TM 5-5420-209-34

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

IMPROVED FLOAT BRIDGE (RIBBON BRIDGE) CONSISTING OF:

TRANSPORTER

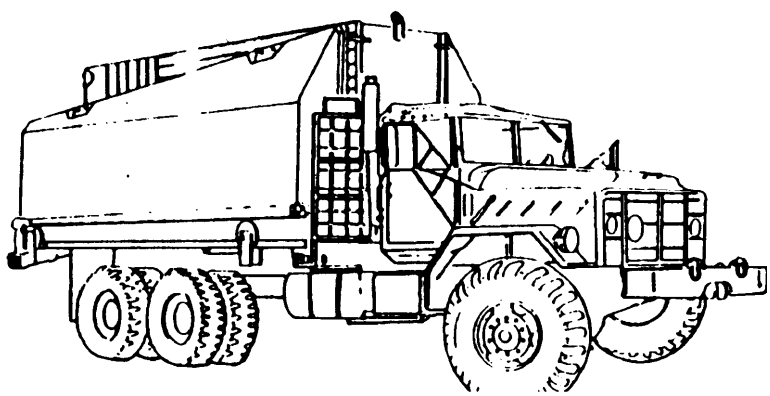
CONDEC MODEL 2280	**NSN 5420-00-071-5321**
CONDEC MODEL 2305	**NSN 5420-01-173-2020**
PACAR MODEL 9999	**NSN 5420-01-175-6523**
SOUTHWEST MODEL RBT	**NSN 5420-01-175-6524**

INTERIOR BAY

CONDEC MODEL 2282	**NSN 5420-00-071-5322**
CONDEC MODEL 2307	**NSN 5420-01-173-2022**
SPACE MODEL 66981	**NSN 5420-01-175-6526**

RAMP BAY

CONDEC MODEL 2281	**NSN 5420-00-497-5276**
CONDEC MODEL 2306	**NSN 5420-01-174-8084**
SPACE MODEL 6698R	**NSN 5420-01-175-6525**



* This manual supersedes TM 5-5420-209-34, dated 27 July 1984.

HEADQUARTERS, DEPARTMENT OF THE ARMY

30 SEPTEMBER 1993

WARNING

DEATH or severe injury to personnel and damage to property may result if personnel fail to observe safety precautions.

WARNING

Use extreme caution when connecting bridge bays. Be sure to secure solid footing since bays may come together with some force and could cause DEATH or serious injury to personnel.

When disconnecting any hydraulic line, open the line slowly and protect face. Hydraulic oil can spray out due to residual pressure in system.

WARNING

Dry cleaning solvent, PD-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100° F - 138°F (38°C - 60° C).

WARNING

Stand dear of pontons and cable during lifting and lowering operations. Ensure that roadway/bow ponton fold lock latch is in good mechanical condition and securely latched before attempting to lift pontons. Failure to comply may cause injury to personnel and damage to equipment.

Disengage power take off if bay is not to be launched immediately.

Death or serious injury could occur if compressed air is directed against the skin. Do not use compressed air for cleaning or drying the pressure is has been reduced to 30 psi (206.7 kPa) or less. When working with compressed air always use chip guards, eye protection and other personal protective equipment.

TECHNICAL MANUAL
NO. 5-5420-209-34

HEADQUATERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., 30 September 1993

TECHNICAL MANUAL

Direct Support and General Support Maintenance Manual

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(RIBBON BRIDGE) CONSISTING OF:

TRANSPORTER

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

* This manual supersedes TM 5-5420-209-34, dated 27 July 1984.

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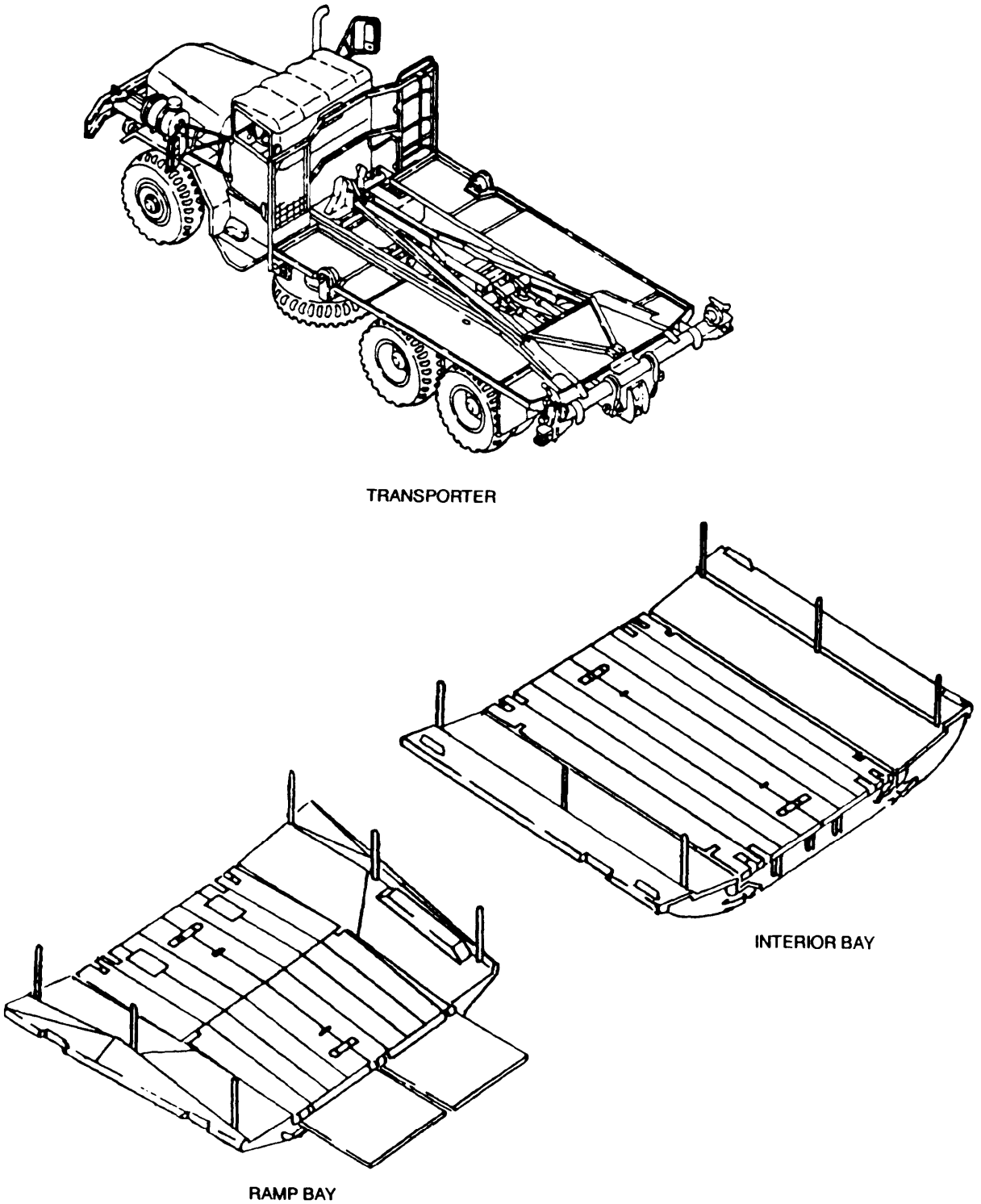

Figure 1-1. Improved Float Bridge (Ribbon Bricdge).

CHAPTER 1

INTRODUCTION

OVERVIEW

This chapter contains general information pertaining to Improved Float Bridge (Ribbon Bridge) and its components.

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Section I. GENERAL INFORMATION

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1-1. **Scope.** This manual contains direct support and general support maintenance of the Improved Float Bridge (Ribbon Bridge consisting of transporter 2280 and RBT, RampBay and interior Bay (figure 1-1)

1-2. **Maintenance Forms, Records and Reports.** Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. **Destruction of Army Materiel to Prevent Enemy Use.** Refer to TM 750-244-3 for procedures to destroy Improved Float Bridge (Ribbon Bridge) to prevent enemy use.

1-4. **Reporting of Equipment Improvement Recommendations (EIR).** If your improved Float Bridge (Ribbon Bridge) needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance. Put it on an SF 368 (Product Quality Defiaency Report). Mail it to us at: Commander, U.S. Army Aviation and Troop Command, Attn: AMSAT-I-MDO, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. We will send you a reply.

Section II. EQUIPMENT DESCRIPTION AND DATA

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1-5. **General.** The ribbon bridge is a floating, modular bridge with integral superstructure and floating supports consisting of a transporter, a ramp bay at each bank and interior bays to complete the bridge between ramp bays. The transporter is used to transport bridge bays overland to a riverbank and to launch and retrieve bays used in ribbon bridge. The bays are welded aluminum alloy construction. Bridge bays can be rapidly connected together to form a continuous bridge and permit high volume stream or river crossing of equipment.

1-6. **Differences Between Models.** The differences between the two models are in the transporters, models 2260 and RBT. The model RBT has three additional pieces of equipment: The selector valve, cable tensioner and external throttle control.

CHAPTER 2

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

OVERVIEW

This chapter contains information for troubleshooting and maintenance of the Improved Float Bridge (Ribbon Bridge) by Direct Support Maintenance personnel.

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Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

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2-1. **Common Tools and Equipment.** For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTWOE) applicable to your unit.

2-2. **Special Tools, TMDE and Support Equipment.** For a listing of special tools, TMDE, and support equipment authorized for use on this equipment, refer to the Repair Parts and Special Tools List, TM 5-5420-209-24P and the Maintenance Allocation Chart (MAC), Appendix B of TM 5-5420-209-12.

2-3. **Repair Parts.** Repair parts are listed and illustrated in the Repair Parts and Special Tools List for Improved Float Bridge (Ribbon Bridge), TM 5-5420-209-24P.

Section II. DIRECT SUPPORT TROUBLESHOOTING

Paragraph		Page
2-4	General	2-1
2-5	Direct Support Troubleshooting Procedures	2-2

2-4. **General.** This section contains troubleshooting procedures to deterrnine the probable cause of observed equipment malfunctions. Tests or inspections are provided to isolate the faulty component and corrective actions are provided to eliminate the malfunction.

2-5. **Direct Support Troubleshooting Procedures.** Table 2-1 lists the common malfunctions that may be found during operation. Refer to Symptom Index to locate the troubleshooting procedures for the malfunction. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not corrected by listed corrective actions, notify your supervisor.

SYMPTOM INDEX

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Table 2-1. Direct Support Troubleshooting Procedures.

Malfunction Test or Inspection Corrective Action

1. CABLE TENSIONER ASSEMBLY INOPERATIVE.

Inspect cable tensioner assembly for damage.

Repair cable tensioner assembly (para. 2-8).

2. TENSlONER MOTOR INOPERATIVE.

Inspect motor for damage or missing components.

Replace tensioner motor (para. 2-9).

3. RAMP BAY BOW PONTONS LEAKING.

Inspect for structural damage, cracks, broken welds or holes through skin.

Repair bow ponton (para. 2-11).

4. RAMP BAY ROADWAY PONTONS LEAKING.

Inspect for structural damage, cracks, broken welds or holes through skin.

Repair roadway pontons (para. 2-12).

Table 2-1. Direct Support Troubleshooting Procedures. - Continued

Malfunction Test or Inspection Corrective Action
5. INTERIOR BAY BOW PONTONS LEAKING.
Inspect for structural damage, cracks, broken welds or holes through skin.
Repair bow pontons (para. 2-14).
6. INTERIOR BAY ROADWAY PONTONS LEAKING.
Inspect for structural damage, cracks, broken welds or holes through skin.
Repair roadway pontons (para. 2-1 5).

Section III. DIRECT SUPPORT MAINTENANCE PROCEDURES

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2-16	Interior Bay Receptacles	2-27

2-6. **General.** This section contains direct support maintence procedure as authorized by the MAC in Appendix B of TM 5-5420-209-12.

2-7. **Lubrication.** Refer to LO 5-5420-209-12 and perform direct level lubrication on improved float bridge.

2-8. **Cable Tensioner Assembly.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Compound, Sealing (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Cable Tensioner Assembly removed
(TM 5-5420-209-12).

a. Repair. (figure 2-1)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 'F-138'F (380 C-600 C).

CAUTION

Thoroughly dean cable tensioner with solvent prior to disassembly to prevent contamination and equipment damage.

NOTE

Screws are installed with sealing compound and may require heating for removal.

(1) Remove locknut(1), nut (2), spring washers (3) and washers(4).

(2) Remove nut (5), lockwasher (6), bolt(7), shaft(8), and lube fitting (9).

2-8. **Cable Tensioner Assembly. - Continued**

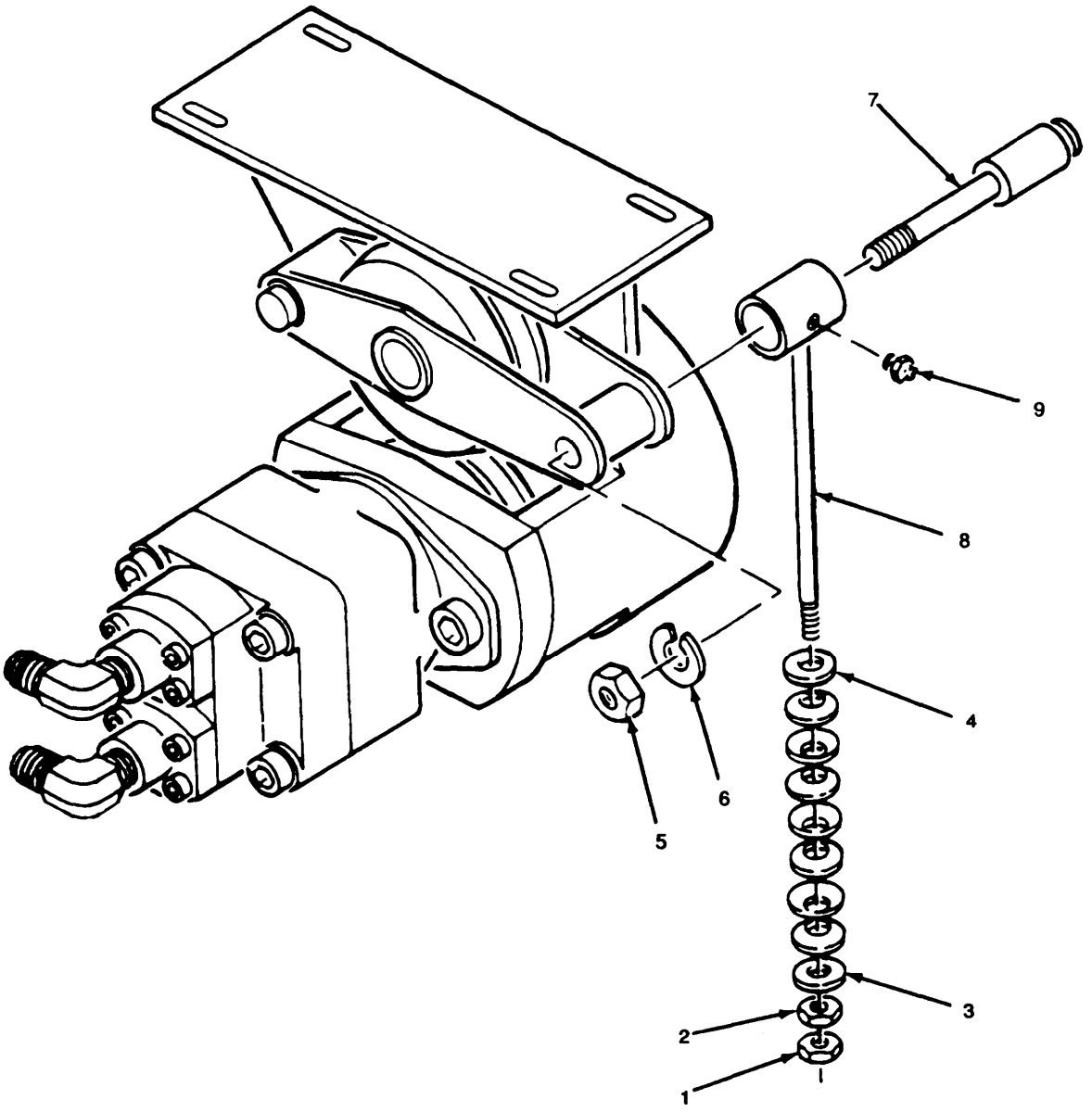


Figure 2-1. Cable Tensioner Assembllly, Repair (Sheet 1 of 4).

2-8. **Cable Tensioner Assembly-Continued**

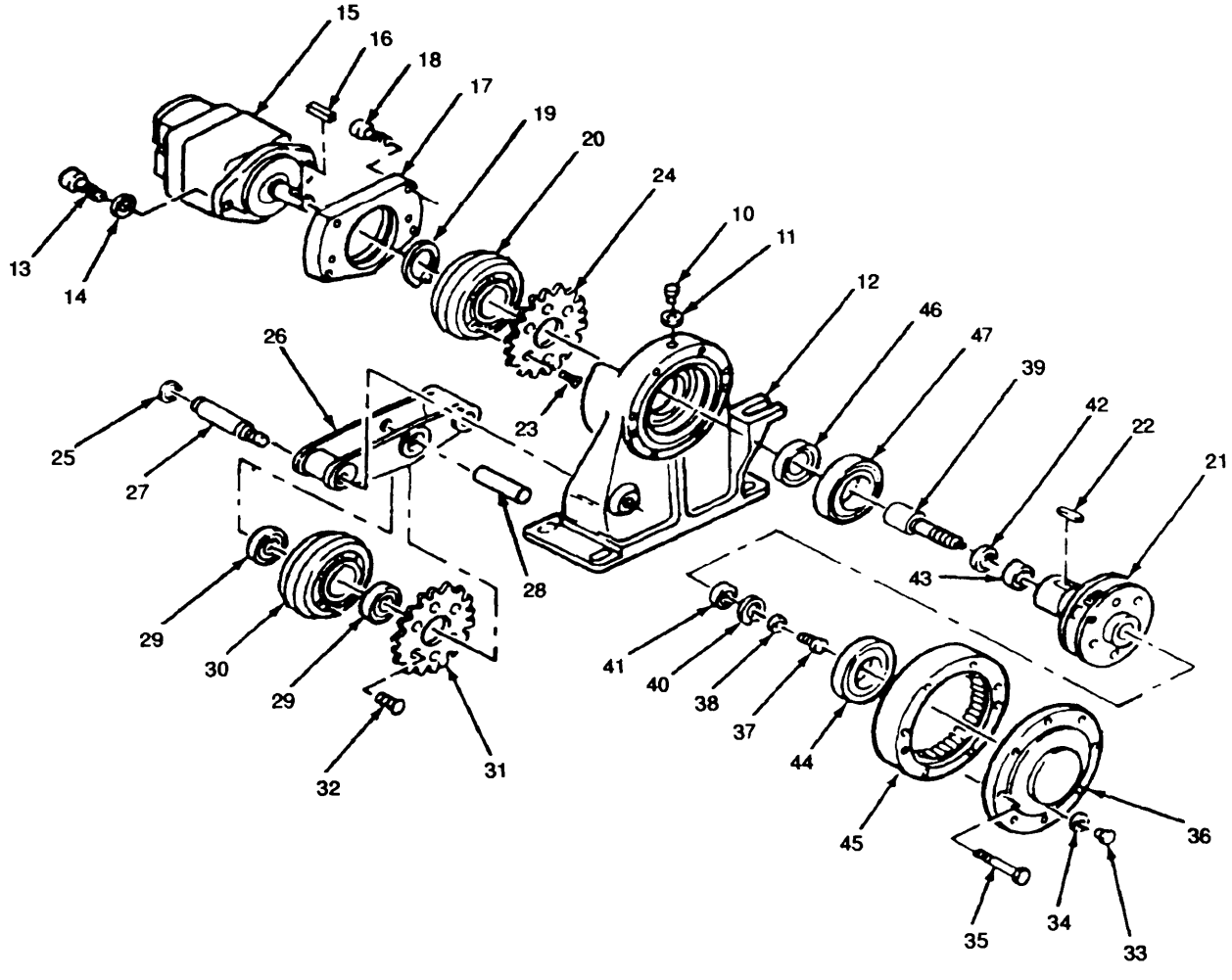


Figure 2-1. Cable Tensioner Assembly Repair (Sheet 2 of 4).

(3) Remove plug (10) and seal (11) and drain tensioner housing (12). Discard seal.

(4) Remove two screws (13), lockwasher (14), and remove motor(15) and key (16) from flange (17).

(5) Remove four screw (18) and remove flange (17) from housing (12).

2-8. **Cable Tensioner Assembly. - Continued**

(6) Remove retaining ring (19) and remove rope pulley (20) from planetary flange (21).

(7) Remove fitting key (22).

(8) Remove six screws (23) and tooth wheel (24) from rope pulley (20).

(9) Remove retaining ring (25) and remove arm (26) from housing (12).

(10) Unscrew pin (27) from housing (12).

(11) Remove pin (28), two bearings (29) and pulley (30) with tooth wheel (31) attached.

(12) Remove six screws (32) securing tooth wheel (31) to pulley (30).

(13) Remove plug (33) and seal (34) and discard seal.

(14) Remove eight screws (35) and cover (36) from housing (12).

(15) Remove planetary flange (21) with screw (37), washer (38), drive shaft (39), retaining ring (40), bearing (41), sealing ring (42), bearing (43) and bearing (44) attached.

(16) Remove internal geared wheel (45) from housing (12).

(17) Remove radial sealing ring (46) and bearing (47) from housing (12).

(18) Remove screw (37), washer (38) and drive shaft (39) from flange (21).

(19) Remove retaining ring (40), bearing (41), sealing ring (42), bearing (43) and bearing (44) from flange (21).

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

(20) Clean all components with dry cleaning solvent and dry thoroughly.

(21) Inspect all threaded parts for damaged threads and replace if damaged.

(22) Inspect retaining ring grooves for scratches, burrs and damage.

NOTE

Tooth wheels are replaced as a set.

(23) Inspect tooth wheel, gears and shaft for cracks, worn or missing teeth, and replace if damaged.

2-8. **Cable Tensioner Assembly. - Continued**

NOTE

Mask all external and internal threads, grooves and ports prior to surface treatment.

(24) Remove minor nicks and scratches from exterior surfaces area and treat and paint repaired areas in accordance with MIL-T-704, Type B.

NOTE

Screws which have been heated for removal must be replaced. Secure all screws except motor mounting hardware with sealing compound.

(25) Install bearing (44), bearing (43), sealing ring (42), bearing (41), and retaining ring (40) in planetary flange (21).

(26) Install drive shaft (39) into planetary flange (21) and secure with washer (38) and screw (37).

(27) Install bearing (47) and radial sealing ring (46) into housing (12).

(28) Install internal geared wheel (45) and bearing (44) into housing (12).

(29) Install planetary flange (21) into housing (12).

(30) Install seal (34) and plug (33) in cover (36) and secure cover to housing (12) with eight screws (35).

(31) Install tooth wheel (31) on rope pulley (30) and secure with six screws (32).

(32) Install rope pulley (30) and bearings in arm (26) using pin (28).

(33) Install pin (27) into housing (12) and slide arm (26) on pin (27) and secure with retaining ring(25).

(34) Install tooth wheel (24) on rope pulley (20) and secure with six screws (23).

(35) Install fitting key(22) in planetery flange (21) and install rope pulley (20) on phnetary flange(21) and secure with retaining ring (19).

(36) Install flange (17) and secure with two screws (18).

(37) Install key (16) and motor (15) and secure with two screws (13) and washers (14).

(38) Install plug (10) and seal (11).

2-8. **Cable Tensioner Assembly. - Continued**

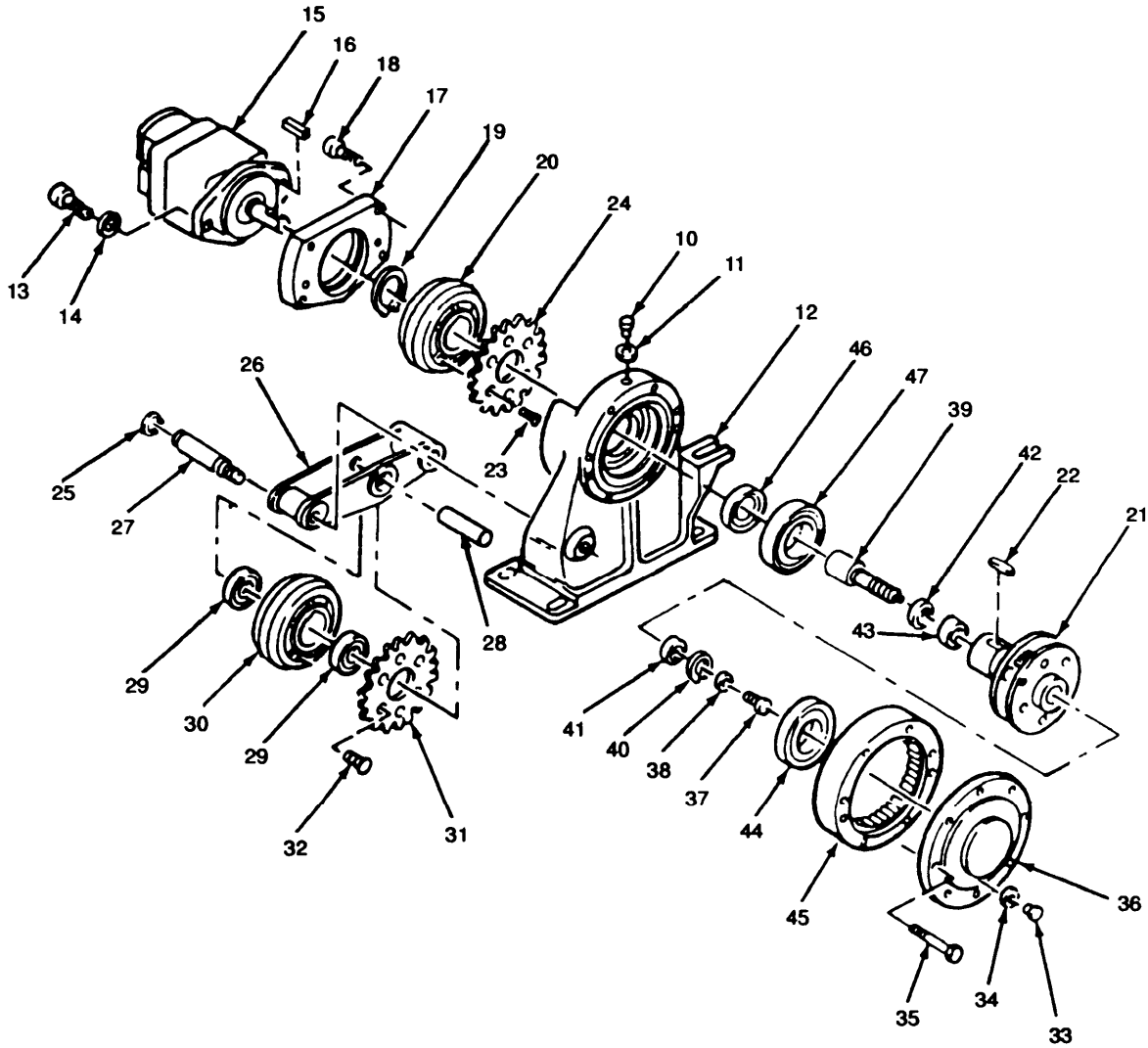


Figure 2-1. Cable Tensioner Assembly Repair (Sheet 3 of 4).

2-8. **Cable Tensioner Assembly. - Continued**

(39) Install fitting (9) on shaft (8).

(40) Install shaft (8) and secure with bolt (7), lockwasher (6) and nut (5).

NOTE

Spring washers must be installed in pairs of alternating directions.

(41) Install washer (4), spring washers (3), nut (2), and locknut (1).

2-8. Cable Tensioner Assembly.- Continued

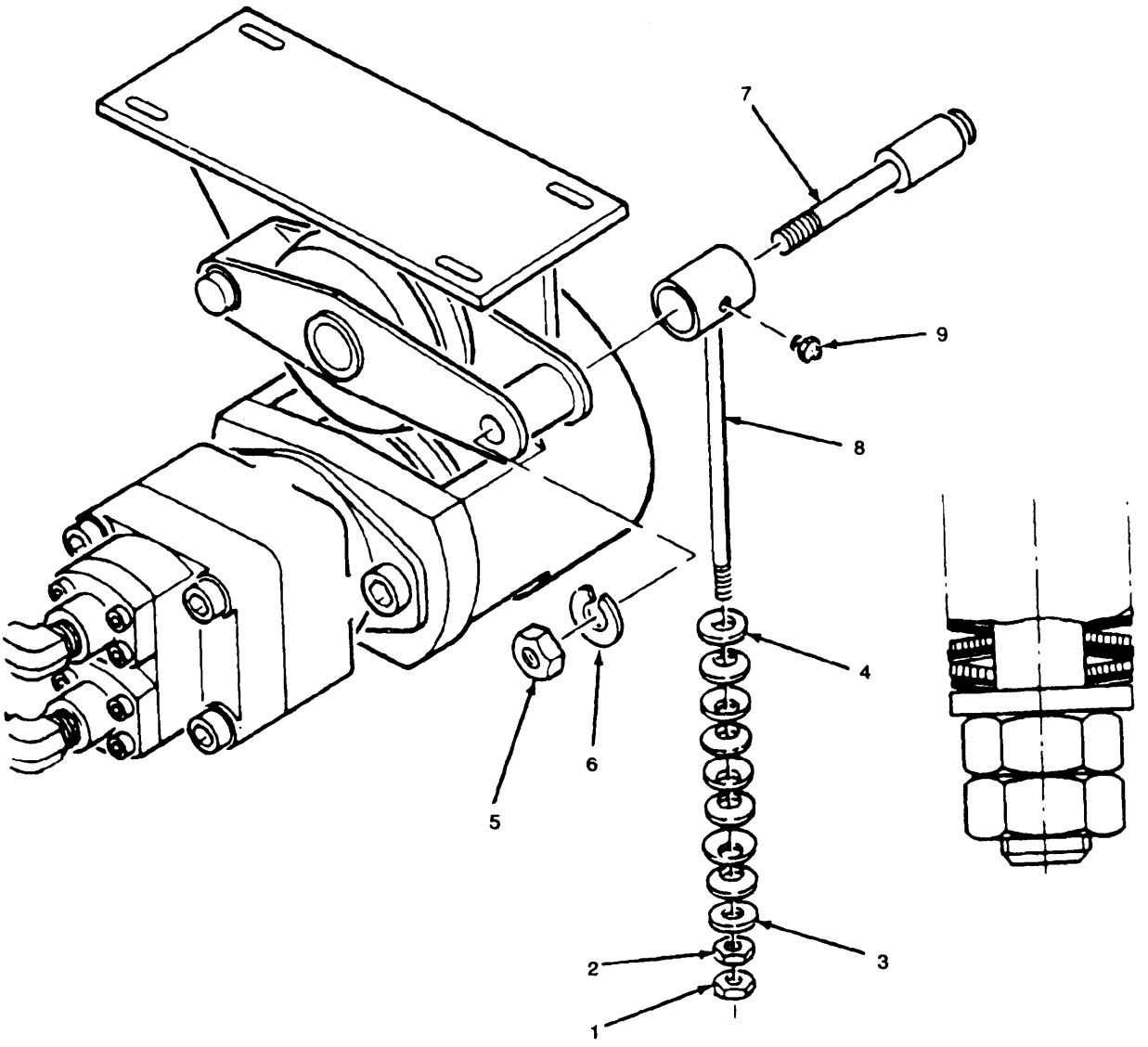


Figure 2-1. Cable Tensioner Assembly Repair (Sheet 4 of 4).

FOLLOW-ON MAINTENANCE: Install cable tensioner TM 5-5420-209-12).

2-9. **Tensioner Motor.**

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition:

Bridge bay removed (TM 5-5420-209-12).

a.. Replace. (figure 2-2)

WARNING

When disconnecting any hydraulic line, open line slowly and protect face, as hydraulic oil may spray out due to residual pressure in system.

When working under boom, support boom by block or other suitable means.

NOTE

When removing hoses, have a suitable container to drain oil from hoses. Also cap all hoses and ports immediately to prevent dirt or foreign matter from entering the system.

(1) Raise boom approximately four feet from the fully stowed position and block boom in this position.

(2) Tag and disconnect three hoses(1).

(3) Remove two screws (2) and remove tensioner motor(3).

(4) Install tensioner motor (3) and secure with two screws (2).

(5) Install three hoses (1) as tagged to tensioner motor(3).

(6) Remove block from boom and lower to fully stowed position.

FOLLOW-ON MAINTENANCE: Install bridge bay (TM 5-5420-209-12).

***2-9.* Tensioner Motor. - Continued**

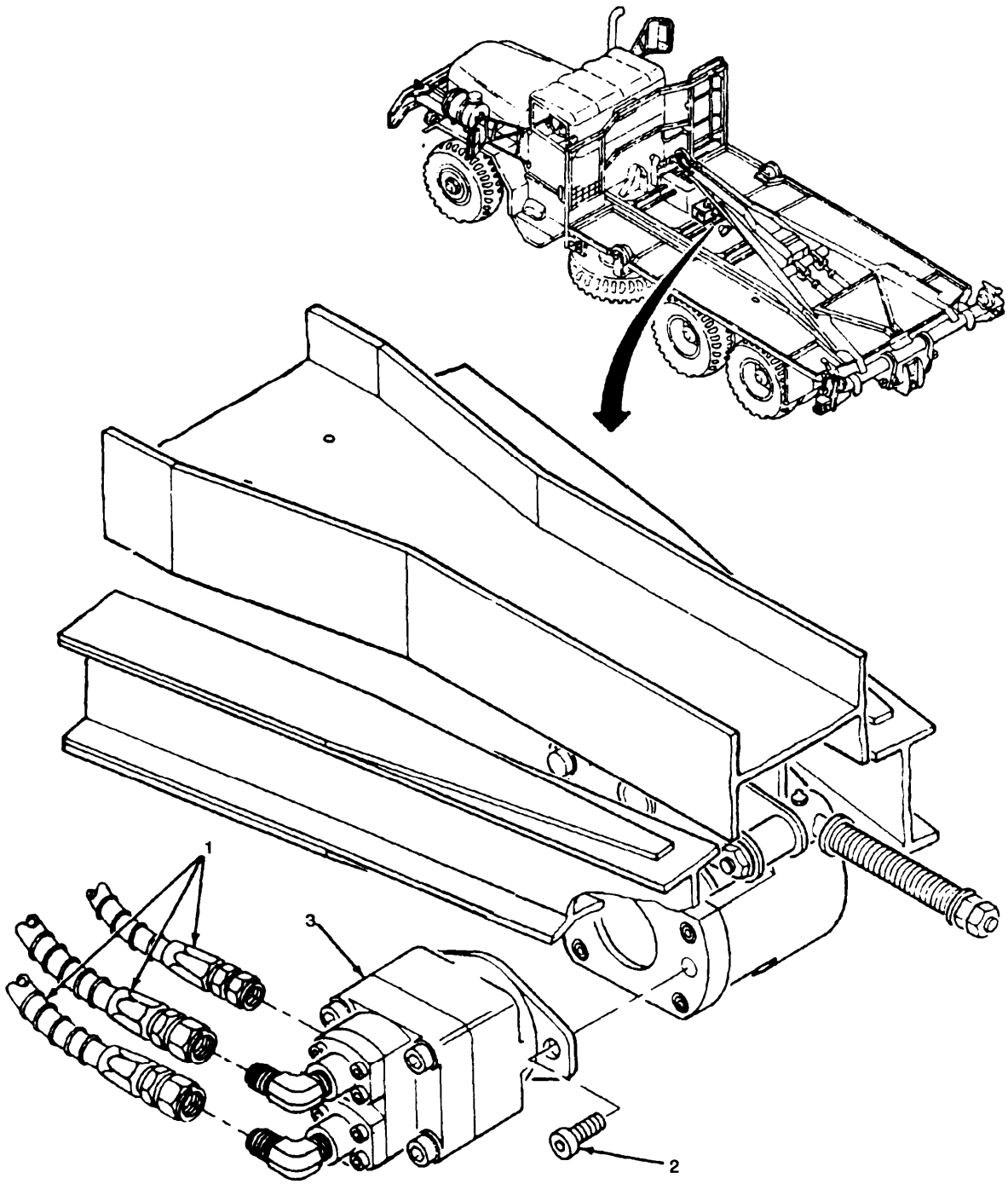


Figure 2-2. Tensioner Motor, Replace.

2-10. **Boom Assembly.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's TooI Kit
(NSN 5180-00-177-7033)

Materials/Parts

Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Boom assembly removed
(TM 5-5420-209-12).

a Repair. (figure 2-3)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

(1) Clean boom assembly (1) using dry cleaning solvent and dry thoroughly.

(2) Inspect boom assembly (1) for cracks and repair by welding in accordance with TM 9-237.

2-10. **Boom Assembly. - Continued**

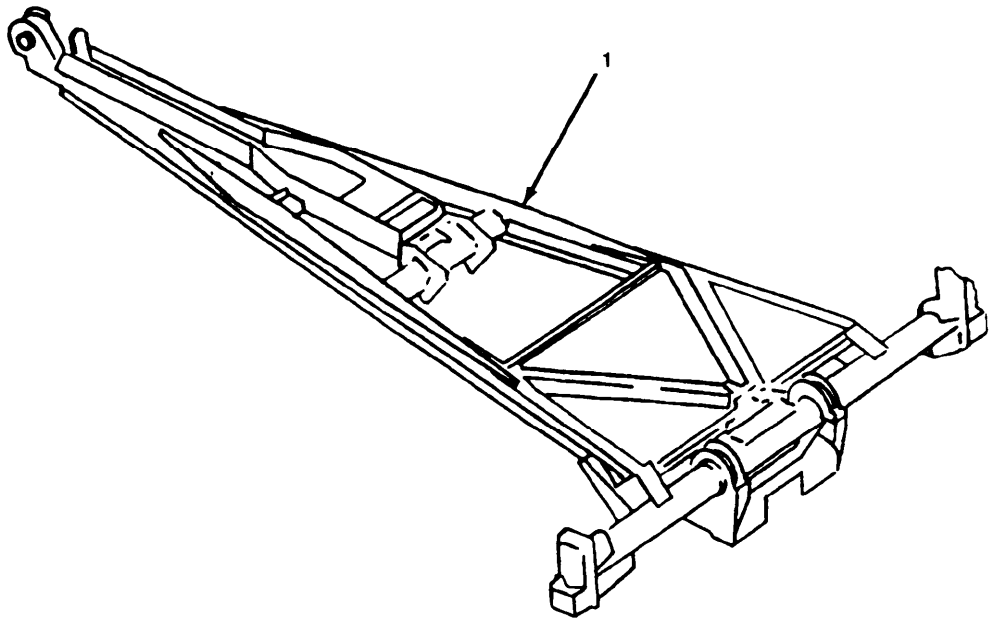


Figure 2-3. Boom Assembly, Repair.

FOLLOW-ON MAINTENANCE: Install boom assembly (TM 5-5420-109-12).

2-11. **Ramp Bay Bow Pontons.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Ramp bay bow ponton removed
(TM 5-5420-209-12).

a. Repair. (figure 2-4)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to prsonnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C -60°C).

(1) Clean bow pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw (2) securing chain (3) and remove chain.

(4) Install ponton leak detector into bow ponton (4).

(5) Connect air source to leak detector and pressurize ponton to 1.5 ± 0.1 psig.

(6) Apply soapy solution to ponton surfaces and check for leaks.

(7) Inspect plates and roadway decking for dents, and repair dents in accordance with TM 9-450.

(8) Inspect plates and check for cracks and repair cracks in accordance with TM 9-237.

(9) Inspect surfaces for damage or minor gouging or plate, bore, or structural angle distortion and repair with a file or suitable bending tool.

(lo) After repair of surface damage, dean, treat and paint the repaired area in accordance with MIL-T-704, Type B.

(11) Remove ponton leak detector.

(12) Mask off cavities and bores in interior bow ponton and apply nonslip deck covering compound to the top surface of ponton decking and to top surface of outboard sheeting.

2-11. **Ramp Bay Bow Pontons. - Continued**

(13) Any damage that requires replacing a section of bow ponton, refer to next higher level of maintenance.

(14) Install screw (2) that secures chain (3) to bow ponton (4).

(15) Install plug (1) in bow ponton.

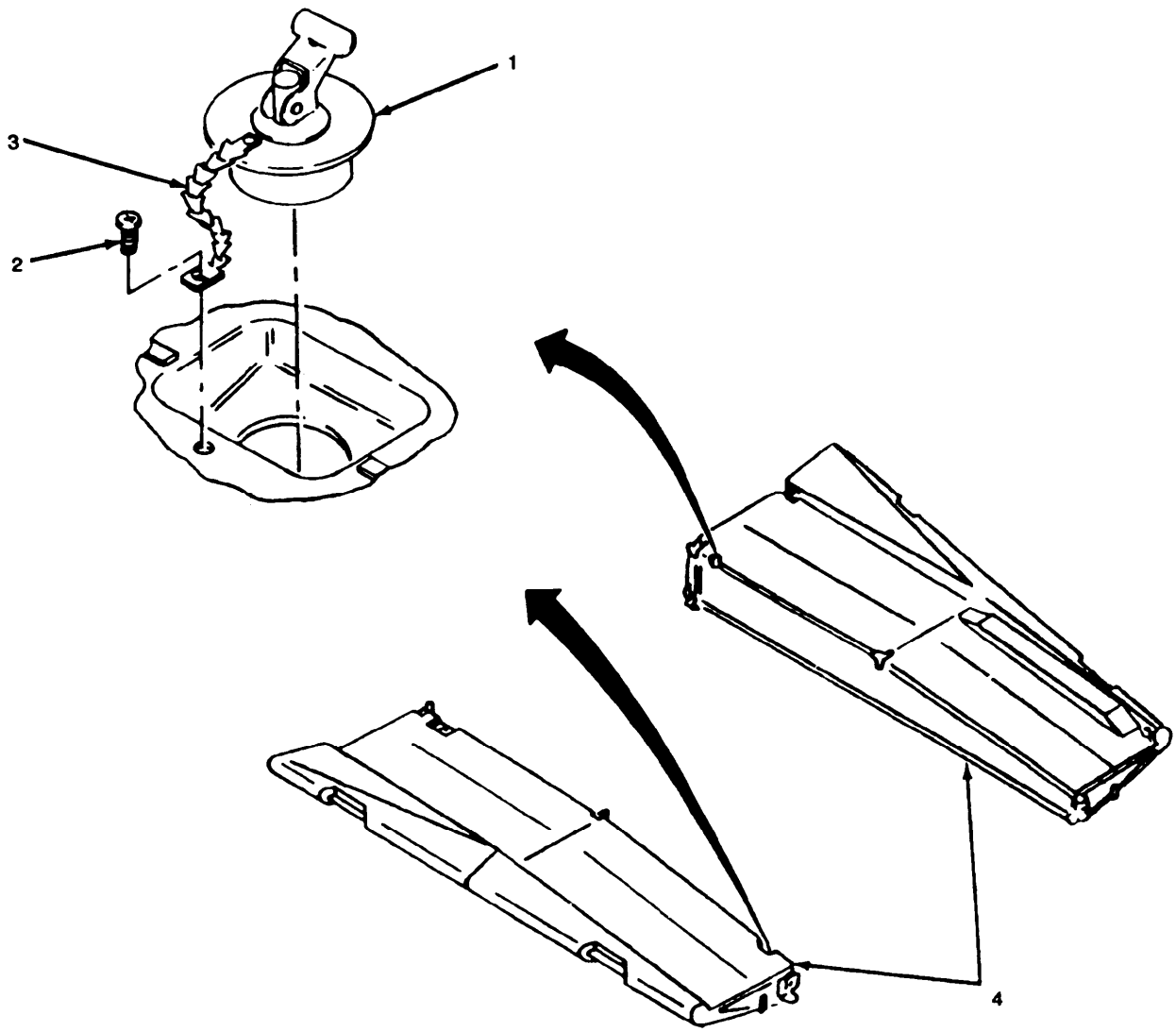


Figure 2-4. Ramp Bay Bow Pontons, Repair.

FOLLOW-ON MAINTENANCE: Install ramp bay bow pontons (TM 5-5420-209-12).

2-12. **Ramp Bay Roadway Pontons.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's TooI Kit
(NSN 5180-00-177-7033)

Equipment Condition:

Ramp bay roadway ponton removed
(TM 5-5420-209-12).

Materials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

a. Repair (figure 2-5)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

(1) Clean roadway pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw (2) securing chain (3) and remove chain.

(4) Install proton leak detector into roadway ponton (4).

(5) Connect air source to leak detector and pressurize ponton to 1.5 ± 0.1 psig.

(6) Apply soapy solution to ponton surfaces and check for leaks.

(7) Inspect plates and roadway decking for dents, and repair dents in accordance with TM 9-450.

(8) Inspect plates and check for cracks, and repair cracks by welding in accordance with TM 9-237.

(9) Inspect surfaces for damage or minor gouging or plate distortion and repair with a file or suitable bending tool.

(10) After repair of surface damage, dean, treat and paint the repaired area in accordance with MIL-T-704, Type B.

(11) Remove ponton leak detector.

(12) Mark off cavities and bores in the ramp roadway and apply nonslip deck covering compound to the repaired top and side deck surfaces.

2-12. **Ramp Bay Roadway Pontons. - Continued**

(13) Any damage that requires replacing a section of roadway ponton, refer to next higher level of maintenance.

(14) Install screw (2) that secures chain (3) to roadway ponton (4).

(15) Install plug (1) in roadway ponton.

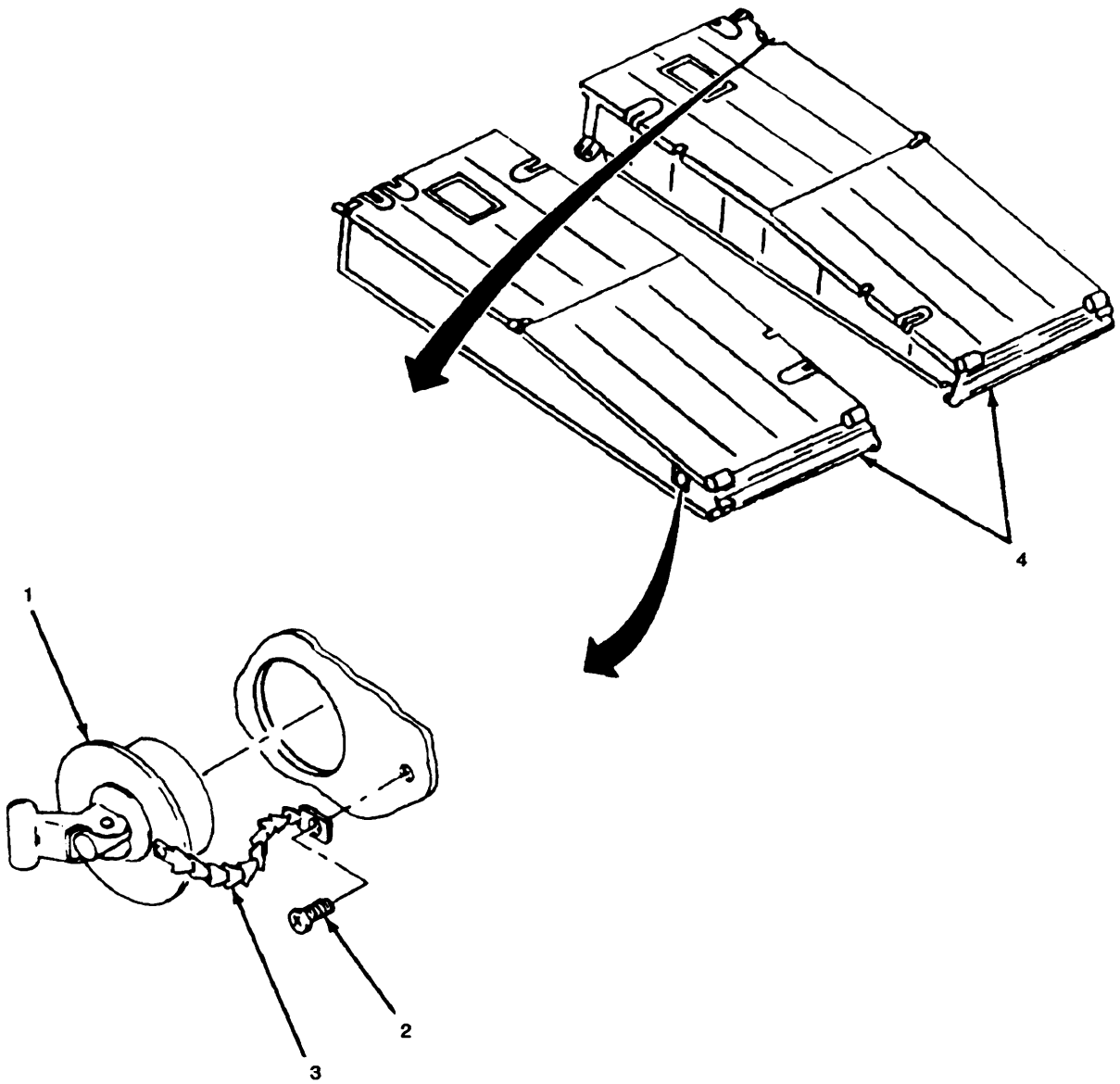


Figure 2-5. Ramp Bay Roadway Pontons, Repair.

FOLLOW-ON MAINTENANCE: Install ramp bay roadway pontons (TM 5-5420-209-12).

2-13. **Ramp Bay Receptacles.**

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Conditions:

Ramp bay roadway pontons removed
(TM 5-5420-209-12).

Roadway-to-roadway connect and attaching hardware removed
(TM 5-5420-209-12).

a. Replace. (figure 2-6)

(1) Cut out receptacles (1) from roadway ponton (2) in accordance with TM 9-237.

(2) Install receptacles (1) by welding in accordance with TM 9-237.

2-13. **Ramp Bay Receptacles. - Continued**

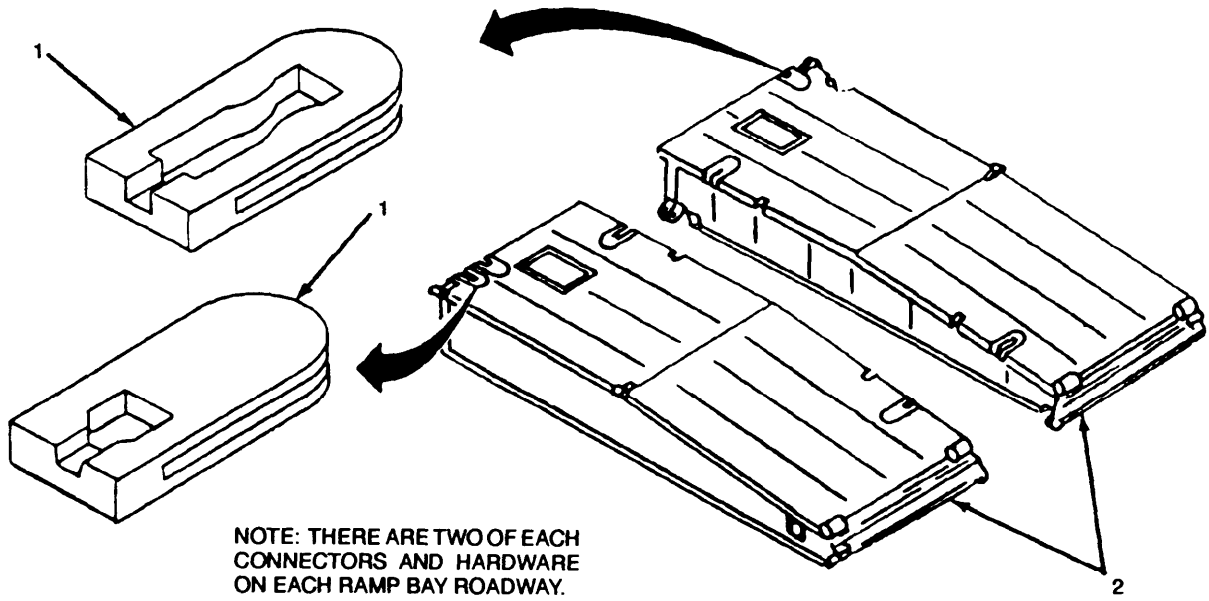


Figure 2-6. Ramp Bay Receptacles, Replace.

FOLLOW-ON MAINTENANCE:
(1) Install roadway-to-roadway connector (TM 5-5420-209-12).
(2) Install ramp bay roadway pontons (TM 5-5420-209-12).

2-14. **Interior Bay Bow Pontons.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Interior bay bow ponton removed
(TM 5-5420-209-12).

a. Repair. (figure 2-7)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

(1) Clean bow pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw (2) securing chain (3) and remove chain.

(4) Install proton leak detector into bow ponton (4).

(5) Connect air source to leak detector and pressurize ponton to 1.5 ± 0.1 psig.

(6) Apply soapy solution to ponton surfaces and check for leaks.

(7) Inspect plates and check for cracks and repair cracks in accordance with TM 9-450.

(8) Inspect plates and check for cracks and repair cracks in accordance with TM 9-237.

(9) Inspect surfaces for damage or minor gouging or plate, bore, or structural angle distortion and repair with a file or suitable bending tool.

(10) After repair of surface damage, dean, treat and paint the repaired areas in accordance with MIL-T-704, Type B.

(11) Remove ponton leak detector.

(12) Mask off cavities and bores in interior bow ponton and apply nonslip deck covering compound to top surface of ponton decking and to top surfaces of outboard sheeting.

2-14. **Interior Bay Bow Pontons. - Continued**

(13) Any damage that requires replacing a section of bow ponton, refer to next higher level of maintenance.

(14) Install screw (2) that secures chain (3) to bow ponton (4).

(15) Install plug (1) in bow ponton.

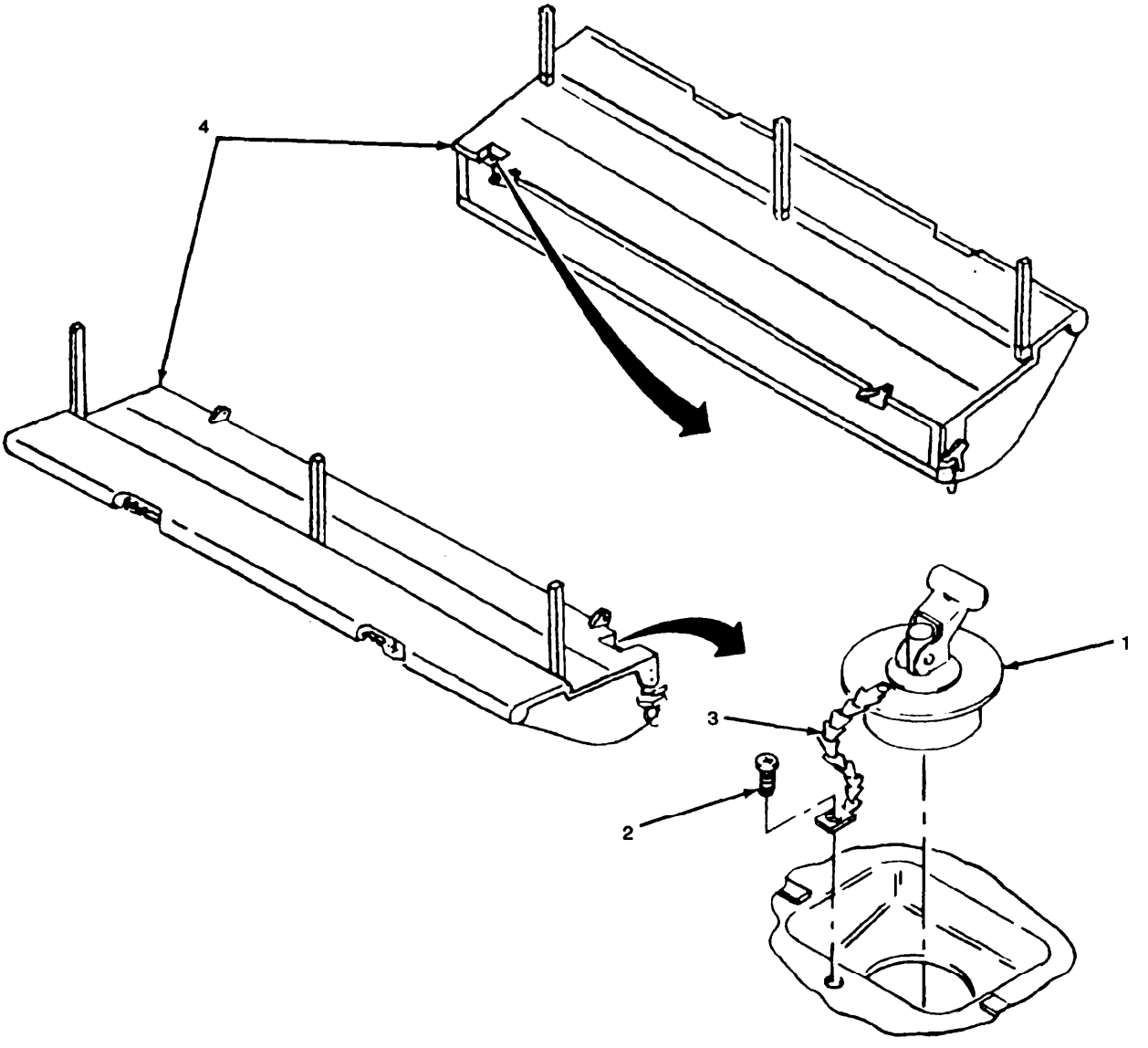


Figure 2-7. Interior Bay Bow Pontons, Repair.

FOLLOW-ON MAINTENANCE: Install interior bay bow ponton (TM 5-5420-209-12).

2-15. **Interior Bay Roadway Pontons.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Interior *bay* roadway ponton removed
(TM 5-5420-209-12).

a Repair (figure 2-8)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

(1) Clean roadway pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw (2) securing chain (3) and remove chain.

(4) Install ponton leak detector and pressurize ponton to 1.5 ± 0.1 psig.

(5) Apply soapy solution to ponton surfaces and check for leaks.

(6) Inspect plates and roadway decking for dents and repair dents in accordance with TM 9-450.

(7) Inspect plates and check for cracks and repair cracks in accordance with TM 9-237.

(8) Inspect surfaces for damage or bent, gouged, or distorted sheeting, structural angles, connector blocks, receptacles, bars, plates and decking extrusion, link supports, cable guide and port tubes and repair with file or suitable bending tool.

(9) Perform radiographic and magnetic particle inspection of weld joint between rear base of ponton yoke and steel plate used to mount yoke in accordance with MIL-R-11468, Standard I, and MIL-I-6868.

2-15. **Interior Bay Roadway Pontons. - Continued**

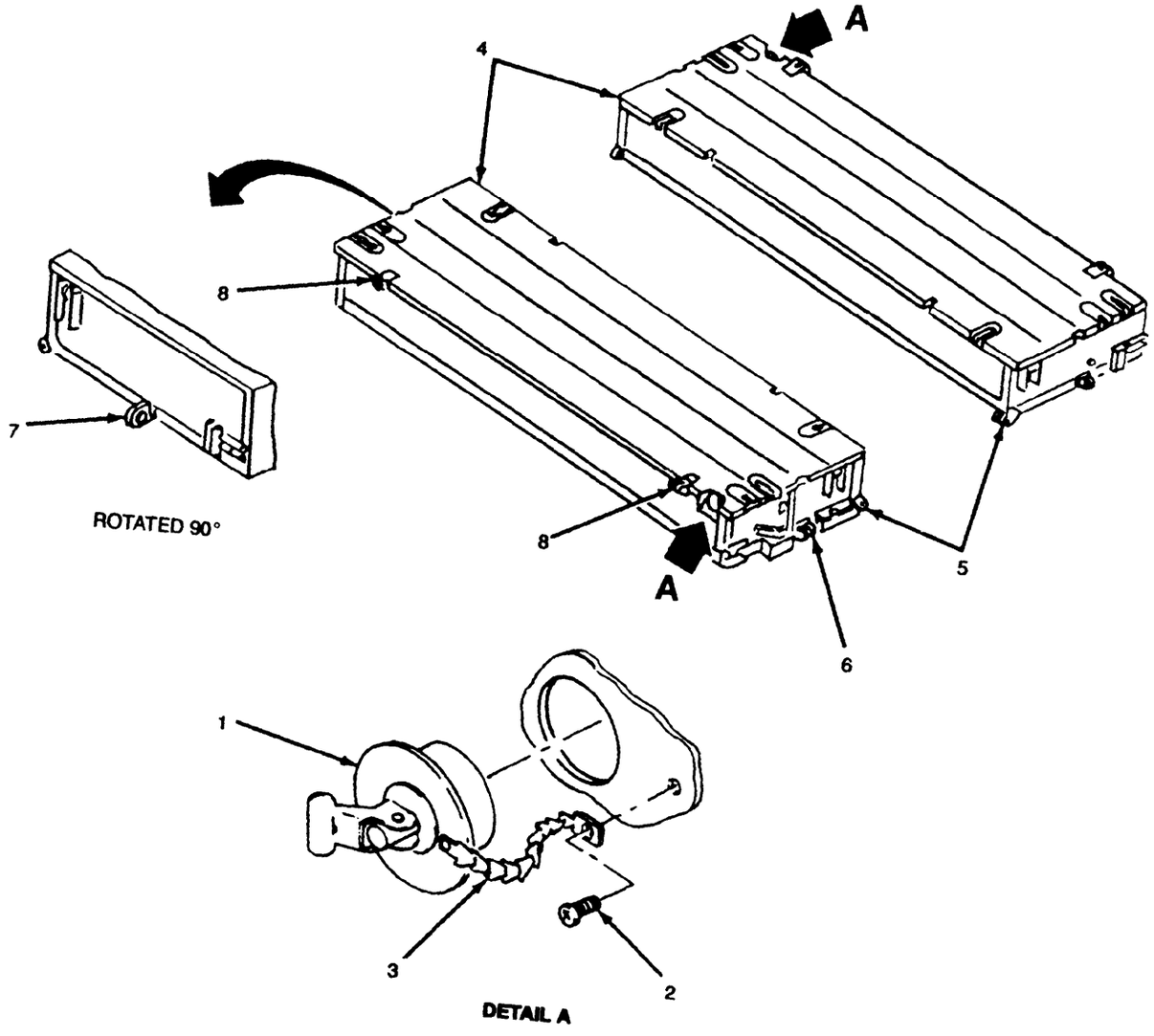


Figure 2-8. Interior Bay Roadway Pontoon, Repair

2-15. **Interior Bay Roadway Pontons. - Continued**

NOTE

Maximum diameter throughout each bore is 2.921 inches (7.41934 cm).

(10) Inspect diameter of bores through roadway-to-roadway hinges (5) and replace ponton if bores are out of tolerances.

NOTE

Maximum diameter of bore is 2.702 inches (6.86308 cm).

(11) Inspect diameter of ponton yoke bore (6), and replace ponton if bore is out of tolerance.

NOTE

Maximum diameter of bore is 2.765 inches (7.0231 cm).

(12) Inspect diameter of ponton eye bore(7) for wear or elongation, and replace ponton if bore is out of tolerance.

NOTE

Maximum diameter through each bore is 1.041 inches (2.6414 cm).

(13) Inspect diameter of roadway ponton to bow ponton hinge plate bore (8) and replace ponton if bore is out of tolerance.

(14) Remove ponton leak detector.

(15) After repair of surface damage, clean, treat and paint the repaired areas in accordance with MIL-T-704, Type B.

(16) Mask cavities and bores and threaded surface areas in roadway ponton and apply nonslip deck covering to top surface of roadway ponton deck.

(17) Any damage that requires replacing a section of roadvay ponton, refer to next higher level of maintenance.

(18) Install screw (2) that secures chain (3) to roadway ponton (4).

(19) Install plug (1) in roadway ponton.

2-16. **Interior Bay Receptacles.**

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Conditions:

Interior bay roadway pontons removed
(TM 5-5420-209-12).

Roadway-to-roadway connectors removed
(TM 5-5420-209-12).

a. Replace. (figure 2-9)

(1) Cutout receptacles (1) from roadway ponton (2) in accordance with TM 9-237.

(2) Install receptacles (1) by welding in accordance with TM 9-237.

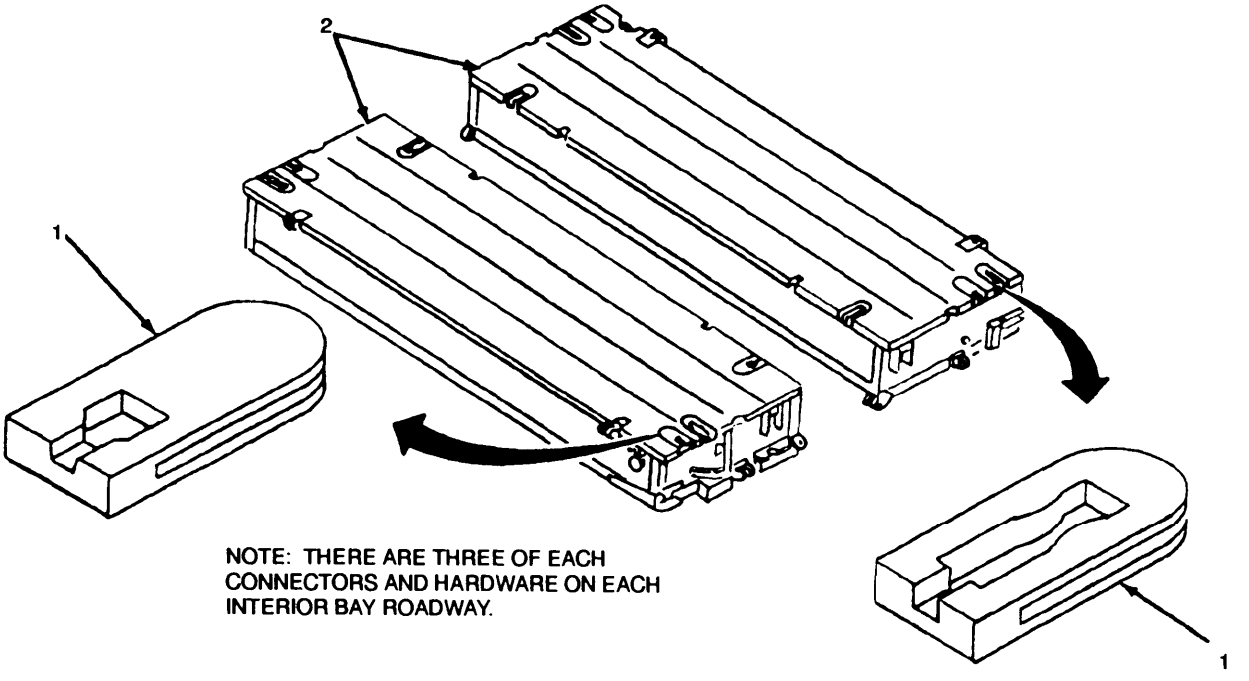


Figure 2-9. Interior Bay Receptacles, Replace.

FOLLOW-ON MAINTENANCE:
(1) Install roadway-to-roadway connectors (TM 5-5420-209-12).
(2) Install interior bay roadway pontons (TM 5-5420-209-12).

Section IV. SHORT TERM STORAGE

Paragraph		Page
2-17	General	2-28
2-18	ShortTerm Storage	2-28

2-17. **General.** This section contains procedures to place the ribbon bridge into short term storage.

2-18. **Short Term Storage.**

a. Perform operator's level before operation PMCS procedures in accordance with TM 5-5420-209-12.

b. Perform unit level weekly and monthly PMCS procedures in accordance with TM 5-5420-209-12.

c. Perform operator's and unit level lubrications procedure in accordance with LO 5-5420-209-12.

CHAPTER 3

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

OVERVIEW

This chapter provides procedures for troubleshooting and maintenance of the Improved float Bridge (Ribbon Bridge) by General Support Maintenance personnel.

		Page
Section I.	Repair Parts; Special Tools; Test, Measurement, Diagnostic Equipment (TMDE); and Support Equipment	3-1
Section II.	General Support Troubleshooting	3-1
Section III.	General Support Maintenance Procedure	3-3

Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

Paragraph		Page
3-1	Common Tools and Equipment	3-1
3-2	Special Tools, TMDEand Support Equipment	3-1
3-3	Repair Parts	3-1

3-1. **Common Tools and Equipment.** For authorized common took and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

3-2. **Special Tools, TMDEand Support Equipment.** For a listing of special tools, TMDE, and support equipment authorized for use on this equipment, refer to the Repair Parts and Special Tools List, TM 5-5420-209-24P and the Maintenance Allocation Chart (MAC), Appendix B of TM 5-5420-209-12.

3-3. **Repair Parts.** Repair parts are listed and illustrated in the Repair Parts and Special Tools List for Improved Float Bridge (Ribbon Bridge), TM 5-5420-209-24P.

Section II. GENERAL SUPPORT TROUBLESHOOTING

Paragraph		Page
3-4	General	3-1
3-5	General Support Troubleshooting Procedures	3-2

3-4. **General.** This section contains troubleshooting procedures to determine the probable cause of observed equipment malfunctions. Tests or inspections are provided to isolate the faulty component and corrective actions are provided to eliminate the malfunction.

3-5. **General Support Troubleshooting Procedures.** Table 3-1 lists the common malfunctions that may be found during operation. Refer to symptom index to locate the troubleshooting procedures for the malfunction. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not corrected by listed corrective actions, notify your supervisor.

SYMPTOM INDEX

Symptom	Page
Boom Cylinder Assembly Inoperative	3-2
Locking Cylinder Inoperative	3-2
Selector Valve Inoperative	3-2
Ramp Bay Bow Pontons Leaking	3-2
Ramp Bay Roadway Pontons Leaking	3-3
Hydraulic Cylinder and Piston Inoperative	3-3
Interior Bay Bow Pontons Leaking	3-3
interior Bay Roadway Pontons Leaking	3-3

Table 3-1. General Support Troubleshooting Procedures.

Malfunction Test or Inspection Corrective Action
1. BOOM CYLINDER ASSEMBLY INOPERATIVE.
Test for evidence of internal damage.
Repair damaged cylinder (para. 3-7)
2. LOCKING CYLINDER INOPERATIVE.
Test for evidence of intenal damage.
Repair damaged cylinder (para.3-8)
3. SELECTOR VALVE INOPERATIVE.
Test for valve malfunction.
Repair selector valve (para.3-9)
4. RAMP BAY BOW PONTONS LEAKING.
Inspect for structural damage, cracks, broken welds or holes through skin.
Repair bow pontons (para. 3-11).

Table 3-1. General Supped Troubleshooting Procedures. - Continued

Malfunction Test or Inspection Corrective Action
5. RAMP BAY ROADWAY PONTONS LEAKING.
Inspect for structural damage, cracks, broken welds or holes through skin.
Repair roadway pontons (paragraph 3-12).
6. HYDRAULIC CYLINDER AND PISTON INOPERATIVE.
Inspect cylinder and piston for external damage.
Replace or repair cylinder and piston (paragraph 3-13).
7. INTERIOR BAY BOW PONTONS LEAKING.
Inspect for structural damage, cracks, broken welds, or holes through skin.
Repair bow pntons (paragraph 3-15).
8. INTERIOR BAY ROADWAY PONTONS LEAKING.
Inspect for structural damage, cracks, broken welds, or holes through skin.
Repair roadway pontons (paragraph 3-16).

Section III. GENERAL SUPPORT MAINTENANCE PROCEDURES

Paragraph		Page
3-6	General	3-3
3-7	Boom Cylinder Assembly	3-4
3-8	Cylinder Assembly (Locking Cylinder)	3-9
3-9	Selector Valve	3-12
3-10	Ramp Bay Support Link and Hinge Pins	3-16
3-11	Ramp Bay Bow Pontons	3-18
3-12	Ramp Bay Roadway Pontons	3-20
3-13	Hydraulic Cylinder and Piston	3-22
3-14	Interior Bay Support Link and Hinge Pins	3-28
3-15	Interior Bay Bow Pontons	3-30
3-16	Interior Bay Roadway Pontons	3-32

3-6. **General.** This section contains general support maintenance procedures as authorized by the MAC in Appendix B of TM 5-5420-209-12.

3-7. **Boom Cylinder Assembly.**

This task covers: a. Test b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Solvent, Dry Cleaning (Item *2*, Appendix B)
Rags, Wiping (Item 5, Appendix B)
Oil; Lubricating (Item 4, Appendix B)

Equipment Condition:

Boom cylinder assembly removed
(TM 5-5420-209-12).

a. Test.

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

(1) Using suitable mounting and hydraulic test equipment secure cylinder with double acting hydraulic ports in upward position.

(2) Connect hydraulic pressure source to cylinder head port, next to the cylinder mounting fork, and return line to cylinder port rod end.

WARNING

When disconnecting any hydraulic line, open line slowly and protect face, as hydraulic oil may spray out due to residual pressure in system.

(3) Operate hydraulic test system Continuously for at least ten minutes by repeating the following:

(a) Apply hydraulic pressure to cylinder head port and activate boom cylinder piston rod to the fully extended position.

(b) Bleed air from rod end of cylinders necessary while piston rod is extending.

(c) Apply hydraulic pressure to cylinder rod port and activate piston rod to fully retracted position.

(d) Bleed air from cylinder head end of cylinder as necessary while the piston rod is retracting.

3-7. **Boom Cylinder Assembly. Continued**

NOTE

There shall be no permanent deformation, rupture of any parts, external hydraulic oil leakage or evidence of binding.

(4) Actuate boom cylinder assembly through at least two full cycles using suitable test equipment to apply hydraulic test pressure of 3,000 psi (211.12 kg/sq cm) for three minutes at each end of cylinder.

3-7. **Boom Cylinder Assembly. - Continued**

b. *Repair.* (figure 3-1)

NOTE

There are two cylinder assemblies, disassembly of each one is the same.

Discard all preformed packings, back-up washers, seals, sealing ring, retainer and rod scraper.

(1) Remove retaining ring (1) from gland (2).

(2) Remove three piece retainer (3) and gland (2) from piston rod (4).

(3) Remove rod scraper (5), cup (6), back-up washer (7) and packing (8) from gland (2).

(4) Remove piston rod (4) from tube (9) and remove spacer.

(5) Remove locknut (n), bearing ring (12), two back-up rings (13), crown seal (14), hydraulic piston (1 5), and packing (16).

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100ºF-138°F (38°C-60°C).

(6) Clean external parts of cylinder assembly using dry cleaning solvent and dry thoroughly.

(7) Clean internal parts using lubricating oil.

(8) Inspect cylinder assembly components for nicks, scratches, cracks or thread damage and replace any damaged parts.

(9) Install packing (16), crown seal (14), two back-up rings (13), and bearing ring (12), on hydraulic piston (15).

(10) Install rod scraper (5) and cup (6) into bore of gland (2).

(11) Install back-up washer (7) and packing (8) on gland (2).

WARNING

The gland must be seated squarely inside piston bore and on piston rod. Cocking, however slight, may damage seals and result in failure of the boom cylinder assembly.

(12) Apply lubricating oil to piston rod, and install gland (2) onto the piston rod (4).

3-7. **Boom Cylinder Assembly. - Continued**

(13) Install spacer, and hydraulic piston rod (4) and secure with nut (11).

(14) Install piston rod(4) into tube (9).

(15) Install three piece retainer (3).

(16) Install retaining ring (1).

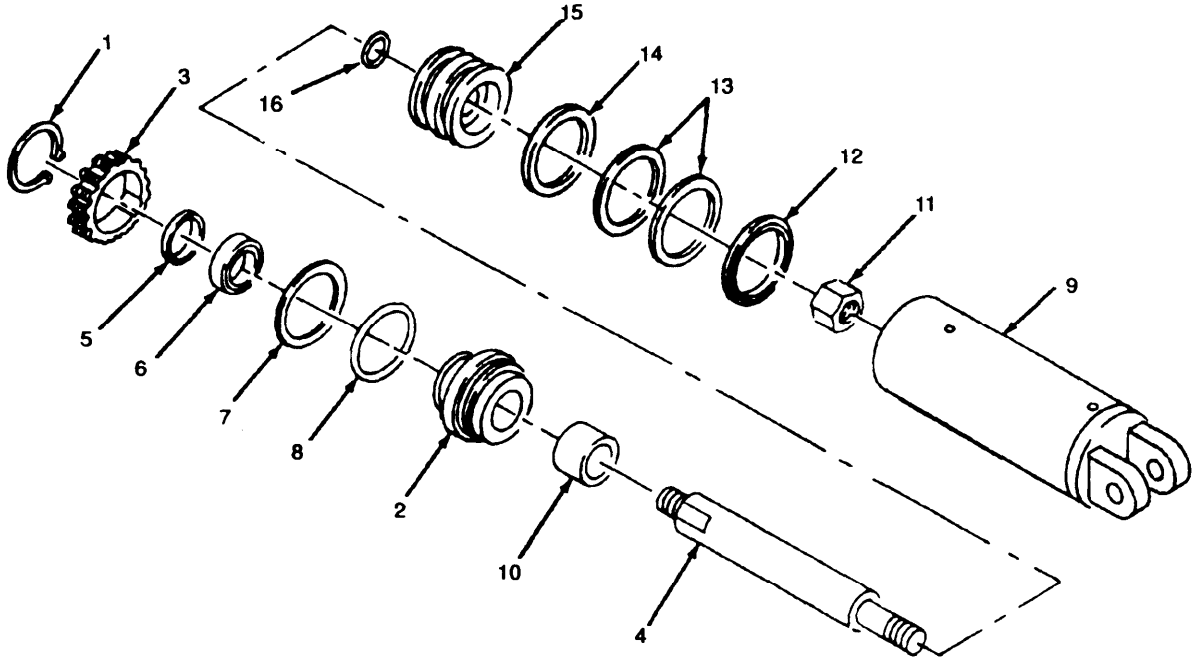


Figure 3-1. Boom Cylinder Assembly Repair.

3-8. **Cylinder Assembly (Locking Cylinder).**

This task covers: a. Test b. Repair

INITIAL SETUP

Tools

General Mechanic's T00l Kit
(NSN 5180-00-177-7033)

Materials/Parts

Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Cylinder assembly removed (locking cylinder) (TM 5-5420-209-12).

a. Test.

(1) Using suitable mounting equipment, secure locking cylinder with hydraulic ports in upward position.

(2) Connect hydraulic pressure source to mounting end of tube assembly and return line to clevis end.

WARNING

When disconnecting any hydraulic line, open line slowly and protect face, as hydraulic oil may spray out due to residual pressure in system

NOTE

Bleed locking cylinder in both the retracted and extended position. There shall be no hydraulic oil leakage.

(3) Actuate cylinder assembly through at least two full cycles, using hydraulic leak test pressure of 3,000 psi (211.1 2 kg/sq cm) for a period of three minutes at each end of cylinder.

(4) Inspect cylinder for deformation, rupture of any parts, extended leakage, chatter or binding.

3-8. **Cylinder Assembly (Locking Cylinder). - Continued**

b. Repair (figure 3-2)

NOTE

Discard all preformed packing during disassembly.

(1) Remove set screw (1) and remove clevis (2) from piston rod (3).

(2) Remove cylinder head (4) from tube assembly (5).

(3) Remove piston rod wiper (6), back-up washer (7) and tube seal (8).

(4) Remove retaining ring (9), packing set (10).

(5) Remove piston rod (3) from tube assembly (5).

(6) Remove nut (11), piston cup retainer (12), piston cup (13), piston (14), seal (15), piston cup (16) and piston cup retainer (17).

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138° F (38°C-60°C).

(7) Clean cylinder assembly using dry cleaning solvent and dry thoroughly.

(8) Inspect cylinder assembly components for nicks, scratches, cracks or thread damage and replace any damaged parts.

(9) install piston cup retainer (17), pistoncup (16), seal (15), piston (14), piston cup (13), piston cup retainer (12) on piston rod (3) and secure with nut (11).

(10) Install piston rod (3) into tube assembly (5).

(11) Install packing set (10) and secure with retaining ring (9).

(12) Install piston rod wiper (6), back-up washer (7) and tube seal (8) into cylinder head (4).

(13) Install cylinder head (4) into tube assembly (5).

NOTE

In dosed position the distance between the clevis and cylinder head is 0.69 inches (1.7526 cm).

(14) lnstall clevis (2)on piston rod (3) and secure with setscrew (1).

3-8. **Cylinder Assembly (Locking Cylinder). - Continued**

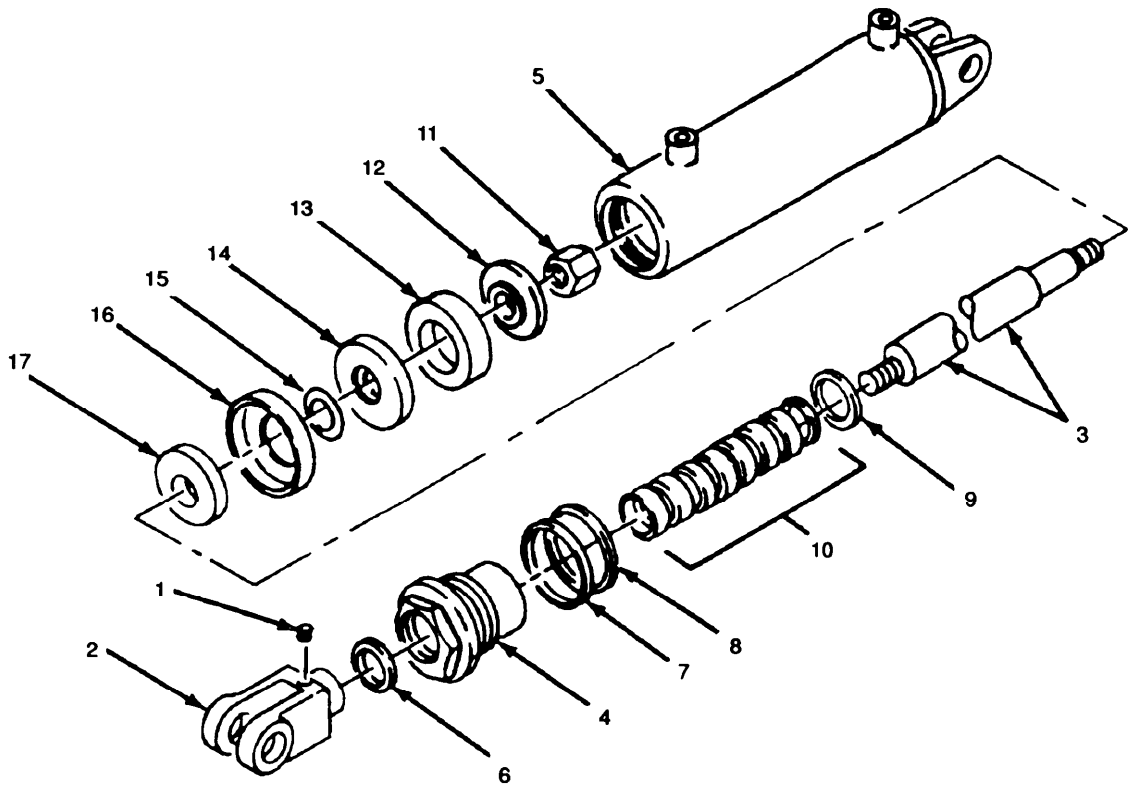


Figure 3-2. Cylinder Assembly (Locking Cylinder), Repair.

FOLLOW-ON MAINTENANCE: Install cylinder assembly (locking cylinder) (TM 5-5420-209-12).

3-9. **Selector Valve.**

This task covers: a. Test b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)
Oil, Lubricating (Item 4, Appendix B)

Equipment Condition:

Selector valve removed (TM 5-5420-209-12).

a. Test. (figure 3-3)

(1) Using suitable hydraulic test equipment, connect valve as shown in illustration with fiitered input of 210 gpm at 2,650 psi (182.71 kg/sq cm).

(2) Measure the pressure at the front winch and rear hydraulics output ports, and verify fluidis being directed to the ports selected.

(3) Using hydraulic gage check that pressure loss from either output port does not exceed 200 psi (13.79 kg/sq cm) at a fluid temperature of 111 °F to 140°F (43°C to 60°C).

3-9. **Selector Valve. - Continued**

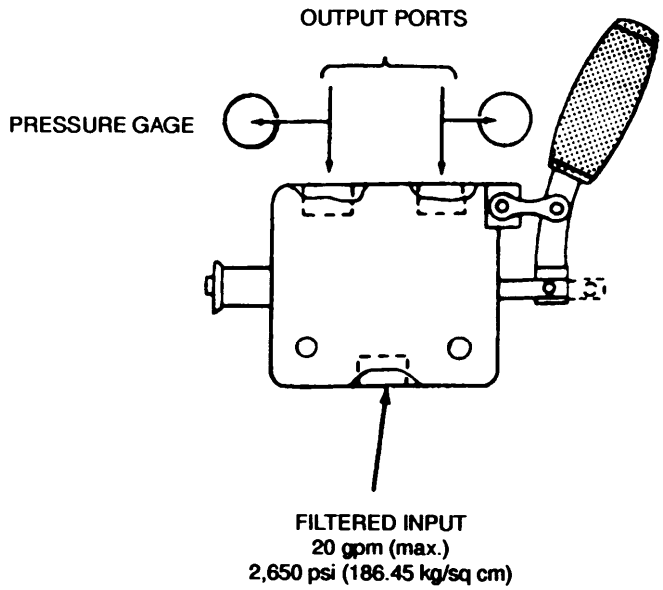


Figure 3-3. Selector Valve, Test.

3-9. **Selector Valve. - Continued**

b. Repair (figure 3-4)

(1) Remove cotter pin (1), pin (2), chain link (3), and control lever (4).

(2) Remove grip (5) from control lever (4).

(3) Remove spool clevis (6), washer (7), packing (8), screw (9), washer (10), float spool (11), and packing (12) from selector valve body (13).

(4) Discard packings (8) and (12).

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

NOTE

Spool and selector valve body are machine fitted. Replace both parts if either part is worn or damaged.

(5) Clean selector valve using dry cleaning solvent and dry thoroughly.

(6) Inspect selector valve for cracks, thread damage or worn parts and replace if damaged.

NOTE

All packings, washers, and threaded surfaces shall be lubricated with lubricating oil before installation in selector valve.

(7) Install packing (12), float spool (11), washer (10), and screw (9).

(8) Install packing (8), washer (7), and spool clevis (6).

(9) Install chain link (3) through valve body (13) and control lever (4).

(lo) Position control lever (4) and install pin (2) through spool clevis (6) and control lever(4) and secure with cotter pin (1).

(11) Slide grip (5) on control lever(4).

3-9. **Selector Valve. - Continued**

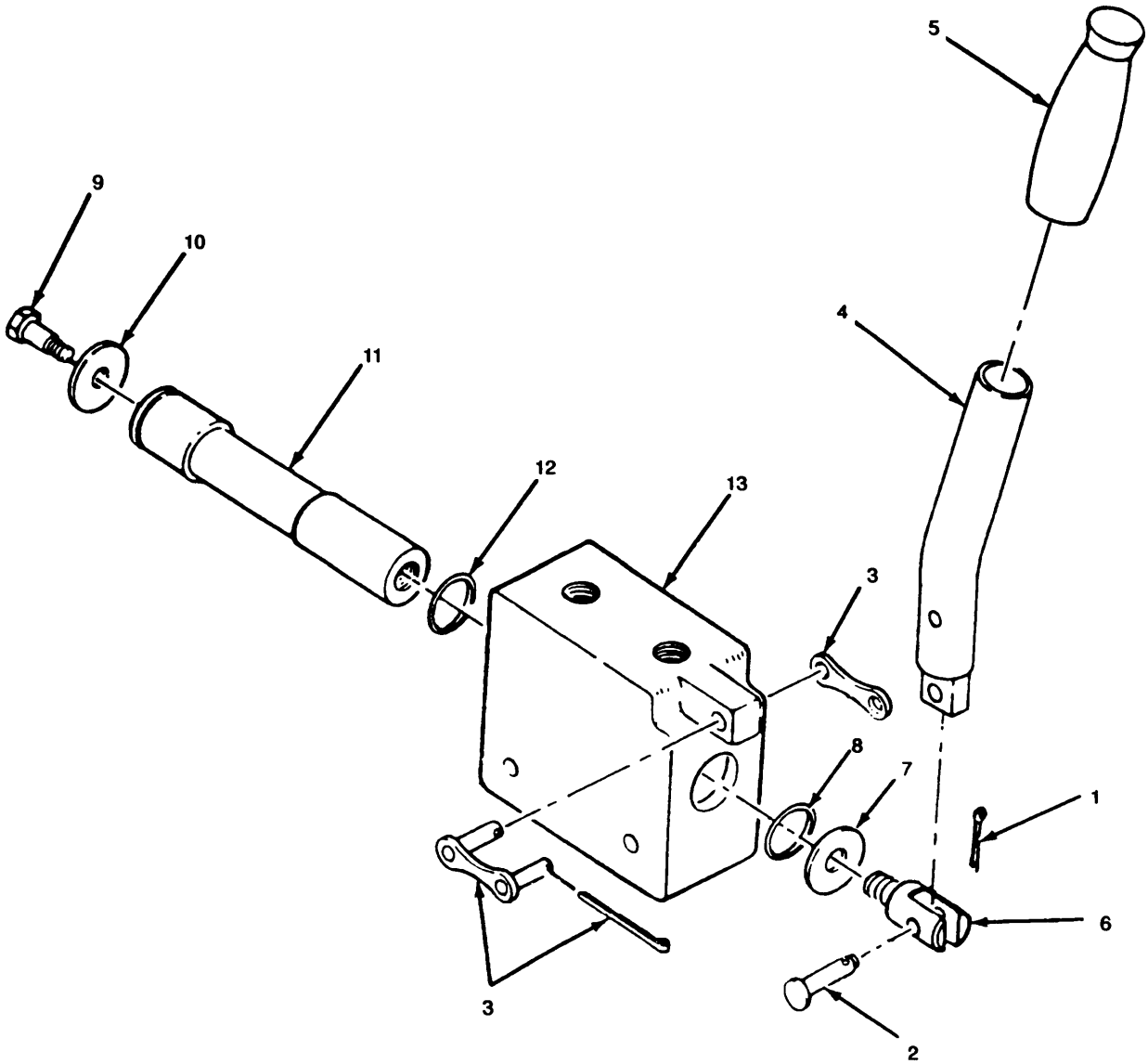


Figure 3-4. Selector Valve, Repair.

FOLLOW-ON MAINTENANCE: Install selector valve (TM 5-5420-209-12).

3-10. **Ramp Bay Support Link and Hinge Pins.**

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition:

Ramp bay roadway pontons removed
(TM 5-5420-209-12).

a. Replace. (figure *3-5)*

(1) Cutout support link (1)from roadway ponton (2) in accordance with TM 9-237.

(2) Install support link (1) by welding in accordance with TM 9-237.

3-10. **Ramp Bay Support Link and Hinge Pins. - Continued**

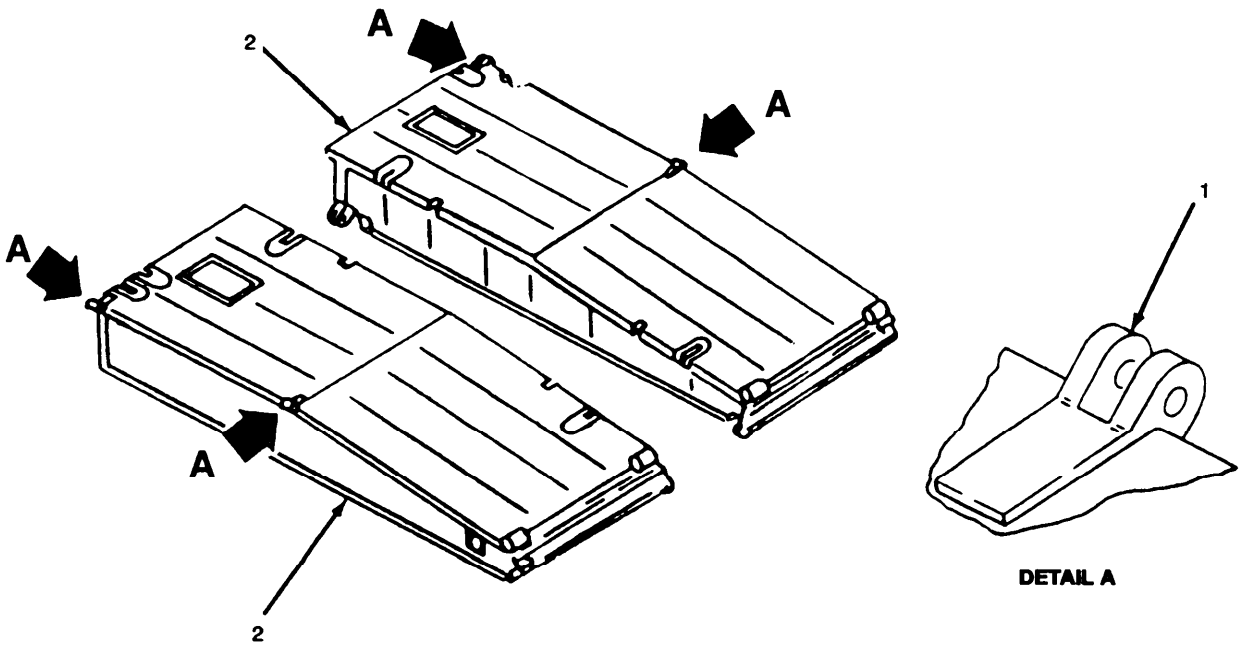


Figure 3-5. Ramp Bay Support Link and Hinge Pins, Replace.

FOLLOW-ON MAINTENANCE: Install ramp bay roadway pontons (TM 5-5420-209-12).

3-11. **Ramp Bay Bow Pontons.** This task covers repair.

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition:

Ramp bay bow ponton removed
(TM 5-5420-209-12).

Materials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

a. *Repair.* (figure 3-6)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 1OO°F-138°F (38°C-60°C).

(1) Clean bow pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw (2) securing chain (3) and remove chain.

(4) Install ponton leak detector into bow ponton (4).

(5) Connect air source to Ieak detector and pressurize ponton to 1.5 ± 0.1 psig.

(6) Apply soapy solution to ponton surfaces and check for leak.

(7) Inspect plates and roadway decking for dents, and repair dents in accordance with TM 9-450.

(8) Inspect plates and deck for cracks and repair cracks in accordance with TM 9-237.

(9) Inspect surfaces for damage or minor gouging or plate distortion and repair with a file or suitable bending tool.

(10) After repair of surface damage, dean, treat and paint the repaired area in accordance with MIL-T-704 type B.

(11) Remove ponton leak detector.

3-11. **Ramp Bay Bow Pontons. - Continued**

(12) Mark off cavities and bores in the ramp bow ponton and apply nonslip deck covering compound to top surfaces of bow ponton decking and top surfaces of outboard sheeting that makeup walkway.

(13) Weld in any patches that are required to repair bow ponton in accordance with TM 9-237.

(14) Install screw (2) that secures chain (3) to bow ponton (4).

(15) Install plug (1) in bow ponton.

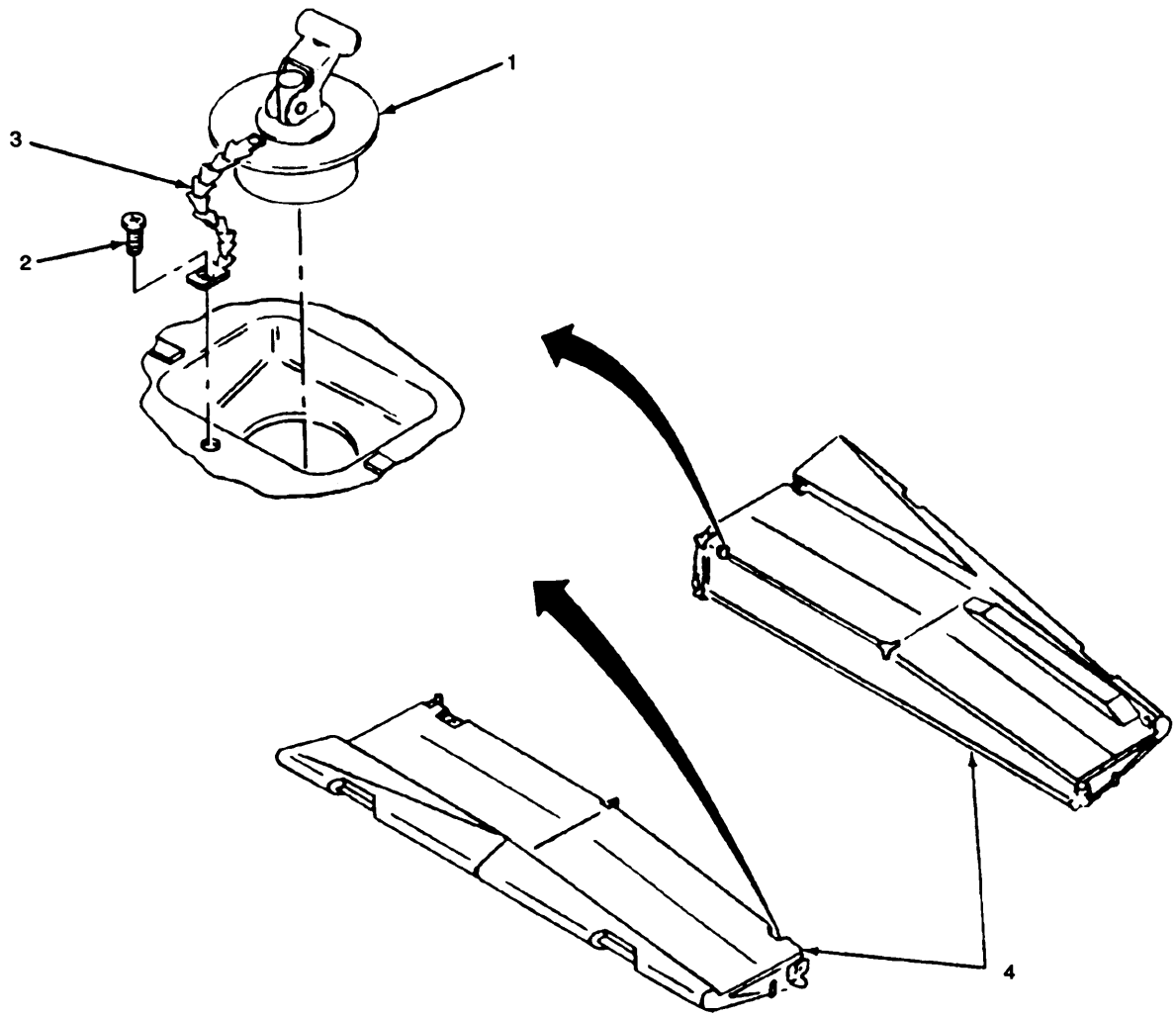


Figure 3-6. Ramp Bay Bow Pontons, Repair.

FOLLOW-ON MAINTENANCE: Install ramp bay bow pontons (TM 5-5420-209-12).

3-12. **Ramp Bay Roadway Pontons.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Ramp bay roadway ponton removed
(TM 5-5420-209-12).

a. Repair. (figure 3-7)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F (38°C-60°C).

(1) Clean roadway pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw (2) securing chain (3) and remove chain.

(4) Install ponton leak detector into roadway ponton (4).

(5) Connect air source to leak detector and pressurize ponton to 1.5 ± 0.1 psig.

(6) Apply soapy solution to ponton surfaces and check for leaks.

(7) Inspect plates and roadway decking for dents, and repair dents in accordance with TM 9-450.

(8) Inspect plates and deck for cracks and repair cracks in accordance with TM 9-237.

(9) Inspect surfaces for damage or minor gouging or plate distortion and repair with a file or suitable bending tool.

(10) After repair of surface damage, dean, treat and paint the repaired area in accordance with MIL-T-704 type B.

(11) Remove ponton leak detector.

(12) Mark off cavities and bores in the ramp roadway ponton and apply nonslip deck covering compound to the repaired top and side deck surfaces.

3-12. Ramp Bay Roadway Pontons. - Continued

(13) Weld in any patches that are required to repair the roadway ponton in accordance with TM9-237.

(14) Install screw (2) that secures chain (3) to roadway ponton (4).

(15) Install plug (1) in roadway ponton.

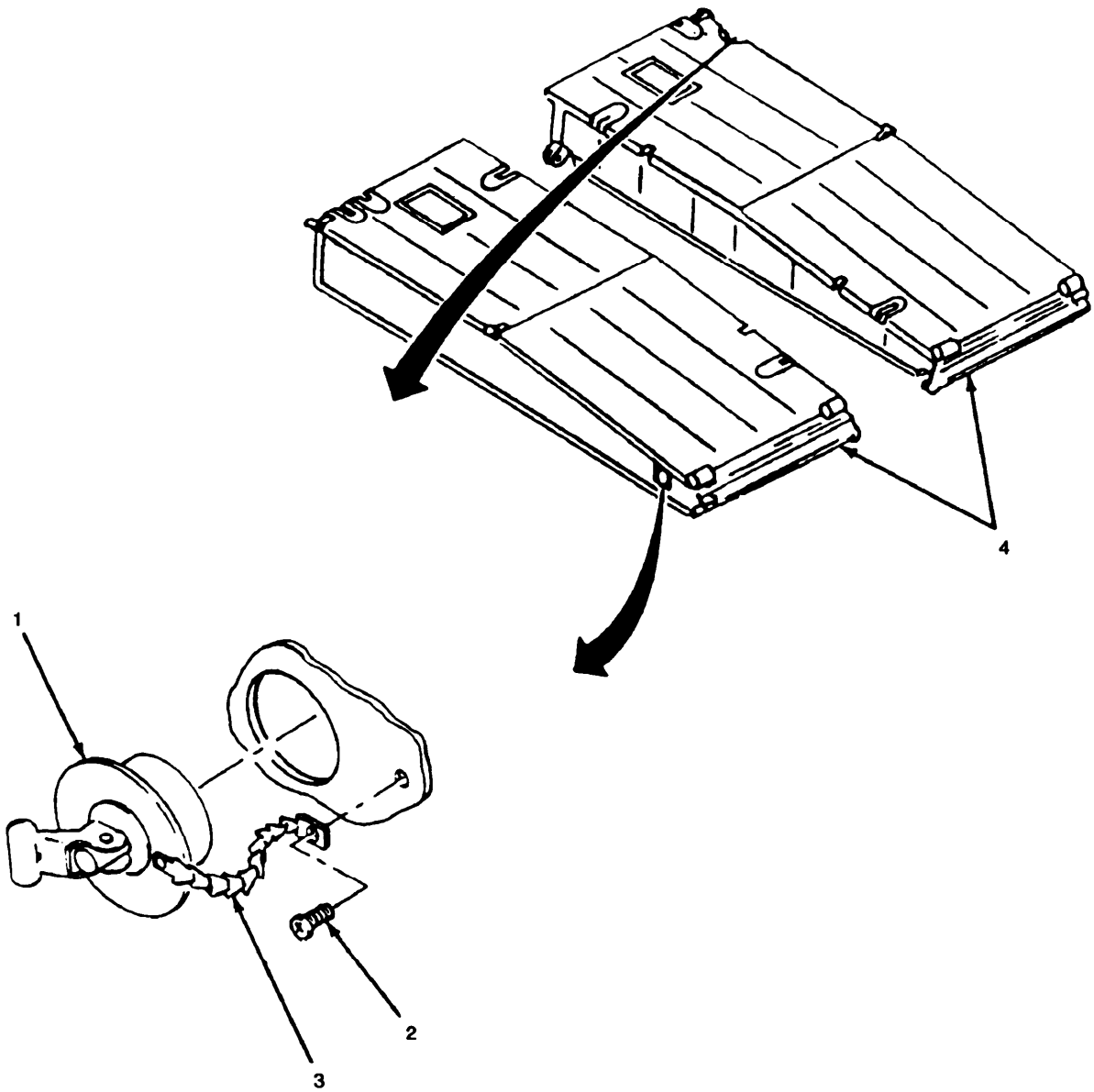


Figure 3-7. *Ramp Bay Roadway Pontons, Repair*

FOLLOW-ON MAINTENANCE: Install ramp bay roadway pontons (TM 5-5420-209-12).

3-13. **Hydraulic Cylinder and Piston.**

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)
Torque wrench (NSN 5120-00-221-7983)

Materials/Parts

Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)
Oil, Lubricating (Item 4, Appendix B)
Compound, Sealing (Item 6, Appendix B)
Grease (Item 3, Appendix B)

Equipment Condition:

Bay removed (TM 5-5420-209-1 2).

a. *Replace.* (figure 3-8)

(1) Remove six screws (NO TAG) and remove access cover (2).

(2) Screw al/2 in. x 20 UNC thread eye bolt into top of cylinder retaining pin (3).

(3) Remove retaining pin (3) using suitable lifting device.

(4) Partially pull open yoke (4).

(5) Remove cotter pin (5), washer(6) and remove pin (7).

(6) Open yoke (4) fully and block in position.

WARNING

When disconnecting any hydraulic line, open line slowly and protect face, as hydraulic oil may spray out due to residual pressure in system.

NOTE

When removing hoses, have a suitable container to drain oil from hoses. Cap all hoses and ports immediately to prevent dirt or foreign matter from entering the system.

(7) Tag and disconnect three hydraulic lines (8) and packings (9) from hydraulic cylinder (10).

3-13. **Hydraulic Cylinder and Piston. - Continued**

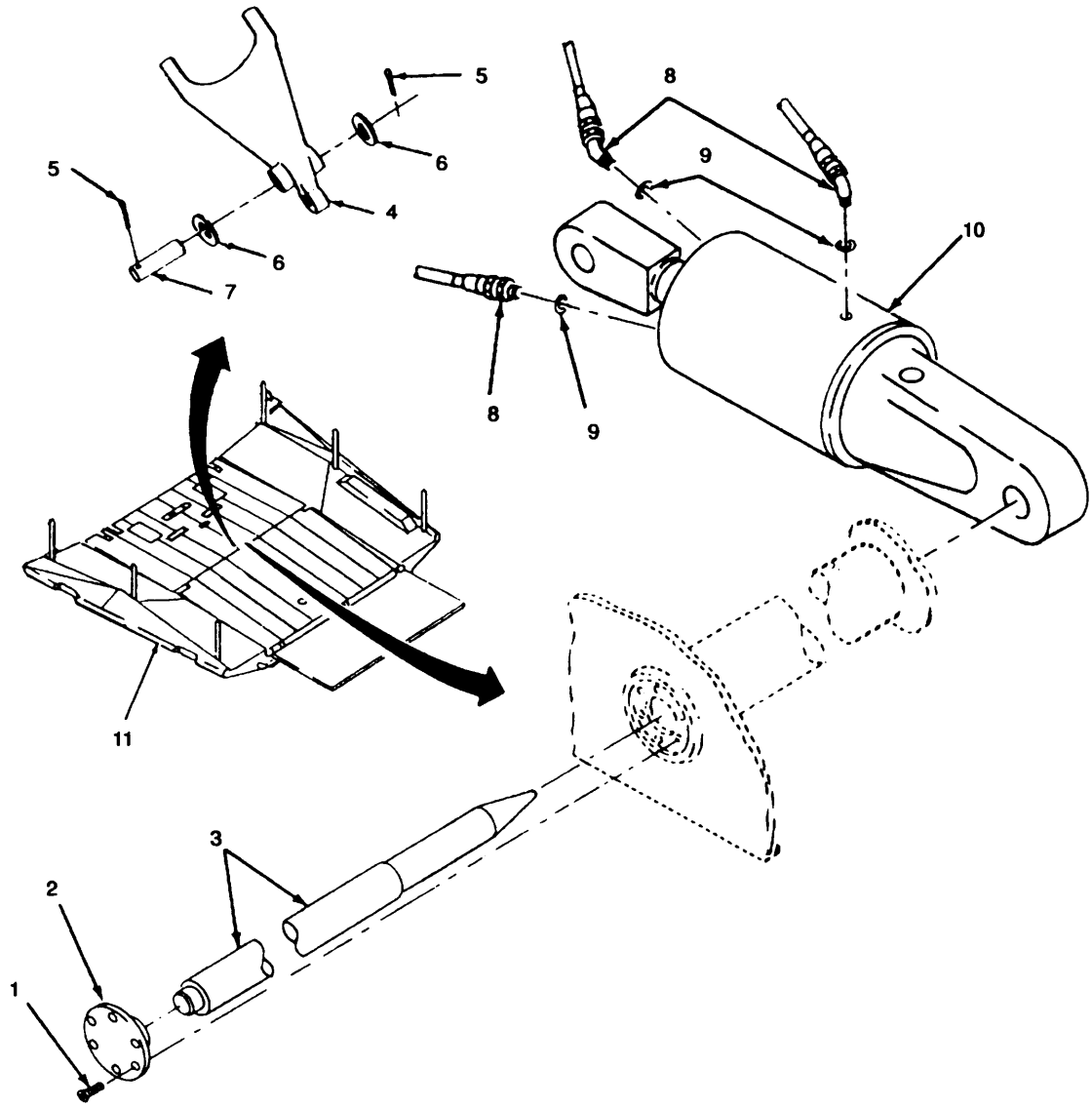


Figure 3-8. Hydraulic Cylinder and Piston, Replace.

CAUTION

A minimum of two persons is required to remove hydraulic cylinder.

(8) Remove hydraulic cylinder (10) from ponton (11).

3-13. **Hydraulic Cylinder and Piston. - Continued**

NOTE

Prior to installing cylinder in ramp bay, place suitable supports in ponton well for purposes of alining hydraulic cylinder.

(9) Position hydraulic cylinder (10) in ponton (11).

(10) Install three hydraulic lines (8) and packings (9) as tagged.

(11) Close yoke (4) partially and install pin (7), washers (6), and cotter pins(5).

(12) Aline hydraulic cylinder (10)with cutout in ponton (11) and dose yoke (4) fully.

(13) Install cylinder retaining pin (3) and remove eyebolt.

(14) Install cover(2) and secure with six screws (NO TAG).

b. *Repairz* (figure 3-9)

NOTE

Hydraulic cylinder and piston removed for repair. See para. a above.

Discard all packings and seals during disassembly.

(1) Remove bleeder plug (1) and packing (2) and drain residual oil.

(2) Using spanner wrench, remove nut (3) from cylinder adapter (4).

(3) Remove cylinder adapter (4) and packing (5).

(4) Remove cylinder head (6) from cylinder housing (7) and remove packing(8) from cylinder head.

(5) Remove relief valve (9) from union (1 O) and remove union from piston rod (11).

(6) Remove two packing(12) from union (10).

(7) Remove nut (13) from piston rod (11).

(8) Remove packing (14).

(9) Secure piston rod in fully retracted position and using torque wrench remove the piston (15).

(lo) Remove two seal rings (16) and seal (17).

(11) Remove piston rod (11) from cylinder housing (7) and remove retaining ring (18) and wiper (19).

3-13. **Hydraulic Cylinder and Piston. - Continued**

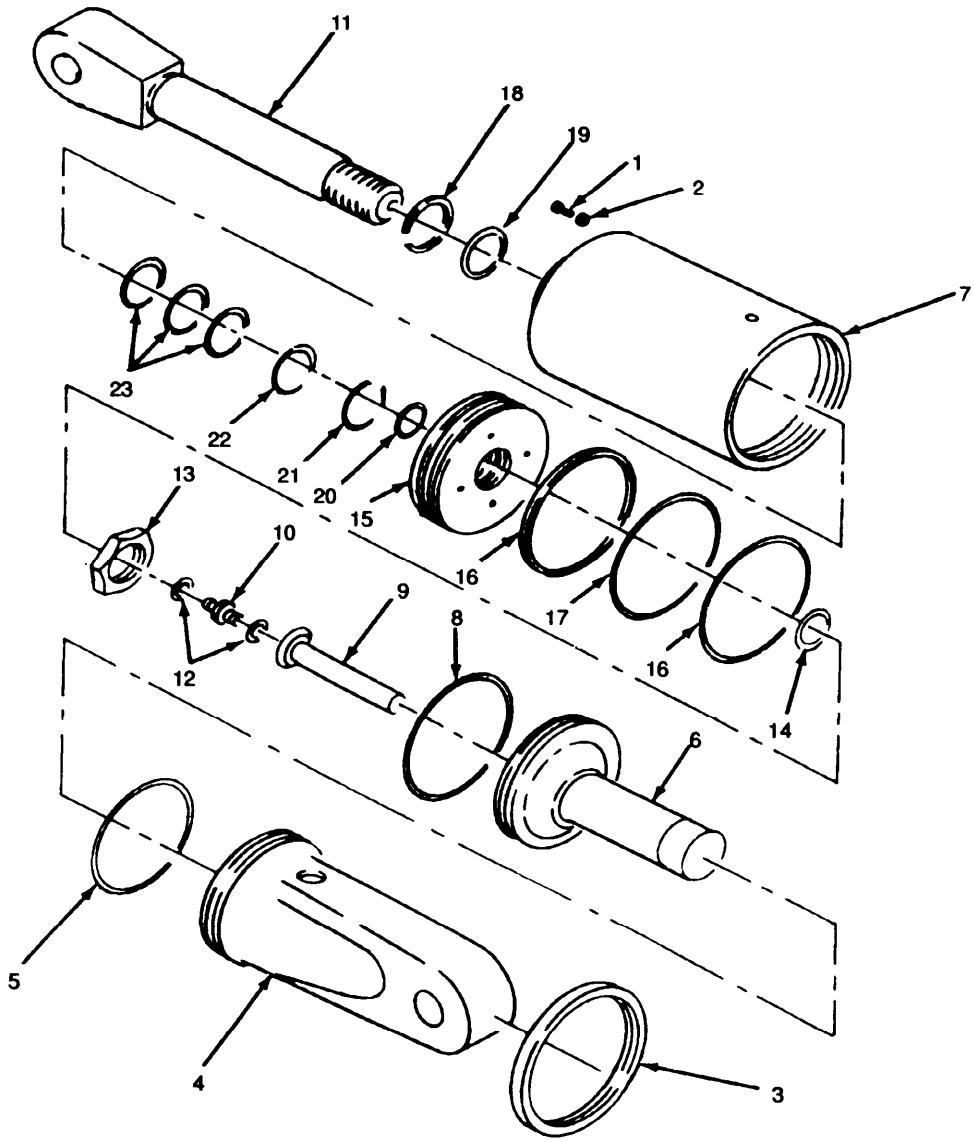


Figure 3-9. Hydraulic Cylinder and Piston, Repair.

(12) Remove packing (20), retaining ring (21), seal ring (22), and three packings (23) from piston end of cylinder housing.

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-136°F (38°C-60°C).

3-13. **Hydraulic Cylinder and Piston. - Continued**

(13) Clean cylinder and piston using dry cleaning solvent and dry thoroughly.

(14) Inspect all threaded parts for thread change.

NOTE

Maximum bore diameter shall be 7.754 inches (19.69616 cm).

(15) lnspect piston bore of cylinder housing for nicks, scratches, cracks, scoring and excessive wear.

NOTE

Maximum bore of housing lands shall be 2.753 inches (6.99262 cm).

(16) Inspect piston rod bore in cylinder housing for nicks, scratches, cracks, scoring or excessive wear.

NOTE

Maximum diameter of piston rod surface within cylinder housing shall be 2.748 inches (6.97992 cm).

(17) Inspect cylinder surface of piston rod for nicks, scratches, scoring, load pattern and signs of stress.

(18) Radiograph inspect cylinder adapter in accordance with ASTM E71 and E186, level 2.

NOTE

Maximum diameter of bore shall be 2.327 inches (5.91058 cm).

(19) Inspect diameter of mounting pin bore in cylinder adapter.

NOTE

Maximum diameter of bore shall be 2.260 inches (5.7404 cm).

(20) Inspect diameter of mounting pin bore in piston rod.

(21) Replace components that are beyond repair or specified diameters.

NOTE

Lubricate the wiper, retaining ring, seal ring and all packings with lubricating oil before installation into cylinder.

(22) Install seal ring (22) and secure with retaining ring (21).

(23) Install three packings (23) and pack (20).

3-13. **Hydraulic Cylinder and Piston. - Continued**

(24) Install wiper (19) and secure with retaining ring (18).

(25) Lubricate piston rod (11) and install into cylinder housing (7).

(26) Install two sealing rings (16) and seal (17) onto piston (15).

(27) Using suitable wrench, install piston on piston rod (11). Torque piston to 950-1,050 lb-ft (131.4 -145.2 mkg) and then install packing (14).

(28) Apply sealing compound to piston rod threads and install nut (13). Torque nut to 200-220 lb-ft (27.7-30.4 mkg).

(29) Install two packings (12) on union (10).

(30) Lubricate union threads and install union (10) in piston rod (11).

(31) Install relief valve (9) onto union (10).

(32) Apply grease to threads on cylinder housing (7), and install packing (8) on cylinder head (6) and then install cylinder head into housing.

(33) Apply grease to threads on cylinder adapter (4), and install packing (5) on adapter (4) and then install adapter into housing (7).

(34) Apply grease to threads on nut (3) and install nut using spanner wrench onto cylinder adapter (4). Torque nut to 100-120 lb-ft (13.8-16.6 mkg).

3-14. **Interior Bay Support Link and Hinge Pins.**

This task covers: Replace

INITIAL SETUP

Tools	*Equipment Condition:*
General Mechanic's Tool Kit *(NSN 5180-00-177-7033)*	Interior bay roadway pontons removed (TM 5-5420-209-12).

a. Replace. (figure 3-10)

(1) Cutout support link (1) from roadway ponton (2) in accordance with TM 9-237.

(2) Install support link(l) by welding in accordance with TM 9-237.

3-14. **Interior Bay Support Link and Hinge Pins. - Continued**

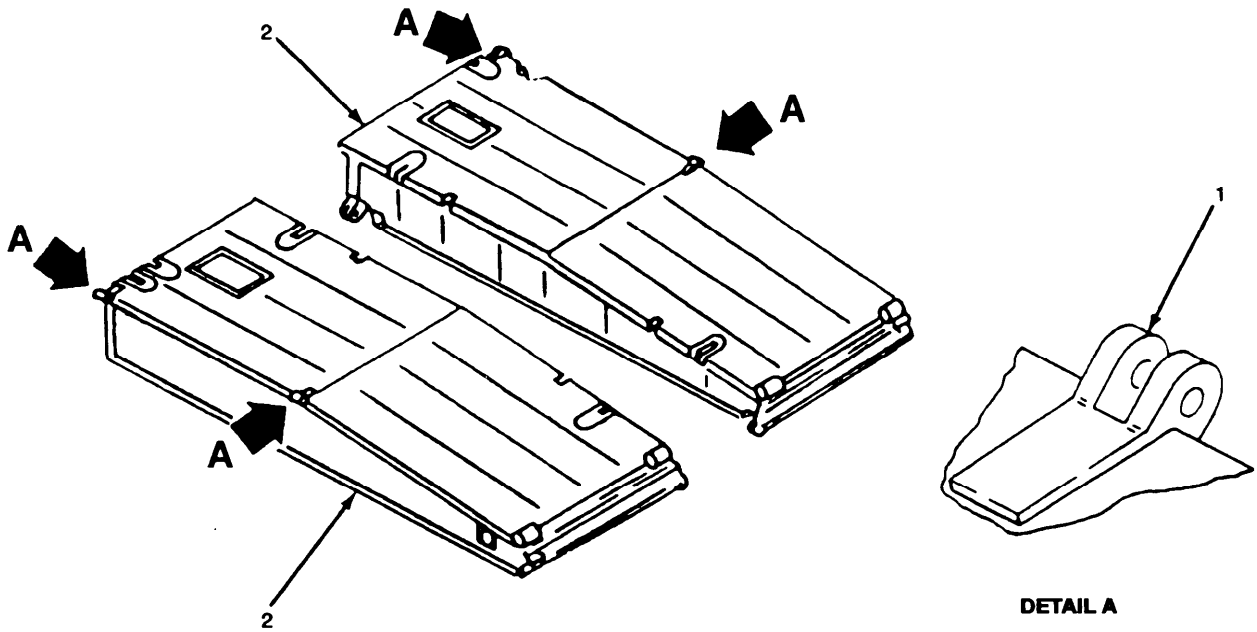


Figure 3-10. interior Bay Support Link and Hinge Pins, Replace.

FOLLOW-ON MAINTENANCE: Install interior bay roadway pontons (TM 5-5420-209-12).

3-15. **Interior Bay Bow Pontons.**

This task Covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Matenials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item *5, Appendix* B)

Equipment *Condition:*

Interior bay bow ponton removed
(TM 5-5420-209-12).

a. Repair. (figure 3-11)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100° F-138° F (38° C-60° C).

(1) Clean bow pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw *(2) securing* chain *(3)* and remove chain.

(4) Install ponton leak detector into bow ponton *(4).*

(5) Connect air source to Ieak detector and pressurize ponton to 1.5 ± 0.1 psig.

(6) Apply soapy solutioni to ponton surfaces and deck for leak.

7 Inspect plates and roadway decking for dents and repair dents in accordance with TM 9-450.

(8) Inspect plates and decks for cracks and repair cracks in accordance with TM 9-237.

(9) Inspect surfaces for damage or minor gouging or plate, bore, or structural angle distortion and repair with a file or suitable bending tool.

(10) After repair of surface damage, dean, treat and paint the repaired areas in accordance with MIL-T-704 type B.

(11) Remove ponton leak detector.

(12) Mark off cavities and bores in interior bow ponton and apply nonslip deck covering compound to top surface of ponton decking and to top surfaces of outboard sheeting.

3-15. **Interior Bay Bow Pontons. - Continued**

(13) Weld in any patches that are required to repair bow ponton in accordance with TM 9-237.

(14) Install screw (2) that secures chain (3)to bow ponton (4).

(15) Install plug (1) in bow ponton.

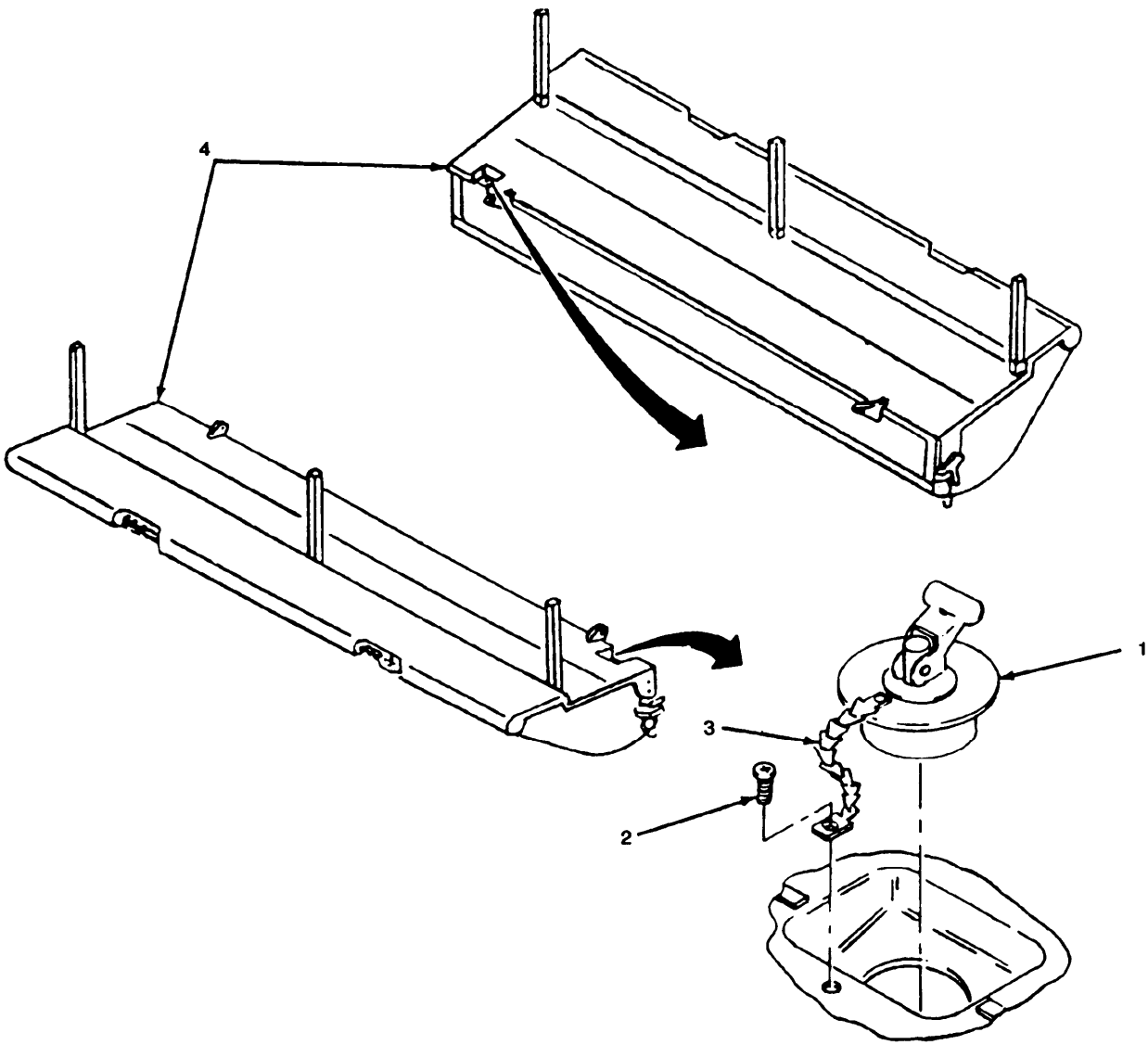


Figure 3-11. Interior Bay Bow Pontons, Repair.

FOLLOW-ON MAINTENANCE: Install bay bow ponton (TM 5-5420-209-12).

3-16. **Interior Bay Roadway Pontons.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kt
(NSN *5160-00-177-7033)*

Materials/Parts

Compound, Covering (Item 1, Appendix B)
Solvent, Dry Cleaning (Item 2, Appendix B)
Rags, Wiping (Item 5, Appendix B)

Equipment Condition:

Interior bay roadway ponton removed
(TM *5-5420-209-12).*

a. Repair (figure 3-12)

WARNING

Dry cleaning solvent, PD-680, used to dean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138° F (38°C-60°C).

(1) Clean roadway pontons using dry cleaning solvent and dry thoroughly.

(2) Raise lever on snap-tite plug (1) and remove plug.

(3) Remove screw (2) securing chain (3) and remove chain.

(4) Install ponton leak detector into bow ponton (4).

(5) Connect air source to leak detector and pressurize to 1.5 ± 0.1 psig.

(6) Apply soapy solution to ponton surfaces and deck for leaks.

(7) Inspect plates and roadway decking for dents and repair dents in accordance with TM 9-450.

(8) Inspect plates and decks for cracks and repair cracks in accordance with TM 9-237.

(9) Inspect surfaces for damage or bent, gouged, or distorted sheeting, structural angles, connectors blocks, receptacles, bars, plates and decking extrusion, link supports, cable guide and port tubes and repair with file or suitable bending tool.

10) Perform radiographic and magnetic particle inspection of weld joint between rear base of ponton yoke and steel plate used to mount yoke in accordance with MIL-R-11468 standard I, and MIL-I-6868.

3-16. **Interior Bay Roadway Pontons. - Continued**

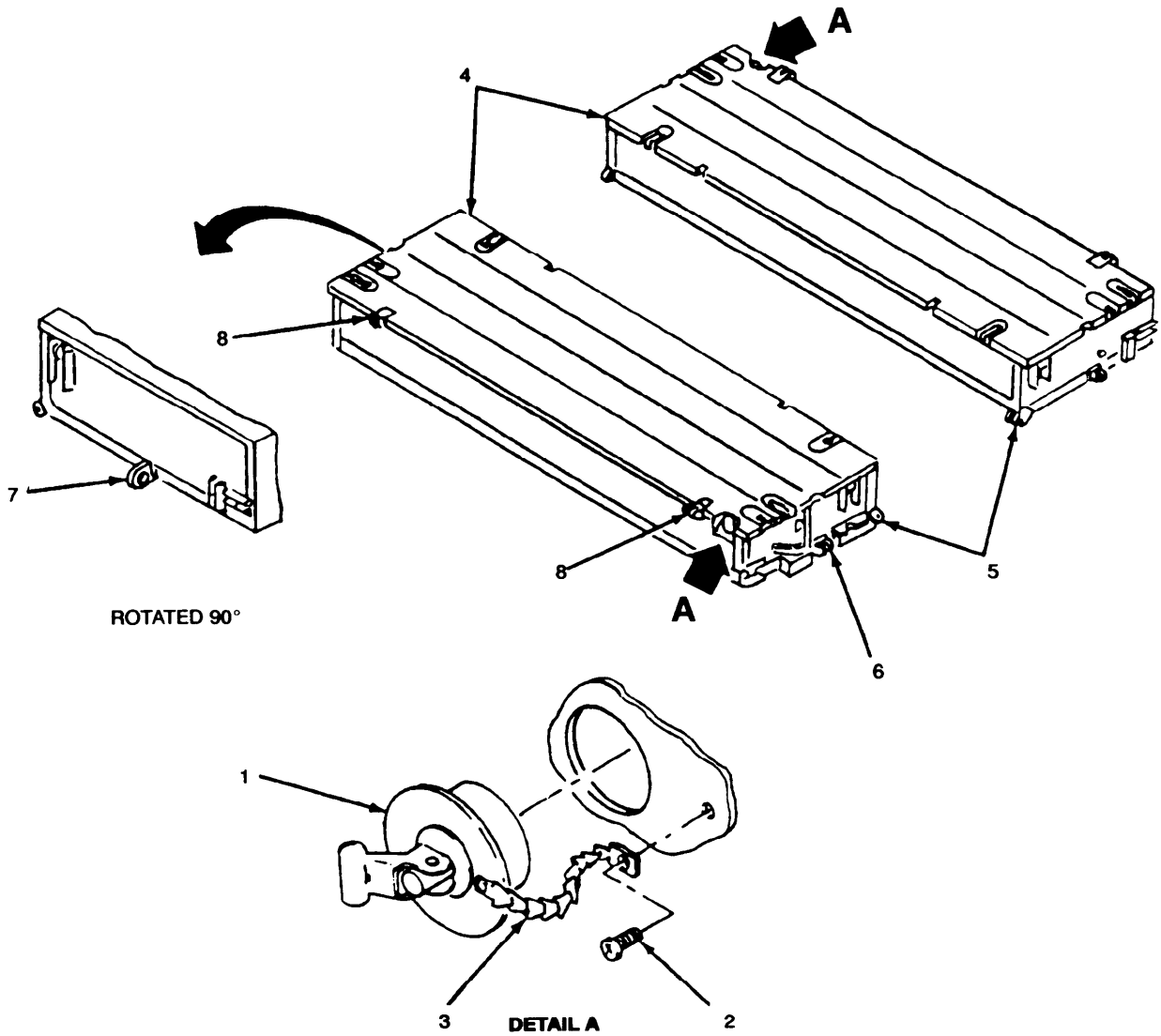


Figure 3-12. Interior Bay Roadway Ponton, Repair.

FOLLOW-ON MAINTENANCE: Install bay roadway ponton (TM 5-5420-209-12).

NOTE

Maximum diameter throughout each bore is 2.927 inches (7.41934 cm).

(11) Inspect diameter of bores through roadway-to-roadway hinges (5) and replace ponton if bores are out of tolerance.

3-16. **Interior Bay Roadway Pontons. - Continued**

NOTE

Maximum diameter of bore is 2.702 inches (6.86308 cm).

(12) inspect diameter of ponton yoke bore (6), and replace ponton if bore is out of tolerance.

NOTE

Maximum diameter of bore is 2.765 inches (7.0231 cm).

(13) Inspect diameter of ponton eye bore (7) for wear or elongation, and replace ponton if bore is out of tolerance.

NOTE

Maximum diameter of bore is 1.041 inches (2.64414 cm).

(14) Inspect diameter of roadway ponton to bow ponton hinge plate bore (8) and replace ponton if bore is out of tolerance.

(15) After repair of surface damage, dean, treat and paint the repaired areas in accordance with MIL-T-704 type B.

(16) Remove ponton leak detector.

(17) Mark cavities and bores and threaded surface areas in roadway ponton and apply nonslip deck covering to top surface of roadway ponton deck.

(18) Weld in any patches that are required to repair roadway ponton in accordance with TM 9-237.

(19) Install screw (2) that secures chain (3) to roadway ponton (4).

(20) Install plug (1) into roadway proton.

APPENDIX A

REFERENCES

A-1. **Scope.** This appendix contains all forms, Iubrication orders, pamphlets and technical mauwals referenced in this manual.

A-2. Forms.

Recommended Changes to Publications . . . . . DA Form 2028-2

Transportation Discrepancy Report (TDR) . . . . . SC 361

Report of Discrepancy (ROD) . . . . . SF 364

Quality Deficiency Report (QDR) SF368

A-3. Lubrication Order.

Lubrication Order, Ribbon Bridge Transporter, Interior Bay and Ramp Bay . . . . . LO 5-5420-209-12

A-4. Pamphlets.

The Army Maintenance Management Systems (TAMMS) . . . . . DA Pam 738-750

Consolidated Index of Army Publications and Blank Forms . . . . . DA Pam 25-30

A-5. Technical Manuals.

Operator and Unit Maintenance Manual for Improved Float Bridge (Ribbon Bridge) . . . . . TM 5-5420-209-12

Unit, Direct Support and General Support Repair Parts and Special Tools List for Improved Float Bridge (Ribbon Bridge) . . . . . TM 5-5420-209-24P

Operator's Manual - Truck 5-Ton, 6x6, M812 series . . . . . TM 9-2320-260-10

Organizational Maintenance - Truck, 5-Ton, 6x6, M812 Series . . . . . TM 9-2320-260-20

Direct and General Support Maintenance - Truck, 5-Ton, 6x6, M812 Series . . . . ~.. . . . . TM 9-2320-260-34

Organizational Parts - Truck, 5-Ton, 6x6, M812 Series . . . . . TM 9-2320-260-20P

Direct and General Support Parts - Truck, 5-Ton, 6x6, M812 Series . . . . . TM 9-2320-260-34P

Operator's Manual - Truck 5-Ton, 6x6, M939 Series . . . . . TM 9-2320-272-10

Organizational Maintenance - Truck, 5-Ton, 6x6, M939 Series . . . . . TM 9-2320-272-20-1

Organizational Maintenance - Truck, 5-Ton, 6x6, M939 Series . . . . . TM 9-2320-272-20-2

Organizational Parts-Truck, 6x6, M939 Series TM9-2320-272-20P

Direct and General Support Maintenance Truck, 5-Ton, 6x6, M939 Series . . . . . TM 9-2320-272 -34-1

Direct and General Support Maintenance Truck, 5-Ton, 6x6, M939 Series . . . . . TM 9-2320-272-34-2

A-5. **Technical Manuals. - Continued**

Direct and General Support Parts - Truck, 5-Ton, 6x6, M939 Series . . . . . TM 9-2320 -272-34P-1

Direct and General Support Parts - Truck, 5-Ton, 6x6, M939 Series . . . . . TM 9-2320 -272-34P-2

operator's Manual for Welding Theory and Application . . . . . TM 9-237

Metal Body Repair and Related Operations . . . . . TM 9-450

Painting Instructions for Field Use . . . . . TM 43-1039

Procedures for Destruction of Equipment to Prevent Enemy Use . . . . . TM 850-244-3

APPENDIX B

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

B-1. **Scope.** This appendix lists expendable supplies and materials you will need to operate and maintain the ribbon bridge. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

B-2. **Explanation of Columns.**

Column (1)- Item Number. This number is assigned to the entry in the listing and referenced in the narrative instructions to identify the material (e.g., "Use dry cleaning solvent, Item 2, Appendix B.").

b. Co/umn (2) - Level. This column identifies the lowest level of maintenance that requires the listed item. (Enter as applicable.)

C - Operator/Crew
O- Unit Maintenance
F - Direct Support Maintenance
H - General Support Maintenance
D - Depot Maintenance

c. *Column (3) - National Stock Number.* This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item.

e.Column (5)- Unit of Measure (U/M).*Indicates* the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	F		Compound, Deck Covering, Nonslip, Lightweight for Aluminum Alloy Landing Mats., MIL-C-81346. FSC 8010	gal can
2	F	6950-00-281-1985	Dry Cleaning Solvent, PD-680, FSC 6950	gal can
3	F	9150-00-190-0905	Grease, Automotive and Artillery, MIL-G-10924, FSC9150	5 lb can
4	F	9150-00-189-6727	Oil, Lubricating, OE/HDO 10, MIL-L-2104 (81349)	1qt can
	F	9150-00-186-6668	Oil, Lubricating, OE/HDO 10, MIL-L-2104 (81349)	5 gal can
	F	9150-00-188-9867	Oil, Lubricating, OE/HDO 10, MIL-L-2104 (81349)	5 5 @ can
	F	9150-00-191-2772	Oil, Lubricating, OE/HDO 10, MIL-L-2104 (81349)	55 gal can
5	F	7920-00-205-1711	Rag, Wiping, 50/G (58536) A-A-531	ea.
6	F		Sealing, Locking and Retaining Compounds, Single-Component, MIL-S-22473, Grade HVV, FSC 8030	

APPENDIX C

ILLUSTRATED LIST OF MANUFACTURED ITEMS

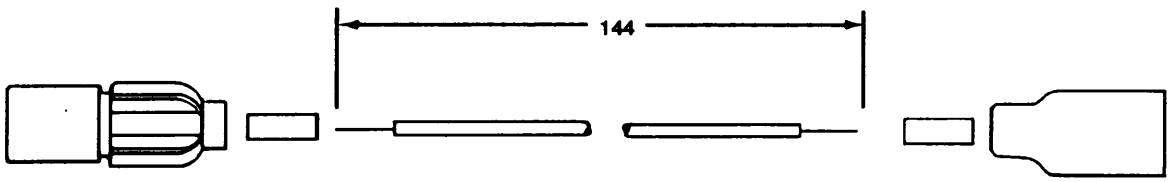
This appendix indudes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance.

Apart number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

All bulk material needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

Index

Item		Figure
13218E4293	Electrical Lead	c-1
13218E4291	Electrical Lead	c-2
13218E4292	Electrical Lead	c-3
13218E4290	Electrical Lead-	c-4
13218E4353	Wiring Harness	c-5



NOTES

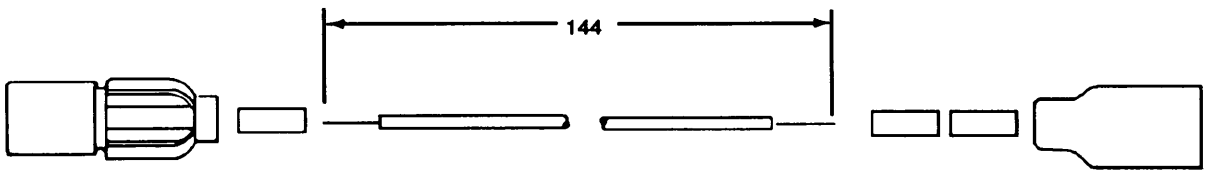
(1) All dimensions in inches.

(2) Strip off .500 inches of wire from both ends.

(3) Assemble as shown in illustration.

Parts Needed: Electrical Connector Plug (PN MS27144-1), Electrical Connector Plug (PN M27142-2), Band Marker (PN 43436/1-1), 2 ea., Electrical Wire (PN M13486/1-5) 12 ft.

Figure C-1. Electrical Lead.



NOTES

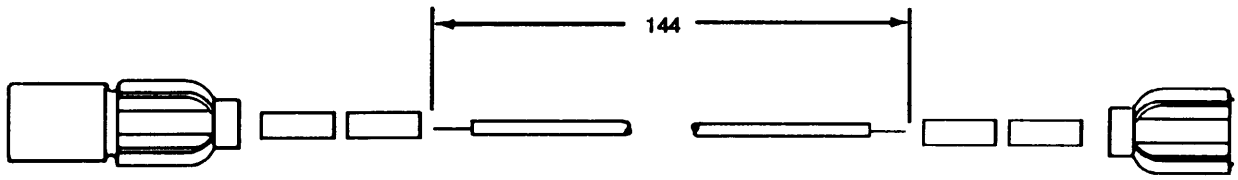
(1) All dimensions in inches.

(2) Strip off .500 inches of wire from both ends.

(3) Assemble as shown in illustration.

Parts Needed: Electrical Connector Plug (PN MS27144-1), Electrical Connector Plug (PN M2142-2), Band Marker (PN M43436/1 -l), 2 ea., Bard Marker (PN M43436/1-3); Electrical Wire (PN M1346/1-5) 12 ft.

Figure C-2. Electrical Lead.



NOTES

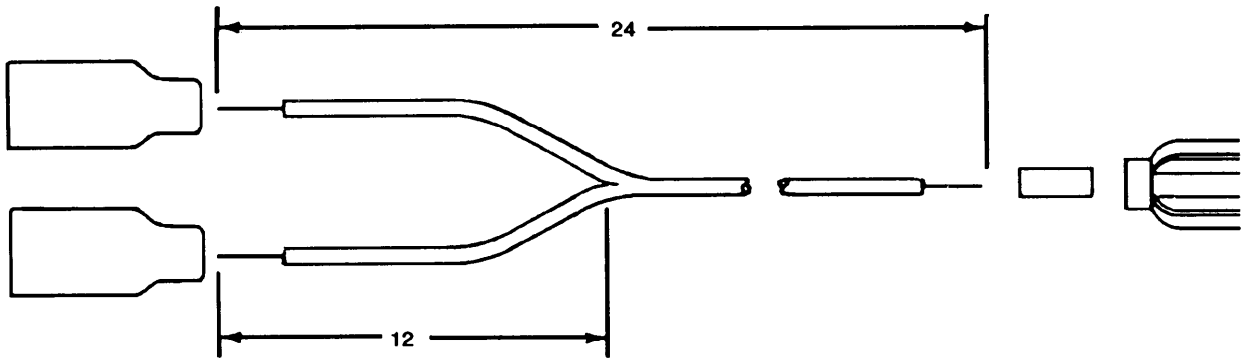
(1) All dimensions in inches.

(2) Strip off.500 inches of wire from both ends.

(3) Assemble as shown in illustration.

Parts Needed: Electrical Connector Plug (PN MS27144-1), 2 ea., Band Marker (PN M43436/1-1), 2ea., Band Marker(PN M43436/1 -3),2 ea., Electrical Wire (PN M1346/2-5) 12 ft.

Figure C-3. Electrica/Lead.



NOTES:

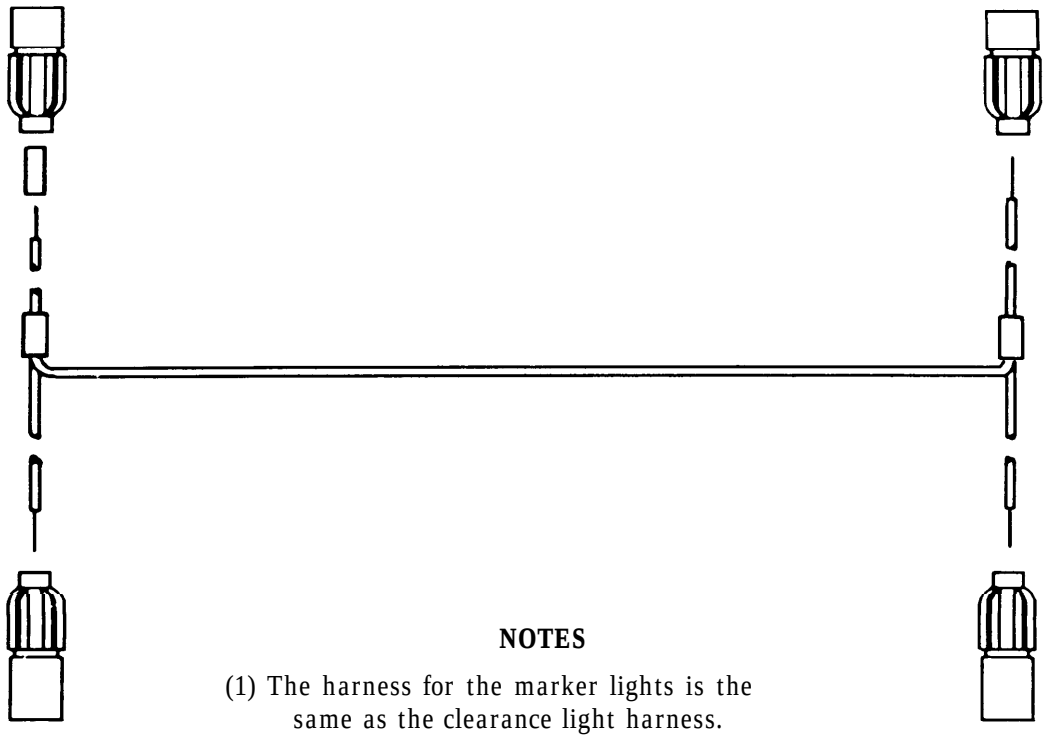
(1) All dimensions in inches.

(2) Strip off .500 inches of wire from all three ends.

(3) Assemble as shown in illustration.

Parts Needed: Electrical Connector Plug (PN MS27142-3), 2 ea., Electrical Connector Plug (PN MS27144), Band Marker (PN M43436/1-3), Electrical Wire (PN M13486/1-5) 12 ft.

Figure C-4. Electrical Lead.



NOTES

(1) The harness for the marker lights is the same as the clearance light harness.

(2) All dimensions in inches.

(3) Strip off .4375 inches of wire from both ends.

(4) Tape up the three side joints.

Parts Needed: Electrical Connector Plug (PN MS27144-1), 8 ea., Insulation Sleeving (PN 13217E8002-1) 2 ea., Insulation Sleeving (PN 3217E8003-1) 2 ea., Band Marker (PN M43436/1-1), Band Marker (PN M43436/1-3), Electrical Wire (PN M13486/1 -5)85 ft., Electrical Insulation Tape (PN MlL-1 -24391).

Figure C-5.Wiring Harness.

APPENDIX D

TORQUE LIMITS

D-1. **General.** Table D-1 provides torque limits to be observed when installing and attaching hardware.

Table D-1. Torque Limits.

Attaching Part	Range
Ramp cylinder piston	950-1050 lb-ft(131 .4-145.2 mkg)
Ramp cylinder piston nut	200-220 lb-ft (27.7-30.4 mkg)
Ramp cylinder plain, round nut	100-120 lb-ft (13.8-16.6 mkg)

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BE EXACT. . . PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Clange the manual to show 4 Cylenders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

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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 decigram = .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 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .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

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
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
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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