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TM 11-362

WAR DEPARTMENT

U.S. Dept. of Army

TECHNICAL MANUAL

REEL UNIT RL–31

July 1, 1941

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TECHNICAL MANUAL

REEL UNIT RL-31

CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON 25, D. C., 5 February 1944.

TM 11-362, 1 July 1941, is changed as follows:

8.1. (Added.) **Installation in ¼-ton truck.**—*a. General.*—To mount reel unit RL-31 in a ¼-ton, 4 by 4 truck, it is necessary to relocate the spare tire and bracket and the gasoline container and bracket (fig. 11.3). A complete assembly of parts for mounting the reel unit is shown in figure 11.1. When mounted, the front legs of the reel unit are supported by two brackets bolted to the rear frame cross member (fig. 11.3). The rear legs are secured by means of two Carriage bolts (fig. 11.4 ⑮ and ⑯), to a hardwood block (fig. 11.4 ①) which, in turn, is bolted to the floor of the truck (fig. 11.4). All parts must be improvised by using units, and be in accordance with the specifications of figures 11.1 and 11.2. Attachment kits containing the necessary bolts and metal parts will be supplied in the future. The hardwood parts will be improvised in the field.

b. Preliminary procedure.—Before mounting reel unit RL-31 in a ¼-ton truck, the following operations are necessary:

(1) Remove gasoline container and bracket, and replace bracket bolts in body of truck.

(2) Remove spare tire and bracket, and replace bracket bolts in body of truck.

c. Mounting reel unit RL-31.—To mount the reel unit, proceed in the sequence indicated below:

(1) Remove the bolts which hold the right side of the left rear bumper, and mount the bracket (fig. 11.1 ⑩) as shown in figure 11.3, using two 1¼-inch bolts and two washers (fig. 11.1 ⑲ and ⑳).

(2) Remove the two body bolts adjacent to the rear shock-absorber housings, and bolt the hardwood block (fig. 11.4 ①) to the floor of the truck, using the two 3½-inch bolts and four washers (fig. 11.4 ⑬ and ⑭). It is not necessary to drill new holes; the original holes will accommodate the longer bolts. The two carriage bolts must be inserted before securing the block to the body.

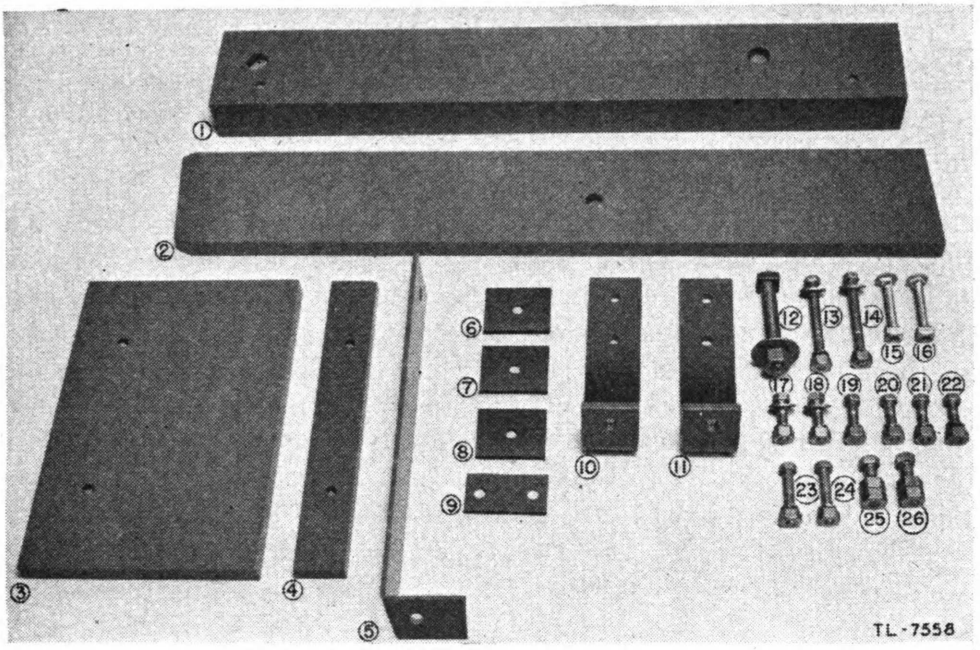
(3) Attach the second bracket (fig. 11.3 ⑪) to the left front leg of reel unit RL-31, using a 1⅜-inch bolt (fig. 11.3 ㉘).

(4) Place reel unit RL-31 in position over the carriage bolts as shown in figure 11.4 ⑮ and ⑯. Place spacer washer (fig. 11.4 ⑥) under right rear leg, and tire support bracket (fig. 11.4 ⑤) under left rear leg. Put nuts on the carriage bolts and tighten.

*This change printed as a pamphlet to conserve paper and printing and to expedite delivery to the field.

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① Reinforcement, floor, hardwood.
② Bracket, tire, hardwood.
③ Reinforcement, wheel-housing, hardwood.
④ Reinforcement, side-panel, hardwood.
⑤ Brace, tire, steel.
⑥ Spacer, for right rear leg, steel.
⑦ and ⑧ Reinforcement, wheel-housing, steel.
⑨ Spacer, for leg support bracket, steel.
⑩ and ⑪ Bracket, leg support, steel.
⑫ Bolt, machine, 9/16 by 4½ inches, hexagonal head, with flat washer and nut.
⑬ and ⑭ Bolt, machine, 3/8 by 3½ inches, hexagonal head, with flat washer, lock washer, and nut.
⑮ and ⑯ Bolt, carriage, 3/8 by 2½ inches, with lock washer.
⑰ and ⑱ Bolt, machine, 3/8 by 1¼ inches, hexagonal head, with flat washer, lock washer, and nut.
⑲, ⑳, ㉑, and ㉒ Bolt, machine, 3/8 by 1¼ inches, hexagonal head, with lock washer and nut.
㉓ and ㉔ Bolt, machine, 3/8 by 1¾ inches, hexagonal head, with lock washer and nut.
㉕ and ㉖ Bolt, machine, 7/16 by 1⅜ inches, hexagonal head, with two nuts.

FIGURE 11.1.—Parts for mounting reel unit RL-31 in ¼-ton, 4 by 4 truck.

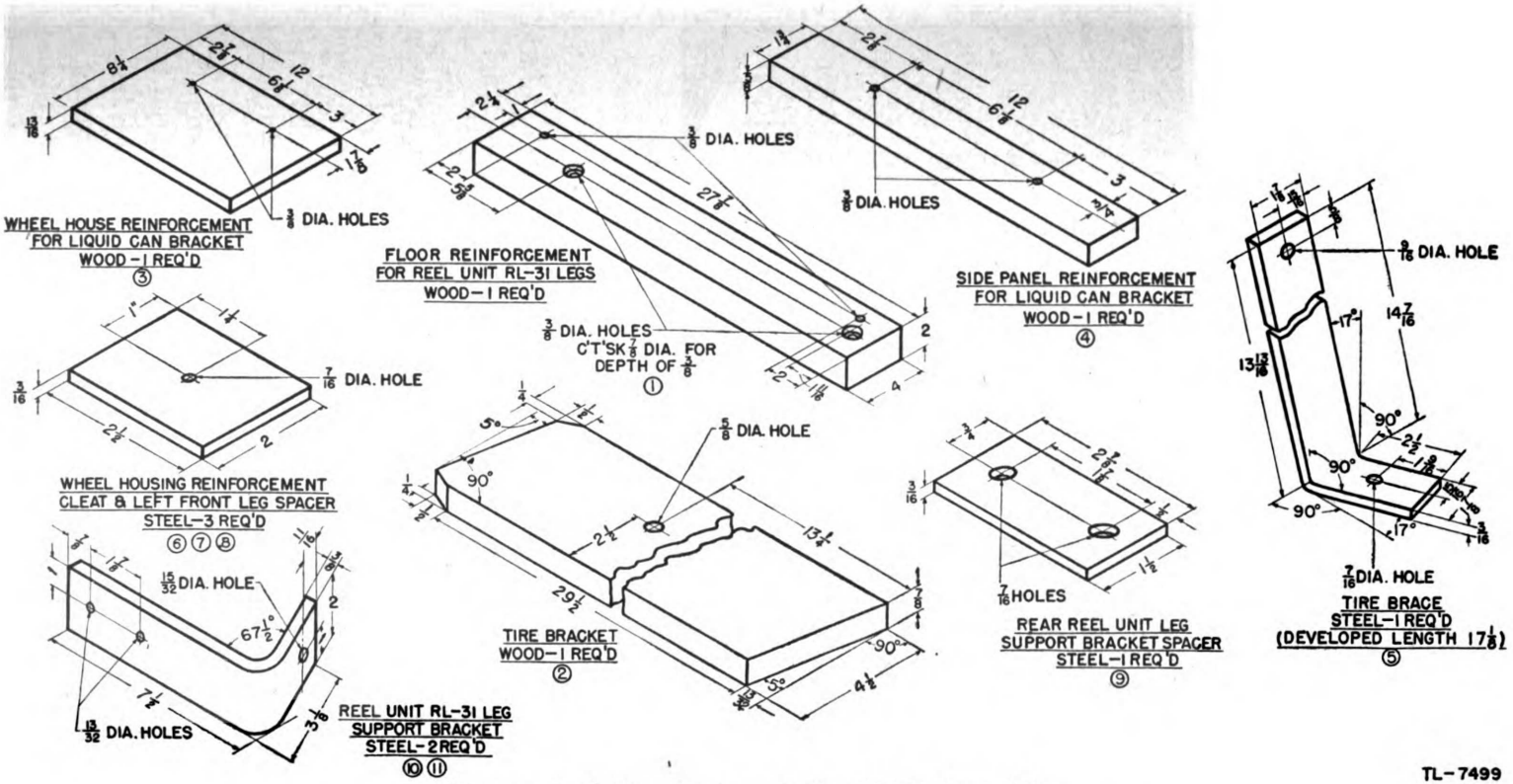
[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

(5) Bolt the right front leg of the reel unit to the bracket which is fastened to the left rear bumper. Use the 1⅜-inch bolt (fig. 11.3 ㉕).

(6) Using the bracket attached to the left front leg of the reel unit as a template, drill two 13/32-inch holes in the rear frame cross member. Place spacer (fig. 11.3 ⑨) under bracket and bolt the bracket to the frame, using two 1¼-inch bolts (fig. 11.3 ㉑ and ㉒).

NOTE.—Reel unit RL-31 is constructed somewhat differently at the cross-arm supports than reel unit RL-31-B, and does not require removal of the spare tire bracket.

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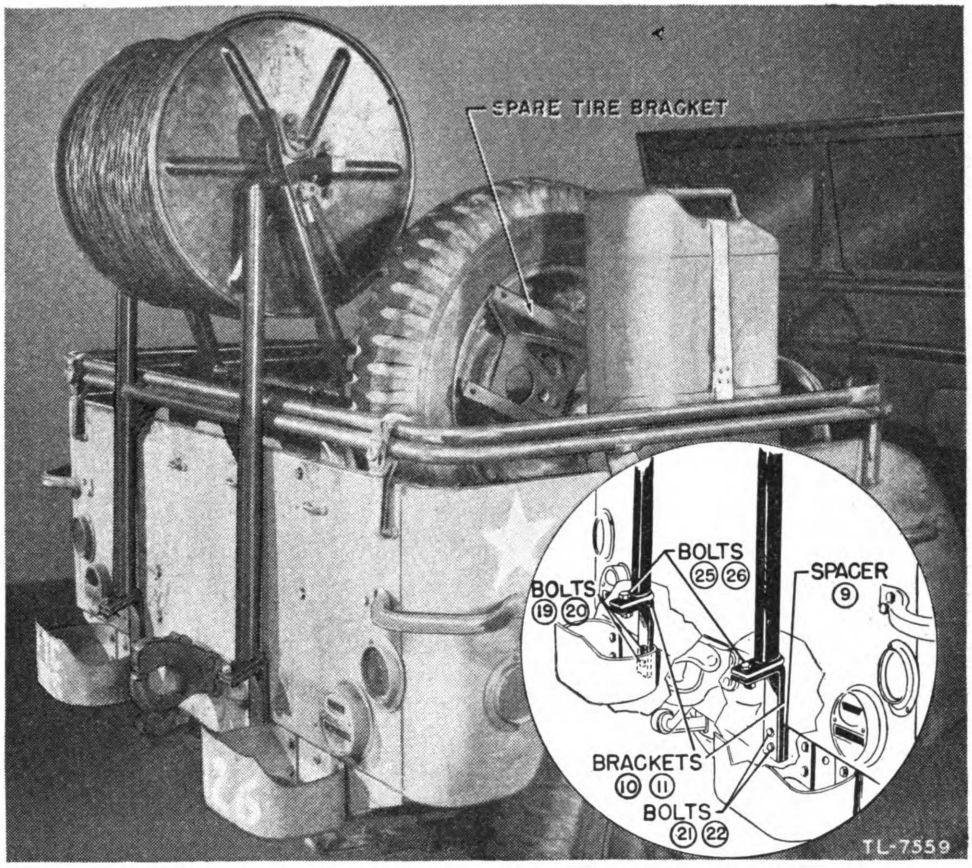


Numbers in circles refer to parts identified in figure 11.1.

FIGURE 11.2.—Specifications for parts for mounting reel unit RL–31 in ¼-ton, 4 by 4 truck.

[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

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Numbers in circles refer to parts identified in figure 11.1.

FIGURE 11.3.—Mounting of front-leg support brackets.

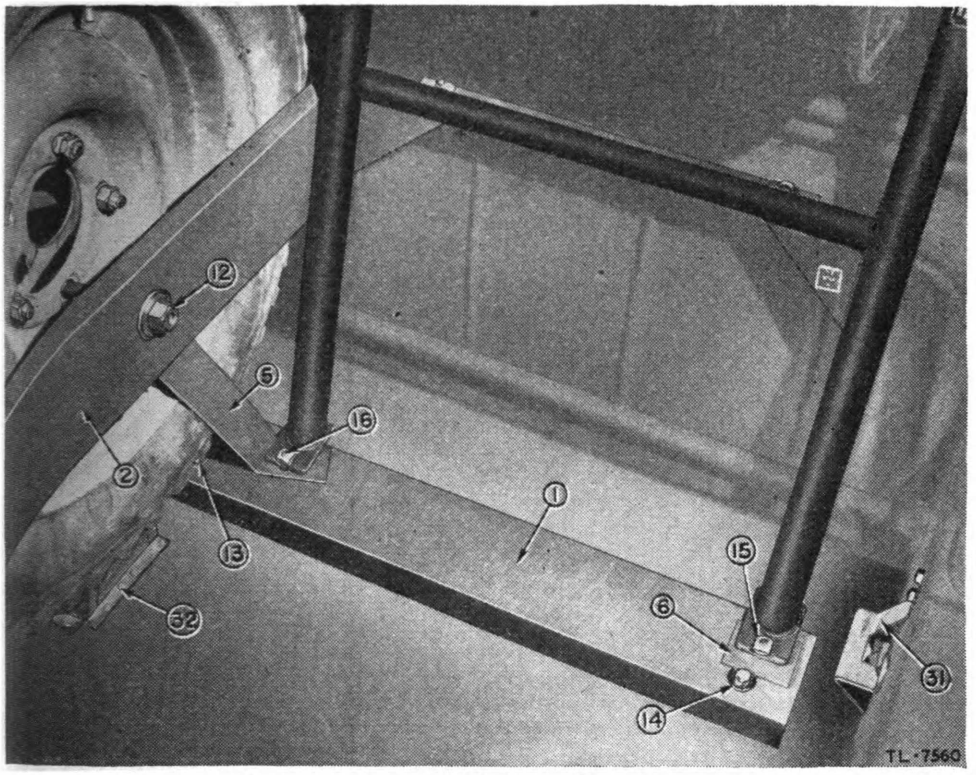
[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

d. Relocating gasoline container.—The gasoline container bracket is mounted inside the body over the right rear wheel housing (fig. 11.5) in the following manner:

(1) Place one hardwood reinforcement (fig. 11.5 ③) between the bottom of the container bracket and the wheel housing, and place the other hardwood reinforcement between the container bracket and the side panel of the truck (fig. 11.5 ④). Using the hardwood parts as templates, drill holes in the truck corresponding to size indicated for the hardwood parts; then bolt the container in place.

(2) Use two 1¼-inch bolts (fig. 11.6 ⑰ and ⑱) to fasten the container bracket to the side panel. Flat washers must be placed between the nut and the side panel of the truck. Use two 1¾-inch bolts (fig. 11.6 ㉓ and ㉔) to secure the bottom of the container bracket to the body of the truck. Metal reinforcement cleats (fig. 11.6 ⑦ and ⑧) must be placed between the nuts and the under side of the wheel housing.

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Numbers in circles refer to parts identified in figure 11.1, with the exception of ㉛ and ㉜
㉛ Spring, to hold rear seat in open position.
㉜ Shock absorber housing, right rear.

FIGURE 11.4.—Installation of rear leg support block.

[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

e. Relocating spare tire.—Mount the spare tire and bracket inside the body on top of the right-side shock-absorber housing (fig 11.4 ㉜), and wedge the tire between the right front seat and the folded rear seat (fig. 11.8). Proceed with the installation as follows:

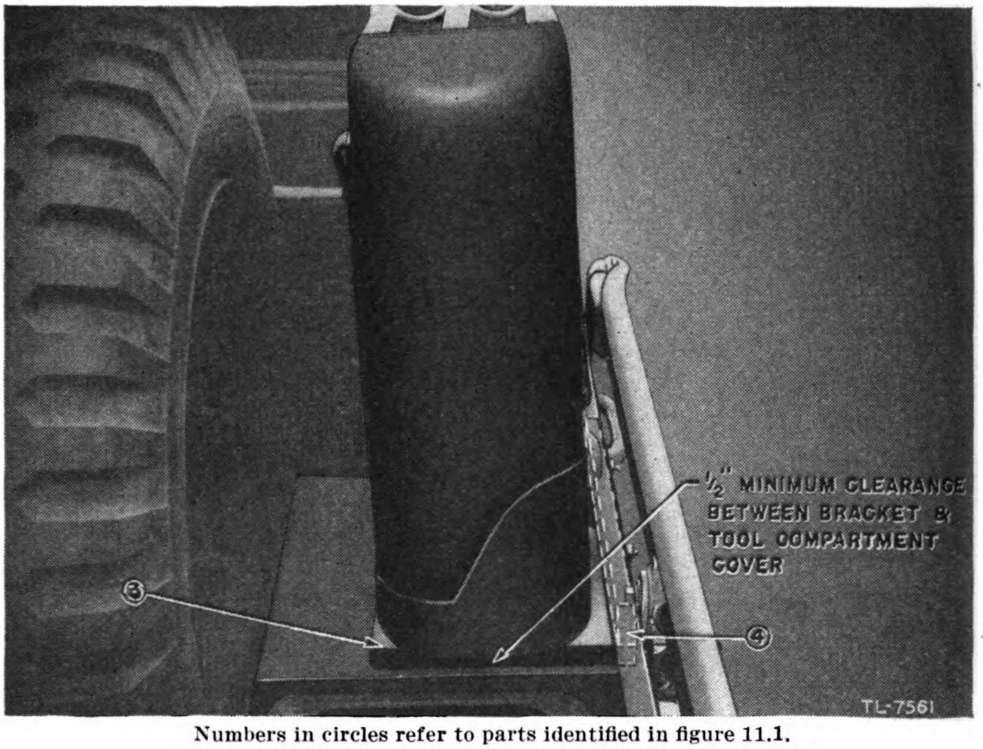
(1) The bolts securing the spring (fig. 11.4 ㉛) which holds the rear seat in the opened position injure the tire, and both spring and bolts must be removed. Place this spring, assembled with bolts, in the right-hand tool compartment.

(2) Strap the right front seat to the cross bar (fig. 11.7 ㉝). (Use one of the two straps located under the right front seat.)

(3) Place spare tire, with tire bracket attached, in position, as shown in figure 11.3.

(4) Insert the 4½-inch bolt (fig. 11.4 ⑫) through the bottom hole of the spare tire wheel, the hole of the spare tire bracket, and the hole in the hardwood brace. The metal bracket (fig. 11.4 ⑤) is already in place.

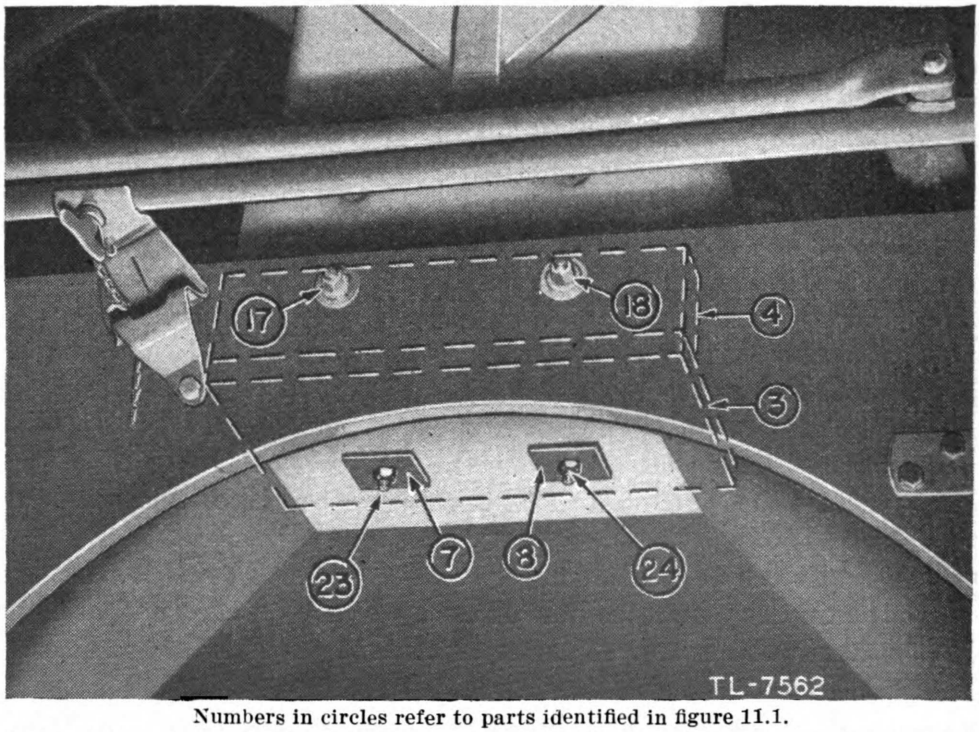
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Numbers in circles refer to parts identified in figure 11.1.

FIGURE 11.5.—Installation of gasoline container and bracket.

[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

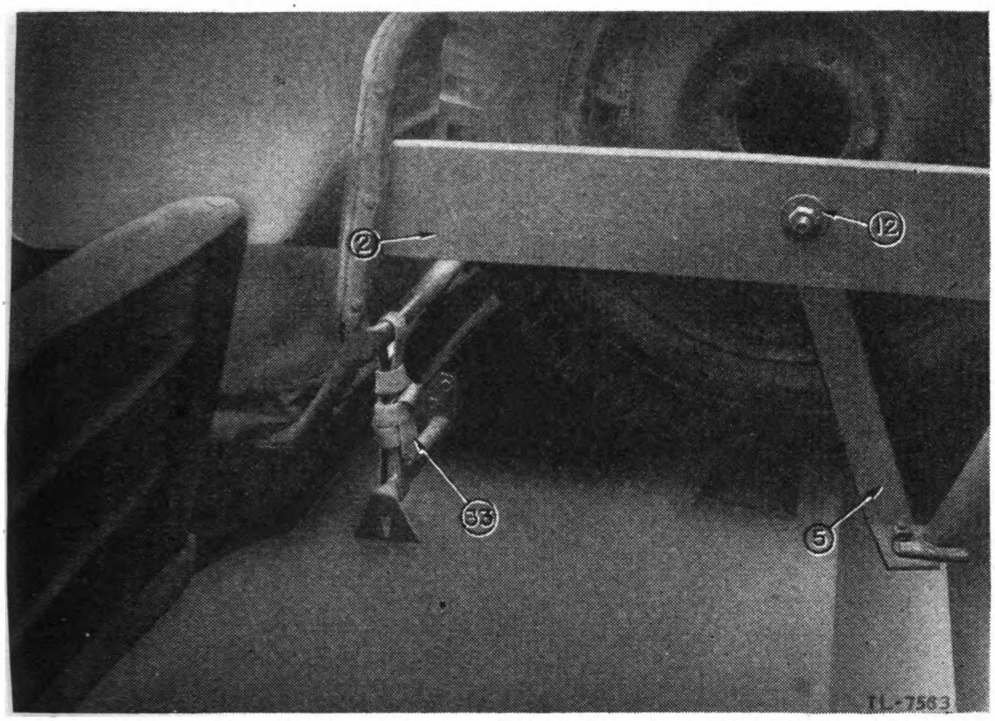


Numbers in circles refer to parts identified in figure 11.1.

FIGURE 11.6.—Installation of wheel housing reinforcements and gasoline container bracket.

[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

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Numbers in circles refer to parts identified in figure 11.1, with the exception of ㉝.
㉝ Strap, to hold right front seat.

FIGURE 11.7.—Method of securing right front seat.

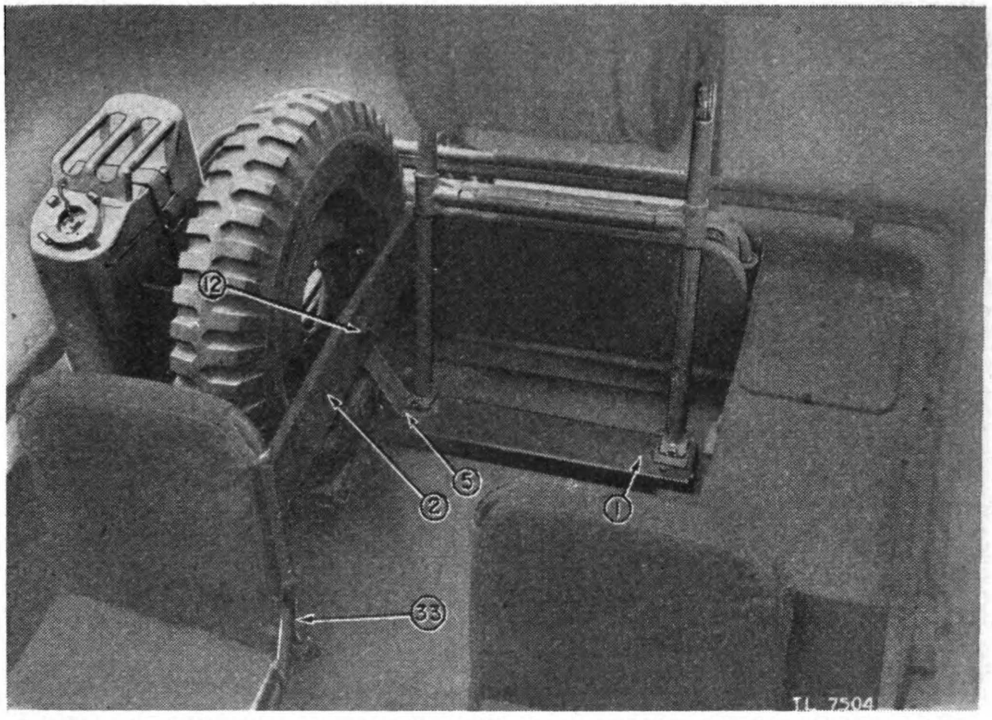
[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

(5) Wedge the hardwood brace (fig. 11.8 ②) into position between the right front seat and the folded rear seat. Place a washer between the hardwood brace and the nut, and tighten. The bolt must be kept at right angles to the tire and hardwood brace (fig. 11.8 ⑫).

[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

10. Transportation.—*a. General* (*Superseded*).—The reel unit RL–31 is intended for use mainly in small trucks, as indicated in figures 10, 11, and 13. Two lines can be paid out or recovered provided that an equal amount of wire is maintained on the reels. The ¼-ton, 4 by 4 truck can be used to lay field wire and field cable cross country over terrain impassable to other vehicles. When ¼-ton trucks are used as wire-laying vehicles, larger trucks are often released for other purposes. The limited cargo space and weight-carrying capacity of the ¼-ton truck restrict its use as a wire-laying vehicle. Only reel unit RL–31 and reels DR–4, DR–5, and DR–15 are to be used. Reel unit RL–31 mounted in a ¼-ton truck is to be used for the installation and recovery of single circuits, such as short trunks and laterals, and for the maintenance of existing circuits. However, for short local

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Numbers in circles refer to parts identified in figure 11.1, with the exception of ㉝. ㉝ Strap, to hold right front seat.

FIGURE 11.8.—Relocation of gasoline container and spare tire.

[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

lines, the unit can also be transported by two men in litter fashion (fig. 14), set up on the ground at any selected point (figs. 2 and 12), and the wire then pulled out by hand.

* * * * * *

[A. G. 300.7 (4 Oct 43).] (C 1, 5 Feb 44.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:
J. A. ULIO,
Major General,
The Adjutant General.

U. S. GOVERNMENT PRINTING OFFICE: 1944

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TECHNICAL MANUAL
No. 11–362

WAR DEPARTMENT,
WASHINGTON, July 1, 1941.

REEL UNIT RL–31

Prepared under direction of the
Chief Signal Officer

SECTION I. General. Paragraph
Purpose ---- 1
Frame ---- 2
Axle ---- 3
Crank GC–4–A ---- 4
Brake unit GC–10 ---- 5
Strap ST–19–A ---- 6
Tail gate hangers ---- 7
Toe clamps ---- 8
II. Employment.
Wire capacity ---- 9
Transportation ---- 10
Weight ---- 11
III. Maintenance.
General ---- 12
List of parts ---- 13

SECTION I

GENERAL

Paragraph
Purpose ---- 1
Frame ---- 2
Axle ---- 3
Crank GC–4–A ---- 4
Brake unit GC–10 ---- 5
Strap ST–19–A ---- 6
Tail gate hangers ---- 7
Toe clamps ---- 8

1. **Purpose.**—*a. General.*—Reel unit RL–31 is a lightweight portable frame designed to facilitate the paying out and the recovering of field wire on reels DR–4 and DR–5. It consists of the following

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parts (fig. 1), which are individually wrapped in paper and packed in a large, flat cardboard carton:

Quantity	Nomenclature	Weight (pounds)
1	Frame	21. 0
1	Axle	4. 5
1	Crank GC–4–A	2. 3
1	Brake unit GC–10	3. 0
2	Strap ST–19–A	2. 0
2	Tail gate hanger	13. 0
4	Toe clamp	. 8
4	Hanger bolt, with nut and washer	. 5
	Total	47. 1

b. Unpacking.—Upon opening a carton containing a new reel unit RL–31, unwrap each item carefully and identify it according to fig-

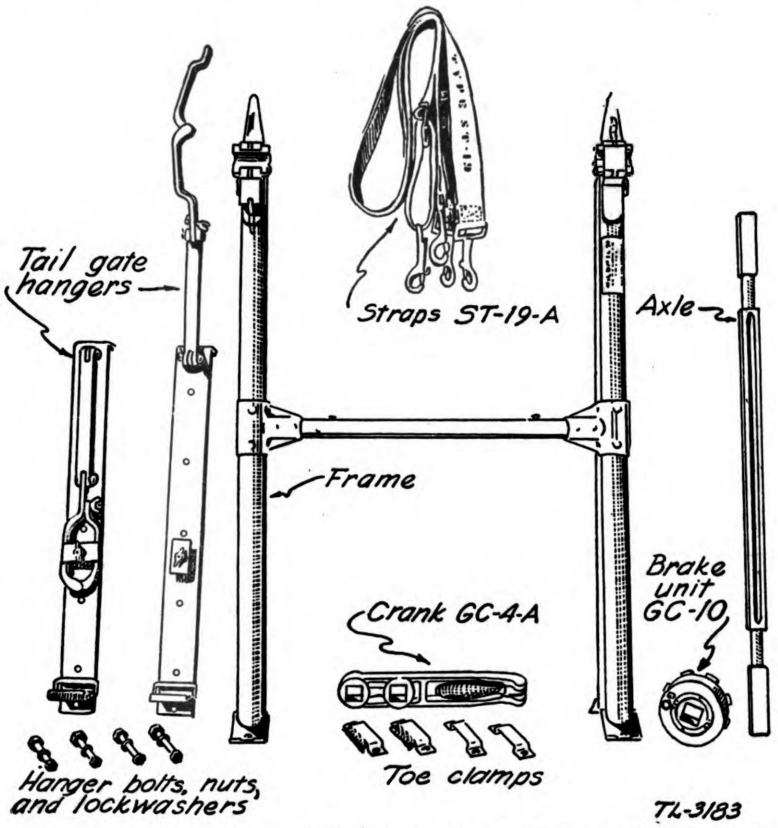


FIGURE 1.—Component parts of reel unit RL–31. One of the tail gate hangers has been opened to show its construction.

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ure 1. Be especially careful to find the toe clamps, which are easily overlooked because they are at the bottom of the carton.

2. **Frame.**—*a. General.*—The frame of the reel unit RL–31 consists of two H-shaped sections of aluminum-alloy pipe hinged together. Directly above the joint of each section is an open bronze bearing with a hinged cap to take the axle. As an upright standard for the DR–4 or DR–5 reel (fig. 2), the frame is usually opened to

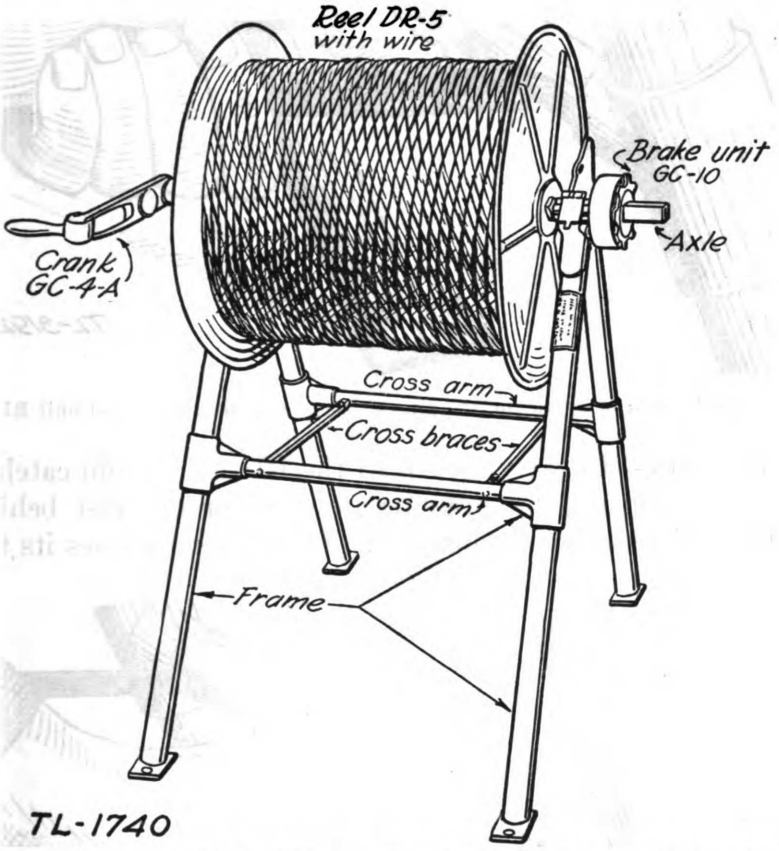


FIGURE 2.—Reel unit RL–31 completely set up, with a Reel DR–5 in place. Note how the two cross braces keep the frame locked in a letter A position.

form a double letter A. The legs are prevented from spreading by means of two pivoted cross braces. When the frame is closed, these lie flat against the cross arms. To put them into position, open the pin catches and swing the braces out on right angles, at the same time adjusting the frame until the pin catches snap into place in the lips on the opposite sides of the cross arms.

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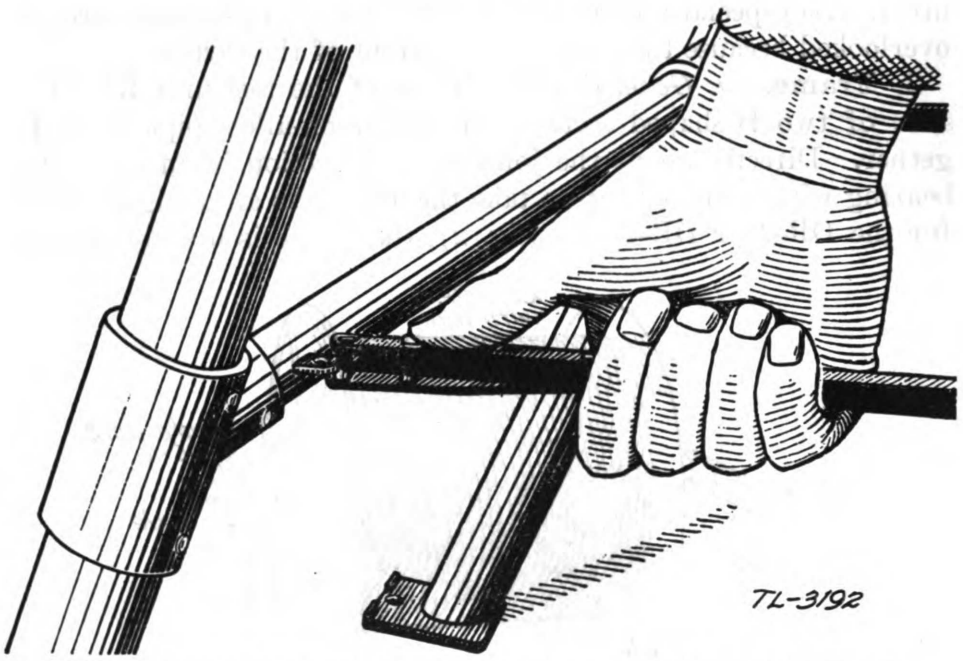


FIGURE 3.—Method of operating the pin catch on early models of reel unit RL-31.

b. Pin catches.—In early models of the RL-31, the pin catch of the cross braces is opened by pressing down on a pin just behind the hole in the end, as shown in figure 3. If this spring loses its tension,

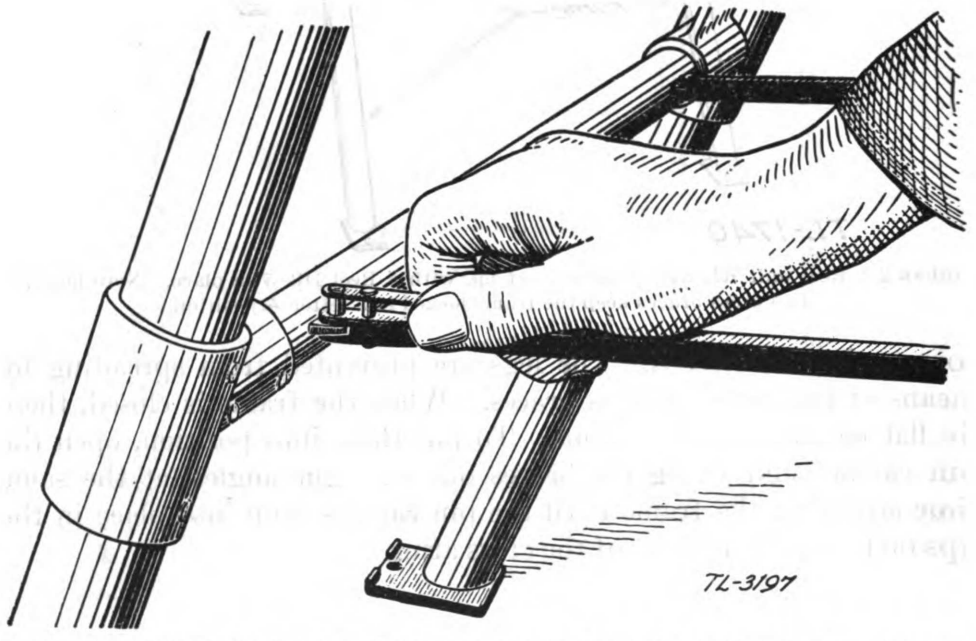


FIGURE 4.—Method of operating the improved pin catch on later models of reel unit RL-31.

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the pin is likely to be pushed out by the weight of a full reel of wire on the axle, and the whole assembly is apt to collapse. To prevent this, twist a piece of seizing wire around the springs. In later models of the RL-31, an improved pin catch is used. As shown in figure 4, the locking pin engages downward instead of upward. Use the thumb and the forefinger to grasp the edge of the spring when closing or opening the catch.

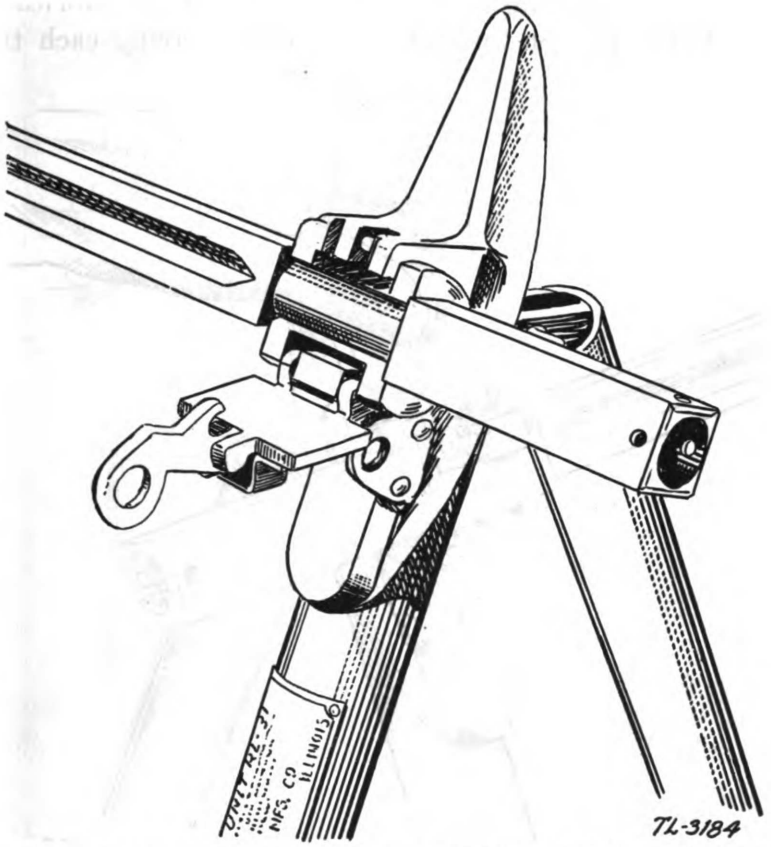


FIGURE 5.—Close-up of one of the axle bearings of reel unit RL-31, with hinged bearing cap open and axle in place.

c. Leg plates.—The legs of the frame are fitted with flat plates designed to afford a firm support on the ground and to engage in the bottom of the tail gate hangers or the toe clamps when the unit is used in a vehicle. These plates are also drilled with holes to take the snap fasteners of the strap ST-19-A.

3. Axle.—*a. General.*—The axle is made of one piece of cold-rolled steel. It is machined to an X-shaped section along the center, square at the ends, and round in between. The round parts fit in the open bearings at the top of the frame. The flat ends of the axle are drilled

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with small holes into which the spring catch of the crank GC–4–A engages.

b. Mounting.—To mount the axle, first open the hinged latches of the bearings by pulling up on the small finger rings on the top. Place the round sections of the axle evenly in the bearings, as indicated in figure 5, and fold the caps up, as in figure 6. Always keep the bearing surfaces clean and shiny by wiping them with a rag.

c. Lubrication.—Any light engine oil is suitable for lubricating the bearings. Apply two or three drops to each bearing each time the

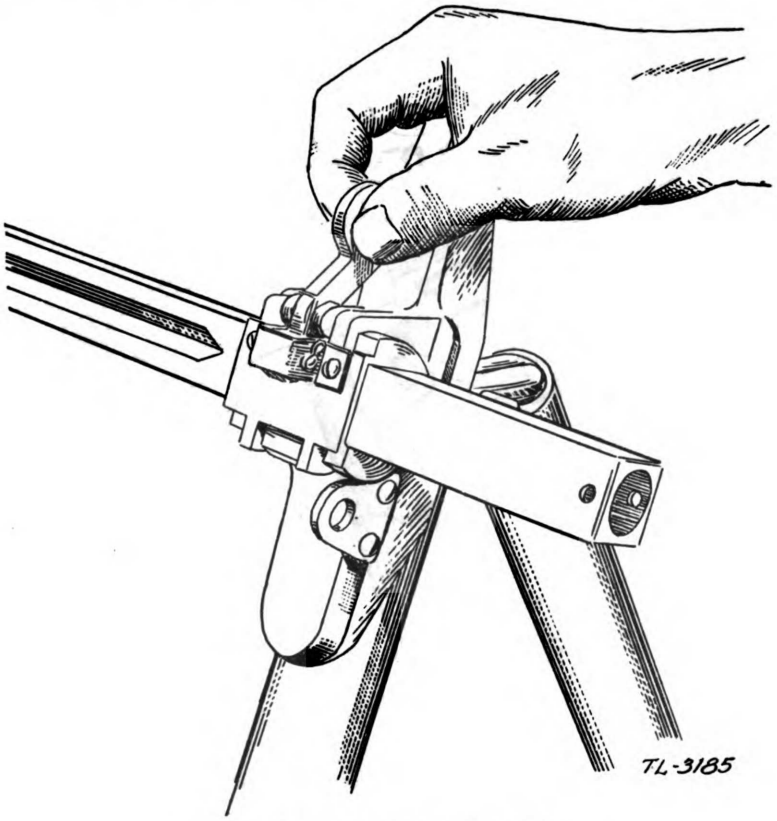


FIGURE 6.—Axle locked in position.

RL–31 is assembled for use. Do not apply oil to any part of the brake unit. Leave the axle temporarily in place in its bearings so as to fit on the crank and brake unit.

4. Crank GC–4–A.—*a. General.*—The crank consists of an arm made of steel and a folding handle made of aluminum. It has two square holes to permit a choice of crank leverage. To bring the handle into position, pick it out of the arm and it will lock itself open automatically. To fold it back, press in the small button on the end of the arm to release the holding catch, as illustrated in figure 7.

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b. Mounting.—The crank fits either end of the axle. Push it over the end of the latter until the spring-actuated plunger inside the square opening engages one of the small holes in the axle. To remove the crank, strike it smartly with the palm of the hand.

5. Brake unit GC-10.—*a. General.*—The purpose of the brake unit GC-10 is to prevent the reel from overspinning when wire is payed out rapidly or when the wire is given a sudden tug. The unit

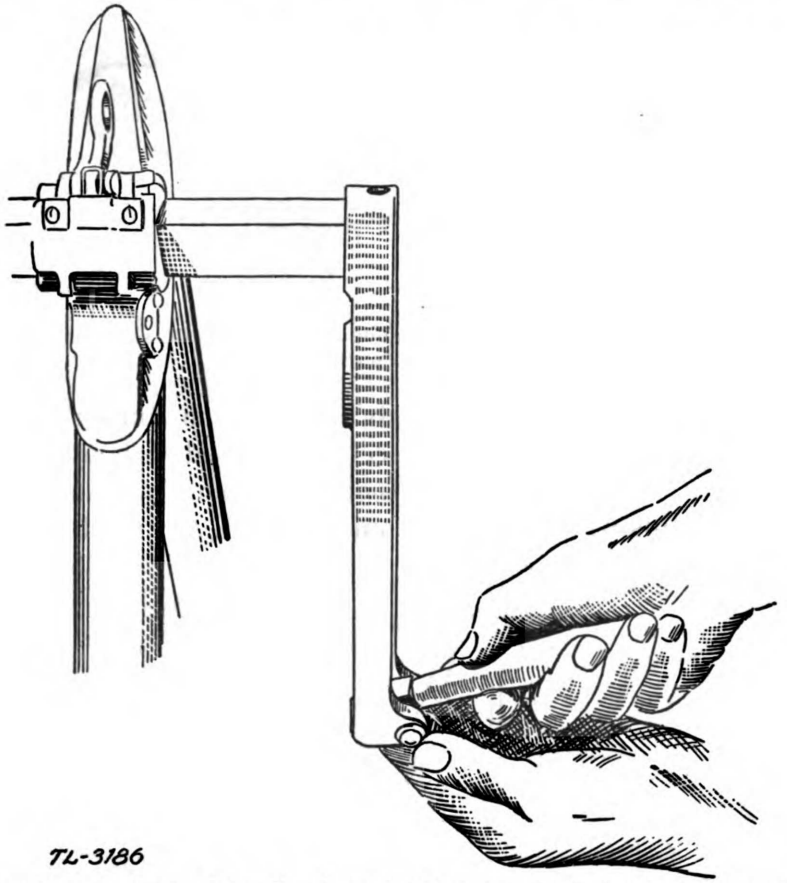


FIGURE 7.—To fold back handle of crank GC-4-A, depress small button on side.

is of the multiple-disk type. Braking effort is produced by friction between a stationary and a revolving set of disks. The former are made of steel and the latter of a compound consisting principally of carbon and copper formed under pressure. This brake is very positive in its action and is readily adjusted to keep even a fully loaded reel from spinning.

b. Mounting.—The unit fits over either end of the axle. It has a protruding, undercut button on its inside face that engages in a lip on the frame, just below the hinged cap of each bearing. Figures 8 and 9 show the method of mounting.

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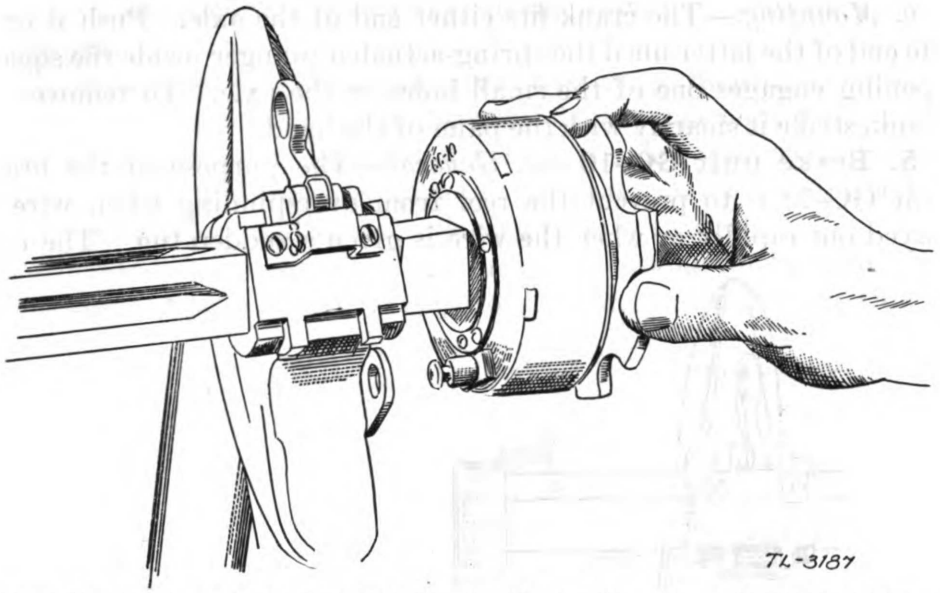


FIGURE 8.—To mount brake unit GC–10, slide it over the axle so that button lines up with lip on frame.

c. Adjustment.—To adjust the braking action, turn the large star wheel to the right or left. The wheel is engraved with an arrow pointing clockwise, with the notation "Increase tension." The useful range of motion of this wheel is only about one turn. If the brake becomes jammed, place a block of wood against the teeth of the star wheel

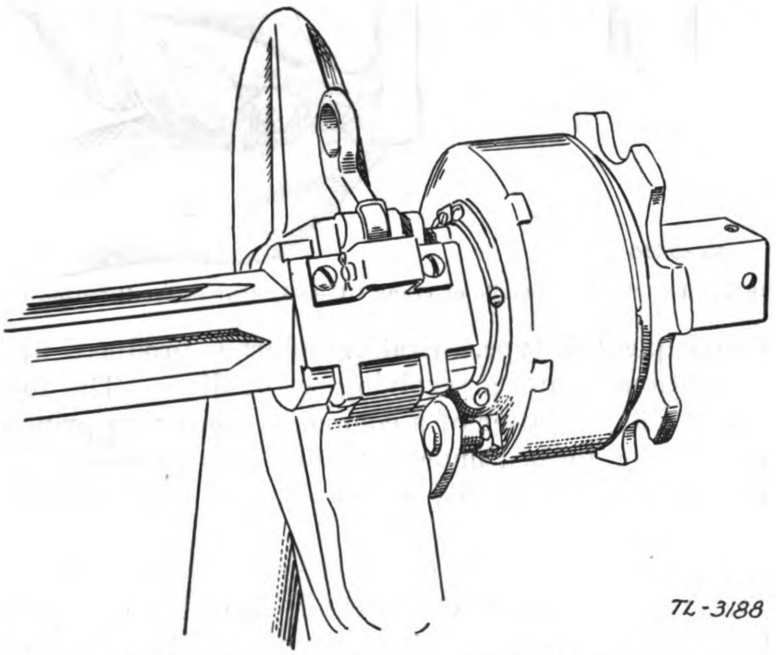


FIGURE 9.—Then push straight in and twist unit very slightly so that button engages lip.

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and strike it lightly, in a counterclockwise direction, with a hammer or with the crank GC–4–A. Do not hammer directly against the wheel, as this will roughen the metal and make manual adjustment uncomfortable and difficult.

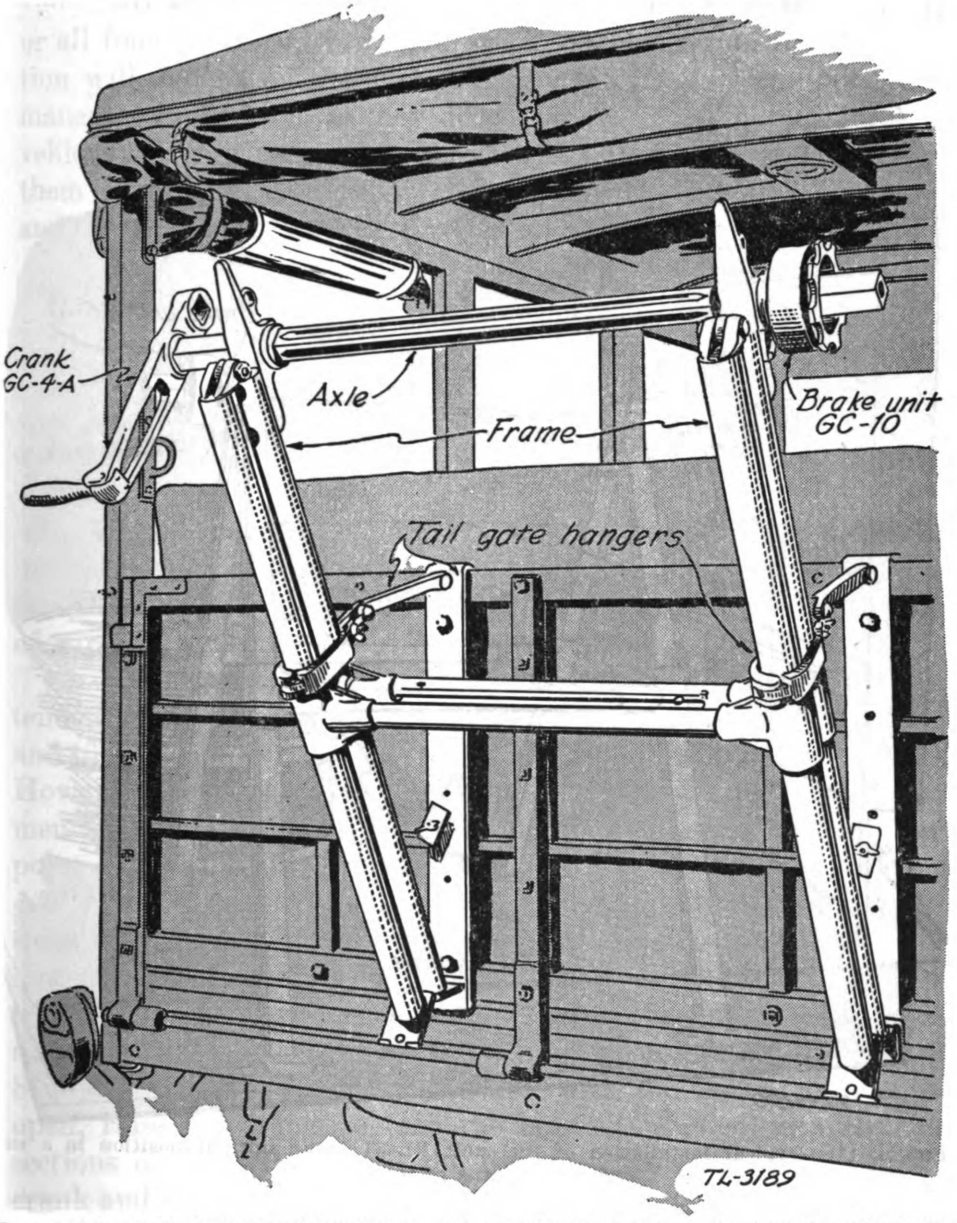


FIGURE 10.—Folded-up RL–31 mounted on back of a station wagon by means of tail gate hangers. Note how top clamps encircle both legs and hold them securely.

d. Removal.—To remove the brake unit, wiggle it a little on the axle until the protruding button is centered in the lip on the frame; then pull straight out and the whole unit will come off easily.

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6. Strap ST–19–A.—Each strap is made of stout webbing and is fitted with a swivel harness snap at each end and a bar buckle. It is 6½ feet long and 2 inches wide. For its use, see section II.

7. Tail gate hangers.—The hangers supplied with reel unit RL–31 were designed specifically for the tail gate of the "station

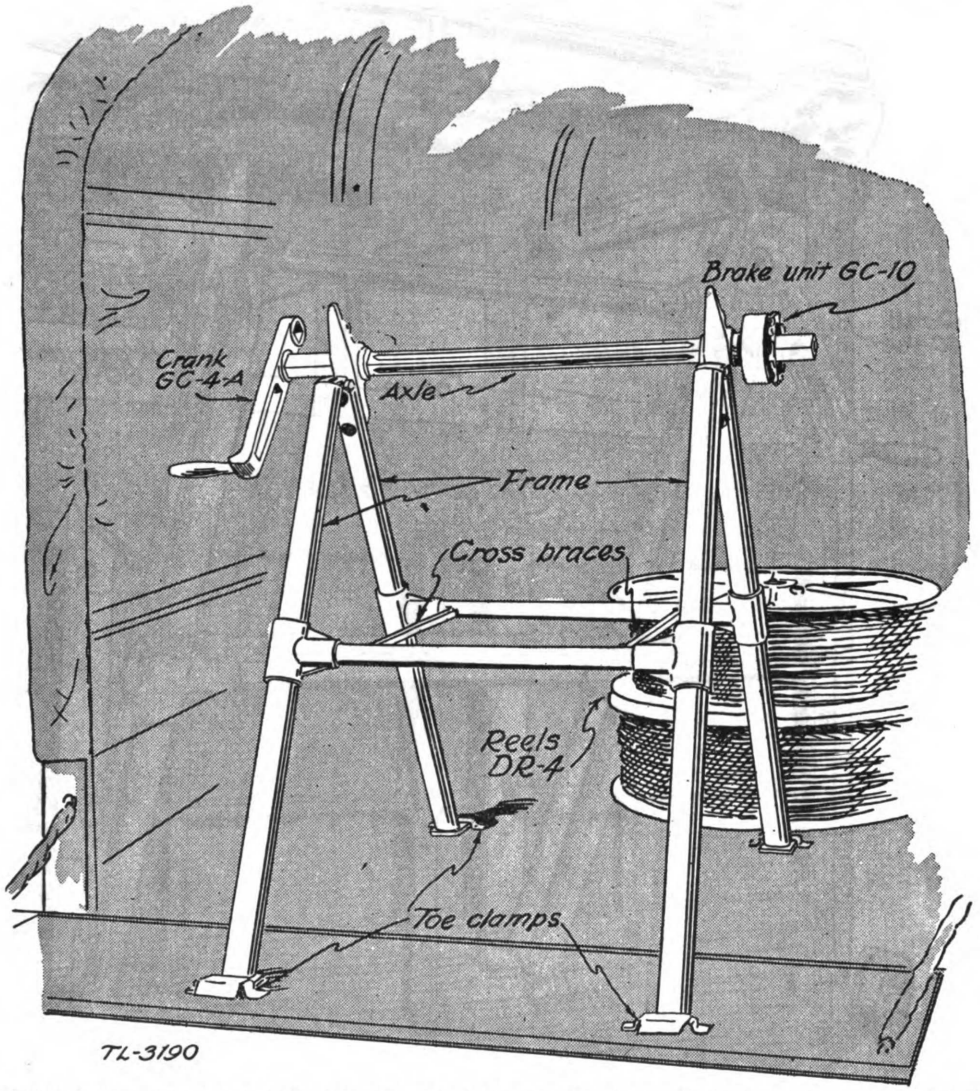


FIGURE 11.—Typical installation of reel unit RL–31 in an upright position in a small truck by means of toe clamps.

wagon" type of vehicle. They are bolted permanently in place, as shown in figure 10, and the folded frame is then set into them. The tail gate must be at least 21 inches deep to accommodate these hangers. If it is shallower, they cannot be used, and the toe clamps should be employed instead.

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8. Toe clamps.—The toe clamps are stamped steel fittings intended to hold the reel unit RL-31 in place in an upright position on the floor of a truck. This is the usual means of operation in vehicles. The two forward clamps can be mounted on the inside of the tail gate, and the two rear ones on the floor of the truck, as shown in figure 11, or all four can be put inside the truck. The exact method of installation will depend on the available vehicle. The clamps are left permanently in position, as they do not interfere with other uses of the vehicle. Locate them accurately so that the reel unit fits against them snugly but without binding, after the legs have been spread and the cross braces locked open.

SECTION II

EMPLOYMENT

	Paragraph
Wire capacity	9
Transportation	10
Weight	11

9. Wire capacity.—The reel unit RL-31 has a capacity of one mile of field wire W-110 or its equivalent. This can be carried on a single reel DR-5 or on two reels DR-4, each of the latter loaded with ½ mile of wire. (See fig. 12.)

10. Transportation.—*a. General.*—The reel unit RL-31 is intended for use mainly in small trucks, as indicated in figures 10, 11, and 13. Two lines can be payed out rapidly and also recovered rapidly. However, for short local lines, the unit can also be transported by two men in litter fashion (fig. 14) set up on the ground at any selected point (figs. 2 and 12), and the wire then pulled out by hand.

b. Litter carry.—(1) Place the loaded reel on the ground, with the sides upright. Fold the cross braces of the RL-31 flat against the cross arms and open up the double H-frames. The heavy castings on which the axle bearings are mounted will keep the assembly open in a straight line. Place the frame over the reel and rest it on the ground. Slip the axle through the reel, and, with the hinged bearing caps open, raise the frame so that the bearings engage with the round sections of the axle. Snap the bearing caps closed and attach the crank and the brake unit.

(2) If the assembly is to be carried a short distance, the straps are not required. Two men simply walk into the open ends of the frame, grasp the legs, and walk away. If the distance to be covered is considerable, the straps ST-19-A will relieve some of the strain

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on the arm and shoulder muscles. Loop them behind the neck, adjust them for length, and snap them into the holes in the legs of the frame.

c. One-man carry.—If the ground is smooth, the loaded reel unit RL–31 may be pushed wheelbarrow fashion as shown in figure 15. Fold up the frame and assemble to the reel and the axle as explained

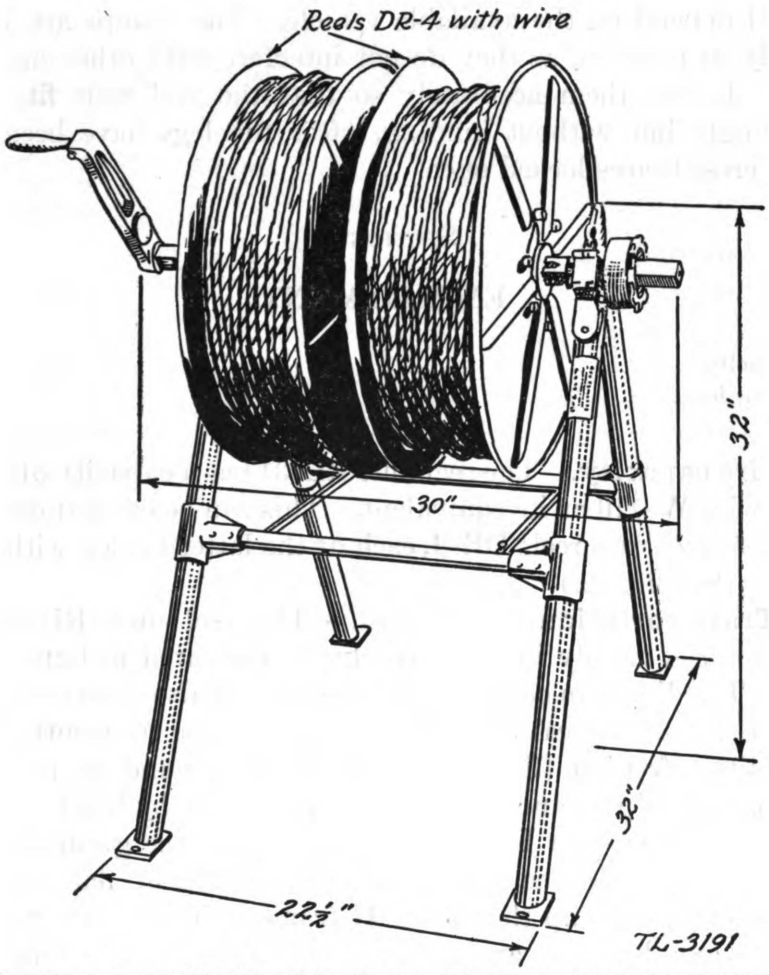


FIGURE 12.—The reel unit RL–31 loaded with two reels DR–4. Important dimensions of the RL–31 are given.

in paragraph 10*b*(1). Leave off the crank and the brake to minimize shaft friction.

11. Weight.—In either case of transportation by manpower, consideration must be given to the weight of the entire unit. The RL–31 plus a full mile of W–110 wire weighs just 200 pounds.

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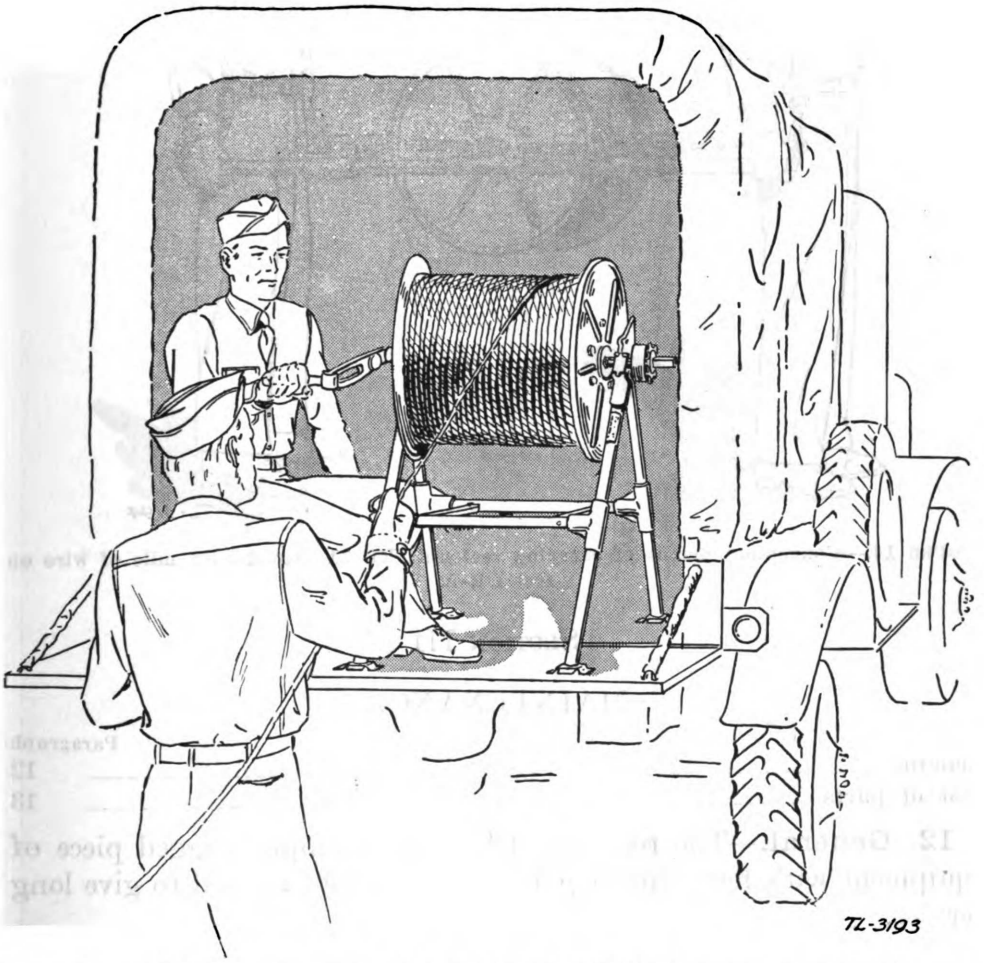


FIGURE 13.—Method of recovering wire with reel unit RL-31 mounted on small truck.

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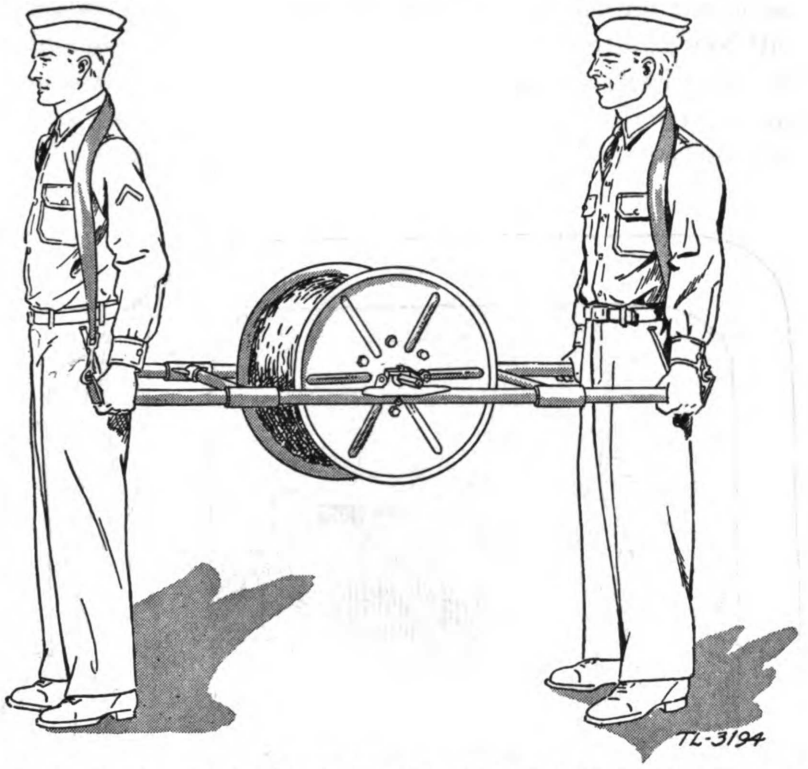


FIGURE 14.—Convenient means of carrying reel unit RL–31 loaded with mile of wire on reel DR–5.

SECTION III

MAINTENANCE

Paragraph
General ---------- 12
List of parts ---------- 13

12. General.—The reel unit RL–31 is a simple, rugged piece of equipment with few moving parts, and may be expected to give long service.

a. Cross braces.—When assembling or disassembling the unit, see that the cross braces are securely locked in place. If they swing free they are likely to snap off. Replacement of the entire element is then necessary.

b. Bearing caps.—Observe the same precautions as given above for the cross braces. With new RL–31 units, paint on the springs and on meeting surfaces sometimes makes the locking action sticky. Examine the assembly closely and carefully scrape off excess paint, using a small screw driver or the back edge of a knife blade.

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c. Brake unit.—Keep clean and do not oil. If a unit becomes defective, do not attempt any repairs in the field, as its internal construction is complicated. Merely replace the whole unit.

d. Axle.—The axle will revolve smoothly in the bearings only if it is perfectly straight. If it becomes bent, support its end on two wood blocks resting on a solid surface, and try to straighten it by



FIGURE 15.—Wheelbarrow method of handling reel unit RL-15.

hitting it with a heavy hammer. Test the axle after each few blows by putting it in the bearings and observing if it revolves evenly, without binding. If the damage cannot be repaired conveniently this way, install a new axle. Never under any circumstances use the axle as a crow bar or for any purpose other than that for which it is intended.

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13. List of parts.—Following is a list of the major parts of the reel unit RL–31, No. 6H6231:

Nomenclature	Signal Corps catalog stock number
Axle	6H6231/41
Brake unit GC–10	6H410
Cap and latch assembly, bearing (Dwg SC–D–1830) consists of following items, assembled:	6H6231/9.2
Item — *Description*	
4 — Bearing cap.	
5 — Latch of bearing cap.	
7 — Spring.	
9 — Split spring washer.	
10 — Round head machine screw.	
12 — Pin.	
14 — Bracket for bearing cap.	
15 — Pin for latch.	
16 — Cotter pin.	
Crank GC–4–A	6H904
Cross brace assembly, complete	6H6231/20
Spring, beryllium copper for latch	6H6231/12.1
Strap ST–19–A	2Z9019A

[A. G. 062.11 (3-25-41).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:
E. S. ADAMS,
Major General,
The Adjutant General.

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