



## TRACTOR TIRES

### Unit Goal:

The goal of this unit is to instruct the student in the knowledge of tires, their operation and repair.

### Unit Performance Objectives:

Upon completion of this unit the student will be able to:

1. Change and repair a tire or be able to select a company to do the repair work if it cannot be handled by the individual.
2. Add liquid ballast to the tire.
3. Locate the proper inflation pressure in the operator's manual, and adjust the tire pressure on the given tractor.
4. Select the proper tire for a given tractor in relation to its use.
5. Mount a tire and rim on a tractor in the proper direction.

## Teaching Outline

- I. Introduction
  - A. What is a pneumatic tire
  - B. Why use a pneumatic tire
  - C. Two general uses for tires:
    1. Over the road tires - for speeds over 30 mph
    2. Off-the-road-tires - for speeds less than 30 mph
      - a. These tires operate at low speeds and generate less heat, but must be tougher to take the shocks of rocks and rough terrain
      - b. Some tires may be able to do both
- II. Construction of Tires (use a cut-away of a tractor tire)
  - A. Bead
  - B. Body plies
  - C. Ply rating
  - D. Bias ply
  - E. Belted bias ply
  - F. Belted radial ply
  - G. Wire-reinforced ply
  - H. Sidewalls
  - I. Tread
  - J. Tubeless inner liner
  - K. Tube
  - L. Flaps
  - M. Rim
- III. Codes for Tire Types - The code is stamped on the side of the tire
- IV. Tire Sizes
  - A. Rim sizes
  - B. Tire width
  - C. Dual size markings
- V. Direction of Tire Rotation
  - A. Why tractor tire must rotate in a given direction
  - B. Arrow marking on the tire



## VI. Tire Inflation

- A. What is proper tire inflation
  - 1. Pressures recommended by the manufacturer
  - 2. Proper balance of tire when setting on a hard surface
- B. Over-inflation - Why tire may be damaged
- C. Under-inflation
  - 1. Why tire may be damaged
  - 2. How side of tread will look
- D. Proper Inflation
- E. Pressure Gauge
  - 1. Gauge just for air
  - 2. Gauge for air or liquid
  - 3. Importance for cleaning gauge
- F. How to Inflate Tires
  - 1. Always check and inflate when tires are cold
  - 2. Never bleed pressure from hot tires
  - 3. If a tire becomes low while operating, adjust the pressure to the same as that of another tire of the same size on the equipment
  - 4. Always use a liquid type pressure gauge when checking pressure in tires with liquid ballast
  - 5. Always check liquid tires with the valve stem at the bottom

## VII. Tire Traction

- A. Can be checked by looking at imprint of the tread in the soil after pulling a full load
- B. When to increase weight (wheel weights or liquid)
- C. When to decrease the weight (wheel weights or liquid)
- D. Proper slippage (about 10%)

## VIII. Front Wheel Ballast - Why - to weight and traction; to counteract excessive load

## IX. Dual Tires

- A. Advantages
- B. Disadvantages
- C. Matching of dual tires

Suggested Learning Activities

1. Have each student find the proper inflation pressure in the operator's manual for a given tractor. Then each student should properly inflate the tire pressure on the given tire.
2. Bring in samples of tires that have been over and under inflated.
3. When the tractor is on concrete it is possible to see the result of different inflation pressure on the imprint of the tractor tire.
4. Have each student or group of the class add water to a tractor tire using a water hose and the special valve stem adaptor--add calcium chloride if possible.
- VII. 5. With the tractor on moist soil, pull several different loads (implements). It is possible to see the tire imprint on the soil. The 10% slippage will clearly show.
- VIII. 6. With the use of a heavy load it is possible to show the effect of added weight to the front of the tractor (A lift-up disk is very good.)

Suggested Resource Materials

2. Operator's manual: Ford Motor Co.
2. Local tire dealer.
- 3.
4. Shop manuals, depending on tractor used.
- 5.
6. Tires and Tracks. John Deere.

## X. Tire Failures

- A. Fabric breaks - Why
- B. Rubber checks
- C. Wear from spinning wheels
- D. Stubble wear
- E. Hard road damage
- F. Valve damage
- G. Tread and sidewall cuts
- H. Grease and oil damage

## XI. Tire Repairs

- A. Decision as to who should make repair
  - 1. Self
  - 2. Tire repair company
- B. Types of repair
  - 1. Temporary repairs
  - 2. Repair of punctures
    - a. Tube
    - b. Tubeless
    - c. When and how to mount a tire
    - d. Possibility of sewing a tire and booting a tire

## XII. Storage of Tires

- A. In a cool dry area
- B. Away from lubricants
- C. Store mounted tires so there is no weight on the tire

## XIII. Mounting and Unmounting Tires

- A. Tools
  - 1. Tire irons
  - 2. Tire bead expander
  - 3. Approved rubber lubricant
- B. Mounting and dismounting small implement tires
- C. Dismounting and mounting large implement and truck tires
- D. Dismounting and mounting large tractor tires

Suggested Learning Activities

- X. 1. Use old tires which may be obtained free from a tire dealer. They are happy to get rid of them.
- XI. 2. Observe a local tire dealer making repairs. NOTE: Do not have students change heavy tire if you do not have the proper equipment--can be very dangerous.
- XIII. 3. Have the local dealer demonstrate how they remove and replace large tires while on their rims. Remember there is a large amount of water in the tires.

Suggested Resource Materials

- 1. Local tire dealer; Slides by John Deere Service Publications, and promotional pictures from a tire manufacturer.
- 2. Local tire dealer.
- 3. Local tire dealer.



Student Evaluation

1. Which of the items below is not true of off-the-road tires: \_\_\_\_
  - A. Operates at low speeds
  - B. Generates little heat
  - C. Receives little shock
  
2. In which direction should the V tread be going (on the soil) on a tractor tire: \_\_\_\_
  - A. V pointing forward
  - B. V pointing backwards
  
3. Tires are designed to operate with some sidewall deflection or bulge: \_\_\_\_
  - A. True
  - B. False
  
4. Will underinflated tires wear more on: \_\_\_\_
  - A. The sides of tire tread
  - B. The center of tire tread
  
5. When filling the tire with water how full should the tire be filled. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
6. About how much slippage should the tire have when making contact with the soil.  
\_\_\_\_\_
  
7. How many pounds of air is normal for the rear tires of a tractor. \_\_\_\_\_
  
8. How should tires be stored. \_\_\_\_\_  
\_\_\_\_\_
  
9. How should mounted tires be stored. \_\_\_\_\_  
\_\_\_\_\_
  
10. Grease is good for stored tires. \_\_\_\_
  - A. True
  - B. False

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Answers:

- |                     |  |
|---------------------|--|
| 1. C                | 6. 10% under load  |
| 2. B                | 7. 12-20 psi   |
| 3. True             | 8. Standing up in dark area                                    |
| 4. B                | 9. Block tractor to reduce weight on tire -<br>reduce pressure |
| 5. 75% - top of rim | 10. False  |

## General References

Tires and Tracks: Fundamentals of Service. John Deere Service Publications.

Preventive Maintenance: Fundamentals of Machine Operation. John Deere Service Publications.

Tractor Operation and Daily Care. Southern Association of Agricultural Engineering and Vocational Agriculture.

Slides produced by John Deere Service Publications.

Transparencies produced by John Deere Service Publications.

Student Workbook. Wheels, Tires and Shock Absorbers. Appendix 1 to Annex A M.003-7, U.S. Army Engineer School, Fort Belvoir, Virginia.