



California Vocational Agriculture Curriculum Guidelines Instructional Unit

ADJUSTMENTS, SERVICE, MAINTENANCE,
AND SAFE OPERATION OF AGRICULTURAL EQUIPMENT

<u>TABLE OF CONTENTS</u>	<u>Page</u>		
		Introduction to Agriculture	
PART I. Unit Goal and Performance Objectives.	1	Agricultural Production	01.01
PART II. Main Text.	2-7	Agricultural Supplies/Services	01.02
Teaching Outline.	2,4,6	Agricultural Mechanics	01.03
Suggested Learning Activities.	3,5,7		
Suggested Resource Materials	3,5,7		
PART III. Unit Evaluation.	8	Agricultural Products/Processing	01.04
PART IV. Teaching Aids.	9-21	Ornamental Horticulture	01.05
PART V. General References	22	Renewable Resources/ Rural Recreation	01.06
		Forestry	01.07

ADJUSTMENTS, SERVICE, MAINTENANCE,
AND SAFE OPERATION OF AGRICULTURAL EQUIPMENT

Unit Goals:

The student will become aware of the need for adjustments, service, maintenance and the safe operation of agricultural equipment common to their area. They will know how to perform these tasks or where to find assistance in performing these tasks.

Unit Performance Objectives:

The students will be able to:

1. Use an operator's manual to assist them in performing service and maintenance operations.
2. Check adjustments on agricultural equipment in common use in their area.
3. Use safe operation procedures of agricultural equipment in their area.
4. Use safe work habits while servicing, maintaining, and adjusting agricultural equipment.
5. Identify the hazards of working with agricultural chemicals.
6. Determine what safety standards to follow when using equipment spreading or spraying hazardous agricultural chemicals.

Teaching Outline

I. Tillage and Planting Equipment

A. Adjustments

1. Check operator's manual for each specific piece of equipment and become familiar with how to make all adjustments.
2. Improperly adjusted equipment can affect steering control, penetration and cause mechanical damage to equipment.

B. Safe Operation

1. Hitching and Unhitching

- a. Firm, level ground
- b. No student between tractor and implement
- c. Use of correct hitch pins
- d. Match equipment to the job and to the tractor

2. Operation

- a. Improperly maintained equipment pulls harder, wears faster, plugs up easier
- b. Avoid tight turns, steep slopes, fences, and other obstructions.

3. Transporting (TM - 1)

- a. Adjust to narrowest width
- b. Use lights, reflectors, slow moving vehicle signs
- c. Check local regulations if on highway

C. Service and Maintenance - Check owner's manual for service schedules to:

1. Lubricate and adjust moving parts
2. Replace parts that deteriorate with age
3. Maintain clearances to compensate for wear
4. Sharpen cutting edges for efficient operation
5. Look for worn and broken parts
6. Look for shields and other safety devices not in place or working properly
7. Tighten loose nuts and bolts to protect safety of operator and equipment

II. Hay and Forage Equipment

A. Adjustments - Check operator's manual for proper adjustment of:

1. Cutter bars - register, lead or lag
2. Crimping or crushing roller - correct clearance
3. Gathering reels, augers, drapers
4. Windrow size
5. Compression and tying units on balers

Suggested Learning Activities

1. Have local farmer go over with your class the adjustments, service, maintenance, and operation of equipment they use on their farm.
2. Visit local farm or equipment dealer to check adjustments, operation, service and maintenance of equipment.
3. Have at school or bring to school equipment for students to work with on this unit.
- I. 4. Discuss with class the types of tillage and planting equipment used in your area.
5. TM - 1
- II. 6. Discuss with class types of agricultural equipment using cutter bars in your area.
7. Check register, lead or lag on a mower.
8. TM - 2.
9. Obtain operator's manual and service a piece of equipment.

Suggested Resource Materials

1. Local farmers; service manual for specific equipment.
2. Local farmers or equipment dealers; service manual for specific equipment.
3. Local farmers or equipment dealers; service manual for specific equipment.
4. Fundamentals of Machine Operation, Agricultural Machinery Safety. John Deere Service Publications, Dept. F., John Deere Road, Moline, Illinois 61265
- 5.
6. Fundamentals of Machine Operation, Agricultural Machinery Safety. John Deere Co., Moline, Illinois.
7. Guide for Teaching Adjustments, Maintenance, and Repair of Mowers. New Mexico State Department of Agricultural Education.
8. Field mowers - AAVIM, Athens, Georgia.
9. Operator's manual for specific equipment available.

II. B. Safe Operation

1. Pre-start - students not to close gears, levers in neutral
 2. Field operation
 - a. Safe speed for field conditions, slopes, ditches, stumps, rocks
 - b. No riders, one seat for operator only
 - c. No one allowed in front or directly behind equipment while running
 - d. Keep all doors, shields, and safety devices in place during operation
 3. Stopping and Dismounting
 - a. Disengage all gears, levers, throttle down, all hydraulic parts lowered
 - b. Cut ignition (set parking brake, remove key)
- C. Service and Maintenance
1. Same as I.C.
 2. Also be aware of unusual noises, vibrations, moving parts too hot, lack of response in controls, increased power requirements, changes in operating speed, exhaust, warning lights or horns, gauges too hot or cold
 3. Before performing any service, maintenance, or adjustment be sure power is off, all moving parts have come to a complete stop

III. Harvesters

- A. Adjustments - Check operator's manual for proper adjustments of:
1. Cutting unit
 2. Threshing unit - cylinder, concave
 3. Separator unit - wind fan
 4. Cleaning unit
 5. May change because of crop conditions, moisture, terrain
 6. Major adjustments may have to be made to convert to a particular crop
- B. Safe Operation (TM - 4, TM - 5)
1. Field Preparation - stones, stumps, slopes, ditches may be no problem to planting, but you can't work as close with harvesters.
 2. Extra room needed at edges of field for turning
 3. Check for undercut banks, new ditches in field
 4. Plan row crops with row spaces (i.e., corn) that can be handled by harvester
 5. Fire hazard - use of spark arrestors

Suggested Learning Activities

- II. 2. Point out where excessive wear may occur, hazardous points on equipment.
- III. 3. Discussion of types of harvesting equipment used in your area.
- 4. Have class visit a farm while harvesting being done, i.e., beets, grapes, in season for your area.
- 5. Discuss, visit, invite local farmer to go over adjustments, maintenance problems with students.
- 6. Plan a visit to local implement dealer (preferably when new equipment is being assembled).
- 7. TM - 4, TM - 5.

Suggested Resource Materials

- 2. Baler, Operation, Service, Maintenance. Ohio State University, Columbus, Ohio, 43210.
- 3. Curriculum Guidelines, Production, Vol. I, Harvesting.
- 4. Local farmers.
- 5. Local farmers.
- 6. Local implement dealer.
- 7. Fundamentals of Machine Operation, Agricultural Machinery Safety. John Deere Service Publications, Dept. F., John Deere Rd., Moline, Illinois, 61265.

III. C. Service and Maintenance

1. Same as I.C. and II.C.
2. A majority of service done prior to going to the field
3. Lubricate and fuel daily after machine cools off; evening better than morning
4. Block up parts before working under (i.e., header)

IV. Chemical Equipment (granular and spray applicators)

A. Adjustments - Check operator's manual for each specific piece of equipment and become familiar with how to perform required adjustments (TM - 6)

1. Check for depth or placement of fertilizers or sprays
2. Check for different application rates
3. Calibration test - check with clean water on sprayers
4. Nozzle spacing, height
5. Pressure

B. Safe Operation (TM - 7, 8, 9, 10, 11)

1. See I.B., II.B. and III.B. for similar operation of equipment that may apply here
2. Be aware of hazards of fertilizers and pesticides
3. Proper protective clothing
4. Granular pesticides more toxic than granular fertilizer
5. Read labels for degree of hazard - danger, warning, caution
6. Kinds of exposure - oral, dermal, inhalation
7. Know antidote instruction on label
8. Check pipes, valves, hose connections on equipment for leaks

C. Service and Maintenance

1. See I.C., II.C., and III.C.
2. Chemical sprays and fertilizers can be very corrosive
3. Clean thoroughly - water, soapy water, diesel
4. Look for special instructions on cleaning pumps or nozzles in service manuals
5. Relieve pressure on sprayer before making any repairs or servicing equipment
6. Storage - do not put away after season's use dirty!

Suggested Learning Activities

Suggested Resource Materials

IV.

1. Discuss with class the types of equipment and agricultural chemicals used in your area.
2. Field calibrate a fertilizer spreader or a pesticide sprayer.
3. TM - 6.
4. Discuss proper protective clothing,
5. Bring into class labels from agricultural chemical containers to determine degree of toxicity and antidotes.
6. Demonstrate proper method of cleaning sprayer (or spreaders) after use.

1. Applying Pesticides, AAVIM, Athens, Georgia, 30602.
2. Principles of Pesticide Use, Handling, and Application, Ellis Associates, Inc., College Park, Maryland, 20740.
3. Fundamentals of Machine Operation, Agricultural Machinery Safety, John Deere Co., Moline, Illinois.
4. TM - 7, 8
5. Tm - 9, 10
6. School equipment

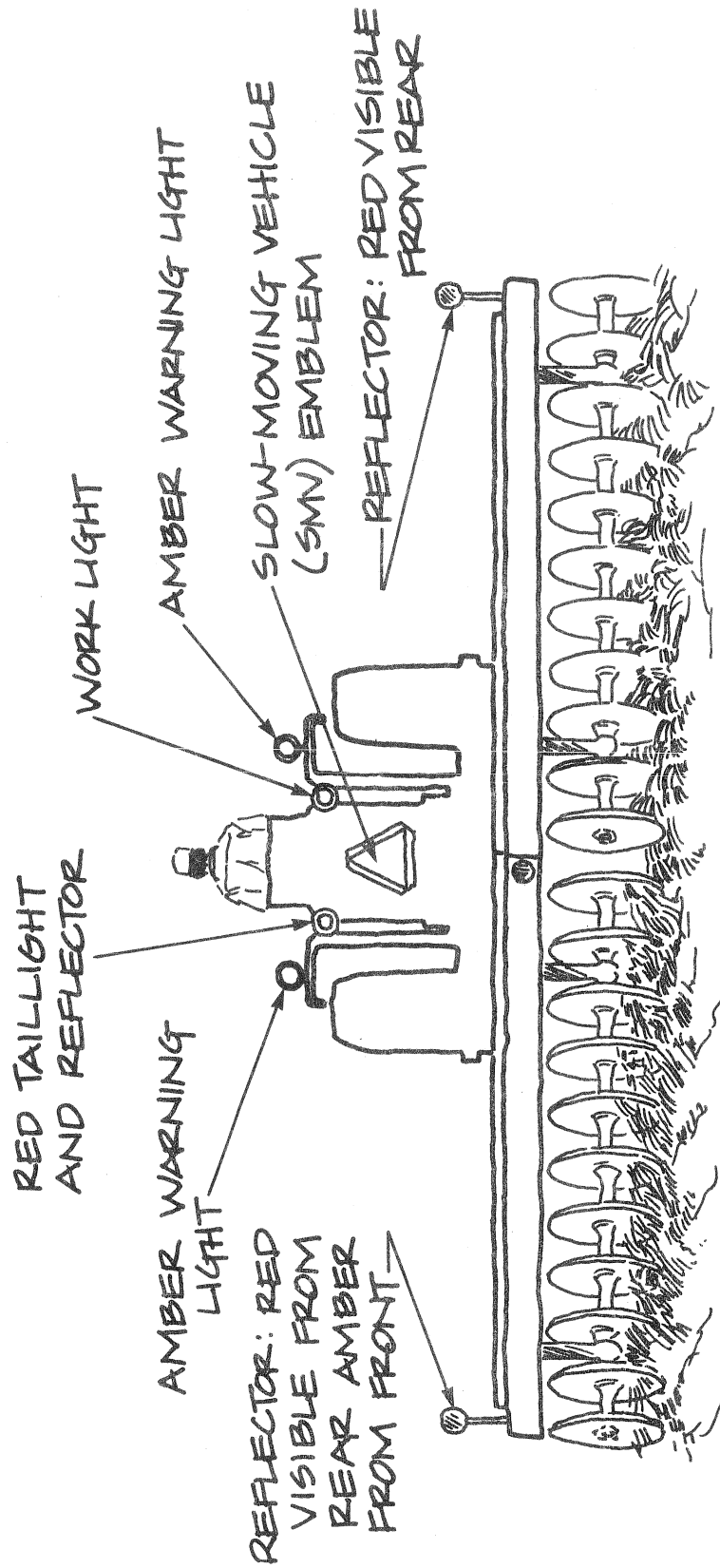
Student Evaluation

1. Demonstrate tractor adjustment and service using the operators manual.
2. Identify spray rig components. TM - 11
3. Identify protective gear for pest control application. TM - 8
4. Identify the type of chemical hazard, and antidote from chemical label.

LIGHTING AND MARKING FOR TOWED EQUIPMENT

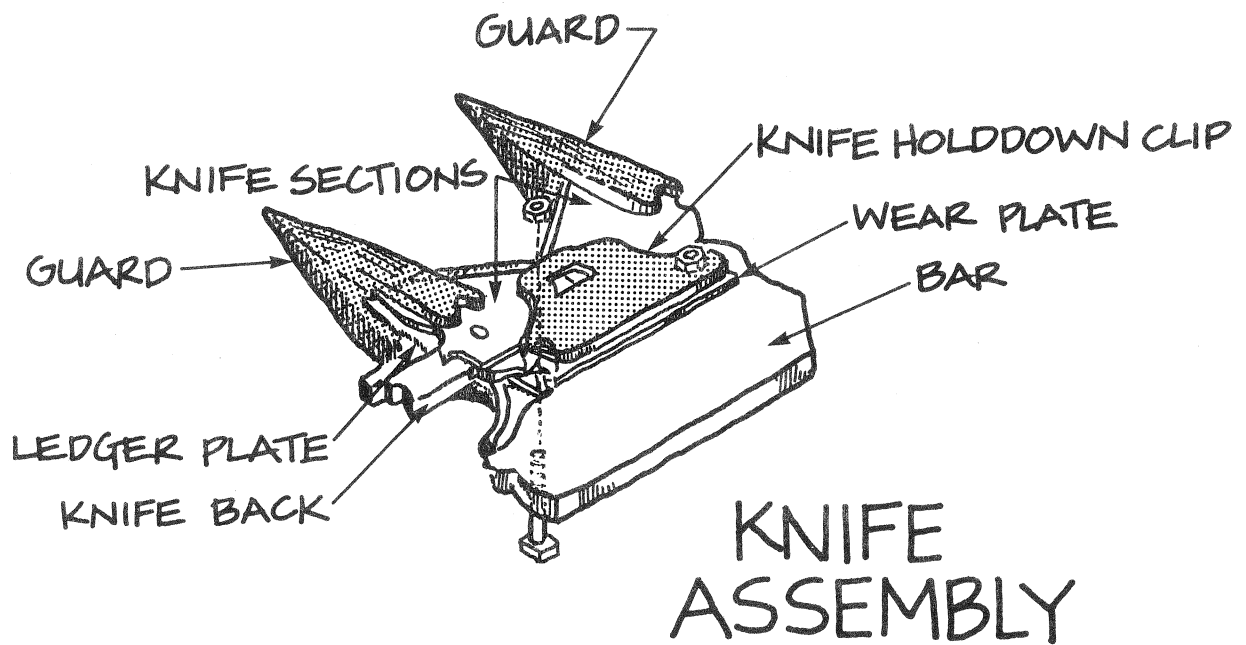
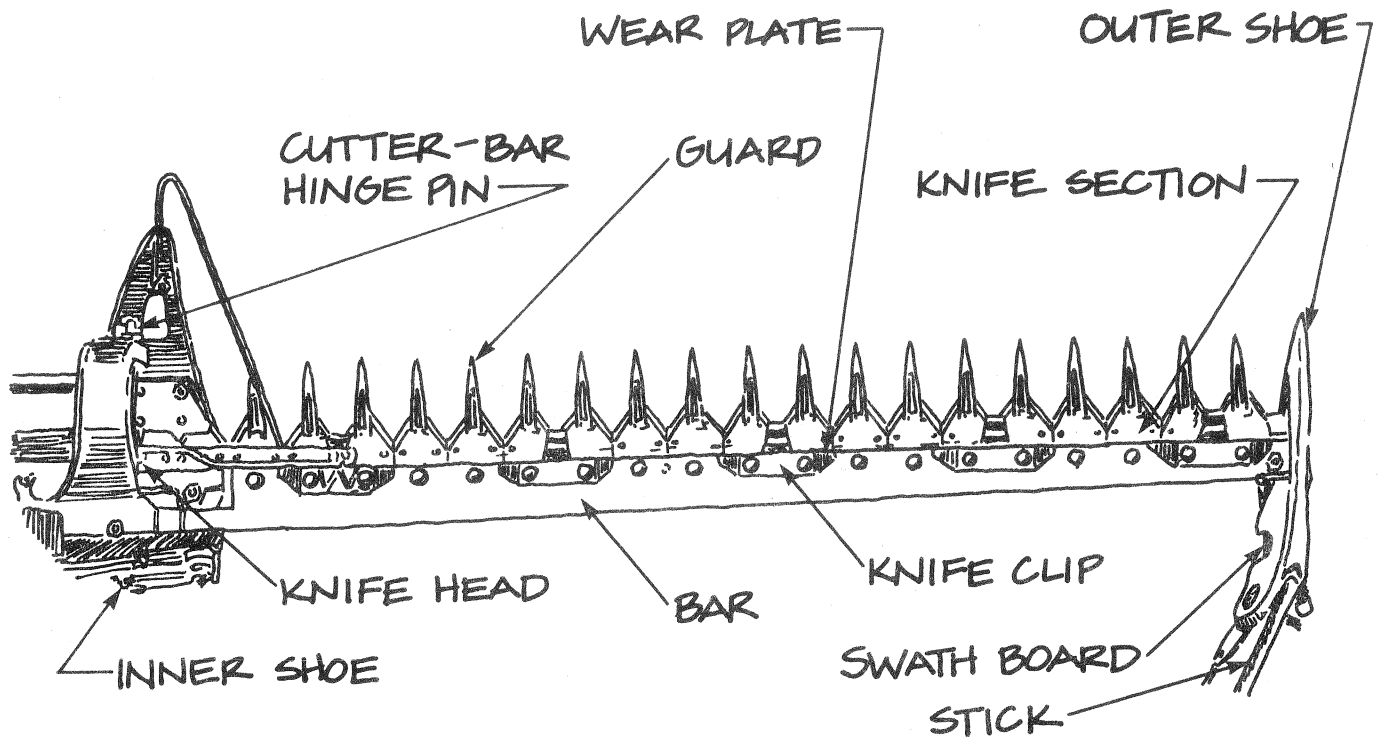
TM-1

NOTE: IF IMPLEMENT OBSTRUCTS VIEW OF
SMV EMBLEM ON TRACTOR, EMBLEM
MUST BE MOUNTED ON IMPLEMENT

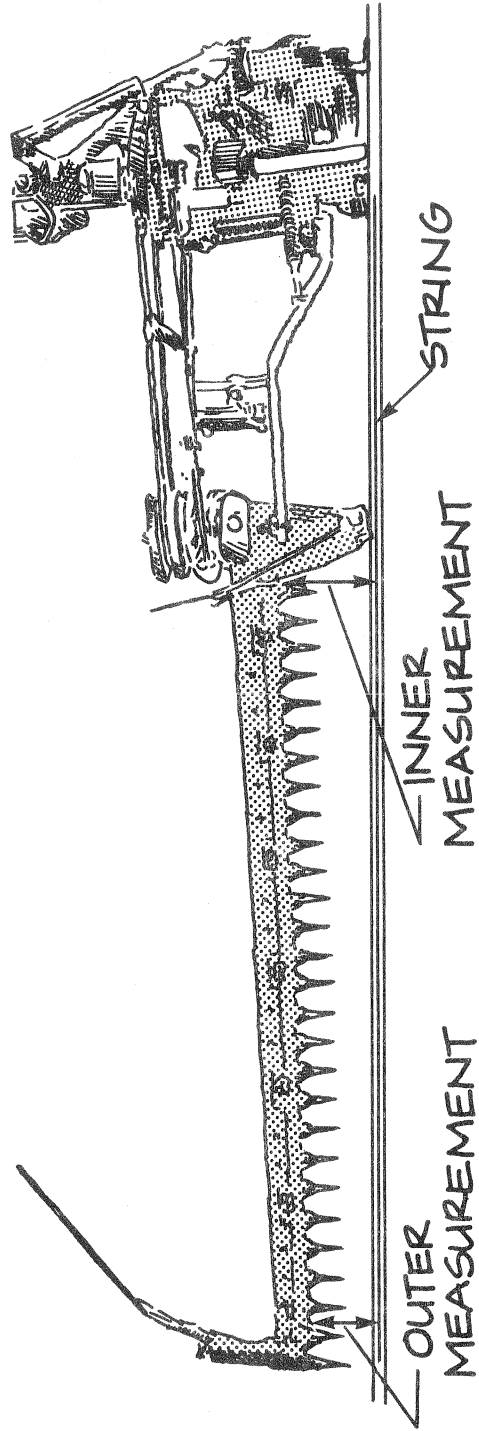


CUTTER-BAR ASSEMBLY

TM-2



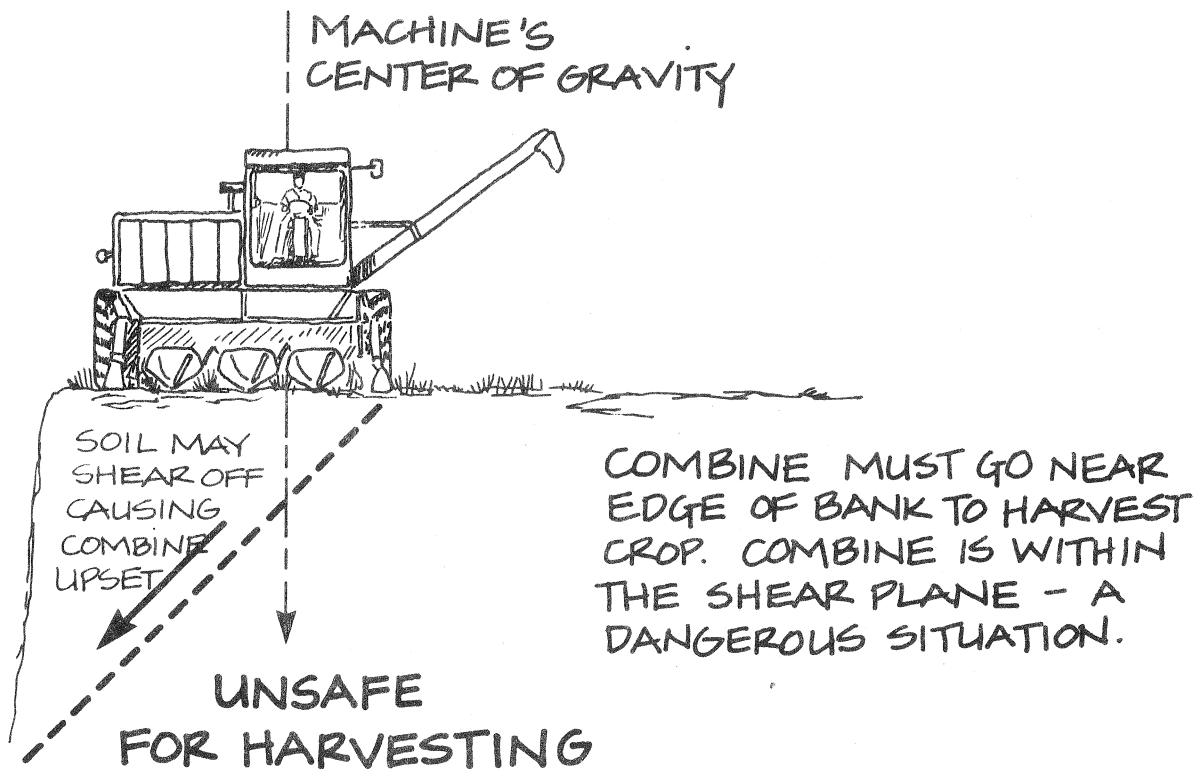
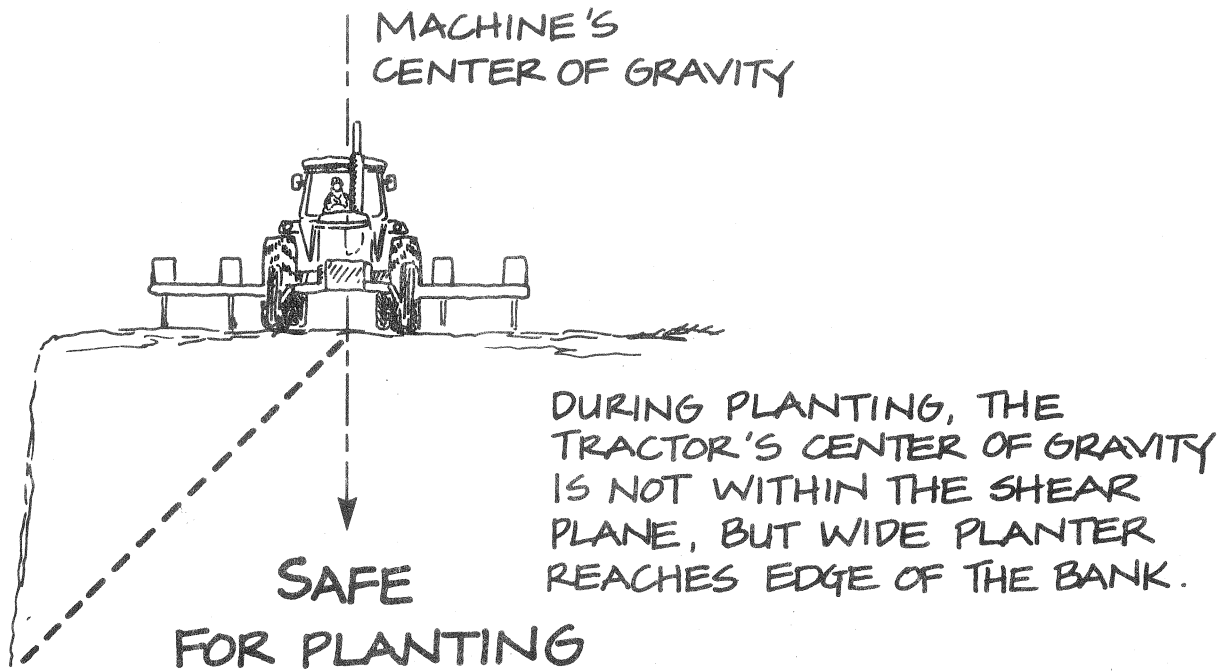
CUTTER-BAR LEAD GUIDE LINE PARALLEL LINE METHOD



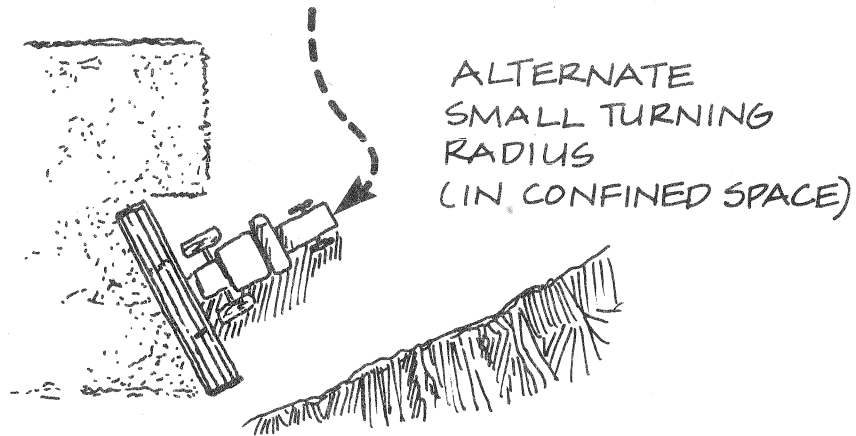
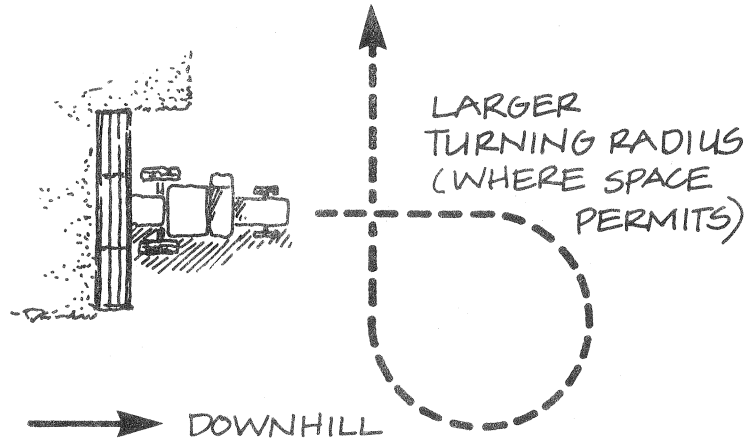
TM-3

SAFE TRACTOR OPERATION — CLIFF DANGER —

TM-4



TURNING RADIUS REQUIREMENT

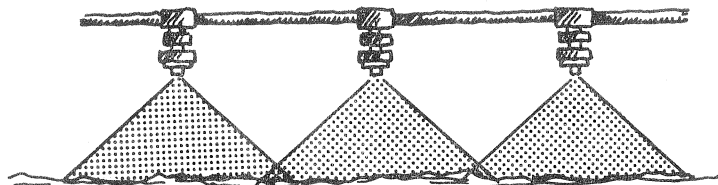


HARVESTER MAY REQUIRE MORE ROOM TO COMPLETE TURNS THAN TILLAGE OR PLANTING EQUIPMENT.

NOZZLE ADJUSTMENT

TM-6

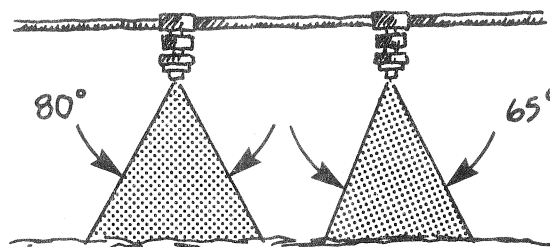
EVENLY SPACED NOZZLES



EVEN SPRAY PATTERNS

EVEN SPACING OF NOZZLES PROVIDES EVEN SPRAY PATTERNS.

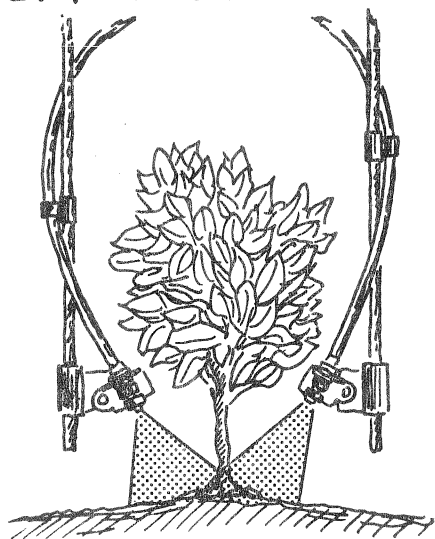
NOZZLES OF DIFFERENT PATTERNS



UNEVEN SPRAY PATTERNS

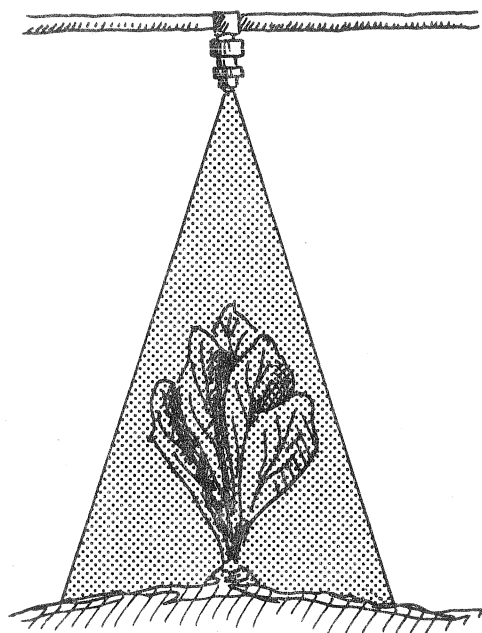
POOR COVERAGE RESULTS WHEN NOZZLES OF DIFFERENT PATTERN ANGLES ARE USED TOGETHER.

NOZZLE ARRANGEMENT FOR BANDING



NOZZLE SPACING FOR POST-EMERGENCE BANDING.

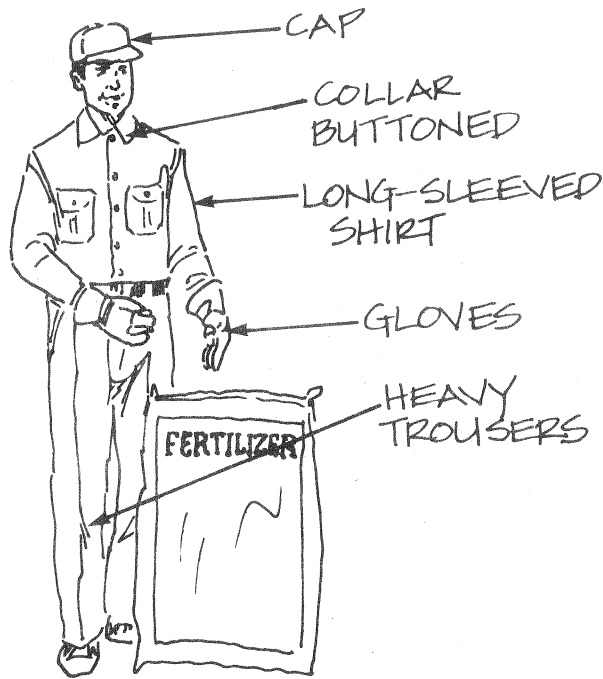
ONE NOZZLE PER ROW



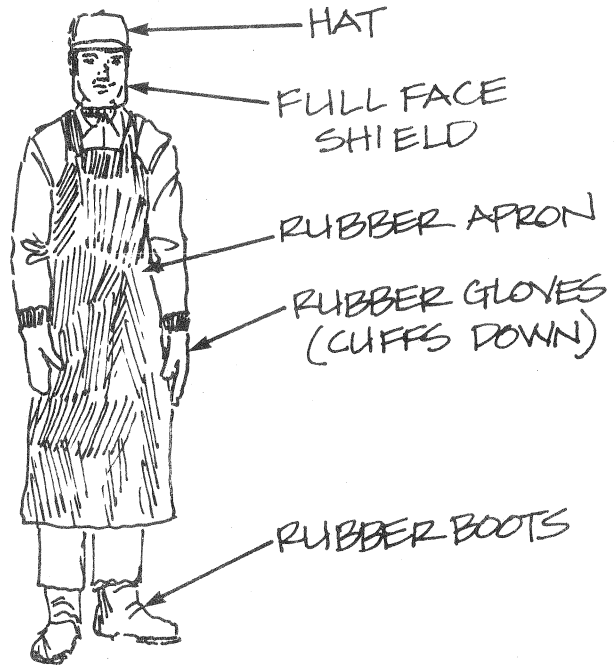
SINGLE-NOZZLE SPRAY PATTERN FOR INSECTICIDES ON SMALL PLANTS

PROTECTIVE GEAR...

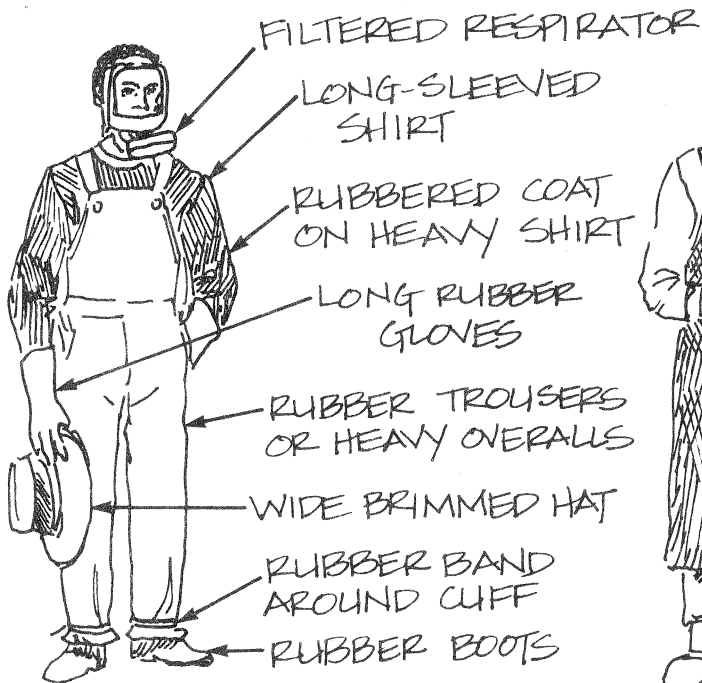
TM-7



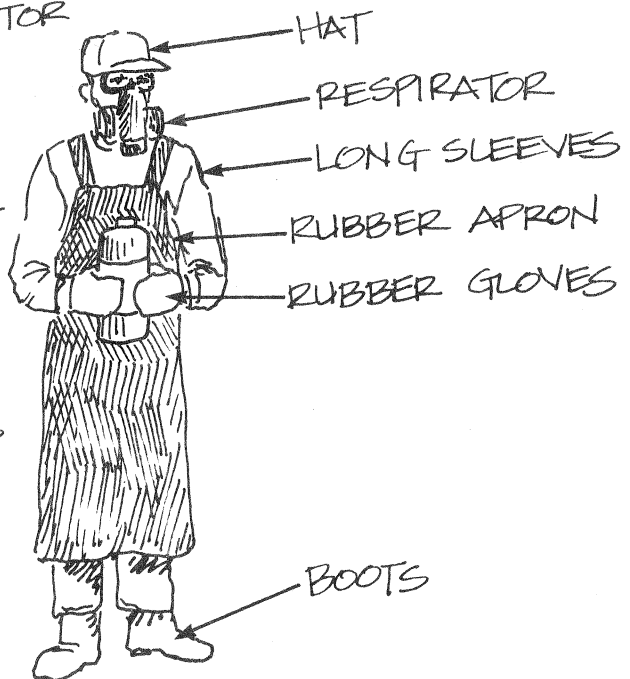
... FOR PROTECTION AGAINST FERTILIZER BURN



... FOR TRANSFERRING AQUEOUS AMMONIA



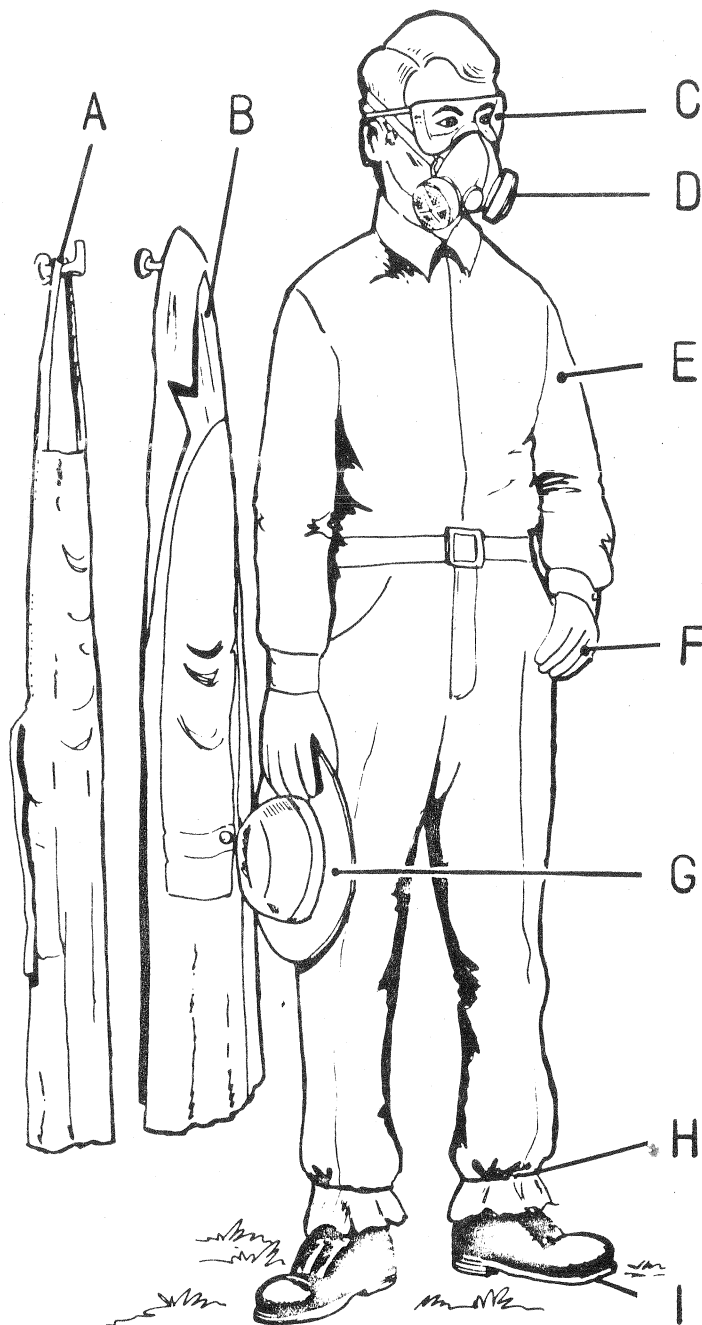
... FOR WORKING WITH PESTICIDES (SHOULD BE WATER REPELLANT)



... FOR WORKING IN THE PESTICIDE STORAGE AREA

PROTECTIVE GEAR FOR PESTICIDE APPLICATORS

TM-8



- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____
- I. _____

PROTECTIVE GEAR FOR
PESTICIDE APPLICATORS

TM-8A

- A. Liquid-proof Apron
- B. Raincoat
- C. Goggles
- D. Respirator
- E. Coveralls
- F. Neoprene Gloves
- G. Hat
- H. Rubber-Band on Ankles
- I. Boots

TOXICITY LABELS

TM-9

INDICATION ON LABEL	TOXICITY
<p>DANGER</p>  <p>POISON</p>	<p>HIGH</p> 
<p>WARNING</p>	<p>MODERATE</p> 
<p>CAUTION</p>	<p>LOW OR SLIGHT</p> 

TOXIC EXPOSURE

TM-10

_____ a. BREATHING

_____ b. CONTACT

_____ c. MOUTH



1. _____

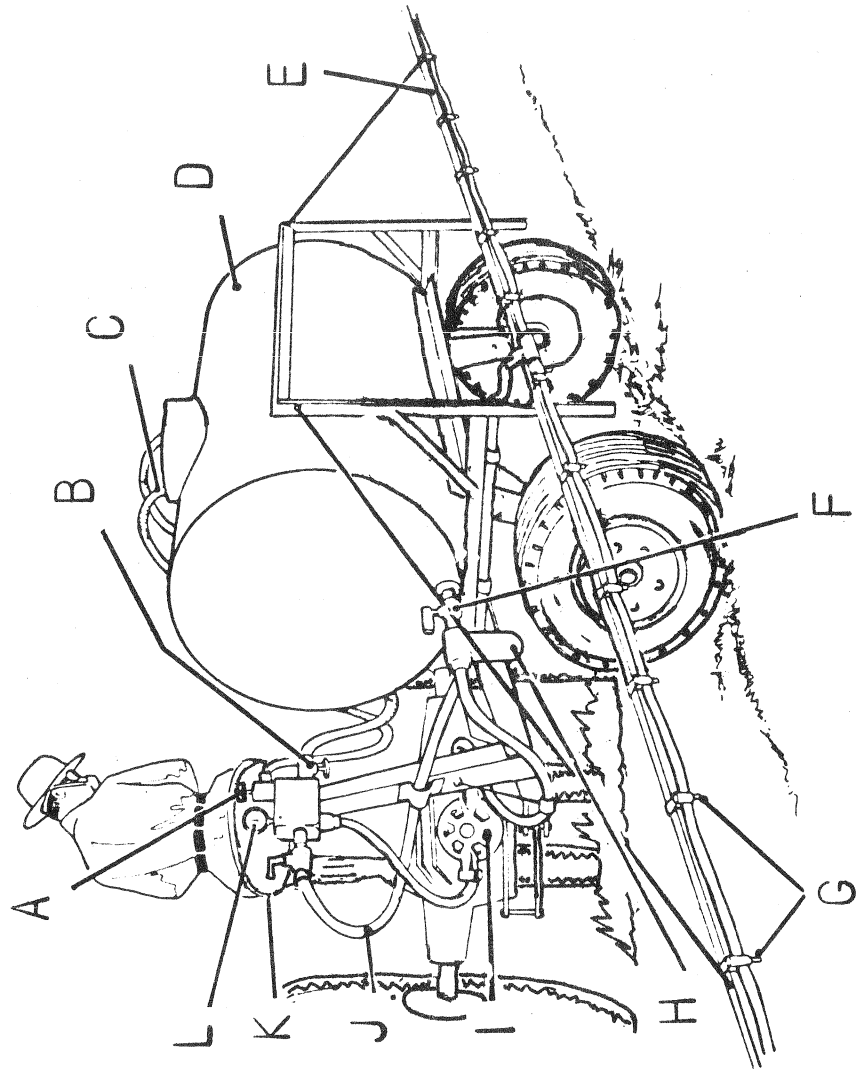


2. _____

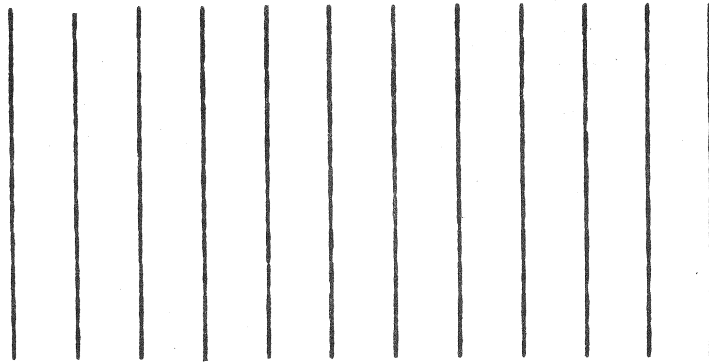


3. _____

SPRAYER PARTS



A B C D E F G H I J K



SPRAYER PARTS

TM-11A

- A. Pressure Regulator
- B. Control Valve
- C. Agitator Line
- D. Tank
- E. Boom
- F. Shut-off Valve
- G. Nozzles
- H. Strainer
- I. Pump
- J. Hose
- K. Boom Valve
- L. Pressure Gage

General References

Harvesting Equipment. Some is very specialized and you would need to check with the manufacturer for service and maintenance operations, i.e., fresh vegetables, fruits, nuts, etc.

Some of the major companies do manufacture machines for some of these and field crops, i.e., beets, potatoes, cotton.

John Deere Service Publications , Tractors
Safety
Preventive Maintenance
Combine Harvesting
Tillage
Planting
Crop Chemicals
Hay and Forage Harvesters
Machinery Management

Dept. F, John Deere Road
Moline, Illinois 61265

International Harvester , Service Manual, Service Analysis Agricultural Equipment.

Agricultural Equipment Division, 401 North Michigan Avenue, Chicago, Ill, 60611

Promersberger, William J., Donald W. Priebe, Frank E. Bishop, Modern Farm Power

Reston Publishing Company, Reston, VA 1979