TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

DIRECT SUPPORT AND GENERAL SUPPORT

M977 SERIES 8 x 8 HEAVY EXPANDED MOBILITY TACTICAL TRUCKS (HEMTT)

MODEL	NSN
TRUCK, CARGO, WITH WINCH, M977	2320-01-097-0260
TRUCK, CARGO, WITH WINCH, M977A2	2320-01-493-3774
TRUCK, CARGO, WITH WINCH, M977A2R1	2320-01-493-3782
TRUCK, CARGO, WITHOUT WINCH, M977	2320-01-099-6426
TRUCK, CARGO, WITHOUT WINCH, M977A2	2320-01-493-3779
TRUCK, CARGO, WITHOUT WINCH, M977A2R1	2320-01-493-3785
TRUCK, TANK, FUEL, WITH WINCH, M978	2320-01-097-0249
TRUCK, TANK, FUEL, WITH WINCH, M978A2	2320-01-492-8216
TRUCK, TANK, FUEL, WITH WINCH, M978A2R1	2320-01-492-8226
TRUCK, TANK, FUEL, WITHOUT WINCH, M978	2320-01-100-7672
TRUCK, TANK, FUEL, WITHOUT WINCH, M978A2	2320-01-492-8215
TRUCK, TANK, FUEL, WITHOUT WINCH, M978A2R1	2320-01-492-8225
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983	2320-01-097-0247
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983A2	2320-01-492-8223
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983A2R1	2320-01-492-8231
TRUCK, TRACTOR, WITH WINCH, WITH CRANE, M983	2320-01-099-6421
TRUCK, WRECKER-RECOVERY, M984	2320-01-097-0248
TRUCK, WRECKER-RECOVERY, M984A1	2320-01-195-7641
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TRUCK, WRECKER-RECOVERY, M984A2R1	2320-01-492-8233
TRUCK, CARGO, WITH WINCH, M985	2320-01-097-0261
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TRUCK, CARGO, WITH WINCH, M985A2R1	2320-01-493-3787
TRUCK, CARGO, WITHOUT WINCH, M985	2320-01-100-7673
TRUCK, CARGO, WITHOUT WINCH, M985A2	2320-01-492-8201
TRUCK, CARGO, WITHOUT WINCH, M985A2R1	2320-01-493-3789
TRUCK, CARGO, WITH WINCH, M985E1	2320-01-194-7032
TRUCK, CARGO, WITH WINCH, M985E1A2	2320-01-493-3790
TRUCK, CARGO, WITH WINCH, M985E1A2R1	2320-01-493-3792

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HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1987

WARNING

CARBON MONOXIDE (EXHAUST GAS) CAN CAUSE DEATH.

Carbon monoxide is without color or smell, but can cause death. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no ventilation. Precautions must be followed to ensure crew safety when the arctic engine heater or engine of any vehicle is operated for any purpose.

1. DO NOT operate arctic engine heater or engine of vehicle in a closed place without proper ventilation.

2. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment covers removed unless necessary for maintenance purposes.

3. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected crew to fresh air and keep warm. DO NOT PERMIT PHYSICAL EXERCISE. If necessary, give artificial respiration and get immediate medical attention. For artificial respiration, refer to FM 21-11.

4. BE AWARE that the gas particulate filter unit or the field protection mask for nuclear-biological-chemical protection WILL NOT offer safety from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

WARNING

Never use the parking brake for normal braking or wheels will lock up causing severe skid. Skidding vehicle could result in serious injury or death.

WARNING

Fuel is very flammable and can explode easily. To avoid serious injury or death, keep fuel away from open fire and keep fire extinguisher within easy reach when working with fuel. Do not work on fuel system when engine is hot. Fuel can be ignited by hot engine. When working with fuel, post signs that read NO SMOKING WITHIN 50 FEET of vehicle.

WARNING

Remove rings, bracelets, wristwatches, neck chains, and any other jewelry before working around vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

WARNING

The radiator is very hot and pressurized during vehicle operation. Let radiator cool before removing cap. Failure to do so can result in serious burns.

WARNING

The exhaust pipe and muffler can become very hot during vehicle operation. Be careful not to touch these parts with bare hands, or allow body to come in contact with pipe or muffler. Exhaust system parts can become hot enough to cause serious burns.

WARNING

Do not use trailer brakes as parking brake. Trailer brakes may not hold a loaded vehicle and trailer on a grade. A runaway vehicle may cause severe personal injury or death.

WARNING

Always use seatbelts when operating vehicle. Failure to use seatbelt can result in serious injury in case of accident.

WARNING

Avoid quick, jerking, winch operation. Keep other personnel well away from vehicles involved in winching operations. A snapped cable or shifting load can cause serious injury or death.

WARNING

Always wear heavy gloves when handling winch cables. Never let cable run through hands; frayed cables can cut. Never operate winch with less than five wraps of cable on winch drum.

WARNING

If operating crane under powerlines, do not allow vehicle to contact high-voltage connections. Death on contact can result. If possible, keep one hand away from equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

When working inside the vehicle with power off, be sure to ground every capacitor likely to hold a dangerous voltage potential.

WARNING

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

WARNING

Be careful when working on or with electrical equipment. Do not be misled by the term “low voltage”. Voltages as low as 50 volts may cause death. For artificial respiration, refer to FM 21-11.

WARNING

Be careful not to short out battery terminals. Do not smoke or use open flame near batteries. Batteries may explode from a spark. Battery acid is harmful to skin and eyes.

WARNING

Brake shoes may be coated with dust. Breathing this dust may be harmful to your health. Do not use compressed air to clean brake shoes. Wear a filter mask approved for use against brake dust. Failure to comply may result in injury or death to personnel.

WARNING

Starting fluid is toxic and flammable. Do not store in cab and do not breathe fumes. Do not puncture or burn containers. Dispose of container following manufacturer's recommendations on the container.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

WARNING

After Nuclear, Biological, or Chemical (NBC) exposure of vehicle, all air filters shall be handled with extreme caution. Unprotected personnel can experience injury or death if residual toxic agents or radioactive material are present. If vehicle is exposed to chemical or biological agents, servicing personnel shall wear protective mask, hood, protective overgarments, and chemical protective gloves and boots in accordance with TM 10-277. All contaminated air filters shall be placed in double-lined plastic bags and moved swiftly to a segregation area away from the worksite. The same procedure applies for radioactive dust contamination. The Company NBC team should measure the radiation prior to filter removal to determine the extent of safety procedures required per the NBC Annex to the unit Standard Operating Procedures (SOP). The segregation area in which the contaminated air filters are temporarily stored shall be marked with appropriate NBC placards. Final disposal of contaminated air filters shall be in accordance with local SOP. Decontamination operation shall be in accordance with FM 3-5 and local SOP.

WARNING

DO NOT grind or sand painted equipment without high-efficiency air purifying respirators in use.

WARNING

Use extreme care when removing or installing spring retainers. Spring retainers are under tension and can act as projectiles when released suddenly. Ensure proper eye protection is worn to prevent injury to personnel.

WARNING

Use extreme care when compressing, releasing, removing, or installing springs. Springs are under tension and can act as projectiles when released. Ensure proper eye protection is worn to prevent injury to personnel.

CHANGE

NO. 8

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 July 2005

TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

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

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TRUCK, CARGO, WITH WINCH, M985E1A2R1	2320-01-493-3792

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22-1 and 22-2	22-1 and 22-2
22-24.1/(22-24.2 blank)	22-24.1/(22-24.2 blank)
22-34.1 and 22-34.2	22-34.1 and 22-34.2
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23-24.17 and 23-24.18	23-24.17 and 23-24.18
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None	23-81 thru 23-102
A-1 and A-2	A-1 and A-2
C-1 and C-2	C-1 and C-2
C-2.1/(C-2.2 blank)	C-2.1/(C-2.2 blank)
INDEX 1 and INDEX 2	INDEX 1 and INDEX 2

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General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
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NO. 7

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 December, 2003

TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

DIRECT SUPPORT AND GENERAL SUPPORT

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Remove Pages	Insert Pages
A thru D	A thru D
i and ii	i and ii
none	ii.1/(ii.2 blank)
21-1 thru 21-11/(21-12 blank)	21-1 thru 21-11
none	21-12 thru 21-21/(21-22 blank)
23-1 thru 21-24	23-1 thru 21-24
none	21-24.1 thru 21-24.22
C-2 thru C-5	C-2 thru C-5
Cover	Cover

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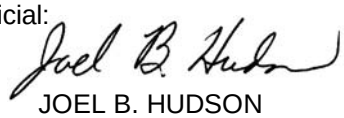
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17-19 – 17-20	17-19 – 17-20
17-20.1 – 17-20.5/(17-20.6 blank)	17-20.1 – 17-20.5/(17-20.6 blank)
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C-1 – C-2	C-1 – C-2
C-5 – C-6	C-5 – C-6

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CHANGE

NO. 4

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TECHNICAL MANUAL

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none	22-52.1 thru 22-52.6
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22-111 thru 22-114	22-111 thru 22-114
C-3 thru C-6	C-3 thru C-6

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TRUCK, CARGO, WITHOUT WINCH, M977	2320-01-099-6426
TRUCK, TANK, FUEL, WITH WINCH, M978	2320-01-097-0249
TRUCK, TANK, FUEL, WITHOUT WINCH, M978	2320-01-100-7672
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983	2320-01-097-0247
TRUCK, TRACTOR, WITH WINCH, WITH CRANE, M983	2320-01-099-6421
TRUCK, WRECKER-RECOVERY, M984	2320-01-097-0248
TRUCK, WRECKER-RECOVERY, M984E1	2320-01-195-7641
TRUCK, CARGO, WITH WINCH, M985	2320-01-097-0261
TRUCK, CARGO, WITHOUT WINCH, M985	2320-01-100-7673
TRUCK, CARGO, WITH WINCH, M985E1	2320-01-194-7032
TRUCK, CARGO, WITHOUT WINCH, M985E1	2320-01-194-7031

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4. Illustrations that are new or that have major revisions are indicated by a vertical bar adjacent to the illustration.
5. Changes on cover are: Removed VOLUME NO. 3, deleted destruction notice, and changed distribution statement.

Remove Pages	Insert Pages
c/(d blank)	c/(d blank)
i and ii	i and ii
iii and iv	iii and iv
17-1 and 17-2	17-1 and 17-2

Remove Pages	Insert Pages
17-34.1 thru 17-34.4	17-34.1 thru 17-34.4
17-39 and 17-40	17-39 and 17-40
17-49 and 17-50	17-49 and 17-50
17-50.1 and 17-50.2	l7-50.1/(17-50.2 blank)
17-50.3 thru 17-50.10	17-50.3 thru 17-50.14
17-72.1 thru 17-72.3/(17-72.4 blank)	17-72.1 thru 17-72.4
17-73 and 17-74	17-73 and 17-74
none	17-74.1/(17-74.2 blank)
17-75 and 17-76	17-75 and 17-76
none	17-92.1 thru 17-92.11/(17-92.12 blank)
17-93 and 17-94	17-93 and 17-94
none	17-94.1/(17-94.2 blank)
17-95 and 17-96	17-95 and 17-96
17-96.1 thru 17-96.3/(17-96.4 blank)	17-96.1 thru 17-96.6
17-114.7/(17-114.8 blank)	17-114.7/(17-114.8 blank)
17-115 and 17-116	17-115 and 17-116
17-116.1 and 17-116.2	17-116.1 and 17-116.2
17-145 and 17-146	17-145 and 17-146
17-146.1 and 17-146.2	17-146.1 and 17-146.2
17-150.5/(17-150.6 blank)	17-150.5 and 17-150.6
17-151 and 17-152	17-151 and 17-152
17-152.1 thru 17-152.6	17-152.1 thru 17-152.7/(17-152. 8 blank)
17-165 and 17-168	17-165 and 17-168
none	17-168.1/(17-168.2 blank)
17-170.1 thru 17-170.4	17-170.1 thru 17-170.4
none	17-170.4.1/(17-170.4.2 blank)
19-1 and 19-2	19-1 and 19-2
19-5 and 19-6	19-5 and 19-6
19-7 and 19-8	19-7 and 19-8
19-11 and 19-12	19-11 and 19-12
19-12.1 and 19-12.2	19-12.1 and 19-12.2
19-12.9 and 19-12.10	19-12.9 thru 19-12.11/(19-12 blank)
19-13 thru 19-23/(19-24 blank)	19-13 thru 19-25/(19-26 blank)
21-1 thru 21-18	21-1 thru 21-11/(21-12 blank) (21-12 thru 21-18 deleted)
22-1 and 22-2	22-1 and 22-2
22-17 thru 22-24	22-17 thru 22-24
none	22-24.1/(22-24.2 blank)
22-25 and 22-26	22-25 and 22-26
22-33 and 22-34	22-33 and 22-34
22-53 and 22-54	22-53 and 22-54
22-67 thru 22-70	22-67 thru 22-70
22-73 and 22-74	22-73 and 22-74
none	22-74.1/(22-74.2 blank)
22-75 and 22-76	22-75 and 22-76
22-81 and 22-82	22-81 and 22-82
22-105 and 22-106	22-105 thru 22-110
23-1 thru 23-24	23-1 thru 23-20/(23-21 thru 23-24 deleted)

Remove Pages	Insert Pages
FP-3/(FP-4 blank)	FP-3/(FP-4 blank)
FP-5/(FP-6 blank)	FP-5/(FP-6 blank)
FP-S/(FP-10 blank)	FP-9/(FP-10 blank)
Cover	Cover
23-75 and 23-76	23-75 and 23-76
A-1 and A-2	A-1 and A-2
B-1 thru B-4	B-1 thru B-4
B-15 thru B-18	B-15 thru B-21/(B-22 blank)
C-1 thru C-5/(C-6 blank)	C-1 thru C-6
DA 2028 sample F & B	DA 2028 sample F & B
DA 2028 F & B	DA 2028 F & B
DA 2028 F & B	DA 2028 F & B
DA 2028 F & B	DA 2028 F & B
Cover	Cover

File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Amy:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
05644

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CHANGE

NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., *30 April 1990*

TECHNICAL MANUAL

MAINTENANCE INSTRUCTIONS

DIRECT SUPPORT AND GENERAL SUPPORT

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

MODEL	NSN
TRUCK, CARGO, WITH WINCH, M977	2320-01-097-0260
TRUCK, CARGO, WITHOUT WINCH, M977	2320-01-099-6426
TRUCK, TANK, FUEL, WITH WINCH, M978	2320-01-097-0249
TRUCK, TANK, FUEL, WITHOUT WINCH, M978	2320-01-100-7672
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983	2320-01-097-0247
TRUCK, TRACTOR, WITH WINCH, WITH CRANE, M983	2320-01-099-6421
TRUCK, WRECKER-RECOVERY, M984	2320-01-097-0248
TRUCK, WRECKER-RECOVERY, M984E1	2320-01-195-7641
TRUCK, CARGO, WITH WINCH, M985	2320-01-097-0261
TRUCK, CARGO, WITHOUT WINCH, M985	2320-01-100-7673
TRUCK, CARGO, WITH WINCH, M985E1	2320-01-194-7032
TRUCK, CARGO, WITHOUT WINCH, M985E1	2320-01-194-7031

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Remove Pages	Insert Pages
17-1 and 17-2	17-1 and 17-2
17-49 and 17-50	17-49 and 17-50
17-55 and 17-56	17-55 and 17-56
17-58.1 and 17-58.2	17-58.1 and 17-58.2
17-62.1 and 17-62.2	17-62.1 and 17-62.2
17-67 and 17-68	17-67 and 17-68
17-71 and 17-72	17-71 and 17-72

Remove Pages	Insert Pages
17-72.3/(17-72.4 blank)	17-72.3/(17-72.4 blank)
17-75 and 17-76	17-75 and 17-76
17-78.1 and 17-78.2	17-78.1 and 17-78.2
17-79 and 17-80	17-79 and 17-80
17-83 thru 17-86.2	17-83 thru 17-86.2
17-89 thru 17-90.2	17-89 thru 17-90.2
17-90.5 and 17-90.6	17-90.5 and 17-90.6
17-93 thru 17-96	17-93 thru 17-96
17-99 and 17-100	17-99 and 17-100
17-113 and 17-114	17-113 and 17-114
17-157 thru 17-160	17-157 thru 17-160
17-173 thru 17-176	17-173 thru 17-179/(17-180 blank)
19-17 thru 19-22	19-17 thru 19-22
23-67 and 23-68	23-67 and 23-68
23-73 and 23-74	23-73 and 23-74
A-1 and A-2	A-1 and A-2
C-3 and C-4	C-3 and C-4
Index 3 and Index 4	Index 3 and Index 4
Index 13 thru Index 16	Index 13 thru Index 16

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By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-38 (Block No. 268), Direct Support and General Support maintenance requirements for Truck, Cargo, 10-ton, 8x8, Heavy Expanded Mobility Tactical Truck, HEMTT, M977, M978, M983, M984, M985.

TM 9-2320-279-34-3
C1

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 23 August 1989

MAINTENANCE INSTRUCTIONS

DIRECT SUPPORT AND GENERAL SUPPORT

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

MODEL	NSN
TRUCK, CARGO, WITH WINCH M977	2320-01-097-0260
TRUCK, CARGO, WITHOUT WINCH M977	2320-01-099-6426
TRUCK, TANK, FUEL, WITH WINCH M978	2320-01-097-0249
TRUCK, TANK, FUEL, WITHOUT WINCH M978	2320-01-100-7672
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE M983	2320-01-097-0247
TRUCK, TRACTOR, WITH WINCH, WITH CRANE M983	2320-01-099-6421
TRUCK, WRECKER-RECOVERY M984	2320-01-097-0248
TRUCK, WRECKER-RECOVERY M984E1	2320-01-195-7641
TRUCK, CARGO, WITH WINCH M985	2320-01-097-0261
TRUCK, CARGO, WITHOUT WINCH M985	2320-01-100-7673
TRUCK, CARGO WITH WINCH M985E1	2320-01-194-7032
TRUCK, CARGO, WITHOUT WINCH M985E1	2320-01-194-7031

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Remove Pages	Insert Pages
iii and iv	iii and iv
B-1 through B-10	B-1 through B-18

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By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-38-R, Direct Support and General Support maintenance requirements for Truck, Cargo, 10-Ton, 8x8, Heavy Expanded Mobility Tactical Truck, HEMTT: M977, M978, M983, M984, M985.

INSERT LATEST UPDATED PAGES/WORK PACKAGES, DESTROY SUPERSEDED DATE

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: The portion of text affected by the updates is indicated by a vertical line in the outer margins of the page. Updates to illustrations are indicated by miniature pointing hands. Updates to wiring diagrams are indicated by shaded areas.

Dates of issue for original and updated pages/work packages are:

Original . . . 0 . . . . . 3 June 1987
Change . . . 1 . . . . . 23 August 1989
Change . . . 2 . . . . . 30 April 1990
Change . . . 3 . . . . . 15 December 1998
Change . . . 4 . . . . . 15 December 2000
Change . . . 5 . . . . . 15 February 2002
Change . . . 6 . . . . . 15 March 2003
Change . . . 7 . . . . . 15 December 2003
Change . . . 8 . . . . . 1 July 2005

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 850 CONSISTING OF THE FOLLOWING:

Page/WP No.	*Change No.	Page/WP No.	*Change No.	Page/WP No.	*Change No.
Cover	7	17-20.6 Blank	5	17-57 – 17-58	0
Blank	7	17-21 – 17-26	0	17-58.1	2
a – b	0	17-26.1 – 17-26.4	0	17-58.2	0
c	3	17-27 – 17-28	0	17-59 – 17-62	0
d Blank	3	17-28.1 – 17-28.4	0	17-62.1	2
i - ii	7	17-29 – 17-34	0	17-62.2 – 17-62.4	0
ii.1/(ii.2 Blank)	8	17-34.1 – 17-34.4	3	17-63 – 17-67	0
iii	1	17-34.5	0	17-68	2
iv	3	17-34.6 Blank	0	17-68.1 – 17-68.4	0
17-1	5	17-35 – 17-38	0	17-69 – 17-71	0
17-2	3	17-38.1 – 17-38.4	0	17-72	2
17-2.1	0	17-39	3	17-72.1	0
17-2.2 Blank	0	17-40 – 17-49	0	17-72.2 – 17-72.4	3
17-3 – 17-16	0	17-50	3	17-73 – 17-74	3
17-16.1 – 17-16.2	0	17-50.1	3	17-74.1	3
17-16.3 – 17-16.4	5	17-50.2 Blank	3	17-74.2 Blank	3
17-16.5 –17-16.16	0	17-50.3 – 17-50.14	3	17-75	3
17-17 – 17-19	0	17-51 - 17-55	0	17-76 – 17-78	0
7-20	5	17-56	2	17-78.1	2
17-20.1 – 17-20.5	5	17-56.1 – 17-56.4	0	17-78.2 – 17-78.4	0
				17-79	2

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INSERT LATEST UPDATED PAGES/WORK PACKAGES, DESTROY SUPERSEDED DATE

Page/WP No.	*Change No.
17-80 – 17-82	0
17-83	2
17-84 – 17-85	0
17-86	2
17-86.1	0
17-86.2	2
17-87 – 17-89	0
17-90	2
17-90.1	2
17-90.2 – 17-90.4	0
17-90.5 – 17-90.6	2
17-90.7 – 17-90.8	0
17-91 – 17-92	0
17-92.1 – 17-92.11	3
17-92.12 Blank	3
17-93 – 17-94	3
17-94.1	3
17-94.2 Blank	3
17-95 – 17-96	3
17-96.1 - 17-96.6	3
17-97 – 17-99	0
17-100	2
17-100.1 – 17-100.4	0
17-100.5	0
17-100.6 Blank	0
17-101 – 17-113	0
17-114	2
17-114.1 – 17-114.6	0
17-114.7	3
17-114.8 Blank	3
17-115 – 17-116	3
17-116.1 – 17-116.2	3
17-117 – 17-138	0
17-138.1 – 17-138.24	0
17-138.25	0
17-138-26 Blank	0
17-139 – 17-140	0
17-140.1	0
17-140.2	5
17-141 – 17-143	0
17-144	5
17-145	6
17-146	0
17-146.1 – 17-146.2	0
17-147 – 17-150	0
17-150.1 – 17-150.4	0
17-150.5 – 17-150.6	3
17-151	3
17-152	0
17-152.1 – 17-152.6	3
17-152.7	3
17-152.8 Blank	3
17-153 - 17-156	0
17-157	2
17-158 – 17-159	0
17-160	2
17-161 – 17-162	0
17-162.1 – 17-162.4	0
17-163 – 17-165	0
17-166 – 17-168	3
17-168.1	3
17-168.2 Blank	3
17-169 - 17-170	0
17-170.1 - 17-170.2	3
17-170.3	0
17-170.4	3
17-170.4.1	3
17-170.4.2 Blank	3
17-170.5 – 17-170.8	0
17-171 – 17-173	0
17-174	2
17-175	0
17-176 – 17-179	2
17-180 Blank	2
Chap 18 Deleted	2
19-1 – 19-2	3
19-3 – 19-4	0
19-5	3
19-6 – 19-7	0
19-8	3
19-9 – 19-10	0
19-11 – 19-12	3
19-12.1	3
19-12.2 – 19-12.9	0
19-12.10	3
19-12.11	3
19-12.12 Blank	3
19-13 - 19-25	3
19-26 Blank	3
20-1 – 20-42	0
21-1 – 21-2	7
21-3	3
21-4	7
21-5	3
21-6	7
21-7	3
21-8	7
21-9	3
21-10 - 21-21	7
21-22 Blank	7
22-1	8

* Zero in this column indicates an original page.

INSERT LATEST UPDATED PAGES/WORK PACKAGES, DESTROY SUPERSEDED DATE

Page/WP No.	*Change No.	Page/WP No.	*Change No.	Page/WP No.	*Change No.
22-2 - 22-16	0	22-76 - 22-78	0	23-25 - 23-66	0
22-17	3	22-79 - 22-81	4	23-67	2
22-18	0	22-82	3	23-68 - 23-73	0
22-19	3	22-83 - 22-86	0	23-74	2
22-20	0	22-87 - 22-90	4	23-75	0
22-21	3	22-91 - 22-98	0	23-76	3
22-22	0	22-99 - 22-101	4	23-77 - 23-79	0
22-23 – 22-24	3	22-102 - 22-105	0	23-80 - 23-102	8
22-24.1	8	22-106 - 22-110	3	A-1 - A-2	8
22-24.2 Blank	8	22-111 - 22-114	4	B-1	3
22-25	3	23-1 - 23-2	8	B-2 - B-3	1
22-26 – 22-32	0	23-3	5	B-4	5
22-33	3	23-4	7	B-5 - B-14	1
22-34	0	23-5	3	B-15	3
22-34.1 - 22-34.2	8	23–6	7	B-16	1
22-35	8	23-7	3	B-17 – B-19	3
22-36	0	23-8	7	B-20	5
22-37 - 22-42	0	23-9	3	B-21	3
22-43	8	23-10	7	B-22 Blank	3
22-44	0	23-11	3	C-1 - C-2	8
22-45 - 22-46	0	23-12	7	C-2.1 - C-2.2	8
22-47 - 22-48	4	23-13	3	C-3	7
22-49	0	23-14	7	C-4	4
22-50	4	23-15	3	C-5	5
22-51	0	23-16	7	C-6	4
22-52	4	23-17	3	D-1 - D-4	0
22-52.1 - 22-52.6	4	23-18	8	Index 1	8
22-53 - 22-54	3	23-19	3	Index 2	0
22-55 - 22-57	4	23-20 - 23-24	7	Index 3	2
22-58 - 22-67	0	23-24.1 - 23-24.12	7	Index 4 - Index 13	0
22-68 - 22-70	3	23-24.13	8	Index 14 - Index 15	2
22-71 - 22-73	0	23-24.14 - 23-24.16	7	Index 16	0
22-74	3	23-24.17	8	Index 17	0
22-74.1	3	23-24.18 - 23-24.20	7	Index 18 Blank	0
22-74.2 Blank	3	23-24.21	8	FP-1	0
22-75	3	23-24.22	7		

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INSERT LATEST UPDATED PAGES/WORK PACKAGES, DESTROY SUPERSEDED DATE

Page/WP No.	*Change No.	Page/WP No.	*Change No.	Page/WP No.	*Change No.
FP-2 Blank	0	FP-14 Blank	0	FP-26 Blank	0
FP-3	3	FP-15	0	FP-27	0
FP-4 Blank	3	FP-16 Blank	0	FP-28 Blank	0
FP-5	3	FP-17	0	FP-29	0
FP-6 Blank	3	FP-18 Blank	0	FP-30 Blank	0
FP-7	0	FP-19	0	FP-31	0
FP-8 Blank	0	FP-20 Blank	0	FP-32 Blank	0
FP-9	3	FP-21	0	FP-33	0
FP-10 Blank	3	FP-22 Blank	0	FP-34 Blank	0
FP-11	0	FP-23	0	FP-35	0
FP-12 Blank	0	FP-24 Blank	0	FP-36 Blank	0
FP-13	0	FP-25	0		

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TECHNICAL MANUAL

HEADQUARTERS
DEPARTMENT OF THE ARMY

No. 9-2320-279-34-3

Washington, DC, *3 June 1987*

MAINTENANCE INSTRUCTIONS
DIRECT SUPPORT AND GENERAL SUPPORT
M977 SERIES, 8 x 8 HEAVY EXPANDED MOBILITY TACTICAL TRUCKS (HEMTT)

MODEL	NSN
TRUCK, CARGO, WITH WINCH, M977	2320-01-097-0260
TRUCK, CARGO, WITH WINCH, M977A2	2320-01-493-3774
TRUCK, CARGO, WITH WINCH, M977A2R1	2320-01-493-3782
TRUCK, CARGO, WITHOUT WINCH, M977	2320-01-099-6426
TRUCK, CARGO, WITHOUT WINCH, M977A2	2320-01-493-3779
TRUCK, CARGO, WITHOUT WINCH, M977A2R1	2320-01-493-3785
TRUCK, TANK, FUEL, WITH WINCH, M978	2320-01-097-0249
TRUCK, TANK, FUEL, WITH WINCH, M978A2	2320-01-492-8216
TRUCK, TANK, FUEL, WITH WINCH, M978A2R1	2320-01-492-8226
TRUCK, TANK, FUEL, WITHOUT WINCH, M978	2320-01-100-7672
TRUCK, TANK, FUEL, WITHOUT WINCH, M978A2	2320-01-492-8215
TRUCK, TANK, FUEL, WITHOUT WINCH, M978A2R1	2320-01-492-8225
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983	2320-01-097-0247
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983A2	2320-01-492-8223
TRUCK, TRACTOR, WITH WINCH, WITHOUT CRANE, M983A2R1	2320-01-492-8231
TRUCK, TRACTOR, WITH WINCH, WITH CRANE, M983	2320-01-099-6421
TRUCK, WRECKER-RECOVERY, M984	2320-01-097-0248
TRUCK, WRECKER-RECOVERY, M984A1	2320-01-195-7641
TRUCK, WRECKER-RECOVERY, M984A2	2320-01-492-8224
TRUCK, WRECKER-RECOVERY, M984A2R1	2320-01-492-8233
TRUCK, CARGO, WITH WINCH, M985	2320-01-097-0261
TRUCK, CARGO, WITH WINCH, M985A2	2320-01-492-8214
TRUCK, CARGO, WITH WINCH, M985A2R1	2320-01-493-3787
TRUCK, CARGO, WITHOUT WINCH, M985	2320-01-100-7673
TRUCK, CARGO, WITHOUT WINCH, M985A2	2320-01-492-8201
TRUCK, CARGO, WITHOUT WINCH, M985A2R1	2320-01-493-3789
TRUCK, CARGO, WITH WINCH, M985E1	2320-01-194-7032
TRUCK, CARGO, WITH WINCH, M985E1A2	2320-01-493-3790
TRUCK, CARGO, WITH WINCH, M985E1A2R1	2320-01-493-3792

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M983 with crane and M985E1 without winch are no longer in the fleet. Ignore all references to these vehicles. The M984E1 and M984A1 are the same vehicle. All references to M984E1 shall be interpreted as the M984A1 model. All references to M977 series vehicles shall be interpreted to include A2 and A2R1 models, unless otherwise noted.

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CHAPTER 17
M977, M985, and M984E1 CRANE MAINTENANCE

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Section I. INTRODUCTION

17-1. GENERAL. This chapter contains maintenance instructions for removing, installing, and repairing the M977 and M985 crane components at the direct support and general support maintenance level. The subassemblies and parts which must be removed before the crane components can be removed are referenced to other paragraphs or chapters of this manual or TM 9-2320-279-20.

Section II. CRANE, SUBFRAME, AND SWING DRIVE

M977, M985, and M984E1 Crane Maintenance Instructions

17-2. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION.

This task covers:

a. Disconnect Quick Couplings
b. Connect Quick Couplings
c. Disconnect Hydraulic Hoses and Tubes
d. Connect Hydraulic Hoses and Tubes
e. Type 1 Clamp Removal
f. Type 1 Clamp Installation
g. Type 2 Clamp Removal
h. Type 2 Clamp Installation
i. Type 3 Clamp and Bracket Removal
j. Type 3 Clamp and Bracket Installation
k. Type 4 Clamp Removal
l. Type 4 Clamp Installation
m. Type 5 Clamp Removal
n. Type 5 Clamp Installation
o. Hydraulic Hose and Tube Removal/Installation
p. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Crane in operating position and supported by suitable lifting device.
TM 9-2320-279-10	Shut off engine.

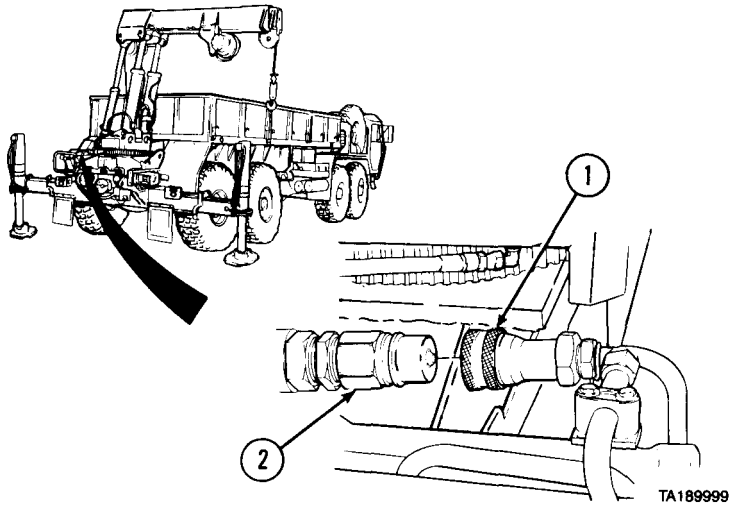
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

NOTE

- Subparagraphs a through **n** show all typical connections and clamps used on the M977 and M985 cranes.
- This procedure is for reference only to show location of hoses, tubes, and fittings used on the M977 and M985 cranes. It will never be necessary to remove all hydraulic hoses at one time. Individual procedures will indicate the area where hoses are to be removed and installed.



a. Disconnect Quick Couplings. Push ring (1) away from hose fitting (2) and pull hose free.

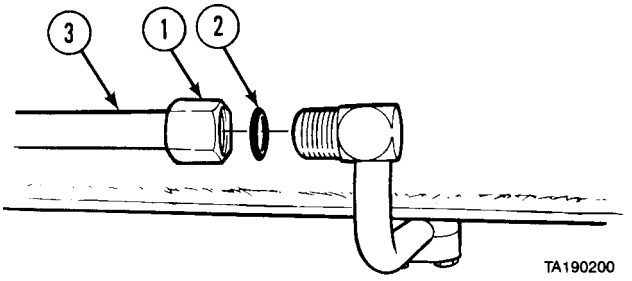
b. Connect Quick Couplings. Push ring (1) away from hose fitting (2) and push hose in until seated. Release ring (1) while holding pressure on hose fitting (2).

NOTE

Some hoses and tubes will not have preformed packings.

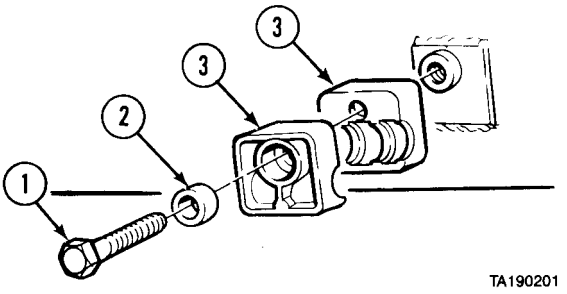
c. Disconnect Hydraulic Hoses and Tubes. Loosen fitting (l). Remove preformed packing (2) and hose (3).

d. Connect Hydraulic Hoses and Tubes. Connect fitting (1) with preformed packing (2) and tighten.



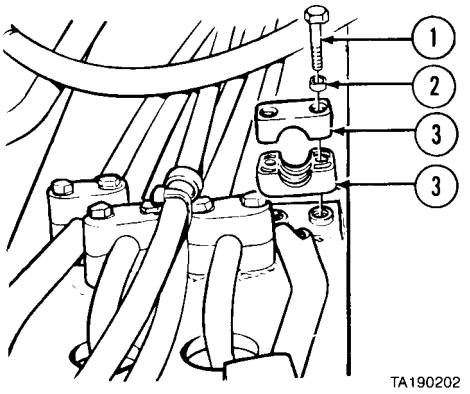
e. Type 1 Clamp Removal. Remove screw (l), spacer (2), and clamps (3).

f. Type 1 Clamp Installation. Install clamps (3) and spacer (2) with screw (1).



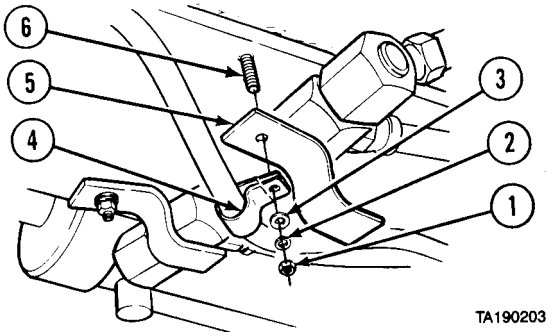
g. Type 2 Clamp Removal. Remove two screws (l), spacers (2), and clamps (3).

h. Type 2 Clamp Installation. Install clamps (3) and spacers (2) with two screws (1).



i. Type 3 Clamp and Bracket Removal. Remove nut (1), lockwasher (2), washer (3), clamp (4), and bracket (5) from stud (6).

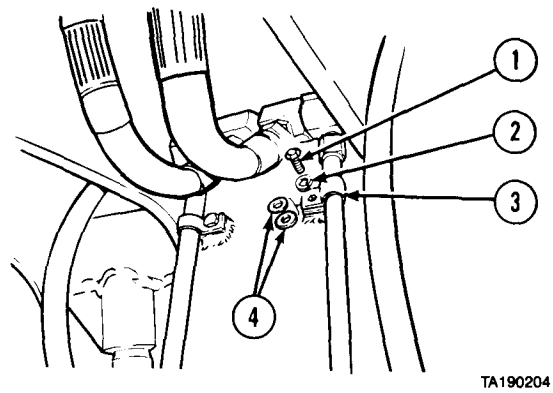
j. Type 3 Clamp and Bracket Installation. Install bracket (5) and clamp (4) on stud (6) with washer (3), lockwasher (2), and nut (l).



17-2. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (CONT).

k. Type 4 Clamp Removal. Remove screw (l), lockwasher (2), clamp (3), and two washers (4).

l. Type 4 Clamp Installation. Install two washers (4), clamp (3), and lockwasher (2) with screw (1).



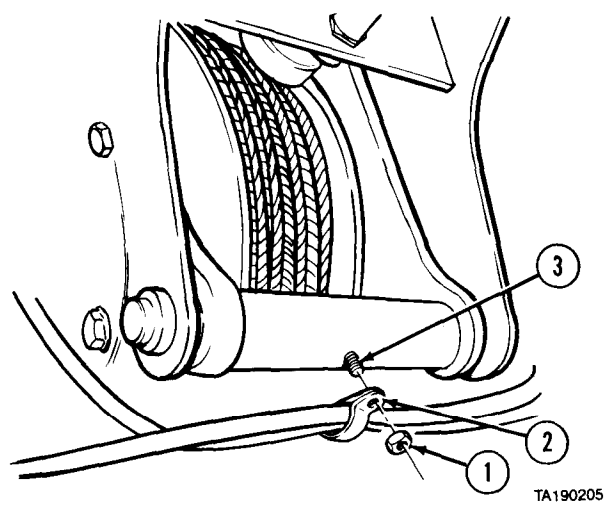
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NOTE

Do not remove screw. Screw holding clamp also holds hoist pivot pin in place.

m. Type 5 Clamp Removal. Remove nut (1) and clamp (2) from screw (3).

n. Type 5 Clamp Installation. Install clamp (2) on screw (3) with nut (1).



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o. Hydraulic Hose and Tube Removal/installation.

NOTE

- This part consists of Hydraulic Hose and Tube Indexes, Tables 17-1 through 17-10, and Figures 17-1 through 17-10, to help locate hydraulic hoses and tubes.
- Tag all hoses and components during removal.
- This paragraph does not cover outrigger hoses, tubes, and fittings. See paragraph 17-36 for outrigger leg and paragraphs 17-38 and 17-39 for outrigger extension cylinder and internal routing.

Table 17-1. Hoist Hoses and Tubes (Left Side)

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
A	Elbow (1)	17-1	Elbow (11)	17-2
B	Elbow (2)	17-1	Elbow (12)	17-2
C	Valve (3)	17-1	Tube End (4)	17-1
D	Valve (3)	17-1	Tube End (5)	17-1
E	Tube End (4)	17-1	Tube End (6)	17-1
F	Tube End (5)	17-1	Elbow (7)	17-1
G	Elbow (7)	17-1	Tube End 16)	17-2
H	Tube End (6)	17-1	Joint (8)	17-1
I	Joint (8)	17-1	Joint (9)	17-1
J	Joint (9)	17-1	Hose End 10)	17-1
K	Hose End (10)	17-1	Hoist Port A (57)	17-10

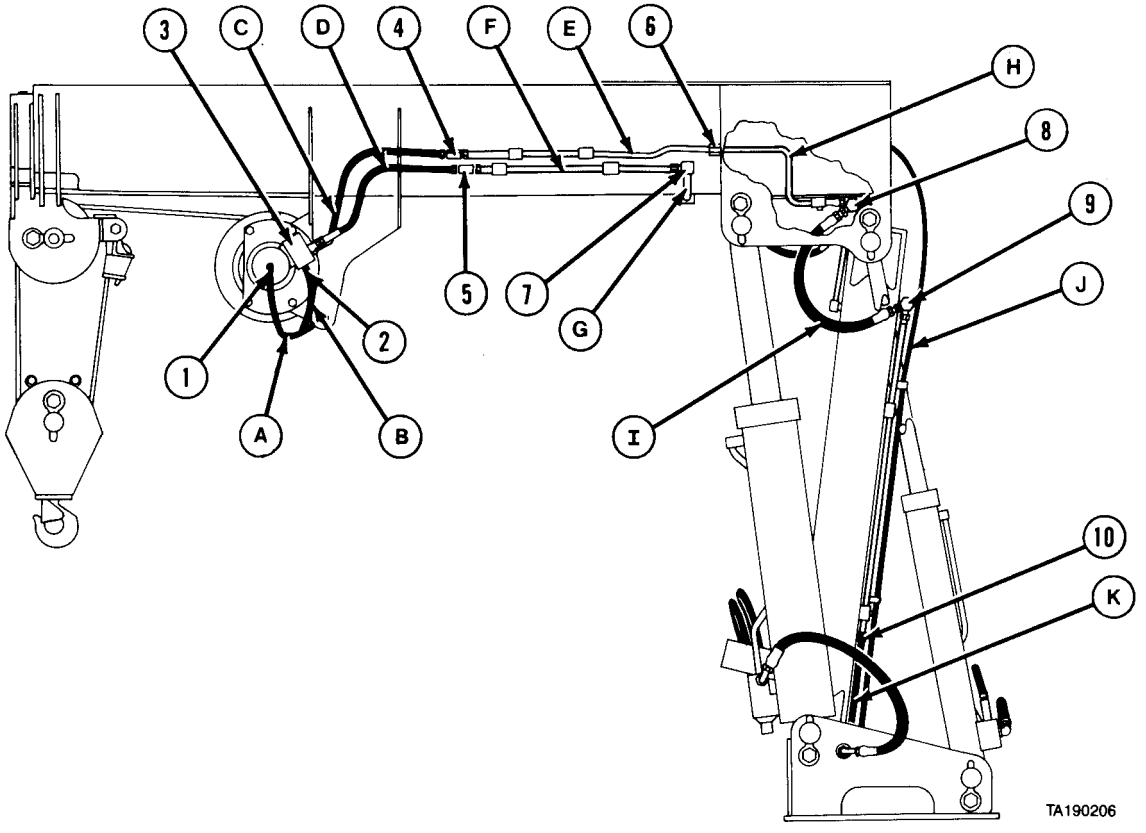


Figure 17-1. Hoist Hoses and Tubes (Left Side).

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

17-2. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (CONT).

Table 17-2. Hoist Hoses and Tubes (Right Side)

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
L	Valve (13)	17-2	Tube End (14)	17-2
M	Tube End (14)	17-2	Hose End (15)	17-2
N	Tube End (16)	17-2	Joint (17)	17-2
O	Joint (17)	17-2	Joint (18)	17-2
P	Joint (18)	17-2	Hose End (19)	17-2
Q	Hose End (19)	17-2	Hoist Port B (58)	17-10
R	Hose End (15)	17-2	Tee (48)	17-8

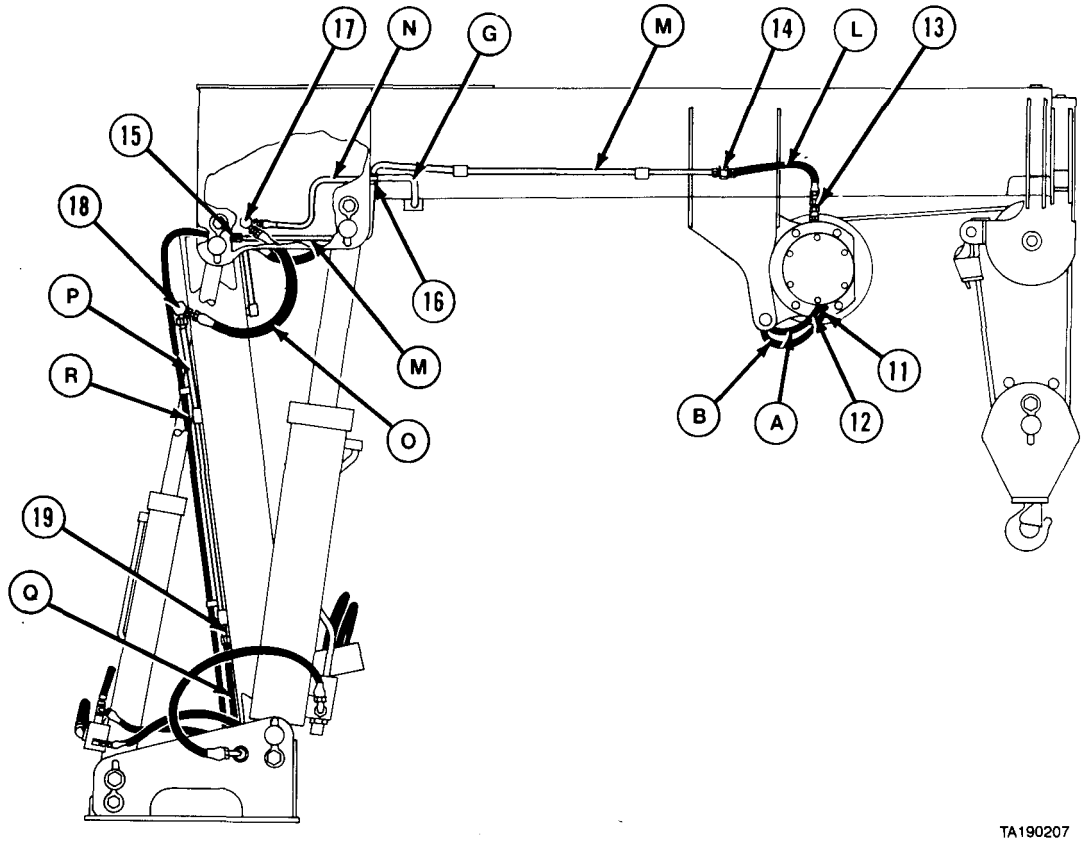


Figure 17-2. Hoist Hoses and Tubes (Right Side).

Table 17-3. Telescoping Cylinders, Hoses, and Tubes

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
S	Connector (20)	17-3	Joint (21)	17-3
T	Joint (21)	17-3	Joint (22)	17-3
U	Joint (22)	17-3	Elbow (23)	17-3
V	Hose End (24)	17-3	Telescoping Port B (64)	17-10
W	Hose End (25)	17-3	Telescoping Port A (63)	17-10

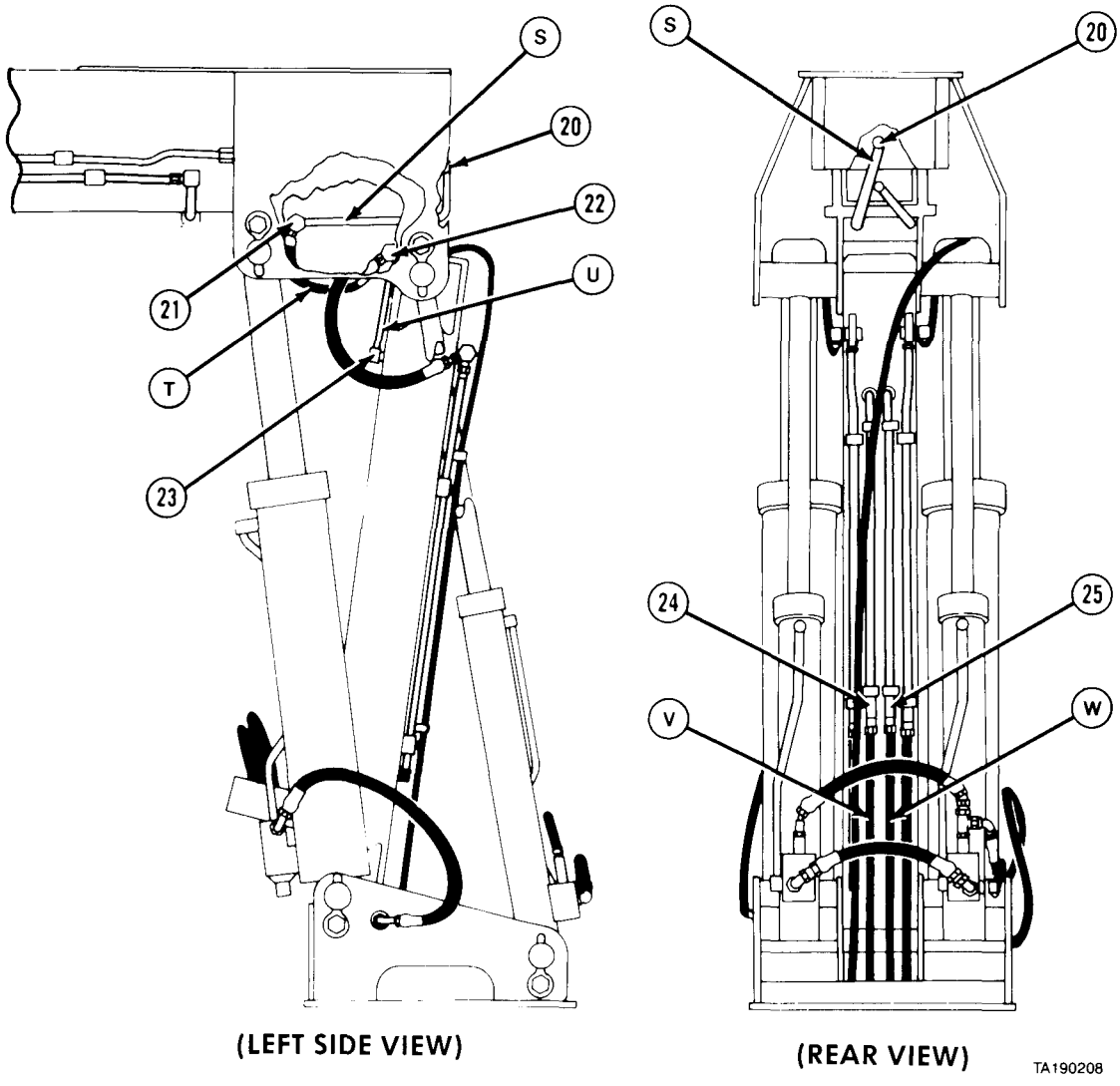


Figure 17-3. Telescoping Cylinders, Hoses, and Tubes.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

17-2. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (CONT).

Table 17-4. Telescoping Cylinders, Hoses, and Tubes

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
X	Connector (26)	17-4	Joint (27)	17-4
Y	Joint (27)	17-4	Joint (28)	17-4
Z	Joint (28)	17-4	Elbow (29)	17-4
AA	Elbow (23)	17-4	Hose End (24)	17-4
AB	Elbow (29)	17-4	Hose End (25)	17-4

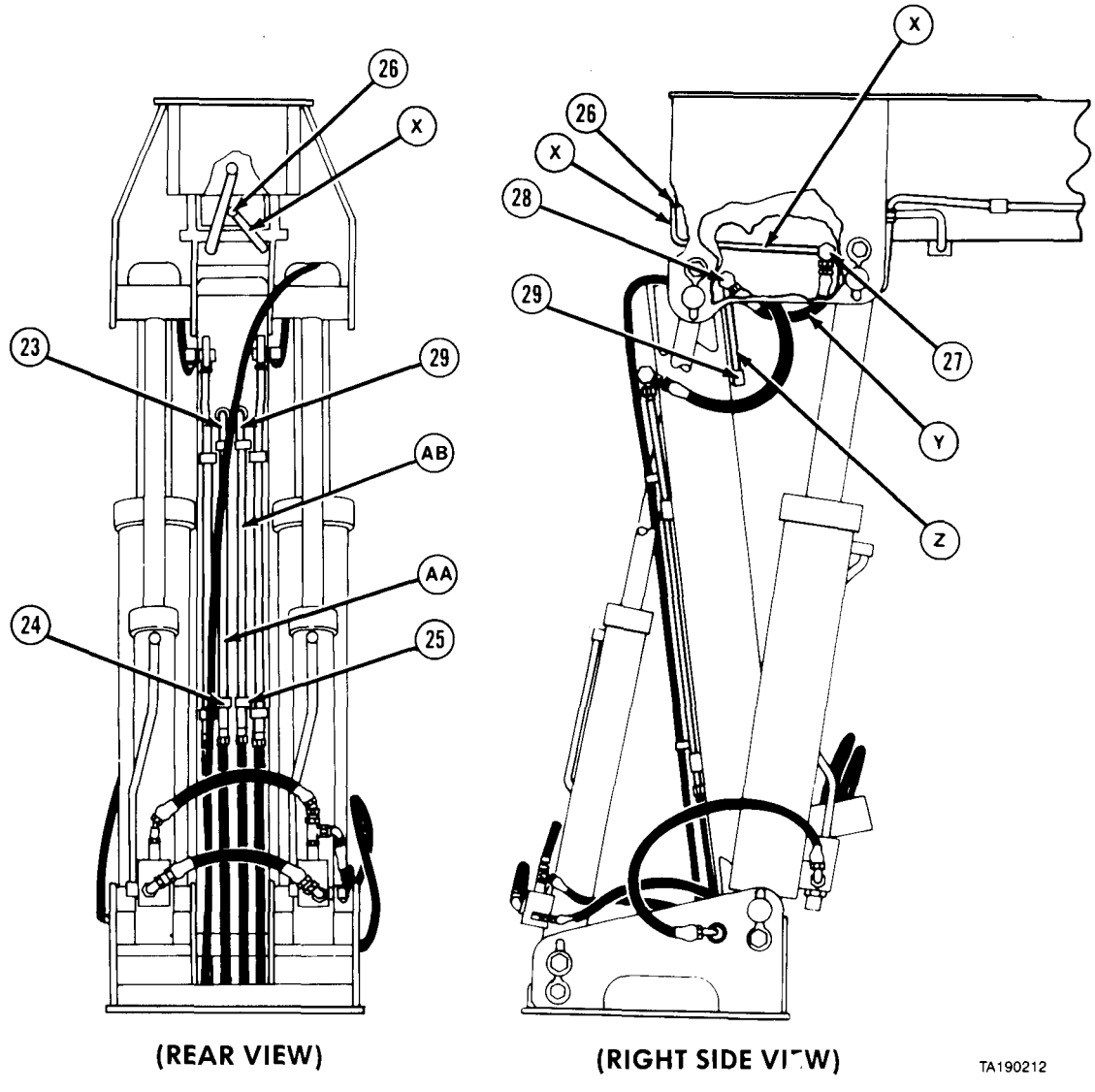


Figure 17-4. Telescoping Cylinders, Hoses, and Tubes.

Table 17-5. Boom Cylinders, Hoses, and Tubes

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
AC	Elbow (30)	17-5	Elbow (31)	17-5
AD	Connector (32)	17-5	Connector (33)	17-5
AE	Connector (34)	17-5	Connector (35)	17-5
AF	Connector (36)	17-5	Elbow (37)	17-5
AG	Elbow (37)	17-5	Boom Port A (59)	17-10

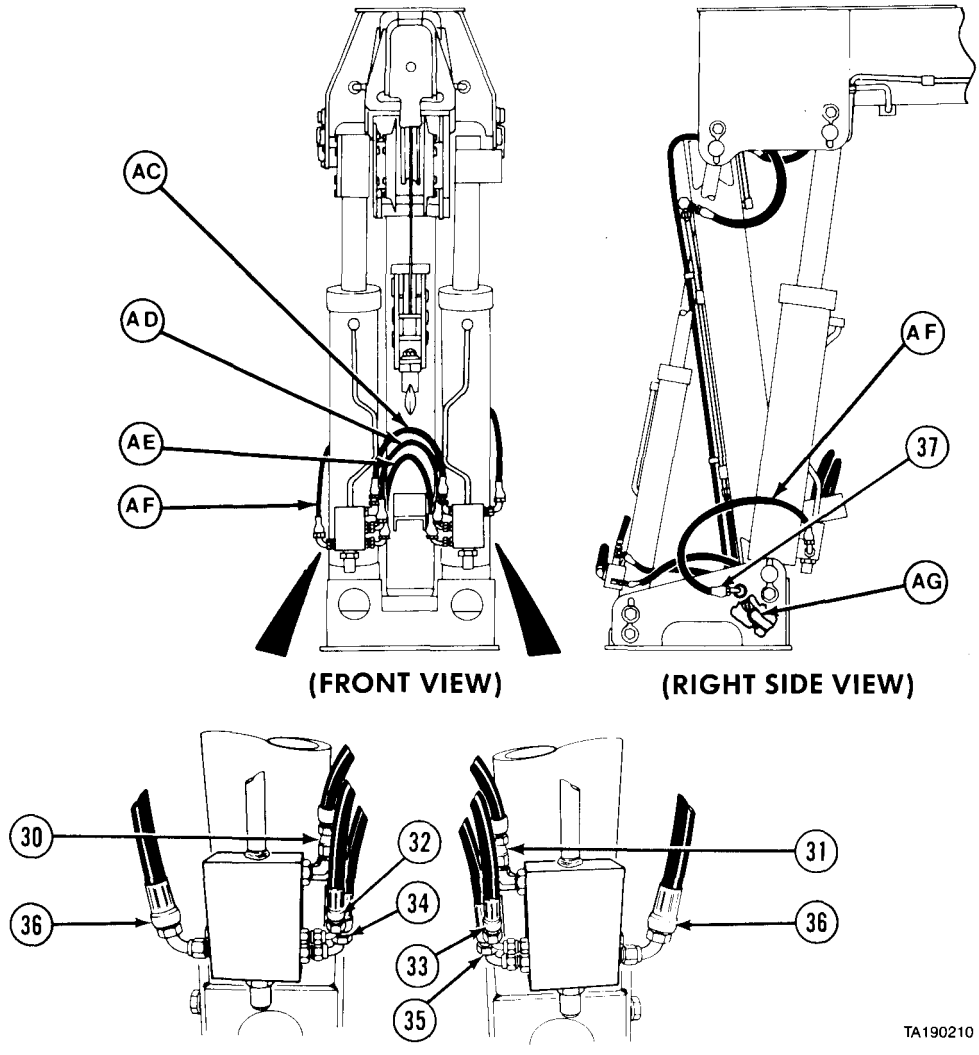


Figure 17-5. Boom Cylinders, Hoses, and Tubes.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

17-2. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (CONT).

Table 17-6. Boom Cylinders, Hoses, and Tubes

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
AH	Connector (38)	17-6	Elbow (39)	17-6
AI	Elbow (39)	17-6	Boom Port B (60)	17-10

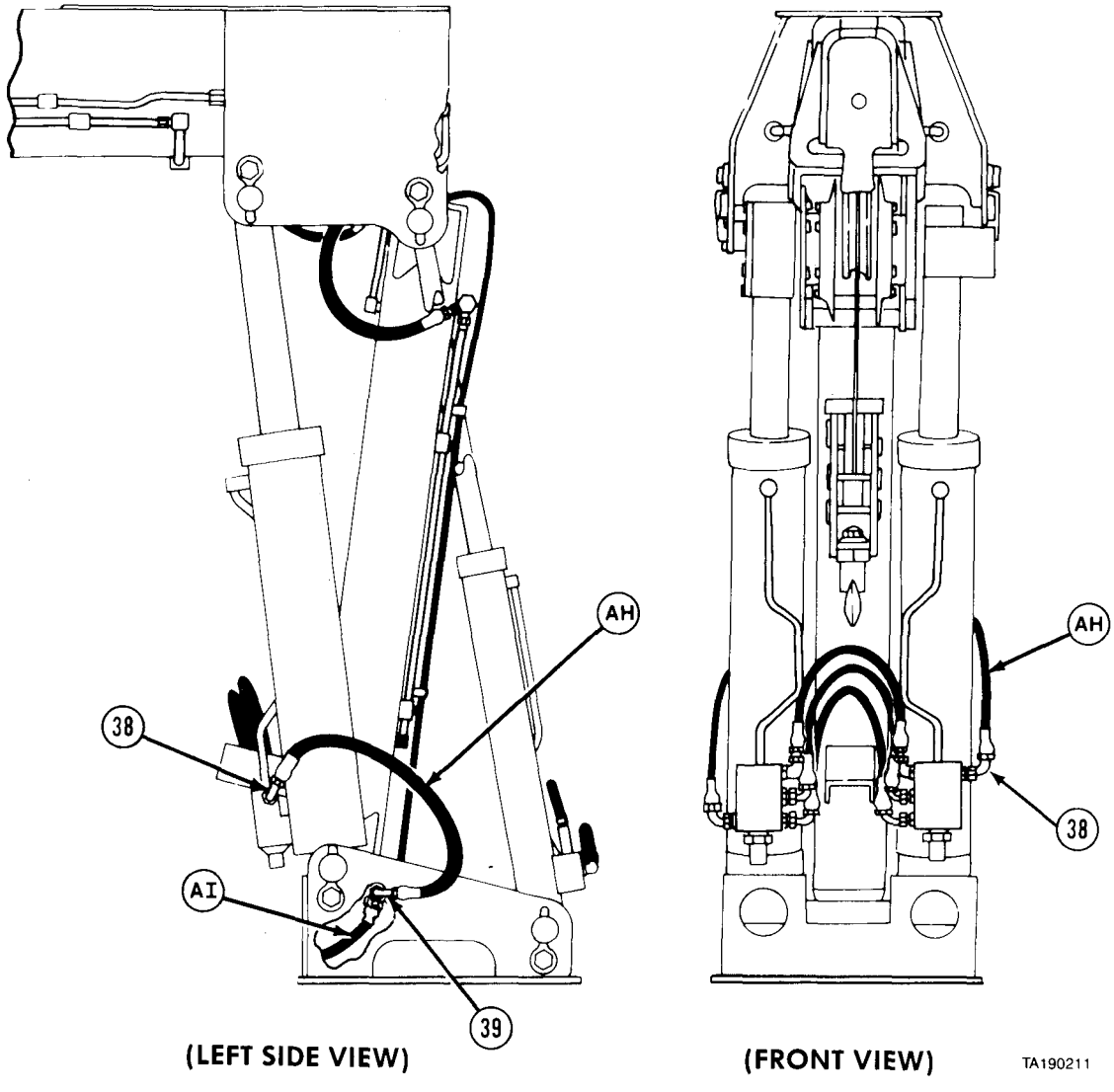


Figure 17-6. Boom Cylinders, Hoses, and Tubes.

Table 17-7. Mast Erection Cylinders, Hoses, and Tubes

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
AJ	Connector (40)	17-7	Reducer (41)	17-7
AK	Elbow (42)	17-7	Elbow (43)	17-7
AL	Tee (44)	17-7	Mast Port A (67)	17-10
AM	Elbow (45)	17-7	Mast Port B (68)	17-10

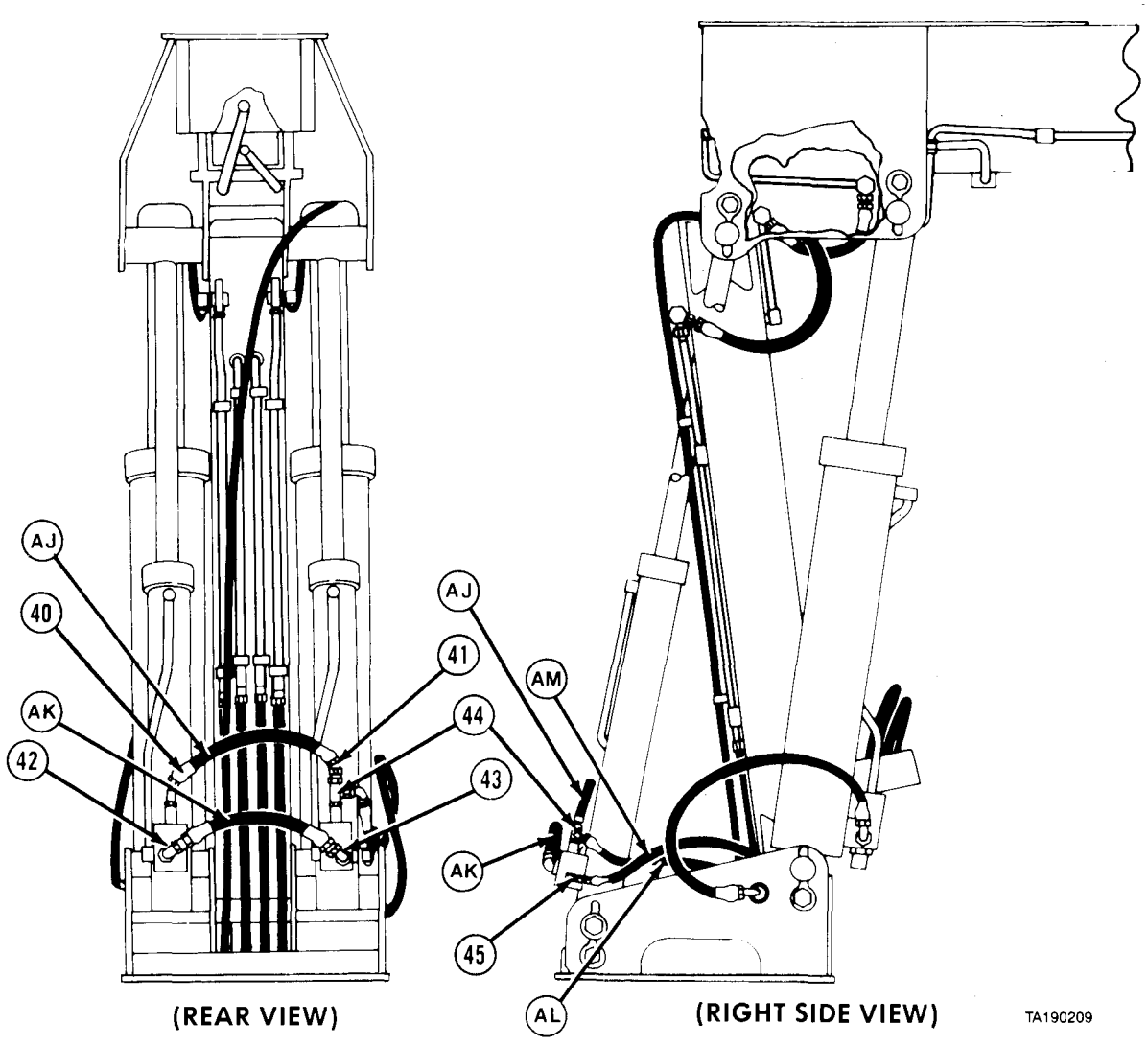


Figure 17-7. Mast Erection Cylinders, Hoses, and Tubes.

17-2. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (CONT).

Table 17-8. Swing Drive Hoses and Tubes

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
AN	Elbow (46)	17-8	Elbow (47)	17-8
R	Tee (48)	17-8	Hose End (15)	17-2
AO	Tee (48)	17-8	Connector (50)	17-9
AP	Swing Drive Brake Valve (49)	17-8	Swing Port B (66)	17-10
AQ	Swing Drive Brake Valve (49)	17-8	Swing Port A (65)	17-10

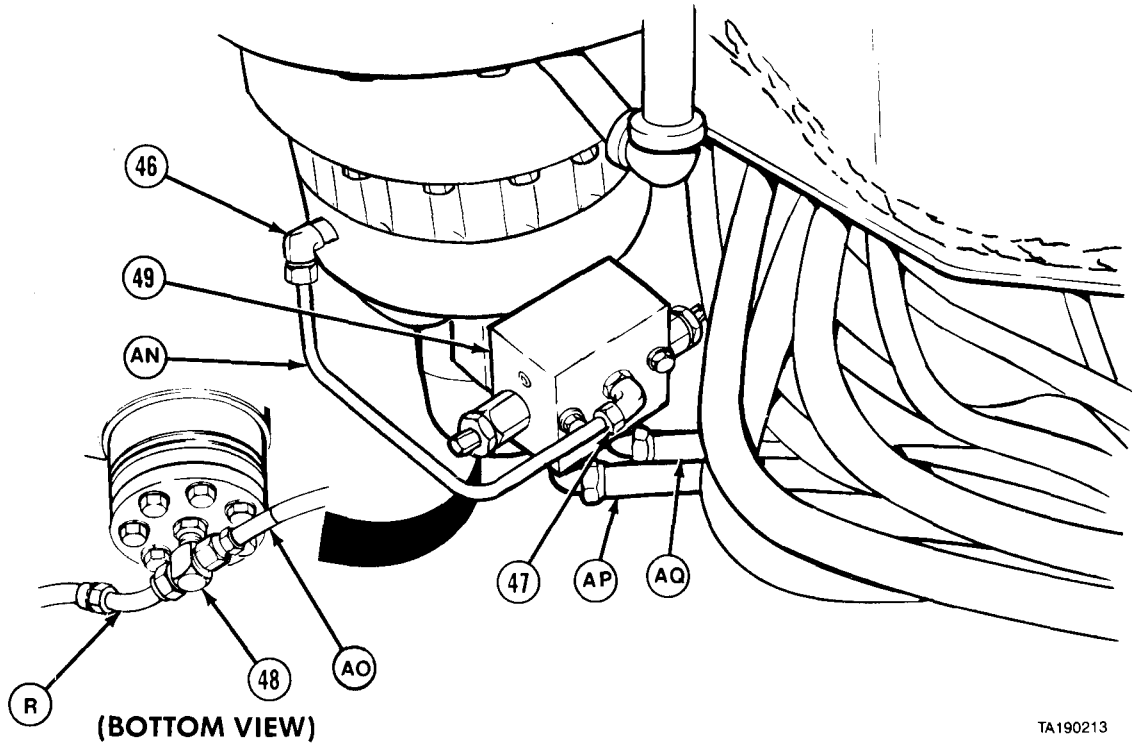


Figure 17-8. Swing Drive Hoses and Tubes.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

Table 17-9. Main Hydraulic Hoses and Tubes

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
AO	Connector (50)	17-9	Tee (48)	17-8
AR	Fitting (51)	17-9	Solenoid (52)	17-9
AS	Quick Coupling (53)	17-9	Tank Port T (61)	17-10
AT	Tee (54)	17-9	Solenoid (52)	17-9
AU	Tee (54)	17-9	Pressure Port P (62)	17-10
AV	Accumulator (55)	17-9	Tee (56)	17-9

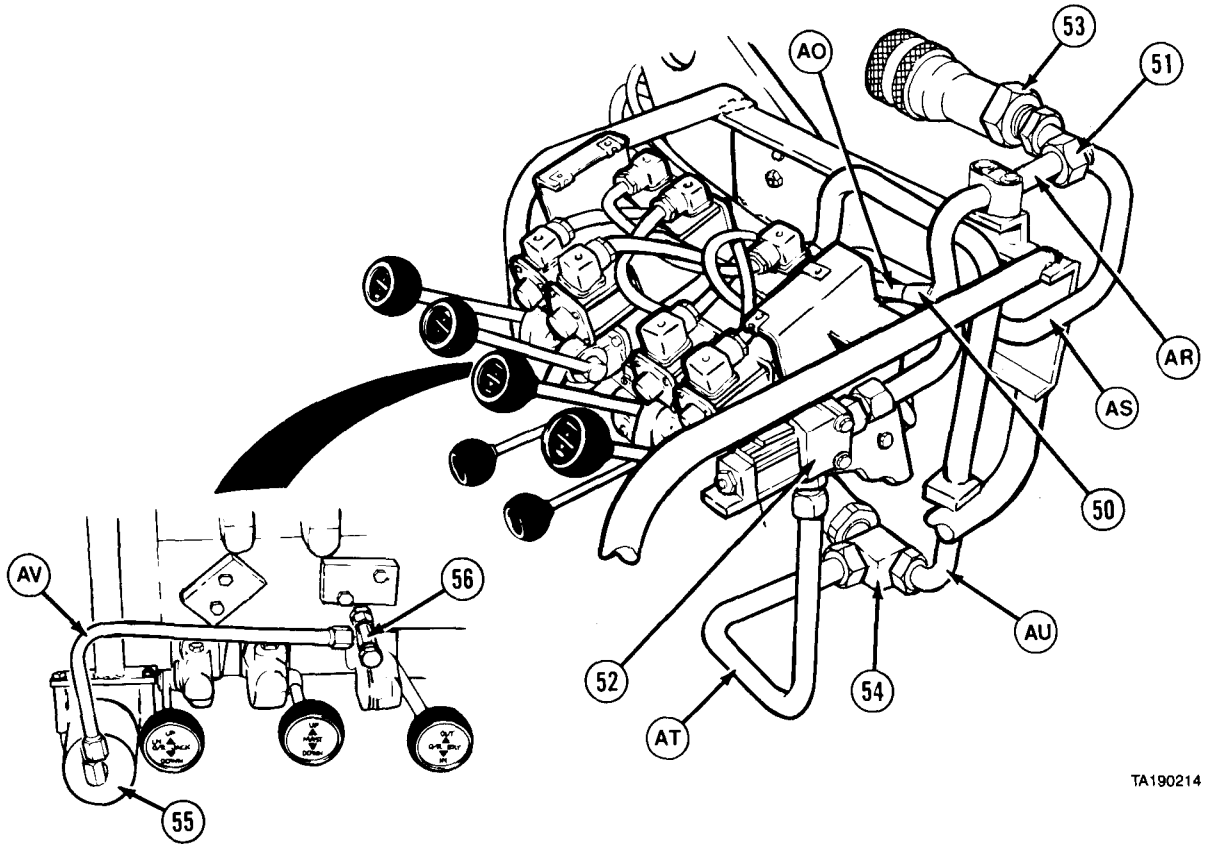
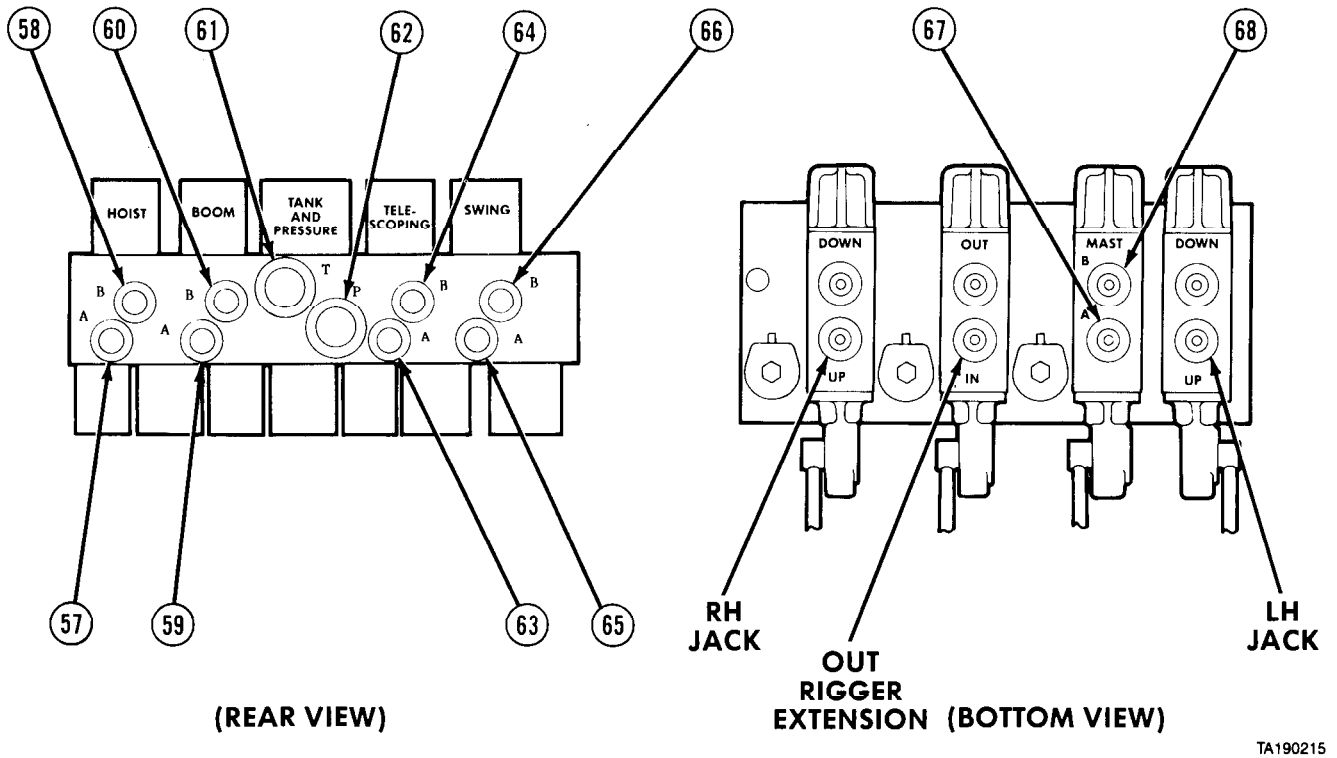


Figure 17-9. Main Hydraulic Hoses and Tubes.

17-2. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (CONT).

Table 17-10. Main Control Valve

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
J	Hoist Port A (57)	17-10	Hose End (10)	17-1
Q	Hoist Port B (58)	17-10	Hose End (19)	17-2
AG	Boom Port A (59)	17-10	Fitting (37)	17-5
AI	Boom Port B (60)	17-10	Fitting (39)	17-6
AS	Tank Port T (61)	17-10	Quick Coupling (53)	17-9
AU	Pressure Port P (62)	17-10	Tee (54)	17-9
W	Telescoping Port A (63)	17-10	Hose End (25)	17-3
V	Telescoping Port B (64)	17-10	Hose End (24)	17-3
AQ	Swing Port A (65)	17-10	Swing Drive Brake Valve (49)	17-8
AP	Swing Port B (66)	17-10	Swing Drive Brake Valve (49)	17-8
AL	Mast Port A (67)	17-10	Tee (44)	17-7
AM	Mast Port B (68)	17-10	Elbow (45)	17-7



NOTE

Hoses and tubes not shown for clarity.

Figure 17-10. Main Control Valve.

Table 17-11. Overload Solenoid (M977 Only)

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
AW	Solenoid Fitting (69)	17-11	Boom Port (60)	17-10
AX	Solenoid Fitting (70)	17-11	Lift Cylinder Fitting (71)	17-11

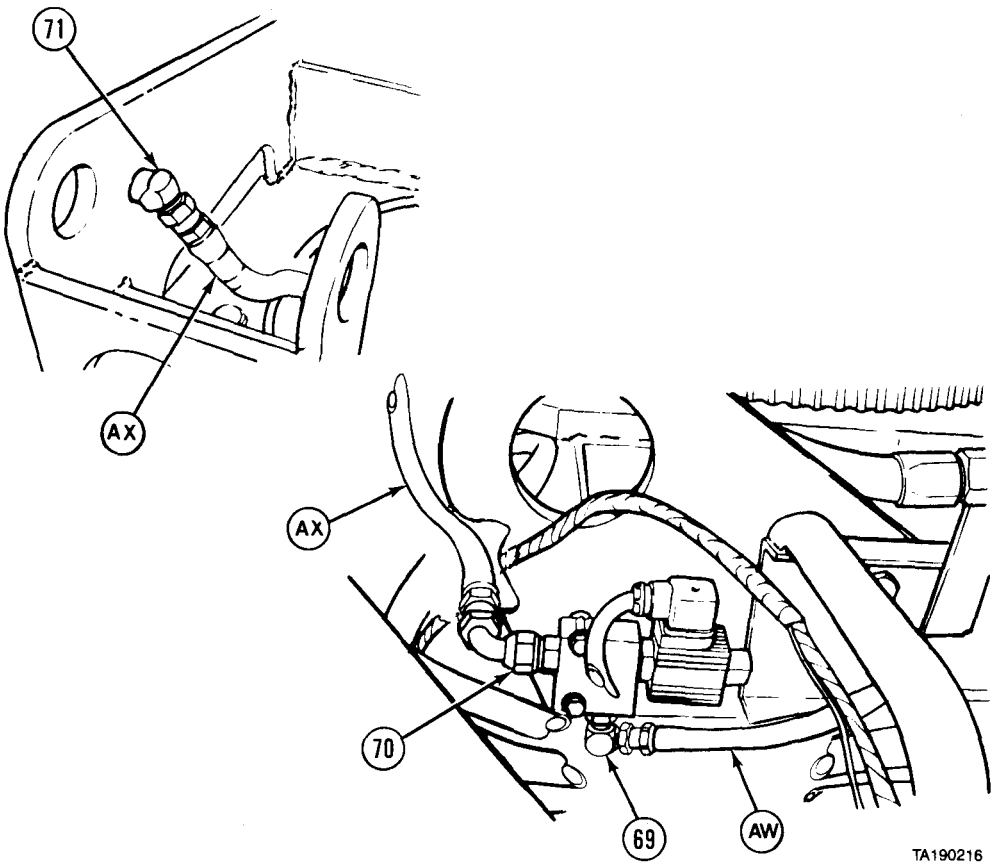


Figure 17-11. Overload Solenoid (M977 Only).

p. Follow-on Maintenance. Remove lifting device and return crane to transport position (TM 9-2320-279-10).

END OF TASK

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Disconnect Hydraulic Hoses and Tubes
b. Connect Hydraulic Hoses and Tubes
c. Type 1 Clamp Removal
d. Type 1 Clamp Installation
e. Type 2 Clamp Removal
f. Type 2 Clamp Installation
g. Type 3 Clamp and Bracket Removal
h. Type 3 Clamp and Bracket Installation
i. Type 4 Clamp Removal
j. Type 4 Clamp Installation
k. Hydraulic Hose and Tube Removal/Installation
l. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Crane in operating position and supported by suitable lifting device.
TM 9-2320-279-10	Shut off engine.

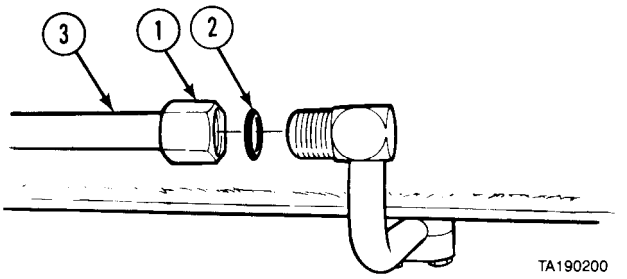
Special Environmental Conditions
None

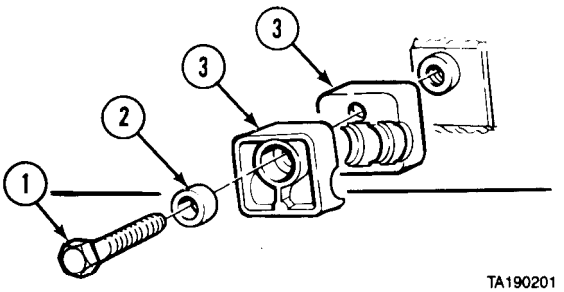
General Safety Instructions
None

Level of Maintenance
Direct Support

NOTE

- Subparagraphs a through i show all typical connections and clamps used on the M984E1 crane.
- This procedure is for reference only to show location of hoses, tubes, and fittings used on the M984E1 crane. It will never be necessary to remove all hydraulic hoses at one time. Individual procedures will indicate the area where hoses are to be removed and installed.
- Some hoses and tubes will not have preformed packings.





a. Disconnect Hydraulic Hoses and Tubes. Loosen fitting (1). Remove preformed packing (2) and hose (3).

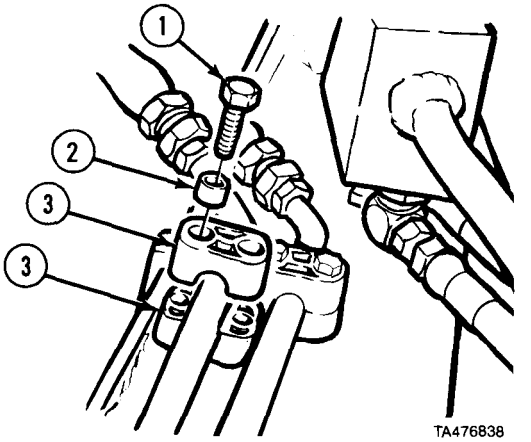
b. Connect Hydraulic Hoses and Tubes. Connect fitting (1) with preformed packing (2) and tighten.

c. Type 1 Clamp Removal. Remove screw (1), spacer (2), and clamps (3).

d. Type 1 Clamp Installation. Install clamps (3) and spacer (2) with screw (1).

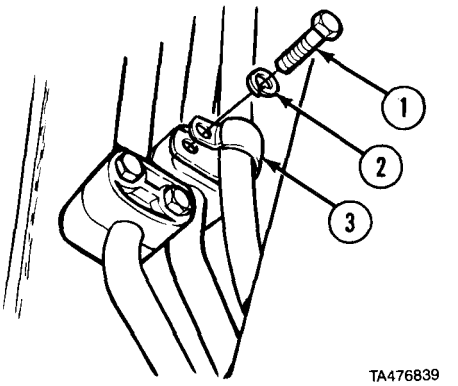
e. Type 2 Clamp Removal. Remove two screws (1), spacers (2), and clamps (3).

f. Type 2 Clamp Installation. Install clamps (3) and spacers (2) with two screws (1).



g. Type 3 Clamp Removal. Remove screw (1), lockwasher (2), and clamp (3).

h. Type 3 Clamp Installation. Install clamp (3) and lockwasher (2) with screw (1).

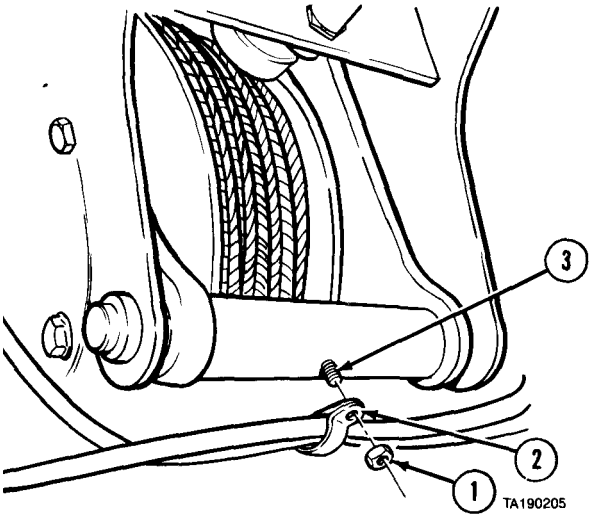


NOTE

Do not remove screw. Screw holding clamp also holds hoist pivot pin in place.

i. Type 4 Clamp Removal. Remove nut (1) and clamp (2) from screw (3).

j. Type 4 Clamp Installation. Install clamp (2) on screw (3) with nut (1).



17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1)

k. Hydraulic Hose and Tube Removal/installation.

NOTE

- This part consists of Hydraulic Hose and Tube Indexes, Tables 17-12 through 17-25, and Figures 17-12 through 17-25, to help locate hydraulic hoses and tubes.
- Tag all hoses and components during removal.
- This paragraph does not cover outrigger hoses, tubes, and fittings. See paragraphs 17-37 and 17-38 for outrigger leg and outrigger extension cylinder and internal routing.

Table 17-12. Hoist Hoses and Tubes (Left Side)

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
A	Elbow (1)	17-12	Elbow (15)	17-13
B	Elbow (2)	17-12	Elbow (16)	17-13
C	Valve (3)	17-12	Tube End (4)	17-12
D	Valve (3)	17-12	Tube End (5)	17-12
E	Tube End (4)	17-12	Tube End (6)	17-12
F	Tube End (5)	17-12	Elbow (7)	17-12
G	Elbow (7)	17-12	Tube End (20)	17-13
H	Tube End (6)	17-12	Joint (8)	17-12
I	Joint (8)	17-12	Joint (9)	17-12
J	Joint (9)	17-12	Hose End (10)	17-12
K	Hose End (10)	17-12	Hoist Port (65)	17-20
L	Fitting (11)	17-12	Joint (12)	17-12
M	Joint (12)	17-12	Joint (13)	17-12
N	Joint (13)	17-12	Hose End (14)	17-12
O	Hose End (14)	17-12	Telescope Port (64)	17-20

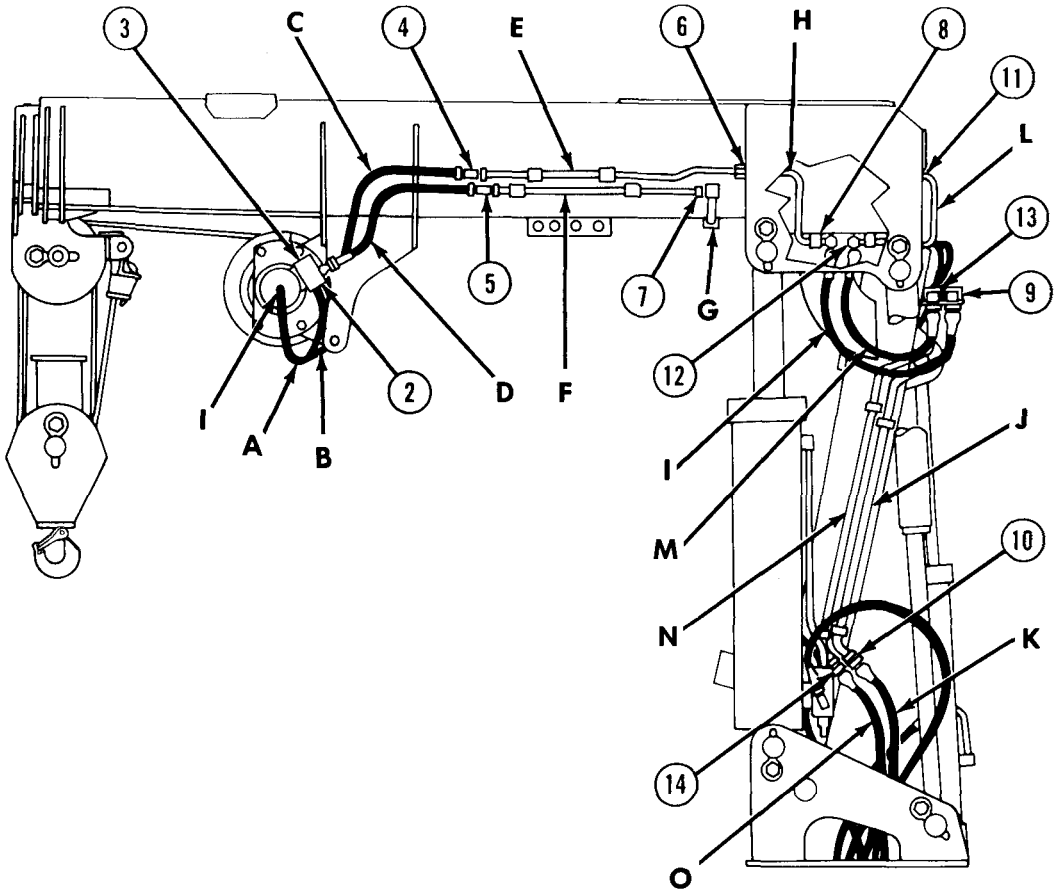


Figure 17-12. Hoist Hoses and Tubes (Left Side).

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1) (CONT).

Table 17-13. Hoist Hoses and Tubes (Right Side)

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
P	Valve (17)	17-13	Tube End (18)	17-13
Q	Tube End (18)	17-13	Hose End (19)	17-13
R	Hose End (19)	17-13	Tee (39)	17-15
S	Tube End (20)	17-13	Joint (21)	17-13
T	Joint (21)	17-13	Joint (22)	17-13
U	Joint (22)	17-13	Hose End (23)	17-13
V	Hose End (23)	17-13	Solenoid (49)	17-18
W	Fitting (24)	17-13	Joint (25)	17-13
X	Joint (25)	17-13	Joint (26)	17-13
Y	Joint (26)	17-13	Hose End (27)	17-13
Z	Hose End (27)	17-13	Solenoid (51)	17-18

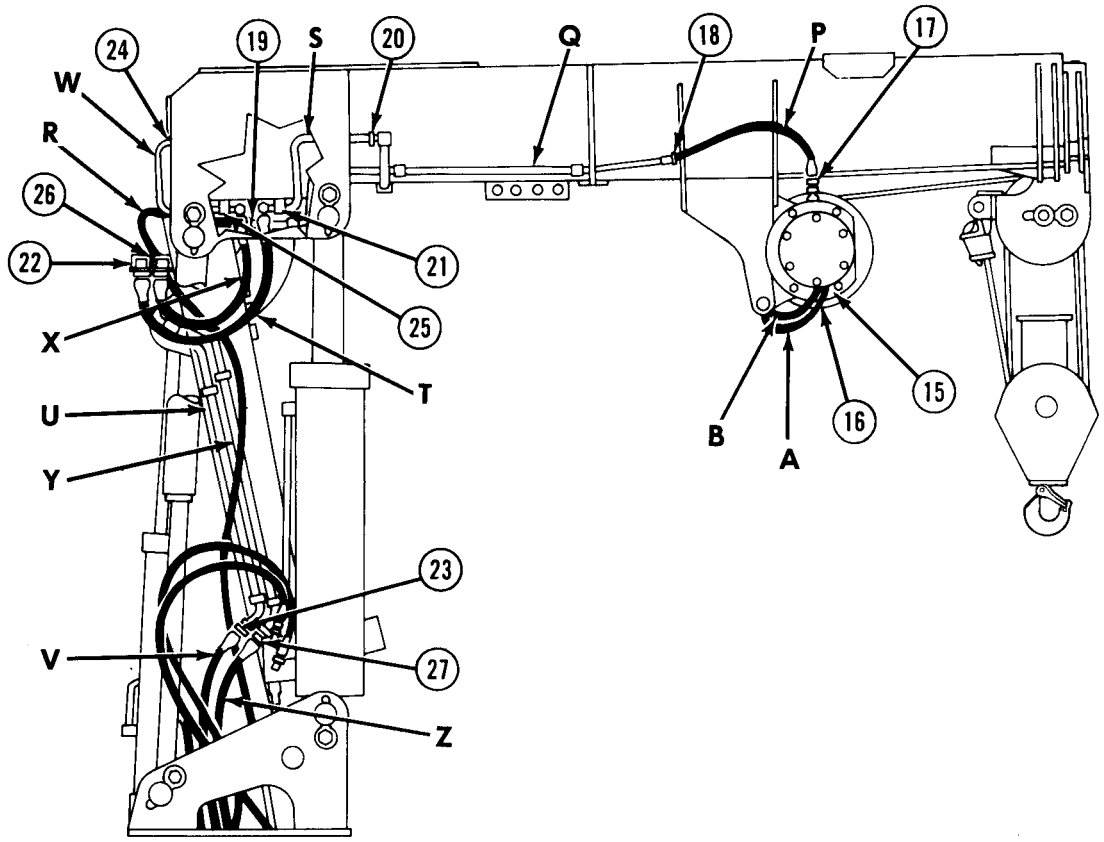


Figure 17-13. Hoist Hoses and Tubes (Right Side)

Table 17-14. Lift Cylinder

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
AA	Elbow (28)	17-14	Elbow (29)	17-14
BB	Elbow (30)	17-14	Elbow (31)	17-14
CC	Elbow (32)	17-14	Elbow (33)	17-14
DD	Elbow (34)	17-14	Solenoid (52)	17-18
EE	Elbow (35)	17-14	Solenoid (49)	17-18
FF	Elbow (36)	17-14	Valve Fitting (47)	17-17
GG	Valve (37)	17-14	Mast Port (69)	17-21
HH	Elbow (38)	17-14	Mast Port (68)	17-21

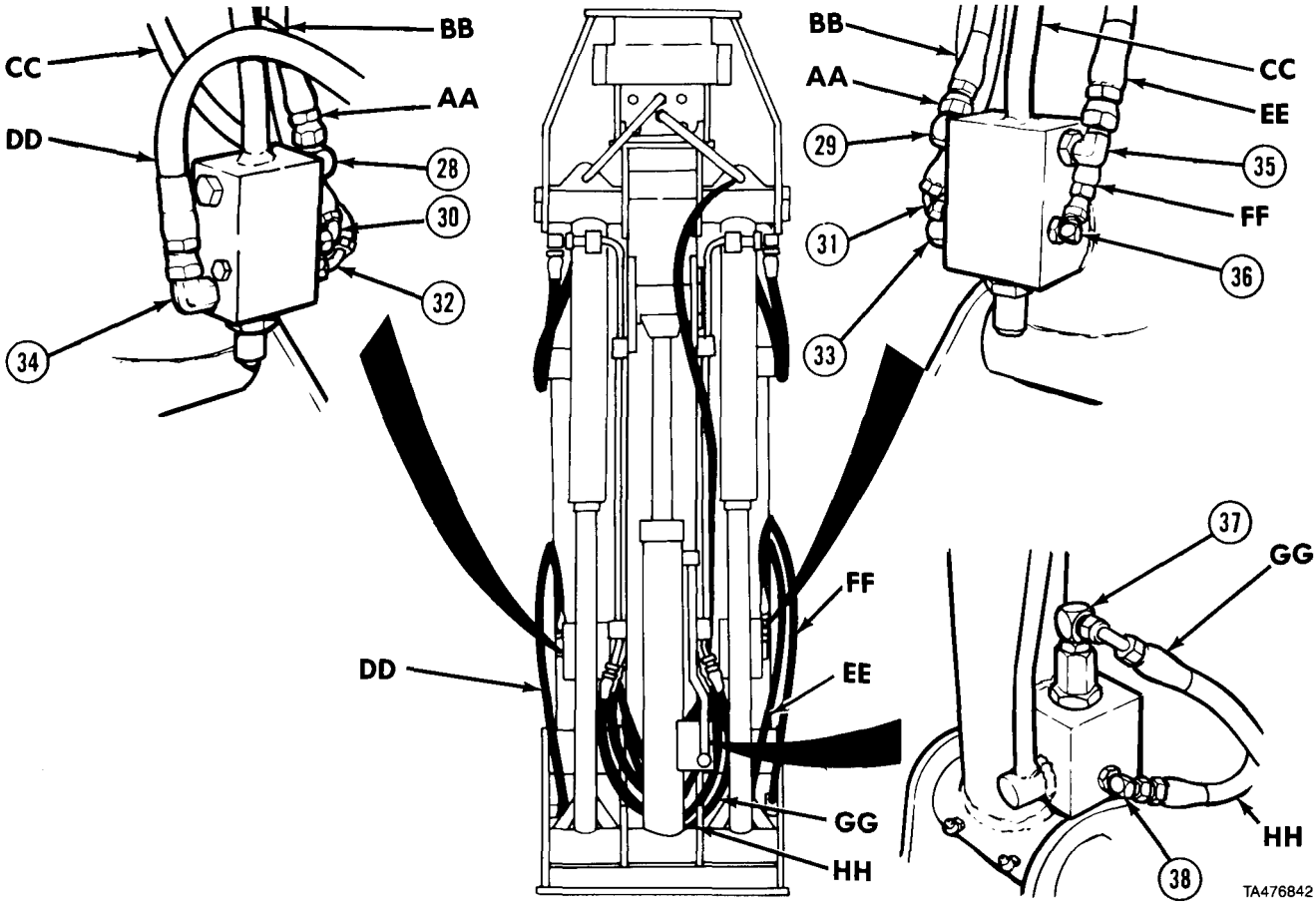


Figure 17-14. Lift Cylinder.

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1) (CONT).

Table 17-15. Swing Drive

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
II	Elbow (40)	17-15	Elbow (41)	17-15
JJ	Fitting (42)	17-15	Swing Port (62)	17-20
KK	Fitting (43)	17-15	Swing Port (63)	17-20
LL	Tee (39)	17-15	Return Line (TT)	17-16

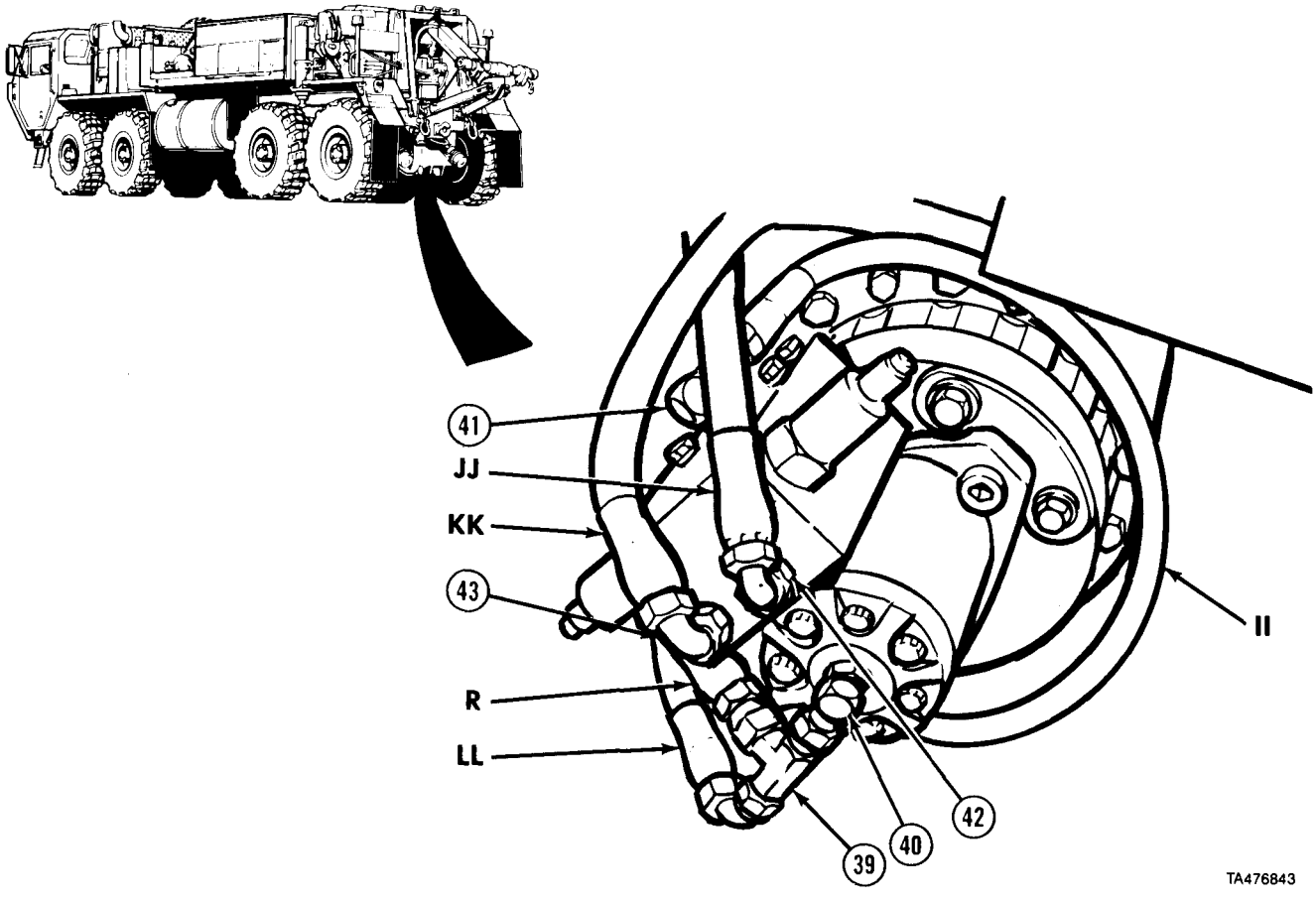


Figure 17-15. Swing Drive.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

Table 17-16. Main Lines

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
MM	Truck Return (44)	17-16	R.H.F. Valve Port (56)	17-20
NN	Truck Supply (45)	17-16	R.H.F. Valve Port (55)	17-20
OO	Main Line MM	17-16	Override Solenoid (48)	17-17
PP	Main Line NN	17-16	Override Solenoid (48)	17-17
QQ	Line OO	17-16	R.H.R. Valve Port (78)	17-22
RR	Line PP	17-16	R.H.R. Valve Port (77)	17-22
SS	Main Line MM	17-16	Lift Cylinder Check Valve Fitting (46)	17-17
TT	Main Line MM	17-16	Swing Drive Tee (39)	17-15
UU	Main Line MM	17-16	L.H. Valve Port	17-24
VV	Main Line NN	17-16	L.H. Valve Port	17-23

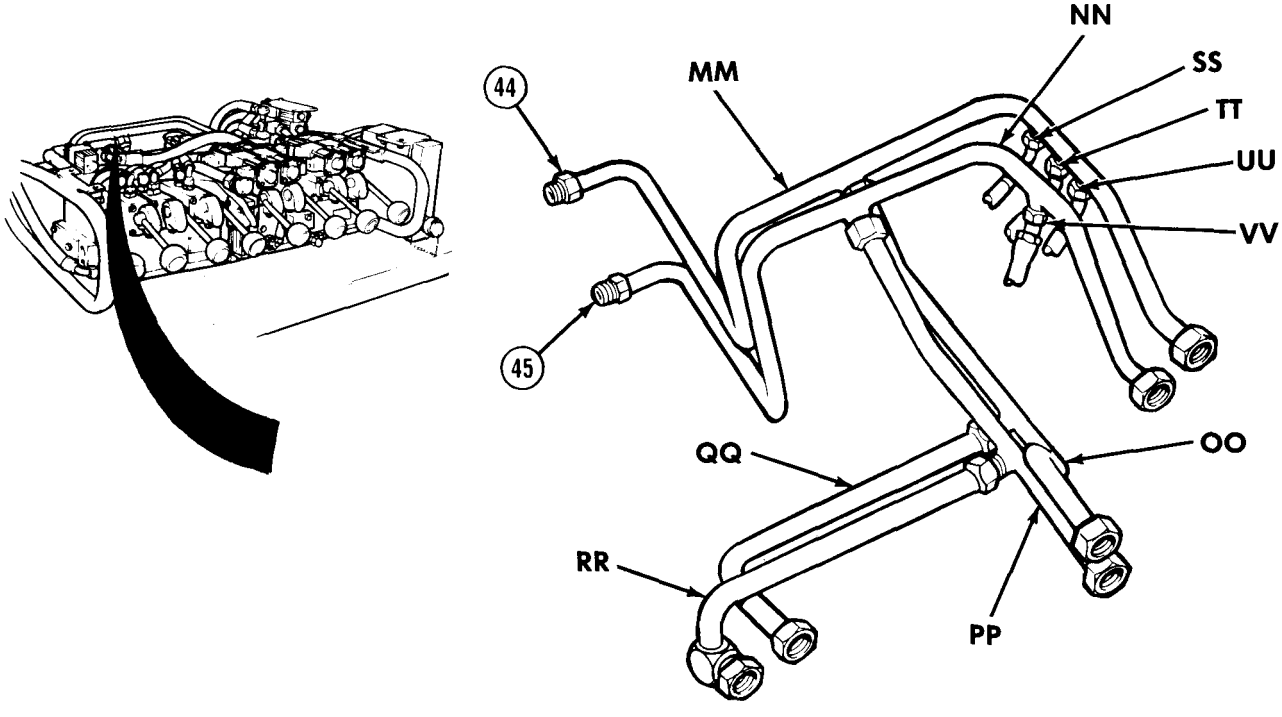


Figure 17-16. Main Lines.

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1)

Table 17-17. Shutdown Valves

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
FF	Valve Fitting (47)	17-17	Elbow (36)	17-14
SS	Valve Fitting (46)	17-17	Main Line MM	17-16
00	Valve (48)	17-17	Main Line MM	17-16
PP	Valve (48)	17-17	Main Line NN	17-16

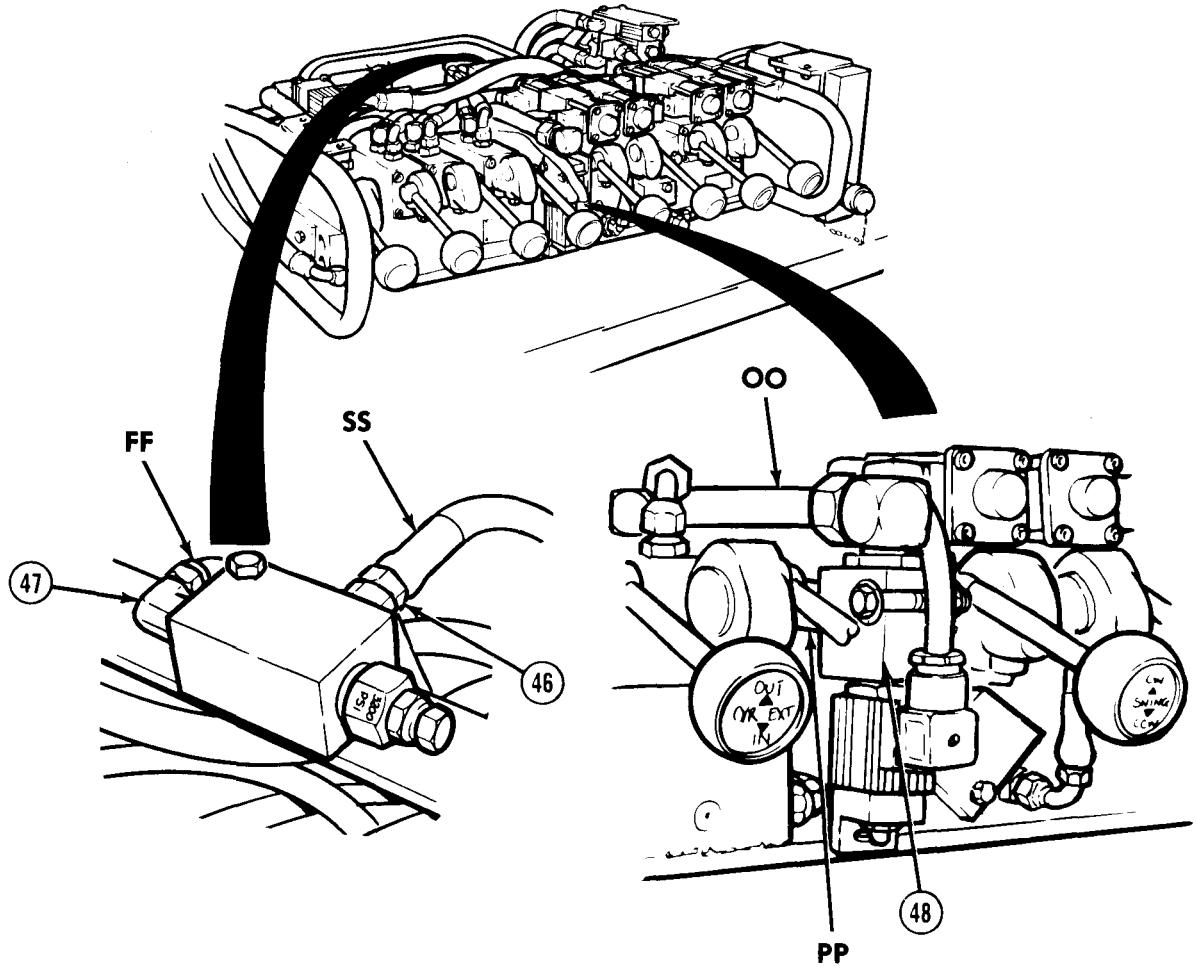


Figure 17-17. Shutdown Valves.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

Table 17-18. Shutdown Valves

NOTE

Fittings on solenoids are on back side.

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
QQ	Solenoid (49)	17-18	R.H.F. Valve Port (57)	17-20
RR	Solenoid (50)	17-18	R.H.F. Valve Port (58)	17-20
SS	Solenoid (51)	17-18	R.H.F. Valve Port (59)	17-20
EE	Solenoid (49)	17-18	Elbow (35)	17-14
V	Solenoid (50)	17-18	Hose End (23)	17-13
Z	Solenoid (51)	17-18	Hose End (27)	17-13
DD	Solenoid (52)	17-18	Elbow (34)	17-14
TT	Solenoid (52)	17-18	R.H.F. Valve Port (60)	17-20

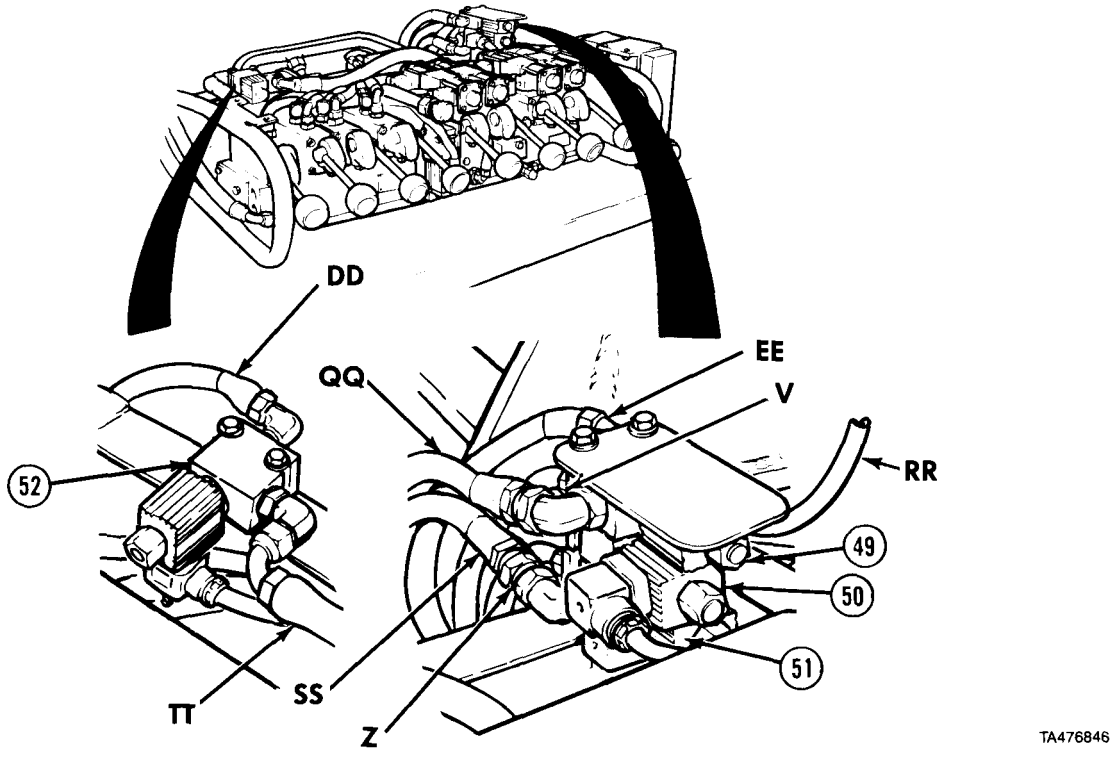


Figure 17-18. Shutdown Valves.

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1)

Table 17-19. Accumulator

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
UU	Tee Fitting (53)	17-19	Accumulator (54)	17-19

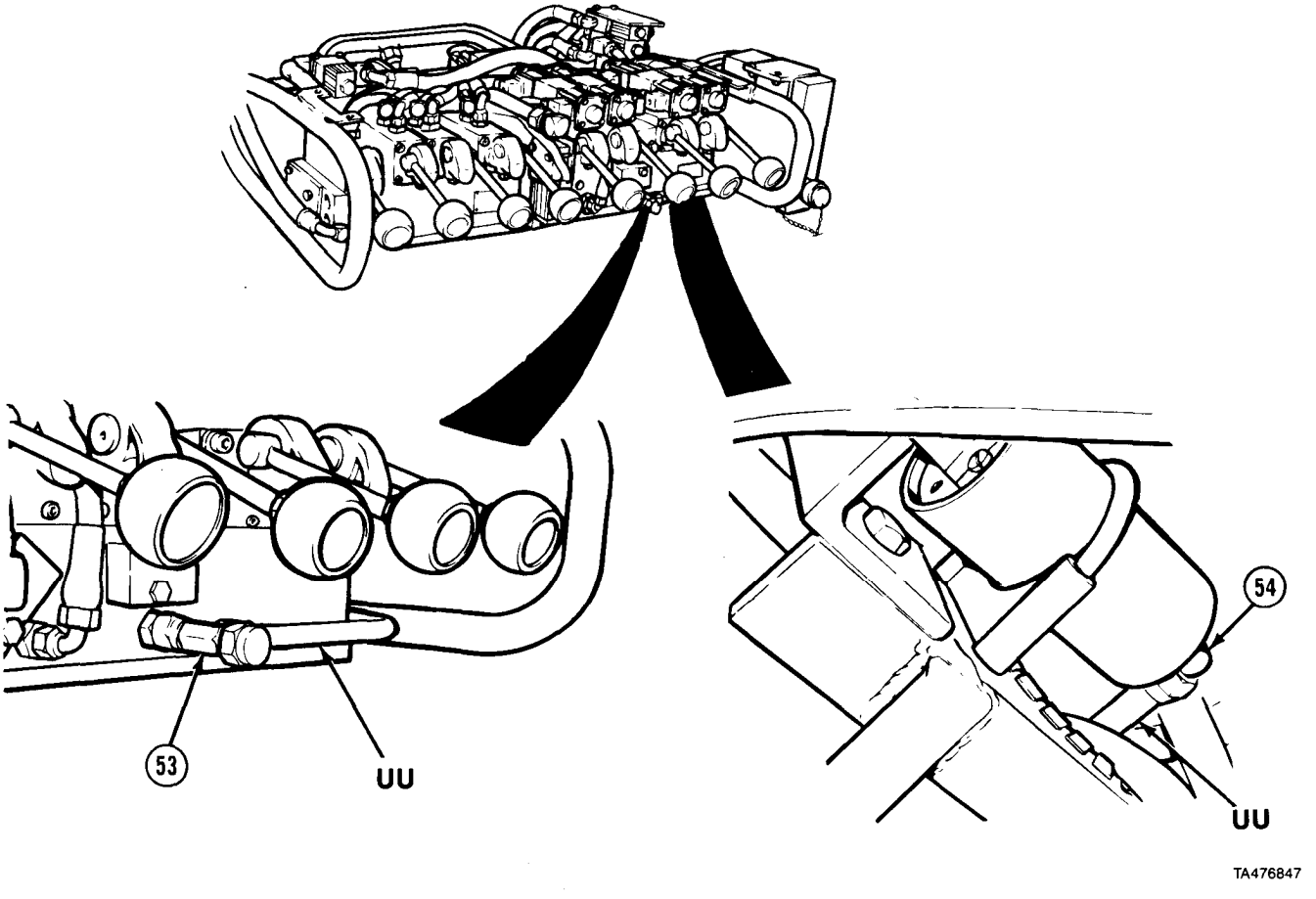


Figure 17-19. Accumulator.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

Table 17-20. Control Valve

Hose Or Tube	From		10	
	Component	Figure	Component	Figure
MM	Port (56)	17-20	Truck Return (44)	17-16
NN	Port (55)	17-20	Truck Supply (45)	17-16
QQ	Port (57)	17-20	Solenoid (49)	17-18
RR	Port (58)	17-20	Solenoid (50)	17-18
SS	Port (59)	17-20	Solenoid (51)	17-18
TT	Port (60)	17-20	Solenoid (52)	17-18
VV	Port (61)	17-20	R.H.R. Port (75)	17-22
JJ	Port (62)	17-20	Fitting (42)	17-15
KK	Port (63)	17-20	Fitting (43)	17-15
O	Port (64)	17-20	Hose End (14)	17-12
K	Port (65)	17-20	Hose End (10)	17-12

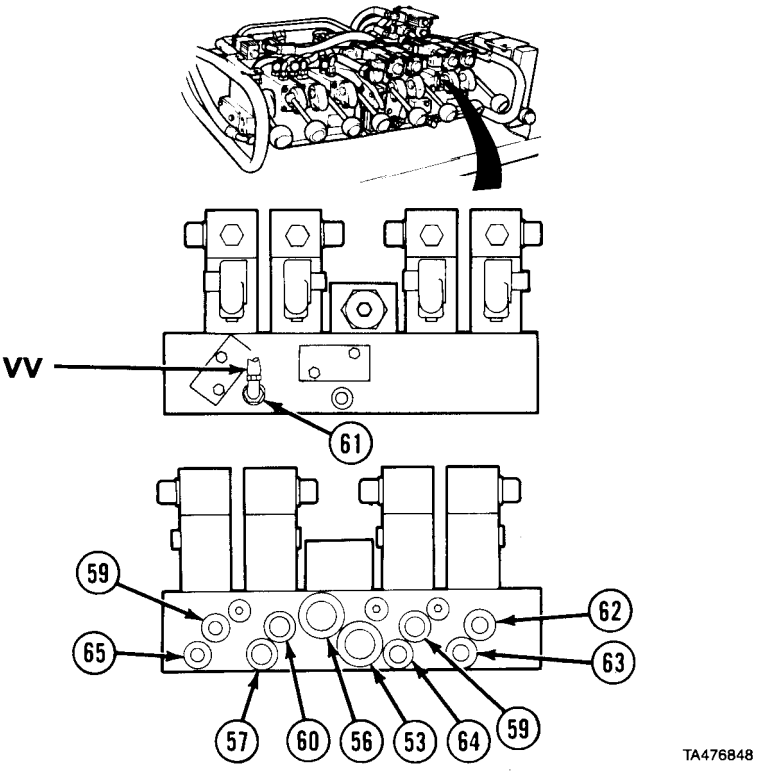


Figure 17-20. Control Valve.

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1)

Table 17-21. Control Valve

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
WW	Port (66)	17-21	Manifold (87)	17-24
XX	Port (67)	17-21	Manifold (88)	17-24
HH	Port (68)	17-21	Elbow (38)	17-14
GG	Port (69)	17-21	Valve (37)	17-14
YY	Port (70)	17-21	Valve (91)	17-25
ZZ	Port (71)	17-21	Valve (92)	17-25
AAA	Port (72)	17-21	Manifold (89)	17-24
BBB	Port (73)	17-21	Manifold (90)	17-24
CCC	Port (74)	17-21	To Retrieval System	

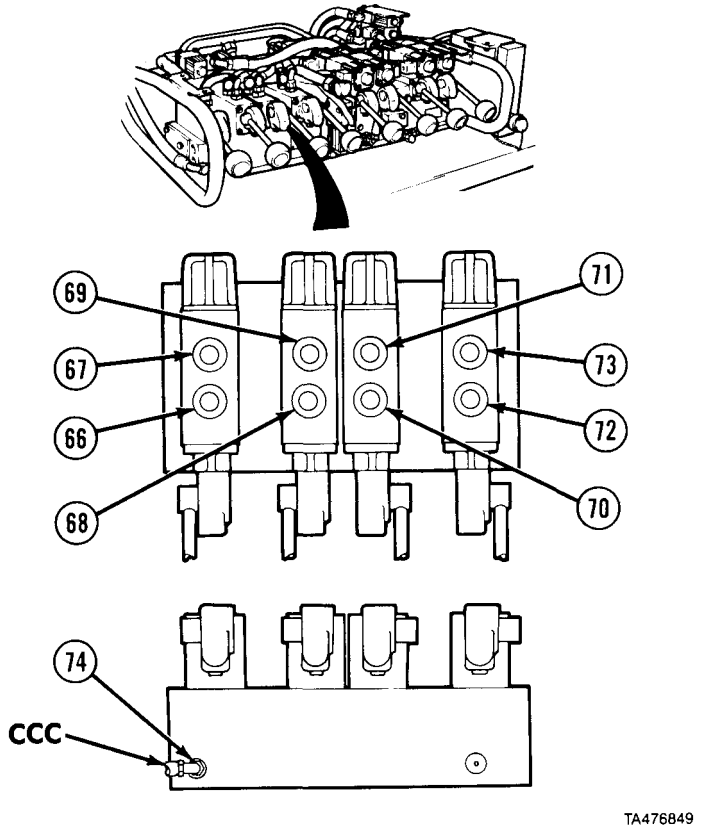


Figure 17-21. Control Valve.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

Table 17-22. Control Valve

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
VV	Port (75)	17-22	Port (61)	17-20
DDD	Port (76)	17-22	L.H. Port (79)	17-23
RR	Port (77)	17-22	Main Line (PP)	17-16
QQ	Port (78)	17-22	Main Line (OO)	17-16

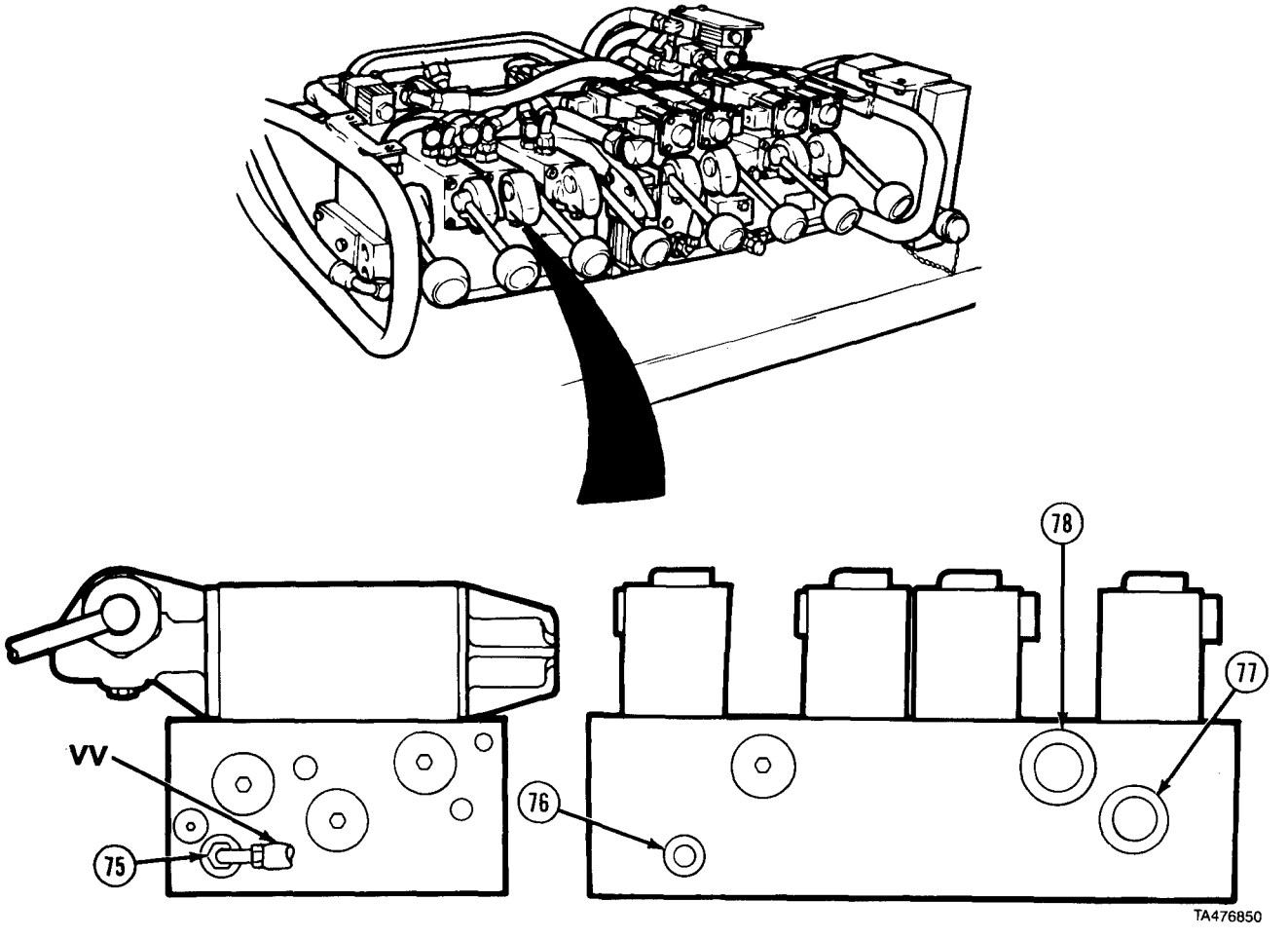


Figure 17-22. Control Valve.

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1)

Table 17-23. Left Hand Valve

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
DDD	Port (79)	17-23	Port (76)	17-22
EEE	Port (80)	17-23	Manifold Elbow (92)	17-24
FFF	Port (81)	17-23		
GGG	Port (82)	17-23	Valve (93)	17-25
HHH	Port (83)	17-23	Valve (94)	17-25
III	Port (84)	17-23	Manifold Elbow (89)	17-24
JJJ	Port (85)	17-23	Manifold Elbow (90)	17-24
KKK	Port (86)	17-23	Port (76)	17-22

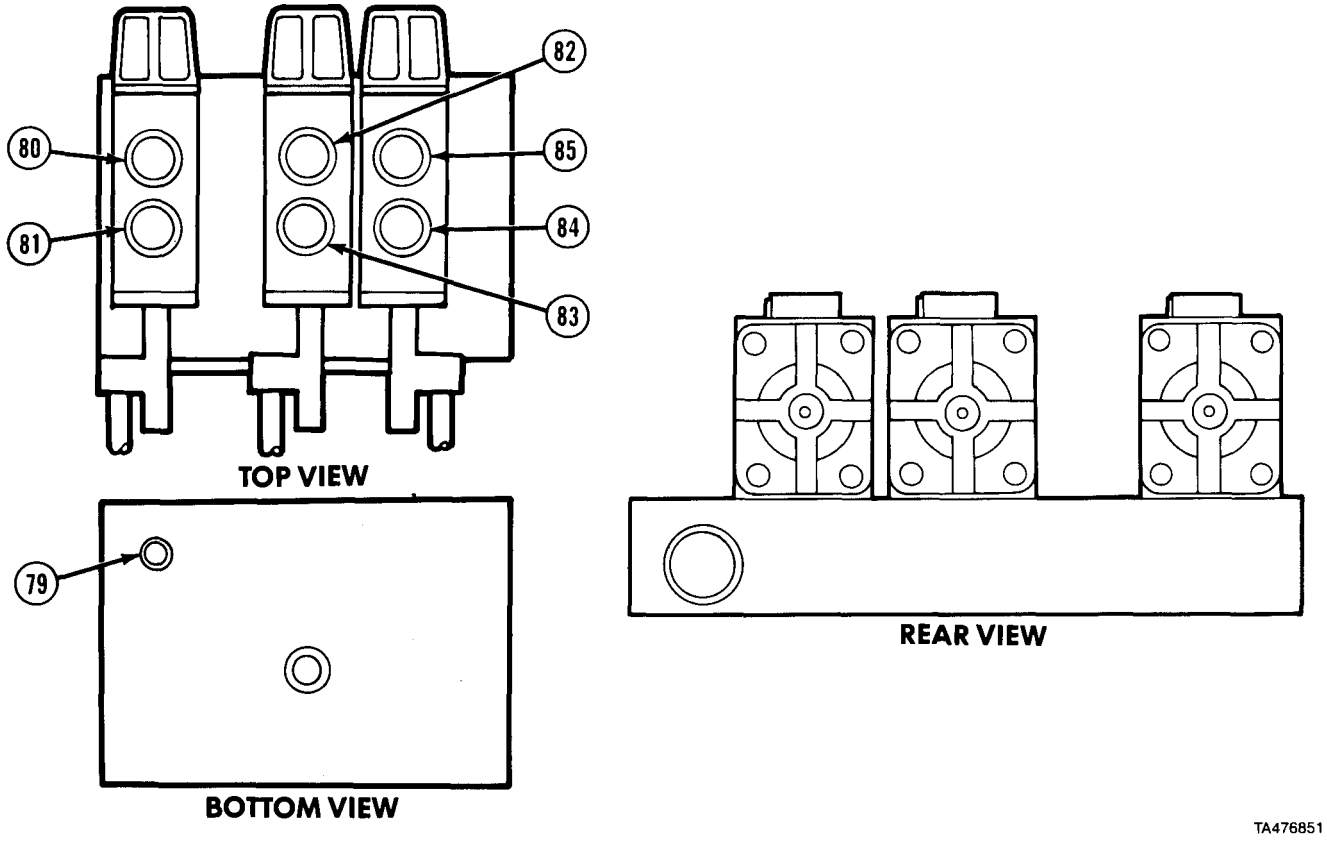


Figure 17-23. Left Hand Valve.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

Table 17-24. Outrigger Manifold

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
XX	Manifold Elbow (88)	17-24	Port (66)	17-21
BBB	Manifold Elbow (90)	17-24	Port (73)	17-21
AAA	Manifold Elbow (89)	17-24	Port (72)	17-21
WW	Manifold Elbow (87)	17-24	Port (66)	17-21
EE	Elbow (35)	17-3	Elbow (92)	17-24
III	Manifold Tee (89)	17-24	Port (84)	17-23
JJJ	Manifold Elbow (90)	17-24	Port (85)	17-23

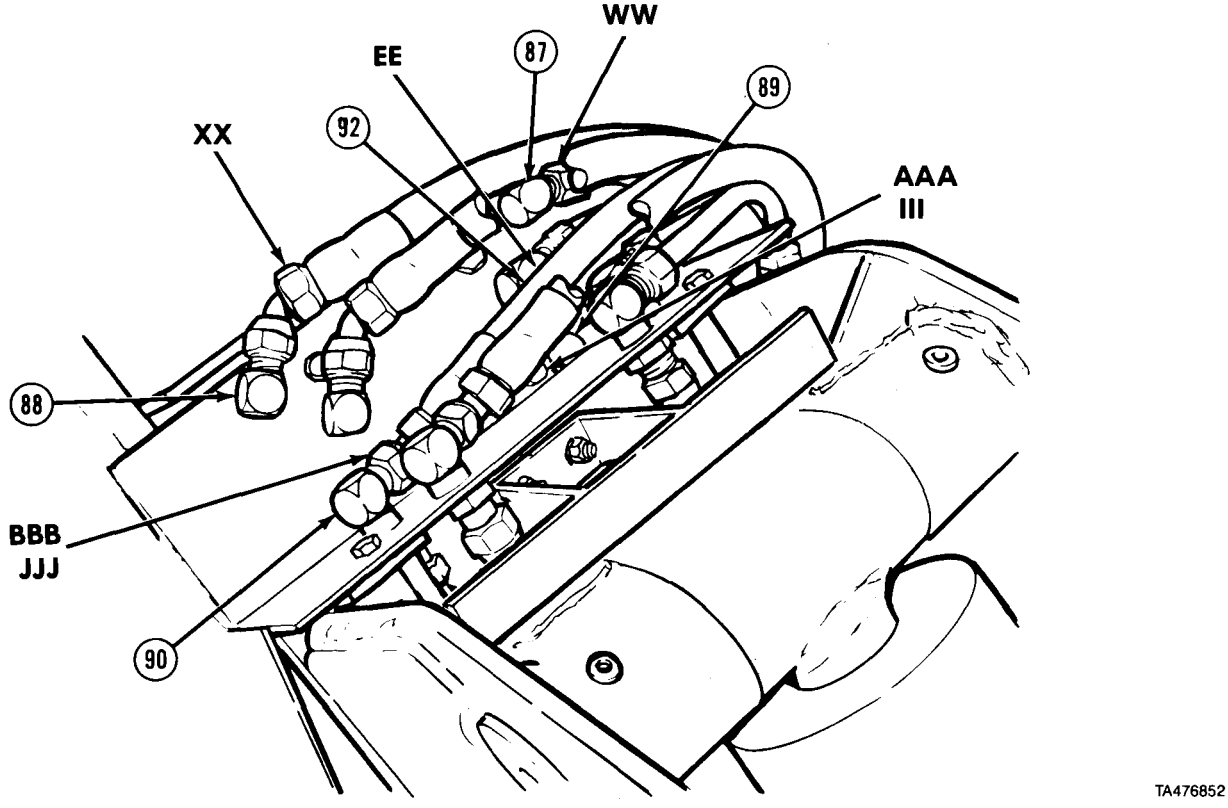


Figure 17-24. Outrigger Manifold.

17-2.1. HYDRAULIC HOSES, TUBES, AND FITTINGS REMOVAL/INSTALLATION (M984E1) (CONT).

Table 17-25. Outrigger Cylinders

Hose Or Tube	From		To	
	Component	Figure	Component	Figure
YY	Valve (91)	17-25	Port (70)	17-21
ZZ	Valve (92)	17-25	Port (71)	17-21
GGG	Valve (93)	17-25	Port (82)	17-23
HHH	Valve (94)	17-25	Port (83)	17-23

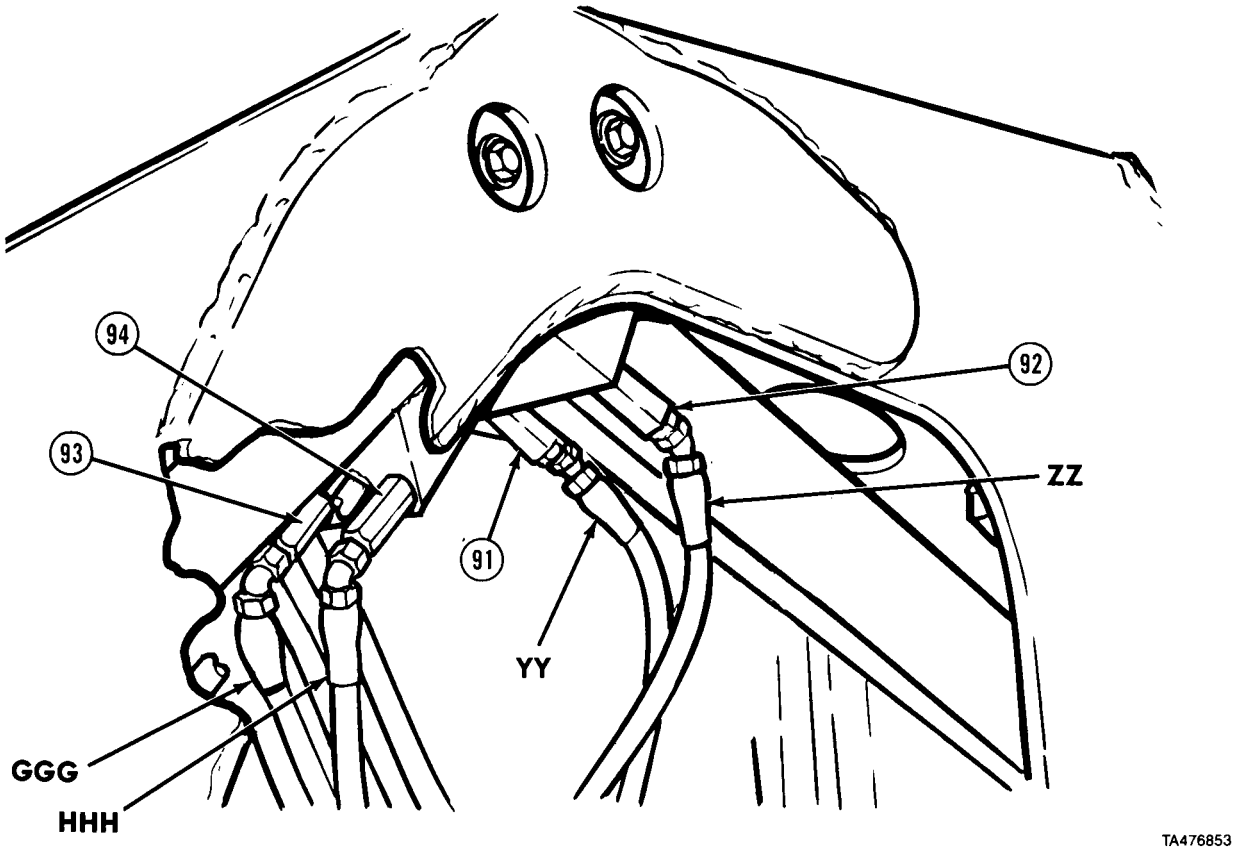


Figure 17-25. Outrigger Cylinders.

l. Follow-on Maintenance. Check for leaks.

END OF TASK

17-3. CRANE REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, *M985*

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-2	Outrigger hoses and tubes disconnected.
Para 17-2	Main hydraulic lines removed.
TM 9-2320-279-20	Taillight wiring harness removed.

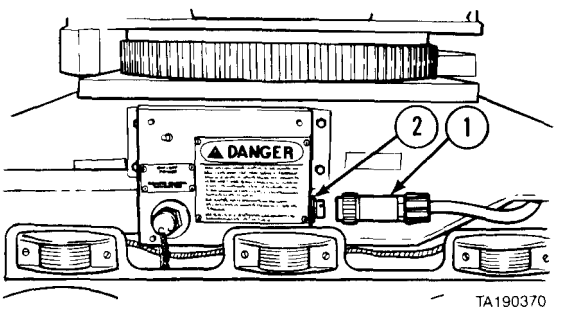
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

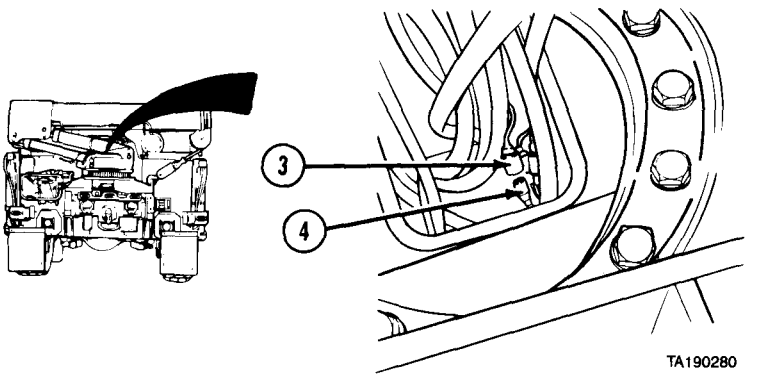
(1) Disconnect cable (1) from connector (2).



NOTE

Tag and mark wires and connectors.

(2) Disconnect three wires (3) at connectors (4).

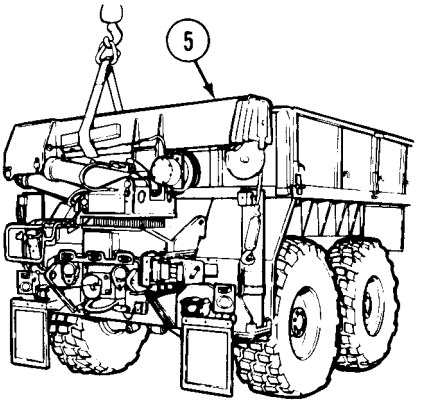


17-3. CRANE REMOVAL/INSTALLATION (CONT).

WARNING

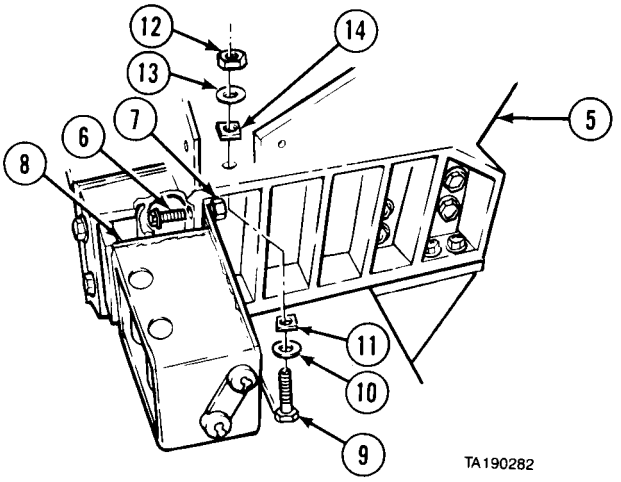
Keep out from under heavy parts. Falling parts may cause serious injury or death.

(3) Attach suitable lifting device to crane (5).



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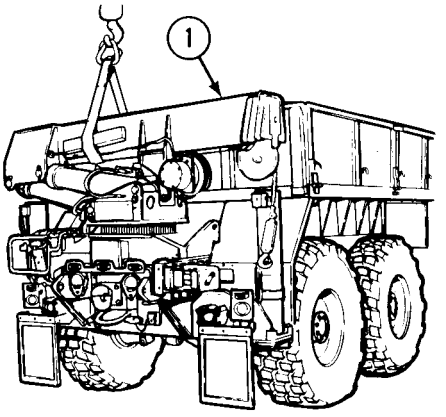
(4) Remove screw (6) and nut (7) from cable guide (8).
(5) Soldier A removes four screws (9), washers (10), and spacers (11) while Soldier B removes nuts (12), washers (13), and spacers (14).
(6) Repeat step (5) for other side.
(7) Remove crane (5).



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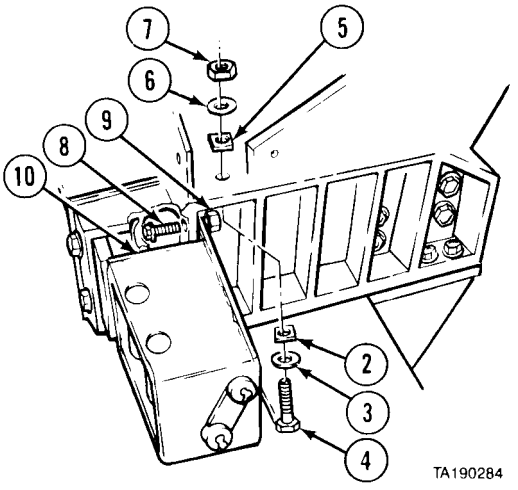
b. Installation.

(1) Aline and install crane (1).

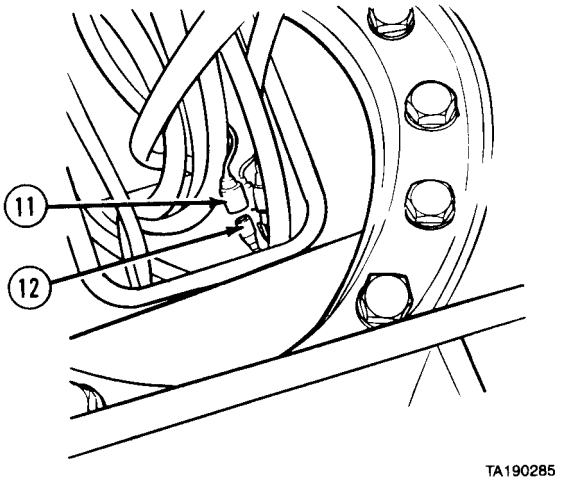


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(2) Soldier A installs four spacers (2), washers (3), and screws (4) while Soldier B installs four spacers (5), washers (6), and nuts (7).
(3) Tighten screws (4).
(4) Install screw (8) and nut (9) in cable guide (10).
(5) Repeat steps *(2)* and *(3)* for other side.

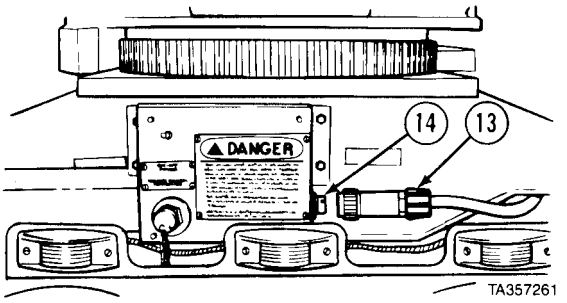


(6) Connect three wires (11) at connectors (12).



(7) Connect cable (13) to connector (14).

c. Follow-on Maintenance.
(1) Connect outrigger hoses and tubes (para 17-2).
(2) Connect main hydraulic lines (para 17-2).
(3) Connect taillight wiring harness (TM 9-2320-279-20).



END OF TASK

17-3.1. CRANE REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Cargo body removed.
TM 9-2320-279-20	Fenders removed.
TM 9-2320-279-20	Crane lockpin removed.

Special Environmental Conditions
None

General Safety Instructions
None

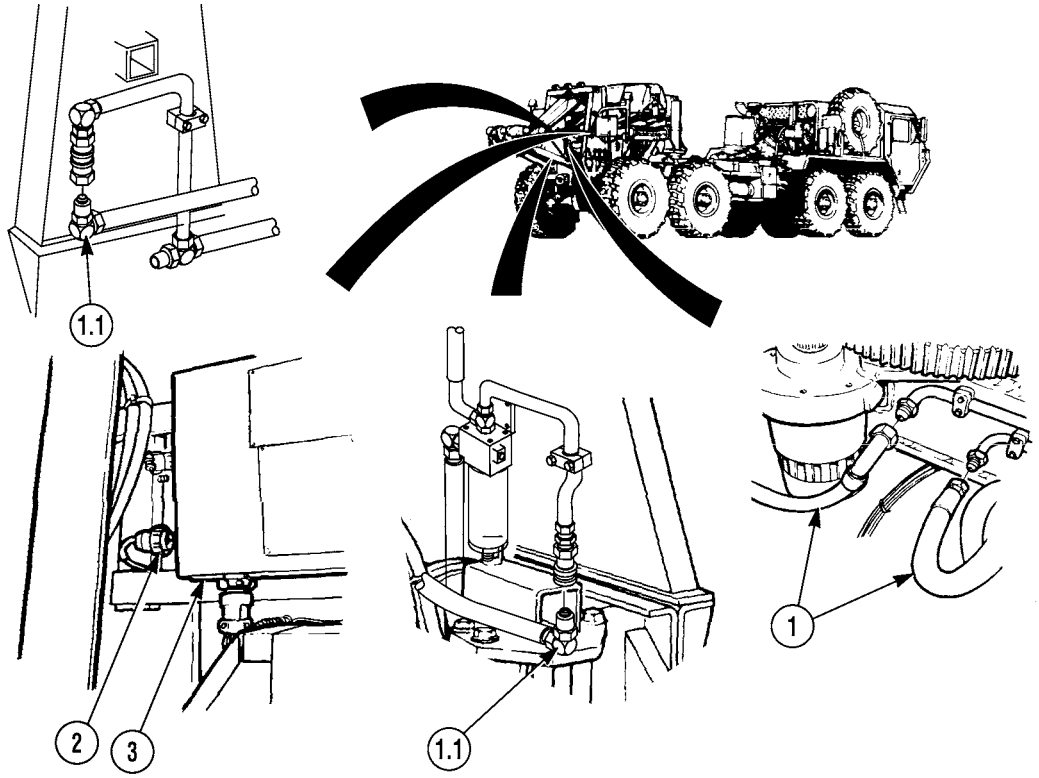
Level of Maintenance
Direct Support

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

a. Removal.

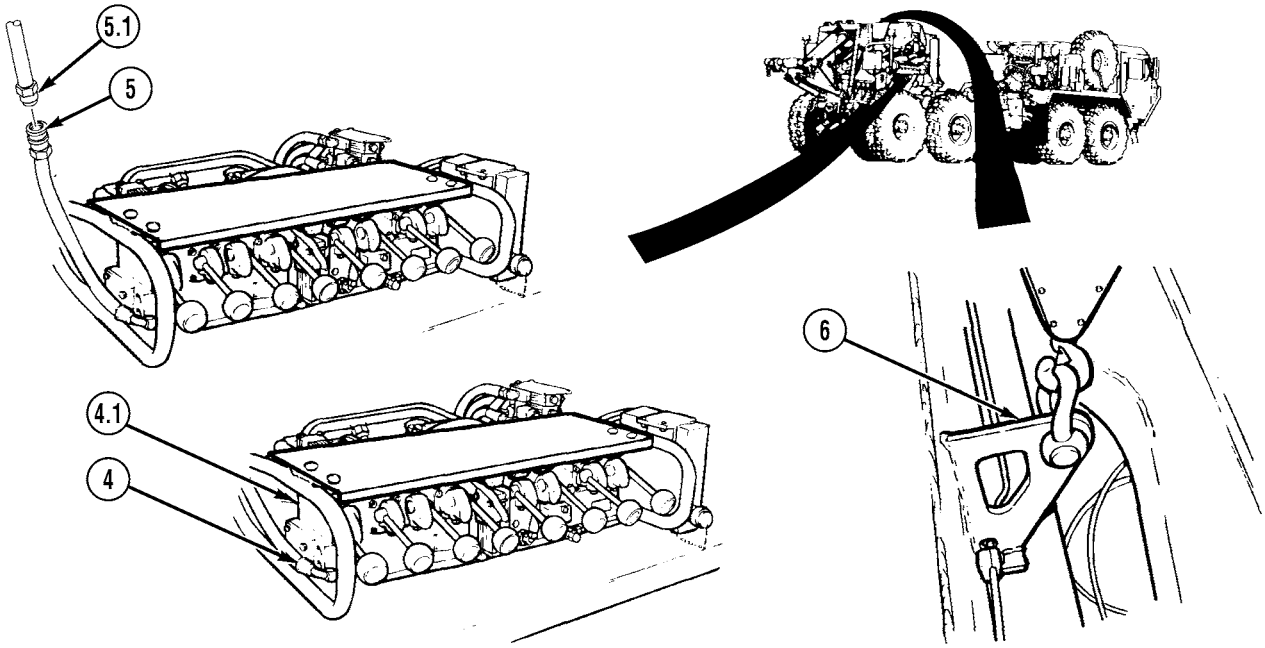
NOTE

- Some vehicles may have quick disconnect.
- Perform step *(1.1)* for vehicles with quick disconnect.



(1) Disconnect two hydraulic lines (1).
(1.1) Disconnect two quick disconnect couplings (1.1).
(2) Disconnect connector (2) at high idle box (3).

17-3.1. CRANE REMOVAL/INSTALLATION (CONT).



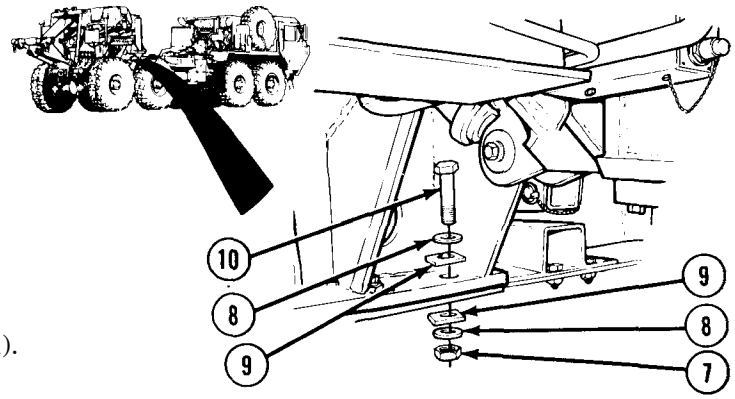
NOTE

- Remove hose clamps as required.
- Some vehicles may have quick disconnect.
- Perform step *(3.1)* for vehicles with quick disconnect.

(3) Disconnect hydraulic line (4) from valve body (4.1).

(3.1) Disconnect quick disconnect coupling (5) from hydraulic line (5.1).

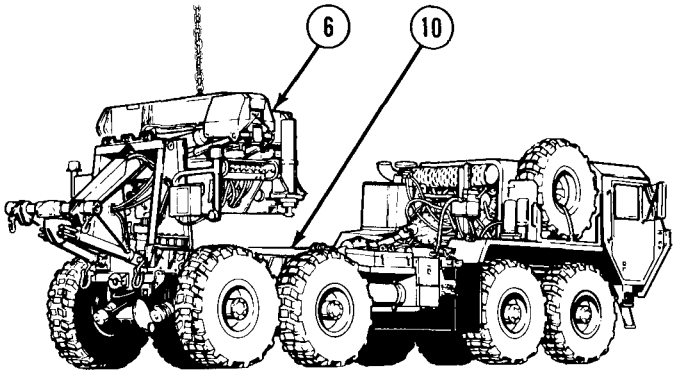
(4) Attach a suitable lifting device to crane (6).



(5) Remove nine nuts (7), washers (8), spacers (9), screws (10), washers (8) and spacers (9).

(6) Repeat step *(5)* for other side.

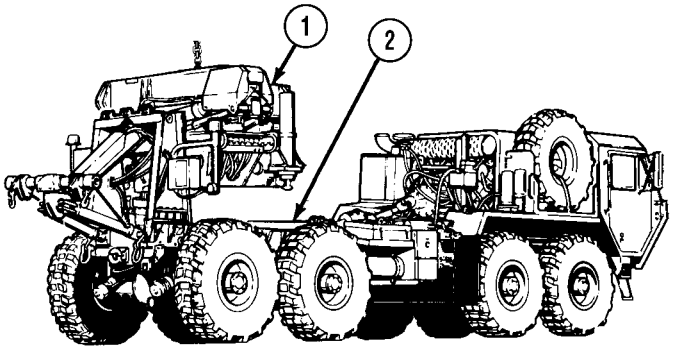
(7) Remove crane (6) from truck (10).



M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

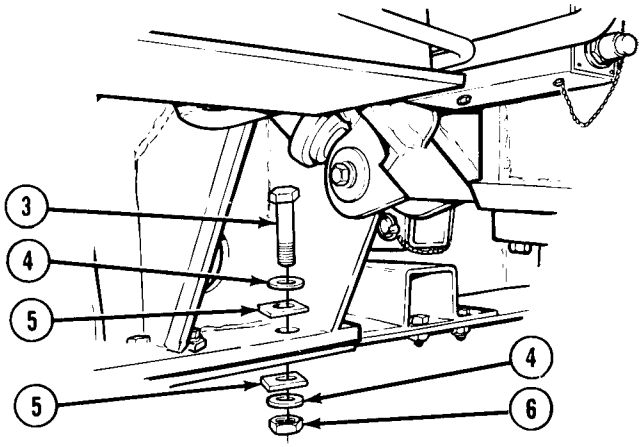
b. Installation.

(1) Position crane (1) on truck (2).

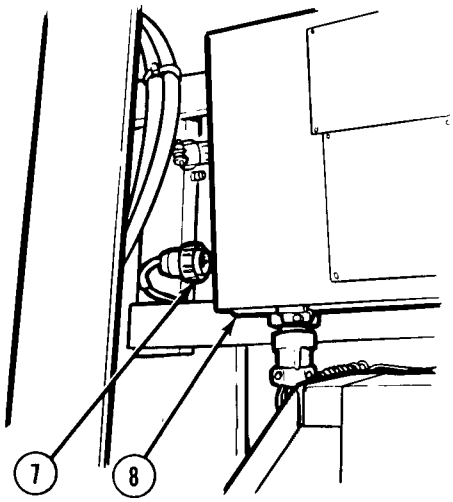


(2) Install nine screws (3), washers (4), and spacers (5) with spacers (5), washers (4), and nuts (6).

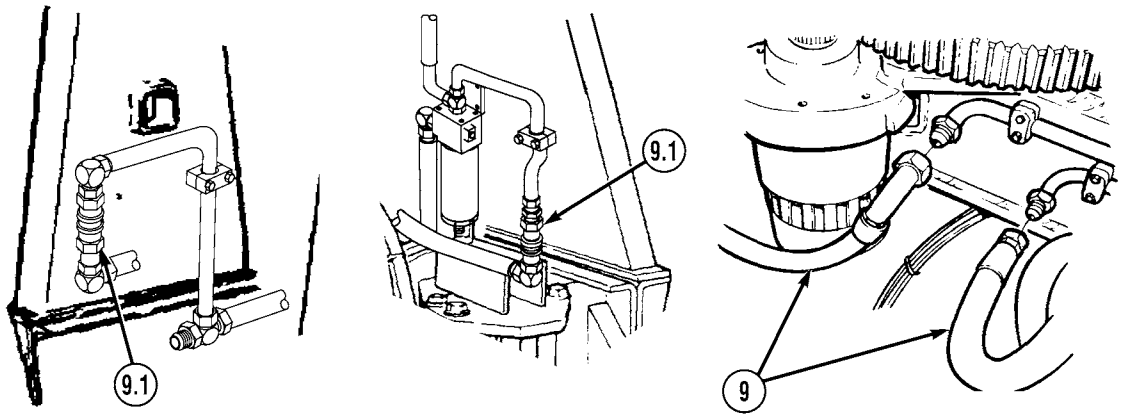
(3) Repeat step *(2)* for other side.



(4) Connect connector (7) to high idle box (8).



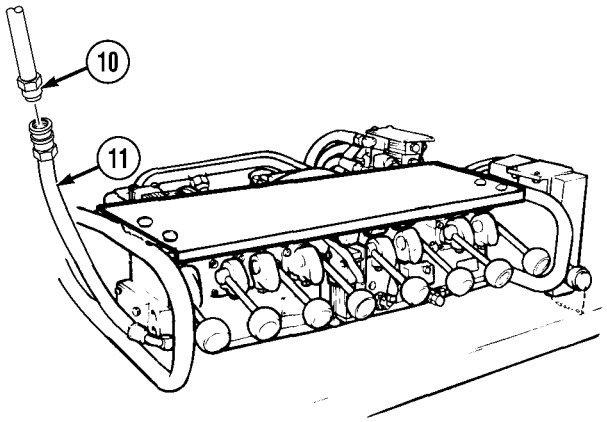
17-3.1. CRANE REMOVAL/INSTALLATION (CONT).



NOTE

- Some vehicles may have quick disconnect.
- Perform step *(5.1)* for vehicles with quick disconnect.

(5) Connect two hydraulic hoses (9).
(5.1) Connect two quick disconnect couplings (9.1).



NOTE
Install hose clamps as required.

(6) Connect quick disconnect coupling (10) to hydraulic line (11).

c. Follow-on Maintenance.

(*1*) Install cargo body (TM 9-2320-279-10).
(*2*) Install fenders (TM 9-2320-279-20).
(*3*) Install crane lockpin (TM 9-2320-279-20).
(*4*) Check for leaks.

END OF TASK

17-4. SUBFRAME REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

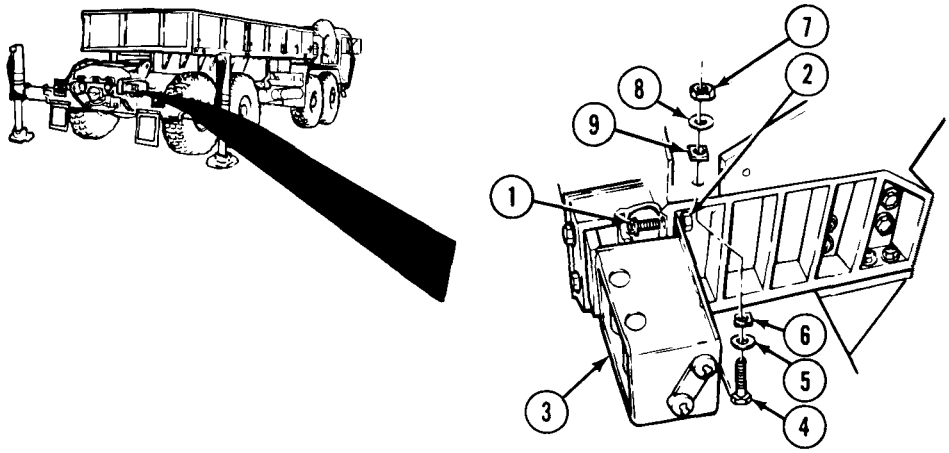
TM or Para	*Condition Description*
TM 9-2320-279-20	Fenders removed.
TM 9-2320-279-20	Clearance light wiring harness removed.
Para 17-10	Boom removed.
Para 17-5	Turntable removed.
Para 17-9	Swing drive removed.
Para 6-11	Junction box removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

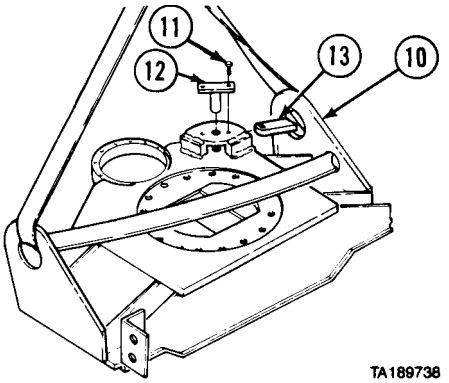


(1) Remove screw (1) and nut (2) from cable guide (3).
(2) Soldier A removes four screws (4), washers (5), and spacers (6) while Soldier B removes four nuts (7), washer (8), and spacer (9).
(3) Repeat step *(2)* for other side.

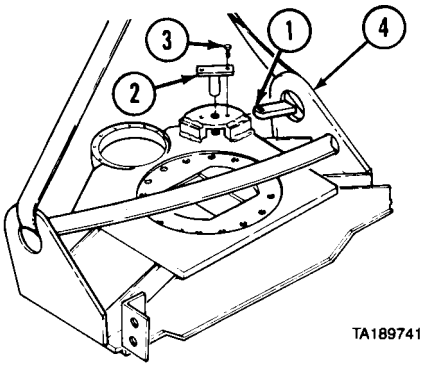
WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(4) Attach suitable lifting device and remove subframe (10).
(5) Remove two screws (11), stop pin (12), and stop (13).



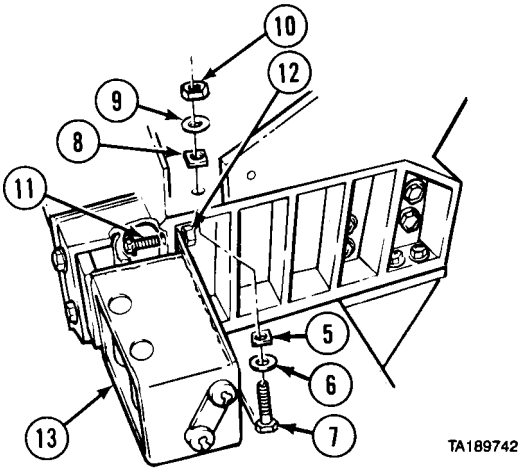
b. Installation.
(1) Install stop (1), stop pin (2), and two screws (3).
(2) Aline and install subframe (4).



(3) Soldier A installs four spacers (5), washers (6), and screws (7) while Soldier B installs four spacers (8), washers (9), and nuts (10).
(4) Repeat step (3) for other side.
(5) Install screw (11) and nut (12) in cable guide (13).

c. Follow-on Maintenance.
(1) Install junction box (para 6-11).
(2) Install swing drive (para 17-9).
(3) Install turntable (para 17-5).
(4) Install boom (para 17-10).
(5) Connect clearance light wiring harness (TM 9-2320-279-20).
(6) Install fenders (TM 9-2320-279-20).

END OF TASK



17-5. TURNTABLE AND BEARING REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

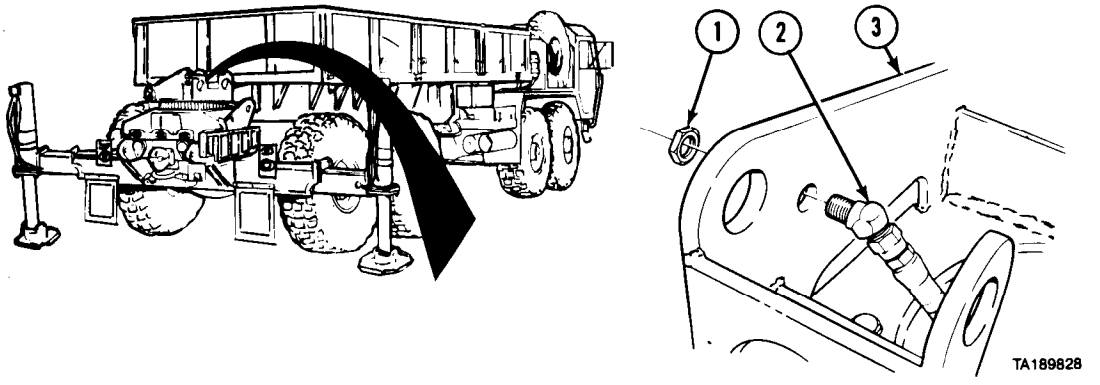
TM or Para	*Condition Description*
Para 17-16	Lift cylinders removed.
Para 17-14	Erection cylinders removed.
Para 17-10	Boom removed.
Para 17-11	Mast removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

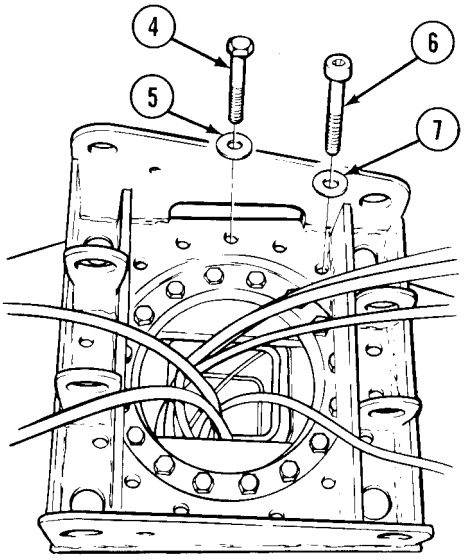
a. Removal.



(1) Remove nut (1) and hydraulic line (2) from turntable (3).
(2) Repeat step *(1)* for other side.

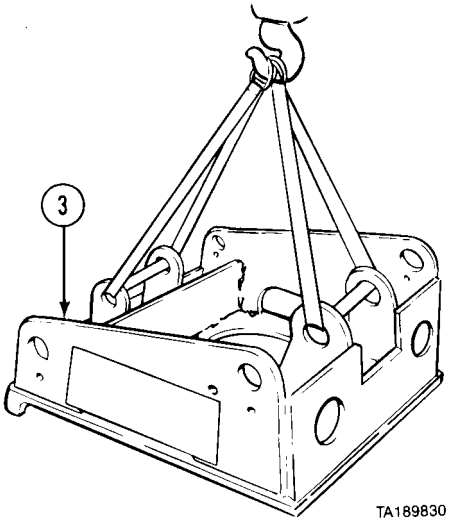
M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

(3) Remove 14 screws (4) and washers (5).
(4) Remove four screws (6) and washers (7).



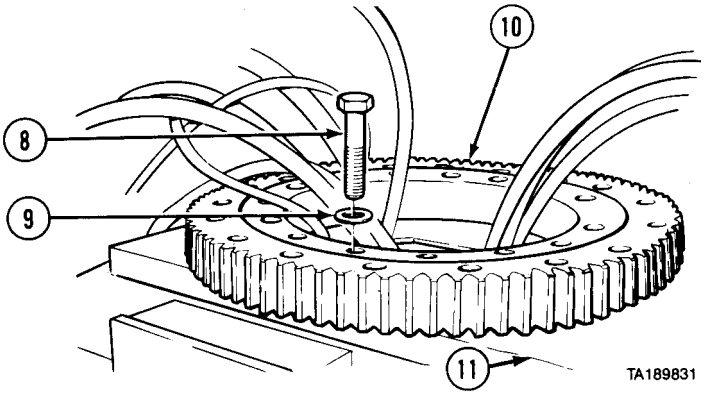
TA189829

(5) Attach suitable lifting device.
(6) Remove turntable (3).



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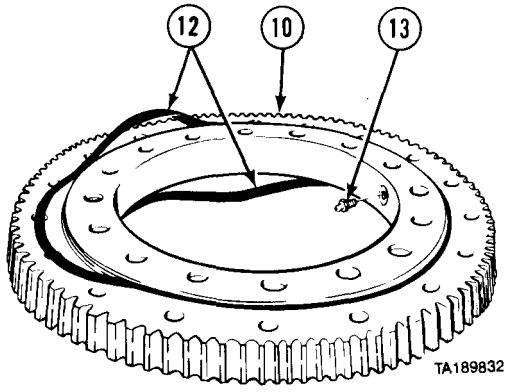
(7) Remove 16 screws (8) and washers (9).
(8) Remove bearing (10) from subframe (11).



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17-5. TURNTABLE AND BEARING REMOVAL/INSTALLATION (CONT).

(9) Remove two dust seals (12) and grease fitting (13) from bearing (10).

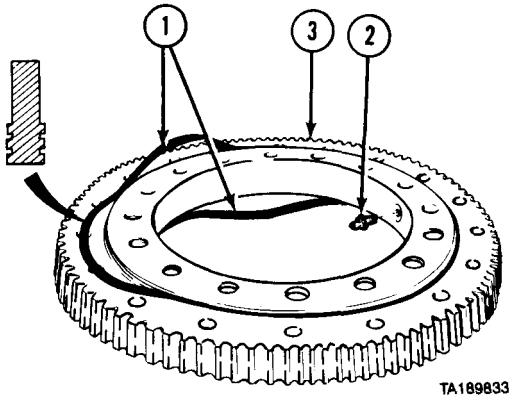


b. Installation.

NOTE

Ridge end of seal is installed in bearing. Cut off excess seal.

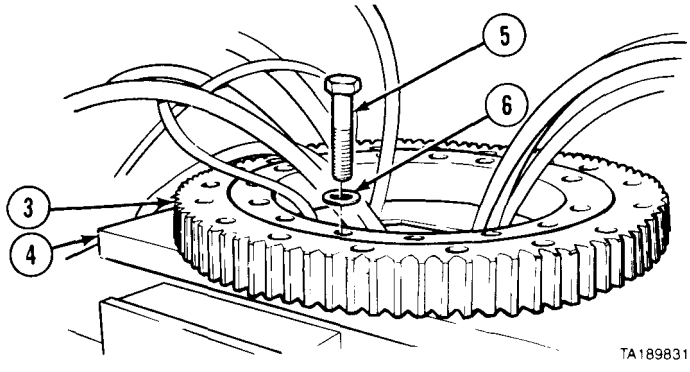
(1) Install two dust seals (1) and grease fitting (2) in bearing (3).



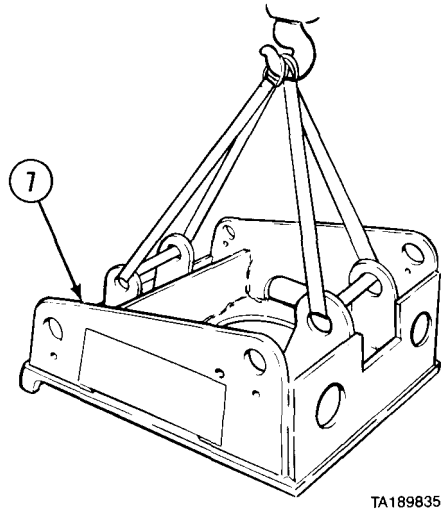
NOTE

- Letter G stamped on bearing faces down and centered on subframe.
- Replace turntable bearing bolts with new bolts any time they are removed.

(2) Aline and install bearing (3) on subframe (4).
(3) Install 16 screws (5) and washers (6).



(4) Aline and install turnable (7).

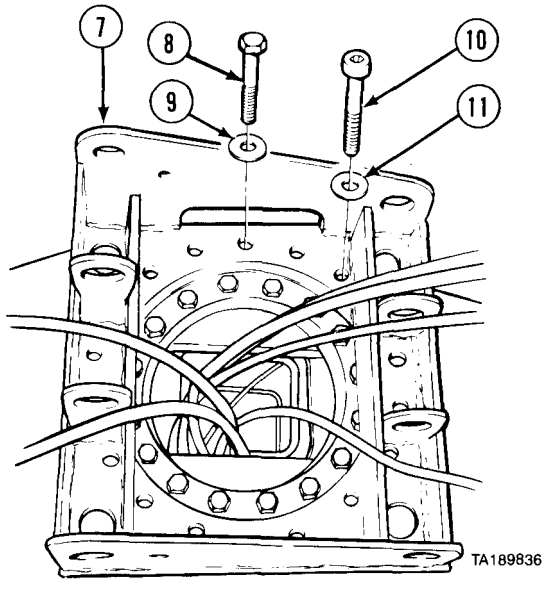


(5) Install 14 screws (8) and washers (9) in turntable (7).

NOTE

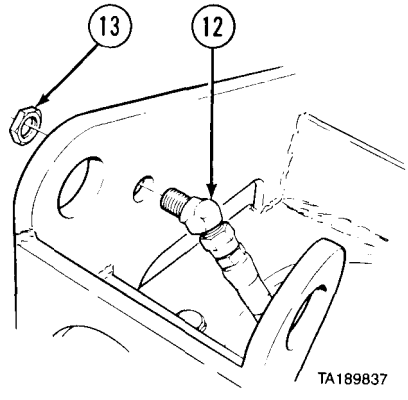
Screws are installed in inside corners.

(6) Install four screws (10) and washers (11).



(7) Install hydraulic line (12) and nut (13).
(8) Repeat step (7) for other side.

c. *Follow-on Maintenance.*
(1) Install erection cylinders (para 17-14).
(2) Install lift cylinders (para 17-16).
(3) Install mast (para 17-11).
(4) Install boom (para 17-10).



END OF TASK

17-5.1. TURNTABLE AND BEARING REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

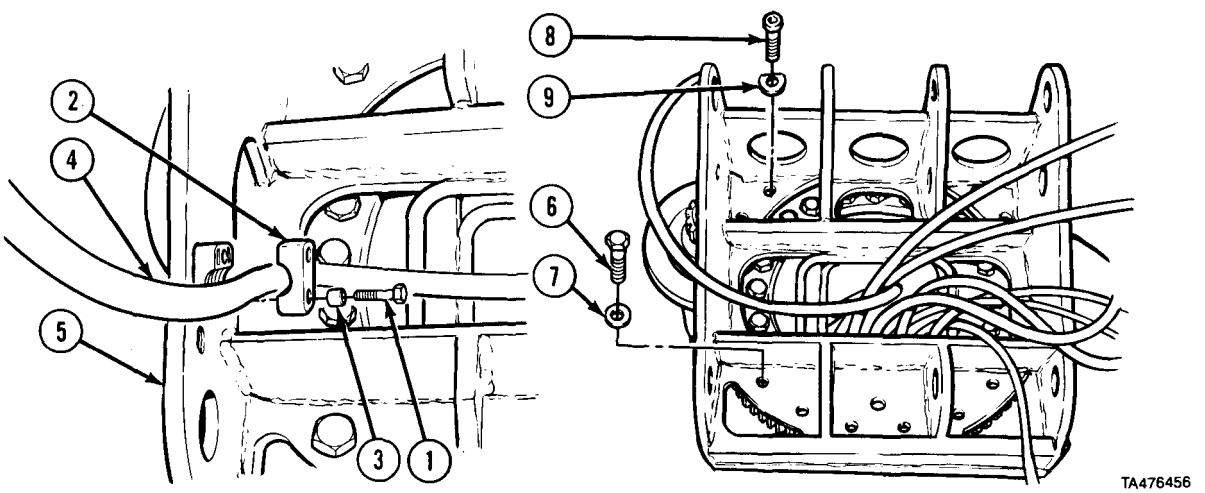
TM or Para	*Condition Description*
Para 17-10.1	Boom removed.
Para 17-16.1	Lift cylinders removed.
Para 17-14.1	Erection cylinders removed.
Para 17-11.1	Mast removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.



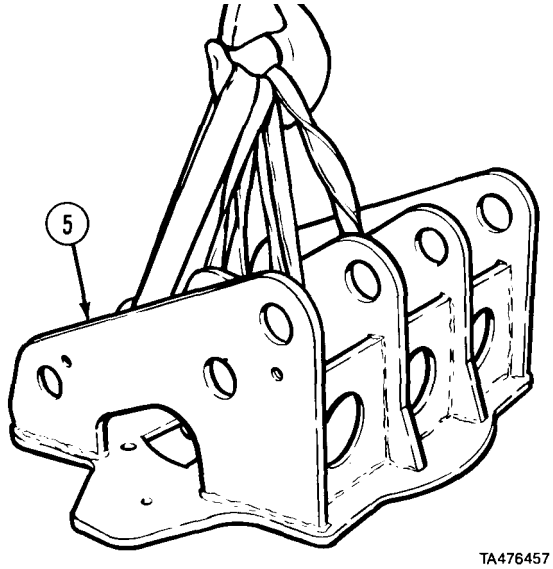
(1) Remove two screws (1), clamp (2), spacers (3), and hydraulic line (4) from turntable (5).
(2) Repeat step *(1)* for other side.

NOTE

Mark position of screws, washers, and turntable.

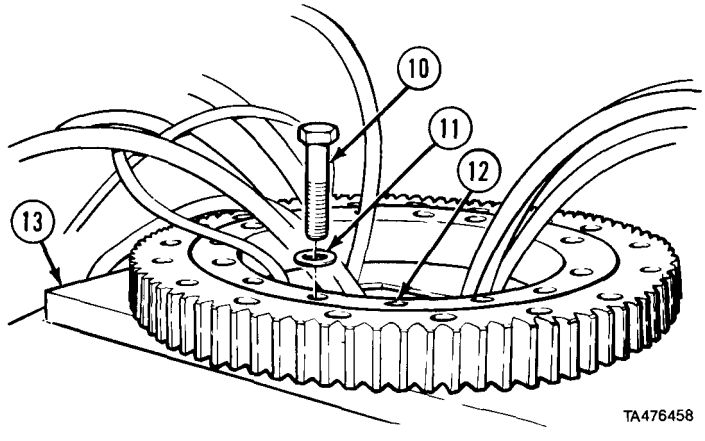
(3) Remove 12 screws (6) and washers (7).
(4) Remove four screws (8) and washers (9).

(5) Attach suitable lifting device to turntable (5).
(6) Remove turntabe (5)



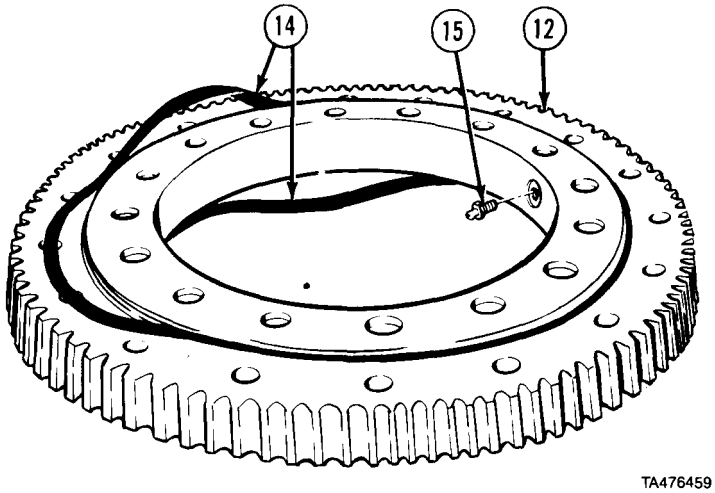
TA476457

(7) Remove 23 screws (10) and washers (11)
(8) Remove bearing (12) from subframe (13)



TA476458

(9) Remove two dust seals (14) and grease fitting (15) from bearing (12).



TA476459

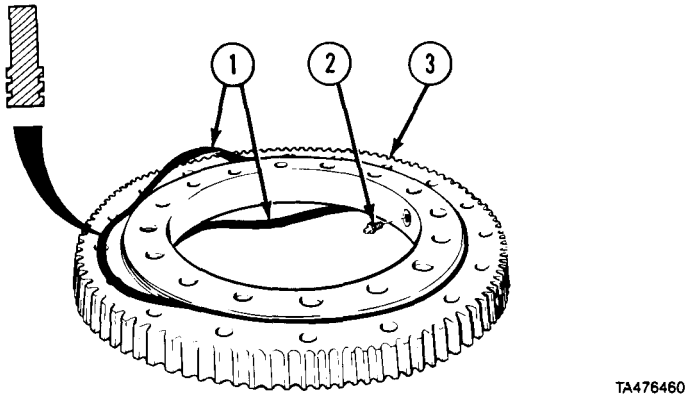
17-5.1. TURNTABLE AND BEARING REMOVAL/INSTALLATION (M984E1) (CONT).

b. Installation.

NOTE

Ridge end of seal is installed in bearing. Cut off excess seal.

(1) Install two dust seals (1) and grease fitting (2) in bearing (3).

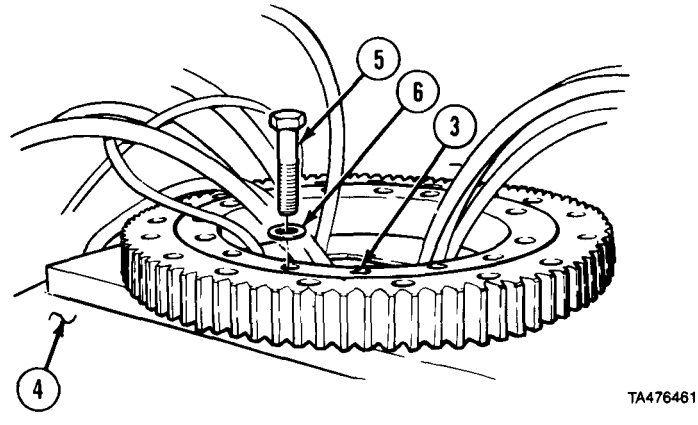


TA476460

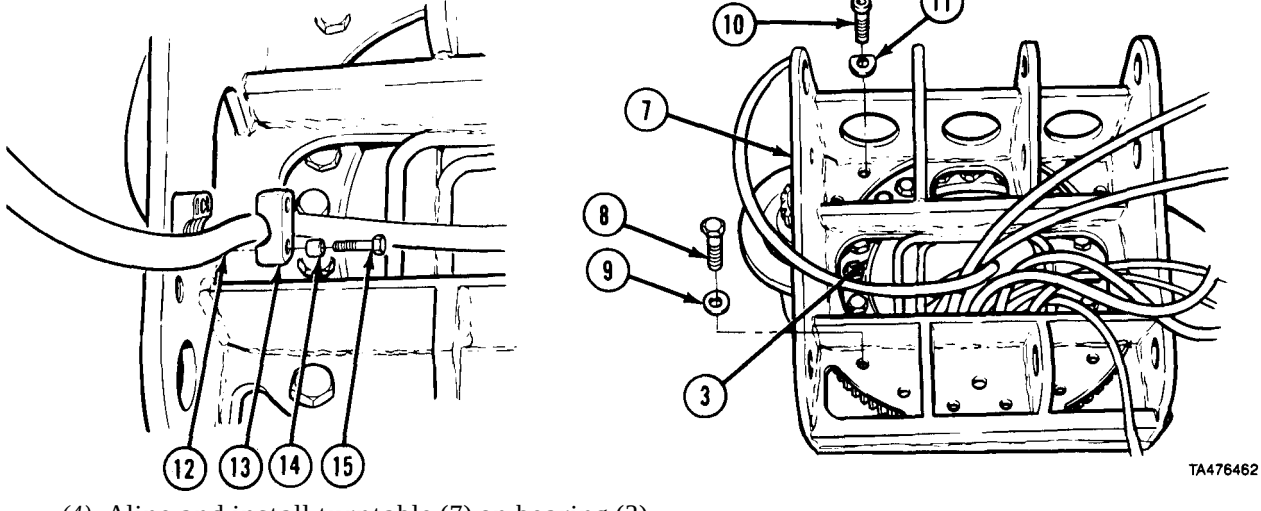
NOTE

- Letter 'G' stamped on bearing faces down and centered on sub frame.
- Replace turntable bearing bolts with new bolts any time they are removed.

(2) Aline and install bearing (3) on subframe (4).
(3) Install 23 screws (5) and washers (6).



TA476461



TA476462

(4) Aline and install turntable (7) on bearing (3).
(5) Install 12 screws (8) and washers (9) in turntable (7).
(6) Install four screws (10) and washers (11).
(7) Install hydraulic line (12) with clamp (13), two spacers (14), and screws (15).
(8) Repeat step *(7)* for other side.

c. Follow-on Maintenance.
(1) Install erection cylinders (para 17-14).
(2) Install lift cylinders (para 17-16.1).
(3) Install mast (para 17-11.1).
(4) Install boom (para 17-10.1).

END OF TASK

17-5.2. TURNTABLE STOP REMOVAL/INSTALLATION (M984E1).

This task covers:
a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-5.1	Turntable removed.

Special Environmental Conditions
None

General Safety Instructions
None

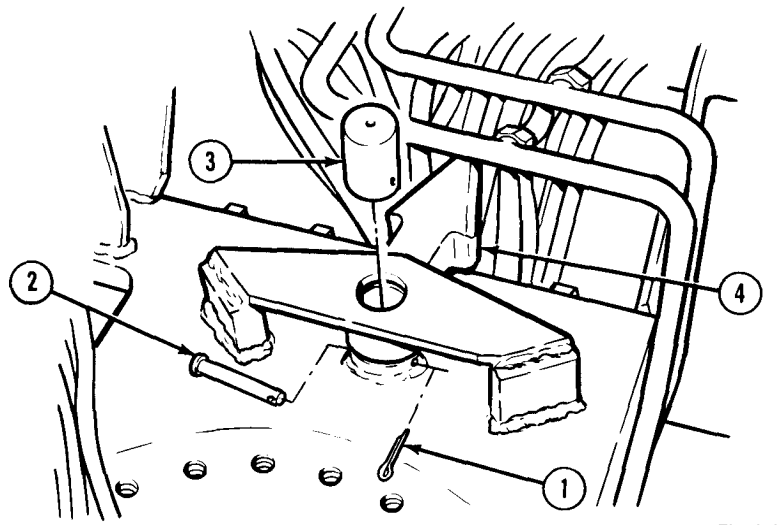
Level of Maintenance
Direct Support

a. Removal.
(1) Remove cotter pin (1) and pin (2).
(2) Remove pin (3) and stop (4).

b. Installation.
(1) Install stop (4) and pin (3).
(2) Install pin (2) and cotter pin (1).

c. Follow-on Maintenance.
Install turntable (para 17-5.1)

END OF TASK



TA476463

17-6. SWING DRIVE VALVE REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation
e. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-2	Swing drive valve hydraulic hoses and tubes removed.

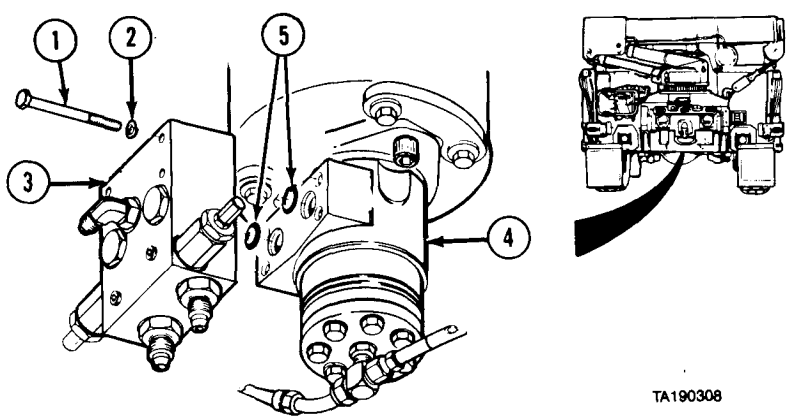
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

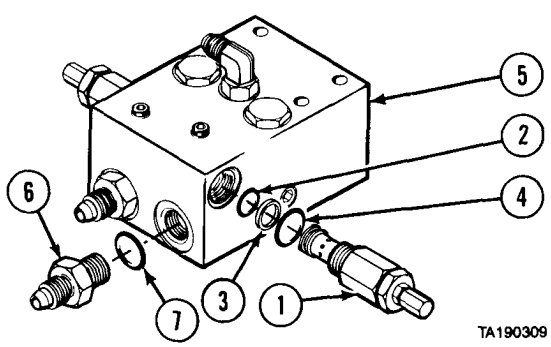
a. Removal.

(1) Remove four screws (1) and lockwashers (2).
(2) Remove valve (3) from motor (4).
(3) Remove two preformed packings (5).



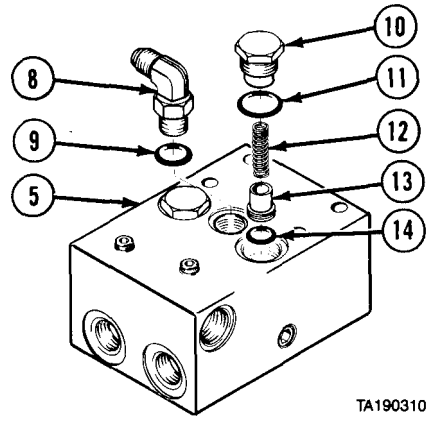
b. Disassembly.

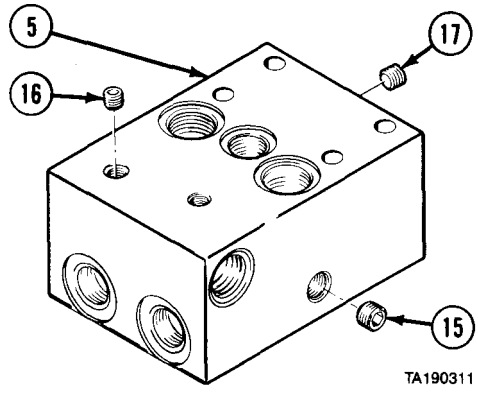
(1) Remove two relief valves (1), preformed packings (2), backup rings (3), and preformed packings (4) from valve (5).
(2) Remove two fittings (6) and preformed packings (7) from valve (5).



(3) Remove elbow (8) and preformed packing (9) from valve (5).

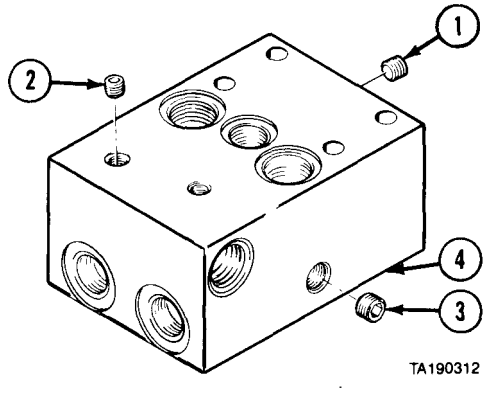
(4) Remove two check valves (10), preformed packings (11), springs (12), valve seats (13), and preformed packings (14) from valve (5).





(5) Remove two plugs (15), two plugs (16), and two plugs (17) from valve (5).

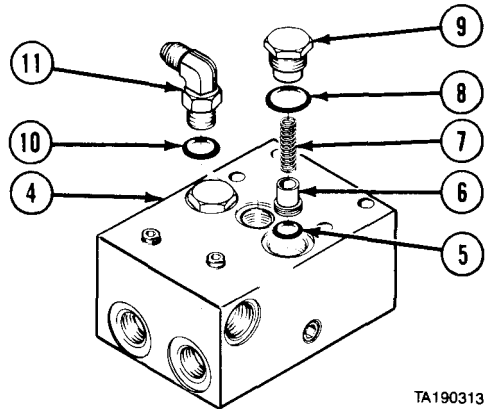
c. Assembly.



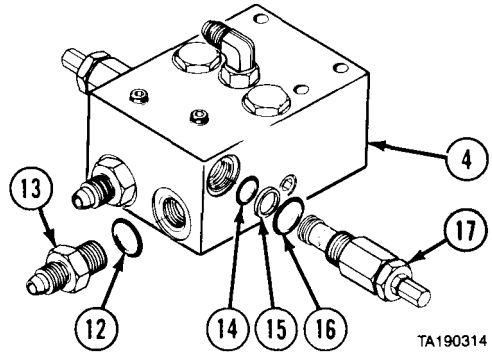
(1) Install two plugs (1), two plugs (2), and two plugs (3) in valve (4).

17-6. SWING DRIVE VALVE REMOVAL/REPAIR/INSTALLATION (CONT).

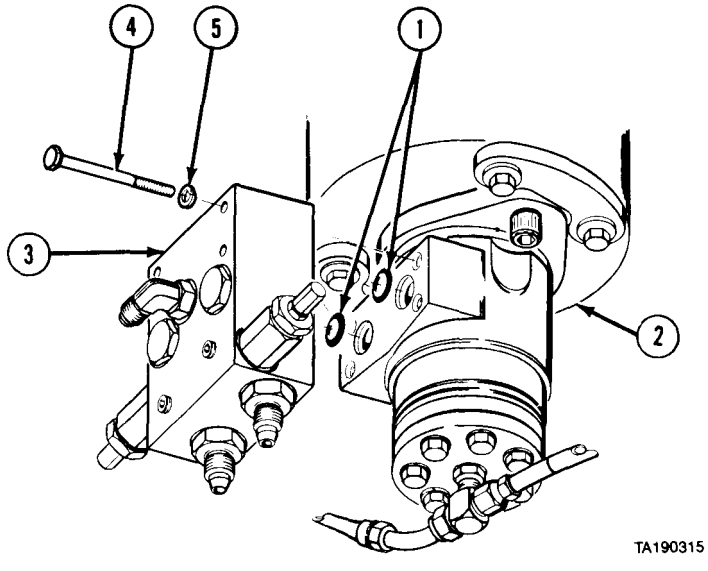
(2) Install two preformed packings (5), valve seats (6), springs (7), preformed packings (8), and check valves (9) in valve (4).
(3) Install preformed packing (10) and elbow (11) in valve (4).



(4) Install two preformed packings (12) and fittings (13) in valve (4).
(5) Install two preformed packings (14), backup rings (15), and preformed packings (16) in valve (4).
(6) Install two relief valves (17) in valve (4).



d. Installation.
(1) Install two preformed packings (1) in motor (2).
(2) Install valve (3) with four screws (4) and lockwashers (5).



e. Follow-on Maintenance. Install swing drive valve hydraulic hoses and tubes (para 17-2).

END OF TASK

17-6.1. SWING DRIVE VALVE REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Too1s
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

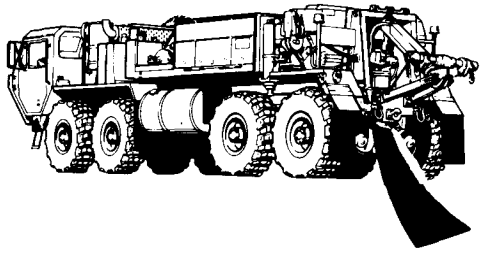
TM or Para	*Condition Description*
Para 17-2.1	Swing drive valve hydraulic hoses and tubes removed.

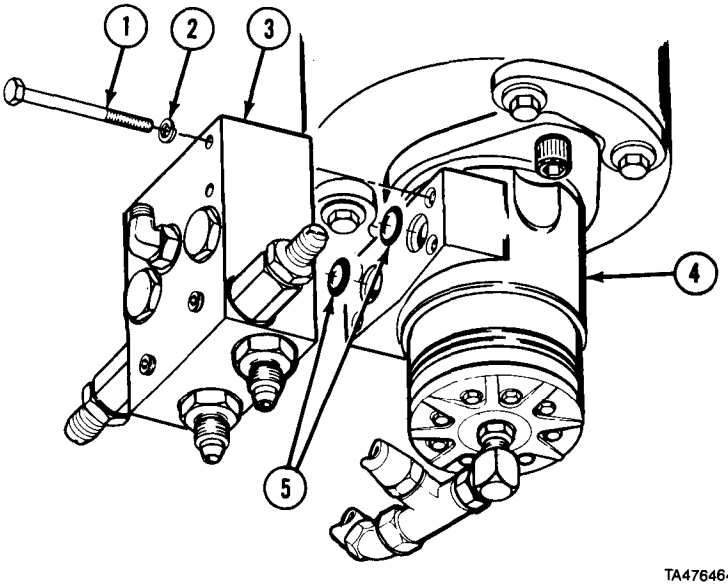
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.





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(1) Remove four screws (1) and lockwashers (2).
(2) Remove valve (3) from motor (4).
(3) Remove two preformed packings (5).

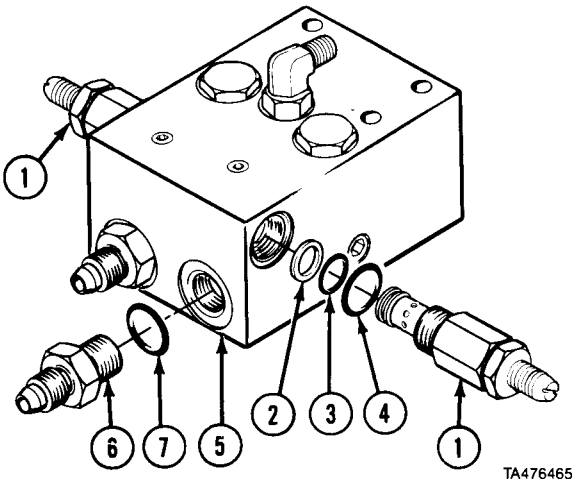
17-6.1. SWING DRIVE VALVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

b. Disassembly.

(1) Remove two relief valves (1).

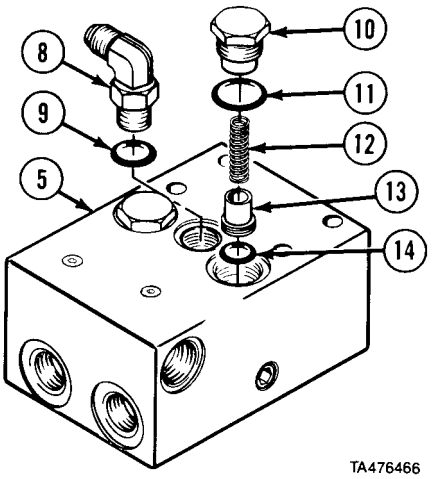
(2) Remove two preformed packings (3), retainers (2), and preformed packings (4) from valve (1).

(3) Remove two fittings (6) and preformed packings (7) from valve (5).

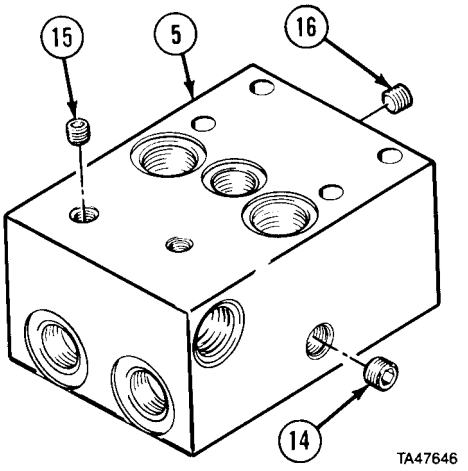


(4) Remove elbow (8) and preformed packing (9) from valve (5).

(5) Remove two check valves (10), preformed packings (11), springs (12), valve seats (13), and preformed packings (14) from valve (5).



(6) Remove two plugs (14), two plugs (15), and two plugs (16) from valve (5).



c. Cleaning/Inspection.

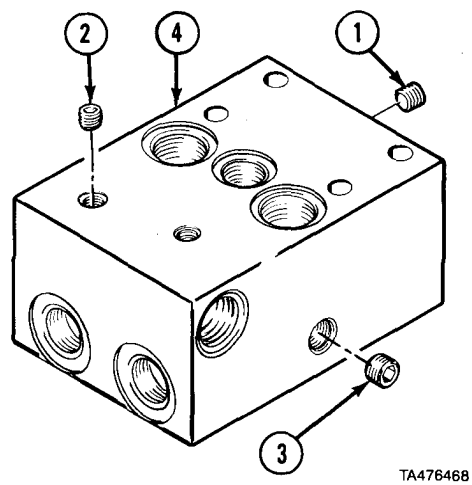
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

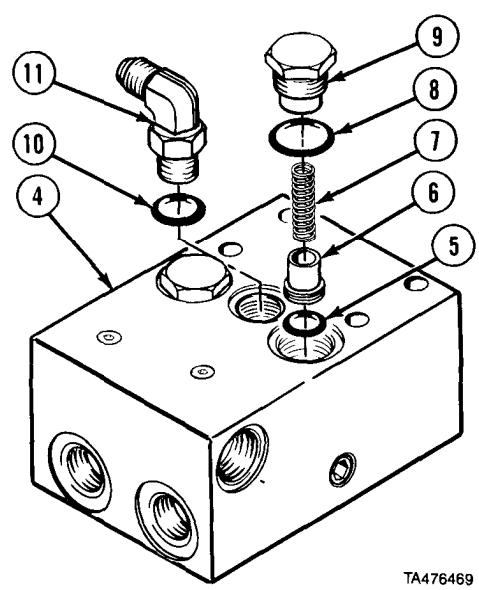
(1) Clean all metal parts in drv cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

d. Assemb/y.

(1) Apply compound and install two plugs (1), two plugs (2), and two plugs (3) in valve (4).

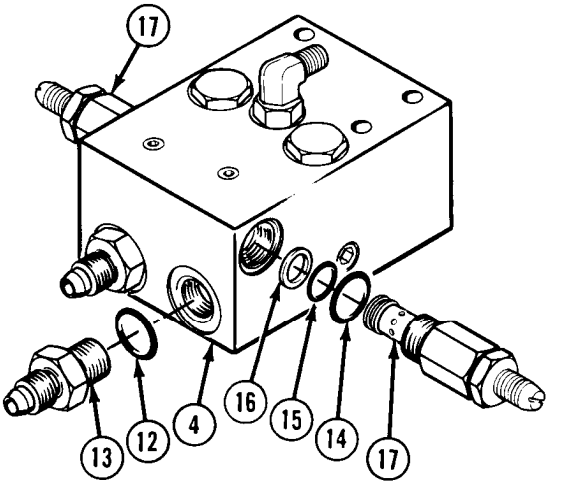


(2) Install two preformed packings (5), valve seats (6), springs (7), preformed packings (8), and check valves (9) in valve (4).
(3) Install preformed packing (10) and elbow (11) in valve (4).



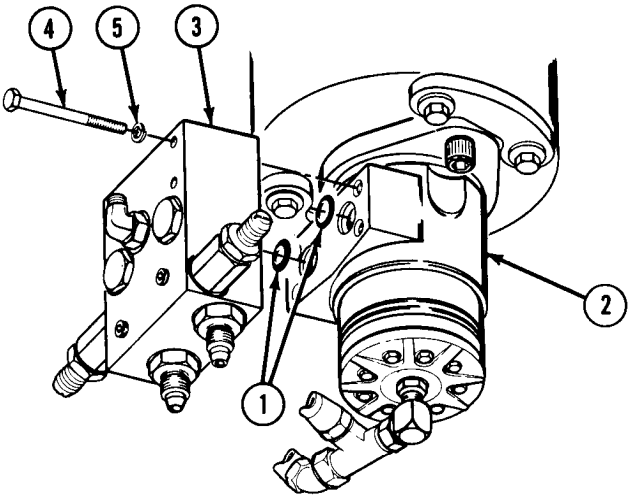
17.6.1. SWING DRIVE VALVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(4) Install two preformed packings (12) and fittings (13) in valve (4).
(5) Install two preformed packings (14), preformed packings (15), and retainers (16) on relief valves (17).
(6) Install two relief valves (17) in valve (4).



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e. Installation.



TA476471

(1) Install two preformed packings (1) in motor (2).
(2) Install valve (3) with four screws (4) and lockwashers (5).

f. Follow-on Maintenance. Install swing drive valve hydraulic hoses and tubes (para 17-2.1).

END OF TASK

17-7. SWING DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

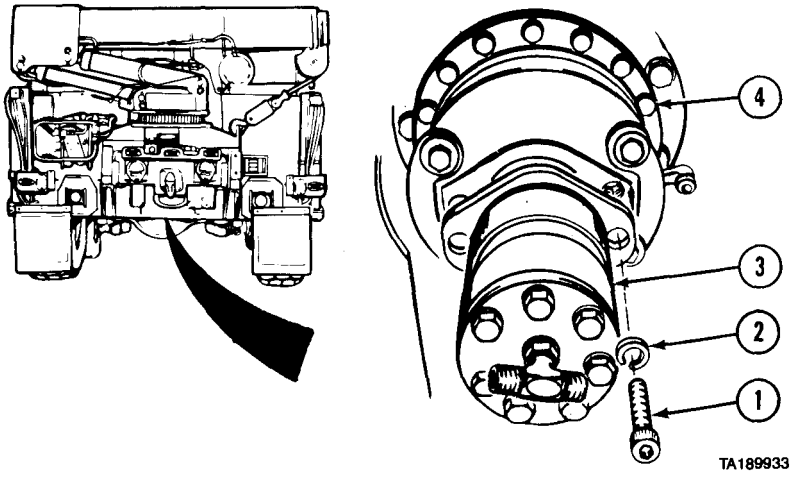
TM or Para	*Condition Description*
Para 17-6	Swing drive valve body removed.
Para 17-2	Swing drive motor hydraulic hoses and tubes removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

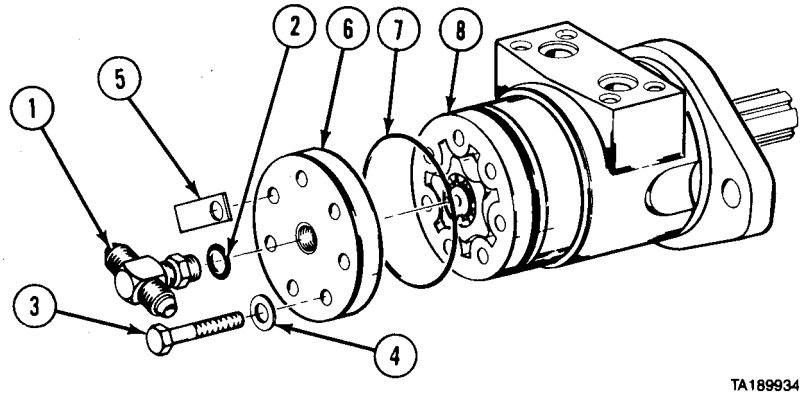


(1) Remove two screws (1) and lockwashers (2).
(2) Remove motor (3) from brake (4).

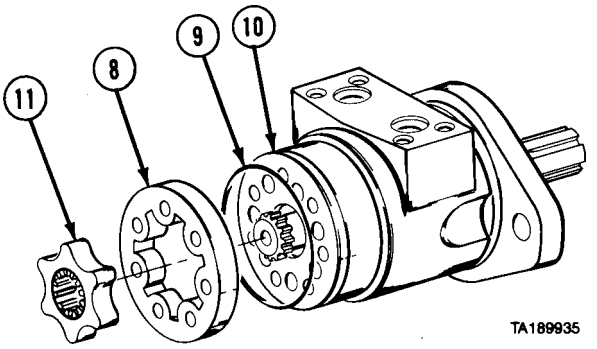
17-7. SWING DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (CONT).

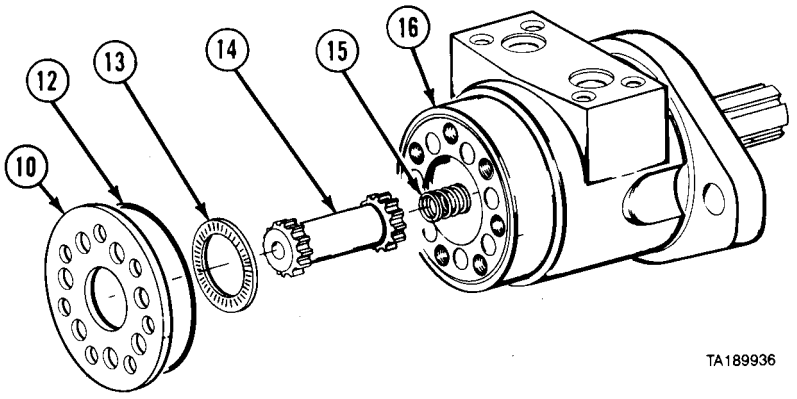
b. Disassembly.

(1) Remove tee fitting (1) and preformed packing (2).
(2) Remove seven screws (3), six washers (4), and tag (5).
(3) Remove end cap (6) and preformed packing (7) from gerotor (8).

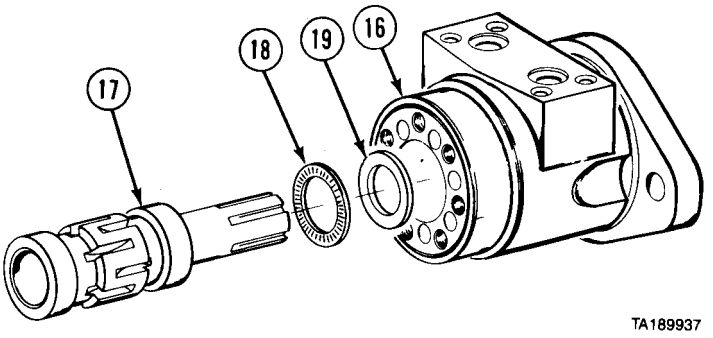


(4) Remove gerotor (8) and preformed packing (9) from plate (10).
(5) Remove star (11) from gerotor (8).

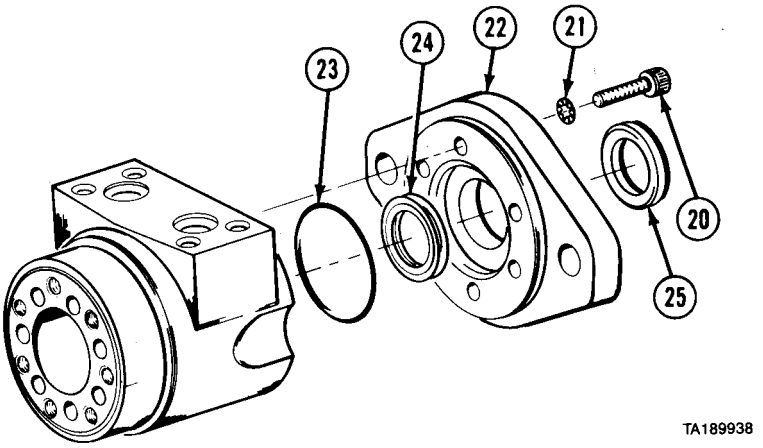




(6) Remove plate (10) and preformed packing (12).
(7) Remove bearing (13), shaft (14), and spring (15) from motor (16).



(8) Remove shaft (17), bearing (18), and thrust washer (19) from motor (16).



(9) Remove six screws (20), lockwashers (21), flange cover (22), and preformed packing (23).
(10) Remove shaft seal (24) and dust seal (25) from flange cover (22).

c. Cleaning/Inspecfion.

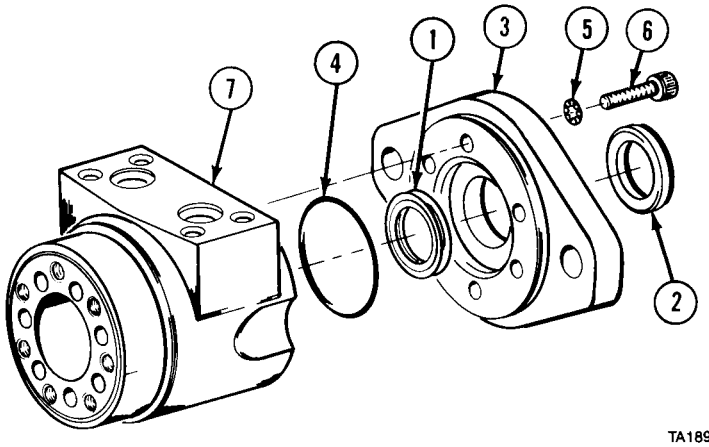
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

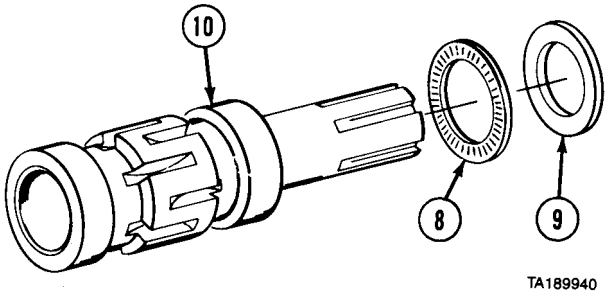
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

17-7. SWING DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (CONT).

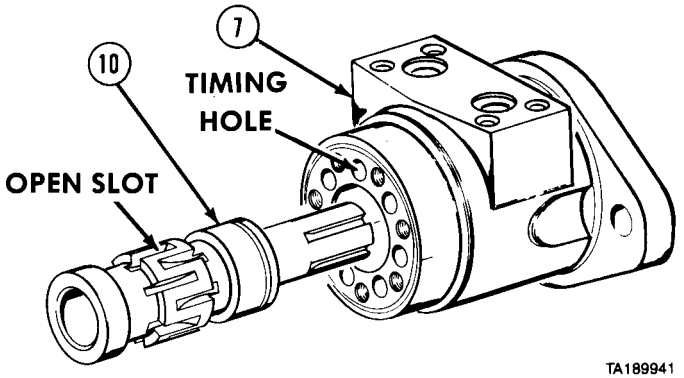
d. Assembly.



(1) Install shaft seal (1) and dust seal (2) in flange cover (3).
(2) Install preformed packing (4), flange cover (3), six lockwashers (5), and screws (6) in motor (7).

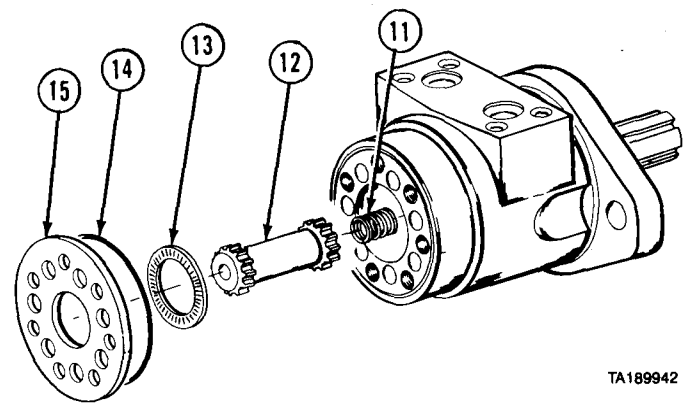


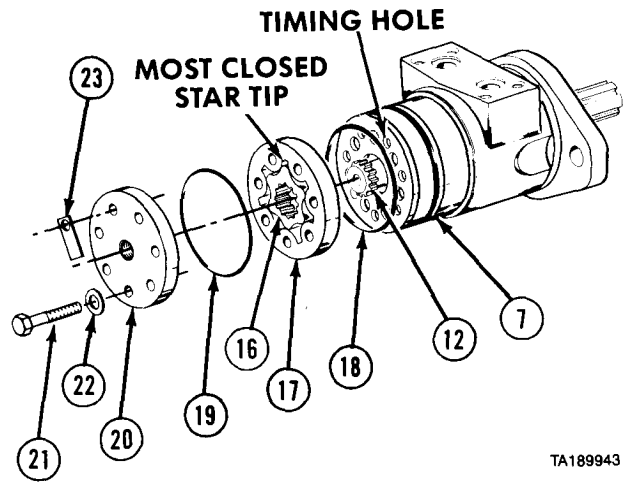
(3) Install bearing (8) and thrust washer (9) on shaft (10).



(4) Aline and install shaft (10) alining any open slot in shaft with timing hole in motor (7).

(5) Install spring (11), shaft (12), bearing (13), preformed packing (14), and plate (15).





(6) Install star (16) in gerotor (17).
(7) Install preformed packing (18).
(8) Aline the most closed star tip in gerotor (17) with timing hole in motor (7).

NOTE

Gerotor may be rotated clockwise 1/2 turn to aline bolt holes.

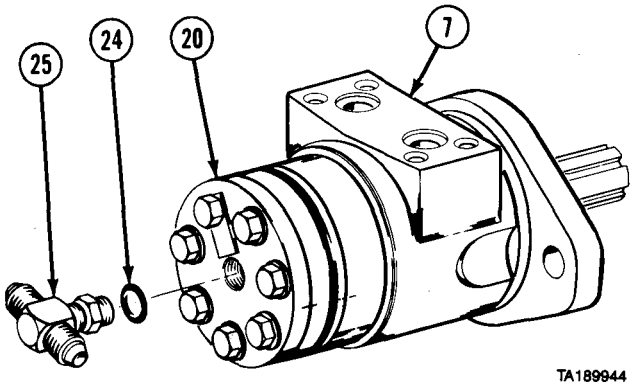
(9) Rotate gerotor (17) clockwise two teeth of shaft (12) and install.
(10) Install preformed packing (19) and end plate (20).

WARNING

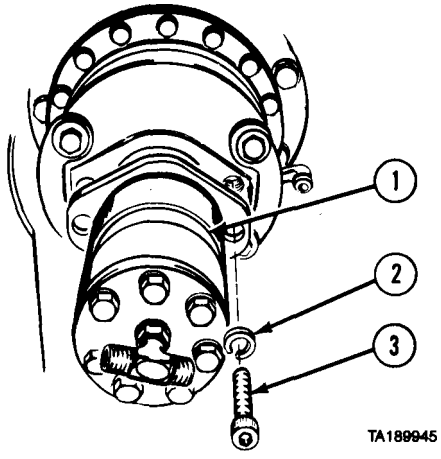
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(11) Apply sealing and thread locking compound to seven screws (21).
(12) Install six washers (22), tag (23), and seven screws (21).

17-7. SWING DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (CONT).



(13) Install preformed packing (24) and tee fitting (25) in end plate (20) on motor (7).



e. Installation. Install motor (1) with two lockwashers (2) and screws (3),

f. Follow-on Maintenance.
(1) Install swing drive valve body (para 17-6).
(2) Connect hydraulic hoses and tubes to swing drive motor (para 17-2).

END OF TASK

17-7.1 SWING DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Adhesive-sealant, silicone, Item 6, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

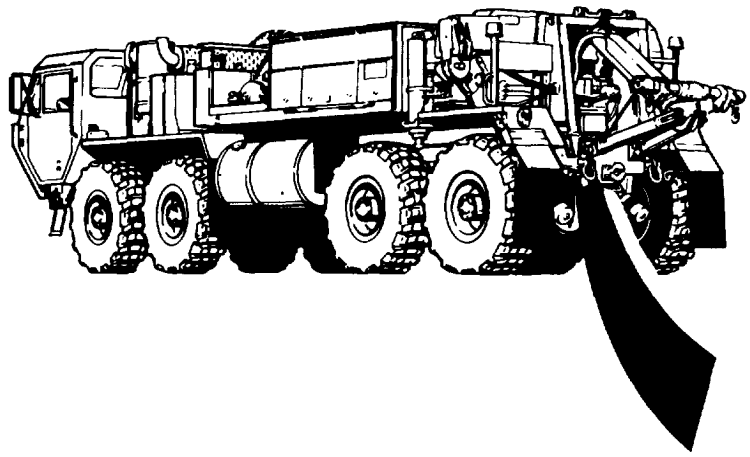
TM or Para	*Condition Description*
Para 17-2.1	Swing drive motor hydraulic hoses and tubes removed.

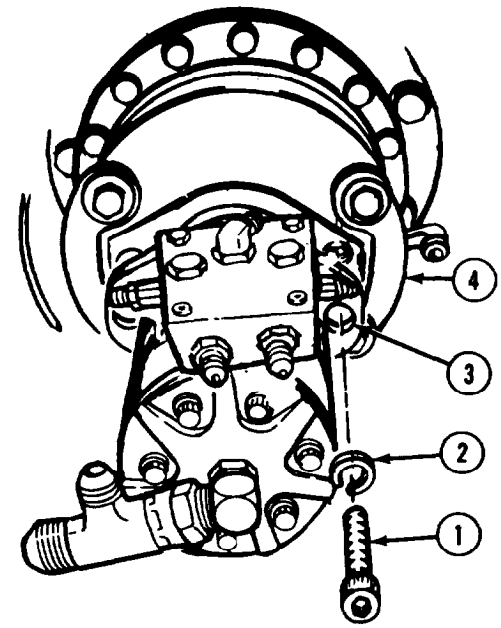
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.





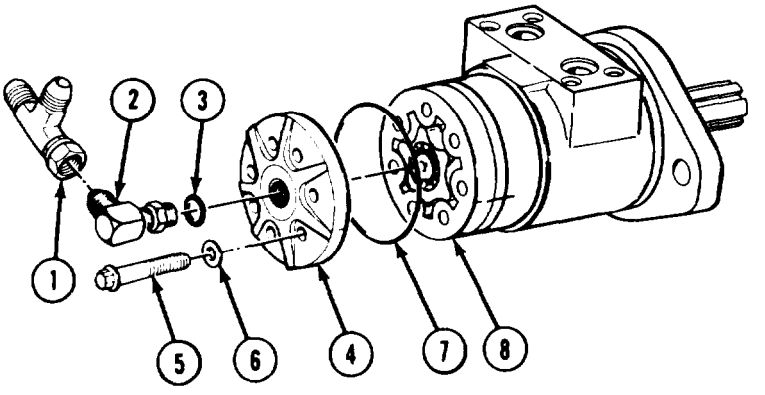
(1) Remove two screws (1) and lockwashers (2)
(2) Remove motor (3) from brake (4).

17-7.1. SWING DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

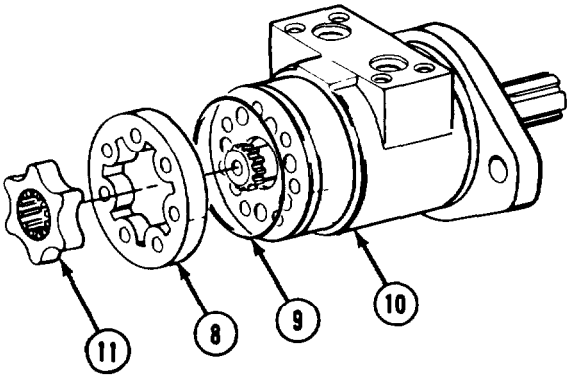
b. Disassembly

NOTE

There are two models of swing drive motors. Model B has a back-up ring and no spacer on gear shaft. Model B motor is equal in size and functional performance and fully interchangeable with Model A. Some internal parts are also interchangeable. refer to TM 9-2320-279-24P for proper identification of parts.



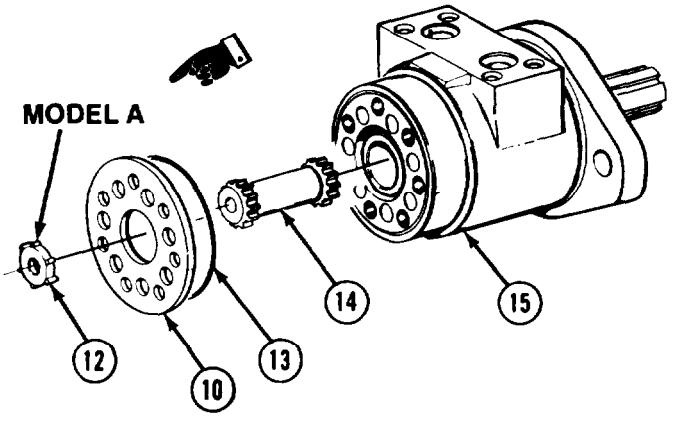
(1) Remove counterbalance valve (para 17-6.1).
(2) Remove tee fitting (1) from elbow (2).
(3) Remove elbow (2) and preformed packing (3) from end plate (4).
(4) Remove seven screws (5), washers (6), end plate (4), and preformed packing (7) from gear assembly (8).
(5) Remove gear assembly (8) and preformed packing (9) from plate (10).
(6) Remove star (11) from gear assembly (8).



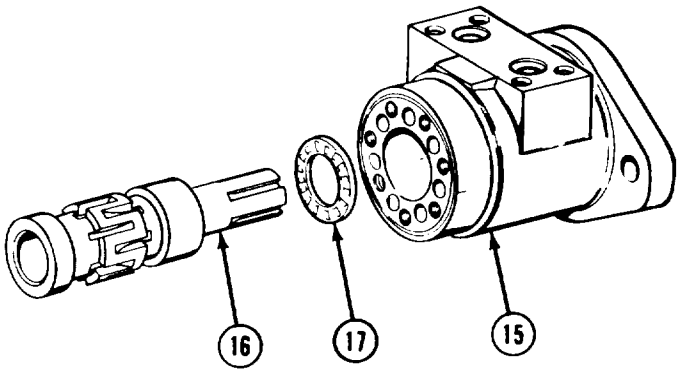
NOTE

Model B motor has no spacer. Skip step *(7)* for Model B.

(7) Remove spacer (12) from gear shaft (14).
(8) Remove plate (10), preformed packing (13), and gear shaft (14) from motor (15).



(9) Remove shouldered shaft (16) and thrust bearing (17) from motor (15).



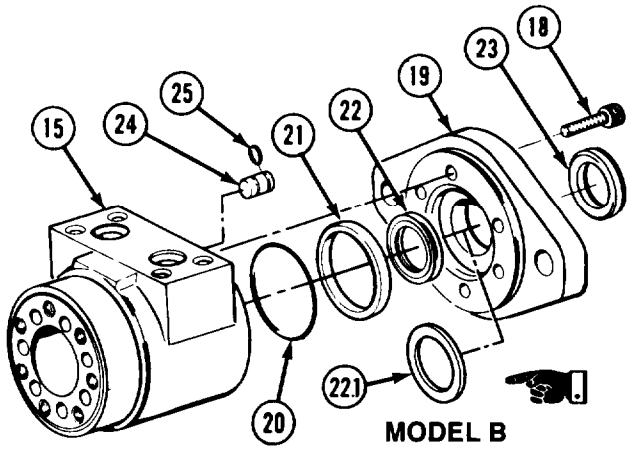
(10) Remove four screws (18), mounting flange (19), and preformed packing (20) from motor (15).

NOTE

Model B has a backup ring. Do step *11.1* for Model B.

(11) Remove thrust washer (21), seal (22) and seal (23) from mounting flange (19).

(11.1) Remove thrust washer (21), seal (22), back-up ring (22.1), and seal (23) from mounting flange (19).



c. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. lb avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in drycleaning solvent.

(2) Inspect each part for damage.

(3) Replace damaged parts.

d. Assembly

NOTE

There are two models of swing drive motors. Model B has a backup ring and no spacer on gearshaft.

(1) Install preformed packing (1) and plug (2) in motor (3).

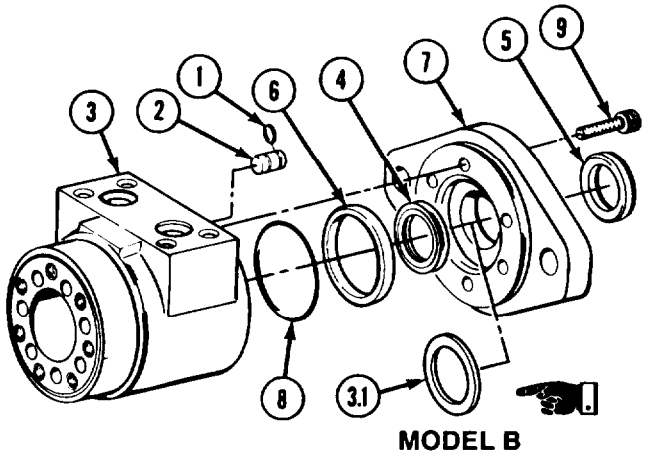
NOTE

Model B has a backup ring. Do step *(2.1)* for Model B

(2) Install seal (4) and seal (5), and thrust washer (6) in mounting flange (7).

(2.1) Install backup ring (3.1), seal (4), seal (5) and thrust washer (6) in mounting flange (7).

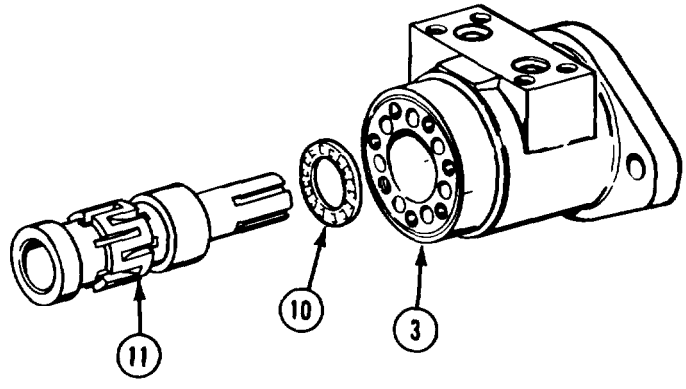
(3) Install preformed packing (8), mounting flange (7) and four screws (9) on motor (3).



17-7.1. SWING DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

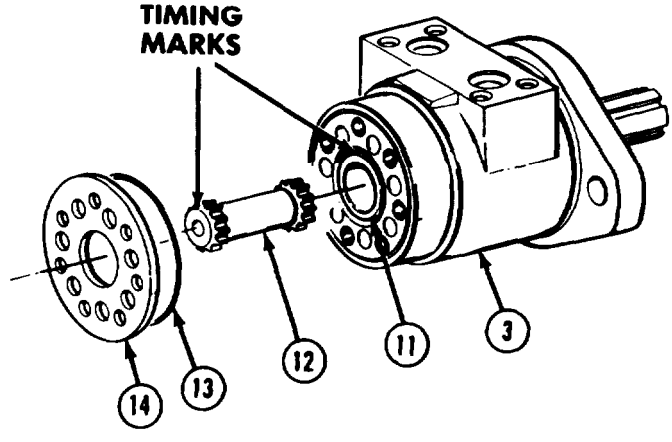
(4) Install thrust bearing (10) on shouldered shaft (11).

(5) Install shouldered shaft (11) in motor (3).



(6) Install gear shaft (12), preformed packing (13), and plate spacer (14) on motor (3).

(7) Aline timing mark on gear shaft (12) with timing mark on shouldered shaft (11).



(8) Install star (15) in gear assembly (16).

(9) Install preformed packing (17), gear assembly (16) and aline any star tip with timing mark on gear shaft (12).

NOTE

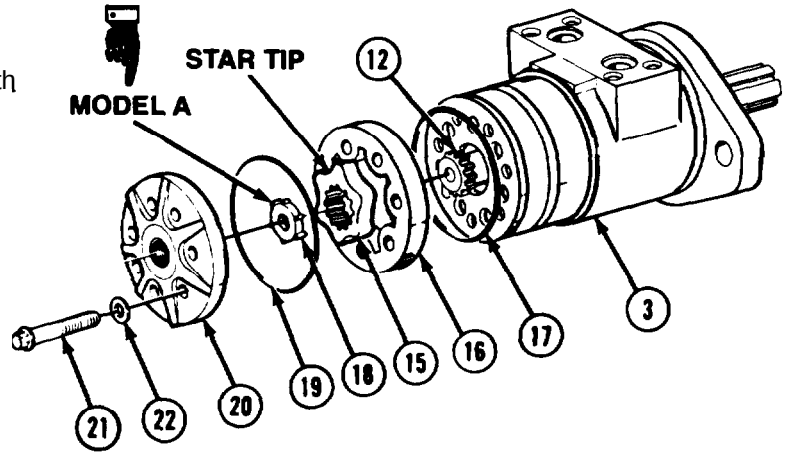
Model B has no spacer. Skip step *(10)* for Model B.

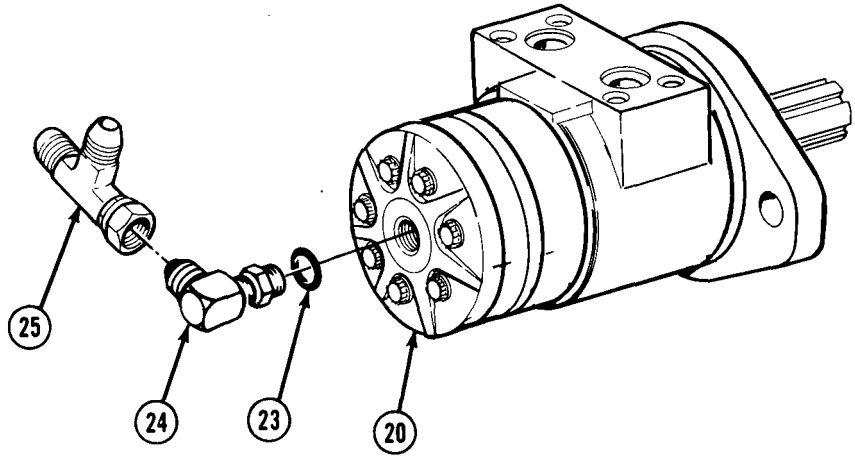
(10) Install spacer (18) in motor (3).

(11) Install preformed packing (19) and end plate (20).

(12) Apply thread locking and sealing compound to seven screws (21).

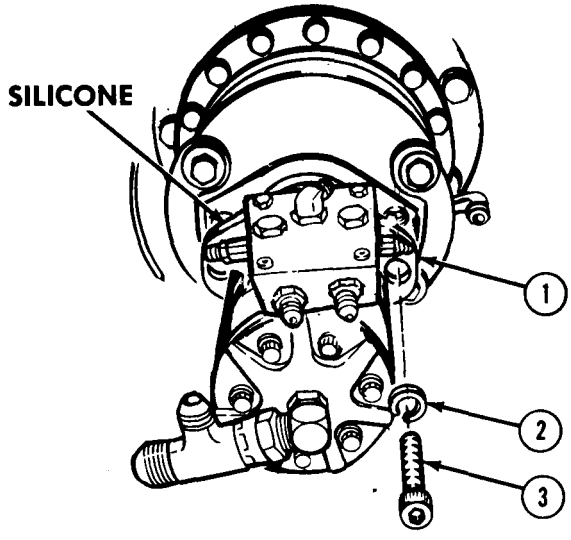
(13) Install seven washers (22) and screws (21).





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(14) Install preformed packing (23), elbow (24) and tee fitting (25) in end cap (20).
(15) Install counterbalance valve (para 17-6. 1).



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e. Installation. Apply silicone and install motor (1) with two lockwashers (2) and screws (3).

f. Follow-on Maintenance. Connect hydraulic hoses and tubes to swing drive motor (para 17-2.1).

END OF TASK

17-8. SWING DRIVE BRAKE REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Adhesive-sealant, silicone, Item 6, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-7	Swing drive motor removed.
Para 17-2	Swing drive brake hydraulic line removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

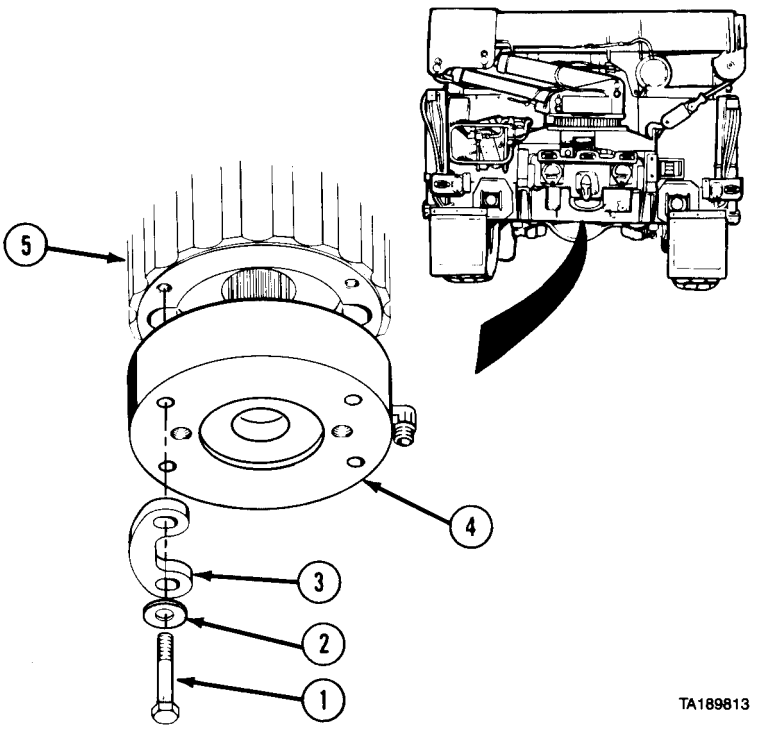
a. Removal.

(1) Remove four screws (1), washer (2), and two brackets (3) from brake (4).

NOTE

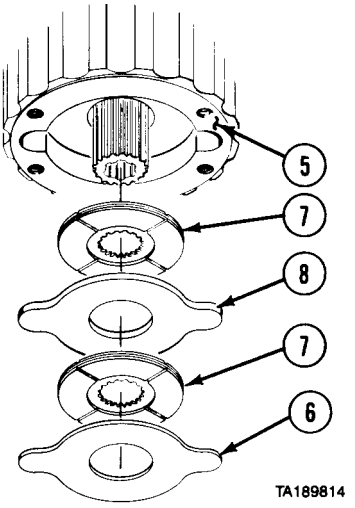
Disc and stators may drop down when brake is removed.

(2) Remove brake (4) from swing drive unit (5).



17-8. SWING DRIVE BRAKE REMOVAL/REPAIR/INSTALLATION (CONT).

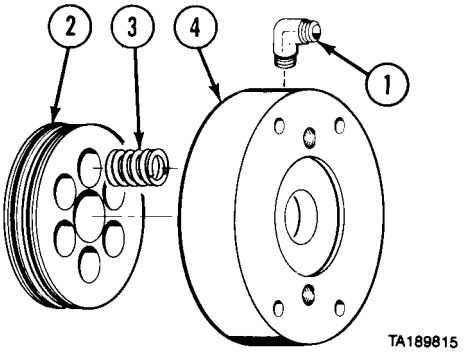
(3) Remove stator (6), disc (7), stator (8), and disc (7) from swing drive unit (5).



b. Disassembly.

(1) Remove elbow (1).

(2) Remove piston head assembly (2) and six springs (3) from brake (4).

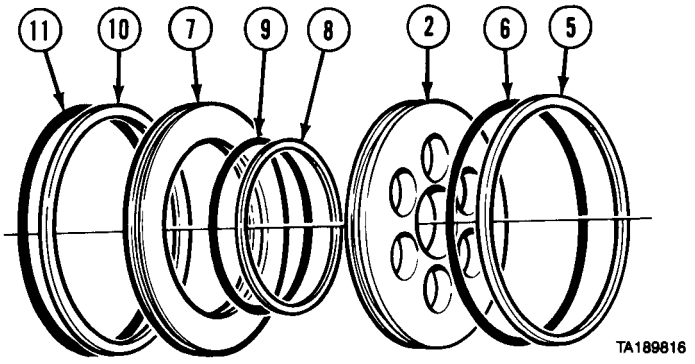


(3) Remove backup ring (5) and preformed packing (6) from head (2).

(4) Remove head (2) from piston (7).

(5) Remove backup ring (8) and preformed packing (9) from piston (7).

(6) Remove backup ring (10) and preformed packing (11).



c. Cleaning/Inspection.

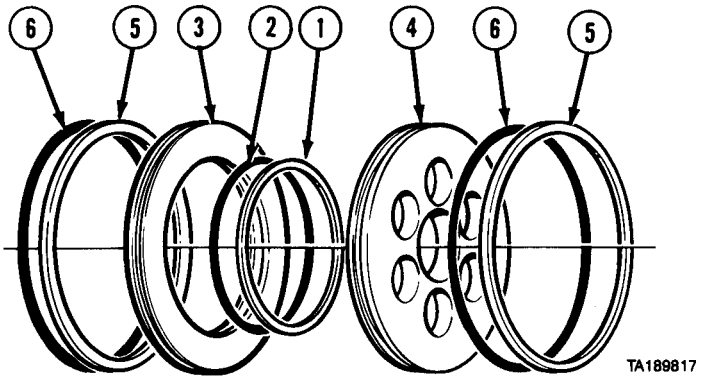
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Inspect stator thickness. If stator is under 0.225 in. (5.71 mm), replace stator.
(5) Inspect stator thickness. If stator is under 0.118 in. (2.99 mm), replace stator.
(6) Inspect disc thickness. If disc is under 0.210 in. (5.33 mm), replace disc.
(7) Inspect spring for length. If length is under 0.938 in. (23.8 mm), replace spring.

d. Assembly.

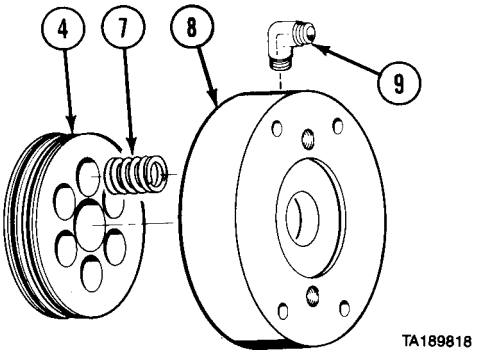
(1) Install backup ring (1) and preformed packing (2) in piston (3).
(2) Install head (4) on piston (3).
(3) Install two preformed packings (5) and backup rings (6).



NOTE

On M985, leave one hole empty between every two springs.

(4) Install piston head assembly (4) and six springs (7) in brake (8).



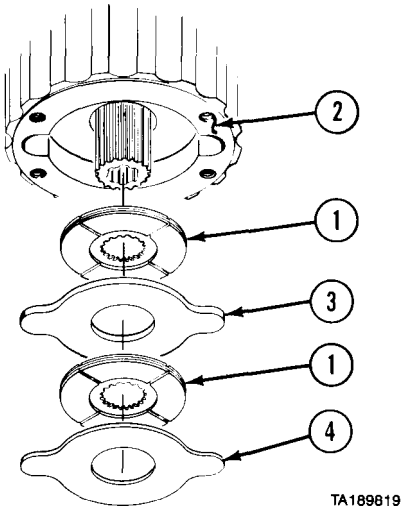
WARNING

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(5) Apply pipe thread sealing compound, and install elbow (9).

17-8. SWING DRIVE BRAKE REMOVAL/REPAIR/INSTALLATION (CONT).

e. Installation.



NOTE

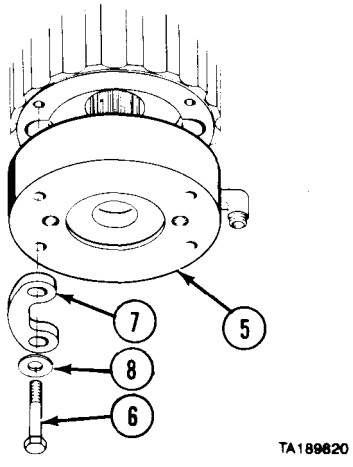
Thick stator is installed first.

(1) Install disc (1) inswing drive unit (2).
(2) Install stator (3), disc (1), and stator (4).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(3) Apply adhesive-sealant to brake (5).
(4) Aline and install brake (5).
(5) Apply sealing and thread locking compound to four screws (6).
(6) Install two brackets (7) with four screws (6) and washers (8).



f. Follow-on Maintenance.
(1) Install swing drive motor (para 17-7).
(2) Install swing drive brake hydraulic line (para 17-2).

END OF TASK

17-8.1. SWING DRIVE BRAKE REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Too1s
None

Supplies
Compound sealing and thread locking, Item 26, Appendix C
Adhesive sealant silicone, Item 5, Appendix C
Compound sealing pipe thread, Item 29, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

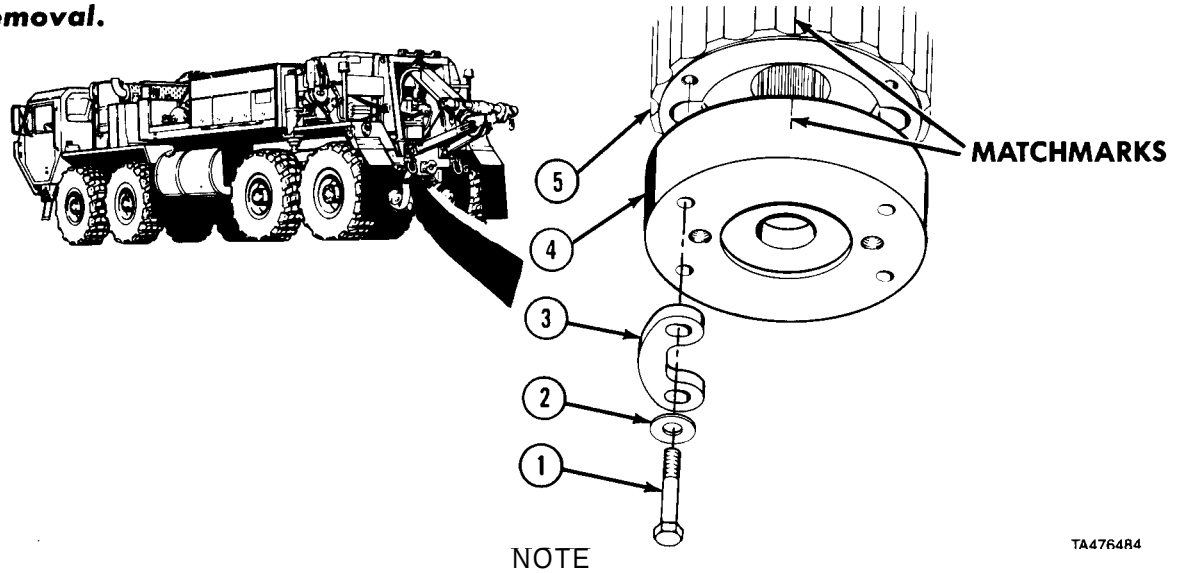
TW or Para	*Condition Description*
Para 17-7.1	Swing drive motor removed.
Para 17-2.1	Swing drive brake hydraulic line removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.



NOTE

Matchmark cylinder housing before removal.

(1) Remove four screws (1), washer (2), and two drive assembly stops (3) from cylinder housing (4).

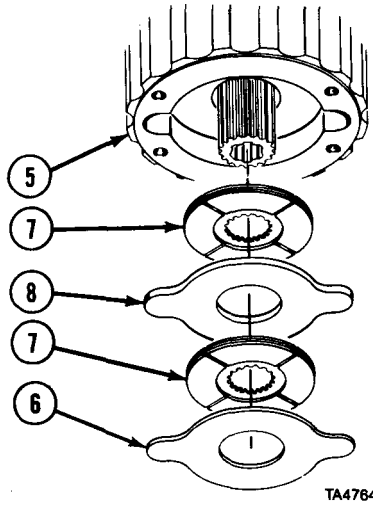
CAUTION

Disc and stators may drop down when brake is removed.

(2) Remove cylinder housing (4) from end cover (5).

17.8.1. SWING DRIVE BRAKE REMOVAL/REPAIR/INSTALLATION (M984EI) (CONT).

(3) Remove stator (6), disc (7), stator (8), and disc (7) from end cover (5).

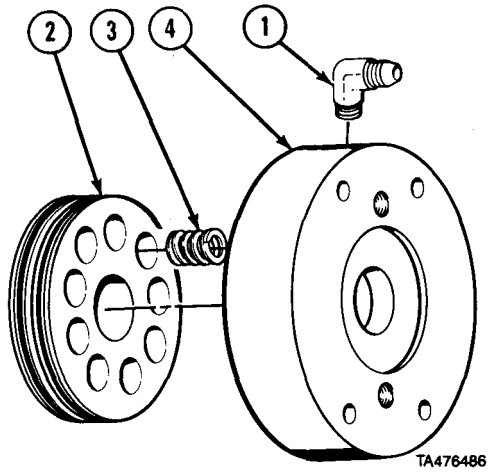


TA476485

b. Disassembly.

(1) Remove elbow (1).

(2) Remove piston assembly (2) and six springs (3) from cylinder housing (4).



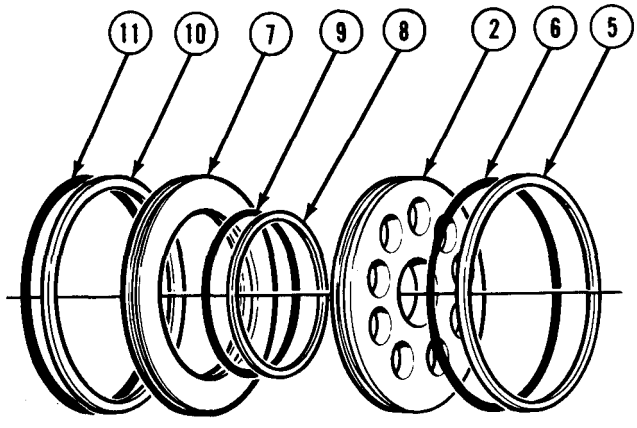
TA476486

(3) Remove packing retainer (5) and preformed packing (6) from piston (2).

(4) Remove piston (2) from cylinder head (7).

(5) Remove packing retainer (8) and preformed packing (9) from cylinder head (7).

(6) Remove packing retainer (10) and preformed packing (11) from cylinder head (7).



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c. Cleaning/Inspection.

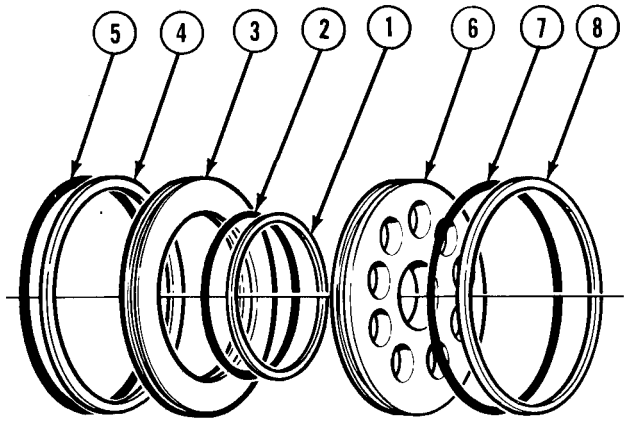
WARNING

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(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Inspect inner stator for thickness. If stator is under 0.225 in. (5.71 mm), replace stator.
(5) Inspect outer stator for thickness. If stator is under 0.118 in. (2.99 mm), replace stator.
(6) Inspect disc thickness. If disc is under 0.210 in. (5.33 mm), replace disc.
(7) Inspect spring for length. If length is under 0.938 in. (23.8 mm), replace spring.

d. Assembly.

(1) Install packing retainer (1) and preformed packing (2) in cylinder head (3).
(2) Install packing retainer (4) and preformed packing (5) on cylinder head (3).
(3) Install piston brake (6) in cylinder head (3).
(4) Install preformed packing (7) and packing retainer (8) on piston brake (6).

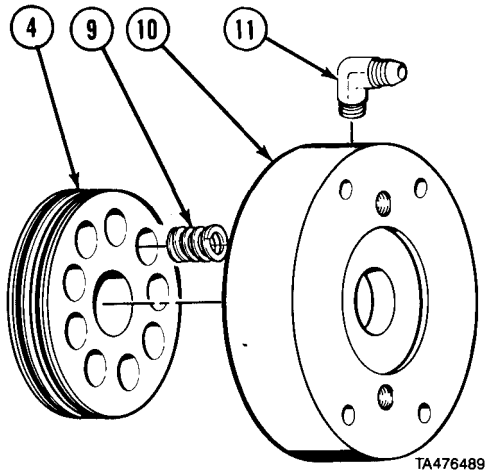


TA476488

NOTE

Leave one hole empty between every two springs.

(5) Install piston brake (4) and six springs (9) in cylinder housing (10).
(6) Apply pipe sealing compound, and install elbow (11).



TA476489

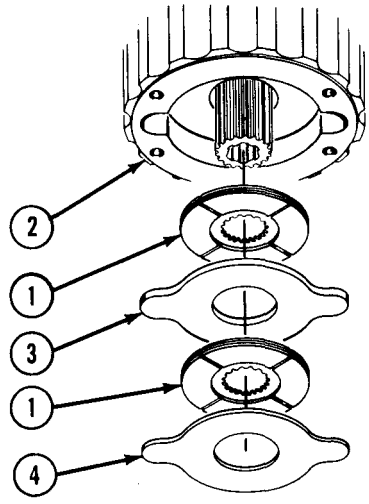
17-8.1 SWING DRIVE BRAKE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT)

e. Installation.

NOTE

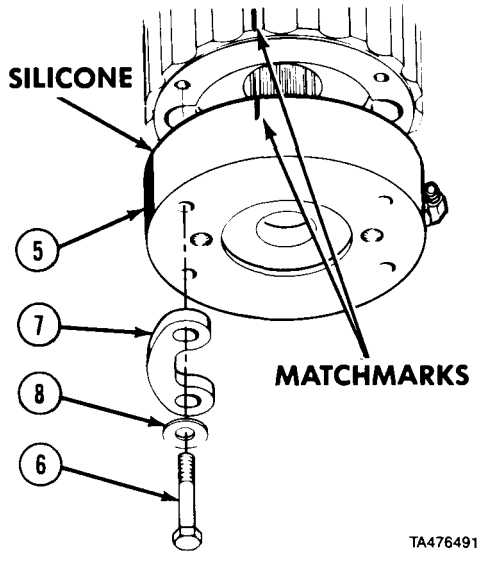
Thick stator is installed first.

(1) Install disc (1) in end cover (2).
(2) Install stator (3), disc (1), and stator (4).



TA476490

(3) Apply silicone sealant to brake (5).
(4) Aline and install brake (5).
(5) Apply thread locking compound to four screws (6).
(6) Install two brackets (7) with four screws (6) and washers (8).



TA476491

f. Follow-on Maintenance. Install swing drive motor (para 17-7.1).

END OF TASK

17-9. SWING DRIVE REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Fabricated Tools
Spanner Socket, Appendix B, Figure 11

Supplies
Adhesive-sealant, silicone, Item 6, Appendix C
Compound, sealing and thread locking, Item 26, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)
MOS 44B, Metal worker repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-8	Swing drive brake removed.

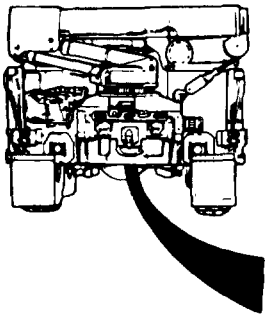
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

(1) Attach suitable lifting device.
(2) Remove nine screws (1) and washers (2).
(3) Remove swing drive (3).



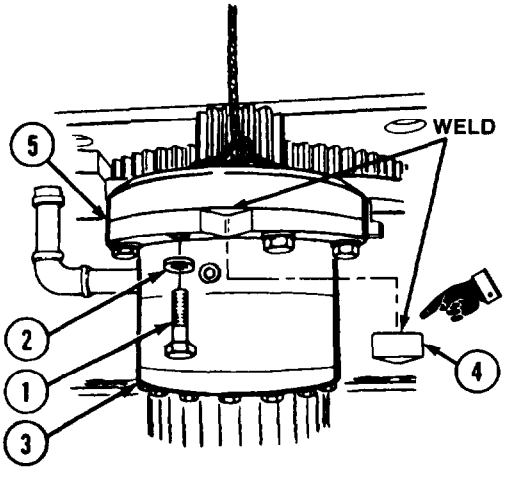
WARNING

DO NOT grind or sand painted equipment without high-efficiency air purifying respirators in use.

NOTE

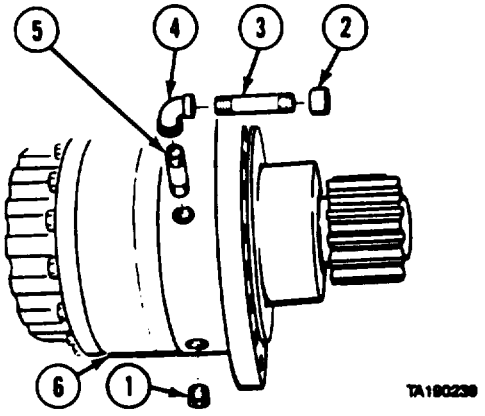
If new swing drive is to be used, wedges must be ground off and rewelded. If existing swing drive is to be repaired, wedges do not need to be removed.

(4) Using a grinder to remove weld, remove two wedges (4) from frame ring (5).

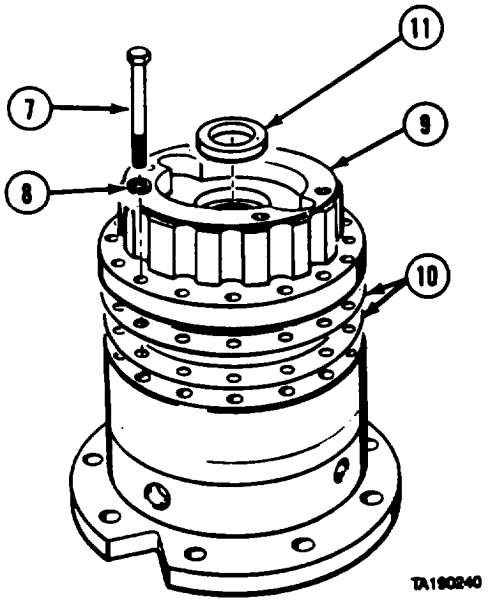


17-9. SWING DRIVE REMOVAL/REPAIR/INSTALLATION (CONT).

b. Disassembly.



(1) Remove two plugs (1). Drain oil in suitable container.
(2) Remove cap (2), pipe (3), elbow (4), and pipe (6) from swing drive (6).

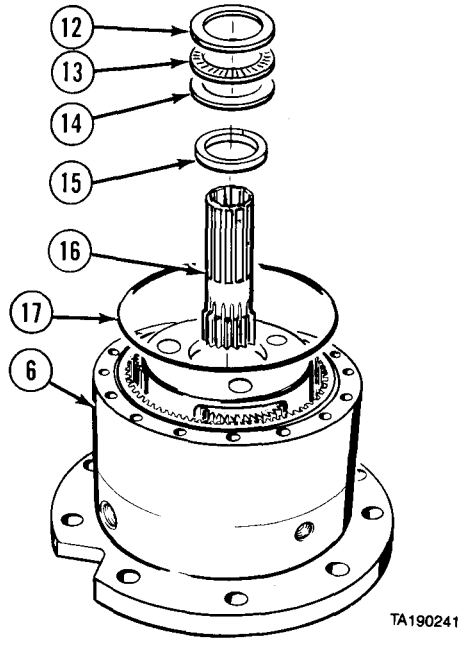


NOTE

Amount of shims required may vary from one swing drive to another.

(3) Remove 16 screws (7) and lockwashers (8).
(4) Remove end cover (9) and shims (10).
(5) Remove oil seal (11) from end cover (9).

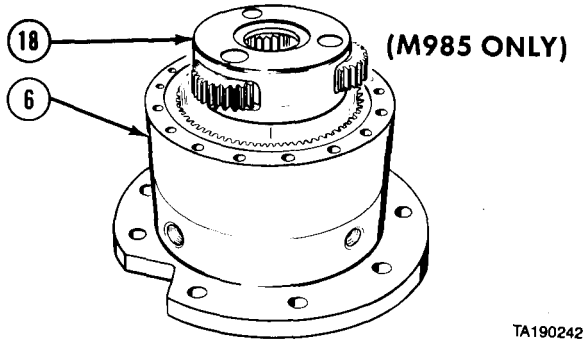
(6) Remove race (12), bearing (13), race (14), and spacer (15).
(7) Remove sun gear (16) and preformed packing (17) from swing drive (6).



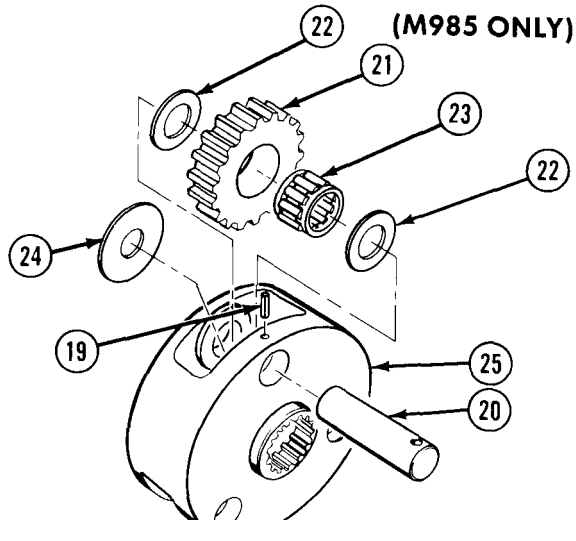
NOTE

- M985 has two planetary assemblies. M977 has one.
- Steps *(8)* through *(16)* are for M985 only.

(8) Remove planetary assembly (18) from swing drive (6).

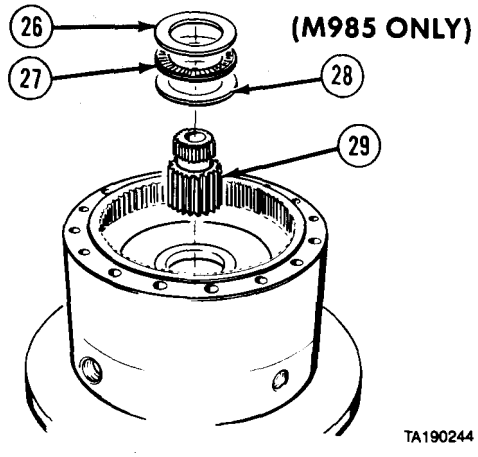


(9) Drive roll pin (19) into pin (20).
(10) Remove pin (20), gear (21), and two spacers (22).
(11) Remove roll pin (19) from pin (20).
(12) Remove bearing (23) from gear (21).
(13) Repeat steps *(9)* through *(12)* for other two assemblies.
(14) Remove center spacer (24) from carrier (25).

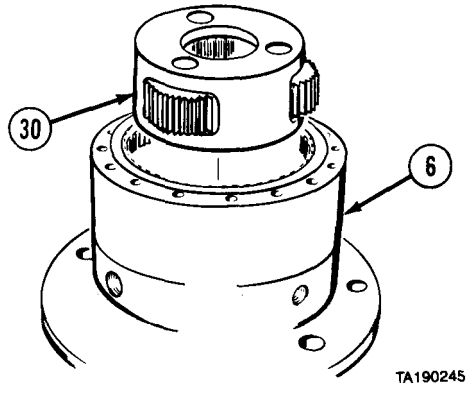


17-9. SWING DRIVE REMOVAL/REPAIR/INSTALLATION (CONT).

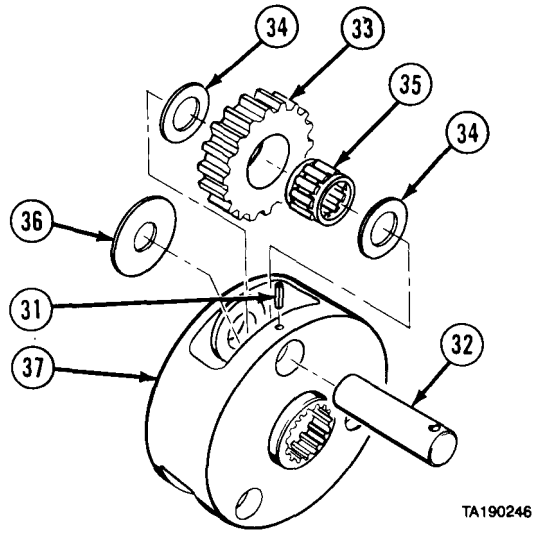
(15) Remove race (26), bearing (27), and race (28).
(16) Remove secondary sun gear (29).



(17') Remove planetary assembly (30) from swing drive (6).



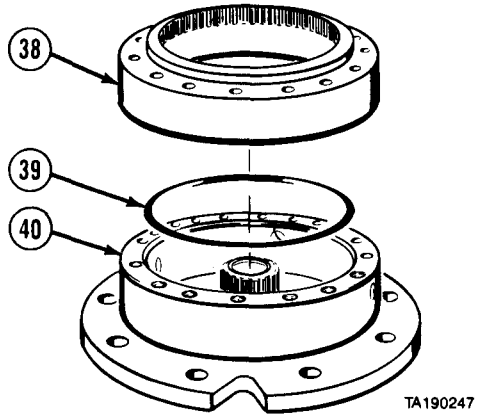
(18) Drive roll pin (31) into pin (32).
(19) Remove pin (32), gear (33), and two spacers (34).
(20) Remove roll pin (31) from pin (32).
(21) Remove bearing (35) from gear (33).
(22) Repeat steps *(18)* through *(21)* for other two assemblies.
(23) Remove center spacer (36) from carrier (37).



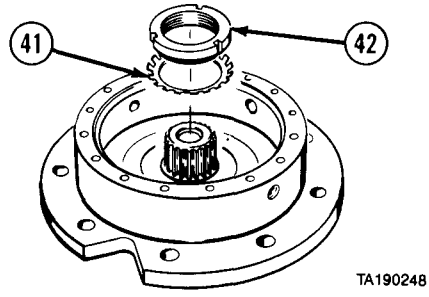
NOTE

Matchmark ring gear and hub.

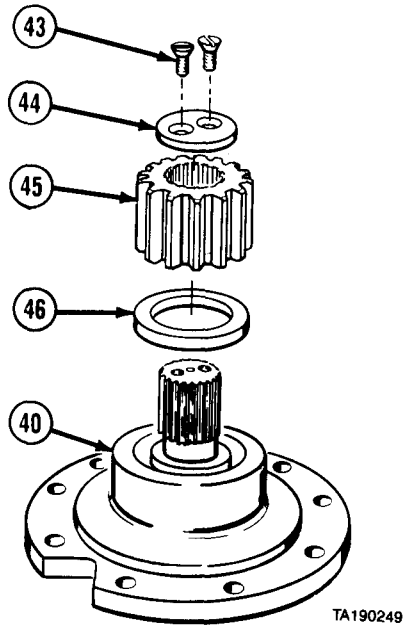
(24) Remove ring gear (38) and preformed packing (39) from hub (40).



(25) Bend down tang of lockwasher (41).
(26) Remove nut (42) with spanner socket and lockwasher (41).

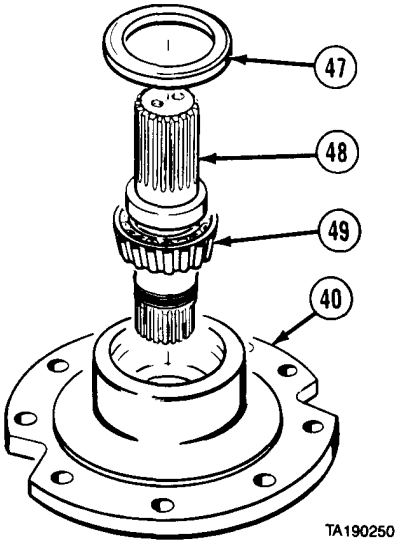


(27) Remove two screws (43), plate (44), gear (45), and spacer (46) from hub (40).



17.9. SWING DRIVE REMOVAL/REPAIR/INSTALLATION (CONT).

(28) Remove seal (47), shaft (48), and bearing (49) from hub (40).
(29) Remove bearing (49) from shaft (48).



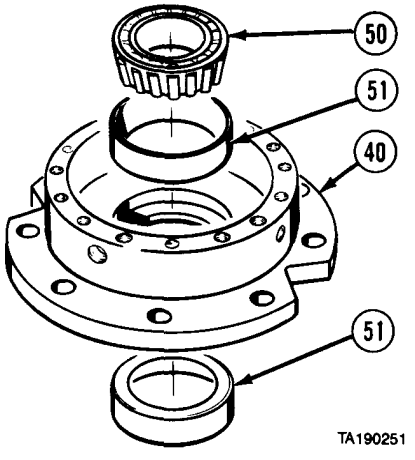
(30) Remove bearing (50) from hub (40).
(31) Remove two races (51).

c. Cleaning/Inspection.

WARNING

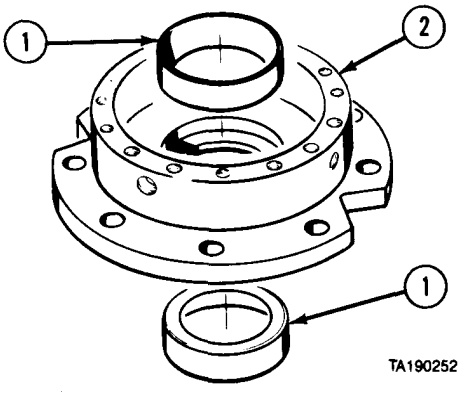
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

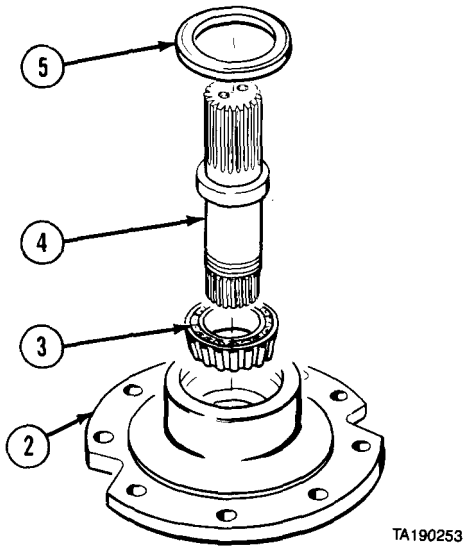
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.



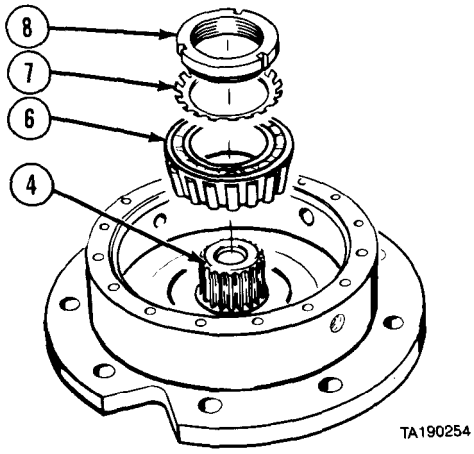
d. Assembly.

(1) Install two races (1) in hub (2).



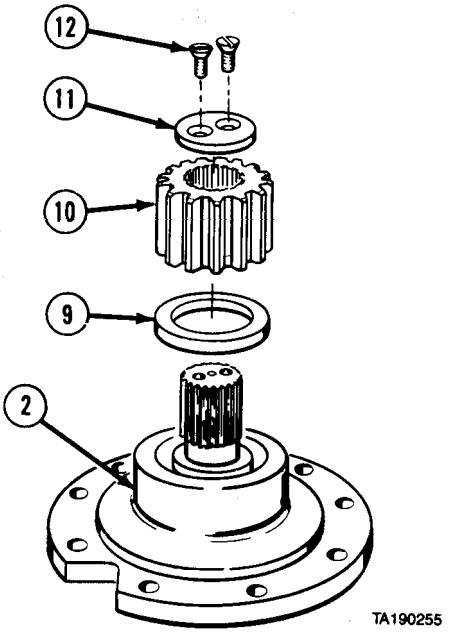


(2) Install bearing (3) on shaft (4).
(3) Install shaft (4) and bearing (3) in hub (2).
(4) Install seal (5) in hub (2).



(5) Install bearing (6).
(6) Install lockwasher (7) and nut (8).
(7) Tighten nut (8) until shaft (4) starts to turn.
(8) Hold shaft (4) and tighten nut (8) until one tang on lockwasher (7) alines with slot in nut (8).
(9) Bend tang of lockwasher (7) up in slot of nut (8).

17-9. SWING DRIVE REMOVAL/REPAIR/INSTALLATION (CONT).

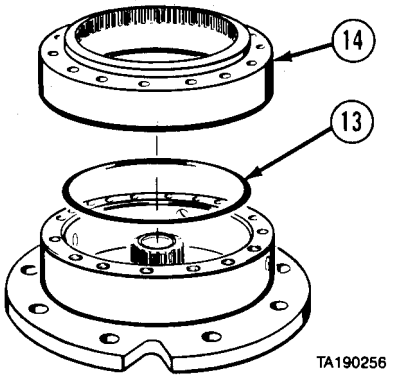


(10) Install spacer (9), gear (10), and plate (11) on hub (2).

WARNING

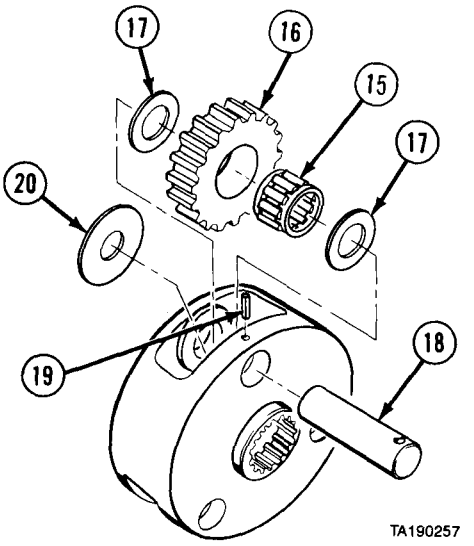
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(11) Apply sealing and thread locking compound and install two screws (12).

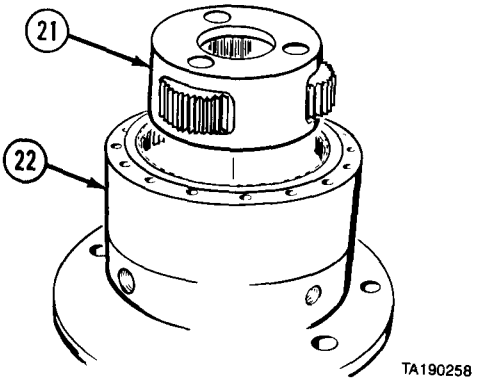


(12) Apply adhesive-sealant and install preformed packing (13).
(13) Install ring gear (14).

(14) Install bearing (15) in gear (16).
(15) Install gear (16), two spacers (17), with pin (18), and roll pin (19).
(16) Repeat steps *(14)* and *(15)* for other two assemblies.
(17) Install center spacer (20).



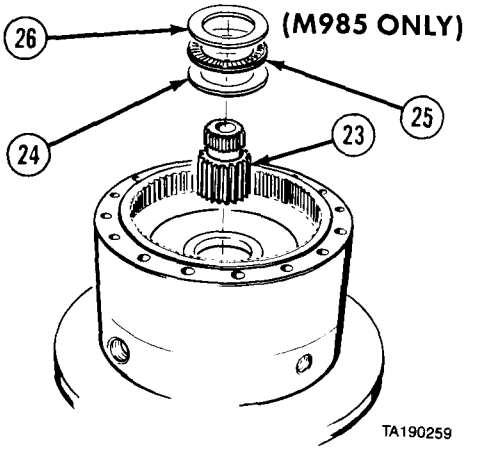
(18) Install planetary assembly (21) in swing drive (22).



NOTE

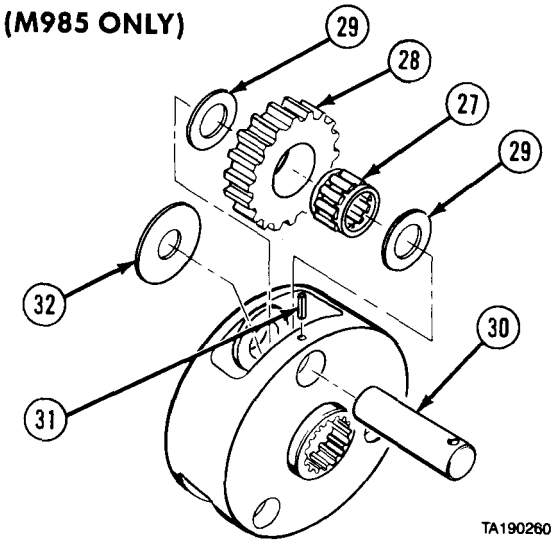
- M985 uses two planetary assemblies. M977 uses only one.
- Steps *(19)* through *(24)* are for M985 only.

(19) Install sun gear (23), race (24), bearing (25), and race (26).

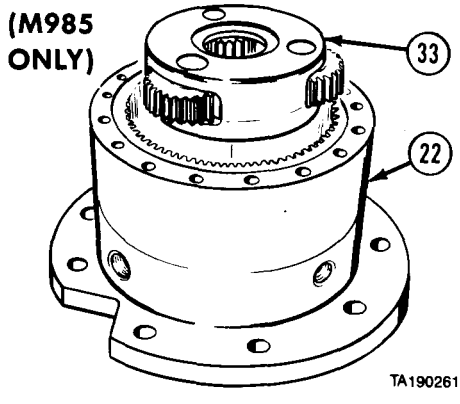


17-9. SWING DRIVE REMOVAL/REPAIR/INSTALLATION (CONT).

(20) Install bearing (27) in gear (28).
(21) Install gear (28) and two spacers (29), with pin (30), and roll pin (31).
(22) Repeat steps *(20)* and *(21)* for other two assemblies.
(23) Install center spacer (32).



(24) Install planetary assembly (33) in swing drive (22).



WARNING

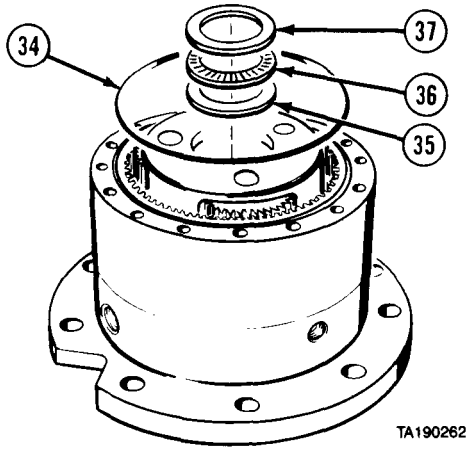
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

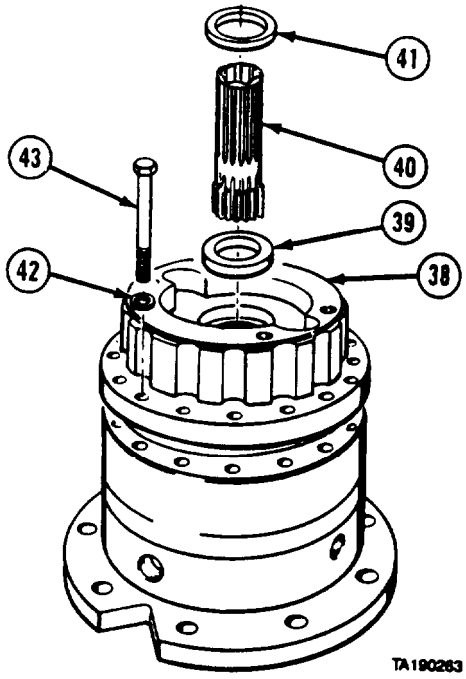
(25) Apply silicone adhesive-sealant and install preformed packing (34).

NOTE

Install thin race first.

(26) Install race (35), bearing (36), and race (37).



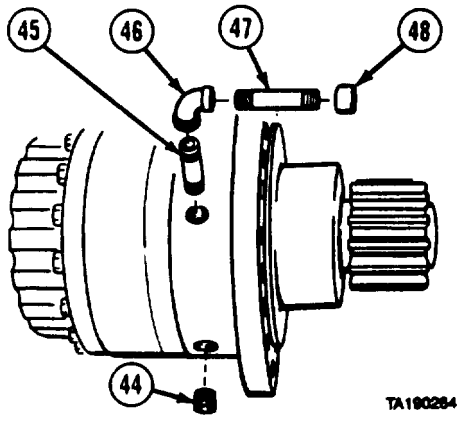


(27) Install end cover (38) loosely.

NOTE

Movement is checked through hole in end cover.

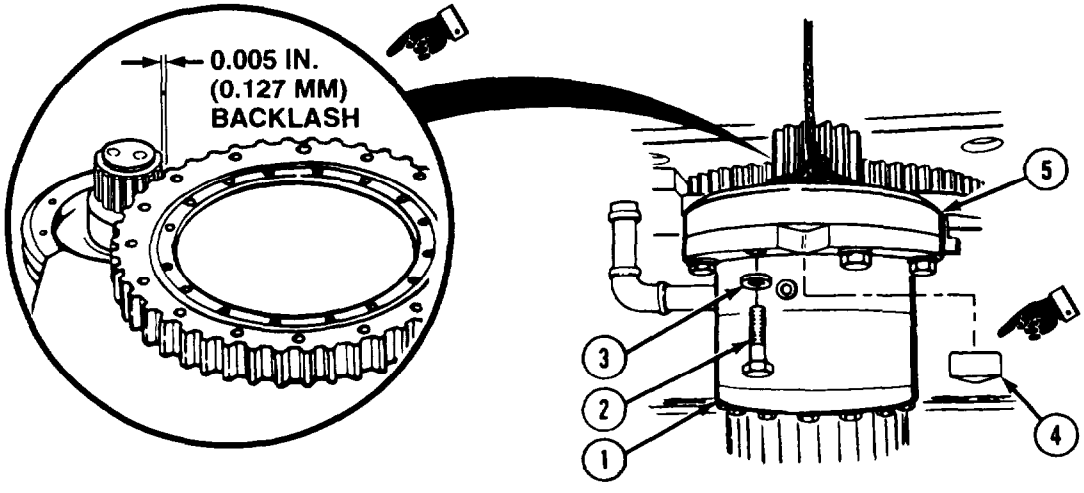
(28) Check for free movement by raising planetary assembly up and down.
(29) If no movement is felt, install shims in progressions of 0.002 in. (0.06 mm) until movement is felt.
(30) Remove end cover (38) and install oil seal (39).
(31) Install sun gear (40) and spacer (41).
(32) Install end cover (38).
(33) Apply sealing and thread locking compound and install 16 lockwashers (42) and screws (43).



(34) Apply pipe thread sealing compound and install two plugs (44).
(35) Apply pipe thread sealing compound and install pipe (45), elbow (46), pipe (47), and cap (48).

17-9. SWING DRIVE REMOVAL/REPAIR/INSTALLATION (CONT).

e. Installation.



(1) Aline swing drive (1).
(2) Adjust swing drive (1) backlash to 0.005 in. (0.127 mm).

NOTE

If wedges were not removed, go to step *(8).*

(3) Install two screws (2) and washers (3). Tighten screws. Do not remove lifting device.

CAUTION

Disconnect battery cables and electrical connectors from all sensitive electrical components prior to electric welding. Electrical current from welder may cause damage to equipment.

(4) Disconnect battery cables and electrical connectors from all electrical equipment.

WARNING

Unsafe welding practices can cause serious injury from fire, explosions, or harmful agents. Allow only authorized personnel to weld or cut metals and follow safety precautions in TM 9-237. Protective clothing and goggles must be worn; adequate protective equipment used, a suitable fire extinguisher kept nearby, and requirements of TM 9-237 strictly followed.

(5) With the aid of a welder, tack-weld two wedges (4) to frame ring (5).
(6) Remove two screws (2), washers (3), and swing drive (1).
(7) With the aid of a welder, weld two wedges (4) to frame ring (5).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(8) Apply sealing and thread locking compound to nine screws (2).
(9) Install swing drive (1) with nine screws (2) and washers (3).

NOTE

Skip step (10) if wedges were not welded.

(10) Reconnect electrical connectors and battery cables.

f. Follow-on Maintenance.

(1) Install swing drive brake (para 17-8).
(2) Fill swing drive with oil (LO 9-2320-279-12).

17-9.1. SWING DRIVE REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Fabricated Tools
Spanner Socket, Appendix B, Figure 11

Supplies
Adhesive-sealant, silicone, Item 5, Appendix C
Compound, sealing and thread locking, Item 26, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)
MOS 44B, Metal worker repairer

References
None

Equipment Condition

TM or Pam	*Condition Description*
Para 17-8.1	Swing drive brake removed.
TM 9-2320-279-20	No. 4 left air brake lines removed.
TM 9-2320-279-20	Left gladhand bracket removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

(1) Attach suitable lifting device.
(2) Remove nine screws (1) and washers (2).
(3) Remove swing drive (3).

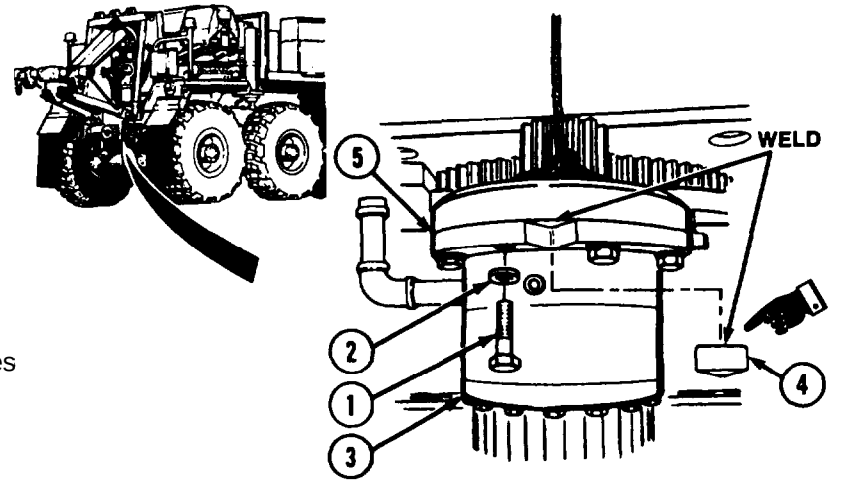
WARNING

DO NOT grind or sand painted equipment without high-efficiency air purifying respirators in use.

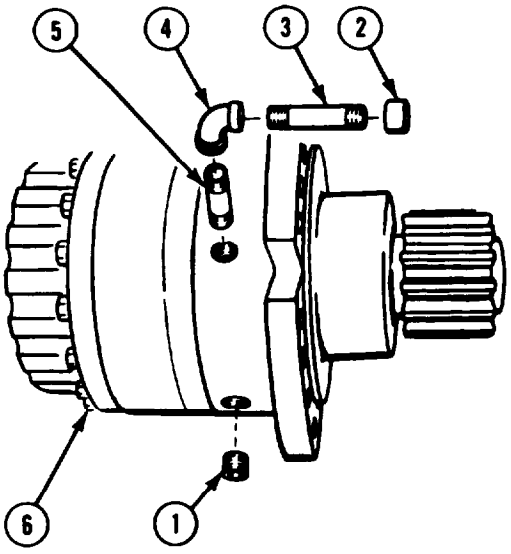
NOTE

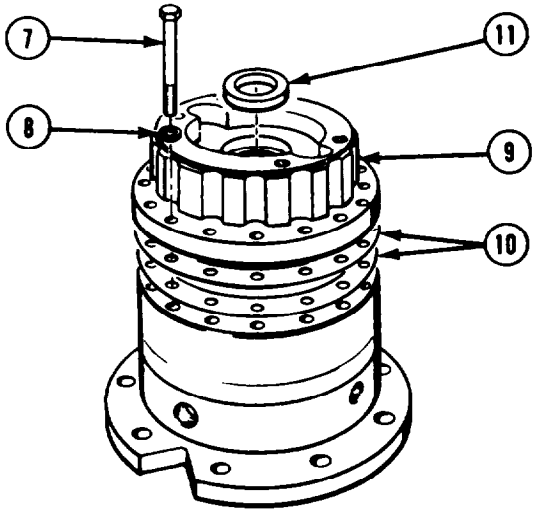
If new swing drive is to be used, wedges must be ground off and rewelded. If existing swing drive is to be repaired, wedges do not need to be removed.

(4) Using a grinder to remove weld, remove two wedges (4) from frame rings (5).



17-9.1 SWING DRIVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).





b. Disassembly.

(1) Remove two plugs (1) and drain oil in suitable container.
(2) Remove cap (2), pipe (3), elbow (4), and pipe (5) from swing drive (6).
(3) Remove 16 screws (7) and lockwashers (8).

NOTE

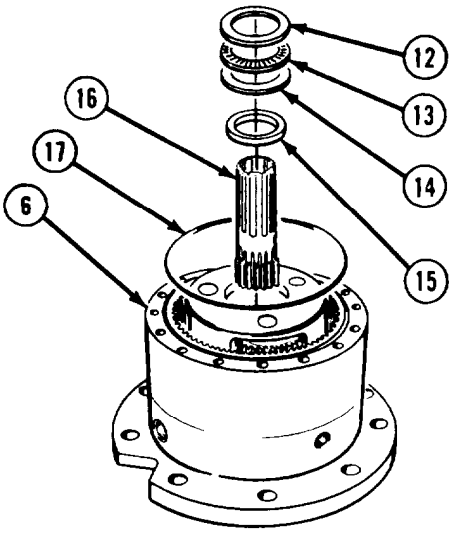
Amount of shims may vary from swing drive to swing drive.

(4) Remove end cover (9) and shims (10).
(5) Remove oil seal (11) from end cover (9).

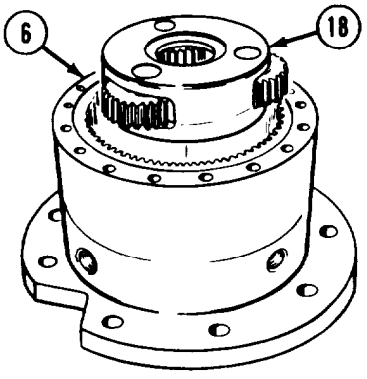
M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

(6) Remove race (12), bearing (13), race (14), and spacer (15).

(7) Remove sun gear (16) and preformed packing (17) from swing drive (6).



(8) Remove planetary assembly (18) from swing drive (6).



(9) Drive roll pin (19) into pin (20).

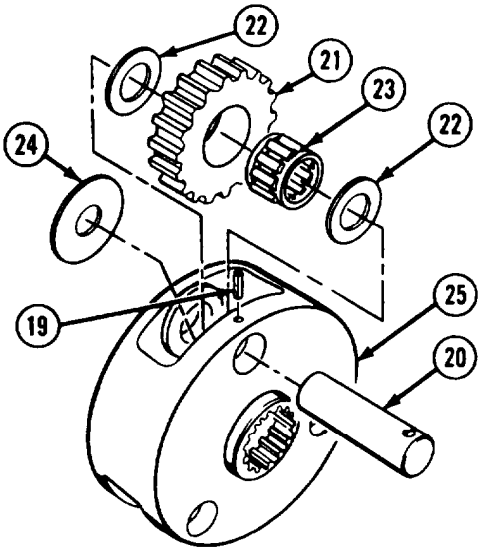
(10) Remove pin (20), gear (21) and two spacers (22).

(11) Remove roll pin (19) from pin (20).

(12) Remove bearing (23) from gear (21).

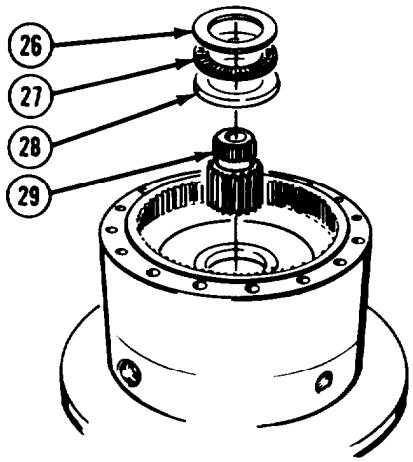
(13) Repeat steps (9) thru (13) for other two assemblies.

(14) Remove center spacer (24) from carrier (25).

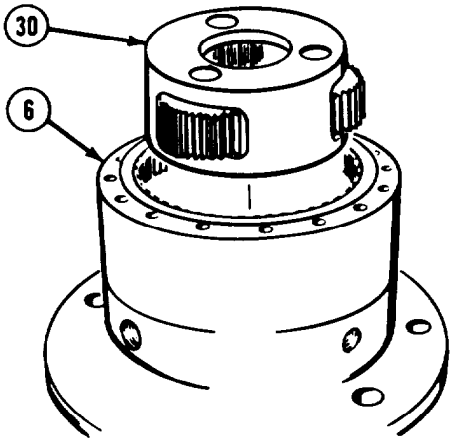


17-9.1 SWING DRIVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

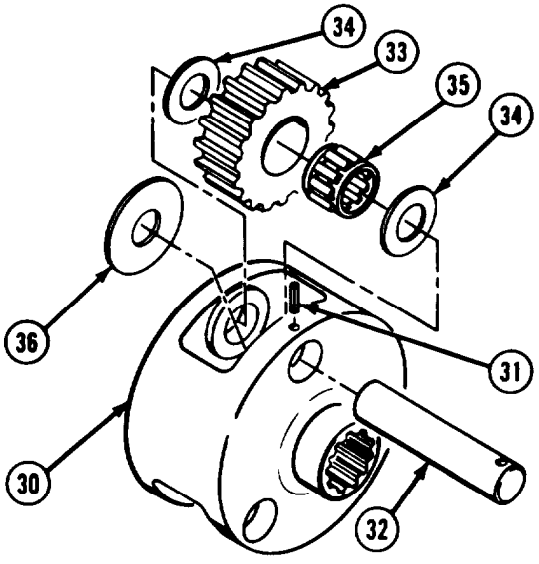
(15) Remove race (26), bearing (27), and race (28).
(16) Remove secondary sun gear (29).



(17) Remove planetary assembly (30) from swing drive (6).

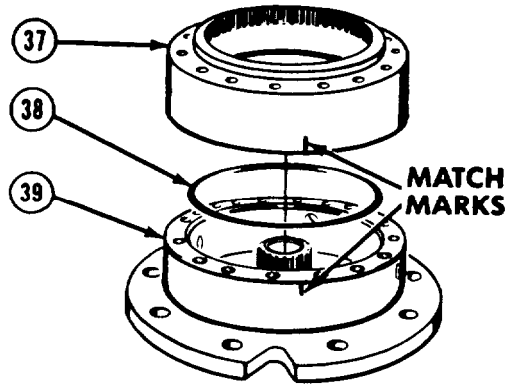


(18) Drive roll pin (31) into pin (32).
(19) Remove pin (32), gear (33), and two spacers (34).
(20) Remove roll pin (31) from pin (32).
(21) Remove bearing (35) from gear (33).
(22) Repeat steps *(18)* thru *(21)* for other two assemblies.
(23) Remove center spacer (36) from planetary assembly (30).

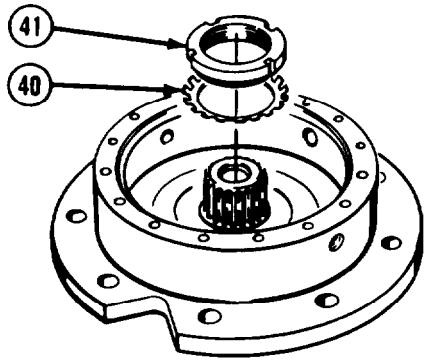


NOTE
Matchmark ring gear with hub.

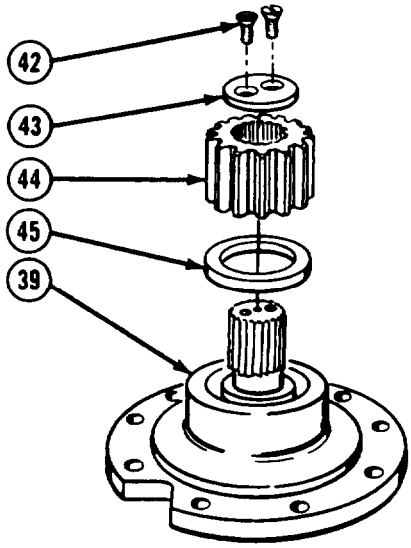
(24) Remove ring gear (37) and preformed packing (38) from hub (39).



(25) Bend down tang of lockwasher (40).
(26) Remove nut (41) with spanner socket and lockwasher (40).

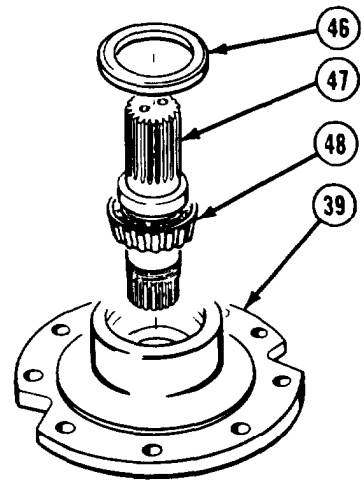


(27) Remove two screws (42), plate (43), gear (44), and spacer (45) from hub (39).

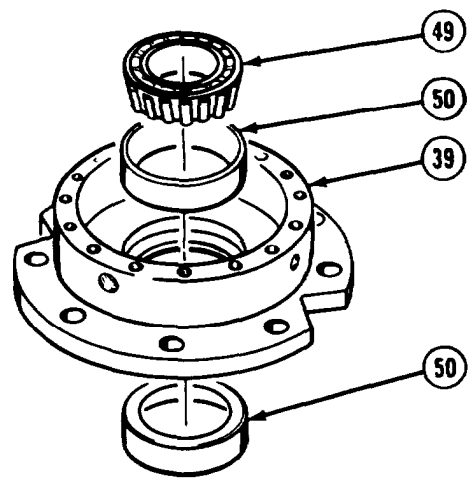


17-9.1 SWING DRIVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(28) Remove seal (46), shaft (47) and bearing (48) from hub (39).
(29) Remove bearing (48) from shaft (47).



(30) Remove bearing (49) from hub (39).
(31) Remove two races (50).



c. Cleaning/Inspection.

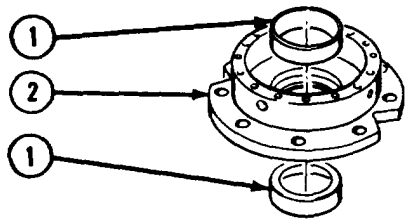
WARNING

- Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.
- Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

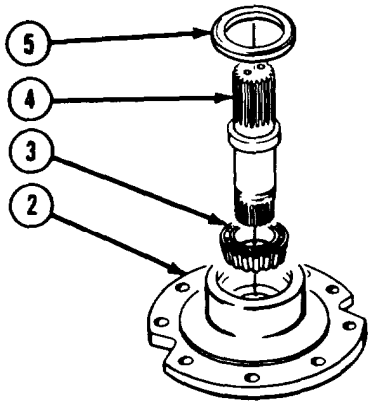
(1) Clean all metal parts in drycleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

d. Assembly.

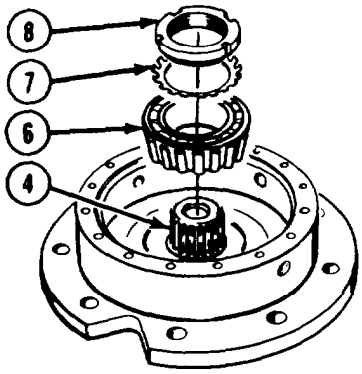
(1) Install two races (1) in hub (2).



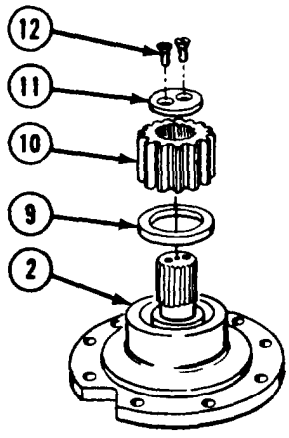
(2) Install bearing (3) on shaft (4).
(3) Install shaft (4) and bearing (3) in hub (2).
(4) Install seal (5) in hub (2).



(5) Install bearing (6).
(6) Install lockwasher (7) and nut (8).
(7) Tighten nut (8) until shaft (4) starts to turn.
(8) Hold shaft (4) and tighten nut (8) to 100 lb-ft (135.6 N•m) and aline one tang on lockwasher (7) with slot in nut (8).
(9) Bend tang of lockwasher (7) up in slot of nut (8).

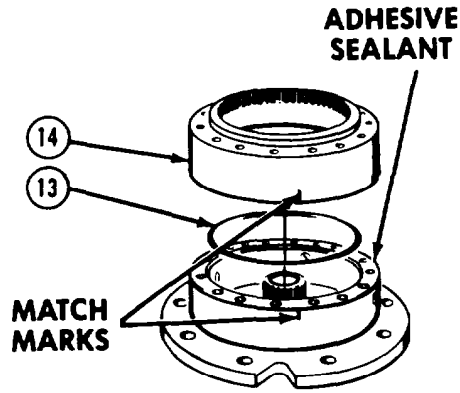


(10) Install spacer (9), gear (10), and plate (11) on hub (2).
(11) Apply thread locking and sealing compound and install two screws (12).

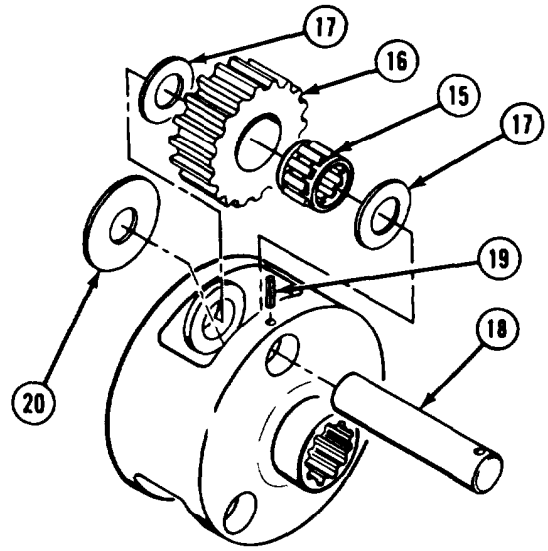


17-9.1 SWING DRIVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

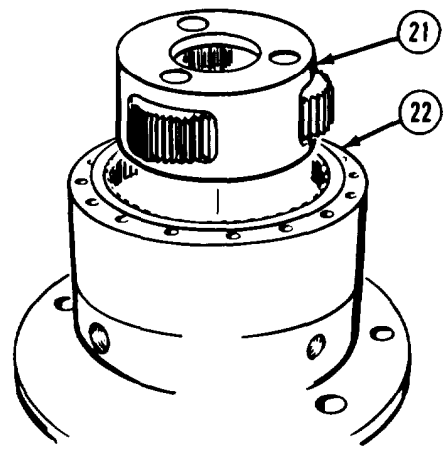
(12) Apply adhesive sealant and install preformed packing (13).
(13) Install ring gear (14).



(14) Install bearing (15) in gear (16).
(15) Install gear (16) and two spacers (17) with pin (18) and roll pin (19).
(16) Install center spacer (20).
(17) Repeat steps (14) and (15) for other two assemblies.

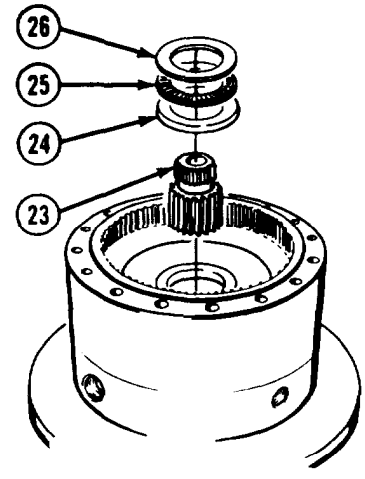


(18) Install planetary assembly (21) in swing drive (22).

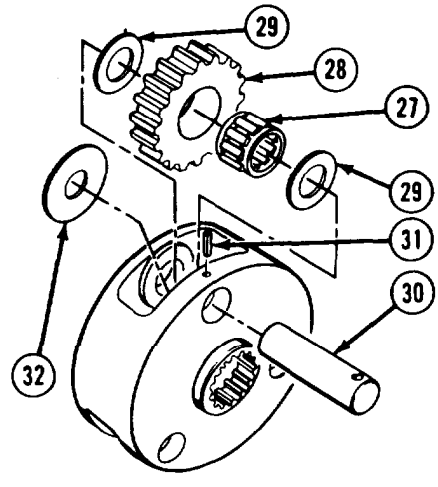


NOTE
Install thicker race first.

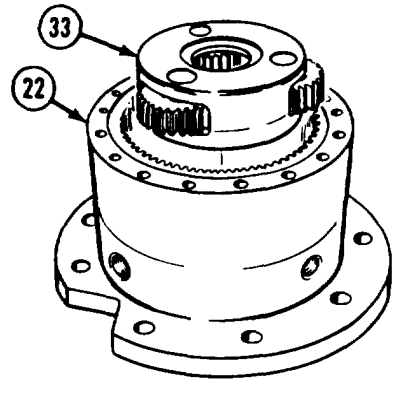
(19) Install secondary sun gear (23), race (24), bearing (25), and race (26).



(20) Install bearing (27) in gear (28).
(21) Install gear (28) and two spacers (29) with pin (30) and roll pin (31).
(22) Install center spacer (32).
(23) Repeat steps (20) and (21) for other two assemblies.

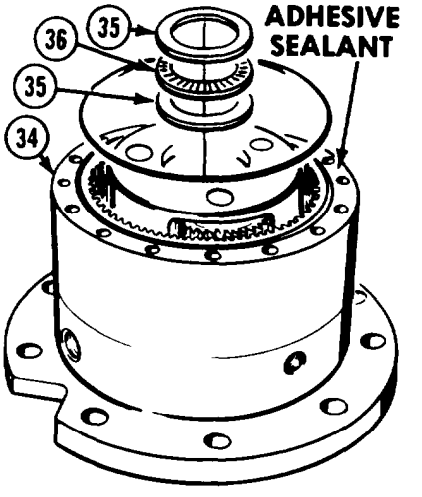


(24) Install planetary assembly (33) in swing drive (22).



17-9.1 SWING DRIVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(25) Apply adhesive sealant and install preformed packing (34).
(26) Install race (35), bearing (36), and race (35).

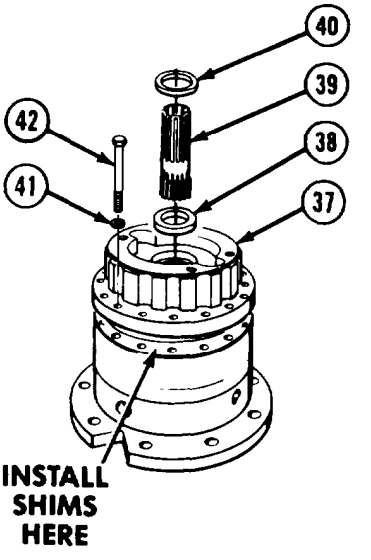


(27) Install end cover (37) loosely.

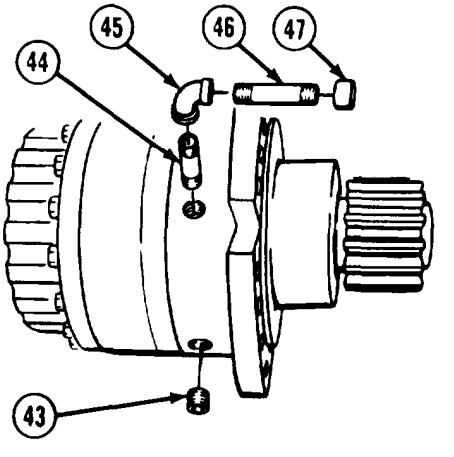
NOTE

Movement is checked through hole in end cover.

(28) Check for free movement by raising planetary assembly up and down.
(29) If no movement is felt, install shims in progression of 0.002 in. (0.0005 mm) until movement is felt.
(30) Remove end cover (37) and install oil seal (38).
(31) Install sun gear (39) and spacer (40).
(32) Install end cover (37).
(33) Apply thread locking and sealing compound and install 16 lockwashers (41) and screws (42).

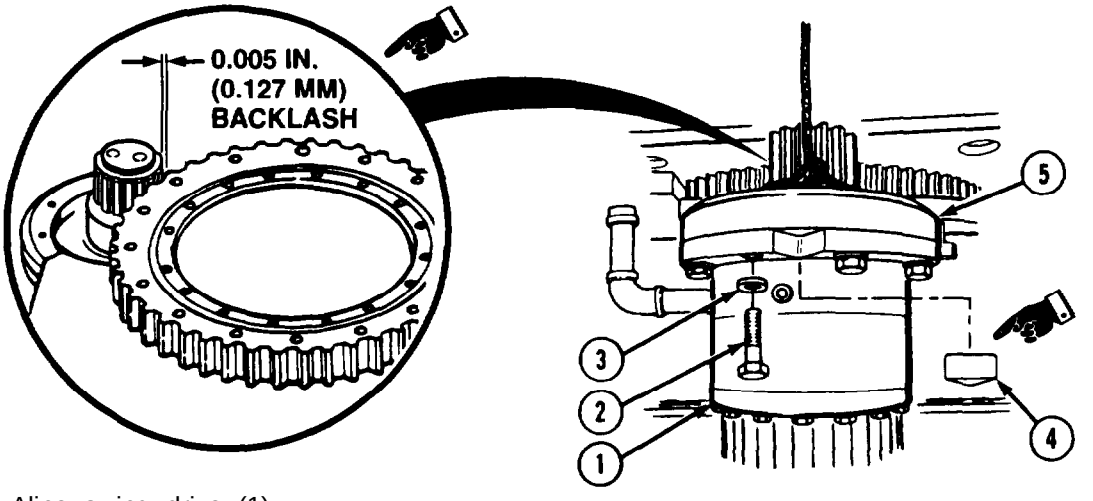


(34) Apply pipe thread sealing compound and install two plugs (43).
(35) Apply pipe thread and sealing compound and install pipe (44), elbow (45), pipe (46), and cap (47).



M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

e. Installation.



(1) Aline swing drive (1).
(2) Adjust swing drive (1) backlash to 0.005 in. (0.127 mm).

NOTE

If wedges were not removed, go to step (8).

(3) Install two screws (2) and washers (3). Tighten screws. Do not remove lifting device.

CAUTION

Disconnect battery cables and electrical connectors from all sensitive electrical components prior to electric welding. Electrical current from welder may cause damage to equipment.

(4) Disconnect battery cables and electrical connectors from all electrical equipment.

WARNING

Unsafe welding practices can cause serious injury from fire, explosions, or harmful agents. Allow only authorized personnel to weld or cut metals and follow safety precautions in TM 9-237. Protective clothing and goggles must be worn; adequate protective equipment used, a suitable fire extinguisher kept nearby, and requirements of TM 9-237 strictly followed.

(5) With the aid of a welder, tack weld two wedges (4) to frame ring (5).
(6) Remove two screws (2), washers (3), and swing drive (1).
(7) With the aid of a welder, weld two wedges (4) to frame ring (5).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. lb avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(8) Apply sealing and thread locking compound to nine screws (2).
(9) Install swing drive (1) with nine screws (2) and washers (3).

17-9.1 SWING DRIVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

NOTE
Skip step (10) if wedges were not welded.

(10) Reconnect electrical connectors and battery cables.

f. follow-on Maintenance.

(1) Install swing drive brake (para 17-8).
(2) Fill swing drive with oil (LO 9-2320-279-12).

Section III. BOOM, MAST, AND EXTENSIONS

17-10. BOOM REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, drycleaning, Item 57, Appendix C
Ties, cable, plastic, Item 65, Appendix C
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

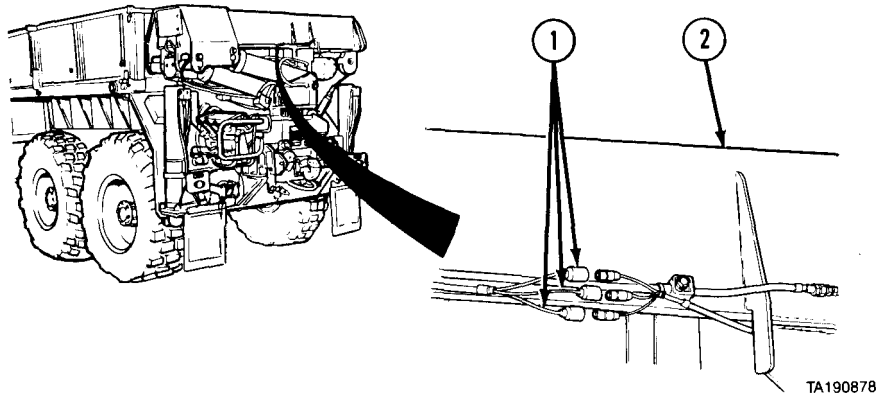
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-20	Overload protection switches disconnected (M977 only).

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

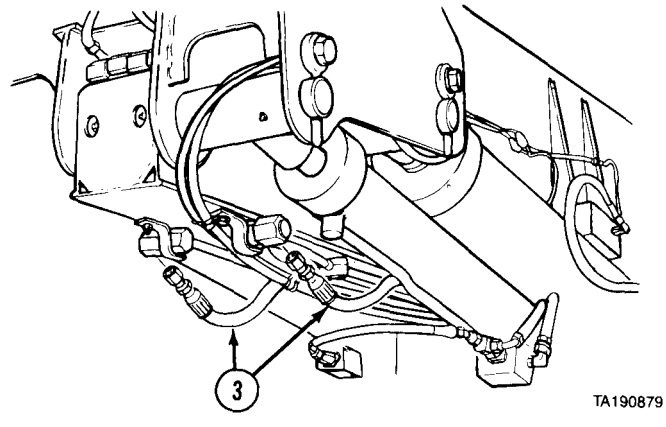


NOTE

- Remove plastic cable ties and clamps.
- Tag and mark wires and hydraulic lines before removal.

(1) Disconnect three wires (1) and remove from boom (2).

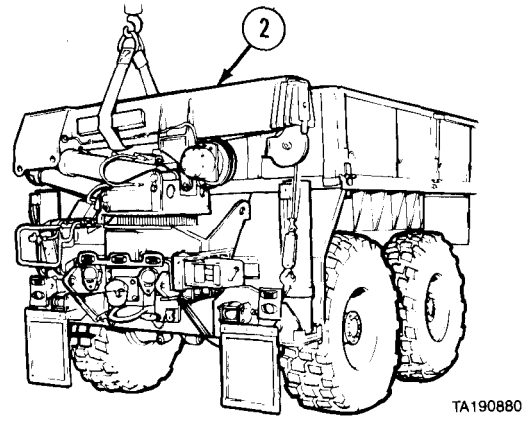
(2) Disconnect two hydraulic lines (3).



WARNING

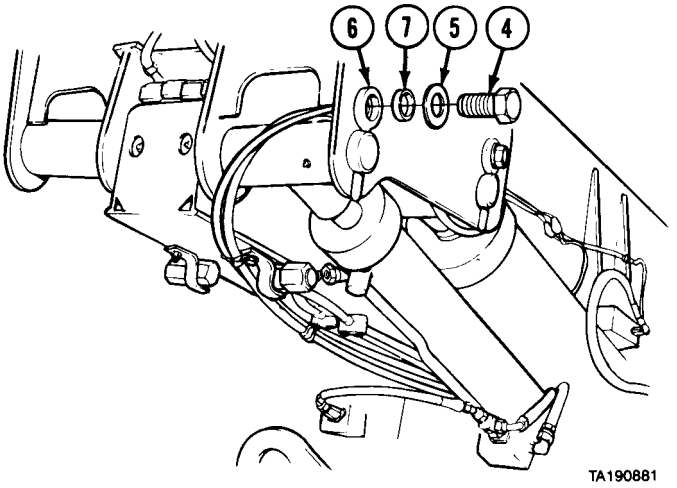
Keep out from under heavy parts. Falling parts may cause serious injury or death.

(3) Attach suitable lifting device to boom (2).

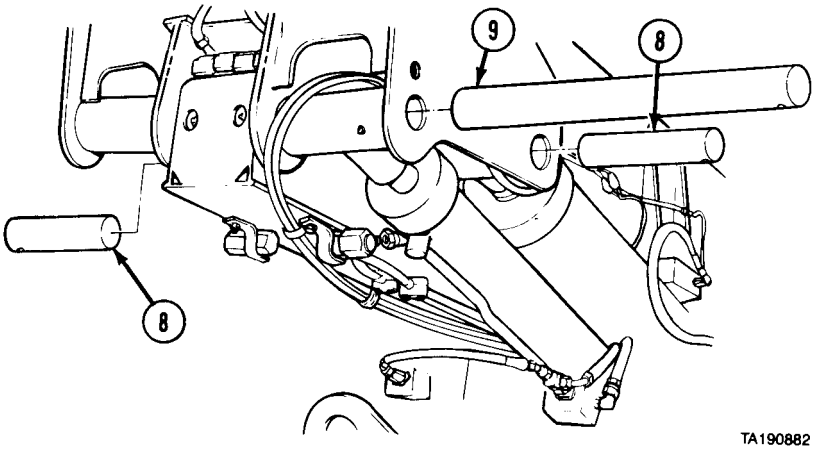


17-10. BOOM REMOVAL/INSTALLATION (CONT).

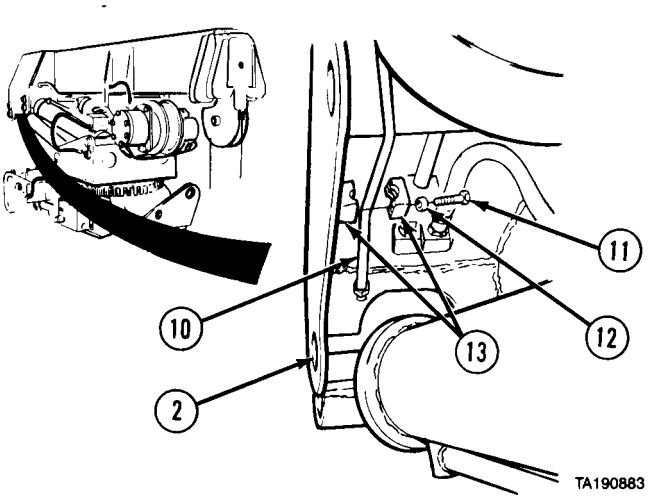
(4) Remove four screws (4), washers (5), locking pins (6), and bushings (7).



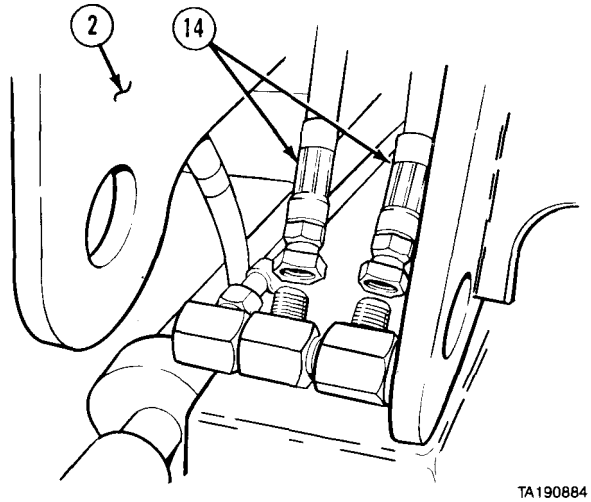
(5) Remove two pins (8) and pin (9).



(6) Disconnect hydraulic line (10).
(7) Remove screw (11), spacer (12), and two clamp halves (13). Pull line (10) from boom (2).



(8) Raise boom (2) enough to remove two hydraulic lines (14).
(9) Remove boom (2).



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b. Cleanlng/Inspection.

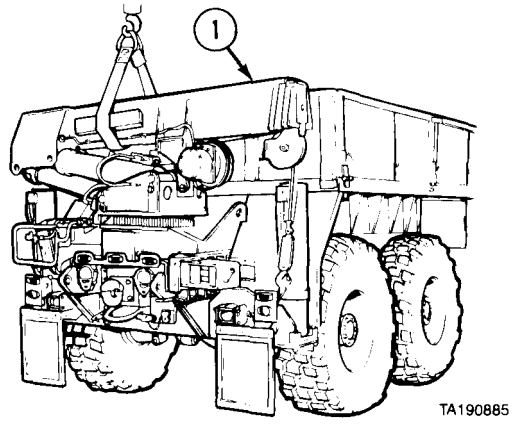
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

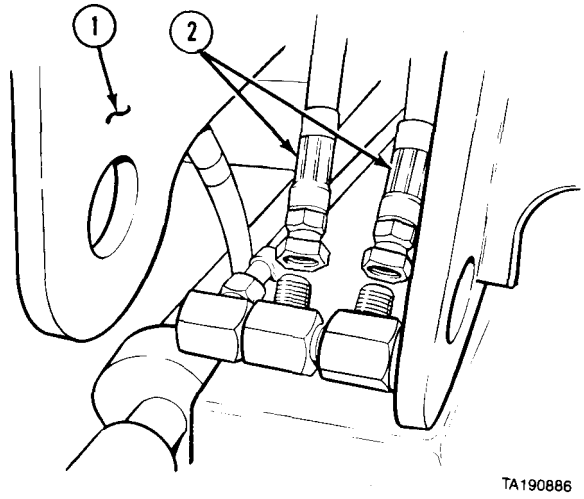
c. Installation.

(1) Attach suitable lifting device and install boom (1).



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(2) Soldier A operates lifting device and lowers boom (1) enough to connect two hydraulic lines (2) while Soldier B connects lines.

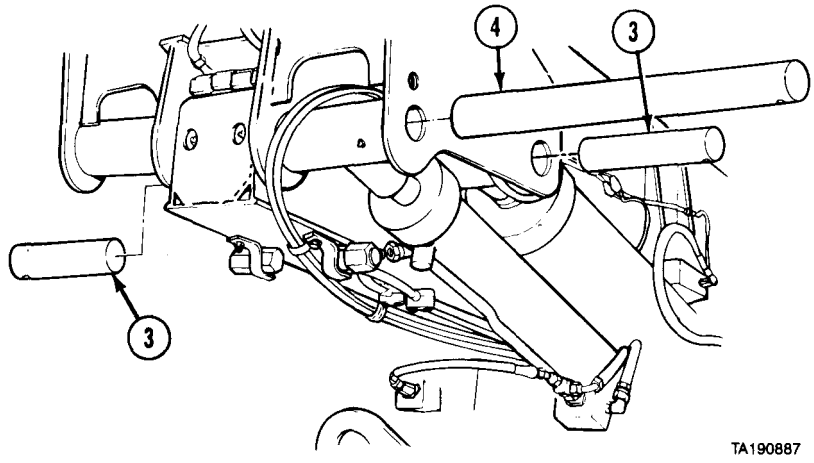


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M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

17-10. BOOM REMOVAL/INSTALLATION (CONT).

(3) Soldier A operates lifting device while Soldier B alines and installs two pins (3) and pin (4).

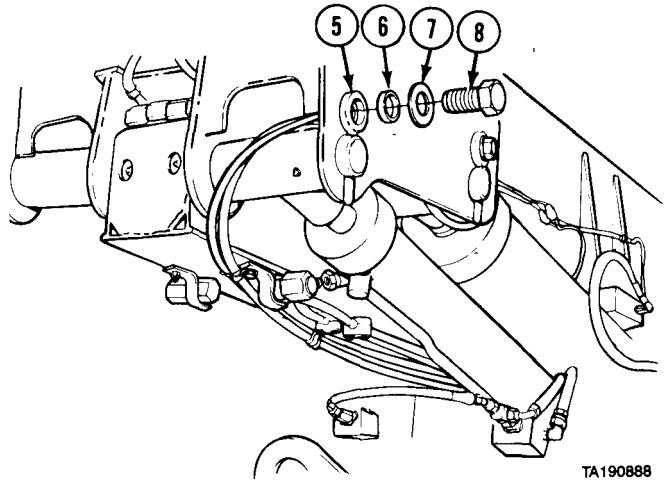


(4) Install four locking pins (5), bushings (6), and washers (7).

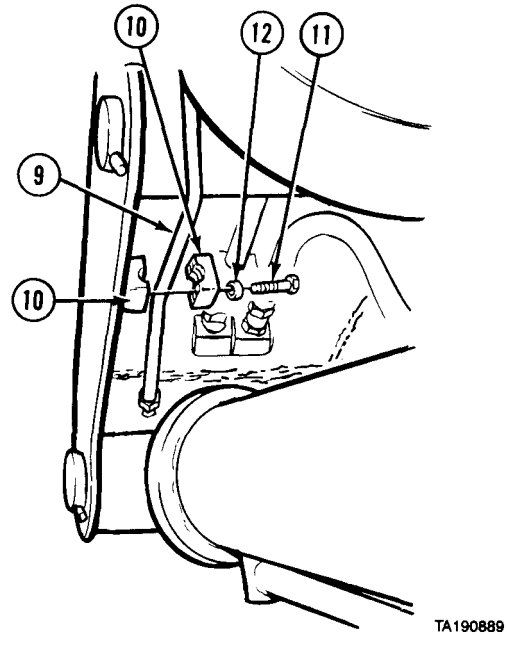
WARNING

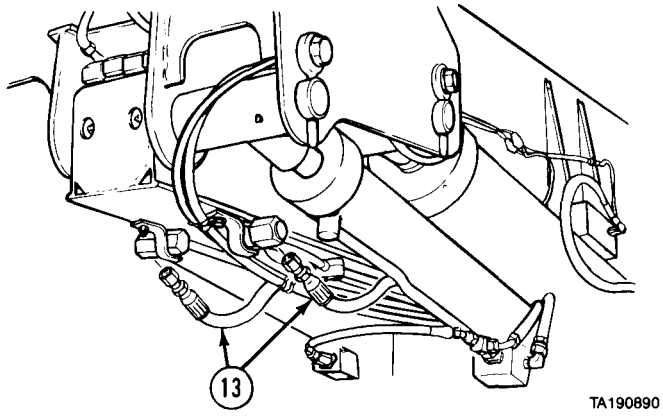
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(5) Apply thread locking and sealing compound and install screws (8).

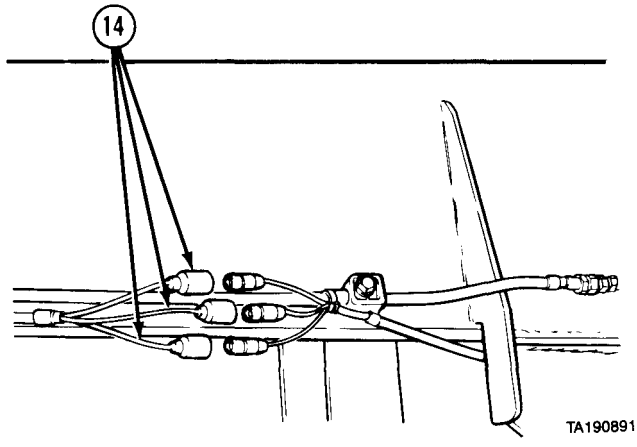


(6) Connect hydraulic line (9).
(7) Install clamp halves (10) with screw (11) and spacer (12).





(8) Connect two hydraulic lines (13).



NOTE

Install plastic cable ties and clamps as necessary.

(9) Connect three wires (14).

d. Follow-on Maintenance. Connect overload protection switches (M977 only) (TM 9-2320-279-20).

END OF TASK

17-10.1. BOOM REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

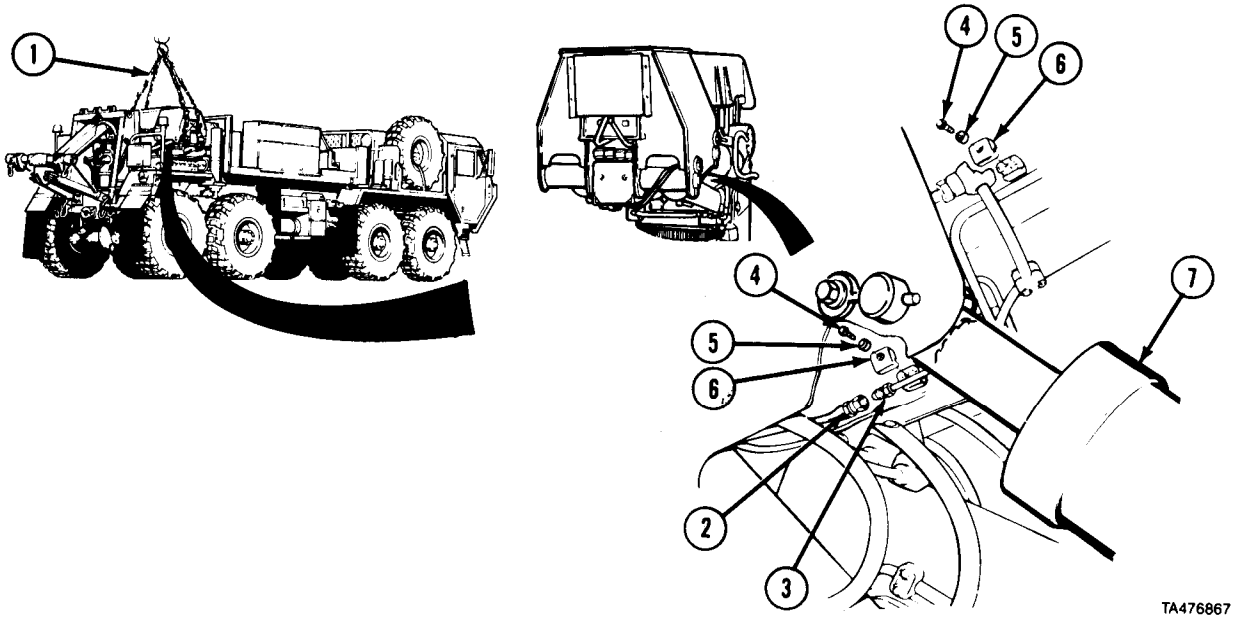
TM or Para	*Condition Description*
TM9-2320-279-10	Outrigger extended.
Para 6-12.1	Overload sensor switches disconnected.
TM 9-2320-279-10	Hook block released.
TM 9-2320-279-10	Raise boom 15°.

Special Environmental Conditions
None

General Safety Instructions
None

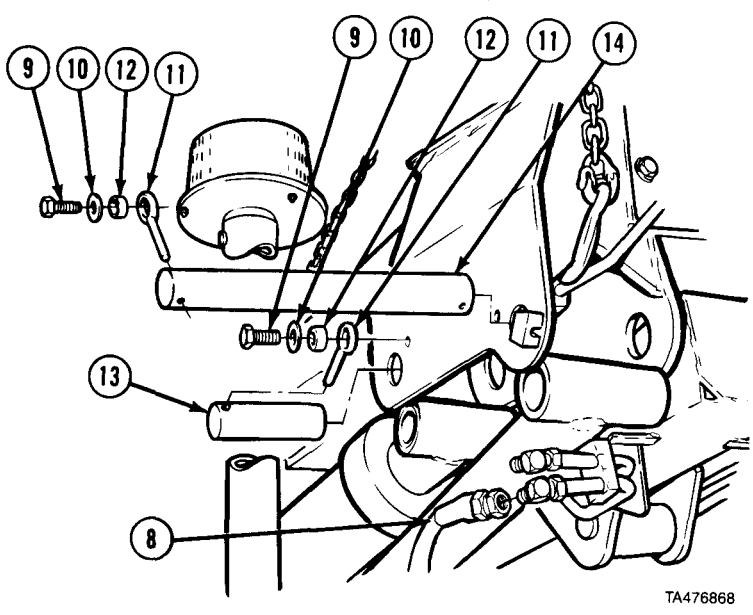
Level of Maintenance
Direct Support

a. Removal.

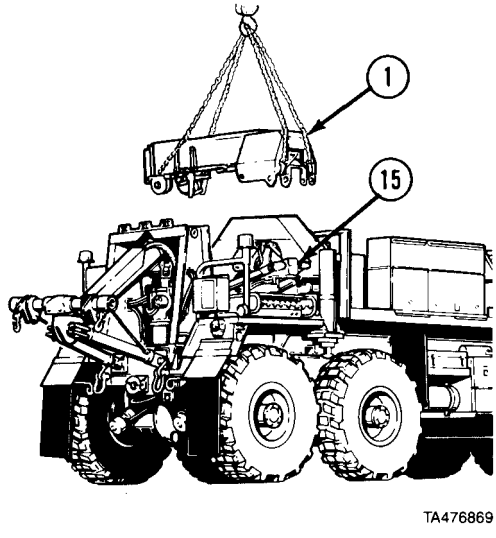


(1) Attach suitable lifting device to boom (1).
(2) Disconnect hydraulic hose (2) from line (3).
(3) Remove two screws (4), spacers (5), and four clamp halves (6).
(4) Move line (3) to clear cylinder (7).

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)



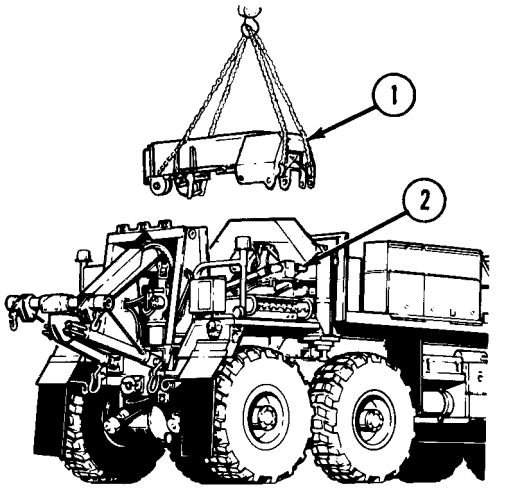
(5) Disconnect four hydraulic lines (8).
(6) Remove two screws (9), washers (10), lockpins (11), and spacers (12).
(7) Repeat step *(6)* for other side.
(8) Remove two pins (13) and pin (14).



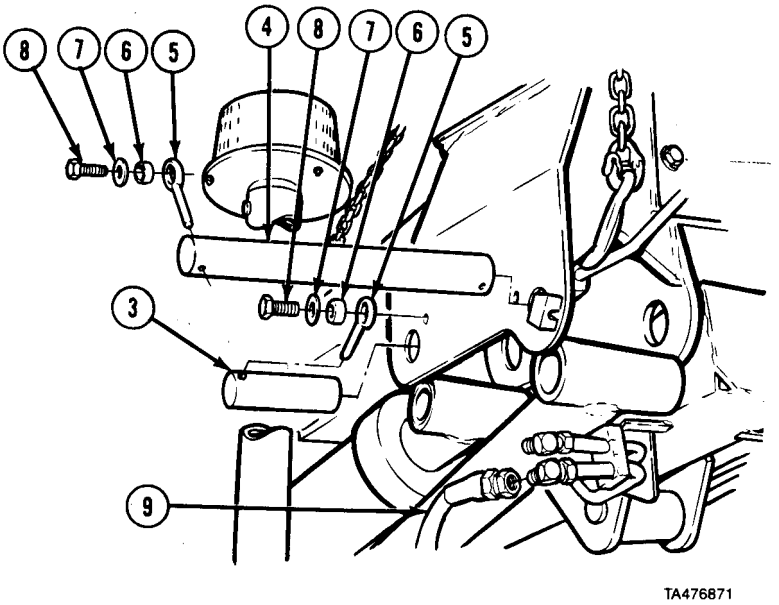
(9) Soldier A and Soldier B remove boom (1) from crane (15).

17-10.1. BOOM REMOVAL/INSTALLATION (M984E1) (CONT).

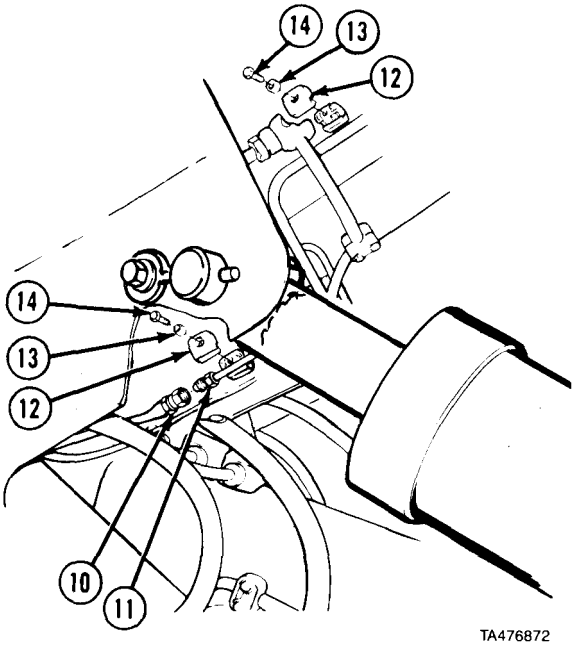
b. Installation.



(1) Soldier A and Soldier B position boom (1) on crane (2).



(2) Soldier A aline while Soldier B installs two pins (3) and pin (4).
(3) Install two lockpins (5) and spacers (6).
(4) Apply sealing and thread locking compound and install two washers (7) and screws (8).
(5) Repeat steps *(3)* and *(4)* for other side.
(6) Attach four hoses (9).



(7) Connect hydraulic hose (10) to line (11).
(8) Install four clamp halves (12) with two spacers (13) and screws (14).

c. Follow-on Maintenance.

(1) Install overload protection switches (TM 9-2320-279-20).
(2) Crane in stowed positiobn (TM 9-2320279-10).

END OF TASK

17-11. MAST AND BUSHINGS REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, dry cleaning, Item 57, Appendix C
Ties, cable, plastic, Item 65, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-10	Boom removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

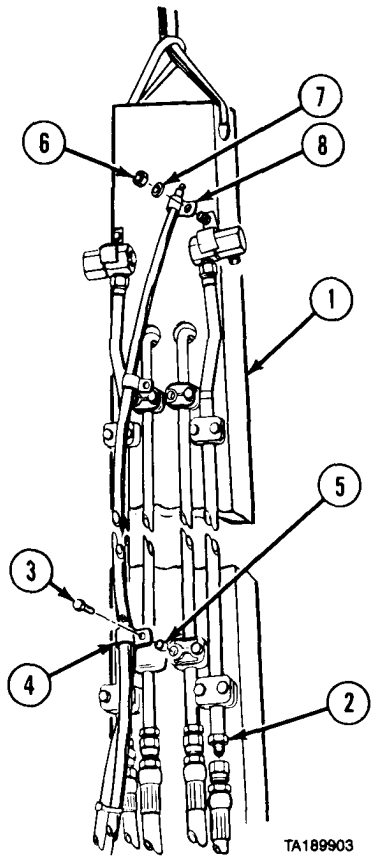
a. Removal.

(1) Attach suitable lifting device and raise mast (1).
(2) Disconnect four hydraulic lines (2).

NOTE

Remove plastic cable ties as necessary.

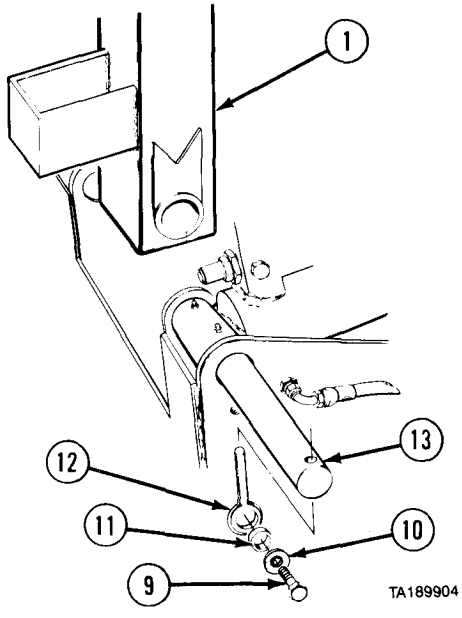
(3) Remove two screws (3), clamps (4), and spacers (5).
(4) Remove nut (6), washer (7), and clamp (8).



WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(5) Remove screw (9), washer (10), spacer (11), and lockpin (12).
(6) Repeat step (5) for other side.
(7) Remove pin (13) enough to clear mast (1).
(8) Remove mast (1).

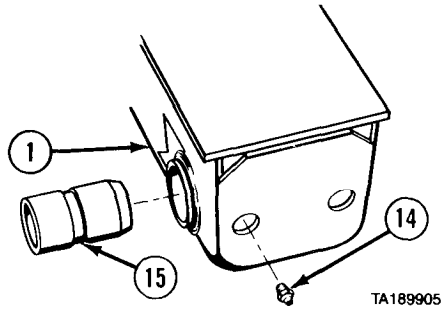


(9) Remove four grease fittings (14).
(10) Remove four bushings (15) from mast (1).

b. Cleaning/Inspection.

WARNING

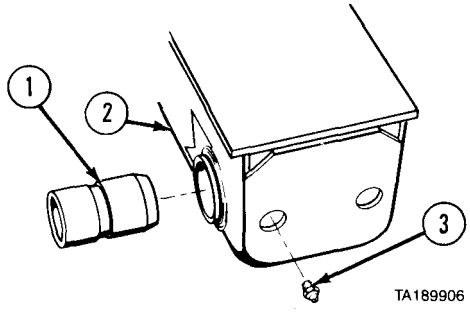
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check bushing inside diameter. If diameter is larger than 2.015 in. (51.18 mm), replace bushing.

c. Installation.

(1) Install four bushings (1) in mast (2).
(2) Install four grease fittings (3).



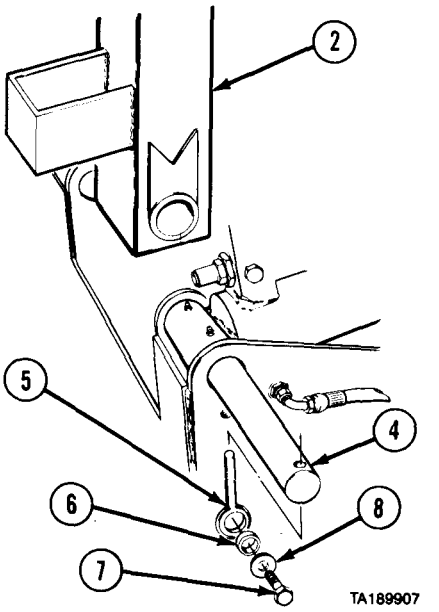
17-11. MAST AND BUSHINGS REMOVAL/INSTALLATION (CONT).

(3) Soldier A operates lifting device while Soldier B alines and installs mast (2) and installs pin (4) through mast (2).
(4) Install two lockpins (5) and spacers (6).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

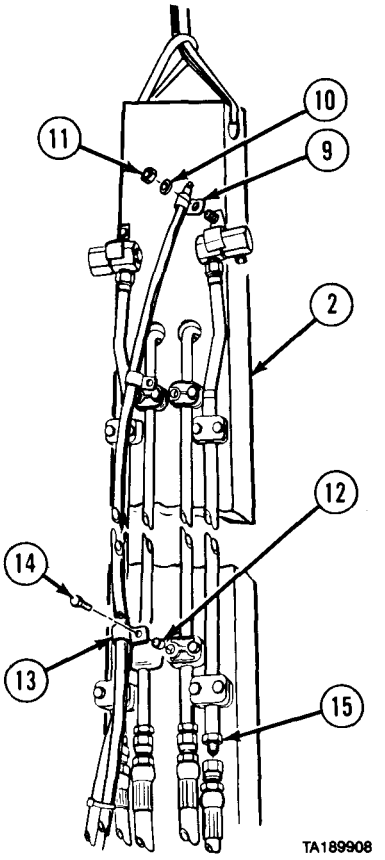
(5) Apply sealing and thread locking compound and install screw (7) and washer (8).



(6) Install clamp (9), washer (10), and nut (11).
(7) Install two spacers (12), clamps (13), and screws (14).
(8) Install four hydraulic lines (15).
(9) Lower mast (2) and remove suitable lifting device.

d. Follow-on Maintenance. Install boom (para 17-10).

END OF TASK



17-11.1 MAST AND BUSHINGS REMOVAL/INSTALALLATION (M984E1).

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

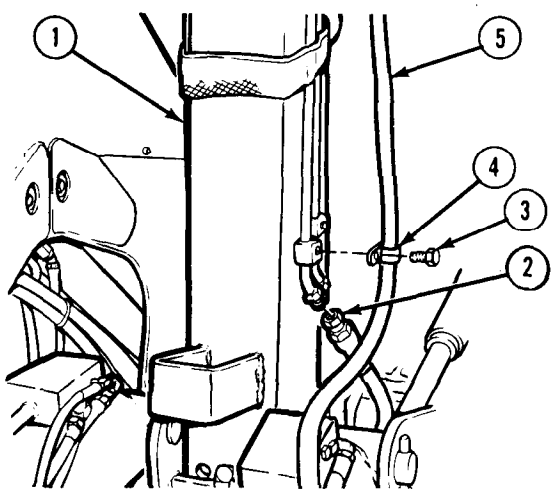
TM or Para	*Condition Description*
Para 17-10.1	Boom removed.
Para 17-14.1	Erection cylinder disconnected.

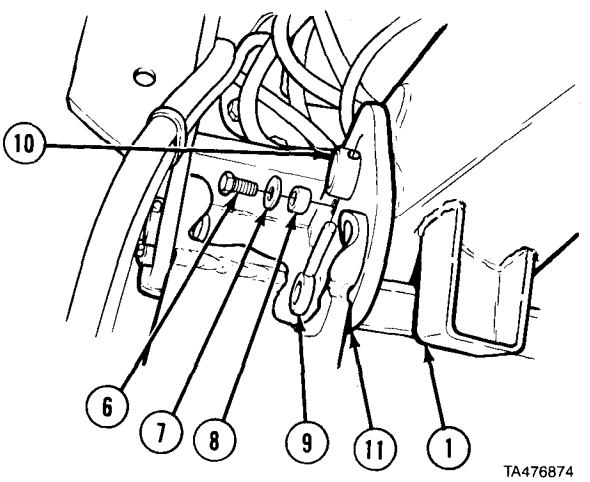
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.





(1) Attach suitable lifting device to mast (l).
(2) Raise mast (l).

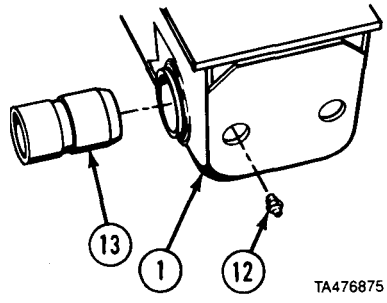
NOTE

Remove all ties as necessary

(3) Disconnect four hydraulic lines (2).
(4) Remove two screws (3), clamps (4) and pull hose (5) clear of mast (1).
(5) Remove screw (6), washer (7), spacer (8), and lockpin (9).
(6) Remove pin (10) and mast (1) from crane (11).

17-11.1. MAST AND BUSHINGS REMOVAL/INSTALALLATION (M984E1) (CONT).

(7) Remove four grease fittings (12).
(8) Remove two bushings (13) from mast (1).



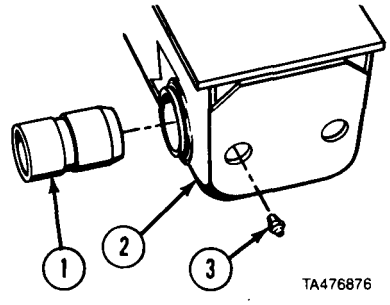
b. Cleaning/Inspection.

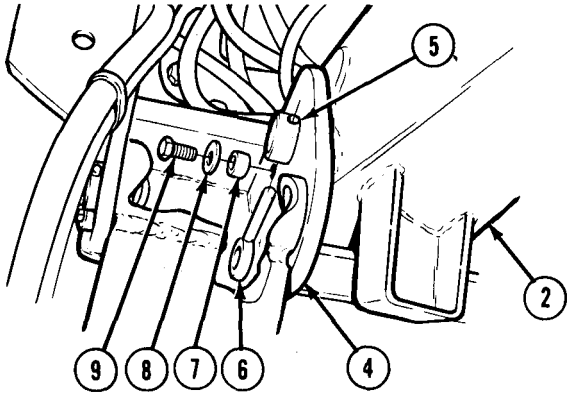
WARNING

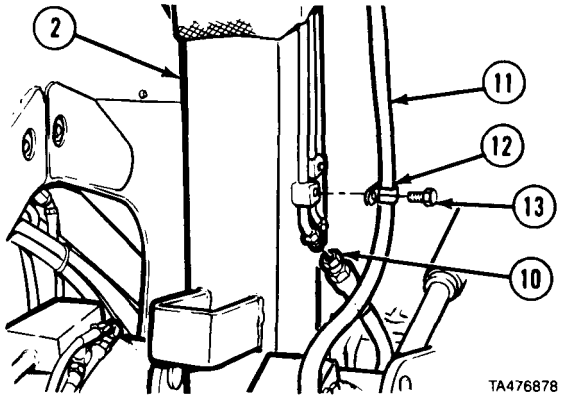
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check bushing inside diameter. If diameter is larger than 2.015 in. (50.82 mm), replace bushing.

c. Installation.
(1) Install two bushings (1) in mast (2).
(2) Install four grease fittings (3).







(3) Aline and install mast (2) on crane (4).
(4) Install pin (5), lockpin (6), and spacer (7).
(5) Apply thread locking compound and install washer (8) and screw (9).
(6) Connect four hydraulic lines (10).
(7) Install hose (11) with two clamps (12) and screws (13).
(8) Lower mast (2).

d. Follow-on Maintenance.
(1) Connect erection cylinder (para 17-10.1).
(2) Install boom (para 17-14.1).

END OF TASK

17-12. EXTENSION NO. 1 AND WEAR PADS REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

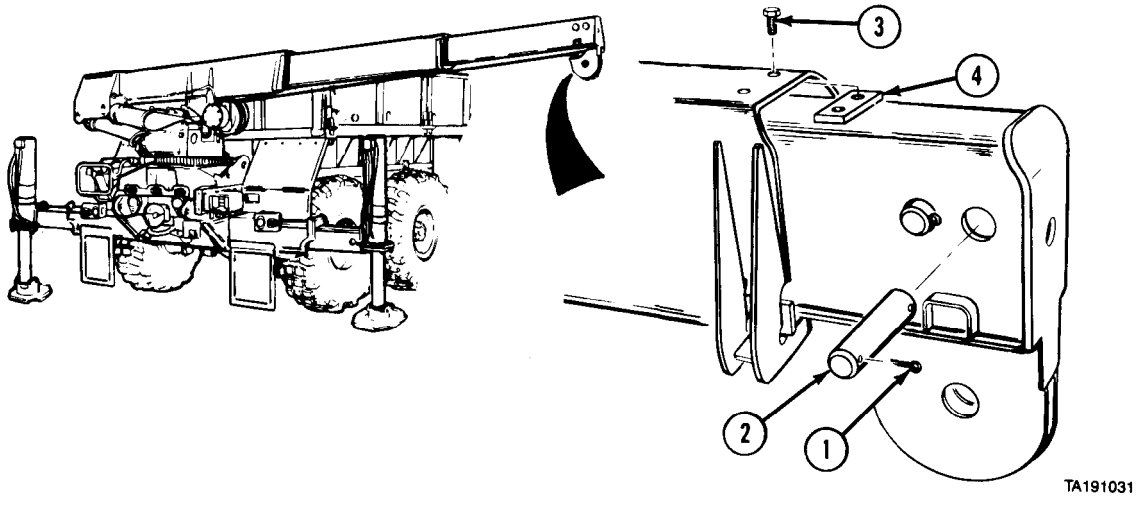
TM or Para	*Condition Description*
TM 9-2320-279-20	Hoist cable removed.
TM 9-2320-279-10	Extension No. 1 extended.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

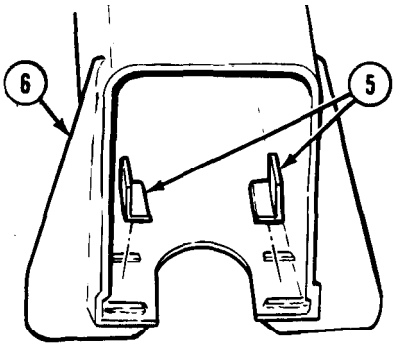


(1) Remove four cotter pins (1) and two pins (2).
(2) Remove two screws (3) and stop (4).

17-12. EXTENSION NO. 1 AND WEAR PADS REMOVAL/INSTALLATION (CONT).

(3) Raise extension No. 1 and remove two wear pads (5) from extension No. 2 (6).

(EXTENSION NO. 1 REMOVED FOR CLARITY)

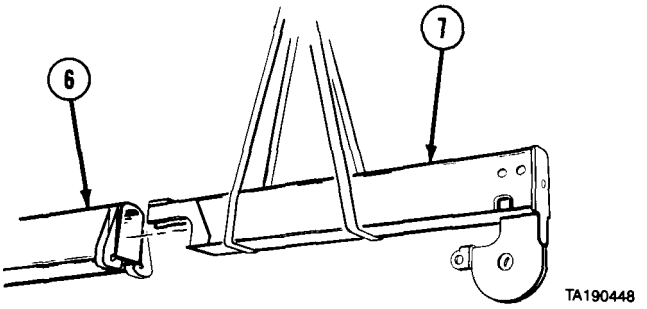


TA191030

WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(4) Attach suitable lifting device and remove extension No. 1 (7) from extension No. 2 (6).



TA190448

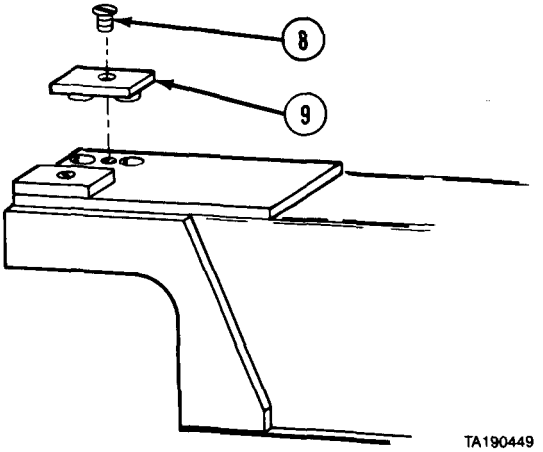
(5) Remove two screws (8) and wear pads (9).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Inspect wear pad thickness. If wear pad is under 0.250 in. (6.35 mm) replace pad.



TA190449

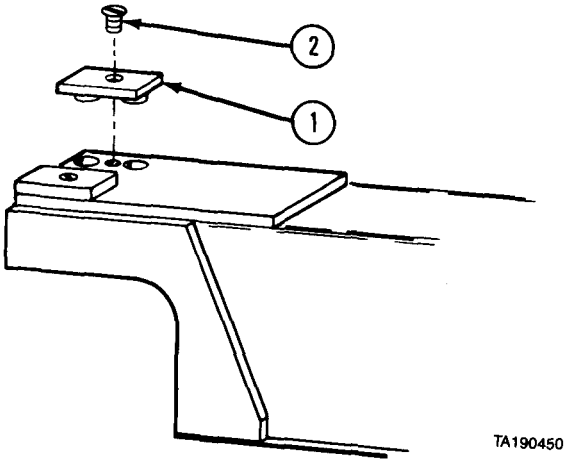
c. Installation.

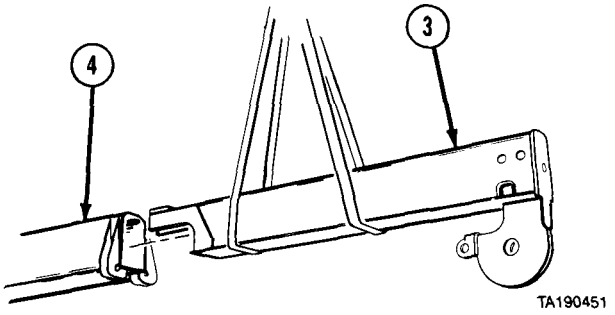
(1) Install two wear pads (1).

WARNING

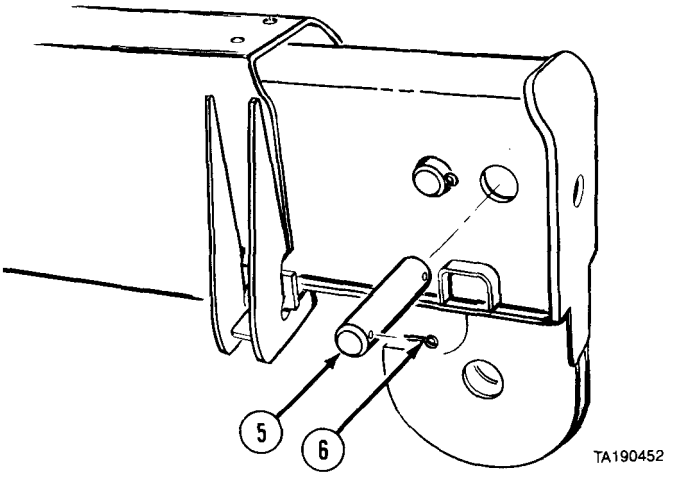
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(2) Apply sealing and thread locking compound and install two screws (2).





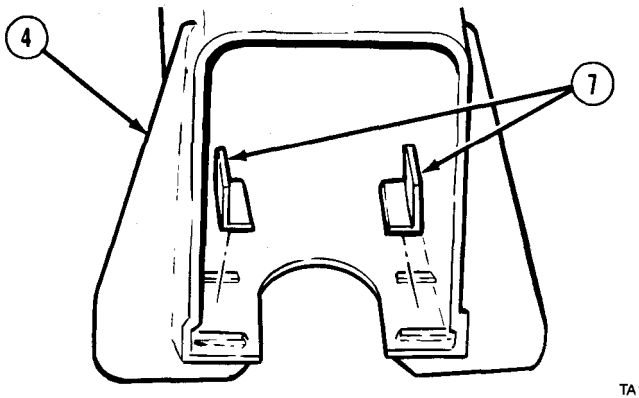
(3) Attach suitable lifting device and install extension No. 1 (3) in extension No. 2 (4).



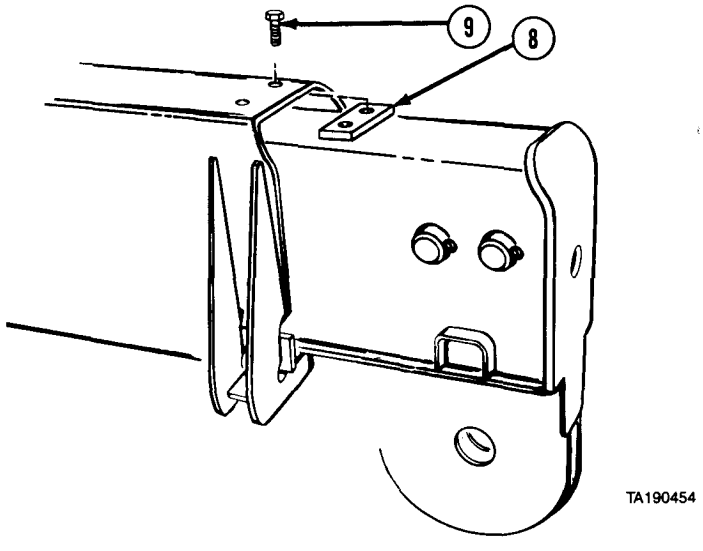
(4) Aline holes and install two pins (5) and four cotter pins (6).

17-12. EXTENSION NO. 1 AND WEAR PADS REMOVAL/INSTALLATION (CONT).

(EXTENSION NO. 1 REMOVED FOR CLARITY)



(5) Raise extension No. 1 and install two wear pads (7) in extension No. 2 (4).



(6) Install stop (8) and two screws (9).

d. Follow-on Maintenance.

(1) Retract extensions (TM 9-2320-279-10).
(2) Telescope boom out and in (TM 9-2320-279-10).
(3) Install hoist cable (TM 9-2320-279-20).

END OF TASK

Section IV. BOOM MAINTENANCE

17-12.1. EXTENSION ONE AND WEAR PADS REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

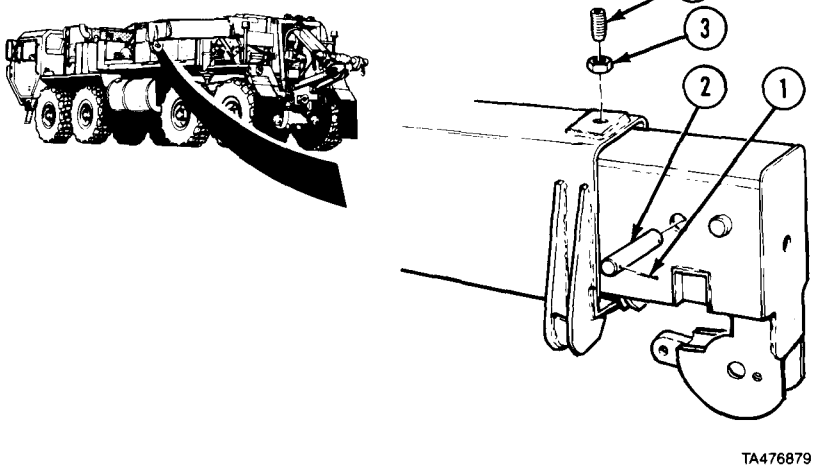
TM or Para	*Condition Description*
TM 9-2320-279-20	Hoist cable removed.
TM 9-2320-279-10	Extension one extended.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

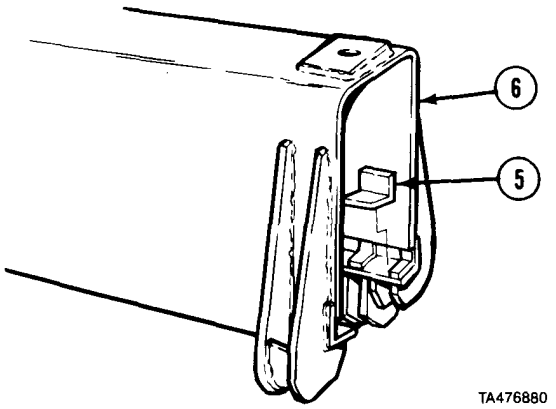


(1) Remove four cotter pins (1) and two pins (2).
(2) Remove nut (3) and setscrew (4).

17-12.1. EXTENSION ONE AND WEAR PADS REMOVAL/INSTALLATION (M984E1) (CONT).

(3) Raise extension one and remove two wear pads (5) from extension two (6).

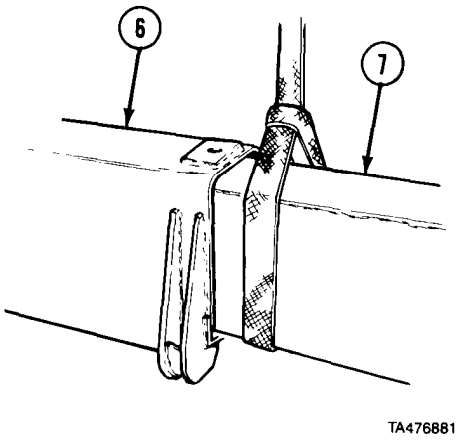
EXTENSION ONE REMOVED FOR CLARITY



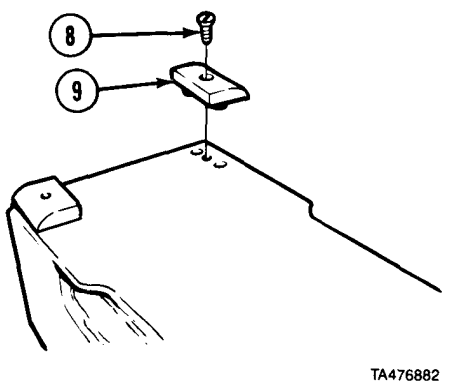
WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(4) Soldier A and Soldier B attach suitable lifting device and remove extension one (7) from extension two (6).



(5) Remove two screws (8) and wear pads (9).



b. Cleaning/Inspection.

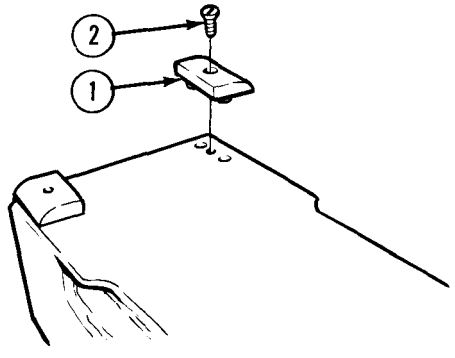
WARNING

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(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Inspect wear pad thickness. If wear pad is under 0.250 in. (6.35 mm) replace pad.

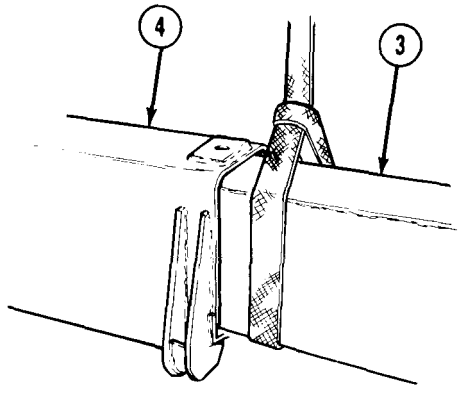
c. Installation.

(1) Install two wear pads (1).
(2) Apply sealing and thread locking compound and install two screws (2).



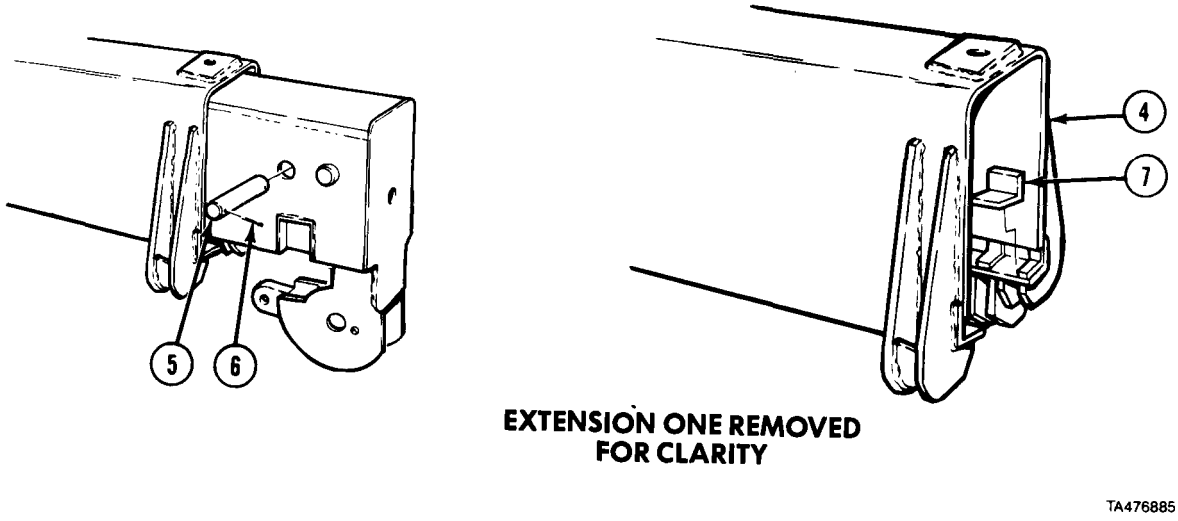
TA476883

(3) Soldier A and Soldier B attach suitable lifting device and install extension one (3) in extension two (4).

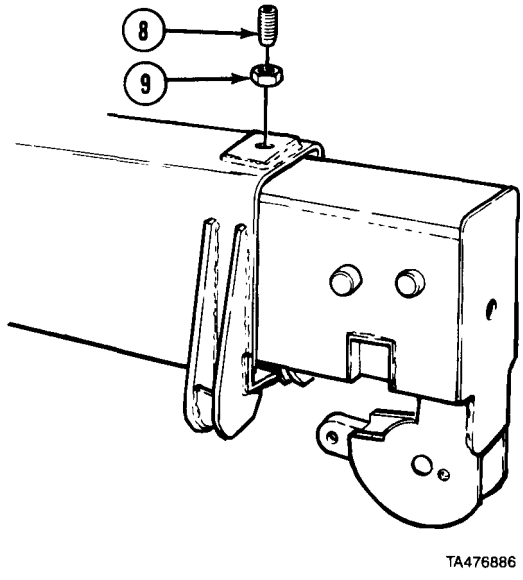


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17-12.1. EXTENSION ONE AND WEAR PADS REMOVAL/INSTALLATION (M984E1) (CONT).



(4) Aline holes and install two pins (5) and four cotter pins (6).
(5) Raise extension one and install two wear pads (7) in extension two (4).



(6) Install setscrew (8) and nut (9).
(7) Adjust setscrew 1/8 in. (3.17 mm) from extension no. one.

d. *Follow-on Maintenance.*
(1) Return extensions (TM 9-2320-279-10).
(2) Install hoist cable (TM 9-2320-279-10).
(3) Telescope boom out and in (TM 9-2320-279-10).

END OF TASK

17-13. EXTENSION NO. 2 AND WEAR PADS REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

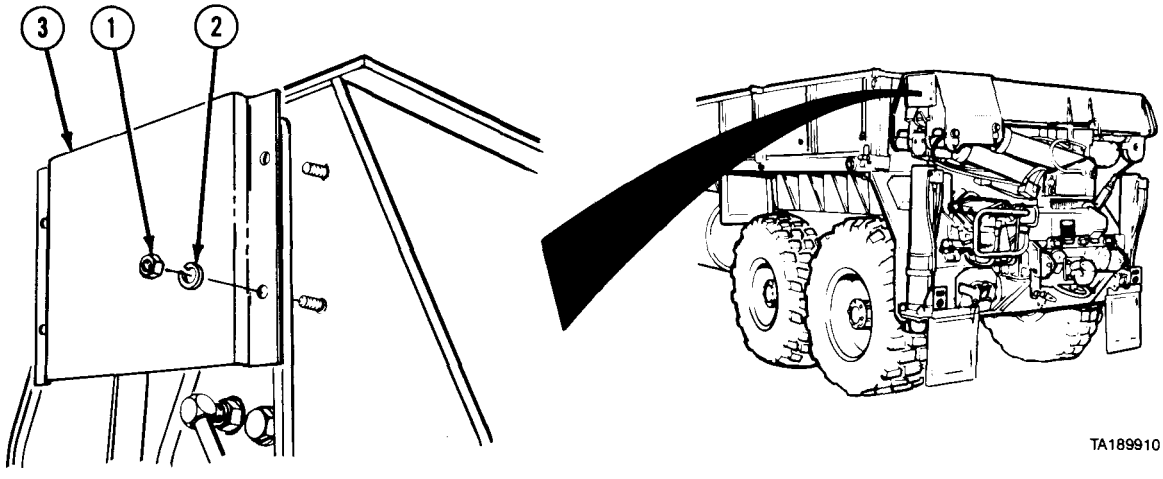
TM or Para	*Condition Description*
Para 17-12	Extension No. 1 removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

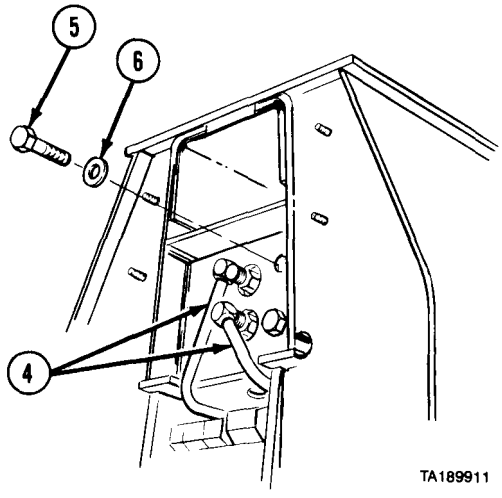
a. Removal.



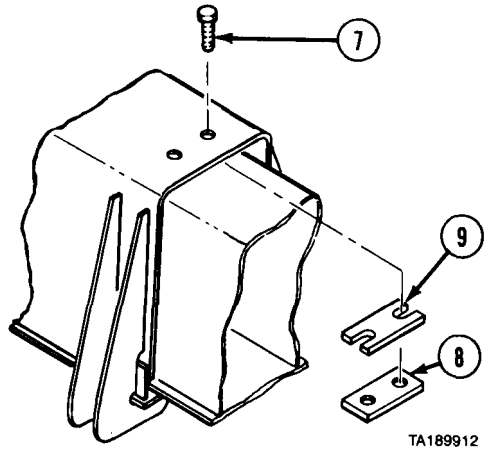
(1) Remove four nuts (1), lockwashers (2), and cover (3).

17-13. EXTENSION NO. 2 AND WEAR PADS REMOVAL/INSTALLATION (CONT).

(2) Disconnect two hydraulic lines (4).
(3) Remove four screws (5) and washers (6).

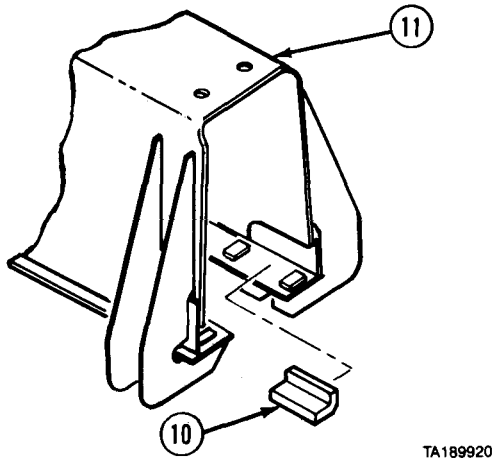


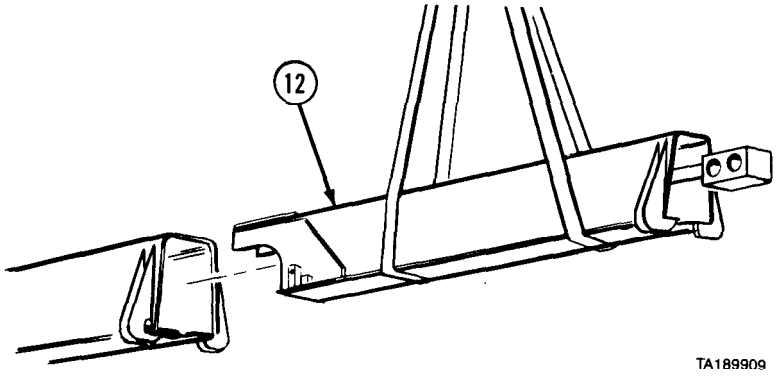
(4) Remove two screws (7), stop (8), and spacer (9).



(5) Raise extension No. 2 and remove two wear pads (10) from boom (11).

(EXTENSION NO. 2 REMOVED FOR CLARITY)



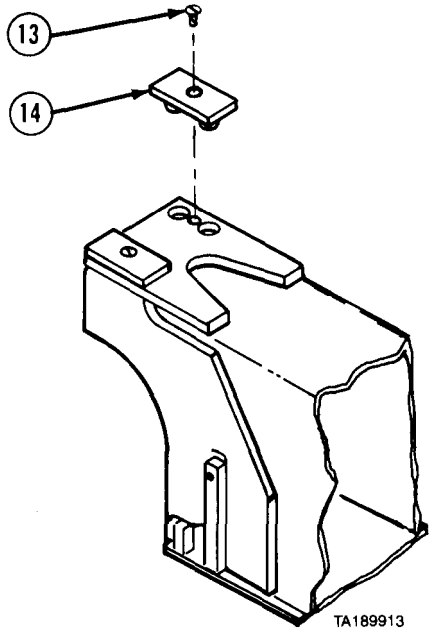


WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(6) Attach suitable lifting device and remove extension No. 2 (12).

(7) Remove two screws (13) and wear pads (14).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check wear pad thickness. If wear pad is below 0.250 in. (6.35 mm) replace wear pads.

17-13. EXTENSION NO. 2 AND WEAR PADS REMOVAL/INSTALLATION (CONT).

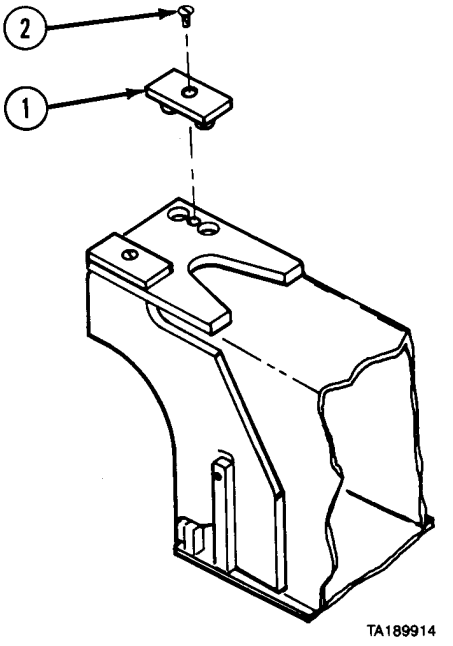
c. Installation.

(1) Install two wear pads (1).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

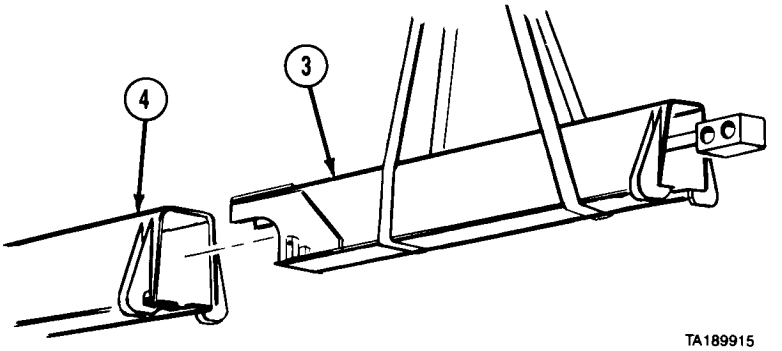
(2) Apply sealing and thread locking compound and install two screws (2).



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(3) Attach suitable lifting device around extension No. 2 (3).

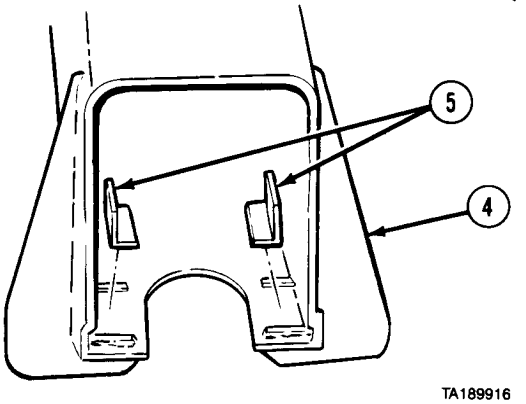
(4) Install extension No. 2 (3) in boom (4).



TA189915

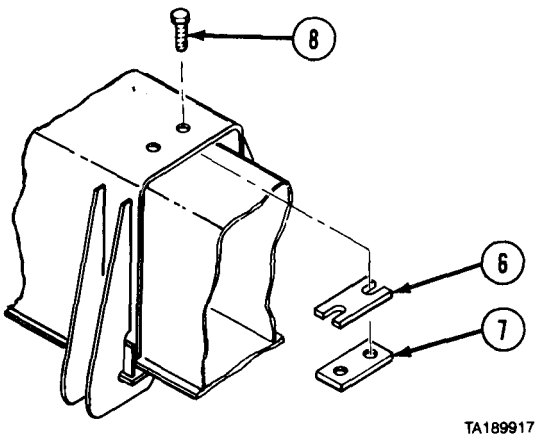
(5) Raise extension No. 2 and install two wear pads (5) in boom (4).

(EXTENSION NO. 2 REMOVED FOR CLARITY)

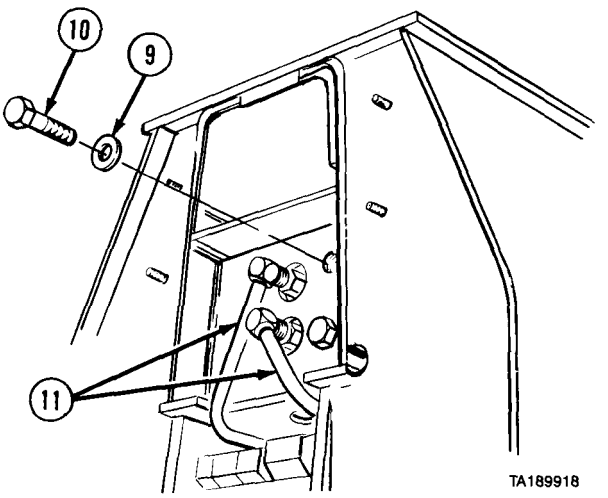


TA189916

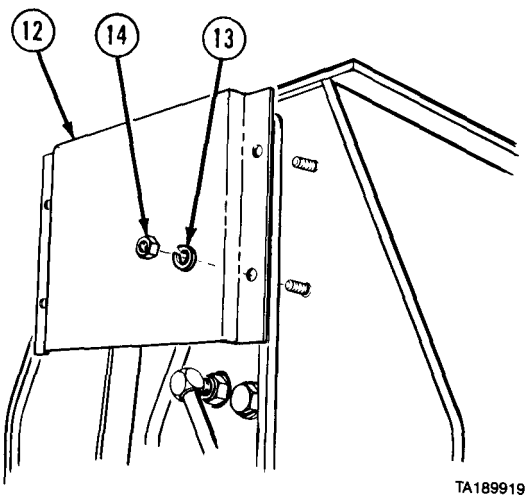
(6) Install spacer (6), stop (7), and two screws (8).



(7) Install four washers (9) and screws (10).
(8) Connect two hydraulic lines (11).



(9) Install cover (12), lockwashers (13), and four nuts (14).



d. Follow-on Maintenance. Install extension No. 1 (para 17-12).

END OF TASK

17-13.1. EXTENSION TWO AND WEAR PADS REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

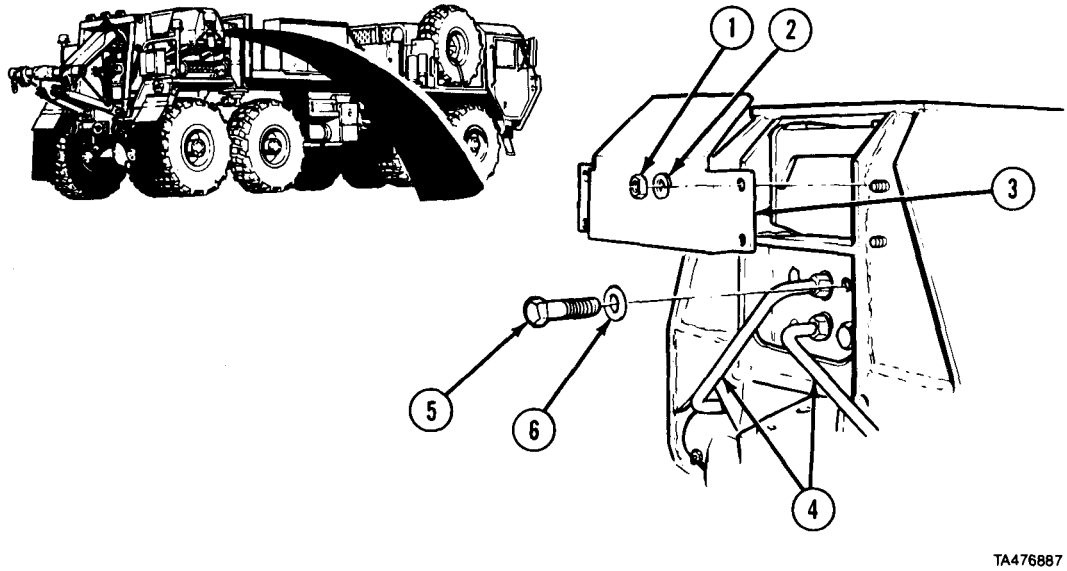
TM or Para	*Condition Description*
Para 17-12.1	Extension one removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. *Removal.*

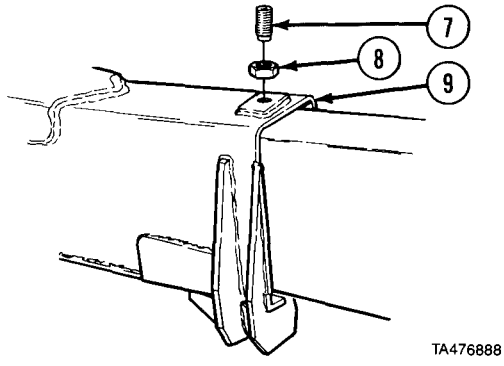


TA476887

(1) Remove four nuts (1), lockwashers (2), and cover (3).
(2) Disconnect two hydraulic lines (4).
(3) Remove four screws (5) and washers (6).

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

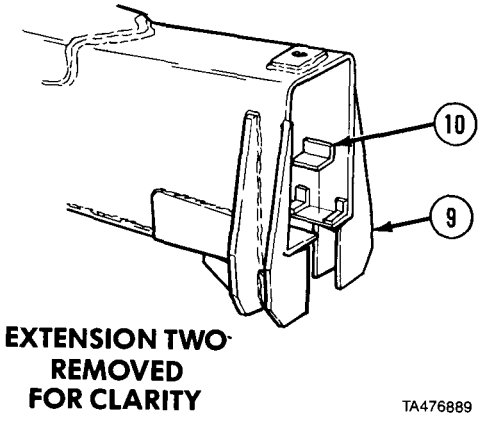
(4) Remove setscrew (7) and nut (8) from boom (9).



WARNING

Do not use fingers to remove wear pads. Personal injury may incur.

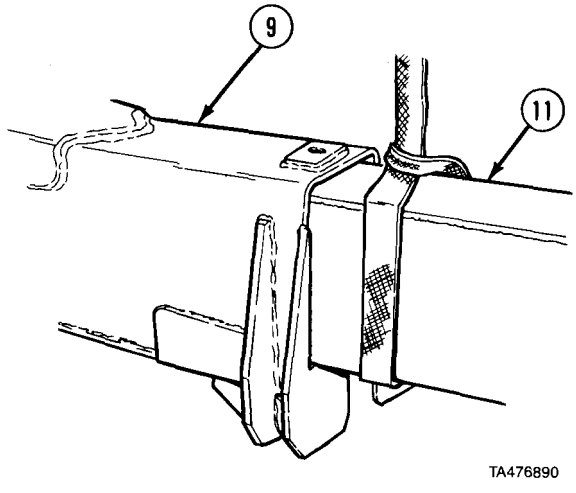
(5) Raise extension two and remove two wear pads (10) from boom (9).



WARNING

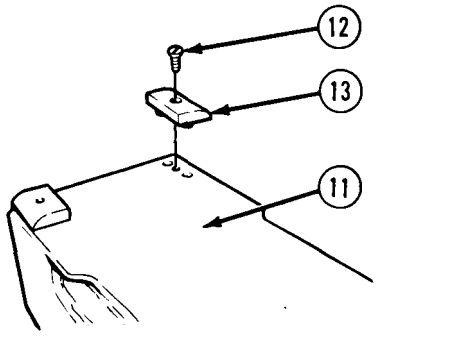
Keep out from under heavy parts. Falling parts may cause serious injury or death.

(6) Soldier A and Soldier B attach a suitable lifting device to extension two (11). Soldier A operates lifting device while Soldier B guides extension two from boom (9).



17-13.1. EXTENSION TWO AND WEAR PADS REMOVAL/INSTALLATION (M984E1) (CONT).

(7) Remove two screws (12) and wear pads (13) from extension two (11).



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b. Cleaning Inspection.

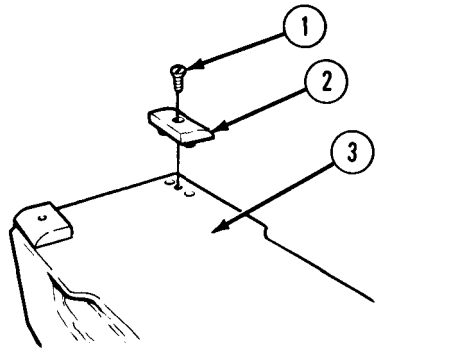
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check wear pad thickness. If wear pad is below 0.250 in. (6.35 mm), replace wear pads.

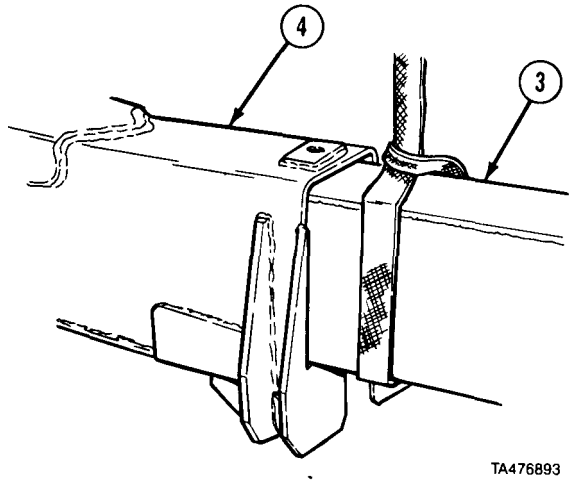
c. Installation.

(1) Apply thread locking compound to screws (1) and install two wear pads (2) on extension two (3).



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(2) Install extension two (3) in boom (4).



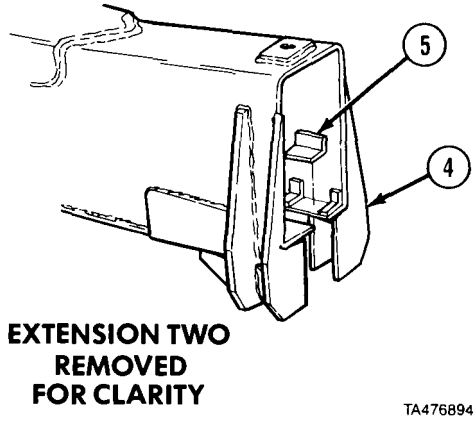
TA476893

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

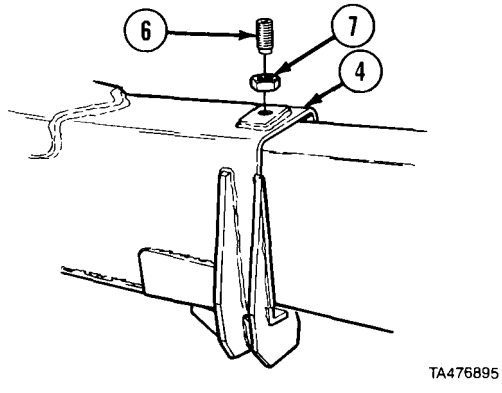
WARNING

Do not use fingers to install wear pads. Personal injury may incur.

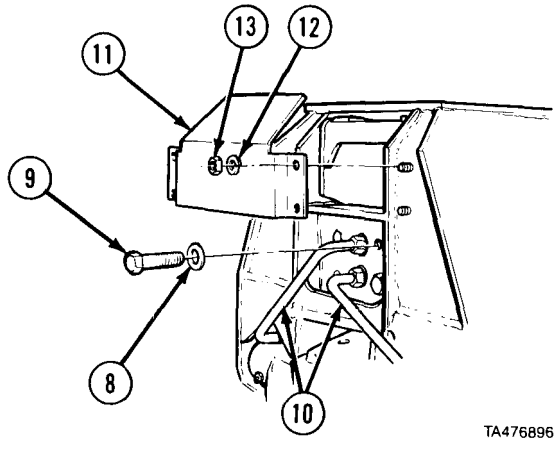
(3) Install two wear pads (5) in boom (4).



(4) Install setscrew (6) and nut (7) in boom (4).
(5) Adjust setscrew (6) until 1/8 in. (3.17 mm) clearance between setscrew and extension two.
(6) Tighten nut (7).



(7) Install four washers (8) and screws (9).
(8) Connect two hydraulic lines (10).
(9) Install cover (11) with four lockwashers (12) and nuts (13).



d. Follow-on Maintenance. Install extension one (para 17-12.1).

END OF TASK

Section IV. CYLINDERS

17-14. ERECTION CYLINDER REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, dry cleaning, Item 57, Appendix C
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

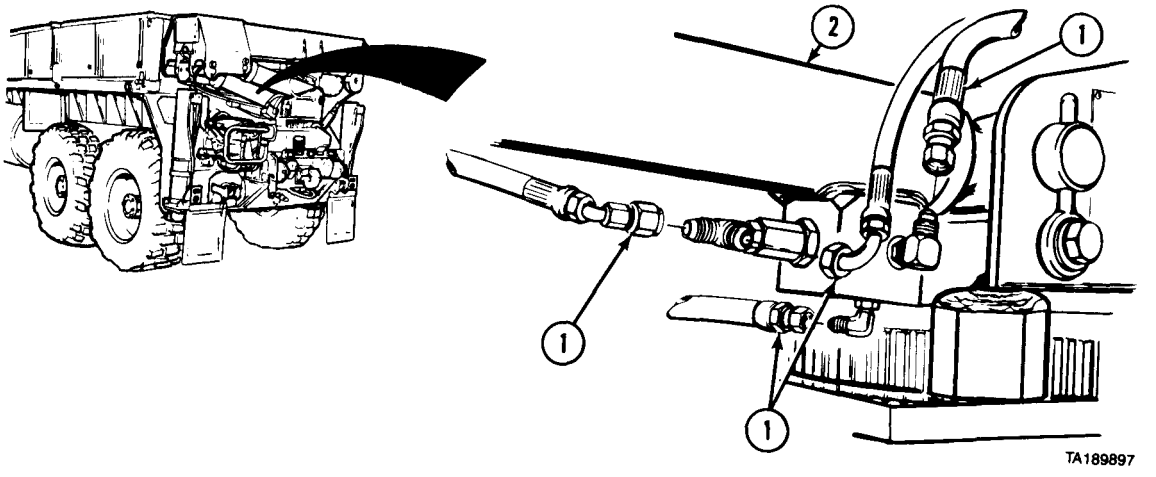
TM or Para	*Condition Description*
TM 9-2320-279-10	Crane in operating condition, extensions 1 and 2 fully extended and lowered to the ground.
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Cargo body rear panel removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

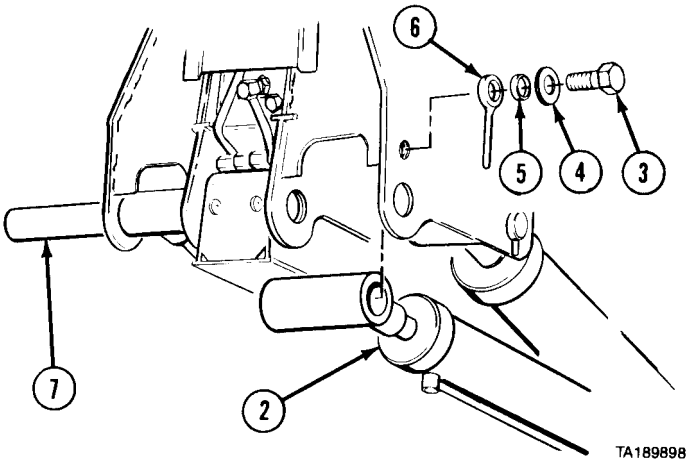


NOTE

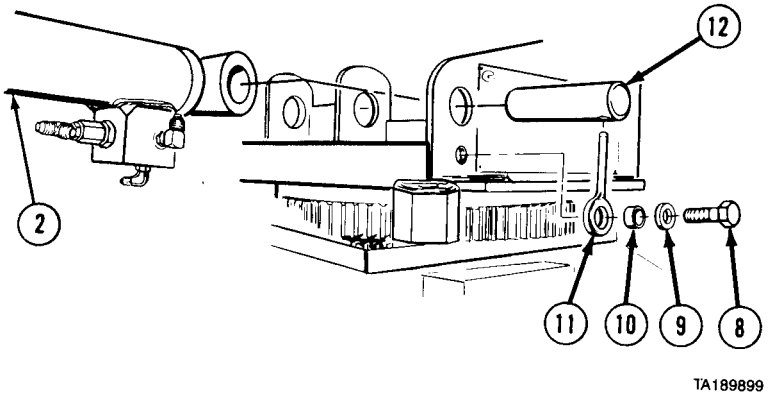
- Right and left cylinders are removed the same way. Left cylinder has two lines and two plugs instead of four lines.
- Tag and mark lines before disconnecting.

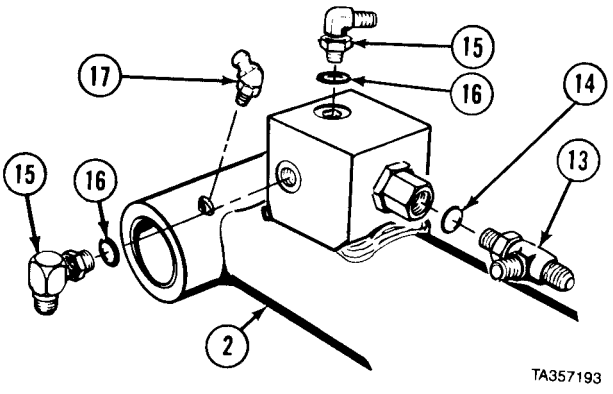
(1) Disconnect four hydraulic lines (1) from cylinder (2).

(2) Remove screw (3), washer (4), spacer (5), and lockpin (6).
(3) Repeat step (2) for other side.
(4) Drive pin (7) in far enough to clear cylinder (2).
(5) Lower end of cylinder (2).



(6) Remove screw (8), washer (9), spacer (10), and lockpin (11).
(7) Soldier A removes pin (12) while Soldier B holds and removes cylinder (2).





NOTE

Left cylinder does not have tee fitting.

(8) Remove tee fitting (13) and preformed packing (14).
(9) Remove two elbows (15) and preformed packings (16).
(10) Remove two grease fittings (17) from each end of cylinder (2).

17-14. ERECTION CYLINDER REMOVAL/INSTALLATION (CONT).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

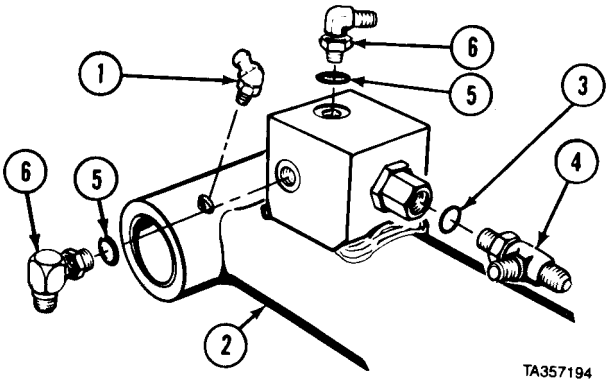
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

c. *Installation.*

NOTE

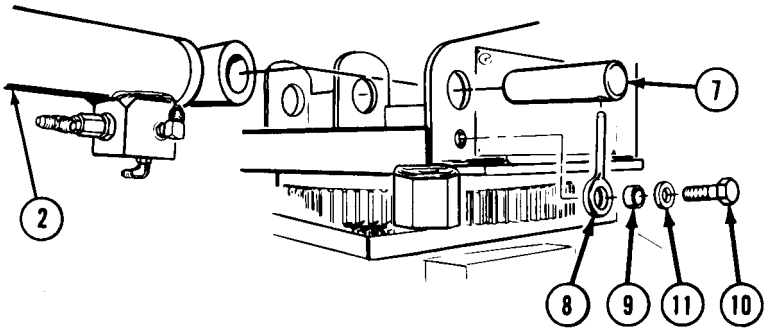
Right and left cylinders are installed the same way. Left cylinder does not have tee fitting.

(1) Install two grease fittings (1) on each end of cylinder (2).
(2) Install preformed packing (3) and tee fitting (4).
(3) Install two preformed packings (5) and elbows (6).



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(4) Soldier A alines and installs cylinder (2) while Soldier B installs pin (7), lockpin (8), and bushing (9).

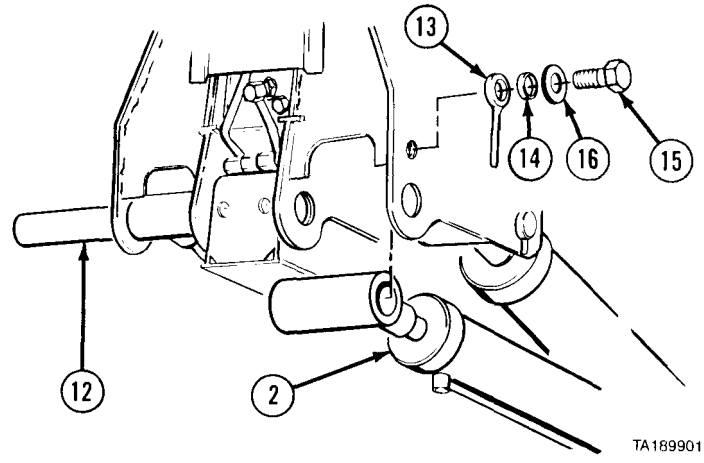


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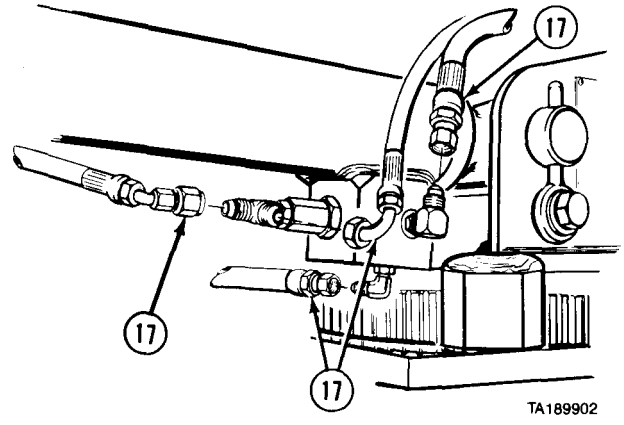
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(5) Apply sealing and thread locking compound and install screw (10) and washer (11).



(6) Aline cylinder (2).
(7) Drive pin (12) through cylinder (2).
(8) Install lockpin (13) and spacer (14).
(9) Apply sealing and thread locking compound and install screw (15) and washer (16).
(10) Repeat steps *(8)* and *(9)* for other side.



(11) Connect four hydraulic lines (17).

d. Follow-on Maintenance. Install cargo body rear panel (TM 9-2320-279-10).

END OF TASK

17-14.1. ERECTION CYLINDER REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

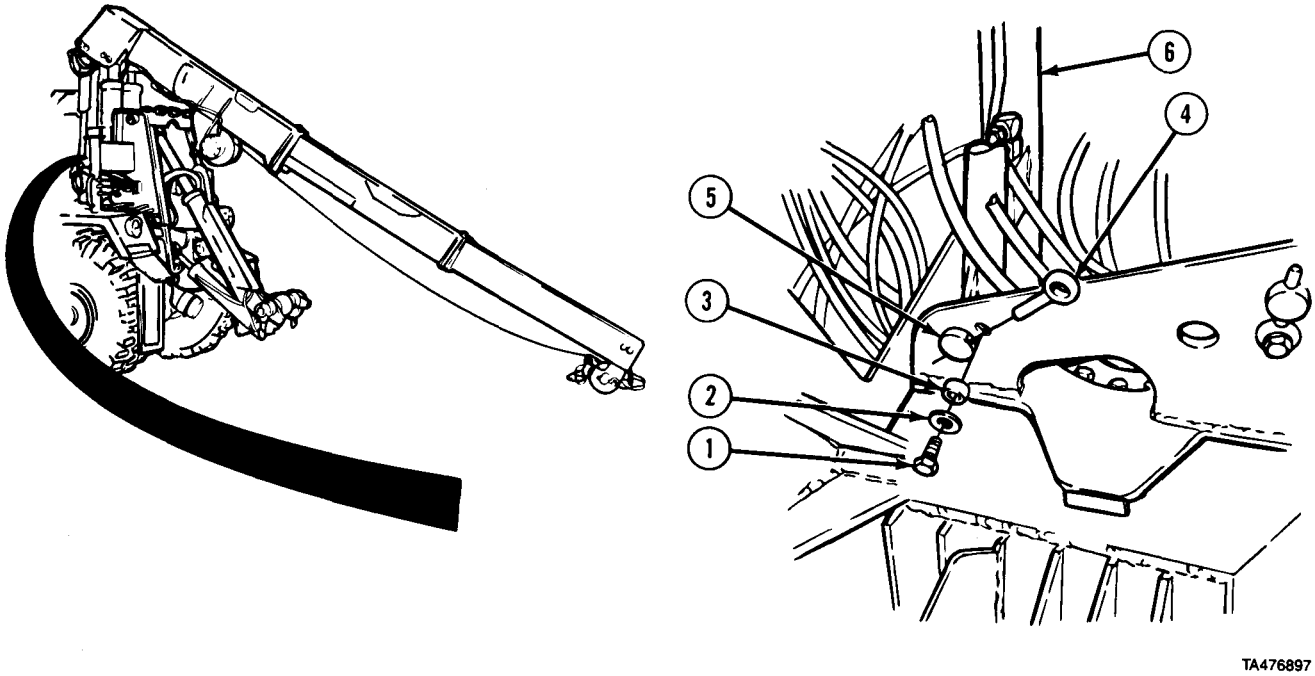
TM or Para	*Condition Description*
TM 9-2320-279-10	Crane in operating condition extensions 1 and 2 fully extended and lowered to ground.
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. **Removal.**



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M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

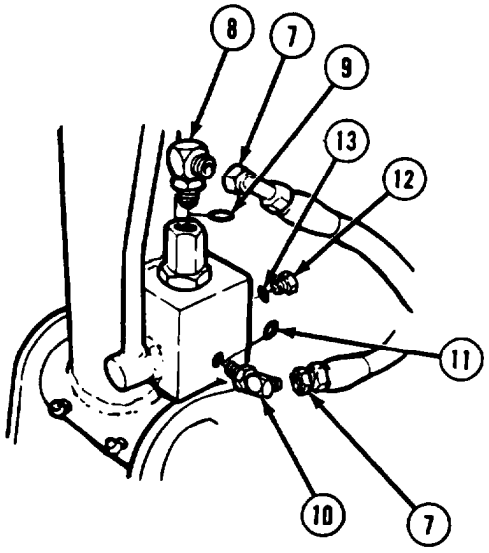
(1) Remove screw (1), washer (2), spacer (3), and lockpin (4).
(2) Repeat step *(1)* for other side.

NOTE

Pin must be driven from right to left side.

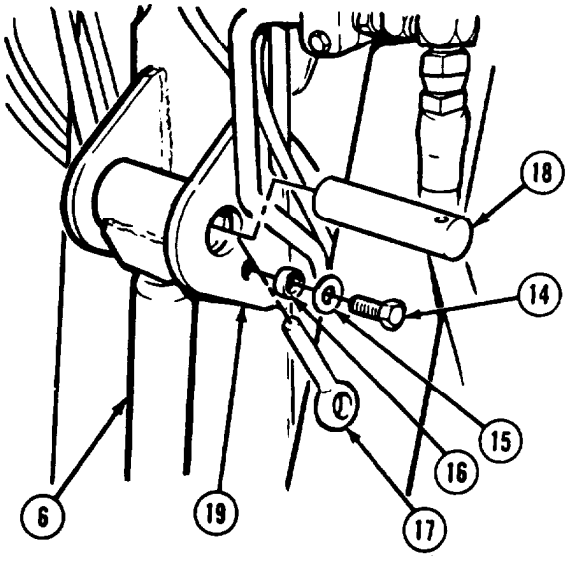
(3) Drive pin (5) in far enough to clear cylinder (6).

Disconnect two hydraulic lines (7).
(5) Remove elbow (8) and preformed packing (9).
(6) Remove elbow (10) and preformed packing (11).
(7) Remove plug (12) and preformed packing (13).



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(8) Remove screw (14), washer (15), spacer (16), and lockpin (17).
(9) Remove pin (18) and cylinder (6) from crane (19).

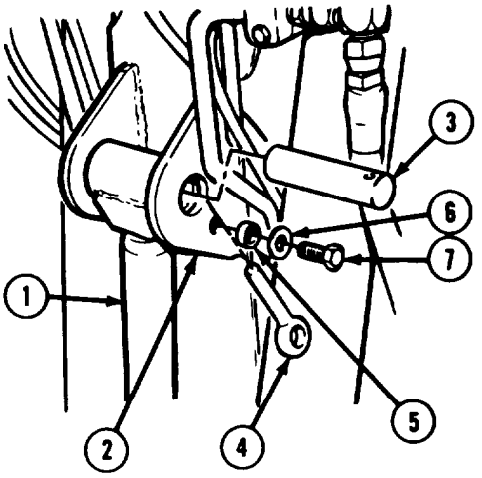


TA476899

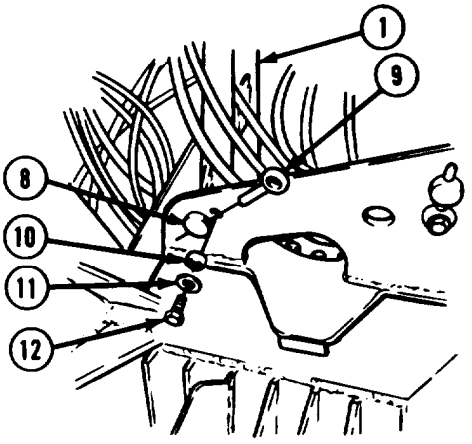
17-14.1 ERECTION CYLINDER REMOVAL/INSTALLATION (M984E1) (CONT).

b. Installation.

(1) Install cylinder (1) in crane (2).
(2) Install pin (3), lockpin (4), and spacer (5).
(3) Apply sealing and thread locking compound and install washer (6) and screw (7).



(4) Aline cylinder (1) and drive pin (8) back through cylinder (1).
(5) Install lockpin (9) and spacer (10).
(6) Apply sealing and thread locking compound and install washer (11) and screw (12).

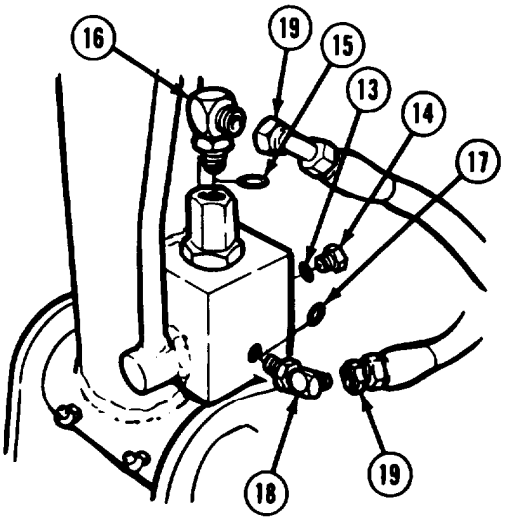


(7) Install preformed packing (13) and plug (14).
(8) Install preformed packing (15) and elbow (16).

NOTE

Standard elbow (on side of manifold) has been replaced by an elbow with an orifice. Refer to TM 9-2320-279-24P

(9) Install preformed packing (17) and elbow (18).
(10) Connect two hydraulic lines (19).



c. Follow-on Maintenance.

(1) Return crane to stowed position (TM 9-2320-279-10).
(2) Check operation (TM 9-2320-279-10).
(3) Check for leaks.

END OF TASK

17-15. ERECTION CYLINDER REPAIR

This task covers:

a. Disassembly
c. Cleaning/Inspection
c. Assembly

INITIAL SETUP

Models
M977, M984E1, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Oil, lubricating, Item 47.1, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Heavy wheel vehicle mechanic (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
	Erection cylinder on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

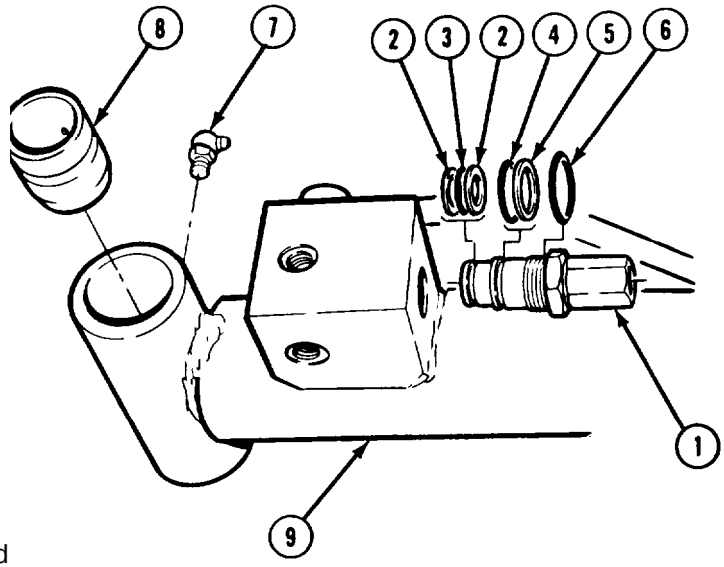
Level of Maintenance
General Support

a. Disassembly.

NOTE

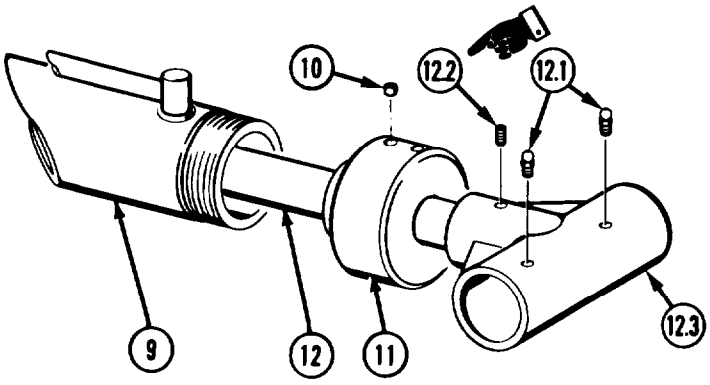
- Right and left cylinders are disassembled the same way.
- There are two models of erection cylinders. Model A is used on M977 and M985 vehicles and includes setscrews and a spacer. Model B is used on M984E1 vehicles.

(1) Remove holding valve (1), backup ring (2), preformed packing (3), backup ring (2), preformed packing (4), backup ring (5), and preformed packing (6).
(2) Remove two grease fittings (7).
(2.1) Remove two bushings (8) from each end of cylinder (9).



17-15. ERECTION CYLINDER REPAIR (CONT).

(3) Remove setscrew (10) and loosen retaining ring (11).
(4) Remove rod assembly (12) from cylinder (9).

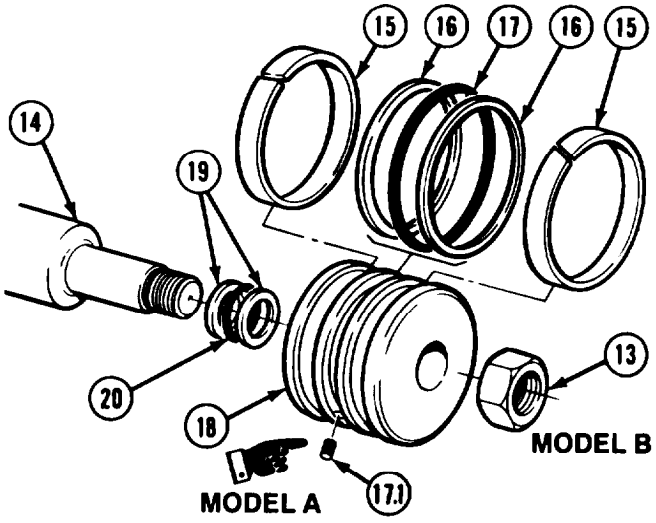


NOTE
Do steps (4.1) and (4.2) for Model A only.

(4.1) Remove two grease fittings (12.1) from rod assembly (12).
(4.2) Remove setscrew (12.2) and rod cap (12.3) from rod (12).

NOTE
Do step (5) for Model B cylinder.

(5) Remove locknut (13) from rod (14).
(6) Remove wear ring (15), two backup rings (16), preformed packing (17), and wear ring.



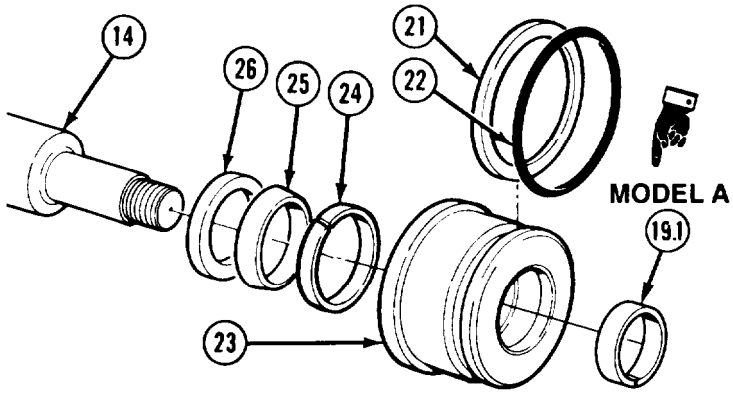
NOTE
Do step (6.1) for Model A cylinder.

(6.1) Remove setscrew (17.1) from piston (18).
(7) Remove piston (18), backup ring (19), preformed packing (20), and backup ring from rod (14).

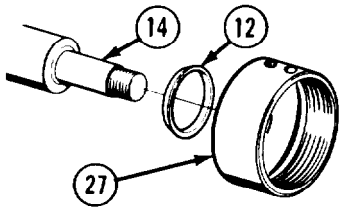
NOTE

Do step *(7.1)* for Model A cylinder.

(7.1) Remove spacer (19.1) from rod (14).
(8) Remove backup ring (21) and preformed packing (22) from head (23).
(9) Remove head (23) from rod (14).
(10) Remove backup ring (24), seal (25), and wear ring (26) from head (23).



(11) Remove retaining ring (12) from rod (14).
(12) Remove wiper ring (27) from retaining ring (12).



b. Cleaning/Inspection.

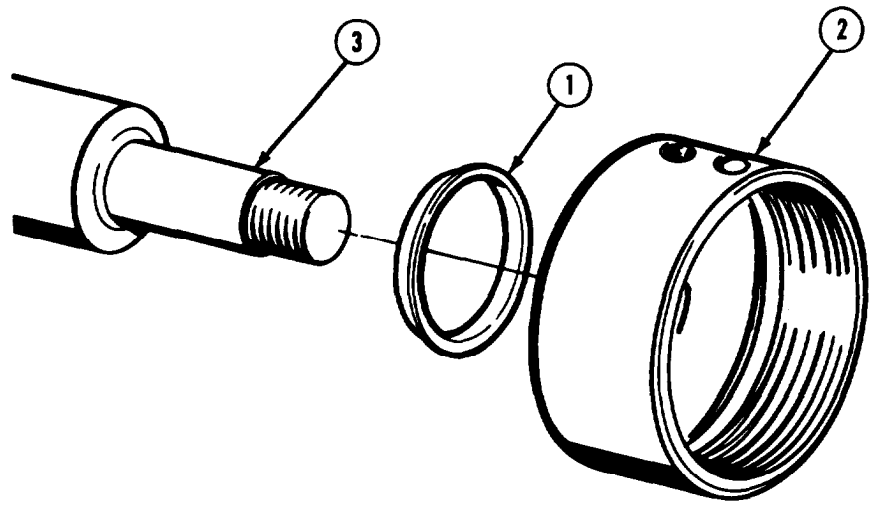
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. 'lb avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

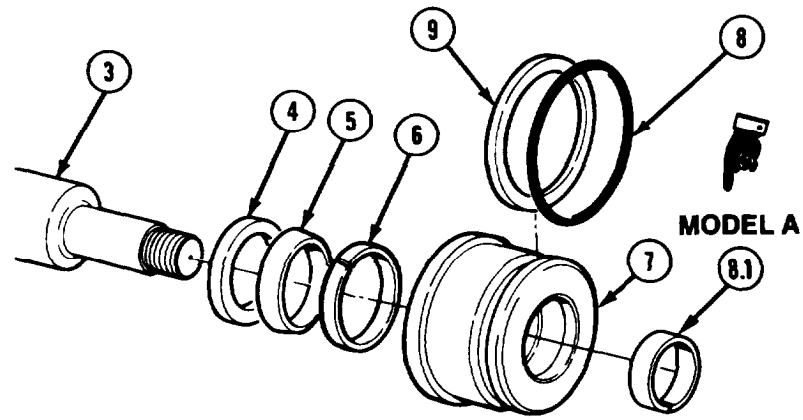
(1) Clean all metal parts in drycleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check cylinder bushing end. If diameter is larger than 2.015 in. (51.18 mm), replace bushing.
(5) Check rod end bushing (M984E1 only). If diameter is larger than 1.515 in. (38.48 mm), replace bushing.

17-15. ERECTION CYLINDER REPAIR (CONT).

c. Assembly.



(1) Install wiper ring (1) in retaining ring (2).
(2) Install retaining ring (2) on rod (3).



(3) Install wear ring (4), seal (5), and backup ring (6) in head (7).
(4) Install head (7) on rod (3).
(5) Install preformed packing (8) and backup ring (9) on head (7).

NOTE

Do step *(5.1)* for Model A only.

(5.1) Install spacer (8.1) on rod (3).

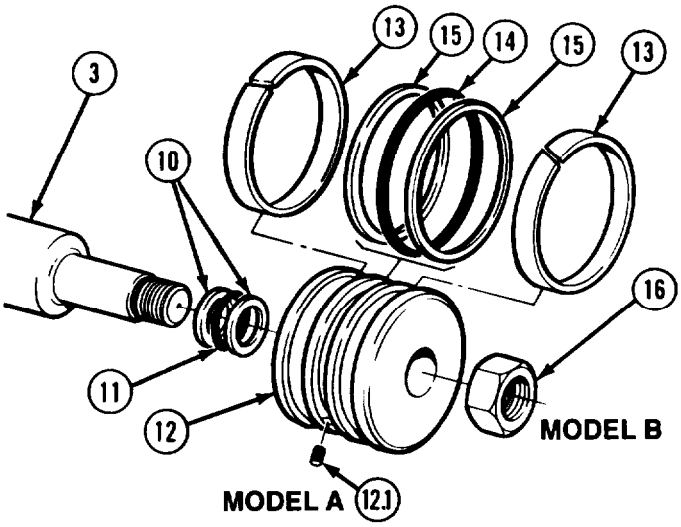
(6) Install backup ring (10), preformed packing (11), and backup ring (10) in piston (12).
(7) Install piston (12) on rod (3).

NOTE
Do step *(7.1)* for Model A cylinder.

(7.1) Install setscrew (12.1) on piston (12).
(8) Install wear ring (13), preformed packing (14), two backup rings (15), and wear ring (13) on piston (12).

NOTE
Do step *(9)* for Model B cylinder.

(9) Install nut (16) on rod (3).



NOTE

Do steps *(9.2)* and *(9.3)* for Model A cylinder.

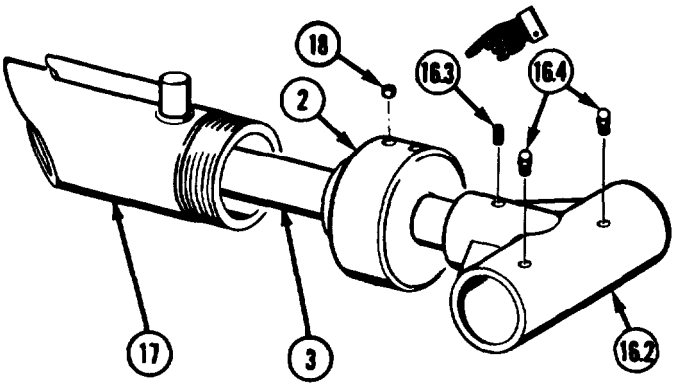
(9.2) Install rod cap (16.2) and two setscrews (16.3) to rod (3).

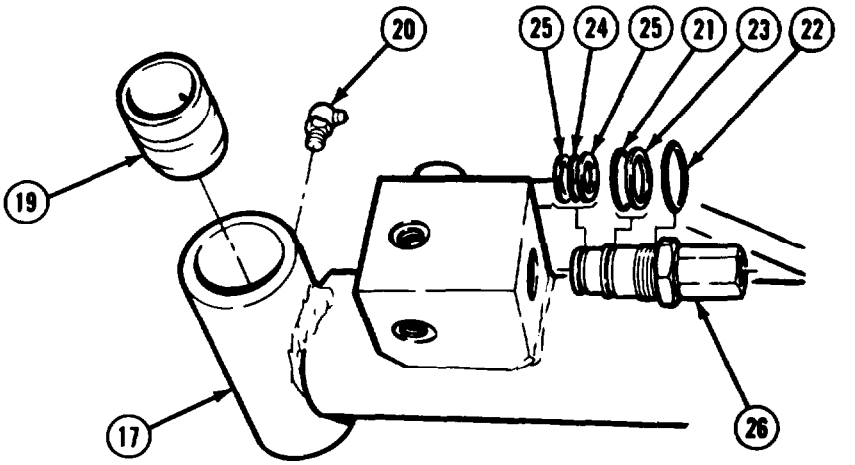
(9.3) Install two grease fittings (16.4) in rod cap (16.2).

(10) Install rod assembly (3) in cylinder (17).

(11) Apply sealing and thread locking compound and install retaining ring (2).

(12) Install setscrew (18).





(13) Install two bushings (19) and grease fittings (20) on each end of cylinder (17).

NOTE

Apply lubricant to preformed packings before installing.

(14) Install preformed packings (21 and 22), backup ring (23), preformed packing (24), and two backup rings (25).

(15) Install holding valve (26).

d. Follow-on Maintenance. None.

END OF TASK

17-16. LIFT CYLINDER REMOVAL/INSTALLATION

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Tags, identification, Item 60, Appendix C
Solvent, dry cleaning, Item 67, Appendix C
Wood, stock, Item 68, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

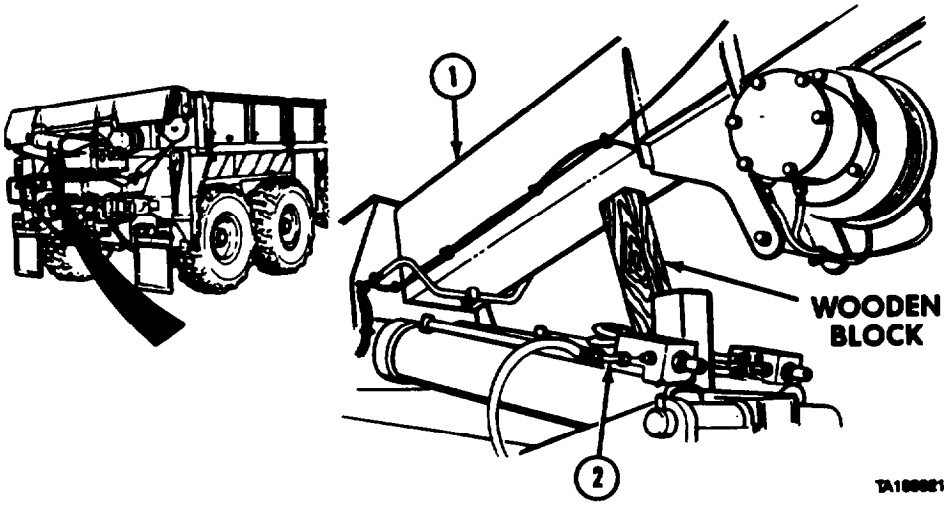
TM or Para	*Condition Description*
Para 17-2	Hoist drain lines removed.
TM 9-2320-279-10	Cargo body rear panel removed.

Special Environmental conditions
None

General Safety Instructions
None

Level of Maintenance
Direct support

a. Removed



NOTE

Wooden block is approximately 4 x 4 x 12 in. (102 x 102 x 306 mm). Right and left cylinders are removed the same way.

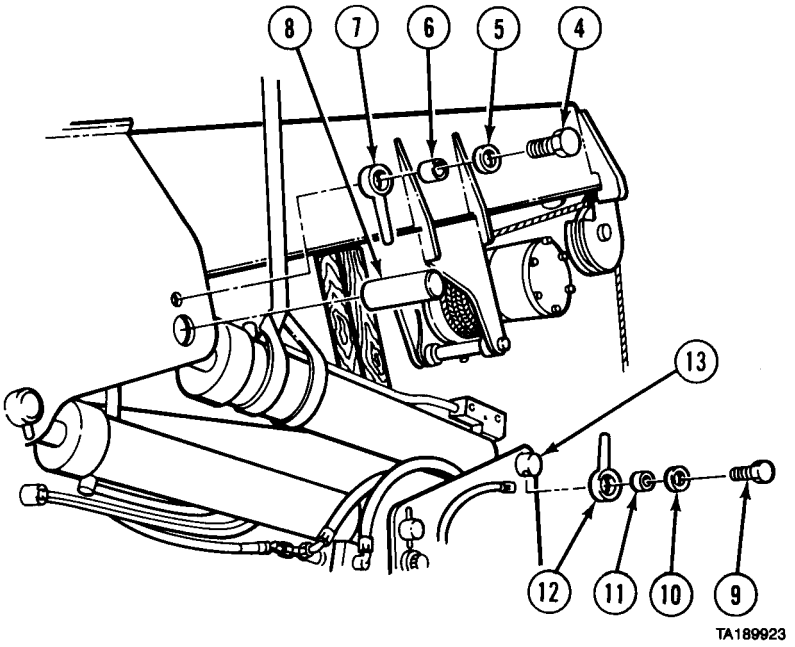
(1) Raise boom (1) and support with wooden block.

NOTE

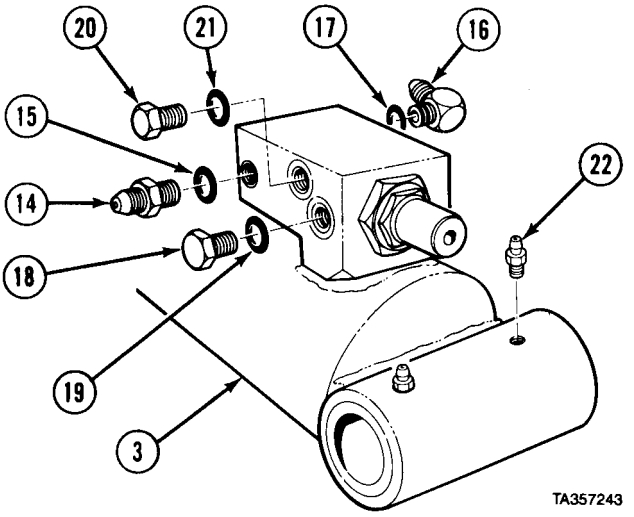
Tag and mark hydraulic lines before disconnecting.

(2) Disconnect four hydraulic lines (2).

(3) Attach suitable lifting device to cylinder (3).
(4) Remove screw (4), washer (5), spacer (6), and lockpin (7).
(5) Remove pin (8).
(6) Remove screw (9), washer (10), spacer (11), and lockpin (12).
(7) Repeat step *(6)* for other side.
(8) Drive pin (13) in far enough to clear cylinder (3).
(9) Remove cylinder (3).



(10) Remove three fittings (14) and preformed packings (15).
(11) Remove elbow (16), preformed packing (17), plug (18), preformed packing (19), plug (20), and preformed packing (21).
(12) Remove two grease fittings (22) from each end of cylinder (3).



b. Cleaning/Inspection.

WARNING

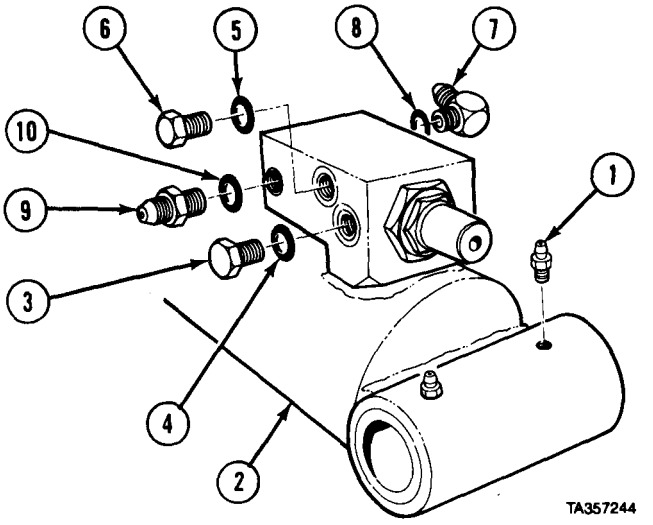
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

17-16. LIFT CYLINDER REMOVAL/INSTALLATION (CONT).

c. Installation.

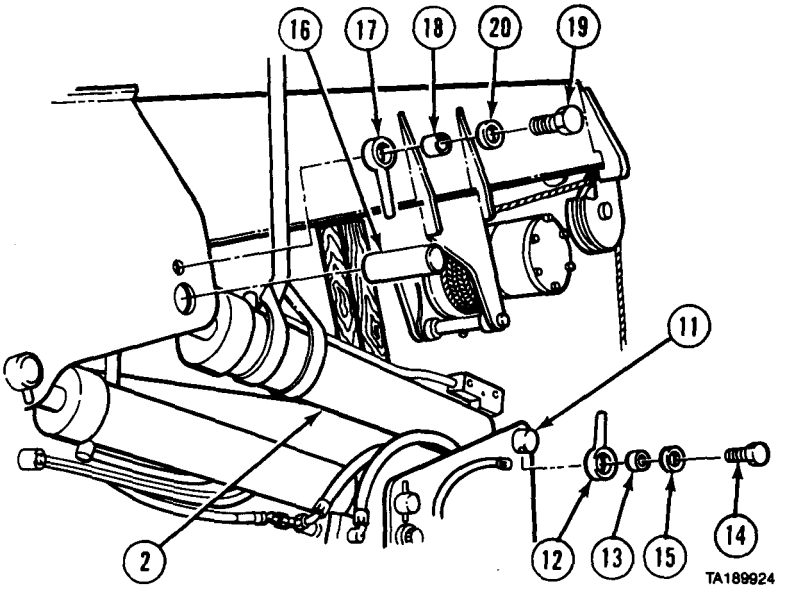
(1) Install two grease fittings (1) in each end of cylinder (2).
(2) Install plug (3), preformed packing (4), preformed packing (5), and plug (6).
(3) Install elbow (7) and preformed packing (8).
(4) Install three fittings (9) and preformed packings (10).



(5) Aline and install cylinder (2).
(6) Drive pin (11) through cylinder (2).
(7) Aline hole in pin (11) and install two lockpins (12) and spacers (13).

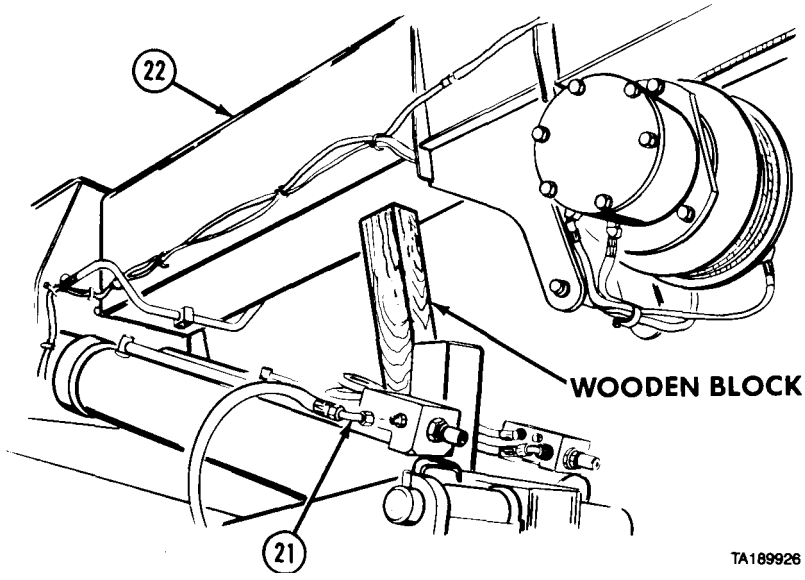
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(8) Apply sealing and thread locking compound to two screws (14) and install washers (15) and screws.
(9) Aline cylinder (2) and install pin (16), lockpin (17), and spacer (18).
(10) Apply sealing and thread locking compound to screw (19) and install washer (20) and screw.

(11) Connect four hydraulic lines (21).
(12) Raise boom (22) and remove wood block.



d. Follow-on Maintenance.
(1) Install hoist drain lines (para 17-2).
(2) Install cargo body rear panel (TM 9-2320-279-10).

END OF TASK

17-16.1. LIFT CYLINDER REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-1 0	Recovery system lowered.
TM 9-2320-279-1 0	Crane in operating position, extension 1 and 2 fully extended and lowered to ground.
TM 9-2320-279-1 0	Shut off engine.

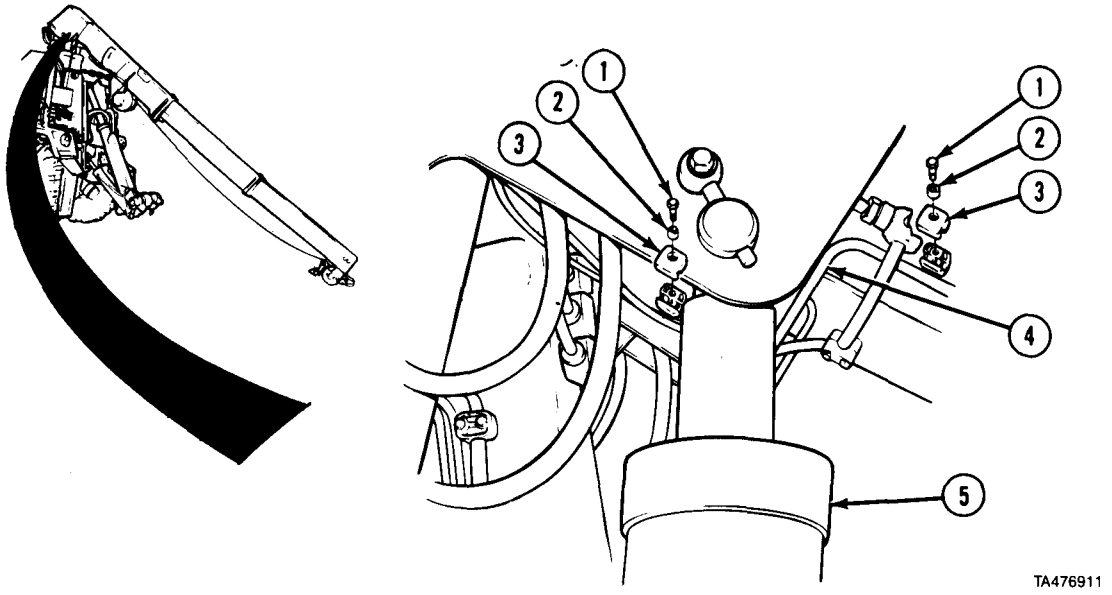
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

17-16.1. LIFT CYLINDER REMOVAL/INSTALLATION (M984E1) (CONT).

a. *Removal.*

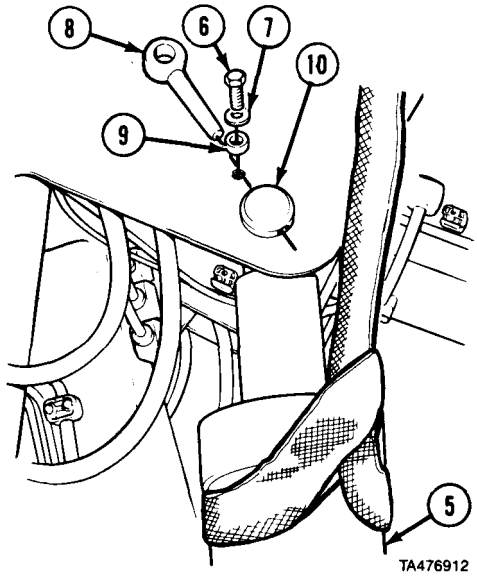


NOTE

Right and left cylinders are removed the same. Steps (1) and (2) must be done before removing left cylinder.

(1) Remove two screws (1), spacers (2), and two clamp halves (3).
(2) Disconnect hydraulic line (4) and move to clear cylinder (5).

(3) Attach suitable lifting device to cylinder (5).
(4) Remove screw (6), washer (7), lockpin (8), spacer (9), and pin (10).
(5) Start engine and retract lift cylinder (TM 9-2320-279-10).

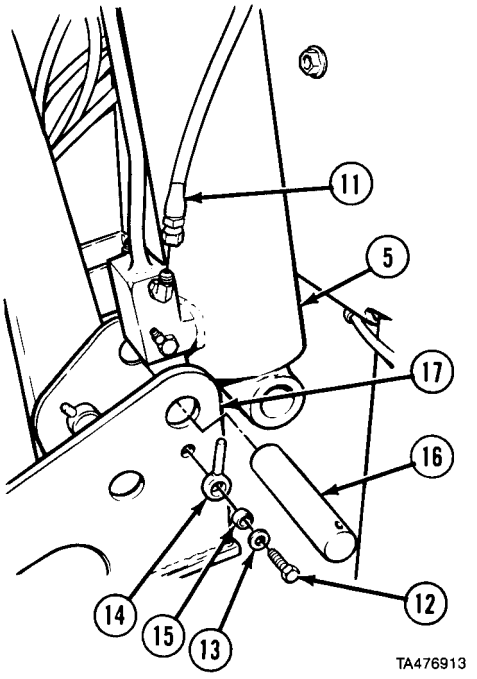


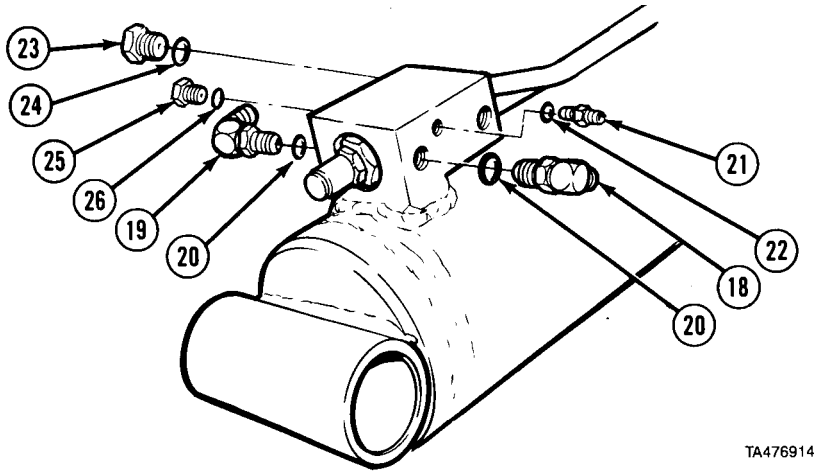
M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

NOTE

Right cylinder has only four lines.

(6) Disconnect five hydraulic lines (11).
(7) Remove screw (12), washer (13), lockpin (14), spacer (15), and pin (16).
(8) Remove cylinder (5) from crane (17).

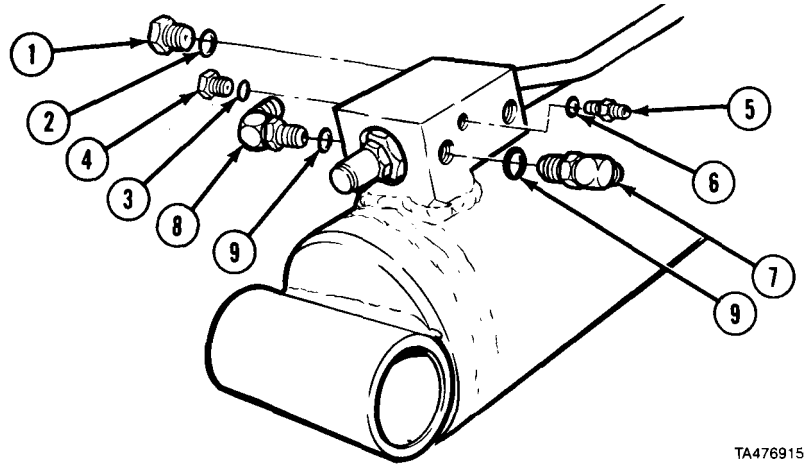




(9) Remove two elbows (18), elbow (19), and three preformed packings (20).
(10) Remove fitting (21), preformed packing (22), plug (23), preformed packing (24), plug (25), and preformed packing (26).

17-16.1. LIFT CYLINDER REMOVAL/INSTALLATION (M984E1) (CONT).

b. Installation.



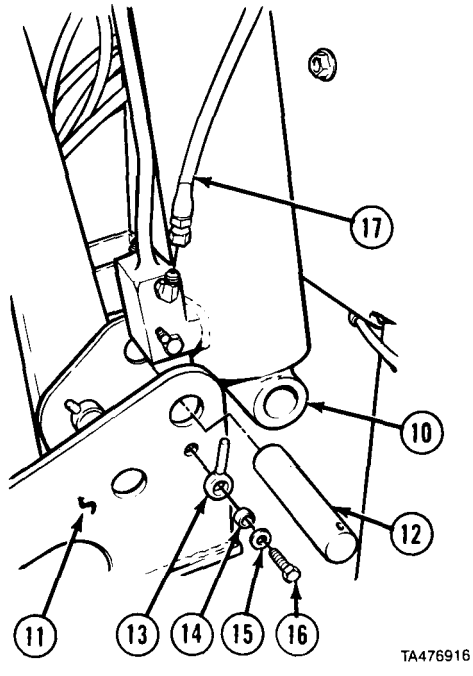
(1) Install plug (1), preformed packing (2), preformed packing (3), and plug (4).
(2) Install fitting (5) and preformed packing (6).
(3) Install two elbows (7), elbow (8), and three preformed packings (9).

(4) Aline and install cylinder (10) in crane (11).
(5) Install pin (12), lockpin (13), and spacer (14).
(6) Apply sealing and thread locking compound and install washer (15) and screw (16).

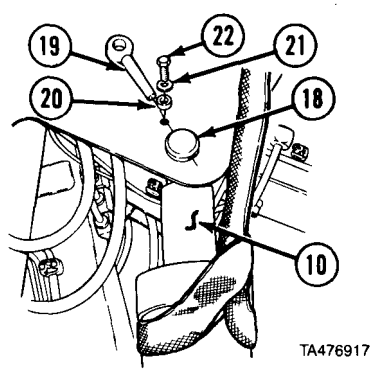
NOTE

Right cylinder has only four lines.

(7) Connect five hydraulic lines (17).



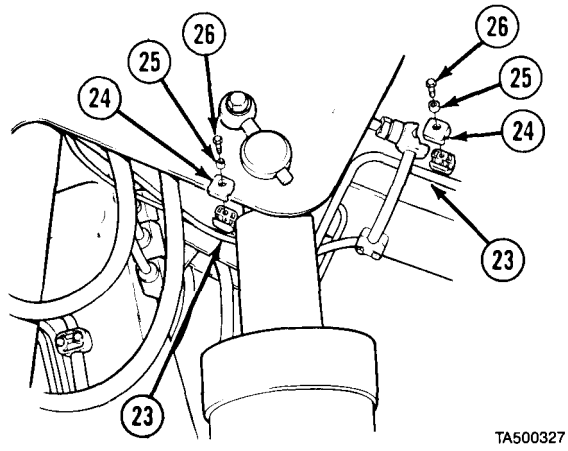
(8) Start engine (TM 9-2320-279-10).
(9) Aline cylinder (10) and install pin (18), lockpin (19), and spacer (20).
(10) Apply sealing and thread locking compound and install washer (21) and screw (22).



(11) Connect hydraulic line (23).
(12) Install two clamp halves (24), spacers (25), and screws (26) on line (23).

c. Follow-on Maintenance.
(1) Check for leaks.
(2) Return crane to stowed position (TM 9-2320-279-10).
(3) Return recovery system to stowed position (TM 9-2320-179-10).

END OF TASK



17-17. LIFT CYLINDER REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M984E1, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Oil, lubricating, Item 47.1, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Lift cylinder on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

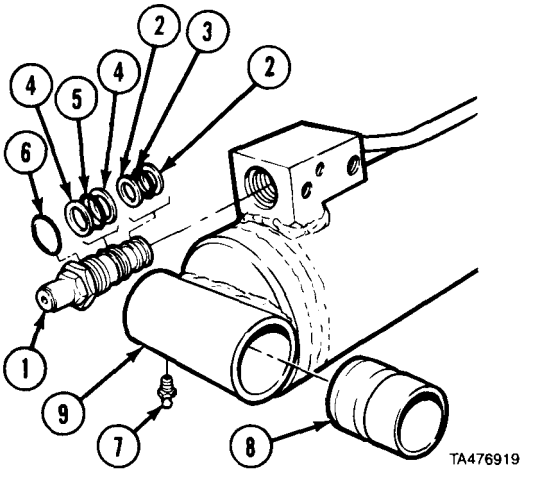
17-17. LIFT CYLINDER REPAIR (CONT).

a. Disassembly.

(1) Remove holding valve (1).

(2) Remove two backup rings (2), preformed packing (3), two backup rings (4), and preformed packings (5 and 6).

(3) Remove two grease fittings (7) and bushings (8) from each end of cylinder (9).

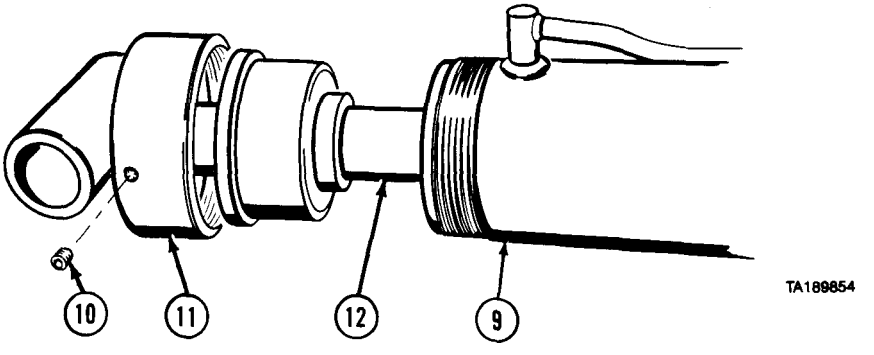


NOTE

Retaining ring may require heat for disassembly.

(4) Remove setscrew (10) and loosen retaining ring (11).

(5) Remove rod assembly (12) from cylinder (9).

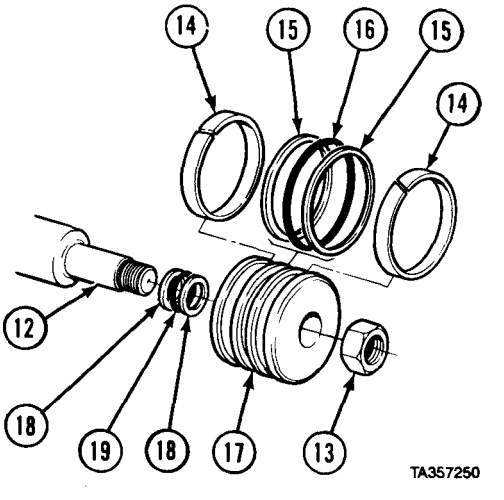


(6) Remove nut (13) from rod (12).

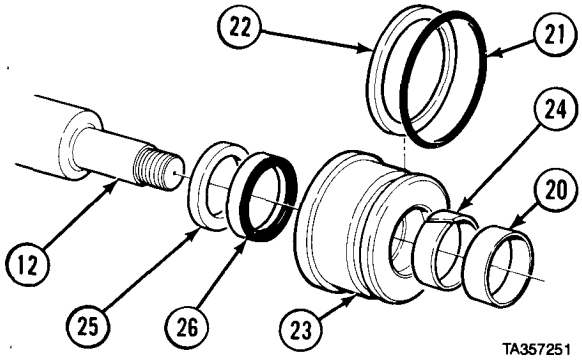
(7) Remove wear ring (14), two backup rings (15), preformed packing (16), and wear ring (14).

(8) Remove piston (17).

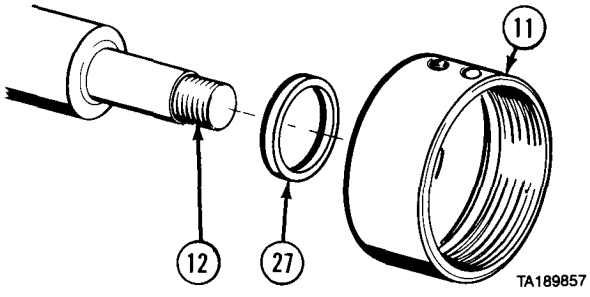
(9) Remove backup ring (18), preformed packing (19), and backup ring (18) from piston (17).



(10) Remove spacer (20).
(11) Remove preformed packing (21) and backup ring (22).
(12) Remove head (23) from rod (12).
(13) Remove wear ring (24), backup ring (25), and seal (26) from head (23).



(14) Remove retaining ring (11) and wiper ring (27) from rod (12).



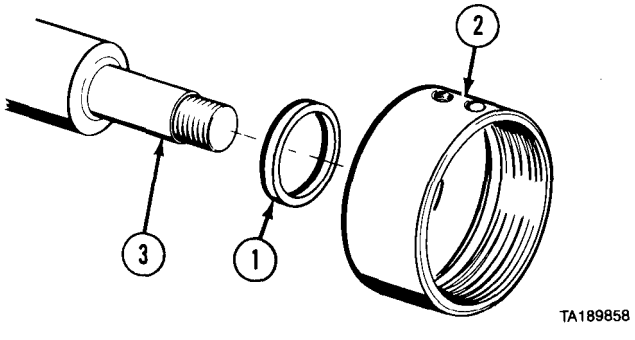
b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check bushing inside diameter. If diameter is larger than 2.020 in. (51.30 mm), replace bushing.

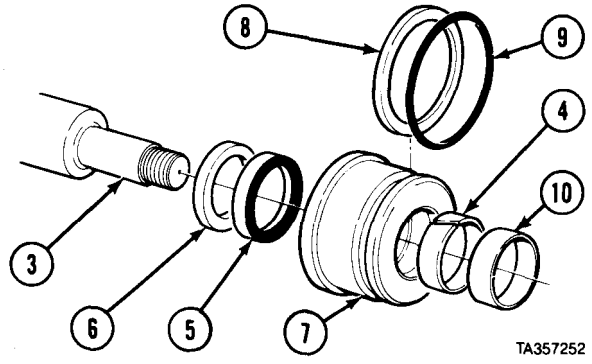
c. Assembly.



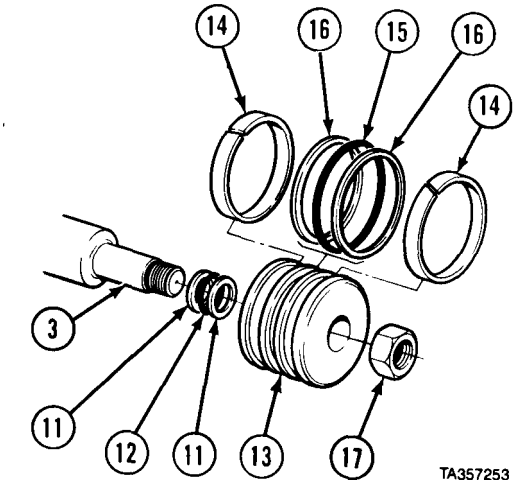
(1) Install wiper ring (1) in retaining ring (2).
(2) Install retaining ring (2) on rod (3).

17-17. LIFT CYLINDER REPAIR (CONT).

(3) Install wear ring (4), seal (5), and backup ring (6) in head (7).
(4) Install backup ring (8) and preformed packing (9) on head (7).
(5) Install head (7) and spacer (10) on rod (3).



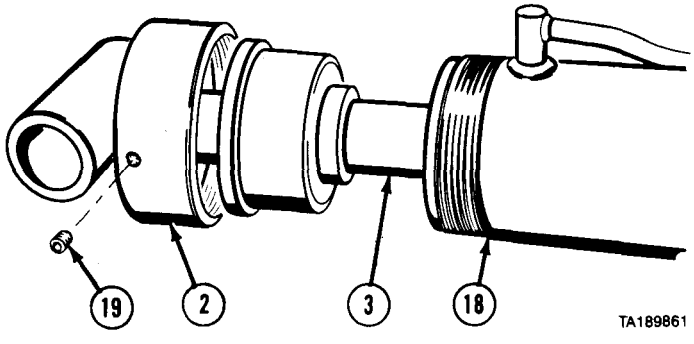
(6) Install backup ring (11), preformed packing (12), and backup ring (11) in piston (13).
(7) Install piston (13) on rod (3).
(8) Install wear ring (14), preformed packing (15), two backup rings (16), and wear ring (14).
(9) Install and tighten nut (17) to 100 lb-ft (135.6 N•m).



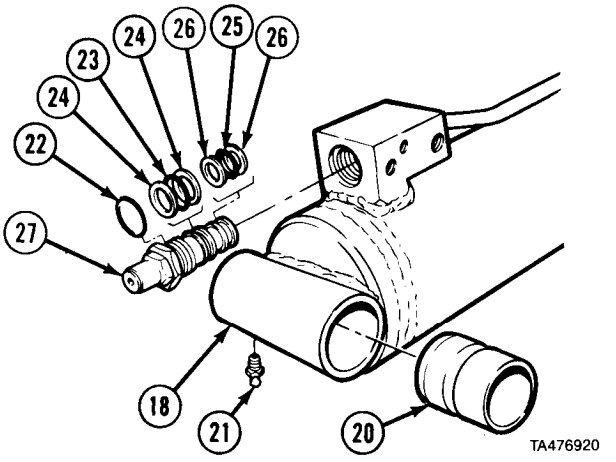
(10) Install rod assembly (3) in cylinder (18).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(11) Apply sealing and thread locking compound and install retaining ring (2).
(12) Install setscrew (19).



(13) Install two bushings (20) and grease fittings (21) in each end of cylinder (18).

NOTE

Apply lubricant to preformed packings before installing.

(14) Install preformed packing (22).
(15) Install preformed packing (23) and two backup rings (24).
(16) Install preformed packing (25) and two backup rings (26).
(17) Install holding valve (27).

d. Follow-on Maintenance. None.

END OF TASK

17-18. EXTENSION NO. 1 AND NO. 2 CYLINDER AND WEAR PADS REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-13	Extension No. *2* removed.

Special Environmental Conditions
None

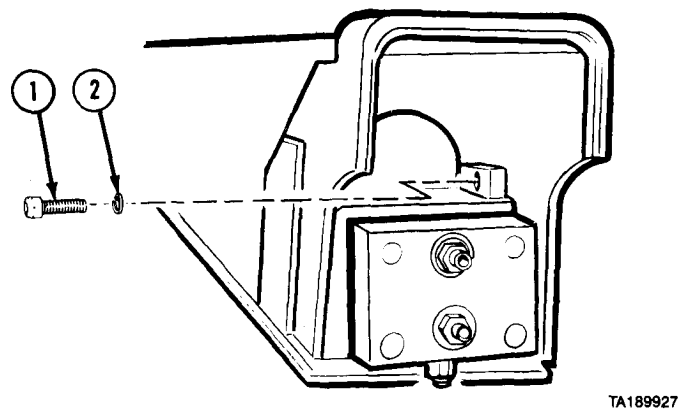
General Safety Instructions
None

Level of Maintenance
Direct Support

17-18. EXTENSION NO. 1 AND NO. 2 CYLINDER AND WEAR PADS REMOVAL/INSTALLATION (CONT).

a. *Removal.*

(1) Remove two screws (1) and lockwashers (2).



TA189927

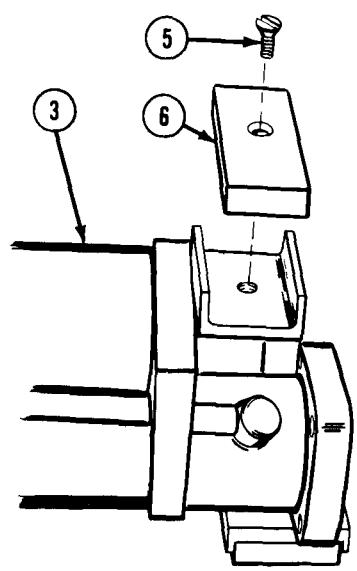
(2) Soldier A lifts front of cylinder (3) while Soldier B lifts rear of cylinder (3).

(3) Remove cylinder (3) through rear of extension No. 2 (4).



TA189928

(4) Remove two screws (5) and wear pads (6) from cylinder (3).



TA189929

b. Cleaning/Inspection.

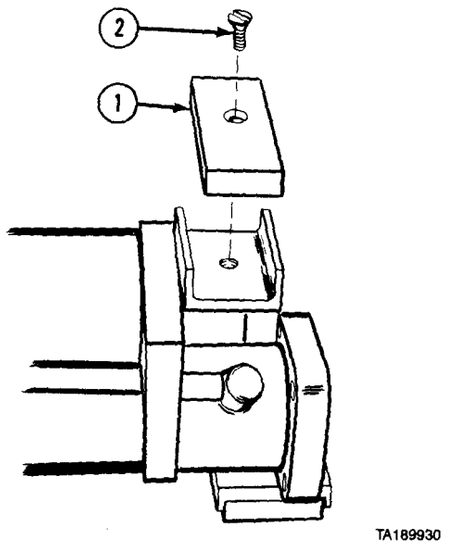
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Inspect wear pad thickness. If upper wear pad is under 0.438 in. (11. 1 mm) replace pad. If lower pad is under 0.500 in. (12.7 mm) replace pad.

c. Installation.

(1) Install two wear pads (1).



WARNING

Adhesives, solvents. and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

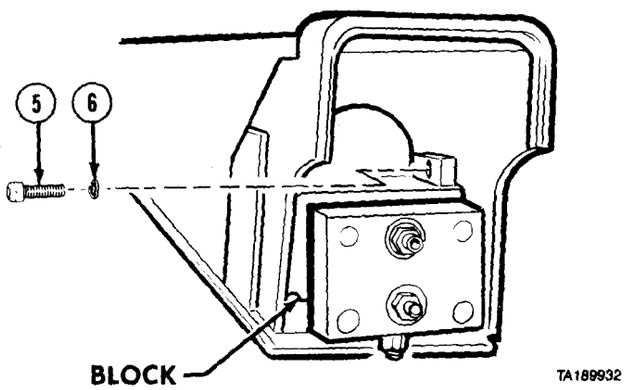
(2) Apply sealing and thread locking compound and install two screws (2).

(3) Soldier A and Soldier B install cylinder (3) in extension No. 2 *(4)* .



Be sure block is positioned below screw holes.

(4) Install two screws (5) and lockwashers (6).



d. Follow-on Maintenance. Install extension No. 2 (para 17-13).

END OF TASK

17-18.1. EXTENSION ONE & TWO CYLINDER AND WEAR PADS REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-13.1	Extension two removed.

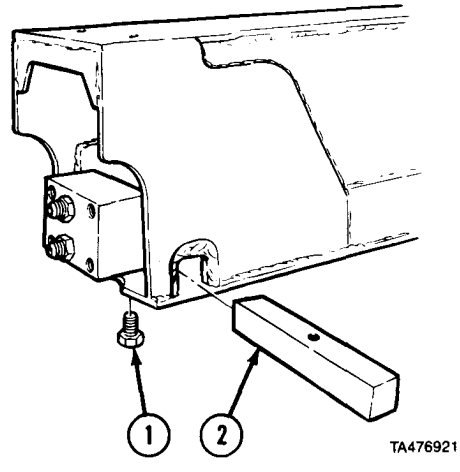
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

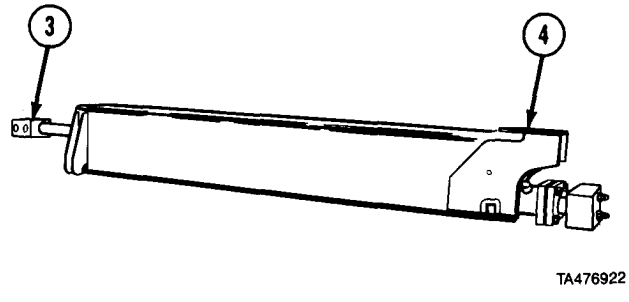
a. *Removal.*

(1) Remove screw (1) and retainer (2).

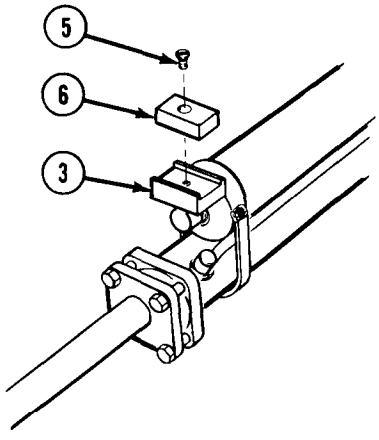


(2) Soldier A lifts front of cylinder (3) while Soldier B lifts rear of cylinder (3).

(3) Remove cylinder (3) through rear of extension two (4).



(4) Remove two screws (5) and wear pads (6) from cylinder (3).



TA476923

b. Cleaning/Inspection.

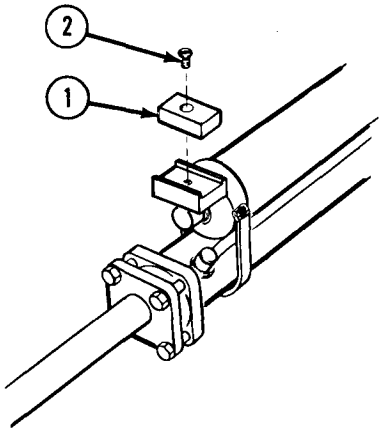
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Inspect wear pad thickness. If upper wear pad is under 0.438 in. (11.1 mm) replace pad. If lower pad is under 0.500 in. (12.7 mm) replace pad.

c. Installation.

(1) Install two wear pads (1).
(2) Apply thread locking sealing compound and install two screws (2).



TA476924

(3) Soldier A and Soldier B install cylinder (3) in extension two (4) through rear of extension.



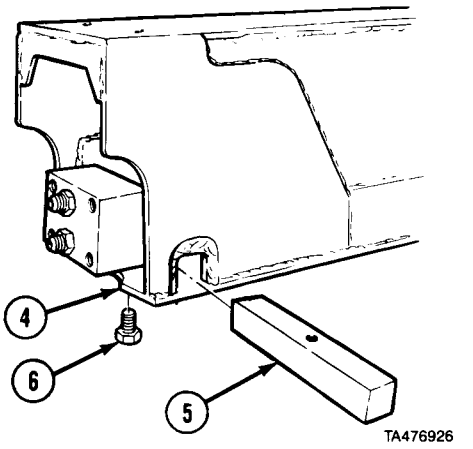
TA476925

17-18.1. EXTENSION ONE & TWO CYLINDER AND WEAR PADS REMOVAL/INSTALLATION (M984E1) (CONT).

(4) Install retainer (5) and screw (6) in extension two (4).

d. Follow-on Maintenance. Install extension two (para 17-13.1).

END OF TASK



17-19. EXTENSION CYLINDER REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Oil, lubricating, Item 47.1, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-18	Extension cylinders removed.

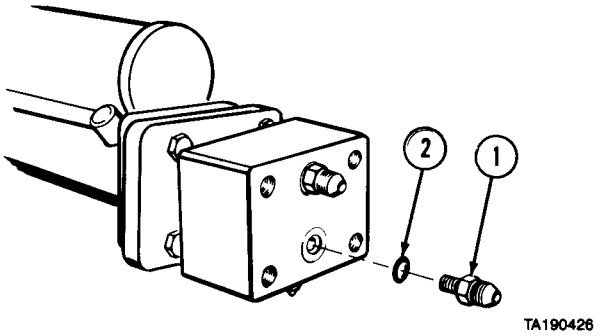
Special Environmental Conditions
None

General Safety Instructions
None

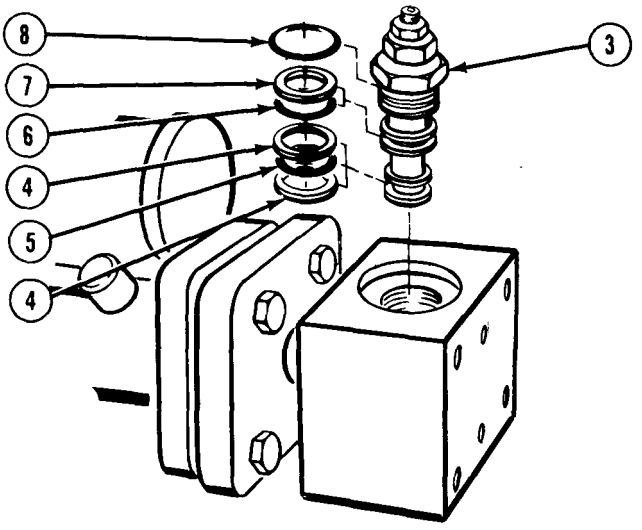
Level of Maintenance
General Support

a. *Disassembly.*

(1) Remove two fittings (1) and preformed packing (2).



(2) Remove holding valve (3).
(3) Remove two backup rings (4), preformed packings (5 and 6), backup ring (7), and preformed packing (8).

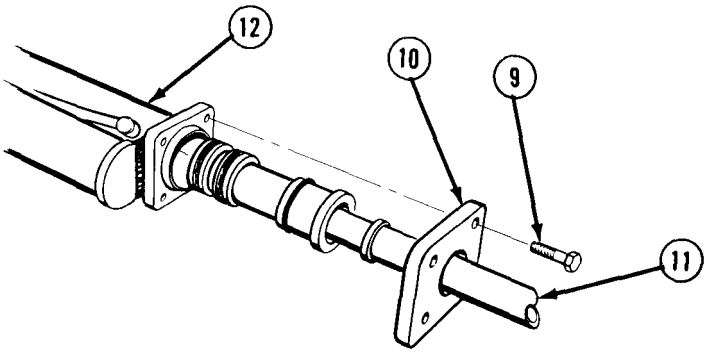


TA190427

NOTE

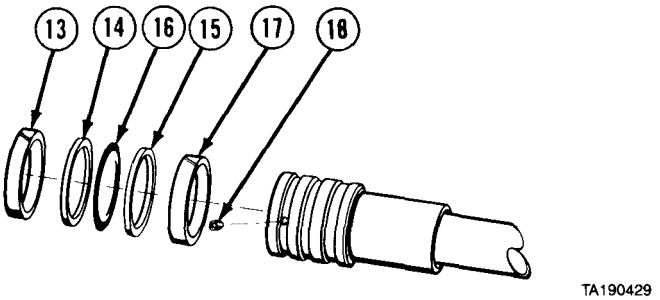
Both ends of cylinder are disassembled the same way.

(4) Remove four screws (9) and slide end cap (10) back.
(5) Remove rod assembly (11) from cylinder (12).



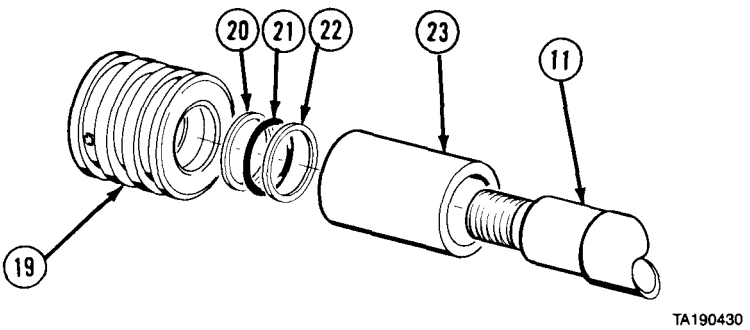
TA190428

(6) Remove wear ring (13), backup ring (14), backup ring (15), preformed packing (16), and wear ring (17).
(7) Remove setscrew (18).



TA190429

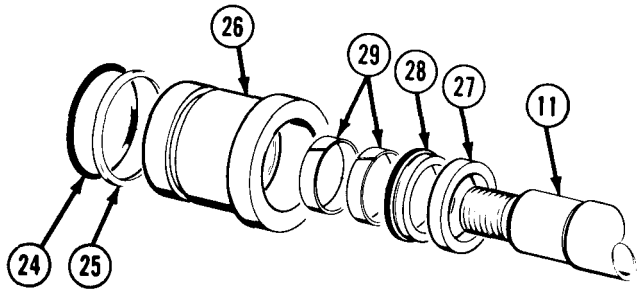
(8) Remove piston (19), backup ring (20), preformed packing (21), and backup ring (22).
(9) Remove spacer (23) from rod (11).



TA190430

17-19. EXTENSION CYLINDER REPAIR (CONT).

(10) Remove preformed packing (24), backup ring (25), and head (26) from rod (11).
(11) Remove backup ring (27), seal (28), and two wear rings (29).



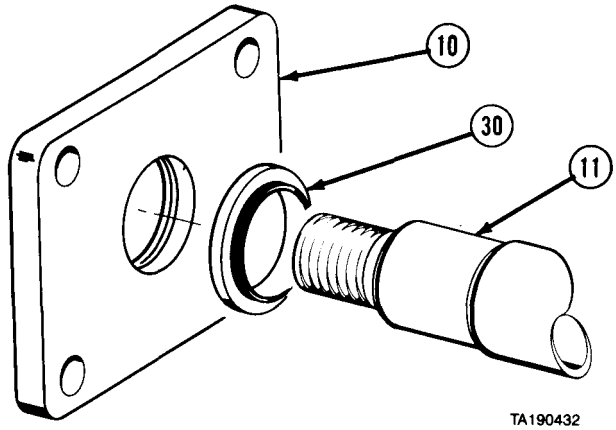
TA190431

(12) Remove end cap (10) from rod (11).
(13) Remove dust seal (30) from end cap (10).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



TA190432

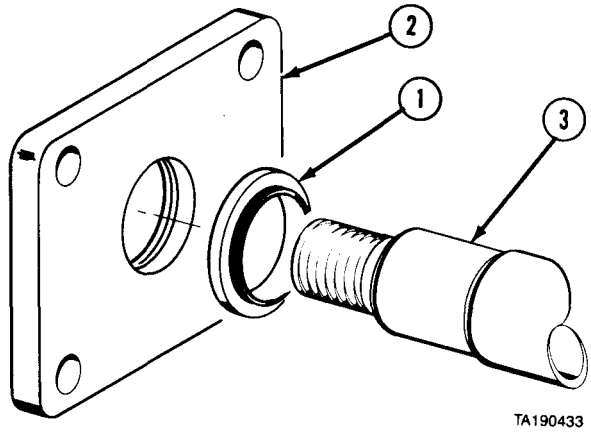
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

c. Assembly.

NOTE

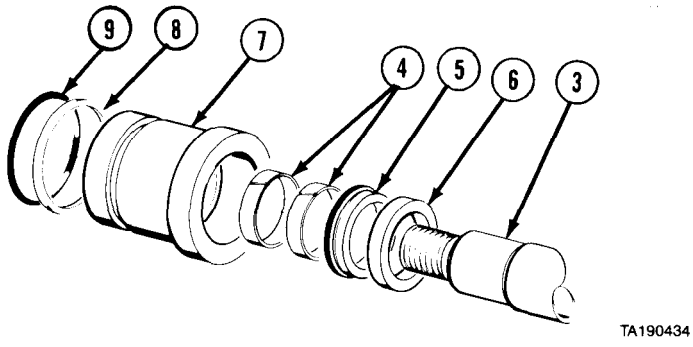
Both ends of cylinder are assembled the same way.

(1) Install dust seal (1) in end cap (2).
(2) Install end cap (2) on rod (3).



TA190433

(3) Install two wear rings (4), seal (5), and backup ring (6) in head (7).
(4) Install head (7) on rod (3).
(5) Install backup ring (8) and preformed packing (9).

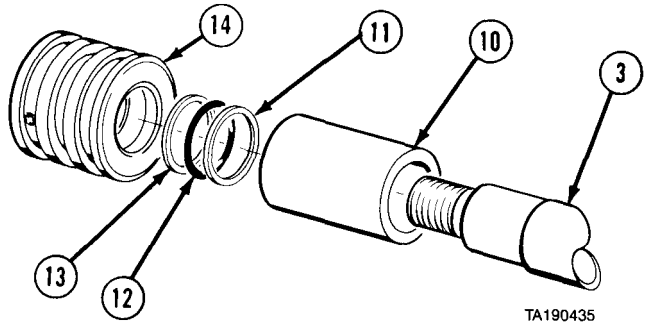


TA190434

(6) Install spacer (10) on rod (3).
(7) Install backup ring (11), preformed packing (12), and backup ring (13).

WARNING

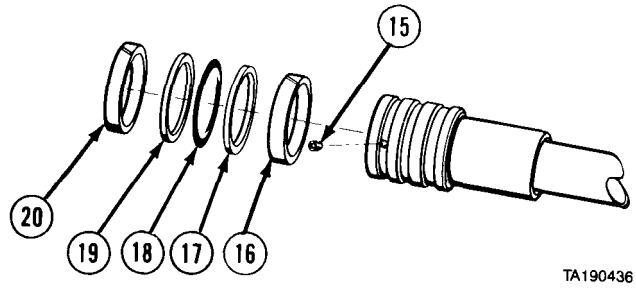
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



TA190435

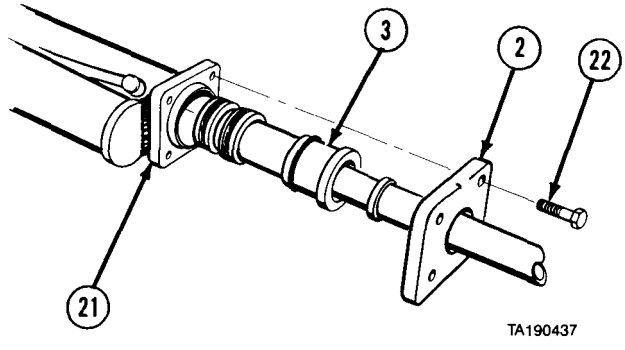
(8) Apply sealing and thread locking compound and install piston (14).

(9) Install setscrew (15).
(10) Install wear ring (16), backup ring (17), preformed packing (18), backup ring (19), and wear ring (20).



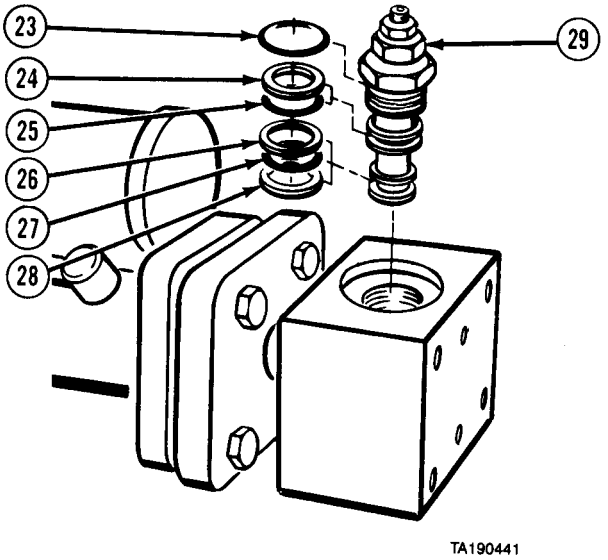
TA190436

(11) Install rod assembly (3) in cylinder (21).
(12) Aline end cap (2) and install four screws (22).



TA190437

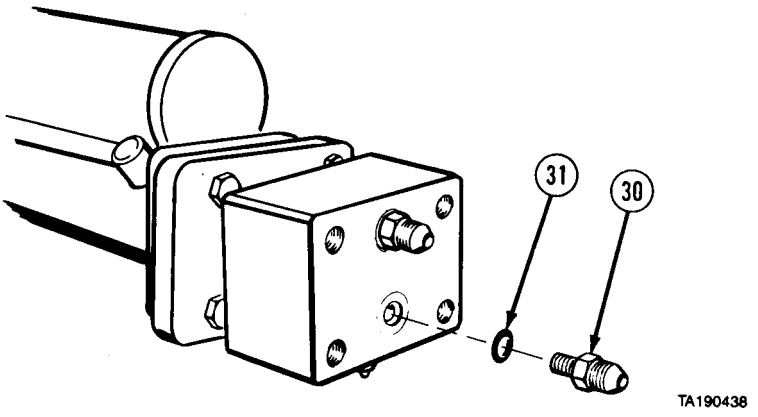
17-19. EXTENSION CYLINDER REPAIR (CONT).



NOTE

Apply lubricant to preformed packings before installing.

(13) Install preformed packing (23), backup ring (24), preformed packing (25), backup ring (26), preformed packing (27), and backup ring (28).
(14) Install holding valve (29).



(15) Install two fittings (30) and preformed packings (31).

d. Follow-on Maintenance. Install extension cylinders (para 17-18).

END OF TASK

17-19.1. EXTENSION CYLINDER REPAIR (M984E1).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Oil, lubricating, Item 47.1, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63S, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-18.1	Extension cylinder removed.

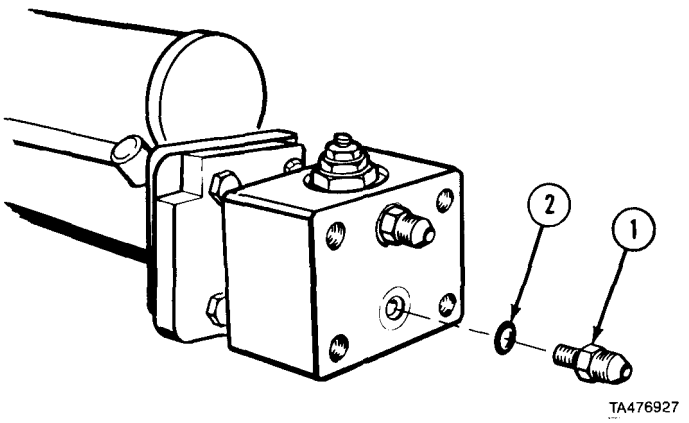
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

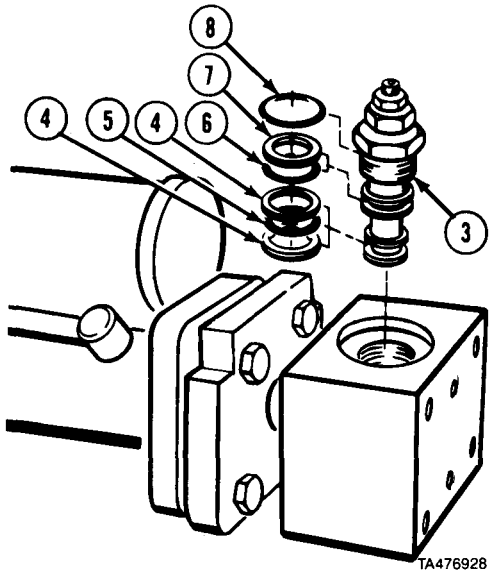
a. Disassembly.

(1) Remove two fittings (1) and preformed packings (2).



17-19.1. EXTENSION CYLINDER REPAIR (M984E1) (CONT).

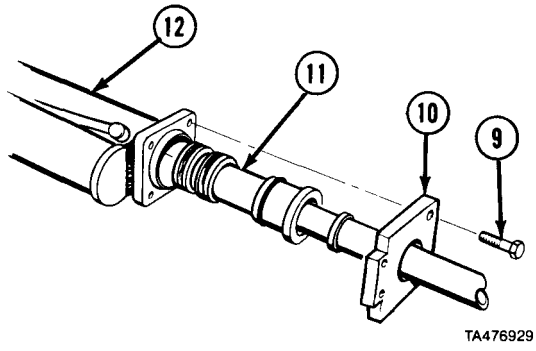
(2) Remove holding valve (3).
(3) Remove two backup rings (4), preformed packing (5), preformed packing (6), backup ring (7), and preformed packing (8) from valve (3).



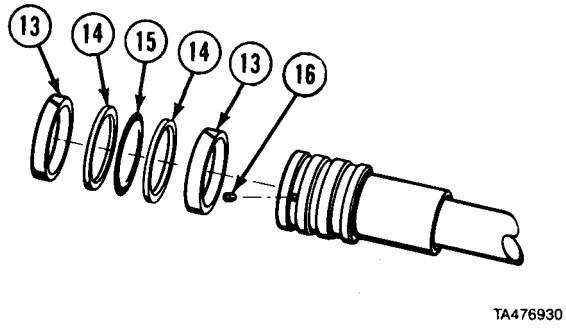
NOTE

Both ends of cylinder are disassembled the same way.

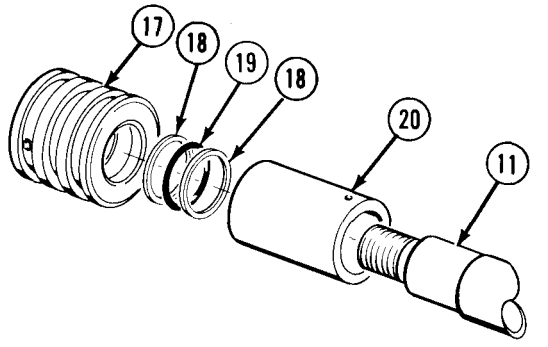
(4) Remove four screws (9) and slide end cap (10) back.
(5) Soldier A and Soldier B remove rod assembly (11) from cylinder (12).



(6) Remove wear ring (13), two backup rings (14), preformed packing (15), and wear ring (13).
(7) Remove setscrew (16).

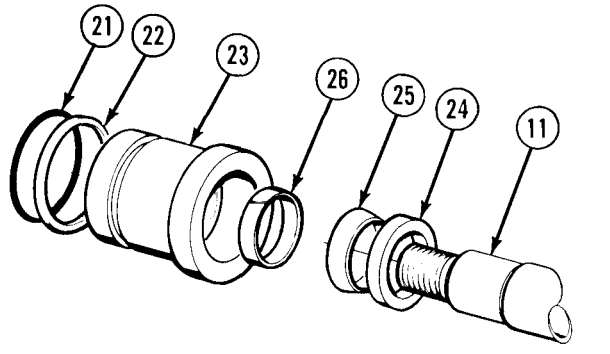


(8) Remove piston (17), backup ring (18), preformed packing (19), and backup ring (18).
(9) Remove spacer (20) from rod (11).



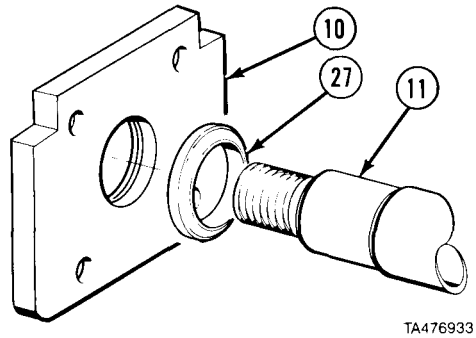
TA476931

(10) Remove preformed packing (21) and backup ring (22) from head (23).
(11) Remove head (23) from rod (11).
(12) Remove backup ring (24), seal (25), and wear ring (26).



TA476932

(13) Remove end cap (10) from rod (11).
(14) Remove dust seal (27) from end cap (10).



TA476933

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

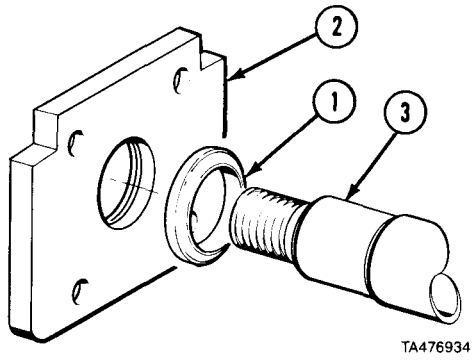
17-19.1. EXTENSION CYLINDER REPAIR (M984E1) (CONT).

c. Assembly.

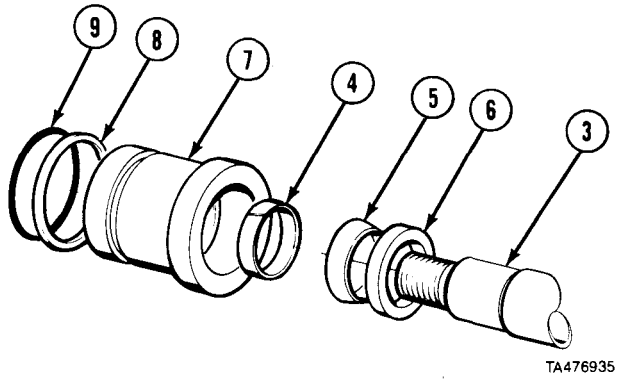
NOTE

Both ends of cylinder are assembled the same.

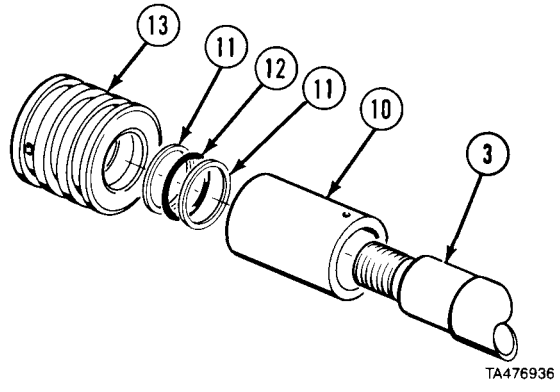
(1) Install dust seal (1) in end cap (2).
(2) Install end cap (2) on rod (3).



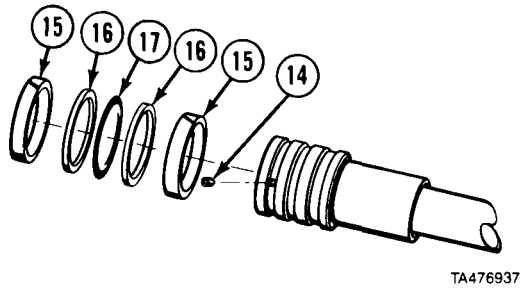
(3) Install wear ring (4), seal (5), and backup ring (6) in head (7).
(4) Install head (7) on rod (3).
(5) Install backup ring (8) and preformed packing (9).



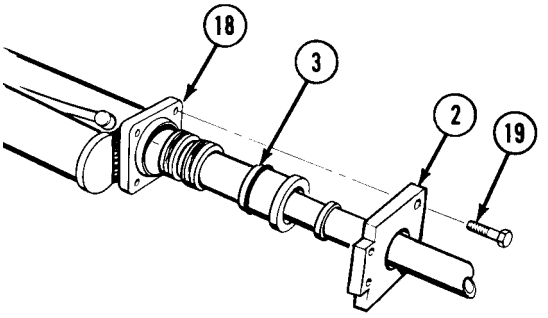
(6) Install spacer (10) on rod (3).
(7) Install backup ring (11), preformed packing (12), and backup ring (11).
(8) Apply thread locking sealing compound and install piston (13).



(9) Install setscrew (14).
(10) Install wear ring (15), preformed packing (17), two backup rings (16), and wear ring (15).



(11) Soldier A and Soldier B install rod assembly (3) in cylinder (18).
(12) Aline end cap (2) and install four screws (19).

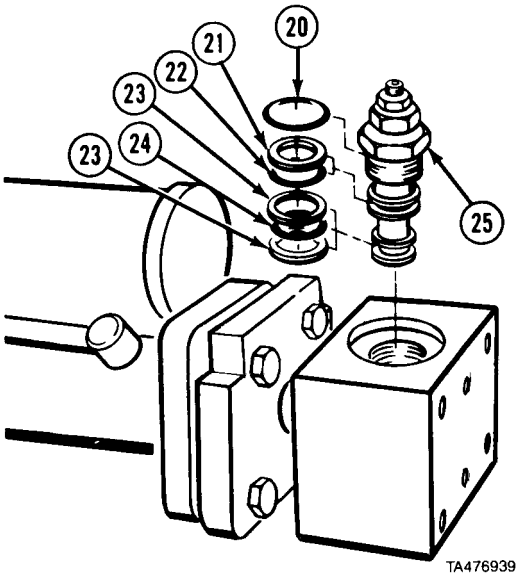


TA476938

NOTE

Apply lubricant to preformed packings before installing.

(13) Install preformed packing (20), backup ring (21), preformed packing (22), backup ring (23), preformed packing (24), and backup ring (23).
(14) Install holding valve (25).

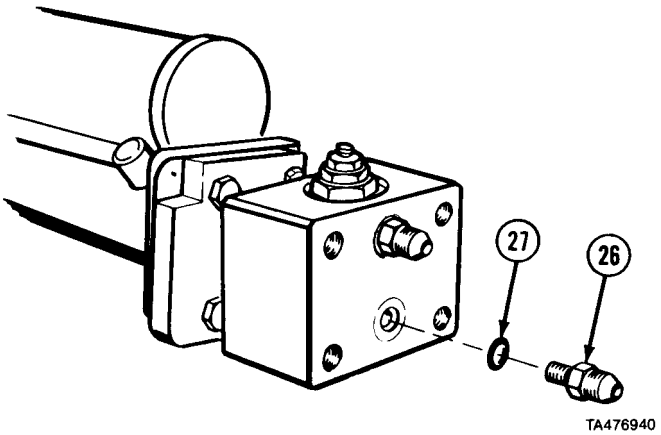


TA476939

(15) Install two fittings (26) and preformed packings (27).

d. Follow-on Maintenance. Install extension cylinder (para 17-18.1).

END OF TASK



TA476940

17-19.2. TENSION CYLINDER REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

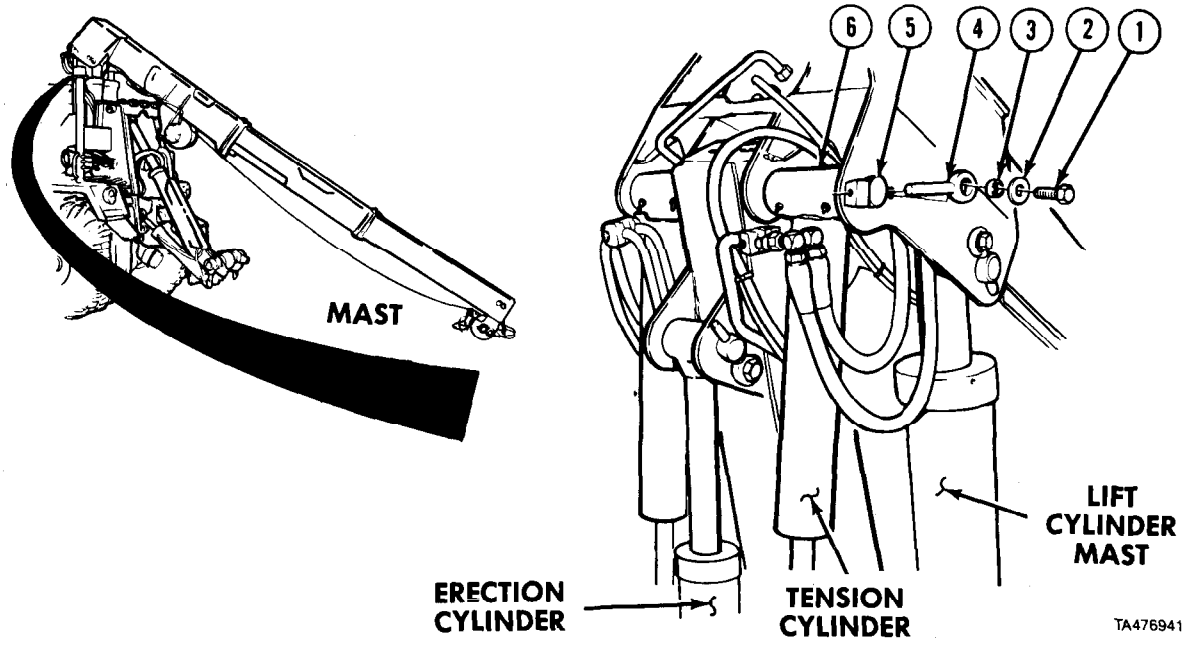
TM or Para	*Condition Description*
TM 9-2320-279-10	Recovery system lowered.
TM 9-2320-279-10	Crane in operating condition with extensions 1 and 2 fully extended and lowered to ground.
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.



NOTE

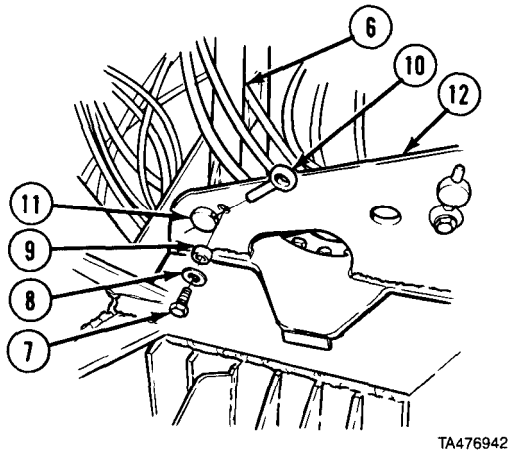
Right and left cylinders are removed the same.

(1) Remove screw (1), washer (2), spacer (3), and lockpin (4).
(2) Repeat step (1) for other side.

WARNING

Do not drive pin out of erection cylinder.

(3) Drive pin (5) in far enough to clear cylinder (6).
(4) Remove screw (7), washer (8), spacer (9), and lockpin (10).
(5) Repeat step (4) for other side.
(6) Drive pin (11) in far enough to clear cylinder (6).
(7) Remove cylinder (6) from crane (12).



TA476942

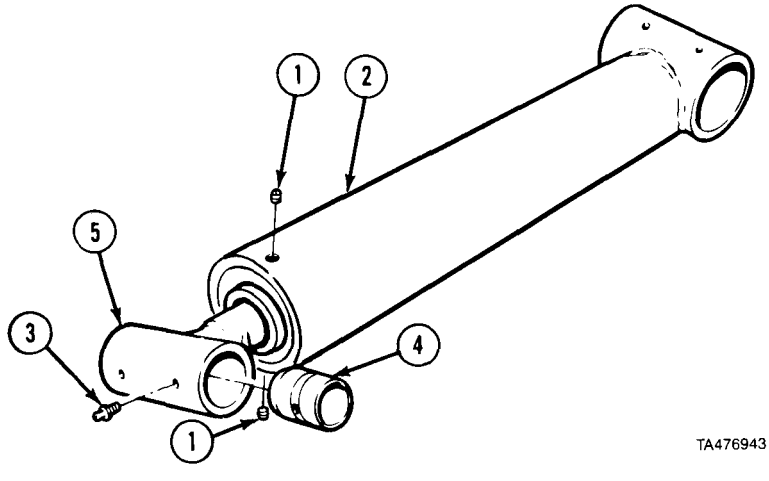
b. Disassembly.

(1) Remove two setscrews (1) from cylinder (2).
(2) Remove four grease fittings (3) and bushings (4) from rod assembly (5).

c. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



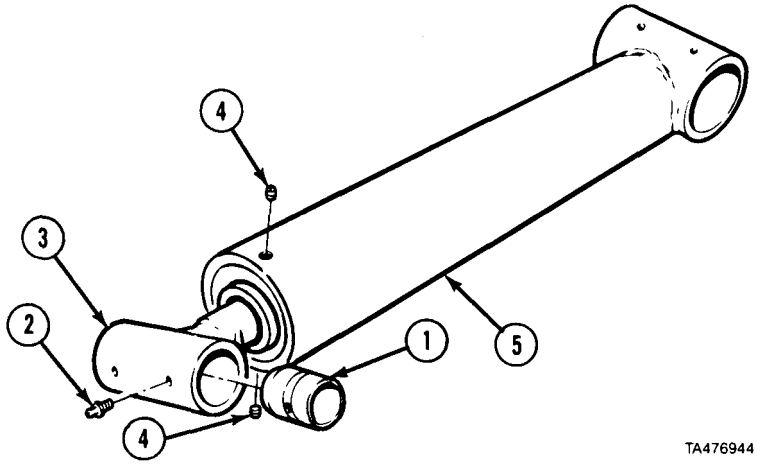
TA476943

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check bushing diameter. Diameter must not exceed 2.015 in. (50.82 mm).

17-19.2. TENSION CYLINDER REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

d. Assembly.

(1) Install four bushings (1) and grease fittings (2) in rod assembly (3).
(2) Install two setscrews (4) in cylinder (5).



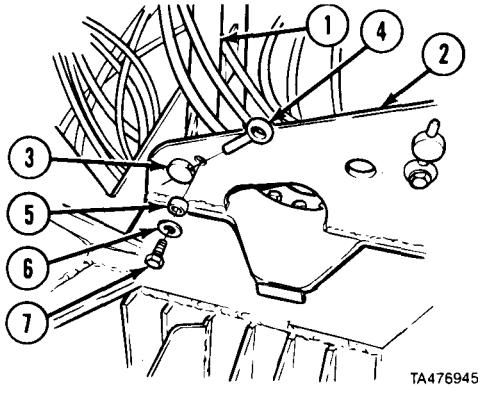
TA476944

e. *Installation.*

NOTE

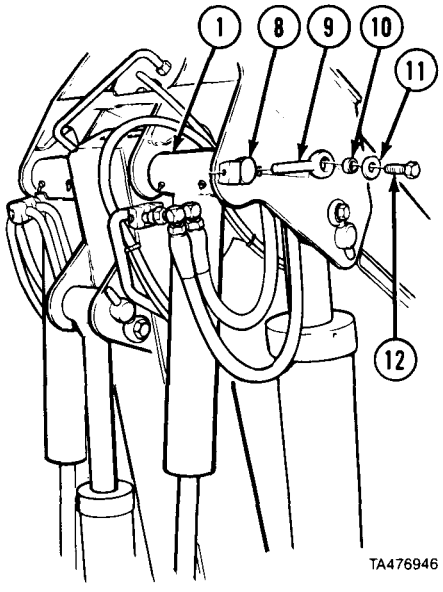
Both cylinders are installed the same.

(1) Soldier A installs cylinder (1) in crane (2).
(2) Soldier B drives pin (3) back in cylinder (1).
(3) Install lockpin (4) and spacer (5).
(4) Apply compound and install washer (6) and screw (7).
(5) Repeat steps *(3)* and *(4)* for other side.



TA476945

(6) Soldier A alines cylinder (1) and Soldier B drives pin (8) back through cylinder (1).
(7) Install lockpin (9) and bushing (10).
(8) Apply compound and install washer (11) and screw (12).
(9) Repeat steps *(7)* and *(8)* for other side.



TA476946

f. Follow-on Maintenance. Return crane to stowed position (TM 9-2320-279-10).

END OF TASK

Section V. HOIST

17-20. HOIST ASSEMBLY AND PIVOT BUSHINGS REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Cleaning/Inspection
c. Installation
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M984E1 , M985

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	Hoist cable removed.
Para 17-2	Hoist hoses disconnected.
TM 9-2320-279-10	Boom raised about 1 ft (30 cm).

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

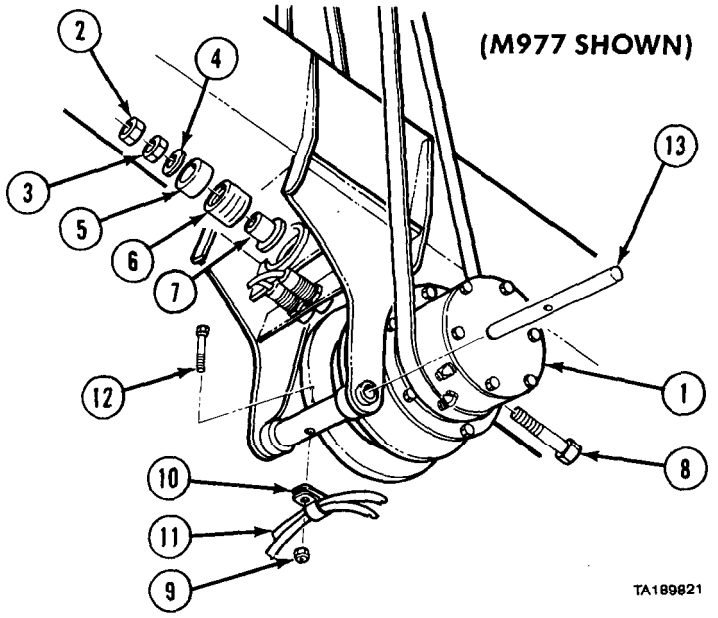
(1) Attach suitable lifting device to hoist assembly (1).

NOTE

Spring washers are sealed in paper. Do not remove paper.

(2) Remove nut (2), jamnut (3), washer (4), spacer (5), disc spring package (6), sleeve (7), and screw (8).

(3) Remove nut (9), clamp (10), hoses (11), and screw (12).

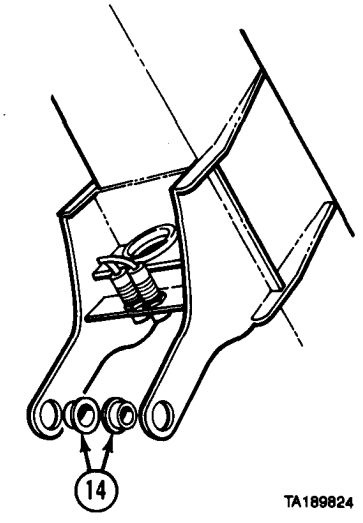


WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(4) Soldier A removes pin (13) and hoist assembly (1) while Soldier B operates lifting device.

17-20. HOIST ASSEMBLY AND PIVOT BUSHINGS REMOVAL/INSTALLATION (CONT).



(5) Remove two bushings (14).

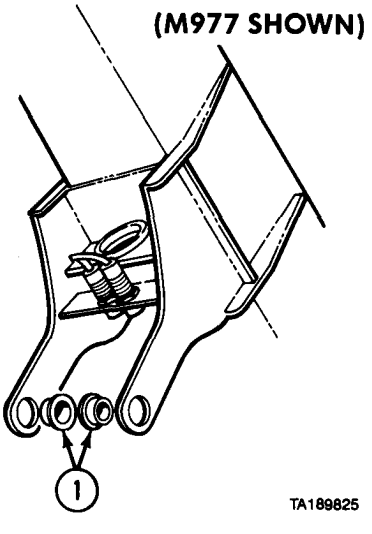
b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check bushings for wear. Bushing inside diameter must not exceed 1.010 in. (25.65 mm).

c. Installation.

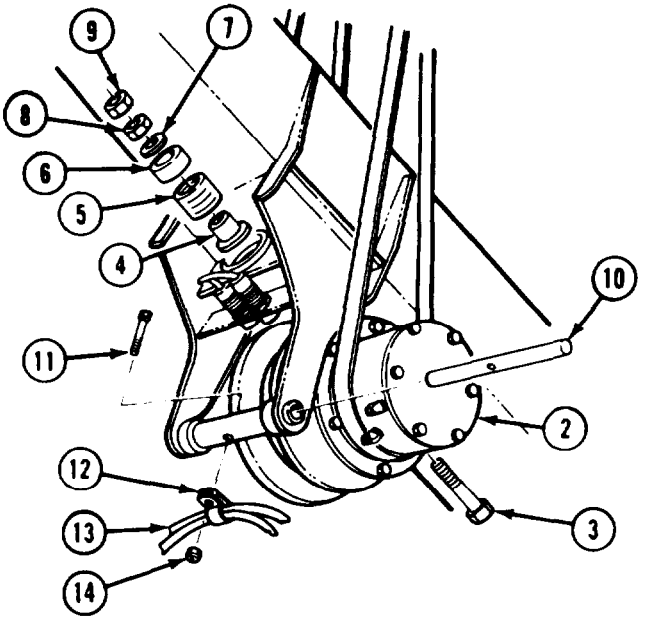


(1) Install two bushings (1).

(2) Soldier A alines hoist assembly (2) and installs screw (3), sleeve (4), disc spring package (5), spacer (6), washer (7), jamnut (8), and nut (9) while Soldier B operates lifting device.
(3) Install pin (10).
(4) Install screw (11), clamp (12), hoses (13), and nut (14).
(5) Adjust screw (3) and nut (9) until screw is 0.62 in. (15.75 mm) below the end of nut.

d. Follow-on Maintenance.

(1) Connect hoist hoses and tubes (para 17-2).
(2) Install hoist cable (TM 9-2320-279-20).
(3) Adjust overload switches (para 17-33.1).



17-20.1 HOIST CABLE FOLLOWER REPAIR (M977, M985).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Solvent, drycleaning, Item 57, Appendix C
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-20	Hoist assembly removed.

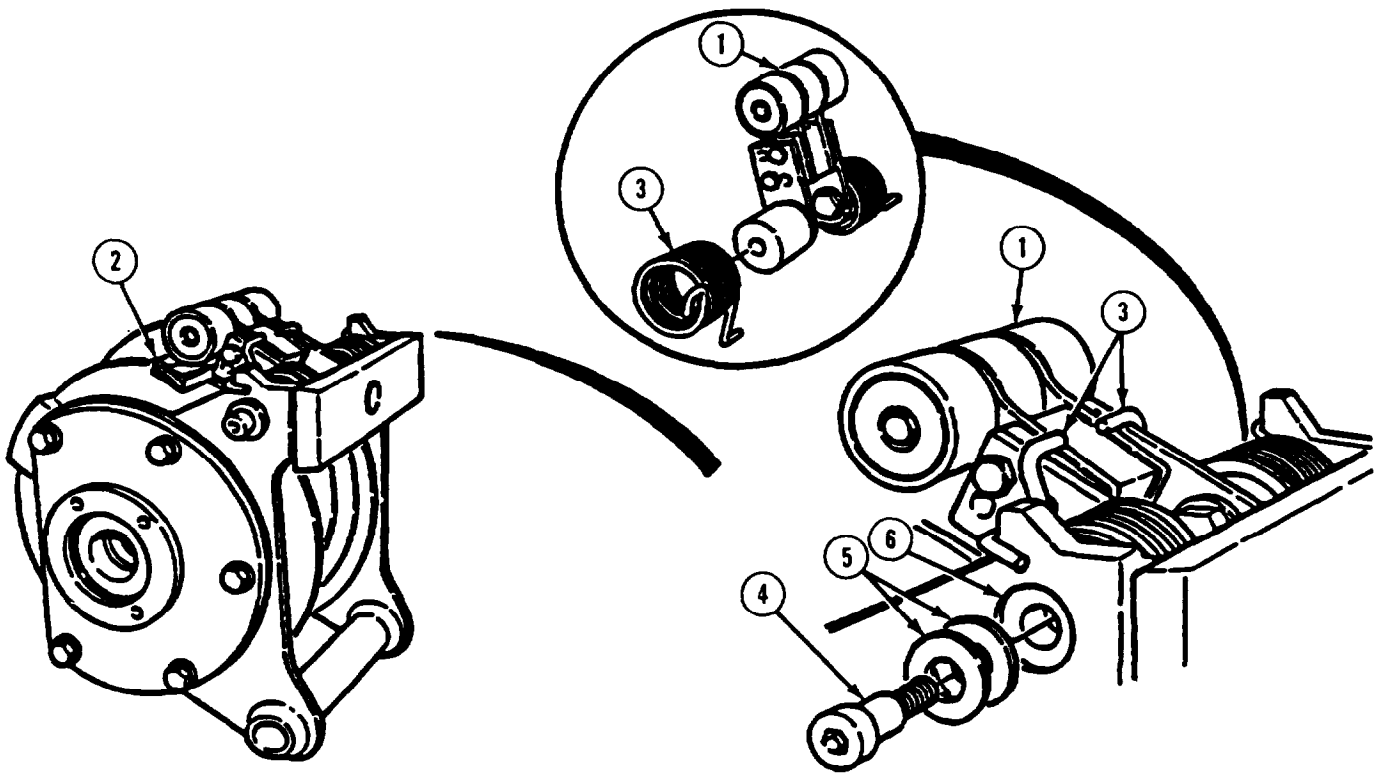
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

17-20.1. HOIST CABLE FOLLOWER REPAIR (M977 AND M985) (CONT).

a. Disassembly.



WARNING

When second spring is released, cable follower may fly up against bracket. Keep hands and face away from this area, or injury to personnel may result.

NOTE

Remove spring on side with extra block first.

(1) Hold cable follower (1) up and install small wooden block (2) to aid disassembly. Pry ends of two springs (3) down to remove spring pressure on cable follower.

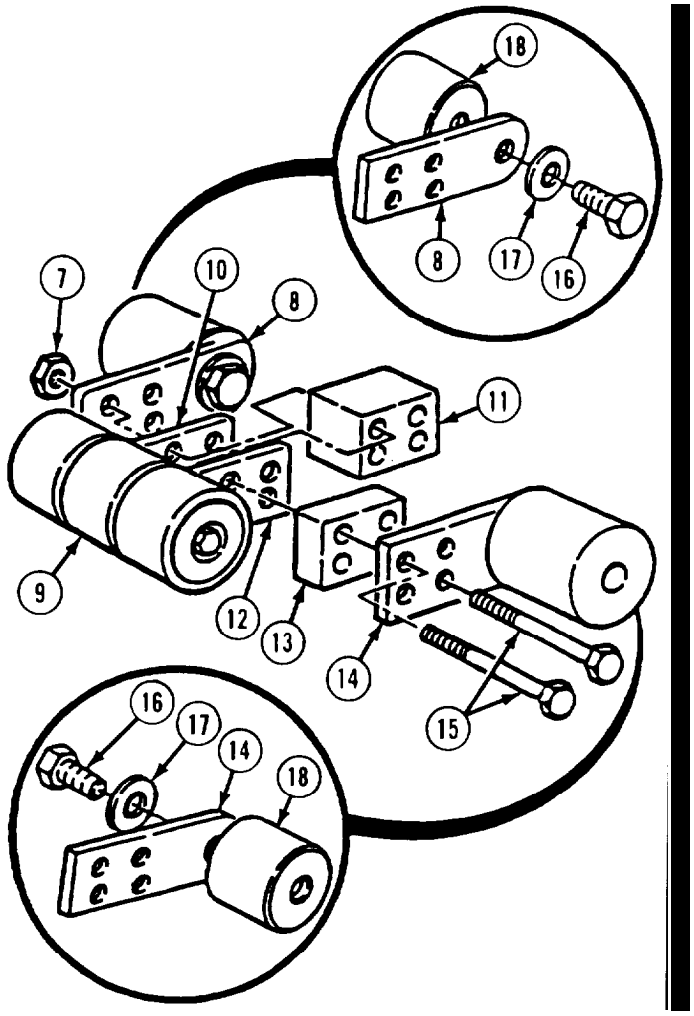
(2) Remove two screws (4), four thrust washers (5), and cable follower (1) from bracket (6) and separate two springs (3).

NOTE

Perform steps (3) through (9) only if cable follower assembly is damaged.

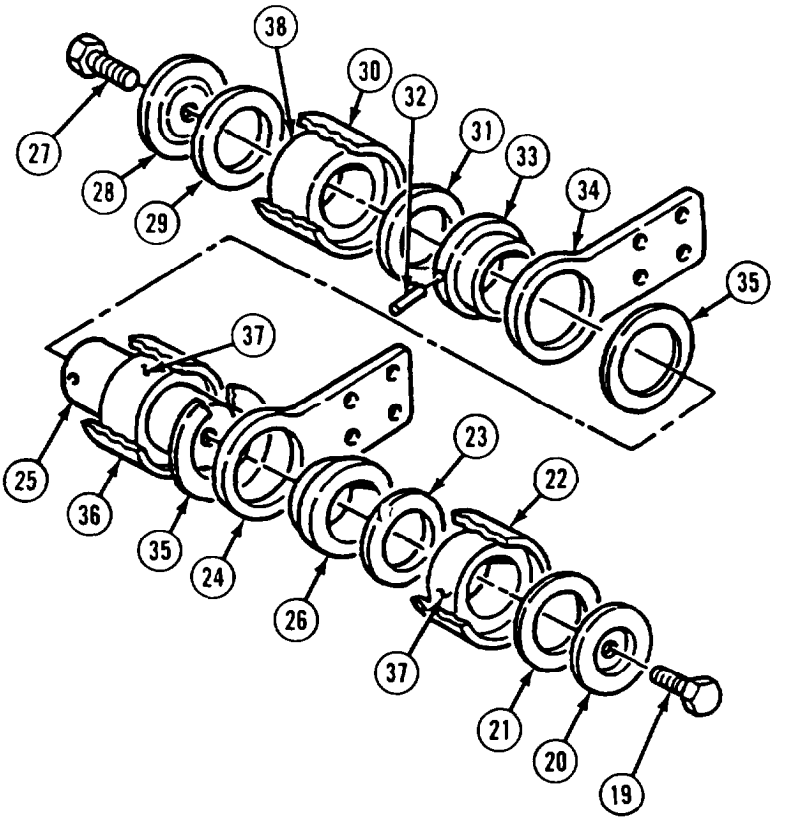
(3) Remove two nuts (7) and separate left lever arm foot (8), roller assembly (9), spacer (10), block (11), spacer (12), block (13), right lever arm foot (14), and two screws (15).

(4) Remove two screws (16), washers (17), and spring support tubes (18) from lever arm feet (8) and (14).



17-20.1. HOIST CABLE FOLLOWER REPAIR (M977 AND M985) (CONT).

(5) Remove screw (19), end cap (20), thrust washer (21), roller (22), and thrust washer (23) from support plate (24), and roller shaft (25).
(6) Remove bushing (26) from support plate (24).
(7) Remove screw (27), end cap (28), thrust washer (29), roller (30), and thrust washer (31) from roller shaft (25).
(8) Remove spring pin (32) from bushing (33).
(9) Remove bushing (33), support plate (34), and two thrust washers (35) from roller shaft.
(10) Remove roller (36) from roller shaft (25).
(11) Remove three bearings (37) from rollers (22), (30), and (36).



b. Cleaning/Inspection

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in drycleaning solvent.
(2) Dry parts with cleaning cloth.
(3) Inspect each part for cracks, breaks, gouges, pitting, and stripped threads.
(4) Replace damaged parts.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

c. Assembly

NOTE

Perform steps *(1)* through *(9)* only if cable follower assembly was disassembled.

(1) Install three bearings (1) in rollers (2), (3), and (4).

(2) Position roller (4) and two thrust washers (5) on roller shaft (6).

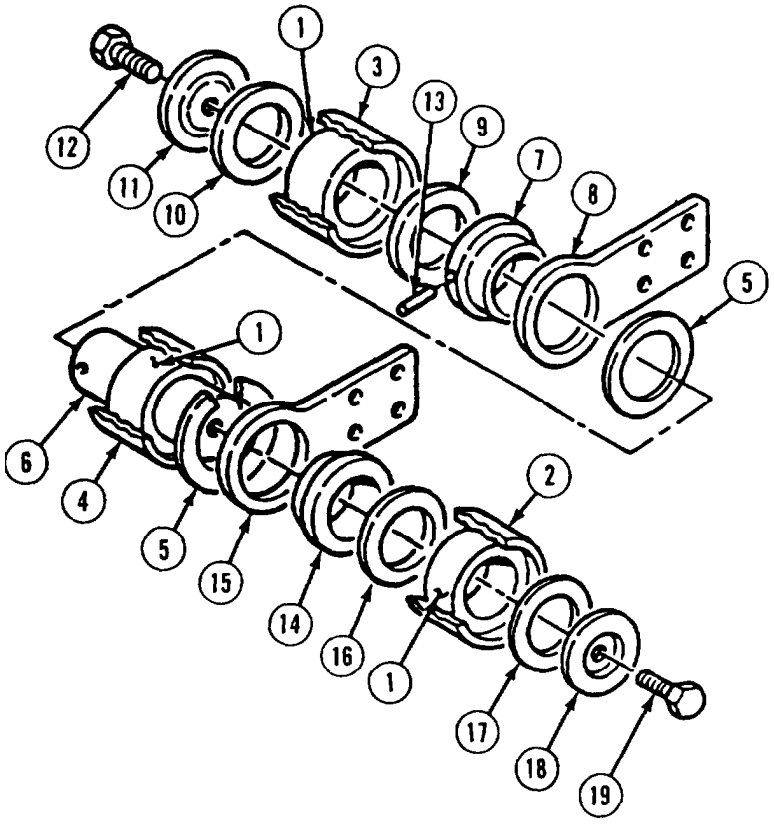
(3) Install bushing (7) in support plate (8).

(4) Install bushing (7), thrust washer (9), roller (3), thrust washer (10), end cap (11), and screw (12) on roller shaft (6). Tighten screw to 72 lb-in. (8 N•m)

(5) Install spring pin (13) in bushing (7) and roller shaft (6).

(6) Install bushing (14) in support plate (15).

(7) Install bushing (14), thrust washer (16), roller (2), thrust washer (17), end cap (18) and screw (19) on roller shaft (6). Tighten screw to 72 lb-in. (8 N•m).



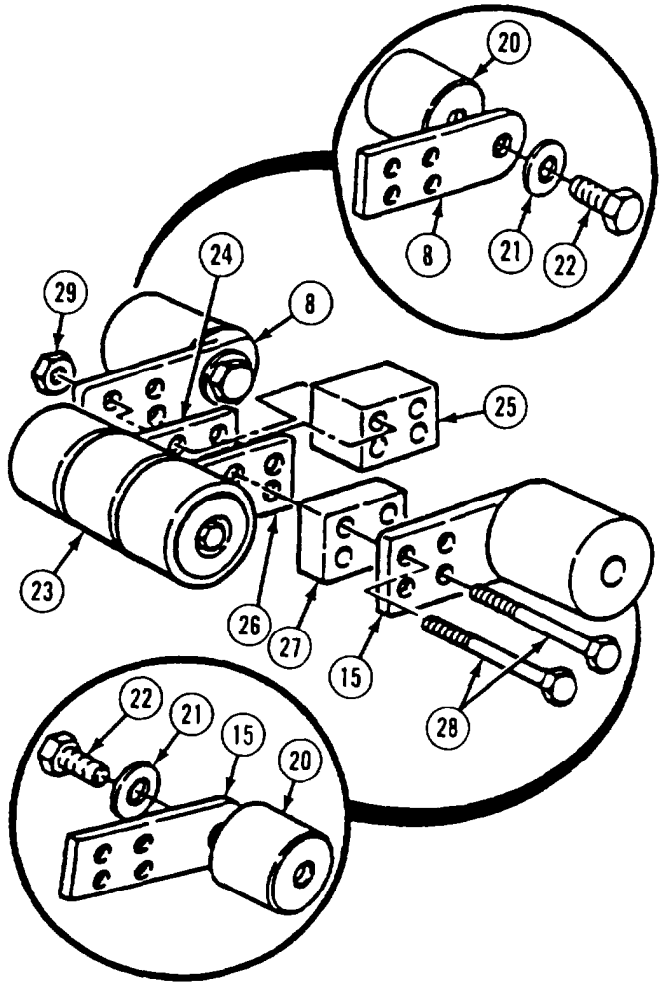
17-20.1. HOIST CABLE FOLLOWER REPAIR (M977 AND M985) (CONT.).

(8) Install spring support tubes (20) on lever arm feet (8) and (15) with two washers (21) and screws (22). Tighten screws to 68 lb-ft (92 N•m).

NOTE

Two screws attaching spring holders to roller assembly are installed diagonally.

(9) Install left spring holder (81, roller assembly (23), spacer (24), block (25), spacer (26), block (27), right spring holder (15), two screws (28), and nuts (29). Tighten screws to 16 lb-ft (22 N•m).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. lb avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

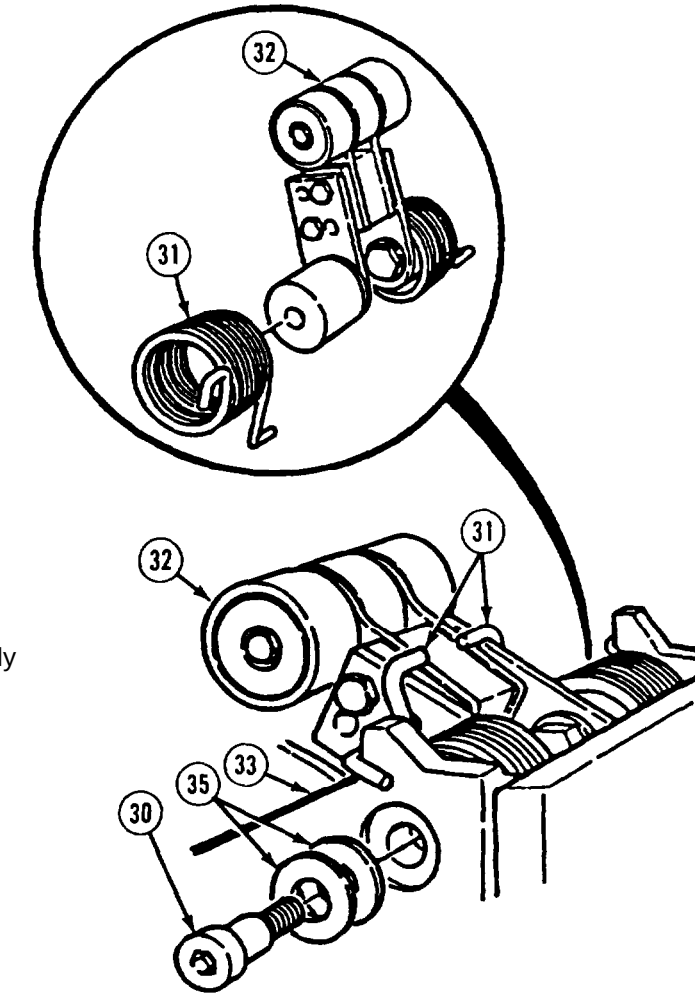
(10) Apply thread sealing compound on threads of two screws (30).

(11) Position springs (31) and install cable follower (32) on bracket (33) with four thrust washers (35) and two screws (30). Tighten screws to 87 lb-ft (118 N•m).

(12) Hold cable follower (32) up while prying ends of two springs (31) up to fully install two springs.

d. Follow-on Maintenance. Install hoist assembly (para 17-20).

END OF TASK



17-20.2 HOIST CABLE GUIDE REMOVAL/INSTALLATION (M977, M985).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

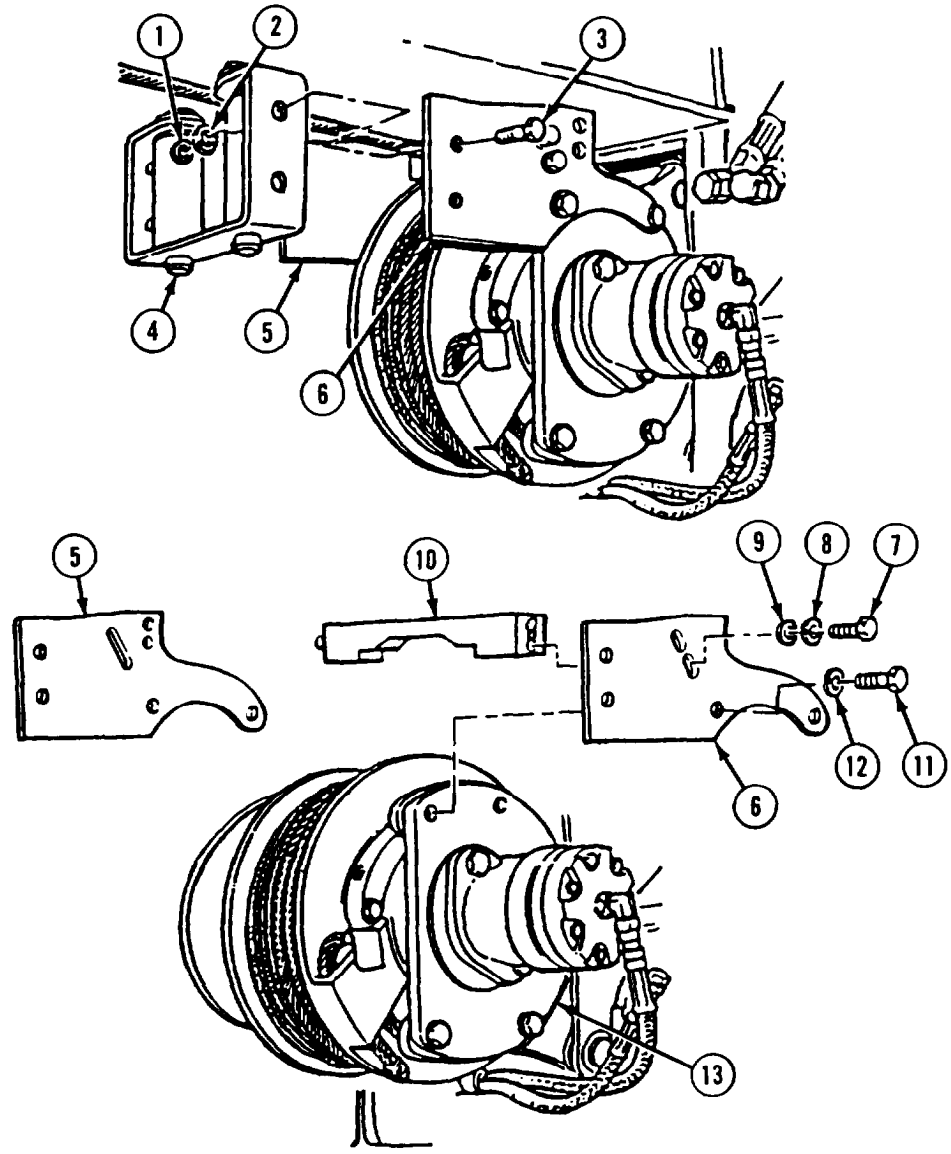
TM or Para	*Condition Description*
Para 17-21	Hoist control valve removed

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal



(1) Remove four nuts (1), lockwashers (2), screws (3), and bracket assembly (4) from Plates (5)

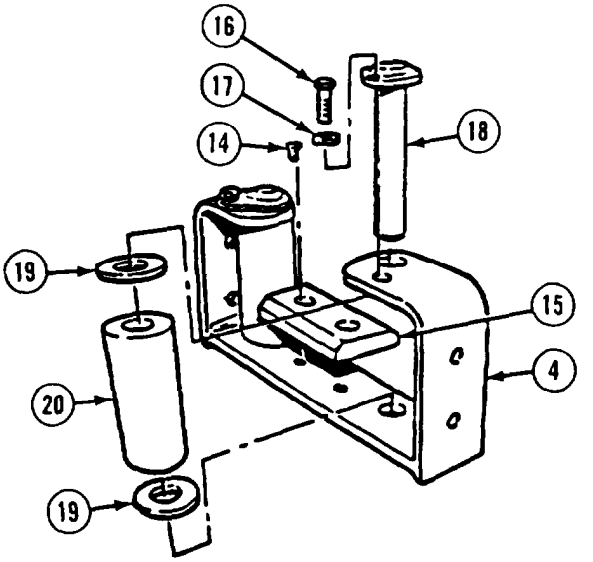
(2) Remove four screws (7), lockwashers (8), and washers (9) from bar assembly (10) and Plates (5) and (6).

(3) Remove four screws (11), lo&washers (12), bar assembly (10), and Plates (5) and (6) from hoist assembly (13).

17-20.2. HOIST CABLE GUIDE REMOVAL/INSTALLATION (M977, M985) (CONT).

(4) Remove two screws (14) and wear pad (15) from bracket assembly (4).

(5) Remove two screws (16), lockwashers (17), weld pin (18), four thrust washers (19), and two roller assemblies (20) from bracket assembly (4).

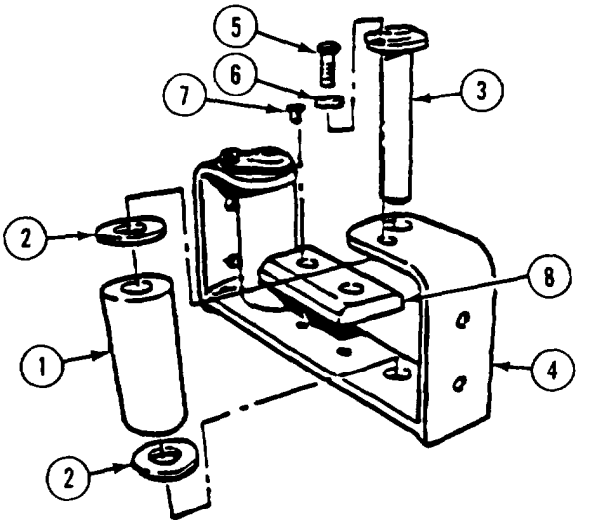


b. Installation.

(1) Install two roller assemblies (1), four thrust washers (2), and weld pin (3) in bracket assembly (4).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. lb avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



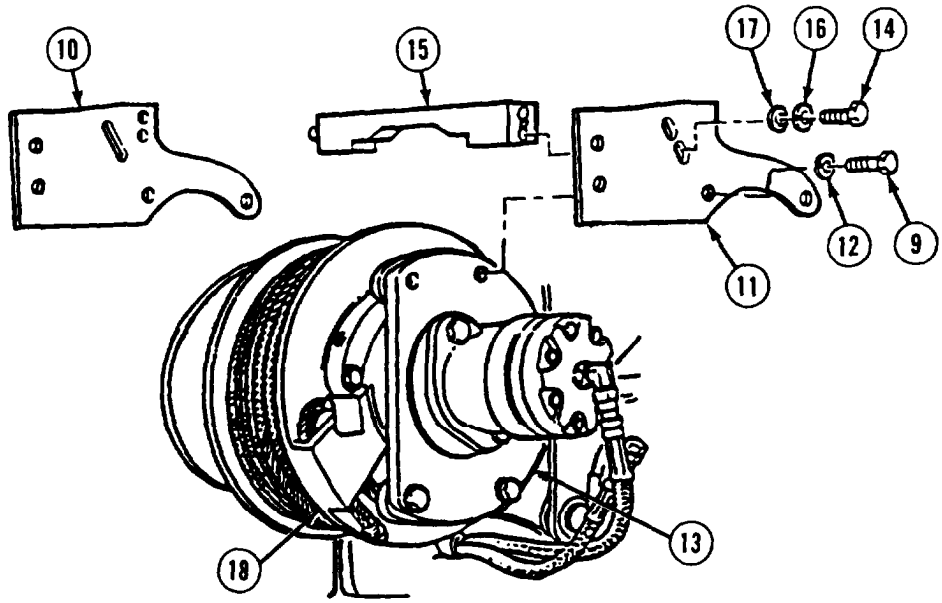
(2) Coat two screws (5) with sealing compound.

(3) Install two lockwashers (6) and screws (5) in bracket assembly (4). Torque screws to 14 lb-ft (20 N•m).

(4) Coat two screws (7) with sealing compound.

(5) Install wear pad (8) on bracket assembly (4) with two screws (7).

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)



(6) Coat four screws (9) with sealing compound.
(7) position plates (10) and (11) with four lockwashers (12) and screws (9) on hoist assembly (13).
(8) Coat four screws (14) with sealing compound.

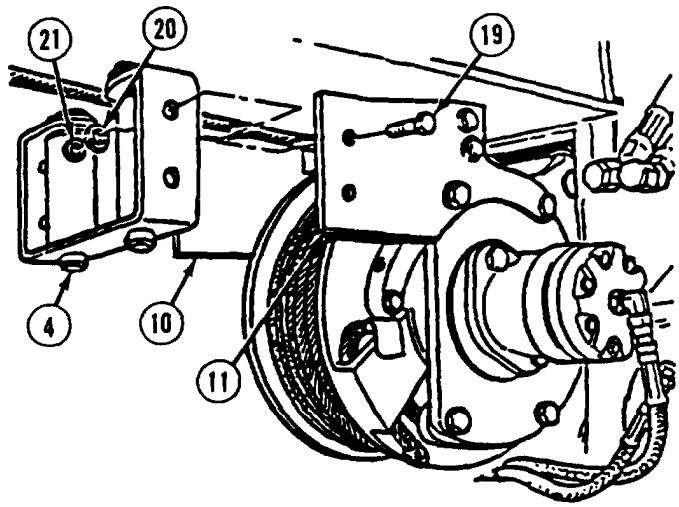
NOTE

Hex socket screw on one end of bar assembly is positioned in long slot of plate.

(9) Position bar assembly (15) on plates (10) and (11) with four lockwashers (16), washers (17), and screws (14). Do not tighten screws.
(10) Tighten four screws (9) on plates (10) and (11) to 68 lb-ft (92 N•m).
(11) Adjust gap between bar assembly (15) and drum flange (18) to 0.06 in. (1.52 mm). Tighten four screws (14) to 30 lb-ft (41 N•m).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(12) Coat four screws (19) with sealing compound.
(13) Install bracket assembly (4) on plates (10) and (11) with four lockwashers (20), screws (19), and nuts (21).

c. Follow-On Maintenance.

(1) Fill hydraulic reservoir (LO 9-2320-279-12).
(2) Check operation (TM 9-2320-279-10).

END OF TASK

17-21. HOIST DRIVE MOTOR CONTROL VALVE REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 25, Appendix C
Pipe thread sealing compound, Item 29, Appendix C
Solvent, drycleaning, Item 57, Appendix C
Oil, lubricating, Item 46, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

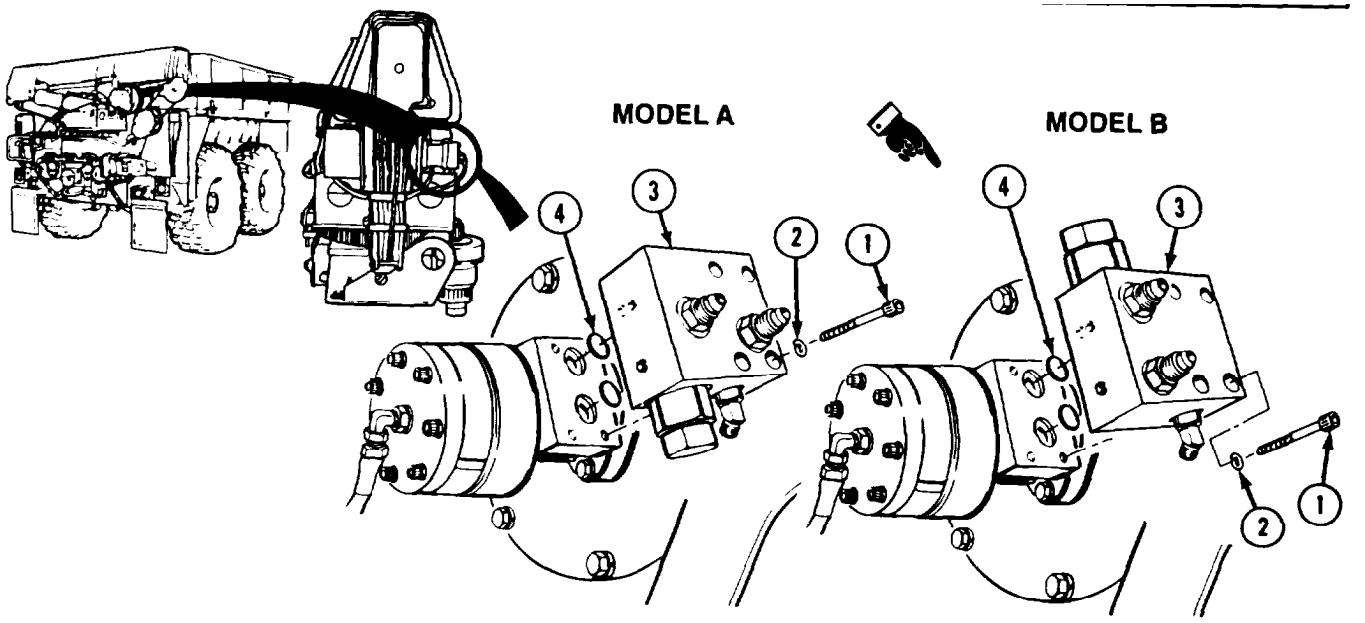
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
Para 17-2	Hoist control valve hoses and tubes disconnected.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

17-21. HOIST DRIVE MOTOR CONTROL VALVE REMOVAL/REPAIR/INSTALLATION (CONT).

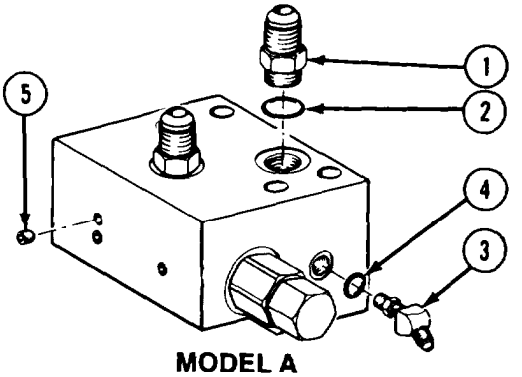


NOTE

There are two models of control valves. Model A (Snap-Tite, no longer available as an assembly) has an SAE #4 brake port. Model B (Dana) has an SAE #6 brake port. Removal procedures are identical for both.

a. ***Removal.*** Remove four screws (1), lockwashers (2), control valve (3), and two preformed packings (4).

b. Disassembly.



MODEL A

NOTE

Perform steps (1) through (3) for Model A. Perform steps (3.1) through (3.5) for Model B.

(1) Remove two fittings (1) and preformed packings (2).
(2) Remove elbow (3) and preformed packing (4).
(3) Remove three plugs (5).

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

(3.1) Remove two fittings (1) and preformed packings (2) from housing (3).

NOTE

Matchmark position of elbow prior to removal.

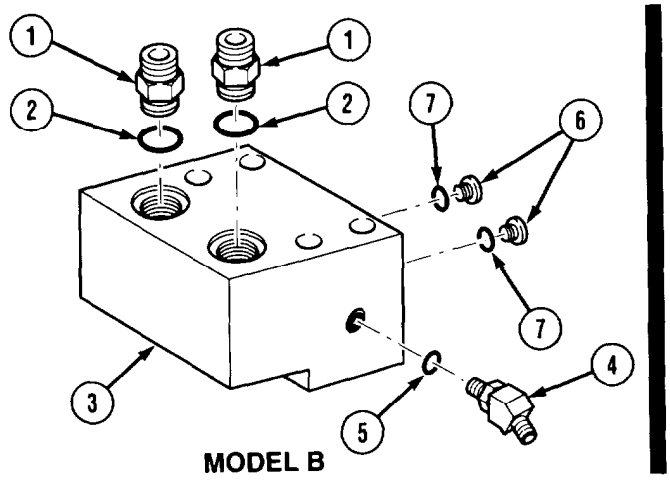
(3.2) Remove elbow (4) and preformed packing (5) from housing (3).

NOTE

Perform step (3.3) if plugs are damaged.

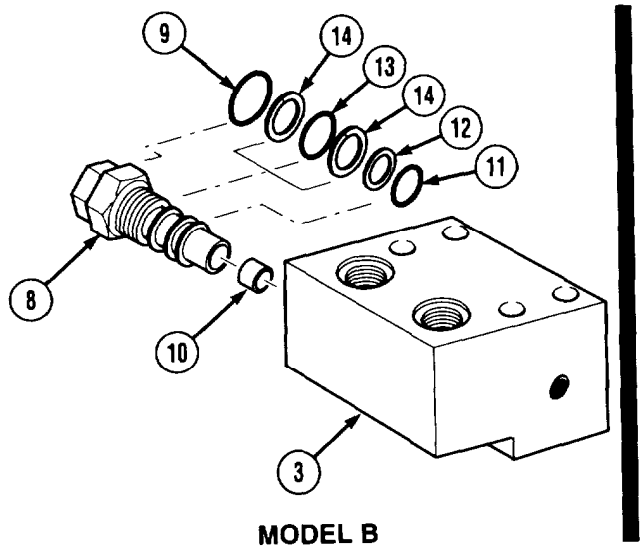
(3.3) Remove two plugs (6) and preformed packings (7) from housing (3).

(3.4) Remove safety valve (8) and preformed packing (9) and orifice (10) from housing (3).



MODEL B

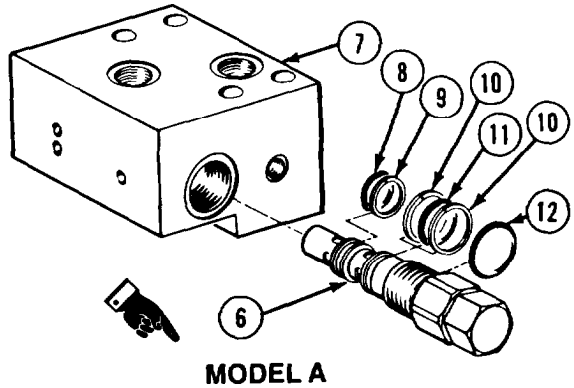
(3.5) Remove preformed packing (11), backup ring (12), preformed packing (13), and two backup rings (14) from safety valve (8).



MODEL B

(4) Remove holding valve (6) from control valve (7).

(5) Remove preformed packing (8), backup ring (9), two backup rings (10), preformed packing (11), and preformed packing (12) from holding valve (6).



MODEL A

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

c. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in drycleaning solvent.

(2) Inspect each part for damage.

(3) Replace damaged parts.

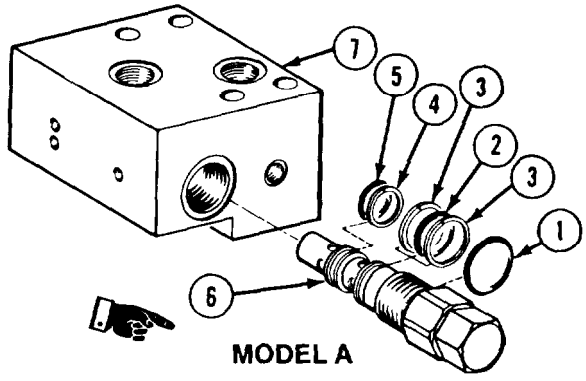
d. Assembly.

NOTE

Perform steps *(1)* through *(3)* for Model A.
Perform steps *(4)* through *(11)* for Model B

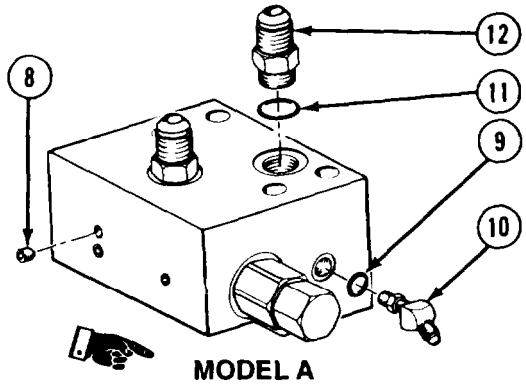
(1) Install preformed packing (1), preformed packing (2), two backup rings (3), backup ring (4), and preformed packing (5) on holding valve (6).

(2) Install holding valve (6) in control valve (7).



MODEL A

(3) Apply pipe thread sealing compound and install three plugs (8)1, preformed packing (9), elbow (10), two preformed packings (11), and fittings (12).

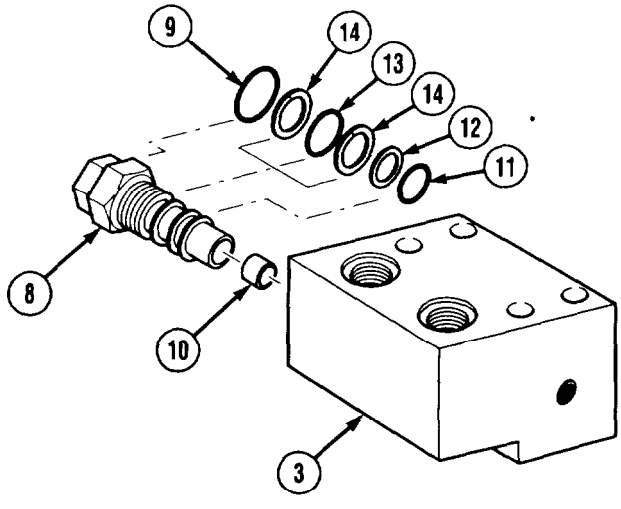


MODEL A

(4) Apply hydraulic oil to preformed packings (13) and (9) and backup rings (14) and (12).

(5) Install two backup rings (14), preformed packing (131, backup ring (12), and preformed packing (11) on safety valve (8).

(6) Install orifice (10), preformed packing (9), and safety valve (8) in housing (3).



MODEL B

17-21. HOIST DRIVE MOTOR CONTROL VALVE REMOVAL/REPAIR/INSTALLATION (CONT).

NOTE

Perform steps (7) and (8) if plugs were removed.

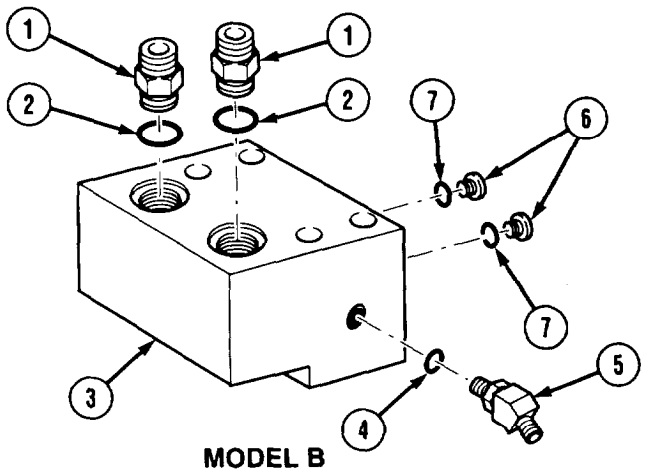
(7) Coat threads of two plugs (6) and elbow (5) with pipe thread sealing compound.

(8) Install two plugs (6) and preformed packings (7) in housing (3).

(9) Apply hydraulic oil to preformed packings (41 and (2).

(10) Install preformed packing (4) and elbow (5) in housing (3).

(11) Install two preformed packings (2) and fittings (1) in housing (3).

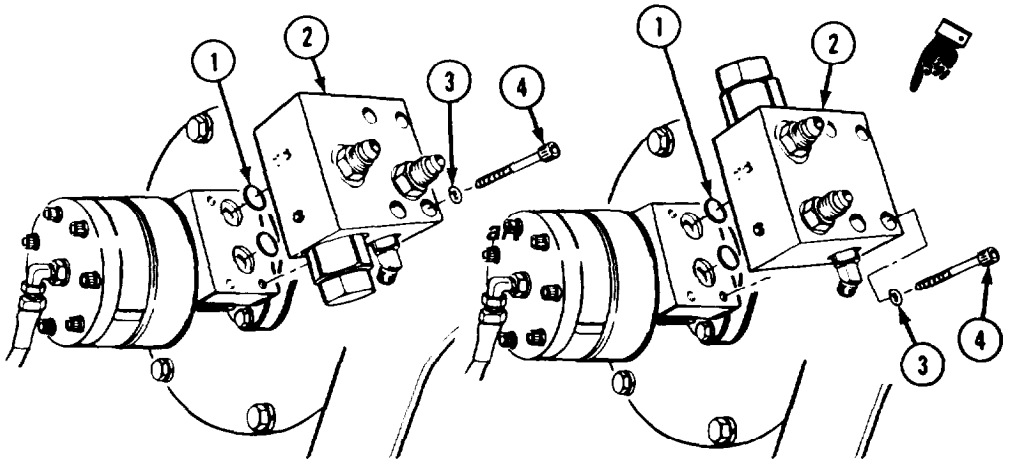


MODEL B

e. Installation.

NOTE

There are two models of control valves. Model A (Snap-Tite, no longer available as an assembly) has an SAE #4 brake port. Model B (Dana) has an SAE #6 brake port. Installation procedures are identical for both. However, if replacing Model A with Model B, elbow located between hoist motor control valve and brake port hose must be replaced (step *b,* substep (3.2)).



MODEL A MODEL B

(1) Install two preformed packings (1) and control valve (2).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(2) Apply sealing and thread locking compound and install four lockwashers (3) and screws (4).

f. Follow-on Maintenance. Install hoist hydraulic hoses and tubes (para 17-2).

END OF TASK

17-21.1 HOIST MOTOR VALVE ASSEMBLY REMOVAL/REPAIR/INSTALLATION (M984E1)

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 22, Appendix C
Pipe thread sealing compound, Item 26, Appendix C
Oil, lubricating, Item 46, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

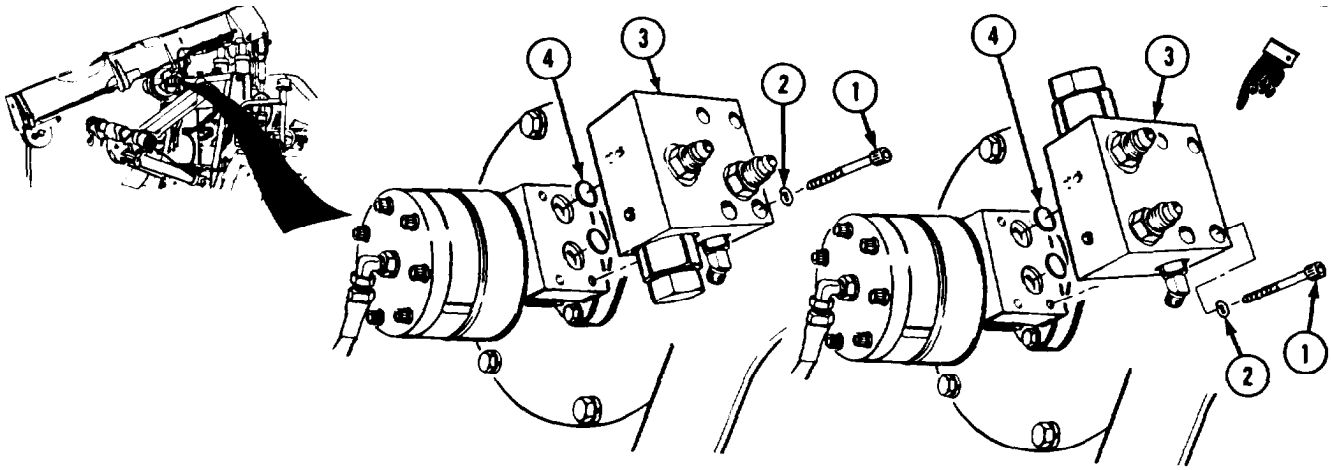
TM or Para	*Condition Description*
TM 9-2320-279-10	Crane positioned for access.
TM 9-2320-279-10	Shut off engine.
Para 17-2.1	Hoist control valve hoses and tubes disconnected.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

17-21.1. HOIST MOTOR VALVE ASSEMBLY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).



MODEL A MODEL B

NOTE

There are two models of control valves. Model A (Snap-Tite, no longer available as an assembly) has an SAE #4 brake port. Model B (Dana) has an SAE #6 brake port. Removal procedures are identical for both.

a. Removal. Remove four screws (1), lockwashers (2), control valve (3), and two preformed packings (4).

b. Disassembly.

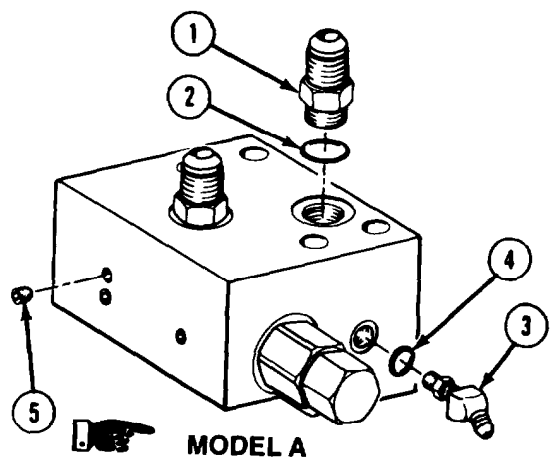
NOTE

Perform steps *(1)* through (5) for Model A.
Perform steps *(6)* through *(10)* for Model B.

(1) Remove two fittings (1) and preformed packings (2).

(2) Remove elbow (3) and preformed packing (4).

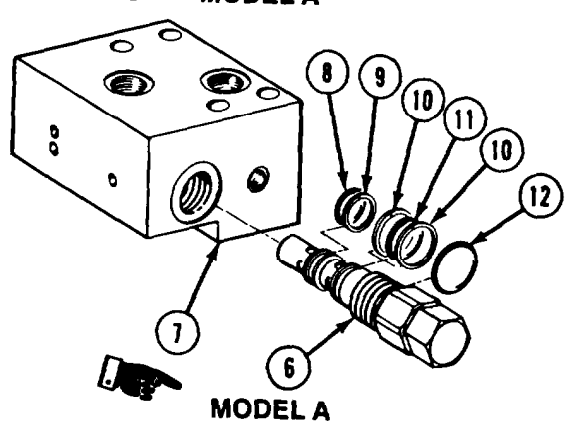
(3) Remove three plugs (5).



MODEL A

(4) Remove holding valve (6) from control valve (7).

(5) Remove preformed packing (8), backup ring (9, two backup rings (10), preformed packing (11), and preformed packing (12) from holding valve (6).



MODEL A

(6) Remove two fittings (1) and preformed packings (2) from housing (3).

NOTE

Matchmark position of elbow prior to removal.

(7) Remove elbow (4) and preformed packing (5) from housing (3).

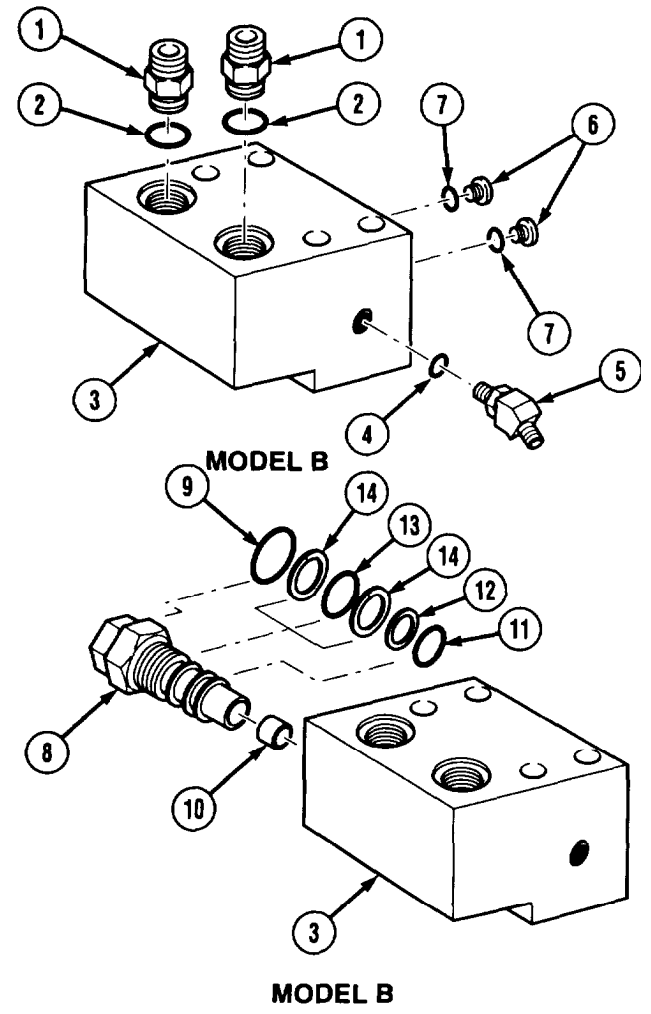
NOTE

Perform step (8) if plugs are damaged.

(8) Remove two plugs (6) and preformed packing (7) from housing (3).

(9) Remove safety valve (8), preformed packing (9), and orifice (10) from housing (3).

(10) Remove preformed packing (11), backup ring (12), preformed packing (13), and two backup rings (14) from safety valve (8).



c. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in drycleaning solvent.

(2) Inspect each part for damage.

(3) Replace damaged parts.

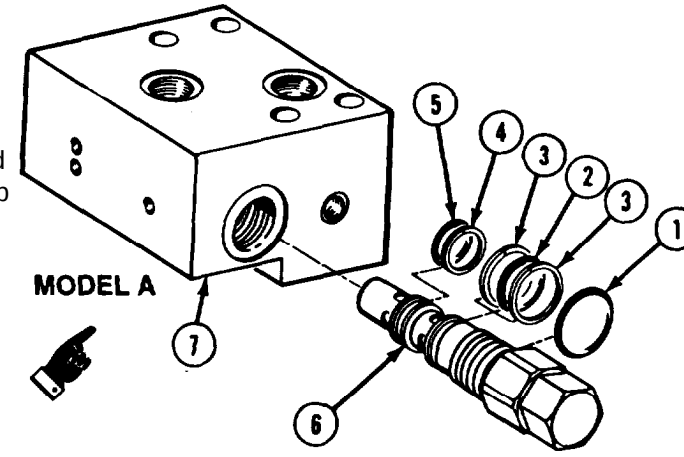
d. Assembly.

NOTE

Perform steps *(1)* through (3) for Model A.
Perform steps *(4)* through *(11)* for Model B.

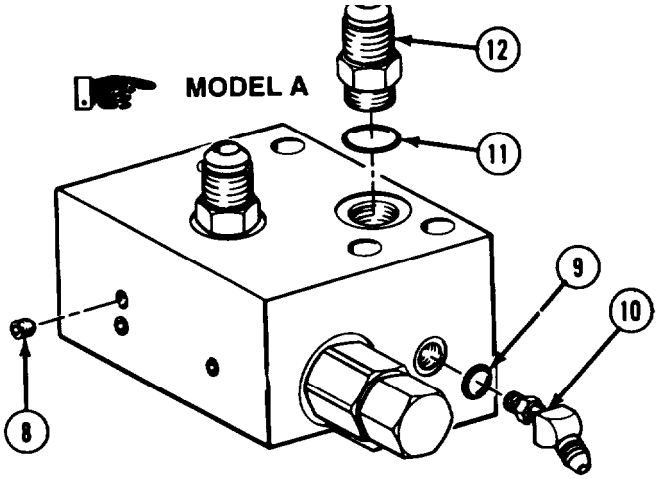
(1) Install preformed packing (1), preformed packing (2), two backup rings (3), backup ring (4), and preformed packing (5) on holding valve (6).

(2) Install holding valve (6) in control valve (7).



17-21.1 HOIST MOTOR VALVE ASSEMBLY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

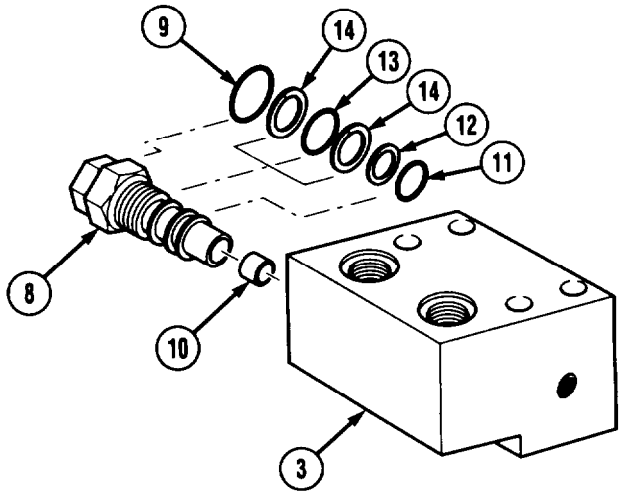
(3) Apply pipe thread sealing compound and install three plugs (8), preformed packing (9), elbow (10), two preformed packings (11), and fittings (12).



(4) Apply hydraulic oil to preformed packings (13) and (9) and backup rings (14) and (12).

(5) Install two backup rings (14), preformed packing (13), backup ring (12), and preformed packing (11) on safety valve (8).

(6) Install orifice (10), preformed packing (9), and safety valve (8) in housing (3).



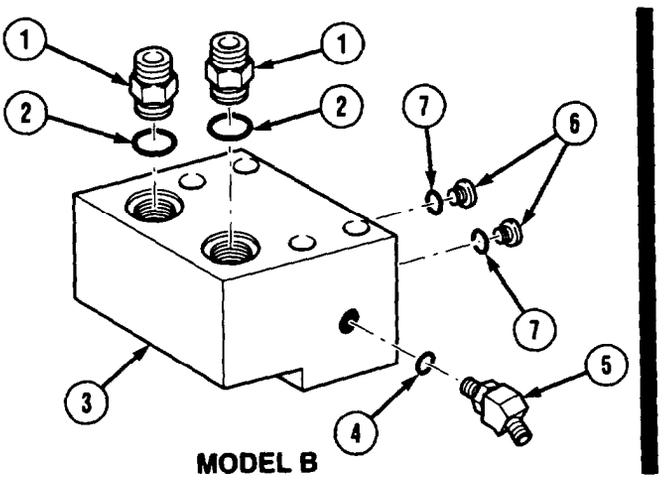
MODEL B

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

NOTE

Perform steps (7) and (8) if plugs were removed.

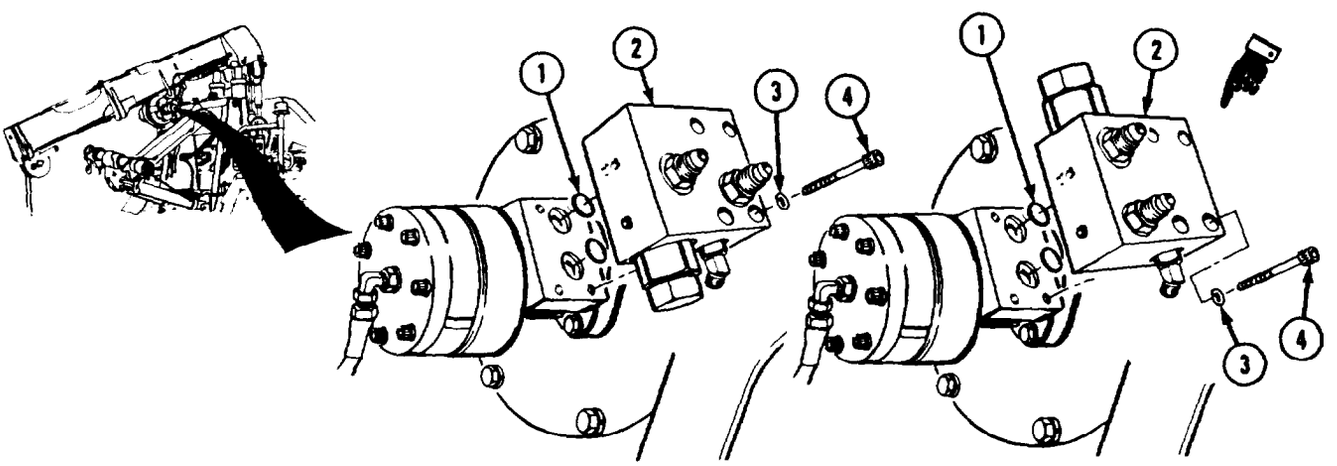
(7) Coat threads of two plugs (6) and elbow (5) with pipe thread sealing compound.
(8) Install two plugs (6) and preformed packings (7) in housing (3).
(9) Apply hydraulic oil to preformed packings (4) and (2).
(10) Install preformed packing (4) and elbow (5) in housing (3).
(11) Install two preformed packings (2) and fittings (1) in housing (3).



MODEL B

NOTE

There are two models of control valves. Model A (Snap-Tite, no longer available as an assembly) has an SAE #4 brake port. Model B (Dana) has an SAE #6 brake port. Installation procedures are identical for both. However, if replacing Model A with Model B, elbow located between hoist motor control valve and brake port hose must be replaced (step *6,* substep (7)).



MODEL A MODEL B

e. Installation.

(1) Install two preformed packings (1) and control valve (2).
(2) Apply sealing and thread locking compound and install four lockwashers (3) and screws (4).

f. Follow-on Maintenance. Install hoist control valve hydraulic hoses and tubes (para 17-2.1).

END OF TASK

17-22. HOIST DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

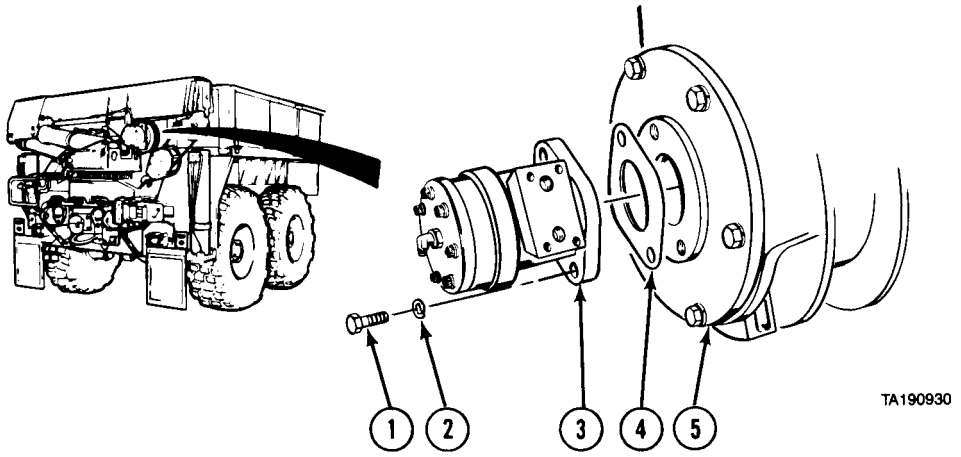
TM or Para	Condition Description
Para 17-21	Hoist drive motor control valve removed.
Para 17-2	Hydraulic drive motor hose and tubes disconnected.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

17-22. HOIST DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (CONT).

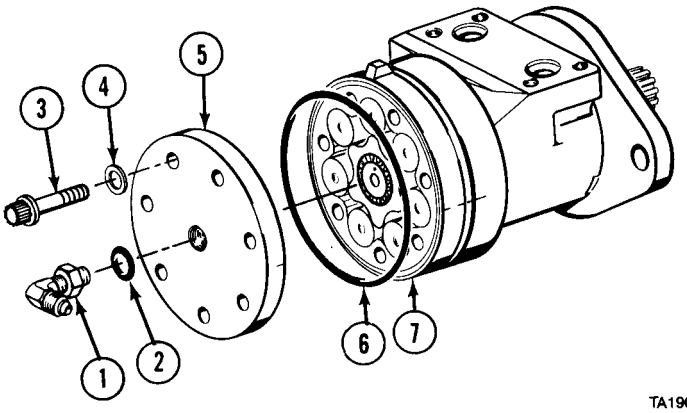


a. Removal. Remove two screws (1), lockwashers (2), motor (3), and gasket (4) from drum (5).

b. Disassembly.

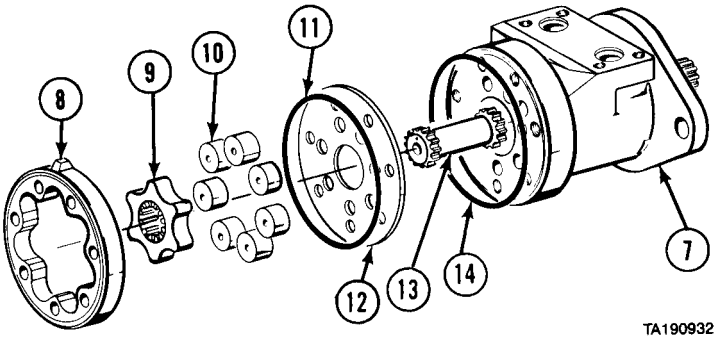
(1) Remove elbow (1) and preformed packing (2).

(2) Remove seven screws (3), washers (4), end cap (5), and preformed packing (6) from motor (7).



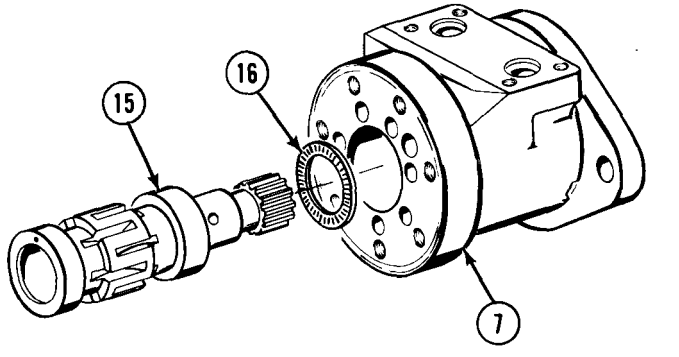
(3) Remove geroler (8), star (9), and seven rollers (10).

(4) Remove preformed packing (11), plate (12), shaft (13), and preformed packing (14) from motor (7).



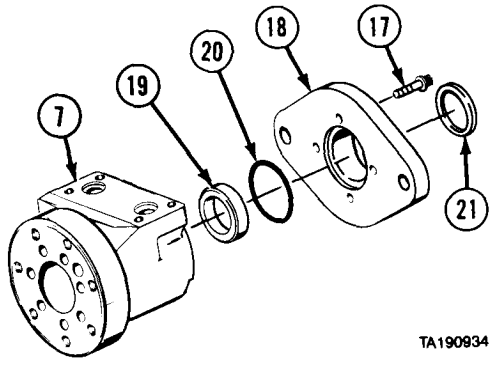
17-22. HOIST DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (CONT).

(5) Remove shaft (15) and bearing (16) from motor (7).



TA190933

(6) Remove four screws (17) and flange cap (18).
(7) Remove race (19) from motor (7).
(8) Remove preformed packing (20) and dust seal (21) from flange cap (18).



TA190934

c. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

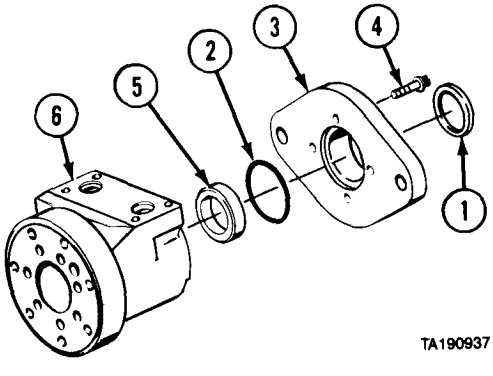
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

d. Assembly.

(1) Install dust seal (1) and preformed packing (2) in flange cap (3).

WARNING

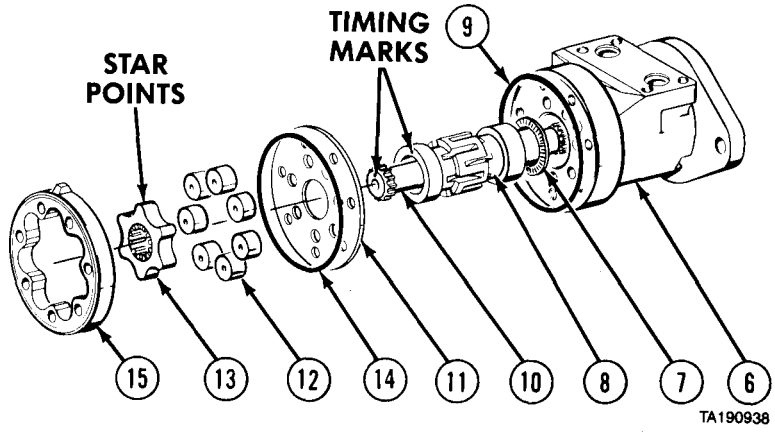
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



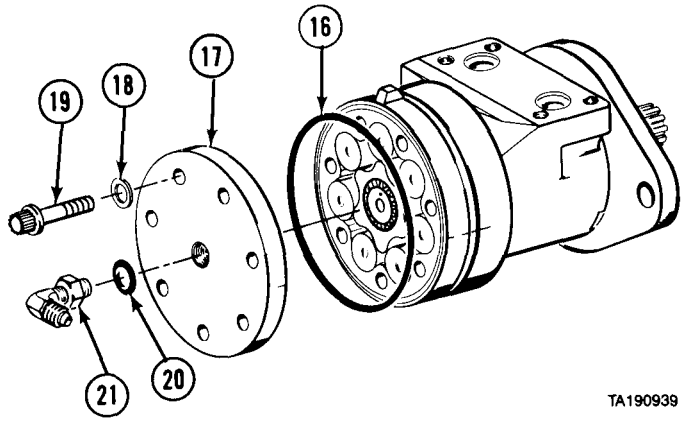
TA190937

(2) Apply sealing and thread locking compound to four screws (4).
(3) Install race (5), flange cap (3), and four screws (4) to motor (6).

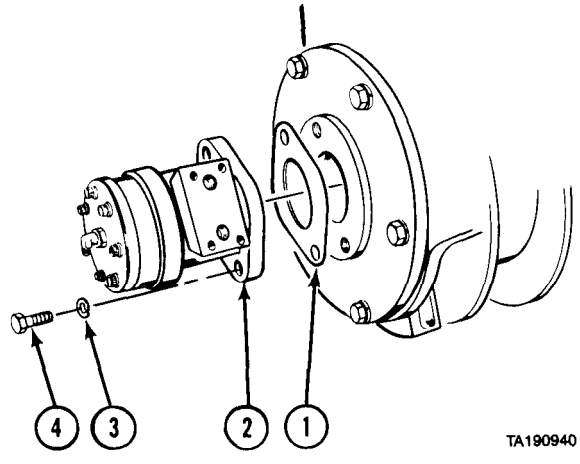
(4) Install bearing (7) and shaft (8) in motor (6).
(5) Install preformed packing (9) and shaft (10).
(6) Aline timing mark on shaft (10) with timing mark on shaft (8).
(7) Install spacer plate (11).
(8) Install seven rollers (12), star (13), and preformed packing (14) in geroler (15).
(9) Install geroler (15) and aline any star point with timing mark on shaft (10).



(10) Install preformed packing (16), end cap (17), seven washers (18), and screws (19).
(11) Install preformed packing (20) and elbow (21).



e. Installation. Install gasket (1), motor (2), two lockwashers (3), and screws (4).



f. Follow-on Maintenance.
(1) Install hoist drive motor control valve (para 17-21).
(2) Connect hydraulic drive motor hose and tubes (para 17-2).

END OF TASK

17-22.1. HOIST DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

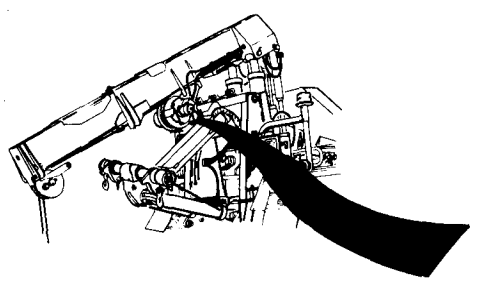
Equipment Condition

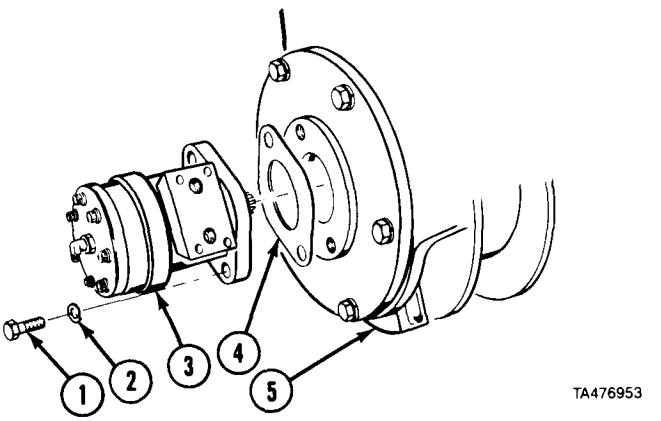
TM or Para	*Condition Description*
Para 17-21.1	Hoist drive motor control valve removed.
Para 17-2.1	Hydraulic drive motor hose and tubes disconnected.
TM 9-2320-279-10	Position crane for access.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support



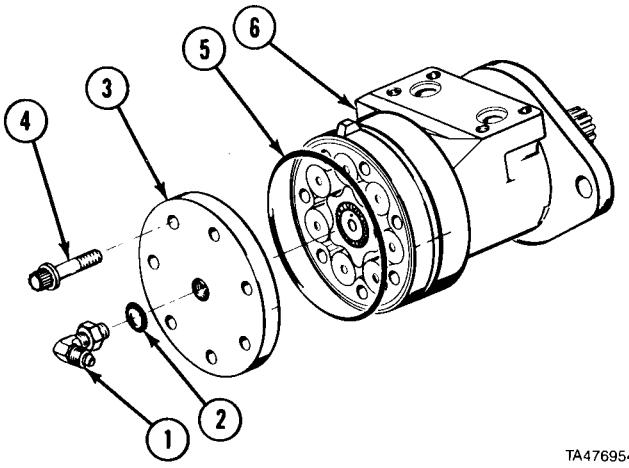


a. Removal. Remove two screws (1), lockwashers (2), motor (3), and gasket (4) from drum (5).

b. Disassembly.

(1) Remove elbow (1) and preformed packing (2) from end cap (3).

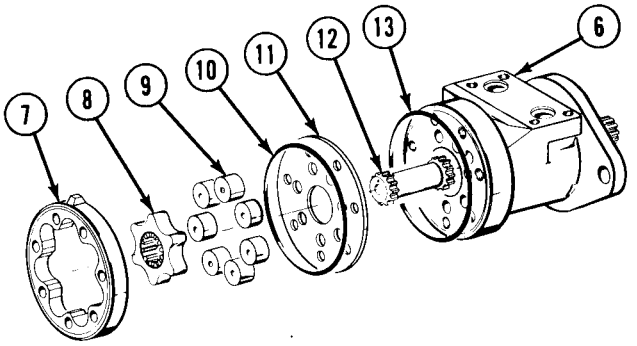
(2) Remove seven screws (4), end cap (3), and preformed packing (5) from motor (6).



TA476954

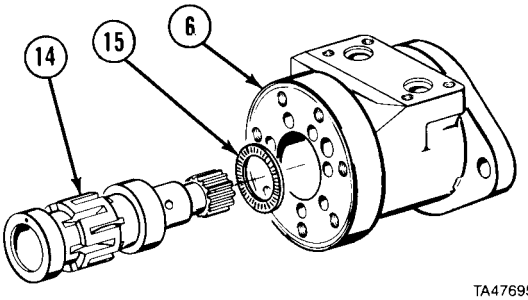
(3) Remove geroler (7), star (8), and seven rollers (9).

(4) Remove preformed packing (10), plate (11), gear shaft (12), and preformed packing (13) from motor (6).



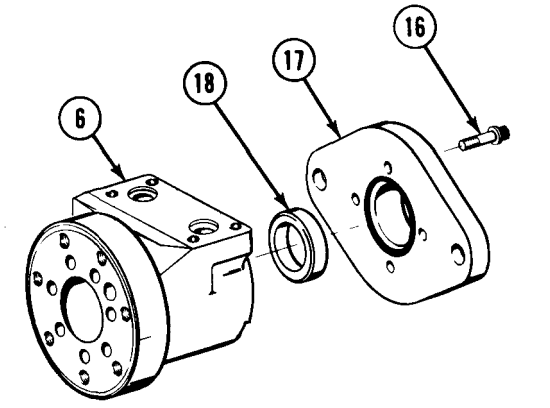
TA4769

(5) Remove shaft (14) and bearing (15) from motor (6).



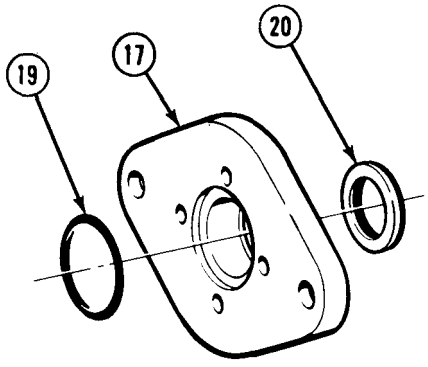
TA476956

(6) Remove four screws (16) and flange cap (17) from motor (6).
(7) Remove race (18) from motor (6).



TA476957

(8) Remove preformed packing (19) and dust seal (20) from flange cap (17).



TA476958

c. Cleaning/Inspection.

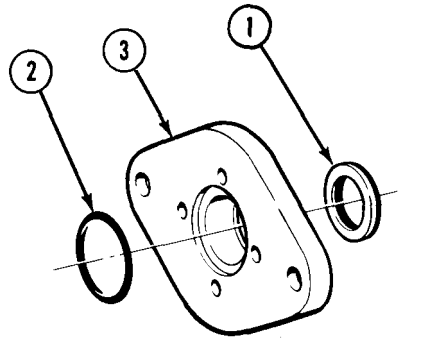
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

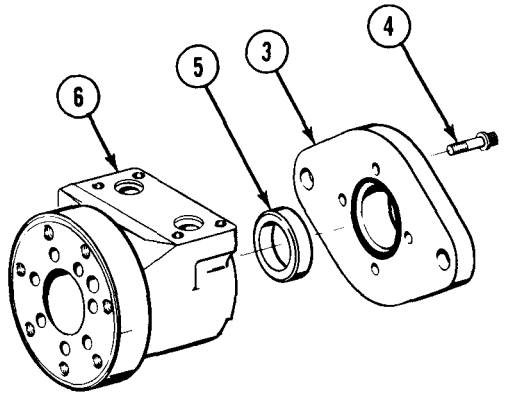
d. Assembly.

(1) Install dust seal (1) and preformed packing (2) in flange cap (3).



TA476959

(2) Apply thread locking and sealing compound to four screws (4).
(3) Install race (5), flange cap (3), and four screws (4) to motor (6).

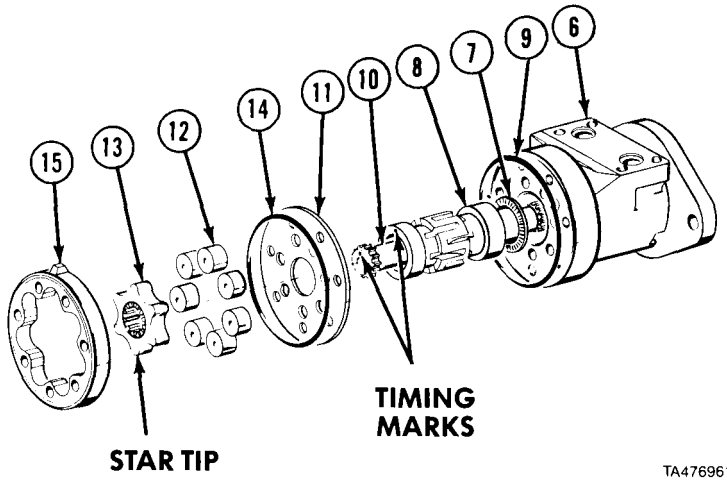


TA476960

NOTE

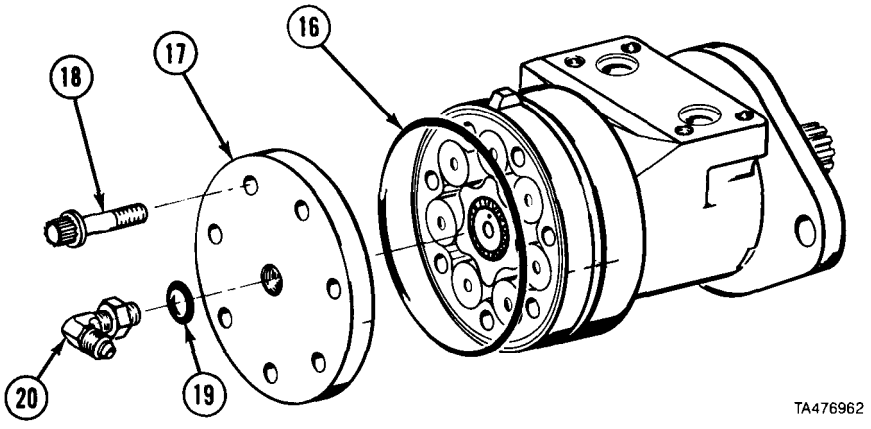
Be sure race is fully seated.

(4) Install bearing (7) and shaft (8) in motor (6).
(5) Install preformed packing (9) and gear shaft (10).
(6) Aline timing mark on gear shaft (10) with timing mark on shaft (8).
(7) Install spacer plate (11).
(8) Install seven rollers (12), star (13), and preformed packing (14) in geroler (15).
(9) Install geroler (15) and aline any star tip with timing mark on gear shaft (10).

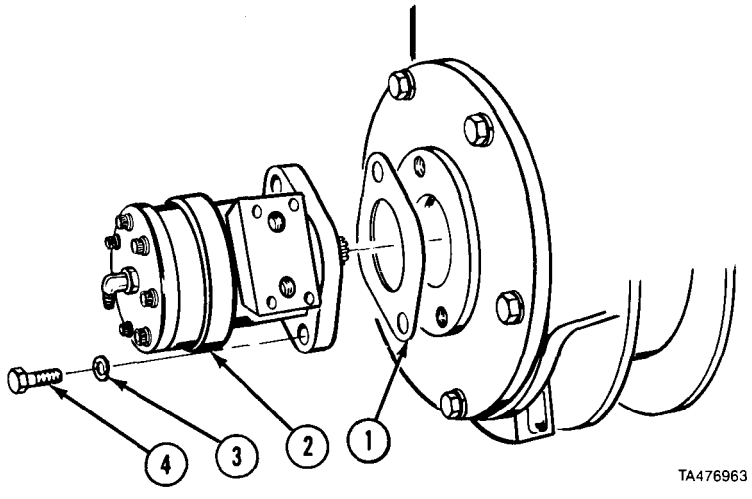


TA476961

17-22.1. HOIST DRIVE MOTOR REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).



(10) Install preformed packing (16), and end cap (17) with seven screws (18).
(11) Install preformed packing (19) and elbow (20).



e. Installation. Install gasket (1), motor (2), two lockwashers (3) with screws (4).

f. Follow-on Maintenance.
(1) Install hoist drive motor control valve (para 17-21.1).
(2) Connect hydraulic drive motor hose and tubes (para 17-2.1).

END OF TASK

17-23. HOIST ASSEMBLY REPAIR

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M984E1 , M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Adhesive-sealant, silicone, Item 6, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

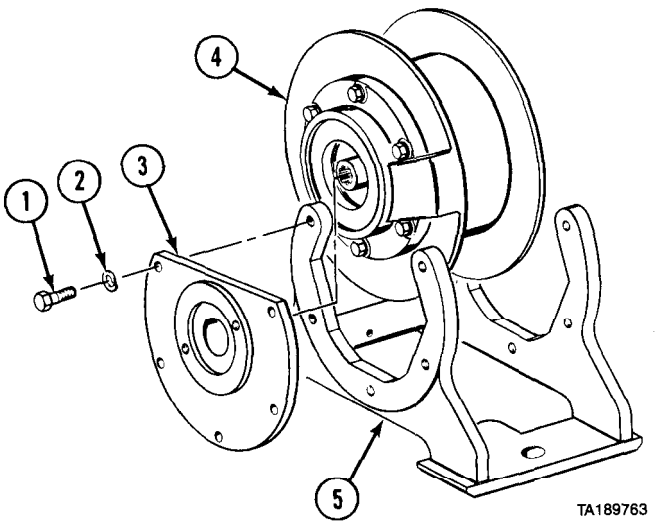
TM or Para	*Condition Description*
Para 17-20	Hoist assembly removed.
Para 17-24	Hoist brake removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.

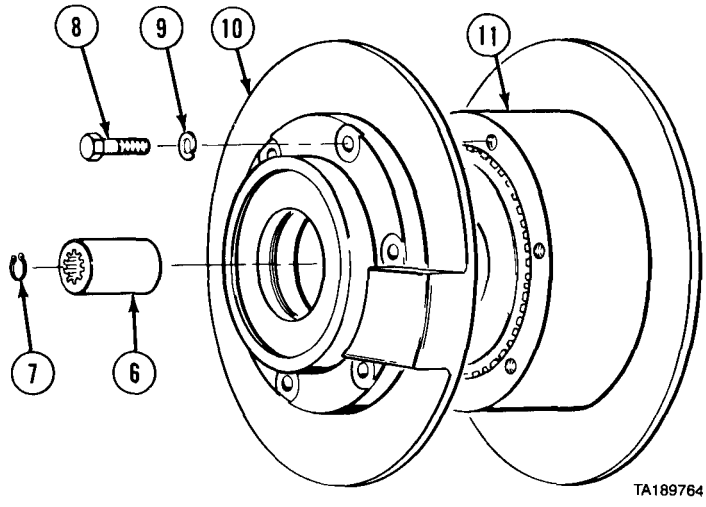


(1) Remove five screws (1), lockwashers (2), and end cap (3).
(2) Remove drum assembly (4) from bracket (5).

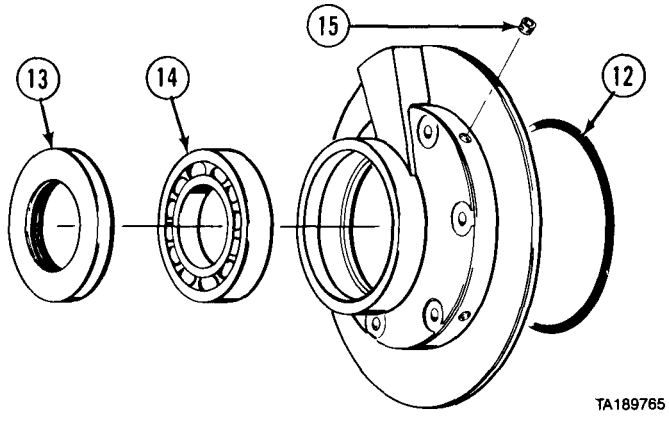
M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

17-23. HOIST ASSEMBLY REPAIR (CONT).

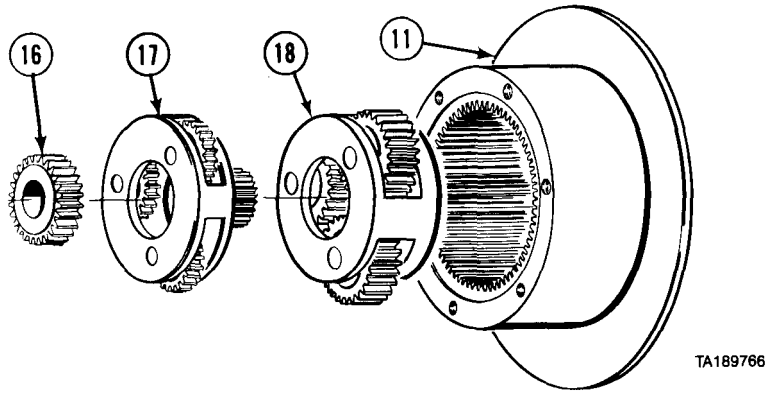
(3) Remove coupling (6).
(4) Remove retaining ring (7).
(5) Remove six screws (8), lockwashers (9), and drum end (10) from ring gear (11).



(6) Remove preformed packing (12), oil seal (13), and bearing (14).
(7) Remove two plugs (15).

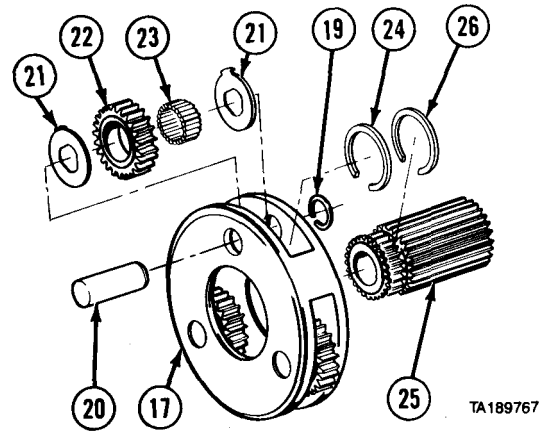


(8) Remove sun gear (16) and carrier (17).
(9) Remove carrier (18) from ring gear (11).

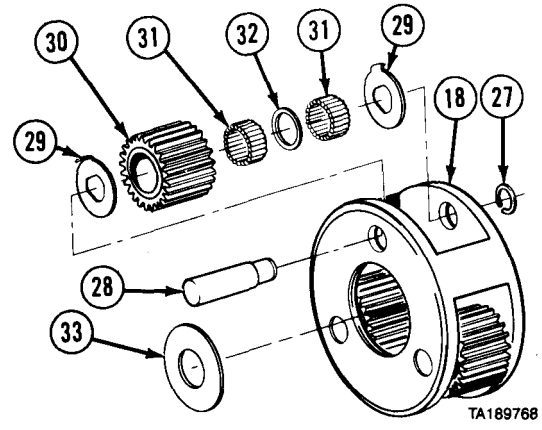


17-23. HOIST ASSEMBLY REPAIR (CONT).

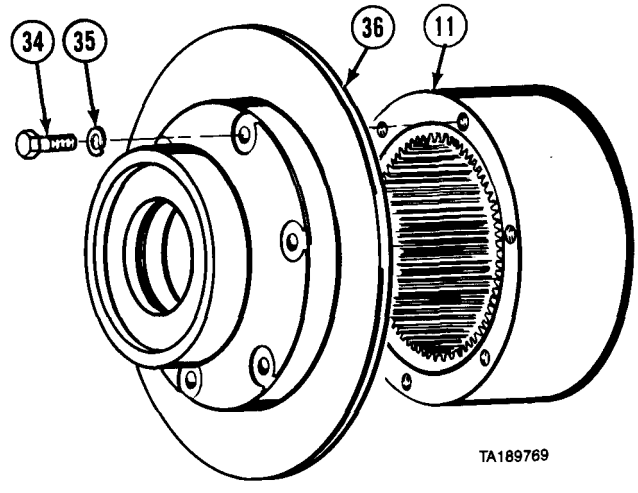
(10) Remove lockring (19), pin (20), two washers (21), gear (22), and 17 rollers (23).
(11) Repeat step *(10)* for other two assemblies.
(12) Remove retaining ring (24) and drive gear (25) from carrier (17).
(13) Remove retaining ring (26) from drive gear (25).



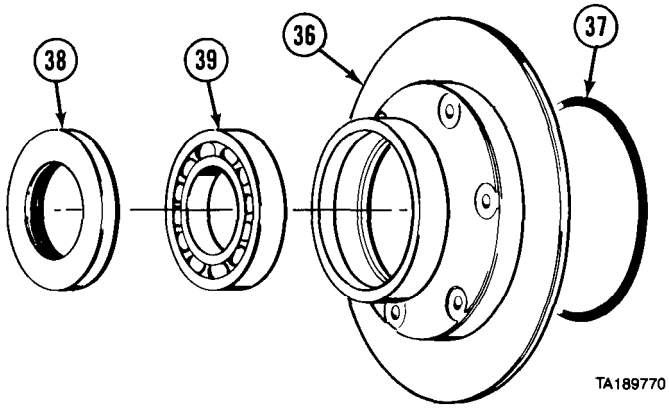
(14) Remove lockring (27), pin (28), two washers (29), gear (30), 34 rollers (31), and separator (32) from carrier (18).
(15) Repeat step *(14)* for other two assemblies.
(16) Remove washer (33).



(17) Remove eight screws (34) and lockwashers (35).
(18) Remove drum end (36) from ring gear (11).



(19) Remove preformed packing (37).
(20) Remove oil seal (38) and bearing (39) from drum end (36).



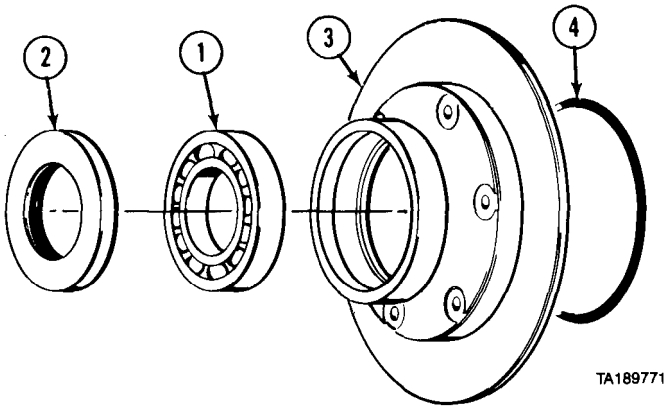
b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Inspect bearings for grooves, pits, or cracks.
(4) Inspect gears for chipping, pitting, or wear.
(5) Replace damaged parts.

c. Assembly.



NOTE

Large slot in bearing faces down.

(1) Install bearing (1) and oil seal (2).

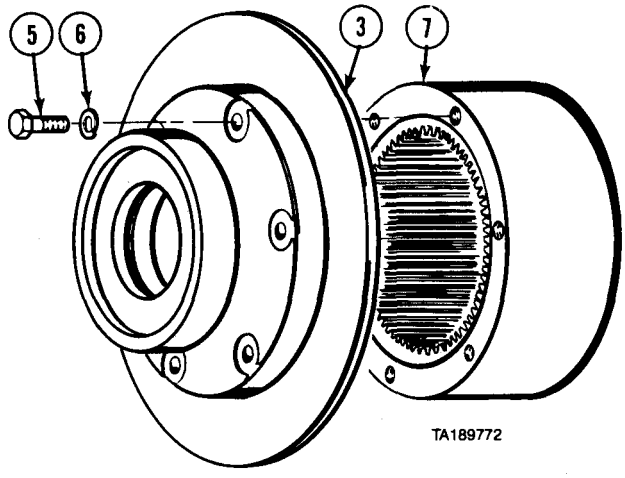
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

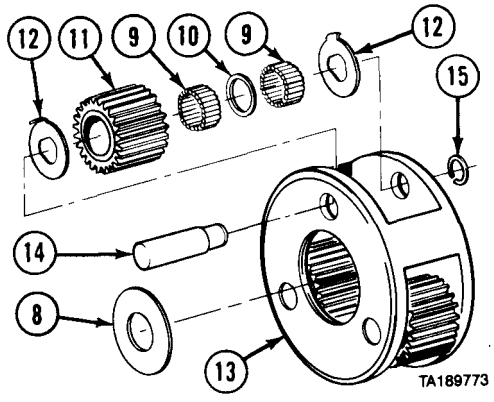
(2) Apply silicone sealant to drum end (3) and install preformed packing (4).

17-23. HOIST ASSEMBLY REPAIR (CONT).

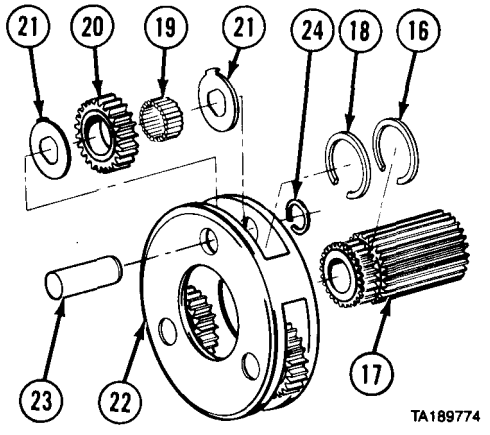
(3) Apply sealing and thread locking compound to eight screws (5).
(4) Install drum end (3) with eight lockwashers (6) and screws (5) to ring gear (7).



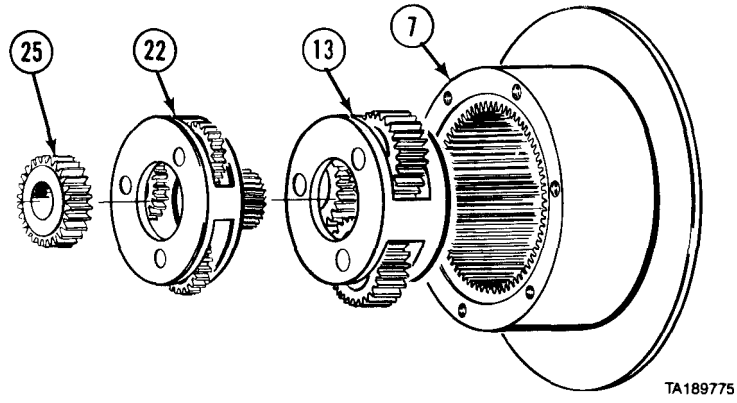
(5) Install washer (8).
(6) Install 34 rollers (9) and separator (10) in gear (11).
(7) Install gear (11) and two washers (12) in carrier (13).
(8) Aline and install pin (14) and lockring (15).
(9) Repeat steps *(6)* through *(8)* for other two assemblies.



(10) Install retaining ring (16), drive gear (17), and retaining ring (18).
(11) Install 17 rollers (19) in gear (20).
(12) Install gear (20) and two washers (21) in carrier (22).
(13) Aline and install pin (23) and lockring (24).
(14) Repeat steps *(11)* through *(13)* for other two assemblies.



(15) Install carrier (13), carrier (22), and sun gear (25) in ring gear (7).



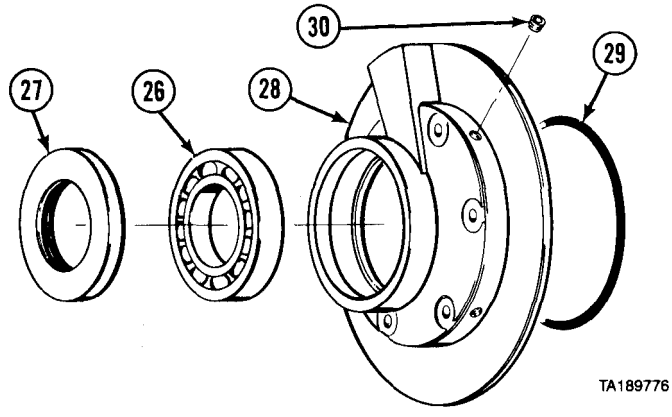
NOTE

Large slot in bearing faces out.

(16) Install bearing (26) and oil seal (27) in drum end (28).

(17) Apply silicone sealant to drum end face (28) and install preformed packing (29).

(18) Install two plugs (30).



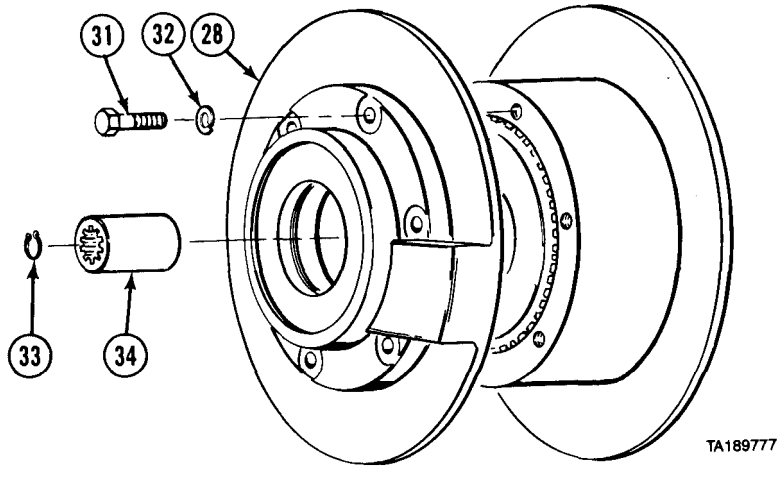
(19) Apply sealing and thread locking compound to six screws (31).

(20) Install drum end (28) with six lockwashers (32) and screws (31).

NOTE

Do not tip, drum coupling will fall out. Coupling is installed on brake spline.

(21) Install retaining ring (33) and place coupling (34) in drum end (28).

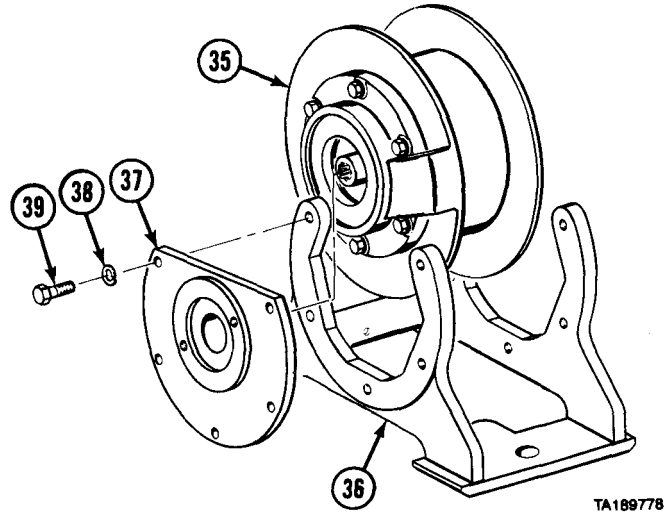


17-23. HOIST ASSEMBLY REPAIR (CONT).

(22) Install drum assembly (35) in bracket (36).
(23) Install end cap (37) with five lockwashers (38) and screws (39).

d. Follow-on Maintenance.
(1) Install hoist brake (para 17-24).
(2) Install hoist assembly (para 17-20).
(3) Fill hoist assembly with oil (LO 9-2320-279-12).

END OF TASK



17-24. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 25, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

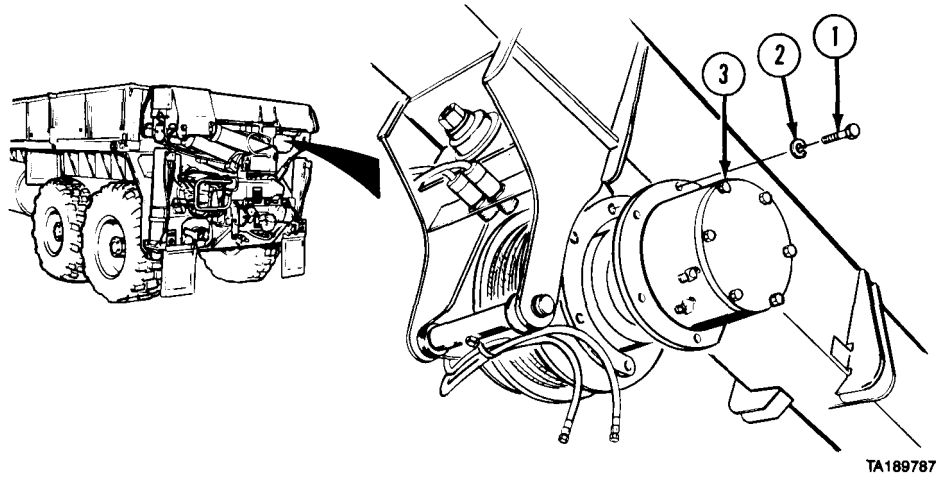
Equipment Condition

TM or Para	*Condition Description*
Para 17-2	Hoist brake hydraulic hose and tubes removed.

Special Environmental Conditions
None

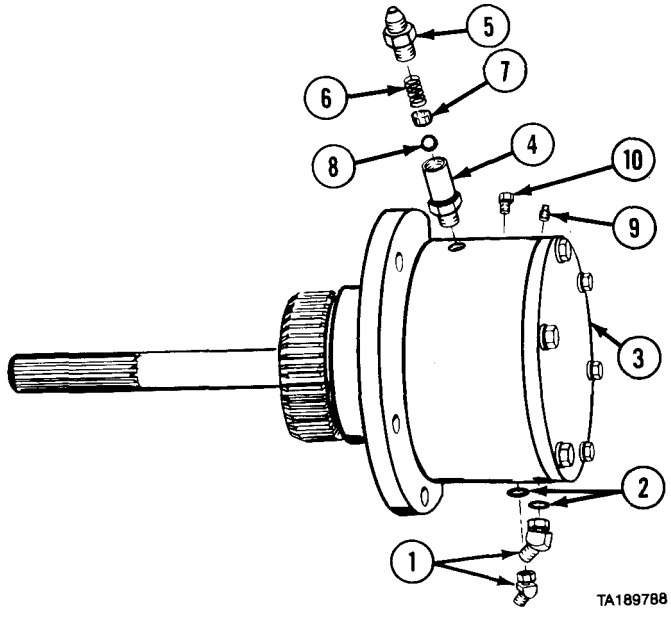
General Safety Instructions
None

Level of Maintenance
Direct Support



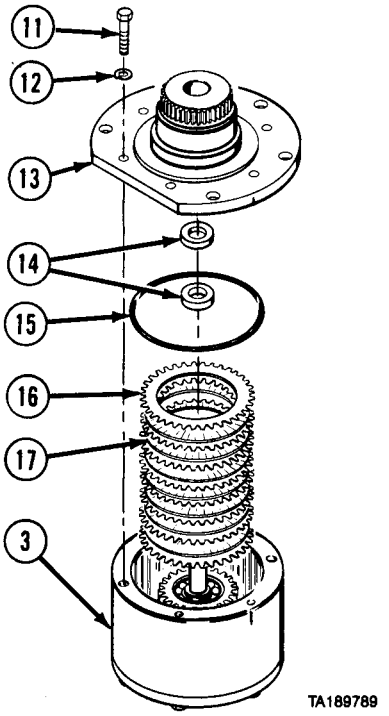
a. Removal. Remove five screws (1), lockwashers (2), and brake assembly (3).

b. Disassembly.

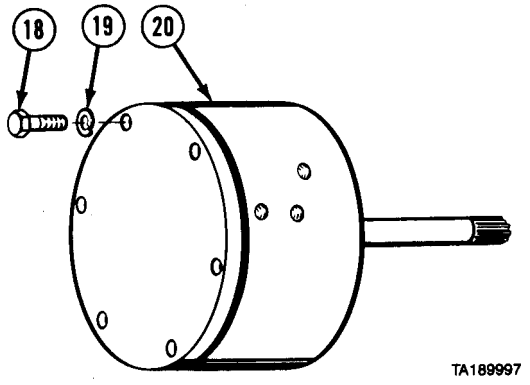


(1) Remove two elbows (1) and preformed packings (2) from hoist brake (3).
(2) Remove check valve (4), fitting (5), spring (6), retainer (7), and ball (8).
(3) Remove plug (9) and bleeder valve (10).

17-24. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION (CONT).

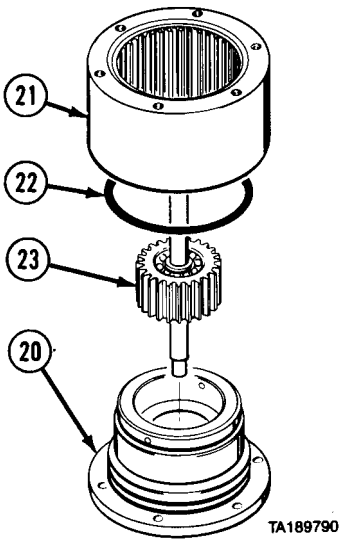


(4) Matchmark hoist brake (3) and remove six screws (11), lockwashers (12), and end cap (13).
(5) Remove two oil seals (14) and preformed packing (15) from hoist brake (3).
(6) Remove eight stators (16) and seven discs (17).

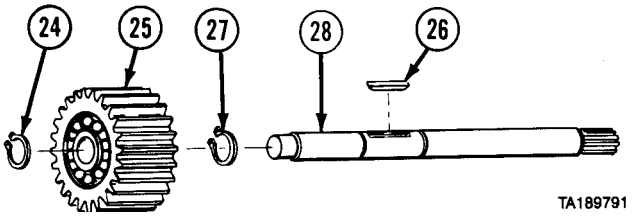


(7) Remove six screws (18) and lockwashers (19) from end cap (20).

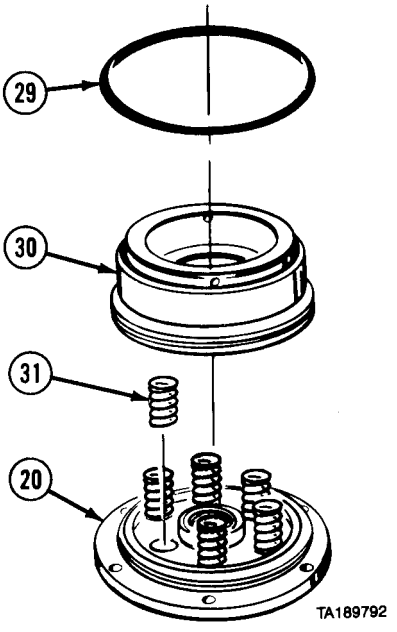
(8) Remove ring gear (21) from end cap (20).
(9) Remove preformed packing (22) from ring gear (21).
(10) Remove clutch assembly (23).



(11) Remove retaining ring (24), gear (25), key (26), and retaining ring (27) from shaft (28).

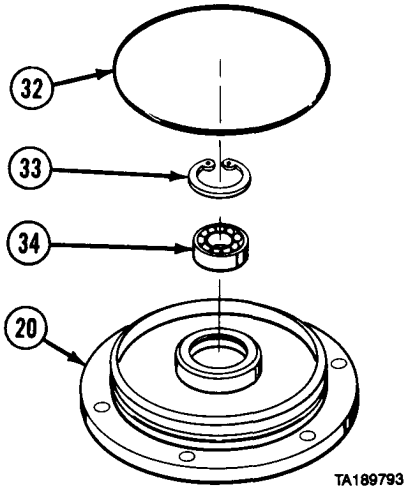


(12) Remove preformed packing (29) from piston (30).
(13) Remove piston (30) and six springs (31) from end cap (20).



17-24. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION (CONT).

(14) Remove preformed packing (32), retaining ring (33), and bearing (34) from end cap (20).



c. Cleaning/Inspection.

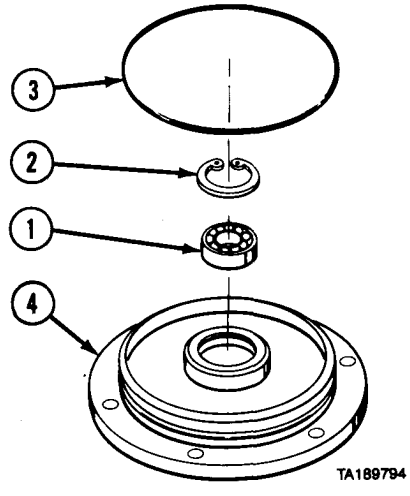
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

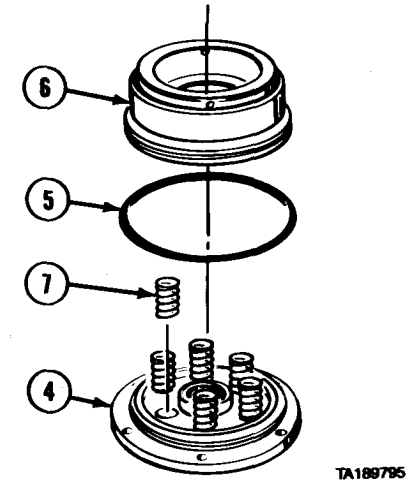
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check stators for wear. If stator is under 0.064 in. (1.62 mm) thick, replace stator.
(5) Check disc for wear. If disc is under 0.057 in. (1.44 mm) thick, replace disc.

d. Assembly.

(1) Install bearing (1), retaining ring (2), and preformed packing (3) in end cap (4).



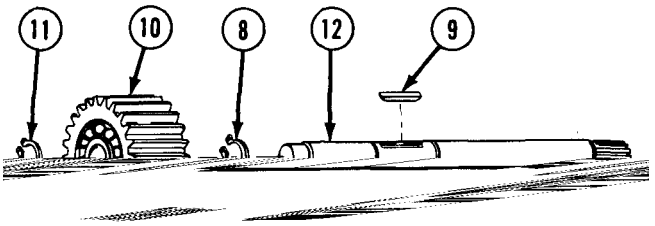
(2) Install preformed packing (5) on piston (6).
(3) Install piston (6) and six springs (7) on end cap (4).



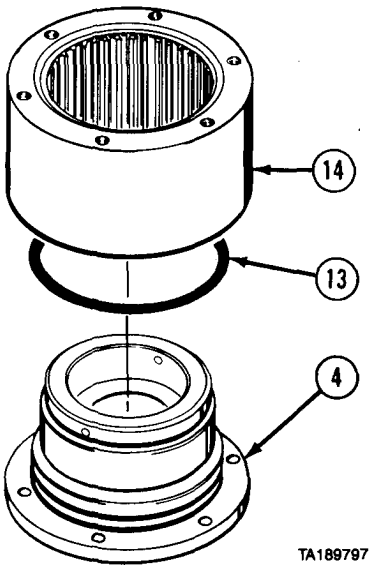
NOTE

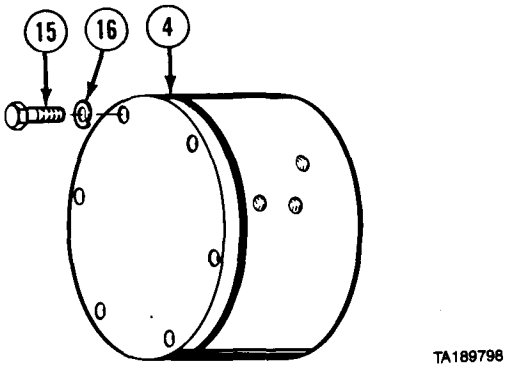
Holes in gear face spline end of shaft.

(4) Install retaining ring (8), key (9), gear (10), and retaining ring (11) on shaft (12).



(5) Install preformed packing (13) in ring gear (14).
(6) Install ring gear (14) on end cap (4).





WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

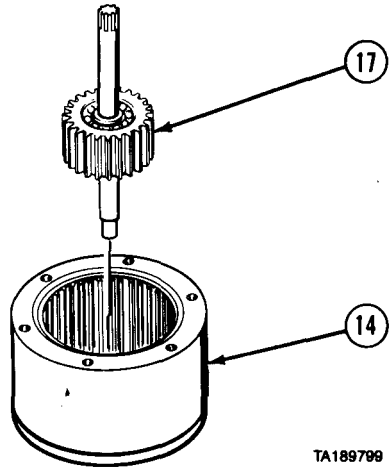
(7) Apply sealing and thread locking compound and install six screws (15) and lockwashers (16) in end cap (4).

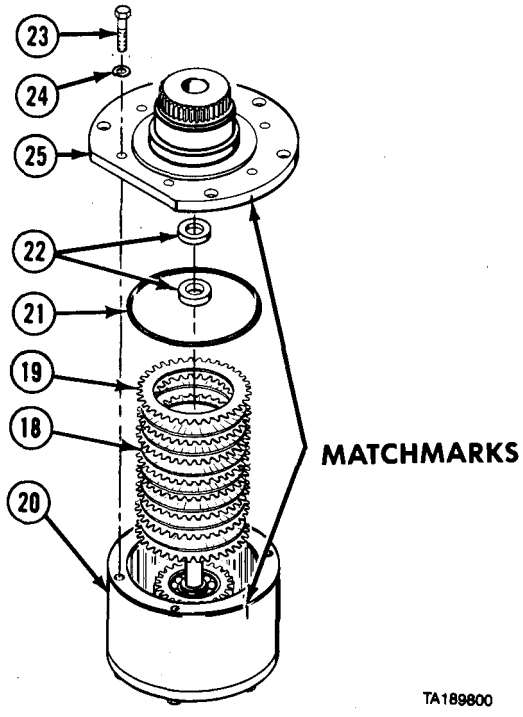
17-24. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION (CONT).

NOTE

Do not seat clutch assembly.

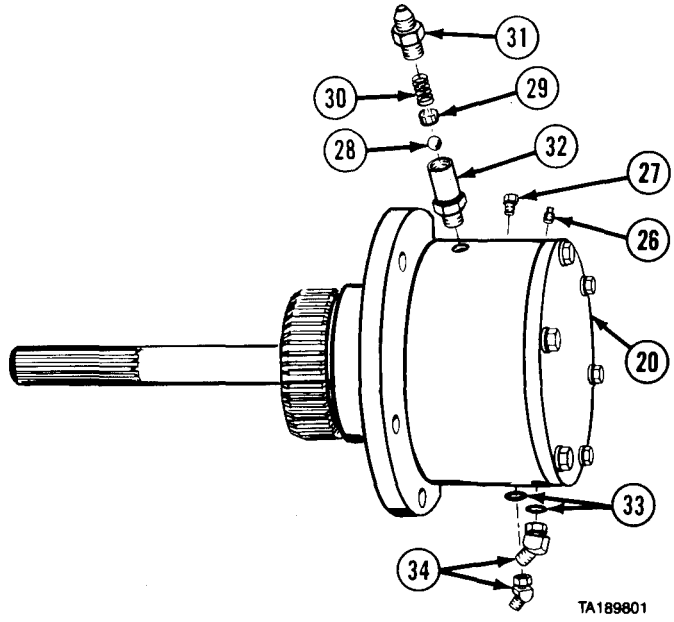
(8) Install clutch assembly (17) in ring gear (14).

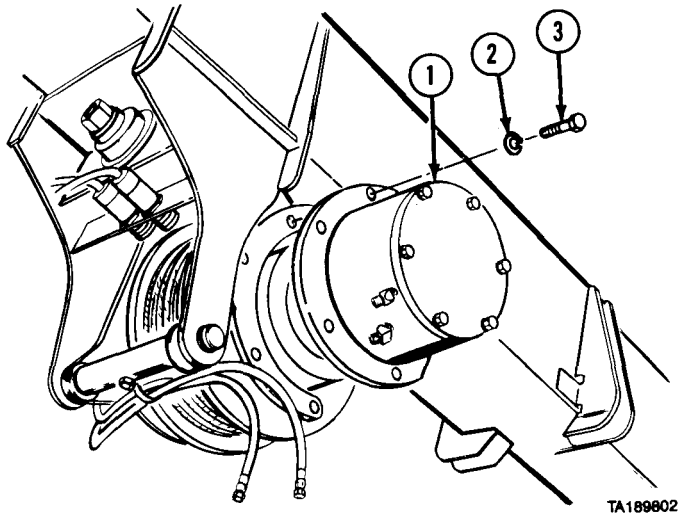




(9) Install seven discs (18) and eight stators (19) alternately in hoist brake (20).
(10) Install preformed packing (21) and two oil seals (22).
(11) Apply sealing and thread locking compound and install six screws (23) and lockwashers (24) in end cap (25).

(12) Apply pipe thread sealing compound and install bleeder valve (26) and plug (27) in hoist brake (20).
(13) Install ball (28), retainer (29), spring (30), and fitting (31) in check valve (32).
(14) Apply pipe thread sealing compound and install check valve (32).
(15) Install two preformed packings (33) and elbows (34).





NOTE

Aline brake with coupling in hoist assembly.

e. Installation. Install brake assembly (1) with five lockwashers (2) and screws (3).

f. Follow-on Maintenance.
(1) Fill hoist brake with oil (LO 9-2320-279-12).
(2) Connect hoist brake hoses and tubes (para 17-2).

END OF TASK

17-24.1. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Compound, sealing pipe thread, Item 29, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

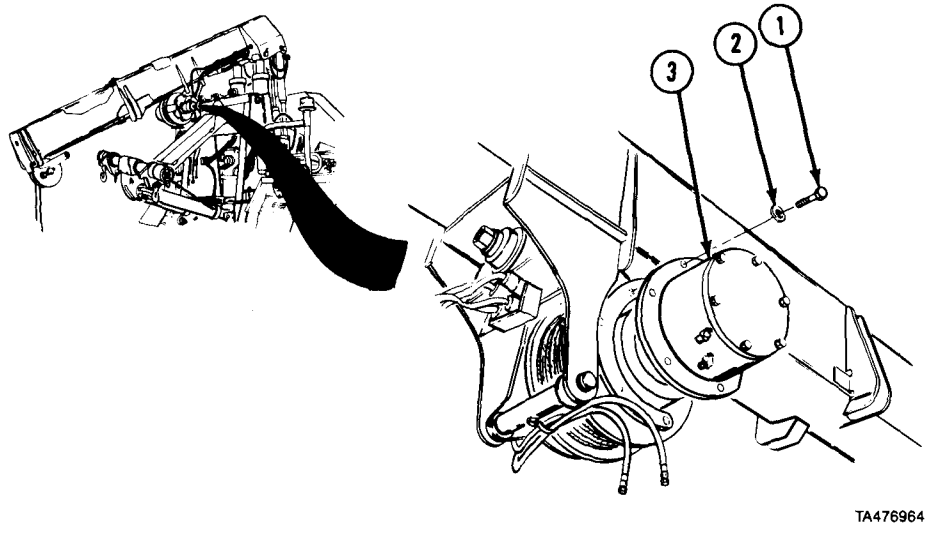
Equipment Condition

TM or Para	*Condition Description*
Para 17-2.1	Hoist brake hydraulic hose and tubes removed.
TM 9-2320-279-10	Position crane for access.

Special Environmental Conditions
None

General Safety Instructions
None

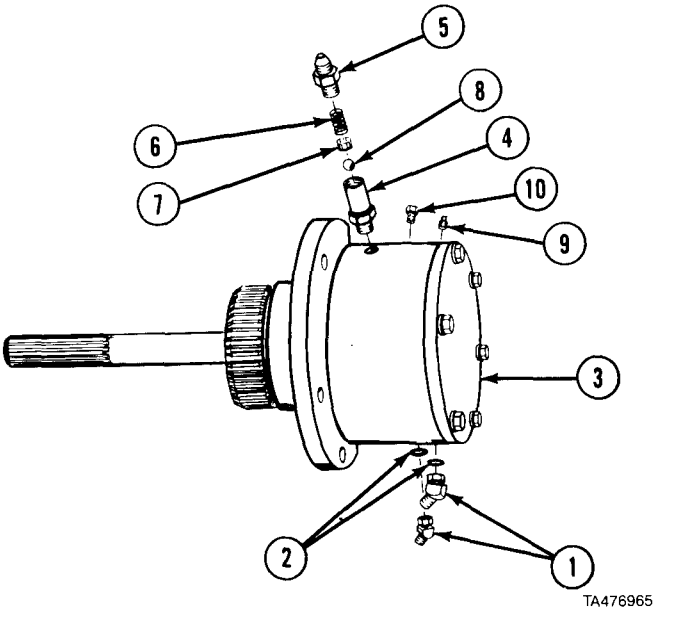
Level of Maintenance
Direct Support



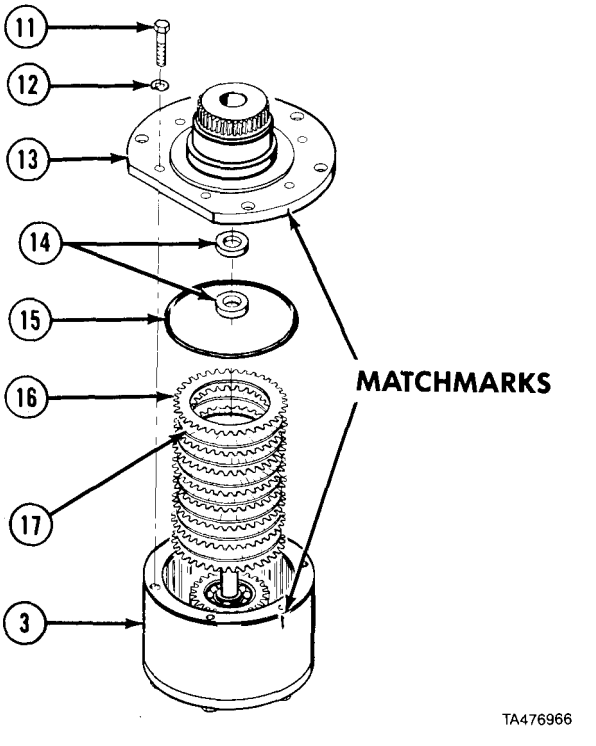
a. Removal. Remove five screws (1), washers (2), and hoist brake assembly (3).

b. Disassembly.

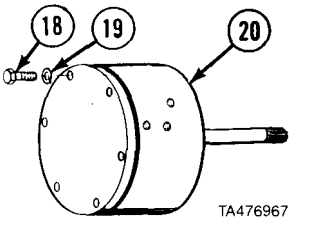
(1) Remove two elbows (1) and preformed packings (2) from hoist brake (3).
(2) Remove check valve (4), fitting (5), spring (6), retainer (7), and ball (8).
(3) Remove plug (9) and bleeder valve (10).



(4) Matchmark hoist brake (3) and remove six screws (11), lockwashers (12), and end cap (13).
(5) Remove two oil seals (14) and preformed packing (15) from hoist brake (3).
(6) Remove eight stators (16) and seven discs (17).

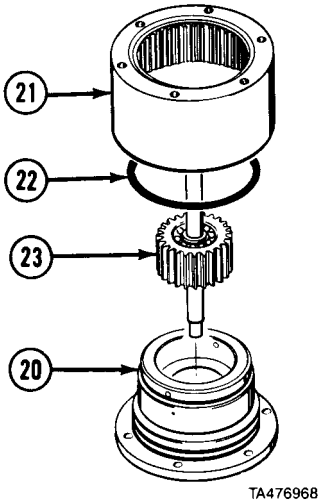


(7) Remove six screws (18) and lockwashers (19) from end cap (20).



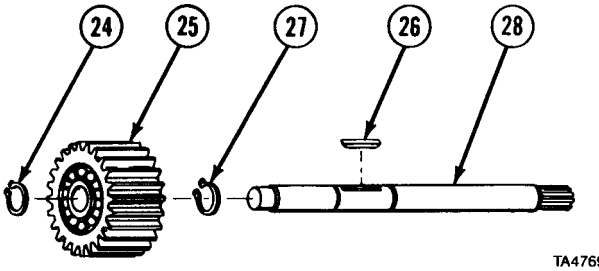
17-24.1. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(8) Remove ring gear (21) from end cap (20).
(9) Remove preformed packing (22) from ring gear (21).
(10) Remove clutch assembly (23) from end cap (20).



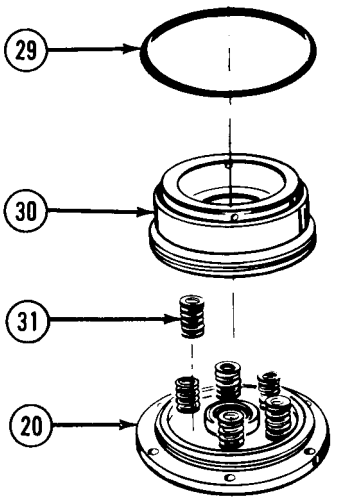
TA476968

(11) Remove retaining ring (24), gear (25), key (26), and retaining ring (27) from shaft (28).



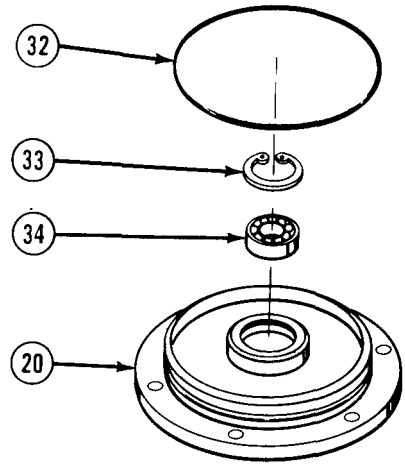
TA476969

(12) Remove preformed packing (29) from piston (30).
(13) Remove piston (30) and six springs (31) from end cap (20).



TA476970

(14) Remove preformed packing (32), retaining ring (33), and bearing (34) from end cap (20).



TA476971

c. Cleaning/Inspection.

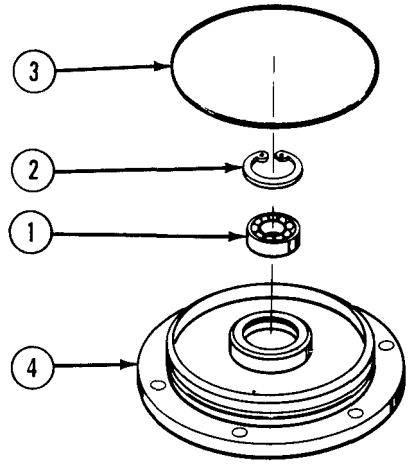
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Check stators for wear. If stator is under 0.064 in. (1.64 mm) thick, replace stator.
(5) Check disc for wear. If disc is under 0.057 in. (1.45 mm) thick, replace disc.
(6) Measure spring length. If spring is under 1.375 in. (34.9 mm), replace spring.

d. Assembly.

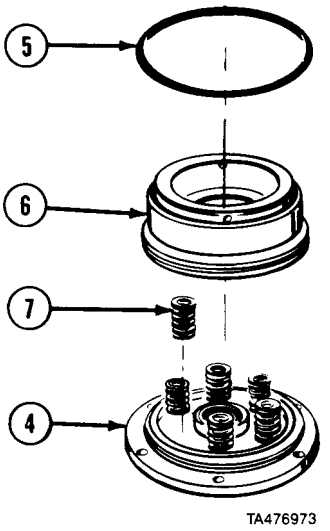
(1) Install bearing (1), retaining ring (2), and preformed packing (3) in end cap (4).



TA476972

17-24.1. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(2) Install preformed packing (5) on piston (6).
(3) Install piston (6) and six springs (7) on end cap (4).

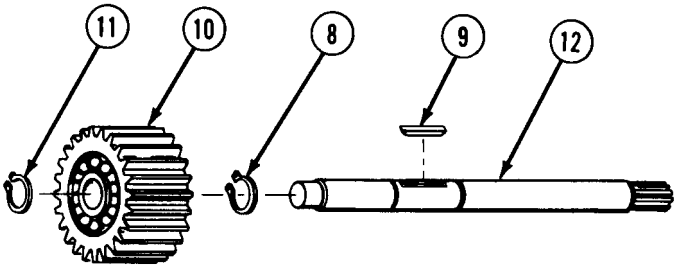


TA476973

NOTE

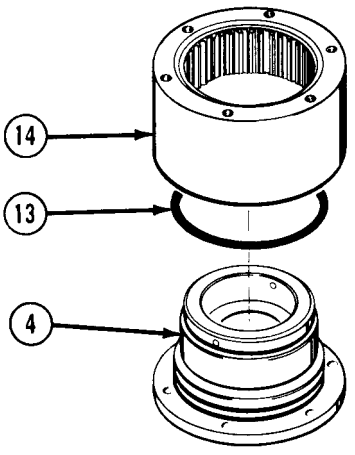
Holes in gear, face spline end of shaft.

(4) Install retaining ring (8), key (9), gear (10), and retaining ring (11) on shaft (12).



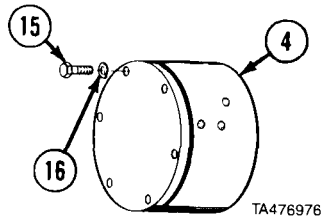
TA476974

(5) Install preformed packing (13) in ring gear (14).
(6) Install ring gear (14) on end cap (4).



TA476975

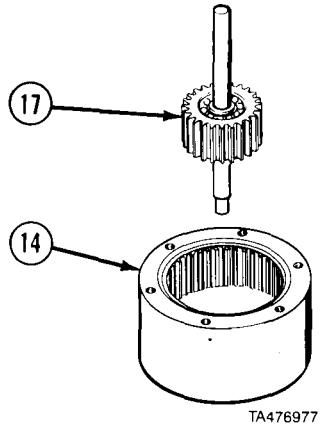
(7) Apply thread locking and sealing compound and install six screws (15) and lockwashers (16) in end cap (4).



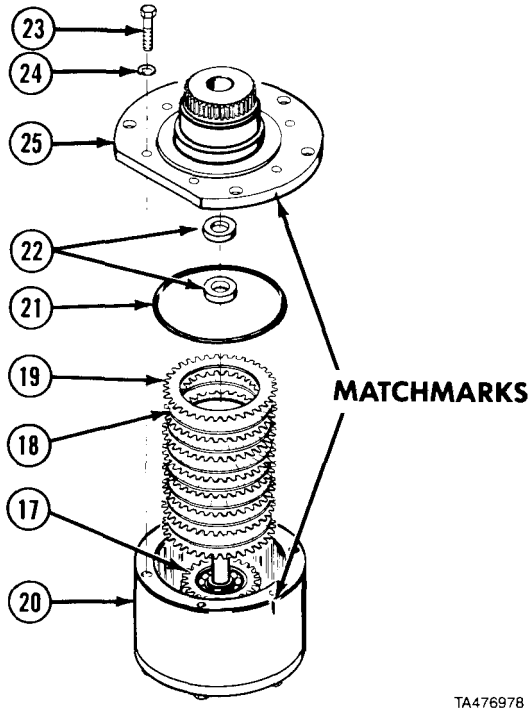
NOTE

Do not seat clutch assembly.

(8) Install clutch assembly (17) in ring gear (14).

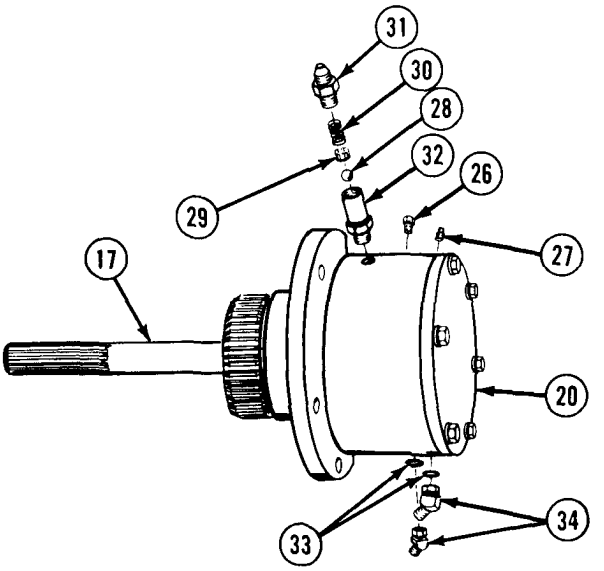


(9) Install seven discs (18) and eight stators (19) alternately in hoist brake (20).
(10) Intall clutch assembly (17) until flush with top stator (19).
(11) Install preformed packing (21) and two oil seals (22).
(12) Apply thread locking and sealing compound and install six screws (23), lockwashers (24), and end cap (25).



17-24.1. HOIST BRAKE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(13) Apply pipe thread sealing compound and install bleeder valve (26) and plug (27) in hoist brake (20).
(14) Install ball (28), retainer (29), spring (30), and fitting (31) in valve (32).
(15) Apply pipe thread sealing compound and install valve (32).
(16) Intall two preformed packings (33) and elbows (34).
(17) Seat clutch assembly (17).

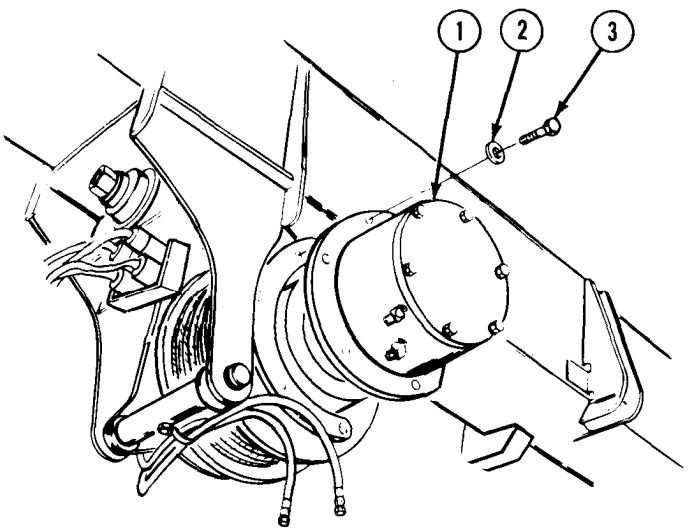


TA476979

NOTE

Aline brake with coupling in hoist assembly.

e. Installation. Install hoist brake assembly (1) with five washers (2) and screws (3).



TA476980

f. Follow-on Maintenance.
(1) Fill brake with oil (LO 9-2320-279-12).
(2) Connect hoist brake hoses and tubes (para 17-2.1).

END OF TASK

7-25. HOIST ADJUSTMENT (M977 AND M985).

This task covers:

a. Adjustment

b. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

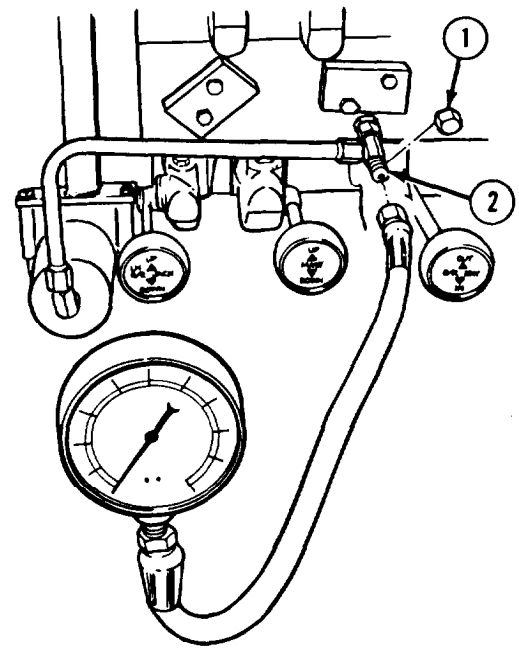
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Outriggers extended.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Adjustment.



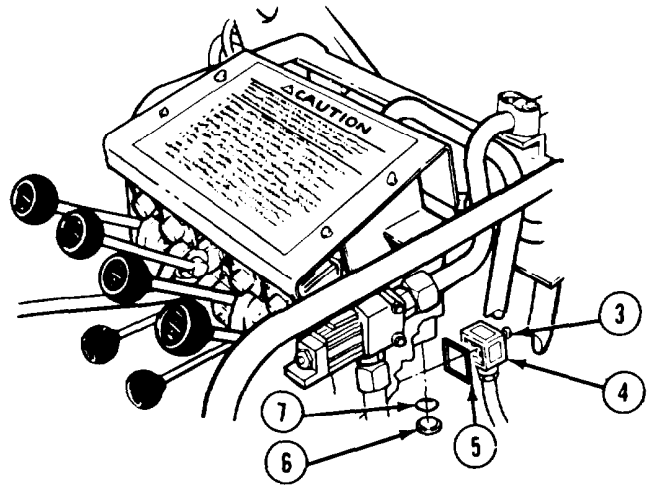
NOTE
Crane must be at normal operating temperature for adjustment.

(1) Remove cap (1) and attach suitable pressure gage to test port (2).

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

(2) Loosen screw (3) and remove plug (4) and seal (5).

(3) Remove plug (6) and preformed packing (7).

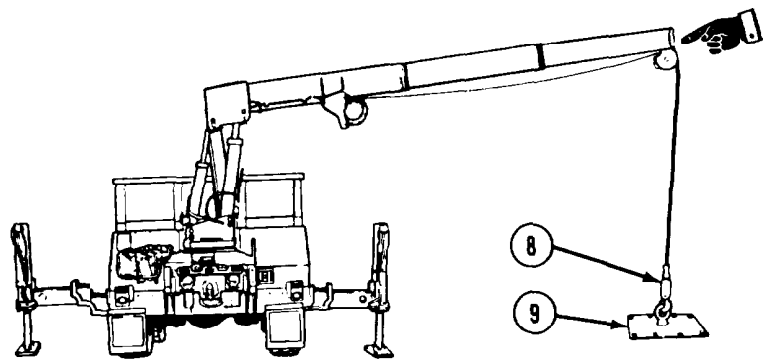


(4) Put crane in operating condition (TM 9-2320-279-10).

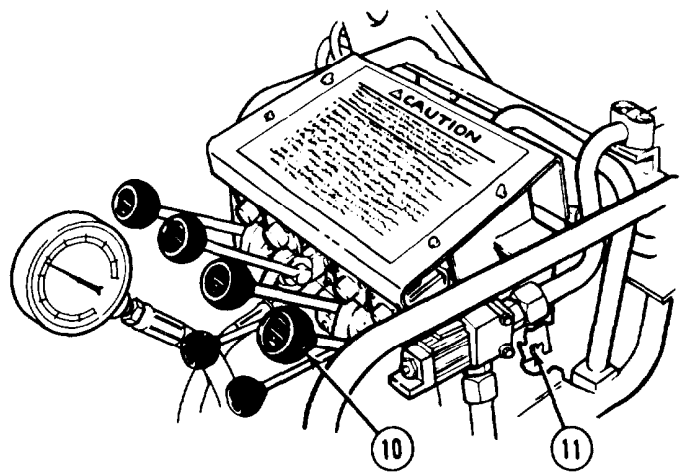
CAUTION

Do not operate crane with boom below horizontal when there is a load on hook.

(5) Attach crane hook (8) to an immovable object (9).

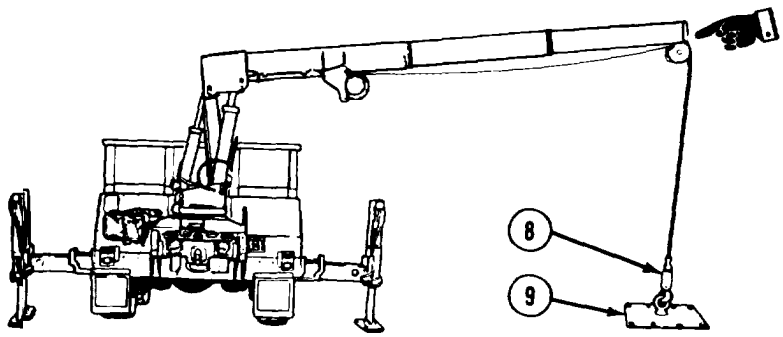


(6) While operating HOIST control lever (10) UP, adjust internal screw (11) until gage reads between 1900 psi (13 100 kPa) and 2100 psi (14 480 kPa) for M977 or between 2100 psi (14 480 kPa) and 2300 psi (15 858 kPa) for M985.

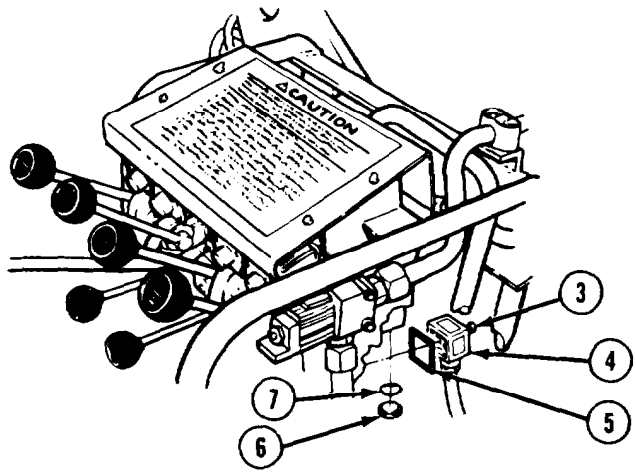


17-25. HOIST ADJUSTMENT (M977 AND M985) (CONT).

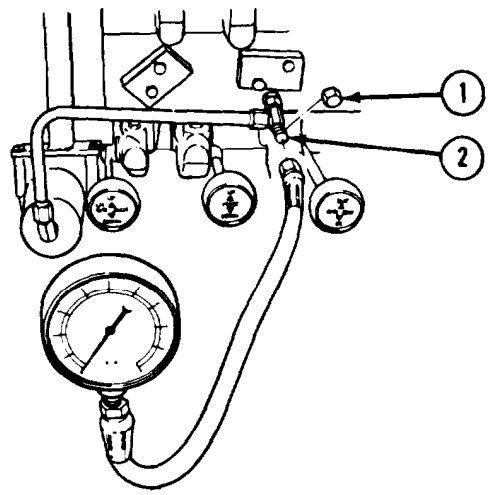
(7) Remove crane hook (8) from immovable object (9).
(8) Return crane to stowed position (TM 9-2320-279-10).



(9) Install preformed packing (7) and plug (6).
(10) Install seal (5) and plug (4) and tighten screw (3).



(10) Remove gage from test port (2).
(12) Install cap (1).



b. Follow-on Maintenance. None.

END OF TASK

17-25.1 HOIST ADJUSTMENT (M984E1).

This task covers:

a. Adjustment
b. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Outriggers extended.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Adjustment.

NOTE

Crane must be at normal operating temperature for adjustment.

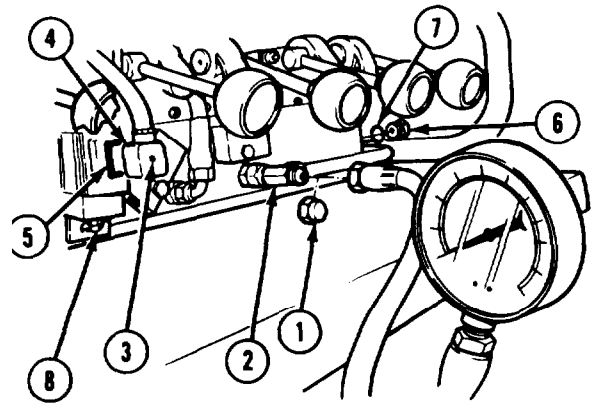
(1) Remove cap (1) and attach suitable pressure gage to test port (2).
(2) Loosen screw (3) and remove plug (4) and seal (5).

NOTE

Plug and internal screw are located in lower right corner of valve body.

(3) Remove plug (6) and preformed packing (7).
(4) Push up and hold solenoid valve button (8).

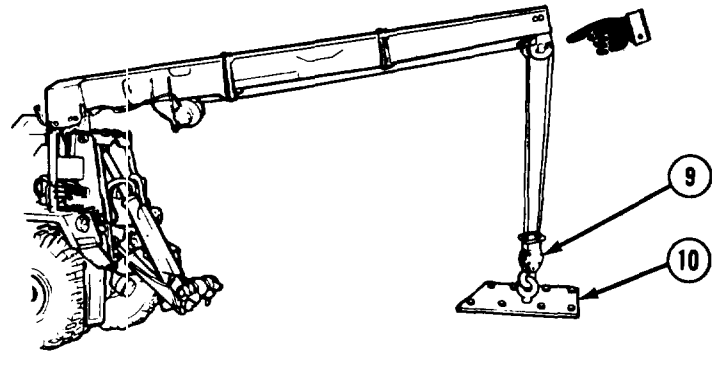
(5) Put crane in operating condition (TM 9-2320-279-10).



CAUTION

Do not operate crane with boom below horizontal when there is a load on hook.

(6) Attach crane (9) to an immovable object (10).

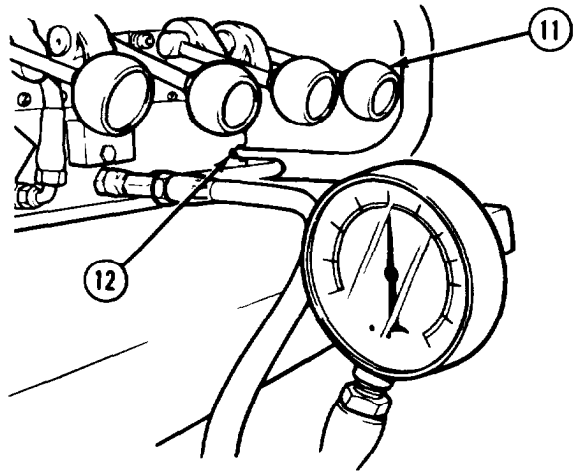


17-25.1 HOIST ADJUSTMENT (M984E1) (CONT).

CAUTION

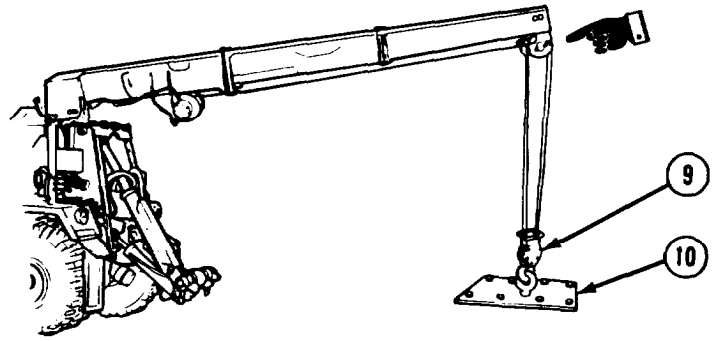
Be sure crane is engaged in high idle. Low idle may cause damage to crane.

(7) While operating hoist up lever (11), adjust internal screw (12) until gage reads between 1700 psi (11721.5 kPa) and 1900 psi (13 100 kPa).



(8) Remove crane (9) from immovable object (10).

(9) Return crane to stowed position (TM 9-2320-279-10).



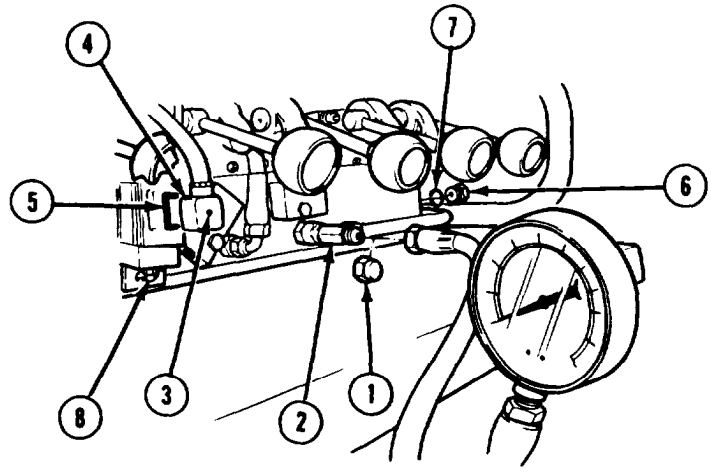
(10) Release solenoid valve button (8).

(11) Install preformed packing (7) and plug (6).

(12) Install seal (5) and plug (4), and tighten screw (3).

(13) Remove gage from test port (2).

(14) Install cap (1).



b. Follow-on Maintenance. None.

END OF TASK

Section VI. CRANE CONTROL SYSTEMS

17-26. EIGHT BANK VALVE BODY AND MOUNTING BRACKET REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-2	Outrigger and mast hydraulic hoses removed from main control valve.
Para 17-2	Main hydraulic lines disconnected.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

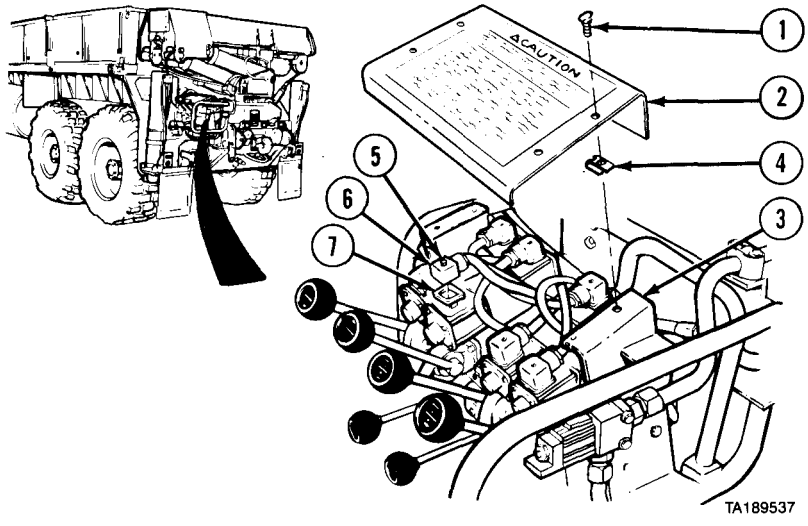
a. Removal.

(1) Remove four screws (1) and cover (2) from valve body and mounting bracket (3).
(2) Remove four clips (4).

NOTE

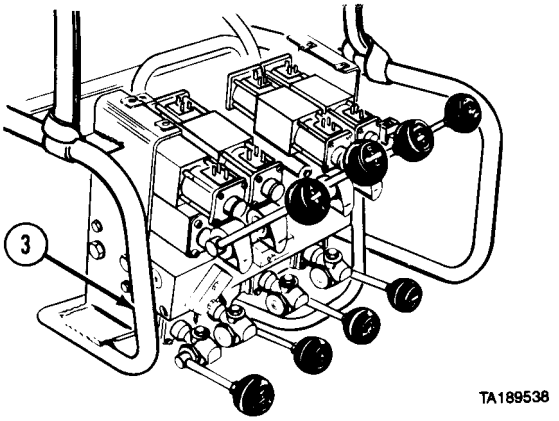
- M977 crane has 10 connectors.
- M985 crane has nine connectors.

(3) Loosen nine screws (5) and remove connectors (6) and seals (7).



17-26. EIGHT BANK VALVE BODY AND MOUNTING BRACKET REMOVAL/INSTALLATION (CONT).

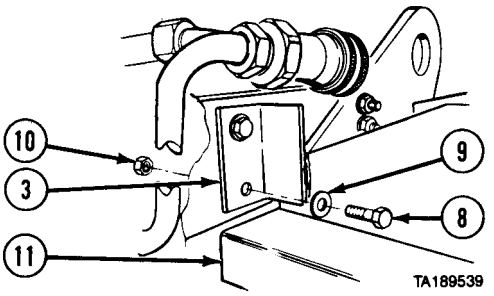
(4) Attach suitable lifting device to valve body and mounting bracket (3).



NOTE

Note position of screws.

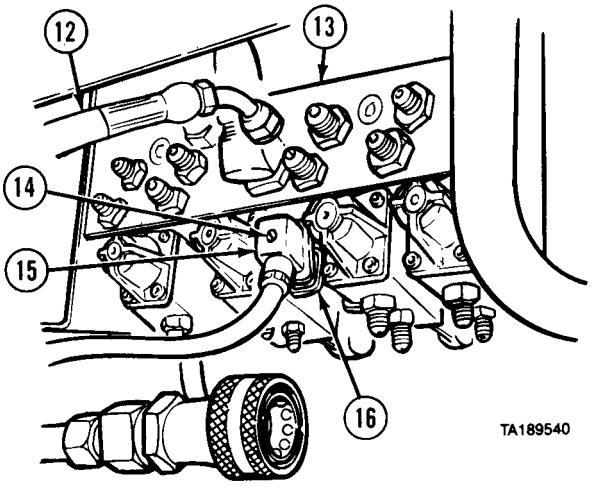
(5) Remove four screws (8), washers (9), and nuts (10).
(6) Move valve body and mounting bracket (3) away from crane (11).



NOTE

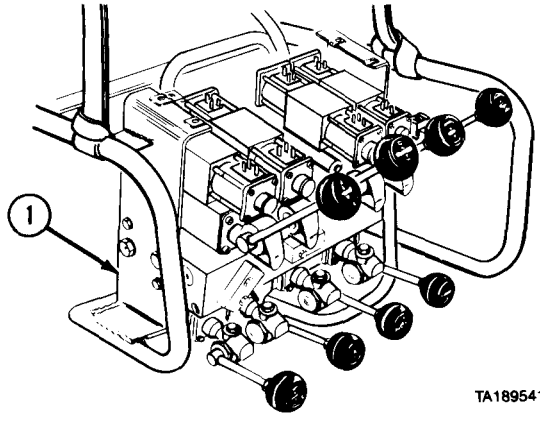
Tag and mark hoses before disconnecting.

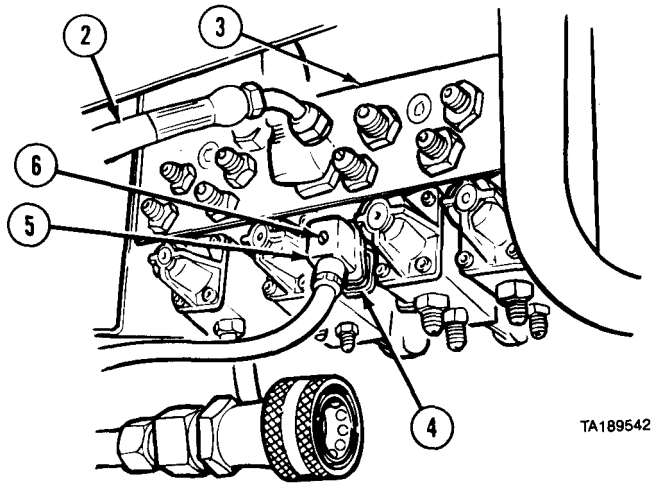
(7) Disconnect nine hoses (12) from valve body (13).
(8) Loosen three screws (14) and remove three connectors (15) and seals (16).



b. Installation.

(1) Aline valve body and mounting bracket (1).

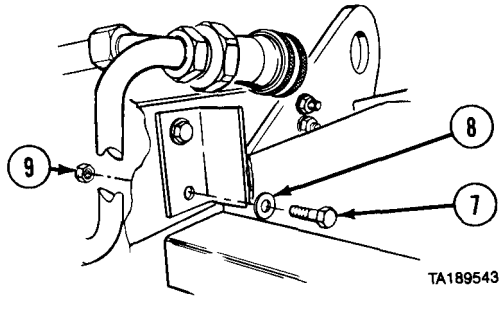




(2) Connect nine hoses (2) to valve body (3).

(3) Install three seals (4), connectors (5), and tighten screws (6).

(4) Install four screws (7), washers (8), and nuts (9).



17-26. EIGHT BANK VALVE BODY AND MOUNTING BRACKET REMOVAL/INSTALLATION (CONT).

NOTE

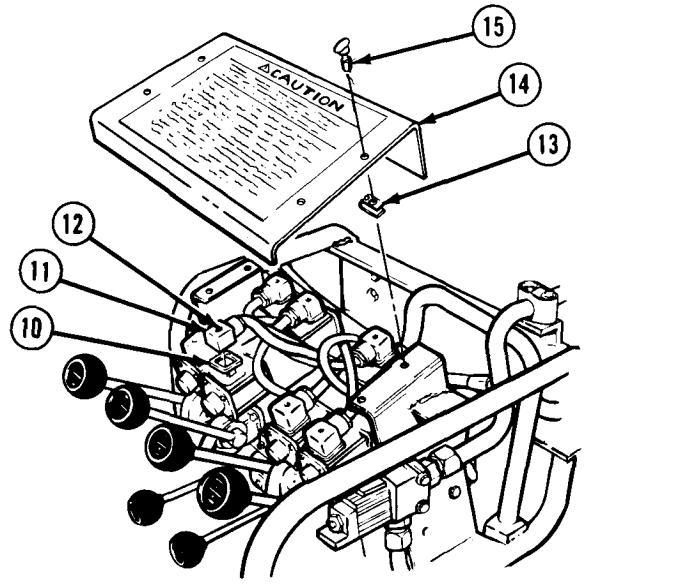
- M977 crane has 10 connectors.
- M985 crane has nine connectors.

(5) Install nine seals (10) and connectors (11).
(6) Tighten nine screws (12).
(7) Install four clips (13).
(8) Install cover (14) with four screws (15).

c. Follow-on Maintenance.

(1) Install outrigger and mast hydraulic hoses to main control valve (para 17-2).
(2) Connect main hydraulic lines (para 17-2).

END OF TASK



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17-27. EIGHT BANK VALVE BODY MOUNTING BRACKET REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-26	Eight bank valve body and mounting bracket removed.
Para 17-30	Accumulator removed.
TM 9-2320-279-20	Crane controls removed.

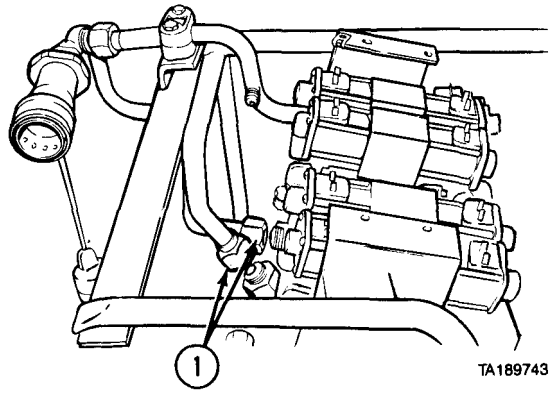
Special Environmental Conditions
None

General Safety Instructions
None

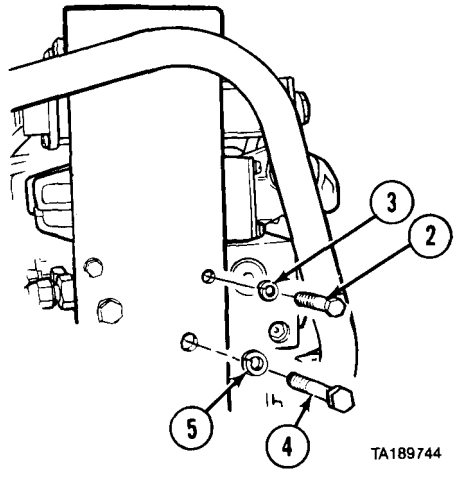
Level of Maintenance
Direct Support

a. Removal.

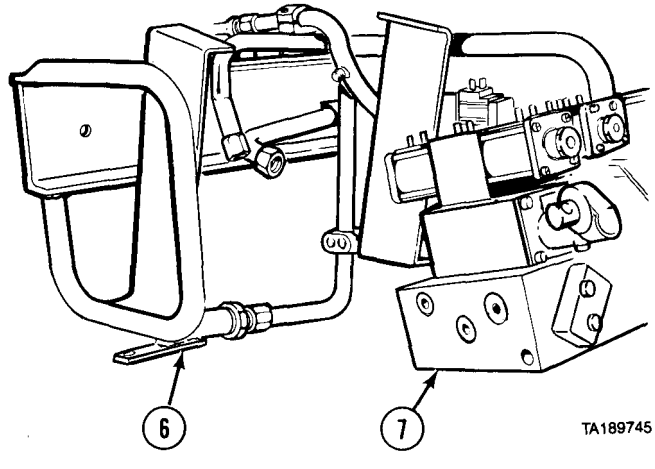
(1) Disconnect two hydraulic lines (l).



(2) Remove four screws (2) and lockwashers (3).
(3) Remove four screws (4) and lockwashers (5).



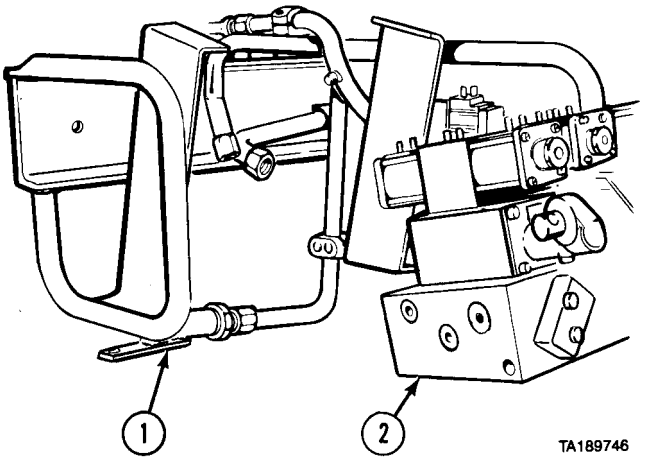
(4) Remove mounting bracket (6) from valve body (7).



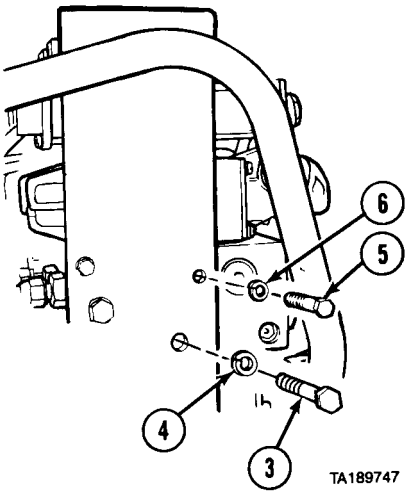
17-27. EIGHT BANK VALVE BODY MOUNTING BRACKET REMOVAL/INSTALLATION (CONT).

b. Installation.

(1) Aline and install mounting bracket (1) on valve body (2).



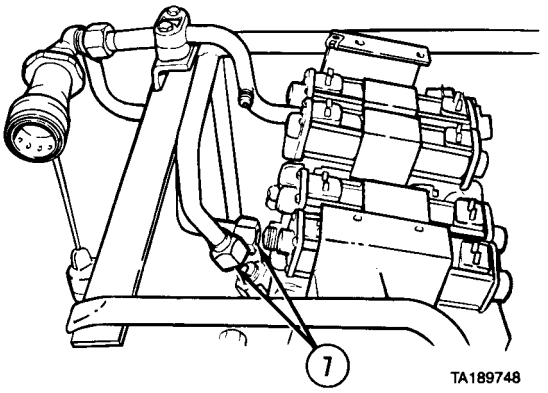
(2) Install four screws (3) and lockwashers (4).
(3) Install four screws (5) and lockwashers (6).



(4) Connect two hydraulic lines (7).

c. Follow-on Maintenance.

(1) Install eight bank valve body and mounting bracket (para 17-26).
(2) Install accumulator (para 17-30).
(3) Install crane controls (TM 9-2320-279-20).



END OF TASK

17-28. EIGHT BANK VALVE BODY REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Eight bank valve body on clean work surface.
Para 17-27	Eight bank valve body mounting bracket removed.

Special Environmental Conditions
None

General Safety Instructions
None

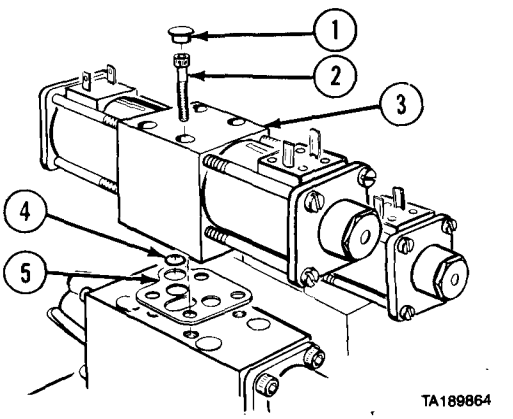
Level of Maintenance
General Support

a. Disassembly.

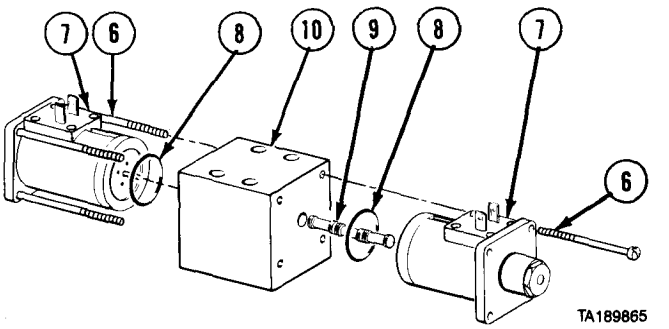
NOTE

All four pilot valves are disassembled the same way.

(1) Remove four caps (1), screws (2), and pilot valve assembly (3).
(2) Remove four preformed packings (4) and plate (5).



(3) Remove eight screws (6), two solenoids (7), and preformed packings (8).
(4) Remove spool (9) from pilot valve (10).



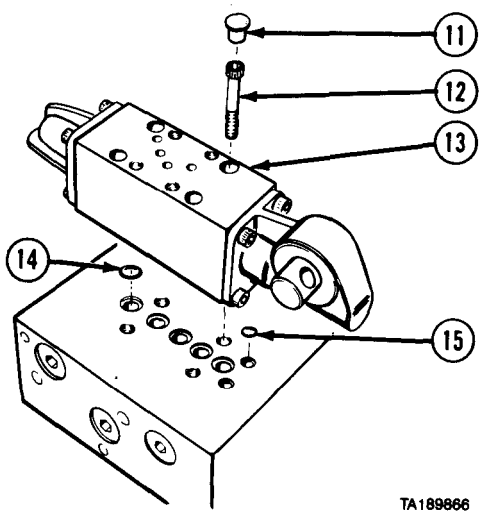
M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

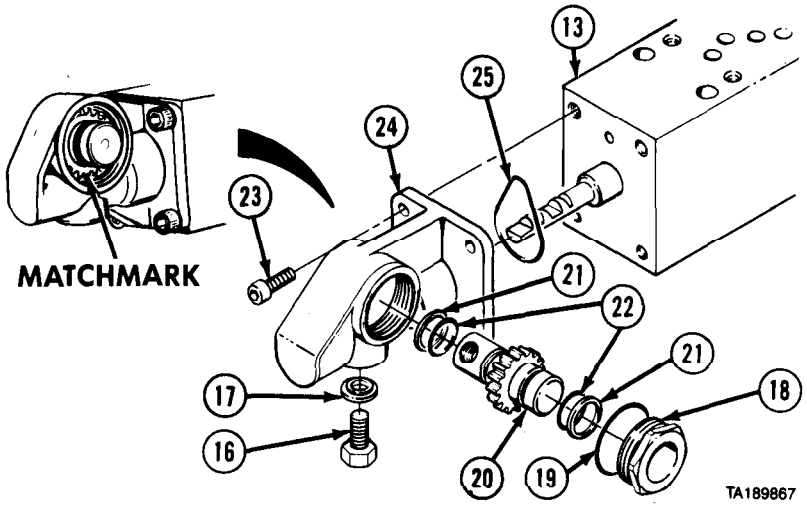
17-28. EIGHT BANK VALVE BODY REPAIR (CONT).

NOTE

All four top directional valves are disassembled the same way.

(5) Remove three caps (11), four screws (12), and directional valve (13).
(6) Remove five preformed packings (14) and two preformed packings (15).

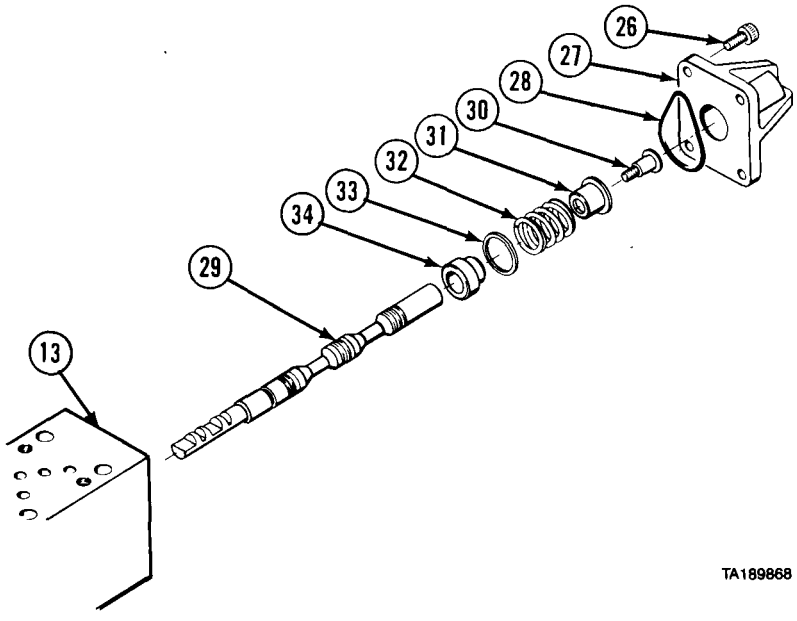




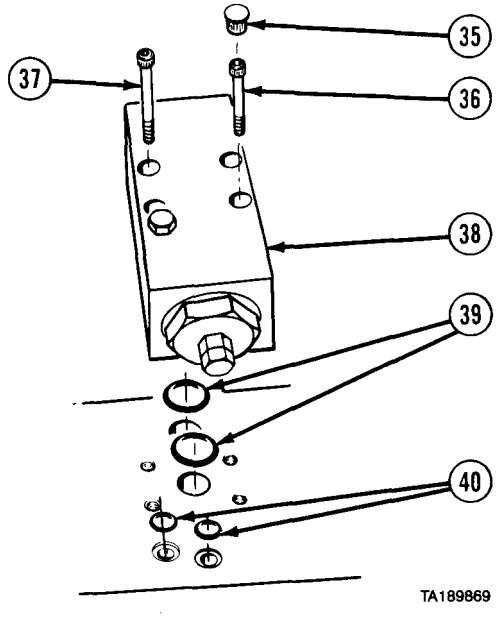
NOTE

Gear may be assembled for right or left hand use.

(7) Remove screw (16) and seal washer (17).
(8) Remove fitting (18) and preformed packing (19).
(9) Matchmark position of gear (20) and remove.
(10) Remove two backup rings (21) and two preformed packings (22) from gear (20).
(11) Remove four screws (23), cap (24), and preformed packing (25) from directional valve (13).

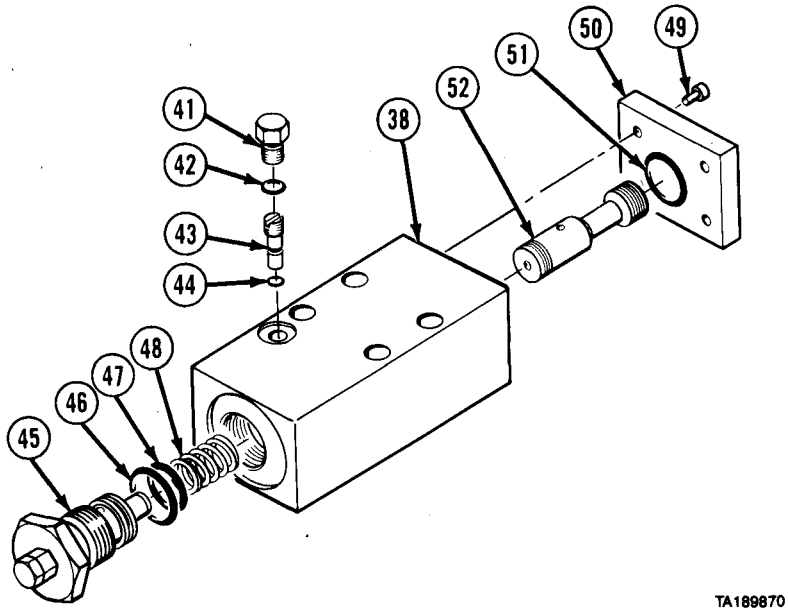


(12) Remove four screws (26), cap (27), and preformed packing (28).
(13) Remove spool (29) from directional valve (13).
(14) Remove screw (30), spring seat (31), spring (32), backup ring (33), and spring seat (34) from Spool (29).

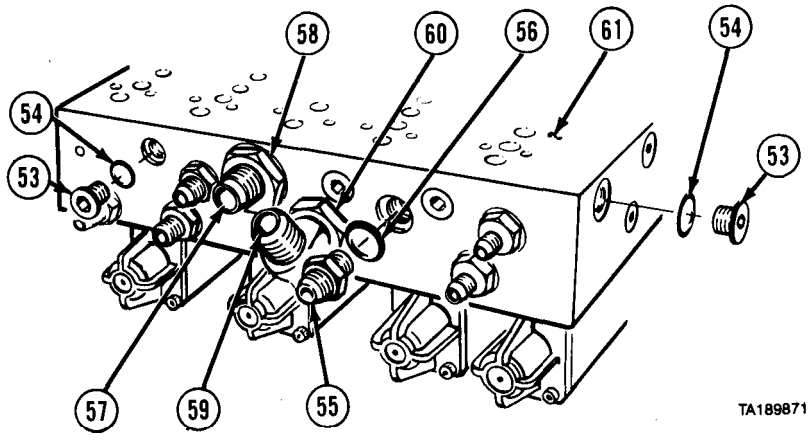


(15) Remove four caps (35), two screws (36), two screws (37), valve body (38), two preformed packings (39), and two preformed packings (40).

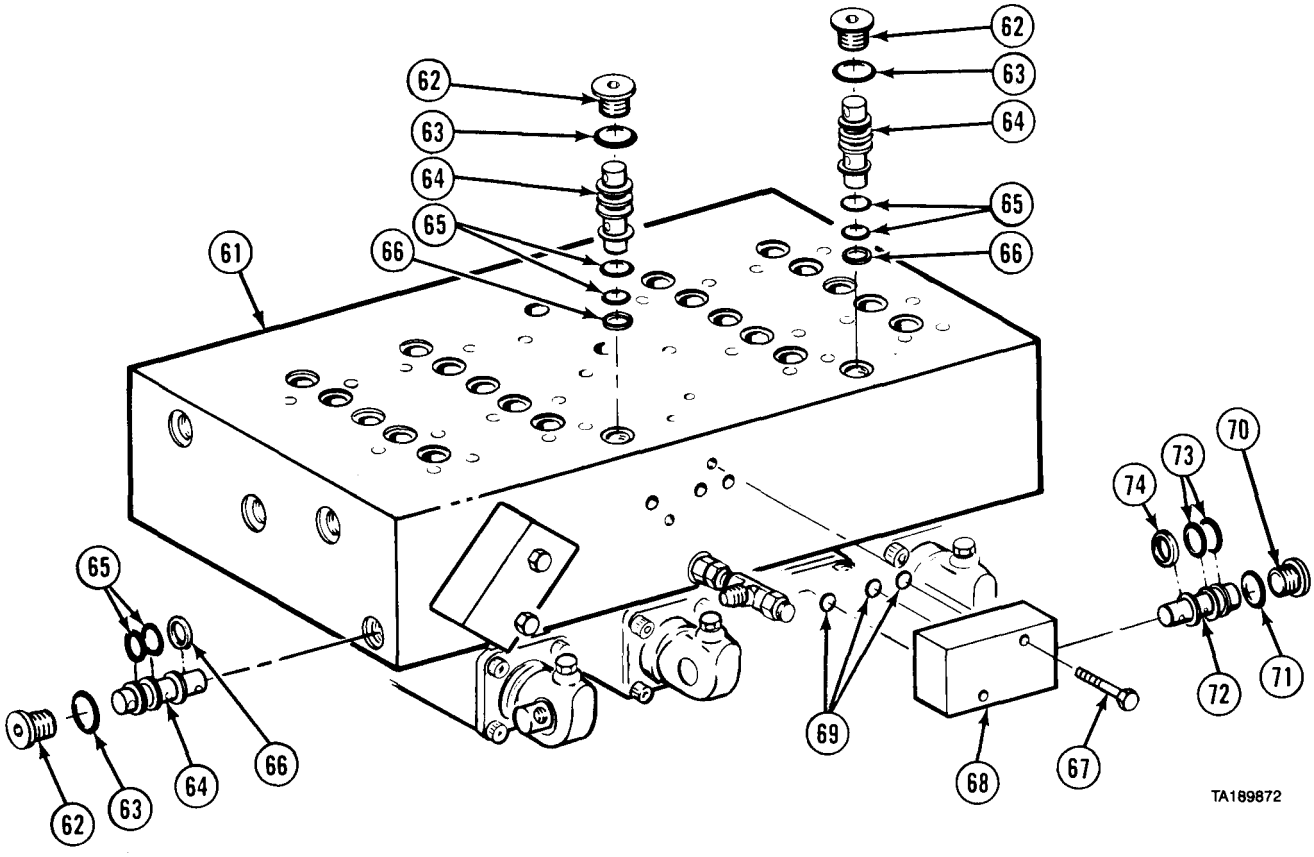
17-28. EIGHT BANK VALVE BODY REPAIR (CONT).



(16) Remove plug (41), preformed packing (42), orifice (43), and preformed packing (44).
(17) Remove valve (45), preformed packing (46), preformed packing (47), and spring (48).
(18) Remove four screws (49), end cap (50), preformed packing (51), and spool (52) from valve body (38).



(19) Remove nine plugs (53) and preformed packings (54).
(20) Remove eight fittings (55) and preformed packings (56).
(21) Remove fitting (57) and preformed packing (58).
(22) Remove elbow (59) and preformed packing (60) from valve body (61).



NOTE

- A standard 4-40 x 2 screw can be threaded into the end of the shuttle valves to aid in disassembly.
- All three valve body shuttle valves are disassembled the same way.

(23) Remove plug (62), preformed packing (63), and shuttle valve (64).

NOTE

Preformed packings and backup ring may stay in valve body.

(24) Remove two preformed packings (65) and backup ring (66).

NOTE

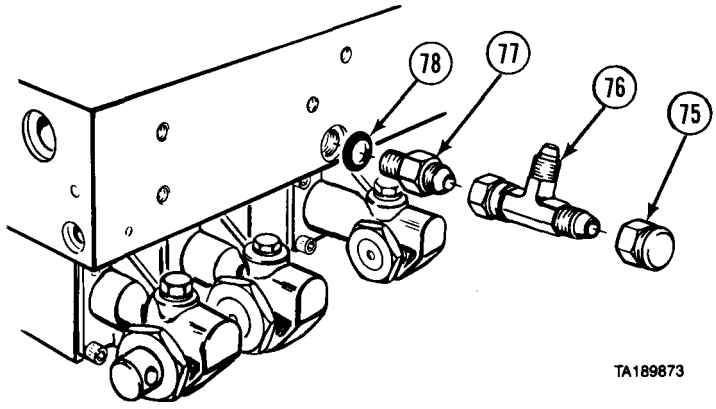
Both shuttle block valves are removed the same way.

(25) Remove two screws (67), shuttle block (68), and three preformed packings (69) from valve body (61).

(26) Remove plug (70), preformed packing (71), shuttle valve (72), two preformed packings (73), and backup ring (74).

17-28. EIGHT BANK VALVE BODY REPAIR (CONT).

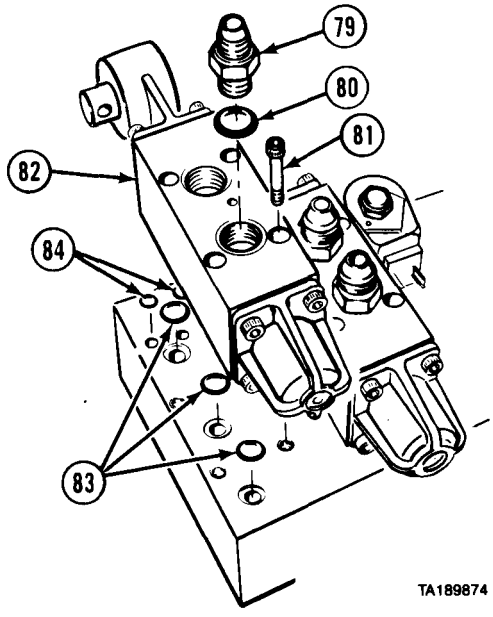
(27) Remove cap (75), tee (76), fitting (77), and preformed packing (78).



NOTE

All bottom directional valves are removed the same way.

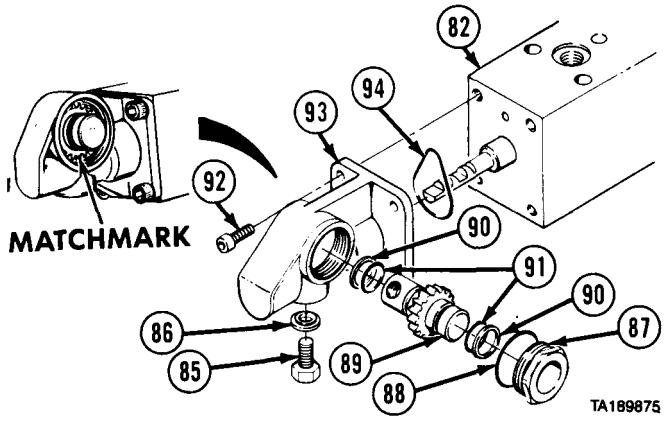
(28) Remove two fittings (79) and preformed packings (80).
(29) Remove four screws (81), directional valve (82), three preformed packings (83), and two preformed packings (84).

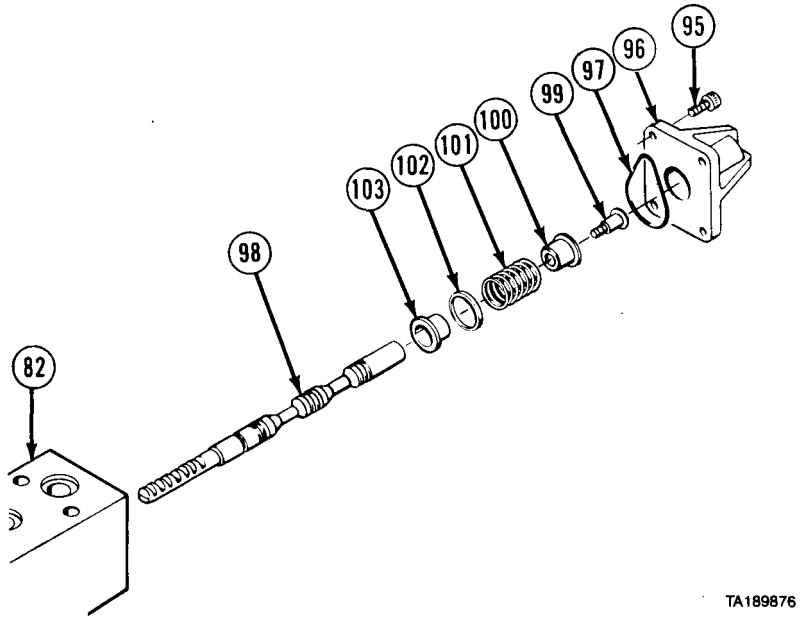


NOTE

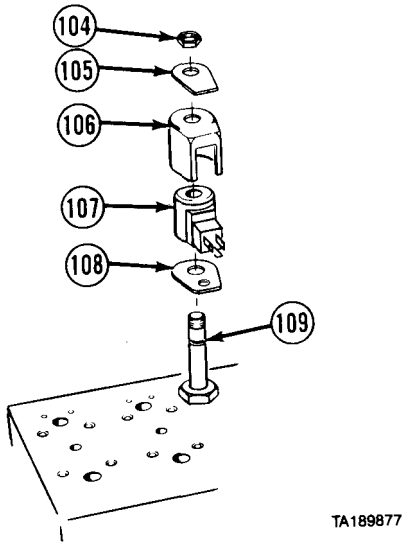
Gear may be assembled for right or left hand use.

(30) Remove screw (85) and seal washer (86).
(31) Remove fitting (87) and preformed packing (88).
(32) Matchmark position of gear (89) and remove.
(33) Remove two backup rings (90) and preformed packings (91) from gear (89).
(34) Remove four screws (92), cap (93), and preformed packing (94) from directional valve (82).





(35) Remove four screws (95), cap (96), and preformed packing (97).
(36) Remove spool (98) from directional valve (82).
(37) Remove screw (99), spring seat (100), spring (101), backup ring (102), and spring seat (103) from SPOOl (98).



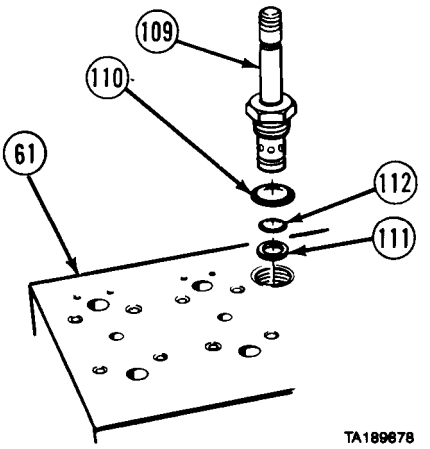
NOTE

All three solenoids are disassembled the same way.

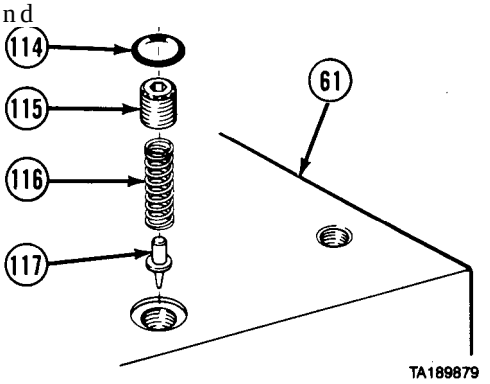
(38) Remove nut (104), plate (105), cover (106), solenoid (107), and end cap (108) from valve (109).

17-28. EIGHT BANK VALVE BODY REPAIR (CONT).

(39) Remove valve (109), preformed packing (110), backup ring (111), and preformed packing (112) from valve body (61).



(40) Remove plug (113) and preformed packing (114).
(41) Remove adjustment screw (115), spring (116), and relief valve (117) from valve body (61).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

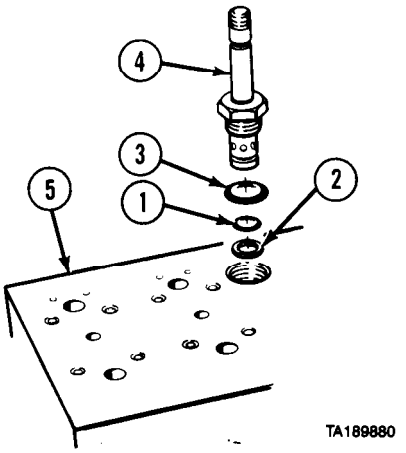
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

c. Assembly.

NOTE

All three solenoids are assembled the same way.

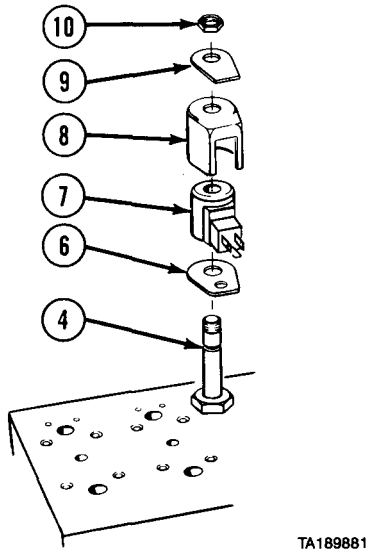
(1) Install preformed packing (1), backup ring (2), preformed packing (3), and valve (4) in valve body (5).

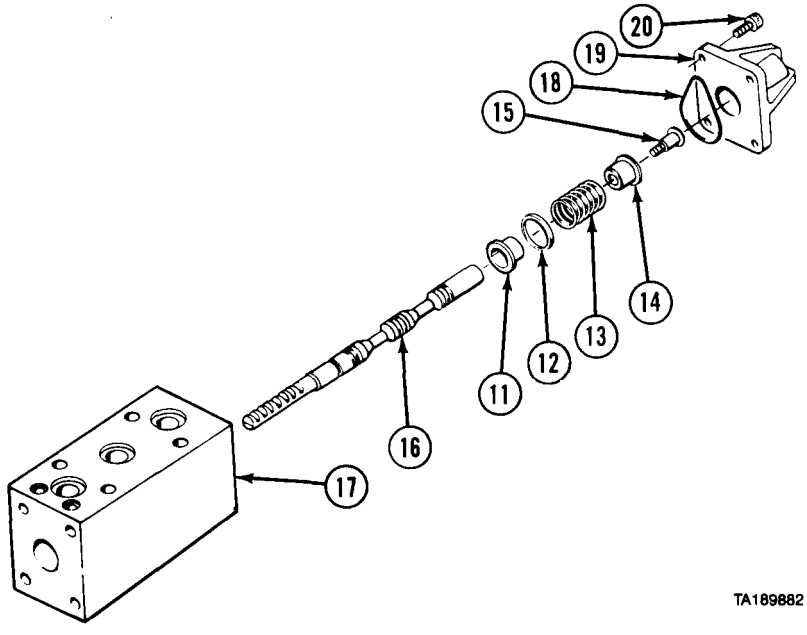


NOTE

Beveled end of end cap faces down.

(2) Install end cap (6), solenoid (7), cover (8), plate (9), and nut (10) on valve (4).





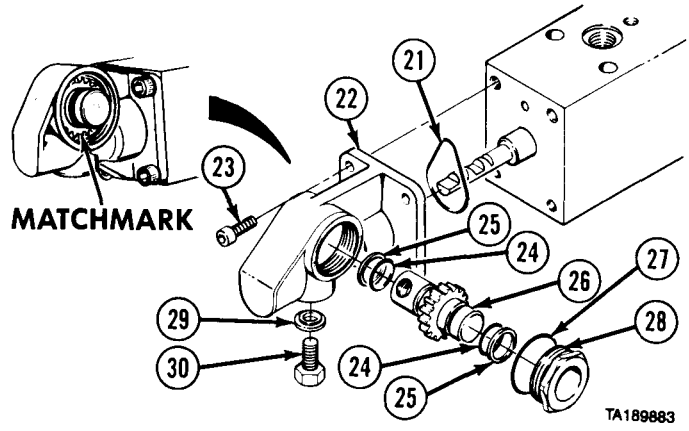
(3) Install spring seat (11), backup ring (12), spring (13), spring seat (14), and screw (15) to spool (16).
(4) Install spool (16) in directional valve (17).
(5) Install preformed packing (18) and cap (19) with four screws (20).

17-28. EIGHT BANK VALVE BODY REPAIR (CONT).

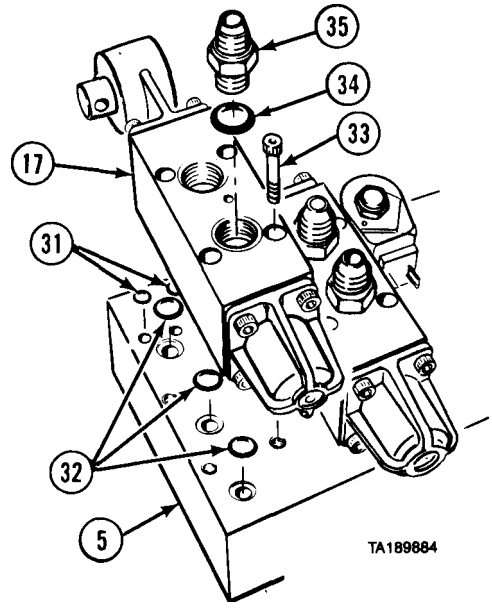
NOTE

Gear may be assembled for right or left hand use.

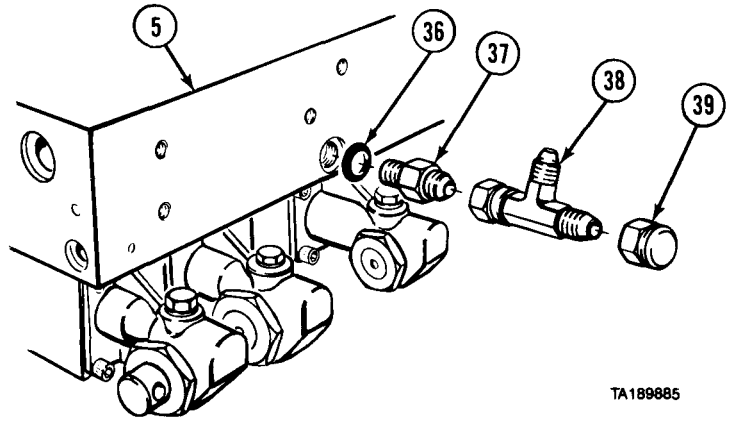
(6) Install preformed packing (21) and cap (22) with four screws (23).
(7) Install two preformed packings (24) and backup rings (25) on gear (26). Aline gear in cap (22).
(8) Install preformed packing (27) and fitting (28).
(9) Install seal washer (29) and screw (30) in cap (22).

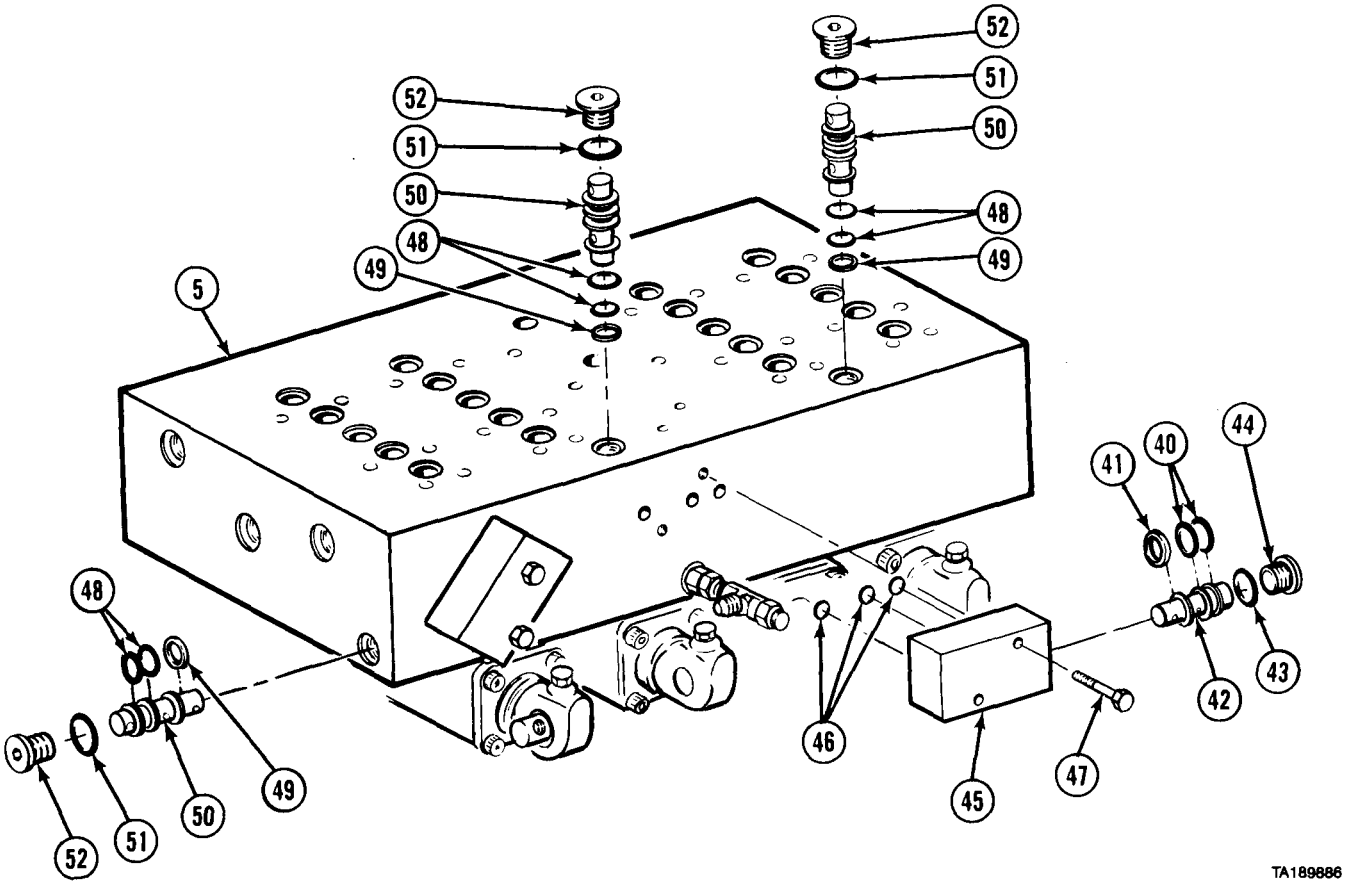


(10) Install two preformed packings (31) and three preformed packings (32).
(11) Install directional valve (17) with four screws (33) in valve body (5).
(12) Install two preformed packings (34) and fittings (35).



(13) Install preformed packing (36), fitting (37), tee (38), and cap (39) in valve body (5).





NOTE

Both shuttle block valves are assembled the same way.

(14) Install two preformed packings (40), backup ring (41), shuttle valve (42), preformed packing (43), and plug (44) in shuttle block (45).

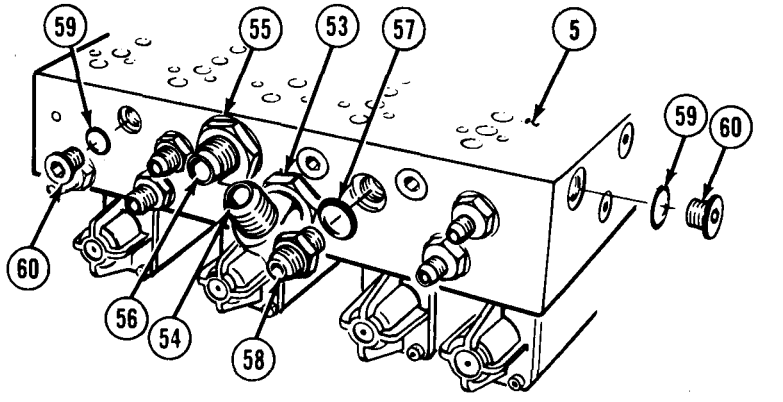
(15) Install three preformed packings (46) and shuttle block (45) with two screws (47).

NOTE

All three valve body shuttle valves are assembled the same way.

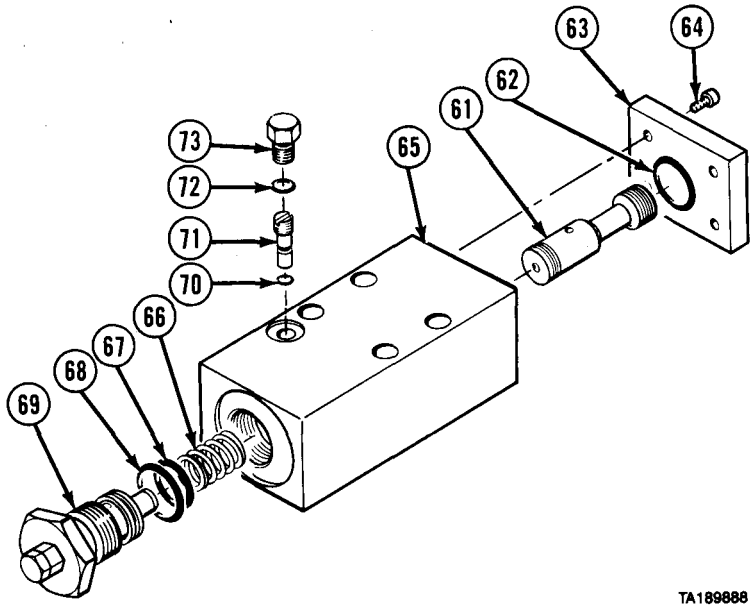
(16) Install two preformed packings (48), backup ring (49), shuttle valve (50), preformed packing (51), and plug (52) in valve body (5).

17-28. EIGHT BANK VALVE BODY REPAIR (CONT).



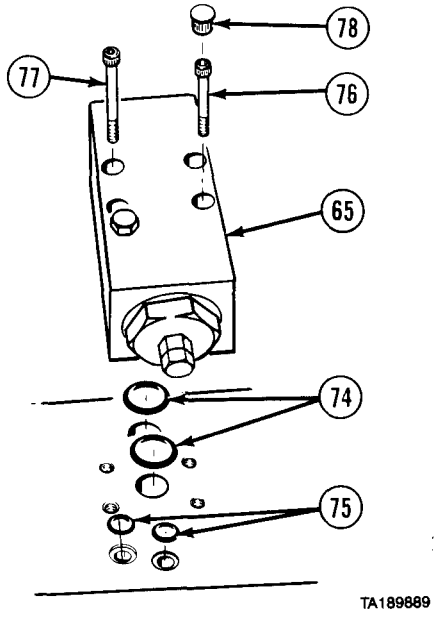
TA189887

(17) Install preformed packing (53) and elbow (54).
(18) Install preformed packing (55) and fitting (56).
(19) Install eight preformed packings (57) and fittings (58).
(20) Install nine preformed packings (59) and plugs (60) in valve body (5).

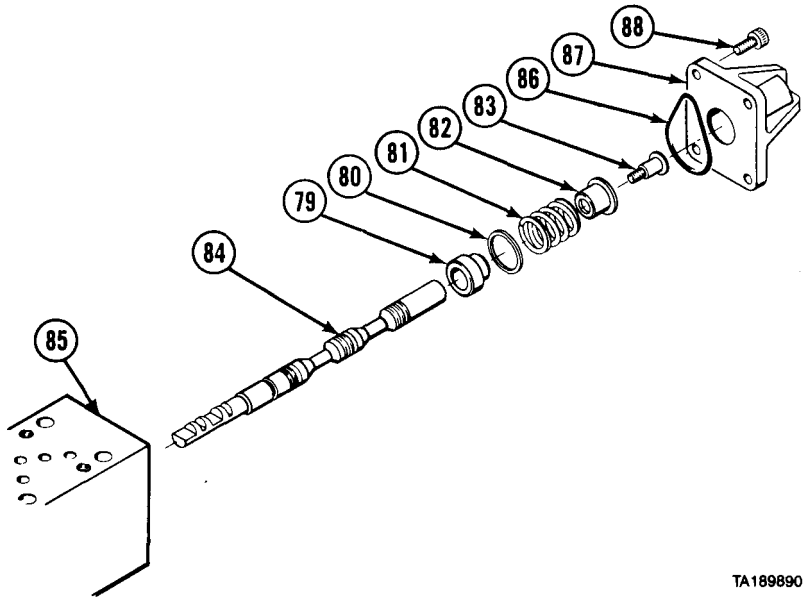


TA189888

(21) Install spool (61), preformed packing (62), end cap (63), and four screws (64) in valve body (65).
(22) Install spring (66), preformed packing (67), preformed packing (68), and valve (69).
(23) Install preformed packing (70), orifice (71), preformed packing (72), and plug (73).



(24) Install two preformed packings (74) and two preformed packings (75) in valve body (65).
(25) Install valve body (65), two screws (76), two screws (77), and four caps (78).



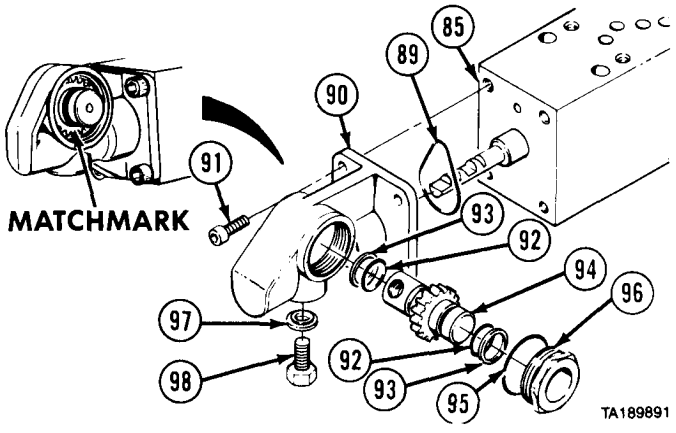
(26) Install spring seat (79), backup ring (80), spring (81), spring seat (82), and screw (83) on spool (84).
(27) Install spool (84) in directional valve (85).
(28) Install preformed packing (86) and cap (87) with four screws (88).

17-28. EIGHT BANK VALVE BODY REPAIR (CONT).

NOTE

Gear may be assembled for right or left hand use.

(29) Install preformed packing (89), cap (90), and four screws (91) on directional valve (85).
(30) Install two preformed packings (92) and two backup rings (93) on gear (94).
(31) Aline and install gear (94) in cap (90).
(32) Install preformed packing (95) and fitting (96).
(33) Install seal washer (97) and screw (98).

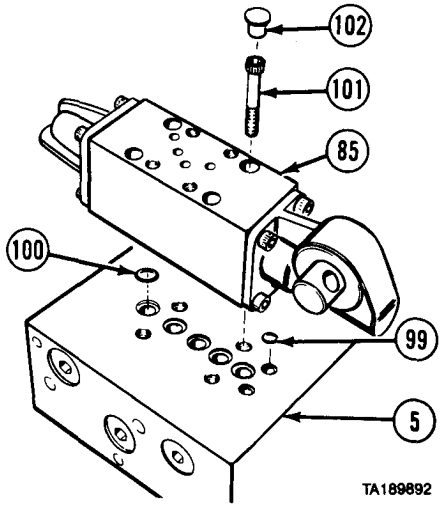


(34) Install two preformed packings (99) and five preformed packings (100) in valve body (5).

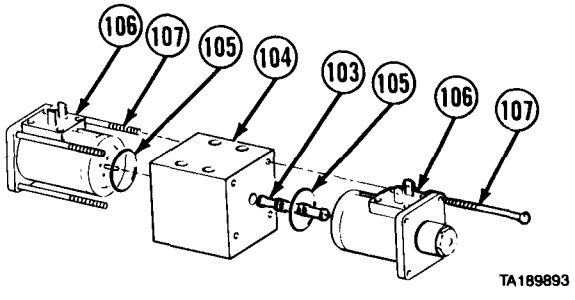
NOTE

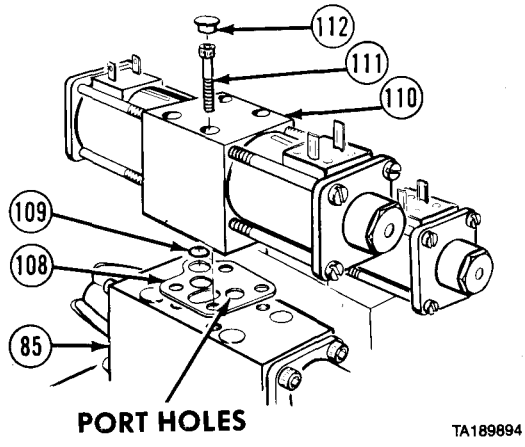
All four top directional valves are assembled the same way.

(35) Install directional valve (85) on valve body (5) with four screws (101) and three caps (102).



(36) Install spool (103) in pilot valve (104).
(37) Install two preformed packings (105) and solenoids (106) with eight screws (107) on pilot valve (104).



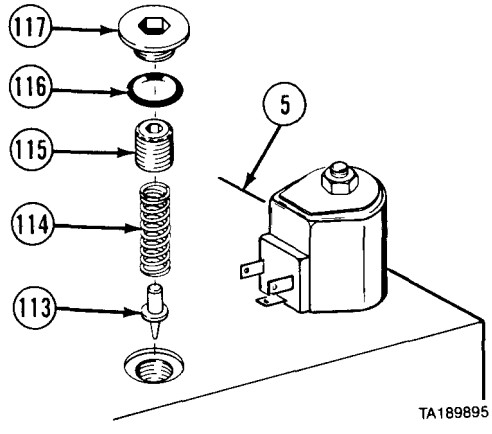


(38) Install plate (108) and four preformed packings (109) on directional valve (85).

NOTE

- All four pilot valves are assembled the same way.
- Be sure to aline port holes in pilot valve assembly with port holes in directional valve.

(39) Install pilot valve assembly (110) with four screws (111) and caps (112)



(40) Install relief valve (113), spring (114), and adjustment screw (115) in valve body (5).
(41) Install preformed packing (116) and plug (117).

d. Follow-on Maintenance.

(1) Install eight bank valve body (para 17-27).
(2) Adjust hoist relief valve (para 17-25).

END OF TASK

17-28.1. RIGHT HAND CONTROL VALVES MOUNTING BRACKET REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-28.3	Right hand rear control valve removed.
Para 17-28.4	Right hand front control valve removed.
Para 17-32.1	Liftdown and shutdown solenoids removed.
Para 17-30	Accumulator removed.
Para 6-11.1	Junction box removed.

Special Environmental Conditions
None

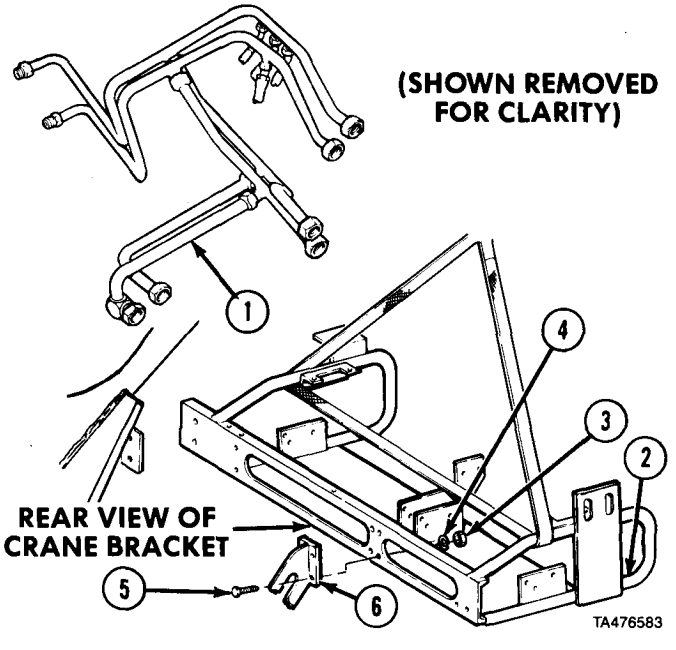
General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.
(1) Remove two hydraulic lines (1).
(2) Attach a suitable lifting device to bracket (2).
(3) Remove six nuts (3), lockwashers (4), screws (5), and bracket (2) from crane bracket (6).

b. Installation.
(1) Aline and install bracket (2) on crane bracket (6).
(2) Install six screws (5), lockwashers (4), and nut (3).
(3) Install two hydraulic lines (1).

c. Follow-on Maintenance.
(1) Install right hand rear control valve (para 17-28.3).
(2) Install right hand front control valve (para 17-28.4).
(3) Install liftdown and shutdown solenoids (para 17-32.1).
(4) Install accumulator (para 17-30).
(5) Install junction box (para 6-11.1).



END OF TASK

17-28.2. LEFT HAND CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

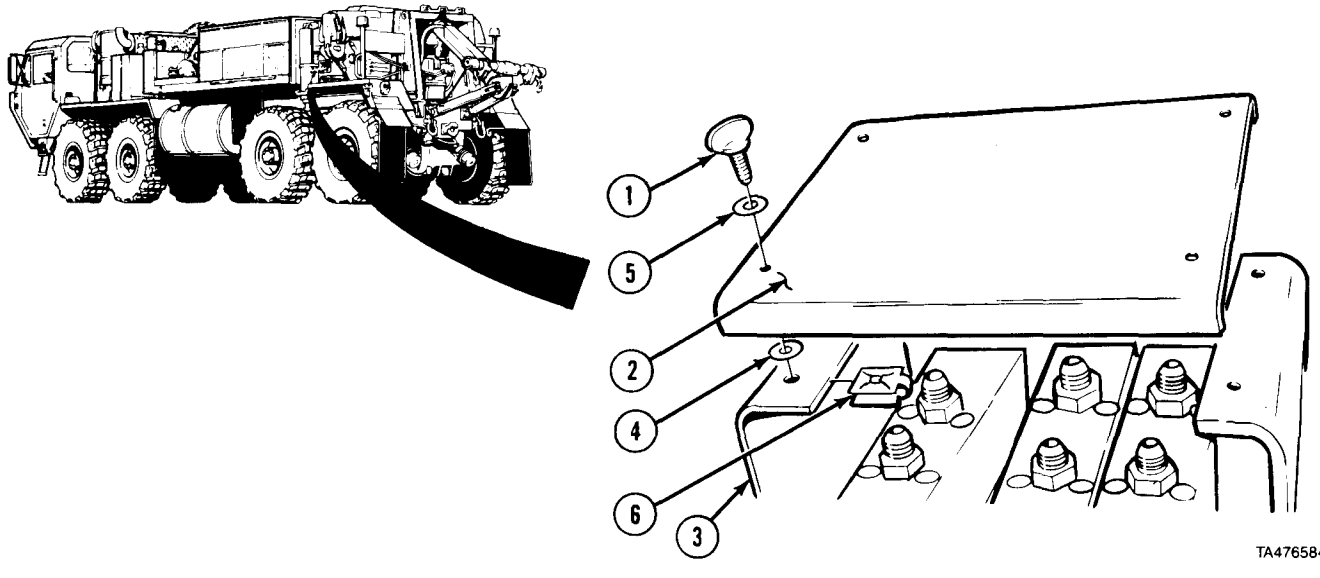
TM or Para	*Condition Description*
TM 9-2320-279-20	Crane control handles removed.
Para 17-2	Hydraulic hoses and tubes removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

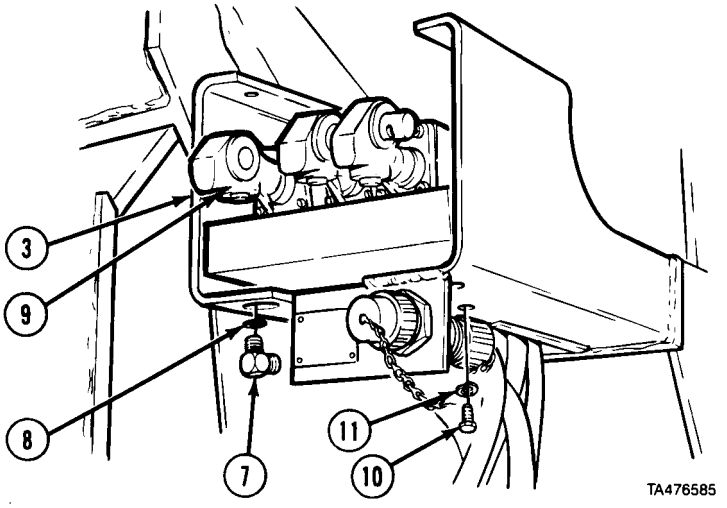
a. Removal.



(1) Loosen four screws (1) and remove cover *(2)* from mounting bracket (3).
(2) Remove four washers (4), screws (1), and washers (5) from cover (2).
(3) Remove four clips (6) from bracket (3).

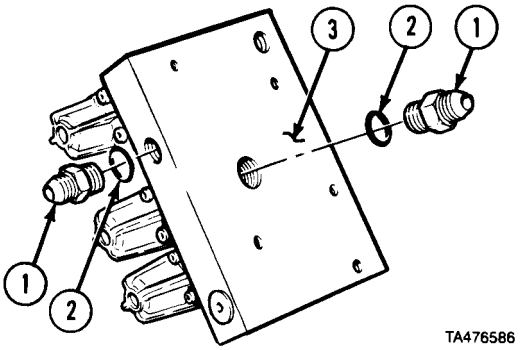
17-28.2. LEFT HAND CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1)

(4) Remove elbow (7) and preformed packing (8) from valve (9).
(5) Remove three screws (10), lockwashers (11), and valve (9) from bracket (3).



b. Disassembly.

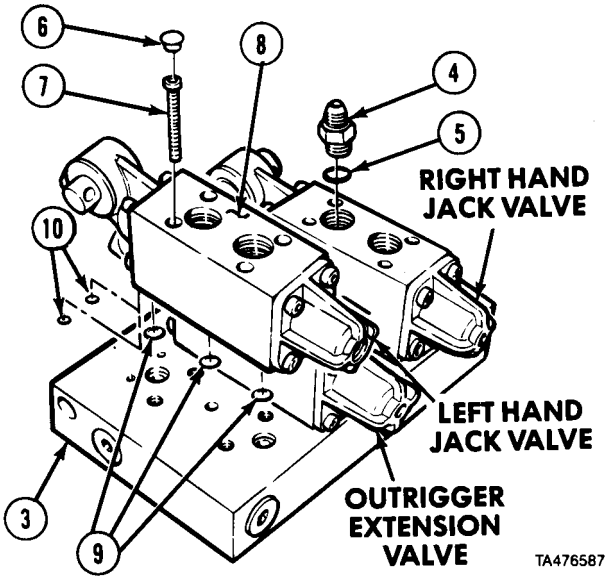
(1) Remove two fittings (1) and preformed packings (2) from valve body (3).



NOTE

All directional valves are removed and repaired the same. Matchmark valve to body.

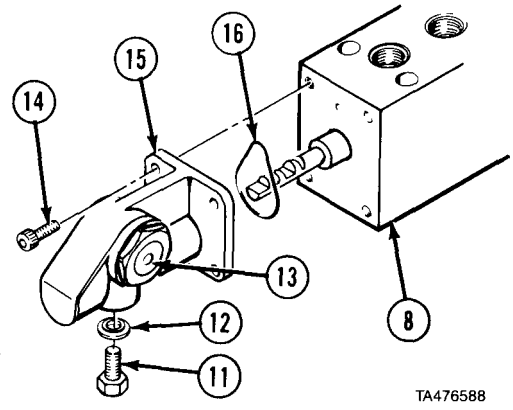
(2) Remove two fittings (4) and preformed packings (5).
(3) Remove four caps (6), screws (7), and directional valve (8) from valve body (3).
(4) Remove three preformed packings (9) and two preformed packings (10).



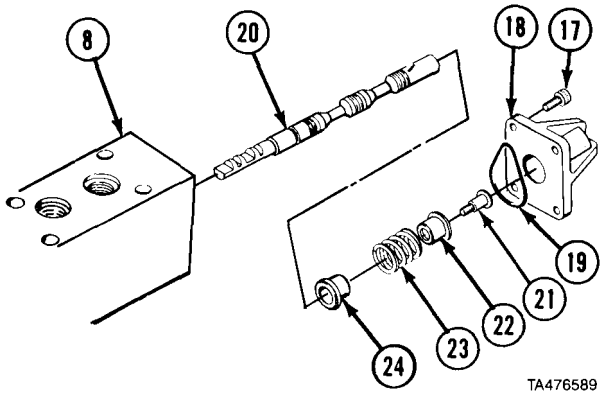
NOTE

Gear may be installed for right or left hand use.

(5) Remove screw (11) and seal washer (12).
(6) Matchmark position of gear (13).
(7) Remove four screws (14), cap (15), and preformed packing (16) from directional valve (8).



(8) Remove four screws (17), cap (18), and preformed packing (19).
(9) Remove spool (20) from directional valve (8).
(10) Remove screw (21), seat (22), spring (23), and seat (24) from spool (20).



(11) Remove two plugs (25) and preformed packings (26).
(12) Remove plug (27) and preformed packing (28).
(13) Remove two plugs (29) and preformed packings (30).

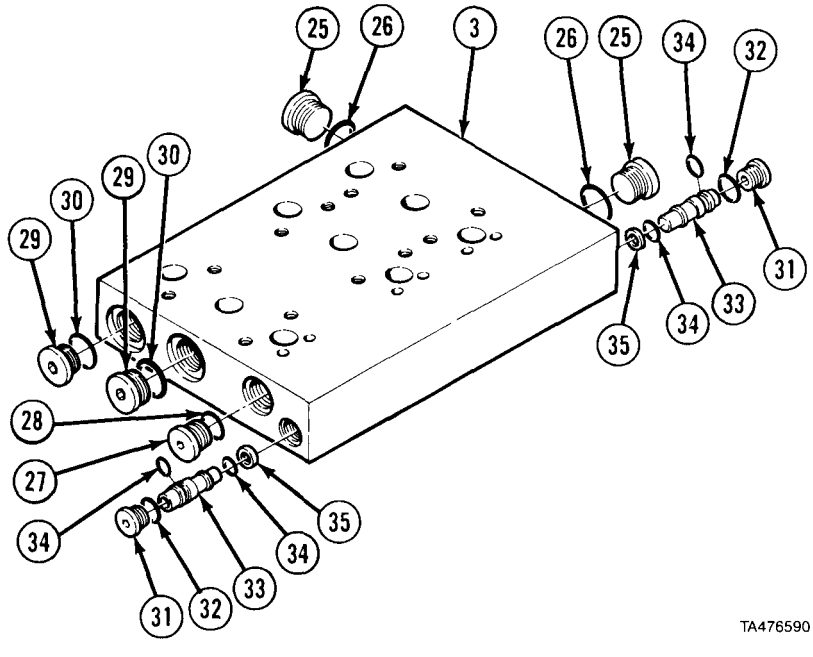
NOTE

A standard 4-40 x 2 screw will aid in removal of shuttle valves. Valves may separate on removal. Replace valves if separated.

(14) Remove two plugs (31), preformed packings (32), and shuttle valves (33) from valve body (3).

NOTE

Preformed packings and backup ring may stay in body.



(15) Remove two preformed packings (34) and backup ring (35) from shuttle valves (33).

17-28.2. LEFT HAND CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1)

c. Cleaning/Inspection.

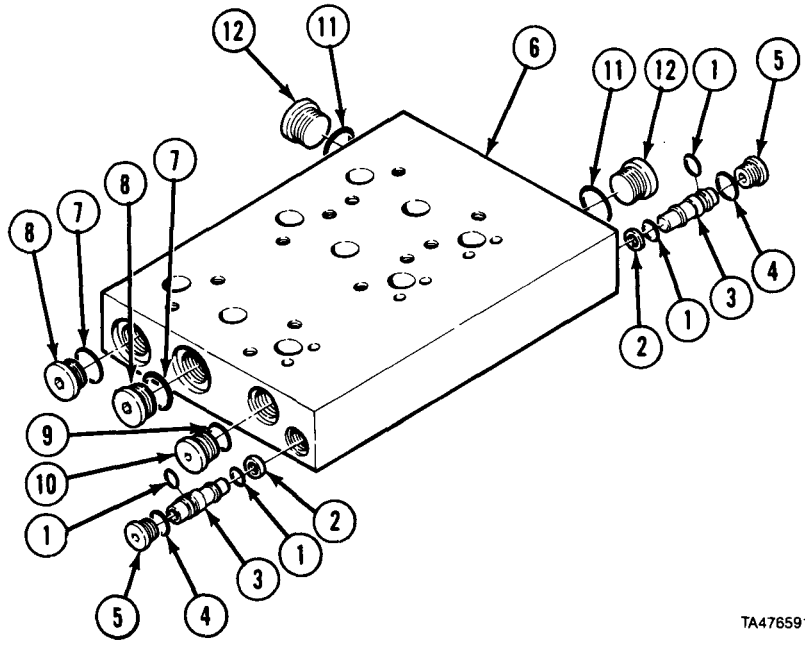
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect all parts for damage.
(3) Replace damaged parts.
(4) Replace centering spring if under 0.940 in. (23.0 mm).

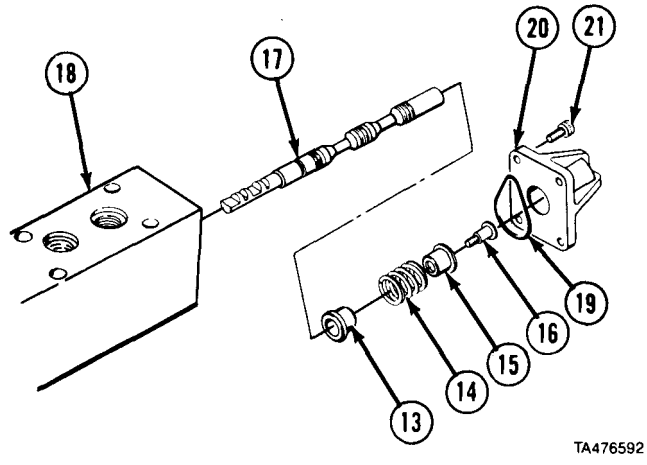
d. Assembly.

(1) Install two preformed packings (1) and backup ring (2) on shuttle valve (3).
(2) Install shuttle valve (3), preformed packings (4), and two plugs (5) in valve body (6).
(3) Install two preformed packings (7) and plugs (8).
(4) Install preformed packing (9), plug (10), two preformed packings (11), and plugs (12).



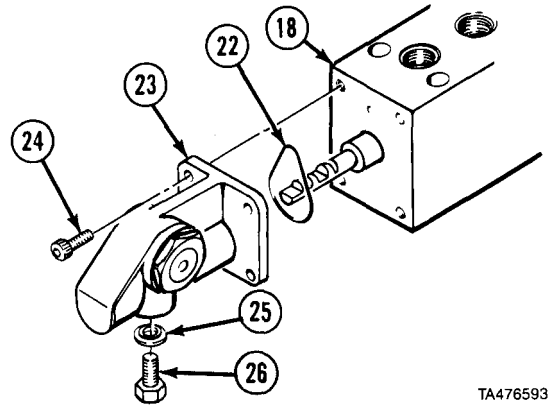
TA476591

(5) Install seat (13), spring (14), seat (15), and screw (16) on spool (17).
(6) Install spool (17) in valve (18).
(7) Install preformed packing (19), cap (20) with four screws (21).



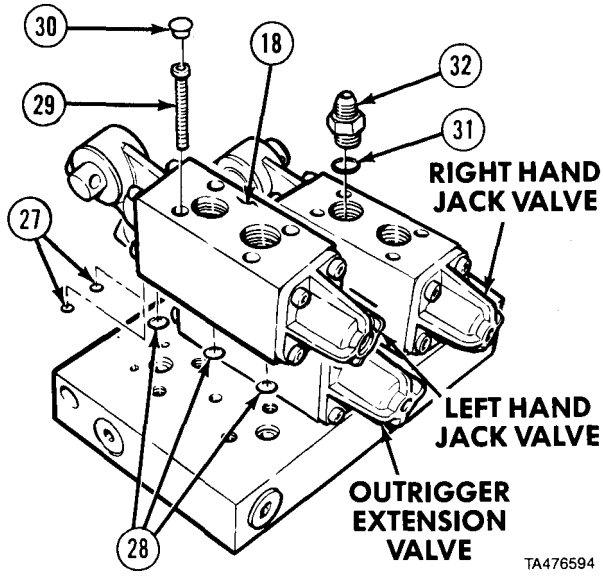
TA476592

(8) Aline and install preformed packing (22), cap (23) with four screws (24) on valve (18).
(9) Install seal washer (25) and screw (26).



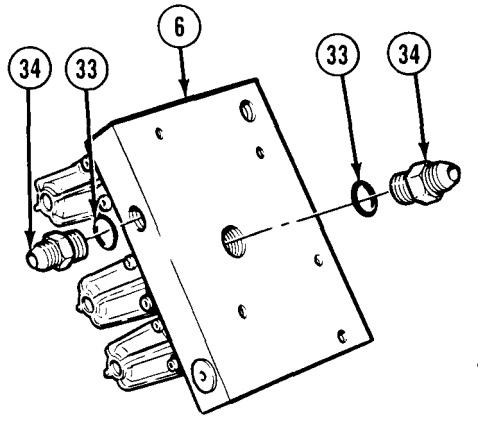
TA476593

(10) Install two preformed packings (27) and three preformed packings (28) in directional valve (18).
(11) Install valve (18) with four screws (29) and caps (30).
(12) Install six preformed packings (31) and fittings (32).



TA476594

(13) Install two preformed packings (33) and fittings (34) in valve body (6).

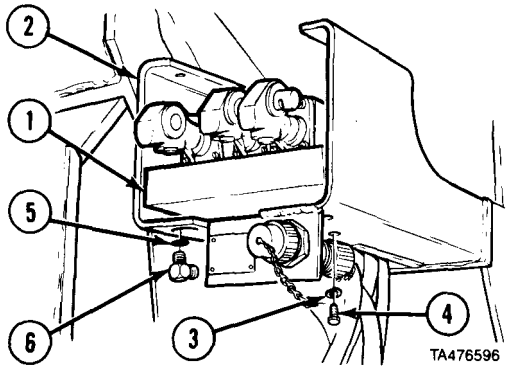


TA476595

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

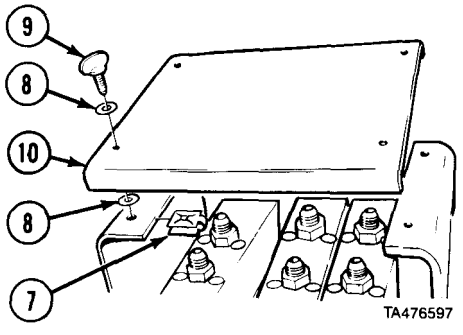
17-28.2. LEFT HAND CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1)

e. Installation.
(1) Install valve body (1) in bracket (2) with three lockwashers (3) and screws (4).
(2) Install preformed packing (5) and elbow (6).



(3) Install four clips (7).
(4) Install eight washers (8) with four screws (9) in cover (10).
(5) Install cover (10).

f. Follow-on Maintenance.
(1) Install hydraulic lines (para 17-2).
(2) Install control handles (TM 9-2320-279-20).
(3) Check crane operation (TM 9-2320-279-10).



END OF TASK

17-28.3. RIGHT HAND REAR CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	Crane control handles removed.

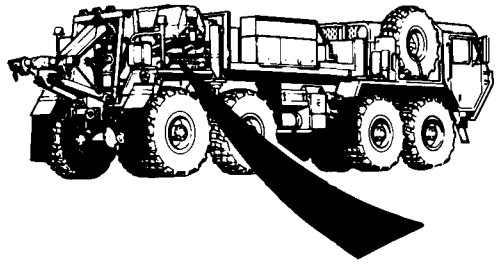
Special Environmental Conditions
None

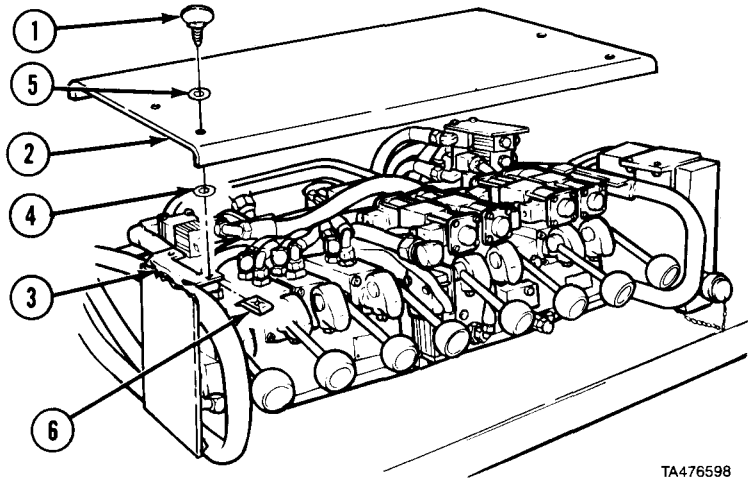
General Safety Instructions
None

Level of Maintenance
Direct Support

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

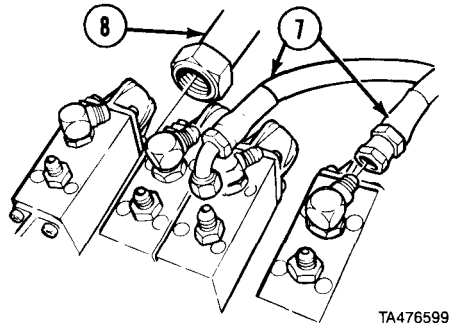
a. Removal.



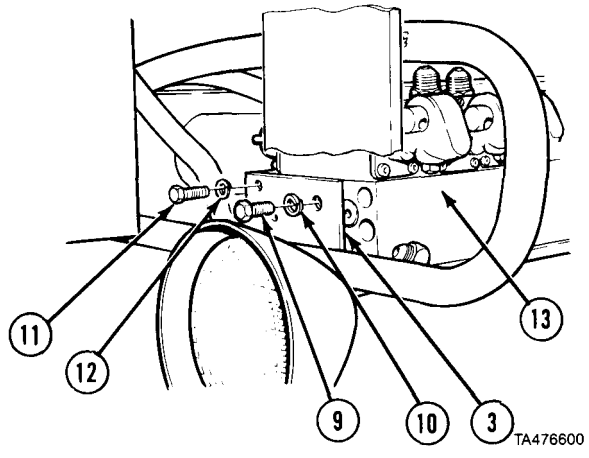


(1) Loosen four screws (1) and cover (2) from bracket (3).
(2) Remove four washers (4), screws (1), and washer (5) from cover (2).
(3) Remove four clips (6) from bracket (3).

(4) Disconnect eleven hydraulic hoses (7).
(5) Disconnect two hydraulic lines (8).



(6) Remove two screws (9), lockwashers (10), screw (11), and lockwasher (12) from each side of bracket (3).
(7) Remove valve body (13) from bracket (3).



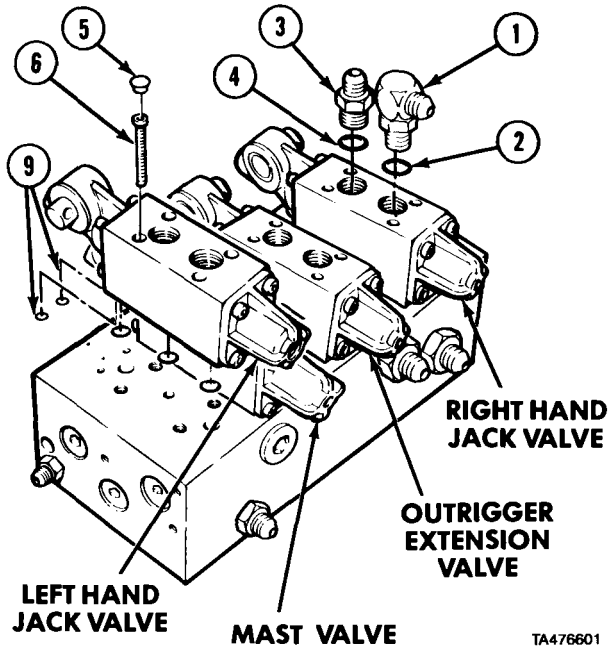
17-28.3. RIGHT HAND REAR CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

b. Disassembly.

NOTE

All four top directional valves are removed and repaired the same way. Matchmark valve to control body.

(1) Remove elbow (1), preformed packing (2), fitting (3), and preformed packing (4).
(2) Remove four caps (5), four screws (6), and directional valve (7).
(3) Remove three preformed packings (8) and two preformed packings (9).

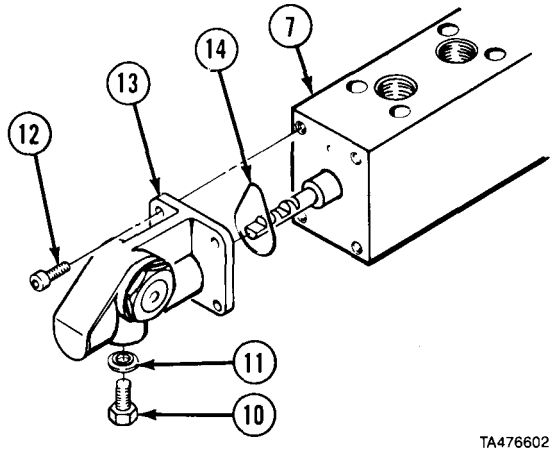


(4) Remove screw (10) and seal washer (11).

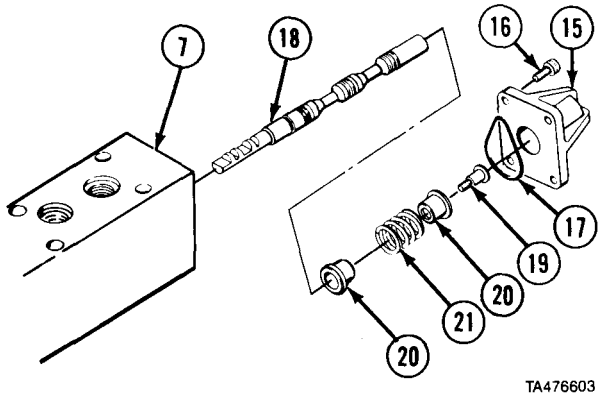
NOTE

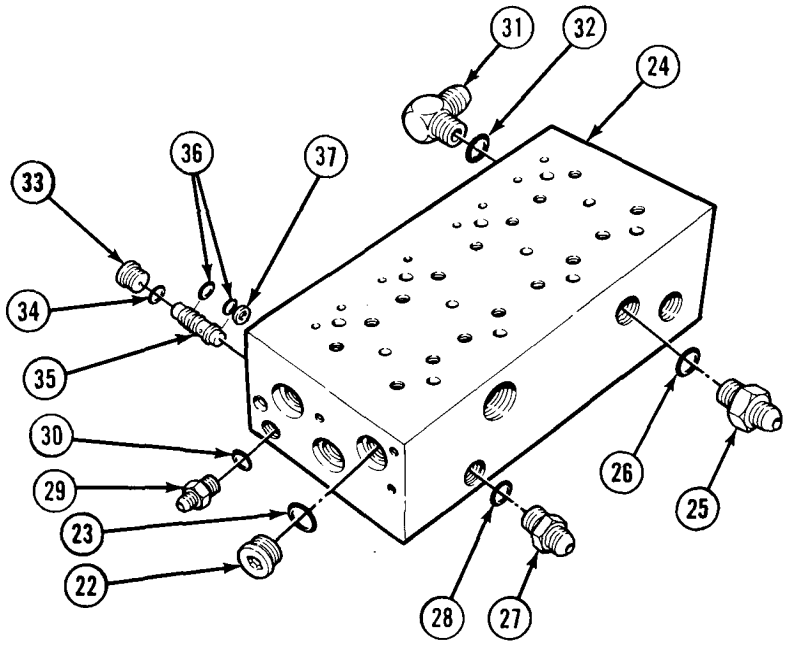
A 1/4 in. (6.3 mm) allen wrench will have to be cut down approximately 1/2 in. (12.7 mm).

(5) Remove four screws (12), cap (13), and preformed packing (14) from directional valve (7).



(6) Remove four screws (15), cap (16), and preformed packing (17).
(7) Remove spool (18) from valve (7).
(8) Remove screw (19), spring seat (20), spring (21), and spring seat (20) from spool (18).





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(9) Remove seven plugs (22) and preformed packings (23) from valve body (24).
(10) Remove two fittings (25), preformed packings (26), fitting (27), and preformed packing (28).
(11) Remove fitting (29), preformed packing (30), elbow (31), and preformed packing (32).

NOTE

- A standard 4-40x2 screw will thread into the end of the shuttle valves to aid in removal.
- Valves may separate. Replace valve if separated.
- Preformed packings and backup ring may stay in body.

(12) Remove plug (33), preformed packing (34), shuttle valve (35), two preformed packings (36), and backup ring (37).
(13) Repeat step (13) for other three shuttle valves.

c. Cleaning/Inspection.

WARNING

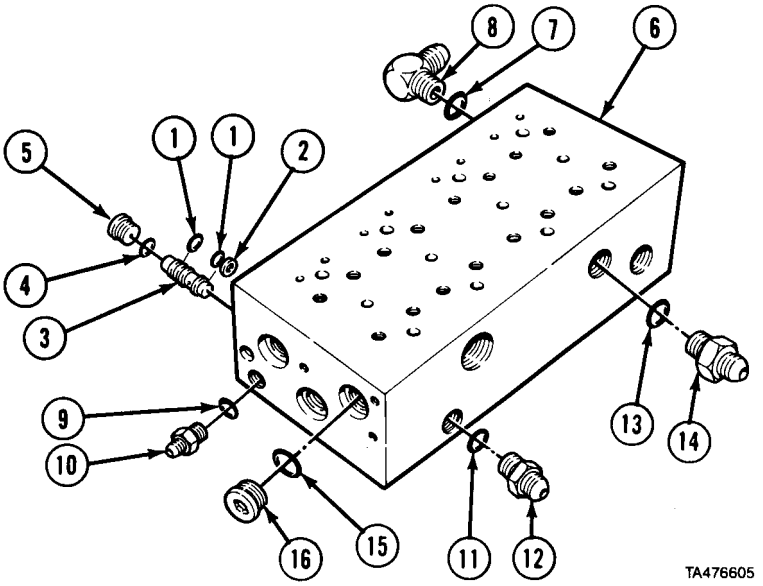
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Replace centering spring if under 0.940 in. (23.0 mm).

17-28.3. RIGHT HAND REAR CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

d. Assembly.

(1) Install two preformed packings (1) and backup ring (2) on shuttle valve (3).
(2) Install shuttle valve (3), preformed packing (4), and plug (5) in valve body (6).
(3) Repeat steps *(1)* and *(2)* for other three shuttle valves.
(4) Install preformed packing (7), elbow (8), preformed packing (9), and fitting (10).
(5) Install preformed packing (11), fitting (12), two preformed packings (13), and fittings (14).
(6) Install seven preformed packings (15) and plugs (16).

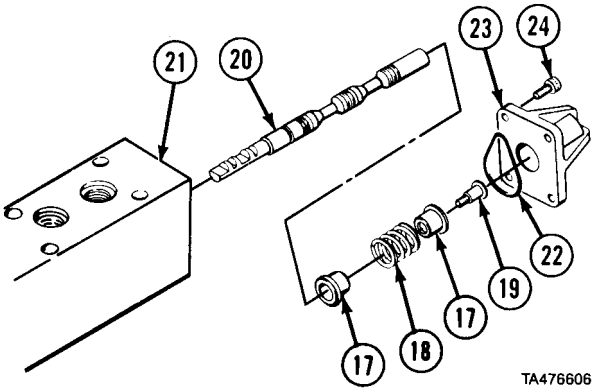


TA476605

NOTE

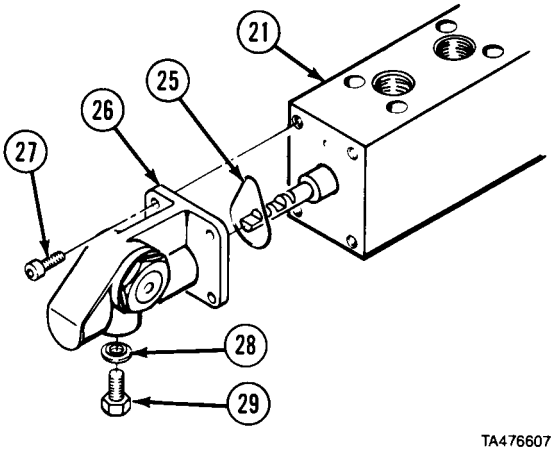
All four directional valves are assembled and installed the same.

(7) Install spring seat (17), spring (18), spring seat (17), and screw (19) on spool (20).
(8) Install spool (20) in valve (21).
(9) Install preformed packing (22) and end cap (23) with four screws (24).



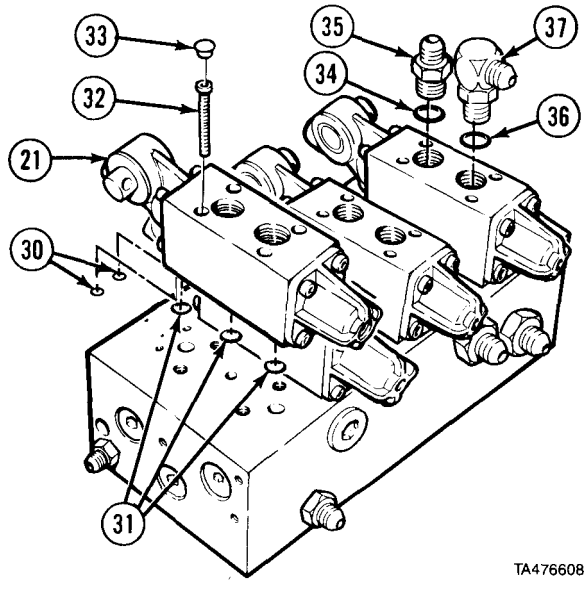
TA476606

(10) Install preformed packing (25) and end cap (26) on valve (21) with four screws (27).
(11) Install seal washer (28) and screw (29).



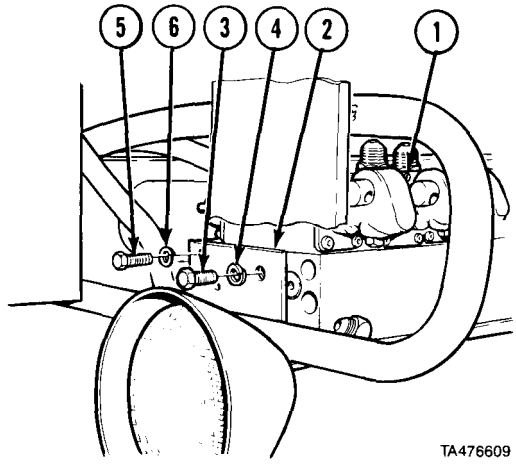
TA476607

(12) Install two preformed packings (30) and three preformed packings (31) in valve (21).
(13) Install valve (21) with four screws (32) and caps (33).
(14) Install preformed packing (34), fitting (35), preformed packing (36), and elbow (37).



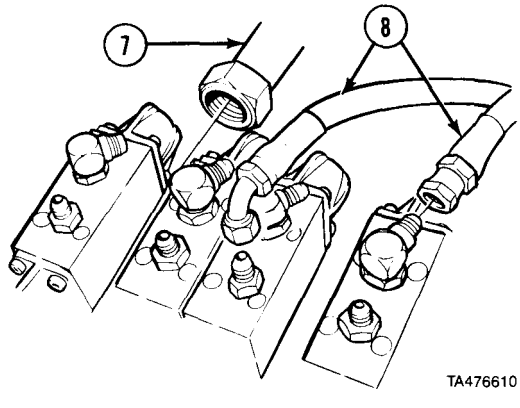
TA476608

e. Installation.
(1) Install valve body (1) in bracket (2) with two screws (3), lockwashers (4), screw (5), and lockwasher (6).
(2) Repeat step *(1)* for other side.



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(3) Install two hydraulic lines (7).
(4) Connect 11 hydraulic hoses (8).



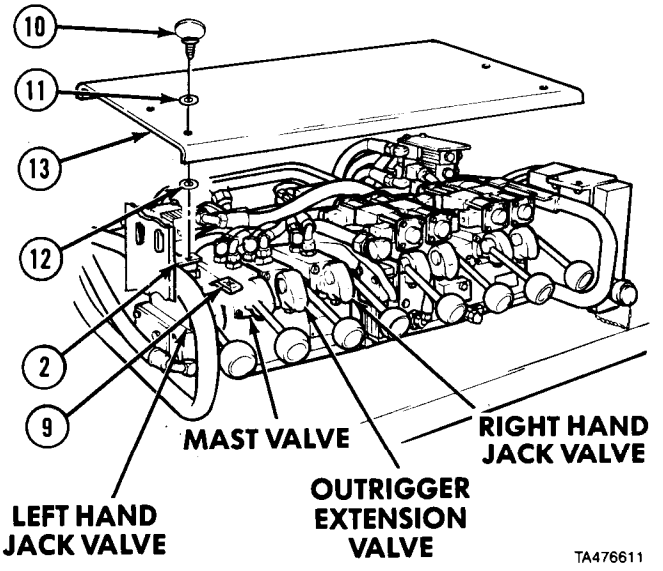
TA476610

17-28.3. RIGHT HAND REAR CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(5) Install four clips (9) on bracket (2).
(6) Install four screws (10), washers (11), and washers (12) in cover (13).
(7) Install cover (13) on bracket (2).

f. Follow-on Maintenance.
(1) Replace crane handles (TM 9-2320-279-20).
(2) Check operation of controls (TM 9-2320-279-20).
(3) Check for leaks.

END OF TASK



17-28.4. RIGHT HAND FRONT CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Installation
f. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	Crane control handles removed.

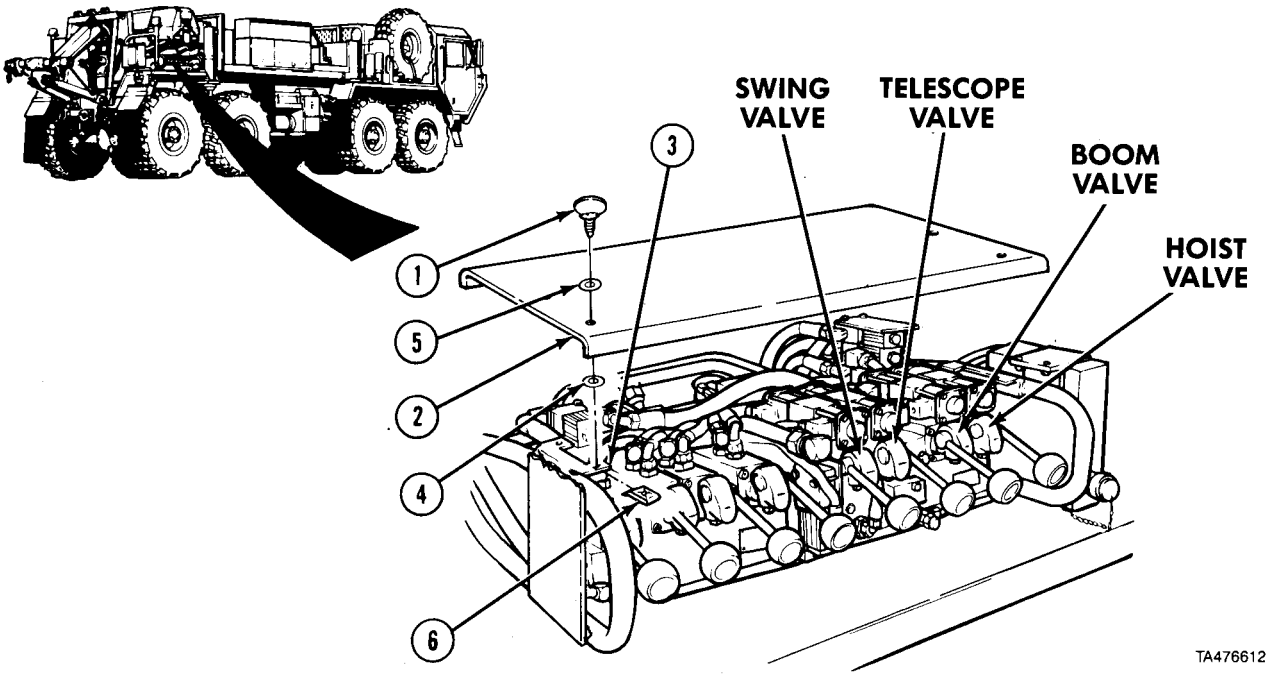
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

a. Removal.

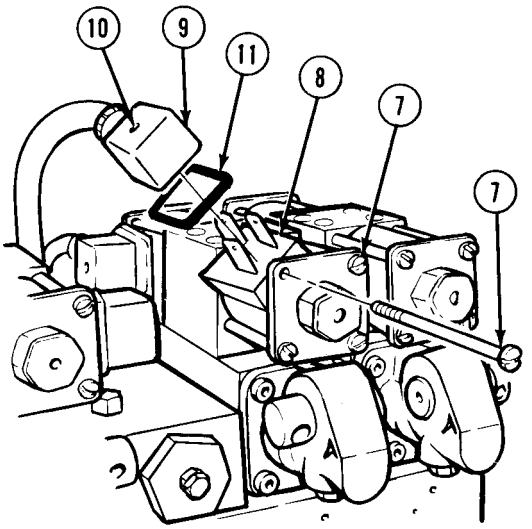


(1) Loosen four screws (1) and remove cover (2) from bracket (3).
(2) Remove four washers (4), screws (1), and washers (5) from cover (2).
(3) Remove four clips (6) from bracket (3).

NOTE

To remove right rear hand plug do step (6) only. Do steps *(4)* and *(5)* for other six plugs.

(4) Loosen three screws (7) and remove one screw (7) from each solenoid (8).
(5) Turn solenoid (8) to remove plug (9).
(6) Loosen 8 screws (10) and remove plugs (9) and seals (11).

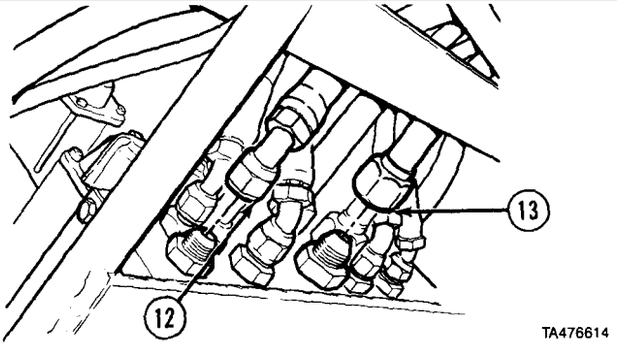


17-28.4. RIGHT HAND FRONT CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

NOTE

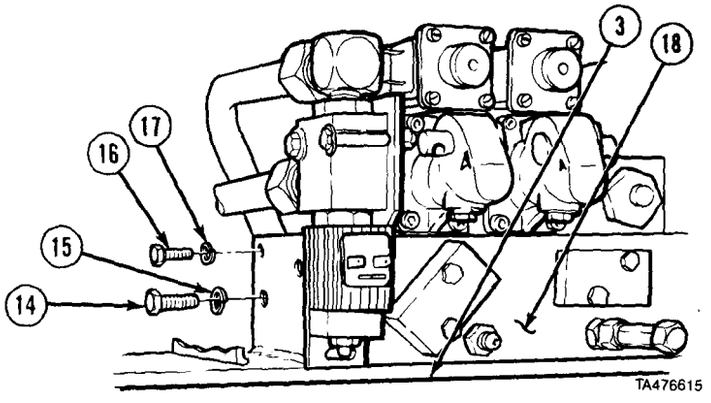
Tag and mark all hydraulic hoses and lines.

(7) Disconnect nine hydraulic hoses (12) and three hydraulic lines (13).



(8) Remove two screws (14), lockwashers (15), screw (16), and lockwasher (17) from bracket (3).
(9) Repeat step *(8)* for other side.
(10) Remove valve body (18) from bracket (3).

RIGHT HAND REAR CONTROL VALVE BODY SHOWN REMOVED FOR CLARITY

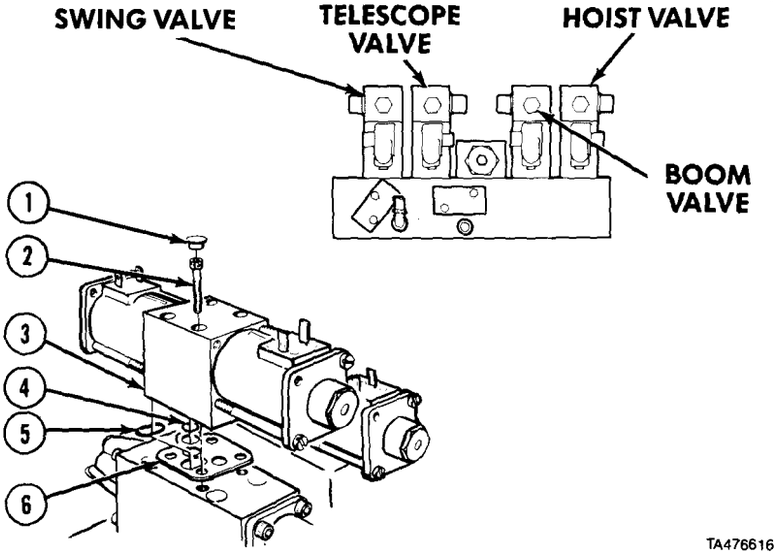


b. Disassembly.

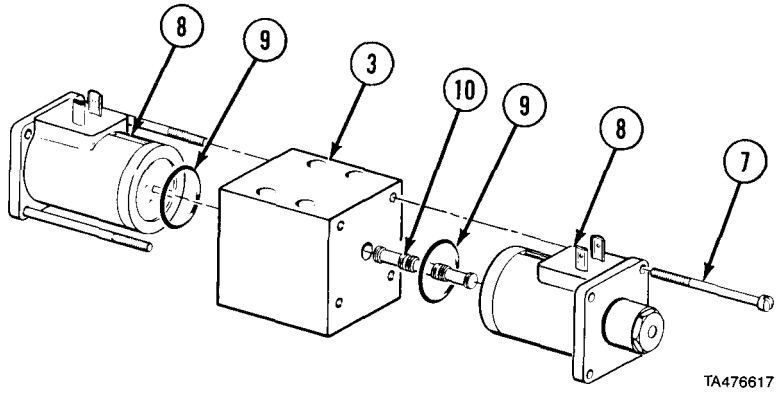
NOTE

All four pilot valves are removed and repaired the same.

(1) Remove four caps (1), screws (2), and pilot valve assembly (3).
(2) Remove three preformed packings (4), preformed packing (5), and plate (6).



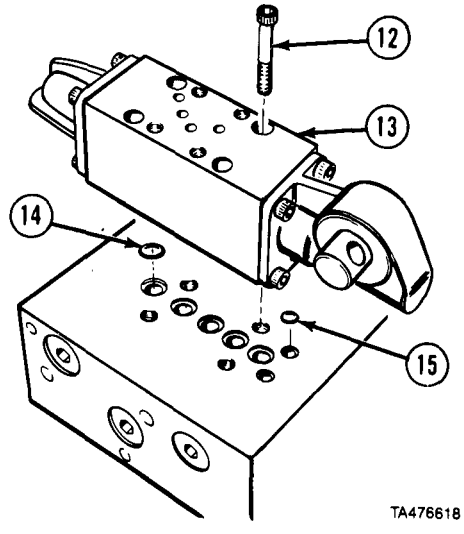
(3) Remove six screws (7), two solenoids (8), and preformed packings (9).
(4) Remove spool (10) from pilot valve (3).



NOTE

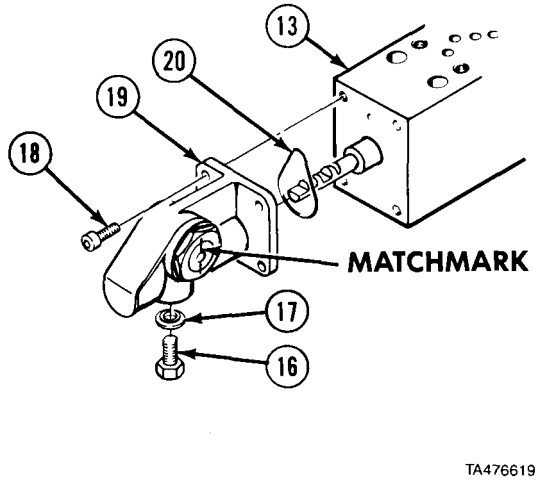
All four top directional valves are removed and repaired the same way. Matchmark valve to body.

(5) Remove three caps (11), four screws (12), and directional valve (13).
(6) Remove five preformed packings (14) and two preformed packings (15).



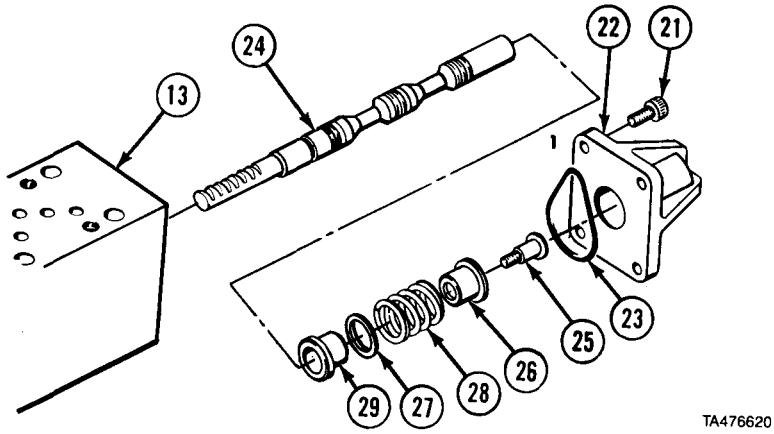
- Mark position of gear to cap.
- A 1/4 in. (6.3 mm) allen wrench will have to be cut down approximately 1/2 in. (12.7 mm).

(7) Remove screw (16) and seal washer (17).
(8) Remove four screws (18), cap (19), and preformed packing (20) from directional valve (13).



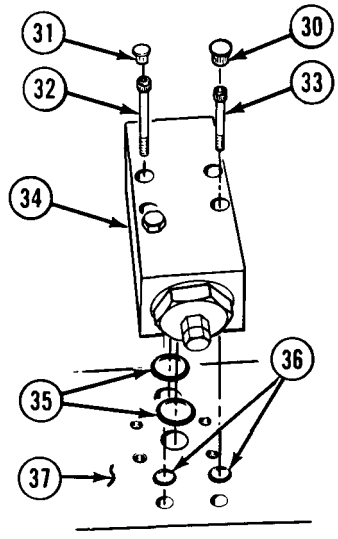
17-28.4. RIGHT HAND FRONT CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(9) Remove four screws (21), cap (22), and preformed packing (23).
(10) Remove spool (24) from valve (13).
(11) Remove screw (25), seat (26), backup ring (27), spring (28), and seat (29) from spool (24).



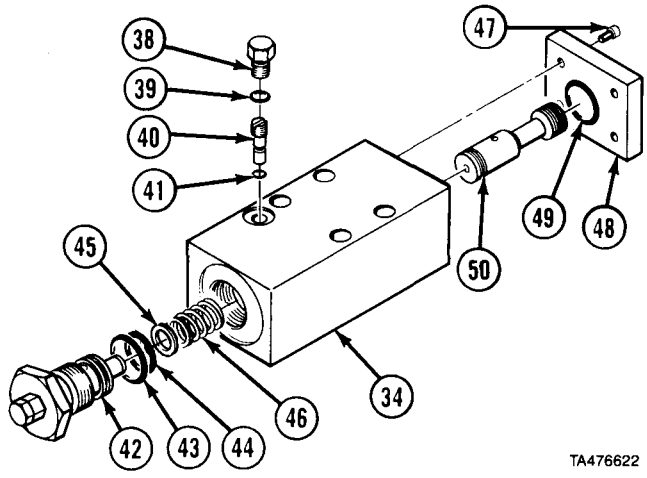
TA476620

(12) Remove two caps (30) and caps (31).
(13) Remove two screws (32), screws (33), and valve (34).
(14) Remove two preformed packings (35) and two preformed packings (36) from valve body (37).



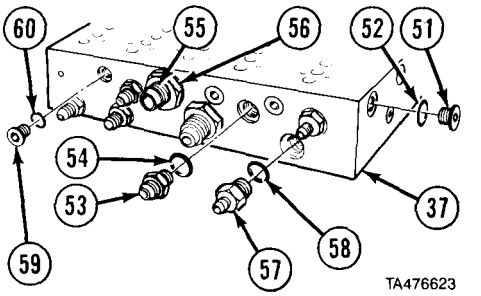
TA476621

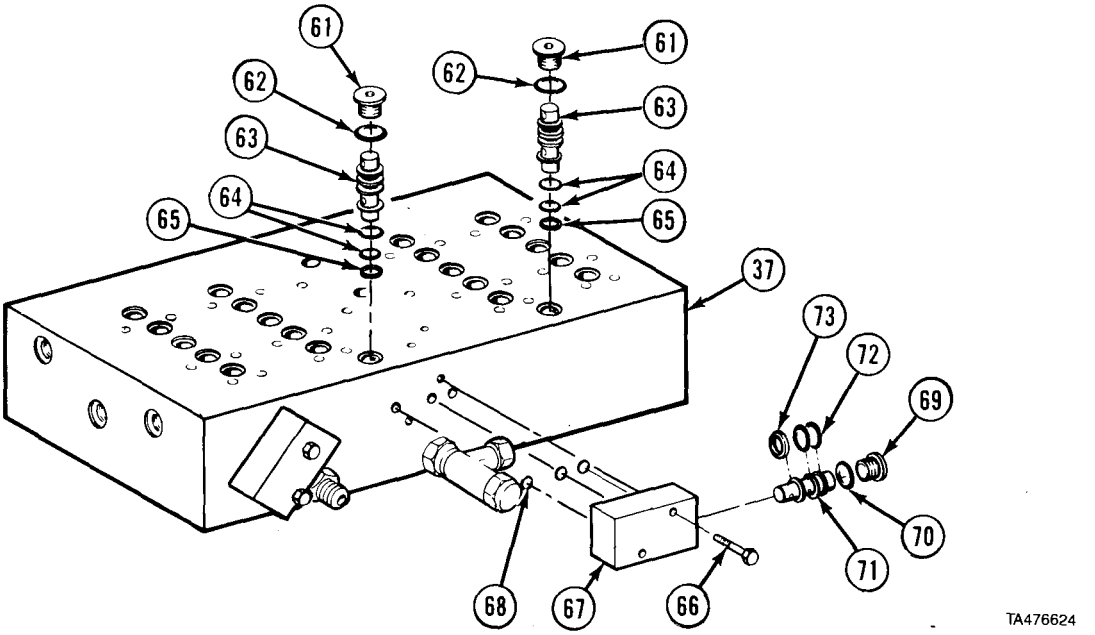
(15) Remove plug (38), preformed packing (39), screw (40), and preformed packing (41).
(16) Remove valve (42), preformed packings (43), preformed packing (44), washer (45), and spring (46).
(17) Remove four screws (47), end cap (48), preformed packing (49), and spool (50) from valve (34).



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(18) Remove six plugs (51) and preformed packings (52).
(19) Remove six fittings (53) and preformed packings (54).
(20) Remove two fittings (55) and preformed packing (56).
(21) Remove two fittings (57) and preformed packing (58).
(22) Remove three plugs (59) and preformed packing (60) from valve body (37).





NOTE

- A standard 4-40x2 screw will thread into the end of the shuttle valves to aid in removal.
- Valves may separate. Replace valves if separated.
- Both valve body shuttle valves are removed the same.

(23) Remove plug (61), preformed packing (62), and shuttle valve (63).

NOTE

Preformed packings and backup ring may stay in body.

(24) Remove two preformed packings (64) and backup ring (65).

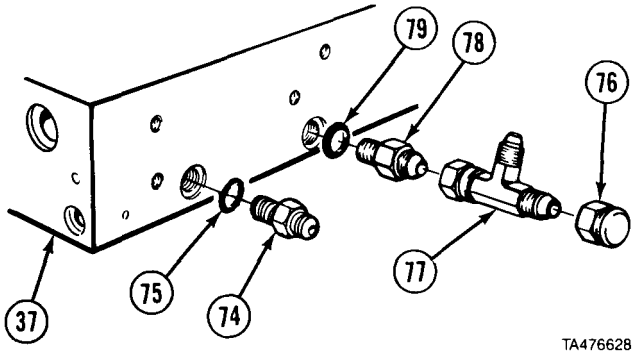
NOTE

Both shuttle block valves are removed the same.

(25) Remove two screws (66), shuttle block (67), and three preformed packings (68) from valve body (37).
(26) Remove plug (69), preformed packing (70), shuttle valve (71), two preformed packings (72), and backup ring (73).

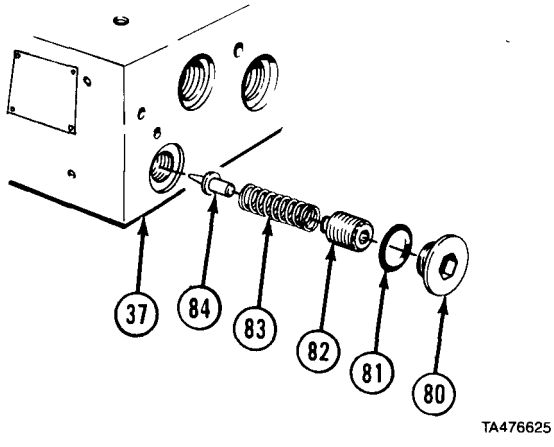
17-28.4. RIGHT HAND FRONT CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(27) Remove fitting (74) and preformed packing (75).
(28) Remove cap (76), tee fitting (77), fitting (78), and preformed packing (79) from valve body (37).



TA476628

(29) Remove cap (80), and preformed packing (81).
(30) Remove setscrew (82), spring (83), and relief valve (84) from valve body (37).



TA476625

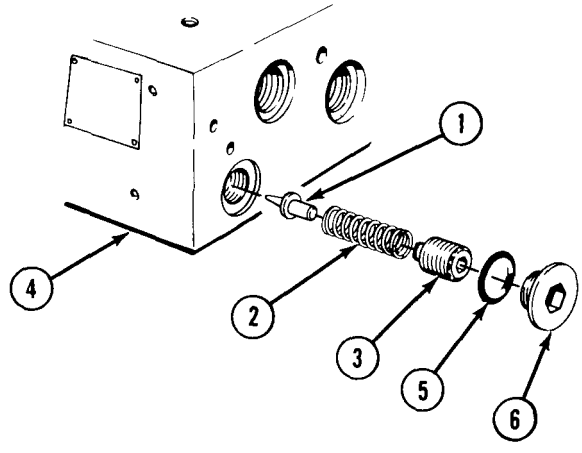
c. Cleaning/Inspection.

WARNING

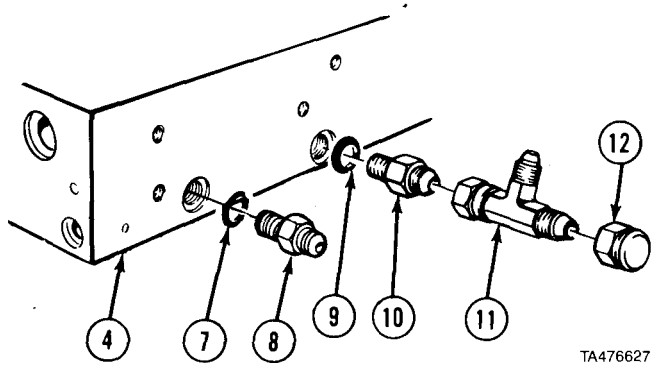
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Replace centering spring if free length is under 0.940 in. (23.0 mm).
(5) Replace valve springs if under 0.800 in. (20.0 mm).

d. Assembly.

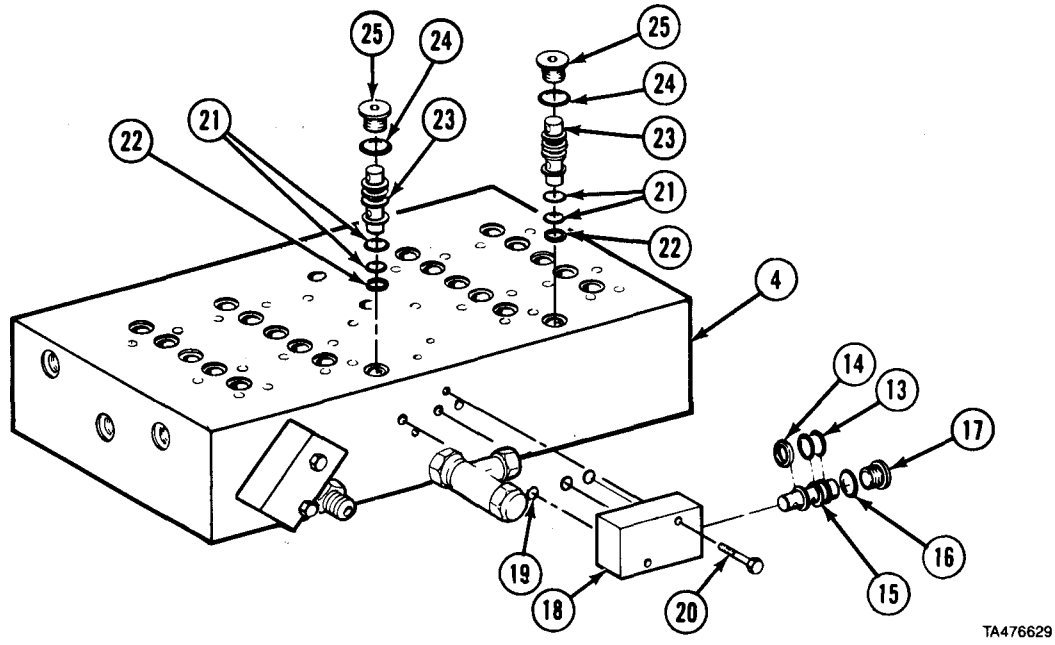


(1) Install relief valve (1), spring (2), and setscrew (3) in valve body (4).
(2) Install preformed packing (5) and plug (6).



(3) Install preformed packing (7) and fitting (8) in valve body (4).
(4) Install preformed packing (9), fitting (10), tee fitting (11), and cap (l2).

17-28.4. RIGHT HAND FRONT CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).



NOTE

Both shuttle block valves are installed the same. Be sure shuttle valve is seated.

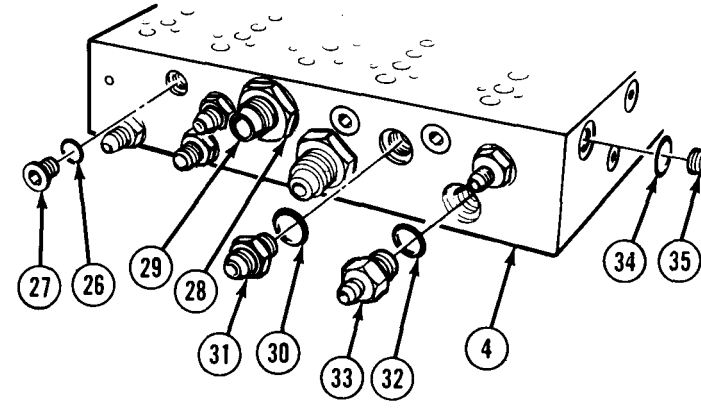
(5) Install two preformed packings (13), backup ring (14), shuttle valve (15), preformed packing (16), and cap (17) in shuttle block (18).
(6) Install three preformed packings (19) and shuttle block (18) with two screws (20).

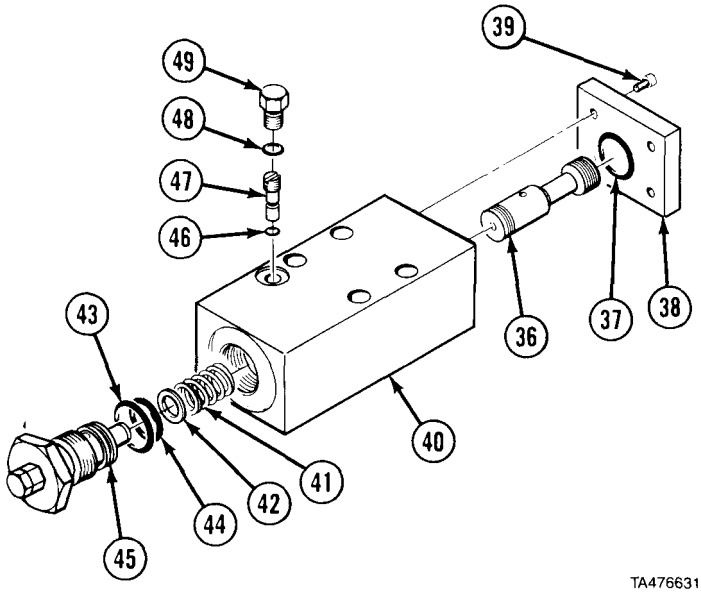
NOTE

Both valve body shuttle valves are installed the same.

(7) Install two preformed packings (21), backup ring (22), shuttle valve (23), preformed packing (24), and plug (25) in valve body (4).

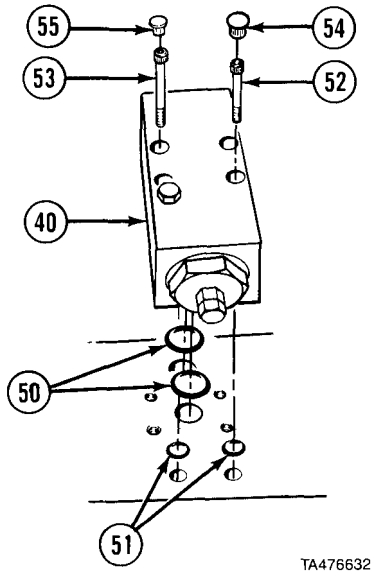
(8) Install three preformed packings (26) and plugs (27).
(9) Install two preformed packings (28) and fittings (29).
(10) Install six preformed packings (30) and fittings (31).
(11) Install two preformed packings (32) and fittings (33).
(12) Install six preformed packings (34) and plugs (35) in valve body (4).





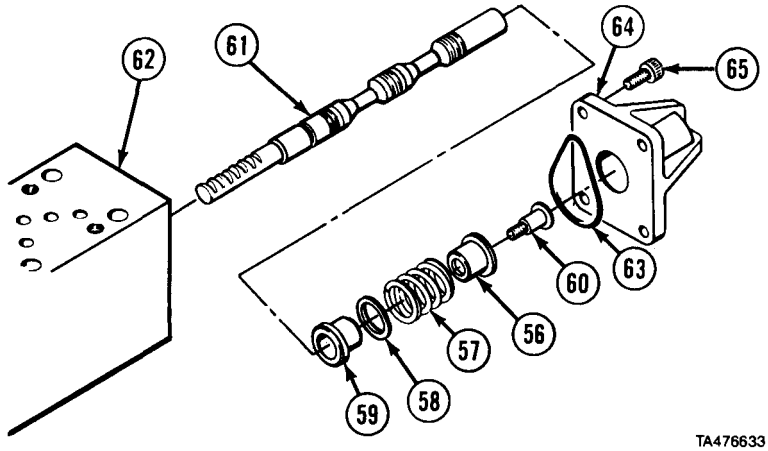
(13) Install spool (36), preformed packing (37), end cap (38), and four screws (39) in valve (40).
(14) Install spring (41), washer (42), preformed pakcing (43), preformed packing (44), and valve (45).
(15) Install preformed packing (46), screw (47), preformed packing (48), and plug (49).

(16) Install two preformed packings (50) and two preformed packings (51) in valve (40).
(17) Install valve (40), two screws (52), two screws (53), two caps (54), and two caps (55).



17-28.4. RIGHT HAND FRONT CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(18) Install seat (56), spring (57), backup ring (58), seat (59), and screw (60) on spool (61).
(19) Install spool (61) in directional valve (62).
(20) Install preformed packing (63) and end cap (64) with four screws (65).

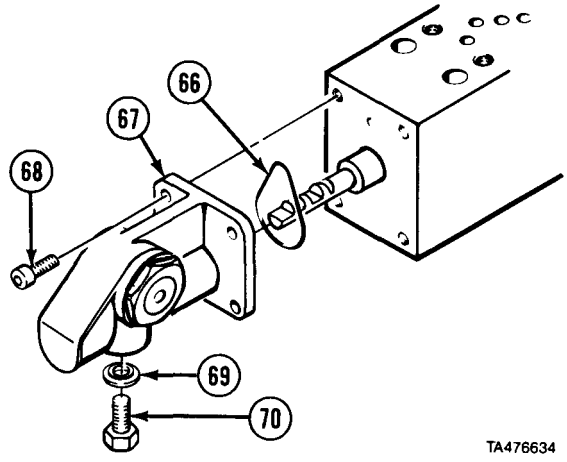


TA476633

NOTE

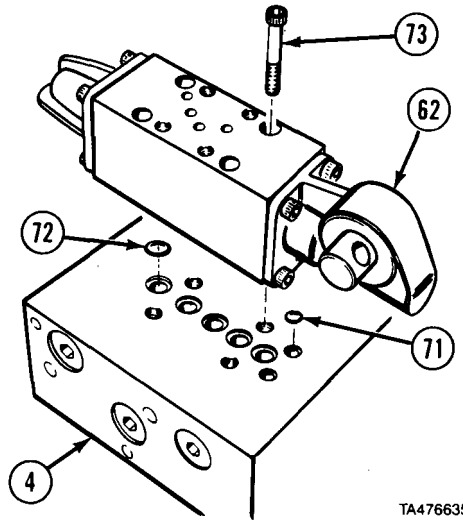
A 1/4 in. (6.3 mm) allen wrench will have to be cut down approximately 1/2 in. (12.7 mm).

(21) Install preformed packing (66), cap (67), and four screws (68).
(22) Install seal washer (69) and screw (70) in cap (67).



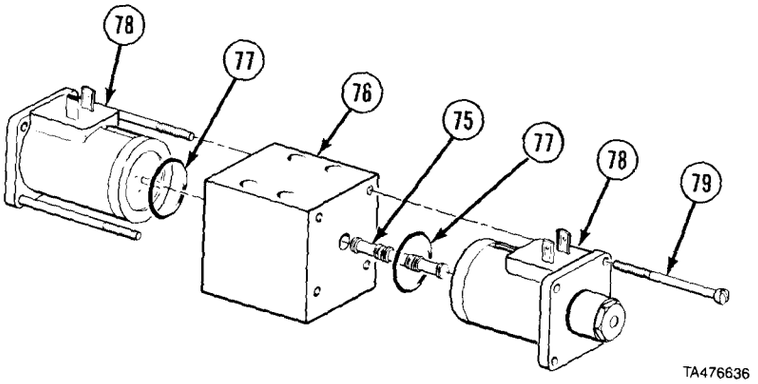
TA476634

(23) Install two preformed packings (71) and five preformed packings (72) in valve body (4).
(24) Install directional valve (62) to valve body (4) with four screws (73) and three caps (74).



TA476635

(25) Install spool (75) in pilot valve (76).
(26) Install two preformed packings (77), solenoid (78) with eight screws (79) to pilot valve (76). Do not tighten screws.

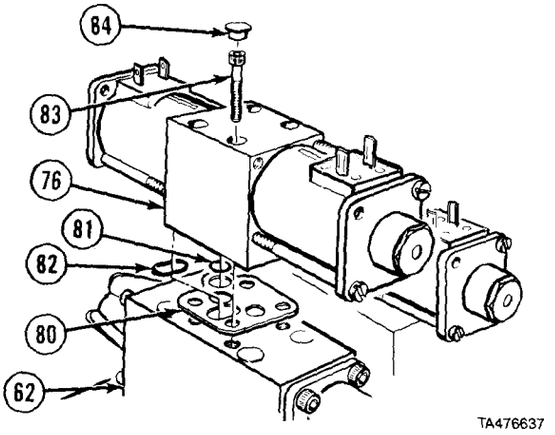


(27) Install plate (80), three preformed packings (81), and preformed packing (82) on directional valve (62).

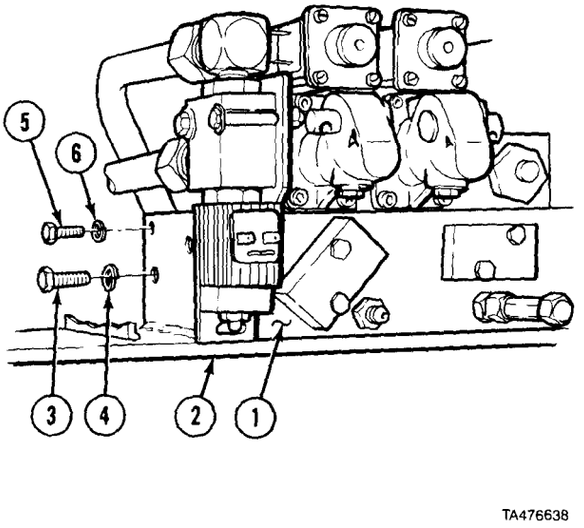
NOTE

Be sure to aline port holes in pilot valve assembly with port holes in directional valve.

(28) Install pilot valve assembly (76) with four screws (83) and caps (84).



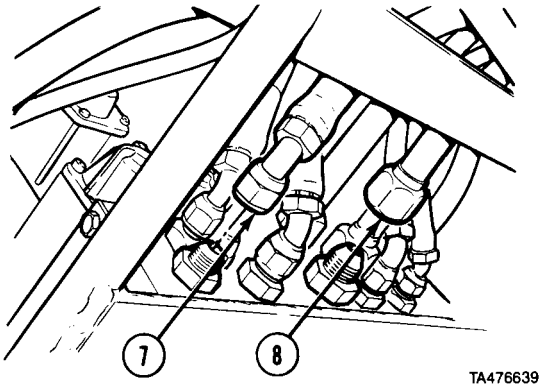
e. Installation.
(1) Install valve body (1) in bracket (2) with two screws (3), lockwashers (4), screw (5), and lockwasher (6).
(2) Repeat step (1) for other side.



M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

17-28.4. RIGHT HAND FRONT CONTROL VALVE BODY REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

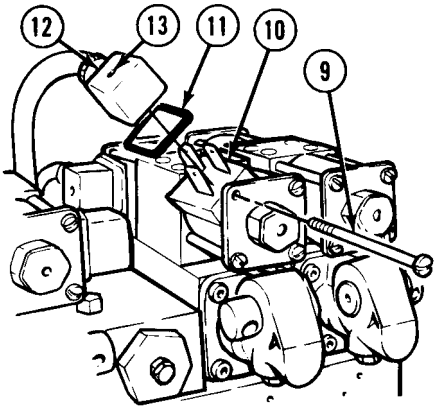
(3) Connect nine hydraulic hoses (7) and three hydraulic lines (8).



NOTE

Do not remove screw from right rear plug.

(4) Remove seven screws (9) from each solenoid (10).
(5) Turn seven solenoids (10) up.
(6) Install eight seals (11), plugs (12), and screws (13).
(7) Turn seven solenoids (10) down and install seven screws (9).
(8) Tighten 32 screws (9) on eight solenoids (10).

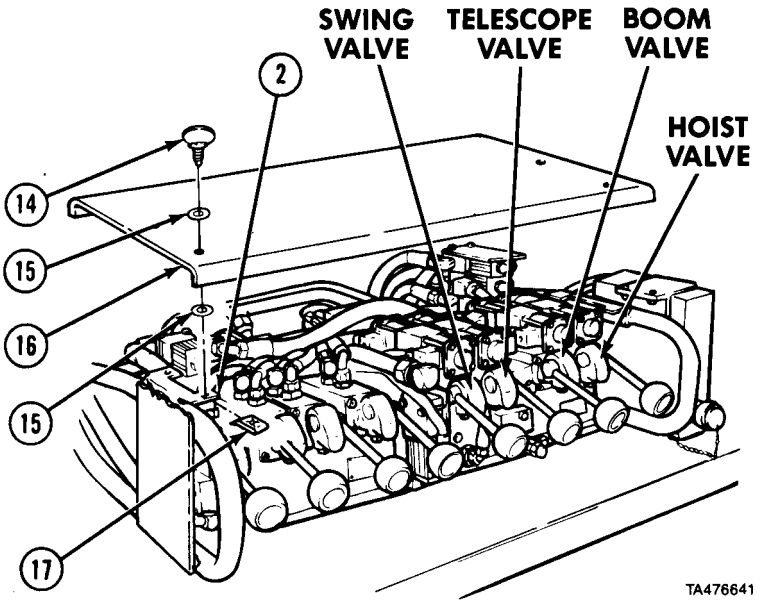


(9) Install four screws (14) with eight washers (15) in cover (16).
(10) Install four clips (17) on bracket (2).
(11) Install cover (16) on bracket (2) with four screws (14).

f. Follow-on Maintenance.

(1) Install control handles (TM 9-2320-279-20).
(2) Check crane operation (TM 9-2320-279-10).
(3) Check for leaks.

END OF TASK



17-29. SOLENOID REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

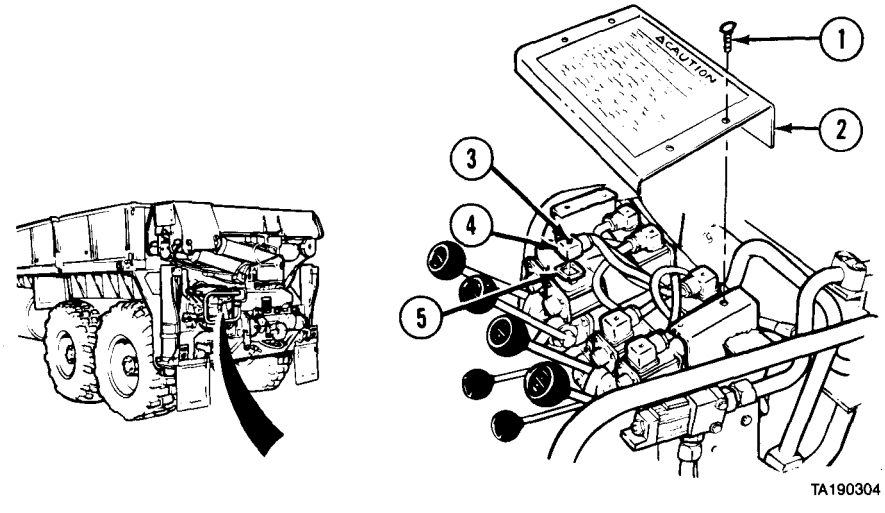
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

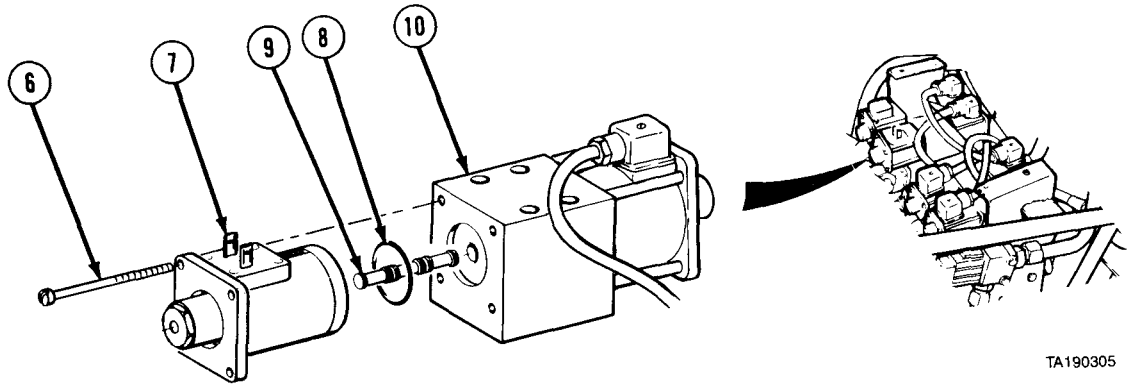
a. Removal.



NOTE

All solenoids are removed the same way.

(1) Loosen four screws (1) and remove cover (2).
(2) Loosen screw (3). Remove connector (4) and seal (5).



(3) Remove four screws (6), solenoid (7), and preformed packing (8).

NOTE

Spool may be up in shift block. Pull handle to release spool.

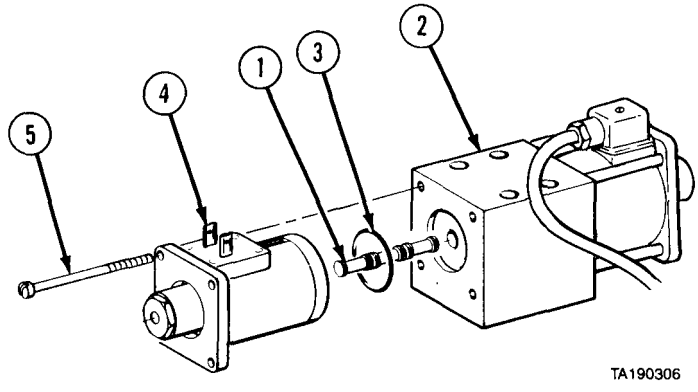
(4) Remove spool (9) from block (10).

b. Installation.

NOTE

All solenoids are installed the same way.

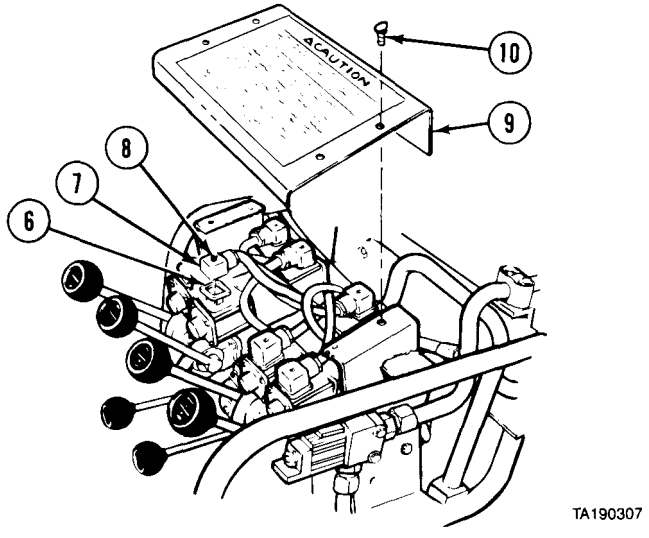
(1) Install spool (1) in block (2).
(2) Install preformed packing (3) and solenoid (4) with four screws (5).



(3) Install seal (6), connector (7), and screw (8).
(4) Aline and install cover (9) with four screws (10).

c. Follow-on Maintenance. None.

END OF TASK



17-29.1. SOLENOID REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

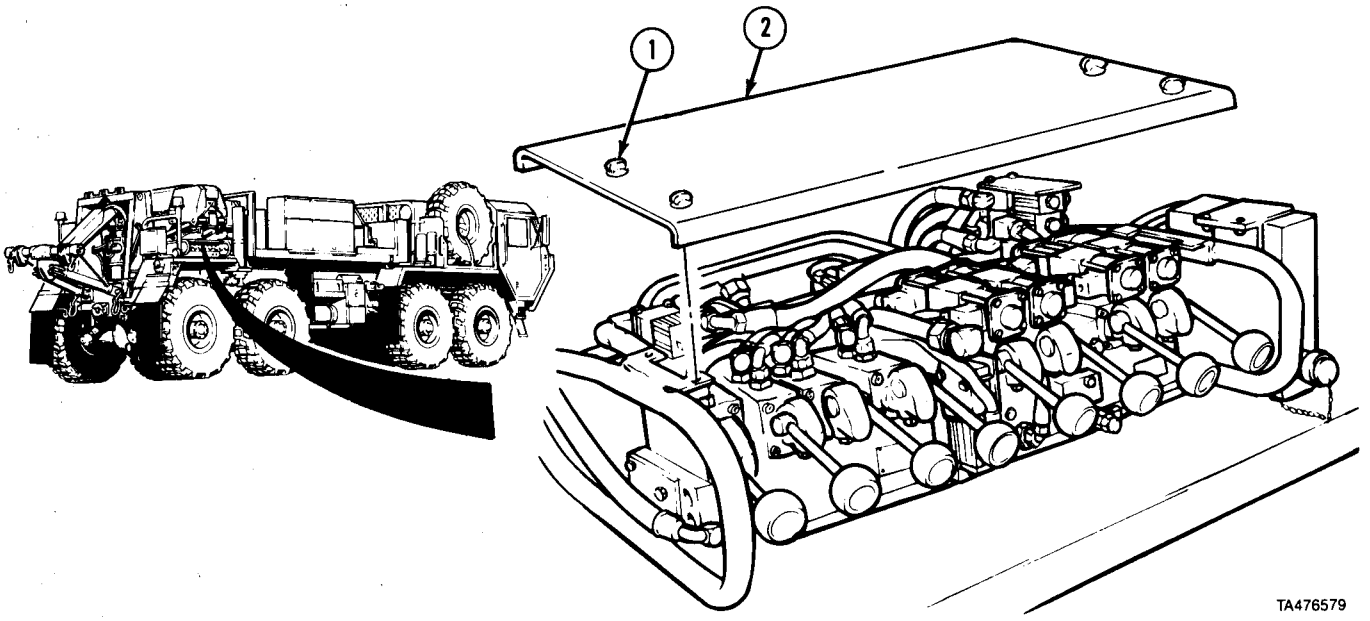
Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support



a. Removal.

(1) Loosen four screws (1) and remove cover (2).

NOTE

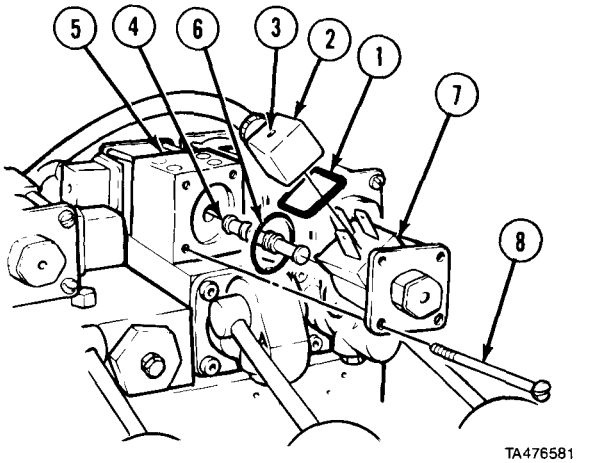
All solenoids are removed and installed the same.

(2) Remove four screws (3), solenoid (4), and preformed packing (5).
(3) Loosen screw (6), remove plug (7), and seal (8).

NOTE

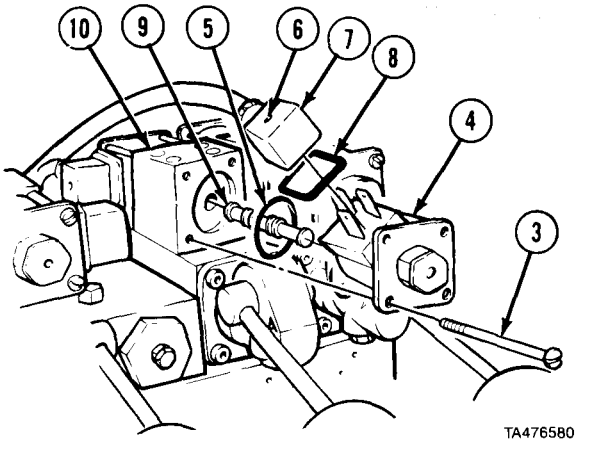
Spool may be up in shift block. Pull handle to release spool.

(4) Remove spool (9) from block (10).



TA476581

b. Installation.
(1) Install seal (1), plug (2), and screw (3).
(2) Install spool (4) in block (5).
(3) Install preformed packing (6) and solenoid (7) with four screws (8).

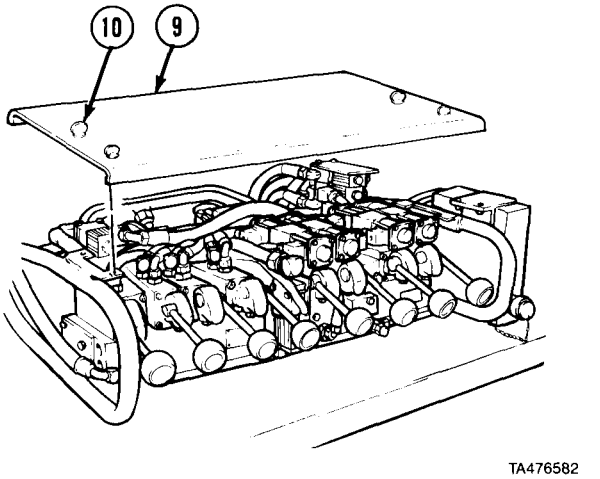


TA476580

(4) Aline and install cover (9) with four screws (10).

c. Follow-on Maintenance.
(1) Check operation of crane controls (TM 9-2320-279-20).
(2) Check for leaks.

END OF TASK



TA476582

17-30. ACCUMULATOR REMOVAL/REPAIR/CHARGING/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Cleaning/Inspection
d. Assembly
e. Charging
f. Installation
g. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985, M984E1

Support Equipment
Accumulator charging assembly 10870344

Special Tools
None

Supplies
Compound, sealing and thread locking Item 26, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

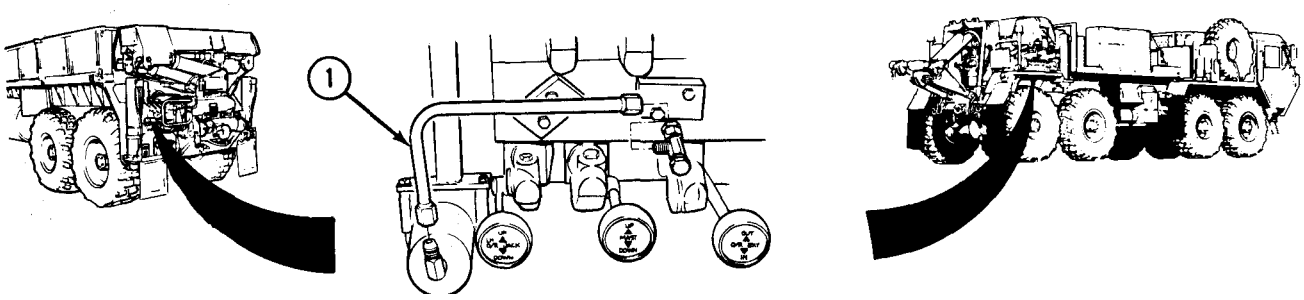
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

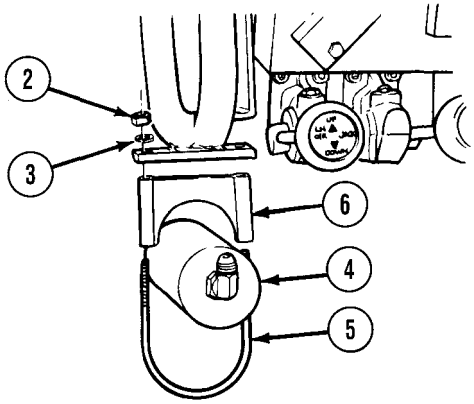
Level of Maintenance
Direct Support

a. Removal.



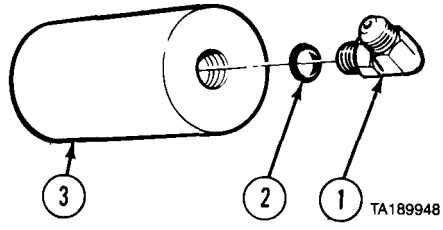
(1) Remove hydraulic line (1).

(2) Remove two nuts (2), lockwashers (3), accumulator (4), U-bolt (5), and bracket (6).



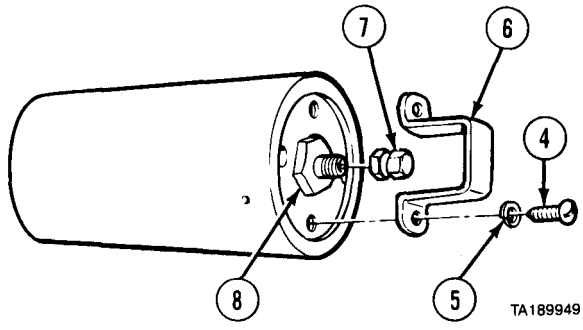
b. Disassembly.

(1) Remove elbow (1) and preformed packing (2) from accumulator (3).



(2) Remove two screws (4), lockwashers (5), and guard (6).

(3) Remove cap (7) from valve (8).

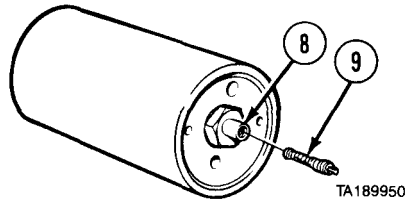


WARNING

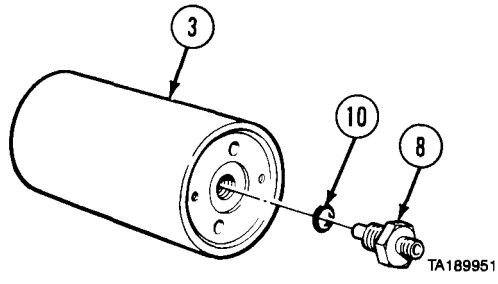
Accumulator is under 800 psi (5 516 kPa) pressure. Removal of any parts without releasing pressure may cause personal injury or death.

(4) Release pressure from valve (8).

(5) Remove valve stem (9).

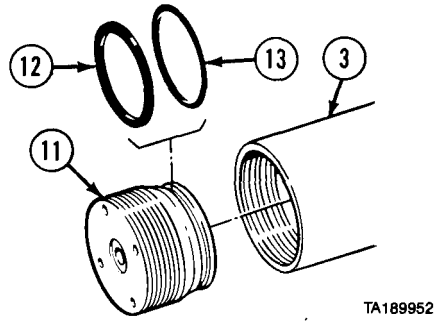


(6) Remove valve (8) and preformed packing (10) from accumulator (3).



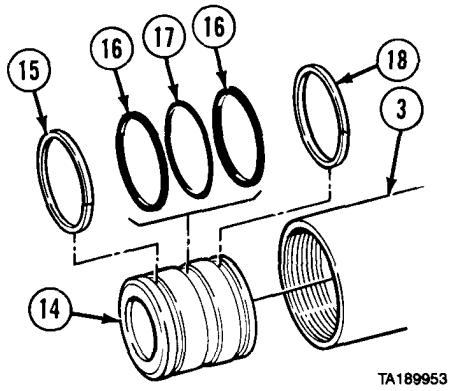
(7) Remove head (11) from accumulator (3).

(8) Remove backup ring (12) and preformed packing (13).



17-30. ACCUMULATOR REMOVAL/REPAIR/CHARGING/INSTALLATION (CONT).

(9) Remove piston (14) from accumulator (3).
(10) Remove wear ring (15), two backup rings (16), preformed packing (17), and wear ring (18).



c. Cleaning/Inspection.

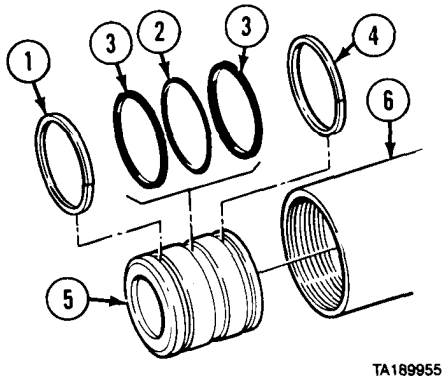
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

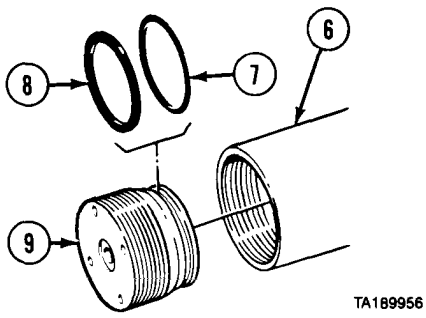
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

d. Assembly.

(1) Install wear ring (1), preformed packing (2), two backup rings (3), and wear ring (4) on piston (5).
(2) Install piston (5) in accumulator (6).



(3) Install preformed packing (7) and backup ring (8) on head (9).

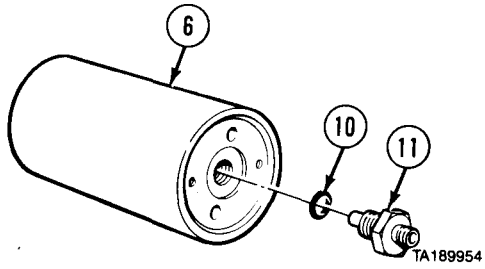


WARNING

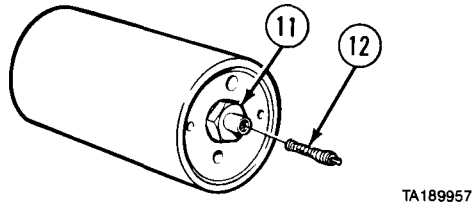
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(4) Apply sealing and thread locking compound on threads of head (9) and install in accumulator (6).

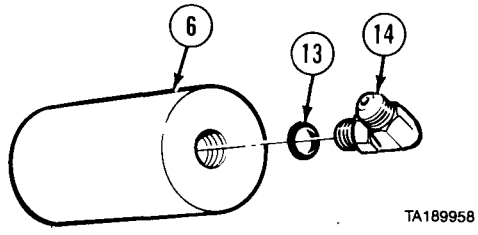
(5) Install preformed packing (10) and valve (11) in accumulator (6).



(6) Install valve stem (12) in valve (11).

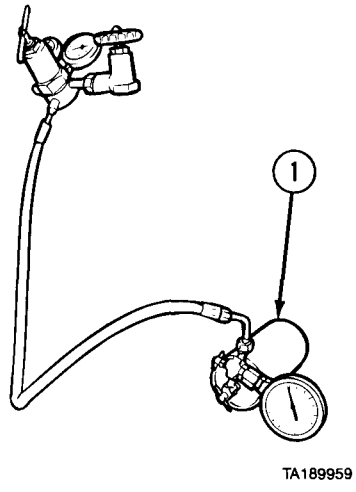


(7) Install preformed packing (13) and elbow (14) in accumulator (6).



e. Charging.

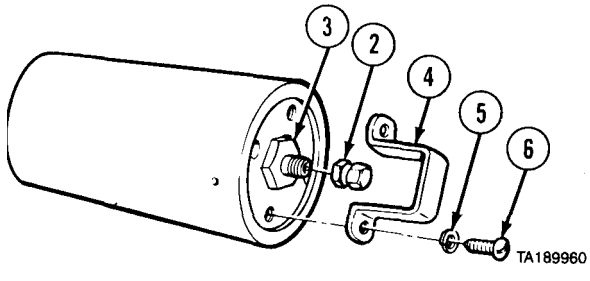
(1) Attach charging device to accumulator (1) and charge with liquid nitrogen to 800 psi (5 516 kPa).



WARNING

Accumulator is under 800 psi (5 516 kPa) pressure. Removal of any parts without releasing pressure may cause personal injury or death.

(2) Install cap (2) on valve (3).
(3) Install guard (4) with two lockwashers (5) and screws (6).



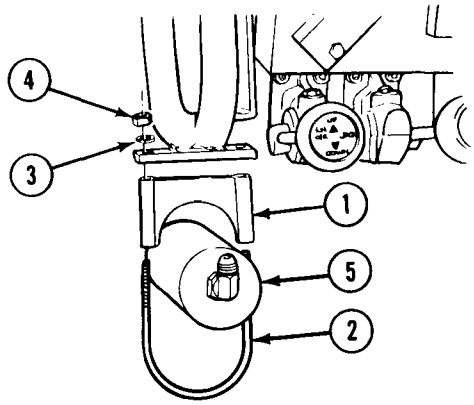
17-30. ACCUMULATOR REMOVAL/REPAIR/CHARGING/INSTALLATION (CONT).

f. Installation.

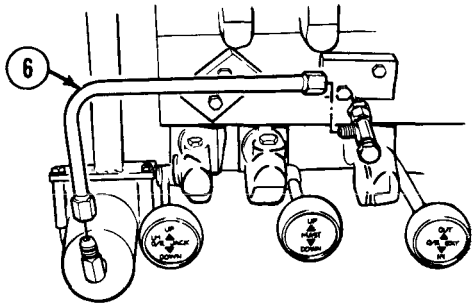
NOTE

If installing a new accumulator, charge per subparagraph e.

(1) Install bracket (1), U-bolt (2), two lockwashers (3), and nuts (4).
(2) Install accumulator (5).
(3) Tighten two nuts (4).



(4) Install hydraulic line (6).



g. Follow-on Maintenance. None.

END OF TASK

17-31. MAIN HYDRAULIC PRESSURE ADJUSTMENT.

This task covers:

a. Adjustment b. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Crane in stowed position.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

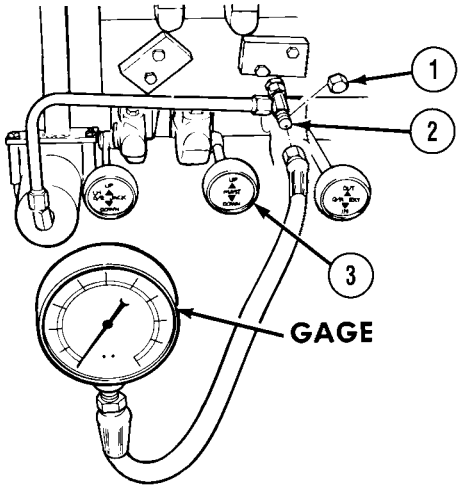
M977, M985, and M984A1 Crane Maintenance Instructions (Cont)

a. Adjustment.

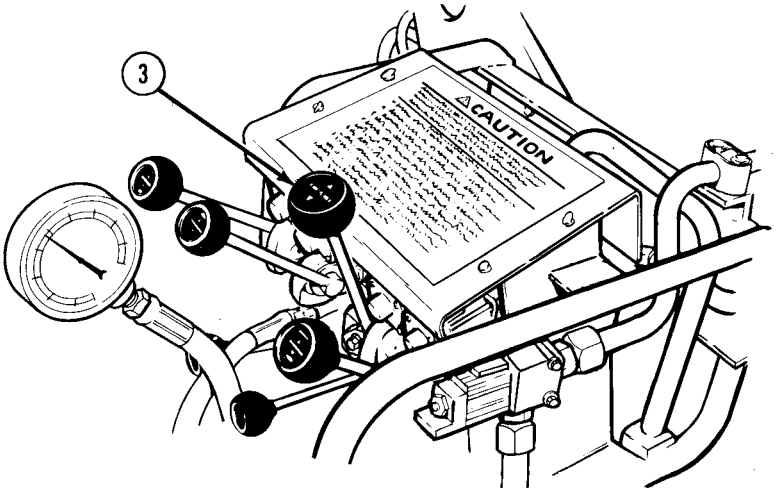
NOTE

Crane must be at normal operating temperature for adjustment.

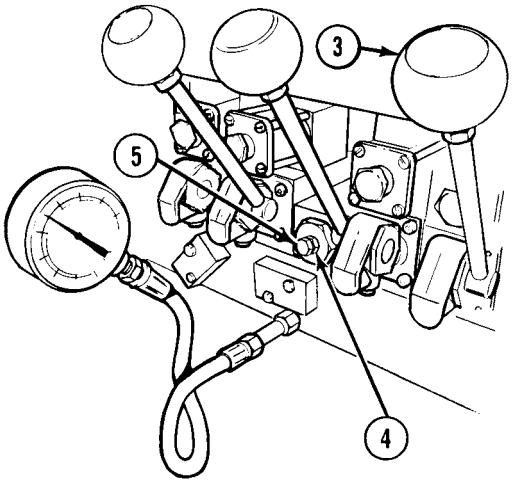
(1) Remove cap (1) and attach suitable pressure gage to test port (2).
(2) Put crane in operating position (TM 9-2320-279-10).



(3) Operate MAST control lever (3) UP.
(4) Check pressure reading. Reading should be between 3000 psi (20 685 kPa) and 3200 psi (22 064 kPa).
(5) If reading is less than 3000 psi (20 685 kPa) or more than 3200 psi (22 064 kPa), do steps *(6)* through *(10)*. If reading is between 3000 psi (20 685 kPa) and 3200 psi (22 064 kPa), do steps *(9)* and *(10)*.

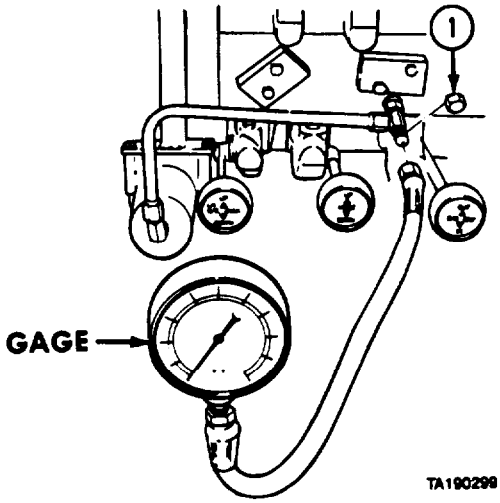


(6) Loosen locknut (4) and adjust screw (5) to lower pressure while operating MAST control lever (3) UP.
(7) Adjust screw (5) to set pressure between 3000 psi (20 685 kPa) and 3200 psi (22 064 kPa).
(8) Tighten locknut (4).



M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

117-31. MAIN HYDRAULIC PRESSURE ADJUSTMENT (CONT).



(9) Shut off engine (TM 9-2320-279-10).
(10) Remove gage and install cap (1).

b. Follow-on Maintenance. None.

END OF TASK

17-31.1. MAIN HYDRAULIC PRESSURE ADJUSTMENT (M984E1).

This task covers:

a. Adjustment
b. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Crane in operating condition.

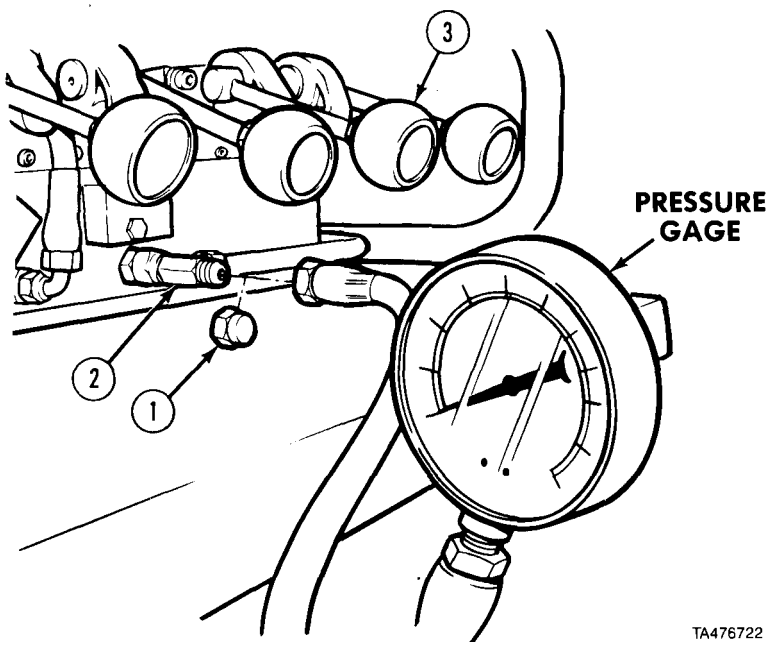
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

a. Adjustment.



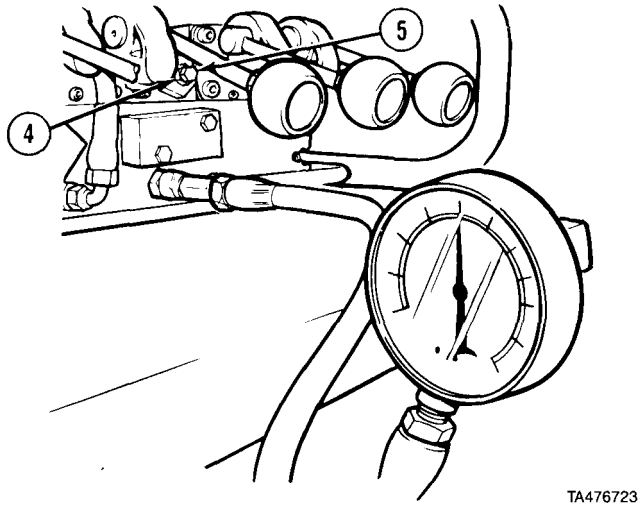
(1) Remove cap (1) and attach suitable pressure gage to test port (2).
(2) Put crane in operating condition and engage high idle (TM 9-2320-279-10).
(3) Operate mast up handle (3).

NOTE

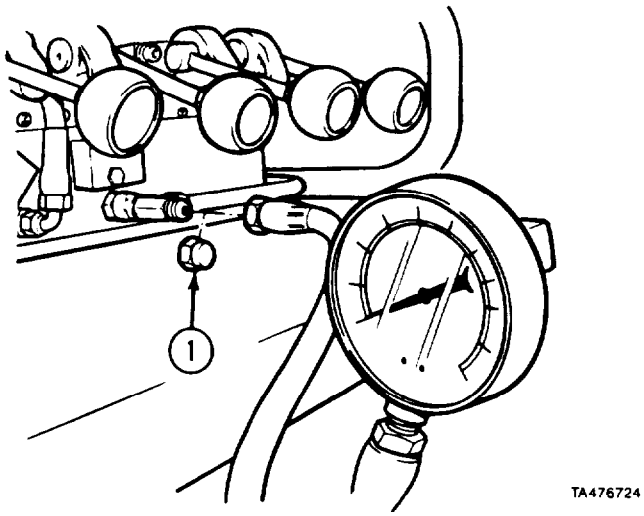
If reading is not 3000 psi (20 685 kpa) do steps *(5)* through *(9)*. If reading is 3000 psi (20 685 kpa) do steps *(8)* and *(9)*.

(4) Check pressure reading. Reading should be 3000 psi.

(5) Loosen locknut (4) and adjust screw (5) to lower pressure while operating mast up function.
(6) Adjust screw to bring pressure up to 3000 psi.
(7) Tighten locknut (4).



17-31.1. MAIN HYDRAULIC PRESSURE ADJUSTMENT (M984E1) (CONT).



(8) Shut off engine (TM 9-2320-279-10).
(9) Remove gage and install cap (1).

b. Follow-on Maintenance. Stow crane (TM 9-2320-279-10)

END OF TASK

17-32. Lift DOWN AND SHUT DOWN SOLENOIDS REMOVAL/REPAIR/INSTALLATION.

This task covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation
e. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.

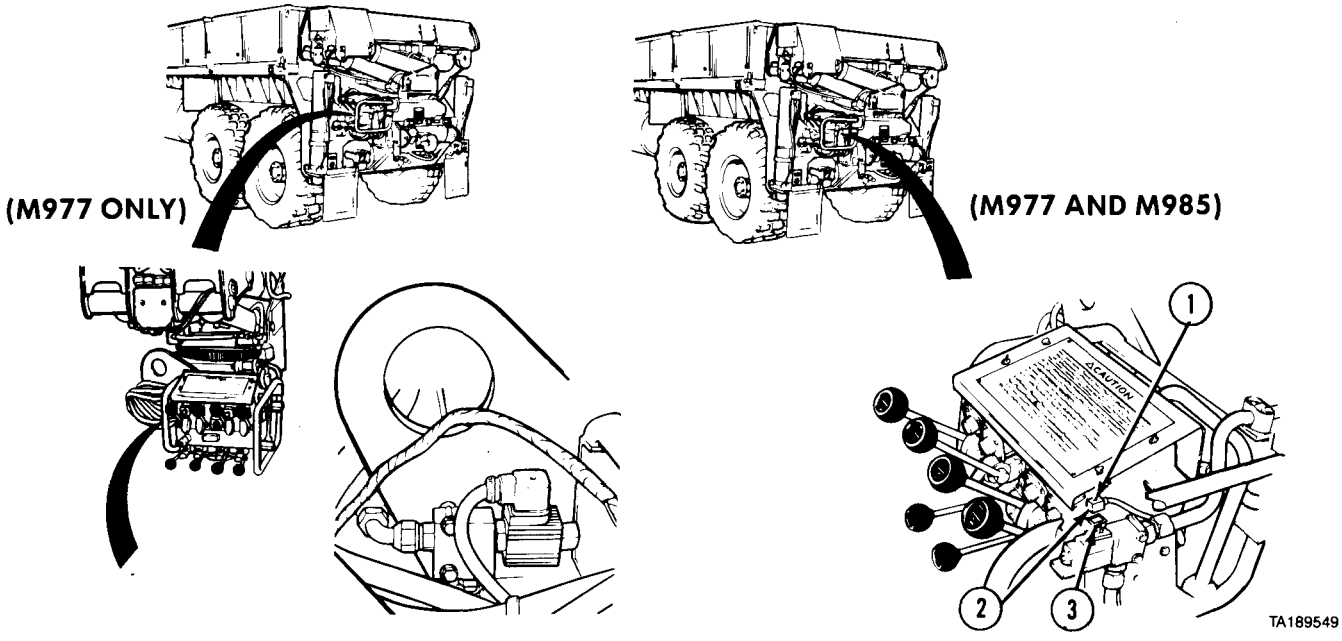
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

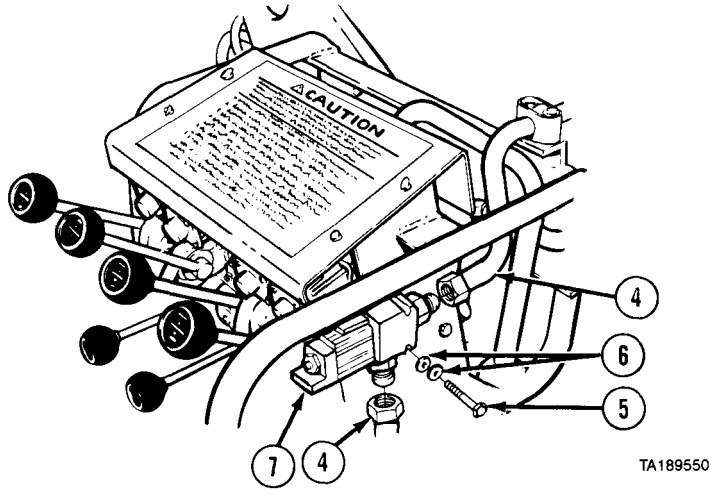
a. Removal.



NOTE

M977 has two solenoids for dual range operations. Both solenoids are removed the same way.

(1) Loosen screw (1) and remove connector (2) and seal (3).

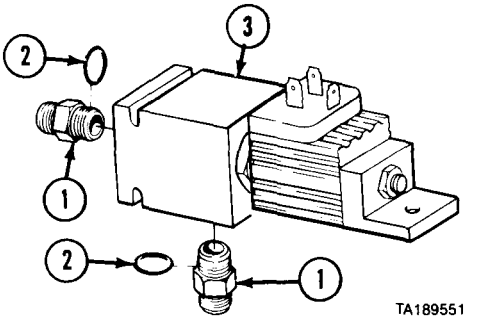


(2) Disconnect two hydraulic lines (4).
(3) Remove two screws (5) and eight washers (6).
(4) Remove solenoid (7).

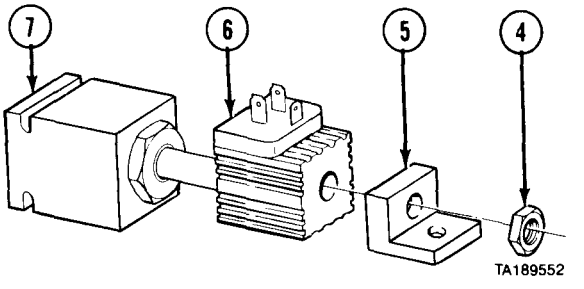
17-32. LIFT DOWN AND SHUT DOWN SOLENOIDS REMOVAL/REPAIR/INSTALLATION (CONT).

b. Disassembly.

(1) Remove two fittings (1) and preformed packings (2) from solenoid (3).

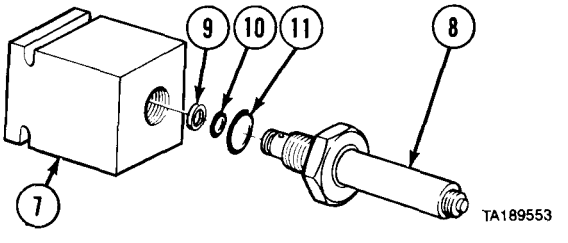


(2) Remove nut (4), end cap (5), and solenoid coil (6) from block (7).



(3) Remove valve (8) from block (7).

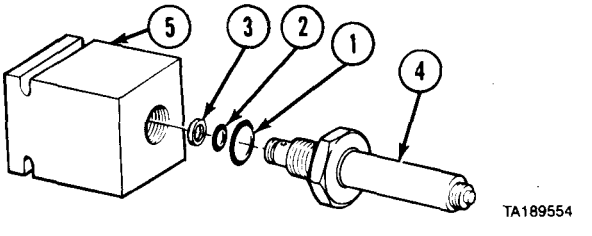
(4) Remove backup ring (9), preformed packing (10), and preformed packing (11) from block (7).



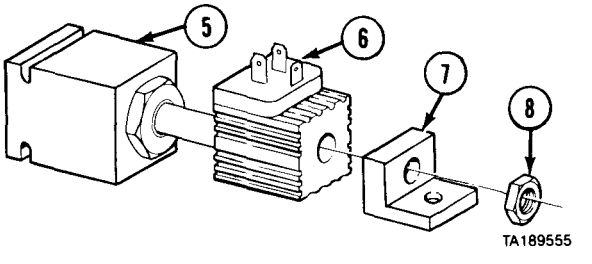
c. Assembly.

(1) Install preformed packing (1), preformed packing (2), and backup ring (3) on valve (4).

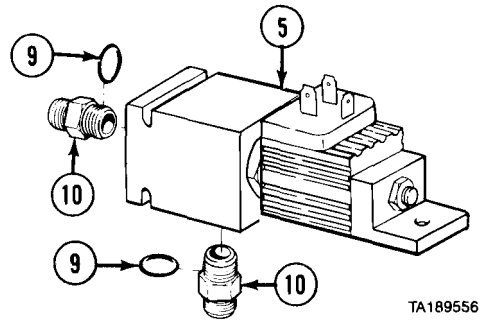
(2) Install valve (4) in block (5).



(3) Install solenoid coil (6), end cap (7), and nut (8) on block (5).



(4) Install two preformed packings (9) and fittings (10) in block (5).

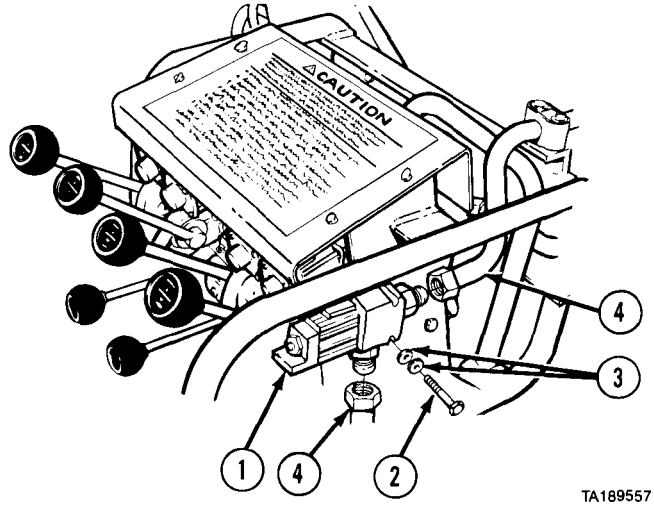


d. Installation.

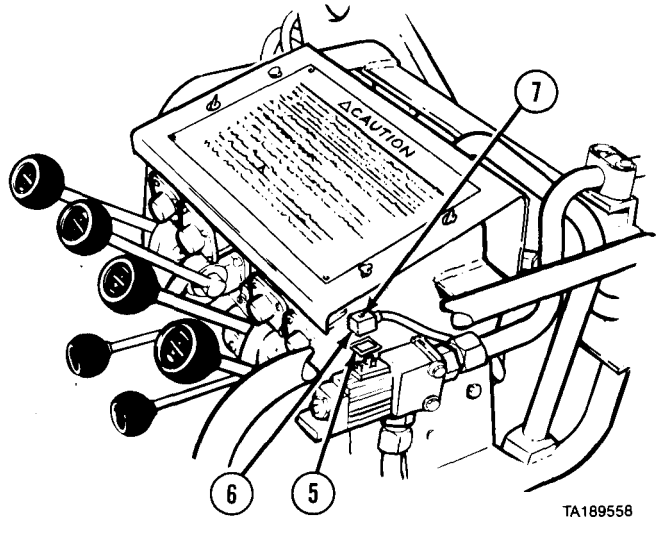
NOTE

M977 has two solenoids for dual range operations. Both solenoids are installed the same way.

(1) Install solenoid (1) with two screws (2) and eight washers (3).
(2) Connect two hydraulic lines (4).



(3) Install seal (5), connector (6), and screw (7).



e. Follow-on Maintenance. None.

END OF TASK

17-32.1. LIFT DOWN AND SHUT DOWN SOLENOIDS AND VALVE REMOVAL/REPAIR/INSTALLATION (M984E1).

This task covers:

a. Removal Boom Up Solenoid
b. Installation Boom Up Solenoid
c. Removal Boom Down, Hoist, and Telescope Solenoid
d. Installation Boom Down, Hoist, and Telescope Solenoid
e. Removal Shut Down Solenoid
f. Installation Shut Down Solenoid
g. Removal Boom Valve
h. Installation Boom Valve
i. Disassembly
j. Cleaning/Inspection
k. Assembly
l. Follow-on Mainentance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
Para 17-28.3	Cover removed (only for shut down solenoid).

NOTE
All solenoids are repaired the same.

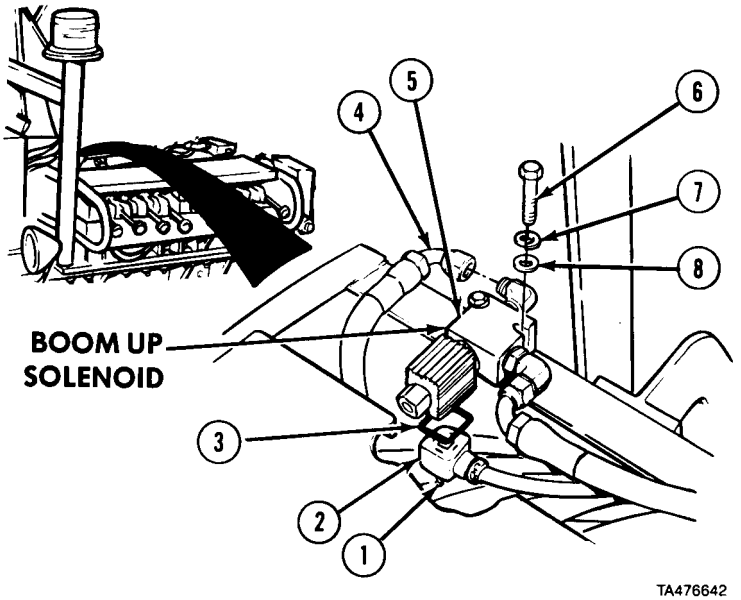
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal Boom Up Solenoid.
(1) Loosen screw (1) and remove plug (2) and seal (3).
(2) Disconnect two hydraulic lines (4) from solenoid (5).
(3) Remove two screws (6), lockwashers (7), washers (8), and solenoid (5).

b. Installation Boom Up Solenoid.
(1) Install solenoid (5) with two washers (8), lockwashers (7), and screws (6).
(2) Connect two hydraulic lines (4).
(3) Install seal (3), plug (2), and screw (1).



c. Removal Boom Down, Hoist, and Telescope Solenoids.

(1) Loosen three screws (1) and remove three plugs (2) and seals (3).

(2) Disconnect six hydraulic lines (4) from three solenoids (5).

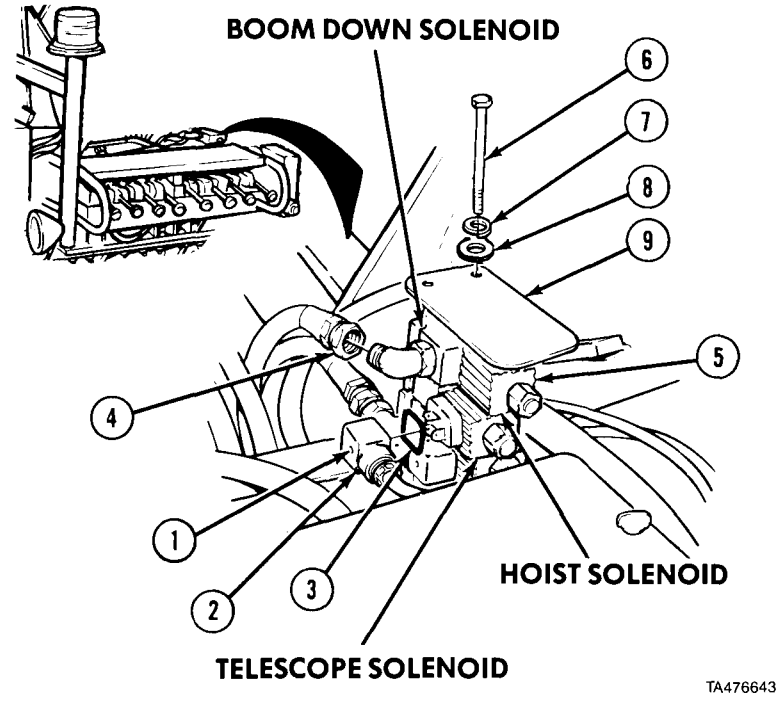
(3) Remove two screws (6), lockwashers (7), washer (8), cover (9), and three solenoids (5).

d. Installation Boom Down, Hoist, and Telescope Solenoids.

(1) Install three solenoids (5), with cover (9), two washers (8), lockwashers (7), and screws (6).

(2) Connect six hydraulic lines (4).

(3) Install three seals (3), plugs (2), and screws (1).



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e. Removal Shut Down Solenoid.

(1) Loosen screw (1) and remove plug (2) and seal (3).

(2) Disconnect two hydraulic lines (4).

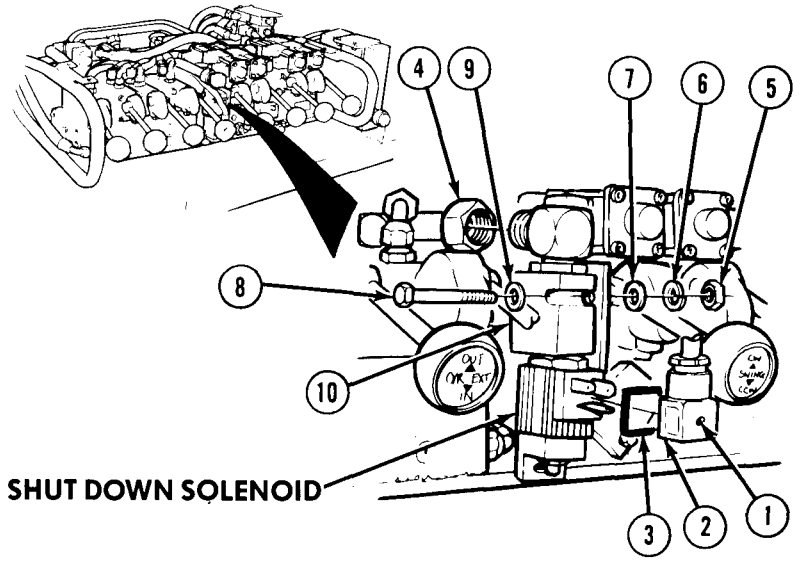
(3) Remove two nuts (5), lockwashers (6), washers (7), screws (8), washers (9), and solenoid (10).

f. Installation Shut Down Solenoid.

(1) Install solenoid (10) with two washers (7), lockwashers (6), and nuts (5).

(2) Connect two hydraulic lines (4).

(3) Install seal (3), plug (2), and screw (1).



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17-32.1. LIFT DOWN AND SHUT DOWN SOLENOIDS AND VALVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

g. Removal Boom Valve.

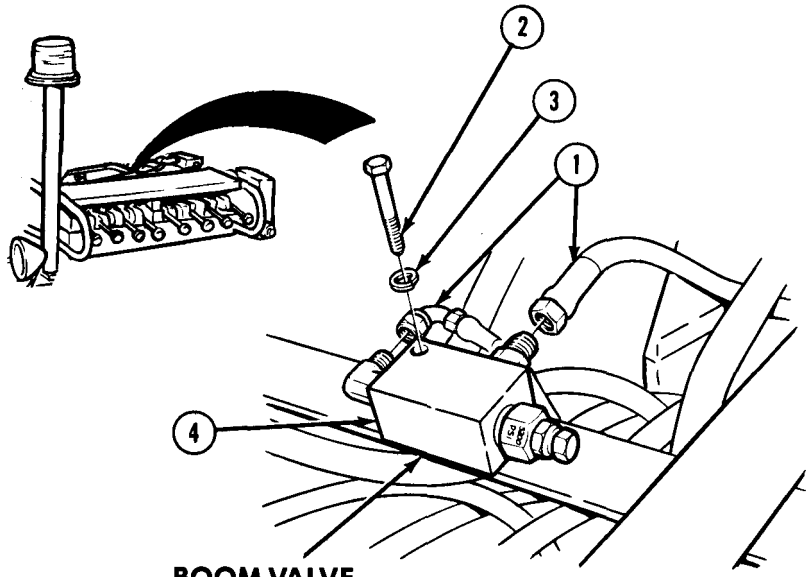
(1) Disconnect two hydraulic lines (1).

(2) Remove screw (2), lockwasher (3), and valve (4).

h. Installation Boom Valve.

(1) Install valve (4) with lockwasher (3) and screw (2).

(2) Connect two hydraulic lines (1).



BOOM VALVE

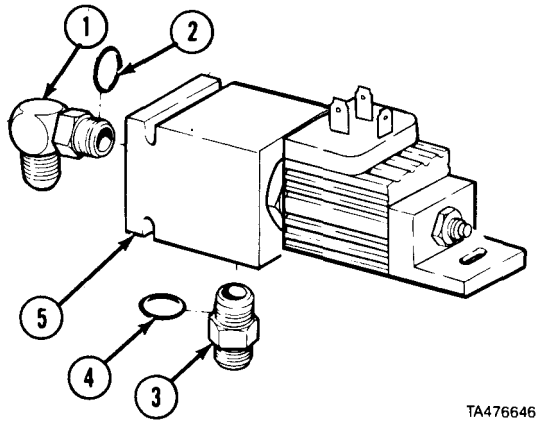
TA476645

NOTE

All five solenoids are repaired the same.

i. Disassembly.

(1) Remove elbow (1), preformed packing (2), fitting (3), and preformed packing (4) from solenoid (5).

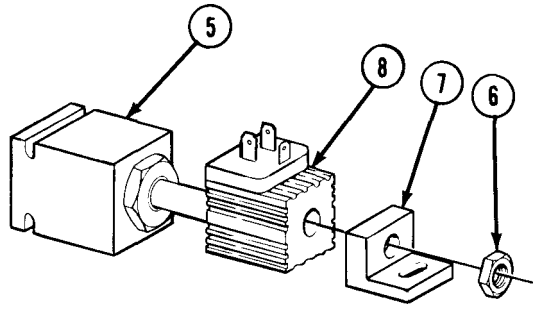


TA476646

NOTE

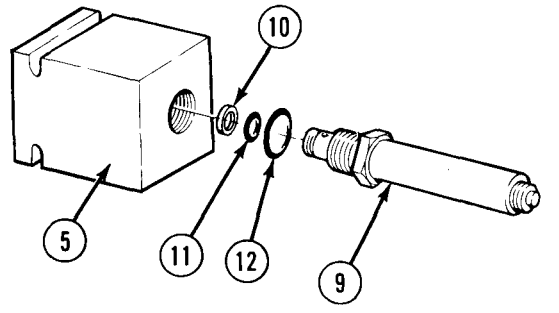
Front center solenoid has end cap. Other four solenoids do not.

(2) Remove nut (6), end cap (7), and coil (8) from solenoid (5).



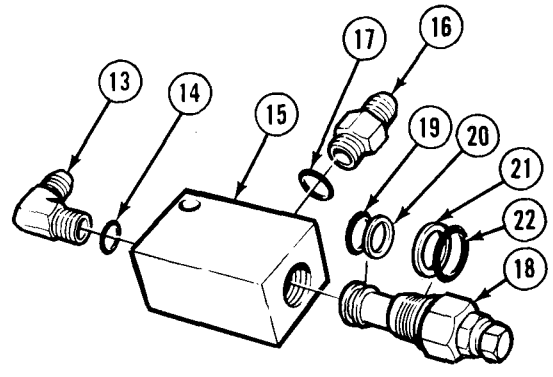
TA476647

(3) Remove valve (9) from solenoid (5).
(4) Remove backup ring (10), preformed packing (11), and preformed packing (12) from valve (9).



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(5) Remove elbow (13) and preformed packing (14) from valve (15).
(6) Remove fitting (16) and preformed packing (17).
(7) Remove cartridge (18) from valve (15).
(8) Remove preformed packing (19), backup ring (20), backup ring (21), and preformed packing (22) from cartridge (18).



TA476649

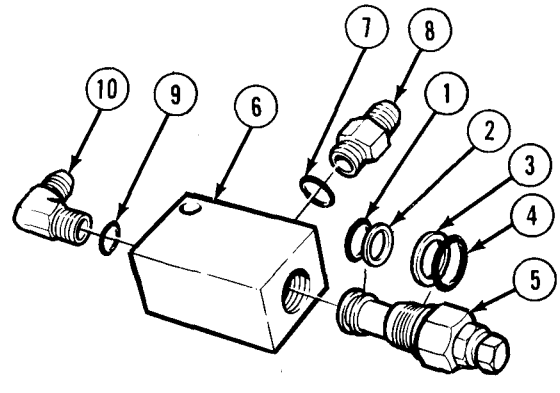
j. *Cleaning/Inspection.*

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

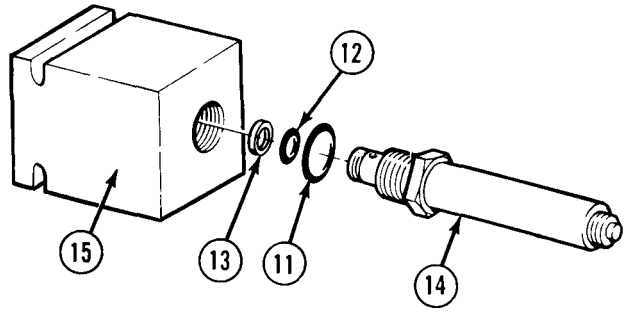
k. Assembly.
(1) Install preformed packing (1), backup ring (2), backup ring (3), and preformed packing (4) on cartridge (5).
(2) Install cartridge (5) in valve (6).
(3) Install preformed packing (7) and fitting (8).
(4) Install preformed packing (9) and elbow (10).



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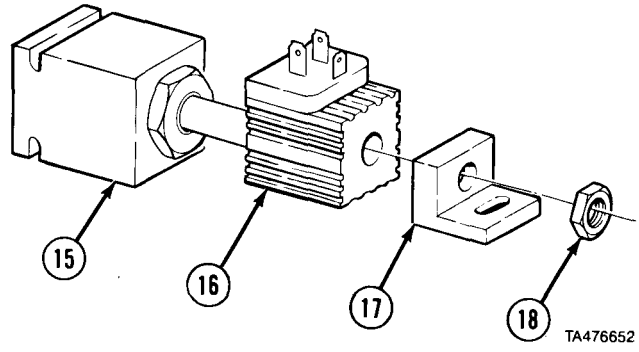
17-32.1. LIFT DOWN AND SHUT DOWN SOLENOIDS AND VALVE REMOVAL/REPAIR/INSTALLATION (M984E1) (CONT).

(5) Install preformed packing (11), preformed packing (12), and backup ring (13) on valve (14).
(6) Install valve (14) in solenoid (15).



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(7) Install coil (16), end cap (17), and nut (18) on solenoid (15).

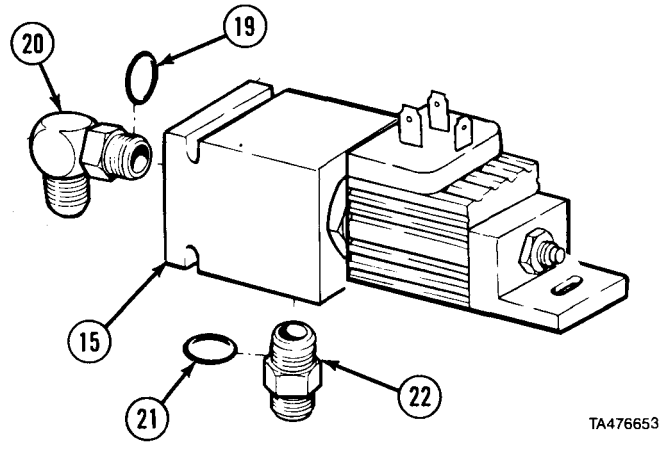


TA476652

(8) Install preformed packing (19), elbow (20), preformed packing (21), and fitting (22) in solenoid (15).

l. Follow-on Maintenance.
(1) Install cover (if removed).
(2) Check operation of controls.
(3) Check for leaks.

END OF TASK



TA476653

17-33. OVERLOAD SENSOR SWITCH ADJUSTMENT.

This task covers:

a. M985 and M977 Overload Sensor Switch Adjustment

b. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
M985 - 6200 lb (2815 kg) Weight
M977 - 5400 lb (2452 kg) Weight
M977 - 3200 lb (1453 kg) Weight

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 6-12	Overload sensor switches installed.
TM 9-2320-279-10	Crane in operating position.

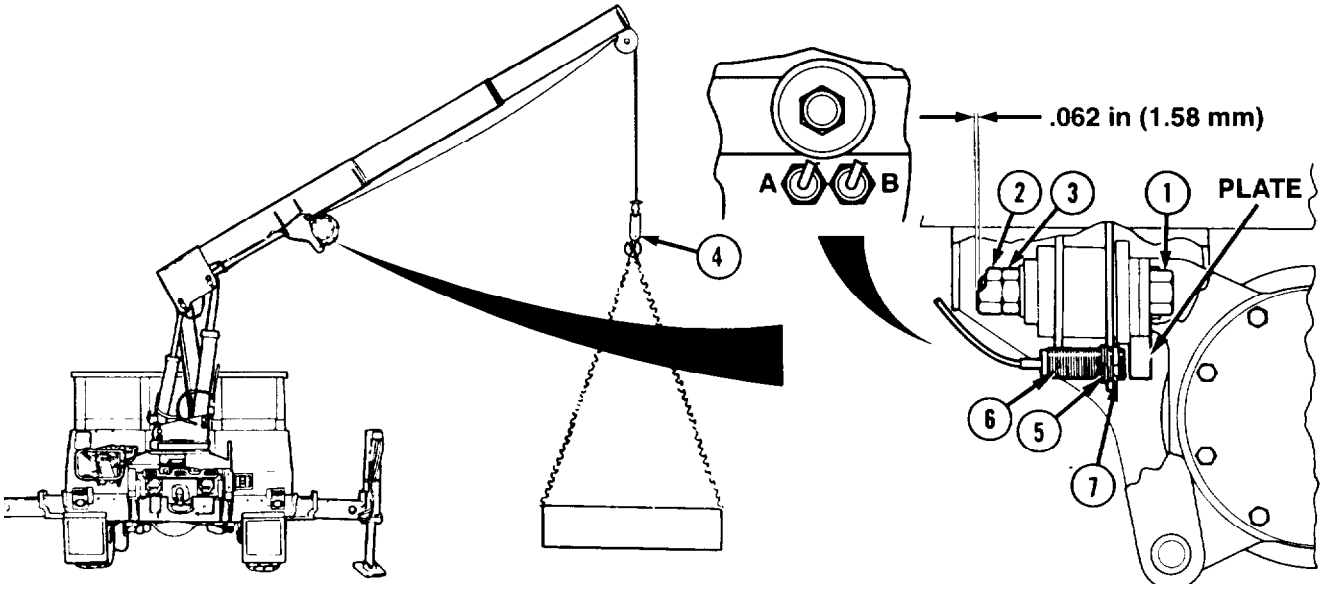
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

17-33. OVERLOAD SENSOR SWITCH ADJUSTMENT (CONT).

a. M985 and M977 Overload Sensor Switch Adjustment.



(1) Measure the distance between the end of screw (1) and the face of nut (2). If measurement is 0.062 in. (1.58 mm), go to step (3). If measurement is not 0.062 in. (1.58 mm), go to step (2).

(2) Loosen nut (2) and adjust screw (1) with nut (3) to get a measurement of 0.062 in. (1.58 mm). Tighten nut (2).

CAUTION

Be sure proper weight is used to adjust M985 or M977 crane, or equipment may be damaged.

NOTE

- M985 has one overload sensor switch. M977 has two overload sensor switches.
- For M977 main overload sensor switch (A) adjustment, position boom at maximum boom angle before weight is attached.
- For M977 reduced overload sensor switch (B) adjustment, boom must be 10° above horizontal.
- For M977 main and reduced overload sensor switch adjustments, extend boom so that cable is spooling onto right side of drum, looking from boom nose.

  For M985 overload sensor switch adjustment, extend boom so that cable is spooling onto left side of drum, looking from boom nose.

(3) Position load hook (4) over weight and attach weight.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

CAUTION

- Use only HOIST control to lift and lower weight or damage to equipment could result.
- Do not operate crane with boom below horizontal when there is a load on hook.
- Use 6200 lb (2815 kg) weight for M985 overload switch (B) adjustment.
- Use 5400 lb (2452 kg) weight for M977 main overload switch (A) adjustment.
- Use 3200 lb (1453 kg) weight for M977 reduced overload switch (B) adjustment.

NOTE

Operate hoist smoothly and slowly when performing test.

(4) Lift weight.

NOTE

- If hoist attempts to lift weight and stops, do steps (5) through (9).
- If hoist lifts weight and does not stop, do steps *(10)* through (14).

(5) Lower weight.
(6) Loosen nut (5) 1/4 turn. Push switch (6) in toward plate.
(7) Tighten nut (7).
(8) Attempt to lift weight. Repeat steps (5) through (7) until weight can be lifted.
(9) Loosen nut (7) 1/4 turn. Tighten nut (5). Overload sensor switch is adjusted.
(10) Lower weight.
(11) Loosen nut (7) 1/4 turn. Push switch (6) away from plate.
(12) Tighten nut (5).
(13) Attempt to lift weight, Repeat steps *(10)* through *(12)* until weight cannot be lifted.
(14) Loosen nut (5) 1/4 turn. Tighten nut (7). Overload sensor switch is adjusted.

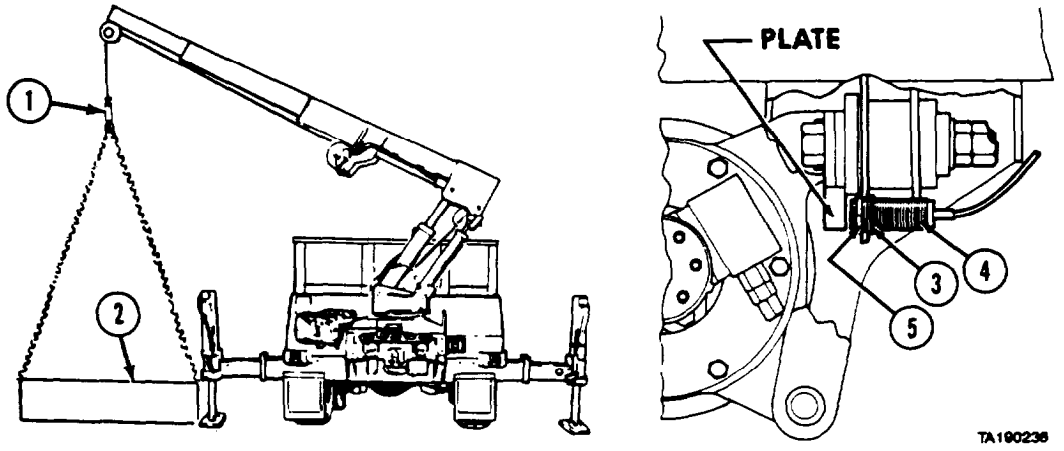
b. ***Follow-on Maintenance.*** Stow crane (TM 9-2320-279-10).

END OF TASK

M977, M905, and M984E1 Crane Maintenance Instructions (Cont)

17-33. OVERLOAD SENSOR SWITCH ADJUSTMENT (CONT).

b. Adjustment Main Overload (M977 Only).



NOTE

Main overload switch is located on left side of hoist looking from boom nose.

(1) Position hoist (1) at maximum boom angle over weight (2) and attach.

NOTE

- If hoist attempts to lift weight and stops, do steps (4) through (9).
- If hoist lifts weight and does not stop, do steps *(12)* through *(16).*

(2) Lift weight.
(3) If hoist attempts to lift weight and stops, do steps (4) through (9).
(4) Wait six seconds and lower weight.
(5) Loosen nut (3) 1/4 turn. Push switch (4) in toward plate.
(6) Tighten nut (5).
(7) Repeat steps (2) through (5) until weight can be lifted.
(8) Loosen nut (3) 1/4 turn. Tighten nut (5).
(9) Overload sensor switch is adjusted.
(10) Lift weight.
(11) If hoist lifts weight and does not stop, do steps (12) through (16).
(12) Lower weight.
(13) Loosen nut (5) 1/4 turn. Push switch (4) away from plate.
(14) Tighten nut (3).
(15) Repeat steps (8) through (10) until weight cannot be lifted.
(16) Loosen nut (5) 1/4 turn. Tighten nut (3). Overload sensor switch is adjusted.

c. Follow-on Maintenance. None.

END OF TASK

17-33.1 OVERLOAD SENSOR SWITCHES ADJUSTMENT (M984E1).

This task covers:

a. 7300 lb Adjustment
b. 10,000 lb Adjustment
c. 14,800 lb Adjustment
d. 16,700 lb Adjustment
e. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
7300 lb (3314 kg) Weight
10,000 lb (4540 kg) Weight
14,800 lb (6719 kg) Weight
16,700 lb (7582 kg) Weight

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Crane in operating condition on level ground.
TM 9-2320-279-10	Connect remote control.
TM 9-2320-279-10	Recovery system lowered.
Para 6-12.1	Boom angle switches adjusted.

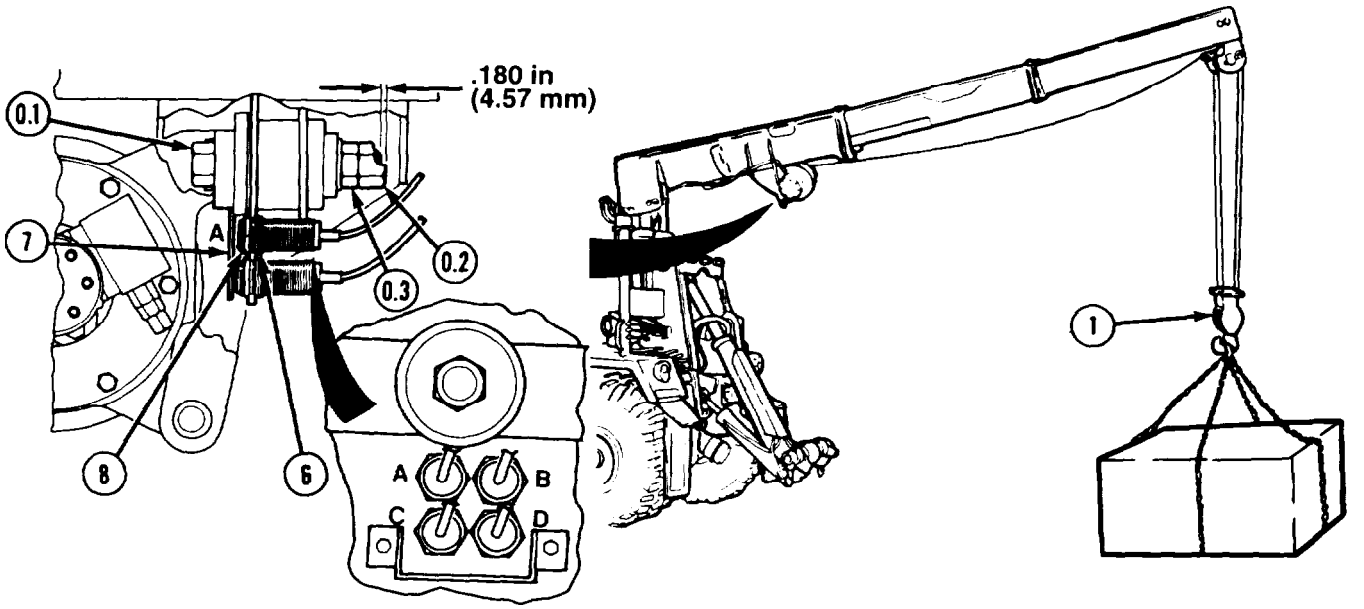
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

17-33.1. OVERLOAD SENSOR SWITCHES ADJUSTMENT (M984E1) (CONT).

a. 7300 lb Weight Adjustment.



(1) Measure the distance between the end of screw (0.1) and the face of nut (0.2). If measurement is 0.180 in. (4.57 mm), go to step (1.21. If measurement is not 0.180 in. (4.57 mm), go to step (1.1).

(1.1) Loosen nut (0.2) and adjust screw (0.1) with nut (0.3) to get a measurement of 0.180 in. (4.57 mm). Tighten nut (0.2).

CAUTION

- Be sure proper weight is used to adjust M984E1 crane, or equipment may be damaged.
- Do not operate crane with boom below horizontal when there is a load on hook.
- Use only HOIST control to lift and lower weight or damage to equipment could result.

NOTE

- Boom must be positioned between 0° and 25° during adjustment.
- Boom must be extended so that when the weight is lifted, cable is on fourth layer, against the right side of the drum (viewed from hook end of boom).

(1.2) Position hook block (1) over weight and attach.

(2) Deleted.

(3) Deleted.

(4) Lift weight.

NOTE

If hoist attempts to lift weight and stops, do steps (5) through (9).

If hoist lifts weight and does not stop do steps *(12)* through *(17).*

Operate hoist smoothly and slowly when performing test.

(5) Lower weight.

(6) Loosen nut (6) 1/8 to 1/4 turn. Push switch A in toward plate (7).

(7) Tighten nut (8).

(8) Repeat steps (4) through (7) until weight can be lifted.
(9) Loosen nut (8) 1/8 to 1/4 turn and tighten nut (6). Overload sensor switch A is adjusted.
(10) Deleted.
(11) Deleted.
(12) Lower weight.
(13) Loosen nut (8) 1/8 to 1/4 turn. Push switch A away from plate (7).
(14) Tighten nut (6).
(15) Attempt to lift weight. Repeat steps *(12)* through *(14)* until weight cannot be lifted.
(16) Loosen nut (6) 1/8 to 1/4 turn. Tighten nut (8). Overload sensor switch is adjusted.
(17) Deleted.

b. 10,000 lb Weight Adjustment.

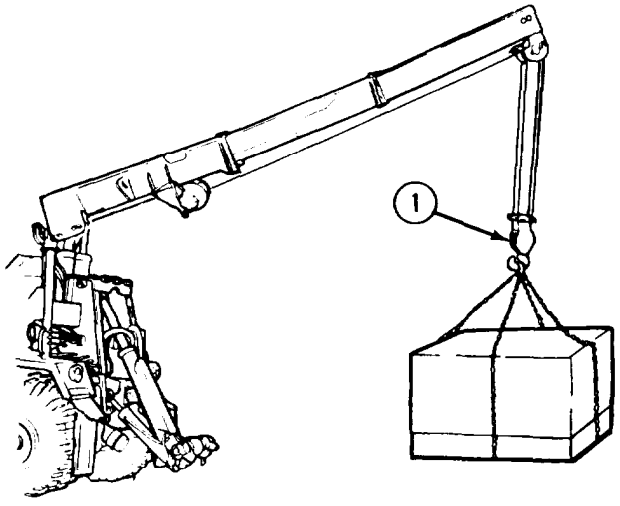
CAUTION

- Be sure proper weight is used to adjust M984E1 crane, or equipment may be damaged.
- Do not operate crane with boom below horizontal when there is a load on hook.
- Use only HOIST control to lift and lower weight or damage to equipment could result.

NOTE

- Boom must be positioned between 25° and 30° during adjustment.
- Boom must be extended so that when the weight is lifted, cable is on fourth layer, against the left side of the drum (viewed from hook end of boom).

(1) Position hook block (1) over weight and attach.
(2) Deleted.
(3) Deleted.
(4) Lift weight.

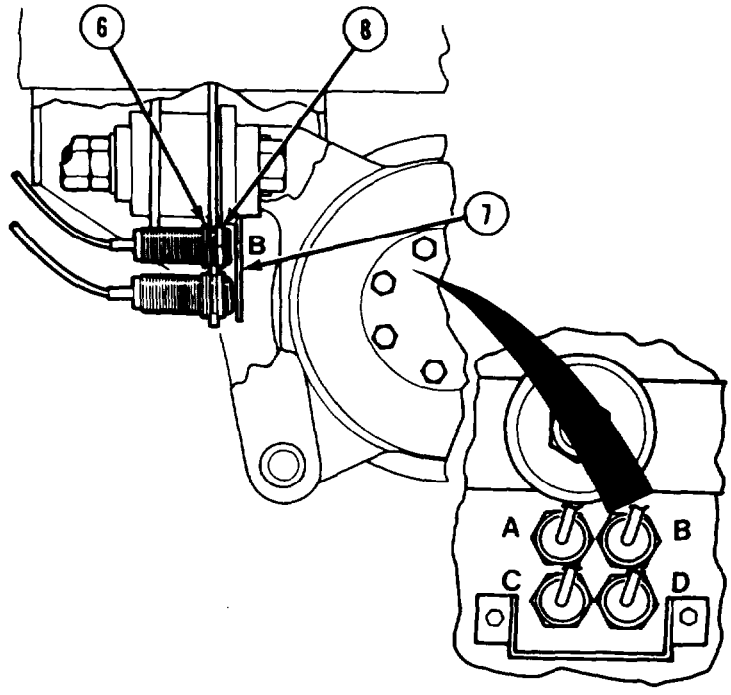


17-33.1. OVERLOAD SENSOR SWITCHES ADJUSTMENT (M984E1) (CONT).

NOTE

- If hoist attempts to lift weight and stops, do steps (5) through (9).
- If hoist lifts weight and does not stop, do steps (12) through (17).
- Operate hoist smoothly and slowly when performing test.

(5) Lower weight.
(6) Loosen nut (6) 1/8 to 1/4 turn. Push switch B in toward plate (7).
(7) Tighten nut (8).
(8) Repeat steps (4) through (7) until weight can be lifted.
(9) Loosen nut (8) 1/8 to 1/4 turn and tighten nut (6). Overload sensor switch B is adjusted.
(10) Deleted.
(11) Deleted.
(12) Lower weight.
(13) Loosen nut (8) 1/8 to 1/4 turn. Push switch B away from plate (7).
(14) Tighten nut (6).
(15) Attempt to lift weight. Repeat steps (12) through (14) until weight cannot be lifted.
(16) Loosen nut (6) 1/8 to 1/4 turn. Tighten nut (8). Overload sensor switch B is adjusted.
(17) Deleted.



M977, M985, and M984El Crane Maintenance Instructions (Cont)

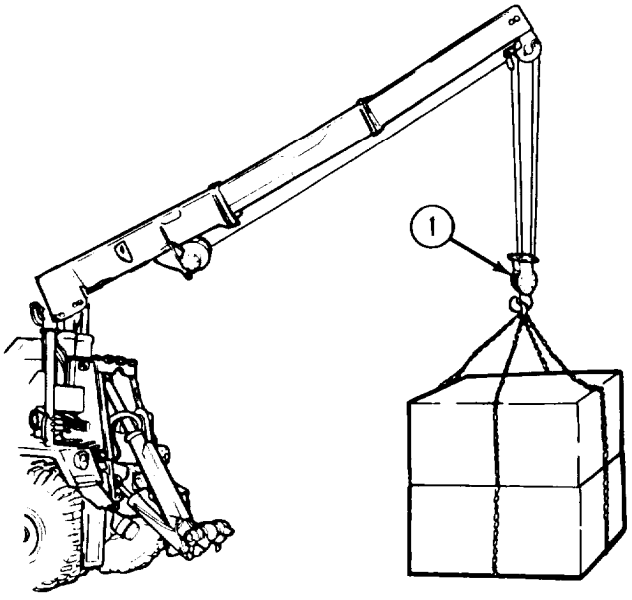
c. 14,800 lb Weight Adjustment,

CAUTION

- Be sure proper weight is used to adjust M984E1 crane, or equipment may be damaged.
- Do not operate crane with boom below horizontal when there is a load on hook.
- Use only HOIST control to lift and lower weight or damage to equipment could result.

NOTE

- Boom must be positioned between 30° and 40° during adjustment.
- Boom must be extended so that when the weight is lifted, cable is on fifth layer, against the right side of the drum (viewed from hook end of boom).



(1) Position hook block (1) over weight and attach.
(2) Deleted.
(3) Deleted.
(4) Lift weight.

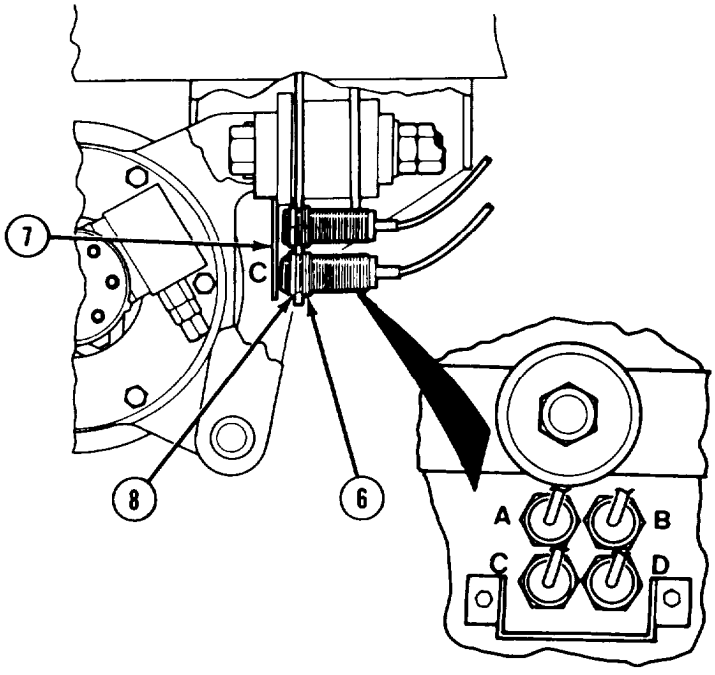
NOTE

If hoist attempts to lift weight and stops, do steps (5) through *(9).*

If hoist lifts weight and does not stop, do steps *(13)* through *(18).*

Operate hoist smoothly and slowly when performing test.

(5) Lower weight.
(6) Loosen nut (6) 1/8 to 1/4 turn. Push switch C in toward plate (7).
(7) Tighten nut (8).
(8) Attempt to lift weight. Repeat steps (5) through (7) until weight can be lifted.
(9) Loosen nut (8) 1/8 to 1/4 turn and tighten nut (6). Overload sensor switch C is adjusted.
(10) Deleted.
(11) Deleted.
(12) Deleted.
(13) Lower weight.
(14) Loosen nut (8) 1/8 to 1/4 turn. Push switch C away from plate (7).
(15) Tighten nut (6).
(16) Attempt to lift weight. Repeat steps *(13)* through *(15)* until weight cannot be lifted.



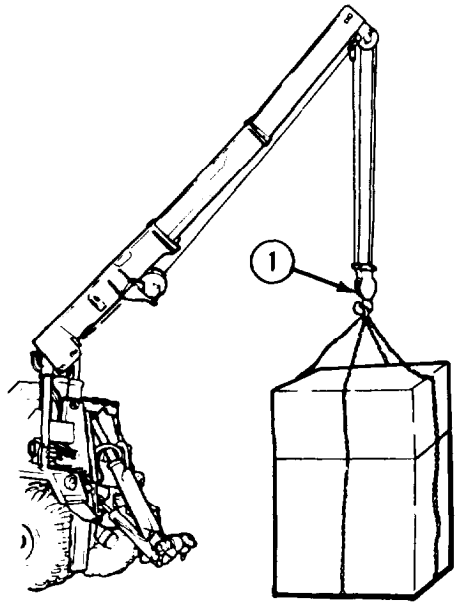
(17) Loosen nut (6) 1/8 to 1/4 turn. Tighten nut (8). Overload sensor switch C is adjusted.
(18) Deleted.

17-33.1. OVERLOAD SENSOR SWITCHES ADJUSTMENT (M984E1) (CONT).

d. 16,700 lb Weight Adjustment.

CAUTION

- Be sure proper weight is used to adjust M984E1 crane, or equipment may be damaged.
- Do not operate crane with boom below horizontal when there is a load on hook.
- Use only HOIST control to lift and lower weight or damage to equipment could result.



NOTE

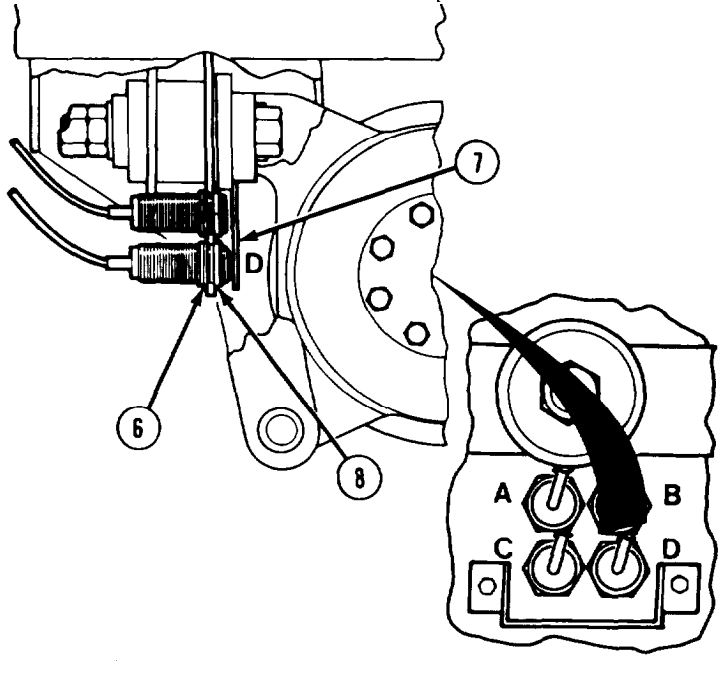
- Boom must be positioned between 40° and maximum boom angle during adjustment.
- Boom must be extended so that when the weight is lifted, cable is on fourth layer, against the left side of the drum (viewed from hook end of boom).

(1) Position hook block (1) over weight and attach.
(2) Deleted.
(3) Deleted.
(4) Lift weight.

NOTE

- If hoist attempts to lift weight and stops, do steps *(5)* through *(9).*
- If hoist lifts weight and does not stop, do steps *(12)* through *(17).*

Operate hoist smothly and slowly when performing test.



(5) Lower weight.
(6) Loosen nut (6) 1/8 to 1/4 turn. Push switch D in toward plate (7).
(7) Tighten nut (8).
(8) Repeat steps *(4)* through *(7)* until weight can be lifted.
(9) Loosen nut (8) 1/8 to 1/4 turn. Tighten nut (6). Overload sensor switch D is adjusted.
(10) Deleted.
(11) Deleted.
(12) Lower weight.
(13) Loosen nut (8) 1/8 to 1/4 turn. Push switch D away from plate (7).
(14) Tighten nut (6).
(15) Attempt to lift weight. Repeat steps *(12)* through *(14)* until weight cannot be lifted.
(16) Loosen nut (6) 1/8 to 1/4 turn. Tighten nut (8). Overload sensor switch D is adjusted.
(17) Deleted.

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

e. Follow-on Maintenance.

(1) Disconnect remote control (TM 9-2320-279-10).
(2) Stow crane (TM 9-2320-279-10).
(3) Deleted.
(4) Return recovery system to stowed position (TM 9-2320-279-10).

END OF TASK

Section VII. OUTRIGGERS

17-34. OUTRIGGER REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

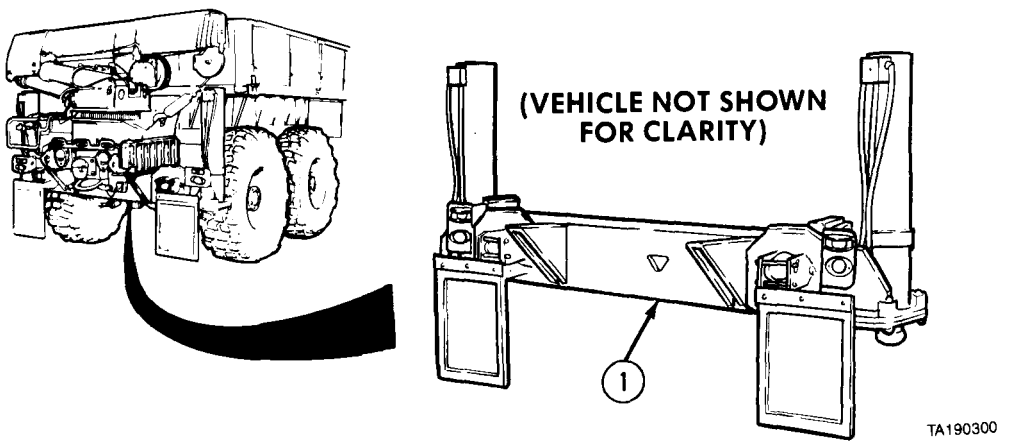
TM or Para	*Condition Description*
Para 17-2	Outrigger hydraulic hoses and tubes disconnected.
TM 9-2320-279-20	Rear fenders removed.
TM 9-2320-279-20	Rear cable guide removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.



(1) Position suitable lifting device to support outrigger assembly (1).

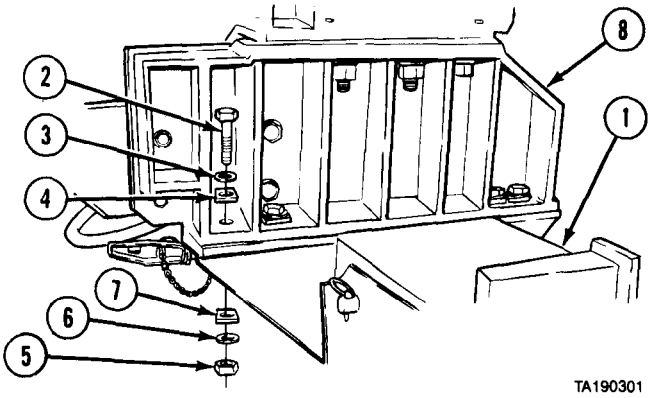
17-34. OUTRIGGER REMOVAL/INSTALLATION (CONT).

WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

NOTE

Right and left side outrigger mounting hardware is removed the same way. Right side is shown.

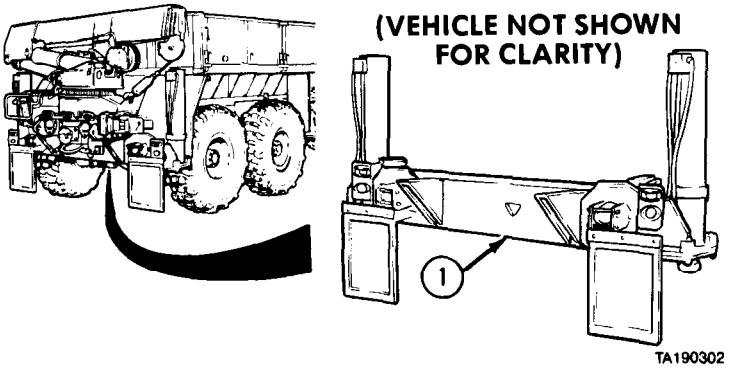


TA190301

(2) Soldier A removes four screws (2), washers (3), and spacers (4) while Soldier B removes four nuts (5), washers (6), and spacers (7) from mounting bracket (8).
(3) Repeat step *(2)* for other side.
(4) Remove outrigger assembly (1).

b. Installation.

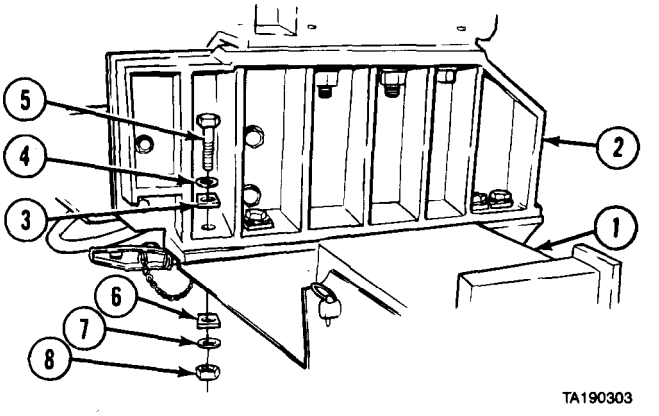
(1) Position outrigger assembly (1).



TA190302

NOTE

Right and left side outrigger mounting hardware is installed the same way. Right side is shown.



TA190303

(2) Soldier A installs outrigger assembly (1) on mounting bracket (2) with four spacers (3), washers (4), and screws (5) while Soldier B installs four spacers (6), washers (7), and nuts (8).
(3) Repeat step *(2)* for other side.

c. Follow-on Maintenance.

(1) Install cable guide (TM 9-2320-279-20).
(2) Install rear fenders (TM 9-2320-279-20).
(3) Connect outrigger hydraulic hoses and tubes (para 17-2).

END OF TASK

17-35. OUTRIGGER LEG CYLINDER REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

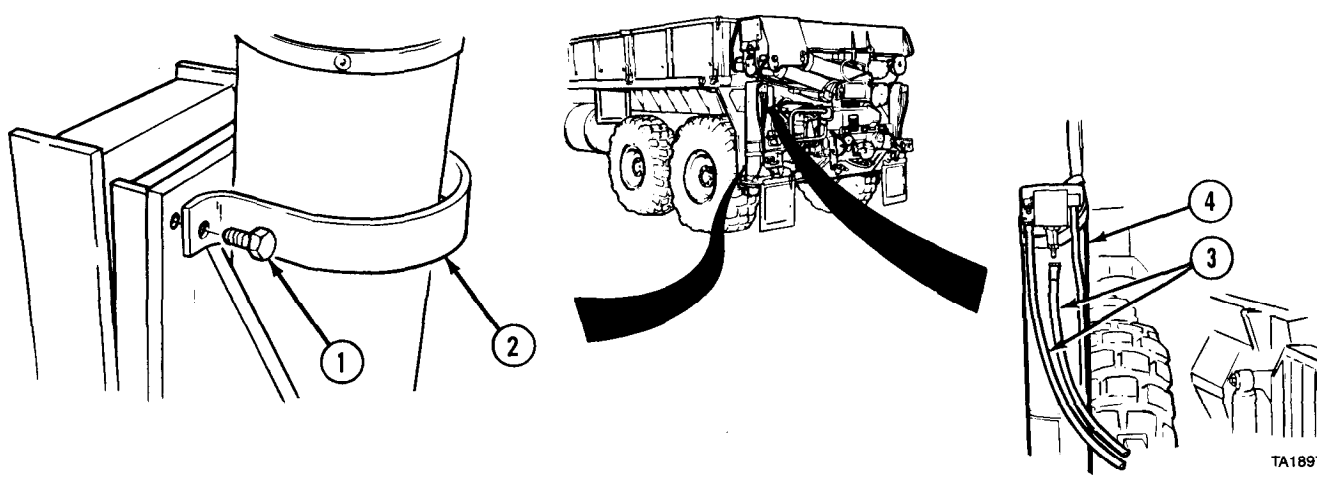
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.



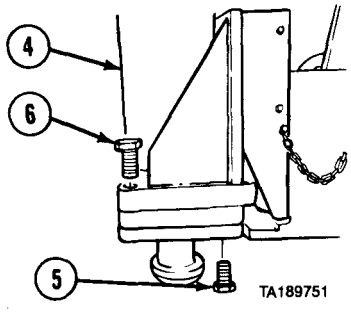
NOTE

- Left and right cylinders are removed the same way.
- Remove all clamps as necessary.

(1) Remove two screws (1) and bracket (2).
(2) Remove two hydraulic lines (3).
(3) Attach suitable lifting device to cylinder (4).

17-35. OUTRIGGER LEG CYLINDER REMOVAL/INSTALLATION (CONT).

(4) Remove two screws (5) and two screws (6).
(5) Remove cylinder (4).

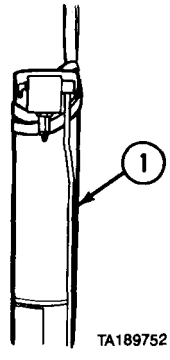


b. Installation.

NOTE

Left and right cylinders are installed the same way.

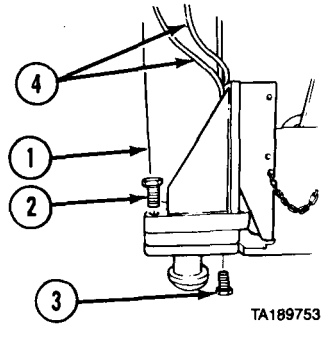
(1) Attach suitable lifting device to cylinder (1).



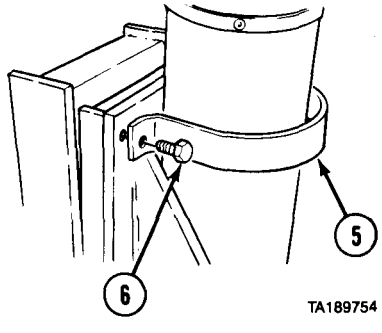
NOTE

Install clamps as necessary.

(2) Install cylinder (1) with two screws (2) and two screws (3).
(3) Install two hydraulic lines (4).



(4) Install bracket (5) and two screws (6).



c. Follow-on Maintenance. None.

END OF TASK

17-36. OUTRIGGER LEG CYLINDER REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Oil, lubricating, Item 47.1, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Outrigger leg cylinder on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

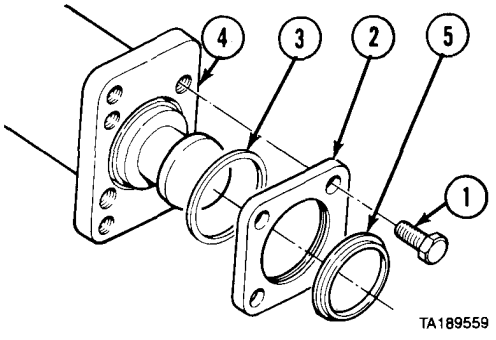
Level of Maintenance
General Support

a. Disassembly.

NOTE

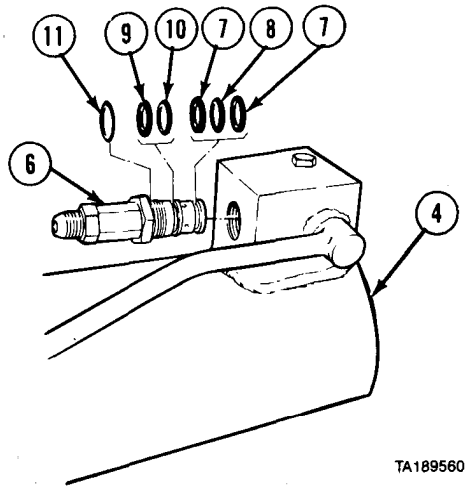
Backup ring may stay in cylinder.

(1) Remove two screws (1), plate (2), and backup ring (3) from cylinder (4).
(2) Remove wiper ring (5) from plate (2).



TA189559

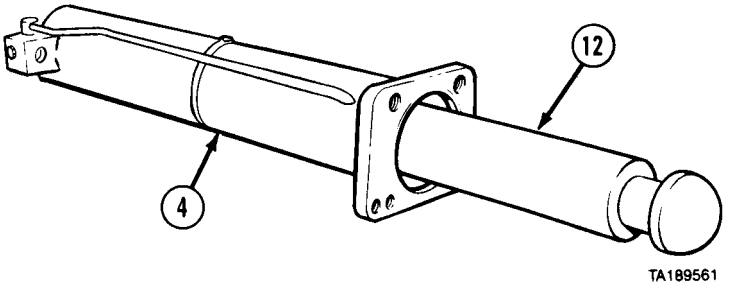
(3) Remove holding valve (6) from cylinder (4).
(4) Remove two backup rings (7) and preformed packing (8).
(5) Remove backup ring (9) and preformed packing (10).
(6) Remove preformed packing (11).



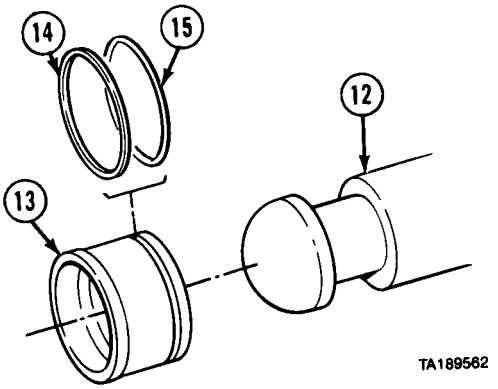
TA189560

17-36. OUTRIGGER LEG CYLINDER REPAIR (CONT).

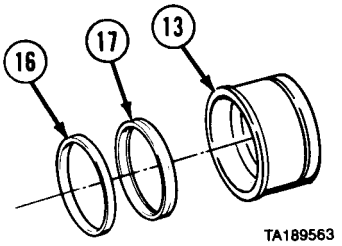
(7) Remove rod assembly (12) from cylinder (4).



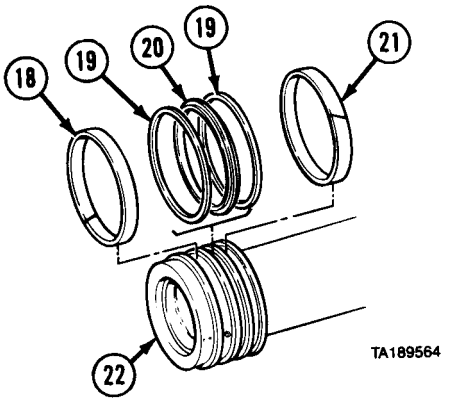
(8) Remove head (13) from rod (12).
(9) Remove backup ring (14) and preformed packing (15)



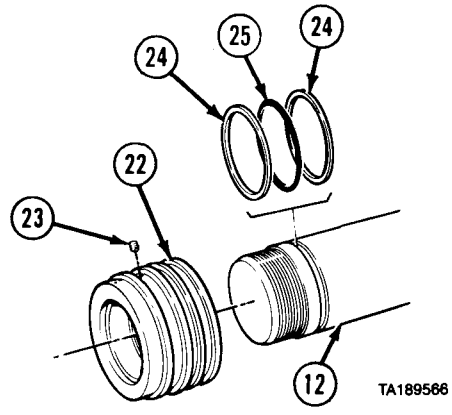
(10) Remove seal (16) and wear ring (17) from head (13).



(11) Remove wear ring (18), two backup rings (19), preformed packing (20), and wear ring (21) from piston (22).



(12) Remove setscrew (23).
(13) Remove piston (22) from rod (12).
(14) Remove two backup rings (24) and preformed packing (25).



b. Cleaning/Inspection.

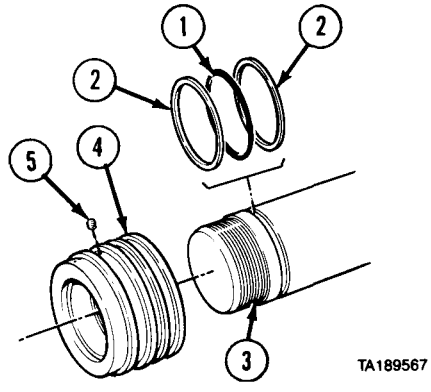
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

c. Assembly.

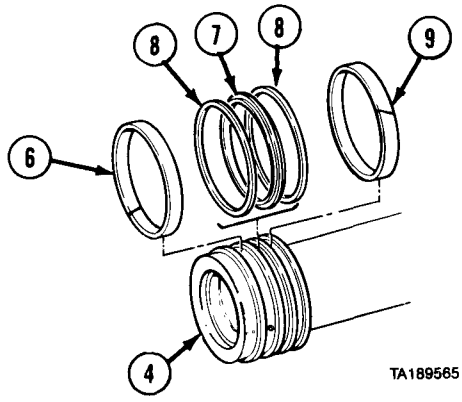
(1) Install preformed packing (1) and two backup rings (2) on rod (3).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

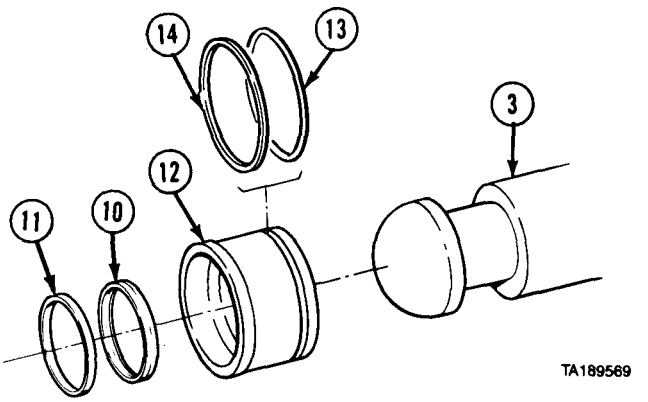
(2) Apply sealing and thread locking compound and install piston (4).
(3) Install setscrew (5).



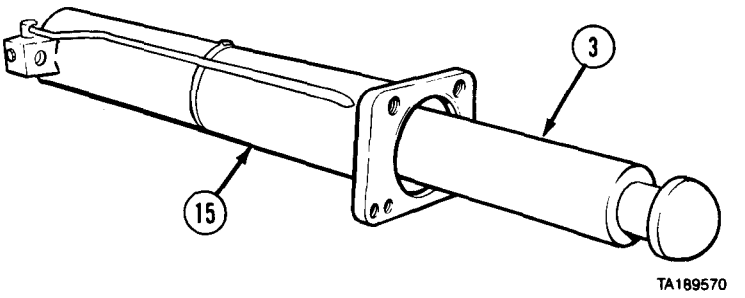
(4) Install wear ring (6), preformed packing (7), two backup rings (8), and wear ring (9) on piston (4).

17-36. OUTRIGGER LEG CYLINDER REPAIR (CONT).

(5) Install wear ring (10) and seal (11) in head (12).
(6) Install preformed packing (13) and backup ring (14).
(7) Install head (12) on rod (3).



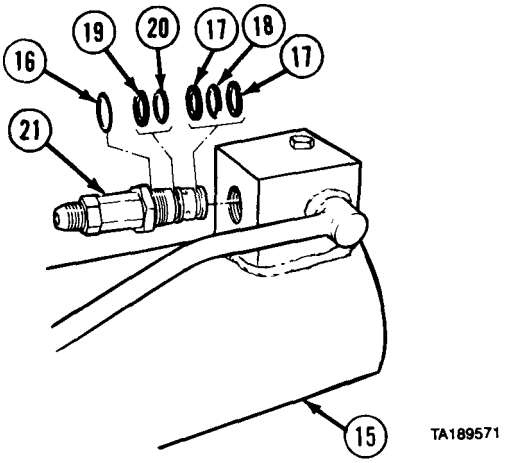
(8) Install rod assembly (3) in cylinder (15).



NOTE

Apply lubricant to preformed packings before installing.

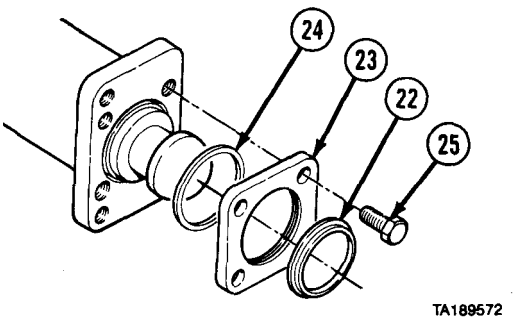
(9) Install preformed packing (16), two backup rings (17), preformed packing (18), backup ring (19), and preformed packing (20).
(10) Install holding valve (21) in cylinder (15).



(11) Install wiper ring (22) in plate (23).
(12) Install backup ring (24), plate (23), and two screws (25).

d. Follow-on Maintenance. None.

END OF TASK



17-36.1. OUTRIGGER LEG CYLINDER REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

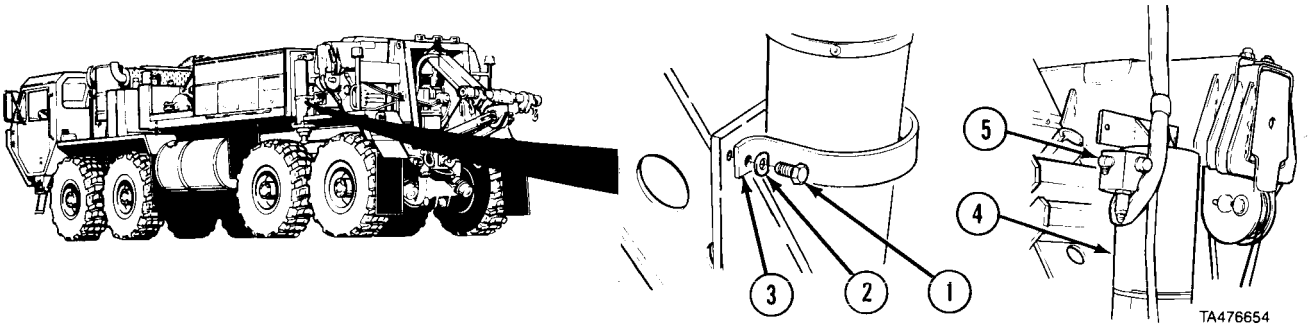
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Outrigger pad removed.
TM 9-2320-279-10	Crane positioned for access.
Para 17-2.1	Leg cylinder hydraulic hoses removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

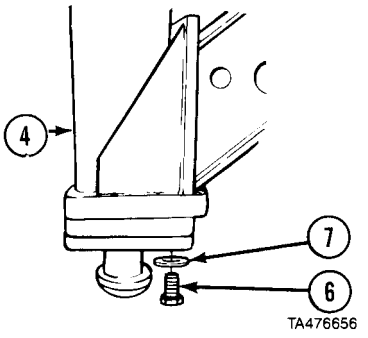


NOTE

Left and right cylinders are removed the same way.

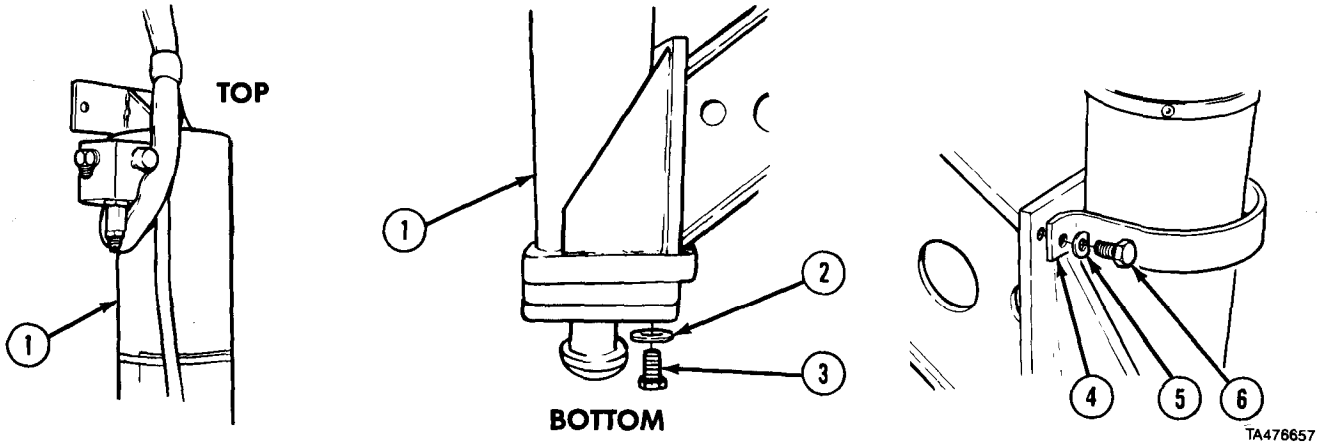
(1) Remove two screws (1), washers (2), and strap (3).
(2) Attach suitable lifting device to cylinder (4).
(3) Remove fitting (5).

(4) Remove four screws (6) and washers (7).
(5) Remove cylinder (4).



17-36.1. Outrigger LEG Cylinder REMOVAL/INSTALLATION (M984E1) (CONT).

b. Installation.



(1) Attach suitable lifting device to cylinder(1).
(2) Install cylinder (1) with four washers (2), and screws (3).
(3) Install strap (4), two washers (5), and screws (6).

c. Follow-on Maintenance.

(1) Connect hydraulic hoses (para 17-2.1).
(2) Install outrigger pads (TM 9-2320-279-10).
(3) Crane stowed (TM 9-2320-279-10).

END OF TASK

17-36.2. OUTRIGGER LEG CYLINDER REPAIR (M984E1).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing, thread locking, Item 25, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-36.1	Outrigger cylinder removed.

Special Environmental Conditions
None

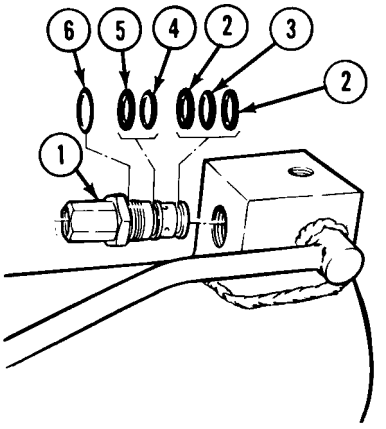
General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.

(1) Remove holding valve (1).

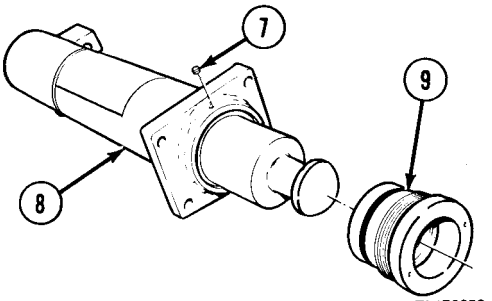
(2) Remove two backup rings (2), preformed packing (3), preformed packing (4), backup ring (5), and preformed packing (6) from holding valve (1).



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(3) Remove setscrew (7) from cylinder (8).

(4) Remove head (9) from cylinder (8).

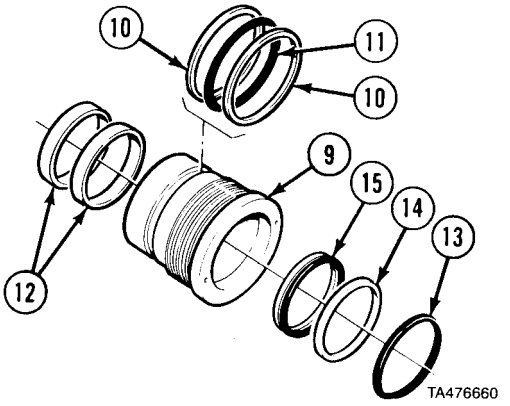


TA476659

(5) Remove two backup rings (10) and preformed packing (11) from head (9).

(6) Remove two wear rings (12).

(7) Remove wiper ring (13), backup ring (14), and seal (15).

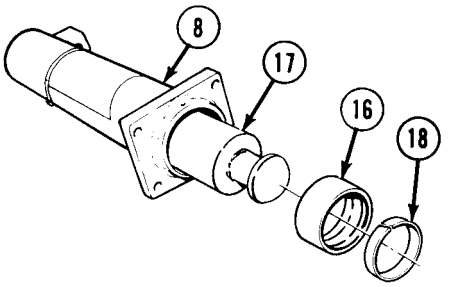


TA476660

(8) Remove spacer (16) from rod (17).

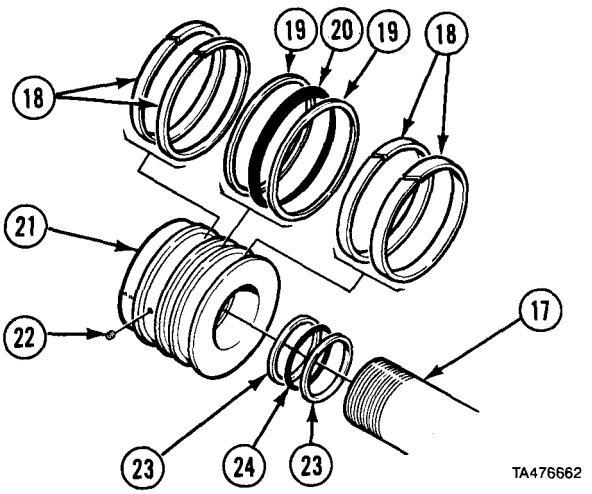
(9) Remove wear ring (18) from spacer (16).

(10) Remove rod (17) from cylinder (8).



TA476661

17-36.2. OUTRIGGER LEG CYLINDER REPAIR (M984E1) (CONT).



(11) Remove four wear rings (18), two backup rings (19), and preformed packing (20) from piston (21).
(12) Remove setscrew (22) and piston (21) from rod (17).
(13) Remove two backup rings (23) and preformed packing (24) from piston (21).

b. Cleaning/Inspection.

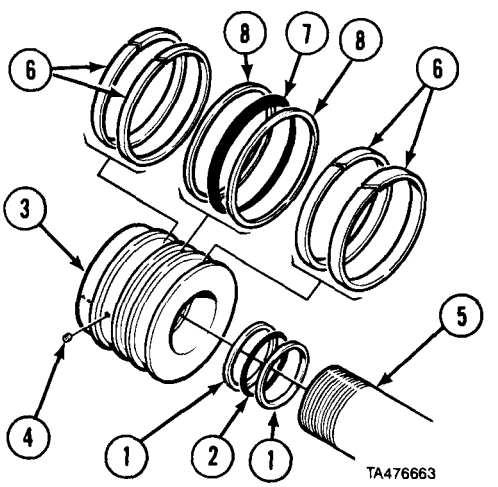
WARNING

- Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.
- Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

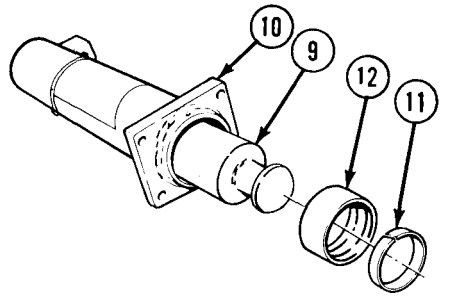
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Replace all wear rings and backup rings.

c. Assembly.

(1) Install two backup rings (1) and preformed packing (2) in piston (3).
(2) Install piston (3) and setscrew (4) on rod (5).
(3) Install four wear rings (6), preformed packing (7), and two backup rings (8) on piston (3).



(4) Install rod (9) in cylinder (10).
(5) Install wear ring (11) in spacer (12).
(6) Install spacer (12) on rod (9).

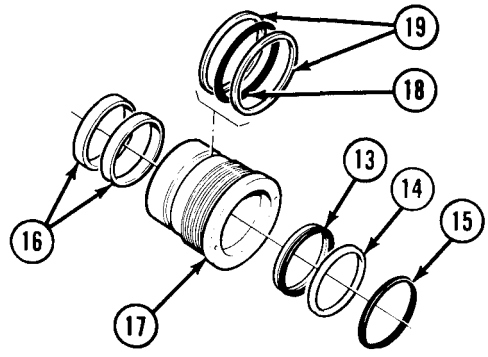


TA476664

NOTE

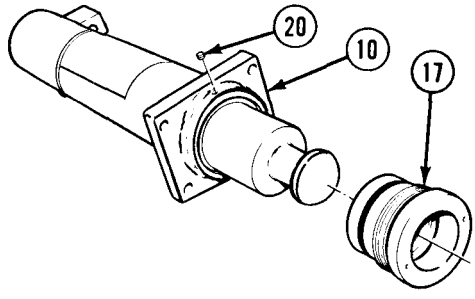
Seal is installed with small lip down.

(7) Install seal (13), backup ring (14), wiper ring (15), and two wear rings (16) in head (17).
(8) Install preformed packing (18) and two backup rings (19) on head (17).



TA476665

(9) Apply compound and install head (17) on cylinder (10).
(10) Aline and install setscrew (20).

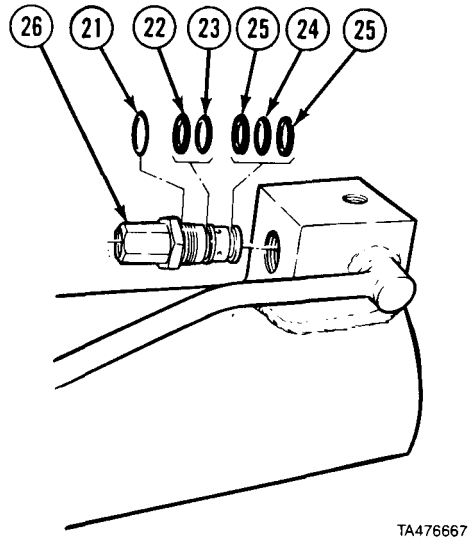


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(11) Install preformed packing (21), backup ring (22), preformed packing (23), preformed packing (24), and two backup rings (25) on valve (26).
(12) Install valve (26).

d. Follow-on Maintenance.
(1) Install leg cylinder (para 17-36.1)
(2) Check for leaks.

END OF TASK



TA476667

17-37. OUTRIGGER EXTENSIONS REMOVAL/INSTALLATION.

This task covers:

a. Removal (M985)
b. Installation (M985)
c. Removal (M977)
d. Installation (M977)
e. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Grease, automotive and artillery, Item 34, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

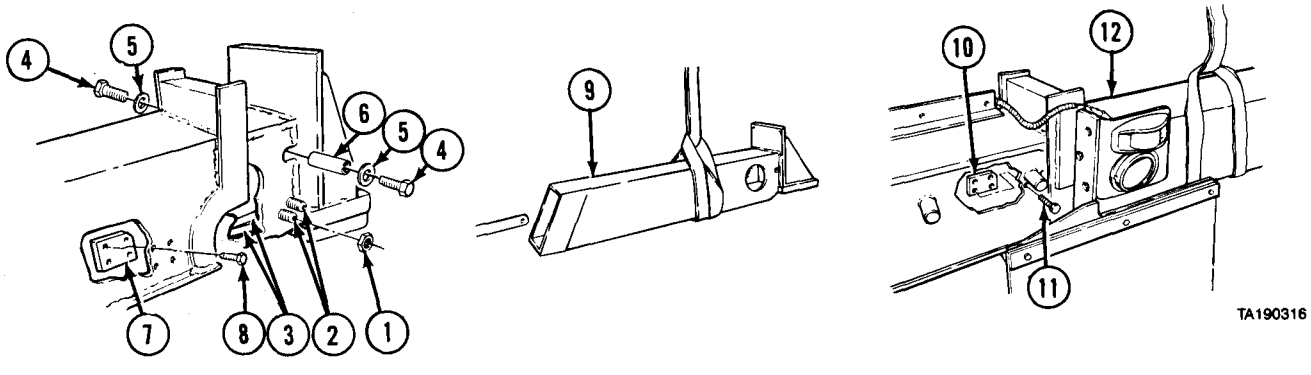
TM or Para	*Condition Description*
TM 9-2320-279-20	Outrigger fully extended.
Para 17-36	Outrigger leg cylinder removed.
TM 9-2320-279-20	Fenders removed (M985 only).
TM 9-2320-279-20	Outrigger pads removed (M985 only).

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal (M985).



NOTE

Right and left extensions are removed the same way.

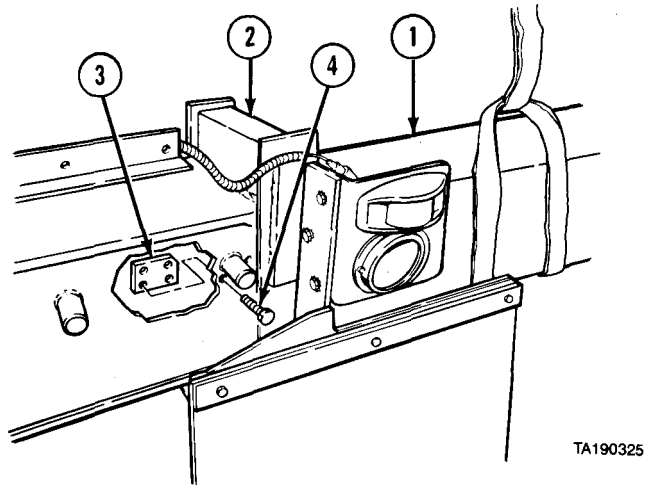
(1) Remove two nuts (1) from fittings (2).
(2) Remove two fittings (2) from hoses (3).
(3) Remove two screws (4), washers (5), and pin (6).
(4) Mark two stop blocks (7) and remove eight screws (8) and two stop blocks.
(5) Attach suitable lifting device.
(6) Remove extension No. 1 (9).
(7) Mark two stop blocks (10) and remove six screws (11) and two stop blocks.
(8) Attach suitable lifting device.
(9) Remove extension No. 2 (12).

b. Installation (M985).

NOTE

Right and left extensions are installed the same way.

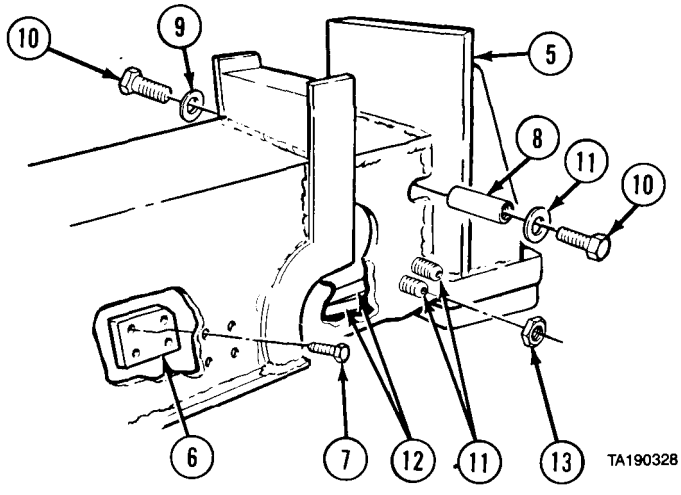
(1) Install extension No. 2 (1) in beam (2).
(2) Install two stop blocks (3) and six screws (4).



NOTE

Be sure hoses go through guide tubes in extension No. 1.

(3) Install extension No. 1 (5) in extension No. 2 (1).
(4) Install two stop blocks (6) with eight screws (7).
(5) Aline rod and install pin (8) with two washers (9) and screws (10).
(6) Install two fittings (11) on hoses (12).
(7) Install two nuts (13) on fittings (11).

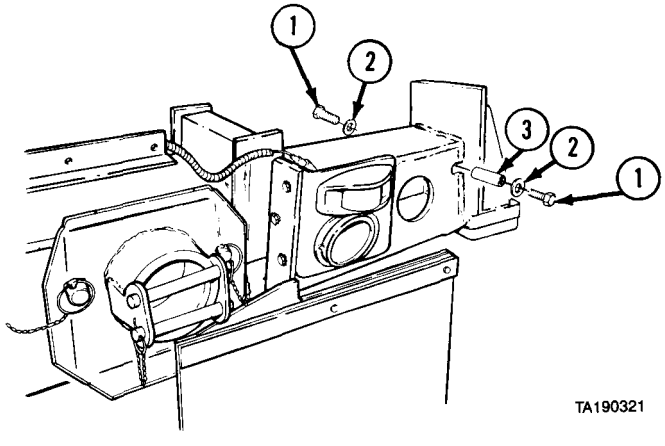


c. Removal (M977).

NOTE

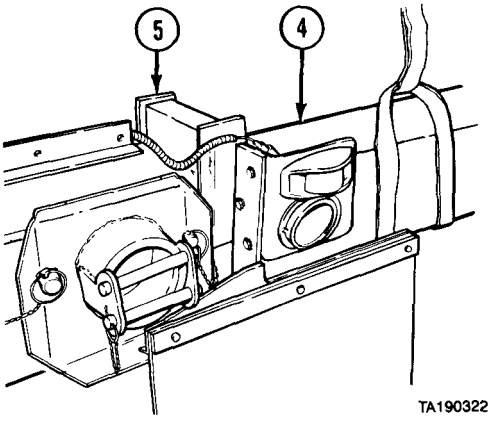
Right and left extensions are removed the same way.

(1) Remove two screws (1), washers (2), and pin (3).



17-37. OUTRIGGER EXTENSIONS REMOVAL/INSTALLATION (CONT).

(2) Attach suitable lifting device.
(3) Remove extension (4) from beam (5).

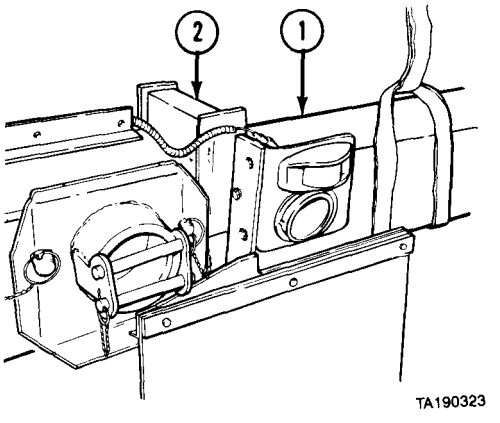


d. Installation (M977).

NOTE

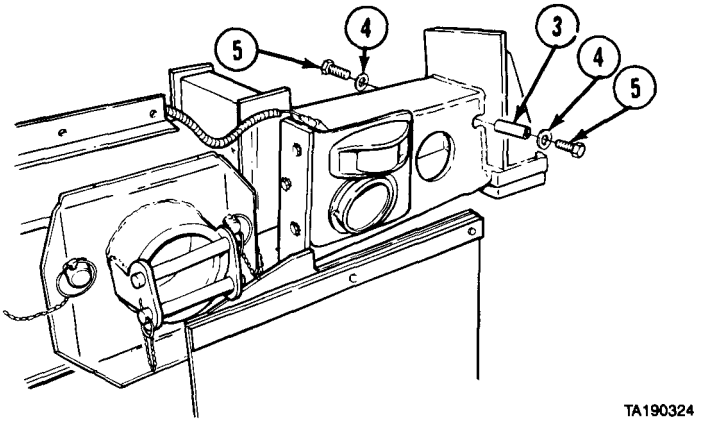
Right and left extensions are installed the same way.

(1) Install extension (1) in beam (2).



(2) Install pin (3), two washers (4), and screws (5).

e. Follow-on Maintenance.
(1) Install outrigger leg cylinder (para 17-36).
(2) Install hoses and tubes (para 17-2).
(3) Install fenders (TM 9-2320-279-20) (M985 only).
(4) Install outrigger pads (TM 9-2320-279-20) (M985 only).



END OF TASK

M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

17-38. OUTRIGGER EXTENSION CYLINDER REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (3)

References
None

Equipment Condition

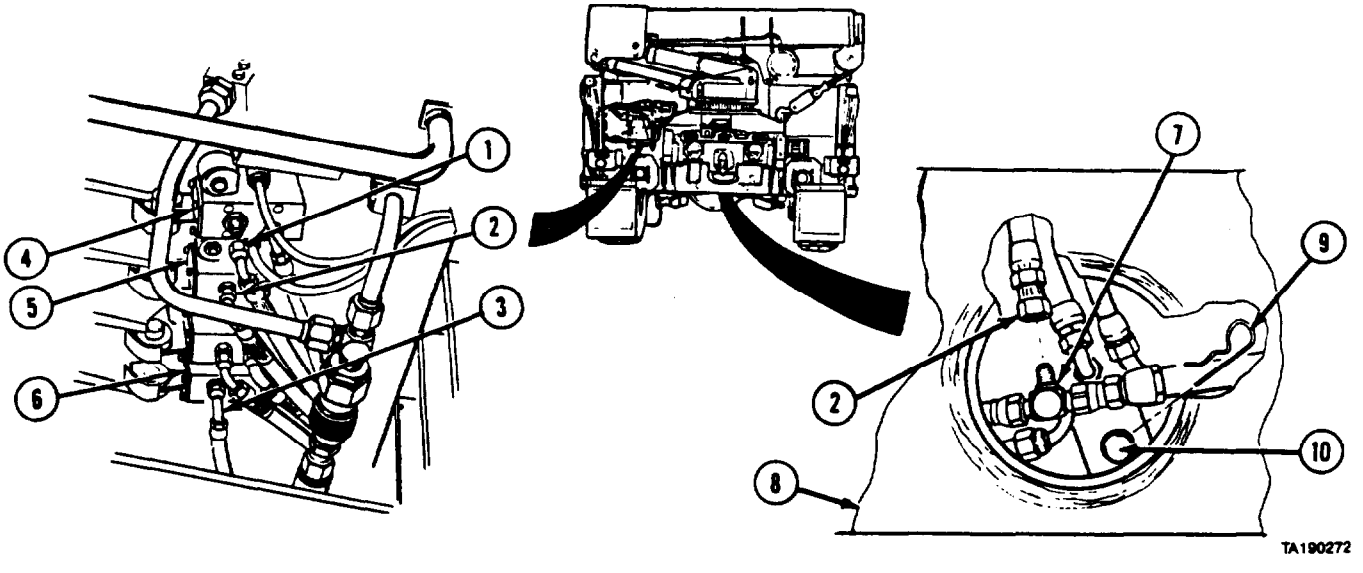
TM or Para	*Condition Description*
Para 17-38	Outrigger extensions removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.



NOTE

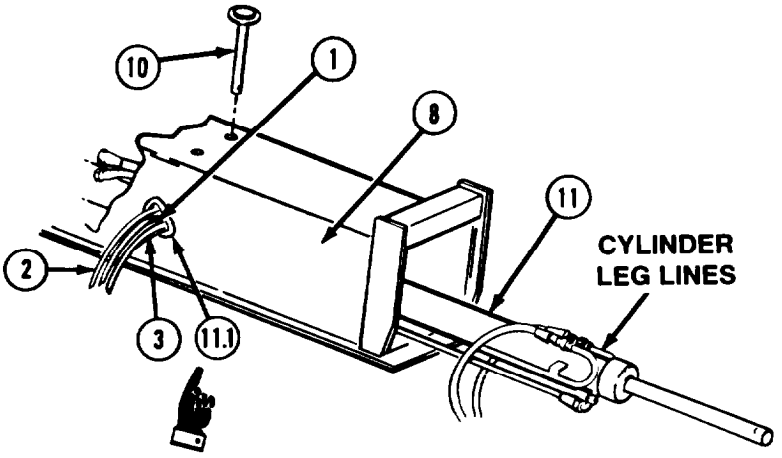
Tag and mark hoses before disconnecting.

(1) Disconnect six hoses (1, 2, and 3) from valve bodies (4, 5, and 6).
(2) Disconnect one hose (2) from tee (7) and remove from beam (8).
(3) Remove two quick pins (9) from pins (10).

17-38. OUTRIGGER EXTENSION CYLINDER REMOVAL/INSTALLATION (CONT).

(4) Remove two pins (10).

(5) Soldier A guides five hoses (1, 2, and 3) through hole in beam (8) while Soldier B removes cylinder (11) and hoses (1,2, and 3).



NOTE

Some models of beams have plastic edge protection around opening for hoses. Do step (5.1) for this model.

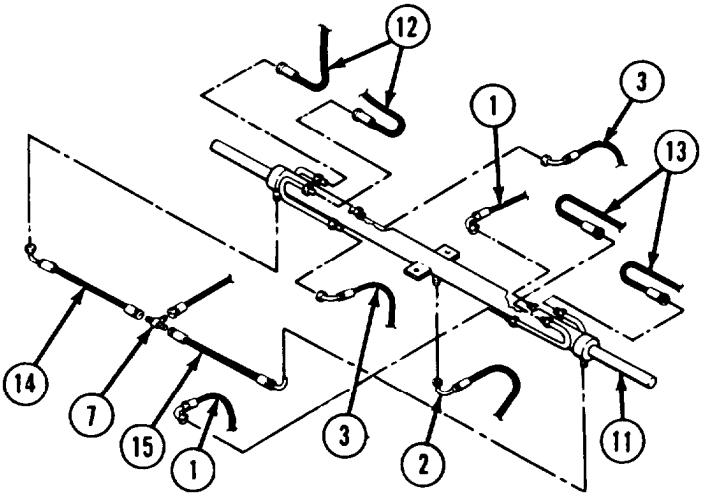
(5.1) If damaged, remove plastic edge protection (11.1) from hose opening in beam (8).

(6) Disconnect four hoses (12 and 13).

(7) Disconnect two hoses (14 and 15) and hose (2) from cylinder (11).

(8) Remove tee (7) from hoses (14 and 15).

(9) Disconnect four hoses (1 and 3) from cylinder (11).



b. Installation.

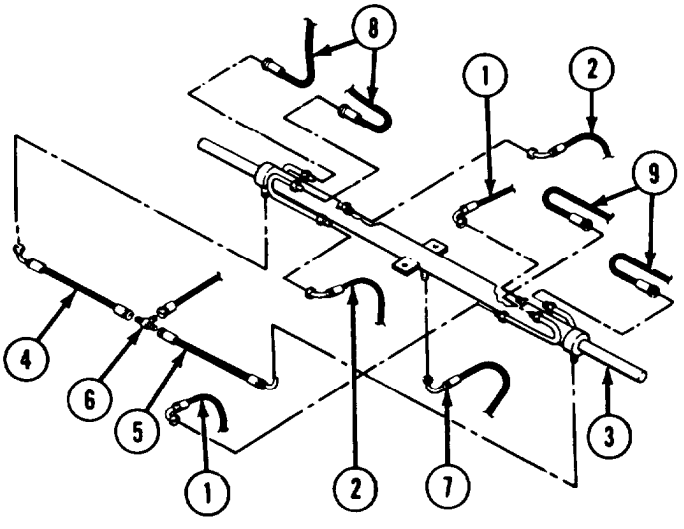
(1) Connect four hoses (1 and 2) to cylinder (3).

(2) Connect two hoses (4 and 5) with tee (6).

(3) Connect hoses (4 and 5) to cylinder (3).

(4) Connect hose (7) to cylinder (3).

(5) Connect four hoses (8 and 9) to cylinder (3).



M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

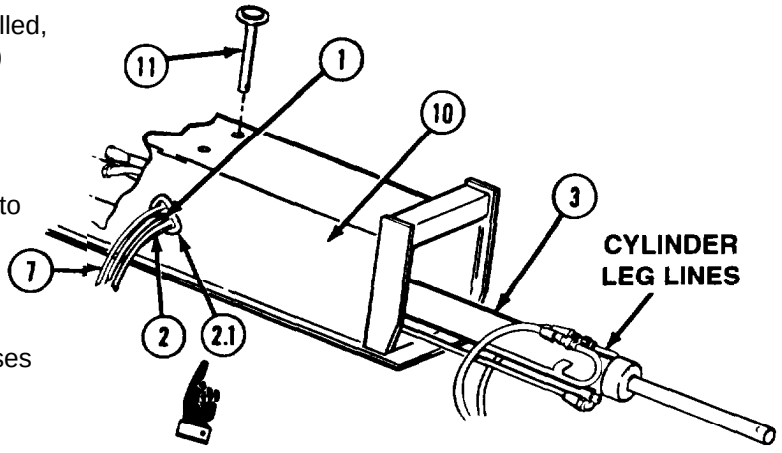
(5.1) If removed or not previously installed, install plastic edge protection (2.1) around hose opening in beam (10).

NOTE

Two hoses for leg cylinder must be kept on bottom of cylinder while being fed through to other side.

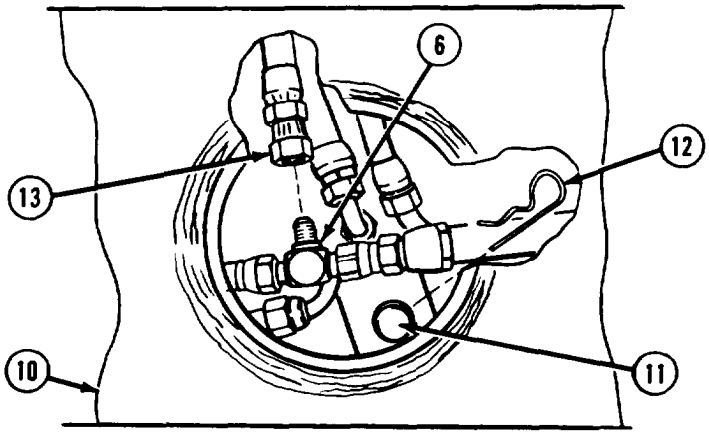
(6) Soldier A and Soldier B install cylinder (3) in beam (10) while Soldier C guides and pulls five hoses (1, 2, and 7) through hole in beam (10).

(7) Aline cylinder (3) and install two pins (11).

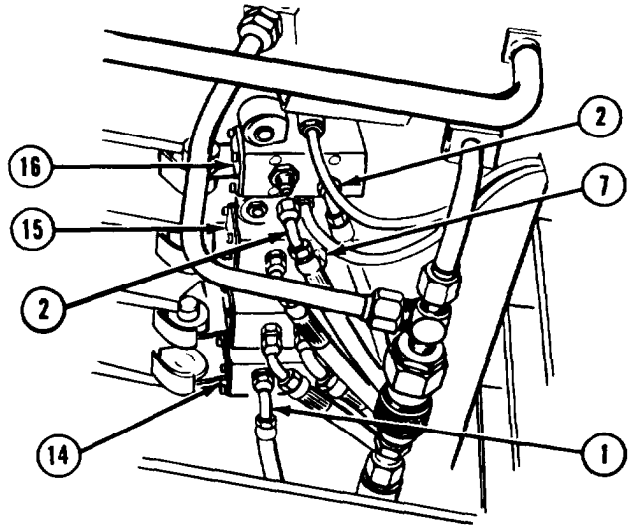


(8) Install two quick pins (12) on pins (11).

(9) Install hose (13) in beam (10) and connect to tee (6).



(10) Connect six hoses (1, 2, and 7) to valve bodies (14, 15, and 16).



c. Follow-on Maintenance. Install outrigger extensions (para 17-38).

END OF TASK

17-38.1 OUTRIGGER OUTER BEAM AND EXTENSION CYLINDER REMOVAL/ INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

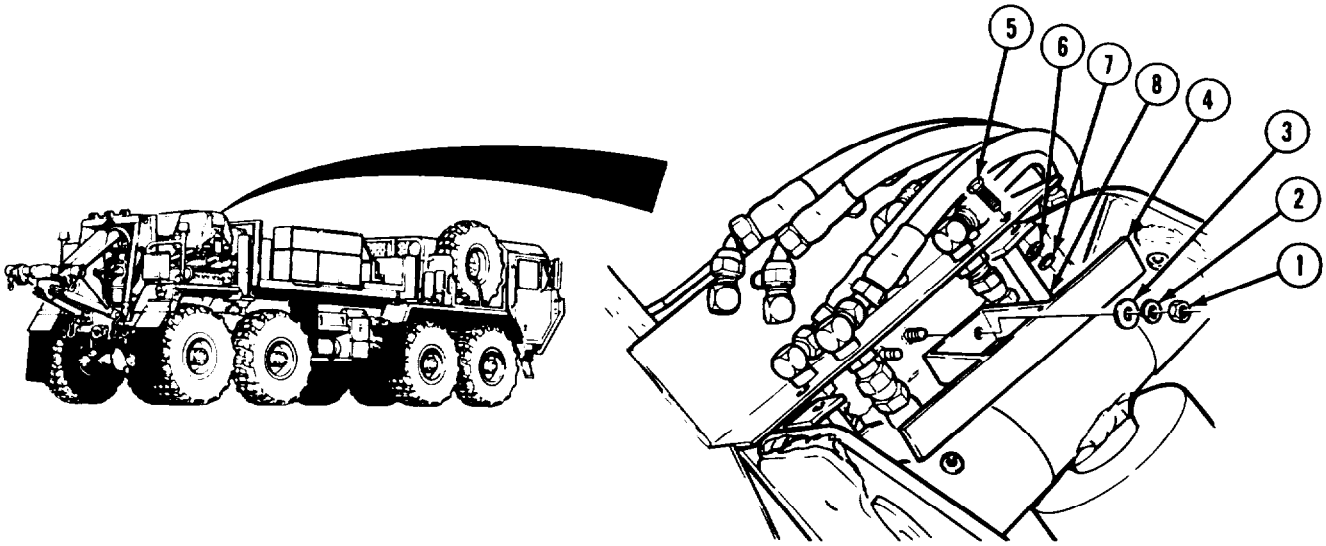
TM or Para	*Condition Description*
Para 17-36.1	Outrigger leg cylinder removed.
TM 9-2320-279-20	Outrigger cover removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

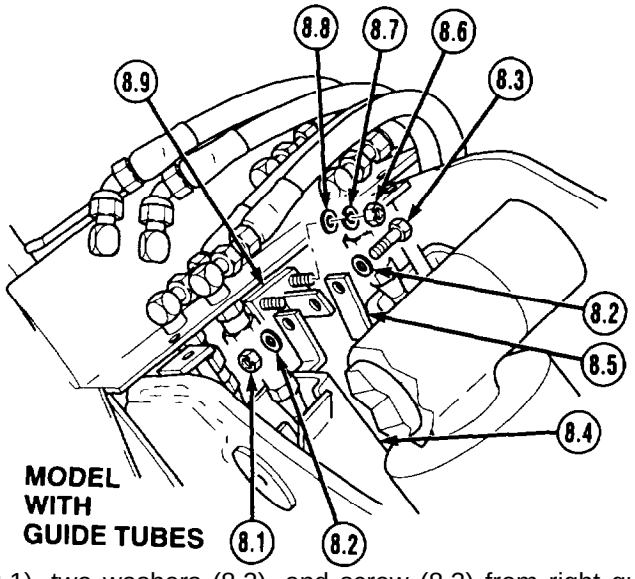
a. Removal.



NOTE

Some models have guide tubes for the outrigger hoses in place of brackets. For outriggers without guide tubes, do steps (1) and (2). For outriggers with guide tubes, do steps (2) through (2.2).

(1) Remove two nuts (1), lockwashers (2), washers (3), and bracket (4).
(2) Remove two screws (5), lockwashers (6), and nuts (7), and slide rods (8) down.



(2.1) Remove locknut (8.1), two washers (8.2), and screw (8.3) from right guide tube (8.4) and left guide tube (8.5).

(2.2) Remove two nuts (8.6), lockwashers (8.71, washers (8.81, and bracket (8.9).

NOTE

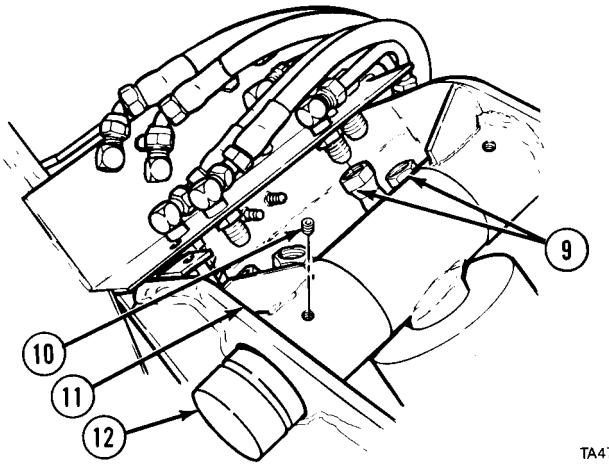
Tag and mark all lines.

(3) Disconnect four hydraulic lines (9).

WARNING

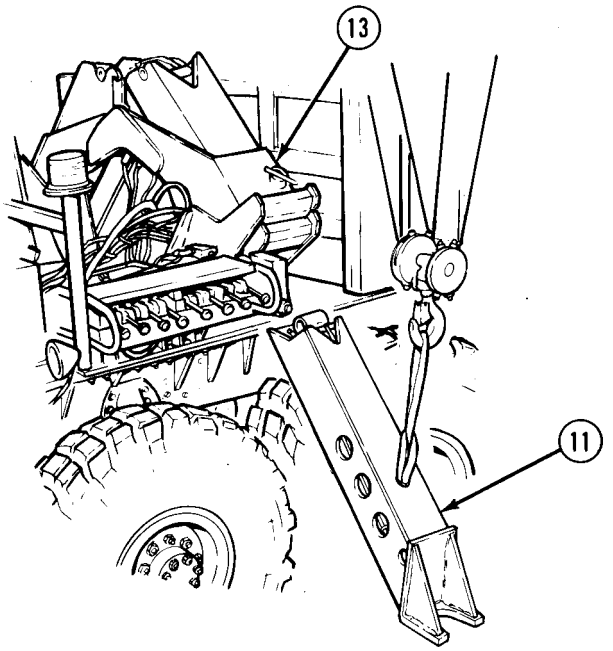
Keep out from under heavy parts. Falling parts may cause serious injury or death.

(4) Remove two setscrews (10).
(5) Soldier A supports beam (11) while Soldier B removes pin (12).



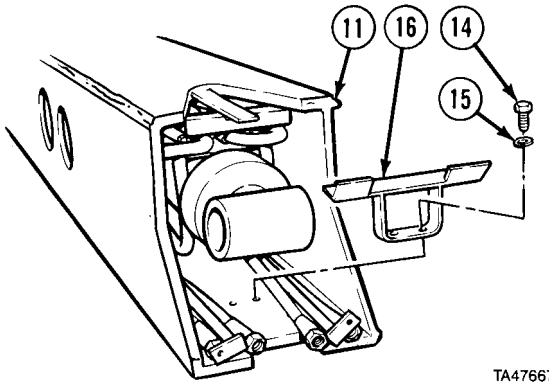
TA476671

(6) Lower beam (11) and attach a suitable lifting device.
(7) Soldier A and Soldier B remove beam (11) from outrigger (13).



TA476672

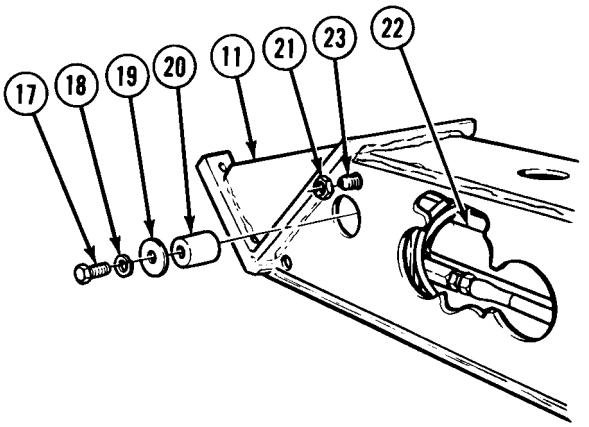
(8) Remove two screws (14), lockwashers (15), and bracket (16) from beam (11).



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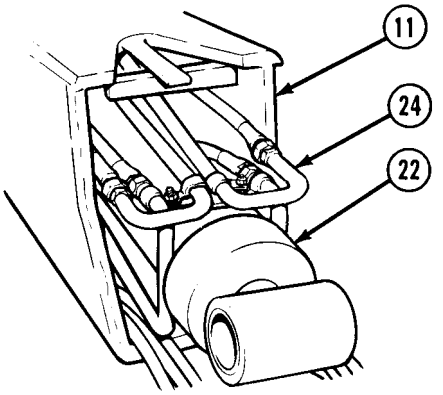
17-38.1. OUTRIGGER OUTER BEAM AND EXTENSION CYLINDER REMOVAL/INSTALLATION (M984E1) (CONT).

(9) Remove two screws (17), lockwashers (18), washers (19), and pin (20).
(10) Remove two nuts (21).
(11) Soldier A slides cylinder (22) back while Soldier B pushes fittings (23) in beam (11).



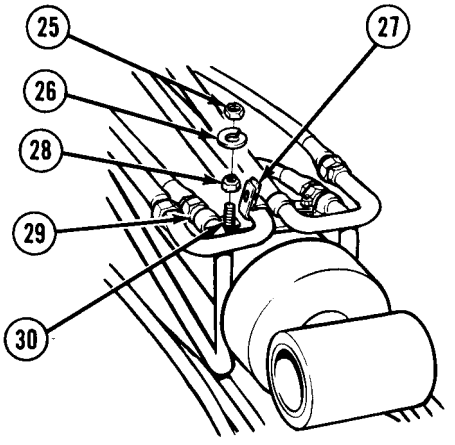
TA476674

(12) Remove cylinder (22) and lines (24) from beam (11).



TA476675

(13) Remove two nuts (25), lockwashers (26), clamps (27), nuts (28), and clamps (29) from studs (30).



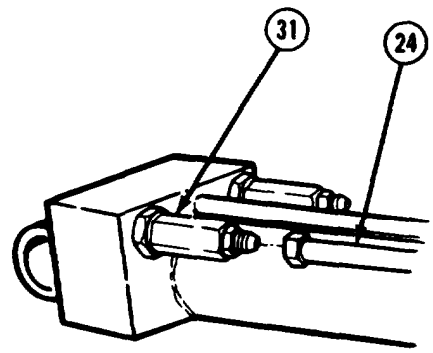
TA476676

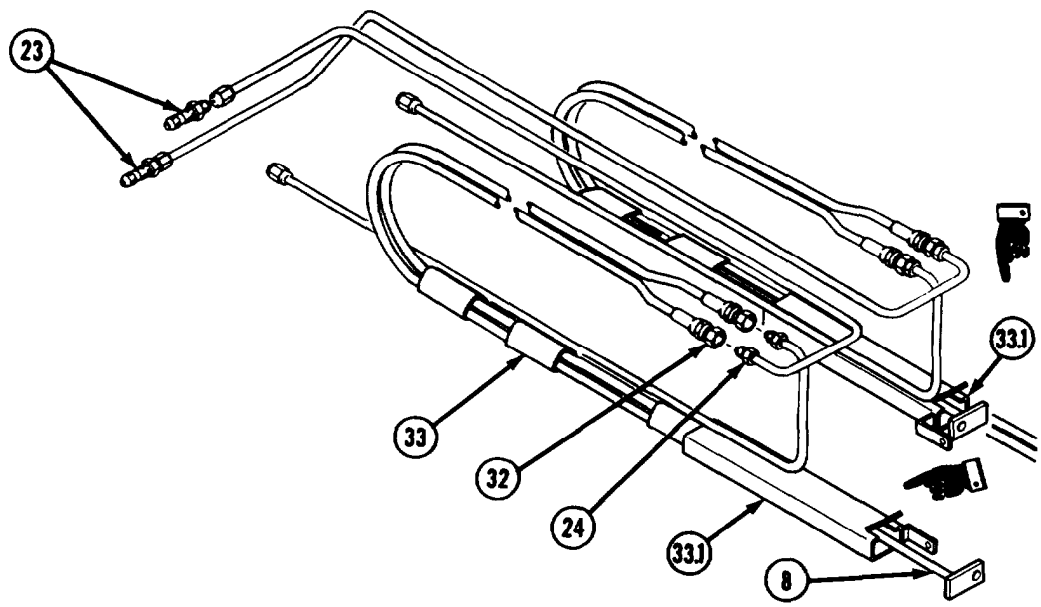
M977, M995, and M994E1 Crane Maintenance Instructions (Cont)

NOTE

Tag and mark all lines.

(14) Remove two hydraulic lines *(24)* from valves (31).





(15) Remove four lines (24) from hoses (32).
(16) Remove two fittings (23) from lines (24).
(17) Remove two rods (8) from sleeves (33).

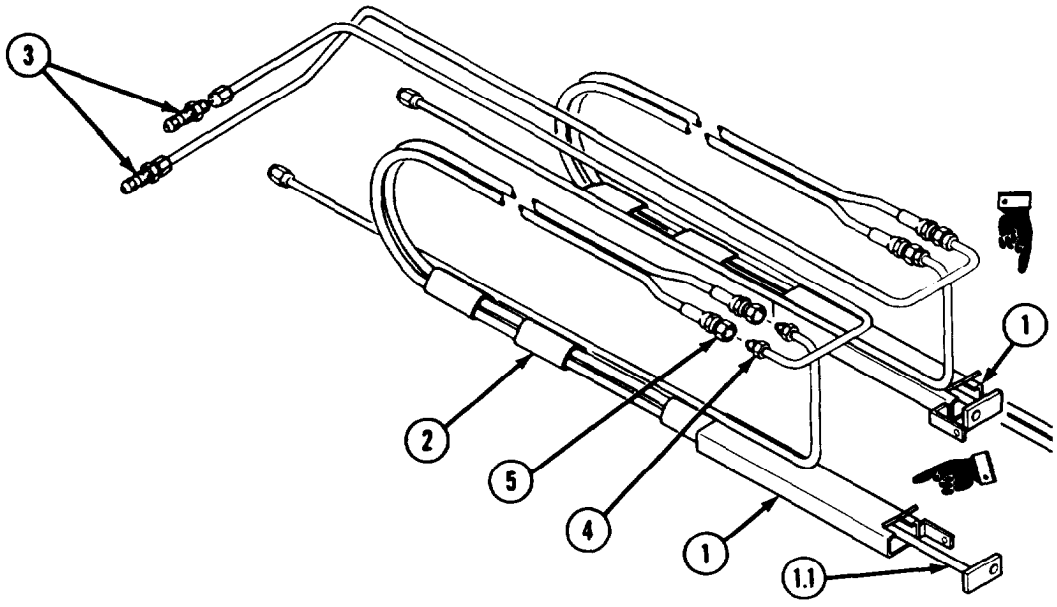
NOTE

Not all models have guide tubes.

(17.1) Remove guide tubes (33.1).

17-38.1 OUTRIGGER OUTER BEAM AND EXTENSION CYLINDER REMOVAL/ INSTALLATION (M984E1) (CONT).

b. Installation



NOTE

If guide tubes are not present, go to step *(1.1).*

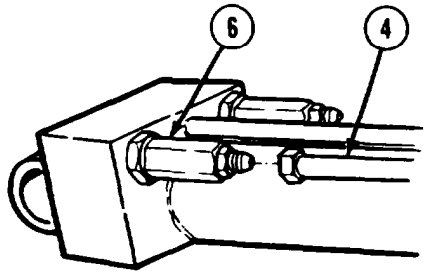
(1) Install two guide tubes (1) over hoses (5).

(1.1) Install two rods (1.1) in sleeves (2).

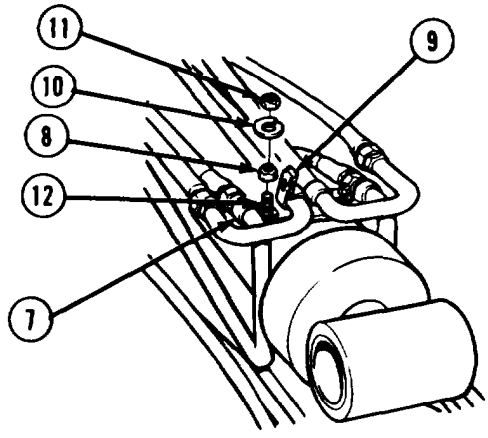
(2) Install two fittings (3) on lines (4).

(3) Install four lines (4) to hoses (5).

(4) Install two hydraulic lines (4) to valves (6).

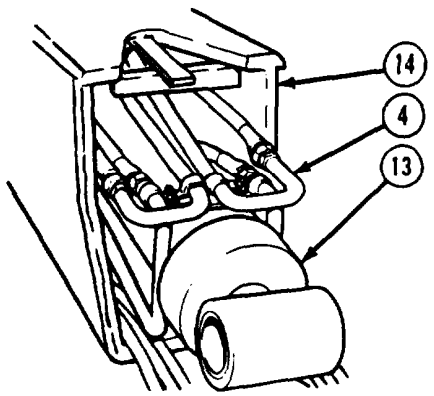


(5) Install two clamps (7), nuts (8), clamps (9), lockwasher (10), and nuts (11) on studs (12).



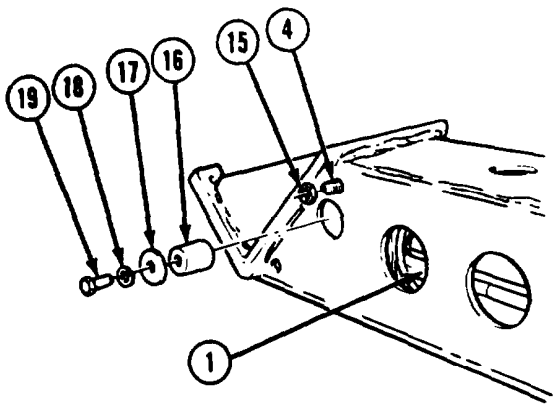
M977, M985, and M984E1 Crane Maintenance Instructions (Cont)

(6) Soldier A and Soldier B install cylinder (13) and lines (4) in beam (14).



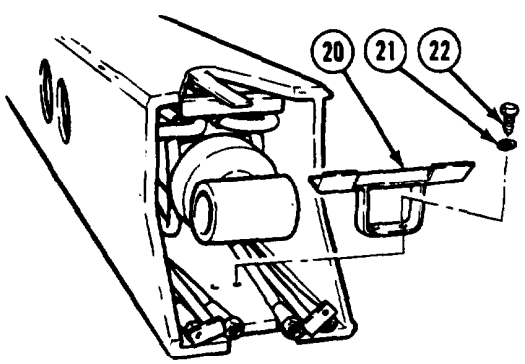
TA476682

(7) Install two nuts (15) on lines (4).
(8) Install pin (16), two washers (17), lockwashers (18), and screws (19).



TA476683

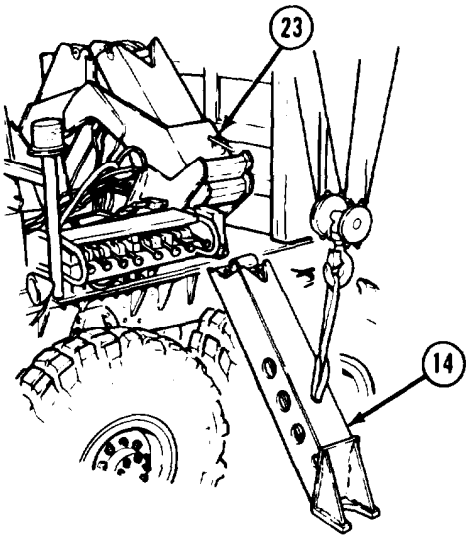
(9) Install bracket (20) with two washers (21) and screws (22).



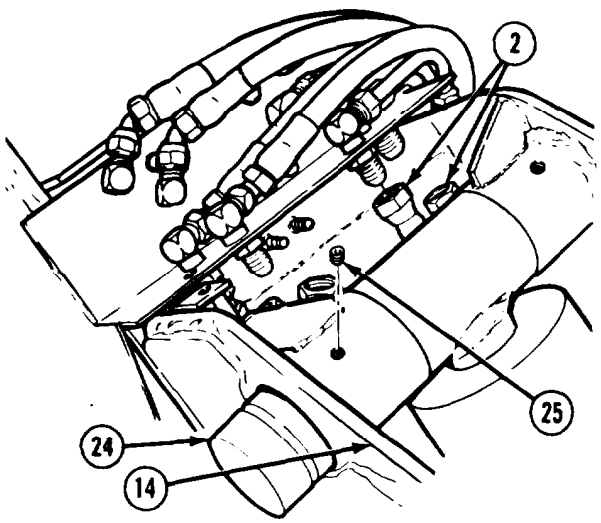
TA476684

17-38.1 OUTRIGGER OUTER BEAM AND EXTENSION CYLINDER REMOVAL/ INSTALLATION (M984E1) (CONT).

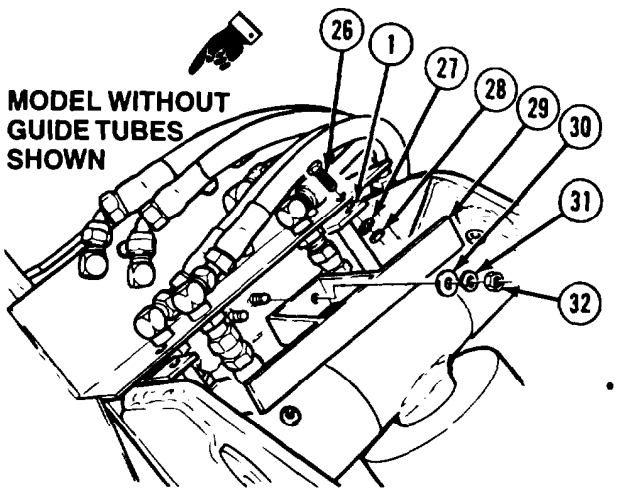
(10) Soldier A and Soldier B attach suitable lifting device to beam (14) and install beam in outrigger (23).



(11) Soldier A supports beam (14) while Soldier B alines and installs pin (24).
(12) Install two setscrews (25).
(13) Connect four hydraulic hoses (2).



(14) Install two rods (1) with screws (26), lockwashers (27), and nuts (28).



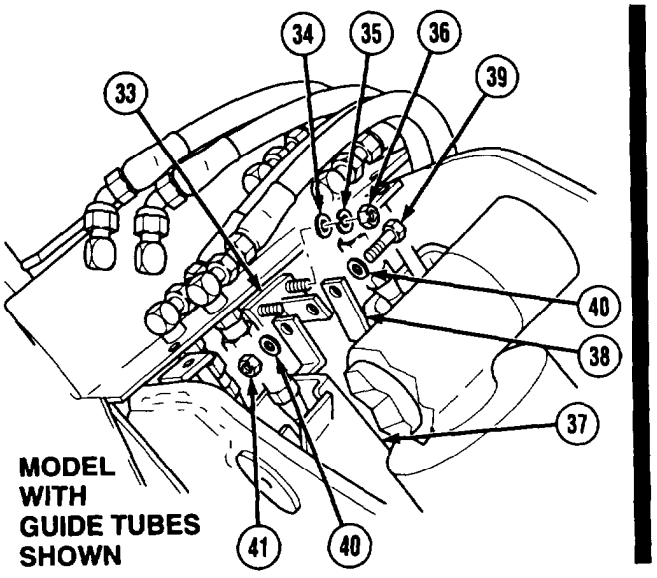
NOTE

Some models have guide tubes. For outriggers without guide tubes, do step *(15).* For outriggers with guide tubes, do steps *(16)* and *(17).*

(15) Install bracket (29) with two washers (30), lockwashers (31), and nuts (32).

(16) Install bracket (33) with two washers (34), lockwashers (35), and nuts (36).

(17) Install right guide tube (37) and left guide tube (38) using screw (39), two washers (40), and locknut (41). Tighten nut until there is a 0.03-in. (0.75 mm) gap between washer and guide tube.



c. Follow-on Maintenance.

(1) Outrigger cover installed (TM 9-2320-279-20).
(2) Outrigger leg cylinder installed (para 17-35).

END OF TASK

17-38.2. OUTRIGGER INNER BEAM REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Too1s
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

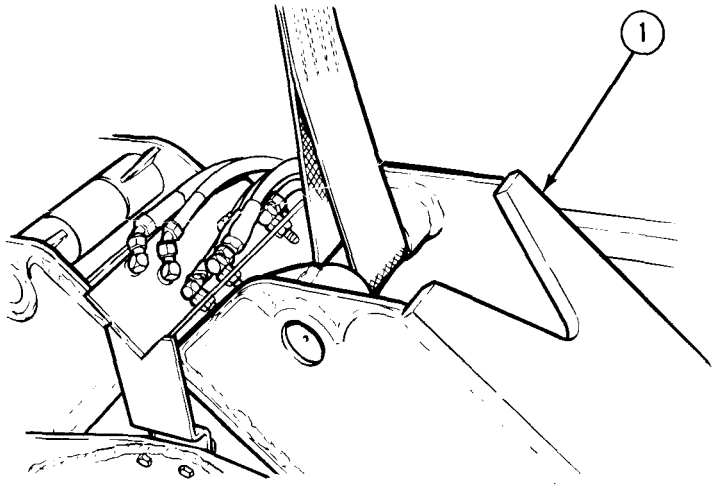
TM or Para	*Condition Description*
Para 17-38.1	Outrigger beam and extension cylinder removed.
Para 17-36.1	Outrigger leg cylinder removed.

Special Environmental Conditions
None

General Safety Instructions
None

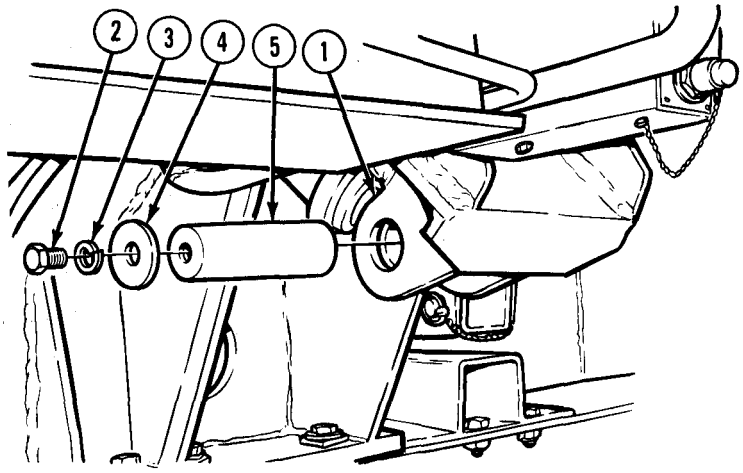
Level of Maintenance
Direct Support

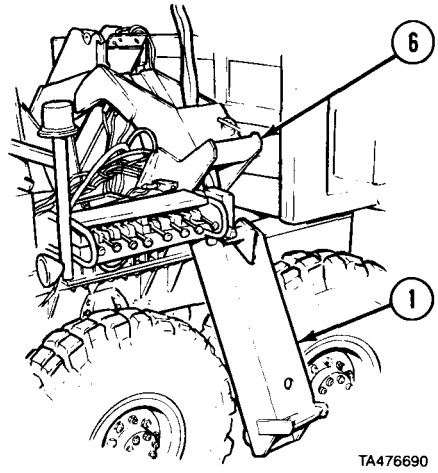
a. *Removal.*
(1) Attach suitable lifting device to inner beam (1).



TA476689

17-38.2. OUTRIGGER INNER BEAM REMOVAL/INSTALLATION (M984E1) (CONT).



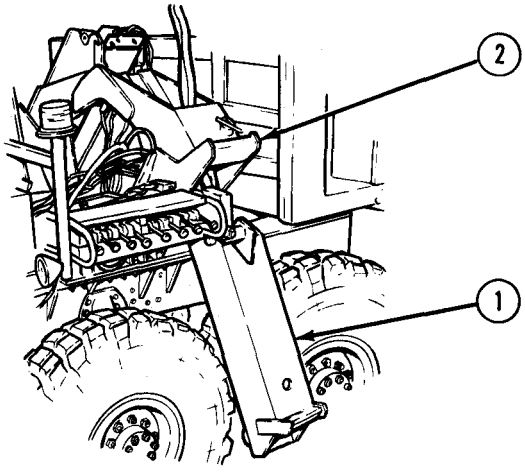


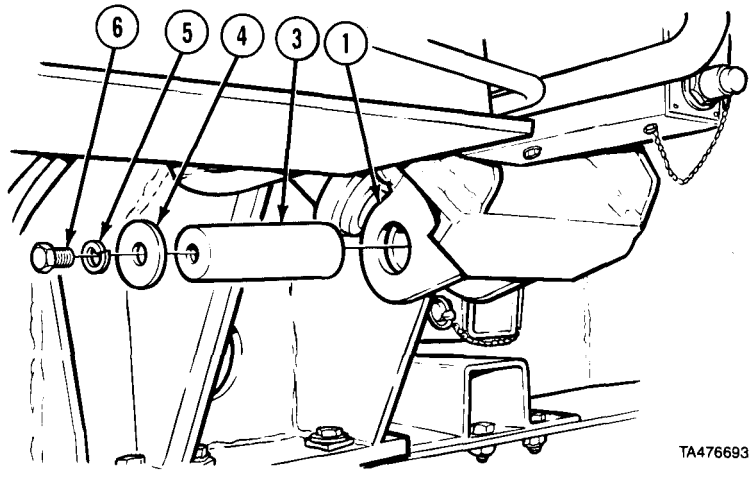
WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(2) Remove two screws (2), lockwashers (3), end caps (4), and pin (5) from inner beam (1).
(3) Soldier A and Soldier B remove inner beam (1) outrigger housing (6).

b. Installation.





(1) Soldier A and Soldier B aline and install inner beam (1) in outrigger housing (2).
(2) Install pin (3) in inner beam (1) with two end caps (4), lockwashers (5), and screws (6).

c. Follow-on Maintenance.
(1) Install extension cylinder and outer beam (para 17-38.1).
(2) Install outrigger leg cylinder (para 17-36.1).

END OF TASK

17-39. OUTRIGGER EXTENSION CYLINDER REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 25, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Outrigger extension cylinder on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

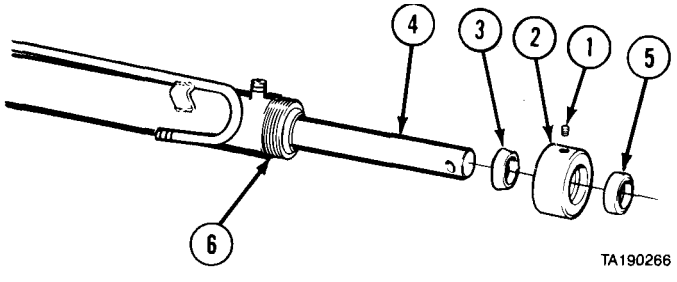
Level of Maintenance
General Support

a. Disassembly.

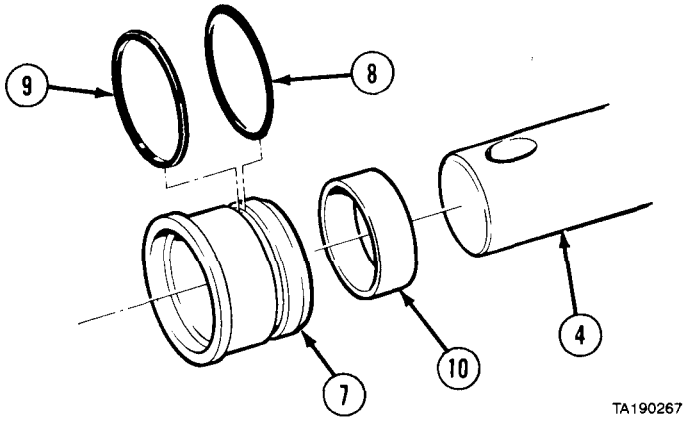
NOTE

- Left and right cylinder ends are disassembled the same way.
- Seal is a two piece assembly.

(1) Remove setscrew (1), retaining ring (2), and seal (3) from rod (4).
(2) Remove wiper ring (5) from retaining ring (2).
(3) Remove rod assembly (4) from cylinder (6).



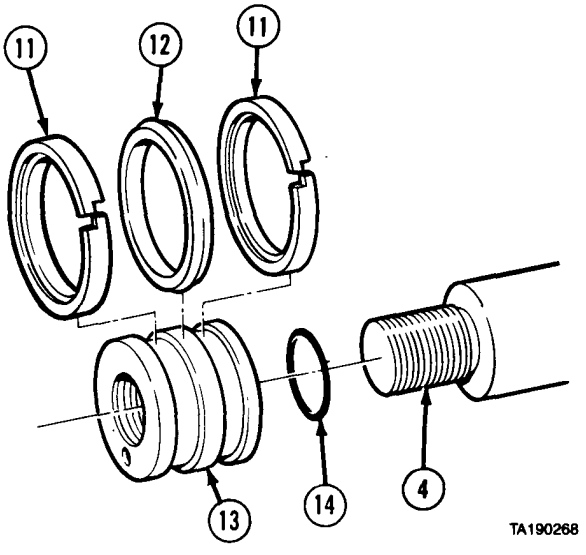
(4) Remove head (7) from rod (4).
(5) Remove preformed packing (8), backup ring (9), and wear ring (10) from head (7).



17-39. OUTRIGGER EXTENSION CYLINDER REPAIR (CONT).

(6) Remove two guide rings (11) and seal (12).

(7) Remove piston (13) from rod (4) and preformed packing (14).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.

(2) Inspect each part for damage.

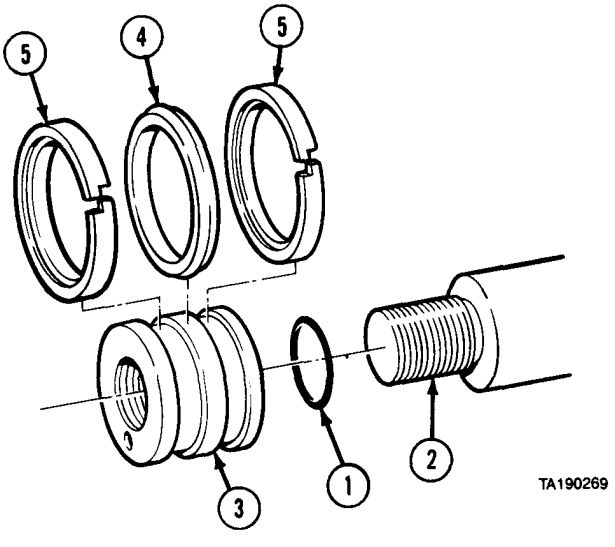
(3) Replace damaged parts.

c. Assembly.

NOTE

Left and right cylinder ends are assembled the same way.

(1) Install preformed packing (1) on rod (2).



WARNING

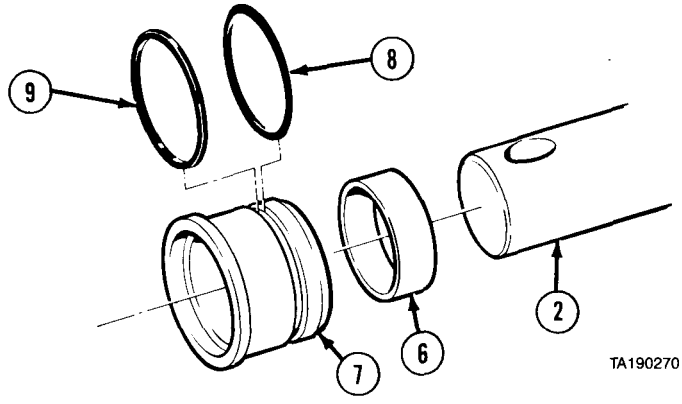
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(2) Apply sealing and thread locking compound and install piston (3).

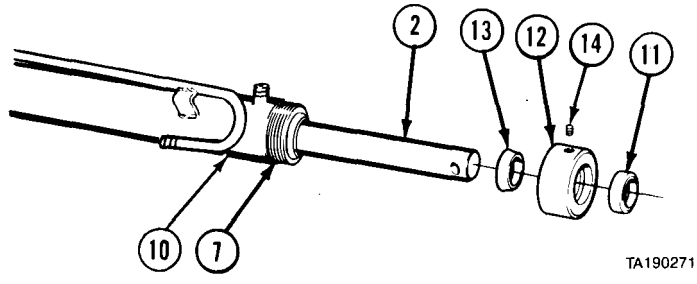
NOTE

Groove in guide rings face away from seal.

(3) Install seal (4) and two guide rings (5).



(4) Install wear ring (6) in head (7).
(5) Install preformed packing (8) and backup ring (9).
(6) Install head (7) on rod (2).



(7) Install rod assembly (2) in cylinder (10).
(8) Install wiper ring (11) in retaining ring (12).
(9) Install seal (13) in head (7).
(10) Apply sealing and thread locking compound and install retaining ring (12).
(11) Install setscrew (14).

d. Follow-on Maintenance. None.

END OF TASK

17-40. OUTRIGGER INNER BEAM EXTENSION CYLINDER REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

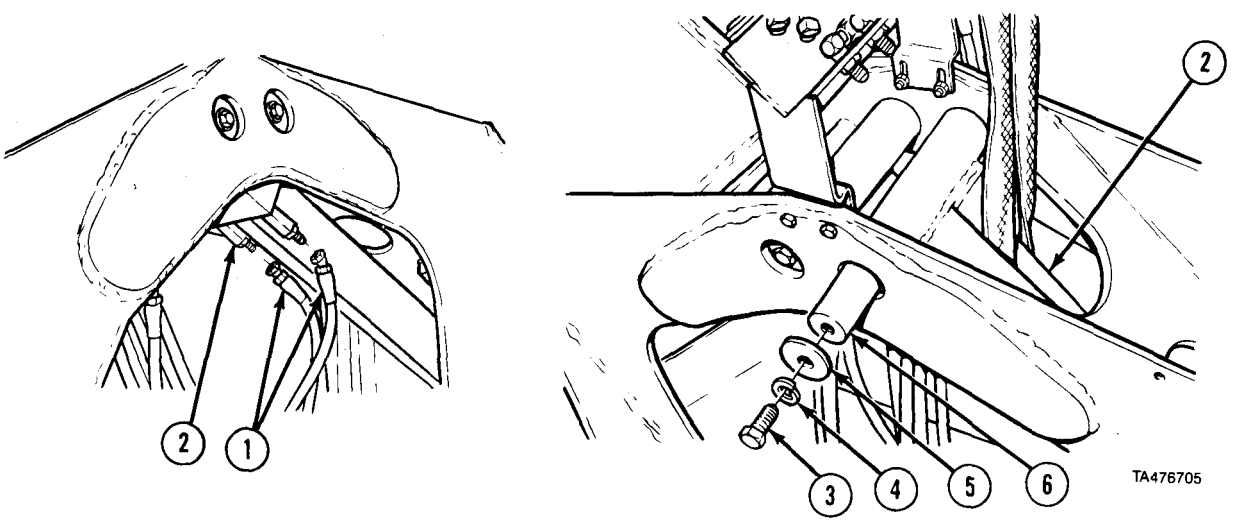
TM or Para	*Condition Description*
Para 17-38.2	Outrigger inner beam removed.
TM 9-2320-279-10	Crane positioned for access.

Special Environmental Conditions
None

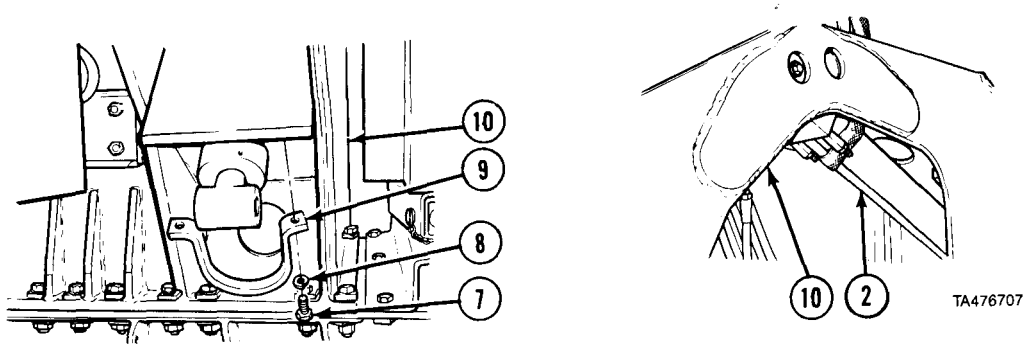
General Safety Instructions
None

Level of Maintenance
Direct Support

a. Removal.

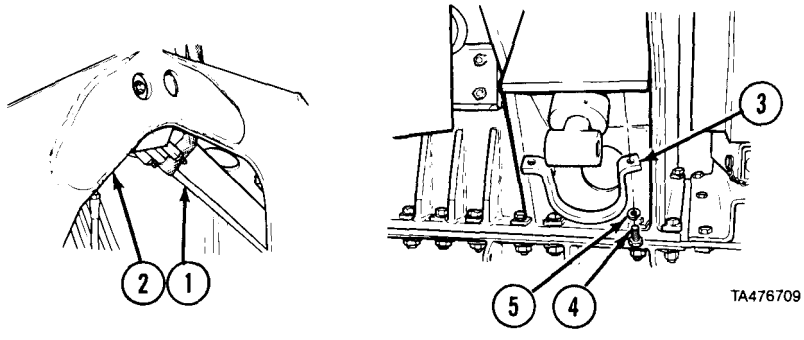


(1) Remove two hydraulic hoses (1) from cylinder (2).
(2) Attach a suitable lifting device to cylinder (2).
(3) Remove two screws (3), lockwashers (4), end caps (5), and pin (6).

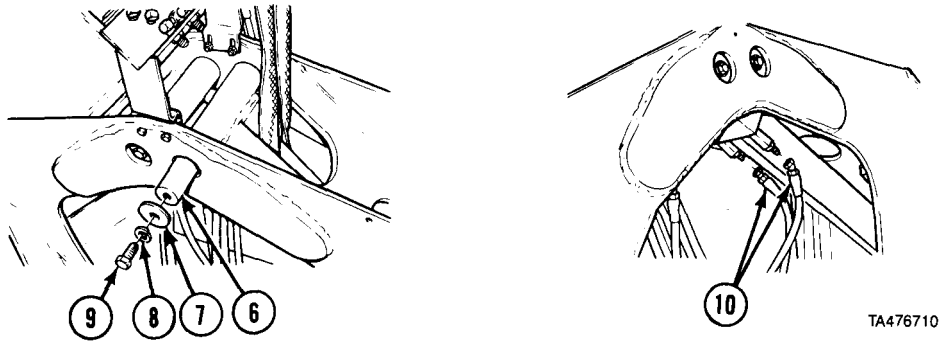


(4) Remove two screws (7), lockwashers (8), and strap (9) from outrigger (10).
(5) Soldier A and Soldier B remove cylinder (2) through outrigger tower (10).

b. Installation.



(1) Soldier A and Soldier B install cylinder (1) through outrigger tower (2).
(2) Install strap (3) with two screws (4) and lockwashers (5).



(3) Aline and install pin (6).
(4) Install two end caps (7), lockwashers (8), and screws (9) in pin (6).
(5) Attach two hydraulic hoses (10).

c. Follow-on Maintenance.
(1) Install outrigger inner beam (para 17-38.2).
(2) Crane returned to stowed position (TM 9-2320-279-10).
(3) Check for leaks.

END OF TASK

17-41. OUTRIGGER INNER AND OUTER BEAM CYLINDER REPAIR (M984E1).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing and thread locking, Item 26, Appendix C
Oil, lubricating, Item 47.1, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 17-39.1	Outrigger outer and inner beam cylinders removed.

Special Environmental Conditions
None

General Safety Instructions
None

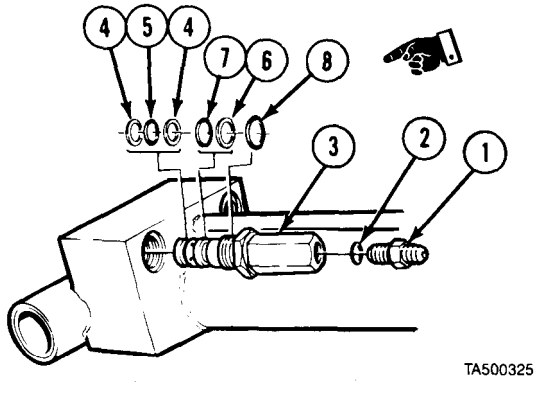
Level of Maintenance
General Support

a. Disassembly.

NOTE

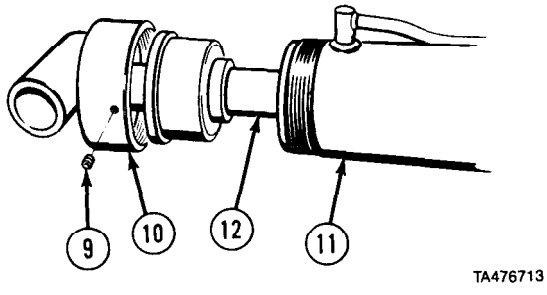
Both inner and outer cylinders are disassembled the same.

(1) Remove two fittings (1) and preformed packings (2) from holding valves (3).
(2) Remove holding valve (3).
(3) Remove retainer (4), preformed packing (5), retainer (4), retainer (6), and preformed packings (7 and 8).
(4) Repeat steps *(2)* and *(3)* for other holding valve.



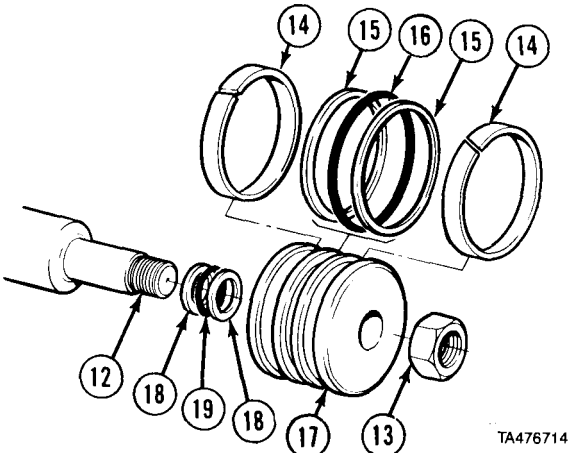
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(5) Remove setscrew (9) and remove retaining ring (10) from cylinder (11).
(6) Remove rod assembly (12) from cylinder (11).

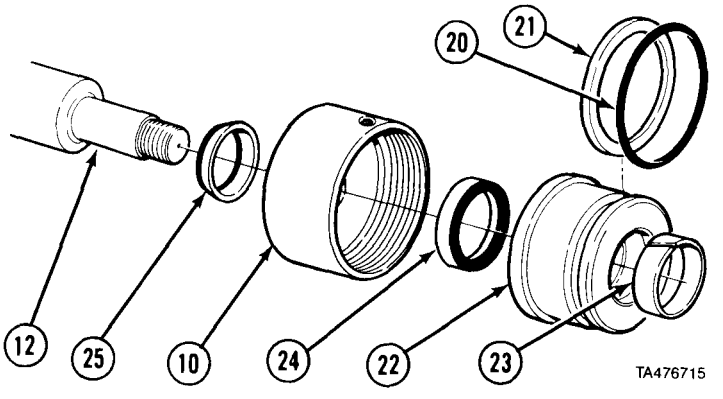


TA476713

(7) Remove nut (13) from rod (12).
(8) Remove wear ring (14), two piston rings (15), preformed packing (16), and wear ring (14).
(9) Remove piston (17).
(10) Remove backup ring (18), preformed packing (19), and backup ring (18).



(11) Remove preformed packing (20) and backup ring (21).
(12) Remove head (22) from rod (12).
(13) Remove wear ring (23), and seal (24) from head (22).
(14) Remove retaining ring (10) and wiper ring (25) from rod (12).



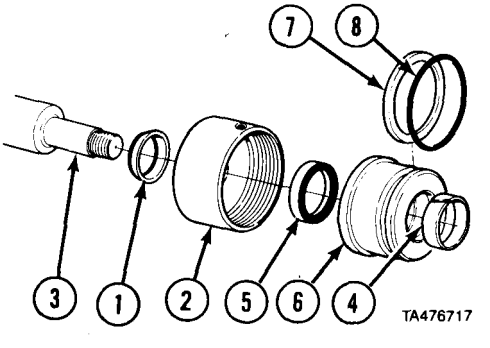
b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin-and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

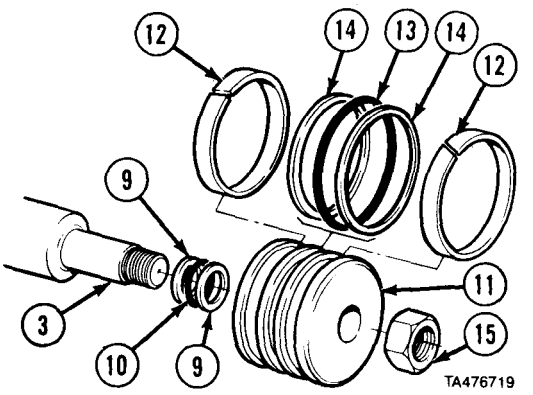
(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.

c. Assembly.
(1) Install wiper ring (1) in retaining ring (2).
(2) Install retaining ring (2) on rod (3).
(3) Install wear ring (4) and seal (5) in head (6).
(4) Install backup ring (7) and preformed packing (8) on head (6).
(5) Install head (6) on rod (3).

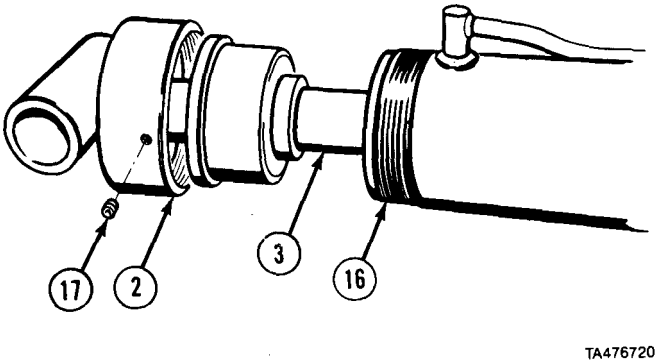


17-41. OUTRIGGER INNER AND OUTER BEAM CYLINDER REPAIR (M984E1) (CONT).

(6) Install backup ring (9), preformed packing (10), and backup ring (9) in piston (11).
(7) Install piston (11) on rod (3).
(8) Install wear ring (12), preformed packing (13), two piston rings (14), and wear ring (12).
(9) Install nut (15) on rod (3) and torque nut (15) to 110 lb-ft (149.1 N • m).



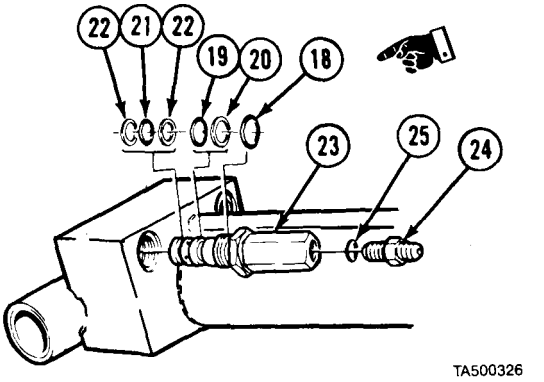
(10) Install rod assembly (3) in cylinder (16).
(11) Apply thread locking and sealing compound and install retaining ring (2).
(12) Install setscrew (17).



NOTE

Apply lubricant to preformed packings before installing.

(13) Install preformed packing (18).
(14) Install preformed packing (19) and retaining ring (20).
(15) Install preformed packing (21) and two retaining rings (22).
(16) Repeat steps *(13)* through *(15)* for other holding valve.
(17) Install two holding valves (23).
(18) Install two fittings (24) and preformed packings (25) in holding valves (23).



d. Follow-on Maintenance. None.

END OF TASK

17-42. CRANE CYLINDER TEST.

This task covers:

a. Test Setup
b. Test Procedure
c. Follow-on Maintenance

INITIAL SETUP

Models
M977, M985, M984E1

Test Equipment
Tool Outfit NSN 4940-01-036-5784 or equivalent

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheeled vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Cylinder repaired.

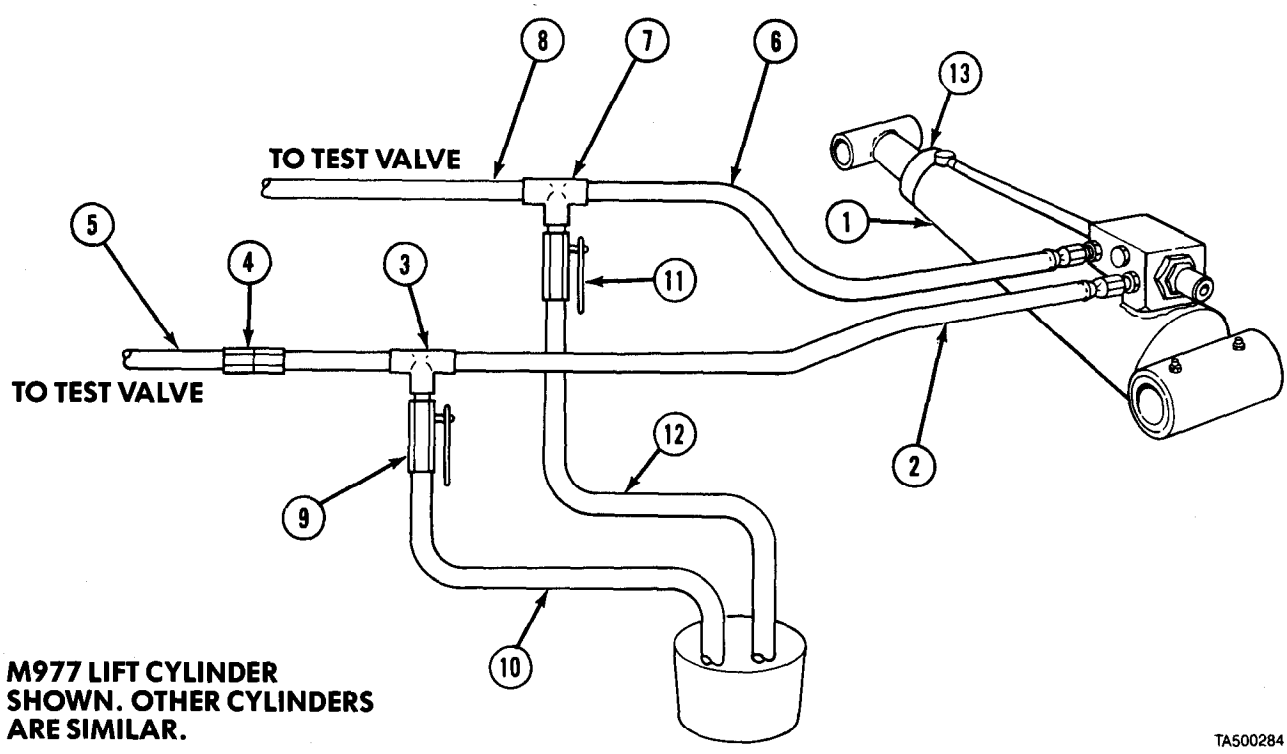
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

17-42. CRANE CYLINDER TEST (CONT).

a. Test Setup.



WARNING

- Pressures of 2000 psi (13.8 mPa) and 2500 psi (17.2 mPa) are used during test. Hoses, fittings, etc., must be of sufficient safety factor to prevent equipment damage or personal injury.
- Install quick-disconnect in piston side port only. Rod side port must not be blocked. Damage to cylinder and/or personal injury could result.

NOTE

Proper holding valve must be installed prior to test. Removal or replacement of holding valve after test constitutes an untested cylinder assembly.

(1) Determine piston side and rod side ports of cylinder (1) and plug remaining ports.
(2) Install hose (2), tee (3), quick-disconnect (4), and hose (5) onto piston side port of cylinder (1).
(3) Install hose (6), tee (7), and hose (8) onto rod side port of cylinder (1).
(4) Install bleeder valve (9) and hose (10) onto tee (3).
(5) Install bleeder valve (11) and hose (12) onto tee (7).
(6) Route hoses (10) and (12) into suitable container.
(7) Connect hoses (5) and (8) to test valve of tool outfit.

b. Test Procedure.

(1) Close bleeder valves (9) and (11).
(2) Extend and retract cylinder (1) three to five times while checking for leakage at rod seal (13).
(3) Extend cylinder (1) full stroke and maintain pressure of 2500 psi (1 7.2 mPa) on hose (5) for minimum of one minute while checking for leaks.
(4) Relieve pressure and uncouple quick-disconnect (4).

NOTE

With piston port blocked, pressurizing rod side will cause an ini tial retraction of the cylinder due to the compression of air within the system.

(5) Apply 2000 psi (13.8 mPa) to hose (8).
(6) Slowly open bleeder valve (9) to retract cylinder (1) approximately 1 inch (25.4 mm).

NOTE

If cylinder extends while applying pressure to the rod side port, cylinder has an internal leak at the piston seal and/or holding valve.

(7) Close bleeder valve (9) and maintain 2000 psi (13.8 mPa) to hose (8) while checking for leaks and observing if cylinder (1) extends.
(8) Slowly open bleeder valve (9) to retract cylinder (1) to midpoint of stroke and repeat Step 7.
(9) Slowly open bleeder valve (9) to fully retract cylinder (1).
(10) Relieve pressure and disconnect cylinder (1).
(11) Plug or cap all ports.

c. Follow-on Maintenance. If cylinder leaked, or extended while pressurizing the rod side port, repair cylinder before using.

END OF TASK

Chapter 18 has been deleted.

CHAPTER 19
POWER TAKEOFF (PTO) AND HYDRAULIC PUMP MAINTENANCE

Contents

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Section I. INTRODUCTION

19.1 GENERAL. This chapter contains maintenance instructions for repair of the hydraulic pump and power takeoff components at the direct support maintenance level. The subassemblies and parts which must be removed before the hydraulic pump and power takeoff (PTO) components can be repaired are referenced in TM 9-2320-279-20.

Section II. POWER TAKEOFF (PTO)

Power Takeoff (PTO) and Hydraulic Pump Maintenance Instructions

19-2. POWER TAKEOFF (PTO) REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, item 46, Appendix C
Solvent, drycleaning, Item 57, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Grease, automotive and artillery, Item 34, Appendix C
Adhesive-sealant, silicon, Item 6, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Power takeoff (PTO on clean work surface).

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

19-2. POWER TAKEOFF (PTO) REPAIR (CONT).

a. Disassembly

NOTE

There are two models of power takeoff (PTO) units. Model B has two pipe plug adapters, one pipe plug, and no cover plate.

(1) Remove pipe plug (1), setscrew (2), and fitting (3) from power takeoff (PTO) housing (4).

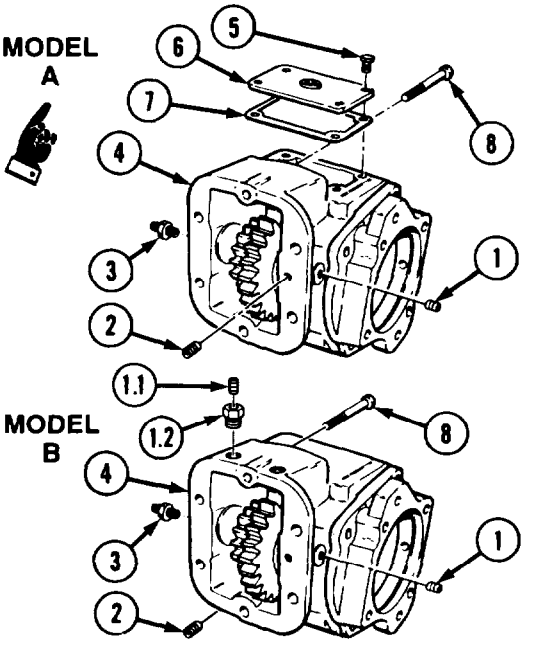
NOTE

Skip step *(2)* and do step *(2.1)* for Model B.

(2) Remove four screws (5), cover plate (6), and gasket (7).

(2.1) Remove two pipe plugs (1.1) and pipe plug adapters (1.2).

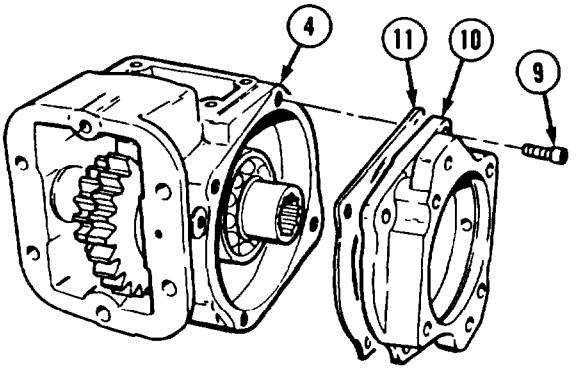
(3) Remove screw (8).



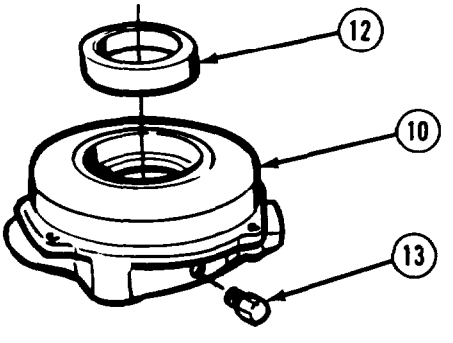
NOTE

Mark open-end bearing cover and power takeoff (PTO) housing.

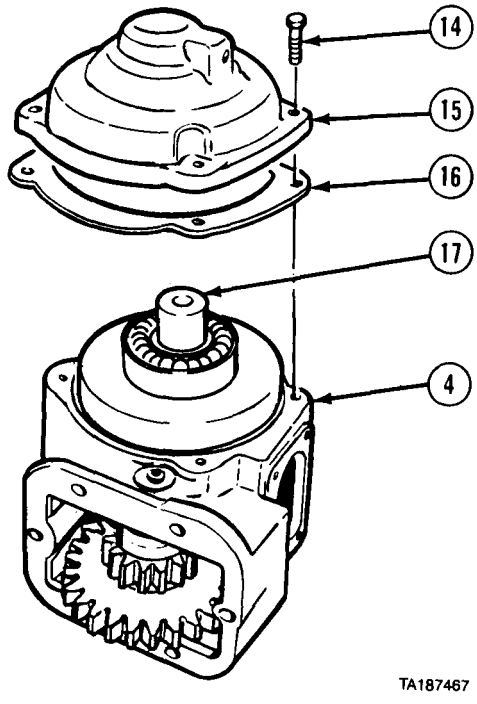
(4) Remove four screws (9), open-end bearing cover (10), and gasket (11) from power takeoff (PTO) housing (4).



(5) Remove oil seal (12) and breather (13) from open-end bearing cover (10).

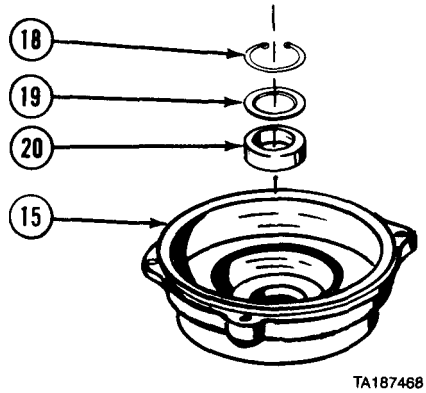


(6) Remove four screws (14), closed-end bearing cover (15), and gasket (16) from power takeoff (PTO) housing (4).
(7) Remove shaft assembly (17).



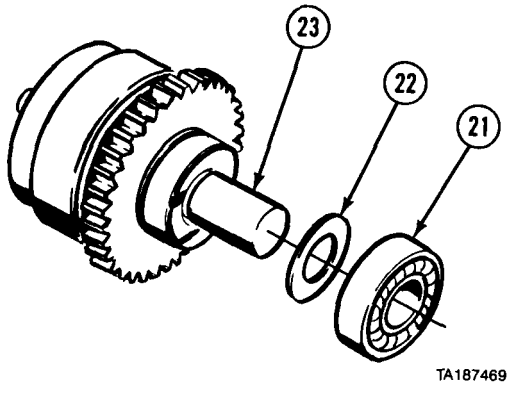
TA187467

(8) Remove retaining ring (18) and washer (19) from closed-end bearing cover (15).
(9) Remove seal (20).



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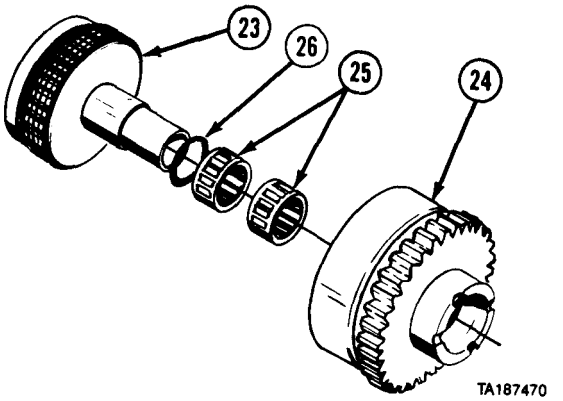
(10) Remove ball bearing (21) and bearing washer (22) from output shaft (23).



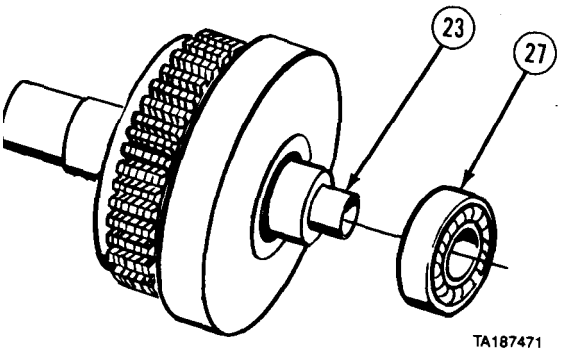
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19-2. POWER TAKEOFF (PTO) REPAIR (CONT).

(11) Remove output gear (24) from output shaft (23).
(12) Remove two roller bearings (25) and bearing spacer (26).



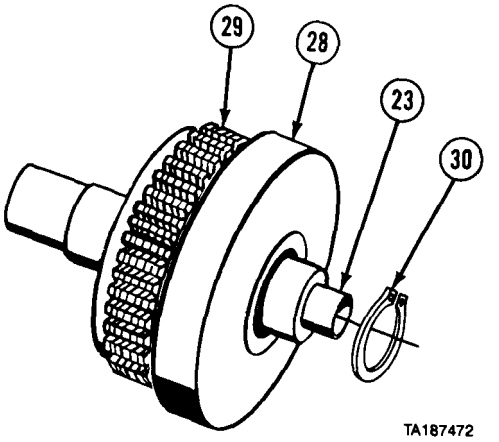
(13) Remove ball bearing (27) from output shaft (23).



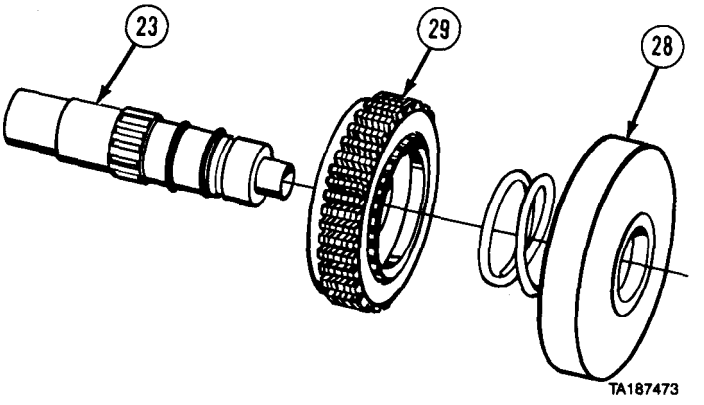
WARNING

Backup cylinder is under spring pressure and must be clamped to prevent injury caused by sudden release of parts.

(14) Put backup cylinder (28) and inner clutch gear (29) in vise.
(15) Remove retaining ring (30) from output shaft (23).



(16) Remove backup cylinder (28) and inner clutch gear (29) from output shaft (23).



Power Takeoff (PTO) and Hydraulic Pump Maintenance Instructions (Cont)

(17) Remove clutch spring (31) and piston (32) from backup cylinder (28).

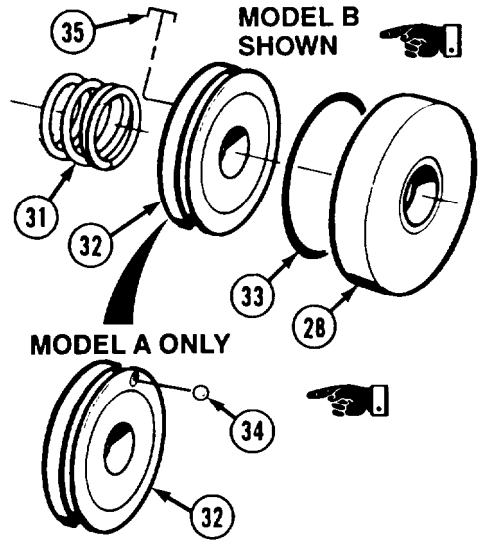
(18) Remove preformed packing (33) from piston (32).

NOTE

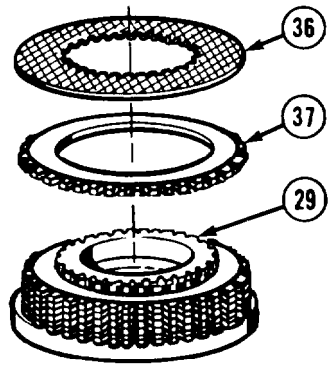
There are two models of power takeoff (PTO) units. Model B does not have a ball. Skip step (19) and do step (19.1) for Model B.

(19) Remove ball (34) and wiggler wire (35).

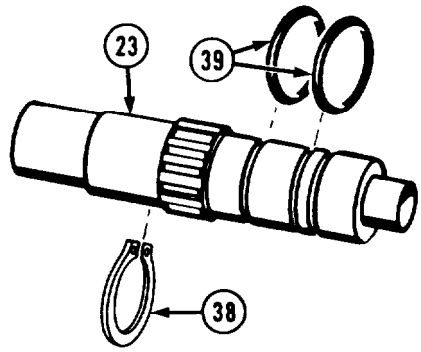
(19.1) Remove wiggler wire (35).



(20) Remove eight friction plates (36) and seven steel plates (37) from inner clutch gear (29).

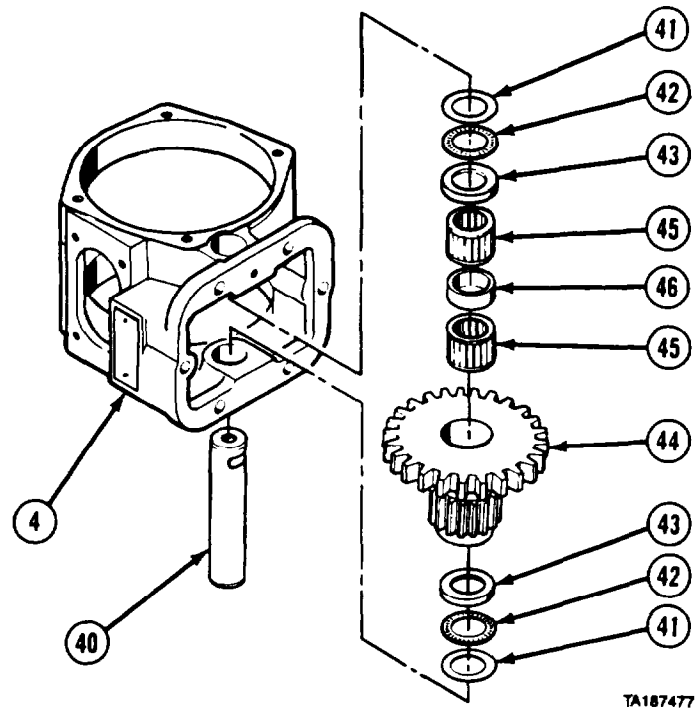


(21) Remove retaining ring (38) and two preformed packings (39) from output shaft (23).



19-2. POWER TAKEOFF (PTO) REPAIR (CONT).

(22) Press idler shaft (40) from power takeoff (PTO) housing (4).
(23) Remove two thin thrust races (41), two thrust bearings (42), two thick thrust races (43), and input gear (44) from power takeoff (PTO) housing (4).
(24) Remove two roller assemblies (45) and bearing spacer (46) from input gear (44).



b. Cleaning/Inspection.

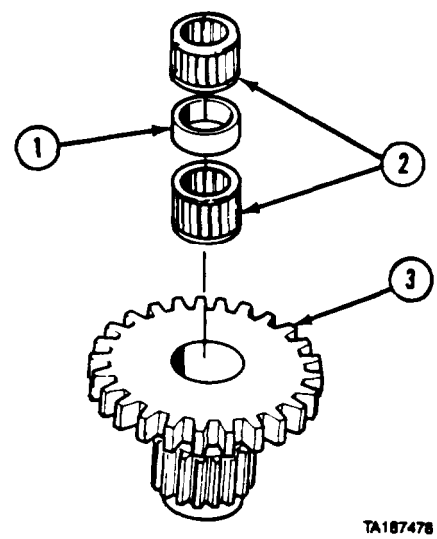
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

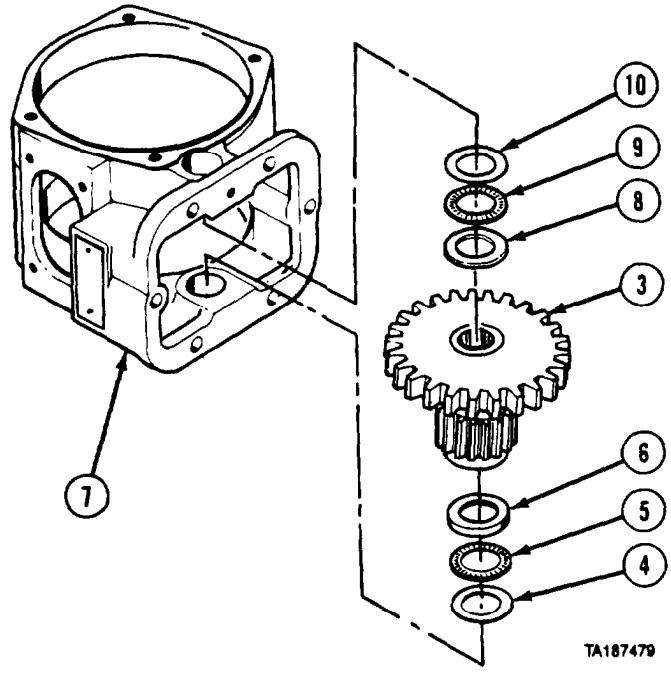
(1) Clean all parts in dry cleaning solvent.
(2) Inspect parts for damage. Replace damaged parts.
(3) Coat all parts with lubricating oil.

c. Assembly.

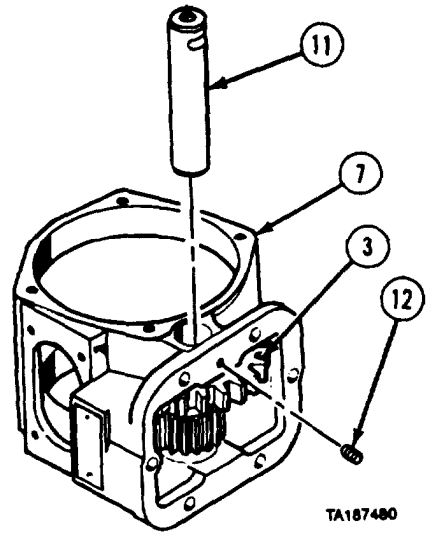
(1) Install bearing spacer (1) and two roller assemblies (2) into input gear (3).



Power Takeoff (PTO) and Hydraulic Pump Maintenance Instructions (Cont)



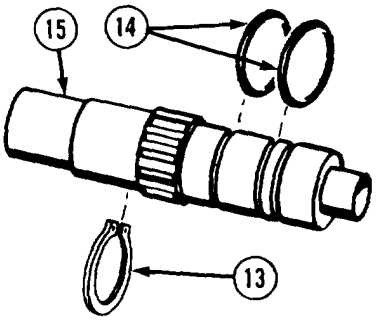
(2) Position thin thrust race (4), thrust bearing (5), and thick thrust race (6) in power takeoff (PTO) housing (7).
(3) Install input gear (3) thick thrust race (8), thrust bearing (9), and thin thrust race (10) in power takeoff (PTO) housing (7).



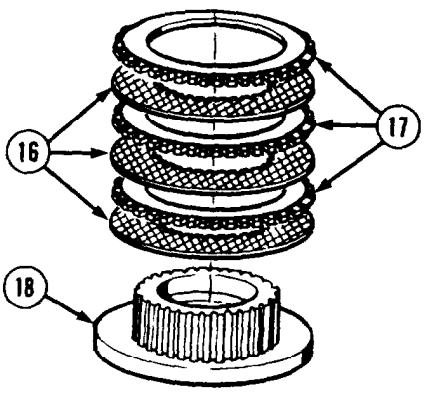
(4) Press idler shaft (11) into power takeoff (PTO) housing (7) and input gear (3).
(5) Install setscrew (12).

19-2. POWER TAKEOFF (PTO) REPAIR (CONT).

(6) Install retaining ring (13) and two preformed packings (14) on output shaft (15).



(7) Starting with friction plate (16) and alternating with steel plates (17), install 15 plates on inner clutch gear (18).



NOTE

There are two models of power takeoff (PTO) units. Model B does not have a ball. Skip steps *(8)* and *(9)* and do step *(9.1)* for Model B.

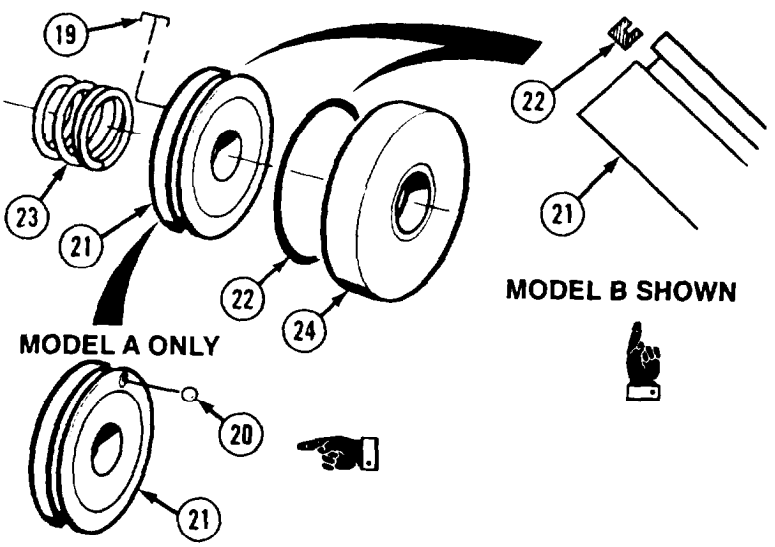
(8) Install wiggler wire (19) and ball (20) in piston (21).

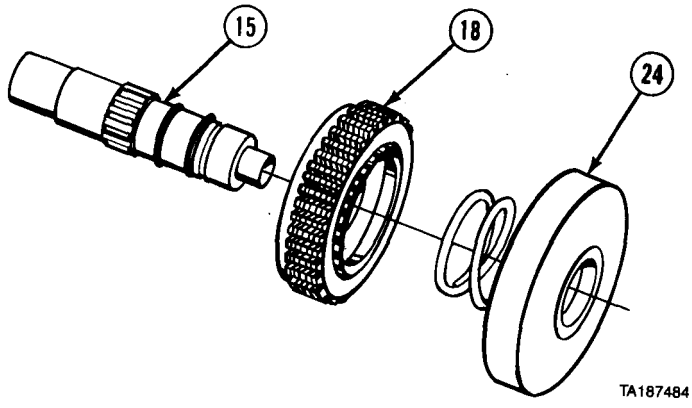
(9) Stake opening so ball (20) will not come out.

(9.1) Install wiggler wire (19) in piston (21).

(10) Install preformed packing (22) on piston (21).

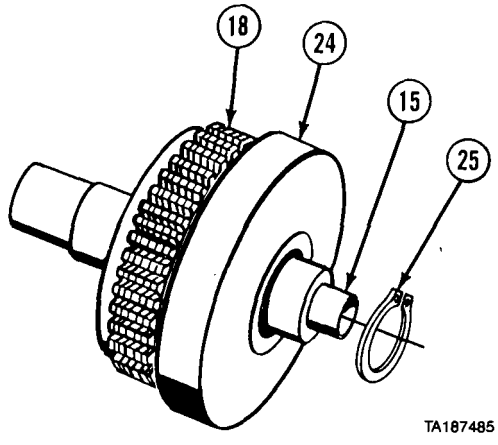
(11) Install piston (21) and clutch spring (23) on backup cylinder (24).



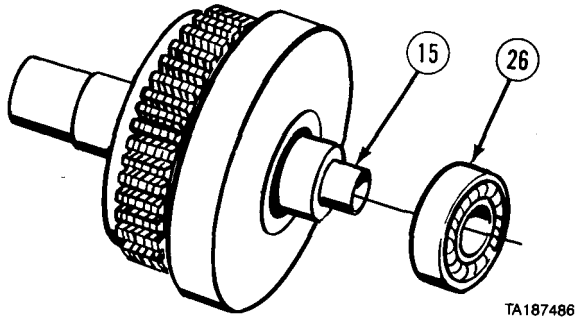


(12) Install inner clutch gear (18) and backup cylinder (24) on output shaft (15).

(13) Put inner clutch gear (18) and backup cylinder (24) together in vise.
(14) Install retaining ring (25) on output shaft (15) and remove from vise.

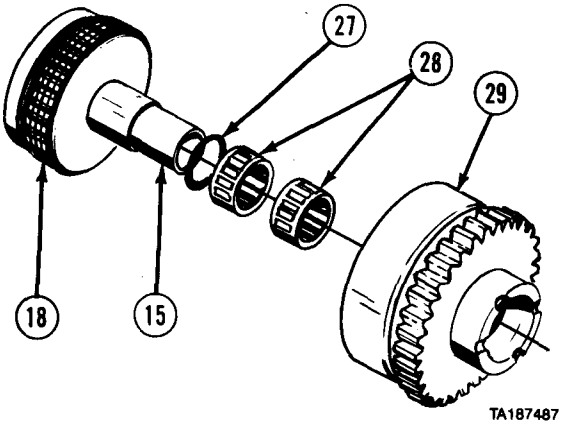


(15) Install ball bearing (26) on output shaft (15).

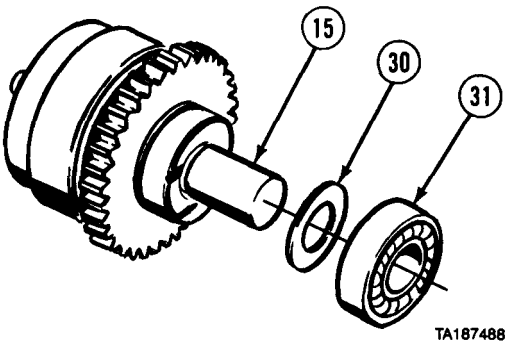


19-2. POWER TAKEOFF (PTO) REPAIR (CONT).

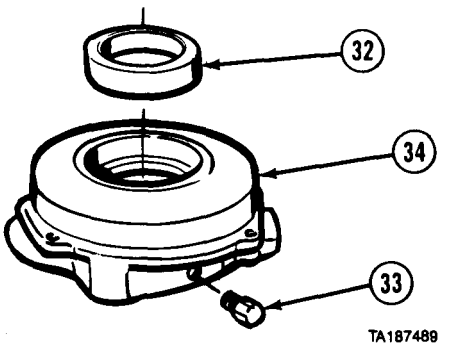
(16) Install bearing spacer (27) and two roller bearings (28) on output shaft (15).
(17) Aline splines on inner clutch gear (18) with splines in output gear (29) and install output gear on output shaft (15).



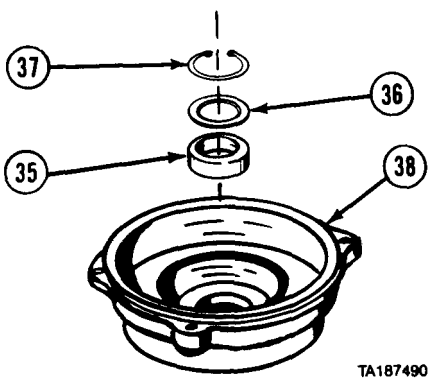
(18) Install bearing washer (30) and ball bearing (31) on output shaft (15).



(19) Install oil seal (32) and breather (33) in open-end bearing cover (34).



(20) Install seal (35), washer (36), and retaining ring (37) in closed-end bearing cover (38).



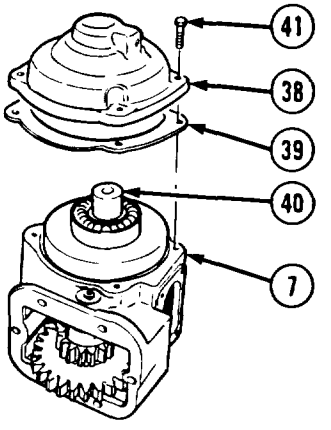
Power Takeoff (PTO) and Hydraulic Pump Maintenance Instructions (Cont)

(21) Apply thin coat of grease to mounting surface of power takeoff (PTO) housing (7).

(22) Install gasket (39) on power takeoff (PTO) housing (7).

(23) Install shaft assembly (40) in power takeoff (PTO) housing (7).

(24) Install closed-end bearing cover (38) with four screws (41). Tighten screws to 17 to 20 lb-ft (23 to 27 N•m).

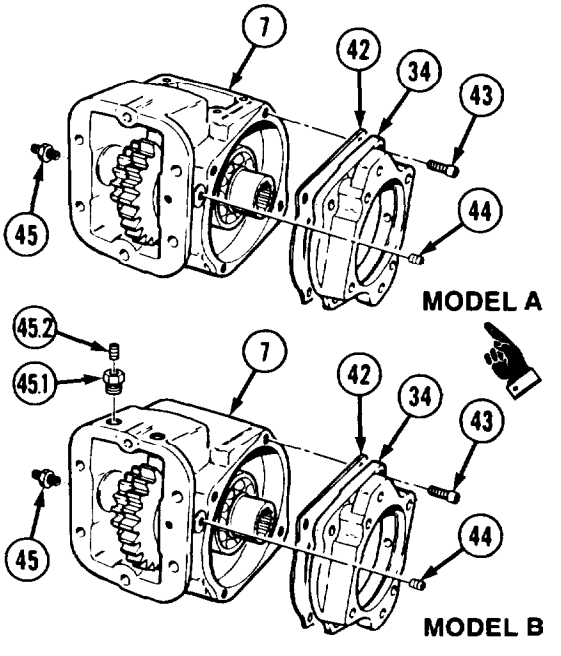


(25) Apply thin coat of grease to mounting surface of power takeoff (PTO) housing (7).

(26) Install gasket (42) and open-end bearing cover (34) to power takeoff (PTO) housing (7) with four screws (43). Tighten screws to 15 to 20 lb-ft (20 to 27 N•m).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(27) Apply a thin coat of pipe thread sealing compound to threads of pipe plug (44) and fitting (45) and install in power takeoff (PTO) housing (7).

NOTE

There are two models of power takeoff (PTO) units. Model B has two pipe plug adapters and a pipe plug. Do steps *(27.1)* and *(27.2)* for Model B.

(27.1) Apply a thin coat of pipe thread sealing compound to threads of two pipe plug adapters (45.1) and install in power takeoff (PTO) housing (7). Tighten adapters to 25 to 30 lb-ft (34 to 41 N•m).

(27.2) Apply a thin coat of pipe thread sealing compound to threads of one pipe plug (45.2) and install in pipe plug adapters (45.1). Tighten plugs to 8 to 12 lb-ft (11 to 16 N•m).

19-2. POWER TAKEOFF (PTO) REPAIR (CONT).

(28) Install screw (46).

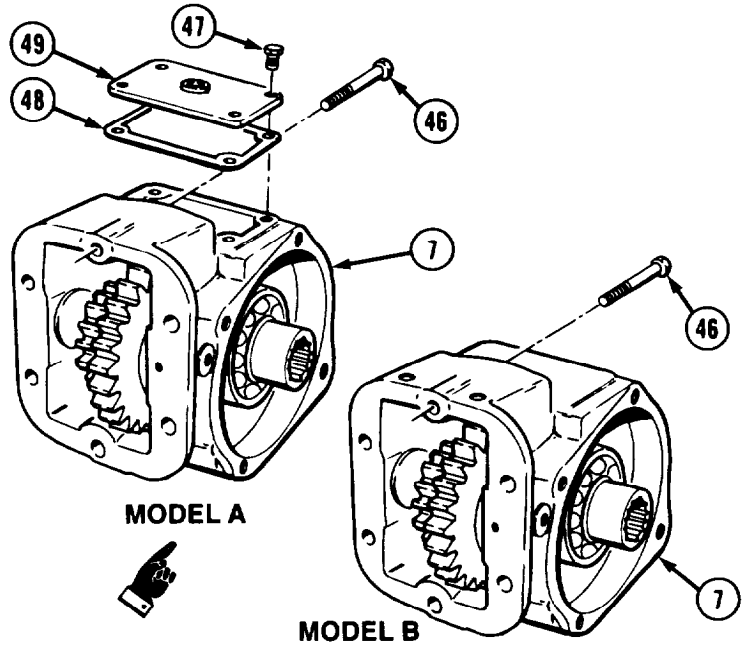
NOTE

There are two models of power takeoff (PTO) units. Model B has no cover plate. Skip steps (29) and (30) for Model B.

(29) Apply silicone adhesive-sealant to threads of four screws (47) and install gasket (48) and cover plate (49) with four screws to power takeoff (PTO) housing (7).

(30) Tighten screws (47) to 15 to 20 lb-ft (20 to 27 N•m)

d. Follow-on Maintenance. None



END OF TASK

19-2.1 POWER TAKEOFF REPAIR (M984E1).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 46, Appendix C
Solvent, drycleaning, Item 57, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Grease, automotive and artillery, Item 34, Appendix C
Sealing and thread locking compound, Item 25, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Power takeoff on a clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

Power Takeoff (PTO) and Hydraulic Pump Maintenance Instructions (Cont)

a. Disassembly.

NOTE

There are two models of power takeoff (PTO) units. Model B has two pipe plug adapters, one pipe plug, and no cover plate.

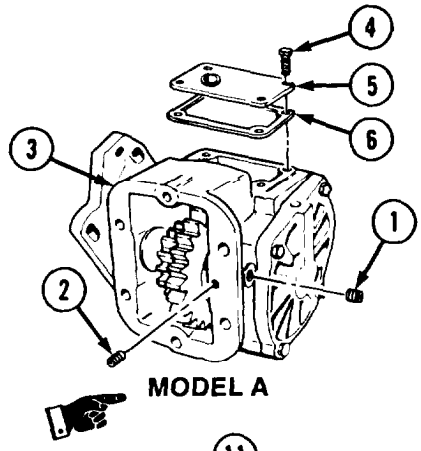
(1) Remove pipe plug (1) and setscrew (2) from power takeoff (PTO) (3).

NOTE

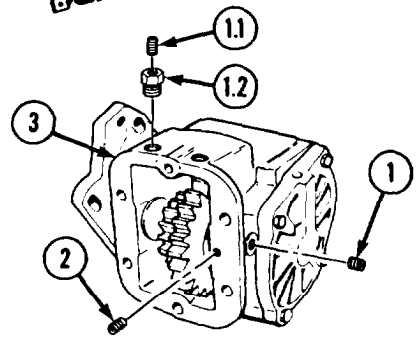
Skip step (2) and do step *(2.1)* for Model B.

(2) Remove four screws (4), cover plate (5), and gasket (6).

(2.1) Remove one pipe plug (1.1) and pipe plug and pipe plug adapter (1.2).



MODEL A

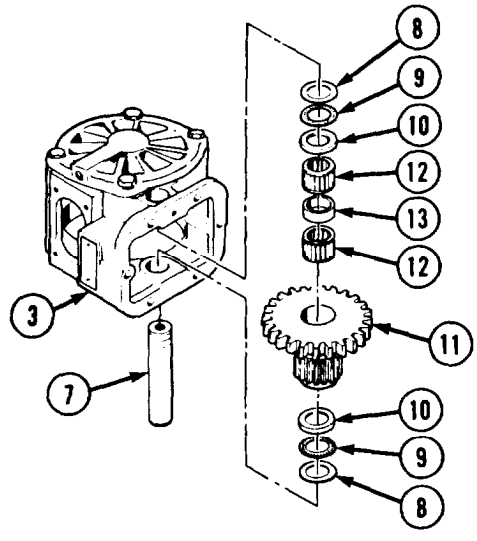


MODEL B

(3) Remove idler shaft (7) from power takeoff (PTO) (3).

(4) Remove two thin thrust races (8), two thrust bearings (9), two thick thrust races (10), and input gear (11) from PTO (3).

(5) Remove two roller assemblies (12) and bearing spacer (13) from input gear (11).

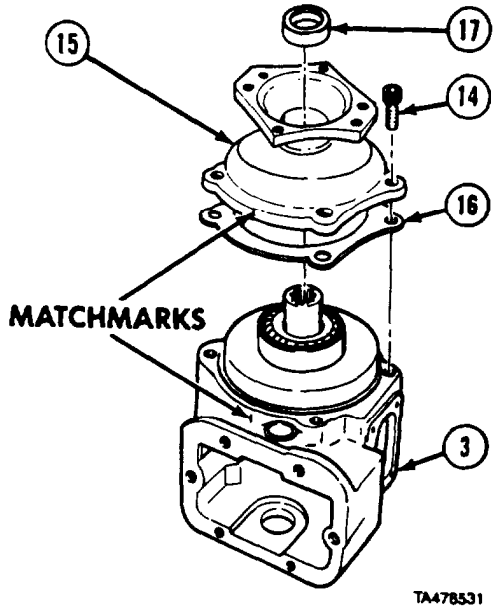


19-2.1. POWER TAKEOFF REPAIR (M984E1) (CONT).

NOTE

Mark pump housing assembly and PTO for installation.

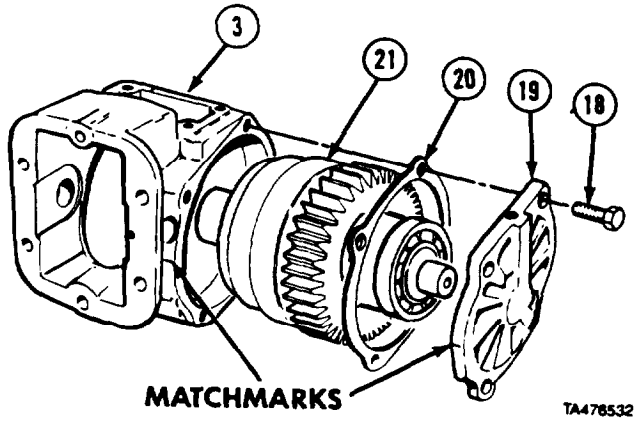
(6) Remove four screws (14), pump housing assembly (15), and gasket (16) from PTO (3).
(7) Remove oil seal (17).



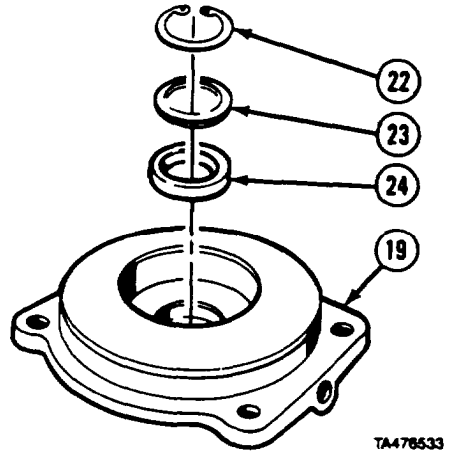
NOTE

Mark closed-end bearing cover and PTO housing for installation.

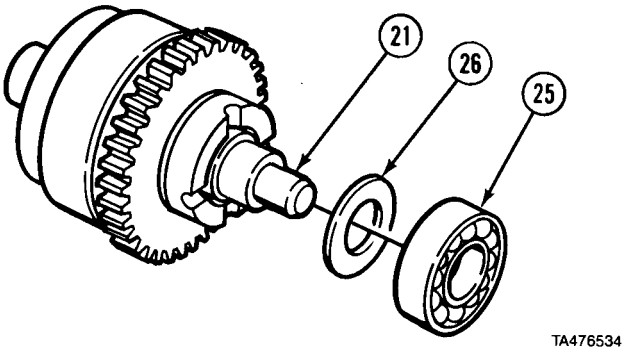
(8) Remove four screws (18), closed-end bearing cover (19) gasket (20) and output shaft assembly (21) from PTO (3).
(9) Remove closed-end bearing cover (19) from output shaft assembly (21).



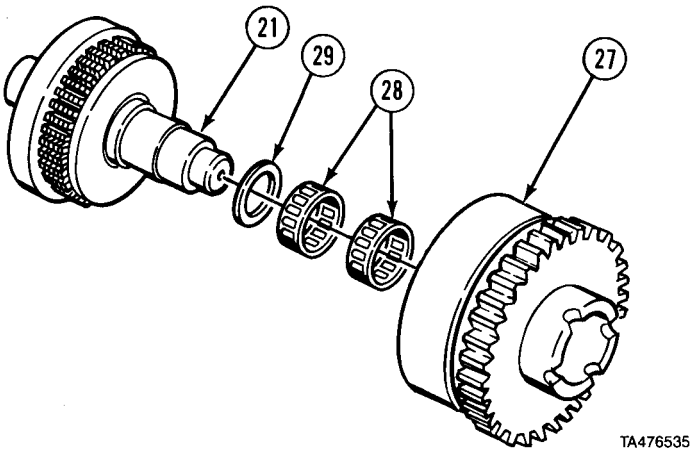
(10) Remove retaining ring (22) and washer (23) from closed-end bearing cover (19).
(11) Remove seal (24).



(12) Remove ball bearing (25) and bearing washer (26) from output shaft assembly (21).



(13) Remove output gear (27) from output shaft assembly (21).
(14) Remove two roller bearings (28) and bearing spacer (29).

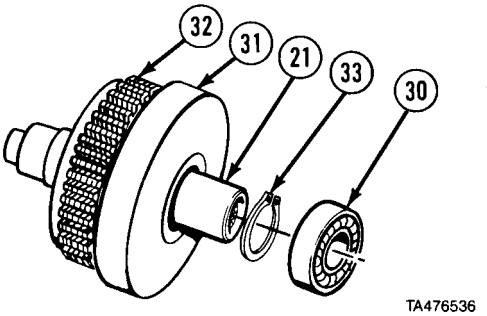


(15) Remove ball bearing (30) from output shaft assembly (21).

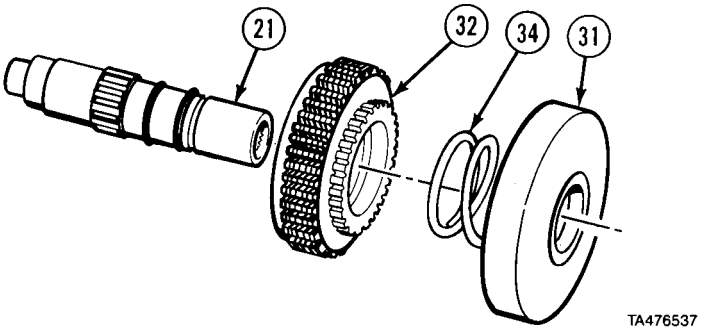
WARNING

Backup cylinder is under spring pressure and must be clamped to prevent injury caused by sudden release of parts.

(16) Put backup cylinder (31) and inner clutch gear (32) in vise.
(17) Remove retaining ring (33) from output shaft assembly (21).

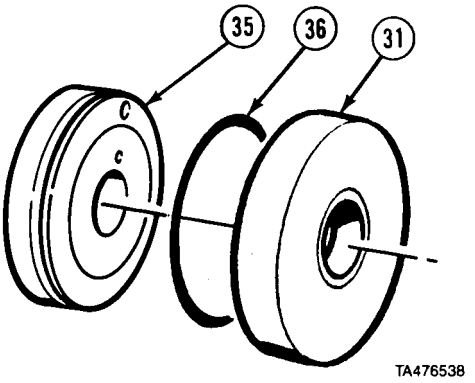


(18) Remove backup cylinder (31), spring (34), and inner clutch gear (32) from output shaft assembly (21).

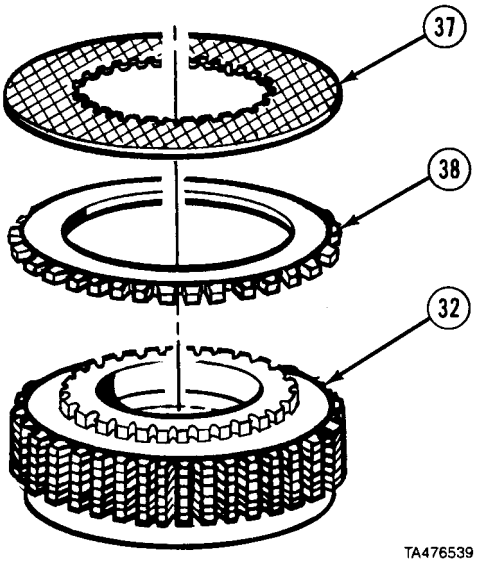


19-2.1. POWER TAKEOFF REPAIR (M984E1) (CONT).

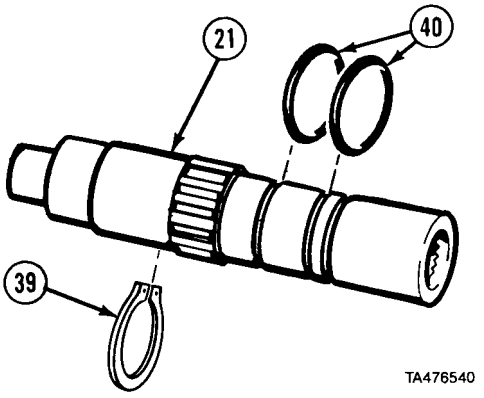
(19) Remove piston (35) from backup cylinder (31).
(20) Remove preformed packing (36) from piston (35).



(21) Remove eight friction discs (37) and seven spur gears (38) from inner clutch gear (32).



(22) Remove retaining ring (39) and two preformed packings (40) from output shaft assembly (21).



b. Cleaning/Inspection.

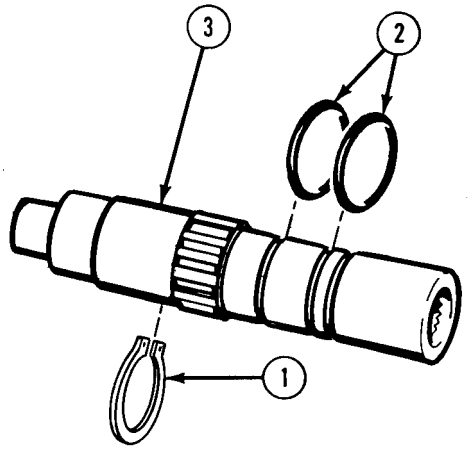
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect friction discs for worn-out condition. If oil grooves are not visible on any portion of any one friction disc, replace all friction discs.
(3) Inspect clutch spring for breaks or discoloration. Replace spring if broken or discolored.
(4) Inspect remaining parts for damage. Replace damaged parts.
(5) Coat all parts with lubricating oil.
(6) Inspect idler shaft, output shaft, and thrust washers for nicks, burrs, grooves, warps, bends, etc. If nicks, burrs or grooves cannot be removed with emery cloth, replace part.

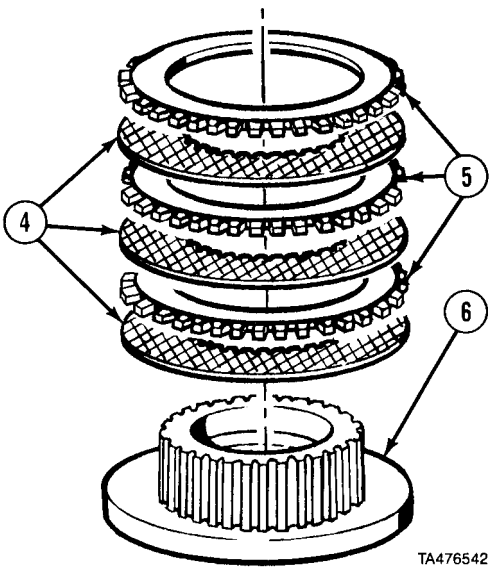
c. Assembly.

(1) Install retaining ring (1) and two preformed packings (2) on output shaft assembly (3).



TA476541

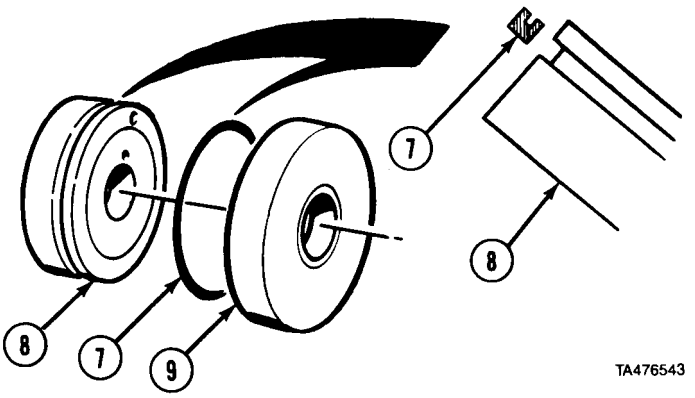
(2) Starting with friction disc (4) and alternating with spur gears (5) install eight friction discs and seven spur gears on inner clutch gear (6).



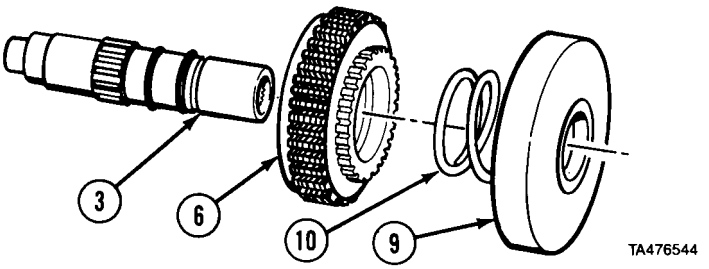
TA476542

19-2.1. POWER TAKEOFF REPAIR (M984E1) (CONT).

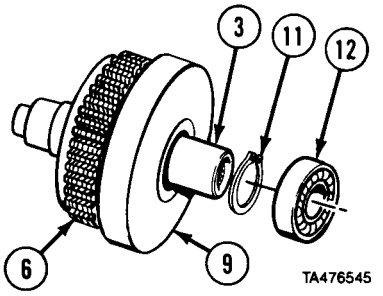
(3) Install preformed packing (7) on clutch piston (8) as shown.
(4) Install clutch piston (8) in backup cylinder (9).



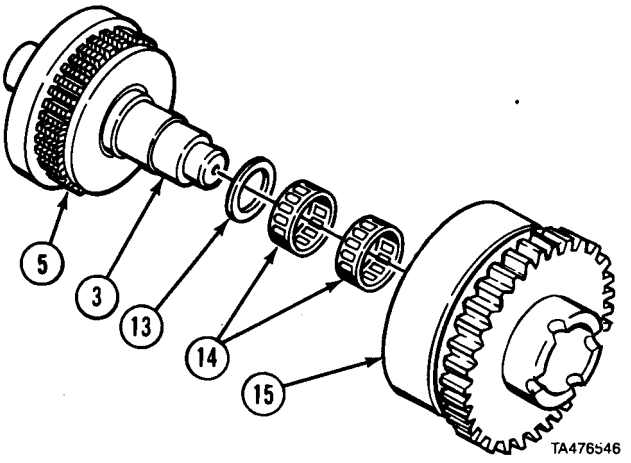
(5) Install spring (10), inner clutch gear (6), and backup cylinder (9) on output shaft assembly (3).

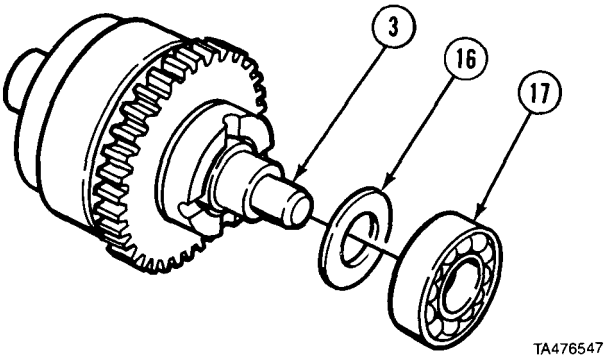


(6) Put inner clutch gear (6) and backup cylinder (9) together in vise.
(7) Install retaining ring (11) on output shaft assembly (3) and remove from vise.
(8) Install ball bearing (12) on output shaft assembly (3).

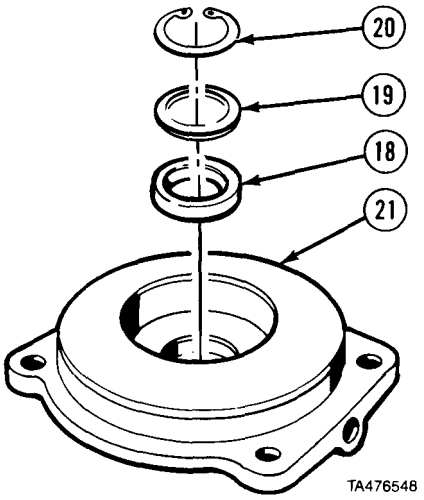


(9) Install bearing spacer (13) and two roller bearings (14) on output shaft assembly (3).
(10) Aline splines on steel plates (5) with splines in output gear (15) and install on output shaft assembly (3).

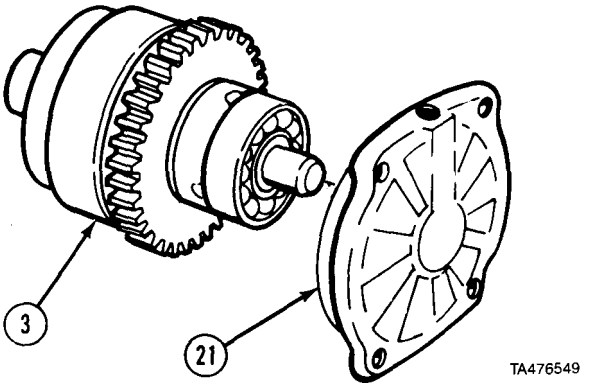




(11) Install bearing washer (16) and ball bearing (17) on output shaft assembly (3).

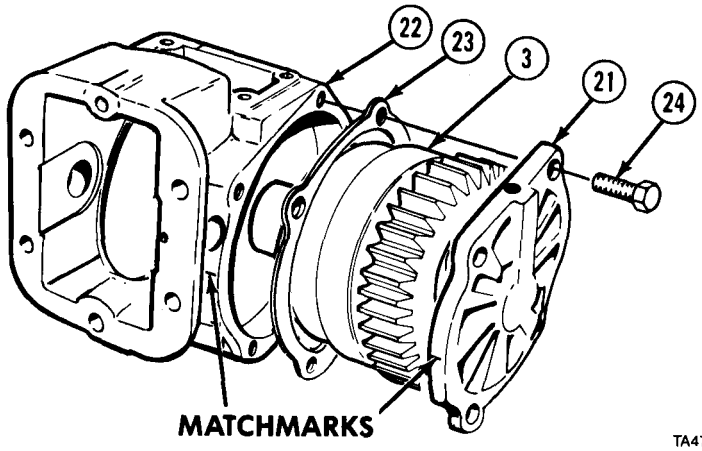


(12) Install seal (18), washer (19), and retaining ring (20) in closed-end bearing cover (21).



(13) Install closed-end bearing cover (21) on output shaft assembly (3).

19-2.1. POWER TAKEOFF REPAIR (M984E1). (CONT).



(14) Apply thin coat of grease to mounting surface of PTO (22).

NOTE

Aline matchmarks on closed-end bearing cover and PTO before installing.

(15) Install gasket (23) and closed-end bearing cover (21) and output shaft assembly (3) to PTO (22) with four screws (24). Tighten screws to 15 to 20 lb-ft (20 to 23 N·m).

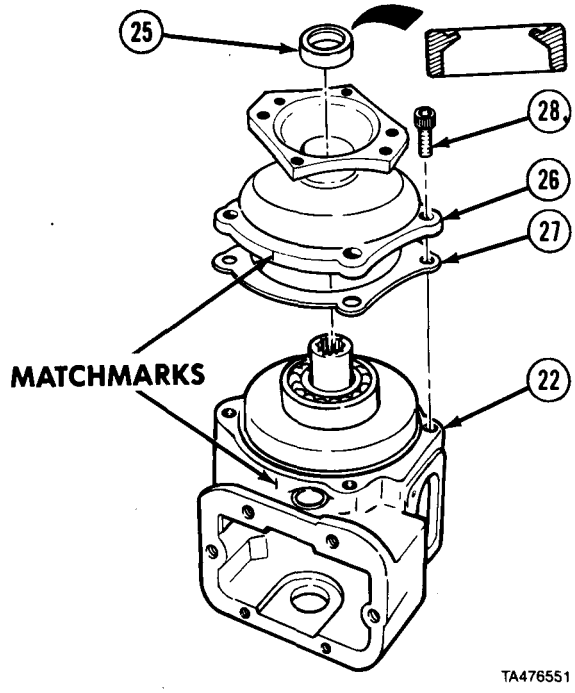
(16) Install oil seal (25) in pump housing assembly (26).

(17) Apply thin coat of grease to mounting surface of PTO (22).

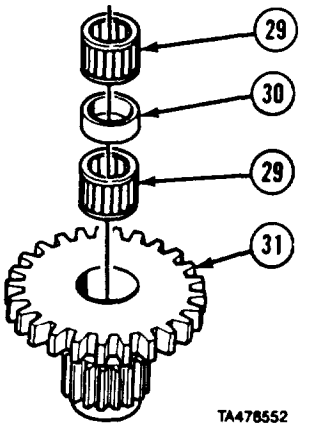
NOTE

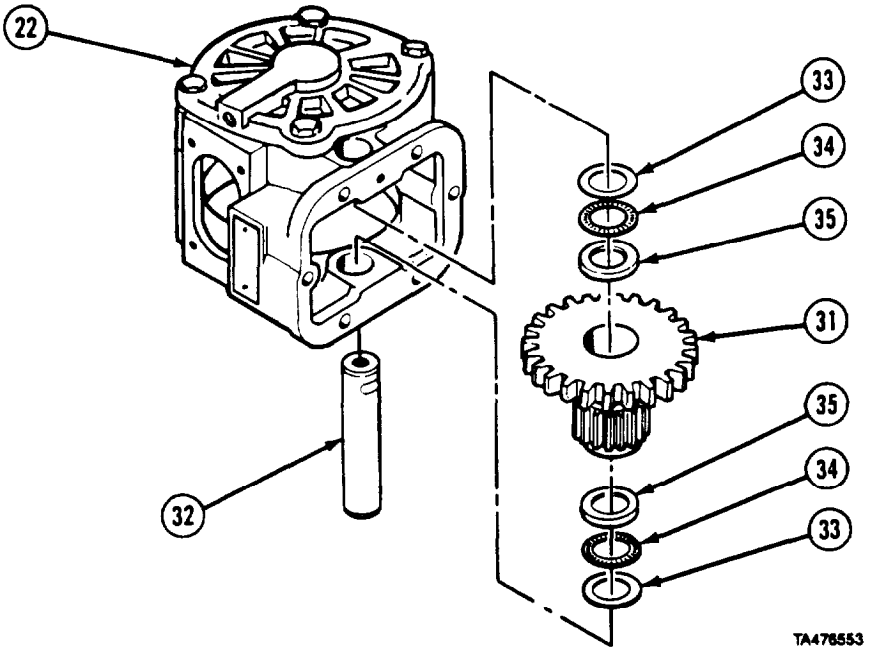
Aline matchmarks on pump housing assembly and PTO before installing.

(18) Install gasket (27) and pump housing assembly (26) with four screws (28). Tighten screws to 17 to 20 lb-ft (23.0 to 27.1 N·m).



(19) Install roller assembly (29), bearing spacer (30), and roller assembly (29) into input gear (31).





NOTE

Line up flat spot on idler shaft with setscrew hole.

(20) Install idler shaft (32), with slot facing out, in PTO (22) until about 1/4 in. (6 mm) shows in opening in PTO.

(21) Install thin thrust washer (33), thrust bearing (34), and thick thrust washer (35) on idler shaft (32).

(22) Install input gear (31) on idler shaft (32) and press idler shaft through input gear, leaving space to install thrust washers (33 and 35) and thrust bearing (34).

(23) Install thin thrust washer (33), thrust bearing (34), and thick thrust washer (35) under input gear (31).

(24) Press idler shaft (32) into PTO (22).

19-2.1. POWER TAKEOFF REPAIR (M984E1) (CONT).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(25) Apply thread locking compound to threads of setscrew (36) and install in PTO (22).

(26) Apply a thin coat of pipe thread sealing compound to threads of pipe plug (37) and install in PTO (22).

NOTE

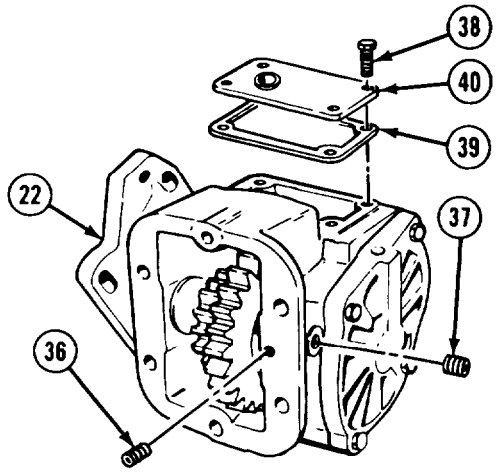
There are two models of power takeoff (PTO) units. Model B has two pipe plug adapters, two pipe plugs and no cover plate. Do steps *(26.1)* and *(26.2)* and skip steps *(27)* and *(28)* for Model B.

(26.1) Apply a thin coat of pipe thread sealing compound to threads of two pipe plug adapters (37.1) and install in PTO (22). Tighten adapters to 25 to 30 lb-ft (34 to 41 N•m).

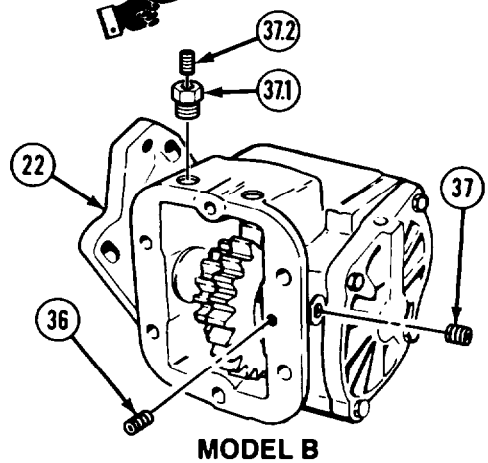
(26.2) Apply a thin coat of pipe thread sealing compound to threads of pipe plug (37.2) and install in pipe plug adapters (37.1). Tighten plugs to 8 to 12 lb-ft (11 to 16 N•m).

(27) Apply thread locking compound to threads of four screws (38) and install gasket (39) and cover plate (40) with four screws to PTO (22).

(28) Tighten screws (38) to 15 to 20 lb-ft (20 to 27 N•m).



MODEL A



MODEL B

d. Follow-on Maintenance. None.

END OF TASK

Section III. HYDRAULIC PUMP

19-3. HYDRAULIC PUMP REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 46, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Hydraulic pump on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

Power Takeoff (PTO) and Hydraulic Pump Maintenance Instructions (Cont)

a. Disassembly.

NOTE

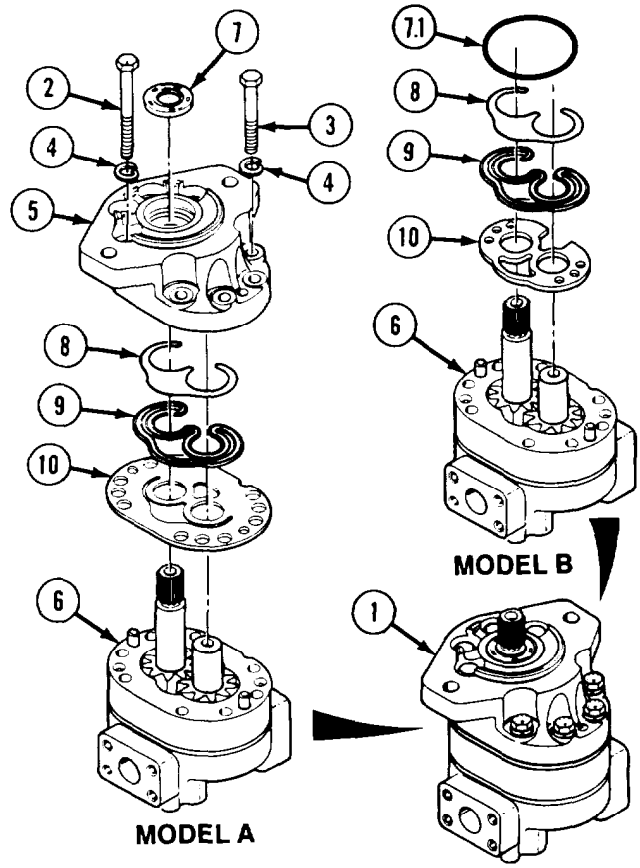
- There are two models of hydraulic pumps. Model B has two preformed packings and different wear plate configuration. The Model B pump is equal in size and functional performance and fully interchangeable with Model A pump.
- Mark front and rear covers and center section.

(1) Place hydraulic pump (1) in vise.
(2) Remove four screws (2), four screws (3), and eight lockwashers (4).
(3) Remove front cover (5) from center section (6).
(4) Remove shaft seal (7).

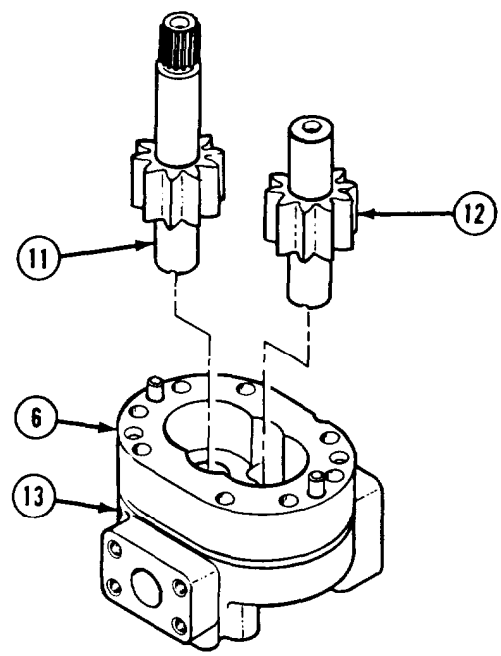
NOTE

Model B pump has preformed packing. Do step *(4.1)* for Model B.

(4.1) Remove preformed packing (7.1) from front cover (5).
(5) Remove seal gland (8), seal retainer (9), and front wear plate (10) from center section (6).



(6) Remove drive gear (11) and driven gear (12) from center section (6) and rear cover (13).



19-3. HYDRAULIC PUMP REPAIR (CONT).

(7) Remove center section (6) and rear wear plate (14) from rear cover (13).

(8) Remove seal retainer (15) and seal gland (16) from rear cover (13).

NOTE

Model B pump has preformed packing. Do step *(9)* for Model B.

(9) Remove preformed packing (17) from rear cover (13).

b. Cleaning/Inspection.

WARNING

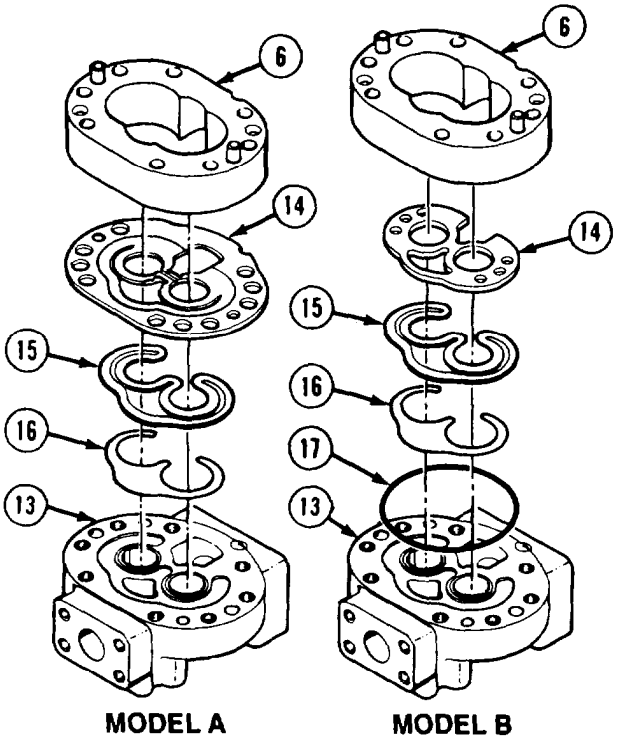
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in drycleaning solvent.

(2) Inspect parts for defects. Replace if necessary

(3) Coat all parts with lubricating oil.

(4) Bushing inside diameter must not exceed 0.003 in. (0.076 mm) larger than shaft diameter.



c. Assembly.

NOTE

There are two models of hydraulic pumps. Model B has two preformed packings and different wear plate configuration.

(1) Place rear cover (1) in vise with inside facing up.

NOTE

Model B Pump has preformed packing. Do step *(1.1)* for Model B.

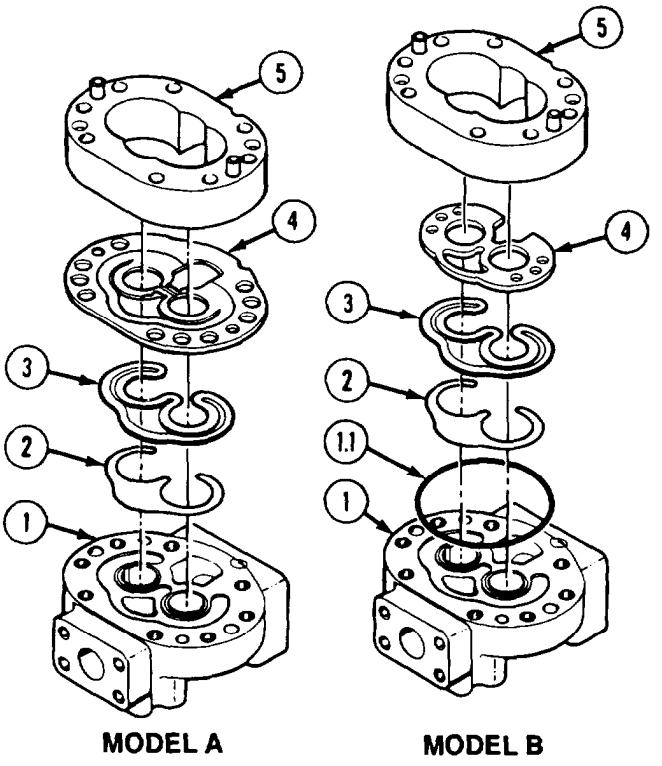
(1.1) Install preformed packing (1.1) on rear cover (1).

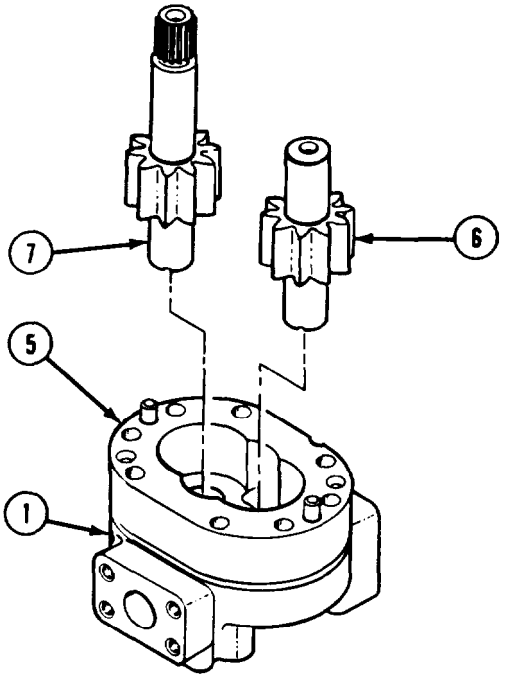
(2) Install seal gland (2) in rear cover (1).

(3) Install seal retainer (3) with flat side facing up.

(4) Install rear wear plate (4) with bronze side up on rear cover (1).

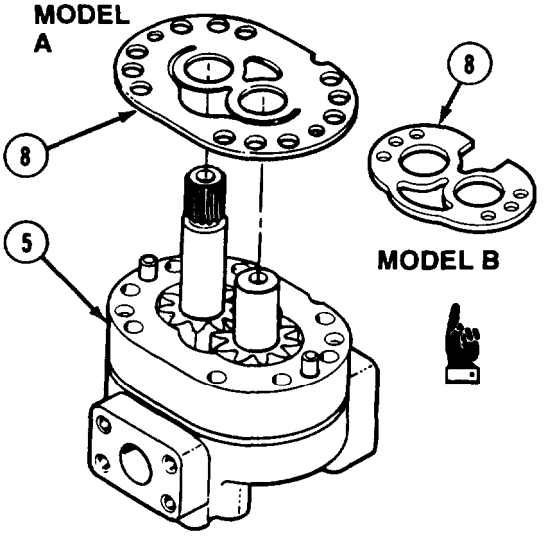
(5) Aline notches and install center section (5).





NOTE
Grooved gear ends go in rear cover.

(6) Install driven gear (6) and drive gear (7) in center section (5) and rear cover (1).



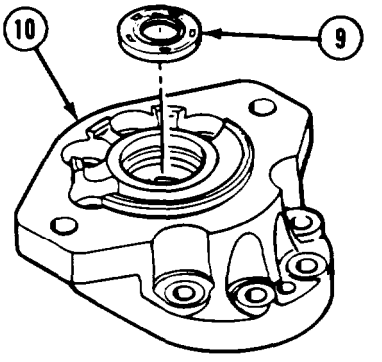
NOTE
Wear plates of Models A and B have different configurations.

(7) Install wear plate (8) on center section (5) with bronze side down.

19-3. HYDRAULIC PUMP REPAIR (CONT).

(8) Install shaft seal (9) in front cover (10).

(9) Place front cover (10) in vise, inside facing up.



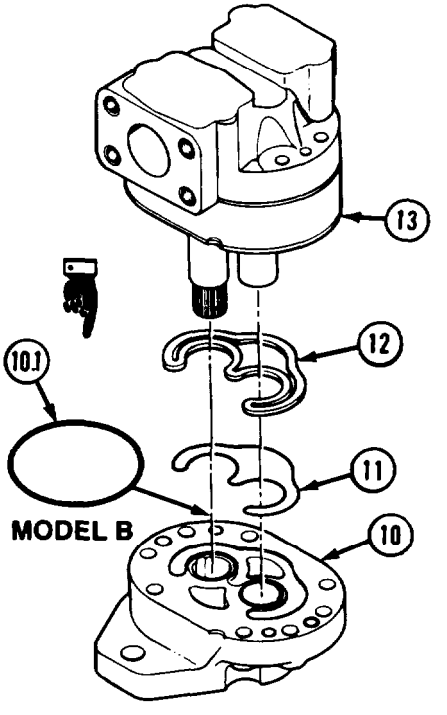
NOTE

Model B pump has preformed packing. Do step *(9.1)* for Model B.

(9.1) Install preformed packing (10.1) on front cover (10).

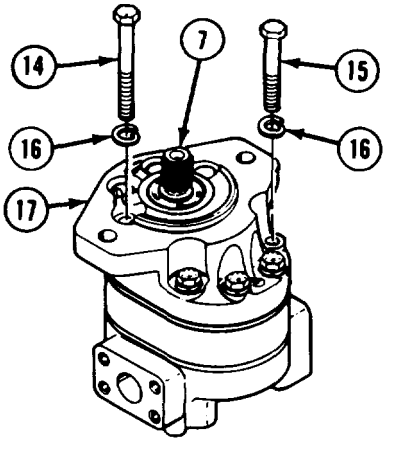
(10) Install seal gland (11) and seal retainer (12) with flat side facing up.

(11) Aline notches and install rear assembly (13) on front cover (10).



(12) Install four long screws (14), four short screws (15), and eight lockwashers (16). Tighten screws to 55 to 65 lb-ft (75 to 88 N•m).

(13) Use suitable socket and torque wrench to turn drive. If tightness exceeds 35 lb-in. (4 N•m), disassemble and repair hydraulic pump (17).



d. Follow-on Maintenance. None.

END OF TASK

19-4. HYDRAULIC PUMP REPAIR (M984E1)

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
None

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 46, Appendix C
Cloth, drycleaning, Item 16, Appendix C
Solvent, drycleaning, Item 57, Appendix C
Jelly, Petroleum, Item 38.1, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Hydraulic pump on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

19-4. HYDRAULIC PUMP REPAIR (M984E1) (CONT).

a. Disassembly.

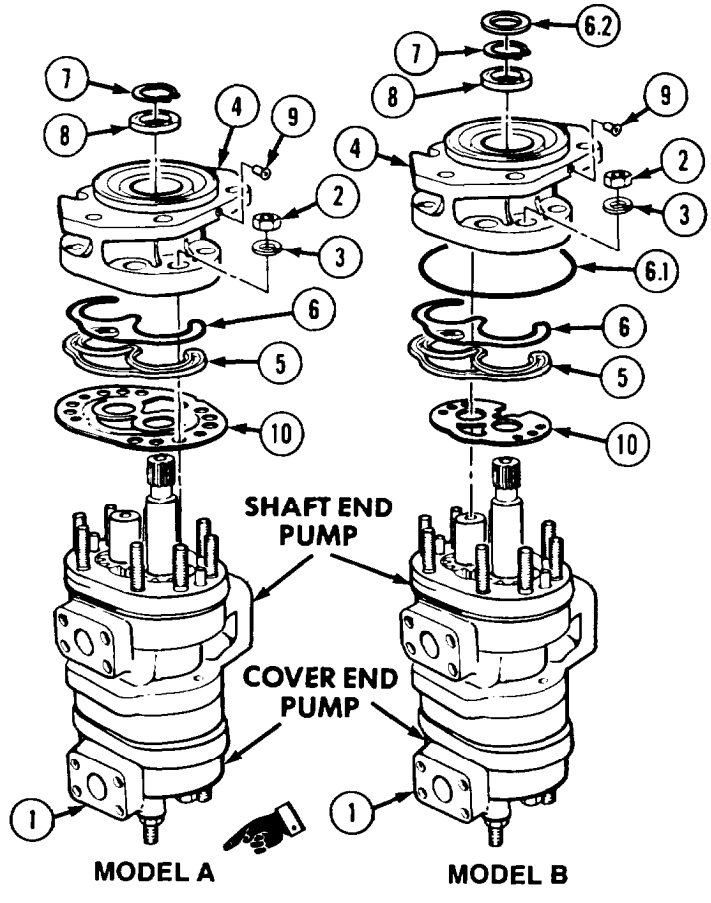
CAUTION

If shaft end pump or cover end pump is suspected of failure, both pumps must be disassembled and inspected or early failure of pump may occur because of contamination or unseen damage.

NOTE

- There are two models of hydraulic pumps. Model B has four additional preformed packings, one seal ring, different wear plate configuration and different hardware. The Model B pump is equal in size and functional performance and fully interchangeable with Model A pump.
- Matchmark pump parts before beginning disassembly

(1) Position hydraulic pump inlet port section (1) in soft-jaw vise.
(2) Remove eight nuts (2), lockwashers (3), and end cover (4).
(3) Remove seal retainer (5) and seal gland (6) from end cover (4).



NOTE

Model B pump has a seal ring and preformed packing. Do steps *(3.1)* and *(3.2)* for Model B.

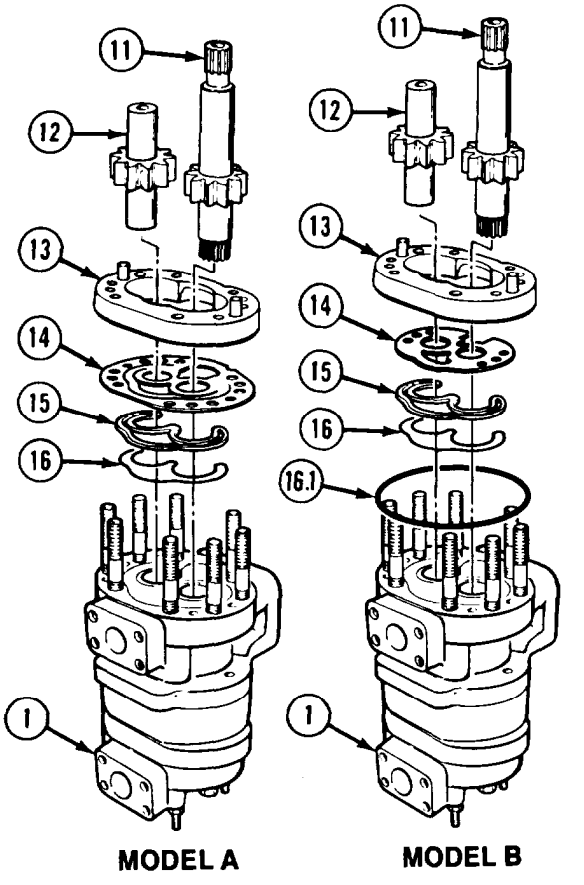
(3.1) Remove preformed packing (6.1) from end cover (4).
(3.2) Remove seal ring (6.2).
(4) Remove retaining ring (7), shaft seal (8), and plug (9) from end cover (4).
(5) Remove front wear plate (10).

(6) Remove drive gear (11) and driven gear (12).
(7) Remove center section (13).
(8) Remove rear wear plate (14), seal retainer (15), and seal gland (16) from inlet port section (1).

NOTE

Model B pump has preformed packing. Do step *(8.1)* for Model B.

(8.1) Removed preformed packing (16.1) from inlet port section (1).

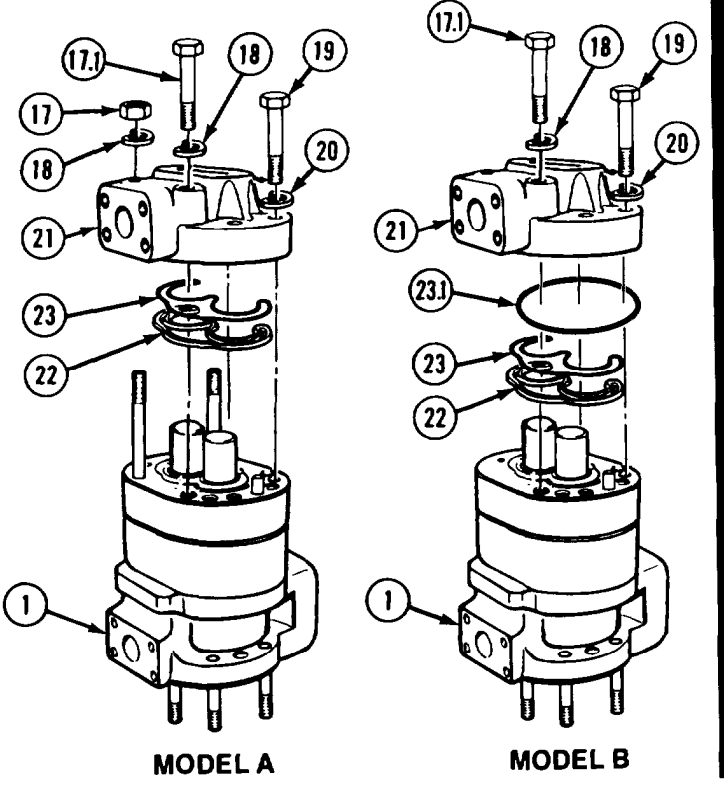


(9) Turn inlet port section (1) over in soft-jaw vise.

NOTE

Model B has preformed packing and different attaching hardware for rear cover. Do steps *(10.1), (11), (12),* and *(12.1)* for Model B. Do steps *(10), (11),* and *(12)* for Model A.

(10) Remove two nuts (17), screws (17.1), and four lockwashers (18).
(10.1) Remove four screws (17.1) and lockwashers (18).
(11) Remove four screws (19), lockwashers (20), and rear cover (21).
(12) Remove seal retainer (22) and seal gland (23) from rear cover (21).
(12.1) Remove preformed packing (23.1) from rear cover (21).

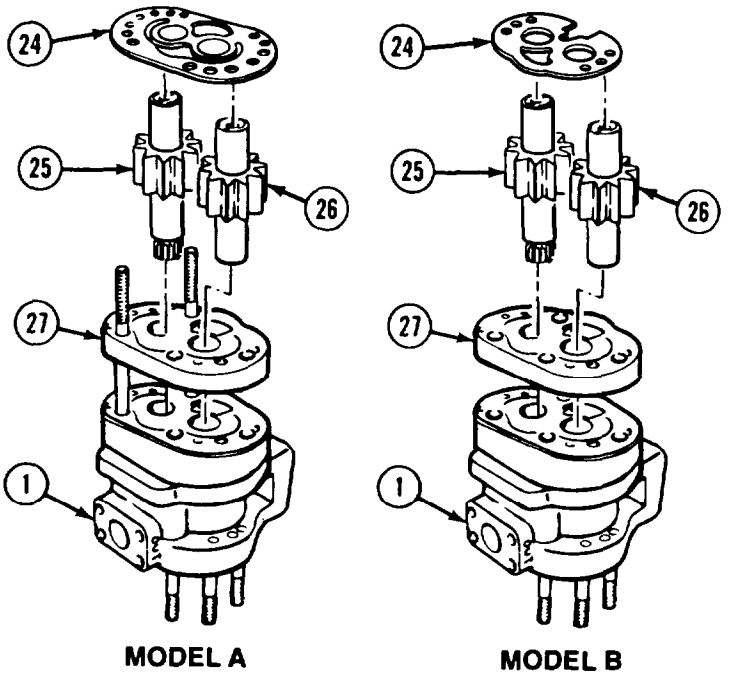


19-4. HYDRAULIC PUMP REPAIR (M984E1) (CONT).

NOTE

Wear plate of Model B pump has a different configuration.

(13) Remove front wear plate (24).
(14) Remove drive gear (25) and driven gear (26).
(15) Remove center section (27) from inlet port section (1).



(16) Remove rear wear plate (28), seal retainer (29), and seal gland (30).

NOTE

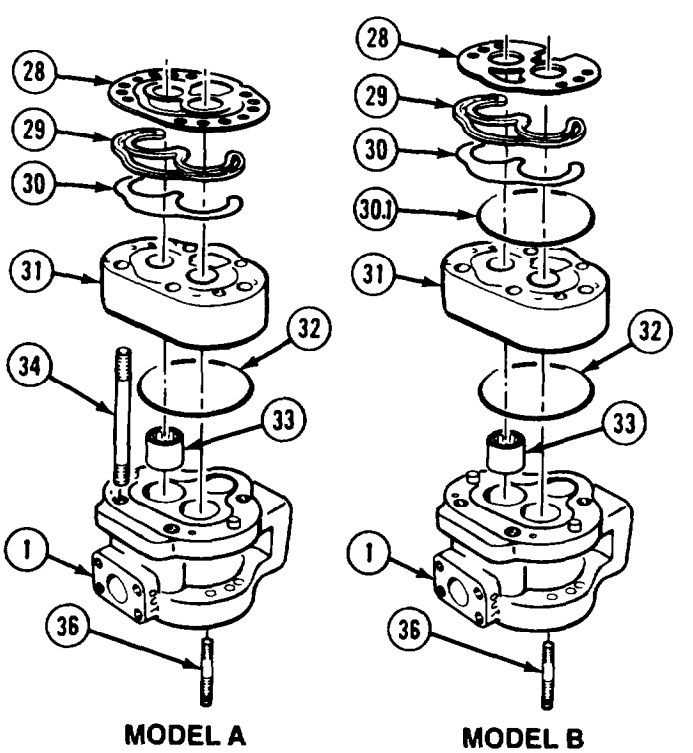
Model B has an additional preformed packing. Do step *(16.1)* for Model B.

(16.1) Remove preformed packing (30.1) from center section (31).
(17) Remove center section (31).
(18) Remove preformed packing (32).

NOTE

Model A has two studs installed in inlet port section. Do step *(20)* for Model A.

(19) Remove coupling (33).
(20) Remove two studs (34) from inlet port section (1).
(21) Remove eight studs (36) from inlet port section (1).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with drycleaning solvent.
(2) Inspect drive and driven gear bushings for flaking, scoring, discoloration, or wear more than 0.003 in. (0.076 mm) larger than shaft diameter. Replace cover if any listed condition is observed.
(3) Inspect cover inside flanges for nicks and burrs. Remove with crocus cloth.
(4) Inspect wear plates for erosion, pitting, scratches, and scoring.
(5) Inspect center sections for porosity (oil seepage thru metal), cracks, and scratches (0.010 in./0.25 mm or deeper).

CAUTION

Do not deburr figure eight edge of center section. Pump efficiency and power will be affected.

(6) Inspect drive and driven gear splines for nicks and worn-out condition. Inspect gear journals for scratches and discoloration. Replace drive or driven gear that has any discoloration. It has been overheated.
(7) Inspect gear teeth for spalling, scratches, and worn-out condition. Removal of scratches with crocus cloth is permitted.
(8) Inspect port section inlet flanges for nicks and burrs. Remove with crocus cloth.
(9) Inspect studs, screws, and nuts for cracks, burrs, and cross threading.
(10) Coat all metal parts with lubricating oil.

19-4. HYDRAULIC PUMP REPAIR (M984E1) (CONT).

c. Assembly

NOTE

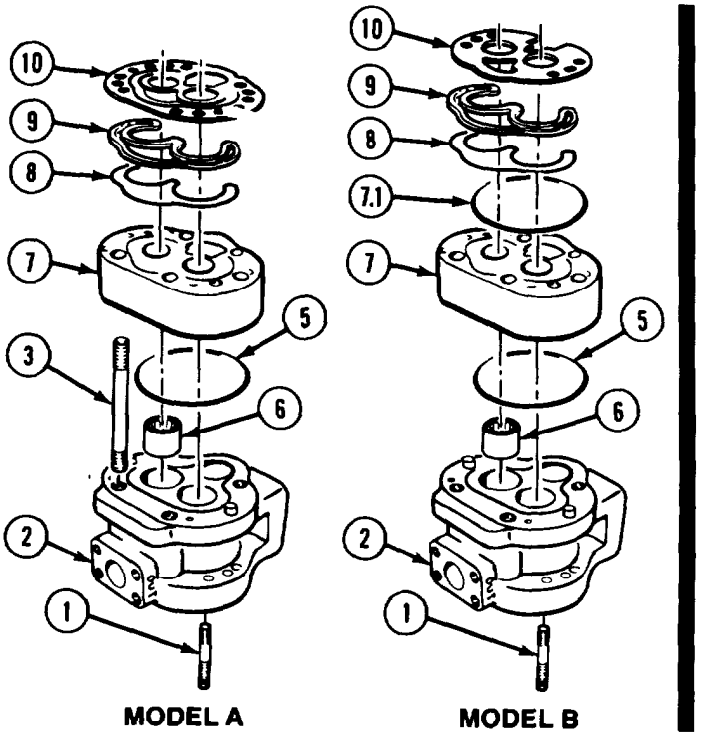
- There are two models of hydraulic pumps. Model B has four additional preformed packings and different wear plate configuration.
- Lubricate all parts with oil before installing.

(1) Install eight studs (1) in inlet port section (2). Tighten studs to 25 to 35 lb-ft (34 to 48 N•m).

NOTE

Model A has two studs. Do step *(2)* for Model A. Do step 5.1 for Model B.

(2) Install two studs (3) in inlet port section (2). Tighten studs to 25 to 35 lb-ft (34 to 48 N•m).
(3) Install preformed packing (5).
(4) Install coupling (6).
(5) Install center section (7).



NOTE

Do step (5.1) for Model B.

(5.1) Install preformed packing (7.1) on center section (7).

NOTE

Coat seal glands with small amounts of petroleum jelly to hold in place in seal retainers during assembly.

(6) Install seal gland (8), seal retainer (9), and rear wear plate (10), bronze end up.

CAUTION

Make sure gear teeth on drive gear and driven gear are same size or equipment can be damaged when installing rear cover.

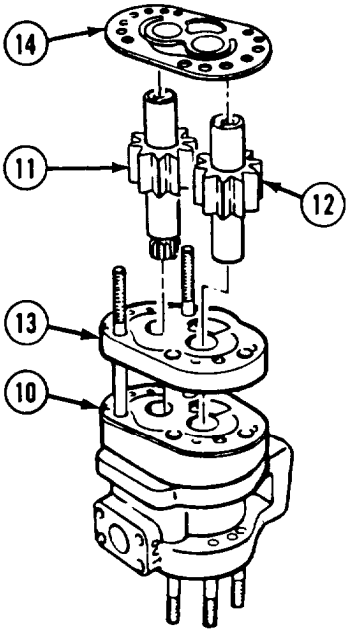
(7) Install drive gear (11) and driven gear (12) in center section (13).

NOTE

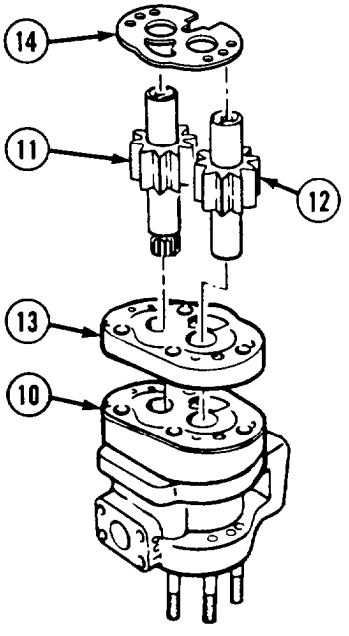
Wear plate of Model B pump has a different configuration.

(8) Install center section (13) on rear wear plate (10).

(9) Install front wear plate (14), bronze side up.



MODEL A



MODEL B

NOTE

Model B has preformed packing and different hardware for attaching rear cover. Do steps *(9.1), (10), (11),* and *(12.1)* for Model B. Do steps *(10), (11),* and *(12)* for Model A.

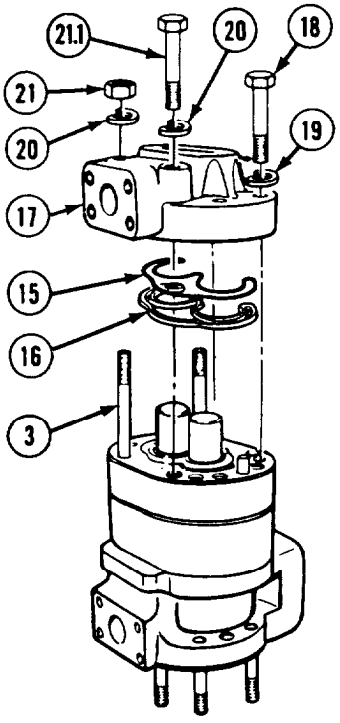
(9.1) Install preformed packing (14.1) on rear cover (17).

(10) Install seal gland (15) and seal retainer (16) into rear cover (17).

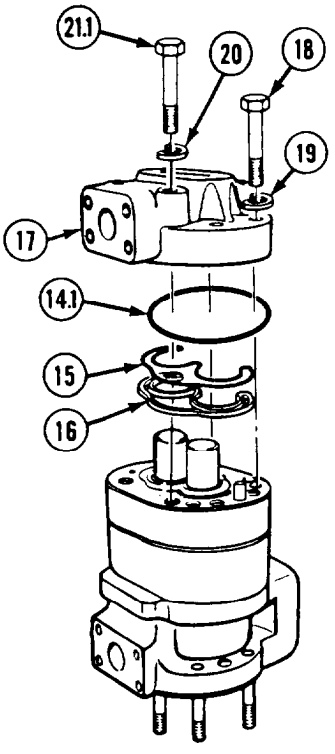
(11) Lubricate threads of four screws (18). Install rear end cover (17), screws (18), and four lockwashers (19). Tighten screws to 60 lb-ft (81 N•m).

(12) Lubricate threads of studs (3). Install four lockwashers (20), two nuts (21), and two screws (21.1). Tighten nuts and screws to 60 lb-ft (81 N•m).

(12.1) Lubricate threads of four screws (21.1). Install four screws (21.1) and lockwashers (20). Tighten screws to 60 lb-ft (81 N•m).



MODEL A



MODEL B

19-4. HYDRAULIC PUMP REPAIR (M984E1) (CONT).

(13) Place inlet port section (2) in vise with inside facing up.

NOTE

Model B has preformed packing. Do step *(13.1)* for Model B.

(13.1) Install preformed packing (21.2) on inlet port section (2).

(14) Install seal gland (22) in inlet port section (2).

(15) Install seal retainer (23) with flat side facing up.

(16) Install rear wear plate (24) with bronze side up on inlet port section (2).

(17) Aline notches and install center section (25).

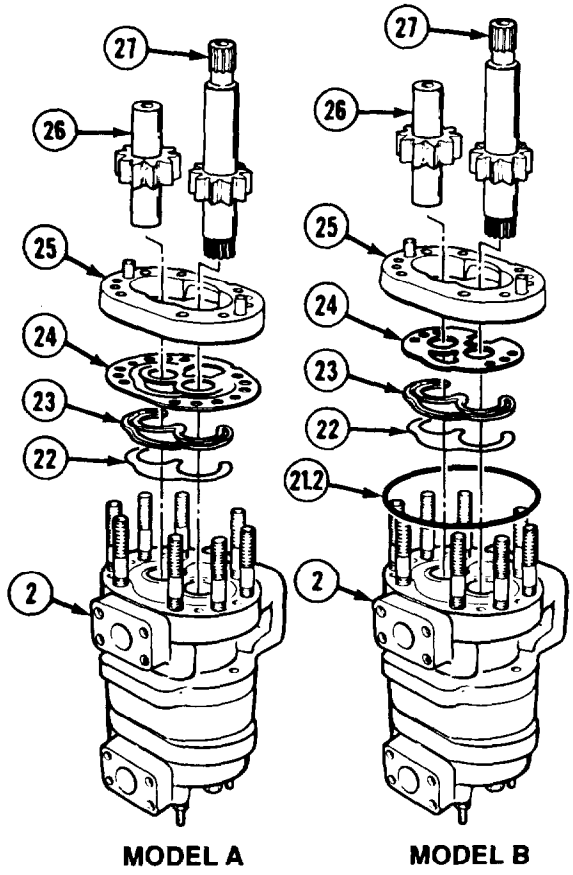
CAUTION

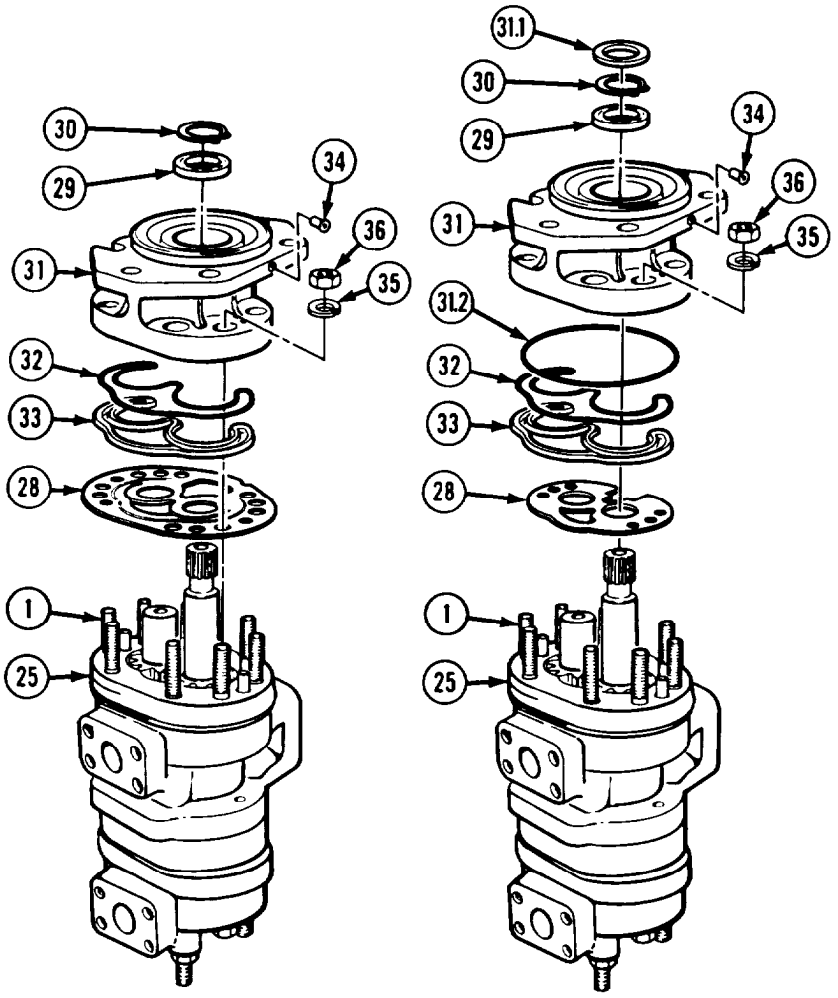
Make sure gear teeth on drive gear and driven gear are same size or equipment can be damaged when installing end cover.

NOTE

Grooved end of gears goes in inlet port section.

(18) Install driven gear (26) and drive gear (27) in inlet port section (2).





(19) Install front wear plate (28) on center section (25) with bronze side down.
(20) Install shaft seal (29) and retaining ring (30) in end cover (31).

NOTE

Model B pump has a seal ring and preformed packing. Do steps (20.1) and (20.2) for Model B.

(20.1) Install seal ring (31.1) in end cover (31).
(20.2) Install preformed packing (31.2) on end cover (31).
(21) Install seal gland (32), seal retainer (33), and plug (34) in end cover (31).
(22) Lubricate threads of studs (1). Install end cover (31), eight lockwashers (35), and nuts (36). Tighten nuts to 55 to 65 lb-ft (75 to 88 N•m).

NOTE

Socket may slip when turning shaft. Shop rag may be used to make tighter lit.

(23) Use 13/16 in. 12 pt. socket and torque wrench to turn drive gear (27). If more than 140 lb-in. (15.6 N•m) is required to turn shaft, disassemble and assemble hydraulic pump.

d. Follow-on Maintenance. None.

END OF TASK

CHAPTER 20
HYDRAULIC SYSTEM MAINTENANCE

Contents

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Section I. INTRODUCTION

20-1. **GENERAL.** This chapter contains maintenance instructions for repair of the hydraulic system at the direct support level.

Section II. HYDRAULIC HAND PUMP

Hydraulic System Maintenance Instructions

20-2. HYDRAULIC HAND PUMP REPAIR (M983).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M983

Test Equipment
None

Special Tools
None

Fabricated Tools
Seal retainer tool, Item 7, Appendix B
Valve seat tool, Item 6, Appendix B

Supplies
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Hydraulic hand pump on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

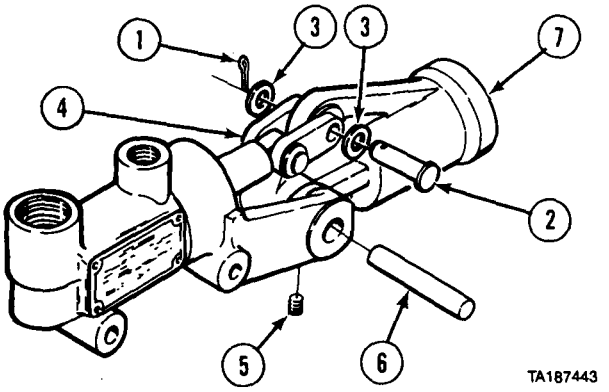
Level of Maintenance
Direct Support

20-2. HYDRAULIC HAND PUMP REPAIR (M983) (CONT).

a. *Disassembly.*

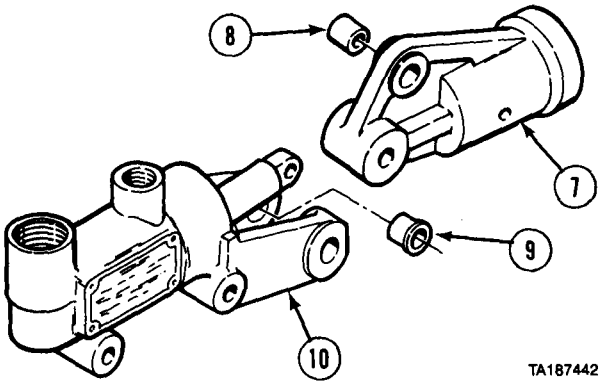
(1) Remove two cotter pins (1), pins (2), four washers (3), and two pivot links (4).

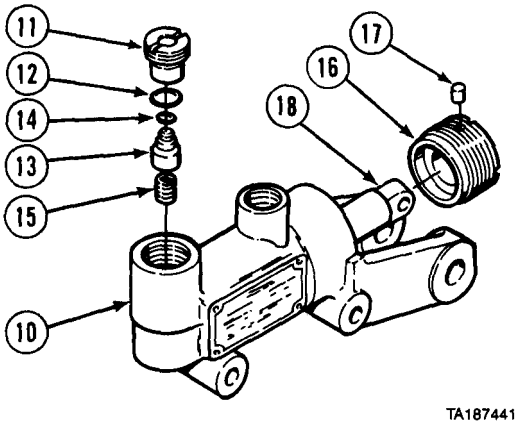
(2) Remove screw (5), pivot pin (6), and pivot arm (7).



(3) Remove bushing (8) from pivot arm (7).

(4) Remove two bushings (9) from pump body (10).





(5) Using valve seat tool, remove valve seat (11) and preformed packing (12) from pump body (10).

(6) Turn pump body (10) over and remove valve poppet (13), preformed packing (14), and spring (15).

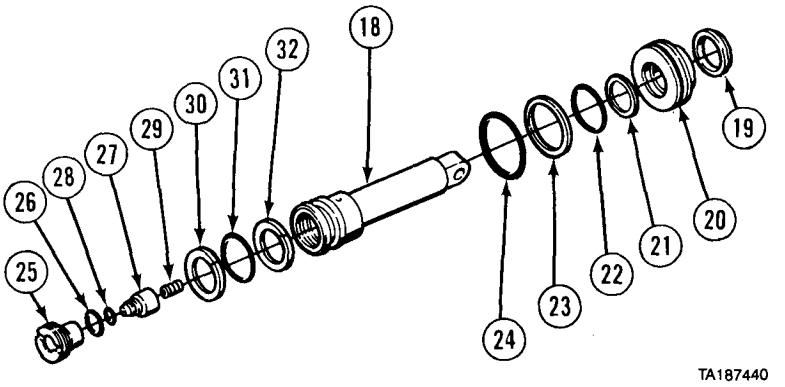
(7) Using seal retainer tool, remove seal retainer (16).

(8) Remove nylon insert (17).

(9) Remove piston rod (18).

Hydraulic System Maintenance Instructions (Cont)

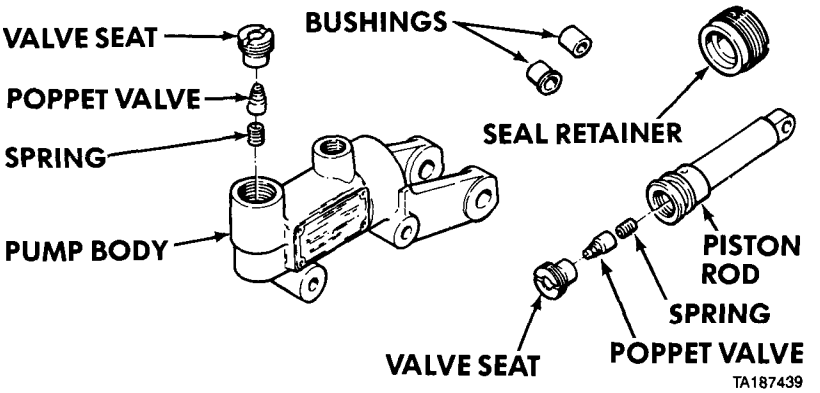
(10) Remove rod scraper (19), seal housing (20), backup ring (21), preformed packing (22), backup ring (23), and preformed packing (24) from piston rod (18).
(11) Using valve seat tool, remove valve seat (25), preformed packing (26), valve poppet (27), preformed packing (28), and spring (29).
(12) Remove backup ring (30), preformed packing (31), and backup ring (32).



b. Cleaning/Inspection.

WARNING

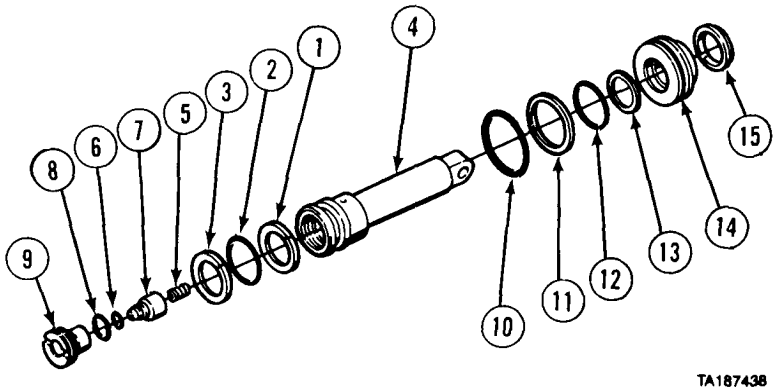
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(1) Clean all metal parts with dry cleaning solvent.
(2) Inspect pump body for cracks and stripped threads.
(3) Inspect pump body ports for scratched valve seating areas.
(4) Inspect poppet valve seats for scratches and grooves.
(5) Inspect seal retainer for stripped threads.
(6) Inspect valve seats for scratches and grooves.
(7) Inspect springs for breaks.
(8) Inspect inside of bushings for out-of-round condition.

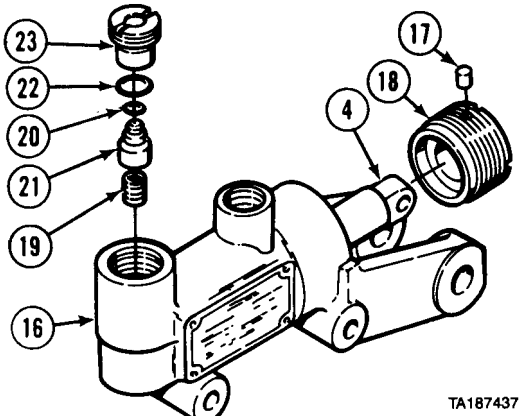
c. Assembly.

(1) Install backup ring (1), preformed packing (2), and backup ring (3) on piston rod (4).
(2) Install spring (5), preformed packing (6), valve poppet (7), preformed packing (8), and valve seat (9). Using valve seat tool, tighten valve seat to 90 to 100 lb-in. (10 to 11 N·m).
(3) Install preformed packing (10), backup ring (11), preformed packing (12), backup ring (13), seal housing (14), and rod scraper (15).

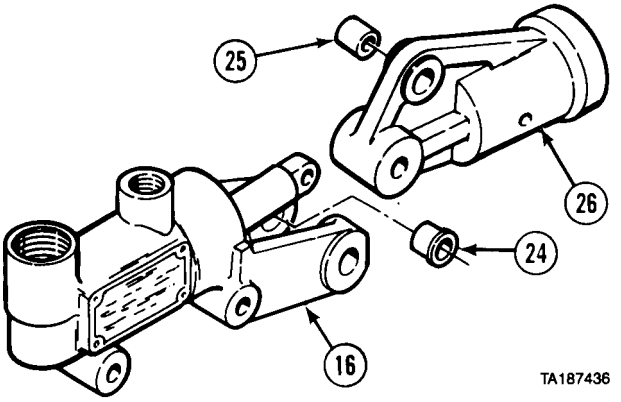


20-2. HYDRAULIC HAND PUMP REPAIR (M983) (CONT).

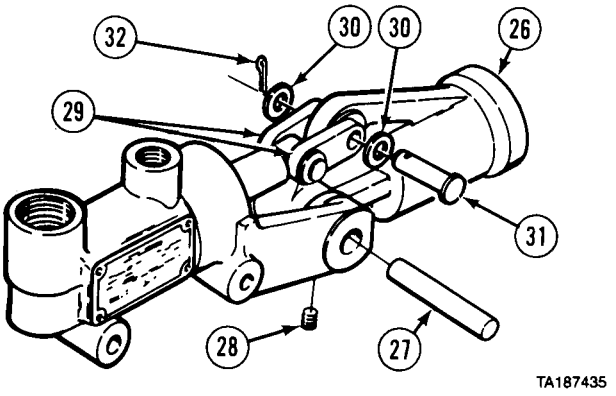
(4) Install piston rod (4) in pump body (16).
(5) Install nylon insert (17) in seal retainer (18).
(6) Using seal retainer tool, install seal retainer (18). Tighten seal retainer to 79 to 83 lb-ft (107 to 113N·m).
(7) Install spring (19), preformed packing (20), and valve poppet (21).
(8) Install preformed packing (22) and valve seat (23). Using valve seat tool, tighten valve seat to 90 to 100 lb-in. (10 to 11 N·m).



(9) Install two bushings (24) in pump body (16).
(10) Install bushing (25) in pivot arm (26).



(11) Install pivot arm (26), pivot pin (27), and screw (28).
(12) Install two pivot links (29), four washers (30), two pins (31), and cotter pins (32).



d. Follow-on Maintenance. None.

END OF TASK

Section III. HYDRAULIC CONTROL VALVES

20-3. WINCH/AUXILIARY HYDRAULIC RELIEF VALVE REPAIR (M983, M984).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984, M983 without crane

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 46, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

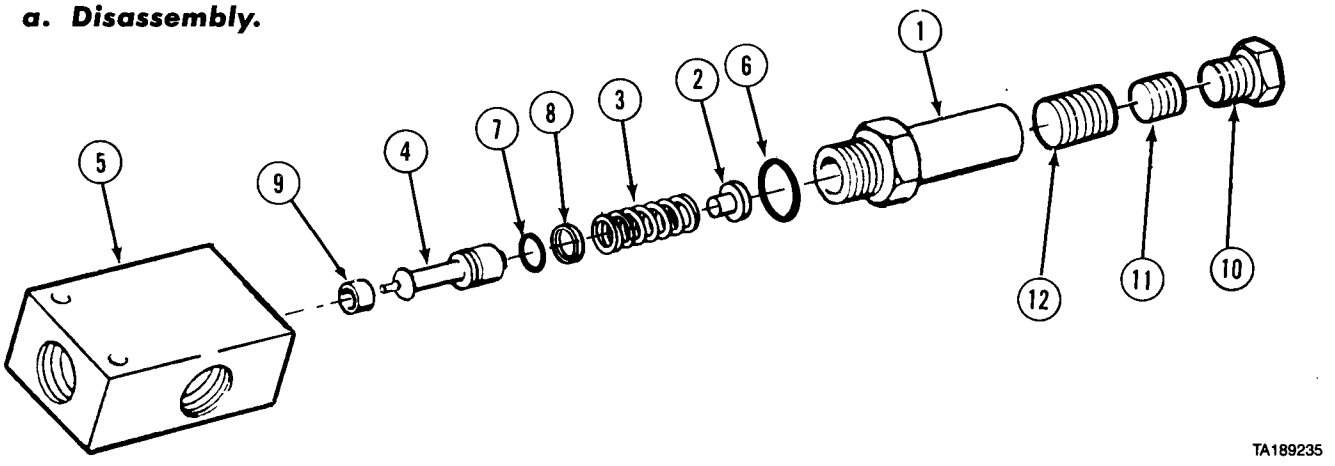
TM or Para	*Condition Description*
	Relief valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Disassembly.



(7) Remove spring retaining plug (1), spring end (2), spring (3), and poppet (4) from relief valve body (5).
(2) Remove preformed packing (6) from spring retaining plug (1).
(3) Remove preformed packing (7) and packing retainer (8) from poppet (4).
(4) Remove valve seat (9) from relief valve body (5).
(5) Remove plug (10), lockscrew (11), and setscrew (12) from spring retaining plug (1).

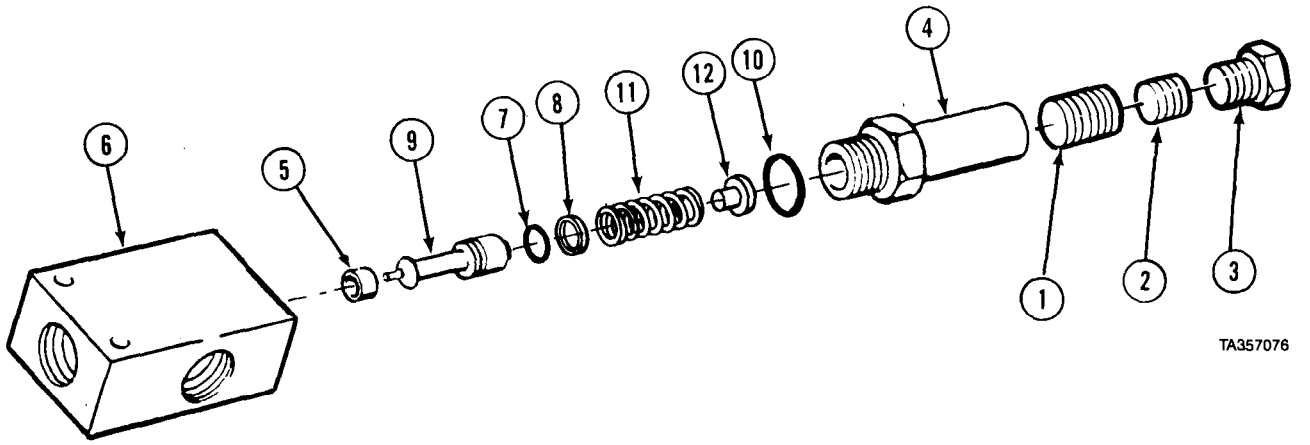
20-3. WINCH/AUXILIARY HYDRAULIC RELIEF VALVE REPAIR (M983, M984) (CONT).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect all parts for damage.
(3) Replace damaged parts.
(4) Relief valve for M983 vehicle is preset for 3000 psi (20 685 kPa). Relief valve for M984 vehicle is preset for 2500 psi (17 238 kPa). Do not mix plugs on valves.



c. Assembly.
(1) Install-setscrew (1), lockscrew (2), and plug (3) in spring retaining plug (4).
(2) Install valve seat (5) in relief valve body (6).
(3) Coat preformed packing (7) with oil and install packing retainer (8) and preformed packing on poppet (9).
(4) Coat preformed packing (10) with oil and install on spring retaining plug (4).
(5) Install poppet (9), spring (11), spring end (12), and spring retaining plug (4) in relief valve body (6).

d. Follow-on Maintenance. None.

END OF TASK

20-4. SELF-RECOVERY WINCH CONTROL VALVE ASSEMBLY REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Too1s
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C
Oil, lubricating, Item 47, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

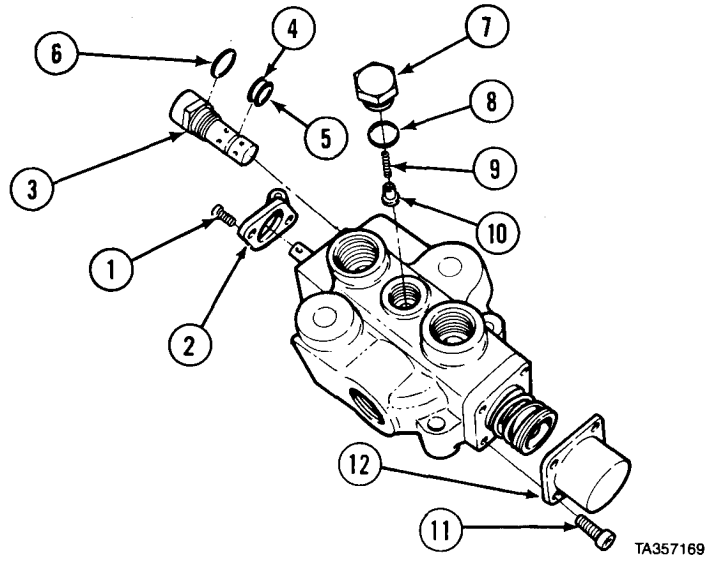
TM or Para	*Condition Description*
	Self-recovery winch control valve assembly on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

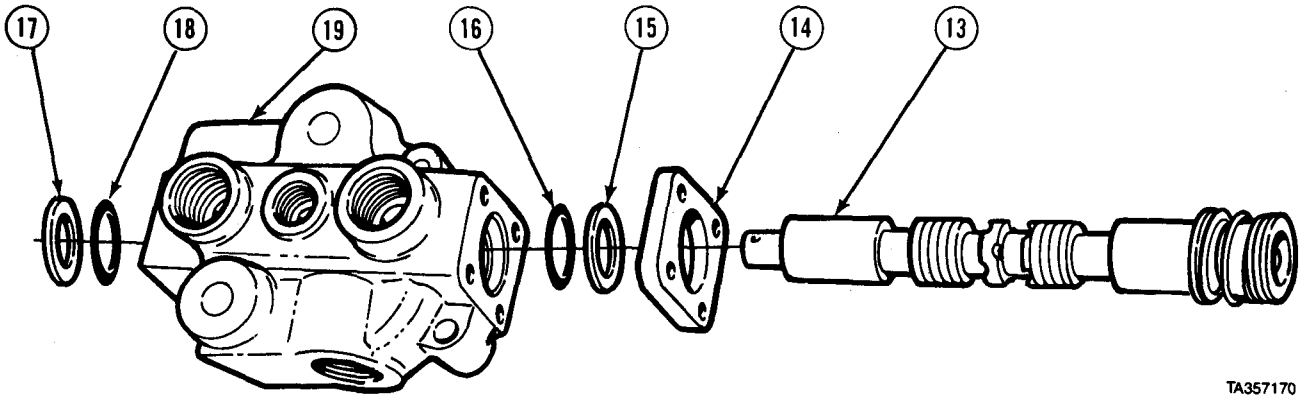
Level of Maintenance
Direct Support

a. Disassembly.

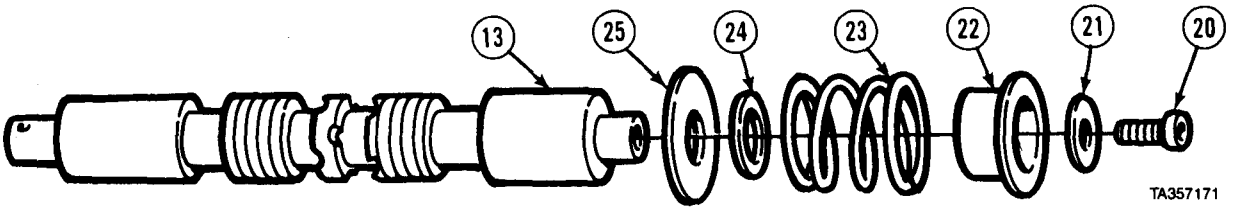


(1) Remove two screws (1) and bracket (2).
(2) Remove relief valve (3). Remove two preformed packings (4 and 5) and retainer (6).
(3) Remove plug assembly (7), preformed packing (8), spring (9), and load check poppet (10).
(4) Remove four screws (11) and cover (12).

20-4. SELF-RECOVERY WINCH CONTROL VALVE ASSEMBLY REPAIR (CONT).



(5) Remove spool (13), spacer (14), packing retainer (15), and preformed packing (16).
(6) Remove packing retainer (17) and preformed packing (18) from valve body (19).



(7) Remove screw (20), washer (21), spool collar (22), spring (23), spacer (24), and washer (25) from valve spool (13).

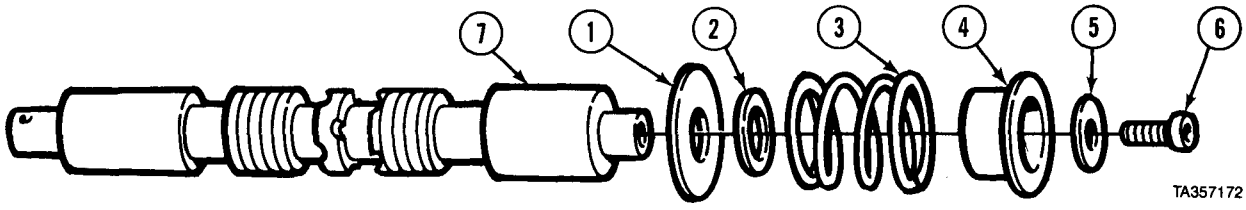
b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all parts with dry cleaning solvent.
(2) Inspect springs for breaks, cracks, and worn spots on coil. Replace springs if broken, cracked, or worn.
(3) Inspect for damaged threads. Repair damaged threads. If threads on valve body cannot be repaired, replace control valve assembly.
(4) Inspect valve body for breaks or cracks, or grooves in valve spool bore. Replace control valve assembly if valve body is damaged.
(5) Inspect valve spool for cracks and scoring. Replace control valve assembly if valve spool is damaged,

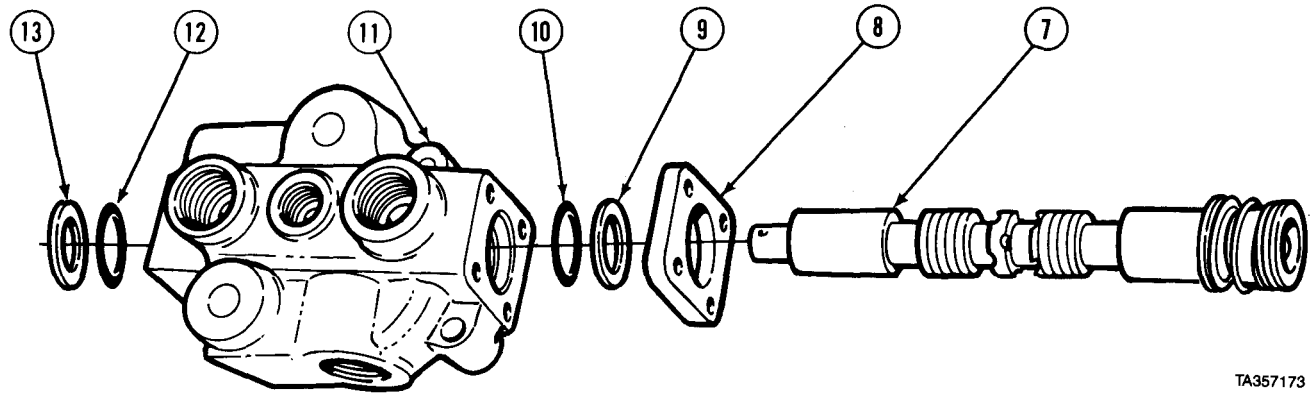
c. Assembly.



NOTE

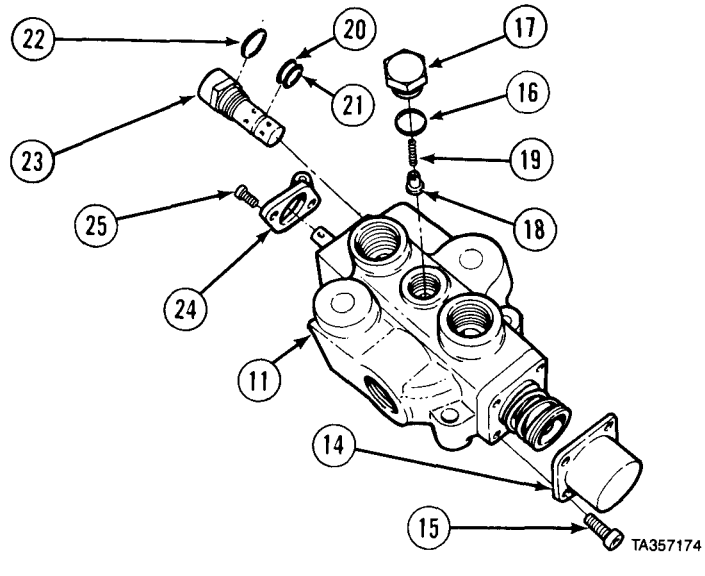
Lubricate all internal parts before installing.

(1) Install washer (1), spacer (2), spring (3), spool collar (4), washer (5), and screw (6) on valve spool (7).



(2) Install spacer (8), packing retainer (9), and preformed packing (10) on valve spool (7).
(3) Install valve spool (7) in valve body (11).
(4) Install preformed packing (12) and packing retainer (13) on valve spool (7).

(5) Install cover (14) with four screws (15).
(6) Install preformed packing (16) on plug (17). Install load check poppet (18), spring (19), and plug (17) in valve body (11).
(7) Install two preformed packings (20 and 21) and retainer (22) on relief valve (23). Install relief valve.
(8) Install bracket (24) with two screws (25).



d. Follow-on Maintenance. None.

END OF TASK

20-5. HEAVY-DUTY SELECTOR VALVE REPAIR (M984).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984

Test Equipment
None

Special Tools
None

Supplies
Tags, identification, Item 60, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

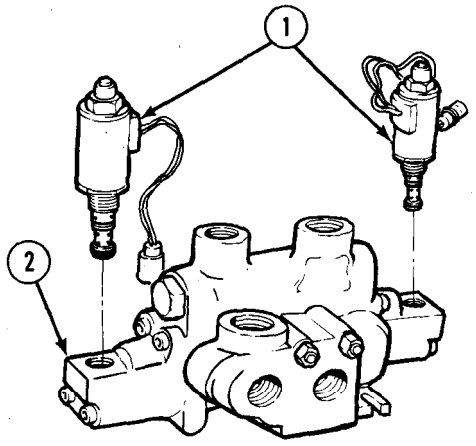
TM or Para	*Condition Description*
	Heavy-duty selector valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Disassembly.



TA189208

NOTE

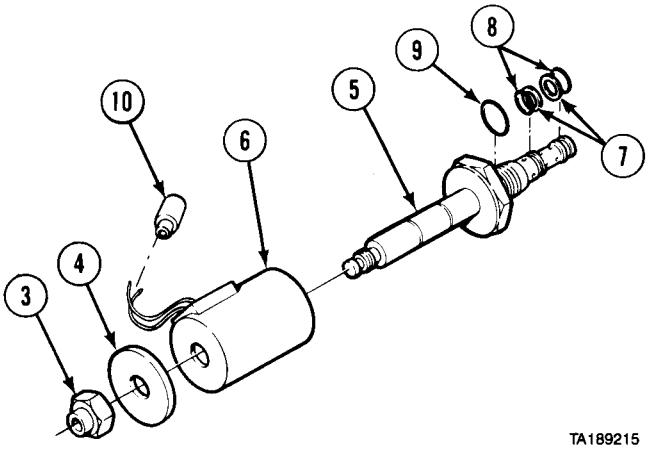
Tag and mark solenoids before disassembly.

(1) Remove two solenoids (1) from valve body (2).

NOTE

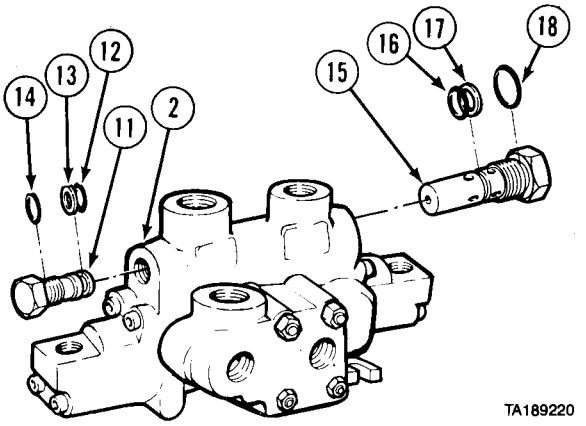
Both solenoids are disassembled the same way.

(2) Remove nut (3), spacer (4), and valve (5) from coil (6).
(3) Remove two backup rings (7), preformed packings (8), and preformed packing (9).
(4) Remove connector (10).



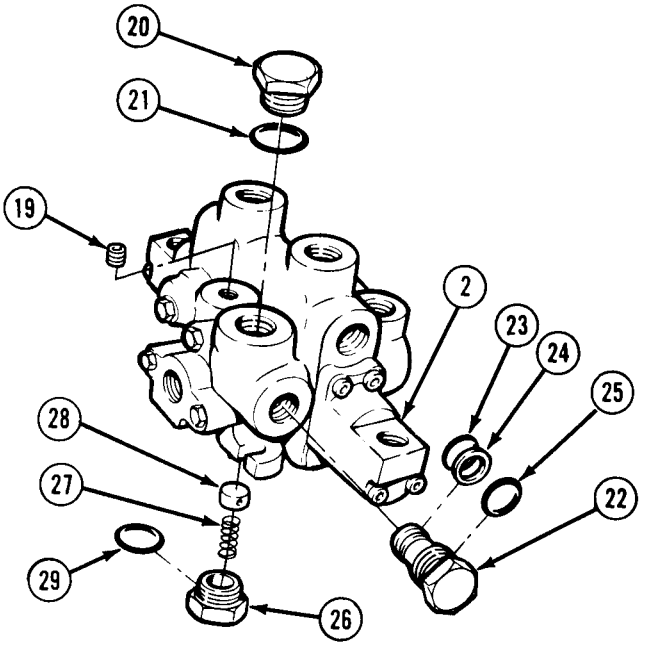
TA189215

(5) Remove plug (11) from valve body (2).
(6) Remove preformed packing (12), backup ring (13), and preformed packing (14) from plug (11).
(7) Remove valve (15) from valve body (2).
(8) Remove preformed packing (16), backup ring (17), and preformed packing (18) from valve (15).



TA189220

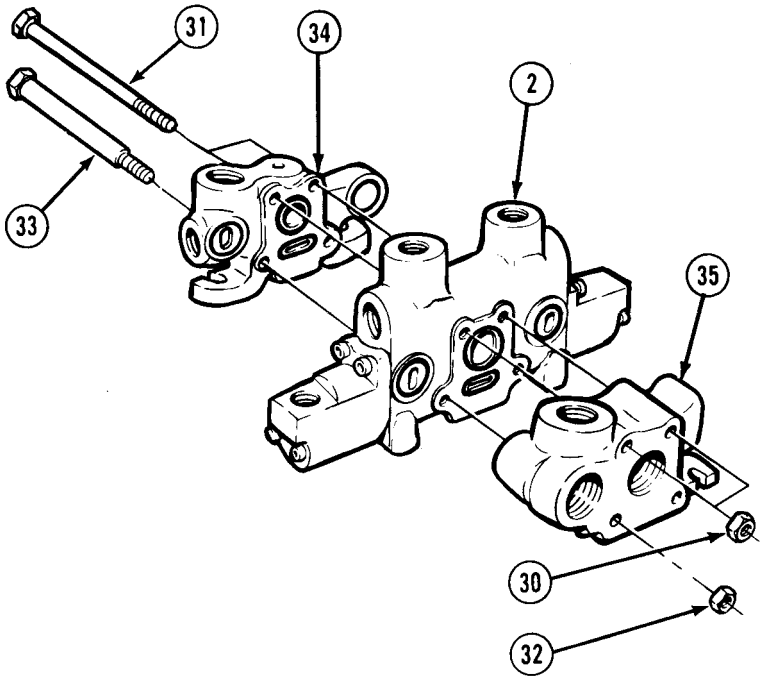
(9) Remove plug (19) and plug (20) from valve body (2).
(10) Remove preformed packing (21) from plug (20).
(11) Remove valve (22) from valve body (2).
(12) Remove preformed packing (23), backup ring (24), and preformed packing (25) from valve (22).
(13) Remove plug (26), spring (27), and valve (28) from valve body (2).
(14) Remove preformed packing (29) from plug (26).

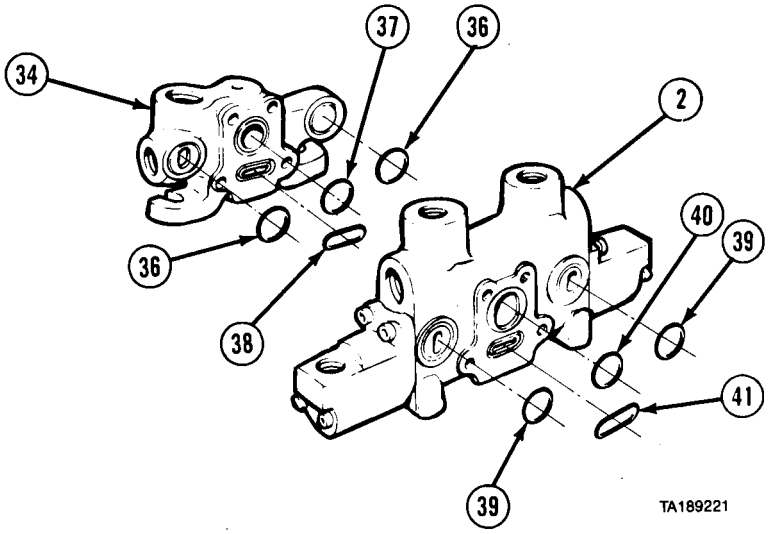


TA189207

20-5. HEAVY-DUTY SELECTOR VALVE REPAIR (M984) (CONT).

(15) Remove two nuts (30), screws (31), nuts (32), and screws (33) from two manifolds (34 and 35).
(16) Remove two manifolds (34 and 35) from valve body (2).

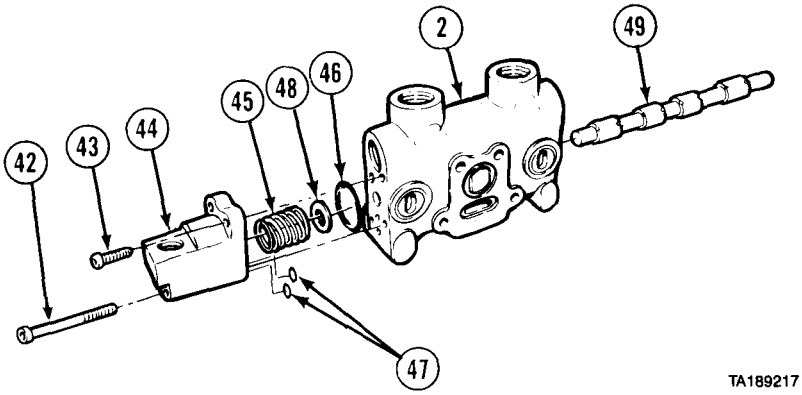




(17) Remove two preformed packings (36), preformed packing (37), and preformed packing (38) from manifold (34).
(18) Remove two preformed packings (39), preformed packing (40), and preformed packing (41) from valve body (2).

NOTE

- Left and right valve body ends are disassembled the same way.
- Mark valve body ends before removing.



TA189217

(19) Remove two screws (42), screws (43), and valve body end (44) from valve body (2).
(20) Remove spring (45), preformed packing (46), and two preformed packings (47) from valve body end (44).
(21) Remove spacer (48) and spool (49) from valve body (2).

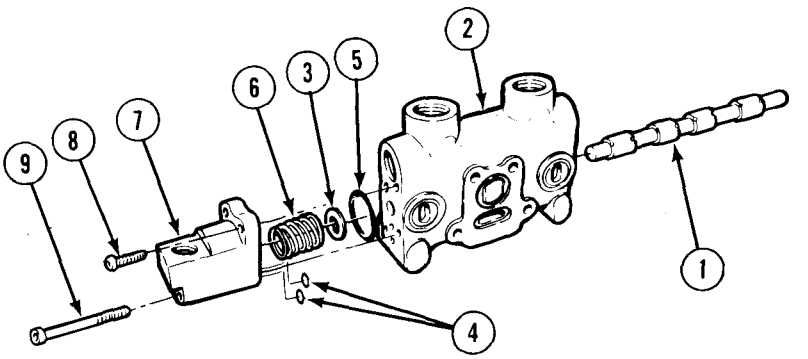
b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect all parts for damage.
(3) Replace damaged parts.

c. Assembly.



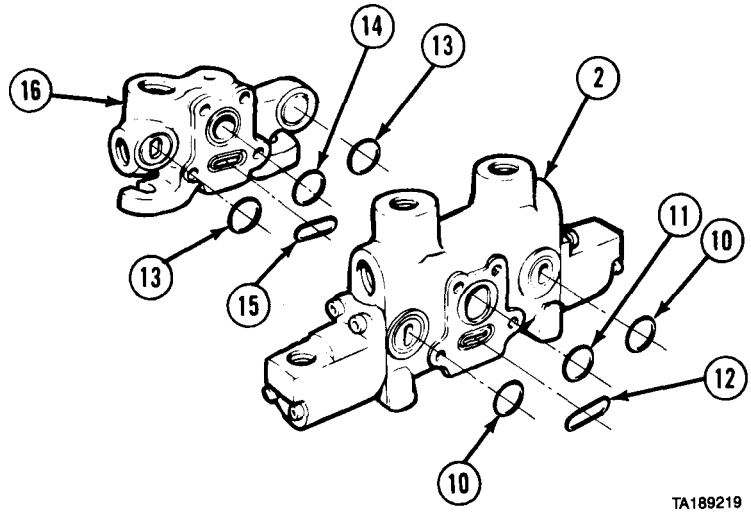
TA189216

NOTE

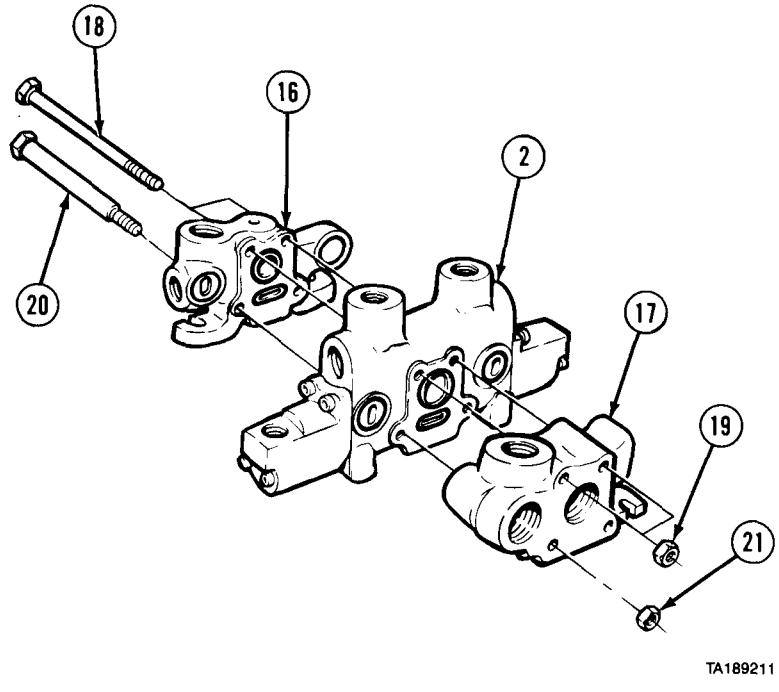
Left and right valve body ends are assembled the same way.

(1) Install spool (1) in valve body (2).
(2) Install spacer (3) on valve body (2).
(3) Install two preformed packings (4), preformed packing (5), and spring (6) on valve body end (7).
(4) Install valve body end (7) on valve body (2) with two screws (8) and screws (9).

20-5. HEAVY-DUTY SELECTOR VALVE REPAIR (M984) (CONT).



(5) Install two preformed packings (10), preformed packing (11), and preformed packing (12) in valve body (2).
(6) Install two preformed packings (13), preformed packing (14), and preformed packing (15) in manifold (16).

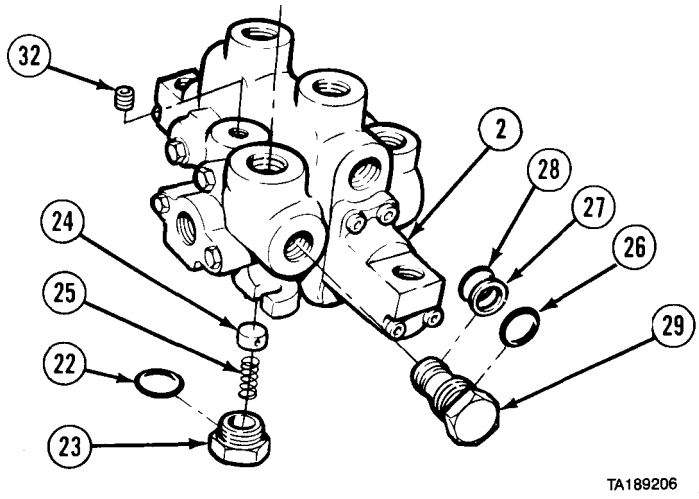


(7) Install two manifolds (16 and 17) on valve body (2) with two screws (18), nuts (19), screws (20), and nuts (21).

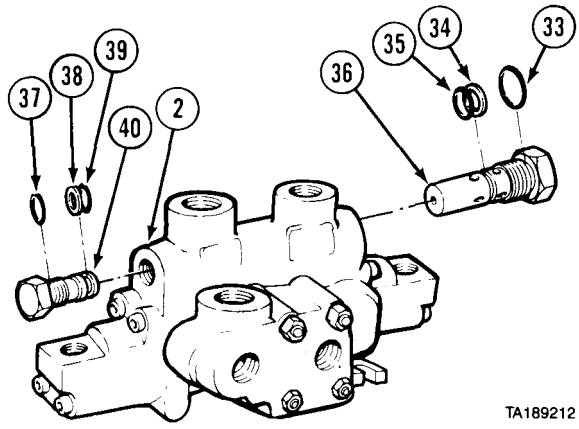
(8) Install preformed packing (22) on plug (23).
(9) Install valve (24), spring (25), and plug (23) in valve body (2).
(10) Install preformed packing (26), backup ring (27), and preformed packing (28) on valve (29).
(11) Install valve (29) in valve body (2).
(12) Install preformed packing (30) on plug (31).
(13) Install plug (31) in valve body (2).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

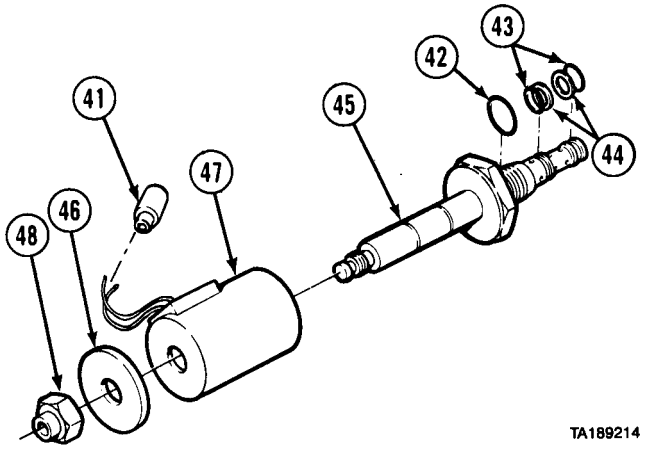


(14) Coat threads of plug (32) with pipe thread sealing compound and install in valve body (2).



(15) Install preformed packing (33), backup ring (34), and preformed packing (35) on valve (36).
(16) Install valve (36) in valve body (2).
(17) Install preformed packing (37), backup ring (38), and preformed packing (39) on plug (40).
(18) Install plug (40) in valve body (2).

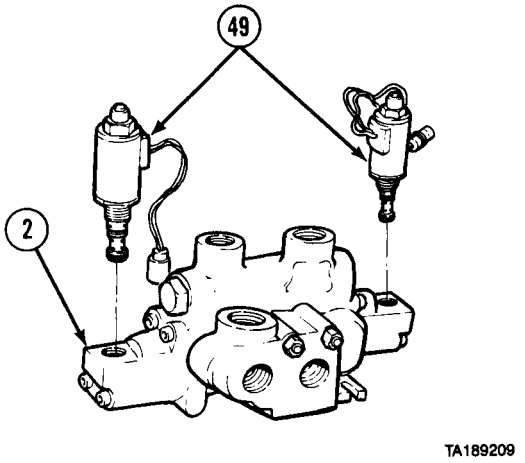
20-5. HEAVY-DUTY SELECTOR VALVE REPAIR (M984) (CONT).



NOTE

Both solenoids are assembled the same way.

(19) Install connector (41).
(20) Install preformed packing (42), two preformed packings (43), and backup rings (44) on valve (45).
(21) Install valve (45) and spacer (46) on coil (47) with nut (48).



(22) Install two solenoids (49) in valve body (2).

d. Follow-on Maintenance. None.

END OF TASK

20-6. ANCILLARY EQUIPMENT ENGINE IDLE SPEED ADJUSTMENT (M984).

This task covers:

a. Maximum Load Speed Adjustment
b. Engine Idle Speed Adjustment
c. Follow-on Maintenance

INITIAL SETUP

Model
M984

Test Equipment
None

Special Tools
Turbocharger inlet shield J26554-A

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

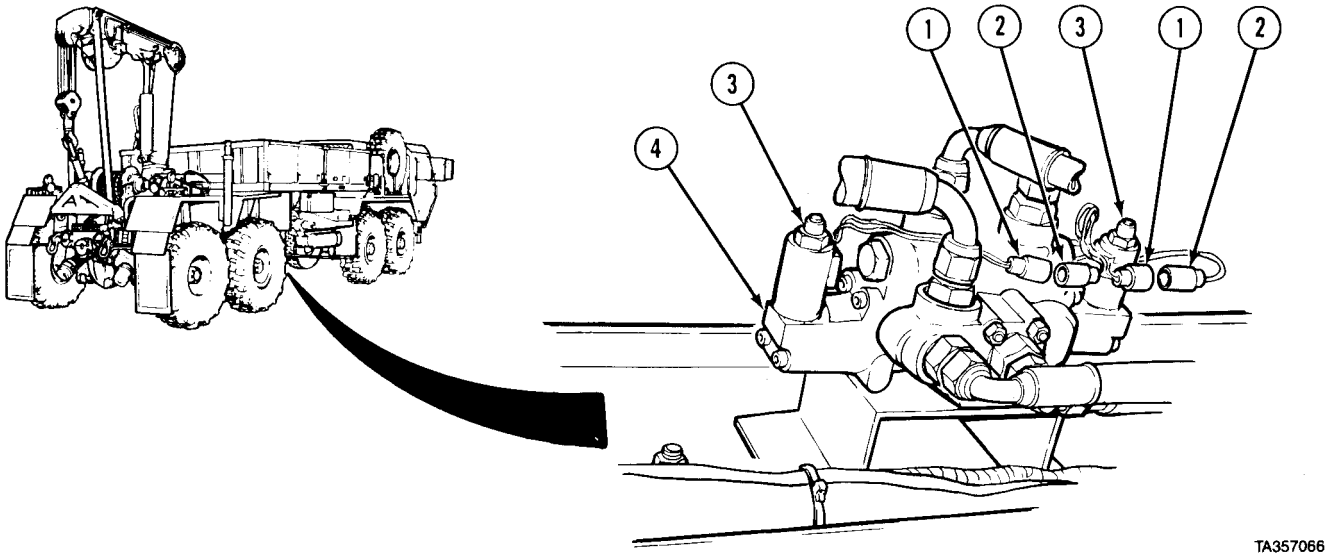
TM or Para	*Condition Description*
TM 9-2320-279-34&P	Throttle delay adjusted.
TM 9-2320-279-10	Engine side panels removed.
TM 9-2320-279-20	Air intake ducting removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Maximum Load Speed Adjustment.

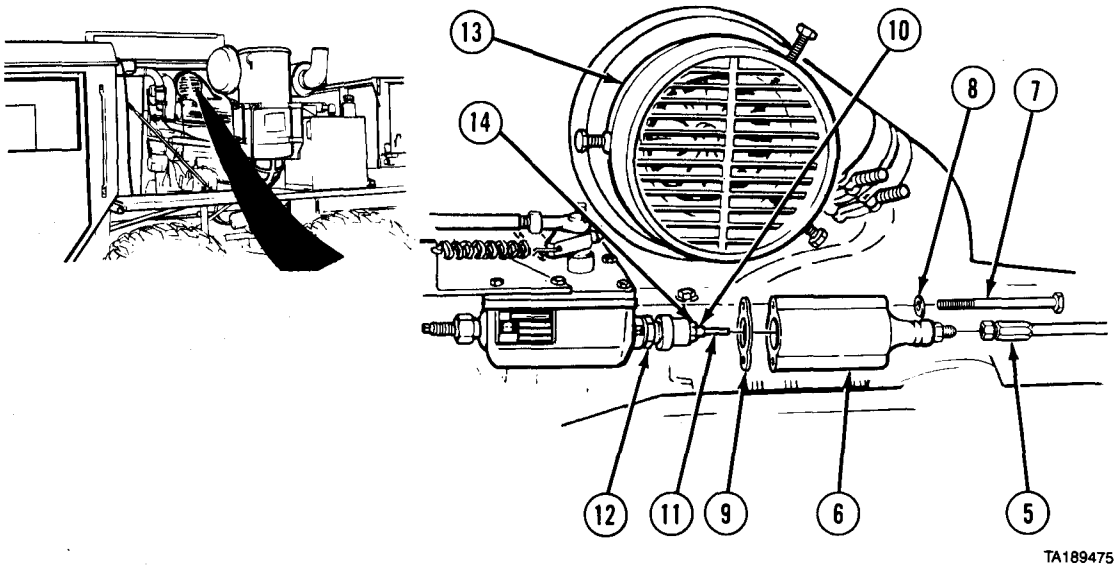


NOTE

Tag and mark wires before disconnecting.

(1) Disconnect two wires (1) from connectors (2) and solenoids (3) on selector valve (4).

20-6. ANCILLARY EQUIPMENT ENGINE IDLE SPEED ADJUSTMENT (M984) (CONT).



(2) Disconnect airhose (5) from high speed spring retainer cover (6).
(3) Remove two screws (7), lockwashers (8), high speed spring retainer cover (6), and gasket (9).
(4) Loosen idle speed locknut (10).

NOTE

Record number of turns (approximately 7 to 8).

(5) Turn adjusting screw (11) clockwise until snug.
(6) Tighten idle speed locknut (10).
(7) Loosen high speed locknut (12).
(8) Install turbocharger inlet air shield on air inlet port (13).

WARNING

- Use extreme care when working around air inlet. Hands and tools may be pulled in causing personal injury or death.
- Wear ear protection when running engine. Noise volume of engine can cause hearing loss or injury.
- Do not touch hot engine with bare hands. Manifolds and covers are hot and can cause severe burns if touched.

CAUTION

Run engine in clean area when air intake ducting is removed. Dirt, dust, and particles in unfiltered air can enter engine intake. Dust in engine can damage parts and cause mechanical failure.

NOTE

This task requires two soldiers; one to operate engine, and one to make adjustments.

(9) Start engine (TM 9-2320-279-10).
(10) Operate engine for 15 minutes.
(11) Engage PTO switch (TM 9-2320-279-10).
(12) Activate ENGINE HIGH IDLE (TM 9-2320-354-10).

NOTE

Maximum load speed is 1800 rpm.

(13) Turn air cylinder (14) clockwise to correct engine speed.
(14) Tighten high speed locknut (12).
(15) Shut off ENGINE HIGH IDLE (TM 9-2320-279-10).
(16) Shut off engine (TM 9-2320-279-10).

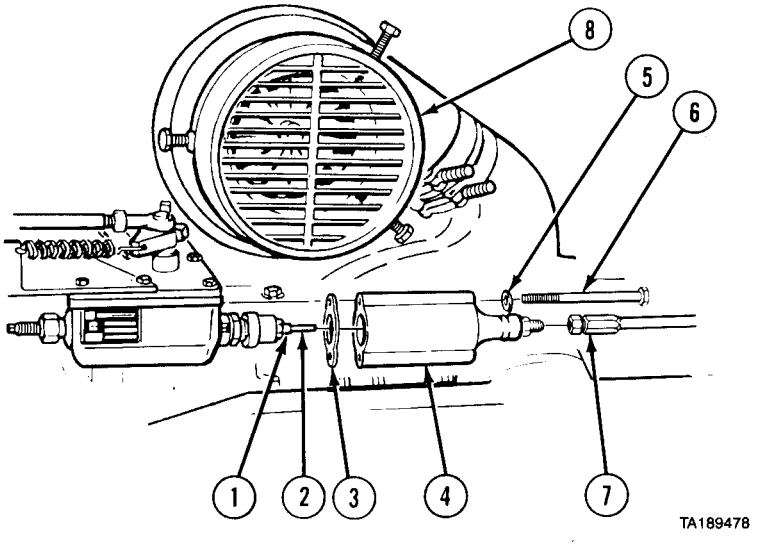
b. Engine Idle Speed Adjustment.

(1) Loosen idle speed locknut (1).
(2) Start engine (TM 9-2320-279-10).

NOTE

Correct engine speed is 600 rpm.

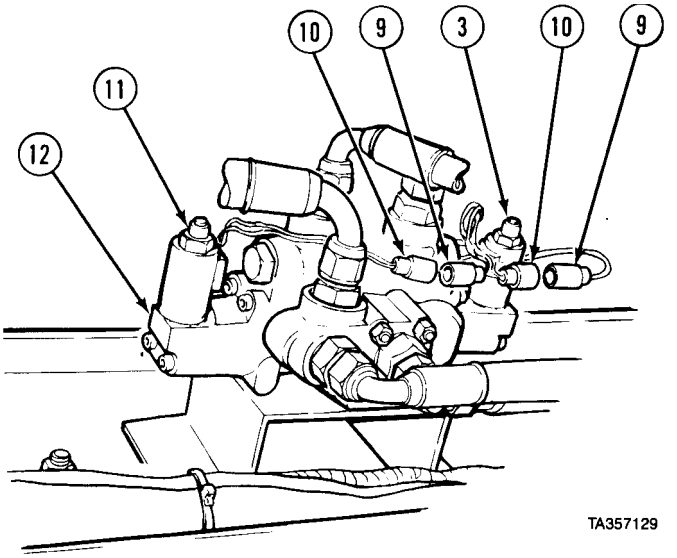
(3) Turn idle adjusting screw (2) counterclockwise to correct engine speed.
(4) Tighten idle speed locknut (1).
(5) Shut off engine (TM 9-2320-279-10).



NOTE

Gasket is not replaced until damaged.

(6) Install gasket (3) and high speed spring retainer cover (4) with two lockwashers (5) and screws (6).
(7) Install airhose (7) on high speed spring retainer cover (4).
(8) Remove turbocharger inlet air shield (8).
(9) Connect two wires (9) to connectors (10) and solenoids (11) on selector valve (12).



c. Follow-on Maintenance.

(1) Install air intake ducting (TM 9-2320-279-20).
(2) Install engine side panels (TM 9-2320-279-10).
(3) Close engine covers (TM 9-2320-279-20).

END OF TASK

20-7. PRIMARY PUMP HYDRAULIC MOTOR CONTROL VALVE REPAIR (M978).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C
Oil, lubricating, Item 47, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Primary pump hydraulic motor control valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

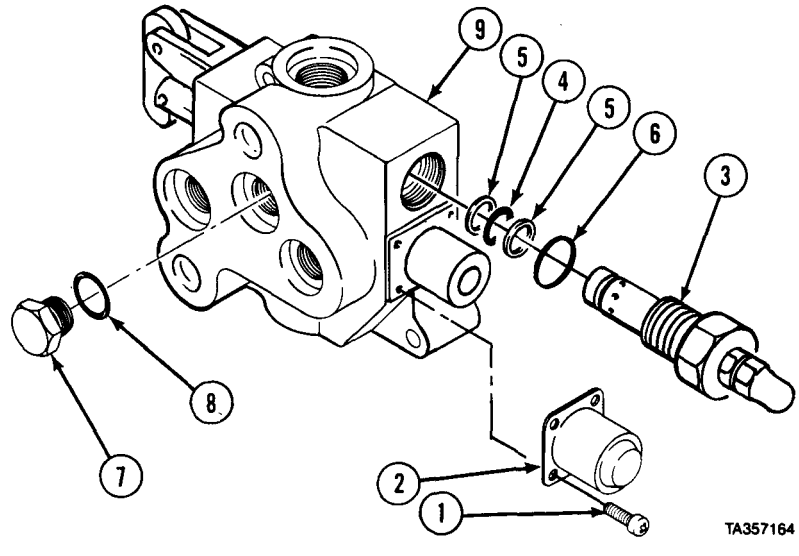
Level of Maintenance
Direct Support

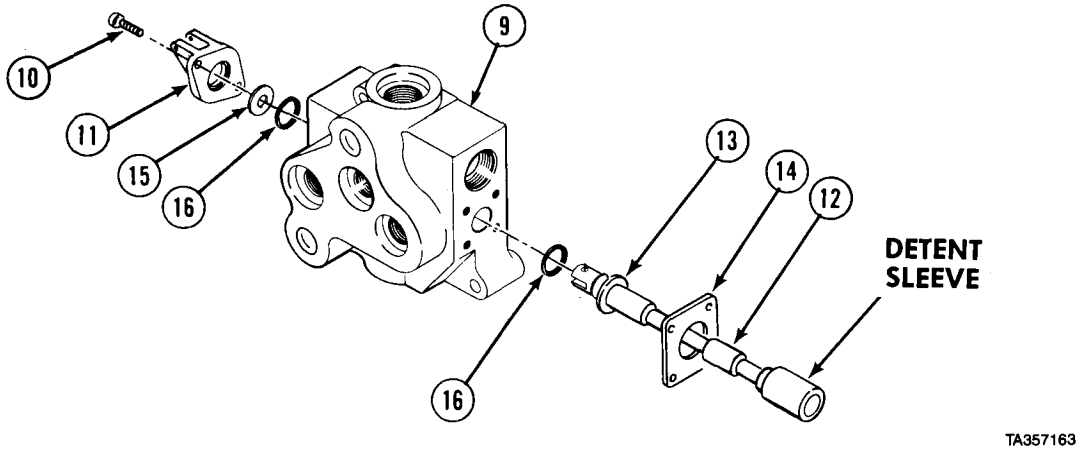
a. Disassembly.

CAUTION

Do not attempt to remove relief valve first. Damage to end cap will occur.

(1) Remove four screws (1) and end cap (2).
(2) Remove relief valve assembly (3).
(3) Remove preformed packing (4), two rings (5), and preformed packing (6) from relief valve assembly (3).
(4) Remove plug (7) and preformed packing (8) from valve housing (9).





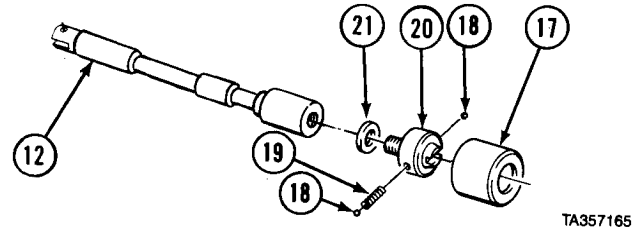
(5) Remove two screws (10) and bracket (11).

CAUTION

Detent balls are spring loaded. Do not pull on detent sleeve when removing spool assembly. Detent balls can be lost if detent sleeve pulled off spool.

(6) Remove spool assembly (12) from valve housing (9).
(7) Remove washer (13) and retaining plate (14) from spool assembly (12).
(8) Remove washer (15) and two seals (16) from valve housing (9).

(9) Remove detent sleeve (17), two detent balls (18), and spring (19).
(10) Remove detent adapter (20) and washer (21) from spool assembly (12).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

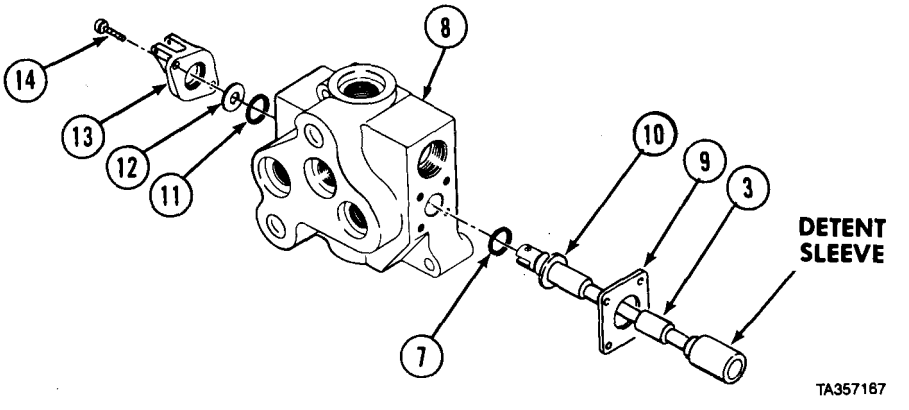
(1) Clean all parts with dry cleaning solvent.
(2) Thoroughly lubricate relief valve after cleaning.
(3) Inspect threads for damage. Repair damaged threads.
(4) Inspect spool and bore of valve housing for cracks and scoring. If valve housing or spool is cracked, or if there are deep scoring marks on spool or in valve housing bore, replace control valve.
(5) Inspect end cap and retaining plate for bends and breaks. If retaining plate or end cap is bent or broken, replace cap assembly.
(6) If detent does not work smoothly, if detent balls are lost, or if detent spring is broken, replace cap assembly.

20-7. PRIMARY PUMP HYDRAULIC MOTOR CONTROL VALVE REPAIR (M978) (CONT).

c. Assembly.

(1) Install washer (1) and detent adapter (2) on spool assembly (3).

(2) Install spring (4), two detent balls (5), and detent sleeve (6) on detent adapter (2).



NOTE

Lubricate preformed packings, seals, and spool before installing.

(3) Install seal (7) in valve housing (8).

(4) Install retaining plate (9) and washer (10) on spool assembly (3). Install spool assembly in valve housing (8).

(5) Install seal (11) and washer (12).

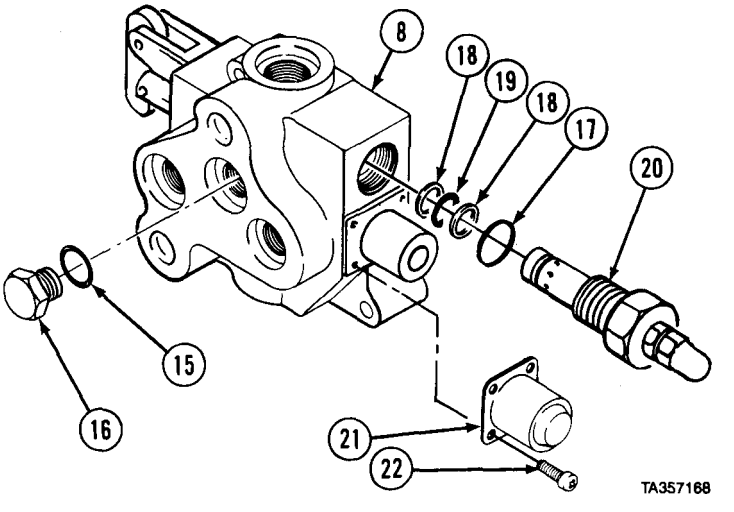
(6) Install bracket (13) with two screws (14).

(7) Install preformed packing (15) on plug (16). Install plug in valve housing (8).

(8) Install preformed packing (17), two rings (18), and preformed packing (19) on relief valve assembly (20).

(9) Install relief valve assembly (20).

(10) Install end cap (21) with four screws (22).



d. Follow-on Maintenance. None.

END OF TASK

20-8. HEAVY DUTY WINCH MANIFOLD REMOVAL/INSTALLATION (M984E1).

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Heavy wheel vehicle repairer

References
None

Equipment Condition

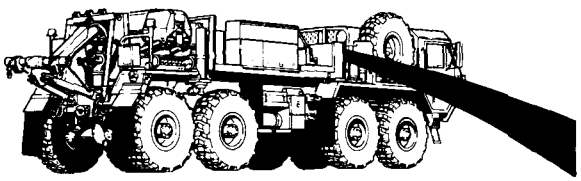
TM or Para *Condition Description*
TM 9-2320-279-20 Handle removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

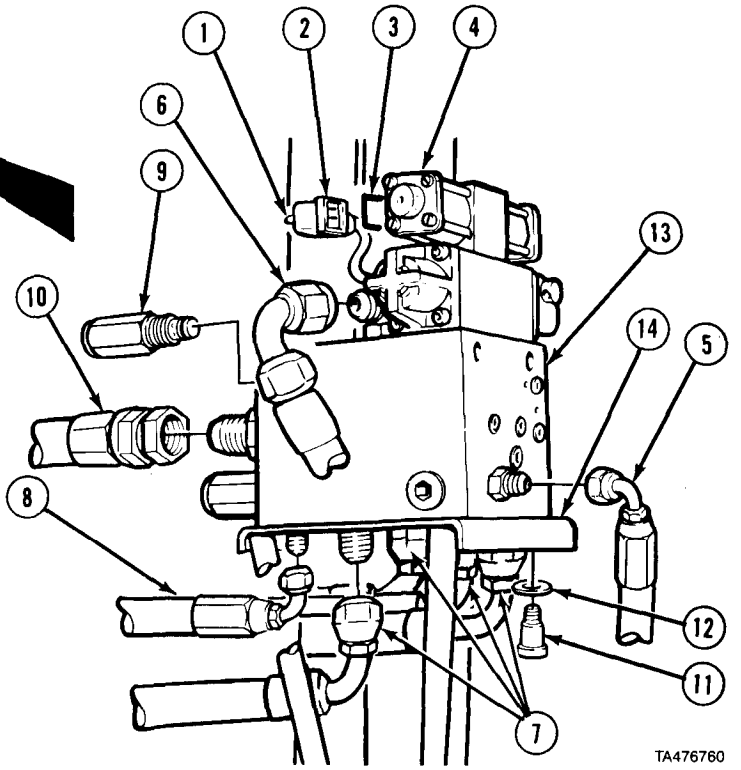
a. Removal.



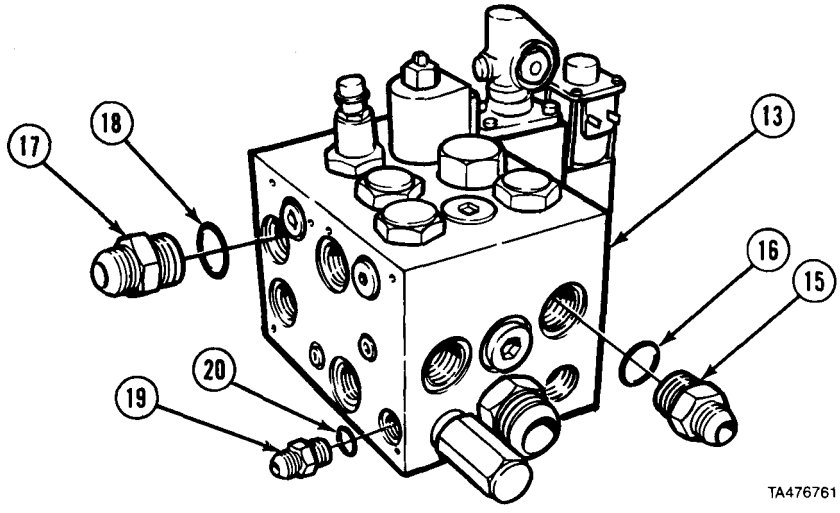
NOTE

Tag and mark all wires, hoses and lines.

(1) Loosen three screws (1), remove plugs (2), and seals (3) from solenoids (4).
(2) Remove hydraulic line (5 and 6).
(3) Remove four hoses (7).
(4) Remove hydraulic line (8).
(5) Remove valve (9).
(6) Remove three hydraulic lines (10).
(7) Remove four screws (11) and washers (12).
(8) Remove manifold valve (13) from tire davit mount (14).



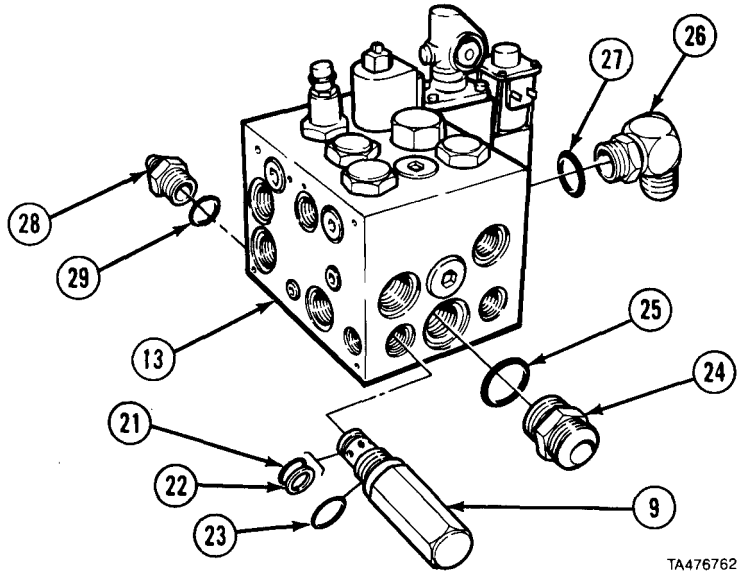
20-8. HEAVY DUTY WINCH MANIFOLD REMOVAL/INSTALLATION (M984E1) (CONT).



NOTE

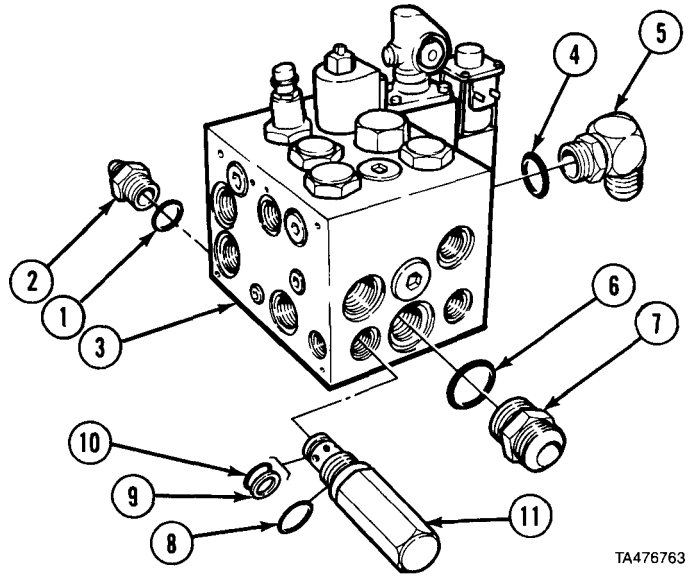
Mark position of all fittings and valves.

(9) Remove four fittings (15) and preformed packings (16) from manifold valve (13).
(10) Remove two fittings (17) and preformed packings (18).
(11) Remove fitting (19) and preformed packing (20).

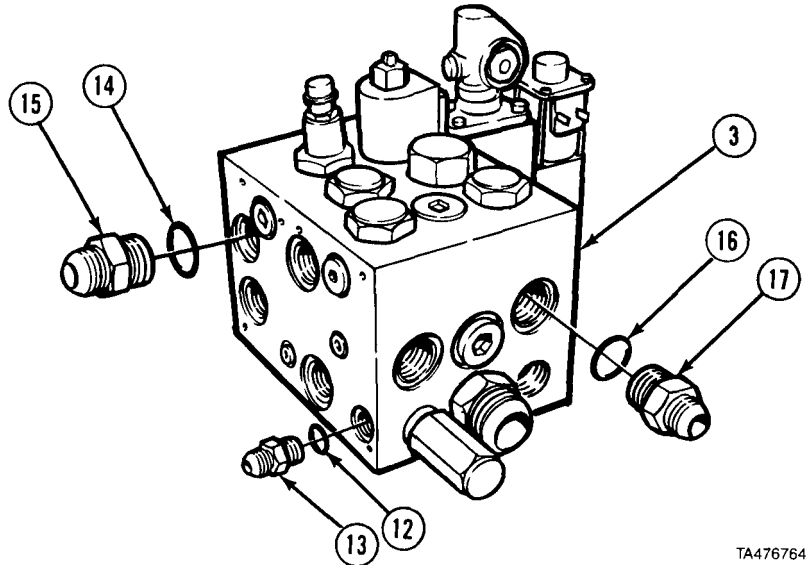


(12) Remove remaining valve (9) from manifold valve (13).
(13) Remove preformed packing (21), backup ring (22), and preformed packing (23) from valve (9).
(14) Repeat step *(13)* for valve (9) removed in step *(5)*.
(15) Remove fitting (24) and preformed packing (25).
(16) Remove elbow (26) and preformed packing (27).
(17) Remove fitting (28) and preformed packing (29).

b. Installation.



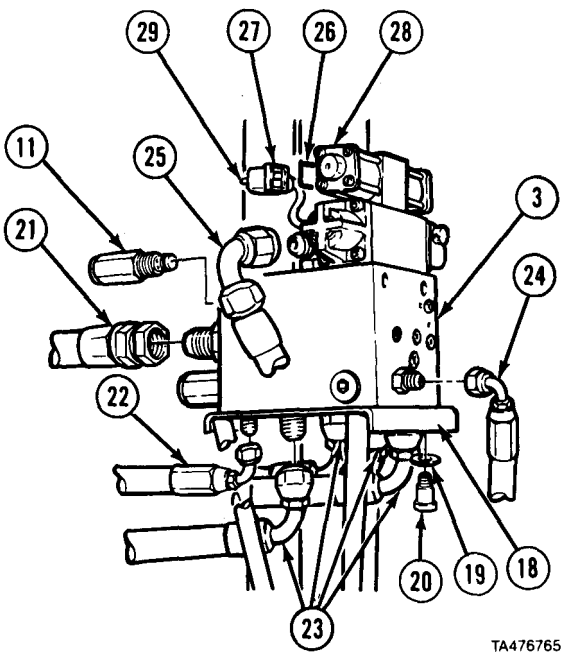
(1) Install preformed packing (1) and fitting (2) in manifold valve (3).
(2) Install preformed packing (4) and elbow (5).
(3) Install preformed packing (6) and fitting (7).
(4) Install preformed packing (8), backup ring (9), and preformed packing (10) on valve (11).
(5) Repeat step (4) for other valve (11).
(6) Install valve (11).



(7) Install preformed packing (12) and fitting (13) in manifold valve (3).
(8) Install two preformed packings (14) and fittings (15).
(9) Install four preformed packings (16) and fittings (17).

20-8. HEAVY DUTY WINCH MANIFOLD REMOVAL/INSTALLATION (M984E1) (CONT).

(10) Install manifold valve (3) on tire davit mount (18) with four washers (19) and screws (20).
(11) Install three hydraulic lines (21).
(12) Install valve (11).
(13) Install hydraulic line (22).
(14) Install four hoses (23).
(15) Install hydraulic lines (24 and 25).
(16) Install three seals (26) and plugs (27) on solenoids (28).
(17) Tighten three screws (29).



c. Follow-on Maintenance. Install handle (TM 9-2320-279-20).

END OF TASK

20-9. HEAVY DUTY WINCH MANIFOLD REPAIR (M984E1).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Heavy wheel vehicle repairer

References
None

Equipment Condition

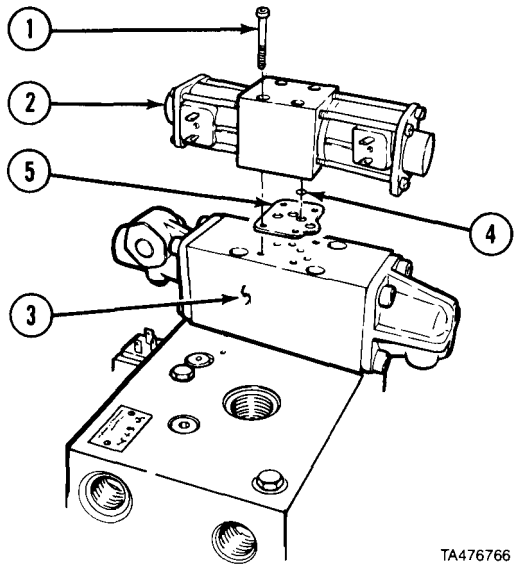
TM or Para	*Condition Description*
Para 20-8	Heavy duty winch manifold removed.

Special Environmental Conditions
None

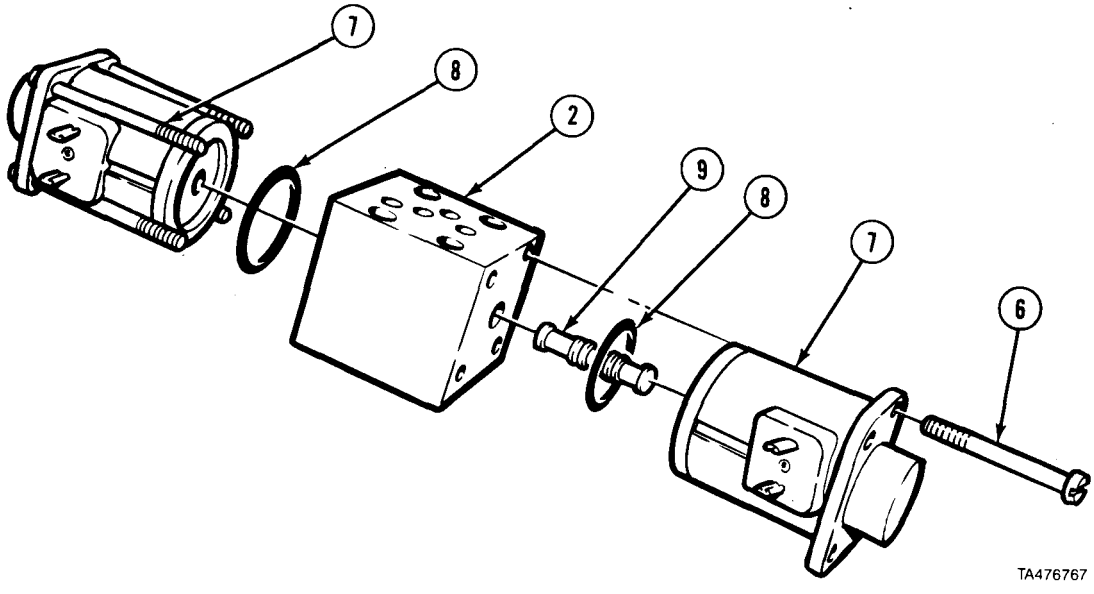
General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.



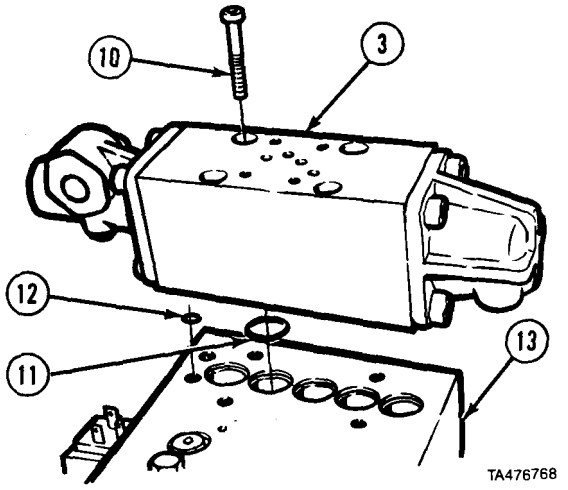
(1) Remove four screws (1) and valve assembly (2) from directional valve (3).
(2) Remove four preformed packings (4) and plate (5).



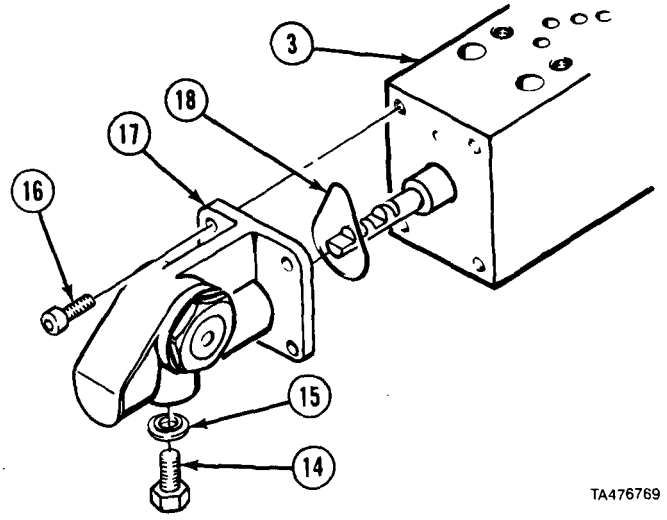
(3) Remove eight screws (6), two solenoids (7), and preformed packings (8).
(4) Remove spool (9) from valve assembly (2).

20-9. HEAVY DUTY WINCH MANIFOLD REPAIR (M984E1) (CONT).

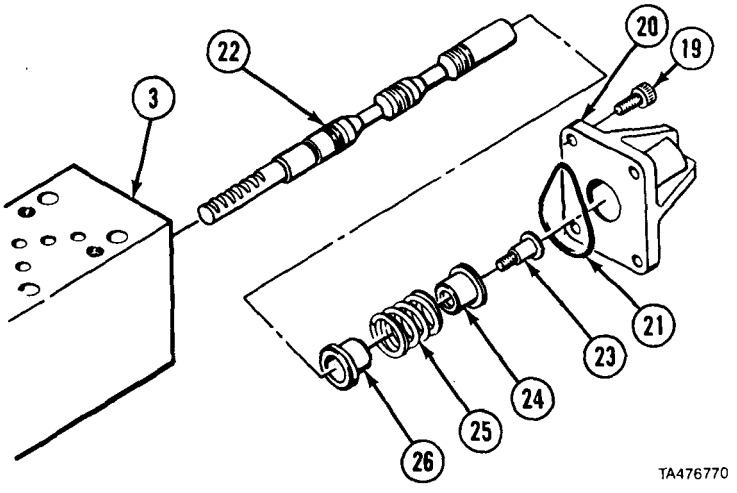
(5) Remove four screws (10) and directional valve (3).
(6) Remove five preformed packings (11) and two preformed packings (12) from manifold valve (13).

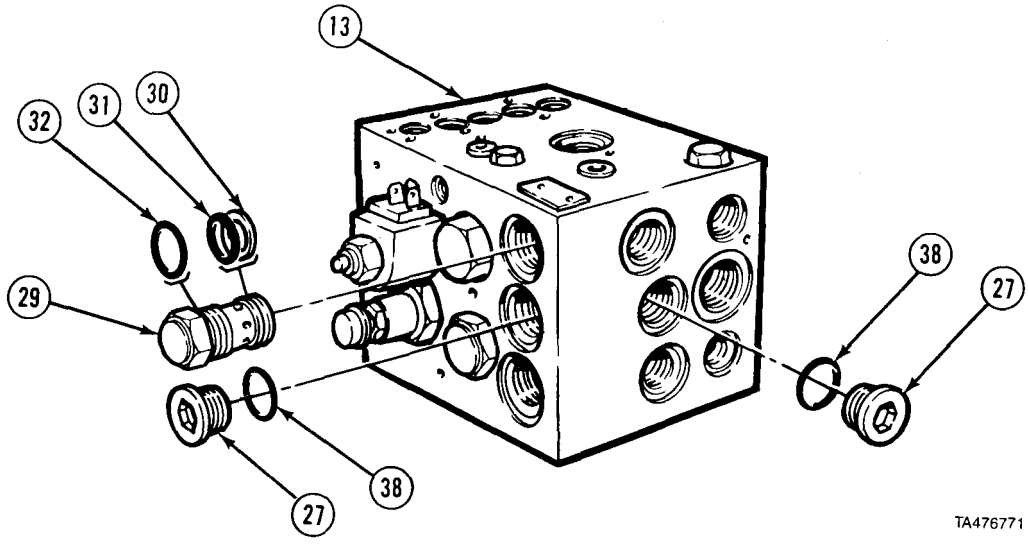


(7) Remove screw (14) and seal washer (15).
(8) Remove four screws (16), end cap (17), and preformed packing (18) from directional valve (3).

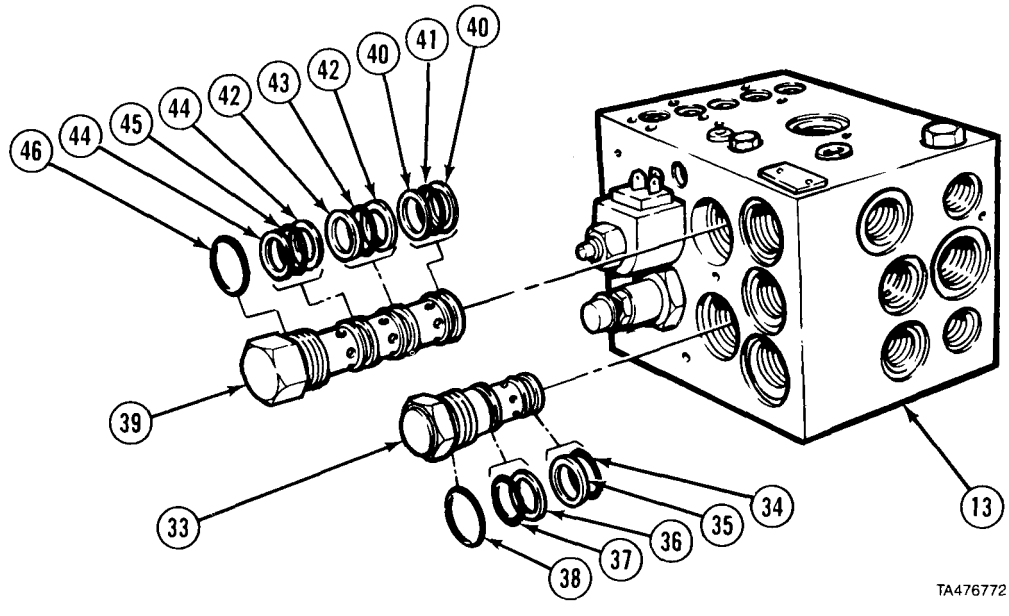


(9) Remove four screws (19), end cap (20), and preformed packing (21) from directional valve (3).
(10) Remove spool (22).
(11) Remove screw (23), spring cup (24), spring (25), and spring cup (26) from spool (22).



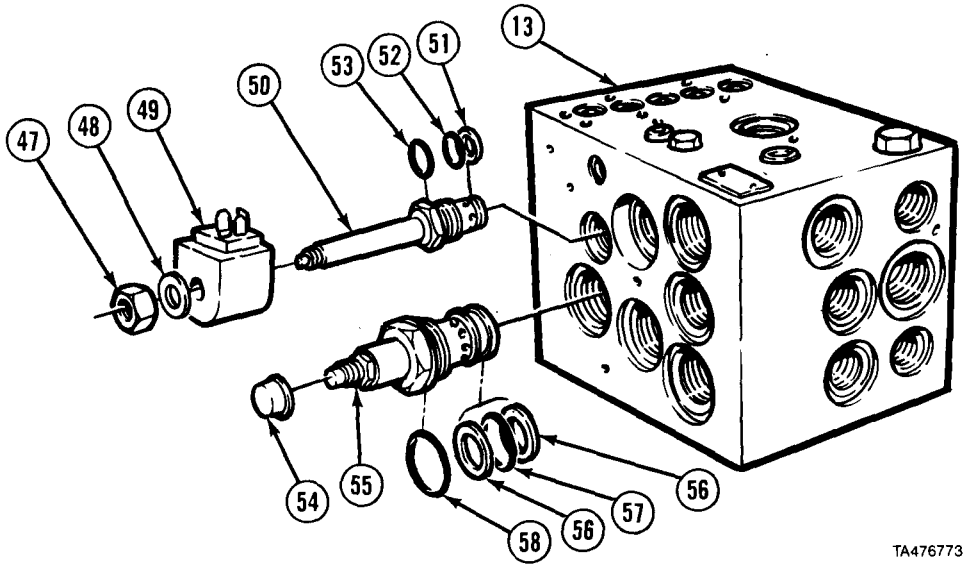


(12) Remove two plugs (27) and preformed packings (38).
(13) Remove two valves (29) from manifold valve (13).
(14) Remove backup ring (30), preformed packing (31), and preformed packing (32) from valve (29).
(15) Repeat step *(14)* for other valve (29).

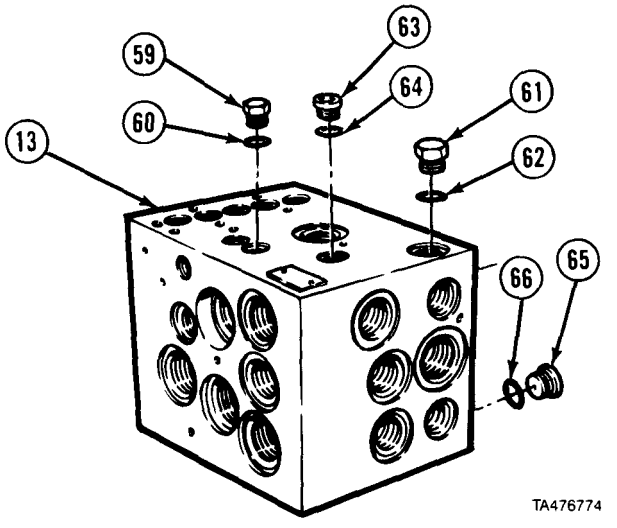


(16) Remove valve (33) from manifold valve (13).
(17) Remove preformed packing (34), backup ring (35), backup ring (36), preformed packing (37), and preformed packing (38) from valve (33).
(18) Remove valve (39) from manifold valve (13).
(19) Remove backup ring (40), preformed packing (41), backup ring (40), backup ring (42), preformed packing (43), backup ring (42), backup ring (44), preformed packing (45), backup ring (44), and preformed packing (46) from valve (39).

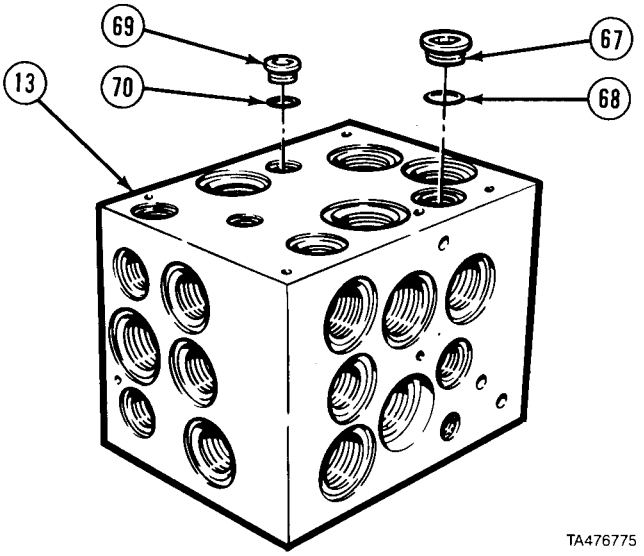
20-9. HEAVY DUTY WINCH MANIFOLD REPAIR (M984E1) (CONT).



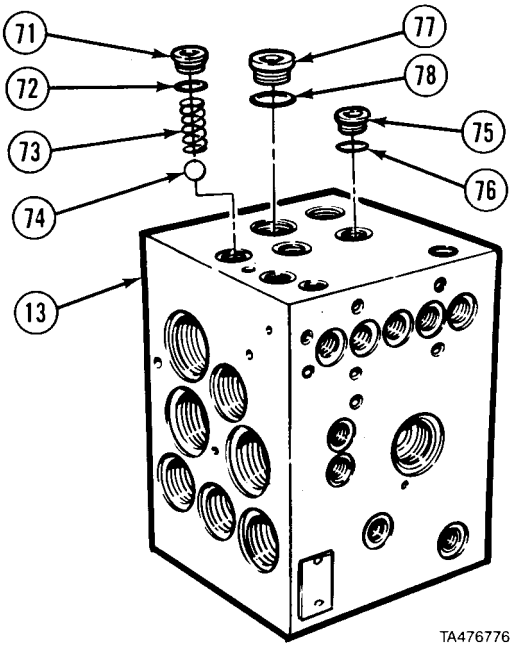
(20) Remove nut (47), washer (48), and solenoid (49) from valve (50).
(21) Remove valve (50) from manifold valve (13).
(22) Remove backup ring (51), preformed packing (52), and preformed packing (53) from valve (50).
(23) Remove cap (54) and valve (55) from manifold valve (13).
(24) Remove backup ring (56), preformed packing (57), backup ring (56), and preformed packing (58) from valve (55).



(25) Remove plug (59) and preformed packing (60) from manifold valve (13).
(26) Remove plug (61) and preformed packing (62).
(27) Remove two plugs (63) and preformed packings (64).
(28) Remove plug (65) and preformed packing (66).



(29) Remove two plugs (67) and preformed packings (68) from manifold valve (13).
(30) Remove two plugs (69) and preformed packings (70) from manifold valve (13).



(31) Remove two plugs (71), preformed packings (72), springs (73), and balls (74) from manifold valve (13).
(32) Remove two plugs (75) and preformed packings (76).
(33) Remove plug (77) and preformed packing (78).

20-9. HEAVY DUTY WINCH MANIFOLD REPAIR (M984E1) (CONT).

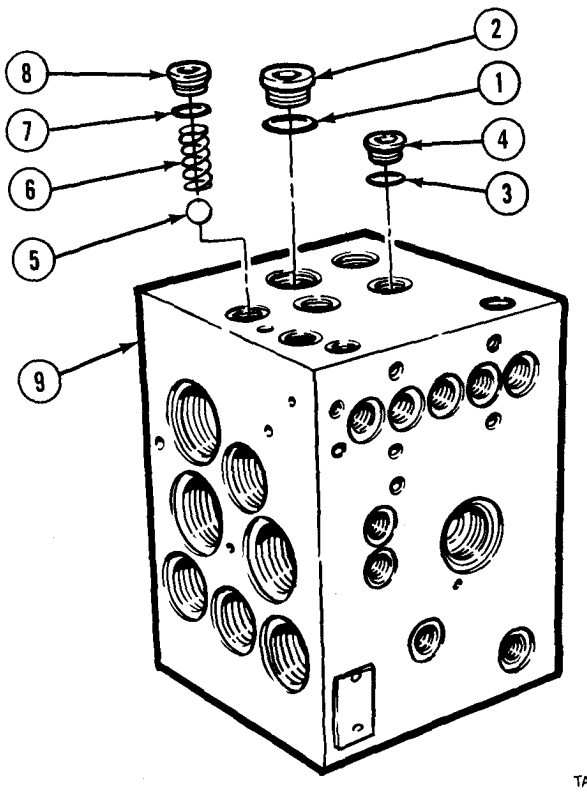
b. Cleaning/Inspection.

WARNING

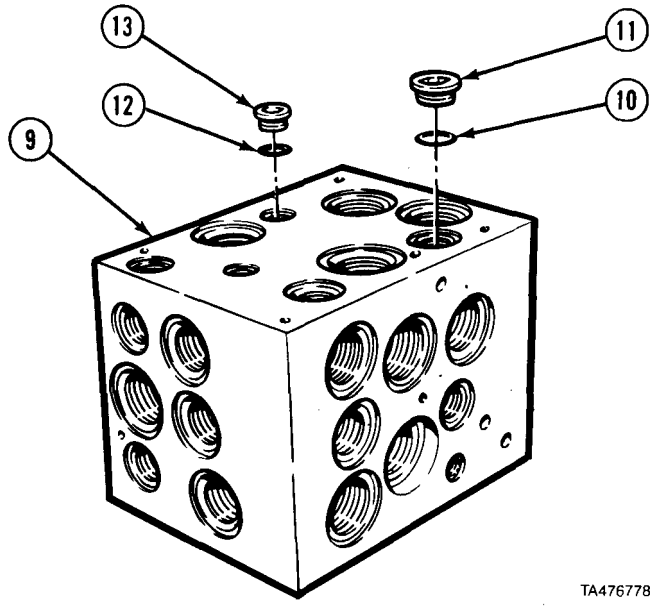
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.
(2) Inspect each part for damage.
(3) Replace damaged parts.
(4) Replace small springs if free length is less than .375 in. (9.53 mm) or broken.
(5) Replace large springs if free length is less than 1.250 in (31.75 mm).

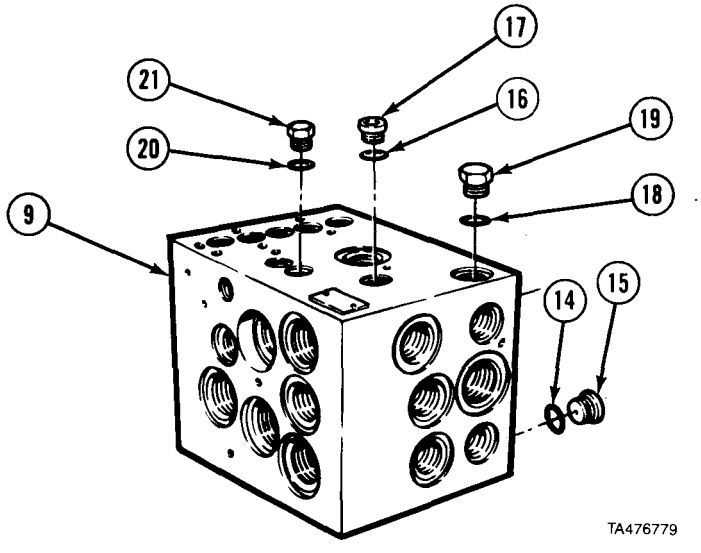
c. Assembly.



(1) Install preformed packing (1) and plug (2).
(2) Install two preformed packings (3) and plugs (4).
(3) Install two balls (5), springs (6), preformed packings (7), and plugs (8) in manifold valve (9).

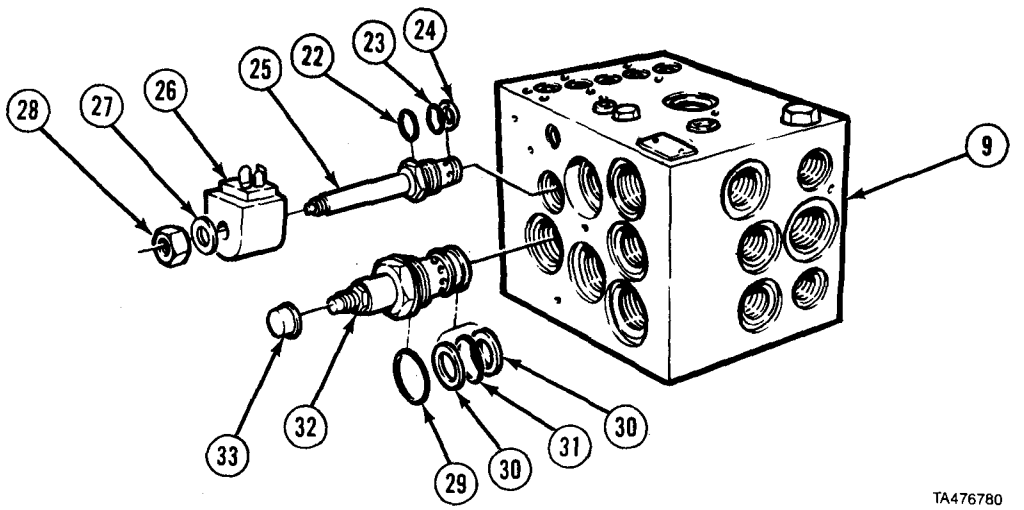


(4) Install two preformed packings (10) and plugs (11) in manifold valve (9).
(5) Install two preformed packings (12) and plugs (13).

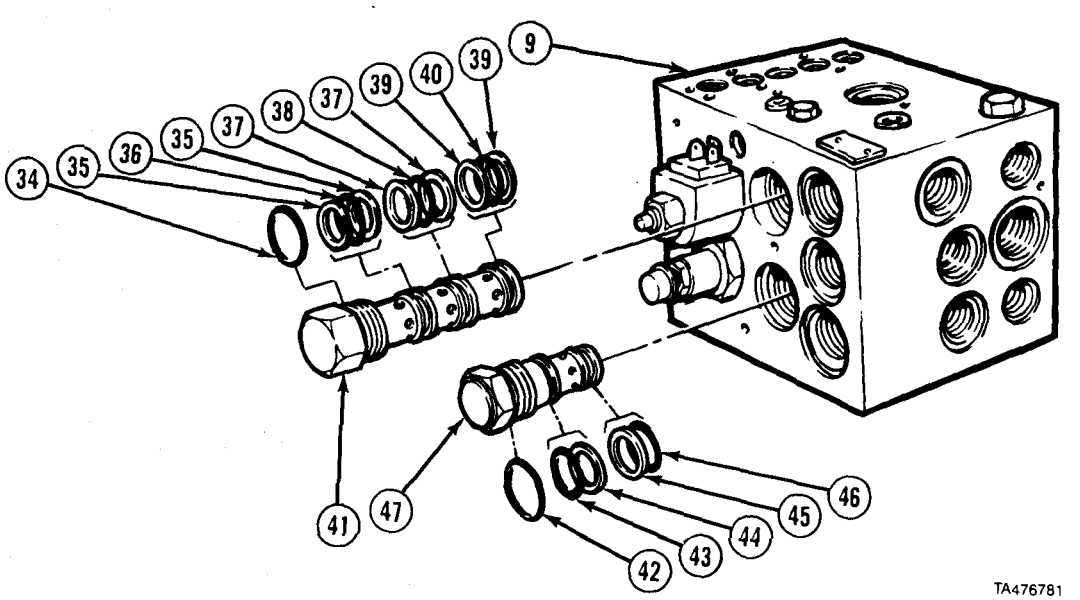


(6) Install preformed packing (14) and plug (15).
(7) Install two preformed packings (16) and plugs (17).
(8) Install preformed packing (18) and plug (19).
(9) Install preformed packing (20) and plug (21) in manifold valve (9).

20-9. HEAVY DUTY WINCH MANIFOLD REPAIR (M984E1) (CONT).

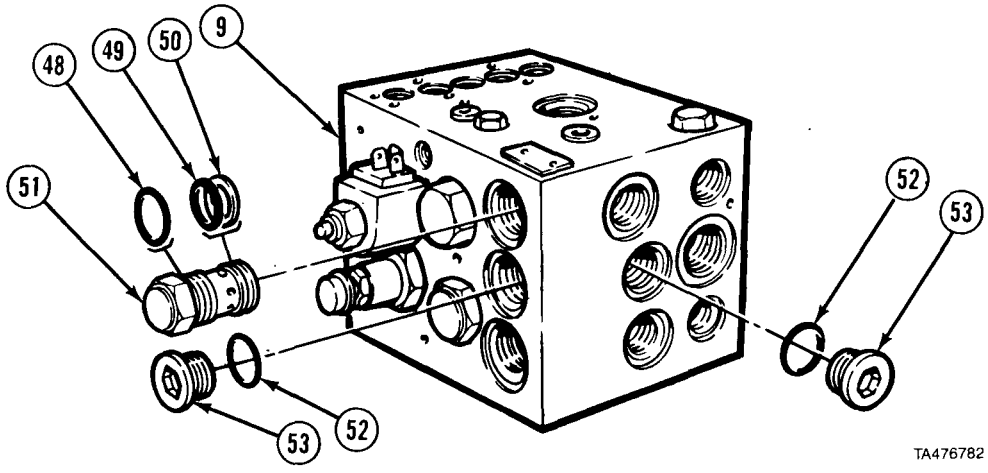


(10) Install preformed packing (22), preformed packing (23), and backup ring (24) on valve (25).
(11) Install valve (25) in manifold valve (9).
(12) Install solenoid (26), washer (27), and nut (28) onto valve (25).
(13) Install preformed packing (29), backup ring (30), preformed packing (31), and backup ring (30) on valve (32).
(14) Install valve (32) and cap (33).



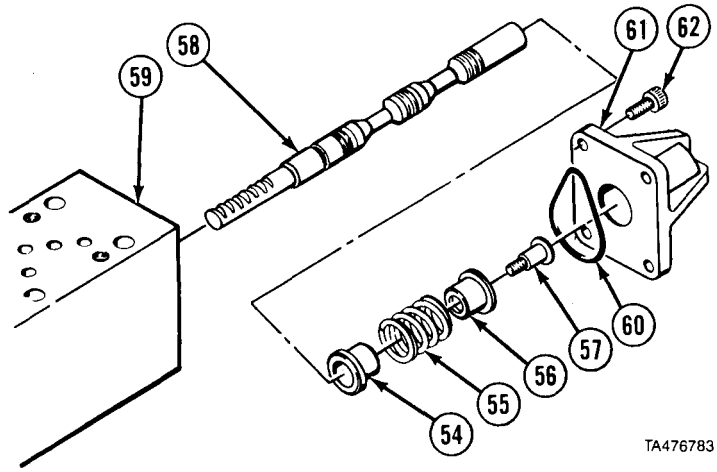
(15) Install preformed packing (34), backup ring (35), preformed packing (36), backup ring (35), backup ring (37), preformed packing (38), backup ring (37), backup ring (39), preformed packing (40), backup ring (39) on valve (41).
(16) Install valve (41) in manifold valve (9).
(17) Install preformed packing (42), preformed packing (43), backup ring (44), backup ring (45), and preformed packing (46) on valve (47).
(18) Install valve (47) in manifold valve (9).

Hydraulic System Maintenance Instructions (Cont)

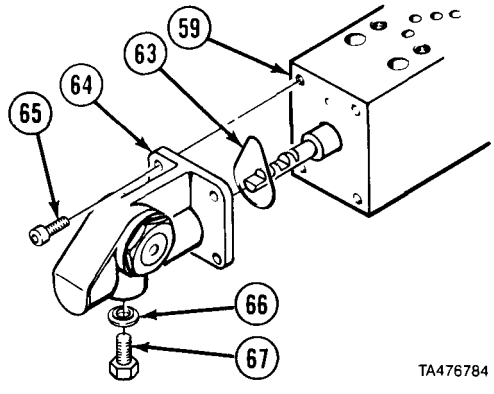


(19) Install preformed packing (48), preformed packing (49), and backup ring (50) on valve (51).
(20) Repeat step (19) for other valve (51).
(21) Install two valves (51) in manifold valve (9).
(22) Install two preformed packings (52) and plugs (53).

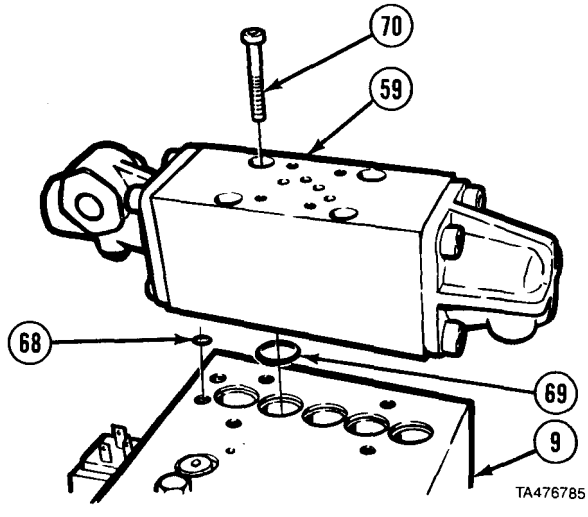
(23) Install spring cup (54), spring (55), spring cup (56), and screw (57) in spool (58).
(24) Install spool (58) in directional valve (59).
(25) Install preformed packing (60), end cap (61) with four screws (62).



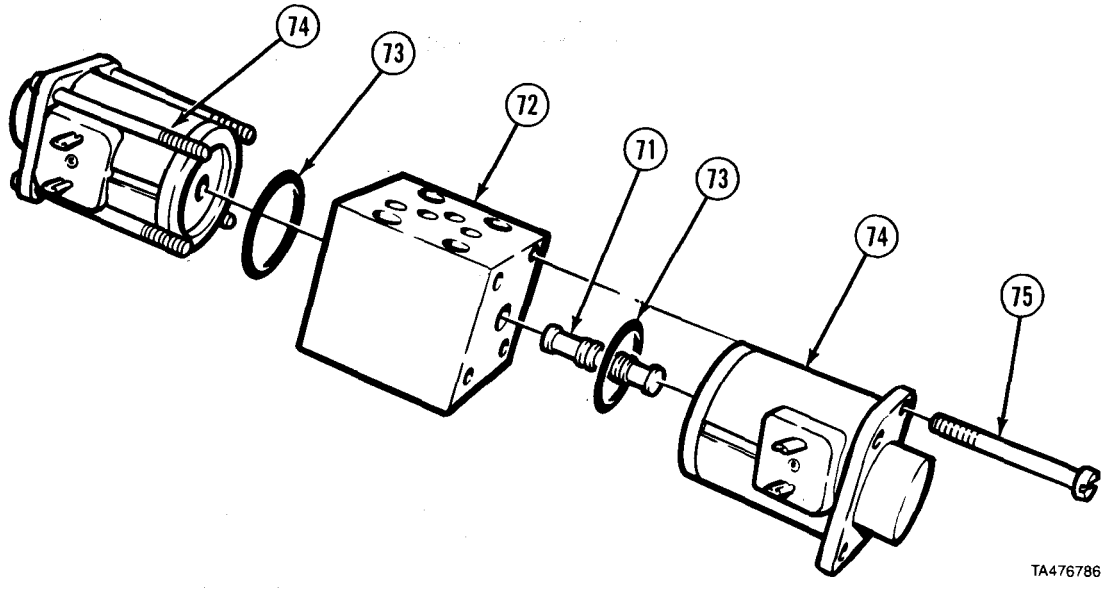
(26) Install preformed packing (63) and end cap (64) with four screws (65) to directional valve (59).
(27) Install seal washer (66) and screw (67).



20-9. HEAVY DUTY WINCH MANIFOLD REPAIR (M984E1) (CONT).

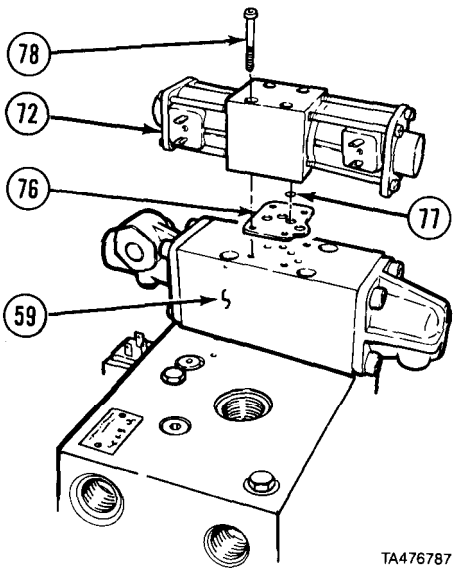


(28) Install two preformed packings (68) and five preformed packings (69) in manifold valve (9).
(29) Install directional valve (59) with four screws (70).



(30) Install spool (71) in valve assembly (72).
(31) Install two preformed packings (73) and solenoids (74) with eight screws (75).

(32) Install plate (76) and four preformed packings (77) on directional valve (59).
(33) Install valve assembly (72) with four screws (78).



d. Follow-on Maintenance. None.

END OF TASK

20-10. RETRIEVER CONTROL VALVE REPAIR (M984E1).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M984E1

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 46, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Retriever control valve on clean work surface

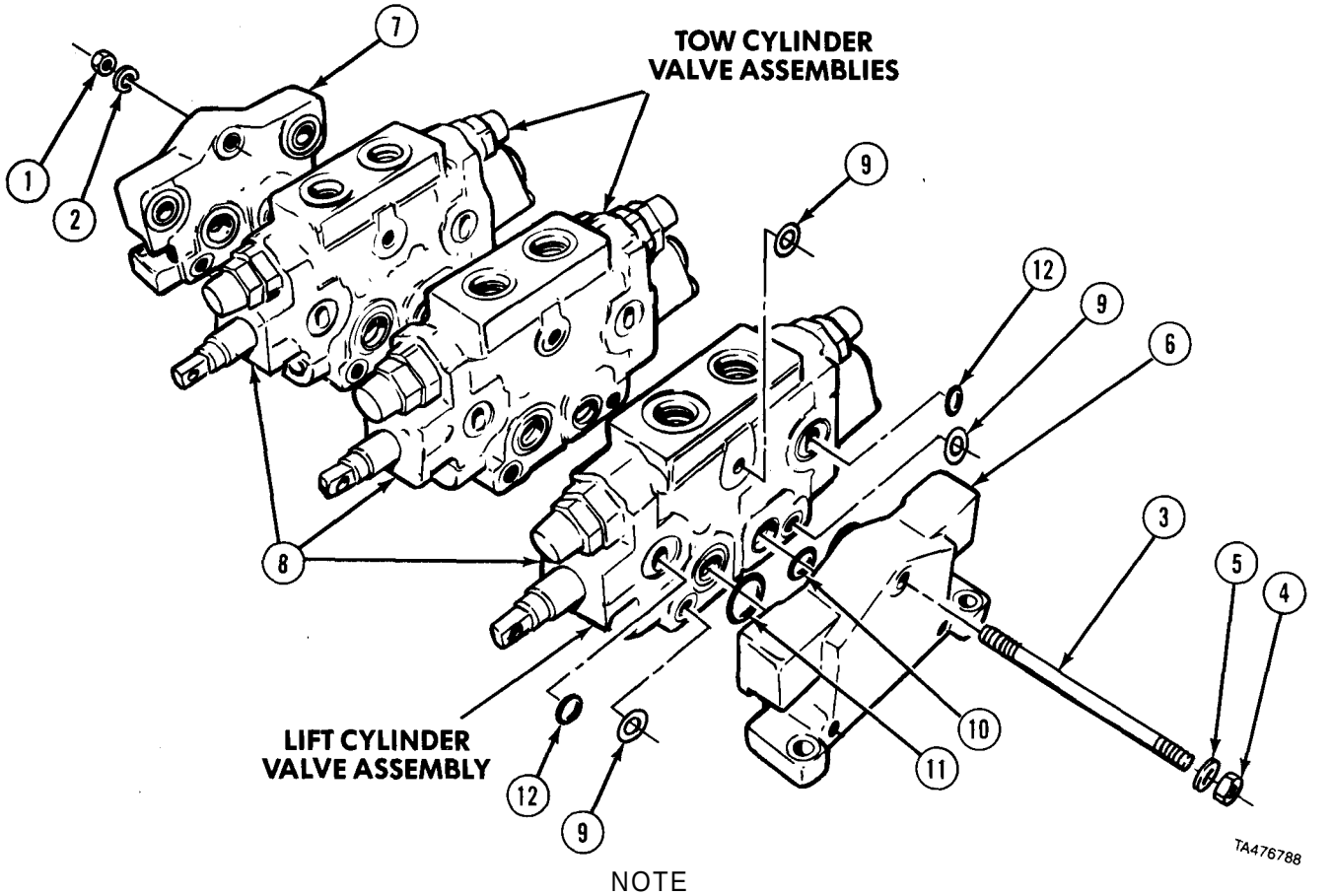
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

20-10. RETRIEVER CONTROL VALVE REPAIR (M984E1) (CONT).

a. Disassembly.



NOTE

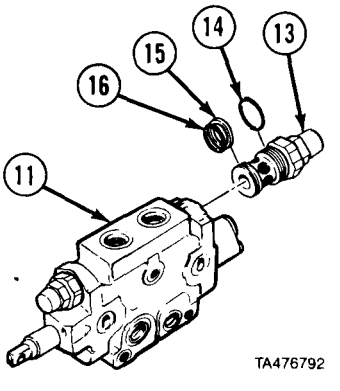
Tag and mark valve assemblies and end covers.

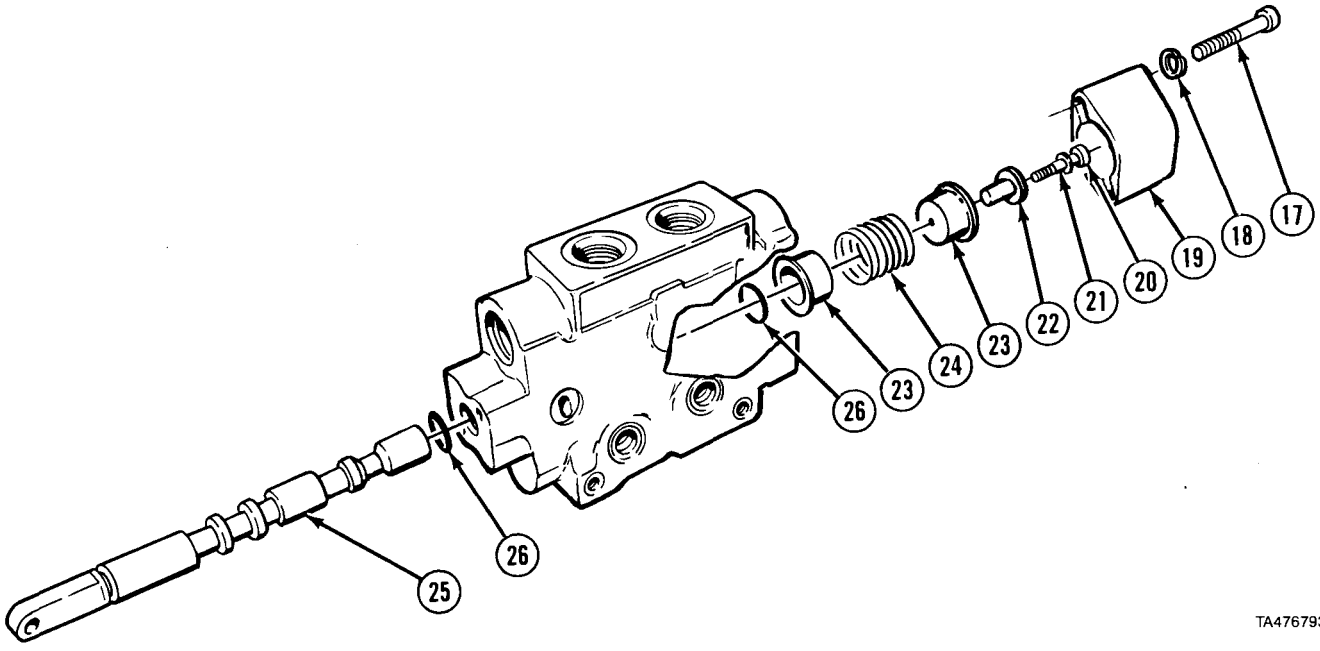
(1) Remove three nuts (1), lockwashers (2), and studs (3).
(2) Remove three nuts (4) and lockwashers (5) from studs (3).
(3) Separate two end covers (6 and 7) and three valve assemblies (8).
(4) Remove 12 shims (9), four preformed packings (10), four preformed packings (11), and eight preformed packings (12).

NOTE

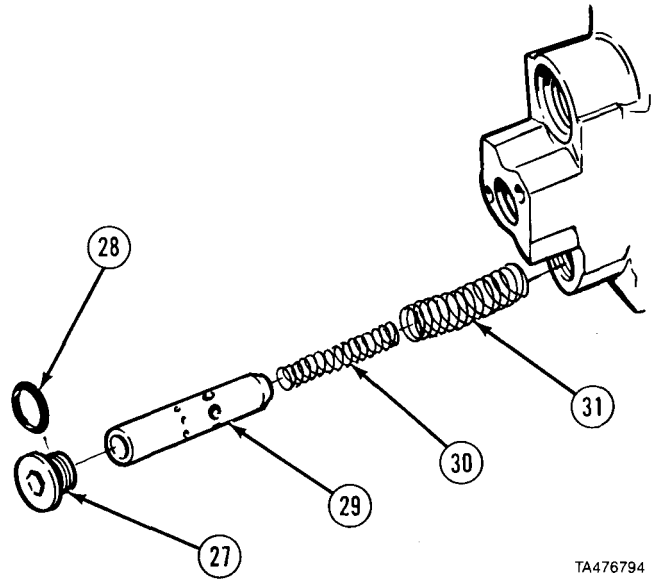
- Matchmark all relief valves before removal. All six relief valves are removed the same.
- All three valve assemblies are disassembled the same.

(5) Remove two relief valves (13) from valve assembly (11).
(6) Remove preformed packing (14), backup ring (15), and preformed packing (16) from relief valve (13).





(7) Remove two screws (17), lockwashers (18), and end cap (19).
(8) Remove screw (20), lockwasher (21), retainer (22), two holders (23), and spring (24).
(9) Remove valve spool (25) and two preformed packings (26).



(10) Remove plug (27) and preformed packing (28).
(11) Remove spring sleeve (29) and two springs (30 and 31).

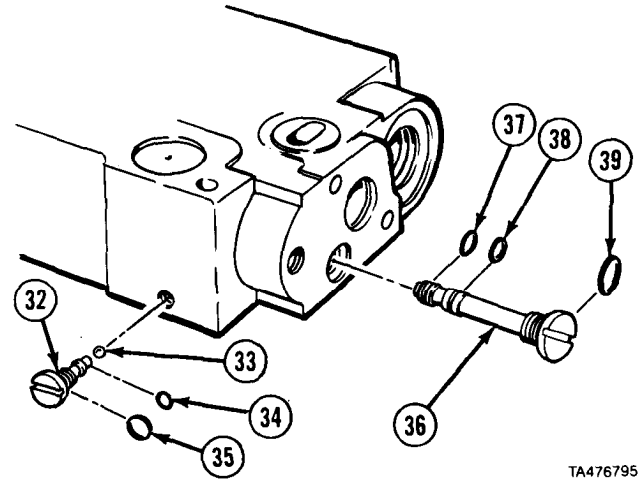
20-10. RETRIEVER CONTROL VALVE REPAIR (M984E1) (CONT).

(12) Remove poppet (32), ball (33), and two preformed packings (34 and 35).
(13) Remove valve (36) and three preformed packings (37, 38, and 39).

b. Cleaning/Inspection.

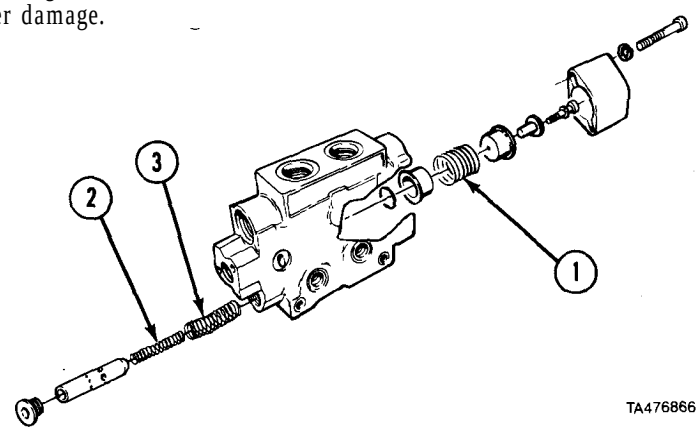
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

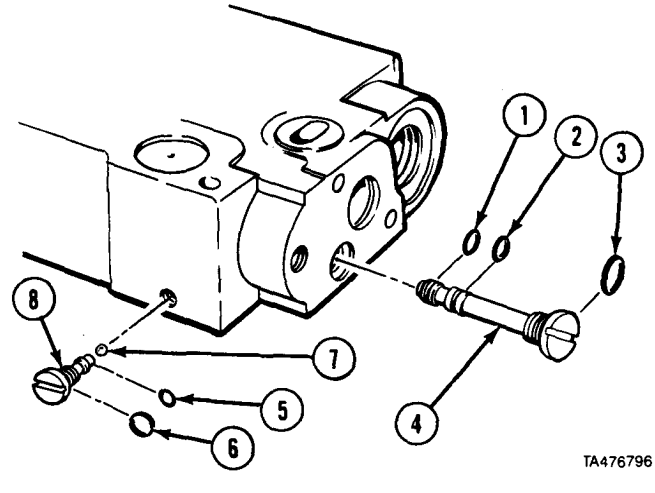


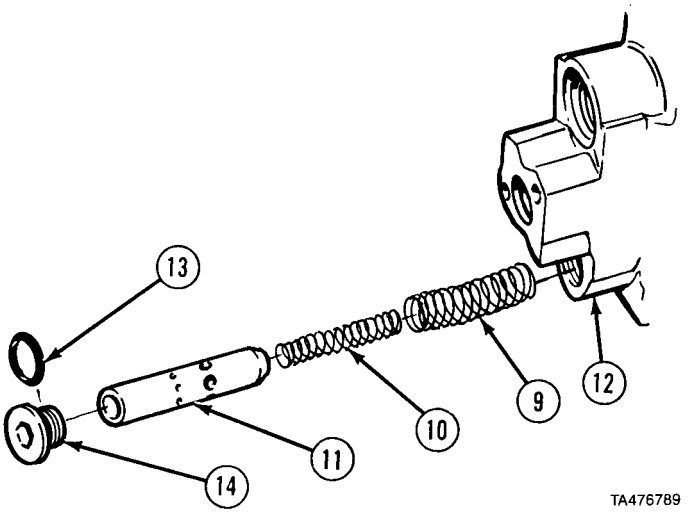
(1) Replace all shims.
(2) Clean all metal parts with dry cleaning solvent.
(3) Inspect each part for damage.
(4) Inspect valve body bores for grooves or other damage.
(5) Inspect valve spools for grooves, cracks, or other damage.
(6) Inspect springs for breaks.
(7) Replace damaged or broken parts.

(8) Measure springs (1, 2, and 3). Replace spring (1) if it is equal to or less than 2.08 in. (52.83 N·m). Replace spring (2) if it is equal to or less than 2.22 in. (56.39 N·m). Replace spring (3) if it is equal to or less than 2.40 in. (6.00 mm).
(9) Coat all metal parts with a thin film of lubricating oil.

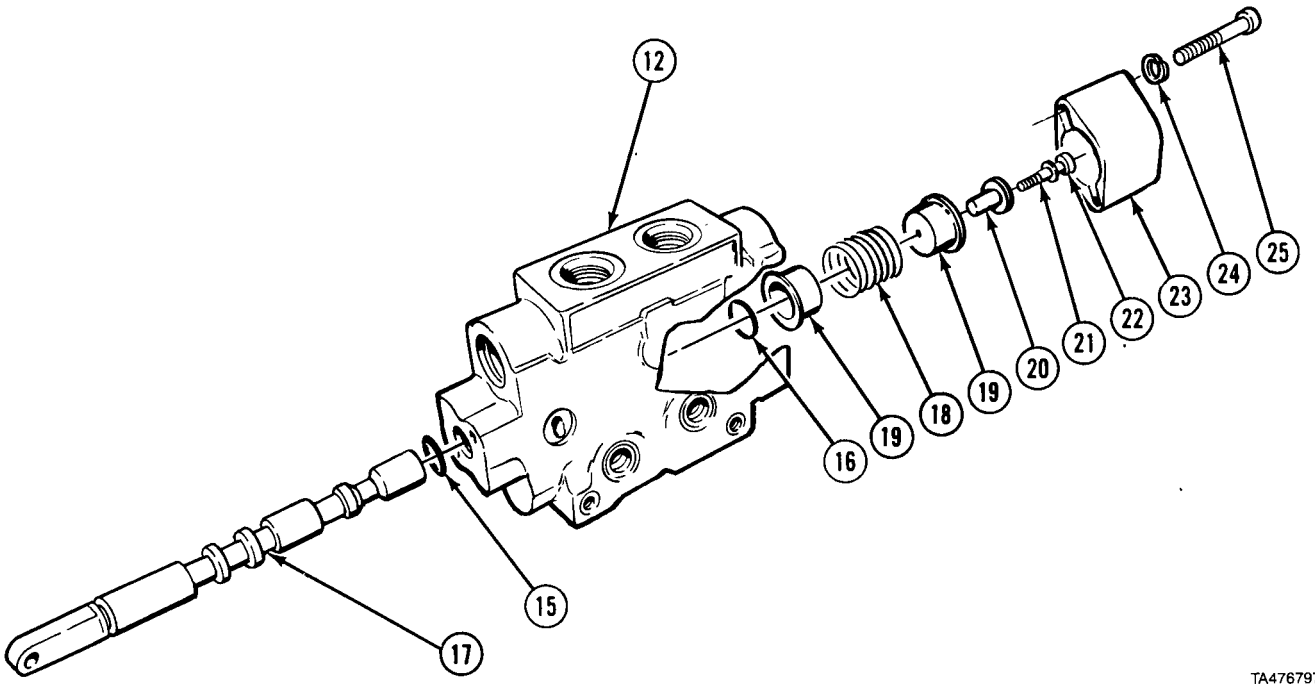


c. Installation.
(1) Install three preformed packings (1, 2, and 3) and shuttle valve (4).
(2) Install two preformed packings (5 and 6), ball (7), and poppet (8).





(3) Install two springs (9 and 10) in spring sleeve (11).
(4) Install spring sleeve (11) in valve body (12).
(5) Install preformed packing (13) and plug (14).



(6) Install two preformed packings (15 and 16) in valve body (12).
(7) Install valve spool (17).
(8) Install spring (18) with two holders (19), retainer (20), lockwasher (21), and screw (22) on valve spool (17).
(9) Install end cap (23), two lockwashers (24), and screws (25).

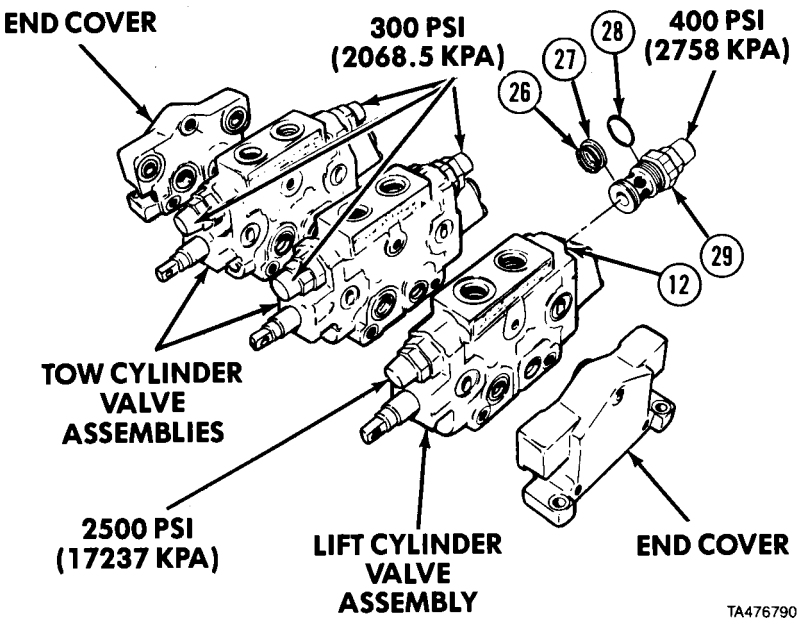
20-10. RETRIEVER CONTROL VALVE REPAIR (M984E1) (CONT).

CAUTION

Relief valves are preset to specific pressures. Correct relief valve must be installed in each valve body or equipment may be damaged when operating retriever controls.

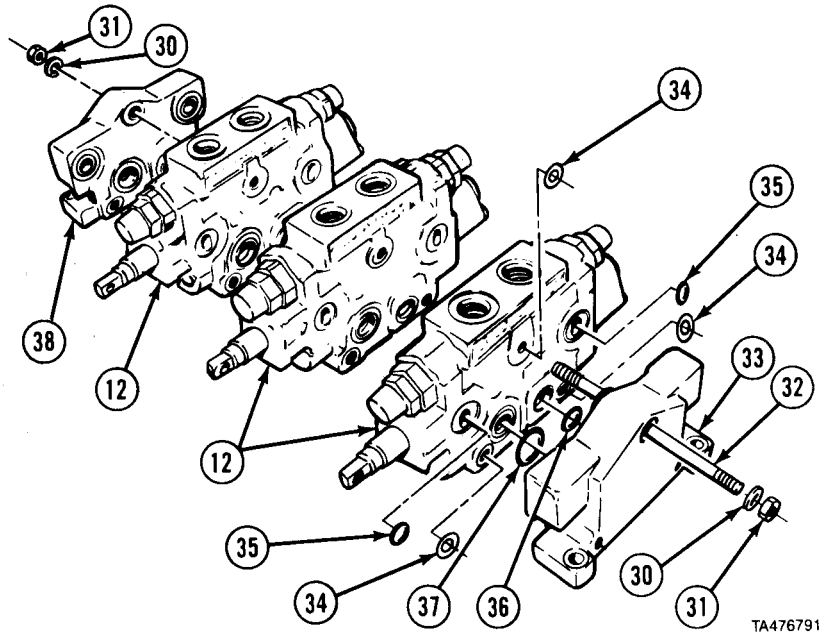
NOTE

- Lift cylinder relief valves are set to 400 psi (2758 kPa) and 2500 psi (17237 kPa).
- Tow cylinder relief valves are set to 300 psi (2068.5 kPa).
- Relief valves are installed the same way in all three valve bodies.



(10) Install Preformed packing (26), backup ring (27), and preformed packing (28) on relief valve (29).
(11) Install relief valve (29) in valve body (12).

(12) Install lockwashers (30) and nuts (31) on three studs (32).
(13) Install three studs (32) through end cover (33).
(14) Install three shims (34) on studs (32).
(15) Install two preformed packings (35), preformed packing (36), and preformed packing (37) on valve body (12).
(16) Assembly valve body (12) and end cover (33).
(17) Repeat steps (14) through (16) for other two valve bodies (12) and end cover (38).
(18) Install lockwashers (30) and nuts (31) on studs (32).



d. Follow-on Maintenance. None.

END OF TASK

CHAPTER 21
ARCTIC HEATER KIT MAINTENANCE

Contents

	Para	Page
General	21-1	21-1
Arctic Kit Coolant Pump Repair (Model A)	21-2	21-1
Arctic Engine Heater Repair (Model B)	21-3	21-12

Section I. INTRODUCTION

21-1. GENERAL. This chapter contains maintenance instructions for the repair of the arctic heater kit at the direct support maintenance level.

Section II. ARCTIC HEATER KIT

Arctic Heater Kit Repair Instructions

21-2. ARCTIC KIT COOLANT PUMP REPAIR (MODEL A).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
Puller Tool 24702

Supplies
Solvent, drycleaning, Item 57, Appendix C
Paper, abrasive, Item 51, Appendix C
Oil, lubricating, Item 46, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	Arctic kit coolant pump removed.

Special Environmental Conditions
None

General Safety Instructions
None

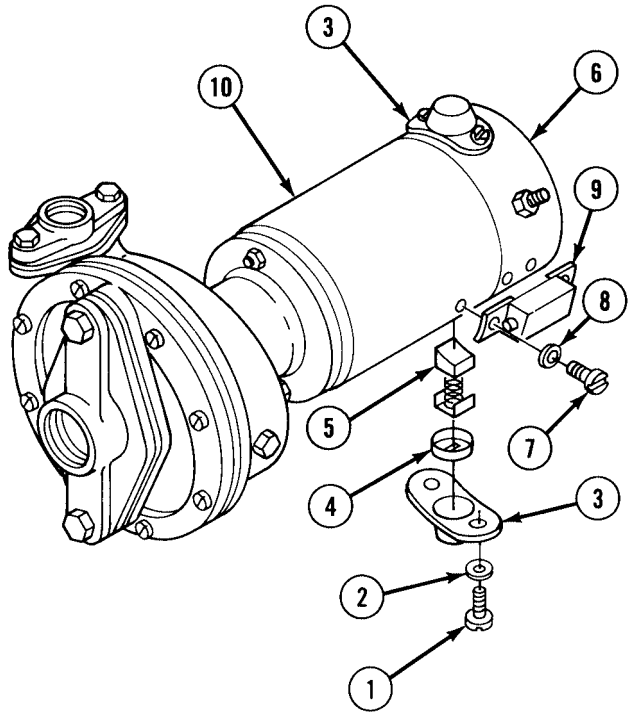
Level of Maintenance
Direct Support

21-2. ARCTIC KIT COOLANT PUMP REPAIR (MODEL A) (CONT).

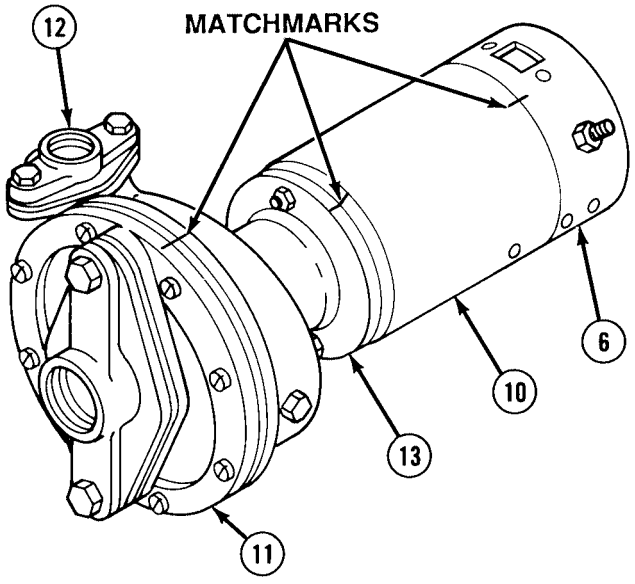
a. Disassembly.

(1) Remove four screws (1), lockwashers (2), two brush shields (3), brush caps (4), and brush and spring assemblies (5) from brush head (6).

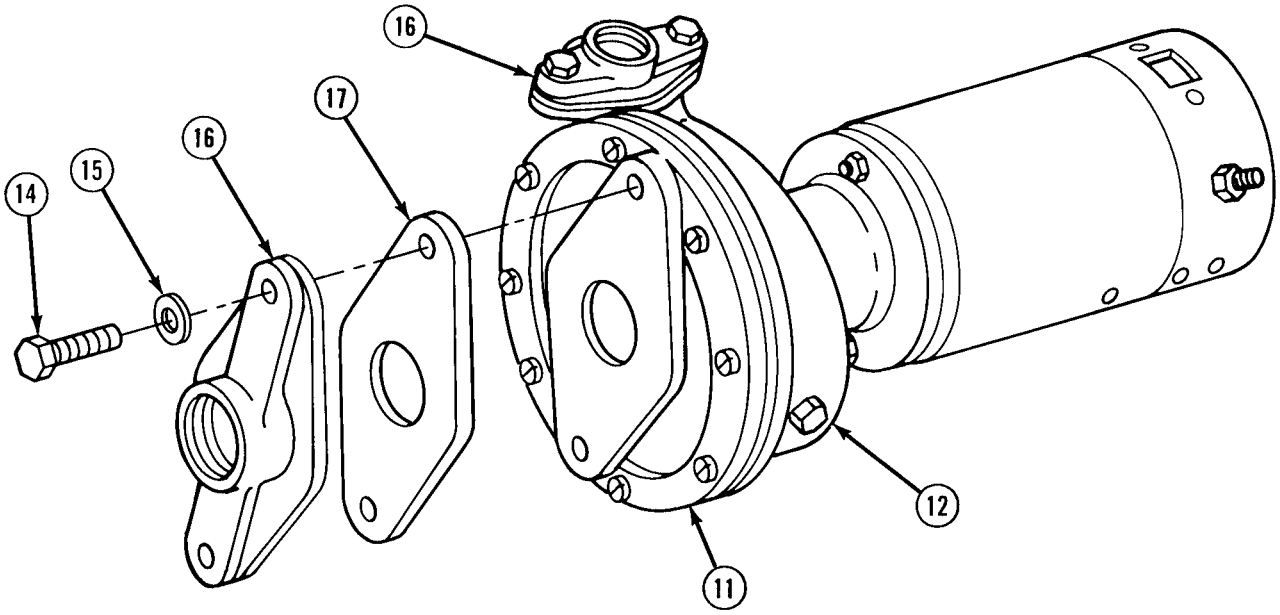
(2) Remove two screws (7), lockwashers (8), and radio noise filter (9) from brush head (6) and stator (10).



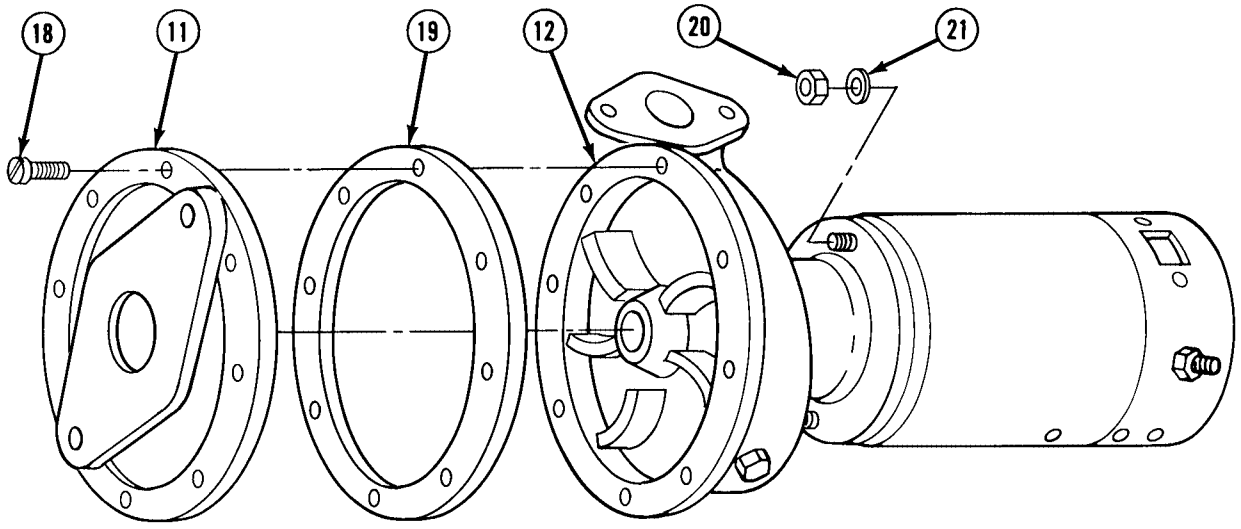
(3) Matchmark pump cover (11), body (12), rear head cover (13), stator (10), and brush head (6).



Arctic Heater Kit Maintenance Instructions (Cont)



(4) Remove four screws (14), lockwashers (15), two flanges (16), and gaskets (17) from pump cover (11) and body (12).



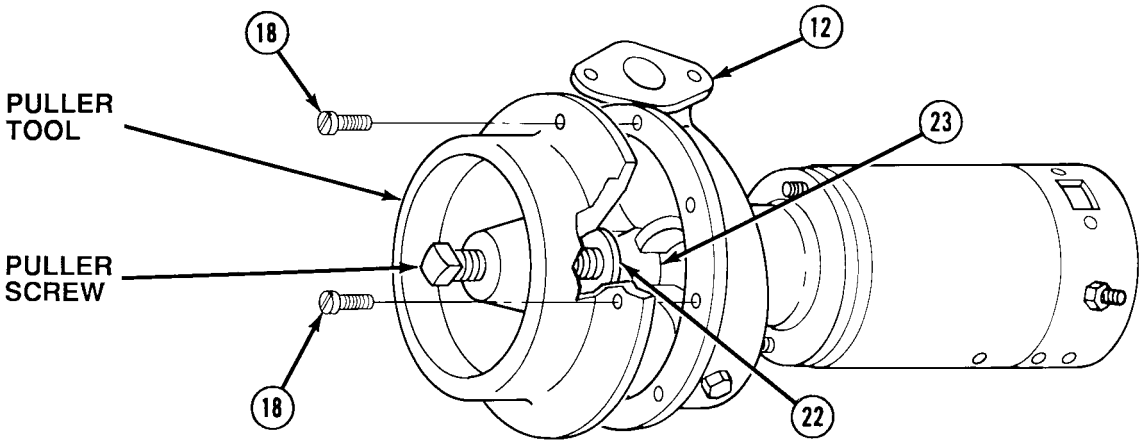
(5) Remove eight screws (18), pump cover (11), and gasket (19) from pump body (12).

NOTE

Two nuts removed in step *(6)* hold motor together. Keep motor as an assembly.

(6) Remove two nuts (20) and lockwashers (21) from pump body (12).

21-2. ARCTIC KIT COOLANT PUMP REPAIR (MODEL A) (CONT).



(7) Install puller tool on pump body (12) using four screws (18) removed from pump body (12) in step *(5)*.

CAUTION

Motor will come off pump body when armature shaft is pressed out of impeller.

NOTE

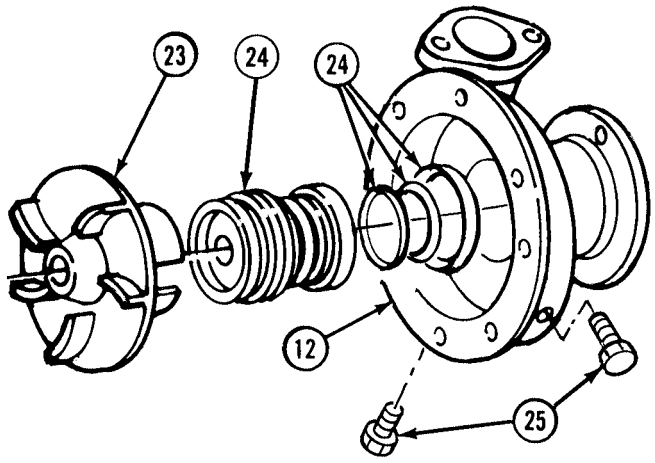
Two nuts removed in step *(6)* hold motor together. Keep motor as an assembly.

(8) Tighten puller screws on shaft of armature (22) and press shaft out of impeller (23).
(9) Remove four screws (18) and puller tool from pump body (12).
(10) Remove impeller (23) from pump body (12).

NOTE

Note position of components within seal assembly to ensure proper assembly.

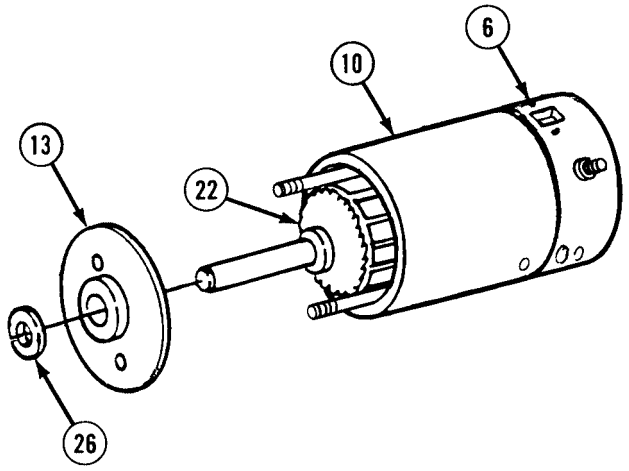
(11) Remove four piece seal assembly (24) from pump body (12).
(12) Remove two drain plugs (25) from pump body (12).



Arctic Heater Kit Maintenance Instructions (Cont)

(13) Remove slinger (26) and rear head cover (13) from shaft of armature (22).

(14) Remove stator (10) from armature (22) and brush head (6).

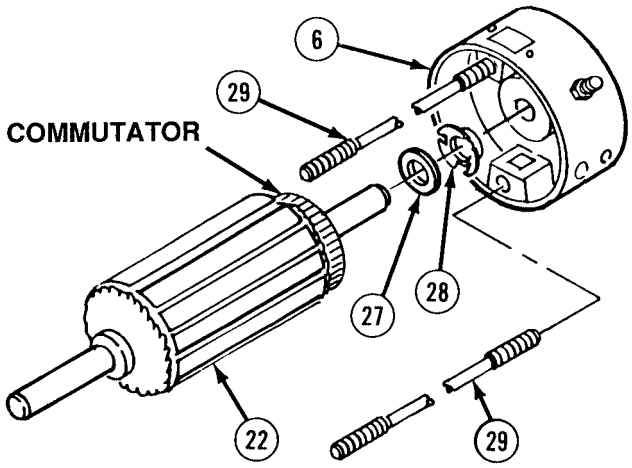


CAUTION

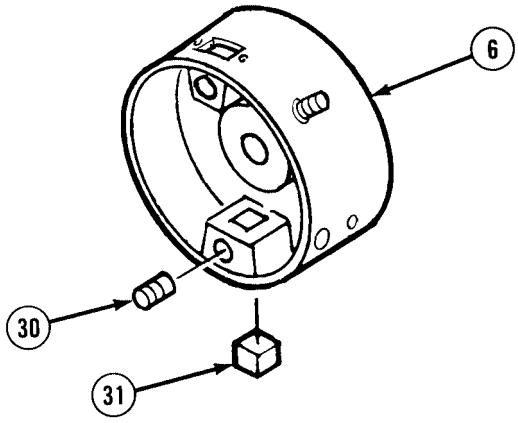
Do not touch commutator directly with skin. Sweat and body oils will damage commutator.

(15) Remove armature (22), thrust washer (27), and spring washer (28) from brush head (6).

(16) Remove two case studs (29) from brush head (6).



(17) Remove two set screws (30) and brush tubes (31) from brush head (6).

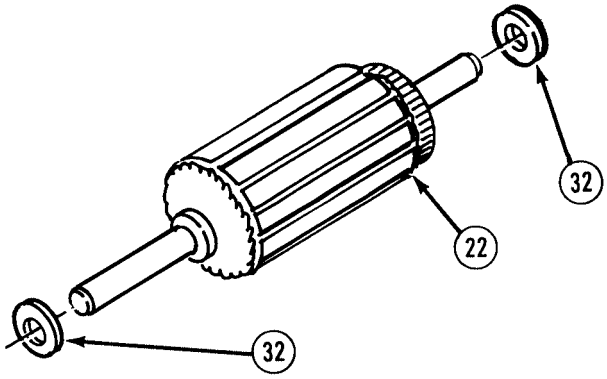


21-2. ARCTIC KIT COOLANT PUMP REPAIR (MODEL A) (CONT).

CAUTION

Do not touch commutator directly with skin. Sweat and body oils will damage commutator.

(18) Remove two bearings (32) from shaft of armature (22).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

CAUTION

Do not touch commutator directly with skin. Sweat and body oils will damage commutator.

(1) Clean all metal parts in drycleaning solvent except armature and stator.

(2) Inspect commutator contact surface for rough surface, pits, scoring, burns, hard carbon, oil coat, severe wear, and out of round. Commutator may not be more than 0.002 in. (.051 mm) out of round. Commutator diameter difference between nonwear surface and brush wear surface must be less than 0.187 in. (4.75 mm).

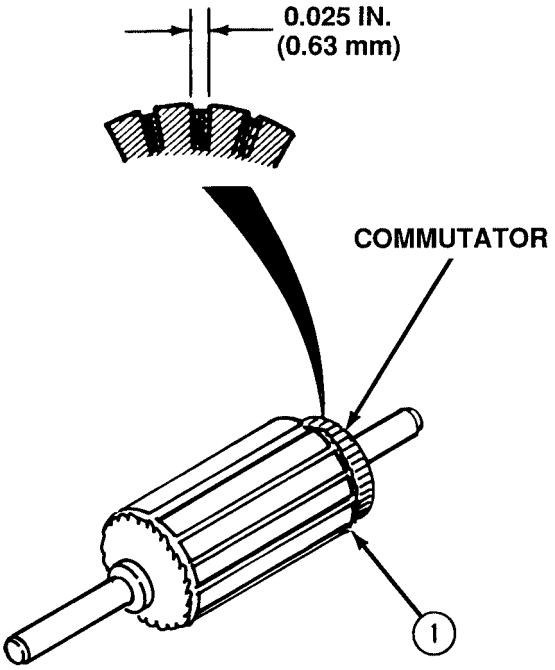
Arctic Heater Kit Maintenance Instructions (Cont)

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(a) Cut commutator of armature (1) as required on lathe. When cutting commutator, cut no more than 0.005 in. (0.13 mm) at a time to remove scoring, pits, burrs, or to return commutator to round. Then make final cut of 0.002 in. (0.051 mm). Undercut commutator with a 0.025 in. (0.63 mm) or less slot width. Blow off all loose copper and mica with compressed air.

(b) Polish commutator of armature (1) with abrasive paper. Blow off all loose debris with compressed air.



(3) Inspect brush and spring assemblies for brush chips, excessive brush wear, spring distortion, and broken or frayed pigtails. If brush has more than minor chips in it or is less than 0.300 in. (7.620 mm) in length, replace brush spring assembly. If spring is distorted or has lost its resilience, replace brush spring assembly. If pigtail is frayed or broken, replace brush spring assembly.

(4) Replace unserviceable parts.

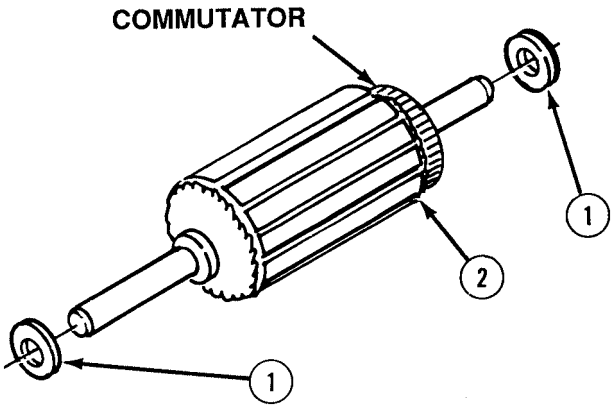
21-2. ARCTIC KIT COOLANT PUMP REPAIR (MODEL A) (CONT).

c. Assembly

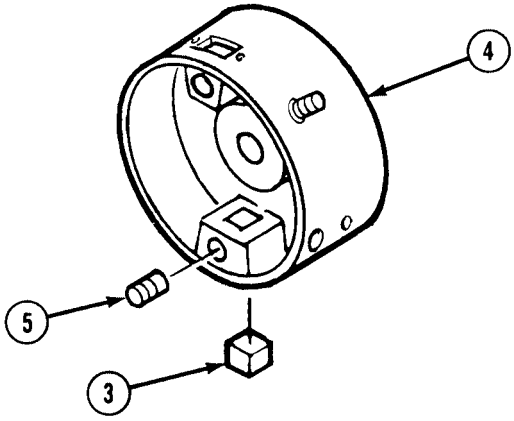
CAUTION

Do not touch armature commutator directly with skin. Sweat and body oils will damage commutator.

(1) Install two bearings (1) on armature (2).



(2) Install two brush tubes (3) in brush head (4) with set screws (5).



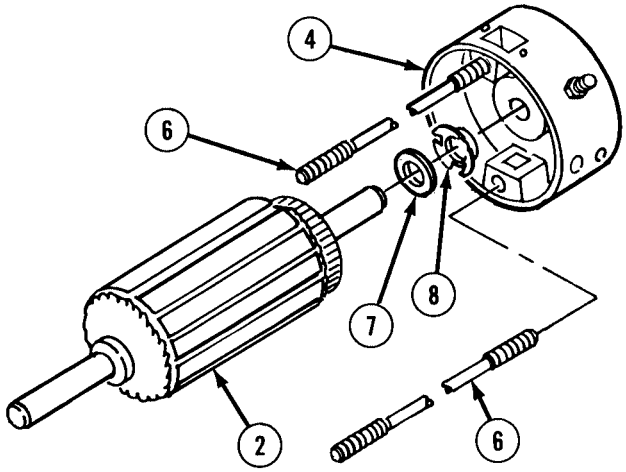
(3) Install two case studs (6) in brush head (4).

CAUTION

Do not touch commutator directly with skin. Sweat and body oils will damage commutator.

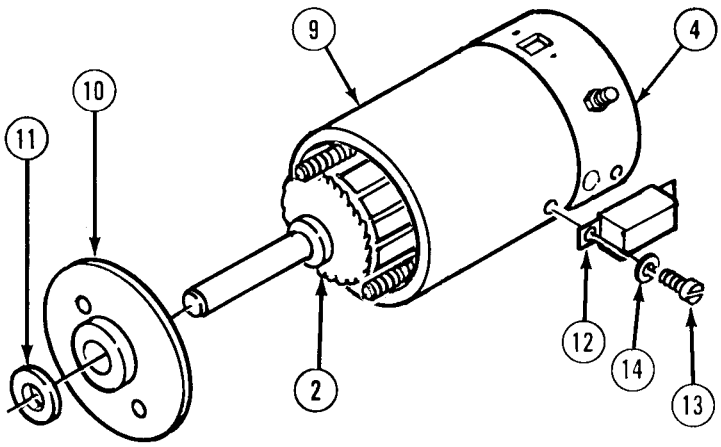
(4) Install thrust washer (7) and spring washer (8) on commutator end of armature (2).

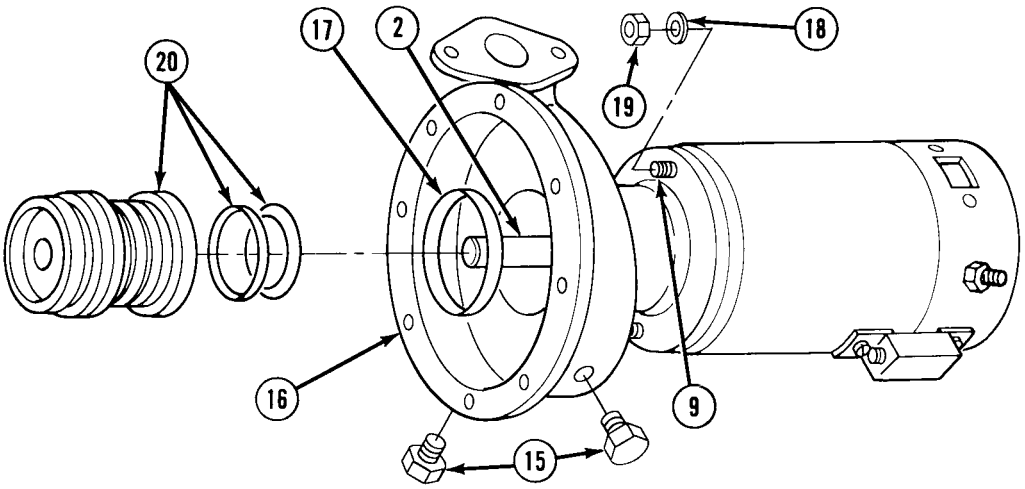
(5) Install armature (2) in brush head (4).



Arctic Heater Kit Maintenance Instructions (Cont)

(6) Install stator (9) on brush head (4).
(7) Install rear head cover (10) on armature (2) and stator (9).
(8) Install slinger (11) on shaft of armature (2).
(9) Install radio noise filter (12) on brush head (4) and stator (9) with two screws (13) and lockwashers (14).





(10) Install two drain plugs (15) in pump body (16).
(11) Install seal assembly seat (17) in recess of pump body (16).
(12) Install case studs (9) through holes in pump body (16) and install two lockwashers (18) and two nuts (19).

CAUTION

Be sure all components of seal fit together correctly.

(13) Lubricate shaft of armature (2) with lubricating oil and install remaining components of seal assembly (20) on shaft of armature (2).

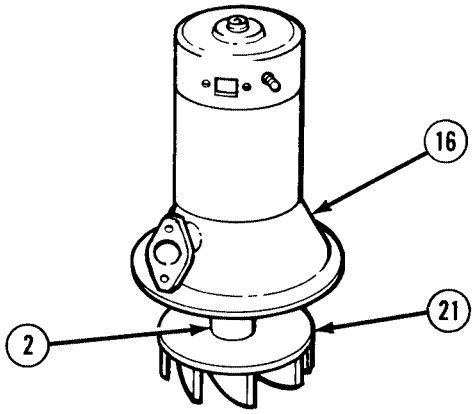
21-2. ARCTIC KIT COOLANT PUMP REPAIR (MODEL A) (CONT).

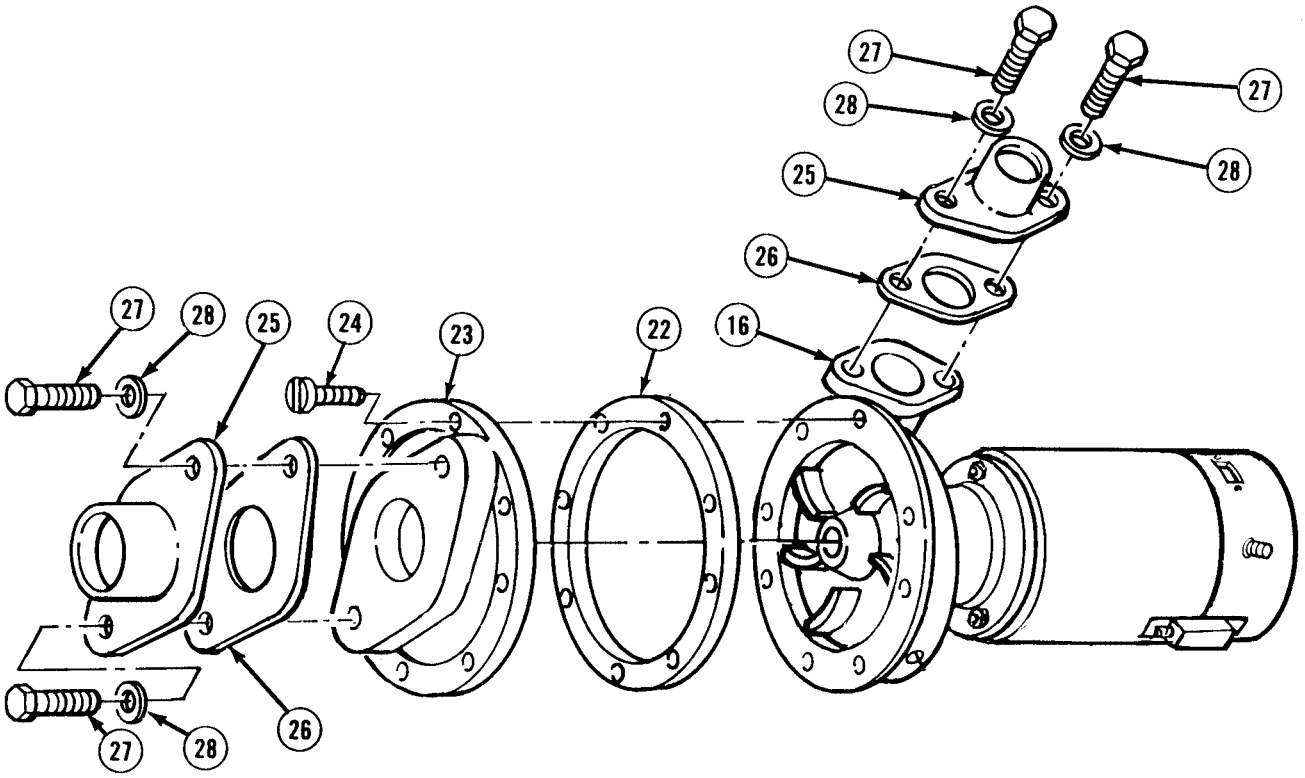
CAUTION

Only use press to install armature shaft into impeller, do not pound on end of motor.

(14) Place impeller (21) on flat surface with vanes down.

(15) Press shaft of armature (2) into bore of impeller (21) until surface of pump body (16) is flush with impeller surface (pump body surface is pressed against flat surface without any gaps between pump body and flat surface).





(16) Install gasket (22) and pump cover (23) on pump body (16) with eight screws (24).

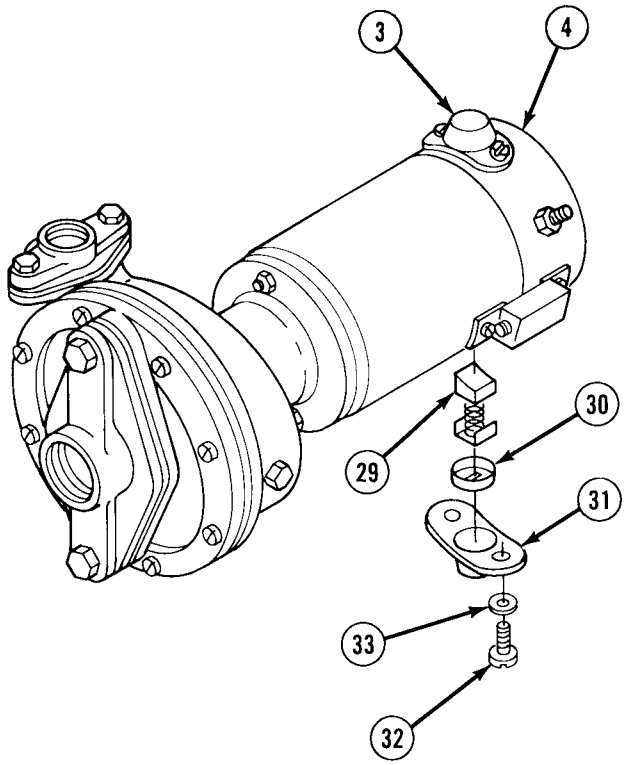
(17) Install two flanges (25) and gaskets (26) on pump cover (23) and pump body (16) with four screws (27) and lockwashers (28).

Arctic Heater Kit Maintenance Instructions (Cont)

NOTE

New brushes have a six degree angle on the brush face. Brush should always be installed so that the angle is open away from the pump end of the motor.

(18) Install two brush and spring assemblies (29), brush caps (30), and brush shields (31) in brush head (4) with four screws (32) and lockwashers (33).



d. Follow-on Maintenance. Install arctic kit coolant pump (TM 9-2320-279-20).

END OF TASK

21-3 ARCTIC ENGINE HEATER REPAIR (MODEL B).

This task covers:

a. Disassembly
b. Assembly
c. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
Pin, extractor, Item 78.2, Appendix B
Pin, extractor, Item 78.3, Appendix B

Supplies
Compound, sealing Loctite 592
Item 29, Appendix C
Tie, cable, plastic, Item 65, Appendix C
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition
TM or Para *Condition Description*
Arctic engine heater on clean work surface

Special Environmental Conditions
None

Level of Maintenance
Direct Support

General Safety Instructions
None

a. Disassembly.

NOTE
Burner assembly shown removed for clarity.

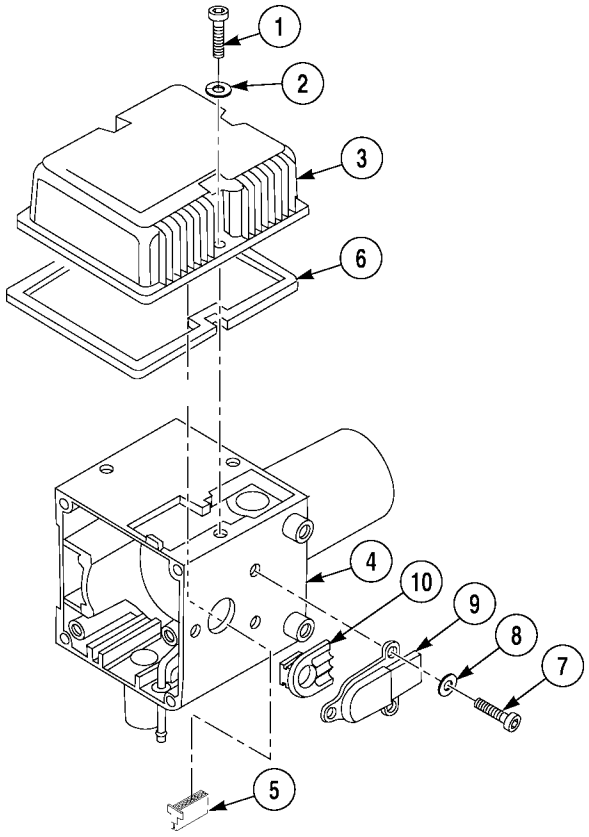
(1) Remove three screws (1) and washers (2) from control unit (3).

(2) Lift control unit (3) from burner assembly (4).

(3) Disconnect internal connector (5) from control unit (3).

(4) Remove seal (6).

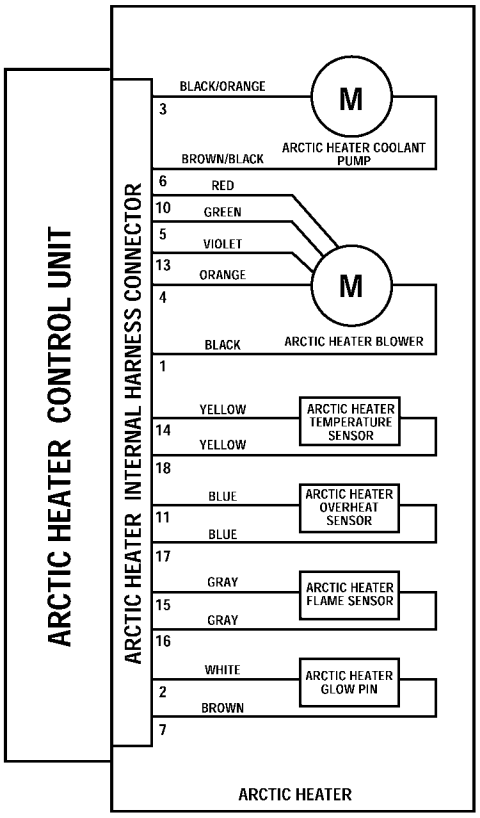
(5) Remove three screws (7), washers (8), cover (9), and sleeve (10) from burner assembly (4).



Arctic Heater Kit Maintenance Instructions (Cont)

NOTE

- Tag and mark all wires prior to removal to ensure proper installation.
- Cut cable ties as required.
- Special tool is required to remove wire from internal connector.

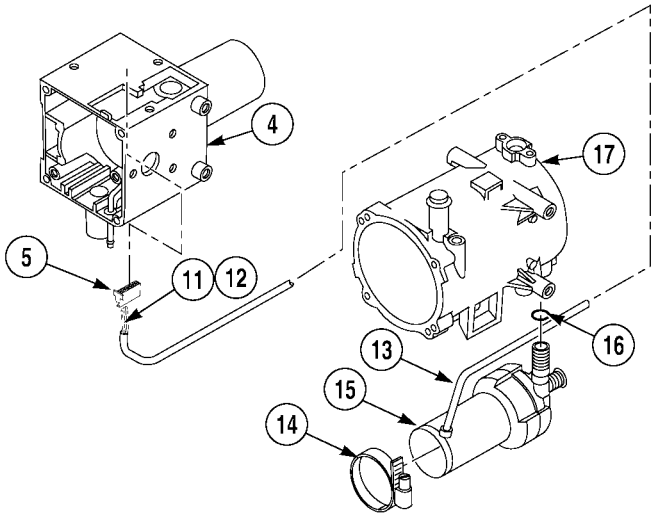


(6) Disconnect water pump black/orange wire (11) from internal connector (5).

(7) Disconnect water pump brown/black wire (12) from internal connector (5).

(8) Remove water pump cable (13) from burner assembly (4).

(9) Remove clamp (14), water pump (15), and preformed packing (16) from outer casing (17).



21-3 ARCTIC ENGINE HEATER REPAIR (MODEL B) (CONT).

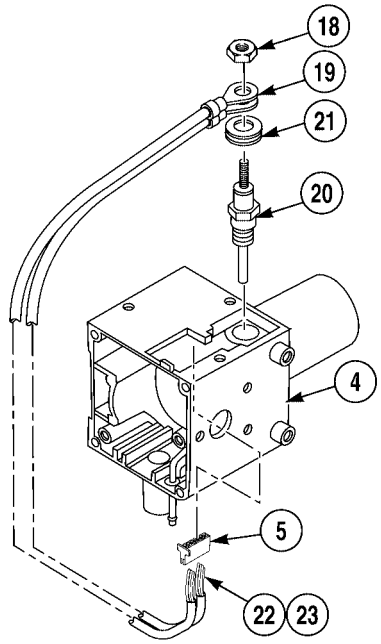
(10) Remove nut (18) and glow pin cable (19) from glow pin (20).

(11) Remove seal (21) from glow pin (20).

(12) Remove glow pin (20) from burner assembly (4).

(13) Disconnect white wire (22) from internal connector (5).

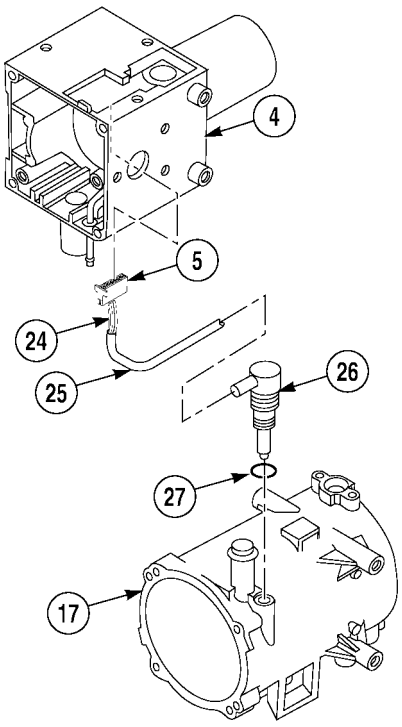
(14) Disconnect brown wire (23) from internal connector (5).



(15) Disconnect two yellow wires (24) from internal connector (5).

(16) Remove temperature sensor cable (25) from burner assembly (4).

(17) Remove temperature sensor (26) and preformed packing (27) from outer casing (17).



Arctic Heater Kit Maintenance Instructions (Cont)

(18) Disconnect two blue wires (28) from internal connector (5).

(19) Remove overheat sensor cable (29) from burner assembly (4).

(20) Unclip overheat sensor cable (29) from clip (30).

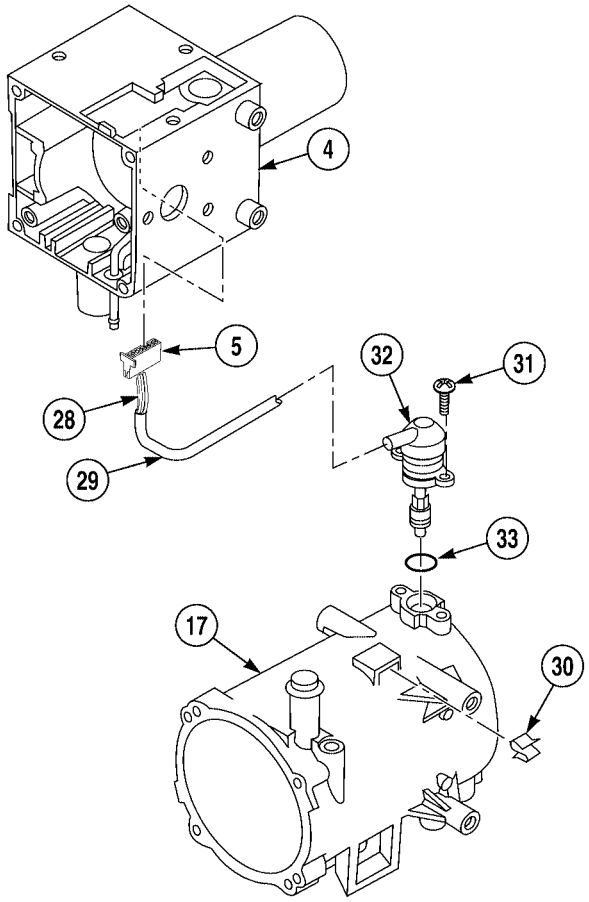
WARNING

Spring is under extreme tension. Wear proper eye protection. Spring may shoot out and cause injury to personnel.

NOTE

Overheat sensor is under spring pressure.

(21) Remove two screws (31), overheat sensor (32), and preformed packing (33) from outer casing (17).



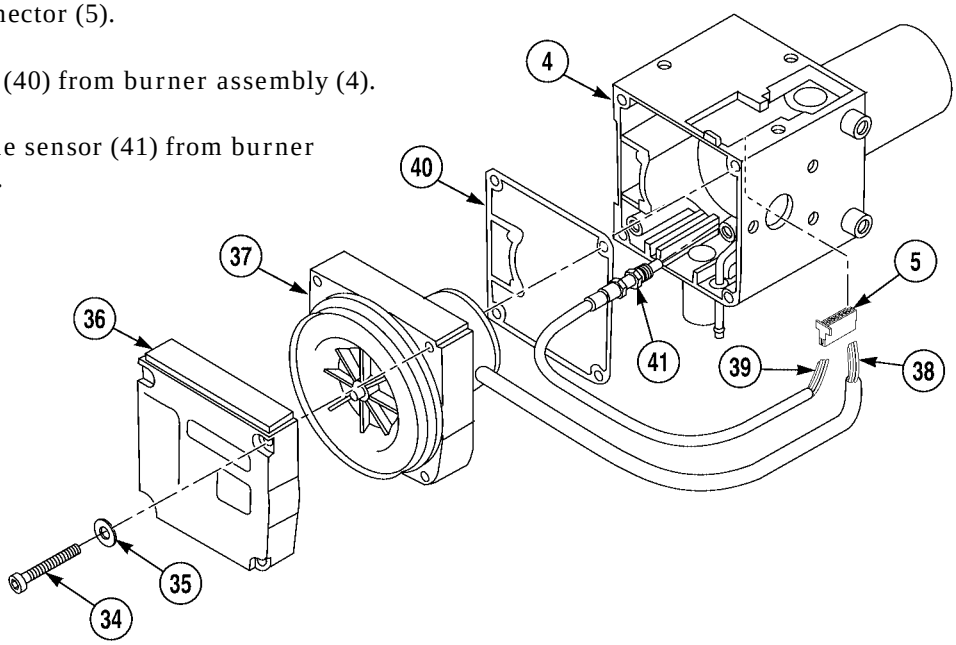
(22) Remove four screws (34), washers (35), blower cover (36), and blower (37) from burner assembly (4).

(23) Disconnect blower cable (38) from internal connector (5).

(24) Disconnect two gray wires (39) from internal connector (5).

(25) Remove seal (40) from burner assembly (4).

(26) Remove flame sensor (41) from burner assembly (4).



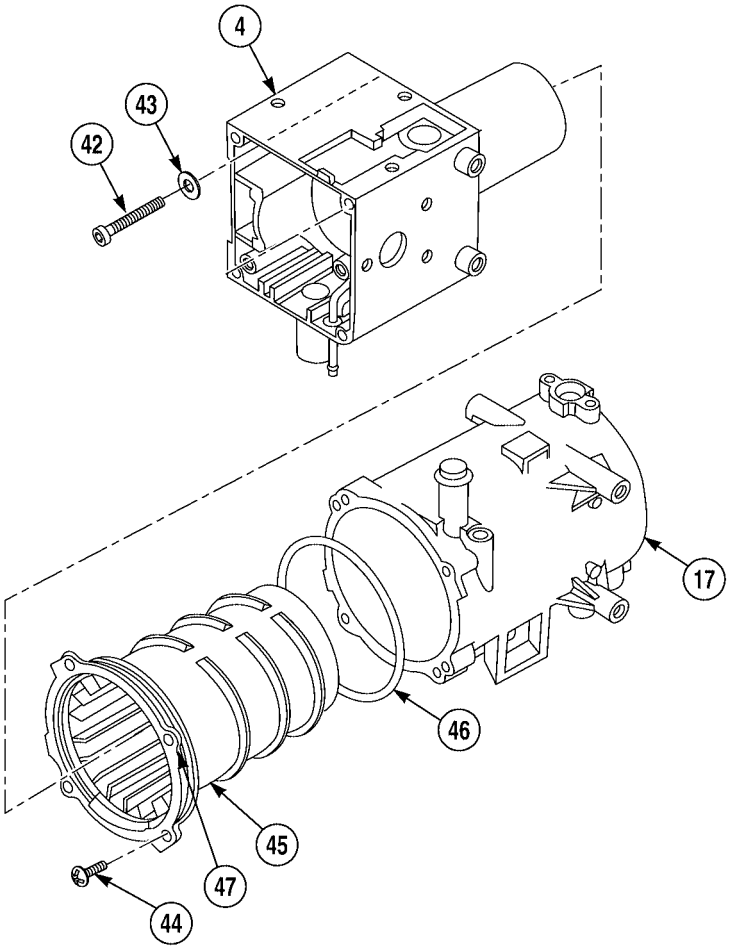
21-3 ARCTIC ENGINE HEATER REPAIR (MODEL B) (CONT).

(27) Remove four screws (42) and washers (43) from burner assembly (4).

(28) Separate burner assembly (4) and outer casing (17).

(29) Remove two screws (44) from heat exchanger (45).

(30) Remove heat exchanger (45) and performed packing (46) from outer casing (17) using slots (47).



(31) Remove four screws (48) from burner (49) and burner assembly (4).

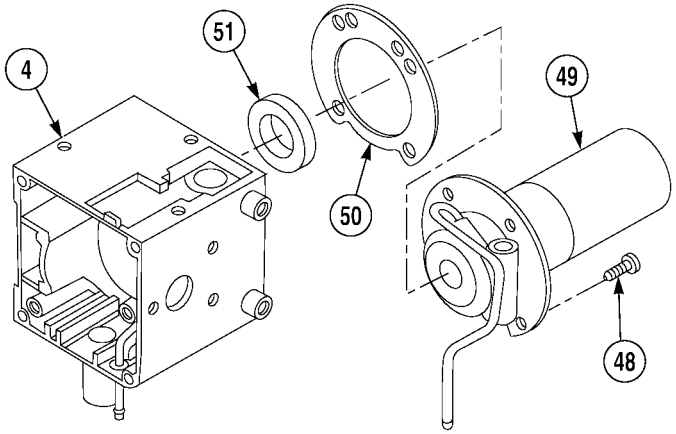
CAUTION

Carefully remove fuel supply tube out of burner assembly. Failure to comply could result in damage to equipment.

(32) Remove burner (49) from burner assembly (4).

(33) Remove seal (50) from burner (49).

(34) Remove seal (51) from burner assembly (4).



Arctic Heater Kit Maintenance Instructions (Cont)

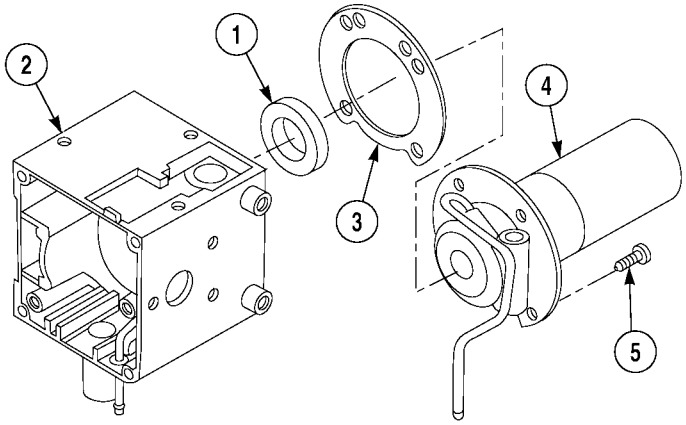
b. Assembly.

NOTE

- Refer to wire diagram at beginning of disassembly to ensure proper installation of wires.
- Burner assembly shown removed for clarity.

(1) Install seal (1) to burner assembly (2).

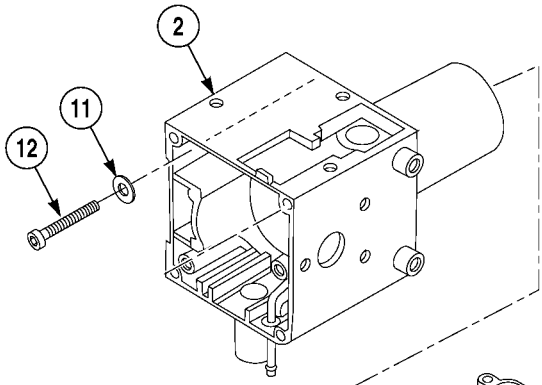
(2) Install seal (3) to burner (4).



CAUTION

Carefully route flame tube through burner assembly. Failure to comply could result in damage to equipment.

(3) Install burner (4) to burner assembly (2) with four screws (5).

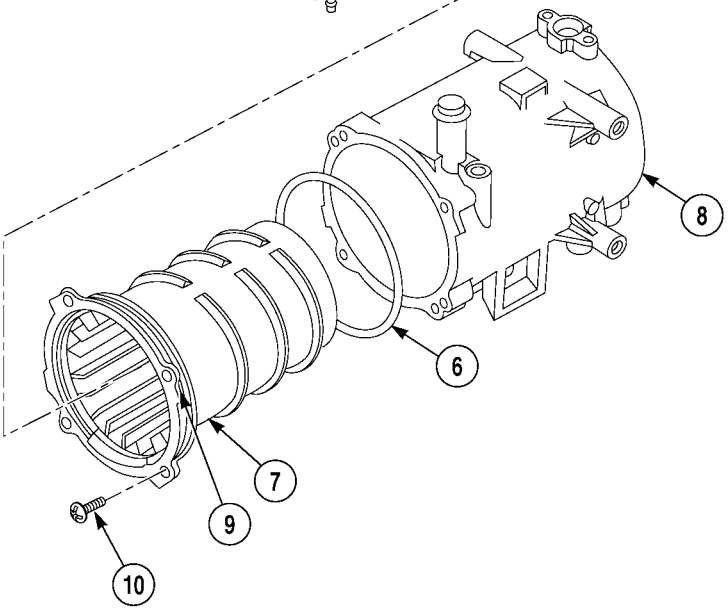


(4) Install preformed packing (6) on heat exchanger (7).

(5) Insert heat exchanger (7) into outer casing (8) and aline slots (9).

(6) Install two screws (10) in heat exchanger (7) and outer casing (8).

(7) Install burner assembly (2) into outer casing (8) with four washers (11) and screws (12).

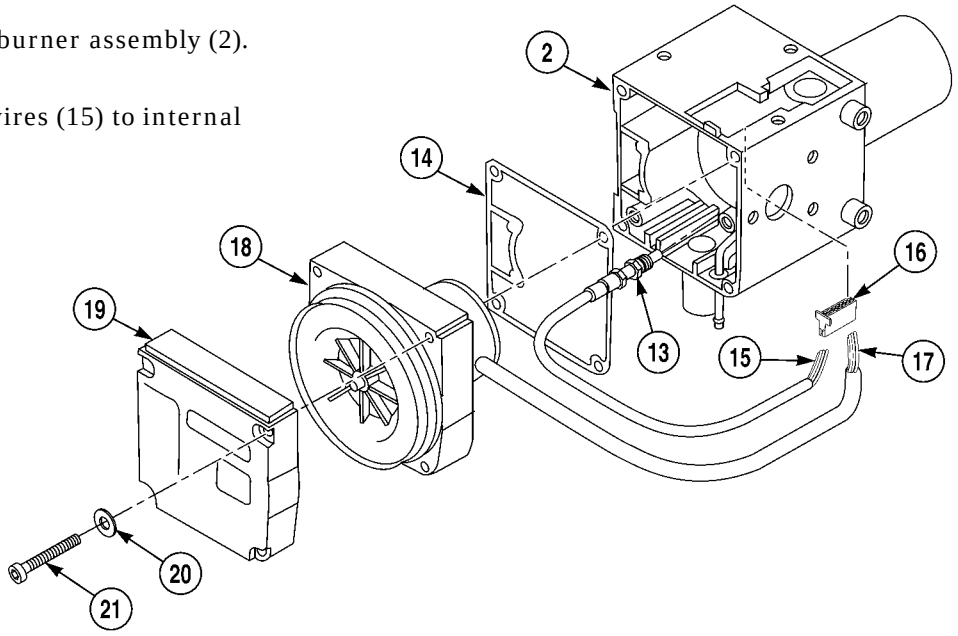


21-3 ARCTIC ENGINE HEATER REPAIR (MODEL B) (CONT).

(8) Install flame sensor (13) in burner assembly (2).

(9) Install seal (14) on burner assembly (2).

(10) Connect two gray wires (15) to internal connector (16).



(11) Connect blower cable (17) to internal connector (16).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(12) Apply sealing compound between blower (18) and blower cover (19).

(13) Install blower (18) and blower cover (19) to burner assembly (2) with four washers (20) and screws (21).

Arctic Heater Kit Maintenance Instructions (Cont)

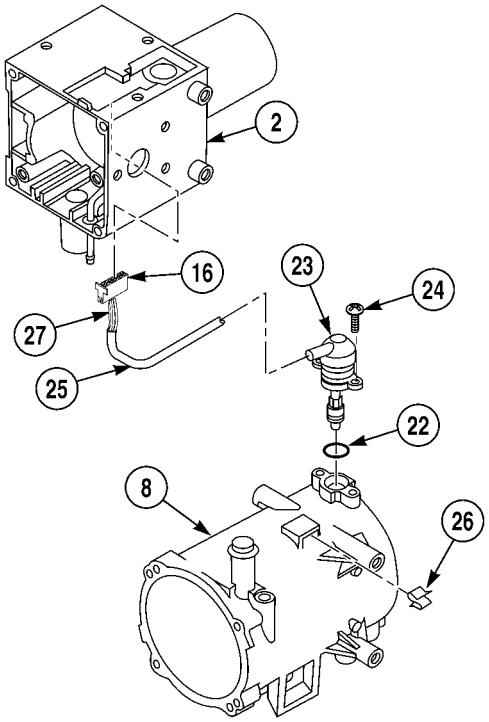
(14) Install preformed packing (22) to overheat sensor (23).

WARNING

Spring is under extreme tension. Wear proper eye protection. Spring may shoot out and cause injury to personnel.

NOTE

Overheat sensor is under spring pressure.



(15) Install overheat sensor (23) to outer casing (8) with two screws (24).

(16) Insert overheat sensor cable (25) into clip (26).

(17) Route overheat sensor cable (25) through burner assembly (2) to internal connector (16).

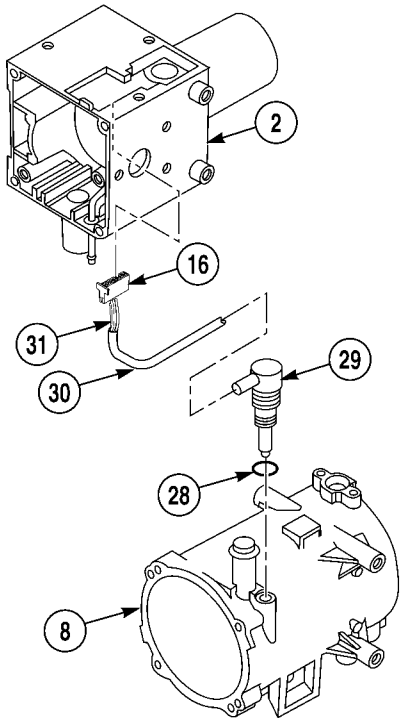
(18) Connect two blue wires (27) to internal connector (16).

(19) Install preformed packing (28) on temperature sensor (29).

(20) Install temperature sensor (29) to outer casing (8).

(21) Route temperature sensor cable (30) through burner assembly (2) to internal connector (16).

(22) Connect two yellow wires (31) to internal connector (16).



Arctic Heater Kit Maintenance Instructions (Cont)

21-3 ARCTIC ENGINE HEATER REPAIR (MODEL B) (CONT).

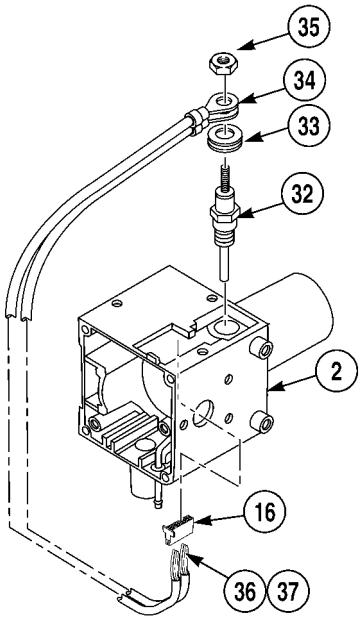
(23) Install glow pin (32) in burner assembly (2).

(24) Install seal (33) on glow pin (32).

(25) Install glow pin cable (34) to glow pin (32) with nut (35).

(26) Connect glow pin cable white wire (36) to internal connector (16).

(27) Connect glow pin cable brown wire (37) to internal connector (16).



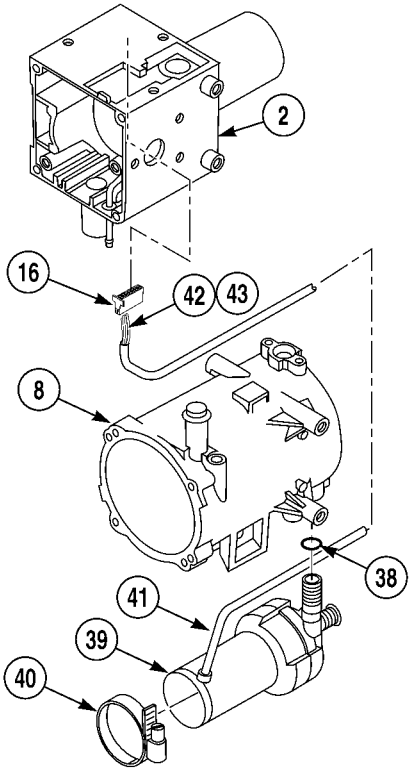
(28) Install preformed packing (38) on water pump (39).

(29) Install water pump (39) to outer casing (8) with clamp (40).

(30) Route water pump cable (41) through burner assembly (2) to internal connector (16).

(31) Connect water pump black/orange wire (42) to internal connector (16).

(32) Connect water pump brown/black wire (43) to internal connector (16).



Arctic Heater Kit Maintenance Instructions (Cont)

(33) Install sleeve (44) to burner assembly (2).

(34) Install cover (45) to burner assembly (2) with three washers (46) and screws (47).

WARNING

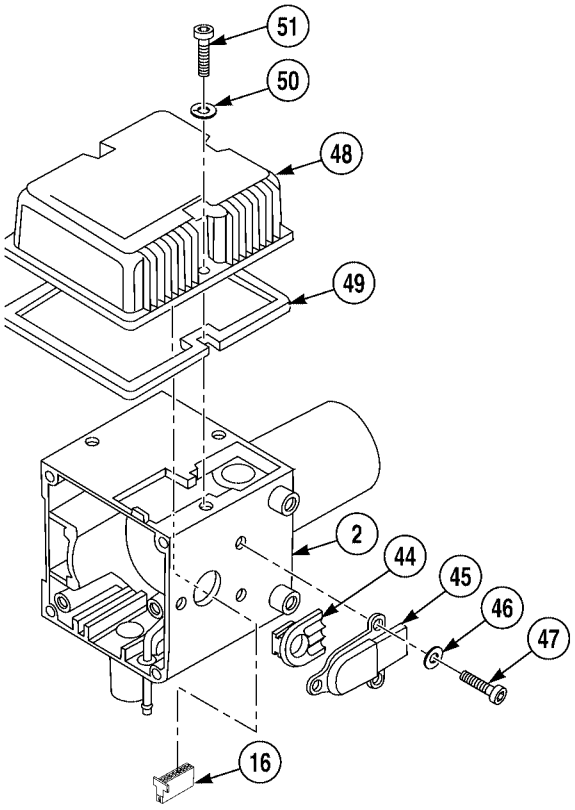
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(35) Apply sealing compound to control unit (48).

(36) Install seal (49) on control unit (48).

(37) Connect internal connector (16) to control unit (48).

(38) Install control unit (48) to burner assembly (2) with three washers (50) and screws (51).



c. Follow-on Maintenance. Test arctic engine heater repair.

END OF TASK

CHAPTER 22
M978 TANKER MAINTENANCE PROCEDURES

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Section I. INTRODUCTION

22-1. GENERAL. This chapter contains maintenance instructions for removing, repairing, and installing the M978 tanker fuel-handling components at the direct support and general support maintenance levels. Major components covered in this chapter include:

- pump, pump motor, and auxiliary pump
- flowmeter
- air eliminator
- valves
- fuel service nozzle

The subassemblies and parts which must be removed before the fuel-handling components can be removed or repaired are referenced to other paragraphs or chapters of this manual or TM 9-2320-279-20.

Section II. SERVICE AND INSPECTION

M978 Tanker Maintenance Procedures Instructions

22.2. GENERAL MAINTENANCE INSTRUCTIONS.

a. Refer to Figures 22-1 through 22-5 to identify M978 tanker components before beginning work.

b. Follow these maintenance practices when working on the M978 tanker and tanker components:

WARNING

- To prevent explosion and fire, no smoking, flame, sparks and glowing or hot objects are allowed within 60 ft (16 m) of vehicle.
- Eye protection is required during all grinding operations.

(1) Tag and mark shims, connectors, wires, tubes, conduit, hoses, and pipes before disconnecting. Matchmark position of fittings, components and subassemblies before removal. Identify similar parts to ensure correct assembly and installation.
(2) Use suitable container to catch fuel when removing hoses, tubes, fittings, pipes, and components.
(3) Drain air system before removing air-actuated components and subassemblies.

CAUTION

Do not use tape to close off fuel openings. Sticky surface of tape will mix with and contaminate fuel.

(4) When a component is removed from vehicle, cover open ends of pipes, valves, and other components. Cover open ends with caps or plugs to prevent contaminants from entering fuel circuit.
(5) Handle and store removed components carefully.
(6) To ease assembly, lay out parts in order they are removed during disassembly.
(7) Plumbing tags are attached with wire, screws, or rivets. Do not remove or replace plumbing tags unless missing or damaged.
(8) Inspect parts as removed for breaks, dents, cracks, surface defects, or other damage. Turn in defective parts. Set aside good parts for later use.
(9) When unpacking items, remove all packing material, barrier paper, tape, plastic bags, and protective caps.
(10) Replace all gaskets, packings, and seals removed during repair work. Replace all lockwire, lockwashers, and cotter pins at time of reassembly.
(11) Remove burrs from gear teeth with fine-cut file.
(12) Remove residue and stain from bearing races with crocus cloth.

WARNING

Welding and brazing operations produce heat, toxic fumes, radiation, metal slag, and carbon particles. Welding and brazing goggles, gloves, apron or jacket, and welders boots are required to avoid injury or death.

(13) Welding and brazing processes may be used to repair cracks in external steel parts, such as brackets, panels, and light framework. Because of time required and chance of subsequent failure, such repairs should be attempted only when replacement parts are unavailable. Welding and brazing of castings and running parts or parts under great stress will be done only in emergencies.
(24) Replace broken, worn, or burned electrical wiring.
(25) Replace broken, frayed, crimped, or soft flexible hoses. Replace stripped or damaged fittings. Replace entire connected flexible hose if fittings are damaged. Hose clamps should not crimp hoses.

(16) Replace any screw, nut, or fitting with damaged threads. Inspect tapped holes for thread damage. If cross-threading is evident, retap hole for next oversize screw or stud. If retapping will weaken part, replace part.
(17) Reshape elongated mounting holes to round and drill to receive bushing with required inner diameter. Stake bushing in place with center punch.
(18) When installing studs, use proper driver. Before driving stud, inspect hole for chips. Blow out foreign matter, coat threads with a film of antiseize compound (Item 17, Appendix C), and start stud by hand.
(19) Remove protective grease coatings from new parts before installation.
(20) Lubricate all preformed packings with thin coat of oil (Item 47, Appendix C) before installation.
(21) To replace a preformed packing, stretch packing and place into position. Rotate component on flat surface and uniformly press packing into position.
(22) Remove all traces of old gasket and sealant before installing new gasket. During installation, coat both sides of gasket with adhesive-sealant (Item 6, Apendix C).
(23) When replacing coupling gaskets, lubricate with a thin coat of grease (Item 34, Appendix C) before installation.
(24) Coat oil seals evenly with oil (Item 47, Appendix C) or grease (Item 36, Appendix C) before installing. Install oil seals applying even force to outer edge of seal. If oil seals are to be installed over keys or splined shafts, use guide to prevent sharp edge of keyway or splines from cutting seal. Construct guides of very thin gage sheet metal and shape to required diameter. Make sure guide edges are not sharp and are bent slightly inward so they do not cut seal.
(25) Lubricate bearings before assembly with lubricant used in the related housing or container to provide first run-in protection until lubricant from the system can reach bearings.
(26) When mounting bearings on shafts, always apply force to inner races. When mounting bearings in housing, always apply force to outer race.
(27) Use suitable lifting device, jack, or other aid when lifting heavy components.

c. Follow these cleaning instructions when working on tanker components:

WARNING

- Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.
- Compressed air used for cleaning and drying purposes will be reduced to 30 psi (207 kPa) and used only with chip guarding and personal protection equipment to avoid injury.
- Eye protection is required during all grinding operations to avoid serious injury.

(1) Soak parts in solvent (Item 57, Appendix C), and wash away deposits by slushing or spraying. When necessary, brush with oval paint brush moistened in solvent. Use a jet of dry compressed air to dry parts, except bearings, after cleaning. Bearings must drip and air dry.
(2) Do not use wire brushes, abrasive wheels, or compounds to clean parts, unless specifically approved in the detailed instructions.
(3) Do not clean rubber parts in dry cleaning solvent. Wipe clean with a clean, dry, lint-free cloth.
(4) Electrical parts, such as coils, junction blocks, and switches, should not be soaked or sprayed with cleaning solutions. Clean these parts with clean lint-free cloth moistened with dry cleaning solvent.

22-2. GENERAL MAINTENANCE INSTRUCTIONS (CONT).

d. Follow these inspection instructions when working on the tanker and tanker components:

(1) Inspect all surfaces in contact with gaskets, coupling gaskets, packings, or seals for nicks, burrs, scratches or other damage, which might damage the new seal upon reassembly. If any defect is found, remove before assembly.

NOTE

Defects which may cause bearing binding or misalinement are cause for rejection.
Nicks or gouges outside race load area are not cause for rejection.

(2) Inspect bearings for rusted or pitted bearings, races, or separators. Inspect bearings and races for abrasion and serious discoloration.

(3) Cuts or grooves parallel to bearing or roller rotation and fatigue pits are causes for bearing rejection.

(4) Guidelines for rejection of gears by visual inspection are not listed because of varying conditions for gear application. The following descriptions of wear conditions may help determine when parts are defective.

(a) Initial pitting may occur when gears are first started in service. When pitting reduces local high spots so there is still enough contact area to carry load without further impairment, initial pitting is not serious.

(b) Destructive pitting continues to progress after initial pitting. If there is not enough contact area remaining to carry load, rapid destruction may occur from continued operation.

(c) Abrasive wear is surface damage caused by fine particles carried in lubricant or particles embedded in tooth surfaces. Particles can be metal, sand, or scale in the oil.

(5) Inspect all hose surfaces for damaged or deteriorated material. Check for breaks caused by sharp kinks or contact with other parts of vehicle. Inspect fitting threads for damage. Replace defective parts. After assembly and during initial vehicle operation period, check for leaks.

(6) Inspect wiring harnesses for chafed or burned insulation. Inspect all terminal connectors for loose connections and broken parts.

(7) Visually inspect all castings and weldments for cracks.

M978 Tanker Maintenance Procedures Instructions (Cont)

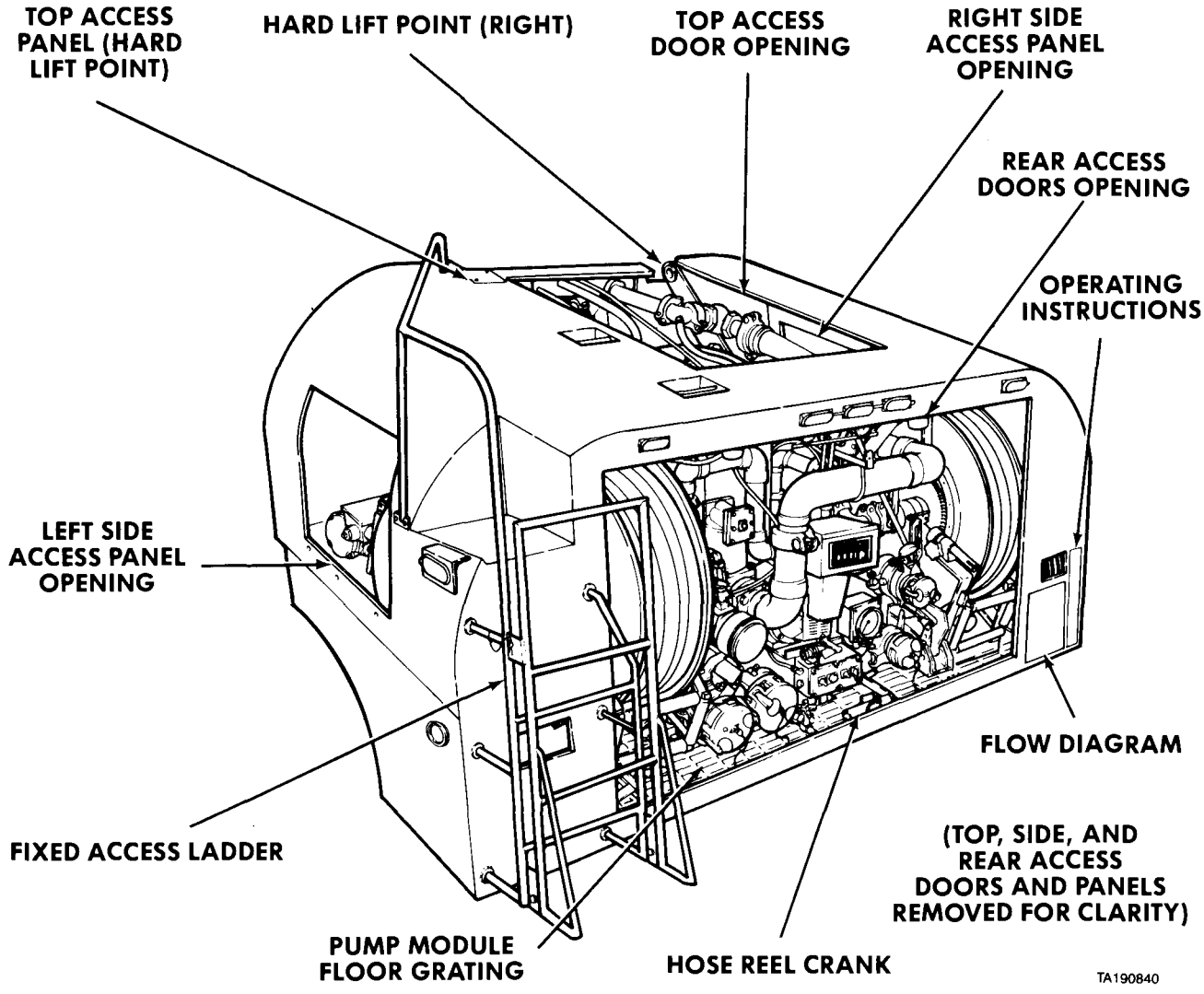


Figure 22-1. Tanker External Components.

22-2. GENERAL MAINTENANCE INSTRUCTIONS (CONT).

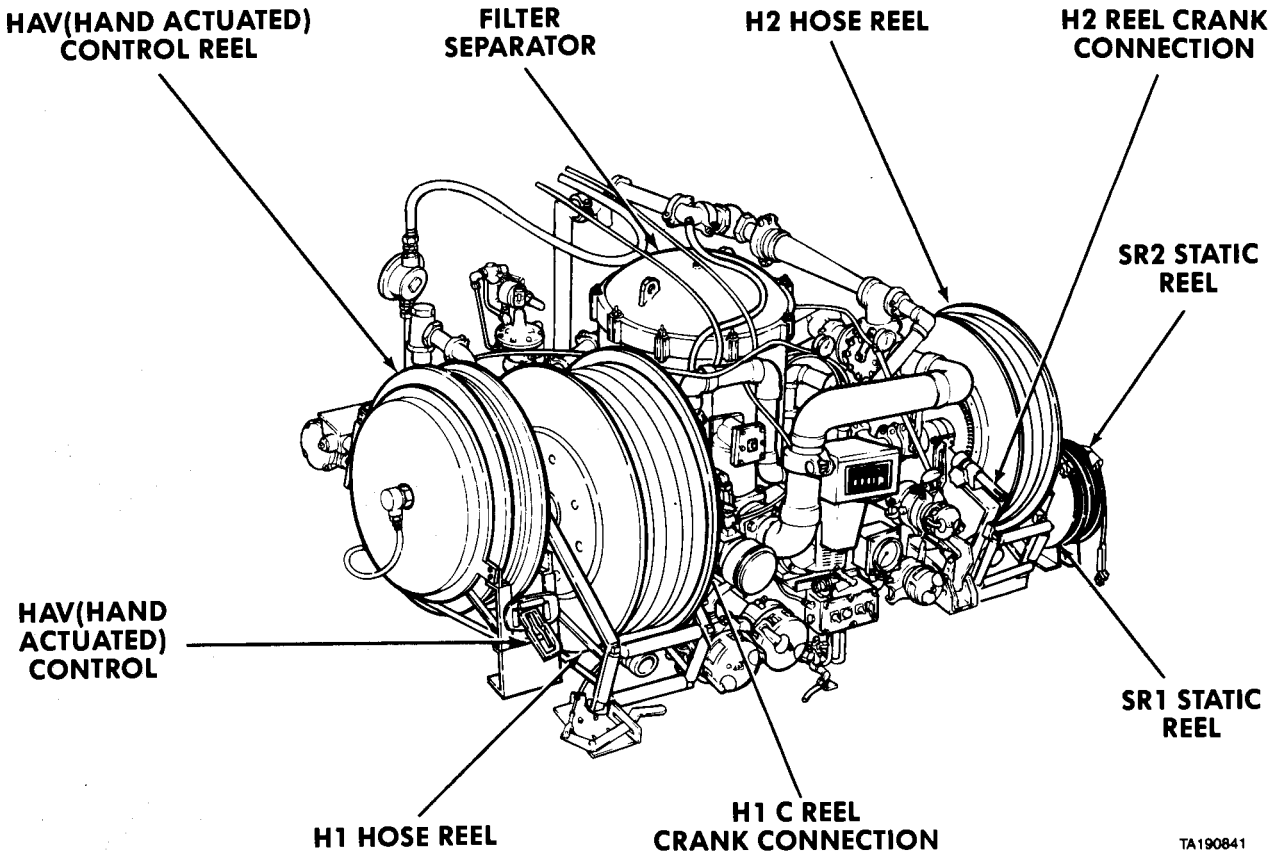


Figure 22-2. Tanker Filter and Manual Dispensing Components.

M978 Tanker Maintenance Procedures Instructions (Cont)

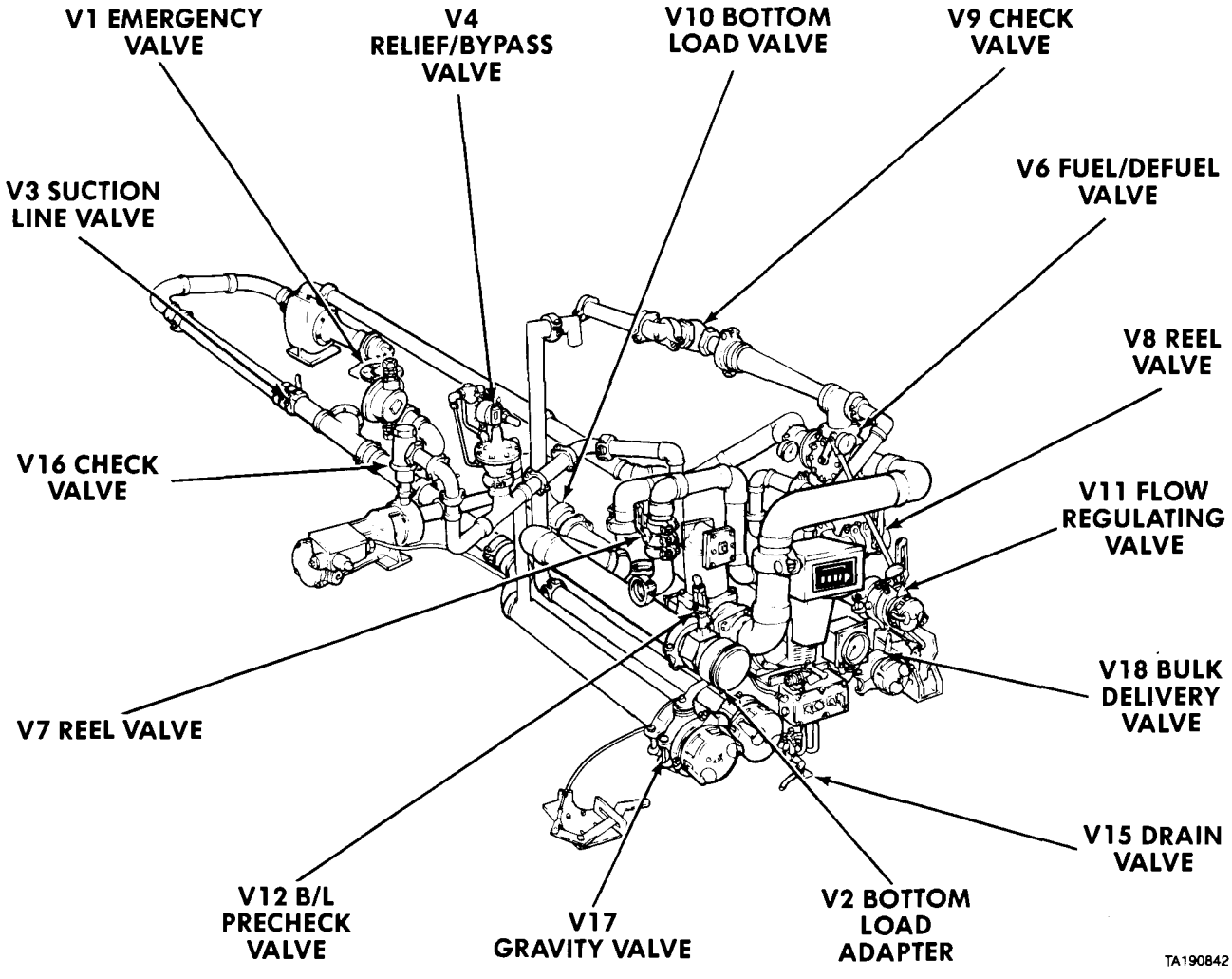


Figure 22-3. Tanker Dispensing Components-Valves.

22-2. GENERAL MAINTENANCE INSTRUCTIONS (CONT).

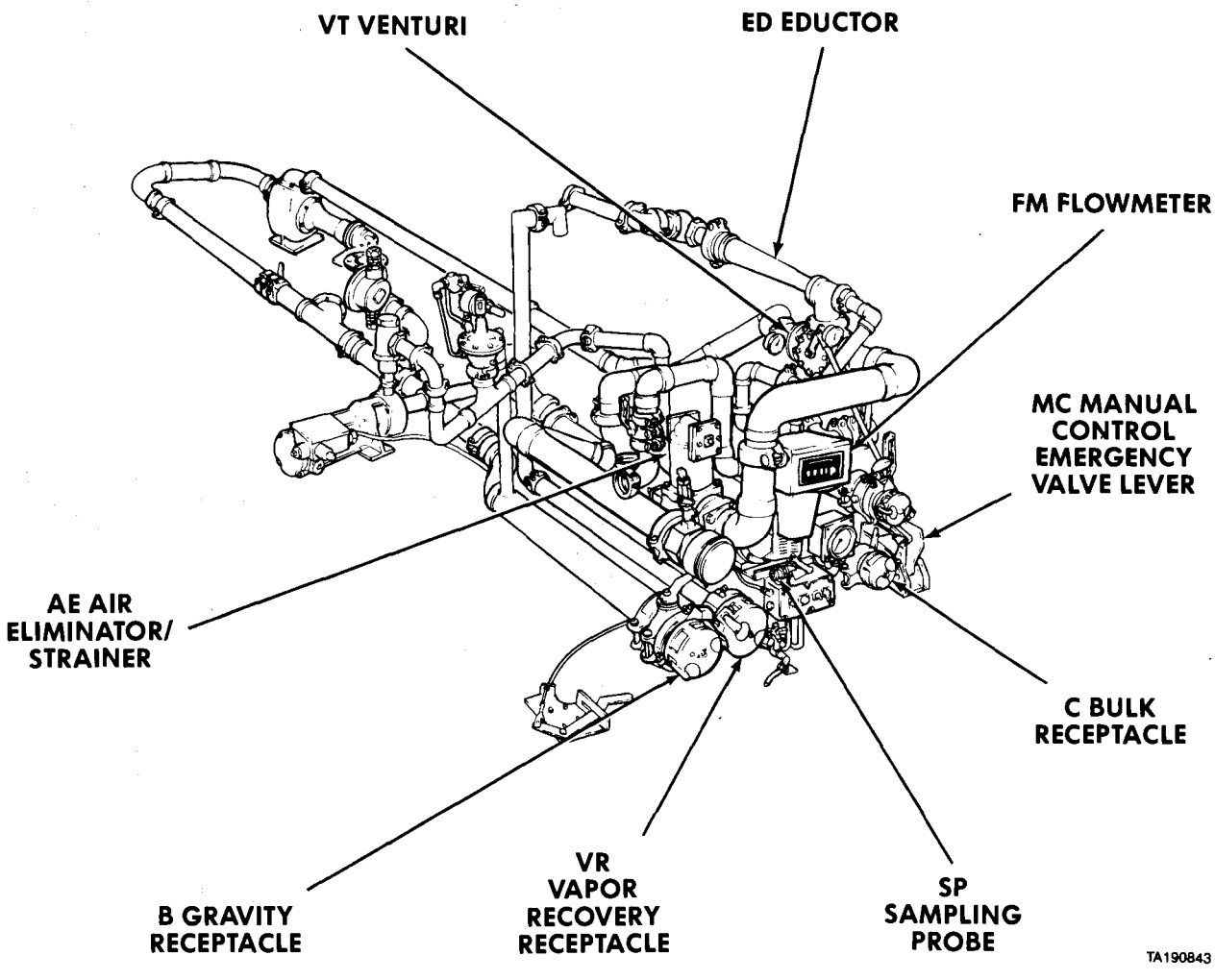


Figure 22-4. Tanker Loading and Unloading Components.

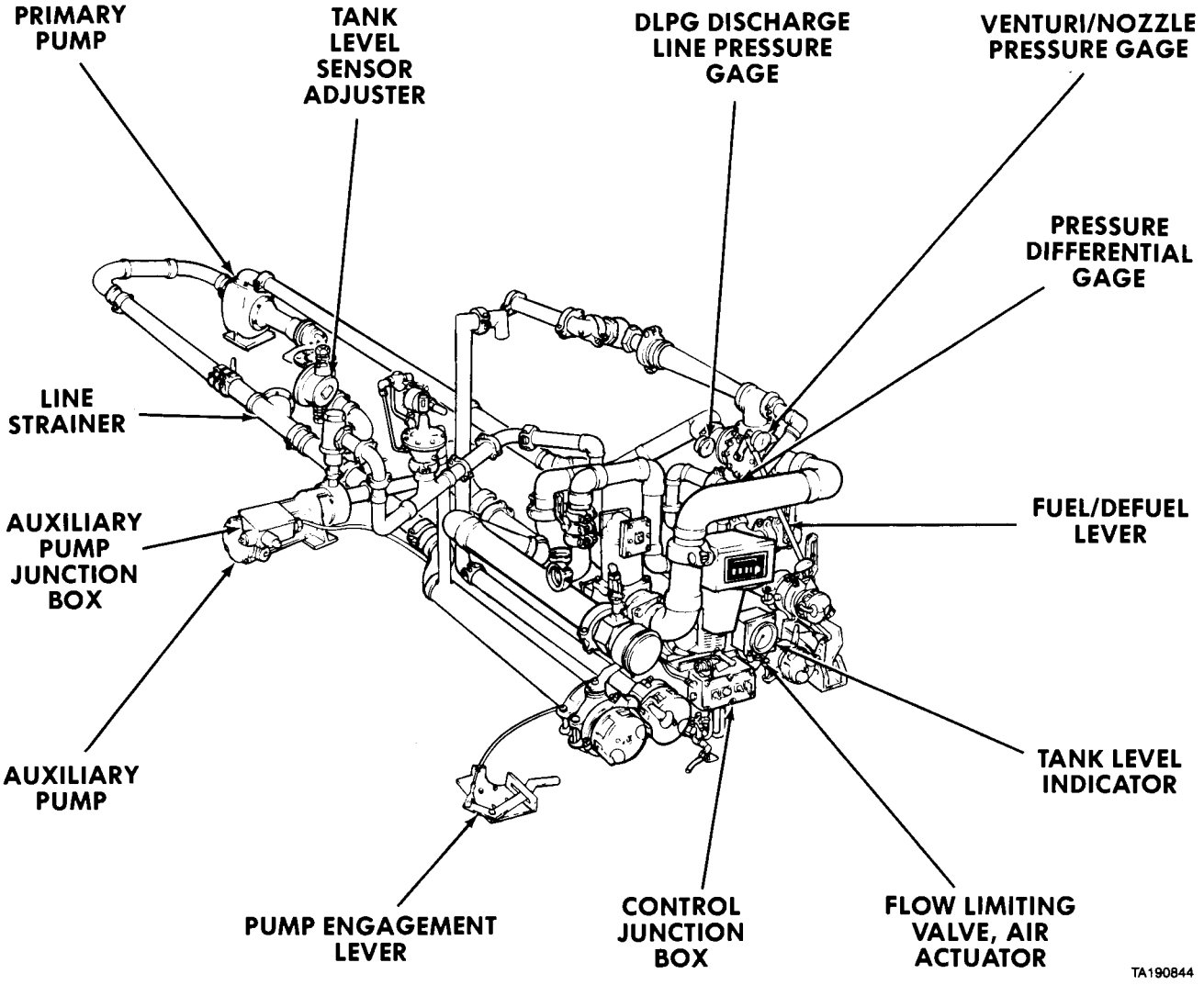


Figure 22-5. Tanker Gages, Air, and Electrical Components.

Section III. PUMP, PUMP MOTOR, AND AUXILIARY PUMP MAINTENANCE

22-3. PRIMARY PUMP HYDRAULIC MOTOR REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Grease, automotive and artillery, Item 34, Appendix C
Oil, lubricating, Item 46, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

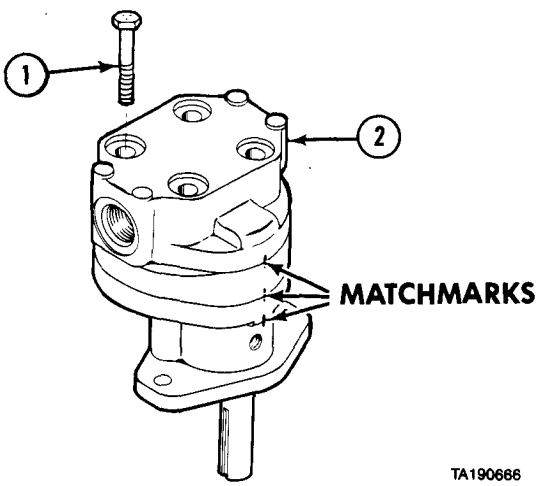
TM or Para	*Condition Description*
	Primary pump hydraulic motor on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects with 50 ft (15 m) of vehicle.

Level of Maintenance
General Support

a. Disassembly.

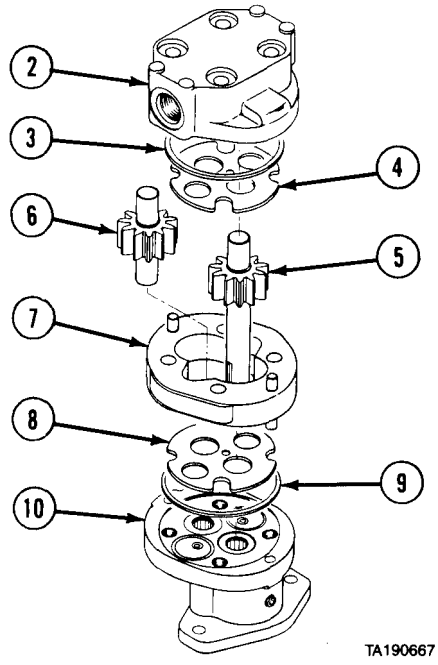


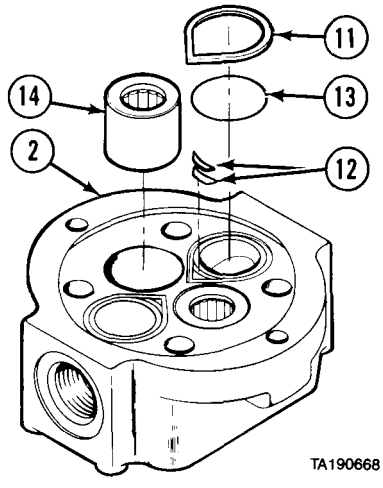
NOTE

Matchmark cover, gear housing, and adapter.

(1) Remove four screws (1) from cover (2).

(2) Remove cover (2), preformed packing (3), and wear plate (4).
(3) Mark positions and remove long shaft (5) and short shaft (6).
(4) Remove gear housing (7), wear plate (8), and preformed packing (9) from adapter (10).

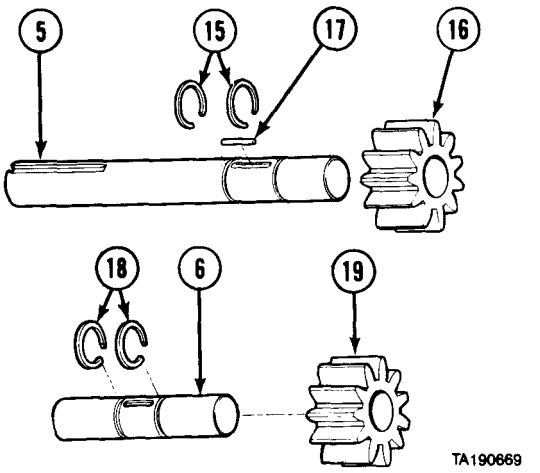




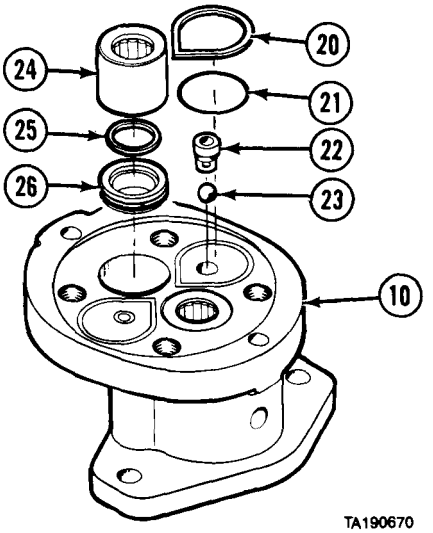
(5) Remove two packing retainers (11), four fiber strips (12), and two preformed packings (13) from cover (2).
(6) Remove two roller bearings (14).

22-3. PRIMARY PUMP HYDRAULIC MOTOR REPAIR (CONT).

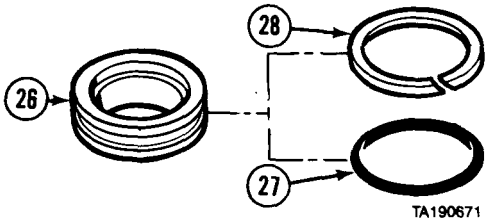
(7) Remove two retaining rings (15) and press gear (16) from long shaft (5). Remove key (17).
(8) Remove two retaining rings (18) and press gear (19) from short shaft (6).



(9) Remove two packing retainers (20) and preformed packings (21) from adapter (10).
(10) Remove two plugs (22) and balls (23).
(11) Remove two roller bearings (24).
(12) Remove fiber washer (25) and bushing (26).



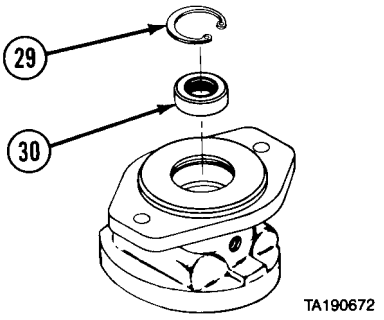
(13) Remove preformed packing (27) and backup ring (28) from bushing (26).



WARNING

Wear safety glasses while removing retaining rings to protect eyes from possible injury or blindness.

(14) Remove retaining ring (29) and seal (30).



b. Cleaning/Inspection.

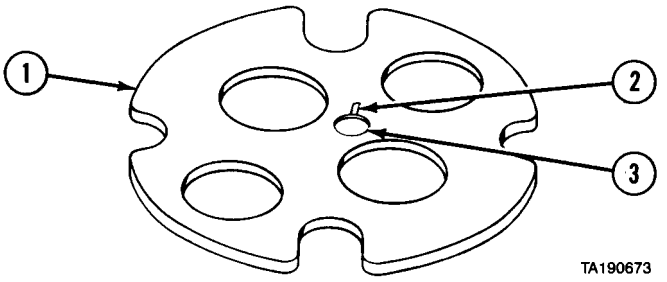
WARNING

- Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.
- Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

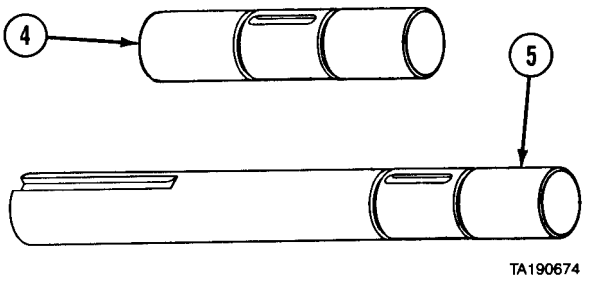
(1) Clean all parts in dry cleaning solvent. Dry all parts, except bearings, with compressed air. Bearings must be allowed to drip dry. Lubricate bearings with oil when dry.

(2) Inspect wear plate (1). Replace wear plate if wear path (2) is present in area of relief pocket (3) or if plate is scored or excessively worn below 0.112 in. (2.844 mm).

(3) Inspect adapter and cover for visible damage. Remove nicks and burrs.

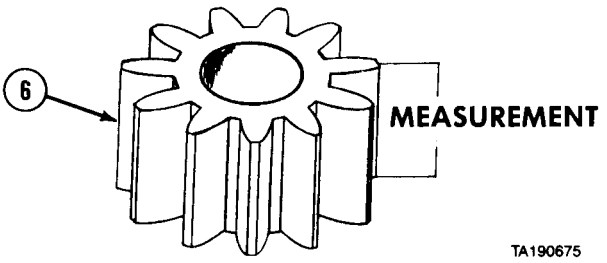


(4) Inspect shafts (4 and 5) at bearing points for rough surfaces and damage. Replace if damaged.



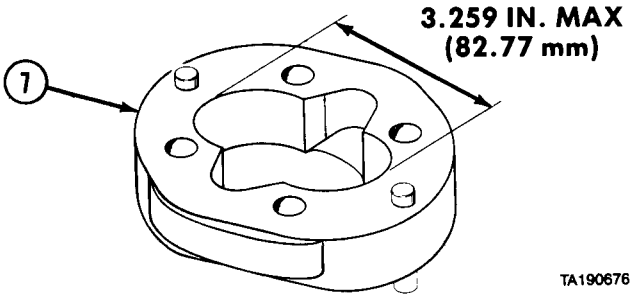
(5) Inspect edge of gear teeth and gear face (6) for scoring or chipped teeth. Replace if damaged.

(6) Measure thickness of gears across gear faces (6). Record measurement.



22-3. PRIMARY PUMP HYDRAULIC MOTOR REPAIR (CONT).

(7) Measure thickness of gear housing (7) and record measurement.
(8) Compare gear housing measurement and gear thickness measurement. If gear housing measurement is 0.0035 in. (0.088 mm) greater than gear thickness measurement, replace both gears.
(9) Measure distance across gear boxes of housing (7) along dowel pin center line. Replace housing (7) if measurement is greater than 3.259 in. (82.77 mm).

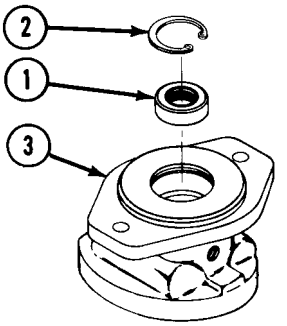


c. Assembly.

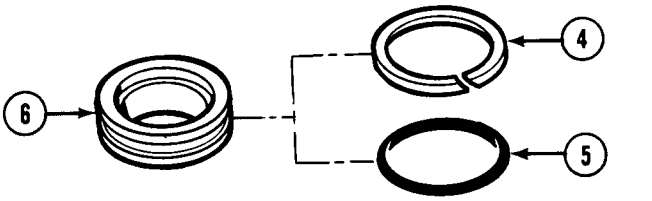
WARNING

Wear safety glasses while installing retaining rings to protect eyes from possible injury or blindness.

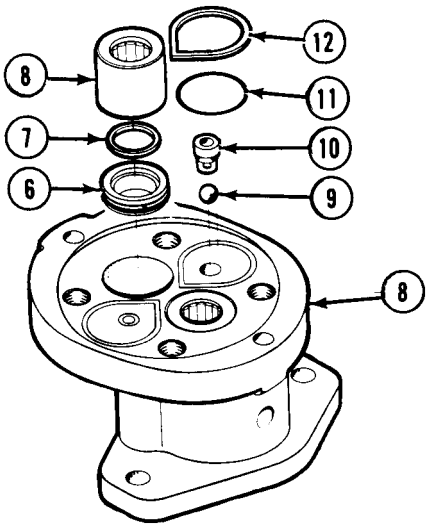
(1) Lubricate seal (1) with oil and install seal and retaining ring (2) in adapter (3).



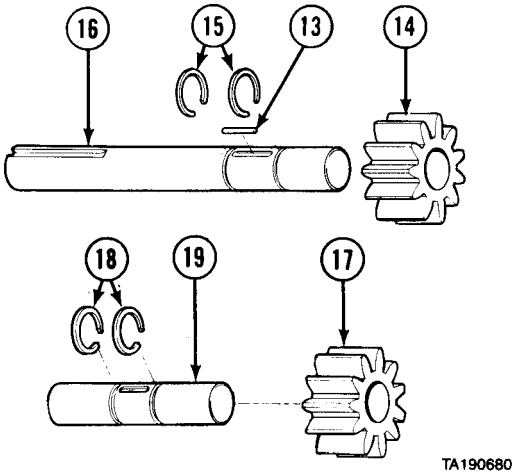
(2) Lubricate backup ring (4) with grease and install backup ring and preformed packing (5) on bushing (6).



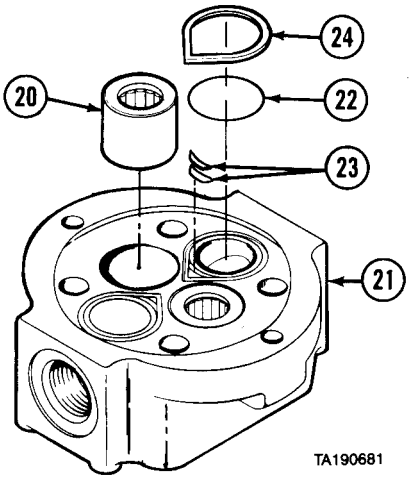
(3) Lubricate bushing (6) with grease and install fiber washer (7) and two roller bearings (8).
(4) Install two balls (9) and plugs (10).
(5) Lubricate two preformed packings (11) with grease and install preformed packings and packing retainers (12).



M978 Tanker Maintenance Procedures Instructions (Cont)

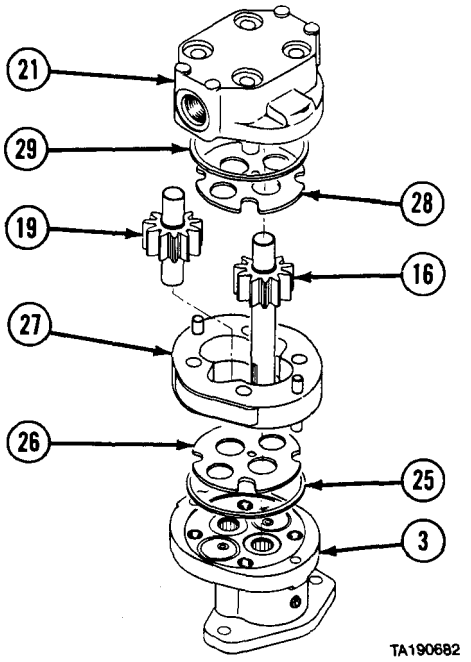


(6) Install key (13). Lubricate gear (14) with grease and install gear and two retaining rings (15) on long shaft (16).
(7) Lubricate gear (17) with grease and install gear and two retaining rings (18) on short shaft (19).



(8) Lubricate two roller bearings (20) with grease and install bearings in cover (21).
(9) Lubricate two preformed packings (22) with grease and install preformed packings, four fiber strips (23), and two packing retainers (24).

22-3. PRIMARY PUMP HYDRAULIC MOTOR REPAIR (CONT).



(10) Lubricate preformed packing (25) with grease and install on adapter (3).

NOTE

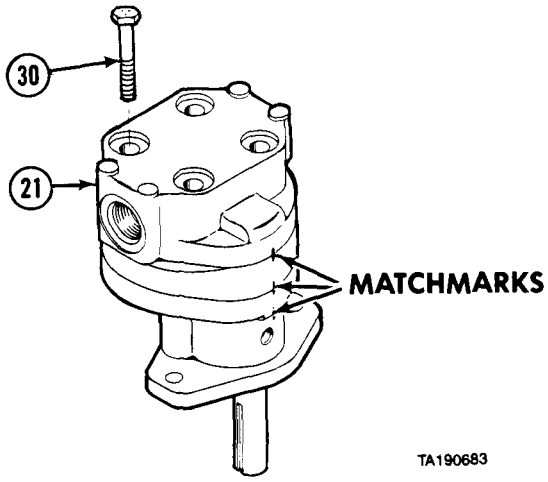
Wear plates must be installed with relief holes toward gears and 180° opposite each other for proper motor operation.

(11) Install wear plate (26) and gear housing (27) on adapter (3).
(12) Lubricate long shaft (16) and short shaft (19) with grease and install shafts as marked.
(13) Install wear plate (28).
(14) Lubricate preformed packing (29) with grease and install packing in cover (21).
(15) Position cover (21) on gear housing (27).

(16) Install four screws (30) in cover (21).

d. Follow-on Maintenance. None.

END OF TASK



22-4. PRIMARY PUMP REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 46, Appendix C
Solvent, drycleaning, Item 57, Appendix C
Adhesive-sealant, silicone, Item 6, Appendix C
Tags, identification, Item 60, Appendix C
Grease, general purpose, lithium base, Item 36, Appendix C
Stock, bar, metal, Item 59, Appendix C (2 required)

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	Primary pump removed and on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects within 50 ft (15 m) of vehicle.

Level of Maintenance
General Support

a. Disassembly.

NOTE

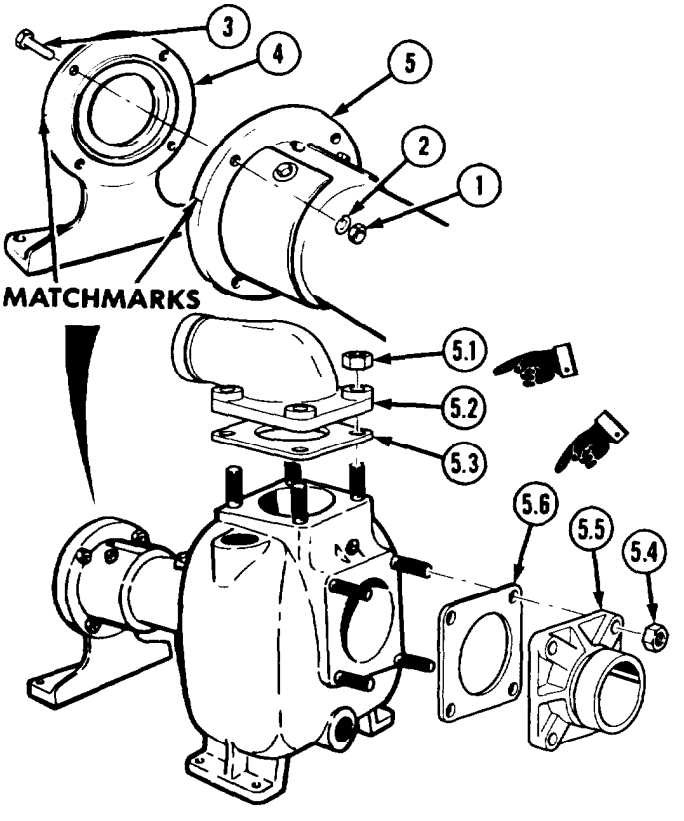
Mark position of support flange before removal.

(1) Remove four nuts (1), lockwashers (2), screws (3), and support flange (4) from intermediate housing (5).

NOTE

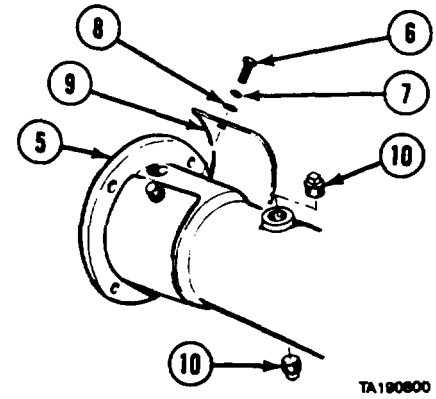
There are two models of primary pump. Model A does not include discharge elbow and suction flange. Model B is supplied with discharge elbow and suction flange installed. Skip steps (1.1) and (1.2) and continue to step (2) if repairing Model A pump. Do steps (1.1) and (1.2) if repairing Model B pump.

(1.1) Remove four nuts (5.1), discharge elbow (5.2), and gasket (5.3).
(1.2) Remove four nuts (5.4), suction flange (5.5), and gasket (5.6).

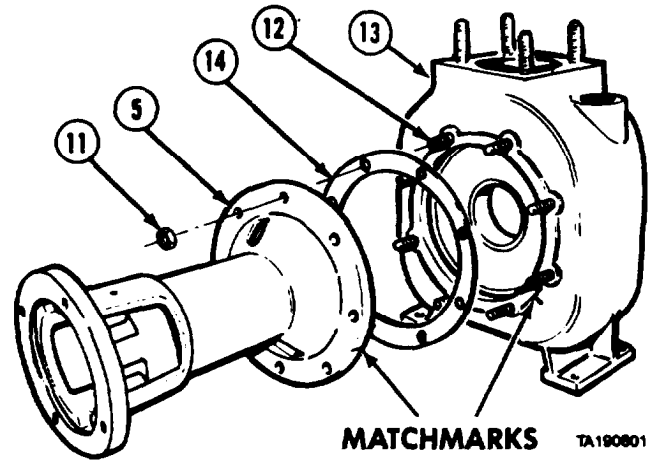


22-4. PRIMARY PUMP REPAIR (CONT).

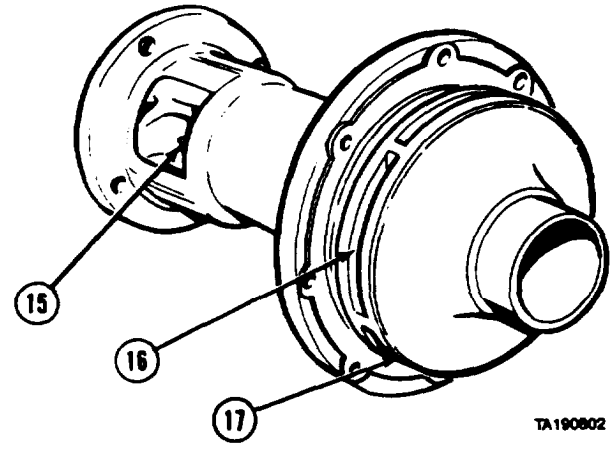
(2) Remove four screws (6) lockwashers (7) washers (8), and two coupling covers (9) from intermediate housing (5).
(3) Remove two pipe plugs (10) from intermediate housing (5).



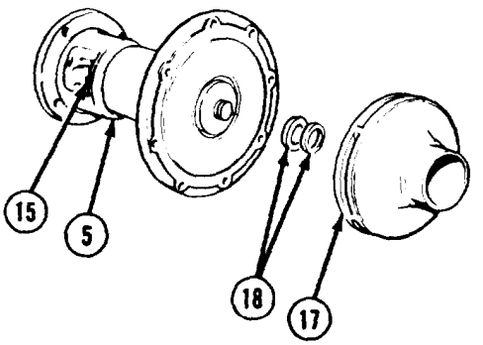
(4) Remove eight nuts (11) from studs (12).
(5) Matchmark and remove intermediate housing (5) from volute casing (13).
(6) Remove gasket (14).



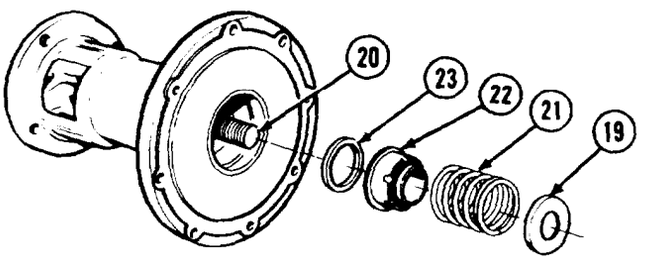
(7) Place steel bar through coupling half (15). Place other bar in between impeller vanes (16) as deep as possible.
(8) Hold coupling half (15) to keep it from turning and strike end of steel bar between impeller vanes (16) to turn impeller (17) counterclockwise.
(9) When impeller (17) loosens, remove steel bar from between impeller vanes (16).



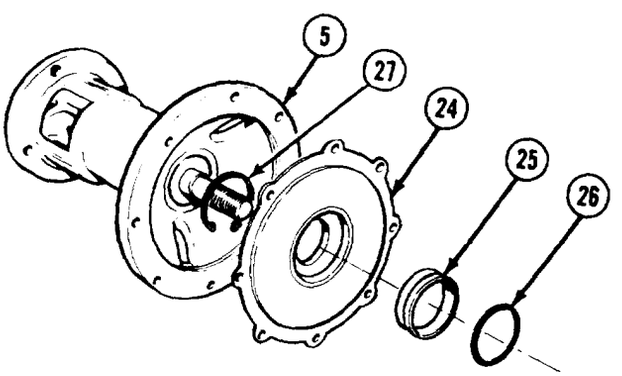
(10) Hold coupling half (15) to keep from turning and remove impeller (17) and shims (18) from intermediate housing (5). Record number and thickness of shims.
(11) Remove steel bar from coupling half (15).



(12) Remove spring centering washer (19) from impeller shaft (20).
(13) Remove spring (21).
(14) Remove shaft seal (22) and carbon seal (23).



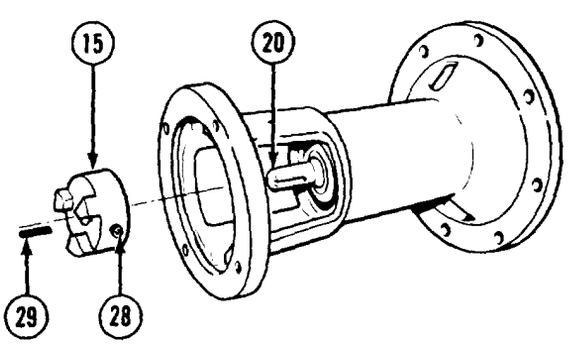
(15) Remove seal plate (24) from intermediate housing (5).
(16) Remove stationary seal (25) from seal plate (24).
(17) Remove preformed packing (26) from stationary seal (25).



WARNING

Wear safety glasses while removing retaining rings to protect eyes from possible injury or blindness.

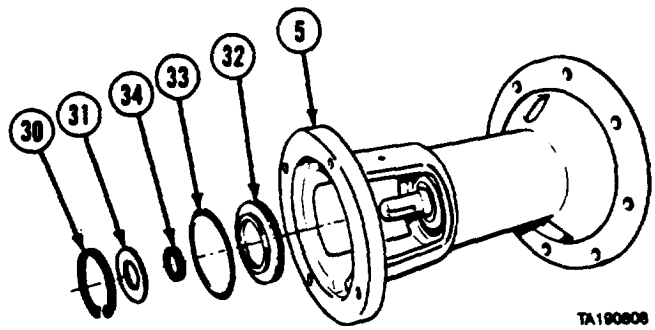
(18) Remove retaining ring (27) from intermediate housing (5).
(19) Loosen setscrew (28) in coupling half (15).
(20) Remove coupling half (15) and key (29) from impeller shaft (20).



22-4. PRIMARY PUMP REPAIR (CONT).

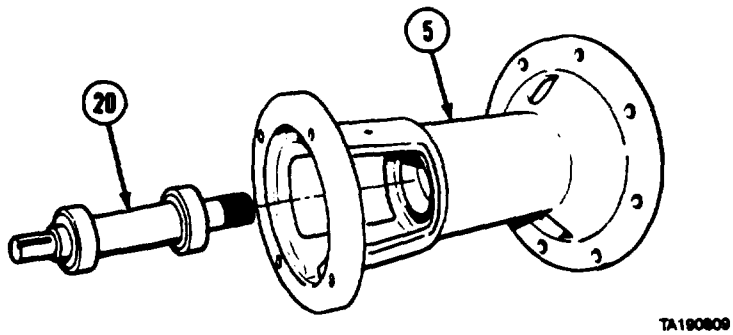
WARNING

Wear safety glasses while removing retaining rings to protect eyes from injury or blindness.

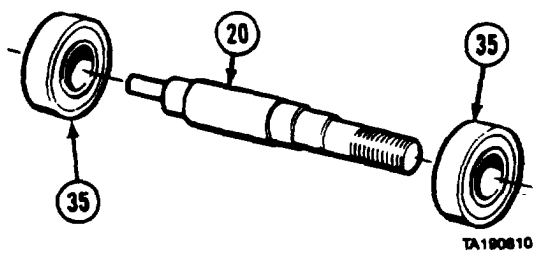


(21) Remove retaining ring (30) from intermediate housing (6).
(22) Remove shims (31). Record number and thickness of shims.
(23) Remove bearing retainer (32).
(24) Remove preformed packing (33) from bearing retainer (32).
(25) Remove oil seal (34) from bearing retainer (32).

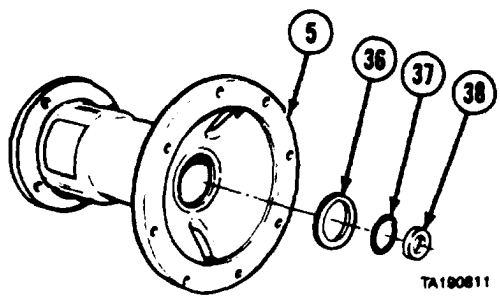
(26) Remove impeller shaft (20) from intermediate housing (5).



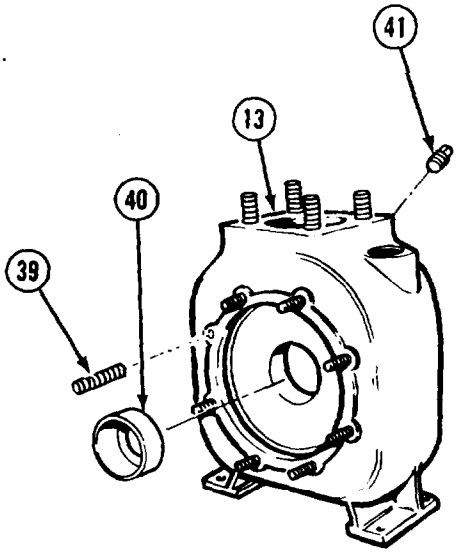
(27) Remove two bearings (35) from impeller shaft (20).



(28) Remove bearing retainer (36) from impeller side of intermediate housing (6).
(29) Remove preformed packing (37) from bearing retainer (36).
(30) Remove oil seal (38) from bearing retainer (36).



(31) Remove eight studs (39) from volute casing (13).
(32) Remove wear ring (40).
(33) Remove pipe plug (41).



b. Cleaning/Inspection.

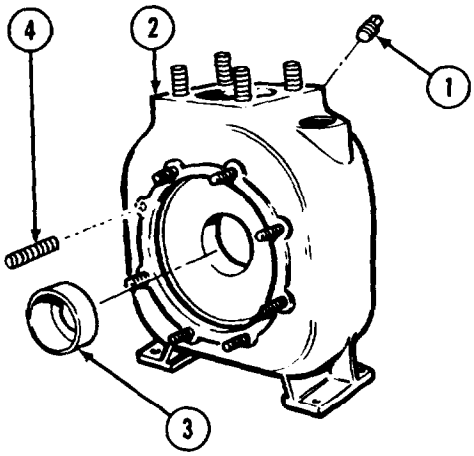
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in drycleaning solvent.
(2) Inspect seal assembly and shaft sleeve for nicks, cuts, and other visible damage.
(3) Inspect impeller vanes, seal plate, intermediate housing, coupling halves, and inside of volute casing for pitting, scratches, burrs, nicks, cracks, and other visible damage.
(4) Inspect bearings for pitting, cracks, scoring, and other visible damage.
(5) Inspect impeller shaft, bearing retainers, shims, and machined surfaces for pitting, cracks, nicks, burrs, grooves, and other visible damage.
(5.1) Inspect impeller shaft sleeve for grooves, nicks, pitting and other damage. Replace if necessary.
(6) Measure inside diameter of wear ring and outside diameter of impeller where they mate. Difference should be 0.010-in. (0.254 mm), or less.
(7) Inspect coupling halves for nicks, cracks, and other visible damage to metal and rubber parts.
(8) Inspect seal spring for kinks, cracks, and other visible damage.
(9) Inspect wear ring and stationary seal for nicks, scratches, burrs, and other visible damage.
(10) Replace all damaged and worn parts.

c. Assembly.

(1) Install pipe plug (1) in volute casing (2).
(2) Install wear ring (3).
(3) Install eight studs (4).

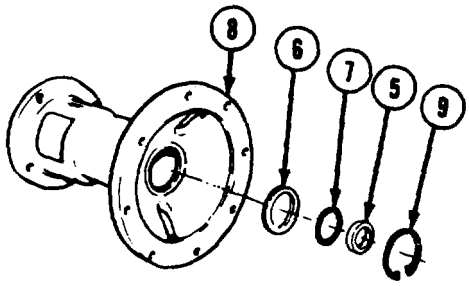


22-4. PRIMARY PUMP REPAIR (CONT).

WARNING

Seals and gaskets must not be reused. Used pump seals and gaskets can leak and cause hazardous operating conditions.

(4) Install oil seal (6) in bearing retainer (6).
(5) Install packing (7) on bearing retainer (6).
(6) Install bearing retainer (6) in impeller side of intermediate housing (8).
(7) Lubricate surface of oil seal (6) with oil.



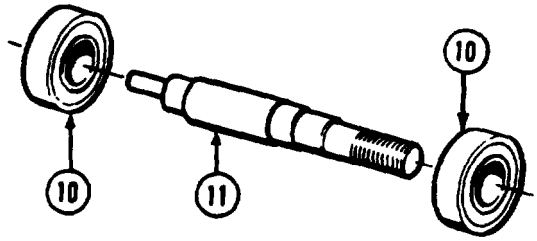
TA190814

WARNING

Wear safety glasses while installing retaining rings to protect eyes from injury or blindness.

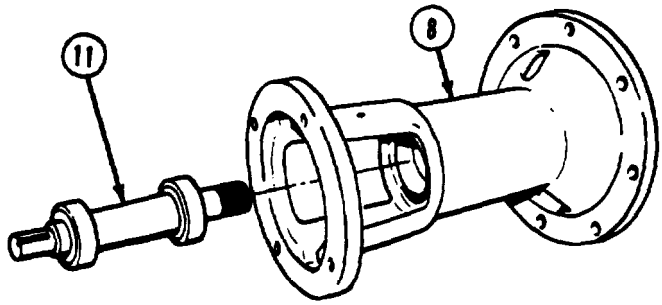
(8) Install retaining ring (9).

(9) Install two bearings (10) on impeller shaft (11).



TA190815

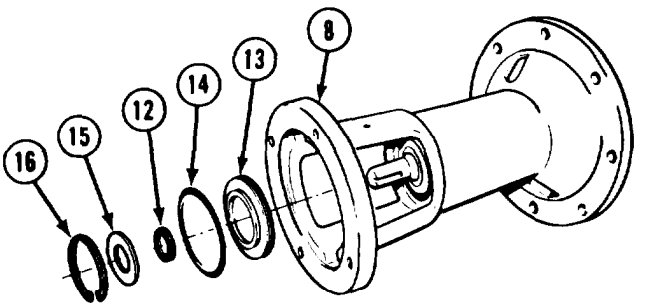
(10) Install impeller shaft (11) in intermediate housing (8).
(11) Make sure impeller shaft (11) is fully seated.



TA190816

M978 Tanker Maintenance Procedures Instructions (Cont)

(12) Install oil seal (12) in bearing retainer (13).
(13) Install preformed packing (14) on bearing retainer (13).
(14) Lubricate surface of oil seal (12) with oil.
(15) Install bearing retainer (13) in coupling end of intermediate housing (8).
(16) Install same number and thickness of shims (15) as removed.



WARNING

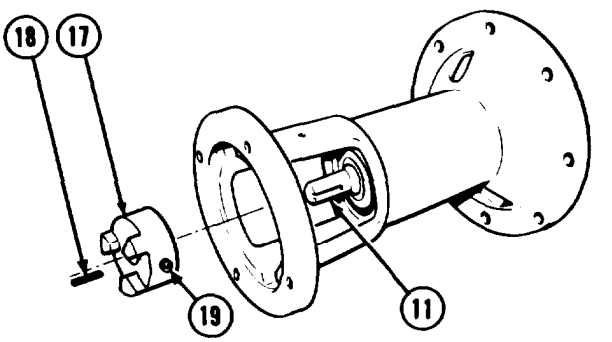
Wear safety glasses while installing retaining rings to protect eyes from injury or blindness.

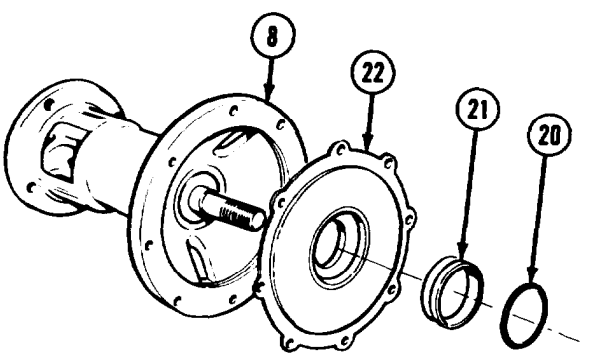
(17) Install retaining ring (16).

NOTE

Front coupling half has no rubber damper.

(18) Install front coupling half (17) on impeller shaft (11).
(19) Install key (18).
(20) Tighten setscrew (19).
(21) Install preformed packing (20) on stationary seal (21).
(22) Install stationary seal (21) in seal plate (22).
(23) Aline and install seal plate (22) on intermediate housing (8).

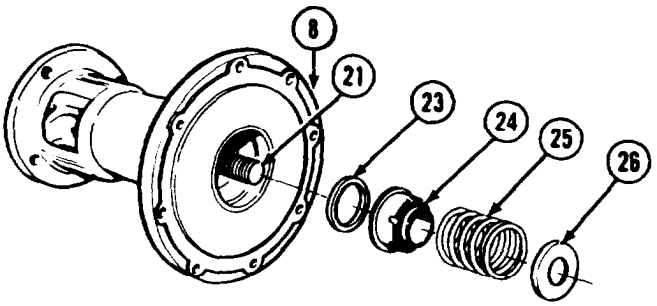




22-4. PRIMARY PUMP REPAIR (CONT).

CAUTION

Handle carbon seal by edge only. Fingerprint or contamination on sealing surface will cause pump malfunction.



(24) Apply a few drops of grease to carbon seal (23) to hold it in place during assembly.

(25) Install carbon seal (23) in shaft seal (24).

WARNING

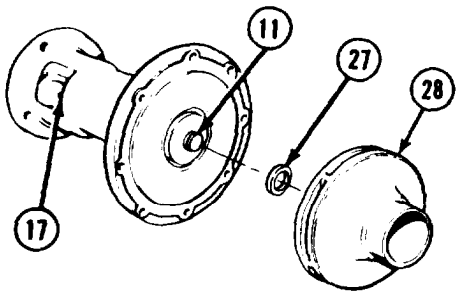
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(26) Wipe sealing surfaces of stationary seal (21) and carbon seal (23) with dry cleaning solvent.

(27) Install shaft seal (24), spring (25), and spring centering washer (26) in intermediate housing (8).

NOTE

Pump is shimmed for maximum efficiency. Be sure to install same number and thickness of shims as in removal.



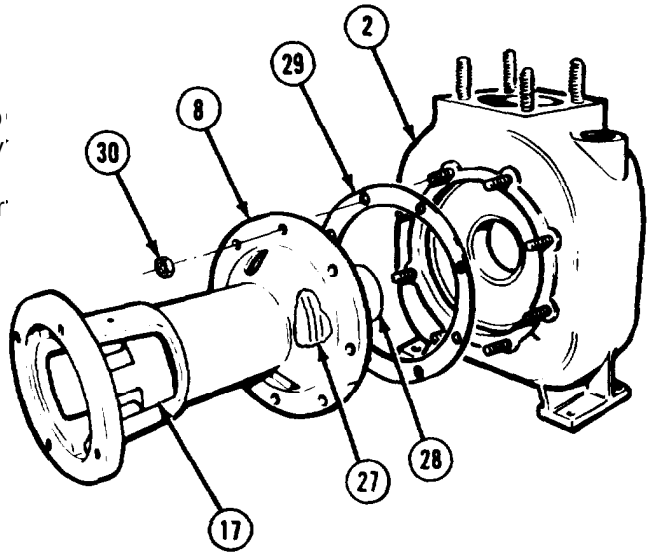
(28) Install same number and thickness of shims (27) as removed.

(29) Install impeller (28).

(30) Hold coupling half (17) so it does not turn, and tighten impeller (28) handtight on impeller shaft (11).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water,



(31) Apply silicone adhesive-sealant and install gasket (29) on volute casing (2).

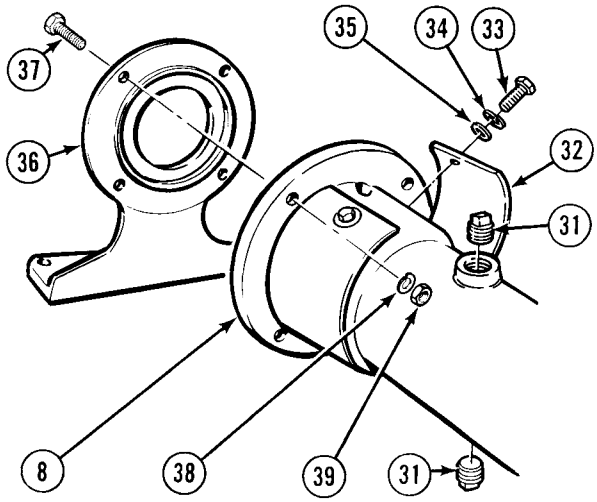
(32) Install intermediate housing (8) with eight nuts (30). Tighten nuts to 40 lb-ft (54 N•m).

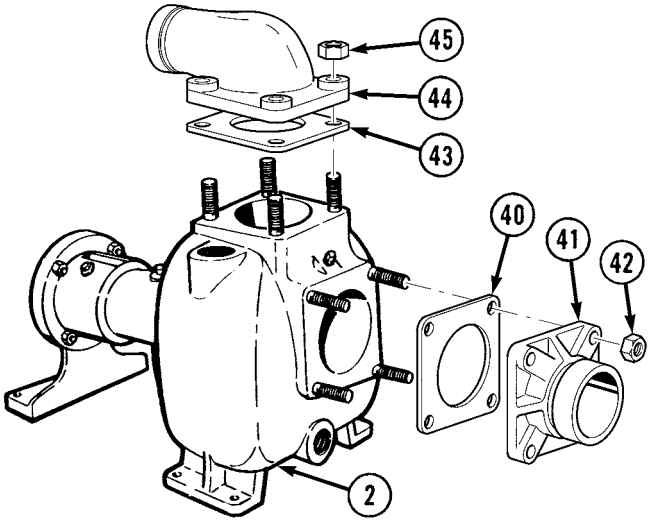
(33) Turn coupling shaft (17) by hand to check that impeller (28) turns freely. If impeller does not turn freely, remove intermediate housing (8), impeller (28), and one impeller shim (27). Go back to step *(29)* and continue,

(34) Install two pipe plugs (31) in intermediate housing (8).

(35) Install two coupling covers (32) on intermediate housing (8) with four screws (33), lockwashers (34), and washers (35).

(36) Install support flange (36) on intermediate housing (8) with four screws (37), lockwashers (38), and nuts (39). Tighten nuts to 18 lb-ft (24 N•m).





WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

NOTE

There are two models of primary pump. Model A does not include discharge elbow and suction flange. If repairing Model B pump, discharge elbow and suction flange must be installed. Do steps *(37)* through *(40)* for Model B only.

(37) Apply silicone adhesive-sealant and install gasket (40) on volute casing (2).

(38) Install suction flange (41) with four nuts (42). Tighten nuts to 34 lb-ft (46 N•m).

(39) Apply silicone adhesive-sealant and install gasket (43) on volute casing (2).

(40) Install discharge elbow (44) with four nuts (45). Tighten nuts to 34 lb-ft (46 N•m).

d. Follow-on Maintenance.

(1) Install primary pump (TM 9-2320-279-20).

(2) Adjust fuel flowmeter (para 22-7.1).

END OF TASK

22-5. AUXILIARY PUMP REPAIR.

This task covers:

a, Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 46, Appendix C
Solvent, drycleaning, Item 57, Appendix C
Adhesive-sealant, silicone, Item 6, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Grease, general purpose, lithium base, Item 36, Appendix C
Compound, sealing and thread locking, Item 25, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer
MOS 63G, Fuel and electrical systems repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	AUXILIARY PUMP on clear work surface.

Special Environmental Conditions
None

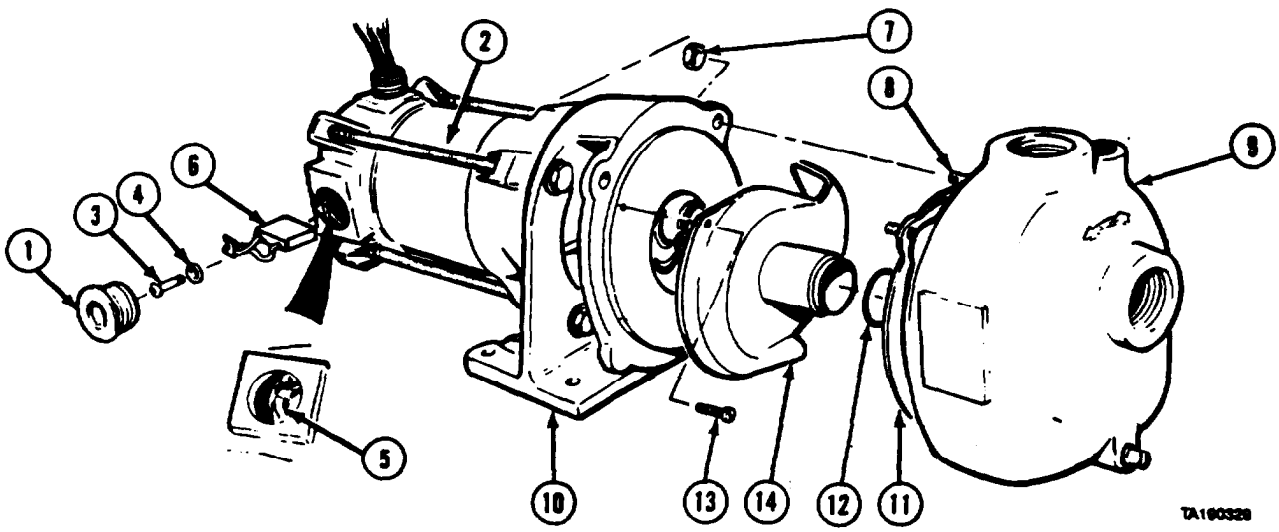
General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects within 50 ft (15 m) of vehicle.

Level of Maintenance
General Support

M978 Tanker Maintenance Procedures Instructions (Cont)

22-5. AUXILIARY PUMP REPAIR (CONT).

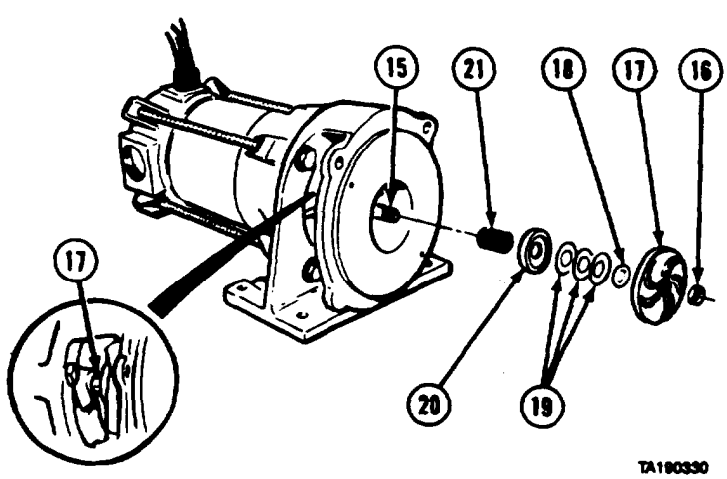
a. Disassembly.



(1) Remove access plug (1) from each side of motor (2).
(2) Remove screw (3) and washer (4) from each side of motor (2).
(3) Hold spring (6) out of way and remove brush (6).
(4) Remove four nuts (7) from studs (8).
(5) Separate pump housing (9) from pedestal (10).
(6) Remove gasket (11) and preformed packing (12).
(7) Remove two screws (13) and vane plate (14) from pedestal (10).

NOTE

Seal is provided as a kit. Kit consists of: spring seat, spring, shaft seal, carbon seal, and stationary seal. Seal spring tension is released when impeller is removed.



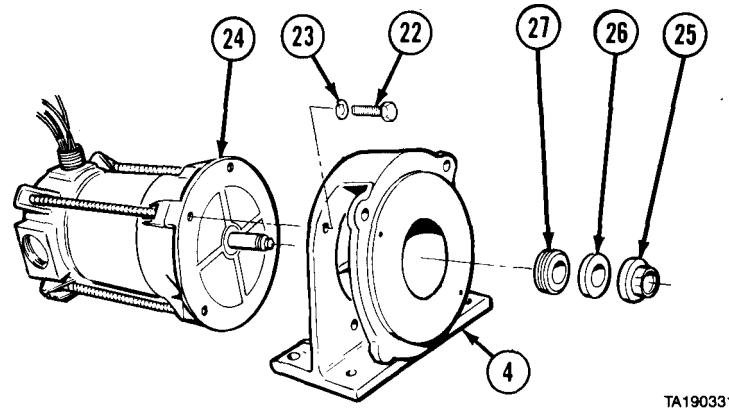
(8) Hold impeller shaft (16) and remove jamnut (16) and impeller (17).

NOTE

- Tag and mark shims.
- Number of shims will vary from pump to pump.

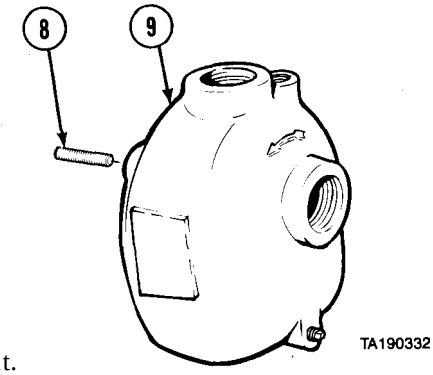
(9) Remove washer (18) and shims (19).
(10) Remove spring seat (20) and spring (21).

(11) Remove four screws (22) and lockwashers (23).
(12) Remove pedestal (4) from motor (24).
(13) Remove shaft seal (25), carbon seal (26), and stationary seal (27).



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(14) Remove four studs (8) from pump housing (9).



TA190332

b. Cleaning/Inspection.

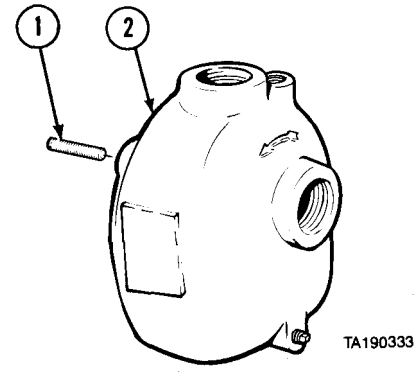
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts, except pump motor, in dry cleaning solvent.
(2) Inspect outside of pump housing for cracks, dents, and breaks.
(3) Inspect impeller, vane plate, and inside of pump housing for visible wear, pitting, scratches, burrs, nicks, cracks, and other visible damage.
(4) Inspect impeller shaft for excessive wear, pitting, cracks, nicks, burrs, grooves, damaged threads, and other visible damage.
(5) Inspect seal spring for kinks, cracks, and other visible damage.
(6) Inspect all threaded parts for damage.
(7) Replace all damaged and visibly worn parts.

c. Assembly.

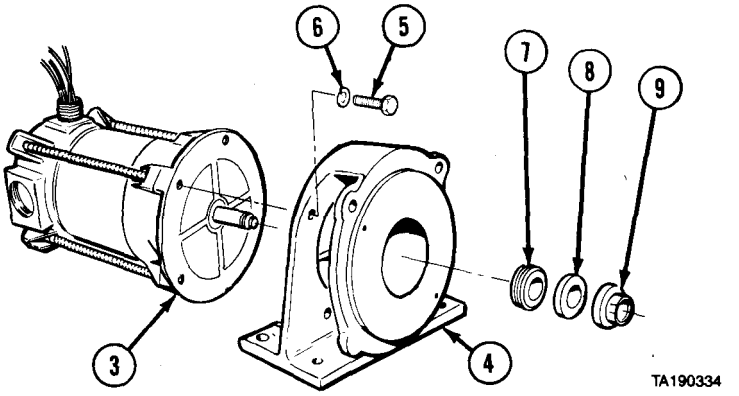
(1) Install four studs (1) in pump housing (2).



TA190333

22-5. AUXILIARY PUMP REPAIR (CONT).

(2) Install motor (3) on pedestal (4) with four screws (5) and lockwashers (6).



CAUTION

Handle stationary seal and carbon ring by sides only. Fingerprints or contamination on face of seals will cause pump malfunction.

NOTE

Seal is provided as a kit. Kit consists of: spring seat, spring, shaft seal, carbon seal, and stationary seal.

(3) Lubricate edge of stationary seal (7) with oil and install.
(4) Apply small amount of grease to front of carbon seal (8) and place in shaft seal (9).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, car give off harmful vapors, and are harmful to skin-and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

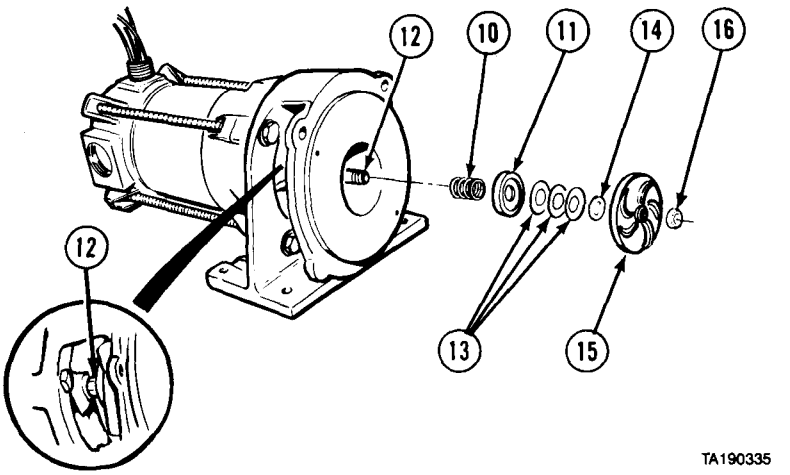
(5) Wipe sealing surfaces of stationary seal (7) and carbon seal (8) with dry cleaning solvent and install shaft seal (9).

(6) Install spring (10) and spring seat (11) on impeller shaft (12).

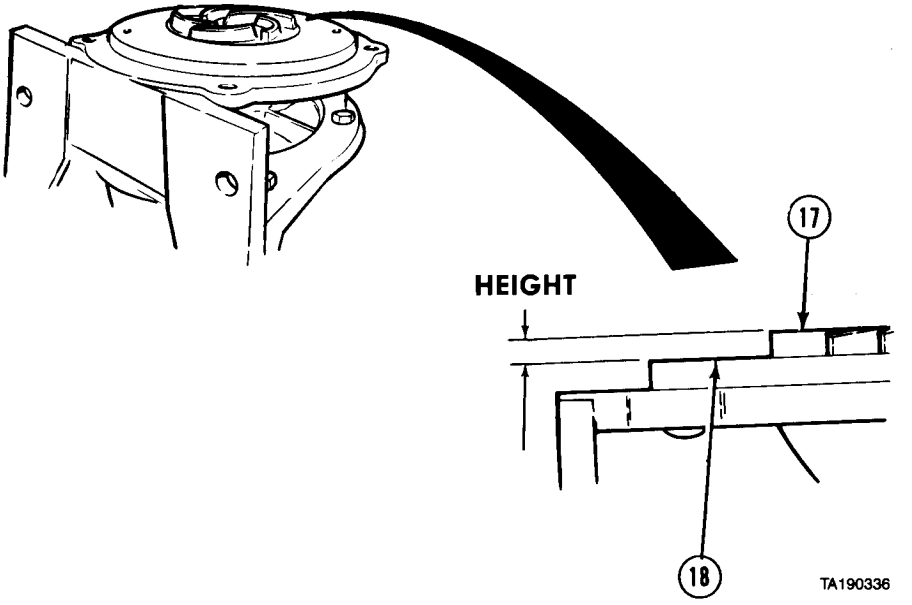
NOTE

Number of shims will vary from pump to pump.

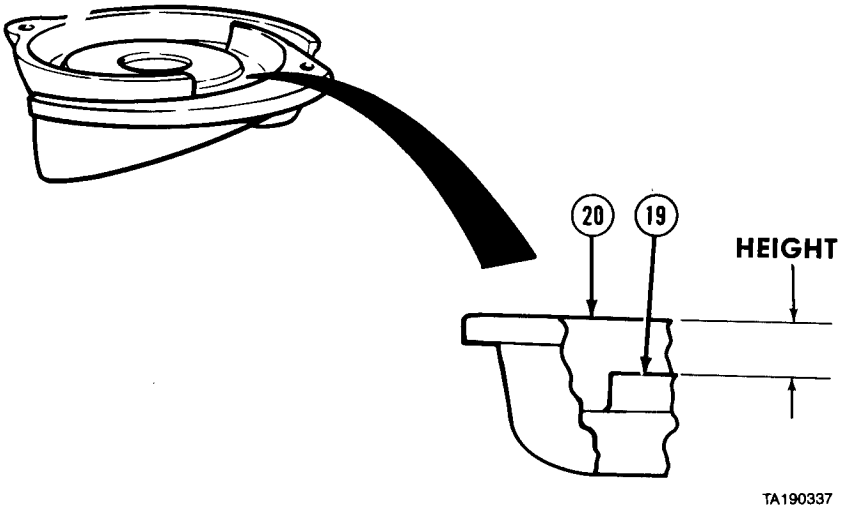
(7) Install shims (13) and washer (14).
(8) Hold impeller shaft (12) and install impeller (15).
(9) Apply sealing and thread locking compound to threads of jamnut (16) and install.



M978 Tanker Maintenance Procedures Instructions (Cont)

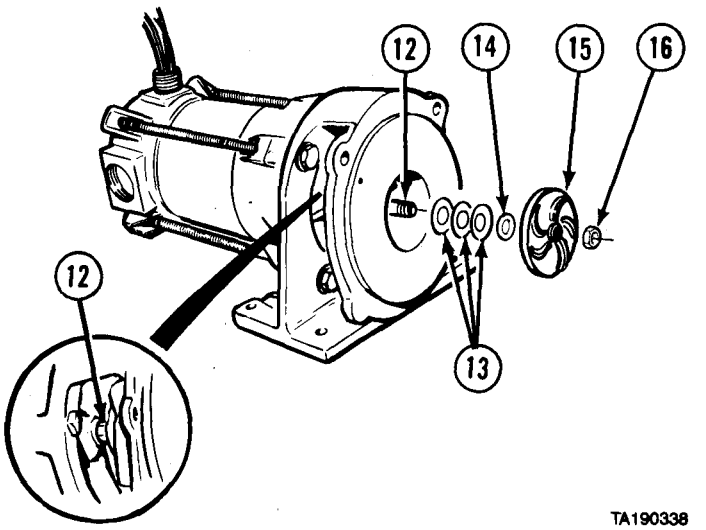


(10) Measure and record distance between height of impeller vanes (17) and plate (18).



(11) Measure and record distance between height of vane plate (19) and housing surface (20).
(12) Subtract the smaller number from the larger number recorded, difference should be between 0.005-in. to 0.008-in. (0.127 to 0.203 mm). If clearance is correct go to step *(21)*. If not continue with step *(13)*.

22-5. AUXILIARY PUMP REPAIR (CONT).



(13) Hold impeller shaft (12) and remove jamnut (16).

NOTE

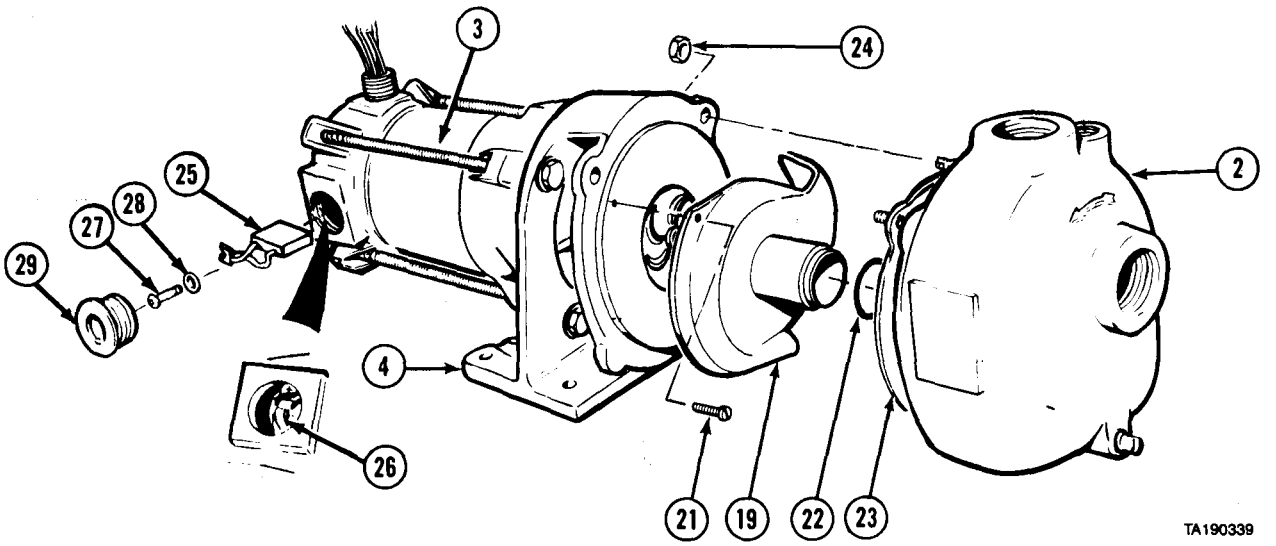
Seal spring tension is released as impeller is removed.

(14) Hold impeller shaft (12) to keep from turning and remove impeller (15).
(15) Remove washer (14).

NOTE

- If difference in clearance was under 0.005-in. (0.127 mm) remove shims as required.
- If difference in clearance was over 0.008-in. (0.203 mm) add shims as required.

(16) Add or remove shims (13).
(17) Install washer (14).
(18) Hold impeller shaft (12) and install impeller (15).
(19) Apply sealing and thread locking compound to threads of jamnut (16) and install.
(20) Repeat steps *(10)* through *(12).*



(21) Apply silicone adhesive-sealant to mating surface of vane plate (19).
(22) Install vane plate (19) on pedestal (4) with two screws (21).
(23) Install preformed packing (22) in groove.
(24) Install gasket (23) and pump housing (2) on pedestal (4) with four nuts (24).
(25) Install brush (25) in each side of motor (3).
(26) Position spring (26) over each brush (25).
(27) Install screw (27) and washer (28) on each side of motor (3).
(28) Install access plug (29) in each side of motor (3).

d. Follow-on Maintenance. None.

END OF TASK

Section IV. FLOWMETER MAINTENANCE

22-6. FLOWMETER REGISTER REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Lockwire, Item 39, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	Flowmeter register knob removed.

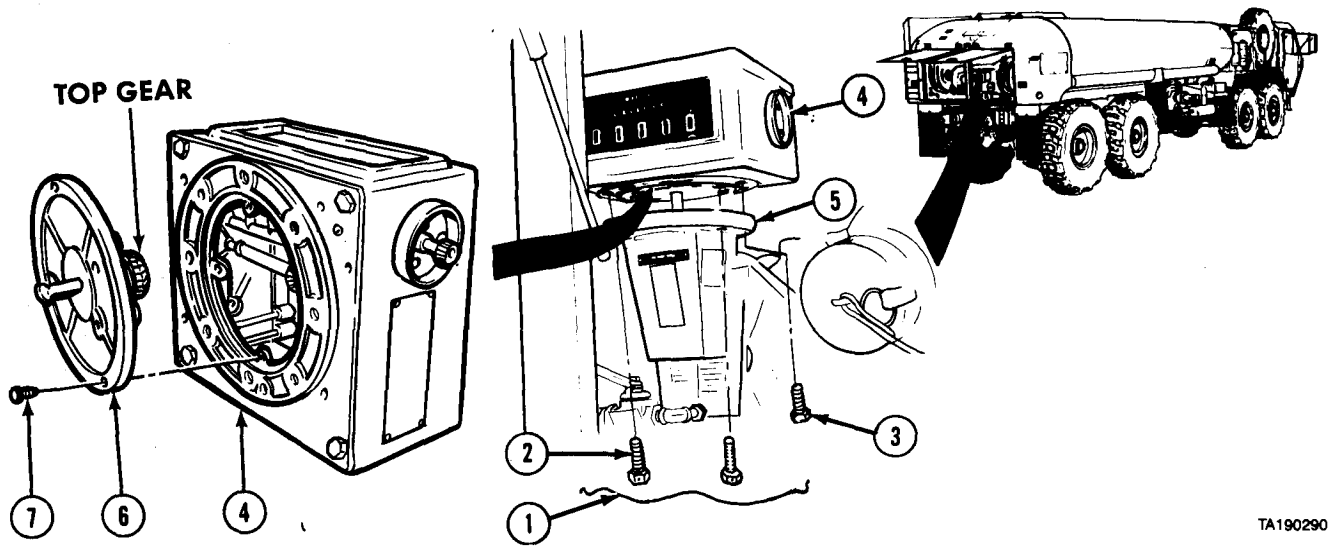
Special Environmental Conditions
None

General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects within 50 ft (15 m) of vehicle.

Level of Maintenance
Direct Support

22-6. FLOWMETER REGISTER REMOVAL/INSTALLATION (CONT).

a. Removal.



(1) Remove safety wire (1) and two front screws (2).
(2) Remove two rear screws (3).
(3) Remove flowmeter register (4) from flowmeter (5).

NOTE

Top gear may come off or stay with gear plate.

(4) Mark position of gear plate (6). Remove two screws (7) and gear plate from flowmeter register (4).

b. Installation.
(1) Aline matchmarks and install gear plate (6) on flowmeter register (4) with two screws (7).
(2) Position flowmeter register (4) on flowmeter (5).
(3) Install four screws (2 and 3).
(4) Install safety wire (1) on two screws (2).

c. Follow-on Maintenance. Install flowmeter register knob (TM 9-2320-279-20).

END OF TASK

22-7. FLOWMETER REMOVAL/INSTALLATION.

This task covers:

a. Removal
b. Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	V11 flow regulating valve removed.
TM 9-2320-279-20	Flowmeter to venturi assembly piping removed.
TM 9-2320-279-20	Flowmeter strainer removed.
TM 9-2320-279-20	Sampling probe valve removed.
TM 9-2320-279-20	Tank level indicator gage removed.
TM 9-2320-279-20	Control junction box removed.
Para 22-6	Flowmeter register removed.
TM 9-2320-279-20	Emergency valve actuator assembly removed.

Special Environmental Conditions
None

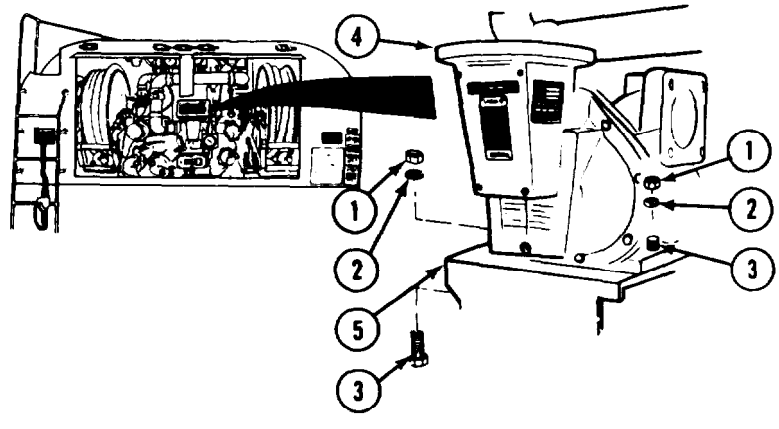
General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects within 50 ft (15 m) of vehicle.

Level of Maintenance
Direct Support

a. Removal.

WARNING

Fuel will drain from piping when couplings are removed. Contact with fuel can irritate eyes and skin. Do not let fuel get into eyes. If fuel comes into contact with eyes, immediately rinse eyes with clear water. Wash fuel off skin with soap and water as soon as possible after contact.



NOTE

Right side screw will not separate from mounting bracket until bracket is removed.

(1) Remove two locknuts (1), washers (2), and screws (3) from flowmeter (4).
(2) Remove flowmeter (4) from mounting bracket (5).

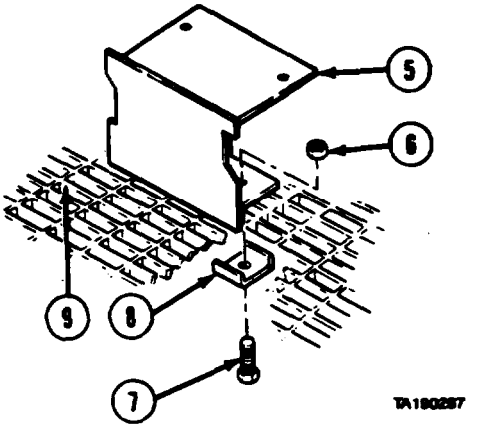
M978 Tanker Maintenance Procedures Instructions (Cont)

22-7. FLOWMETER REMOVAL/INSTALLATION (CONT).

NOTE

Mark position of mounting bracket before removal.

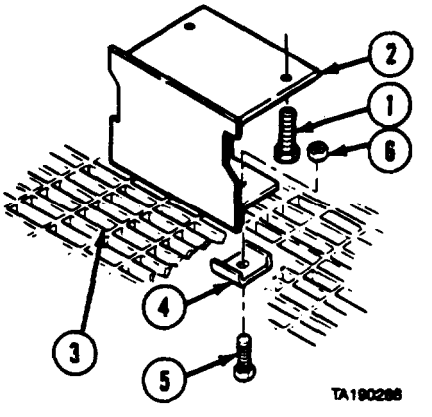
(3) Remove two locknuts (6), screws (7), brackets (8), and mounting bracket (5) from grating (9).



b. Installation.

(1) Position screw (1) in mounting bracket (2).

(2) Position mounting bracket (2) on grating (3) and install two brackets (4), screws (5), and locknuts (6).



(3) Position flowmeter (7) on mounting bracket (2).

(4) Install flowmeter (7) with two screws (1), washers (8), and locknuts (9).

c. Follow-on Maintenance.

(1) Install tank level indicator gage (TM 9-2320-279-20).

(2) Install control junction box (TM 9-2320-27920).

(3) Install sampling probe valve (TM 9-2320-27920).

(4) Install flowmeter strainer (TM 9-2320-279-20).

(5) Install flowmeter register (para 22-6).

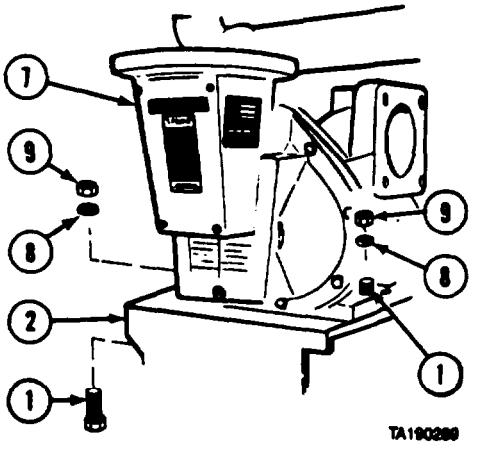
(6) Install V11 flow regulating valve (TM 9-2320-279-20).

(7) Install flowmeter to venturi assembly piping (TM 9-2320-27920).

(8) Recirculate fuel (TM 9-2320-279-10).

(9) Inspect flowmeter for leaks and proper operation.

(10) Close pump module rear access doom (TM 9-2320-279-10).



END OF TASK

22-7.1. FUEL FLOWMETER ADJUSTMENT.

This task covers:

a. Adjustment

b. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

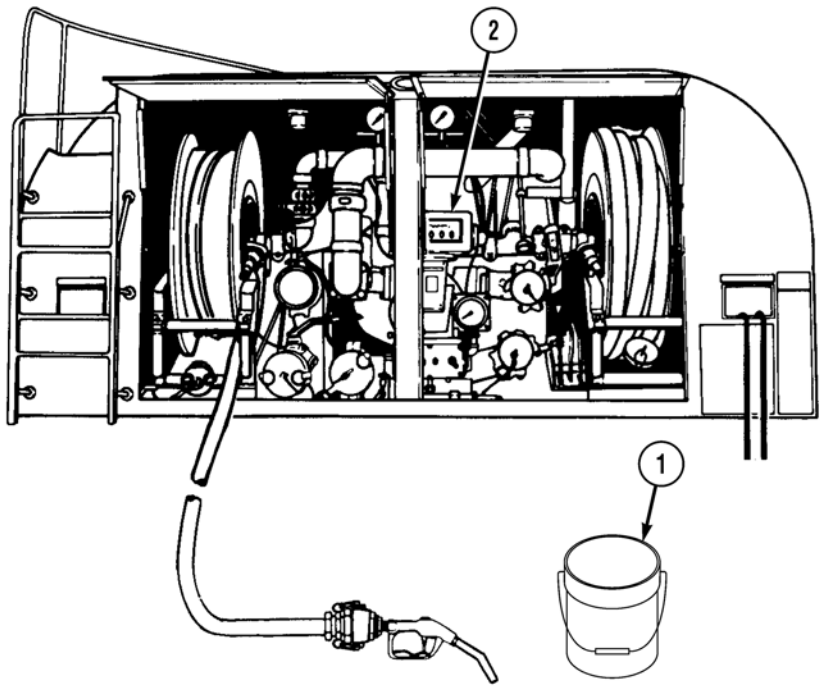
Equipment Condition
TM or Para *Condition Description*
None

Special Environmental Conditions
None

General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects within 50 ft (15 m) of vehicle.

Level of Maintenance
Direct Support

a. Adjustment.



(1) Deliver fuel to a reliable container (1) of known volume.

NOTE

If amounts compared in step *(2)* are equal, no adjustment of flowmeter adjuster is necessary. If amounts compared in step *(2)* differ, proceed to steps *(3)* through *(10)*.

(2) Compare known volume in container (1) and volume indicated on meter counter (2).

22-7.1. FUEL FLOWMETER ADJUSTMENT (CONT).

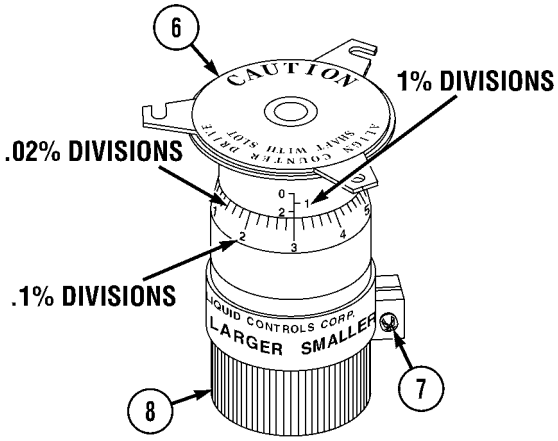


FLOWMETER SHOWN REMOVED FOR CLARITY

(3) Remove four screws (3) and coverplate (4) from front cover (5).
(4) Record setting indicated on adjuster (6).
(5) Note difference between volume of container (1) and volume indicated on meter counter (2). Calculate % correction required, as follows:

$$\% \text{ correction} = \frac{\text{Volume in container - volume on meter counter}}{\text{volume in container}} \times 100$$

(6) Loosen adjuster clamp screw (7).
(7) When container (1) volume is less than meter counter (2) volume, add percentage to original adjuster (6) setting by turning thimble (8) towards arrow marked larger (volume). Correct original setting by approaching number desired from next larger number. For example, if desired adjuster setting is 2.4, turn adjuster thimble left to number 5, then right to obtain 2.4 setting. Adjuster is currently set at 2.3 in illustration to the right.



(8) When container (1) volume is more than meter counter (2) volume, subtract percentage from original adjuster (6) setting by turning thimble (8) in direction of arrow marked smaller volume percent.
(9) Retighten adjuster clamp screw (7). Run product through meter to allow adjuster (6) to take a set. Repeat steps *(1)* and *(2)* three times to check for accuracy and repeatability.
(10) Install four screws (3) and coverplate (4) to front cover (5).

b. Follow-on Maintenance. None.

END OF TASK

22-8. FLOWMETER REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Adhesive-sealant, silicone, Item 6, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

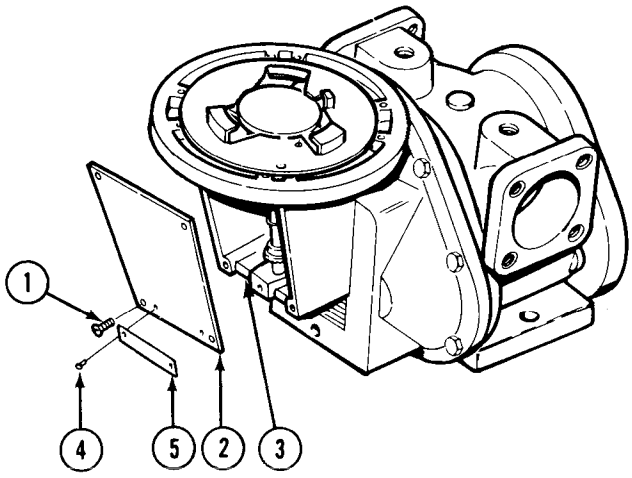
TM or Para	*Condition Description*
Para 22-7	Flowmeter removed and on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects within 50 ft (15 m) of vehicle.

Level of Maintenance
General Support

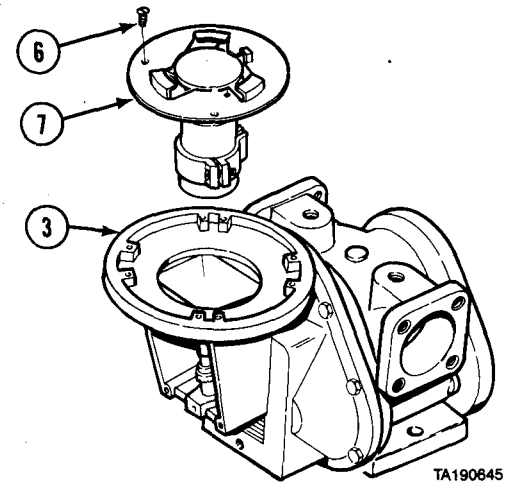
a. Disassembly.



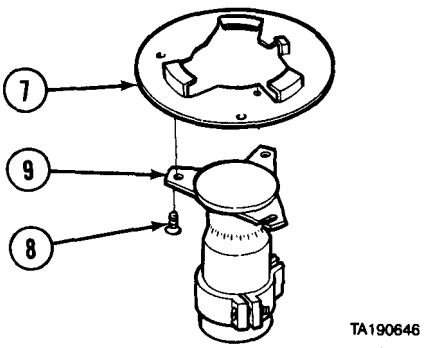
(1) Remove four screws (1) and cover plate (2) from front cover (3).

(2) Remove two screws (4) and data plate (5).

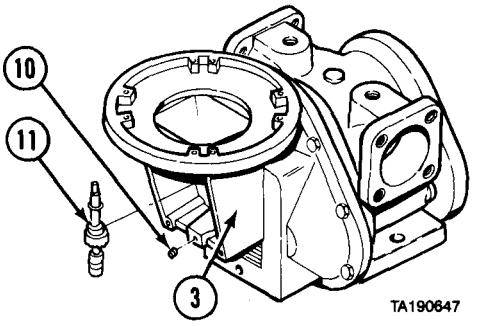
22-8. FLOWMETER REPAIR (CONT).



(3) Remove two screws (6) and adjuster plate (7) from front cover (3).

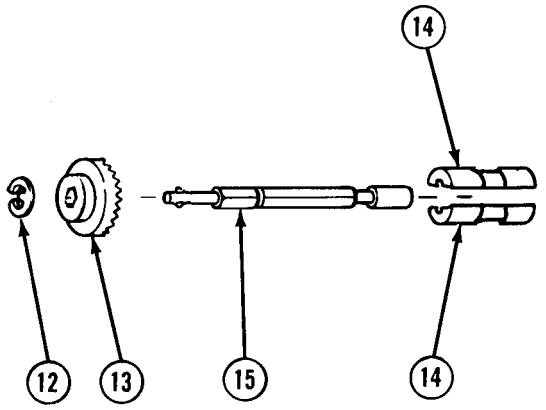


(4) Remove screw (8) and adjuster plate (7) from adjuster (9).



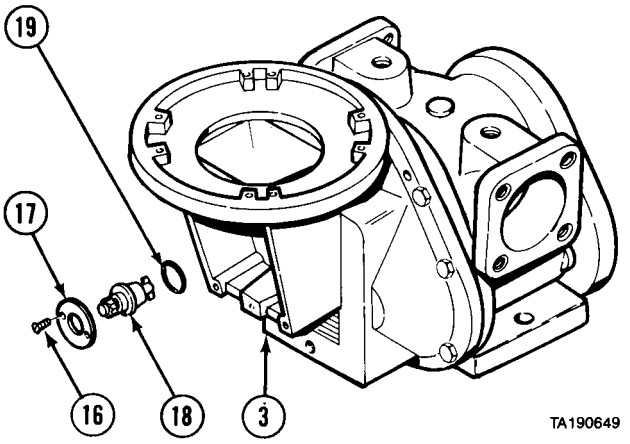
(5) Remove setscrew (10) and adjuster drive gear assembly (11) from front cover (3).

(6) Remove retaining ring (12) and adjuster drive gear (13).
(7) Separate two-part bushing (14) and remove drive shaft (15).



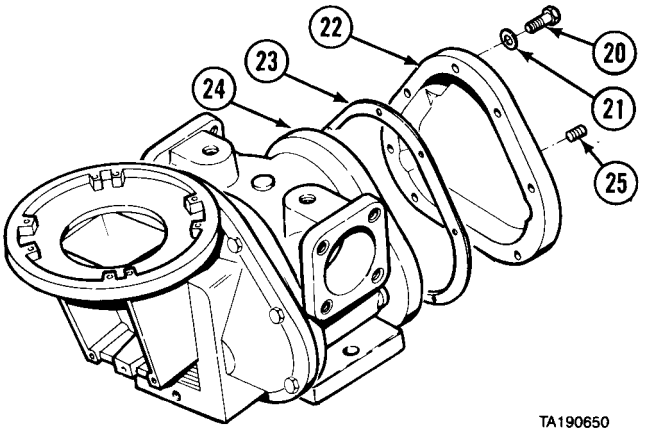
TA190648

(8) Remove two screws (16) and retaining plate (17) from front cover (3).
(9) Remove gland assembly (18).
(10) Remove preformed packing (19).



TA190649

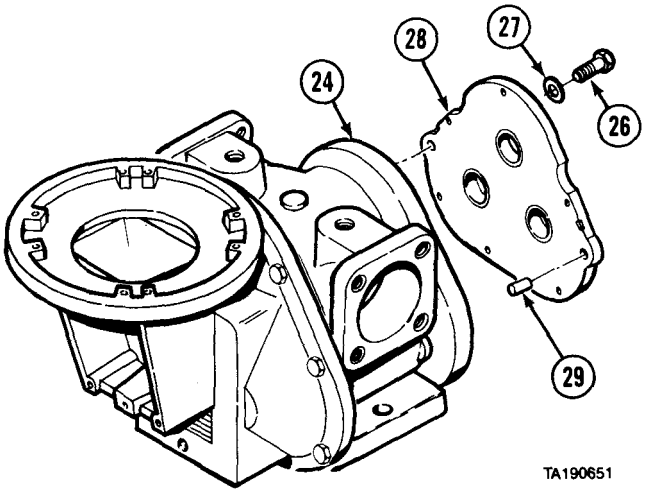
(11) Remove nine screws (20), washers (21), rear cover (22), and gasket (23) from housing (24).
(12) Remove plug (25) from rear cover (22).



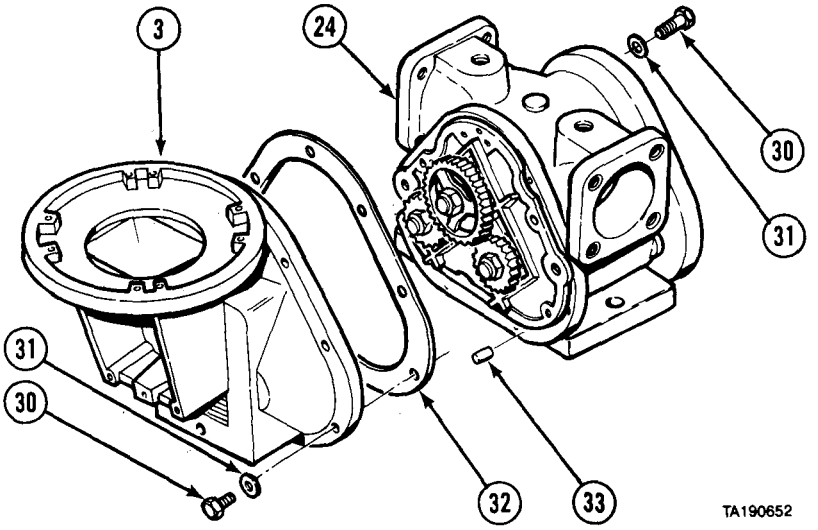
TA190650

22-8. FLOWMETER REPAIR (CONT).

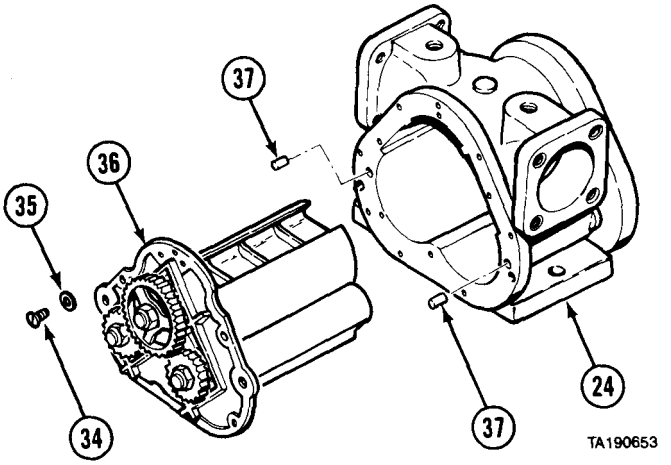
(13) Remove six screws (26), washers (27), and bearing plate (28) from housing (24).
(14) Remove two pins (29).



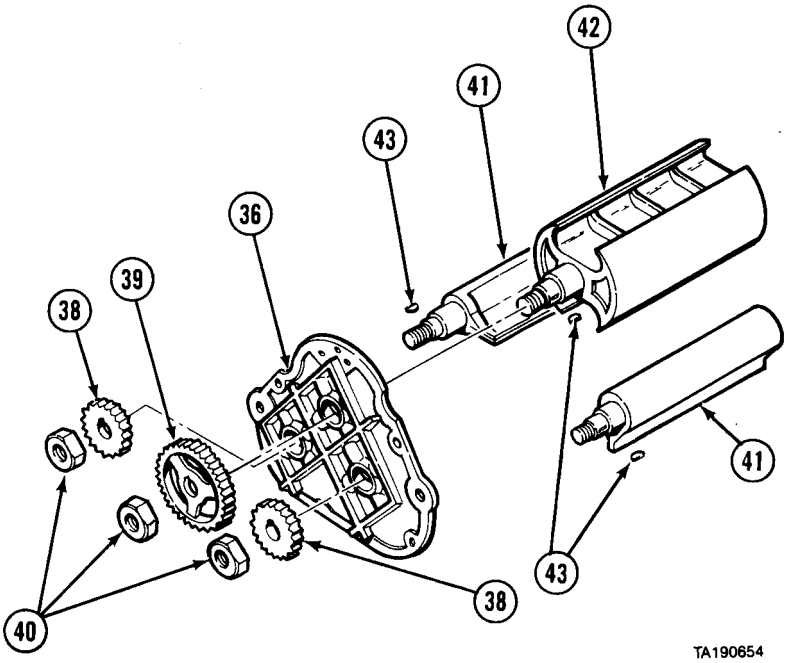
(15) Remove nine screws (30), washers (31), front cover (3), and gasket (32) from housing (24).
(16) Remove two pins (33).



(17) Remove six screws (34), lockwashers (35), and bearing plate assembly (36) from housing (24).
(18) Remove two pins (37).



(19) Matchmark two displacement rotor gears (38) and blocking rotor gear (39).
(20) Remote three locknuts (40), two displacement rotor gears (38), and blocking rotor gear (39) from bearing plate (36).
(21) Remove two displacement rotors (41), blocking rotor (42), and three machine keys (43).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts in dry cleaning solvent.

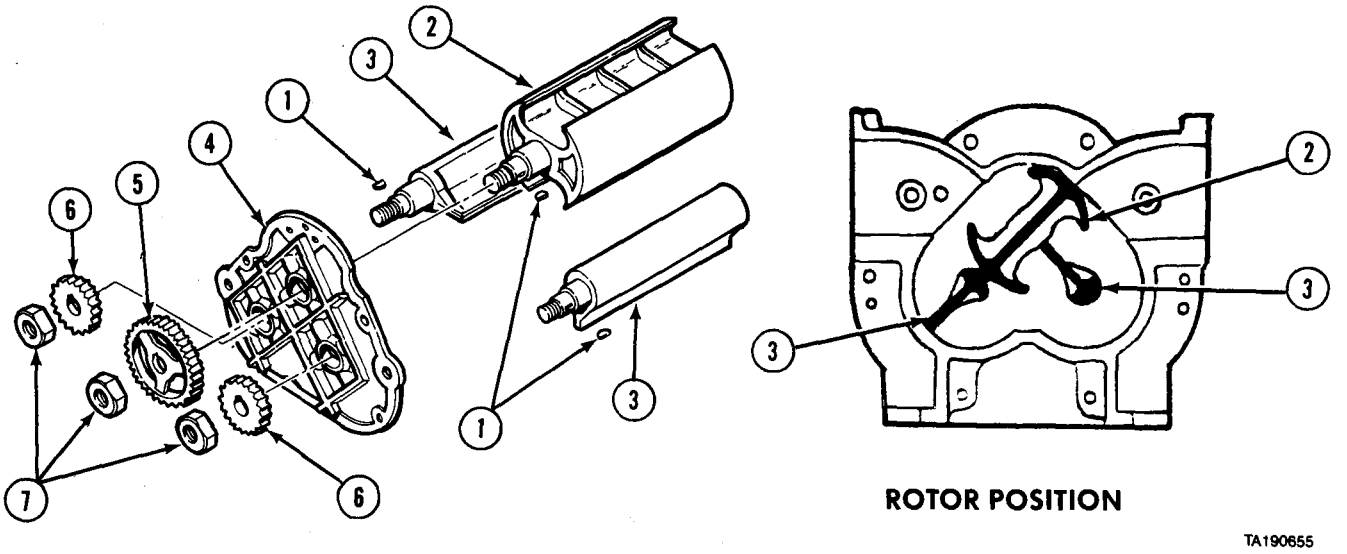
WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

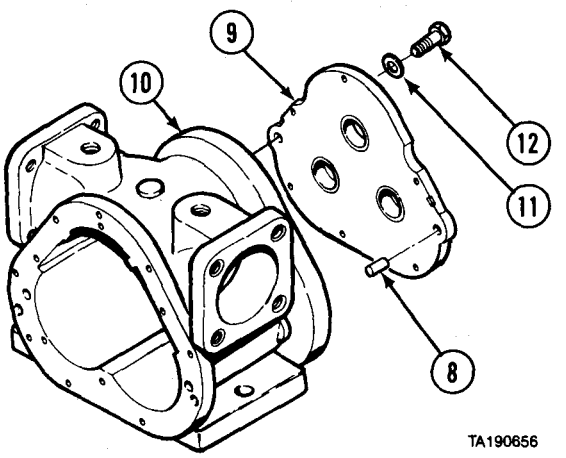
(2) Dry metal parts with compressed air.
(3) Inspect threaded parts for stripping or crossthreading. Replace damaged parts.
(4) Inspect gears for chipped or cracked teeth. Replace damaged gears.
(5) Inspect packing gland assembly for damage. Replace if damaged.
(6) Inspect two-piece bushing, bushing plates, and shafts for scoring or damage. Replace if damaged.
(7) Inspect rotors for damage, chips, or deposits. Remove deposits, nicks, chips, or burrs, then clean and dry.
(8) Inspect keys and keyways for damage. Replace damaged keys.
(9) Inspect housings for cracks and deposits. Replace damaged housings. Remove all deposits, then clean and dry.

22-8. FLOWMETER REPAIR (CONT).

c. Assembly.



(1) Install three machine keys (1) in blocking rotor (2) and two displacement rotors (3).
(2) Install blocking rotor (2) and two displacement rotors (3) in bearing plate (4).
(3) Aline matchmarks and install blocking rotor gear (5) and two displacement rotor gears (6). Check position of rotors as shown.
(4) Install three locknuts (7).

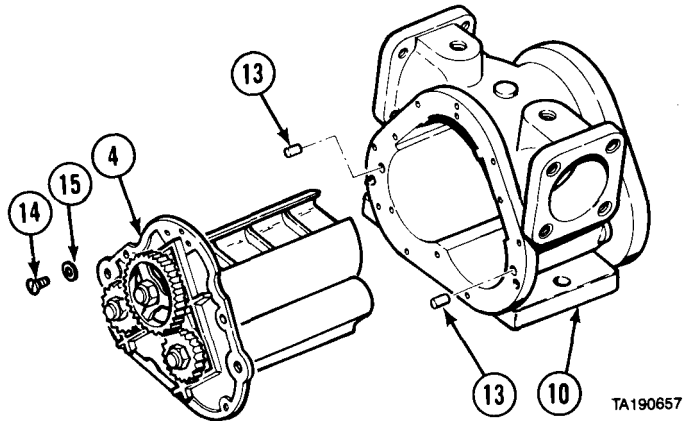


(5) Install two pins (8) in rear bearing plate (9).
(6) Install rear bearing plate (9) on housing (10) with lockwashers (11) and screws (12).

NOTE

When installing front bearing plate assembly make sure rotor shafts are seated in holes in rear bearing plate and turn freely.

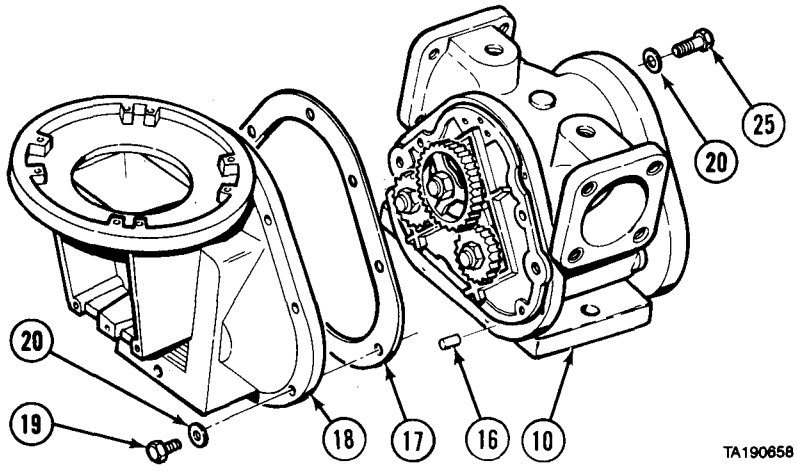
(7) Install two pins (13) in housing (10).
(8) Install front bearing plate assembly (4) on housing (10) with six screws (14) and lockwashers (15).



(9) Install two pins (16) in housing (10).

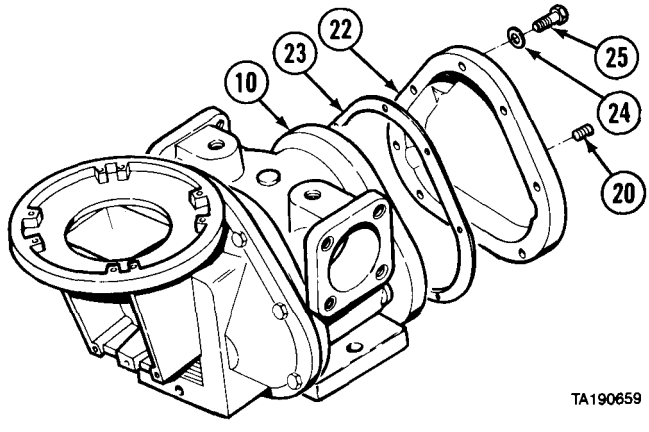
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(10) Apply silicone adhesive-sealant and install gasket (17) and front cover (18) on housing (10) with nine screws (19) and washers (20).

(11) Apply pipe thread sealing compound to plug (20) and install in rear cover (22).
(12) Apply silicone adhesive-sealant and install gasket (23) and rear cover (22) on housing (10) with nine washers (24) and screws (25).



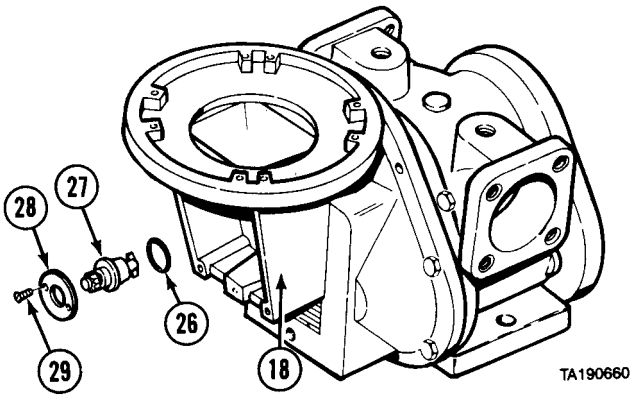
22-8. FLOWMETER REPAIR (CONT).

(13) Install preformed packing (26) on gland assembly *(27)*.

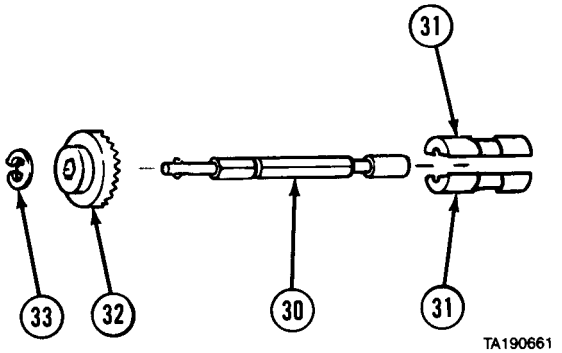
NOTE

When assembling packing gland into housing, make sure two blades of packing gland shaft fit into slot in end of blocking rotor shaft.

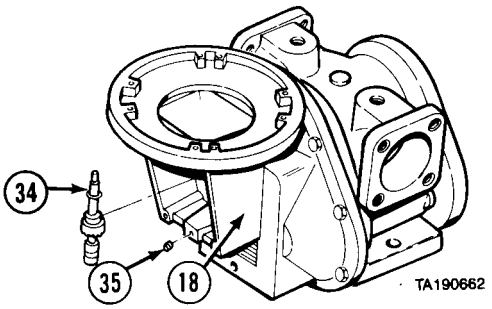
(14) Install gland assembly (27) in front cover (18).
(15) Install retaining plate (28) with two screws (29).



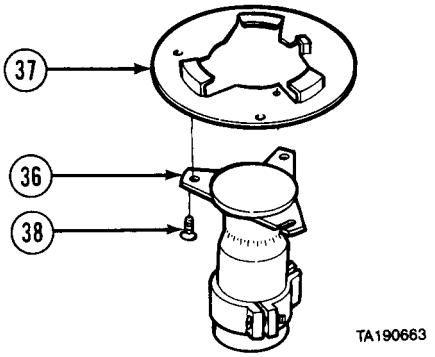
(16) Install shaft (30) in two piece bushing (31).
(17) Install gear (32) and retaining ring (33) on shaft (30).

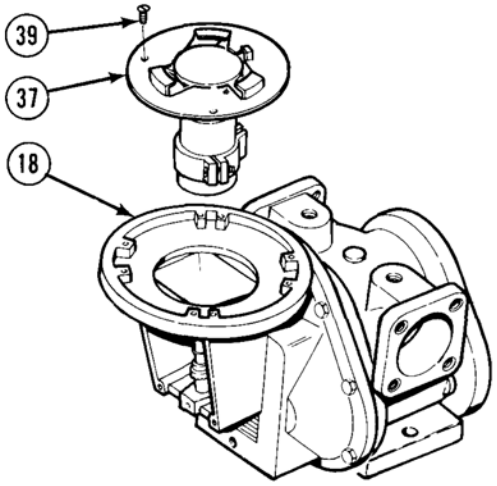


(18) Install adjuster gear assembly (34) in front cover (18).
(19) Install setscrew (35).



(20) Position adjuster (36) on adjuster plate (37) and install screw (38).

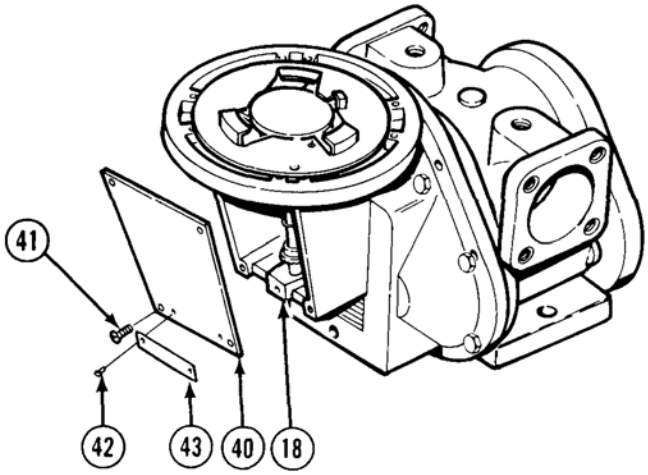




NOTE

Make sure two ears on shaft go inside adjuster.

(21) Install adjuster plate (37) on front cover (18) with two screws (39).



(22) Install cover plate (40) on front cover (18) with four screws (41).

(23) Install data plate (42) with two screws (43).

d. Follow-on Maintenance.

(1) Install flowmeter (para 22-7).

(2) Adjust fuel flowmeter (para 22-7.1).

END OF TASK

Section V. AIR ELIMINATOR

22-9. AIR ELIMINATOR REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

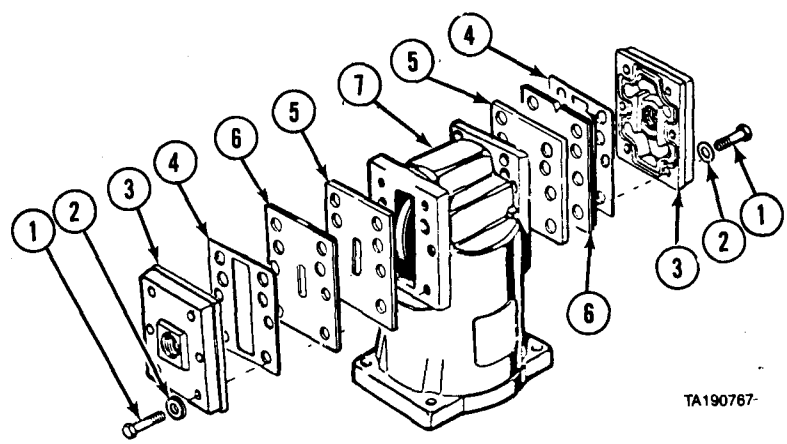
TM or Para	*Condition Description*
	Air eliminator on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

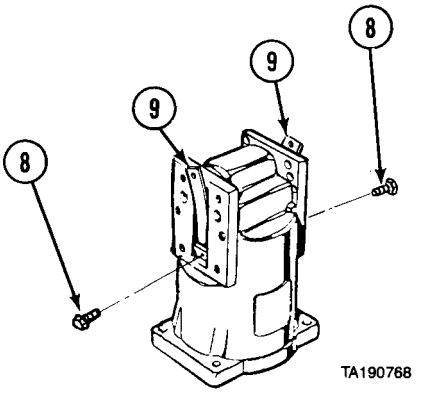
Level of Maintenance
General Support

a. Disassembly.

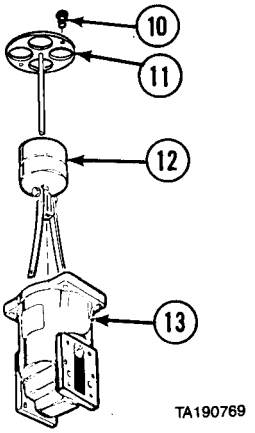


(1) Remove 12 screws (1) and washers (2) from two outlet covers (3).
(2) Remove two outlet covers (3), two gaskets (4 and 5), and valve plates (6) from housing (7).

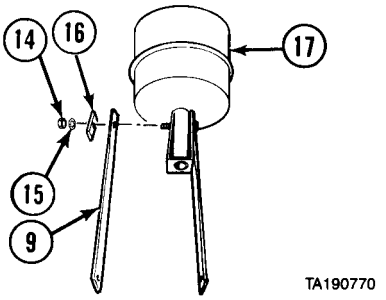
(3) Note position and remove two screws (8) from valve reeds (9).



(4) Remove two screws (10) and baffle (11).
(5) Remove float (12) from housing (13).



(6) Remove two nuts (14), lockwashers (15), reed clips (16), and valve reeds (9) from float (17).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

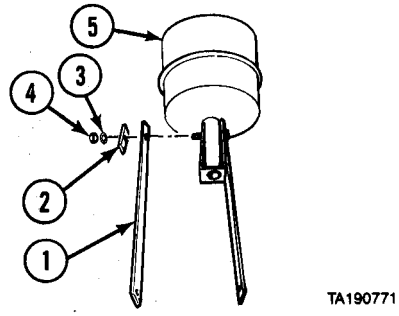
WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect each part for damage.
(4) Replace damaged parts.

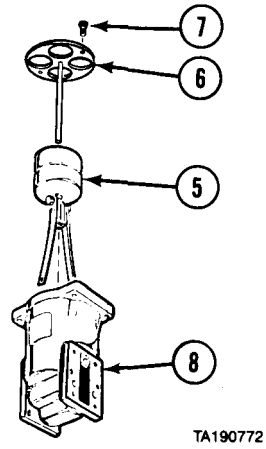
22-9. AIR ELIMINATOR REPAIR (CONT).

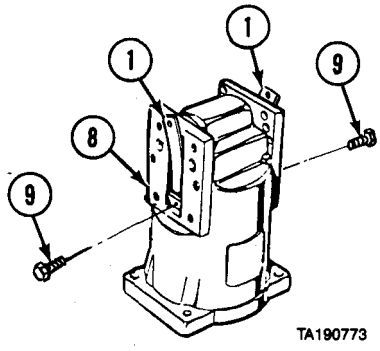
c. Assembly.



(1) Install two valve reeds (1), reed clips (2), lockwashers (3), and nuts (4) on float (5).

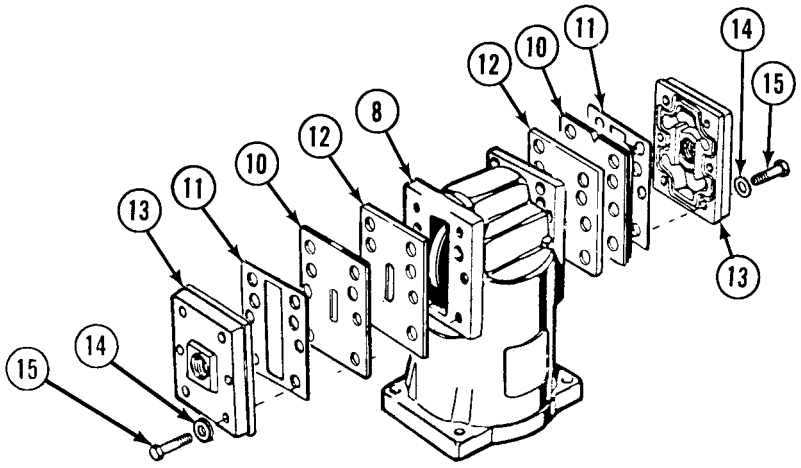
(2) Install float (5), baffle (6), and two screws (7) in housing (8).





(3) Bend two valve reeds (1) over and down and install screws (9) in valve reeds and housing (8).

(4) Position two valve plates (10), two gaskets (11 and 12) and outlet covers (13) on housing (8).
(5) Install 12 washers (14) and screws (15).



d. Follow-on Maintenance. None.

END OF TASK

Section VI. VALVES

22-10. V1 EMERGENCY VALVE REPAIR (MODEL A).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing, lubricating, wicking, thread locking, Item 25 Appendix C
Oil, lubricating, Item 47, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V1 emergency valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

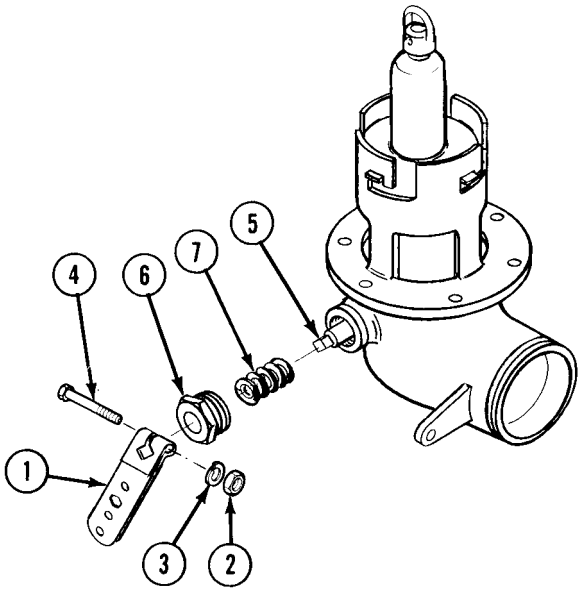
Level of Maintenance
General Support

22-10. V1 EMERGENCY VALVE REPAIR (MODEL A) (CONT).

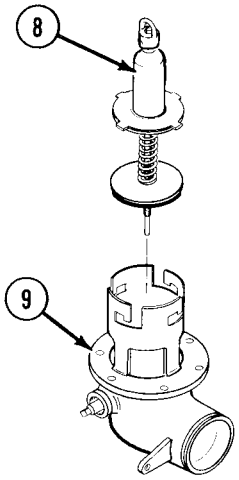
a. Disassembly.

(1) Mark position of lever (1) and remove nut (2), lockwasher (3), screw (4), and lever from camshaft assembly (5).

(2) Remove nut (6) and spring (7).

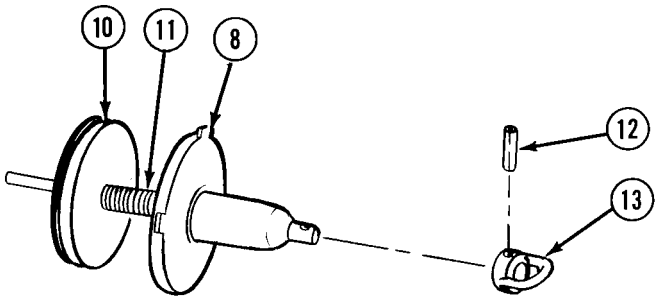


(3) Remove bonnet assembly (8) from valve body (9) by pressing and turning counterclockwise.



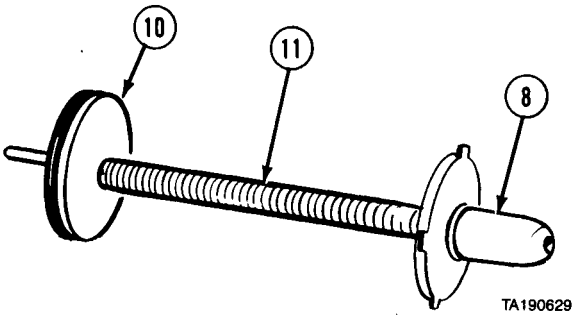
WARNING

Make sure bonnet assembly is secure in clamping device compressing spring. If bonnet assembly slips from clamping device while spring is compressed, injury to personnel can result.



(4) Install bonnet (8) and disk assembly (10) in suitable clamping device and compress spring (11).

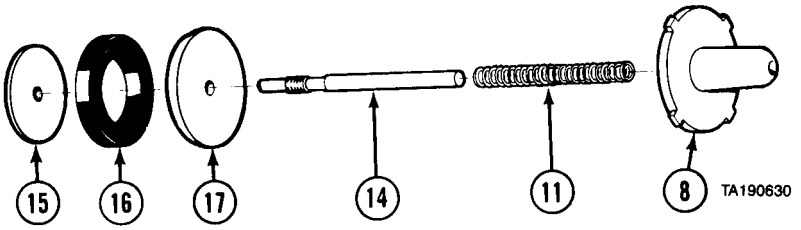
(5) Remove spring pin (12) and bail (13).



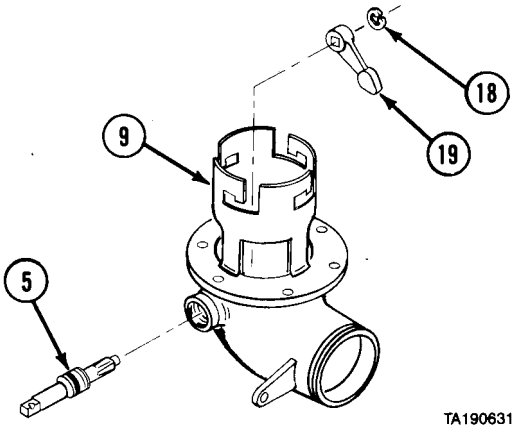
WARNING

Bonnet assembly is spring loaded. Spring tension must be released slowly to prevent injury to personnel.

(6) Release tension on spring (11) and remove bonnet (8) and disk assembly (10) from clamping device.



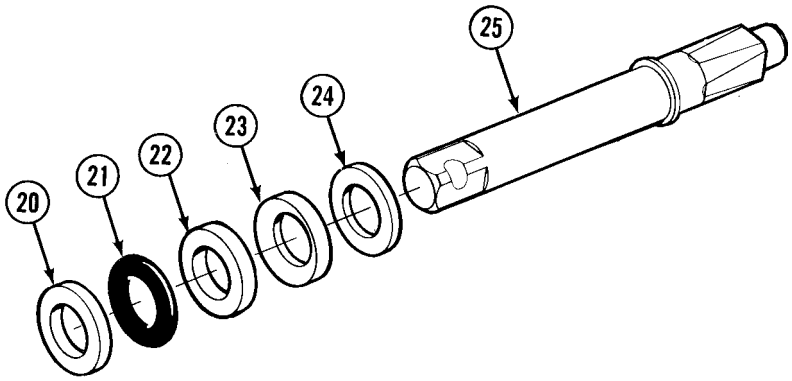
(7) Remove bonnet (8) and spring (11) from valve stem (14).
(8) Remove disk nut (15), disk (16), and disk holder (17).



(9) Remove retaining ring (18), camshaft assembly (5), and cam (19) from valve body (9).

22-10. V1 EMERGENCY VALVE REPAIR (MODEL A) (CONT).

(10) Remove asbestos packing (20), packing ring (21), asbestos packing (22), gland washer (23), and leather washer (24) from camshaft (25).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with drycleaning solvent.

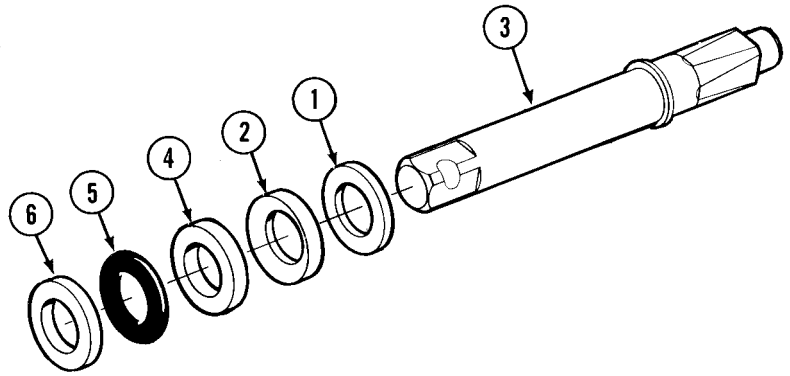
WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Use clean cloth and compressed air to dry metal parts cleaned with drycleaning solvent.
(3) Inspect all metal parts for bends, breaks, cracks, and sharp edges.
(4) Replace damaged parts.

c. Assembly.

(1) Install leather washer (1) and gland washer (2) on camshaft (3).



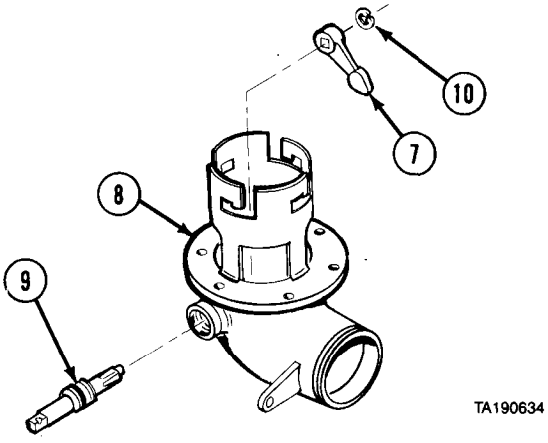
NOTE

Asbestos packings and packing ring are provided as a set.

(2) Install asbestos packing (4), packing ring (5), and asbestos packing (6) on camshaft (3).

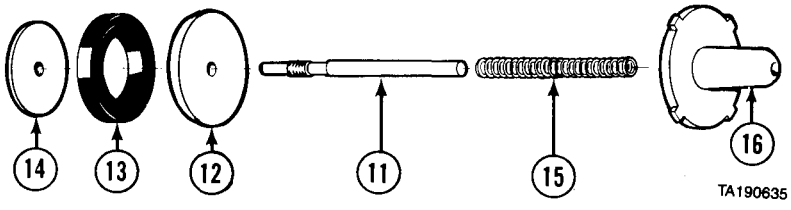
M978 Tanker Maintenance Procedure Instructions (Cont)

(3) Install cam (7) in valve body (8).
(4) Install camshaft assembly (9) in valve body (8) and install cam (7) on camshaft assembly.
(5) Install retaining ring (10).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

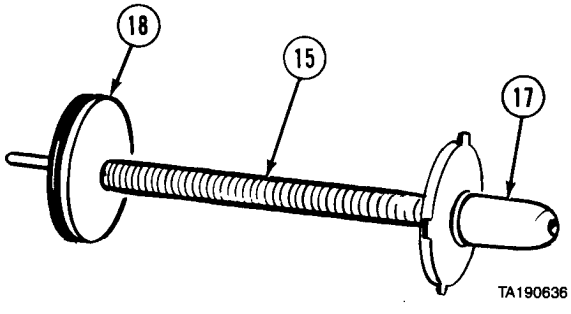


(6) Apply thread locking compound on threads of valve stem (11).
(7) Install disk holder (12), disk (13), and disk nut (14) on valve stem (11).
(8) Install spring (15) and bonnet (16) on valve stem (11).

WARNING

Make sure bonnet assembly is secure in clamping device before compressing spring. If bonnet assembly slips from clamping device while spring is compressed, injury to personnel can result.

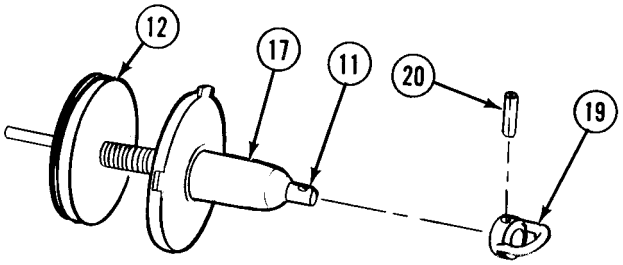
(9) Install bonnet assembly (17) and disk assembly (18) in suitable clamping device and compress spring (15).



22-10. V1 EMERGENCY VALVE REPAIR (MODEL A) (CONT).

WARNING

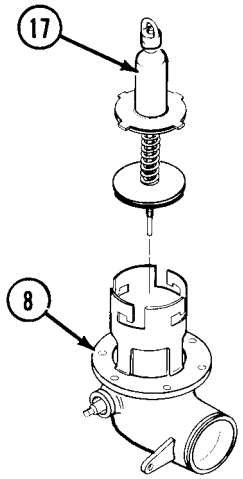
Spring pin must be securely installed before removing bonnet assembly from clamping device. Quick release of spring pressure can cause serious injury to personnel.



(10) Install bail (19) and spring pin (20) on valve stem (11).

(11) Remove bonnet assembly (17) and disk assembly (12) from clamping device.

(12) Install bonnet assembly (17) in valve body (8) by pressing and turning clockwise.

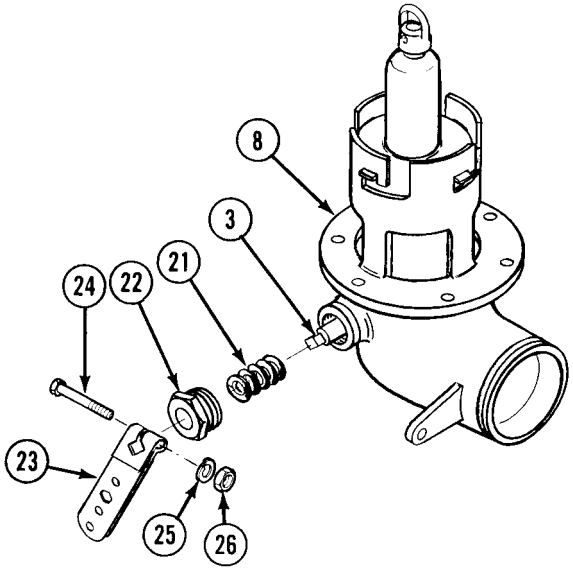


(13) Apply lubricating oil to spring (21) and install on camshaft (3).

(14) Install nut (22) in valve body (8).

(15) Install lever (23) on camshaft (3).

(16) Install screw (24), lockwasher (25), and nut (26).



d. Follow-on Maintenance. None

END OF TASK

22-10.1 V1 EMERGENCY VALVE REPAIR (MODEL B).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing, lubricating, wicking, thread locking, Item 25 Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V1 emergency valve on clean work surface.

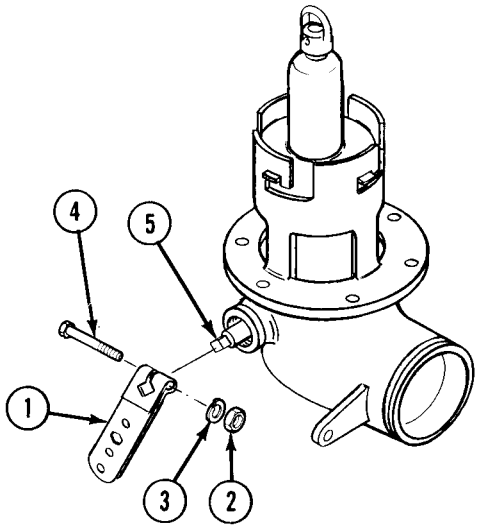
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

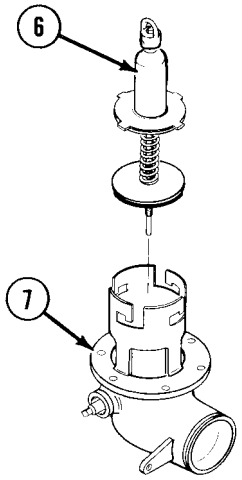
a. Disassembly.

(1) Mark position of lever (1) and remove nut (2), lockwasher (3), screw (4), and lever from camshaft (5).



22-10.1 V1 EMERGENCY VALVE REPAIR (MODEL A) (CONT).

(2) Remove bonnet assembly (6) from valve body (7) by pressing and turning counterclockwise.

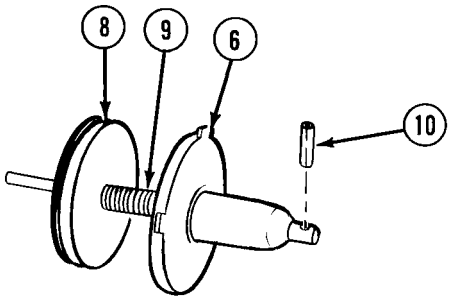


WARNING

Make sure bonnet assembly is secure in clamping device compressing spring. If bonnet assembly slips from clamping device while spring is compressed, injury to personnel can result.

(3) Install bonnet (6) and disk assembly (8) in suitable clamping device and compress spring (9).

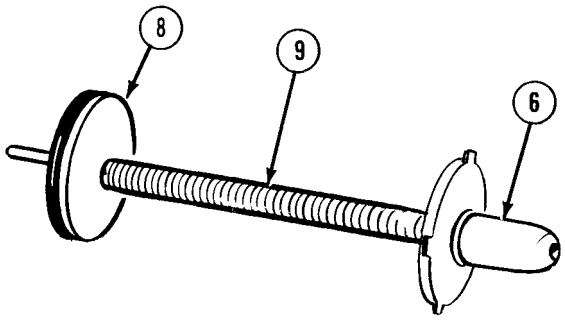
(4) Remove spring pin (10).



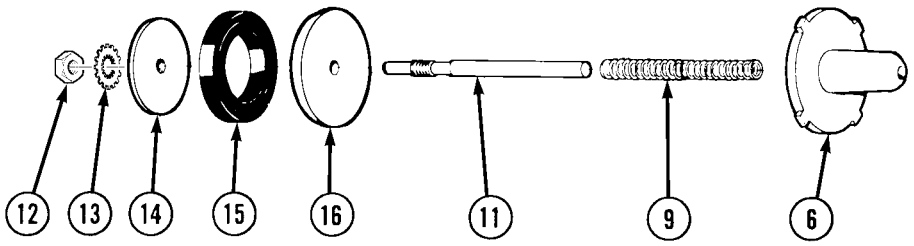
WARNING

Bonnet assembly is spring loaded. Spring tension must be released slowly to prevent injury to personnel.

(5) Release tension on spring (9) and remove bonnet (6) and disk assembly (8) from clamping device.



M978 Tanker Maintenance Procedures Instructions (Cont)



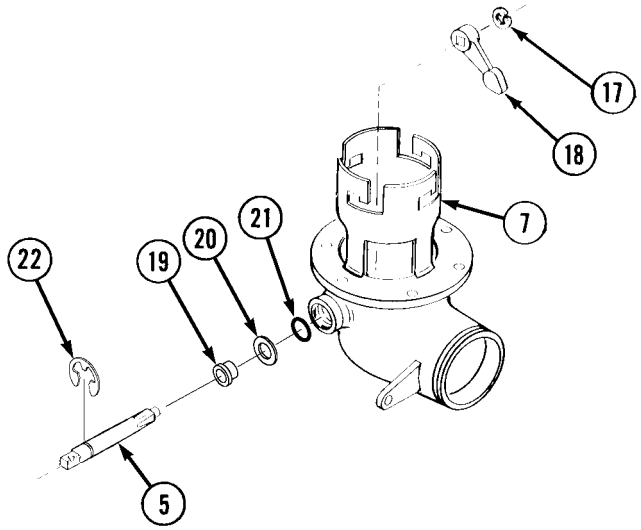
(6) Remove bonnet (6) and spring (9) from valve stem (11).

(7) Remove hex nut (12), lockwasher (13), retainer plate (14), disk (15), and disk holder (16).

(8) Remove retaining ring (17) and cam (18) from camshaft (5).

(9) Remove camshaft (5), retaining gland (19), retaining ring (20), and preformed packing (21) from valve body (7).

(10) Remove retaining ring (22) from camshaft (5).



22-10.1 V1 EMERGENCY VALVE REPAIR (MODEL B) (CONT).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kpa). Use only with effective chip guarding and personal protective equipment goggles, shield, and gloves.

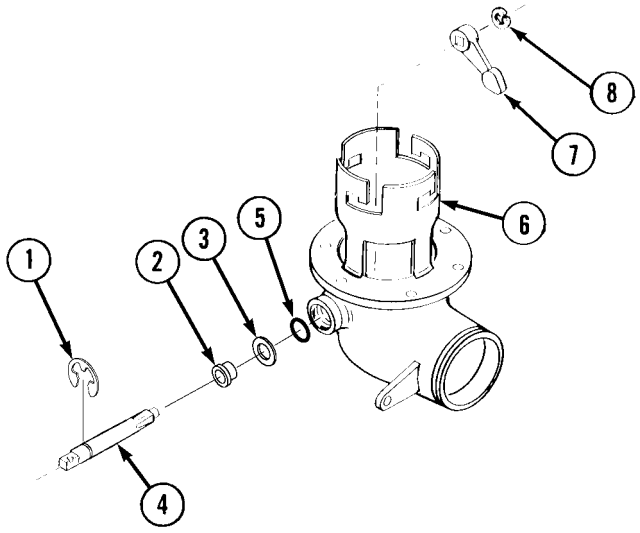
(2) Use clean cloth and compressed air to dry metal parts cleaned with dry cleaning solvent.

(3) Inspect all metal parts for bends, breaks, cracks, and sharp edges.

(4) Replace damaged parts.

c. Assembly.

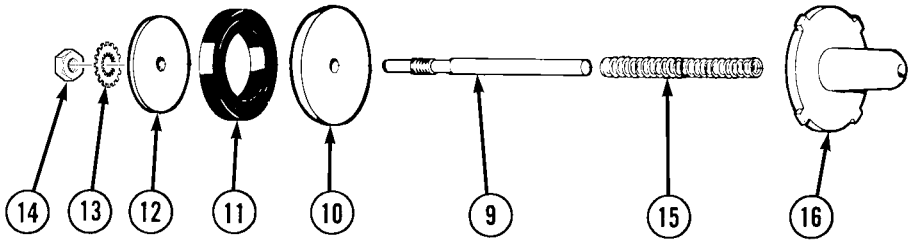
(1) Install retaining ring (1), retaining gland (2), and retaining ring (3) on camshaft (4).
(2) Install preformed packing (5) in valve body (6).
(3) Install camshaft (4) in valve body (6).
(4) Install cam (7) and retaining ring (8) on camshaft (4).



M978 Tanker Maintenance Procedures Instructions (Cont)

WARNING

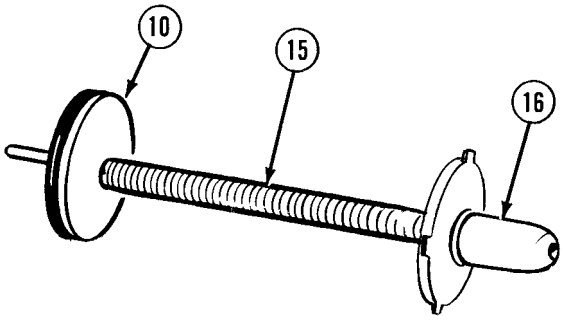
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



(5) Apply thread locking compound on threads of valve stem (9).
(6) Install disk holder (10), disk (11), retainer plate (12), lockwasher (13), and disk nut (14) on valve stem (9).
(7) Install spring (15) and bonnet (16) on valve stem (9).

WARNING

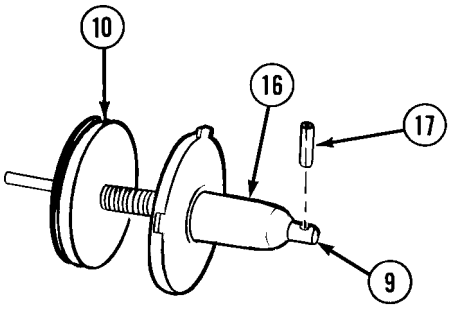
Make sure bonnet assembly is secure in clamping device before compressing spring. If bonnet assembly slips from clamping device while spring is compressed, injury to personnel can result.



(8) Install bonnet assembly (16) and disk assembly (10) in suitable clamping device and compress spring (15).

WARNING

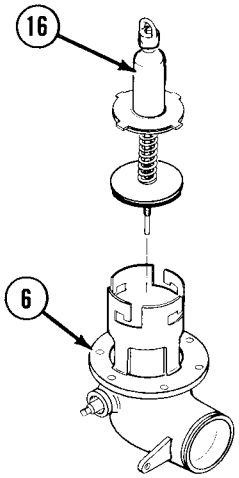
Spring pin must be securely installed before removing bonnet assembly from clamping device. Quick release of spring pressure can cause serious injury to personnel.



(9) Install spring pin (17) on valve stem (9).
(10) Remove bonnet assembly (16) and disk assembly (10) from clamping device.

22-10.1 V1 EMERGENCY VALVE REPAIR (MODEL B) (CONT).

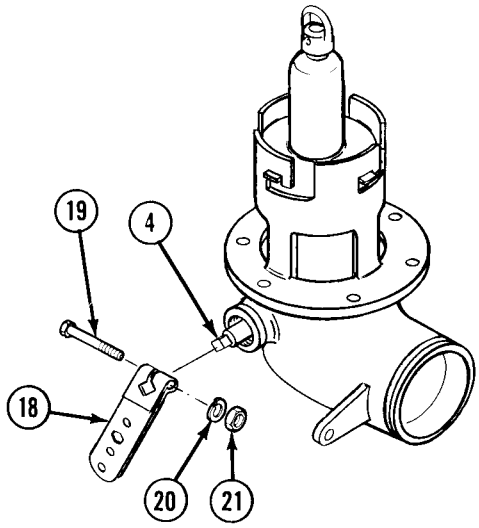
(11) Install bonnet assembly (16) in valve body (6) by pressing and turning clockwise.



(12) Install lever (18) on camshaft (4).
(13) Install screw (19), lockwasher (20), and nut (21).

d. Follow-on Maintenance. None.

END OF TASK



22-11. V2 BOTTOM LOAD ADAPTER REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 47, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

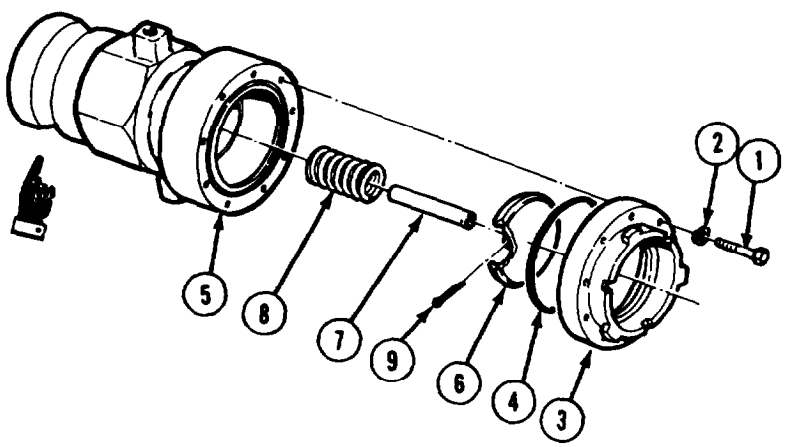
TM or Para	*Condition Description*
	V2 Bottom load adapter on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.



CAUTION

Bottom load adapter is spring loaded. Compress spring while removing screws to prevent loss of parts.

(1) Remove nine screws (1) and lockwashers (2) from flange (3).
(2) Remove flange (3) and preformed packing (4) from valve body (5).
(3) Remove poppet (6) with shaft (7).
(4) Remove spring (8).
(5) Remove cotter pin (9) and shaft (7) from poppet.

21-11. V2 BOTTOM LOAD ADAPTER REPAIR (CONT).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with drycleaning solvent.

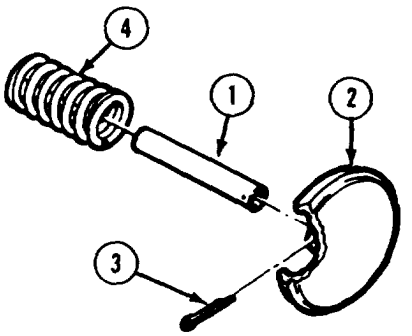
WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Use clean cloth and compressed air to dry metal parts cleaned with drycleaning solvent.
(3) Inspect all parts for damage.
(4) Replace damaged parts.

c. Assembly.

(1) Install shaft (1) on poppet (2) with cotter pin (3).
(2) Wrap ends of cotter pin (3) around shaft (1) so they will be clear of spring (4).
(3) Install spring (4) over shaft (1).

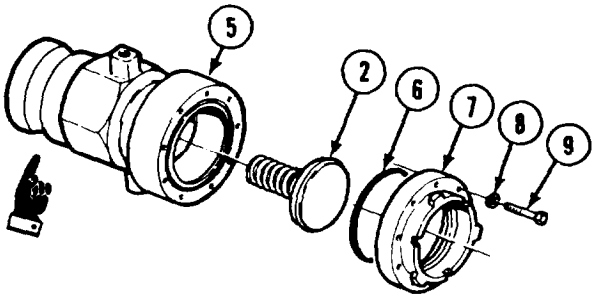


(4) Position poppet (2) in valve body (5).

NOTE

Compress spring while installing screws to prevent loss of parts.

(5) Lubricate preformed packing (6) with oil and install in grooves of valve body (5).
(6) Install flange (7) on valve body (5) with nine lockwashers (8) and screws (9).



d. Follow-on Maintenance. None.

END OF TASK

22-12. V3 SUCTION LINE VALVE AND V17 GRAVITY VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 47, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel Vehicle repairer

References
None

Equipment Condition

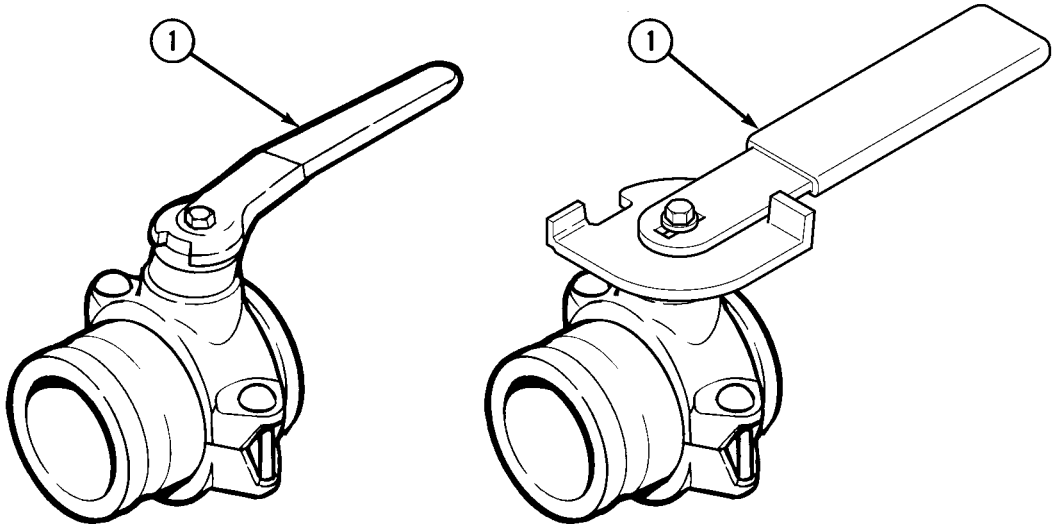
TM or Para	*Condition Description*
	V3 suction line valve or V17 gravity valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.



MODEL A **MODEL B**

CAUTION

Valve must be in open position to allow removal of valve parts and to prevent equipment damage.

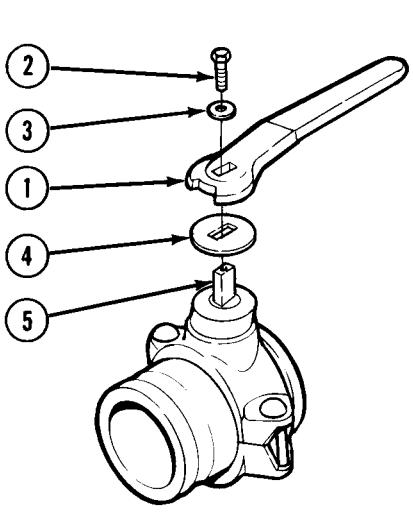
NOTE

There are two models of V3 Suction Line Valve and V17 Gravity Valve. Disassembly is the same for both.

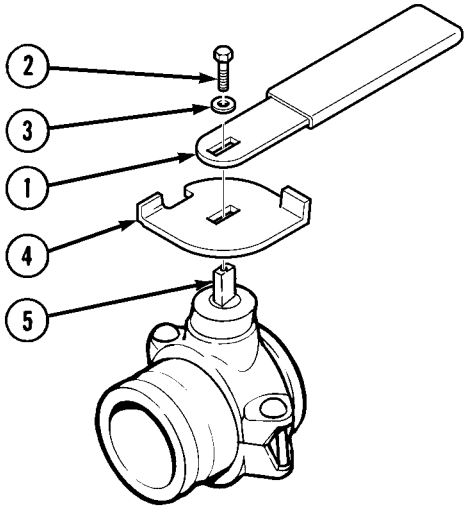
(1) Set handle (1) to OPEN position.

22-12. V3 SUCTION LINE VALVE AND V17 GRAVITY VALVE REPAIR (CONT).

(2) Remove screw (2), washer (3), handle (1), and washer (4) from stem (5).



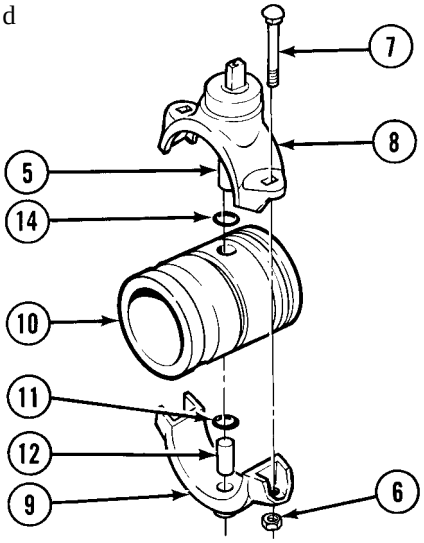
MODEL A



MODEL B

(3) Remove two nuts (6) and screws (7) from upper housing (8) and lower housing (9).

(4) Remove lower housing (9) from body and liner (10).



NOTE

Preformed packing and stem may stay in liner.

(5) Remove preformed packing (11) from stem (12) on lower housing (9). Remove upper housing (8).

(6) Remove stem (12) from lower housing (9).

(7) Remove preformed packing (14) from upper stem (5).

b. Cleaning/Inspection.

WARNING

Adhesives solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metals parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield and gloves.

(2) Dry metal parts with compressed air.

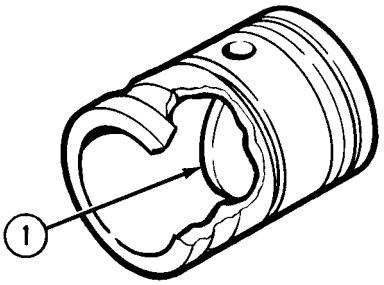
(3) Inspect all metal parts for bends, breaks, cracks, and sharp edges.

(4) Replace damaged parts.

M978 Tanker Maintenance Procedure Instructions (Cont)

CAUTION

Body and liner disk must be in open position to allow proper installation of valve parts and prevent equipment damage.

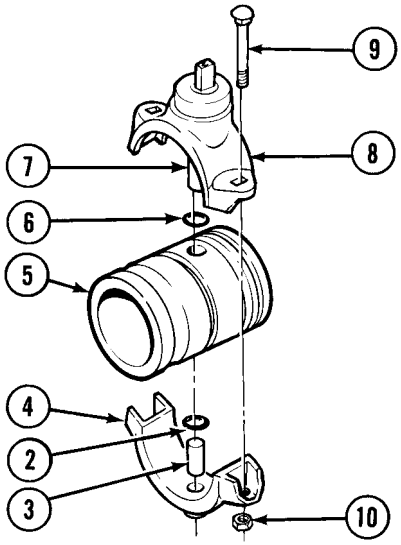


NOTE

There are two models of V3 Suction Line Valve and V17 Gravity Valve. Assembly is the same for both.

(1) Move disk (1) to open position.

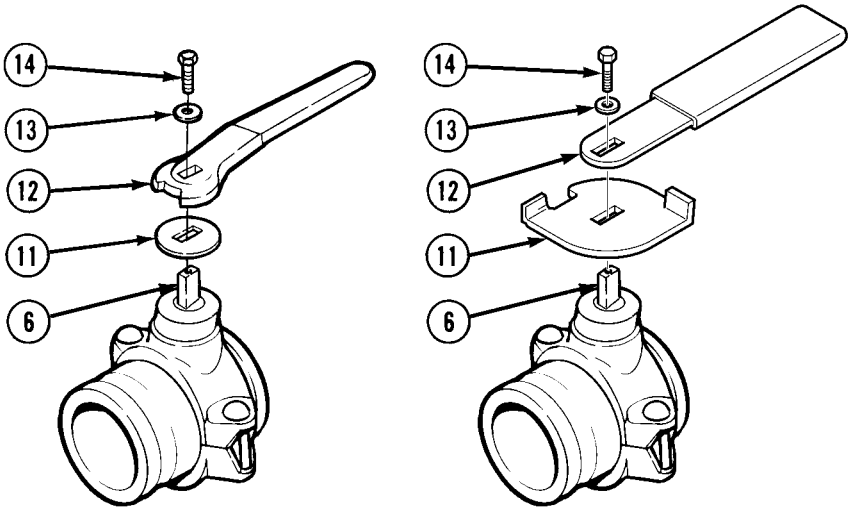
(2) Install preformed packing (2) on lower stem (3).
(3) Lubricate stem (3) and install in lower housing (4).
(4) Install lower housing (4) on body and liner (5).
(5) Install preformed packing (6) on upper stem (7).



NOTE

Stem in upper housing is installed in hole stamped T on body liner.

(6) Install upper housing (8) on body and liner (5).
(7) Install two screws (9) and nuts (10) in upper housing (8) and lower housing (4).



MODEL A MODEL B

(8) Install washer (11), handle (12), washer (13), and screw (14) on stem (6).

d. Follow-on Maintenance. None.

END OF TASK

22-13. V4 BYPASS/PRESSURE RELIEF VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Compound, pipe thread sealing, Item 29, Appendix C
Solvent, dry cleaning, Item 57, Appendix C
Tags, identification, Item 60, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V4 pressure relief valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

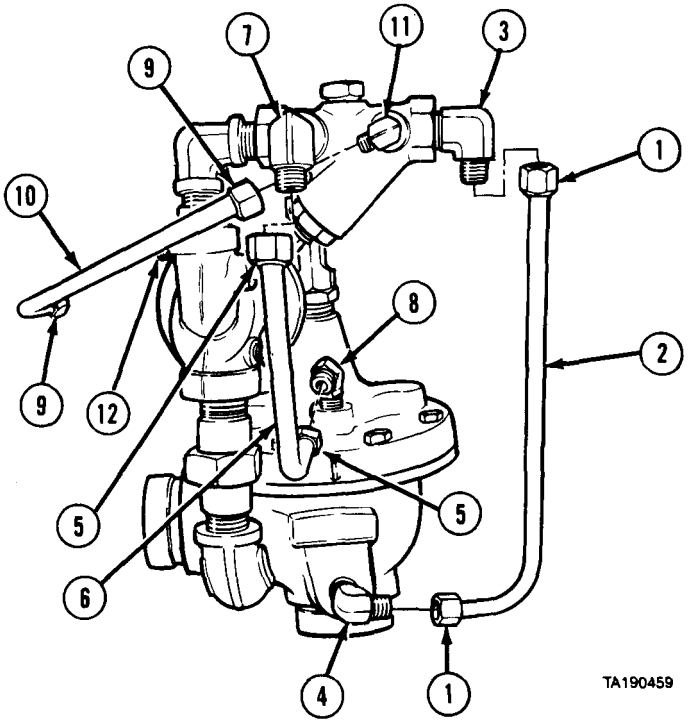
Level of Maintenance
Direct Support

a. Disassembly.

NOTE

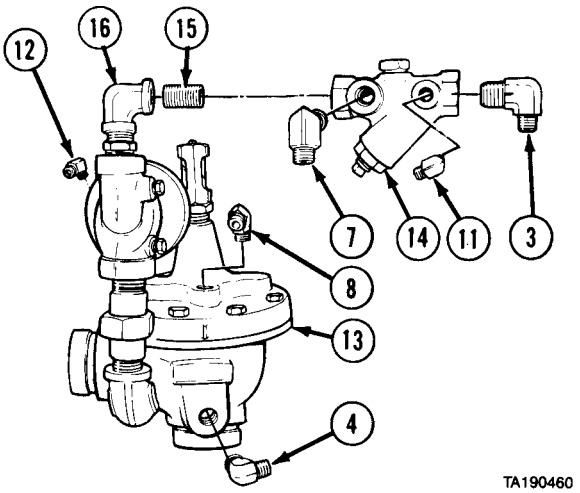
Tag and mark fittings, tubes, and components before removal.

(1) Remove two fittings (1) and tube (2) from elbows (3 and 4).
(2) Remove two fittings (5) and tube (6) from elbows (7 and 8).
(3) Remove two fittings (9) and tube (10) from elbows (11 and 12).



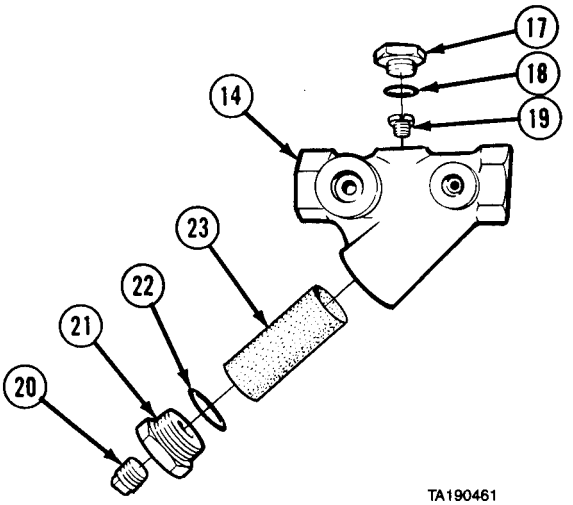
M978 Tanker Maintenance Procedure Instructions (Cont)

(4) Remove six elbows (3, 4, 7, 8, 11, and 12) from relief valve assembly (13).
(5) Remove strainer body (14) and nipple (15) from elbow (16).



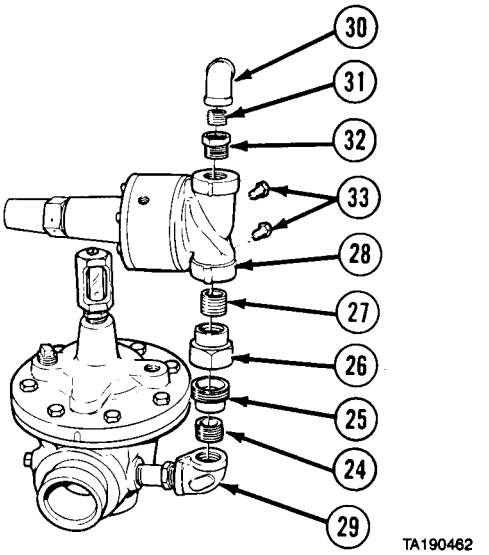
TA190460

(6) Remove plug (17), preformed packing (18), and plastic screw (19) from strainer body (14).
(7) Remove plug (20), fitting (21), preformed packing (22), and strainer screen (23) from strainer body (14).



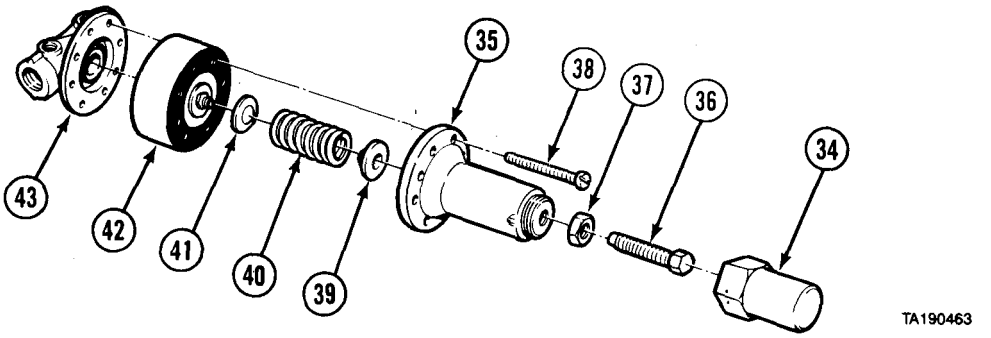
TA190461

(8) Remove nipple (24), union (25), union (26), nipple (27), and control assembly (28) from elbow (29).
(9) Remove elbow (30), nipple (31), and bushing (32) from control assembly (28).
(10) Remove two plugs (33) from control assembly (28).

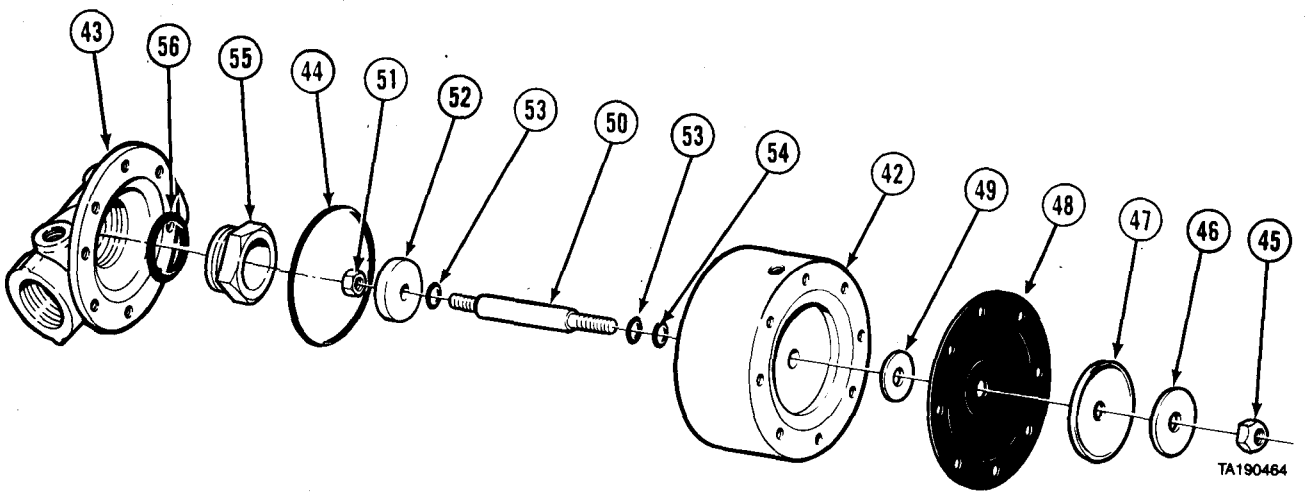


TA190462

22-13. V4 BYPASS/PRESSURE RELIEF VALVE REPAIR (CONT).

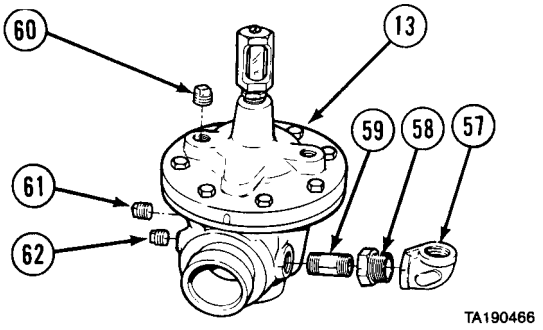


(11) Remove cap (34) from cover (35).
(12) Record number of threads showing on adjusting screw (36) and remove adjusting screw and nut (37).
(13) Remove eight screws (38), cover (35), guide (39), spring (40), guide (41), and control body (42) from valve body (43).



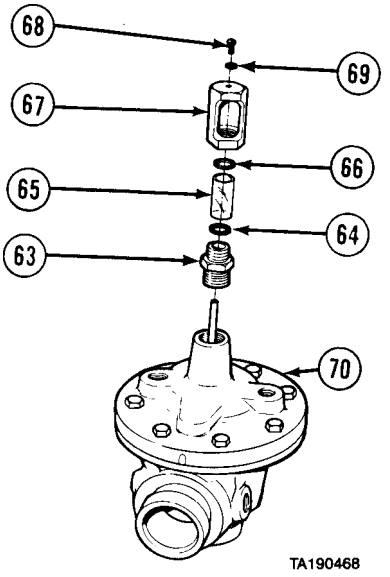
(14) Remove preformed packing (44) from control body (42).
(15) Remove nut (45), washer (46), washer (47), diaphragm (48), and washer (49).
(16) Remove stem (50), nut (51), and retainer (52).
(17) Remove two preformed packings (53) from stem (50) and preformed packing (54) from control body (42).
(18) Remove seat (55) and preformed packing (56) from valve body (43).

M978 Tanker Maintenance Procedures Instructions (Cont)

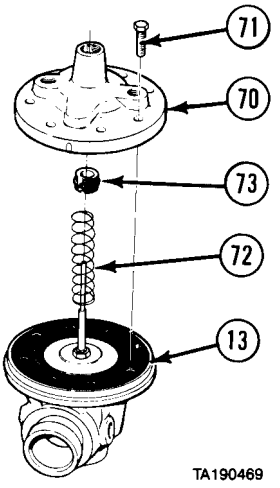


(19) Remove elbow (57), bushing (58), and nipple (59) from relief valve (13).
(20) Remove three plugs (60, 61, and 62) from relief valve (13).

(21) Remove adapter (63), gasket (64), glass tube (65), gasket (66), housing (67), screw (68), and gasket (69) from relief valve cover (70).

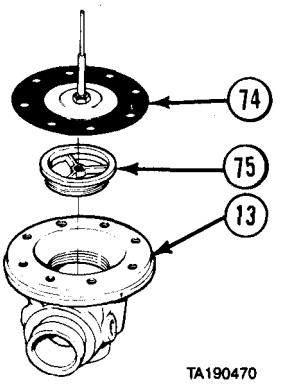


(22) Remove eight screws (71) and relief valve cover (70) from relief valve (13). Remove spring (72).
(23) Remove cover (73) from relief valve cover (70).



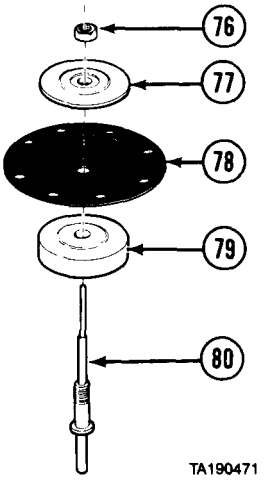
M978 Tanker Maintenance Procedures Instructions (Cont)

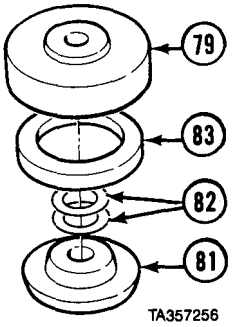
22-13. V4 BYPASS/PRESSURE RELIEF VALVE REPAIR (CONT).



(24) Remove sight rod assembly (74) and seat (75) from relief valve (13).

(25) Remove nut (76), washer (77), diaphragm (78), and seat (79) from stem (80).





(26) Remove guide (81), two washers (82), and disc (83) from seat (79).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all glass and metal parts in dry cleaning solvent.
(2) Wipe rubber parts with clean cloth.

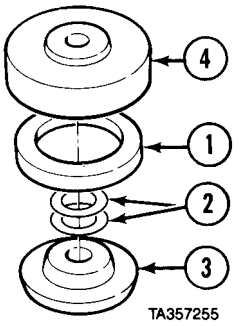
WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

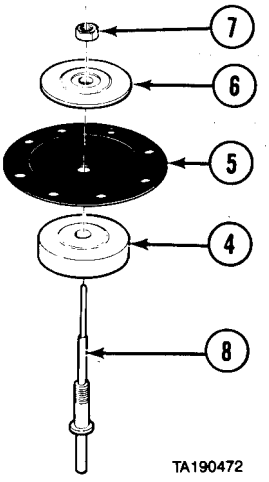
(3) Dry metal parts with compressed air.
(4) Inspect threaded parts for stripping or cross threading. Replace damaged or worn parts.
(5) Inspect rubber parts. Replace damaged parts.
(6) Inspect stems, seats, and washers for scoring, deposits, chips, nicks, or burrs. Remove deposits, chips, nicks, or burrs.
(7) Inspect strainer screen for deposits and holes. Replace damaged screen.
(8) Inspect housings, bodies, and covers for cracks and deposits. Remove deposits, replace damaged housings, bodies, and covers.

c. Assembly.

(1) Install disc (1), two washers (2), and guide (3) in seat (4).

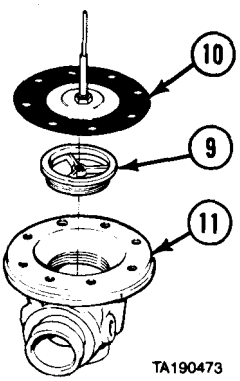


(2) Install seat (4), diaphragm (5), washer (6), and nut (7) on stem (8).

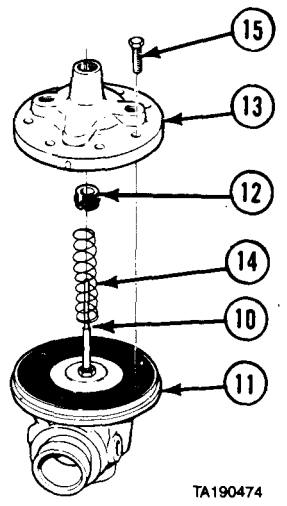


22-13. V4 BYPASS/PRESSURE RELIEF VALVE REPAIR (CONT).

(3) Install seat (9) and sight rod assembly (10) in relief valve (11).



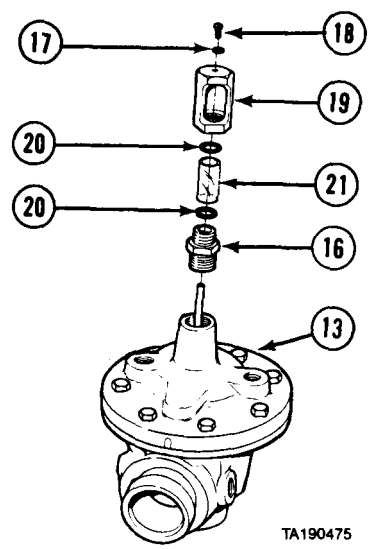
(4) Install seat (12) in relief valve cover (13).
(5) Position spring (14) on sight rod assembly (10) and install relief valve cover (13) on relief valve (11) with eight screws (15).



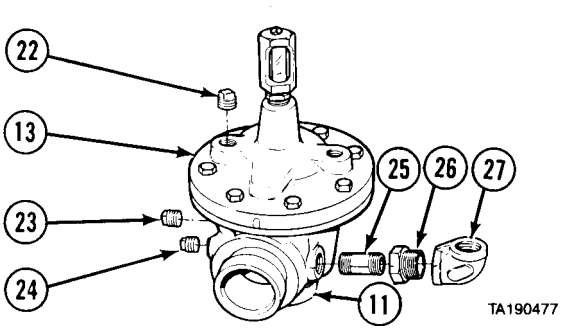
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

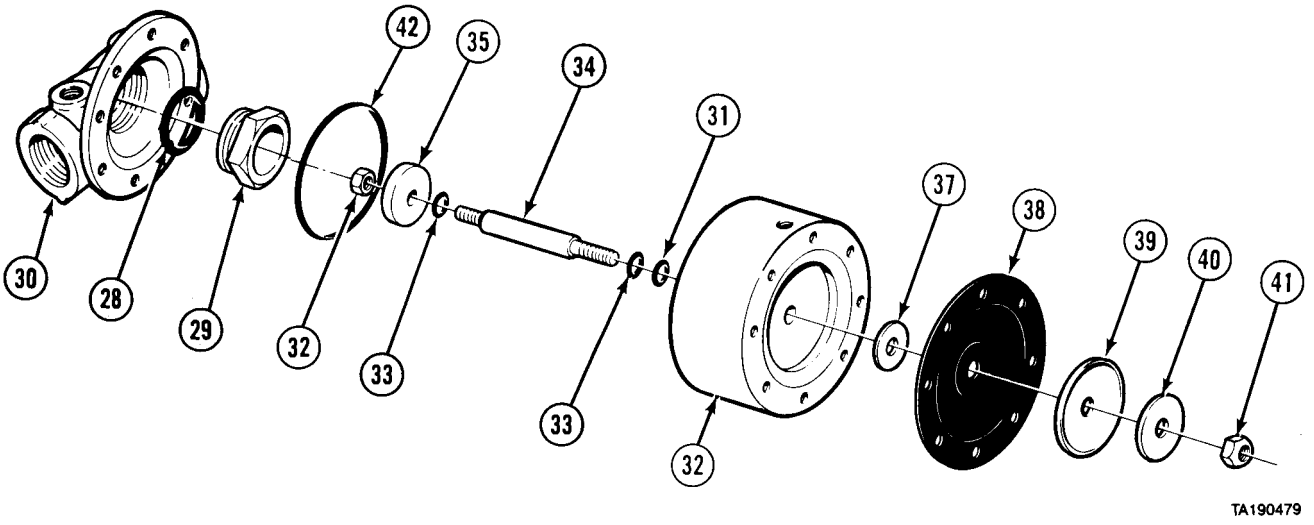
(6) Coat threads of adapter (16) with pipe thread sealing compound and install in relief valve cover (13).
(7) Install gasket (17) and screw (18) in housing (19).
(8) Install gasket (20), glass tube (21), gasket (20), and housing (19) on adapter (16).



M978 Tanker Maintenance Procedures Instructions (Cont)

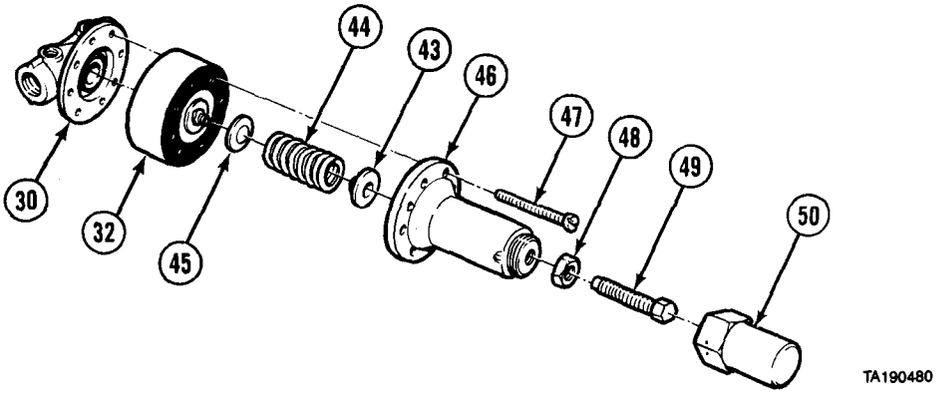


(9) Coat threads of three plugs (22, 23, and 24) with pipe thread sealing compound and install in relief valve (11) and relief valve cover (14).
(10) Coat threads with pipe thread sealing compound and install nipple (25), bushing (26), and elbow (27) in relief valve (11).

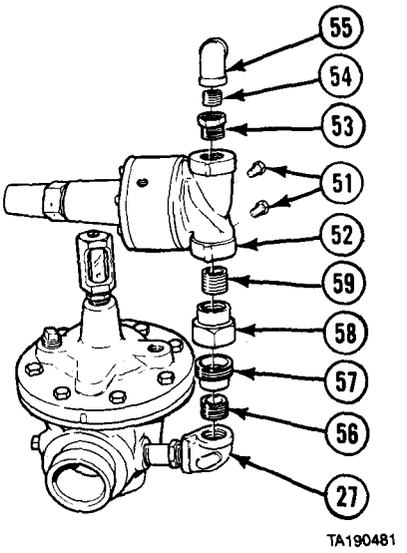


(11) Install preformed packing (28) and seat (29) in valve body (30).
(12) Install preformed packing (31) in control body (32) and two preformed packings (33) on stem (34).
(13) Install stem (34), retainer (35), and nut (36) in control body (32).
(14) Install washer (37), diaphragm (38), washer (39), washer (40), and nut (41) on control body (32) and stem (34).
(15) Install preformed packing (42) in control body (32).

22-13. V4 BYPASS/PRESSURE RELIEF VALVE REPAIR (CONT).



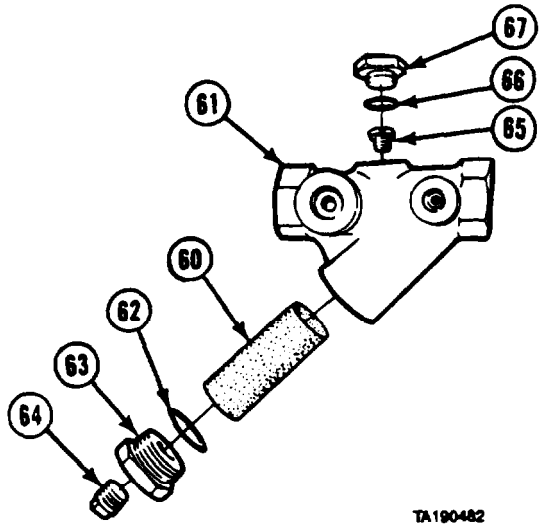
(16) Position control body (32) on valve body (30).
(17) Install guide (43), spring (44), guide (45), and cover (46) with eight screws (47).
(18) Install nut (48) and adjusting screw (49) to recorded number of threads in cover (46). Tighten nut .
(19) Install cap (50) on cover (46).



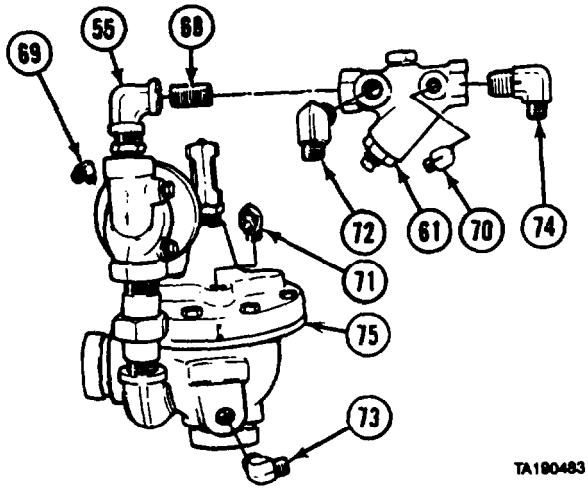
(20) Coat threads with pipe thread sealing compound and install two plugs (51) in control assembly (52).
(21) Coat threads with pipe thread sealing compound and install bushing (53), nipple (54), and elbow (55).
(22) Coat threads with pipe thread sealing compound and install nipple (56), union (57), union (58), nipple (59), and control assembly (52) on elbow (27). Do not tighten.

M978 Tanker Maintenance Procedure Instructions (Cont)

(23) Position strainer screen (60) in strainer body (61) and install preformed packing (62) and fitting (63).
(24) Coat threads of plug (64) with pipe thread sealing compound and install in fitting (63).
(25) Install plastic screw (65), preformed packing (66), and plug (67) in strainer body (61).



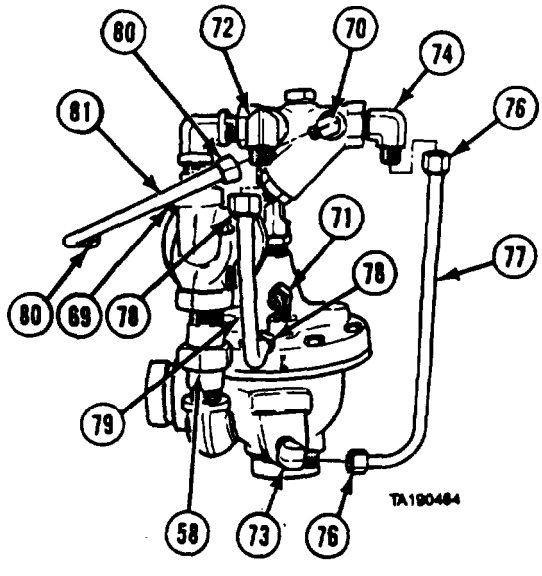
(26) Coat threads with pipe thread sealing compound and install nipple (68) and strainer body (61) on elbow (65).
(27) Coat threads with pipe thread sealing compound and install six elbows (69, 70, 71, 72, 73, and 74) in relief valve assembly (75).



(28) Install two fittings (76) and tube (77) on two elbows (73 and 74).
(29) Install two fittings (78) and tube (79) on two elbows (71 and 72).
(30) Install two fittings (80) and tube (81) on two elbows (69 and 70).
(31) Tighten union (68).

d. Follow-on Maintenance. None.

END OF TASK



22-14. V5 AIR ACTUATED FLOW VALVE AND ACTUATOR REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Adjustment
e. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Fabricated Tools
Compression Tool, Item 8, Appendix B

Supplies
Oil, lubricating, Item 47, Appendix C
Grease, general purpose, lithium base, Item 36, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V5 air actuated flow valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.

NOTE

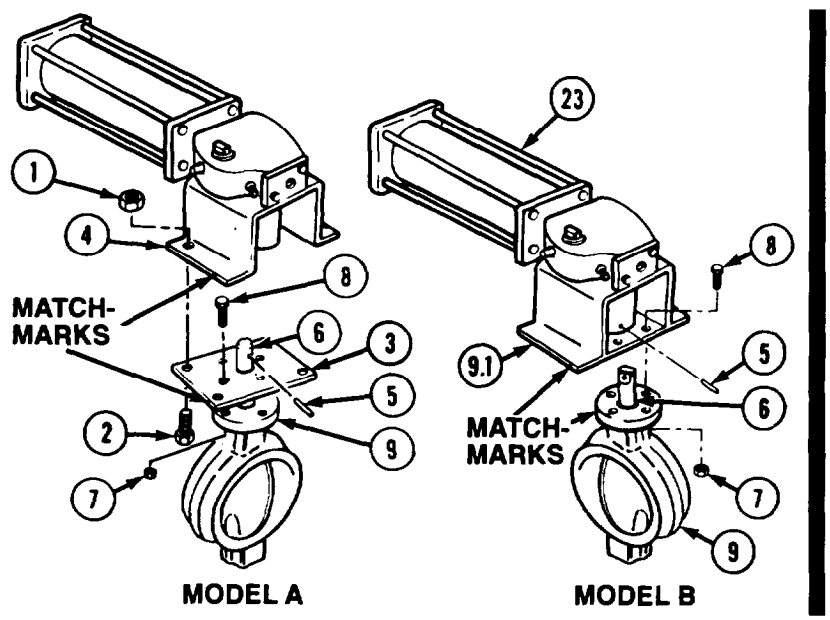
- Mark position of parts before removal.
- There are two models of flow valves. Model A has a two piece bracket. Model B has a single piece bracket. Do step (1) for Model A only.

(1) Remove four nuts (1), screws (2), and bottom bracket (3) from top bracket (4).
(2) Remove pin (5) from stem (6).
(3) Remove four nuts (7) and screws (8).

NOTE

Do step (4) for Model A. Do step (4.1) for Model B.

(4) Remove bottom bracket (3) from butterfly valve (9).
(4.1) Remove flow valve body (23) with bracket (9.1) from butterfly valve (9).



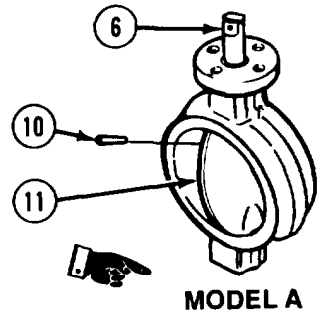
M978 Tanker Maintenance Procedures Instructions (Cont)

CAUTION

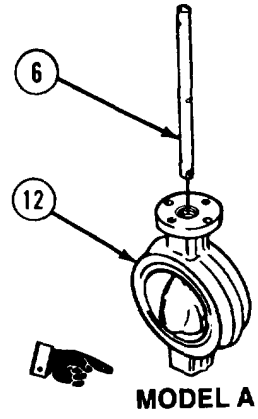
Pin and hole in stem are tapered. When driving out pin, small end should be driven so big end comes out first, or damage to parts can result.

NOTE

There are two model of butterfly valve. Model A can be repaired. Model B cannot be repaired. Refer to TM 9-2320-279-24P for identification of valves. Do steps *(5)* through *(10)* for Model A. Go to step *(10.1)* for Model B.



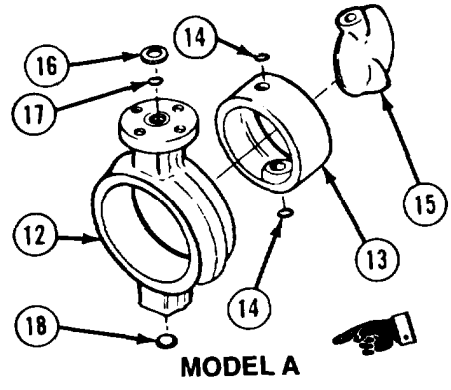
(5) Remove pin (10) from disk (11) and stem (6).
(6) Remove stem (6) from valve body (12).



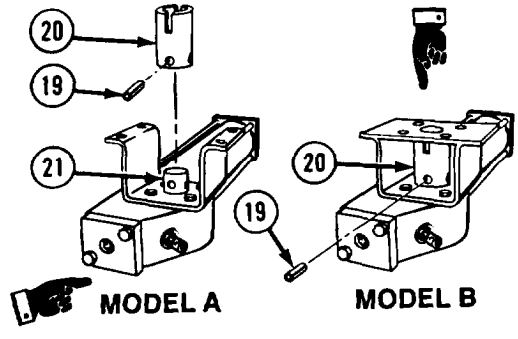
NOTE

Seat and preformed packings may come out with stem.

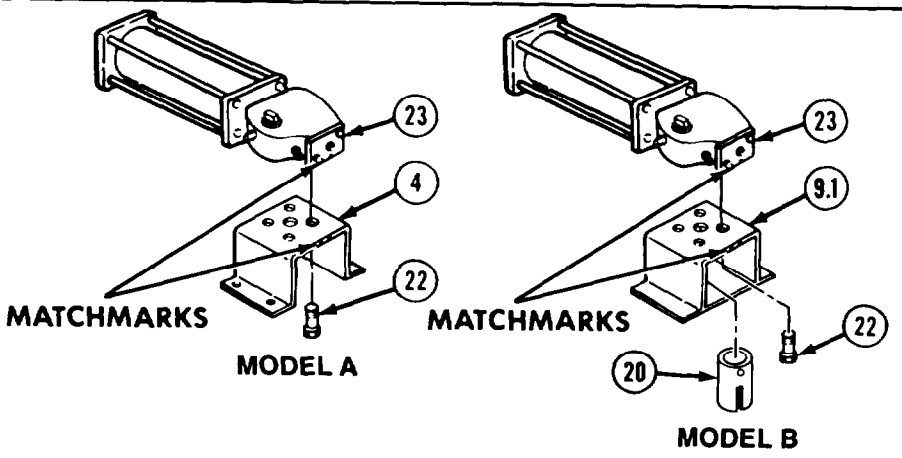
(7) Matchmark and remove seat (13) and two preformed packings (14) from valve body (12).
(8) Mark and remove disk (15) from seat (13).
(9) Remove gasket (16), preformed packing (17), and plug (18).



(10) Remove pin (19) from collar (20) and remove collar from shaft (21).
(10.1) Remove pin (19) from collar (20).



22-14. V5 AIR ACTUATED FLOW VALVE AND ACTUATOR REPAIR (CONT).



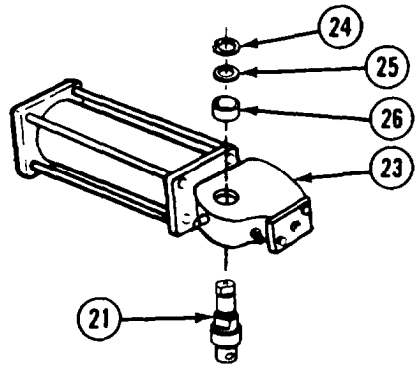
NOTE

Do step *(11)* for Model A. Do step *(11.1)* for Model B.

(11) Remove four screws (22) and top bracket (4) from flow valve body (23).

(11.1) Remove four screws (22), bracket (9.1), and collar (20) from flow valve body (23).

(12) Remove retaining ring (24) and washer (25) from shaft (21).



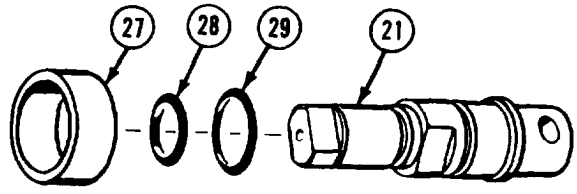
CAUTION

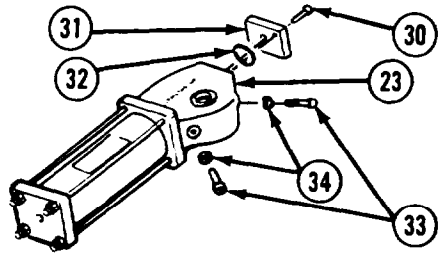
Shaft must be driven out through bottom side of body to prevent damage to parts.

(13) Remove shaft (21) from flow valve (23).

(14) Remove bearing (26) from flow valve (23).

(15) Remove bearing (27), preformed packing (28), and preformed packing (29) from shaft (21).



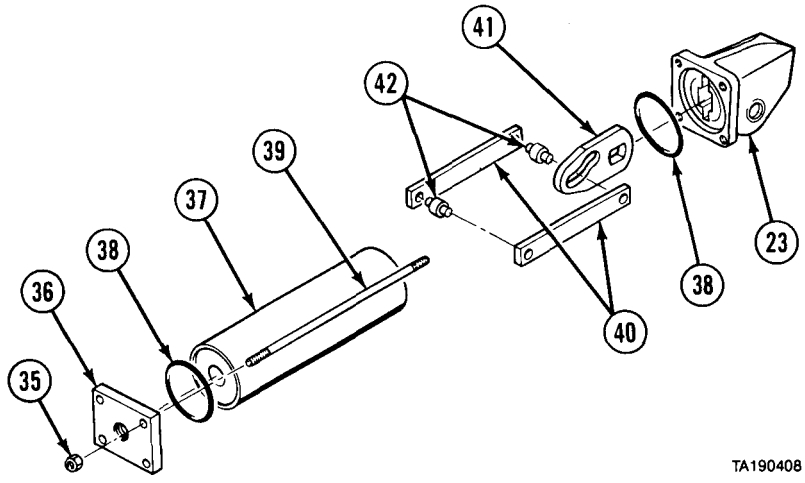


(16) Remove two screws (30), end cap (31), and preformed packing (32) from flow valve body (23).

(17) Record number of threads and remove two stop screws (33) and locknuts (34).

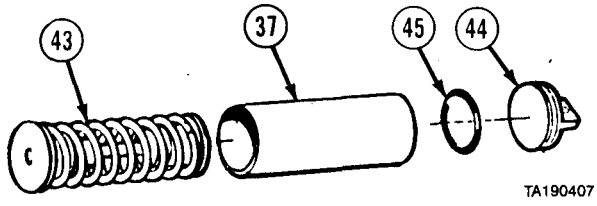
M978 Tanker Maintenance Procedure Instructions (Cont)

(18) Remove four cylinder locknuts (35), cylinder end cap (36), cylinder assembly (37), and two preformed packings (38) from flow valve body (23).
(19) Remove four cylinder cap rods (39).
(20) Remove two guide bars (40), cam lever (41), and two guide pins (42) from cylinder assembly (37).



TA190408

(21) Remove spring assembly (43) from cylinder (37).
(22) Remove piston (44) and preformed packing (45).



TA190407

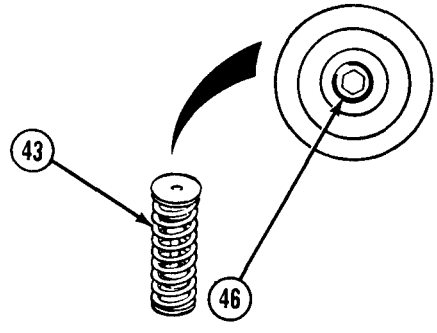
WARNING

Spring is under very extreme tension. Use extreme care when releasing spring to avoid personal injury.

NOTE

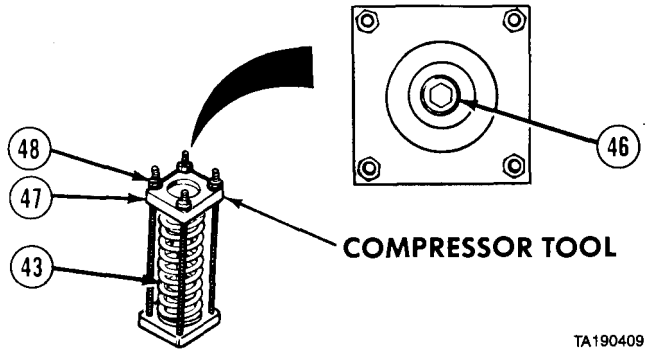
Record length of spring before loosening screw. Screw must be loosened before spring assembly is placed in compression tool.

(23) Hold spring assembly (43) in suitable holding device and loosen screw (46).



TA190406

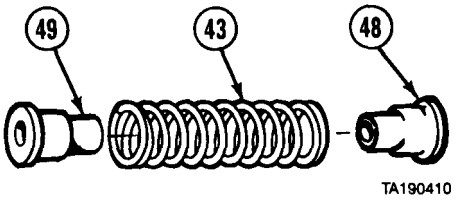
(24) Position spring assembly (43) in compression tool.
(25) Tighten plate (47) against spring assembly (43).
(26) Remove screw (46).
(27) Alternately unscrew four nuts (48) and compression tool a few threads at a time to slowly release tension from spring assembly (43).
(28) Remove spring assembly (43) from compression tool.



TA190409

22-14. V5 AIR ACTUATED FLOW VALVE AND ACTUATOR REPAIR (CONT).

(29) Remove spring guides (48 and 49) from spring (43).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

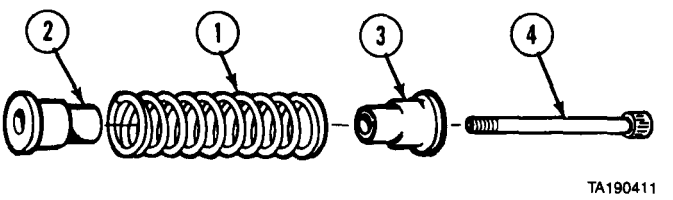
WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect each part for damage.
(4) Replace damaged parts.

c. Assembly.

(1) Aline spring (1), spring guides (2 and 3), and screw (4).



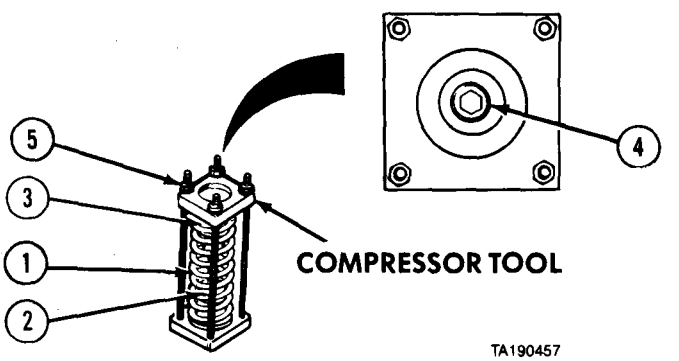
WARNING

As spring is compressed, keep spring tension under control to prevent injury to personnel.

(2) Using compression tool, alternately tighten four nuts (5) and compress spring (1) and spring guides (2 and 3).

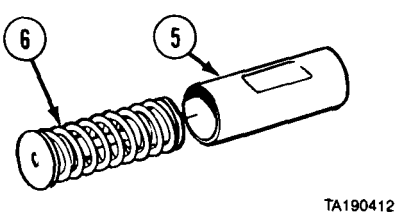
NOTE

Be sure spring is compressed to recorded length.



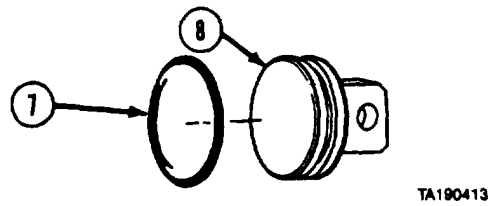
(3) Install screw (4) in spring guide (3) and remove compression tool.

(4) Apply thin layer of grease to inside of cylinder (5) and install spring assembly (6) in cylinder.



M978 Tanker Maintenance Procedure Instructions (Cont)

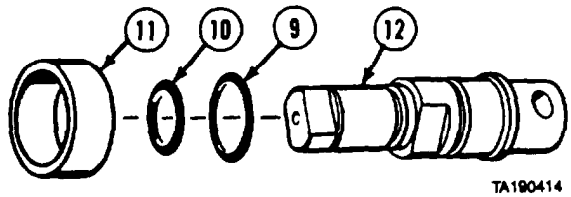
(5) Install preformed packing (7) on piston (8).



CAUTION

If one bearing was faulty, both bearings must be replaced to ensure proper shaft operation and fit.

(6) Install two preformed packings (9 and 10) and bearing (11) on shaft (12).

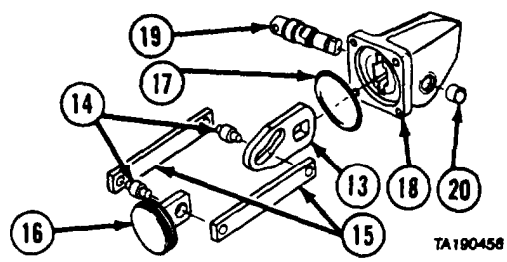


(7) Install cam lever (13) with. two pins (14) and guide bars (16) on piston assembly (16).
(8) Install preformed packing (17) on valve body (18).
(9) Install piston assembly (16) on valve body (18).

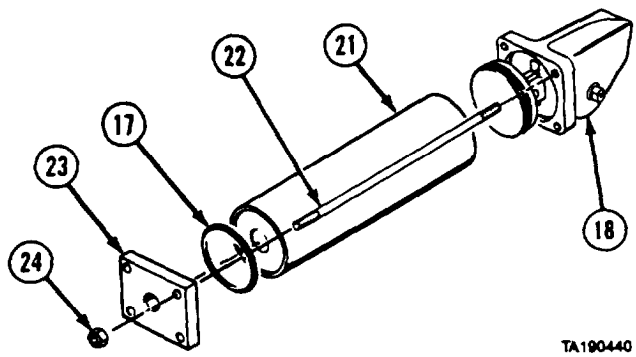
NOTE

Make sure shaft is installed through cam lever inside body.

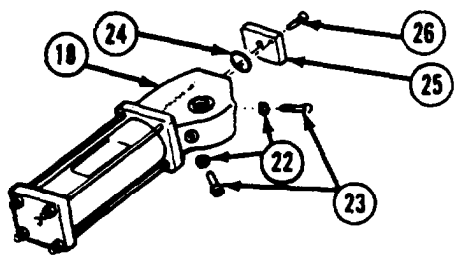
(10) Aline and install shaft assembly (19) in flow valve body (18). Install bearing (20) in flow valve body.



(11) Install cylinder assembly (21) in valve body (18).
(12) Install four cylinder cap rods (22) in valve body (18).
(13) Install preformed packing (17) in end cap (23).
(14) Install end cap (23) with four nuts (24).

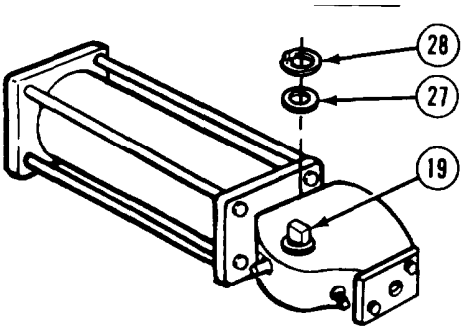


(15) Install two locknuts (22) and stop screws (23) in flow valve body (18) to recorded number of threads.
(16) Install preformed packing (24) and end cap (25) in flow valve body (18) with two screws (26).



M978 Tanker Maintenance Procedures Instructions (Cont)

(17) Install washer (27) and retaining ring (28) on shaft assembly (19).

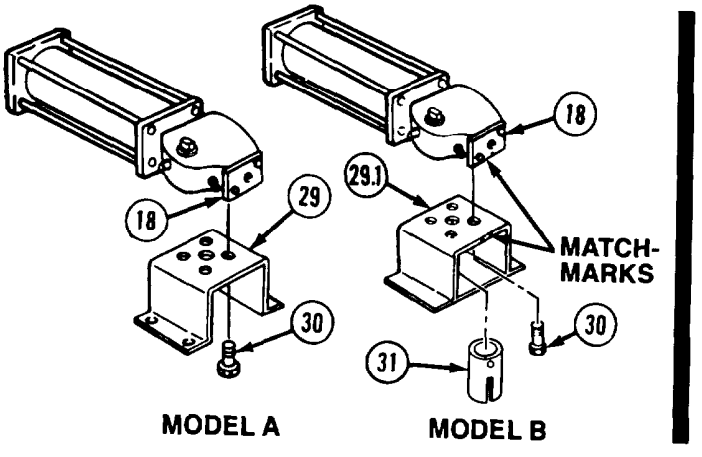


NOTE

Do step (18) for Model A. Do step (18.1) for Model B and continue to step (20).

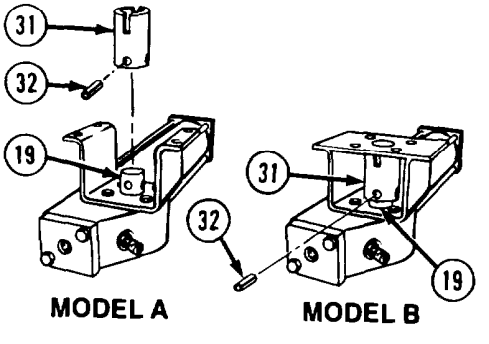
(18) Position top bracket (29) on flow valve body (18) and install four screws (30).

(18.1) Position collar (31) and bracket (29.1) on flow valve body (18) and install four screws (30).



(19) Position collar (31) on shaft (19) and aline holes.

(20) Install pin (32) through collar (31) and shaft (19).



NOTE

There are two models of butterfly valves. Model A can be repaired. Model B cannot be repaired. Refer to TM 9-2320-279-24P for identification of valves. Do steps (21) through (28) for Model A. Go to step (28.1) for Model B.

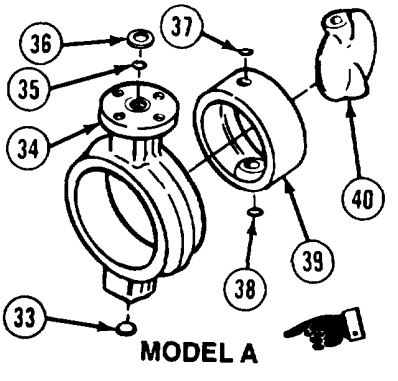
(21) Install plug (33) in valve body (34).

(22) Install preformed packing (35) and gasket (36).

(23) Install two preformed packings (37 and 38) in seat (39).

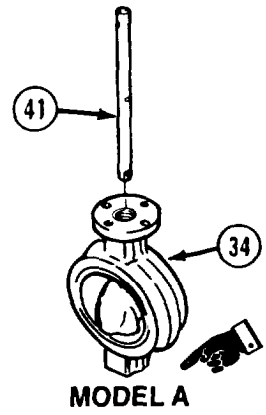
(24) Position disk (40) in seat (39).

(25) Install seat (39) in valve body (34).



M978 Tanker Maintenance Procedures Instructions (Cont)

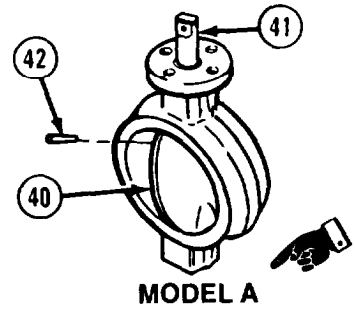
(26) Install stem (41) in valve body (34).



CAUTION

Pin and hole in stem are tapered. When driving in pin, big end should be driven so small end goes in first, or damage to parts can result.

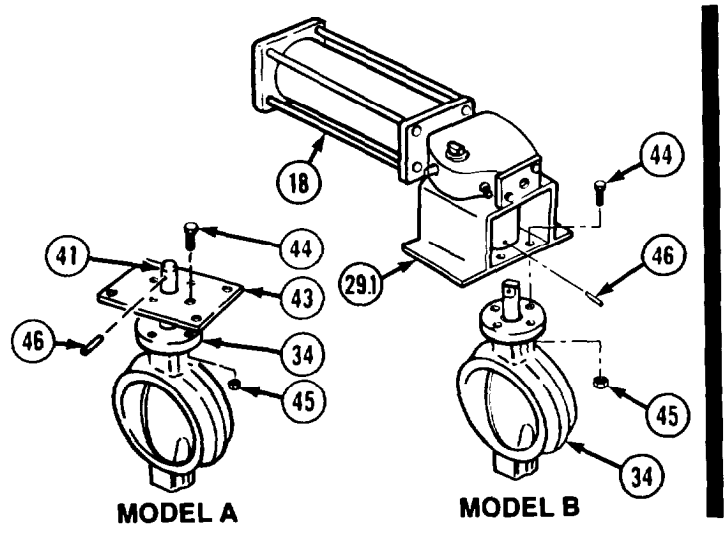
(27) Install pin (42) through disk (46) and stem (41).



(28) Install bottom bracket (43) on butterfly valve body (34) with four screws (44) and nuts (45).

(28.1) Install flow valve body (15) with bracket (29.1) on butterfly valve body (34) with four screws (44) and nuts (45).

(29) Install pin (46) in stem (41).

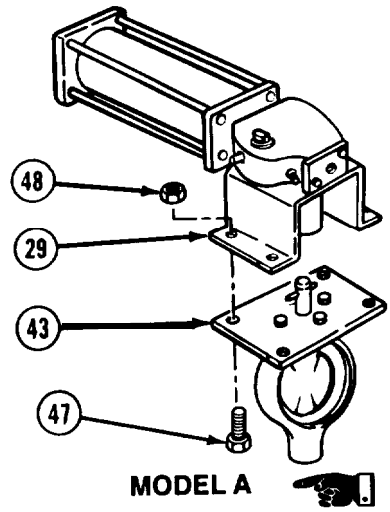


M978 Tanker Maintenance Procedures Instructions (Cont)

NOTE

Do step *(30)* for Model A only.

(30) Install bottom bracket (43) on top bracket (29) with four screws (47) and nuts (48).



M978 Tanker Maintenance Procedure Instructions (Cont)

22-14. V5 AIR ACTUATED FLOW VALVE AND ACTUATOR REPAIR (CONT).

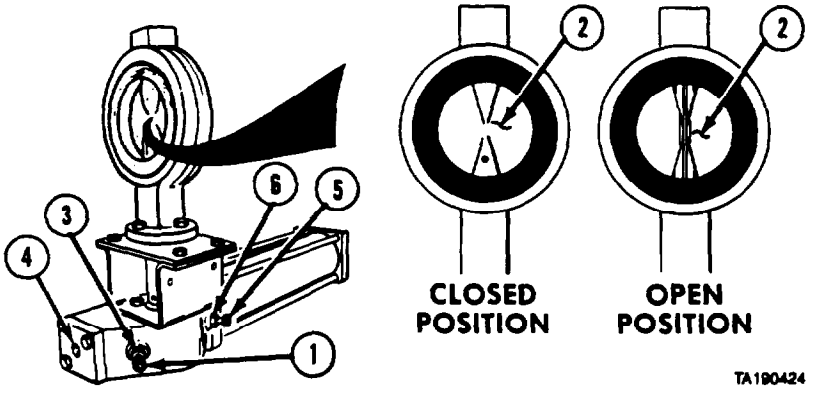
d. Adjustment.

(1) Turn stop screw (1) until disk (2) is in full closed position.

(2) Hold stop screw (1) and tighten locknut (3).

NOTE

Do not apply over 100 psi (690 kPa) air pressure to actuator.



(3) Apply air pressure to flow valve body (4).

(4) Turn stop screw (5) until disk (2) is in full open position.

(5) Hold stop screw (5) and tighten locknut (6).

(6) Remove air pressure from valve body (4).

e. Follow-on Maintenance. None.

END OF TASK

22-15. V6 FUEL/DEFUEL VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Adhesive-sealant, silicone, Item 6, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V6 FUEL/DEFUEL valve on clean work surface.

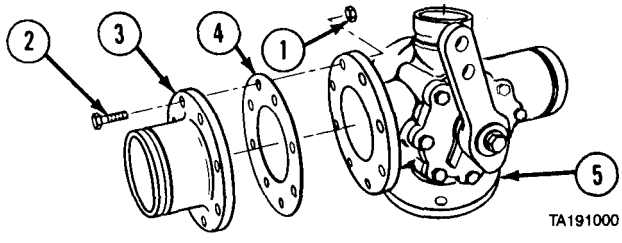
Special Environmental Conditions
None

General Safety Instructions
None

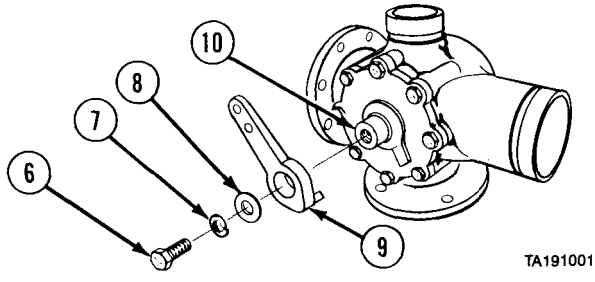
Level of Maintenance
Direct Support

a. Disassembly.

(1) Remove eight locknuts (l), screws (2), flange (3), and gasket (4) from valve housing (5).



(2) Remove screw (6), lockwasher (7), washer (8), and handle (9) from valve plug (lo).



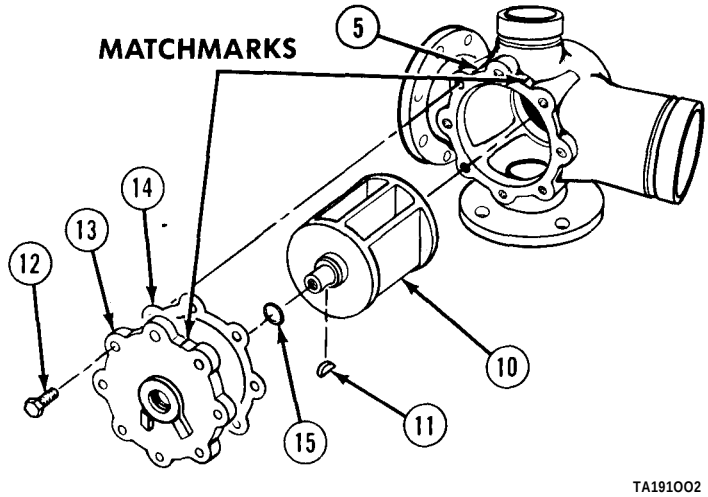
NOTE

Matchmark valve cap and valve housing before removal.

(3) Remove key (11) from valve plug (lo).

(4) Remove eight screws (12), valve cap (13), gasket (14), and valve plug (10) from valve housing (5).

(5) Remove preformed packing (15) from valve cap (13).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

WARNING

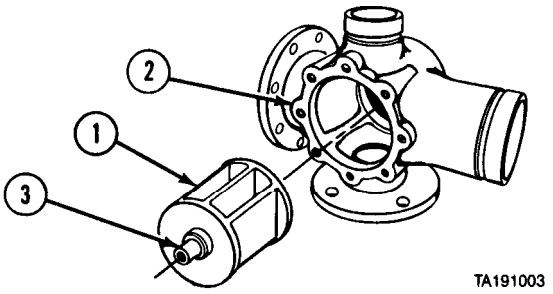
Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect each part for damage.
(4) Replace damaged parts.

[22-1 5. V6 **FUEL/DEFUEL** VALVE REPAIR **(CONT).**]

c. ***Assembly.***

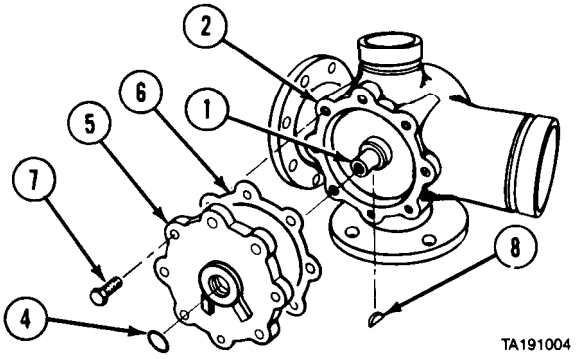
(1) Position valve plug (1) in valve housing (2) so key slot (3) is down.



(2) Install preformed packing (4) in valve cap (5).

WARN NG

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.



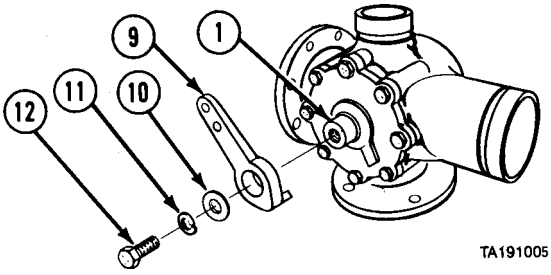
(3) Apply silicone adhesive-sealant to gasket (6) and install on valve cap (5).

(4) Install valve cap (5) on valve housing (2) with eight screws (7).

CAUTION

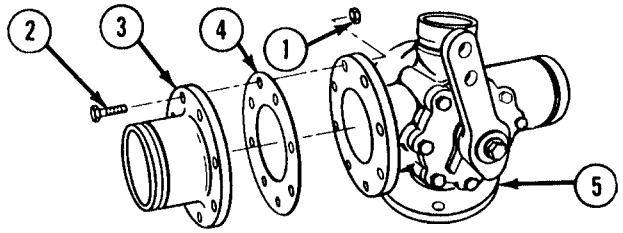
Woodruff key must be installed securely in valve plug slot to ensure proper valve operation.

(5) Install key (8) in valve plug (l).



(6) Install handle (9), washer (10), lockwasher (1 1), and screw (12) on valve plug (1).

(7) Install gasket (13), flange (14), screws (15), and locknuts (16) in valve housing (2).



d. Follow-on Maintenance. None.

END OF TASK

22-16. V7/V8 REEL VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 47, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition
TM or Para — *Condition Description*
V7 or V8 reel valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.

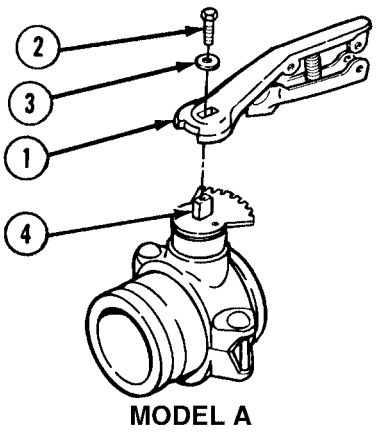
CAUTION

Valve must be in open position for removal of valve parts and to prevent equipment damage.

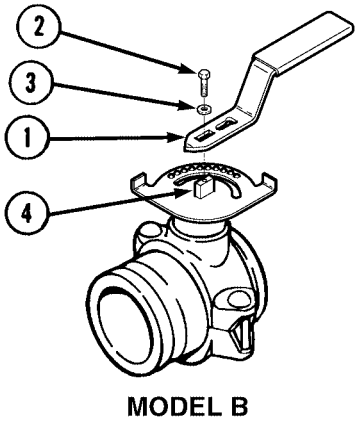
NOTE

V7 Models A and B and V8 Models A and B reel valves are disassembled the same way.

(1) Set handle (1) to OPEN position.
(2) Remove screw (2), washer (3), and handle (1) from stem (4).



MODEL A



MODEL B

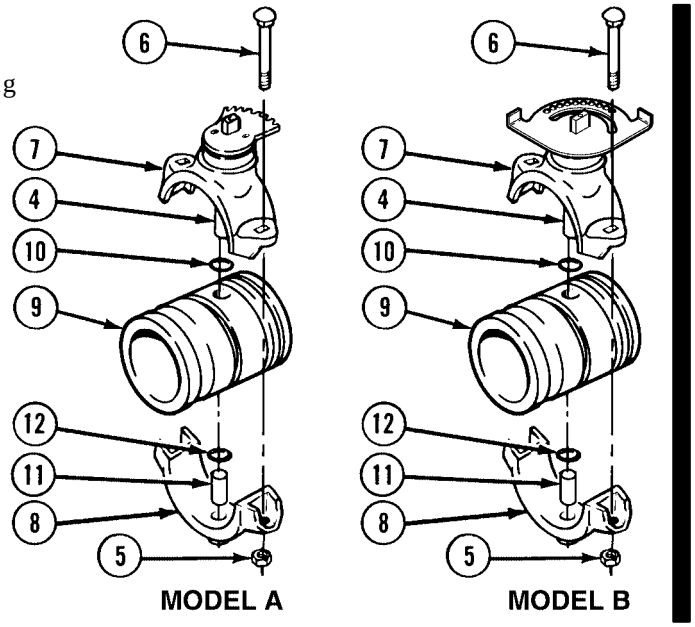
22-16. V7/V8 REEL VALVE REPAIR (CONT).

(3) Remove two nuts (5) and screws (6) from upper housing (7) and lower housing (8).
(4) Remove upper housing (7) and lower housing (8) from body and liner (9).
(5) Remove preformed packing (10) from stem (4).

NOTE

Stem may stay in lower housing or body.

(6) Remove stem (11) from housing (8).
(7) Remove preformed packing (12) from stem (11).



b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect all metal parts for bends, breaks, cracks, and sharp edges.
(4) Replace damaged parts.

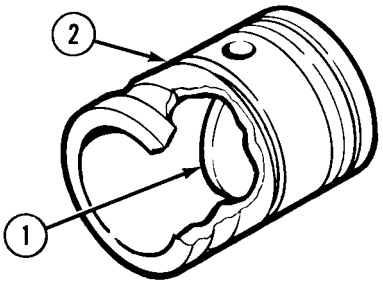
c. Assembly.

CAUTION

Disk must be in open position for proper installation of valve parts and to prevent equipment damage.

NOTE

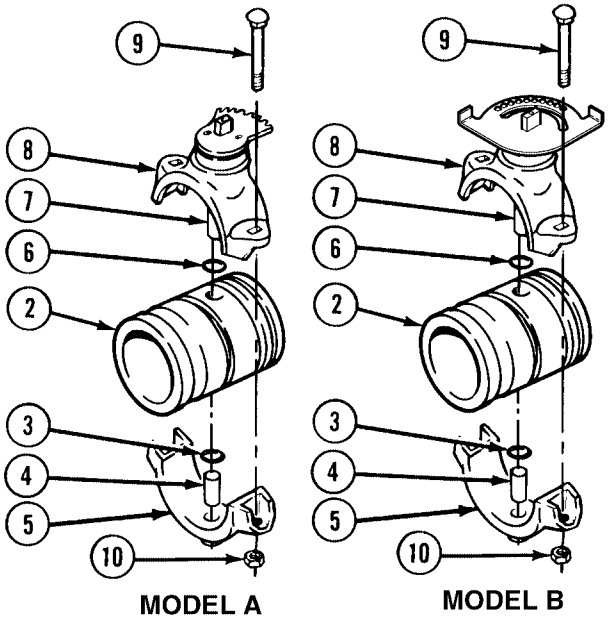
V7 Models A and B and V8 Models A and B reel valves are assembled the same way.

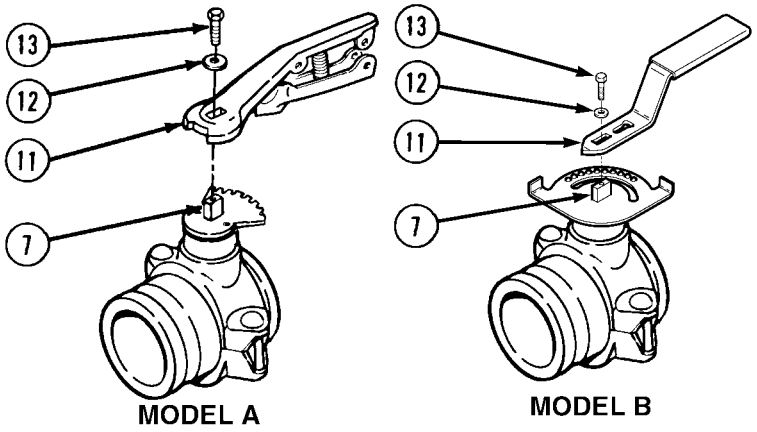


(1) Move disk (1) in body liner (2) to open position.

M978 Tanker Maintenance Procedures Instructions (Cont)

(2) Install preformed packing (3) on stem (4).
(3) Install stem (4) in lower housing (5).
(4) Install preformed packing (6) on stem (7).
(5) Lubricate stems (4 and 7) with oil and position upper housing (8) and lower housing (5) on body and liner (2).
(6) Install two screws (9) and nuts (10) in upper housing (8) and lower housing (5).





(7) Install handle (11) on stem (7) with washer (12) and screw (13).

d. Follow-on Maintenance. None.

END OF TASK

22-17. V10 BOTTOM LOAD VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing, pipe thread, Item 29, Appendix C
Compound, antiseize, Item 17, Appendix C
Oil, lubricating, Item 47, Appendix C
Solvent, drycleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

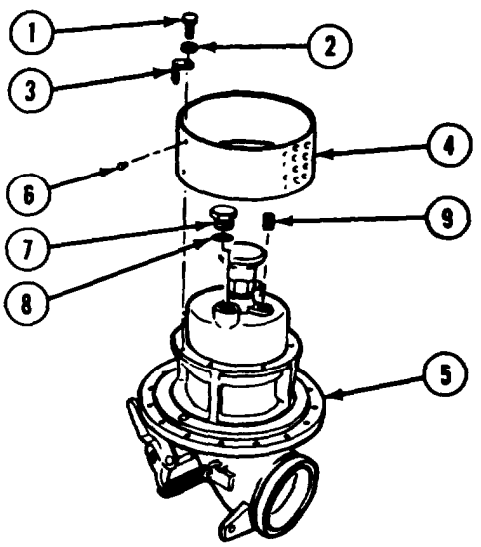
TM or Pam	Condition Description
	V10 bottom load valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Disassembly

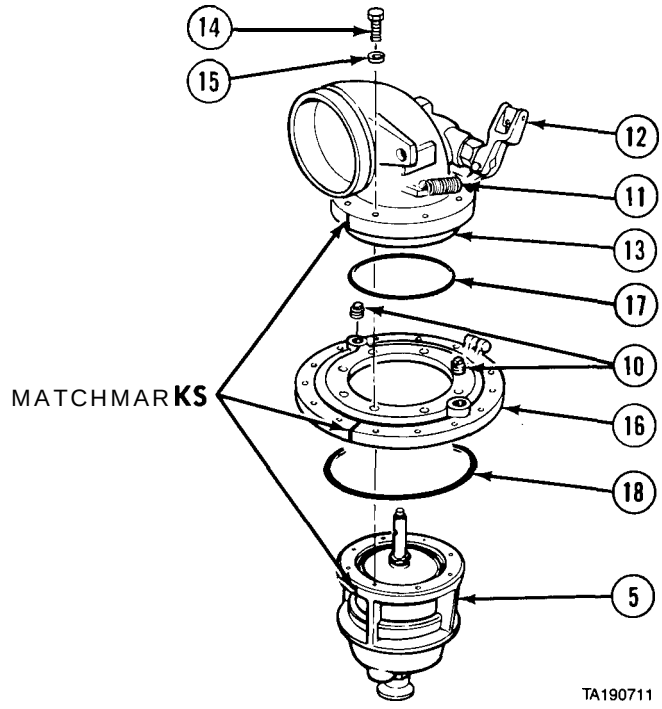


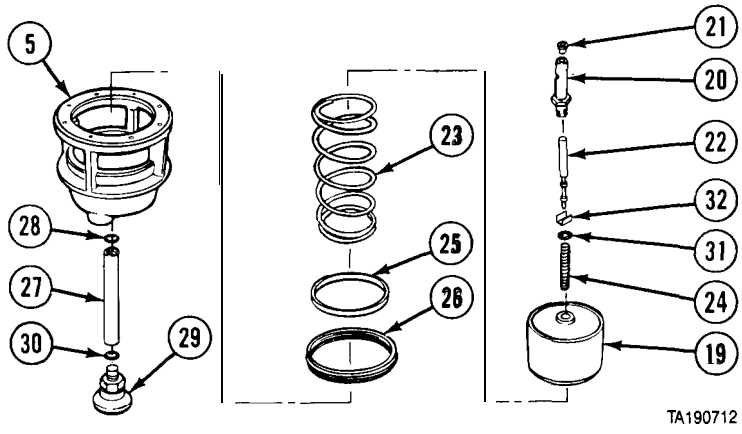
(1) Remove four screws (1), lockwashers (2), and retainers (3).
(2) Remove screen (4) from valve body (5).
(3) Remove two rivets (6) from screen (4).
(4) Remove plug (7) and preformed packing (8).
(5) Remove plug (9).

NOTE

Matchmark parts before disassembly.

(6) Remove two plugs (10).
(7) Remove spring (11) from lever (12) and elbow (13).
(8) Remove eight screws (14) and lockwashers (15).
(9) Remove elbow (13), sump plate (16), preformed packing (17), valve body (5), and preformed packing (18).





WARNING

Valve is spring loaded. Spring must be compressed during disassembly, then released slowly to prevent personal injury.

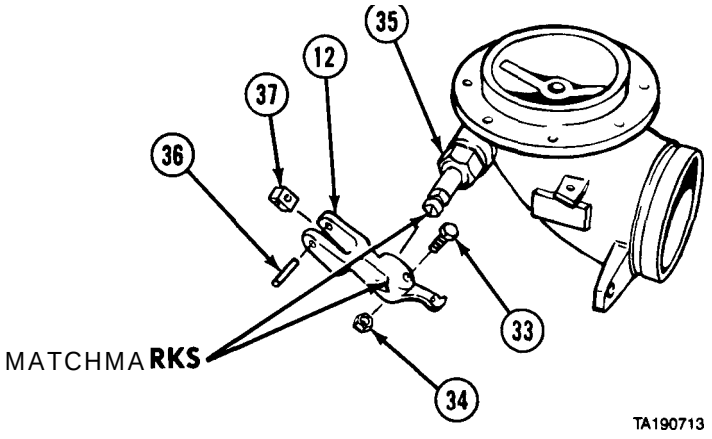
(lo) Push down on piston (19) and remove nut assembly (20), bushing (21), and metering rod (22).
(11) Remove piston (19), spring (23), spring (24), piston seal retainer (25), and seal (26).
(12) Remove shaft (27) and preformed packing (28) from valve body (5).
(13) Remove socket (29) and preformed packing (30) from shaft (27).
(14) Remove retaining ring (31) and bracket (32) from metering rod (22).

22-17. V10 BOTTOM LOAD VALVE REPAIR (CONT).

NOTE

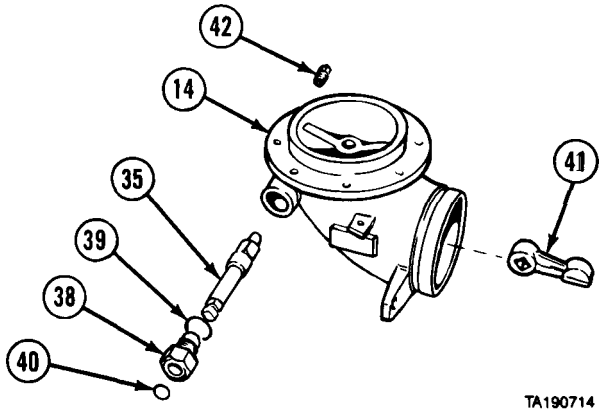
Matchmark position of lever before removal.

(15) Remove screw (33) and nut (34) from lever (12).
(16) Remove lever (12) from shaft (35).
(17) Remove spring pin (36) and link (37).



TA190713

(18) Remove gland (38), preformed packing (39), and seal (40).
(19) Note position and remove shaft (35) and cam (41).
(20) Remove plug (42) from elbow (14).



TA190714

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

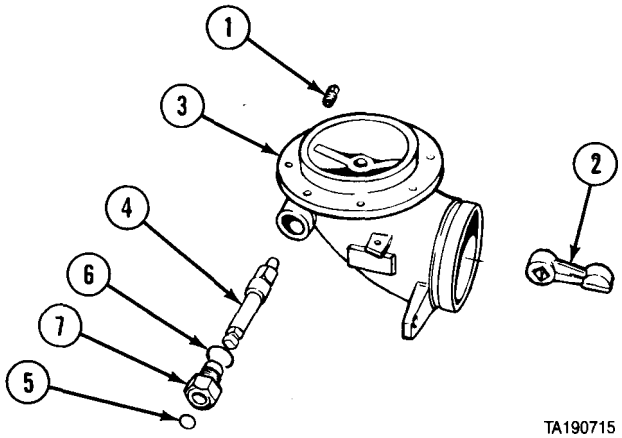
(1) Clean all metal parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect all metal parts for bends, breaks, cracks, and sharp edges.
(4) Inspect springs for cracks and distortion.
(5) Replace damaged parts.

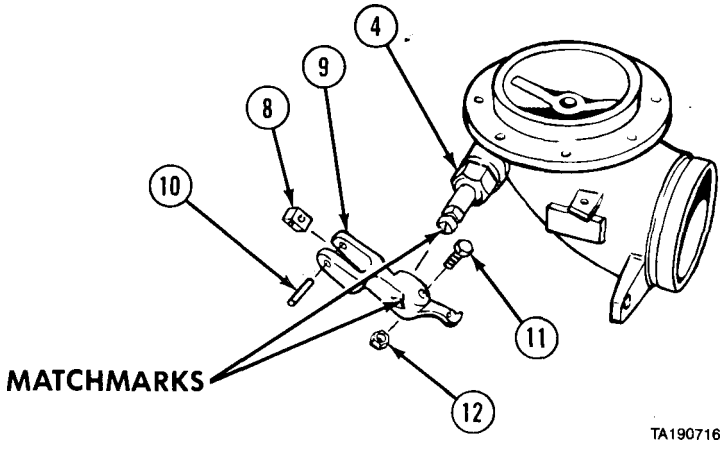
c. Assembly.



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

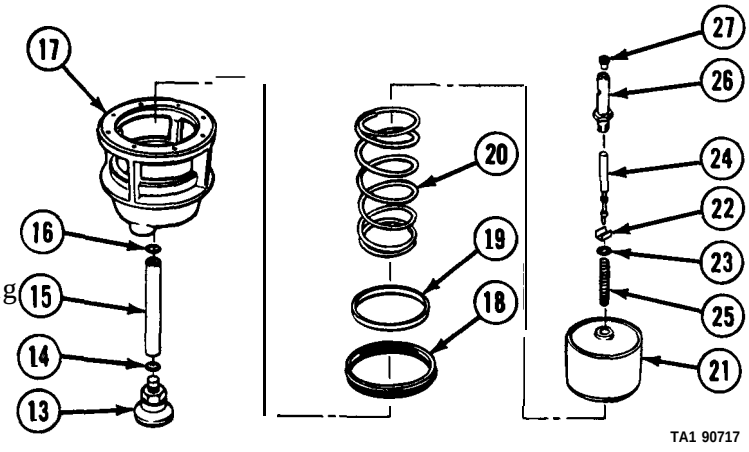
(1) Apply pipe thread sealing compound to plug (1) and install.
(2) Position cam (2) in elbow (3) and install shaft (4).
(3) Install seal (5) and preformed packing (6) in gland (7).
(4) Apply antiseize compound to gland (7) and install in elbow (3).



(5) Install link (8) in lever (9) with spring pin (10).
(6) Aline matchmarks and install lever (9) on shaft (4).
(7) Apply antiseize compound to screw (11) and install screw and nut (12).

122-17. V10 BOTTOM LOAD VALVE REPAIR (CONT).

(8) Install socket (13) and preformed packing (14) in shaft (15).
(9) Install preformed packing (16) and shaft (15) in valve body (17).
(10) Install piston seal (18) and seal retainer (19) in valve body (17).
(11) Lubricate spring (20) and piston (21) with oil and install in valve body (17).
(12) Install bracket (22) and retaining ring (23) on metering rod (24).
(13) Lubricate spring (25) and nut assembly (26) with oil.
(14) Install spring (25) and metering rod (24) in piston (21).



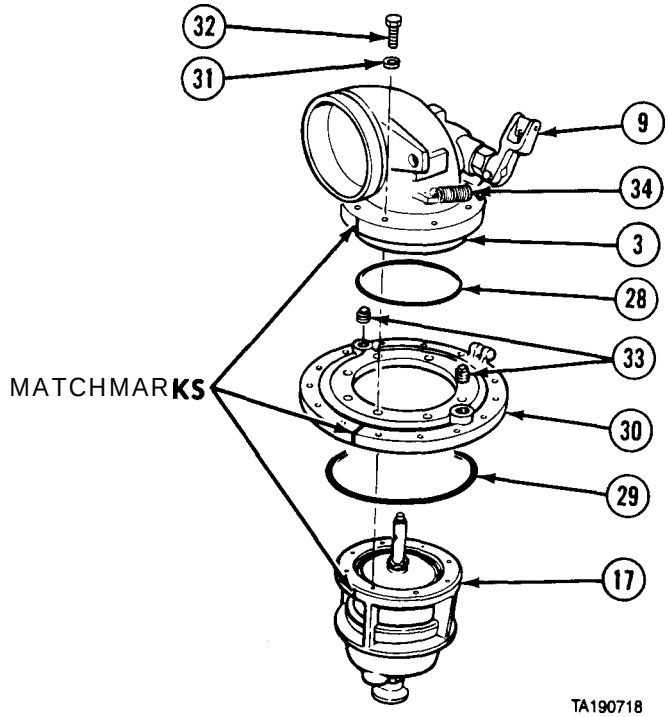
TA1 90717

WARNING

Valve is spring loaded. Spring must be compressed during assembly, then released slowly to prevent injury.

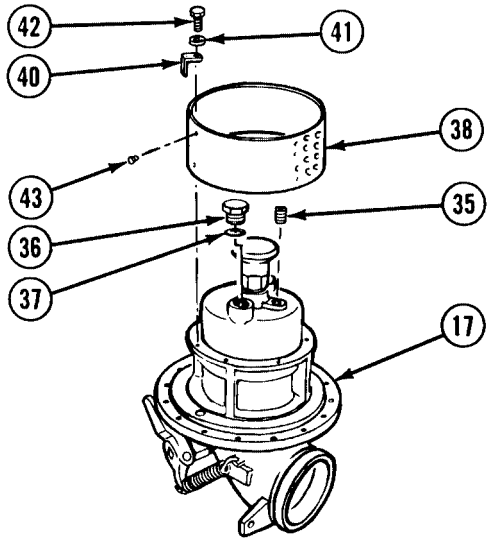
(15) Compress and hold piston (21) and install nut assembly (26) and bushing (27).

(16) Install preformed packing (28) in valve body (17).
(17) Install preformed packing (29) in sump plate (30).
(18) Install sump plate (30) and elbow (3) on valve body (17) with eight lockwashers (31) and screws (32).
(19) Apply pipe thread sealing compound to two plugs (33) and install.
(20) Install spring (34) to elbow (3) and lever (9).



TA190718

(21) Apply pipe thread sealing compound to plug (35) and install in valve body (17).
(22) Install plug (36) and preformed packing (37).
(23) Install screen (38) with four retainers (40), lockwashers (41), and screws (42).
(24) Install two rivets (43).



d. Follow-on Maintenance. None.

END OF TASK

22-18. V11 FLOW REGULATING VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 47, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition
TM or Para — *Condition Description*
V11 flow regulating valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.

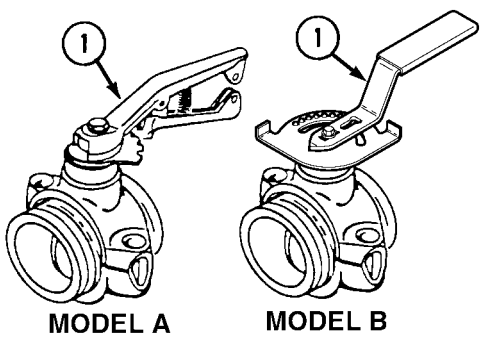
CAUTION

Valve must be in open position for removal of valve parts and to prevent equipment damage.

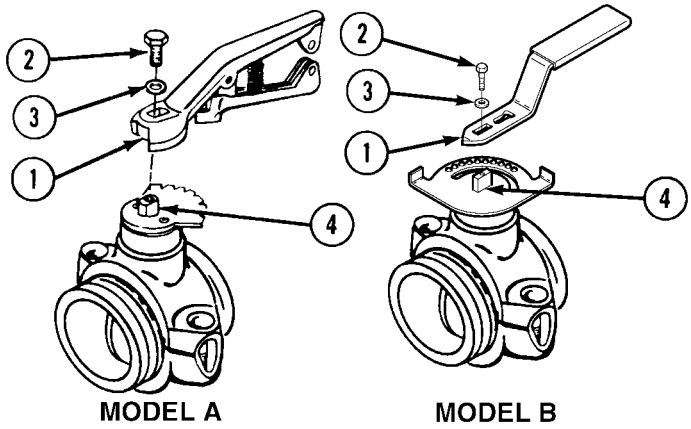
NOTE

There are two models of V11 flow regulating valve. Disassembly is the same for both.

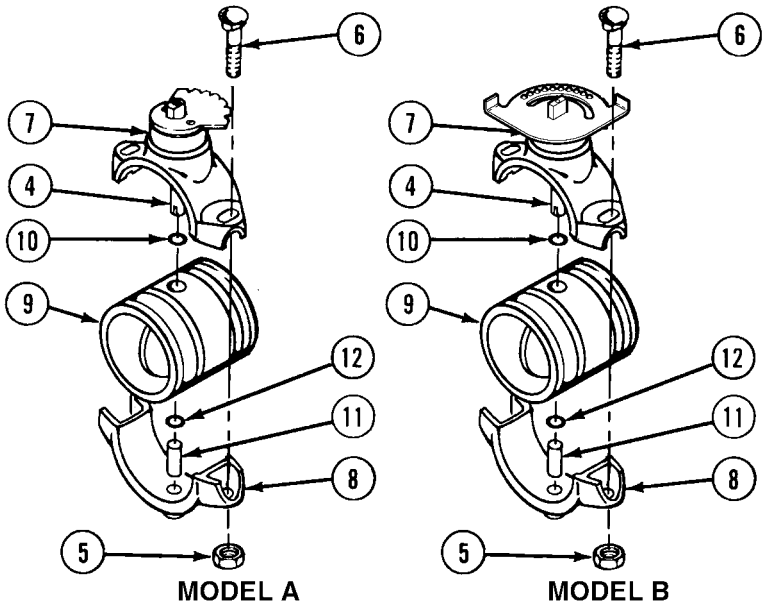
(1) Set handle (1) to OPEN position.



22-18. V11 FLOW REGULATING VALVE REPAIR (CONT).



(2) Remove screw (2), washer (3), and handle (1) from stem (4).



(3) Remove two nuts (5) and screws (6) from upper housing (7) and lower housing (8).
(4) Remove upper housing (7) and lower housing (8) from body and liner (9).

NOTE

Stem and preformed packing may stay in liner during removal.

(5) Remove preformed packing (10) from stem (4).
(6) Remove stem (11) from lower housing (8).
(7) Remove preformed packing (12) from stem (11).

M978 Tanker Maintenance Procedures Instructions (Cont)

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect all parts for bends, breaks, cracks, and sharp edges.
(4) Replace damaged parts.

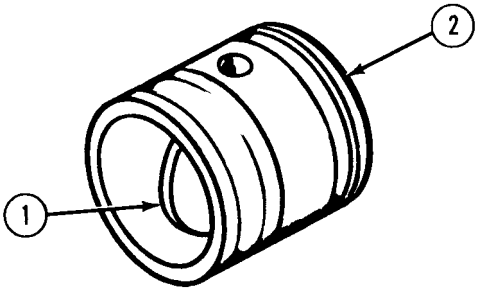
c. Assembly.

CAUTION

Body and liner disk must be in open position to allow proper installation of valve parts and prevent equipment damage.

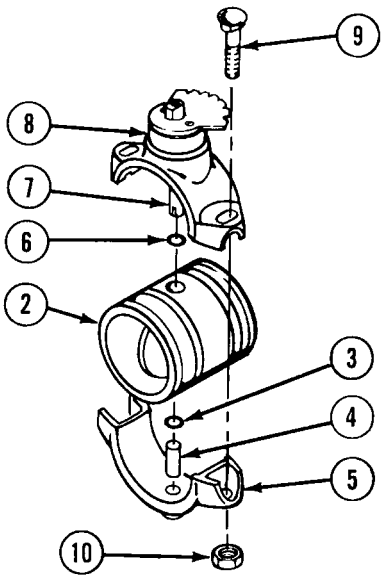
NOTE

There are two models of V11 flow regulating valve. Assembly is the same for both.

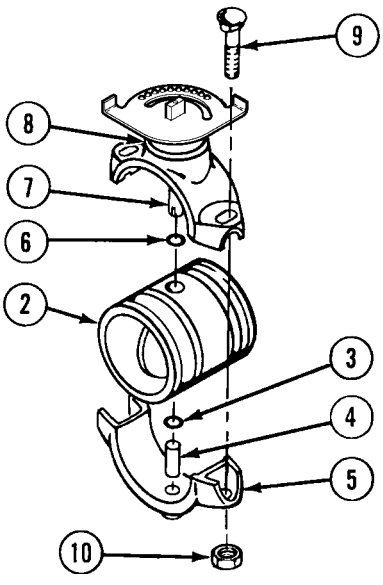


(1) Move disk (1) in body and liner (2) to open position.

(2) Install preformed packing (3) on stem (4).
(3) Install stem (4) in lower housing (5).
(4) Install preformed packing (6) on stem (7).
(5) Lubricate stems (4 and 7) with oil and position upper housing (8) and lower housing (5) on body and liner (2).
(6) Install two screws (9) and nuts (10) in upper housing (8) and lower housing (5).



MODEL A



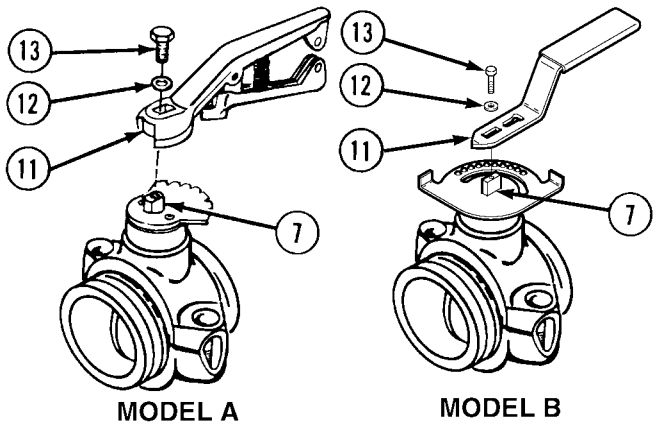
MODEL B

22-18. V11 FLOW REGULATING VALVE REPAIR (CONT).

(7) Install handle (11) on stem (7) with washer (12) and screw (13).

d. Follow-on Maintenance. None.

END OF TASK



22-19 V12 BOTTOM LOAD PRECHECK VALVE AND SAMPLING PROBE VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 47, Appendix C
Solvent, dry cleaning, Item 57, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C

Personnel Required
MOS 63W, wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V12 bottom load precheck valve or sampling probe valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

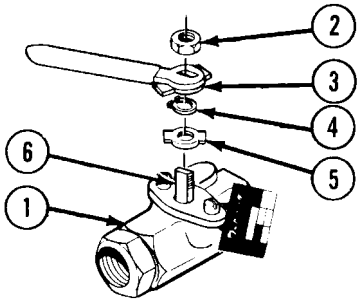
Level of Maintenance
General Support

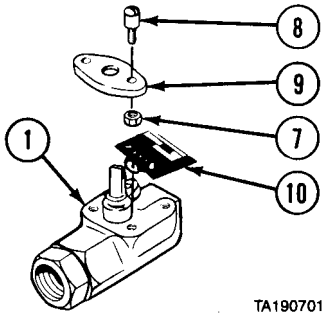
a. Disassembly.

NOTE

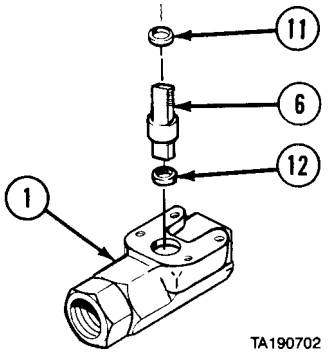
V12 bottom load precheck valve and sampling probe valve are disassembled the same way.

(1) Hold valve body (1) and remove nut (2), handle (3), retaining ring (4), and indicator stop (5) from stem (6).

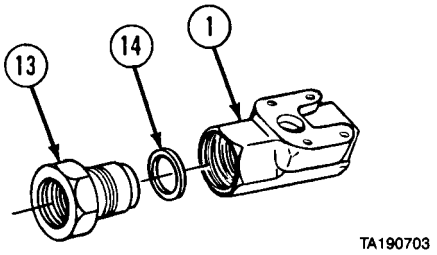




(2) Remove two nuts (7), screws (8), bonnet plate (9), and data plate (10) from valve body (l).



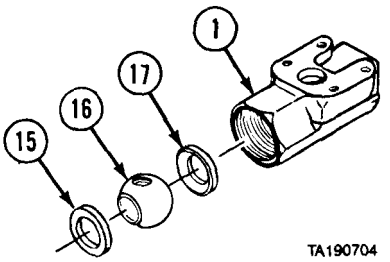
(3) Remove bearing (11), stem (6), and seal (12) from valve body (l).



(4) Remove end cap (13) and seal (14) from valve body (l).

22-19. V12 BOTTOM LOAD PRECHECK VALVE AND SAMPLING PROBE VALVE REPAIR (CONT).

(5) Remove seat (15), ball (16), and seat (17) from valve body (l).



TA190704

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

WARNING

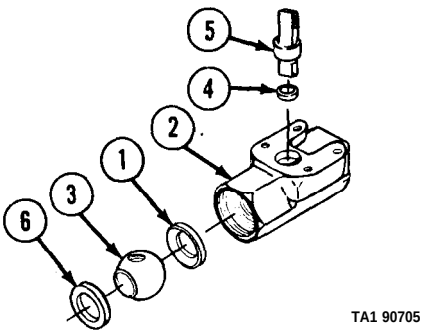
Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect each part for damage.
(4) Replace damaged parts.

c. Assembly.

NOTE

V12 bottom load precheck valve and sampling probe valve are assembled the same way.

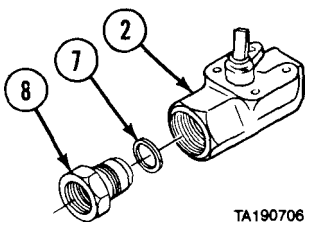


TA1 90705

(1) Lubricate seat (1) with oil.
(2) Install seat (l), bevel edge facing out, in valve body (2).
(3) Lubricate ball (3) with oil and install in valve body (2).
(4) Lubricate seal (4) with oil and install in stem (5).
(5) Install stem (5). Turn stem and rotate ball (3) to closed position
(6) Lubricate seat (6) with oil and install in valve body (2) so bevel"edge is toward ball (3).

CAUTION

Ball is loose inside valve body and can slide out of position. When handling valve body, avoid misalinement of or damage to valve.



TA190706

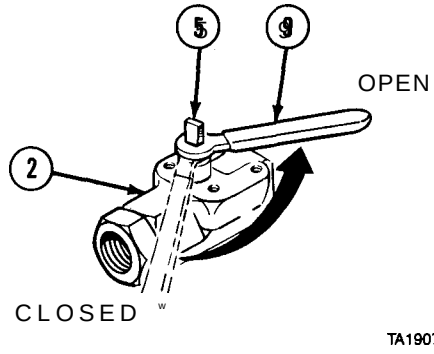
(7) Lubricate seal (7) with oil and install on end cap (8).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(8) Apply pipe thread sealing compound on threads of end cap (8) and install in valve body (2).

(9) Position handle (9) on stem (5).

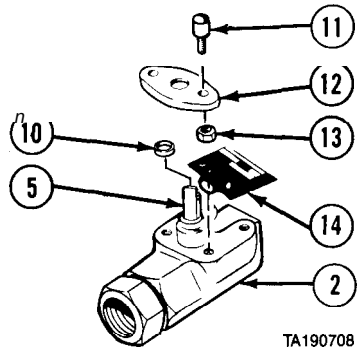


TA190707

CAUTION

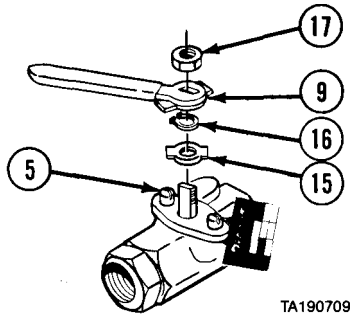
Do not rotate handle quickly. If parts are not seated correctly and valve is turned too fast, parts can be damaged.

(lo) Look through valve body (2) and slowly rotate handle (9) from closed to open position several times to seat ball in valve.
(11) Rotate handle (9) to closed position.
(12) Remove handle (9).



TA190708

(13) Lubricate bearing (10) with oil and install on stem (5).
(14) Install two screws (11) in bonnet plate (12).
(15) Install two nuts (13) 3/8 in. (9.5 mm) from end of screw.
(16) Position data plate (14) on valve body (2). .
(1 7') Install bonnet plate (12) on stem (5).
(18) Tighten two screws (11).
(19) Tighten two nuts (13) against bottom of valve body (2).



TA190709

NOTE

Bottom side of indicator stop is marked “bottom”.

(20) Install indicator stop (15), retaining ring (16), handle (9), and nut (17) on stem (5).

d. Follow-on Maintenance. None.

END OF TASK

22-20. V13VENTVALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special 2%01s
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C
Oil, lubricating, Item 47, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

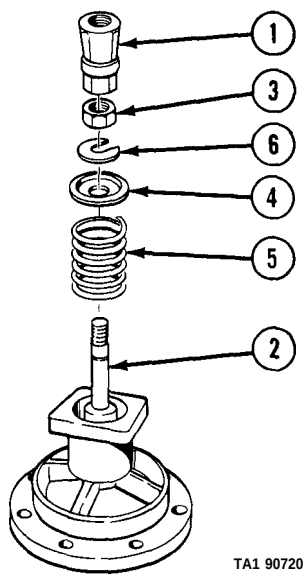
TM or Para	*Condition Description*
	V13 vent valve on clean work surf ace.

Special Environmental Conditions
None

General Safety Instructions
None

Level *of Maintenance*
General Support

a. Disassembly.

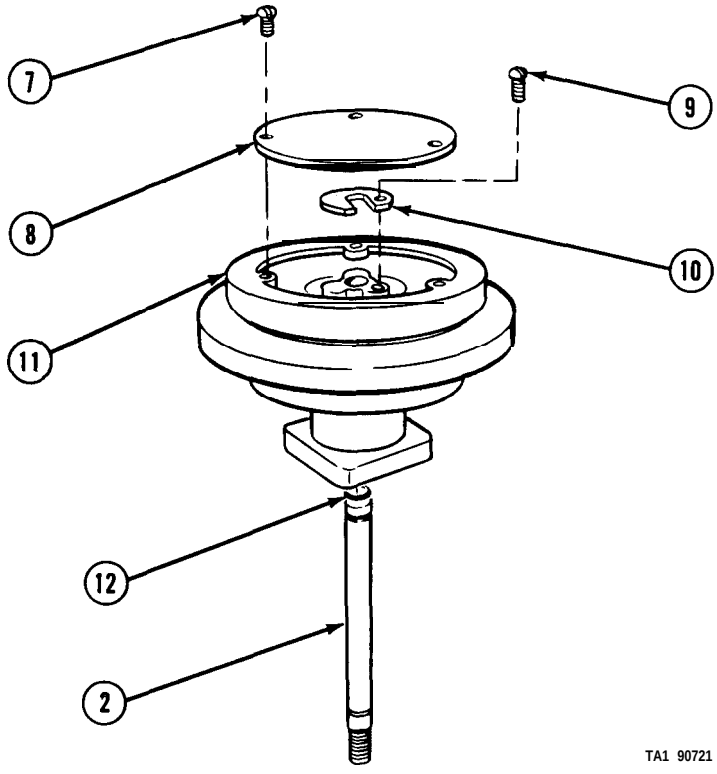


TA1 90720

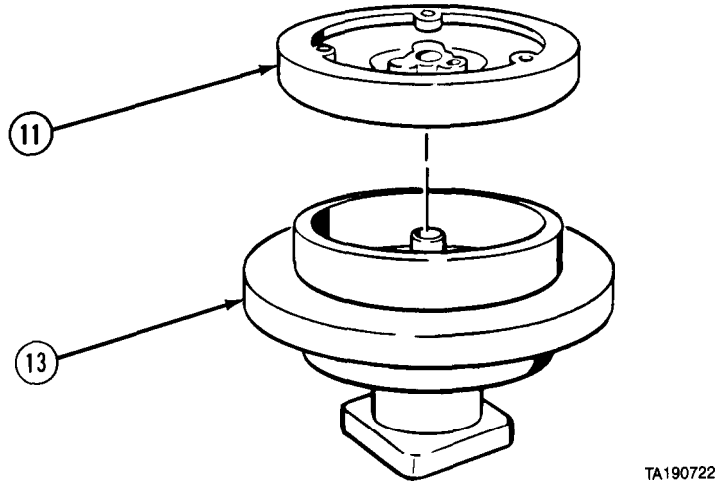
WARNING

Valve is spring loaded. Spring must be compressed then released slowly while removing slotted washer or serious injury may result.

(1) Matchmark socket (1) and shaft (2). Remove socket from shaft.
(2) Remove nut (3) from shaft (2).
(3) Soldier A compresses plate (4) and spring (5) while Soldier B removes slotted washer (6) from shaft (2).
(4) Release tension and remove plate (4) and spring (5) from shaft (2).



(5) Remove three screws (7) and poppet cover (8).
(6) Remove screw (9) from slotted washer (10) and slotted washer from shaft (2).
(7) Remove shaft (2) from poppet (11).
(8) Remove preformed packing (12) from shaft (2).



(9) Remove poppet (11) from valve body (13).

22-20. VI 3 VENT VALVE REPAIR **(CONT).**

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

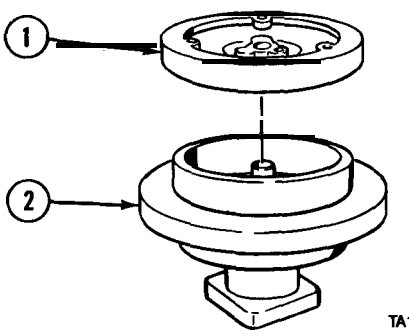
(1) Clean all metal parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect all parts for damage.
(4) Replace damaged parts.

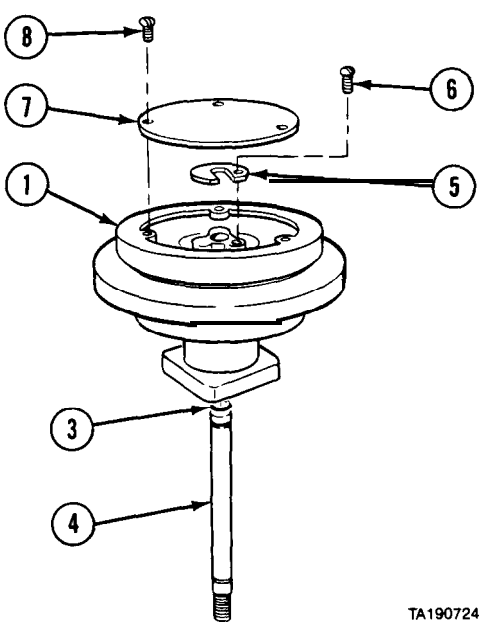
c. Assembly.



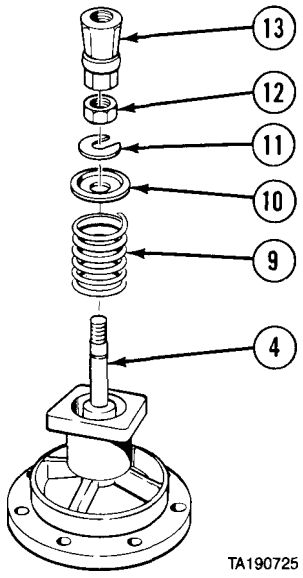
TA190723

(1) Position poppet (1) on valve body (2).

(2) Lubricate preformed packing (3) with oil and install on shaft (4).
(3) Install shaft (4) in poppet (l).
(4) Position slotted washer (5) on shaft (4) and install screw (6).
(5) Install poppet cover (7) on poppet (1) with three screws (8).



TA190724



(6) Position spring (9) and plate (10) on shaft (4).
(7) Soldier A installs slotted washer(11) and nut (12) while Soldier B compresses plate (10) and spring (9).
(8) Aline matchmarks and install socket (13) on shaft (4).

cf. Follow-on Maintenance. None.

END OF TASK

22-21. **V14** PILOT VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C
Oil, lubricating, Item 47, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V14 pilot valve on clean work surface.

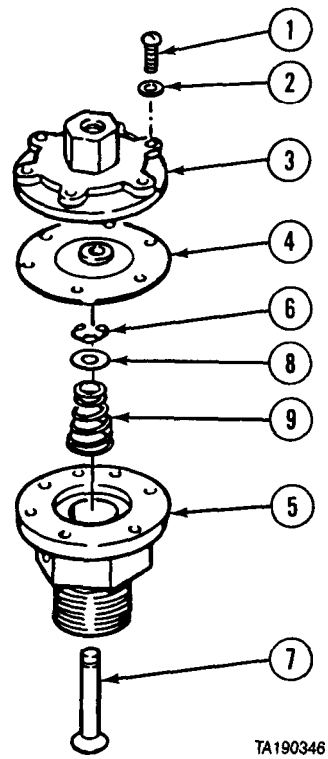
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

122-21. V14 PILOT VALVE REPAIR (CONT).

a. Disassembly.
(1) Remove six screws (1) and washers (2) from cover (3).
(2) Remove cover (3) and diaphragm (4) from fitting (5).



CAUTION

Release spring tension slowly to prevent parts from scattering and being lost.

(3) Remove retaining ring (6) from poppet (7) and remove poppet from fitting (5).
(4) Remove washer (8) and spring (9) from fitting (5).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with clean cloth or compressed air.
(3) Inspect all metal parts for bends, breaks, cracks, and sharp edges.
(4) Replace damaged parts.

c. Assembly.
(1) Install poppet (7) in fitting (5).
(2) Apply thin coat of oil to spring (9) and install on poppet (7).

CAUTION

Keep pressure on spring until retaining ring is installed to prevent parts from scattering and being lost.

(3) Install washer (8) and retaining ring (6) on poppet (7).
(4) Install diaphragm (4) and cover (3) with six washers (2) and screws (1).

d. Follow-on Maintenance. None.

END OF TASK

22-22. V18 BULK DELIVERY VALVE REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Oil, lubricating, Item 47, Appendix C
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	V18 bulk delivery valve on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.

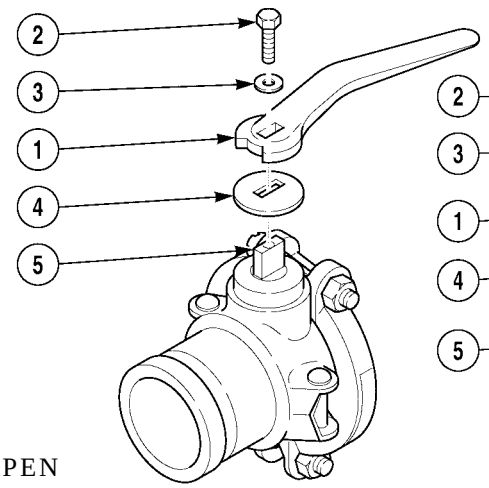
CAUTION

Valve must be in open position for proper removal of valve parts and to prevent equipment damage.

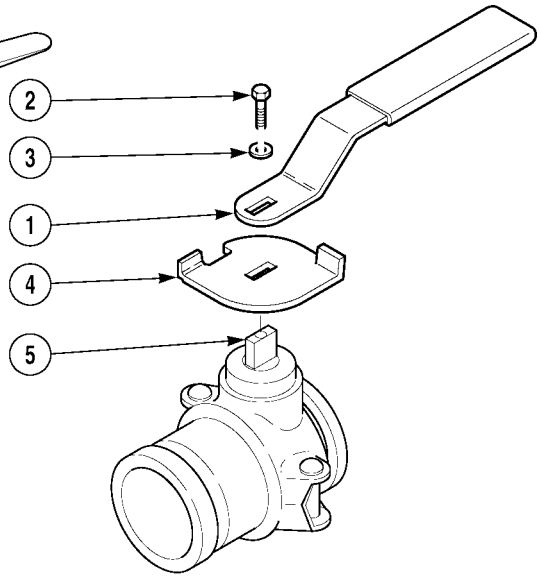
NOTE

There are two models of V18 bulk delivery valve. Disassembly is the same for both.

(1) Set handle (1) to OPEN position.
(2) Remove screw (2), washer (3), handle (1), and washer (4) from stem (5).



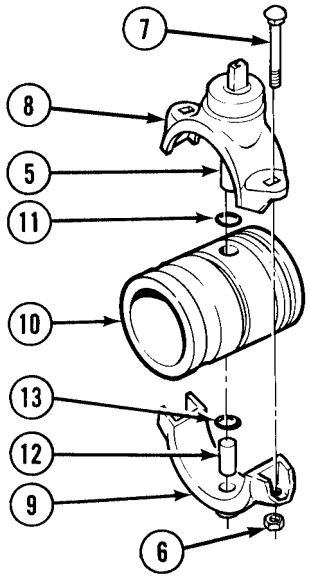
MODEL A



MODEL B

22-22. V18 BULK DELIVERY VALVE REPAIR (CONT).

(3) Remove two nuts (6) and screws (7) from upper housing (8) and lower housing (9).
(4) Remove upper housing (8) and lower housing (9) from body and liner (10).



NOTE

Preformed packing and stem may stay in body during removal.

(5) Remove preformed packing (11) from stem (5).
(6) Remove stem (12) from lower housing (9).
(7) Remove preformed packing (13) from stem (12).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

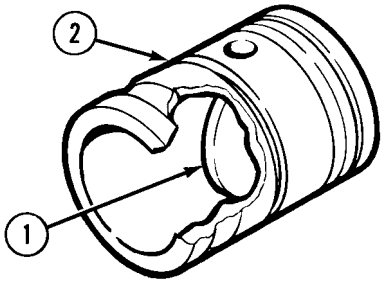
(1) Clean all metal parts with dry cleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry metal parts with compressed air.
(3) Inspect all metal parts for bends, breaks, cracks, and sharp edges.
(4) Replace damaged parts.

c. Assembly.



CAUTION

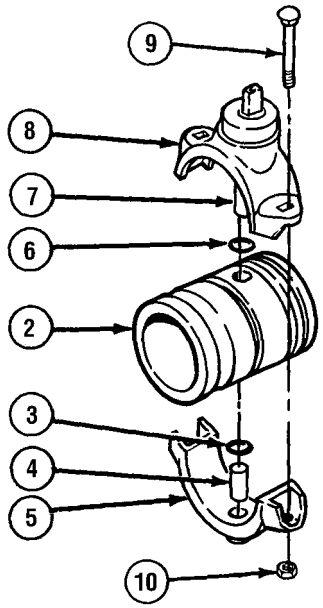
Body and liner disk must be in open position for proper installation of valve and to prevent equipment damage.

NOTE

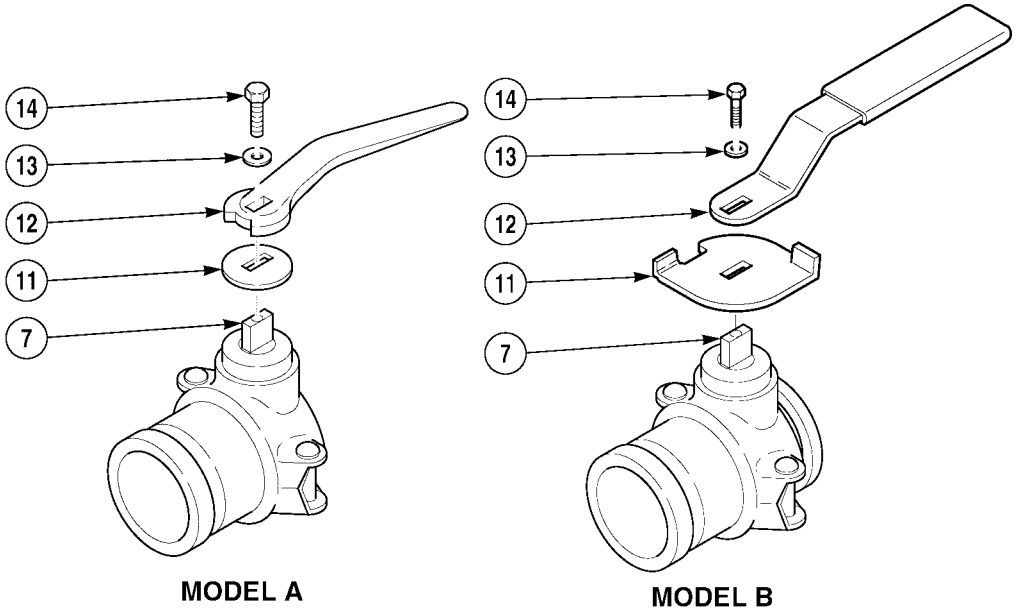
There are two models of V18 bulk delivery valve. Assembly is the same for both.

(1) Move disk (1) in body liner (2) to open position.

M978 Tanker Maintenance Procedures Instructions (Cont)



(2) Install preformed packing (3) on stem (4).
(3) Install stem (4) in lower housing (5).
(4) Install preformed packing (6) on stem (7).
(5) Lubricate stems (4 and 7) with oil and position upper housing (8) and lower housing (5) on body and liner (2).
(6) Install two screws (9) and nuts (10) in upper housing (8) and lower housing (5).



(7) Install washer (11), handle (12), washer (13), and screw (14) on stem (7).

d. Follow-on Maintenance. None.

END OF TASK

22-23. V19JETLEVEL SENSOR REPAIR.

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

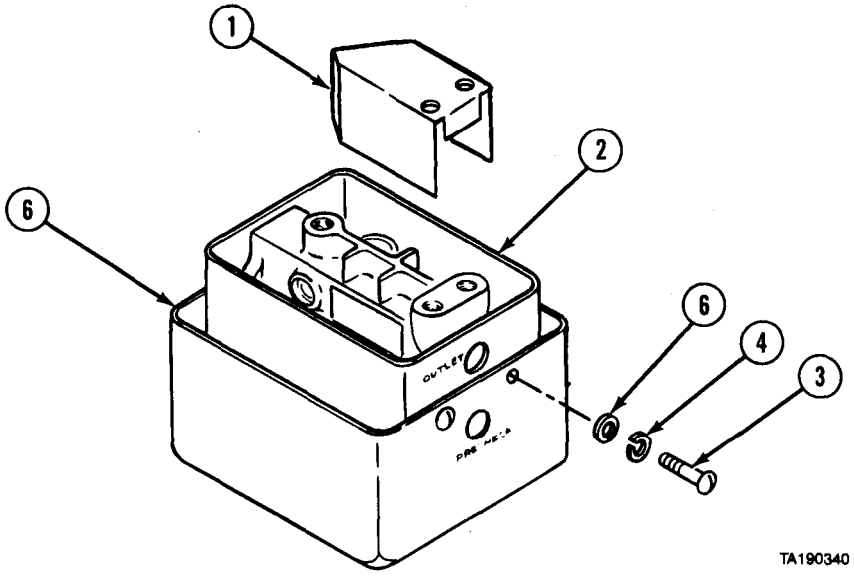
TM or Para	*Condition Description*
	V 19 jet level sensor on clean work surface.

Special Environmental Conditions
None

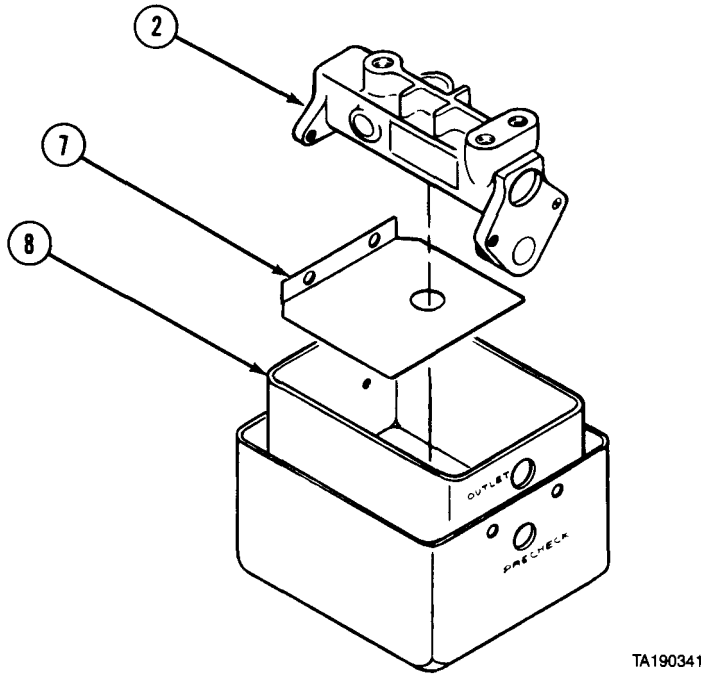
General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.



(1) Remove cover (1) from sensor body (2).
(Z) Remove four screws (3), lockwashers (4), and washers (5) from PRECHECK can (6).



(3) Note OUTLET end and remove sensor body (2) and deflector (7) from collector can (8).

(4) Remove collector can (8) from PRECHECK can (6).
(5) Remove plug (9) from collector can (8).
(6) Remove two plugs (10) from collector can (8).
(7) Remove plug (11) from PRECHECK can (6).

b. Cleaning/inspection.

WARNING

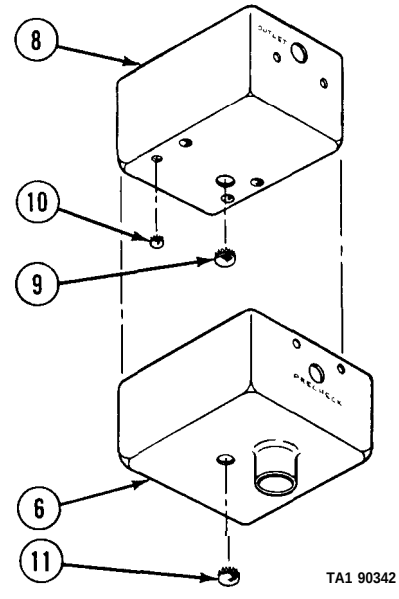
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all parts with dry cleaning solvent.

WARNING

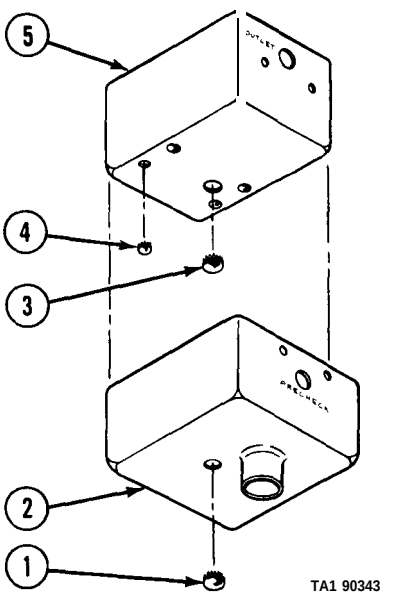
Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

(2) Dry parts with compressed air.
(3) Inspect all parts for damage.
(4) Replace damaged parts.

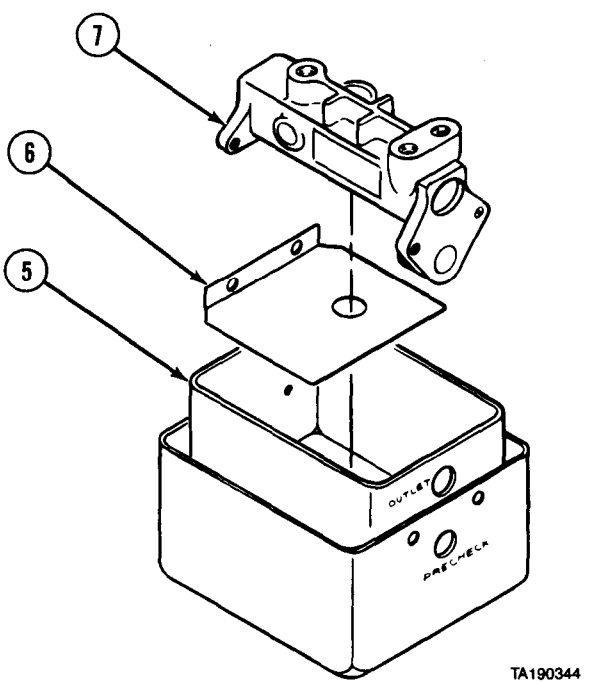


22-23. V19 JET LEVEL SENSOR REPAIR (CONT).

c. Assembly.
(1) Install plug (1) in PRECHECK can (2).
(2) Install plug (3) and two plugs (4) in collector can (5).
(3) Position collector can (5) in PRECHECK can (2).



TA1 90343



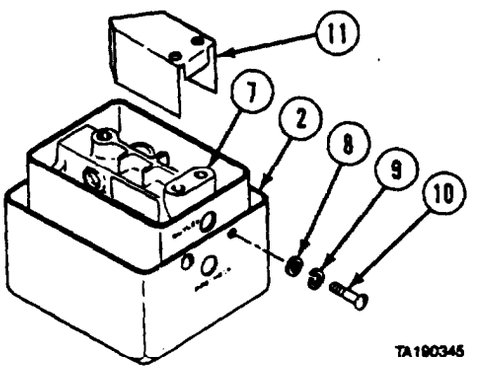
TA190344

NOTE

Outlet end of sensor body must be positioned on OUTLET end of collector can.

(4) Position deflector (6) and sensor body (7) in collector can (5).

(5) Aline screw holes and install four washers (8) lockwashers (9) and screws (10) in PRECHECK can (2).
(6) Install cover (11) on sensor body (7).



d. Follow-on Maintenance. None.

END OF TASK

Section VII. FUEL SERVICE NOZZLE

22-24. FUEL SERVICE NOZZLE REPAIR.

This task covers:
a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
	Fuel service nozzle assembly on clean work surface.

Special Environmental Conditions
None

General Safety Instruction
None

Level of Maintenance
Direct Support

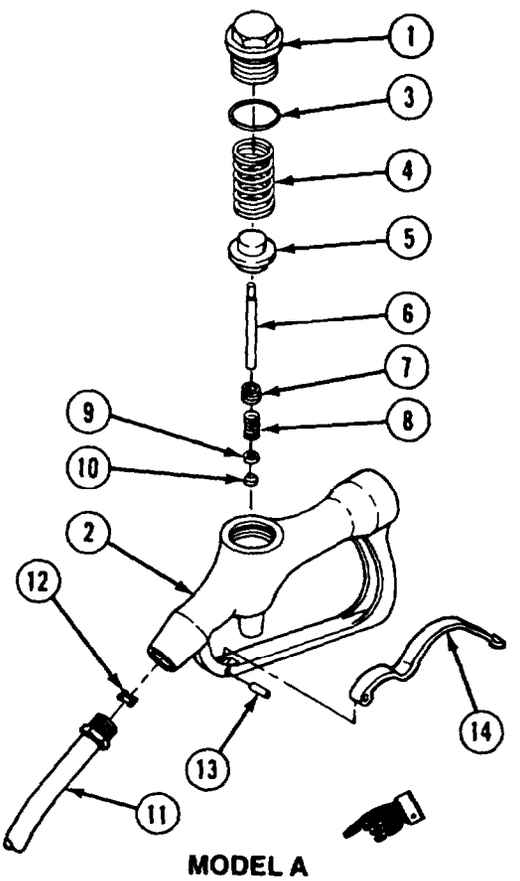
22-24. FUEL SERVICE NOZZLE REPAIR (CONT).

a. Disassembly.

NOTE

There are two types of fuel nozzle assemblies.
For Model A, perform steps *(1)* through *(6).*
For Model B, perform steps *(7)* through *(12).*

(1) Remove cap (1) from nozzle body (2).
(2) Remove preformed packing (3), helical spring (4), disk and poppet (5), and stem (6).
(3) Remove spring retainer (7).
(4) Remove gland (8), packing retainer (9), and preformed packing (10).
(5) Remove tube (11) and vane (12) from nozzle body (2).
(6) Drive out spring pin (13) and remove lever (14).



MODEL A

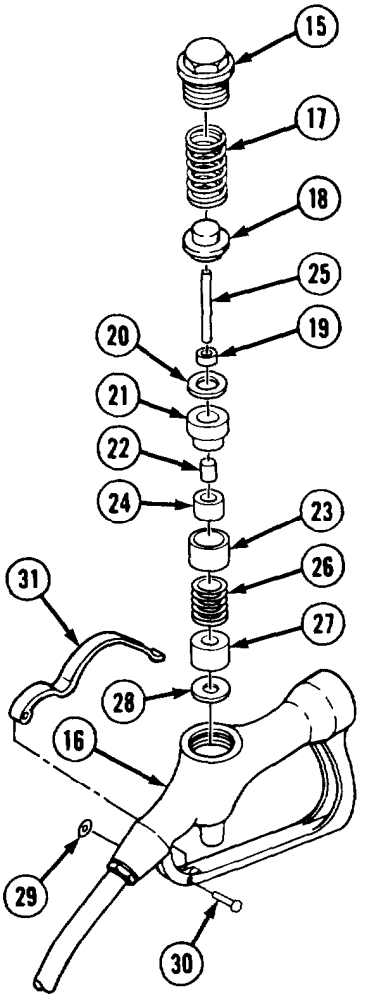
(7) Remove cap (15) from nozzle body (16).
(8) Remove spring (17), top piece (18), disk (19), and washer (20).
(9) Remove lower poppet subassembly (21) and disc holder (22).
(10) Remove dashpot cylinder (23) and plunger (24).
(11) Remove stem (25), packing spring (26), and packings (27) and (28).
(12) Remove push nut (29), pin (30), and lever (31).

b. Cleaning/Inspection

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. lb avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts of fuel nozzle with dry cleaning solvent.
(2) Inspect all threaded parts for stripped threads or mashed ridges and cracks.
(3) Inspect valve seat of nozzle body for excessive wear and ridges.
(4) Inspect valve spring for cracks, breaks, and kinks.
(5) Inspect disk and poppet for dents and other visible damage.
(6) Inspect stem for burrs and other visible damage.
(7) Replace all damaged parts.



MODEL B

c. Assembly.

NOTE

There are two types of fuel nozzle assemblies. For Model A, perform steps *(1)* through (5). For Model B, perform steps *(6)* through *(11).*

(1) Install lever (14) and spring pin (13) in nozzle body (2).
(2) Install vane (12) and tube (11) in nozzle body (2).

NOTE

Do not tighten spring retainer on installation.

(3) Install preformed packing (10), packing retainer (9), gland (8), and spring retainer (7) in nozzle body (2).
(4) Install stem (6) and tighten spring retainer (7).
(5) Install disk poppet (5), helical spring (4), preformed packing (3), and cap (1).
(6) Install lever (31), pin (30), and push nut (29) in nozzle body (16).
(7) Install packings (28) and (27), packing spring (26), and stem (25).
(8) Install plunger (24) and dashpot cylinder (23).
(9) Install disc holder (22) and lower poppet subassembly (21).
(10) Install washer (20), disk (19), top piece (18), and spring (17).
(11) Apply thin coat of antiseize lubricant on cap (15) threads and install cap in nozzle body (16).

d. Follow-on Maintenance. None.

END OF TASK

22-25. MANHOLE COVER REPAIR (MODEL B).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Solvent, drycleaning, Item 57, Appendix C
Sealant, pipe, Teflon, Item 55.1, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

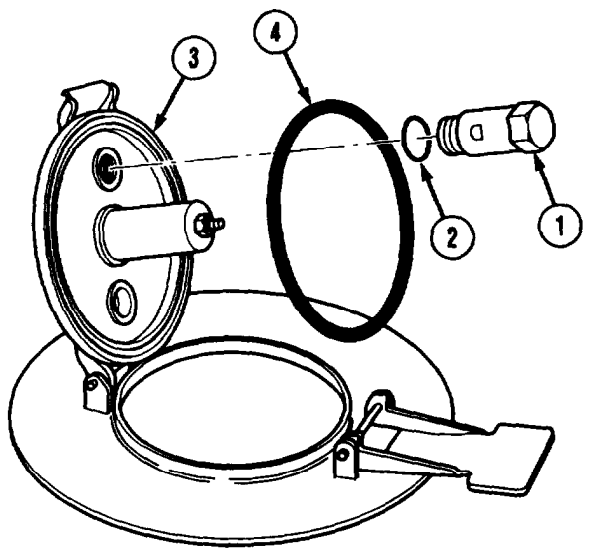
TM or Pam	Condition Description
TM 9-2320-279-20	Manhole cover on clean work surface.

Special Environmental Conditions
None

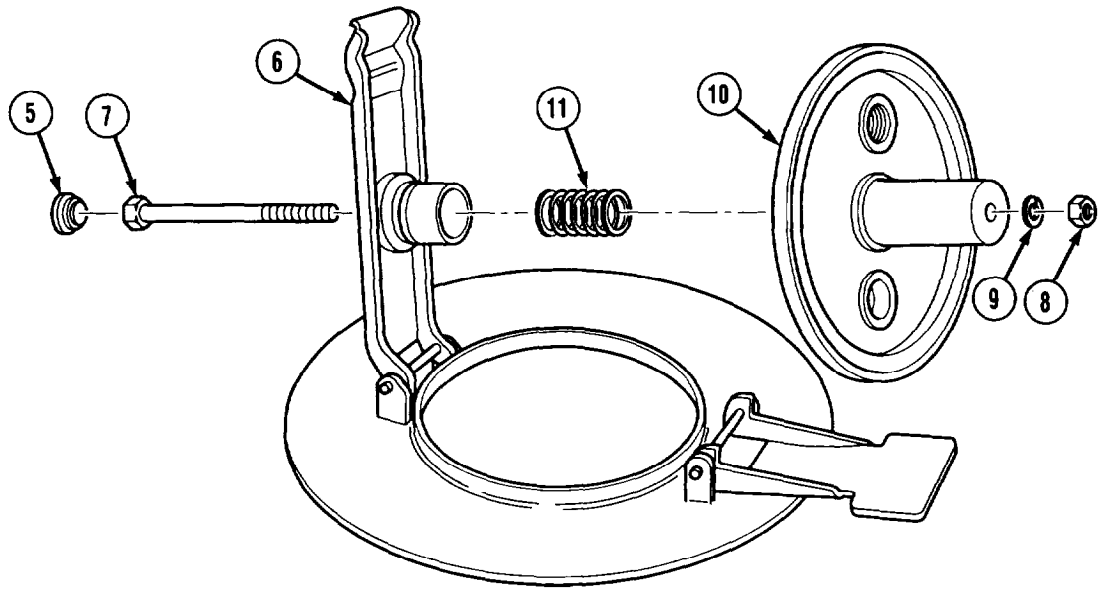
General Safety Instructions
None

Level of Maintenance
General Support

a. Disassembly.



(1) Remove vent assembly (1) and gasket (2) from fill cover (3).
(2) Remove gasket (4) from fill cover (3).



(3) Remove plug (5) from closure assembly (6).

WARNING

Use extreme care when compressing, releasing, removing, or installing springs. Springs are under tension and can act as projectiles when released. Ensure proper eye protection is worn to prevent injury to personnel.

(4) While Soldier A holds screw (7), Soldier B removes nut (8), lockwasher (9), and fill cover (10) from closure assembly (6).

(5) Remove spring (11) and screw (7) from closure assembly (6).

b. Cleaning/Inspection.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open tire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(1) Clean all metal parts with drycleaning solvent.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment, goggles, shield, and gloves.

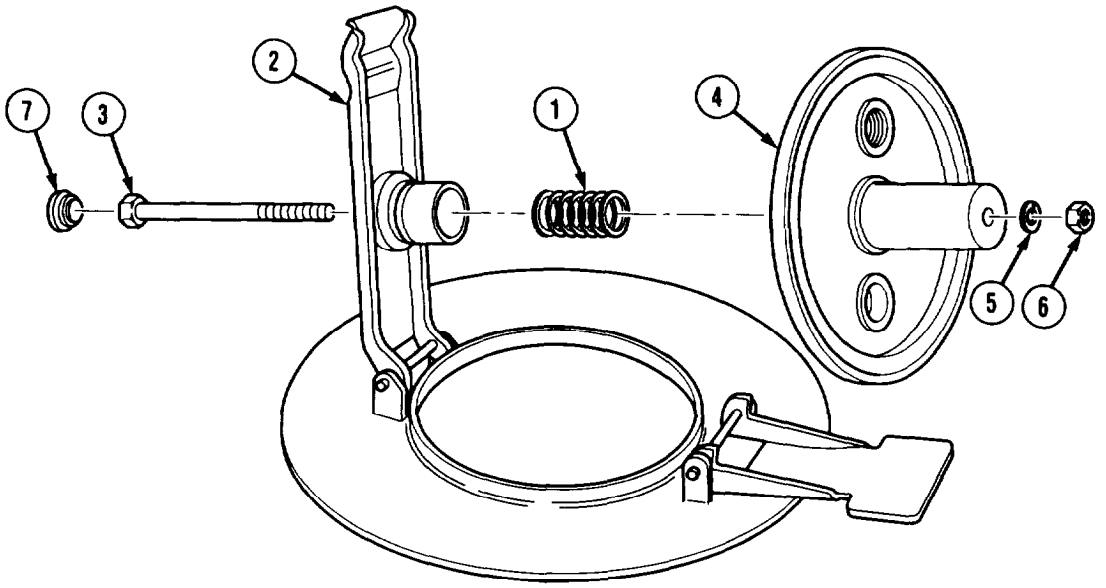
(2) Dry metal parts with compressed air.

(3) Inspect each part for damage.

(4) Replace damaged parts.

22-25. MANHOLE COVER REPAIR (MODEL B) (CONT).

c. Assembly.



(1) Position spring (1) on closure assembly (2) with screw (3)

WARNING

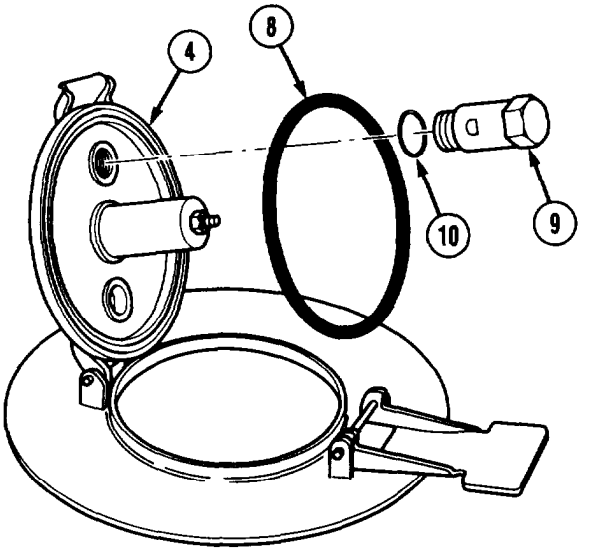
Use extreme care when compressing, releasing, removing, or installing springs. Springs are under tension and can act as projectiles when released suddenly Ensure proper eye protection is worn to prevent injury to personnel.

(2) While Soldier A holds screw (3), install fill cover (4) on closure assembly (2) with lockwasher (5) and nut (6).

(3) Install plug (7) on closure assembly (2).

(4) Install gasket (8) on fill cover (4).

(5) Install vent assembly (9) with gasket (10) on fill cover (4).



d. Follow-on Maintenance.

(1) Install manhole cover (TM 9-2320-279-20).

(2) Adjust manhole cover pressure (TM 9-2320-279-20).

END OF TASK

22-26. MANHOLE COVER REPAIR (MODEL C).

This task covers:

a. Disassembly
b. Cleaning/Inspection
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
Solvent, dry cleaning, Item 57, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

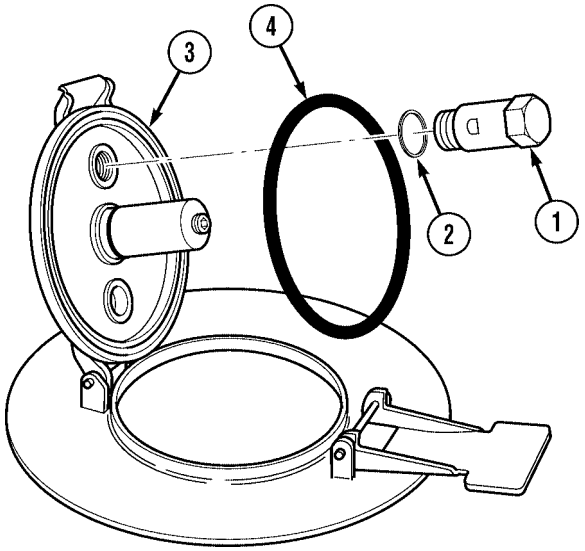
TM or Para	*Condition Description*
TM 9-2320-279-20	Manhole cover on clean work surface.

Special Environmental Conditions
None

General Safety Instructions
None

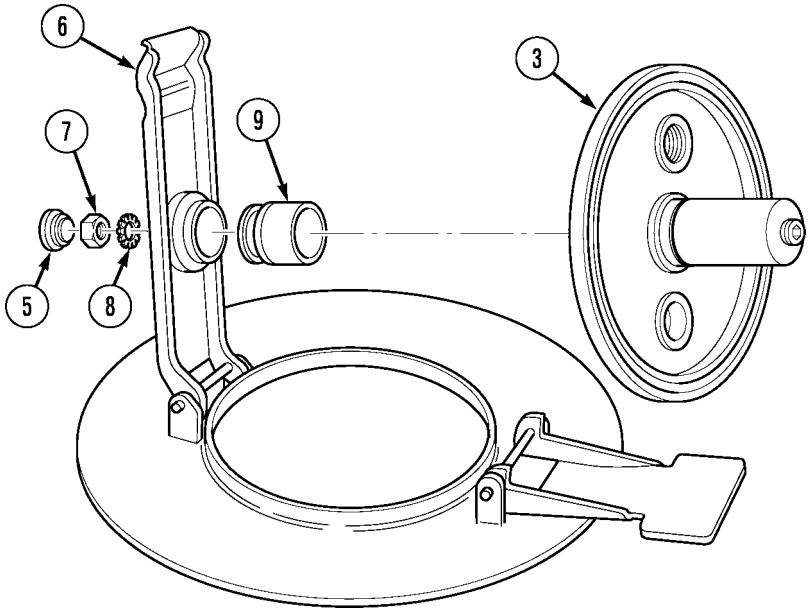
Level of Maintenance
General Support

a. Disassembly.



(1) Remove vent assembly (1) and gasket (2) from fill cover (3).
(2) Remove gasket (4) from fill cover (3).

22-26. MANHOLE COVER REPAIR (MODEL C) (CONT).



WARNING

Do not attempt to repair fill cover. Fill cover contains a spring that is under extreme tension and may cause injury or death if repair is attempted.

NOTE

Parts are not available for repair of fill cover. Refer to TM 9-2320-279-24P.

(3) Remove plug (5) from closure assembly (6).
(4) Remove nut (7), lockwasher (8), fill cover (3), and bellows (9) from closure assembly (6).

CHAPTER 23
SPECIAL PURPOSE KIT INSTALLATION

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Section I. INTRODUCTION

23-1. GENERAL. This chapter covers initial installation of special purpose kits. Subassemblies and parts which must be removed before the kits can be installed will be referenced to other paragraphs or chapters of this manual or TM 9-2320-279-10 or TM 9-2320-279-20.

Section II. ARCTIC HEATER KIT

Special Purpose Kit Installation Instructions

23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A).

This task covers:

a. Sheet Metal Preparation
b. Initial Installation
c. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
Adhesive, Item 5.3, Appendix C
Adhesive, Item 5.4, Appendix C
Compound, sealing, pipe thread, Item 28.1, Appendix C
Sealant, RTV200 Electrical, Item 55.2, Appendix C
Tags, identification, Item 60, Appendix C
Ties, cable, plastic, Item 65, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Spare tire removed.
TM 9-2320-279-10	Engine cover open.
TM 9-2320-279-10	Engine side panels removed.
Para 6-2	Radiator and engine block drained.
Para 7-92	Battery box removed.

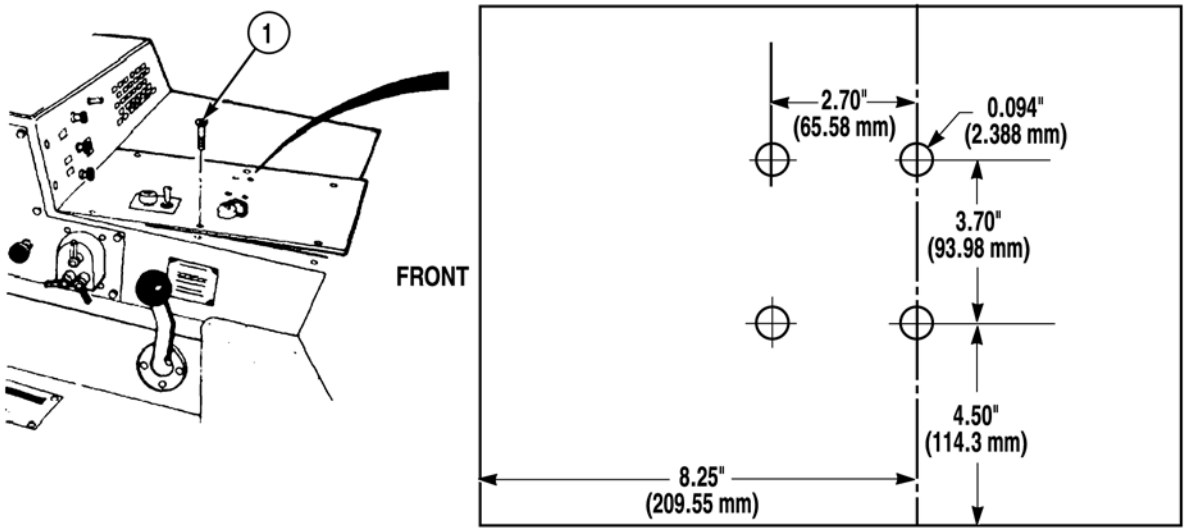
Special Environmental Conditions
None

General Safety Instructions
None

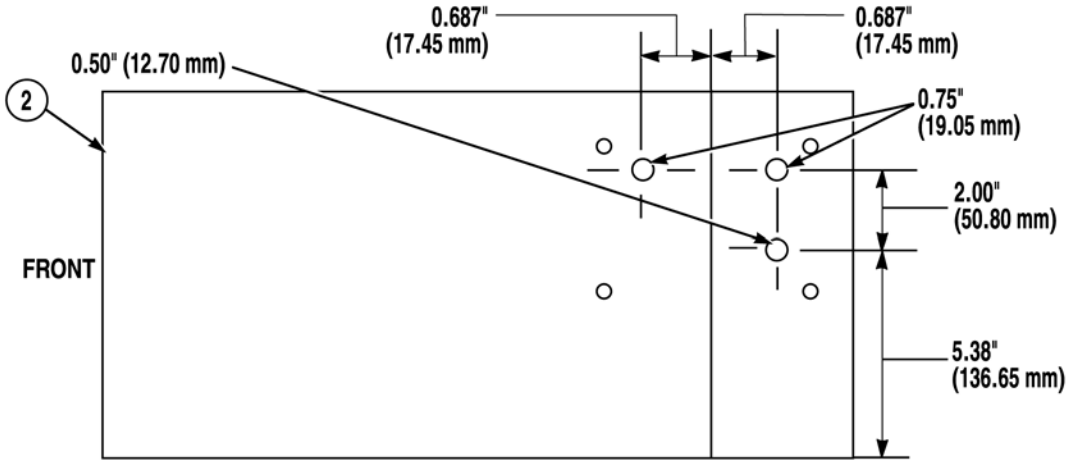
Level of Maintenance
Direct Support

23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

a. Sheet Metal Preparation

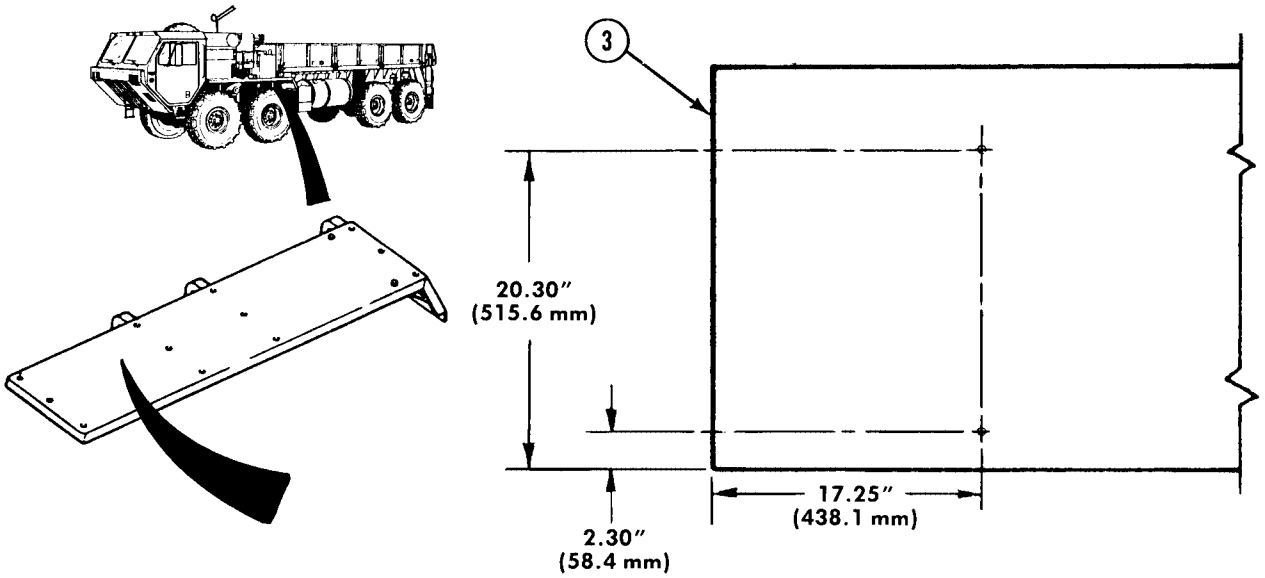


(1) Remove six screws (1) and heater compartment cover (2).
(2) Remove PTO indicator light assembly and switch from heater compartment cover (2) (TM 9-2320-279-20).
(3) If installed, remove chemical alarm switch from heater compartment cover (2) (TM 9-2320-279-20).
(4) If installed, remove gas particulate switch from heater compartment cover (2) (TM 9-2320-279-20).
(5) Remove utility outlet from heater compartment cover (2) (Non-A2 and A2R1 Models) (TM 9-2320-279-20).
(6) Drill four 0.094 in. (2.388 mm) holes in heater compartment cover (2).

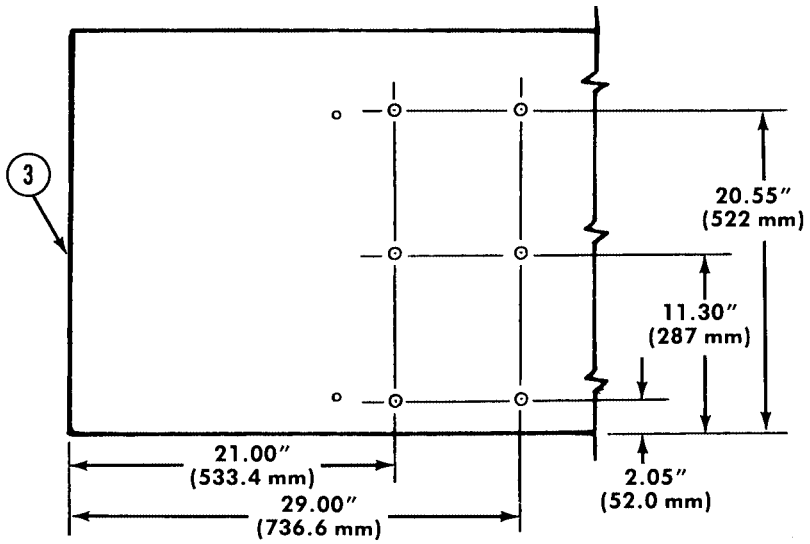


(7) Drill 0.50 in. (12.70 mm) hole in heater compartment cover (2).
(8) Drill two 0.75 in. (19.05 mm) holes.

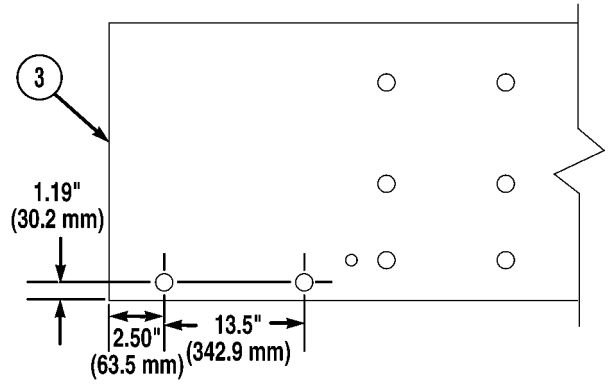
Special Purpose Kit Installation Instructions (Cont)



(9) Drill two 0.34 in. (8 mm) holes in left front fender (3).



(10) Drill six 0.28 in. (7 mm) holes in left front fender (3).



(10.1) Drill two 0.750 in. (19.05 mm) holes in left front fender (3).

23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

b. Initial Installation.

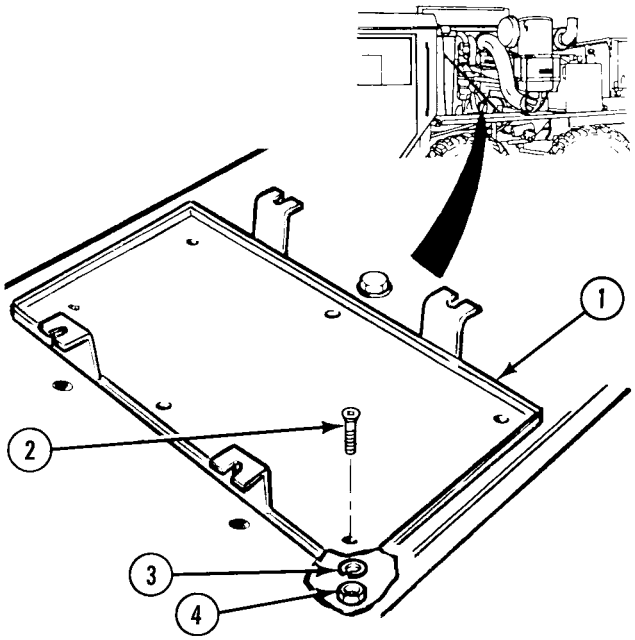
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

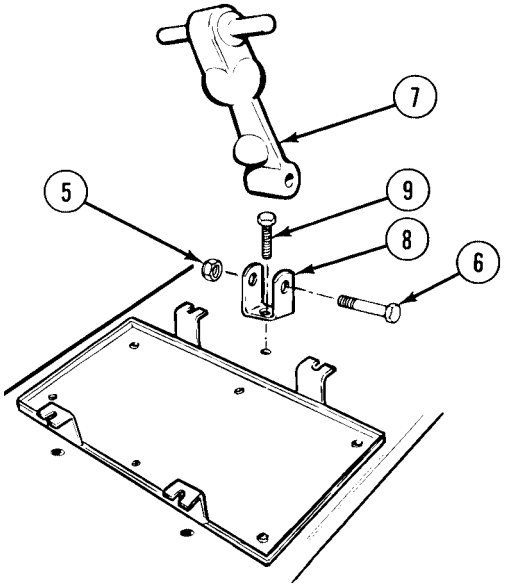
NOTE

- Apply electrical sealant to exposed wire connectors after installing connectors.
- Install plastic cable ties as required.

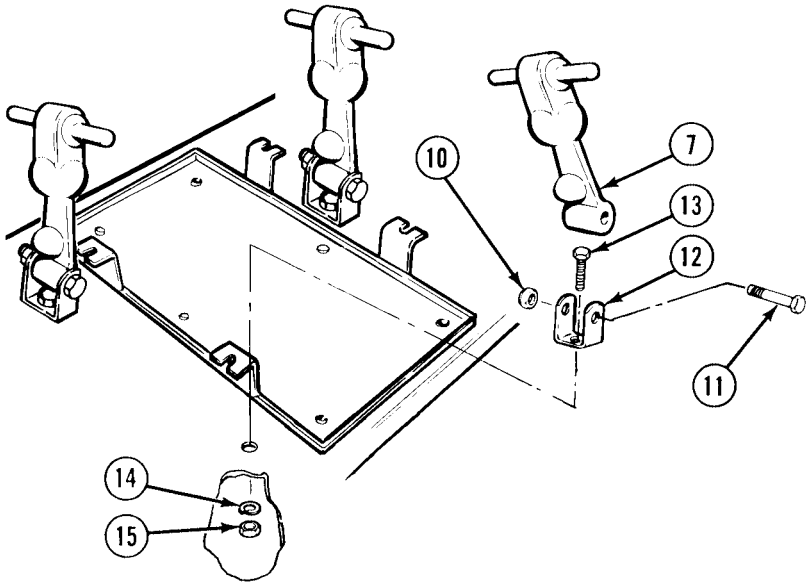
(1) Remove alternator belts and fan belts (TM 9-2320-279-20).
(2) Install arctic kit alternator belts and fan belts (TM 9-2320-279-20).
(3) Remove battery box (TM 9-2320-279-20).
(4) Install arctic kit battery box (TM 9-2320-279-20).
(5) Install battery box (1) with six screws (2), washers (3), and locknuts (4).



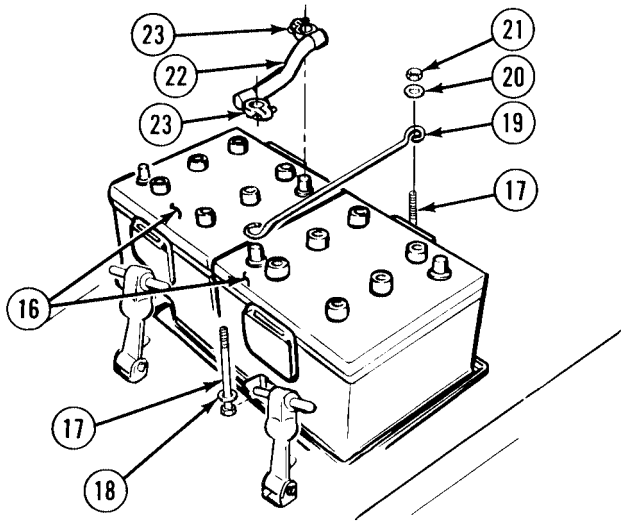
(6) Remove locknut (5), screw (6), and rubber hood hook (7) from bracket (8).
(7) Remove screw (9) and install bracket (8) with screw.



Special Purpose Kit Installation Instructions (Cont)



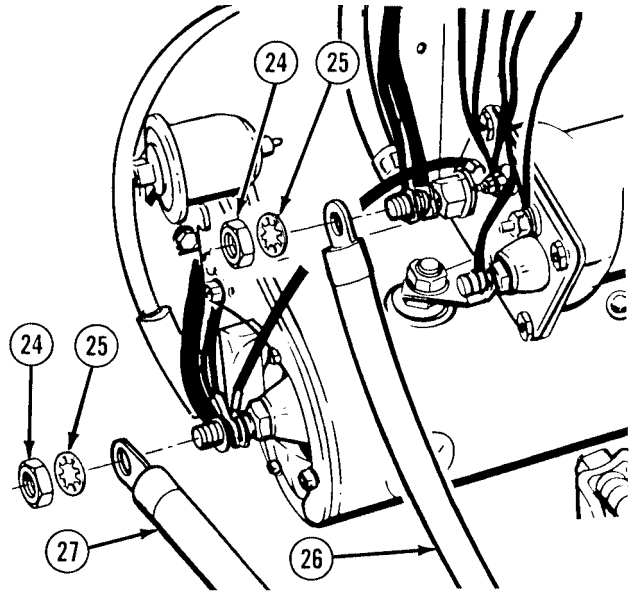
(8) Remove two locknuts (10), screws (11), and rubber hood hooks (7).
(9) Install two brackets (12) with two screws (13), lockwashers (14), and nuts (15).
(10) Install two rubber hood hooks (7) with two screws (11) and locknuts (10).



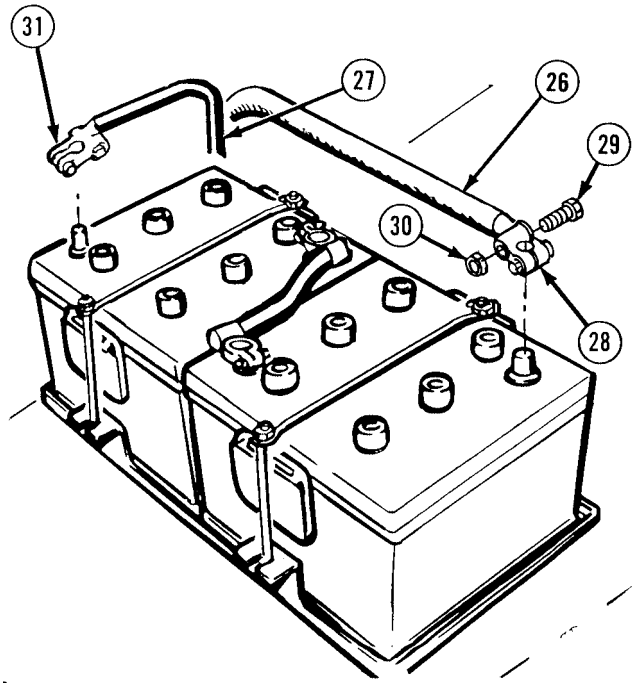
(11) Install two batteries (16).
(12) Install four screws (17) and washers (18).
(13) Install two holddowns (19) on four screws (17) with four washers (20) and locknuts (21).
(14) Install jumper cable (22) and tighten two nuts (23).

23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

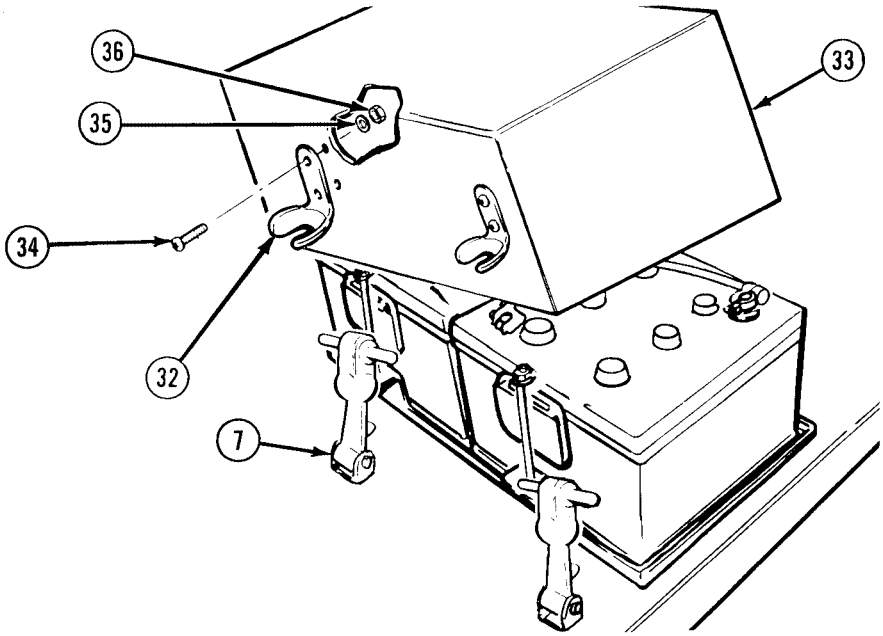
(15) Remove two nuts (24) and lockwashers (25).
(16) Install two cables (26) and (27) with two lockwashers (25) and nuts (24).



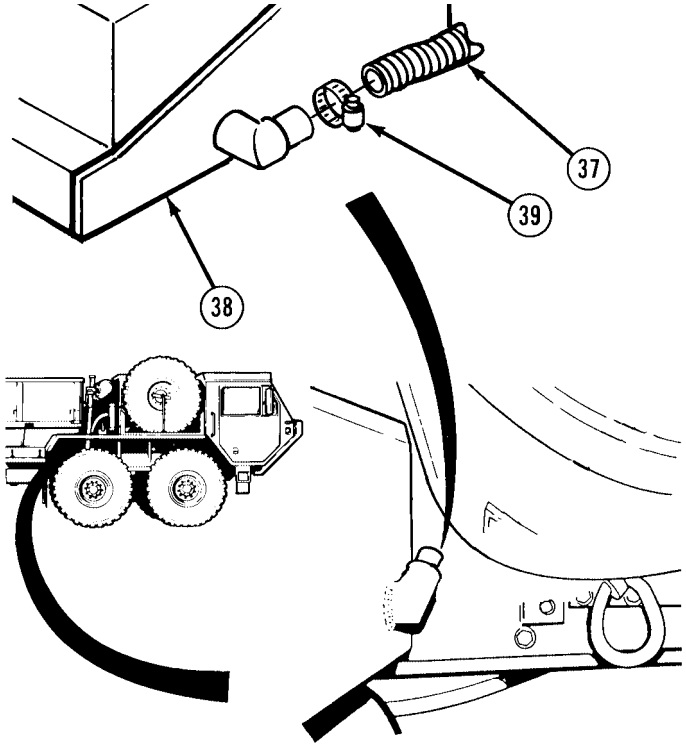
(17) Install two terminals (28) on cables (26) and (27) with screws (29) and nuts (30).
(18) Install two cables (26) and (27) and tighten nuts (31).



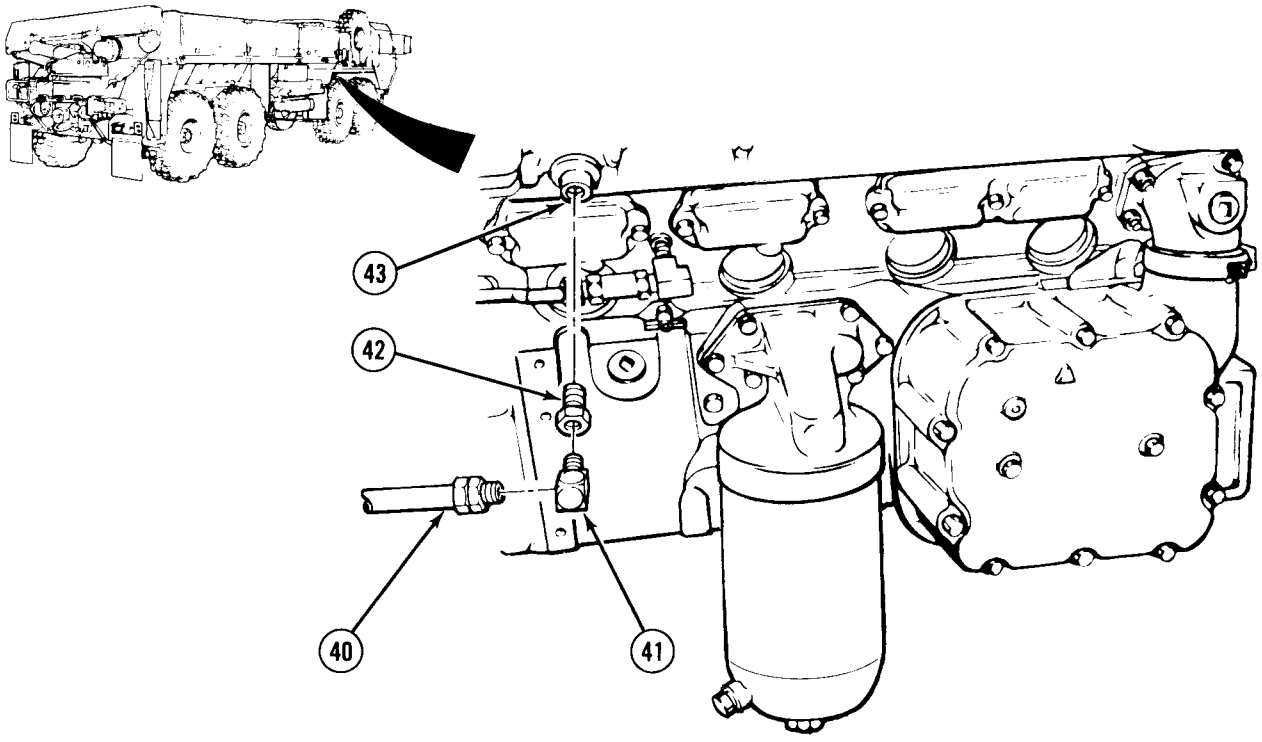
Special Purpose Kit Installation Instructions (Cont)



(19) Install three hood brackets (32) on battery box cover (33) with six screws (34), washers (35), and locknuts (36).
(20) Install battery box cover (33) with three rubber hood hooks (7).
(21) Install exhaust pipe (37) within right side frame rail and attach to battery box (38) with clamp (39).

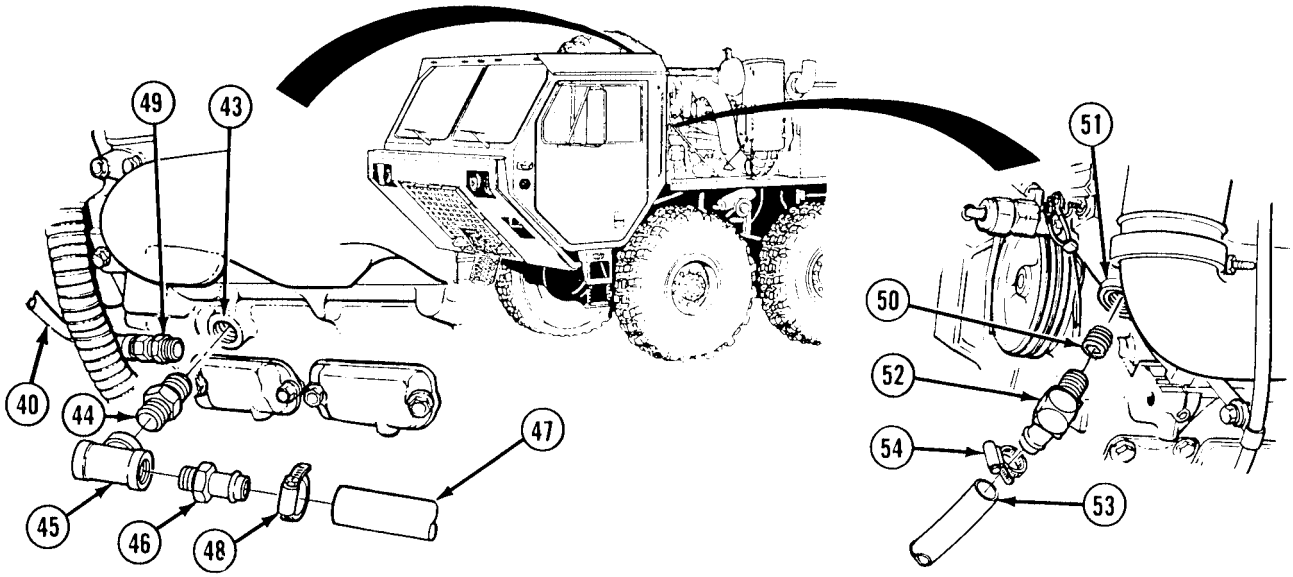


23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).



(22) Remove hose (40) from elbow (41).
(23) Remove and discard elbow (41) and bushing (42) from engine block (43).

Special Purpose Kit Installation Instructions (Cont)

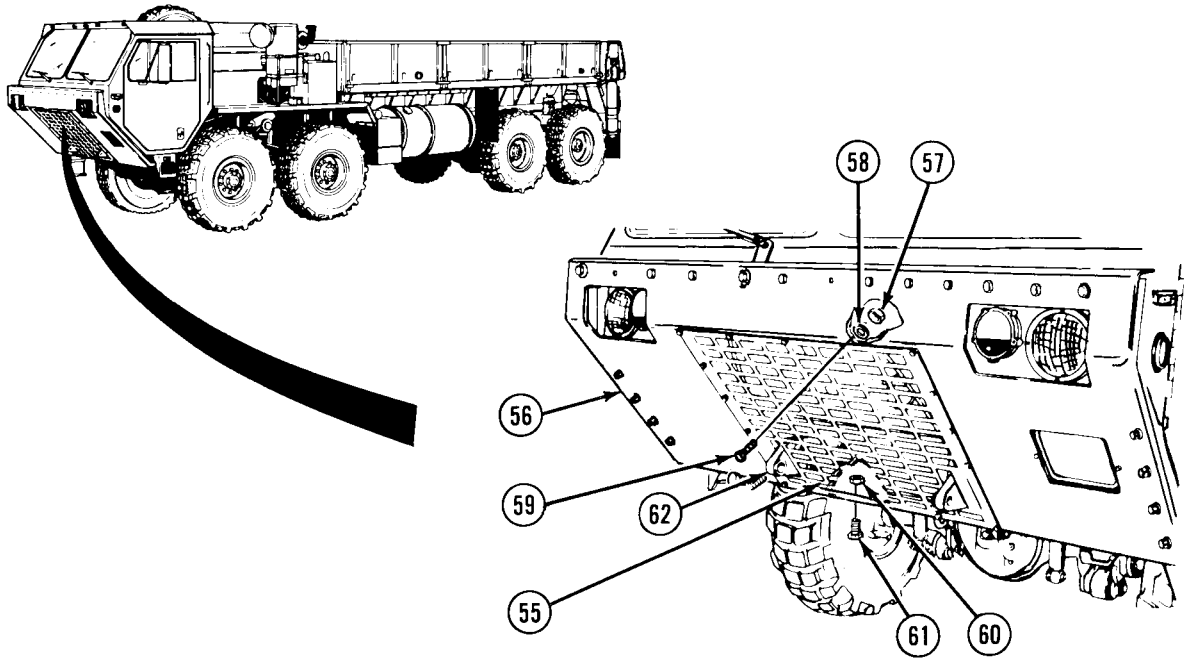


WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(24) Apply pipe thread sealing compound to threads of nipple (44) and install nipple and tee (45) in engine block (43).
(25) Apply pipe thread sealing compound to threads of adapter (46) and install in tee (45).
(26) Install 112 in. (2845 mm) hose (47) on adapter (46) with clamp (48).
(27) Apply pipe thread sealing compound to threads of adapter (49), in hose (40), and install adapter in tee (45).
(28) Remove and discard plug (50) from thermostat housing (51).
(29) Apply pipe thread sealing compound to threads of adapter (52) and install in thermostat housing (51).
(30) Install 92 in. (2337 mm) hose (53) on adapter (52) with clamp (54).
(31) Route hoses (47) and (53) towards front of vehicle using plastic cable ties to secure hoses.

23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).



(32) While Soldier A holds skid plate grille (55) to skid plate (56), Soldier A removes 16 locknuts (57), washers (58), and screws (59).

(33) Soldier A and Soldier B remove skid plate grille (55).

NOTE

These two bolt holes will be used to mount bracket that supports coolant pump.

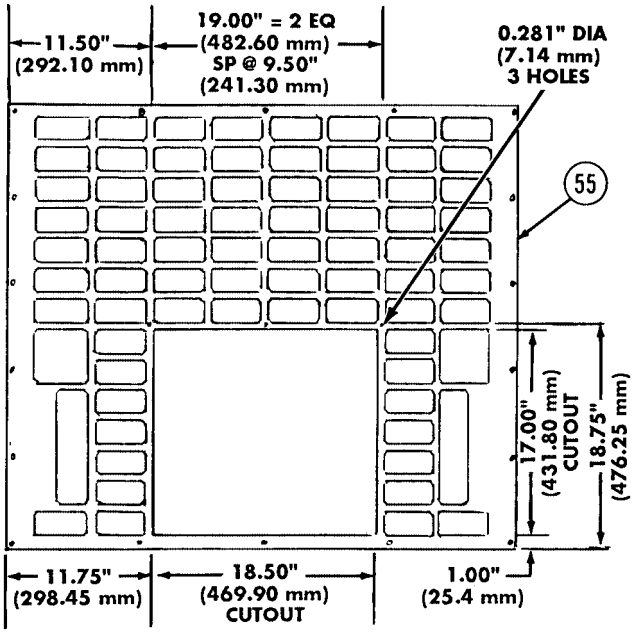
(34) Remove and discard two nuts (60) and screws (61) from bottom of skid plate (56) nearest right side of frame section (62).

(35) Modify skid plate grille (55) as follows:

(a) Cut a 17.0 in. (431.80 mm) by 18.50 in. (469.90 mm) opening in skid plate grille (55).

(b) Drill three 0.281 in. (7.14 mm) holes in skid plate grille (55).

(c) Break all sharp edges.



Special Purpose Kit Installation Instructions (Cont)

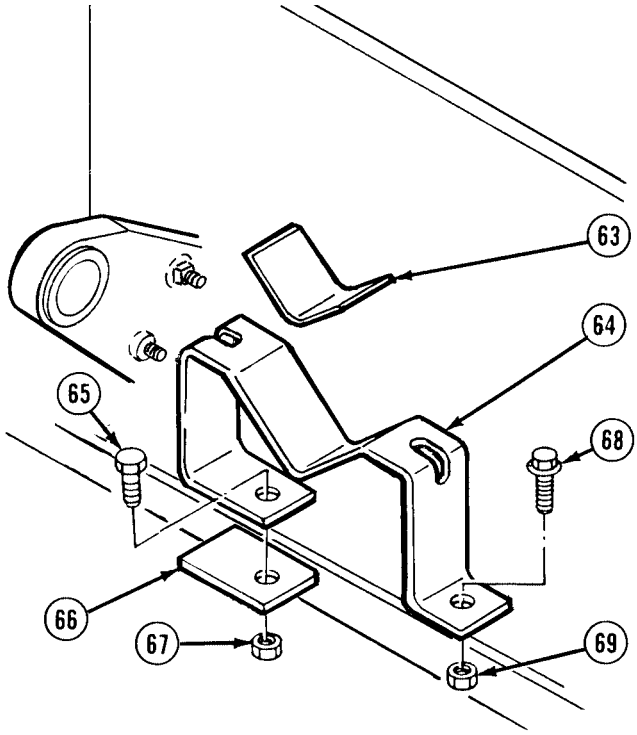
WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

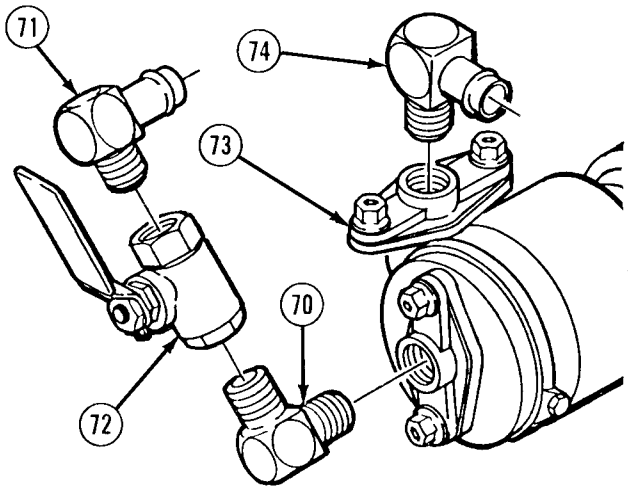
NOTE

Ensure that surface of bracket is clean.

(37) Apply adhesive (Item 5.3, Appendix C) to rubber (63) and install on bracket (64). Apply hand pressure until adhesive sets.
(38) Install bracket (64) with screw (65), plate (66), and nut (67).
(39) Install screw (68) and nut (69).



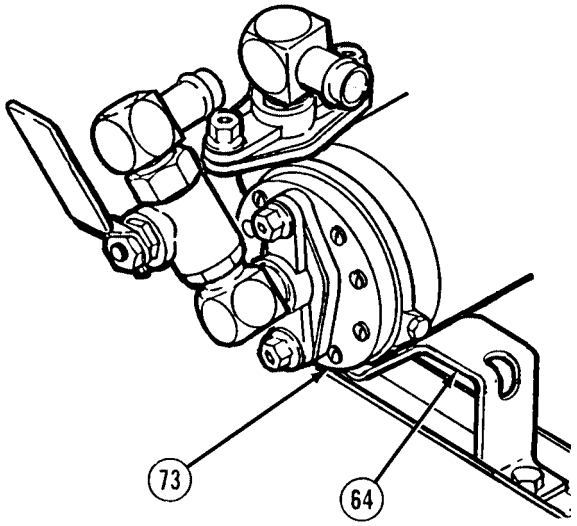
(40) Apply pipe thread sealing compound to threads of elbows (70) and (71).
(41) Install elbow (70), valve (72), and elbow (71) in coolant pump (73).
(42) Apply pipe thread sealing compound to threads of elbow (74) and install in coolant pump (73).



23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

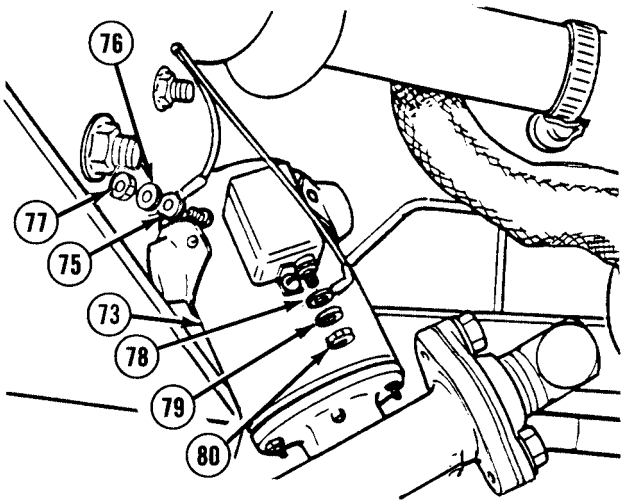
(43) Install coolant pump (73) as follows:

(a) Position coolant pump (73) on bracket (64).



(b) Install wire (75) on coolant pump (73) with lockwasher (76) and nut (77).

(c) Install wire (78) on coolant pump (73) with lockwasher (79) and nut (80).



Special Purpose Kit Installation Instructions (Cont)

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

NOTE

Ensure that surface of bracket is clean.

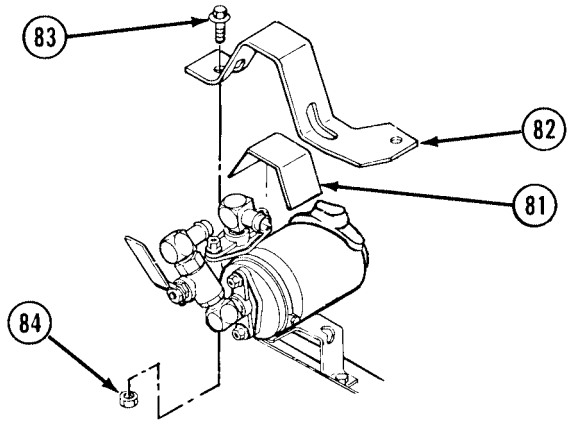
(d) Apply adhesive (Item 5.3, Appendix C) to rubber (81) and install on bracket (82). Apply hand pressure until adhesive sets.

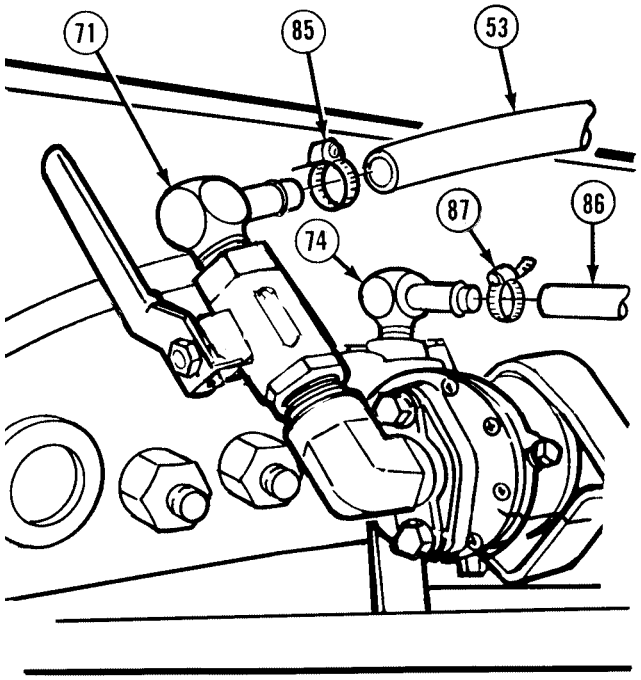
(e) Install bracket (82) with two screws (83) and nuts (84). Do not tighten nuts.

(f) Install hose (53) on elbow (71) with clamp (85).

(g) Install 8 in. (203 mm) hose (86) on elbow (74) with clamp (87).

(h) Tighten nuts (84).



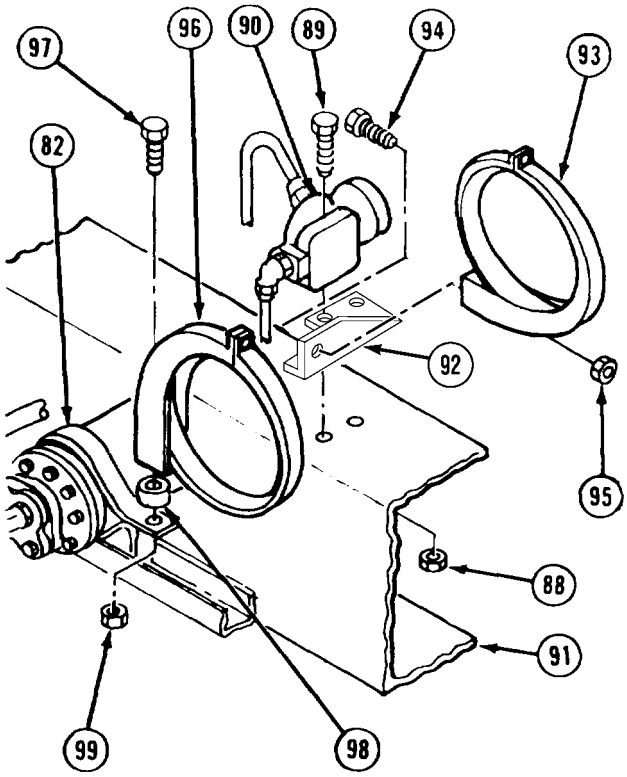


23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

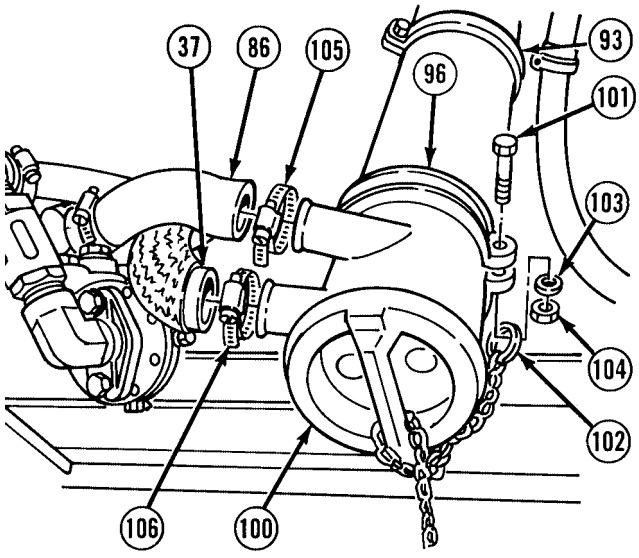
NOTE

Quick release valve is mounted to crossmember only on Model M984E1.

(44) Remove two nuts (88), screws (89), and quick release valve (90) from crossmember (91).
(45) Install bracket (92) and quick release valve (90) with two screws (89) and nuts (88).
(46) Install clamp (93) on bracket (92) with screw (94) and nut (95).
(47) Install clamp (96) on bracket (82) with screw (97), spacer (98), and nut (99).

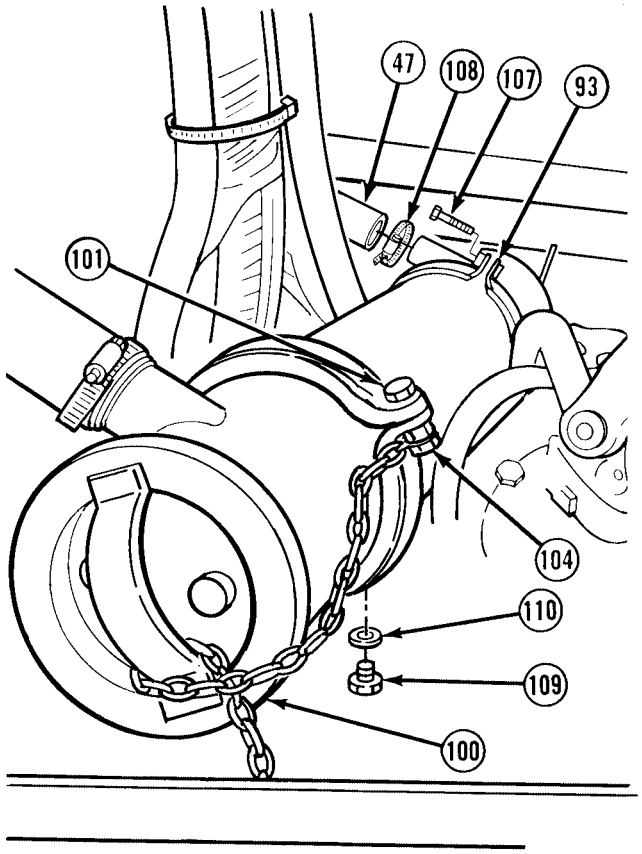


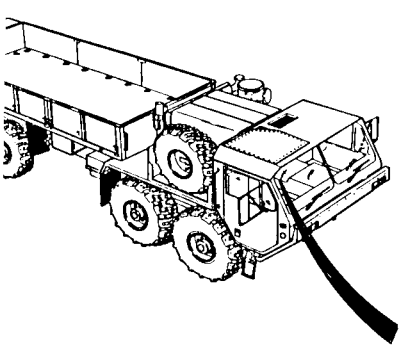
(48) Install water jacket (100) as follows:
(a) Position water jacket (100) in two clamps (93) and (96).
(b) Install screw (101) in clamp (96). Do not tighten screw.
(c) Install safety chain (102) on a screw (101) with washer (103) and nut (104).
(d) Install hose (86) on water jacket (100) with clamp (105).
(e) Install exhaust pipe (37) on water jacket (100) with clamp (106).

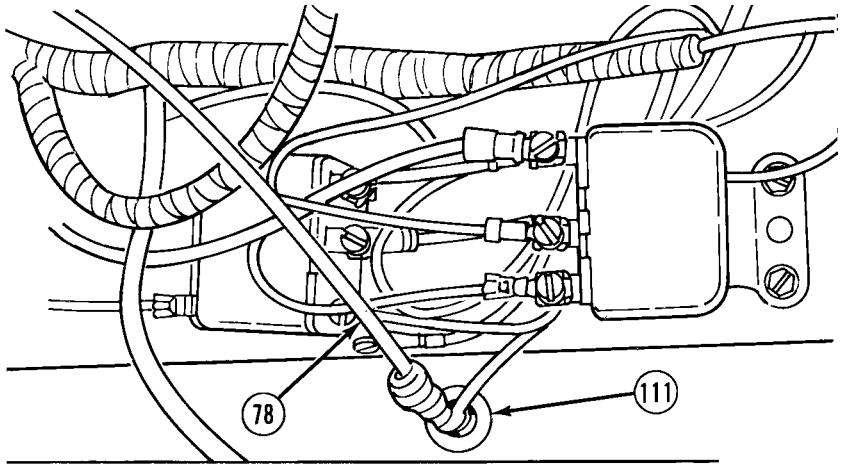


Special Purpose Kit Installation Instructions (Cont)

(f) Install screw (107) in clamp (93). Do not tighten screw.
(g) Install hose (47) on water jacket (100) with clamp (108).
(h) Tighten screws (101), (107), and nut (104).
(i) Install drain plug (109) with washer (110) in water jacket (100).





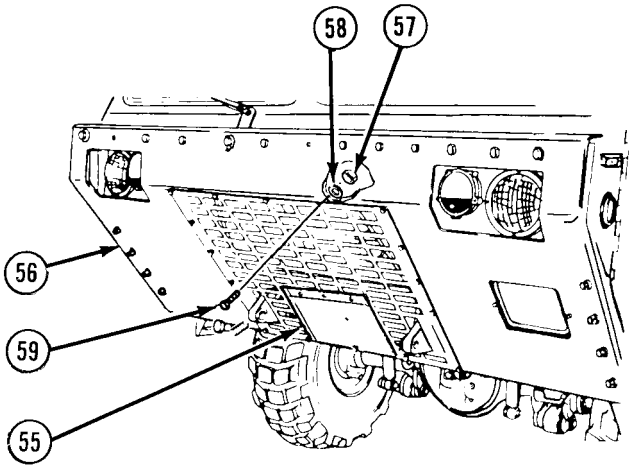


(49) Push wire (78) up through hole (111).

23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

(50) Soldier A and Soldier B position skid plate grille (55) on skid plate (56).

(51) While Soldier A holds skid plate grille (55) in position, Soldier B installs 13 screws (59), washers (58), and locknuts (57).

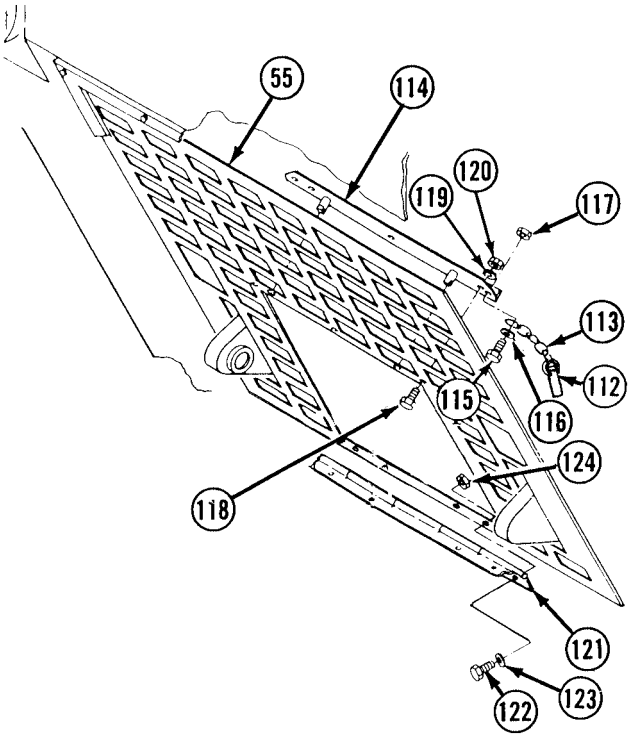


(52) Install two pins (112) on chains (113).

(53) Install two chains (113) on stiffener (114) with two screws (115), washers (116), and locknuts (117).

(54) Install stiffener (114) with three screws (118), lockwashers (119), and nuts (120).

(55) Install hinge (121) on skid plate grille (55) with three screws (122), washers (123), and locknuts (124).



Special Purpose Kit Installation Instructions (Cont)

WARNING

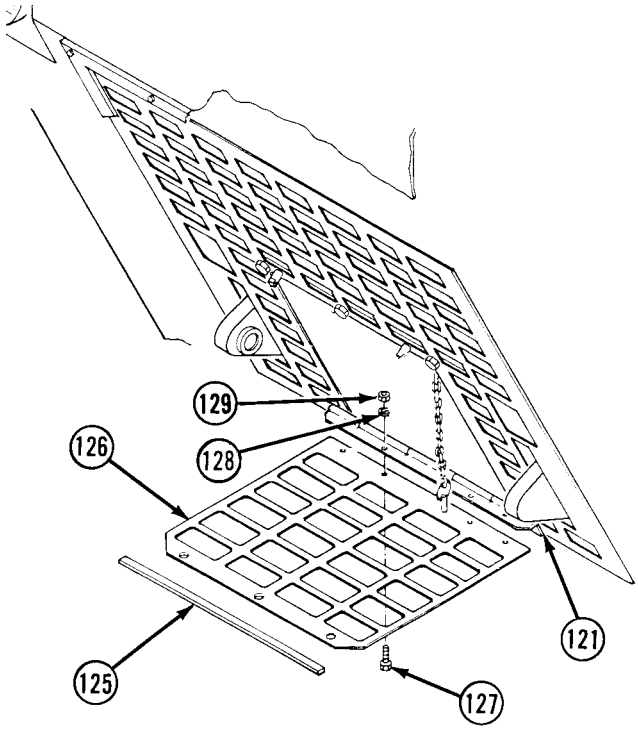
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

NOTE

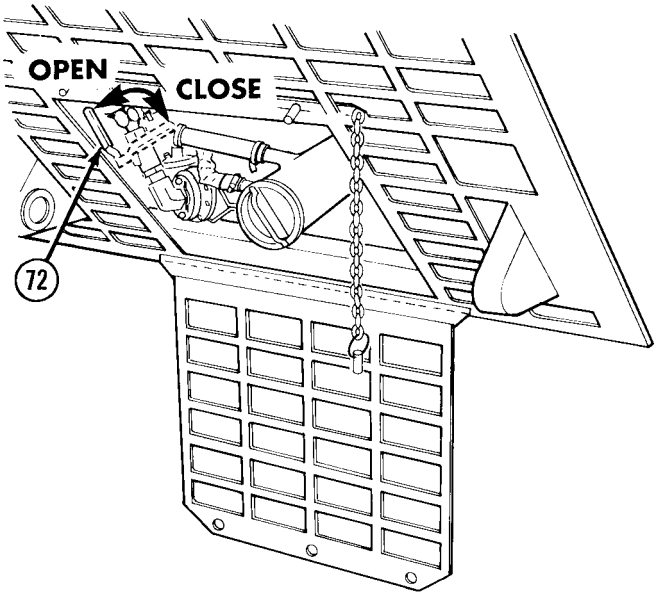
Ensure that rubber mounting surface of door is clean.

(56) Apply adhesive (Item 5.4, Appendix C) to rubber (125) and install on door (126). Apply hand pressure until adhesive sets.

(57) Install door (126) on hinge (121) with four screws (127), lockwashers (128), and nuts (129).

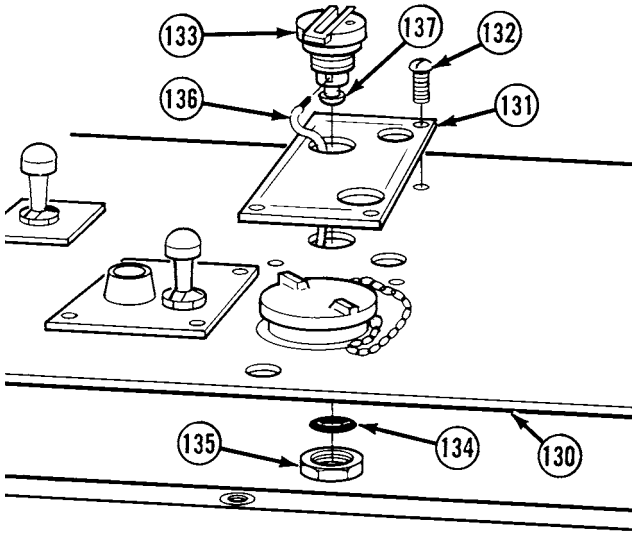


(58) Ensure that valve (72) is in open position.

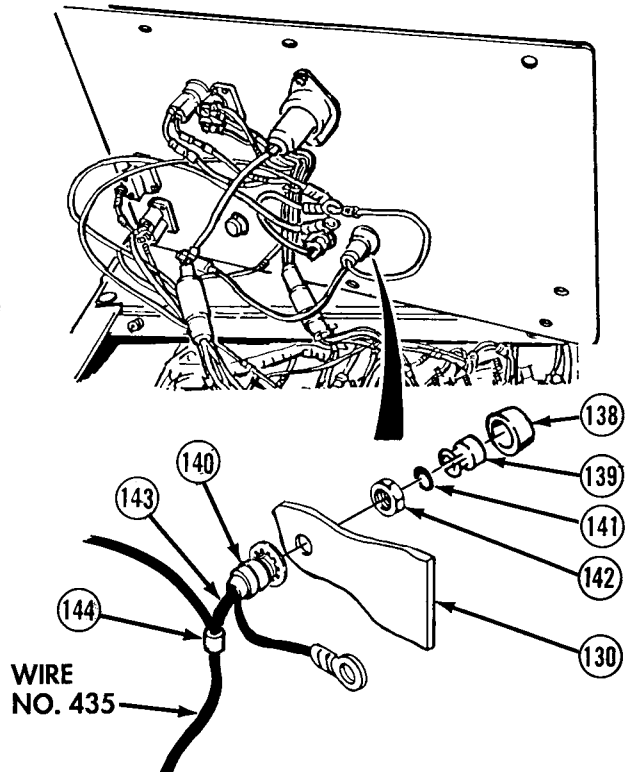


23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

(59) Install utility outlet on heater compartment cover (130) (Non-A2 and A2R1 Models) (TM 9-2320-279-20).
(60) If removed, install gas particulate switch on heater compartment cover (130) (TM 9-2320-279-20).
(61) If removed, install chemical alarm switch on heater compartment cover (130) (TM 9-2320-279-20).
(62) Install PTO indicator light assembly and switch on heater compartment cover (130) (TM 9-2320-279-20).
(63) Install data plate (131) on heater compartment cover (130) with four screws (132).
(64) Install receptacle (133) with washer (134) and nut (135).
(65) Install wire (136) in receptacle (133) and tighten screw (137).



(66) Remove shield (138).
(67) Remove lens (139) from housing (140). Remove force ring (141) from lens.
(68) Remove nut (142) from housing (140).
(69) Install housing (140) in heater compartment cover (130) with nut (142).
(70) Install force ring (141) in lens (139) and install lens in housing (140).
(71) Install shield (138).
(72) Attach ground wire (143) to PTO ground wire No. 435 with electrical butt connector (144).



Special Purpose Kit Installation Instructions (Cont)

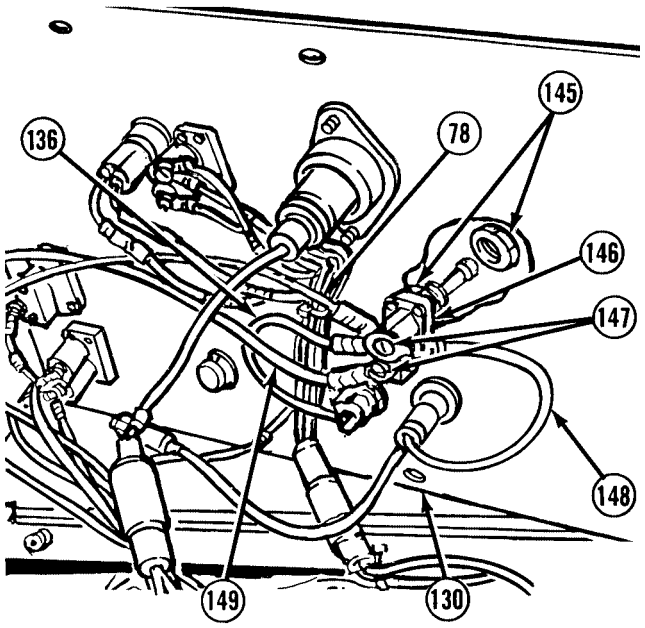
(73) Remove one nut (145) from coolant pump switch (146). Adjust remaining nut to provide proper height of switch when installed in heater compartment cover (130).

(74) Install coolant pump switch (146) in heater compartment cover (130) with nut (145).

(75) Remove two screws (147) from coolant pump switch (146).

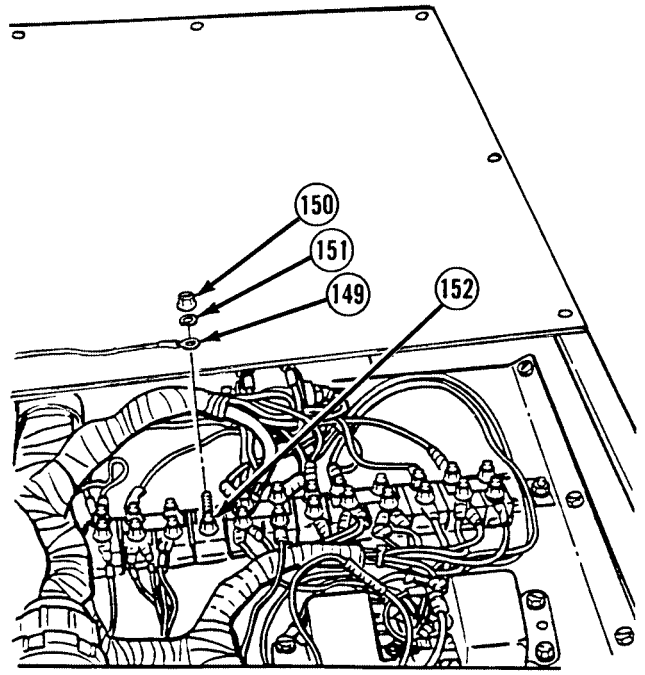
(76) Install three wires (78), (136), and (148) on output side of coolant pump switch (146) with screw (147).

(77) Install wire (149) on input side of coolant pump switch (146) with remaining screw (147).



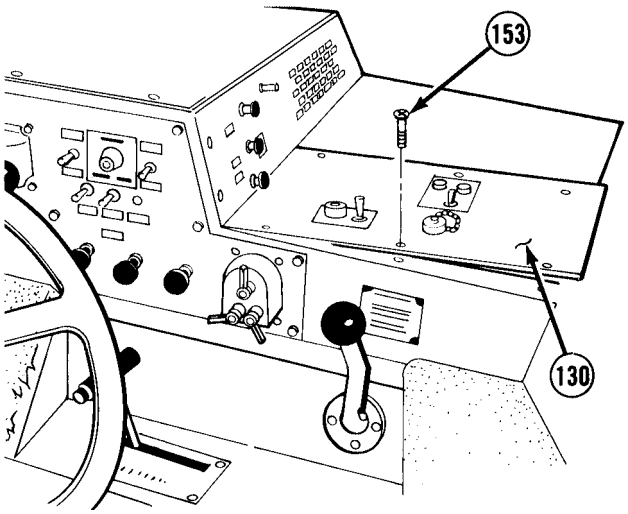
(78) Remove nut (150) and washer (151) from circuit breaker No. 4 (152).

(79) Install wire (149) on circuit breaker No. 4 (152) with washer (151) and nut (150).

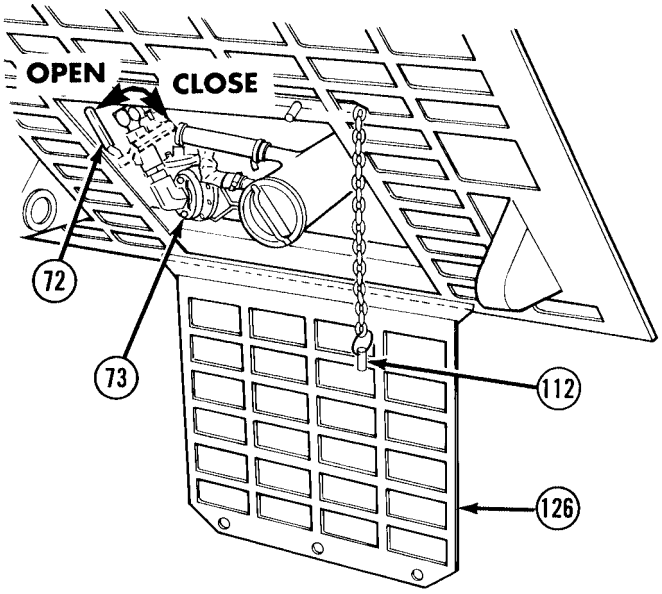


23-2. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL A) (CONT).

(80) Install heater compartment cover (130) with six screws (153).
(81) Fill cooling system (TM 9-2320-279-20).
(82) Operate coolant pump (73) (TM 9-2320-279-10) to distribute coolant throughout arctic heater kit.
(83) Check and fill coolant system (TM 9-2320-279-20).



(84) Place valve (72) in closed position.
(85) Close door (126) and secure with two pins (112).



c. Follow-on Maintenance.

(1) Install battery box (para 7-92).
(2) Install engine side panels (TM 9-2320-279-10).
(3) Close engine cover (TM 9-2320-279-10).
(4) Stow spare tire (TM 9-2320-279-10).

END OF TASK

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B).

This task covers:

a. Sheet Metal Preparation for Arctic Battery Initial Installation
b. Arctic Battery Initial Installation
c. Frame Preparation for Arctic Heater Initial Installation
d. Arctic Engine Heater Initial Installation
e. Preparation for Arctic Engine Heater Fuel Pump Initial Installation
f. Arctic Engine Heater Fuel Metering Pump Initial Installation
g. Arctic Engine Heater Coolant Plumbing Initial Installation
h. Sheet Metal Preparation for Arctic Engine Heater Electrical Harness Initial Installation
i. Arctic Engine Heater Electrical Harness Initial Installation
j. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
Compound, corrosion preventive, Item 19.1, Appendix C
Compound, sealing, pipe thread, Item 29, Appendix C
Sealant, RTV200 electrical, Item 55.2, Appendix C
Tags, identification, Item 60, Appendix C
Ties, cable, plastic, Item 65, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 6-2	Cooling system drained.
Para 14-5	Skid plate grille removed.
Para 16-13	Right front splash guards removed.
Para 17-2	Front cable tensioner removed.
Para 7-91	Battery box removed.

Special Environmental Conditions
None

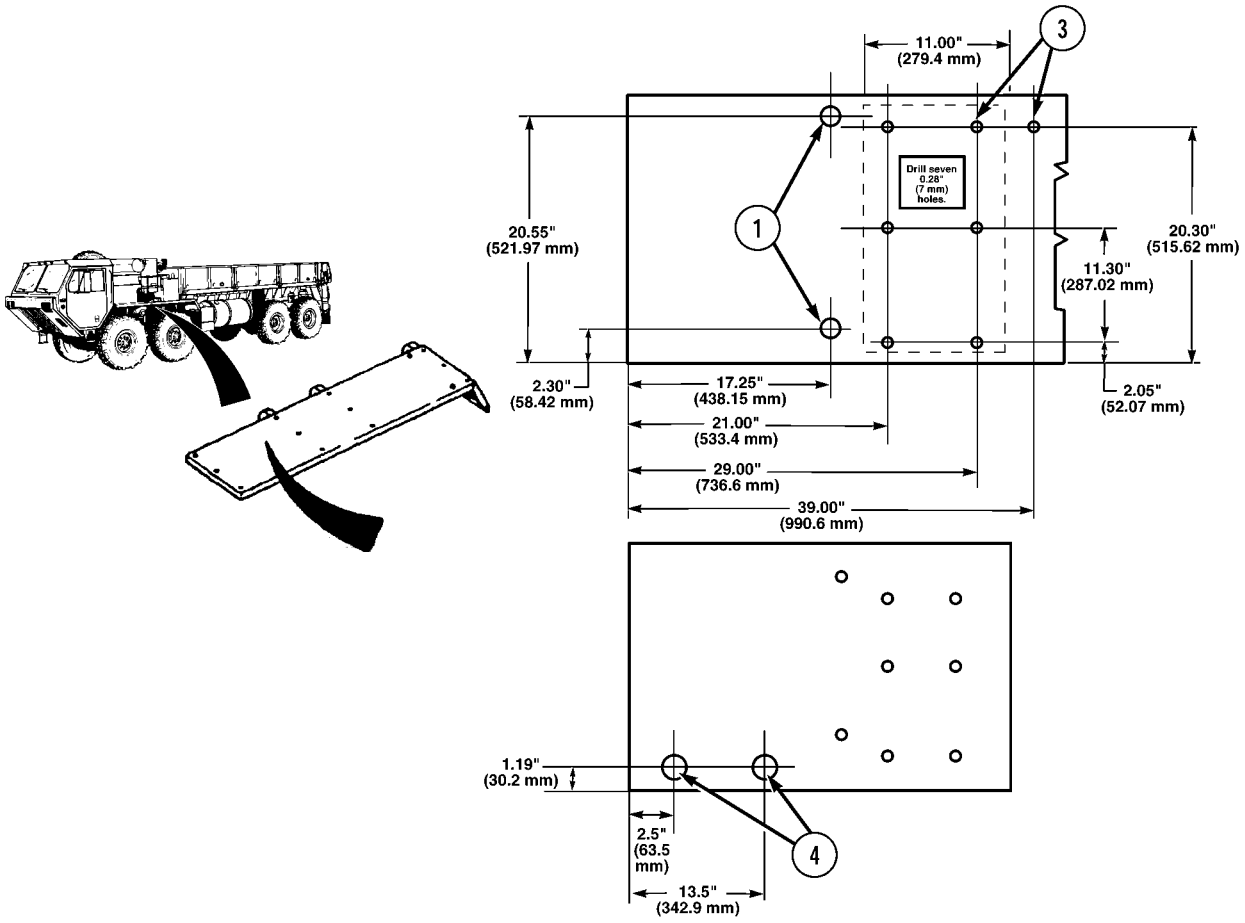
Level of Maintenance
Direct Support

General Safety Instructions
None

Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

a. Sheet Metal Preparation for Arctic Battery Initial Installation.



WARNING

Drilling and grinding operations are hazardous to the eyes. Eye protection is required. Failure to heed this warning can result in injury to personnel.

(1) Drill two 0.34 in. (8.64 mm) holes (1) in left front fender (2).

(2) Drill seven 0.28 in. (7 mm) holes (3) in left front fender (2).

(3) Drill two 0.75 in. (19.05 mm) holes (4) in left front fender (2).

Special Purpose Kit Installation Instructions (Cont)

b. Arctic Battery Initial Installation.

WARNING

- To avoid eye injury, eye protection is required when working around batteries. Do not smoke, use open flame, make sparks, or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry, such as rings, ID tags, watches, and bracelets. If jewelry contacts a battery terminal, a direct short will result in instant heating of tools, damage to equipment, and cause injury to personnel.
- Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

NOTE

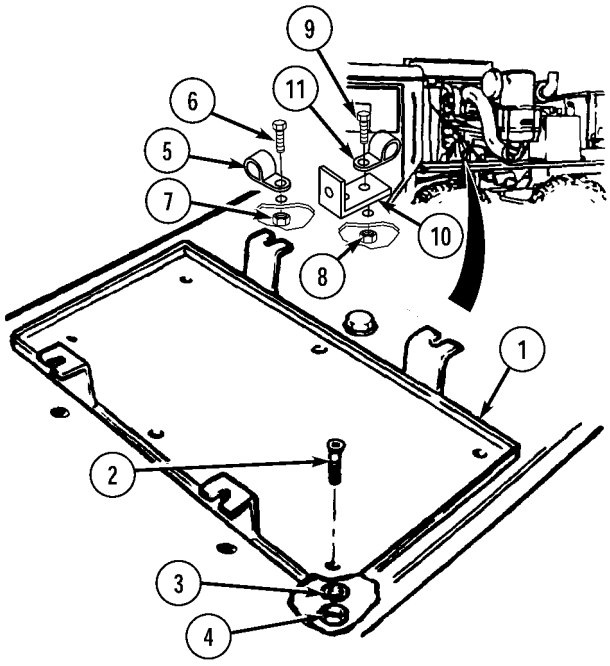
- Apply electrical sealant to exposed wire connectors after installation.
- Install plastic cable ties as required.

(1) Install battery box (1) with six screws (2), washers (3) and locknuts (4).

(2) Install cushion clamp (5) with screw (6) and locknut (7). Do not tighten.

(3) Remove locknut (8) and screw (9) from engine left side panel holddown bracket (10).

(4) Install cushion clamp (11) to engine left side panel holddown bracket (10) with screw (9) and locknut (8). Do not tighten.

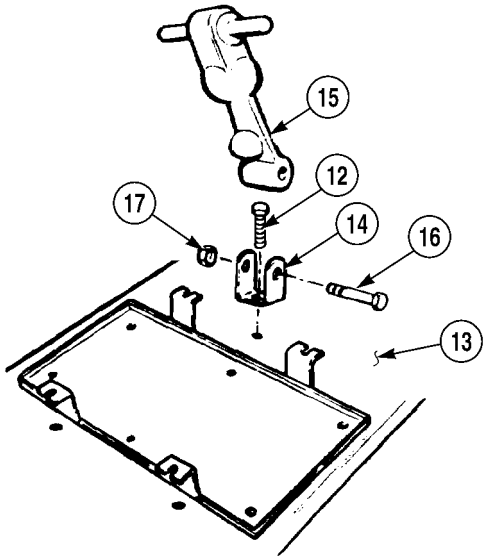


23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

(5) Remove screw (12) from left front fender (13).

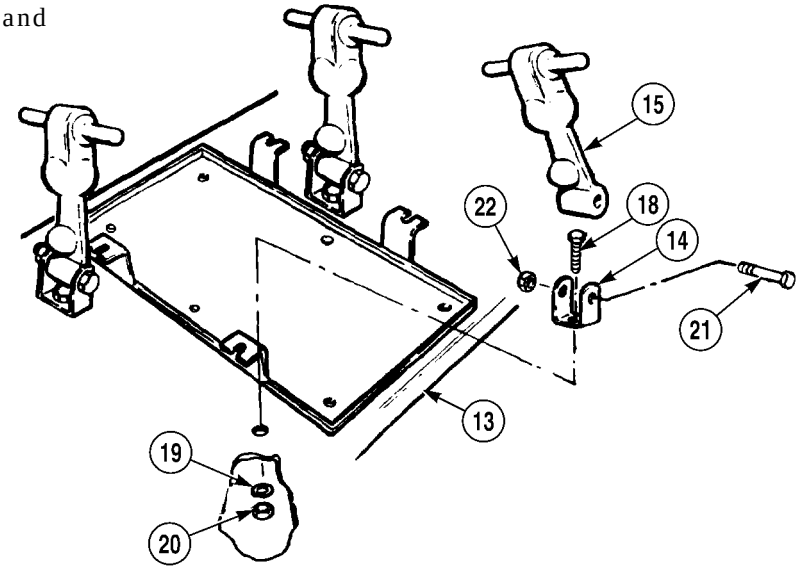
(6) Install bracket (14) to left front fender (13) with screw (12).

(7) Install rubber hood hook (15) to bracket (14) with screw (16) and locknut (17).



(8) Install two brackets (14) to left front fender (13) with screws (18), washers (19), and locknuts (20).

(9) Install two rubber hood hooks (15) to brackets (14) with screws (21) and locknuts (22).



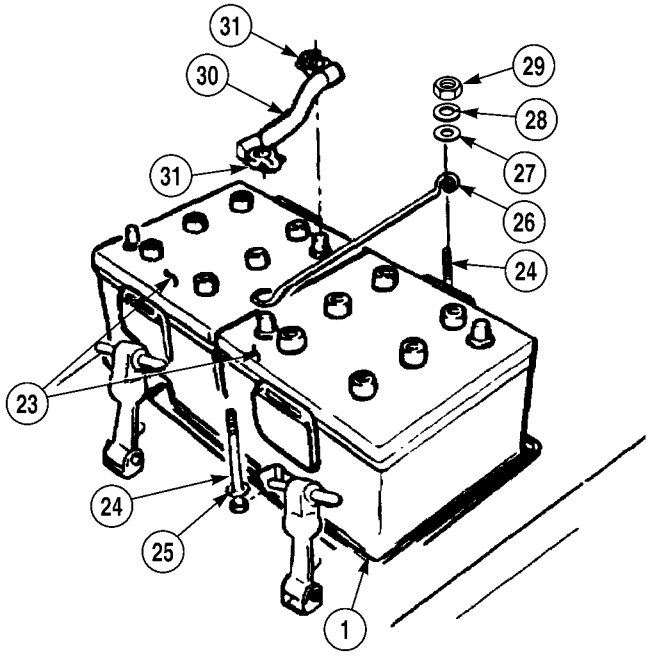
Special Purpose Kit Installation Instructions (Cont)

(10) Install two batteries (23).

(11) Install four screws (24) and washers (25) to battery box (1).

(12) Install two holddowns (26) on four screws (24) with washers (27), lockwashers (28) and nuts (29).

(13) Install jumper cable (30) with two nuts (31). Tighten nuts (31) to 84 to 96 lb-in (9 to 11 NSm).



NOTE

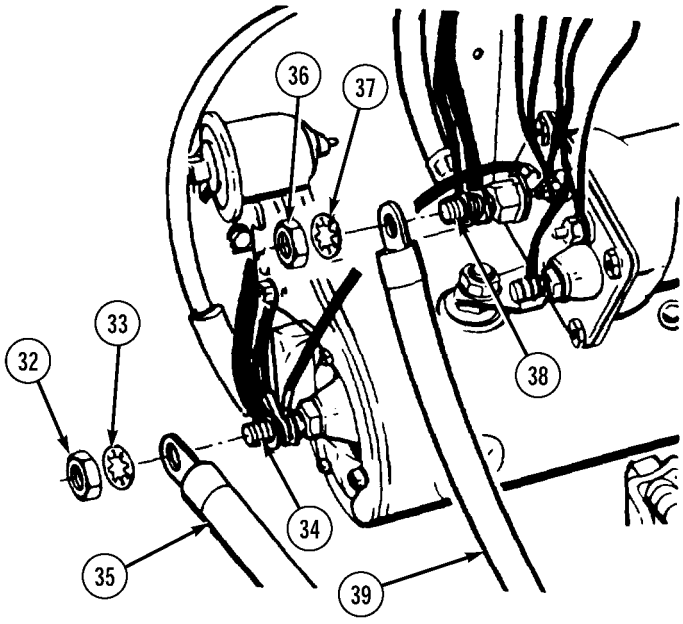
Remove and apply electrical sealant, RTV 200 as required.

(14) Remove locknut (32) and lockwasher (33) from starter motor ground terminal (34).

(15) Install cable 1138 (35) to starter motor ground terminal (34) with lockwasher (33) and locknut (32).

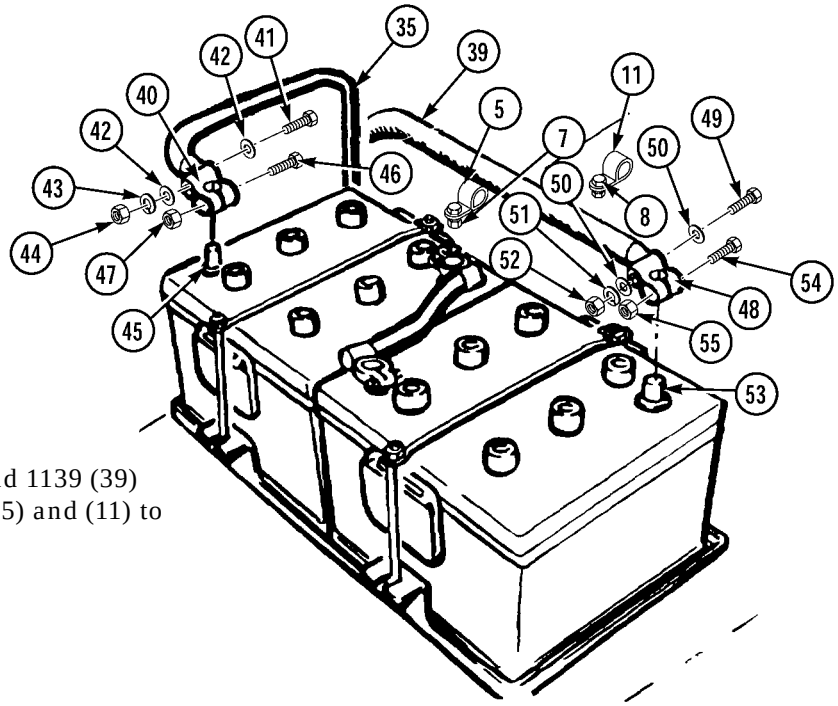
(16) Remove locknut (36) and lockwasher (37) from starter solenoid battery terminal (38).

(17) Install cable 1139 (39) to starter solenoid battery terminal (38) with lockwasher (37) and locknut (36).



Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).



(18) Route cables 1138 (35) and 1139 (39) through cushion clamps (5) and (11) to batteries (23).

(19) Tighten locknut (7).

(20) Tighten locknut (8).

CAUTION

While tightening nuts, hold screw with wrench or damage to battery may occur.

(21) Install negative terminal (40) on cable 1138 (35) with screw (41), two washers (42), lockwasher (43), and nut (44). Tighten nut (44) to 12 to 16 lb-ft (16 to 22 N$m).

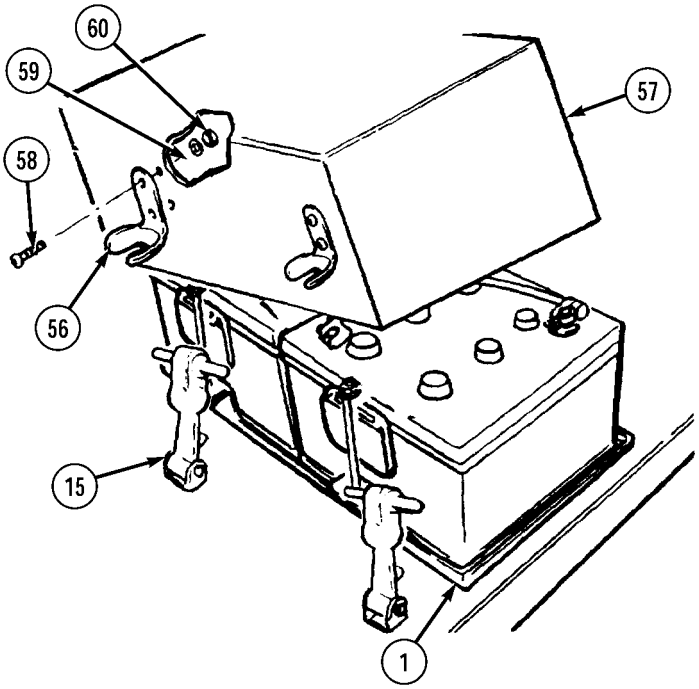
(22) Install negative terminal (40) to battery post (45) with screw (46) and nut (47). Tighten nut (47) to 84 to 96 lb-in (9 to 11 N$m).

(23) Install positive terminal (48) on cable 1139 (39) with screw (49), two washers (50), lockwasher (51) and nut (52). Tighten nut (52) to 12 to 16 lb-ft (16 to 22 N$m).

(24) Install positive terminal (48) to battery post (53) with screw (54) and nut (55). Tighten nut (55) to 84 to 96 lb-in (9 to 11 N$m).

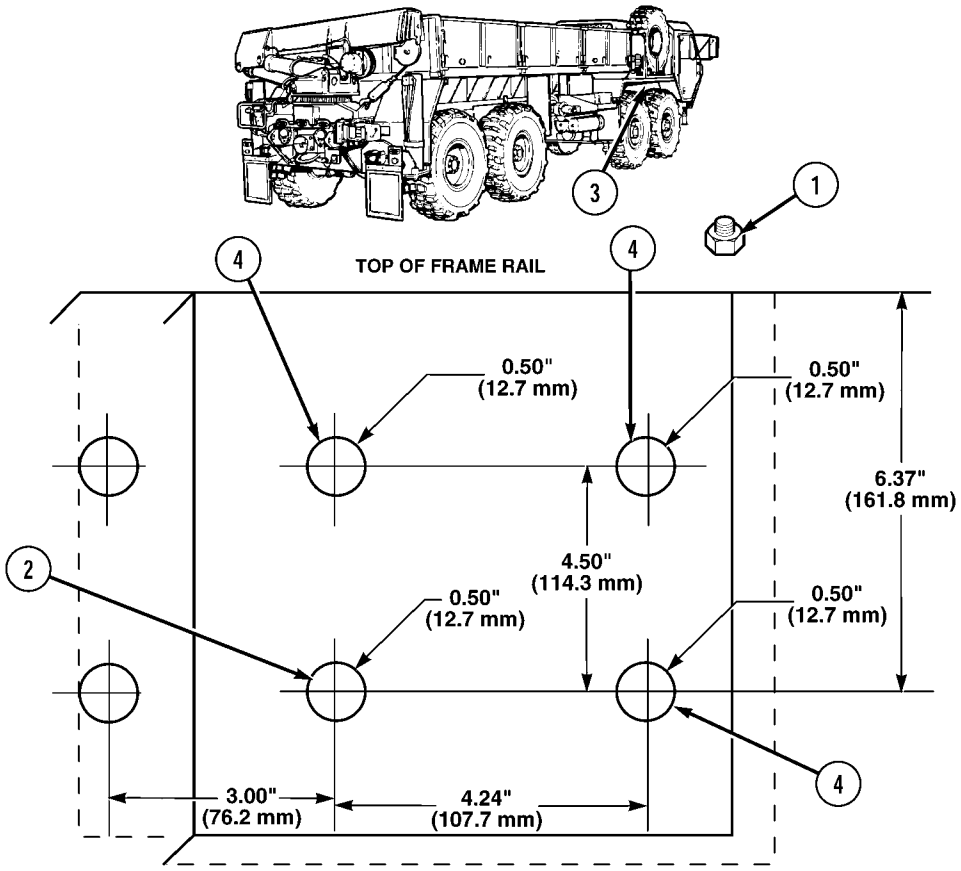
(25) Install three hood brackets (56) to battery box cover (57) with six screws (58), washers (59), and locknuts (60).

(26) Install battery box cover (57) to battery box (1) with three rubber hood hooks (15).



Special Purpose Kit Installation Instructions (Cont)

c. Frame Preparation for Arctic Heater Initial Installation.



WARNING

Drilling and grinding operations are hazardous to the eyes. Eye protection is required. Failure to heed this warning can result in injury to personnel.

NOTE

- Situate heater below normal coolant level of engine.
- Guard against excessive road spray.
- Keep coolant hoses, fuel lines, and electrical wiring as short as possible.

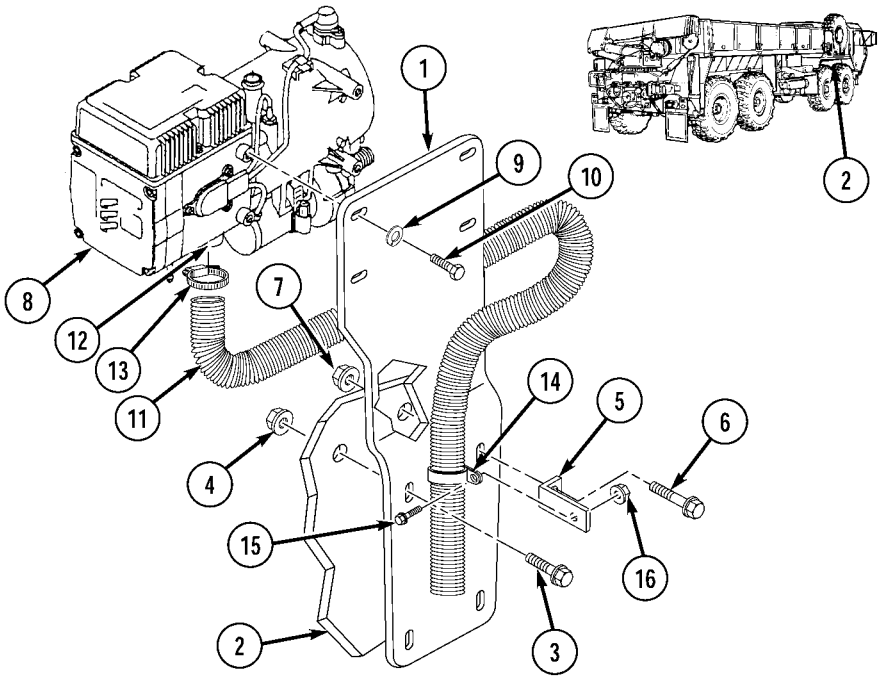
(1) Remove plug (1) from hole (2) on frame rail (3).

(2) Drill three 0.50 in. (12.7 mm) holes (4) in frame rail (3).

Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

d. Arctic Engine Heater Initial Installation.



(1) Install arctic engine heater mounting bracket (1) to frame rail (2) with three screws (3) and locknuts (4).

(2) Install clip bracket (5) to arctic engine heater mounting bracket (1) and frame rail (2) with screw (6) and locknut (7).

(3) Install arctic engine heater (8) to arctic engine heater mounting bracket (1) with four lockwashers (9) and screws (10).

(4) Install exhaust pipe (11) to arctic engine heater exhaust port (12) with clamp (13).

(5) Install clamp (14) and exhaust pipe (11) to clip bracket (5) with screw (15) and locknut (16).

Special Purpose Kit Installation Instructions (Cont)

e. Preparation for Arctic Engine Heater Fuel Pump Initial Installation.

WARNING

Drilling and grinding operations are hazardous to the eyes. Eye protection is required. Failure to heed this warning can result in injury to personnel.

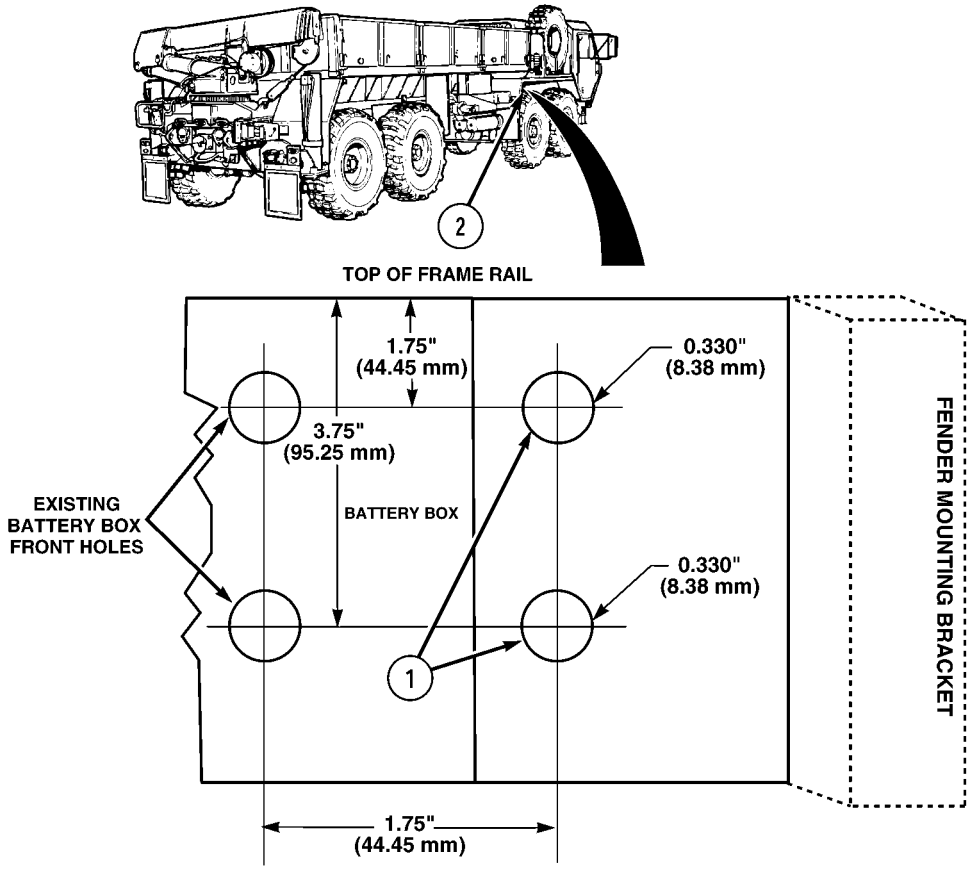
CAUTION

- Fuel line limits must not be exceeded. Ensure following conditions are met:
- Bottom of fuel metering pump must be within a height of 2'6" (762 mm) of bottom of fuel pick–up pipe.
- Fuel metering pump must not exceed a distance of 6'6" (1981.2 mm) from fuel pick–up pipe.
- Proper mounting angle of pump is necessary to allow any air or vapor in fuel lines to pass through pump rather than cause a blockage. Install fuel pump from 15_ to vertical.

NOTE

Take all measurements from frame rail, not frame liner.

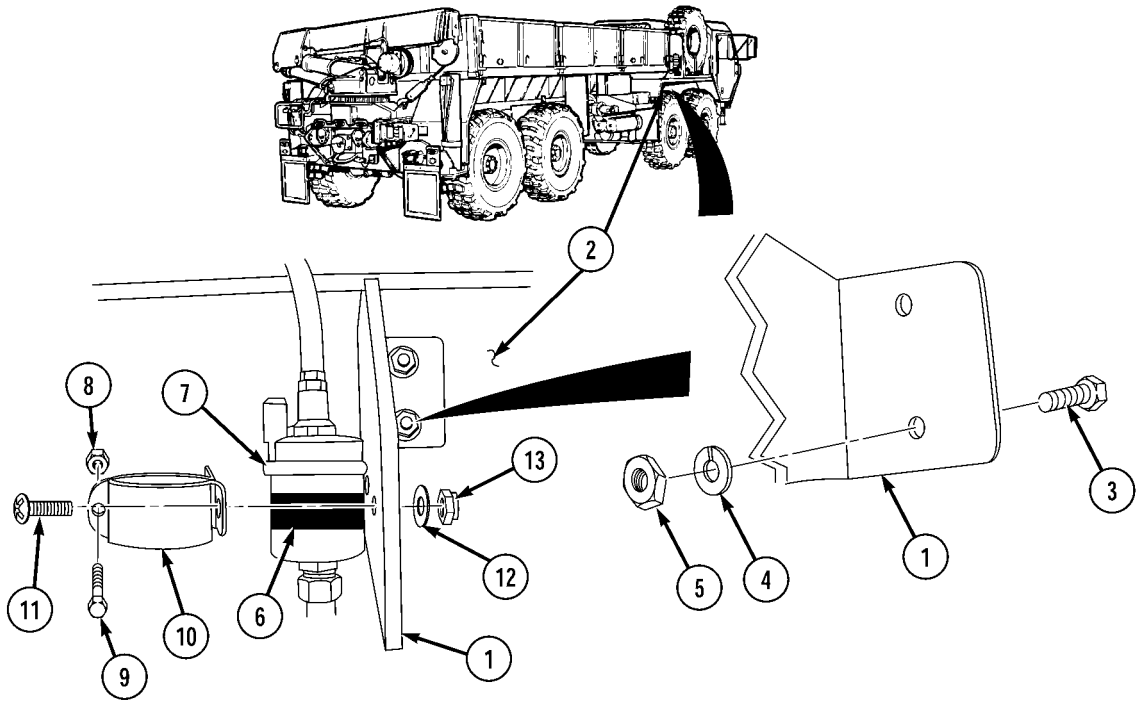
Drill two 0.33 in (8.38 mm) holes (1) in frame rail (2).



Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

f. Arctic Engine Heater Fuel Metering Pump Initial Installation.



WARNING

- Wear safety goggles for eye protection when removing, cleaning, or installing fuel lines and fuel air vent lines to prevent injury or blindness.
- Contact with fuel can irritate eyes and skin. Do not let fuel get into eyes. If fuel comes into contact with eyes, immediately rinse eyes with clear water. Wash fuel off skin with soap and water as soon as possible after contact.

NOTE

- Butt joints and clamps on all connections.
- Install plastic cable ties as required.

(1) Install fuel metering pump mounting bracket (1) to inside of frame rail (2) with two screws (3), lockwashers (4) and locknuts (5).

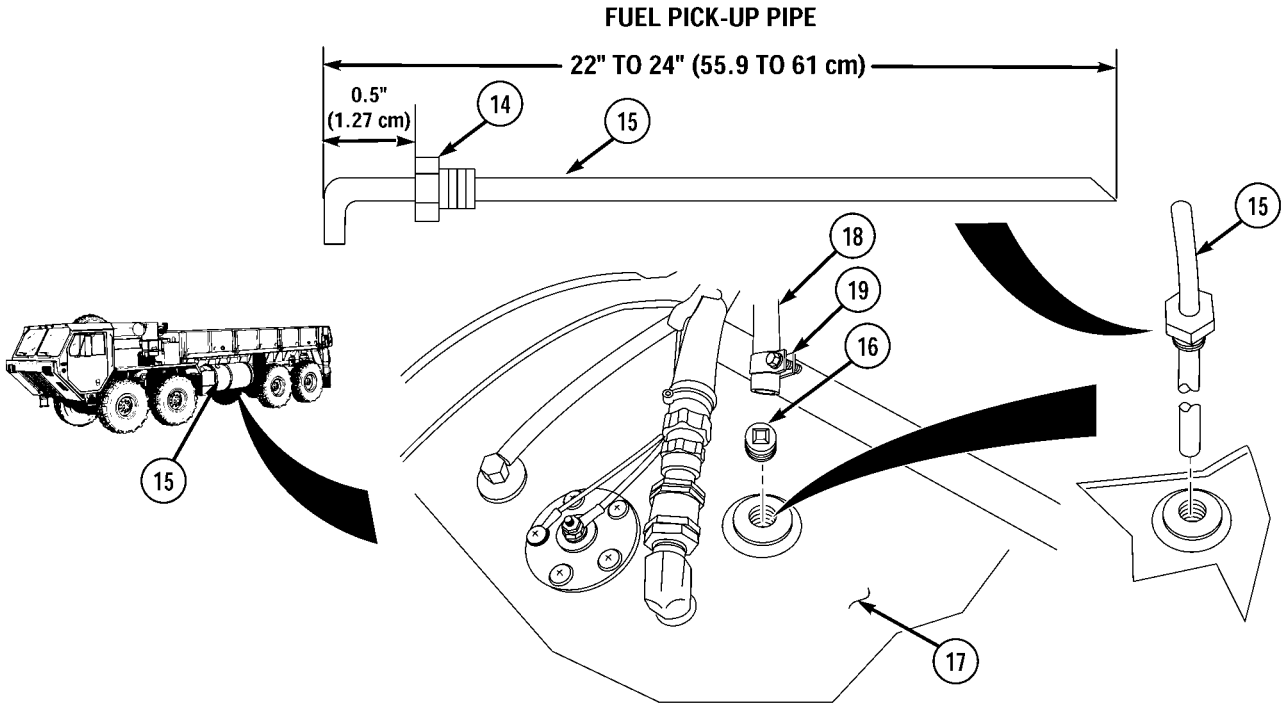
(2) Install rubber ring (6) to fuel metering pump (7).

(3) Loosen locknut (8) and screw (9) on fuel metering pump holder (10).

(4) Install fuel metering pump holder (10) on fuel metering pump (7) and tighten locknut (8).

(5) Install fuel metering pump (7) and fuel metering pump holder (10) to fuel metering pump mounting bracket (1) with two screws (11), washers (12) and locknuts (13).

Special Purpose Kit Installation Instructions (Cont)



(6) Install compression fitting (14) on fuel pick-up pipe (15).

(7) Remove plug (16) from fuel tank (17).

WARNING

To prevent explosion and fire, no smoking, flame, sparks, and glowing or hot objects are allowed within 50 ft (15 m) of vehicle.

(8) Apply pipe thread sealing compound to threads of compression fitting (14).

(9) Install fuel pick–up pipe (15) in fuel tank (17) and tighten compression fitting (14) and fuel pick–up pipe (15) to fuel tank (17).

(10) Install fuel metering pump hose (18) to fuel pick–up pipe (15) with clamp (19).

(11) Route fuel metering pump hose (18) to fuel metering pump (7) and cut to length.

Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

(12) Install fuel metering pump hose (18) to suction side of fuel metering pump (7) with clamp (20).

(13) Install fuel hose (21) to pressure side of fuel metering pump (7) with clamp (22).

(14) Place clamp (23) over end of fuel hose (21).

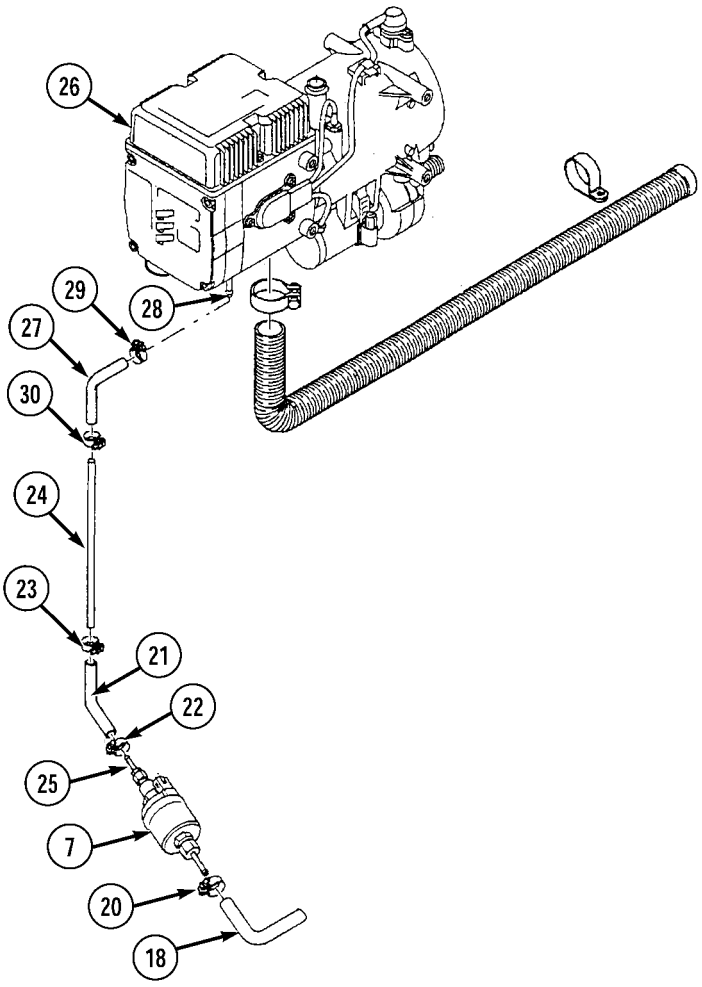
(15) Insert fuel line (24) into fuel hose (21) until contact is felt with fuel metering pump stem (25) and tighten clamp (23).

(16) Route fuel line (24) to arctic engine heater (26) and cut to length.

(17) Install fuel hose (27) to arctic engine heater fuel supply stem (28) with clamp (29).

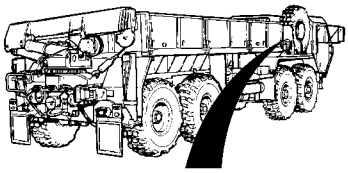
(18) Place clamp (30) over fuel hose (27).

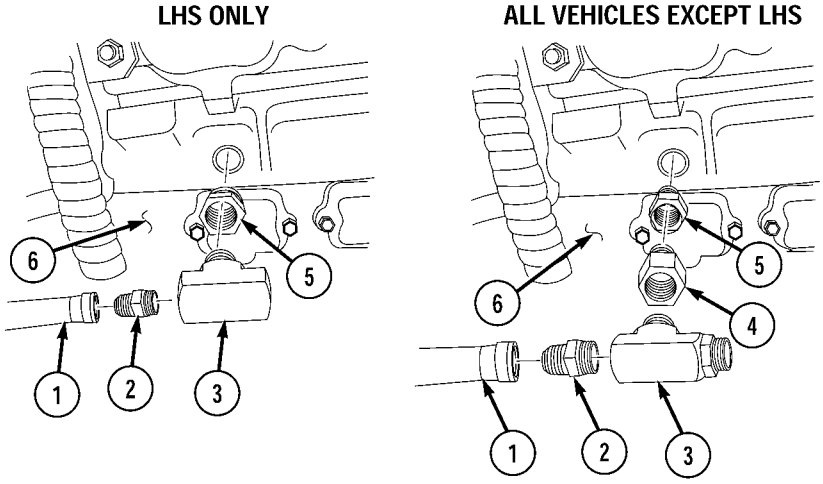
(19) Insert fuel line (24) into fuel hose (27) until contact is felt with arctic engine heater fuel supply stem (28) and tighten clamp (30).



Special Purpose Kit Installation Instructions (Cont)

g. Arctic Engine Heater Coolant Plumbing Initial Installation.





(1) Disconnect air compressor water line (1) from flared fitting (2).

(2) Remove flared fitting (2) from tee fitting (3) and put with arctic engine heater kit.

NOTE

- Perform steps *(3)* and *(4)* for all vehicles except LHS.
- Perform step *(5)* for LHS vehicles.

(3) Remove tee fitting (3) from fitting (4).

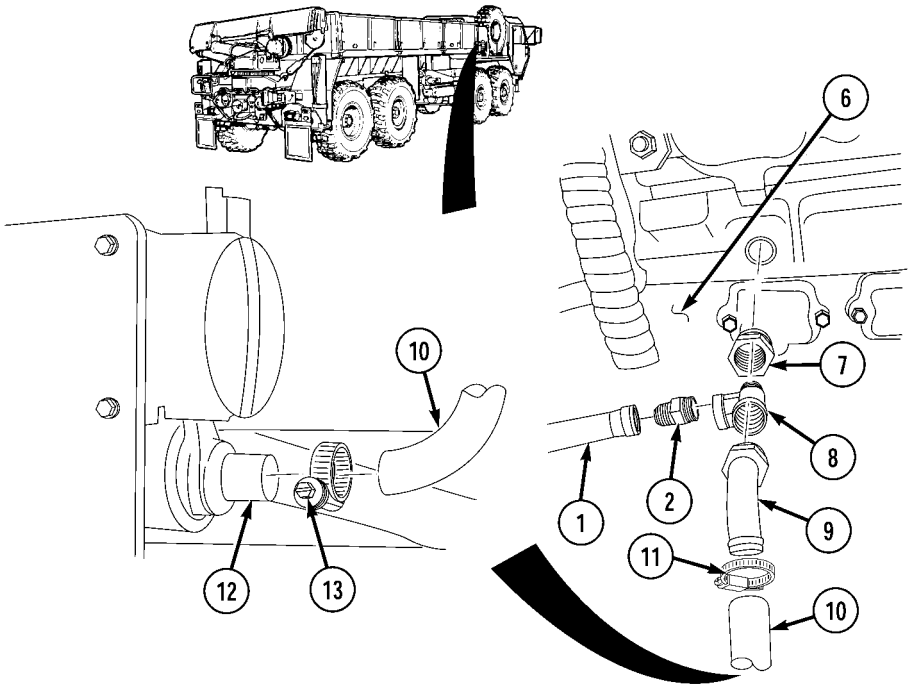
(4) Remove fitting (4) from reducer fitting (5).

(5) Remove tee fitting (3) from reducer fitting (5).

(6) Remove reducer fitting (5) from engine block (6).

Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(7) Apply pipe thread sealing compound to threads of reducer fitting (7) and install to engine block (6).

(8) Apply pipe thread sealing compound to threads of tee fitting (8) and install to reducer fitting (7).

(9) Apply pipe thread sealing compound to threads of flared fitting (2) and install to tee fitting (8).

(10) Apply pipe thread sealing compound to threads of 45_ fitting (9) and install to tee fitting (8).

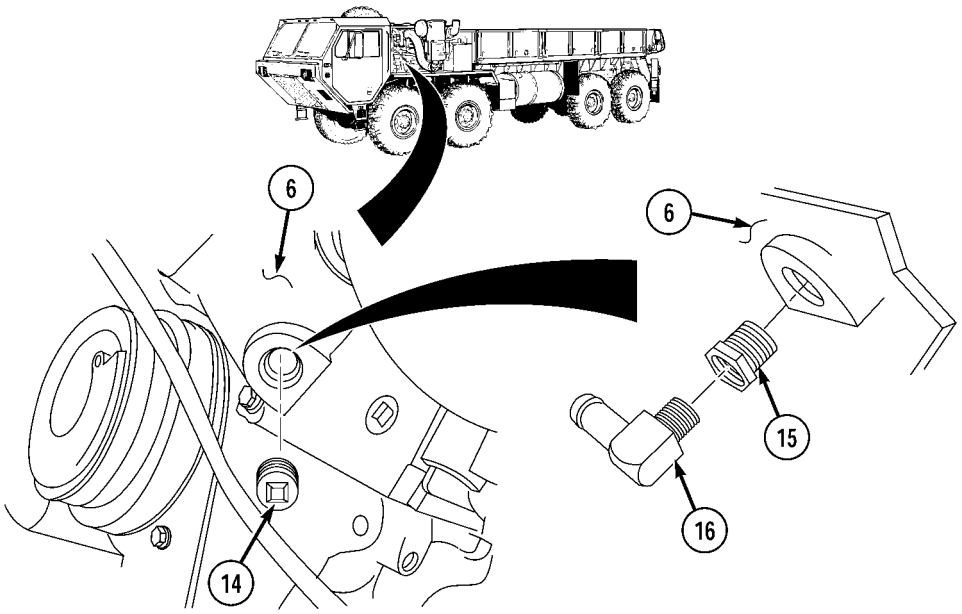
(11) Connect air compressor water line (1) to flared fitting (2).

(12) Install water hose (10) to 45_ fitting (9) with clamp (11).

(13) Route water hose (10) to water pump intake port (12) and cut to length.

(14) Install water hose (10) to water pump intake port (12) with clamp (13).

Special Purpose Kit Installation Instructions (Cont)



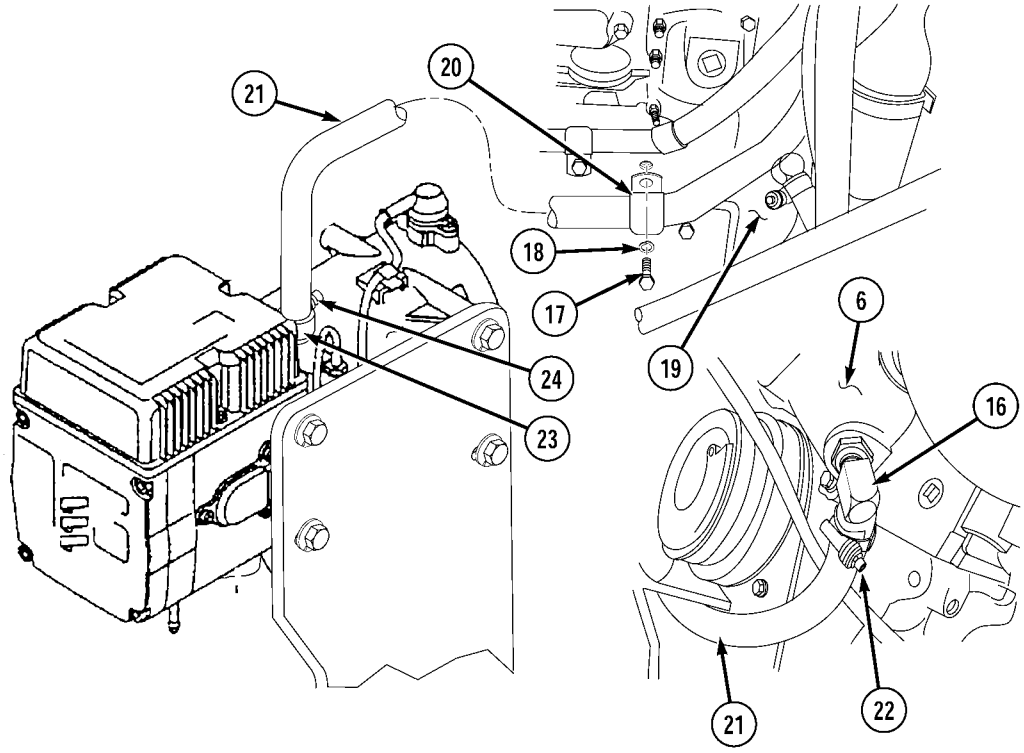
(15) Remove plug (14) from engine block (6).

(16) Apply pipe thread sealing compound to threads of reducer fitting (15) and install to engine block (6).

(17) Apply pipe thread sealing compound to threads of 90_ fitting (16) and install to reducer fitting (15).

Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).



(18) Remove screw (17) and lockwasher (18) from oil cooler (19).

(19) Install cushion clamp (20) to oil cooler (19) with screw (17) and lockwasher (18). Do not tighten.

(20) Install water hose (21) to 90_ fitting (16) with clamp (22).

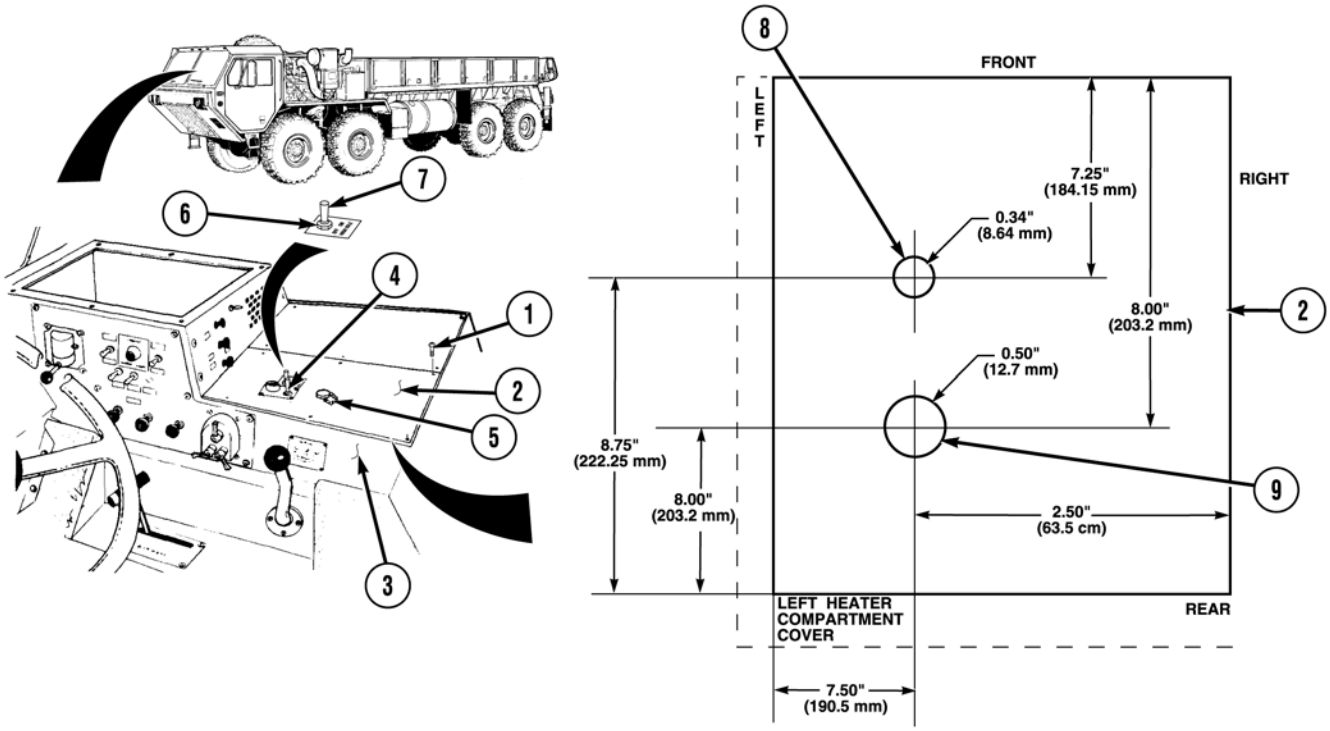
(21) Route water hose (21) along front of engine block (6) through cushion clamp (20) to arctic engine heater output port (23) and cut to length.

(22) Tighten screw (17).

(23) Install water hose (21) to arctic engine heater output port (23) with clamp (24).

Special Purpose Kit Installation Instructions (Cont)

h. Sheet Metal Preparation for Arctic Engine Heater Electrical Harness Initial Installation.



WARNING

Drilling and grinding operations are hazardous to the eyes. Eye protection is required. Failure to heed this warning can result in injury to personnel.

(1) Remove six screws (1) and left heater compartment cover (2) from console (3).

(2) Remove PTO indicator light assembly and switch (4) from left heater compartment cover (2) (TM 9-2320-279-20).

(3) Remove utility outlet (5) from left heater compartment cover (2) (Non-A2 and A2R1 Models) (TM 9-2320-279-20).

(4) If installed, remove chemical alarm switch from left heater compartment cover (2) (TM 9-2320-279-20).

(5) If installed, remove gas particulate switch from left heater compartment cover (2) (TM 9-2320-279-20).

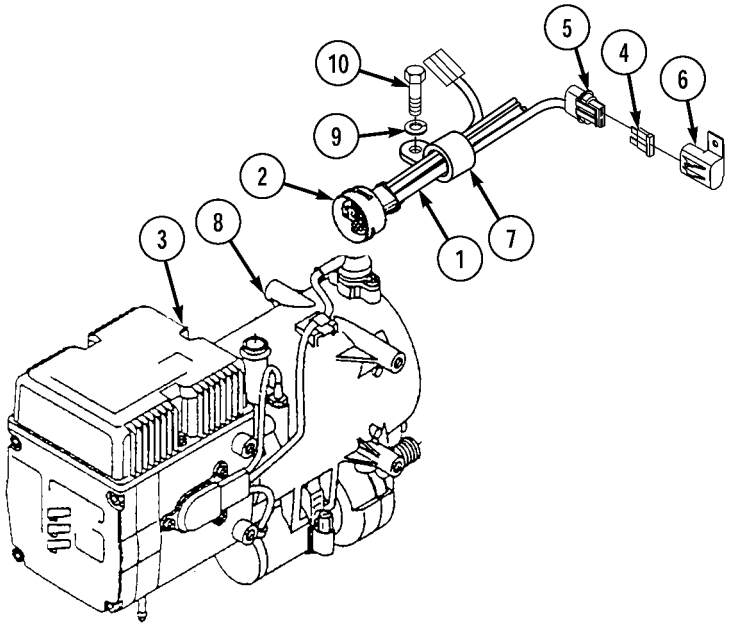
(6) If installed, remove locknut (6) and high idle switch (7) from left heater compartment cover (2) (TM 9-2320-279-20).

(7) Drill one 0.34 in. (8 mm) hole (8) in left heater compartment cover (2).

(8) Drill one 0.50 in. (12.7 mm) hole (9) in left heater compartment cover (2).

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

i. Arctic Engine Heater Electrical Harness Initial Installation.



WARNING

To avoid eye injury, eye protection is required when working around batteries. Do not smoke, use open flame, make sparks, or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry, such as rings, ID tags, watches, and bracelets. If jewelry contacts a battery terminal, a direct short will result in instant heating of tools, damage to equipment, and cause injury to personnel.

CAUTION

To avoid potential short circuit damage during installation, insert 15 amp fuse into the power harness after all electrical connections are complete.

NOTE

- All electrical harnesses should be cut to length.
- Apply electrical sealant to exposed wire connectors after installation.
- Install plastic cable ties as required.

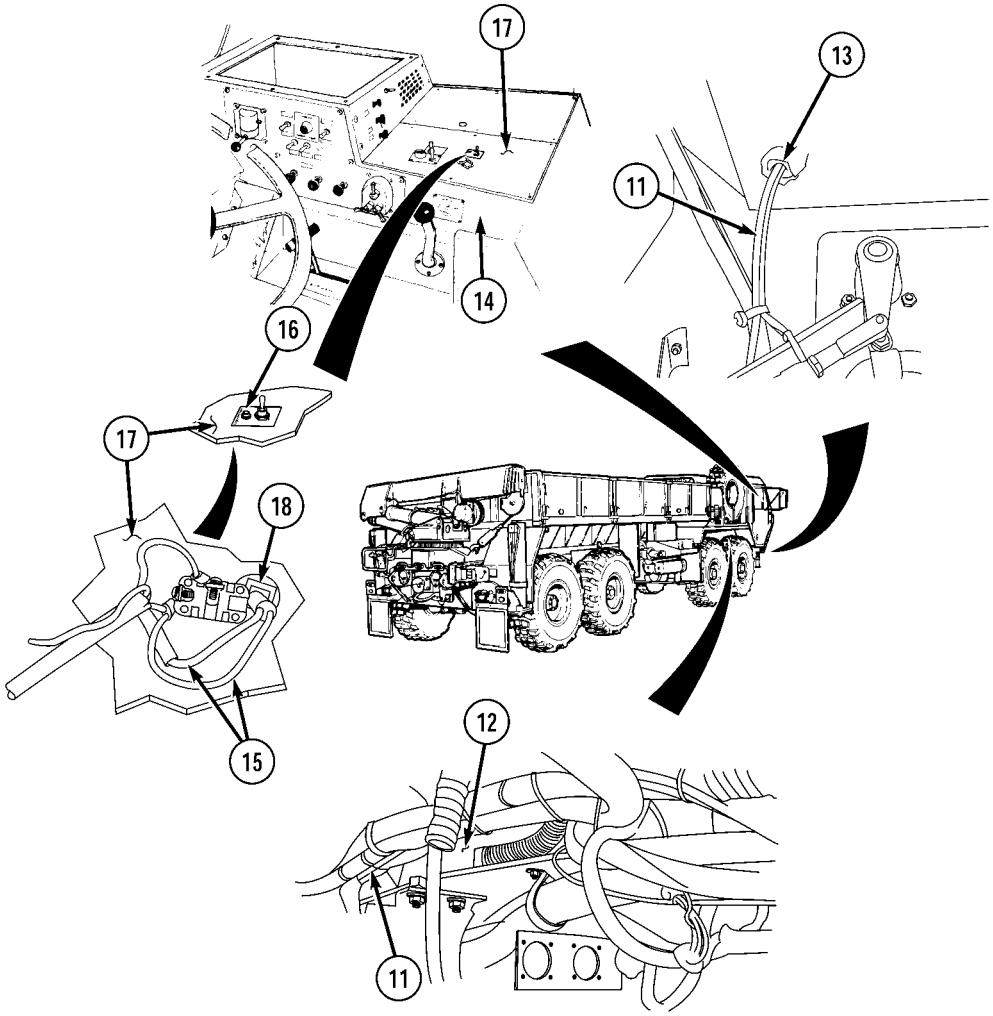
(1) Install electrical harness (1) on vehicle.

(2) Connect electrical harness connector (2) to arctic engine heater connector (3).

(3) Install 5 amp fuse (4) in switch fuse holder (5) and enclose with fuse holder cover (6).

(4) Install cushion clamp (7) and electrical harness (1) to arctic engine heater (8) with lockwasher (9) and screw (10).

Special Purpose Kit Installation Instructions (Cont)



(5) Route switch harness (11) along frame rail (12) to hole in cab (13).

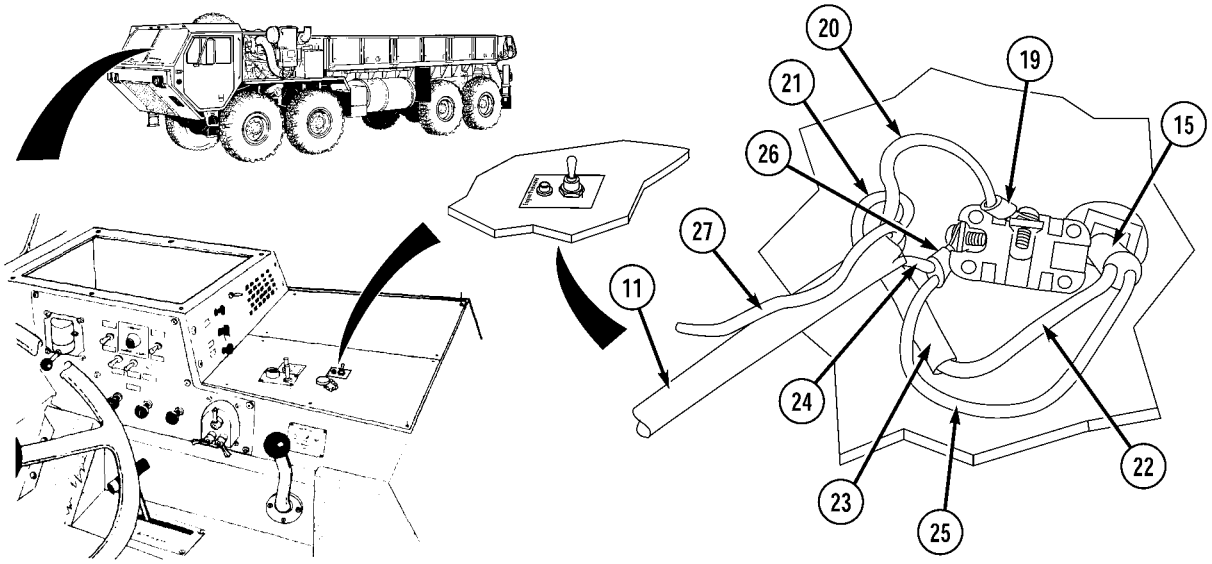
(6) Push switch harness (11) through hole in cab (13) into left heater compartment (14).

(7) Push LED harness (15) through hole (16) in left heater compartment cover (17).

(8) Install LED harness (15) to left heater compartment cover (17) with spring clip (18).

Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).



(9) Prepare switch harness (11) and LED harness (15) for initial installation.

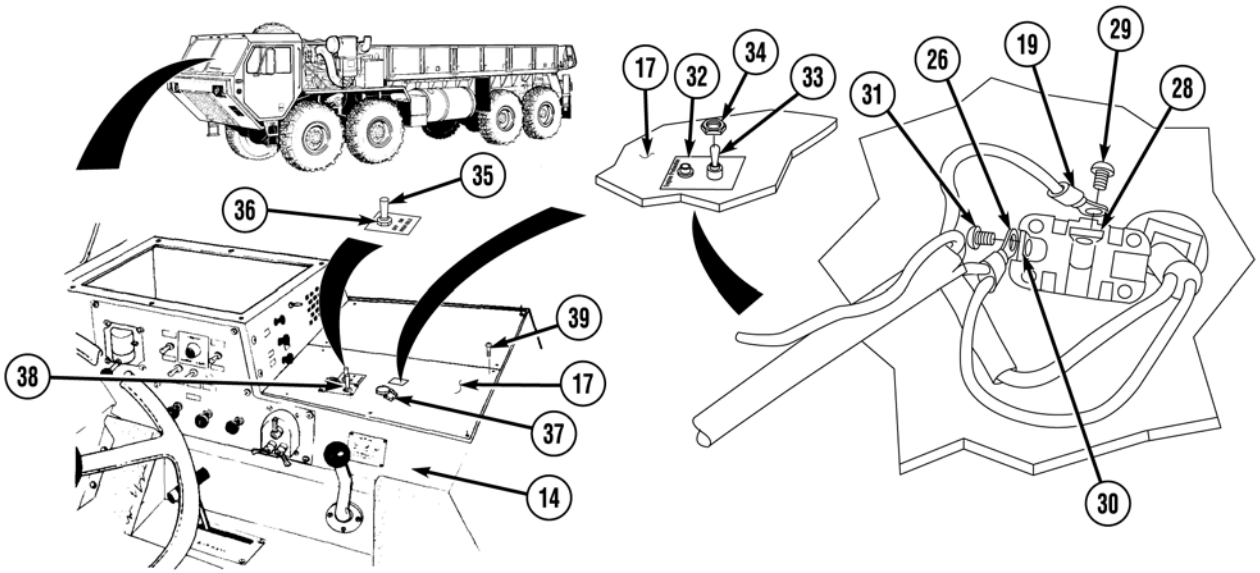
(10) Connect ring terminal (19) to switch harness red/yellow wire (20).

(11) Connect switch harness blue/white wire (21) to LED harness white wire (22) with butt connector (23).

(12) Connect switch harness yellow wire (24) and LED harness red wire (25) together with ring terminal (26).

(13) Fold switch harness brown wire (27) back.

Special Purpose Kit Installation Instructions (Cont)



(14) Connect ring terminal (19) to switch terminal (28) with screw (29).

(15) Connect ring terminal (26) to switch terminal (30) with screw (31).

(16) Install engine pre-heat decal (32) on left heater compartment cover (17).

(17) Install arctic engine heater switch (33) on left heater compartment cover (17) with locknut (34).

(18) If removed, install high idle switch (35) on left heater compartment cover (17) with locknut (36) (TM 9-2320-279-20).

(19) If removed, install gas particulate switch on left heater compartment cover (17) (TM 9-2320-279-20).

(20) If removed, install chemical alarm switch on left heater compartment cover (17) (TM 9-2320-279-20).

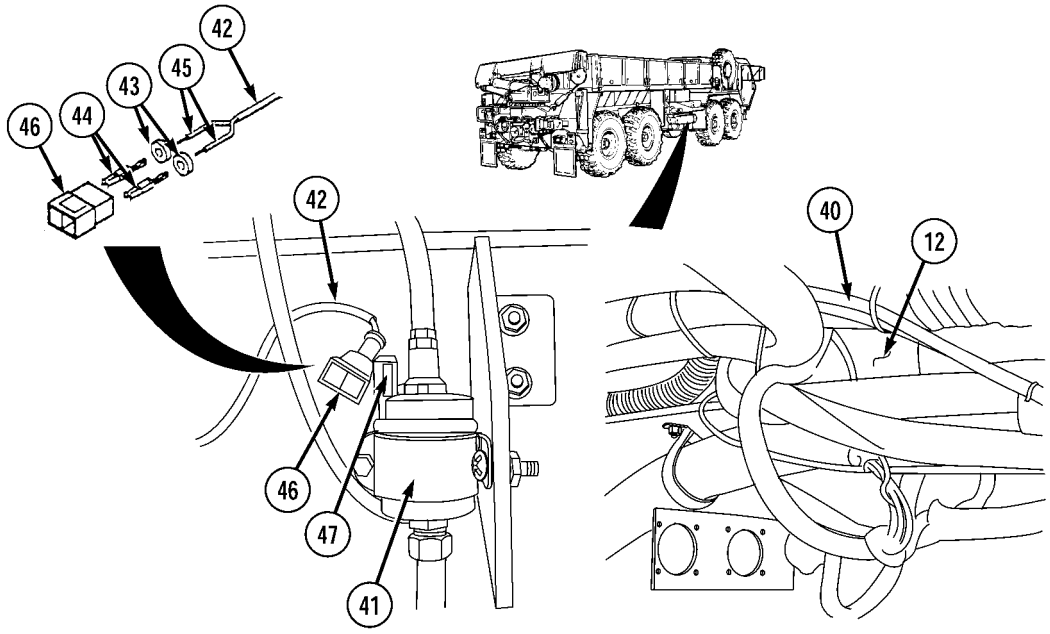
(21) Install utility outlet (37) on left heater compartment cover (17) (Non-A2 and A2R1 Models) (TM 9-2320-279-20).

(22) Install PTO indicator light assembly and switch (38) on left heater compartment cover (17) (TM 9-2320-279-20).

(23) Install left heater compartment cover (17) to left heater compartment console (14) with six screws (39).

Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).



(24) Route fuel metering pump harness (40) along frame rail (12) to fuel metering pump (41) and cut to length.

(25) Prepare fuel metering harness (42) for initial installation.

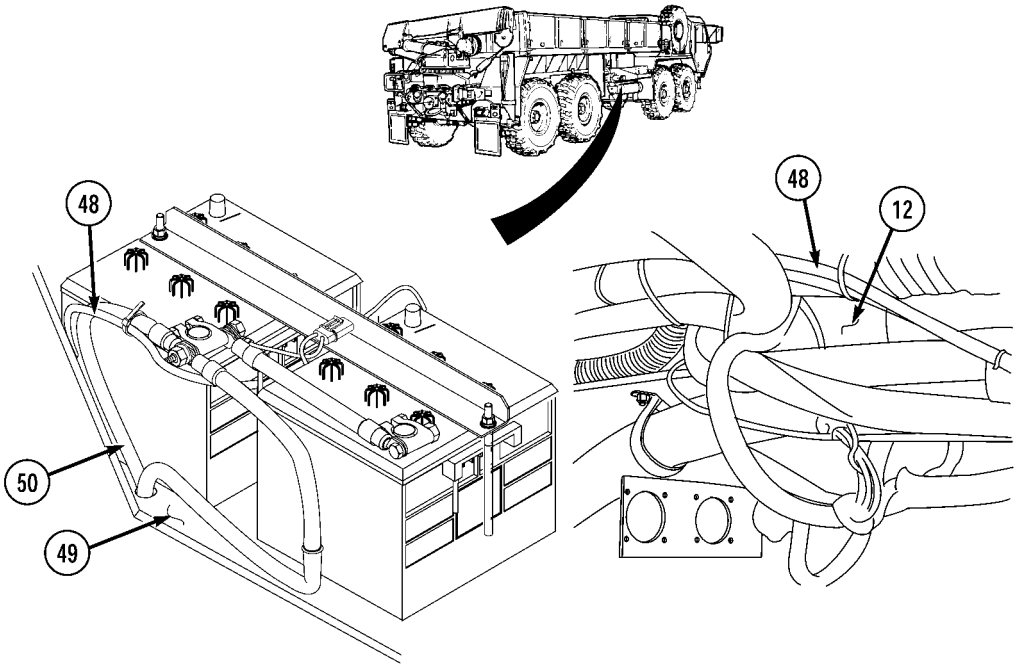
(26) Install two seals (43) and female connectors (44) on two green wires (45).

(27) Install two female connectors (44) in socket connector (46).

(28) Connect socket connector (46) to fuel metering pump connector (47).

(29) Install battery box (TM 9-2320-279-20).

Special Purpose Kit Installation Instructions (Cont)



(30) Route power harness (48) along frame rail (12) to battery box (49).

(31) Route power harness (48) through battery box (49) beside battery cables (50) and cut to length.

NOTE

Wire must be inserted into fuse holder prior to terminating.

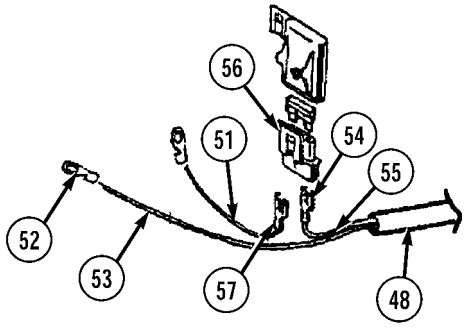
(32) Prepare power harness (48) and power pigtail (51) for initial installation.

(33) Install ring terminal (52) on power harness brown wire (53).

(34) Install connector (54) on power harness red wire (55).

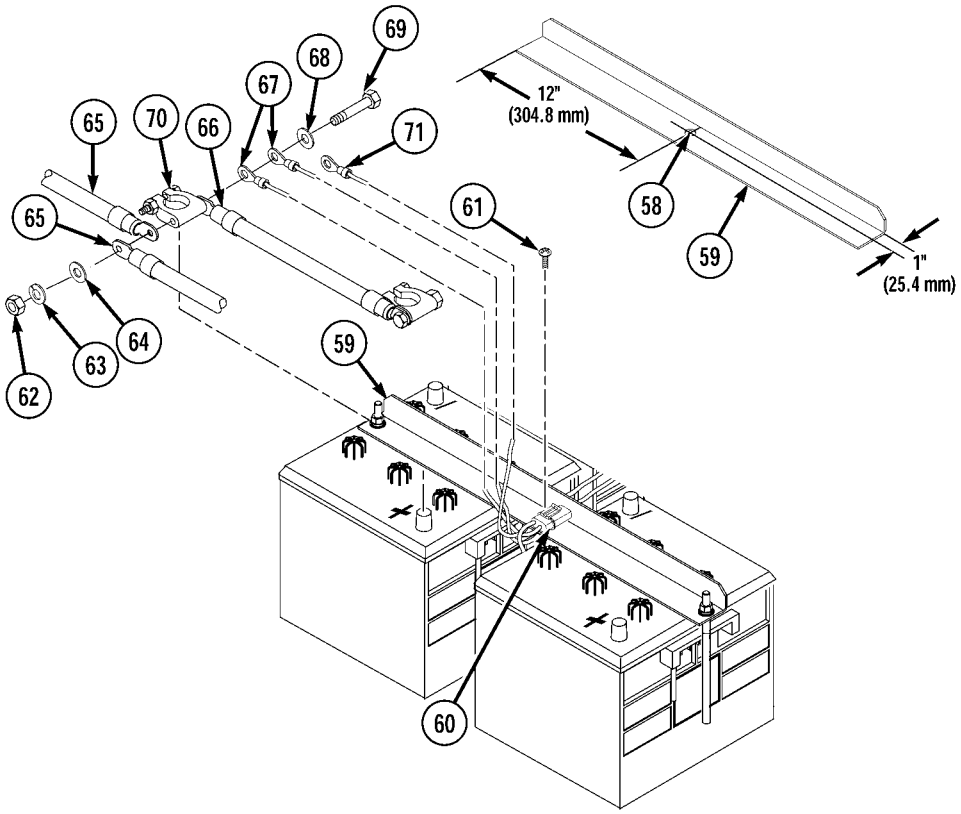
(35) Install connector (54) in fuse holder base (56).

(36) Install pigtail connector (57) in fuse holder base (56).



Special Purpose Kit Installation Instructions (Cont)

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

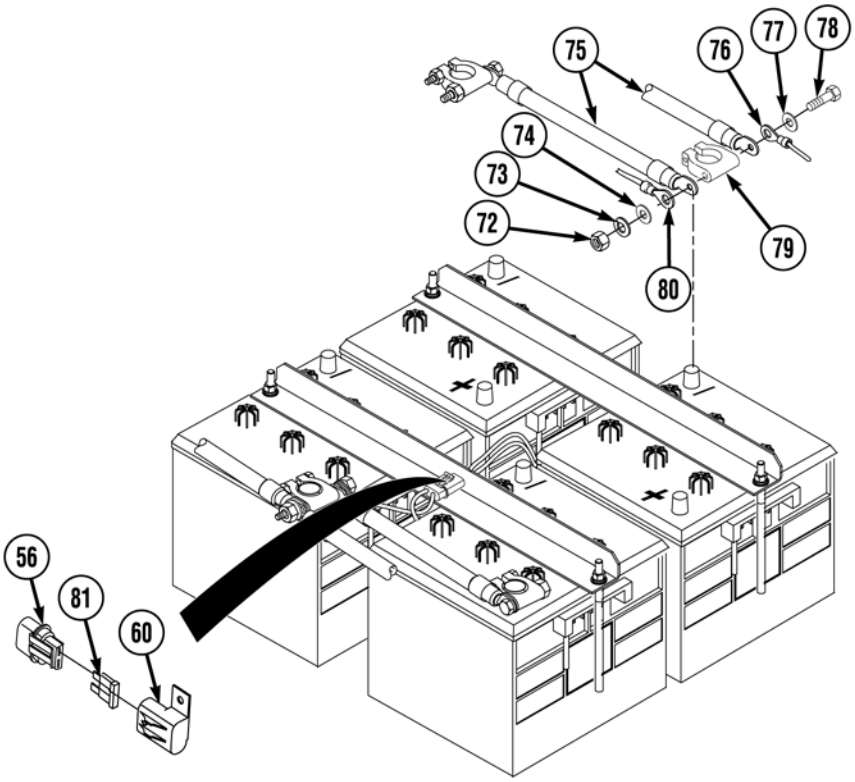


(37) Drill one 0.187 in. (4.75 mm) hole (58) in battery holddown (59).

(38) Install fuse holder cover (60) to battery holddown (59) with screw (61).

(39) Remove nut (62), lockwasher (63), washer (64), two positive cables (65), jumper cable (66), two wires (67), washer (68), and screw (69) from battery terminal (70).

Special Purpose Kit Installation Instructions (Cont)



CAUTION

While tightening nuts, hold screw with wrench or damage to battery may occur.

(40) Install screw (69), washer (68), power harness pigtail ring terminal (71), two wires (67), jumper cable (66), and two positive cables (65) to battery terminal (70) with washer (64), lockwasher (63), and nut (62). Tighten nut (62) to 12 to 16 lb-ft (16 to 22 N•m).

(41) Remove nut (72), lockwasher (73), washer (74), two negative cables (75), five wires (76), washer (77), and screw (78) from battery terminal (79).

(42) Install screw (78), washer (77), ring terminal (80), two negative cables (75), and five wires (76) to battery terminal (79) with washer (74), lockwasher (73), and nut (72). Tighten nut (72) to 12 to 16 lb-ft (16 to 22 N•m).

(43) Install 15 amp fuse (81) in fuse holder base (56).

(44) Install fuse holder base (56) in fuse holder cover (60).

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

(45) Fill cooling system (TM 9-2320-279-20).

(46) Start engine and warm up to normal operating temperature (TM 9-2320-279-10).

(47) Check cooling system for leaks (TM 9-2320-279-20).

(48) Shut off engine (TM 9-2320-279-10).

(49) Check and fill coolant system (TM 9-2320-279-20).

NOTE

- On initial startup, arctic engine heater may require several start attempts to self prime fuel system.
- Arctic engine heater will attempt to start two times per start cycle. After second failed start attempt, arctic engine heater will not operate until arctic engine heater on/off switch is turned OFF and back ON.
- Audible clicking from arctic engine heater fuel metering pump may indicate that arctic engine heater fuel system is not primed. If audible clicking is heard from arctic engine heater fuel metering pump, repeat steps *(50)* through *(53)* four times or until arctic engine heater starts. Do not attempt to start arctic engine heater more than five times. Arctic engine heater should prime itself within nine start attempts.

(50) Turn arctic engine heater ON (TM 9-2320-279-10).

(51) Observe arctic engine heater indicator light for steady illumination.

(52) Observe arctic engine heater for proper operation.

(53) Turn arctic engine heater on/off switch OFF (TM 9-2320-279-10).

j. Follow-on Maintenance.

(1) Install front cable tensioner (para 17-2).

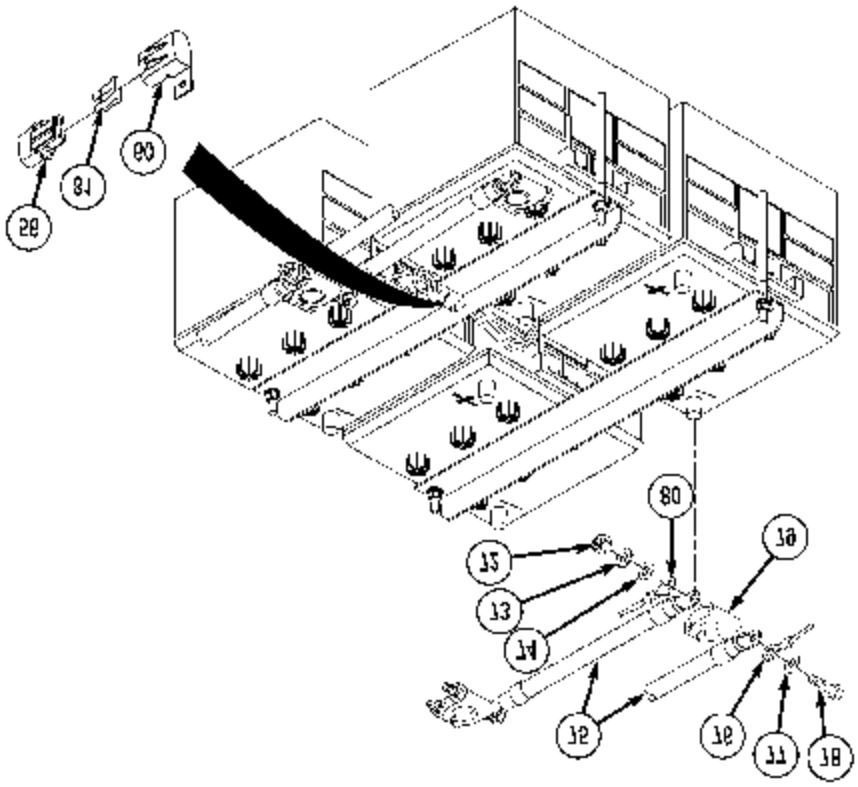
(2) Install right front splash guards (para 16-13).

(3) Install skid plate grille (para 14-5).

(4) Install engine side panels and close engine cover (TM 9-2320-279-10).

END OF TASK

Special Purpose Kit Installation Instructions (Cont)



CAUTION

While tightening nuts, hold screw with wrench or damage to battery may occur.

(40) Install screw (69), washer (68), power harness pigtail ring terminal (71), two wires (67), jumper cable (66), and two positive cables (65) to battery terminal (70) with washer (64), lockwasher (63), and nut (62). Tighten nut (62) to 12 to 16 lb-ft (16 to 22 N$m).

(41) Remove nut (72), lockwasher (73), washer (74), two negative cables (75), five wires (76), washer (77), and screw (78) from battery terminal (79).

(42) Install screw (78), washer (77), ring terminal (80), two negative cables (75), and five wires (76) to battery terminal (79) with washer (74), lockwasher (73), and nut (72). Tighten nut (72) to 12 to 16 lb-ft (16 to 22 N$m).

(43) Install 15 amp fuse (81) in fuse holder base (56).

(44) Install fuse holder base (56) in fuse holder cover (60).

23-2.1. ARCTIC HEATER KIT INITIAL INSTALLATION (MODEL B) (CONT).

(45) Fill cooling system (TM 9-2320-279-20).

(46) Start engine and warm up to normal operating temperature (TM 9-2320-279-10).

(47) Check cooling system for leaks (TM 9-2320-279-20).

(48) Shut off engine (TM 9-2320-279-10).

(49) Check and fill coolant system (TM 9-2320-279-20).

NOTE

- On initial startup, arctic engine heater may require several start attempts to self prime fuel system.
- Arctic engine heater will attempt to start two times per start cycle. After second failed start attempt, arctic engine heater will not operate until arctic engine heater on/off switch is turned OFF and back ON.
- Audible clicking from arctic engine heater fuel metering pump may indicate that arctic engine heater fuel system is not primed. If audible clicking is heard from arctic engine heater fuel metering pump, repeat steps *(50)* through *(53)* four times or until arctic engine heater starts. Do not attempt to start arctic engine heater more than five times. Arctic engine heater should prime itself within nine start attempts.

(50) Turn arctic engine heater ON (TM 9-2320-279-10).

(51) Observe arctic engine heater indicator light for steady illumination.

(52) Observe arctic engine heater for proper operation.

(53) Turn arctic engine heater on/off switch OFF (TM 9-2320-279-10).

j. Follow-on Maintenance.

(1) Install front cable tensioner (para 17-2).

(2) Install right front splash guards (para 16-13).

(3) Install skid plate grille (para 14-5).

(4) Install engine side panels and close engine cover (TM 9-2320-279-10).

END OF TASK

Section III. ARMAMENT EQUIPMENT

23-3. MACHINE GUN RING KIT INITIAL INSTALLATION.

This task covers:

a. Initial Installation
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
Adhesive-sealant, silicone, Item 6, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

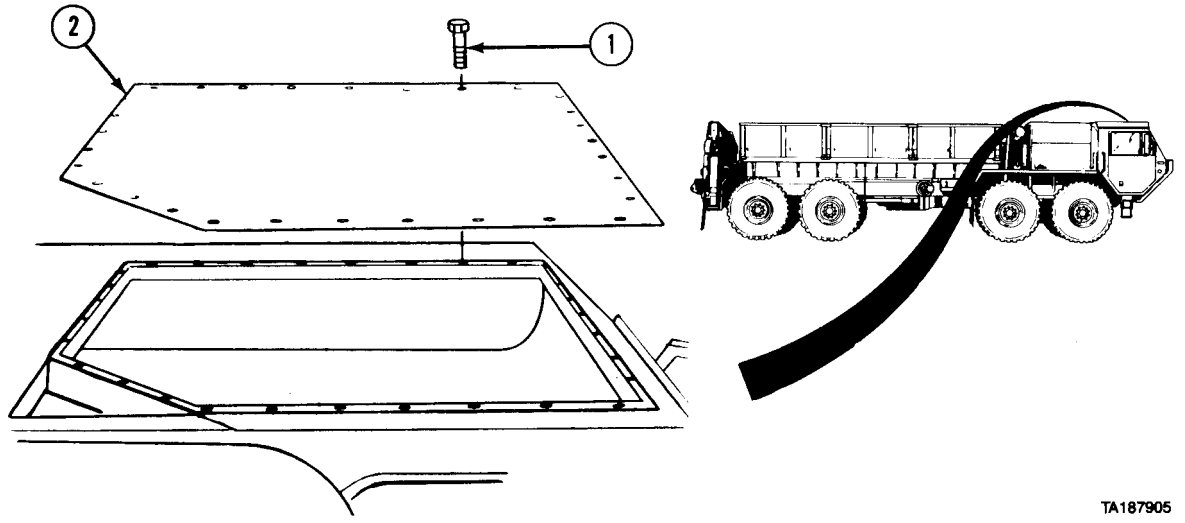
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Spare tire removed.

Special Environmental Conditions
None

General Safety Instructions
None

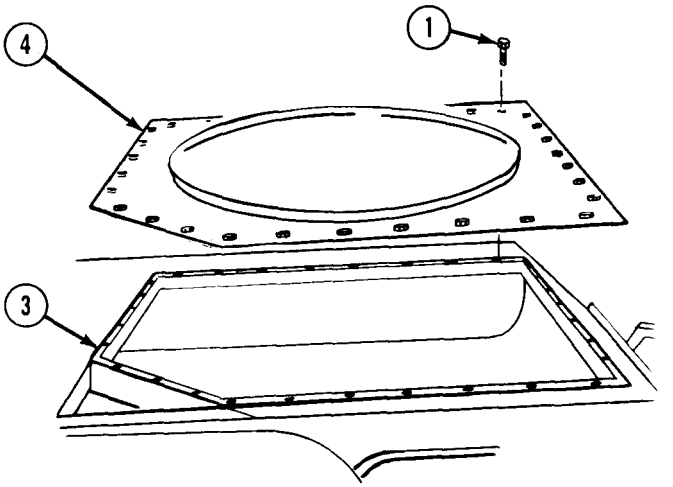
Level of Maintenance
Direct Support

a. Initial Installation.



(1) Remove 34 screws (1) and right roof panel (2).

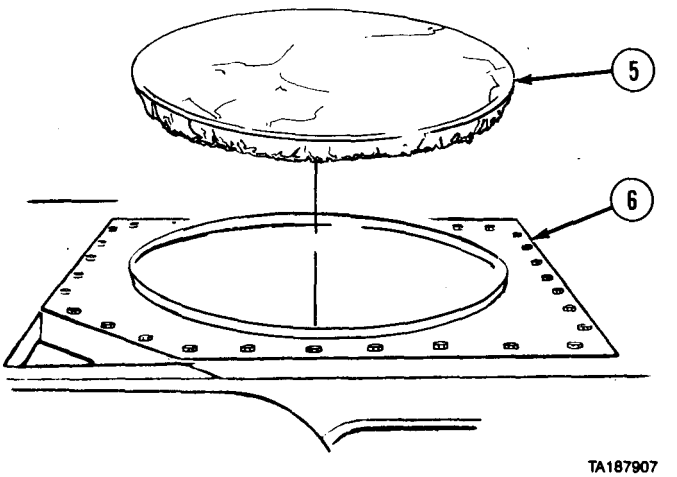
23-3. MACHINE GUN RING KIT INITIAL INSTALLATION (CONT).



WARNING

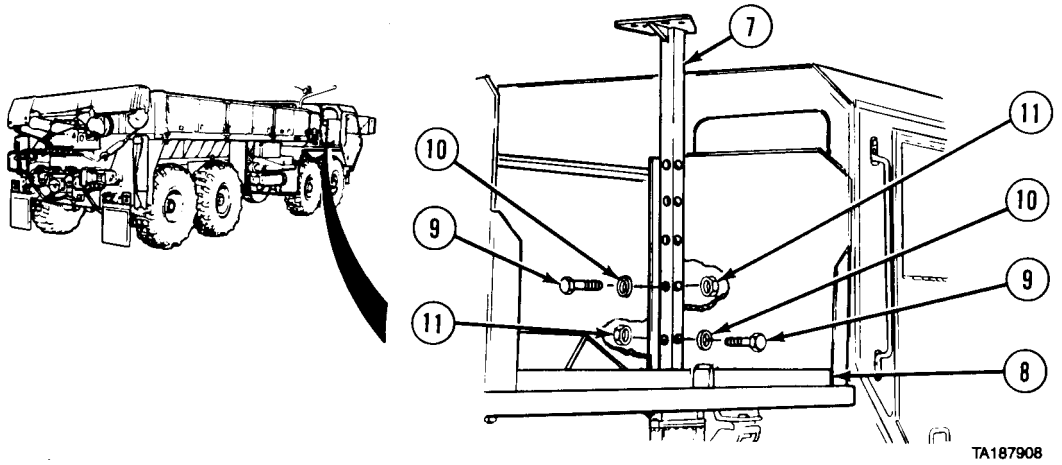
Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(2) Apply silicone adhesive-sealant to roof panel (3).
(3) Install cab gunner roof panel (4) with 34 screws (1).



(4) Install cover (5) on hatch (6).

Special Purpose Kit Installation Instructions (Cont)



(5) Install gun ring rear support (7) on tire carrier (8) with 12 screws (9), washers (10), and locknuts (11).

(6) Install front support channel (12) to supports (13 and 14) with four screws (15), washers (16), lockwashers (17), and nuts (18).

NOTE

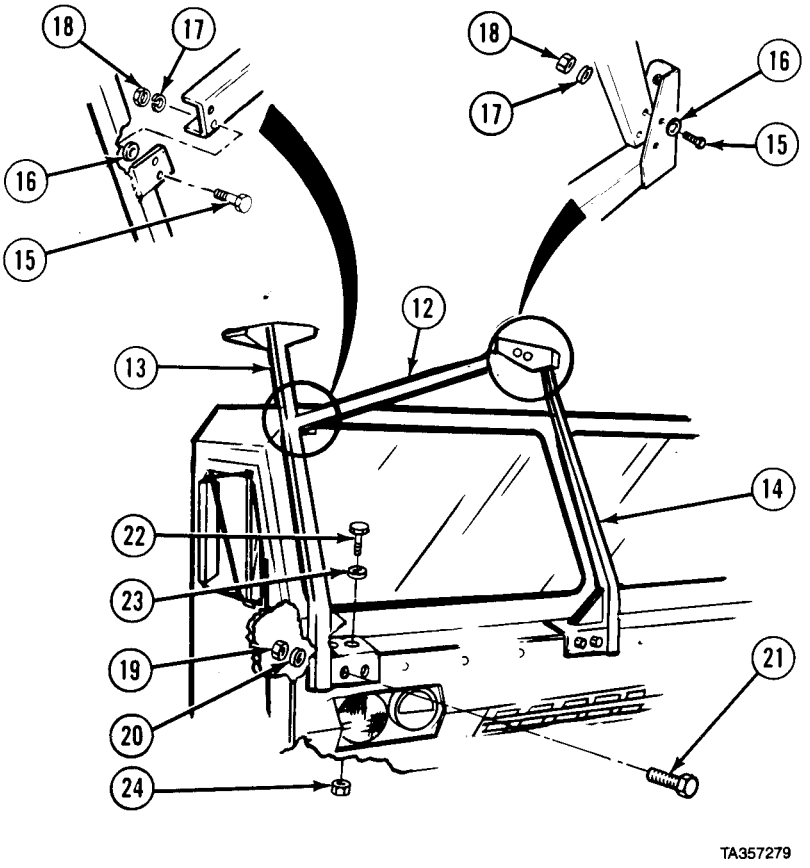
Two nuts, washers, and screws must be removed from the front of the skid plate before positioning support assembly on skid plate. These two nuts, washers, and screws will be used to install the support assembly. Other screws for installation are provided with the kit.

(7) Remove two nuts (19), washers (20), and screws (21).

(8) Using suitable lifting device, position support assembly (12) on vehicle.

(9) Install support assembly (12) with four screws (21), washers (20), and nuts (19).

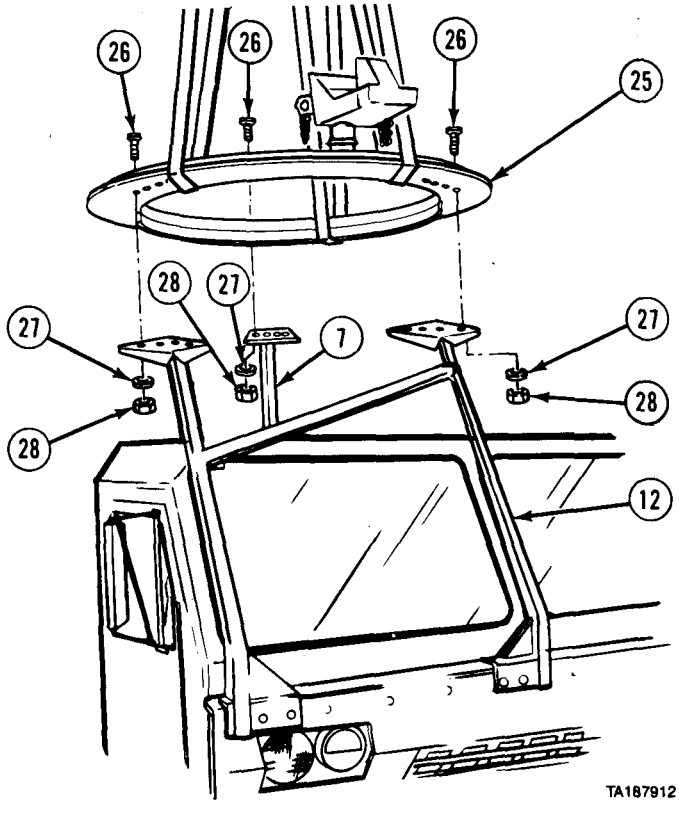
(10) Install four screws (22) with washers (23) and nuts (24).



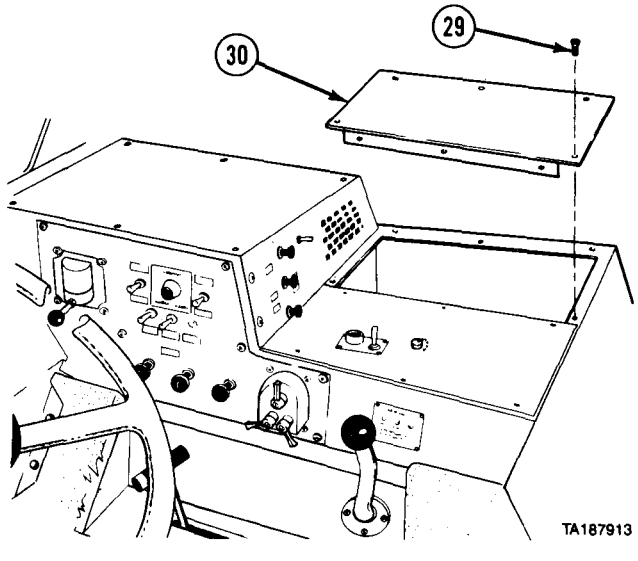
Special Purpose Kit Installation Instructions (Cont)

23-3. MACHINE GUN RING KIT INITIAL INSTALLATION (CONT).

(11) Using suitable lifting device, position machine gun ring (25) on gun ring rear support (7) and support assembly (12).
(12) Install machine gun ring (25) to support assembly (12) with eight screws (26), washers (27), and locknuts (28). Do not tighten.
(13) Install machine gun ring (25) to gun ring rear support (7) with four screws (26), washers (27), and locknuts (28).
(14) Tighten 12 screws (26) and locknuts (28).

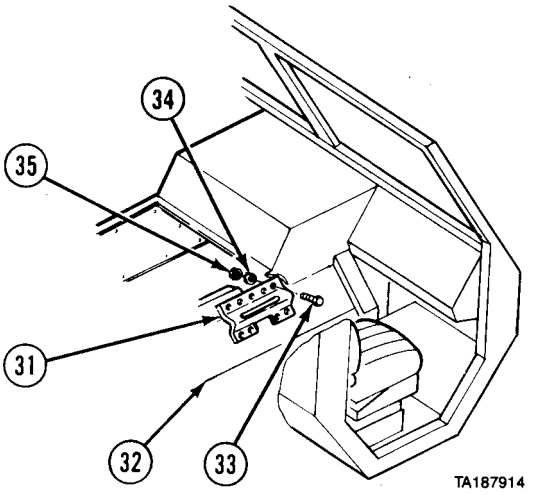


(15) Remove eight screws (29) and heater compartment cover (30).

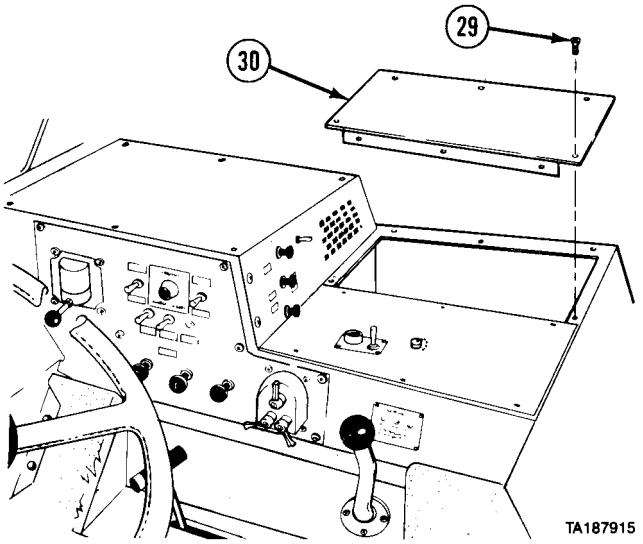


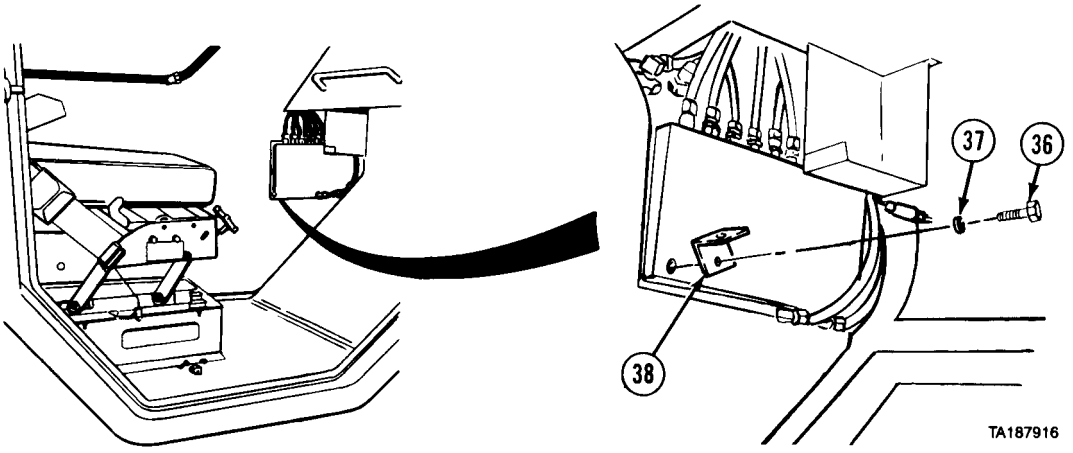
Special Purpose Kit Installation Instructions (Cont)

(16) Install support (31) to bulkhead (32) with five screws (33), washers (34), and locknuts (35).



(17) Install heater compartment cover (30) with eight screws (29).

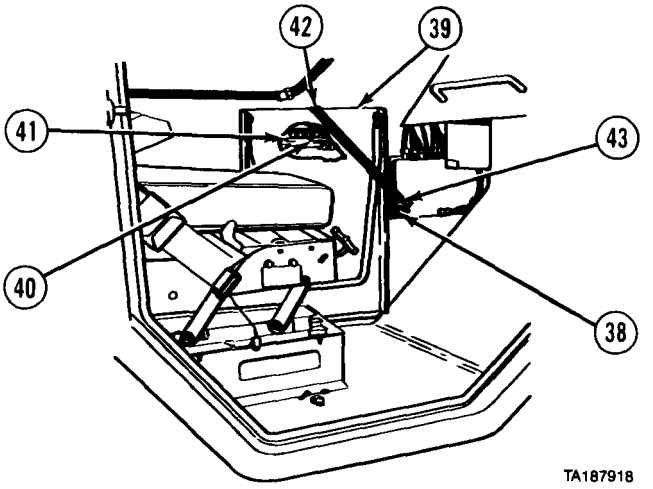


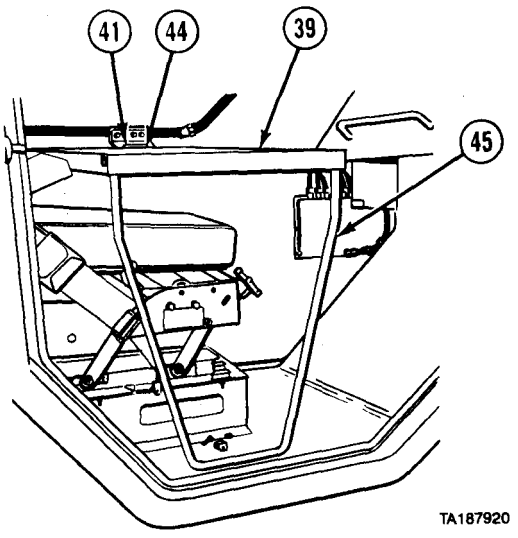


(18) Remove screw (36) and lockwasher (37).
(19) Install platform holddown bracket (38) with screw (36) and lockwasher (37).

23-3. MACHINE GUN RING KIT INITIAL INSTALLATION (CONT).

(20) Install operator platform (39) in stowed position with S-hook (40) in slot (41), strap (42) over operator platform, and S-hook (43) in platform holddown bracket (38).





(21) Install operator platform (39) in operating position by inserting tab (44) in slot (41) with leg (45) down.

b. Follow-on Maintenance. Stow spare tire (TM 9-2320-279-10).

END OF TASK

23-4. M-16 RIFLE MOUNT KIT INITIAL INSTALLATION.

This task covers:

a. Initial Installation
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

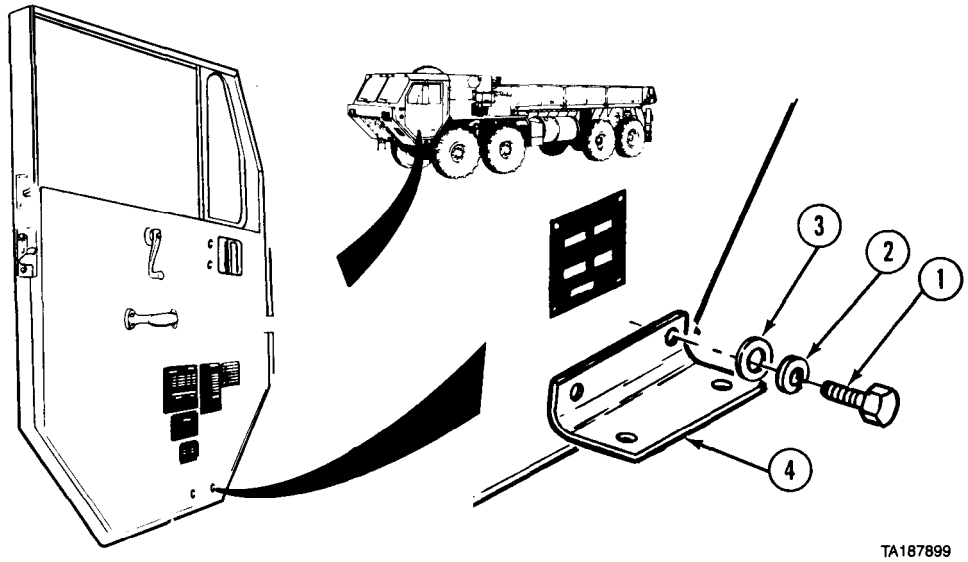
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

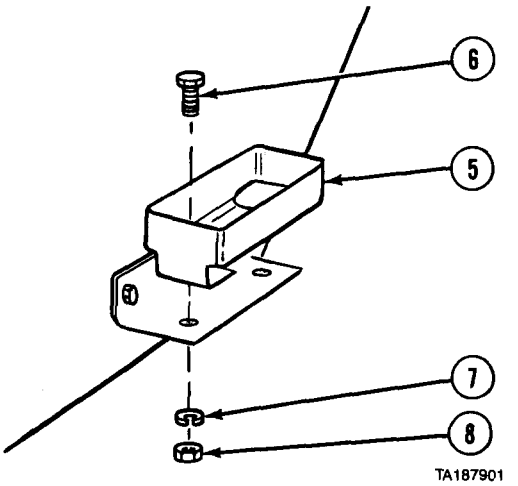
Level of Maintenance
Direct Support

a. Initial Installation.

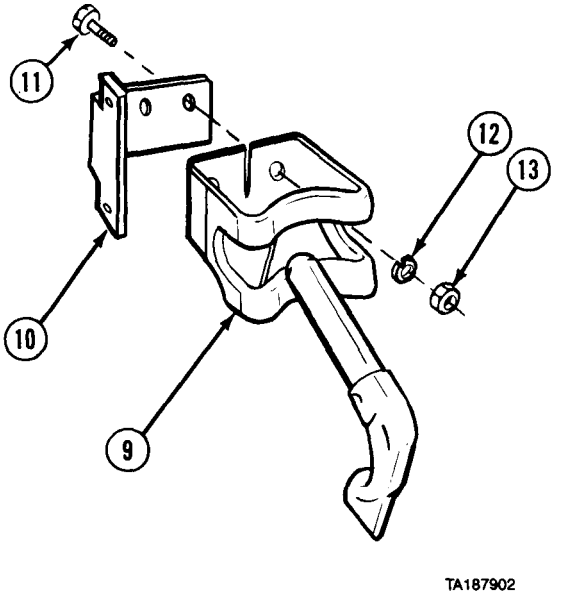


(1) Remove two screws (1), lockwashers (2), and washers (3).
(2) Install bracket (4) with two screws (1), lockwashers (2), and washers (3).

23-4. M-16 RIFLE MOUNT KIT INITIAL INSTALLATION (CONT).

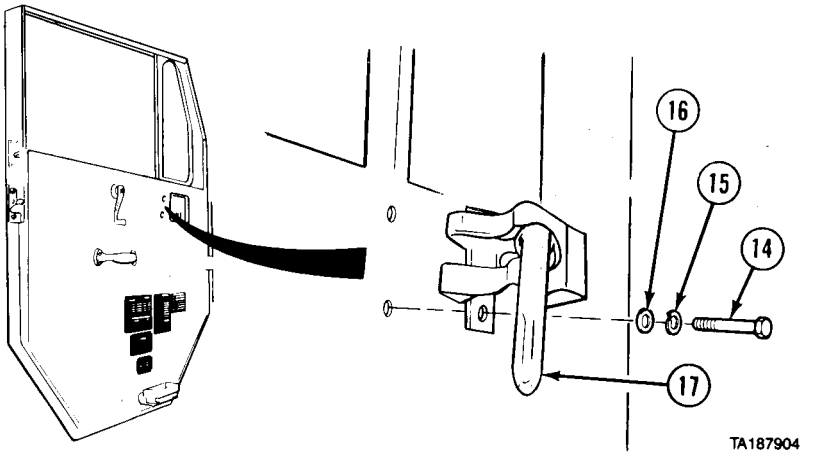


(3) Install support (5) with two screws (6), lockwashers (7), and nuts (8).



(4) Install catch mount (9) on bracket (10) with two screws (1 1), lockwashers (12), and nuts (13).

(5) Remove two screws (14), lockwashers (15), and washers (16).
(6) Install catch mount assembly (17) with two screws (14), lockwashers (15), and washers (16).



b. Follow-on Maintenance. None.

END OF TASK

Section IV. RADIO

23-5. RADIO KIT INITIAL INSTALLATION.

This task covers:

a. Initial Installation
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Too1s
None

Supplies
Ties, cable, plastic, Item 65, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Spare tire removed.
TM 9-2320-279-20	Batteries disconnected.

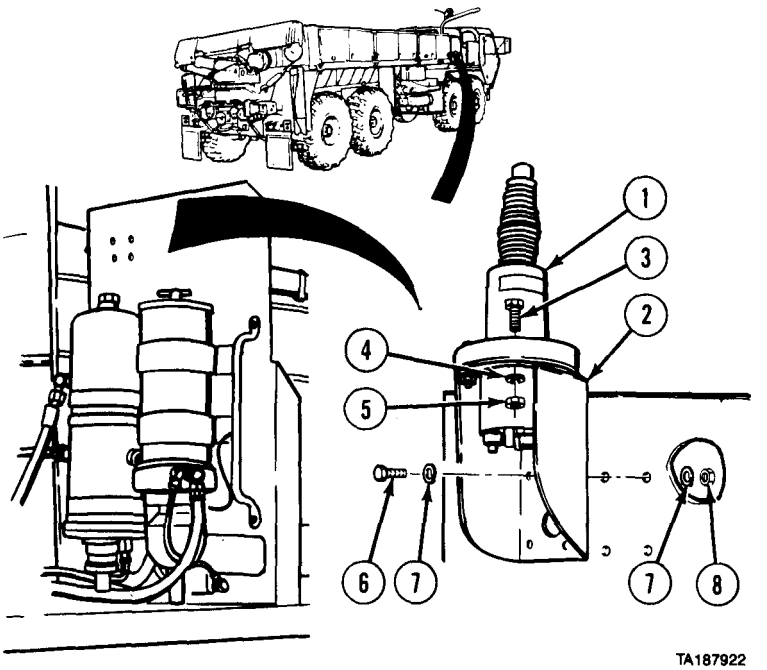
Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

23-5. RADIO KIT INITIAL INSTALLATION (CONT).

a. Initial Installation.



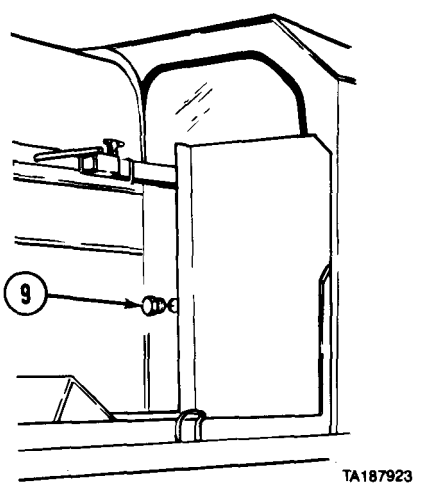
(1) Install antenna (1) to mount (2) with four screws (3), lockwashers (4), and nuts (5).

NOTE

Use top four screw holes in mount to attach mount.

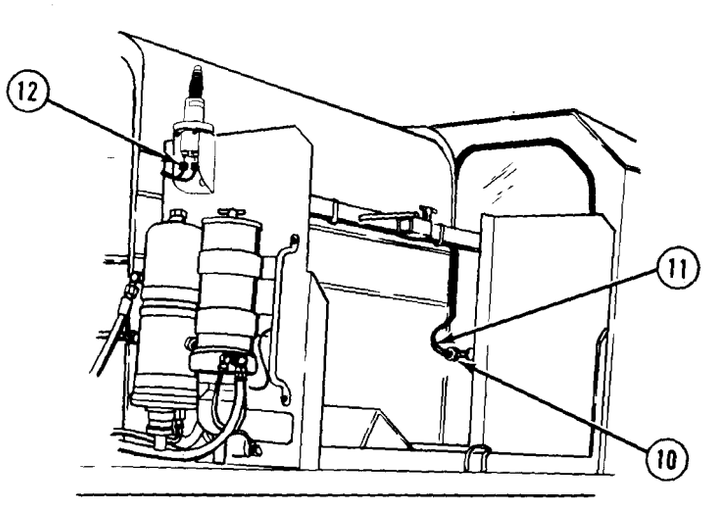
(2) Install mount (2) with four screws (6), eight lockwashers (7), and four nuts (8).

(3) Remove plug (9).



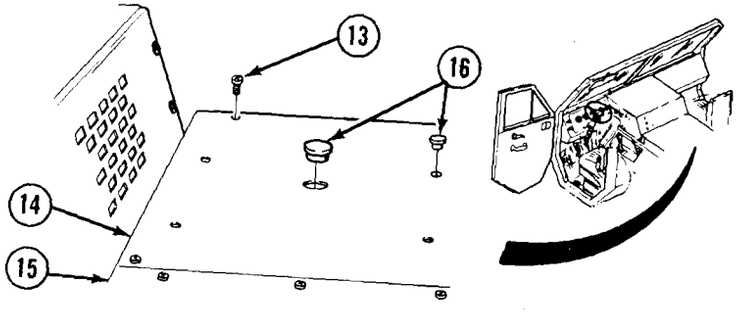
Special Purpose Kit Installation Instructions (Cont)

(4) Install grommet (10). Pull two cables (11) through grommet.
(5) Connect two connectors (12) and install cables (11) using plastic cable ties.



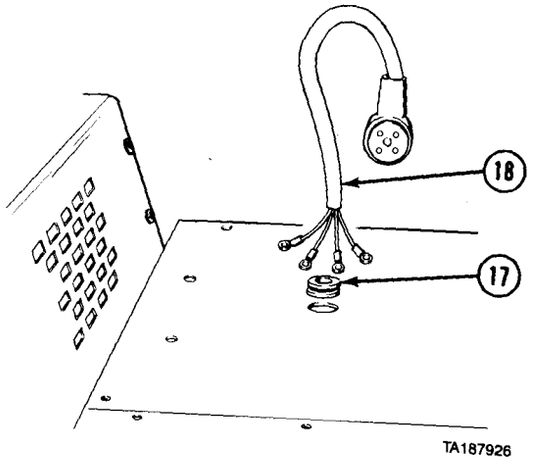
TA187924

(6) Remove 11 screws (13) and heater compartment covers (14 and 15).
(7) Remove six plugs (16).



TA187925

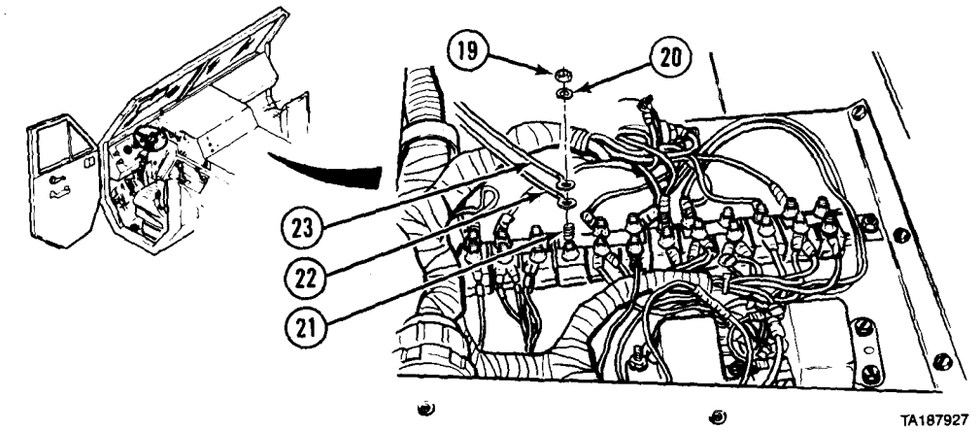
(8) Install grommet (17). Push cable (18) down through grommet.



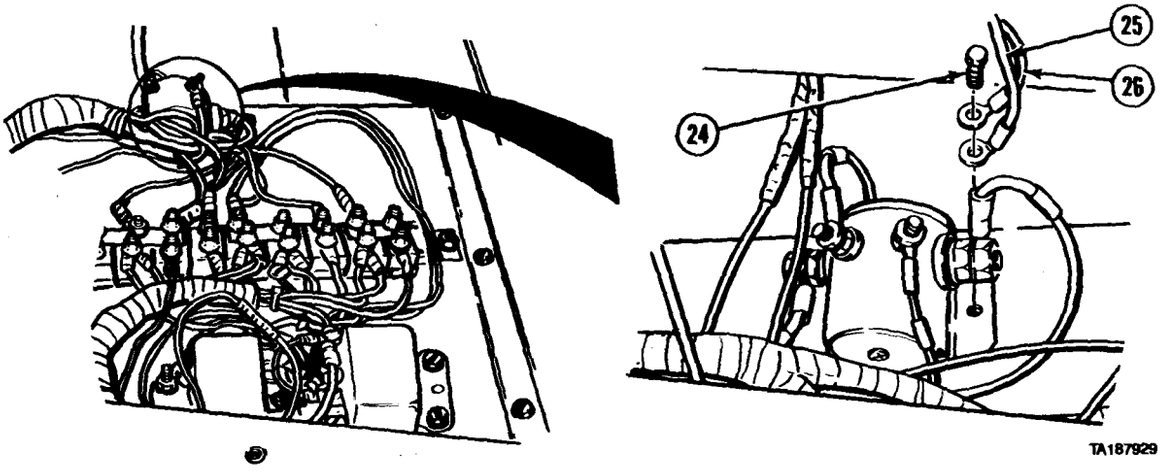
TA187926

Special Purpose Kit Installation Instructions (Cont)

23-5. RADIO KIT INITIAL INSTALLATION (CONT).



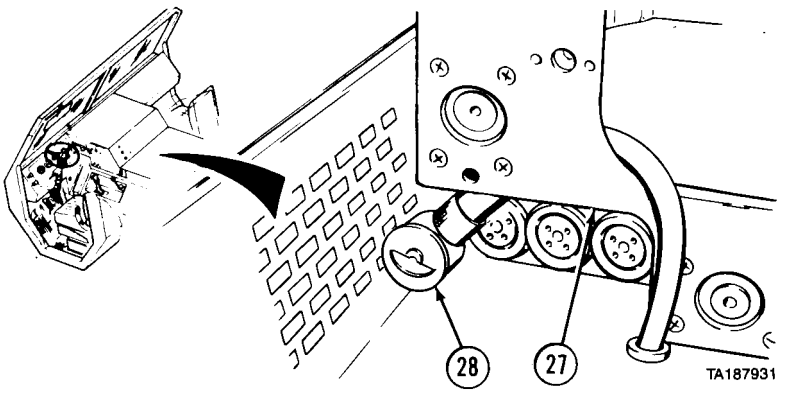
(9) Remove nut (19) and lockwasher (20) from circuit breaker No. 4 (21).
(10) Install white wire (22) and red wire (23) on circuit breaker No. 4 (21) with lockwasher (20) and nut (19).

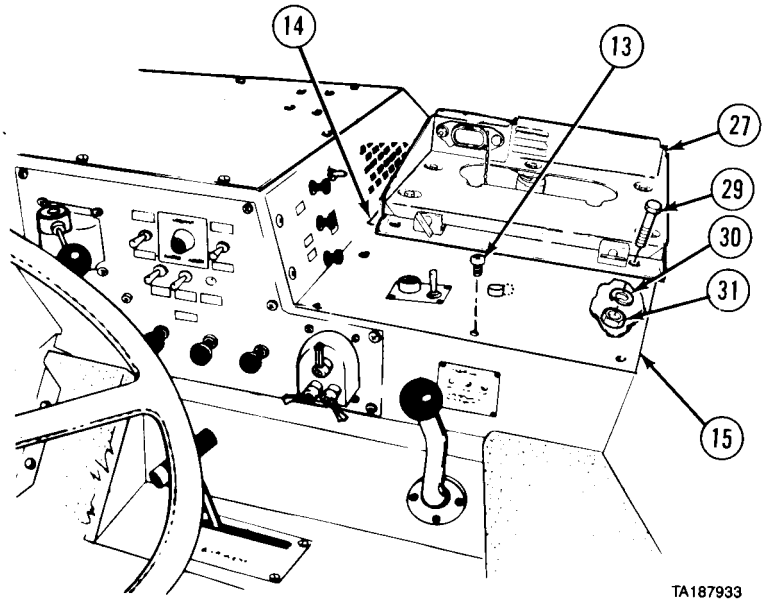


(11) Remove screw (24).
(12) Install green ground wire (25) and black ground wire (26) with screw (24).

Special Purpose Kit Installation Instructions (Cont)

(13) Position mount (27) and connect connector (28).

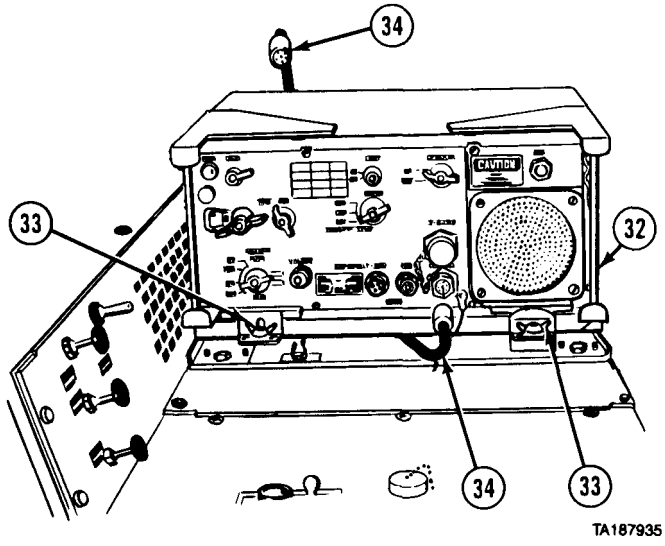


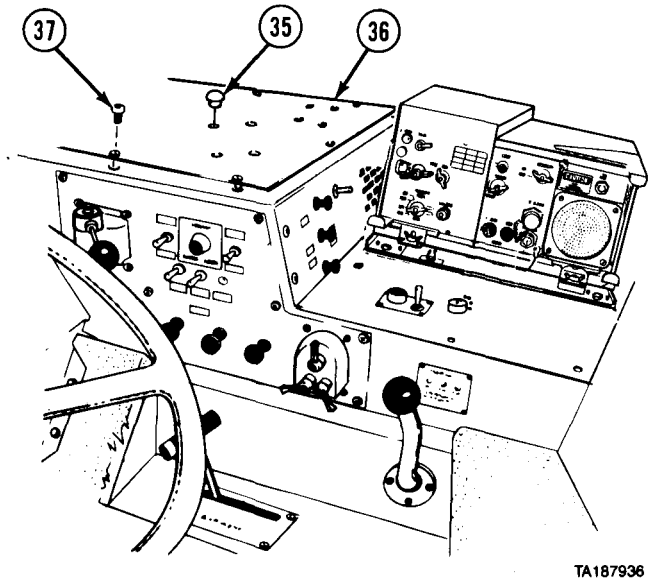


(14) Lift heater compartment cover (14) and install mount (27) with five screws (29), lockwashers (30), and nuts (31).
(15) Install heater compartment covers (14 and 15) with 11 screws (13).

23-5. RADIO KIT INITIAL INSTALLATION (CONT).

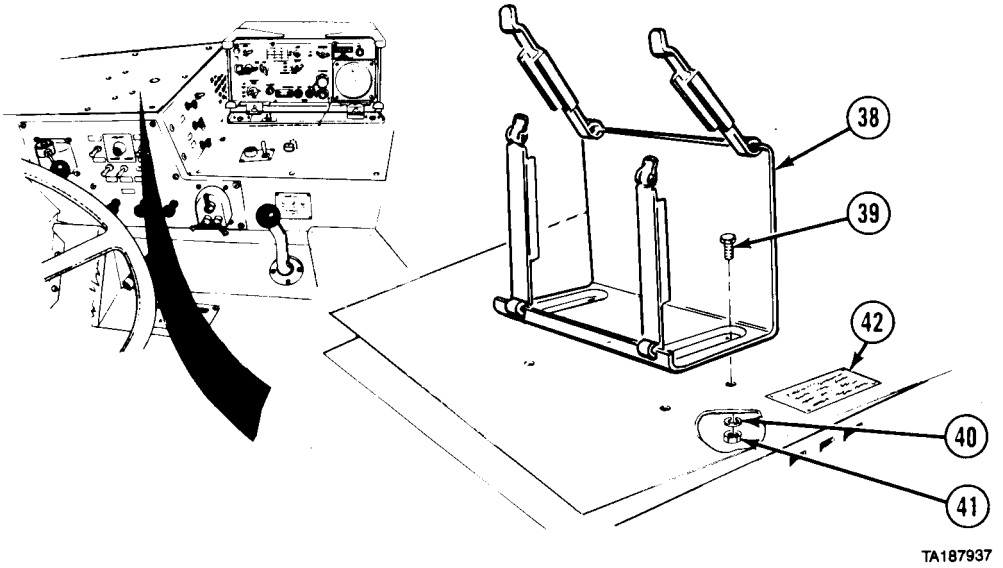
(16) Install radio (32) and tighten two wingnuts (33).
(17) Connect two antenna leads (34).





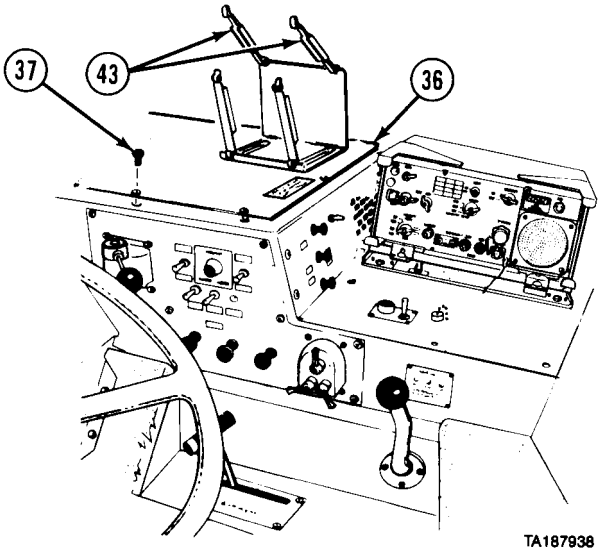
(18) Remove four plugs (35) from heater compartment cover (36).
(19) Remove eight screws (37) and lift heater compartment cover (36).

Special Purpose Kit Installation Instructions (Cont)



(20) Install security unit mount (38) with four screws (39), lockwashers (40), and nuts (41).
(21) Install data plate (42).

(22) Install heater compartment cover (36) with eight screws (37).
(23) Install security unit and tighten clamps (43).



b. Follow-on Maintenance.
(1) To complete installation of kit, refer to TM 11-5820-498-12 and TM 11-5820-498-35.
(2) Connect batteries (TM 9-2320-279-20).
(3) Stow spare tire (TM 9-2320-279-10).

END OF TASK

Section V. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL (CBR) EQUIPMENT

23-6. GAS PARTICULATE FILTER UNIT (GPFU) KIT INITIAL INSTALLATION.

This task covers:

a. Initial Installation
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
Compound, sealing, pipe thread, Item 29, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

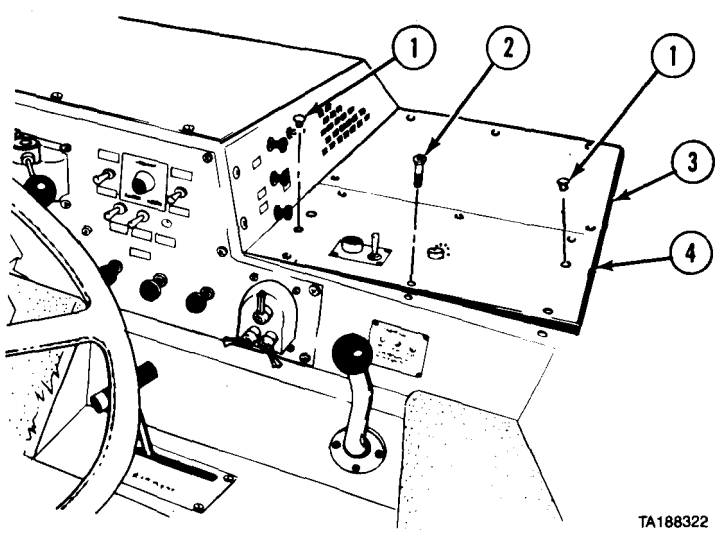
TM or Para	*Condition Description*
TM 9-2320-279-20	Batteries disconnected.

Special Environmental Conditions
None

General Safety Instructions
None

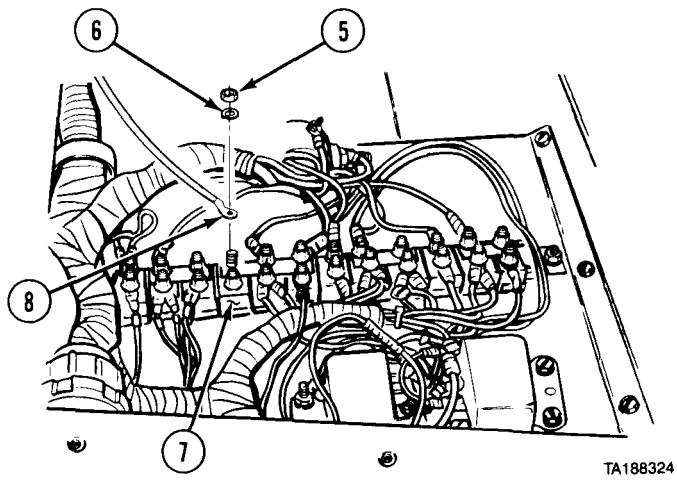
Level of *Maintenance*
Direct Support

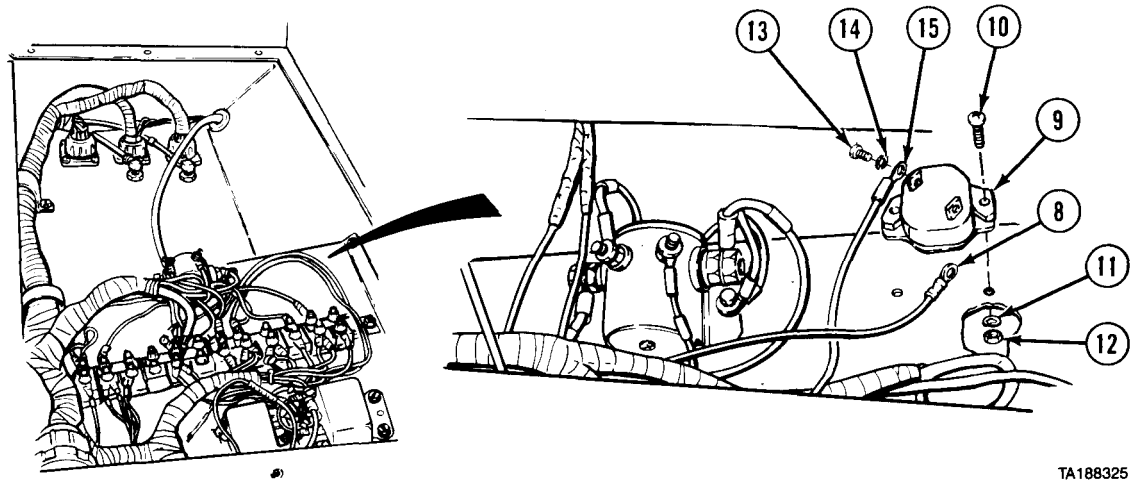
a. Initial Installation.
(1) Remove two plugs (1).
(2) Remove 11 screws (2) and lift heater compartment covers (3 and 4).



Special Purpose Kit Installation Instructions (Cont)

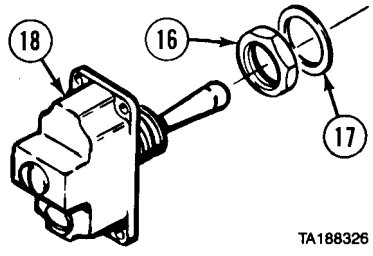
(3) Remove nut (5) and lockwasher (6) from circuit breaker No. 4 (7).
(4) Install wire (8) on circuit breaker No. 4 (7) with lockwasher (6) and nut (5).





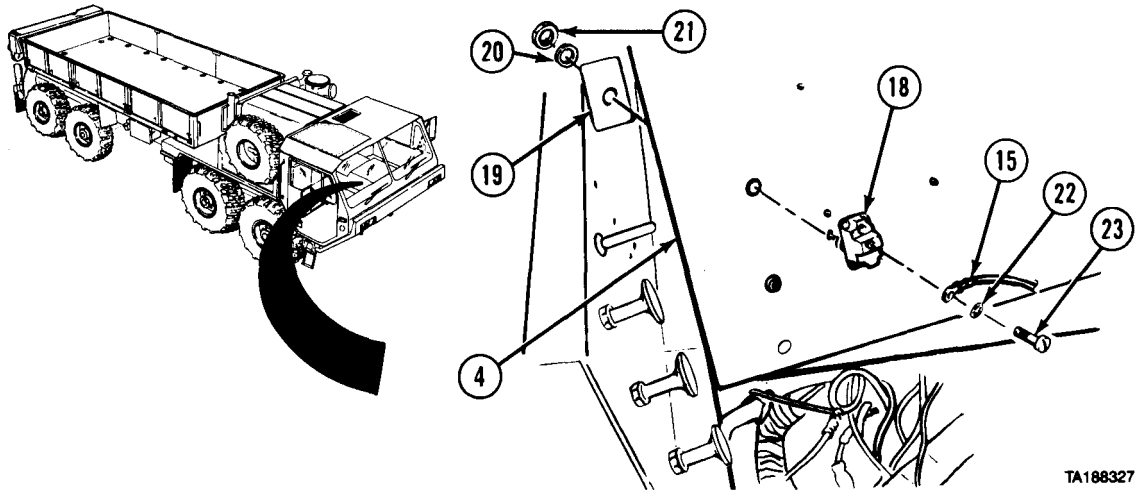
(5) Install circuit breaker (9) with two screws (10), lockwashers (11), and nuts (12).
(6) Remove two screws (13) and lockwashers (14).
(7) Install two wires (8 and 15) with screws (13) and lockwashers (14).

(8) Install nut (16) and washer (17) on gas particulate switch (18).



Special Purpose Kit Installation Instructions (Cont)

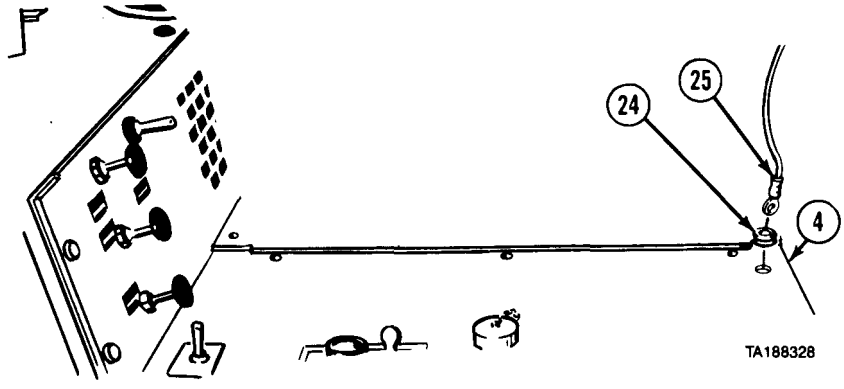
23-6. GAS PARTICULATE FILTER UNIT (GPFU) KIT INITIAL INSTALLATION (CONT).



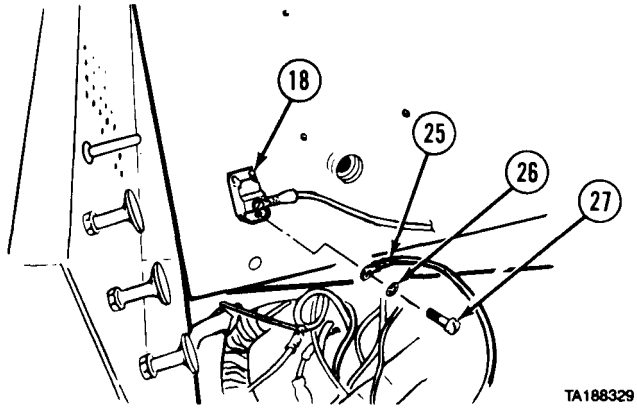
(9) Install gas particulate switch (18) and data plate (19) with washer (20) and nut (21) through bottom of heater compartment cover (4).

(10) Install wire (15) on gas particulate switch (18) with lockwasher (22) and screw (23).

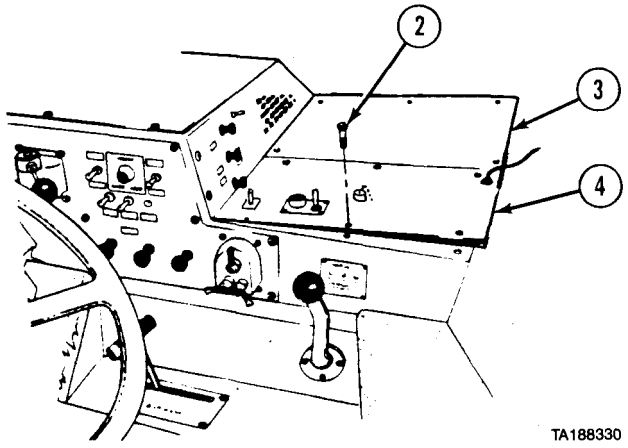
(11) Install grommet (24) in heater compartment cover (4). Pull wire harness (25) through grommet.



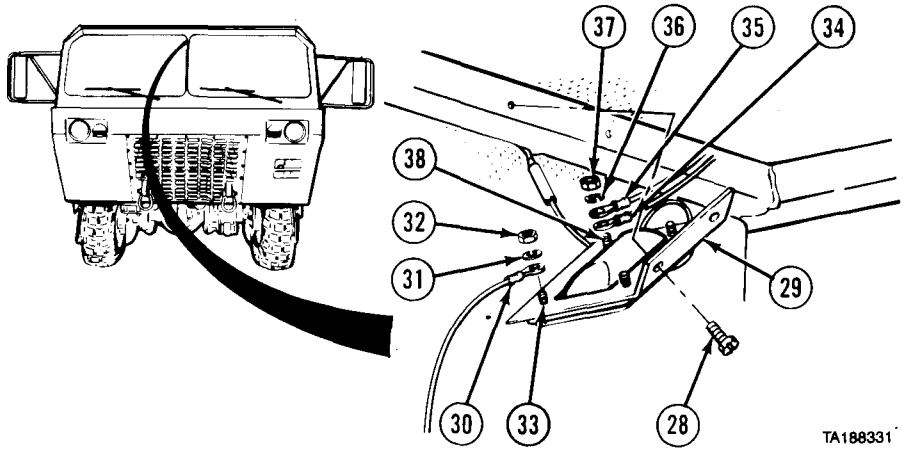
(12) Install wire harness (25) on gas particulate switch (18) with lockwasher (26) and screw (27).



Special Purpose Kit Installation Instructions (Cont)



(13) Install heater compartment covers (3 and 4) with 11 screws (2).



(14) Remove two screws (28) and domelight bracket (29).
(15) Install 8-in. (203 mm) ground wire (30) with lockwasher (31) and nut (32) on screw (33).
(16) Install 8-in. (203 mm) ground wire (34), 4-in. (102 mm) ground wire (35), lockwasher (36), and nut (37) on screw (38).
(17) Install domelight bracket (29) with two screws (28).

23-6. GAS PARTICULATE FILTER UNIT (GPFU) KIT INITIAL INSTALLATION (CONT).

NOTE

Left and right heaters are installed in the same way.

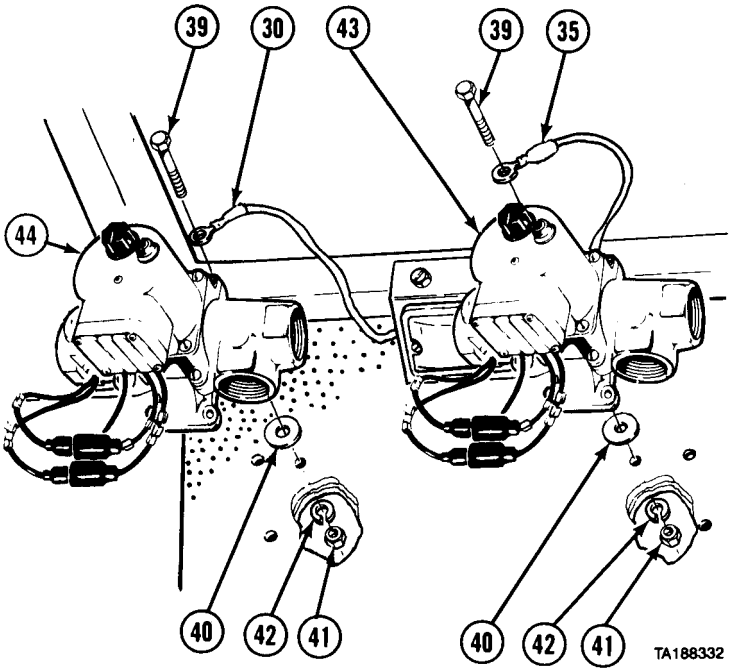
(18) Soldier A holds and removes four screws (39) and washers (40) while Soldier B removes four nuts (41) and lockwashers (42).

CAUTION

Tighten screws evenly to avoid breaking heater leg.

(19) Soldier A installs heater (43) with four washers (40), screws (39), and 4-in. (102 mm) ground wire (35), while Soldier B installs four lockwashers (42) and nuts (41).

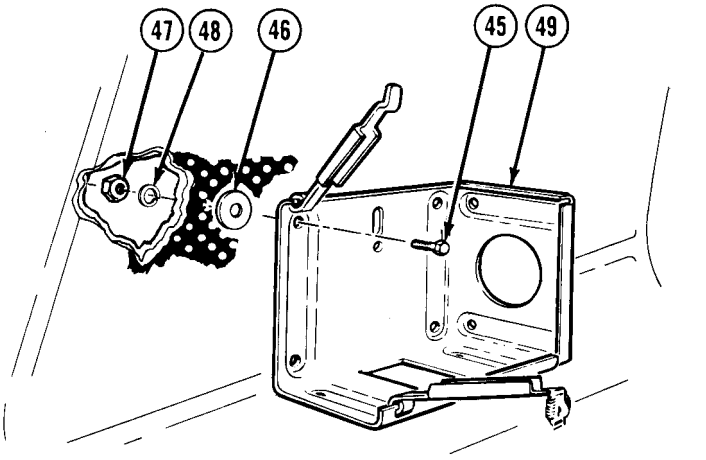
(20) Repeat step *(18)* for right side.



(21) Soldier A installs heater (44) with four washers (40), screws (39), and 8-in. (203 mm) ground wire (30) while Soldier B installs four lockwashers (42) and nuts (41).

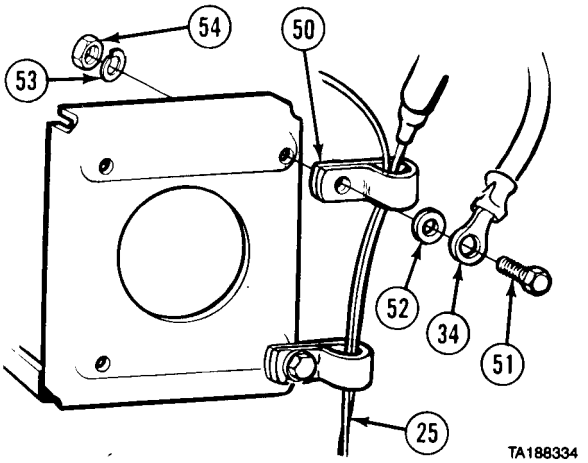
(22) Soldier A holds and removes four screws (45) and washers (46) while Soldier B removes four nuts (47) and lockwashers (48) from center of rear cab wall.

(23) Soldier A installs and holds four screws (45), bracket (49), and four washers (46) while Soldier B installs four lockwashers (48) and nuts (47).

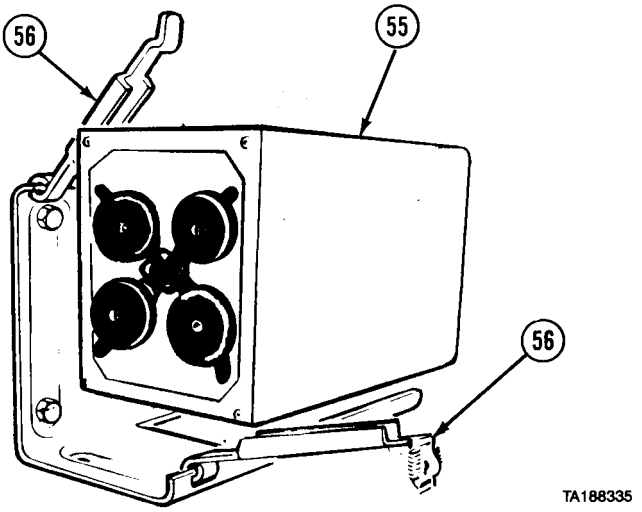


Special Purpose Kit Installation Instructions (Cont)

(24) Install wire harness (25) in two cushion clips (50). Install two screws (51) with two washers (52), 8-in. (203 mm) ground wire (34), cushion clips, lockwashers (53), and nuts (54).



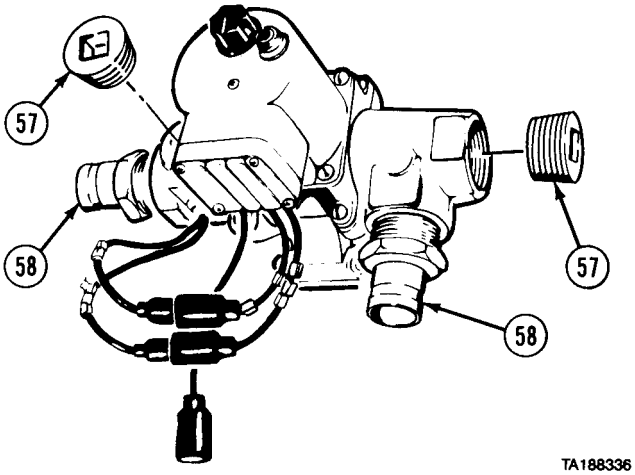
(25) Install filter (55) and tighten clamps (56).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

(26) Apply pipe thread sealing compound and install two plugs (57).
(27) Apply pipe thread sealing compound and install two fittings (58).
(28) Repeat steps (26) and (27) for right heater.



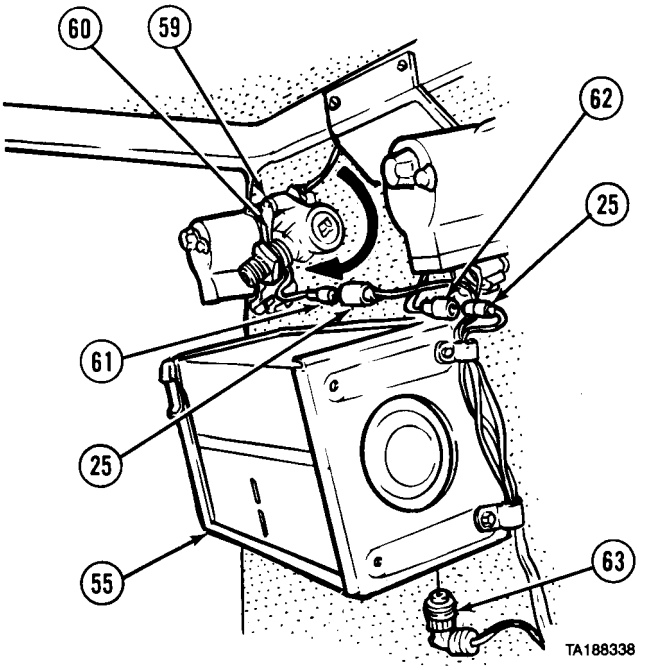
Special Purpose Kit Installation Instructions (Cont)

23-6. GAS PARTICULATE FILTER UNIT (GPFU) KIT INITIAL INSTALLATION (CONT).

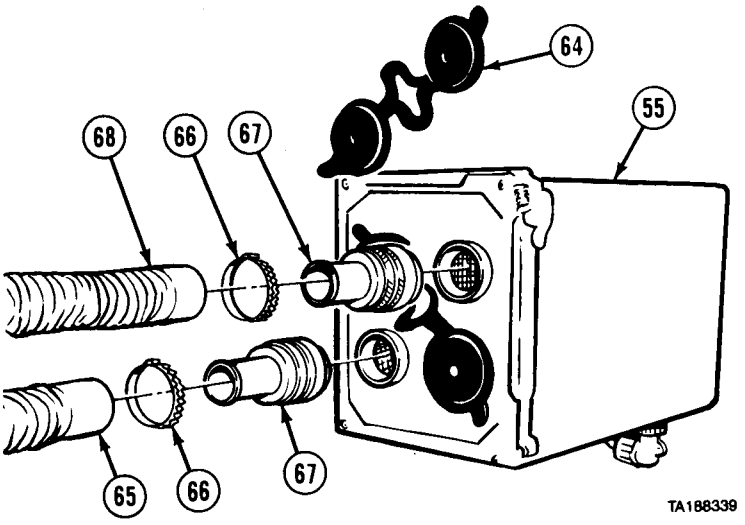
NOTE

Steps *(29)* and *(30)* are for right side heater only.

(29) Loosen two screws (59).
(30) Twist outlet port (60) towards front of cab to allow clearance for outlet hose. Tighten two screws (59).
(31) Connect two wires (61 and 62) to wire harness (25).
(32) Connect connector (63) to filter (55).

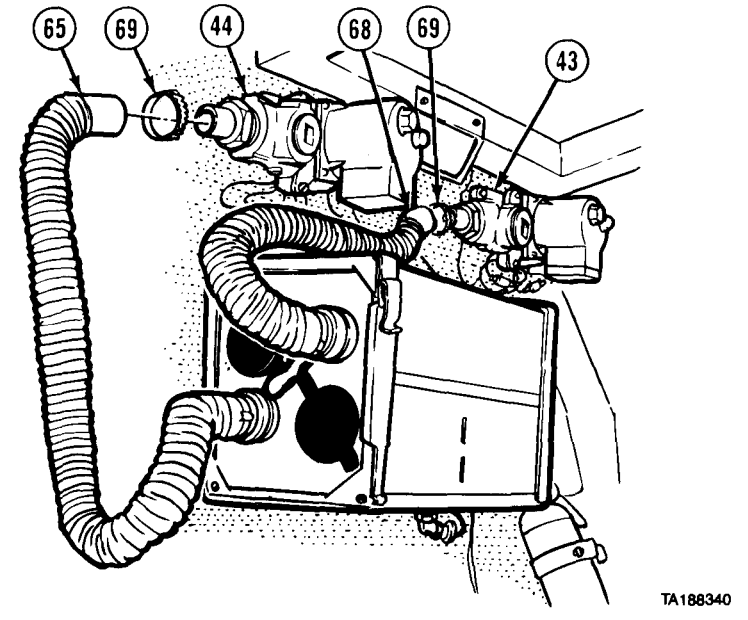


(33) Remove caps (64) from filter (55).
(34) Install 2-ft (0.6 m) air duct hose (65) and hose clamp (66) on quick release coupling (67).
(35) Repeat steps *(33)* and *(34)* for 4-ft (1.2 m) air duct hose (68).
(36) Install two air duct hoses (65 and 68) on filter (55).



Special Purpose Kit Installation Instructions (Cont)

(37) Install air duct hose (68) on heater (43) with clamp (69).
(38) Install air duct hose (65) on heater (44) with clamp (69).

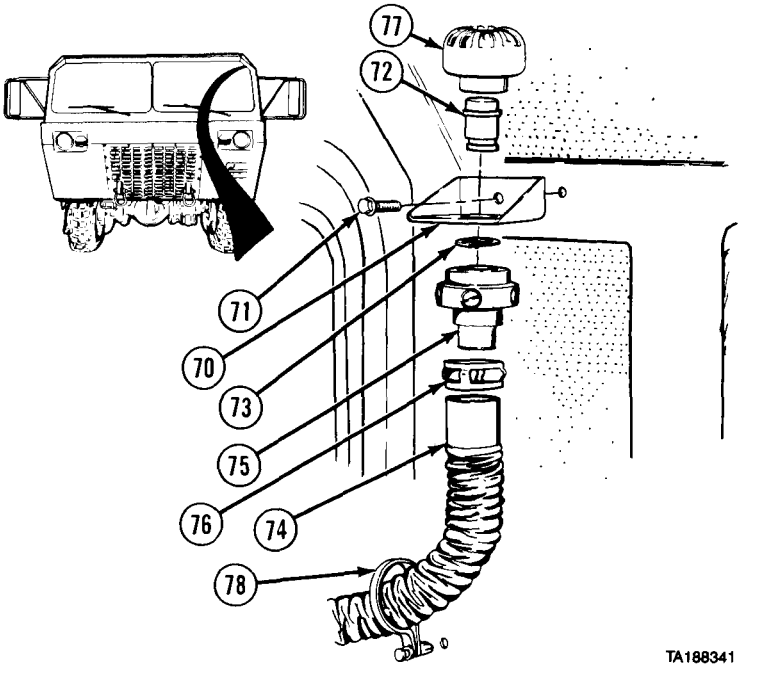


(39) Install angle bracket (70) with screw (71).
(40) Install connector (72) with retaining ring (73).
(41) Install 9-ft (2.75 m) hose (74) on quick release coupling (75) with hose clamp (76).
(42) Install quick release coupling (75) and orifice (77) on connector (72).

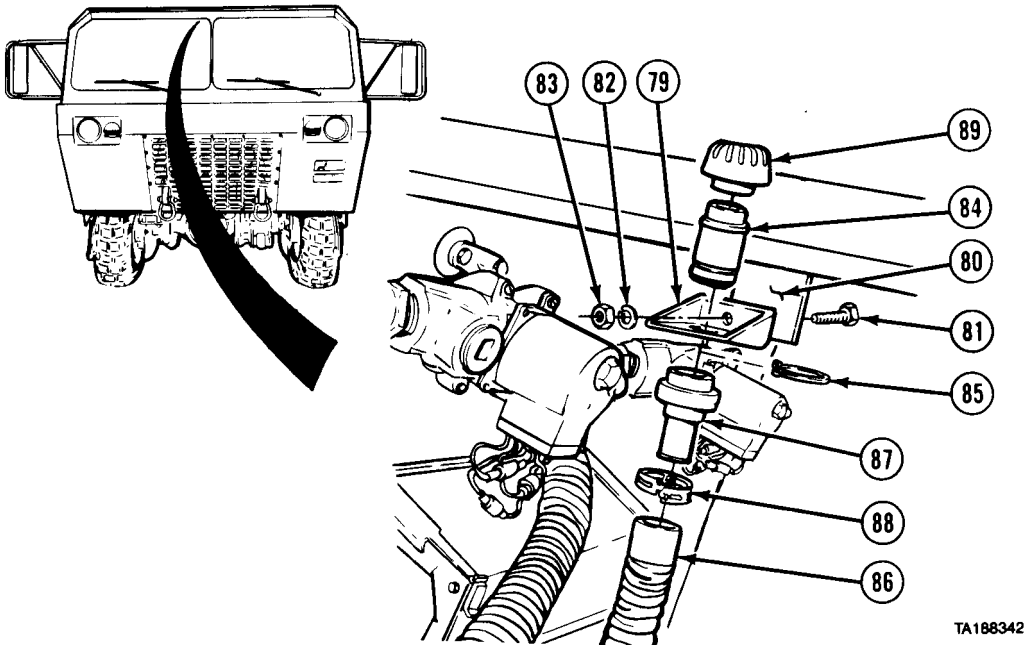
NOTE

Hose clip is installed behind driver's seat.

(43) Install clip (78) on hose (74).

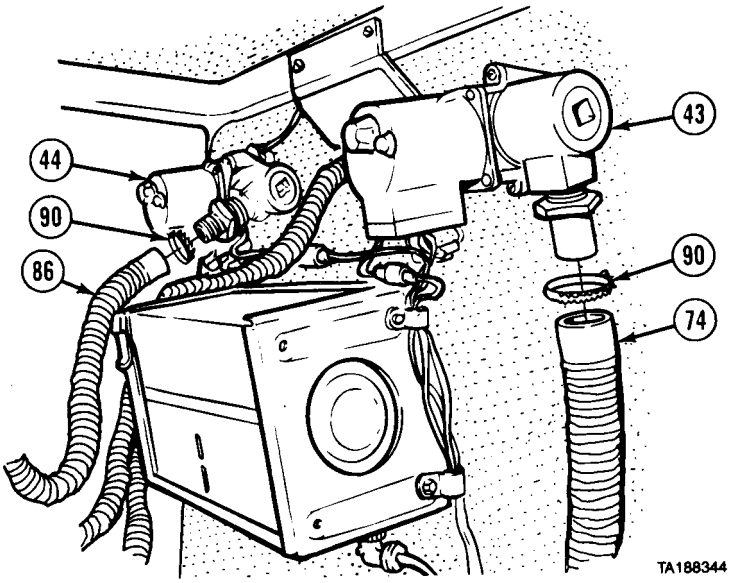


23-6. GAS PARTICULATE FILTER UNIT (GPFU) KIT INITIAL INSTALLATION (CONT).



(44) Install angle bracket (79) on hose mounting (80) with screw (81), lockwasher (82), and nut (83).
(45) Install connector (84) with retaining ring (85).
(46) Install 6-ft (1.8 m) hose (86) on quick release coupling (87) with hose clamp (88).
(47) Install quick release coupling (87) and orifice (89) on connector (84).

(48) Install hose (74) on heater (43) with hose clamp (90).
(49) Install hose (86) on heater (44) with hose clamp (90).



b. Follow-on Maintenance.
Connect batteries (TM 9-2320-279-20).

END OF TASK

Special Purpose Kit Installation Instructions (Cont)

23-7. DECONTAMINATION KIT INITIAL INSTALLATION.

This task covers:

a. Initial Installation
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

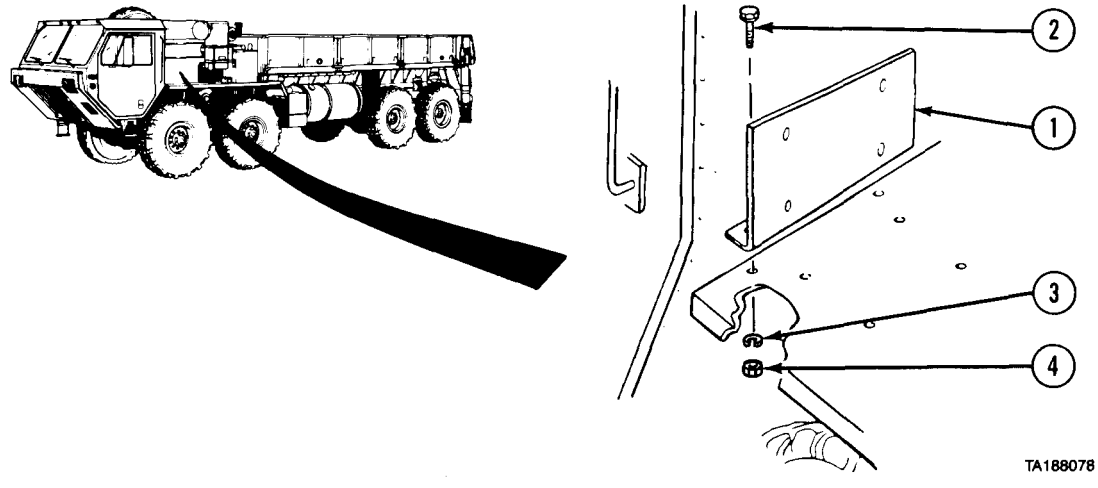
TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. Initial Installation.

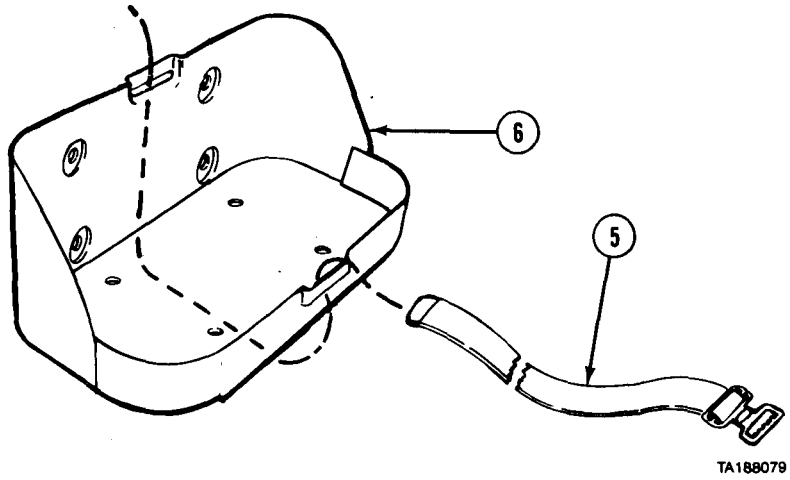


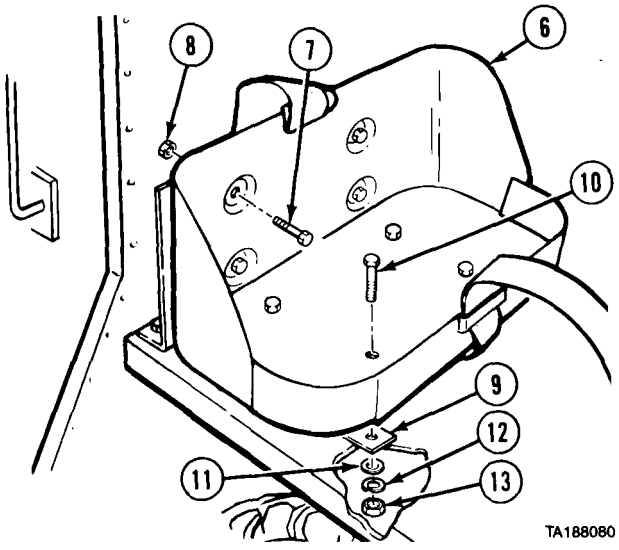
(1) Install bracket (1) with two screws (2), lockwashers (3), and nuts (4).

Special Purpose Kit Installation Instructions (Cont)

23-7. DECONTAMINATION KIT INITIAL INSTALLATION (CONT).

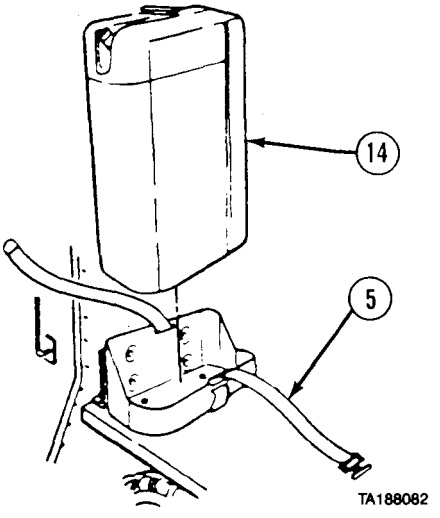
(2) Install strap (5) through carrier (6).





(3) Install carrier (6) with four screws (7) and locknuts (8). Do not tighten.
(4) Install two spacers (9), four screws (10), washers (11), lockwashers (12), and nuts (13).
(5) Tighten screws (7 and 10).

Special Purpose Kit Installation Instructions (Cont)



(6) Install decontamination unit (14) and tighten strap (5).

b. Follow-on Maintenance. None.

END OF TASK

23-8. M-8 CHEMICAL ALARM KIT INITIAL INSTALLATION.

This task covers:

a. Initial Installation
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
TM 3-6665-225-12

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-20	Batteries disconnected.

Special Environmental Conditions
None

General Safety Instructions
None

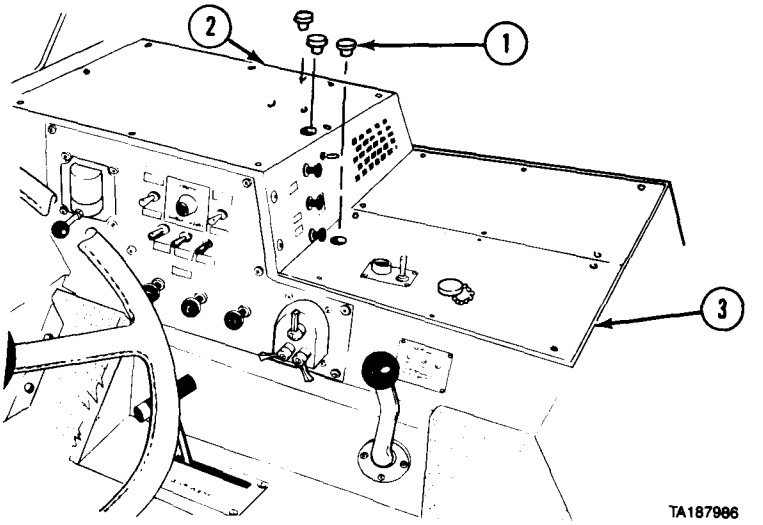
Level of Maintenance
Direct Support

Special Purpose Kit Installation Instructions (Cont)

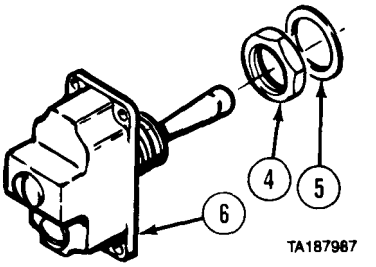
23-8. M-8 CHEMICAL ALARM KIT INITIAL INSTALLATION (CONT).

a. Initial Installation.

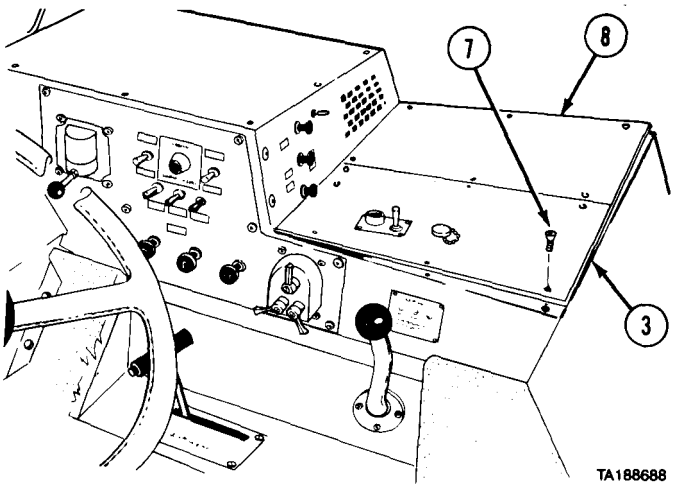
(1) Remove six plugs (1) from heater compartment covers (2 and 3).



(2) Install nut (4) and washer (5) on switch (6).

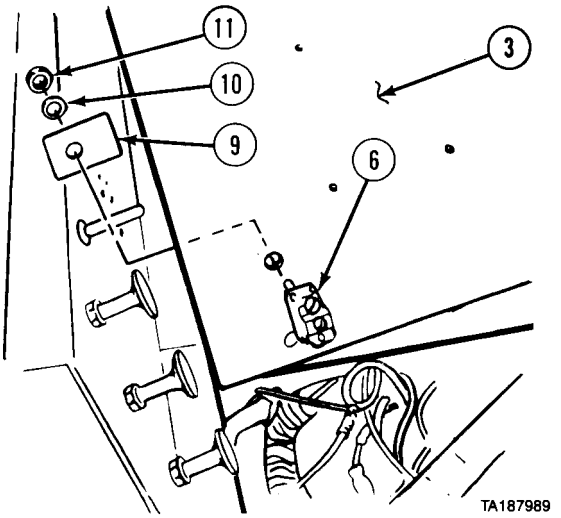


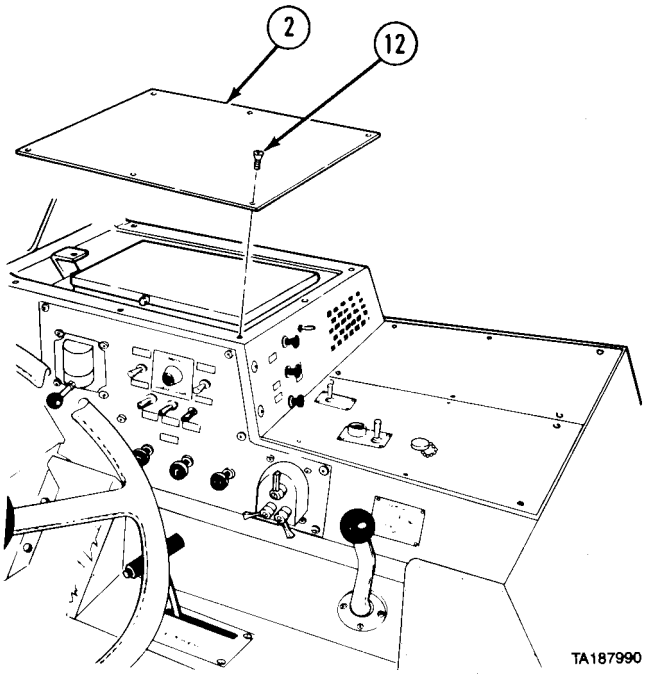
(3) Remove 11 screws (7) and lift heater compartment covers (3 and 8).



Special Purpose Kit Installation Instructions (Cont)

(4) Install switch (6) and data plate (9) in heater compartment cover (3) with washer (10) and nut (11).

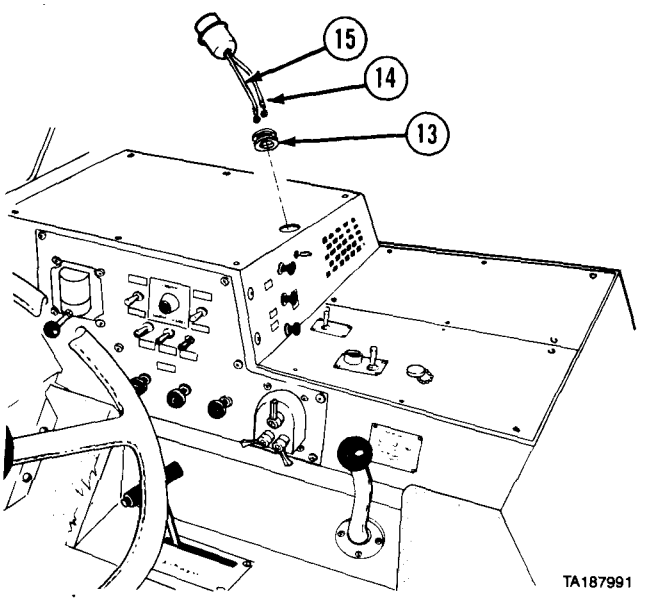


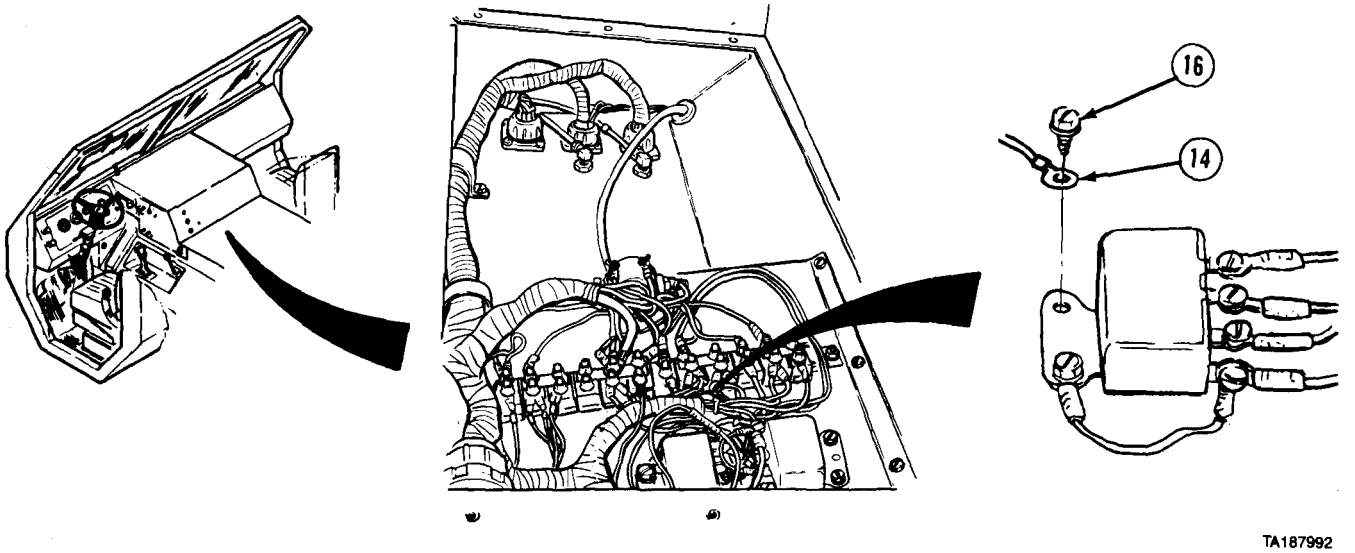


(5) Remove eight screws (12) and lift heater compartment cover (2).

23-8. M-8 CHEMICAL ALARM KIT INITIAL INSTALLATION (CONT).

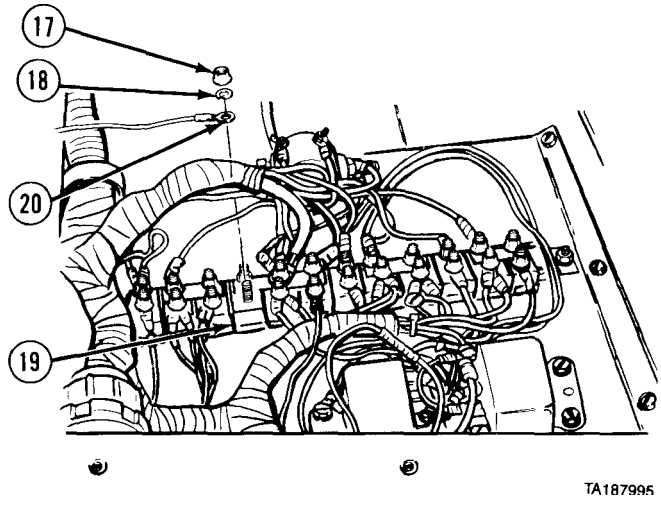
(6) Install grommet (13). Install ground wire (14) and wire (15) through grommet.



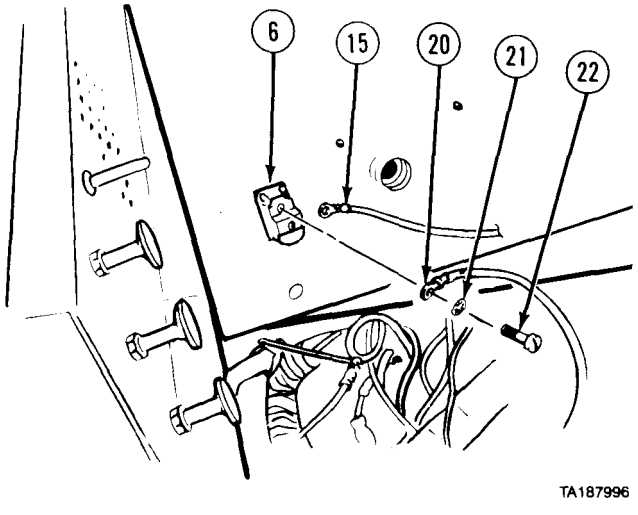


(7) Remove screw (16).
(8) Install ground wire (14) with screw (16).

Special Purpose Kit Installation Instructions (Cont)



(9) Remove nut (17) and lockwasher (18) from circuit breaker No. 4 (19).
(10) Install wire (20) on circuit breaker No. 4 (19) with lockwasher (18) and nut (17).

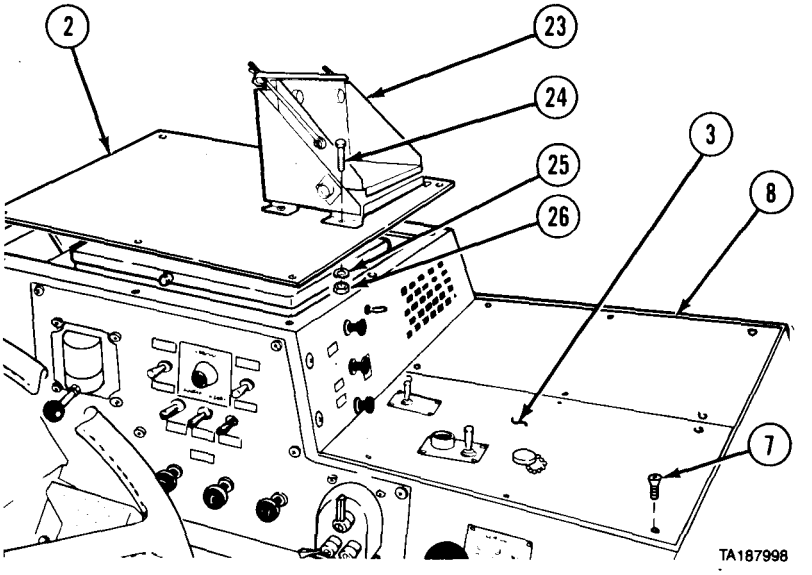


(11) Install wire (20) and wire (15) on switch (6) with two lockwashers (21) and screws (22).

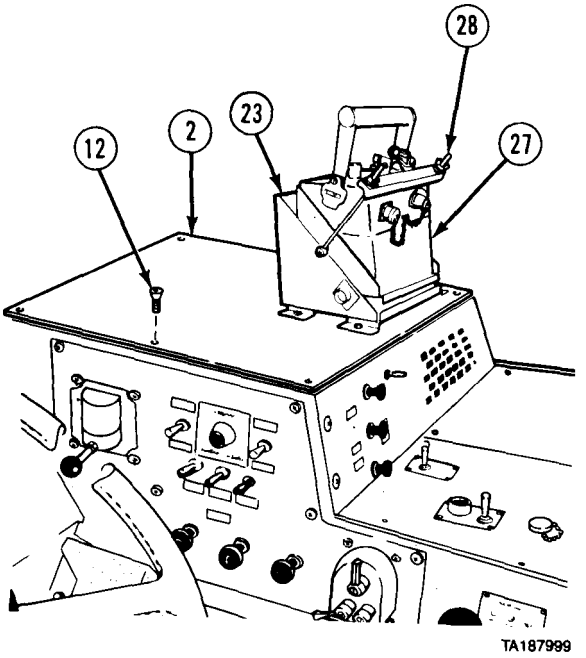
Special Purpose Kit Installation Instructions (Cont)

23-8. M-8 CHEMICAL ALARM KIT INITIAL INSTALLATION (CONT).

(12) Install two heater compartment covers (3 and 8) with 11 screws (7).
(13) Install detector mount (23) with four screws (24), lockwashers (25), and nuts (26) on heater compartment cover (2).

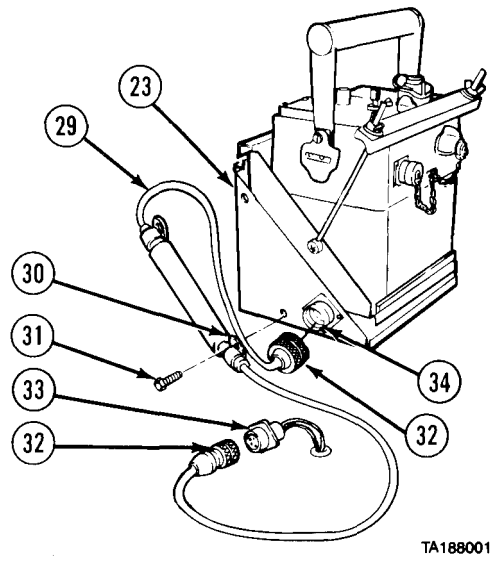


(14) Install heater compartment cover (2) with eight screws (12).
(15) Install detector (27) in detector mount (23) and tighten two wingnuts (28).

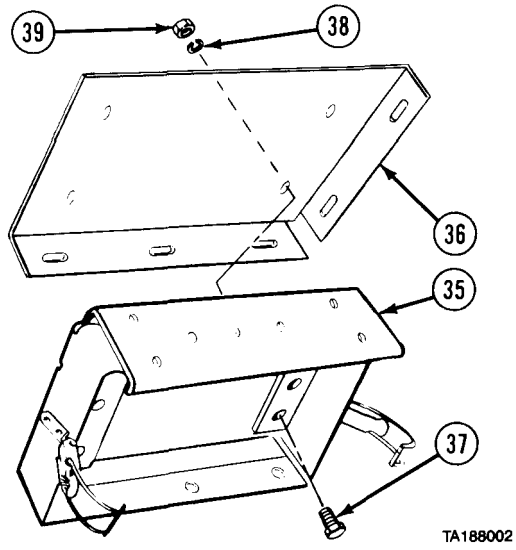


Special Purpose Kit Installation Instructions (Cont)

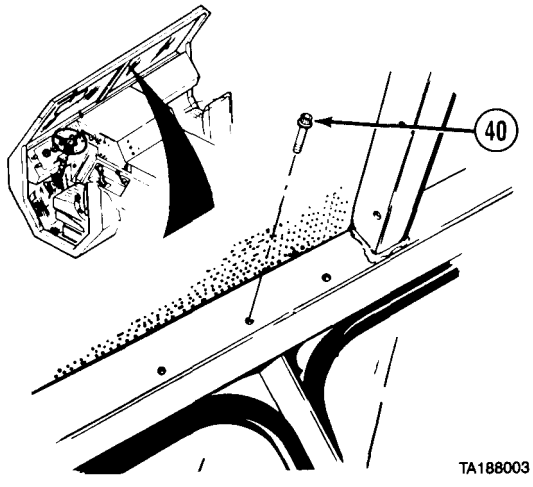
(16) Install power input cable (29) on detector mount (23) with two cushion clips (30) and screws (31).
(17) Connect power input cable connectors (32) to connector (33) and dummy connector (34) on detector mount (23).



(18) Install hanger (35) on bracket (36) with four screws (37), lockwashers (38), and nuts (39).

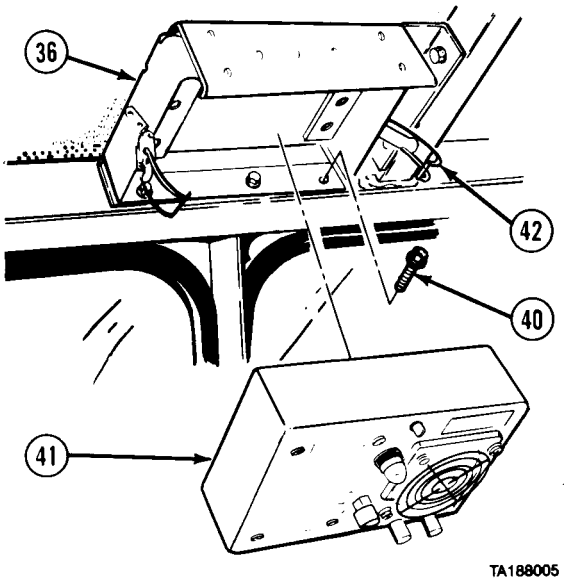


(19) Remove five screws (40).



23-8. M-8 CHEMICAL ALARM KIT INITIAL INSTALLATION (CONT).

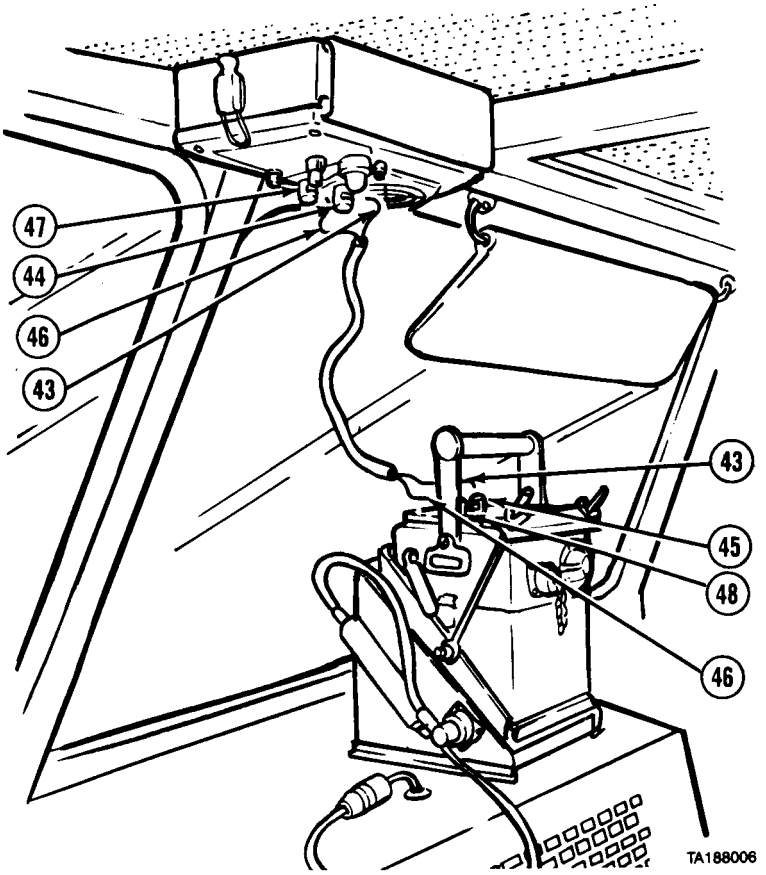
(20) Install bracket (36) with five screws (40).
(21) Install alarm (41) and tighten two clamps (42).



(22) Install red wire (43) on binding posts (44 and 45) and brown wire (46) on binding posts (47 and 48).

b. Follow-on Maintenance.
(1) Connect batteries (TM 9-2320-279-20).
(2) Do startup and operations procedures (TM 3-6665-225-12).

END OF TASK



Special Purpose Kit Installation Instructions (Cont)

23-9. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION AND TRANSFER CASE PACKING AND UNPACKING.

This task covers:

a. Upper Container Removal
b. Upper Container Installation
c. Engine Removal
d. Engine Installation
e. Transmission Removal
f. Transmission Installation
g. Transfer Case Removal
h. Transfer Case Installation
i. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 23-11	Engine prepared for storage.
Para 23-12	Transmission prepared for storage.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

a. *Upper Container Removal.*

NOTE

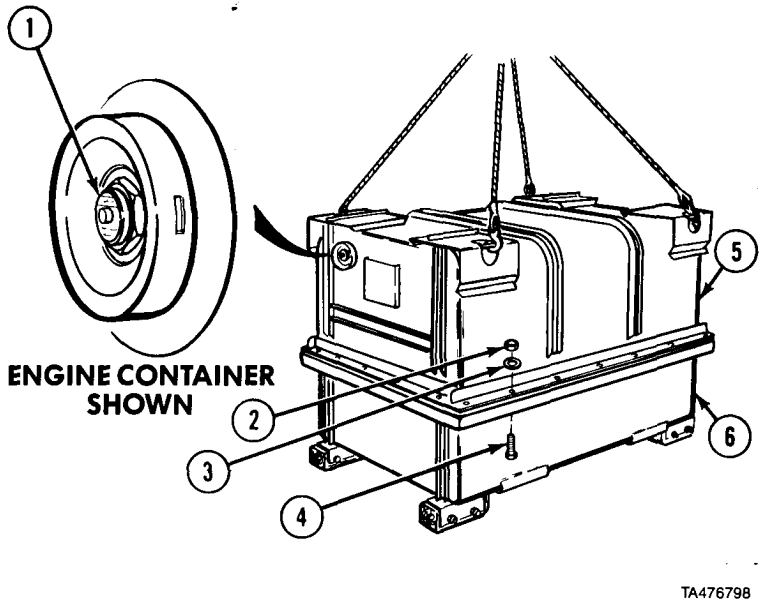
All upper containers are removed the same. Transmission has 22 screws. Transfer case has 20 screws.

(1) Release air pressure at vent valve (1).
(2) Remove 30 nuts (2), washers (3), and screws (4).

WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(3) Attach suitable lifting device and remove upper container (5) from lower container (6).



23-9. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION AND TRANSFER CASE PACKING AND UNPACKING (CONT).

b. Upper Container Installation.

WARNING

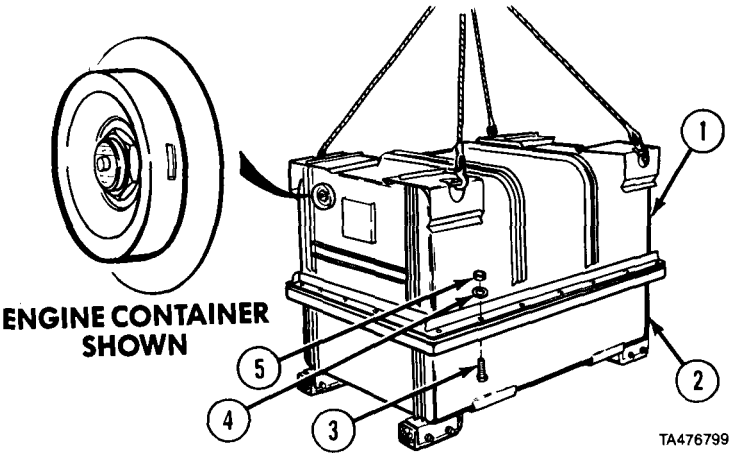
Keep out from under heavy parts. Falling parts may cause serious injury or death.

(1) Install upper container (1) on lower container (2).

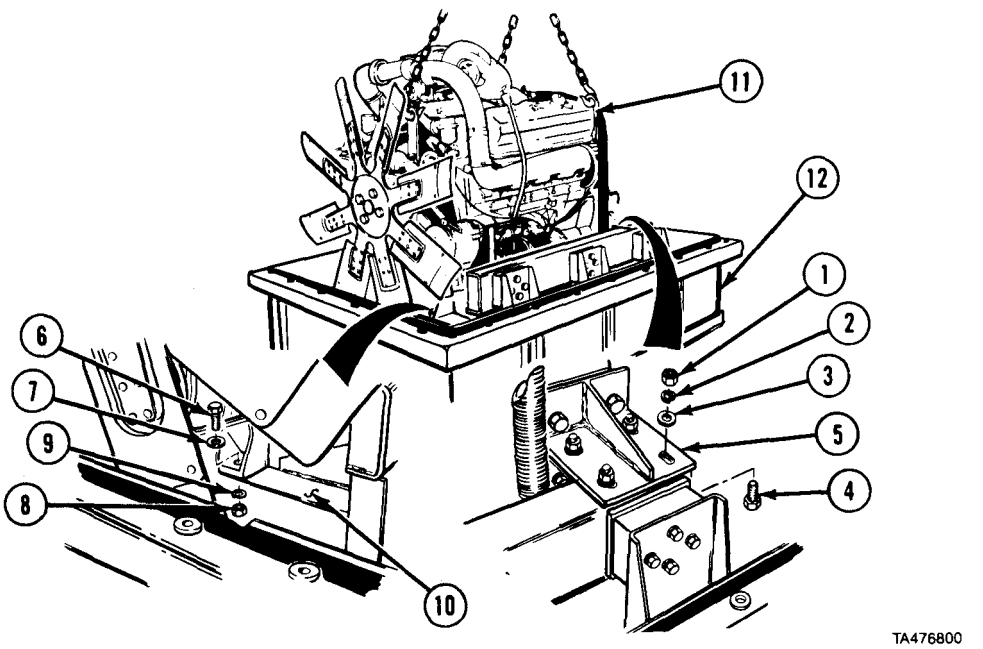
NOTE

When tightening nuts use a crisscross pattern working around container.

(2) Install 30 screws (3), washers (4), and nuts (5).
(3) Tighten nuts (5) to 440 lb-in (48 N·m).



c. Engine Removal.



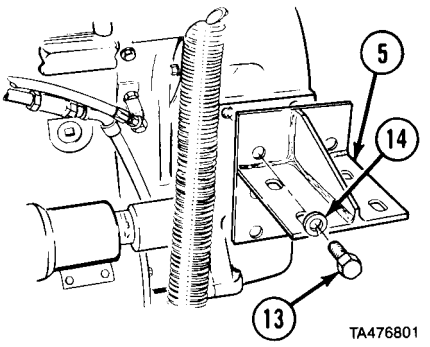
(1) Remove four nuts (1), lockwashers (2), washers (3), and screws (4) from rear support (5).
(2) Repeat step *(1)* for other side.
(3) Remove two screws (6), washers (7), nuts (8), and lockwashers (9) from inner frame (10).

WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(4) Attach suitable lifting device to engine (11) and remove lower container (12).

(5) Remove six screws (13), lockwashers (14), and support (5)
(6) Repeat step (5) for other side.

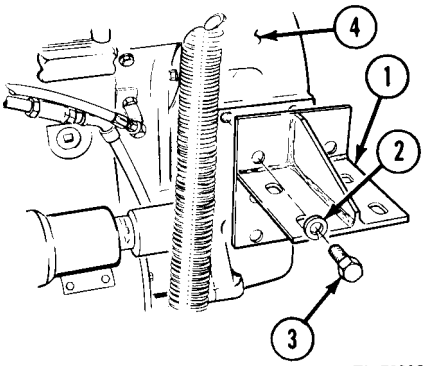


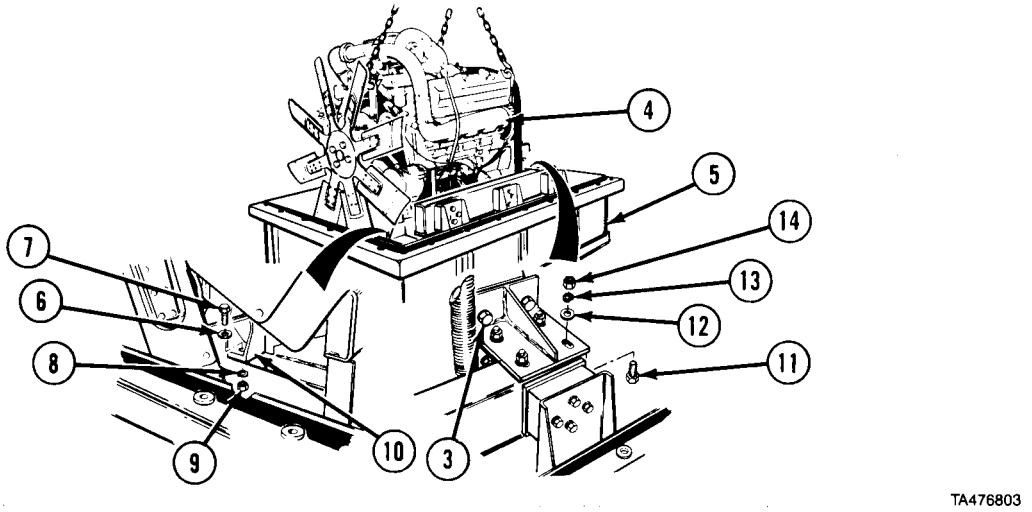
d. Engine Installation.

WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(1) Install support (1) with six lockwashers (2) and screws (3) to engine (4). Do not tighten.
(2) Repeat step *(1)* for other side.

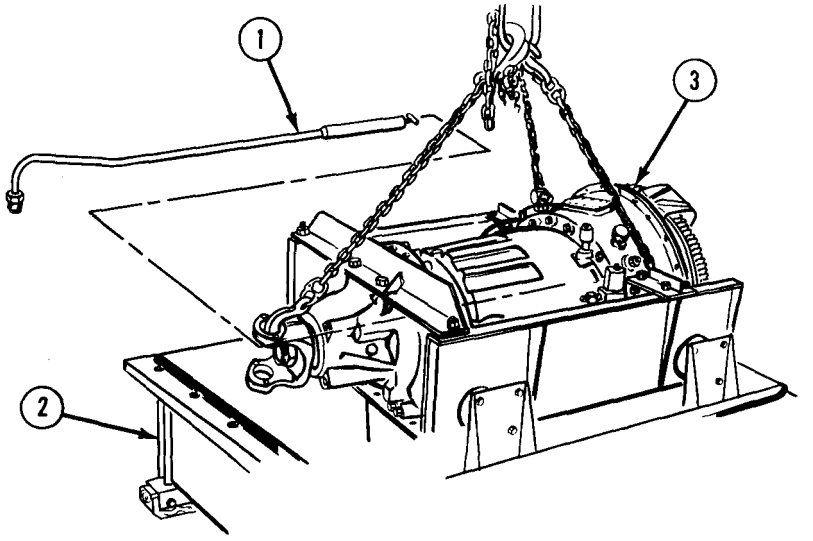




(3) Aline and install engine (4) in lower container (5).
(4) Install two washers (6), screws (7), lockwashers (8), and nuts (9) in inner frame (10).
(5) Install four screws (11), washers (12), lockwashers (13), and nuts (14).
(6) Repeat step (5) for other side.
(7) Tighten twelve screws (3) to 1000 lb-in. (112 N·m).
(8) Tighten nuts (9 and 14) to 440 lb-in (48 N·m).

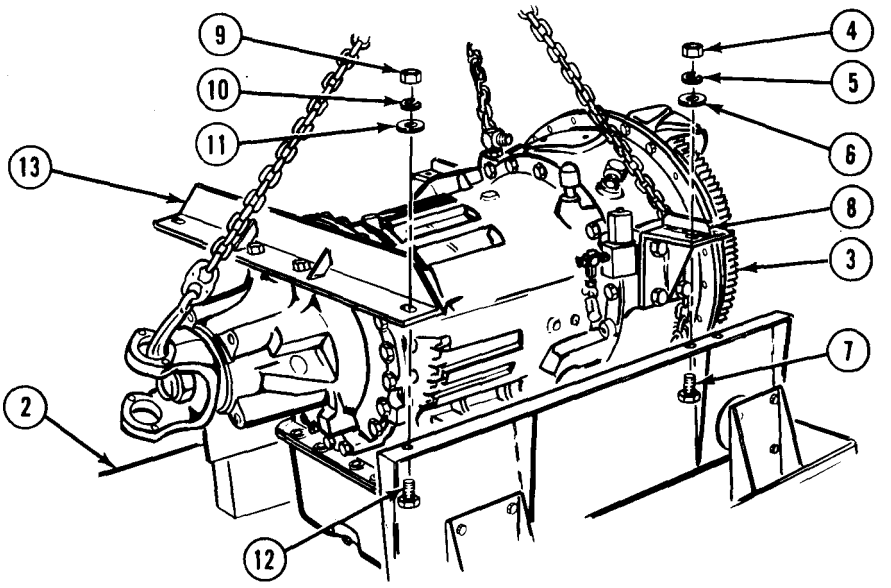
23-9. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION AND TRANSFER CASE PACKING AND UNPACKING (CONT).

e. Transmission Removal.



TA476804

(1) Remove dipstick (1) from lower container (2).
(2) Attach suitable lifting device to transmission (3).



TA476805

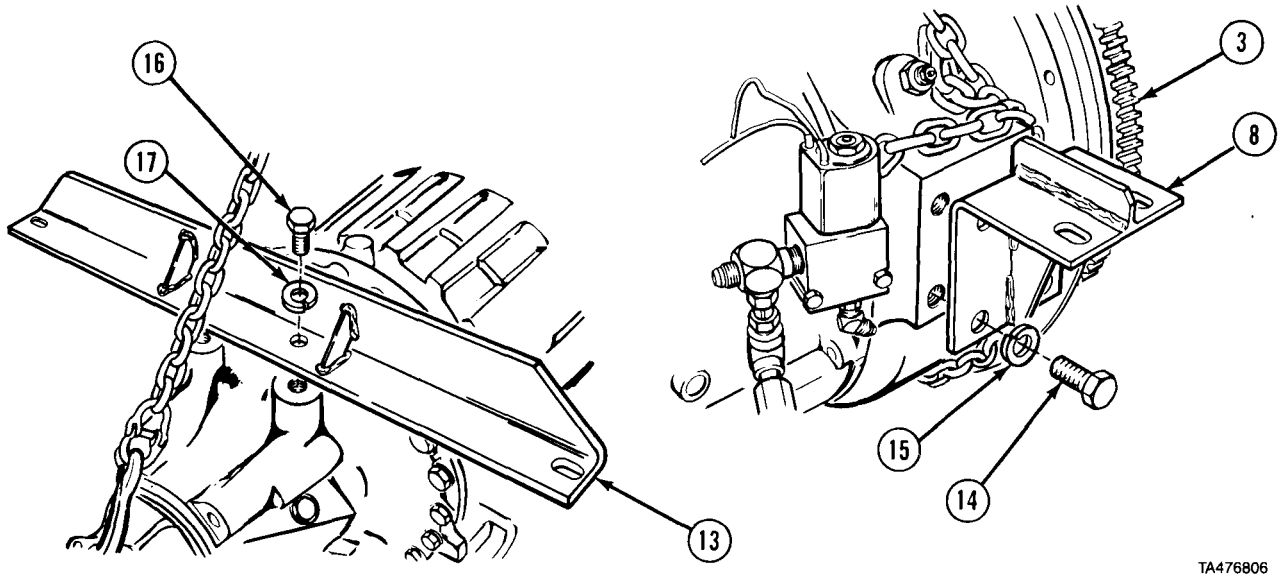
(3) Remove four nuts (4), lockwashers (5), washers (6), and screws (7) from two forward mounts (8).
(4) Remove two nuts (9), lockwashers (10), washers (11), and screws (12) from aft mount (13).

WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

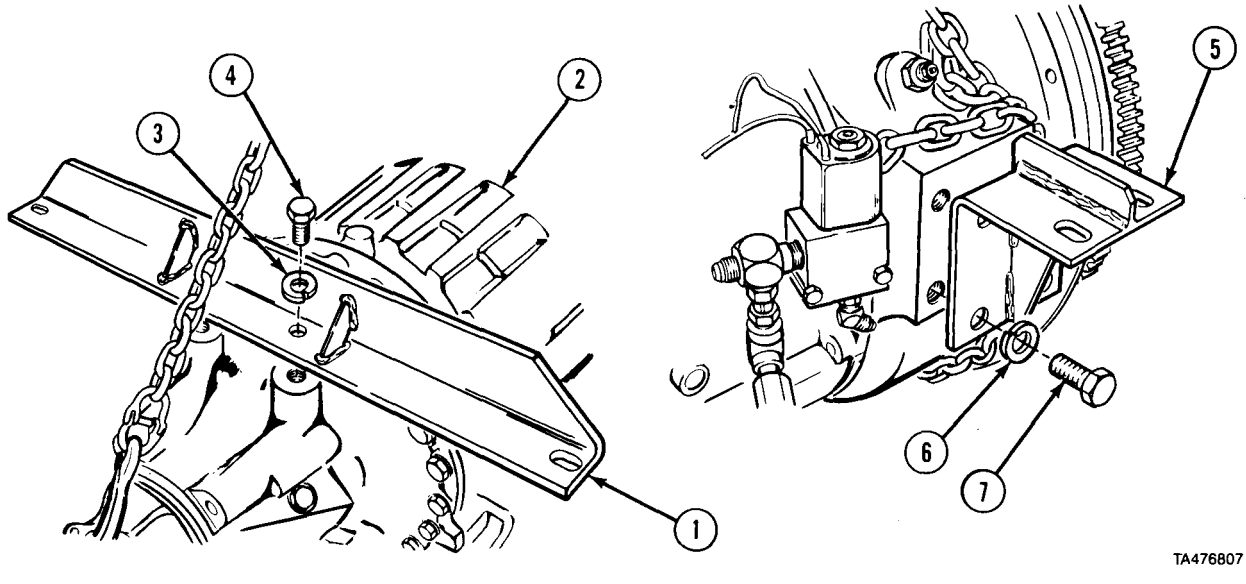
(5) Remove transmission (3) from lower container (2) and place in suitable holding fixture.

Special Purpose Kit Installation Instructions (Cont)



(6) Remove four screws (14), lockwashers (15), and forward mount (8) from transmission (3).
(7) Repeat step (6) for other side.
(8) Remove two screws (16), lockwashers (17), and aft mount (13).

f. Transmission Installation.

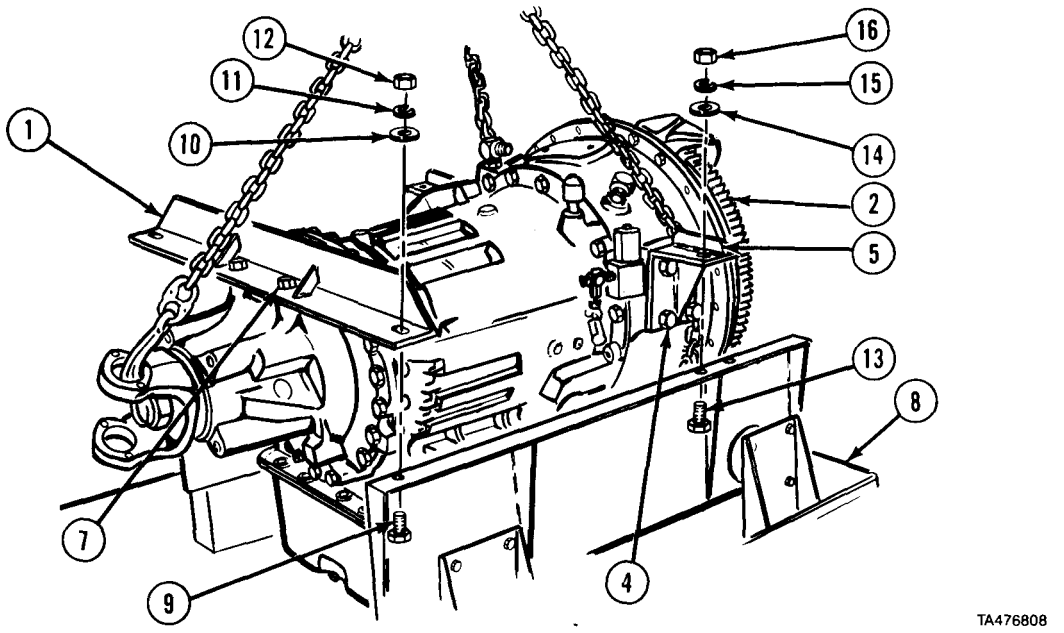


WARNING

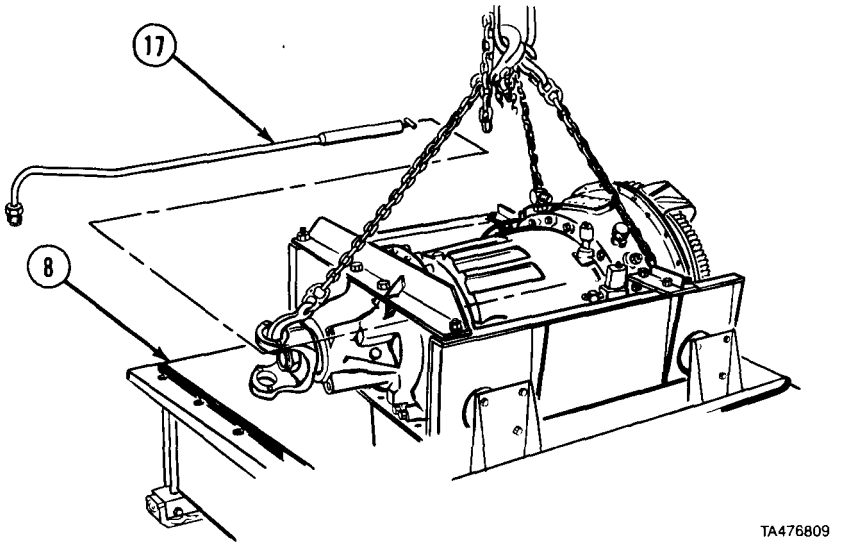
Keep out from under heavy parts. Falling parts may cause serious injury or death.

(1) Install aft mount (1) on transmission (2) with two lockwashers (3) and screws (4). Do not tighten.
(2) Install forward mount (5) with four lockwashers (6) and screws (7). Do not tighten.
(3) Repeat step (2) for other side.

23-9. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION AND TRANSFER CASE PACKING AND UNPACKING (CONT).



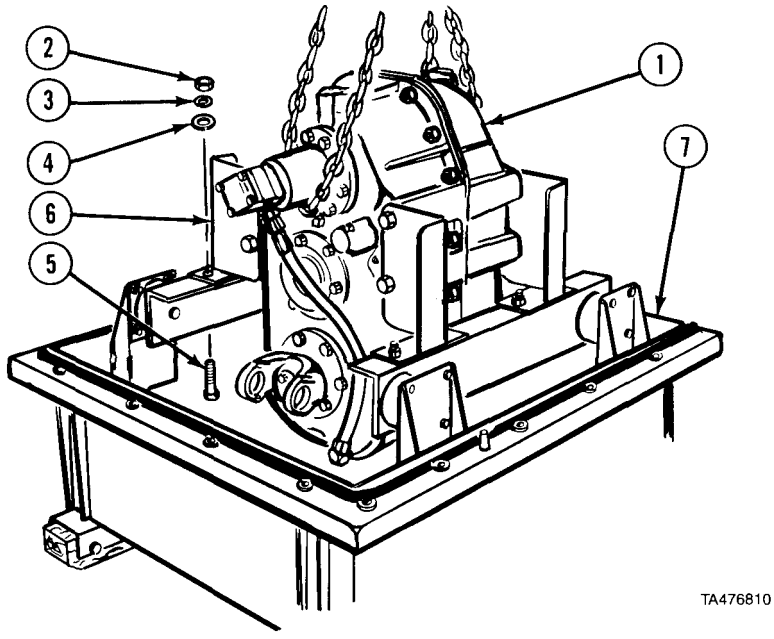
(4) Aline and install transmission (2) in lower container (8).
(5) Install two screws (9), washers (10), lockwashers (11), and nuts (12) in aft mount (1).
(6) Install four screws (13), washers (14), lockwashers (15), and nuts (16) in two forward mounts (5).
(7) Tighten screws (4 and 7) to 1000 lb-in (112 N⋅m).
(8) Tighten nuts (12 and 16) to 440 lb-in (48 N⋅m).



(9) Position dipstick (17) in lower container (8) and secure with ties.

Special Purpose Kit Installation Instructions (Cont)

g. Transfer Case Removal.



NOTE

All transfer cases in storage containers have 1710 series yoke. 1810 series yoke must be installed on transfer case for M984E1.

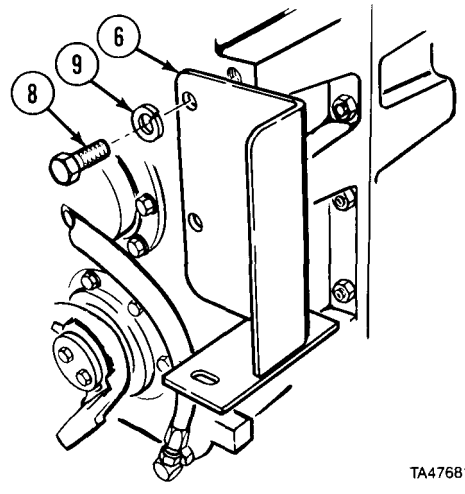
(1) Attach suitable lifting device to transfer case (1).
(2) Remove eight nuts (2), lockwashers (3), washers (4), and screws (5) from four brackets (6).

WARNING

Keep out from under heavy parts. Falling parts may cause serious injury or death.

(3) Remove transfer case (1) from lower container (7).

(4) Remove two screws (8), lockwashers (9), and brackets (6).
(5) Repeat step *(4)* for other three brackets



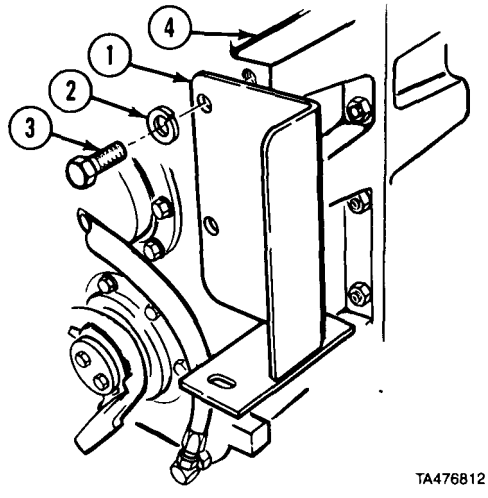
23-9. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION AND TRANSFER CASE PACKING AND UNPACKING (CONT).

h. Transfer Case Installation.

NOTE

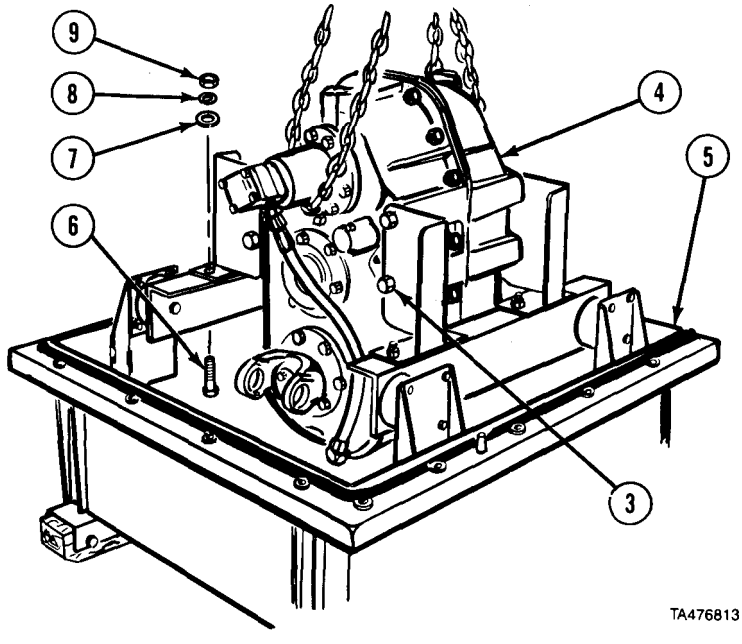
M984E1 transfer case has 1810 series yoke. 1710 series yoke must be installed before transfer case is placed in storage container.

(1) Install bracket (1) with two lockwashers (2) and screws (3) on transfer case (4). Do not tighten.
(2) Repeat step (1) for other three brackets.



TA476812

(3) Aline and install transfer case (4) in lower container (5) with eight screws (6), washers (7), lockwashers (8), and nuts (9).
(4) Tighten nuts (9) to 440 lb-in (48 N·m).
(5) Tighten screws (3) to 1000 lb-in (112 N·m).



TA476813

i. Follow-on Maintenance. None

END OF TASK

23-10. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION, AND TRANSFER CASE SERVICE AND REPAIR.

This task covers:

a. Service
b. Disassembly
c. Assembly
d. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
(TB 9-289) Depot reconditioning of engine, transmission and similiar reusable metal containers.

Equipment Condition

TM or Para	*Condition Description*
Para 23-9	Remove upper container.

Special Environmental Conditions
None

General Safety Instructions
None

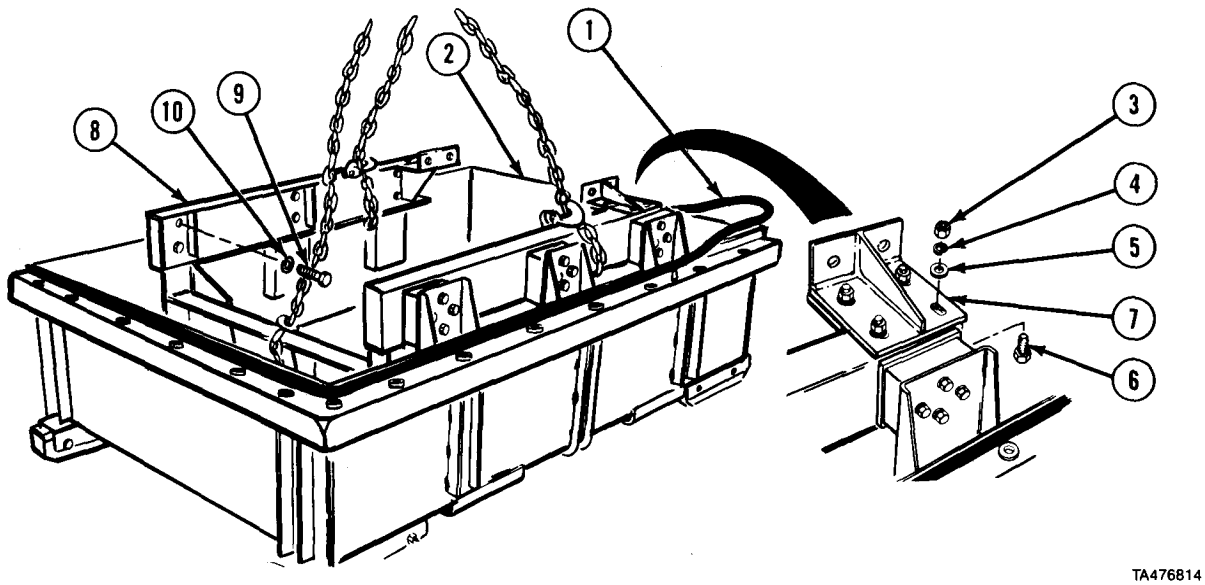
Level of Maintenance
General Support

a. Service. Service reusable container (TB 9-289).

Special Purpose Kit Installation Instructions (Cont)

23-10. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION, AND TRANSFER CASE SERVICE AND REPAIR. (CONT).

b. Disassembly.



NOTE

All three containers are repaired the same. Engine container shown throughout the task.

(1) Remove seal (1) from lower container (2).

NOTE

All reusable containers are similar except for shapes and quantity of mounting brackets and hardware. Transmission has 3 brackets, 6 screws, washers, lockwashers and nuts. Transfer case has 4 brackets, 8 screws, washers, lockwashers, and nuts.

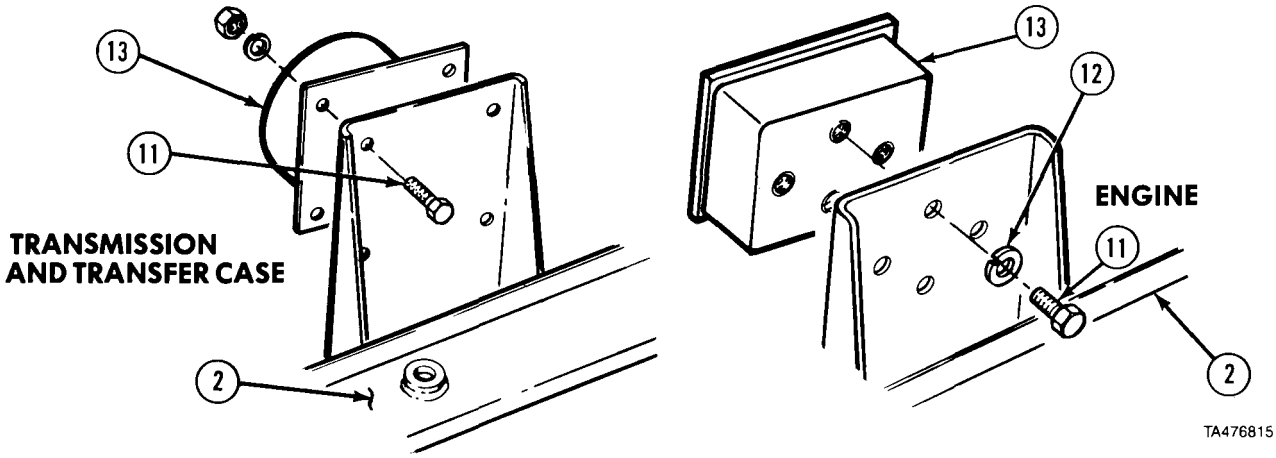
(2) Remove eight nuts (3), lockwashers (4), washers (5), screws (6), and two mounting brackets (7).

NOTE

- Inner frame for transmission and transfer case only have four screws and lockwashers.
- Mark position of inner frame before removal.

(3) Attach suitable lifting device to inner frame (8) and remove 24 screws (9), lockwashers (10), and inner frame (8) from lower container (2).

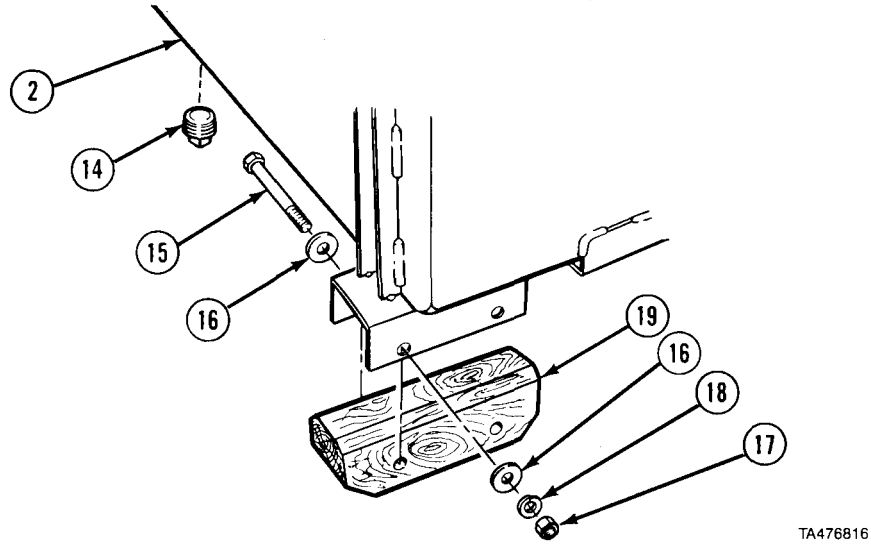
Special Purpose Kit Installation Instructions (Cont)



NOTE

Shear mounts are similar except for shape and hardware. Transmission and transfer case have washers and nuts.

(4) Remove four screws (11), lockwashers (12), and shear mount (13) from lower container (2).



(5) Remove plug (14) from lower container (2).

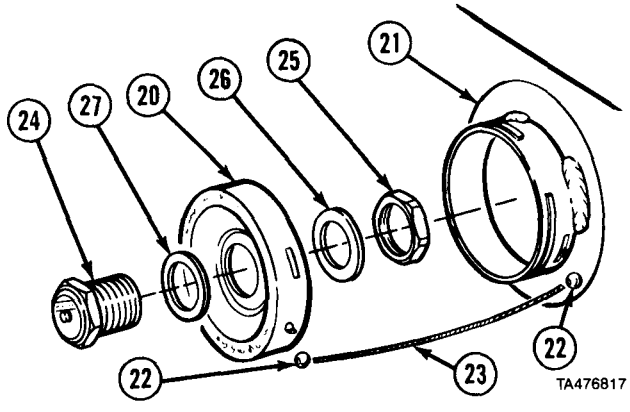
NOTE

All skid legs are removed the same.

(6) Remove two screws (15), four washers (16), two nuts (17), lockwashers (18), and skid leg (19).

23-10. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION, AND TRANSFER CASE SERVICE AND REPAIR. (CONT).

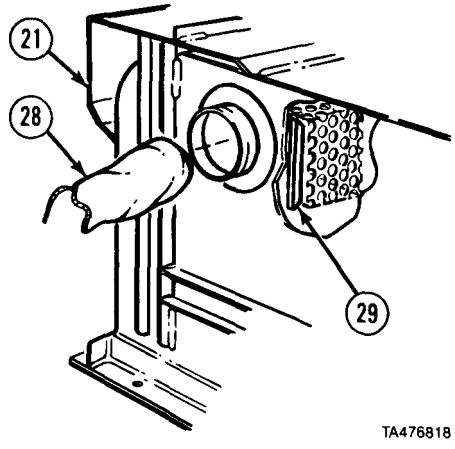
(7) Remove cover (20) from upper container (21).
(8) Remove two end balls (22) and cable (23).
(9) Remove valve (24), nut (25), washer (26), and gasket (27) from cover (20).



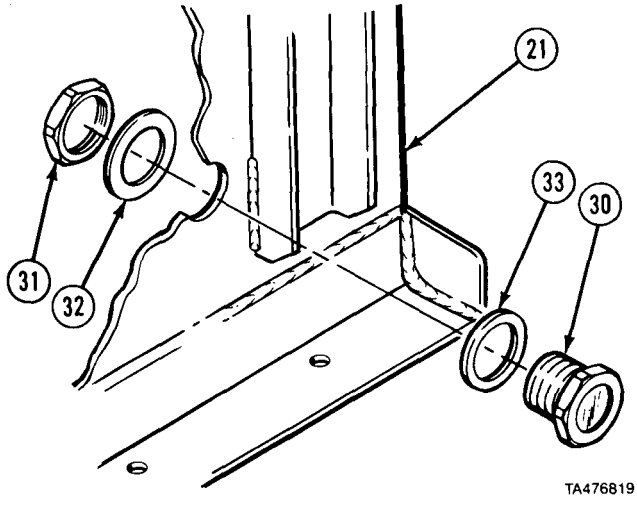
NOTE

Number of dehumidification bags may vary due to amount of units per bag.

(10) Remove 128 units of desiccant (8 to 16 bags) (28) from upper container (21).
(11) Remove edge protector (29) from upper container (21).



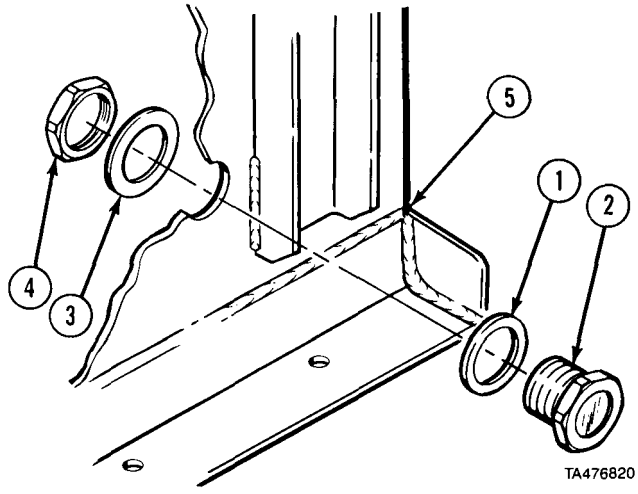
(12) Remove sight gage (30), nut (31), washer (32), and gasket (33) from upper container (21).



Special Purpose Kit Installation Instructions (Cont)

c. *Assembly.*

(1) Install gasket (1) and sight gage (2) with washer (3) and nut (4) in upper container (5).



NOTE

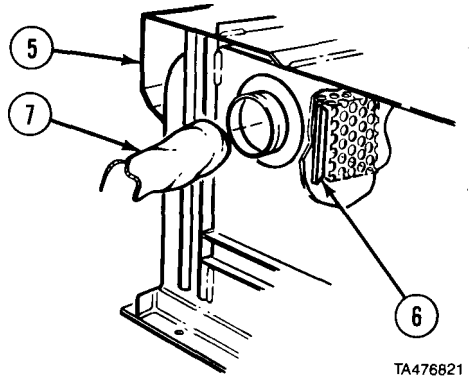
Tip container up for access to install edge protectors.

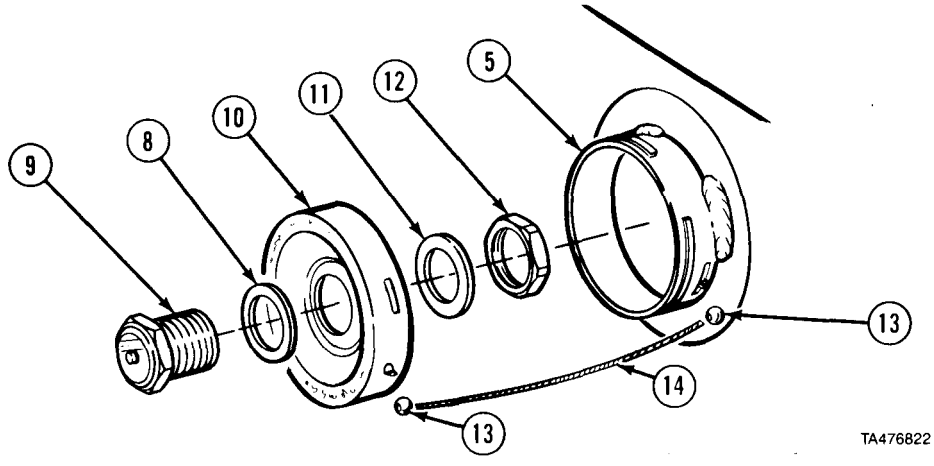
(2) Install edge protector (6) in upper container (5).

NOTE

Desiccant comes in bags of 8 units each or 16 units each. The minimum units for engine is 128 units, transmission is 48 units and transfer case is 40 units.

(3) Install appropriate units of desiccant (8 to 16 bags) (7).

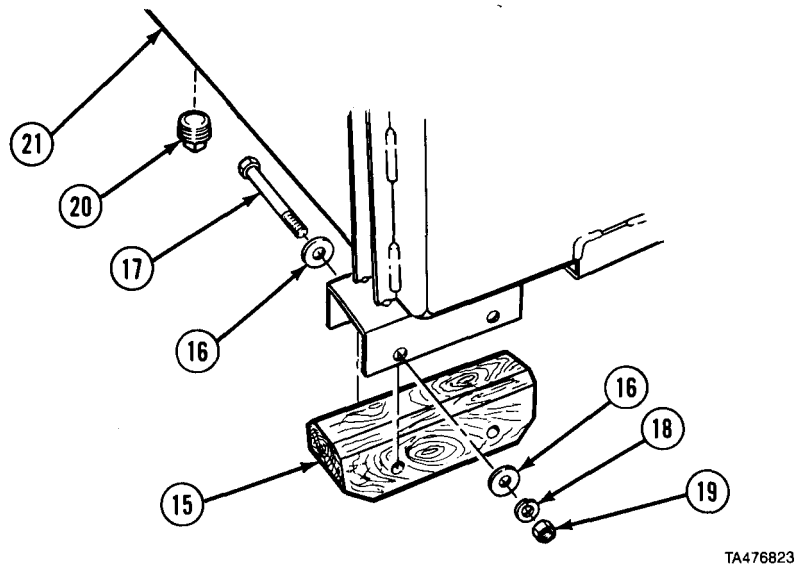




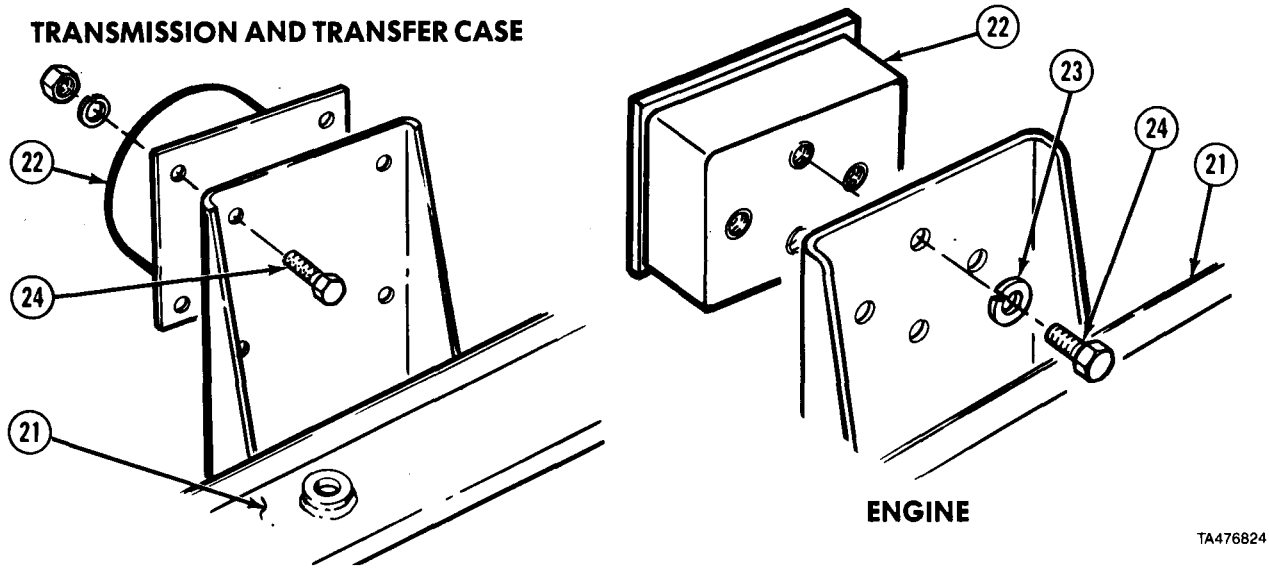
(4) Install gasket (8) and valve (9) in cover (10) with washer (11) and nut (12).
(5) Install cover (10) on upper container (5) with two balls (13) and cable (14).

Special Purpose Kit Installation Instructions (Cont)

23-10. SHIPPING AND STORAGE CONTAINERS, ENGINE, TRANSMISSION, AND TRANSFER CASE SERVICE AND REPAIR. (CONT).



(6) Install skid leg (15) with four washers (16), two screws (17), lockwashers (18), and nuts (19).
(7) Install plug (20) in lower container (21).

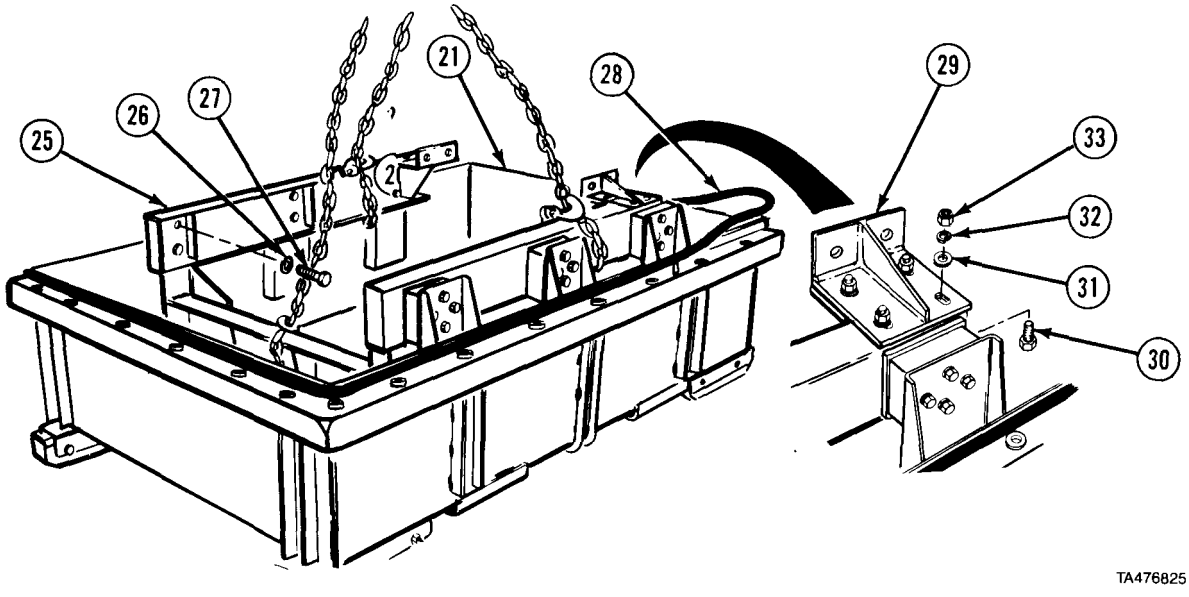


NOTE

Shear mounts are similar except for shape and hardware. Transmission and transfer case have washers and nuts.

(8) Install shear mount (22) in lower container (21) with four lockwashers (23) and screws (24).

Special Purpose Kit Installation Instructions (Cont)



NOTE

Inner frame for transmission and transfer case only have four screws and lockwashers.

(9) Install inner frame (25) in lower container (21) with 24 lockwashers (26) and screws (27).
(10) Install seal (28) on lower container (21).

NOTE

All reusable containers are similar except for shapes and quantity of mounting brackets and hardware. Transmission has 3 brackets, 6 screws, washers, lockwashers, and nuts. Transfer case has 4 brackets, 8 screws, washers, lockwashers, and nuts.

(11) Install two mounting brackets (29) with four screws (30), washers (31), lockwashers (32), and nuts (33).

c. Follow-on Maintenance. Install upper container (para 23-9).

END OF TASK

Special Purpose Kit Installation Instructions (Cont)

23-11. ENGINE, PREPARATION FOR SHIPPING AND STORAGE CONTAINER.

This task covers:

a. Removal
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
Sealant, pipe thread, Item 29, Appendix C

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

TM or Para	*Condition Description*
Para 3-3	Engine removed from vehicle.
Para 6-6	Remove engine wiring harness.

Equipment Condition

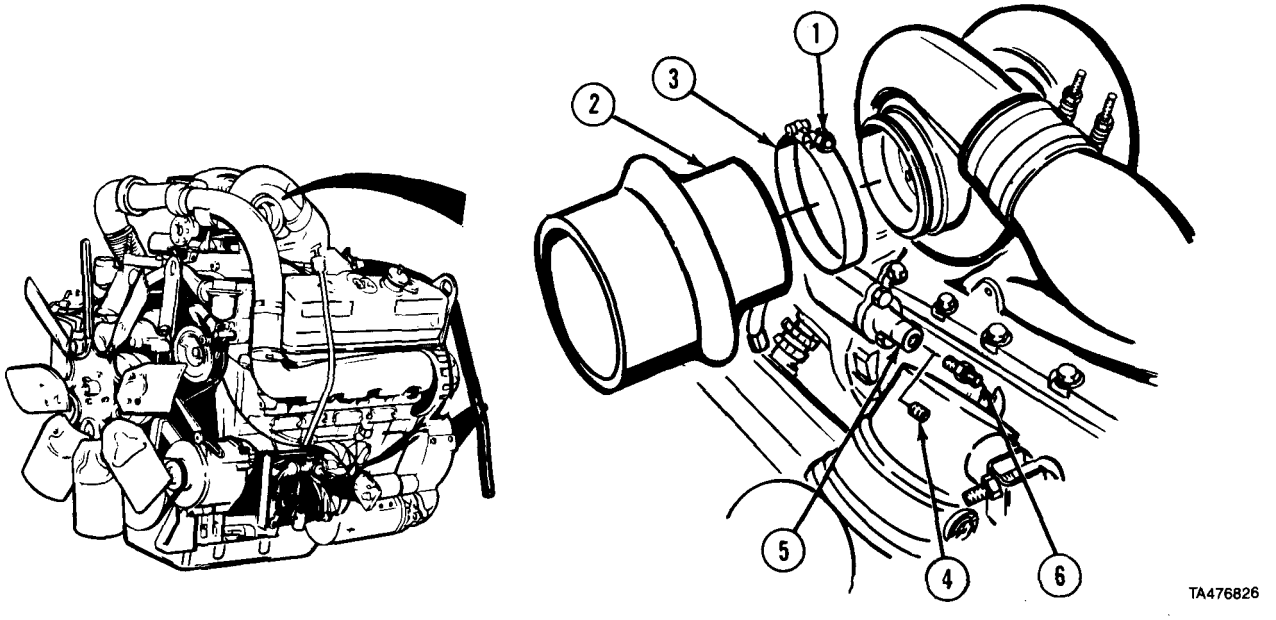
TM or Para	*Condition Description*
TM 9-2320-279-20	Remove starter relay.
TM 9-2320-279-20	Remove tachometer sending unit.
TM 9-2320-279-20	Remove ether sensing unit.
Para 12-8	Remove throttle control solenoid.
TM 9-2320-279-20	Remove air compressor governor.
Para 12-10	Remove steering pump.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Removal.



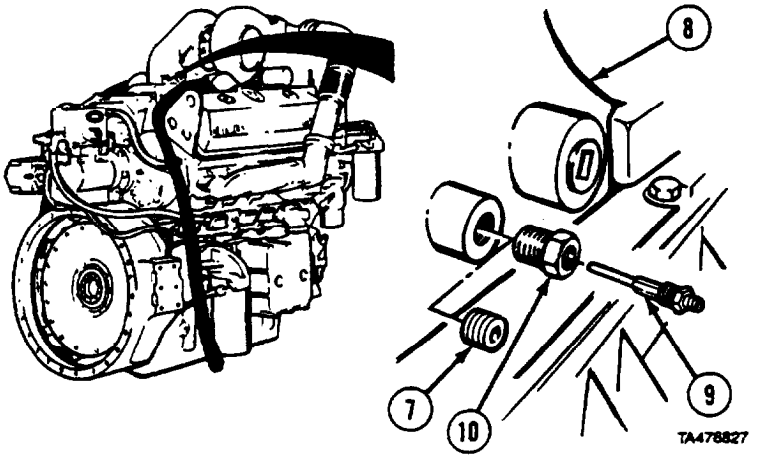
Special Purpose Kit Installation Instructions (Cont)

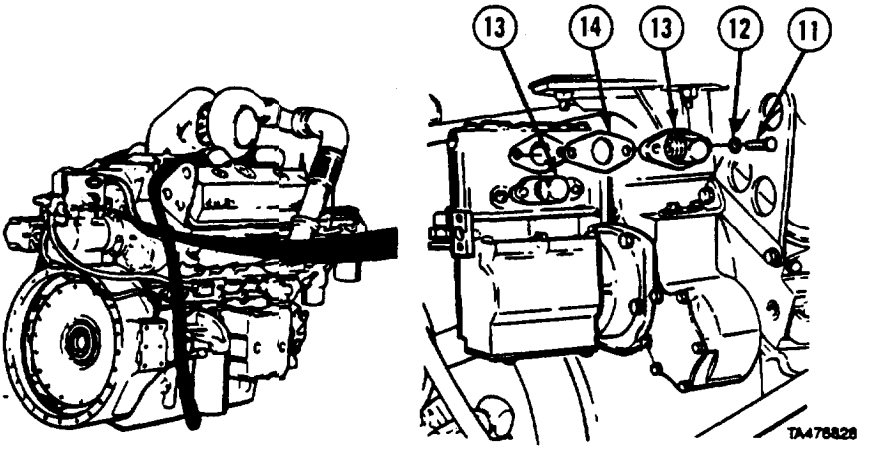
NOTE

- All components removed in this procedure from old engine must be installed on replacement (new engine).
- The M983 vehicle requires a 100 amp alternator. When replacing engine remove alternator from old engine and install on new engine. Remove alternator from new engine and install on old engine (refer to TM 9-2320-279-20).

Loosen screw (1) and remove reducer (2) and clamp (3) from old engine and install on new engine.
Remove plug (4) from governor (6) on new engine.
Remove fitting (6) from governor (5) of old engine.
Install plug (4) in governor (5) of old engine.
Apply sealant and install fitting (6) in governor (5) of new engine.

Remove plug (7) from air inlet adapter (8) of new engine.
Remove atomizer (9) and reducer (10) from air inlet adapter (8) of old engine.
Install plug (7) in air inlet adapter (8) of old engine.
Apply sealant to atomizer (9) and reducer (10) and install in air inlet adapter (8) of new engine.



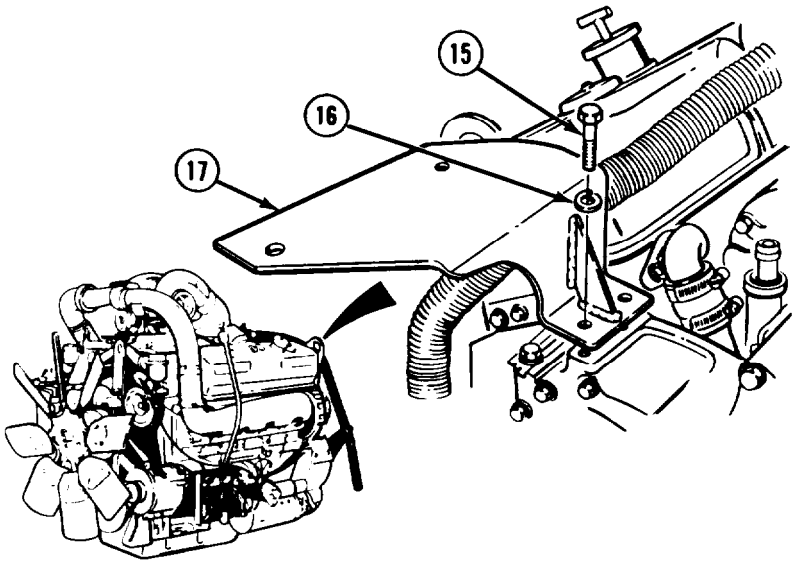


NOTE

Note position of elbows.

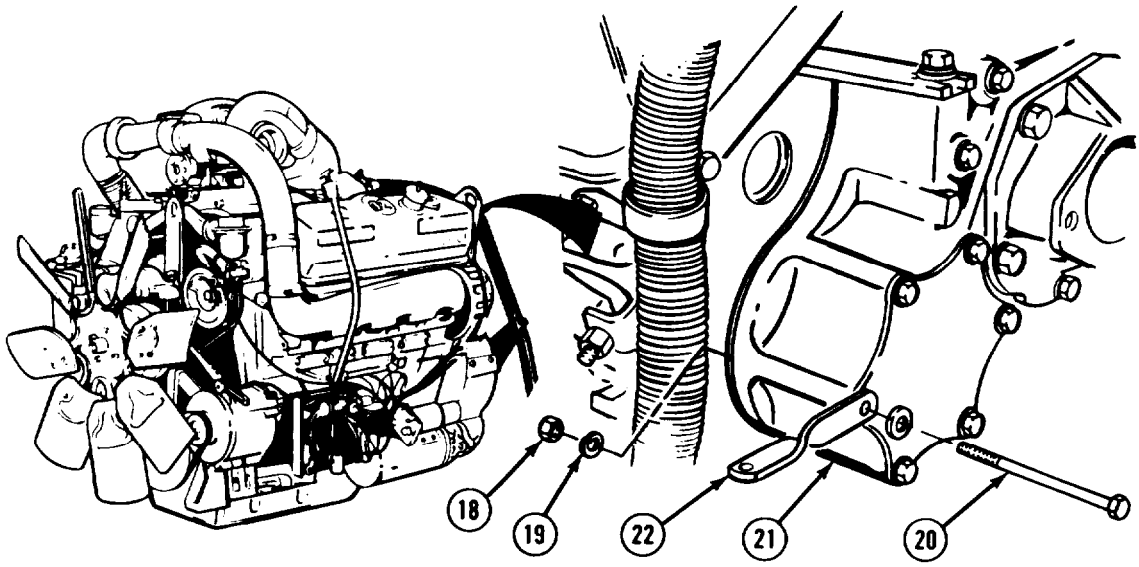
(10) Remove two screws (11), lo&washers (12), flange assembly (13), and discard gasket (14). Install screws, lo&washers, flange assembly, and new gasket on new engine.
(II) Repeat step (10) for other flange assembly (13).

23-11. ENGINE, PREPARATION FOR SHIPPING AND STORAGE CONTAINER (CONT).



NOTE
Front left screw has star-shaped lockwasher.

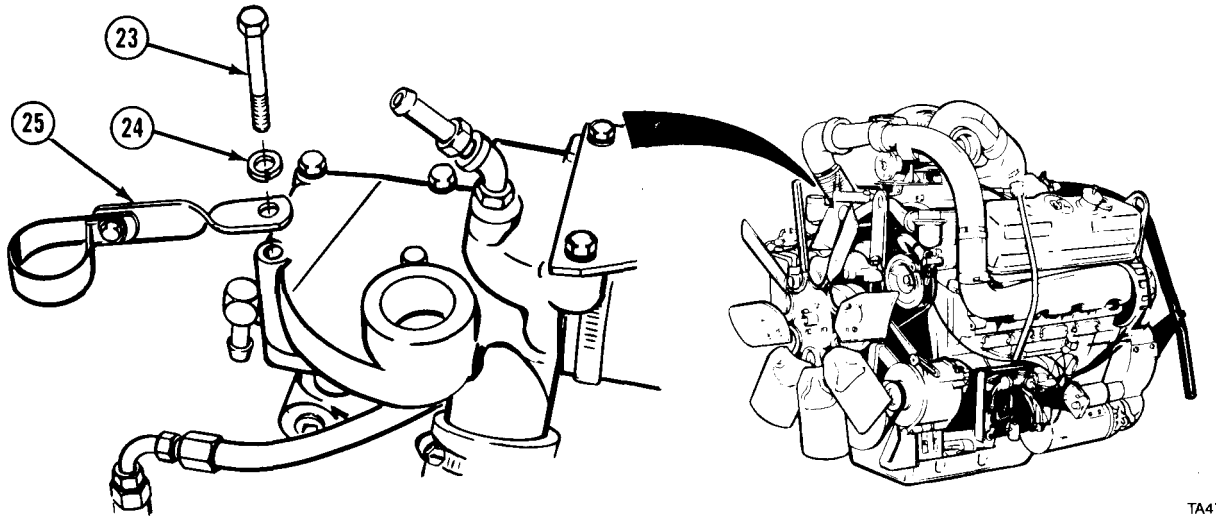
(12) Remove two screws (15), lockwashers (16), and bracket (17) from old engine and install on new engine.
(13) Repeat step (12) for other side.



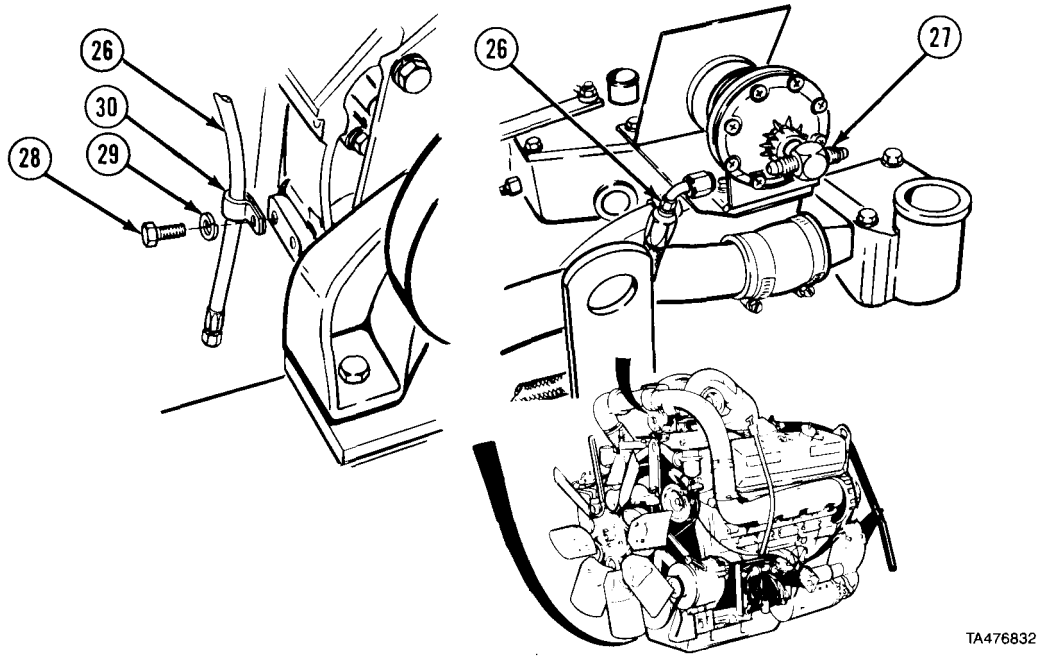
NOTE
Screw, washer, lockwasher, and nut must be reinstalled after bracket is removed.

(14) Remove nut (18), lockwasher (19), screw (20), washer (21), and bracket (22) from old engine and install on new engine.

Special Purpose Kit Installation Instructions (Cont)



(15) Remove screw (23), lockwasher (24), and bracket (25) from old engine and install on new engine.



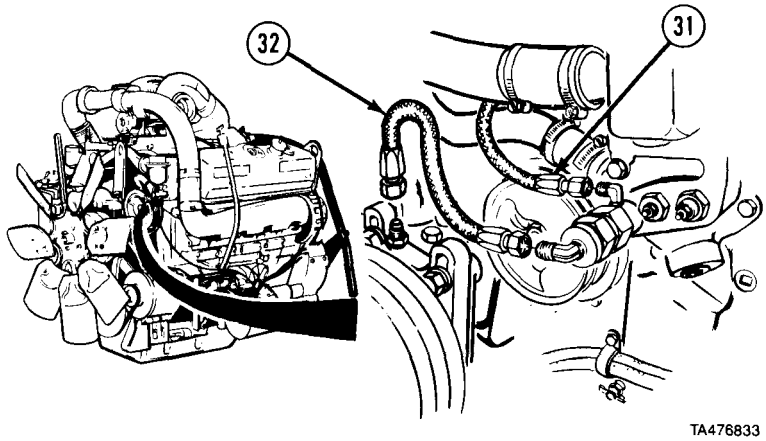
(16) Disconnect hose (26) from tee (27) and remove screw (28), lockwasher (29), clamp (30), and hose (26) from old engine and install on new engine.
(17) Remove tee (30) from old engine.
(18) Apply sealant and install fitting (30) on new engine.

23-11. ENGINE, PREPARATION FOR SHIPPING AND STORAGE CONTAINER (CONT).

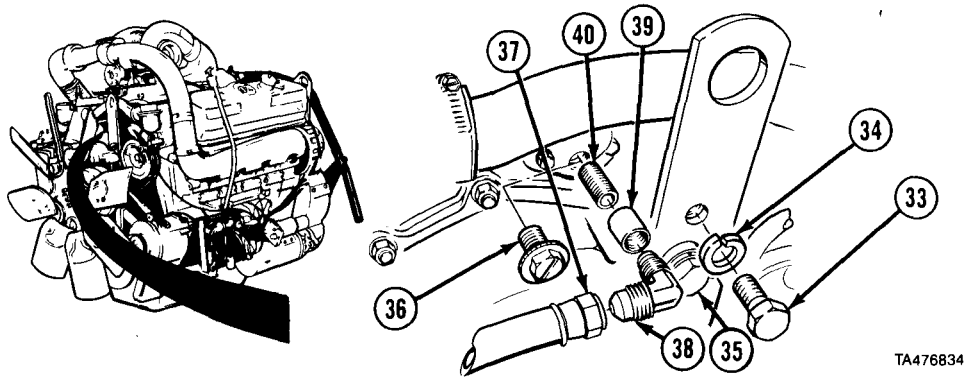
NOTE

Note position of air lines.

(19) Disconnect hose (31) and remove from old engine and install on new engine.
(20) Disconnect hose (32) from old engine and install on new engine.



TA476833



TA476834

(21) Remove screw (33), lockwasher (34), and loosen screw (35).

NOTE

Install screw and lockwasher after removing fitting.

(22) Remove plug (36) from new engine.
(23) Remove hose (37), elbow (38), adapter (39), and fitting (40).
(24) Install plug (36) in old engine.
(25) Apply compound and install fitting (40), adapter (39), and elbow (38) on new engine.

b. Follow-on Maintenance.

(1) Install fan (TM 9-2320-279-20).
(2) Install steering pump on replacement engine (para 12-10).
(3) Install air compressor governor on replacement engine (TM 9-2320-279-20).
(4) Install throttle control solenoid on replacement engine (Para 12-8).
(5) Install ether sensing unit on replacement engine (TM 9-2320-279-20).
(6) Install tachometer sending unit on replacement engine (TM 9-2320-279-20).
(7) Install starter relay on replacement engine (TM 9-2320-279-20).
(8) Install engine wiring harness on replacement engine (para 6-6).
(9) Install replacement engine in vehicle (para 3-3).
(10) Install engine in shipping and stowage container (para 23-9).

END OF TASK

Special Purpose Kit Installation Instructions (Cont)

23-12. TRANSMISSION, PREPARATION FOR SHIPPING AND STORAGE CONTAINER.

This task covers:

a. Removal
b. Follow-on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer

References
None

Equipment Condition

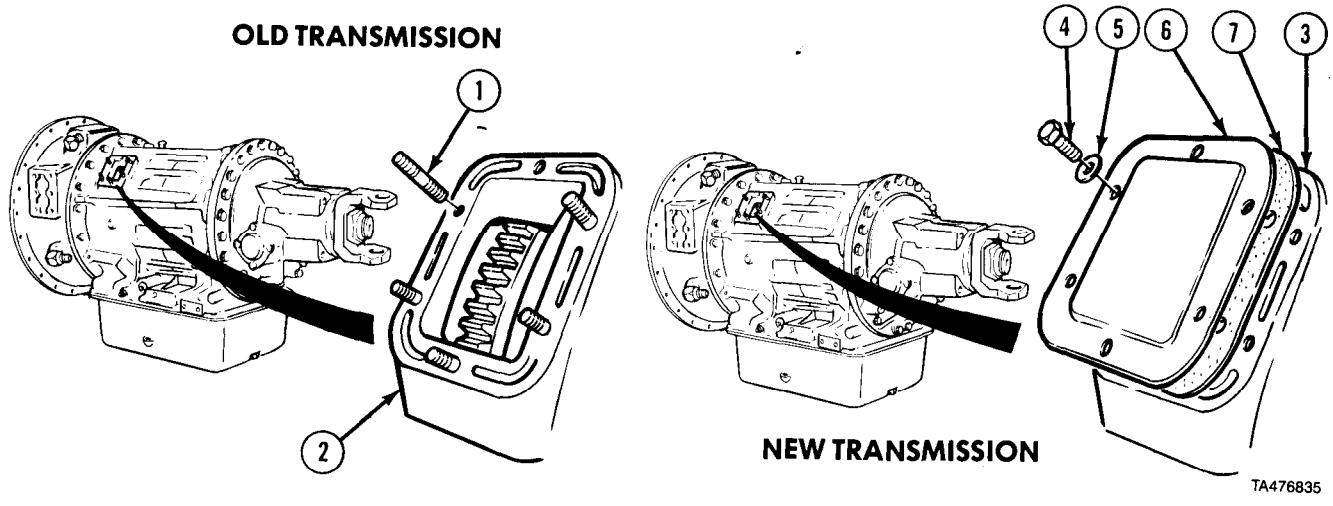
TM or Para	*Condition Description*
Para 7-3	Transmission removed from vehicle.
TM 9-2320-279-20	Neutral interlock switch sender unit removed.
Para 7-4	Modulator valve removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
General Support

a. Removal.

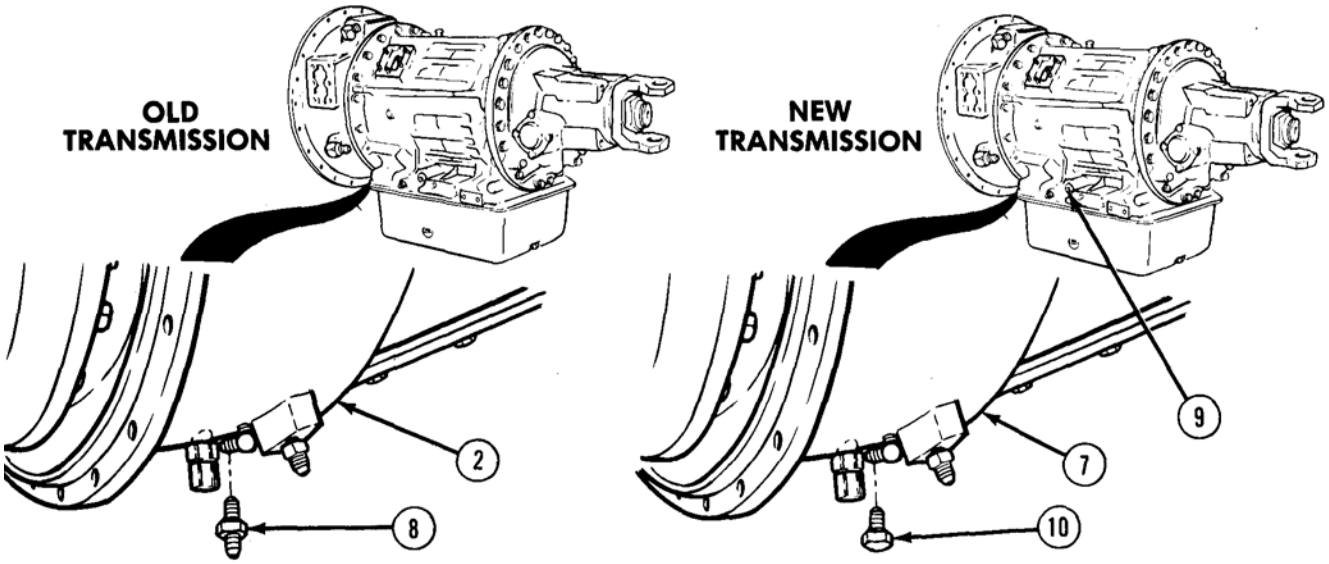


NOTE

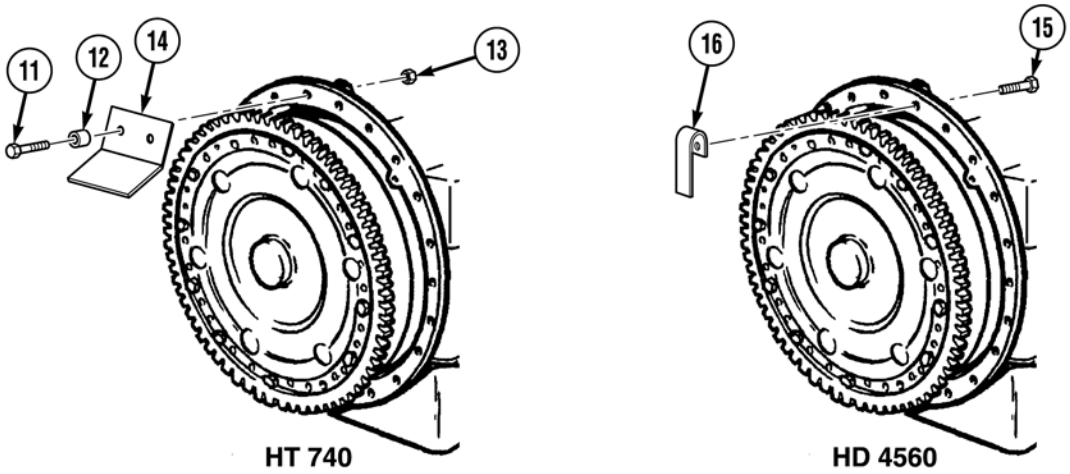
All components removed in this procedure must be installed on replacement (new) transmission.

(1) Remove five studs (1) from old transmission (2) and install on new transmission (3).
(2) Remove six screws (4), washers (5), cover (6), and gasket (7) from new transmission (3) and install on old transmission (2).

23-12. TRANSMISSION, PREPARATION FOR SHIPPING AND STORAGE CONTAINER (CONT).



(3) Remove fitting (8) from old transmission (2) and install on new transmission (3).
(4) Remove plug (9) and plug (10) from new transmission (3) and install in old transmission (2).



NOTE

- Perform steps *(5)* and *(6)* for HT 740 transmissions.
- Perform steps *(7)* and *(8)* for HD 4560 transmissions.

(5) Remove six screws (11), spacers (12), nuts (13), and three brackets (14) from new transmission.
(6) Install three brackets (14) on old transmission with six screws (11), spacers (12), and nuts (13).
(7) Remove three screws (15) and brackets (16) from new transmission.
(8) Install three brackets (16) on old transmission with three screws (15).

b. Follow-on Maintenance.

(1) Install modulator valve (para 7-22).
(2) Install neutral interlock switch sender unit (TM 9-2320-279-20).
(3) Install transmission (para 7-4).

END OF TASK

Section VI. CAB EQUIPMENT

23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION.

This task covers:

a. Seatbelt Removal
b. Sheet Metal Preparation
c. Air Line Installation
d. Installing Seatbelts
e. Brackets and Seat Installation
f. Follow–on Maintenance

INITIAL SETUP

Models
All

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63W, Wheel vehicle repairer (2)

References
None

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
TM 9-2320-279-10	Spare tire removed.
TM 9-2320-279-10	Air system drained.
TM 9-2320-279-20	Batteries disconnected.
TM 9-2320-279-20	Step removed.
TM 9-2320-279-20	Seat and seat frame removed.

Special Environmental Conditions
None

General Safety Instructions
None

Level of Maintenance
Direct Support

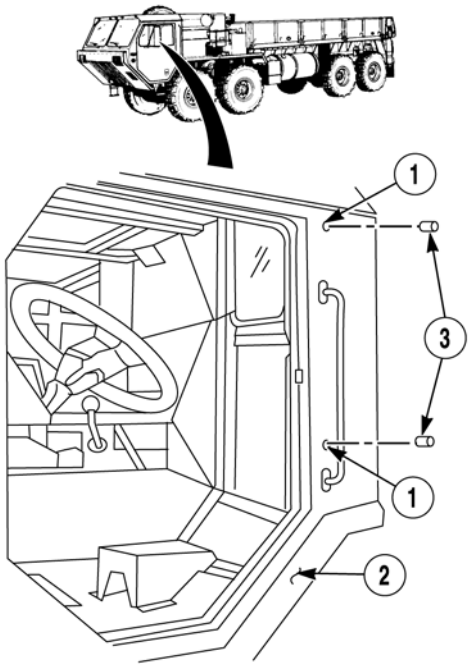
a. Seatbelt Removal.

NOTE

Perform step *(1)*, *(2)*, or *(3)* depending on type of seatbelt in vehicle.

(1) Remove seatbelt (without shoulder harness) (TM 9-2320-279-20).
(2) Remove seatbelt (three-point) (Model A) (TM 9-2320-279-20).
(3) Remove seatbelt (three-point) (Model B) (TM 9-2320-279-20).

23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).



WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

NOTE

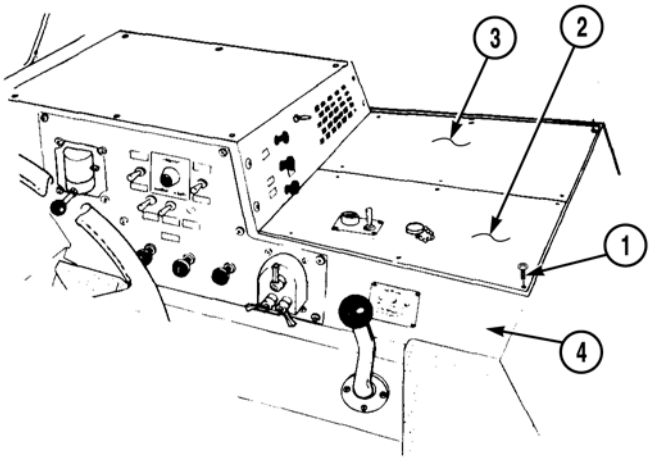
Perform steps *(4)* and *(5)* if (three-point) (Model A) or (Model B) seatbelts were removed.

(4) Apply adhesive around four holes (1) on driver and passenger side of cab (2).

(5) Install four plugs (3) in holes (1) on driver and passenger side of cab (2).

b. Sheet Metal Preparation.

(1) Remove 11 screws (1) and two center console covers (2 and 3) from center console (4).

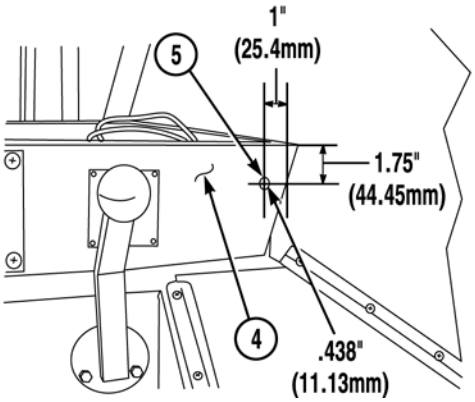


Special Purpose Kit Installation Instructions (Cont)

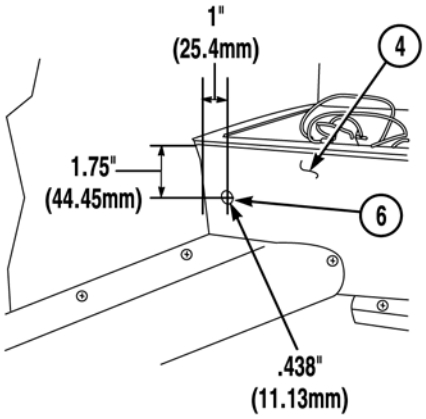
WARNING

Drilling and grinding operations are hazardous to the eyes. Eye protection is required. Failure to heed this warning can result in injury to personnel.

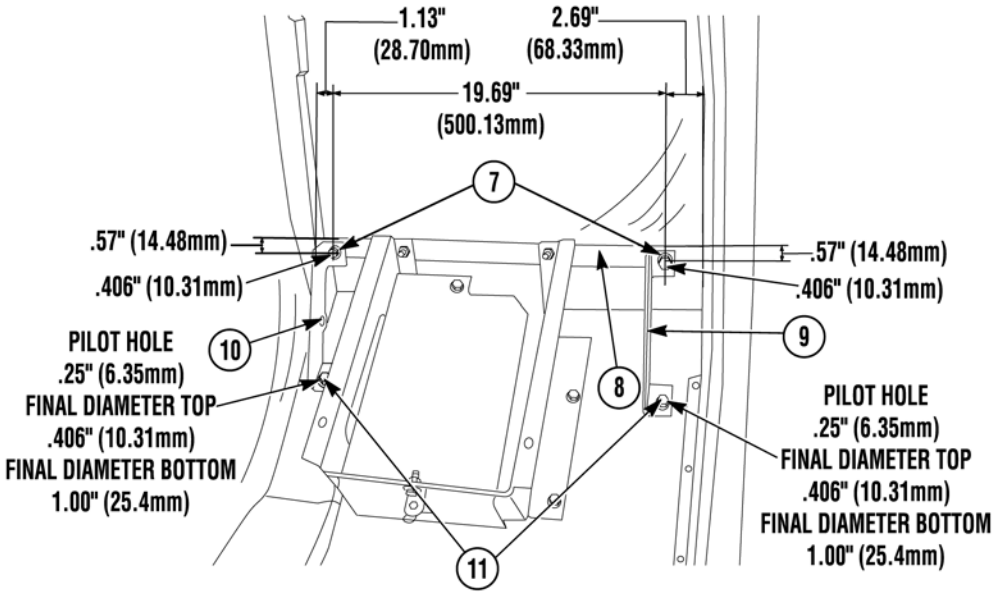
(2) Drill one 0.438 in. (11.13 mm) hole (5) on left side of center console (4).



(3) Drill one 0.438 in. (11.13 mm) hole (6) on right side of center console (4).



23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).



NOTE

Holes for both right and left side lower retractor brackets are drilled the same way.

(4) Drill two 0.406 in. (10.31 mm) holes (7) in two lower seat support brackets (8) on driver and passenger side of vehicle.

(5) Using two lower retractor brackets (9 and 10) as templates, mark two holes (11) on cab floor on driver and passenger side of vehicle.

NOTE

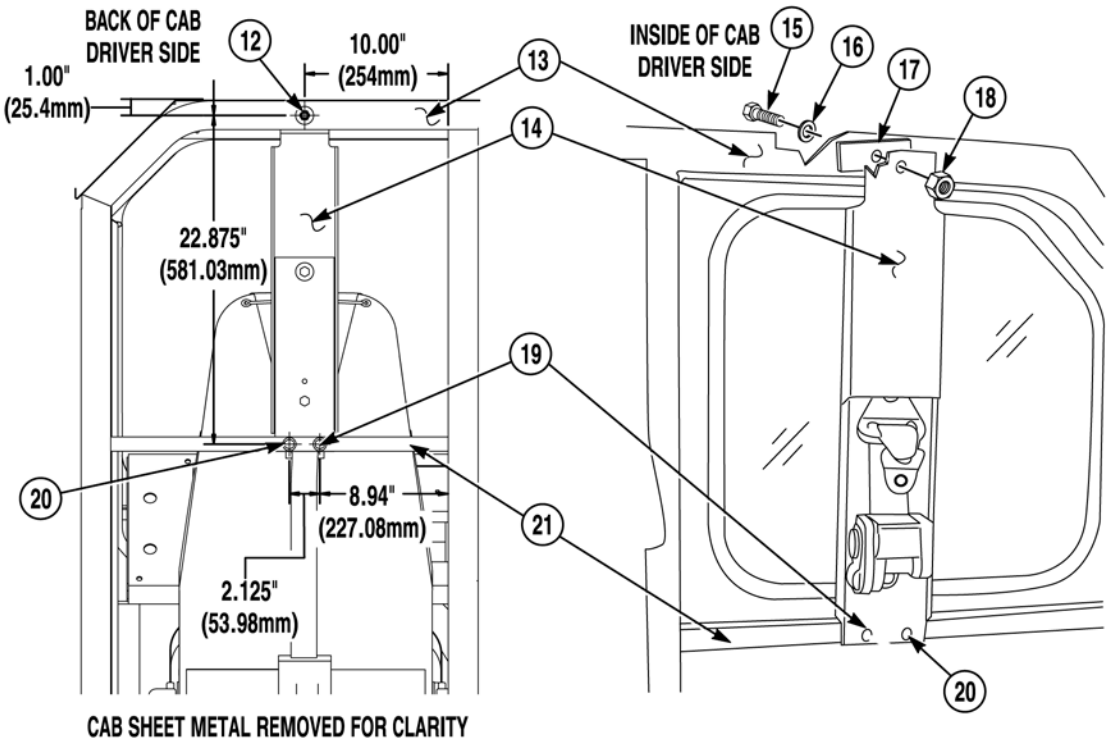
Locations for drilling two lower retractor bracket holes must first be drilled with a 0.25 in. (6.35 mm) drill bit. Drill bit will pass through cab floor, top of support tube, and bottom of support tube. Bottom hole in support tube will need to be enlarged to 1.00 in. (25.4 mm) using a 0.25 in. (6.35 mm) pilot guided 1.00 in. (25.4 mm) hole saw to provide clearance for attaching hardware.

(6) Drill two 0.25 in. (6.35 mm) holes (11) in cab floor on driver and passenger side of vehicle.

(7) Enlarge top two holes (11) to 0.406 in. (10.31 mm).

(8) Using a 0.25 in. (6.35 mm) pilot guided 1.00 in. (25.4 mm) hole saw, enlarge bottom two holes (11) to 1.00 in. (25.4 mm).

Special Purpose Kit Installation Instructions (Cont)



NOTE

Perform steps *(9)* through *(13)* to drill holes for driver side tether bracket.

(9) Drill one 0.50 in. (12.7 mm) hole (12) through tube (13) and back of cab.

NOTE

- Temporarily attaching top of tether bracket (14) through hole (12) in tube (13) and using tether bracket as a template, will permit accurate location of two bottom mounting holes on cross tube.
- Spacer is used on driver side only.

(10) Temporarily attach top of tether bracket (14) to hole (12) in tube (13) with screw (15), washer (16), spacer (17), and locknut (18).

(11) Using tether bracket (14) as a template, mark location of two holes (19 and 20) on cross tube (21).

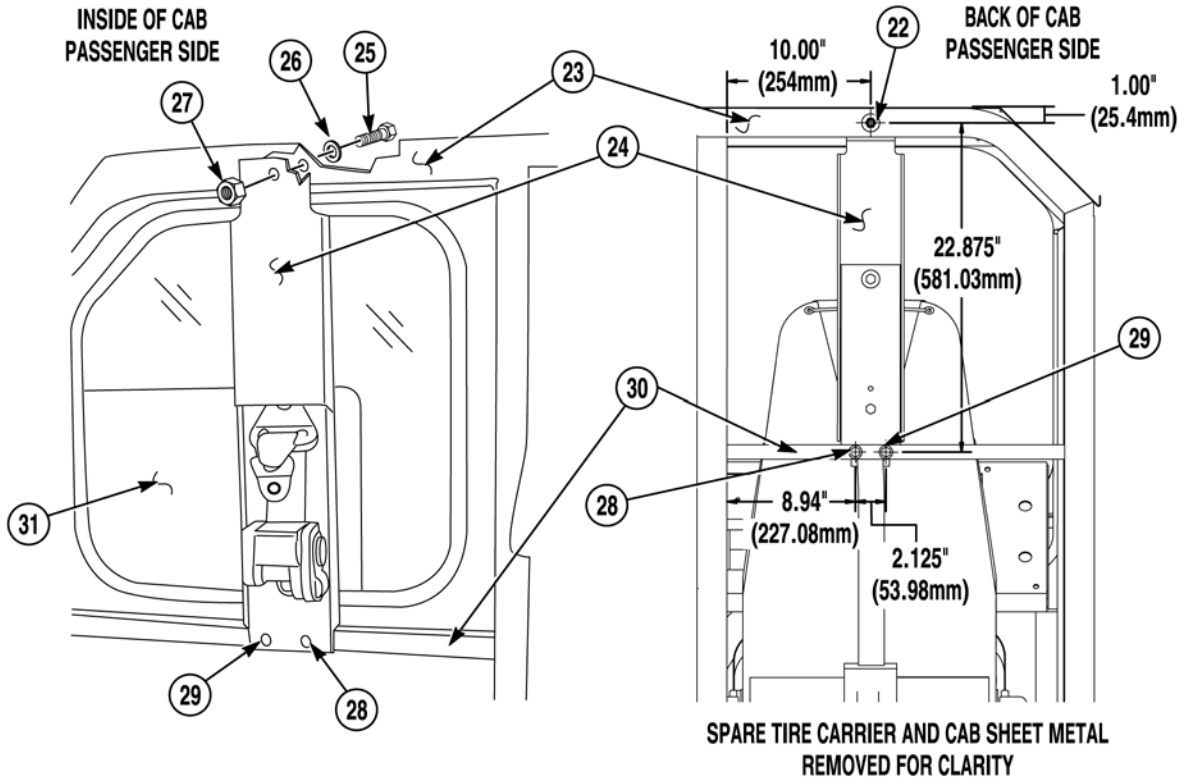
(12) Remove locknut (18), tether bracket (14), spacer (17), washer (16), and screw (15) from tube (13).

NOTE

After marking location of two holes, verify location of two holes with dimensions shown.

(13) Drill two 0.50 in. (12.7 mm) holes (19 and 20) through cross tube (21) and back of cab.

23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).



NOTE

Perform steps *(14)* through *(20)* to drill holes for passenger side tether bracket.

(14) Drill one 0.50 in. (12.7 mm) hole (22) through tube (23) and back of cab.

NOTE

Temporarily attaching top of tether bracket (24) through hole (22) in tube (23) and using tether bracket as a template, will permit accurate location of two bottom mounting holes on cross tube.

(15) Temporarily attach top of tether bracket (24) through hole (22) in tube (23) with screw (25), washer (26), and locknut (27).

(16) Using tether bracket (24) as a template, mark location of two holes (28 and 29) on cross tube (30).

(17) Remove locknut (27), tether bracket (24), washer (26), and screw (25) from tube (23).

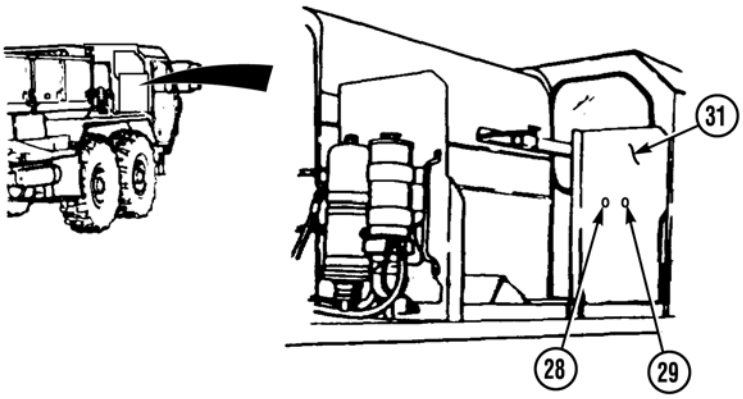
NOTE

Locations for drilling two bottom mounting holes for tether bracket must first be drilled with a 0.25 in. (6.35 mm) drill bit. Drill bit will first pass through tube and back of cab and then through spare tire carrier. Spare tire carrier holes will need to be enlarged to 1.00 in. (25.4 mm) using a 0.25 in. (6.35 mm) pilot guided 1.00 in. (25.4 mm) hole saw to provide clearance for attaching hardware.

(18) Drill two 0.25 in. (6.35 mm) holes (28 and 29) through cross tube (30) and back of cab and spare tire carrier (31).

(19) Enlarge two holes (28 and 29) through cross tube (30) and back of cab to 0.50 in. (12.7 mm).

Special Purpose Kit Installation Instructions (Cont)



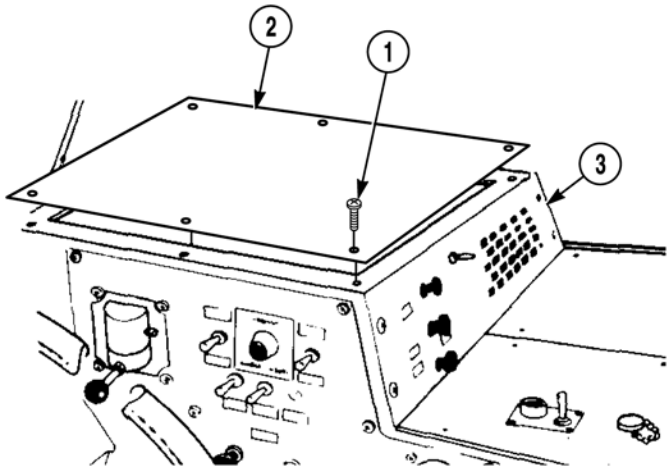
NOTE

Holes in spare tire carrier are enlarged from outside the cab while standing on the spare tire carrier.

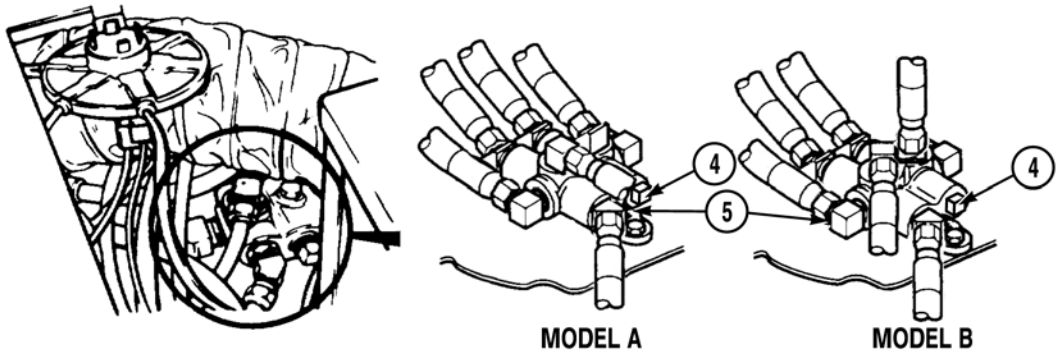
(20) Using a 0.25 in. (6.35 mm) pilot guided 1.00 in. (25.4 mm) hole saw, enlarge two holes (28 and 29) in spare tire carrier (31) to 1.00 in. (25.4 mm).

c. Air Line Installation.

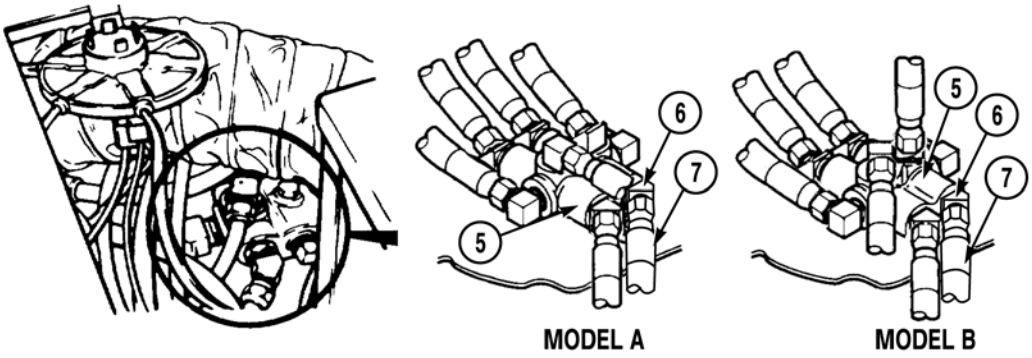
(1) Remove eight screws (1) and heater cover (2) from heater control panel (3).



23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).

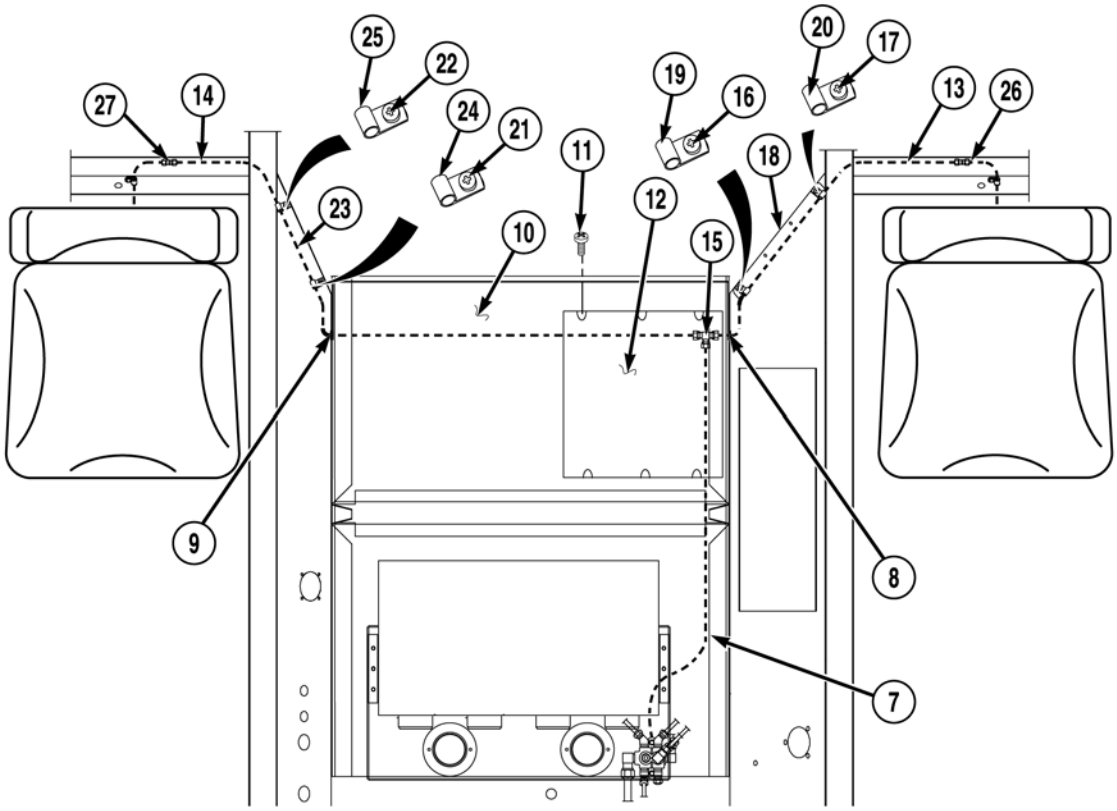


(2) Remove and discard plug (4) from valve (5).



(3) Install elbow (6) on valve (5).
(4) Install air line (7) on elbow (6).

Special Purpose Kit Installation Instructions (Cont)



NOTE

Longest of three air lines is routed from tee fitting to passenger side air-ride seat.

(5) Install two grommets (8 and 9) in holes on left and right side of center console (10).
(6) Remove six screws (11) and circuit breaker panel (12) from center console (10).
(7) Install air line (13) through grommet (8).
(8) Install air line (14) through grommet (9).
(9) Install three air lines (7, 13, and 14) on tee fitting (15).
(10) Lift circuit breaker panel (12) and position tee fitting (15) and three air lines (7, 13, and 14) under circuit breaker panel (12).

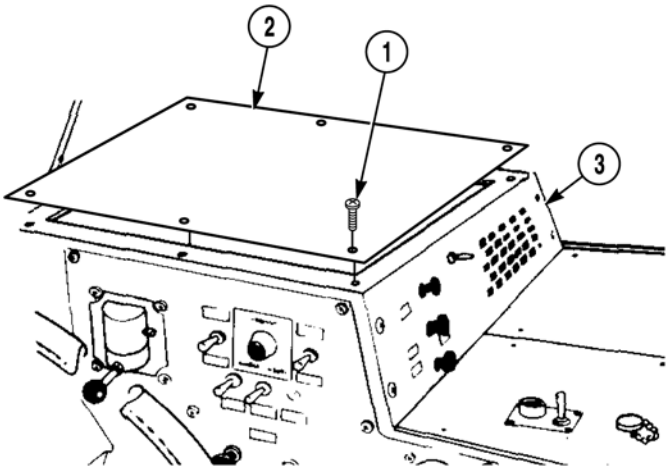
NOTE

Air lines are secured on both driver and passenger side with existing screws securing insulation retaining strips.

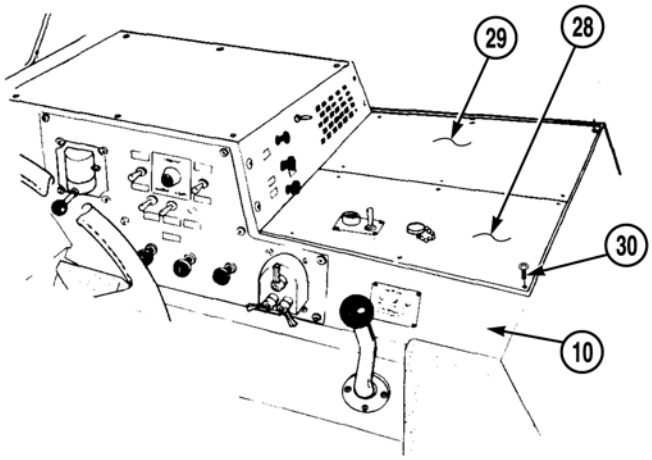
(11) Remove two screws (16 and 17) from driver side insulation retaining strip (18).
(12) Install air line (13) on insulation retaining strip (18) with two cushion clips (19 and 20) and screws (16 and 17).
(13) Remove two screws (21 and 22) from passenger side insulation retaining strip (23).
(14) Install air line (14) on insulation retaining strip (23) with two cushion clips (24 and 25) and screws (21 and 22).
(15) Install two fittings (26 and 27) on air lines (13 and 14).
(16) Install circuit breaker panel (12) on center console (10) with six screws (11).

23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).

(17) Install heater cover (2) on heater control panel (3) with eight screws (1).



(18) Install two center console covers (28 and 29) on center console (10) with 11 screws (30).



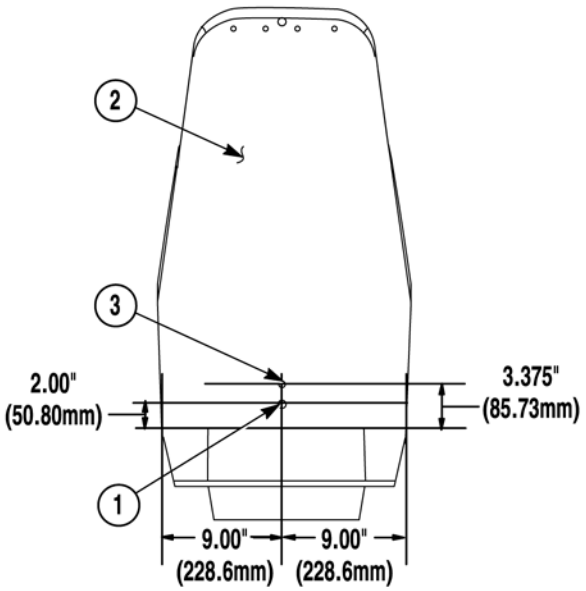
Special Purpose Kit Installation Instructions (Cont)

d. Installing Seatbelts.

NOTE

- Two mounting holes for upper retractable tether and lower belt retractor must be located and seat cover fabric cut prior to installation.
- Four mounting holes for two loops must be located and marked prior to installing two loops on back of seat.
- Hole for lower belt retractor can be felt through fabric with tip of finger.

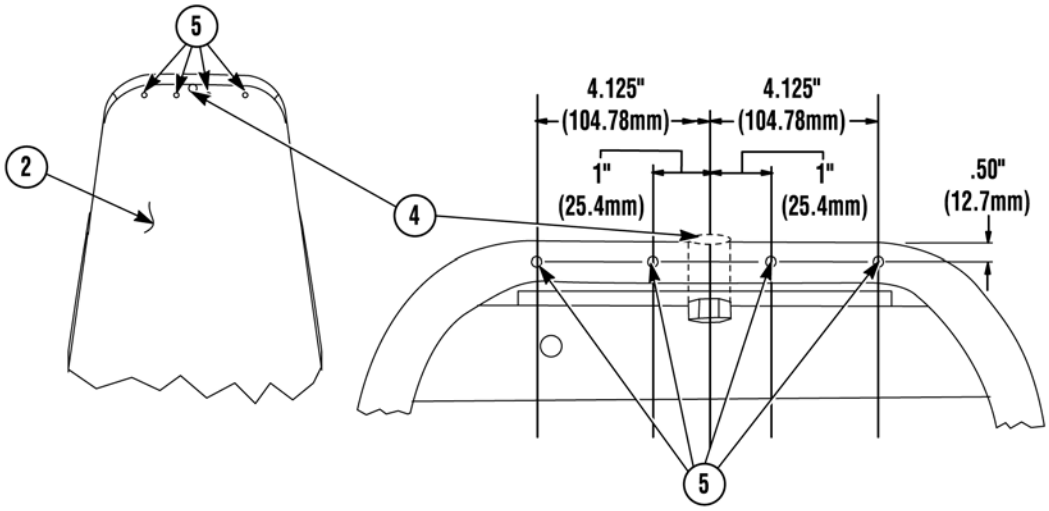
(1) Locate and cut a 0.50 in. (12.7 mm) hole (1) in seat cover (2).



NOTE

- 1.375 in. (34.93 mm) above lower belt retractor mounting hole (1), is a 0.25 in. (6.35 mm) hole used for the lower belt retractor alinement pin.
- Hole for lower belt retractor alinement pin can be located with pin pushed through fabric.

(2) Locate and cut a 0.25 in. (6.35 mm) hole (3) in seat cover (2).



CAUTION

Hole being cut for upper retractable tether must not cut through seam on seat cover. Cutting through seam will cause seam to open. If hole is cut above or below seam, seat cover can be repositioned enough to allow attaching hardware to secure upper retractable tether D-ring.

NOTE

Hole for upper retractable tether in support tubing can be felt through fabric with tip of finger.

(3) Locate and cut a 0.50 in. (12.7 mm) hole (4) in seat cover (2).
(4) Locate and mark four holes (5).

23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).

NOTE

- Seatbelt kit has attaching hardware temporarily secured to tethers with discardable fiber retaining washers. Fiber retaining washers should be discarded prior to installation.
- Alinement pin on lower belt retractor must seat in alinement hole.

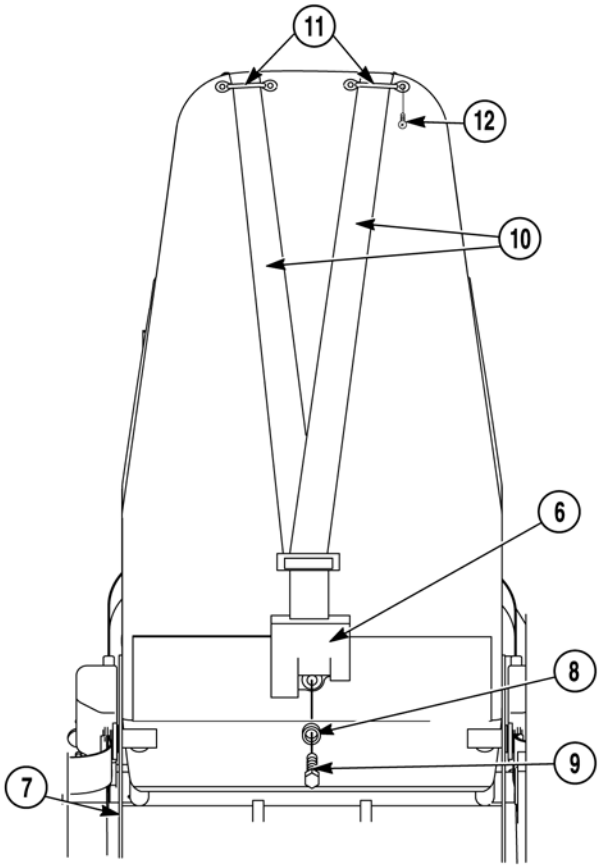
(5) Attach lower belt retractor (6) on seat (7) with washer (8) and screw (9).

NOTE

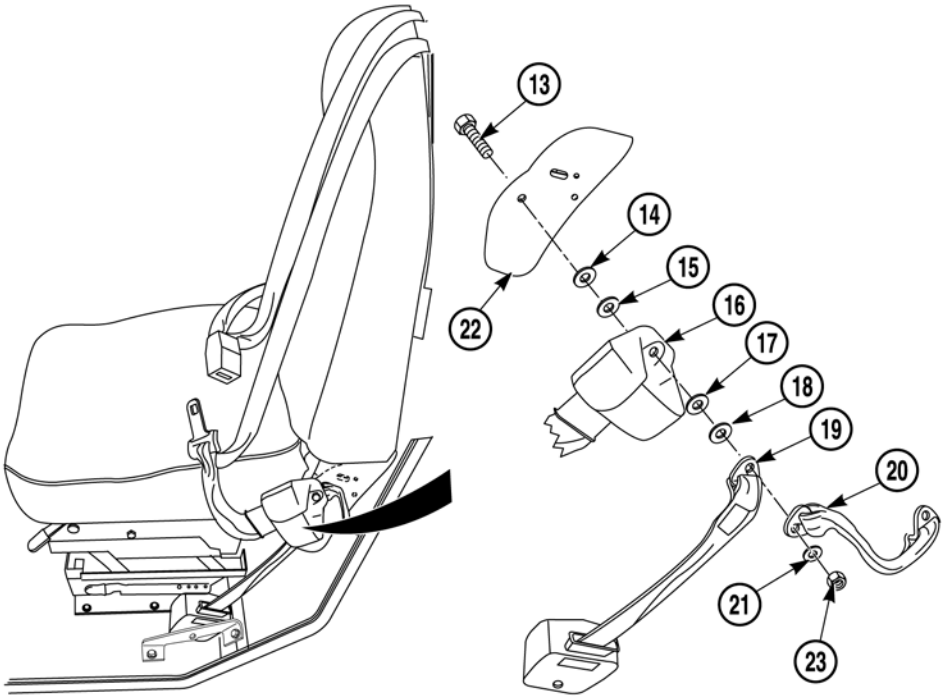
Straps must be positioned between four holes identified for mounting two loops.

(6) Position two straps (10) over back of seat (7).

(7) Install two loops (11) on seat (7) with four screws (12).



Special Purpose Kit Installation Instructions (Cont)



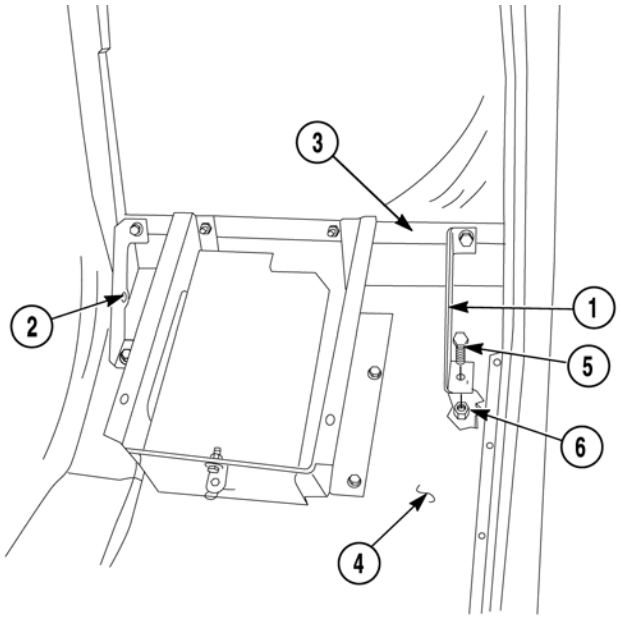
NOTE

- Both right and left belt retractors are installed on seat frame the same way. Left side shown. Large washer (14) is between seat frame and smaller washer (15).
- Locknut must be tightened so tethers can just rotate on screw.

(8) Install screw (13), two washers (14 and 15), belt retractor (16), two washers (17 and 18), lower retractable tether (19), side tether (20), and washer (21) on seat frame (22) with locknut (23).

23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).

e. Brackets and Seat Installation.

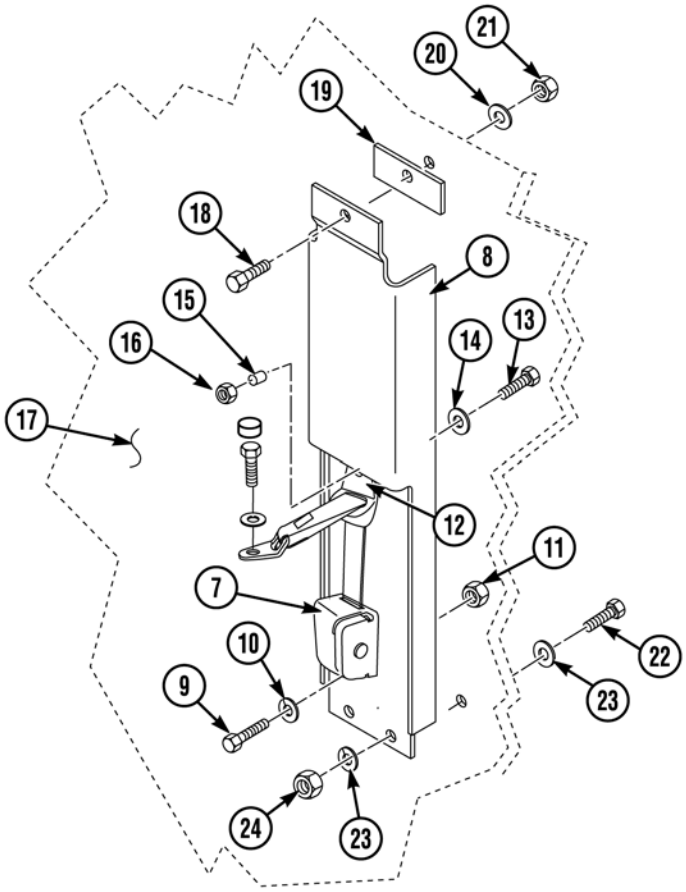


NOTE

Both driver and passenger side brackets and seats are installed the same way. Driver side shown.

(1) Install two lower retractor brackets (1 and 2) on lower seat support bracket (3) and cab floor (4) with four screws (5) and locknuts (6).

Special Purpose Kit Installation Instructions (Cont)



(2) Install upper retractable tether (7) on tether bracket (8) with screw (9), washer (10), and locknut (11).

(3) Install upper retractable tether belt guide (12) on tether bracket (8) with screw (13), washer (14), bushing (15), and locknut (16).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well-ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

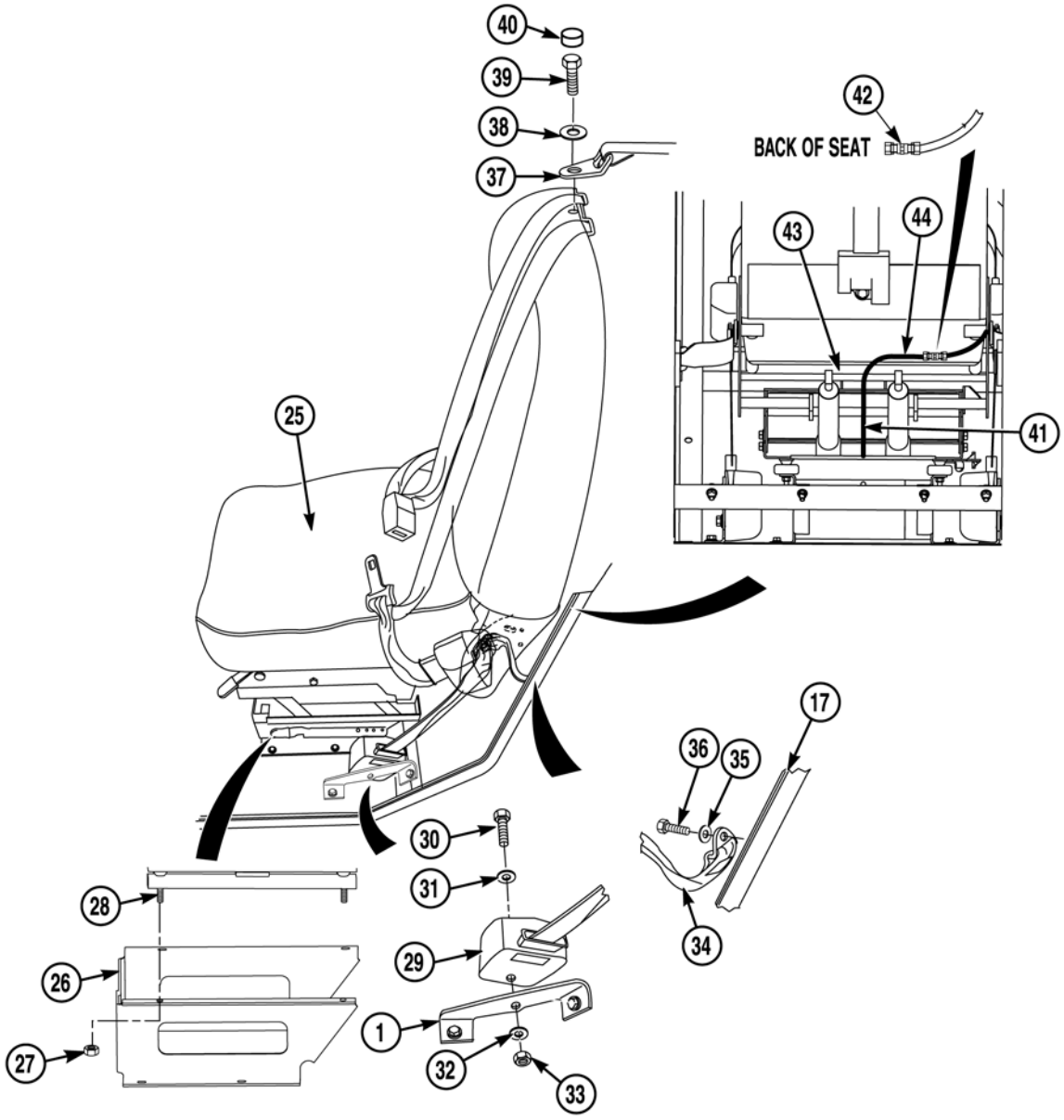
NOTE

- Before installing locking hardware, a small bead of adhesive must be applied around mounting holes of tether bracket on outside of cab.
- Spacer is used on driver side only.

(4) Install tether bracket (8) on cab (17) with screw (18), spacer (19), washer (20), and locknut (21). Tighten locknut to 70 to 75 lb-in. (7.9 to 8.5 N•m).

(5) Install two screws (22), four washers (23), and two locknuts (24) on tether bracket (8) and cab (17). Tighten two locknuts to 70 to 75 lb-in. (7.9 to 8.5 N•m).

23-13. AIR-RIDE SEAT AND SEATBELT (FOUR POINT) KIT INSTALLATION (CONT).



(6) Soldier A and Soldier B position seat (25) on seat support (26).

(7) Install four locknuts (27) on studs (28).

NOTE

Both right and left belt retractors are installed on two lower retractor brackets the same way. Left side shown.

(8) Install belt retractor (29) on lower retractor bracket (1) with screw (30), two washers (31 and 32), and locknut (33).

Special Purpose Kit Installation Instructions (Cont)

NOTE

Both side tethers are installed the same way. Left side shown.

(9) Install side tether (34) on cab (17) with lockwasher (35) and screw (36).
(10) Install upper retractable tether D-ring (37) on seat (25) with lockwasher (38) and screw (39).
(11) Install cap (40) on screw (39).
(12) Install air line (41) on fitting (42).
(13) Secure air line (41) on seat bar (43) with cable tie (44).

f. Follow-on Maintenance.

(1) Connect batteries (TM 9-2320-279-20).
(2) Stow spare tire (TM 9-2320-279-10).
(3) Install step (TM 9-2320-279-20).
(4) Start engine and build up air pressure (TM 9-2320-279-10).
(5) Check operation of air-ride seats (TM 9-2320-279-10).

END OF TASK

23-14. LADDER RAIL AND LADDER REMOVAL (M978 - MODELS A & B) AND INITIAL BOLT-ON LADDER INSTALLATION (M978 - MODEL C).

This task covers:

a. Removal (Models A & B)
b. Installation (Model C)
c. Follow-on Maintenance

INITIAL SETUP

Models
M978

Test Equipment
None

Special Tools
None

Supplies
None

Personnel Required
MOS 63S, Heavy wheel vehicle mechanic

References
FM 10-67-1
TM 43-0139

Equipment Condition

TM or Para	*Condition Description*
TM 9-2320-279-10	Shut off engine.
Para 16-48	Pump module left side access panel removed.
TM 9-2320-279-20	
Para 25-3	Empty tanks, pipes and hoses.
GPM 94-02	Purge tanks with biodegradable solution.

Special Environmental Conditions
None

General Safety Instructions
No smoking, flame, sparks, and hot or glowing objects within 50 ft (15 m) of vehicle.

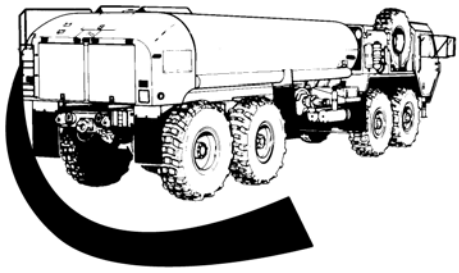
23-14. LADDER RAIL AND LADDER REMOVAL (M978 - MODELS A & B) AND INITIAL BOLT-ON LADDER INSTALLATION (M978 - MODEL C) (CONT).

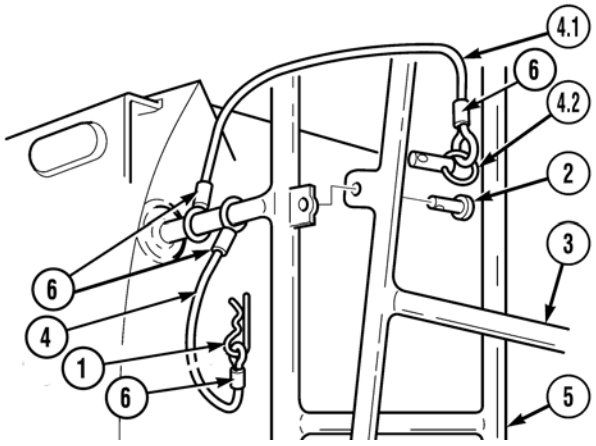
a. Removal (Models A & B).

WARNING

CHEMICAL AGENT RESISTANT COATING (CARC)

- Unusable CARC mixtures are considered hazardous waste and will require disposal in accordance with Federal, State, Department of Defense, Department of the Army, and local installation hazardous waste regulations. Consult the installation environmental office for proper disposal guidance. Mixed CARC is extremely flammable. Use only in well-ventilated areas. Keep away from open flames, sparks, and other ignition sources.
- CARC paint contains isocyanate (HDI), which is highly irritating to skin and respiratory system. High concentrations of HDI can produce symptoms of itching and reddening of skin, a burning sensation in throat and nose, and watering of the eyes. In extreme concentrations, HDI can cause coughing, shortness of breath, pain during respiration, increased sputum production, and chest tightness. The following precautions must be taken whenever using CARC paint:
  - ALWAYS use air-line respirators when using CARC paint unless air sampling shows exposure to be below standards. Use chemical cartridge respirator if air sampling is below standards.
  - DO NOT let skin or eyes come in contact with CARC paint. Always wear protective equipment (gloves, ventilation mask, safety goggles, etc.).
  - DO NOT use CARC paint without adequate ventilation.
  - NEVER weld or cut CARC-coated materials.
  - DO NOT grind or sand painted equipment without high-efficiency, air-purifying respirators in use.
  - BE AWARE of CARC paint exposure symptoms; symptoms can occur a few days after initial exposure. Seek medical help immediately if symptoms are detected.





(1) Remove safety pin (1) from pin (2).

(2) Remove pin (2) and deploy lower ladder assembly (3).

(3) Remove cable (4) from safety pin (1) and from upper ladder assembly (5) by removing two sleeves (6).

NOTE

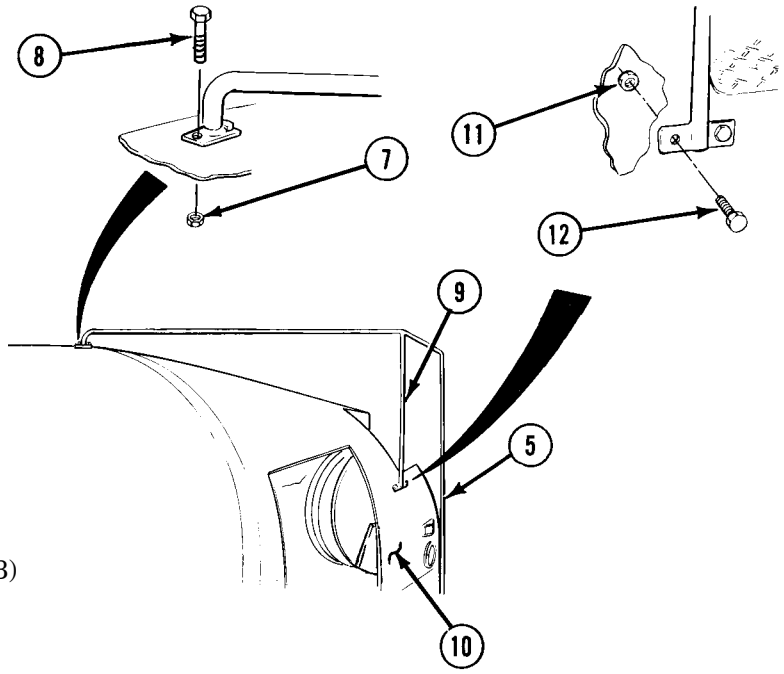
Some models have an additional cable to secure pin. Do step *(4)* for these models.

(4) Remove cable (4.1) from pin (4.2) and from upper ladder assembly (5) by removing two sleeves (6).

Special Purpose Kit Installation Instructions (Cont)

(5) Remove two locknuts (7) and screws (8) from ladder rail (9) and pump module (10).

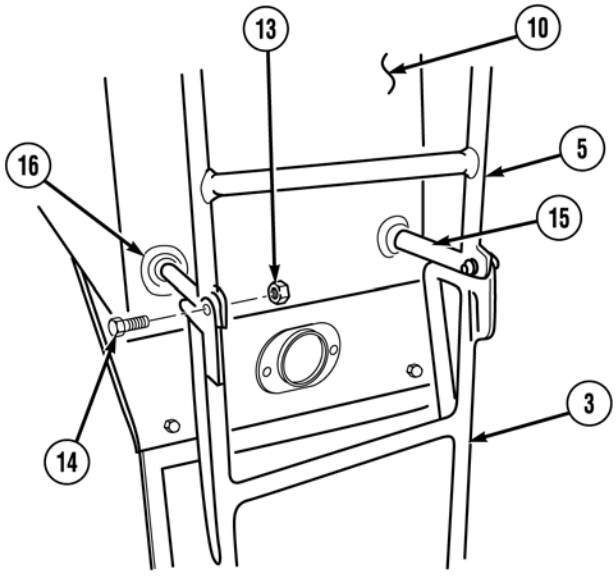
(6) Remove two locknuts (11), screws (12), and ladder rail (9) from pump module (10) and upper ladder assembly (5).



(7) Remove two locknuts (13), screws (14), and lower ladder assembly (3) from upper ladder assembly (5).

WARNING

- Eye protection is required during all grinding operations.
- Take all necessary precautions to confine grinding sparks so they cannot contact flammable or combustible materials or vapors. Failure to comply may result in serious injury or death to personnel.
- When grinding, avoid creating excess heat on CARC painted surfaces near grinding area. CARC paint can ignite if heated. Failure to comply may result in serious injury or death to personnel.



NOTE

Remove ladder supports as close to welded plates as possible, to reduce amount of grinding required.

(8) Use cutting wheel and angle grinder to remove ladder supports (15) at pump module (10) and remove upper ladder assembly (5) from pump module (10).

(9) Use angle grinder to remove welding material from six ladder support attachment points (16) until flush with surface of pump module (10).

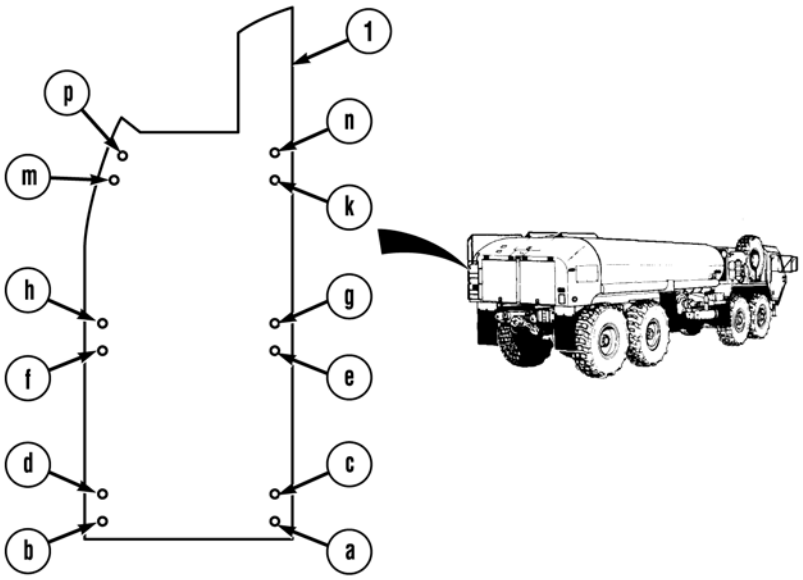
23-14. LADDER RAIL AND LADDER REMOVAL (M978 - MODELS A & B) AND INITIAL BOLT-ON LADDER INSTALLATION (M978 - MODEL C) (CONT).

b. Installation (Model C).

NOTE

To avoid confusing letters with numbers, the letters i, j, l, and o were skipped in the following figure and table.

(1) Use center punch to mark locations for 12 ladder mounting holes in left pump module panel (1), located as indicated in following chart:



Hole Designation	Distance Up From Panel Bottom	Distance From Panel Right Edge
a	2 in. (51 mm)	1 5/8 in. (41 mm)
b	2 in. (51 mm)	13 5/8 in. (346 mm)
c	4 1/4 in. (108 mm)	1 5/8 in. (41 mm)
d	4 1/4 in. (108 mm)	13 5/8 in. (346 mm)
e	14 in. (356 mm)	1 5/8 in. (41 mm)
f	14 in. (356 mm)	13 5/8 in. (346 mm)
g	16 1/4 in. (413 mm)	1 5/8 in. (41 mm)
h	16 1/4 in. (413 mm)	13 5/8 in. (346 mm)
k	25 1/16 in. (637 mm)	1 5/8 in. (41 mm)
m	26 1/16 in. (662 mm)	13 23/64 in. (339 mm)
n	27 5/16 in. (694 mm)	1 5/8 in. (41 mm)
p	28 3/16 in. (716 mm)	12 5/8 in. (321 mm)

Special Purpose Kit Installation Instructions (Cont)

CAUTION

Before drilling, check inside of left pump module panel to ensure no components, wires, or hoses behind panel will be damaged by drilling.

(2) Drill 12, 13/32 in. (10 mm) holes at locations marked in step *(1)*.

WARNING

CARC paint contains isocyanate (HDI), which is highly irritating to skin and respiratory system. High concentrations of HDI can produce symptoms of itching and reddening of skin, a burning sensation in throat and nose, and watering of the eyes. In extreme concentrations, HDI can cause coughing, shortness of breath, pain during respiration, increased sputum production, and chest tightness. The following precautions must be taken whenever using CARC paint:

- ALWAYS use air-line respirators when using CARC paint unless air sampling shows exposure to be below standards. Use chemical cartridge respirator if air sampling is below standards.
- DO NOT let skin or eyes come in contact with CARC paint. Always wear protective equipment (gloves, ventilation mask, safety goggles, etc.).
- DO NOT use CARC paint without adequate ventilation.
- NEVER weld or cut CARC-coated materials.
- DO NOT grind or sand painted equipment without high-efficiency, air-purifying respirators in use.
- BE AWARE of CARC paint exposure symptoms; symptoms can occur a few days after initial exposure. Seek medical help immediately if symptoms are detected.

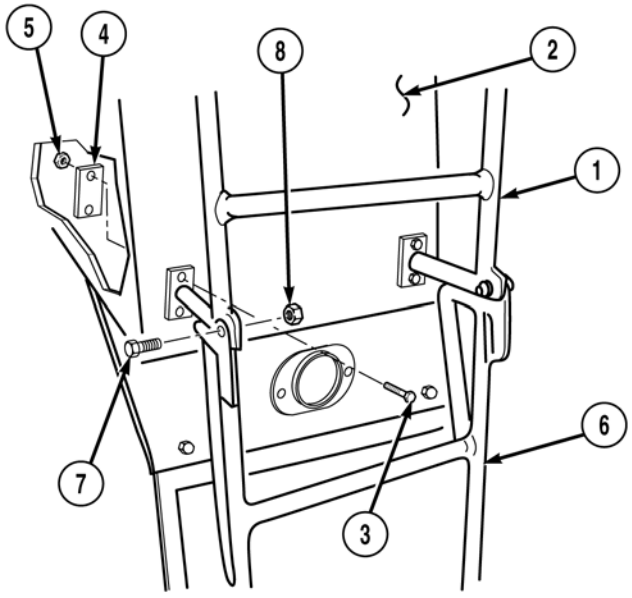
(3) Prime and paint areas as necessary where grinding and drilling were done. Refer to TM 43-0139.

(4) Position removable ladder assembly (1) on left pump module panel (2) and insert two screws (3) in mounting holes. From inside of pump module panel, install mounting plate (4) and two locknuts (5) on screws (3). Tighten locknuts (5) finger tight.

(5) Repeat step *(4)* for remaining five sets of anchoring points.

(6) Tighten screws (3) and locknuts (5) to 30 lb-ft (41 N•m).

(7) Position lower ladder assembly (6) on removable ladder assembly (2) and install two screws (7) and locknuts (8).



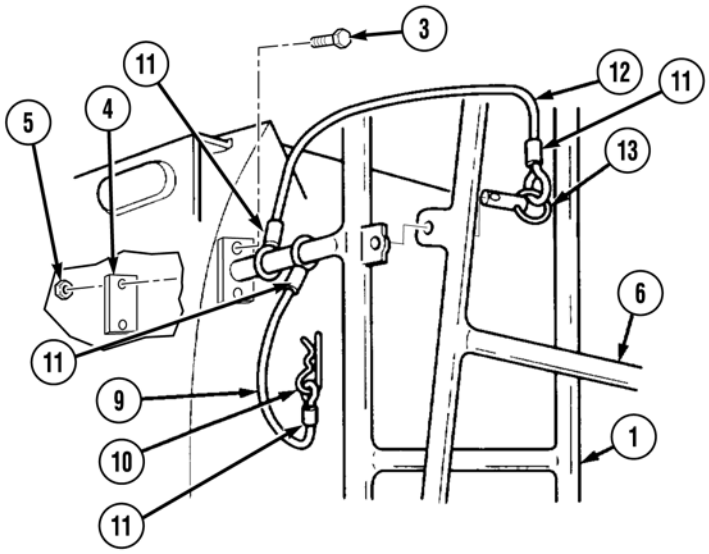
23-14. LADDER RAIL AND LADDER REMOVAL (M978 MODEL A & B) AND INITIAL BOLT-ON LADDER INSTALLATION (M978 - MODEL C) (CONT).

(8) Install cable (9) and safety pin (10) on removable ladder assembly (1) with two sleeves (11).

(9) Install cable (12) and pin (13) on removable ladder assembly (1) with two sleeves (11).

(10) Lift lower ladder assembly (6) to stowed position and insert pin (13) to secure.

(11) Insert safety pin (10) in pin (13).



c. Follow-on Maintenance. Install pump module left side access panel (para 16-48).

END OF TASK

APPENDIX A
REFERENCES

A-1. SCOPE. This appendix lists all forms, field manuals, technical manuals, and other publications referenced in this manual. Also, those publications that should be consulted for additional information about vehicle operations are listed.

A-2. PUBLICATION INDEXES. The following indexes should be consulted frequently for latest changes or revisions and for new publications relating to material covered in this technical manual.

Consolidated Index of Army Publications and Blank Forms ..... DA Pam 310-1

A-3. FORMS. The following forms pertain to this manual. Refer to DA Pamphlet 310-1 for index of blank forms.

Equipment Inspection and Maintenance Worksheet (DA Form 2404).
Maintenance Request (DA Form 2407).
Recommended Changes to DA Publication and Blank Forms (DA Form 2028).

Refer to DA PAM 738-750, The Army Maintenance Management Systems (TAMMS), for instructions for the use of maintenance forms pertaining to this material.

A-4. OTHER PUBLICATIONS. The following publications contain information pertinent to the M977 series vehicles and associated equipment.

a. Safety.

First Aid for Soldiers ..... FM 21-11
Safety Inspection and Testing of Lifting Devices ..... TB 43-0142
Security of Tactical Wheeled Vehicles. ..... TB 9-2300-422-20

b. Vehicle Operation.

Operator's Manual, M977 Series Vehicles ..... TM 9-2320-279-10
Operator's Manual, M984 ..... TM 9-2320-354-10
Operator's Manual, M985E1 ..... TM 9-2320-355-10
Concepts and Equipment of Petroleum Operations ..... FM 10-67-1

c. Cold Weather Operation and Maintenance.

Operations and Maintenance of Ordnance Material in Extreme Cold Weather (0 degrees to -65 degrees F) ..... FM 9-207

d. Maintenance and Repair.

Lubrication Order for M977 Series Vehicles ..... LO 9-2320-279-12
Organization Repair Parts and Special Tools List for M977 Series Vehicle ..... TM 9-2320-279-24P
Direct Support and General Support Maintenance Repair Parts and Special Tools List for M977 Series Vehicles ..... TM 9-2320-279-24P
Organizational, Direct Support and General Support Maintenance, and Repair Parts and Special Tools List, M984 Crane (HIAB 8109) ..... TM 9-2320-354-24&P
Organizational, Direct Support and General Support Maintenance, and Repair Parts and Special Tools List, M985E1 Crane (HIAB 8108) ..... TM 9-2320-355-24&P
Cooling Systems: Tactical Vehicles ..... TM 750-254
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems ..... TB 750-651
Repair of Tents, Canvas, and Webbing ..... FM 10-16
Painting Instructions for Field Use ..... TM 43-0139
Camouflage Pattern Painting ..... TC 5-200
Color, Marking, and Camouflage Painting of Military Vehicles ..... TB 43 0209
Description, Use, Bonding Techniques, and Properties of Adhesives ..... TB ORD 1032

References (Cont)

A-4. OTHER PUBLICATIONS (CONT).

Direct Support and General Support Level, Generator Assembly, Prestolite Leece-Neville 60 and 100 Amp ..... TM 9-2920-225-34
Direct Support and General Support Maintenance Levels, Load Testing Heavy, Expanded Mobility Tactical Truck (HEMTT) Vehicle Cranes ..... TM 9-2320-279-34

Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Materiels Including Chemicals ..... TM 9-247
Metal Body Repair and Related Operations ..... FM 43-2
Welding Theory and Application ..... TM 9-237
Inspection, Care, and Maintenance of Antifriction Bearings ..... TM 9-214
Ordnance Tracked and Wheeled Vehicle Hull and Chassis Wiring, Repair of ..... TB ORD 650
Care and Use of Handtools and Measuring Tools ..... TM 9-243
Charging System Troubleshooting (The Easy Way) ..... DA Pam 750-33
Purging, Cleaning, and Coating Interior Ferrous and Terne Sheet Vehicle Fuel Tanks ..... TB 43-0212
Operator's Unit Direct Support, and General Support Maintenance Manual for Care, Maintenance, Repair, and Inspection of Pneumatic Tires and Inner Tube ..... TM 9-2610-200-14
Operator's Organizational, Direct Support, and General Support Maintenance Manual for Lead-Acid Storage Batteries ..... TM 9-6140-200-14
Operator's Organizational, Direct Support, and General Support Maintenance Manual for Tool Outfit, Hydraulic Systems Test and Repair (HSTRU) ..... TM 9-4940-468-14
Maintenance Advisory for Purging All Fuel Tankers Using a Biodegradable Purging Solution ..... GPM 94-02

e. Decontamination.

Chemical, Biological, and Radiological (CBR) Decontamination ..... TM 3-220
Nuclear, Biological and Chemical (NBC) Decontamination ..... FM 3-5

f. Maintenance of Auxiliary Equipment and Special Purpose Kits.

Operator's and Organizational Maintenance Manual Radio Sets ..... TM 11-5820-498-12
Direct Support, General Support, and Depot Maintenance Manual Radio Sets ..... TM 11-5820-498-35
Operator, Organizational, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Machine Gun Mounts ..... TM 9-1005-245-14
Operator and Organizational Maintenance Manual for General Set ..... TM 5-6115-465-12
LO 5-6115-465-12
Organizational, Direct Support and General Support, and Depot Maintenance Repair Parts and Special Tools List Generator Set ..... TM 5-6115-465-24P
Direct and General Support and Depot Maintenance Manual Generator Set ..... TM 5-6115-465-35

g. General.

Procedure for Destruction of Tank-Automotive Equipment to Prevent Enemy Use ..... TM 750-244-6
Principles of Automotive Vehicles ..... TM 9-8000

h. Warranty.

Warranty Technical Bulletin for M977 Series Vehicles ..... TB 9-2300-295-15/19

APPENDIX B
ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at direct support and general support maintenance.

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

Section II. MANUFACTURED ITEMS PART NUMBER INDEX

Part No.	Description	Fig. No.
	Arctic Heater Test Set	B-5
	Crane Hoist Drive Pressure Plate Removal/Installation Tool (M983)	B-4
	Shims	B-2
	Spanner Socket	B-11
A52789-G5	Hose, Nonmetallic	B-12
B107.2	Socket	B-12
FA126GGG0426180	Hose Assembly	B-12
FA3391MMM0750	Hose Assembly	B-12
FA3391MMM0900	Hose Assembly	B-12
FB9535-0043	Hose Assembly	B-12
FG1002GGG0320	Hose Assembly	B-12
FG1002GGG0830	Hose Assembly	B-12
FG1002GGG0880	Hose Assembly	B-12
FG1002KKK0200	Hose Assembly	B-12
FG1002KKK0320	Hose Assembly	B-12
FG1002KKK0400	Hose Assembly	B-12
FG1002KKK0420	Hose Assembly	B-12
FG1002KKK0480	Hose Assembly	B-12
FG1002KKK0640	Hose Assembly	B-12
FG1002KKK0700	Hose Assembly	B-12
FG1002KKK0710	Hose Assembly	B-12
FG1002KKK0730	Hose Assembly	B-12
FG1003KKK1770	Hose Assembly	B-12
FG1003KKK0800	Hose Assembly	B-12
FGI0IIGGG0820	Hose Assembly	B-12
FGI0IIGGG0870	Hose Assembly	B-12
FG1011KKK0320	Hose Assembly	B-12
FG1011KKK0370	Hose Assembly	B-12
FG1011KKK0380	Hose Assembly	B-12
FG1011KKK0460	Hose Assembly	B-12
FG1011KKK0520	Hose Assembly	B-12
FG1011KKK0610	Hose Assembly	B-12

Illustrated list of Manufactured Items (Cont)

Part No.	Description	Fig. No.
FG1011KKK0870	Hose Assembly	B-12
FG1011KKK1200	Hose Assembly	B-12
FG1011KKK1650	Hose Assembly	B-12
FG1082HHH0910	Hose Assembly	B-12
FG115KJJ0700090	Hose Assembly	B-12
FG1556GGG0290	Hose Assembly	B-12
FG1556GGG0760	Hose Assembly	B-12
FG1556GGG0790	Hose Assembly	B-12
FG1556GGG0820	Hose Assembly	B-12
FG1556GGG0960	Hose Assembly	B-12
FG1556GGG1670	Hose Assembly	B-12
FG1556GGG2300	Hose Assembly	B-12
FG1556HHH0780	Hose Assembly	B-12
FG1556HHH0920	Hose Assembly	B-12
FG1556HHH1330	Hose Assembly	B-12
FG1556HHH2260	Hose Assembly	B-12
FG1556JJJ0260	Hose Assembly	B-12
FG1556JJJ0810	Hose Assembly	B-12
FG1556KKK0080	Hose Assembly	B-12
FG1556KKK0180	Hose Assembly	B-12
FG1556KKK0210	Hose Assembly	B-12
FG1556KKK0270	Hose Assembly	B-12
FG1556KKK0300	Hose Assembly	B-12
FG1556KKK0320	Hose Assembly	B-12
FG1556KKK0380	Hose Assembly	B-12
FG1556KKK0400	Hose Assembly	B-12
FG1556KKK0420	Hose Assembly	B-12
FG1556KKK0440	Hose Assembly	B-12
FG1556KKK0630	Hose Assembly	B-12
FG1556KKK0633	Hose Assembly	B-12
FG1556KKK0660	Hose Assembly	B-12
FG1556KKK0700	Hose Assembly	B-12
FG1556KKK0790	Hose Assembly	B-12
FG1556KKK0860	Hose Assembly	B-12
FG1556KKK0900	Hose Assembly	B-12
FG1556KKK0930	Hose Assembly	B-12
FG1556KKK0960	Hose Assembly	B-12
FG1556KKK1000	Hose Assembly	B-12
FG1556KKK1360	Hose Assembly	B-12
FG1556KKK1380	Hose Assembly	B-12
FG1556KKM0270	Hose Assembly	B-12
FG1556MMM0160	Hose Assembly	B-12
FK540GGG0180	Hose Assembly	B-12
FK540HHH0910180	Hose Assembly	B-12
FK541GGGO770180	Hose Assembly	B-12
FK541GGG0800	Hose Assembly	B-12
FK541HHH0210180	Hose Assembly	B-12
FK541HHH0890180	Hose Assembly	B-12
FK542EEE0230090	Hose Assembly	B-I2
FK542EEE0300	Hose Assembly	B-12
FK542EEE0380	Hose Assembly	B-12

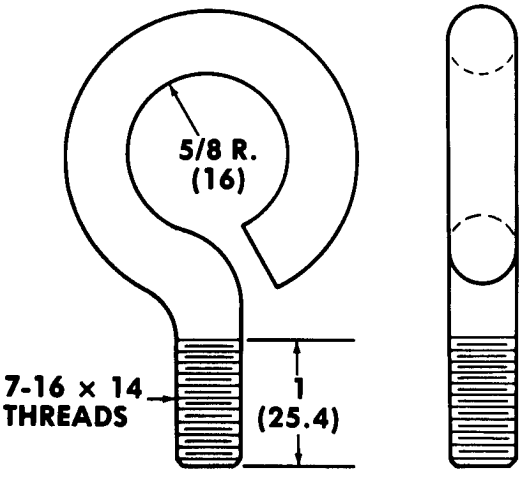
Illustrated List of Manufactured Items (Cont)

Part No.	Description	Fig. No.
FK542GGG0310	Hose Assembly	B-12
FK542GGG0450	Hose Assembly	B-12
FK542GGG0720	Hose Assembly	B-12
FK542HHH0350	Hose Assembly	B-12
FK542HHH0900	Hose Assembly	B-12
FL1315EEE0200	Hose Assembly	B-12
FL1315EEE0250	Hose Assembly	B-12
FL1315GEG0130	Hose Assembly	B-12
FL1315GEG0200	Hose Assembly	B-12
FL1315GEG0920	Hose Assembly	B-12
FL1315GEG000	Hose Assembly	B-12
FL1315GEG1060	Hose Assembly	B-12
FL1315GEG1280	Hose Assembly	B-12
FL1315GGG0140	Hose Assembly	B-12
FL1315GGG0240	Hose Assembly	B-12
FL1315GGG0360	Hose Assembly	B-12
FL1315GGG0420	Hose Assembly	B-12
FLl315GGG0460	Hose Assembly	B-12
FL1315GGG054o	Hose Assembly	B-12
FL1315GGG0600	Hose Assembly	B-12
FL1315GGG0650	Hose Assembly	B-12
FL1315HHH0110	Hose Assembly	B-12
FL1315HHH0180	Hose Assembly	B-12
FL1315HHH0200	Hose Assembly	B-12
FL1315HHH0220	Hose Assembly	B-12
FL1315HHH0310	Hose Assembly	B-12
FLl526EEE0ll0	Hose Assembly	B-12
FLl526EEE0960	Hose Assembly	B-12
FLl526GGG0250	Hose Assembly	B-12
FL1526GGG0270	Hose Assembly	B-12
FLl526GGG0350	Hose Assembly	B-12
FL1526GGG0370	Hose Assembly	B-12
FLl526GGG0450	Hose Assembly	B-12
FL1526GGG0530	Hose Assembly	B-12
FLl526GGG0570	Hose Assembly	B-12
FL1526GGG0600	Hose Assembly	B-12
FLl526GGG0720	Hose Assembly	B-12
FL1526GGG0730	Hose Assembly	B-12
FL1526GGG0800	Hose Assembly	B-12
FLl526HHH0160	Hose Assembly	B-12
FLl526HHH0180	Hose Assembly	B-12
FL1526HHH0280	Hose Assembly	B-12
FL1526HHH0600	Hose Assembly	B-12
FL1526HHH0690	Hose Assembly	B-12
FLl526HHH0840	Hose Assembly	B-12
FLl526HHH0900	Hose Assembly	B-12
FLl526HHH1200	Hose Assembly	B-12
FL1628GGG0260	Hose Assembly	B-12
FL1628GGG0400	HOSE Assembly	B-12
FL1628GGGO560	Hose Assembly	B-12
FL1628GGG0600	Hose Assembly	B-12
FL1628GGGl000	Hose Assembly	B-12

Illustrated List of Manufactured Items (Cont)

Part No.	Description	Fig. No.
FL1628HHH0180	Hose Assembly	B-12
FL1628HHH0200	Hose Assembly	B-12
FL1628HHH0220	Hose Assembly	B-12
FL1628HHH0240	Hose Assembly	B-12
FL1628HHH0690	Hose Assembly	B-12
FL1628HHH1080	Hose Assembly	B-12
IM923	Socket	B-16
IPP161	Detent Ball Compression Tool	B-3
1467160-7	Channel	B-14
1467160-8	Channel	B-14
2AH762	Air Compressor Cylinder Head Removal Tool	B-10
2BF829	Unloader Bore Bushing Tool	B-9
2BH944	Lifting Eyes	B-1
2CS30	Valve Seat Tool (M983)	B-6
2CS31	Seal Retainer Tool (M983)	B-7
2SK886	V5 Air Actuated Valve Spring Compression Tool (M978)	B-8
3243781	PVC Matting, Black	B-20
42925AX2.5	Pad, Rubber	B-18
45A285-P1	Hose Assembly	B-12
45A285-P2	Hose Assembly	B-12
59745AX40	Strip, Locking	B-13
59745AX82	Seal, Rubber	B-13
59747AX40	Channel, Locking	B-14
59747AX82	Channel, Locking	B-14
6-512-00016	Harness Assembly	B-15
7-543-001350	Hose	B-12
8594000019-9	Protection, Plastic Edge	B-19

Section III. MANUFACTURED ITEMS

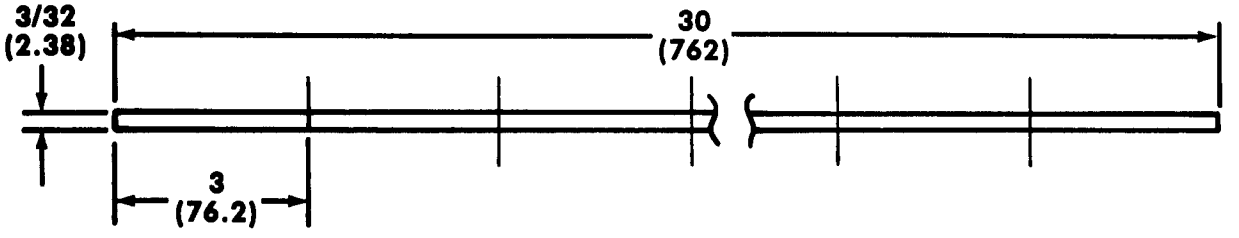


NOTE

(1) Fabricate from 1/2 × 6-in. (12.7 × 152 mm) cold rolled steel.
(2) Thread Size 7-16 × 14 × 1-in. (25.4 mm) long.
(3) Heat unthreaded end and bend over 1-1/4-in. (32 mm) diameter rod.
(4) All dimensions are in inches (mm).

TA356194

Figure B-1. Lifting Eyes (PN 2BH944).



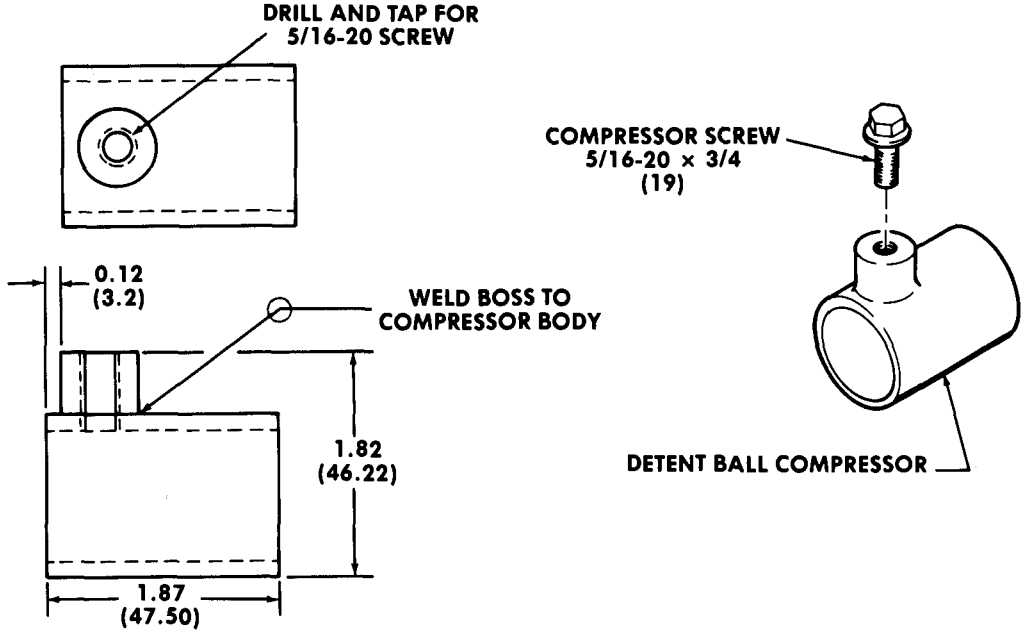
NOTE

(1) Fabricate from flat shim stock 0.02-in. (0.5 mm) thick by 3/32 × 30-in. (2.38 × 762 mm) long.
(2) Cut shim stock into 10 3-in. (76.2 mm) pieces.
(3) All dimensions are in inches (mm).

TA356195

Figure B-2. Shims.

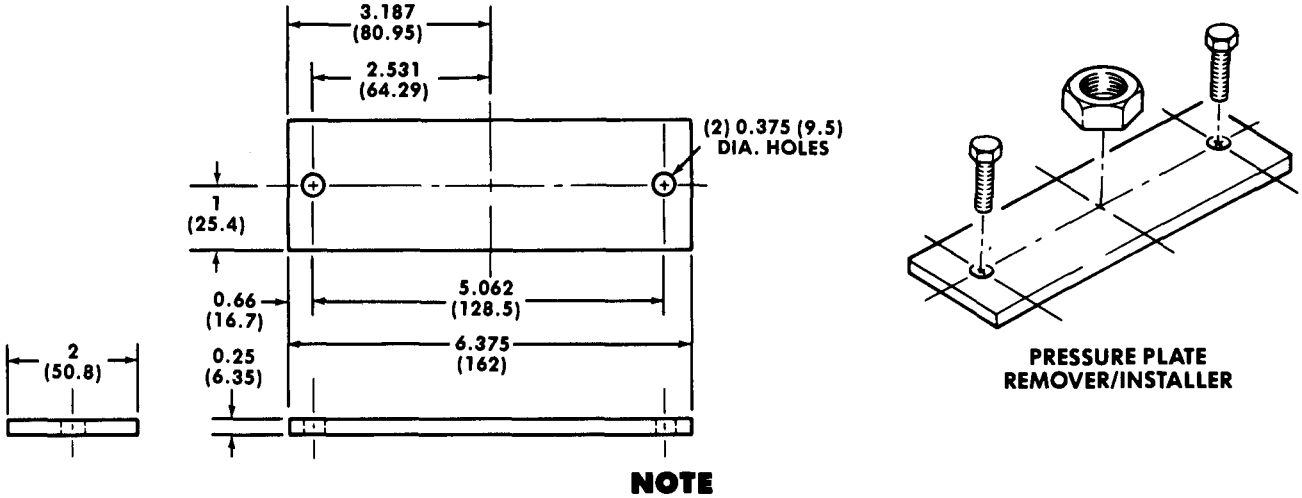
Manufactured Items (Cent)



(1) Weld round bar stock, 0.625 × 0.5 in. (16 × 12.7 mm) to 1.25 × 0.12 ×. 1.87-in. (3.2 × 47.5 × 46.2 mm) steel tubing.
(2) Drill and tap bar stock for 5/16-20 × 3/4-in. (19 mm) screw.
(3) Install 5/16-20 × 3/4-in. (19 mm) screw.
(4) All dimensions are in inches (mm).

TA356196

Figure B-3. Detent Ball Compression Tool (Heavy-Duty Winch) (PN IPP161).



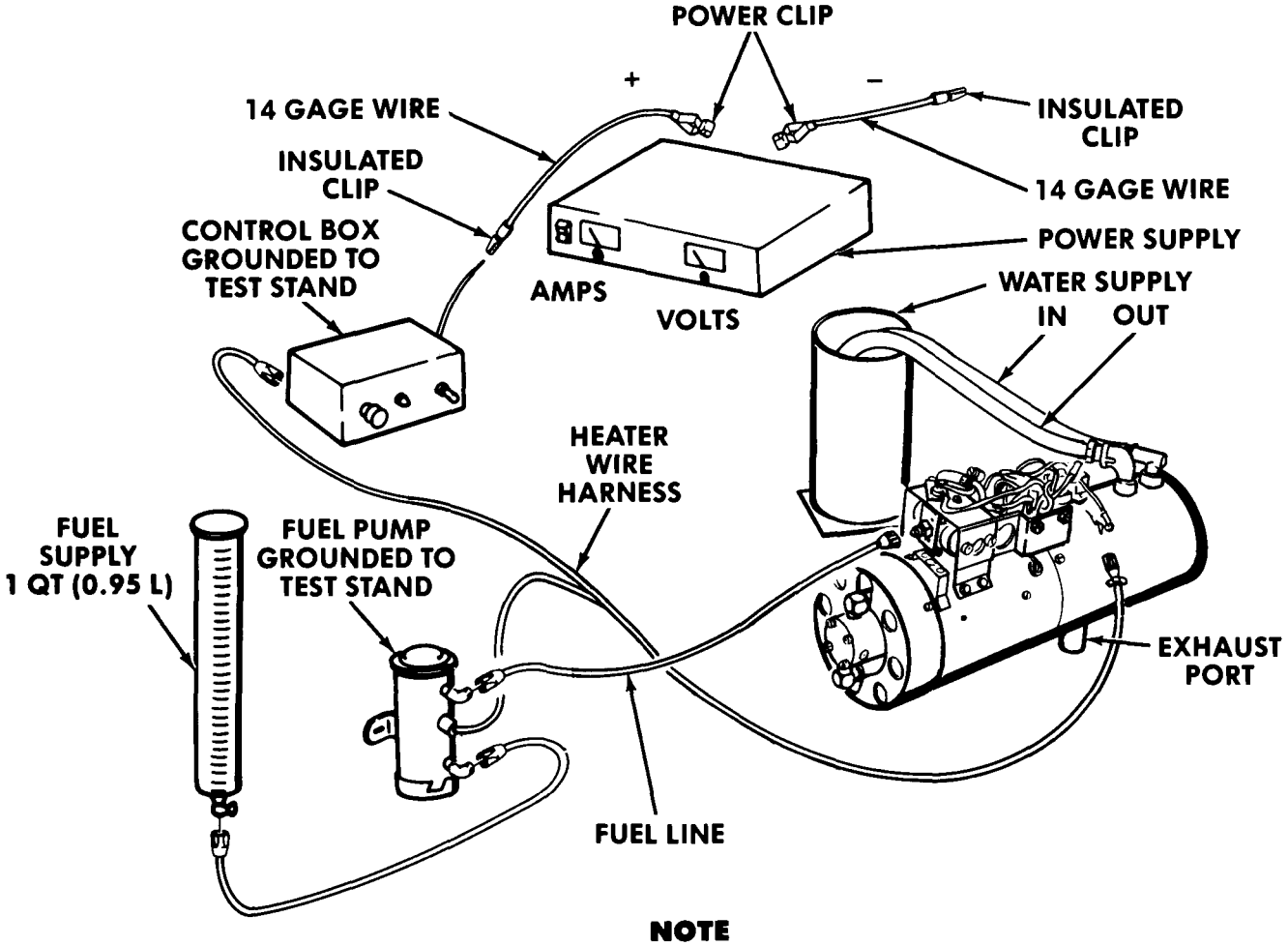
NOTE

(1) Drill two 0.375-in. (9.5 mm) diameter holes in 0.25 × 2 × 6.375-in. (6.35 × 50.8 × 162 mm) mild steel flat bar stock.
(2) Install two 3/4-30 × 1-1/2 in. (38 mm) screws.
(3) Weld two screws and two 7/8-20 in. nuts to bar stock.
(4) All dimensions are in inches (mm).

TA356197

Figure B-4. Crane Hoist Drive Unit Pressure Plate Removal/installation (M983).

Manufactured Items (Cont)



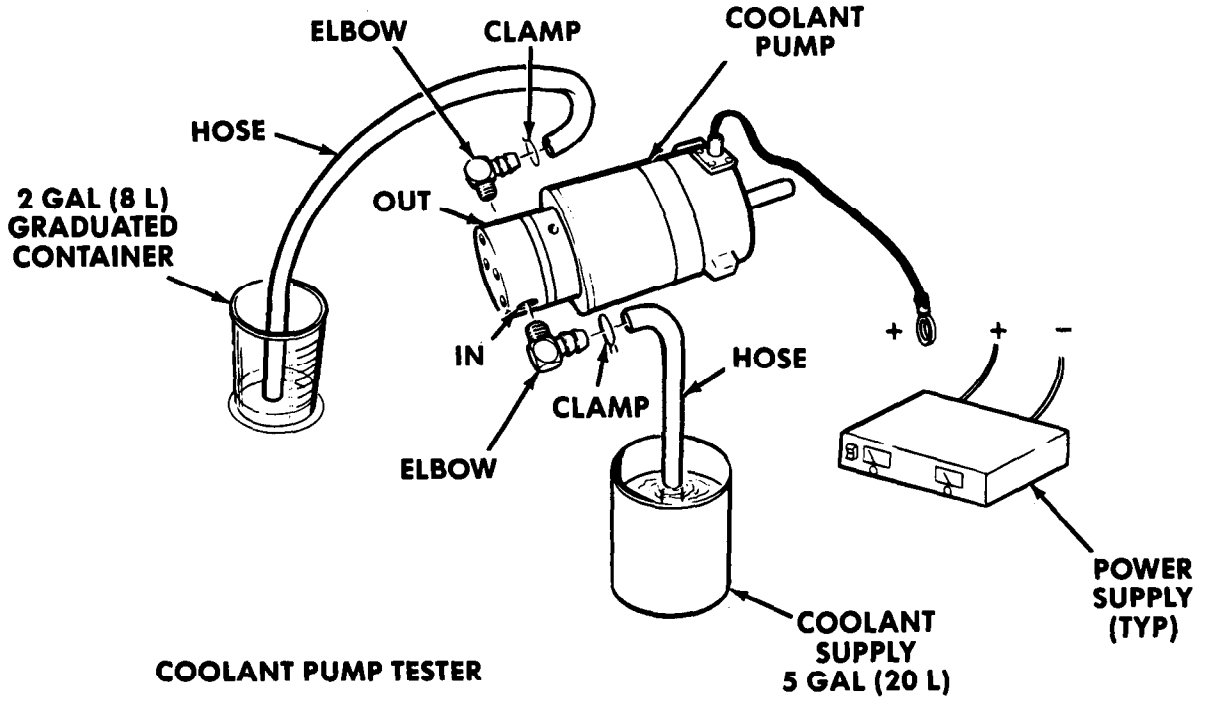
NOTE

(1) Cut two 39-in. (1 m) lengths of 14 gage wire.
(2) Connect one insulated clip and one power clip to each wire.
(3) Ground heater, control box, and fuel pump.
(4) Connect heater wire harness to heater, control box, and fuel pump.
(5) Connect positive wire to heater control wire and ground negative wire. Wrap positive wire and heater control wire connections with electrical tape.
(6) Connect two hose assemblies to heater, fuel pump, and fuel container, 1 quart (0.95 l) capacity container graduated in cc.
(7) Connect positive wire to positive (+) side of power supply.
(8) Connect negative wire to negative (–) side of power supply.
(9) Connect two hose assemblies to heater and water reservoir.

TA356198

Figure B-5. Arctic Heater Test Set.

Manufactured Items (Cont)



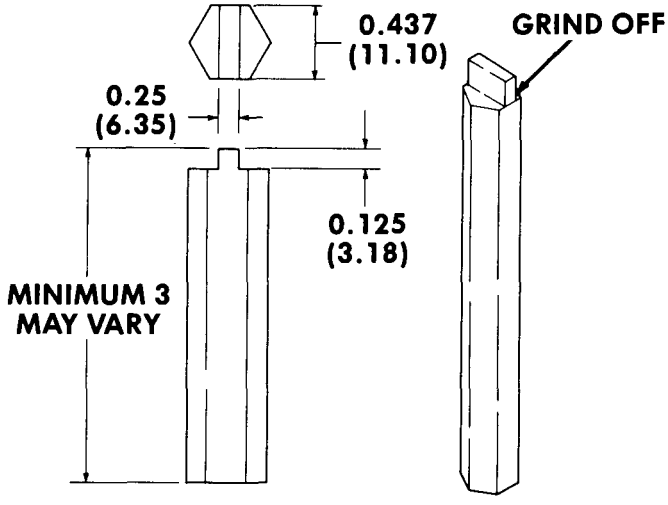
NOTE (CONT)

(10) Coat threads of two 3/8-in. elbows with pipe thread sealing compound and install one elbow in IN and one elbow in OUT port of coolant pump.
(11) Connect two 3/8-in. hoses to elbows with two clamps.
(12) Place end of hose in 2 gal. (8 l) graduated container.
(13) Place second hose in 5 gal. (20 l) container of engine coolant.
(14) Connect positive lead of power suppy to coolant pump.

TA356200

Figure B-5. Arctic Heater Test Set (Cont).

Manufactured Items (Cont)

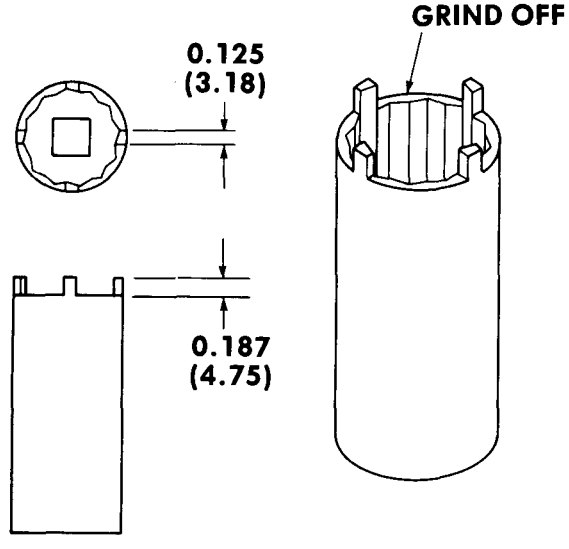


NOTE

(1) Grind 7/16-in. socket head screw key.
(2) All dimensions are in inches (mm).

TA356192

Figure B-6. Valve Seat Tool (M983) (PN 2CS30).



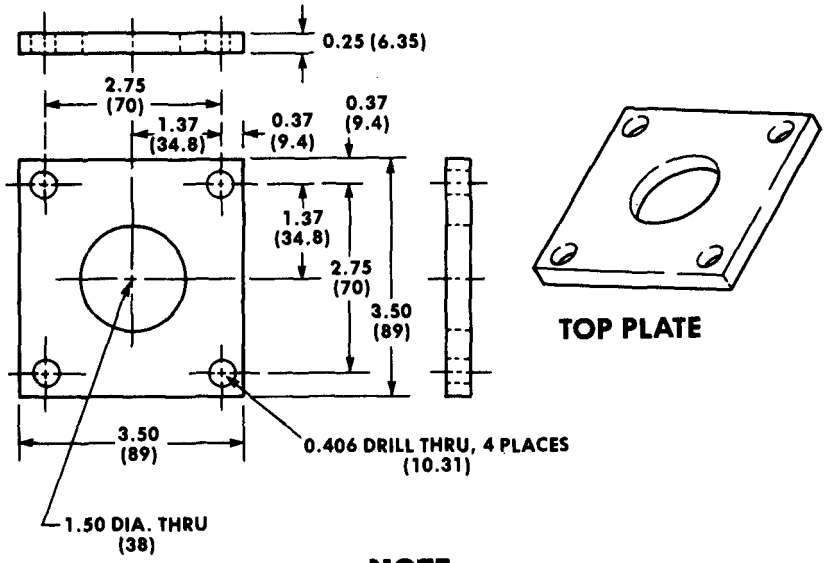
NOTE

(1) Grind 13/16-in. × 3/8-in. square drive socket using 13/16-in. × 3/8 in. standard socket.
(2) All dimensions are in inches (mm).

TA356193

Figure B-7. Seal Retainer Tool (M983).

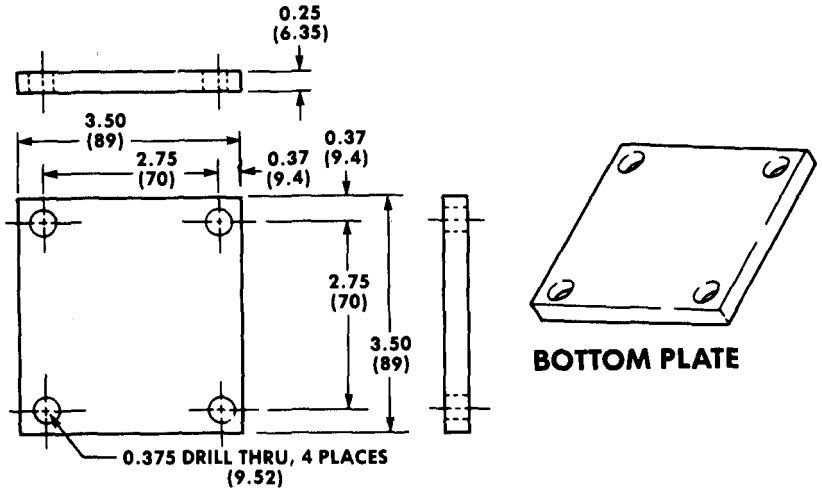
Manufactured Items (Cont)



NOTE

Required Stock:
Mild steel plate, 0.25 × 3.5 × 7.0-in. (6.35 × 89 × 178 mm).
Cold rolled steel rod, 0.375 × 80-in. (9.52 × 2100 mm).
Washer, flat,-round, steel, 0.375-in. i.d., (4) (MS 27183-13)
nut, plain, hexagon, 3/8-16 (4).
(1) Cut 0.25 × 3.5 × 3.5-in. (6.35 × 89 × 89 mm) steel plate.
(2) Drill four 0.406 in.-diameter holes in steel plate.
(3) Drill 1.5-in. diameter hole through center of steel plate.
(4) All dimensions are in inches (mm).

TA356187



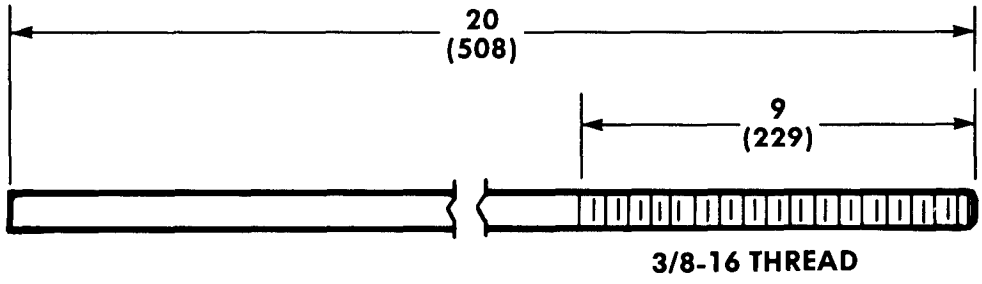
NOTE (CONT)

(5) Cut 0.25 × 3.5 × 3.5 in. (6.35 × 89 × 89 mm) steel plate.
(6) Drill four 0.375-in. (9.52 mm) diameter holes in steel plate.
(7) All dimensions are in inches (mm).

TA356189

Figure B-8. V5 Air Actuated Valve Spring Compression Tool (M978) (PN 2SK886).

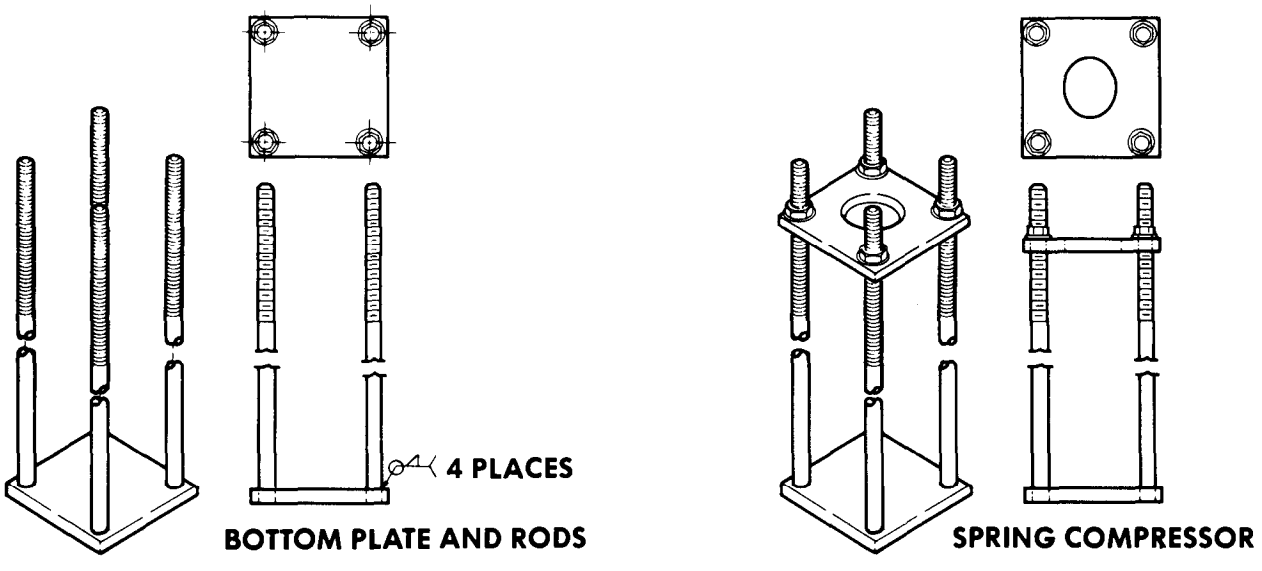
Manufactured Items (Cont)



THREADED ROD

NOTE (CONT)

(8) Cut 0.375 × 20 in. (9.52 × 508 mm) steel rod.
(9) Thread size 3/8-16 × 9-in. (229 mm) long.
(10) All dimensions are in inches (mm).

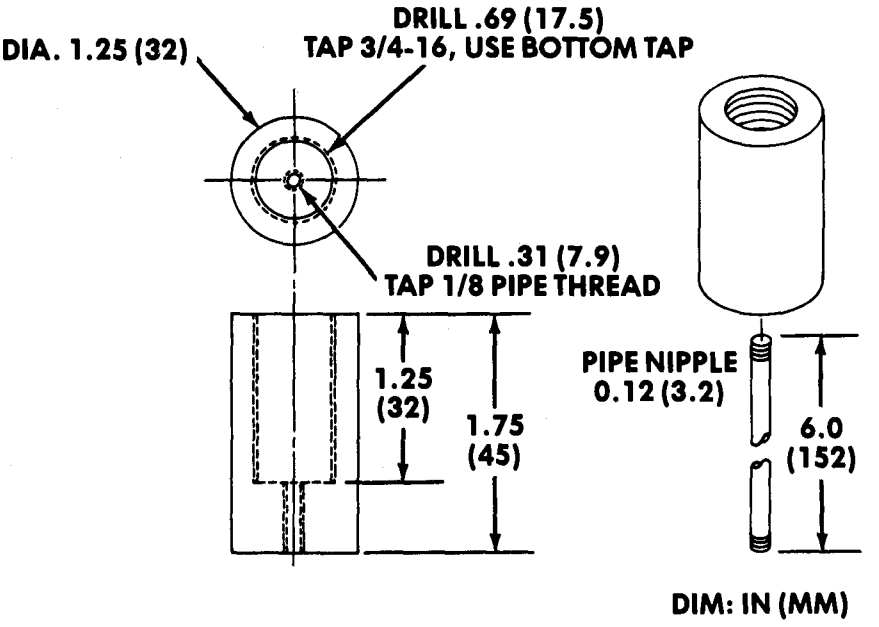


NOTE (CONT)

(11) Install four threaded rods in bottom plate.
(12) Fillet weld completely around bottom of threaded rods to secure to bottom plate.
(13) Place top plate on threaded rods.
(14) Install four 3/8-in. (9.52 mm) diameter washers and four 3/8-16 nuts on threaded rods.

Figure B-8. V5 Air Actuated Valve Spring Compression Tool (M978) (PN 2SK886) (Cont).

Manufactured Items (Cont)

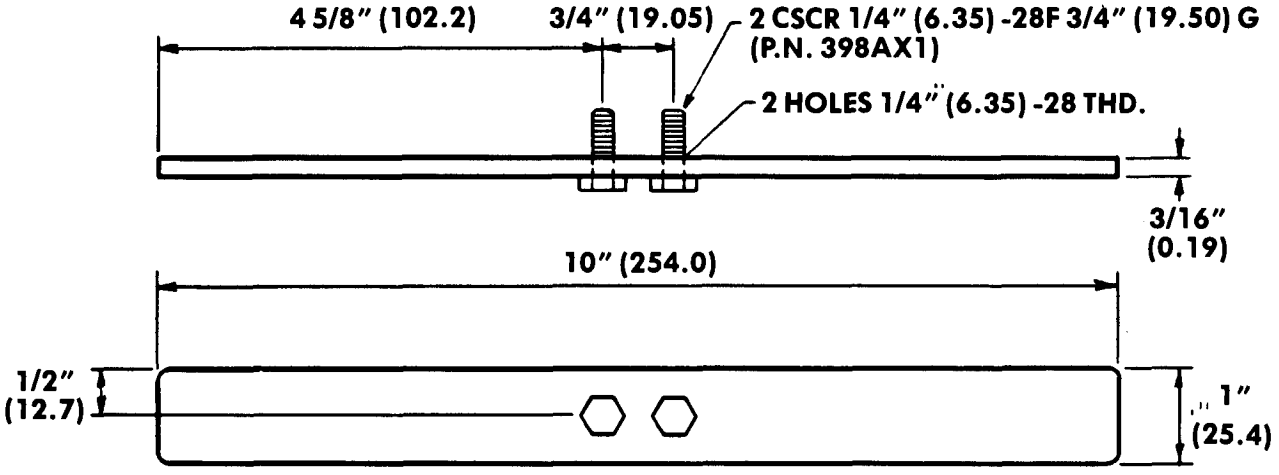


NOTE

Stock:
0.12-in. (3.2 mm) pipe nipple, 6.0-in. (152 mm) long.
1.25-in. (32 mm) mild steel, round; 1.75-in. (45 mm) long.
(1) Drill 0.69-in. (17.5 mm) hole 1.25-in. (32 mm) deep, as shown.
(2) Drill 0.31-in. (7.9 mm) hole as shown.
(3) Tap holes as shown.
(4) Screw pipe nipple into round stock.
(5) Use unloader bore bushing removal tool with slide hammer. TA357323

Figure B-9. Air Compressor Unloader Bore Bushing Removal Tool (PN 2BF829).

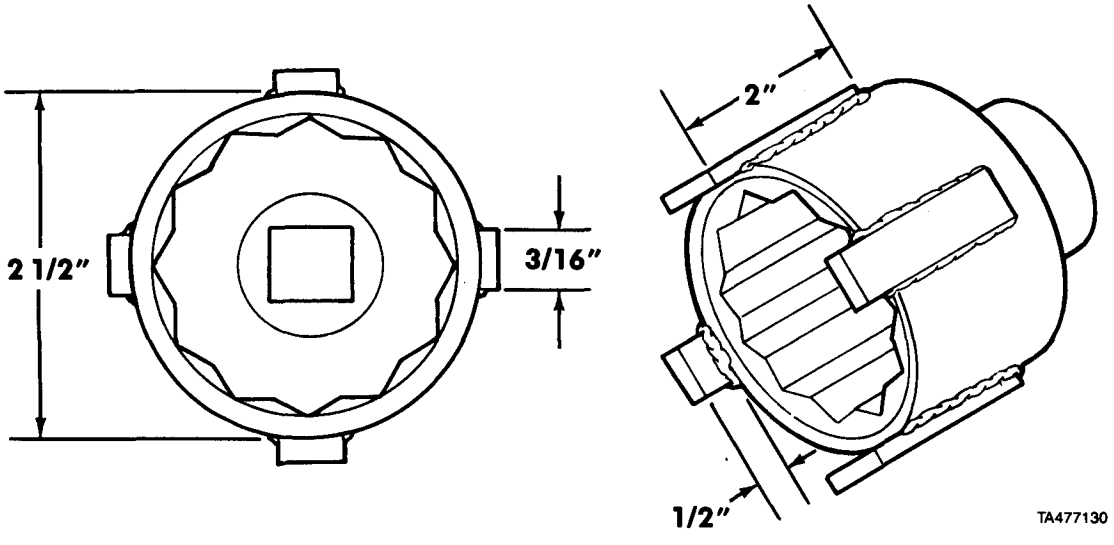
Manufactured Items (Cont)



(1) Drill and tap two 0.25-in (6.35 mm) diameter holes in 0.19 × 1 × 10 in. (4.76 × 25.4 × 254.0 mm) mild steel flat bar stock.
(2) Install two 0.25 × 0.75 in. (6.35 × 19.05 mm) screws.
(3) All dimensions are in inches (mm).

TA476197

Figure B-10. Air Compressor Cylinder Head Removal Tool (PN 2AH762).



TA477130

(1) Fabricate from any 2½ in. OD socket.
(2) Weld four 2 in. long strips of 3/16 in. keystock on socket as shown, so that ½ in. extends beyond socket face.

Figure B-11. Spanner Socket

Manufactured Items (Cont)

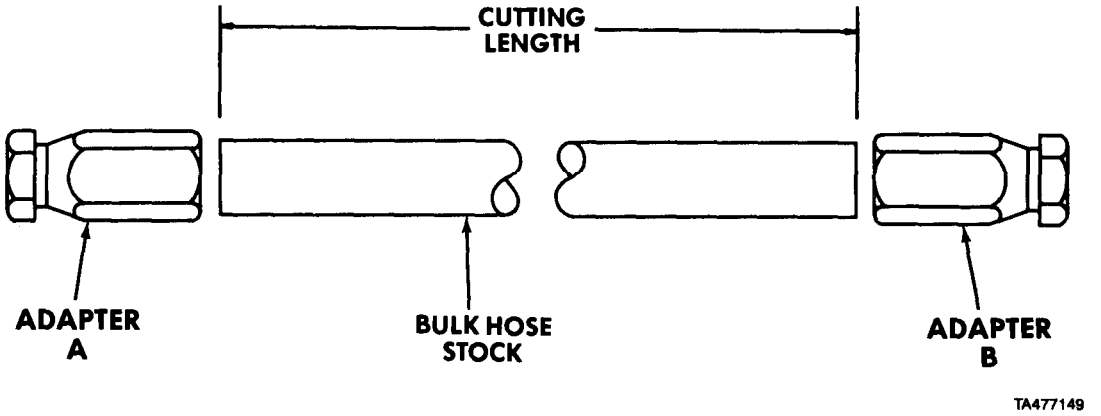


Figure B-12. Hoses and Hose Assemblies

1. Fabricate from bulk hose stock listed in table B-1.
2. Using fine tooth hacksaw or suitable cutting tool cut hose to length required in table B-1.
3. For hose assemblies, place fitting A in vise and screw hose counterclockwise until hose bottoms in fitting. Back off 1/4 turn.
4. Place fitting Bin vise and screw hose counterclockwise until hose bottoms. Back off 1/4 turn.
5. Dimensions are in inches (mm).

Table B-1. Hoses and Hose Assemblies

Hose/Assembly Part Number	Bulk Hose Part Number	Cutoff Length Inches (mm)	Fitting A	Fitting B
A52789-G5	2575-4RL	6 (152.4)		
FA126GGG0426180	2781-6-RL	42.75 (1085.9)	Adapter 191112-6-6S	Elbow 191113-6-6S
FA3391MMM0750	FC350-16RL	75 (1905.0)	Adapter 191121-16-16S	Elbow 191112-16-16S
FA3391MMM0900	FC350-16RL	90 (228.6)	Adapter 191121-16-16S	Elbow 191112-16-16S
FB9535-0043	FC914-01	76 (1930.4)	Adapter FC5810-0604S	Adapter FC5810-0604S
FG1002GGG0320	2781-6-RL	32 (812.8)	Adapter 191100H6-6S	Elbow 191113-6-6S
FG1002GGG0830	2781-6-RL	83 (2108.2)	Elbow 191113-6-6S	Adapter 191100H6-6S
FG1002GGG0880	2781-6-RL	88 (2235.2)	Elbow 191113-6-6S	Adapter 191100H6-6S
FG1002KKK0200	2781-12-RL	20 (508.0)	Adapter 191100H12-12S	Elbow 191113-12-12S
FG1002KKK0320	2781-12-RL	32 (812.8)	Elbow 191113-12-12S	Adapter 191100H12-12S
FG1002KKK0400	2781-12-RL	40 (1016.0)	Adapter 191100H12-12S	Elbow 191113-12-12S
FG1002KKK0420	2781-12-RL	42 (1066.8)	Elbow 191113-12-12S	Adapter 191100H12-12S
FG1002KKK0480	2781-12-RL	48 (1219.2)	Adapter 191100412-12S	Elbow 191113-12-12S
FG1002KKK0640	2781-12-RL	64 (1625.6)	Adapter 191100H12-12S	Elbow 191113-12-12S
FG1002KKK0700	2781-12-RL	70 (1778.0)	Elbow 191113-12-12S	Adapter 191100H12-12S
FG1002KKK0710	2781-12-RL	71 (1803.4)	Adapter 191100H12-12S	Elbow 191113-12-12S
FG1002KKK0730	2781-12-RL	73 (1854.2)	Adapter 191100H12-12S	Elbow 191113-12-12S
FG1002KKK1770	2781-12-RL	177 (4495.8)	Elbow 191113-12-12S	Adapter 191100H12-12S
FG1003KKK0800	2781-12-RL	80 (2032.0)	Adapter 191101-12-12S	Elbow 191113-12-12S
FG1011GGG0820	2781-6-RL	82 (2082.8)	Adapter 191100H6-6S	Adapter 191100H6-6S
FG1011GGG0870	2781-6-RL	87 (2209.8)	Adapter 191100H6-6S	Adapter 191100H6-6S
FG1011KKK0320	2781-12-RL	32 (812.8)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1011KKK0370	2781-12-RL	37 (939.8)	Adapter 191100H12-12S	Adapter 191100H12-12S

Manufactured items (Cont)

Table B-1. Hoses and Hose Assemblies (Continued)

Hose/Assembly Part Number	Bulk Hose Part Number	Cutoff Length Inches (mm)	Adapter A	Adapter B
FG1011KKK0380	2781-12-RL	38 (965.2)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1011KKK0460	2781-12-RL	46 (1168.4)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1011KKK0520	2781-12-RL	52 (1320.8)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1011KKK0610	2781-12-RL	61 (1549.4)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1011KKK0870	2781-12-RL	87 (2209.8)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1011KKK1200	2781-12-RL	120 (3048.0)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1011KKK1650	2781-12-RL	165 (4191.0)	Adapter 191100H12-12S	Adapter 191100H12-12S
FG1082HHH0910	2781-8-RL	91 (2311.4)	Adapter 191101-8-8S	Adapter 191100H8-8S
FG115KJJ0700090	2781-10-RL	70 (1778.0)	Adapter 191118-10-10S	Elbow 191112-12-10S
FG1556GGG0290	2781-6-RL	29 (736.6)	Elbow 191112-6-6S	Adapter 191100H6-6S
FG1556GGG0760	2781-6-RL	76 (1930.4)	Elbow 191112-6-6S	Adapter 191100H6-6S
FG1556GGG0790	2781-6-RL	79 (2006.6)	Elbow 191112-6-6S	Adapter 191l00H6-6S
FG1556GGG0820	2781-6-RL	82 (2082.8)	Elbow 191112-6-6S	Adapter 191100H6-6S
FG1556GGG0960	2781-6-RL	96 (2438.4)	Elbow 191112-6-6S	Adapter 191100H6-6S
FG1556GGG1670	2781-6-RL	167 (4241.8)	Adapter 191100H6-6S	Elbow 191112-6-6S
FG1556GGG2300	2781-6-RL	230 (5842.0)	Adapter 191100H6-6S	Elbow 191112-6-6S
FG1556HHH0780	2781-8-RL	75 (1905.0)	Adapter 191100H8-8S	Elbow 191118-8-8S
FG1556HHH0920	2781-8-RL	89 (2260.6)	Adapter 191100H8-8S	Elbow 191118-8-8S
FG1556HHH1330	2781-8-RL	130 (3302.0)	Adapter 191100H8-8S	Elbow 191118-8-8S
FG1556HHH2250	2781-8-RL	225 (5715.0)	Adapter 191118-8-8S	Adapter 191100H8-8S
FG1556JJJ0260	2781-10-RL	23 (584.2)	Adapter 191100Hl0-10S	Elbow 191118-10-10S
FG1556JJJ0810	2781-10-RL	78 (1981.2)	Adapter 191100Hl0-10S	Elbow 191118-10-10S
FG1556KKK0080	2781-12-RL	8 (203.2)	Elbow 191112-12-12S	Adapter 191100H12-12S
FG1556KKK0180	2781-12-RL	18 (457.2)	Elbow 191112-12-12S	Adapter 191100H12-12S
FG1556KKK0210	2781-12-RL	21 (533.4)	Elbow 191112-12-12S	Adapter 191100H12-12S
FG1556KKK0270	2781-12-RL	27 (685.8)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0300	2781-12-RL	30 (762.0)	Elbow 191112-12-12S	Adapter 191100H12-12S
FG1556KKK0320	2781-12-RL	32 (812.8)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0380	2781-12-RL	38 (965.2)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0400	2781-12-RL	40 (1016.0)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0420	2781-12-RL	42 (1066.8)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0630	2781-12-RL	63 (1600.2)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0633	2781-12-RL	63.37 (1609.6)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0660	2781-12-RL	66 (1676.4)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0700	2781-12-RL	70 (1778.0)	Elbow 19113-12-12S	Adapter 191100H12-12S
FG1556KKK0790	2781-12-RL	79 (2006.6)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0860	2781-12-RL	86 (2184.4)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKK0900	2781-12-RL	90 (2286.0)	Elbow 191112-12-12S	Adapter 191100H12012S
FK542GGG0450	FC374-06RL	45 (1143.0)	Elbow FC5814-0606S	Elbow FC5814-0606S
FK542GGG720	FC374-06RL	72 (1828.8)	Elbow FC5814-0606S	Elbow FC5814-0606S
FK542HHH0350	FC374-08RL	35 (889.0)	Elbow FC5937-0808S	Elbow FC5937-0808S
FK542HHH0900	FC374-08RL	90 (2286.0)	Elbow FC5937-0808S	Elbow FC5937-0808S
FL1315EEE0200	FC374-04RL	20 (508.0)	Adapter FC5810-0404S	Adapter FC5810-0404S
FL1315EEE0250	FC374-04RL	25 (635.0)	Adapter FC5810-0404S	Adapter FC5810-0404S
FL1315GEG0130	FC374-04RL	13 (330.2)	Adapter FC5810-0604S	Adapter FC5810-0604S
FL1315GEG0200	FC374-04RL	20 (508.0)	Adapter FC5810-0604S	Adapter FC5810-0604S
FL1315GEG0920	FC374-04RL	92 (2336.8)	Adapter FC5810-0604S	Adapter FC5810-0604S
FL1315GEG1000	FC374-04RL	100 (2540.0)	Adapter FC5810-0604S	Adapter FC5810-0604S

Manufactured Items (Cont)

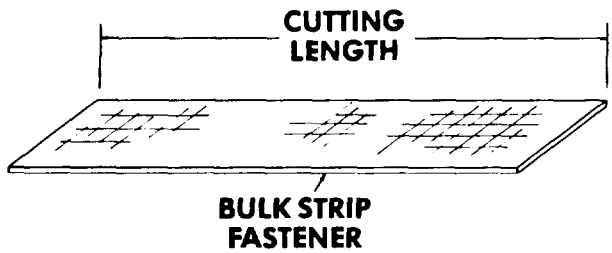
Table B-1. Hoses and Hose Assemblies (Continued)

Hose/Assembly Part Number	Bulk Hose Part Number	Cutoff Length Inches (mm)	Adaptor A	Adaptor B
FL1315GEG1060	FC374-04RL	106 (2692.4)	Adapter FC5810-0604S	Adapter FC5810-0604S
FL1315GEG1280	FC374-04RL	128 (3261.2)	Adapter FC5810-0604S	Adapter FC5810-0604S
FL1315GGG0140	FC374-06RL	14 (355.6)	Adapter FC5810-0606S	Adapter FC5810-0606S
FL1315GGG0240	FC374-06RL	24 (600.6)	Adapter FC6810-0606S	Adapter FC6810-0606S
FL1315GGG0360	FC374-06RL	36 (914.4)	Adapter FC5810-0606S	Adapter FC5810-0606S
FL1315GGGO420	FC374-06RL	42 (1066.8)	Adapter FC5810-0606S	Adapter FC5810-0606S
FG1556KKK0930	2781-12-RL	93 (2362.2)	Adapter 191100H12-12S	Elbow 191112-12-128
FG1556KKK0960	2781-12-RL	96 (2438.4)	Elbow 191112-12-12S	Adapter 191100H12-12S
FG1556KKK1000	2781-12-RL	100 (2640.0)	Elbow 191112-12-12S	Adapter 191100H12-12S
FG1556KKK1360	2781-12-RL	130 (3302.0)	Elbow 191112-12-12S	Adapter 191100H12-12S
FG1556KKK1380	2781-12-RL	138 (3505.2)	Adapter 191100H12-12S	Elbow 191112-12-12S
FG1556KKM0270	2781-12-RL	27 (685.8)	Adapter 191100H12-12S	Elbow 191107-16-12S
FG1556MMM0160	FC350-16RL	16 (406.4)	Elbow 191112-16-16S	Adapter 191100H16-16S
FK540GGG0180	2661-32	90 (2286.0	Adapter FC5813-0606S	Adapter FC5813-0606S
FK540HHH0910180	FC374-08RL	91 (2311.4)	Elbow FC5936-0808S	Elbow FC5936-0808S
FK541GGG0770180	FC374-06RL	77 (1955.8)	Adapter FC5813-0606S	Elbow FC5814-0606S
FK541GGG0800	FC374-06RL	80 (2032.0)	Adapter FC6813-0606S	Elbow FC5814-0606S
FK541HHH0210180	FC374-08RL	21 (533.4)	Elbow FC5936-0808S	Elbow FC5937-0808S
FK541HHH0890180	FC374-08RL	89 (2260.6)	Elbow FC5936-0808S	Elbow FC6937-0808S
FK642EEE0230090	FC374-04RL	23 (584.2)	Elbow FC5937-0404S	Elbow FC5937-0404S
FK542EEE0300	FC374-04RL	30 (762.0)	Elbow FC5937-0404S	Elbow FC5937-0404S
FK542EEE0380	FC374-04RL	38 (965.2)	Elbow FC5937-0404S	Elbow FC5937-0404S
FK542GGG0310	FC374-06RL	31 (787.4)	Elbow FC5814-0606S	Elbow FC5814-0606S
FL135GGG0460	FC374-06RL	46 (1168.4)	Adapter FC5810-0606S	Adapter FC5810-0606S
FL1315GGG0540	FC374-06RL	54 (1371.6)	Adapter FC5810-0604S	Adapter FC5810-0604S
FL1315GGG0600	FC374-06RL	60 (1624.0)	Adapter FC5810-0606S	Adapter FC5810-0606S
FL1315GGGO650	FC374-06RL	65 (1651.0)	Adapter FC5810-0606S	Adapter FC5810-0606S
FL1315HHH0110	FC374-08RL	11(279.4)	Adapter FC5810-0808S	Adapter FC6810-0808S
FL1315HHH0180	FC374-08RL	18 (457.2)	Adapter FC5810-0808S	Adapter FC5810-0808S
FL1315HHH0200	FC374-08RL	20 (608.0)	Adapter FC5810-0808S	Adapter FC5810-0808S
FL1315HHH0220	FC374-08RL	22 (558.8)	Adapter FC5810-0808S	Adapter FC5810-0808S
FL1315HHH0310	FC374-08RL	31(787.4)	Adapter FC5810-0808S	Adapter FC5810-0808S
FL1526EEE0110	FC374-04RL	11 (279.4)	Elbow FC5937-0404S	Adapter FC5810-0404S
FL1526EEE0960	FC374-04RL	96 (2438.4)	Elbow FC5937-0404S	Adapter FC5810-0404S
FL1526GGG0250	FC374-06RL	25 (635.0)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0270	FC374-06RL	27 (685.8)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0350	FC374-06RL	35 (889.0)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0370	FC374-06RL	37 (939.8)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0450	FC374-06RL	45 (1143.0)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0530	FC374-06RL	53 (1346.2)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0570	FC374-06RL	57 (1447.8)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0600	FC374-06RL	60 (1524)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0720	FC374-06RL	72 (1828.8)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0730	FC374-06RL	73 (1854.2)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526GGG0800	FC374-06RL	80 (2032.0)	Adapter FC5810-0606S	Elbow FC5814-0606S
FL1526HHH0160	FC374-08RL	16 (406.4)	Adapter FC5810-0808S	Elbow FC5937-0808S
FL1526HHH0180	FC374-08RL	18 (457.2)	Adapter FC5810-0808S	Elbow FC5937-0808S
FL1526HHH0280	FC374-08RL	28 (711.2)	Adapter FC5810-0808S	Elbow FC5937-0808S
FL1526HHH0600	FC374-08RL	60 (1524.0)	Adapter FC5810-0808S	Elbow FC5937-0808S
FL1526HHH0690	FC374-08RL	69 (1752.6)	Adapter FC5810-0808S	Elbow FC5937-0808S

Manufactured Items (Cont)

Table B-1. Hoses and Hose Assemblies (Continued)

Hose/Assembly Part Number	Bulk Hose Part Number	Cutoff Length Inches (mm)	Adapter A	Adapter B
FL1526HHH0840	FC374-08RL	84 (2133.6)	Adapter FC5810-0808S	Elbow FC5937-0808S
FL1526HHH0900	FC374-08RL	90 (2286.0)	Adapter FC5810-0808S	Elbow FC5937-0808S
FL1526HHH1200	FC374-08RL	120 (3048.0)	Adapter FC5810-0808S	Elbow FC5937-0808S
FL1628GGG0260	FC374-06RL	26 (660.4)	Adapter FC5810-0606S	Adapter FC5813-0606S
FL1628GGG0400	FC374-06RL	40 (1016.0)	Adapter FC5810-0606S	Adapter FC5813-0606S
FL1628GGG0560	FC374-06RL	56 (1422.4)	Adapter FC5810-0606S	Adapter FC5813-0606S
FL1628GGG0600	FC374-06RL	60 (1524.0)	Adapter FC5810-0606S	Adapter FC5813-0606S
FL1628GGGI000	FC374-06RL	100 (2540.0)	Adapter FC5810-0606S	Adapter FC5813-0606S
FL1628HHH0180	FC374-08RL	18 (457.2)	Adapter FC5810-0808S	Elbow FC5936-0808S
FL1628HHH0200	FC374-08RL	20 (508.0)	Adapter FC5810-0808S	Elbow FC5936-0808S
FL1628HHH0220	FC374-08RL	22 (558.8)	Adapter FC5810-0808S	Elbow FC5936-0808S
FL1628HHH0240	FC374-08RL	24 (609.6)	Adapter FC5810-0808S	Elbow FC5936-0808S
FL1628HHH0690	FC374-08RL	69 (1752.6)	Adapter FC5810-0808S	Elbow FC5936-0808S
FL1628HHH1080	FC374-08RL	108 (2743.2)	Adapter FC5810-0808S	Elbow FC5936-0808S
2252290	2781-12-RL	44 (1117.6)	Elbow 191112-12-128	Adapter 191100H12-12S
45A285-Pl	2556-8-RL	96 (2438.4)	Adapter 45A285-P4	Adapter 4797-4
45A285-P2	2556-8-RL	84 (2133.6)	Adapter 45A285-P4	Adapter 4797-4
7-543-001350	FC374-06RL	34 (863.6)	Adapter FC5810-0606S	Adapter FC5813-0606S



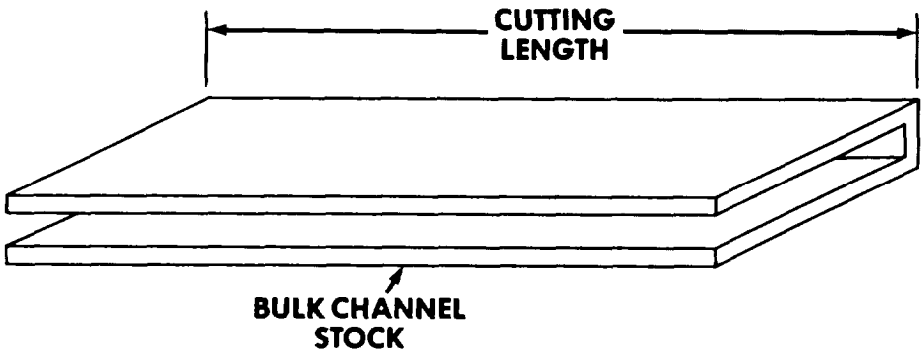
1. Fabricate from bulk stock listed in table B-2.
2. Using knife or suitable cutting device cut to length required in table B-2.
3. Dimensions are in inches (mm).

Figure B-13. Locking Strip

Table B-2. Locking Strip

Strip Part Number	Bulk Strip Part Number	Cutoff Length Inches (mm)
59745AX40	AS1597	40 (1016.0)
59745AX82	AS1597	82 (2082.8)

Manufactured Items (Cont)

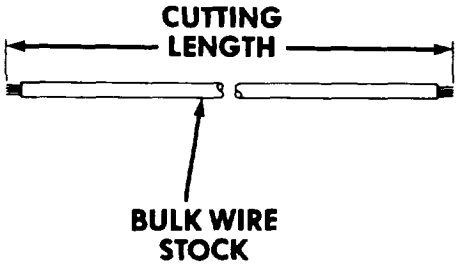


1. Fabricate from bulk stock listed in table B-3
2. Using knife or suitable cutting device, cut to length required in table B-3.
3. Dimensions are in inches (mm).

Figure B-14. Locking Channel

Table B-3. Locking Channel

Channel Part Number	Bulk Channel Part Number	Cutoff Length Inches (mm)
1467160-7	75000343	7 (177.8)
1467160-8	75000343	8 (203.2)
59747AX40	3509-R	40 (1016.0)
59747AX82	3509-R	82 (2082.8)



1. Fabricate from bulk wire stock listed in table B-4.
2. Using wire cutters, cut to required length.
3. Dimensions are in inches (mm).

Figure B-15. Locking Channel

Table B-4. Harness Assembly

Harness Assembly Part Number	Bulk Channel Part Number	Cutoff Length Inches (mm)
6-512-000156	R-59110	As required

Manufactured Items (Cont)

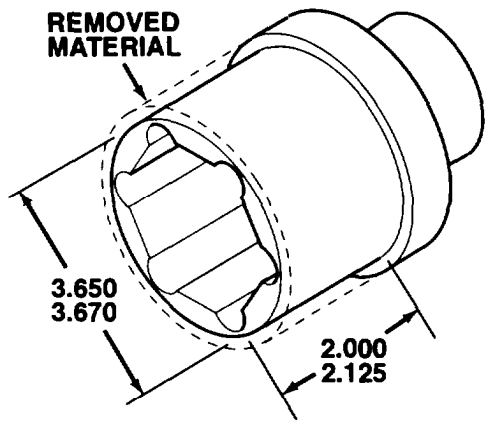


Figure B-16. Socket - Fabrication

1. Fabricate from 2-7/8 in., 6-point socket with 1 in. square drive, PN IM 923 (55719), NSN 5130-00-684-0923.
2. Machine socket wall to diameter and depth shown.

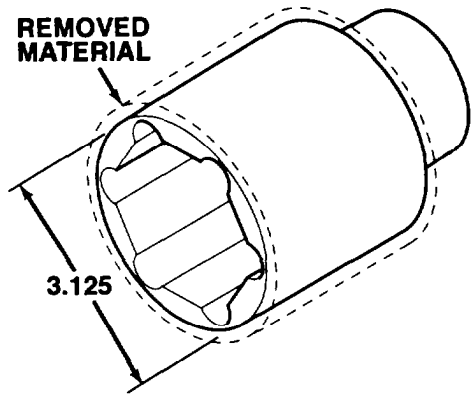
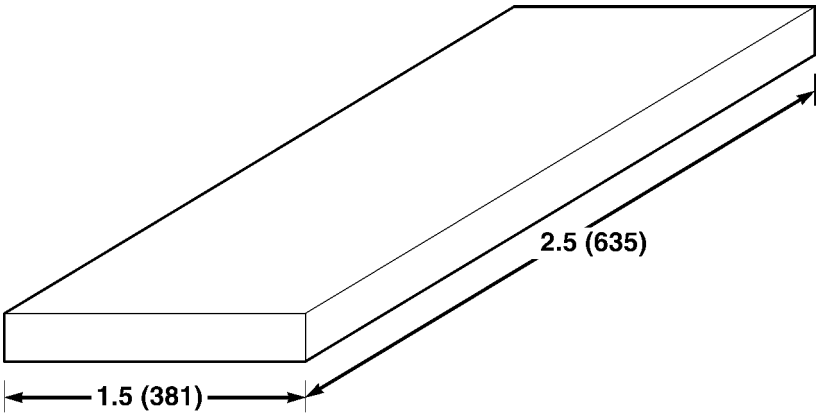


Figure B-17. Socket - Fabrication

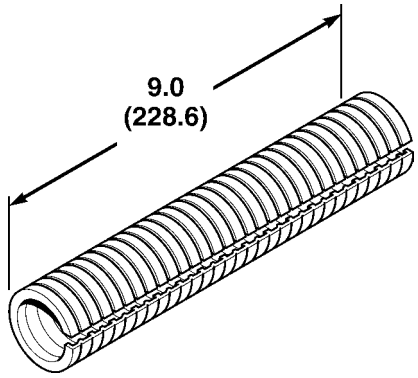
1. Fabricate from 2-1/4 in., 6-point socket with 1 in. square drive, PN B107.2 (802041, NSN 5130-00-293-1374.
2. Machine socket wall to diameter shown.

Manufactured Items (Cont)



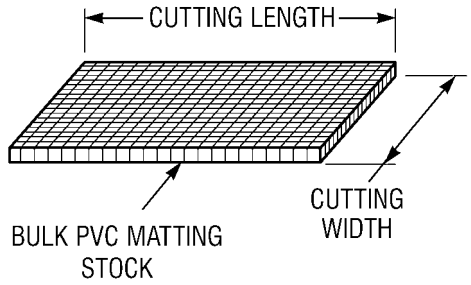
1. Fabricate from 42925AX rubber.
2. Using knife or suitable cutting device, cut to length.
3. All dimensions are in inches (mm).

Figure B-18. Rubber Pad



1. Fabricate from 8594000019 plastic edge.
2. Using knife or suitable cutting device, cut plastic edge to 9.0 in. (228.6 mm).
3. Dimensions are in inches (mm).

Figure B-19. Plastic Edge Protection



1. Fabricate from bulk stock listed in table B-20.
2. Using suitable cutting tool, cut to length and width required in table B-20.
3. Dimensions are in inches (mm).

Figure B-20. PVC Matting

Table B-20. PVC Matting

PVC Matting Part Number	Bulk PVC Matting Part Number	Cutoff Length Inches (mm)	Cutoff Width Inches (mm)
3243150	3243781	21 (533.4)	11 (279.4)
3243183	3243781	34 (863.6)	11 (279.4)

Manufactured Items (Cont)

Table B-5. M1977-CBT Components

The maintenance task listed below contains specific information about the M1977-CBT (Common Bridge Transport).

TITLE	PARAGRAPH
Spring Removal/Repair/Installation	14-2

APPENDIX C
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. SCOPE. This appendix lists expendable supplies and materials needed to operate and maintain M977 Series Vehicles. These items are authorized by CTA 50-970. This appendix includes expendable items (except Medical, Class V, Repair Parts, and Heraldic Items) and consumable materials.

C-2. EXPLANATION OF COLUMNS.

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the Initial Setup under "Supplies" to identify the material ("Compound, cleaning, Item 18, Appendix C").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column (3) - National Stock Number. This is the national stock number assigned to the item. Use the national stock number to request or requisition the item.

d. Column (4) - Description. Indicates the federal item name and, if required, a description to identify the item. Where applicable, the last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in preforming 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 the requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	F	8040-00-826-3535	Adhesive, Cyanoacrylate, RTV (MIL-A-46050)	
2	F		Adhesive, Epoxy	
2.05	F		Adhesive, No. 380 (FSCM 05972) (OTC P/N 3303334)	
		8040-01-388-8704	3 gm tube	gm
		8040-01-406-8424	1 oz bottle	oz
		8040-01-284-3984	1 oz can	oz
2.1	F	8040-00-142-9193	Adhesive, No. 445 (FSCM 05972)	
3	O		Adhesive, No. 4500 (FSCM 08853) (30456 AX) (FSCM 45152)	
4	O		Adhesive, No. 1099-L (FSCM 04963) (EE 39597) (FSCM 45152)	

Expendable Supplies and Materials List (Cont)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
5	O	8040-01-182-8104	Adhesive No. PL 200 (1322080) (FSCM 45152)	
5.1	F		Adhesive, Spray (OTC P/N 1537350)	
5.2	F	8040-01-519-3385	Adhesive, Insulation (540) (FSCM 28112) (OTC P/N 1372150) 10.3 oz (305 ml) cartridge	oz
5.3	O	8040-01-321-1254	Adhesive, No. 409 (No. 40945) (FSCM 05972) (OTC P/N 1586850)	20 gm tube
5.4	O	8040-01-235-5435	Adhesive, No. 1300-5 (FSCM 28712) (OTC P/N 32167AX)	5 oz tube
			Adhesive, No. 1300 (28712) (OTC P/N 2021420)	gal
6	O	8040-00-995-0590	Adhesive-Sealant, Silicone, RTV, General Purpose (MIL-A-46106A) 108 (FSCM 01139)	
7	O		Adhesive-Sealer (No. 517119)	
8	F		Adhesive-Sealant	
			(No. 51517) (Loctite 515)	6 ml tube
			(No. 51531) (Loctite 515)	50 ml tube
			(No. 51574) (Loctite 515)	300 ml tube
8.1	F	8040-01-250-3969	Adhesive (FSCM 05972) (Loctite 242)	ea
8.2	F	8040-01-515-2456	Adhesive (OPMNO) Sika 255 FC Blk (45152) (OTC P/N 3145938)	oz
9	C		Antifreeze, Arctic Type	
		6850-00-243-1992	1-gal can (MIL-A-11755)	gal
		6850-00-174-1806	55-gal drum	
10	C	6850-00-181-7940	Antifreeze, Permanent, Glycol, Inhibited (FS A-A-870)	gal
11	O		Caps, Shipping and Sealing	
12	O		Cement, General Purpose, Synthetic Base (MIL-C-4003)	
13	O	7510-00-164-8893	Chalk, Marking, White and Colored SS-C-266F	Box
14	C	7930-00-634-3935	Chips, Soap, P-S-579	
15	O		Chemical Agent Resistant Coating (CARC) Green 383 (MIL-C-46168B)	
		8010-01-160-6741	1 qt kit	kt
		8010-01-162-5378	1 gal kit	kt
		8010-01-160-6742	5 gal kit	kt
16	O		Cloth, Crocus	
17	O	8030-00-597-5367	Compound, Antiseize, High Temperature (MIL-A-907) 2-1/2 lb can	lb

Expendable Supplies and Materials List (Cont)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
18	O		Compound, Cleaning, Conditioner and Inhibitor for Engine Cooling System (MIL-C-10597)	
		6850-00-598-7328	Package, Consisting of: a. Cleaner, Part 1, Oxalic Acid. b. Cleaner, Part 2, Aluminum Chloride. c. Sodium Silicate Conditioner. d. Alkaline Conditioner. e. Inhibitor. f. Instruction Sheet.	ea

Expendable Supplies and Materials List (Cont)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
19	O		Compound, Cleaning, Creosol Base (MIL-C-5546)	
19.1	O		Compound, Corrosion Preventive (MIL-C-62218A) (05238) (P/N 2085B)	
20	F	5970-00-166-5697	Compound, Insulating, Electrical, Embedding (MIL-C-47233)	
21	F		Compound, International, No. 2	
22	F	5350-01-157-6916	Compound. Lapping and Grinding J3179-5 (FSCM 58805) 1 pk No. 1 dry grain	ea
23	F		Compound, Polishing J23028 (FSCM 58805)	
24	F		Compound, Retaining (MIL-R-46082)	
		8030-00-181-7603	50-cc	cc
		8030-00-181-7529	250-cc	cc
25	O		Compound, Sealing, Lubricating, Wicking, Thread Locking, Anaerobic, Single Component (MIL-S-46163) Type I, Grade K	
26	O		Compound, Sealing, Lubricating, Wicking, Thread Locking, Anaerobic, Single Component (MIL-S-46163) Type II, Grade N	
27	O		Compound, Sealing, Lubricating, Wicking, Thread Locking, Anaerobic, Single Component (MIL-S-46163) Type II, Grade O	
28	O		Compound, Sealing, Lubricating, Wicking, Thread Lockring, Anaerobic, Single Component (MIL-S-46163) Type II, Grade R	ml
28.1	F		Compound, Sealing, Pipe Thread (FSCM 05972)	
			(No. 56707) (Loctite 567)	6 ml tube
		8030-01-166-0675	(No. 56747) (Loctite 567)	50 ml tube
			(No. 56765) (Loctite 567)	250 ml tube
28.2	F	6640-00-315-3022	Compound, Sealing, Teflon, Pipe Thread TP00-013-26 (FSCM 08071)	
29	O		Compound, Sealing, Pipe Thread (Loctite 592) (FSCM 05972) (702350-X)	
29.1	F		Compound, Walking (FSCM 45152) (1330480)	
30	O	5610-00-67-1533	Compound, Walkway, Nonslip (MIL-W-5044)	gal
31	O		Connector, Electrical, Butt 34072 (FSCM 04618)	ea
32	F		Dye, Prussian Blue	
33	O	8010-01-141-2419	Chemical Agent Resistant Coating (CARC) Black (MIL-C-46168B) 1 qt kit	kt
		8010-01-131-6254	1-gal can	kt
		8010-01-131-6261	5-gal can	kt

Expendable Supplies and Materials List (Cont)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
34	C		Grease, Automotive and Artillery GAA (MIL-G-10924)	
		9150-00-065-0029	2-1/4 oz tube	oz
		9150-00-935-1017	14-oz cartridge	oz
		9150-00-190-0904	1-lb can	lb
		9150-00-190-0905	5-lb can	lb
		9150-00-190-0905	35-lb can	lb
35	F	9150-01-095-5512	Grease, Ball Bearing, Lithium Base	
36	F	9150-01-091-9336	Grease, General Purpose, Lithium Base	
37	F		Grease, High Performance, Multi-purpose, (MIL-G-24508)	
38	F	9150-00-543-7220	Grease, Molybdenum Disulfide (MIL-G-21164)	
38.1	F		Jelly, Petroleum	
38.2	O		Inhibitor, Corrosion, Liquid Cooling System (89524) (P/N NALCOOL 2000)	
		6850-01-085-4717	1-pt can	pt
		6850-01-085-4718	64-oz bottle	oz
		6850-01-085-4719	5-gal drum	gal
		6850-01-087-4045	15-gal drum	gal
		6850-01-086-3438	55-gal drum	gal
39	O	9505-00-191-3680	Lockwire	
39.1	O		Lubricant, Tire and Rim	
		2640-00-256-5526	1-qt can	qt
		2640-00-256-5527	1-gal can	gal
		2640-00-256-5529	(5) 1-gal containers in a carton	gal
40	F	6810-00-812-9181	Methyl Ethyl Ketone TT-M-261 (MIL-T-27602)	gal
41	C		Oil, Fuel, Diesel DF-1 Winter (VV-F-800)	
		9140-00-286-5286	Bulk	gal
		9140-00-286-5287	5-gal can	gal
		9140-00-286-5288	55-gal drum, 16 gage	gal
		9140-00-286-5289	55-gal drum, 18 gage	gal
42	C		Oil, Fuel, Diesel DF-2 Regular (VV-F-800)	
		9140-00-286-5294	Bulk	gal
		9140-00-286-5295	5-gal can	gal
		9140-00-286-5296	55-gal drum, 16 gage	gal
		9140-00-286-5297	55-gal drum, 18 gage	gal
43	C		Oil, Lubricating, Gear, GO 75 (MIL-L-2105C)	
		9150-01-035-5390	1-qt can	qt
		9150-01-035-5391	5-gal drum	gal
		9150-01-035-5393	55-gal drum	gal
44	C		Oil, Lubricating, Gear, GO 80/90 (MIL-L-2105C)	
		9150-01-035-5393	5-gal drum	gal

Expendable Supplies and Materials List (Cont)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
45	O		Oil, Lubricating, OEA Ice, Subzero (MIL-L-46167)	
		9150-00-402-4478	1-qt can	qt
		9150-00-402-2372	5-gal drum	gal
		9150-00-491-7197	55-gal drum, 16 gage	gal
46	C		Oil, Lubricating, OE/HDO 10 (MIL-L-2104)	
		9150-00-189-6727	1-qt can	qt
		9150-00-186-6668	5-gal drum	gal
			55-gal drum, 16 gage	gal
		9150-00-191-2772	55-gal drum, 18 gage	gal
47	C		Oil, Lubricating, OE/HDO 30 (SAE 30) (MIL-L-2104)	
		9150-00-186-6681	1-qt can	qt
		9150-00-188-9858	5-gal drum	gal
		9150-00-265-9436	55-gal drum, 16 gage	gal
		9150-00-189-6729	55-gal drum, 18 gage	gal
47.1	C		Oil, Lubricating, OE/HDO 40 (SAE 40) (MIL-L-2104)	gal
		9150-00-189-6730	1-qt can	gal
		9150-00-188-9862	55-gal drum	gal
48	C		Oil, Lubricating: Internal combustion engine, tactical service (MIL-L-2104) (OE/HDO 15W/40)	qt
		9150-00-152-4117	1-qt can	qt
		9150-00-152-4119	55-gal drum, 16 gage	gal
49	O		Oil, Mineral	
50	F		Oil, Test, Fuel Injector J26400-5 (FSCM 58805)	
			5-gal can	gal
51	O	5350-00-186-8818	Paper, Abrasive, Garnet (Emery Cloth) P-P-121	
52	O	5350-00-224-7203	Paper, Abrasive, Silicon Carbide, Waterproof P-P-101	
52.1	F		Plastic, Anti-Friction (FSCM 45152) (1771600)	
53	F		Preventive, Rust (MIL-C-16173) Texaco Type 19AS436 (FSCM 45152)	gal
		8030-00-062-5866	1-gal	
		8030-00-244-1293	5-gal	
		8030-00-244-1294	55-gal	
54	O	8010-00-193-0516	Primer, Epoxy, (MIL-P-52192B) qt kit	gal
55	O		Chemical Agent Resistant Coating (CARC) Brown 383 (MIL-C-46168B) 511X303	kt
		8010-01-160-6744	1-qt kit	kt
			1-gal kit	kt
			5-gal kit	kt
55.1	F	1015-01-255-4144	Sealant, Pipe, Teflon, 50 ml Tube	tu
55.2	O		Sealant, RTV200 Electrical (OTC P/N 3119525) (45152)	
56	O		Solder, Rosin Flux Core ASTM B 284-79	

Expendable Supplies and Materials List (Cont)

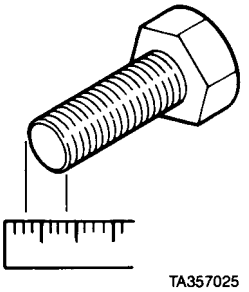
(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
57	C		Solvent, Drycleaning SD (P-D-680)	
		6850-00-664-5685	1-qt can	qt
		6850-00-281-1985	1-gal can	gal
58			Deleted	
59	F		Stock, Bar, Steel 0.1975 x 0.25 x 14 in. (4.76 x 6.35 x 355.6 mm)	
60	O	8135-00-178-9200	Tags, Identification (MIL-T-12755) pk/1000	pk
60.1	F		Tape, Acrylic Foam Double Backed (FSCM 45152) (1775280)	
61	F	8030-00-398-4130	Tape, Antiseize, Tetrafluoroethylene (MIL-T-27730)	ea
62	O	5970-00-644-3167	Tape, Insulation, Electrical (MIL-T-50886)	
63	O		Tape, Masking, A-A-883	
64	O	8010-00-181-8079	Thinner, Aliphatic, Polyurethane Coat (MIL-T-81772)	
		8010-00-181-8080	5-gal drum	gal
65	O		Ties, Cable, Plastic (MIL-S-29190)	
66			Deleted	
67	F	5970-01-161-8031	Tubing, Heat Shrink (MIL-T-47051)	
68	F		Wood, 120 x 3.5 x 2 in. (3.048 x 88.9 x 50.8 mm)	
69	F		Wood block, 4 x 6 x 40 in. (102 x 152 x 1016 mm)	

APPENDIX D
TORQUE LIMITS

D-1. GENERAL. This section provides general torque limits for screws used on the M977 series vehicles. Special torque limits are indicated in the maintenance procedures for applicable components. The general torque limits given in this appendix shall be used when specific torque limits are not indicated in the maintenance procedure. These general torque limits cannot be applied to screws that retain rubber components. The rubber components will be damaged before the torque limit is reached. If a special torque limit is not given in the maintenance instructions, tighten the screw or nut until it touches the metal bracket then tighten it one more turn.

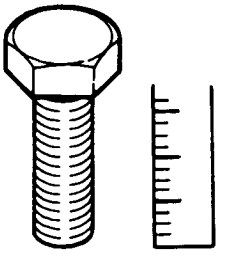
D-2. TORQUE LIMITS. Table D-1 lists dry torque limits. Dry torque limits are used on screws that do not have lubricants applied to the threads. Table D-2 lists wet torque limits. Wet torque limits are used on screws that have high pressure lubricants applied to the threads. Table D-3 lists torque limits for the M983 (HIAB) crane.

D-3. HOW TO USE TORQUE TABLE:



TA357025

(1) Measure the diameter of the screw you are installing.



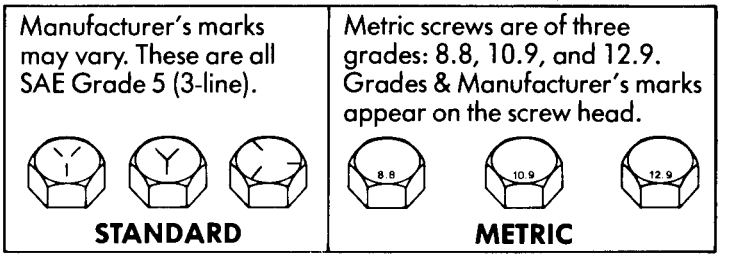
TA357026

(2) Count the number of threads per inch.

(3) Under the heading SIZE, look down the left hand column until you find the diameter of the screw you are installing (there will usually be two lines beginning with the same size).

(4) In the second column under SIZE, find the number of threads per inch that matches the number of threads you counted in step (2). (Not required for metric screws.)

CAPSCREW HEAD MARKINGS



TA357028

(5) To find the grade screw you are installing, match the markings on the head to the correct picture of CAPSCREW HEAD MARKINGS on the torque table.

(6) Look down the column under the picture you found in step (5) until you find the torque limit (in lb-ft or N·m) for the diameter and threads per inch of the screw you are installing.

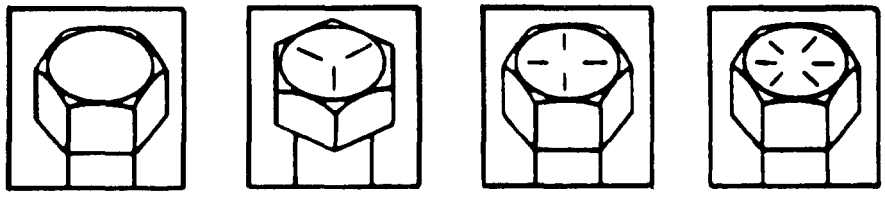
Torque Limits (Cont)

Table D-1. Torque Limits for Dry Fasteners

CAPSCREW HEAD MARKINGS



Manufacturer's marks may vary. These are all SAE Grade 5 (3-line).



TA357027

SIZE			TORQUE							
			SAE GRADE NO. 2		SAE GRADE NO. 5		SAE GRADE NO. 6 or 7		SAE GRADE NO. 8	
DIA. INCHES	THREADS PER INCH	MILLIMETERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS
1/4	20	6.35	5	7	8	11	10	14	12	16
1/4	28	6.35	6	9	10	14	12	16	14	19
5/16	18	7.94	11	15	17	23	21	28	25	34
5/16	24	7.94	12	16	19	26	24	33	25	34
3/8	16	9.53	20	27	30	41	40	54	45	61
3/8	24	9.53	23	31	35	47	45	61	50	68
7/16	14	11.11	30	41	50	68	60	81	70	95
7/16	20		35	47	55	75	70	95	80	108
1/2	13	12.70	50	68	75	102	95	129	110	149
1/2	20		55	75	90	122	100	136	120	163
9/16	12	14.29	65	88	110	149	135	183	150	203
9/16	18		75	102	120	163	150	203	170	231
5/8	11	15.88	90	122	150	203	190	258	220	298
5/8	18		100	136	180	244	210	285	2.40	325
3/4	10	19.05	160	217	260	353	320	434	380	515
3/4	16		180	244	300	407	360	488	420	597
7/8	9	22.23	140	190	400	542	520	705	600	814
7/8	14		155	210	440	597	580	786	660	895
1	8	25.40	220	298	580	786	800	1085	900	1220
1	12		240	325	640	868	860	1166	1000	1356
1-1/8	7	25.58	300	407	800	1085	1120	1519	1280	1736
1-1/8	12		340	461	880	1193	1260	1709	1440	1953
1-1/4	7	31.75	420	570	1120	1519	1580	2142	1820	2468
1-1/4	12		460	624	1240	1681	1760	2387	2000	2712
1-318	6	34.93	560	759	1460	1980	2080	2820	2380	3227
1-3/8	12		640	868	1680	2278	2380	3227	2720	3688
1-1/2	6	38.10	740	1003	1940	2631	2780	3770	3160	4285
1-1/2	12		840	1139	2200	2983	3100	4204	3560	4827

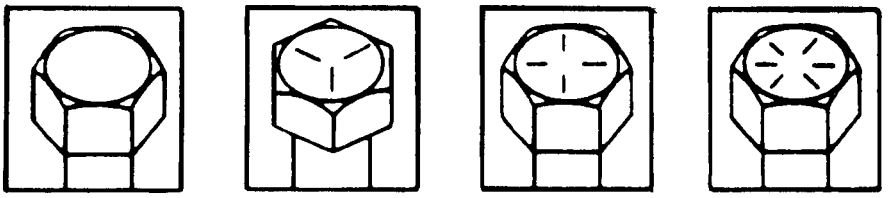
Torque Limits (Cont)

Table D-2. Torque Limits for Wet Fasteners

CAPSCREW HEAD MARKINGS



Manufacturer's marks may vary. These are all SAE Grade 5 (3-line).



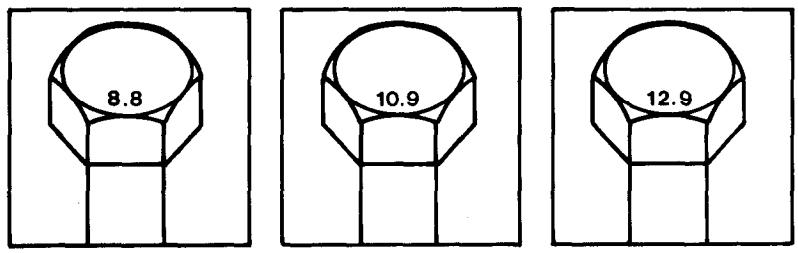
TA357027

SIZE			TORQUE							
			SAE GRADE NO. 2		SAE GRADE NO. 5		SAE GRADE NO. 6 or 7		SAE GRADE NO. 8	
DIA INCHES	THREADS PER INCH	MILLIMETERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS
1/4	20	6.35	4	6	6	8	8	11	9	12
1/4	28	6.35	5	7	7	9	9	12	10	14
5/16	18	7.94	8	11	13	18	16	22	18	24
5/16	24	7.94	9	12	14	19	18	24	20	27
3/8	16	9.53	15	20	23	31	30	41	35	47
3/8	24	9.53	17	23	25	34	30	41	35	47
7/16	14	11.11	24	33	15	47	45	61	55	75
7/16	20		25	34	40	54	50	68	60	81
1/2	13	12.70	35	47	55	75	70	95	80	108
1/2	20		40	54	65	88	80	108	90	122
9/16	12	14.29	50	68	80	108	100	136	110	149
9/16	18		55	75	90	122	110	149	130	176
5/8	11	15.88	70	95	110	149	140	190	170	231
5/8	18		80	108	1:30	176	160	217	180	244
3/4	10	19.05	120	163	200	271	240	125	280	x-x)
3/4	16		140	190	220	298	280	380	320	434
7/8	9	22.23	110	149	300	407	400	542	460	624
7/8	14		120	163	320	434	440	597	500	678
1	8	25.40	160	217	440	597	600	814	680	922
1	12		170	231	480	651	660	895	740	1003
1-1/8	7	25.58	220	298	600	814	840	11:39	960	1302
1-1/8	12		260	353	660	895	940	1275	1080	1464
1-1/4	7	31.75	320	434	840	1139	1100	1492	1360	1844
1-1/4	12		360	488	920	1248	1320	1790	1500	2034
1-3/8	6	34.93	420	570	1100	1492	1560	2115	1780	2414
1-3/8	12		460	624	1260	1709	1780	2414	2040	2766
1-1/2	6	38.10	560	760	1460	1980	2080	2820	2360	3200
1-1/2	12		620	841	6 4 0	2224	2320	3146	2660	3607

Torque Limits (Cont)

Table D-3. Dry Torque Limits for M983 Crane (Metric)

CAPSCREW HEAD MARKINGS



SIZE		TORQUE					
		METRIC GRADE 8.8		METRIC GRADE 10.9		METRIC GRADE 12.9	
DIA INCHES	MILLIMETERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS	POUNDS FEET	NEWTON METERS
.157	4	2	3	3	4	4	5
.197	5	4	5	6	8	7	9
.237	6	7	9	10	14	11	15
.276	7	11	15	16	22	20	27
.315	8	18	24	25	34	29	39
.394	10	32	43	47	64	58	79
.473	12	58	79	83	113	100	136
.552	14	94	127	133	180	159	216
.630	16	144	195	196	266	235	319
.709	18	190	258	269	365	323	438
.788	20	260	353	366	496	440	597
.867	22	368	499	520	705	678	919
.946	24	470	637	664	900	794	1077
1.064	27	707	959	996	1351	1235	1675
1.182	30	967	1311	1357	1840	1630	2210

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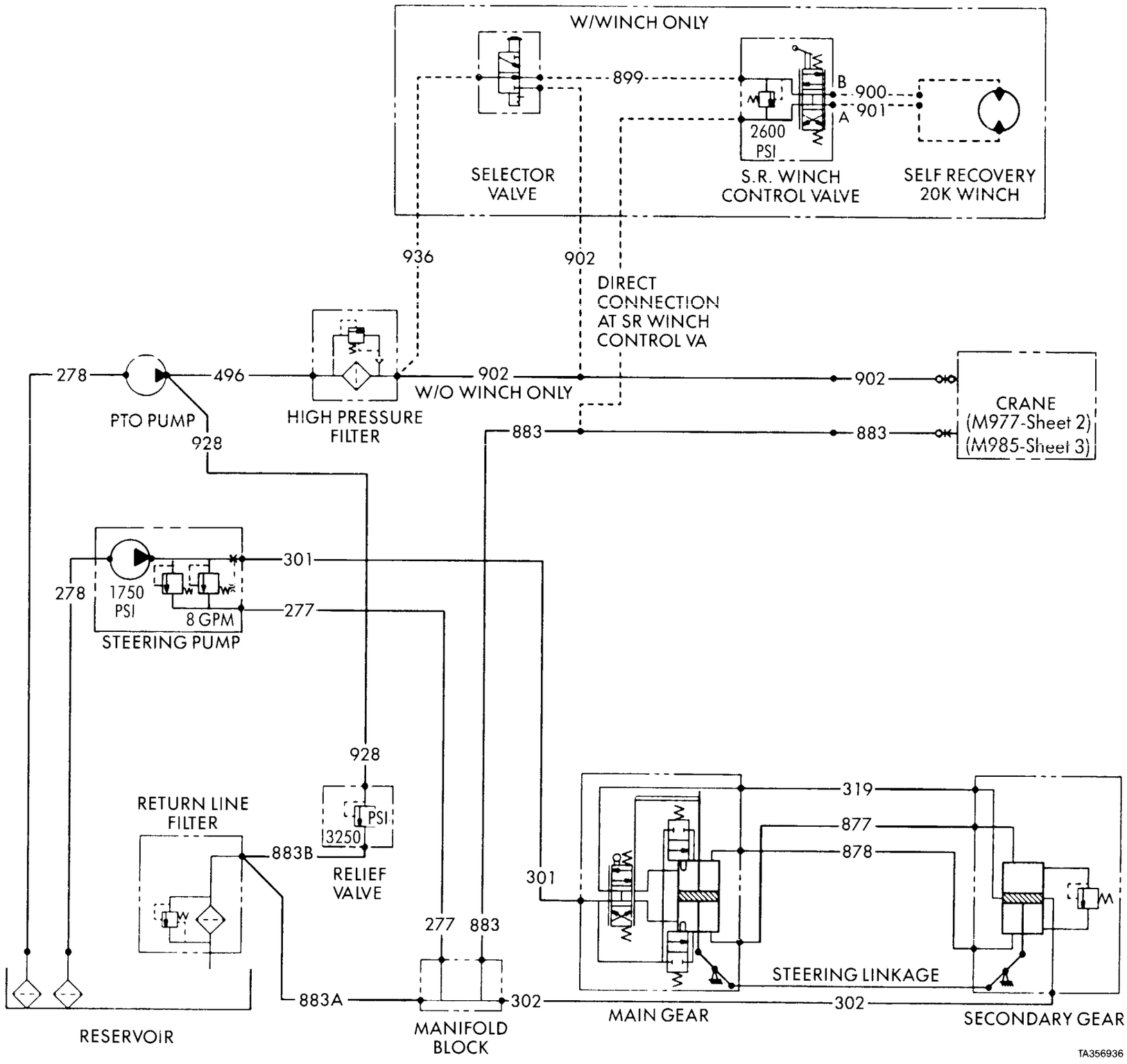
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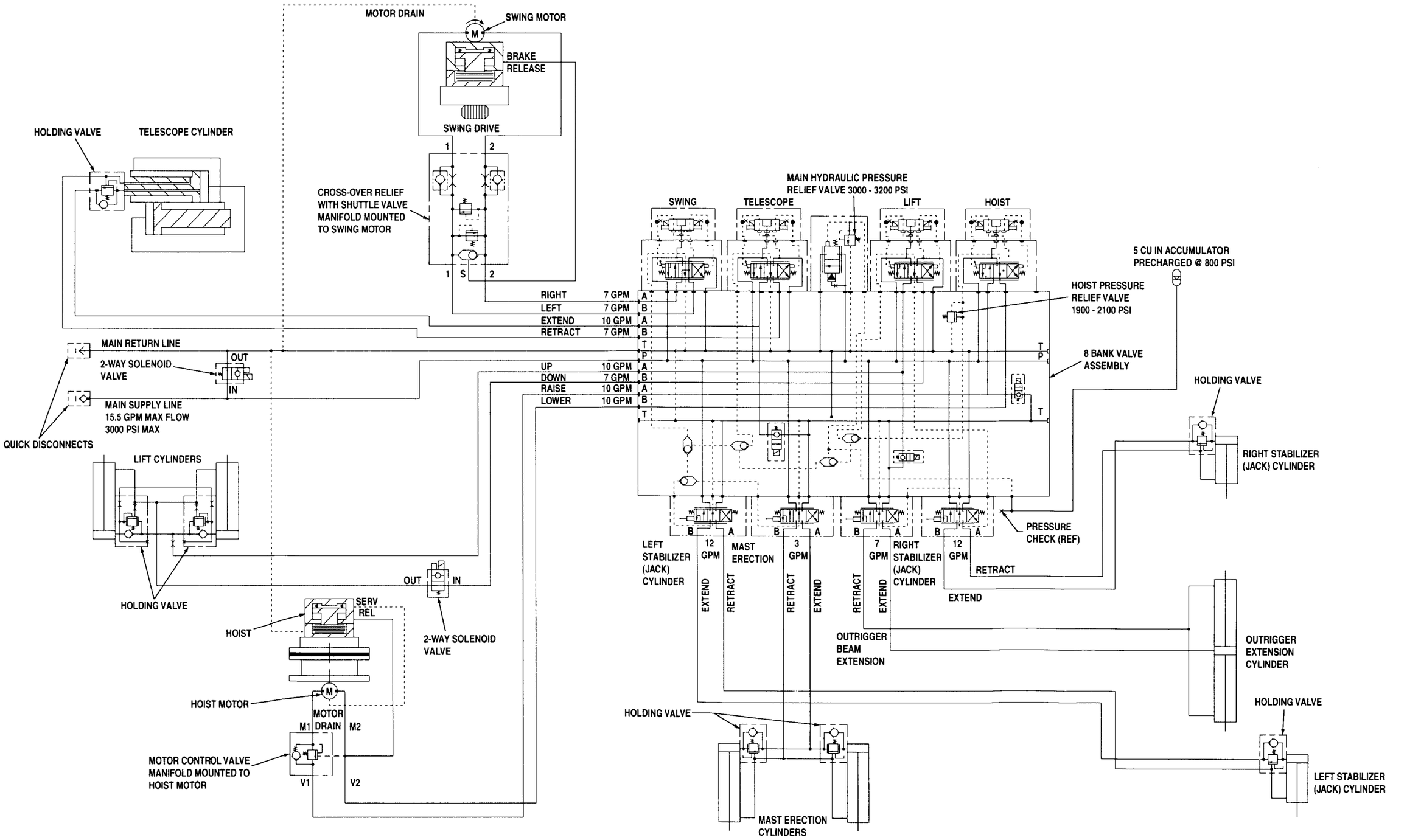
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Asbestos in brake linings	c
Batteries, terminals, and cables	c
Carbon monoxide (exhaust gas)	a
Compressed air	c
Crane operation under powerlines	b
Fuel	a
High voltage	b
Hot exhaust pipe/muffler	b
Hot radiator	b
Jewelry, wearing of	a
“Low’’ voltage	b
Nuclear, biological, or chemical (NBC) exposure	c
Parking brake, incorrect use of	a
Seatbelts, use of	b
Starting fluid	c
Trailer brakes	b
Winch cable, handling of	b
Winch operation	b
Warranty references	A-3
Wear pads and cylinder extension No. 1 and No. 2 (M977, M985) removal/installation	17-18
Wear pads and cylinder, extension No. l and No. 2 (M984E1) removal/installation	17-18.1
Wear pads and extension No. 1 (M977, M985) removal/installation	17-12
Wear pads and extension No. l (M984E1) removal/installation	17-12.1
Wear pads and extension No. 2 (M977, M985) removal/installation	17-13
Wear pads and extension No. 2 (M984E1) removal/installation	17-13.1
Winch/auxiliary hydraulic relief valve (M983, M984) repair	20-3
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Removal/Installation	20-8

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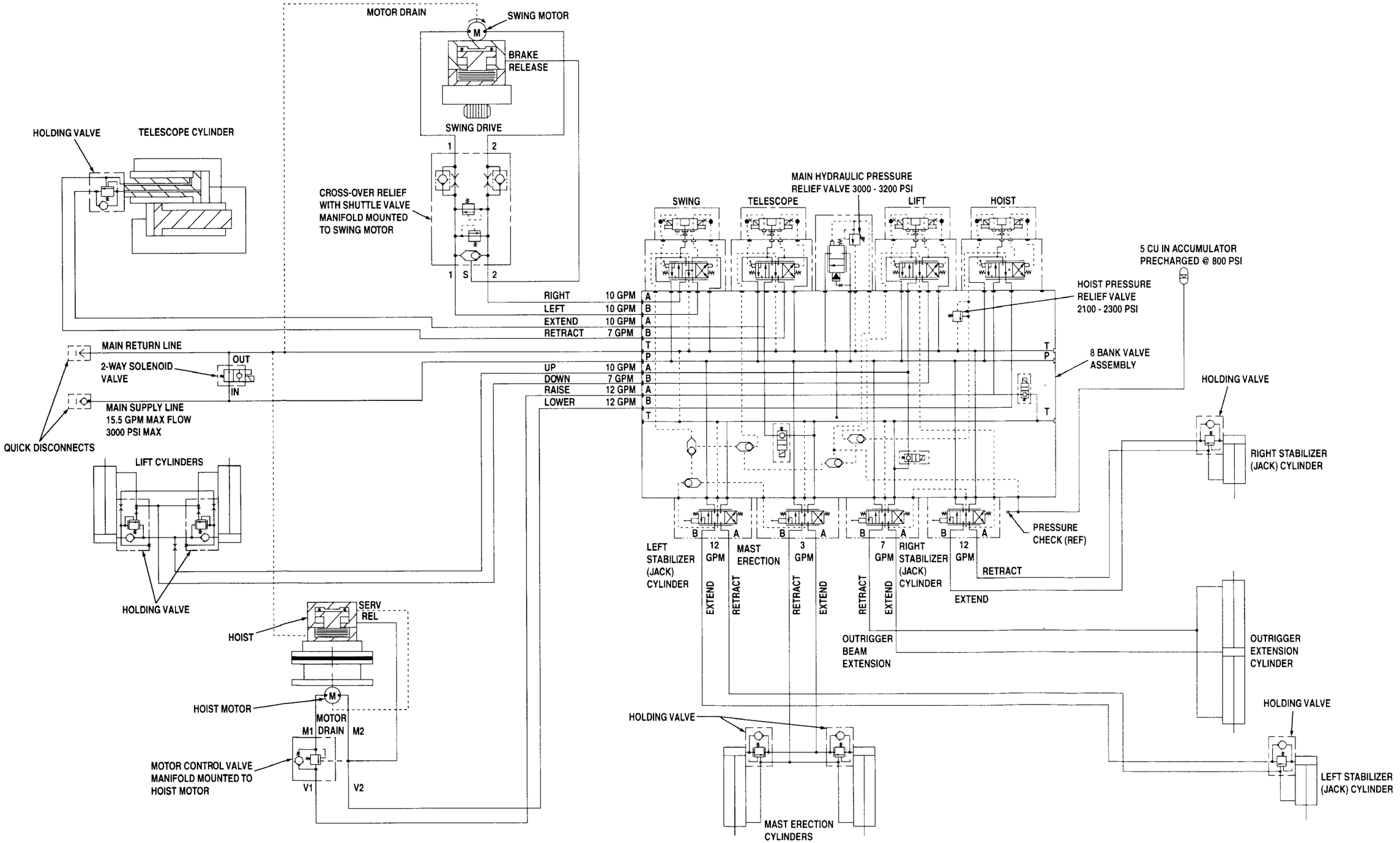
Subject	Paragraph, Figure, Table Number
Winch, heavy-duty, manifold (M984E1) (Cont)	
Repair	20-9
Winch, self-recovery, control valve assembly repair	20-4
Wiring diagrams, cranes	FO-2



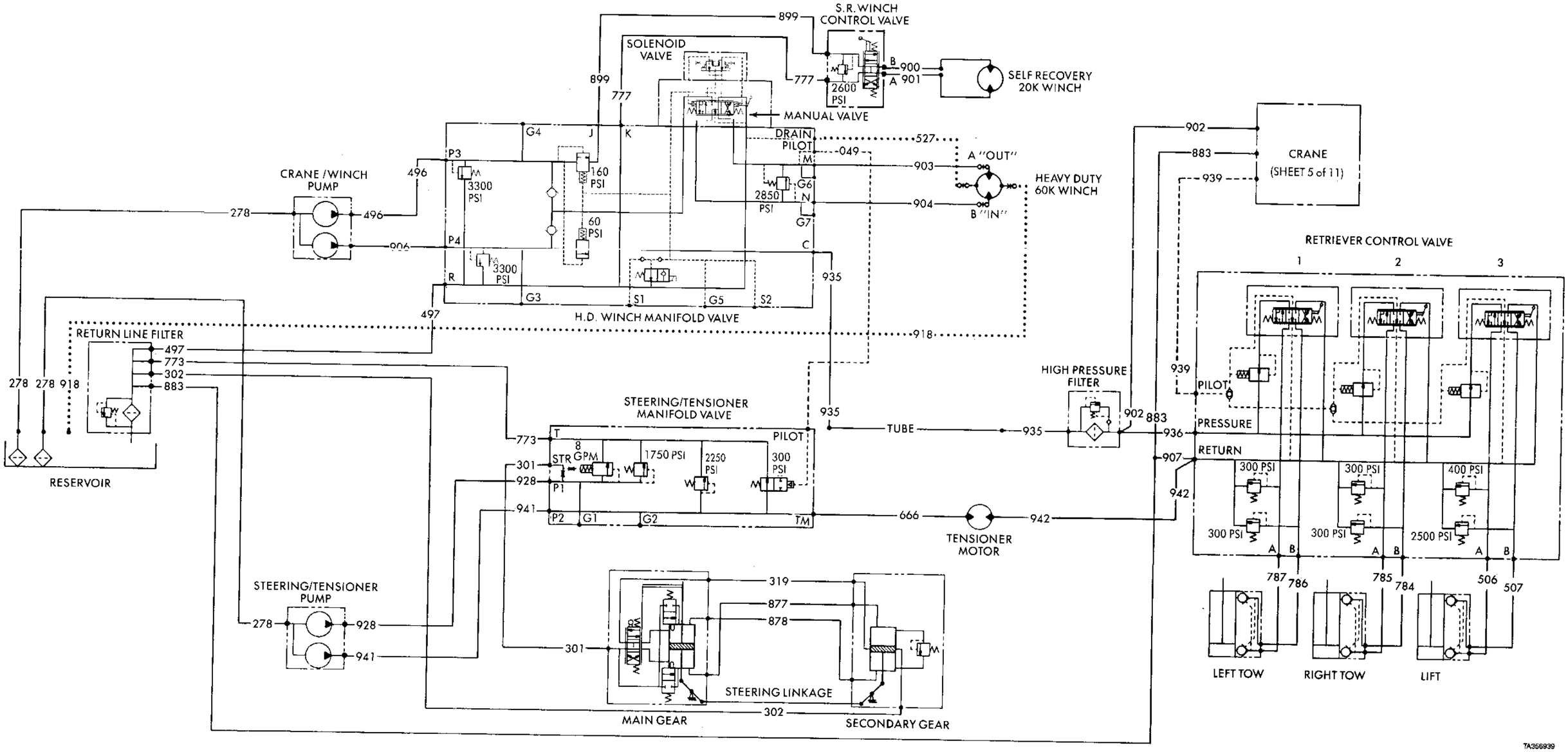
FO-1. Hydraulic Schematic (M977, M985) (Sheet 1 of 11).



FO-1. Hydraulic Schematic (M977 Crane) (Sheet 2 of 11).

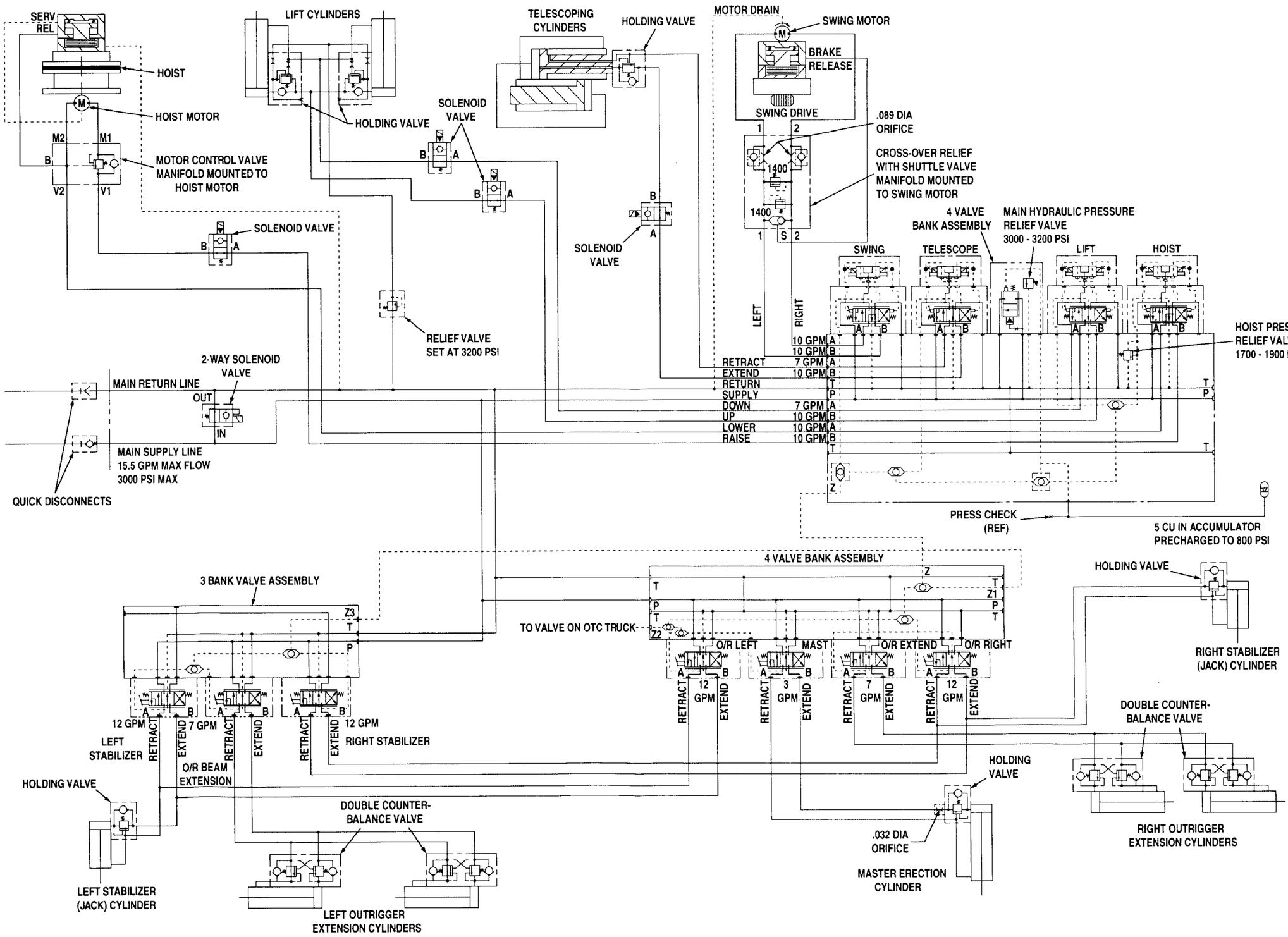


FO-1. Hydraulic Schematic (M985 Crane) (Sheet 3 of 11).

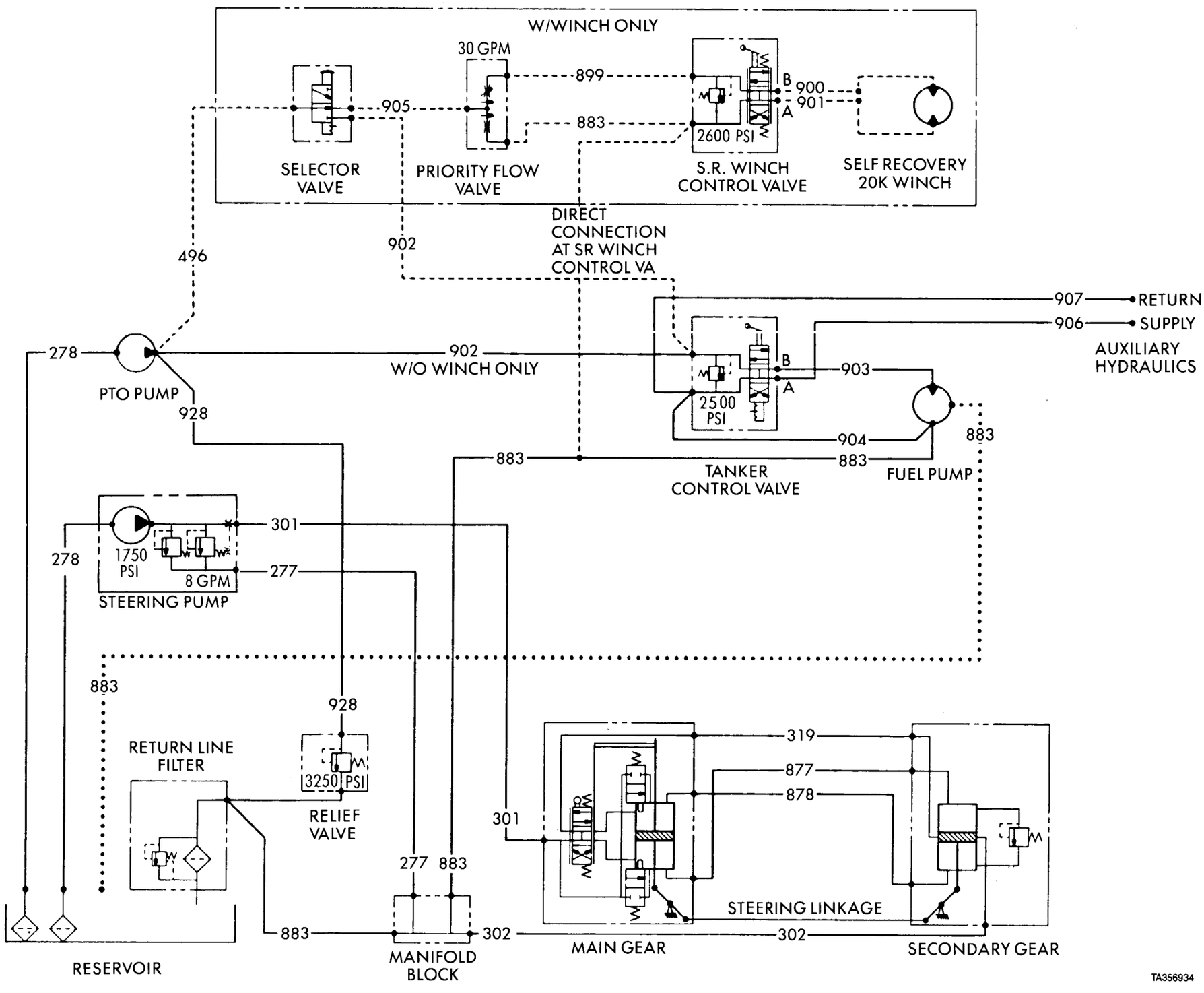


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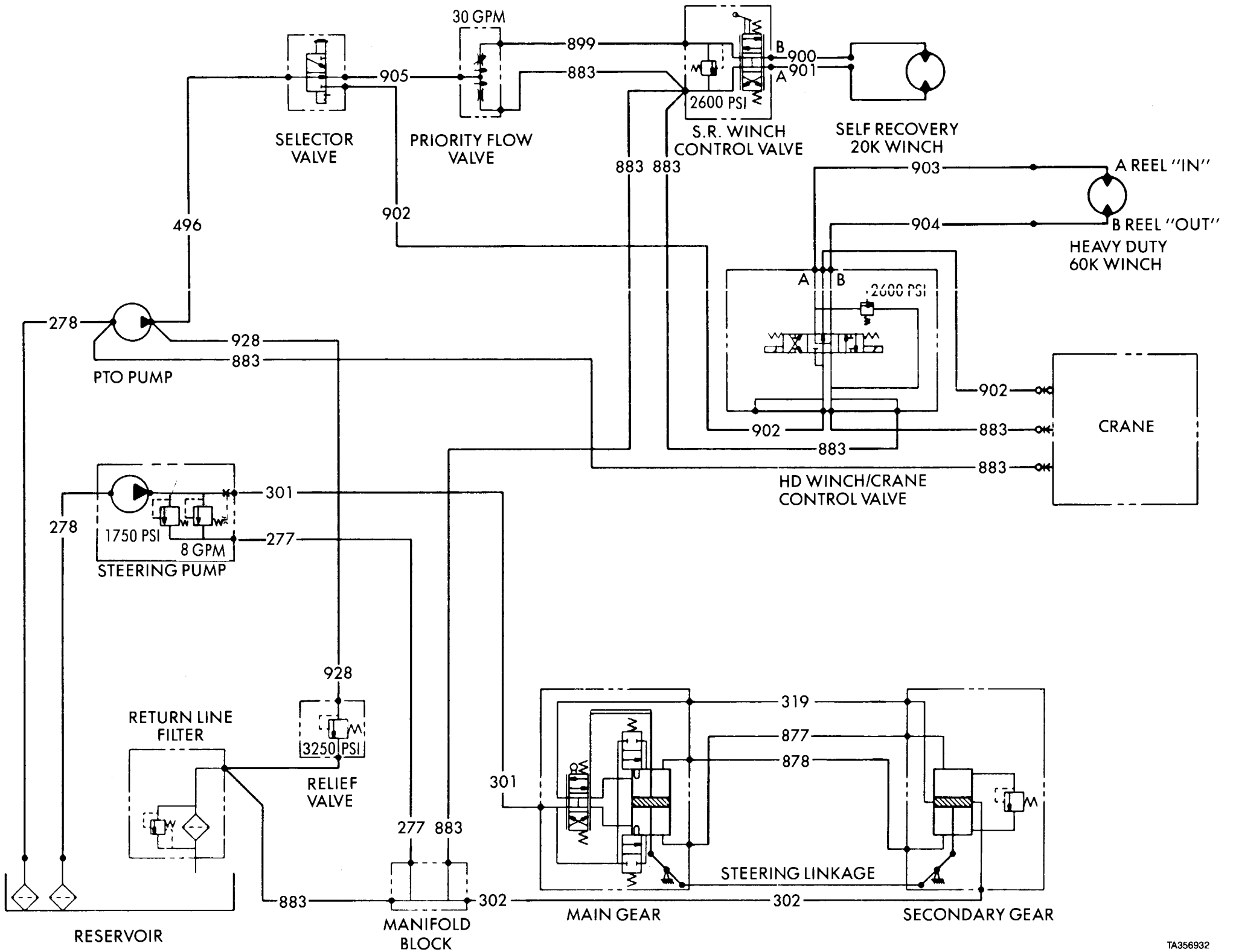
FO-1. Hydraulic Schematic (M984E1) (Sheet 4 of 11).



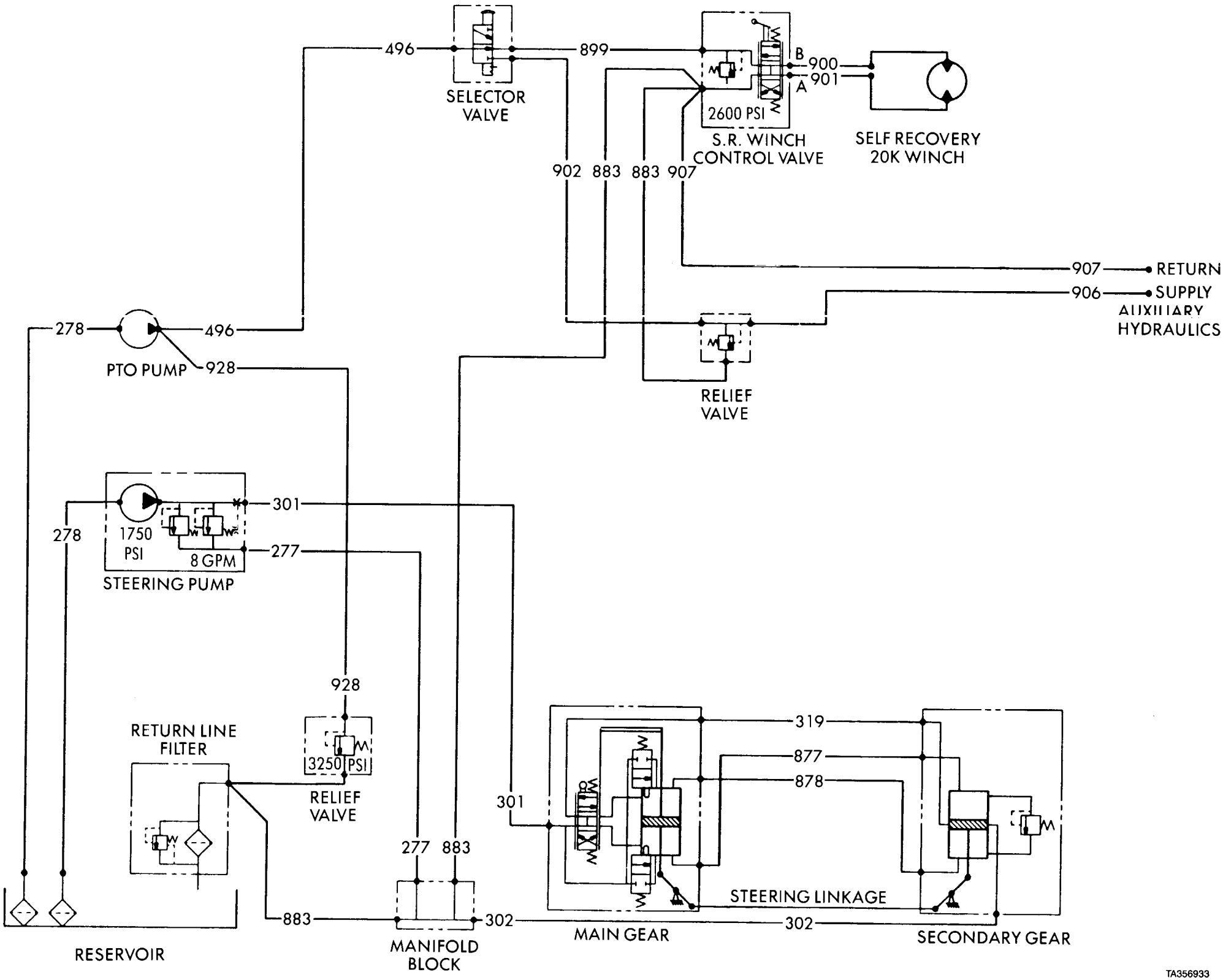
FO-1. Hydraulic Schematic (M984E1 Crane) (Sheet 5 of 11).



FO-1. Hydraulic Schematic (M978) (Sheet 6 of 11).

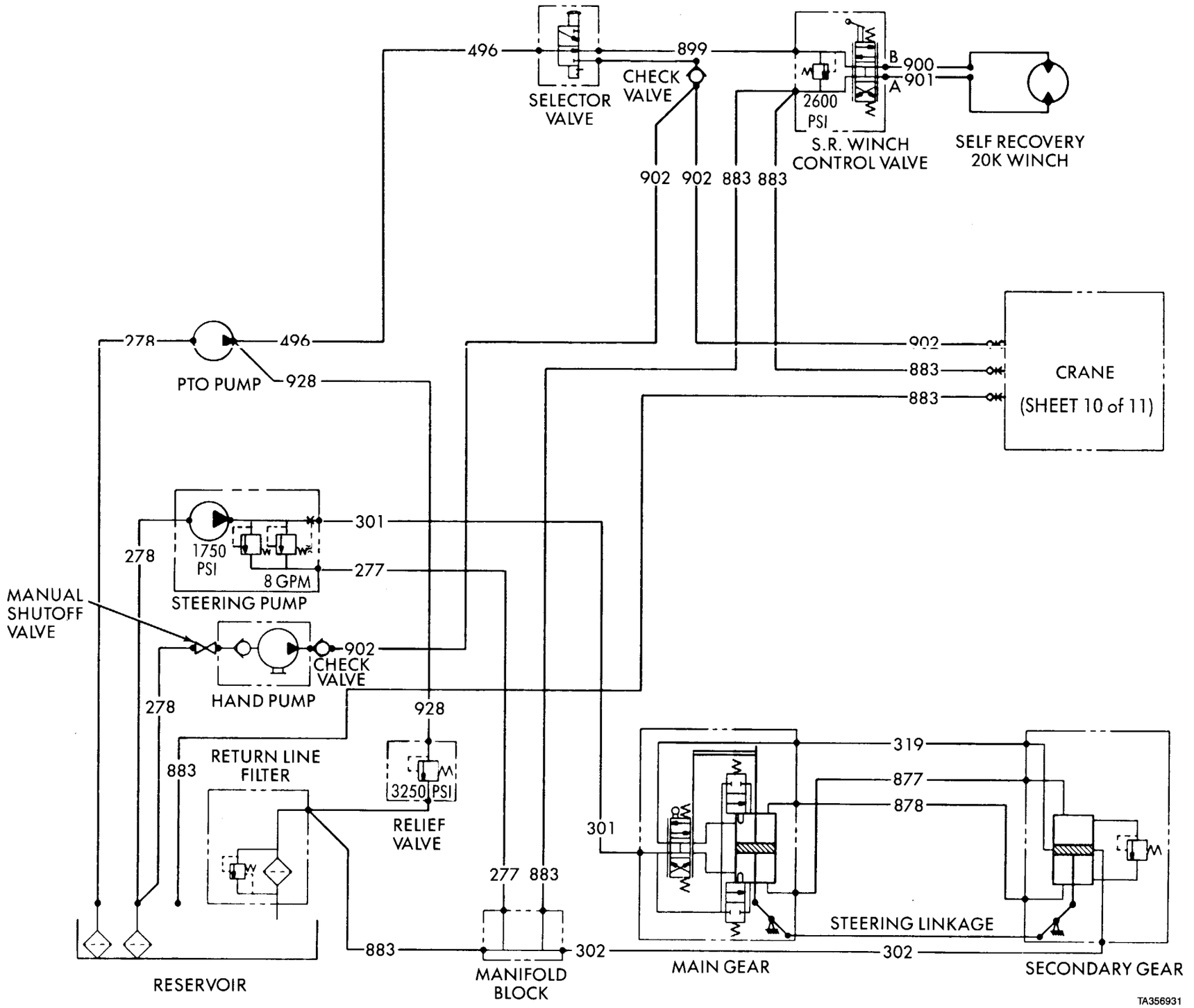


FO-1. Hydraulic Schematic (M984) (Sheet 7 of 11).

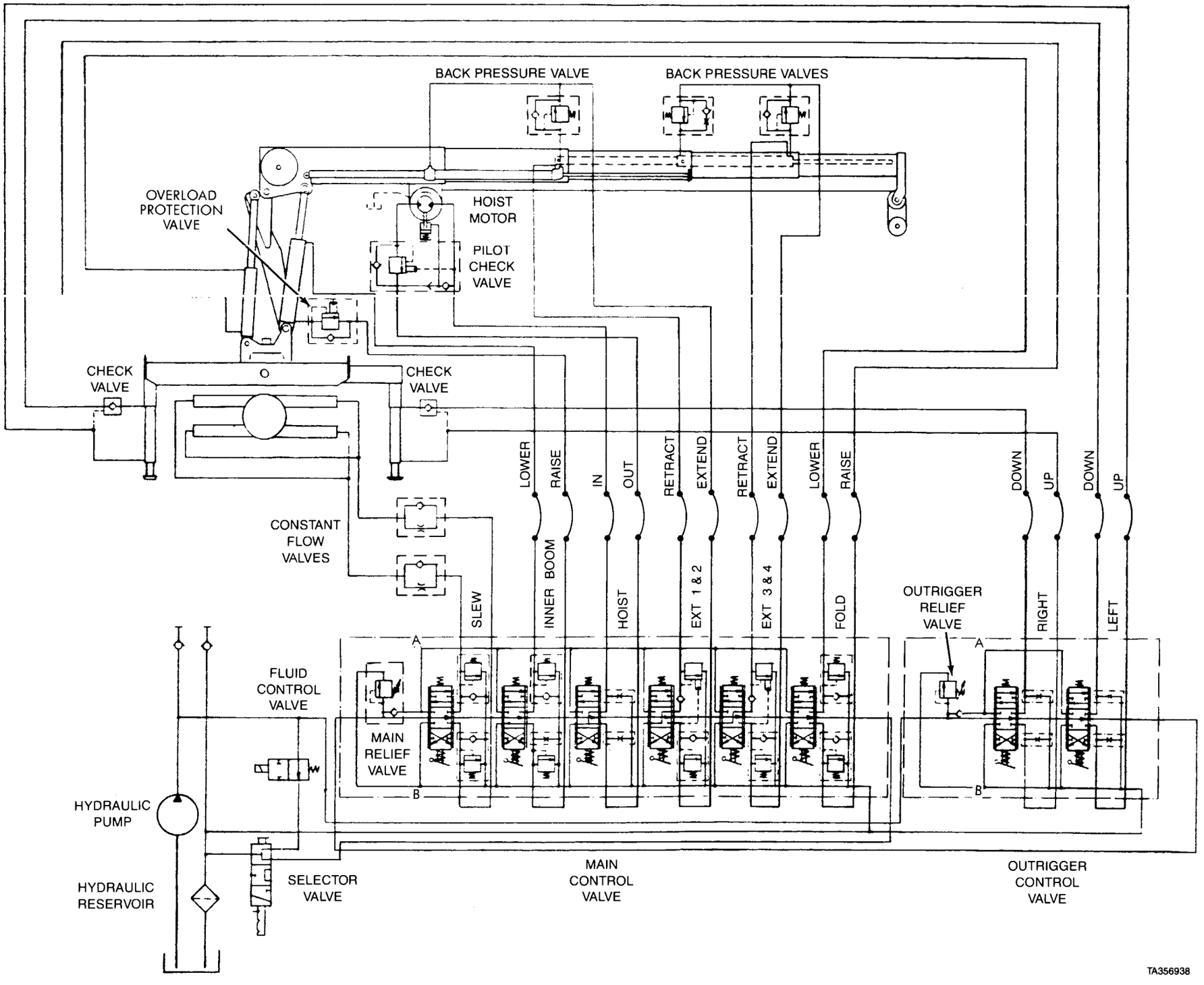


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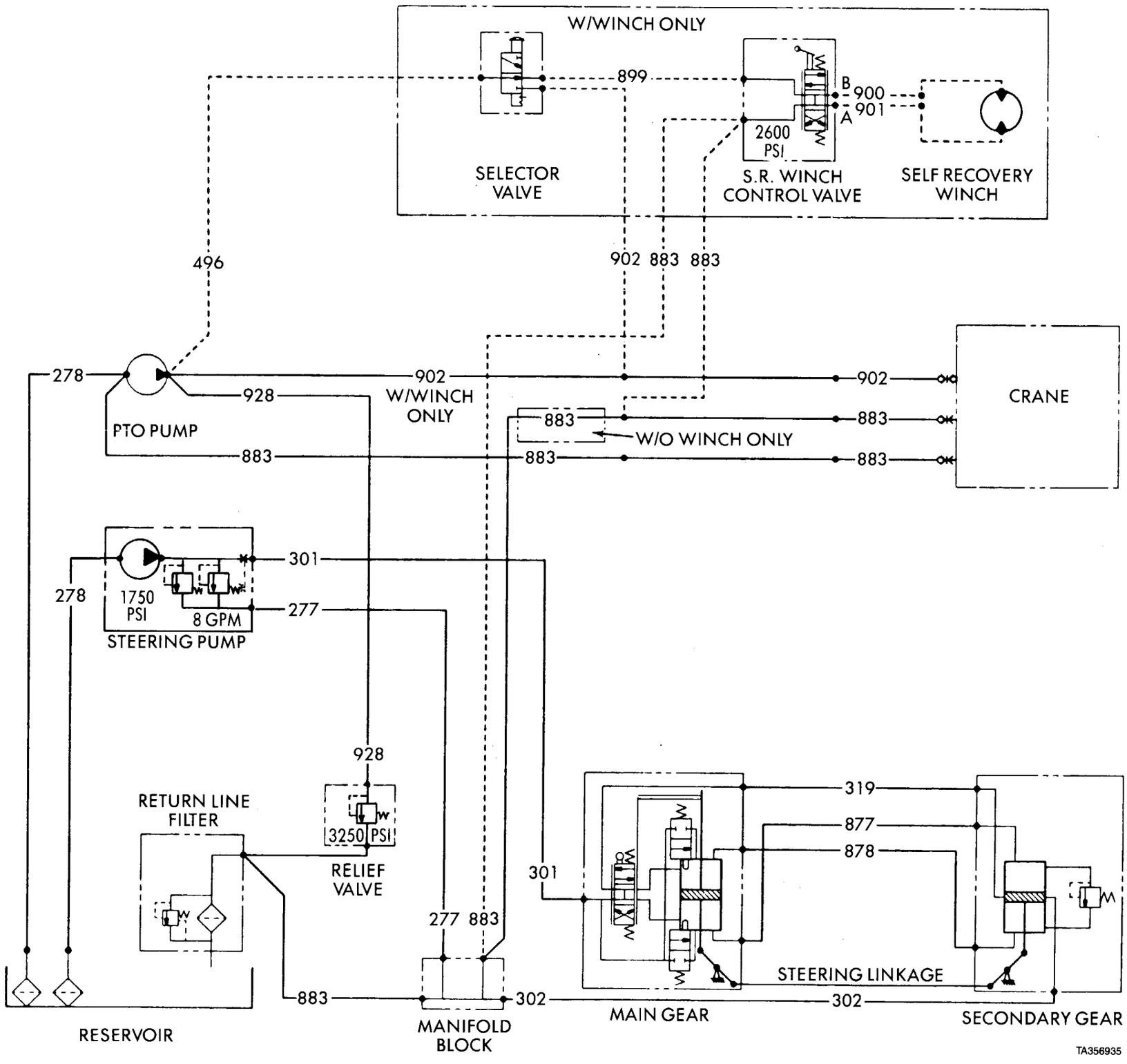
FO-1. Hydraulic Schematic (M983 w/o Crane) (Sheet 8 of 11).



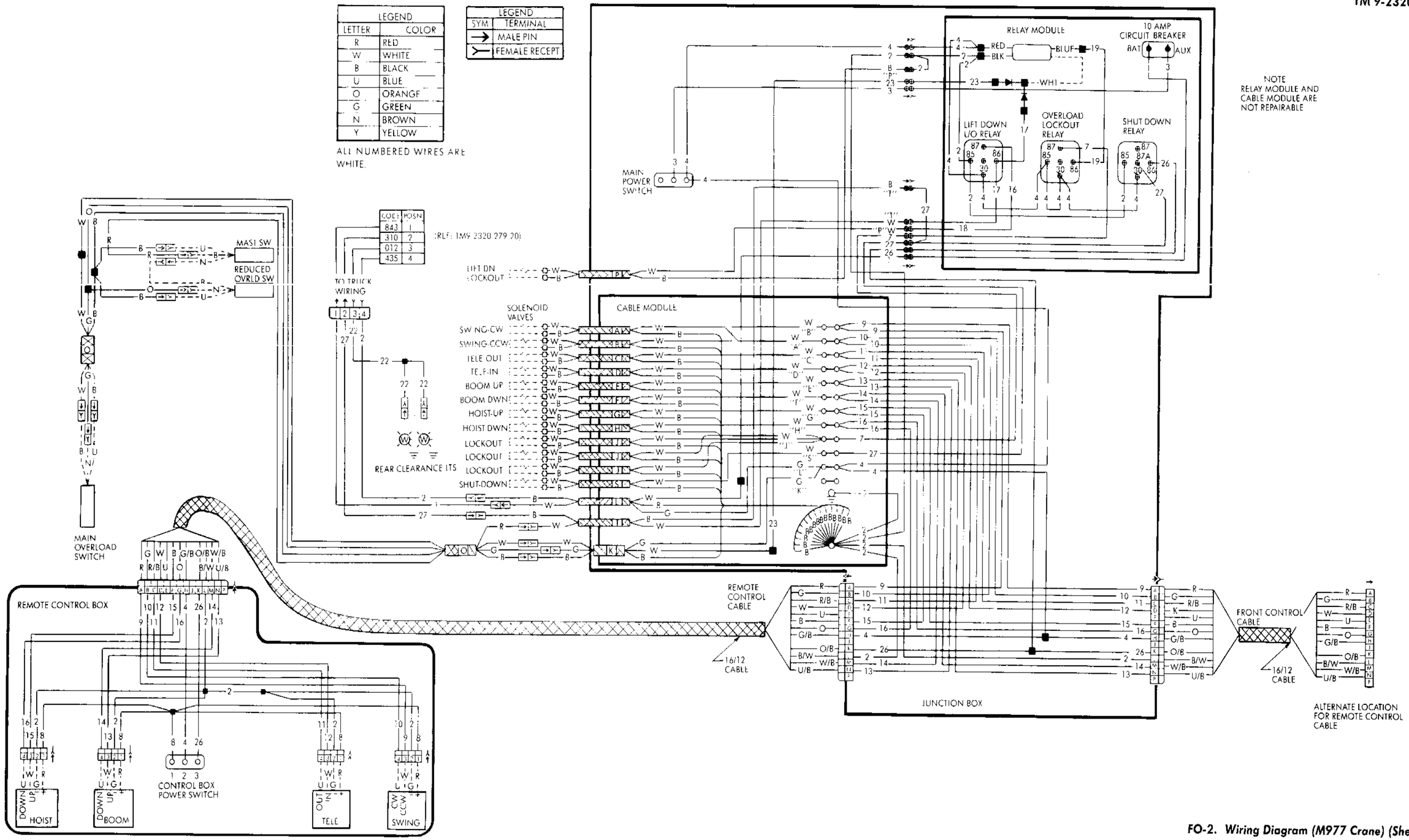
FO-1. Hydraulic Schematic (M983 w/Crane((Sheet 9 of 11).



FO-1. Hydraulic Schematic (M983 Crane) (Sheet 10 of 11).

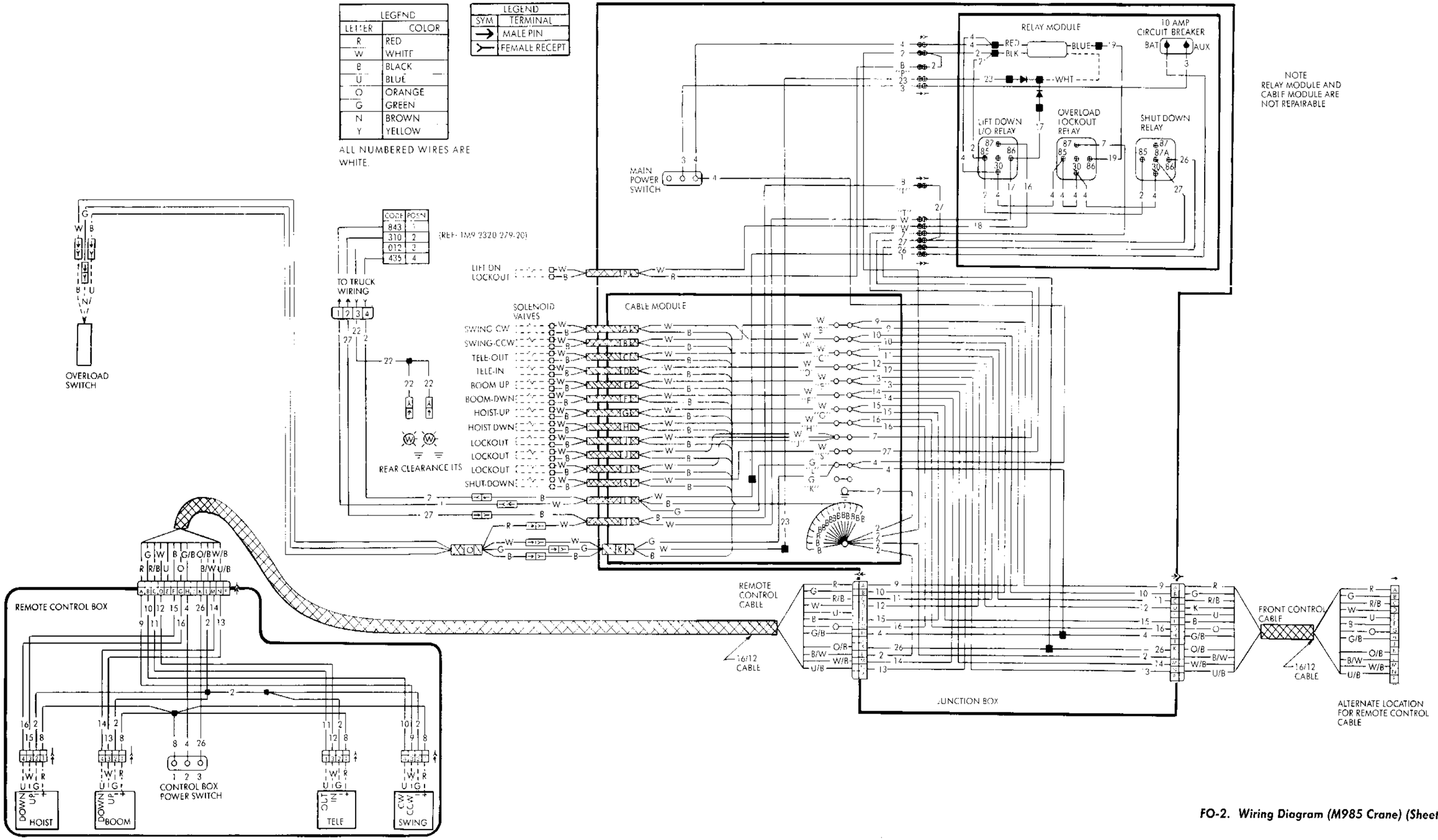


FO-1. Hydraulic Schematic (M985E1) (Sheet 11 of 11).



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FO-2. *Wiring Diagram (M977 Crane) (Sheet 1 of 3).*



TA356954

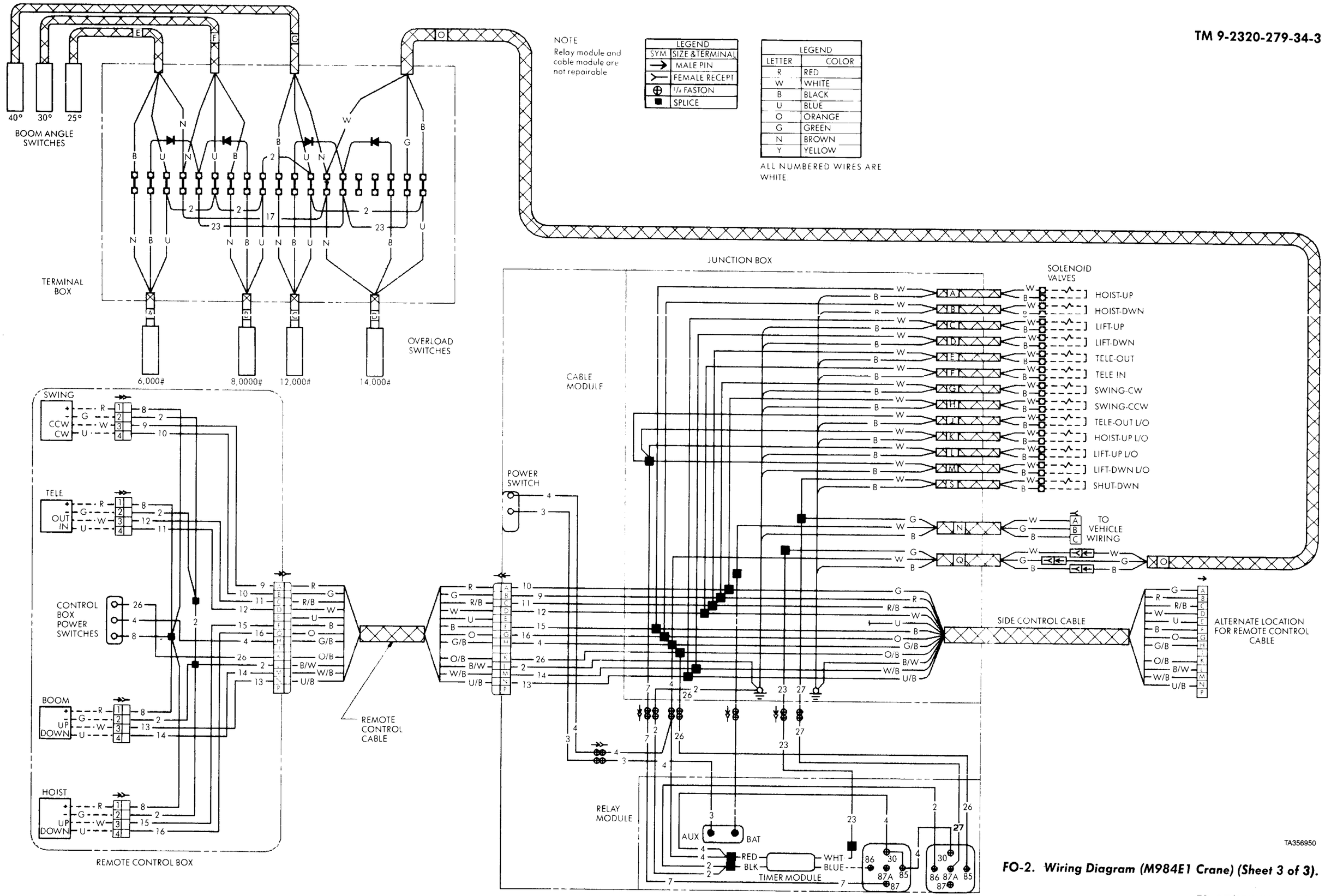
FO-2. Wiring Diagram (M985 Crane) (Sheet 2 of 3).

NOTE
Relay module and cable module are not repairable

LEGEND	
SYM	SIZE & TERMINAL
→	MALE PIN
>—	FEMALE RECEPT
⊕	1/4 FASTON
■	SPLICE

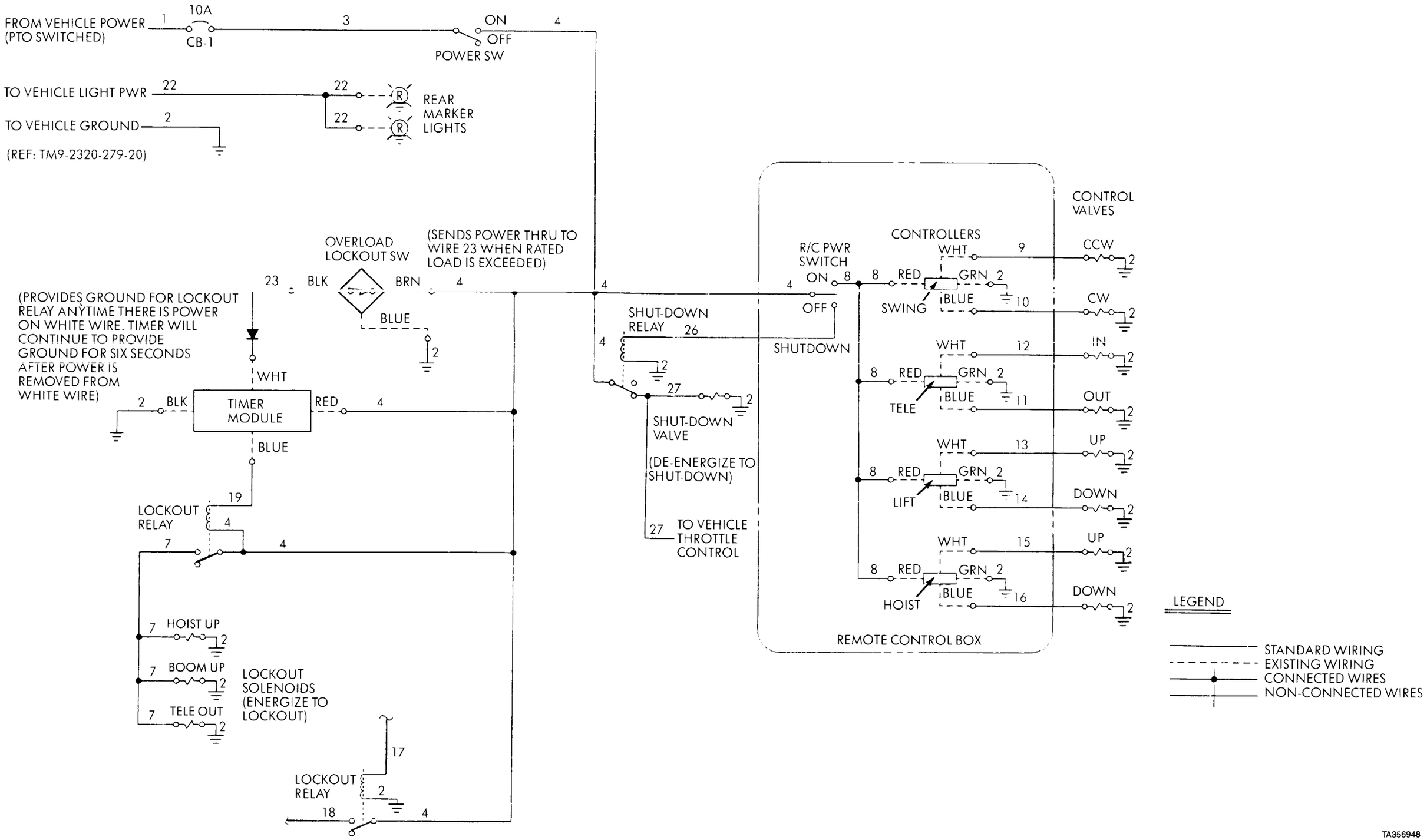
LEGEND	
LETTER	COLOR
R	RED
W	WHITE
B	BLACK
U	BLUE
O	ORANGE
G	GREEN
N	BROWN
Y	YELLOW

ALL NUMBERED WIRES ARE WHITE.



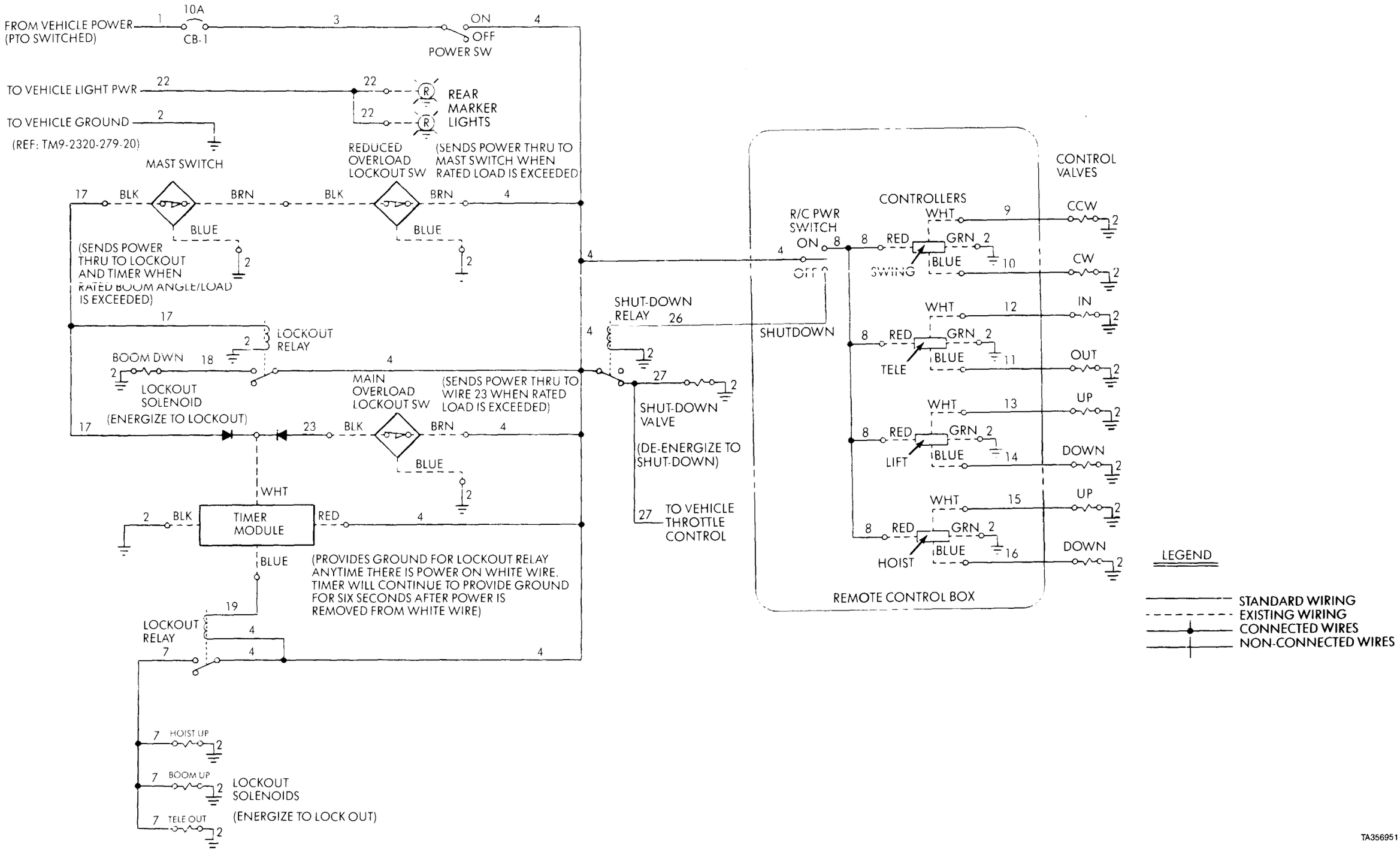
TA356950

FO-2. Wiring Diagram (M984E1 Crane) (Sheet 3 of 3).

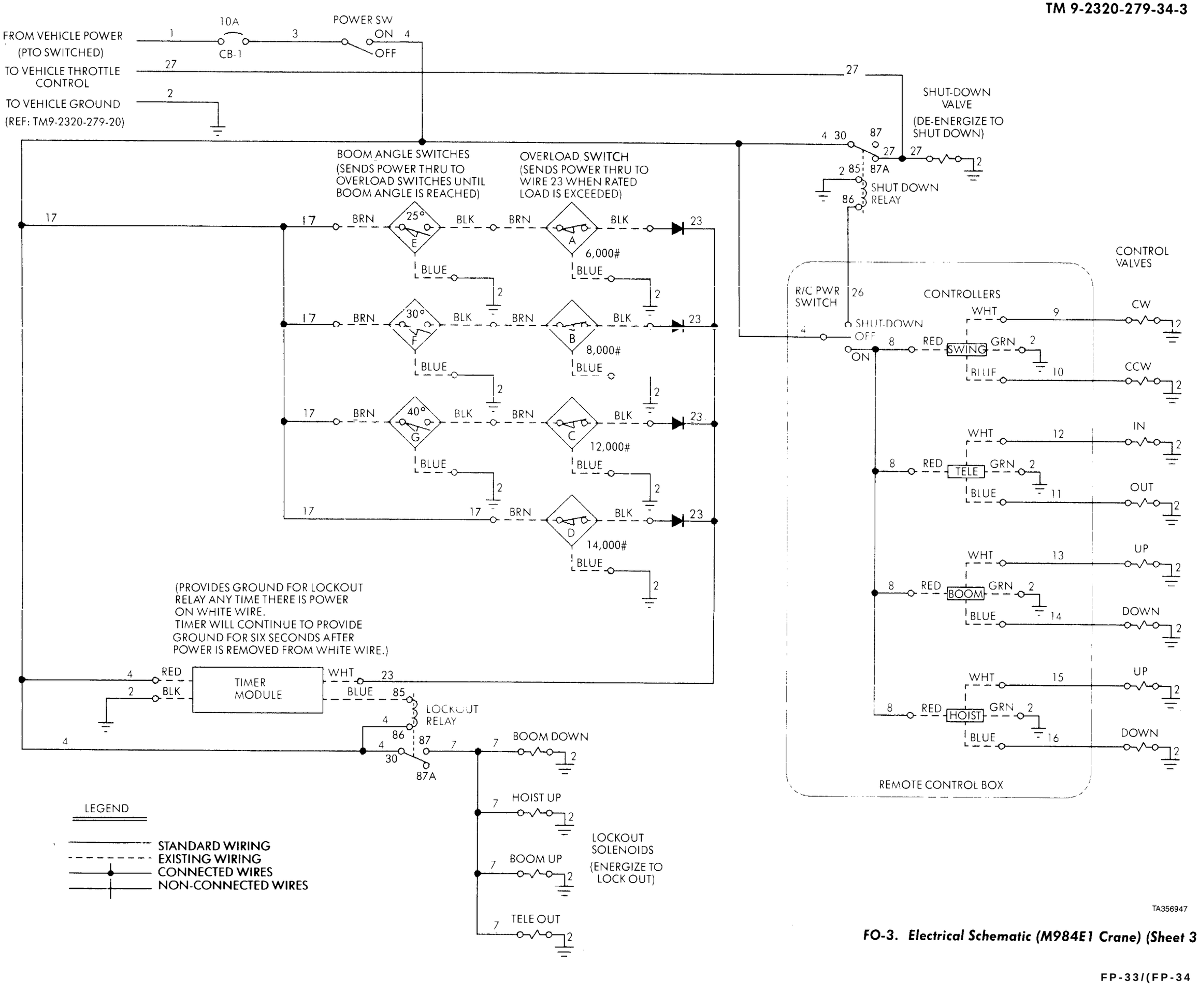


TA356948

FO-3. Electrical Schematic (M985 Crane) (Sheet 1 of 4).

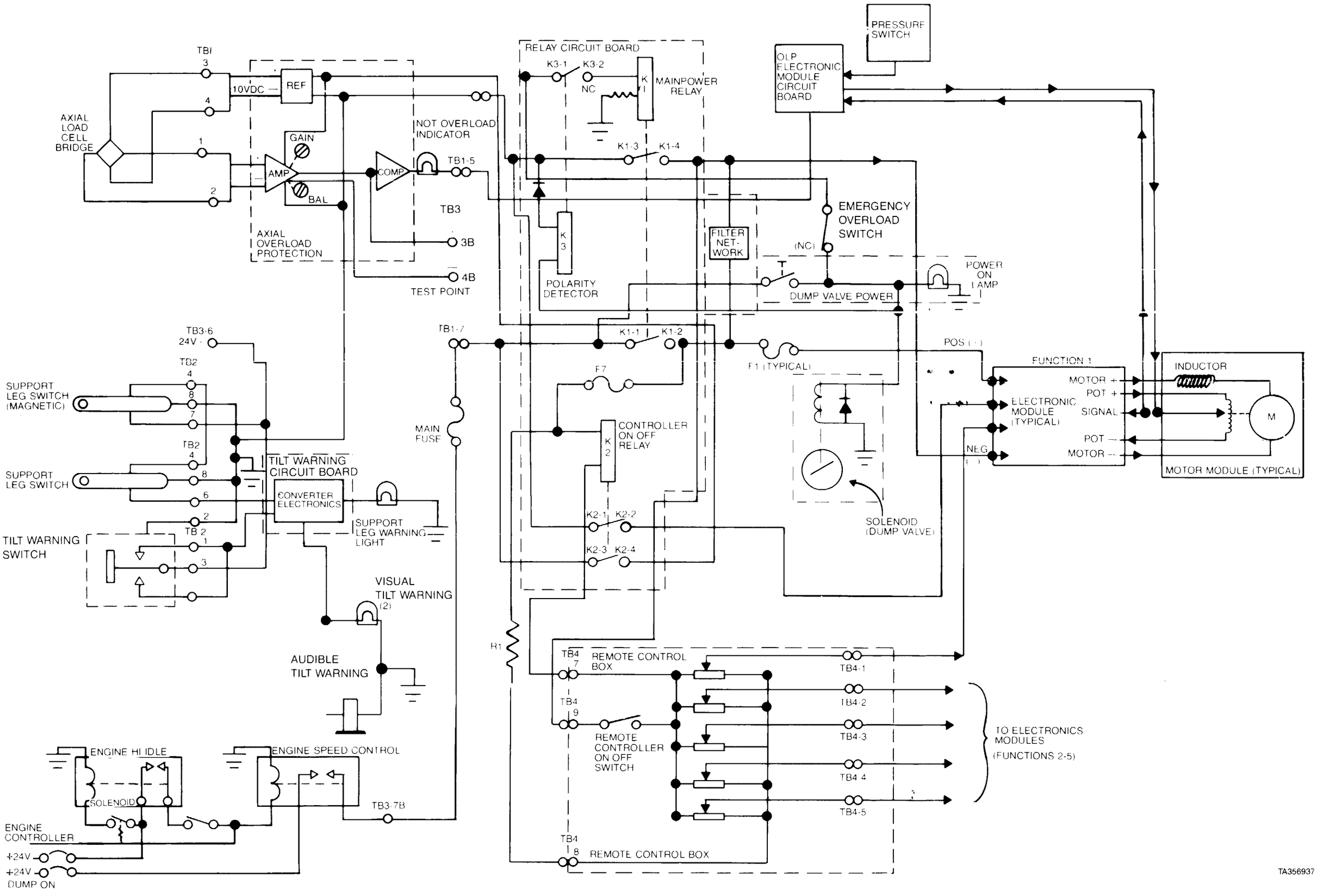


FO-3. Electrical Schematic (M977 Crane) (Sheet 2 of 4).



TA356947

FO-3. Electrical Schematic (M984E1 Crane) (Sheet 3 of 4).



TA356937

FO-3. Electrical Schematic (M983 Crane) (Sheet 4 of 4).

By Order of the Secretary of the Army

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R.L. DILWORTH
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The Adjutant General

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21-8	21-2	NA	NA

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

In para 21-2.c, Assembly, step (1) user is not cautioned about touching commutator.

Add caution to not touch commutator of armature during assembly so oils from skin will not damage it.

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THE METRIC SYSTEM ANO EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters= 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton =1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter=100 Sq Millimeters=0.155Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,00,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

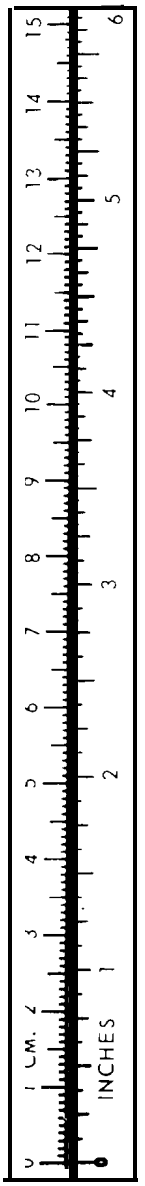
TEMPERATURE

5/9 (°F–32) =°C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 = F°

APPROXIMATE CONVERSION FACTORS

TO CHANGE	To	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	O.946
Gallons	Liters	3.785
Ounces	Grams	...28.349
Pounds	Kilograms	O.454
Short Tons,	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.289
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.195
Square Kilometers	Square Miles	0.385
Square Hectometers	Acres	2,471
Cubic Meters	Cubic Feet	35.315
Cubic Meters,	Cubic Yards	1303
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	...0.264
Grams	Ounces	O.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.733
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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