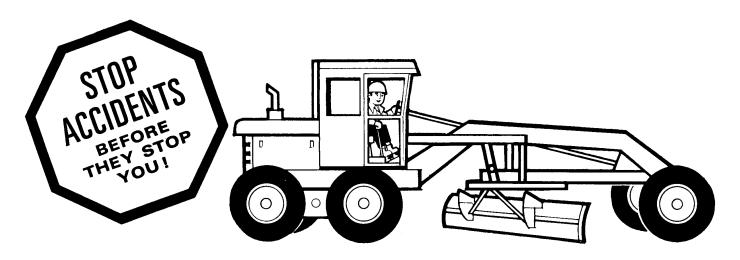
MOTOR GRADER TB 385-9

Safety Manual

FOR OPERATING AND MAINTENANCE PERSONNEL



HEADQUARTERS, DEPARTMENT OF THE ARMY

DECEMBER 1973

OPERATOR'S SAFETY MANUAL

This bulletin contains copyright material.

TECHNICAL BULLETIN

HEADQUARTERS DEPARTMENT OF THE ARMY WASHINGTON, D.C., 20 December 1973

NO. 385-9

SAFETY MANUAL, MOTOR GRADER FOR OPERATING AND MAINTENANCE PERSONNEL

This manual is intended to illustrate only basic safety procedures. Additional precautions may be necessary for the safe operation of motor graders. The information contained in this manual is not intended to replace safety codes, rules and regulations.

This bulletin contains copyright material reproduced by permission of the Construction Industry Manufacturers Association.

PROMOTE SAFETY

FOREWORD

SAFETY of the operator and maintenance personnel for motor graders is of prime concern. This Safety Manual is designed to present situations which exemplify some of the daily work problems encountered by the operator and other personnel.

It is the responsibility of the operator to know what specific requirements, precautions and work area hazards exist, and to discuss these with his foreman or supervisor. A common understanding should be reached by all personnel to assure safe performance in operating the equipment.

The operator is the key to safe job performance and should study this safety manual to be aware of basic safety precautions to help prevent serious injury and damage to property. This manual is presented as a helpful guide to construction equipment personnel.

STOP ACCIDENTS BEFORE THEY STOP YOU!

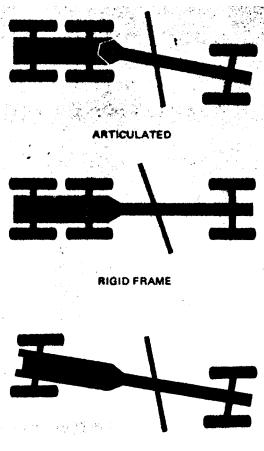


A WORD TO THE OPERATOR

The safest machine must still be operated with care and with knowledge of its performance capabilities. The most comprehensive safety program must still be followed. So the man who has the ultimate responsibility is the operator. You!

READ THIS MANUAL, AND THE MANUFACTURERS' MANUALS, COVERING YOUR SPECIFIC MOTOR GRADER. STUDY THEIR PRECAUTIONS. READ THE WARNING PLATES ON YOUR MACHINE. PRACTICE SAFE OPERATION. INSIST THAT YOUR FELLOW WORKERS DO, TOO. BE ALERT TO POSSIBLE HAZARDS BEFORE THEY CAUSE TROUBLE, AND REMEMBER...

Safety is up to you!

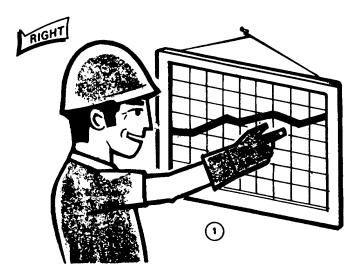


CONTENTS

Page	Page	
SAFETY IS-FORESIGHT6 Know your employer's safety program Dress properly for the job Understand your grader - Know your area	Brake safely General precautions Grading - high banks/slopes Grading - near overhang	1
Personal dress Know all signals and traffic rules Emergencies	Snow removal Roading grader - Towing the grader	2
Be safety-conscious	(5) SHUT DOWN-WITH CARE28	
DEEODE OTABTINO OLIFOIC		_
Check grader and attachments - Walk-around	Shutdown procedure Dismount carefully	3
Fueling - Coolant check Clean-up for safety Report necessary repairs Check the area	(6) SERVICE AND REPAIR - CAREFULLY30 Read and understand Warning tags Clothing - safe practice	4
STARTING17 Mount carefully	Work area - Equipment Blocking equipment Fire hazards	5
Start correctly Starting procedure Cold weather starting	Pressurized systems'- Heavy parts Hydraulic system - Electrical system Brakes	6
OPERATING GRADER -SAFELY21 A few tips to live by! Remember the rules of the road Clutch and shift correctly to retain control	(7) TIRE SAFETY41 Pressure points Use quality parts Tire mounting tips	7
	SAFETY IS-FORESIGHT	SAFETY IS-FORESIGHT

know your employer's safety program

- Safety records show that a great percentage of accidents are caused by disregard of simple safety rules. (1)
- Know and observe the overall program consult your foreman for specific instructions when starting a job.
- The best safety device is an alert informed operator!





dress properly for the job

- You may need any number of special items safety hat, safety shoes, goggles, heavy gloves, ear protective devices, etc. - for your own protection.
- Find out what items are required and wear them.





understand your grader

- Read the manufacturer's operating manual. Know the capabilities of your equipment - and its limitations. Become thoroughly familiar with all controls, gauges, instruments, changes. (3)
- If your grader is equipped with protective devices, USE THEM. Work slowly and carefully until accustomed to the equipment.
- TAKE YOUR TIME NOT YOUR LIFE!

know your working area

- Learn beforehand as much about your working area as possible:
- Surface condition.
- Holes, obstructions, mud or ice.
- Heavy traffic and traffic pattern.
- Thick dust, smoke, fog.
- Eliminate the element of surprise you'll have fewer emergencies. (4)

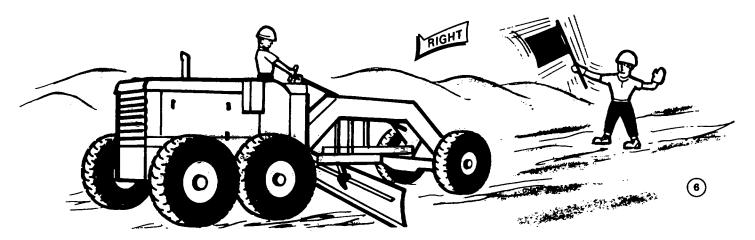


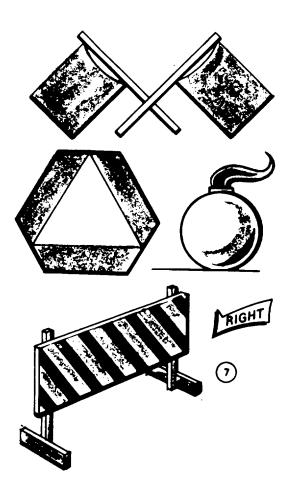
personal dress

 Loose clothing can catch in moving parts. (5) Keep sleeves buttoned, jackets belted, and wear your special safety equipment. Keep warm without restricting your movement. Wrist watches and rings can be dangerous. Keep your pockets free of objects which may fall out.

know all signals and traffic rules

 Hand signals should be used by you as well as your signalman. Know who your signalman is and obey the signals! Move in and out of work areas under the direction of a signalman, if he is present. Be courteous in giving the right of way. (6)





 Learn the meaning of all signal flags, signs, and markings. For night operation, carry a flare kit. (7)

emergencies

- Plan ahead stay alert operate sensibly and you will avoid both having and causing personal injury and accidental equipment damage. If a careless moment does cause an emergency react quickly with the tools and skills at hand. Know location of and how to use a fire extinguisher and a first aid kit.
- Know where to get prompt assistance.
- An emergency calls for fast action! (8)



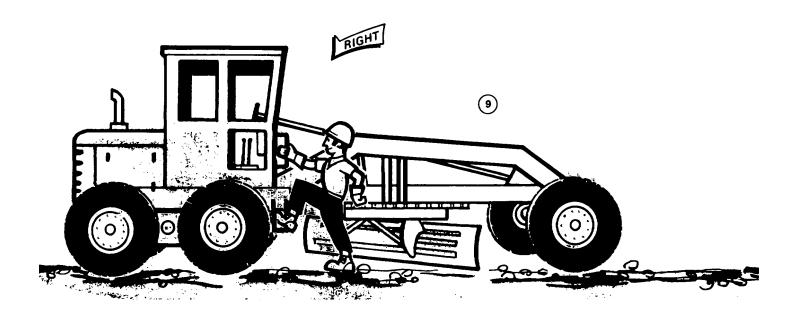
be safety-conscious

Staying healthy on the job is your responsibility.
 To help yourself - and others - practice the following DO's and DON'Ts:

FOR INSTANCE:

DO -

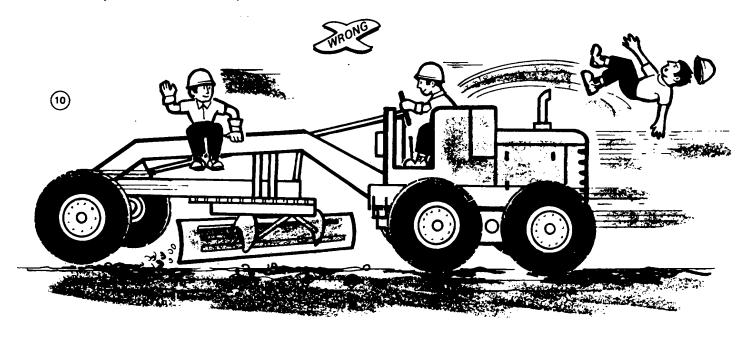
- Observe all signals
- Sound horn before starting engine or moving vehicle
- Mount and dismount properly (9)
- Be alert to vehicle traffic when on foot
- Obey traffic rules
- Heed all warnings
- Maintain control of grader at all times



FOR INSTANCE: DON'T -

- "Speed"
- Carry unauthorized riders (10)
- Engage in horseplay
- Get on or off a moving vehicle
- Service a grader in motion
 Drive any vehicle that needs repair

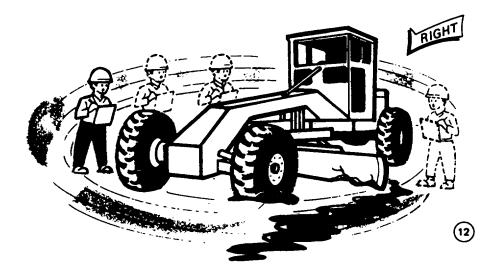
THESE ARE GENERAL SAFETY RULES. SPECIFIC WORKING CONDITIONS - AND YOUR PARTICULAR EQUIPMENT - CAN REQUIRE ADDITIONAL PRECAUTIONS.





check grader and attachments

 Equipment not properly prepared for operation is unsafe equipment. (11) Run a careful check at the beginning of your shift. If you find something that needs attention, THINK TWICE before deciding to "let it go this time." Even minor mechanical defects can lead to personal injury and accidents. Report any defect and see that repairs are made.



walk-around check

- Walk around the motor grader. Look for loose bolts, trash buildup, oil and coolant leaks, badly damaged tires. (12) Visually inspect the condition of other items such as -
- √ Controls
- √ Engine compartment
- √ Cooling system
- √ Gear boxes
- √ Linkages
- √ Blade and bits
- √ Scarifier √ R
- √ Rim lugs
 - √ Hydraulic system √ Tandem housings
 - √ Safety equipment

2

 CHECK fluid systems: Are they at the correct level, and completely leak free?
 For example ...
 LOSS OF PRESSURE FROM LOW FLUID LEVELS MAY LEAD TO SERIOUS HYDRAULIC STEERING AND BRAKE FAILURES. (13)



• CHECK every cap, drain cock, valve, fitting to be sure it is in place and secure.

ENGINE SEIZURE FROM LACK OF OIL IS A PROBLEM THAT MAY CAUSE ACCIDENTS.

 CHECK for broken, defective or missing parts and replace them.

INOPERATIVE HEADLIGHTS BECOME A PROBLEM WHEN VISIBILITY IS POOR.

 CHECK tires. Be sure they are correctly inflated; show no serious cuts, bulges, irregularities or abnormal wear.

fueling

 Use caution in handling any type of fuel, particularly near a hot engine. NEVER refuel when engine is running. Always ground the filler spout against the filler neck to avoid a spark. PUT OUT THAT CIGARETTE before checking or adding fuel. (14)





coolant check

WARNING:

LOOSEN RADIATOR FILLER CAP SLIGHTLY PAUSE TO RELIEVE PRESSURE SLOWLY THEN REMOVE CAP. (15)

 NEVER pour cold coolant into the radiator if the engine is very hot.

clean-up for safety

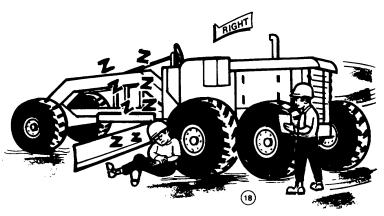
- Your visibility will be better, if you clean all windows, mirrors, and outside light lenses. (16)
- You're safer if you clear the cab steps, grab rails, floor and seat of mud, oil, water, and ice in freezing weather, and keep floor free of debris and tools.
- Your grader will be safer, if you keep front axle and steering mechanism, tandem drive housings and blade control linkage clean.
- You can handle controls without slip-ups, if you wipe steering wheel, foot pedals, hand levers and knobs clean of oil or grease.
- You will eliminate distraction while driving, if you secure tools, lunch buckets and other material in the operator's compartment.



report necessary repairs

- If your daily check uncovers any item that needs attention - repair, replacement or adjustment -REPORT it NOW! (17)
- The most minor defect could result in more serious trouble - IF THE GRADER IS OPERATED.





check the area

Before starting, walk completely around your motor grader.
 Make sure there is no one next to, under, or on the machine. Warn any personnel nearby that you are starting up. (18)

ALWAYS LOOK OUT FOR THE OTHER GUY!

- NEVER start engine within an enclosed area unless there is adequate ventilation.
 - **EXHAUST FUMES CAN KILL!**
- NOW, YOU'RE READY TO START!

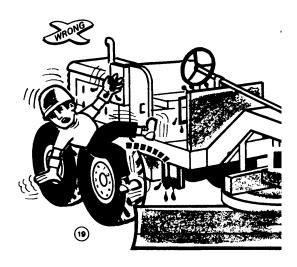
3

REMEMBER ALL WARNINGS GIVEN IN YOUR MANUFACTURER'S OPERATION MANUAL

mount carefully

- Use all steps and hand-holds provided. Don't get on machine or operate it with wet or greasy hands, or muddy shoes. (19) NEVER try to mount a machine in motion.
- WHEN GETTING READY TO START, BE COMFORTABLE. ADJUST STEERING WHEEL AND SEAT FOR BEST OPERATING POSITION.





start correctly

- Follow instructions and precautions given in the operator's manual - and pay particular heed to any warnings given.
- ALWAYS SOUND THE HORN BEFORE STARTING.

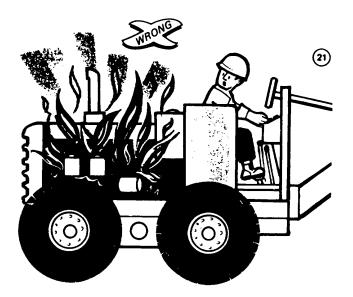
STARTING



starting procedure

- · Check equipment for warning tags.
- Check controls to be sure they are in NEUTRAL before starting engine.
- Be sure parking brake is set.
- It is a good safety habit to sound horn before starting up.
- After engine has been started, observe a gauges and instruments for correct readings.
- Shut down engine immediately if any in proper readings are observed.
- Test all controls for proper functioning.
- Test parking and service brakes. (20)
- Test right and left steering while moving slowly.
- Test engine governor control lever an accelerator.
- · Listen for and report any unusual noises.
- Recheck lights, back-up alarms or other warning and safety devices.

 NEVER operate electric starter for more than 30 seconds. Allow 2 minutes for cooling before starting again. Overheated starter could cause a fire. (21)





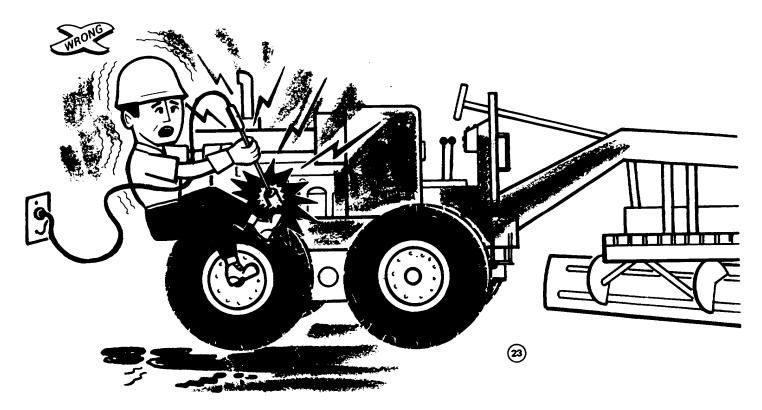
cold weather starting

- When cold weather starting fluid is required, follow manufacturer's recommendations.
- REMEMBER -THIS FLUID IS FLAMMABLE!
- Do not puncture or burn container. Dispose of it according to manufacturer's instructions on the container. (22)

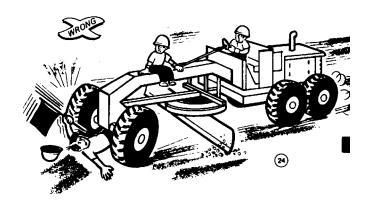
STARTING

cold weather starting

• If heaters are used for cold weather starting, be sure to follow manufacturer's recommendations. (23)

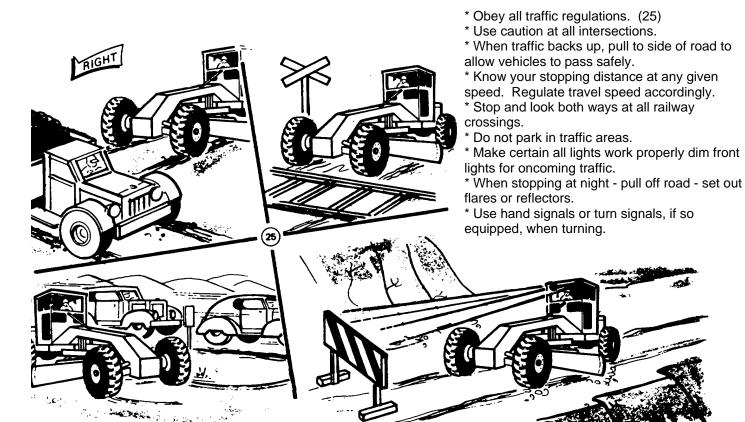


- No unauthorized riders. (24)
- · Look behind machine before and while backing.
- Be aware of overhangs, electric wires, slide areas, or other dangerous conditions.
- Use extra caution in crossing side hills, ridges, ditches and other obstructions.
- Match speed with job conditions.
- Do not coast.
- Know traffic pattern of job and obey flagmen, road signs and signals. (24)
- Be alert to unusual traffic patterns. In some situations, one way traffic is required or driving on the left hand side is correct
- Keep machine under control do not try to work machine over capacity.



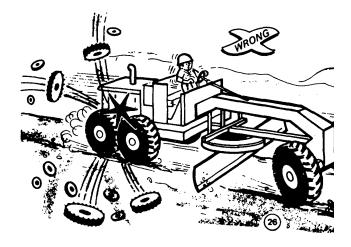
- Make sure clearance flags and other required warnings are on machine when roading.
- When scarifying across a slope, keep blade crossways to provide some protection against tipping.

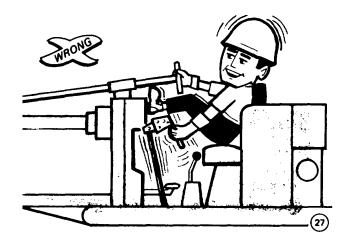
remember the rules of the road



clutch and shift correctly to retain control

- Do follow instructions in the manufacturer's manual for clutch and shift operations.
- Stay in proper gear when traveling downhill (26) ...
 NEVER COAST IN NEUTRAL. Maintain engine
 RPM to give you control when you need it. It is
 generally recommended that the same gear range
 be used for traveling up or down a grade.





brake safely

- Use service brakes and parking brake carefully and in strict accordance with manufacturer's instructions. Proper use of brakes will increase their life span - and possibly yours.
- Use the parking brake for parking. Only an emergency may justify using this brake to help slow down and stop the motor grader. (27)

OPERATING GRADER - SAFELY

general precautions

- Be careful when operating on a slope.
- Operate controls from operator station only.
 (28)
- Cross obstacles at an angle and at slow speed. Be alert when going over obstacles.
- Get help, if necessary, for jobs such as adjusting links.
- · Use proper hitch equipment when towing.
- Use caution when backing up to hitch.
 Watch ground man's signal -wait until he is clear before pulling away.
- Stop machine and back away from objects that should be removed, such as stumps and rocks. (29)
- Watch out for sewer manholes and bridge abutments. (30)



OPERATING GRADER - SAFELY

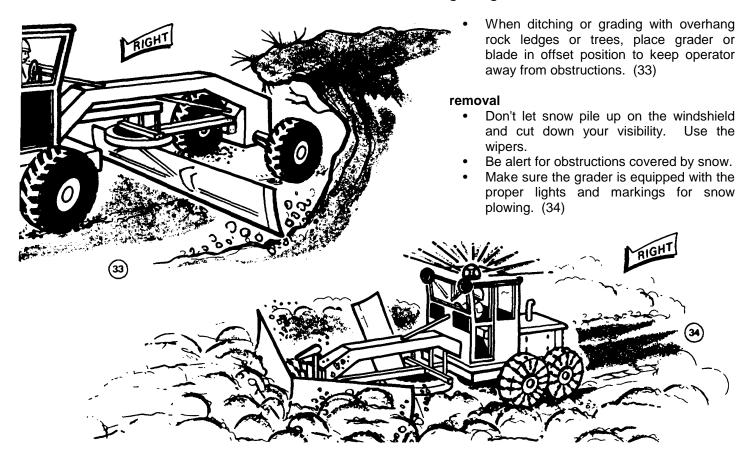


grading - high banks/slopes

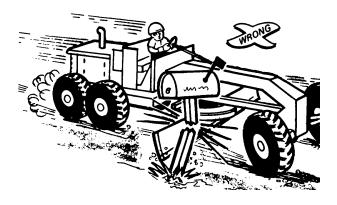
- Keep away from outer edge when working on sidehill road - extended blade to move material near edge. (31)
- Use extreme care to avoid blade down pressure and obstacles when working on hills, banks or slopes. This can tip you over. (31)
 - When rear wheels can be offset, refer to operator's manual for proper procedure. Also refer to manual for positioning mold-board in offset positioning. (32)



grading



OPERATING GRADER - SAFELY

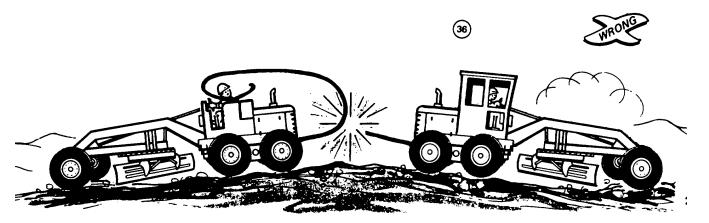


towing the grader

 Improper towing may be dangerous. (36) Refer to manufacturer's instructions for correct procedures. NEVER tow grader at high speeds.

roading grader

- Clearance flags, lights, and warning devices such as "SLOW MOVING VEHICLE" signs may be required. Conform to governmental regulation.
- Always position blade within wheel width and raised as high as possible. (35)



SHUT DOWN - WITH CARE

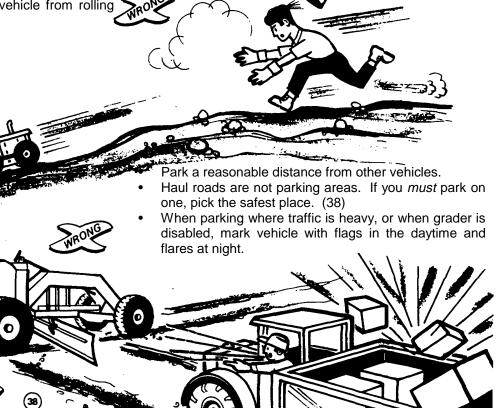
parking precautions

(37)

Select level ground whenever possible.

Set parking brake and lower blade to ground.If parking on a slope cannot be avoided,

position grader to prevent vehicle from rolling down slope. (37)

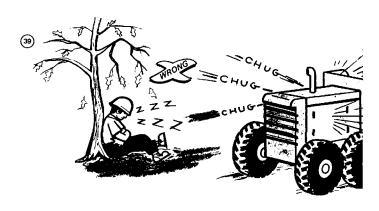


shutdown procedure

- Read and follow the detailed shutdown procedure as given in your manufacturer's manual.
- The SEQUENCE of this procedure is important ... and should become a habit in practice.

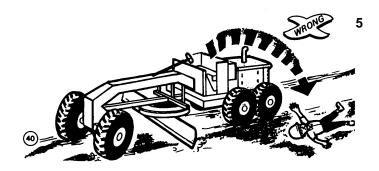
For example:

- Lower all equipment to ground.
- · Reduce engine speed.
- Place transmission in neutral and lock shift lever if so equipped.
- Set parking brake.
- · Allow hot engine to cool gradually.
- · Stop engine.
- Secure machine as instructed to prevent unauthorized starting and movement.
- IT'S AN UNSAFE PRACTICE TO LEAVE YOUR GRADER UNATTENDED WHILE ENGINE IS RUNNING. (39)



dismount carefully

- Dismount from your grader only when it is fully stopped. A moving machine is dangerous without an operator.
- Don't jump off. Use hand rails and steps, and face the machine when getting off. (40)



read and understand

- Maintenance manual furnished with grader.(41)
- Engine manufacturer's instructions for adjustments and repairs.
- Lubrication guide for periodic servicing.
- Instructions thoroughly before performing needed repairs.
- Warning and caution plates provided on motor grader.



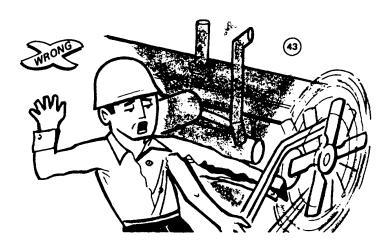


warning tags

- Attach warning tags to steering wheel, or as directed, to prevent accidents. (42) For example:
- If machine is unsafe for operation.
- If controls are being serviced.
- If machine is being repaired.
- If any system or compartment has been drained.

clothing - safe practice

- For example:
- KEEP HANDS AND CLOTHING AWAY FROM MOVING PARTS. Don't take chances by wearing loose sleeves, floppy ties, watches and rings. (43)
- WEAR EYE PROTECTION when handling fuel, cleaning fluid, oil or brake fluid. THESE MATERIALS CAN DAMAGE YOUR EYES.
- WEAR A RESPIRATOR when required.
- WEAR SAFETY GLASSES when drilling, grinding, or hammering metal.
- Keep your pockets free of objects which can fall out and into machinery.
- WEAR HARD HAT AND SAFETY SHOES, when required.





work area

 When working indoors, make sure the building is properly ventilated. EXHAUST FUMES CAN KILL YOUI (44)

6

work area

- Keep the floor clean and dry. Oily, greasy floors are slippery. Wet spots, especially near electrical equipment, are dangerous.
- Store dangerous fluids in a suitable place away from unauthorized personnel. (45) ALLOW NO SMOKING IN THE AREA!





equipment

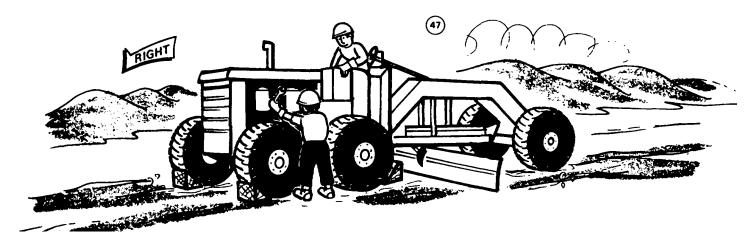
- Keep all tools and equipment free of dirt, oil and grease. Do not drop or toss tools around. Protect nearby personnel.
- Use hoisting equipment for heavy lifting SAVE YOUR BACK!
- Use only approved commercial solvents for cleaning parts.
- Clean steps, hand rails and all areas of the grader you will be working on. (46)

blocking equipment

Be sure engine is stopped before - cleaning, servicing, lubricating, checking belt tension, adjusting brakes or clutch, removing housing covers, working on hydraulic system, making repairs - except for those adjustments which require a running engine. In this case, have brakes set, transmission in neutral, wheels blocked and TWO MEN working, one at the controls and one at the engine. (47)

WARNING:

NEVER run an engine if the air inlet tube or exhaust outlet is disconnected. Clothing or debris can be drawn into the air inlet. Discharged carbon particles and hot exhaust gas from the engine outlet can cause personal injury.

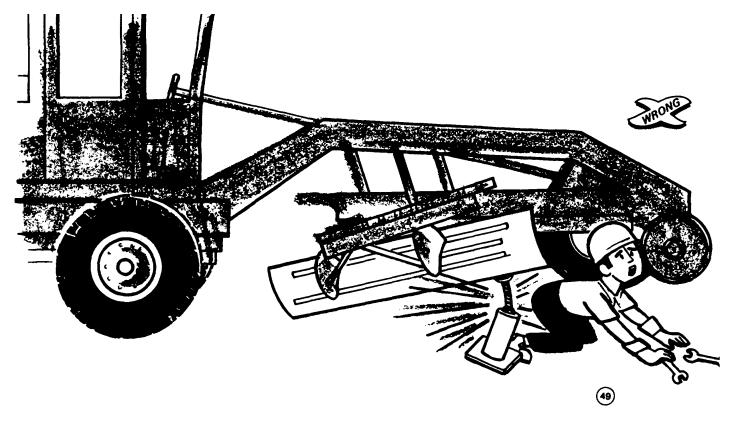


MAKE NO CHECKS, ADJUSTMENTS, OR REPAIRS OF ANY KIND WHILE MOTOR GRADER IS IN MOTION.

blocking equipment

- LOWER ALL RAISED EQUIPMENT BEFORE SERVICING GRADER.
- IF ANY EQUIPMENT MUST BE RAISED FOR SERVICE, BLOCK THE EQUIPMENT SECURELY. (48)
- If necessary to work on a machine positioned on an incline - or anytime the engine will be running -BLOCK MACHINE SECURELY, front and back.





- When jacking up vehicle, use a suitable jack in the proper position. Block wheels, front and back - set brake - and keep JACK EXTENSION WELL WITHIN ITS SAFE LIMIT. (49)
- Before working under a jacked-up vehicle, support SECURELY on axle stands or other rigid supports.

fire hazards

- Fuel is dangerous!
- Don't smoke while refueling or when handling fuel containers.
- Shut off engine when fueling -and use extra caution if engine is hot.
- When pouring fuel into the tank, ground the funnel or spout against the filler neck to avoid static electric spark.
- Don't use gasoline or diesel fuel for cleaning parts.
 Good commercial, nonflammable solvents are preferred. (50)
- Don't let greasy, oily rags accumulate in a poorly ventilated area.



SERVICE and REPAIR- CAREFULLY



- Battery Gas is Explosive
- Don't smoke near battery nor allow sparks or open flame in the vicinity. (51)

 Don't check battery charge by placing metal objects across the posts. Serious burns can result. (52)

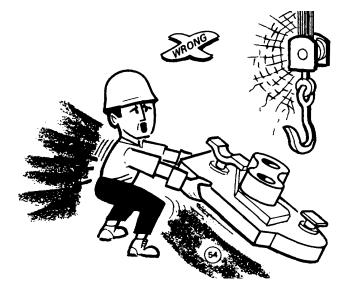


SERVICE and REPAIR- CAREFULLY

pressurized systems

- Engine coolant gets hot and builds up PRESSURE! Turn radiator cap just enough to relieve pressure before removing cap.
- Relieve ALL pressure before opening or removing any hydraulic pressure caps, lines, valves, fittings. (53)





heavy parts

- Handle tools and heavy parts SENSIBLY with regard to yourself and other persons.
- LOWER PARTS DON'T DROP THEM.
- Use hoisting equipment not your back for lifting heavy parts (54)
- AND WATCH OUT FOR OTHERS WITHIN STRIKING DISTANCE.

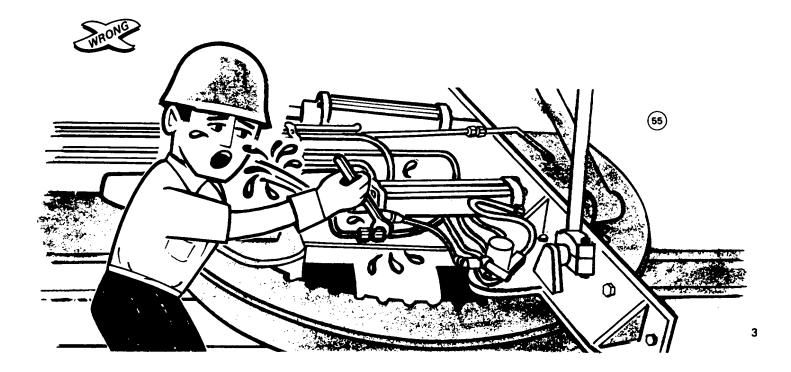
SERVICE and REPAIR - CAREFULLY

hydraulic system

WARNING:

High pressure and hot oil can be dangerous. (55)

- Lower all hydraulically actuated equipment before servicing the hydraulic system.
- Before working on a hydraulic system, be sure all pressure is relieved in accordance with manufacturer's recommendations.

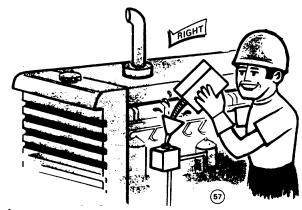


SERVICE and REPAIR - CAREFULLY

electrical system

- ALWAYS DISCONNECT BATTERY BEFORE REPAIRING ELECTRICAL SYSTEM - OR PERFORMING A MAJOR OVERHAUL. Disconnect ground terminal first, and install last.
- Become thoroughly familiar with the different procedures and special handling required. (56)
- Observe all cautions for battery installation and booster connections.





brakes

- When adjusting brakes, follow manufacturer's instructions exactly.
- IMPROPER ADJUSTMENT CAN LEAD TO ACCIDENTS.
- Block wheels before bleeding wheel cylinders. Air trapped in hydraulic brake lines will cause erratic performance.
- When adding brake fluid, use only type recommended by manufacturer. (57)

pressure points

<u>TIRE SAFETY</u>

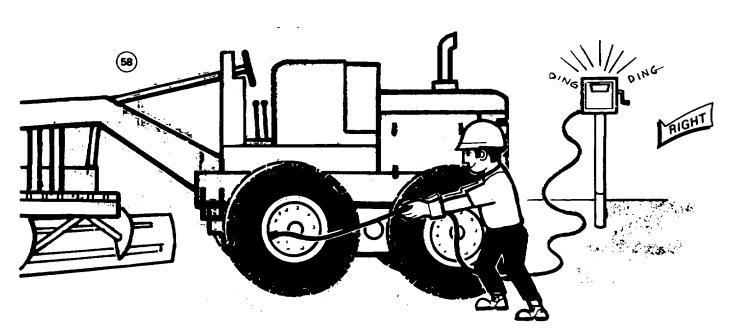
use quality parts

- Recommended Air Pressure must be maintained in every tire. Daily checks assure that inflation is correct for grader operation.
- Add Air- from a distance with self attaching air chuck on the tire valve Use an extension hose that permits you to sand behind tread. (58) Tire blowout can cause serious injury.

 A replacement part for any item on the vehicle should always be of comparable SIZE, TYPE and

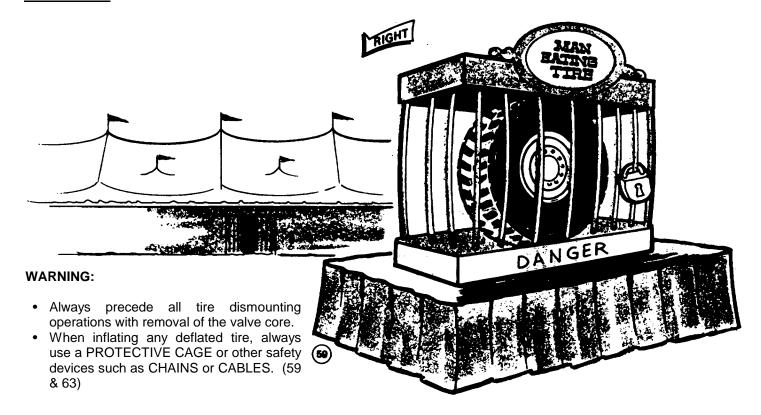
7

QUALITY - as the part being discarded.



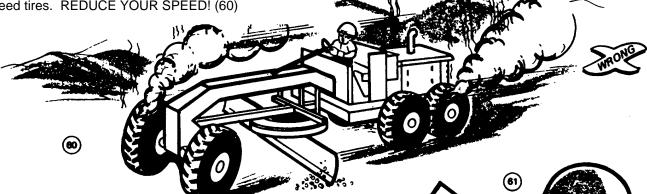
41

TIRE SAFETY



• Excessive Pressure -

A certain air pressure rise during operation is normal, and should NOT be reduced. High speeds during transport may produce excessive tire pressures due to heat. Never bleed tires. REDUCE YOUR SPEED! (60)

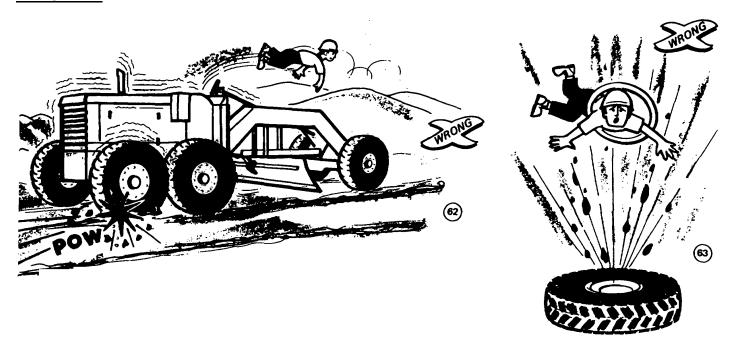


• Inspection Insurance-

For that added protection when you check pressure (61) also inspect for:

- Missing valve caps and wheel lugs.
- Cuts that may need repair.
- Abnormal or uneven wear, indicating mechanical trouble elsewhere such as bent axle, wheel misalignment, etc.
- Damaged or poor fitting rim or rim flanges.

TIRE SAFETY



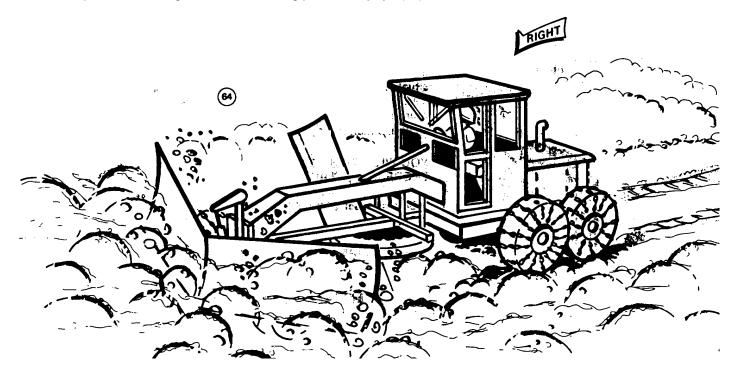
• IF YOUR PERIODIC CHECK DISCLOSES A TIRE THAT IS CONTINUOUSLY LOSING AIR, A LEAK IS INDICATED -AND MUST BE REPAIRED. A BLOWOUT CAN RESULT IN LOSS OF VEHICLE CONTROL. (62)

tire mounting tips

- Changing tires can be hazardous. Under press tire and rim assembly is potentially a danger. Special tools and procedures are required. Follow the required. Follow manufacturer's instructions to the letter.
- Do not use a heavy hammer to seat lock ring - damage to the locking lip will weaken it.

- Never stand over, or stand directly besides, a tire and rim during mounting.
- If a tire inflation is increased to stabilize the tires for excessive side tilt, be sure pressure is reduced for normal operation.

 When tire chains are used, keep them in good repair, to prevent throwing chains and causing personal injury. (64)



OPERATOR'S SAFETY MANUAL



A FINAL WORD

You have now read the Motor Grader Safety Manual. Although it is impractical to try to cover every possible operating or maintenance situation, the safety precautions recommended here should serve to develop operator safety habits and promote safe operation. Follow your employer's safety instructions and those covered by the manufacturer's manuals. YOU WILL THEN DISCOVER THE GREATEST SAFETY DEVICE THERE IS.... THE CAREFUL OPERATOR!

-Be a member of the SAFETY TEAM -

REMEMBER - Safety is up to you

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS General, United States Army, Chief of Staff

Official:

VERNE L. BOWERS Major General, United States Army The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-25B (qty rqr block No. 393) Operator maintenance requirements for Earth Moving Equipment: Graders.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS	
SOMETHING WRONG WITH THIS PUBLICATION?	
DOPE AB FORM, C	JOT DOWN THE OUT IT ON THIS AREFULLY TEAR IT LD IT AND DROP IT MAIL! FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS) DATE SENT
اع ا	
PUBLICATION NUMBER	PUBLICATION DATE PUBLICATION TITLE
BE EXACT PIN-POINT WHERE IT IS	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE GRAPH FIGURE TABLE NO.	
PRINTED NAME, GRADE OR TITLE, AND TELEPI	HONE NUMBER SIGN HERE:

DA 1501 2028-2

PREVIOUS EDITIONS
• ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

PIN: 009469-000