

# ROUTINE

*MWO effective date is 1 August 2006 and completion date is 1 August 2010.*

MWO 5-2350-262-35-3

## MODIFICATION WORK ORDER

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### MODIFICATION OF ARMORED COMBAT EARTHMOVER (ACE), M9 (NSN 2350-00-808-7100) (EIC ASA)

HYDRAULIC BLADE FOLDER – TRACK TENSIONER (HBF-TT)

SYSTEM IMPROVEMENT PLAN (SIP)  
PHASE 4 BLOCK MODIFICATION

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HEADQUARTERS, DEPARTMENT OF THE ARMY, WASHINGTON, D.C.

30 March 2007

#### REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this MWO. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your DA Form 2028, (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeprs.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM." The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or email your letter or DA Form 2028 direct to: AMSTA-LC-CI/TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is [ROCK-TACOM-TECH-PUBS@conus.army.mil](mailto:ROCK-TACOM-TECH-PUBS@conus.army.mil). The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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

MODIFICATION WORK ORDER  
No. 5-2350-262-35-3

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D.C., 30 March 2007

Modification Work Order  
Modification of  
Armored Combat Earthmover (ACE), M9  
(NSN 2350-00-808-7100) (EIC ASA)

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## CHAPTER 1 INTRODUCTION

### 1-1 PURPOSE.

The purpose of this Modification Work Order is to improve the performance capabilities of the M9 ACE through vehicle modification and improved hardware.

### 1-2 PRIORITY.

This modification is classified ROUTINE.

### 1-3 END ITEM TO BE MODIFIED.

**Table 1-1. Description of End Item.**

Nomenclature	NSN	Part Number	CAGEC	Model Number	Serial Number
Armored Combat Earthmover (ACE), M9	2350-00-808-7100	M9	97403	M9 ACE	TBD

### 1-4 COMPONENTS TO BE MODIFIED.

Not applicable.

### 1-5 PARTS TO BE MODIFIED.

Apron, blade and track tensioner system components will be modified. See Chapter 2 for more details.

### 1-6 APPLICATION.

- a. Time compliance schedule: MWO effective date is 1 August 2006 and completion date is 1 August 2010.
- b. The lowest level of maintenance authorized to apply this MWO: Direct Support (DS).
- c. Work Force/Skills and hour requirements for application of this MWO to a single unit, end item, or system are as follows:
  - a. Skill Requirements: Construction Equipment Repair (62B10)
  - b. Manhours Required: 80 Man hours
  - c. Removal Procedures for Track Adjusting System
  - d. Installation Procedures for HBF-TT System
- d. MWOs to be applied prior to or concurrently with the application of this MWO: Not applicable.

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- e. The following publications will assist in the application of this MWO:

AR 750-10  
MIL-PRF-63002H(TM)

TM 750-245-4  
DA Pam 738-750

DA Pam 738-751  
TB 43-0209

### 1-7 TECHNICAL PUBLICATIONS AFFECTED/CHANGED.

TM 5-2350-262-10 dated October 1990 w/change 6 dated March 2003  
TM 5-2350-262-20-1 dated January 1997 w/change 3 dated March 2000  
TM 5-2350-262-20-2 dated January 1997 w/change 3 dated March 2000  
TM 5-2350-262-20-3 dated November 1998 w/change 2 dated March 2000  
TM 5-2350-262-34 dated 1997 w/change 2 dated March 2000

### 1-8 MWO KITS/PARTS AND THEIR DISPOSITION.

- a. See Chapter 2, Table 2-1, MWO Parts List, for parts.  
b. Bulk and Expendable Material are as follows:

**Table 1-2. Bulk and Expendable Material.**

Part No.	CAGE	NSN	Description	Qty
3119525	45152	9160-01-515-2484	Sealant, RTV	A/R

- c. Return removed parts, if no longer required, to unit for disposition.  
d. Return removed parts to be retained to:

U.S. Army Tank-automotive and Armaments Command  
6501 E. 11 Mile Road  
ATTN: Mr. Chris Boughton  
Building 200D, (586) 574-5433  
Warren, MI 48397-5000

### 1-9 SPECIAL TOOLS; TOOL KITS; JIGS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND FIXTURES REQUIRED.

See Chapter 2 for tools/kits.

### 1-10 MODIFICATION PROCEDURES.

See Chapter 2 for modification procedures.

### 1-11 CALIBRATION REQUIREMENTS.

Not applicable.

### 1-12 WEIGHT AND BALANCE DATA.

Weight and balance are not significantly affected.

**1-13 QUALITY ASSURANCE REQUIREMENTS.**

- a. General. Quality assurance will be accomplished in accordance with TM 750-245-4.
- b. Physical Inspection. Check components that are removed or installed during the modification for stability of mounting.
- c. Functional Inspection. Start vehicle and insure that vehicle is operating properly, in accordance with TM 5-2350-262-10.

**1-14 RECORDING AND REPORTING OF THE MODIFICATION.**

- a. Reporting Requirement. The organization responsible for MWO application will report application information as follows:

(1) Reporting will be accomplished by electronic means. MWO application information can be input directly in the Modification Management Information System (MMIS) over the Internet. Entry into the MMIS system is password protected. New users can register on-line at <https://www.mmis.army.mil>. Passwords are normally approved and issued within 48 hours.

(2) Submission will be comprised of the nine (9) data elements listed in the Table below. Elements 1, 2, & 8 are given for this MWO (as shown). The person reporting the MWO data will acquire the remaining elements 3, 4, 5, 6, 7 & 9 and input all nine into MMIS.

**Table 1-3. Data Elements to Input to MMIS.**

	DATA ELEMENT	INPUT DATA
1.	Materiel Change Number (MCN)	1-04-05-0010
2.	MWO Number	MWO 5-2350-262-35-3
3.	Unit Identifier Code	
4.	NSN of the End Item	
5.	Serial Number	
6.	USA Registration Number	
7.	Date of Application	
8.	Hours Required for Application	80
9.	Applied by: (Name)	

(3) If you do not have access to the Internet, recording will be on a 3.5 inch disk (or CD), which will be mailed to the MMIS administrator to the following address:

Commander  
 U.S. Army Tank-automotive and Armaments Command  
 6501 E. 11 Mile Road  
 ATTN: AMSTA-LC-LMIM/MS 419  
 Warren, MI 48397-5000

- b. Records and Reports. Record the modification in accordance with AR 750-10, DA Pam 738-750, and DA Pam 738-751.
- c. Marking Equipment. Stamp "MWO 35-3" on existing vehicle data plate 13214E2452.

**1-15 MATERIEL CHANGE (MC) NUMBER.**

This Modification Work Order is authorized by MC number 1-04-05-0100.

## **MWO 5-2350-262-35-3**

### **1-16 MODIFICATION IDENTIFICATION.**

MWO 3 will be stamped on data plate. MWO includes new steel apron, track and blade control box and headlights. Inspect materials and verify completion of the modification by using the procedures and illustrations in Chapter 2.

## CHAPTER 2 HYDRAULIC BLADE FOLDER – TRACK TENSIONER (HBF-TT) SYSTEM IMPROVEMENTS

**SUBJECT:** Installation of new steel apron and blade, and track tensioner system. Installation of new operating controls for blade folder and track tensioner system.

**DATE:** 1 August 2006.

**DESCRIPTION:** Remove apron and blade to install the steel apron. Install new configuration track tensioner system. Install new configuration operating controls for blade folder and track tensioner systems and remove, if exists, semi-automatic track adjuster system. This MWO is DA Funded for Counter Attack Core Units only. Other units must self-fund if they want this MWO applied to their M9 ACE.

**TM REFERENCES:** The technical manual references in this procedure are: TM 5-2350-262-10, dated October 1990, with Change 6, dated March 2003, TM 5-2350-262-20-1, dated January 1997, with Change 3, dated March 2000, TM 5-2350-262-20-2, dated January 1997, with Change 3, dated March 2000, TM 5-2350-262-20-3, dated November 1998, with Change 2, dated March 2000, and TM 5-2350-262-34, dated January 1997, with Change 2, dated March 2000.

### SECTION I MWO PARTS LIST

**Table 2-1. MWO Parts List.**

Part No.	CAGE	NSN	Description	Qty
B1821BH031C113N	80204	5306-00-226-4828	Bolt, Machine	8
B1821BH031C350L	80204	5306-01-195-9819	Bolt, Machine	3
B1821BH038C075N	80204	5305-00-543-4372	Screw, Cap, Hex Head	11
B1821BH050C100N	80204	5305-00-071-2066	Screw, Cap, Hex Head	4
CVCV XCN	54035	4820-01-329-1661	Valve, Check, Vented	2
CWCG-LGN	54035	4810-01-525-1114	Valve, Holding with relief	2
FCCB LAV (2.0 GPM)	54035	4810-01-525-1077	Valve, Flow Control	2
GAI/S	54035	4730-01-525-1012	Body, Flow Valve	2
HT 2027	09106	9330-01-165-0375	Tubing, Plastic, Spiral Wrap, 6 inches long	1
H2-62-T6	97111	4730-01-494-8226	Coupler, Quick Disconnect	1
H2-63-T6	97111	4730-01-245-7605	Nipple, Quick Disconnect	1
MS16562-226	96906	5315-00-834-0745	Pin, Straight, 0.125 x 1 inch	2
MS21333-105	96906	5340-00-809-1494	Clamp Loop	1
MS27183-10	96906	5310-00-809-4058	Washer, Flat, ¼ ID	3
MS27183-12	96906	5310-00-081-4219	Washer, Flat, 5/16 ID	14
MS27183-14	96906	5310-00-080-6004	Washer, Flat, 3/8 ID	13
MS35206-215	80205	5305-00-889-2997	Screw, Machine, Pan Head, #4	4
MS35338-40	80205	5310-00-543-2410	Washer, Lock	4
MS35338-44	96906	5310-00-582-5965	Washer, Lock, ¼ ID	1
MS35338-45	96906	5310-00-407-9566	Washer, Lock, 5/16 ID	10
MS35338-46	80205	5310-00-637-9541	Washer, Lock, 3/8 ID	7
MS35489-107	96906	5325-00-174-9325	Grommet, Nonmetallic, 0.75 ID	4
MS35649-2254	96906	5310-00-250-9477	Nut, Plain	3

Table 2-1. MWO Parts List – Continued.

Part No.	CAGE	NSN	Description	Qty
MS35649-2312	96906	5310-00-829-9981	Nut, Plain, 5/16-18 UNC	3
MS35649-2384	96906	5310-00-477-6768	Nut, Plain, 3/8-16 UNC	4
M13486/1-5	81349	6145-00-152-6499	Wire, Electrical, 6 inches long	2
M23053/1-101-0	81349	5970-01-319-4531	Sleeving, Insulation, 3 inches long	2
XPI/S	54035	4730-01-525-1015	Body, Valve	2
12312192	19207	6240-01-179-1061	Lamp, Incandescent	2
12342077	19207	3990-01-314-8393	Tie Down, Cargo, Vehicle	2
12352658	19207	5310-01-529-3803	Boss	1
12466272	19207	3040-01-446-7606	Cylinder Assembly	2
12466281	19207	5340-01-487-7139	Bracket, Angle, Front	1
12466282	19207	5340-01-487-7145	Bracket, Angle, Rear	1
12491606	19207	5995-01-529-2108	Harness, Headlight	1
12491607	19207	5995-01-529-1535	Harness, Blade Folder	1
12491612	19207	4730-01-529-2099	Manifold Assembly, Track and Blade	1
12491614	19207	5340-01-529-1580	Bracket	1
12491615	19207	4720-01-529-3329	Hose Assembly, Track and Blade	1
12491616-1	19207	4720-01-529-3331	Hose Assembly, Track and Blade	5
12491616-2	19207	4720-01-529-3332	Hose Assembly, Track and Blade	3
12491616-3	19207	4720-01-529-3335	Hose Assembly, Track and Blade	1
12491616-4	19207	4720-01-529-3766	Hose Assembly, Track and Blade	2
12491616-5	19207	4720-01-529-3770	Hose Assembly, Track and Blade	1
12491616-6	19207	4720-01-529-3774	Hose Assembly, Track and Blade	1
12491618	19207	5975-01-529-1565	Harness, Control Box Power	1
12491619	19207	5975-01-529-0044	Control Box, Track and Blade	1
12491620	19207	5340-01-529-1586	Bracket	1
12491622	19207	6150-01-529-2140	Harness, Manifold	1
13214E2457-15	19207	4720-01-455-4173	Hose Assembly, Nonmetallic	1
13214E2457-16	19207	4720-01-455-5065	Hose Assembly, Nonmetallic	1
13214E2582	19207	5330-01-193-0208	Gasket	1
1826	31969	3830-01-496-4440	Apron	1
203102-10-10S	01276	4730-01-024-0915	Tee, Tube, .875 all ends	1
203102-8-8S	01276	4730-00-491-4983	Tee, Tube, .75 all ends	2
2062-6-6S	01276	4730-00-143-3941	Elbow, .562 ORB/.562 37°	2
2062-8-8S	01276	4730-00-822-5609	Elbow, .75 ORB/.75 37°	2
2215-10-8S	01276	4730-01-137-6966	Reducer, Tube, -10/-8	1
4F50X-S	30780	4730-01-007-5232	Adapter, Straight, Tube to Boss	3
4R6X-S	45681	4730-00-618-5382	Tee, Tube, .438 all ends	1
4-6C5OX-S	45681	4730-01-242-4510	Elbow, .562 ORB/.438 37°	2
4-6F50X-S	30780	4730-00-258-1864	Adapter, Straight, Tube to Boss	17
500454-8S	01276	4730-01-195-3805	Elbow, Tube, .75 all ends	1
6AOG5JG5	30780	4730-01-525-1065	Tee, SAE, ORB all ends	1
6F50X-S	30780	4730-00-491-9576	Adapter, Straight	2
8-34071-1	00779	5940-01-525-2822	Splice, Butt	2



Table 2-1. MWO Parts List – Continued.

Part No.	CAGE	NSN	Description	Qty
8-4 TRTX-S	30780	4730-00-647-3343	Reducer, Tube, -8/-4	1
8338561	19207	5935-00-833-8561	Shell	2
8338562	19207	5970-00-833-8562	Insulator, Bushing, Sleeve	2
8338564	19207	5940-00-399-6676	Terminal	2
900729-3	01276	5340-00-985-6690	Clamp, Loop	6
MS21333-104	80502	5340-00-088-1254	Clamp, Loop	3
MS3367-1-0	96906	5975-00-984-6582	6" Cable Ties	3
12502193	19207	9510-01-541-8566	Chain Guide	2

## SECTION II TOOLS REQUIRED

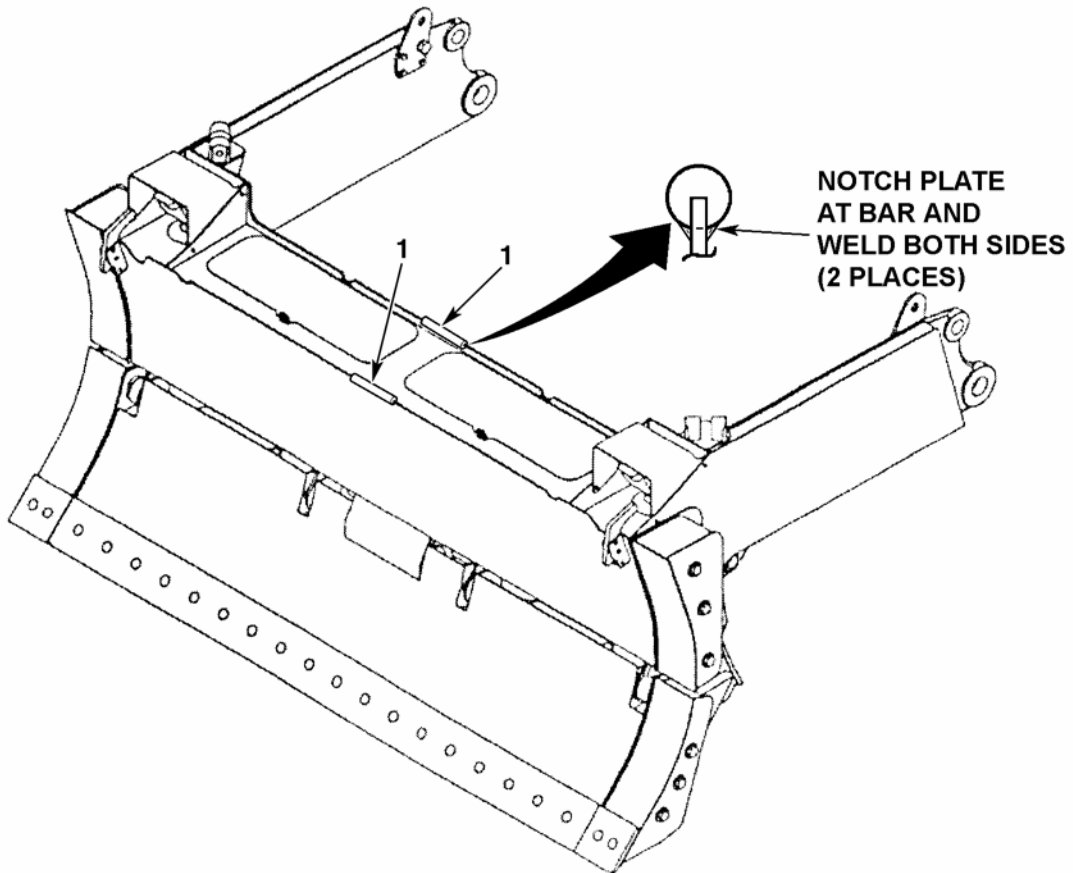
1. Tool Kit, General Mechanics: Automotive, NSN 5180-00-177-7033.
2. Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power, NSN 4910-00-754-0705.
3. Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No.1, Less Power, NSN 4910-00-754-0706.
4. Lifting device must have a weight capacity greater than 3865 lb (1753.135 kg).

## SECTION III REMOVAL PROCEDURES FOR TRACK ADJUSTING SYSTEM

1. Remove apron and dozer assembly per TM 5-2350-262-20-1, Apron and Dozer Assembly Replacement and Repair. Remove and inspect steel dozer blade from assembly and if serviceable, retain for future use. Set aside remaining parts for disposition per Chapter 1, Section 1-8, step c.
2. Remove apron wiring harness per TM 5-2350-262-34, Apron Wiring Harness Replacement. Inspect apron wiring harness, nut, washer, screw, and pin and if serviceable, retain for future use.
3. Remove battery box per TM 5-2350-262-20-1, Battery Box Replacement and retain parts for future use.
4. Remove grease track adjusting cylinders, if applicable, per TM 5-2350-262-20-2, Track Adjusting Cylinder Replacement. Retain and inspect pin, washers, screw, and locknut from final drive adjusting flange and if serviceable, retain for future use. Set aside remaining parts for disposition per Chapter 1, Section 1-8, step c.

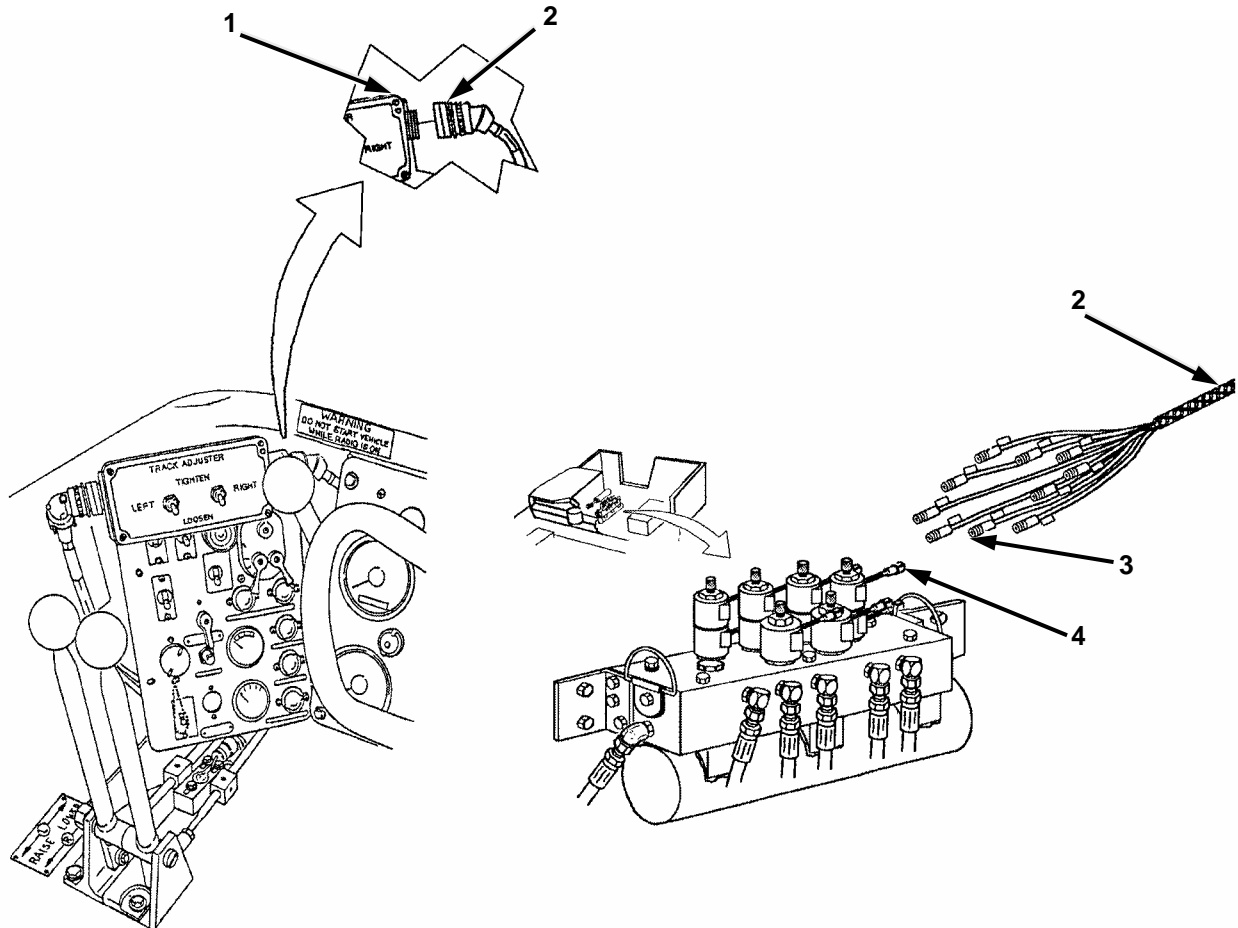
## SECTION IV PRELIMINARY PROCEDURES

1. Center chain guide P/N 12502193 (1) on front lip of apron and cut 6.0 inches long and  $\frac{9}{16}$  inch deep and weld.
2. Center chain guide P/N 12502193 (1) on rear of apron and cut 6.0 inches long and  $\frac{3}{4}$  inch deep and weld.



## SECTION V REMOVAL PROCEDURES FOR SEMI-AUTOMATIC TRACK ADJUSTER SYSTEM

1. If applicable, remove track adjuster main wiring harness as follows:
  - a. Remove rear floor plates per TM 5-2350-262-20-1, Rear Floor Plates Replacement.
  - b. Remove track adjuster main wiring harness connector (Figure 2-1, 2) from suspension control electrical box (1).



**Figure 2-1. Track Adjuster Main Wiring Harness.**

- c. Remove ten track adjuster main wiring harness connectors (3) from ten coil connectors (4).

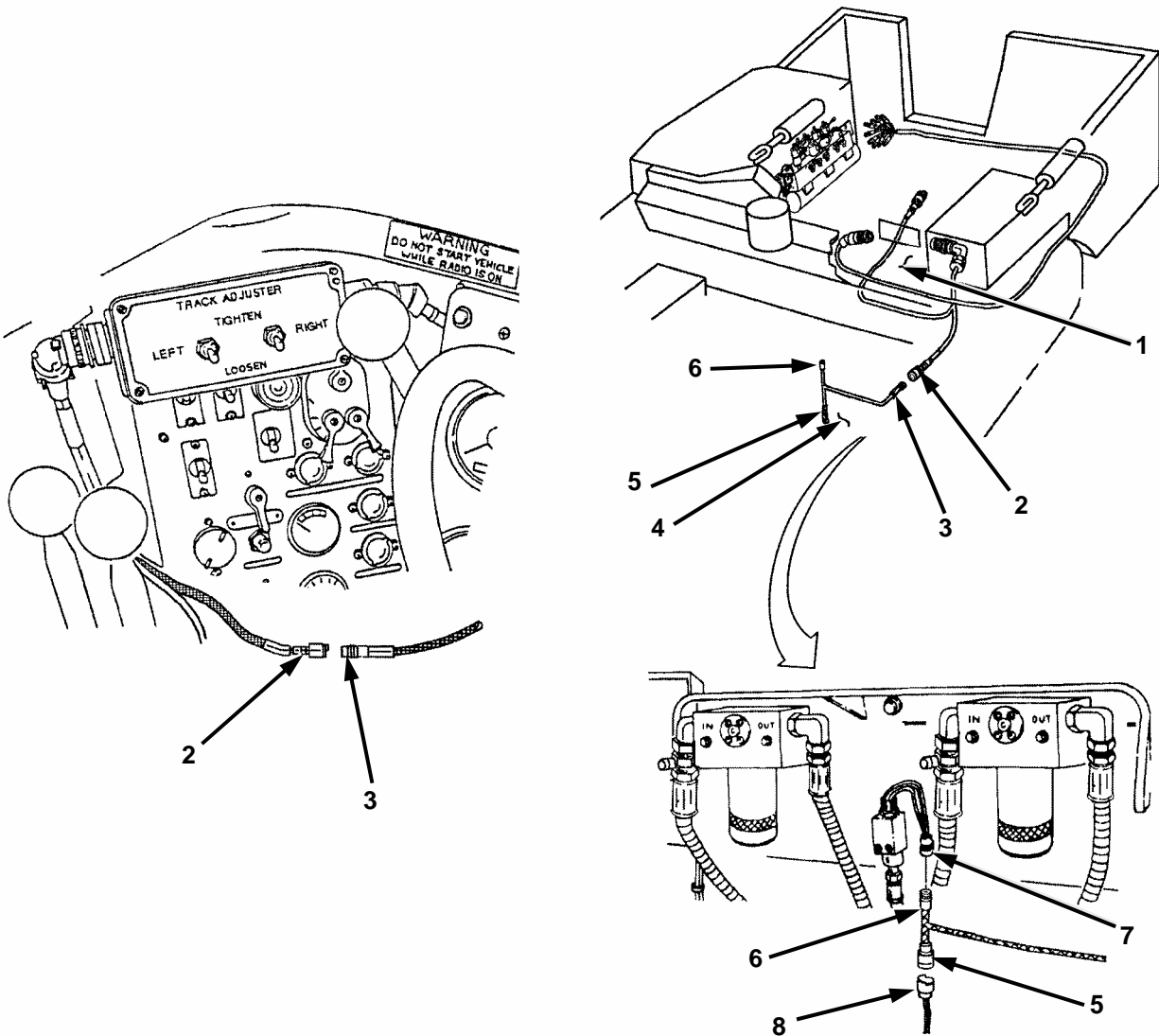
### NOTE

Track adjuster main wiring harness is secured to other components as needed by electrical tie down straps. Cut/remove as required prior to removal.

- d. Set aside track adjuster main wiring harness (2) for disposition per Chapter 1, Section 1-8, step c.
2. Remove track adjuster SPRUNG/UNSPRUNG tap wiring harness as follows:
  - a. Move ejector forward per TM 5-2350-262-10, Folding the Dozer Blade.

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- b. Remove SPRUNG/UNSPRUNG switch tap wiring harness connector (Figure 2-2, 3) from track control wiring harness connector (2).



**Figure 2-2. Track Adjuster SPRUNG/UNSPRUNG Switch Tap Wiring Harness.**

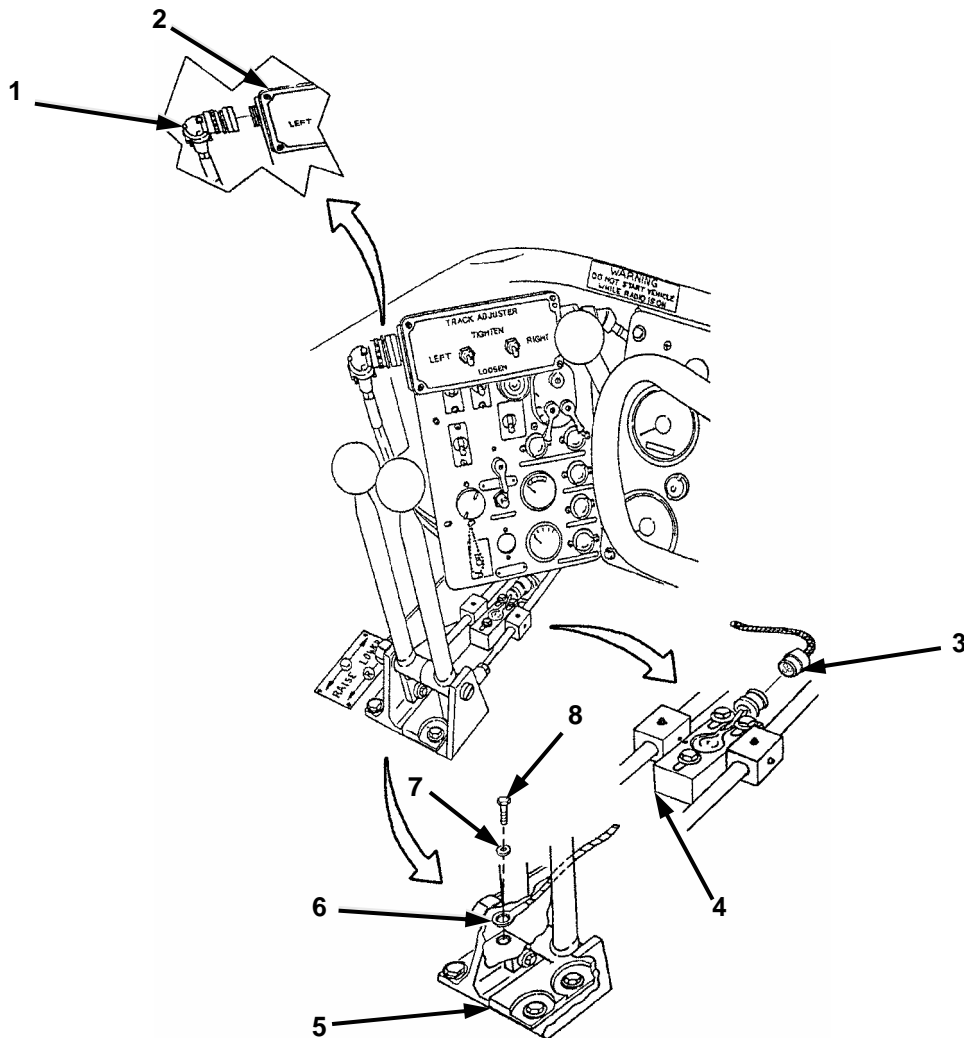
### NOTE

SPRUNG/UNSPRUNG switch tap wiring harness is secured to other components as needed by electrical tie down straps. Cut/remove as required prior to removal.

- c. Remove SPRUNG/UNSPRUNG switch tap wiring harness connectors (6 and 5) from SPRUNG/UNSPRUNG switch connector (7) and wiring harness connector (8).
- d. Remove SPRUNG/UNSPRUNG switch tap wiring harness (3), by routing through hull (4) from driver's compartment (1) to SPRUNG/UNSPRUNG switch connector (7) and set aside for disposition per Chapter 1, Section 1-8, step c.
- e. Install wiring harness connector (8) to SPRUNG/UNSPRUNG switch connector (7).

## 3. Remove track control wiring harness as follows:

- a. Remove track control wiring harness connector (Figure 2-3, 1) from suspension control electrical box (2).



**Figure 2-3. Track Control Wiring Harness.**

- b. Remove screw (8), washer (7), and track control wiring harness ground terminal (6) from hydraulic control lever bracket (5) and set aside for disposition per Chapter 1, Section 1-8, step c.
- c. Remove track control wiring harness connector (3) from track control switch (4).

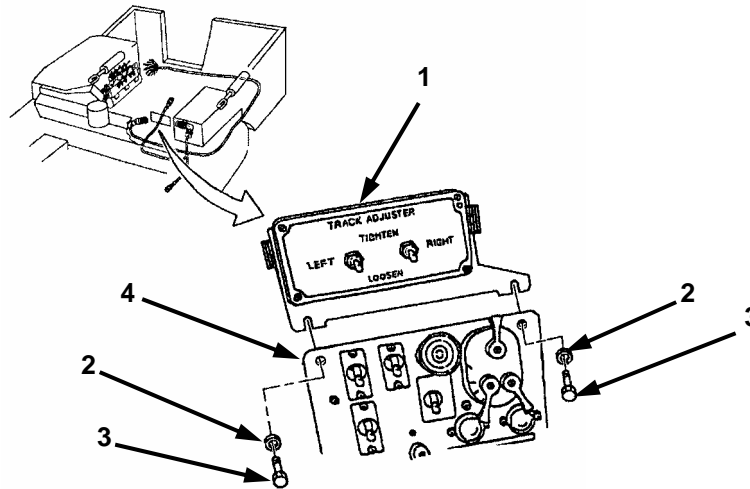
**NOTE**

Track control wiring harness is secured to other components as needed by electrical tie down straps.  
Cut/remove as required prior to removal.

- d. Set aside track control wiring harness (1) for disposition per Chapter 1, Section 1-8, step c.

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4. Remove suspension control electrical box as follows:
  - a. Remove two screws (Figure 2-4, 3) and flat washers (2) from instrument panel (4) and retain for future use.



**Figure 2-4. Suspension Control Electrical Box.**

- b. Slide suspension control electrical box (1) upward from behind instrument panel (4) and set aside for disposition per Chapter 1, Section 1-8, step c.
5. Remove semi-automatic track adjuster manifold as follows:
  - a. Relieve hydraulic system pressure per TM 5-2350-262-20-3, Relieving Hydraulic System Pressure.

### **WARNING**

**High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each of the hydraulic control levers is moved several times through all positions, and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury to personnel.**

**Spilled hydraulic oil is very slippery. Use caution when entering or working in bowl area. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.**

**Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury to personnel.**

**CAUTION**

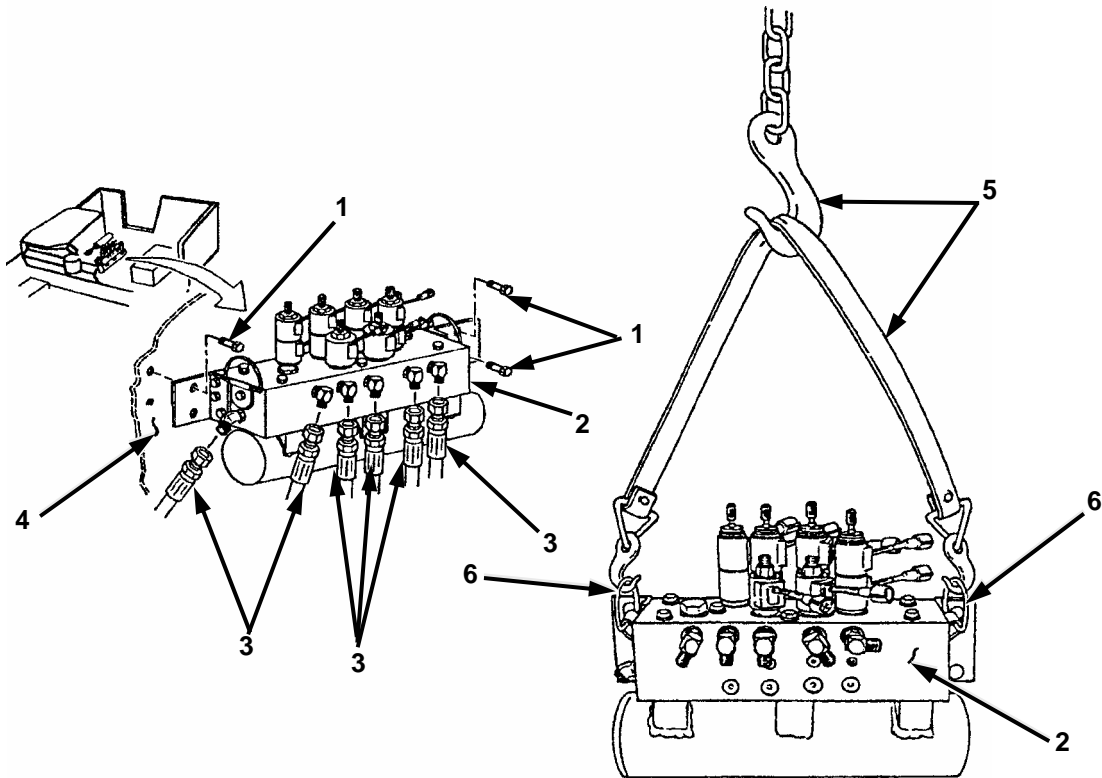
Cap or plug all ports and ends of hoses and tubes to prevent contamination of hydraulic oil. Failure to comply may result in damage to equipment.

**NOTE**

Use two wrenches when disconnecting hydraulic hoses and fittings.

Have suitable container ready to catch hydraulic oil.

- b. Disconnect six hoses (Figure 2-5, 3) from track adjuster manifold (2).



**Figure 2-5. Track Adjuster Manifold.**

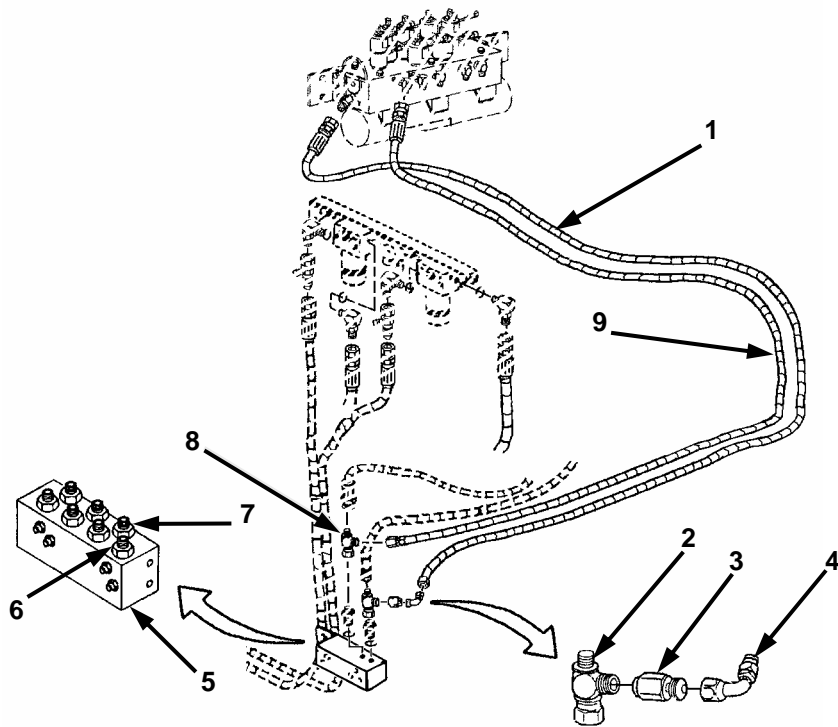
**WARNING**

**Semi-automatic track adjuster assembly is heavy. Support semi-automatic track adjuster assembly before disconnecting or removing. Failure to comply may result in severe injury to personnel.**

- c. Attach suitable lifting device (5) to two tie downs (6) on semi-automatic track adjuster assembly (2).
- d. Remove four screws (1) from hull (4) and lift semi-automatic track adjuster assembly (2) from vehicle and set aside for disposition per Chapter 1, Section 1-8, step c.

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- e. Disconnect hose (Figure 2-6, 1), elbow (4), tube reducer (3) and tee (2) from manifold (5), port 7 (6) and set aside for disposition per Chapter 1, Section 1-8, step c.



**Figure 2-6. Manifold.**

- f. Disconnect hose (9) and tee (8) from manifold (5), port 9 (7) and set aside for disposition per Chapter 1, Section 1-8, step c.



6. Remove track adjuster cylinders as follows:
- Relieve track tension per TM 5-2350-262-10, Track Tension Check/Adjustment.

**WARNING**

High pressure is present in the M9 hydraulic system. Do not disconnect any hydraulic system component unless hydraulic system pressure has been relieved. Ensure each of the hydraulic control levers is moved several times through all positions, and the hydraulic tank dipstick is slowly loosened to relieve pressure. Failure to comply may result in severe injury to personnel.

Spilled hydraulic oil is very slippery. Use caution when entering or working in bowl area. Wipe up any spilled oil immediately. Failure to comply may result in severe injury to personnel.

Do not operate ejector when personnel are in bowl. Do not work in bowl unless ejector lock is engaged. Failure to comply may result in severe injury to personnel.

**CAUTION**

Cover ports and hose or tube ends to prevent contamination of hydraulic oil. Failure to comply may result in damage to equipment.

**NOTE**

Have suitable container ready to catch oil.

- Remove two hoses (Figure 2-7, 2) from right side hydraulic track adjusting cylinder (1) and set aside for disposition per Chapter 1, Section 1-8, step c.

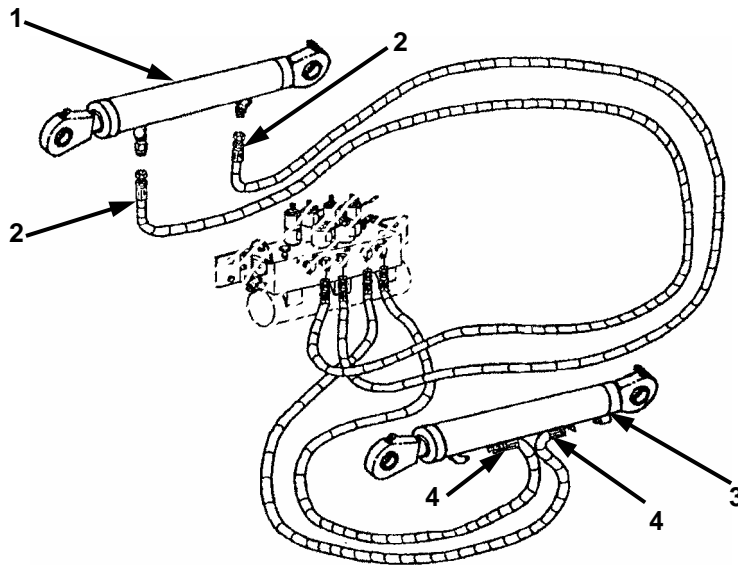


Figure 2-7. Track Adjusting Cylinder (1 of 3).

- Remove two hoses (4) from left side hydraulic track adjusting cylinder (3) and set aside for disposition per Chapter 1, Section 1-8, step c.

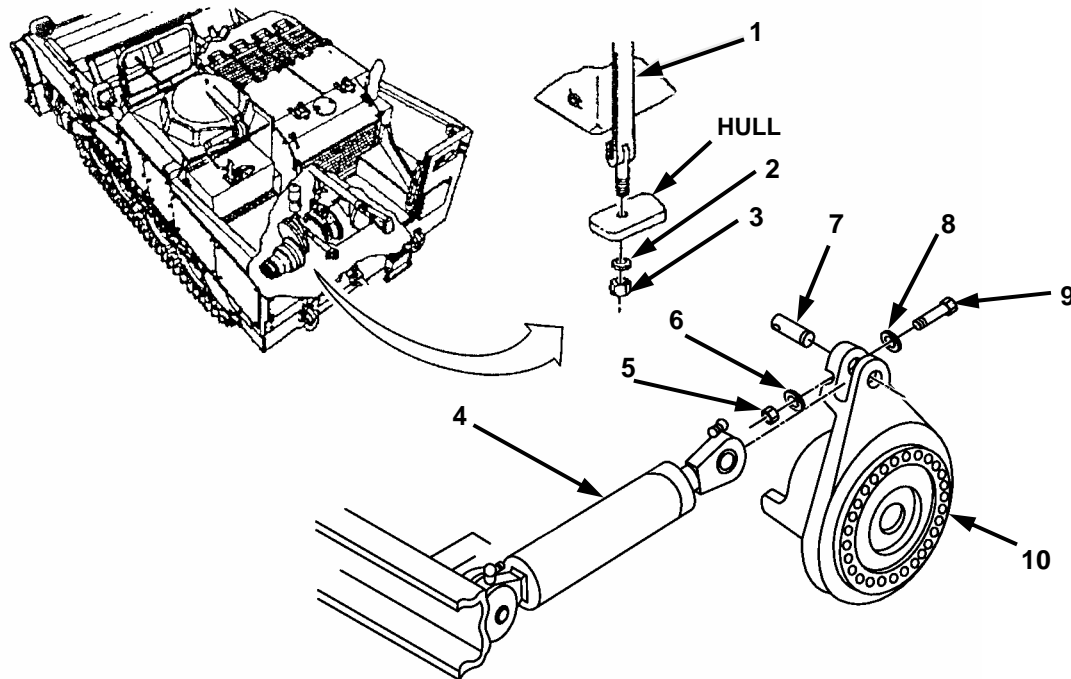
**NOTE**

Section IV, step 6d applies to left cylinder, there is an additional clamp on left track adjusting cylinder.

Section IV steps 6e through 6g apply to both cylinders.

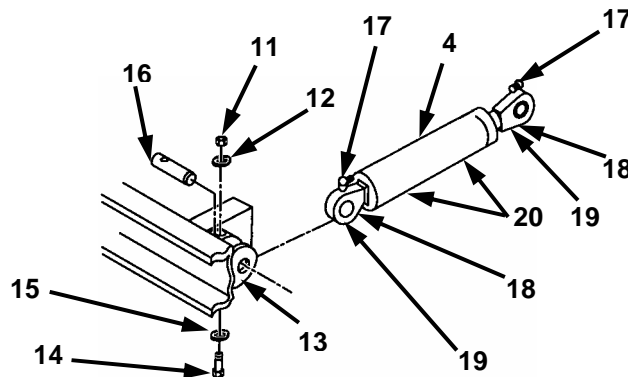
## MWO 5-2350-262-35-3

- d. Remove locknut (Figure 2-8, 3) and washer (2) from rear fuel tank strap (1) and hull, and move rear fuel tank strap away from hydraulic track adjusting cylinder (4). Retain parts for future use.



**Figure 2-8. Track Adjusting Cylinder (2 of 3).**

- e. Remove locknut (5), washer (6), screw (9), washer (8), pin (7), and hydraulic track adjusting cylinder (4) from final drive adjusting flange (10). Retain parts for future use.
- f. Remove locknut (Figure 2-9, 11), washer (12), screw (14), washer (15), pin (16), and hydraulic track adjusting cylinder (4) from hull mounting bracket (13). Retain locknut, washers, screw, and pin for future use. Set aside hydraulic track adjusting cylinder for disposition per Chapter 1, Section 1-8, step c.



**Figure 2-9. Track Adjusting Cylinder (3 of 3).**

- g. If damaged, remove two bearings (19). Remove two hydraulic elbows and o-rings (20) from bottom of hydraulic track adjusting cylinder. Remove two plugs (18) and lubrication fittings (17) from hydraulic cylinder. Set aside for disposition per Chapter 1, Section 1-8, step c.

## SECTION VI PROCEDURES FOR PREPARING VEHICLE FOR HBF-TT SYSTEM INSTALLATION

### WARNING

Serious hearing loss and eye injury can occur during drilling and grinding operations. Wear ear and eye protection.

1. Drill two one-inch (25.40 mm) diameter holes (Figure 2-10) through hull above the apron cylinder mounting bracket.

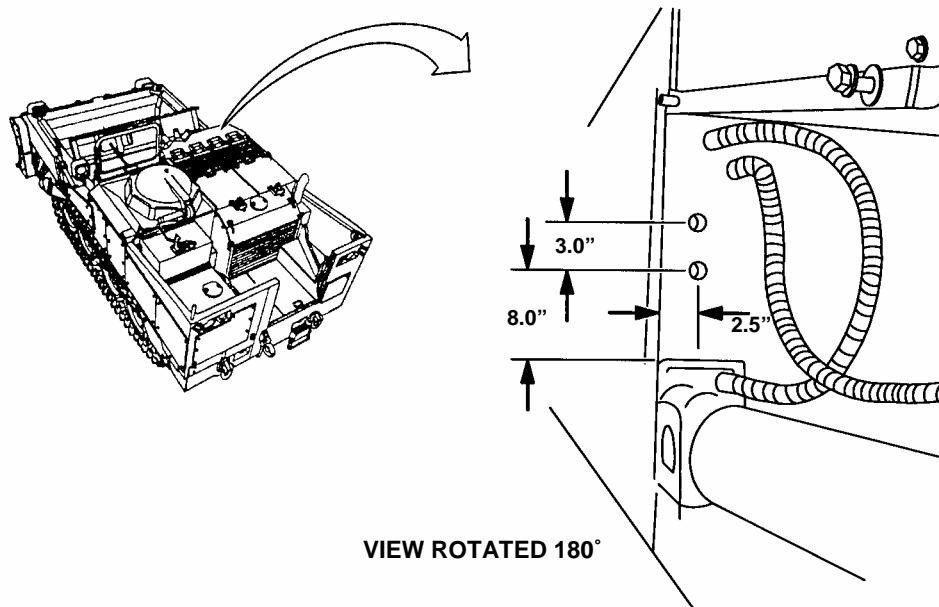
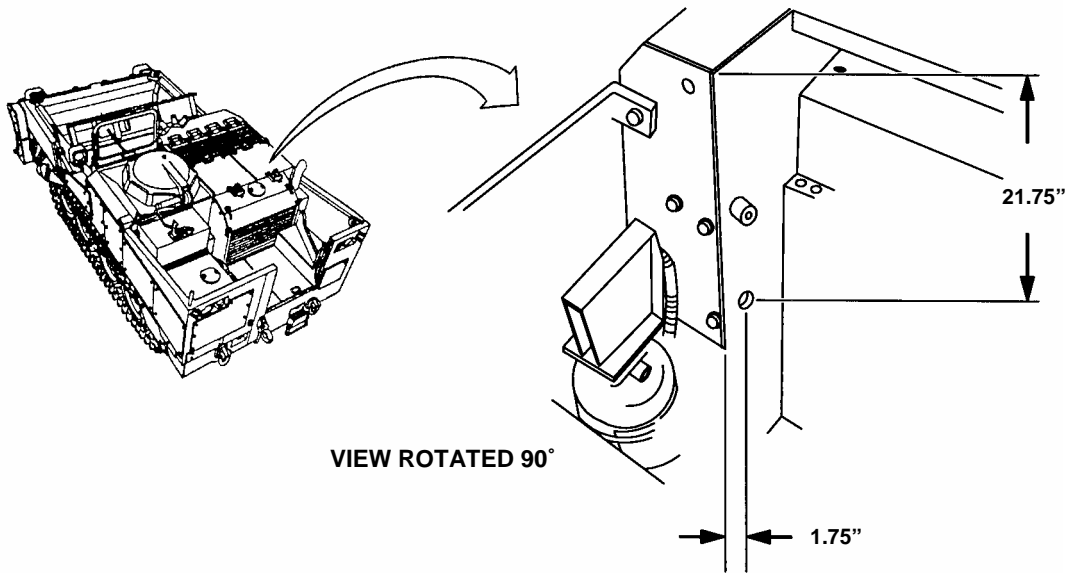


Figure 2-10. Blade Folder Hose Access Holes.

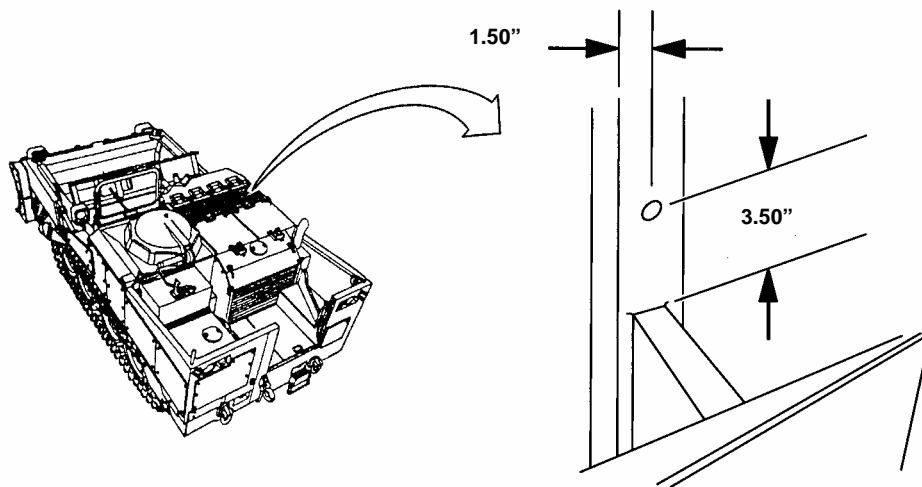
**MWO 5-2350-262-35-3**

2. Drill 0.3125 inch (7.937 mm) diameter hole (Figure 2-11) on hull plate next to radiator and cut threads using 3/8" - 16 tap.



**Figure 2-11. Blade Folder Hose Clamp Holes (1 of 2).**

3. Drill 0.3125 inch (7.937 mm) diameter hole (Figure 2-12) on inside hull plate and cut threads using 3/8" - 16 tap.



**Figure 2-12. Blade Folder Hose Clamp Holes (2 of 2).**

4. Weld boss 12352658 (Figure 2-13, 1) to hull on right side of vehicle in accordance with TM 5-2350-262-34, General Welding Procedures.

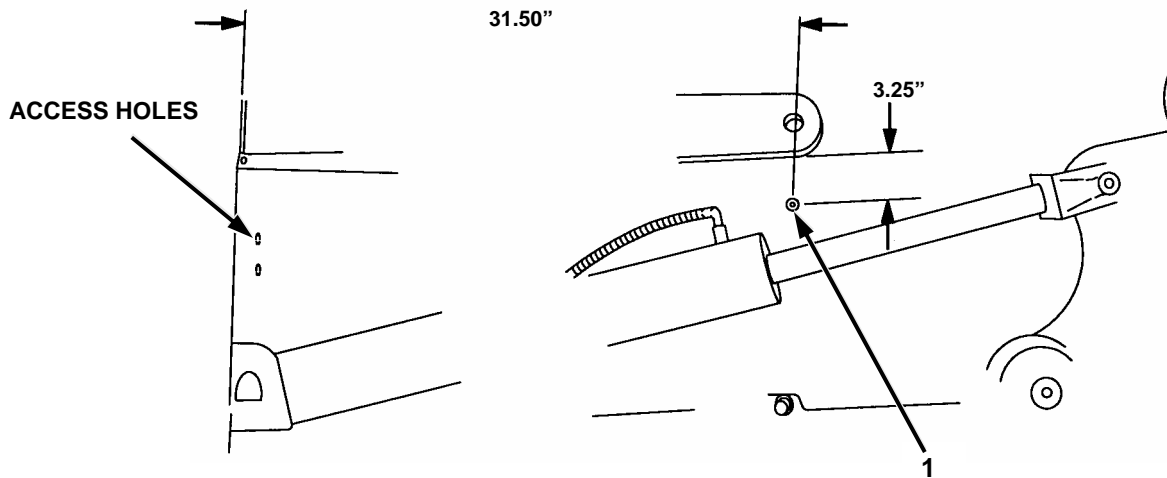


Figure 2-13. Blade Folder Hose Boss.

5. Remove two bolts (Figure 2-14, 1), flat washers (2), and right side floor support (3) from rear support (5) and hull (4) and retain parts for future use.

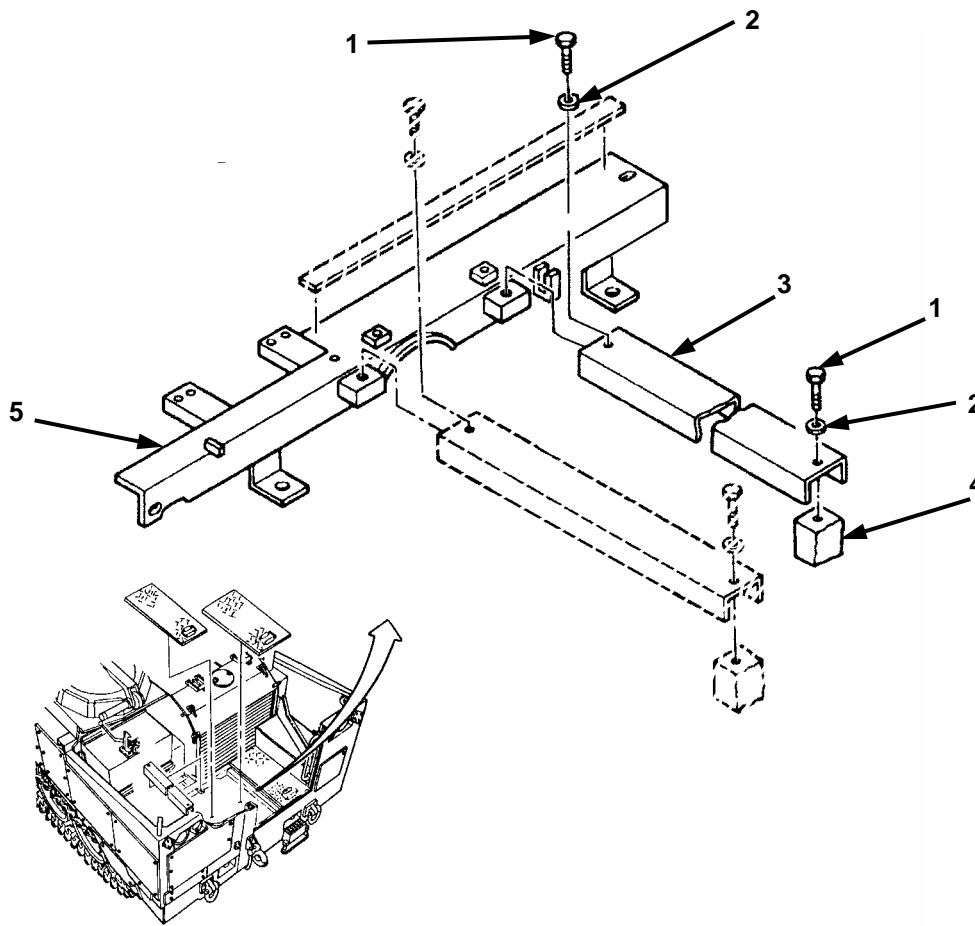
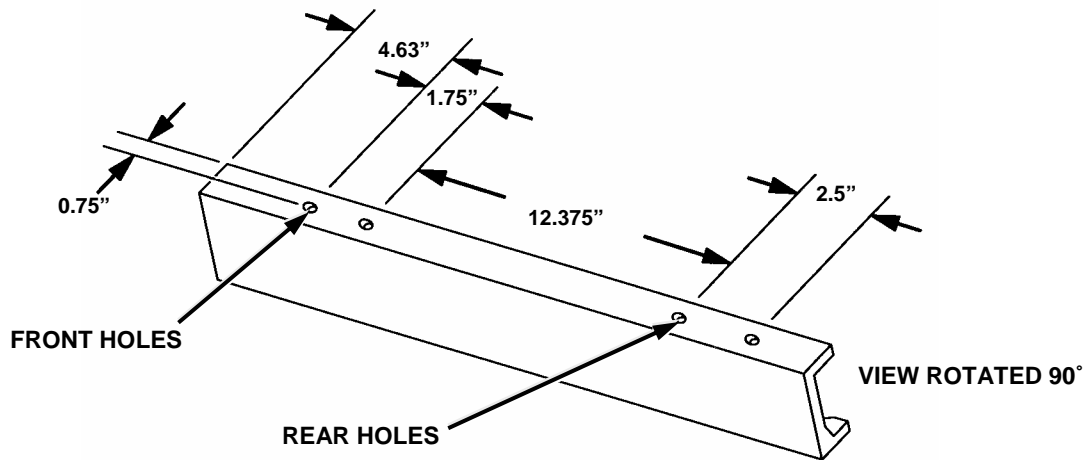


Figure 2-14. Right Side Floor Support.

**WARNING**

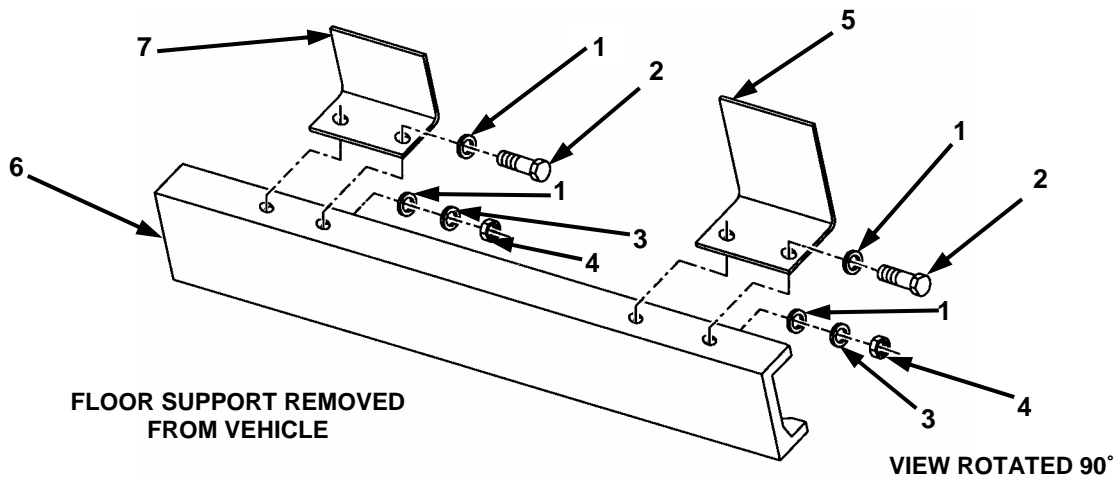
**Serious hearing loss and eye injury can occur during drilling and grinding operations. Wear ear and eye protection.**

6. Drill four 0.375 inch (9.525 mm) diameter holes (Figure 2-15) in right side floor support.



**Figure 2-15. Right Side Floor Support Holes.**

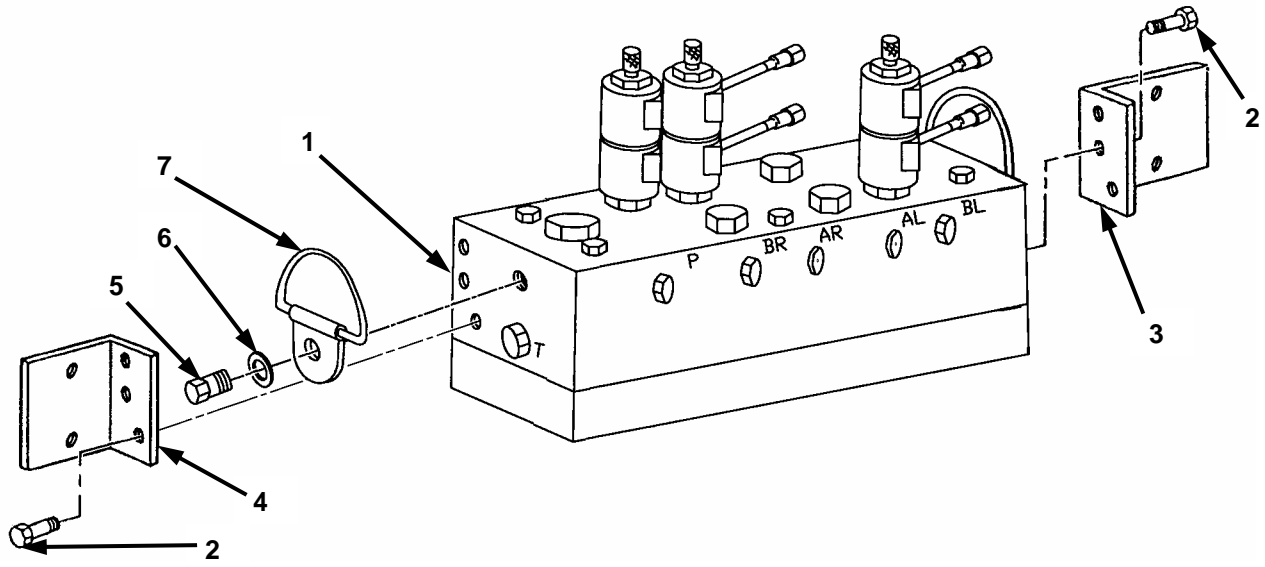
7. Attach bracket 12491614 (Figure 2-16, 7) using four flat washers MS27183-14 (1), two screws B1821BH038C075N (2), lock washers MS35338-46 (3), and nuts MS35649-2384 (4) to front holes on floor support (6).



**Figure 2-16. Floor Support Brackets.**

8. Attach bracket 12491620 (Figure 2-16, 5) with four flat washers MS27183-14 (1), two screws B1821BH038C075N (2), lock washers MS35338-46 (3), and nuts MS35649-2384 (4) to rear holes on floor support (6).

9. Install two tie downs 12342077 (Figure 2-17, 7), flat washers MS27183-14 (6), and screws B1821BH038C075N (5) to track and blade manifold assembly (1). Torque to 45.0 to 50.0 lb-ft (200.1 to 222.4 N•m).



**Figure 2-17. Tie Downs.**

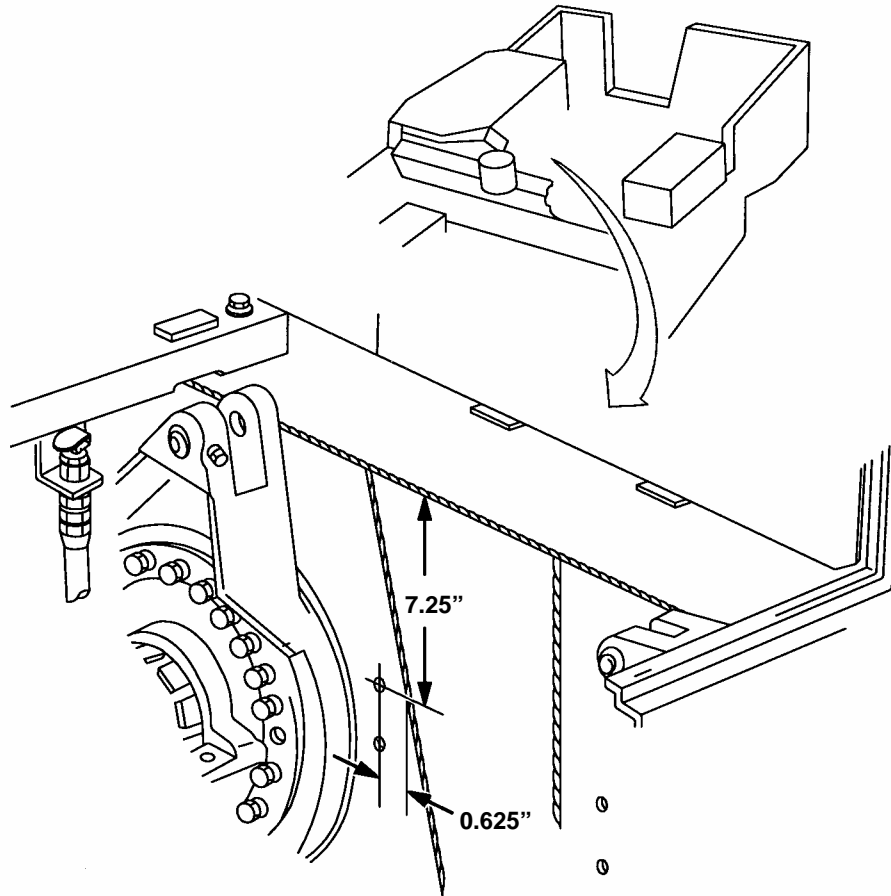
10. Install rear manifold mount 12466282 (3), front manifold mount 12466281 (4), and six screws B1821BH038C075N (2) to track and blade manifold assembly (1).

**WARNING**

**Serious hearing loss and eye injury can occur during drilling and grinding operations. Wear ear and eye protection.**

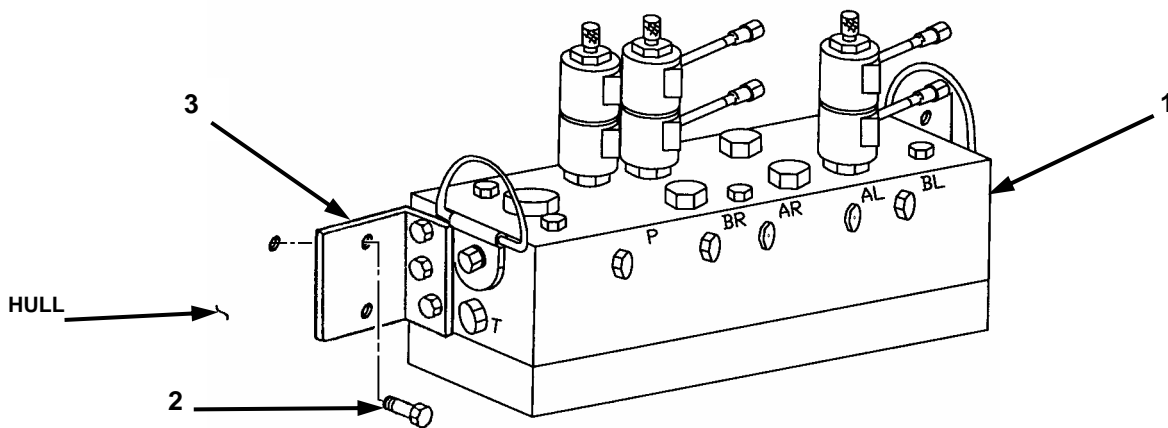
**MWO 5-2350-262-35-3**

11. Drill 0.421 inch (10.693 mm) hole (Figure 2-18) in hull and cut threads using 1/2" – 13 tap.



**Figure 2-18. Manifold Mount Holes.**

12. Use suitable lifting device to lift front manifold mount (Figure 2-19, 3) and track and blade manifold 12491612 (1) to hole (Figure 2-18) in hull wall and attach with screw B1821BH050C100N (Figure 2-19, 2).



**Figure 2-19. Manifold Mounts.**

13. Use suitable leveling device and level track and blade manifold (1). Mark remaining three holes using front and rear manifold mount holes as guides.

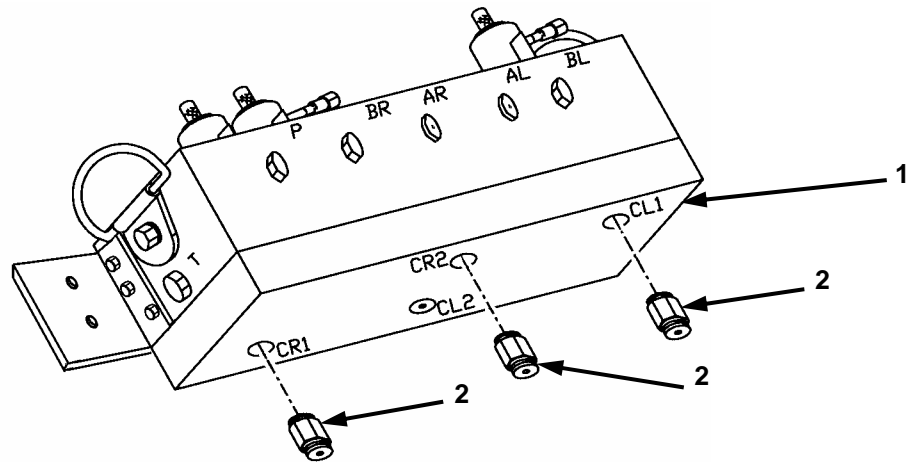


14. Remove screw (Figure 2-19, 2) and track and blade manifold (1), retain part for future use.

**WARNING**

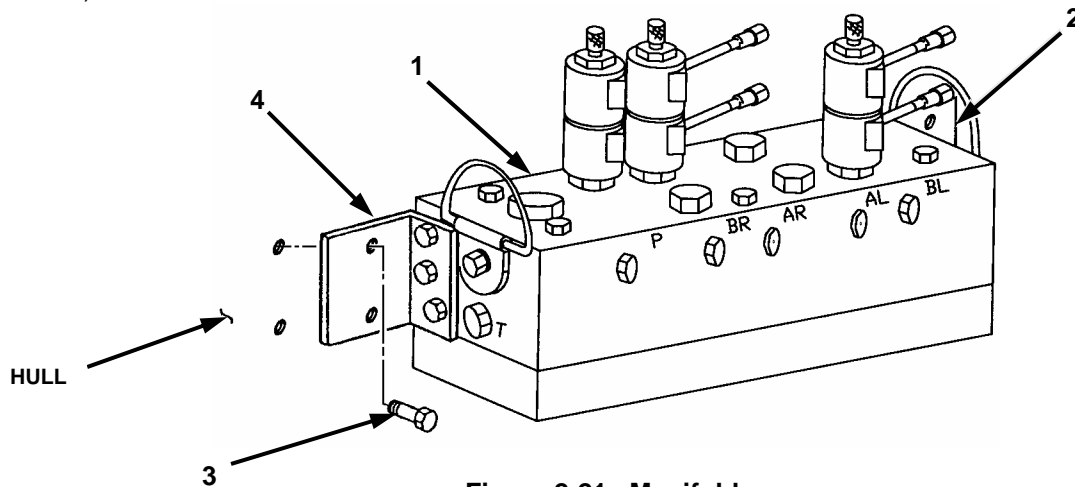
**Serious hearing loss and eye injury can occur during drilling and grinding operations. Wear ear and eye protection.**

15. Drill and tap remaining three 0.50 inch (12.70 mm) holes in hull.
16. Install three straight adapters 4F50X-S (Figure 2-20, 2) on track and blade manifold bottom (1), ports CR1, CR2, and CL1.



**Figure 2-20. Manifold Bottom.**

17. Attach front manifold mount (Figure 2-21, 4) and track and blade manifold (1) with screw B1821BH050C100N (3) and screw retained from Section V, step 14, to two front holes on hull wall. Torque to 45.0 to 50.0 lb-ft (200.1 to 222.4 N•m).



**Figure 2-21. Manifold.**

18. Attach rear manifold mount (2) and track and blade manifold (1) with two screws B1821BH050C100N (3) to two rear holes on hull wall. Torque to 45.0 to 50.0 lb-ft (200.1 to 222.4 N•m).

## MWO 5-2350-262-35-3

19. Use suitable cutting device on four grommets MS35489-107 (Figure 2-22) and trim off one wide end of grommet and make even with inside cylinder.

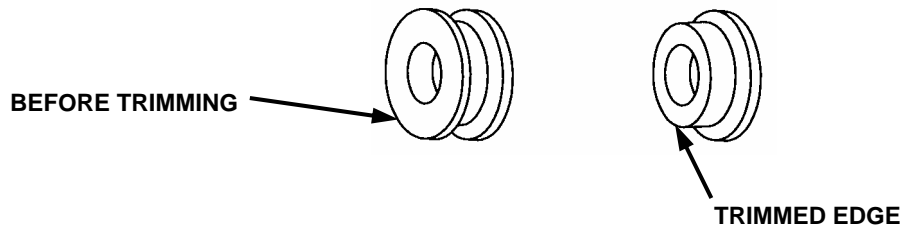


Figure 2-22. Apron Hose Grommet.

20. Use RTV sealant (Chapter 1, 1-8) or suitable sealant to install trimmed ends of grommets into two holes (Figure 2-10) from both sides.

## SECTION VII INSTALLATION PROCEDURES FOR HBF-TT SYSTEM

1. Install fittings on valves and track and blade manifold as follows:
  - a. Install two flow valves FCCB LAV (2.0 GPM) (Figure 2-23, 5) to valve bodies GAI/S (1).

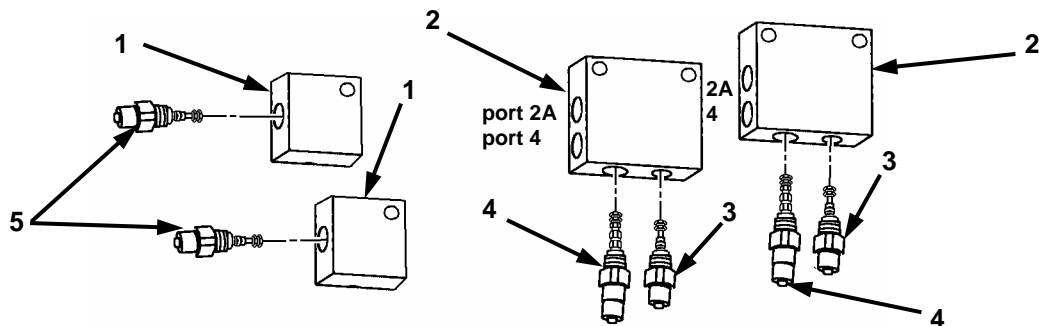


Figure 2-23. Valve Fittings (1 of 2).

- b. Install two valves CWCG-LGN (4) next to port 4 and vented check valves CVCV XCN (3) and to valve bodies XP1/S (2).

- c. Secure two flow valve bodies (Figure 2-24, 4) to bracket (5) with bolt B1821BH031C350L (2), two flat washers MS27183-12 (1), and nut MS35649-2312 (7).

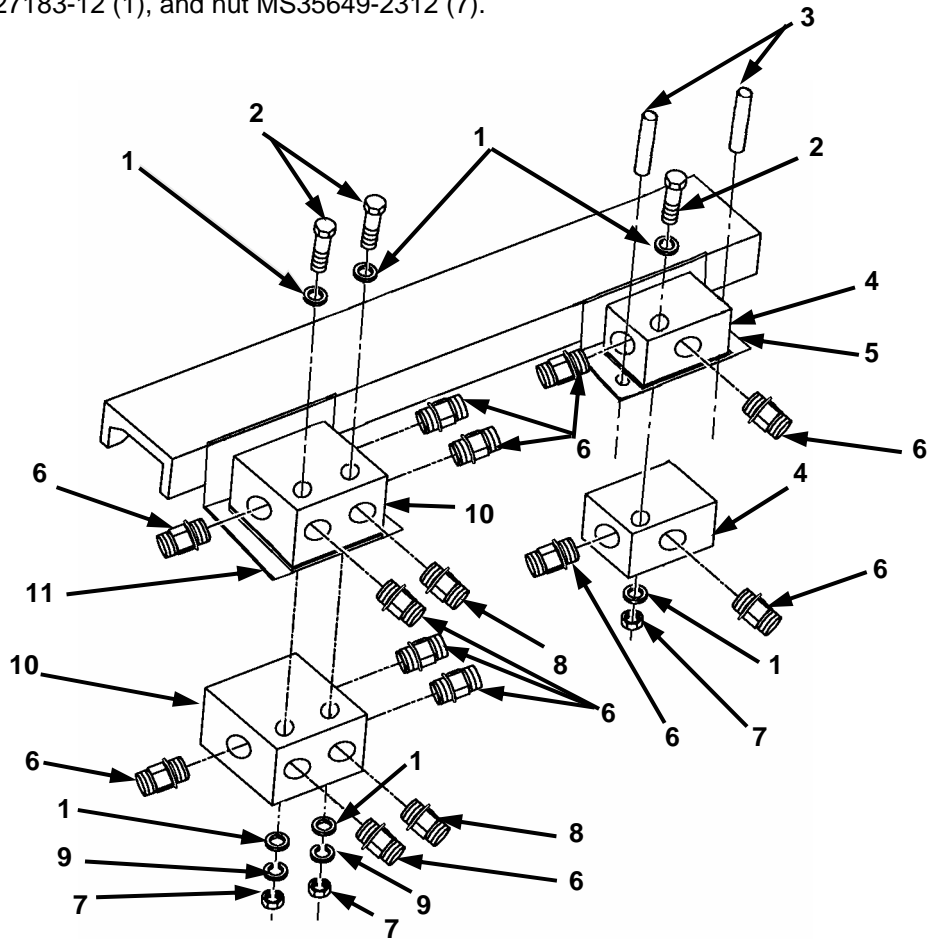
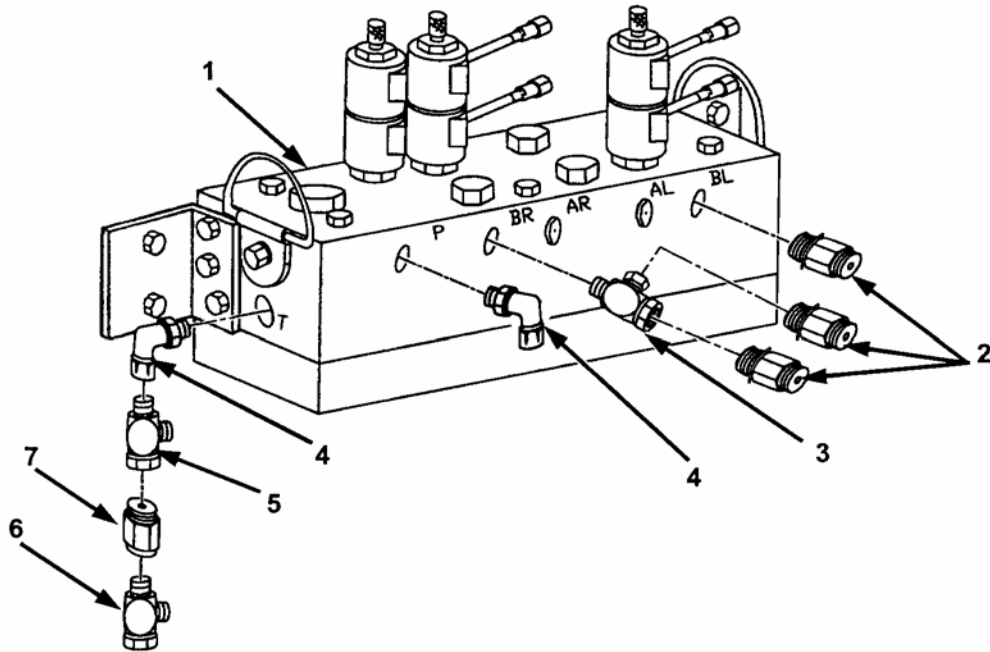


Figure 2-24. Valve Fittings (2 of 2).

- d. Insert two pins MS16562-226 (3) in holes on either side of valve bodies (4).
- e. Install four straight adapters 4-6F50X-S (6) on flow valve body (4) ports.
- f. Secure two holding valve bodies (10) to bracket (11) with two bolts B1821BH031C350L (2), four flat washers MS27183-12 (1), two lock washers MS35338-45 (9), and nuts MS35649-2312 (7).
- g. Install two straight adapters 6F50X-S (8) on top and bottom holding valve bodies (10), port 1A.
- h. Install eight straight adapters 4-6F50X-S (6) on remaining holding valve body (10) ports.

## MWO 5-2350-262-35-3

- i. Install elbow 2062-8-8S (Figure 2-25, 4) to track and blade manifold (1), port T.



**Figure 2-25. Track and Blade Manifold Fittings.**

- j. Install tee 4R6X-S (5), reducer 8-4 TRTX-S (7), and tee 203102-8-8S (6) to elbow (4) on track and blade manifold (1), port T.
  - k. Install elbow 2062-8-8S (4) to track and blade manifold (1), port P.
  - l. Install tee 6 AOG5JG5 (3) to track and blade manifold (1), port BR.
  - m. Install two straight adapters 4-6F50X-S (2) to tee (3).
  - n. Install straight adapter 4-6F50X-S (2) to track and blade manifold (1), port BL.
2. Install track adjusting cylinders as follows:

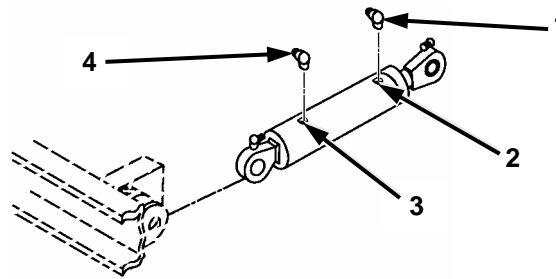
### CAUTION

Drain oil from new cylinder into suitable container. Failure to comply may result in damage to cylinder.

### NOTE

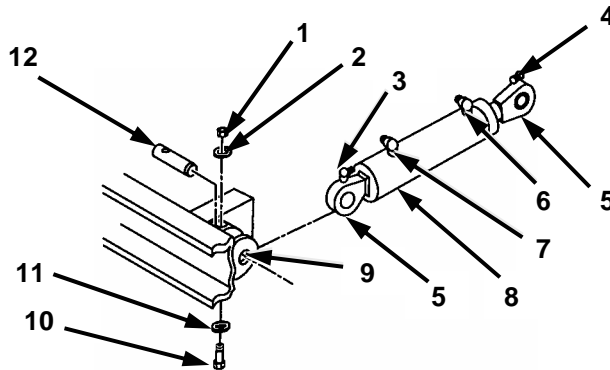
Steps a through e apply to both cylinders.

- a. Install elbow 4-6 C5OX-S (Figure 2-26, 1) to front cylinder port (2).



**Figure 2-26. Hydraulic Track Adjuster Cylinder (1 of 4).**

- b. Install elbow 2062-6-6S (4) to rear cylinder port (3).
- c. If not installed, install lubrication fitting (Figure 2-27, 3) and plug (5) on fixed end of hydraulic track adjusting cylinder 12466272 (8), so that lubrication fitting (3) faces forward and hydraulic ports (6 and 7) face upward.



**Figure 2-27. Hydraulic Track Adjuster Cylinder (2 of 4).**

- d. Install plug (5) and lubrication fitting (4) on rod end of hydraulic track adjusting cylinder (8) so that lubrication fitting (4) faces rearward.

**NOTE**

Coat threads of screw and nut with lubricating oil prior to installation.

Screw must be inserted from bottom when connecting fixed end of cylinder to hull.

- e. With cylinder ports (6 and 7) pointing up, connect fixed end of hydraulic track adjusting cylinder (8) to hull mounting bracket (9) with pin (12), washer (11), screw (10), washer (2), and locknut (1) retained from Section IV, step 6f.

**NOTE**

There is an additional clamp on left hydraulic track adjusting cylinder.

Coat threads of screw and nut with lubricating oil prior to installation.

## MWO 5-2350-262-35-3

- f. Connect rod end (Figure 2-28, 2) of hydraulic track adjusting cylinder (1) to final drive adjusting flange (8) with pin (5), washer (6), screw (7), washer (4), and locknut (3), retained from Section III, step 4 or Section IV, step 6e.

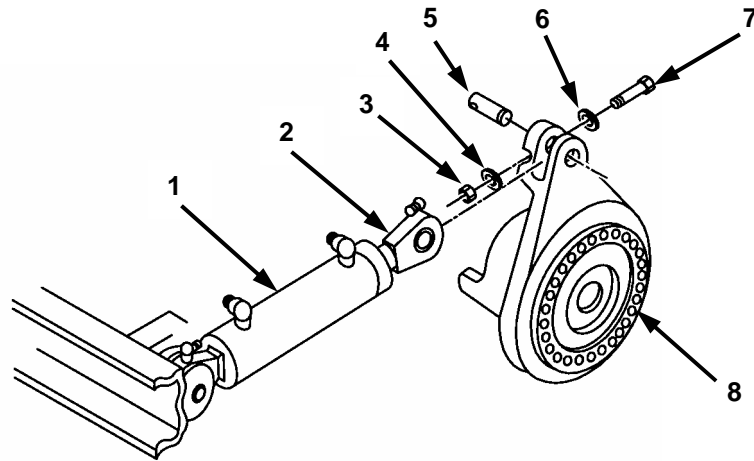


Figure 2-28. Hydraulic Track Adjusting Cylinder (3 of 4).

- g. Tighten locknuts (Figure 2-29, 1 and 4) to 19 to 31 lb-ft (39 to 42 N•m).

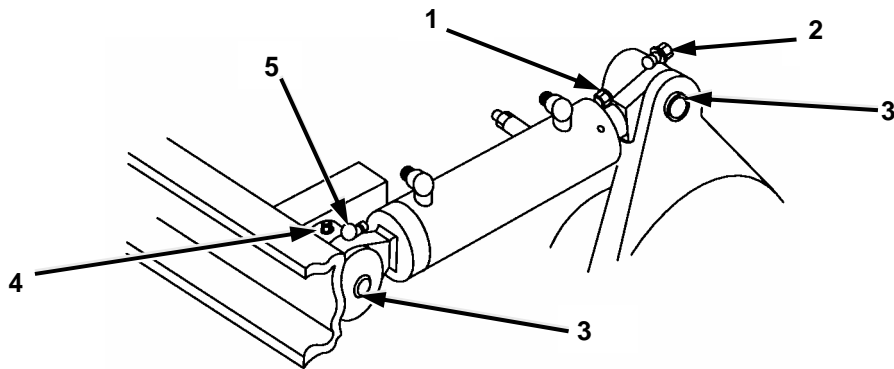


Figure 2-29. Hydraulic Track Adjusting Cylinder (4 of 4).

- h. Lubricate bearings (3) with grease at lubrication fittings (2 and 5).
- i. Connect rear fuel tank strap (Figure 2-30, 1) to hull with washer (2) and locknut (3) retained from Section IV, step 6d.

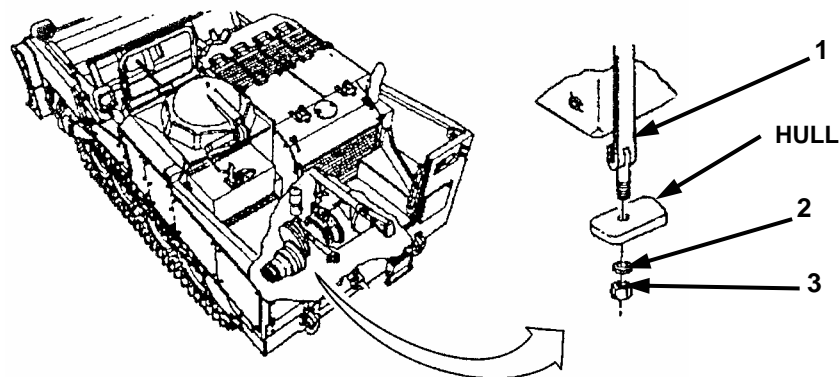


Figure 2-30. Rear Fuel Tank Strap.

3. Attach right side floor support (Figure 2-31, 3) to rear support (5) and hull using two bolts (1) and flat washers (2) (4) retained from Section V, step 5.

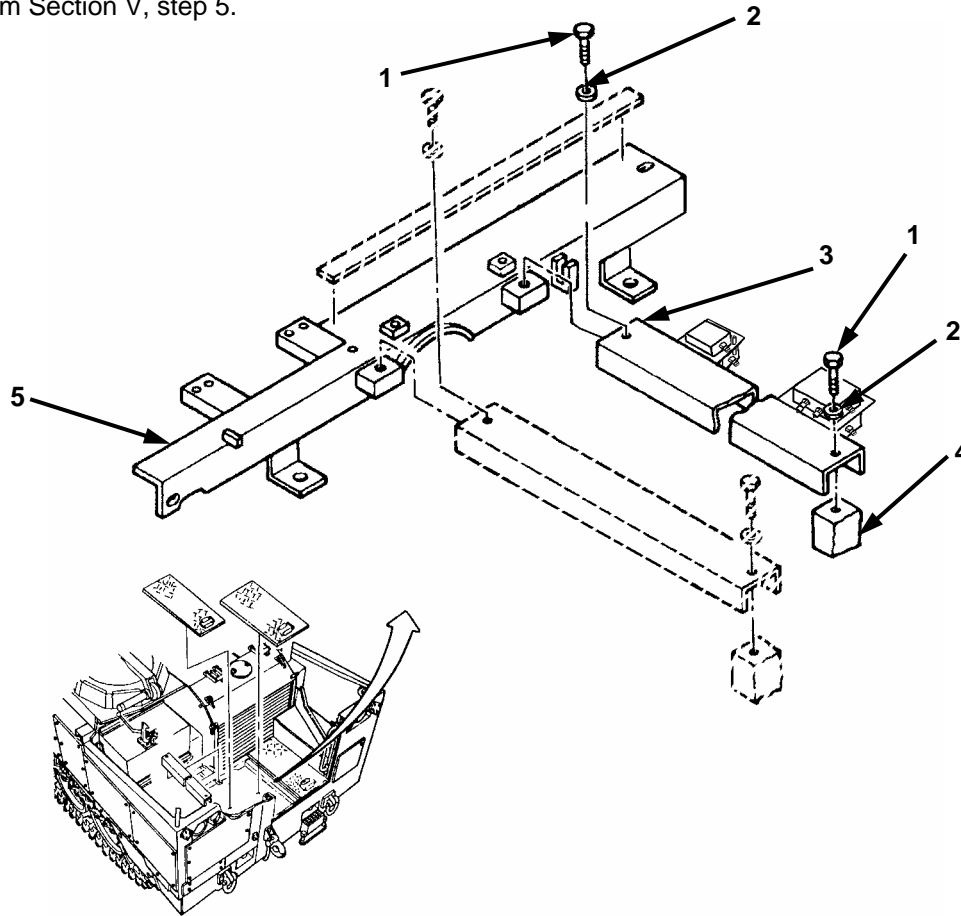


Figure 2-31. Floor Support.

4. Install apron (1826) and blade as follows:

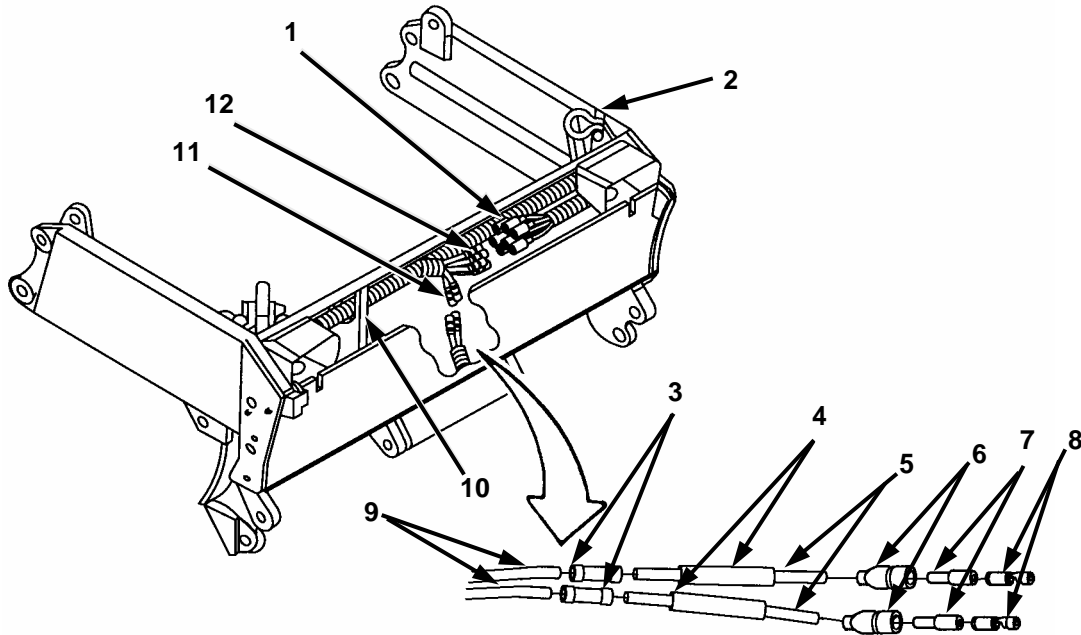
**WARNING**

**Do not stand or work under apron and dozer assembly unless apron lock pins have been installed. Failure to comply may result in severe injury or death to personnel.**

- a. Install apron wiring harness and attaching hardware retained from Section III, step 2, with gasket 13214E2582, four screws MS35206-215 and lock washers MS35338-40 on apron per TM 5-2350-262-34, Apron Wiring Harness Replacement.

## MWO 5-2350-262-35-3

- b. Route headlight wiring harness 12491606 (Figure 2-32, 12) through openings in top of four braces (10) inside apron back wall starting from left headlight to right headlight and fix with tie straps MS3367-1-9.



**Figure 2-32. Headlight Wiring Harness.**

- c. Install four apron wiring harness leads (1) in apron (2) to headlight harness leads (12), matching circuit numbers on leads.
- d. Install two terminals 8338564 (8), sleeves 8338562 (7), and shells 8338561 (6) to two six inch (152.40 mm) cables M13486/1-5 (5).
- e. Install two butt splices 8-34071-1 (3) to cables (5) and apron mercury cables (9) by sliding three inch (76.20 mm) insulation sleeve M23053/1-101-0 (4) over butt splices and heat shrink.
- f. Install two apron wiring harness leads (11) #514 and #515 to two mercury switch leads (8).

### CAUTION

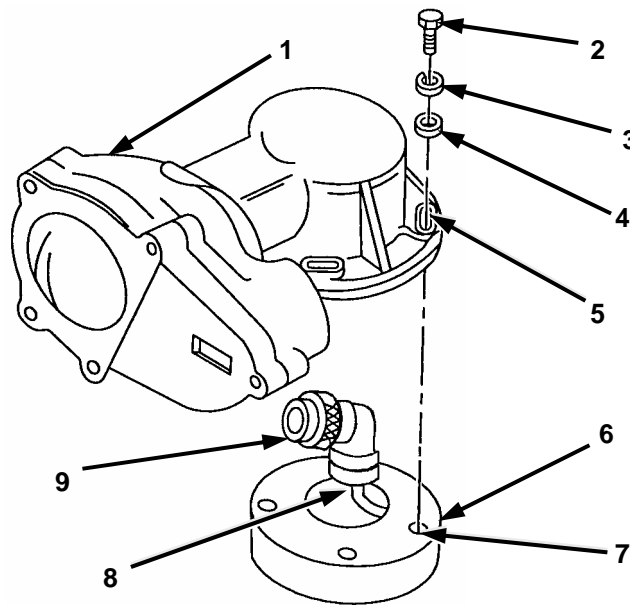
Do not turn or twist headlight during installation. Turning or twisting headlight can damage headlight wiring harness.

### NOTE

Installation procedures for the headlight are the same for both sides of the vehicle. The right side is shown here.

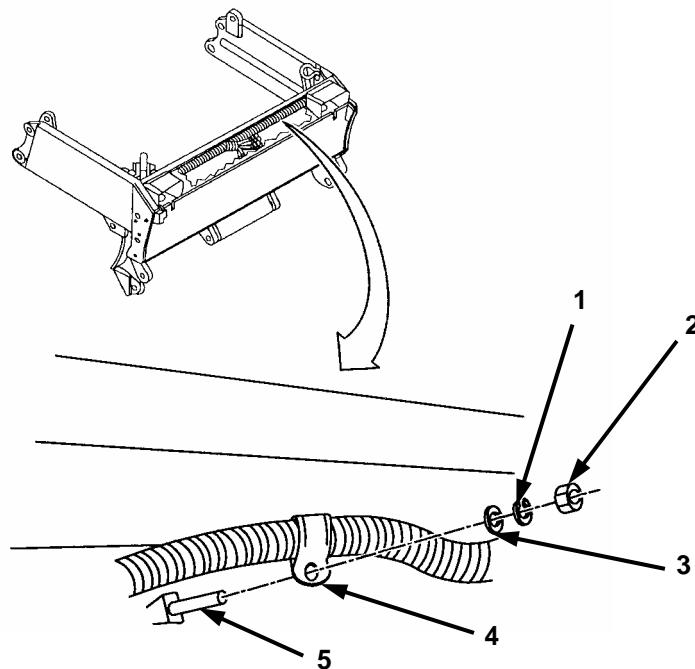


- g. Hold headlight 12312192 (Figure 2-33, 1) near connector (9). Install connector on headlight.



**Figure 2-33. Headlight.**

- h. Align four holes (5) in headlight (1) with holes (7) on hull (6). Make sure cable (8) is in groove in headlight.
- i. Attach headlight (1) with four bolts B1821BH031C113N (2), lock washers MS35338-45 (3), and flat washers MS27183-12 (4) to hull (6). Torque screws between 40 to 48 lb-ft (54 to 65 N•m).
- j. Install hose clamp MS21333-105 (Figure 2-34, 4), flat washer MS27183-10 (3), lock washer MS35338-44, (1) and nut MS35649-2254 (2) to stud (5) on apron.



**Figure 2-34. Headlight Wiring Harness Loop Clamp.**

**MWO 5-2350-262-35-3**

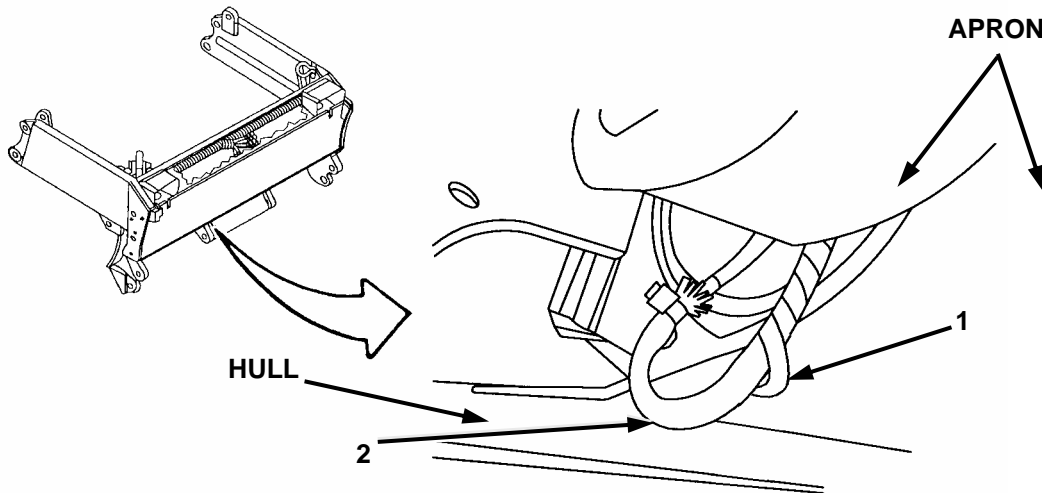
- k. Use appropriate tie strapping and neatly bundle wiring harnesses under left headlight in apron.

**WARNING**

**Steel apron assembly weighs 2700 lbs (1224.699 kg). Use appropriate lifting device. Failure to comply may result in severe injury to personnel.**

**Personnel must stand clear during lifting operations. Failure to comply may result in severe injury to personnel.**

- l. Install apron 1826 per TM 5-2350-262-20-1, Apron and Dozer Assembly Replacement and Repair, installing right side first.
- m. Install spiral wrap HT 2027 (Figure 2-35, 1) on apron mercury switch cable (2). Cut spiral wrap to fit.



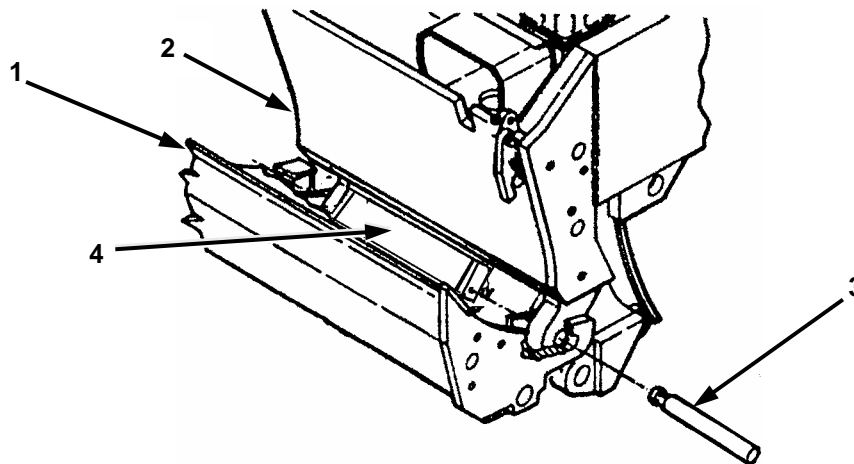
**Figure 2-35. Apron Mercury Switch Cable.**

**WARNING**

**Steel blade assembly weighs 1165 lbs (528.435 kg). Use appropriate lifting device. Failure to comply may result in severe injury to personnel.**

**Personnel must stand clear during lifting operations. Failure to comply may result in severe injury to personnel.**

- n. Use appropriate lifting device to install blade (Figure 2-36, 1) retained from Section III, step 1, on apron (2). Make sure that holes on blade dogs line up with holes on apron actuator (4).

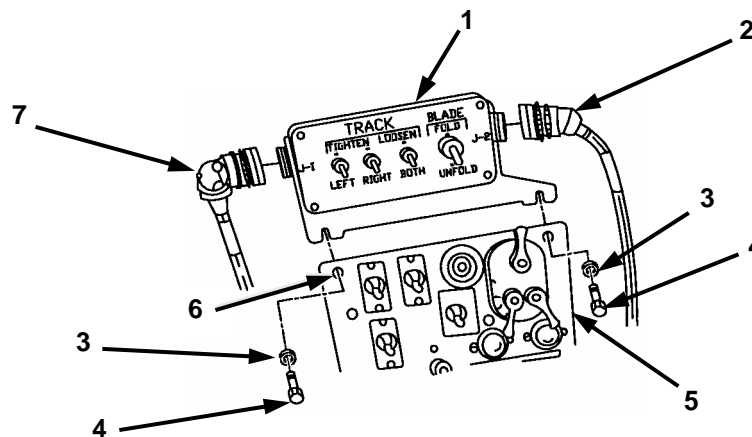


**Figure 2-36. Blade.**

**NOTE**

Old apron had four pins, new apron has two.

- o. Attach blade (1) to apron (2) with two pins (3).
5. Remove bolts and nut sleeves. Slide track and blade control box 12491619 (Figure 2-37, 1) behind instrument panel (5) and install two screws (4) and flat washers (3), retained from Section IV, step 4a, on instrument panel. And use tow nuts MS35649-2254 in place of nut sleeves 3D5074.



**Figure 2-37. Track and Blade Control Box.**

6. Install manifold harness connector 12491622 (2) on track and blade control box (1).
7. Install control box power harness connector 12491618 (7) on track and blade control box (1).

8. Route manifold harness (Figure 2-38, 2) through hull and clamp (3) MS21333-104 to hull connect to solenoids at ports Z1, Z2, and Z4 on manifold (1).

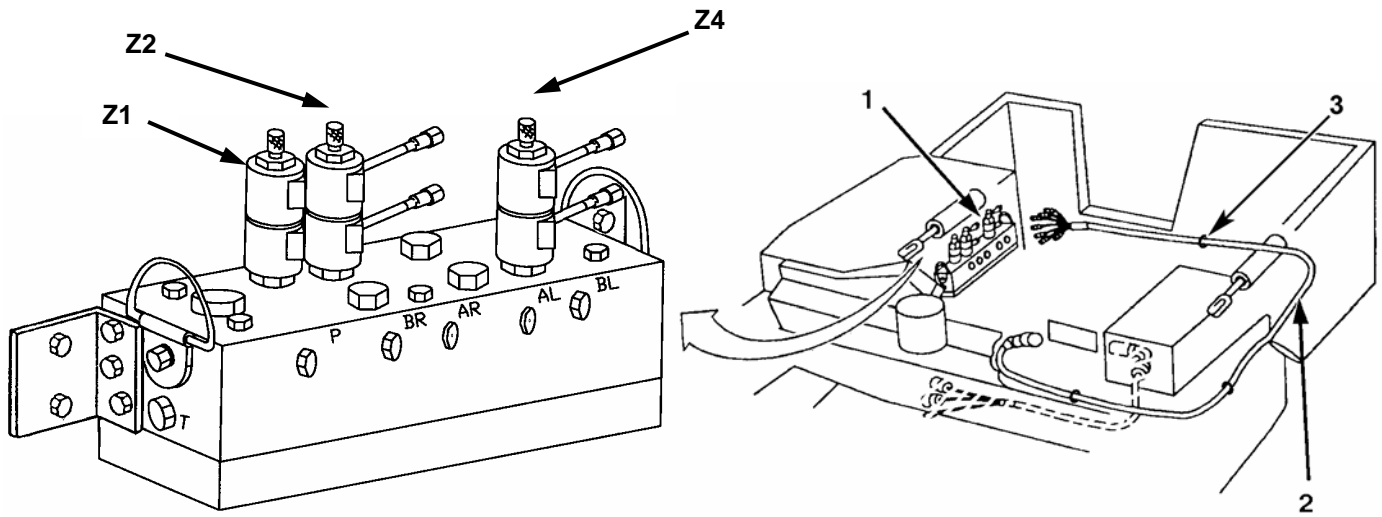


Figure 2-38. Harnesses (1 of 2).

9. Remove hull wiring harness (Figure 2-39, 2) leads #514 and #515 from control harness (1).

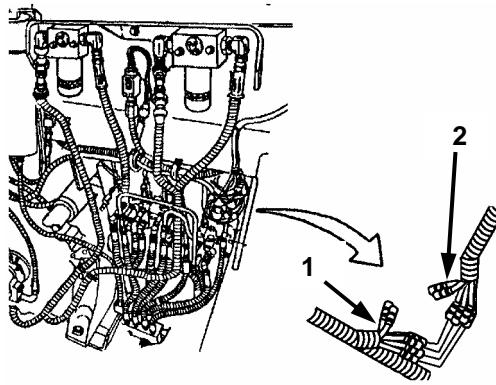
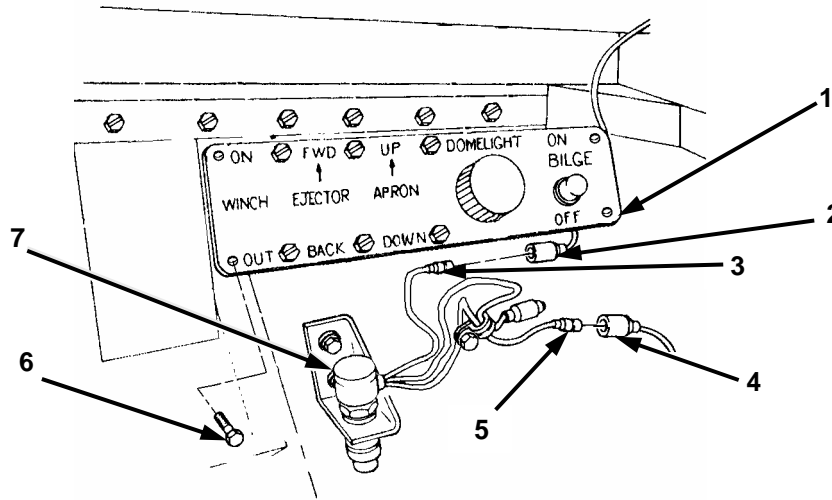


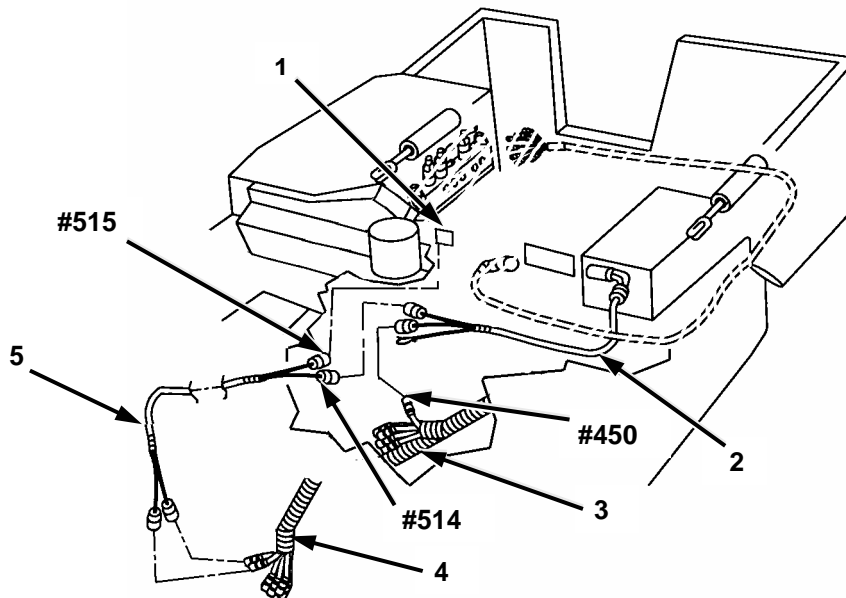
Figure 2-39. Harnesses (2 of 2).

- Remove four screws (Figure 2-40, 6) on ejector panel (1) and move panel downward, retaining screws for future use.



**Figure 2-40. Ejector Panel.**

- Remove control harness lead #450 (Figure 2-40, 4) from bilge pump switch (7) lead (5).
- Remove bilge light lead #450 (2) from bilge pump switch (7) lead (3).
- Connect hull wiring harness leads (Figure 2-41, 4) to blade folder harness 12491607 (5), matching lead numbers.

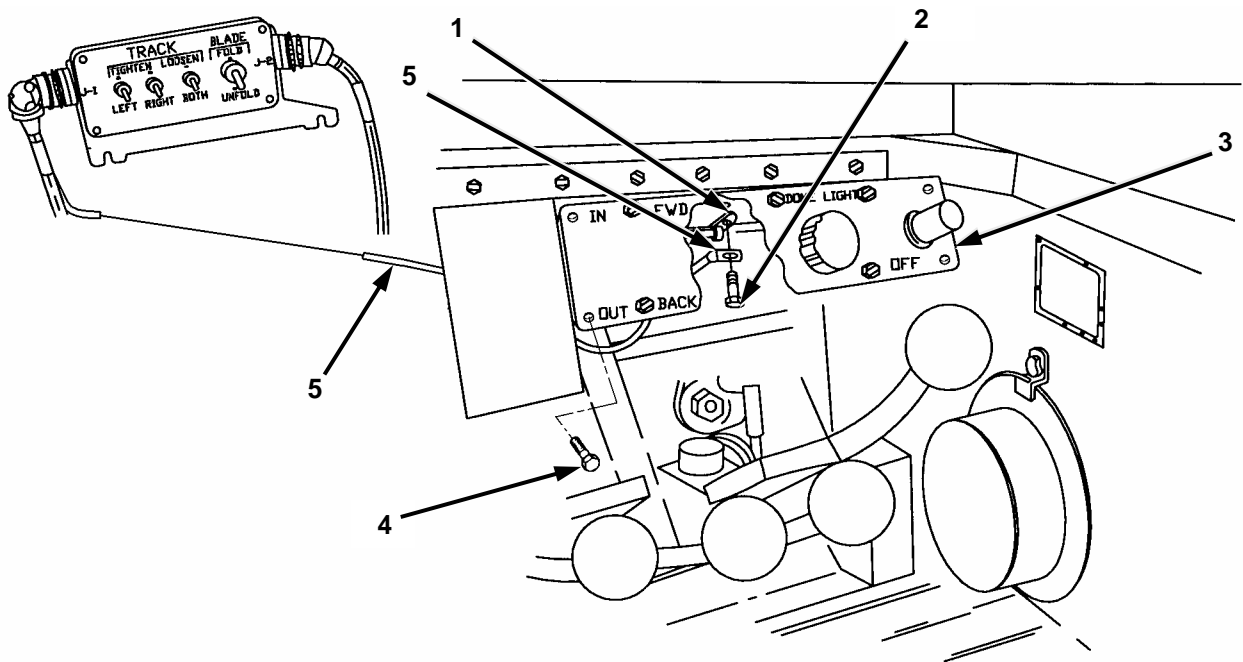


**Figure 2-41. Blade Folder Harness.**

- Route blade folder harness (5) through opening on lower left side into driver's compartment behind ejector panel.
- Route control box power harness (2) behind ejector panel.
- Connect blade folder harness lead #514 to control box power harness (2).
- Connect bilge pump light lead #450 (Figure 2-40, 2 and Figure 2-41, 1) to blade folder harness lead #515.
- Connect control harness lead #450 (3) to control box power harness (2).

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19. Install control box power harness ground terminal (Figure 2-42, 5) with bilge pump light ground (1) with screw (2).

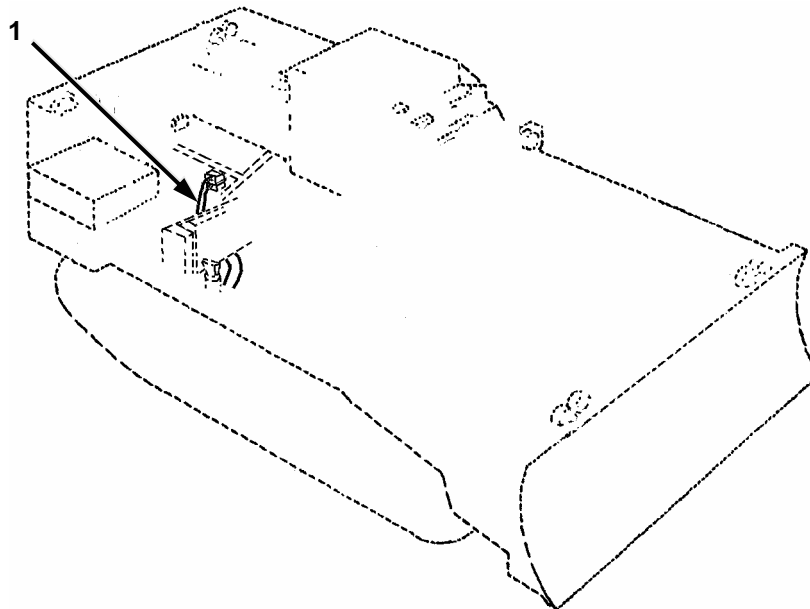


**Figure 2-42. Control Box Ground.**

20. Install ejector panel (3) to hull with four screws (4) retained from step 10.

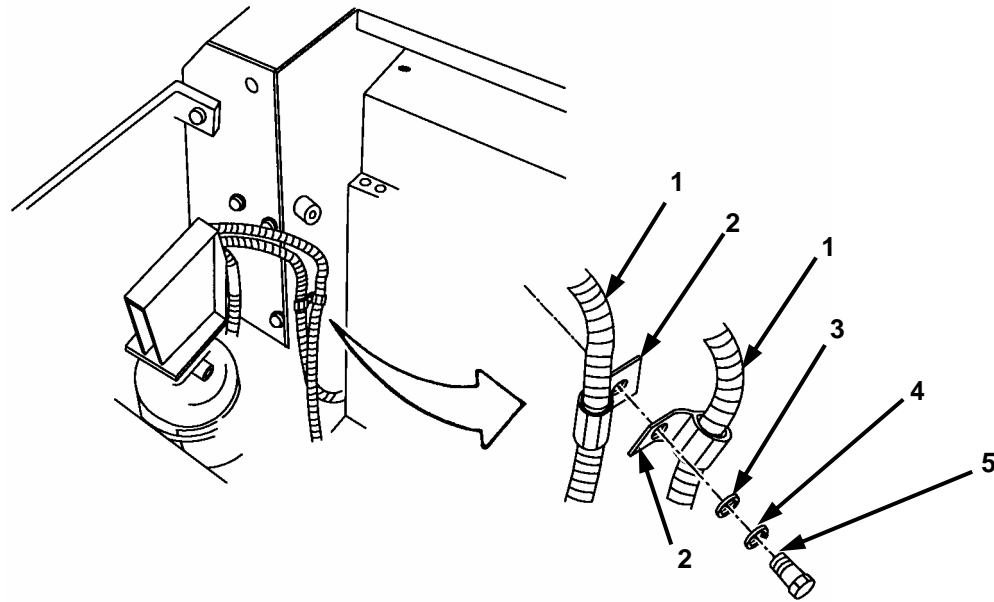
21. Install HBF-TT hoses as follows:

- a. Install two blade folder hoses 12491616-4 (Figure 2-43, 1) to top and bottom flow valves, port 2, and route under radiator and up in front of radiator next to muffler plate.



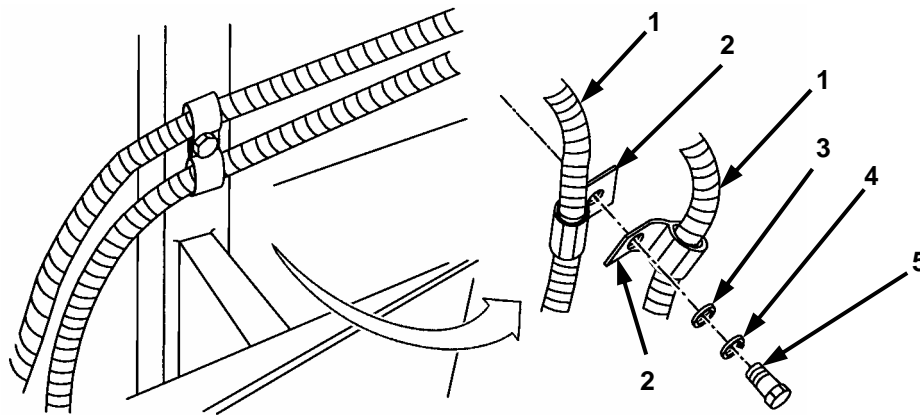
**Figure 2-43. Blade Folder Hoses.**

- b. Secure two blade folder hoses (Figure 2-44, 1) with two clamps 900729-3 (2), one flat washer MS27183-14, (3) lock washer MS35338-46 (4), and screw B1821BH038C075N (5) to hole (Figure 2-11) on hull plate next to right side fire extinguisher.



**Figure 2-44. Blade Folder Hose Clamps (1 of 2).**

- c. Secure two blade folder hoses (Figure 2-45, 1) with two clamps 900729-3 (2), one flat washer MS27183-14 (3), lock washer MS35338-46 (4), and screw B1821BH038C075N (5) to hole on hull member (Figure 2-12).



**Figure 2-45. Blade Folder Hose Clamps (2 of 2).**

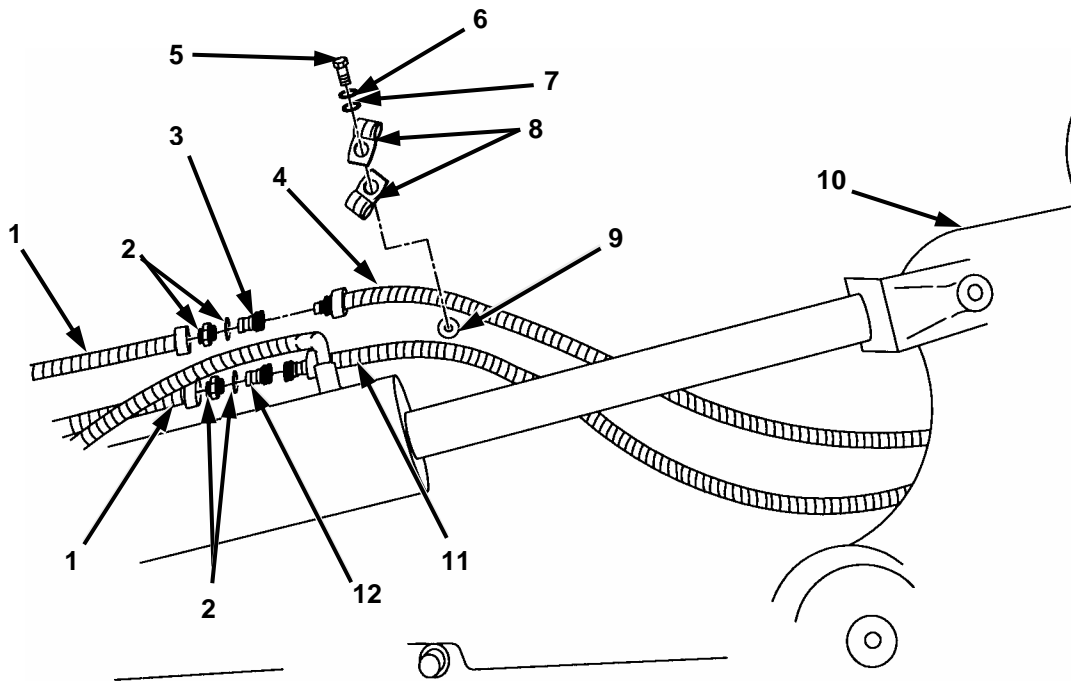
**NOTE**

Be sure to install blade folder hose, from top flow valve, port 2, through top access hole in hull and to top apron hose.

- d. Route two blade folder hoses (Figure 2-45, 1) from inside to outside vehicle through holes (Figure 2-10).

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- e. Install adapter and o-ring 4-6F50X-S (Figure 2-46, 2) and quick-disconnect coupler H2-62-T6 (3) to blade folder hose (1).



**Figure 2-46. Clamp Location.**

- f. Install adapter and o-ring 4-6F50X-S (2) and quick-disconnect coupler H2-63-T6 (12) to blade folder hose (1).
- g. Connect blade folder hose (1) to apron hose (4) from top hole on apron (10).
- h. Connect blade folder hose (13) to apron hose (11) from bottom hole on apron (10).

### NOTE

Make sure apron hoses have minimum slack between clamps and apron when apron is in down position.

- i. Secure two apron hoses (4 and 11) with two clamps 900729-3 (8), one flat washer MS27183-14 (7), lock washer MS35338-46 (6), and screw B1821BH038C075N (5) to boss (9).



- j. Install tee 203102-10-10S (Figure 2-47, 3), tube reducer 2215-10-8S (4), elbow 500454-8S (5), and hose 13214E2457-15 (2) to manifold (8), port 7 (7) and track and blade manifold, port T (11).

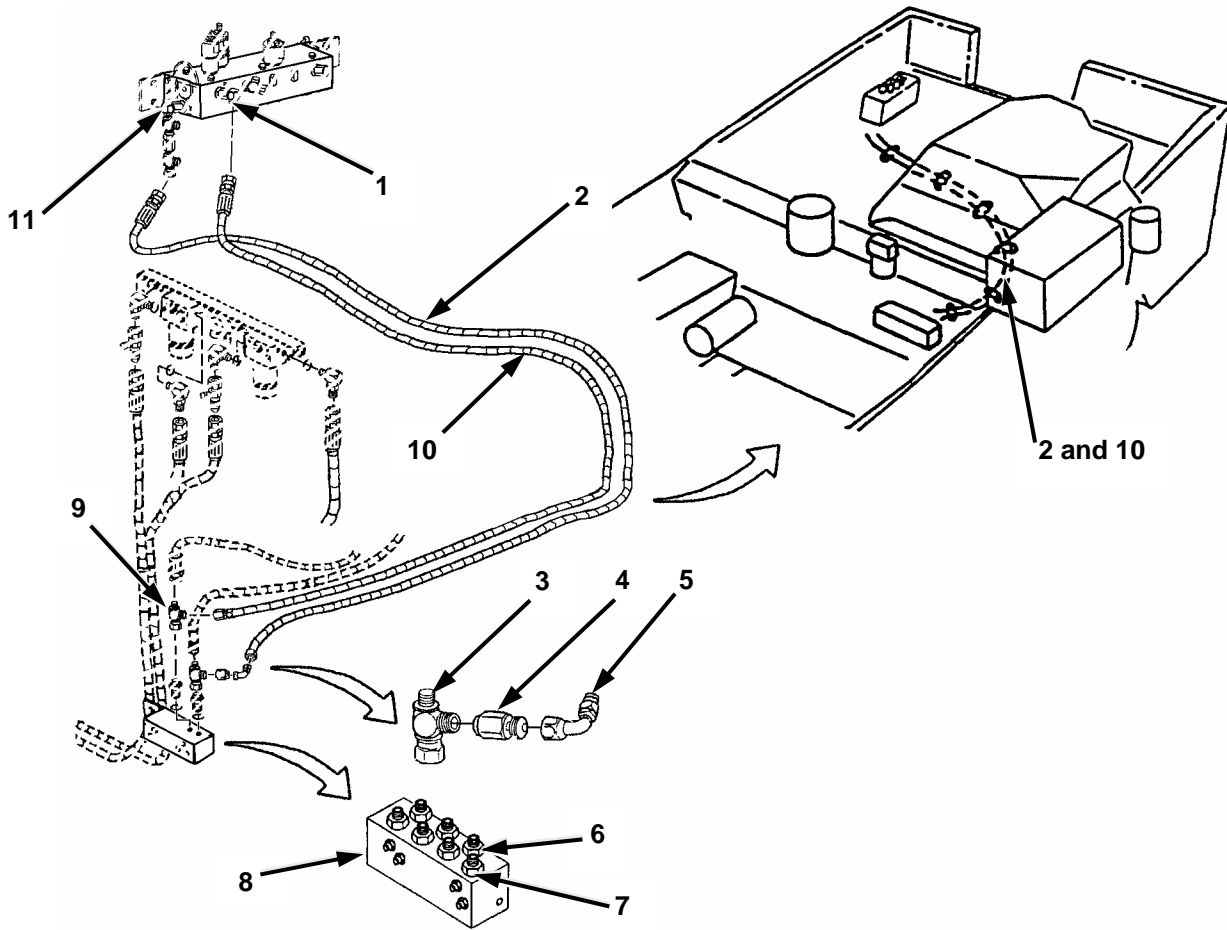


Figure 2-47. Manifold Fittings.

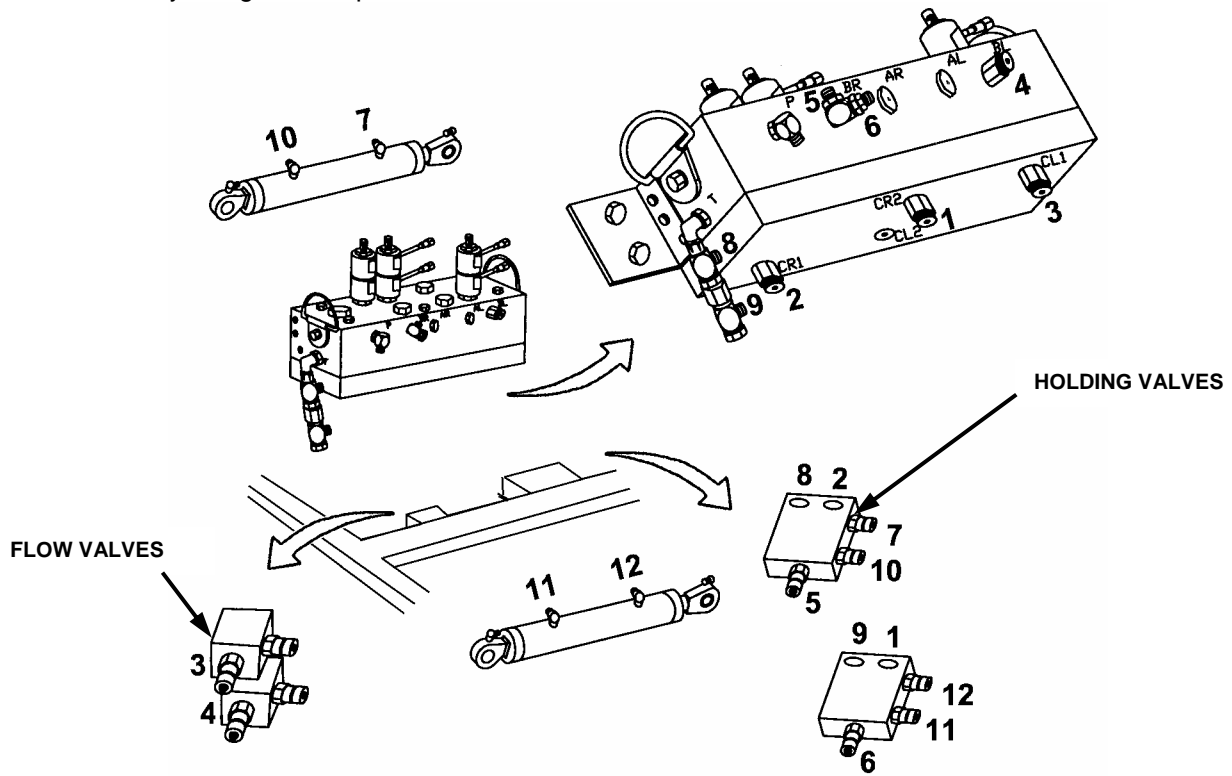
- k. Install tee 203102-8-8S (9) and hose 13214E2457-16 (10) to manifold, port 9 (6) and track and blade manifold, port P (1).

**NOTE**

Install all elbow hose ends to valve ports except for top flow valve, port 1, install straight hose end.

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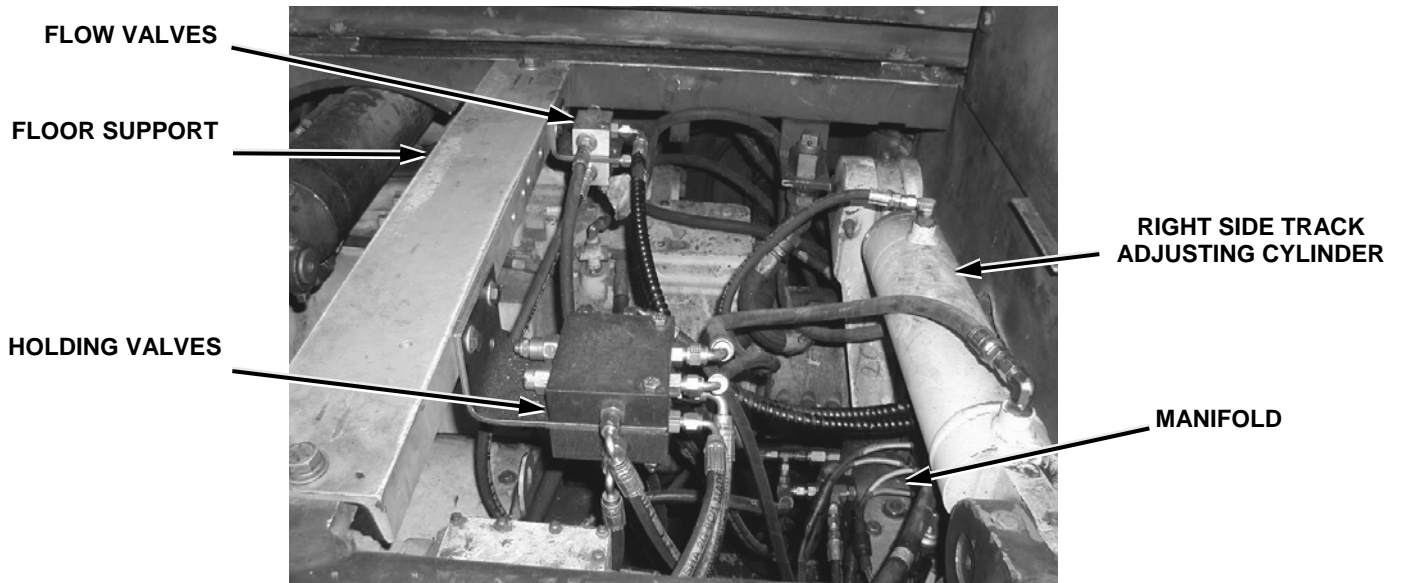
- I. Connect 12 hoses (Table 2-2 and Figures 2-48 and 2-49) to valves, cylinders, and track and blade manifold. Numbers by fittings are steps from Table 2-2.



**Figure 2-48. Hoses.**

Table 2-2. Hose Installation Guide.

Step	Hose	From:	To:
1	12491616-2	Port 2A on bottom holding valve	Port CR2 on manifold
2	12491616-2	Port 2A on top holding valve	Port CR1 on manifold
3	12491616-2	Port 1 on top flow valve	Port CL1 on manifold
4	12491615	Port 1 on bottom flow valve	Port BL on manifold
5	12491616-1	Port 2B on top holding valve	Port BR on tee fitting on manifold
6	12491616-1	Port 2B on bottom holding valve	Port BR on tee fitting on manifold
7	12491616-5	Port 1A on top holding valve	Rear port of right side track tensioner cylinder
8	12491616-1	Port 4 on top holding valve	Port T on tee fitting on manifold
9	12491616-1	Port 4 on bottom holding valve	Port T on tee fitting on manifold
10	12491616-1	Port 1B on top holding valve	Front port of right side track tensioner cylinder
11	12491616-3	Port 1B on bottom holding valve	Front port of left side track tensioner cylinder
12	12491616-6	Port 1A on bottom holding valve	Rear port of left side track tensioner cylinder



**Figure 2-49. Valves, Cylinder, and Manifold.**

22. Install rear floor plates per TM 5-2350-262-20-1, Rear Floor Plates Replacement.
23. Install battery box retained from Section III, step 3, per TM 5-2350-262-20-1, Battery Box Replacement.

**By Order of the Secretary of the Army:**

**Official:**

A handwritten signature in black ink that reads "Joyce E. Morrow". The signature is written in a cursive style with a large initial "J" and "M".

**JOYCE E. MORROW**  
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Secretary of the Army*

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*General, United States Army*  
*Chief of Staff*

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