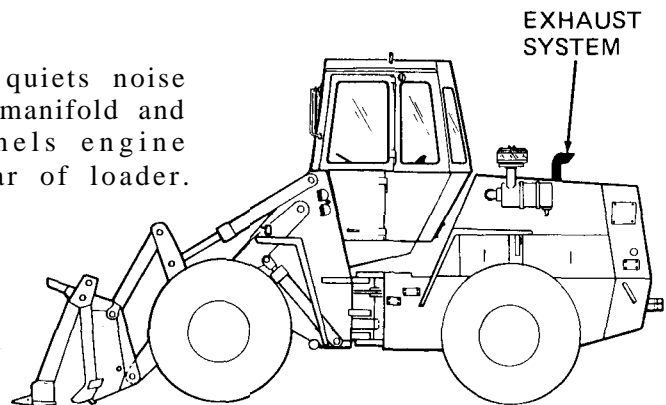
7. ACCELERATOR. Consists of accelerator pedal connected by cable to fuel injection pump and fuel shutoff control connected to fuel injection pump fuel shutoff lever.

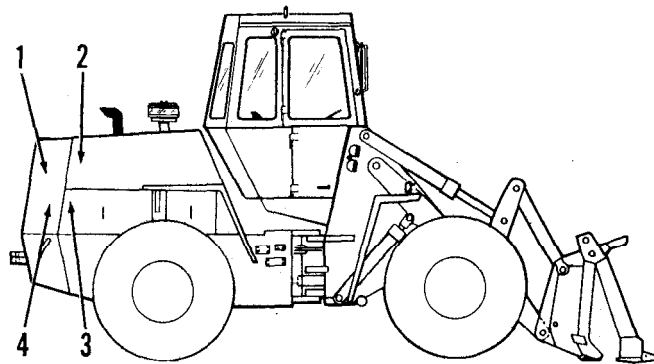
1-19. EXHAUST SYSTEM

Consists of muffler and tail pipe. Muffler quiets noise from engine operation. Connected to exhaust manifold and mounted above engine. Tail pipe channels engine combustion byproducts from muffler to rear of loader.

1-20. COOLING SYSTEM

1. RADIATOR. Engine coolant circulated through radiator giving up its heat to air stream developed by belt driven fan. Cooled coolant drawn from bottom of radiator by water pump and discharged into lower part of cylinder block. Radiator also has cooler built into its bottom for cooling transmission hydraulic oil. Radiator located at rear of loader.

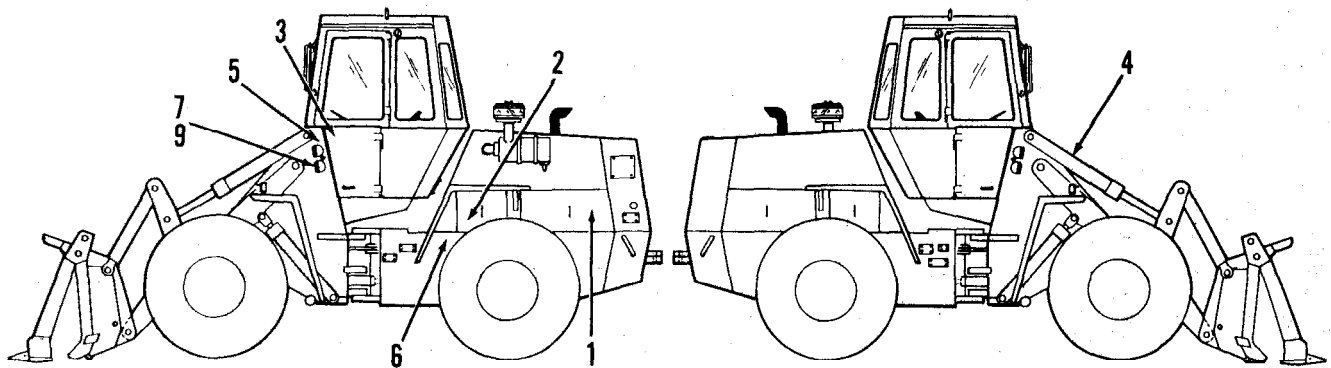




2. WATER MANIFOLD AND THERMOSTAT. Secured to cylinder heads on right side of engine. Coolant from cylinder heads passes through manifold, thermostat, and then to radiator. With thermostat open, coolant circulates through radiator before returning to water pump. With thermostat closed, coolant is bypassed through water manifold directly to water pump and through engine ensuring a quick warm up of engine.

3. WATER PUMP. Draws cooled coolant from bottom of radiator and discharges it into lower part of cylinder block. Openings in water jacket around cylinder bores connect with corresponding openings in cylinder heads. Coolant rises to circulate around valves and fuel injectors then passes through water manifold back to radiator.

4. FAN. Mounted on water pump pulley; located behind radiator. Generates air stream to cool coolant circulated through radiator.



1-21. ELECTRICAL SYSTEM

1. ALTERNATOR. 65 amperes. Charges batteries and supplies current for additional electrical power.

2. STARTING MOTOR. Electric motor with an over running clutch. Solenoid is mounted on starter with an enclosed shifting mechanism.

3. INSTRUMENT PANELS. Refer to pages 1-19 through 1-23 for a description of instrument panels.

1-21. ELECTRICAL SYSTEM (CONT)

4. RETURN-TO-DIG CIRCUIT. Return-to-dig circuit returns bucket to digging position after it has been dumped. It includes a micro switch mounted on return-to-dig control rod located on right bucket tilt cylinder and an actuating rod inserted in control rod and connected to rod end of tilt cylinder. Micro switch is connected to solenoid located on hydraulic control valve in tilt spool. With bucket raised and in dump position, micro switch and solenoid are deenergized. Placing LIFT ARM control lever in FLOAT and BUCKET control lever to CROWD will cause bucket to lower to ground. At same time, bucket will roll back until actuating rod actuates micro switch arm in turn energizing solenoid in tilt spool. With tilt spool solenoid energized, BUCKET control lever will return to its NEUT. position stopping roll back of bucket.

5. BUCKET HEIGHT CIRCUIT. Automatically stops loader lift arms at an operator selected dump height. It includes a micro switch mounted to height control bracket located on left side of loader. Micro switch is connected to solenoid located on hydraulic control valve in lift spool. Micro switch actuated when loader lift arms reach preset height energizing solenoid, in turn, causing lift spool to return to neutral position. This stops loader lift arms from raising any further.

6. AUXILIARY STEERING. Consists of steering motor and pump, flow switch mounted in hydraulic system, relay socket assembly, and warning buzzer and indicator.

Auxiliary Steering Motor and Pump. Electrically operated motor with hydraulic oil pump mounted on output shaft. Installed on left of rear chassis near transmission. Automatically operates when hydraulic oil flow stops through hose in which flow switch is installed.

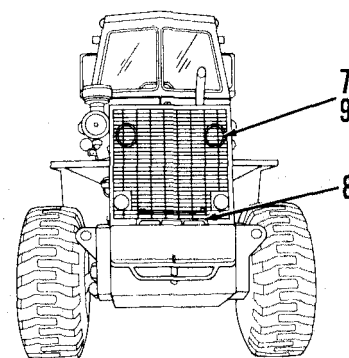
Flow Switch. Mounted in hose connected to hydraulic oil cooler. When hydraulic pump mounted on transmission is operating, flow switch provides dc voltage to relay A, pin 2 (figure FO-3). When hydraulic oil flow through hose stops, flow switch routes dc voltage to relay A, pin 6.

Relay Socket Assembly (Figure FO-3). Contains control circuitry for turning on auxiliary steering motor and pump. Mounted at side of front chassis. Relay A is connected as a latching relay. 24 Vdc applied to relay A coil at pin 2 energizes relay A. 24 Vdc applied to pin 1 and switched out pin 3 latches relay A coil on. Relay A, pin 6 switched to pin 8 has no effect on the circuit. When hydraulic oil flow stops either due to engine, transmission, or hydraulic pump failure, flow switch routes dc voltage to relay A, pin 6. This voltage is switched out pin 8 and applied through 47 ohm resistor to relay B, pin 2 and 2000 microfarad capacitor. 2000 microfarad capacitor and 47 ohm resistor provide a small time delay before relay B coil energizes. When relay B coil energizes, 24 Vdc at pins 1 and 3 latch relay B coil and 24 Vdc at pins 6 and 8 sounds buzzer, turns on indicator, and energizes auxiliary steering motor solenoid turning on motor. With motor operating, hydraulic pump attached to its output shaft starts oil flow through hoses. Flow switch will switch 24 Vdc from one contact to the other, which has no effect on circuit due to relays being latched. Auxiliary steering motor and pump will continue to operate until ignition key switch is placed in off position. When ignition key switch is placed to off position, 2000 microfarad capacitor will discharge through 50 ohm resistor and diode.

7. LIGHTS. Mounted at rear of loader are two flood lights, two stop and tail lights, and two black out stop light-tail light assemblies. Mounted at front of loader are two driving lamps, two flood lamps, and one black out driving lamp mounted on left front fender. All lights are controlled by Vehicle Lights switch mounted on right instrument panel. Front and rear flood lights in addition, are controlled by FLOOD LIGHTS switch also mounted on right instrument panel.

8. BATTERIES. Two batteries connected in series provide 24 Vdc power. Batteries located at rear of loader.

9. WIRING HARNESES. Include front and rear wiring harnesses, black out wiring harness, cab upper wiring harness, cab lower wiring harness, and cab console wiring hamess.



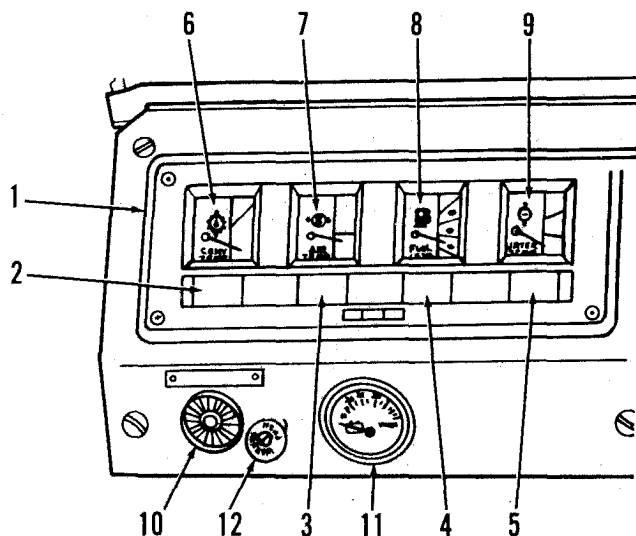
Front and Rear Wiring Harnesses. Main wiring harnesses. Interconnect major electrical components of loader.

Black Out Wiring Harness. Interconnects rear black out stop and tail lights and front black out light to front wiring harness.

Cab Upper Wiring Harness. Interconnects cab defroster fans, defroster blower, cab dome light, and cab console control panel to front wiring harness.

Cab Lower Wiring Harness. Interconnects cab console control panel to front wiring harness.

Cab Console Wiring Harness. Interconnects cab console control panel to front wiring harness,

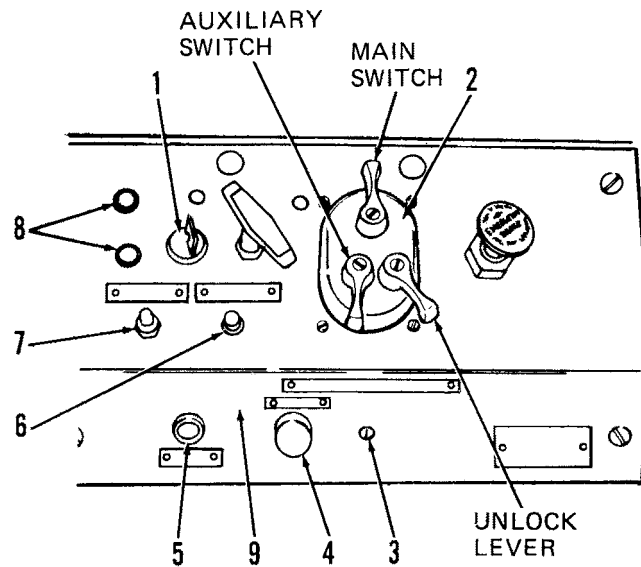


1-22. LEFT INSTRUMENT PANEL Also see FO-3

Includes instrument panel cluster, AUXILIARY STEERING buzzer and indicator light, voltmeter, and windshield washer control.

1-22. LEFT INSTRUMENT PANEL (CONT)

1. INSTRUMENT PANEL CLUSTER. Includes warning indicators and following gages: CONV TEMP, AIR PRESS, FUEL LEVEL, and WATER TEMP.
2. BRAKE ENGAGED INDICATOR. Connected in series with air activated switch mounted in port of Parking Brake Control. Switch is normally closed applying ground to indicator light causing it to turn on. Air pressure supplied to parking brake chamber causes switch to open disconnecting ground to indicator light in turn causing it to turn off. Resistor (40 ohms, 2 watts) in circuit limits current through indicator.
3. ALTERNATOR INDICATOR. Not connected.
4. ENGINE OIL PRESSURE INDICATOR. Connected in series with oil pressure switch located in engine cylinder block assembly. Switch is normally closed turning indicator on. Increasing oil pressure causes switch to open turning indicator off. Resistor (40 ohms, 2 watts) in circuit limits current through indicator.
5. CLUTCH OIL PRESSURE INDICATOR. Connected in series with oil pressure switch installed in transmission. Switch is normally closed turning indicator on. Increasing pressure causes switch to open turning indicator off. Resistor (40 ohms, 2 watts) in circuit limits current through indicator.
6. CONV TEMP GAGE. Connected in series with 24 Vdc and temperature sender installed in transmission. Temperature sender acts as variable resistor varying voltage across gage. At high temperatures, resistance decreases; at low temperatures, resistance increases .
7. AIR PRESS GAGE. Connected in series with air pressure sender installed in air reservoir port. Air pressure sender acts as variable resistor varying voltage across gage. At low air pressure resistance is low; at high pressure resistance is high.
8. FUEL LEVEL GAGE. Connected in series with fuel level sender installed in fuel tank. Sender acts as variable resistor varying voltage across gage. When fuel level is low, resistance is low; resistance increases with quantity of fuel in fuel tank.
9. WATER TEMP GAGE. Connected in series with engine water temperature sender installed in engine water manifold. Sender acts as variable resistor varying voltage across gage. When water temperature is high, resistance is low; low temperature, resistance is high.
10. AUXILIARY STEERING BUZZER AND INDICATOR. Buzzer and indicator connected across auxiliary steering motor and pump solenoid. Buzzer sounds warning operator that primary hydraulic pump is not operating and indicator turns on indicating that auxiliary steering motor and pump is operating.
11. VOLTMETER. Connected across ignition key switch accessory terminal and ground. Indicates voltage of batteries.
12. WINDSHIELD WASHER CONTROL. Part of pneumatic system. Pushing control inward applies compressed air to washer pressure reservoir, which in turn, forces washer solvent via hoses from washer nozzle mounted in front of windshield.



1-23. RIGHT INSTRUMENT PANEL

Also see FO-3

Includes all switches and indicators for operating lights, parking brake, starting and stopping engine, dimmer control, and a HYDRAULIC FILTER warning indicator.

1. IGNITION KEY SWITCH. Four position key switch.

Accessory Position (Maintained). Extreme left position. Applies power to Vehicle Lights switch and instrument panel cluster.
Off Position (Maintained). Center position. Electrical system off.

Run Position (Maintained). First right position. Normal operating position after engine started. Applies power to Vehicle Lights switch, instrument panel cluster, and return-to-dig and height control circuits.

Start Position (Spring Return-to-Run Position). Applies power to COLD START switch, starter relay via neutral start switch installed in transmission control valve, and return-to-dig and height control circuits. With power applied to starter relay, starter solenoid will energize, kicking in starter to turn engine flywheel and start engine. When released, ignition key switch will return to Run position.

2. MECHANICAL MILITARY LIGHT SWITCH. Controls all vehicle lights including stop light at rear of vehicle. Main switch has five positions an auxiliary switch has four positions. UNLOCK lever must be in UNLOCK to move Main switch in B.O. DRIVE, STOP LIGHT, and SER. DRIVE positions.

Main Switch B.O. DRIVE. Power from pin F routed out pins A, D, and E to enable stop light switch (pin A), turn on front black out driving light (pin D), and turn on black-out tail light (pin E). When brake treadle is pressed, black-out stop light will turn on (pin N). Auxiliary switch can be in any position.

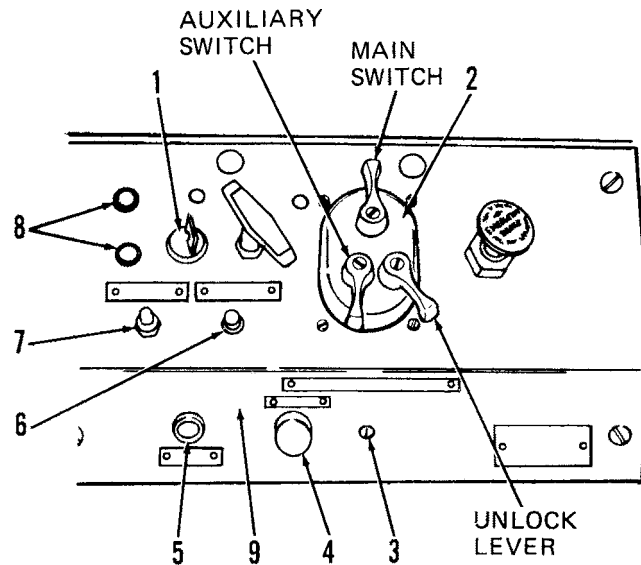
Main Switch B.O. MARKER. Power from pin F routed out pins A and E to enable stop light switch (pin A) and turn on black-out tail light (pin E). When brake treadle is pressed, black-out stop light will turn on (pin N). Auxiliary switch can be in any position.

Main Switch OFF. All lights are turned off. When brake treadle pressed, stop light at rear of loader will not turn on.

Main Switch STOP LIGHT. Power from pin F routed out pins A and J to enable stop light switch (pin A) and enable turn signals (pin J). When brake treadle pressed, stop light in stop-tail lights will turn on (pin C). Auxiliary switch can be in any position.

Main Switch SER. DRIVE. Power from pin F routed out pins A, H, J, and M to enable stop light switch (pin A), turn on tail lights at rear of loader (pin H), enable turn signals (pin J), and turn on driving lamps and enable FLOOD LIGHTS switch (pin M). When brake treadle is pressed, stop light in stop-tail lights will turn on (pin C). Placing FLOOD LIGHTS switch in On position will turn on front and rear flood lights. Auxiliary switch can be in any position.

1-23. RIGHT INSTRUMENT PANEL (CONT)



Auxiliary Switch PANEL BRT. Power from pin F routed out pin B to turn on illumination lamps in instrument panel cluster and Voltmeter, and enable cab dome lamp switch. Brightness of lamps can be set by DIMMER COMPT LIGHTS control. Main switch can be in any position other than OFF.

Auxiliary Switch DIM. Same as PANEL BRT. position above.

Auxiliary Switch OFF. Instrument panels illumination lamps all off.

Auxiliary Switch PARK. Same as PANEL BRT. position above.

3. AIR PRESSURE WARNING ALARM. Mounted beneath instrument panel. Connected in series with air pressure switch installed in Parking Brake Control. When air pressure falls below 64 to 76 psi, air pressure switch closes applying 24 Vdc to warning alarm. Alarm sounds warning operator that air pressure is below level necessary to safely operate loader.

4. COLD START SWITCH. Connected in series between Ignition Key switch start terminal and cold start solenoid. Pressing switch energizes cold start solenoid in turn injecting measured amount of ether into intake manifold. Used as starting aid when ambient temperature is below 32 degrees. Switch is operable only when Ignition Key switch is in start position.

5. HYDRAULIC FILTER INDICATOR. Connected in series with hydraulic filter switches installed in steering hydraulic filter and hydraulic system hydraulic filter. When pressure increases in hydraulic filters due to clogging condition, switches close. When any one switch closes, HYDRAULIC FILTER light comes on indicating filter is clogged and must be changed. Resistor (40 ohms 2 watts) in circuit limits current through lamp.

6. DIMMER COMPT LIGHTS CONTROL. Connected in series with cab dome light and switch, voltmeter illumination lamp, and instrument panel cluster illumination lamps. Clockwise rotation increases resistance dimming these lights and lamps; counterclockwise rotation decreases resistance causing lights and lamps to be brightly lit. Resistor (15 ohms 25 watts) in circuit limits current through illuminating lamps.

7. FLOOD LIGHTS SWITCH. Applies 24 Vdc power to front and rear flood lights causing them to turn on. Switch is operable only when Vehicle Lights Switch is in SER. DRIVE position.

8. 5 AMPERE CIRCUIT BREAKERS. Resetable circuit breakers. Press button to reset. Top circuit breaker protects return-to-dig and bucket height control circuits. Bottom circuit breaker protects auxiliary steering circuit, instrument panel cluster, voltmeter, cab relay solenoid, electric fuel pump, and air pressure switch and warning alarm.

9. 10 AMPERE CIRCUIT BREAKER. Mounted on underside of instrument panel. Protects front and rear flood lamps.

10. ELECTRONIC MILITARY LIGHT SWITCH: Located on the right instrument panel, it controls the operation of the machine's service, blackout, parking, and instrument panel lights.

Mode/Function Keys. Press to select desired function or mode of lighting. Both the selected function and the ENTER keys blue lights will come on. Press the ENTER key. The function key and selected lights will come on.

NOTE

- Press ENTER key to activate mode/function key selected. If ENTER key is not pressed in 5 seconds, the switch will reset to previous mode.
- The interior light switch does not operate in blackout mode.
- Ignition key switch must be in extreme counterclockwise position or ON position for vehicle lights switch to operate.

Mode and Function keys are as follows:

ALL OFF. Turns all lights off when pressed.

STOP LIGHT. Turns on when brake treadle valve is pressed. Turn signals can be operated.

SER. DRIVE. Taillights and front driving lamps lit. Stop lights will light when brake treadle valve is pressed. Turn signals and flood lights will operate when turned on.

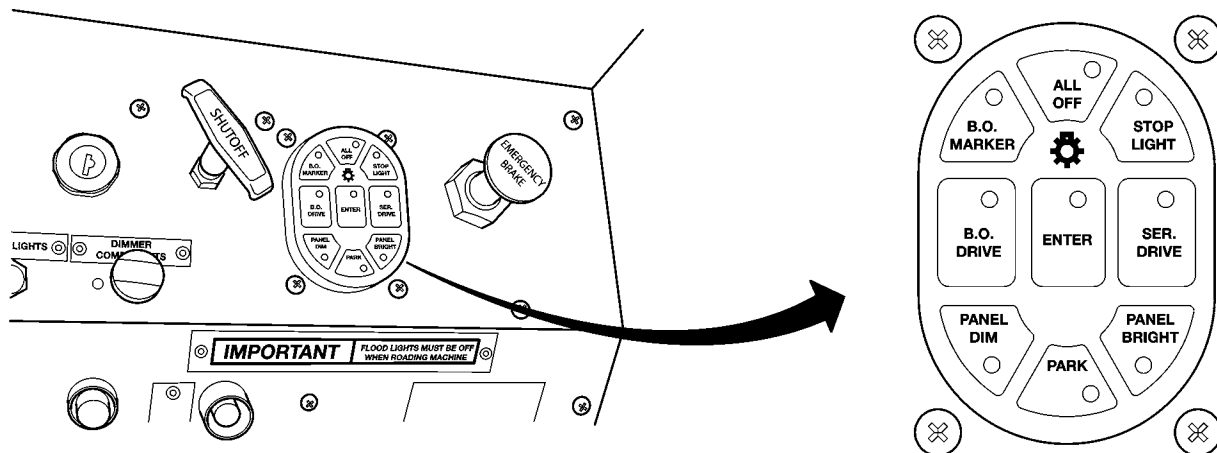
PANEL BRIGHT. Gage lights are brightly lit and cab dome light will operate when turned on.

PARK. Service taillights lit (main switch in SER. DRIVE position), gage lights are dimly lit and cab dome light will operate when turned on. Blackout taillights lit (main switch in B.O. DRIVE or B.O. MARKER position).

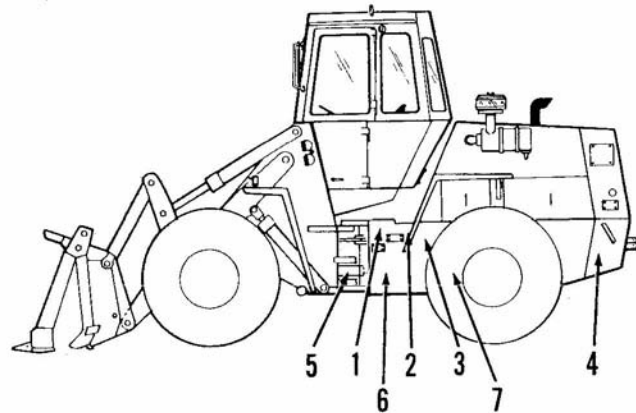
PANEL DIM. Gage lights dimly lit and cab dome light will operate when turned on.

B.O. DRIVE. Blackout taillights and driving lights lit. Stop lights will light when brake treadle valve is pressed.

B.O. MARKER. Blackout taillights lit. Stop lights will light when brake treadle valve is pressed.



1-24. TRANSMISSION AND DRIVE SHAFTS

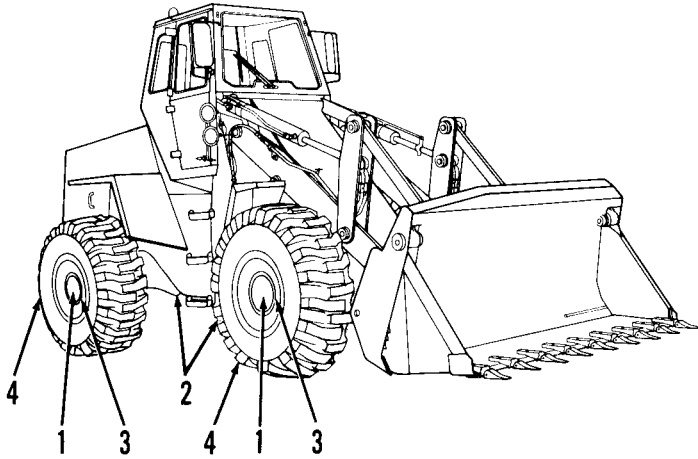


1. TRANSMISSION. Three speed transmission: two in forward and one in reverse. Hydraulic oil lubricates and cools transmission components, apply clutches, and turn torque converter turbines. Its major components are control valve including linkage, oil pump including filter, torque converter, free wheel clutch, reverse clutch, low clutch, high clutch, and necessary gears and shafts to send motion to output shaft of transmission.
2. CONTROL VALVE AND LINKAGE. Control valve directs hydraulic oil under pressure to desired directional and speed clutch. Directional and speed control valves connected by push-pull type cables to operator's transmission direction and speed selector control.
3. OIL PUMP AND FILTER. Draws hydraulic oil from transmission sump through oil suction screen and directs oil through external filter to transmission control valve. Oil enters transmission control valve at main pressure regulating valve. Filter removes impurities from oil.
4. TRANSMISSION COOLER. Part of radiator. Built into lower portion of radiator. Includes oil sampling valve used to drain a sample of transmission oil. Sample oil analyzed in laboratory for wear particles. This helps determine extent of wear in transmission. Transmission oil routed to and from radiator oil cooler through hoses.
5. FRONT DRIVE SHAFT. Connected between center drive shaft and front axle. Connected to front axle yoke by universal joint and to center drive shaft by a yoke with internal splines. Rear of front drive shaft supported by a bearing.

1-24. TRANSMISSION AND DRIVE SHAFTS (CONT)

6. CENTER DRIVE SHAFT. Connected between transmission output shaft and front drive shaft. Connection accomplished by universal joints.

7. REAR DRIVE SHAFT. Connected between transmission output shaft and rear axle by universal joints.



3. PLANETARY ENDS. Integral part of axle. Second reduction employs planetary spur gears. Power transmitted by differential carrier to axle shafts drives the sun gear. Sun gear drives planet spur gears which drive the planetary spider and in turn the wheel hub.

4. RIMS AND TIRES. Heavy duty steel rims; pneumatic tires 20.5 by 25, tubeless.

1-26. BRAKES (See figure FO-1.)

PARKING BRAKE SYSTEM. Consists of parking brake valve mounted on right instrument panel, air operated parking brake actuator, and parking brake assembly mounted on transmission output shaft. Refer to page 1-26 for a description of parking brake system operation.

SERVICE BRAKE SYSTEM. Consists of hydraulic brake system and pneumatic system; operation described below.

HYDRAULIC BRAKE SYSTEM. Consists of brake calipers mounted on each wheel end and two hydraulic brake reservoirs and two brake actuators, one for front wheels and one for rear wheels. Service brake treadle and valve controls the flow of air to both brake actuators. Each actuator has an air chamber and a hydraulic master cylinder. Air pressure from brake treadle and valve flows to air chamber, pushing diaphragm and push rod. This action pushes piston in master cylinder. Hydraulic pressure increases in brake lines forcing brake caliper piston outward and brake pads in brake calipers are applied to rotors mounted on axle wheel ends.

1-25. AXLE AND WHEELS

1. FRONT AND REAR AXLES. Double reduction type driven by propeller shafts. First gear reduction occurs in differential carrier, second gear reduction occurs in planetary wheel ends. Front axle is rigidly mounted; rear axle is trunnion mounted. Axles include differential carrier, planetary ends, and disk type brakes on each wheel.

2. DIFFERENTIAL CARRIER. Integral part of axle; single reduction unit employs a heavy duty spiral bevel gear.

PNEUMATIC SYSTEM. Provides air pressure for parking and service brakes, hydraulic reservoir, clutch cut-out, low pressure warning buzzer, horn, windshield washer, and air pressure gage. System operation is controlled by two brake treadle and valve assemblies, washer control, and horn valve located on cab deck. Comprised of air compressor assembly, brake actuators (described above), brake treadle and valve assemblies, pressure protection valve, pressure reducing valve, washer control, fluid reservoir, horn, and horn valve.

AIR COMPRESSOR. Compressed air supplied by a two cylinder, reciprocating compressor mounted on engine, right side. Driven by drive belt between air compressor pulley and radiator fan cooling hub when engine operating. Governor mounted on rear of air compressor and connected between air compressor and air reservoir to control compression. Air compression starts when air reservoir pressure falls below 95 psi and stops when pressure reaches a maximum of 122 psi. When air reservoir pressure reaches maximum, governor routes air to unloader in compressor which stops compression. If governor fails to operate properly, safety valve installed in air reservoir opens at 150 psi venting air to atmosphere preventing damage to system and possible personnel injury. Input air drawn through air cleaner via air cleaner adapter mounted on engine intake manifold.

AIR RESERVOIR. Air from air compressor routed to, and stored in, air reservoir until required by system components. Check valve installed at reservoir inlet prevents compressed air from flowing back to air compressor. Drain valve installed in bottom of air reservoir to drain water that accumulates due to condensation. Air actuated sending unit in air reservoir outlet generates an electrical signal for air pressure gage mounted in instrument panel cluster.

BRAKE TREADLE AND VALVE. Controls air flow to brake actuators. Incorporates a rubber piston spring. Pressing on brake treadle compresses this spring; further pedal is depressed, more spring resists. This feature allows more even control of air pressure, assuring more accurate control of brake application. A combined check valve and stop light switch prevents excessive air being applied to brake actuators and turns rear stop lights on.

INCHING TREADLE AND VALVE. Controls air flow to clutch cutout cylinder mounted on transmission control valve. Inching treadle and valve same as brake treadle and valve. Depressing this treadle disengages transmission during loader operation allows operator to inch further from or closer to load.

BRAKE ACTUATORS. See hydraulic brake system description on page 1-24 above for description of brake actuators.

CLUTCH CUTOUT. Used to disengage transmission during loader operation to inch loader closer to or further from load. When inching treadle depressed, compressed air routed to cylinder in transmission control valve. Push rod in cylinder moves a spool in transmission control valve. Spool stops flow of oil to clutches and releases pressure in clutches so that transmission is in neutral. Allows effective way of causing loader to inch forward other than using brake treadle.

AIR PRESSURE GAGE. Mounted on instrument panel cluster. Green area of gage indicates enough air pressure for safe operation of loader. Red area of gage indicates there is insufficient air pressure for safe operation. Air system is at a maximum pressure of 110 psi.

1-26. BRAKES (CONT)

PRESSURE PROTECTION VALVE. Performs two functions: (1) permits fast increase in pressure in air reservoir when pressure in system is below 65 psi and (2) keeps pressure in air reservoir if an air leak in hydraulic reservoir or between pressure protection valve and hydraulic reservoir exists. Pressure protection valve opens when pressure in air reservoir increases to approximately 85 psi and closes when pressure decreases to approximately 65 psi.

PRESSURE REDUCING VALVE. Mounted in hydraulic reservoir air pressure line. Decreases air pressure applied to hydraulic reservoir to 7 to 12 psi. Air pressure is applied to the hydraulic reservoir to ensure a constant oil supply when loader is traversing up or down a steep incline and to prevent cavitation of hydraulic oil.

RELIEF VALVE. Mounted in pressure reducing valve port. Protects hydraulic reservoir from excessive air pressure. Vents air when pressure exceeds 12 psi.

AIR HORN AND HORN VALVE. Air horn activated by pressure on horn valve button located on cab deck near inching treadle. Depressing horn valve button applies air pressure to horn causing horn diaphragm to vibrate and sound.

PARKING BRAKE VALVE AND ACTUATOR. Pushing in knob of parking brake valve routes air pressure to parking brake actuator. This air pressure pushes against piston and spring in parking brake actuator. As piston moves, linkage connected between actuator and parking brake assembly releases parking brake and permits normal use of loader. A minimum of 60 psi air pressure is necessary to hold parking brake in released position. Pulling out knob of parking brake valve releases air from parking brake actuator through parking brake valve. Spring in parking brake actuator then applies parking brake assembly. Loader cannot be moved until knob of parking brake valve is pushed in or parking brake assembly is manually released.

PRESSURE SWITCH. Mounted in parking brake valve port. Switch is closed when air pressure not applied to parking brake actuator. This turns brake indicator located on instrument panel cluster on. When air pressure applied releasing parking brake actuator, switch opens, turning brake indicator off.

WARNING BUZZER SWITCH. Mounted in parking brake valve port. Closes to sound warning buzzer when air pressure in system is less than approximately 70 psi. Warning buzzer mounted on right instrument panel.

WASHER CONTROL AND FLUID RESERVOIR. Control mounted on left instrument panel; fluid reservoir mounted in hydraulic reservoir area, right side. Pressing washer control applies pressure to fluid reservoir forcing water through hose and nozzle mounted in front of windshield.

1-27. STEERING SYSTEM See figure FO-11

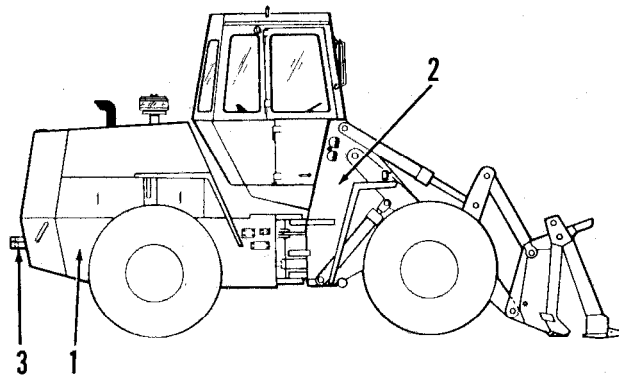
STEERING GEAR. Steering is controlled by steering wheel in cab. Steering wheel mechanically connected to steering gear. Position of steering wheel varies oil flow through steering gear which in turn varies flow of oil to steering cylinders controlling direction of loader.

FLOW CONTROL VALVE. Controls flow of oil to steering gear, in effect, reducing oil flow from hydraulic pump steering section to approximately 13 gpm. Relief valve located in flow control valve and is not adjustable; setting is 2500 ±100 psi.

CHECK VALVE. Prevents oil from auxiliary steering motor and pump entering hydraulic pump when auxiliary steering motor and pump operating.

AUXILIARY STEERING MOTOR AND PUMP. Automatically provides steering hydraulic power if engine shuts down. Includes flow switch and auxiliary steering check valve. Check valve prevents oil from hydraulic pump entering auxiliary steering pump when hydraulic pump is operating. If engine stops, hydraulic pump stops pumping oil. Flow switch will operate to electrically activate auxiliary steering control circuit (page 1-18), When control circuit is activated, auxiliary steering motor and pump will operate providing hydraulic power to steering system.

STEERING CYLINDER ASSEMBLIES. Two used, one mounted on each side of loader. Each end of cylinder attached to front and rear chassis.



1-28. FRAME AND TOWING ATTACHMENTS

1. **REAR CHASSIS ASSEMBLY.** Constructed of heavy duty steel. Includes (1) frame stops constructed of heavy duty rubber which provide stops when chassis' are turned to their maximum travel. (2) Transport/service link used to prevent front chassis from pivoting when loader raised from ground or when maintenance performed. (3) Engine side panels. (4) Trunnion lubrication fittings installed on left side of loader and connected to trunnion via grease hoses. (5) Lift and tiedowns welded to chassis at rear. (6) Trunnion to which rear axle is fastened. Trunnion pivots at center to ensure four wheel contact at all times on uneven terrain.

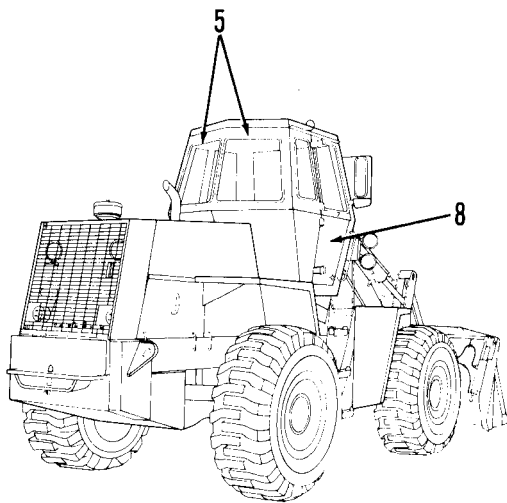
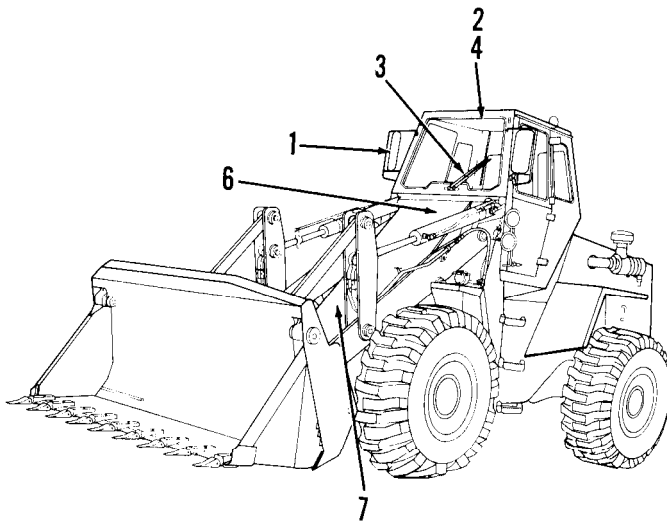
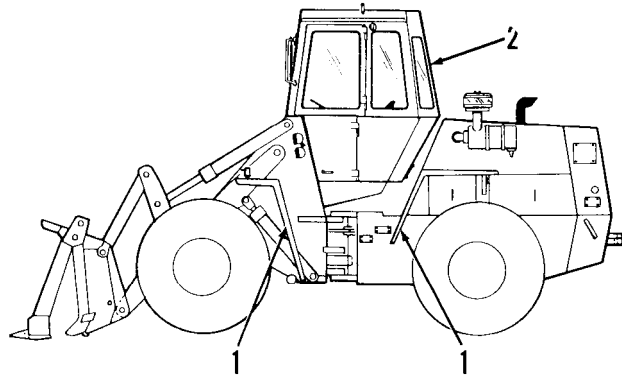
2. **FRONT CHASSIS ASSEMBLY.** Constructed of heavy duty steel. Includes (1) steps for access to cab; (2) frame stops constructed of heavy duty rubber which provide stops when chassis' are turned to their maximum travel. (3) Tiedowns and lifting brackets welded to chassis. (4) Chassis spindles on which front and rear chassis' pivot when loader is turned.

3. **DRAWBAR PIN.** Located at rear of loader. Used to attach tow bar to loader for either towing loader or another vehicle.

1-29. BODY AND CAB

1. FENDERS. Two front fenders and two rear fenders. Constructed of heavy gage steel.

2. CAB. Metal construction. Provides facilities for one man operation of loader. Easily removable for air shipment. Attached at rear of front chassis approximately over pivot point. Includes front and rear windshields, two door assemblies, cab dome light, defroster fans (2), and defogger assembly.



1-30. ACCESSORIES

1. MIRRORS. Two outside mirrors mounted on cab. One inside mirror mounted on cab ceiling.

2. CAB DOME LIGHT. Located at center of cab ceiling. Switch operated. Protected by resetable 5 ampere circuit breaker located on right instrument panel.

3. WINDSHIELD WIPER AND MOTOR. One used for front windshield. Two speed electric motor operated. Switch mounted on cab console panel. Protected by resetable 3 ampere circuit breaker also mounted on cab console panel.

4. DEFOGGER ASSEMBLY. Located at cab ceiling above front windshield. Blows warm air on windshield to prevent fogging. Control switch located on cab console panel. Protected by resetable 6 ampere circuit breaker also located on cab console panel.

5. FAN ASSEMBLY. Two used. Electric fans. One each above both rear windshields. Switch integral with fan assembly. Protected by resetable 6 ampere circuit breaker located on cab console panel.

6. WINDSHIELD WASHER. Part of pneumatic system. Refer to page 1-26 for description.



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