TM 9-1870-1

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

CARE AND MAINTENANCE OF

PNEUMATIC TIRES

DEPARTMENT OF THE ARMY • FEBRUARY 1955

TAGO 3550B—Feb

Changes in force: C 1 and C 2

TM 9–1870–1
*C 3

CHANGE NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *17 February 1967*

CARE AND MAINTENANCE OF PNEUMATIC TIRES

TM 9–1870–1, 18 February 1955, is changed as follows:

1. Purpose

a. (Superseded) These instructions are published for the guidance of organizational maintenance personnel in the proper care and use of tubed pneumatic and tubeless tires, and in the proper care, use and minor repair of pneumatic tubes.

b. They describe the procedures recommended for demounting, mounting, and repairing the tubeless tire and valve.

2. Scope

(Superseded)

a. This manual covers the description, care and use of tubeless and tubed pneumatic tires and inner tubes, common causes of tire failures, and methods of mounting and demounting tires using available equipment.

b. Inspections and repairs covered in this manual are authorized to be performed by organizational maintenance.

Page 2.

6. The Tire Assembly

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g. (Added) (1) The tubeless tire has a layer of cured rubber compound vulcanized to the cord plies within the tire (fig. 1.1) extends from bead to bead to form an air-tight chamber.

(2) The exterior surfaces of the tire beads have a series of concentric ridges which contact the rim flanges and form a seal preventing loss of air.

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* This change supersedes C 2, 23 March 1961; TB 9–1870–1/1, 23 July 1956; and TB ORD 645, 6 June 1956, including C 1, 2 November 1956.

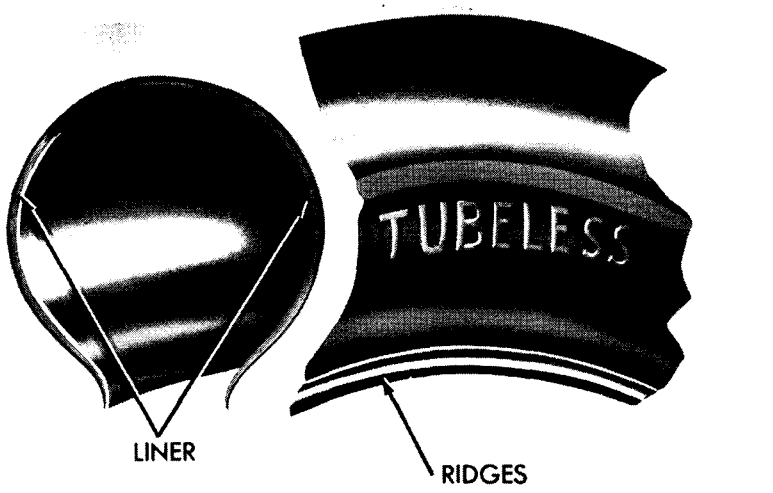

Figure 1.1 (Added) *Tubeless tire construction.*

(3) The valve is affixed to the tire rim, and replaces the inner tube valve, and should not be mounted on wheels with oval shaped valve holes.

(4) The tubeless tire outward appearance is similar to the tire requiring an inner tube and is interchangeable with it on the drop center rim.

Page 4.

7. Types of Tires

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m. (Added) *Tubeless Tires.* (1) Both tactical and passenger vehicle tubeless tires combines the function of the tire and tube.

(2) Tubes of appropriate size may be installed in tubeless tires, if the wheel rims are slightly damaged or irregular at tire seating ridge and the exact original contour cannot be recovered to maintain air pressure.

(3) Tubes are also authorized for use with tubeless tires if tire bead or sealing ridges are slightly damaged and air pressure cannot be maintained.

Caution: **Before installing tube, inspect the liner surface of the tire for damage, and make necessary repairs. Tires with ribbed liner surface may cause early tube failure due to friction.**

The tubeless tire valve must be removed from the tire rim when using a tube.

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Page 7.

9. Tire Markings

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k. (Added) *Tubeless Tires.* Tires are identified by the word TUBELESS on the tire sidewall.

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11. Valves

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f. (Added) *Tubeless Tire Valve.* (1) The valve used with tubeless tires is mounted on the wheel rim through a circular hole of controlled dimensions (0.618—0.634-inches dia) and called a snap-in type.

(2) The valve stem is incased in a heavy, pear shaped (fig. 7.2) rubber cover. The base of the valve is shaped like a

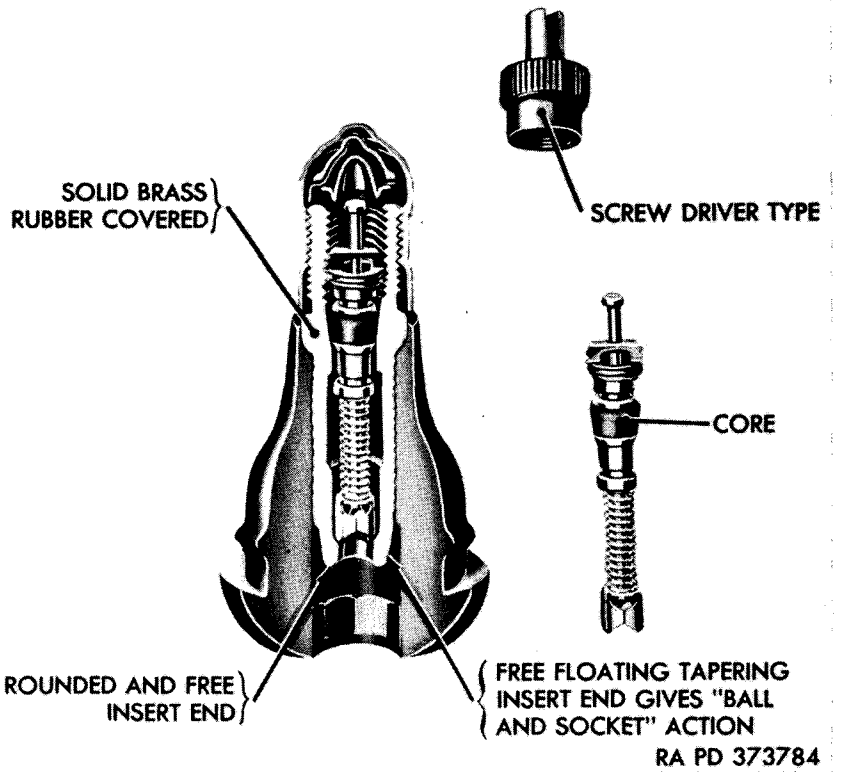
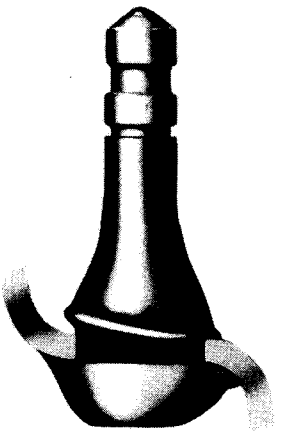


Figure 7.2 (Added) *Tubeless tire valve, rubber covered, snap-in type.*



RA PD 373785

Figure 7.3 (Added) *Cross section wheel rim, snap-in type.*

mushroom head and just below the head, on the shank is a slight ridge.

(3) The unit is held in place by the compression fit between the edges of the valve hole and the rubber cover. When the valve is properly installed, the edges of the rim valve hole will lie between the mushroom head and the ridge (fig. 7.3).

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12. Valve Cores

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c. (Added) The valve core for the tubeless valve is interchangeable with the standard valve cores used with the pneumatic tubes.

13. Valve Caps

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c. (Added) The valve cap for the tubeless valve is interchangeable with the standard valve used with the pneumatic tires.

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22. Special Tools and Equipment

Table 1. Special Tools and Equipment

Add the following:

Item	Identifying No.	Reference		Use
		Fig.	Par.	
MOUNTER and demounter, pneumatic tire.	4910–695–9623	30.1	47.1	Mounting and demounting tires.
CONSTRICTOR, bead expanding.	4910-305-0349	30.2	46.2	Mounting tire on rim.
VALVE tool, "U" clamp.	4910–305–0350 4910–305–0351	30.3 30.4	46.3	Installation of valve on rim. Vulcanizing patch on inside of tire.
STRAP, webbing, universal tie down.	2540–980–9277	33.2 33.3 33.4	49.5	Mounting of all service (NDCC).

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23. General

(Superseded)

a. Tire maintenance consists mainly of jobs that are performed regularly, to make certain that tires are kept in proper operating condition.

b. Paragraphs 23,24,26,28,29,30*a,* and 31, are applicable to tubeless tire maintenance. Pressure losses should be investigated by immersing tire and rim assembly in a water tank to detect leaks.

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46.1 Mounter and Demounter, Pneumatic Tire, 4910–695–9623

(Added)

a. Description. The unit is mounted on a pedestal stand secured to the floor, and is manually operated. The wheel assembly is mounted on a support plate, over a self-centering, spring loaded, stepped cone (capacity $2\frac{3}{8}$ to $4\frac{3}{16}$ hub diameter). A lug pin under spring tension enters one lug hole in the tire wheel in position one of two holddown attachments (fig. 30.1) provided is placed on wheel over center pose and secured by means of an attached drift inserted through a slot in the center post. Upper and lower bead breakers are hinged together through linkage and are operated by a common lever handle. The entire breaking assembly

rotates 360° around the changer column. The lower bead breaker automatically adjusts itself to the tire and rim when operated through the lever handle. The jaw is adjustable to clear different size tires and can be positioned down against the tire at edge of rim. The jaw opening is adjustable from 6-inch minimum to 10-inch maximum. The bead breaking ends of the bead breaker are 2½ inches wide providing ample area to protect bead seal.

b. Demounting. A demounting tool (fig. 30.1) is provided and is 36½ inches in overall length. One end is fork shaped and the other serves as a handle. Each finger of the fork has a 1½ inch bearing surface designed to prevent damage to inside of the tire or bead seal. To remove tire, the forked end of the tool is inserted between tire bead and rim, the handle is then pulled down over center post into a channel slot just back of the fork allowing the forked end to be pried up.

c. Mounting. A mounting tool (fig. 30.1) is provided consisting of a handle on one end and a sleeve type bearing on the other. It is designed to pivot on center post of the tire changer. A blade is attached to mounting tool, which is designed with a curved heading edge to work against tire bead and a lip at the bottom of the blade to prevent pinching of bead between blade and wheel rim. Blade is adjustable for rims from 12 inches through 17 inches in diameter.

d. Maintenance. The only maintenance required to the tire changer is the oiling of the sliding parts of stepping cone, lug pin, and the hinged mechanism of the bead breaker.

46.2 Constrictor, Bead Expander, 4910–305–0349
(Added)

The tool consists of an all metal strap ¾-inch wide (fig. 30.2) wrapped with spring steel wire (a safety feature in event of breakage) to provide equal pull throughout. The ends are connected by a double lead, right and left hand crank screw, and is adjustable from 24 inches through 31½ inches in diameter.

46.3 Valve tool, 4910–305–0350
(Added)

The tool (fig. 30.3) consists of a ½-inch bar internally threaded (302–32 thd) on one end to screw on valve stem. The tool has a tapered wood handle and overall length of 5¾ inches.

46.4 "U" Clamp, 4910–305–0351
(Added)

The "U" clamp (fig. 30.4) is mechanically operated, formed in

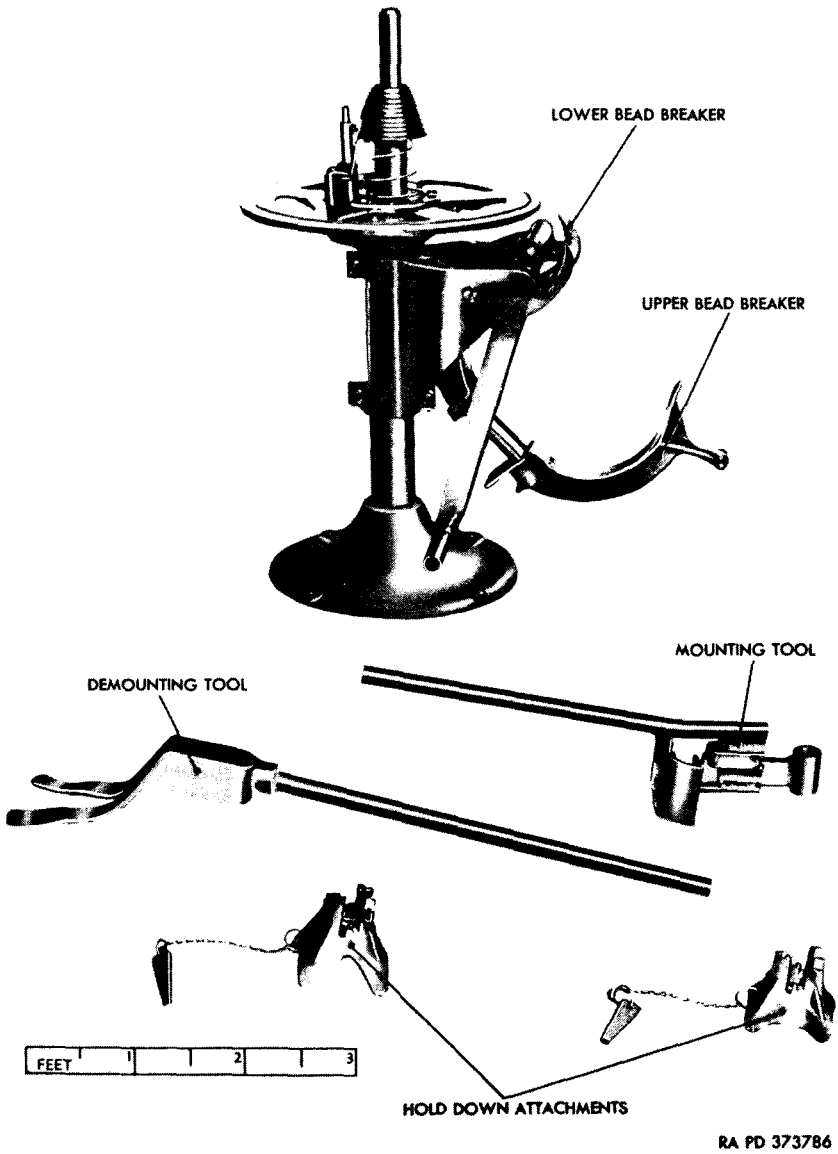

Figure 30.1 (Added) *Mounter and demounter, pneumatic tire, 4910–695–9623.*

a "U" shape, and can readily be adjusted to any position within the tire to within 1½ inches of the tire bead. The clamp is constructed mainly of cast aluminum. It has a four point anvil to provide equal pressure on round and oblong patches and provides easy access for igniting fuel pan type patches. A clamping screw

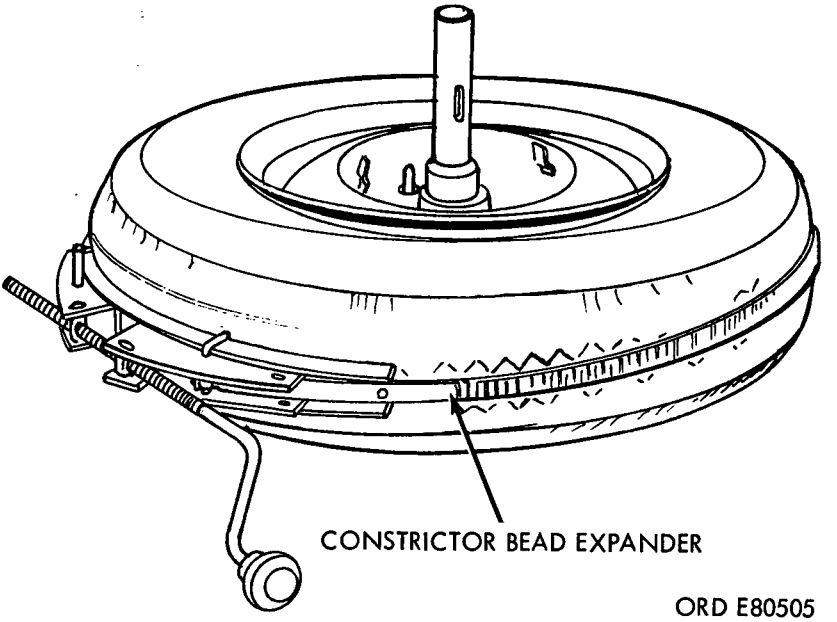

Figure 30.2 (Added) *Constrictor, bead expander.*

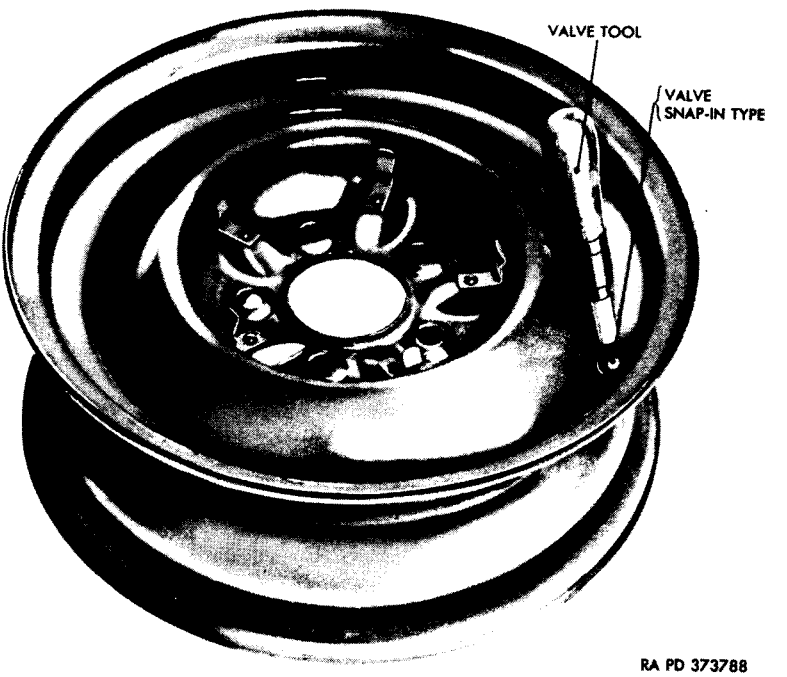

Figure 30.3 (Added) *Valve tool.*

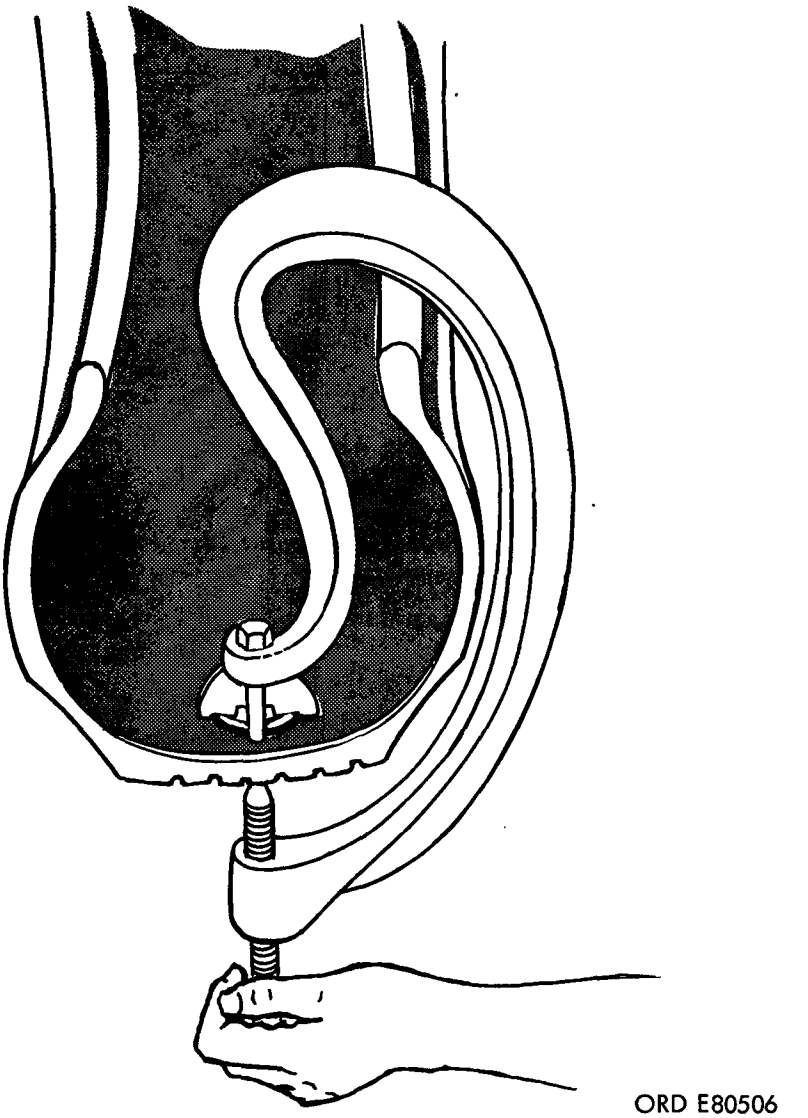

Figure 30.4 "U" clamp positioned on tire and vulcanizing patch.

with swivel head is used for pressing patch against tire by turning handle clockwise.

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49.1 Drop-Center Rims (Tubeless Tires Regular Thread) (Added)

General. *a.* Before removing tire from the rim, make the inspections described in (1) through (3) below.

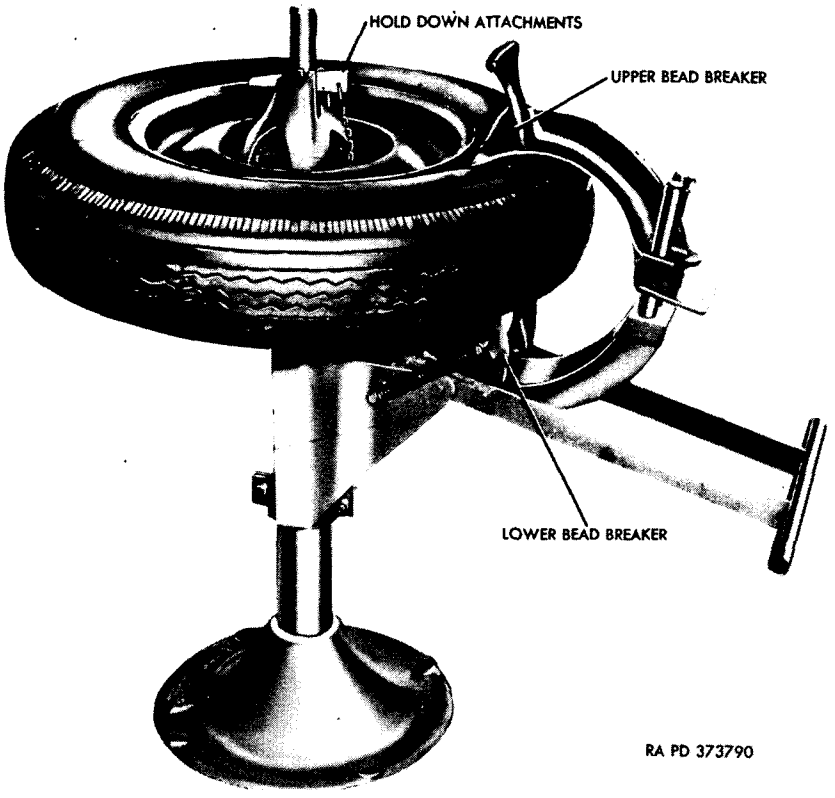


Figure 32.1 (Added) *Loosening tire bead from rim.*

(1) Inspect tire and remove nails, glass and other injurious particles from the tread.

(2) Inspect tire for irregular wear, cuts, and blisters appearing on the sidewalls.

(3) Inflate the tire to 50 lbs psi and immerse the assembly in water. Leaks at beads, valve, as well as in the tire itself, should be located and marked.

b. Punctures may be repaired without removing tire from the rim as instructed in paragraph 63.1. Other injuries, such as section reinforcement, spot repair, and retread will be performed at depot maintenance.

49.2 Demounting Procedure
(Added)

a. Inspect wheel rims for rough and sharp edges. Extreme caution should be used to avoid scarring the tire rim flange, nicking and gouging the tire bead area. These precautions are neces-

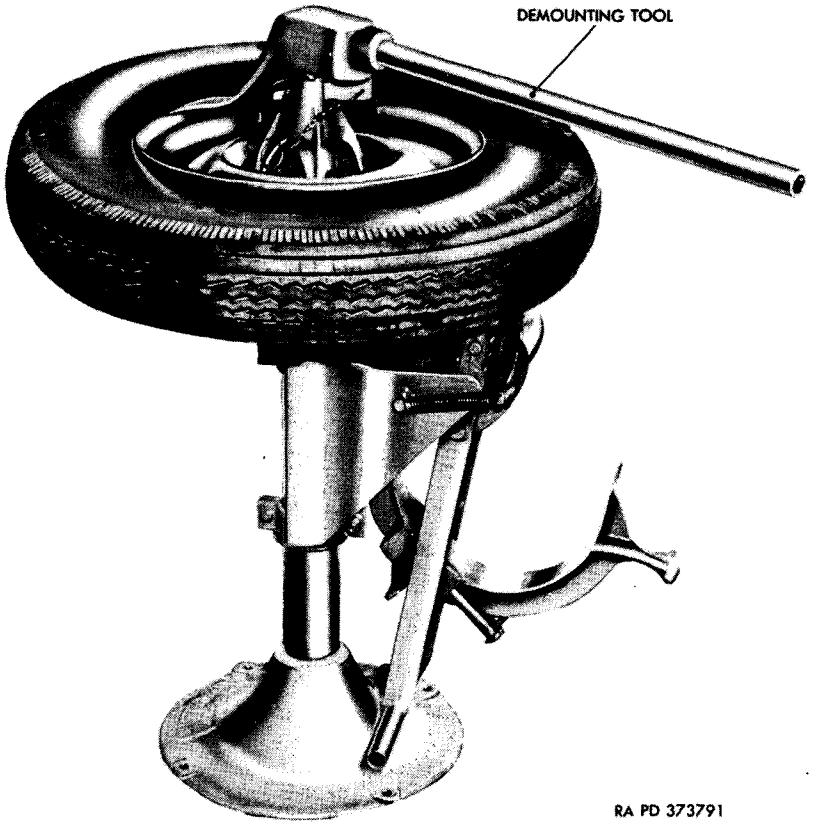


Figure 32.2 (Added) *Demounting tool in position to remove tire.*

sary as injury to the rim or the sealing surface of the bead will permit loss of air when the tire is mounted. Injury to the bead base or toe of the bead of the tire will permit air contained within the tire to seep into the tire ply cords, and escape through the cords up under the rubber tread or shoulders, eventually causing separation.

b. Apply demounting lubricant on tire bead and wheel rims.

c. Mount wheel and tire assembly on tire changer.

d. Remove valve core and deflate tire.

e. Loosen tire beads from rim with bead breaking tool as shown in Figure 30.1.

f. Insert forked end of demounting tool between tire bead and rim at the valve area and pull tool handle down over center post of tire changer (demounting tool has a channel slot near forked end to position over center post) (fig. 32.2). Move the tool right

or left to junction where tire bead crosses rim flange and push handle down, lifting tire bead over rim flange.

Caution: **Do not use any other tool or a wedge which will cause tire bead base to scrape rim flange as the operator walks around the tire.**

49.3 Mounting Procedure

(Added)

a. Inspect wheel rim before mounting tire.

b. Bent rim flanges must be straightened. It is not possible to use wheel or tire accordance with paragraph *7m* discard the wheel.

c. Wheel rim must be free of rust, gummy rubber deposits, nicks and gouges in the rim bead seat area surface mating with tire bead. Wire brush, steel wool, and emery cloth may be used to smooth surfaces. Rubber solvent may be used to assist in removal of rubber deposits and grease.

d. Rough, sharp, and high spots on the rim will be dressed and smoothed out.

e. Inspect valve hole and remove all sharp or irregular edges.

49.4 Valve Installation (Tubeless Tire)

(Added)

a. Lubricate snap-in valve above rubber base with demounting solution and insert in clean rim hole (fig. 30.3).

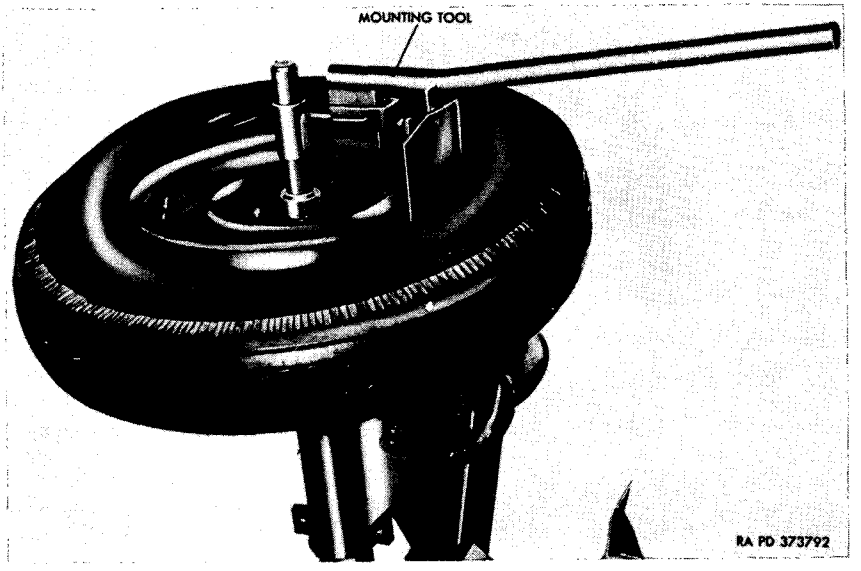


Figure 33.1 (Added) *Installing tire on rim, using mounting tool.*

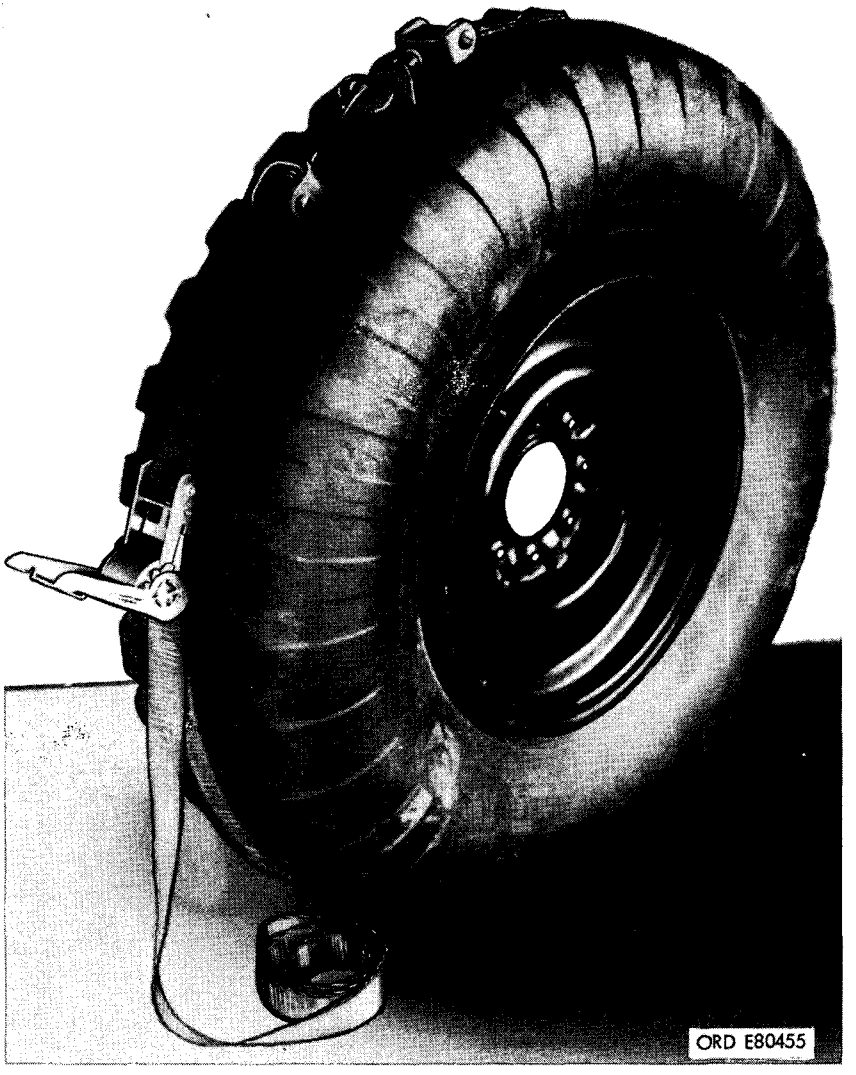


Figure 33.2 (Added) *Install tie-down strap, 2540–980–9277.*

b. Attach valve tool to valve (fig. 30.3) and pull valve into position, working valve while pulling firmly. Valve is properly seated when base is in full contact with inner (tire) side of rim.

Caution: **To prevent possible damage to the valve, work valve in a narrow radius with as direct a pull as possible. Do not bend valve over to pry into place. Do not twist valve in rim hole, and do not pull past sealed position.**

c. Check valve core for tightness.

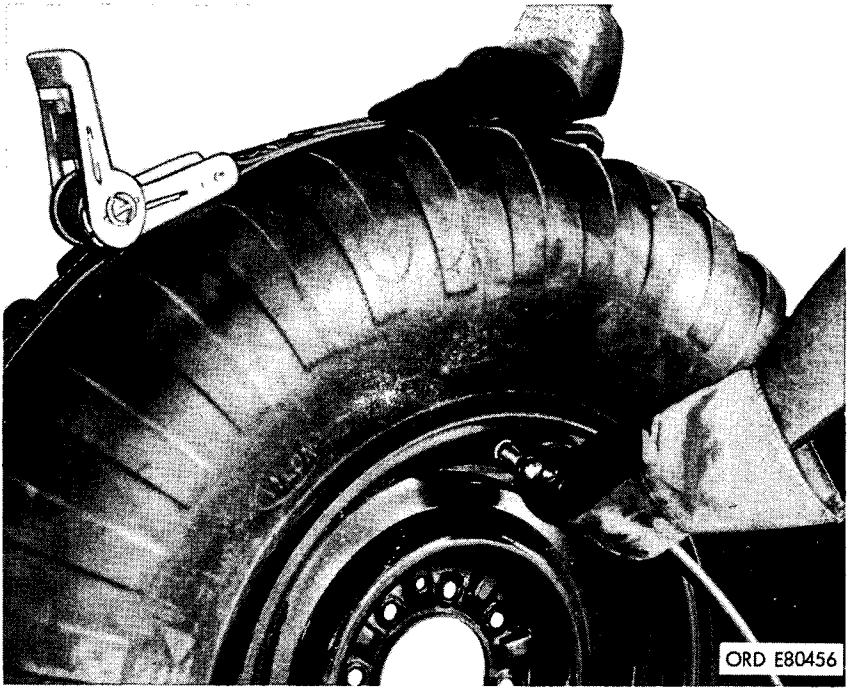


Figure 33.3 (Added) *Applying air to seat tire beads.*

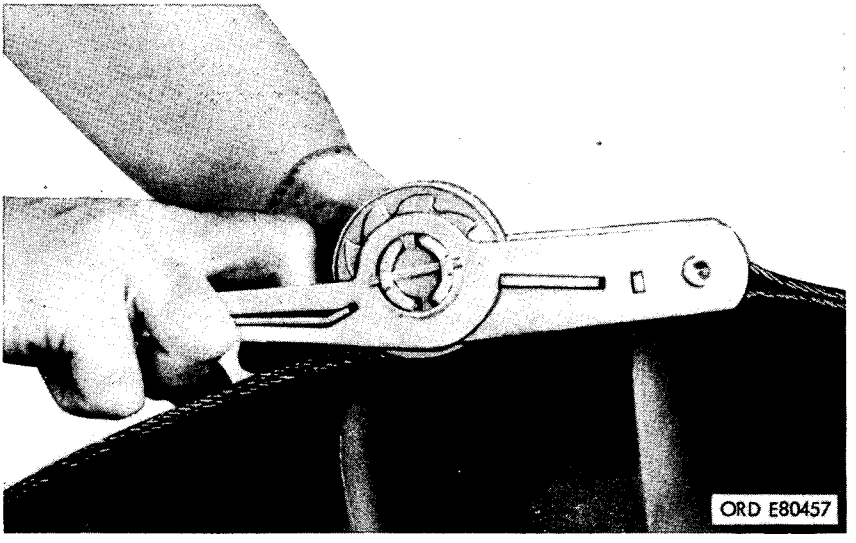


Figure 33.4. Releasing tie-down strap.

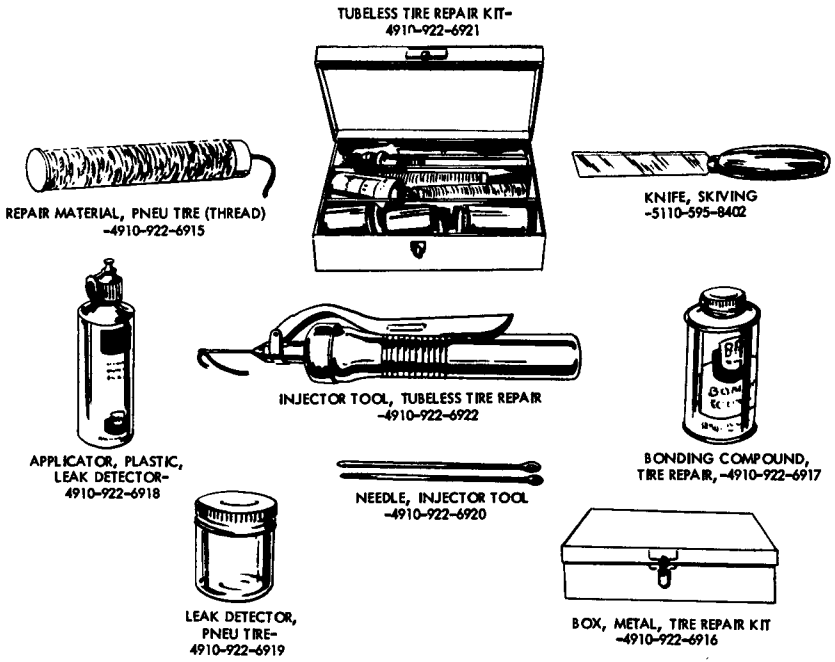


Figure 58.1. Tubeless tire repair kit, 4910–922–6921.

49.5 Tire Installation

(Added)

a. Lubricate tire beads and rim with demounting lubricant.

b. With wheel mounted on tire changer, install lower bead of tire on rim and start upper tire bead on rim at a point opposite tire valve.

c. Install mounting tool (fig. 33.1) and complete installing tire on rim.

d. Position tire on wheel so that tire balance mark is at the valve location.

e. Install tire constrictor (fig. 30.2) and tighten it just enough to force the tire beads onto rim seating ledge.

f. Inflate tire to 4 or 5 psi to seat beads firmly.

g. Loosen and remove constrictor. Inflate tire to 50 psi.

Note. With safety type rims, tire beads should seat at 50 psi inflation. If the beads fail to seat properly, deflate the tire, lubricate the beads, and reinflate. Seating the beads may be facilitated by striking the tie with a bar.

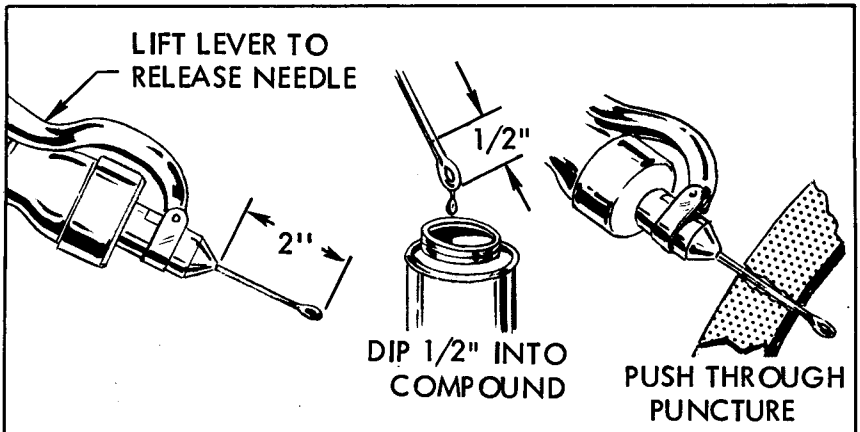


Figure 58.2. Probing and working compound into puncture.

This precaution is necessary because if the tire beads jump the ridge instantaneously instead of progressively, the tire bead may be ruptured.

h. Test for leaks by submerging tire and wheel in water.

i. Reduce tire pressure to prescribed operating pressure.

j. Install and tighten valve cap.

49.5 Drop-Center Rims (Tubeless Tires, All Service NDCC)
(Added)

a. These drop-center rims are similar to those used for the regular thread tubeless tire except these rims are not equipped to accept wheel covers.

b. All instruction appearing in paragraphs 49.1, 49.2, and 49.3, apply to these tires and rims.

c. The tire installation is the same as in paragraphs 49.5*a* through *d*. The remaining instructions are as follows:

(1) Install tie-down strap 2540–980–9277 as indicated (fig.

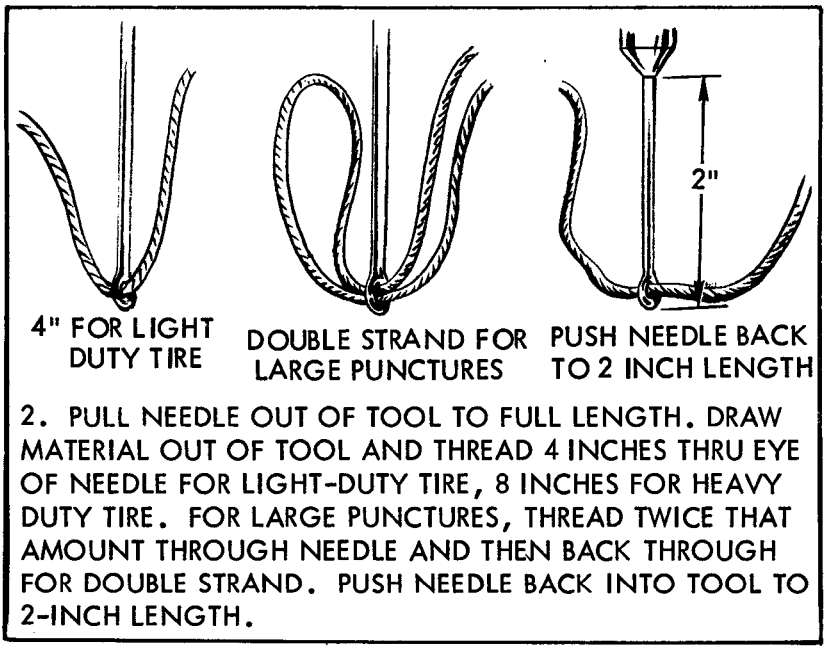


Figure 58.3. Threading needle.

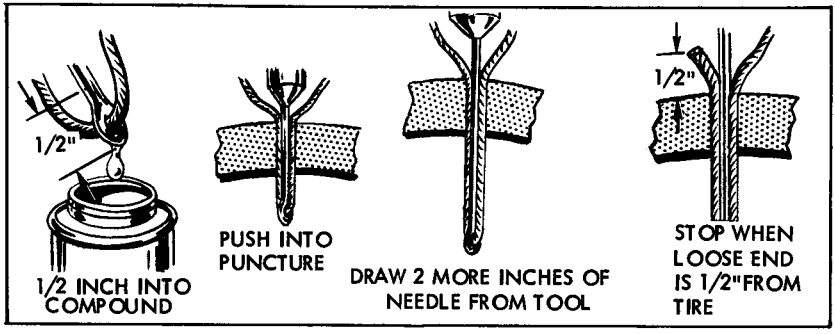
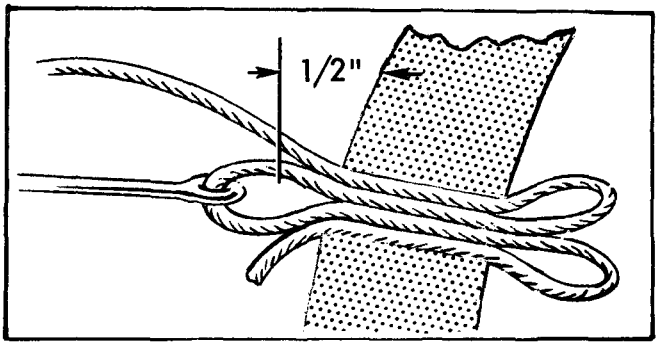


Figure 58.4. Placing repair material into puncture.



4. WITH A STEADY MOTION, WITHDRAW NEEDLE UNTIL TIP IS 1/2-INCH OUTSIDE OF TIRE. CUT MATERIAL OFF AT EYE OF NEEDLE. REPEAT 1 THROUGH 4 UNTIL PUNCTURE OR CUT IS REPAIRED. (CUTTING MATERIAL DIAGONALLY MAKES A POINT FOR EASIER THREADING OF NEEDLE).

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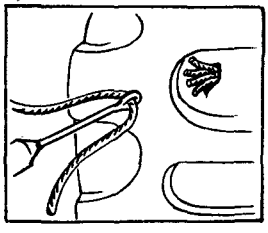
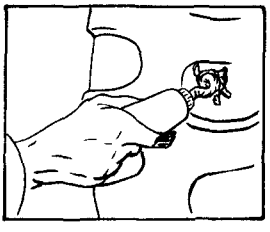
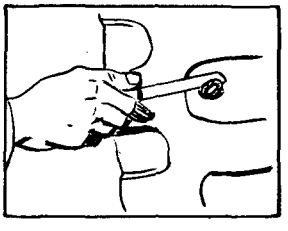
Figure 58.5. Cutting material from tool.



5. THREAD THE NEEDLE AGAIN AND REPEAT THE SAME STEPS, UNTIL THE PUNCTURE OR CUT IS FILLED. DO NOT OVERPACK DAMAGED AREA.



6. CHECK REPAIR WITH LEAK SEEKER SOLUTION SO ONLY THE REQUIRED NUMBER OF STRANDS ARE USED. IF THE SOLUTION FOAMS THE DAMAGED AREA REQUIRES ADDITIONAL STRANDS.



7. AFTER PUNCTURE OR CUT HAS BEEN REPAIRED AND TESTED, CUT OFF MATERIAL 1/4-INCH FROM TIRE.

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Figure 58.6. Completing repair.

33.2) and tighten it just enough to force the tire beads onto rim seating ledge.

(2) Inflate tire to 4 or 5 psi (fig. 33.3) to seat beads firmly.

(3) Loosen and remove tie-down strap (fig. 33.4). Inflate tire to 50 psi.

Warning: **Injury to hand may result if the tie-down strap catch is not released as indicated in figure 33.4.**

(4) Test for leaks by submerging tire and wheel in water.

(5) Reduce tire pressure to prescribed operating pressure.

(6) Install and tighten valve cap.

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Paragraph 57*b* (1) (*c*). Change warning to read:

Warning: **Injury may result if tires are not deflated.**

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63.1 Tubeless Tire Repair

(Added)

a. Tire injuries such as section reinforcement, spot repair, and retread will be performed at depot maintenance.

b. Before attempting any type of tire repair, all foreign elements including dirt and mud removed from the surfaces of the tire.

c. Tubeless tires can be repaired without removing the tire from the rim using tubeless tire repair kit, FSN 4910–922–6921, as instructed in figures 58.1 through 58.6.

Note. Be sure that *b* above is accomplished first.

d. Tubeless tires can also be repaired utilizing the repair material listed the Federal Supply Catalog, C2630/40, as indicated below.

(1) Spread and block tire beads apart, inspect liner for size of injury. If the tire does not require repairs as stated in *a* above, the following procedure will be applied:

(2) Position tire so that injured area is just off a vertical line to allow buffed particles of rubber to fall away from injury.

(3) Clean injury by using rubber solvent applied with a fabric swab.

(4) Gently buff an area around the injury slightly larger than the fuel pan of the hot patch to be applied.

Note. Avoid use of power buffer for this operation.

(5) Remove rubber particles by lightly dusting buffed area from the center out, with a dry, clean swab.

(6) Insert sealant compound in the tire injury from tread side and completely fill injury with sealant.

Note. Remove any compound that may appear through liner. Be sure that all dirt and inside tire paint have been removed and the liner shows up black in color.

(7) Select proper size hot patch to cover injury. Prepare hot patch in accordance with instructions received with repair material. Center patch over injury and press firmly into position.

Note. Do not attempt to use larger size patches as they will not fit curvature of the inside of tire.

(8) Install vulcanizing "U" clamp over the tire (fig. 30.4) and center the sider over the patch. Turn clamp handwheel down firmly.

(9) Expel air and fumes from within the tire by using compressed air.

Warning: **The fumes of solvents and rubber cement are heavier than air and will flash when hot patch unit is ignited unless the tire is purged.**

(10) Ignite hot patch fuel and leave undisturbed for at least ten minutes after fuel is consumed.

(11) Remove "U" clamp and hot patch fuel pan.

(12) Tie shop repair tag to tubeless tire.

Caution: **Do not use staples.**

By Order of the Secretary of the Army:

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Chief of Staff.

Official:

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NG: State AG (3).

USAR: None.

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This manual is correct to 30 December 1954

* TM 9-1870-1

TECHNICAL MANUAL } DEPARTMENT OF THE ARMY
No. 9-1870-1 } WASHINGTON 25, D. C., *18 February 1955*

CARE AND MAINTENANCE OF PNEUMATIC TIRES

Section I. GENERAL

1. Purpose

SEE PAGE 1 OF C-3

These instructions are published for the information and guidance of personnel responsible for the proper care, use, and minor repairs of pneumatic tires and inner tubes.

2. Scope

SEE PAGE 1 OF C-3

a. This manual covers the description, care, and use of pneumatic tires and inner tubes, common causes of tire failures, and methods of mounting and demounting tires using available equipment.

* This manual supersedes TB ORD 349, 28 May 1947, and so much of TM 31-200, 1 April 1943, including C 4, 20 June 1947, as pertains to the material covered herein.

SEE PAGE 1 OF C-3

~~b. Only such inspections and repairs are covered in this manual as are authorized to be performed by the using organization (2d echelon) and by ordnance field maintenance companies (3d and 4th echelon). For repairs performed by higher echelon, see TM 9-1800.~~

3. Importance of Tires

a. Military mobility depends upon tires. The cushion of air inside rubber tires absorbs and reduces effect of road shock, making possible increased road speed, flexibility, and maneuverability of vehicles. Speed is necessary to rush troops, ammunition, food, and supplies. Flexibility and maneuverability enable the vehicle to roll into action over rough terrain.

b. The tire must stand severe service, road shocks, cuts, moisture, and abuse. When a tire fails, the entire vehicle may be put out of use, together with its load of troops or supplies. In combat, tire failure may bring defeat of a local military mission.

4. Importance of Proper Care and Maintenance

While natural wear-and-tear affects tire life, premature tire failures can be traced to abuse and neglect. Proper maintenance of tires can prevent hazardous tire failures and helps to conserve the supply of rubber.

5. Natural and Synthetic Rubbers

a. Synthetic rubbers are identified as GR rubber. The GR, meaning Government Rubber, is followed by a letter indicating the type. GR–S represents the Butadiene-Styrene type of synthetic rubber, which is used in the manufacture of tires and tubes for both military and commercial purposes. Tires made from this material are identified by the letter S (E, fig. 5) or a red mark approximately three-quarters of an inch in diameter.

b. Tires get heated by internal friction when they are in motion, therefore, high tire temperatures are encountered in hot weather and at high running speeds. At these high temperatures, there is a serious loss in the strength of rubber. This loss of strength at high temperatures is much greater in synthetic rubber than in natural rubber; consequently, tires made of synthetic rubber do not stand as much abuse as tires made of natural rubber, but they give satisfactory service, if not run at excessive speeds or in extremely hot climates.

6. The Tire Assembly

a. The tire assembly generally consists of the tire (also known as casing), inner tube, flap, and rim (A, fig. 1). Failure of any of these parts may mean failure of the entire vehicle.

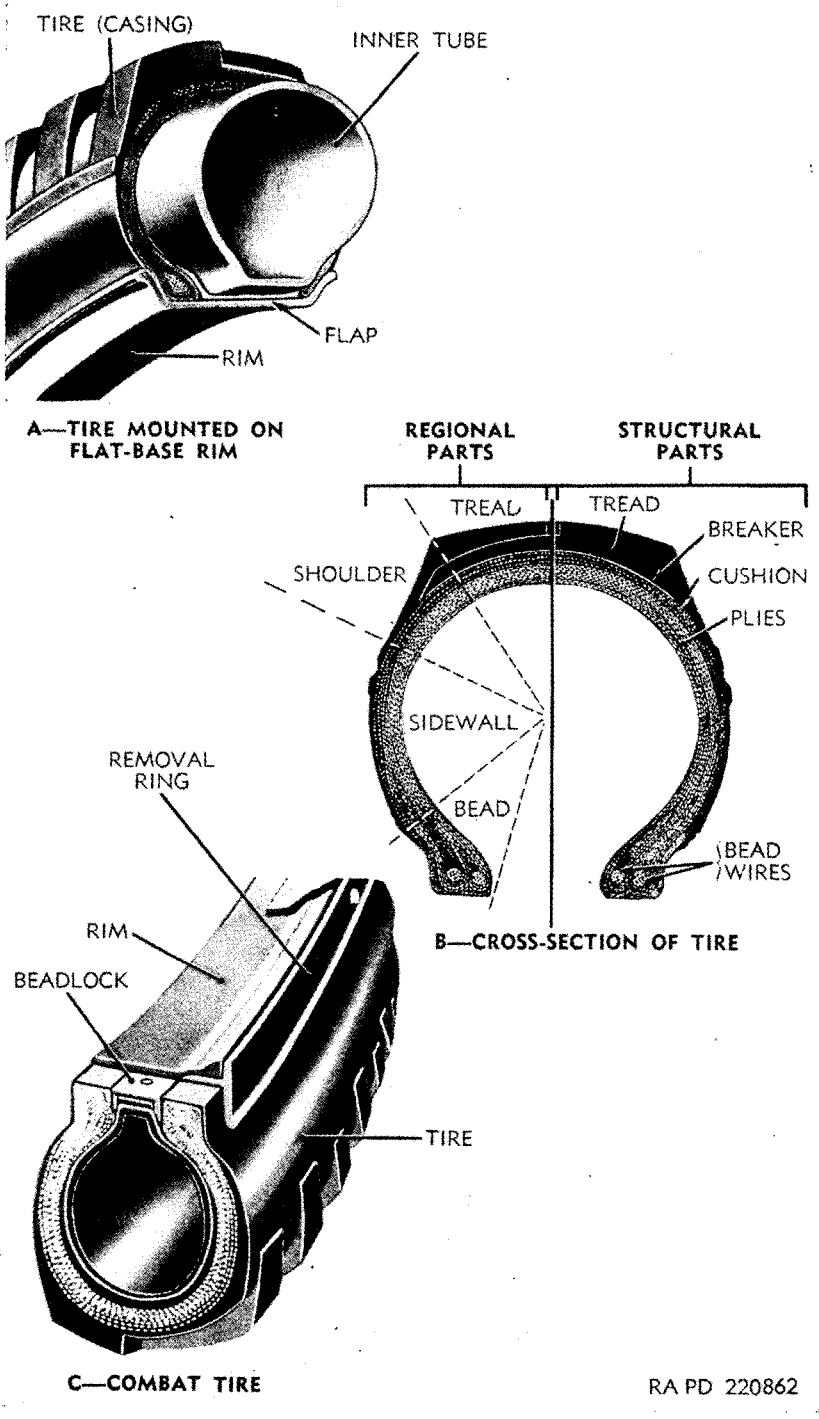


Figure 1. Tire construction—Sectionalized view.

FIG. 1.1 (ADDED) SEE PAGE 2 OF C-3

b. Structural parts of a tire are the tread, breaker, cushion, plies of cord, and bead wires (B, fig. 1). Each part of the tire serves a definite purpose, as described in (1) through (5) below.

(1) The tread is a layer of rubber on the outside circumference of the tire and is the wearing surface. It usually has a nonskid design to provide traction. The tread also protects the cords from cuts, bruises, and moisture. The external rubber, which forms the tread, extends over the sidewalls as shoulders for protective purposes.

(2) Breakers are layers of rubber-covered cords, similar to the plies, except that the cords of the breakers are spaced farther apart. Breakers distribute road shocks and prevent the separation of the tread from the cushion.

(3) The cushion is of soft heat-resisting rubber. It absorbs road shocks and bonds the plies and breakers together.

(4) Cord plies give strength to resist internal pressure, to support loads, and to absorb road shocks.

(5) The bead wires are made of steel and are necessary reinforcings in order that the tire remain properly seated on the rim.

c. The regional parts of the tire are the tread, shoulders, sidewalls, and beads (B, fig. 1).

d. The inner tube contains the air.

e. The flap protects the tube throughout the rim and bead area.

f. The rim holds the tire in place.

G. (ADDED) SEE PAGES 1&2 OF E-3

7. Types of Tires

a. Tactical Tires. These are similar to combat tires, except that these tires have rounded shoulders. Tactical tires are used for the same purposes as combat tires (A, fig. 2).

b. Combat Tires. These are of much heavier construction than civilian tires; they have more rigid sidewalls and heavily cushioned plies that are spaced wider apart (B, fig. 2). They are designed to operate without air pressure for a limited distance only and only in combat where the tactical situation requires it.

c. Truck and Bus Tires. These are of standard construction as used on civilian vehicles (C, fig. 2).

d. Passenger Tires. These are of standard construction as used on civilian vehicles (D, fig. 2).

e. Rock-Service Tires. These are large-size tires of standard construction as used on civilian vehicles for off-the-road service and on unpaved roads at speeds not exceeding 30 mph (A, fig. 3).

f. Earthmover Tires. These are large-size tires of standard construction as used on civilian vehicles for off-the-road service and for maximum traction. The maximum permissible vehicle

speed, when using these tires on the road (to and from work location), is 25 mph (B, fig. 3).

g. Grader Tires. These are similar to earthmover tires, except they are designed for somewhat lower inflation pressures (C, fig. 3) and for service involving extreme angular ground contact.

h. Tractor Tires. These are of standard construction as used on civilian low-speed tractors (max speed of vehicle 20 mph).

(1) Front tractor tires are of small or medium size (A, fig. 4).

(2) Rear tractor tires are of larger size and are designed for maximum traction (B, fig. 4).

i. Industrial Tractor Tires. These are similar to the other tractor tires, except they are designed for somewhat lower inflation pressure.

j. Straight-Side Industrial Tires. These are of standard construction and are similar to truck and bus tires in appearance, except that most of them are of small size. The maximum vehicle speed with these tires is 10 mph.

k. Low-Platform Trailer Tires. These are of moderate size, have high inflation pressures, and are designed to carry a very heavy load for their size. Maximum vehicle speed with these tires is 20 mph.

l. Implement Tires. These are similar to tractor tires, except that they are designed for towed vehicles (A and C, fig. 4).

M. (ADDED) SEE PAGE 2 OF C-3

8. Types of Treads

a. Cross-Country Tread. This is similar in appearance and application to the mud-and-snow tread (A, fig. 2), except for the rounded shoulder.

b. Mud-and-Snow Tread.

(1) *Nondirectional.* Nondirectional mud-and-snow tread design is used extensively on tires for military purposes (B, fig. 2). This tread gives good traction in either direction in mud and snow, on dirt or temporary roads, and cross-country. They are also practical for hard-surface roads.

(2) *Directional.* Tires with directional mud-and-snow treads are generally used in the Army only on certain earthmovers and graders (C, fig. 3). These tires will be mounted in accordance with instructions in *g* below.

c. Regular Tread. This tread is common on civilian passenger tires, truck and bus tires (C, fig. 2), and industrial straight-side tires. It gives satisfactory traction on highways and delivers long mileage.

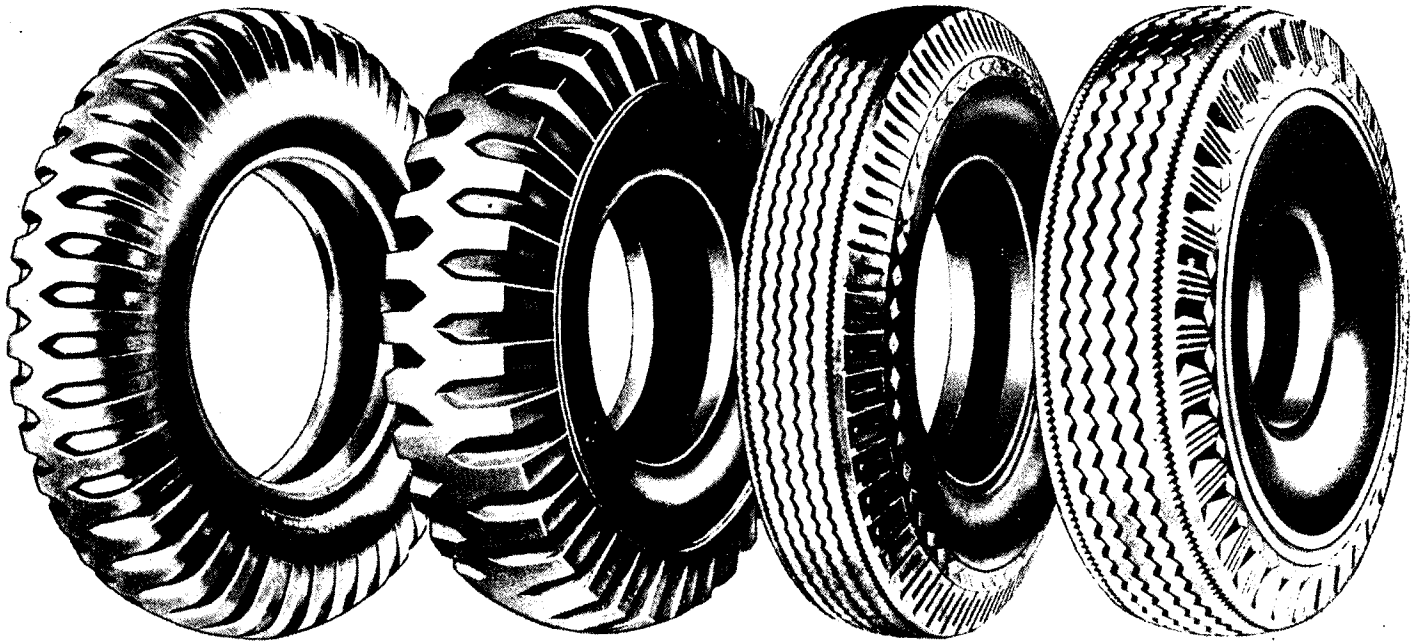


Figure 2. Types of tires.

d. Rock-Service Tread. This tread design is used on tires for service on rough terrain (A, fig. 3).

e. Earthmover Tread. This tread design is used on earthmover tires (B, fig. 3).

f. Rib Tread. This tread design is used on front tractor tires, front implement tires, and other tires for easy steering where traction is unimportant (A, fig. 4).

g. Traction Tread. This is common on tractor tires and on implement tires (B, fig. 4). On tractors and live axles, tires are mounted so that the point of the V in the tread design meets the ground first. On towed vehicles or on dead axles, tires are mounted so that the open part of the V in the tread design meets the ground first.

h. Smooth Tread. Tires with smooth treads (C, fig. 4), are used where neither steering nor traction are of importance.

i. Desert Tread. This is very similar to the cross-country tread. While there are certain differences in design and construction, these are not readily discernible.

9. Tire Markings

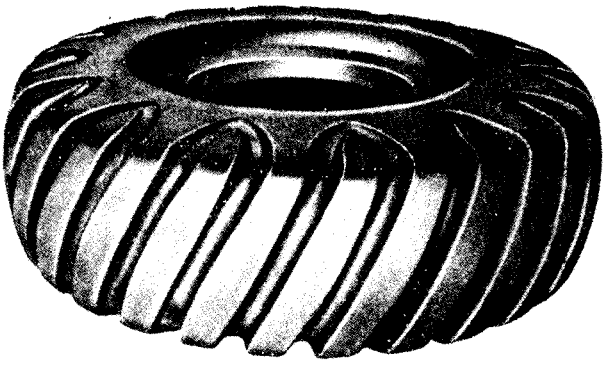
a. Manufacturer's Name and Type (A, fig. 5). These markings are imprinted on the sidewalls of tires. The manufacturer's type designation is usually by trade name, and it generally does not agree with the type designations given in paragraphs 7 and 8, except that combat tires are marked COMBAT.

b. Controlled-Bead Tires (B, fig. 5). Only tires with controlled (width) beads can be used with beadlocks or with bead clips. Tires with controlled beads have the letters BL or BLX imprinted on the sidewalls near the size markings on the serial-number side. Combat tires and tactical tires have controlled beads, even when they are not marked BL or BLX.

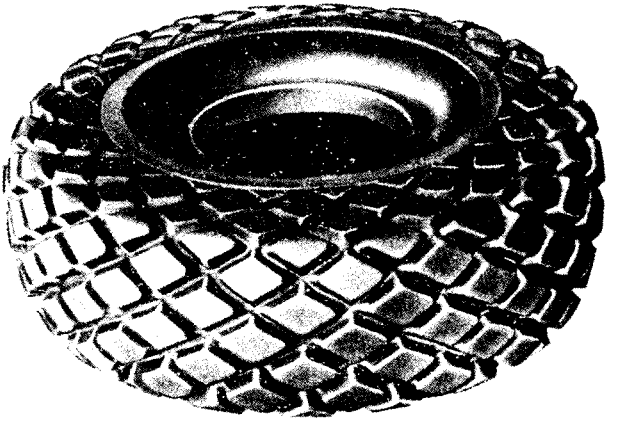
Note. Controlled-bead tires may be used without beadlocks or bead clips, and, when so used, they may be mounted on any type of rim of correct width and diameter.

c. Serial Number (C, fig. 5). The serial number is shown by numbers indented in the sidewall. Raised numbers in bead area indicate the number of the mold in which the tire was cured (vulcanized).

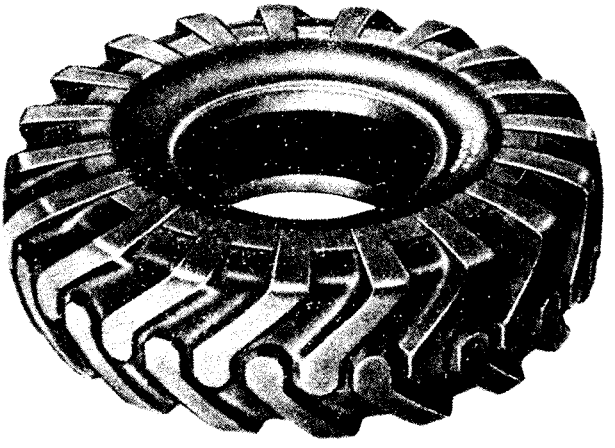
d. Balance Mark (D, fig. 5). A small red mark, approximately one-quarter inch in diameter, on the sidewall near the bead of some tires indicates where the valve of the tube should be placed in order to effect best balance of tire and tube.



A—ROCK-SERVICE TIRE



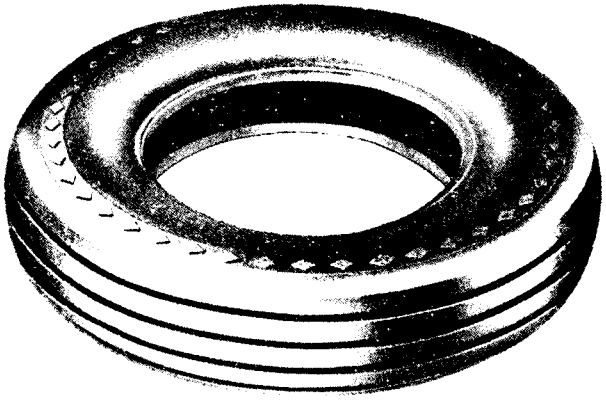
B—EARTHMOVER TIRE



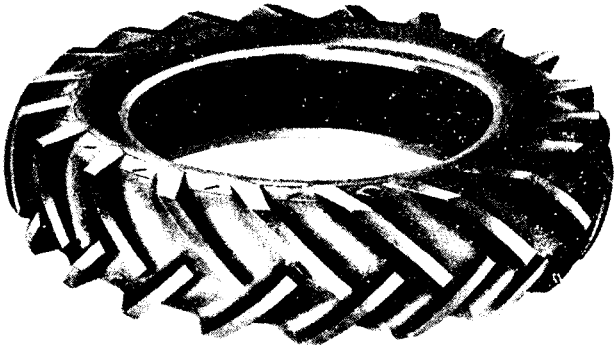
C—GRADER TIRE—MUD-AND-SNOW TREAD

RA PD 220800

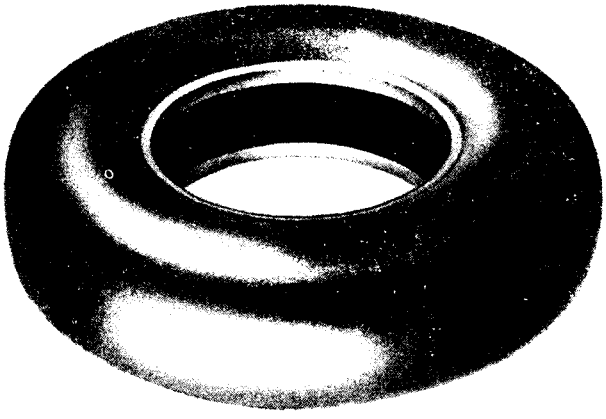
Figure 3. Tire treads—Rock service, earthmover, and grader.



A—TRACTOR OR IMPLEMENT TIRE—RIB TREAD



B—TRACTOR REAR TIRE—TRACTION TREAD



C—IMPLEMENT TIRE RA PD 220801

Figure 4. Tire treads—tractor and implement.

e. Size and Ply Markings (E, fig. 5). The size is marked on the side of each tire, for example, 7.50-20. The first number, 7.50, is the approximate width of the tire in inches, when the tire is properly mounted on the rim and inflated, but not carrying a load. The second number, 20, is the inside diameter of the bead in inches. Marking such as 8-ply is the ply rating of the cord fabric.

Note. Ply rating is the numerical designation of the tire strength of the tire and does not necessarily indicate the actual number of cord plies in the tire. In official nomenclature and in markings on tires, such terms as 8-ply and 8-ply rating have the same significance and tires so marked require the same inflation pressures.

f. Identification of Synthetic Tires (E, fig. 5.) Synthetic tires usually can be identified by a red mark, approximately three-quarters of an inch in diameter, or by the letter S on the sidewalls.

g. Inflation Pressure. The inflation pressure recommended by the vehicle manufacturer is sometimes shown. When the manufacturer's recommendation is in conflict with prescribed inflation pressures (par. 24*a*), disregard the manufacturer's recommendation. (See guide to tire inflation pressures, table IV, app I).

h. Rayon Cord. The letter R identifies tires constructed of rayon cord. (Otherwise the cord is made of cotton yarns.)

i. Military Marking (E, fig. 5). All tires used in the Army are marked military on the serial-number side of the tire.

j. Arctic Tires. Tires designed for use in arctic regions or in extreme cold are marked POLYMERIZED.

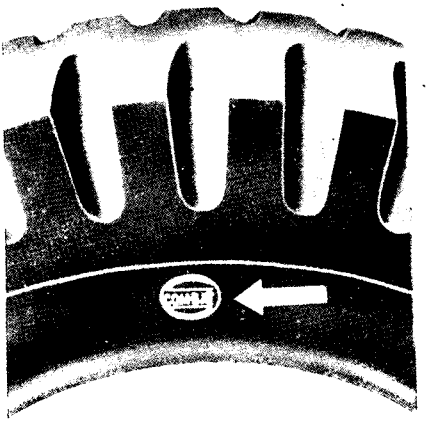
K. (ADDED) SEE PAGE 3 OF C-3

10. Inner Tubes

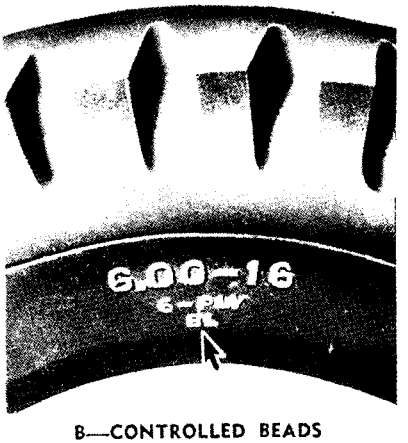
a. The inner tube is a continuous, circular, rubber container that fits inside the tire and holds the air that supports the vehicle. The tube is only strong enough to stand a few pounds of air pressure when not confined, yet it bears extremely high pressures when enclosed in the tire. Because the tube is made of comparatively soft rubber to fulfill its function, it is easily chafed, pinched, punctured, or otherwise damaged. The three types of tubes are described in *b* through *d* below.

b. Standard tubes are made of one layer of rubber molded in the shape of a doughnut. They are regularly used for standard-type tires.

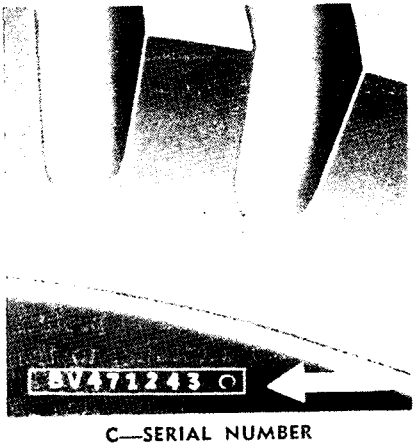
c. Tubes for combat tires are constructed the same as standard tubes, except that they are smaller than standard tubes with the same size markings, since the inside air space of combat tires is smaller. Combat tubes are stamped COMBAT (A, fig. 6) and should always be used exclusively with combat tires.



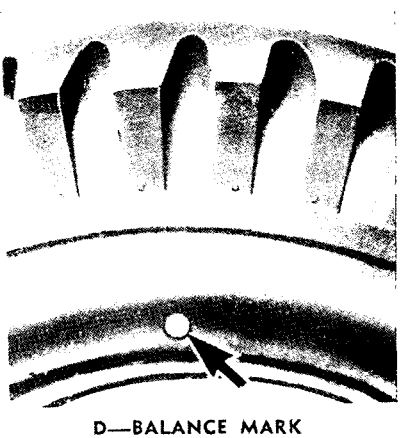
A—COMBAT TIRE



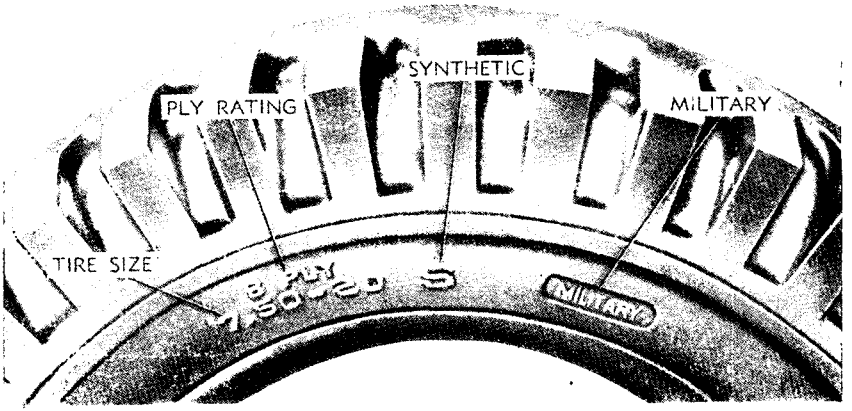
B—CONTROLLED BEADS



C—SERIAL NUMBER



D—BALANCE MARK



E—PLY, SIZE, MATERIAL, AND TYPE MARKING

RA PD 220802

Figure 5. Tire identification markings.

d. Synthetic tubes are identified by a blue stripe around the inside (B, fig. 6).

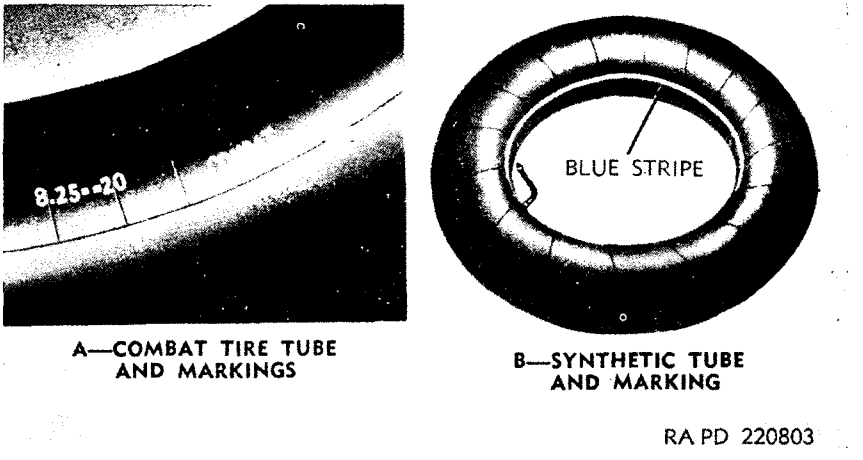


Figure 6. Tube identification.

11. Valves

Tubes are inflated by air under pressure forced into the tube through the valve, which automatically prevents air from escaping. The valve stem is threaded inside and outside at the end to accommodate the valve core and cap. Stems on truck tubes are bent to make them more accessible for inflation and to protect them from flying stones. Valves are classified according to the method of mounting on the tube.

a. Cured-On Valve. The cured-on valve has a rubber base that is vulcanized on the outer surface of the tube and cannot be removed unless cut off for replacement. It is available in two types—nonbendable, such as used on cars; and bendable, such as used on ¼-ton 4x4 trucks.

(1) *Rubber-Covered Valve* (A, fig. 7). The stems of rubber-covered valves are covered with rubber and are hand-bendable, when the stem is longer than 3 inches.

(2) *All-Metal-Stem Cured-On Valve.* These are provided as standard and oval-base types.

(*a*) *Standard.* Standard all-metal-stem cured-on valves have round rubber bases that are vulcanized to the tube body. A bridge washer is fastened to the bottom of the stem by a hex locknut. For function and positioning of bridge washers, see paragraph 18.

(*b*) *Oval Base.* Oval base all-metal-stem cured-on valves are similar to standard all-metal-stem cured-on valves, except they have a large oval base.

b. Cured-In Valve (B, fig. 7). This type valve is similar to cured-on valves, except that, either the rubber base is inverted (vulcanized to the inner surface of the tube), or it is vulcanized directly into the rubber body of the tube.

c. Spud-Mounted Valve (C, fig. 7). Spud-mounted valves (Eger-type) are constructed in two parts for attaching to the tube. These

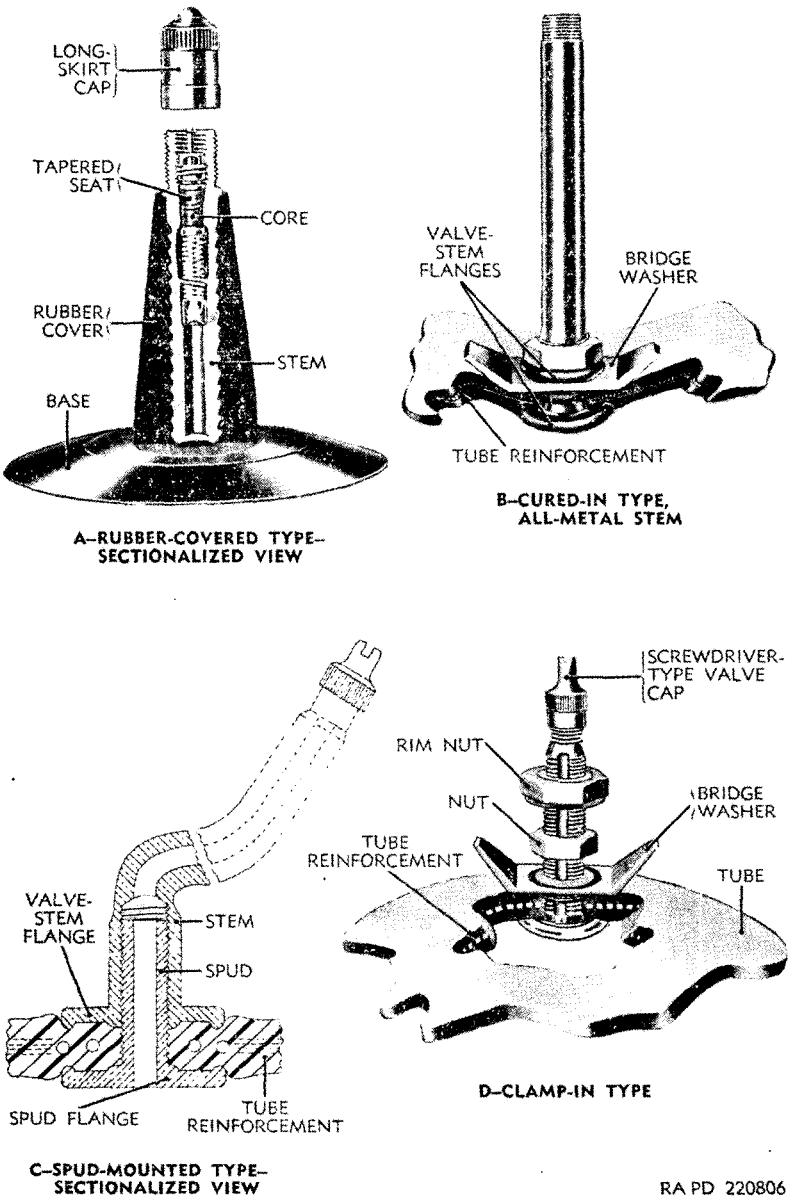


Figure 7. Tire valves.

FIG. 7.2 (ADDED) SEE PAGE 3 OF C-3
FIG. 7.3 (ADDED) SEE PAGE 4 OF C-3

valves are airtight at the base, through the clamping action between the spud and valve flanges. They are readily identified on tubes by the absence of bridge washers and hex nuts.

d. Clamp-In Valve (D, fig. 7). Clamp-in valves are no longer used, except on motorcycle and bicycle tubes. Such a valve is airtight at the base, through the clamping action of the bridge washer and nut. Some of these valves have stems that are fully threaded, in which case, a second nut, called rim nut, is used to hold the valve stem firmly in place on the rim. The bridge washer is positioned so that the ends lie lengthwise with the tube.

e. Large-Bore Valve. Large-bore valves are used on tubes for very large earthmover tires. The large bore affords rapid inflation and deflation. Except for size, they are similar to the standard all-metal-stem cured-in valves described in *b* above.

Note. Valve cores, caps, air chucks, gages, and tools (table I, par. 22) (including valve repair and converting tools), designed for standard-bore valves do not fit large-bore valves.

F. (ADDED) SEE PAGES 3 + 4 OF C-3

12. Valve Cores

a. The valve core is that component of the valve that is screwed into the stem and permits air under pressure to enter, but prevents it from escaping. There are two types and two sizes of valve cores in use. The two types (A and B, fig. 8) are the visible-spring type and concealed-spring type and are used interchangeably.

b. The core shell has a rubber washer, which provides an airtight fit against the tapered seat inside the stem (fig. 9). Directly below the shell is a cup that contains a rubber seat. In the closed position, the rubber seat is forced against the bottom of the shell, forming an airtight seal. In open position, the pin forces the cup away from the shell. Two sizes are provided for standard-bore and large-bore valves.

C. (ADDED) SEE PAGE 4 OF C-3

13. Valve Caps

The valve cap is also a component part of the valve and is screwed on the end of the valve stem, furnishing a second airtight seal. The valve cap also protects the threads on the end of the valve stem and keeps out dirt and moisture from the interior of the valve. Two types of valve caps are provided, each containing a dome-shaped, rubber sealing cup (fig. 8).

a. Screwdriver-Type Valve Cap. The screwdriver-type valve cap has a forked tip. By means of this tip, the cap may be used as a tool for inserting and removing valve cores. The forked end of the valve stem repair tool (C, fig. 56) may also be used for this purpose.

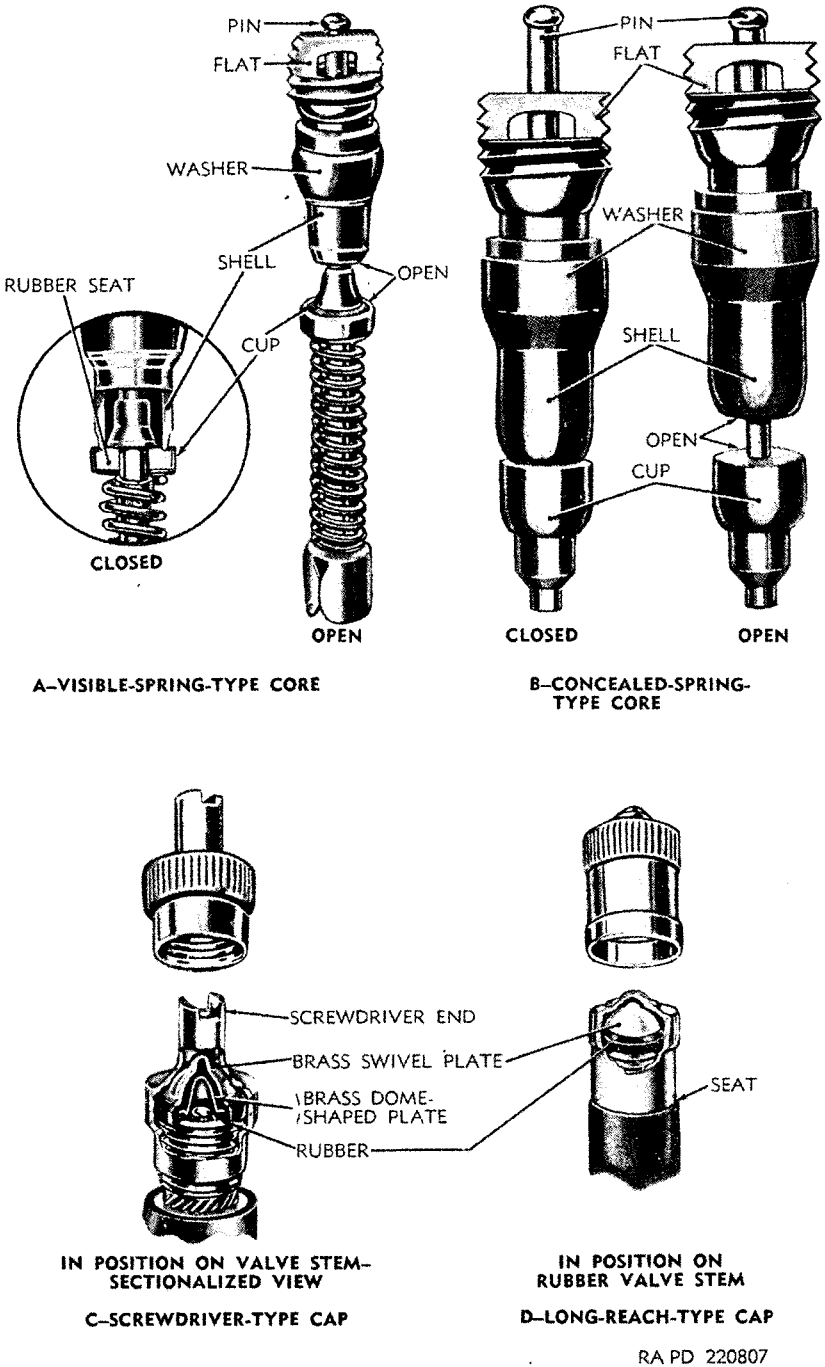


Figure 8. Valve cores and caps.

b. Plain Valve Cap. The plain valve cap is used on rubber-covered valves and has a skirt that contacts the rubber covering on the valve stem (D, fig. 8). Screwdriver-type valve caps may be substituted for these.

Note. Standard size valve caps do not fit large-bore valves.

C. (ADDED) SEE PAGE 4 OF C-3

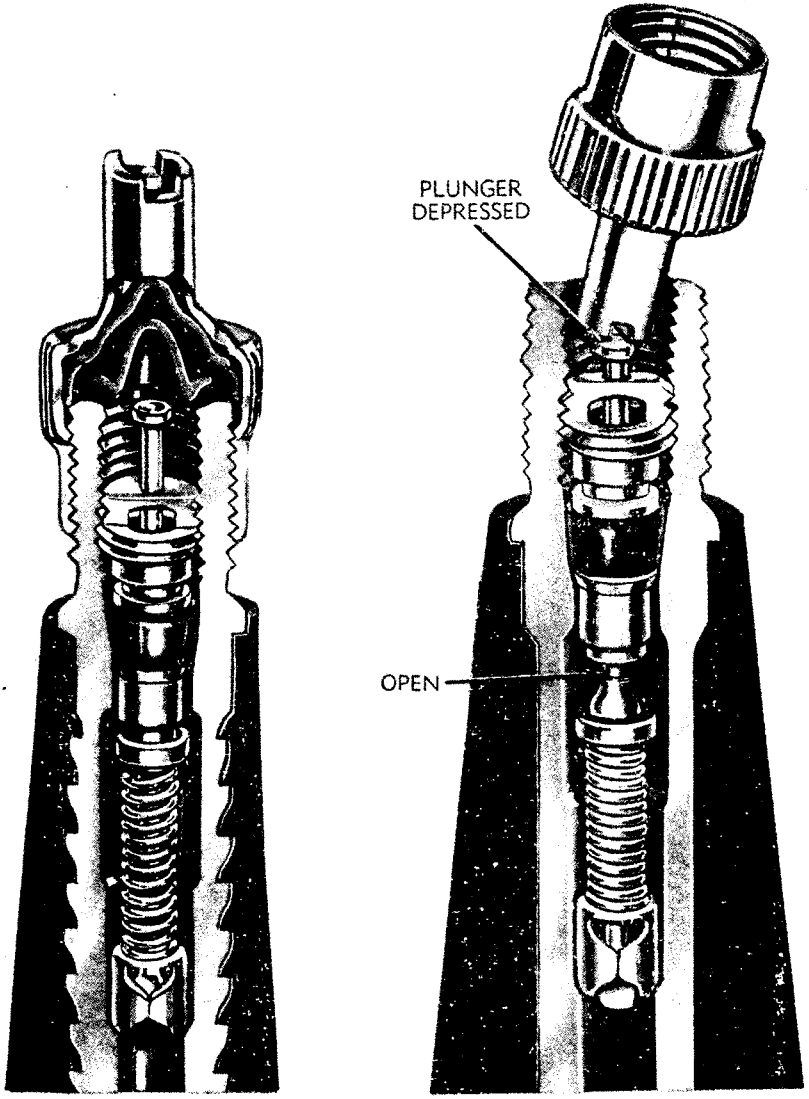


Figure 9. Core installed in valve stem—sectionalized view.

14. Tire Flaps

a. Purpose. A flap is usually constructed of a strip of semihard rubber with tapered edges and with ends spliced together to form a circle. Flaps are required in tires used on flat-base rims, to protect tubes from the toes of the beads and from the bases of rims (fig. 1), and the bead-clips for protection from the edges of clips (fig. 16).

b. Size Markings. The size of the tire and the width of the rim determine the size of flap to be used. Manufacturers have different methods of marking flap sizes. Some use a code, some the actual tire or group of tire sizes, and some the actual flap diameter and width in inches.

c. Synthetic Flaps. A flap with a colored stripe down the center indicates synthetic rubber construction. Synthetic flaps require special care in mounting as explained in paragraph 43*f*.

d. Fabric Flaps. Some manufacturers supply flaps constructed of cotton fabric.

Caution: Do not use these flaps with synthetic rubber tubes.

15. Types of Rims

a. General. The rim completes the enclosure for the tube, holds the tire beads rigidly in place, and connects the tire to the wheel. Usually, rim and wheel are permanently fastened together as one unit and bolted to the hub. On spoked wheels, the rim is attached with lugs. For correct mounting, demounting, and tire fit, it is necessary to recognize the differences in rim types (figs. 10 through 16).

b. Flat-Base Rim (B, fig. 10, and fig. 12). The flat-base rim is generally fastened permanently to the wheel, when used on a military vehicle. It has a flat seat for the bead and, as the name indicates, the rim has no well. This type rim has a demountable side flange to permit mounting and demounting the tire. Flaps are provided for protection of the tube (par. 52).

c. Drop-Center Rim (fig. 10). This type of rim (C) is made in one piece, and it is permanently fastened to the wheel. Its important feature is a well, which permits mounting and demounting the tire. Bead seats are tapered to match corresponding tapers on the tire beads. Drop-center rims are generally used on smaller vehicles, such as passenger cars and ¼–ton 4x4 trucks.

Note. Some passenger cars and light trucks are equipped with safety-type drop-center rims (A). Safety rims have slight humps at the edges of the bead ledges, which hold the beads in place when tires go flat.

d. Semidrop-Center Rim (D, fig. 10). This type of rim is also permanently fastened to the wheel. It has a shallow well, beveled bead seats to fit the tapers of the beads of the tire, and a demount-

able flange. The demountable flange, or side ring, which fits into a gutter on the outside edge of the rim, holds the tire in place.

e. Advanced Rim (E, fig. 10). Advanced rims are replacing flat-base rims on vehicles of recent manufacture. The advanced rim, like the flat-base rim, has no well. These rims are manufactured in a variety of designs, which are of two or three piece construction. The characteristics of all advanced rims are the 5-degree tapered bead seats on both sides and that one of the bead seats bears on a removable ring. One type of advanced rim is mentioned in *f* below. Other types of advanced rims may be considered as variations (*i* below).

f. Military Rim (F, fig. 10, and fig. 13). This is the type of advanced rim adpoted as standard by the Army. It is of two-piece construction.

g. Earthmover Rim (fig. 14). Rims of this type vary in construction. One variation, adopted as standard by the Army for 16.00–25 size tires, is shown in figure 14 (par. 54).

h. Divided Rim.

(1) *Small size.* A, figure 11, shows a wheel with divided rim used only with small size tires, such as those on the ¼-ton 4x4 truck. Note that the sections, fastened together by studs and nuts, are of equal width.

(2) *Large size.* B, figure 11, shows the type of divided rim wheel found on ¾-ton 4x4 trucks, scout cars, half tracks, etc. The two sections of this type of rim are not of equal width. They are fastened together with studs and nuts or with bolts.

i. Variations. Variations occur in most of the described types of rims (*b* through *h* above), i.e., figure 10 shows two types of semidrop-center rims, one where both bead seats are on the main part of the rim and another where one of the bead seats is on the removable flange. There are, however, semidrop-center rims where a portion of one bead seat is on the main part of the rim and the other portion of the bead seat is on the removable flange. Another variation is the three-piece construction of flat-base rims. The described rims, however, represent characteristic construction and any variations encountered will present no difficulties.

16. Beadlocks and Bead Clips

a. General. Beadlocks and bead clips are used on tires on certain military vehicles, to prevent the tires from becoming detached from the rims when the air pressure in the tube fails (because of puncture or break). With these devices, it is possible to drive the vehicle some distance without any air pressure in the tubes.

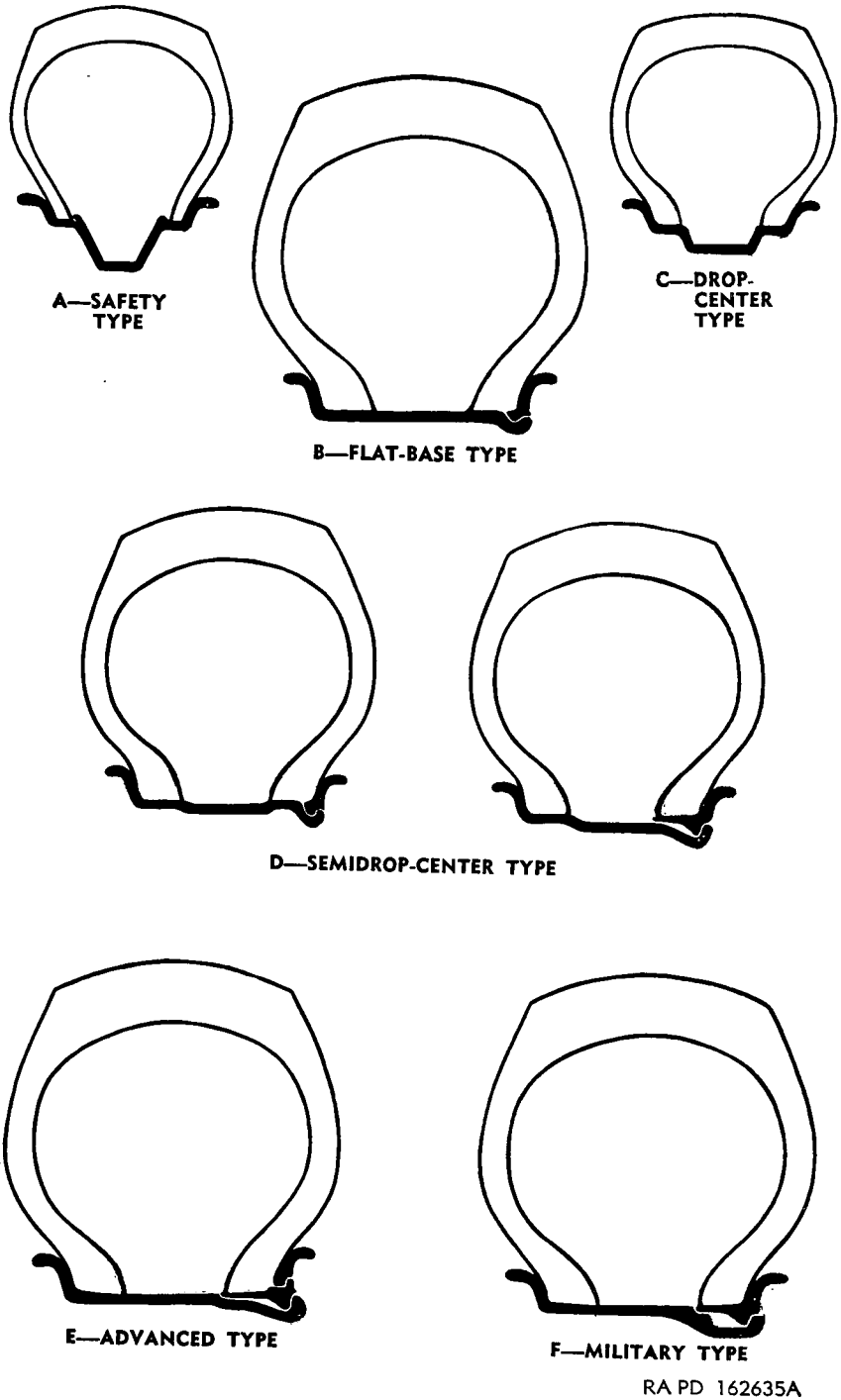
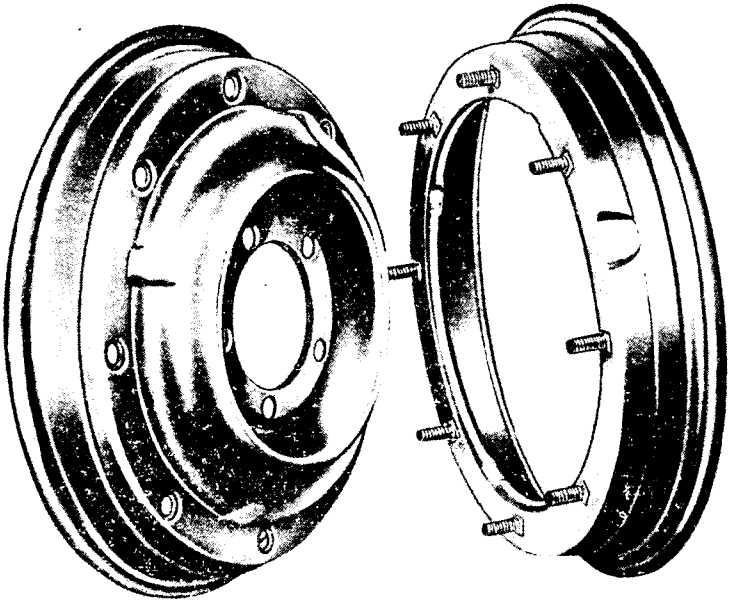
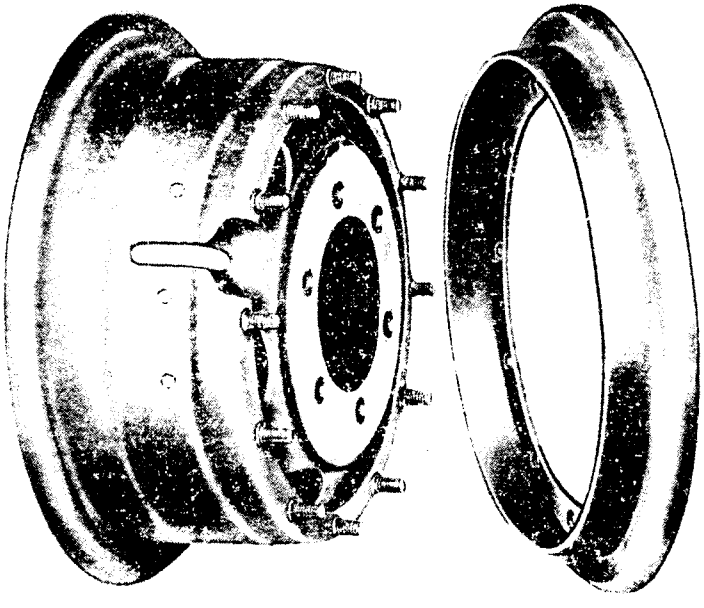


Figure 10. Types of rims.



A—DIVIDED-RIM WHEEL FOR SMALL VEHICLES



B—DIVIDED-RIM WHEEL FOR LARGE VEHICLES

RA PD 220804

Figure 11. Divided rims.

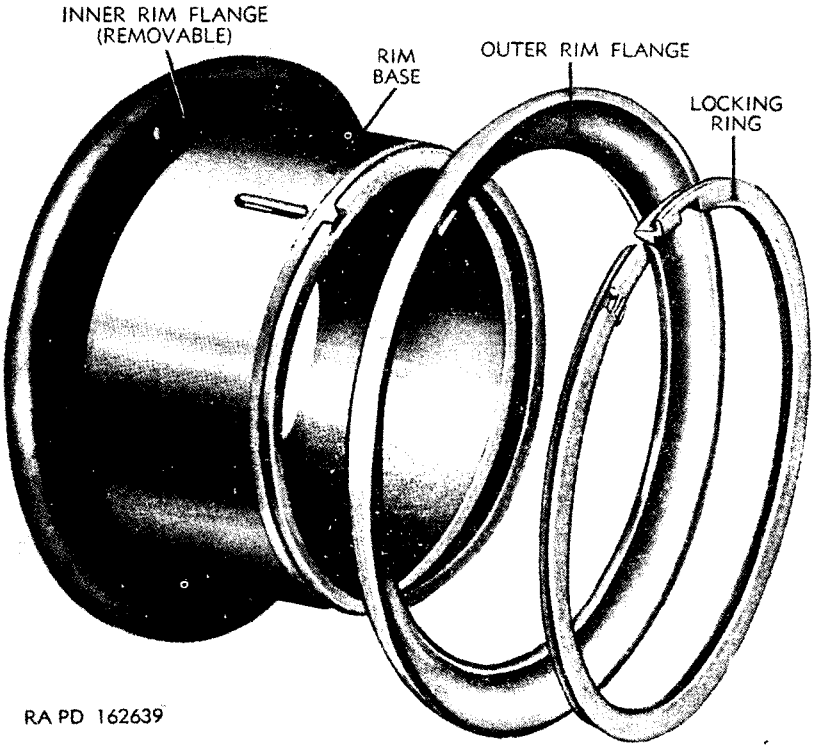


Figure 12. Four-piece, flat-base rim.

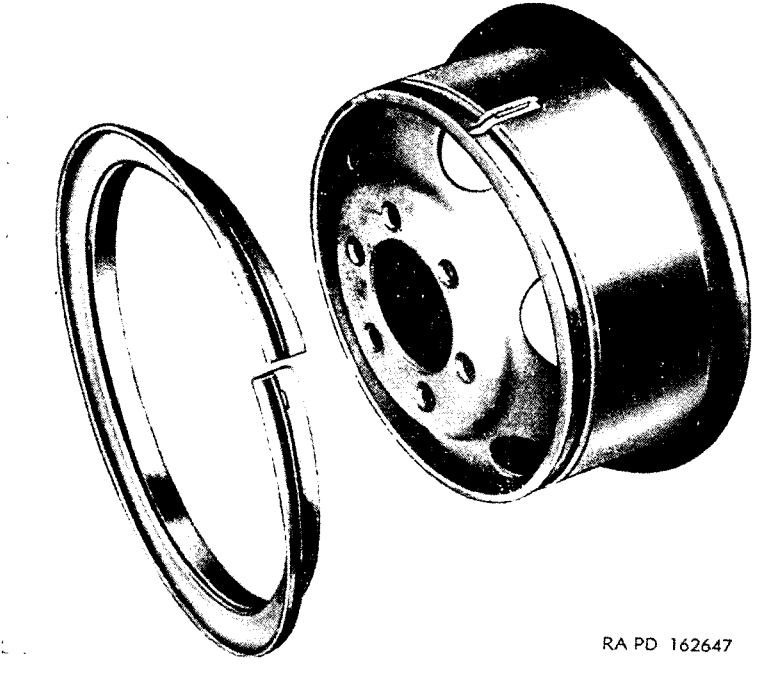


Figure 13. Military rim.

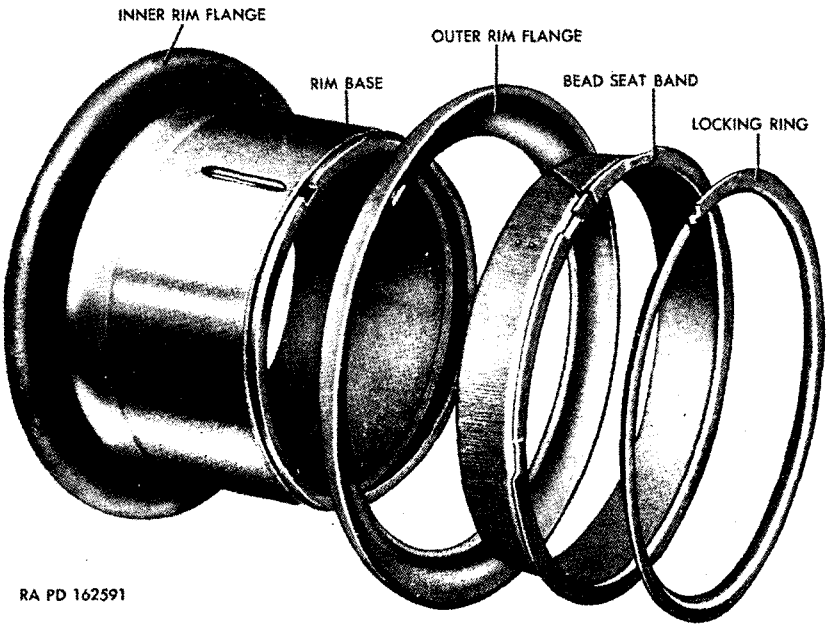


Figure 14. Large earthmover rim with 5-degree-taper bead seat.

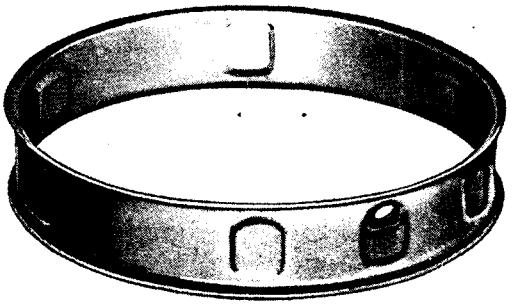
This feature of military vehicles has great tactical importance in combat, hence the proper use and installation of these devices are very important (pars. 55 through 57).

b. Description. The beadlock is a metal device that fits between the beads of a tire, so that pressure can be applied by tightening the rim flanges against the outer sides of the bead. It is slightly wider than the space between tire beads when mounted on the rim, which provides a compression fit and prevents the slippage even when operating the tire without air pressure.

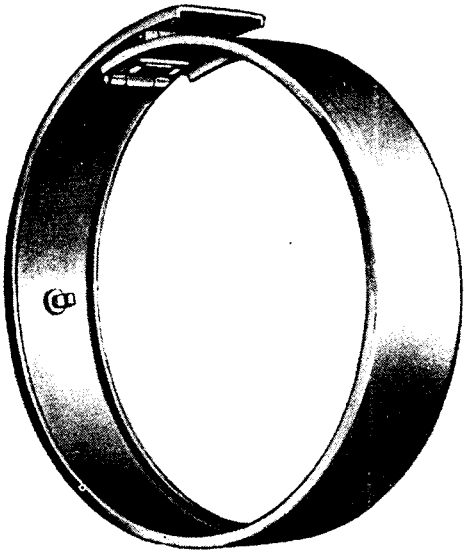
c. Channel-type Beadlock (A, fig. 15). This type of beadlock is a solid band of steel, which can be readily inserted in its position in the tire. It is used with the type of wheel described in paragraph 15*h*(1). Flaps are not required with this type of beadlock.

d. Hinged-Type Beadlock (B, fig. 15). This type of beadlock is not a continuous band, but is connected near its ends by a hinged link, in order that the beadlock may be collapsed. In its collapsed position, the beadlock is small enough to permit insertion in the tire. It is used with the type of wheel described in paragraph 15*h* (2). Flaps are not required with this type of beadlock.

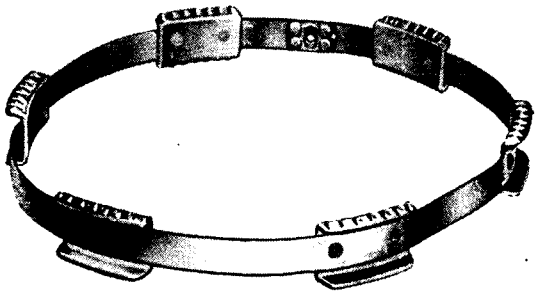
e. Segmental Beadlock (C, fig. 15). This type of beadlock is provided with spacer blocks of hard metal, which are fastened



A—CHANNEL-TYPE



B—HINGED-TYPE



C—SEGMENTAL-TYPE

RA PD 184012

Figure 15. Beadlocks.

together with a flexible steel band, and can be collapsed for removal from and insertion in the tire. This beadlock requires the use of a correct size and type of rubber flap.

f. Beadlock Identification. Tire size and code number are stamped near the valve hole of beadlocks.

17. Bead Clips

(fig. 16).

Bead clips are used in lieu of beadlocks on certain sizes of tires. Bead clips are used in multiples (5 to 6 clips are *equally spaced* on each bead of the tire for balance). Correct sizes of bead clips are given in table I (app. I). Tire and rim sizes are stamped on each bead clip. Bead clips are used only on tires marked BL on sidewalls. Tire flaps must be used in conjunction with bead clips.

18. Bridge Washers

The bridge washer is so called because it bridges the valve slot (or hole) in the rim. Its purpose is to protect the rubber at the base of all-metal-stem valves from rubbing against the edges of the valve slot (or hole) in the rim. It is held in place by a hex nut. The clamping action of the nut and bridge washer provides an additional air seal at the base of cured-on and cured-in all-metal-stem valves and furnishes the only air seal for clamp-in valves. The ends of the bridge washer point lengthwise on the tube (B and D, fig. 7).

Section. II. REPLACEMENT ITEMS, MATERIALS, TOOLS, AND EQUIPMENT

19. Replacement Items

a. Tires, tubes, valve cores, valve caps, etc, required for the replacement of unserviceable parts are listed in the pertinent Department of the Army publications covering lists of parts for the vehicle concerned.

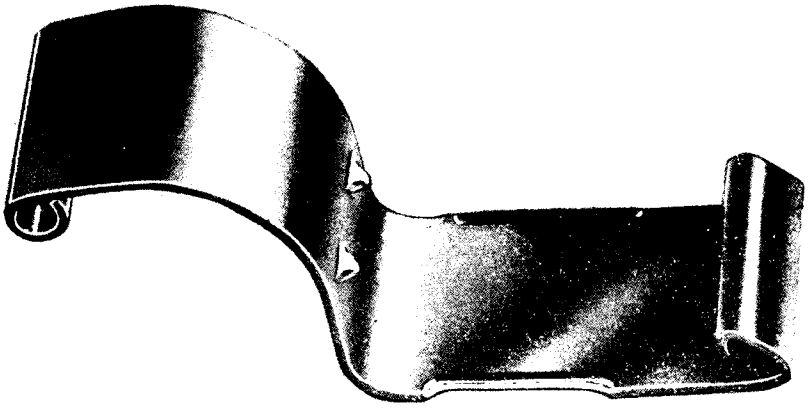
b. Replacement valves are listed in table II (app. I).

20. Materials

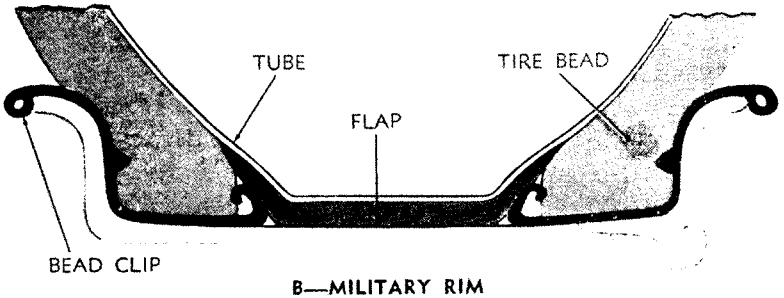
Such materials as patches, rubber, etc, are listed in Department of the Army Supply Manual ORD 5 SNL H–14.

21. Common Tools and Equipment

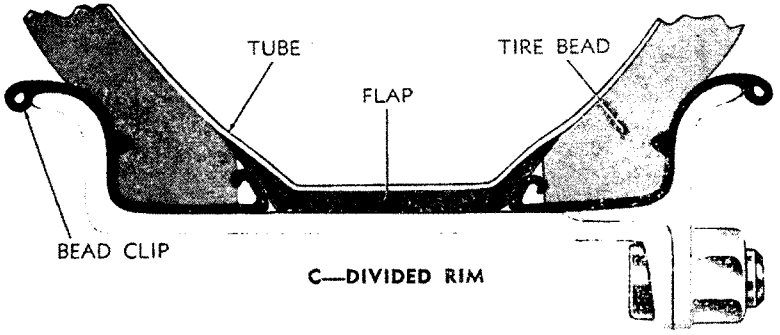
Standard and commonly used tools and equipment having general application to the maintenance of tires are listed in Department of the Army Supply Manuals ORD 6 SNL J–7, sections 1, 3, and 7; ORD 6 SNL J-8, sections 2, 7, and 13; and ORD 3 SNL J-17; and are authorized by pertinent TOE.



A—BEAD CLIP



B—MILITARY RIM



C—DIVIDED RIM

RA PD 220805

Figure 16. Bead clip and clip applications.

22. Special Tools and Equipment

Special tools and equipment required for the maintenance of tires are listed in table I.

Table I. Special Tools and Equipment

Item	Identifying No.	References		Use*
		Fig.	Par.	
CHUCK GAGE, tire pressure, bay type, calibrated in 2½ lb steps or less to a min of 40 lb and in 5 lb steps or less to a min of 120 lb.	8–C–5300	29	11	
DEMOUNTER, tire, hyd, hv-duty, adj, 15-24 in rim, 33-ton cap.	40–D–67–850	30	51	ORD 10, SNL N–20; ORD 6, SNL J–8, sec. 2.
GAGE, tire pressure, general service type, calibrated 10 to 60 psi in 1 psi units and 60 to 160 psi in 5 psi units.	8–G–620	29	11	
GAGE, tire pressure, precision type, calibrated 10 to 60 psi in 1 psi units and 60 to 160 psi in 5 psi units.	8–G–650	29	11, 24*a*	
HAMMER, blacksmiths', hand, cross-peen, 3 lb.	41–H–126	29		
IRON, rim (2)	8366453 41–I–784	42, 44, 45	54	In tool sets (J–16, sec 56)—41–T–3750–438, —41–T–3751–438, and —41–T–3752–438; and G268–5701697.
IRON, tire (2)	8366452 41–I–774–5	42, 44, 45	54	In tool sets (J–16, sec 56)—41–T–3750–438, —41–T–3751–438, and —41–T–3752–438, and G268–5701697.

* Footnote appears at end of table.

Table I. Special Tools and Equipment—Continued

Item	Identifying No.	References		Use*
		Fig.	Par.	
IRON, tire, curved spoon type, 18 in lg.	41–I–771	29		
IRON, tire, curved type, 24 in lg.	41–I–772	29		
IRON, tire, driving	41–I–773–50	29	51*a*	For driving tires off rusted rims.
IRON, tire, hand, univ, 18 in lg, set of 2 (mil-type).	41–I–780	50	49, 57	
IRON, tire, mil-type, 31½ in lg (exhaust to —41–I–780).	41–I–774	29		
IRON, tire, nonpinching, dble end, 18 in lg.	41–I–775	29		For drop-center rim.
MALLET, rawhide, 2¾ in diam, 4¾ in lg, 24 oz.	41–M–484			
REMOVER and REPLACER, tire lock ring, 18½ in lg.	41–R–2378	29	50, 51	
REMOVER, tire, hyd (Goodyear No. 2000).	41-R–2373–243	42	54	In tool set—G268–5701697.
SQUARE, tire-mating, al, 26 x 48.	41–S–4612–50	B, 20	27	For measuring diameter of tire.
TAPE, meas, S, circumferential, lgh 14 ft, ¾ in wd.	41–T–197–300	A, 20	27	For measuring circumference of tire.
TOOL, holding, tire valve repair	41–T–3378–50	E, 56	65*c*	
TOOL, rack		42	54	For earthmover tires.
TOOL, tire chain repair, hv-duty, bench type.	41–T–3370	C, 65	73	
TOOL, tire probing	41–T–3374	29		
TOOL, tire valve stem fishing	41–T–3378	29	49*d*	
TOOL, valve converting (bending).	41–T–3381	A, 59, 60	11, 66	For bending tire valve stem.
TOOL, valve core removing	41–T–3376	29		For damaged valve cores.
TOOL, valve repair	41–T–3382–20	C, 56	65	
TOOL SET, orgn maint (2d echelon, No. 8, tire remover, hv-duty, portable.	41–T–3545–17	31	47, 51	

* Footnote appears at end of table.

Table I. Special Tools and Equipment—Continued

Item	Identifying No.	References		Use*
		Fig.	Par.	
VULCANIZER, elec, 1-tube type, puncture and valve base, 110 v, univ.	41–V–595	A, 61	64, 65, 67	Tube repair and valve replacement.
VULCANIZER, tube and valve repair, elec, built-in thermostat control, 4 clamps, 6 x 21 plate size, w/cord and thermometer, 110 v, ac.	66–V–5950	—	64	Tube repair and valve replacement.
VULCANIZER, tube, fleet service type, w/patches and tools.	41–V–612	—	64	Tube repair and valve replacement.
VULCANIZER, valve and tube	41–V–615	B, 61	65, 67	Tube repair and valve replacement.
(ADDED) SEE PAGE 5 OF C-3				

* Where the use of an item is not indicated, the nomenclature is self-explanatory.

Section III. MAINTENANCE OF TIRES

23. General

SEE PAGE 5 OF C-3

~~Tire maintenance consists mainly of jobs that are performed regularly to make certain that tires are kept in proper operating condition.~~

24. Air Pressure

a. Correct air pressure is the foundation of reliable tire performance. Tire are designed to operate at specified air pressures and should be checked daily and, when necessary, inflated to prescribed air pressures. When checking pressures, check valve cores for leaks. Always use an accurate gage to determine air pressure. All air gages should be checked periodically with a precision-type gage 8–G–650 (fig. 29). Never try to judge air pressure by the eye or by kicking a tire. For correct air pressures, consult the pertinent operator's technical manual for the vehicle. If such a technical manual is not available or if it does not contain information regarding inflation pressures, see table IV (app. I).

b. Tires should never be bled (let air out) during or immediately after operation. Tires heat as they roll, and heat causes air to expand, increasing the pressure. Bleeding reduces air pressure, not the temperature. When a bled tire cools, it becomes dangerously underinflated.

c. Figure 17 shows tires properly and improperly inflated. A, figure 17 shows tire in proper contact with the road. Any other pressure forces the tire to run in an abnormal manner and always results in decreased tire life.

d. B, figure 17 shows tire underinflated. This tire does not contain enough air for its size and the load it must carry. It flexes excessively in all directions and gets hot. In time, the heat weakens the cords in the tire, and it blows out. Underinflation also causes tread edges to scuff the road, which puts uneven wear on the tread and shortens tire life. Never run a tire flat or nearly flat, unless the tactical situation in combat requires it. When run flat for even a short distance or almost flat for some time, the tire may be ruined beyond repair.

e. C, figure 17 shows tire overinflated. Too much air pressure also causes tire failure. Excess pressure prevents the tire from flexing enough. The tire has no give and it is constantly subjected to hard jolts. When an overinflated tire hits a stone or rut, the cords may snap, causing a break in the cord body. The center of the tread wears rapidly instead of permitting equal wear across the entire tread. Hard riding from too much air pressure speeds up wear and tear on the whole vehicle.

f. Desert, sand beaches, and other abnormal operations require adjustment of air pressures. See footnote [1], table IV (app. I).

25. Valve Positioning

a. For speed and convenience in inflating, valve stems should be readily accessible. They should be properly centered in valve holes or slots, to prevent scraping against the brake drums. They should be placed in position so that valves extend through wheel handholes. Ends of valves on front wheels and on inside duals point away from the vehicle. Valves on outside duals point toward the vehicle.

b. On dual wheels, valve of outside dual is placed 180 degrees (opposite) from inside valve for speed and convenience in checking pressures and inflating. With this arrangement, the locations of the valves are always known even when checking in the dark.

c. Spare tire should be mounted on the vehicle so that valve is accessible for checking and inflating (B, fig. 18).

26. Valve Caps

Equip every tire with a valve cap to prevent dirt from entering the valve core and thus causing leakage. In addition, a firmly screwed-down cap provides a final seal against air escaping from the tube. Tighten with fingers only; do not use pliers.

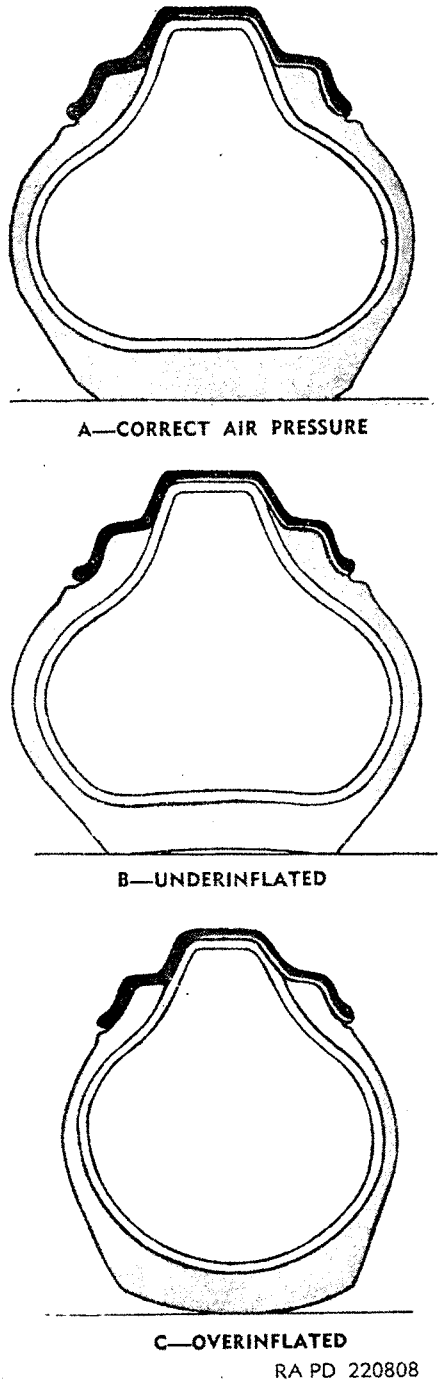
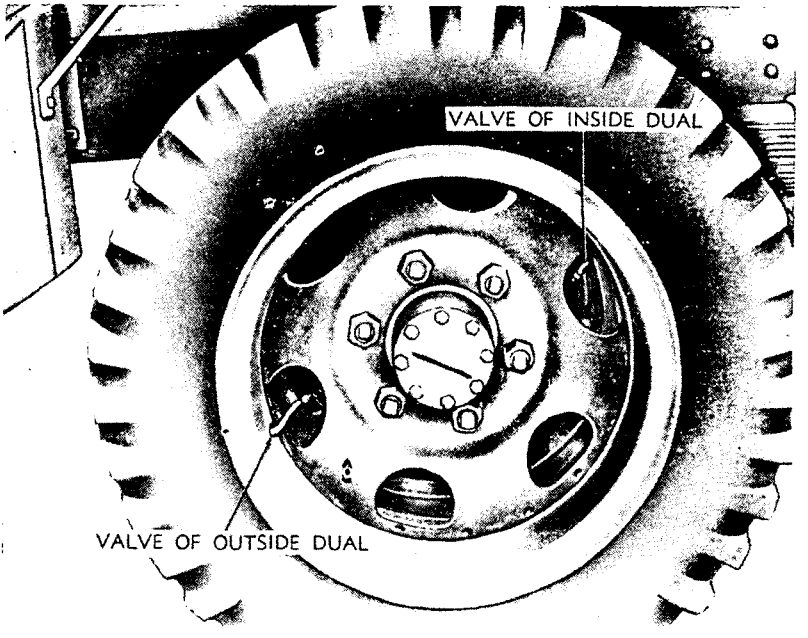
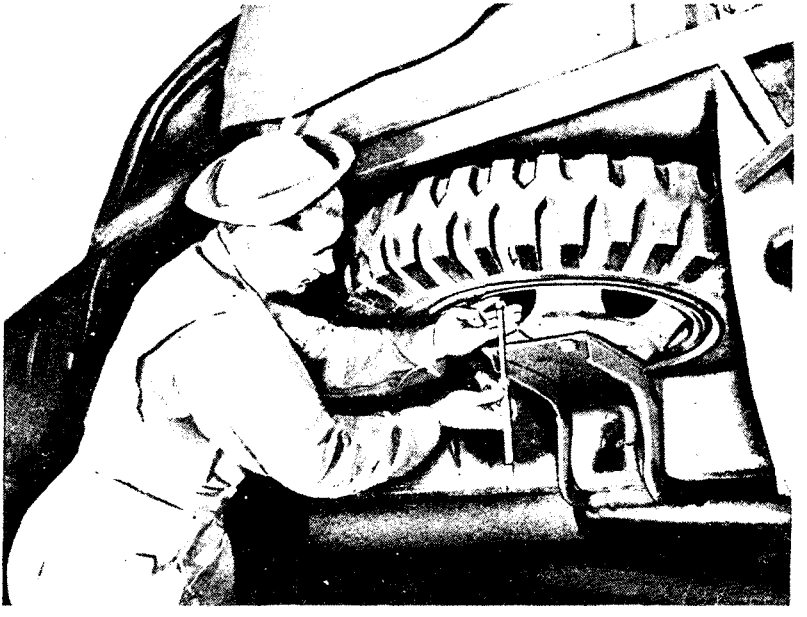


Figure 17. Proper and improper tire inflation.



A—VALVES CORRECTLY POSITIONED ON DUAL TIRES



B—VALVE CORRECTLY POSITIONED ON SPARE TIRE

RA PD 220809

Figure 18. Valve positioning.

27. Matching Tires

a. For longer tire life and more efficient performance, dual tires and tires on all-wheel drive vehicles must be of the same size, tread design, and tread wear. Improperly matched tires cause rapid and uneven wear and transfer case and differential failures.

b. Accurate matching of tires is necessary, because tires on all-axle-drive vehicles rotate at the same speed when all axles are engaged; and, of course, dual wheels turn at the same speed because they are locked together; which means that tires on all driving wheels must be of the same circumference and diameter. If one tire of a pair of duals is worn considerably more than the other, it will not carry its proper share of the load and will scrub on the road. The result is uneven and rapid wear on both tires or tire failure. Figure 19 illustrates the wear of tires on dual wheels.

c. New or practically new, dual tires of the same make, size, tread type, and tread wear may be matched without measuring. Otherwise, either the circumference or the overall diameter should be measured after mounting on rim and inflating. Never overinflate or underinflate tires, in an attempt to compensate for tire measurement variations. The permissible difference is given in table V (app. I). When dual tires have permissible differences in measurements, mount the larger tire outside.

(1) Measure circumference at center of tread with a steel tape 41–T–197–300 or other device (A, fig. 20).

(2) Measure overall diameter with a square 41–S–4612–50 as shown in B, figure 20. This tool may also be improvised.

28. Periodic Tire Rotation

a. The purpose of rotating tires is to equalize wear.

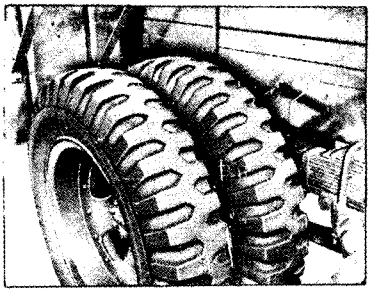
b. Tires should be inspected for evenness of wear and should be measured as described in paragraph 27*c*(1) and (2) after every 2,000 miles of vehicle operation. At this time, based on this inspection and on these measurements, if uneven wear is indicated, proceed to change the tires around (rotate). Tires will be arbitrarily rotated at 6,000 miles. In doing this, consider (1) through (3) below.

(1) The purpose of this operation (*a* above).

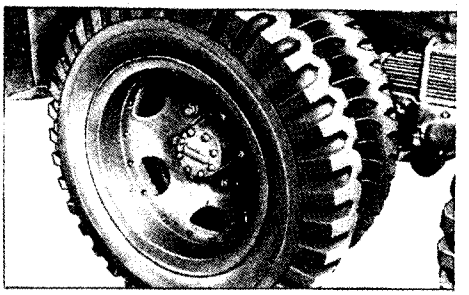
(2) The necessary matching of tires (par. 27).

(3) Whether uneven wear is indicated.

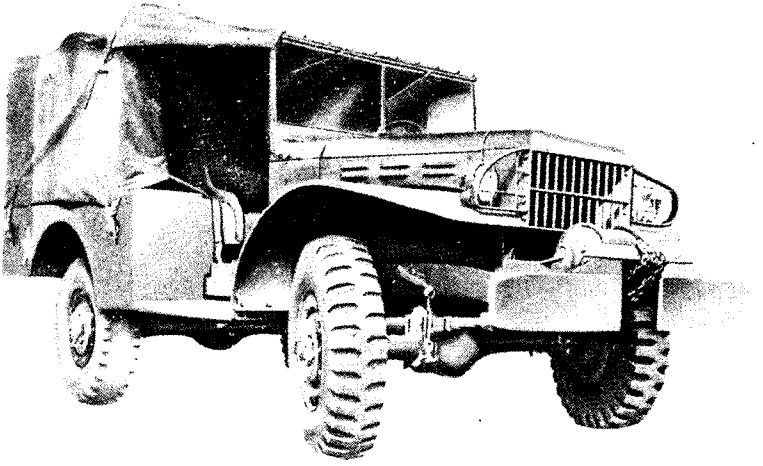
c. Suggested order of tire rotation for various types of vehicles is given in figure 21. Modifications of this order of rotation may be necessary in view of *b*(1) through (3) above.



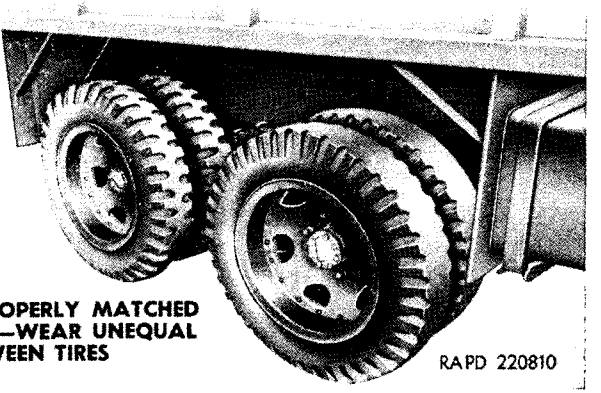
A—CORRECTLY MATCHED DUALS—SAME SIZE, MAKE, TREAD-TYPE, AND WEAR



B—INCORRECTLY MATCHED DUALS—DIFFERENT TREAD DESIGNS



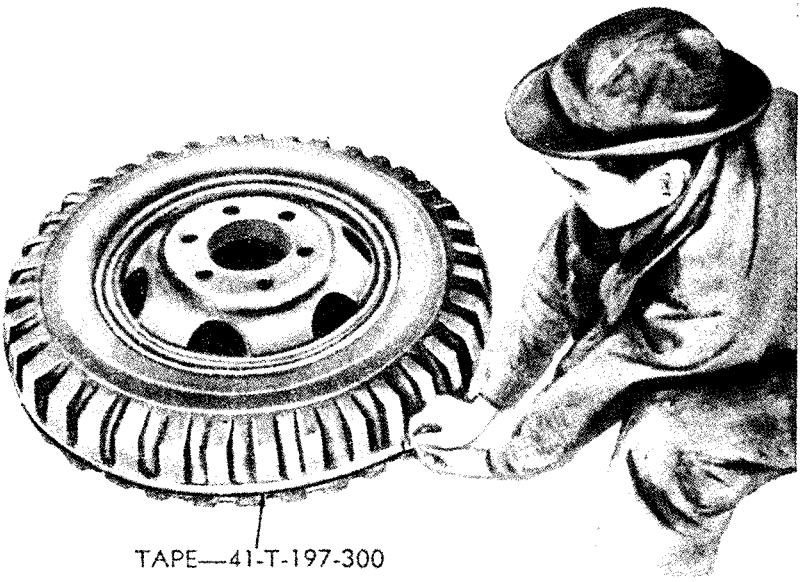
C—IMPROPERLY MATCHED TIRES—UNEQUAL WEAR AND UNMATCHED IN CIRCUMFERENCE



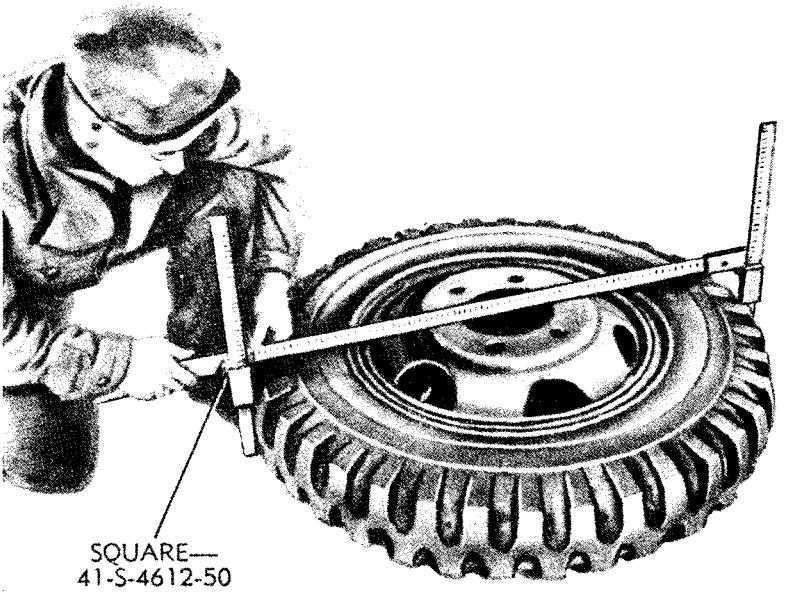
D—IMPROPERLY MATCHED TIRES—WEAR UNEQUAL BETWEEN TIRES

RAPD 220810

Figure 19. Matching of tires.



A—MEASURING CIRCUMFERENCE OF TIRE



B—MEASURING DIAMETER OF TIRE

RA PD 220811

Figure 20. Tire measuring methods.

d. The spare tire should be interchanged with the smallest diameter tire on the vehicle after rotation has been accomplished (if not contrary to proper matching). No tire should remain in the spare position for more than three consecutive months (except on stored vehicles).

29. When To Recap Tires

a. Tires should be watched carefully and removed at just the right time (fig. 22). If removed too soon, usable rubber is wasted. If removed too late, the cord body may be injured for lack of protection by the tread, or the tire may be worn too far. In either event, recapping is impossible.

b. When the tread design is worn off in the center, so that tire is smooth in the center (B, fig. 22), the tire should be removed for recapping. Tires with irregular wear, worn to the extent that the cord body shows in any one spot or worn through the tread design in several spots (D, fig. 22), should likewise be removed.

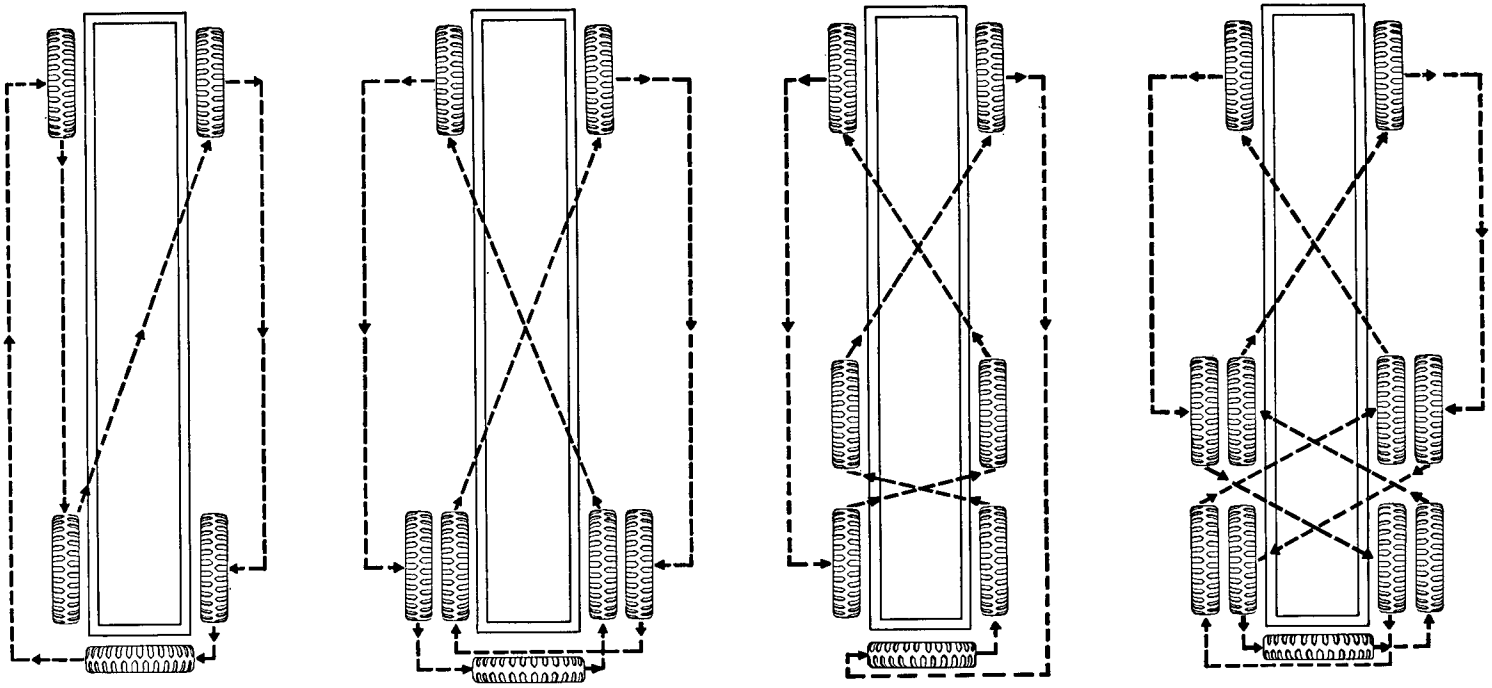
c. The tires shown in C and E figure 22 are not worn enough. Plenty of tread design still remains in the center, and the tires will render considerable service before recapping is necessary.

30. Tire Injuries

a. Tires are constantly subject to injuries. They are cut by sharp objects, bruised by bad roads, stones, etc., and they may be injured by road shocks in general. It is dangerous to drive with a seriously injured tire, because it may blow out, causing the driver to lose control of the vehicle and possibly putting a much-needed vehicle out of military action. Carefully inspect your tires after every run. Remove glass, nails, stones, and other foreign materials imbedded in tires or lodged between duals. In general, injuries tend to become more serious with further use of the tire. If injuries are detected in time and repairs are made immediately, valuable tires will give longer mileage and safer driving.

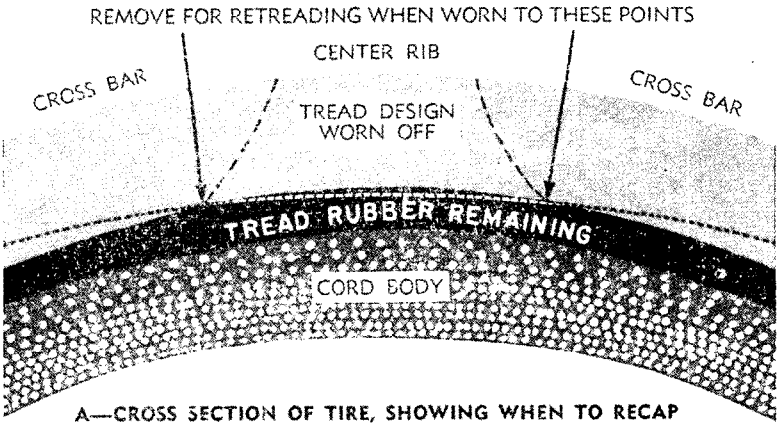
b. The tire shown in A, figure 23, has been run too far before removal. The tread design is worn off, as is the rubber under the tread design, and the cord body is exposed. Also shown in A, figure 23, is a tire that has been run too far while subject to irregular wear. Rubber has been wasted. If wheel position of tire had been changed when wear started, the wear would have been equalized.

c. The tire shown in B, figure 23, has been destroyed, and rubber has been wasted by failure to remove it at the proper time for recapping.



NOTE: INCLUDE SPARE IN ROTATION PROCESSES IN ACCORDANCE WITH ESTABLISHED MEASUREMENTS.

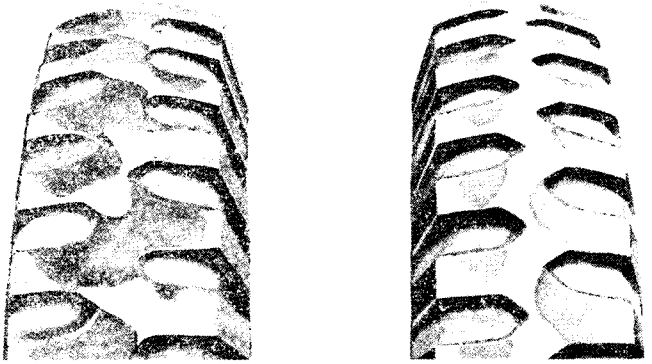
Figure 21. Guide for rotation of tire positions.



A—CROSS SECTION OF TIRE, SHOWING WHEN TO RECAP

TIRE WORN EVENLY

B—READY FOR RECAPPING C—TOO SOON FOR RECAPPING

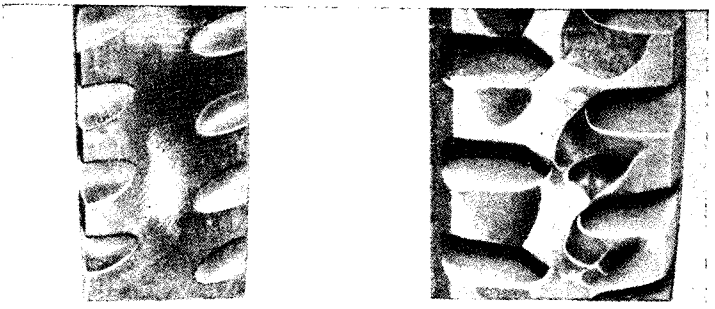


TIRE WORN UNEVENLY

D—READY FOR RECAPPING E—TOO SOON FOR RECAPPING

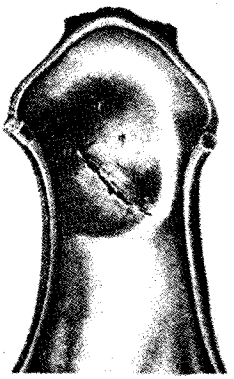
RA PD 220812

Figure 22. Tire-wear study for recapping.

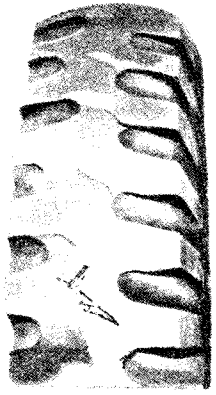


A—TIRE WORN TOO FAR BEFORE REMOVAL

B—TIRE DESTROYED—
NOT REMOVED
IN TIME



C—TIRE DESTROYED
BY BOOT



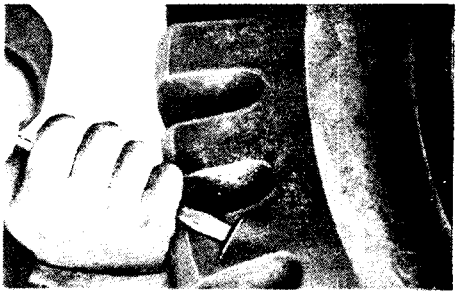
D—TIRE DESTROYED
BY IRREGULAR
WEAR

E—TIRE RUINED BY
RUNNING "FLAT"

RA PD 220813

Figure 23. Causes of tire failure.

A—CUT INTO FABRIC

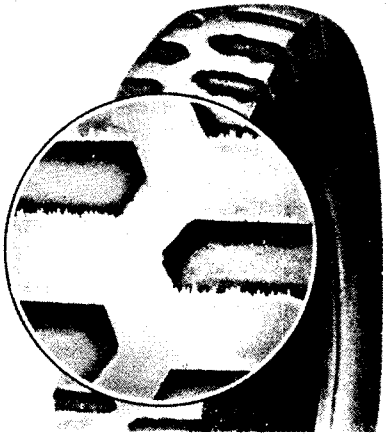


B—MINOR CUT—NOT INTO FABRIC

C—BULGE INDICATING INTERNAL INJURY

D—START OF IRREGULAR WEAR—TIME TO ROTATE TIRE POSITIONS

E—IRREGULAR WEAR—TIME TO ROTATE TIRE POSITIONS



F—TIRE WORN BY IMPROPER "TOE-IN"

RA PD 220814

Figure 24. Causes of tire wear.

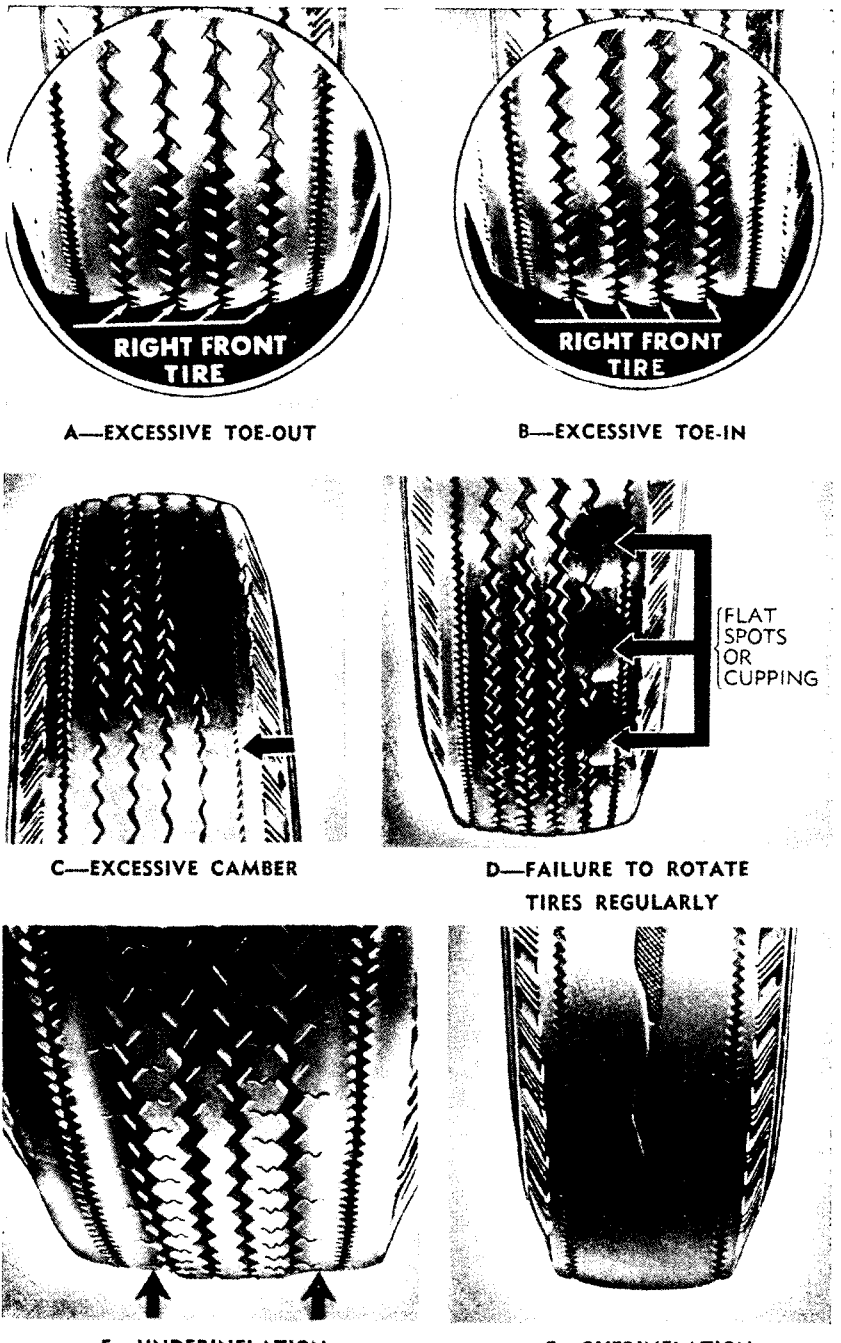


Figure 25. Causes of tire wear.

d. The tire shown in C, figure 23, has been destroyed by use of a blowout patch or boot. If such a patch is used in an emergency, the tire should be replaced with a serviceable tire at the earliest practicable time.

e. The tire shown in D, figure 23, shows a tire destroyed by irregular wear. Tire has blown out; rubber in tread and cord body has been wasted by failure to change wheel positions and failure to take corrective measures.

f. Always be on the alert against the tire conditions described in (1) through (3) below.

(1) Remove tire for repair when tire is cut so that the cut extends to or through the fabric (A, fig. 24).

(2) Small tread cuts, not extending to the fabric (B, fig. 24), need not be repaired, but such cuts must be inspected for penetration to cord body and for enlargement. Tires having large cuts should be removed for repair.

(3) A bulge in the tire indicates internal injury (C, fig. 24). Remove tire for repair.

31. Irregular Tire Wear

a. Mechanical maladjustments or operating conditions cause irregular and excessive tire wear. Improper toe-in, caster, or camber; wobbly wheels; sprung axles; faulty bearings, brake drums, brakes, or springs cause irregular wear, as do severe use of brakes and power and turning at high speeds.

b. At the first sign of irregular wear, change tires to different wheel positions, determine the cause, and take corrective measures (par. 27). D and E, figure 24, and figure 25 show tires that should be changed to other wheel positions. When irregular wear develops on tires used on front or on trailer wheels, change tires to driving wheels, where tires tend to wear more evenly.

Section IV. EFFECT OF VEHICLE OPERATION ON TIRES

32. Flat Tire Operation

Never run on a flat or almost flat tire unless the tactical situation in combat demands. Stop as quickly as possible (but avoid jamming the brakes) and immediately replace the tires. Running flat only a few feet or nearly flat for a short distance can ruin a tire; usually, the tube is beyond all repair (E, fig. 23).

33. Excessive Speed

a. Excessive speed grinds off rubber, particularly when the vehicle is driven around turns at high speed. Continuous opera-

tion at high speed weakens the tread and cord body, causing rapid wear and tire failures. The effects of various speeds on tire wear is demonstrated by the chart in figure 26. To conserve rubber and to obtain greater tire mileage, the prescribed speed limit for all military vehicles should not exceed that given in the technical manual.

b. Tires get heated by internal friction in the rubber as the sidewalls of the tires are flexed. The higher the vehicle speed, the higher the rate of this flexing, the hotter the tires get. When the vehicle is overloaded or the tires are underinflated, the tire flexes more, causing more internal friction, hence, more heat. Naturally, hot climate also causes higher temperatures. When tires become excessively hot, they fail by the separation between plies or between tire carcass and tread. It is necessary that the factors in raising the temperatures of tires be considered in the operation of both natural and synthetic tires (par. 5*b*).

34. Front Axle Drive

Front axles should be disengaged except when extra traction is required in mud, ice, snow, sand, very steep grades, fording, and similar circumstances where the rear wheels might slip. (There are a few vehicles on which the front axles cannot be disengaged.) Driving with the front axle in gear speeds up tire wear considerably.

35. Improper Loading

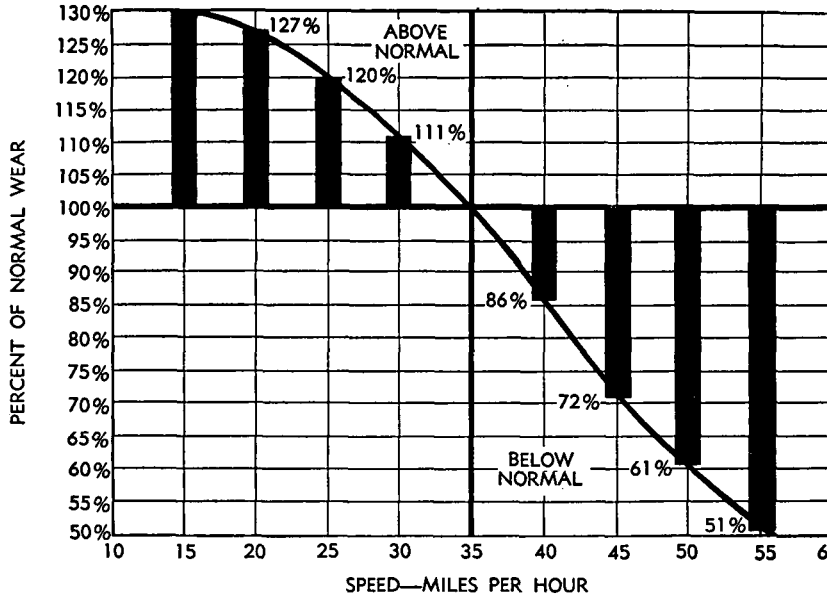
Overloading vehicles beyond their rated capacity is a common cause of tire failure. Overloading makes a tire flex excessively, resulting in a weakening of the cord body, especially if the vehicle is driven at high speeds. Even if the total load does not exceed the capacity of the vehicle, uneven distribution of the load may overstress certain tires.

Warning: If one side of a vehicle is overloaded and if the overstressed tire blows out, the vehicle is likely to turn over.

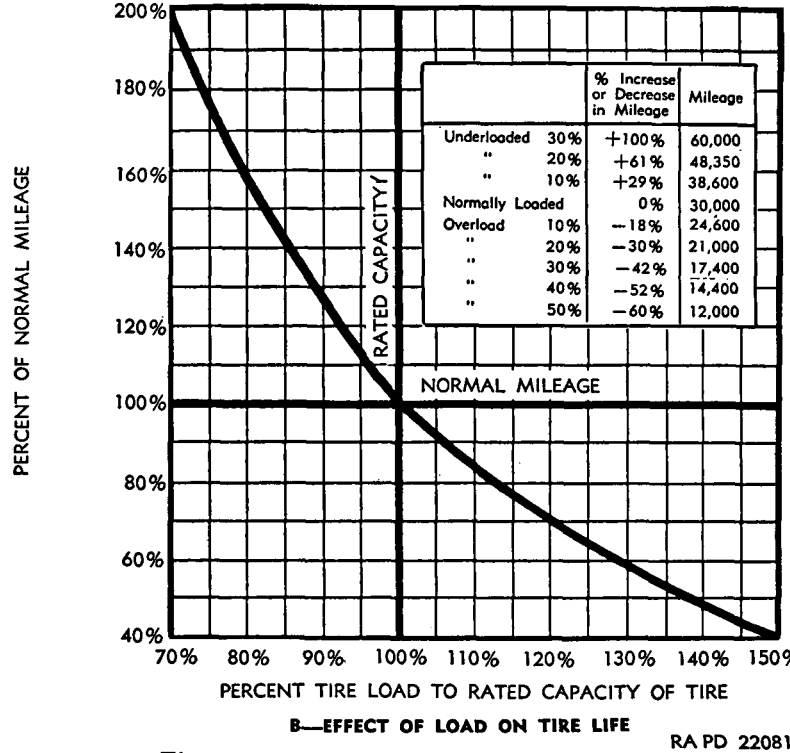
On semitrailers, distribute the load so that each axle and fifth wheel carries its share according to the carrying capacities of the tires. All loose loads should be lashed to the vehicle in such a manner that the load will not shift when the vehicle is in motion (B, fig. 26, and A, fig. 27).

36. Use of Chains and Other Traction Devices

Tire chains must not be used longer than road conditions require, since continued travel on hard surfaces will cause rapid wear on the chains and early failure of tires. Chains must also be properly installed to avoid damage to the affected parts. (See



A—EFFECT OF SPEED ON TIRE WEAR



		% Increase or Decrease in Mileage	Mileage
Underloaded	30%	+100%	60,000
"	20%	+61%	48,350
"	10%	+29%	38,600
Normally Loaded		0%	30,000
Overload	10%	−18%	24,600
"	20%	−30%	21,000
"	30%	−42%	17,400
"	40%	−52%	14,400
"	50%	−60%	12,000

B—EFFECT OF LOAD ON TIRE LIFE

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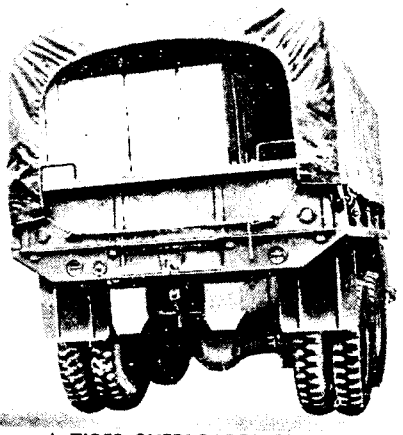
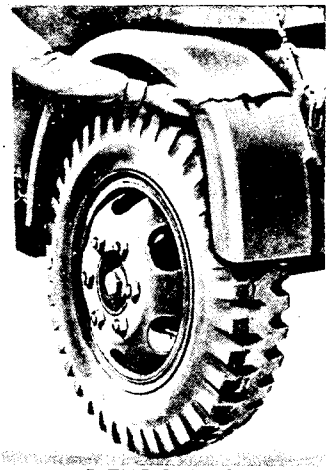
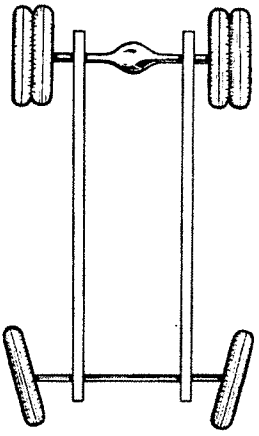
Figure 26. Speed and load effect charts.



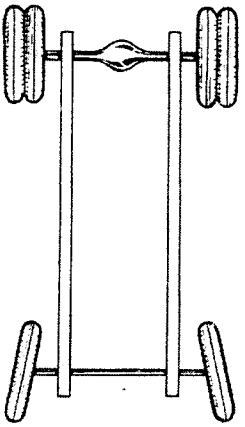
A–TIRES OVERLOADED BY UNEVEN LOAD DISTRIBUTION



B–TIRE DAMAGED BY DAMAGED FENDER



C–EXCESSIVE "TOE-IN"



D–EXCESSIVE "TOE-OUT"

E–CHECKING TIRE

F–CHECKING TUBE

RA PD 220816

Figure 27. Points of inspection for tires and tubes.

pars. 68 through 77 for further information on uses of tire chains and other traction devices.)

Section V. EFFECT OF VEHICLE MAINTENANCE ON TIRES

37. Mechanical Irregularities

In addition to proper and regular care of tires and tubes, better and longer service will result if the vehicle itself is kept in good mechanical condition, particularly the steering assembly. Improper toe-in; camber; caster; wrong turning alinement; sprung axle; faulty wheel bearing, brake drum, wheel, or spring will prevent a tire from rolling properly and will cause scuffing against the road, shortening tire life and wasting rubber. Should the vehicle have any mechanical irregularity, correction should be made promptly.

38. Toe-In Misalinement

a. Faulty alinement of the front wheels is a common source of rapid tire wear. Front wheels frequently encounter obstructions that jolt the wheels out of alinement. Rear wheels likewise may get out of alinement.

b. Tires wear rapidly when wheels are improperly alined, and the telltale sharp edges or featheredges appear on the tread. Front tires, especially, should be watched for rapid wear resulting in sharp edges or featheredges (F, fig. 24). When this condition develops, immediate corrective action should be taken.

c. A tire on a wheel one-half inch out of alinement is dragged sidewise 87 feet in every mile.

d. When correctly alined, front wheels should toe-in slightly towards front of the vehicle, in accordance with the specifications given in operator's technical manual for each vehicle (C and D, fig. 27).

39. Excessive Play

Wheel bearings, tie-rods, steering gears, drag links, and spring shackles should be checked for excessive play and maintained in accordance with the pertinent operator's technical manual for vehicle to prevent rapid uneven tire wear.

40. Brakes

Brakes should be properly adjusted and maintained. Brake drums should be true, to prevent spotty tire wear. If one brake grabs, the wheel will skid and tear off rubber rapidly.

41. Clutch

The clutch should be kept properly adjusted. A grabbing clutch starts the vehicle with a sudden jolt and is one of the worst offenders in destroying rubber.

42. Obstructions on Vehicle

Care should be taken to inspect vehicle for obstructions, such as bent fenders, front bumpers, mud aprons, bolts, spring-clip bolts, spring clips, etc., which might scrape or gouge tires (B, fig. 27).

Section VI. MOUNTING AND DEMOUNTING OF TIRES

43. General

a. Before mounting tires on rims, make the inspections described in (1) through (3) below.

(1) Inspect tires for nails, glass, and other injurious particles in tread (E, fig. 27). Inspect for tread wear, cuts in fabric, fabric breaks, or damaged beads and do not install unless tires are satisfactory for service. Remove any dirt and foreign material from inside of tire.

(2) Check tubes for punctures, pinches, cuts, and cracks (F, fig. 27). Inspect valves for proper bend and condition of inside and outside threads.

Note. Even new tubes may not have valves with proper bends. Valve bending procedures are given in paragraph 66 (fig. 60).

Replace any leaking cores. Install valve caps, and tighten valve stem nuts, especially on new tubes. Flaps should be proper size and type for the tire used. Check flaps for cracks, folds, tears, and cleanliness.

(3) Check rims for cracks, dents, dirt, and rust, especially in gutters. Be sure that rim locking ring is proper size and type for the rim used and is not sprung or bent (A, fig. 28). Inspect wheels for worn or out-of-round stud holes and cracked disks.

Note. Side rings and locking rings are not interchangeable if they are of different manufacture.

b. Use soap solution or bar of soap on tire beads, to make mounting and demounting easier, particularly when mounting and demounting tires on drop-center or semidrop-center rims. Do not use oil or grease, because petroleum products cause rapid deterioration of rubber. Make solution from 5 parts soap and 95 parts water. Apply soap solution with a brush or swab, taking care not to allow excess solution to enter tire (B, fig. 28). Do

not use soap when mounting motorcycle or combat tires or when bead clips are used.

c. Larger size tubes should be folded before inserting in tire. The procedure is as follows: Deflate the tube completely. This can be speeded up by placing the tire on top of tube after valve core has been removed. Install valve cap. With the tube in a circular position, fold the quarter of the tube to the left of the valve inward; then fold the quarter to the right of the valve inward. Likewise fold the two quarters opposite the valve inward. The tube will then have two somewhat pointed ends. Insert the pointed end with the valve into the tire; then insert the other pointed end into the tire and unfold the tube into the tire (C, fig. 28).

d. When placing tubes in tires and tires on wheels, be sure—

(1) Valves point in correct direction.

(2) Valves that are offset in tubes are placed to match the offset valve hole of rims.

(3) Angle valves always point toward the removable flanges of rims.

e. Be careful not to damage beads with tire tools or hammer. Bead wires are covered with fabric and rubber and are easily damaged if gouged with steel tools. If proper directions are followed, severe use of tools is not necessary. When difficulties are met, check methods.

f. Synthetic tubes and flaps require special care and precautions must be observed in mounting to insure maximum service. Before placing a small-sized tube in tire, inflate to about three-quarters full or to the point where it starts to round out. Large tubes should not be rounded out until after being placed in tires. Inspect tire and repair all damage. Lubricate entire surface of tube with talcum.

Caution: Do not use any petroleum product.

Remove all dust, rust, or other material from inside of tire, rim, and beadlock and lubricate with talcum. Clean and lubricate the well on base of rim. Flaps must be dusted or lubricated on both sides (in addition to tube).

Note. Natural rubber flaps used with synthetic tubes need only be dusted or lubricated on side that comes in contact with tube.

After properly preparing tube, tire, and rim, place tube in tire and mount in usual manner. Next, inflate the tube sufficiently to force the tire beads to seat properly against the rim flange of drop-center and semidrop-center rims and to allow flaps to center properly between beads of flat-base rims and beadlocks; then deflate, in all cases, to relieve any unnatural strain, free

creases, or wrinkles. Finally, install valve core and again inflate to recommended operating pressures.

g. For use of hydraulic equipment for the removal of tires, see paragraphs 46 and 47.

44. Wheel Removal

a. Stop engine and set handbrake tightly. Block one rear wheel that is to remain on the ground rigidly, using two chocks, one behind and one in front of tire, to make sure that vehicle will not move or roll off the jack. Place jack on firm foundation. If ground is soft or uneven, use board as base. Set jack under special jacking pad if vehicle has one. If not, set jack as close to wheel as possible. Loosen wheel nuts one-half turn before jacking wheels clear of ground. Keep brakes set while loosening nuts. When wheel has been raised just sufficiently to take weight off the tire and permit removal of the wheel (never more than 2 in. from the ground), remove handle of jack after locking in position to avoid possible accident. Do not remove nuts or studs with wheel on ground. Weight of the vehicle will bind or strip the threads.

b. Put safety blocks or stones under axle, if rigid jack or stand is not available, and lower axle until weight rests on safety blocks (D, fig. 28), then lock hydraulic jack in position and remove handle.

Caution: Should this precaution not be taken, the vehicle may fall, causing serious personal injury and damage to axle, brake drums, and shields.

c. Wheel nuts and bolts may have either right- or left-hand threads. When this is the case, as is usual on large vehicles, the left wheel nuts usually have a left-hand thread. Left-hand nuts are often identified by letter L on the end of nuts and the right wheel nuts by letter R. If direction is not seen or found at once, turn nut alternately left and right with wheel wrench until nut loosens.

d. To make wheel removal easier, remove top nut last; then raise wheel just high enough to clear studs and prevent damage to threads and remove. Apply heavy grease to each stud, so nuts will go on easily.

45. Wheel Installation

a. Clean contacting surface of the wheel and the hub, so wheel will run true. Install wheel on hub, taking care not to scrape against stud threads. Install top nut, but do not tighten. Hold wheel in place with foot at bottom; see that the wheel holes are

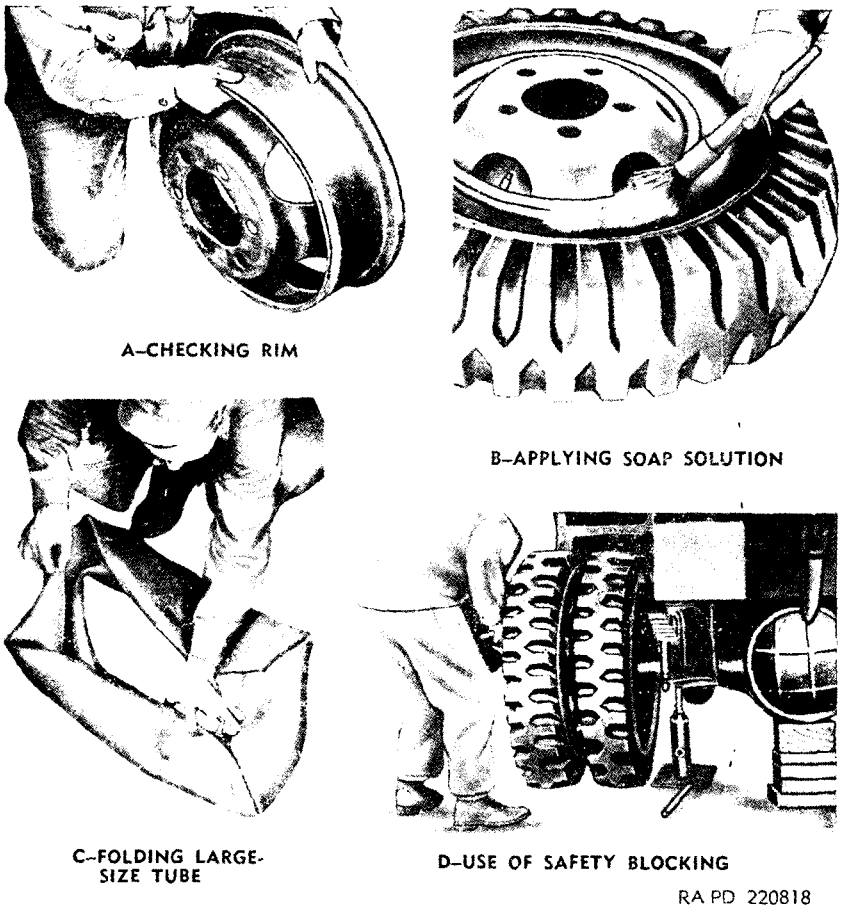


Figure 28. Tire mounting and demounting operations.

centered on the studs. Then install the other nuts alternately on opposite sides of the wheel.

b. Tighten nuts in the same sequence in which they were installed; that is, alternately on opposite sides of the wheel. Usually, face toward front of the vehicle and pull up on nuts. Tighten nuts again at first opportunity after driving about 15 miles, in order to take up any looseness due to operation.

c. On dual wheels, be sure the inner wheel stud nuts are drawn tight before putting on outer wheel. The inner wheel is held in place by stud nuts and the outer wheel is held by wheel nuts. Thus the stud nuts may be loose, even though wheel nuts are tight. Loose stud nuts permit the wheels to rock and wobble, which damages the threads on the studs and the holes in the wheels and, which in turn, may allow the wheels to come off.

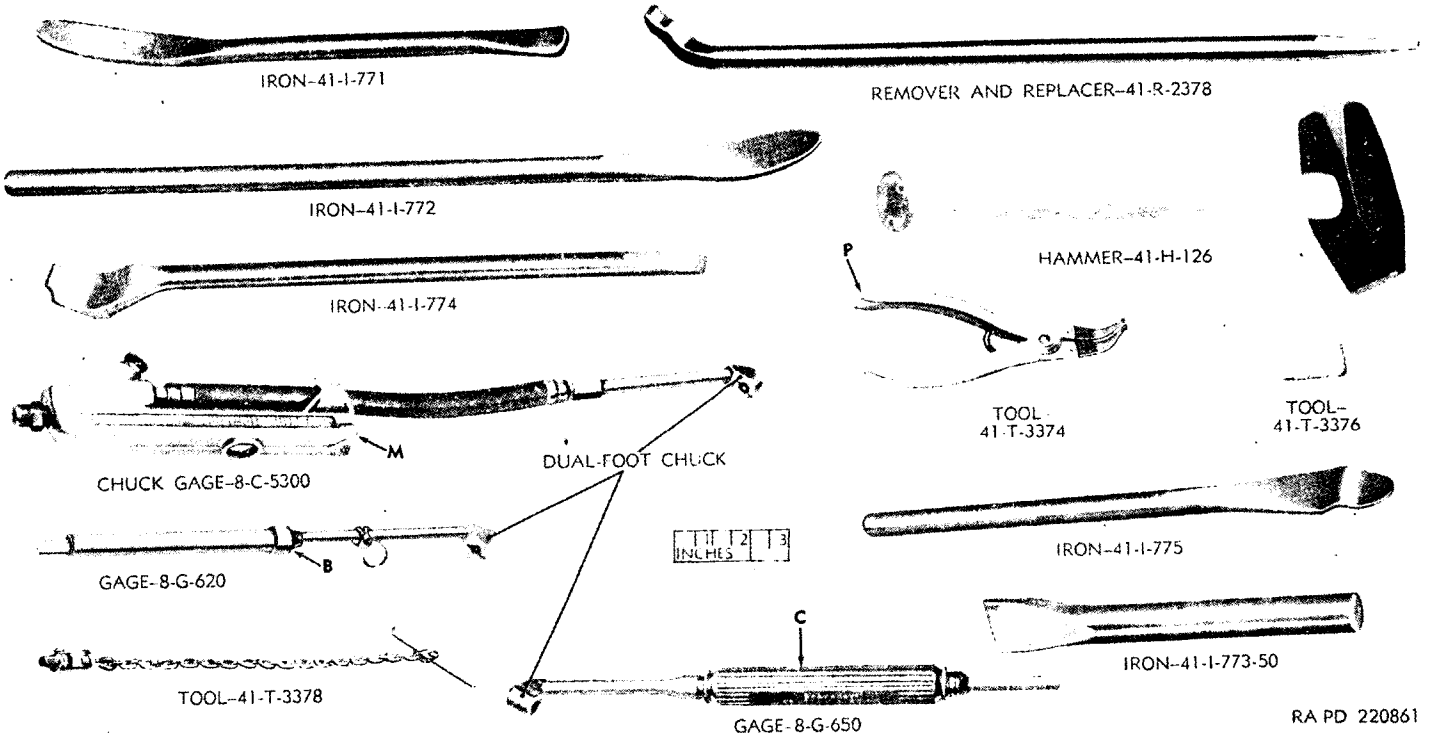


Figure 29. Tire servicing tools and equipment.

d. Mount dual wheels so that the ventilating holes of the inner wheels are directly behind the ventilating holes of the outer wheels, in order to permit flow of air to cool tires and brake drums. Also, make certain valves are easily reached. Place valves on duals diametrically opposite each other (180° apart) for easier checking and inflation and for quick location even in darkness, as the position of the inside valve will always be known after the outside valve is located (A, fig. 18).

46. Hydraulic Tire Demounter (Lee Model AR–1)–40–D–67–850

Note. The key letters noted in parentheses are in figure 30.

a. Description. This unit is mounted on a base equipped with leveling screws. Its range is from 15– to 29–inch diameter rims and wheels. The double-acting master and lifting cylinder actuated by the pump exerts pressures up to 33 tons. Lifting and lowering of assembled crosshead is accomplished by a single-acting hydraulic cylinder.

b. Preparation for Use.

(1) *Adjustment for height.* Adjust height of crosshead to suit tire to be demounted by closing lifter release valve (K), using slotted end of pump handle (F). Raise or lower machine by operating lifter pump (J).

(2) *Adjustment of fingers.*

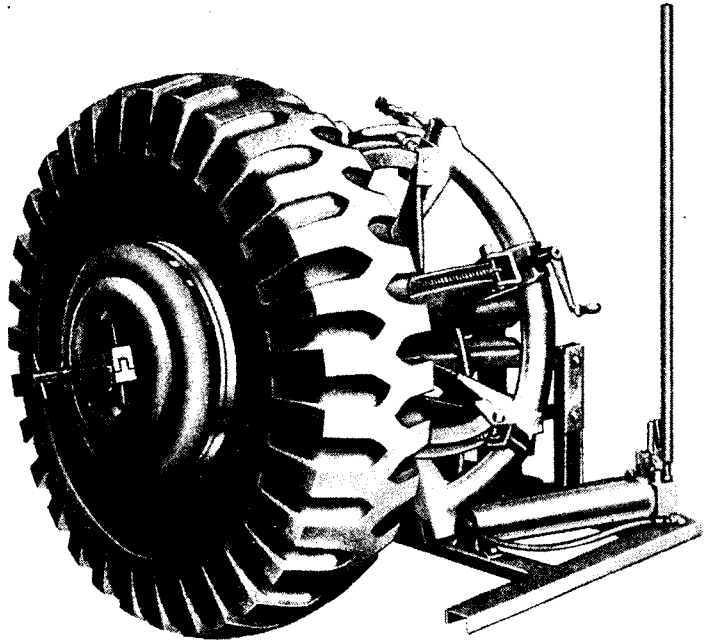
(*a*) Adjust fingers to suit the rim of tire being demounted by turning hand crank (E), making sure that all eight fingers are engaging the rim between the tire bead and the rim.

(*b*) For large wheels (29 in.), it will be necessary to first adjust the eight fingers independently, by turning the finger stop (L) on each finger until finger rests in the slot of the finger stop.

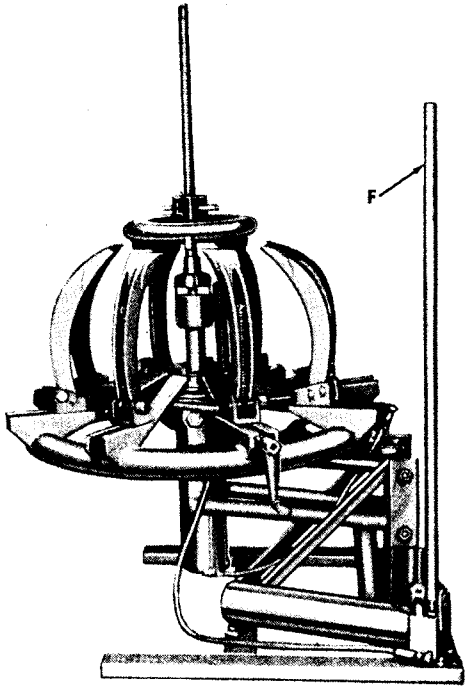
(3) *Pressure plate.*

(*a*) *Selection.* Pressure plates suitable for use on all standard tires are furnished with the demounter. For all wheels, use center section only E; for 20-inch rims, use center section and outer ring F; for 22- and 24-inch rims, use center section, outer ring, and adapter G.

(*b*) *Adapters.* Adapters are furnished in two sizes to accommodate 22- and 24-inch rims. They are identified for rim size by measuring the distance from the attaching-pin hole D to the end. The shorter distance is mounted outward for 22-inch rims; the longer distance is mounted outward for 24-inch rims.



A—TIRE DEMOUNTER IN USE



C—HORIZONTAL MOUNTING

Figure 30. Demounter, tire, hydraulic (Lee Model AR–1)—40–D–67–850.

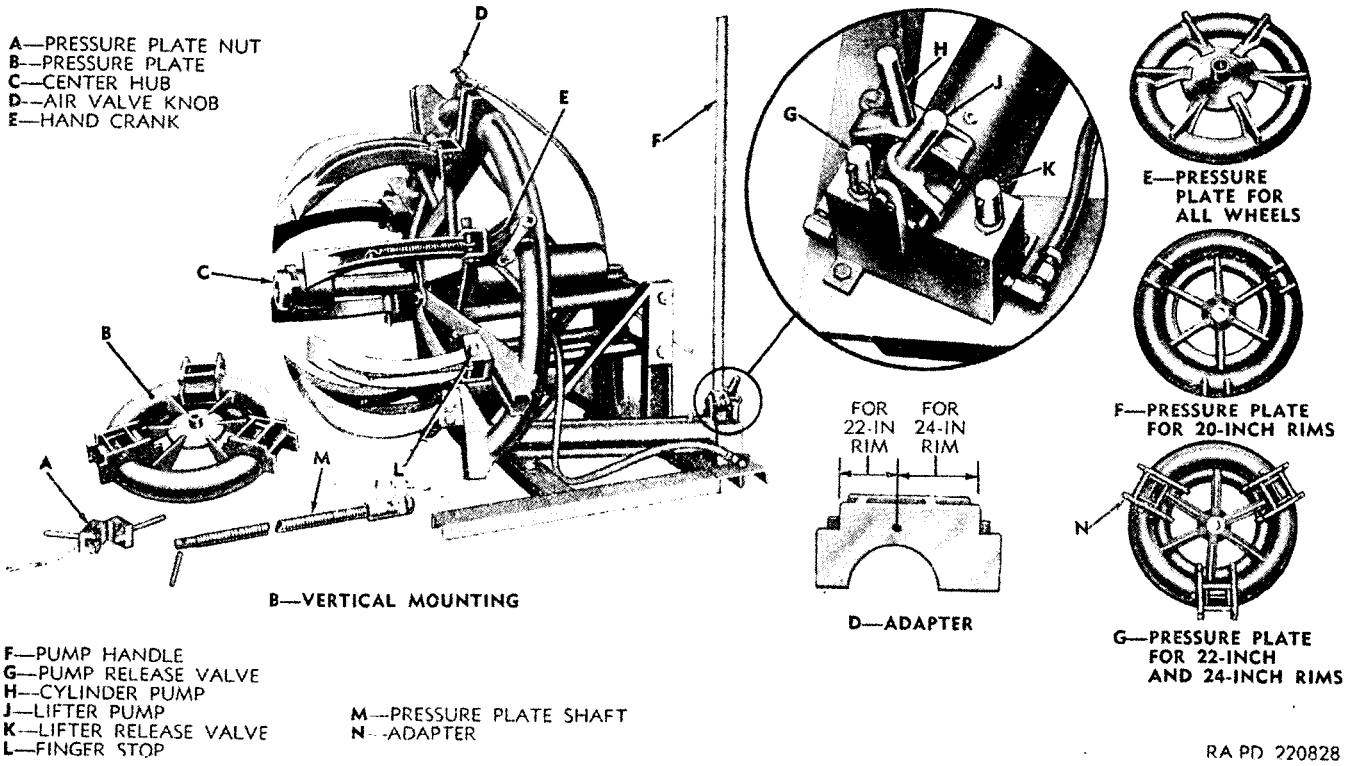


Figure 30—Continued.

FIG. 30.1 (ADDED) SEE PAGE 7 OF C-3
FIG 30.2 THRU 30.4 (ADDED) SEE PAGES 8 & 9 OF C-3

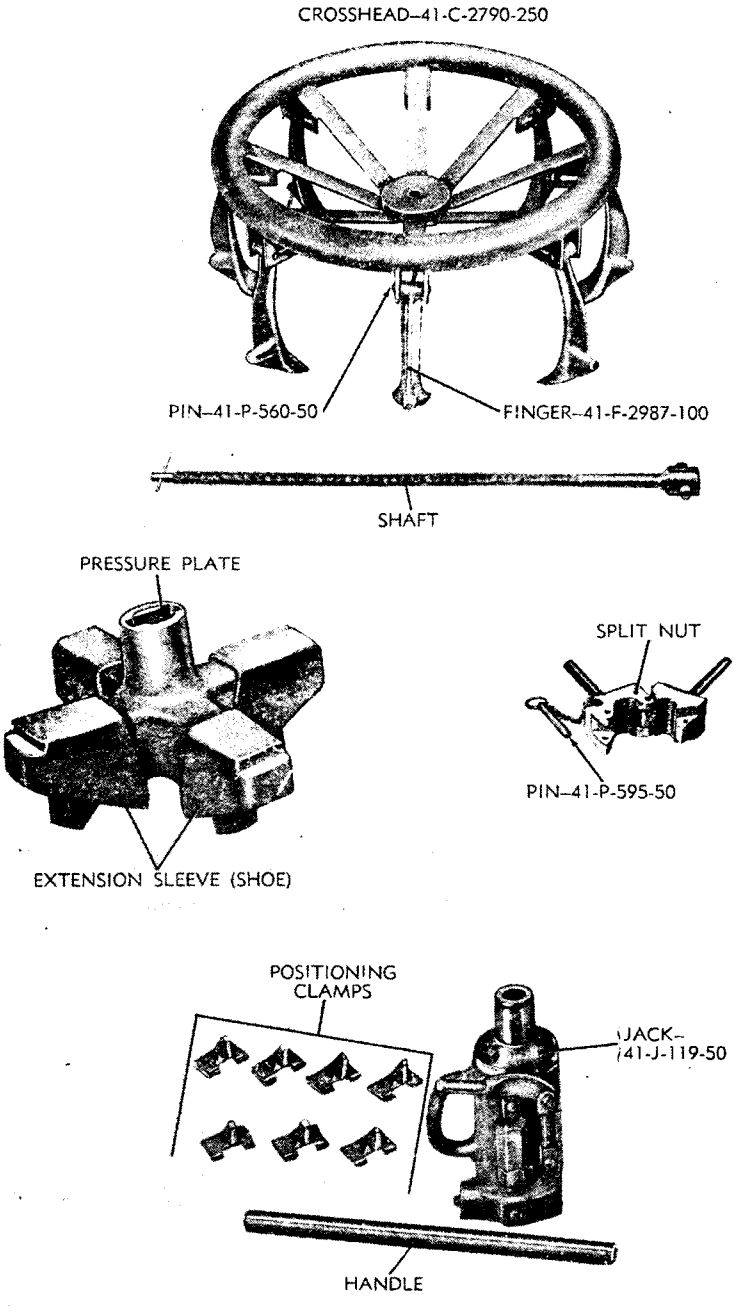
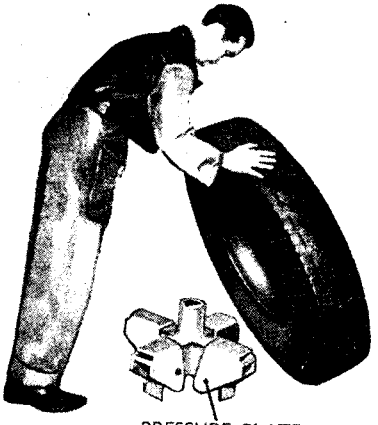
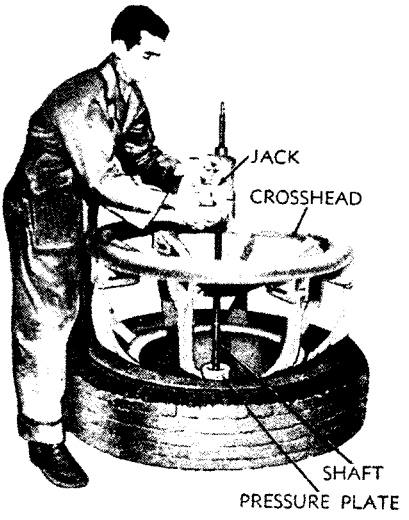


Figure 31. Tool set, tire-remover, hydraulic, portable (Lee Model B–1)—41–T–3545–17.



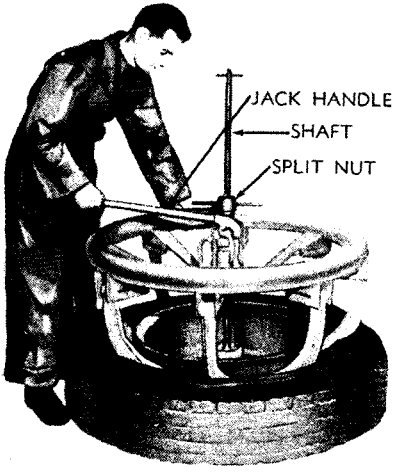
1. ADJUST PRESSURE PLATE TO FIT RIM.
2. ROLL TIRE INTO POSITION.

B–STEP 1



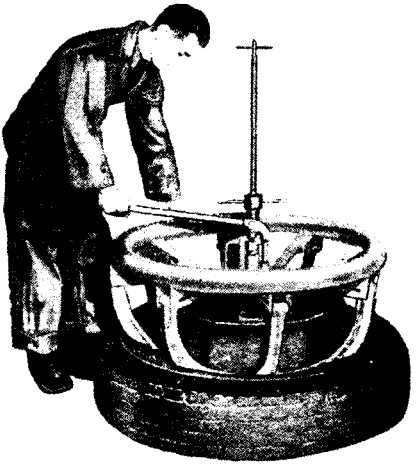
3. ADJUST FINGERS TO RIM DIAMETER.
4. PLACE CROSSHEAD ON TIRE.
5. INSTALL SHAFT IN PRESSURE PLATE AND LOCK.
6. INSTALL JACK OVER SHAFT

C–STEP 2



7 INSTALL SPLIT NUT ON SHAFT ABOVE JACK.

D–STEP 3



8 OPERATE HYDRAULIC JACK AND REMOVE RIM FROM TIRE.

E–STEP 4

RA PD 220857

Figure 31—Continued.

c. Vertical Use B.

(1) *Attachment of pressure plate.* Select and assemble pressure plate to correct rim size (*b*(3) above). Insert pressure plate shaft (M) into center of hub (C) and turn until locked in position. Open pump release valve (G), using end of pump handle (F), and extend shaft (M) to its fullest extended position by pressing air valve knob (D). Attach pressure plate (B) with nut (A). Deflate tire and push valve stem into tire. The tire is now ready for demounting.

(2) *Demounting of tire.* Close pump release valve (G), using end of pump handle, and operate main cylinder pump until tire is completely removed from rim.

(3) *Removing rim.* Open release valve (G), using end of pump handle, and extend shaft (M) to its fullest extended position by pressing air valve knob (D). Remove nut (A), pressure plate (B), and shaft (M). Open up fingers by turning hand crank (E) and remove rim.

d. Horizontal Use C. Unlock crosshead positioning holder by loosening handle. Tilt crosshead to position desired and lock in position. Operate demounter as described for vertical use.

46.1 THRU 46.4 46A (ADDED) SEE PAGES 5 THRU 9 OF C-3

47. Portable Hydraulic Tire-Remover Tool Set 41–T–3545–17

(fig. 31)

a. Description. This unit will demount tires from size 7.00-15 to 24.00-24 inches. It is a self-contained unit employing a hydraulic jack with a capacity of 30 tons.

b. Operation.

(1) Place pressure plate on floor. Use pressure plate without extension sleeves for all size wheels. For 20-inch rim, place sleeves over arms and install guide pin in hole marked 20; for 22-inch rim, use hole marked 22; for 24-inch rim, slide sleeves until pins strike the outside of the arms. No holes are provided for 24-inch rim adjustment.

(2) Place mounted tire on pressure plate, flange of rim downward, centering same, and install threaded shaft in pressure plate by turning it clockwise. Push valve stem into tire.

(3) Lift crosshead over shaft and place the eight fingers in position around the tire. The fingers work in a slip joint having three positions for various size tires. Use outer position for 22- and 24-inch tires; center position for 20-inch tires; and inner position for tires under 20

inches. On occasion, the fingers will bypass the rim. When this occurs, use positioning clamps to obtain desired setting.

(4) Place jack over threaded shaft and lock split nut above jack. Screw split nut downward as far as possible.

(5) Apply hydraulic pressure, by means of the jack handle, until locking ring is exposed. Remove lock ring.

(6) Remove entire hydraulic remover as an assembly by turning threaded shaft counterclockwise, turn tire over (flange of rim upward), install remover assembly, and repeat operations (2) through (5) above, until tire is free.

(7) Remove remover and rim.

c. Maintenance. With the ram fully extended, remove hydraulic oil reservoir and fill with hydraulic oil to within one-half inch from the top of reservoir. Oil all moving parts.

48. Detachable Rims

To demount detachable rims on duals, remove the lugs; then force off outer rims, the spacer band, and inner rim. Reverse procedure in mounting. When mounting, be sure lugs fit in their proper place against the rim.

Caution: Before lowering wheel to ground, rotate wheel and check to make sure the assembly does not wobble.

49. Drop-Center Rims

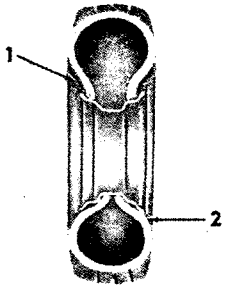
a. This type of rim has a well in the center, which permits mounting and demounting. A, figure 32, shows how the well in the rim makes these operations possible. With the lower part of the bead in its seat 1 the upper part would have to be stretched or broken to free it, but with the lower part of the bead pushed into the rim well 2, it is not necessary to stretch the upper part to slip it over the flange.

b. Tires may be removed from a drop-center rim (except from a safety-type rim) without removing the wheel, especially on small size tires. Considerable skill is required to mount and demount tires on this type rim when wheel is on the vehicle. For this reason, the instructions in *c* and *d* below are for procedures when the wheel is removed.

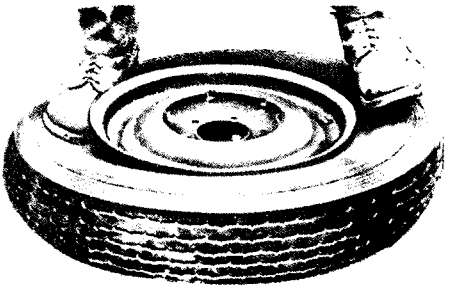
c. To demount tires, proceed as indicated in (1) through (5) below.

(1) Deflate tire by removing valve cap and valve core.

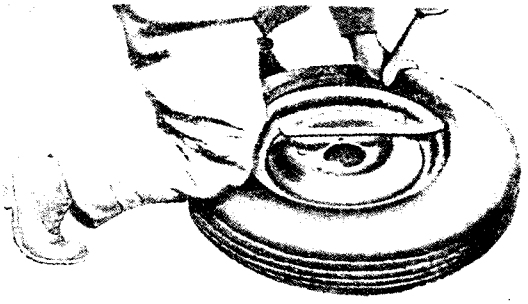
(2) After tire has been completely deflated, install cap to prevent damage to threads of valve stem. Loosen both beads from rim flanges (B, fig. 32).



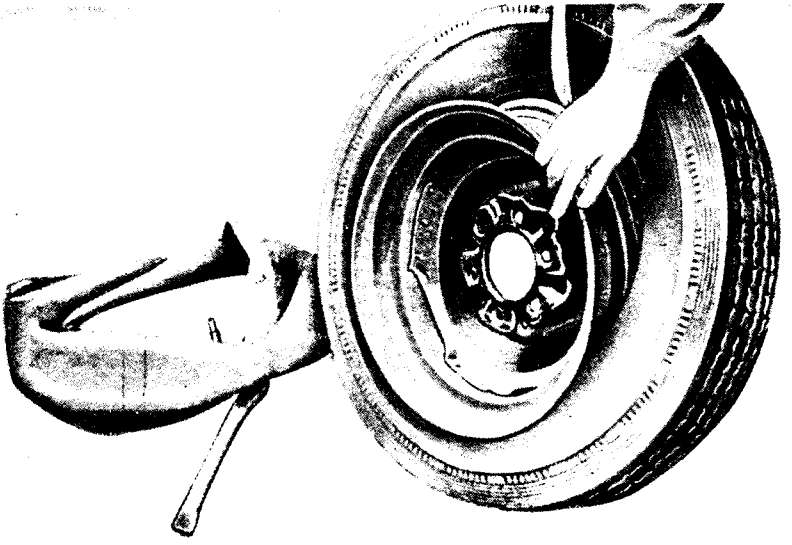
A—PRINCIPLE OF DROP-CENTER RIM



B—LOOSENING BEAD FROM RIM FLANGE



C—LIFTING OUTSIDE BEAD OVER RIM



D—REMOVING INSIDE BEAD

RA PD 220819

Figure 32. Demounting tire—drop-center rim.

FIGS 32.1 AND 32.2 (ADDED) SEE PAGES 10 + 11 OF C9

(3) Insert two tire irons about 6 inches apart between outer bead and rim, near valve, kneeling on the tire opposite the valve, to force beads into well. Both inner and outer beads must be in the well opposite the valve. Pry outer bead over flange near the valve. Shift and later release position of the knee and, by working progressively with tire iron, pry outer bead over the flange all around (C, fig. 32).

(4) Remove the tube from the tire.

Caution: Do not pull on the valve.

(5) Push inner bead into tube well on one side. Insert tire iron on opposite side and pry bead over the flange (D, fig. 32).

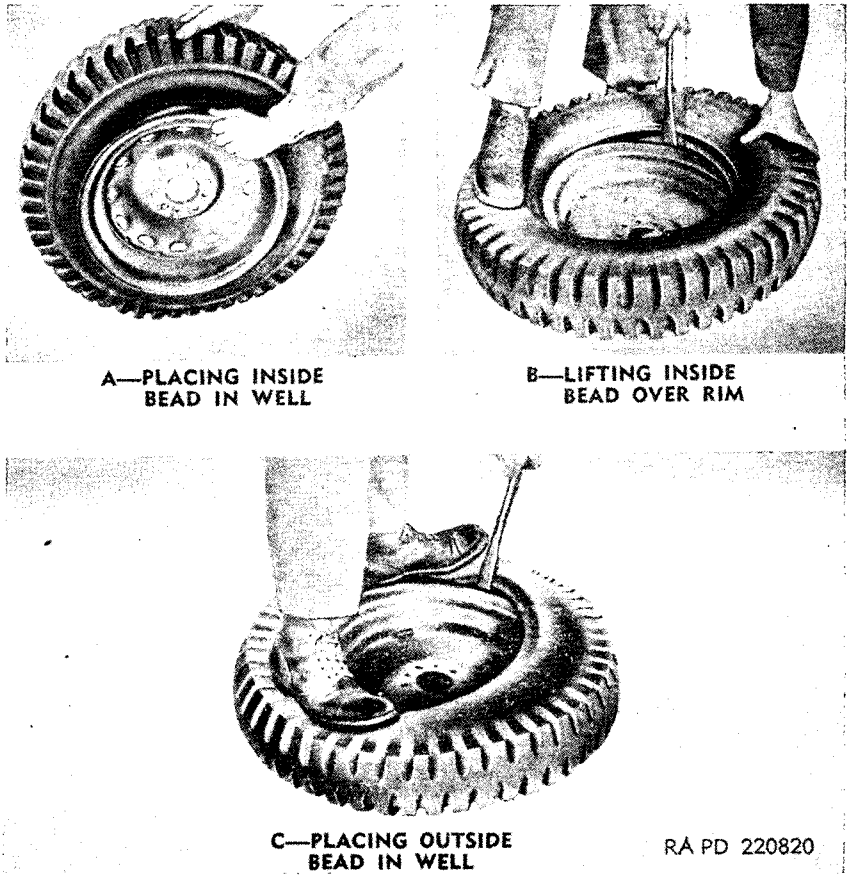


Figure 33. Mounting tire—drop-center rim.

FIG. 33.1 THRU 33.4 (ADDED) SEE PAGES 13 THRU 14 OF C-3

Note. Some passenger cars and light trucks use drop-center rims known as safety rims (fig. 10). These have a hump in base of bead ledge to hold beads in place. Sets of military-type tire irons —41–I–780 (table I, par. 22) are used to force beads off bead seats. Wheels must be demounted before removal of tires. After the beads are forced off the seats, proceed to remove tire in same manner as above.

d. To mount tires, proceed as directed in (1) through (4) below.

(1) Inspect tire, tube, and rim (par. 43*a*). Remove valve cap. Inflate tube slightly and insert in tire, placing valve at balance mark. Lay wheel flat, with valve hole up. Screw a valve fishing tool 41–T–3378 (table I, par. 22) on the valve stem. Start to mount tire with valve pointing toward valve hole, pulling the handle of the fishing tool through the valve hole in the rim. Place inside bead in rim well near valve hole (A, fig. 33).

(2) Holding inside bead in well, force remainder of inside bead over rim flange with a tire tool or hammer. Spread tire and pull valve stem through hole in rim (B, fig. 33).

(3) Place outside bead in well, opposite valve, and pry on rim with tire tool or tap on with hammer, being careful not to damage beads or pinch the tube. While forcing bead on rim, keep as much of the bead as possible in rim well (C, fig. 33).

(4) Check position of valve, shifting the tire to center the valve in the hole with the aid of the fishing tool.

Caution: Pull very gently with the fishing tool, in order not to tear the tube at the base of the valve.

Center the tire around the rim and inflate to about 10 psi. Apply air chuck to that part of the fishing tool that serves as a valve stem extension. In this operation, the valve stem may be held by the fishing tool. If beads fail to seat properly against the rim flange at this pressure, either the tube is pinched or part of bead is still in well, in which case, deflate and make appropriate correction. Occasionally, beads will fail to seat in rim flange, due to friction between beads and rim, especially if rim has not been sufficiently or properly lubricated with soap solution. This can be corrected by holding tire and rim (inflated to 10 to 15 psi) upright and bouncing it on the ground. If bead is properly seated, remove fishing tool, inflate to full pressure, then remove valve core and deflate tire to smooth out wrinkles in tube. Install valve core and again inflate to recommended

pressure (par. 24*a*). Check valve for leaks, and install valve cap.

Note. Beads of tires mounted on safety rims, used on some cars and light trucks, snap over the hump into place after approximately 20 psi is applied. A snapping noise can be heard as beads snap into place. Inflate sufficiently to force beads against rim flanges, then deflate completely, and again inflate to prescribed air pressure.

49.1 THRU 49.5 (ADDED) SEE PAGES 9 THRU 19 OF C-3

50. Semidrop-Center Rims

This type rim is similar to the full drop-center type. The chief difference is that the well in the semidrop-center rim is shallow, and the rim has a removable side ring. Like the full-drop-center, the semidrop-center rim has tapered bead seats. A, figure 34, shows how the shallow well in this rim must be used in mounting and demounting. With the lower part of the bead in its seat 1, the upper part would have to be stretched or broken to free it; but, with the lower part of the bead pushed into the rim well 2, it is not necessary to stretch the upper part to slip it off the rim.

a. Demounting.

(1) Remove the wheel and completely deflate tire by removing the valve core. Install valve cap for protection of threads on valve stem. Loosen both beads from bead seats in rim with tire iron, by driving tire iron between flanges and tire beads, taking care not to drive iron into the beads of the tire. Then pry tire loose by lifting up on iron, forcing bead toward well (B, fig. 34).

(2) Remove side ring.

(*a*) When demounting the continuous-ring-type rim, insert a lock ring remover and replacer 41–R–2378 (fig. 29) with curved side upward in prying notch. Force side ring opposite prying notch into gutter. Then pry out the side ring, with a circular motion of this tool, enough to permit insertion of a tire iron adjacent to this tool. Use both tools to pry ring off, a little at a time, until the whole ring is removed, being careful not to bend the side ring (C, fig. 34).

(*b*) When demounting the split-type side ring, insert the lock ring remover and replacer 41–R–2378 into prying notch and pry side ring out of gutter, using two tools to complete the removal. Do not bend side ring while removing (D, fig. 34).

(3) Push valve into tire and slightly shift tire and tube assembly on rims to keep valve away from valve hole. Stand or kneel on one side of tire, forcing bead into

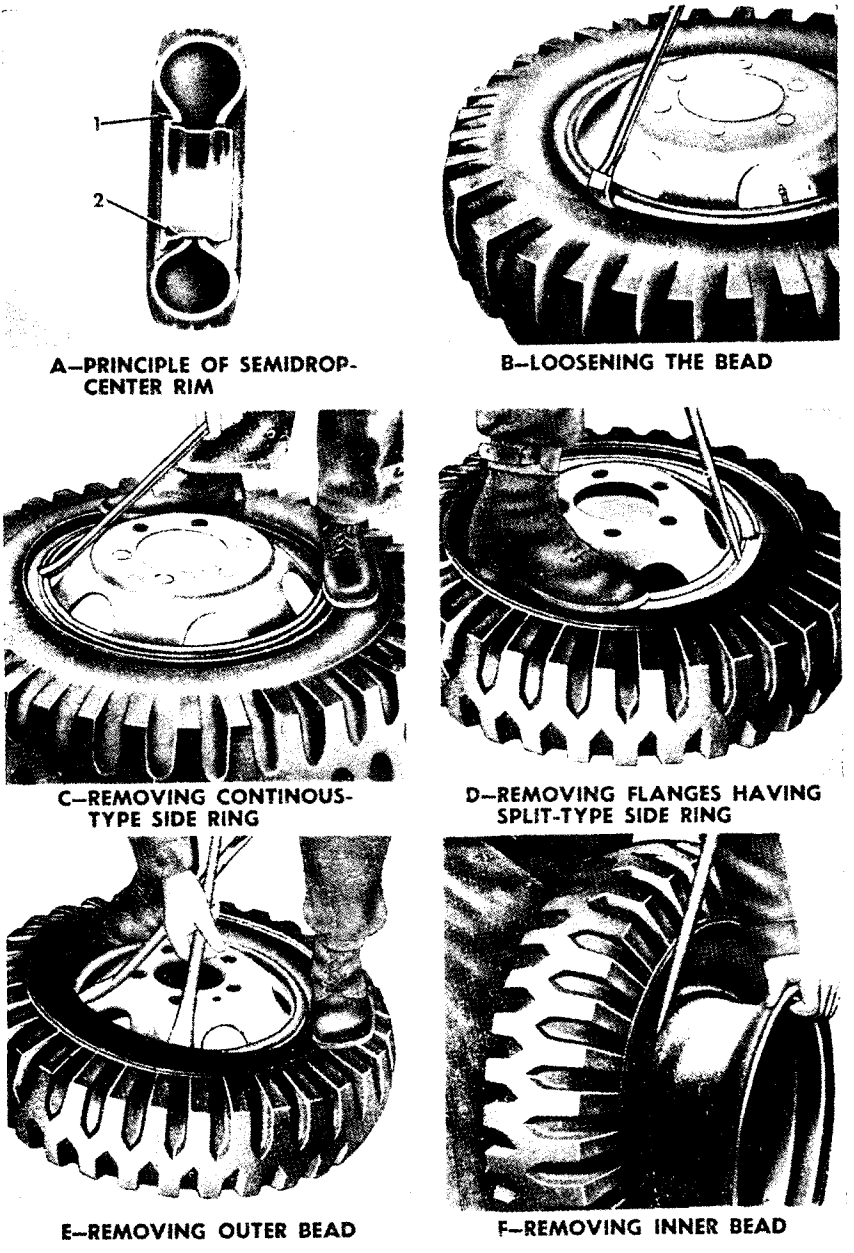


Figure 34. Demounting tire—semidrop-center rim.

well of rim. Hold bead in this position and insert a thin, flat tire iron under opposite part of bead and pry over edge of rim. Then, using a similar tire iron, work entire outer bead off the rim (E, fig. 34).

(4) Remove the tube; do not pull on the valve. Stand assembly upright and thoroughly soap the inner bead (B, fig. 28). Force the inner bead into rim well. Using two flat tire irons, work the inner bead over the edge of the rim and complete the removal (F, fig. 34).

b. Mounting.

(1) After proper inspection (par. 43*a*), assemble tire and tube. Apply soap solution to tire beads and rim.

Note. Never use oil.

Inflate until tube is barely rounded out.

Note. Too much air will make mounting difficult.

(2) Place tire in such position that valve is in line with valve hole in rim. Force inside bead down into well of rim with aid of tire irons, progressing from each side of the valve until only a small portion of the bead is left outside of the rim or well. Force remaining part of bead into well by tapping lightly on bead toe with round or flat end of tool (A, fig. 35), and insert valve through valve hole.

(3) To apply outside bead, start at point opposite valve and press bead toe over rim gutter and into rim well with knee pressure. Mount remainder of bead by means of tire irons (B, fig. 35). (See that bead fully clears rim gutter all around.)

(4) Install side ring.

(*a*) When mounting the continuous-ring-type rim, place that portion of the side ring that is opposite the prying notch into the rim gutter. This portion (which should be inserted first) extends between the two cutaway portions on the inside circumference of the ring. Insert the lock ring remover and replacer 41–R–2378 in prying notch and, holding the opposite portion of ring in gutter, strike side ring in area between prying notch and nearest cutaway section with a hammer and, by prying with the tool and by using the hammer, force ring in place. Then repeat on opposite side of prying notch and force rest of the ring in place (C, fig. 35).

Note. Improperly seated rings constitute a hazard when tire is inflated (B, fig. 36).

(*b*) When mounting the split-ring-type rim, place end without a prying notch into rim ring gutter. Using a tire iron, force the ring in place (D, fig. 35).

(5) Inflate tube to a few pounds of air pressure, just enough to bring pressure between beads and side ring. Tap ring with hammer, in order to be sure that it is anchored in place.

Warning: In doing this, the side ring should be turned away from the operator and away from any other person nearby who might be fatally injured if the ring should fly off (fig. 36).

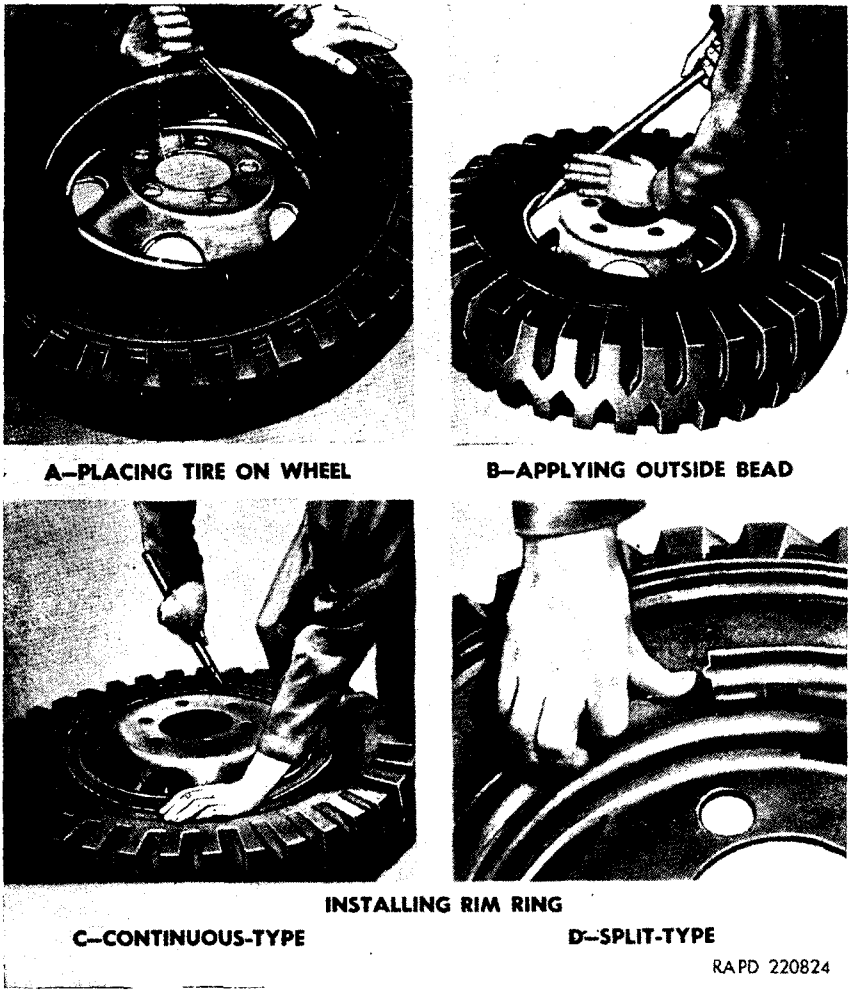


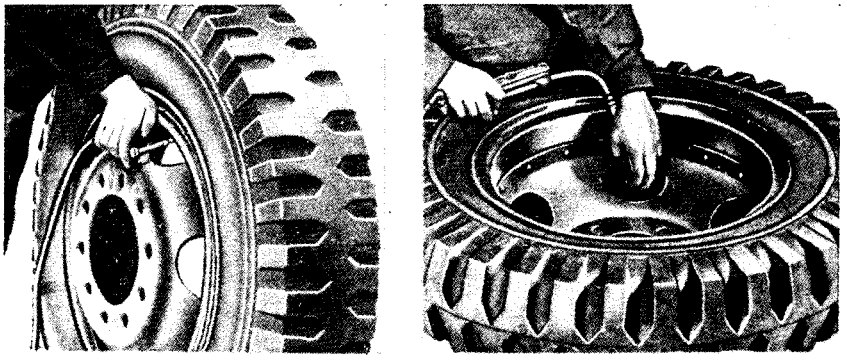
Figure 35. Mounting tire—semidrop-center rim.

Then reach through that handhole of the wheel that is at the valve to apply air chuck or, if there is no handhole, hold the palm of the hand only against the side ring in applying the air chuck and inflate to correct air pressure (par. 24*a*). An alternate method, if the valve can be reached, is to lay the tire flat, with ring down, and reach through wheel handhole to apply the air chuck.

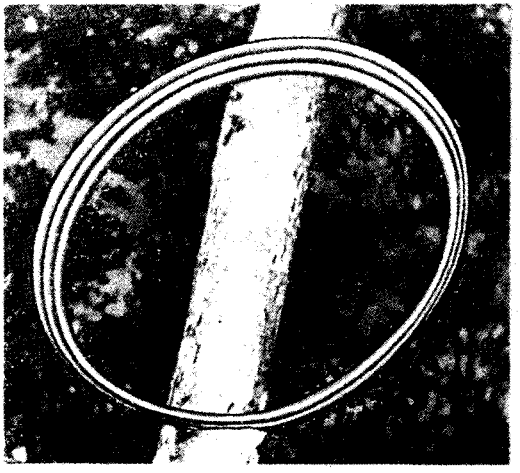
51. Flat-Base Rims

a. Demounting.

(1) Deflate the tire completely by removing valve cap and



A—RING TURNED AWAY FROM BODY DURING TIRE INFLATION



B—IMPROPERLY SEATED RING BLOWN ON TREE

RA PD 220825

Figure 36. Tire inflation procedure and hazards involved.

valve core. Install valve cap for protection of threads on valve stem.

(2) Pry both inside and outside beads from rim flanges by the use of tire irons, taking care not to damage the beads.

(3) Remove flange (side ring) as described in (*a*) through (*c*) below.

(*a*) Force section of side ring opposite prying notch into gutter. If a continuous ring, insert lock ring remover and replacer 41–R–2378 (fig. 29), with curved side up, in prying notch. Pry out the side ring, with a circular motion of this tool, enough to permit insertion of a tire iron adjacent to this tool. Use both tools to pry ring off a little at a time, until the whole rim is removed, being careful not to bend the side ring (A, fig. 37).

(*b*) When demounting a one-piece split ring (two-piece rim), insert lock ring remover and replacer 41–R–2378 in notch and, with the assistance of a tire iron, pry the ring off (B, fig. 37).

(*c*) When demounting a two-piece rim with split locking ring (three-piece rim), force flange (side ring) in, away from locking ring. Apply lock-ring remover and replacer 41–R–2378 in prying notch and remove locking ring. Remove the flange (side ring) as shown in C, figure 37.

(4) Force valve from slot to the right or left so it will slide off and not catch in edge of slot when the tire is removed. Place wheel on blocks and force tire off the wheel (D, fig. 37). In doing this, do not allow the valve stem to get caught in the gutter. If the tire is rusted on the rim and if heavy-duty hydraulic tire remover tool set 41–T–3545–17 (fig. 31) or heavy-duty hydraulic tire demounter 41–D–67–850 (fig. 30), is available, it should be used. If this equipment is not available, use driving tire iron 41–I–773–50 (fig. 29).

b. Mounting.

(1) Assemble tire, tube, and flap after inspecting carefully and after removing any foreign material on the inside of tire (par. 43*a*). Inflate tube enough to shape it. Place tire on wheel with valve in line with the valve slot (A, fig. 38).

(2) Apply flange (side ring).

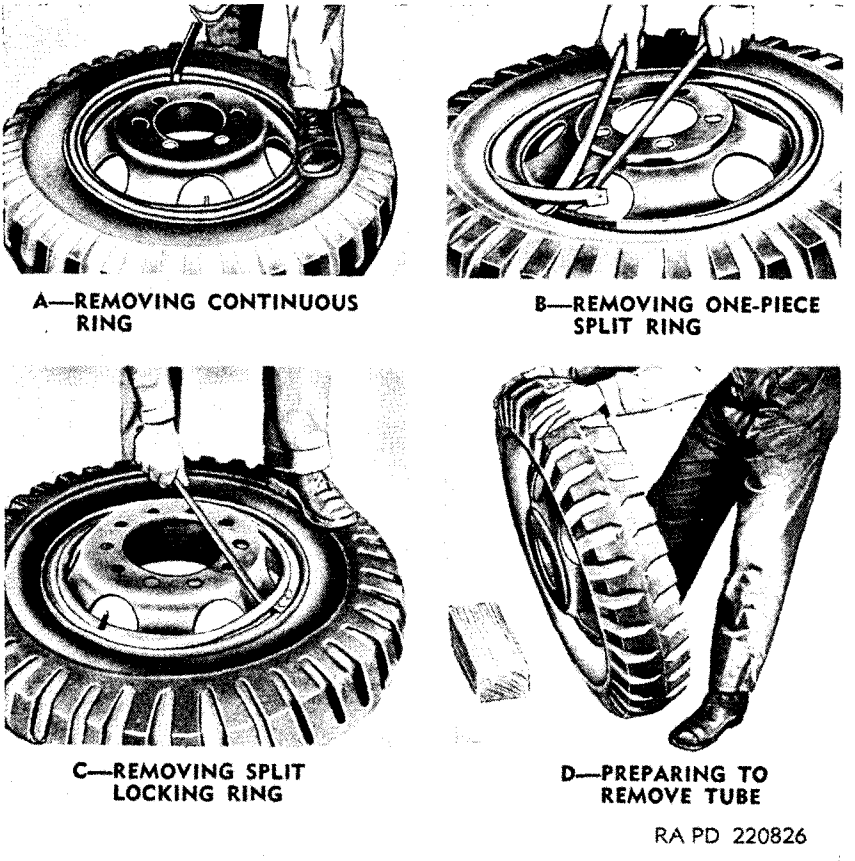


Figure 37. Demounting tire—flat-base rim.

(*a*) When mounting the continuous-type rim, place that portion of the side ring that is opposite the prying notch in the rim gutter. This portion (which should be inserted first) extends between the two cutaway portions on the inside circumference of the ring. Insert lock ring remover and replacer 41–R–2378 in prying notch and, holding opposite portion of ring in gutter, strike side ring in area between prying notch and nearest cutaway section with a hammer. By prying with the tool and by using the hammer, force ring in place. Repeat on opposite side of prying notch and force rest of the ring in place (B, fig. 38).

(*b*) When mounting the one-piece split-ring-type rim (two-piece rim), place end without a prying notch into rim ring gutter. Using a tire iron, force the ring in place (C, fig. 38).

(*c*) When mounting the two-piece rim with split locking ring (three-piece rim), install the flange (side ring), force end of split locking ring without a prying notch into rim ring gutter, and force ring in place (D, fig. 38).

(3) Inflate to a few pounds air pressure, just enough to bring pressure between beads and side ring. Tap side ring to be sure it is anchored in place.

Warning: In doing this, the side ring should be turned away from the operator and away from any other persons nearby who might be fatally injured if ring should fly off (fig. 36).

Then reach through wheel handhole and apply air chuck or, if there is no handhole, hold the palm of the hand

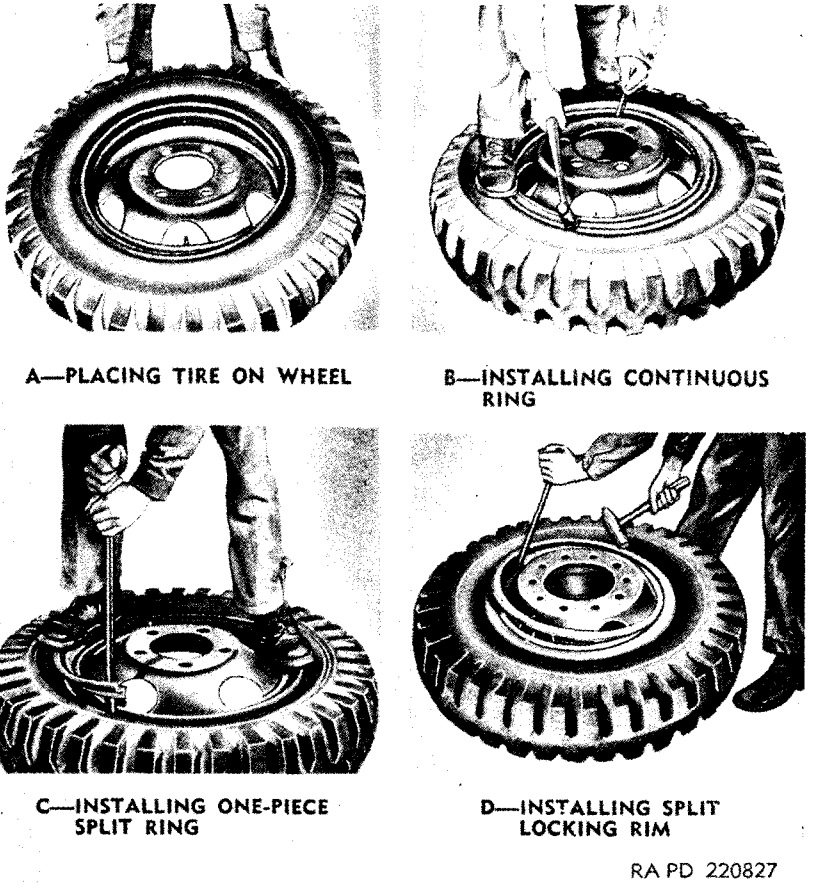


Figure 38. Mounting tire—flat-base ring.

only against the ring, in applying the air chuck, and inflate to correct air pressure (par. 24*a*). An alternate method, if valve can be reached, is to lay the tire flat, with ring down, and reach through wheel handhole to apply the air chuck.

52. Flat-Base Rims on Nondemountable Wheels

These rims are of four-piece construction; in addition to the split locking ring, both inner and outer flanges are removable (fig. 12). This type of mounting is most commonly found on off-the-road equipment, especially in the larger sizes. Working with an assistant is recommended.

a. Demounting.

(1) Block other wheels to prevent vehicle from rolling, then jack up wheel sufficiently for tire to clear ground, using wood blocks beneath jack to secure firm footing (A, fig. 39). As a safety precaution, place blocks under axle to prevent the vehicle from falling should the jack slip.

(2) Remove the valve cap and the core, exhausting all air. After exhausting the air, install the valve cap to protect the soft metal threads during removal.

(3) Loosen the outer bead by driving a small tool, with rounded end, between flange and bead. Work bead inward to gain sufficient clearance to free locking ring. Pry against rim flange, using longer tool or crowbar for leverage.

(4) Insert tool in locking ring slot and pry end of locking ring out of the gutter (B, fig. 39). Work the locking ring out around the circumference of the rim, using one or more bars to hold and pry. Tapping the rim flange with a lead hammer or prying with a bar will force the flange back and release the locking ring from the gutter (C, fig. 39). Do not bend or twist locking ring. A sprung locking ring may be difficult to install and, if used, it is a serious safety hazard. An improperly seated locking rim may blow off the tire.

(5) Remove outer flange by sliding it over the rim gutter.

(6) Loosen the inner bead in the same way that the outer bead was loosened ((3) above) (D, fig. 39). Where the inner flange is loose (not welded to the rim), it is possible on certain vehicles to insert a small jack between the vehicle frame and the rim flange to obtain pressure against the flange and bead.

(7) When inner bead has been loosened, start to work the tire off the rim. Force the tire outward as far as possible at the bottom, then lower the jack just enough so that the weight of the tire is resting on the ground. This will provide clearance at the top and permit the tire to be forced out at the top. Holding the upper part of the tire as far out as possible, raise the jack so that the tire weight is resting on the top of the rim. By alternating at top and bottom in this way, the tire can be walked off the rim without having to work against the great weight of the tire binding on the rim. If a hoist or crane is available, it should be used to raise and lower the tire in this operation.

(8) Complete the removal of tire from wheel and leave tire in vertical position, leaning against vehicle or other solid object.

(9) Remove flap from tire, using a tool with a rounded end to pry out and away from the beads (E, fig. 39). On some types of tires, it may be necessary to use a tire spreader or a small jack to spread the beads in removing the flap.

(10) Remove the tube in a similar manner, being careful not to pull on the valve stem or to enlarge any injuries. In heavy-gage tubes, repairs of almost any size are possible, if the rubber in the tube is still in good condition.

b. Mounting.

(1) Before installing tube in tire, inspect the tire casing carefully, inside and out, for breaks, bruises, nails, etc. Clean out all dirt and foreign matter from the inside of the casing. F, figure 39, shows the quantity of dirt removed from the casing of a grader tire.

(2) Install tube in casing, starting at bottom and working around the tire. Adding air as the tube is worked in will help to hold it in place and will eliminate the possibility of wrinkles (A, fig. 40).

(3) Insert flap in casing, properly centered and free of wrinkles. Rotate the tire as the flap is worked in, so the portion being inserted is at the bottom of the tire (B, fig. 40). In some cases, it may be necessary to spread the beads, using a spreader or small jack.

(4) Clean wheel of rust and dirt by scraping and by the use of a wire brush. Remove all foreign matter from the locking ring gutter.

(5) Place the tire (in which tube and flap have been inserted) in normal position, close to the wheel, with the valve in line with the valve hole or slot, as shown in C, figure 40. Lower jack so that the top part of the inner tire bead can be pushed on the rim, then walk the tire on the rim by alternately raising and lowering the jack,

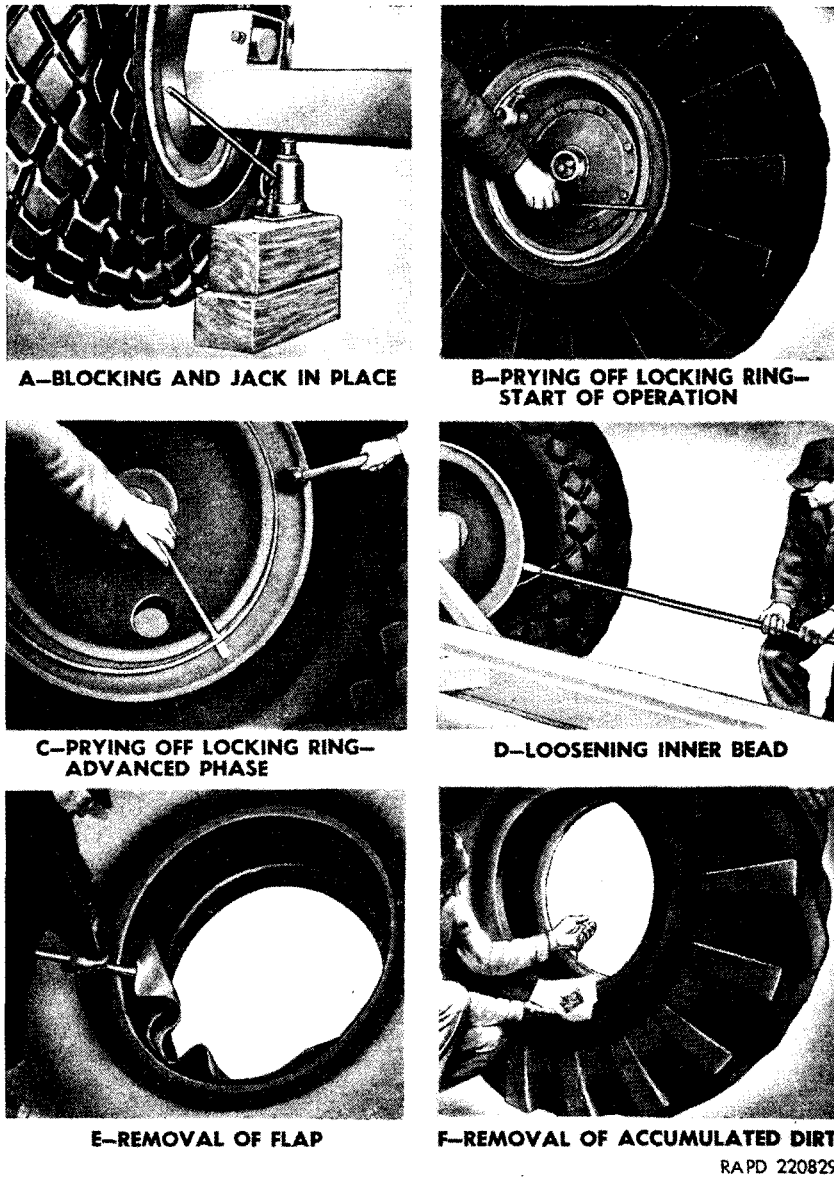


Figure 39. Demounting tire—nondemountable wheel.

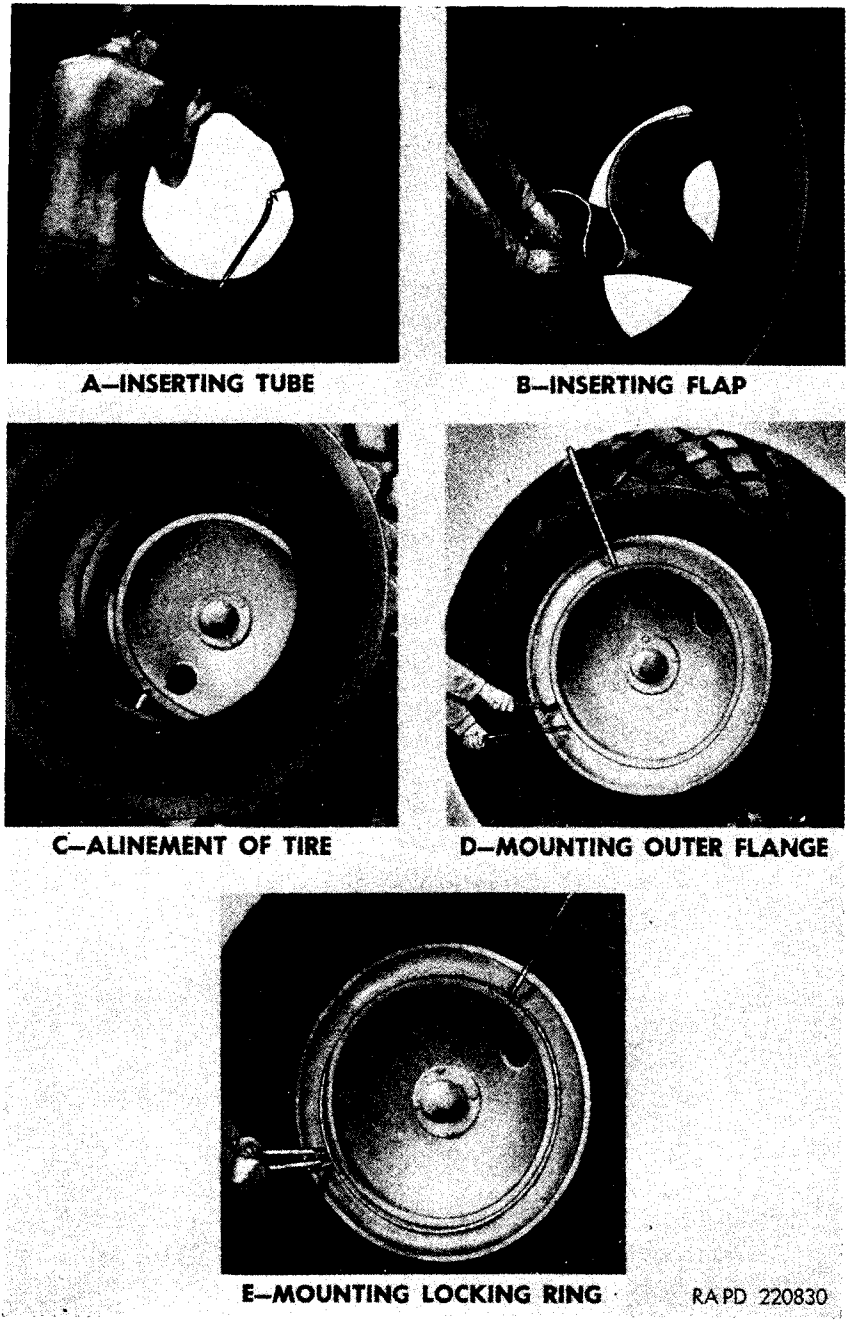


Figure 40. Mounting tire—nondemountable wheel.

gaining clearance alternately at the bottom and at the top. This procedure is similar to the method described in *a*(7) above.

(6) Mount the outer side flange and push it in far enough to clear the rim base gutter. Execute this operation as suggested by D, figure 40.

(7) Place one end of locking ring in the gutter, then proceed to work around the wheel, pushing the flange back far enough to allow the locking ring to seat properly. This may involve a series of steps of pushing on the flange as shown in E, figure 40, followed by snapping the locking ring into place or, if necessary, by driving it in with a hard rubber, rawhide, or wooden mallet. Do not drive the locking ring with a metal hammer.

(8) Slide the flange out against the locking ring in order that it will not bind on the rim base during inflation.

Warning: Before applying any air to the tire, be sure that the locking ring is securely in place.

Inflate the tire to 5 to 10 psi, then tap the locking ring carefully with a mallet to be sure it is properly seated.

(9) Inflate tire to recommended tire pressure (par. 24*a*).

53. Military Rims

As shown in figure 13, this type rim consists of a rim base and a side ring. The bead seats are tapered 5 degrees.

a. Demounting.

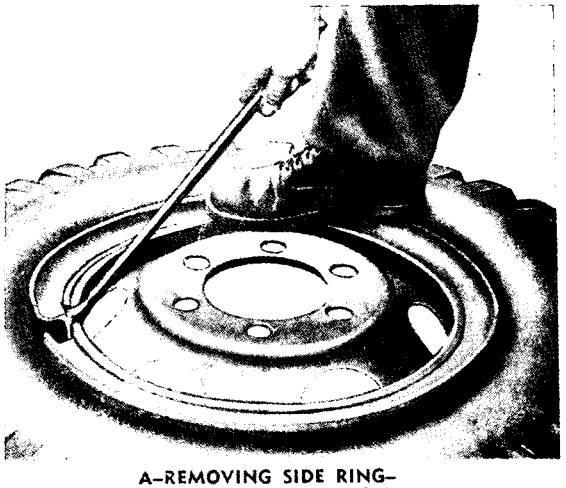
(1) Deflate the tire completely by removing valve cap and valve core. Install valve cap.

(2) Loosen tire bead next to the side ring by the use of tire irons, taking care not to damage the beads. If the bead is rusted to rim, the procedures described in paragraph 51*a*(4) may be employed.

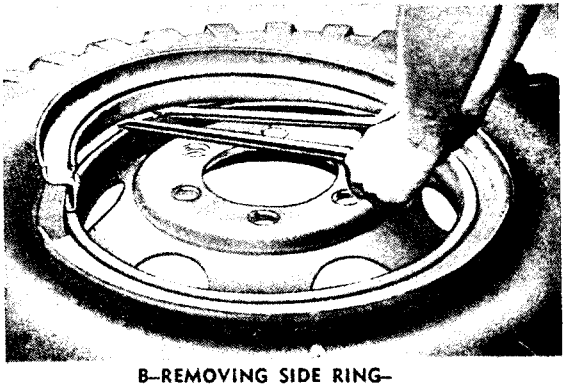
(3) Remove side ring. To do this, start at the prying slot as shown in A, figure 41. Complete the removal by using two tools (B, fig. 41).

(4) Loosen the other tire bead by turning over the wheel and by using tire irons.

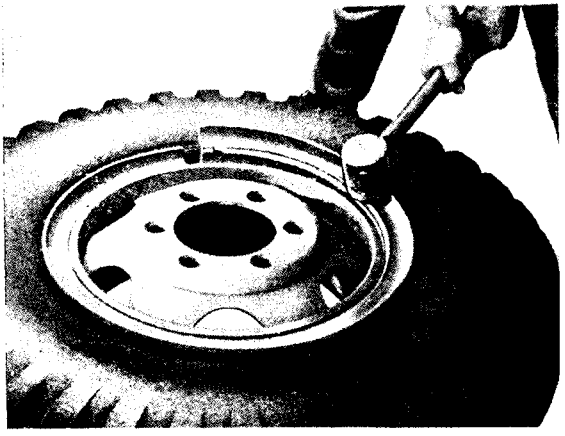
(5) Force valve from slot to the right or left so it will slide off and will not catch in the edge of the valve slot when the tire is removed. Place the wheel on blocks and force the tire off the wheel. Precaution should be taken that the valve does not get caught in the rim gutter while the tire is being removed.



A–REMOVING SIDE RING–
START OF OPERATION



B–REMOVING SIDE RING–
ADVANCED PHASE



C–INSTALLING SIDE RING

RA PD 220831

Figure 41. Demounting and mounting tire—military rim side ring.

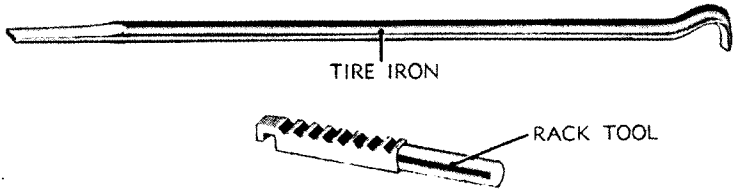
b. Mounting.

(1) Inspect tire, tube, and rim (par. 43*a*).

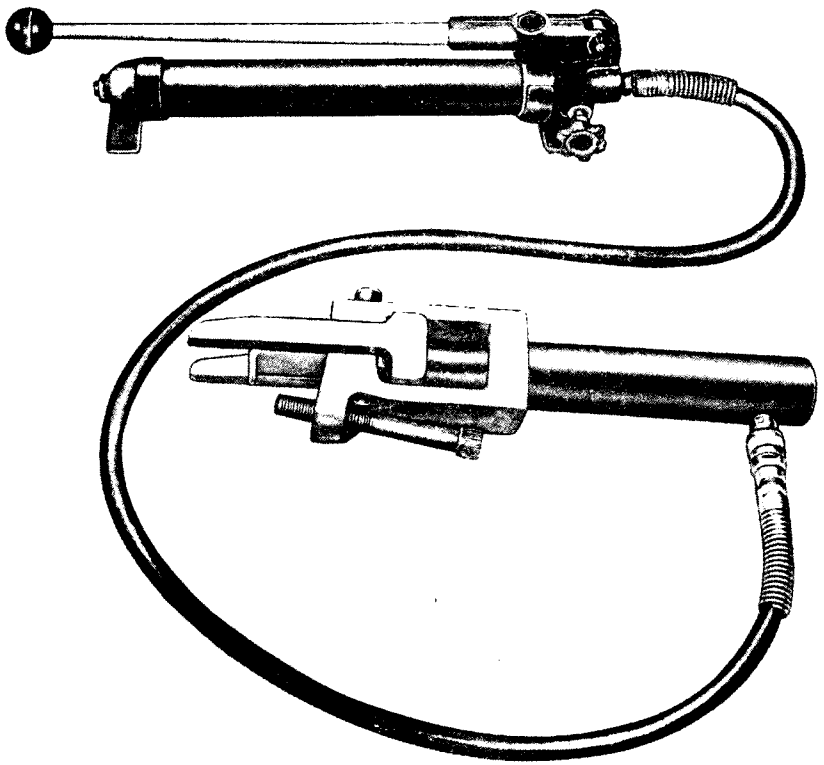
(2) Assemble tire, tube, and flap. Inflate tube enough to shape it. Place tire on rim base with valve in line with the valve slot.

(3) Install side ring.

Caution: Use only soft-faced hammer, such as the hammer shown in C, figure 41.



A—EARTHMOVER TIRE DEMOUNTING TOOLS



B—HYDRAULIC REMOVER RA PD 220832

Figure 42. Earthmover tire demounting equipment.

(4) Inflate tire to 5 to 10 psi, then check for proper seating of side ring. Tap it, in order to assure proper seating.

(5) Inflate tire to recommended pressure (par. 24*a*).

54. Large Earthmover Rims With 5-Degree Taper-Bead Seat on Nondemountable Wheels

A 5-degree tapered rim, such as now being used with earthmover tires 16.00 and larger, is shown in figure 14. Many of these tires, particularly on driving wheels, are mounted and demounted in a vertical position. To facilitate mounting and demounting these tires, tools shown in figure 42 may be used. Working with an assistant will facilitate the operation.

a. Demounting.

(1) Securely block all wheels other than the one from which the tire is being demounted, and jack up wheel sufficiently for tire to clear the ground. As a safety precaution, place blocks under the axle to prevent falling if jack should slip.

(2) Remove the valve core and exhaust all air. Install the valve cap in order to protect the threads on the valve during tire removal.

(3) Loosen outer tire bead and bead seat band.

(*a*) Using hydraulic tire remover (B, fig. 42) proceed as given in *1* through *7* below.

1. Place the lip of the hydraulic remover in one of the prying slots in the bead seat band (A, fig. 43).

2. Set the adjusting screw to a position that will hold the remover perpendicular (B, fig. 43).

3. Close the valve on the pump unit and apply enough pressure to take up the slack in the remover and rim parts. This will cause the remover to tilt slightly downward. Release pressure, and again set the adjusting screw so that the remover will be perpendicular to the rim when under pressure. This is very important.

4. Apply enough pressure to move the flange back approximately half an inch. Hold this distance by dropping a nut or similar solid object in the space between the flange and bead seat band (C, fig. 43).

5. Release pressure and move remover about a foot around the rim in either direction. This time, insert the lip of the remover against the unraised portion of the bead seat band (not in a prying slot). Again

apply pressure, making sure that the remover is perpendicular to the rim, moving the flange back this time from five-eighths to three-quarters of an inch. Hold this distance by blocking in the same way as described in *4* above.

6. Repeat this performance circumferentially about the rim and when three-quarters of the circumference has been covered, apply pressure until the bead has broken loose (D, fig. 43).

7. The bead will break loose with a popping sound. Remove the hydraulic remover and proceed as described in (4) through (9) below.

(*b*) When a hydraulic tire remover is not available, proceed to loosen outer tire bead and bead seat as given in *1* and *2* below.

1. Place the hooked end of tire iron into one of the prying slots between the bead seat band and the rim flange (A, fig. 44). With a 5-foot length of pipe slipped over the straight end of the tire iron for leverage, twist the tool in a circular motion. Have an

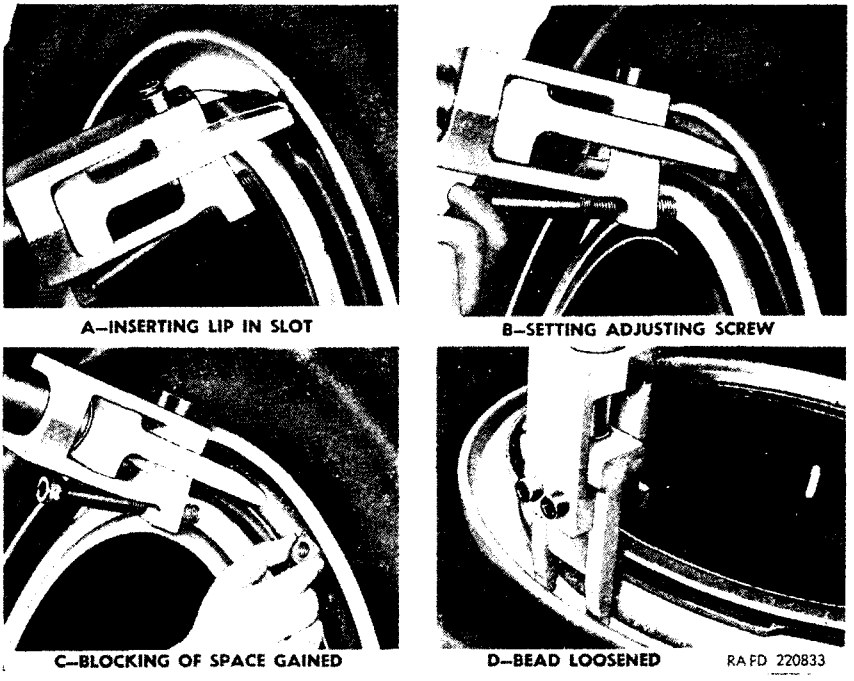
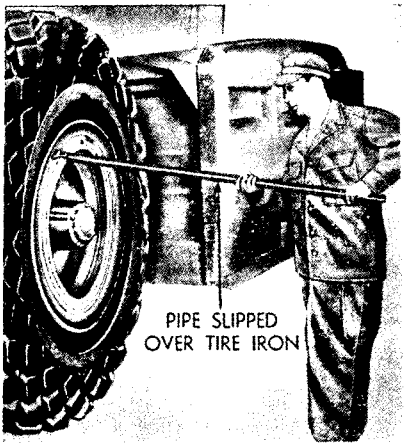
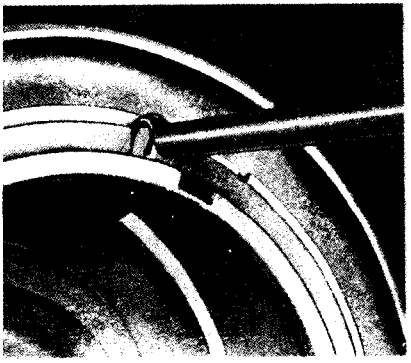


Figure 43. Demounting earthmover tire, using hydraulic tire remover —41–R–2373–243.

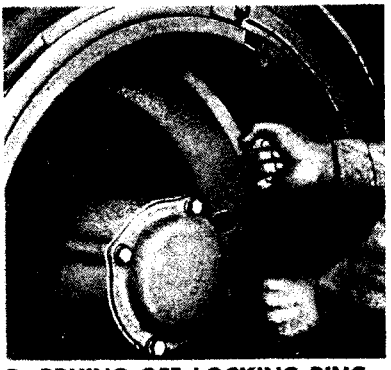


A—LOOSENING OUTER BEAD—START OF OPERATION

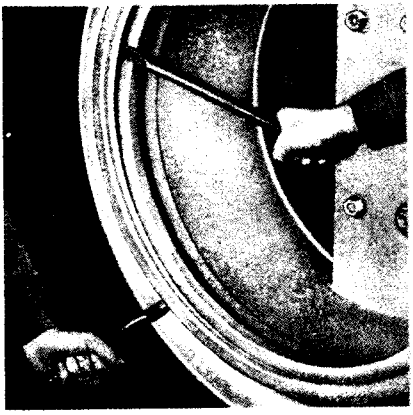
B—LOOSENING OUTER BEAD—ADVANCED PHASE



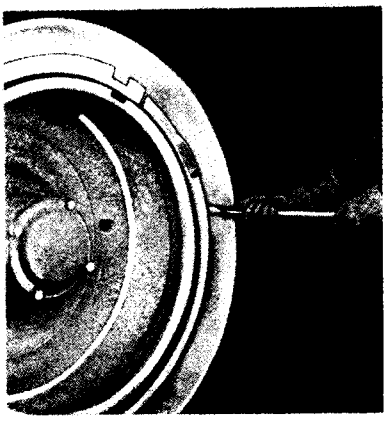
C—LOOSENING BEAD SEAT BAND



D—PRYING OFF LOCKING RING—START OF OPERATION



E—PRYING OFF LOCKING RING—ADVANCED PHASE



F—PRYING OFF BEAD SEAT BAND

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Figure 44. Demounting earthmover tire, using tire irons.

assistant insert another tire iron between the bead seat band and the rim flange, about 18 inches from the first tool, and with the same twisting action, loosen the bead in that portion of the tire. Move the first tire iron forward around the rim, twist it, and have the assistant follow up with the second tire iron (B, fig. 44). Continue in this way around the circumference of the bead seat band until the outer tire bead is loose all around.

2. Place a tire iron in the gutter, between the ends of the locking ring. With prying action of this tool, push the bead seat band away from the locking ring (C, fig. 44). Employ an assistant with another tire iron. By prying and holding alternately, working with assistant, push the bead seat band away from the locking ring all around the tire.

(4) Pry off locking ring. Start at prying notch and work around the tire, using two irons to pry and to hold (D and E, fig. 44).

(5) Remove bead seat band and outer rim flange. Pry with tire iron as shown in F, figure 44.

(6) Loosen inner tire bead in the same way as the outer bead, or by means of a small jack employed between the inner rim flange and some other part of the vehicle. Work progressively around the tire.

(7) Work the tire off the rim, making certain that the valve is pried out sufficiently to clear the rim gutter. First, force the tire outward as far as possible at the bottom, then lower the jack just enough so that the weight of the tire is resting on the ground. This will provide clearance at the top, making it possible to move the tire out at the top by pushing or prying. Hold the upper part of the tire out as far as possible, and raise the jack so that the tire weight is resting on the top of the rim, thereby gaining clearance at the bottom. By alternating at top and bottom in this way, the tire can be walked off the rim without having to work against the great weight of the tire binding on the rim. If a hoist or crane is available, it should be used for this operation. After tire has been removed from the wheel, leave it in vertical position, leaning against vehicle or other solid object.

(8) Remove flap from tire, using a tool with a rounded end to pry it out (E, fig. 39). On some tires it may be

necessary to use a tire spreader or a small jack to spread the beads and assist in removing the flap.

(9) Remove the tube in a similar manner, being careful not to pull on the valve stem or to enlarge any injuries. In heavy-gage tubes, repairs of almost any size are possible, if the rubber in the tube is still in good condition.

b. Mounting.

(1) Inspect the tire carefully, inside and out, for breaks, bruises, nails, etc. Clean out all dirt and foreign matter inside the tire (F, fig. 39).

(2) Place the tube in the tire, starting at bottom and working around the tire. Adding air as the tube is worked in will help to hold it in place and eliminate the possibility of wrinkles (A, fig. 40).

(3) Insert the flap in the tire, properly centered and free from wrinkles. Rotate the tire as the flap is worked in, so that the portion being inserted is at the bottom of the tire (B, fig. 40). In some cases, it may be necessary to spread the beads, using a tire spreader or a small jack.

(4) Clean off any rust or dirt from the rim base, rim flanges, and from the bead seat band by scraping and by the use of a wire brush. Pay special attention to cleaning all foreign matter out of the locking ring gutter.

(5) Place inner rim flange on rim base, alining the driving lug on the flange with the slot in the rim base (A, fig. 45).

(6) Hoist or roll tire into position, alining the valve stem with the valve slot. If hoist is not used, lower wheel far enough to permit top of tire to be hooked over top of rim, then raise wheel, and walk the tire on in the same manner as described for demounting (*a*(7) above).

(7) Hook two toothed rim irons 8366453 (A, fig. 42) into the rim gutter approximately 4 inches from either side of the valve slot. Place the bead seat band in the outside rim flange, alining the driving lug on the flange with the slot in the bead seat band. Mount the assembled bead seat band and side flange on the rim base by hooking them over the two rim irons and sliding on the rim (B, fig. 45), this time alining the driving lug on the bead seat band with the valve slot in the rim base.

(8) Engage one tire iron 8366452 (A, fig. 42) in one of the notches of each rim iron and force the bead seat band into position by prying. Holding pressure against the band with one rim iron and one tire iron, move the other

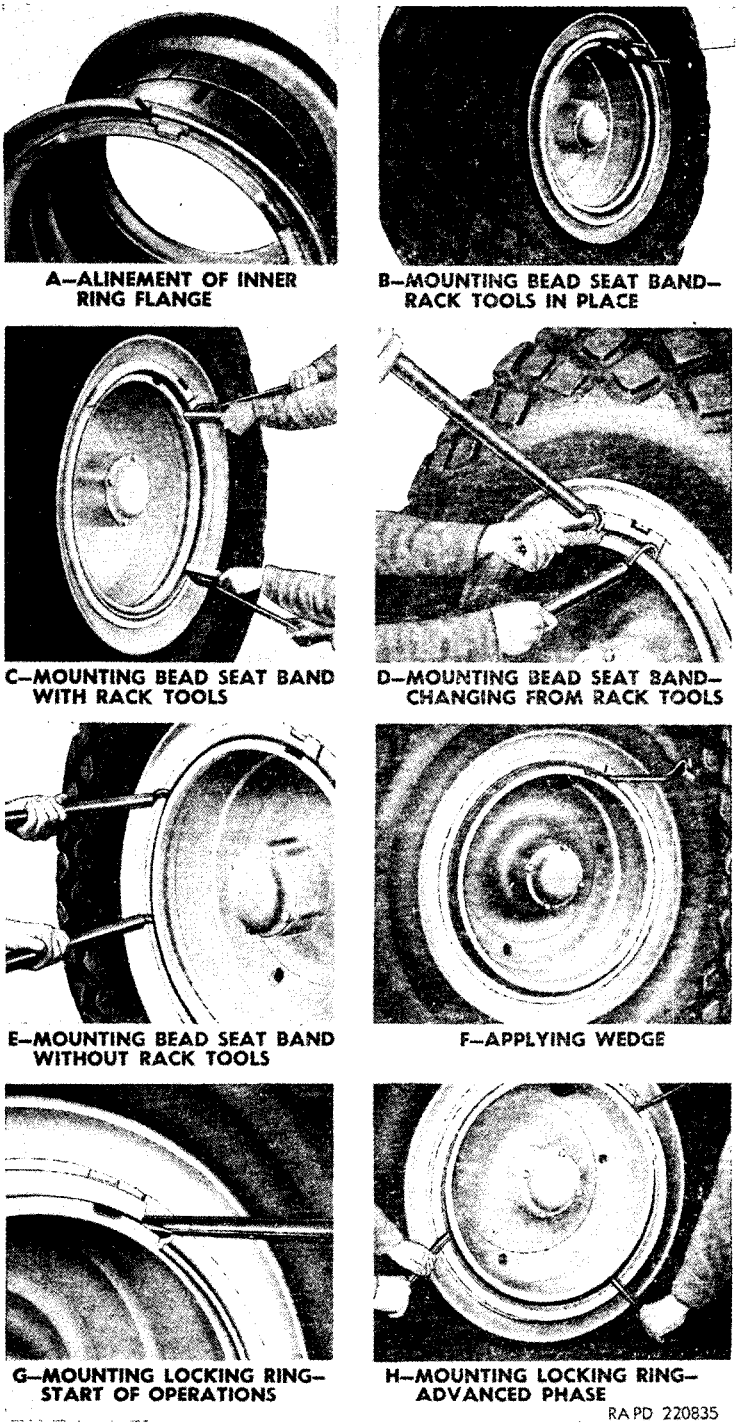


Figure 45. Mounting earthmover tire.

two irons about a foot away from the other side of the first irons along the circumference of the rim (C, fig. 45). Pry again and, by working the irons alternately holding and prying, push the bead seat band back so far that the tire iron can be hooked into the rim gutter. Remove one of the rim irons, and hook a tire iron in the rim gutter for additional prying (D, fig. 45). Continue to work around the rim, using two tire irons without the rim irons (E, fig. 45), until the bead seat band has been forced 1 to 1⅛ inches inside the gutter edge.

(9) Hold the band in this position and drive the tapered end of a tire iron, or any suitably tapered wedge, between the bead seat band and the rim base, directly under the break in the bead seat band (F, fig. 45).

(10) Hook one end of the locking ring into the gutter next to the wedge (G, fig. 45). Pry or snap the locking ring into place, using the tapered ends of two tire irons (H, fig. 45). When the locking ring is in place, remove the wedging tool.

(11) Pry the bead seat band out over the ledge of the locking ring. Move the band a little at a time, all around, in order to avoid cocking it. When the band is cocked, it has a tendency to bind. Should the band become cocked, straighten it first before proceeding.

Warning: Do not inflate tire unless the bead seat band has been pried out over the locking ring.

(12) Check the engagement of the driving lugs on both flanges, then inflate to approximately 75 psi to insure proper seating of the beads. Reduce air pressure to correct operating pressure (par. 24*a*).

55. Divided Wheels With Channel-Type Beadlocks

a. Demounting.

(1) Demount wheel and deflate tire by removing valve core.

Warning: Do not take wheel apart before deflating tire, otherwise the tire will blow apart and cause injury. Remove valve mounting sleeve, if present, from valve stem and install valve cap to protect threads on valve stem. Remove nuts that hold wheel together.

(2) Work beads loose from seats on both sides as shown in A, figure 46.

(3) Pry off liner half of wheel (B, fig. 46). Alternately pry one side, then the other. Avoid cocking wheel holes

against studs. Lift off inner half of wheel. Turn tire over and remove other half of wheel.

(4) Stand tire up, with valve at the top. Push valve from hole into tire. Push beadlock down, with the heel, into tire at point opposite valve hole (C, fig. 46).

(5) Grasp beadlock with both hands near valve hole and, standing on tire, pull up and out. Remove beadlock (D, fig. 46).

(6) Remove tube.

b. Mounting.

(1) Inspect tire, tube, beadlock, and rim (par. 43*a*).

(2) Inflate tube sufficiently to shape it and apply valve cap. Place tube in tire. In combat tires, use only tubes marked COMBAT. Stand tire up, with valve at bottom pointing upwards.

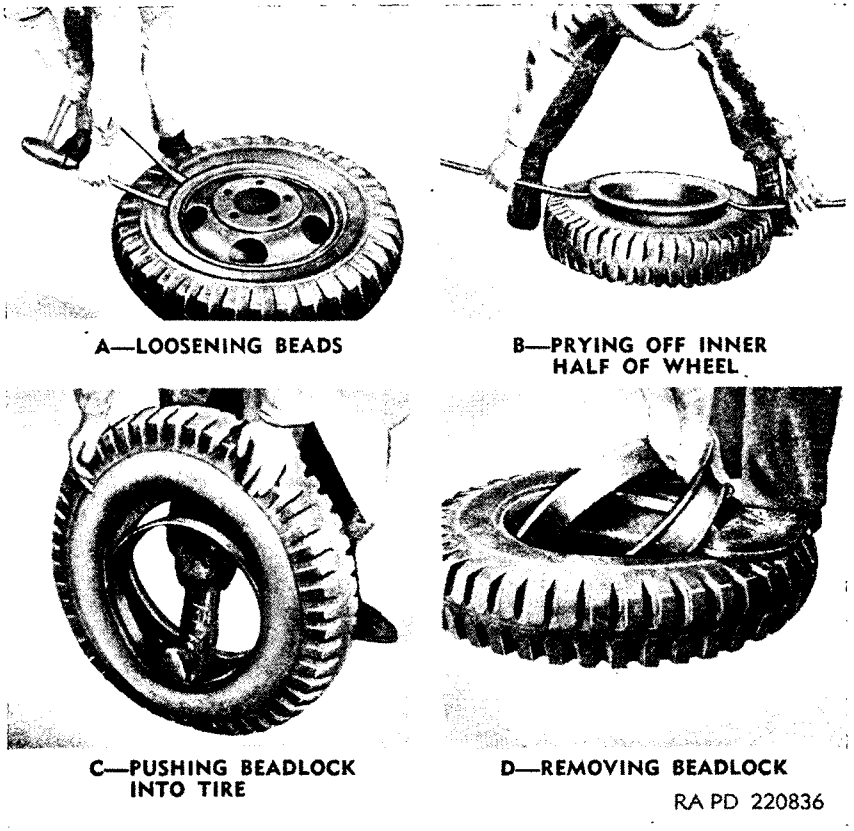


Figure 46. Demounting tire—divided rim, channel-type beadlock.

(3) Place valve through valve hole of beadlock, with the offset valve hole of the beadlock to the right. Insert the beadlock into the tire halfway, with beadlock at right angle to tire (A, fig. 47).

(4) Roll tire to the left one-quarter turn and push projecting part of beadlock down and into the tire as far as possible with the foot. Turn tire and repeat operation on opposite

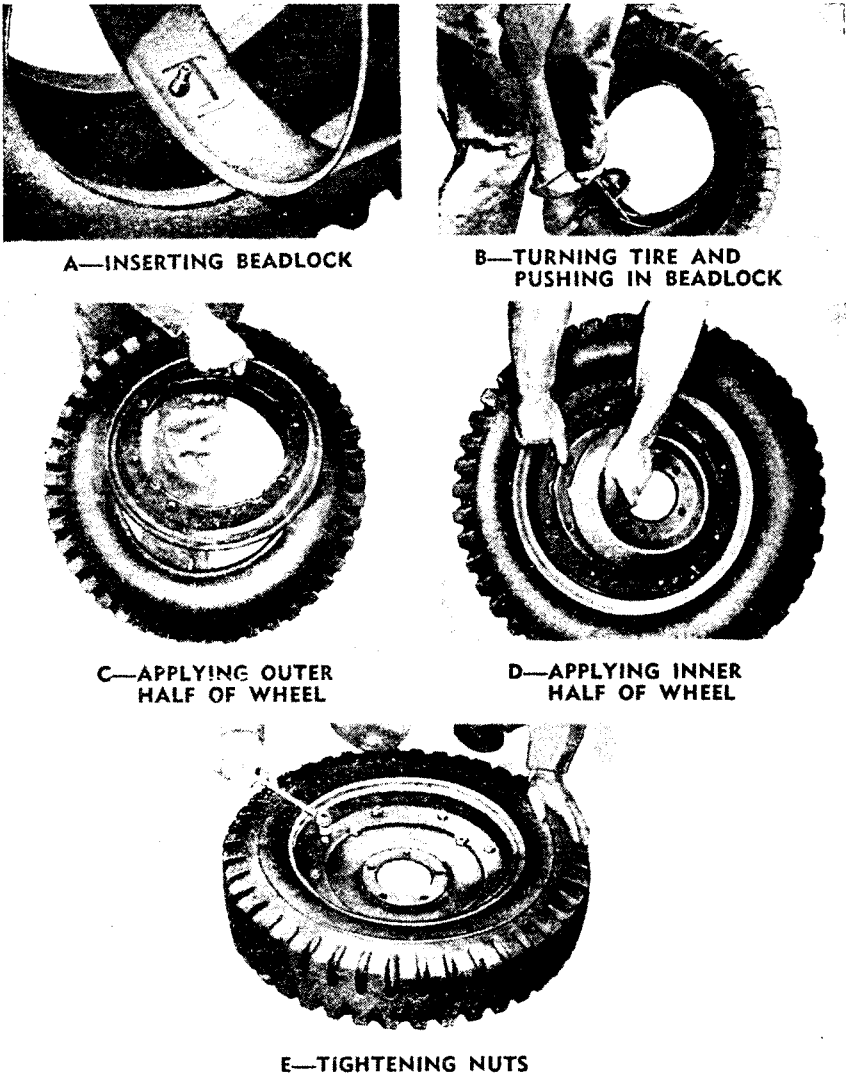


Figure 47. Mounting tire—divided rim, channel-type beadlock.

side. Then complete insertion of beadlock in tire with a tire tool (B, fig. 47).

(5) Apply outer half of wheel, with offset of valve matching offset of hole. Insert valve through valve hole (C, fig. 47).

(6) Apply inner half of wheel. Be sure to match the lug of the inner half with the slot of the outer half (D, fig. 47).

(7) Apply nuts and tighten (E, fig. 47). Inflate tire to prescribed air pressure (par. 24*a*).

Note. Only those 6.00-16 standard tires with BL or BLX imprinted on the sidewall under the size marking on the serial number side should be used on divided-type wheels.

56. Divided Rims With Hinge-Type Beadlocks

a. Demounting.

(1) Remove wheel and deflate tire by removing valve core. Apply valve cap to protect threads on valve stem.

Warning: Injury may result if tire is not deflated.
Remove side flange nuts or screws, leaving two on opposite side of the wheel to hold rim in place until all the other nuts or studs have been removed (A, fig. 48).

(2) Loosen side flange with tire iron. Insert tire iron between flange and the bead, to pry off side flange. If side flange does not loosen readily, drive a tire iron or chisel between wheel and flange. Turn tire over and loosen other bead from wheel (B, fig. 48).

(3) After the tire has been completely loosened, place wheel on a wooden block and tire will fall free. If tire does not come off readily, it may be necessary to drop wheel on block.

(4) Free beadlock from bead. If tube holds air, inflate enough to push beads apart and free beadlock.

(5) Stand tire up, with valve at bottom, and push valve into tire as far as possible. Then push beadlock with the foot into tire near valve. Insert tire iron between beadlock and tire on side of beadlock and across the split from the pad about 10 inches back from the split. Press down on tire tool or stick and collapse the beadlock (C, fig. 48).

Caution: Take care that the hands are away from hinge area, as injury may result.
Turn beadlock at right angle to tire and remove it by pulling over valve cap carefully.

(6) Remove tube.

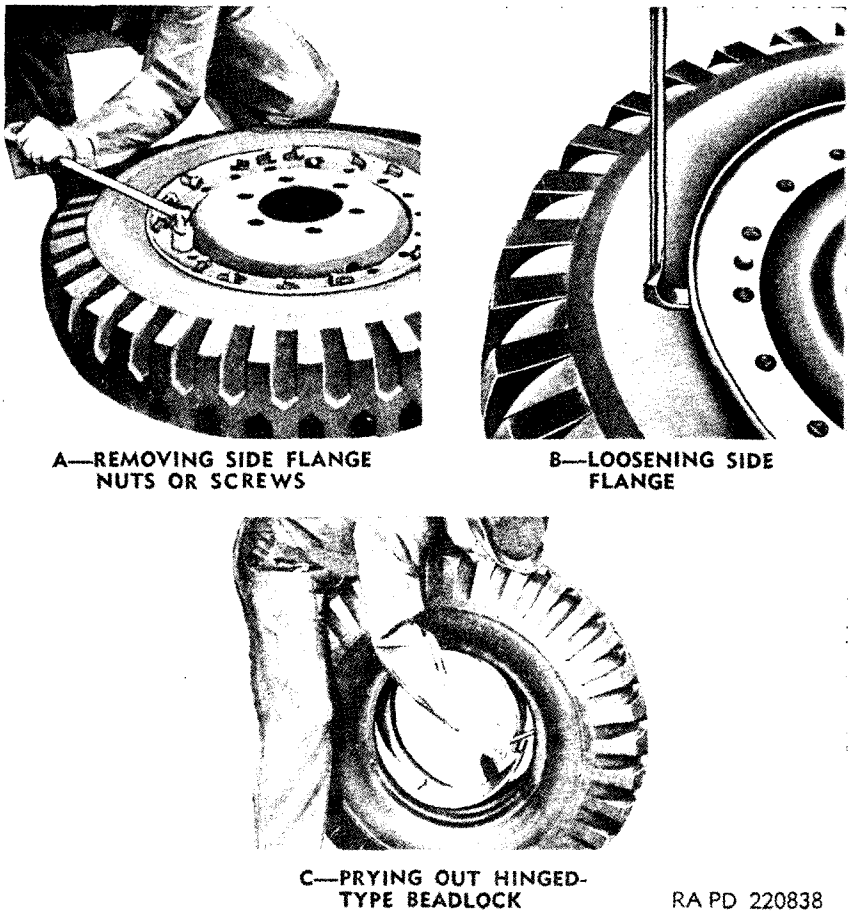


Figure 48. Demounting tire—divided rim, hinge-type beadlock.

b. Mounting.

(1) Inspect tire, tube, beadlock, and rim (par 43*a*).

(2) Inflate tube slightly to shape it. Place tube in tire.

(3) Collapse beadlock at the hinge, taking care not to catch the hands. Slip beadlock over valve with beadlock at right angle to tire. Roll tire one-quarter turn to left and push beadlock into tire (A, fig. 49). Turn tire around and repeat operation on opposite side, using tire tool, if necessary.

(4) Expand beadlock by jerking up with hands, as shown in B, fig. 49. Be sure beadlock is centered.

(5) Place tire on wheel, (C, fig. 49), with valve pointing up in slot.

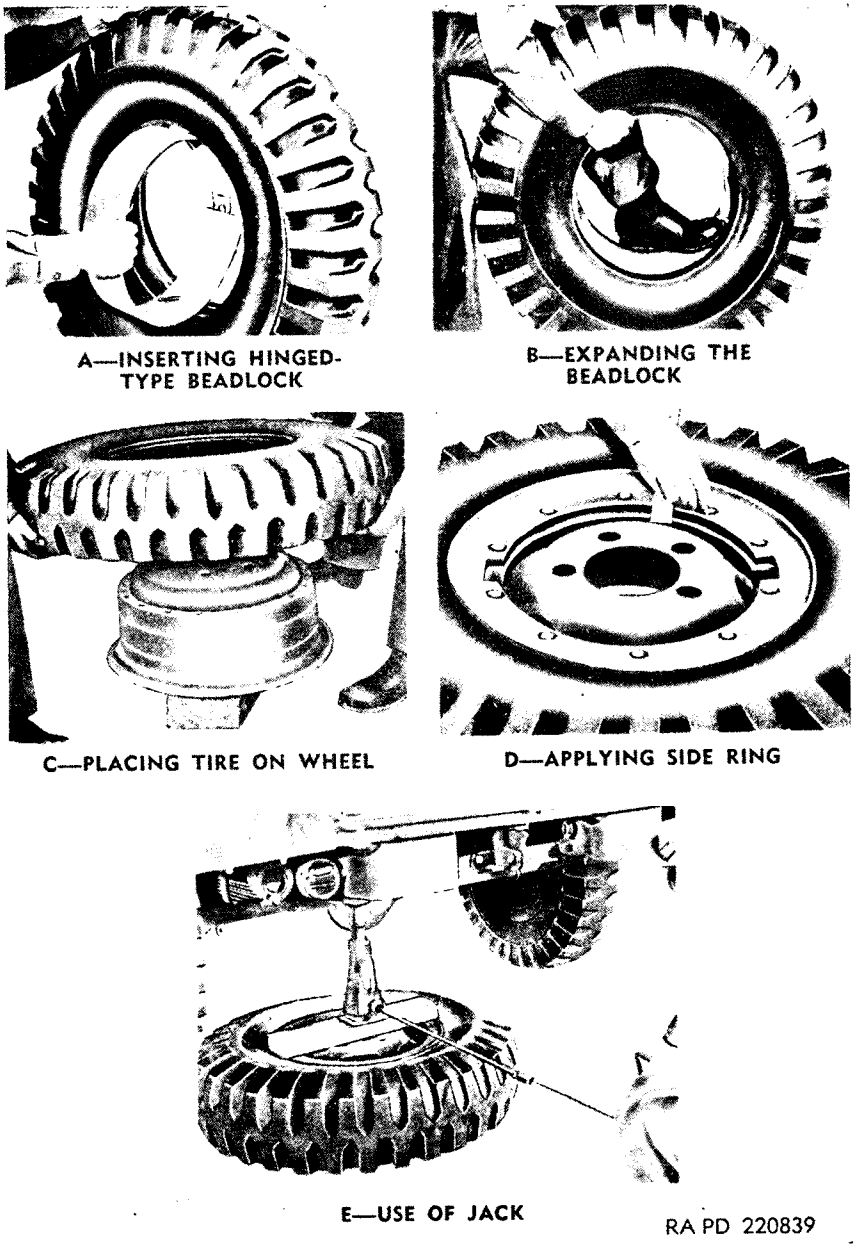


Figure 49. Mounting tire—divided rim, hinge-type beadlock.

(6) Place side flange in position, alining valve slot. Using the tire tool to hold side flange in position, force side ring down far enough to start nuts or screws (D, fig. 49).

(7) If difficulty is encountered in forcing side flange down far enough to start nuts or screws, place tire assembly under rear frame of heavy vehicle and use a jack to force the side flange down into position, by placing boards across the ring to support the jack (E, fig. 49).

(8) Apply first the nut or screw that is near valve, next one directly opposite, continuing to apply nuts or screws in alternate positions.

(9) If flange is held by nuts and long screws are available, use them to start to tighten rim flange; then remove and replace with regular screws.

(10) After side flange is fastened securely in place, insert valve core and inflate tire to correct pressure (par. 24*a*).

57. Bead Clip Applications

Tires with bead clips may be mounted on semidrop-center rims (w/split side rings), military rims, and divided rims. A flap is always required when bead clips are used. Bead clips are used only with controlled-bead tires (par. 16). They are made to fit tightly on the beads of such tires, thereby keeping the clips in place during handling. Sectional views of bead clip applications are shown in figure 16. From 10 to 14 bead clips are required per tire.

a. Semidrop-Center and Military Rims.

(1) *Demounting.*

(*a*) Deflate tire completely by removing valve cap and valve core, then install valve cap.

(*b*) Drive a tire iron 41–I–780 (table I, par. 22) between tire bead and the flange, next to any bead clip (A, fig. 50). Apply pressure against the heel of the tire bead by a circular motion of the tool, rather than a radial motion. Tap the clip loose from the rim (B, fig. 50). Repeat this operation until all clips have been freed from both flanges.

Caution: Do not apply more pressure with tire iron than needed to free the bead clip. Excessive pressure may damage the tire bead.

(*c*) Remove side ring. This operation is the same as performed when bead clips are not used (par. 50*a*(2) (b) or 53*a*(3)).

(*d*) Remove the tire from the rim base in the same manner as performed when bead clips are not used (par. 50*a*(3) or 53*a*(5)).

(2) *Mounting.*

(*a*) Inspect tire, tube, flap, rim, and bead clips (par. 43*a*).

(*b*) Inflate tube sufficiently to shape it. Apply valve cap. Place tube and flap in tire.

(*c*) Space the bead clips evenly around the tire bead, and tap them into place as shown in C, fig. 50. Use 10 clips (5 on ea side) for each 9.00-16 size tire and 12 clips (6 on ea side) for each larger size tire.

Note. See table I (app I) for correct size bead clip. Do not attempt to install clips over flange with tools.

(*d*) Place tire on rim, with valve in line with valve hole or slot (A and B, fig. 51). If semidrop-center rim, proceed as described in paragraph 50*a*(2) and (3).

(*e*) Install side ring as shown in C, D, and E, figure 51. Notice that in A, figure 51, one end of the side ring is

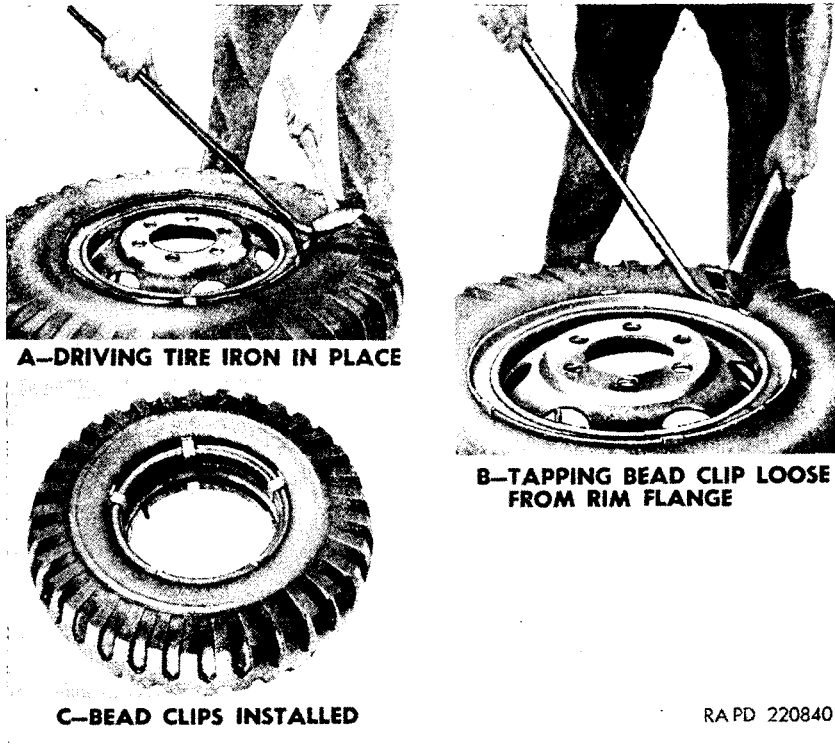


Figure 50. Installation of bead clips.

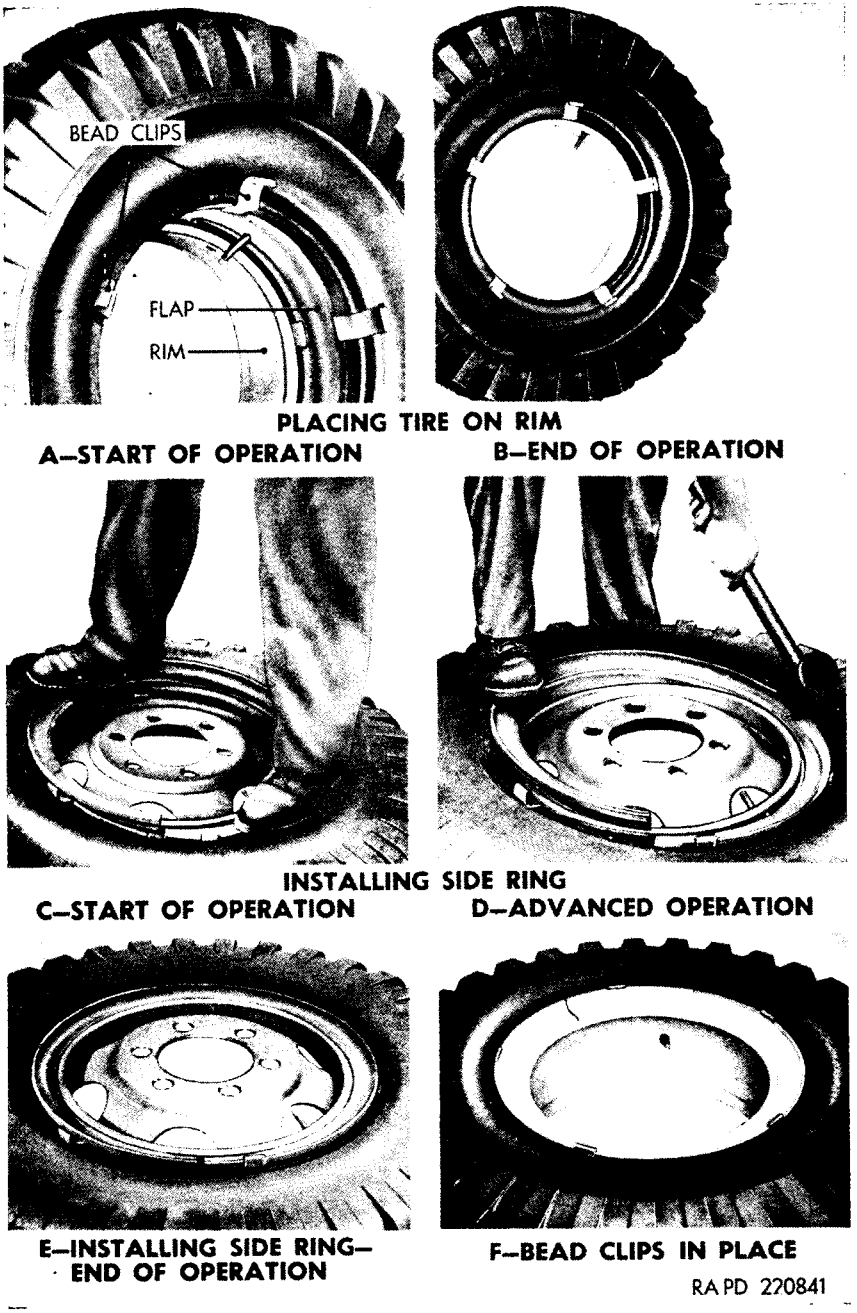


Figure 51. Installation of bead clips.

forced in place under one of the bead clips. In this operation, most of the weight must be applied by the foot near this end of the ring. In order to facilitate mounting of tire, support the rim with another rim or suitable blocks of wood, so that the tire is off the ground. The bead clip near the end of the side ring holds that end of the ring in place while the rest of the ring is hammered in place (D, fig. 51).

Caution: Use only soft-faced hammer, such as the brass hammer shown in the illustration. Normally, only heel pressure will be required.

(*f*) After ring is properly seated, inflate tire to 5 to 10 psi, then check for proper seating of the side ring. Tap it, in order to assure proper seating.

(*g*) If necessary, increase inflation pressure until bead clips snap in place over the edges of the flanges on both sides (F, fig. 51). Reduce tire pressure to recommended operating pressure (par. 24*a*) before mounting tire on vehicle.

b. Divided Rims.

Bead clips are not available for tires smaller than 9.00-16, therefore, mounting and demounting procedures are given only for the larger size divided rims, shown in figure 11.

(1) *Demounting.*

(*a*) Demount wheel and deflate tire by removing valve cap and valve core. Install valve cap.

(*b*) Loosen bead clips from both rim flanges as described in *a*(1) (*b*) above.

(*c*) Remove nuts or studs that hold the wheel together.

Warning: Injury may result, if tires are not inflated.

(*d*) Pry off first one part, then the other part of the wheel. Use tire irons where necessary.

(2) *Mounting.*

(*a*) Inspect tire, tube, flap, rim, and bead clips (par. 43*a*).

(*b*) Inflate tube sufficiently to shape it. Apply valve cap. Place tube and flap in tire.

(*c*) Place the bead clips in the tire as described in *a*(2) (*c*) above.

(*d*) Place tire on wheel, alining the valve with the valve slot. Install side ring (properly alined), and apply nuts or studs.

(*e*) After the side flange is securely in place, inflate to a pressure sufficient to cause the bead clips to snap in place over edges of flanges on both sides.

(*f*) Bring tire pressure to recommended operating pressure (par. 24*a*).

Section VII. STORAGE OF TIRES AND TUBES

58. General

a. Factors contributing to deterioration of tires in storage include light, heat, air in motion, ozone (created by electrical discharge), oil, dust and dirt, and water.

b. Proper storage is essential for ease of identification, classification, handling, location, and inventory.

c. Tires and tubes must be protected from contact with fuels, oils, greases, and other petroleum products. Any such products on tires should be washed off immediately with approved soap and water solution. Vehicles should not be stored on floor, cinders, or other surfaces soaked with oil or grease.

d. Allow enough space around vehicles in storage to permit routine inspection and servicing.

e. Utilize available shaded areas for the protection of tires from sunlight.

f. Keep tires on unserviceable, uneconomically repairable, and obsolete vehicles adequately inflated, or block up the wheels of such vehicles, maintaining one-third to two-thirds normal air pressure.

g. Tires continually exposed to oil drippage should be thoroughly cleaned with a soap and water solution, after which a deflector should be placed at point of drippage. This deflector can be improvised, using aluminum foil, metal, or fiberboard.

59. Tires on Vehicles in On-Call Limited Storage

a. Vehicles in on-call limited storage are those that are temporarily out of service for less than 30 days or vehicles that must be ready for operation on call.

b. Clean and inspect the tires on vehicles in limited storage. Replace any tires requiring repairing or retreading by serviceable tires. Maintain proper air pressures (par. 24*a*).

60. Tires on Vehicles in Limited Storage

a. Vehicles in limited storage are those that will not be required for service for periods up to 180 days.

b. Block vehicles up or move each vehicle a few feet at monthly intervals. Proper air pressure should be maintained (par. 24*a*).

c. Tires may remain in place if protected from direct sunlight and if storage conditions for tires are otherwise satisfactory. If

stored in open, cover tires with flexible waterproof barrier-material, type C–1, or with similar material. Hold the covering in place with nonhygroscopic adhesive tape or similar material (A, fig. 52). Maintain one-third to two-thirds normal air pressure.

d. When conditions are improper for storing the tires on vehicles, remove the tires and store them as described in paragraph 62 (B, fig. 52).

61. Tires on Emplaced Artillery Carriages

Maintain proper inflation pressures (par. 24*a*), and where practicable, protect the tires from sunlight. In addition, when artillery carriages are so emplaced that they are resting on pneumatic tires and they are staying in that emplacement for more than 30 days, either move the carriages a few feet at monthly intervals, in order to shift the weight on the tires, or block carriages up.

62. Tires and Tubes Not Mounted on Vehicles

a. Store tires and tubes under cover (C, fig. 52), unless tires are not suitable for further use. Protect the tires and tubes from light by covering windows and doors of buildings. Painting of glass on inside with sun-resistant green or blue paint is recommended (D, fig. 52).

b. If possible, protect tires and tubes from excessive heat (temperatures between 32° and 80° F., are preferable) and from exposure to strong air currents, dampness, and dirt. Do not store them in rooms in which electric generators or battery chargers are operated.

c. Stack tires horizontally in piles, except where vertical racks are available, and group them according to size. Pallet-rack storage (figs. 53 and 54) is ideal for stacking tires. Size of tire will determine the number permitted to be stacked horizontally. Stacks must be reversed at 6-month intervals.

Table II. Horizontal Tire-Stacking Requirements

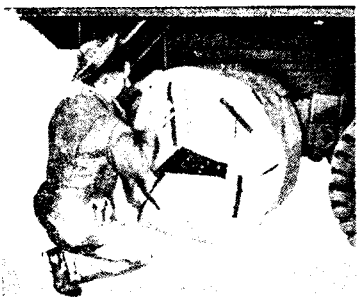
Tire size	Maximum No. of tires to be stacked one upon another
6.00–16	15
6.50–20	14
7.50–16	12
7.00–20	12
9.00–16	8
10.00–20	6
12.00–24	6
13.00–20	6
14.00–20	5

d. Store new tubes in their original containers. Deflate used tubes, rolled in such manner as to avoid sharp creases, and group them according to sizes and types.

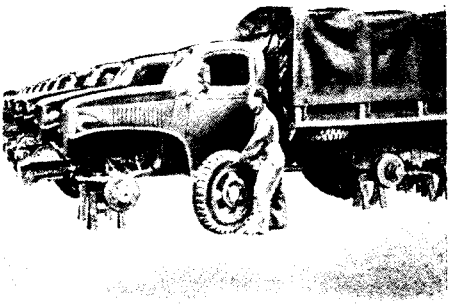
e. Clean used flaps and store them rolled into combat bundles, tied and tagged.

f. Inspect used tires and tubes before storing. Repair those tubes that can be repaired by the organization (pars 64*a*(2) and 65). Forward other unserviceable tubes and all unserviceable tires to higher echelon.

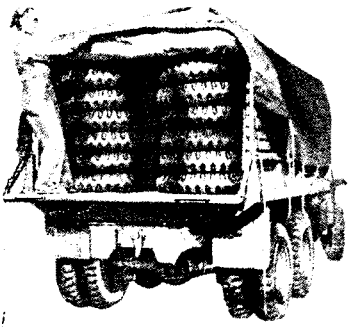
g. Mounted tires may remain on wheels during storage. Extra tubes and flaps may be matched with and stored inside the tire casings.



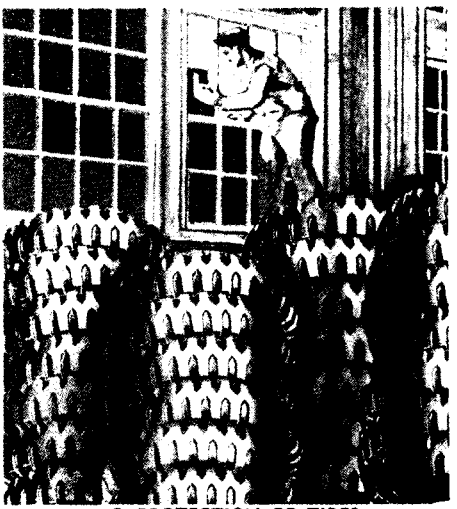
A–COVERING TIRES FOR PROTECTION AGAINST SUNLIGHT



B–REMOVAL OF TIRES FROM VEHICLE IN OUTDOOR STORAGE



C–PROTECTION OF TIRES IN TRANSIT



D–PROTECTION OF TIRES AGAINST SUNLIGHT

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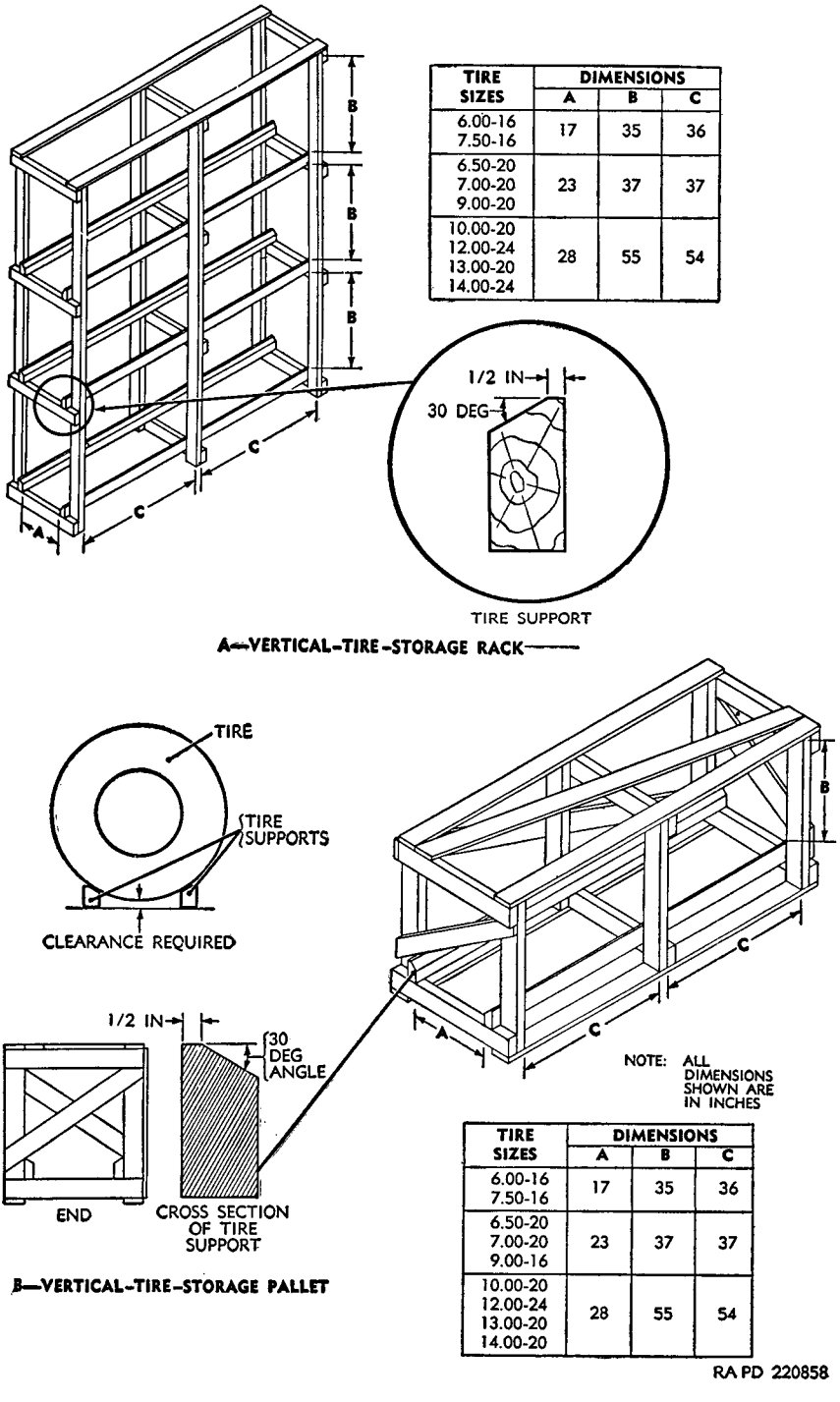
Figure 52. Protection of tires.

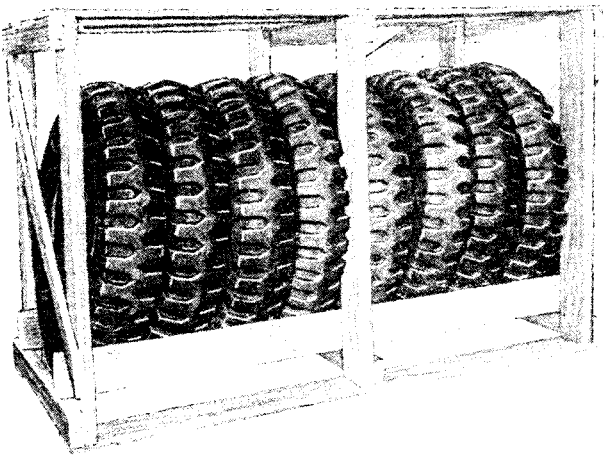


TIRE SIZES	DIMENSIONS		
	A	B	C
6.00-16 7.50-16	17	35	36
6.50-20 7.00-20 9.00-20	23	37	37
10.00-20 12.00-24 13.00-20 14.00-24	28	55	54

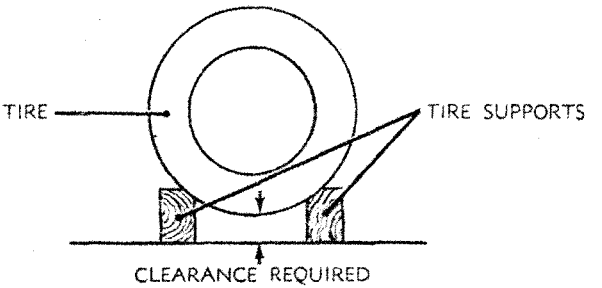
TIRE SIZES	DIMENSIONS		
	A	B	C
6.00-16 7.50-16	17	35	36
6.50-20 7.00-20 9.00-16	23	37	37
10.00-20 12.00-24 13.00-20 14.00-20	28	55	54

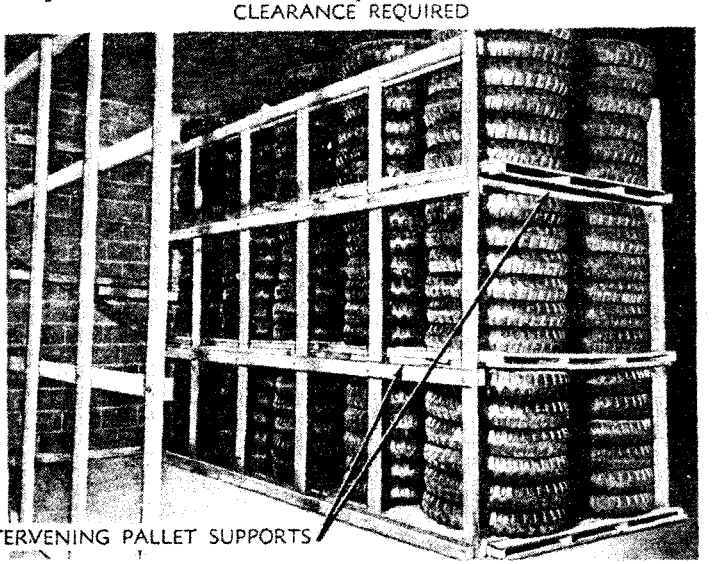
RA PD 220858

Figure 53. Tire storage—vertical rack and pallet.



A—TIRES STORED VERTICALLY IN PALLET





B—TIRES STORED HORIZONTALLY IN PALLET RACKS

RA PD 220859

Figure 54. Tire storage—vertical and horizontal pallets.

h. Tires, tubes, and flaps should be arranged to facilitate issue on a first-in first-out basis.

Section VIII. REPAIRS

63. Tire Repair

Tire repair will be performed only by higher echelon. Unserviceable tires should be immediately exchanged through proper channels for suitable replacements.

63.1 (ADDED) SEE PAGES 19 & 20 OF C-3

64. Tube Repair

a. General.

(1) See paragraph 10 for tube types and characteristics. Repair procedures are the same for all, but repairs to synthetic rubber tubes require special care.

(2) Tube injuries, especially in synthetic rubber tubes, have a serious tendency to enlarge, even after they have been repaired. Therefore, all tubes that have injuries longer than three-quarters of an inch (A, fig. 55), must be sent to higher echelon, where adequate repair equipment is available.

(3) Punctures or tears in the tube rubber are mended by placing a patch over the injury. Two methods of patch application are described in *c* and *d* below. Hot-patch applications by electric curing are described in TM 9–1868. Repairs to valves and valve replacements are covered in paragraphs 65 and 66.

b. Preparation for Repair.

(1) If the location of the injury to the tube is not obvious, locate the leak by submerging either the entire inflated tube or part of the tube in water (locate leaks in extremely large tubes by running water over the surface and watching closely). Check the valve core, especially for slow leaks. If the leak is thought to be around the valve stem but does not show up under water, work the stem around to break any possible temporary or low-pressure seal. If the leak cannot be located (for lack of adequate equipment), replace it with a good tube and forward the faulty tube to higher echelon. The more common causes for leaks are described in (*a*) through (*c*) below.

(*a*) Punctures or cuts through tube.

(*b*) Valve base not sealing (caused by loose hex nut or split fabric in valve base).

(*c*) Holes chafed through the tube by a tire break or rough bead toe.

(2) A, figure 55, illustrates the appearance of most injuries resulting from cuts and punctures. To prevent enlargement, the precautions in (3) and (4) below must be taken.

(3) Round out ends and any sharp corners with shears to prevent further tearing (B, fig. 55). Trim edges to slightly widen injury, so that new patch rubber will flow into and fill injury.

(4) Use emery cloth, sandpaper, or scraper provided with vulcanizer to thoroughly buff directly across injury (C, fig. 55). Completely roughen, but do not deeply groove the rubber.

c. Hot-Patch Application.

(1) The heat for hot-patch application described herein is generated by burning fuel in a pan that is in close contact with the patch gum or by means of an electric-type vulcanizer. One or more of the items given in (*a*) through (*d*) below are available for tube repairs by these methods.

(*a*) The type II patch-kit (H014–0586798), which contains hot-patch gum, heating element (fuel), fuel pan, and buffer. Enough materials are contained in this kit for eight patches.

(*b*) The type III patch-kit (H014–0586799), which contains hot patch, heating element (fuel), fuel pan, and buffer. The materials in this kit are sufficient for 40 patches.

(*c*) The 2⅜-inch diameter hot patch (H014–0520828) is an assembly of hot-patch gum, stuck on the bottom of a fuel pan, with a heating element (fuel) in place. A small extra piece of hot-patch gum is furnished with each patch (H, fig. 55).

(*d*) Some hot patches of various sizes are of older procurement and are furnished with some vulcanizers. These are also assembled with fuel pan and heating element (fuel), but do not have the extra pieces of hot-patch gum.

Caution: These are not suitable for repairing synthetic rubber tubes.

(2) If synthetic rubber tube, fill injury with hot-patch gum (D, fig. 55).

(3) Select or cut patch of size required to cover tube injury. (If only 2⅜-inch diameter patch is available, use this size.) If one of the patch-kits described in (1) (*a*) and (*b*) above is used, assemble fuel pan and heating element in accordance wtih directions furnished with the kit.

(4) Remove protective covering from patch (only from one side if gum from one of the patch-kits described in (1) (*a*) or (*c*) above is used). Clean buffed area and place patch over injury, carefully centered. Do not touch raw rubber or buffed area with fingers.

(5) Using fuel-type vulcanizer (B, fig. 61), place tube with patch applied on flat plate of vulcanizer. Place fuel pan containing heating element on top of patch (w/o removing protective covering from *outside* of gum unless ready-assembled patch was used). Shift tube so that the prongs of the vulcanizer clamp fit into the notches on the edge of the fuel pan (E, fig. 55). Tighten clamp (w/fingers only). Light the fuel by holding match into fuel pan (F, fig. 55). After all the fuel has burned, allow the pan to cool completely before opening the clamp.

(6) Using electric-type vulcanizer (A, fig. 61), with flat plate on vulcanizer, plug the cord into the electrical outlet and allow vulcanizer to heat up for 10 minutes.

(7) Buff and clean the tube and press the repair patch on inner tube. Place tube on hot, flat plate of vulcanizer, patch downward and centered on plate. Place the large rubber pad on tube, followed by the wooden block, and clamp the assembly firmly with handwheel screw.

(8) Cure according to time and temperature data furnished with repair material.

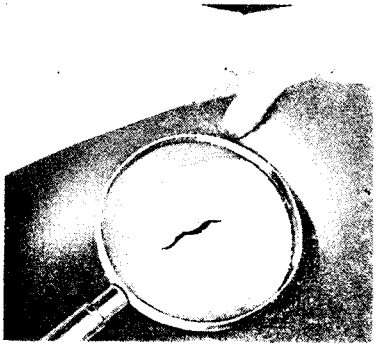
Note. Vulcanizer temperature is approximately 300° F.

(9) If synthetic rubber tube is being repaired, fill injury with hot-patch gum.

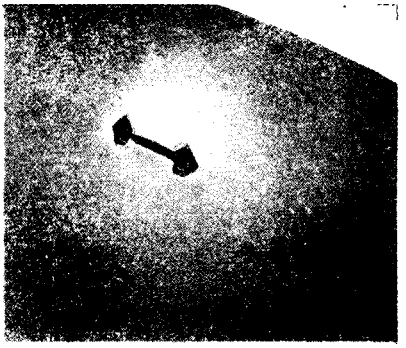
d. Cold-Patch Application.

(1) Round out and buff tube injury as instructed in *b* above. Brush buffed area clean and apply cold-patch cement over buffed area. Work cement in by working back and forth with a knife blade; then scrape off excess wet cement. Do not touch cement-covered area with fingers.

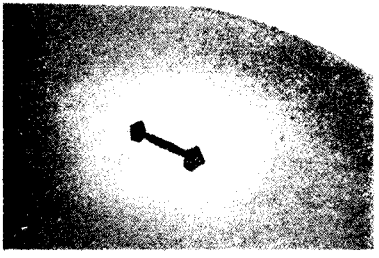
(2) Cut a piece of cold-patch material slightly smaller than the buffed and cemented area. Bevel edges of patch,



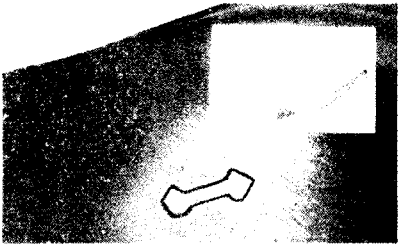
A—REPAIRABLE INJURY



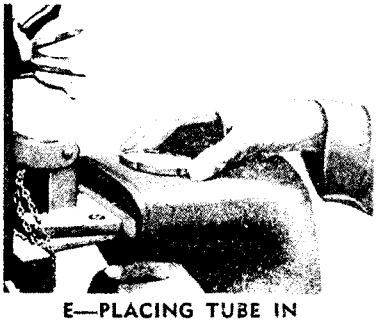
B—INJURY ROUNDED OUT AND TRIMMED



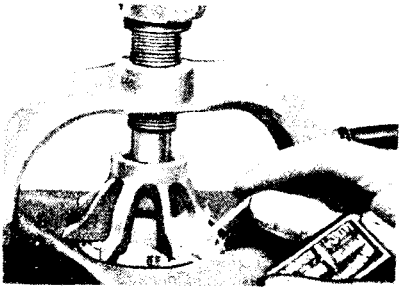
C—INJURY BUFFED CROSSWISE



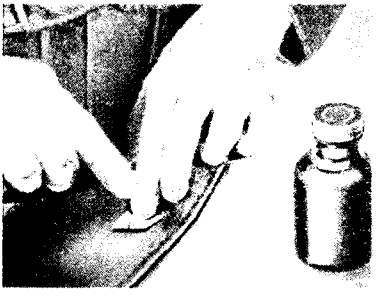
D—FILLED INJURY



E—PLACING TUBE IN VULCANIZER



F—IGNITING VULCANIZER FUEL



G—APPLYING COLD PATCH

H—HOT PATCH PACKET WITH EXTRA GUM

RA PD 220843

Figure 55. Repair of inner tubes.

remove protective cloth covering, and center patch over injury without touching raw face with fingers (G, fig. 55). Roll patch down tightly with edge of repair-kit can or other suitable tool. Be sure all edges are down tight.

(3) Cold-patch repair kits are available under stock No. H014–0501244 and H014–0520830.

Caution: Use cold-patch method only in an emergency for synthetic rubber tubes. If necessary to repair with a cold patch, remove patch as soon as possible thereafter and apply hot patch.

65. Valve Repair

a. Inspection. If air pressure in tire is low or tire is flat for unknown reason, check valve parts first before demounting tire.

(1) Inspect valve cap (A, fig. 56). If washer inside is worn or damaged, replace cap.

(2) Inspect valve mouth for nicks or damage, which would prevent seal by valve cap washer. Using die and reamer on valve repair tool—41–T–3382–20 (C, fig. 56), repair threads and resurface valve mouth (B, fig. 56).

(3) Bubble-test valve core by rubbing film of saliva across mouth of valve. If bubble appears, replace core.

Note. Use brake fluid for test in sub-zero temperature.

(4) Inspect stem. If valve stem is broken, cracked, or crushed, replace or repair valve.

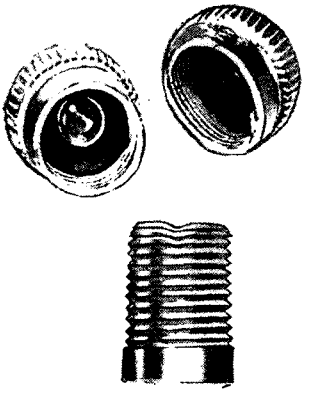
b. Test. When a tube is demounted for any reason, water-test the valve stem before remounting. While under water, twist valve stem from side to side by hand and watch for leaks around valve base. Such a leak at base of spud-mounted or clamp-in valve can sometimes be stopped by tightening nut on stem or spud. If the leak cannot be stopped this way, proceed as directed in *d* and *e* below.

c. Cured-On and Cured-In Types. Repair damaged cured-on and cured-in metal valve stems (par. 11*a* and *b*) by means of a screw-on repair valve as directed in (1) through (7) below.

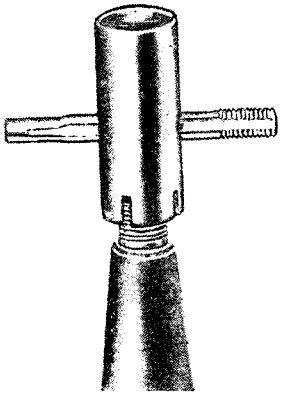
(1) Remove hex nut and bridge washer from old valve stem (D, fig. 56).

(2) Use valve holding tool—41–T–3378–50 (E, fig. 56) to hold base of damaged valve and to determine where to cut it off.

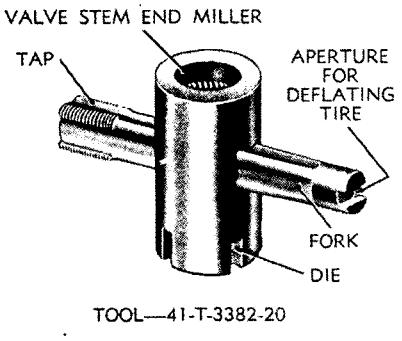
(3) Screw valve holding tool down firmly against tube, but not so tightly that the rubber around it is crushed.



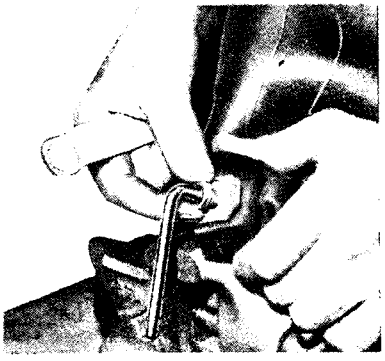
A—DAMAGED CAPS AND VALVE STEM



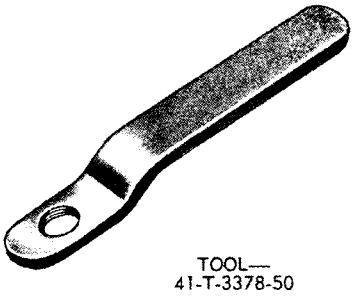
B—CHASING THREADS ON VALVE STEM



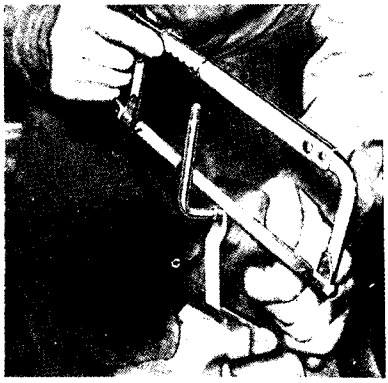
C—VALVE REPAIR TOOL



D—REMOVAL OF NUT AND BRIDGE WASHER



E—VALVE HOLDING TOOL



F—CUTTING OFF VALVE STEM

RA PD 220844

Figure 56. Tire valve repairs.

Clamp tool in vise and saw off damaged stem, using outside of tool as a guide for hacksaw (F, fig. 56).

(4) If top of sawed-off valve stem (A, fig. 57) is uneven, smooth it with a file. Unscrewing the holding tool will chase the threads.

(5) Consult table II (app. I) for correct repair valve. Moisten surface of inner tube around the valve stem and screw repair valve down tightly onto stem (B, fig. 57), stopping with stem pointing at right angle to tube. See paragraph 66 for bending additional angles in stem.

(6) If replacement valve is not available, the damaged stem may be repaired by the following method (C, fig. 57): Cut off damaged portion of the valve stem and thread the end of the remaining portion of the stem. Manufacture sleeve from ½-inch brass rod as shown in figure 57. Select another valve stem from a scrap inner tube and, if found suitable, cut this stem to desired length and thread stem into sleeve.

Note. The assembled valve stem must not be so long that it extends beyond the rim flange of the wheel after the tire and tube are mounted.

(7) If reinforcing pad is damaged, replace inner tube.

d. Spud-Mounted Type. Replace damaged spud-mounted (Eger-type) valve stems (par. 11*c*) as directed in (1) through (4) below.

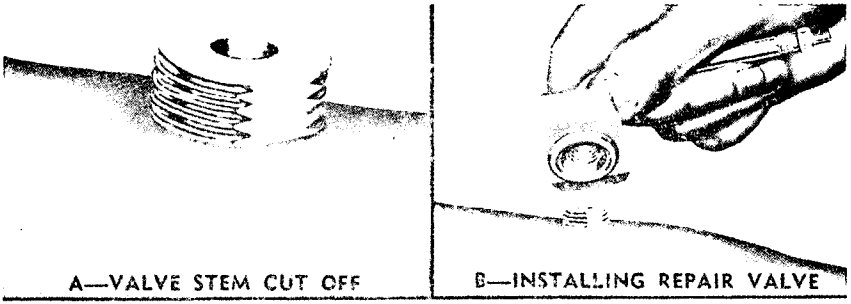
(1) Loosen damaged valve stem with an open-end wrench and unscrew stem by hand.

(2) Consult table II (app. I) for correct size repair valve.

Note. If repair valve having screw threads for Eger-type spuds is not available, use corresponding regular screw-on repair valve with adapter bushing (H014–0500464).

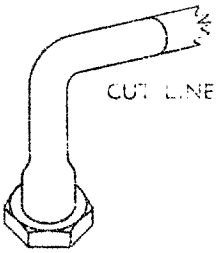
Wet base of stem, or area around spud, with water and screw on new stem. Tighten stem with open-end wrench, stopping with valve pointing at right angles to tube. Make second bend in valve, if required (par. 66).

(3) If valve is damaged so badly that a new stem or sleeve cannot be screwed on, push valve inside the tube and remove it through a small hole cut in side of tube. (Stretch the rubber to enlarge the hole to required size.) Then patch hole and apply a new cured-on replacement valve over valve hole. Procedure is the same as for rubber-covered valves (*e* below), except for bending the valve, for which see paragraph 66.

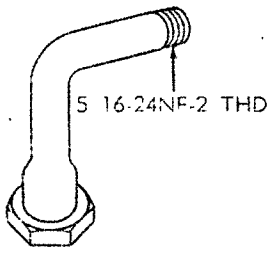


A—VALVE STEM CUT OFF

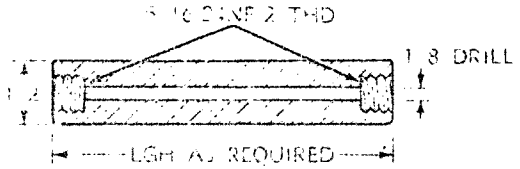
B—INSTALLING REPAIR VALVE



DAMAGED VALVE STEM



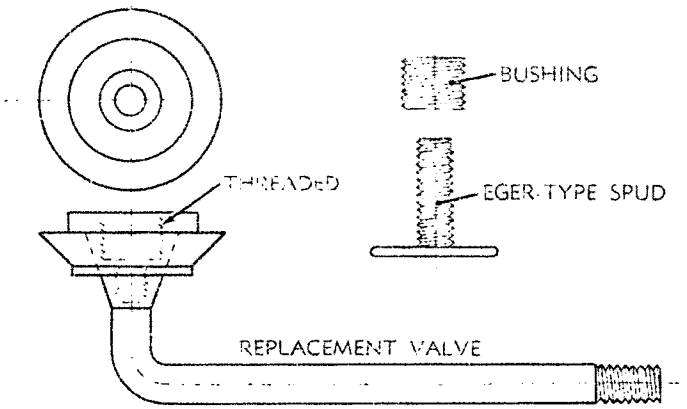
THREADED VALVE STEM



BRASS SLEEVE

NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES

C—SLEEVE METHOD OF REPAIR



D—EGER-TYPE VALVE SPUD INSTALLATION

RA PD 220845

Figure 57. Repairing all-metal stem valve.

(4) If reinforcing pad is damaged, inner tube must be replaced.

e. Clamp-In Type. Replace damaged clamp-in valve (par. 11*d*) as directed in (1) through (3) below.

(1) Remove hex nut and bridge washer; then push valve stem inside the tube.

(2) Cut small round hole in side of tube and remove stem by stretching the rubber to enlarge the hole to required size. Insert new stem through the same hole and push it through hole in valve reinforcing pad. Apply bridge washer and hex nut. Tighten nut. Patch hole in tube.

(3) Procurement of clamp-in replacement valves, except for motorcycles and bicycles, has been discontinued. If not available, use corresponding cured-on replacement valve. Install over old valve hole as instructed in *f* below. Patch hole in tube.

Note. Repair and replacement valves are furnished with cores and caps. Discard valve core and cap from damaged valve.

f. Rubber-Covered Type. Install rubber-covered valves as directed in (1) through (4) below.

(1) Cut off damaged valve stem along surface of tube (A, fig. 58). Wet cutting knife with water to make cutting action easier.

Note. If the tube is torn or damaged at the valve hole, close the hole or repair the damage as for ordinary puncture repair and relocate the valves at a corresponding spot elsewhere on the tube.

(2) Enlarge old valve hole in tube to about ¼-inch diameter, to make it easier to match hole in new stem (B, fig. 58).

(3) Buff off as much of old valve location as possible for an area slightly larger than the base of new stem (C, fig. 58) and as near to the tube stock as will provide an even surface.

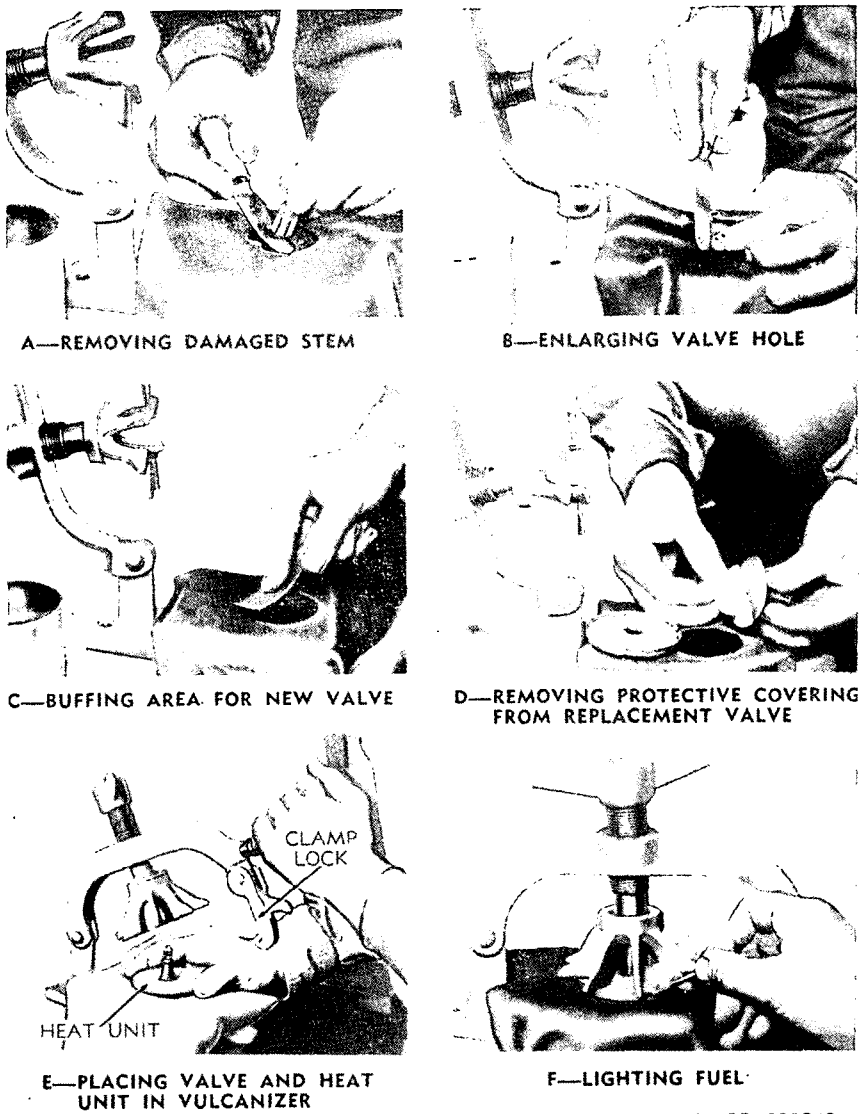
(4) Consult table II (app. I) for correct size replacement valve. A heat unit, consisting of a fuel pan of the correct size, assembled with heating element (fuel), is furnished with each replacement valve of this type. Remove protective cover from adhesive base of stem, being careful not to touch adhesive surface with fingers (D, fig. 58). Press valve base firmly onto tube, making sure to center hole in base over hole in tube.

g. Use of Fuel-Type Vulcanizer (E and F, fig. 58, and B, fig. 61).

(1) With the valve and tube prepared as directed in *f* above, place heat unit over valve stem with *bottom* of fuel

pan against base of *valve* (E, fig. 58). Then slip valve stem into hollow shank of vulcanizer clamp and, at the same time, center spider into notches on edge of fuel pan. Lock clamp and screw clamp stem down tightly with fingers only.

(2) Ignite fuel in fuel pan (F, fig. 58). Fuel will continue to heat pan for several minutes after flame has gone



A—REMOVING DAMAGED STEM

B—ENLARGING VALVE HOLE

C—BUFFING AREA FOR NEW VALVE

D—REMOVING PROTECTIVE COVERING FROM REPLACEMENT VALVE

E—PLACING VALVE AND HEAT UNIT IN VULCANIZER

F—LIGHTING FUEL

RA PD 220848

Figure 58. Rubber valve-stem repairs.

FIG. 58.1 THRU 58.6 (ADDED)

SEE PAGES 15 THRU 18 OF C-3

out, completing vulcanization. Do not remove from clamp until pan is cool.

h. Use of Electric-Type Vulcanizer (A, fig. 61).

(1) With the concave plate in position on vulcanizer, plug the cord into an electrical outlet and allow vulcanizer to heat up for approximately 10 minutes.

(2) With the valve and tube prepared as directed in *f* above, hold the valve to prevent its slipping on the tube and place it on the hot vulcanizer plate, with stem of valve centered through hole in plate. Place the large rubber pad, the small rubber pad, and the wooden block on the tube, in the order given.

Note. Small rubber pad may be omitted when attaching a truck-type, rubber-base, metal valve stem.

(3) Clamp this assembly down firmly with the handwheel screw.

(4) Allow 8 to 10 minutes for curing passenger-tire-type valves to inner tubes and 12 to 14 minutes for curing truck-type tire valves to inner tubes.

i. Large-Bore Valves. When large-bore valves are damaged, replace tube.

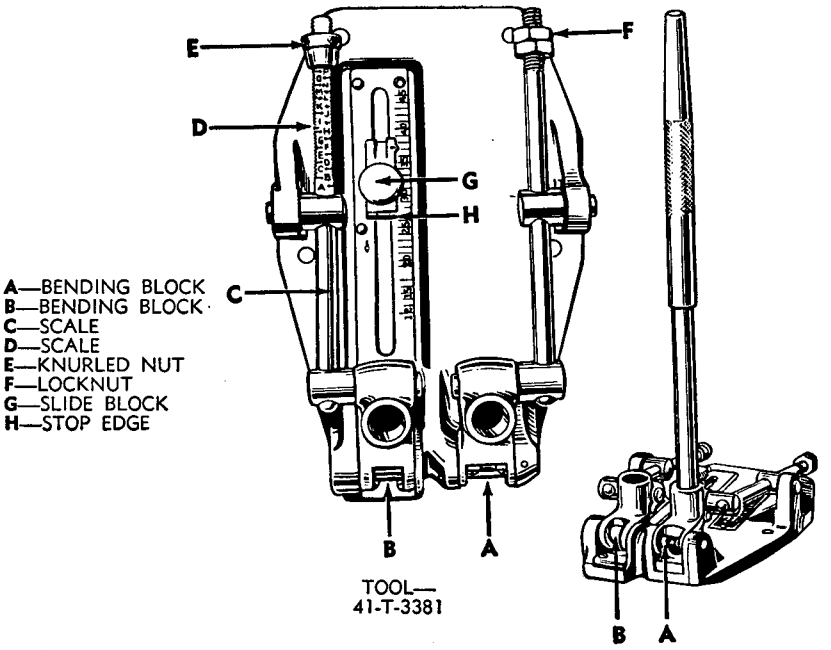
66. Bending Valve Stems

a. Many valves are furnished with the proper bend but others, both on new tubes and those used for replacement, require bending for protection and to make them accessible. Except for hand-bendable rubber-covered valves, all bending must be done by means of the valve-converting tool—41–T–3381 (A, fig. 59). Valves with threads running the full length of the stem cannot be bent.

b. The valve-converting tool is operated as directed in (1) and (2) below.

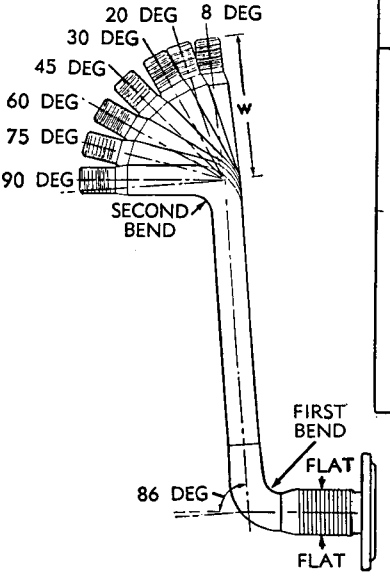
(1) The first bend is produced by inserting the stem as far as possible in bending block (A, fig. 59), with flat side of stem resting on flat of block to prevent valve from turning (A, fig. 60). Pull handle down full distance allowed by lock nut (F, fig. 59, and B, fig. 60), which is permanently set at the factory and should not be moved. The nut controls the distance the handle must be moved to make the required 86-degree first bend. This operation produces a vertical length of 1 inch, to be used with tires not using beadlock.

Note. To produce a vertical length of 1½ inches, required when beadlocks are used, insert stem as far as possible in bending block; then withdraw it one-half inch before pulling handle.



A—TIRE-VALVE-BENDING TOOL

ANGLE OF SECOND BEND	TOOL SETTING LETTER
8 DEG	A
15 DEG	B
20 DEG	C
25 DEG	D
30 DEG	E
35 DEG	F
40 DEG	G
45 DEG	H
50 DEG	I
55 DEG	J
60 DEG	K
65 DEG	L
70 DEG	M
75 DEG	N
80 DEG	O
85 DEG	P
90 DEG	Q



LENGTH "W"	TOOL SETTING NUMBER
1-1/2 IN	12
1-5/8 IN	13
1-3/4 IN	14
1-7/8 IN	15
2 IN	16
2-1/8 IN	17
2-1/4 IN	18
2-3/8 IN	19
2-1/2 IN	20
2-5/8 IN	21
2-3/4 IN	22
2-7/8 IN	23
3 IN	24
3-1/8 IN	25
3-1/4 IN	26
3-3/8 IN	27
3-1/2 IN	28
3-3/4 IN	30

RA PD 220846

B—VALVE-BENDING CHART

Figure 59. Valve bending tool and chart.

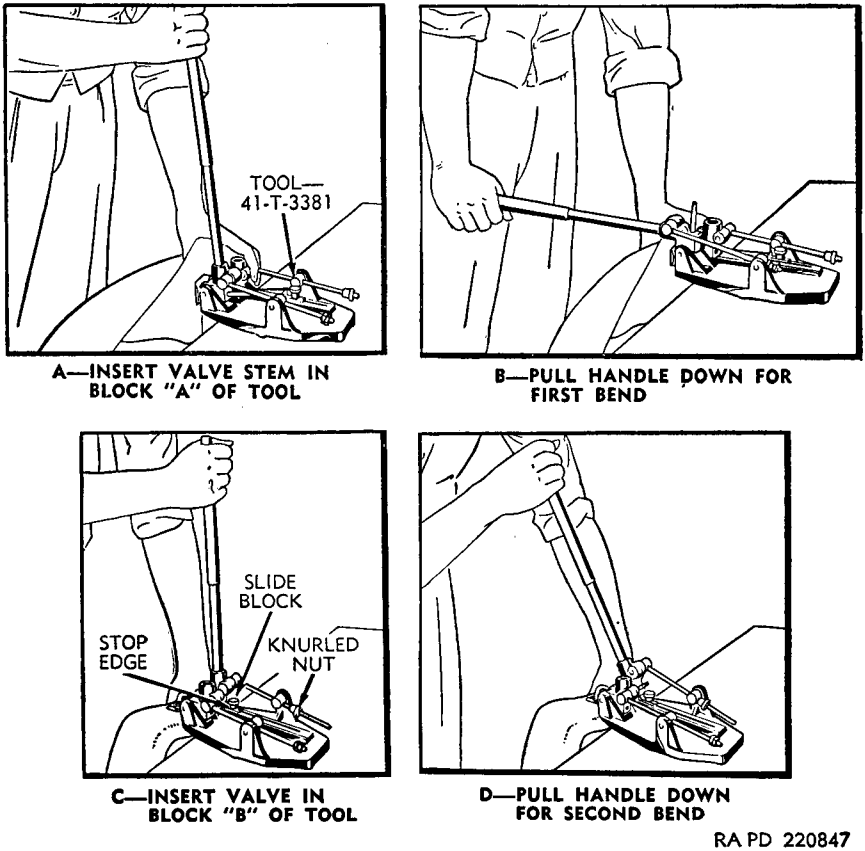
(2) The second bend is produced as directed in (*a*) through (*c*) below.

(*a*) Select the desired angle to be bent in stem and corresponding tool-setting letter by reference to chart in B, figure 59. Set tapered edge of knurled nut (E, fig. 59) to corresponding letter on scale (D, fig. 59).

(*b*) Determine the desired length (W) in chart and refer to chart for corresponding tool-setting number. Set and tighten thumb nut with indicator on slide block (G, fig. 59) pointing to the tool-setting number on scale (C, fig. 59).

(*c*) Insert the valve stem (valve cap removed) in bending block (B, fig. 59), holding the valve against stop edge (H, fig. 59). Pull tool handle down as far as setting permits.

Note. Length (W) must be at least 1½ inches. If shorter, the valve core chamber will be damaged.



A—INSERT VALVE STEM IN BLOCK "A" OF TOOL

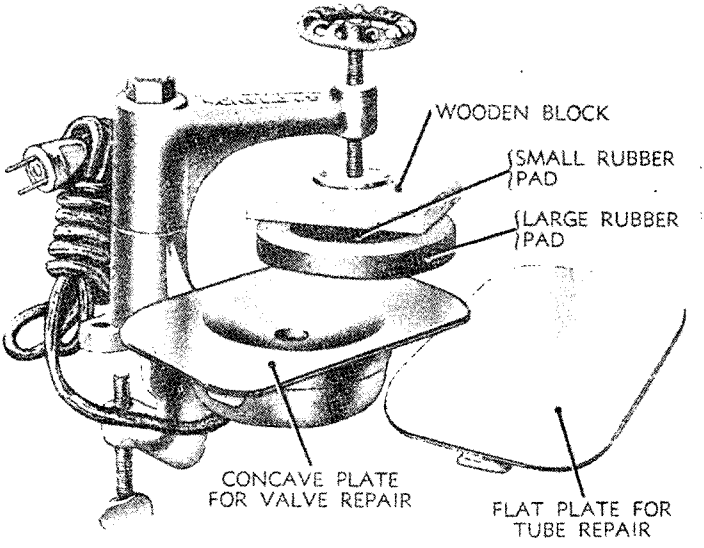
B—PULL HANDLE DOWN FOR FIRST BEND

C—INSERT VALVE IN BLOCK "B" OF TOOL

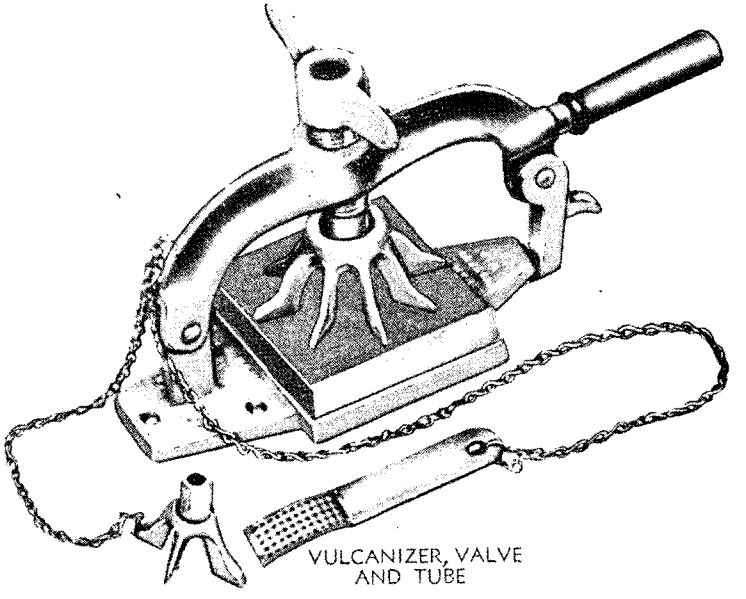
D—PULL HANDLE DOWN FOR SECOND BEND

RA PD 220847

Figure 60. Valve bending procedure.



A—ELECTRIC-TYPE VULCANIZER—41-V-595



B—FUEL-TYPE VULCANIZER—41-V-615

RA PD 220860

Figure 61. Vulcanizers.

67. Vulcanizers

a. Types. Both electric (110 v) and fuel-burning types of vulcanizers are available for minor inner tube repairs. See table I (par. 22) and figure 61.

b. Use. See paragraphs 64 and 65 and figures 55 and 58 for use.

Section IX. CHAINS AND OTHER TRACTION DEVICES USED WITH TIRES

68. Types of Chains and Traction Devices

a. Single-Wheel Tire Chains. Single-wheel tire chains (A, fig. 62) consist of two parallel side-chains, to which uniformly spaced cross-chains are attached with hooks. Fasteners are attached to one end of each side-chain. This type is used on single front wheels, single rear wheels, or on the outer tires of dual wheels.

b. Dual-Wheel Tire Chains. Dual-wheel tire chains (B, fig. 63) consist of three parallel side-chains, to which uniformly spaced cross-chains are attached with hooks. One set of cross-chains connects the outside and center side-chains and another set connects the center and inside side-chains. Fasteners are attached to one end of each outside and center side-chain. These chains are for use only on dual-tired wheels.

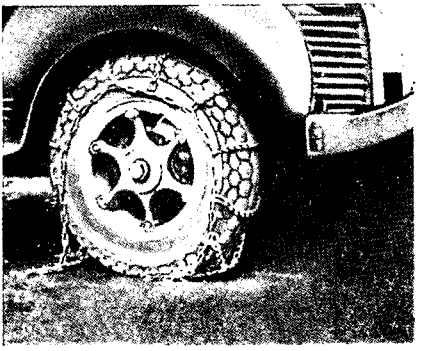
c. Fit of Chains. Chains are designed to creep or move on the tires, and should be tightened by hand, never with tools. Creeping or moving of chains reduces the possibility of the links gouging into tires. When using chains continuously, check them for fit at each halt. Always apply chains with the open ends of the cross-chain hooks *away* from the tires (outward) and with the fasteners on the trailing ends of the side-chains. Install repair links as soon as one of the cross-chains is broken (par. 73*b*).

69. Basis of Supply

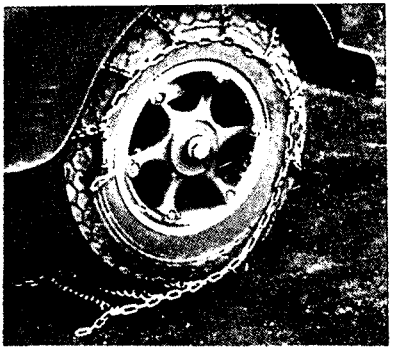
Tire chains and repair items therefor are supplied in accordance with SB 9–99. For selection of proper chains, etc, see table III (app. I).

70. Installation of Single-Wheel Tire Chains

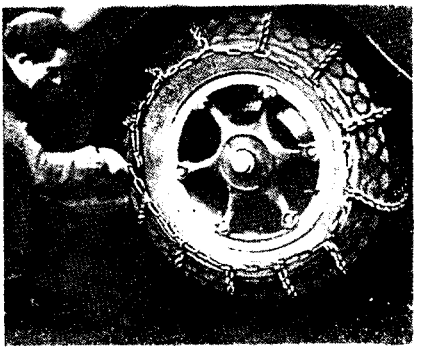
a. Normal Installation. Check condition of chain and eliminate any twist. Drape chain over tire, with open ends of cross-chain hooks *away* from tire and hinge pins of fasteners at front of connectors in direction of wheel rotation (fig. 62). This prevents uncoupling due to irregularities of terrain. Tuck first cross-chain under front of tire and move vehicle forward until fasteners



A—CHAIN PLACED ON TIRE



B—MOVING TIRE ONTO CHAIN



C—SELECTING PROPER LINK TO FASTEN ENDS

D—CHAIN PLACED ON TIRE IN MUD

E—FASTENING CHAIN TO WHEEL

F—SIDE CHAINS FASTENED

RA PD 220849

Figure 62. Installation of single-wheel tire chains.

are as high as the hub cap (B, fig. 62). Straighten and center cross-chains on tire. Lift ends of the side-chains up to the fasteners and determine which links should be hooked into the fasteners (C, fig. 62). Drop the outer side-chain and fasten the inner side-chain first. Then pull outer side-chain up tight and hook the predetermined link into fastener. Any free links remaining must hang away from tire or be fastened with wire.

b. Installation on Mired Vehicles.

(1) When vehicle is mired in mud or stuck in snow, do not spin the wheels. Spinning the wheels will mire the vehicle deeper.

(2) Drape chain over tire, with ends of cross-chain hooks away from tire and first cross-chain near mud or snow line (D, fig. 62). Fasteners should be on trailing end of chain.

(3) Secure one end of each side-chain to wheel by means of strong wire, cord, or chain passed through opening in wheel, fastening it to inner and outer side-chains adjacent to first cross-chain (E, fig. 62). Center cross-chains over tire, pull chain back to remove slack, and aline trailing end with tire.

(4) After positioning chains on both drive tires as instructed in (3) above, revolve wheels slowly to draw chains around tires. When chains have been pulled around under the tires until ends are at tops of tires, hook the side-chain links into the fasteners (F, fig. 62). When vehicle has moved to solid ground, back it a short distance to loosen the temporary wires, cords, or chains used to pull the chains around the wheels and remove them.

71. Installation of Dual-Wheel Tire Chains

a. Normal Installation.

(1) Eliminate any twist in chain. Drape chain over both tires on one wheel, with open ends of cross-chain hooks *away* from tires and hinge pins of fasteners at front of connectors in direction of wheel rotation (A, fig. 63). This prevents uncoupling due to irregularities of terrain. Tuck first cross-chain under front of each tire.

(2) Next, move vehicle forward until fasteners are as high as hub caps. Straighten and center cross-chains on each tire, lift ends of inner and center side-chains up to fasteners, and determine which links should be hooked into fasteners (C, fig. 63).

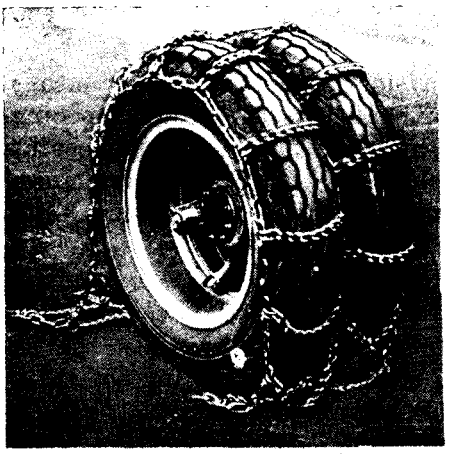
(3) Drop inner and outer side-chains and fasten center side-chain. Pull inner side-chain up and hook predetermined link into fastener (A, fig. 63). Repeat procedure for outer chain.

(4) Repeat (1) through (3) above for the second or additional wheels.

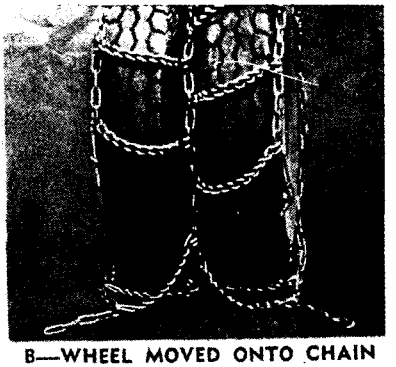
b. Installation on Mired Vehicle.

(1) Avoid the spinning of wheels. Put on chains before vehicle has dug itself deeply into mud or snow.

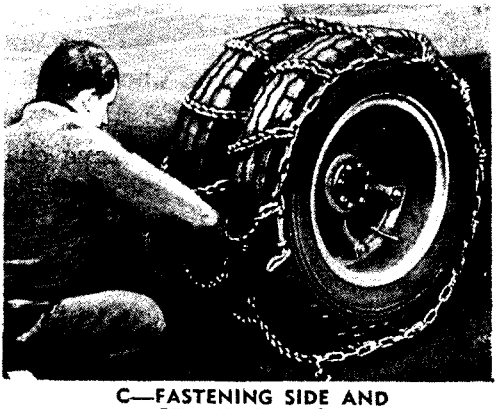
(2) Drape chains over both tires with ends of cross-chain hooks *away* from tires and the first cross-chain near the



A—CHAIN DRAPED OVER DUAL TIRES



B—WHEEL MOVED ONTO CHAIN



C—FASTENING SIDE AND CENTER CHAINS

RA PD 220850

Figure 63. Installation of dual-wheel tire chains—hard ground.

mud or snow line (A, fig. 64). Fasteners must be on trailing end of chain.

(3) Fold inner half of chain over top of outer half of chain on top of outer tire (B, fig. 64). Fasten both halves of chain to outer wheel by placing strong wire, cord, or chain through opening in wheel (C, fig. 64), fastening it to center side-chain and doubled side-chains, adjacent to first cross-chain. Pull chain back to take up slack and aline with tire.

(4) In positioning chains on front-rear (intermediate) tires on 6x6 vehicle, do not trail them out behind, because they might be caught under rear tires. To avoid this danger, after chain is attached to wheel, grasp middle of side-chains, raise them straight up, then drop them straight down so they will pile up close behind wheel. As an alternate method for installing chains on front-rear (intermediate) wheels, fasten first cross-chain to wheel, as previously instructed, then lay chain out on the ground in front of the rear wheel.

Note. If alternate procedure is used, it will be necessary to guide chains under wheels as they turn.

(5) After positioning chains on both rear wheels, or on all four rear wheels if vehicle is a 6x6, rotate wheels slowly to draw chains around tires (D, fig. 64).

(6) Pull side-chains up tight to fasteners and select links to be hooked into fasteners. Hook center side-chain link first; then hook both inner and outer side-chain links to their respective fasteners (E, fig. 64).

Note. Chain remains doubled on outer tire until hard ground is reached.

(7) When vehicle has moved to solid ground, back it a little to loosen wire, cord, or chain (used to fasten first cross-chain) and remove this temporary fastening. Also unfasten inner half of chain, install it over inner dual tire, and fasten it in proper position.

72. Removal and Care of Tire Chains

a. Single-Wheel Tire Chains. To remove single-wheel tire chains, unfasten the inner side-chain first and let complete chain drop to ground at outside of tire. Roll vehicle off chain and refasten the ends of inner side-chain to avoid tangling.

b. Dual-Wheel Tire Chains. To remove dual-wheel tire chains, unfasten the inner side-chain first, then the center side-chain, and let complete chain drop to ground at outside of tire.

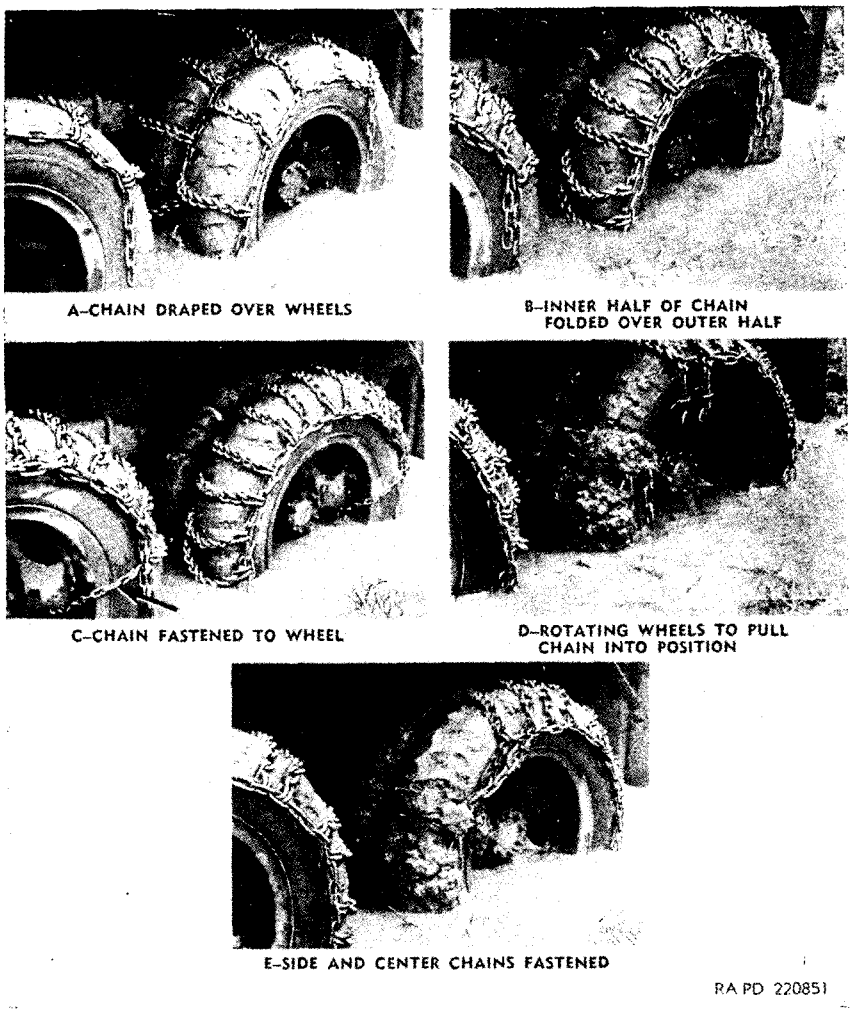


Figure 64. Installation of dual-wheel tire chains—in mud.

c. Care. After removal, clean chains and, at the earliest opportunity, dip them in used engine oil to prevent rusting.

73. Chain Repair

a. When only the cross-chains are broken or excessively worn, repair the tire chain by replacing one or more cross-chains (B, fig. 65). Use the tire-chain repair tool—41–T–3370 shown in C, figure 65. Select proper size of cross-chain by referring to table III (app. I).

b. The cross-chain repair links (A, fig. 65) listed in table III (app. I) may be used for emergency repairs. Link repair links

into ends of broken cross-chains, with open side outward. It is not necessary to close the repair links. At first opportunity, cross-chains repaired with such links must be replaced as described in *a* above.

c. Large, medium, and small repair links are available for repair of side-chains (see ORD 5 SNL H–14).

74. Traction Device (Tyr-Tracs)
(fig. 66)

a. This traction device consists of individual steel track shoes, which, when joined, form a track for dual-wheel tires and provide additional traction and flotation in mud, snow, or sand.

b. Each shoe (A) consists of a cleat on the ground side, a guide on inside to fit between dual tires, a chain with hook on one end and yoke on other with which to attach adjacent shoes, and an adjusting screw to lengthen or shorten chain.

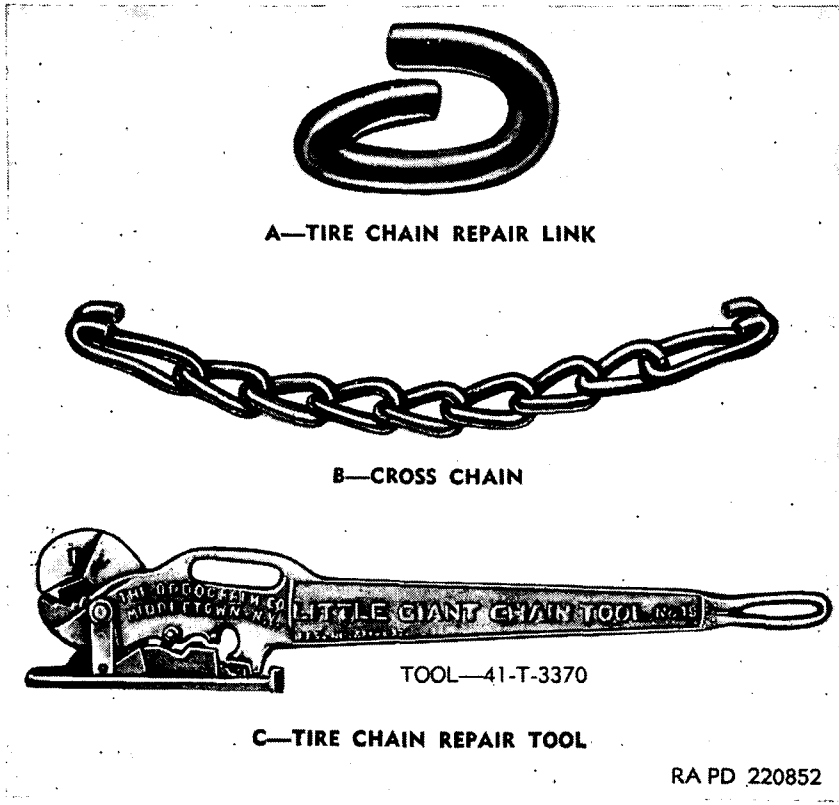
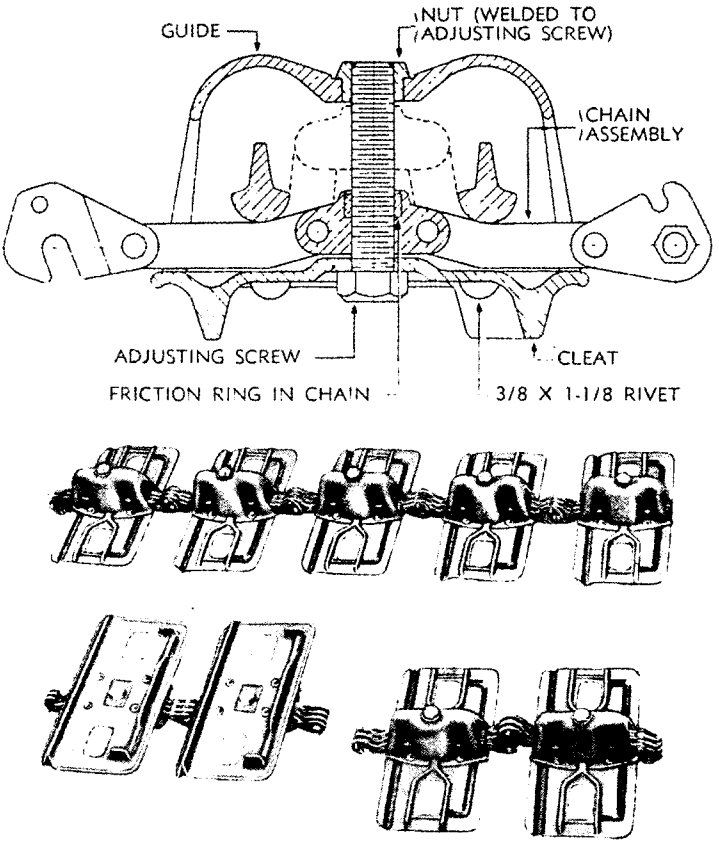
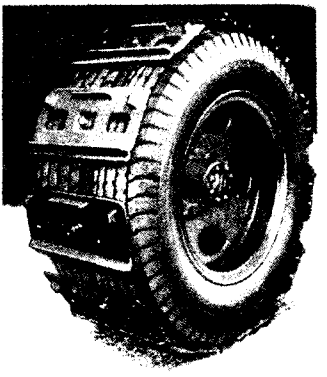


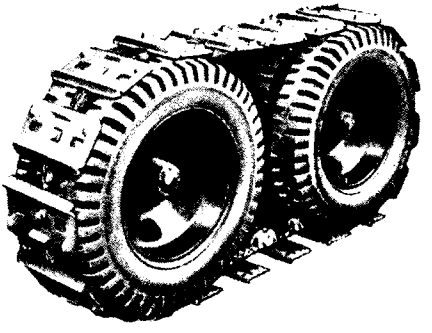
Figure 65. Chain repair tool and repair link.



A–DETAILS OF TRACTION DEVICE



B–DUAL-WHEEL INSTALLATION



C–TANDEM-DUAL-WHEEL INSTALLATION

RA PD 220853

Figure 66. Traction device (TYR-TRACS).

c. Two sizes of shoes are available. The 7½ x 15 shoes are packed to form a pair of 11-shoe tracks (22 shoes) (H014–0520766) and will fit all dual-wheel tires (B) up to and including 8.25–20. One or two shoes may be left out to fit smaller tires. The 7½ x 18 shoes are packed to form a pair of 12-shoe tracks (H014–0520767) and will fit all dual tires 9.00–15 through 12.00–20. One or two shoes may be removed to fit smaller tires. For tandem-axle dual wheels (C), two pairs of tracks are required.

75. Installation of Traction Device

a. Preliminary Operations. When received, shoes will not be joined. Older model shoes are painted green, newer models tan. Remove green paint from hooks and yokes with file or paint remover (it is not necessary to remove tan paint). If necessary, lightly peen ends of pin to prevent forcing off washers.

b. Joining Track Shoes. Assemble shoes to form required length of track by slipping hooked end of shoe-chain into yoke end of adjoining shoe-chain (A, fig. 67). Make sure hook is all the way down on the connection bolt; then tighten bolt (B, fig. 67).

c. Installation on Tandem-Axle Wheel.

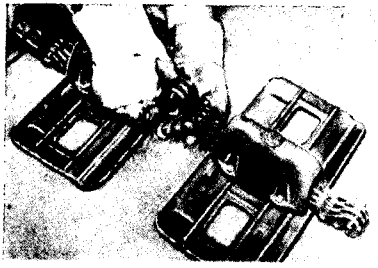
(1) Lay track out straight behind rear wheel (C, fig. 67), with short cleats toward the tires and guides alined to fit between dual tires. Back vehicle slowly onto tracks and stop when the front-rear (intermediate) tires are clear of the first two shoes (D, fig. 67).

(2) While holding front end of track against tires (A, fig. 68), have vehicle slowly backed farther onto track. As vehicle moves back, carry end-shoes over onto rear tires (B, fig. 64). Stop vehicle just before reaching last two shoes.

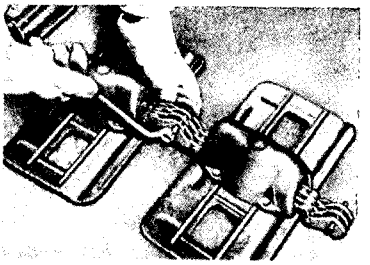
(3) Hook first and last shoes together (C, fig. 68). Be sure hook-end fits down tight over the connection bolt and the yoke-end up around pin. Then tighten connection bolt.

(4) Take up slack in track by tightening the adjusting screw in center of each shoe (D, fig. 68). Tighten all adjusting screws uniformly to hold equal spacing of shoes. If tracks cannot be tightened sufficiently without taking up full length of adjusting screws, shorten track by removing one or more shoes.

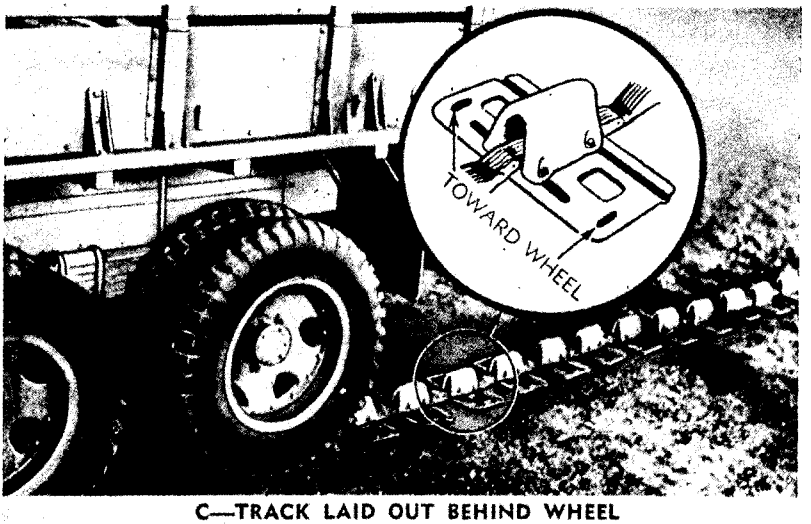
(5) A properly installed track must not be so tight as to cause a drag on the engine or prevent a slight creeping of tires in track, yet it must not be so loose that



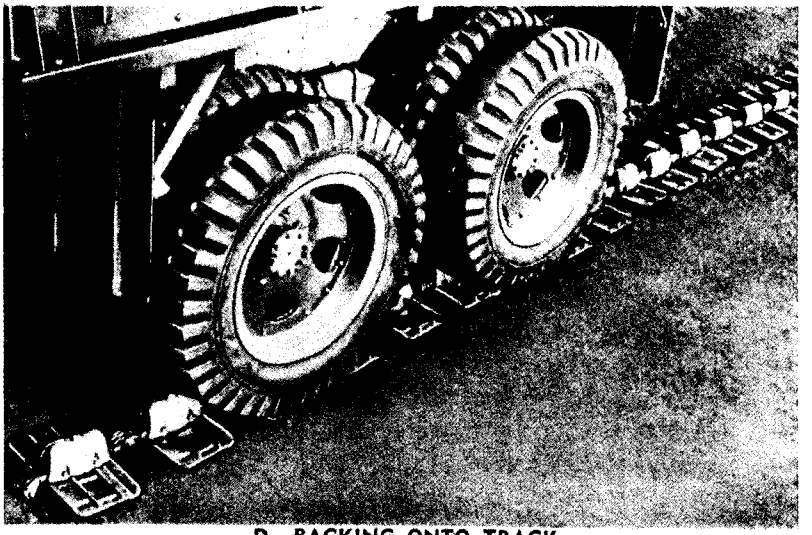
A—PREPARING AND JOINING SHOES



B—TIGHTENING CONNECTING BOLTS



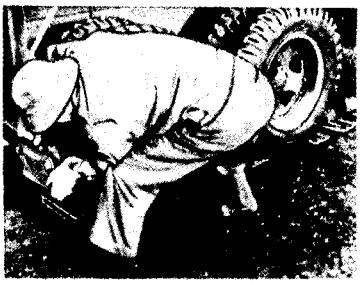
C—TRACK LAID OUT BEHIND WHEEL



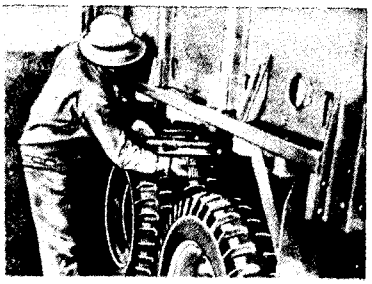
D—BACKING ONTO TRACK

RA PD 220854

Figure 67. Installation of traction device.

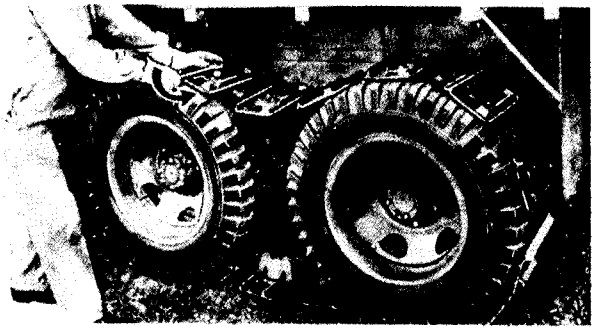


A—RAISING SHOES AGAINST TIRES

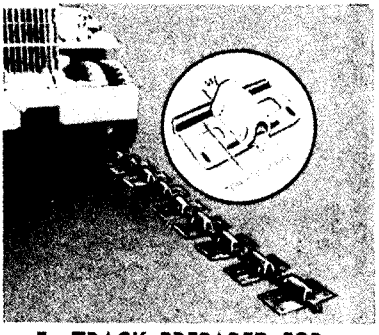


B—BRIDGING TRACK OVER WHEELS

C—CONNECTING TRACK



D—TIGHTENING TRACK



E—TRACK PREPARED FOR FRONT WHEEL INSTALLATION

F—TRACTION DEVICE INSTALLED ON FRONT WHEELS

RA PD 220855

Figure 68. Installation of traction device.

the track may be thrown off or to permit tires to spin in track.

d. Installation on Single-Rear-Axle Dual Tires. Procedure for installing track on single-rear-axle dual tires is same as for tandem-axle duals (*c* above), except that only half as many shoes are required (B, fig. 66).

e. Installation on Front Tires.

(1) To make travel over difficult terrain easier, tracks can be installed on front wheels after they have been dualled. To dual front wheels, jack up axle, remove wheel-stud nuts, and mount spare wheels on same studs. Then install nuts and tighten.

(2) To install track on front duals, lay track out straight ahead of front tires with long cleat toward tires and, while moving vehicle forward onto track (E, fig. 68), raise end of track up behind and onto tires. Hook ends together and tighten connection bolt. Tighten adjusting screw in each shoe evenly to make track fit snugly, yet slip slightly, as wheel revolves.

76. Operating Precautions

a. When device is installed only on rear tires of a vehicle that has front-drive axle, disengage front drive to prevent excessive wear and scuffing of front tires.

b. Do not use device on front tires only.

c. Be particularly careful to keep tires inflated to correct pressure when tracks are used.

d. After operating new device for the first few miles, stop vehicle and retighten the tracks.

77. Removal of Traction Device

a. To remove track from rear tires, loosen one of the connection bolts at a point about halfway up on the rear of the tires. Next, loosen the adjusting screws in several of the adjoining shoes and disconnect the loosened hook and yoke. Move vehicle forward off track.

b. Move track from front tires as instructed in *a* above, except that track must be disconnected on front of tires and vehicle backed off track.

Caution: In moving vehicle off tracks, be sure tires do not run up over track guides or turn up edges of shoes.

c. After removal, clean and dry tracks; then lightly coat adjusting screws and chains with used engine oil.

Section X. CARE AND MAINTENANCE OF TIRES UNDER UNUSUAL CONDITIONS

78. Cold Weather Care and Maintenance of Tires

a. Do not allow tires to freeze in water, snow, or mud. The best means of avoiding tires or tracks from freezing to the ground is to run the vehicle up on planks, logs, flat stones, brush, or on any available material that will raise the vehicle off the ground.

Caution: If vehicles are allowed to rest directly on ice, snow, or frozen mud for long periods of time, initial thawing may occur and later the tires will freeze in.

b. Synthetic tubes become somewhat brittle when temperatures drop below 0° F, and are, therefore, more likely to fail than ordinarily. To minimize this effect of low temperatures, lubricate inside of tire, rim, beadlock, and tube with vegetable oil soap instead of talcum (par. 43*f*) and increase tire pressures by 10 percent (this reduces rubbing the tube against the tire).

c. See TM 9–2855 for care and maintenance in extreme cold.

79. Extreme-Hot-Weather Care and Maintenance

a. Use only heat-resisting tire-valve cores (H014–0520822).

b. Do not apply cold patches to tubes, as they will not stay in place in extreme hot-weather operation.

APPENDIX I
TABLES

Table I. Bead Clips

Tire		Bead clip	
Size	Ply rating	The tire and rim association code	Ordnance stock No.
9.00–16	8	B3C	H014–0520800
9.00–20	8	B13C	H014–0520801
10.00–20	12	B12C	H014–0520802
11.00–20	12	B12C	H014–0520802
12.00–20	14	B12C	H014–0520802
14.00–20	12	B11C	H014–0520803
14.00–24	20	B7C	H014–0520804

Table II. Replacement and Repair Valves

Tube Size	Rim type	Ordnance Stock No.		
		Screw-on repair valve, Eger-type (dble bent) [1]	Screw-on repair valve, Schrader-type (sgle bent) [2]	Cure-on replacement valve (stght) [3]
4.00–18	Drop-center			H014–0520863 (Clamp-in)
4.50–18	Drop-center			H014–0520863 (Clamp-in)
5.90–15	Drop-center			H014–0520851
6.00–16	Drop-center or divided (w/or w/o beadlock).			H014–0520851
6.40–15	Drop-center			H014–0520851
6.50–16	Drop-center			H014–0520851
6.50–16	Semidrop-center			H014–0520862
6.50–20	Flat-base		H014–0520870	H014–0520857
6.70–15	Drop-center			H014–0520851
7.00–15	Drop-center			H014–0520851
7.00–15	Semidrop-center			H014–0520862
7.00–16	Drop-center or divided (w/or w/o beadlock).			H014–0520851
7.00–16	Semidrop-center			H014–0520862
7.00–20	Flat-base		H014–0520870	H014–0520857
7.10–15	Drop-center			H014–0520851
7.50–15	Drop-center			H014–0520851

Footnotes appear at end of table.

Table II. Replacement and Repair Valves—Continued

Tube Size	Rim type	Ordnance Stock No.		
		Screw-on repair valve, Eger-type (dble bent) [1]	Screw-on repair valve, Schrader-type (sgle bent) [2]	Cure-on replacement valve (stght) [3]
7.50–15	Semidrop-center			H014–0520862
7.50–16	Drop-center			H014–0520851
7.50–16	Semidrop-center			H014–0520862
7.50–17	Flat-base		H014–0520870	H014–0520857
7.50–18	Flat-base	H014–0520874	H014–0520865	H014–0520854
7.50–20	Flat-base	H014–0520874	H014–0520865	H014–0520854
7.60–15	Drop-center			H014–0520851
8.25–20	Flat-base or divided w/o beadlock.			H014–0520858
9.00–16	Semidrop-center			H014–0520862
9.00–16	Divided w/bead-lock.		H014–0520871	H014–0520854
9.00–20	Flat-base or military.	H014–0520875	H014–0520867	H014–0520860
10.00–22	Flat-base	H014–0520875	H014–0520867	H014–0520860
10.00–24	Flat-base	H014–0520875	H014–0520867	H014–0520860
11.00–20	Flat-Base military, or divided w/o beadlock.		H014–0520868	H014–0520861
11.00–20	Divided w/bead-lock.		H014–0520897	H014–0520861
11.00–22	Flat-base		H014–0520868	H014–0520861
12.00–20	Flat-base, military, or divided w/o beadlock.		H014–0520868	H014–0520861
12.00–20	Divided w/bead-lock.		H014–0520897	H014–0520861
12.00–24	Flat-base		H014–0520868	H014–0520861
14.00–20	Flat-base, military, or divided w/o beadlock.	H014–0520876	H014–0520869	H014–0520855
14.00–20	Divided w/bead-lock.		H014–0520872	H014–0520855
14.00–24	Flat-base, military, or divided w/o beadlock.	H014–0520876	H014–0520869	H014–0520855
14.00–24	Divided w/bead-lock.		H014–0520872	H014–0520855
16.00–25	5-degree tapered		H014–0520868	H014–0520861

[1] These repair valves for spud-mounted valves are no longer procured. They are available only until stocks are exhausted.

[2] May be used on Eger-type spud with adapter bushing (H014–0500464).

[3] The ordnance stock numbers of clamp-in replacement valves, where used, are also given in this column (w/appropriate notation).

Table III. Tire Chains, Cross Repair Chains, and Repair Links

Tire size	Type of chain	Ordnance stock No. of a pair of tire chains	No. of cross chains*	Ordnance stock No. of cross-chain	Ordnance stock No. of cross-chain repair link
3.50–18	Motorcycle	H014–0540036	13	H014–0540059	H014–0583246
4.00–18	Motorcycle	H014–0540037	13	H014–0540060	H014–0583246
4.50–18	Motorcycle	H014–0540038	13	H014–0540060	H014–0583246
5.00–16	Motorcycle	H014–0540038	13	H014–0540060	H014–0583246
5.50–16	Passenger car	H014–0540039	13	H014–0540061	H014–0583246
5.90–15	Passenger car	H014–0540039	13	H014–0540061	H014–0583246
6.00–16	Truck, single	H014–0540013	12	H014–0540052	H014–0583247
6.00–16	Passenger car	H014–0540040	13	H014–0540062	H014–0583246
6.25–16	Passenger car	H014–0540042	14	H014–0540062	H014–0583246
6.40–15	Passenger car	H014–0540039	13	H014–0540061	H014–0583246
6.50–15	Passenger car	H014–0540040	13	H014–0540062	H014–0583246
6.50–16	Passenger car	H014–0540042	14	H014–0540062	H014–0583246
6.50–16	Truck, single	H014–0540014	13	H014–0540052	H014–0583247
6.50–20	Truck, dual	H014–0540001	32	H014–0540052	H014–0583247
6.70–15	Passenger car	H014–0540040	13	H014–0540062	H014–0583246
7.00–15	Passenger car	H014–0540043	13	H014–0540063	H014–0583246
7.00–16	Passenger car	H014–0540044	13	H014–0540063	H014–0583246
7.00–16	Truck, single	H014–0520810	12	H014–0540052	H014–0583247
7.00–20	Truck, single	H014–0540015	11	H014–0540053	H014–0583248
7.00–20	Truck, dual	H014–0540002	22	H014–0540053	H014–0583248
7.10–15	Passenger car	H014–0540042	14	H014–0540062	H014–0583246
7.50–15	Passenger car	H014–0540044	13	H014–0540063	H014–0583246
7.50–15	Truck, single	H014–0520810	12	H014–0540052	H014–0583247
7.50–16	Passenger car	H014–0540045	14	H014–0540063	H014–0583246
7.50–16	Truck, single	H014–0540016	10	H014–0540053	H014–0583248
7.50–16	Truck, dual	H014–0540003	20	H014–0540053	H014–0583248
7.50–17	Truck, single	H014–0540017	11	H014–0540053	H014–0583248
7.50–20	Truck, single	H014–0540018	12	H014–0540053	H014–0583248
7.50–20	Truck, dual	H014–0540004	22	H014–0540053	H014–0583248
7.60–15	Passenger car	H014–0540042	14	H014–0540062	H014–0583246
8.25–16	Truck, single	H014–0540020	11	H014–0540054	H014–0583248
8.25–20	Truck, single	H014–0540021	12	H014–0540054	H014–0583248
8.25–20	Truck, dual	H014–0540005	24	H014–0540054	H014–0583248
9.00–16	Truck, single	H014–0540022	11	H014–0540055	H014–0583248
9.00–20	Truck, single	H014–0540023	13	H014–0540055	H014–0583248
9.00–20	Truck, dual	H014–0540006	24	H014–0540055	H014–0583248
10.00–20	Truck, single	H014–0540024	14	H014–0540055	H014–0583248
10.00–20	Truck, dual	H014–0540007	26	H014–0540055	H014–0583248
10.00–22	Truck, single	H014–0540025	14	H014–0540055	H014–0583248
10.00–22	Truck, dual	H014–0540008	28	H014–0540055	H014–0583248
10.00–24	Truck, single	H014–0540026	15	H014–0540055	H014–0583248
10.00–24	Truck, dual	H014–0540009	30	H014–0540055	H014–0583248
11.00–18	Truck, single	H014–0540067	11	H014–0540056	H014–0583248
11.00–20	Truck, single	H014–0540027	12	H014–0540056	H014–0583248
11.00–24	Truck, single	H014–0583050	14	H014–0540056	H014–0583248
11.00–24	Truck, dual	H014–0540010	28	H014–0540056	H014–0583248
12.00–20	Truck, single	H014–0540028	13	H014–0540057	H014–0583248

Footnote appears at end of table.

Table III. Tire Chains, Cross Repair Chains, and Repair Links—Continued

Tire size	Type of chain	Ordnance stock No. of a pair of tire chains	No. of cross chains*	Ordnance stock No. of cross-chain	Ordnance stock No. of cross-chain repair link
12.00–20	Truck, dual	H014–0540066	26	H014–0540057	H014–0583248
12.00–24	Truck, single	H014–0540029	15	H014–0540057	H014–0583248
12.00–24	Truck, dual	H014–0540011	28	H014–0540057	H014–0583248
14.00–20	Truck, single	H014–0540030	14	H014–0540058	H014–0583248
14.00–20	Truck, dual	H014–0583059	30	H014–0540058	H014–0583248
14.00–24	Truck, single	H014–0540031	16	H014–0540058	H014–0583248
14.00–24	Truck, dual	H014–0540012	32	H014–0540058	H014–0583248
16.00–20	Truck, single	H014–0583051	13	H014–0583056	H014–0583249
16.00–24	Truck, single	H014–0583052	15	H014–0583056	H014–0583249
16.00–24	Truck, dual	H014–0583060	30	H014–0583056	H014–0583249
16.00–25	Truck, single	H014–0583052	15	H014–0583056	H014–0583249
16.00–25	Truck, dual	H014–0583060	30	H014–0583056	H014–0583249
18.00–24	Truck, single	H014–0583053	14	H014–0583057	H014–0583249
18.00–25	Truck, single	H014–0583053	14	H014–0583057	H014–0583249
18.00–28	Truck, single	H014–0583054	16	H014–0583057	H014–0583249
18.00–29	Truck, single	H014–0583054	16	H014–0583057	H014–0583249
21.00–29	Truck, single	H014–0583055	16	H014–0583058	Not issued

* This column gives the number of cross-chains for recently purchased individual tire chains (half pr). Tire chains of earlier procurement may have more or fewer cross-chains.

Table IV. Guide to Tire Inflation Pressures [1]

Tire size	Tire type	Ply rating	Load per tire [2] (lb)	Inflation pressure (psi)
4.00–8	Industrial (max speed 10 mph)	4	810 [3]	65
4.00–12	Industrial (max speed 10 mph)	4	1070 [3]	65
4.00–18	Motorcycle	4	335	12
			420	18
			500	24
			570 [3]	30
4.50–18	Motorcycle	4	410	12
			520	18
			615	24
			700 [3]	30
5.90–15	Passenger car	4	630	18
			670	20
			710	22
			745 [3]	24

Footnotes appear at end of table.

Table IV. Guide to Tire Inflation Pressures[1]—Continued

Tire size	Tire type	Ply rating	Load per tire[2] (lb)	Inflation pressure (psi)
6.00–9	Industrial (max speed 10 mph)	6	1070	35
			1395	55
			1600[3]	65
6.00–16	Passenger car	4	750	20
			835	24
			915[3]	28
6.00–16	Light truck or tactical	6	600	15
			710	20
			810	25
			900	30
			985	35
			1060	40
			1140[3]	45
6.40–15	Passenger car	4	700	18
			745	20
			790	22
			830[3]	24
6.50–16	Truck and bus	6	980	30
			1090	35
			1190	40
			1290[3]	45
6.50–20	Truck and bus	6	1260	30
			1380	35
			1500	40
			1600	45
			1700[3]	50
		8	1950[3]	65
6.70–15	Passenger car	4	780	20
			830	22
			880	24
			920[3]	26
7.00–15	Passenger car	4	940	20
			995	22
			1045	24
			1095[3]	26
	Light truck	6	1190	35
			1290	40
			1380[3]	45

Footnotes appear at end of table.

Table IV. Guide to Tire Inflation Pressures [1]—Continued

Tire size	Tire type	Ply rating	Load per tire [2] (lb)	Inflation pressure (psi)
7.00–15	Light truck	8	1190	35
			1290	40
			1380	45
			1470	50
			1555 [3]	55
7.00–16	Light truck or tactical	6	760	15
			900	20
			1020 [4]	25
			1140	30
			1240	35
			1340	40
			1440 [3]	45
7.00–20	Truck and bus	8	1650	40
			1775	45
			1900	50
			2000 [3]	55
7.10–15	Passenger car	4	835	20
			890	22
			940	24
			990 [3]	26
7.50–15	Light truck	8	1365	35
			1475	40
			1580	45
			1680	50
			1780 [3]	55
	Low platform trailer	10	3310 [3]	80
		12	3660 [3]	95
7.50–16	Light truck	6	1425	35
			1540	40
			1650 [3]	45
		8	1425	35
			1540	40
			1650	45
			1755	50
			1860 [3]	55
7.50–17	Truck and bus	8	1650	40
			1775	45
			1900	50
			2000	55
			2100 [3]	60

Footnotes appear at end of table.

Table IV. Guide to Tire Inflation Pressures[1]—Continued

Tire size	Tire type	Ply rating	Load per tire[2] (lb)	Inflation pressure (psi)
7.50–18	Truck and bus	8	1750	40
			1875	45
			2000	50
			2100	55
			2200[3]	60
7.50–20	Truck and bus	8	1875	40
			2000	45
			2125	50
			2250	55
			2375[3]	60
7.60–15	Passenger car	4	920	20
			980	22
			1035	24
			1090[3]	26
8.25–15	Low platform trailer	14	4450[3]	100
8.25–20	Truck and bus	10	2175	40
			2325	45
			2475	50
			2600	55
			2750	60
			2900[3]	65
9.00–15	Low platform trailer	12	4510[3]	75
9.00–16	Tactical and light truck	8	1180	15
			1400	20
			1595	25
			1780	30
			1940	35
			2100	40
			2250[3]	45
9.00–20	Truck and bus, and tactical	8	1725	20
			1975[4]	25
			2200	30
			2400	35
			2600	40
			2775[3]	45
		10	1725	20
			1975	25
			2200	30
			2400	35

Footnotes appear at end of table.

Table IV. Guide to Tire Inflation Pressures[1]—Continued

Tire size	Tire type	Ply rating	Load per tire[2] (lb)	Inflation pressure (psi)
9.00–20	Truck and bus, and tactical		2600	40
			2775	45
			2950	50
			3125	55
			3300	60
			3450[3]	65
10.00–15	Low platform trailer	14	5480[3]	85
10.00–20	Truck and bus	12	3275	50
			3475	55
			3650	60
			3825	65
			4000[3]	70
10.00–22	Truck and bus	12	3500	50
			3700	55
			3900	60
			4100	65
			4275[3]	70
10.00–24	Truck and bus	12	3725	50
			3950	55
			4150	60
			4350	65
			4550[3]	70
11.00–20	Truck and bus, and tactical	12	2175	20
			2450	25
			2750	30
			3000[4]	35
			3250	40
			3475	45
			3700	50
			3900	55
			4100	60
			4300	65
			4500[3]	70
11.00–22	Truck and bus	12	3900	50
			4125	55
			4350	60
			4550	65
			4750[3]	70

Footnotes appear at end of table.

Table IV. Guide to Tire Inflation Pressures [1]—Continued

Tire size	Tire type	Ply rating	Load per tire [2] (lb)	Inflation pressure (psi)
12.00–20	Truck and bus, and tactical	14	2450	20
			2775	25
			3075	30
			3375 [4]	35
			3650	40
			3900	45
			4150	50
			4400	55
			4625	60
			4850	65
			5075	70
			5275 [3]	75
12.00–24	Truck and bus	14	5200	60
			5450	65
			5700	70
			5925 [3]	75
14.00–20	Truck and bus, and tactical	12	3400	20
			3875 [4]	25
			4300	30
			4700	35
			5100	40
			5450 [3]	45
14.00–24	Truck and bus, and tactical	20	3800	20
			4300	25
			4800	30
			5250	35
			5700	40
			6100	45
			6475	50
			6850	55
			7200	60
			7550	65
			7900	70
			8225	75
			8525	80
			8850	85
			9150 [3]	90
16.00–25	Tactical	20	5000	20
			5680	25
			6325	30
			6925	35
			7475	40
			8000	45
			8525	50
			9025	55
			9475 [3]	60

Footnotes appear at end of table.

Table IV. Guide to Tire Inflation Pressures[1]—Continued

Tire size	Tire type	Ply rating	Load per tire[2] (lb)	Inflation pressure (psi)
18.00-24	Earthmover	16	10300[5] 9200[6]	25
			11460[5] 10230[6]	30
			12540[5] 11200[6]	35
			13590[3,5] 12130[3,6]	40

[1] Inflation pressures given in this table are those prevailing at approximately the prevailing atmospheric temperatures and do not include inflation build-up due to vehicle operation. Complete information on correct inflation pressures is contained in the pertinent operator's technical manual for each vehicle. Where the inflation pressures in this table differ from the pressures prescribed in the technical manual for the vehicle, disregard this table. Inflation pressures may be reduced by about 50 percent for muddy, rocky, or snow-covered terrain; by about 60 percent for lengthy operation in soft sand; and by about 70 percent for operation over sand dunes or emergency landings onto sandy beaches, however, pressures below 10 psi are not recommended. Tires should be inflated to normal pressures as soon as the tactical situation permits.

[2] If the vehicle is evenly loaded, the load per tire may be calculated by dividing the sum of the vehicle weight and payload (gross wt) by the number of tires on which the vehicle rolls. For instance, in the case of a 6x6 truck, the vehicle weighs 10,745 pounds. When carrying a payload of 5,000 pounds, the gross weight is 15,745 pounds, and the load per tire is 2,624 pounds.

[3] Maximum for ordinary or transport service.

[4] Maximum for tactical service.

[5] At vehicle speeds not exceeding 10 mph.

[6] Up to vehicle speeds of 25 mph.

Table V. Tolerances In Matching Dual Tires

Outside diameter of tires	Permissible difference	
	In diameter	In circumference
Under 30 inches	¼ inch	¾ inch
From 30 to 40 inches	⅜ inch	1⅛ inches
Over 40 inches	½ inch	1½ inches

APPENDIX II
REFERENCES

1. Publication Indexes

Special regulations in the SR 310–20 series; DA Pamphlets in the 310-series; DA Pamphlet 108–1; and FM 21–8 should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to materiel covered in this manual.

2. Supply Manuals

The following manuals of the Department of the Army Supply Manual pertain to this materiel:

Cleaners, Preservatives, Lubricants, Recoil Fluids, Special Oils and Related Maintenance Materials.	ORD 3 SNL K–1
Shop Set, Maintenance (Field), Automotive.	ORD 6 SNL J–8, Section 13
Tires, Tubes, Tire Repair Material, and Related Items.	ORD 5 SNL H–14
Tools and Supplies for Field Maintenance Post, Camp, and Station Ordnance Shops.	ORD 10 SNL N–20
Tool Set, Maintenance (Field), Ordnance Collecting Point Company.	ORD 6 SNL J–8, Section 2
Tool Set, Organizational Maintenance (2d Echelon), Set No. 1, Common.	ORD 6 SNL J–7, Section 1
Tool Set, Maintenance (Field), Motor Vehicle Assembly Company.	ORD 6 SNL J–8, Section 7
Tool Set, Organizational Maintenance (2d Echelon), Set No. 2, Common.	ORD 6 SNL J–7, Section 3
Tool Set, Organizational Maintenance (2d Echelon), Set No. 8, Remover, Tire, Heavy Duty.	ORD 6 SNL J–7, Section 7
Tool Sets, Field and Depot Maintenance for: Truck, Gun-Lifting, Heavy, 4x4, Front, M249; Truck, Gun-Lifting, Heavy, 4x4, Rear, M250 (SNL G–268).	ORD 6 SNL J–16, Section 56

Transporter, Heavy Artillery, T10 (Composed of Truck, Gun-Lifting, Heavy, 4x4, Front, M249 and Truck, Gun-Lifting, Heavy, 4x4, Rear, M250).	ORD (*) SNL G–268

3. Other Publications

The following explanatory publications contain information pertinent to this materiel and associated equipment:

a. General.

Driver's Manual	TM 21–305
Tire Chains	SB 9–99

b. Maintenance and Repair.

Abrasive, Cleaning, Preserving, Sealing, Adhesive, and Related Materials Issued for Ordnance Materiel.	TM 9–850
Instruction Guide: Operation and Maintenance of Ordnance Materiel in Extreme Cold (0° to —65° F.).	TM 9–2855
Maintenance and Care of Hand Tools	TM 9–867
Painting Instructions for Field Use	TM 9–2851
Ordnance Maintenance, Tire Repair and Retread	TM 9–1868
Wheeled Vehicles: Discontinued Use of Tire Bead Clips and Bead Locks.	TB ORD 477

(*) See DA Pamphlet 310-29, Index of Supply Manuals—Ordnance Corps, for published types of manuals of the ordnance section of the Department of the Army Supply Manual.

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[AG 451.92(19 Jan 55)]

BY ORDER OF THE SECRETARY OF THE ARMY:

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9-367, Sup Depot Co (1)
9-387, Ammo Depot Co (1)

NG: Same as Active Army except allowance is one copy to each unit.
USAR: None.
Unless otherwise noted, distribution applies to CONUS and overseas.
For explanation of abbreviations used, see SR 320-50-1.

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