

***TB 9-2355-315-10-1**

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

OPERATOR'S

RG31A2/A3 LIFT AND TOW PROCEDURES

USING THE

**RG31A2/A3 LIFT TOW ADAPTER (LTA),
NSN 2540-01-590-7232**

**M977 SERIES, 8X8 HEAVY EXPANDED MOBILITY
TACTICAL TRUCKS (HEMTT)**

**TRUCK, WRECKER-RECOVERY, M984A2, NSN 2320-01-492-8224
TRUCK, WRECKER-RECOVERY, M984A2R1, NSN 2320-01-492-8233
TRUCK, WRECKER-RECOVERY, M984A4, NSN 2320-01-534-2245**

***TB 9-2355-315-10-1 dated 4 June 2012 supersedes TB 9-2355-315-10-1 dated 31
March 2011, including all changes.**

DISTRIBUTION STATEMENT A. - Approved for public release; distribution is unlimited.

Headquarters, Department of the Army, Washington, DC

4 JUNE 2012

WARNING

FOR INFORMATION ON FIRST AID, REFER TO FM 4-25.11 FIRST AID.

WARNING

Hold cross tube when removing springs and endcaps. Cross tube may swing and cause adapters to slide, resulting in personal injury.

WARNING

When end caps are removed from cross tube, adapters may slide off, causing personal injury.

WARNING

LTAs are heavy, approximately 73 lbs: Lifting adapters less than 3 feet requires 1 male or 2 females. Lifting LTAs higher than 3 feet requires 2 males or 2 females. Handle carefully or serious personal injury may result.

WARNING

Keep hands and fingers away from adapters and tow eyes when operating retrieval system, or serious personal injury or death may result.

WARNING

Keep out from under retrieval system and disabled vehicle when raised off the ground.

WARNING

The M984 should not be operated at speeds over 15 MPH (24 km/hr) except on paved roads when the operator determines that the vehicle being towed and the terrain allow safe operation. Engine brake switch must be "ON" for all towing operations. Excessive speeds can result in loss of control, serious injury, or death.

WARNING

Do not stand between vehicles while disabled vehicle is raised off ground, or serious personal injury or death can result.

WARNING

The arrow on the vehicle brake switch must be in the forward position during normal operation. If activated during normal operation, all four wheels of the vehicle will lock up. This switch is only to be activated in the towed vehicle when the pneumatic lines have been coupled to a towing vehicle.

WARNING

LTAs will rotate when pins are removed. Use caution or serious personal injury may result.

WARNING

If disabled vehicle's parking brake is inoperative, chock wheels of disabled vehicle. Failure to chock wheels may result in personal injury.

WARNING

Do not allow LTAs to swing around; personal injury may result.

WARNING

Rear lift tow is for emergency only. **Rear lift tow has been approved for RG31A2 only, do not attempt for RG31A3.**

WARNING

While vehicles are connected, avoid parking on grades over 20%, and avoid towing on grades over 30%. Failure to comply may cause damage to equipment or serious personal injury or death.

LIST OF EFFECTIVE PAGES / WORK PACKAGES

NOTE: This manual supersedes TB 9-2355-315-10-1 dated 31 March 2011. Zero in the “change No.” column indicates an original page or work package.

Date of issue for original manual is:

Original 4 June 2012

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 8 AND TOTAL NUMBER OF WORK PACKAGES IS 3 CONSISTING OF THE FOLLOWING:

Page/WP	*Change No.
Cover	0
a/(b blank)	0
i/(ii blank)	0
WP 0001	0
WP 0002	0
WP 0003	0

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., 4 June 2012

TECHNICAL BULLETIN

OPERATOR'S

RG31A2/A3 LIFT AND TOW PROCEDURES

USING THE

RG31A2/A3 LIFT TOW ADAPTER (LTA), NSN 2540-01-590-7232

**M977 SERIES, 8X8 HEAVY EXPANDED MOBILITY
TACTICAL TRUCKS (HEMTT)**

**TRUCK, WRECKER-RECOVERY, M984A2 NSN 2320-01-492-8224
TRUCK, WRECKER-RECOVERY, M984A2R1 NSN 2320-01-492-8233
TRUCK, WRECKER-RECOVERY, M984A4, NSN 2320-01-534-2245**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and Blank Forms) through the Internet on the TACOM Unique Logistics Support Applications (TULSA) Web site. The Internet address is <https://tulsa.tacom.army.mil>. Access to all applications requires CAC authentication, and you must complete the Access Request form the first time you use it. The DA Form 2028 is located under the TULSA Applications on the left-hand navigation bar. Fill out the form and click on SUBMIT. Using this form on the TULSA Web site will enable us to respond more quickly to your comments and to better manage the DA Form 2028 program. You may also mail, e-mail, or fax your comments or DA Form 2028 directly to the U.S. Army TACOM Life Cycle Management Command. The postal mail address is U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LCL-MPP/ TECH PUBS, MS 727, 6501 E. 11 Mile Road, Warren, MI 48397-5000. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 786-1856 or Commercial (586) 282-1856. A reply will be furnished to you.

*TB 9-2355-315-10-1 dated 4 June 2012 superseded TB 9-2355-315-10-1 dated 31 March 2011, including all changes.

DISTRIBUTION STATEMENT A. - Approved for public release; distribution is unlimited.

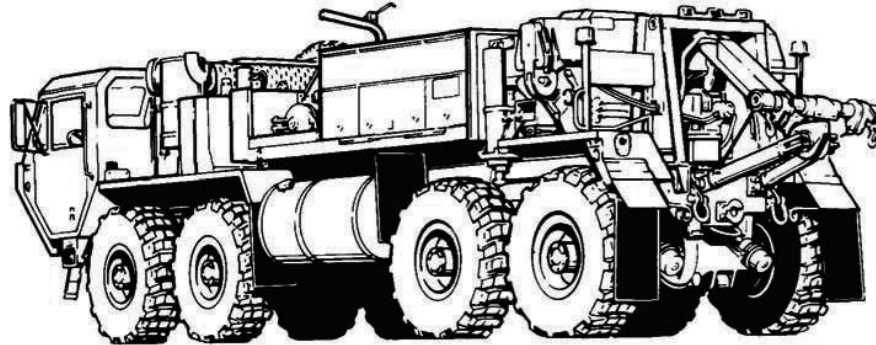
TABLE OF CONTENTS

<u>Work Package</u>	<u>Page</u>
0001 General Information.....	0001-1
0002 Front Lift and Tow of RG31A2/A3.....	0002-1
0003 Rear Lift and Tow of RG31A2.....	0003-1

i/(ii blank)

OPERATOR MAINTENANCE

GENERAL INFORMATION



INTRODUCTION

This document presents procedures for the HEMTT wrecker using the RG31A2/A3 Lift Tow Adapters (LTAs) to lift and tow the RG31A2/A3. This manual is to be used as a supplement to the lift and tow procedures in the HEMTT operator's manuals and in conjunction with the operator's manual for the disabled vehicle. These procedures do not replace or override any safety procedures, warnings, cautions, or notes in the existing manuals.

ITEMS TO BE ADDED

The following items are added to the COEI of the HEMTT wrecker:

Table 1. Components of End Items to be Added.

Part Number	National Stock Number (NSN)	Description	Qty.
57K7587	2540-01-590-7232	LIFT TOWING ADAPTER KIT	1

Lift Tow Adapter (LTA) Kit



Left LTA



Right LTA

REFERENCES

HEMTT M984A2 (paper manual) TM 9-2320-279-10-1,2
 HEMTT M984A4 (paper manual).....TM 9-2320-342-10-1
 HEMTT (IETM) TM 9-2320-315-14&P
 RG31A2.....TM 9-2355-315-10
 RG31A3.....TM 9-2355-331-10

ACRONYMS AND ABBREVIATIONS

Table 2. Acronyms and Abbreviations

cm	Centimeters
COEI	Components Of End Item
FMTV	Family of Medium Tactical Vehicles
ft	Feet
HEMTT	Heavy Extended Mobility Tactical Truck
in	Inches
kg	Kilograms
km/hr	Kilometers per Hour
lbs	Pounds
LTA	Lift Tow Adapter
m	Meters
mm	Millimeters
mph	Miles Per Hour
PTO	Power Take-Off
TM	Technical Manual
WP	Work Package

END OF WORK PACKAGE

OPERATOR MAINTENANCE
FRONT LIFT AND TOW OF RG31A2/A3

FRONT HOOKUP**NOTE**

This is a three-soldier task.

When using the M984A4 retrieval system, do not touch the brakes while running the PTO. This will cause the hydraulic system to shut down, and will require the operator to either restart the PTO at the rear power panel or to flip the main hydraulic switch in the cab off and then on again. (TM 9-2320-342-10-1)

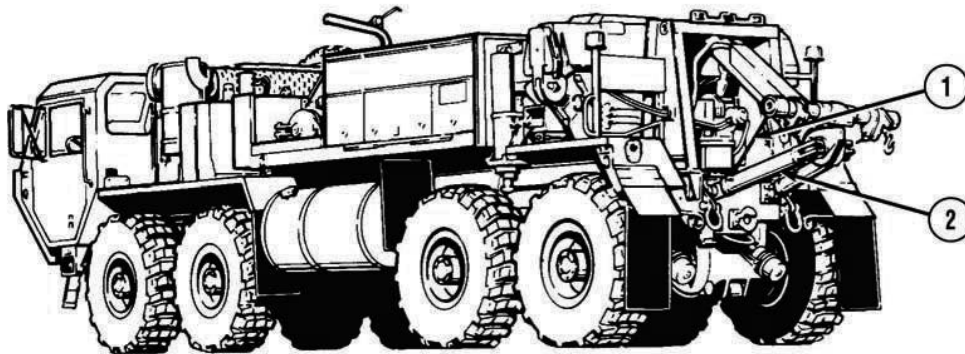
WARNING

While vehicles are connected, avoid parking on grades over 20%, and avoid towing on grades over 30%. Failure to comply may cause damage to equipment or serious personal injury or death.

CAUTION

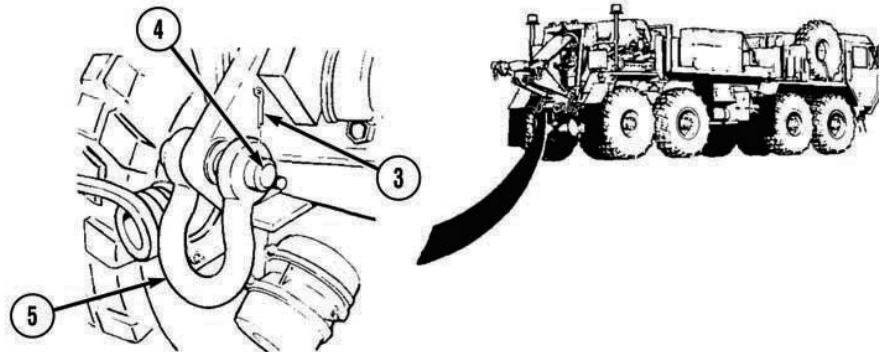
Gross Axle Weight Rating on RG31A2/A3 is exceeded during lift tow. Strictly adhere to specified towing restrictions, or damage to disabled vehicle may result.

1. Prepare retrieval system for operation (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

**WARNING**

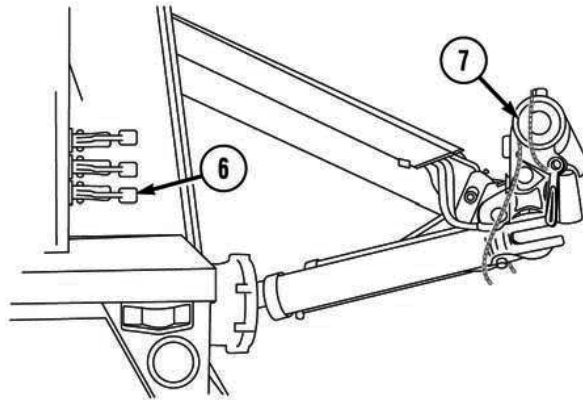
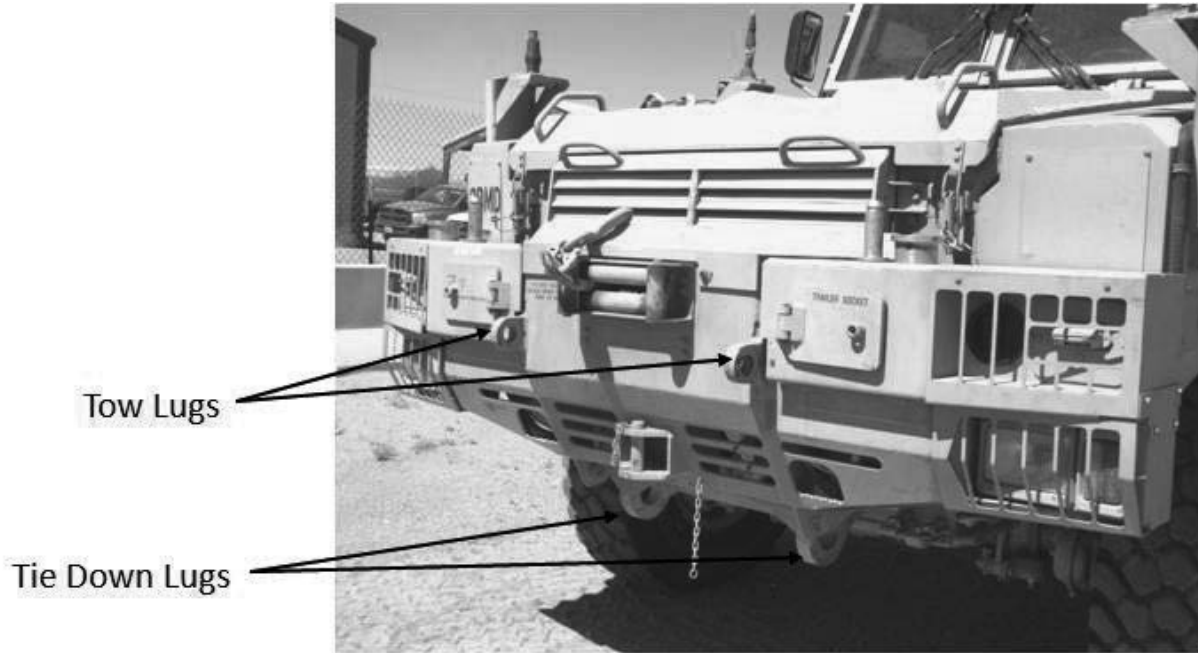
Hold crosstube when removing springs. Crosstube may swing and cause adapters to slide, resulting in personal injury.

2. Disconnect two springs (1) from tow cylinders (2).

**NOTE**

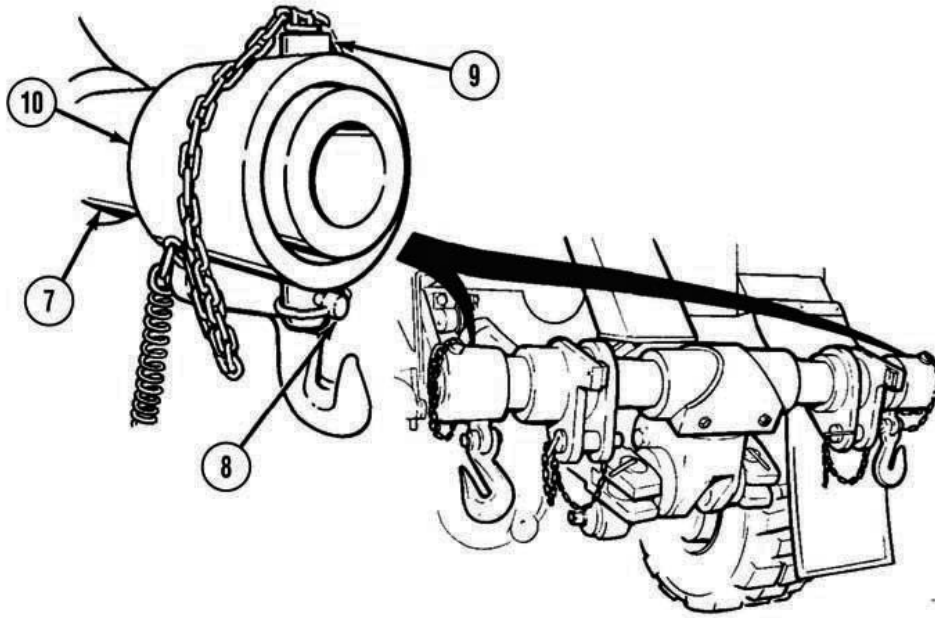
Right and left towing shackles are removed the same way.

3. Remove two cotter pins (3), pins (4), and towing shackles (5).



4. Pull LIFT CYLINDER control lever (6) to lower crossbar (7) until it is vertically level with the tie down lugs of the disabled vehicle.

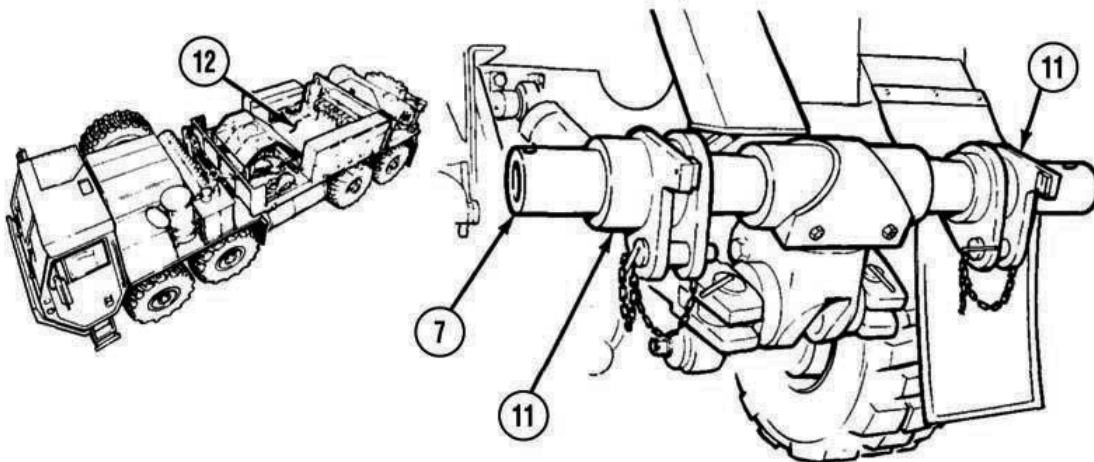
Position wrecker so that crossbar (7) is approximately 2 ft. (30 cm) from tie down lugs of disabled vehicle and centered on disabled vehicle.



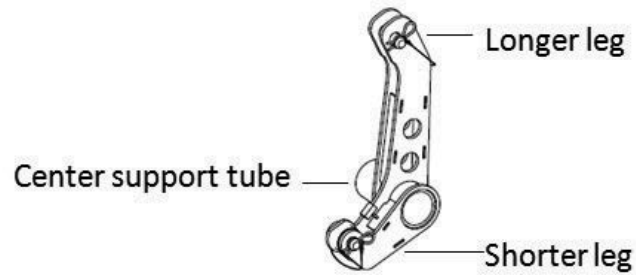
WARNING

When end caps are removed from crosstube, adapters may slide off, causing personal injury.

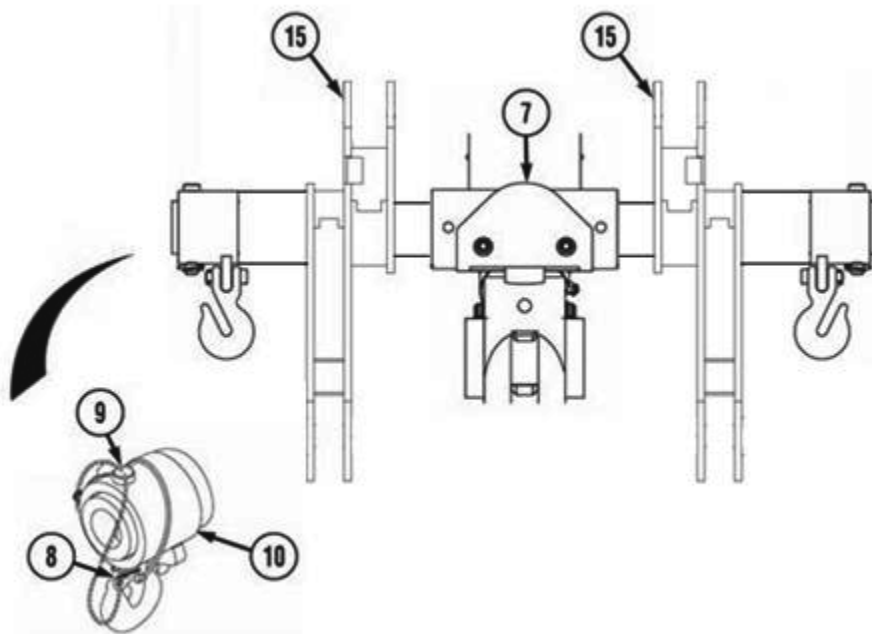
6. Remove two quick pins (8) and pins (9) from end caps (10).
7. Remove two end caps (10) from crosstube (7).



8. Remove two M977 front adapters (11) from crosstube (7) and secure on equipment body floor (12).

**NOTE**

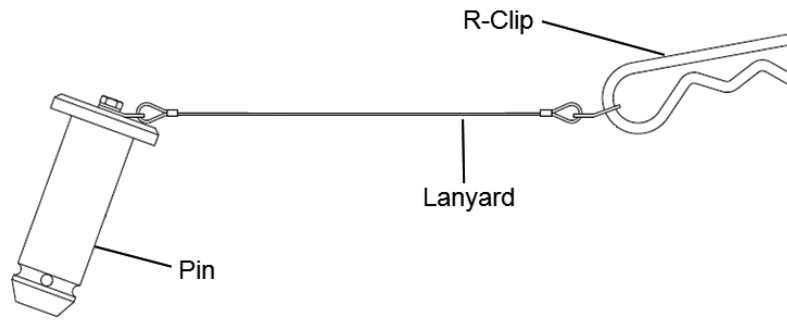
LTA's must be positioned on crosstube with each adapter's center support tube adjacent to the end caps.

**WARNING**

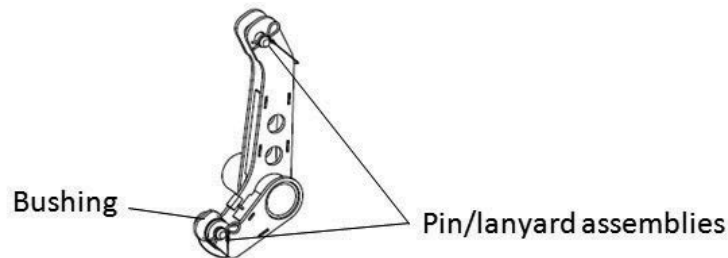
LTA's are heavy, approximately 73 lbs: Lifting adapters less than 3 feet requires 1 male or 2 females. Lifting LTA's higher than 3 feet requires 2 males or 2 females. Handle carefully or serious personal injury may result.

Adapters and end caps may slide off when installing, and may cause personal injury.

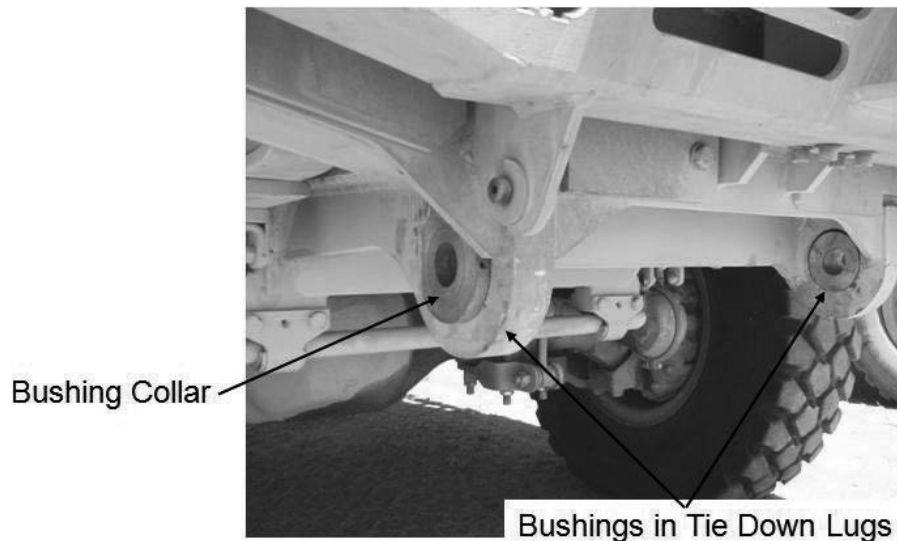
9. Install LTAs (15) on crosstube (7) with adapter center support tubes adjacent to the end caps, and aligned such that shorter leg of adapter will connect to the tie down lugs and longer leg will connect to the tow lugs.
10. Install two end caps (10) on crosstube (7).
11. Install two pins (9) and quick pins (8).
12. Attach two springs (1) on tow cylinders (2).



Pin/Lanyard Assembly



13. Remove two pin/lanyard assemblies and one bushing from each LTA assembly.



WARNING

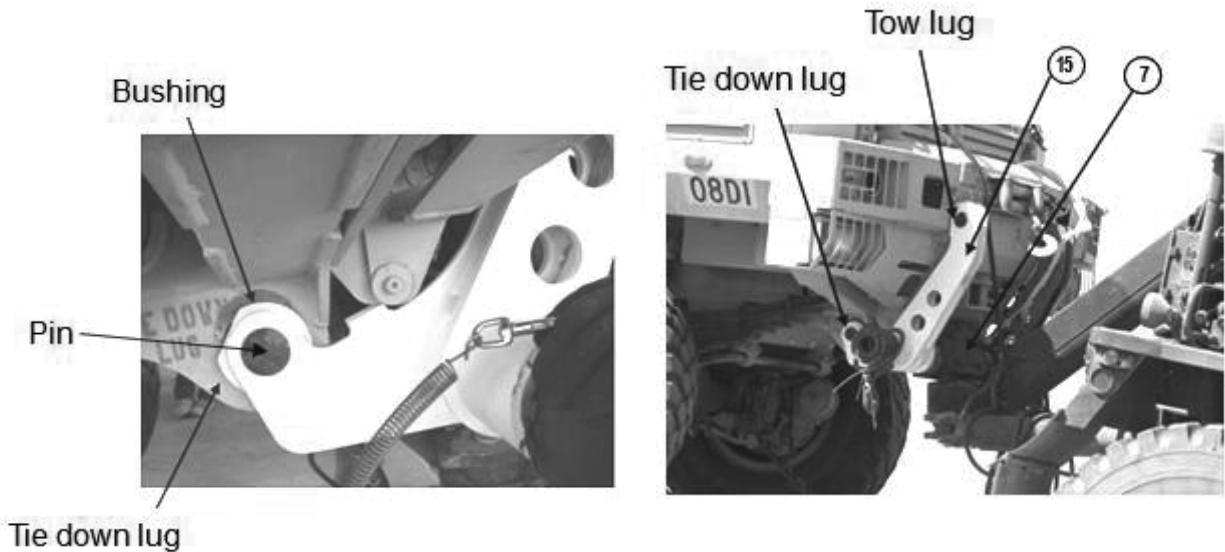
Keep hands and fingers away from adapters and tow eyes when operating retrieval system or serious personal injury or death may result.

NOTE

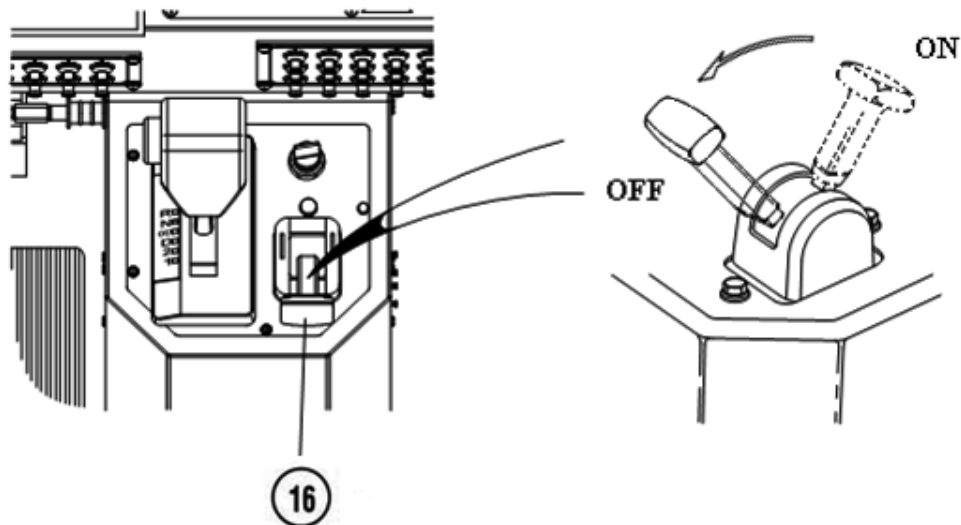
If disabled vehicle has tow shackles installed, remove shackles and stow in disabled vehicle.

14. Soldiers B and C each insert the bushings into the tie down lugs. For older variants of the RG31A2, the bushing collar should be on the outside of the tie down lug, but for the newer and upgraded variants, including the RG31A3, the collar may need to be on the inside of the tie down lug.

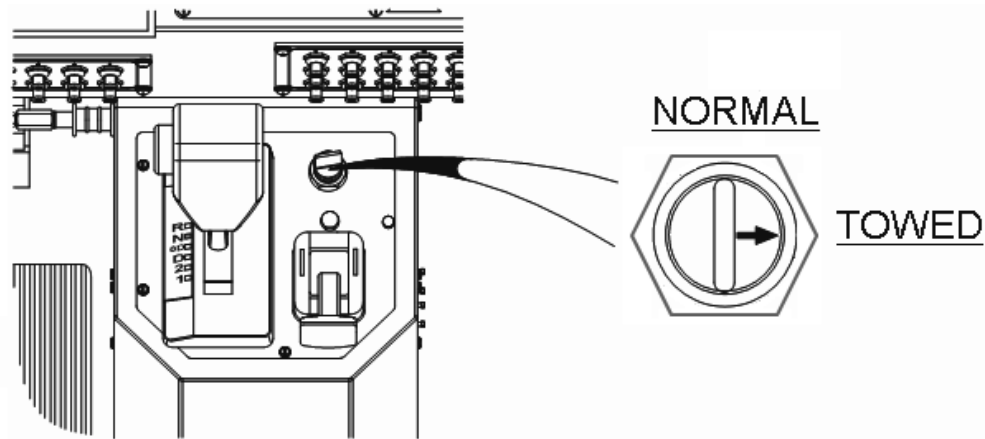
15. Soldier A operates retrieval system (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) while Soldier B and Soldier C position crosstube (7) so the hole in the shorter leg of the LTA (15) aligns with front tie down lugs and the bushings.
16. For both right and left LTAs, insert pins from pin/lanyard assemblies through the LTA (15), bushing and front tie down lug. Install R-clips in pins to lock in place.



17. Soldier A operates retrieval system (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) while Soldier B and Soldier C position crosstube (7) so the hole in the longer leg of the LTA (15) aligns with front tow lugs.
18. For both right and left LTAs, insert pins from pin/lanyard assemblies through the LTA (15) and front tow lug. Install R-clips in pins to lock in place.

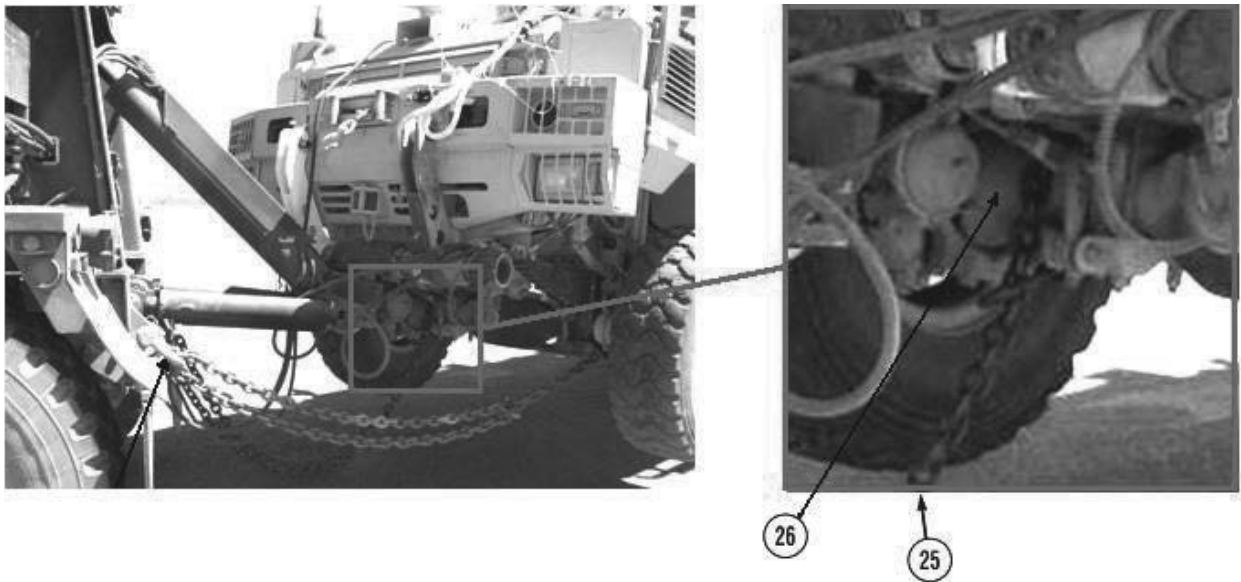


19. Disengage PARKING BRAKE LEVER (16) on disabled vehicle and remove chocks.

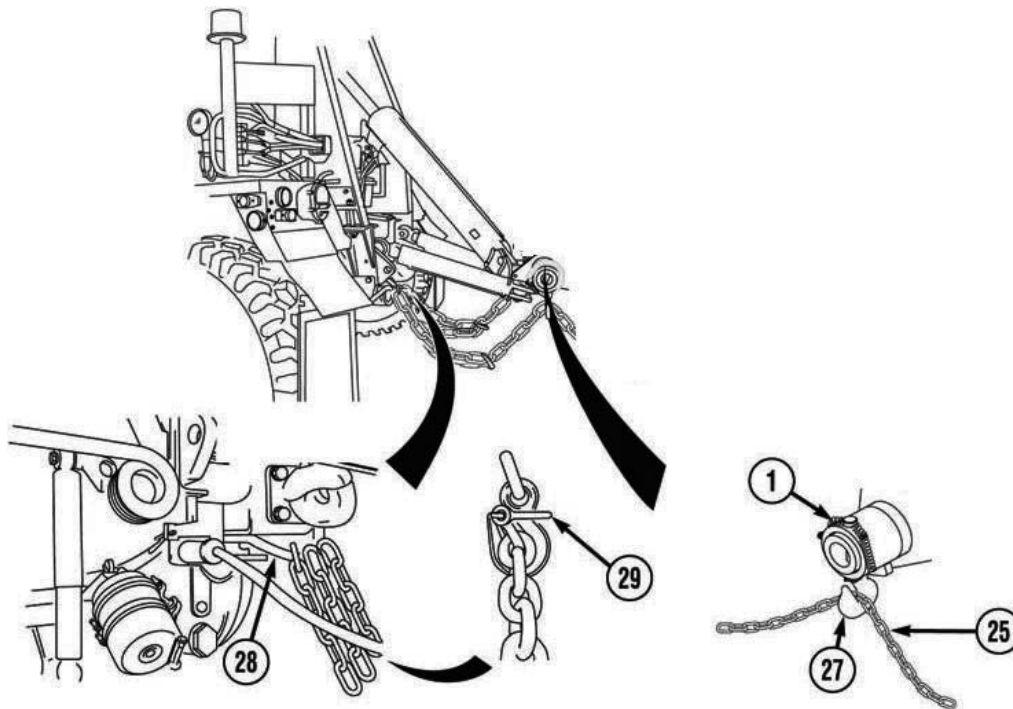
**NOTE**

The towed vehicle brake switch allows braking action from the towing vehicle to be transmitted to the towed vehicle. The switch should only be activated in the towed vehicle position when all pneumatic connections have been completed.

20. Turn the Towed Vehicle Brake Switch in the RG31A2/A3 to the "Towed" position. Arrow should point to the side.



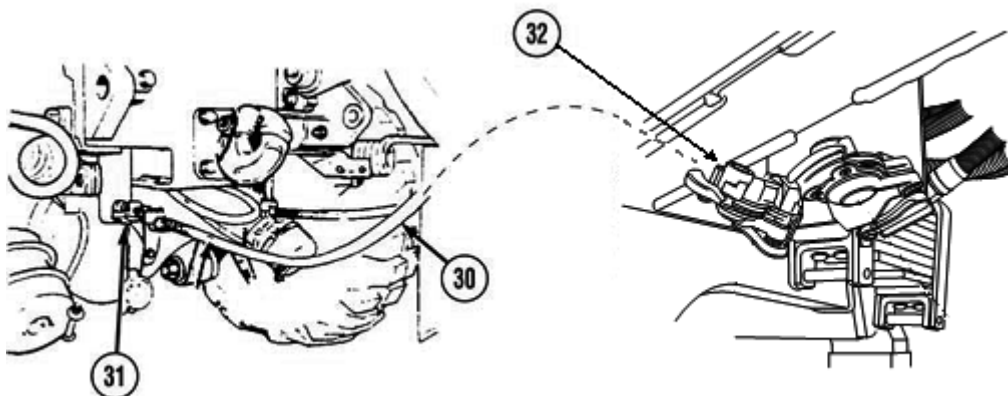
21. Remove two 16 ft. (4.9m) safety chains (25) from stowage.
22. Route one end of 16 ft. (4.9 m) safety chain (25) over front axle (26) of disabled vehicle.
23. Hook safety chain (25) together in front of axle (26).
24. Repeat above two steps for other side of disabled vehicle.

**NOTE**

Safety chains can be routed to safety chain hoop or towing shackles. Towing shackles can be used only after towing cylinders are extended.

Adjust chain slack so safety chains do not touch the ground.

25. Route safety chains to end cap hooks (27) and through safety chain hoop (28) on wrecker, and secure with safety shackles (29).
26. Wrap two springs (1) around crosstube (7) and secure.
27. Prepare disabled vehicle for towing (TM 9-2355-315-10, TM 9-2355-331-10).

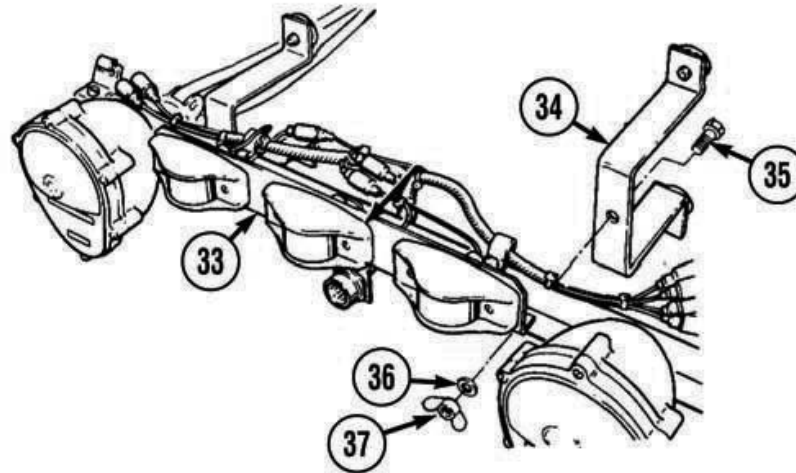


NOTE

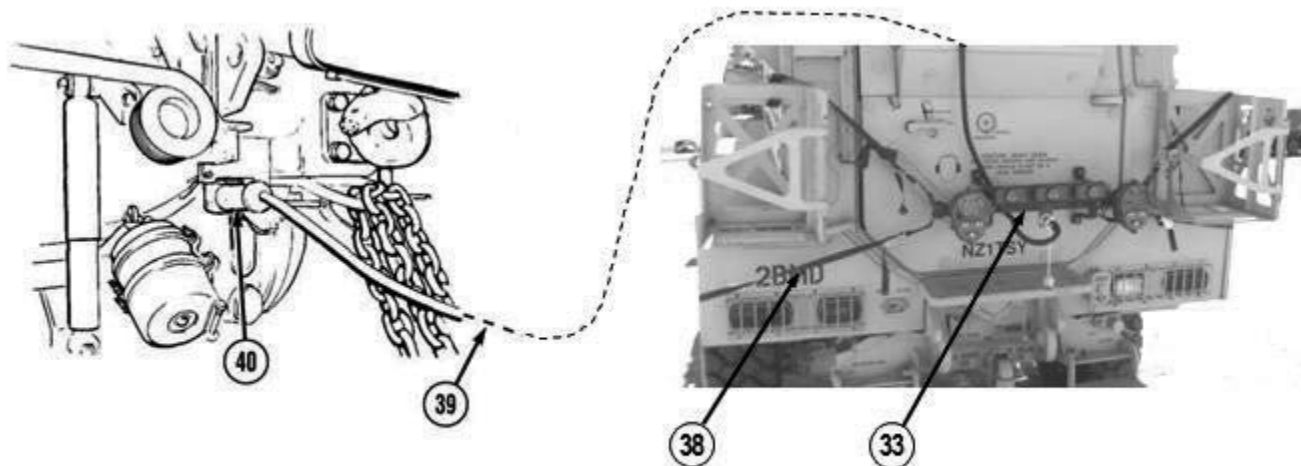
Rear emergency air hose from wrecker must be connected to the front emergency glad hand on the disabled vehicle. Rear service air hose from wrecker must be connected to the front service glad hand on the disabled vehicle.

When routing air hoses, ensure that they will not bind on the retrieval system or drag on the ground during turns.

28. Remove two air lines (30) from stowage and attach to rear glad hands (31) of wrecker.
29. Route two air lines (30) over crosstube and attach to front glad hands (32) of disabled vehicle.

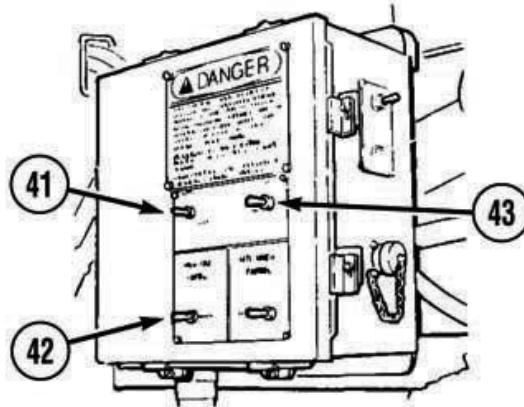


30. Remove emergency tow lights (33) and two brackets (34) from stowage.
31. Install two brackets (34) in center holes of emergency tow lights (33) with two screws (35), washers (36), and nuts (37).

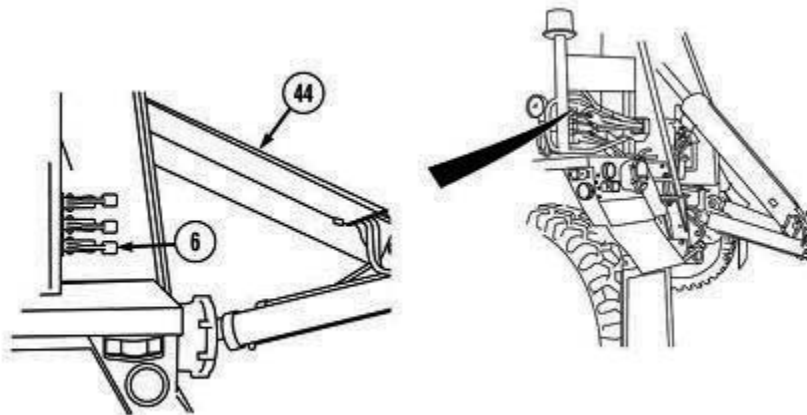


32. Install emergency tow lights (33) on rear of RG31A2/A3 and fasten securely with straps (38).

33. Remove tow light cable (39) from stowage and connect to emergency tow lights (33).
34. Route other end of tow light cable (39) along disabled vehicle and connect to rear electrical connector (40) on wrecker.



35. Set POWER switch (41) at rear of wrecker to ON position.
36. Set HIGH IDLE switch (42) at rear of wrecker to CONTINUOUS.
37. Push and release LATCH switch (43) at rear of wrecker. Engine speed will increase to approximately 1500 rpm.



WARNING

Keep out from under retrieval system and disabled vehicle when raised off ground or personal injury or death may result.

CAUTION

Make sure all rigging is secure. Loose rigging can become entangled and cause equipment damage.

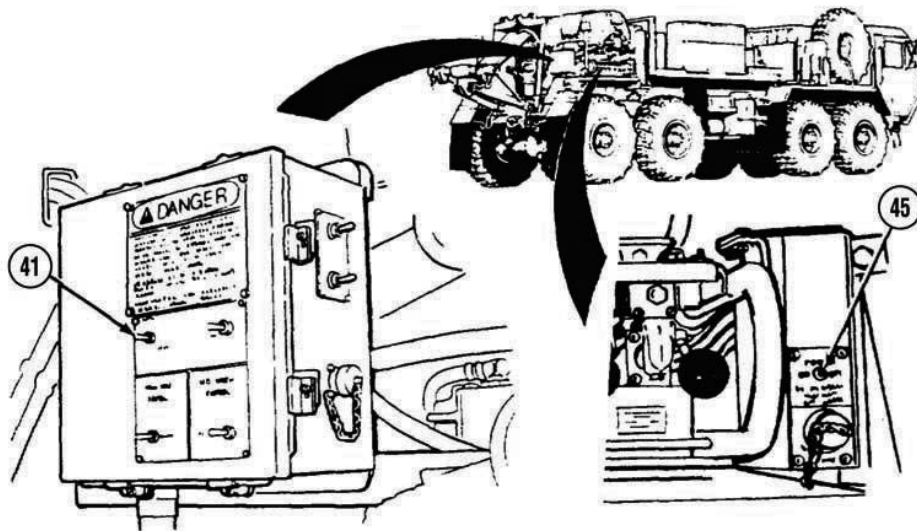
Fully retract two tow cylinders before lifting disabled vehicle or damage to equipment may result.

38. Push in LIFT CYLINDER control lever (6) to retract lift cylinder (44) to raise disabled vehicle approximately 1 ft. (30 cm) off ground.

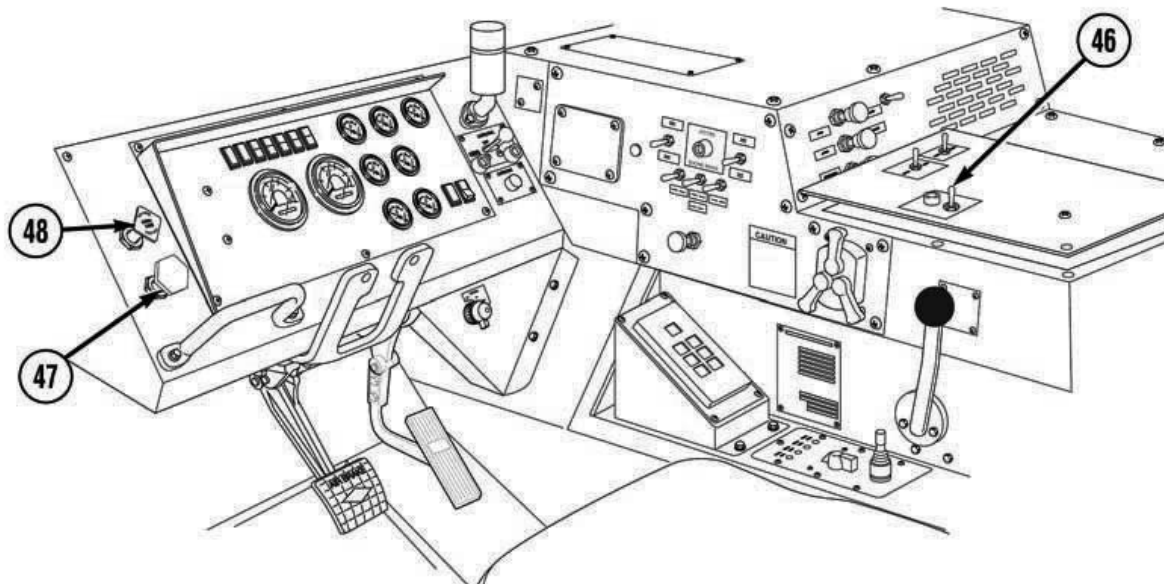
39. Adjust slack in two 16 ft. (4.9 m) safety chains so chains between crosstube and wrecker are approximately 1 ft. (30 cm) off ground.

CAUTION

When routing safety chains, ensure that they will not bind on the retrieval system or drag on the ground during turns, or damage to equipment may result.



40. Set POWER switch (41) to OFF position.
41. Set POWER switch (45) to OFF position.



42. Set PTO ENGAGE switch (46) in wrecker to OFF position.
43. Push in TRAILER AIR SUPPLY control (47) in wrecker.

44. Turn on service drive lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).
45. Turn on emergency flashers on wrecker (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) and disabled vehicle.
46. Push in PARKING BRAKE control (48) and select desired gear (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

WARNING

The M984 should not be operated at speeds over 15 MPH (24 km/hr) except on paved roads when the operator determines that the vehicle being towed and the terrain allow safe operation. Engine brake switch must be "ON" for all towing operations. The following are maximum safe speeds:

Terrain Condition	Maximum speed with towed load
On road-level	25 mph (40 km/hr)
On road-hilly	15 mph (24 km/hr)
Off road	15 mph (24 km/hr)

WARNING

Speeds in excess of the above can result in loss of control, serious injury, or death.

47. Transport disabled vehicle.

END OF TASK

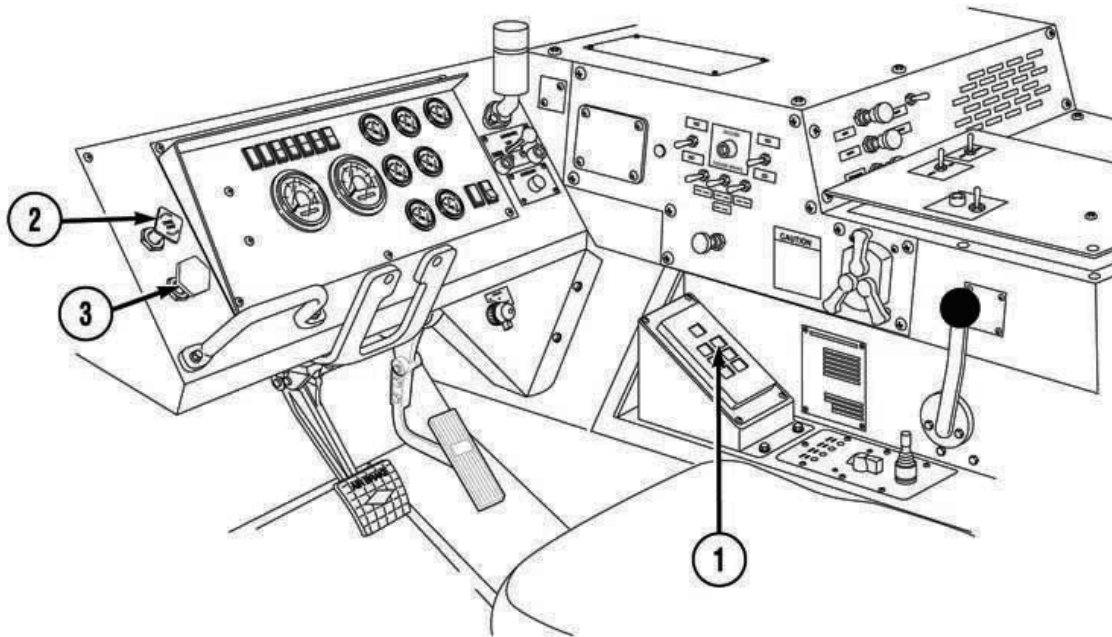
FRONT DISCONNECT

NOTE

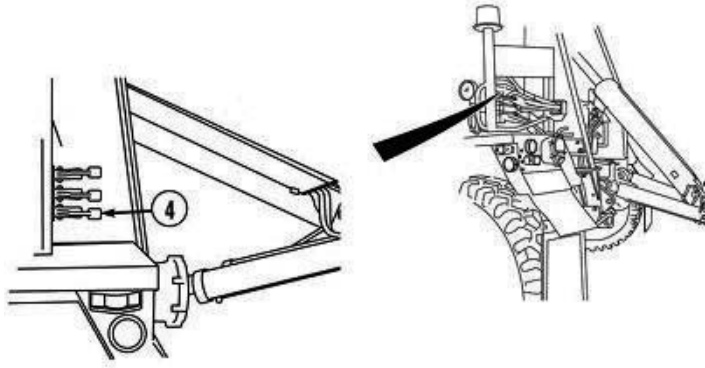
This is a three-soldier task.

WARNING

While vehicles are connected, avoid parking on grades over 20%, and avoid towing on grades over 30%. Failure to comply may cause damage to equipment or serious personal injury or death.

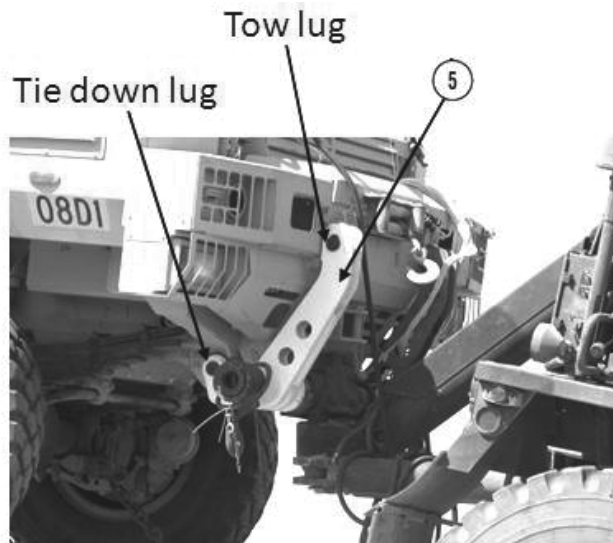


1. Set wrecker transmission range selector (1) to N (neutral).
2. Pull wrecker PARKING BRAKE control (2).
3. Pull wrecker TRAILER AIR SUPPLY control (3).
4. Prepare retrieval system for operation (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).



WARNING

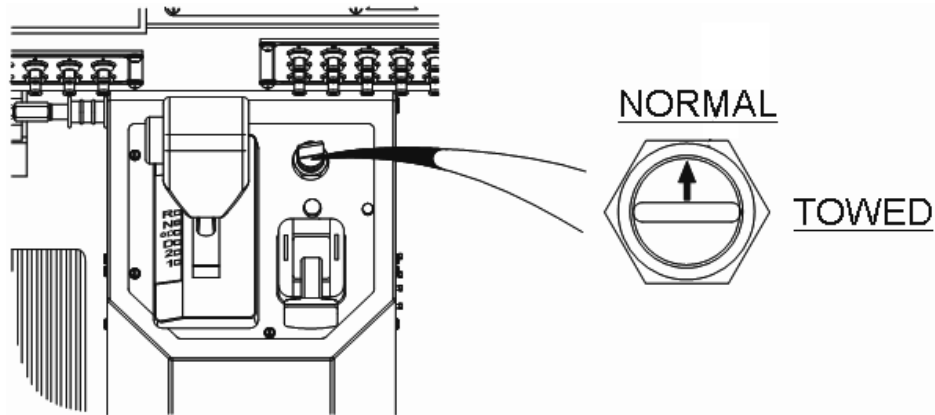
Do not stand between vehicles while disabled vehicle is raised off ground or serious personal injury or death can result.



NOTE

After lowering disabled vehicle, extend lift and tow cylinders approximately 2 to 4 inches (51 to 102 mm) to allow for adjustment when removing adapters.

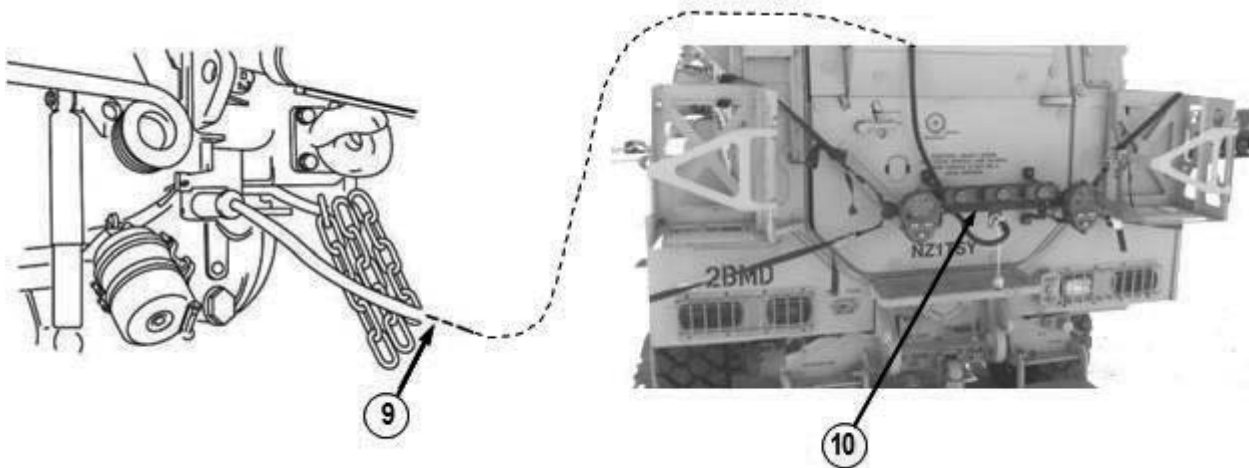
5. Pull LIFT CYLINDER control lever (4) to extend lift cylinder and lower disabled vehicle to the ground to release tension on LTAs (5) on tow and tie down lugs.



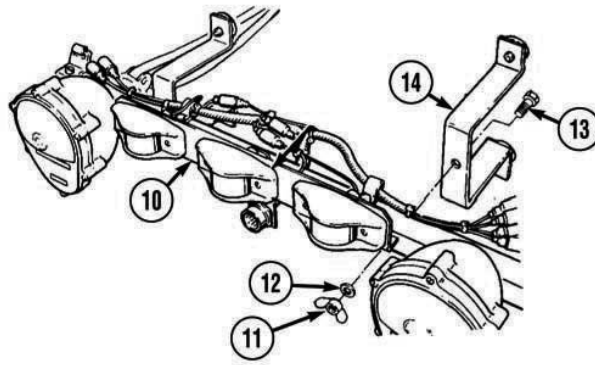
WARNING

The arrow on the vehicle brake switch must be in the forward position during normal operation. If activated during normal operation, all four wheels of the vehicle will lock up. This switch is only to be activated in the towed vehicle when the pneumatic lines have been coupled to a towing vehicle.

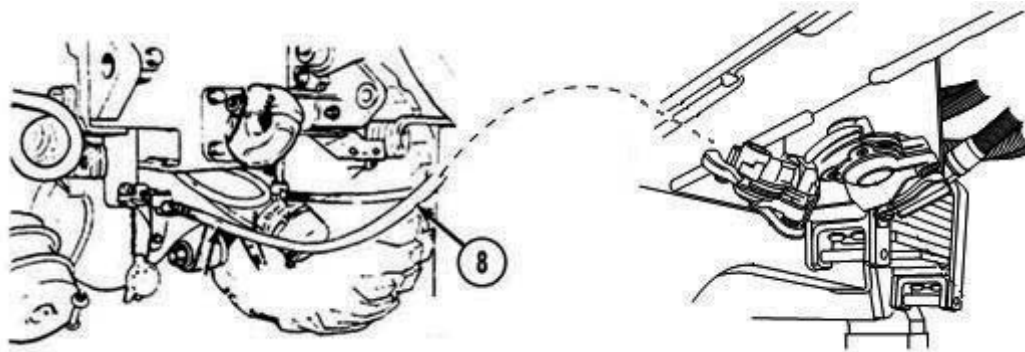
6. Turn the Towed Vehicle Brake Switch in the RG31A2/A3 to the "Normal" position. Arrow should point forward.



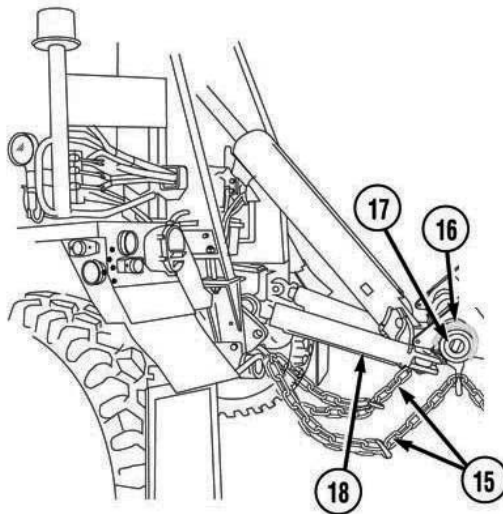
7. Turn off service and emergency lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).
8. Remove tow light cable (9) from wrecker.
9. Remove tow light cable (9) from emergency tow lights (10) and stow.
10. Remove emergency tow lights (10) from disabled vehicle.



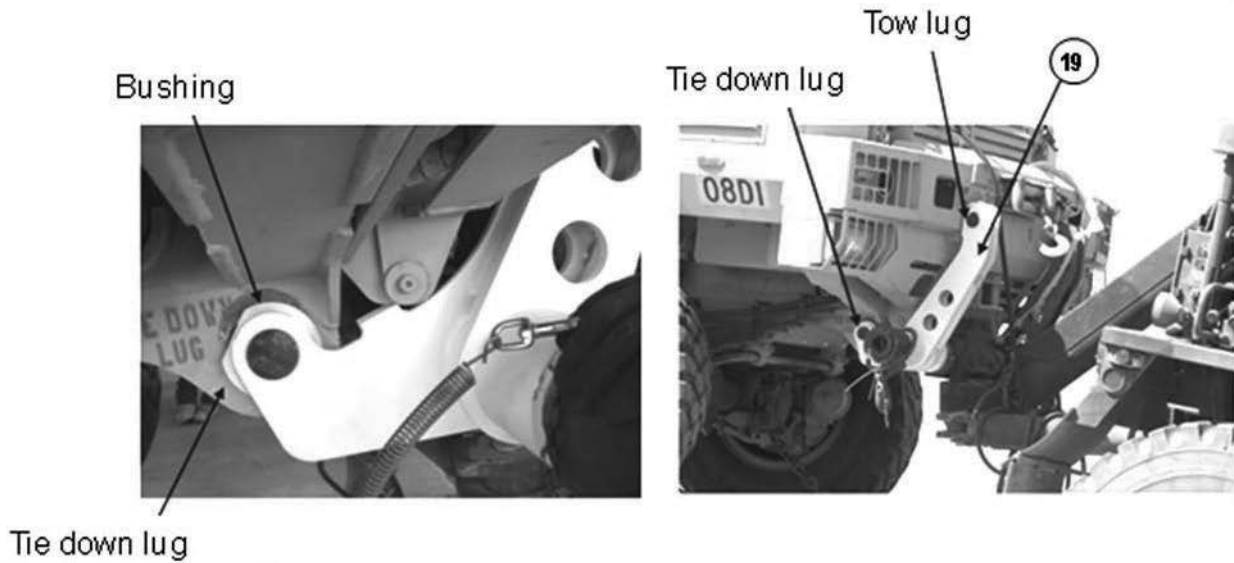
11. Remove two nuts (11), washers (12), screws (13), and brackets (14) from emergency tow lights (10). Stow emergency tow lights (10) and brackets (14).



12. Remove and stow air lines (8).



13. Remove and stow two 16 ft. (4.9 m) safety chains (15).
14. Unwrap two springs (16) from crosstube (17) and connect to tow cylinders (18).

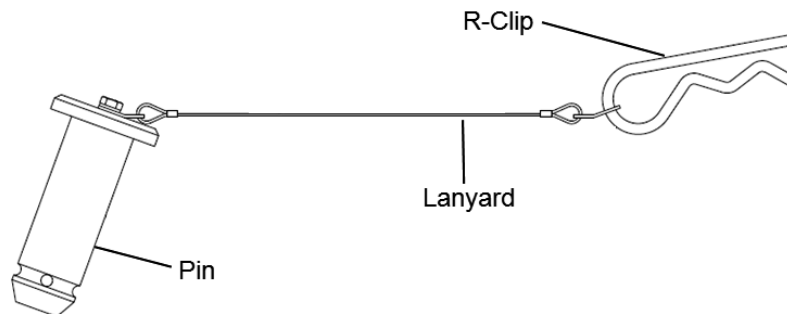
**WARNING**

Keep hands and fingers away from adapters and tow eyes when operating retrieval system or serious personal injury or death may result.

LTA's will rotate when pins are removed. Use caution or serious personal injury may result.

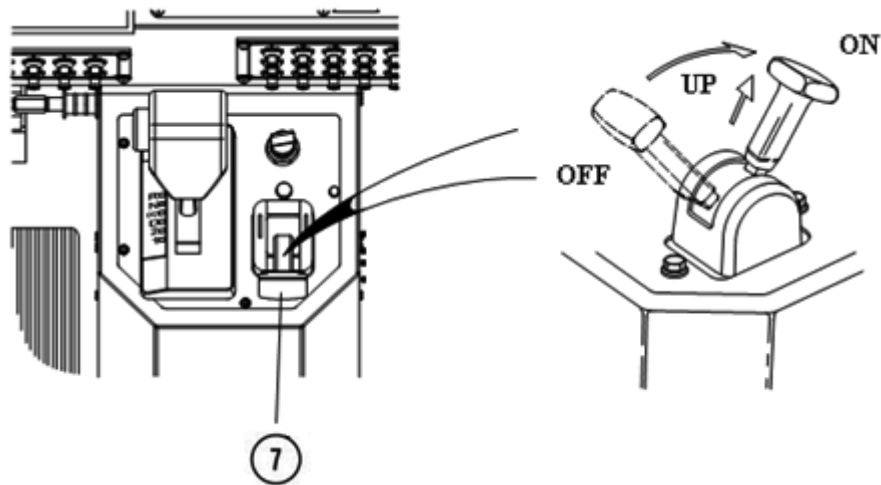
NOTE

Use retrieval controls to position crosstube to relieve tension from adapters.



Pin/Lanyard Assembly

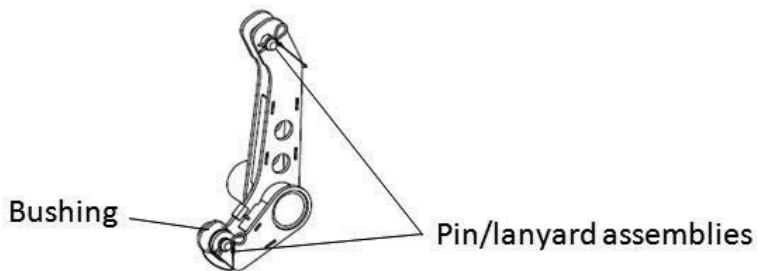
15. For both right and left LTA's, remove R-clips from pins holding the LTA (19) to the front tow lug.



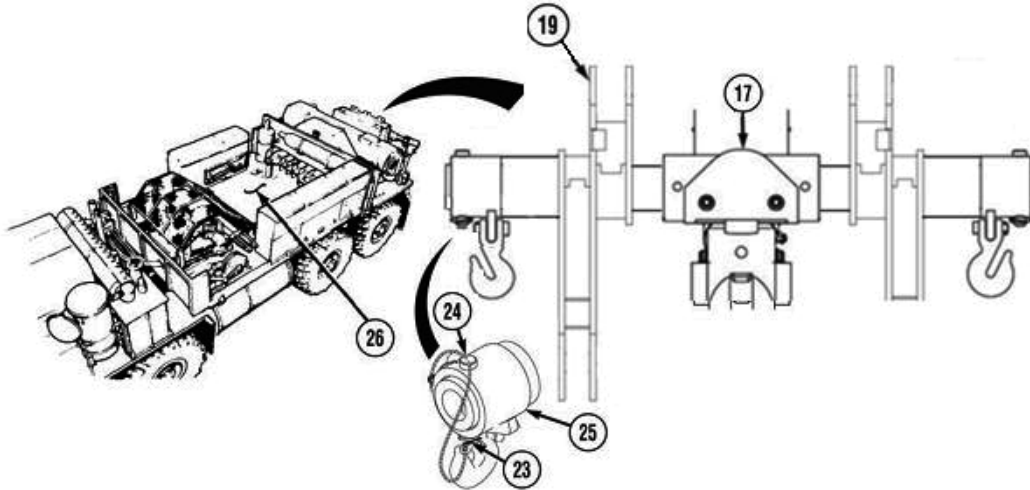
WARNING

If disabled vehicle's parking brake is inoperative, chock wheels of disabled vehicle. Failure to chock wheels may result in personal injury.

16. Pull PARKING BRAKE control (7) on disabled vehicle. If parking brake is inoperative, chock wheels on disabled vehicle.
17. For both right and left LTAs, remove R-clips from pins holding the LTA (19) and bushing to the front tie down lug.
18. Remove bushings from tie down lugs.



19. With the LTAs disconnected from the towed vehicle, place the bushings and pin/lanyard assemblies in the LTA holes and secure with the R-clips.



20. Drive wrecker forward a few feet and park (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

WARNING

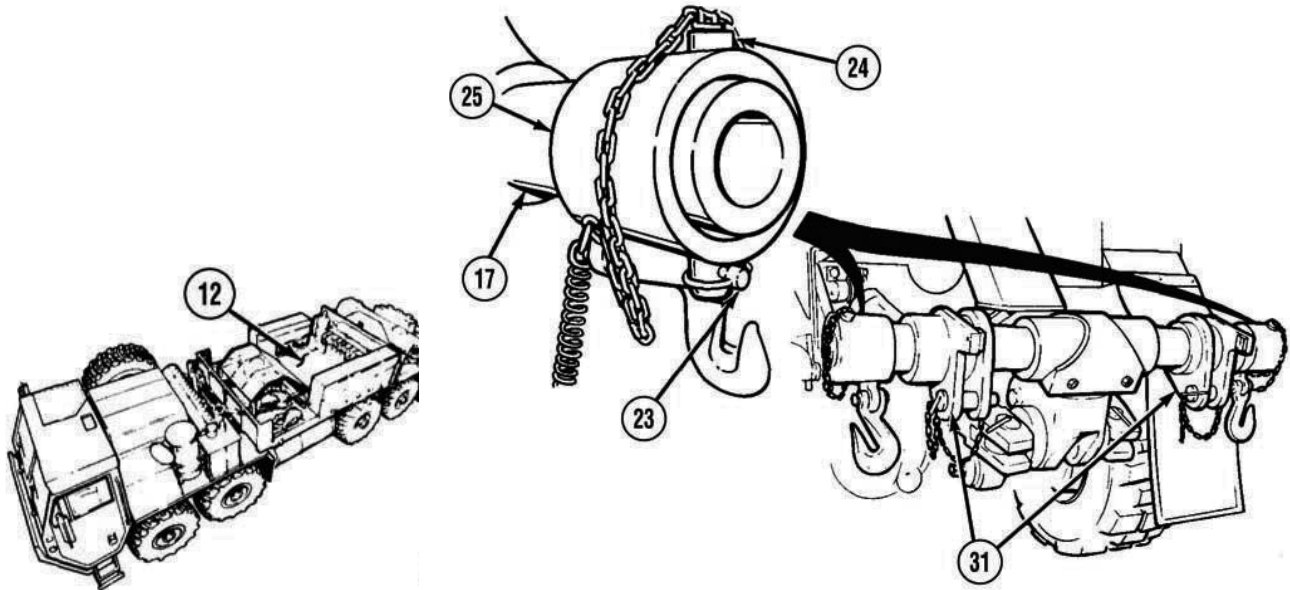
Hold cross tube when removing springs and endcaps. Cross tube may swing and cause adapters to slide, resulting in personal injury.

21. Remove two springs (16) from tow cylinders (18).
22. Remove two quick pins (23) and pins (24) from end caps (25).
23. Remove two end caps (25) from crosstube (17).

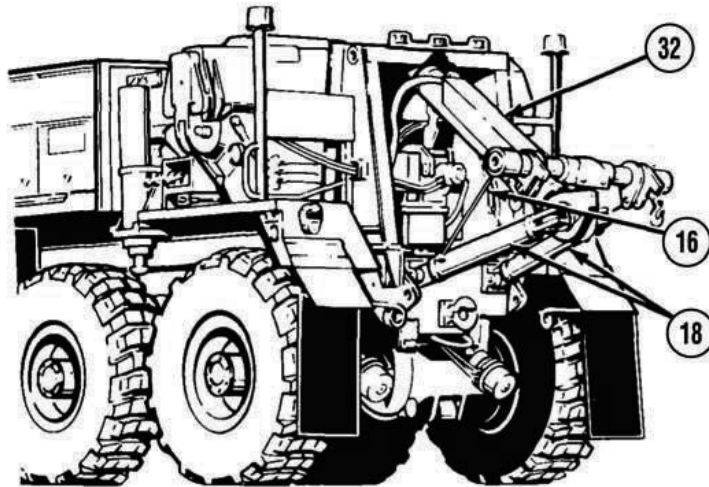
WARNING

LTA's are heavy, approximately 73 lbs: Lifting adapters less than 3 feet requires 1 male or 2 females. Lifting LTA's higher than 3 feet requires 2 males or 2 females. Handle carefully or serious personal injury may result.

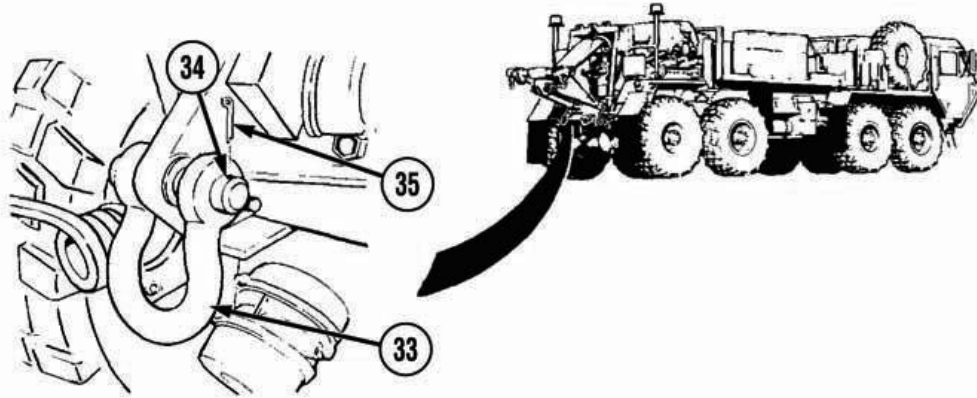
24. Remove two LTA's (19) from crosstube (17).



25. Remove M977 front adapters (31) from equipment body floor (12).
26. Install two M977 front adapters (31) on crosstube (17).
27. Install two end caps (25) on crosstube (17).
28. Install two pins (24) and quick pins (23).

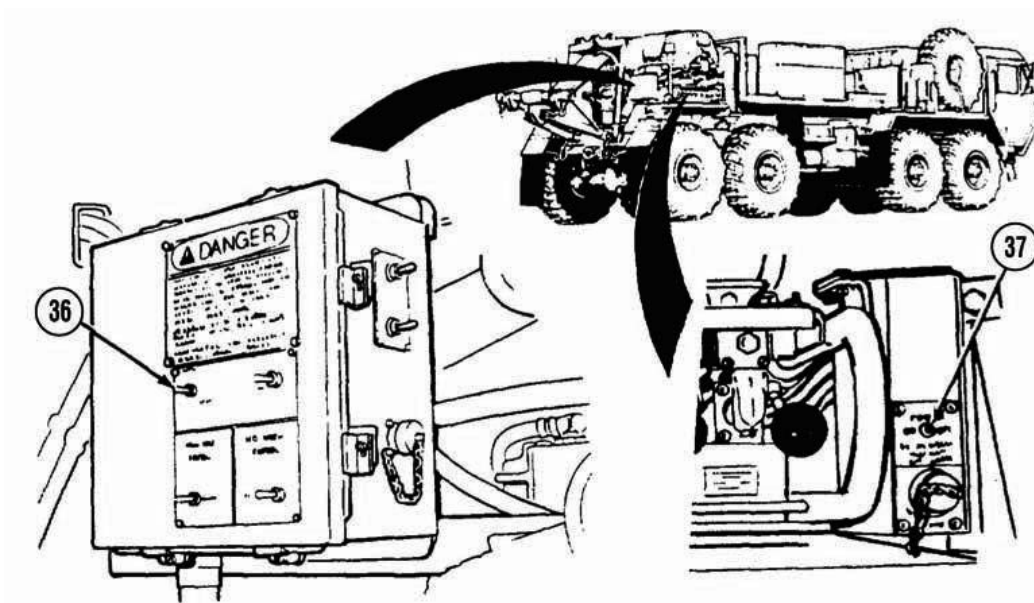


29. Install two springs (16) on tow cylinders (18).
30. Operate retrieval controls and fully retract lift cylinders (32) and tow cylinders (18).

**NOTE**

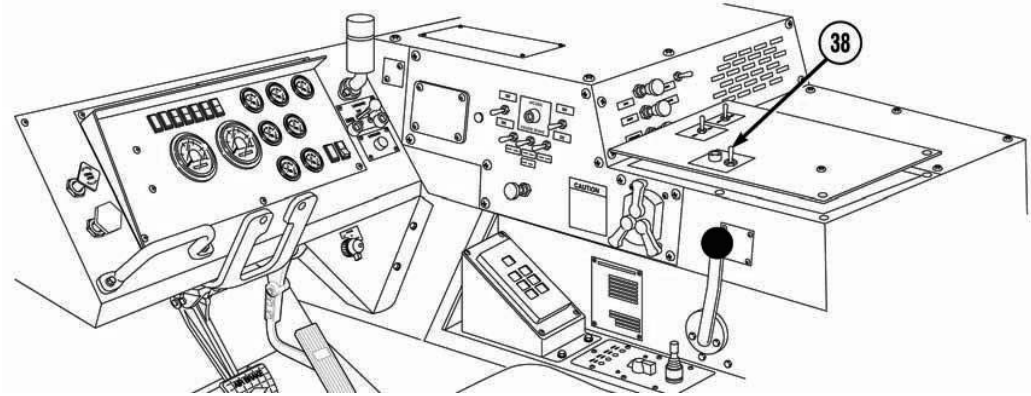
Right and left towing shackles are installed the same way.

31. Install two towing shackles (33), pins (34), and cotter pins (35).



32. Set POWER switch (36) to OFF position.

33. Set POWER switch (37) to OFF position.



34. Turn off emergency flashers on wrecker (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) and disabled vehicle.
35. Turn off service drive lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).
36. Set PTO ENGAGE switch (38) to OFF position.
37. Remove and stow beacon lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).
38. Shut off engine (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

END OF TASK

END OF WORK PACKAGE

OPERATOR MAINTENANCE
REAR LIFT AND TOW OF RG31A2

REAR HOOKUP**WARNING**

Rear lift tow is for emergency only. Rear lift tow has been approved for RG31A2 only, do not attempt for RG31A3.

NOTE

This is a three-soldier task.

When using the M984A4 retrieval system, do not touch the brakes while running the PTO. This will cause the hydraulic system to shut down, and will require the operator to either restart the PTO at the rear power panel or to flip the main hydraulic switch in the cab off and then on again. (TM 9-2320-342-10-1)

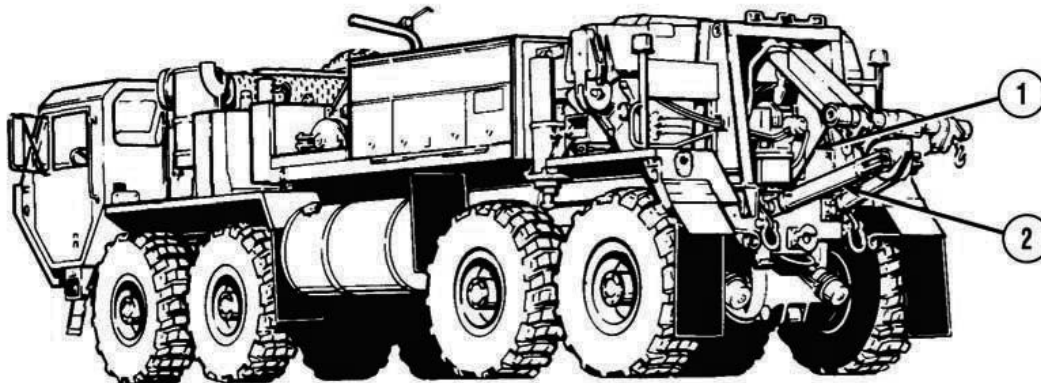
WARNING

While vehicles are connected, avoid parking on grades over 20%, and avoid towing on grades over 30%. Failure to comply may cause damage to equipment or serious personal injury or death.

CAUTION

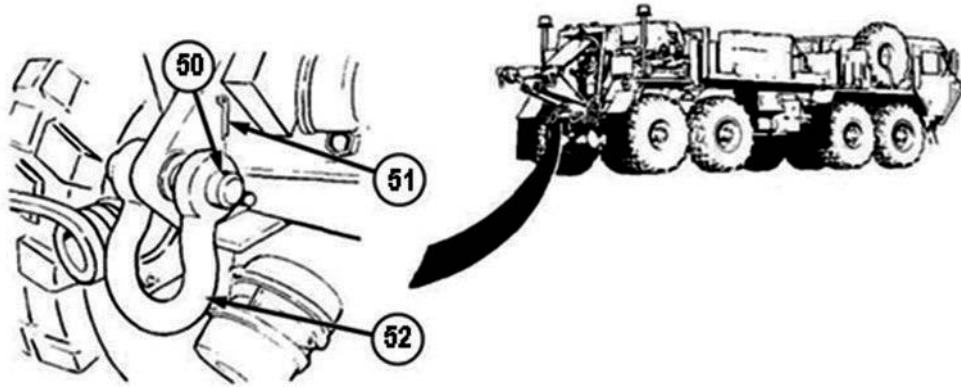
Gross Axle Weight Rating on RG31A2 is exceeded during lift tow. Strictly adhere to specified towing restrictions, or damage to disabled vehicle may result.

1. Prepare retrieval system for operation (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

**WARNING**

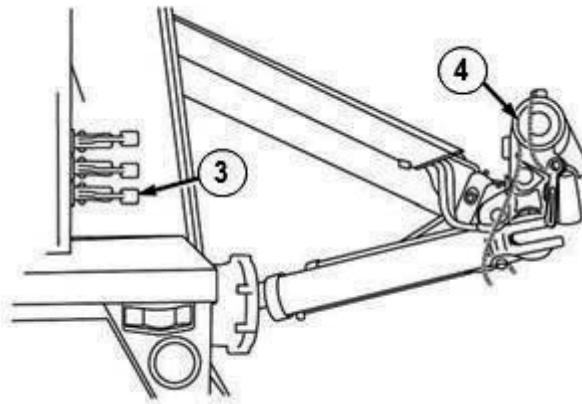
Hold crosstube when removing springs. Crosstube may swing and cause adapters to slide, resulting in personal injury.

2. Disconnect two springs (1) from tow cylinders (2).

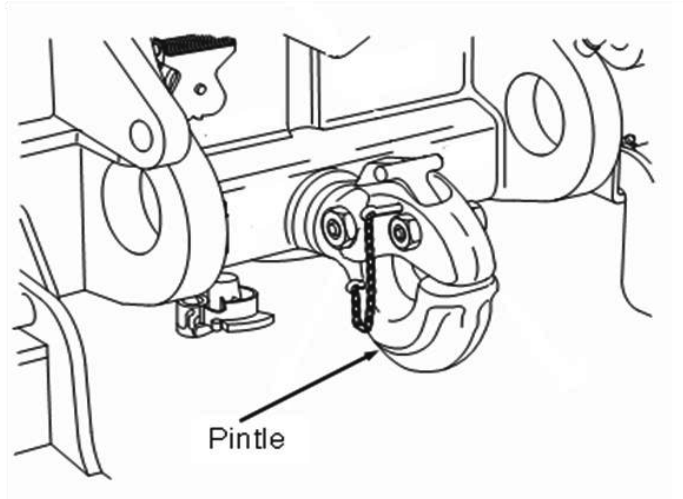
**NOTE**

Right and left towing shackles are removed the same way.

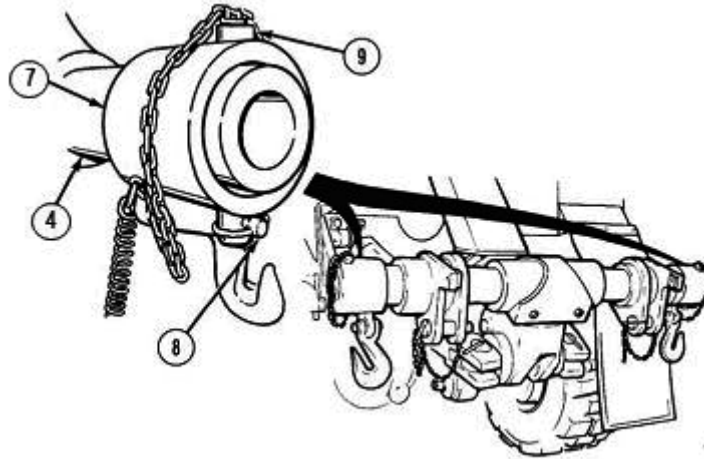
3. Remove two cotter pins (51), pins (50), and towing shackles (52).



4. Pull LIFT CYLINDER control lever (3) to lower cross-tube (4) to approximately 3 ft. (1 m) above the ground.

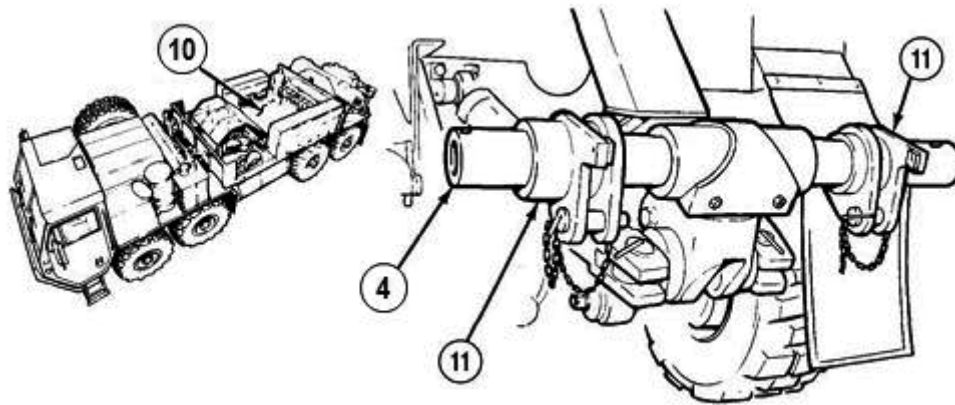


5. Remove rear pintle from disabled vehicle (TM 9-2355-315-10).
6. Stow pintle in disabled vehicle.

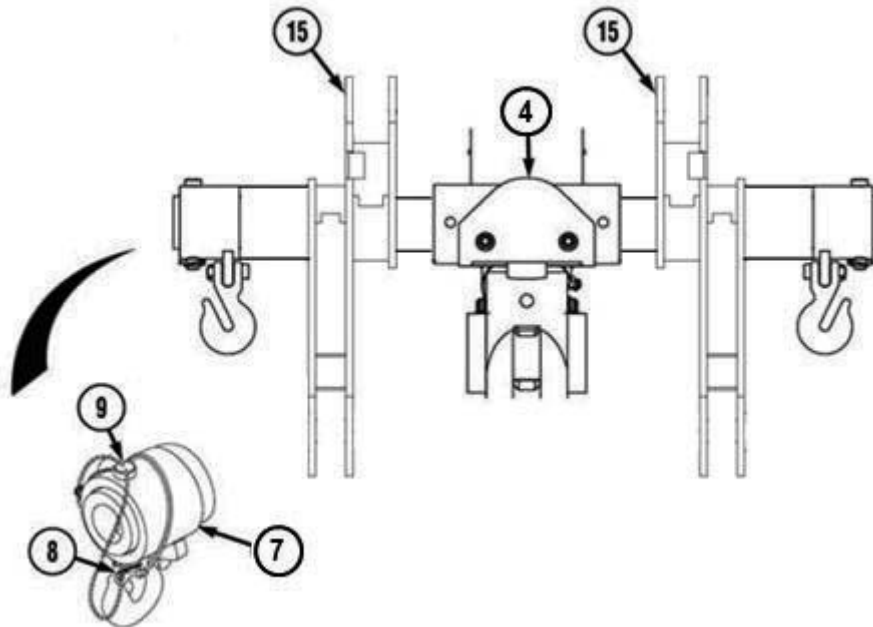
**WARNING**

When end caps are removed from crosstube, adapters may slide off, causing personal injury.

7. Remove two quick pins (8) and pins (9) from end caps (7).
8. Remove two end caps (7) from crosstube (4).

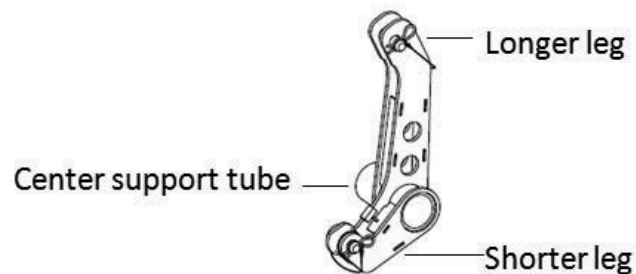


9. Remove two M977 front adapters (11) from crosstube (4) and secure on equipment body floor (10).
10. Position wrecker so that crosstube (4) is approximately 1 ft. (30cm) from tie down lugs of disabled vehicle and centered on disabled vehicle.

**WARNING**

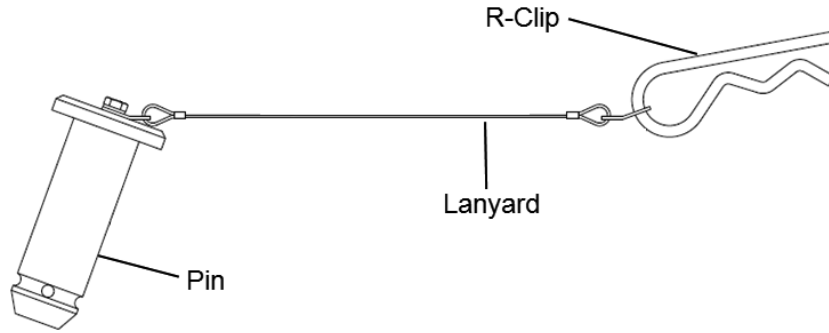
LTAs are heavy, approximately 73 lbs: Lifting adapters less than 3 feet requires 1 male or 2 females. Lifting LTAs higher than 3 feet requires 2 males or 2 females. Handle carefully or serious personal injury may result.

Adapters and end caps may slide off when installing, and may cause personal injury.

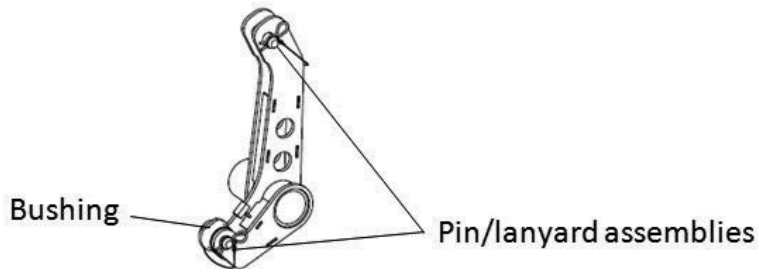
**NOTE**

LTAs must be positioned on crosstube with each adapter's center support tube adjacent to the end caps.

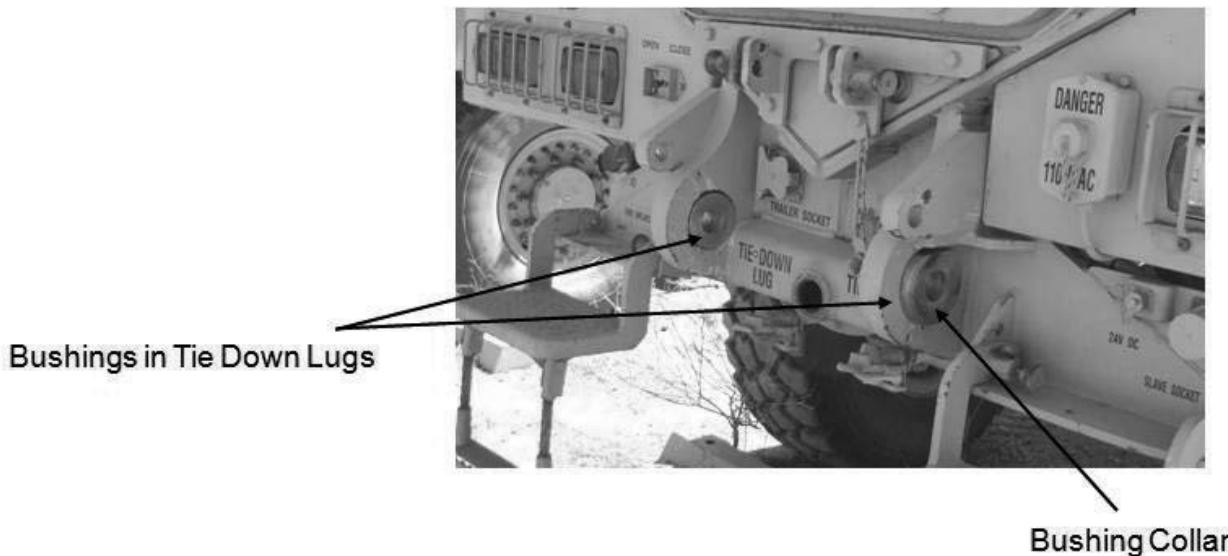
11. Install LTAs (15) on crosstube (4) with adapter center support tubes adjacent to the end caps, and aligned such that that shorter leg of the adapter will connect to the rear tie down lugs.
12. Install two end caps (7) on crosstube (4).
13. Install two pins (9) and quick pins (8) on end caps (7).
14. Attach two springs (1) on tow cylinders (2).



Pin/Lanyard Assembly



15. Remove pin/lanyard assembly and bushing from shorter leg of each LTA.



WARNING

Keep hands and fingers away from adapters and tow eyes when operating retrieval system or serious personal injury or death may result.

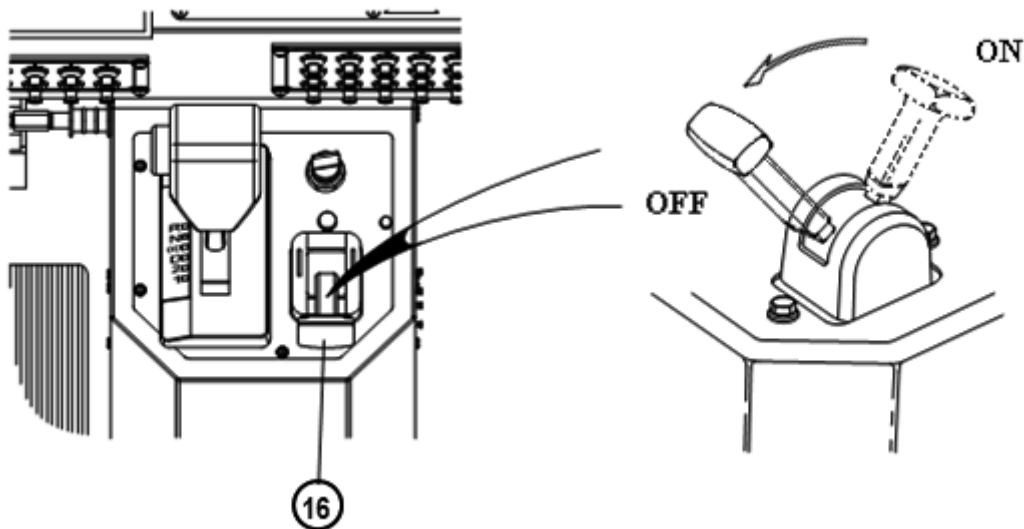
NOTE

If disabled vehicle has towing shackles installed, remove shackles and stow in disabled vehicle.

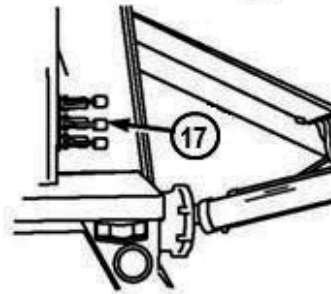
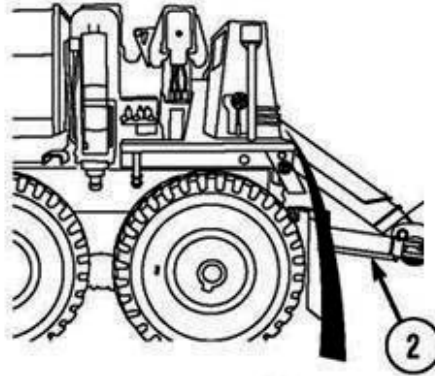
- Soldier A operates retrieval system (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) while Soldiers B and C each insert the bushings into the tie down lugs, so that the bushing collar is on the outside of the tie down lug.



- Soldier A operates retrieval system (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) while Soldier B and Soldier C position crosstube (4) and LTAs (15) so the hole in the shorter leg of the LTA (15) aligns with rear tie down lug and bushing.
- Insert pins from pin/lanyard assembly through LTAs (15), bushings, and rear tie down lugs. Install R-clips in pins to lock in place.

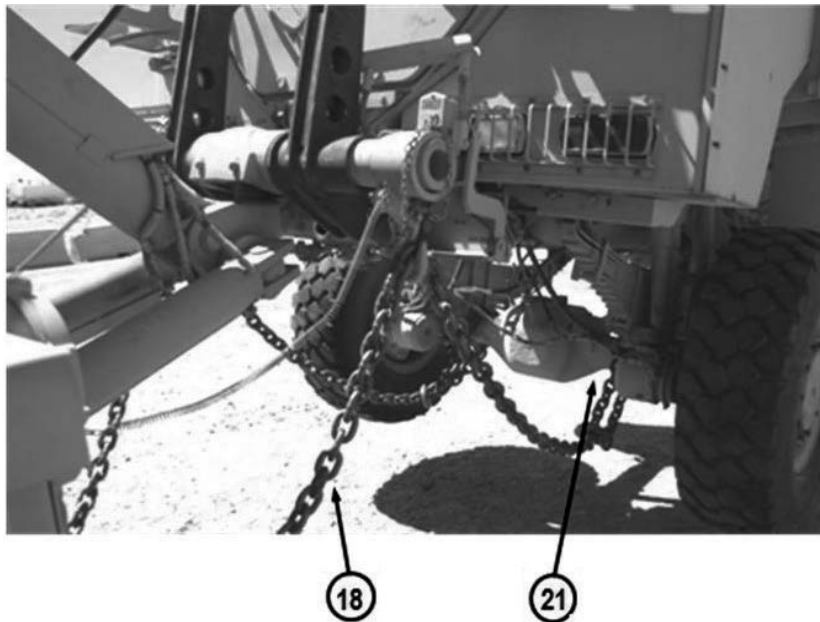


- Disengage PARKING BRAKE LEVER (16) on disabled vehicle and remove chocks.

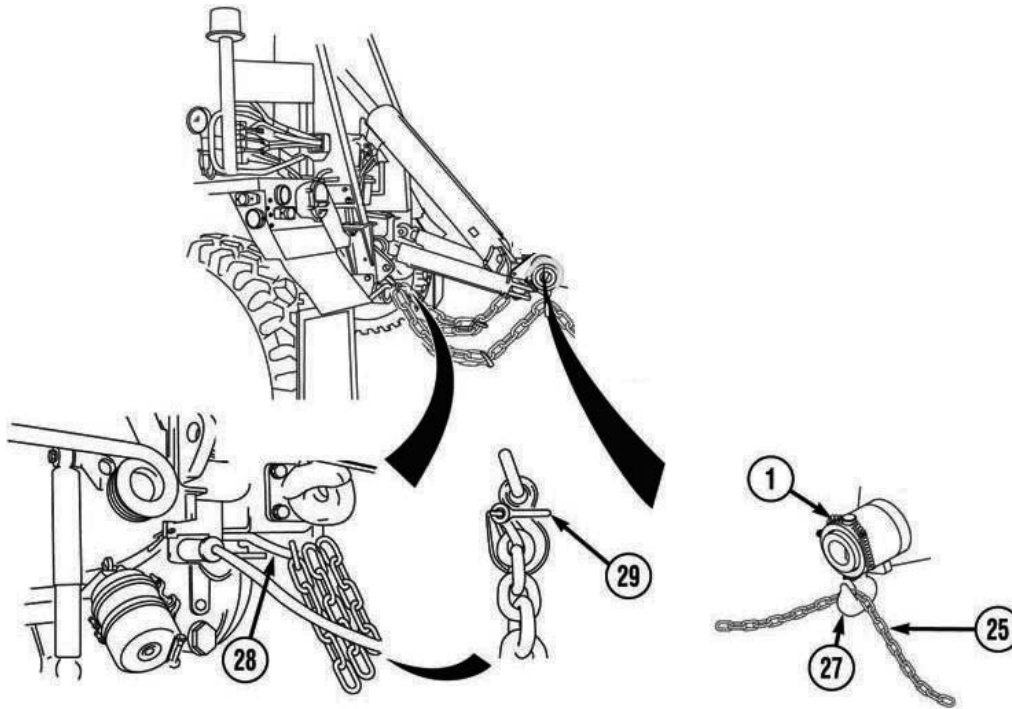
**NOTE**

Do not lift vehicle off ground when performing the next step.

20. Operate TOW and LIFT CYLINDER control levers (17) until tow cylinders (2) are fully retracted.



21. Remove two 16 ft. (4.9 m) safety chains (18) from stowage.
22. Route one end of 16 ft. (4.9 m) safety chain (18) over rear axle (21) of disabled vehicle.
23. Hook safety chain (18) together in front of axle (21).
24. Repeat above two steps for other side of disabled vehicle.

**NOTE**

Safety chains can be routed to safety chain hoop or towing shackles. Towing shackles can be used only after towing cylinders are extended.

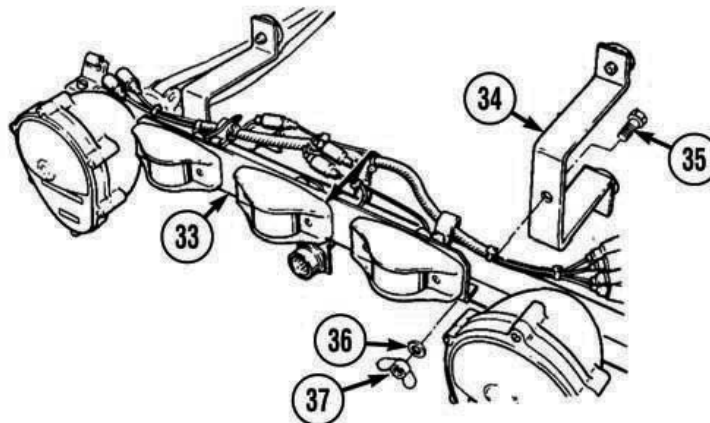
Adjust chain slack so safety chains do not touch the ground.

25. Route safety chains to end cap hooks (27) and through safety chain hoop (28) on wrecker, and secure with safety shackles (29).

CAUTION

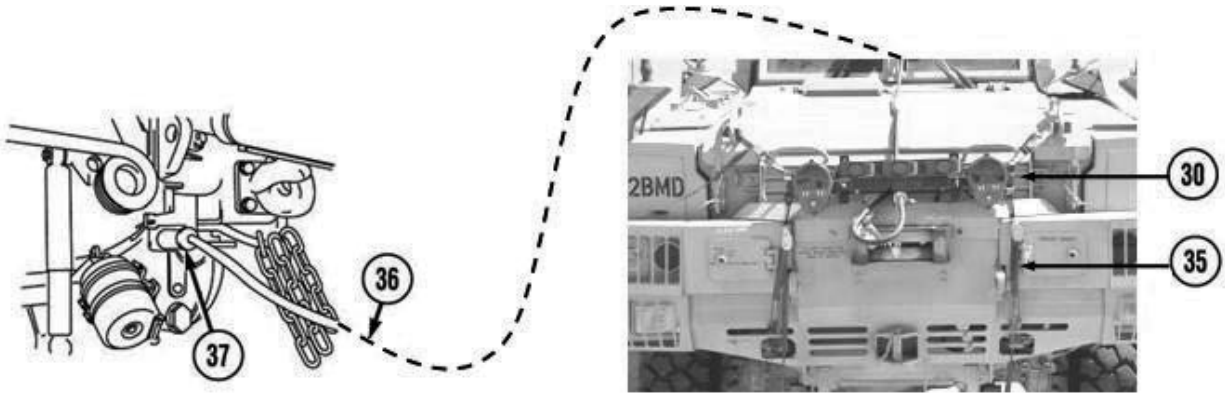
When routing safety chains, ensure that they will not bind on the retrieval system or drag on the ground during turns, or damage to equipment may result.

26. Wrap two springs (1) around crosstube and secure.
27. Prepare disabled vehicle for towing (TM 9-2355-315-10).

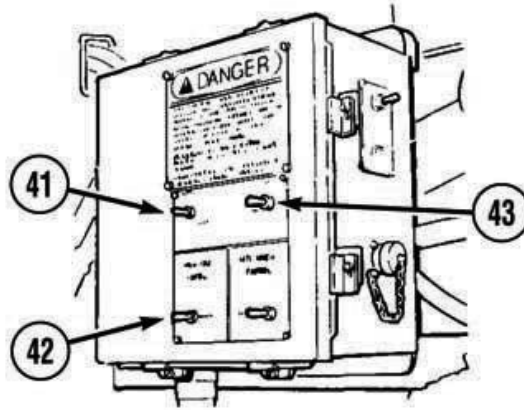


28. Remove emergency tow lights (33) and two brackets (34) from stowage.

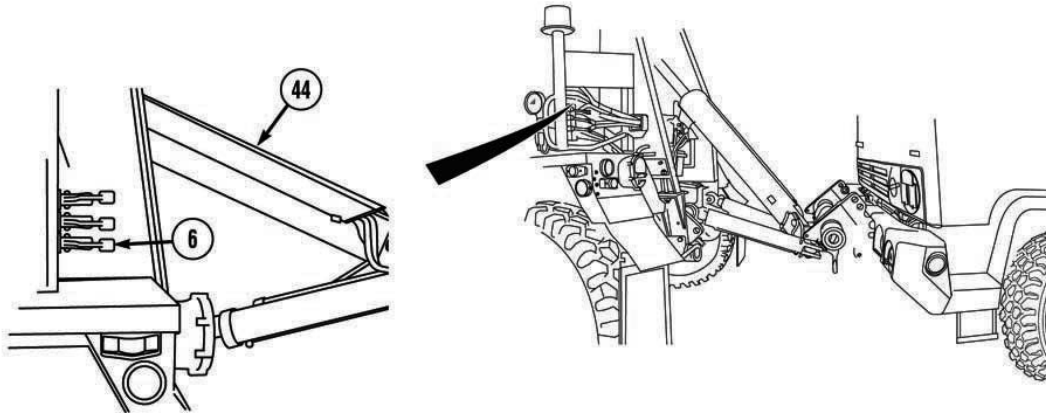
29. Install two brackets (34) in center holes of emergency tow lights (33) with two screws (35), washers (36), and nuts (37).



30. Install emergency tow lights (30) on front of RG31A2 and fasten securely with straps (35).
31. Remove tow light cable (36) from stowage and connect to emergency tow lights (30).
32. Route other end of tow light cable (36) along disabled vehicle and connect to rear electrical connector (37) on wrecker.
33. Straighten and secure disabled vehicle's steering wheel.



34. Set POWER switch (41) at rear of wrecker to ON position.
35. Set HIGH IDLE switch (42) at rear of wrecker to CONTINUOUS.
36. Push and release LATCH switch (43) at rear of wrecker. Engine speed will increase to approximately 1500 rpm.



WARNING

Keep out from under retrieval system and disabled vehicle when raised off ground or personal injury or death may result.

CAUTION

Make sure all rigging is secure. Loose rigging can become entangled and cause equipment damage.

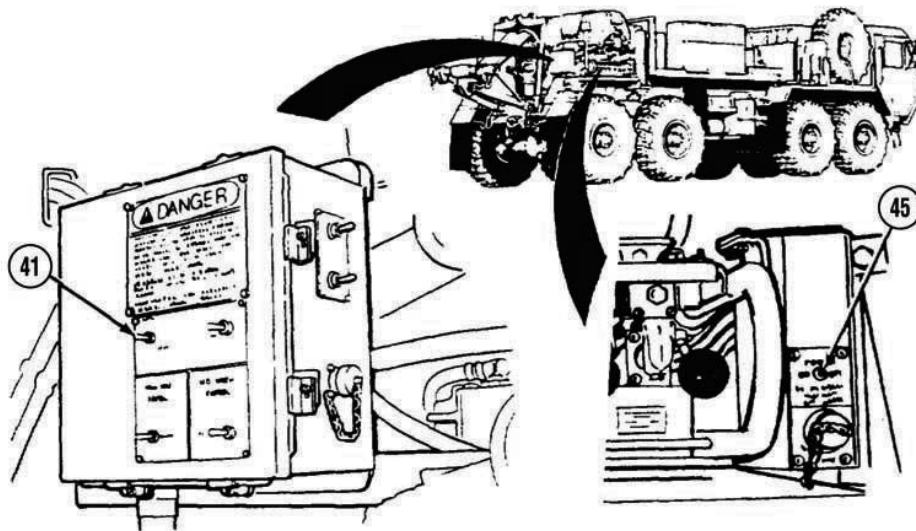
Fully retract two tow cylinders before lifting disabled vehicle or damage to equipment may result.

37. Push in LIFT CYLINDER control lever (6) to retract lift cylinder (44) to raise disabled vehicle approximately 1 ft. (30 cm) off ground.

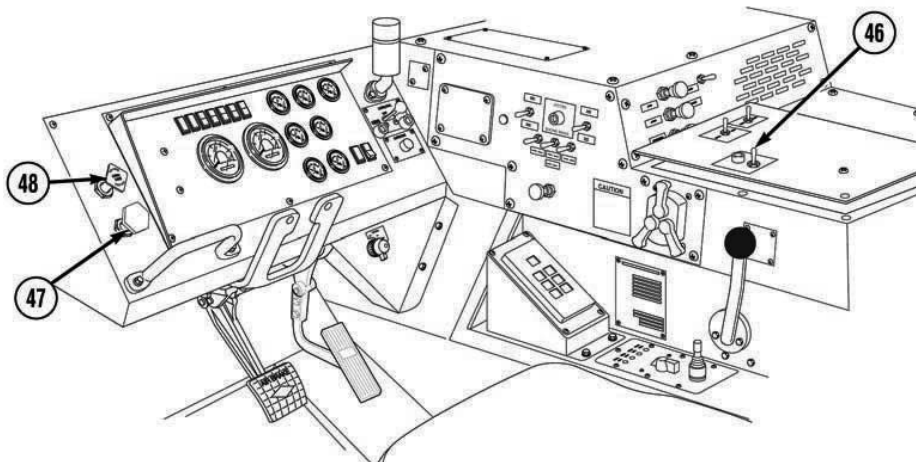
38. Adjust slack in two 16 ft. (4.9 m) safety chains so chains between crosstube and wrecker are approximately 1 ft. (30 cm) off ground.

CAUTION

When routing safety chains, ensure that they will not bind on the retrieval system or drag on the ground during turns, or damage to equipment may result.



39. Set POWER switch (41) to OFF position.
40. Set POWER switch (45) to OFF position.



41. Set PTO ENGAGE switch (46) to OFF position.
42. Turn on service drive lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).
43. Turn on emergency flashers on wrecker (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) and disabled vehicle (RG31A2 operator's manual).
44. Push in PARKING BRAKE control (48) and select desired gear (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

WARNING

The M984 should not be operated at speeds over 15 MPH (24 km/hr) except on paved roads when the operator determines that the vehicle being towed and the terrain allow safe operation. Engine brake switch must be "ON" for all towing operations. The following are maximum safe speeds:

Terrain Condition	Maximum speed with towed load
On road-level	25 mph (40 km/hr)
On road-hilly	15 mph (24 km/hr)
Off road	15 mph (24 km/hr)

WARNING

Speeds in excess of the above can result in loss of control, serious injury, or death.

45. Transport disabled vehicle.

END OF TASK

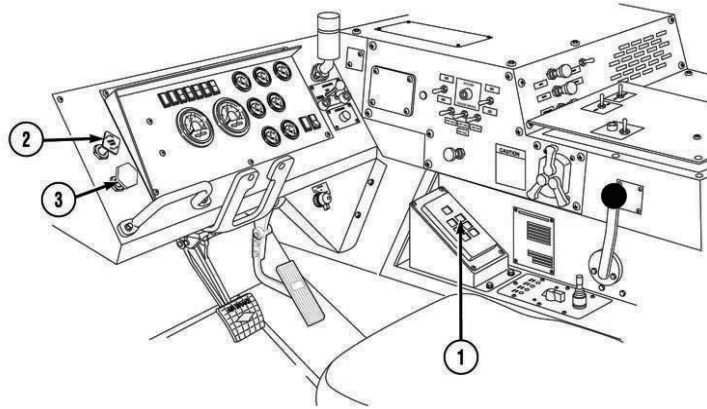
REAR DISCONNECT

NOTE

This is a three-soldier task.

WARNING

While vehicles are connected, avoid parking on grades over 20%, and avoid towing on grades over 30%. Failure to comply may cause damage to equipment or serious personal injury or death.

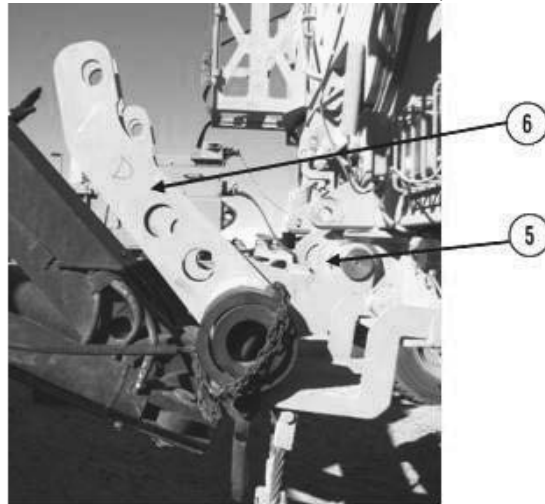
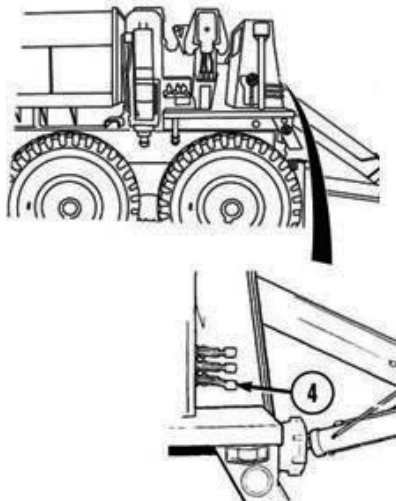


1. Set wrecker transmission range selector (1) to N (neutral).
2. Pull wrecker PARKING BRAKE control (2).

WARNING

Do not stand between vehicles while disabled vehicle is raised off ground or serious personal injury or death can result.

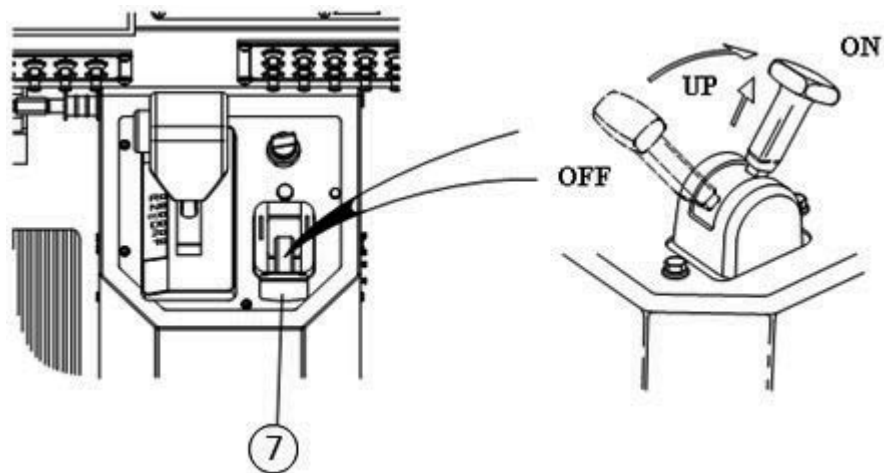
3. Prepare retrieval system for operation (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).



4. Pull LIFT CYLINDER control lever (4) to extend lift cylinder and lower disabled vehicle to the ground to release tension on LTAs (6) on tie down lugs (5).

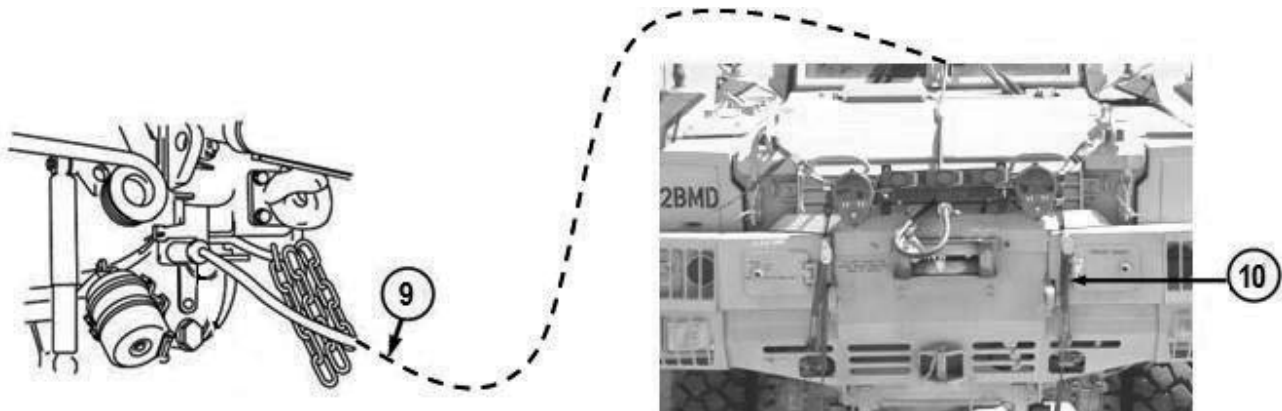
NOTE

After lowering disabled vehicle, extend lift and tow cylinders approximately 2 to 4 inches (51 to 102 mm) to allow for adjustment when removing adapters.

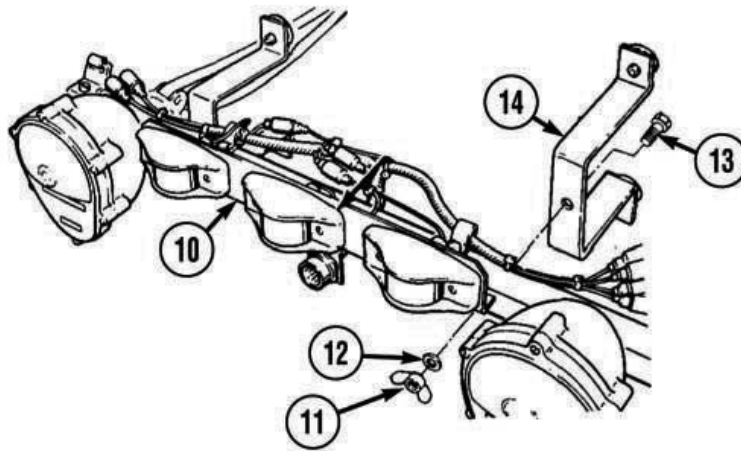
**WARNING**

If disabled vehicle's parking brake is inoperative, chock wheels of disabled vehicle. Failure to chock wheels may result in personal injury.

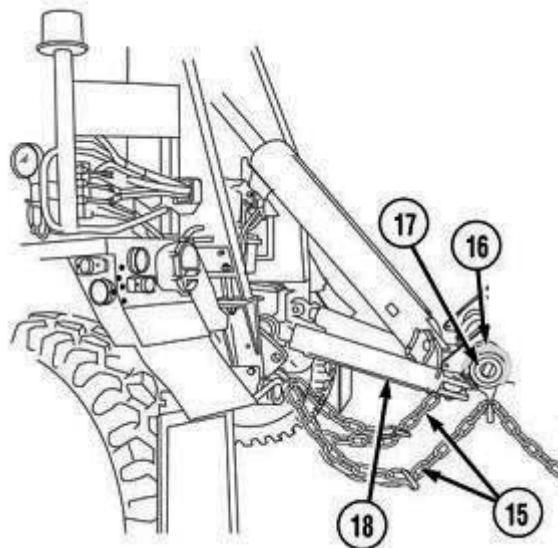
5. Pull PARKING BRAKE control (7) on disabled vehicle. If parking brake is inoperative, chock wheels on disabled vehicle.



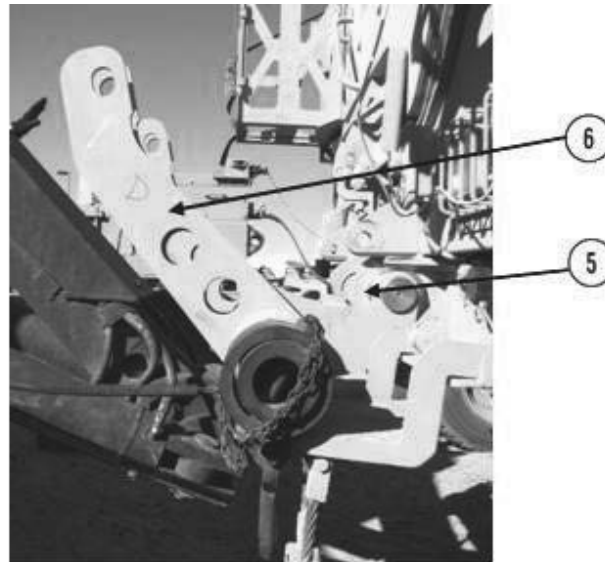
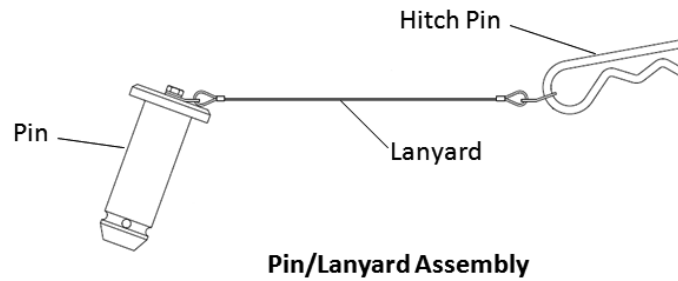
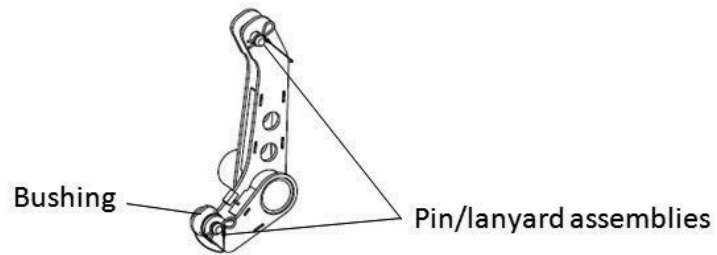
6. Turn off service and emergency lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).
7. Remove tow light cable (9) from wrecker.
8. Remove tow light cable (9) from emergency tow lights (10) and stow.
9. Remove emergency tow lights (10) from disabled vehicle.



10. Remove two nuts (11), washers (12), screws (13), and brackets (14) from emergency tow lights (10). Stow emergency tow lights (10) and brackets (14).



11. Remove and stow two 16 ft. (4.9 m) safety chains (15).
12. Unwrap two springs (16) from crosstube (17) and connect to tow cylinders (18).



WARNING

Keep hands and fingers away from adapters and tow eyes when operating retrieval system or serious personal injury or death may result.

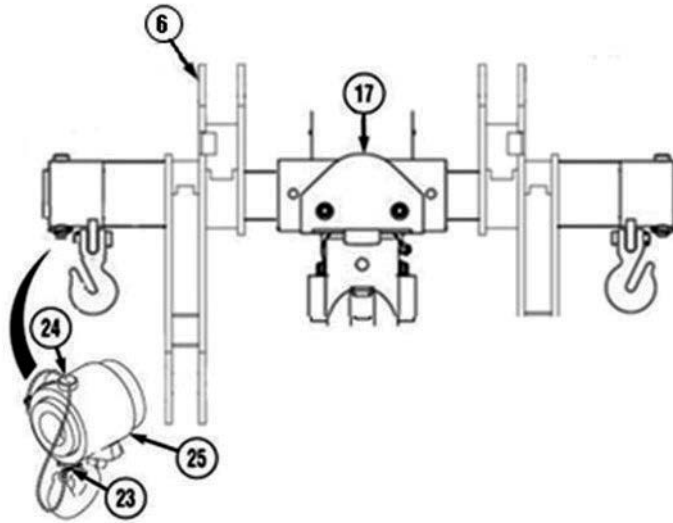
LTAs will rotate when pins are removed. Use caution or serious personal injury may result.

NOTE

Use retrieval controls to position crosstube to relieve tension from adapters.

13. Remove two R-clips and pins from rear tie down lugs (5) and bottom holes on LTAs (6).
14. Remove LTAs (6) from tie down lugs (5) on disabled vehicle.
15. Remove bushings from tie down lugs (5) on disabled vehicle.

16. With the LTAs disconnected from the towed vehicle, place the bushings and pin/lanyard assemblies in the LTA holes and secure with the R-clips.
17. Drive wrecker forward a few feet and park (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).



WARNING

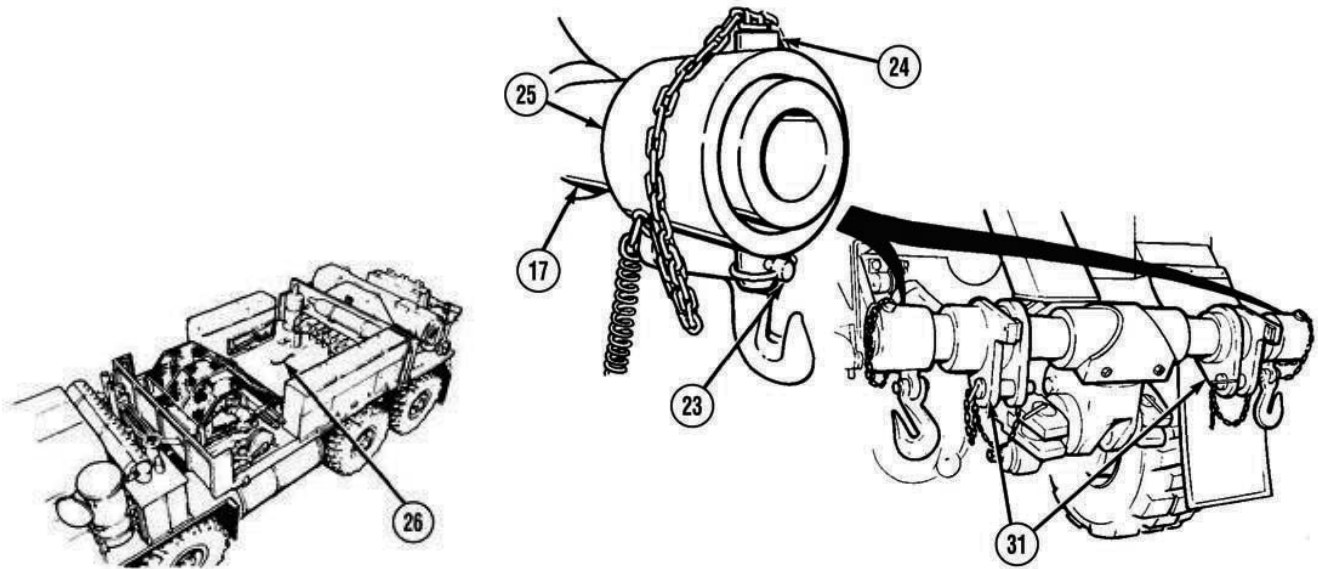
As springs and end caps are removed, crosstube can swing in all directions and adapters may slide off and can cause personal injury.

18. Remove two springs (16) from tow cylinders (18).
19. Remove two quick pins (23) and pins (24) from end caps (25).
20. Remove two end caps (25) from crosstube (17).

WARNING

LTAs are heavy, approximately 73 lbs: Lifting adapters less than 3 feet requires 1 male or 2 females. Lifting LTAs higher than 3 feet requires 2 males or 2 females. Handle carefully or serious personal injury may result.

21. Remove two LTAs (6) from crosstube (17).

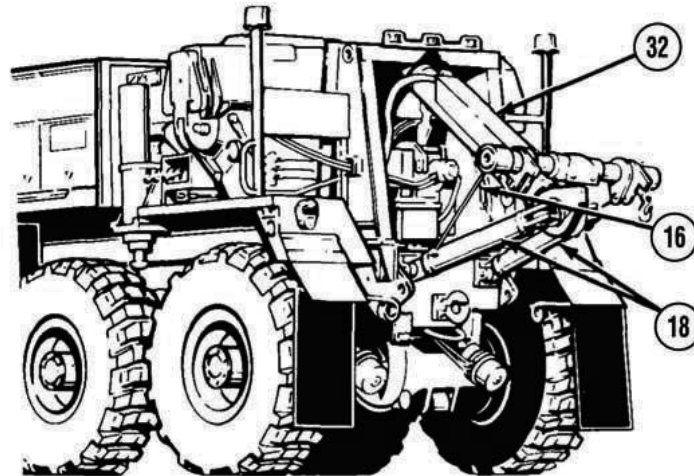


22. Remove M977 front adapters (31) from equipment body floor (26).

23. Install two M977 front adapters (31) on crosstube (17).

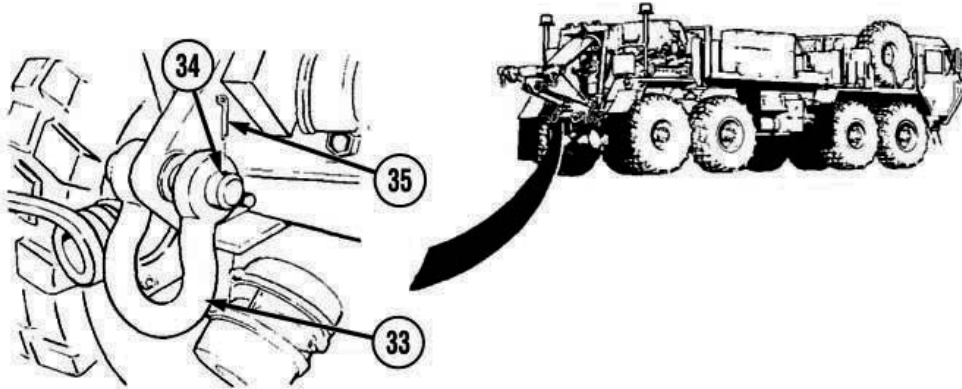
24. Install two end caps (25) on crosstube (17).

25. Install two pins (24) and quick pins (23).



26. Install two springs (16) on tow cylinders (18).

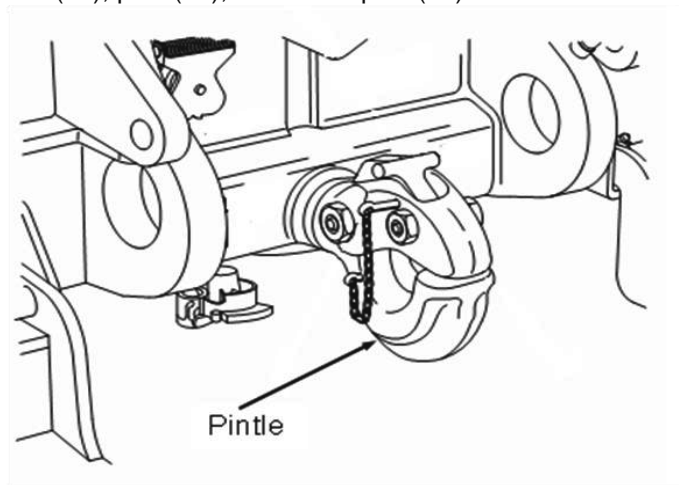
27. Operate retrieval controls and fully retract lift cylinders (32) and tow cylinders (18).



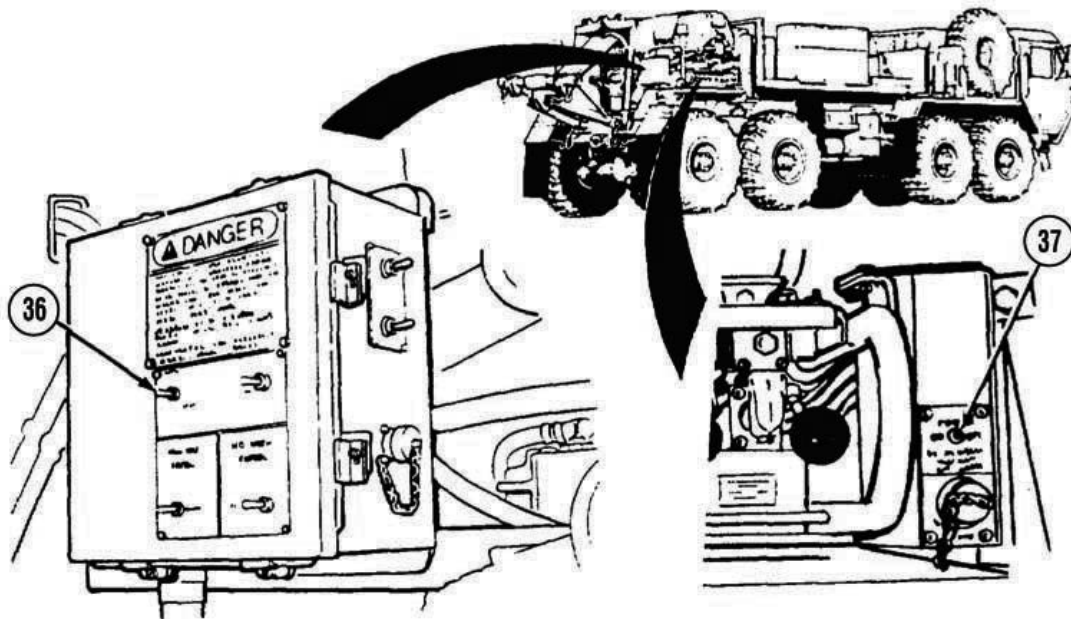
NOTE

Right and left towing shackles are installed the same way.

28. Install two towing shackles (33), pins (34), and cotter pins (35).

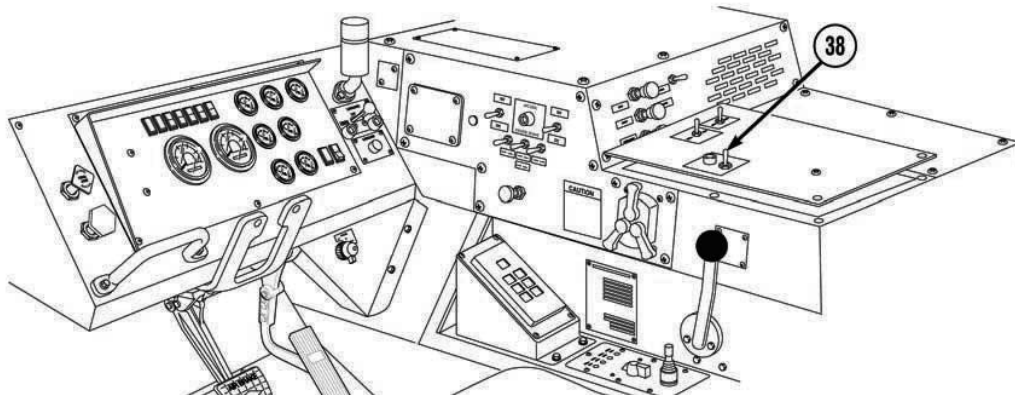


29. Install pintle on disabled vehicle (TM 9-2355-315-10).



30. Set POWER switch (36) to OFF position.

31. Set POWER switch (37) to OFF position.



32. Turn off emergency flashers on wrecker (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1) and disabled vehicle.

33. Turn off service drive lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

34. Set PTO ENGAGE switch (38) to OFF position.

35. Remove and stow beacon lights (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

36. Shut off engine (TM 9-2320-279-10-1,2, TM 9-2320-342-10-1).

37. Unlock disabled vehicle's steering.

END OF TASK

END OF WORK PACKAGE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <i>Date you filled out this form.</i>	
For use of this form, see AR 25-30; the proponent agency is OAASA.								
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code) <i>Your mailing address</i>		
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS								
PUBLICATION/FORM NUMBER <i>TM Number</i>						DATE <i>Date of the TM</i>	TITLE <i>Title of the TM</i>	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)		
	0007-3					<i>Figure 2, Item 9 should show a lockwasher. Currently shows a flat washer.</i>		
	0018-2					<i>Cleaning and inspection, Step 6, reference to governor support pin (14) is wrong reference. Reference should be change to (12).</i>		
SAMPLE								
TYPED NAME, GRADE OR TITLE						TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE
<i>Your Name</i>						<i>Your Phone Number</i>		<i>Your Signature</i>

TO (Forward direct to addressee listed in publication) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM (Activity and location) (Include ZIP Code) <i>Your Address</i>	DATE <i>Date you filled out this form</i>
--	---	---

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER <i>TM Number</i>	DATE <i>Date of the TM</i>	TITLE <i>Title of the TM</i>
--	-------------------------------	---------------------------------

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<h1>SAMPLE</h1>								

PART III – REMARKS (Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)

TYPED NAME, GRADE OR TITLE <i>Your Name</i>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <i>Your Phone Number</i>	SIGNATURE <i>Your Signature</i>
--	--	------------------------------------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TB 9-2355-315-10-1				DATE 4 June 2012		TITLE Operator's RG31A2/A3 Lift and Tow Procedures	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM <i>(Activity and location) (Include ZIP Code)</i>	DATE
---	---	-------------

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TB 9-2355-315-10-1	DATE 4 June 2012	TITLE Operator's RG31A2/A3 Lift and Tow Procedures
--	----------------------------	---

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS *(Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
----------------------------	--	-----------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TB 9-2355-315-10-1				DATE 4 June 2012		TITLE Operator's RG31A2/A3 Lift and Tow Procedures	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

TO <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM <i>(Activity and location) (Include ZIP Code)</i>	DATE
---	---	-------------

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TB 9-2355-315-10-1	DATE 4 June 2012	TITLE Operator's RG31A2/A3 Lift and Tow Procedures
--	----------------------------	---

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS *(Any general remark, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
-----------------------------------	---	------------------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TB 9-2355-315-10-1				DATE 4 June 2012	TITLE Operator's RG31A2/A3 Lift and Tow Procedures		
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE	

TO <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM <i>(Activity and location) (Include ZIP Code)</i>	DATE
---	---	-------------

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER TB 9-2355-315-10-1	DATE 4 June 2012	TITLE Operator's RG31A2/A3 Lift and Tow Procedures
--	----------------------------	---

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS *(Any general remarks, recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
-----------------------------------	---	------------------

By Order of the Secretary of the Army:

Official:



JOYCE E. MORROW
*Administrative Assistant to the
Secretary of the Army*

1211404

RAYMOND T. ODIERNO
*General, United States Army
Chief of Staff*

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 345113 requirements for TM 9-2355-315-10-1.

The Metric System and Equivalents

Linear Measure

1 centimeter - 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram - 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102

Temperature (Exact)

<i>To change</i>	<i>To</i>	<i>Multiply by</i>
° F Fahrenheit temperature	° C Celsius temperature	5/9 (after subtracting 32)

PIN: 086713-000