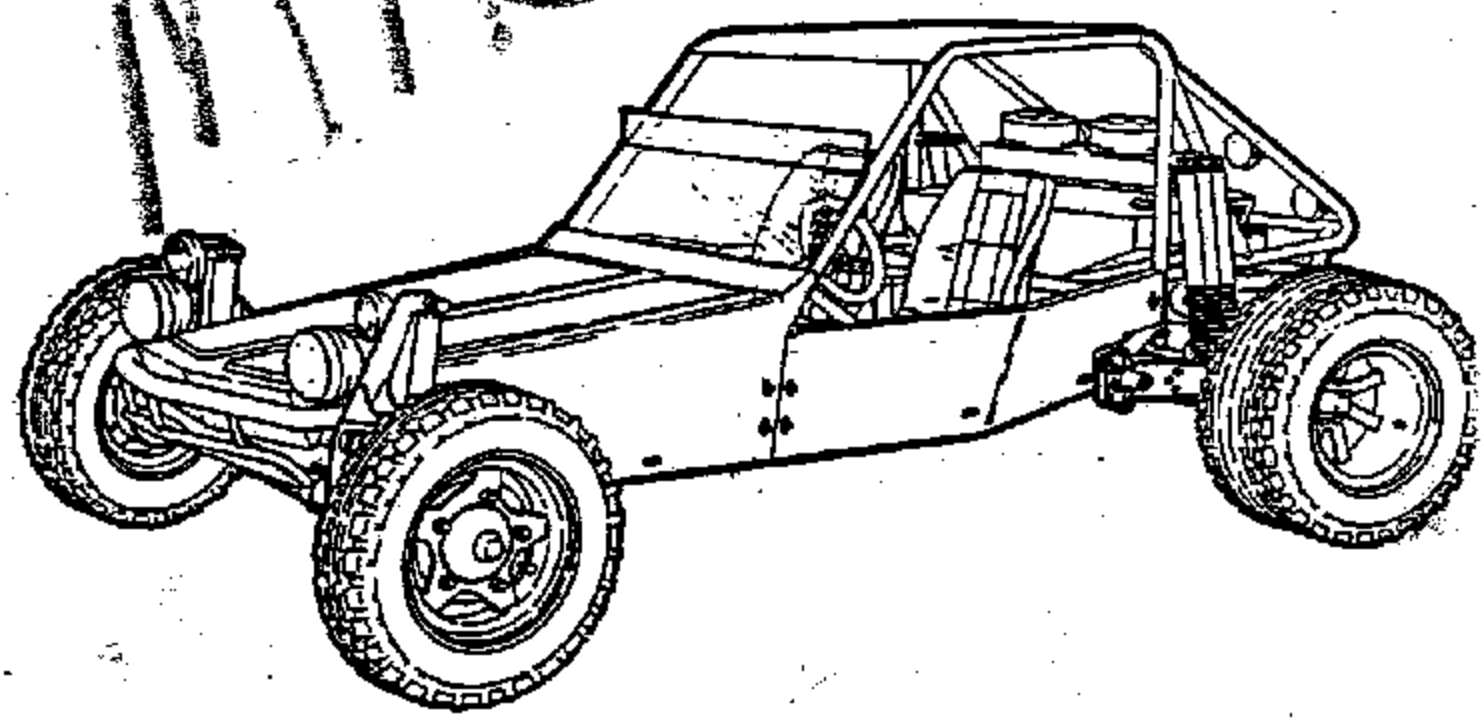
SHOP MAINTENANCE, SERVICE AND REPAIR MANUAL FOR THE FAST ATTACK VEHICLE



CHENOWTH RACING PRODUCTS, INC

943 Vernon Way
El Cajon, California 92020
619/449-7100

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

TABLE OF CONTENTS - Continued

Table 1-1. SFAV Leading Particulars

Performance	
Speed (Maximum)	84 mph +
Acceleration 0-60 mph	Less than 12 seconds
Horsepower	94 hp @ 4400 rpm (nominal)
Compression Ratio	8:1
Fuel Consumption	30 mpg (average)
Fuel Capacity	16 gallons
Turning Radius	22 feet (minimum)
Physical Characteristics	
Length	146 inches (approximate)
Width (Outside Wheel to Wheel)	76 inches (approximate)
Height	57 inches (approximate)
Ground Clearance	13.2 inches (minimum)
Weight	1540 pounds
Wheel Base	103 inches
Gross Weight	2440 pounds
Engine Data	
Type Engine	Modified VW 1984 cc, 4 cylinder
Fuel System	Gasoline, standard carburetion
Type Fuel	Unleaded (87 octane) commerical or military grade
Type Cooling	Air cooled
Transmission	Synchromesh Transaxle
Electrical System	
System Voltage	12 volts
Alternator Output	14 volts, 55 amperes
Battery Capacity	100 ampere-hours

Table 1-1. SFAV Loading Particulars - Continued

Chassis Characteristics	
Frame Type	Welded, tubular, 4130 Chromoly
Suspension (Front)	Standard fixed with VW type torsion bar, king pin, adjustable joint and double gas-filled shock absorbers
Suspension (Rear)	Modified with 3 gas-filled shock absorbers
Steering	Rack and pinion
Brakes (Rear)	Hydraulic drum type
Brakes (Front)	Hydraulic drum type
Wheels (Front)	Five-lug 15 x 5
Wheels (Rear)	Five-lug 15 x 8 offset
Tires (Front)	Four-ply E78-15, National Commando (tube type)
Tires (Rear)	Four-ply 31 x 11.50 R15 Goodyear Wrangler (tube type)
Tire Pressure	
Front	18 psi
Rear	20 psi

Section II. REQUIREMENTS AND SPECIFICATIONS

2-1. TOOLS AND EQUIPMENT. Tools and equipment required to perform the service and maintenance instructions contained in this manual are listed in appendix.

2-2. CONSUMABLE MATERIALS. Consumable materials required during performance of the service and maintenance instructions contained in this manual are listed in table 2-1.

2-3. TUNE-UP SPECIFICATIONS. To assist shop personnel in maintaining the SFAV engine, table 2-2 lists engine tune-up specifications. Engine specifications should be checked following engine maintenance to ensure operational reliability.

Table 2-1. Consumable Materials

Description	Part No.	Quantity
Oil, 40 Wt, Racing	-	
Grease, Valvoline 731	-	35 pounds
Grease, Valvoline 633 (Special Moly-Lube)	MIC-75B	12 tubes
Brake Fluid (DOT-3)	-	1 gallon
Gear Lube, Hyphoid, 90 Wt	-	1 gallon
Solvent, Cleaning	PD-680 Type II	5 gallons

Table 2-2. Tune-Up Specifications

Component	Specification
Spark Plug Gap	0.024 to 0.028 inch
Ignition Point Gap	0.016 inch
Dwell Angle	46 to 54 degrees
Ignition Timing (Static)	6 to 7 degrees BTDC
Engine Compression	126 +20 -15 psi (no more than 15 psi difference between high and low readings)
Valve Clearance (Cold)	Exhaust ~~0.006~~ 0.004 Intake ~~0.006~~ 0.004
Idle Speed	900 ±100 rpm
Front Wheel Alignment	
Toe in	1/8 to 3/16 inch
Chamber	0 ±1 degree
Clutch and Brake Pedal Freeplay	1 to 1-1/2 inches
Oil Pressure	50 ±10 psi

Section III. PREVENTIVE MAINTENANCE

3-1. MAINTENANCE CHECKS AND SERVICES. Maintenance checks and services are scheduled to be performed after 25, 50, 130, 210, and 265 hours of vehicle operation. Checklists for each of these inspections are provided in tables 3-1 through 3-5. All discrepancies must be corrected following the instructions in the corrective action column. Refer to the referenced paragraphs as applicable for detailed maintenance procedures.

3-2. SERVICING. The following instructions contain procedures necessary to maintain the SFAV during normal operation. Servicing must be performed during hourly scheduled maintenance intervals or as often as operating and environmental conditions require.

a. Oil Replacement. To replace engine oil, complete the following steps. Refer to figure 3-1.

NOTE

Engine oil should be drained while hot.

(1) Remove engine skid plate.

(2) Position 1-gallon container beneath engine.

(3) Loosen six cap nuts (1) on cover plate (3).

(4) Remove five cap nuts (1) and five washers (2). Pry oil strainer (5) loose from engine (7).

(5) After oil has drained, remove remaining cap nut (1) and washer (2).

(6) Lower cover plate (3), gasket (4), oil strainer (5), and gasket (6) from engine (7).

(7) Clean oil strainer (5) and cover plate (3).

(8) Remove oil filter located on left side of vehicle (just in front of fuel tank).

(9) Clean oil filter bracket to remove all grit and dirt.

OIL RUBBER GASKET

(10) Install new oil filter. Do not overtighten.

(11) Position new gasket (6), oil strainer (5), new gasket (4), and cover plate (3) on engine (7). Install six cap nuts (1) and new washers (2).

(12) Install engine skid plate.

(13) Fill engine with 6.3 pints of high-performance racing oil, Valvoline 40 wt or equivalent.

(14) Start engine and check for oil leaks.

b. Fuel Filter Replacement. To replace the fuel filter, complete the following steps:

TURN OFF FUEL AT TANK

(1) Loosen hose clamps at both ends of filter. Disconnect and plug fuel lines.

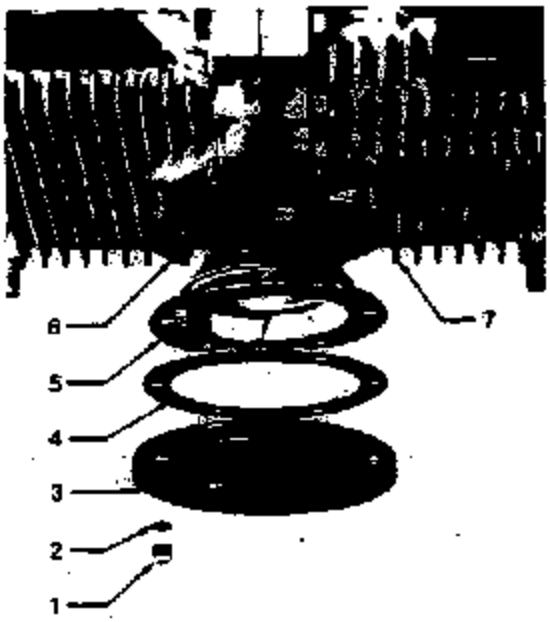
(2) Position new fuel filter in place and connect fuel lines.

(3) Tighten hose clamps.

TURN ON FUEL

(4) Check for fuel leaks.

(5) Start engine and recheck filter for leaks.



LEGEND

1. Cap Nut
2. Washer
3. Cover Plate
4. Gasket
5. Oil Strainer
6. Gasket
7. Engine

SFAV-4977-02

Figure 3-1. Oil Replacement.

Table 3-1. 25-Hour Maintenance Checks and Services

	Task	Corrective Action
1.	Check fluid level of both brake master cylinders.	Replenish cylinders with brake fluid as required.
2.	Check fluid level of clutch master cylinder.	Replenish cylinder with brake fluid as required.
3.	Check engine air inlet paper and foam filters for cleanliness.	Clean foam filter and replace paper filters. Refer to EM-1150-10.
4.	Check alternator belt tension. Inspect belt for damage or wear.	Adjust belt tension if loose. Replace belt if badly worn or damaged. Refer to paragraph 3-2c.
5.	Lubricate distributor breaker cam. Refer to paragraph 3-4b.	
6.	Change engine oil. Refer to paragraph 3-2a.	
7.	Lubricate front suspension. Refer to paragraph 3-4a.	

Table 3-2. 50-Hour Maintenance Checks and Services

	Task	Corrective Action
1.	Perform 25-hour maintenance checks and services in table 3-1.	
2.	Remove spark plugs and check for damage, cleanliness, and correct electrode gap.	Replace badly fouled or damaged plugs. Set plug gap 0.024 to 0.028 inch.
3.	Adjust rocker arms. Refer to paragraph 3-2d.	
4.	Check engine compression at each cylinder. Compression should be 111 to 146 psi with no more than a 15 psi difference between high and low indications. Refer to paragraph 3-2i.	Replace engine if any one cylinder compression is too low or if more than a 15 psi pressure differential exists.
5.	Check points, condenser, distributor cap, and rotor for damage, burning, and fouling.	Replace defective components. Refer to paragraph 3-2f.
6.	Lubricate distributor. Refer to paragraph 3-4b.	
7.	Start engine and check ignition timing. Refer to table 2-2.	Loosen distributor attach bolt and adjust timing.
8.	Replace fuel filter. Refer to paragraph 3-2b.	
9.	Adjust brakes. Refer to paragraph 3-2g.	

Table 3-3. 130-Hour Maintenance Checks and Services

	Task	Corrective Action
1.	Perform 25- and 50-hour maintenance checks and services. Refer to tables 3-1 and 3-2.	
2.	Adjust rocker arms. Refer to paragraph 3-2d.	
3.	Lubricate front wheel bearings. Refer to paragraph 3-4c.	
4.	Perform carburetor adjustment. Refer to paragraph 3-2e.	
5.	Check front wheel camber.	Adjust camber as required. Refer to paragraph 3-2h.

Table 3-4. 210-Hour Maintenance Checks and Services

Task	Corrective Action
1. Perform 25- and 50-hour maintenance checks and services. Refer to tables 3-1 and 3-2.	
2. Change transmission oil. Refer to paragraph 3-4e.	

Table 3-5. 265-Hour Maintenance Checks and Services

Task	Corrective Action
1. Perform 25-, and 50-, and 130-hour maintenance checks and services. Refer to tables 3-1 through 3-3.	
2. Lubricate constant velocity joints. Refer to paragraph 3-4d.	

c. Alternator Belt Adjustment. To check alternator belt tension, press down on the belt halfway between alternator pulley and crankshaft pulley. Belt should deflect about 3/8 inch. If deflection is significantly larger or smaller than this amount, adjust belt tension as follows. Refer to figure 3-2.

(1) Wedge screwdriver between one of notches in rear of alternator pulley (4) and alternator (6) mounting bolts. Hold screwdriver in position to stop pulley from turning.

(2) Remove nut (1), special cupped washer (2), shim washers (3), and half of pulley (4).

(3) To tighten belt (5), remove shim washers (3) as required from between pulley halves. To loosen belt, add shim washers as required between pulley halves.

NOTE

Store remaining shim washers (3) between cupped washer (2) and pulley (4).

(4) Install shim washers (3), half of pulley (4), cupped washer (2), and nut (1). Recheck belt (5) deflection.

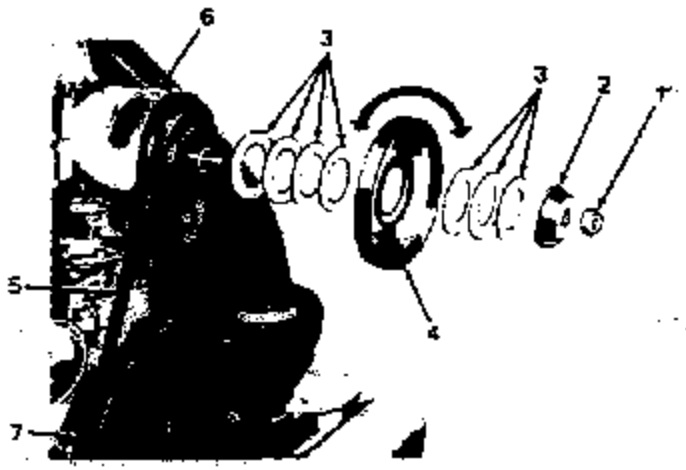
d. Rocker Arm Adjustment. Adjust rocker arms as follows:

(1) Remove cylinder head covers and distributor cap.

NOTE

When rotor is aligned with no. 1 cylinder mark, both valves for the no. 1 cylinder are closed, the piston is at approximately top dead center, and the spark plug is ready to fire.

(2) Hand turn the engine until distributor rotor is aligned with no. 1 cylinder notch in top edge of distributor housing.



LEGEND

1. Nut
2. Cupped Washer
3. Shim Washers
4. Pulley (Half)
5. Belt
6. Alternator
7. Pulley

SFAV-4871-03

Figure 3-2. Alternator Belt Adjustment.

NOTE

Adjust valve clearance in cylinder sequance 1-2-3-4 (reverse of firing order).

(3) Using a 0.004-inch feeler gauge, check clearance of both no. 1 cylinder valves.

(4) If adjustment is required, complete the following steps. Refer to figure 3-3.

(a) Insert 0.004-inch feeler gauge between valve stem and rocker.

(b) Loosen locknut and turn adjusting screw right to decrease clearance; left to increase clearance.

(c) Move feeler gauge in and out of clearance. When moderate drag is felt, tighten locknut while holding adjusting screw stationary.

(d) Recheck clearance.

(5) Turn engine by hand until distributor rotor moves counterclockwise (left) 90 degrees (1/4 turn) from no. 1 cylinder position.

(6) Using a 0.004-inch feeler gauge, check clearance of no. 2 cylinder valves. If required, adjust clearance in accordance with step (4) above.

(7) Turn engine by hand until distributor rotor moves counterclockwise (left) 90 degrees (1/4 turn). Check valve clearance of no. 3 cylinder. If required, adjust clearance in accordance with step (4) above.

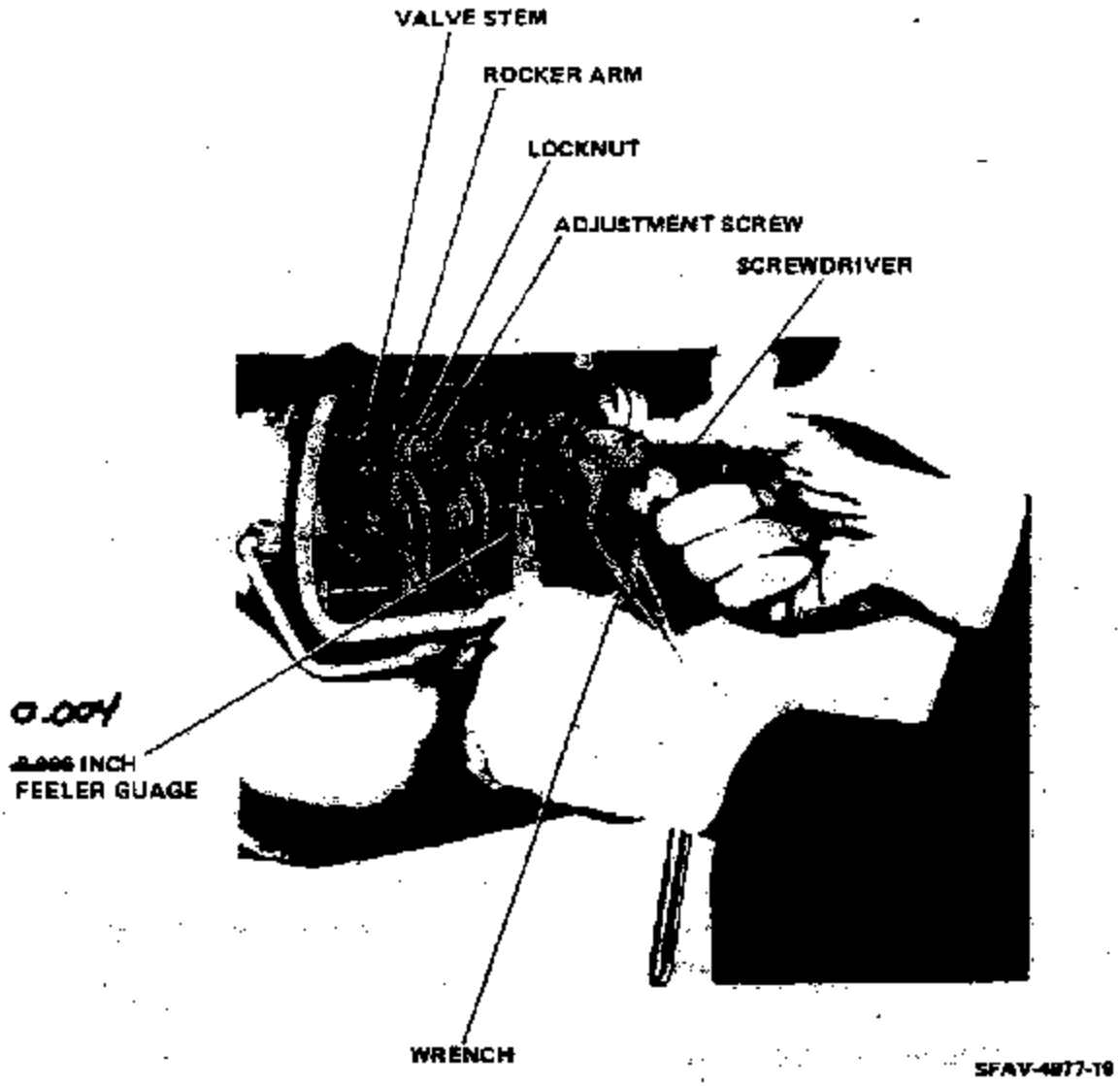


Figure 3-3. Rocker Arm Adjustment.

(8) Turn engine by hand until distributor rotor moves counterclockwise (left) 90 degrees (1/4 turn). Check valve clearance of no. 4 cylinder valves. If required, adjust clearance in accordance with step (4) above.

(9) Install cylinder head covers and distributor cap.

e. Carburetor Adjustment. To adjust the carburetor, complete the following steps:

(1) Install Unisynch tool on carburetor.

(2) Start engine and adjust idle to 900 rpm.

(3) Check Unisynch indications. If required, reset throttle-plate stops by loosening jam nut and turning stop screws until both carburetor indications are equal. Tighten jam nuts.

(4) Turn off engine and remove Unisynch tool.

(5) Start engine. Turn idle mixture screw in (right) until engine coughs.

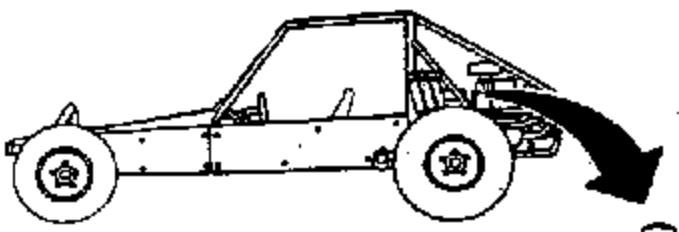
(6) Slowly turn idle mixture screw left (out) until engine smoothes out; then turn screw left 3/4 turn.

f. Ignition Component Service. Ignition component service is limited to replacement or adjustment of parts. Service the ignition components (figure 3-4) as follows:

(1) Unclasp and remove distributor cap (1).

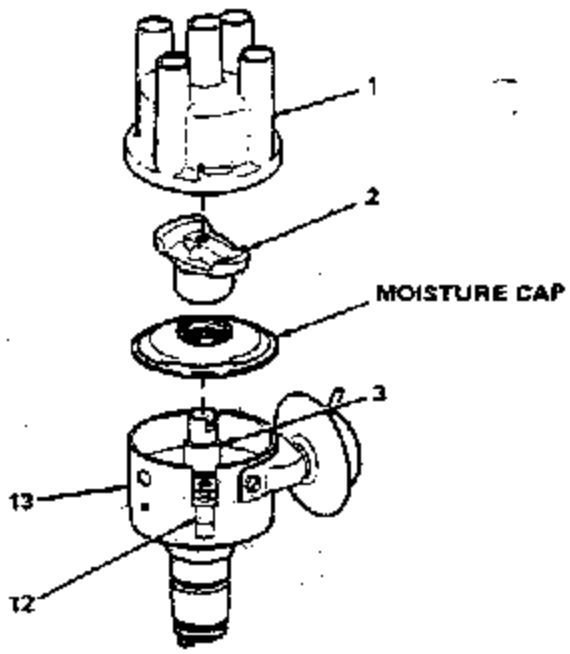
(2) Remove rotor (2).

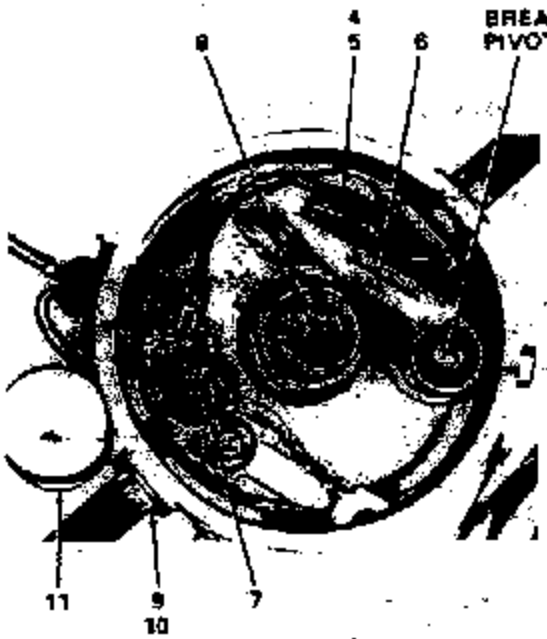
(3) Remove screw (4), washer (5), and breaker point (6). Disconnect wiring as required.



LEGEND

1. Cap
2. Rotor
3. Breaker Cam
4. Screw
5. Washer
6. Breaker Point
7. Guide Ball
8. Felt Wick
9. Screw
10. Washer
11. Condenser
12. Clasp
13. Housing





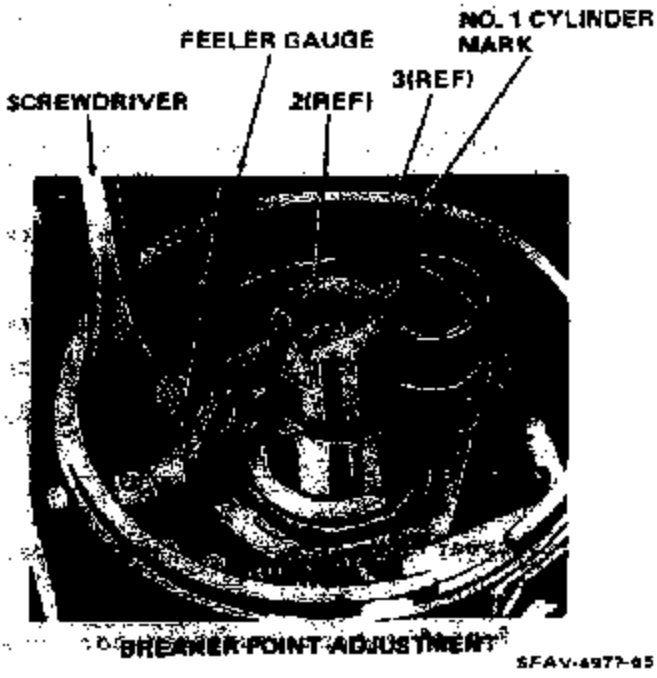


Figure 3-4. Distributor Assembly.

(4) Remove screw (9) and washer (10). Disconnect wire lead and remove condenser (11).

(5) Position new condenser (11) on housing (13) and install screw (9) and washer (10). Connect wire lead.

(6) Position breaker point (6) in housing (13) and install screw (4) and washer (5). Make sure breaker pivot is fully seated. Connect electrical lead.

(7) Using feeler gauge and screwdriver, adjust breaker point gap to 0.016 inch.

(8) Install new rotor (2) and cap (1). Fasten clasps (12).

(9) Using a dwell meter and timing light, set ignition timing and dwell. Refer to table 2-2.

g. Brake Adjustment. Adjust the brakes as follows:

(1) Using a jack, raise wheel of brake being adjusted until tire clears ground.

(2) Depress brake pedal several times to center brake shoes in drum.

(3) Remove plugs from holes in brake backing plate.

(4) Using a straight-slot screwdriver and working through access hole in backing plate, turn adjuster until a slight drag is felt when wheel is turned by hand. Back off adjuster four clicks so wheel turns freely.

(5) Lower wheel to ground and install plugs.

(6) Repeat entire procedure for remaining three wheels.

(7) Road test vehicle.

b. Front Wheel Camber Adjustment. Adjustment of front wheel camber is accomplished by rearranging the position of the front beam and spindle shims. Perform adjustment as follows. Refer to figure 3-5.

(1) Using floor jack, raise front end of vehicle.

(2) Remove left and right front wheels. Refer to EM-1150-10.

(3) Remove left and right front brake assemblies. Refer to paragraph 5-26.

AS ASSEMBLY

(4) Remove left and right brake back plates.

(5) Position straight edge on lower beams as shown in figure 3-5. Measure offset at upper beams as shown.

(6) If offset is less than 0.215 inch, no further adjustment is required.

(7) If offset is greater than 0.215 inch, reposition shims as indicated in table 3-6 and figure 3-5. Reassemble components after adjustment.

(8) Install left and right brake back plates.

(9) Install left and right brake assemblies. Refer to paragraph 5-26.

(10) Install left and right front wheels.

ADJUST BRAKES - TIGHTEN LINK PIN BOLTS TO 20 FT. LBS

(11) Lower vehicle to ground. TIGHTEN PINCH BOLTS

i. Compression Check. Check engine compression as follows:

(1) Remove all four spark plugs from engine.

(2) Install compression gauge in one of spark plug holes.

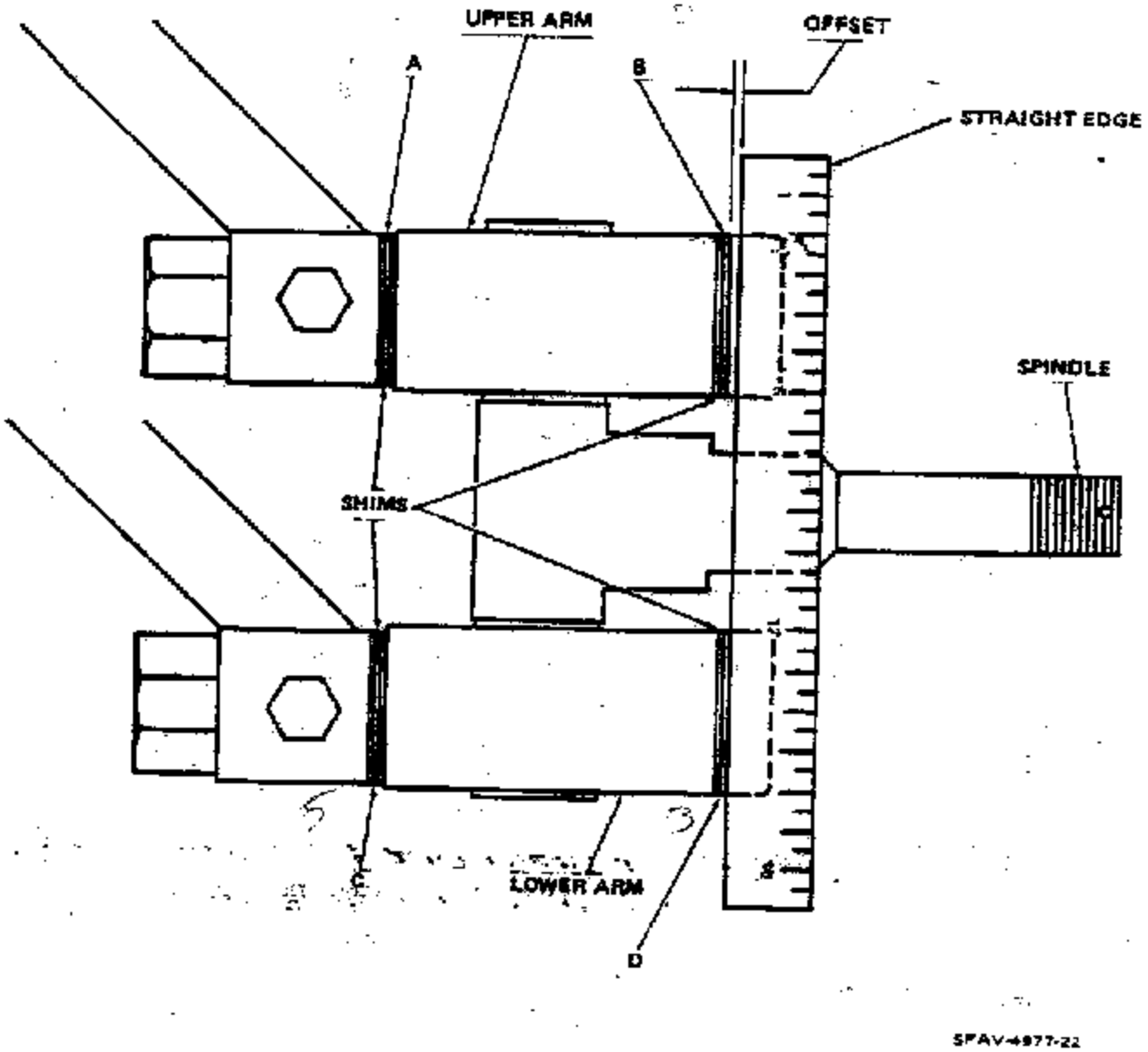


Figure 3-5. Front Wheel Camber Adjustment.

Table 3-6. Front Wheel Camber Adjustment

Offset		Upper Arm Position		Lower Arm Position	
Inch	mm	A	B	C	D
0.216	5.5	2	6	5	3
0.236	6.0	2	6	4	4
0.256	6.5	3	5	4	4
0.276	7.0	3	5	3	5
0.295	7.5	4	4	3	5
0.315	8.0	4	4	2	6
0.335	8.0	5	3	2	6

Example: If offset is 0.216 inch, place two shims on upper arm position A and six shims on position B. Place five shims on lower arm position C and three shims on position D.

(3) Crank engine with starter while holding accelerator full down.

(4) Read and record gauge indication.

(5) Repeat steps (3) and (4) for remaining three cylinders.

(6) Compression should be 126 +20 -15 psi on all cylinders.

(7) Remove compression gauge and install spark plugs.

3-3. CLEANING. Cleaning of the SFAV is accomplished by first rinsing the vehicle with fresh water to remove loose particles of sand and dirt. Then, using a bristle brush and mild detergent solution, scrub frame, wheels, and undercarriage. Direct particular attention to all suspension components to ensure all dirt buildup is removed. Rinse vehicle thoroughly with low-pressure fresh water.

3-4. LUBRICATION. To ensure maximum operational reliability, lubrication of the SFAV must be completed as soon as possible after cleaning or fording. Lubrication should also be performed as required by applicable maintenance checks and services. To lubricate the vehicle, complete the following steps:

a. Front Suspension. Lubricate front suspension as follows. Refer to figure 3-6.

(1) Using a floor jack, raise front of vehicle to allow free flow of grease to mating surfaces.

(2) Wipe grease fittings to remove all dirt buildup.

(3) Using a low-pressure grease gun, pump fresh grease into fittings until grease squeezes from extremities of part being lubricated. Refer to figure 3-3 for grease fitting location.

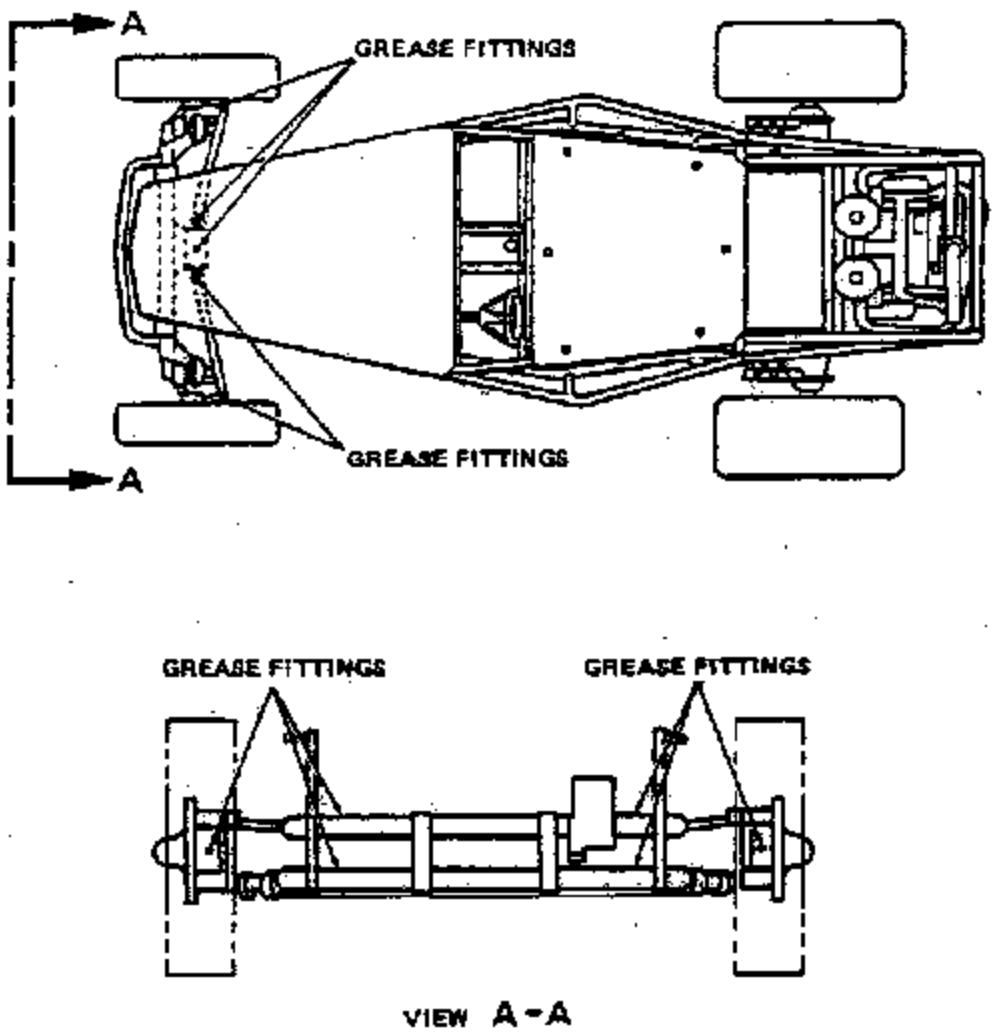
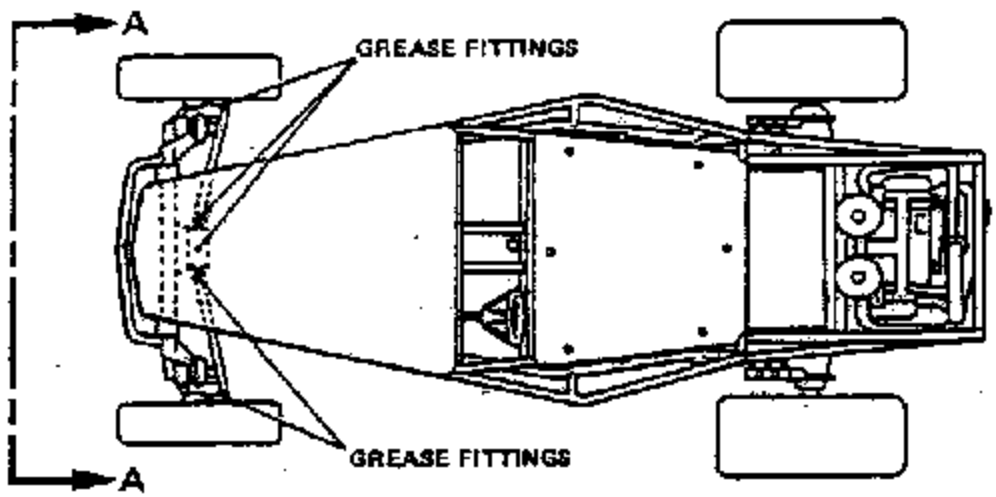
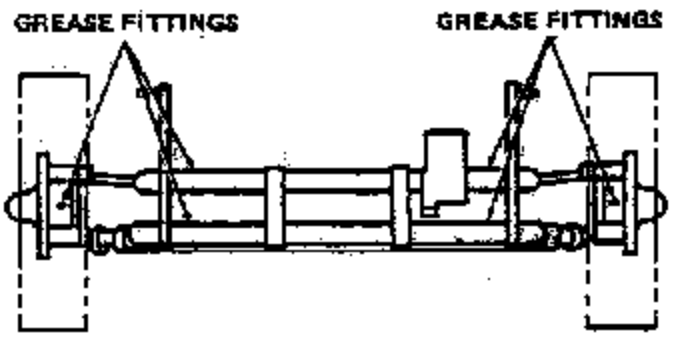


Figure 3-6. Front Suspension Lubrication.





VIEW A-A

SFAV-4977-64-A

Figure 3-6. Front Suspension Lubrication.

(4) Using a clean cloth, wipe off excess grease from fittings and components.

(5) Lower front of vehicle to ground.

b. Distributor. Lubricate distributor as follows. Refer to figure 3-4.

(1) Release clasps (12) and remove distributor cap (1).

(2) Remove rotor (2) from breaker cam (3).

(3) Apply Vaseline, or equivalent lubricant, to breaker cam (3) lobes.

(4) Apply two drops of engine oil to felt wick (8).

(5) Apply one drop of oil to breaker point (6) pivot.

(6) Lubricate guide ball (7) with multipurpose grease.

(7) Install rotor (2) on breaker cam (3). Make sure index on rotor is aligned with index on breaker cam.

(8) Position distributor cap (1) on housing (13) and fasten clasps (12).

c. Front Wheel Bearings. Lubricate front wheel bearings as follows:

(1) Remove front wheels. Refer to EM-1150-10.

(2) Remove front wheel bearings. Refer to paragraph 5-26.

(3) Clean bearings and bearing races with solvent. Make sure all old grease, dirt, and grit is removed.

(4) Repack bearings with multipurpose grease.

(5) Install front wheel bearings. Refer to paragraph 5-26.

(6) Install front wheels. Refer to EM-1150-10.

d. Constant Velocity Joints. Lubricate constant velocity joints as follows:

(1) Remove left and right drive shafts. Do not remove constant velocity joints from shafts. Refer to paragraph 5-25.

(2) Loosen boot clamps and peel back boot.

END OF AXLE

(3) Remove circlips from both ~~hub~~.

CAUTION

To prevent damage to joints, do not tilt ball hub more than 20 degrees in joint outer ring or balls will fall out.

AXLE OUT OF JOINTS

(4) Using a drift punch, tap ~~off joint~~.

(5) Using cleaning solvent, a soft-bristle brush, and a bucket, dip and clean joints thoroughly. Remove old grease from boots.

(6) Allow joints to drain dry.

NOTE

Pack two thirds of grease between joint, cap, and boot. Pack remaining one third into open front of joints.

(7) Pack joints with 3.2 ounces of molybdenum grease.

Section IV. TROUBLESHOOTING

4-1. GENERAL. This section contains troubleshooting guidelines for the SFAV to expedite the identification of a problem, its cause, and the recommended solution. The troubleshooting is presented in six parts: Engine, Clutch, Transmission, Fuel System, Brakes, and Starting System.

4-2. ENGINE. Table 4-1 lists only the most obvious malfunctions that could occur in the engine. Column 1 lists the potential problem; column 2 lists the probable cause; and column 3 lists the recommended action that should be taken to solve the problem. The remainder of this section covers in more detail those problems that could occur in the system.

4-3. CLUTCH. Table 4-2 lists the most common clutch complaints for the SFAV.

4-4. TRANSMISSION. Table 4-3 lists the most obvious malfunctions that could occur in the transmission. Generally, fault isolation is not attempted when a transmission fails, as the transmission must be replaced.

4-5. FUEL SYSTEM. Fuel system troubleshooting is presented in two parts: fuel pump troubleshooting (table 4-4) and carburetor troubleshooting (table 4-5).

4-6. BRAKES. Table 4-6 presents the most common malfunctions associated with drum brake systems.

4-7. STARTING SYSTEM. Table 4-7 presents those malfunctions related to the starting system. When there is difficulty in starting the SFAV, refer to this section for a quick reference and solution to the possible cause.

Table 4-1. Engine Troubleshooting

Problem	Probable Cause	Solution
Engine overheats.	Broken alternator belt.	Replace alternator belt.
	FAN INTAKE BLOCKED	REMOVE DEBRIS
Engine makes knocking sound.	Engine oil low.	Add oil as required.

Table 4-2. Clutch Troubleshooting

Problem	Probable Cause	Solution
Clutch noise.	1. Needle bearing in the gland nut is worn.	1. Replace engine.
	2. Driven plate fouling pressure plate.	2. Replace pressure plate assembly.
	3. Release lever springs are weak, or tension is uneven.	3. Replace pressure plate assembly.
	4. Clutch release bearing is defective.	4. Replace clutch release bearing.
Clutch grabbing.	1. Transmission mountings loose.	1. Tighten mounting bolts and nuts.
	2. Pressure plate contacting unevenly.	2. Replace pressure plate assembly.
	3. Release plate not running true.	3. Replace pressure plate assembly.
	4. Spring segments deformed.	4. Replace ~~engine~~ CLUTCH ASSEMBLY.
Clutch dragging.	1. Excessive pedal freeplay.	1. Reduce pedal freeplay to lower limit of 1 inch.
	2. Driven plate not running true.	2. Replace ~~engine~~ CLUTCH.

Table 4-2. Clutch Troubleshooting - Continued

Problem	Probable Cause	Solution
	3. Spring segments excessively or unevenly set.	3. Replace ~~engine~~ CLUTCH.
	4. Plate linings broken.	4. Replace ~~engine~~ CLUTCH.
	5. Main drive shaft not running true with gland nut.	5. Loosen engine mounting bolts, move engine slightly, and retighten bolts. Check gland nut. If thread is damaged or there is excessive play between inner and outer threads, gland nut is not centered correctly. Replace engine.
	6. Needle bearing in gland nut defective or insufficiently greased.	6. Replace engine or lubricate needle bearing with 1 gram (1/32 ounce) of multipurpose grease.
	7. Splines on main drive shaft or clutch driven plate dirty or burred.	7. Clean splines. Remove burrs.
	8. Sticky clutch linings (lining dust).	8. Replace ~~engine~~ CLUTCH.
	9. Felt ring in gland nut too tight on main drive shaft.	9. Replace engine.

Table 4-2. Clutch Troubleshooting - Continued

Problem	Probable Cause	Solution
	10. Stiffness in pedal assembly.	10. Grease parts thoroughly with general purpose grease.
Clutch slipping.	1. Insufficiant pedal freeplay because of lining wear.	1. Adjust freeplay to ~~1 1/4~~ ¼ to ½ ~~1 1/2~~ inches at clutch CYLINDER ~~pedal~~. Replace CLUTCH ~~engine~~.
	2. Oily linings.	2. Replace engine or transmission. SEAL

Table 4-3. Transmission

Problem	Probable Cause	Solution
Transmission makes noise and overheats.	Low on transmission oil.	Add proper amount of oil.
Transmission locks up.	Broken gearing.	Replace transmission.

Table 4-4. Fuel Pump Troubleshooting

Problem	Probable Cause	Solution
Fuel leaking at joint faces of pump.	1. Slotted screws loose.	1. Tighten screws.
	2. Diaphragm cracked.	2. Replace fuel pump.
Fuel leaking at diaphragm rivets.	Diaphragm damaged during assembly.	Replace fuel pump.
Fuel leaking through diaphragm itself.	Diaphragm material damaged by solvent in fuel.	Replace fuel pump.
Diaphragm damaged, apparently from excessive pump stroke.	Pump incorrectly installed; gasket too thin.	Replace fuel pump.
Pump pressure low.	1. Pump incorrectly installed; gasket too thick.	1. Install pump correctly, removing one gasket if necessary.
	2. Spring pressure low.	2. Stretch spring to lengthen, or if necessary, replace.

Table 4-4. Fuel Pump Troubleshooting - Continued

Problem	Probable Cause	Solution
Carburetor flooding.	1. Pump pressure excessive, forcing needle valve down. Pump gasket too thin.	1. Install pump correctly. Check pushrod stroke. Add gasket if needed.
	2. Spring pressure excessive.	2. Press spring together to shorten, or replace spring.
Insufficient fuel delivery.	Valves leaky or sticking.	Replace pump.

Table 4-5. Carburetor Troubleshooting

Problem	Probable Cause	Solution
Tank has fuel, and ignition is working, but engine won't start.	Float needle valve sticking, causing carburetor flooding.	Clean or replace carburetor.. REPLACE NEEDLE & SEAT
Engine idles unevenly or stalls (ignition dwell correct).	1. Idle adjustment incorrect.	1. Adjust idle.
	2. Air leak in manifold.	2. Check carburetor flange gasket, manifold sleeves, and intake pipe gaskets.
Engine continues to run when ignition is turned off.	3. DOES NOT HAVE ONE 1. Faulty electromagnetic cutoff valve or wire.	3. REMOVE IDLE JETS AND CLE 1. Test wire for current. Test solenoid for continuity. Replace faulty cutoff valves.
	2. Idle speed too fast.	2. Adjust idle speed.
	3. Faulty electromagnetic cutoff valve.	3. Replace solenoid.
Exhaust backfire when SFAV is overrunning the engine.	4. TIMING OFF Idle mixture slightly lean.	4. SET TIMING Enrich mixture by turning control screw counterclockwise (left).
Poor transition from idle to operating speed.	1. Accelerator pump passages blocked or ball sticking.	1. Clean accelerator pump and check operation.
	2. Torn accelerator pump diaphragm.	2. Replace carburetor.

Table 4-5. Carburetor Troubleshooting - Continued

Problem	Probable Cause	Solution
	3. Idle adjustment incorrect.	3. Adjust idle.
	4. Amount of fuel injected incorrect.	4. Adjust accelerator pump volume.
Engine stalls when accelerator pedal is released suddenly.	Idle mixture too rich.	Adjust idle.
Engine runs unevenly (surges), with black smoke at low idle and heavy smoke as idle speed increases. Spark plugs soot up quickly and misfire.	1. Excessive pressure on float needle valve.	1. Check fuel pump pressure and reduce if necessary.
	2. Float leaking.	2. Replace carburetor.
	3. Float needle valve not closing.	3. Replace carburetor.
Engine runs unevenly at full throttle, misfires, and either cuts out or lacks power (ignition dwell, spark advance, spark plugs all normal).	1. Fuel starvation at driving speeds.	1. Replace carburetor. CLEAN MAIN JET
	2. Low fuel level in float bowl.	2. Replace carburetor.
	3. Low fuel pressure.	3. Check fuel pump pressure and increase if necessary.

Table 4-5. Carburetor Troubleshooting - Continued

Problem	Probable Cause	Solution
	4. Dirt in fuel system.	4. Clean fuel tank. Flush lines. Clean carburetor and fuel pump.
Excessive fuel consumption.	1. Excessive pressure at float needle valve.	1. Check fuel pump pressure and reduce if necessary.
	2. Float leaking.	2. Replace carburetor.
	3. Float needle valve not closing.	3. Replace carburetor. REPLACE NEEDLE & SEAT

Table 4-6. Brake Troubleshooting

Problem	Probable Cause	Solution
Pedal goes all the way to floor.	1. Linings are worn.	1. Adjust or replace brake shoes.
	2. Insufficient fluid.	2. Find and repair leaks. Fill and bleed air from system.
Low pedal remains after adjustment and bleeding.	Master cylinder defective.	Replace master cylinder.
Pedal spongy or brakes work only after pedal is pumped.	1. Insufficient fluid in reservoir.	1. Service master cylinders with brake fluid and bleed system.
	2. Air in system.	2. Check for leaks and bleed.
	3. Spring weak in master cylinder.	3. Replace master cylinder.
Decreased braking action following shoe adjustment.	1. Brake lines leaking.	1. Tighten connections or fit new lines and hoses.
	2. Defective master or wheel cylinders.	2. Replace faulty cylinders.
INCREASE BRAKE ADJUSTMENT		READJUST BRAKES

Table 4-6. Brake Troubleshooting - Continued

Problem	Probable Cause	Solution
Brakes overheat.	1. Compensating port blocked.	1. Clean master cylinder.
	2. Inadequate pushrod clearance.	2. Adjust master cylinder clevis on brake pedal assembly.
	3. Brake shoe return springs weak.	3. Replace return springs.
	4. Rubber parts swollen.	4. Flush system. Replace fluid and all rubber parts.
	BRAKE ADJUSTMENT TOO TIGHT	READJUST BRAKES
Brakes inefficient despite high pedal pressure.	1. Oil on linings.	1. Clean drums. Replace brake shoes and oil seals.
	2. Unsuitable brake shoes.	2. Replace brake shoes.
Brakes bind while car is in motion.	1. Compensating port blocked.	1. Replace master cylinder.
	2. Brake fluid unsuitable.	2. Flush system and refill.
	3. Inadequate pushrod clearance.	3. Adjust master cylinder clevis clearance at pedal assembly.
Brakes chatter and tend to grab.	1. Linings worn.	1. Replace brake shoes.
	2. Drums out-of-round.	2. Replace drums.
	GREASE OR OIL ON LINING	REPLACE SHOES & CLEAN DRUM

Table 4-6. Brake Troubleshooting - Continued

Problem	Probable Cause	Solution
Brakes squeak.	1. Unsuitable or badly fitted brake shoes.	1. Replace brake shoes.
	2. Brake linings dirty.	2. Clean brake shoes.
	3. Backing plates distorted.	3. Check backing plates for distortion. Replace brake shoes if necessary.
	4. Brake shoe return springs weak.	4. Replace springs.
	5. Poor lining contact due to shoe distortion.	5. Align shoes with backing plate.
Brakes give uneven braking action.	1. Oil or grease on linings.	1. Clean drums. Replace brake shoes, seals, or wheel cylinders if necessary.
	2. Poor contact between lining and drum due to brake shoe distortion.	2. Realign shoes and adjust clearance.
	3. Brake shoes too tight in adjusting screw or piston slots.	3. Readjust shoes.
	4. Different types of linings on same axle.	4. Replace shoes.

Table 4-6. Brake Troubleshooting - Continued

Problem	Probable Cause	Solution
	5. Incorrect tire pressure or unevenly worn tires.	5. Correct pressure and replace worn tires.
	6. Drums out-of-round or scored.	6. Replace drums. OR TURN
	7. Brake shoes not in contact with backing plate.	7. Reposition shoes or align backing plate.
	8. Pistons tight in wheel cylinders.	8. Free pistons.
	9. Dirt in brake lines or hoses.	9. Clean system and replace defective parts.
Brakes pulsate.	1. Drums out-of-round.	1. Replace drums. OR TURN
	2. Dirt trapped between drum and hub.	2. Clean surfaces and reinstall drum.

Table 4-7. Electrical System

Problem	Probable Cause	Solution
	NOTE Turn lights on for test.	
Starter does not operate when ignition key is turned to the start position.	1. Lights are out. Loose cables or poor ground connection. Battery run down.	1. Check battery cable and terminals. Test battery. Charge if necessary.
	2. Lights go out when key is moved to starting position. Insufficient current due to loose connections or corroded terminals.	2. Clean and tighten all battery cable connections.
	3. Lights go dim when key is moved to starting position. Battery run down.	3. Charge battery.
	4. Lights stay bright; solenoid operates. Connect jumper cable between starter terminal and connector strip terminal. If starter runs, solenoid is faulty.	4. Replace solenoid.

Table 4-7. Electrical System - Continued

Problem	Probable Cause	Solution
Starter does not operate when battery cable is directly connected with terminal stud.	1. Brushes are sticking.	1. Replace starter.
	2. Brushes worn.	2. Replace starter.
	3. Weak spring tension. Brushes do not make contact.	3. Replace starter.
	4. Commutator dirty.	4. Replace starter.
	5. Commutator rough, pitted, or burned.	5. Replace starter.
	6. Armature or field coils defective.	6. Replace starter.
Starter turns slowly or fails to turn engine over.	1. Battery run down.	1. Charge battery.
	2. Low current due to loose or corroded connections.	2. Clean battery terminals and cable clamps; tighten connections.
	3. Brushes sticking.	3. Replace starter.
	4. Brushes worn.	4. Replace starter.
	5. Commutator dirty.	5. Replace starter.
	6. Commutator rough, pitted, or burned.	6. Replace starter.
	7. Armature or field coils defective.	7. Replace starter.

Table 4-7. Electrical System - Continued

Problem	Probable Cause	Solution
Starter makes unusual sounds, cranks engine erratically, or fails to crank.	1. Drive pinion defective.	1. Replace starter.
	2. Flywheel ring gear defective.	2. Replace engine.
Drive pinion does not move out of mesh.	1. Drive pinion or armature shaft dirty or damaged.	1. Replace starter.
	2. Solenoid switch defective.	2. Replace solenoid.
Noisy alternator.	Misalignment between V-belt and pulley, loose or broken pulley, worn bearings, or bent motor shaft.	Realign and correct installation, or if necessary, replace alternator.
Instrument panel gauges do not operate.	1. In line fuse blown.	1. Replace fuse.
	2. Electrical wiring shorted or broken.	2. Perform continuity test of wiring. Refer to vehicle electrical schematic. Repair or replace defective wiring or components.
	3. Gauge defective.	3. Replace gauge.

Table 4-7. Electrical System – Continued

Problem	Probable Cause	Solution
Turn signal, head light, brake light, or instrument light fails to illuminate.	1. Bulb has burned out.	1. Replace bulb.
	2. In line fuse blow.	2. Replace fuse.
	3. Electrical wiring shorted or broken.	3. Perform continuity test of wiring. Refer to vehicle electrical schematic. Repair or replace defective wiring or components.

Section V. MAINTENANCE AND REPAIR

5-1. INTRODUCTION. Maintenance, and repair of the SFAV, as addressed in this section, is confined to replacement of defective assemblies and components. Special torque valves, lubrication, and adjustments are contained within the replacement procedures where applicable.

5-2. ENGINE REPLACEMENT. To replace the engine (figure 5-1), proceed as follows:

a. Removal

DISCONNECT BATTERY

(1) Drain engine oil.

(2) Remove six nuts, washers, and bolts securing skid plate to bottom of engine.

(3) Loosen clamp (1) and disconnect flexible tube (2) from carburetor (3).

(4) Tag and disconnect wires from distributor (4) that connect to vehicle wire harness.

(5) Tag and disconnect electrical wires (5) from alternator (6).

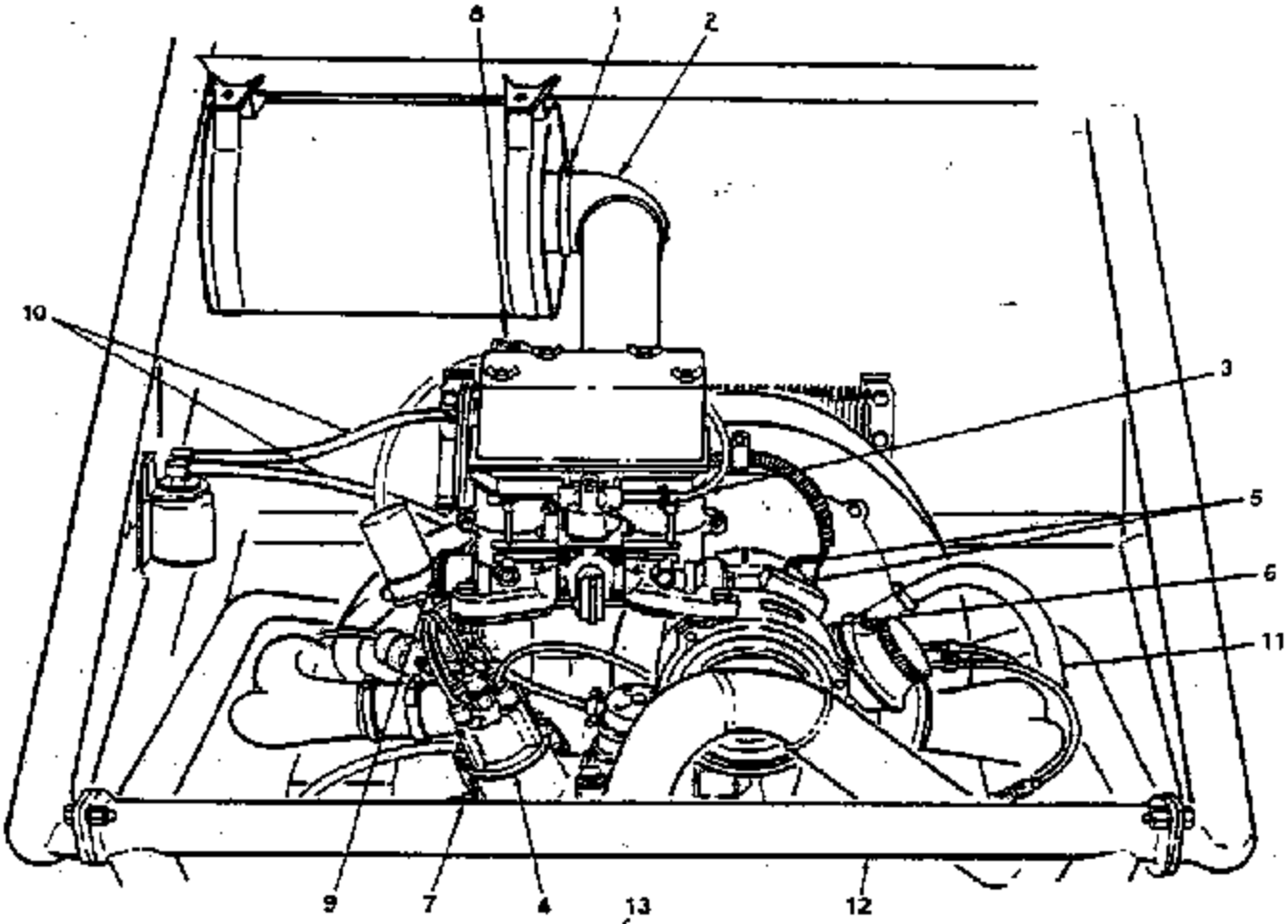
(6) Tag and disconnect wires from oil pressure sensor (7).

(7) Tag and disconnect wires from starter motor.

(8) Disconnect fuel supply line from fuel filter (8).

(9) Disconnect accelerator cable (9) from carburetor (3). AND FROM HOUSING

(10) Disconnect oil lines (10) and crankcase ventilation lines (11) from engine.



LEGEND

1.	Clamp	9.	Accelerator Cable
2.	Flexible Tube	10.	Oil Line
3.	Carburetor	11.	Ventilation Line
4.	Distributor	12.	Rear Chassis Section
5.	Wires	13.	Nut
6.	Alternator	14.	Bolt
7.	Oil Pressure Sensor	15.	Nut
8.	Fuel Filter		

Figure 5-1. Engine Replacement.

(11) Remove rear chassis section (12) by removing six mounting bolts and attaching hardware.

(12) Remove exhaust system. Refer to paragraph 5-11.

(13) Check area around engine to make sure all wires, hoses, and tubes will clear engine during removal.

(14) Remove nuts (13) from two lower engine mounting studs.

(15) Position floor jack below engine. Raise jack until it firmly contacts crankcase.

(16) Remove two upper engine mounting bolts (14) and nuts (15).

(17) Using floor jack, pull engine from transmission until clutch plate clears transmission drive shaft.

(18) Carefully lower engine from chassis. Make sure all wires and hoses are disconnected.

b. Installation

(1) Wipe off engine and transmission mating surfaces.

(2) Roughen surface of clutch release bearing with emery cloth, or equivalent; ~~then apply molybdenum grease~~. AJO

(3) Lubricate transmission drive shaft splines with molybdenum disulfide powder.

(4) ~~Lubricate steering gear bushing with multipurpose grease~~. AJO

(5) Using floor jack, raise engine level with transmission.

(6) Position transmission shifter to first gear.

(7) Carefully push engine toward transmission. Hand turn engine crankshaft until engine and transmission splines engage.

(8) Start lower engine mounting studs in their holes; then press engine firmly against transmission flange. Install upper engine mounting nuts (15) and bolts (14). Install lower mounting nuts (13).

(9) Torque mounting nuts (13 and 15) and bolts (14) to 22 foot-pounds.

(10) ~~Install exhaust system. Refer to paragraph 5-41.~~

(11) Position rear chassis section (12) in place. Install six mounting bolts and attaching hardware.

(12) Connect oil lines (10) and crankcase ventilation lines (11) to engine.

(13) Connect accelerator cable (9) to carburetor (3). AND ROD HOUSING

(14) Connect fuel supply line to fuel filter (8).

(15) Connect wires to starter motor.

(16) Connect wire to oil pressure sensor (7).

(17) Connect wiring to alternator (6).

(18) Connect wiring to distributor (4).

(19) Connect flexible tube (2) to carburetor (3) and tighten clamp (1).

(20) Fill crankcase to specified level with 40 wt. engine oil.

(21) Adjust clutch slave cylinder and pedal assembly.

CONNECT BATTERY

(22) Adjust carburetor cable if required.

(23) Adjust ignition timing.

(24) Adjust engine idle.

5-3. OIL PUMP REPLACEMENT. To replace the oil pump (figure 5-2), proceed as follows:

a. Removal

NOT NECESSARY

(1) Remove exhaust system. Refer to paragraph 5-11.

REMOVE PULLEY

(2) Remove four self-sealing nuts (1) and cover (2).

(3) Remove cover gasket (4) and two pump gears (3).

(4) Pull oil pump housing (5) from crankcase.

(5) Remove housing gasket (6).

b. Installation

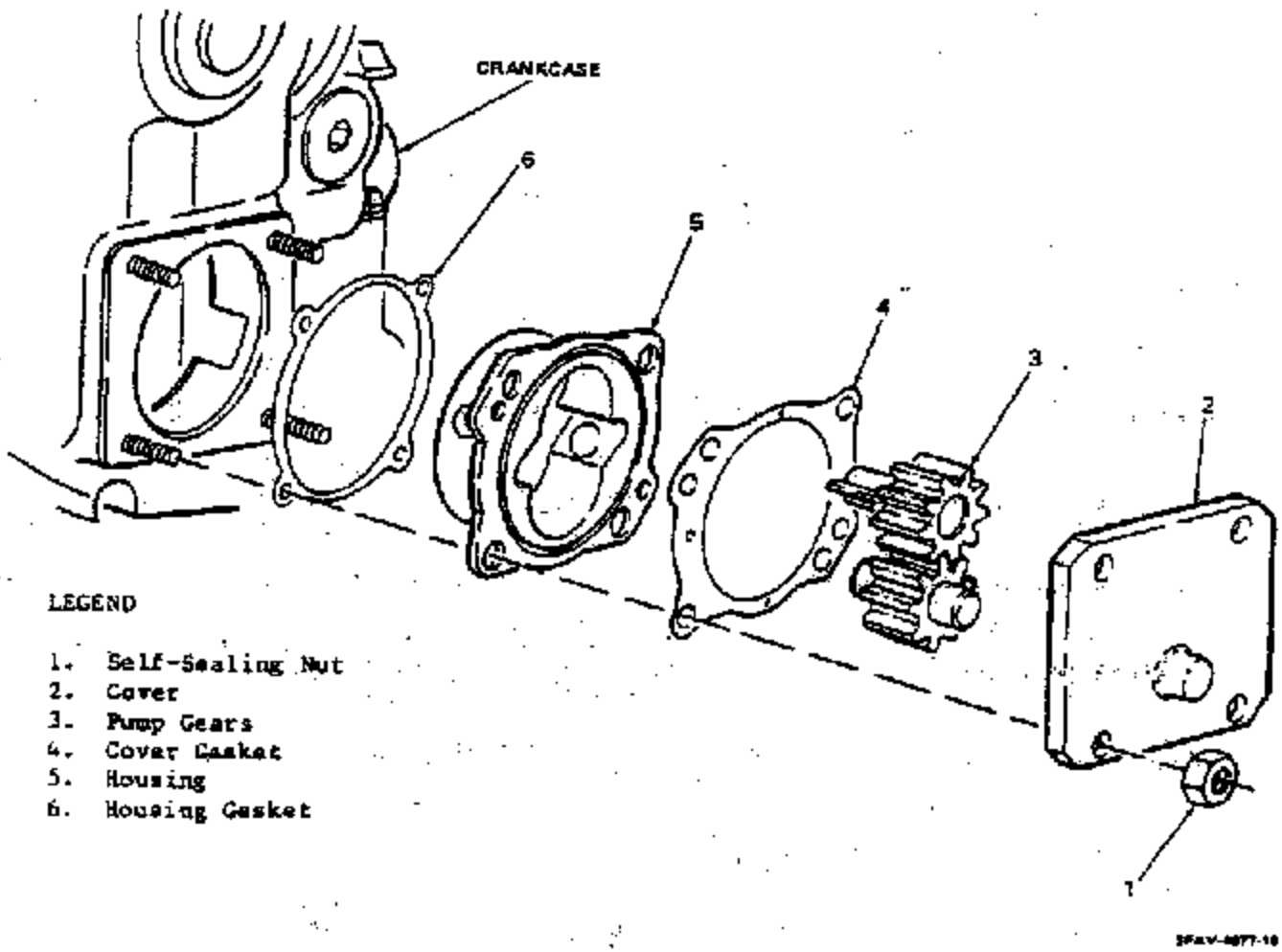
(1) Position new housing gasket (6) in crankcase.

(2) Install oil pump housing (5).

(3) Install two pump gears (3) in housing (5). Turn upper gear as required to engage drive dog in camshaft.

LIGHTLY GREASE PUMP GEARS

(4) Hand turn crankshaft as required to align pump housing (5) with camshaft.



LEGEND

1. Self-Sealing Nut
2. Cover
3. Pump Gears
4. Cover Gasket
5. Housing
6. Housing Gasket

Figure 5-2. Oil Pump Replacement.

(5) Install new cover gasket (4). Position cover (2) on studs. Install self-sealing nuts (1) with plastic facing toward cover.

(6) Torque self-sealing nuts to 14 foot-pounds.

5-4. CLUTCH REPLACEMENT. To replace the clutch (figure 5-3), proceed as follows:

a. Removal

(1) Remove engine. Refer to paragraph 5-2.

(2) Mark position of pressure plate (3) on flywheel (5) to aid installation.

(3) Loosen six mounting bolts (1) sequentially (1/4 turn at at time) until spring pressure is relieved; then remove bolts and washers (2).

(4) Remove pressure plate (3) from flywheel (5).

(5) Pull clutch disc (4) from flywheel (5).

(6) If clutch throw-out bearing must be replaced, remove retaining springs and bearing from transmission.

b. Installation

(1) Clean friction surface of flywheel (5). Inspect for wear, cracks, and grooves.

(2) Inspect pressure plate (3) for wear, cracks, and grooves. Alternate bright and dull areas indicate a warped plate. Shake plate and check for loose springs.

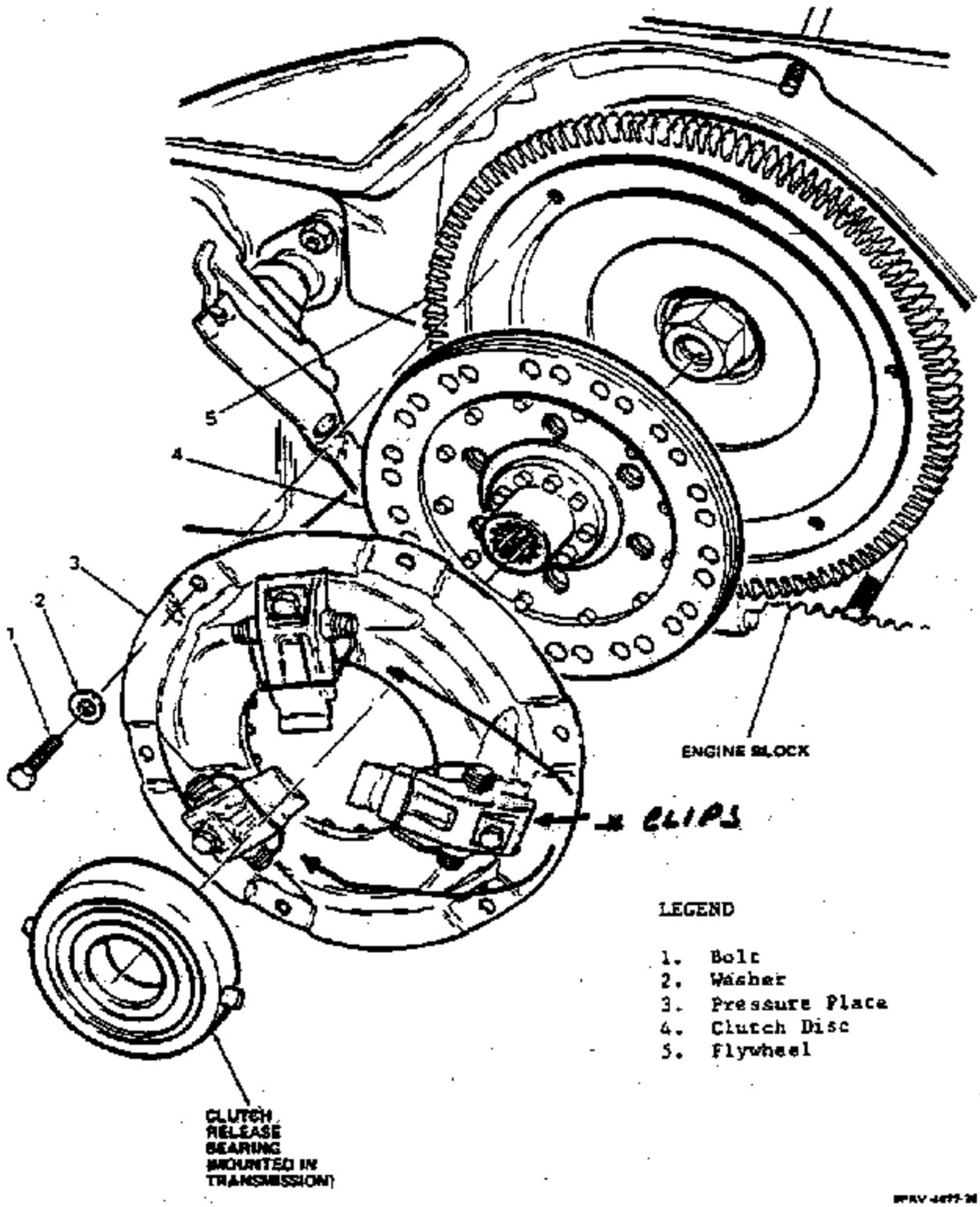


Figure 5-3. Clutch Replacement.

(3) Clean needle bearings inside flywheel gland nut with solvent. Repack bearings with multipurpose grease (just enough to lightly coat needles).

(4) Inspect clutch disc (4) for wear. There should be at least 1/16 inch of friction material remaining above rivet heads.

(5) Inspect clutch disc (4) splines for cracks and distortion.

(6) Lubricate clutch disc (4) splines with molybdenum disulfide powder.

(7) Lubricate flywheel gland nut felt ring with engine oil.

(8) Position clutch disc (4) on engine drive shaft.

NOTE

On some replacement clutches a white paint spot is used as a balance mark. This spot should be positioned 180 degrees from the 5mm countersunk hole or from the white paint balance mark on flywheel.

(9) While holding clutch disc (4) ~~centered in flywheel~~ IN PLACE WITH PILOT SHAFT (5), install pressure plate (3) according to reference marks made during removal. Loosely install six bolts (1) and washers (2).

(10) Working diagonally, tighten mounting bolts (1) two or three turns at a time until snug.

(11) Torque mounting bolts (1) to 18 foot-pounds.

* IF NEW PRESSURE PLATE REMOVE 3 CLIPS REMOVE PILOT SHAFT THIS TYPE OF CLUTCH

(12) If clutch throw out bearing is being replaced, install bearing in transmission and secure with retaining springs.

(13) Install engine. Refer to paragraph 5-2.

5-5. CLUTCH PEDAL ASSEMBLY REPLACEMENT. To replace the clutch pedal assembly (figure 5-4), proceed as follows:

a. Removal

(1) Disconnect hydraulic line (1) from clutch master cylinder (19).

(2) Remove two bolts (2) and two washers (3). Lift clutch pedal assembly from vehicle floor.

b. Disassembly

(1) Remove cotter pin (4) and straight pin (5).

(2) Remove nut (9), washer (8), spacers (7), and bolt (6). Separate clutch pedal (10) from frame (20).

NOTE

Count and record number of exposed threads on rod (18) before removing clevis (16) and nut (17).

(3) Remove clevis (16), nut (17), and boot (15) from rod (18).

(4) Remove nuts (14), lockwashers (13), washers (12), and bolts (11). Remove master cylinder (19) from frame (20).

c. Reassembly

(1) Position master cylinder (19) on frame (20). Install washers (12), bolts (11), lockwashers (13), and nuts (14).

(2) Install boot (15), nut (17), and clevis (16) on rod (18). Adjust position of clevis and nut to location recorded during removal (same number of exposed threads).

LEGEND

1.	Hydraulic Line	11.	Bolt
2.	Bolt	12.	Washer
3.	Washer	13.	Lockwasher
4.	Cotter Pin	14.	Nut
5.	Straight Pin	15.	Boot
6.	Bolt	16.	Clevis
7.	Spacer	17.	Nut
8.	Washer	18.	Rod
9.	Nut	19.	Master Cylinder
10.	Clutch Pedal	20.	Frame

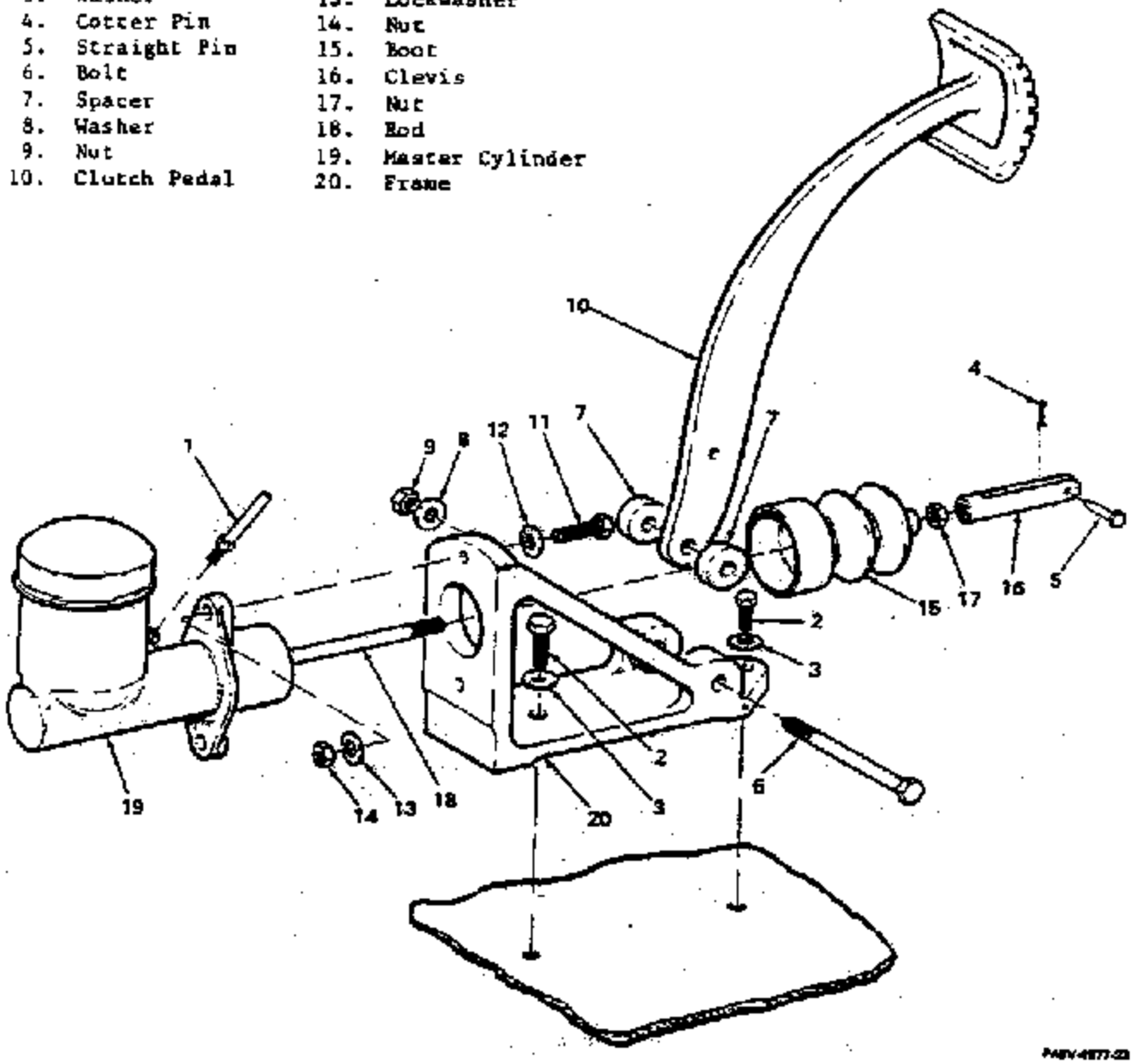


Figure 5-4. Clutch Pedal Assembly Replacement.

(3) Position clutch pedal (10) in frame (20). Install spacers (7), bolt (6), washer (8), and nut (9).

(4) Align clevis (16) with clutch pedal hole. Install straight pin (5) and cotter pin (4).

d. Installation

(1) Position clutch pedal assembly on vehicle floor and align mounting holes.

(2) Install bolts (2) and washers (3). Tighten securely.

(3) Connect hydraulic line (1).

(4) Replenish master cylinder (19) with brake fluid, and bleed system.

5-6. CLUTCH SLAVE CYLINDER REPLACEMENT. To replace the clutch slave cylinder (figure 5-5), proceed as follows:

a. Removal

(1) Count and record the number of exposed threads at both ends of clutch slave cylinder (10). Count the number of exposed threads extending beyond cylinder rod adjustment nut (9).

(2) Disconnect clutch hydraulic line (1).

(3) Remove two nuts (2 and 3) and dome washer (4).

(4) Remove two nuts (5 and 6) and dome washer (7).

(5) Remove clutch slave cylinder (10) from transmission.

LEGEND

1. Hydraulic Line
2. Nut
3. Nut
4. Dome Washer
5. Nut
6. Nut
7. Dome Washer
8. Bleed Port
9. Nut
10. Clutch Slave Cylinder

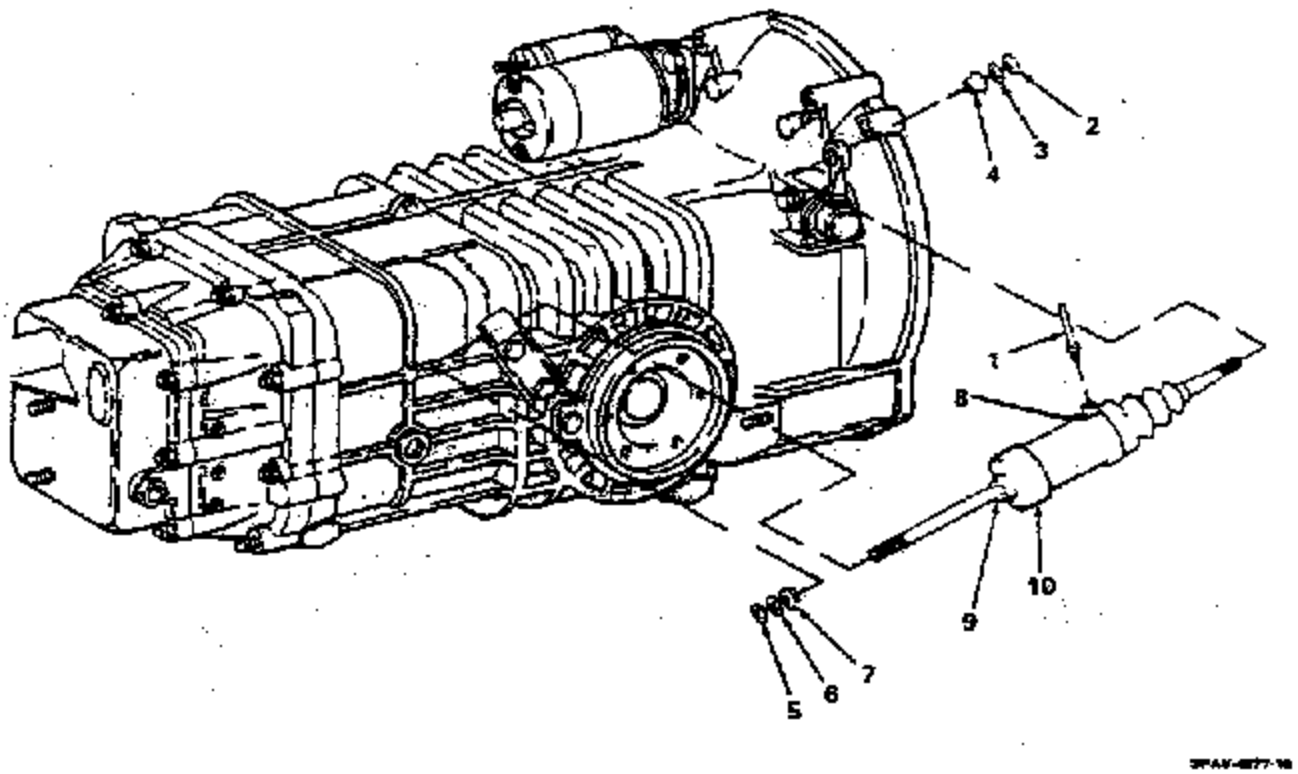


Figure 5-5. Clutch Slave Cylinder Replacement.

b. Installation

(1) Position clutch slave cylinder (10) on transmission.

(2) Install dome washer (7) and two nuts (5 and 6). Position nuts on shaft so that the same number of threads are exposed on the new cylinder as were exposed on old cylinder.

(3) Install dome washer (4) and two nuts (2 and 3). Position nuts on shaft so that the same number of threads are exposed on the new cylinder as were exposed on old cylinder.

(4) Position nut (9) on shaft so that the number of exposed threads equals the number of exposed threads on old shaft.

(5) Connect hydraulic line (1).

(6) Depress clutch pedal and hold.

(7) Open bleed port (8) and slowly allow air to bleed from clutch slave cylinder (10). Tighten bleed port and release clutch pedal. Repeat procedure until all air is bled from system.

(8) Replenish clutch master cylinder with fluid.

(9) If required, adjust clutch pedal to ensure a minimum of 1 inch toe play.

5-7. ACCELERATOR PEDAL ASSEMBLY REPLACEMENT. To replace the accelerator pedal assembly, proceed as follows:

a. Removal

(1) Disconnect accelerator cable from pedal.

(2) Remove bolts and washers securing accelerator pedal assembly to chassis floor.

(3) Lift pedal assembly from floor.

b. Installation

(1) Position accelerator pedal assembly on chassis floor. Align mounting holes.

(2) Install mounting bolts and washers.

(3) Connect accelerator cable to pedal.

(4) Adjust pedal stop bolt as required.

5-8. CARBURETOR REPLACEMENT. To replace the carburetor, proceed as follows:

a. Removal.

(1) Disconnect and plug carburetor fuel inlet line.

(2) Disconnect air cleaner flexible tubing from carburetor.

(3) Disconnect accelerator cable from carburetor linkage.

(4) Remove four carburetor-to-manifold mounting bolts, nuts, and washers.

(5) Lift carburetor from intake manifold. Discard old gasket.

b. Installation

(1) Position new gasket and carburetor on intake manifold.

(2) Install four carburetor-to-intake-manifold mounting bolts.

(3) Connect accelerator cable to carburetor linkage.

(4) Connect air cleaner flexible tube to carburetor intake.

(5) Unplug and connect fuel inlet line to carburetor.

(6) Adjust carburetor. Refer to paragraph 3-2a.

5-9. FUEL PUMP REPLACEMENT. To replace the fuel pump (figure 5-6), proceed as follows:

WARNING

Do not smoke or work near open flames. Make sure a fire extinguisher is nearby.

a. Removal

(1) Disconnect negative (-) battery cable from battery terminal.

(2) Disconnect two fuel lines (1) from fuel pump (6), quickly plugging them to prevent gas leakage.

(3) Remove two nuts (2), spring washers (3), and fuel pump (6) from engine.

(4) Remove gasket (4) and intermediate flange (5).

b. Installation

(1) Install intermediate flange (5).

(2) Measure the distance pushrod (7) extends above intermediate flange (5). Distance should be 0.5 inch. If required, adjust (add or remove) the number of gaskets below flange to get measurement in tolerance.

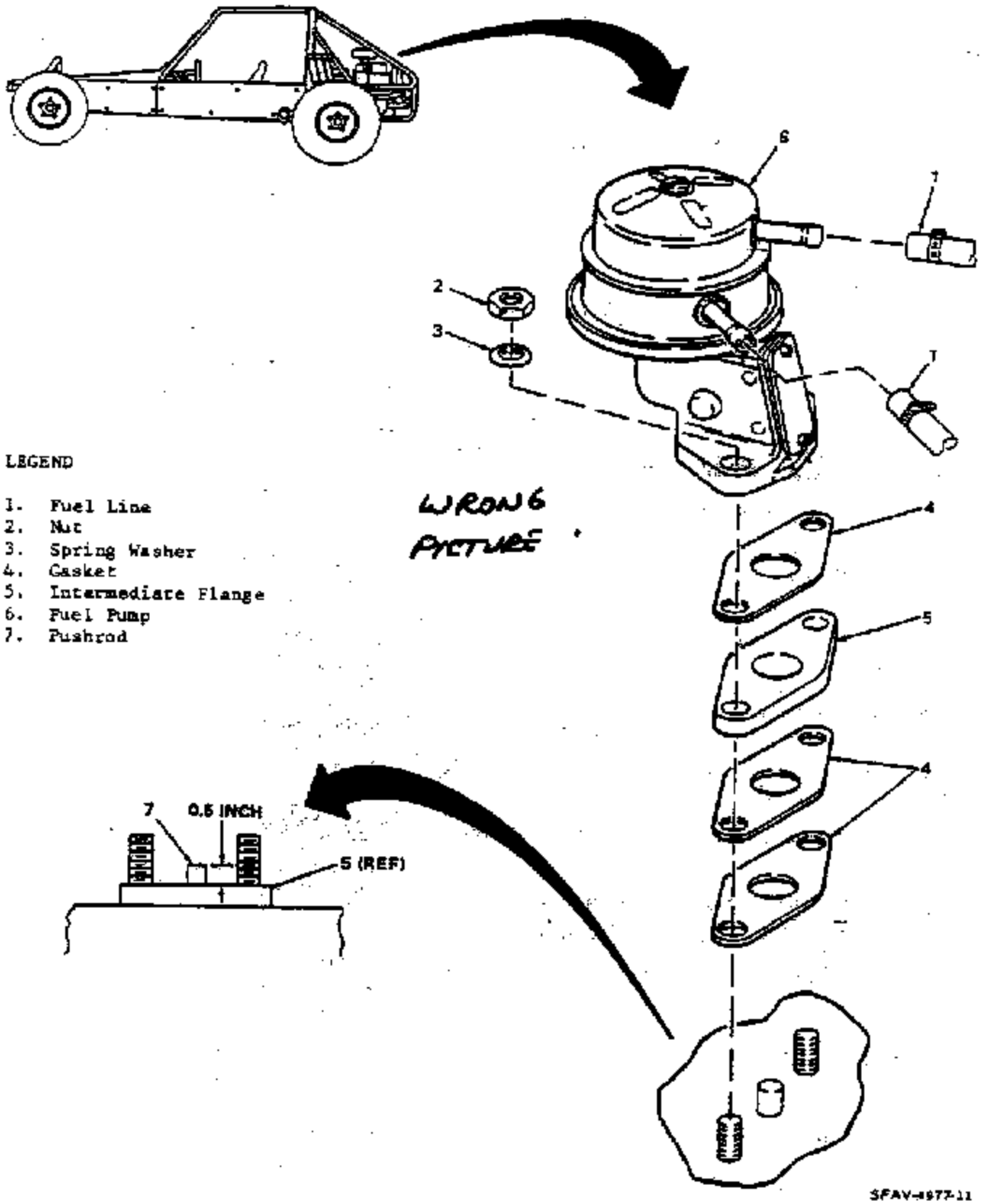


Figure 5-6. Fuel Pump Replacement.

(3) Pack bottom of fuel pump (6) with multipurpose grease.

(4) Install gasket (4) and fuel pump (6).

(5) Install two spring washers (3) and two nuts (2).

(6) Connect two fuel lines (1).

(7) Connect negative (-) battery cable to battery terminal.

5-10. FUEL TANK REPLACEMENT. To replace the fuel tank, proceed as follows:

a. Removal

TURN OFF VALVE AT TANK

(1) Disconnect and plug fuel line.

(2) Remove fuel tank mounting straps.

(3) Remove fuel tank.

b. Installation

(1) Position fuel tank in chassis.

(2) Install fuel tank mounting straps.

(3) Unplug and connect fuel line.

TURN ON FUEL VALVE

5-11. EXHAUST SYSTEM REPLACEMENT. To replace the exhaust system, proceed as follows:

a. Removal

(1) Remove engine skid plate. Refer to paragraph 5-31.

(2) Remove rear chassis section by removing two lower and four upper mounting bolts and attaching hardware.

(3) Remove two nuts, four washers, two bolts, and muffler from exhaust pipes.

(4) Remove two nuts and washers from each cylinder exhaust pipe connection.

(5) Lift exhaust pipes from engine.

b. Installation

(1) Position exhaust pipes on engine. Install new gaskets on exhaust ports.

(2) Install two nuts and washers on each exhaust pipe and cylinder port connection.

(3) Place new muffler gasket on exhaust pipe. Position muffler on exhaust pipe.

(4) Install two muffler mounting bolts, four washers, and two nuts. Tighten nuts securely.

(5) Position rear chassis section in place and install four upper bolts and attaching hardware. Install two lower bolts and attaching hardware.

(6) Install engine skid plate. Refer to paragraph 5-31.

(7) Start engine and check for exhaust leaks.

5-12. DISTRIBUTOR REPLACEMENT. To replace the distributor (figure 3-4), proceed as follows:

a. Removal

(1) Unclasp and remove distributor cap (1).

(2) Turn engine over by hand until rotor (2) tip points to the number 1 cylinder mark on distributor housing (13).

(3) Disconnect ~~wiring harness and~~ wiring to distributor.

(4) Remove bolt that secures distributor to crankcase. Lift off distributor. Cover engine opening to prevent contamination.

b. Installation

(1) If required, turn engine over by hand to align timing mark on crankshaft pulley with seam of engine crankcase centerline and to position distributor drive shaft as shown in figure 5-7.

(2) Align rotor (2, figure 3-4) with number 1 cylinder mark on housing (13). Carefully insert distributor into crankcase hole.

(3) Install bolt securing distributor to crankcase.

(4) Install distributor cap (1). Make sure clasps (12) are securely fastened.

(5) Connect hoses and wiring to distributor.

(6) Check ignition timing.

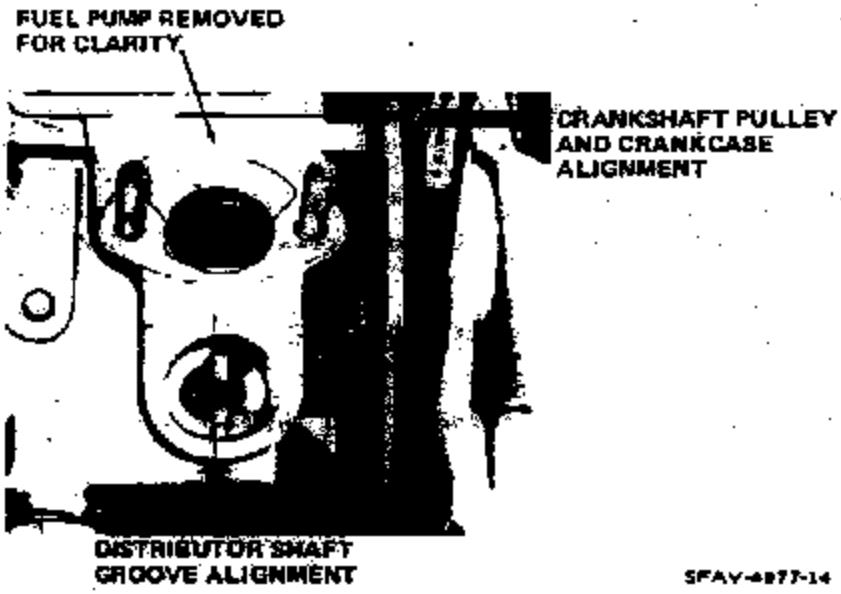


Figure 5-7. Distributor Shaft and Crankshaft Pulley Alignment.

5-13. IGNITION COIL REPLACEMENT. To replace the ignition coil, proceed as follows:

a. Removal

(1) Tag and disconnect wire leads from ignition coil.

(2) Remove two screws, mounting bracket, and ignition coil.

(3) Loosen screw and remove coil from bracket.

b. Installation

(1) Position ignition coil in mounting bracket and tighten screw.

(2) Position ignition coil and mounting bracket on chassis. Align mounting holes and install two screws.

(3) Connect wire leads to ignition coil.

5-14. ALTERNATOR/REGULATOR REPLACEMENT. To replace the alternator/regulator (figure 5-8), proceed as follows:

a. Removal

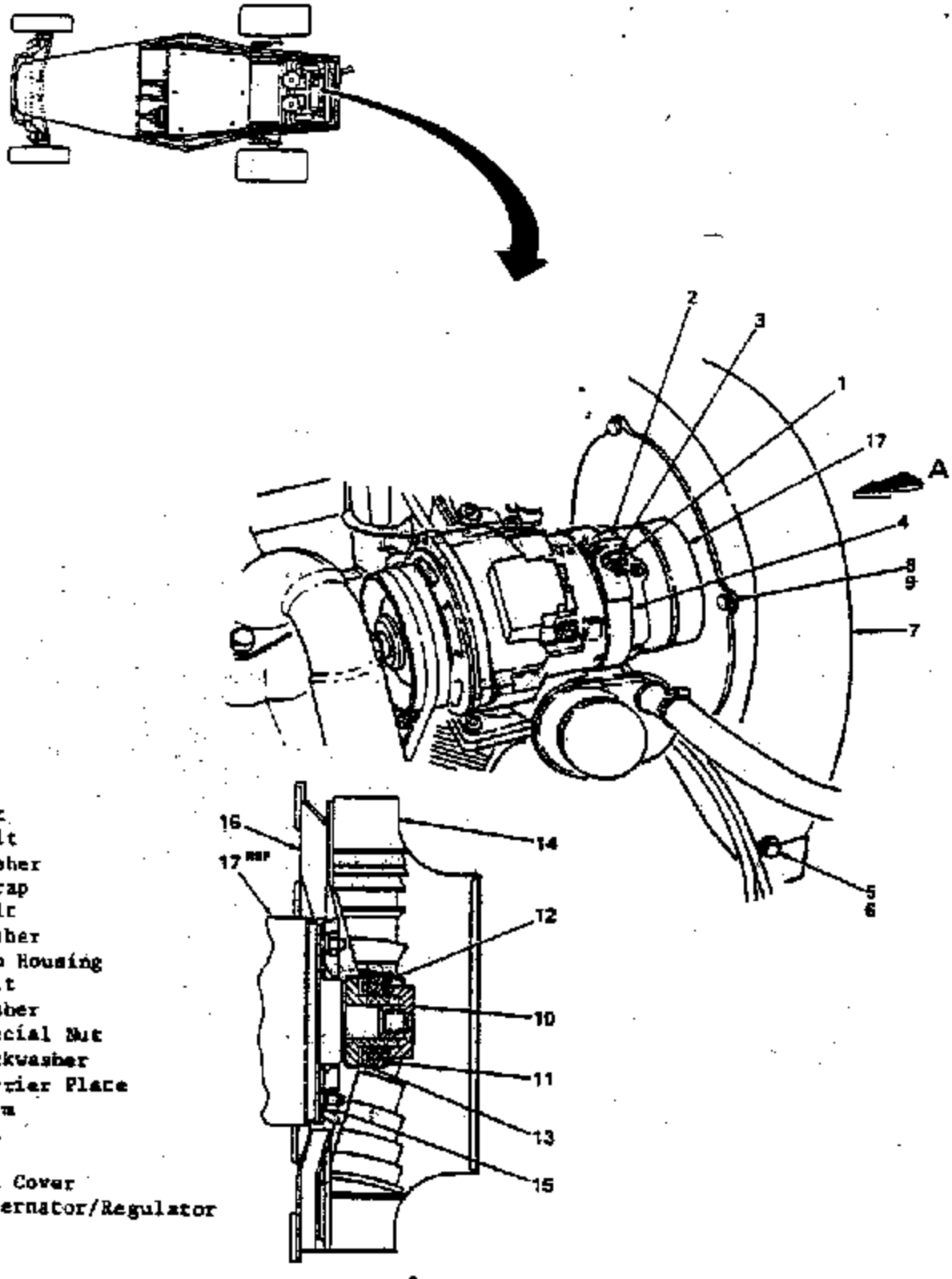
(1) Remove alternator belt. Refer to paragraph 3-2c.

(2) Disconnect wires from alternator/regulator (17).

(3) Remove nut (1), bolt (2), two washers (3), and strap (4).

(4) Remove fan housing attach bolts (5) and washers (6).

(5) Remove four bolts (8) and washers (9). Lift fan housing (7) to allow access to lower bolts, if required.



LEGEND

1. Nut
2. Bolt
3. Washer
4. Strap
5. Bolt
6. Washer
7. Fan Housing
8. Bolt
9. Washer
10. Special Nut
11. Lockwasher
12. Carrier Place
13. Shim
14. Fan
15. Nut
16. Fan Cover
17. Alternator/Regulator

Figure 5-8. Alternator/Regulator Replacement.

(6) Pull alternator/regulator (17) and fan cover (16) from fan housing (7).

(7) Remove special nut (10), lockwasher (11), two carrier plates (12), and shims (13). Separate fan (14) from alternator/regulator (17).

(8) Remove two nuts (15) and fan cover (16) from alternator/regulator (17).

b. Installation

WITH VENT IN REAR PLATE POINTING DOWN

(1) Position fan cover (16) on alternator/regulator (17) and install two nuts (15).

(2) Position fan (14) in place on alternator/regulator (17) and install shims (13), two carrier plates (12), lockwasher (11), and special nut (10).

(3) Place alternator/regulator (17) and fan cover (16) in fan housing (7).

(4) Install four bolts (8) and washers (9).

(5) Set fan housing (7) in place and install attach bolts (5) and washers (6).

(6) Install strap (4), bolt (2), two washers (3), and nut (1).

(7) Connect wires to alternator/regulator (17).

(8) Install and adjust alternator belt. Refer to paragraph 3-2c.

5-15. STARTER MOTOR AND SOLENOID REPLACEMENT. To replace the starter motor and solenoid, proceed as follows:

a. Removal

(1) ~~Jack up and remove right rear wheel. Refer to EM-1150-10.~~

(2) Disconnect negative (-) battery cable from battery terminal.

(3) Disconnect two electrical leads from solenoid.

(4) Remove upper attaching bolt and washer.

(5) Remove lower mounting nut. Separate starter and solenoid from transmission.

b. Installation

(1) Lubricate starter shaft bushing with multipurpose grease.

(2) Apply sealing compound along starter and transmission mating surfaces.

(3) Slide starter onto mounting stud and secure loosely in place with nut.

(4) Install upper attaching bolt and washer. Do not tighten.

(5) Working alternately, gradually torque nut and bolt to 22 foot-pounds.

(6) Clean terminals and connect wires to starter solenoid.

(7) Connect negative (-) battery cable to battery terminal.

(8) ~~Install right rear wheel and lower to ground. Refer to EM-1150-10.~~

5-16. HEADLIGHT ASSEMBLY REPLACEMENT. To replace the headlight assembly (figure 5-9), proceed as follows:

a. Removal

(1) To remove the headlamp assembly, go to step (2). To remove the headlight bulb only, complete the following steps:

(a) Remove nut (4), ~~washers (2 and 3), and bolt (1) from lens re-~~ ~~tainer (5)~~. screw

(b) Remove lens retainer (5) from bulb housing (11) and unplug defective headlight bulb (6).

(2) To remove the headlamp assembly, complete the following steps:

(a) Tag, label, and disconnect headlight assembly wiring from chassis wiring.

(b) Remove nut (7), lockwasher (8), washer (9), and rubber bushing (10).

(c) Lift headlight assembly from mounting bracket (12).

b. Installation

(1) To install the headlight assembly, go to step (2). To install the headlight bulb (6), complete the following steps:

CAUTION

To prevent premature failure, do not touch headlight bulb during installation. Heat will concentrate on contaminated surfaces of lens.

(a) Install new headlight bulb (6) in bulb housing (11).

LEGEND

1. Nut	7. Nut
2. Washer	8. Lockwasher
3. Washer	9. Washer
4. Bolt	10. Rubber Bushing
5. Lens Retainer	11. Bulb Housing
6. Headlight Bulb	12. Mounting Bracket

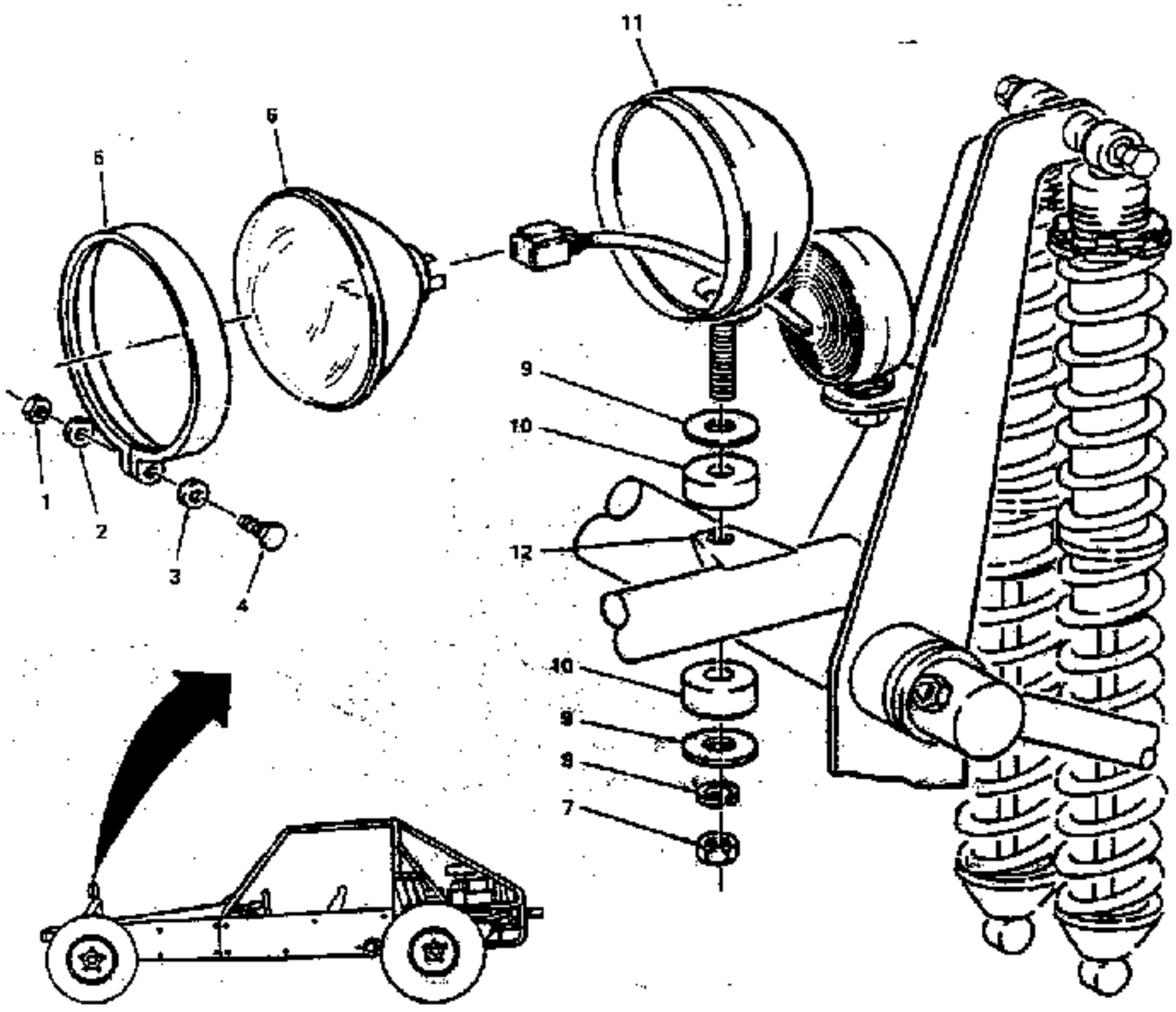


Figure 5-9. Headlight Assembly Replacement.

(b) Position lens retainer (5) on bulb housing (11).

(c) Install screw

(2) To install the headlight assembly, complete the following steps:

(a) Position headlight assembly on mounting bracket (12).

(b) Install [illegible] (10), washer (9), lockwasher (8), and nut (7).

(c) Connect headlight assembly wiring to chassis wiring.

5-17. TAILLIGHT REPLACEMENT. To replace the taillight lens, bulb, and housing, proceed as follows:

a. Removal

NOTE

The taillights are located below the two turn signal directional lights on the rear frame of the SFAV.

(1) To remove taillight housing assembly, tag, label, and disconnect taillight assembly wiring from chassis wiring. Remove nut, washer, [illegible]. Remove housing assembly.

(2) Loosen soft rubber guard that secures lens to light housing and remove lens.

(3) Remove light bulb by gently pushing in and turning bulb 90 degrees counterclockwise (left).

b. Installation

(1) Position taillight assembly on frame bar just above rear chassis section. Install bolt, washer, and nut. Tighten nut securely.

(2) Connect chassis wiring to taillight assembly wiring.

(3) Install taillight bulb by inserting bulb into housing receptacle and turning bulb 90 degrees clockwise.

(4) Position lens on light housing and secure with soft rubber guard.

(5) Turn on taillights to verify operation.

5-18. DIRECTIONAL SIGNAL LIGHT REPLACEMENT. To replace directional signal light lens, bulb, and housing, proceed as follows:

NOTE

Right and left directional lights are mounted in front above headlights, and in rear above taillights.

a. Removal

(1) Loosen soft rubber guard on light housing and remove lens.

(2) Remove light bulb by gently pushing in and turning bulb 90 degrees counterclockwise (left).

(3) Tag, label, and disconnect directional signal light wiring from chassis wiring. Remove nut, washer, and bolt. Remove housing assembly from chassis.

b. Installation

(1) Position directional signal light assembly on frame and install bolt, washer, and nut. Tighten nut securely.

(2) Connect chassis wiring to directional signal light assembly wiring.

(3) Install directional signal light bulb by inserting bulb into housing receptacle and turning bulb 90 degrees clockwise (right).

(4) Install lens and secure with soft rubber guard.

(5) Operate turn signals to verify directional signal lights are working.

5-19. INDICATOR GAUGE REPLACEMENT. To replace the indicator gauges on the indicator panel, proceed as follows. Refer to figure 5-10 for electrical wiring data.

a. Removal

LOOSEN BOLTS ON WINDSHIELD AND SLIDE WINDSHIELD UP

(1) Unlock fasteners and pull control panel forward.

DISCONNECT BATTERY - CANCELS COMPUTER

(2) Fuel Gauge. To remove fuel gauge from back of indicator panel, tag, label, and disconnect fuel gauge wires. Remove attaching hardware and fuel gauge.

(3) Ammeter. To remove ammeter from back of indicator panel, tag, label, and disconnect ammeter wires. Remove attaching hardware and ammeter.

(4) Cylinder Head Temperature Gauge. To remove cylinder head temperature gauge from back of indicator panel, tag, label, and disconnect cylinder head temperature gauge wires. Remove attaching hardware and cylinder head temperature gauge.

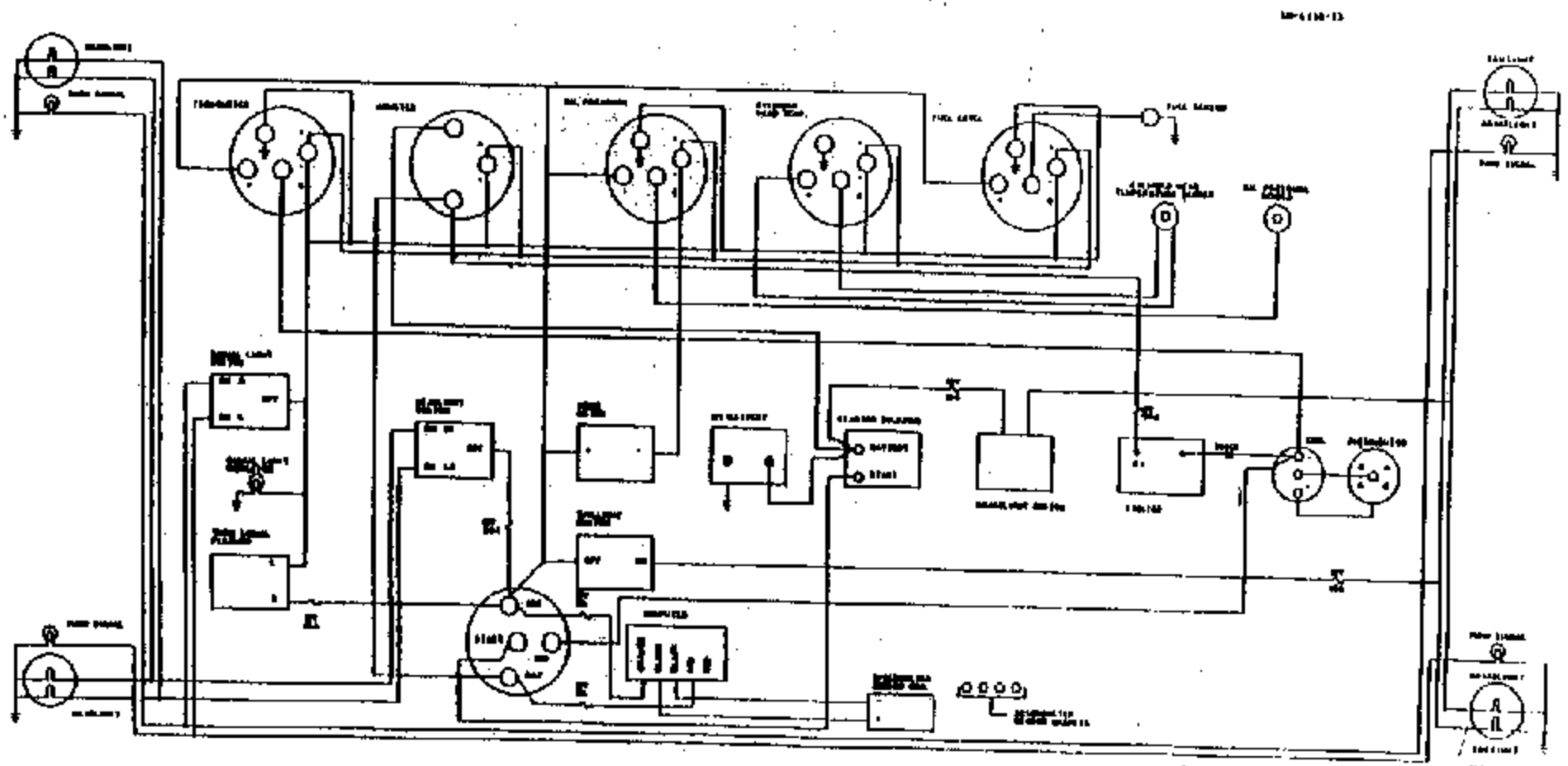


Figure 3-10. Electrical Schematic.

(5) Engine Oil Pressure Gauge. To remove engine oil pressure gauge from back of indicator panel, tag, label, and disconnect engine oil pressure gauge wires. Remove attaching hardware and engine oil pressure gauge.

(6) Tachometer. To remove tachometer from back of indicator panel, tag, label, and disconnect tachometer wires. Remove attaching hardware and tachometer.

(7) Hourmeter. To remove hourmeter from front of indicator panel, remove two Phillips-head screws. From rear of indicator panel, tag, label, and disconnect hourmeter wiring. Remove hourmeter.

(8) Ignition Switch. To remove ignition switch from back of indicator panel, tag, label, and disconnect ignition switch wires. Remove attaching hardware and ignition switch.

(9) Driving Computer (Speedometer and Clock). To remove driving computer from back of indicator panel, tag, label, and disconnect computer wires. Remove attaching hardware and computer.

(10) Signal Indicator Light. To remove signal indicator light from back of indicator panel, tag, label, and disconnect signal indicator light wires. Remove attaching hardware and signal indicator light.

(11) Turn Signal Switch. To remove turn signal switch from back of indicator panel, tag, label, and disconnect turn signal switch wires. Remove attaching hardware and turn signal switch.

(12) Headlight Switch. To remove headlight switch from back of indicator panel, tag, label, and disconnect headlight switch wires. Remove attaching hardware and headlight switch.

(13) Taillight Switch. To remove taillight switch from back of indicator panel, tag, label, and disconnect taillight switch wires. Remove attaching hardware and taillight switch.

b. Installation. To install the indicator gauges and switches into the indicator panel, install gauge or switch with attaching hardware and, at the back of the indicator panel, connect the tagged and labeled wires.

5-20. BATTERY REPLACEMENT. To replace the battery (figure 5-11), proceed as follows:

WARNING

Electrolyte causes severe burns to eyes and skin. Avoid spilling fluid on clothing or skin. In the event of accidental skin contact, wash area thoroughly with soap and water. If electrolyte gets in the eyes, rinse thoroughly with fresh water and get immediate medical attention. Make sure battery caps are securely installed.

a. Removal

(1) Disconnect negative (-) cable (5) from battery terminal. Disconnect positive (+) cable (4) from battery terminal.

(2) Remove wing nuts (1), washers (2), retaining plate (3), and J bolts (7).

(3) Remove battery.

b. Installation

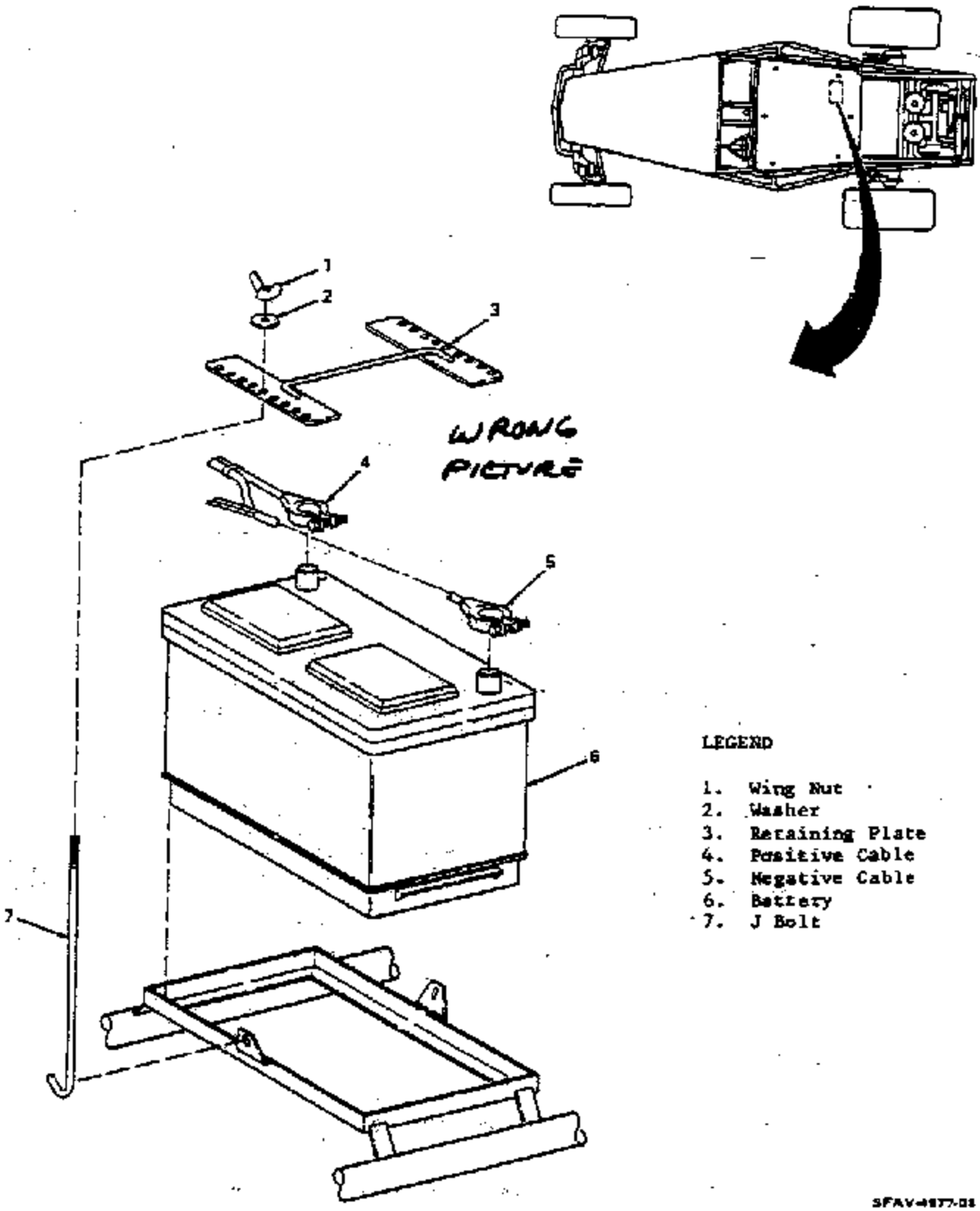
(1) Place new battery (6) in vehicle with positive (+) and negative (-) terminal posts toward front of vehicle.

(2) Place retaining plate (3) over J bolts (7).

(3) Install washers (2) and wing nuts (1).

(4) Connect positive (+) cable (4) to positive (+) battery terminal post.

(5) Connect negative (-) cable (5) to negative (-) battery terminal post.



LEGEND

1. Wing Nut
2. Washer
3. Retaining Plate
4. Positive Cable
5. Negative Cable
6. Battery
7. J Bolt

SFAV-4877-01

Figure 5-11. Battery Replacement.

5-21. TRANSMISSION REPLACEMENT. To replace the transmission (figure 5-12), proceed as follows:

a. Removal

DISCONNECT BATTERY

(1) Remove engine. Refer to paragraph 5-2.

REMOVE TRANS SKID PLATE

(2) Remove socket head screws and washers (1) from left and right constant velocity (CV) joints at transmission. Reposition drive shafts to prevent interference with transmission.

(3) Remove square head bolt (2) securing shift rod coupling (3) to transmission. Reposition shifter as required to disengage coupling.

(4) Remove clutch slave cylinder in accordance with paragraph 5-6.

(5) Disconnect wires from starter solenoid (4).

REMOVE STARTER

(6) Remove two nuts (5) from front transmission mount (6).

REMOVE SUPPORT RODS AND REAR MOUNT

(7) Position floor jack beneath transmission. Raise jack until weight of transmission is fully supported.

(8) Remove transmission carrier bolts (7) and nuts (8) from both sides of transmission.

(9) Using the jack, carefully pull transmission toward rear of vehicle. Lower jack and transmission.

b. Installation

(1) Using floor jack, raise transmission up into posiion on chassis.

(2) Apply general purpose grease to transmission carrier bolts (7). Install carrier bolts and nuts (8).

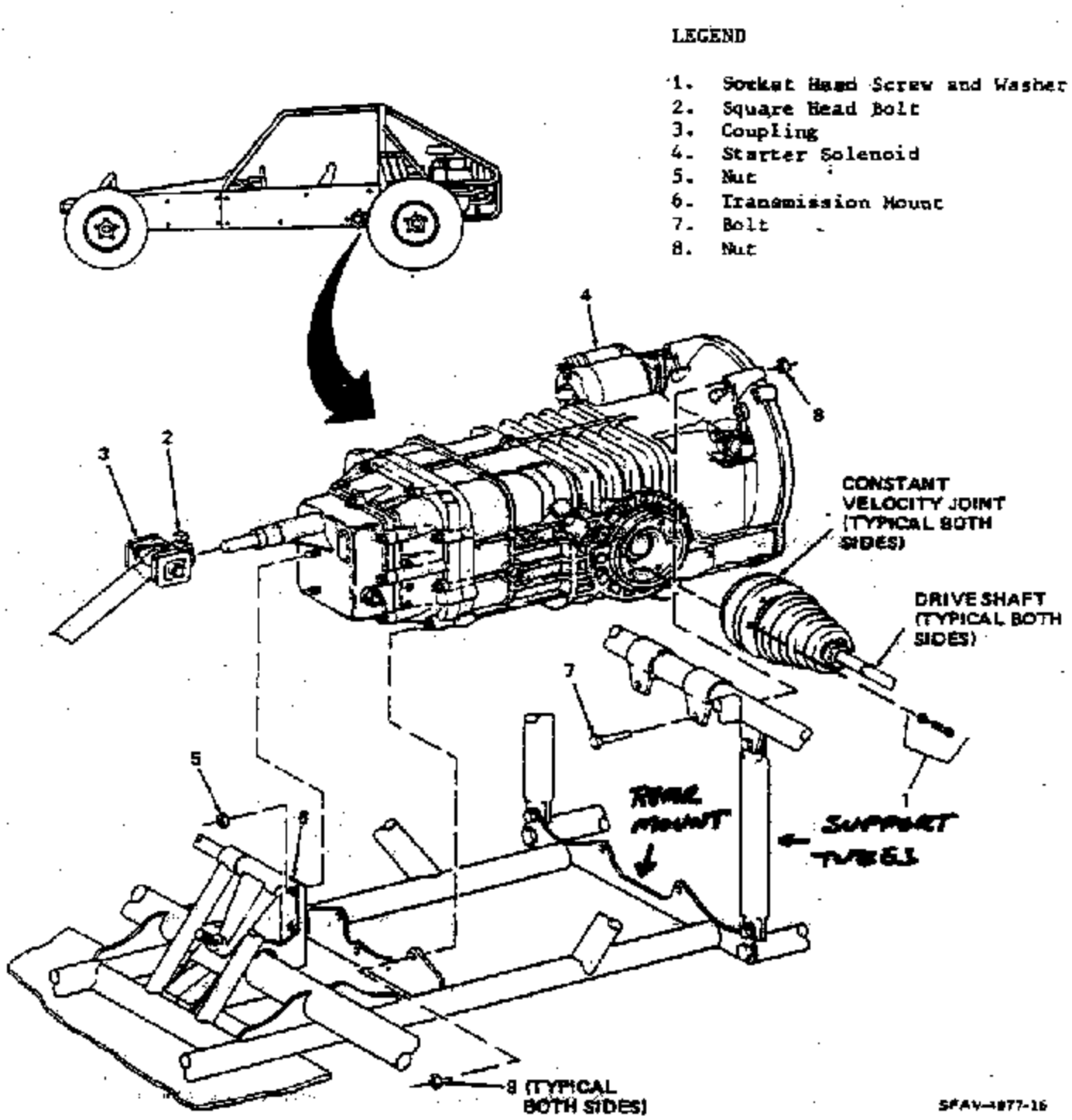


Figure 5-12. Transmission Replacement.

(3) Install two front transmission mounting nuts (5). Torque nuts to 14 foot-pounds.

INSTALL REAR MOUNT AND SUPPORT TUBES

(4) Torque carrier bolts (7) to 60 foot-pounds.

INSTALL STARTER

(5) Connect wires to starter solenoid (4).

(6) Install clutch slave cylinder. Refer to paragraph 5-6.

(7) Engage shift rod coupling (3) with transmission and install square head bolt (2).

(8) Position CV joints on transmission. Install socket head screws and washers (1) in both shafts. Torque screws to 25 foot-pounds.

INSTALL TRANSMISSION SKID PLATE

(9) Install engine. Refer to paragraph 5-2.

5-22. SHIFT LINKAGE REPLACEMENT. To replace the shift linkage (figure 5-13), proceed as follows:

a. Removal

(1) Remove nut (1), bolts (3), and washers (2) securing gear shift (4) to chassis.

(2) Pull gear shift (4), spring (5), and lockout plate (6) from chassis.

(3) Remove bolt (7), spacer (8), coupler plates (9), and sleeve (10) from coupler frame (11).

(4) Pull rod (12) forward through bushing (14). Remove bushing and retaining ring (13).

LEGEND

1. Nut
2. Washer
3. Bolt
4. Gear Shift
5. Spring
6. Lockout Plate
7. Bolt
8. Spacer
9. Coupler Plates
10. Sleve
11. Coupler Frame
12. Rod
13. Retaining Ring
14. Bushing

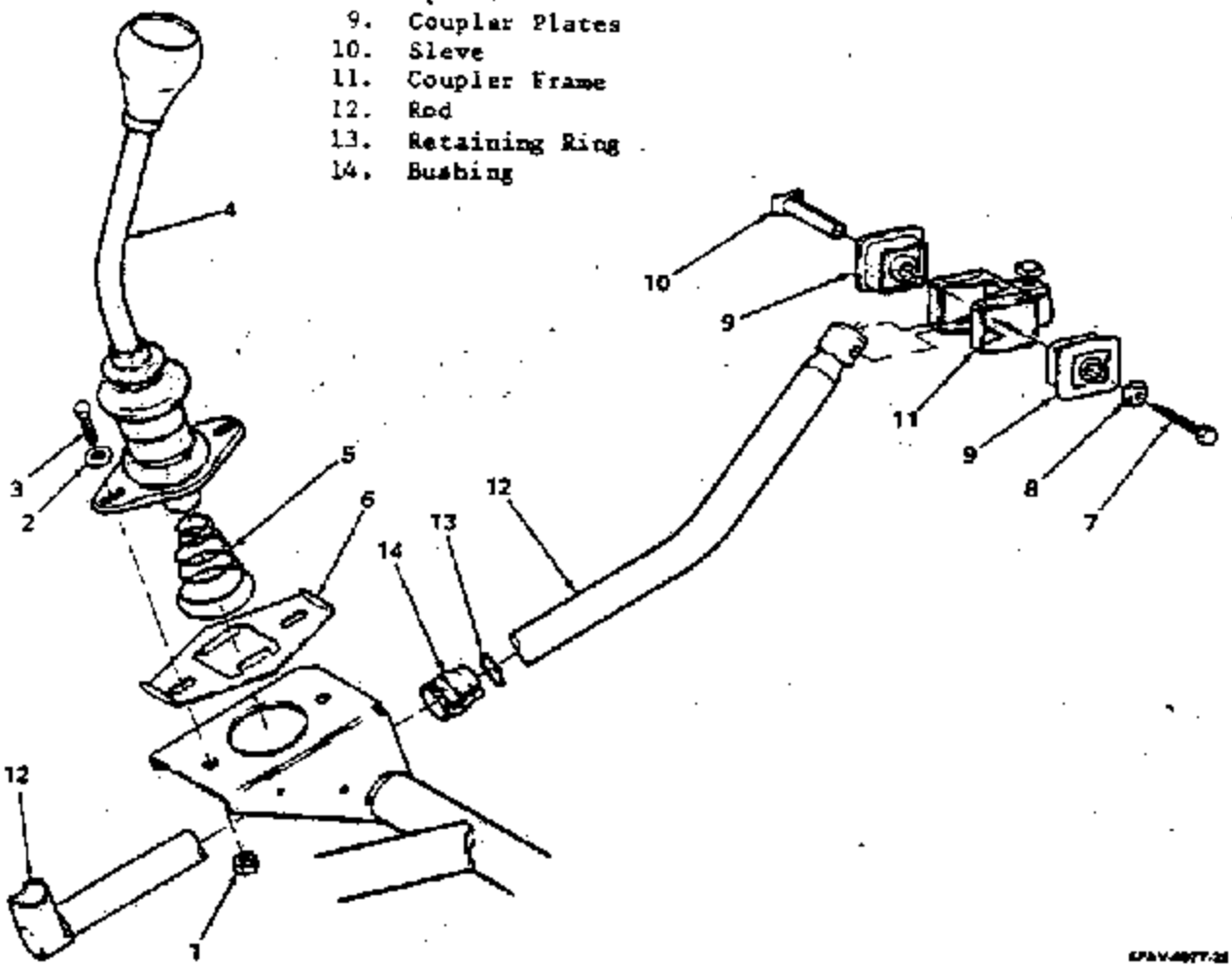


Figure 5-13. Shift Linkage Replacement.

b. Installation

(1) Lubricate bushing (14) with multipurpose grease. Install retaining ring (13).

(2) Insert rod (12) through forward end of bushing (14).

(3) Position rod (12) in coupler frame (11). Install coupler plates (9), spacer (8), sleeve (10), and bolt (7).

(4) Position lockout plate (6), spring (5), and gear shift (4) over chassis mounting holes. Make sure lockout plate is positioned with tabs pointing upward and narrow tab toward driver's seat. Make sure pin on gear shift ball is engaged with slot in rod (12) socket.

(5) Install bolts (3), washers (2), and nut (1). ADJUST

5-23. DRIVE SHAFT, STUB AXLE, AND CONSTANT VELOCITY JOINT REPLACEMENT. To replace the drive shaft, stub axle, and CV joints (figure 5-14), proceed as follows:

a. Drive Shaft and Constant Velocity Joint Removal

(1) Remove wheel. Refer to EM-1150-10.

(2) Remove brake assembly. Refer to paragraph 5-24.

(3) Remove socket head screws (1) and washers (2) from transmission end of drive shaft (11). If installed, remove plate (3).

(4) Remove socket head screws from wheel end of drive shaft (11).

(5) Separate drive shaft (11) from vehicle.

(6) If installed, loosen clamps (4 and 6). Peel back boots (5) from CV joint (10).

SNAP RING

(7) Remove strip (9). ~~Drive cap (7) from CV joint (10) using a brass punch, and remove concave washer (8).~~

CAUTION

~~After removing cap~~ (7), do not tilt ball hub more than 20 degrees in CV joint outer hub or balls will fall out.

(8) Slide CV joint outer ring, together with the balls, onto ball hub.

(9) While supporting hub, press out drive shaft (11) ~~and remove concave washer~~ (8).

b. Stub Axle Removal

(1) Remove bolts (12) and bearing cover (13).

21 AND SNAP RING

(2) Remove seal (~~20~~), bearing spacer (15), and bearing (16).

(3) Drive out stub axle (22) from trailing arm (18).

(4) Remove spacer (17), ~~seal (21), snap ring (20), and bearing (19)~~.

c. Stub Axle Installation

(1) Install bearing (19), snap ring (20), seal (21), and spacer (17).

(2) Slide stub axle (22) into trailing arm (18).

(3) Install bearing (16), bearing spacer (15), and seal (14).

(4) Install bolts (12) and bearing cover (13).

LEGEND

1. Screw
2. Washer
3. Plate
4. Clamp
5. Boot
6. Clamp
7. Cap
8. Concave Washer
9. Clip
10. CV Joint
11. Drive Shaft
12. Bolt
13. Bearing Cover
14. Seal
15. Bearing Spacer
16. Bearing
17. Spacer
18. Trailing Arm
19. Bearing
20. Snap Ring
21. Seal
22. Stub Axle

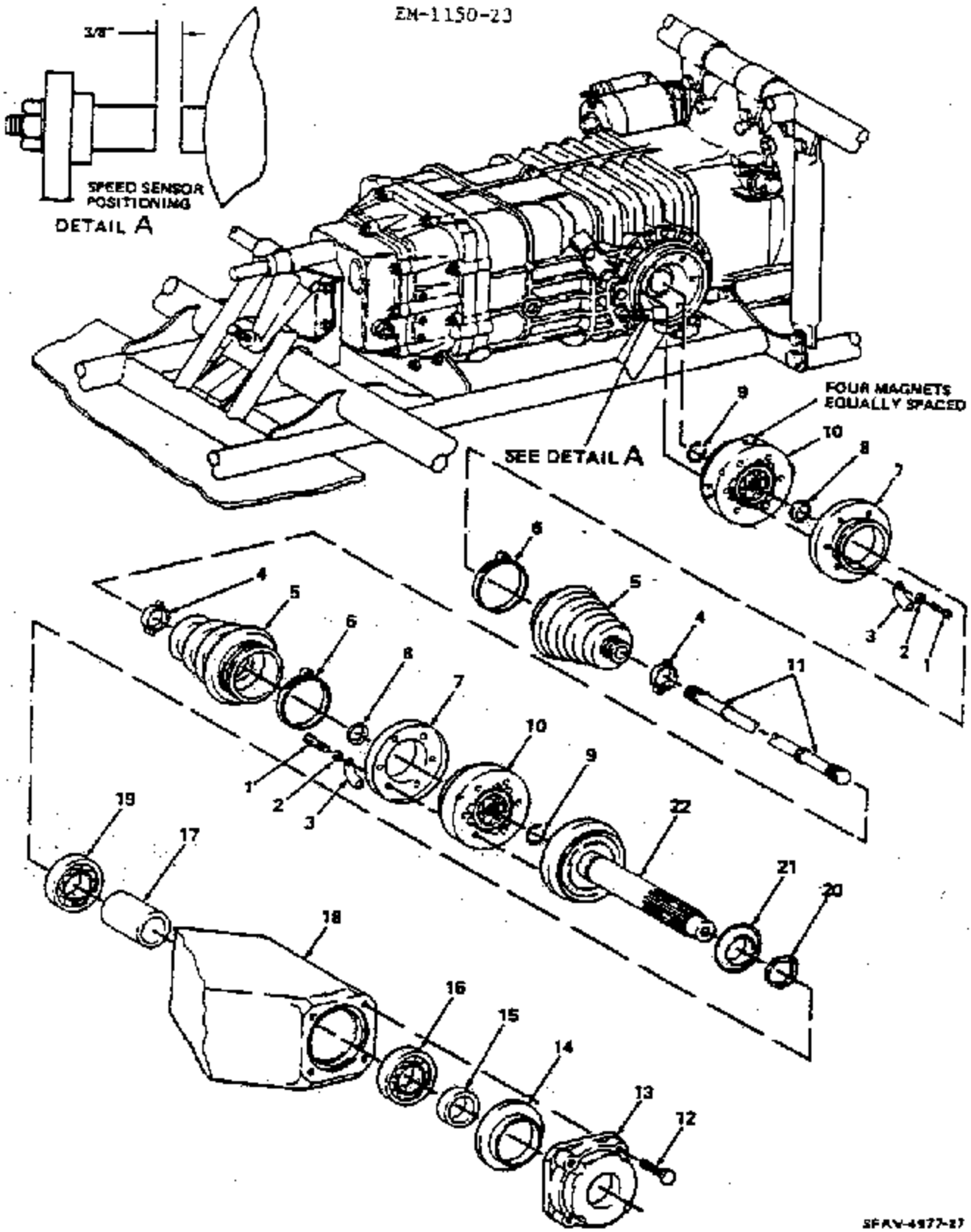


Figure 5-14. Drive Shaft, Stub Axle, and Constant Velocity Joint Replacement

d. Drive Shaft and Constant Velocity Joint Installation

(1) ~~Install conical washer (9)~~ and drive shaft (11) in CV joint (10) supporting hub.

CAUTION

Do not tilt ball hub more than 20 degrees in CV joint (10) outer hub or balls will fall out.

(2) Slide CV joint (10) outer ring, together with balls, onto ball hub.

(3) ~~Position snapring washer (8)~~ on CV joint (10). Install drive shaft (11) and ~~snap ring~~ SNAP RING.

(4) Install cap (7) and boot (5). If removed, install clamps (4 and 6).

(5) Repack CV joints (10) with 3.2 ounces of molybdenum grease.

(6) If installed, tighten clamps (4 and 6).

(7) Place drive shaft (11) and CV joints (10) into position. Install plates (3), if removed, washers (2), and socket head screws (1) in both transmission and wheel end CV joints (10).

(8) Install brake assembly. Refer to paragraph 5-24.

(9) Install wheel. Refer to EM-1150-10.

5-24. BRAKE ASSEMBLY REPLACEMENT. To replace a brake assembly (figure 5-15), proceed as follows:

NOTE

Replacement of the left front brake assembly is shown. Replacement of the remaining three assemblies is similar except as noted.

LEGEND

1.	Dust Cap	15.	Brake Shoe
2.	Socket Head Screw	16.	Screw
3.	Clamp Nut	17.	Adjuster
4.	Thrust Washer	18.	Bolt
5.	Outer Bearing	19.	Lockwasher
6.	Outer Race	20.	Adjuster
7.	Inner Race	21.	Screw
8.	Inner Bearing	22.	Wheel Cylinder
9.	Grease Seal	23.	Washer
10.	Brake Hub	24.	Bolt
11.	Spring Cup	25.	Retaining Pin
12.	Retaining Spring	26.	Spindle
13.	Upper Return Spring	27.	Backing Plate
14.	Lower Return Spring		

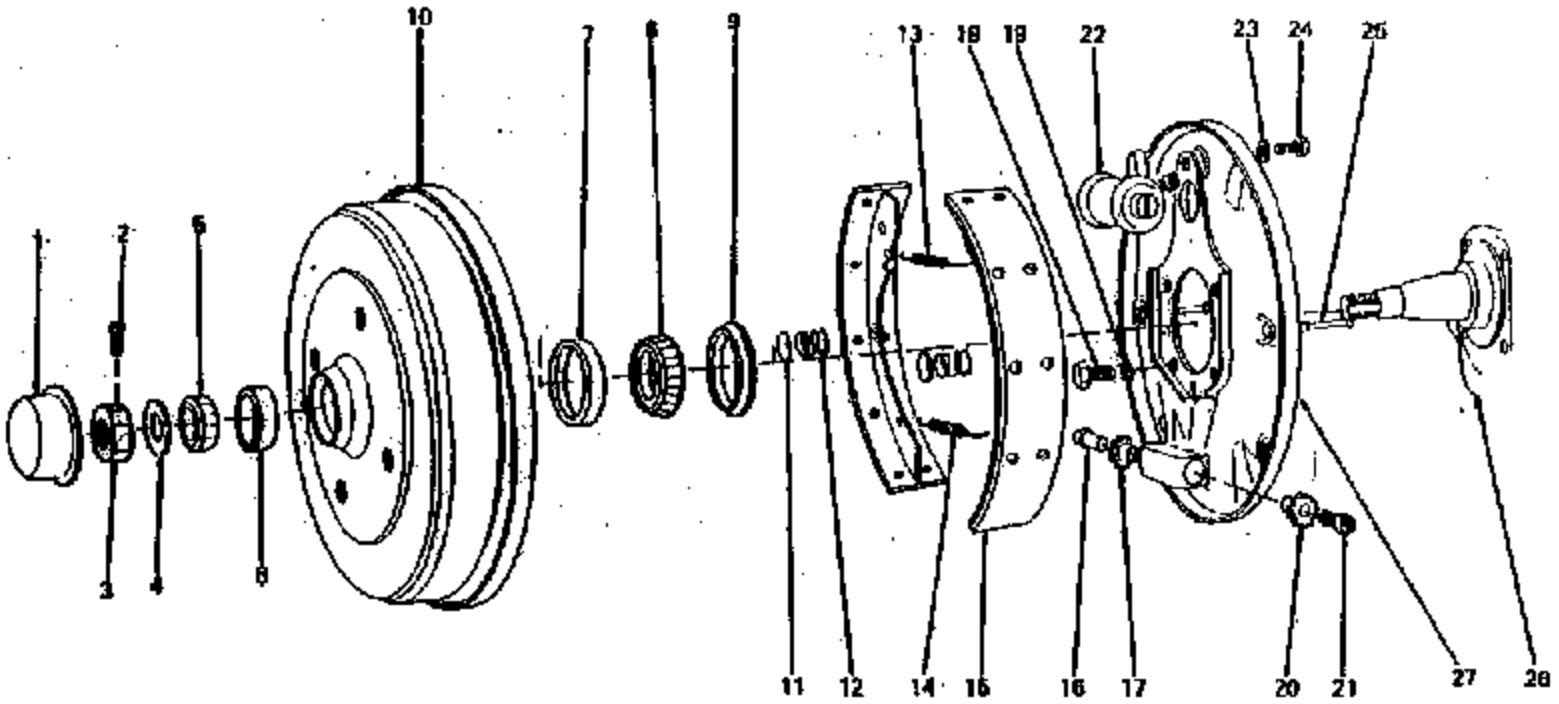


Figure 5-15. Brake Assembly Replacement.

a. Removal

(1) Remove tire and wheel. Refer to EM-1150-10.

(2) Pry dust cap (1) from brake hub (10).

(3) Loosen socket head screw (2).

NOTE

BOTH RIGHT HAND THREAD

~~Clamp nut (3) on the left front wheel has left handed threads.~~

(4) Remove clamp nut (3) from spindle (26).

CAUTION

To prevent damage to thrust washer (4) and outer bearing (5), do not allow parts to fall out onto floor.

(5) Carefully remove brake hub (10) from spindle (26).

(6) Remove thrust washer (4) and outer bearing (5).

(7) Remove grease seal (9) and inner bearing (8) from brake hub (10).

(8) Inspect outer and inner race (6 and 7) for wear, burring, scoring, or discoloration. Replace only if required.

(9) Check wheel cylinder (22) for sticking pistons by slowly depressing brake pedal and watching brake expansion.

(10) Insert two screwdrivers behind backing plate (27) flange. Press screwdrivers against brake shoes to limit travel. Lift wheel cylinder (22) boots and check for fluid leakage. Replace cylinder during installation if sticking or leaking.

(11) Remove spring cups (11) and retaining springs (12) by depressing cup, then turning 90 degrees. Remove retaining pins (25).

(12) Using a brake spring pliers, remove upper and lower return springs (13 and 14).

(13) Remove brake shoes (15).

(14) Disconnect brake hose from wheel cylinder (22). Cap and plug openings.

(15) Remove bolt (24), washer (23), and wheel cylinder (22) from backing plate (27).

(16) If backing plate (27) must be removed, remove bolts (18) and lockwashers (19). Separate plate from spindle (26).

b. Installation

(1) If removed, install backing plate on spindle (26) with bolts (18) and lockwashers (19).

(2) Position wheel cylinder (22) on backing plate (27). Install washer (23) and bolt (24). Torque bolt to 18 foot-pounds.

(3) Remove protective cap and plug. Connect brake hose to wheel cylinder (22).

(4) Remove screws (16 and 21) and adjusters (17 and 20). Lightly coat threads and bearing surfaces of adjusters with multipurpose grease.

(5) Install adjusters (17 and 20) and screws (16 and 21). If new brake shoes are being installed, back adjusters full out.

(6) Install new brake shoes (15) on wheel cylinder (22) pistons and connect to adjuster screws (16 and 21).

(7) Install upper and lower return springs (13 and 14).

(8) Install retaining pins (25), retaining springs (12), and spring cups (11).

(9) Clean all parts of bearing assembly, except brake hub (10), with solvent.

(10) Repack outer and inner bearings (5 and 8) with multipurpose grease.

(11) Lubricate outer and inner races (6 and 7) with multipurpose grease.

(12) Install inner bearing (8) and grease seal (9) in brake hub (10).

(13) Position brake hub (10) and attached parts on spindle (26). Hold in place.

(14) Install outer bearing (5), thrust washer (4), and clamp nut (3).

CAUTION

To prevent damage to outer and inner races (6 and 7), do not overtorque clamp nut (3).

(15) On front brakes, torque clamp nut (3) to 7 foot-pounds while turning brake hub (10) by hand. On rear brakes, torque castellated nut to ~~100~~ 135 foot-pounds while turning brake hub.

(16) Move brake hub (10) in and out by hand. Check for excessive axial play.

(17) Torque socket head screw (2) 7 to 9.5 foot-pounds.

(18) Install dust cap (1) on brake hub (10).

(19) Install wheel and tire. Refer to EM-1150-10.

5-25. BRAKE PEDAL ASSEMBLY REPLACEMENT. To replace the brake pedal assembly (figure 5-16), proceed as follows:

a. Removal

(1) Disconnect hydraulic lines (1). Plug lines to prevent contamination.

(2) Remove four nuts (2) and four bolts (3).

(3) Remove brake pedal assembly from vehicle.

b. Disassembly

(1) Remove two nuts (4) from pedal (5).

(2) Remove four nuts (6), eight washers (7), and four bolts (8) securing master cylinders (9) to frame (10). Separate cylinders from frame.

c. Reassembly

(1) Position master cylinders (9) on frame (10) and pedal (5) stud.

(2) Install four bolts (8), eight washers (7), and four nuts (6) securing master cylinders (9) to frame (10).

(3) Install two nuts (4) on pedal (5) stud.

d. Installation

(1) Position brake pedal assembly in vehicle. Align mounting holes as required.

(2) Install four bolts (3) and four nuts (2).

(3) Connect hydraulic lines (1) to master cylinders (9).

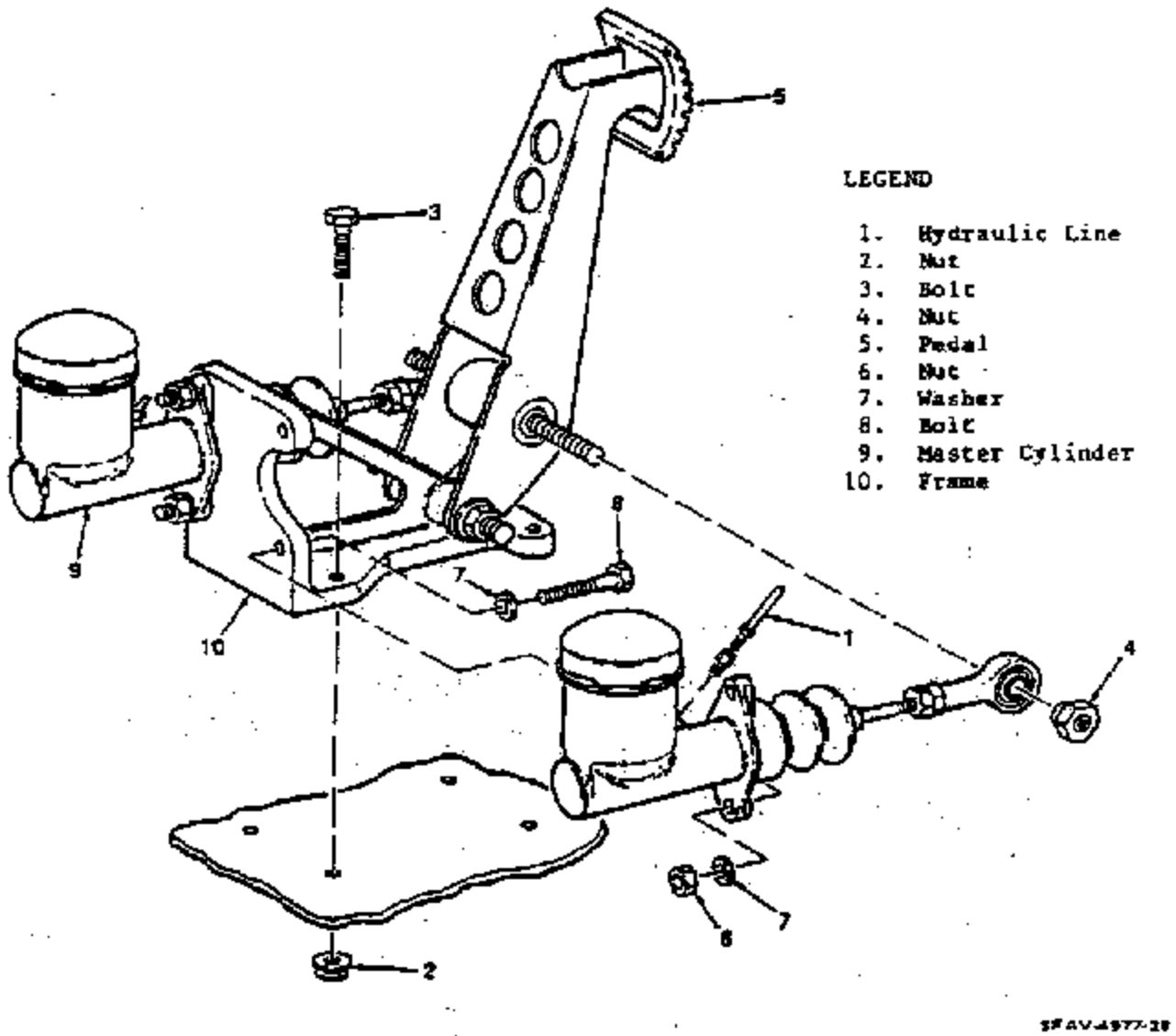


Figure 5-16. Brake Pedal Assembly Replacement.

(4) Replenish master cylinders (9) with brake fluid.

(5) Bleed brake system.

(6) Adjust master cylinder clevises as required to maintain 1 to 1-1/2 inches of toe play in pedal (5).

5-26. WHEEL AND TIRE REPLACEMENT. To replace the wheel and tire, proceed as follows:

a. Removal

(1) Jack tire clear of ground.

(2) Using a lug wrench, remove five lug nuts. Remove wheel and tire. Deflate tire.

(3) Using standard break-down tool, break tire head away from rim.

(4) Remove inner tube and inspect for cuts, punctures, and tears. Inspect tire for damage.

b. Installation

(1) Insert new tube in tire, partly inflated.

(2) Using standard tools, install tire/tube on rim. Make sure valve stem is inserted properly through wheel opening.

(3) Inflate tire to 20 psi. Test assembly for leaks.

(4) Place wheel and tire on hub and secure with five lug nuts.

5-27. STEERING MECHANISM REPLACEMENT. To replace the steering mechanism, proceed as follows:

a. Steering Column Removal. Remove the steering column and sleeve assembly as follows:

(1) Remove steering wheel by removing three nuts holding wheel to steering column.

(2) Remove steering column by removing four nuts, washers, and bolts securing upper column bearing retainer plate to frame.

(3) Remove nut and bolt that secure lower steering column to steering gearbox. Remove steering column by gently prying column sleeve off gearbox shaft.

b. Steering Box Removal. Remove the steering box as follows. Refer to figure 5-17.

(1) If not previously disconnected, remove nut (1) and bolt (2). Separate lower column sleeve (3) from steering box (9).

(2) Remove two cotter pins (4) and two nuts (5). Disconnect tie rods (6).

(3) Remove four nuts (7) and four washers (8). Pull steering box (9) from chassis.

c. Tie Rod Removal. To remove the two tie rods, proceed as follows:

(1) Remove two cotter keys and nuts that hold tie rods to steering gearbox steering arms. Gently press tie rod ends off steering arms.

(2) Remove two cotter keys and nuts (one on each wheel).

(3) Gently press two tie rod ends off wheel connections.

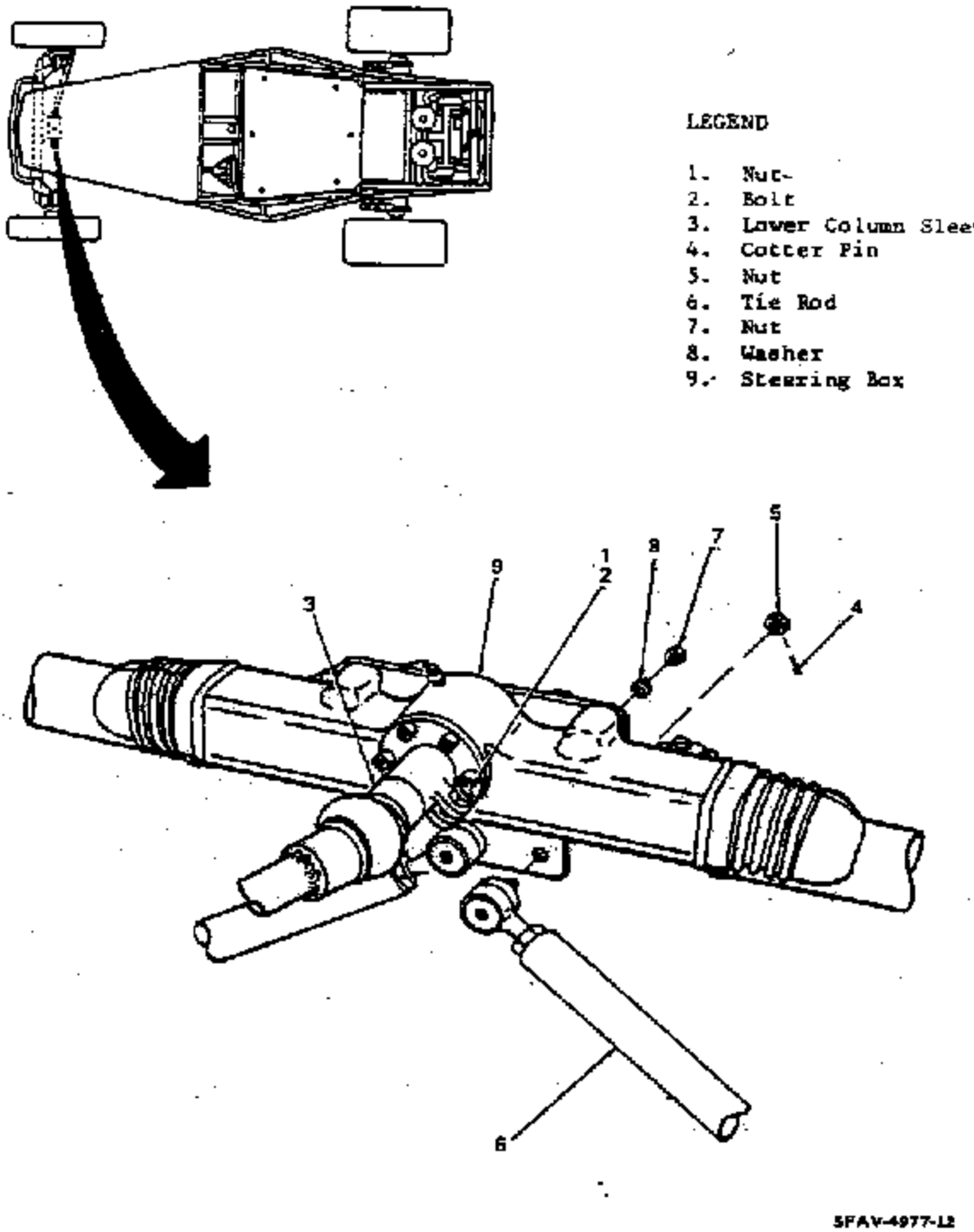


Figure 5-17. Steering Box Replacement.

d. Tie Rod Installation. Install the tie rods as follows:

(1) Align proper tie rod end with wheel connection. Gently press tie rod end into place on wheel connection.

(2) Install nut and secure with cotter pin.

(3) If steering box has not been removed, connect tie rod ends to steering box and install nuts and cotter pins.

e. Steering Box Installation. Install steering box as follows. Refer to figure 5-17.

(1) Position steering box (9) in chassis. Install four washers (8) and four nuts (7).

(2) Position tie rods (6) in their respective mounting holes and secure in place with two nuts (5) and cotter pins (4).

(3) Connect lower column sleeve (3) and secure with bolt (2) and nut (1).

f. Steering Column Installation. Install the steering column as follows:

(1) If not previously connected, insert sleeve of lower column over gearbox shaft.

(2) Position steering column to align with gearbox and secure with bolt and nut.

(3) Position and attach upper bearing retainer plate to frame with four bolts, washers, and nuts. (Use safety wire to hold parts in position while bolting.)

(4) Position and attach steering wheel to steering column with three nuts. Tighten nuts securely.

5-28. REAR TORSION BAR REPLACEMENT. To replace the rear torsion bar (figure 5-18), proceed as follows:

NOTE

Replacement of left rear torsion bar is shown. Replacement of the right rear torsion bar is similar.

a. Removal

(1) Jack rear of vehicle.

(2) Remove wheel. Refer to EM-1150-10.

(3) Loosen left torsion bar adjustment bolt (12).

(4) Remove nuts (3), bolts (1), and washers (2) from spring plate (4).

(5) Remove nuts (6), bolts (5), stop (10), and plate (7).

(6) Pull spring plate (4) from torsion bar (8) and separate two bushings (9).

(7) Pull torsion bar (8) from chassis.

b. Installation

(1) Insert torsion bar (8) into chassis tube and adjustment arm (11).

(2) With bushings (9) in place, position spring plate (4) on torsion bar so that spring plate lower edge just clears lower stop (10) and adjustment arm (11) is bottomed out against chassis.

(3) Install stop (10), plate (7), nuts (6), and bolts (5).

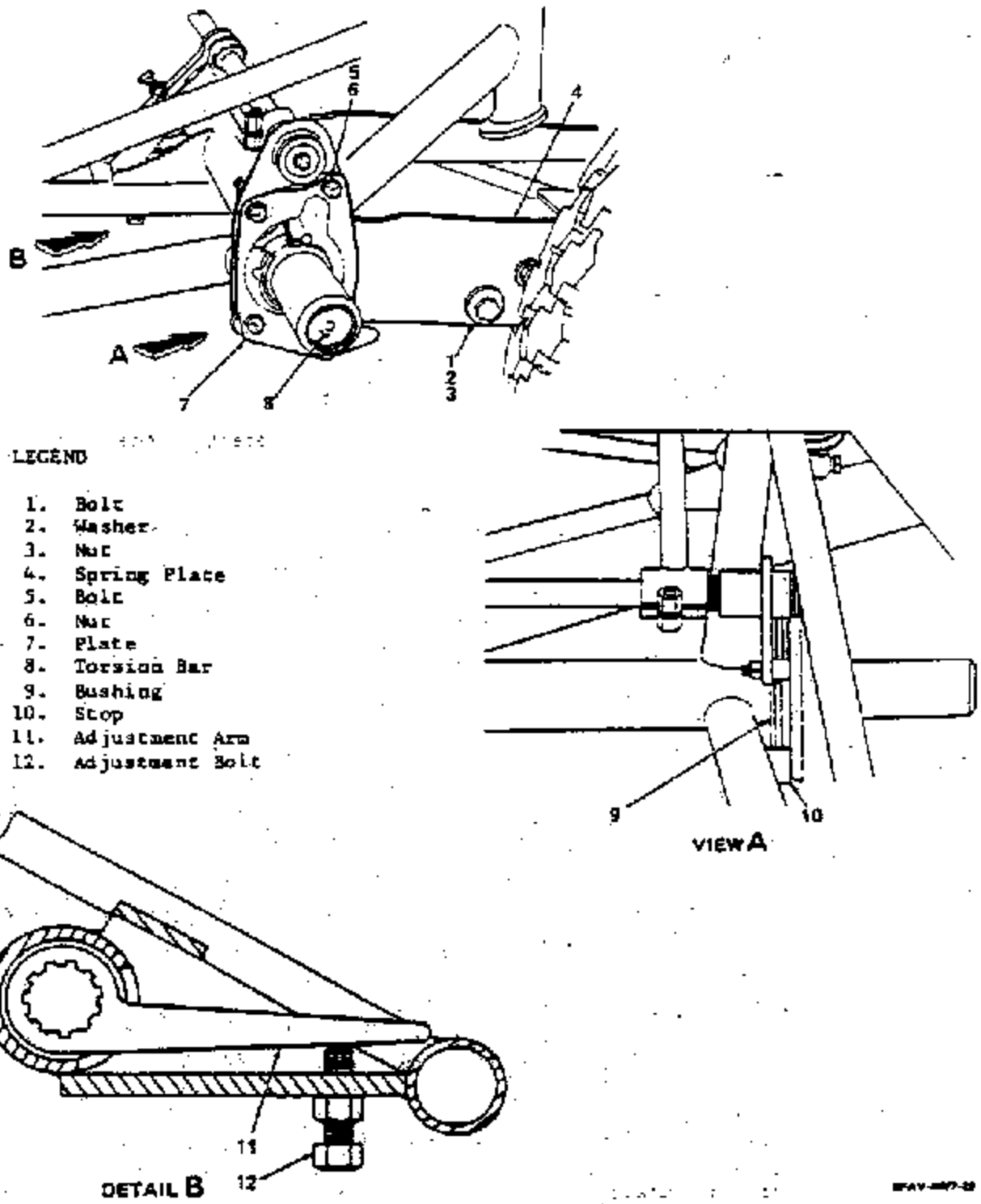


Figure 5-18. Rear Torsion Bar Replacement.

(4) Align spring plate (4) bolt holes with trailing arm and install bolts (1), washers (2), and nuts (3).

REVERSE 516

(5) Turn left torsion bar adjustment bolt (12) until spring plate (4) clears lower stop (10) by 1/4 inch. ½ to ¼ MAXIMUM

(6) Install wheel and lower vehicle to ground. Refer to EM-1150-10.

5-29. SWAY BAR REPLACEMENT. To replace the sway bar (figure 5-19), proceed as follows:

NOTE

Replacement of the right sway bar is shown. Replacement of the left sway bar is similar.

a. Removal

(1) Jack rear of vehicle off ground.

(2) Remove wheel. Refer to EM-1150-10.

(3) Loosen sway bar adjustment bolt (8).

(4) Remove bolt (1) from sway bar arm (3) and disconnect turnbuckle (2).

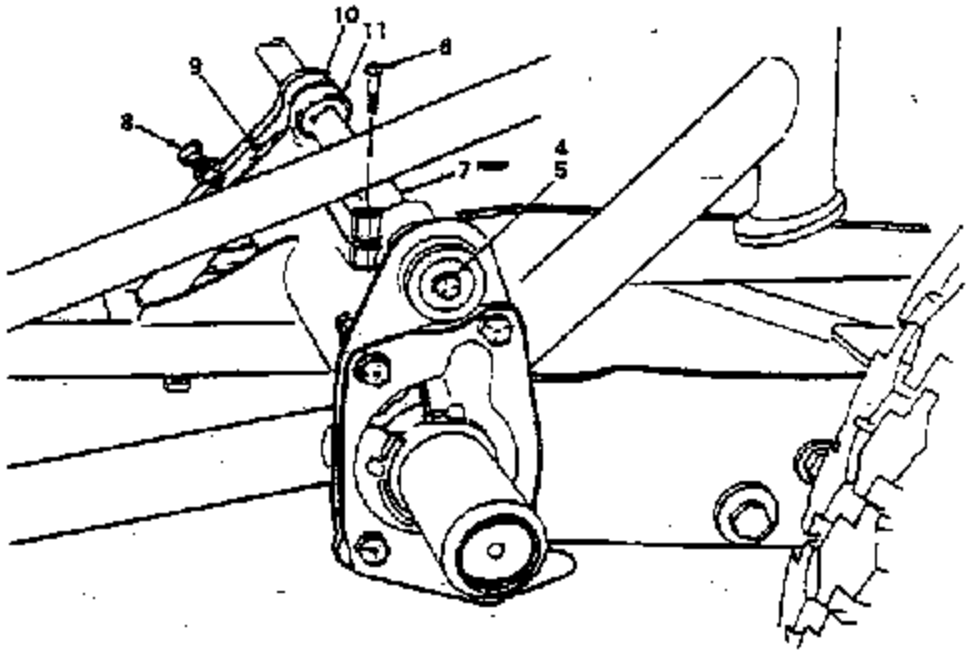
(5) Remove bolt (6) from sway bar arm (3).

(6) Remove bolt (4) and washer (5) from sway bar (7) end.

(7) Pull sway bar (7) from chassis. Do not lose spacer (10).

b. Installation

(1) Connect turnbuckle (2) to sway bar arm (3) with bolt (1).



LEGEND

1. Bolt
2. Turnbuckle
3. Sway Bar Arm
4. Bolt
5. Washer
6. Bolt
7. Sway Bar
8. Adjustment Bolt
9. Adjustment Arm
10. Spacer
11. Support Bracket

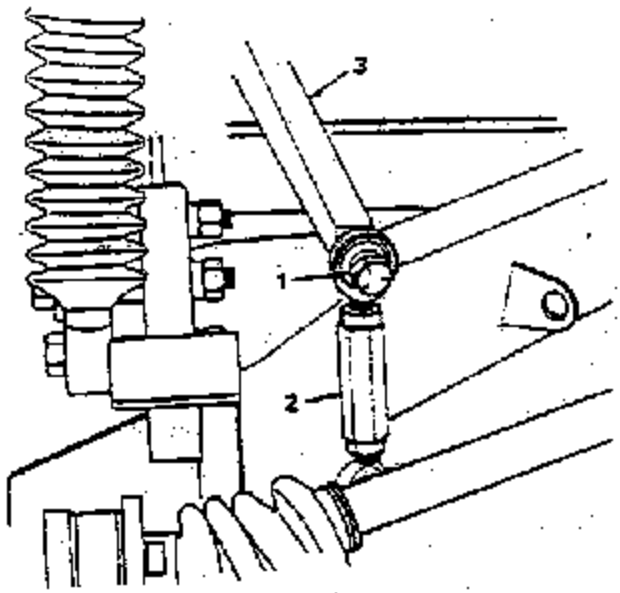


Figure 5-19. Sway Bar Replacement.

(2) Slide sway bar (7) into chassis and through sway bar arm (3). Continue sliding sway bar in toward support bracket (11).

(3) With spacer (10) in place and adjustment arm (9) full down, insert sway bar into adjustment arm while maintaining upward pressure against sway bar arm (3).

(4) Install bolt (6) in sway bar arm (3).

(5) Install bolt (4) and washer (5).

(6) Turn adjustment bolt (8) inward until moderate resistance is felt; then tighten jam nut.

(7) Install wheel and lower vehicle.

5-30. AIR CLEANER ASSEMBLY REPLACEMENT. To replace the air cleaner assembly (figure 5-20), proceed as follows:

a. Removal

(1) Loosen clamp (4) and disconnect flexible tubing (5) from air cleaner assembly (6).

(2) Remove two bolts (1), lockwashers (2), and nuts (3) from both sides of air cleaner assembly (6).

(3) Lift air cleaner assembly (6) from vehicle.

b. Installation

(1) Position air cleaner assembly (6) in vehicle.

(2) Install two nuts (3), lockwashers (2), and bolts (1) in each side of air cleaner assembly (6).

(3) Connect flexible tubing (5) and tighten clamp (4).

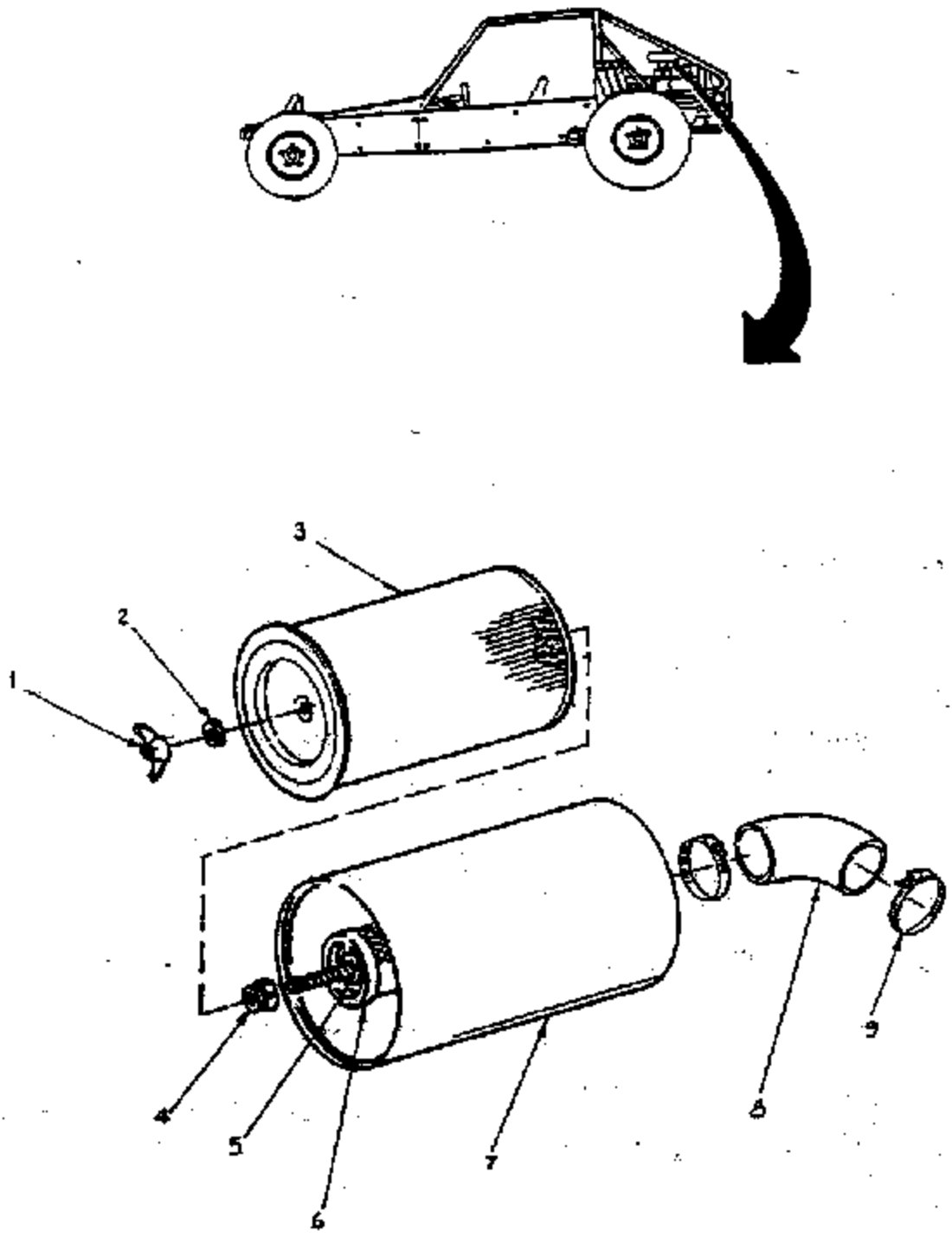


Figure 5-20. Air Cleaner Assembly Replacement.

5-31. SKID PLATE REPLACEMENT. The skid plate is located beneath and is attached to the rear chassis section. To replace the skid plate, proceed as follows:

a. Removal

(1) Remove six nuts, washers, and bolts securing plate to chassis section.

(2) Remove skid plate.

b. Installation

(1) Position skid plate on chassis section.

(2) Install six bolts, washers, and nuts.

5-32. SHOCK ABSORBER REPLACEMENT. To replace a shock absorber (figure 5-21), proceed as follows:

WARNING

To prevent injury to personnel and damage to equipment, do not disassemble or expose shock absorber to fire or open flame.

NOTE

Replacement of left rear shock absorber is shown. Replacement of the remaining shock absorbers is similar.

a. Removal

(1) Remove nut (1), two spacers (2 and 3), and bolt (4) from lower end of rear shock absorber (9).

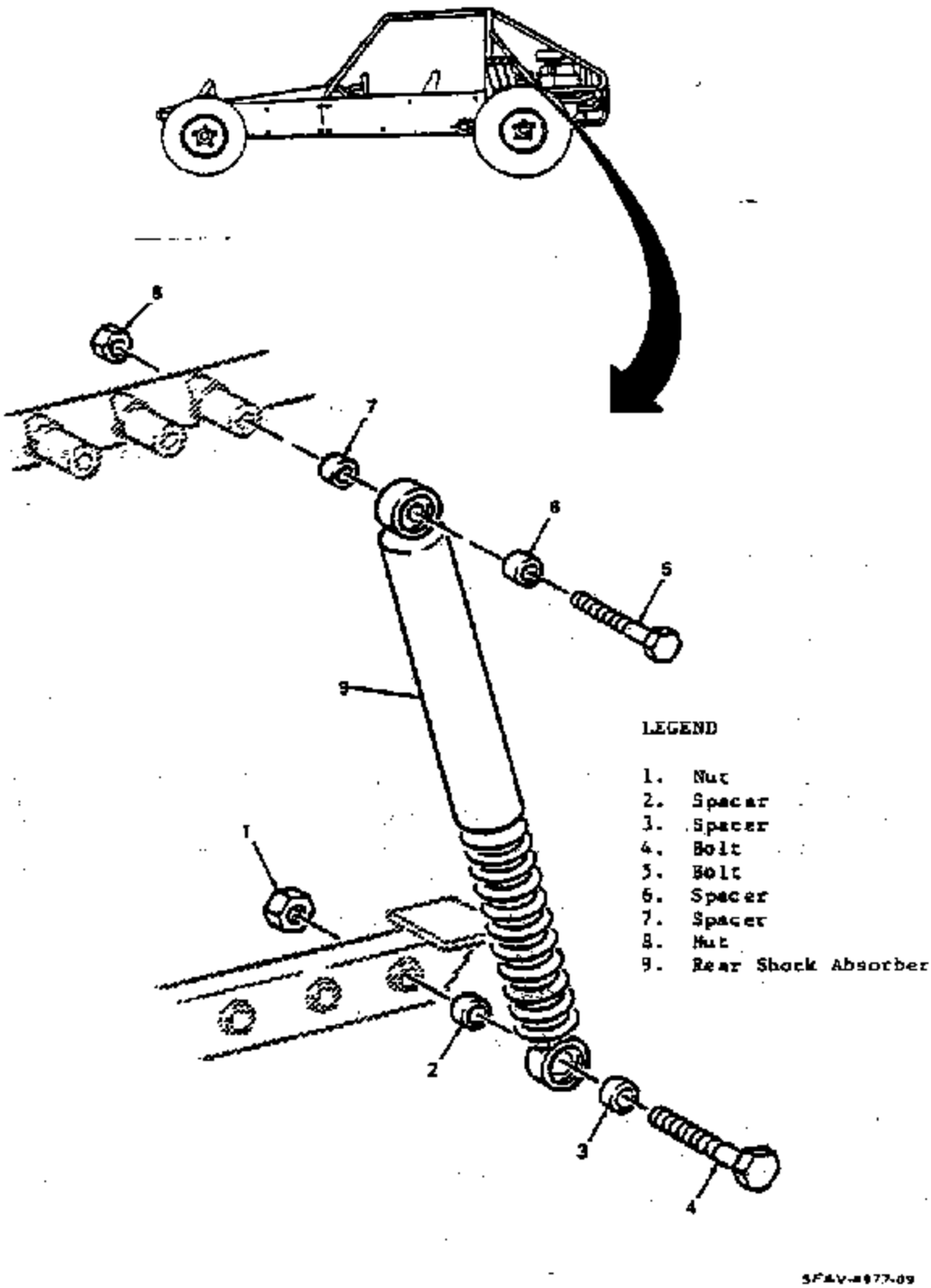


Figure 5-21. Rear Shock Absorber Replacement.

(2) Remove nut (8), bolt (5), and two spacers (6 and 7) from upper end of rear shock absorber (9).

(3) Remove rear shock absorber (9) from chassis.

b. Installation

(1) Position rear shock absorber (9) in chassis.

(2) Install two spacers (6 and 7), bolt (5), and nut (8) in upper end of rear shock absorber (9).

(3) Install two spacers (2 and 3), bolt (4), and nut (1) in lower end of rear shock absorber (9).

5-33. FRONT COVER, TOP PANEL, AND WINDSHIELD REPLACEMENT. To replace the front cover, top panel, and windshield, proceed as follows:

a. Removal

(1) Unlock fasteners securing front cover to chassis. Remove front cover.

(2) Remove clamps and attaching hardware securing windshield to chassis. Remove windshield.

(3) Unlock fasteners securing top panel to chassis. Remove top panel.

b. Installation

(1) Position top panel on chassis and lock fasteners.

(2) Position windshield in place on chassis. Install clamps and attaching hardware.

(3) Position front cover on chassis and lock fasteners.

5-34. SEAT AND SEAT BELT REPLACEMENT. To replace a seat and seat belt, proceed as follows:

a. Removal

(1) Remove four bolts and attaching hardware securing seat to chassis mounting places.

(2) Remove seat.

(3) Remove bolts and attaching hardware securing seat belt to chassis.

(4) Remove seat belt.

b. Installation

(1) Position seat belt on chassis.

(2) Install seat belt mounting bolts and attaching hardware.

(3) Position seat in chassis.

(4) Install four seat mounting bolts and attaching hardware.

5-35. BUMPER REPLACEMENT. To replace the bumper, proceed as follows:

a. Removal

(1) Remove two nuts, washers, and bolts from the four bumper mounting points.

(2) Separate bumper from chassis.

b. Installation

(1) Position bumper on chassis.

(2) Install two bolts, washers, and nuts at each of four mounting points.

5-36. WIRE HARNESS REPLACEMENT. To replace the wire harness, proceed as follows:

a. Removal

(1) Tag and label wire harness, indicating size, color, and termination point of individual wires. Disconnect wires.

(2) Cut tie wraps securing wire harness to chassis.

(3) Remove damaged wiring from chassis.

b. Installation

(1) Position new wiring in chassis.

(2) Connect wires to termination points as indicated on tags.

(3) Secure wiring to chassis with tie wraps.

(4) Perform continuity test of electrical wiring. Refer to vehicle electrical schematic.

5-37. CUTTING BRAKE REPLACEMENT. To replace the cutting brake, proceed as follows:

a. Removal

(1) Disconnect hydraulic lines from cutting brake.

(2) Remove four bolts and washers that secure brake to chassis.

(3) Remove cutting brake assembly.

b. Installation

(1) Position cutting brake over four mounting holes.

(2) Install four bolts and washers.

(3) Connect two hydraulic lines (upper to right rear wheel and lower to left rear wheel hydraulic lines).

(4) Bleed brake system.

APPENDIX

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

A-1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. The maintenance allocation chart (MAC) designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

A-2. MAINTENANCE FUNCTIONS

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (services/actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tools and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code in alphabetic order, which shall be keyed to the remarks contained in section IV.

A-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III

a. Column 1, Reference Code. The tool reference code correlates with a code used in the MAC, section II, column 5.

b. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or support equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The national stock number of the tool or support equipment.

e. Column 5, Tool Part Number. The manufacturer's part number.

A-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV

a. Reference Code. The code recorded in column 6, section II.

b. Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, section II.

Section II. MAINTENANCE ALLOCATION CHART
SURROGATE FAST ATTACK VEHICLE

(1)	(2)	(3)	(4)					(5)	(6)
Group Number	Component/Assembly	Maintenance Function	Maintenance Level C	O	F	H	D	Tools and Equipment	Rema.
00	Vehicle	Inspect	0.25					1	A
		Service	0.50						B
		Adjust	0.16					1	C
01	Engine	Test		0.75				7,13,26	D
		Service	0.75						E
		Adjust		0.83				4,5,15,27,28	F
0100	Engine Assembly	Replace			3.0			3,4,5,8,9,13,14, 15,20,22,23,24, 26,27,28	H
		Repair		0.50				14,15,23	I
0106	Lubrication System	Service		0.33				13,21,22	J
		Replace		0.58				13,15,22	K
02	Clutch	Inspect		0.16					
		Adjust		0.25				24,27	M
0200	Clutch Assembly	Replace			4.5			3,8,9,13,14,15, 22,23,24,26,27	N & R
0202	Clutch Release Mechanism	Replace		0.50				13,26,27	P
0207	Hydraulic Clutch System	Replace		0.50				13,26,27	Q

(1)	(2)	(3)	(4)					(5)	(6)
Group Number	Component/Assembly	Maintenance Function	Maintenance Level C	O	F	H	D	Tools and Equipment	Remarks
03	Fuel System	Inspect		0.16					
0301	Carburetor	Adjust		0.33				15,27,28	R
		Replace		1.0				13,15,26,27,28	
		Repair			1.5			13,15,26	T
0302	Fuel Pump	Replace		0.75				13,26	
		Repair		0.75				13,26	V
0304	Air Cleaner	Service	0.16						W
		Replace		0.5				13,15,26	
		Repair		0.25				15	Y
0306	Fuel Tank, Lines, Filter	Service		0.25				15	Z
		Replace		0.75				13,26,27	
		Repair		0.50				13,15,26,27	A2
0312	Pedal and Throttle Cable	Replace		0.50				13,26,27	A3
04	Exhaust System	Inspect	0.16						
0401	Muffler and Pipes	Replace		0.41				13,26	A4
06	Electrical System	Test		0.75				6,15	A5
0601	Alternator/ Regulator	Replace		0.50				13,15,16,22	
		Repair		0.33				13,15,16,22	A7
0603	Start Motor	Replace		0.50				13,15,16,22	

(1)	(2)	(3)	(4)					(5)	(6)
Group Number	Component/Assembly	Maintenance Function	Maintenance Level C	O	F	H	D	Tools and Equipment	Remar
0605	Ignition Components	Service		1.33				4,5,13,15,20,22, 26,27	A9
		Replace		0.75				4,5,13,15,20,22, 26,27	B1
0607	Instruments and Control Panel	Replace		1.50				6,13,15,17,26,27	B2
		Repair		1.00				6,13,15,17,26,27	B3
0609	Lights	Replace		0.25				13,16,26,27	B4
		Repair		0.15					B5
0612	Battery	Inspect	0.08						
		Replace		0.16				27	B6
		Repair		0.27				27	B7
07	Transmission	Inspect	0.16						
		Service		0.50				14,23,25	B8
0700	Transmission Assembly	Replace			4.5			3,8,9,13,14,15, 20,22,23,24, 26,27	B
0705	Transmission Linkage	Replace		0.50				13,22,26	C1
08	Transfer and Final Drive Assembly	Inspect	0.08						
		Service		2.0				2,14,15,25	C2
0807	Final Drive	Replace		2.30				2,14,15,25	C3

(1)	(2)	(3)	(4)					(5)	(6)
Group Number	Component/Assembly	Maintenance Function	Maintenance Level C	O	F	H	D	Tools and Equipment	Remarks
12	Brake Assembly	Inspect		0.75				2,13,15,17,18,22	C4
		Adjust		0.75				2,13,15,17,18,22	C5
1201	Cutting Brake	Replace		0.50				13,26,27	
1202	Brake Shoes	Replace		0.75				2,13,15,17,18, 19,22,26,27	
1204	Brake Hydraulic System	Replace		0.75				2,13,15,17,18, 19,22,26,27	C8
13	Wheel Assembly	Inspect	0.08						
		Service		0.75				2,13,15,17,18, 19,22,26,27	C9
1311	Wheel	Replace	0.25					2,13,22	D1
		Replace		0.50				2,13,15,16,17,22	D2
1313	Wheel Components	Replace		0.75				2,13,22,29,30	D3
14	Steering Assembly	Inspect	0.16						
1401	Mechanical Steering Assembly	Service	0.25					12,15	D4
		Aline		1.0				9,10,11,16,17, 24,27	D5
		Replace		0.33				2,9,13,15,17,20, 26,27	D6
15	Frame	Inspect	0.50					15	D7
		Service	0.75					15	D8

(1)	(2)	(3)	(4)					(5)	(6)
Group Number	Component/Assembly	Maintenance Function	Maintenance Level C	O	F	H	D	Tools and Equipment	Rema
1501	Frame Components	Replace		0.75				13,15,26,27	09
16	Suspension Assembly	Inspect	0.25						E1
1604	Shocks	Replace		0.50				2,13,26,27	
1605	Torsion and Sway Bars	Replace			2.0			2,9,13,14,15,22, 25,26,27	E3 &
18	Body Assembly	Inspect	0.25						
1801	Body Components	Replace		0.75				13,15,26,27	E4

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	C	Air Gauge	4910-00-204-3170	28RY1055 Sears
2	O	1-1/2 Ton Floor Jack	5120-00-224-7330	28RY1200N Sears
3	F	1/2" Impact Gun Air Kit		9HT18944 Sears
4	O	Ignition Timing Light	4910-00-255-1449	28RY2134 Sears
5	O	Ignition Dwell Meter	4910-00-788-8549	28RY2177 Sears
6	O	Volt-Ohm Meter	6625-00-999-6282	34HT5194 Sears
7	O	Compression Gauge	4910-00-250-2423	28RY2171 Sears
8	O	Torque Wrench 10-150 Ft/Lbs	5120-00-247-2540	9HT44478 Sears
9	F	Torque Wrench 25-250 Ft/Lbs		6014-3
10	F	Toe in-out Gauge		WGJ61 MAC Tools

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
11	F	Camber Checking Gauge	4910-00-221-2472	17-9272X J.C. Whitney
12	O	Grease Gun	4930-00-253-2478	75-3280N J.C. Whitney
13	O	3/8" drive Ratchet Wrench	5120-00-240-5364	9HT43786 Sears
		3/8" drive extension 3"	5120-00-958-3851	9HT44264 Sears
		3/8" drive extension 6"	5120-00-273-9203	9HT44261 Sears
		3/8" drive extension 10"	5120-00-243-1691	9HT44262 Sears
14	O	1/2" drive Ratchet Wrench	5120-00-230-6385	9HT44985 Sears
		1/2" drive extension 3"	5120-00-243-1697	9HT44133 Sears
		1/2" drive extension 6"	5120-00-243-7326	9HT44131 Sears
		1/2" drive extension 10"	5120-00-227-8074	9HT44132 Sears
15	O	25-piece Screwdriver Set		9HT41013 Sears
16	C	Pliers	5120-00-223-7397	9HT30702 Sears

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
17	O	Wire Cutters	5110-00-222-2708	9HT45074 Sears
18	O	"Channel Lock" Pliers	5120-00-278-0350	9HT30723 Sears
19	O	Internal and External Snap Ring Pliers	5120-00-789-0492	9HT45358 Sears
20	O	Feeler Gauge	5210-00-221-1999	9HT40811 Sears
21	O	Oil Filter Wrench	5120-00-408-2040	58-8491U J.C. Whitney
22	O	Adapter 3/8F X 1/4m	5120-00-227-8695	5255 Proto Tools
		4mm Socket 3/8" dr.	5120-01-026-9406	4704M Proto Tools
		5mm Socket 3/8" dr.	5120-01-025-0196	4705M Proto Tools
		7mm Socket 3/8" dr.		5207MM Proto Tools
		8mm Socket 3/8" dr.		5208M Proto Tools
		10mm Socket 3/8" dr.		5210M Proto Tools
		11mm Socket 3/8" dr.		5211M Proto Tools
		12mm Socket 3/8" dr.		5212M Proto Tools

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
		13mm Socket 3/8" dr.		5213M Proto Tools
		14mm Socket 3/8" dr.		5214M Proto Tools
		15mm Socket 3/8" dr.		5215M Proto Tools
		17mm Socket 1/2" dr.		5417M Proto Tools
		19mm Socket 3/8" dr.		5219M Proto Tools
		21mm Socket 3/8" dr.		5221M Proto Tools
23	O	15mm Socket 1/2" dr.		5415M Proto Tools
		17mm Socket 1/2" dr.		5417M Proto Tools
		19mm Socket 1/2" dr.		5419M Proto Tools
		21mm Socket 1/2" dr.		5421M Proto Tools
		36mm Socket 1/2" dr.		5436M Proto Tools
		1-1/8" Socket 1/2" dr.	5120-00-189-7914	5436 Proto Tools
24	O	6mm Combination Wrench		OEXM6 Snap-On Tools
		7mm Combination Wrench		1207M-500 Proto Tools

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
		8mm Combination Wrench	5120-01-079-8026	1208M-500 Proto Tools
		10mm Combination Wrench	5120-00-177-7325	1210M-500 Proto Tools
		11mm Combination Wrench		1211M-500 Proto Tools
		12mm Combination Wrench		1212M-500 Proto Tools
		13mm Combination Wrench	5120-01-079-8030	1213M-500 Proto Tools
		14mm Combination Wrench	5120-01-079-8029	1214M-500 Proto Tools
		15mm Combination Wrench		1215M-500 Proto Tools
		17mm Combination Wrench	5120-00-077-1987	1217M-500 Proto Tools
		19mm Combination Wrench	5120-01-079-8028	1219M-500 Proto Tools
		21mm Combination Wrench		1221M-500 Proto Tools
25	O	Adapter 1/2F x 3/8M		5254 Proto Tools
		6mm Allen Socket 6 pt. 1/2" dr.	5120-01-055-1308	4990-6M Proto Tools
		8mm Allen Socket 12 pt. 1/2" dr.	5120-01-053-4159	4990-8M Proto Tools
		17mm Allen Socket 6 pt. 1/2" dr.		5441-17M Proto Tools

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
26	O	3/8 Socket 3/8" dr.	5120-00-227-6702	5212 Proto Tools
		7/16 Socket 3/8" dr.	5120-01-036-3457	5214 Proto Tools
		1/2 Socket 3/8" dr.	5120-00-237-0977	5216 Proto Tools
		9/16 Socket 3/8" dr.	5120-00-227-6704	5218 Proto Tools
		5/8 Socket 3/8" dr.	5120-00-237-4973	5220 Proto Tools
		11/16 Socket 3/8" dr.	5120-00-232-5706	5222 Proto Tools
		3/4 Socket 3/8" dr.	5120-00-227-6705	5224 Proto Tools
		13/16 Socket 3/8" dr.	5120-00-596-0836	5026 Proto Tools
		7/8 Socket 3/8" dr.	5120-00-242-3330	5228 Proto Tools
27	O	5/16 Combination Wrench		1210-500 Proto Tools
		3/8 Combination Wrench	5120-00-895-9567	1212-500 Proto Tools
		7/16 Combination Wrench	5120-00-895-9568	1214-500 Proto Tools
		1/2 Combination Wrench	5120-00-895-9569	1216-500 Proto Tools
		9/16 Combination Wrench	5120-00-895-9570	1218-500 Proto Tools
		5/8 Combination Wrench	5120-00-895-9571	1220-500 Proto Tools

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
		11/16 Combination Wrench	5120-00-895-9572	1222-500 Proto Tools
		3/4 Combination Wrench	5120-00-895-9573	1224-500 Proto Tools
		13/16 Combination Wrench		1226-500 Proto Tools
		7/8 Combination Wrench	5120-00-895-9574	1228-500 Proto Tools
28	O	Carburetor Synchronizer		88-2792N J.C. Whitney
29	O	Tool Box		9HT65371L (See Remark E5)

Reference Code	Remarks
A	Inspection of entire vehicle required before operation of vehicle.
B	Service is filling fluid levels to proper levels (brake, engine oil, clutch) and cleaning vehicle.
C	Adjust tire pressure to reach proper limits.
D	Test limited to compression check.
E	Service limited to touch-up paint only.
F	Adjust limited to rocker arm adjustment and timing.
H	Mission requirements may authorize organization maintenance to perform this task.
I	Repair limited to replacement of fan belt.
J	Service is limited to oil and oil filter change.
K	Replace is limited to dip stick, oil cap, oil pump, and other oil system related components.
M	Adjust pedal travel on clutch assembly.
N	Replace is limited to disc, pressure plate, release bearing, and other related components.
P	Replace is limited to pedal, pedal assembly, lines, and related components.

Reference Code	Remarks
Q	Replace is limited to master cylinder and slave cylinder.
R	Adjust fuel mixture and synchronize carburetor air intake.
T	Repair is rebuild of carburator using carburetor kit.
V	Repair limited to replacement of gasket.
W	Replace paper filter and wash foam filter.
Y	Repair limited to filter cover and flex tube.
Z	Service limited to replacement of fuel filter.
A2	Repair limited to replacement of fuel cap, tank straps, lines, and related items.
A3	Replacement is limited to gas pedal, pedal assembly, cable, and related items.
A4	Replace either the muffler or exhaust pipes.
A5	Test for broken wire by using a multimeter.
A7	Repair limited to replacement of regulator.
A9	Service limited to replacement of plugs, points, condenser, and rotor.
B1	Replace is limited to distributor, dust cap, wires, and coil.
B2	Replace entire panel assembly.

Reference Code	Remarks
B3	Repair limited to replacement of ignition switch, gauges, wires, entire wire harness, sending units, fuses, and all switches.
B4	Replace any light assembly (headlights, stop lights, and turn signal lights).
B5	Repair limited to replacement of light bulbs and lens cover.
B6	Replace battery assembly.
B7	Repair is limited to replacement of battery cables and hangers.
B8	Service is limited to oil change.
C1	Replace is limited to gear shift assembly and transmission linkage.
C2	Service limited to cleaning and greasing C.V. joints and stub axle bearings.
C3	Replace is limited to C.V. joints, drive axle, stub axle, and related components.
C4	Inspect for shoe wear and damage to entire brake system.
C5	Adjust limited to brake shoe adjustment.
C8	Replace is limited to master cylinder, wheel cylinder, pedal, lines, parking brake, and related items.
C9	Service is limited to greasing.

Reference Code	Remarks
D1	Replace is limited to changing complete wheel assembly.
D2	Replace is limited to wheel assembly, bearings, and seals.
D3	Replace is limited to tubes, tires, rims, and related items.
D4	Service is limited to greasing front end.
D5	Aline limited to toe in/out and camber.
D6	Replace limited to steering wheel, tie rods, tie rod ends, steering shaft, steering box, and related items.
D7	Inspect will require removal of body panels.
D8	Service is limited to cleaning and touch-up paint.
D9	Replace is limited to skid plates, rubber bumpers, seats, seat belts, frame bumper, and related items.
E1	Inspection includes all shocks, torsion bar, and sway bar.
E3	Replace is limited to torsion bar, sway bar, and other related items.
E4	Replace is limited to body panels and windshield.
E5	Tool Box 9WT653711 (Sears) is recommended as the optimum size to contain the tools required for the SFAV program.