

# SECTION 5 WINCHES

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## RAMSEY ELECTRIC WINCHES

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### GENERAL

Ramsey electric winch kits may be installed on all Jeep models. The three electric winches outlined in this section are front mount units. CJ winch kits and the hidden winch kit for 1979 Cherokee, Wagoneer and Truck models (only) make use of the original vehicle front bumper. The standard front mount winch kit for Cherokee, Wagoneer and Truck models includes a special equipment bumper.

The various Ramsey winch kits include all of the components necessary for a complete installation. This includes all necessary brackets, braces, and attaching hardware. Before proceeding with a kit installation, check the kit contents thoroughly to be sure all needed parts are included (fig. 5-1).

All references to bolt and nut sizes in the following procedures are in inches. Bolt sizes are indicated in diameter followed by length. For example, 3/8 x 1 represents a bolt that is 3/8-inch in diameter and one inch long. Whenever fine thread (NF) bolts are used, the number of threads per inch are also included in the size description, such as 1/2-20 x 3. In some cases, additional or replacement fasteners may be required to complete a kit installation. When necessary, obtain the required parts from your stock.

**WARNING:** The screws, bolts, nuts, lockwashers and flat washers used to attach the winch and winch mounting components are extremely important to safe and

satisfactory winch operation. Winch attaching hardware must be grade 5 or better. Refer to the Standard Torque Specifications and Capscrew Markings Chart for bolt grade identification. Any attaching hardware that is not to specified quality must be replaced with grade 5 or better hardware. Do not use parts of lesser quality or substitute design at any time. In addition, specified torque values must be used when installing or servicing winch components. This is necessary to ensure proper retention of all winch components. Refer to the Torque Specification and Capscrew Marking Chart for non-specified torque values if they occur.

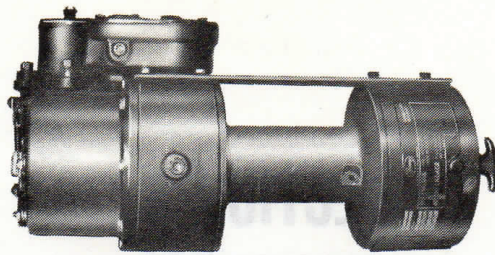
### KIT INSTALLATION PROCEDURES

#### CJ Kit Installation

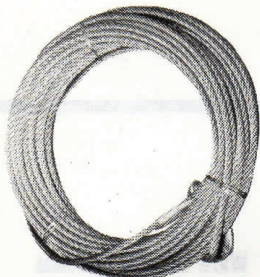
(1) Place front mounting plate in vise. Position plate so tapered sides face upward and clamp plate at center.

(2) Install a side angle and parking light bracket on one end of front mounting plate. Position side angle under mounting plate and parking light bracket on top of plate (fig. 5-2). Align holes in bracket, plate and angle, insert 3/8 x 1-1/4 bolt through assembled components from bottom and loosely install lockwasher and nut on bolt.

**NOTE:** The 3/8 x 1-1/4 bolt must be installed from the bottom up to provide clearance for the bumper mounting bracket.



WINCH



WINCH CABLE



REMOTE CONTROL SWITCH



INSTRUCTIONS



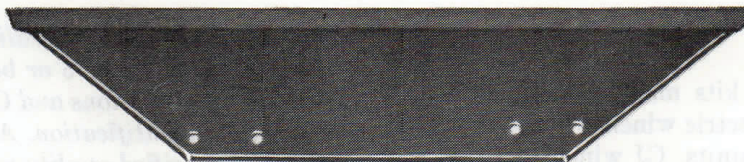
WINCH MOTOR CABLE



PARKING LIGHT WIRE HARNESS EXTENSIONS



SIDE ANGLE



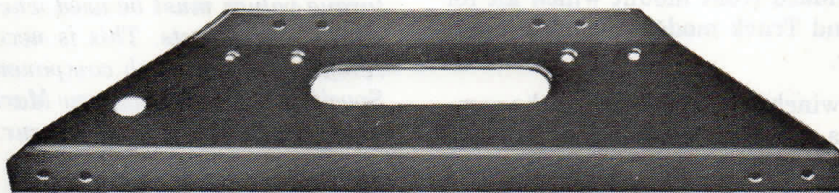
REAR MOUNTING PLATE



SIDE ANGLE



BUMPER MOUNTING BRACKET



FRONT MOUNTING PLATE



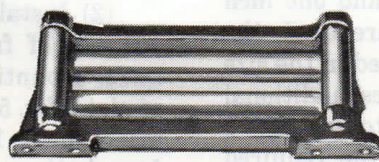
BUMPER MOUNTING BRACKET



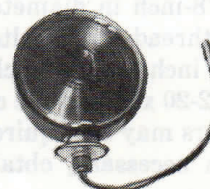
PARKING LIGHT MOUNTING BRACKET



PARKING LIGHT



FAIRLEAD

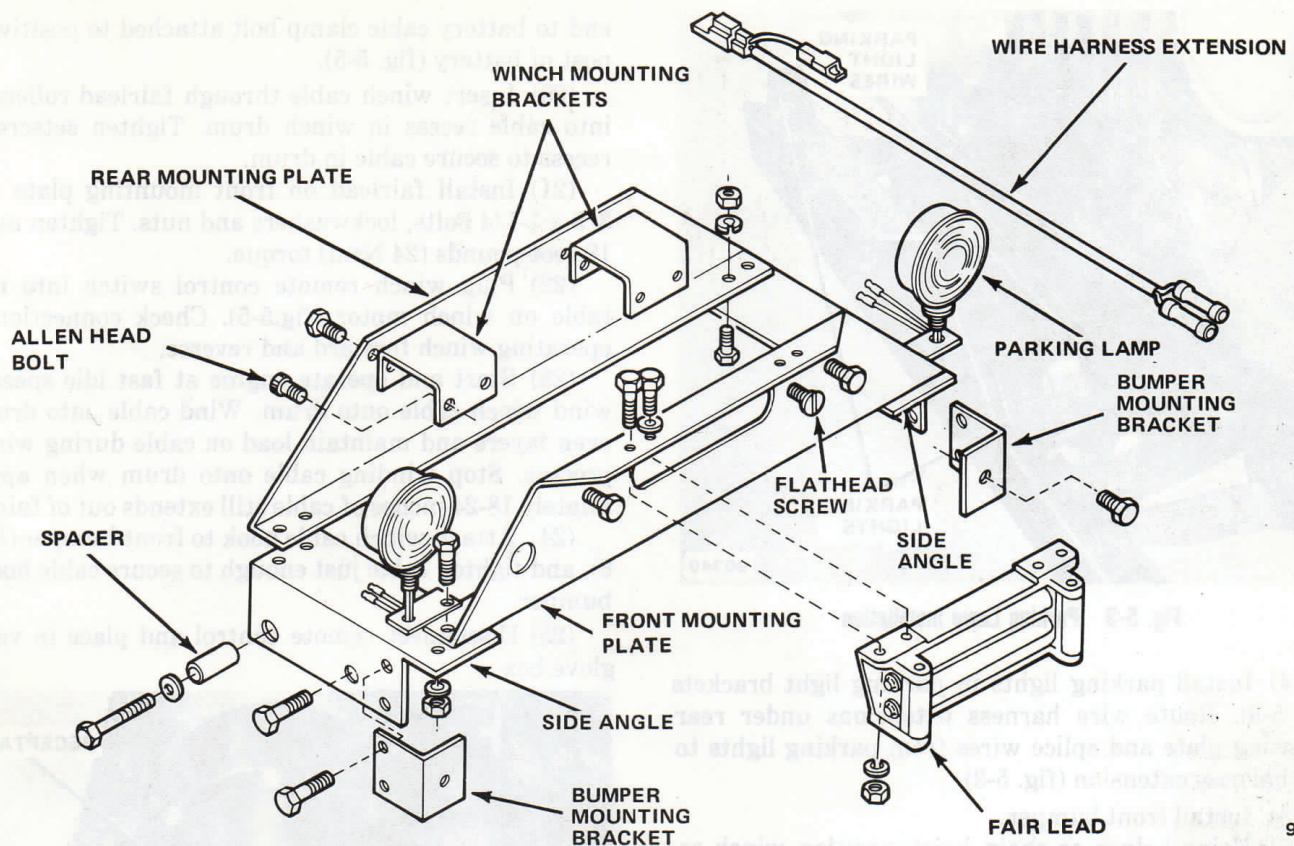


PARKING LIGHT



PARKING LIGHT MOUNTING BRACKET

Fig. 5-1 Ramsey Electric Winch Kit—CJ Models



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Fig. 5-2 Winch Mounting Components—CJ Models

(3) Install remaining side angle and parking light bracket on front mounting plate using procedure outlined in previous step.

(4) Install winch mounting brackets on gear housing and clutch housing of winch using  $3/8 \times 3/4$  hex and Allen head bolts, lockwashers and nuts (fig. 5-2). Tighten bolts to 18 foot-pounds (24 N•m) torque.

**NOTE:** The Allen head bolt must be installed in the outboard hole of the bracket attached to the winch gear housing (fig. 5-2).

(5) Position rear mounting plate on side angles, align bolt holes in plate and angles and loosely install  $3/8 \times 1$  bolts, lockwashers and nuts.

**NOTE:** The bolts must be installed from the bottom up (fig. 5-2).

(6) Remove front bumper.

(7) Remove both parking lamp assemblies from vehicle. Disconnect parking and side marker lamp wires at front end lighting harness connector and remove wires.

(8) Connect parking and side marker lamp wire harness extensions furnished in kit to lighting harness connector (fig. 5-2). Route harness extensions behind front panel and out grille openings. Install parking lamp assemblies after routing wire harness extensions through grille.

(9) Remove assembled winch mounting components from vise and position assembly on vehicle frame rails.

(10) Align bolt holes in frame rails and side angles. Install  $1/2-20 \times 3$  bolts and spacers in rear holes in side angles and frame rails. Install  $3/4 \times 1-1/2$  bolts in front holes in side angles and frame rails.

(11) Position front bumper mounting brackets on side angles and attach brackets using  $1/2-13 \times 1$  bolts, lockwashers and nuts (fig. 5-2).

(12) Tighten all winch mounting bolts. Tighten  $1/2-20$  bolts to 41 foot-pounds (56 N•m) torque and  $1/2-13$  bolts to 39 foot-pounds (53 N•m) torque. Tighten  $3/4$  bolts to 105 foot-pounds (142 N•m) torque and  $3/8$  bolts to 18 foot-pounds (24 N•m) torque.

(13) Install parking lamp assemblies furnished in kit on parking light brackets (fig. 5-3).

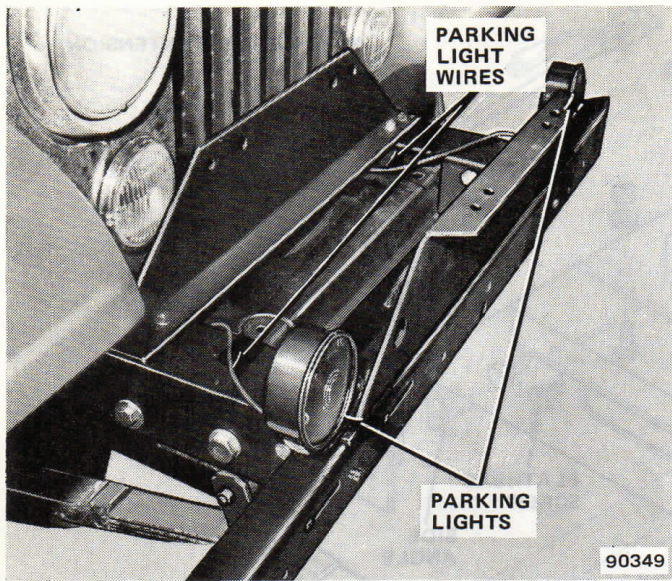


Fig. 5-3 Parking Lamp Installation

(14) Install parking lights in parking light brackets (fig. 5-3). Route wire harness extensions under rear mounting plate and splice wires from parking lights to wire harness extension (fig. 5-3).

(15) Install front bumper.

(16) Using helper or chain hoist, position winch assembly on front and rear mounting plates (fig. 5-4).

(17) Align and install  $3/8 \times 1$  bolts, lockwashers and nuts that attach winch mounting brackets to rear mounting plate. Tighten bolts to 18 foot-pounds (24 N•m) torque.

(18) Align and install  $3/8 \times 3/4$  bolt that attaches winch gear housing to front mounting plate. Align and install  $3/8 \times 3/4$  flathead screw and  $3/8 \times 1$  bolt that attaches winch clutch housing to front mounting plate. Tighten bolts to 18 foot-pounds (24 N•m) torque.

(19) Install winch motor cable. Connect cable end with protective boot to motor and connect cable eyelet

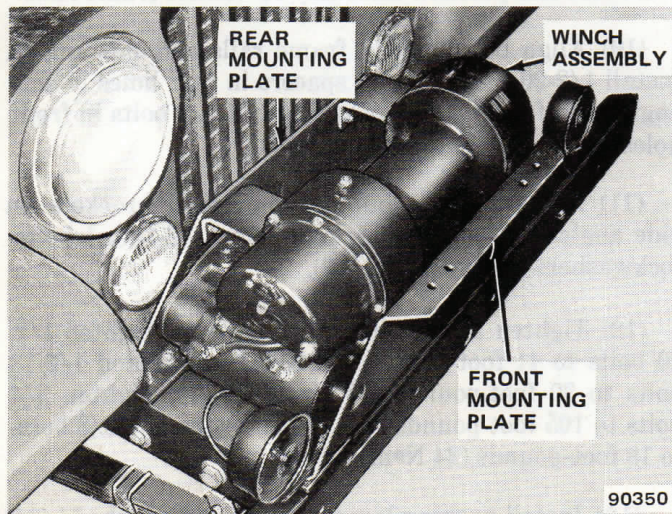


Fig. 5-4 Installing Winch on Mounting Plates

end to battery cable clamp bolt attached to positive (+) post of battery (fig. 5-5).

(20) Insert winch cable through fairlead rollers and into cable recess in winch drum. Tighten setscrew in recess to secure cable in drum.

(21) Install fairlead on front mounting plate using  $3/8 \times 1-1/4$  bolts, lockwashers and nuts. Tighten nuts to 18 foot-pounds (24 N•m) torque.

(22) Plug winch remote control switch into receptacle on winch motor (fig.5-5). Check connections by operating winch forward and reverse.

(23) Start and operate engine at fast idle speed and wind winch cable onto drum. Wind cable onto drum in even layers and maintain load on cable during winding process. Stop winding cable onto drum when approximately 18-24 inches of cable still extends out of fairlead.

(24) Attach winch cable hook to front bumper (fig. 5-6), and tighten cable just enough to secure cable hook on bumper.

(25) Disconnect remote control and place in vehicle glove box.

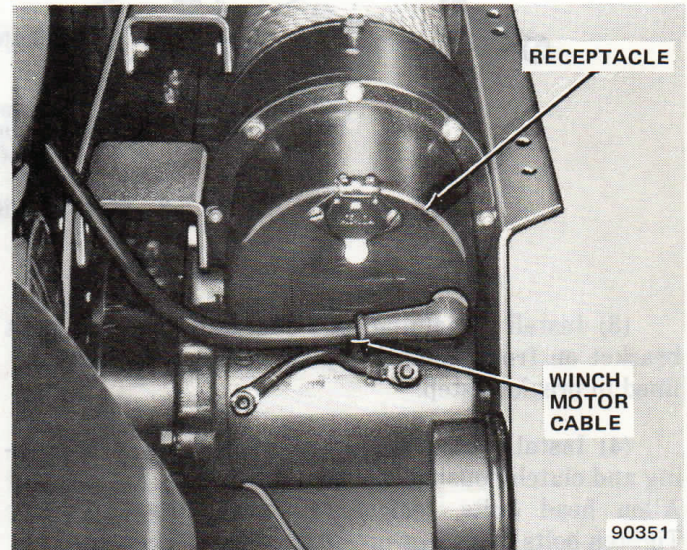


Fig. 5-5 Connecting Winch Motor Cable

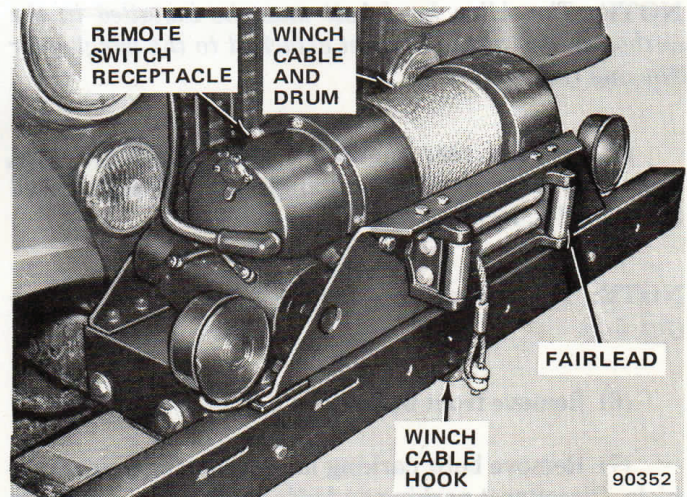


Fig. 5-6 Winch Cable Installation

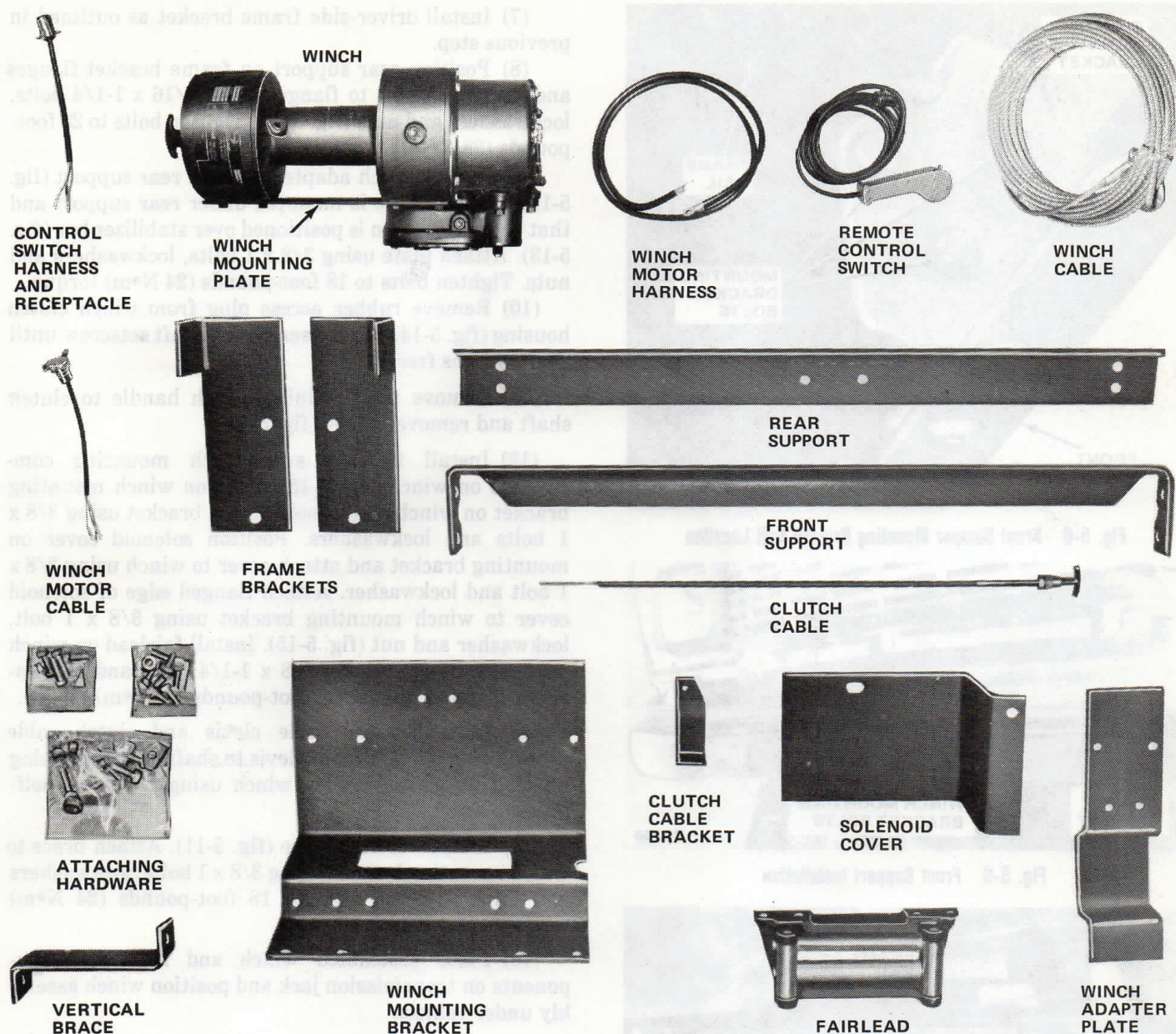


Fig. 5-7 Ramsey Electric Hidden Winch Kit—1979 Cherokee-Wagoneer-Truck Models

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### 1979 Cherokee-Wagoneer-Truck Hidden Winch Kit Installation

**NOTE:** The Ramsey electric hidden winch kit is available for 1979 Cherokee, Wagoneer, and Truck models only. The winch is installed under the vehicle, on the frame rails and behind the original front bumper. A special bumper is not required with this kit. Before installing the kit, check the kit contents to be sure all necessary components are included (fig. 5-7).

- (1) Remove brush guard if equipped.
- (2) Raise vehicle on hoist.
- (3) Remove bolts attaching front bumper mounting brackets to frame rails (fig. 5-8), and remove bumper and brackets as assembly.

(4) Insert four  $3/8 \times 1$  bolts in bolt holes at center of front support and position support inside frame rail channels (fig. 5-9).

**NOTE:** The bolts must be installed from the rear of the front support only and before the support is installed. Be sure the front support is positioned so the support angle-ends are facing outward.

(5) Install front bumper. Align bolt holes in bumper mounting brackets, frame rails and front support and install original bolts in lower hole of each bracket. Install  $7/16 \times 1-1/4$  bolts furnished in kit in upper holes of brackets (fig. 5-8). Use flat washers under all bolt heads and lockwashers under all attaching nuts. Tighten all bolts to 28 foot-pounds (38 N•m) torque.

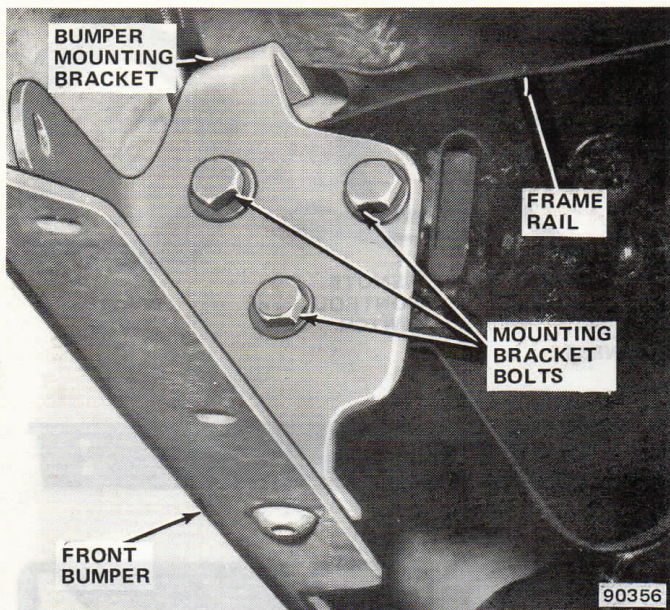


Fig. 5-8 Front Bumper Mounting Bracket Bolt Location

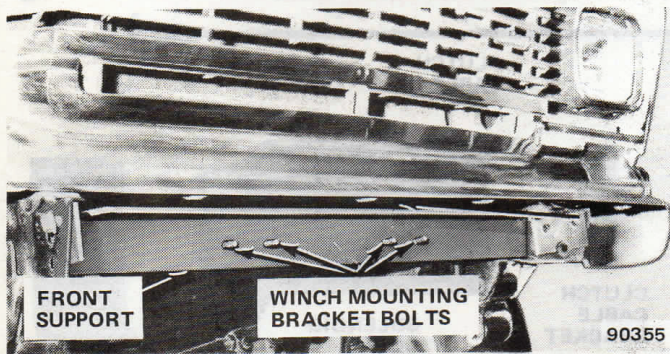


Fig. 5-9 Front Support Installation

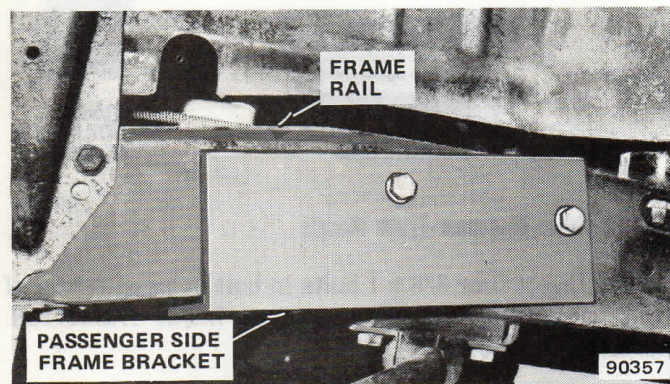


Fig. 5-10 Frame Bracket Installation

(6) Install passenger-side frame bracket on frame rail (fig. 5-10). Align bracket bolt holes with weldnuts in frame and attach bracket using 7/16 x 1-1/4 bolts and lockwashers. Tighten bolts to 28 foot-pounds (38 N•m) torque.

**NOTE:** The frame brackets are not interchangeable (fig. 5-11). Be sure the horizontal bracket flange is to the rear of the vehicle when the bracket is installed (fig. 5-10, 5-11).

(7) Install driver-side frame bracket as outlined in previous step.

(8) Position rear support on frame bracket flanges and attach support to flanges using 7/16 x 1-1/4 bolts, lockwashers and nuts (fig. 5-12). Tighten bolts to 28 foot-pounds (38 N•m) torque.

(9) Install winch adapter plate on rear support (fig. 5-11). Be sure plate is mounted under rear support and that channel section is positioned over stabilizer bar (fig. 5-13). Attach plate using 3/8 x 1 bolts, lockwashers and nuts. Tighten bolts to 18 foot-pounds (24 N•m) torque.

(10) Remove rubber access plug from winch clutch housing (fig. 5-14), and loosen clutch shaft setscrew until shaft rotates freely.

(11) Remove pin retaining clutch handle to clutch shaft and remove handle (fig. 5-14).

(12) Install fairlead and winch mounting components on winch (fig. 5-15). Position winch mounting bracket on winch and loosely attach bracket using 3/8 x 1 bolts and lockwashers. Position solenoid cover on mounting bracket and attach cover to winch using 3/8 x 1 bolt and lockwasher. Attach flanged edge of solenoid cover to winch mounting bracket using 3/8 x 1 bolt, lockwasher and nut (fig. 5-15). Install fairlead on winch mounting bracket using 3/8 x 1-1/4 bolts and lockwashers. Tighten bolts to 18 foot-pounds (24 N•m) torque.

(13) Install clutch cable clevis and clutch cable bracket (fig. 5-16). Attach clevis to shaft using retaining pin and attach bracket to winch using 1/4 x 3/4 self-tapping screws.

(14) Install vertical brace (fig. 5-11). Attach brace to winch mounting bracket using 3/8 x 1 bolts, lockwashers and nuts. Tighten bolts to 18 foot-pounds (24 N•m) torque.

(15) Place assembled winch and mounting components on transmission jack and position winch assembly under vehicle.

**NOTE:** Use a chain hoist or have a helper assist in placing the winch on the jack.

(16) Raise winch assembly with jack (fig. 5-17). Align holes in winch mounting bracket with bolts previously in front support and insert bolts through holes in bracket. Install lockwashers and nuts on bolts but do not tighten bolts at this time.

(17) Align bolt holes in vertical brace with holes in winch adapter plate (fig. 5-18). Attach brace to adapter using 3/8 x 1 bolts, lockwashers and nuts. Tighten bolts to 18 foot-pounds (24 N•m) torque.

(18) Install clutch cable in front bumper (fig. 5-19). Drill 1/2-inch diameter hole in flat surface at top of bumper. Locate hole 6 inches to right of top bolt on driver side of bumper (fig. 5-19).

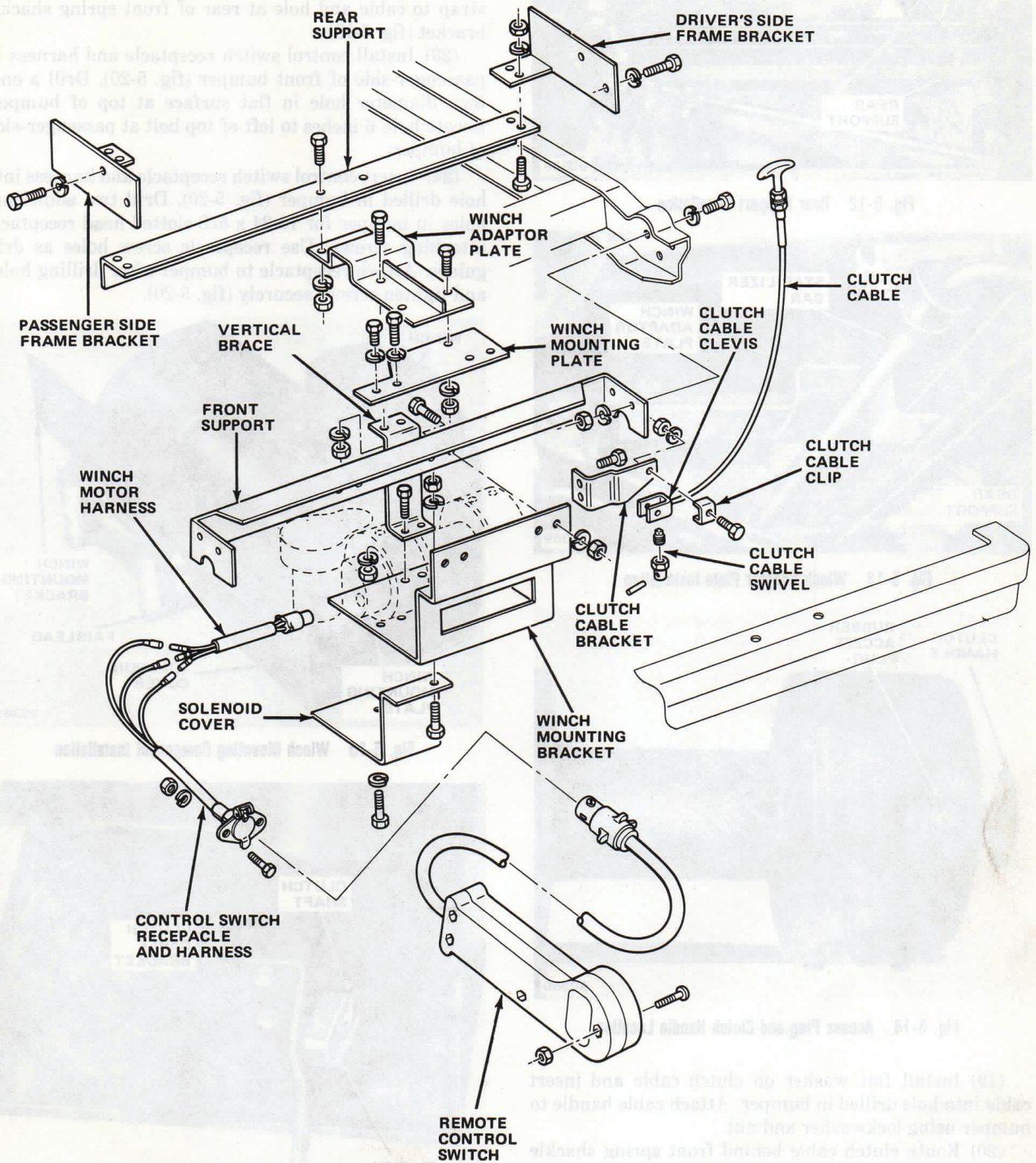


Fig. 5-11 Hidden Winch Mounting Components

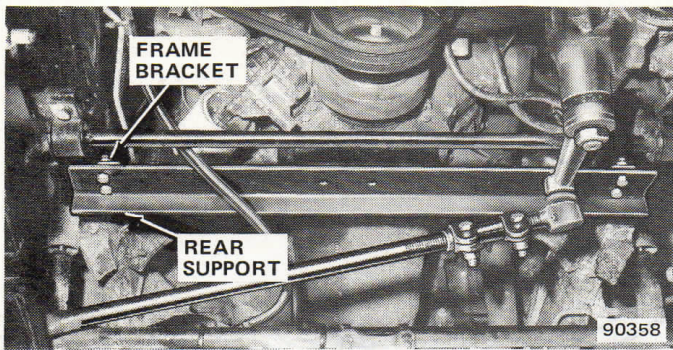


Fig. 5-12 Rear Support Installation

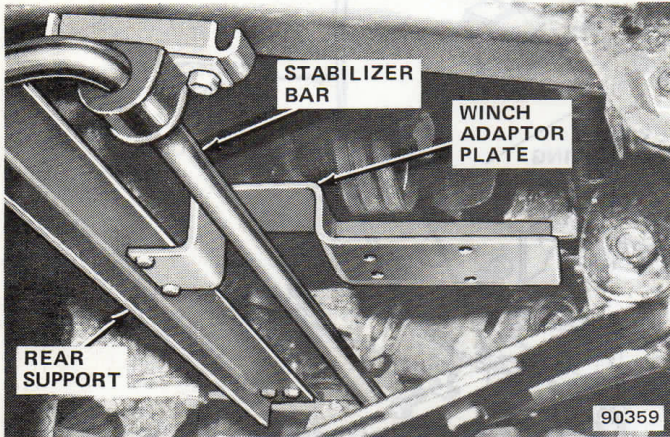


Fig. 5-13 Winch Adapter Plate Installation

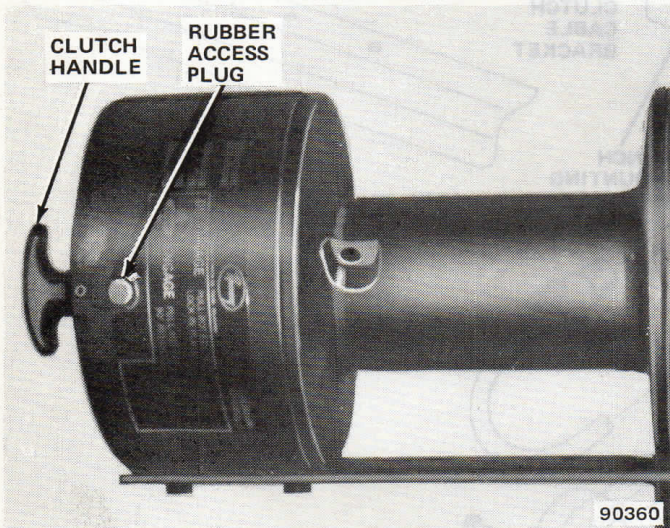


Fig. 5-14 Access Plug and Clutch Handle Location

(19) Install flat washer on clutch cable and insert cable into hole drilled in bumper. Attach cable handle to bumper using lockwasher and nut.

(20) Route clutch cable behind front spring shackle (fig. 5-19). Install cable swivel in clevis and insert cable end through clevis and swivel. Bend cable end 90° and tighten swivel setscrew to retain cable.

(21) Clamp cable to clutch cable bracket using cable clip. Attach cable clip to bracket using 1/4 x 1 bolt,

lockwasher and nut (fig. 5-19). Tighten bolt to 10 foot-pounds (14 N•m) torque.

(22) Install nylon tie strap retainer on cable. Attach strap to cable and hole at rear of front spring shackle bracket (fig. 5-19).

(23) Install control switch receptacle and harness in passenger-side of front bumper (fig. 5-20). Drill a one-inch diameter hole in flat surface at top of bumper. Locate hole 6 inches to left of top bolt at passenger-side of bumper.

(24) Insert control switch receptacle and harness into hole drilled in bumper (fig. 5-20). Drill two additional holes in bumper for 10-24 x 5/8 slotted head receptacle attaching screws. Use receptacle screw holes as drill guides. Attach receptacle to bumper after drilling holes and tighten screws securely (fig. 5-20).

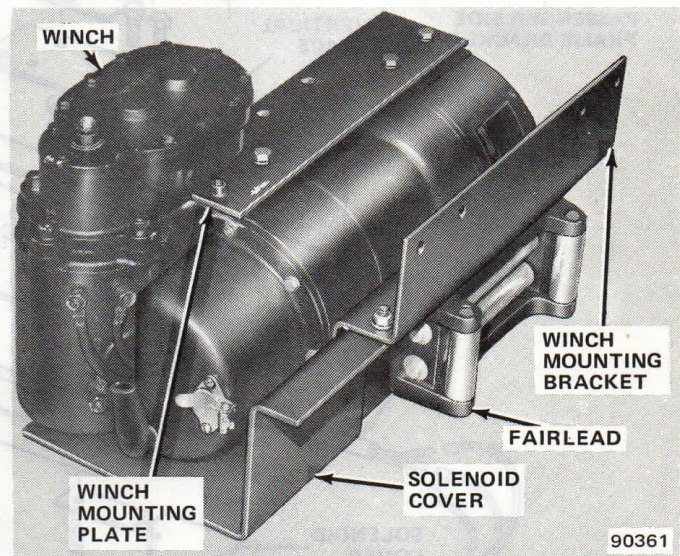


Fig. 5-15 Winch Mounting Component Installation

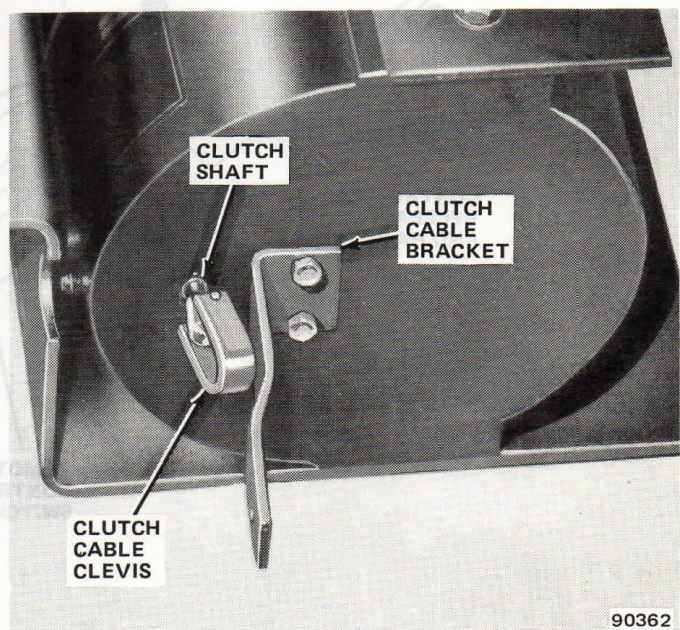


Fig. 5-16 Clutch Cable Clevis and Bracket Installation



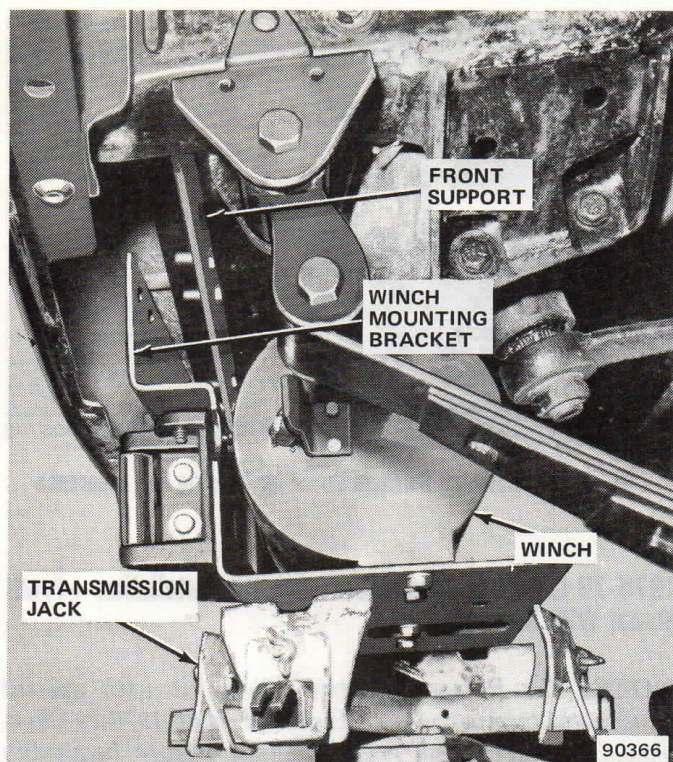


Fig. 5-17 Winch Installation

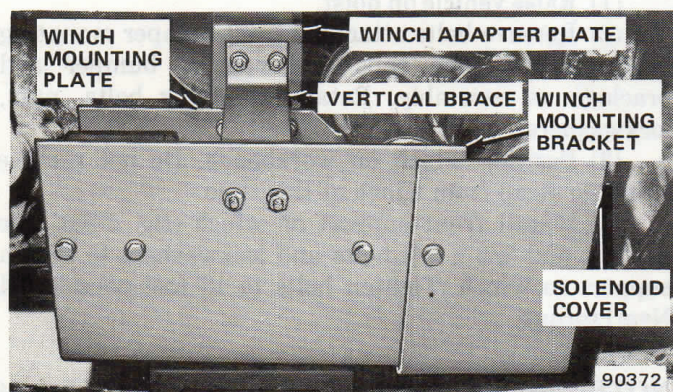


Fig. 5-18 Attaching Vertical Brace to Adapter Plate

(25) Connect winch motor harness to control switch receptacle harness (fig. 5-11). Tape each wire connector separately; then wrap additional protective tape around all three connectors.

(26) Route winch motor/control switch harness around engine-side of bumper mounting bracket, and plug male connector of winch motor harness into receptacle on winch solenoid (fig. 5-21).

(27) Install rubber protective boot on one end of winch motor cable and connect that end of cable to winch motor solenoid (fig. 5-21).

(28) Lower vehicle.

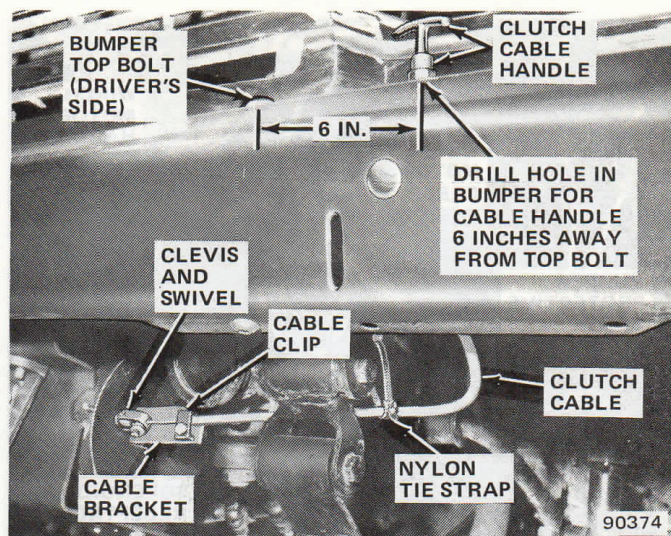


Fig. 5-19 Clutch Cable Installation

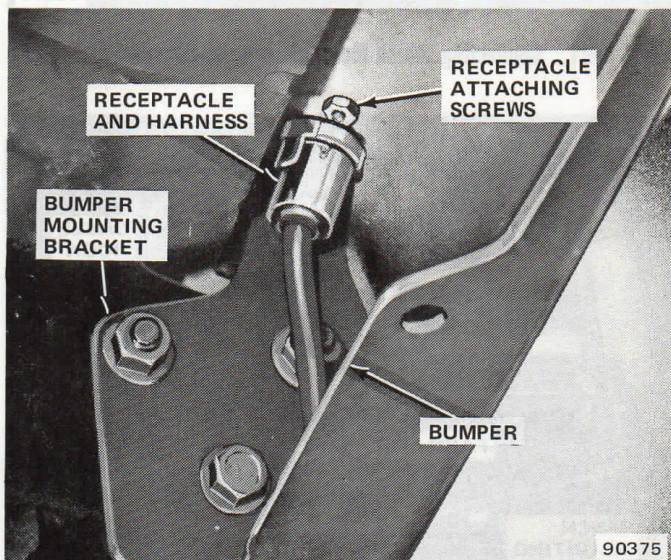


Fig. 5-20 Control Switch Receptacle and Harness Installation

(29) Route opposite end of winch motor cable between grille and crossmember and to battery. Connect cable eyelet to cable clamp bolt at battery positive (+) post.

(30) Plug remote control switch connector into control switch receptacle in bumper.

(31) Operate winch in forward and reverse directions to check operation.

(32) Insert cable-end through fairlead rollers and into cable hole in winch drum. Tighten cable retaining setscrew to secure cable in drum.

(33) Uncoil and straighten full length of cable.

(34) Place gearshift lever in neutral, apply parking brake and operate engine at fast idle.

(35) Wind five coils of cable around winch drum without applying tension to cable. Use remote control switch to operate winch.

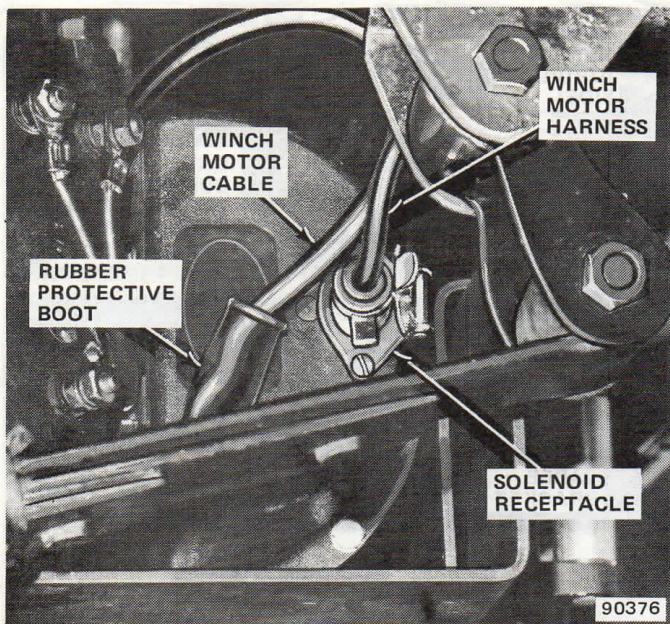


Fig. 5-21 Connecting Winch Motor Harness to Solenoid Receptacle

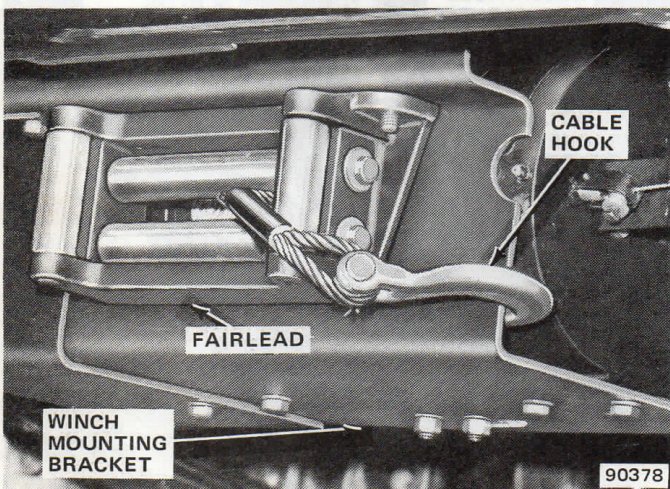


Fig. 5-22 Securing Cable Hook

(36) Wind remaining length of cable onto winch applying as much tension to cable as possible. Stop winding cable when approximately 18 inches of cable still extends past fairlead. Position cable hook on winch mounting bracket (fig. 5-22), and operate winch until cable and hook are snug.

(37) Raise vehicle.

(38) Notch solenoid cover for spring shackle bolt clearance as follows (fig. 5-23). Mark cover area to be notched (fig. 5-23). Remove cover. Notch cover using grinder. Install cover and tighten cover attaching bolts to 18 foot-pounds (24 N•m) torque.

(39) Lower vehicle.

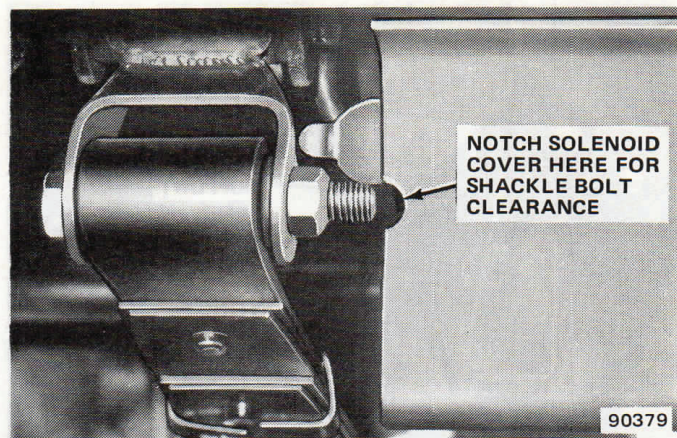


Fig. 5-23 Notching Solenoid Cover for Shackle Bolt Clearance

### 1976-79 Cherokee-Wagoneer-Truck Kit Installation—Front Mount With Bumper

**NOTE:** The Ramsey electric winch kit with special equipment bumper may be installed on all 1976-79 Cherokee, Wagoneer and Truck models. Before beginning installation, check the kit contents to be sure all necessary components are included (fig. 5-24).

(1) Raise vehicle on hoist.

(2) Remove bolts attaching front bumper mounting brackets to frame rails and remove bumper and brackets as assembly. Retain attaching bolts, nuts, lockwashers.

(3) Position winch on workbench. Do not remove shipping strap from winch at this time.

(4) Install front support on winch (fig. 5-25). Use 3/8 x 1 and 3/8 x 3/4 bolts and lockwashers to attach support to winch. Tighten bolts to 18 foot-pounds (24 N•m) torque.

**NOTE:** Install the 3/8 x 3/4 bolt in the outboard hole of the winch gear housing.

(5) Remove shipping strap from winch.

(6) Install winch mounting brackets on winch (fig. 5-25). Attach one bracket to winch clutch housing using 3/8 x 1 bolts and lockwashers. Attach remaining bracket to winch gear housing using 3/8 x 1 hex-head bolt and 3/8 x 3/4 Allen head bolt and lockwashers. Tighten bolts to 18 foot-pounds (24 N•m) torque.

**NOTE:** Install the Allen head bolt in the outboard hole of the gear housing (fig. 5-26).

(7) Install rear support on winch mounting brackets (fig. 5-25). Attach support using 3/8 x 1 and 3/8 x 3/4 bolts, lockwashers and nuts. Tighten bolts to 18 foot-pounds (24 N•m) torque. Install 3/8 x 3/4 bolt opposite Allen head bolt in winch mounting bracket attached to gear housing.

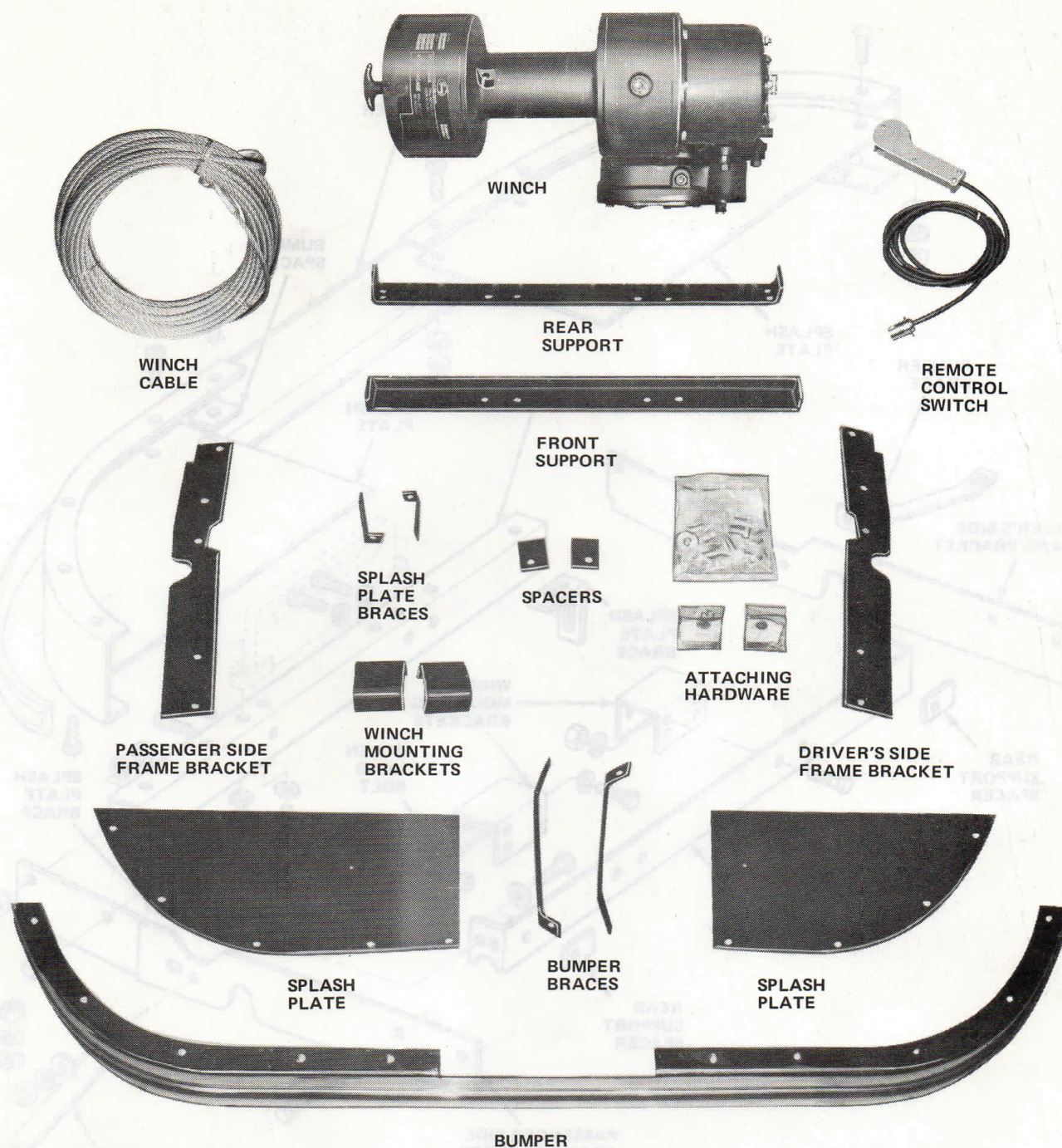


Fig. 5-24 Ramsey Winch Kit with Bumper—1976-79 Cherokee-Wagoneer-Truck

**NOTE:** Attach the support using the upper bracket holes on Cherokee and Wagoneer models. Use the lower holes on Truck models.

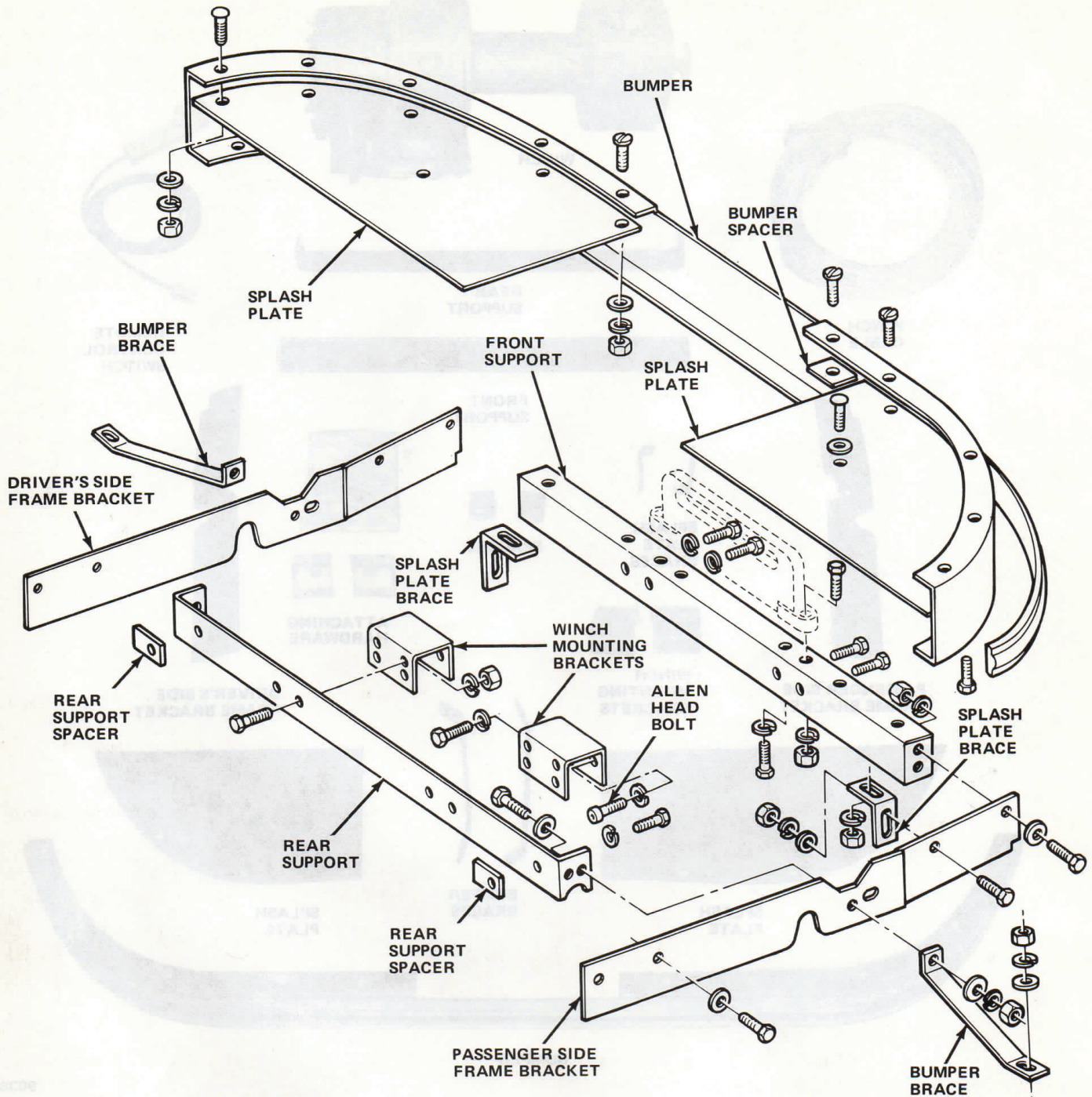
(8) Install rubber protective boot on one end of winch motor cable and connect that end of cable to solenoid (fig. 5-27).

(9) Install driver- and passenger-side frame brackets on vehicle frame rails (fig. 5-28). On 1976-78 models, use original bumper bracket bolts to attach frame

brackets. On 1979 models, use 7/16 x 1-1/4 bolts, flat washers and lockwashers supplied in kit to attach brackets to frame rails. Tighten bolts to 28 foot-pounds (38 N•m) torque.

(10) Place assembled winch and mounting components on transmission jack. Use chain hoist or helper to lift and place winch on jack.

(11) Raise winch with jack and position rear support against front crossmember (fig. 5-29). Insert rear sup-



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Fig. 5-25 Winch Mounting Components—Cherokee-Wagoneer-Truck

port spacers at each end of support between crossmember and support (fig. 5-29). Align bolt holes in support, spacers, and crossmember. Attach support to crossmember using  $1/2 \times 1-1/4$  bolts, lockwashers and nuts. Tighten bolts to 41 foot-pounds (55 N•m) torque.

**NOTE:** On 1979 models, the frame rails extend beyond the front crossmember. When positioning the rear sup-

port on these models, the support must fit within the extended frame rail channel sections.

(12) Attach front support ends to each frame bracket using  $3/8 \times 3/4$  bolts, lockwashers and nuts. Tighten bolts to 18 foot-pounds (24 N•m) torque.

(13) Install splash plate braces on frame brackets (fig. 5-30). Attach brackets using  $7/16 \times 1-1/4$  bolts,

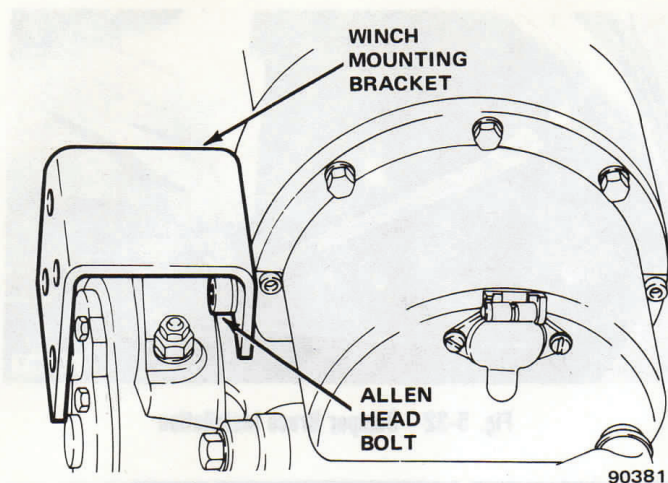


Fig. 5-26 Allen Head Bolt Location in Winch Mounting Bracket

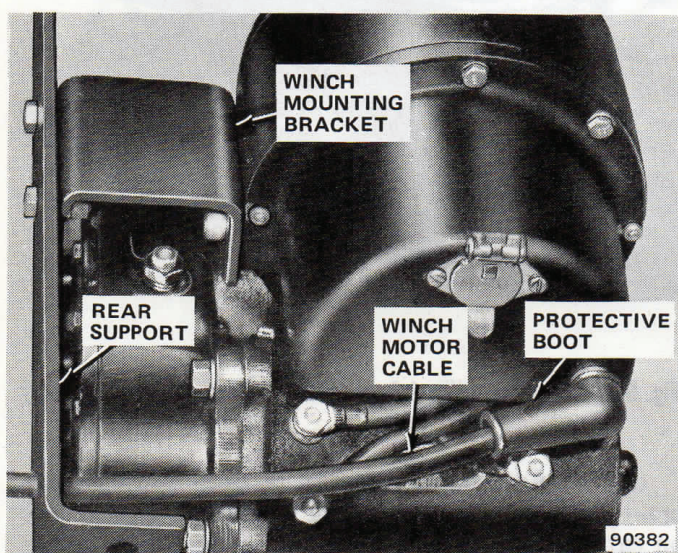


Fig. 5-27 Winch Motor Cable Installation

lockwashers and nuts but do not tighten bolts at this time.

(14) Install fairlead on front support. Position fairlead on top of support and install attaching bolts. Install 3/8 x 1 bolts at outer ends of fairlead and 3/8 x 3/4 bolts from bottom, through front support and into fairlead. Install lockwashers and nuts on outer bolts and tighten all bolts to 18 foot-pounds (24 N•m) torque.

(15) Install splash plates on special equipment bumper (fig. 5-31). Position splash plates under upper flange of bumper and align holes in plate and bumper (fig. 5-25). Attach plates using 1/4 x 1 slotted-head carriage bolts and tighten bolts to 5 foot-pounds (7 N•m) torque.

(16) Position bumper spacer and bumper assembly on front support and splash plate braces (fig. 5-25).

(17) Attach splash plates to splash plate braces using 1/4 x 1 slotted-head bolts. Attach bumper and bumper spacer to front support using 1/4 x 1 slotted-head bolts. Tighten 1/4 x 1 bolts to 5 foot-pounds (7 N•m) torque and splash plate-to-frame bracket bolts to 28 foot-pounds (38 N•m) torque.

(18) Install bumper braces (fig. 5-32). Attach braces to bumper lower flange using 3/8 x 1 bolts, lockwashers, flat washers and nuts. Tighten bolts to 18 foot-pounds (24 N•m) torque. Attach braces to rear support and frame brackets using 7/16 x 1-3/4 bolts, flat washers, lockwashers and nuts. Tighten bolts to 28 foot-pounds (38 N•m) torque.

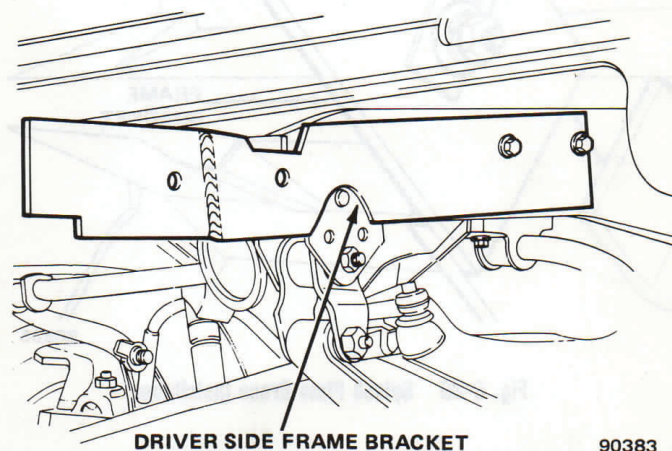


Fig. 5-28 Frame Bracket Installation

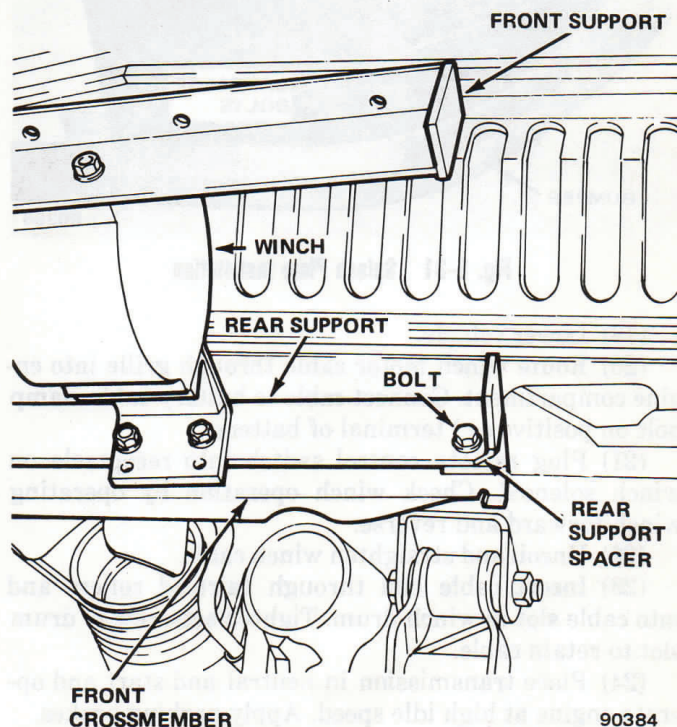


Fig. 5-29 Winch Mounting

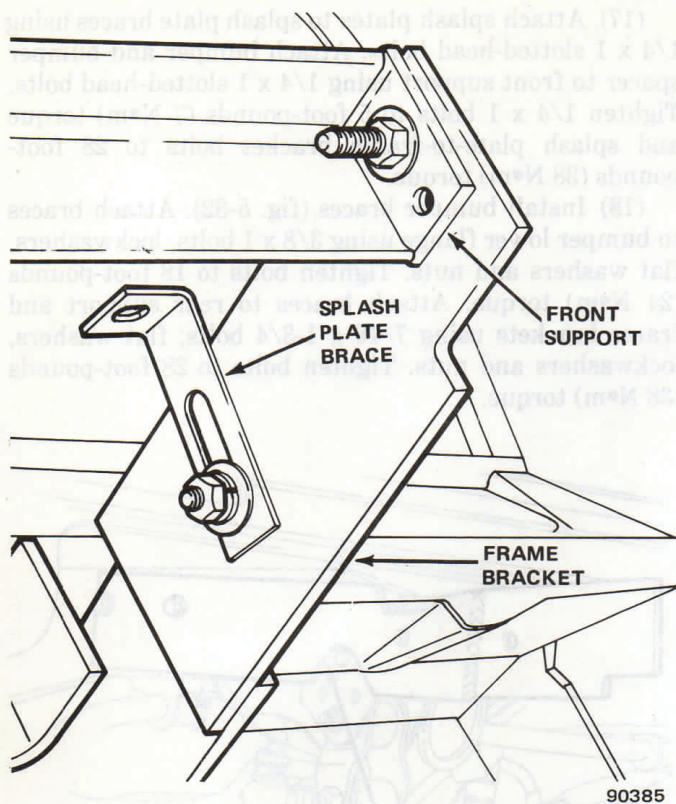


Fig. 5-30 Splash Plate Brace Installation

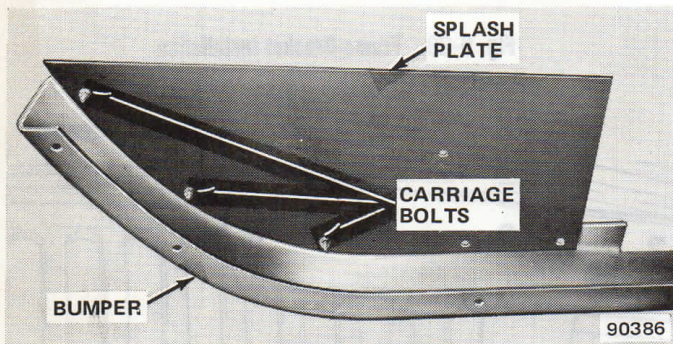


Fig. 5-31 Splash Plate Installation

- (19) Lower vehicle.
- (20) Route winch motor cable through grille into engine compartment. Connect cable to battery cable clamp bolt on positive (+) terminal of battery.
- (21) Plug remote control switch into receptacle on winch solenoid. Check winch operation by operating winch forward and reverse.
- (22) Uncoil and straighten winch cable.
- (23) Insert cable end through fairlead rollers and into cable slot in winch drum. Tighten setscrew in drum slot to retain cable.
- (24) Place transmission in neutral and start and operate engine at high idle speed. Apply parking brakes.
- (25) Wind five coils of cable onto drum without applying tension on cable.

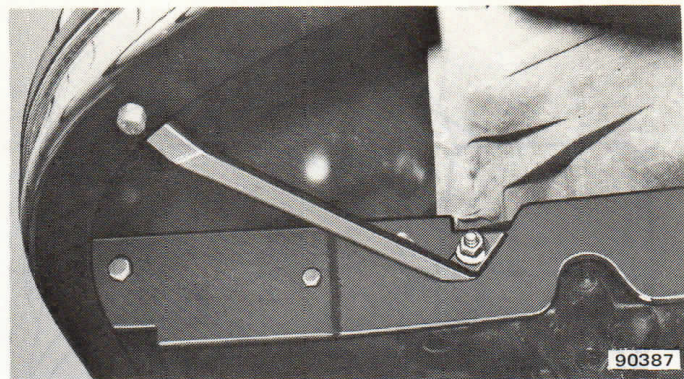


Fig. 5-32 Bumper Brace Installation

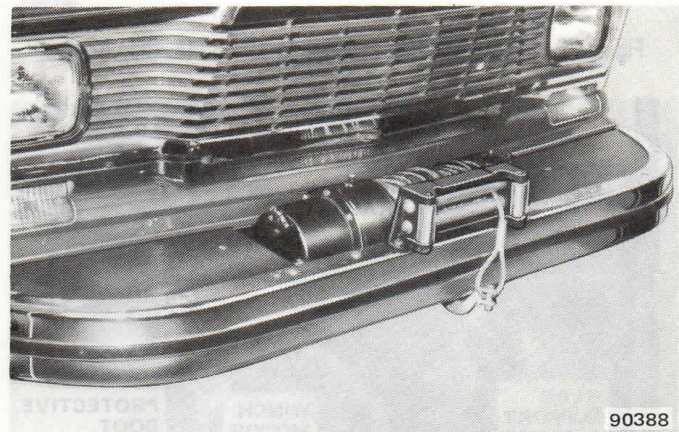


Fig. 5-33 Completed Winch Installation—Cherokee-Wagoneer-Truck

(26) Wind remaining length of cable—in even layers—onto drum while applying maximum tension (pull) on cable. Stop winding cable onto drum when approximately 18 inches of cable still extends beyond fairlead.

(27) Attach cable hook to bumper (fig. 5-33), and wind cable onto drum just enough to retain hook on bumper.

## TROUBLESHOOTING

Ramsey electric winches will provide satisfactory and effective operation with proper use and regular maintenance. However, if a winch malfunction should occur, refer to the following troubleshooting guide to locate and correct the cause of the problem.

Before performing any service operations to correct a suspected winch malfunction, be sure all electrical connections are clean and tight and that all winch attaching hardware has been tightened properly. In addition, be sure the battery and alternator are in good condition and operating properly. The battery must have sufficient capacity to handle winch loads. An ampere hour rating of 70 or more is recommended.

Troubleshooting Guide—Ramsey Electric Winch

Condition	Possible Cause	Correction
MOTOR RUNS IN ONE DIRECTION ONLY	<ul style="list-style-type: none"> <li>(1) Defective solenoid or stuck solenoid.</li> <li>(2) Defective switch.</li> <li>(3) Broken wire or bad connection.</li> </ul>	<ul style="list-style-type: none"> <li>(1) Jar solenoid to free contacts. Check by applying 12 volts to coil terminal (it should make an audible click when energized).</li> <li>(2) Disengage winch clutch or remove armature lead. Remove switch plug from hood. Raise connector cover on hood and with screw driver, short the bottom two pins. Solenoid should click. Short the two left hand pins. The other solenoid should operate. If both solenoids operate, check for a broken wire in switch cable.</li> <li>(3) Check for loose connection on switch and switch connector. Spread pins apart slightly if necessary.</li> </ul>
MOTOR RUNS EXTREMELY HOT	<ul style="list-style-type: none"> <li>(1) Armature dragging.</li> <li>(2) Defective motor.</li> <li>(3) Long period of operation.</li> </ul>	<ul style="list-style-type: none"> <li>(1) Check bushings for excessive wear. Replace if worn badly.</li> <li>(2) Replace if cause not determined.</li> <li>(3) Allow to cool.</li> </ul>
MOTOR RUNS, BUT WITH INSUFFICIENT POWER, OR WITH LOW LINE SPEED	<ul style="list-style-type: none"> <li>(1) Battery voltage insufficient.</li> <li>(2) Battery to winch cable too small.</li> <li>(3) Bad connection.</li> <li>(4) Insufficient charging system.</li> </ul>	<ul style="list-style-type: none"> <li>(1) Check battery terminal voltage under load. If 10 volts or less, replace or parallel another battery to it.</li> <li>(2) Check battery to ground (chassis) cable. Must be No. 2 or larger.</li> <li>(3) Check battery terminals for corrosion; clean and grease.</li> <li>(4) Replace with larger capacity charging system.</li> </ul>
MOTOR RUNS, BUT DRUM DOES NOT TURN	<ul style="list-style-type: none"> <li>(1) Clutch not engaged.</li> <li>(2) Sheared drum shaft key.</li> <li>(3) Drive gear stripped.</li> <li>(4) Broken shaft.</li> </ul>	<ul style="list-style-type: none"> <li>(1) If clutch engaged but symptom still exists, it will be necessary to disassemble winch to determine cause and repair.</li> </ul>
MOTOR WILL NOT OPERATE	<ul style="list-style-type: none"> <li>(1) Defective solenoid or stuck solenoid.</li> <li>(2) Defective switch.</li> </ul>	<ul style="list-style-type: none"> <li>(1) Jar solenoid to free contacts. Check by applying 12 volts to coil terminal (it should make an audible click when energized).</li> <li>(2) Disengage winch clutch or remove armature lead. Remove switch plug from hood. Raise connector cover on hood and with a screwdriver, short the bottom two pins. Solenoid should click. Short the two left hand pins. The other solenoid should operate. If both solenoids operate, check for a broken wire in switch cable.</li> </ul>

Condition	Possible Cause	Correction
MOTOR WILL NOT OPERATE (Cont.)	(3) Defective motor.	(3) If solenoids operate, check for voltage at armature post, if present, replace motor.
	(4) Loose connections.	(4) Tighten connections on bottom side of hood and on motor.
CLUTCH JUMPS OUT UNDER LOAD	(1) Clutch jaws have been damaged or worn by partial engagement on previous heavy pulls.	(1) Replace clutch and drum, or the clutch and clutch ring which is bolted to the drum.
CLUTCH BINDS	(1) Dry or rusty shaft.	(1) Clean and lubricate.
	(2) Keys pulled out of shape.	(2) File off burrs or replace keys.
CLUTCH INOPERATIVE	(1) Loose setscrew.	(1) Tighten.
	(2) Key missing.	(2) Install replacement key.
	(3) Bent yoke.	(3) Straighten or replace.
OIL LEAKS FROM HOUSINGS	(1) New seal.	(1) New seals sometimes leak until seated to shaft.
	(2) Seal damaged or worn.	(2) Replace.
	(3) Too much oil.	(3) Drain excess oil per lubrication instructions.
	(4) Damaged gasket.	(4) Replace.

90390B

## COMPONENT REPAIR AND REPLACEMENT

Ramsey electric winches can be disassembled and serviced when necessary. Repair kits and parts are available for most of the winch components. Major winch components such as the clutch and gear housings and cable drum are also serviceable. Refer to the winch overhaul procedures.

**NOTE:** The following overhaul procedure includes instructions for replacing individual winch components as well as complete winch disassembly and assembly. To replace an individual component, simply follow the disassembly procedure up to removal of the desired part. Then, refer to the necessary point in the assembly procedure where the part is installed and continue from there.

### Winch Overhaul

#### Disassembly

- (1) Disconnect winch motor cable at battery terminal and remove winch.
- (2) Remove drain plug in bottom of gear housing and drain oil from housing (fig. 5-34).

- (3) Remove pin retaining clutch handle on shaft of jaw clutch yoke and remove handle.

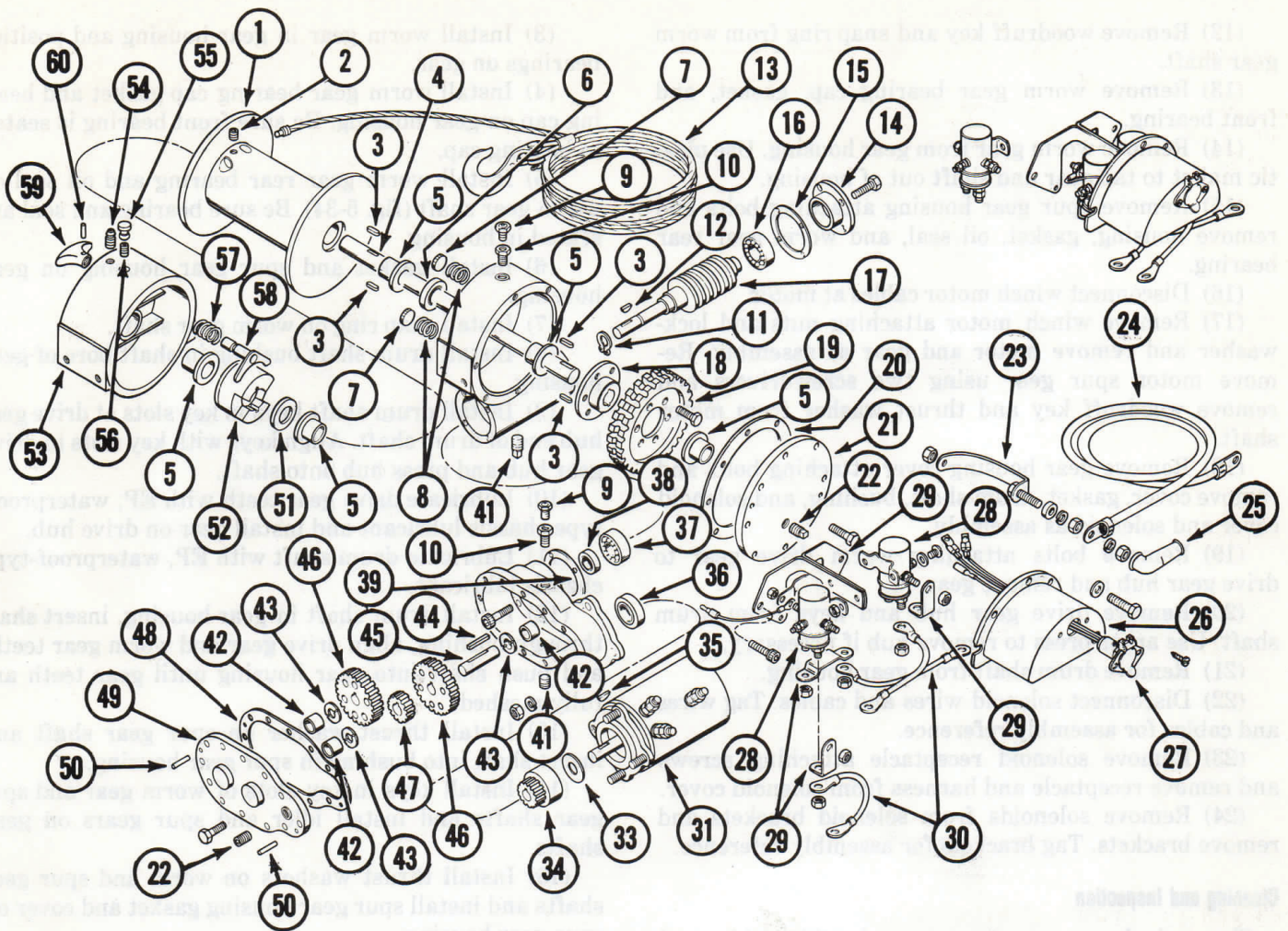
**NOTE:** On models with the hidden winch, remove the clevis retaining pin and remove the clutch cable clevis.

- (4) Remove clutch housing from winch drum.
- (5) Remove jaw clutch from clutch housing and remove drum shaft bushings and spacer (fig. 5-34).
- (6) Remove rubber access plug from clutch housing and remove clutch shaft retaining setscrew.
- (7) Remove clutch shaft and yoke and clutch shaft spring. If clutch shaft on yoke must be replaced, remove and discard yoke retaining clip and remove yoke from shaft.

**NOTE:** The yoke retaining clip is not reusable. If it is removed, install a replacement clip at assembly.

- (8) Remove drum shaft keys (2), and remove winch drum from shaft.
- (9) Remove brake discs and springs from gear housing.
- (10) Remove spur gear housing cover and gasket and remove thrust washers from worm gear and spur gear shafts.
- (11) Remove idler gear, spur gears, spur gear shaft and key, and spur gear shaft rear thrust washer.





- 1 WINCH DRUM
- 2 CABLE RETAINING SETSCREW
- 3 DRUM SHAFT KEY
- 4 DRUM SHAFT
- 5 DRUM SHAFT BUSHING
- 6 GEAR HOUSING OIL SEAL
- 7 DRAG BRAKE DISC
- 8 DRAG BRAKE SPRING
- 9 RELIEF PLUG
- 10 REDUCER
- 11 WORM SHAFT SNAP RING
- 12 WORM SHAFT WOODRUFF KEY
- 13 CABLE AND HOOK
- 14 WORM GEAR BEARING CAP
- 15 WORM GEAR BEARING CAP GASKET
- 16 WORM GEAR FRONT BEARING
- 17 WORM GEAR
- 18 DRIVE GEAR HUB
- 19 DRIVE GEAR
- 20 GEAR HOUSING COVER GASKET
- 21 GEAR HOUSING COVER
- 22 FILL PLUG
- 23 CONNECTING STRAP
- 24 WINCH MOTOR CABLE
- 25 PROTECTIVE BOOT
- 26 SOLENOID COVER
- 27 SOLENOID RECEPTACLE AND HARNESS
- 28 SOLENOID
- 29 SOLENOID BRACKET
- 30 SOLENOID CABLE

- 31 WINCH MOTOR
- 32 OIL SEAL
- 33 SPACER AND O-RING
- 34 PINION GEAR
- 35 MOTOR SHAFT WOODRUFF KEY
- 36 PINION GEAR OIL SEAL
- 37 WORM GEAR REAR BEARING
- 38 OIL SEAL
- 39 SPUR GEAR HOUSING GASKET
- 40 SPUR GEAR HOUSING
- 41 DRAIN PLUG
- 42 SPUR GEAR SHAFT BUSHING
- 43 THRUST WASHER
- 44 SPUR GEAR SHAFT KEY
- 45 SPUR GEAR SHAFT
- 46 SPUR GEAR
- 47 IDLER GEAR
- 48 SPUR GEAR HOUSING COVER GASKET
- 49 SPUR GEAR HOUSING COVER
- 50 SPUR GEAR COVER LOCATING PIN
- 51 SPACER
- 52 JAW CLUTCH
- 53 CLUTCH HOUSING
- 54 LUBE FITTING
- 55 RUBBER ACCESS PLUG
- 56 CLUTCH SHAFT SETSCREW
- 57 CLUTCH SHAFT SPRING
- 58 CLUTCH SHAFT AND YOKE
- 59 CLUTCH HANDLE (NOT USED ON HIDDEN WINCH)
- 60 CLUTCH HANDLE PIN (NOT USED ON HIDDEN WINCH)

Fig. 5-34 Winch Assembly—Exploded View

- (12) Remove woodruff key and snap ring from worm gear shaft.
- (13) Remove worm gear bearing cap, gasket, and front bearing.
- (14) Remove worm gear from gear housing. Use plastic mallet to tap gear and shaft out of housing.
- (15) Remove spur gear housing attaching bolts and remove housing, gasket, oil seal, and worm gear rear bearing.
- (16) Disconnect winch motor cables at motor.
- (17) Remove winch motor attaching nuts and lock-washer and remove motor and gear as assembly. Remove motor spur gear using two screwdrivers and remove woodruff key and thrust washer from motor shaft.
- (18) Remove gear housing cover attaching bolts and remove cover, gasket, drum shaft, bushing, and solenoid cover and solenoid as assembly.
- (19) Remove bolts attaching worm drive gear to drive gear hub and remove gear.
- (20) Remove drive gear hub and keys from drum shaft. Use arbor press to remove hub if necessary.
- (21) Remove drum shaft from gear housing.
- (22) Disconnect solenoid wires and cables. Tag wires and cables for assembly reference.
- (23) Remove solenoid receptacle attaching screws and remove receptacle and harness from solenoid cover.
- (24) Remove solenoids from solenoid brackets and remove brackets. Tag brackets for assembly reference.

### Cleaning and Inspection

Clean winch components except solenoids, cables and harness, with solvent. Clean electrical components using clean, dry shop towels only. Use compressed air or shop towels to dry the winch components after cleaning.

Inspect all winch components thoroughly for wear or damage. Pay particular attention to bushings, bearings, thrust washers, and shaft surfaces. Replace any components that are worn or damaged. Gear teeth should be checked for nicks, cracks, chipped teeth or excessive wear and replaced if necessary. Check the housings and drum for cracks, wear or other damage and inspect the cable for kinks, frayed spots, or wear. Replace damaged or excessively worn components.

Check all electrical cables, wires, and solenoids for visible damage. Check the solenoid posts for thread damage or looseness and the solenoid cases for cracks. Check all cable ends for signs of wear or damage and check the cable insulation for wear, and frayed or bare spots. Replace any components that exhibit excessive wear or damage.

### Assembly

- (1) Install replacement bushings in spur gear housing and cover if bushings were removed.
- (2) Lubricate worm gear and gear bearings with EP, waterproof-type chassis lubricant.

- (3) Install worm gear in gear housing and position bearings on gear.
  - (4) Install worm gear bearing cap gasket and bearing cap on gear housing. Be sure front bearing is seated in bearing cap.
  - (5) Install worm gear rear bearing and oil seal on worm gear shaft (fig. 5-34). Be sure bearing and seal are seated in housing.
  - (6) Install gasket and spur gear housing on gear housing.
  - (7) Install snap ring on worm gear shaft.
  - (8) Install drum shaft bushing in shaft bore of gear housing.
  - (9) Install drum shaft keys in key slots at drive gear hub end of drum shaft. Align keys with key slots in drive gear hub and press hub onto shaft.
  - (10) Lubricate drive gear teeth with EP, waterproof-type chassis lubricant and install gear on drive hub.
  - (11) Lubricate drum shaft with EP, waterproof-type chassis lubricant.
  - (12) Install drum shaft in gear housing, insert shaft through bushing, align drive gear and worm gear teeth, and push shaft into gear housing until gear teeth are fully meshed.
  - (13) Install thrust washer on spur gear shaft and insert shaft into bushing in spur gear housing.
  - (14) Install keys in key slots of worm gear and spur gear shafts and install idler and spur gears on gear shafts.
  - (15) Install thrust washers on worm and spur gear shafts and install spur gear housing gasket and cover on spur gear housing.
  - (16) Install spacer and O-ring on winch motor shaft. Be sure spacer and O-ring are properly seated in counterbores.
  - (17) Install woodruff key and pinion gear on winch motor shaft. Insert key in shaft slot, align key with key slot in gear, and press gear onto shaft.
  - (18) Install pinion gear oil seal in spur gear housing and install winch motor in housing. Tighten motor attaching stud nuts securely.
  - (19) Assemble solenoids, solenoid brackets, and solenoid cover and harness. Connect harness wires and solenoid cables.
  - (20) Position gear housing cover gasket on housing.
  - (21) Position assembled solenoids and cover on gear housing cover and install assembled components on gear housing. Tighten attaching bolts securely.
- CAUTION:** *When tightening the winch motor terminal nuts, hold the terminal retaining (bottom) nuts with a wrench to prevent rotating and breaking the terminal internal connections.*
- (22) Connect solenoid cables to winch motor terminals.
  - (23) Install oil seal on drum shaft and seat seal in gear housing.

(24) Install drag brake springs and discs in gear housing.

(25) Install drum shaft bushings in winch drum and install drum on shaft. Be sure drag brake discs are not displaced during drum installation.

(26) Install spacer on drum shaft.

(27) Install keys in drum shaft key slots.

(28) Install drum shaft bushing in clutch housing.

(29) Install clutch shaft spring on clutch shaft and yoke and install assembly in clutch housing. Press shaft inward and install shaft retaining setscrew. Tighten setscrew just enough to retain shaft in housing.

(30) Engage jaw clutch in clutch shaft yoke and install assembled clutch and housing on drum shaft. Be sure drum shaft keys are not displaced during housing installation.

(31) Attach winch adapter bracket to clutch and gear housings if equipped.

(32) Install clutch handle and retaining pin on clutch shaft. If servicing hidden winch, install clevis and retaining pin on shaft.

(33) Tighten clutch shaft setscrew. Back off setscrew one-half turn or until clutch shaft rotates freely and install rubber access plug.

(34) Connect winch motor cable to solenoid terminal.

(35) Fill winch gear housing with SAE 140 gear lubricant. Fill winch spur gear housing with SAE 20 gear lubricant.

(36) Install winch.

(37) Connect winch motor cable to battery cable clamp bolt on positive (+) terminal of battery.

(38) Install winch cable if removed.

## WARN ELECTRIC WINCHES

	Page		Page
Component Repair and Replacement	5-27	Kit Installation Procedures	5-19
General	5-19	Troubleshooting	5-25

### GENERAL

Warn electric winch kits may be installed on all 1976-79 Jeep models. The electric winch kits described in this section are all front mount units. The kit for CJ models makes use of the original vehicle bumper. Cherokee, Wagoneer and Truck kits require a special equipment bumper.

All references to bolt and nut sizes in the following procedures are in inches. Bolt sizes are indicated in diameter followed by length. For example, 3/8 x 1 represents a bolt that is 3/8-inch in diameter and one inch long. Whenever fine thread (NF) bolts are used, the number of threads per inch are also included in the size description, such as 1/2-20 x 3. In some cases, additional or replacement fasteners may be required to complete a kit installation. When necessary, obtain the required parts from your stock.

**WARNING:** *The screws, bolts, nuts, lockwashers and flat washers used to attach the winch and winch mounting components are extremely important to safe and satisfactory winch operation. Winch attaching hardware must be grade 5 or better. Refer to the Standard Torque Specifications and Capscrew Markings Chart for bolt grade identification. Any attaching hardware that is not to specified quality must be replaced with grade 5 or better hardware. Do not use parts of lesser quality or substitute design at any time. In addition, specified torque values must be used when installing or servicing*

*winch components. This is necessary to ensure proper retention of all winch components. Refer to the Torque Specification and Capscrew Marking Chart for non-specified torque values if they occur.*

### KIT INSTALLATION PROCEDURES

#### CJ Kit Installation

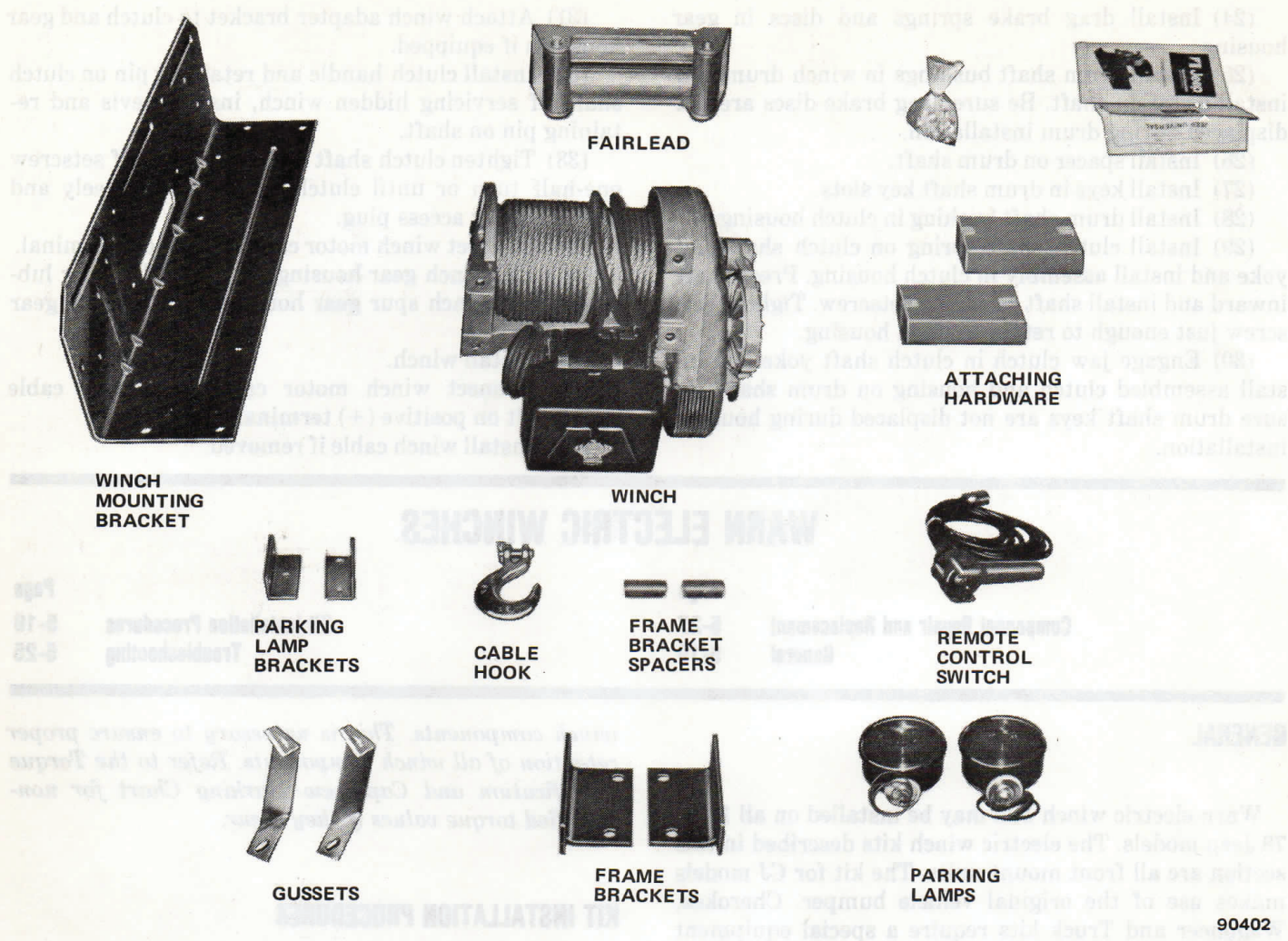
**NOTE:** *The various Warn winch kits include all of the components necessary for a complete installation. This includes the required brackets, braces and attaching hardware. Before proceeding with kit installation, check the kit contents thoroughly to be sure all needed parts are included (fig. 5-35).*

(1) Install frame bracket spacers in frame. Insert spacers in second hole at forward end of frame (fig. 5-36). Use plastic mallet to tap spacers into frame holes.

(2) Install 7/16 x 1-1/2 carriage bolts in frame brackets and position brackets on frame rails (fig. 5-37). Be sure square shanks of carriage bolts are seated in brackets.

(3) Align bolt holes in frame brackets and frame rails and attach brackets using 5/8 x 1-1/2 bolts, flat washers, lockwashers and nuts (fig. 5-38). Tighten bolts to 150 foot-pounds (203 N•m) torque.

(4) Remove vehicle parking lamps. Disconnect parking lamp wire harness at each lamp and route each harness through grille opening to front of vehicle.



90402

Fig. 5-35 Warn Electric Winch Kit—CJ Models

(5) Install vehicle parking lamps after routing each wire harness through grille opening.

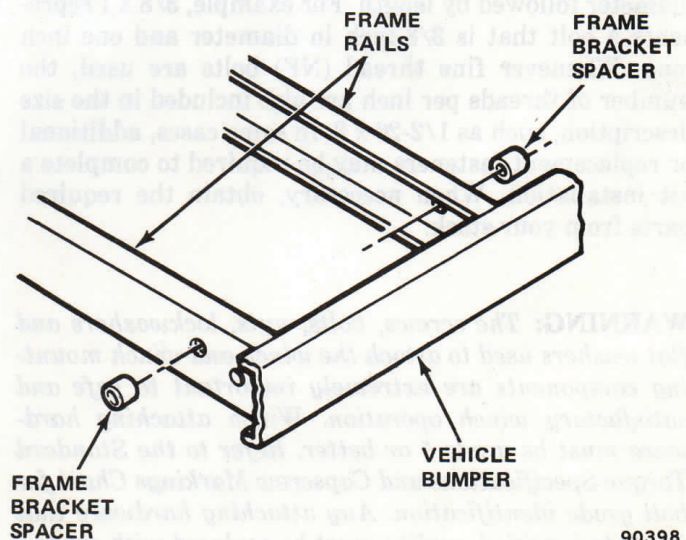
(6) Install parking lamps furnished in kit on parking lamp brackets. Do not tighten parking lamp attaching nuts completely at this time.

(7) Splice red wire of kit parking lamps to yellow wire of vehicle parking lamp harness. Splice brown wire of kit parking lamps to blue wire of vehicle parking lamp harness. Check parking lamp operation after splicing wires.

**NOTE:** Do not splice the center (blue) wire of the vehicle harness.

(8) Install gussets on winch mounting bracket (fig. 5-39). Attach gussets using 7/16 x 1-1/2 carriage bolts, flat washers, lockwashers and nuts. Tighten bolts to 50 foot-pounds (68 N•m) torque.

(9) Install winch mounting bracket assembly on frame bracket carriage bolts (fig. 5-40). Attach mounting bracket to carriage bolts using 7/16 lockwashers and nuts. Tighten nuts to 50 foot-pounds (68 N•m) torque.



90398

Fig. 5-36 Frame Bracket Spacer Installation

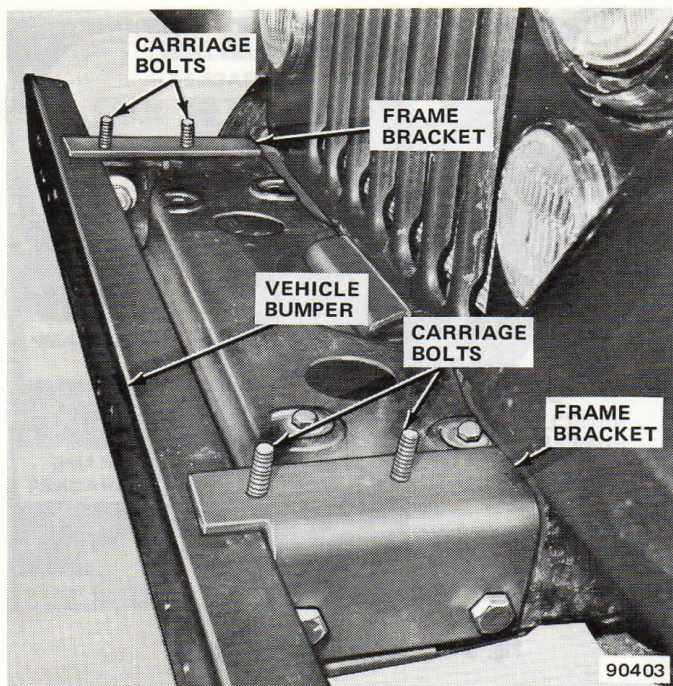


Fig 5-37 Frame Bracket Installation

(10) Install parking lamp and bracket assemblies on winch mounting bracket (fig. 5-41). Attach lamp brackets to winch mounting bracket using 7/16 x 1-1/2 carriage bolts, lockwashers and nuts. Tighten bolts to 50 foot-pounds (68 N•m) torque. Tighten 3/8 parking lamp attaching nuts to 25 foot-pounds (34 N•m) torque.

(11) Install winch on winch mounting bracket. Use chain hoist or helper to lift and position winch on bracket.

(12) Align upper bolt holes in winch mounting bracket with upper bolt holes in winch end support and upper housing. Loosely attach winch to bracket using two 7/16 x 1-1/2 carriage bolts, lockwashers and square nuts. Do not tighten bolts at this time.

**NOTE:** The square nuts are specially dimensioned to fit in the recess between the winch housing reinforcing ribs (fig. 5-42). Do not use any other type of nut to attach the mounting bolts.

(13) Position fairlead on winch mounting bracket. Align bolt holes in fairlead with lower bolt holes in bracket and winch housings. Loosely attach fairlead and winch to bracket using 7/16 x 1-1/2 carriage bolts, lockwashers and square nuts (fig. 5-42).

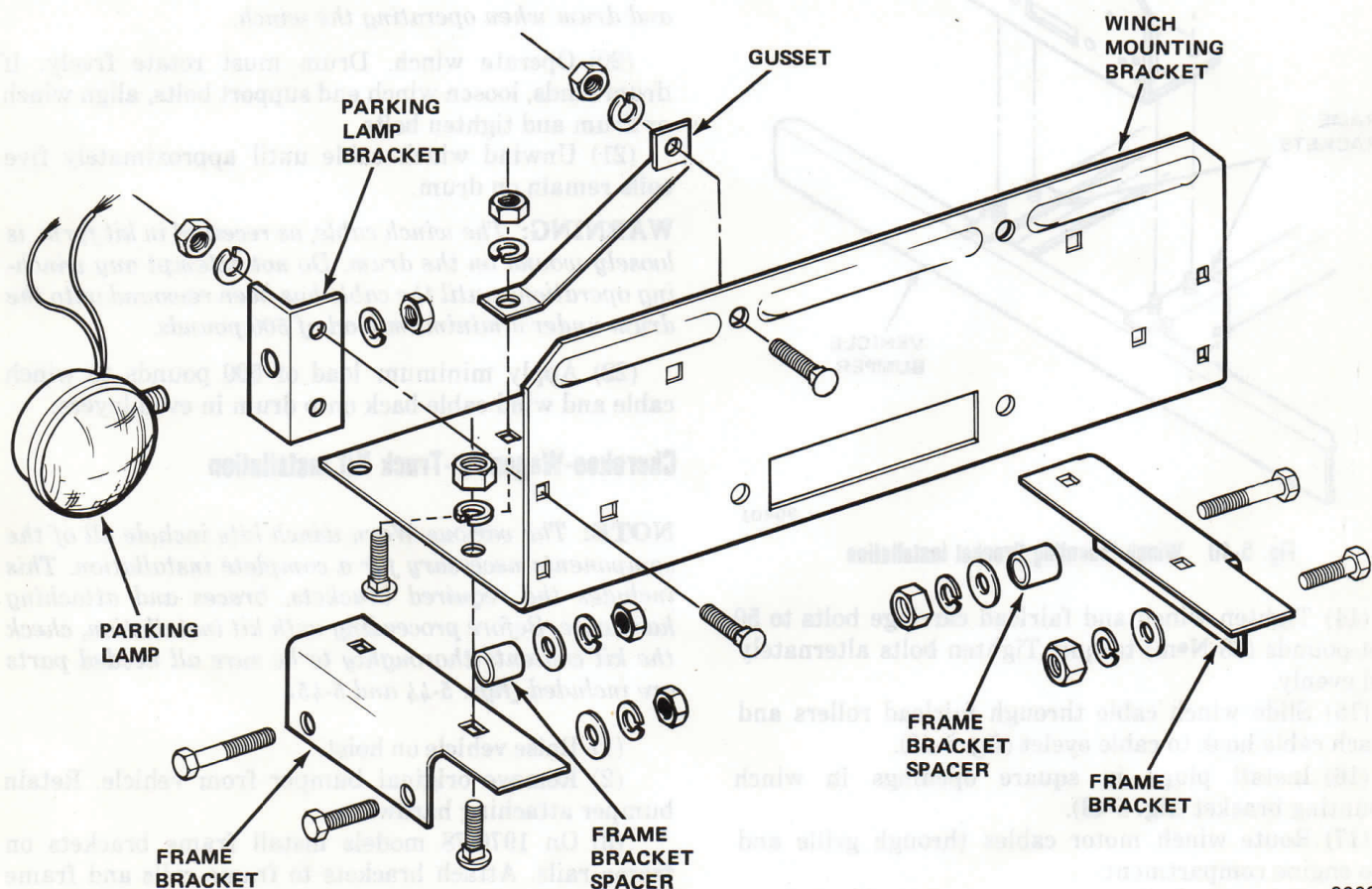
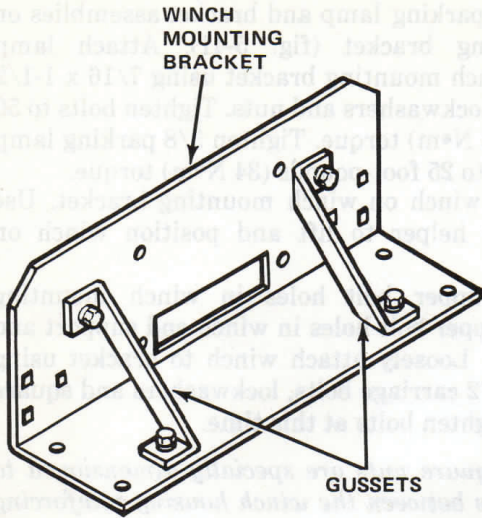
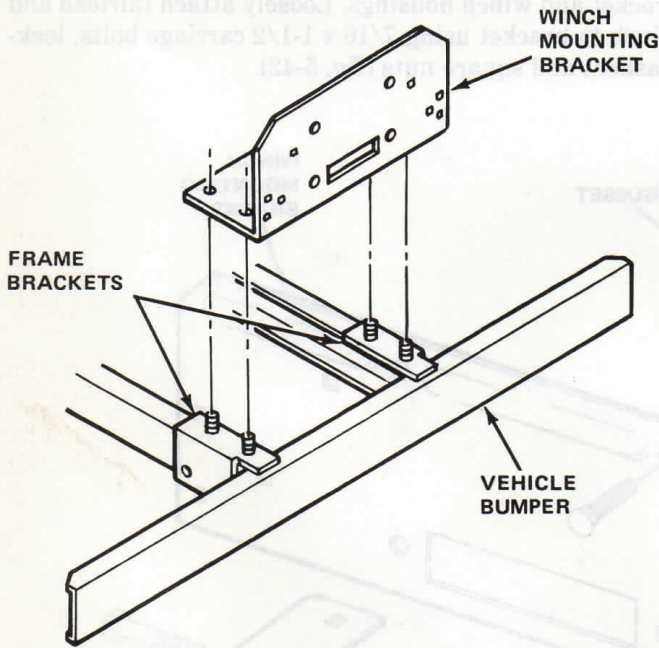


Fig. 5-38 Winch Mounting Components—CJ



90400

Fig. 5-39 Mounting Bracket Gusset Installation



90401

Fig. 5-40 Winch Mounting Bracket Installation

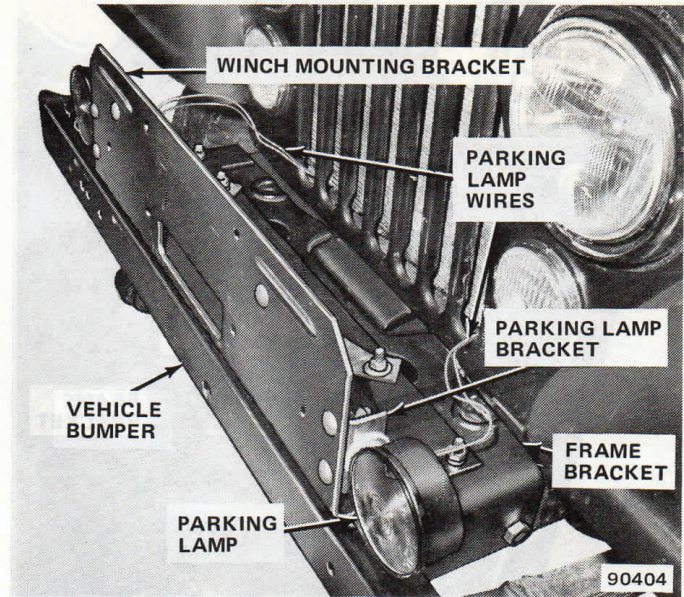
(14) Tighten winch and fairlead carriage bolts to 50 foot-pounds (68 N•m) torque. Tighten bolts alternately and evenly.

(15) Slide winch cable through fairlead rollers and attach cable hook to cable eyelet (fig. 5-43).

(16) Install plugs in square openings in winch mounting bracket (fig. 5-43).

(17) Route winch motor cables through grille and into engine compartment.

(18) Connect winch motor ground cable (fig. 5-43) to cable clamp bolt on battery negative (-) post. Connect large diameter winch motor cable to cable clamp bolt on battery positive (+) post.



90404

Fig. 5-41 Parking Lamp Installation

(19) Plug remote control switch into winch motor receptacle.

**WARNING:** Keep hands away from the winch cable and drum when operating the winch.

(20) Operate winch. Drum must rotate freely. If drum binds, loosen winch end support bolts, align winch or drum and tighten bolts.

(21) Unwind winch cable until approximately five coils remain on drum.

**WARNING:** The winch cable, as received in kit form, is loosely wound on the drum. Do not attempt any winching operations until the cable has been rewound onto the drum under a minimum load of 500 pounds.

(22) Apply minimum load of 500 pounds to winch cable and wind cable back onto drum in even layers.

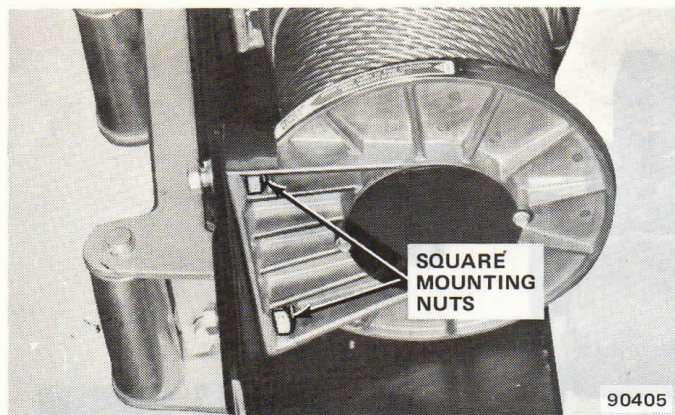
### Cherokee-Wagoneer-Truck Kit Installation

**NOTE:** The various Warn winch kits include all of the components necessary for a complete installation. This includes the required brackets, braces and attaching hardware. Before proceeding with kit installation, check the kit contents thoroughly to be sure all needed parts are included (figs. 5-44 and 5-45).

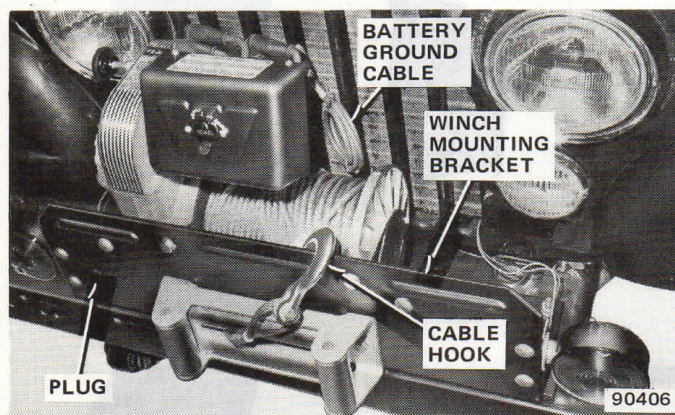
(1) Raise vehicle on hoist.

(2) Remove original bumper from vehicle. Retain bumper attaching hardware.

(3) On 1976-78 models install frame brackets on frame rails. Attach brackets to frame rails and frame front crossmember using original bumper mounting bolts and special dowel nuts and 7/16 x 1-1/4 bolts, flat washers and lockwashers (fig. 5-46). Tighten bracket attaching bolts to 50 foot-pounds (68 N•m) torque.



**Fig. 5-42 Attaching Winch and Fairlead to Mounting Bracket**



**Fig. 5-43 Winch Cable Hook Installation**

**NOTE:** The dowel nuts are used to attach the frame bracket angle to the front crossmember (fig. 5-47). Insert the dowel nut through the crossmember hole, hold the nut in position using the dowel pin and thread the bracket attaching bolt into the nut. The pin will prevent nut rotation when tightening the bolt.

(4) On 1979 models, install frame bracket adapters and frame brackets (fig. 5-48). Position adapters in frame rail ends and attach adapters to front crossmember using special dowel nuts and 7/16 x 1-1/4 bolts, flat washers and lockwashers (fig. 5-49). Position frame brackets on frame rails and place 7/16 flat washers between brackets and rails. Attach brackets to frame rails and adapter brackets using 7/16 x 1-1/4 and 7/16 x 2 bolts, lockwashers, flat washers and nuts. Install 7/16 x 1-1/4 bolts in rearmost bracket holes. Install 7/16 x 2 bolts in front bracket holes and through bracket adapters. Tighten bolts to 50 foot-pounds (68 N•m) torque.

**NOTE:** The 7/16 flat washers must be installed between the frame rails and brackets for correct bracket spacing and alignment.

(5) Install bumper braces on frame brackets (fig. 5-50). Attach braces using 1/2 x 2 bolts lockwashers and nuts. Do not tighten bolts at this time.

(6) Install winch mounting bracket and splash plate support brackets on frame brackets (fig. 5-51). Position support brackets on top of winch mounting bracket. Attach mounting and support brackets using 1/2 x 1-1/4 bolts, lockwashers and nuts. Do not tighten bolts at this time.

(7) Install bumper brackets in bumpers. Attach brackets using 5/16 x 1 machine screws but do not tighten screws at this time.

(8) Install assembled bumpers and brackets (fig. 5-52). Attach bumper brackets to braces using 1/2 x 1-1/4 bolts, flat washers, lockwashers and nuts. Attach bumpers to winch mounting bracket using 7/16 x 1-1/2 carriage bolts, lockwashers and nuts. Do not tighten bolts at this time.

(9) Install splash plates and license plate bracket (fig. 5-53). Attach splash plates to bumpers and splash plate support brackets using 1/4 x 3/4 machine screws, lockwashers and nuts. Attach license plate bracket to driver side splash plate using 1/4 x 3/4 machine screws (fig. 5-53).

(10) Align winch mounting components and tighten all mounting component bolts to following torque values: Tighten 1/4 machine screws to 6 foot-pounds (8 N•m) torque. Tighten 5/16 machine screws to 11 foot-pounds (15 N•m) torque. Tighten 7/16 bolts to 50 foot-pounds (68 N•m) torque. Tighten 1/2 bolts to 75 foot-pounds (102 N•m) torque.

(11) Position 7/16 square nuts over mounting bolt holes in winch housing and tape nuts in place securely. Be sure nuts are positioned between winch housing reinforcing ribs (fig. 5-42).

(12) Install winch on mounting bracket. Use chain hoist or helper to lift and position winch on bracket.

(13) Align upper bolt holes in winch mounting bracket with upper bolt holes in winch end support and upper housing. Loosely attach winch to bracket using two 7/16 x 1-1/2 carriage bolts, lockwashers and square nuts. Do not tighten bolts at this time.

**NOTE:** The square nuts are specially dimensioned to fit in the recess between the winch housing reinforcing ribs (fig. 5-42). Do not use any other type of nut to attach the mounting bolts.

(14) Install gussets on winch mounting plate (fig. 5-54). Attach gussets using 7/16 x 1-1/2 carriage bolts. Do not tighten bolts at this time.

(15) Position fairlead on winch mounting bracket. Align bolt holes in fairlead with lower bolt holes in bracket and winch housings. Loosely attach fairlead and winch to mounting bracket using 7/16 x 1-1/2 carriage bolts, lockwasher and square nuts (fig. 5-42).

(16) Tighten gusset, winch and fairlead carriage bolts to 50 foot-pounds (68 N•m) torque. Tighten bolts alternately and evenly.

(17) Slide winch cable through fairlead rollers and attach cable hook to cable eyelet (fig. 5-55).

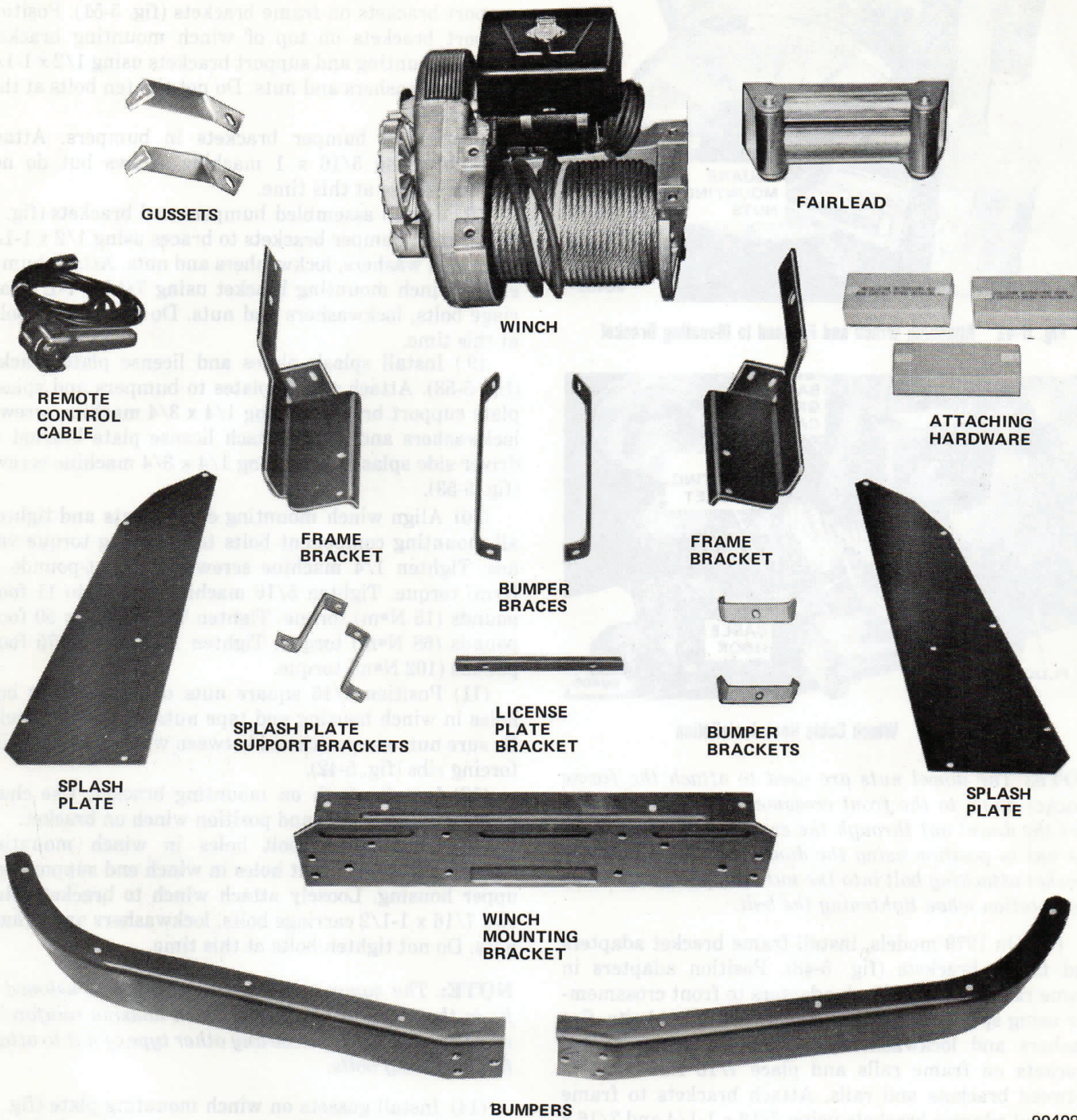


Fig. 5-44 Warn Electric Winch Kit—1976-78 Cherokee-Wagoneer-Truck

90409

(18) Plug remote control switch into winch motor receptacle (fig. 5-54).

(19) Route winch motor cables through grille and into engine compartment.

(20) Connect ground cable (fig. 5-54) to cable clamp bolt on battery negative (-) post. Connect large diameter winch motor cable to cable clamp bolt on battery positive (+) post.

**WARNING:** Keep hand away from the winch cable and drum when operating the winch.

(21) Operate winch. Winch drum must rotate freely. If bind occurs, loosen winch end support bolts, align winch or drum and tighten end support bolts.

(22) Unwind winch cable until approximately five coils remain on drum.



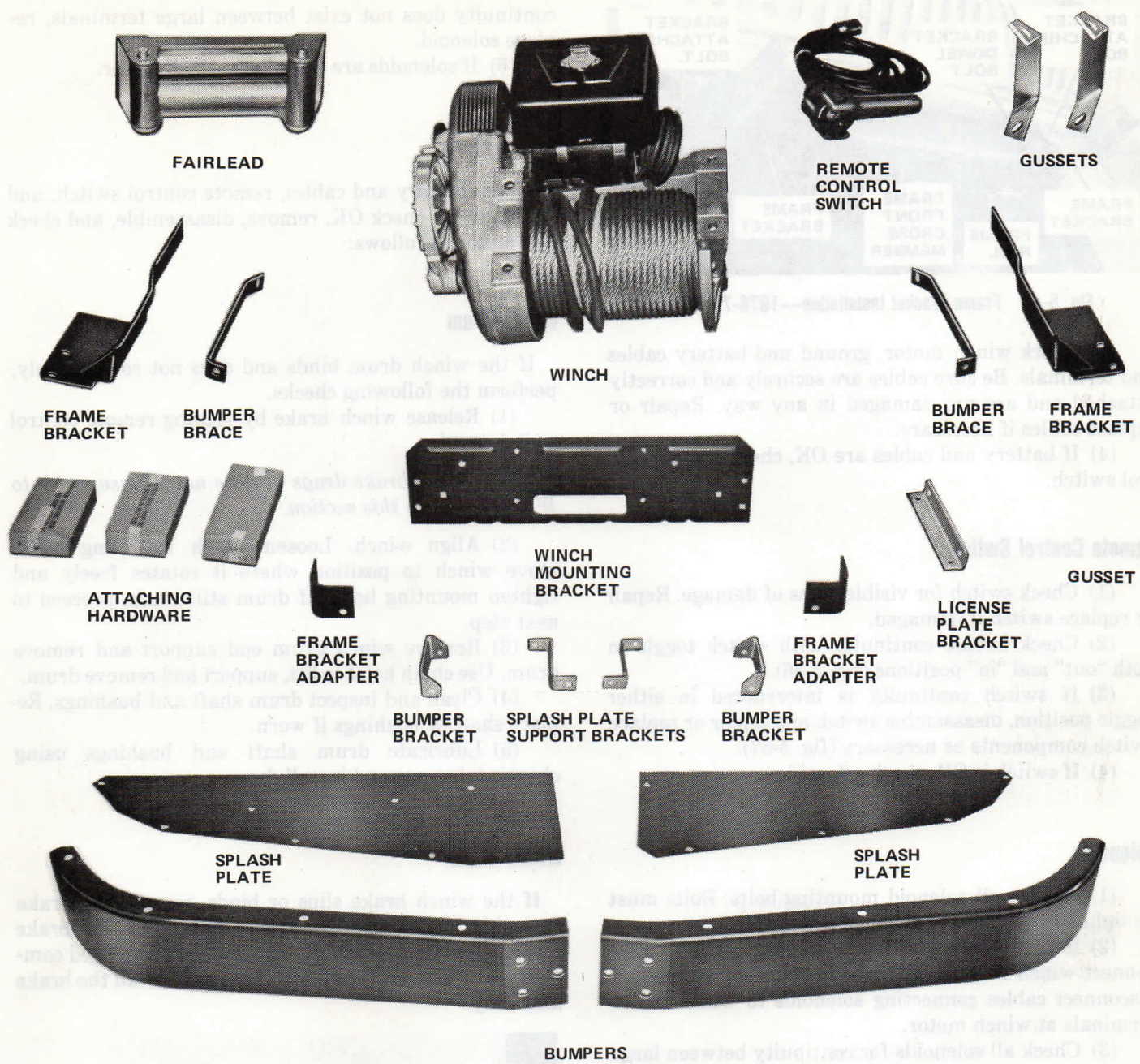


Fig. 5-45 Warn Electric Winch Kit—1979 Cherokee-Wagoner-Truck

**WARNING:** The winch cable, as received in kit form, is loosely wound on the drum. Do not attempt any winching operations until the cable has been rewound onto the drum under a minimum load of 500 pounds.

(23) Apply minimum load of 500 pounds to winch cable and wind cable back onto drum in even layers.

**TROUBLESHOOTING**

If the winch lacks pulling power, operates in one direction only, or will not operate at all, refer to the following

diagnosis procedures. Perform the procedures in the order in which they appear and in the sequence presented.

**Battery**

- (1) Check battery capacity. If battery has capacity rating of less than 70 amphere hours, it may not provide sufficient power to operate winch.
- (2) Check battery charge condition. Charge or replace battery if necessary.

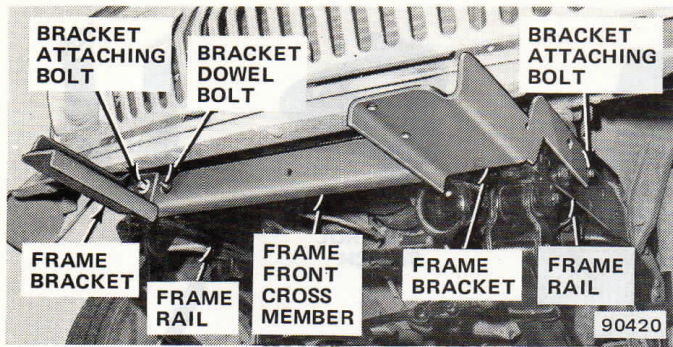


Fig. 5-46 Frame Bracket Installation—1976-78 Models

(3) Check winch motor, ground and battery cables and terminals. Be sure cables are securely and correctly attached and are not damaged in any way. Repair or replace cables if necessary.

(4) If battery and cables are OK, check remote control switch.

### Remote Control Switch

(1) Check switch for visible signs of damage. Repair or replace switch if damaged.

(2) Check switch continuity with switch toggle in both "out" and "in" positions (fig. 5-56).

(3) If switch continuity is interrupted in either toggle position, disassemble switch and repair or replace switch components as necessary (fig. 5-57).

(4) If switch is OK, check solenoid operation.

### Solenoids

(1) Inspect all solenoid mounting bolts. Bolts must be tight to make proper solenoid grounds.

(2) Isolate solenoids from battery circuit. Disconnect winch motor and ground cables at battery and disconnect cables connecting solenoids to winch motor terminals at winch motor.

(3) Check all solenoids for continuity between large terminals of each solenoid (fig. 5-58). If continuity exists, solenoid has internal malfunction and should be replaced.

(4) Connect jumper wire to battery positive (+) post and to solenoid terminal with green or black wire connected to it (fig. 5-58). Solenoid should produce audible "click" when jumper is connected and display continuity across large terminals of solenoid.

**NOTE:** *The only time continuity between the large solenoid terminals should exist is when the solenoid is activated by battery current applied to the small terminal.*

(5) If solenoid does not produce an audible "click" when battery current is applied to small terminal, or if

continuity does not exist between large terminals, replace solenoid.

(6) If solenoids are OK, check winch motor.

### Winch Motor

If the battery and cables, remote control switch, and solenoids all check OK, remove, disassemble, and check the motor as follows:

### Winch Drum

If the winch drum binds and does not rotate freely, perform the following checks.

(1) Release winch brake by joggling remote control switch toggle.

**NOTE:** *If the brake drags or does not release, refer to Winch Brake in this section.*

(2) Align winch. Loosen winch mounting bolts, move winch to position where it rotates freely and tighten mounting bolts. If drum still binds, proceed to next step.

(3) Remove winch drum end support and remove drum. Use chain hoist to lift, support and remove drum.

(4) Clean and inspect drum shaft and bushings. Replace shaft or bushings if worn.

(5) Lubricate drum shaft and bushings using chassis lubricant and install drum.

### Winch Brake

If the winch brake slips or binds, remove the brake assembly (fig. 5-59). Clean and inspect all the brake components thoroughly. Replace worn or damaged components as necessary and assemble and install the brake assembly.

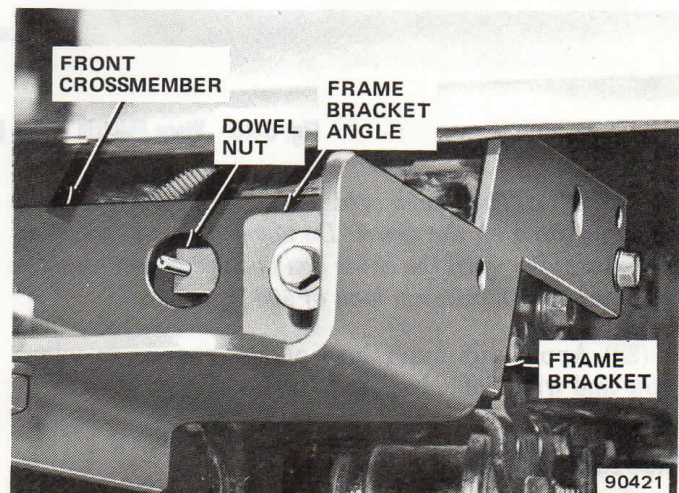


Fig. 5-47 Dowel Nut Installation—1976-78 Models

## Winch Motor Diagnosis

Symptom	Possible Cause
MOTOR WILL NOT RUN	Brush wires burned. Brushes stuck in brush holder due to rust or corrosion. Solder melted from commutator.
MOTOR WILL NOT RUN CAUSING DIRECT SHORT, CABLES OR MOTOR HOT	Field coil cross straps shorting to motor frame bolts. Brush wire shorting to motor housing or end plate. Armature windings thrown or expanded. Field coils burned out or shorting to motor housing.
MOTOR RUNS BUT LACKS POWER	Rust and corrosion in motor housing affecting field coils or brushes. Bearing or bushing on armature shaft faulty allowing armature to rub against pole shoes. Armature windings shorted, open, or solder melted from commutator.
MOTOR RUNS BUT MAKES NOISE	Armature rubbing against pole shoes. Faulty bearings at drive end of armature. Distorted teeth on armature shaft drive gear or teeth on shifter gear. (This may occur if motor has been struck severely by some object.)
BRAKE WILL NOT LOCK AUTOMATICALLY	Cable wound in wrong direction on drum. Cable must be wound so it comes out bottom of drum. Cable can reverse itself if entire cable is run off drum under power and switch is not reversed before rewinding.
WINCH RUNS OK IN "POWER IN" DIRECTION BUT BARELY TURNS, IF AT ALL, IN "POWER OUT" DIRECTION	Faulty solenoid in solenoid cluster. Brake shoes not releasing from ratchet plate due to foreign substance on brake lining. Clean and sand or replace lining.

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## COMPONENT REPAIR AND REPLACEMENT

## Drive Pinion and Clutch Shifter Assembly Replacement

(1) Remove screws attaching clutch shifter assembly to upper housing (fig. 5-59).

(2) Remove clutch shift knob, shifter assembly and winch motor drive pinion as assembly.

(3) Clean and inspect clutch shifter components. Replace any parts that are damaged or exhibit excessive wear.

**NOTE:** Do not attempt to remove the clutch shifter shaft and yoke from the cover (fig. 5-60). If the cover, shaft, or yoke are damaged or worn, replace the entire shifter assembly.

(4) Apply silicone-type sealer to clutch shifter cover mating surface of winch upper housing.

(5) Position drive pinion in clutch shifter yoke, install clutch shifter assembly in winch upper housing and install shifter cover attaching screws.

(6) Install clutch shift knob if removed.

## Brake Assembly Overhaul

(1) Install Warn Brake Holding Tool 9192 over brake assembly (fig. 5-61).

**NOTE:** The brake assembly is under spring tension from the brake disc compression spring. The holding tool must be used in order to hold the assembly together and remove the brake retaining ring (fig. 5-61).

(2) Remove brake retaining ring (fig. 5-61).

(3) Remove brake assembly and holding tool from brake shaft. Remove brake shaft keys.

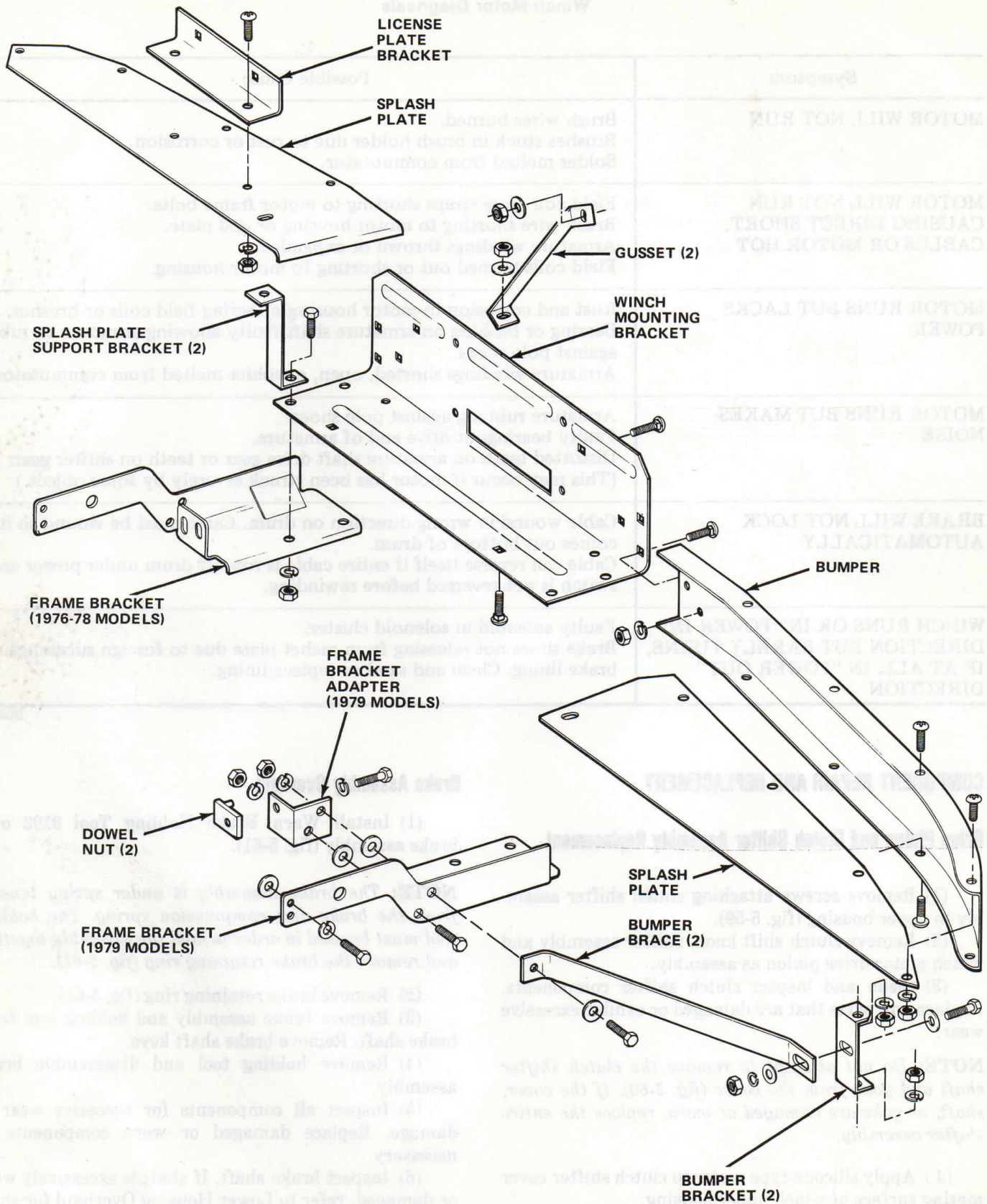
(4) Remove holding tool and disassemble brake assembly.

(5) Inspect all components for excessive wear or damage. Replace damaged or worn components as necessary.

(6) Inspect brake shaft. If shaft is excessively worn or damaged, refer to Lower Housing Overhaul for shaft replacement procedure.

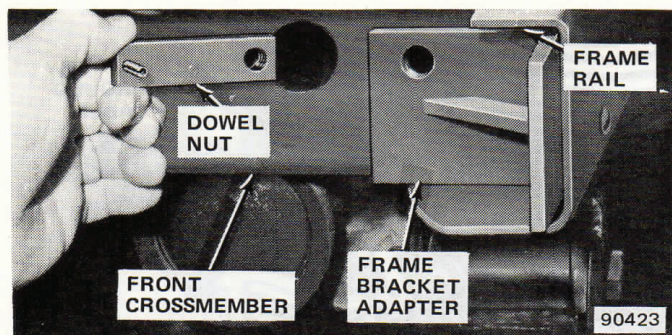
(7) Position brake hub on outer disc.

(8) Install brakelining in brake ratchet and position assembled components on outer disc and hub.

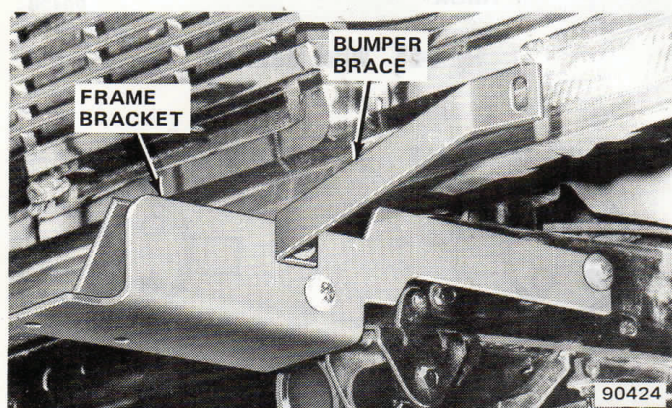


90422

Fig. 5-48 Winch Mounting Components



**Fig. 5-49** Frame Bracket Adapter and Dowel Nut Installation—1979 Models



**Fig. 5-50** Bumper Brace Installation

(9) Install brake shaft ball bearings. Insert 21 bearing balls between hub and ratchet.

(10) Install brake disc compression spring in inner brake disc and position assembled disc and spring on outer disc and ratchet.

(11) Align key slots in inner and outer discs. Compress brake assembly and install Warn Brake Holding Tool 9192 on brake assembly (fig. 5-61).

(12) Install keys in brake shaft.

(13) Align brake disc key slots with shaft keys and install brake assembly on brake shaft.

(14) Install brake retaining ring and remove holding tool.

### Clutch Pawl and Torsion Spring Replacement

(1) Remove protective cap attaching bolt and remove protective cap.

(2) Remove pawl and torsion spring (fig. 5-59). Note spring position for assembly reference.

(3) Assemble replacement pawl and torsion spring and install on lower housing.

(4) Install protective cap and cap attaching bolt.

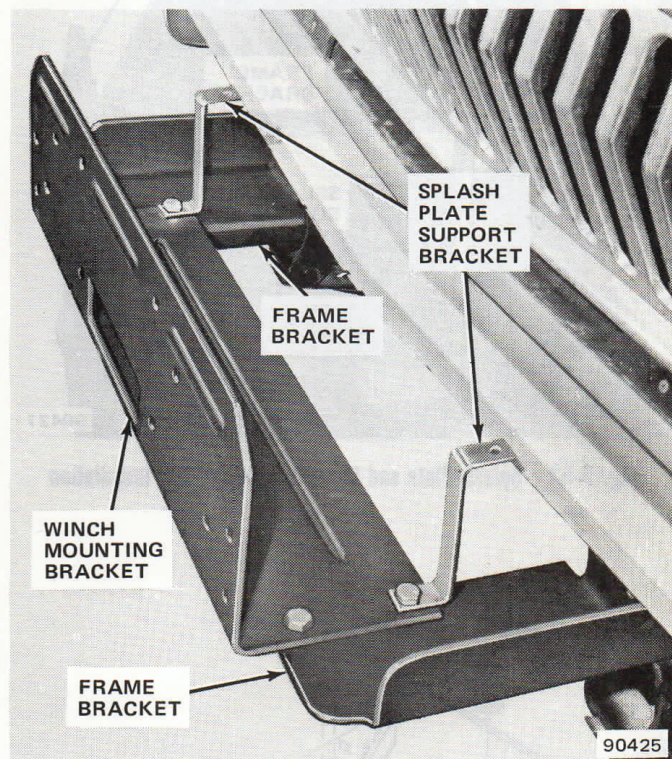
### Lower Housing—Winch Drum—Brake Shaft Overhaul

#### Disassembly

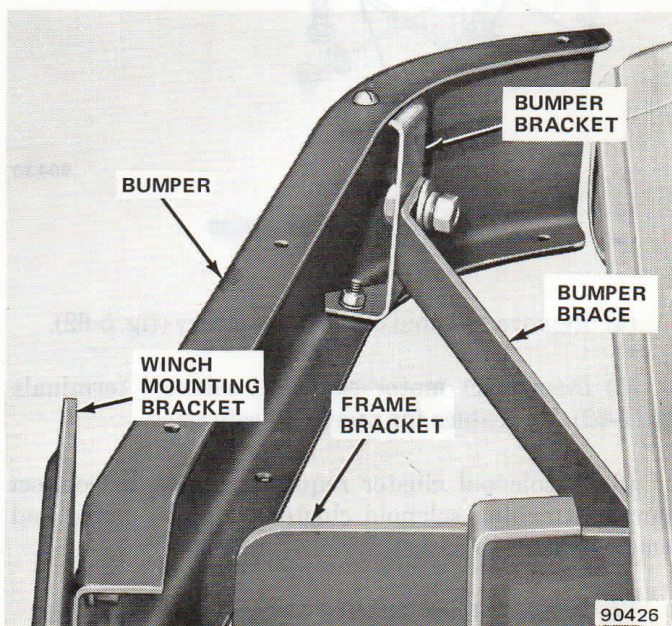
(1) Disconnect winch motor and ground cables at battery.

(2) Remove cable hook, fairlead and winch cable.

(3) Remove winch.



**Fig. 5-51** Winch Mounting Bracket and Splash Plate Support Bracket Installation



**Fig. 5-52** Bumper Installation

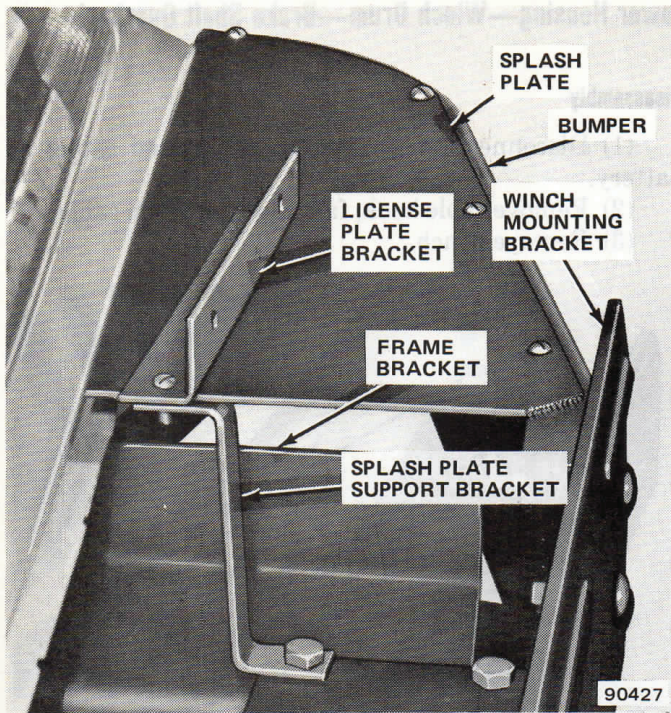


Fig. 5-53 Splash Plate and License Plate Bracket Installation

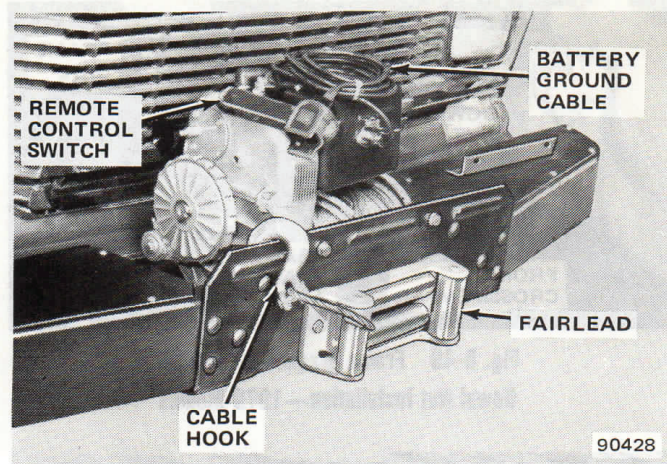


Fig. 5-55 Winch Installation

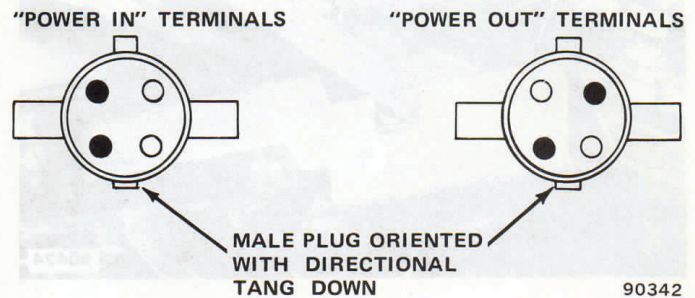


Fig. 5-56 Checking Remote Control Switch Continuity

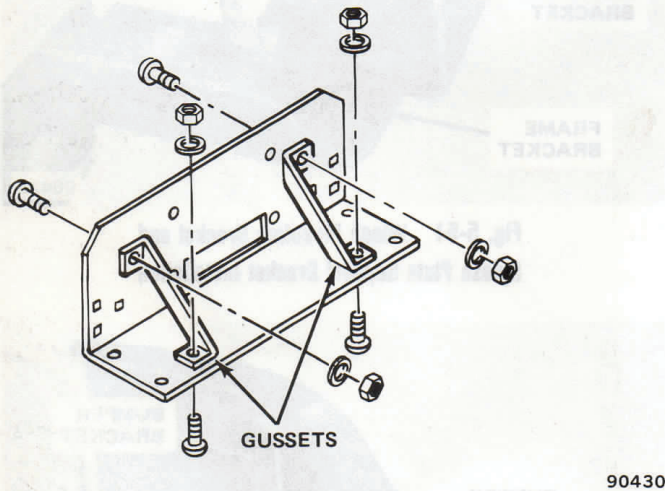


Fig. 5-54 Gusset Installation

- (4) Remove solenoid cover if necessary (fig. 5-62).
- (5) Disconnect motor cables at solenoid terminals (fig. 5-62). Tag cables for assembly reference.
- (6) If solenoid cluster requires service, disconnect clamps attaching solenoid cluster to winch motor and remove cluster as assembly.
- (7) Remove upper housing and motor as assembly.
- (8) Remove clutch pawl and spring assembly.

(9) Raise main gear lockplate and hold in position to disengage it.

(10) Install Warn Holding Tool 9192 on brake assembly (fig. 5-61).

(11) Remove brake assembly and brake shaft as a unit using slide hammer and puller.

(12) Remove brake retaining ring and remove brake assembly from brake shaft. Remove keys from shaft slots.

(13) Remove oil seal, bushing, cam gear and O-ring from brake shaft.

(14) Remove winch drum and end support from lower case as assembly.

(15) Remove thrust washer, oil seal from winch drum.

(16) Remove lockplate, main gear and intermediate gear from lower case.

(17) Remove end support from drum. Remove end cap and bushing from drum. Remove drum shaft bushings using Warn Bushing Tool 9167 (fig. 5-63).

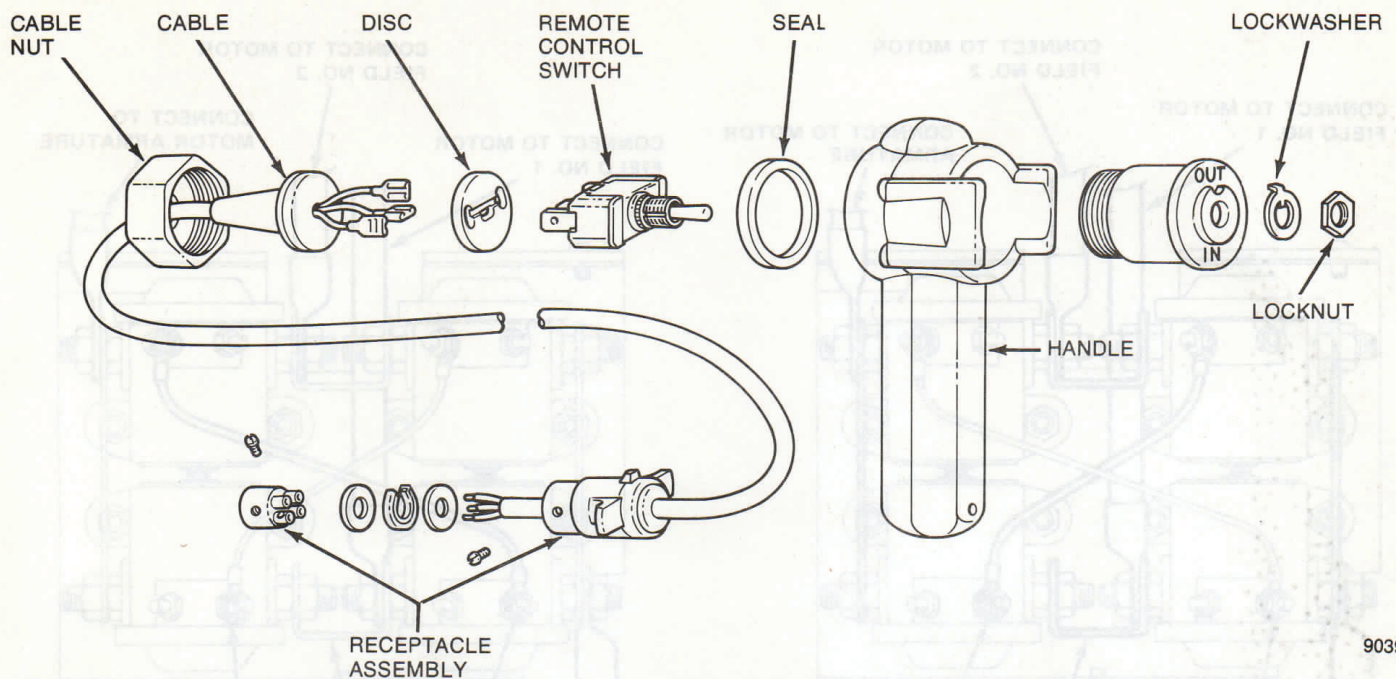


Fig. 5-57 Remote Control Switch Assembly

### Cleaning and Inspection

Clean components thoroughly and dry using filtered compressed air. Inspect all components for excessive wear or damage. Replace worn damaged components as necessary.

### Assembly

- (1) Install main gear in lower housing.
- (2) Install replacement drum shaft bushing in end support using Warn Bushing Tool 9167 (fig. 5-64).

**NOTE:** Do not install the bushings without the installer tool. This tool is necessary to locate the bushings at the correct installed depth.

- (3) Install replacement drum shaft bushing in lower housing using Warn Bushing Tool 9167 (fig. 5-64).

**NOTE:** Coat bushing exterior with Jeep Adhesive/Sealant, Loctite 271, or equivalent before installation.

- (4) Install replacement thrust washer and oil seal on drum shaft. Lubricate seal with Jeep Automatic Transmission Fluid, Dexron, or equivalent before installation.
- (5) Lubricate winch drum bushing contact surfaces with chassis lubricant.
- (6) Align main gear and winch drum splines and install drum in lower housing and gear.
- (7) Install end support on winch drum and install end cap in support.

- (8) Install assembled lower housing and drum on winch mounting plate.

- (9) Install intermediate gear and lockplate in lower housing.

- (10) Raise and hold lockplate in disengaged position.

- (11) Install replacement O-ring on brake shaft and lubricate shaft with chassis lubricant.

- (12) Install cam gear, brake shaft bushing and oil seal on brake shaft. Be sure cam gear is engaged in tangs of brake shaft gear.

- (13) Install keys in brake shaft slots. Install brake assembly on brake shaft and install brake retaining ring on shaft.

- (14) Install assembled brake shaft and brake assembly in lower housing. Align oil seal with housing bore using Warn Alignment Tool 8675 (fig. 5-65), and tap shaft into housing using plastic mallet (fig. 5-65).

**NOTE:** Be sure the brake shaft is aligned with the intermediate gear and lockplate before seating the shaft in the housing.

- (15) Seat lockplate in winch drum and brake shaft grooves.

- (16) Install clutch pawl and torsion spring assembly.

- (17) Fill lower housing with 1/2 pint (0.2 liter) of automatic transmission fluid (ATF).

- (18) Apply bead of Jeep Adhesive/Sealant or equivalent to mating surface of lower housing.

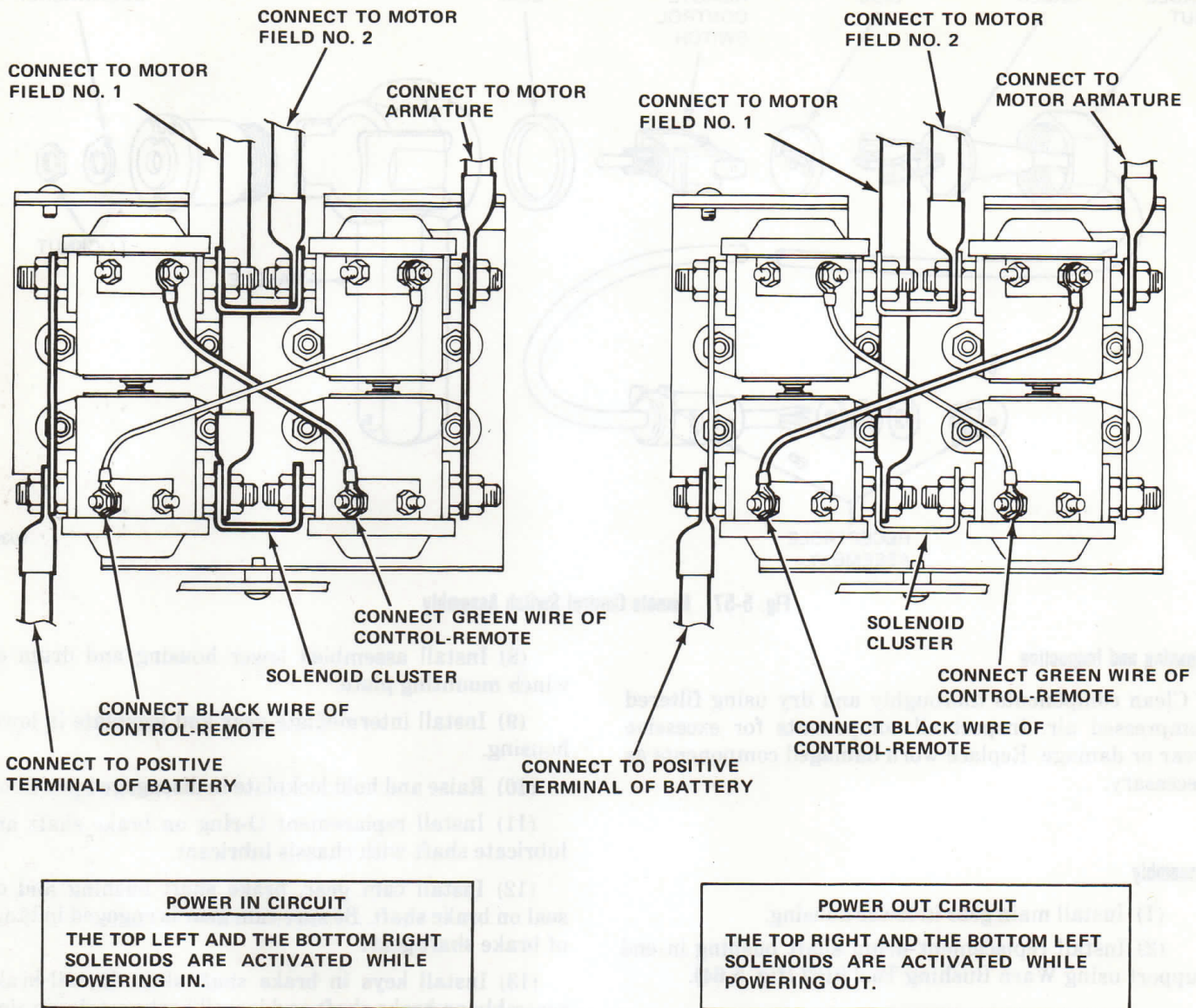


Fig. 5-58 Solenoid Cluster Electrical Connections

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(19) Install upper housing and motor assembly on lower housing. Tighten attaching bolts securely.

(20) Install solenoid cluster on winch motor if cluster was removed. Connect cables to solenoids and motor terminals if removed.

(21) Install winch cable.

(22) Install fairlead and cable hook.

(23) Connect winch motor and ground cables to battery and install solenoid cover.

(24) Wind winch cable onto drum. Apply minimum of 500 pounds force to cable when winding it onto drum.

### Winch Motor Replacement

**NOTE:** The winch motor is serviced as an assembly only. If diagnosis indicates the motor has malfunctioned, replace the motor, do not disassemble it.

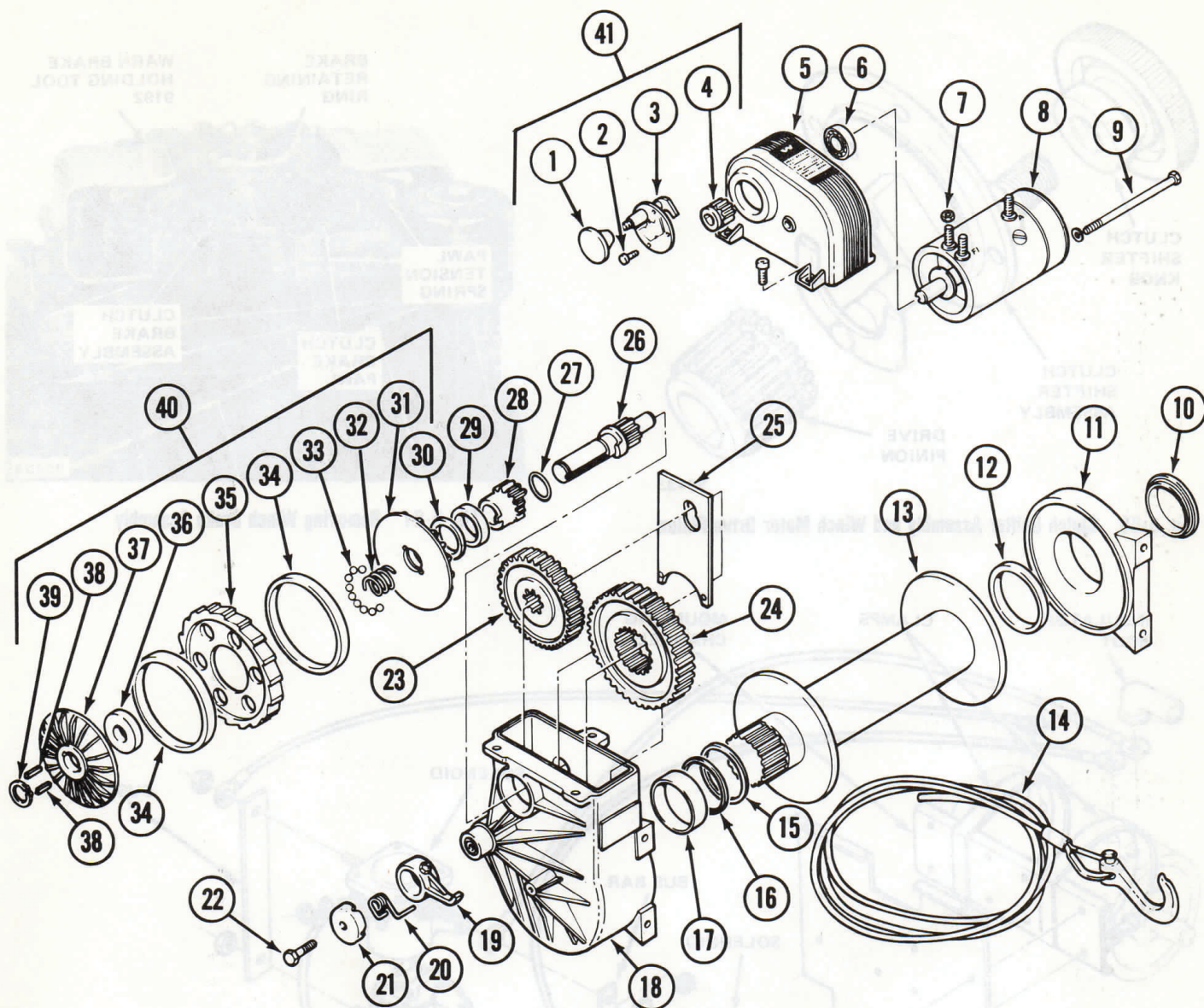
(1) Disconnect cables at motor terminals.

(2) Disconnect clamps attaching solenoid cluster to motor and remove cluster.

(3) Remove bolts attaching motor to upper housing and remove motor.

(4) Remove protective dust cover from replacement motor (fig. 5-66).





- |                                      |                                    |
|--------------------------------------|------------------------------------|
| 1. CLUTCH SHIFT KNOB                 | 22. PROTECTIVE CAP BOLT            |
| 2. CLUTCH COVER SELF-TAPPING SCREW   | 23. INTERMEDIATE GEAR              |
| 3. CLUTCH SHIFTER ASSEMBLY           | 24. MAIN GEAR                      |
| 4. DRIVE PINION                      | 25. MAIN GEAR LOCK PLATE           |
| 5. UPPER HOUSING                     | 26. BRAKE SHAFT                    |
| 6. MOTOR SHAFT BEARING               | 27. BRAKE SHAFT O-RING             |
| 7. TERMINAL NUT                      | 28. BRAKE SHAFT CAM GEAR           |
| 8. WINCH MOTOR                       | 29. BRAKE SHAFT BUSHING            |
| 9. MOTOR MOUNTING BOLT               | 30. BRAKE SHAFT OIL SEAL           |
| 10. END CAP                          | 31. INNER BRAKE DISC               |
| 11. END SUPPORT                      | 32. BRAKE DISC COMPRESSION SPRING  |
| 12. END SUPPORT DRUM SHAFT BUSHING   | 33. BRAKE SHAFT BALL BEARINGS (21) |
| 13. WINCH DRUM                       | 34. BRAKE LINING                   |
| 14. WINCH CABLE AND HOOK             | 35. BRAKE RATCHET                  |
| 15. WINCH DRUM THRUST WASHER         | 36. BRAKE HUB                      |
| 16. LOWER HOUSING OIL SEAL           | 37. OUTER BRAKE DISC               |
| 17. LOWER HOUSING DRUM SHAFT BUSHING | 38. BRAKE SHAFT KEYS               |
| 18. LOWER HOUSING                    | 39. BRAKE RETAINING RING           |
| 19. CLUTCH PAWL                      | 40. WINCH BRAKE ASSEMBLY           |
| 20. PAWL TORSION SPRING              | 41. CLUTCH SHIFTER ASSEMBLY        |
| 21. PAWL PROTECTIVE CAP              |                                    |

Fig. 5-59 Warn Winch Assembly

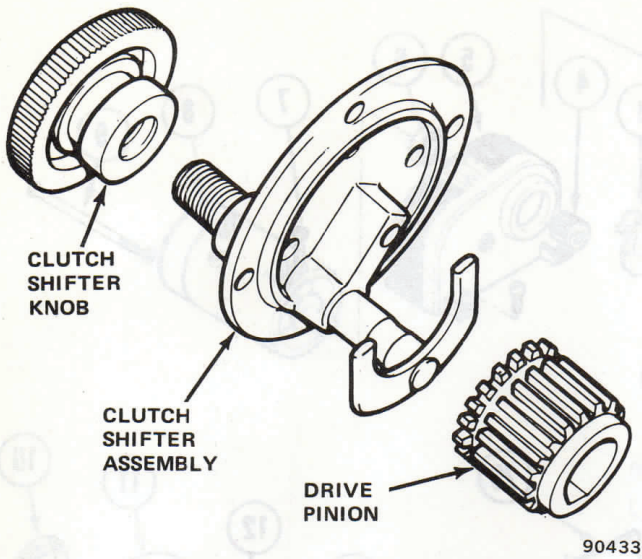


Fig. 5-60 Clutch Shifter Assembly and Winch Motor Drive Pinion

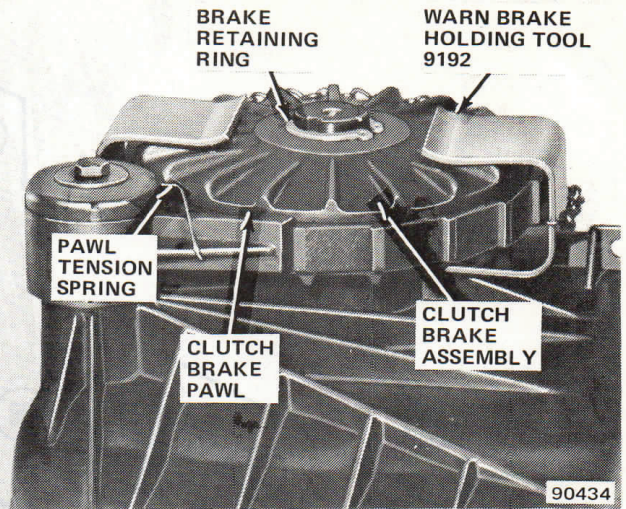


Fig. 5-61 Removing Winch Brake Assembly

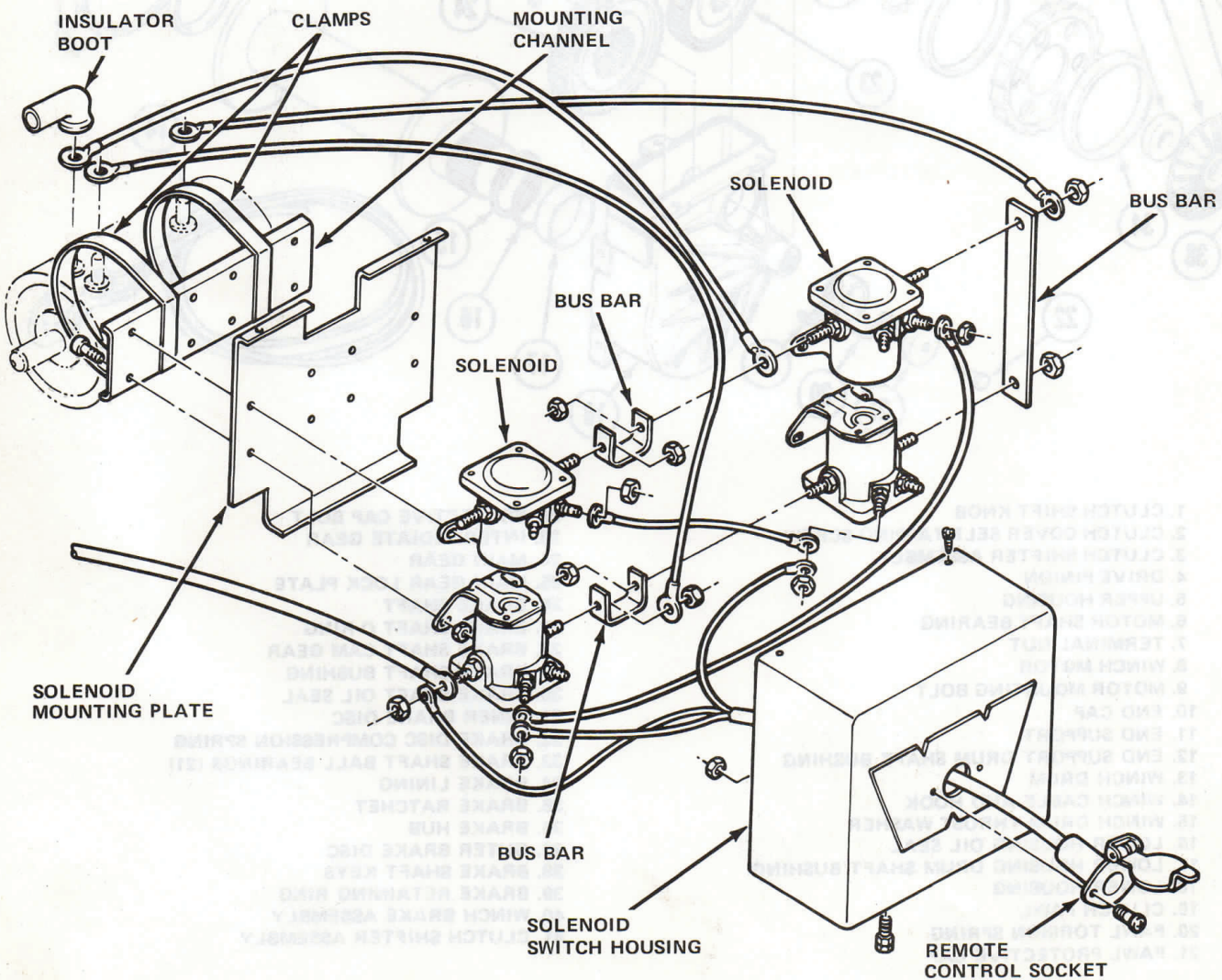


Fig. 5-62 Solenoid Cluster Assembly

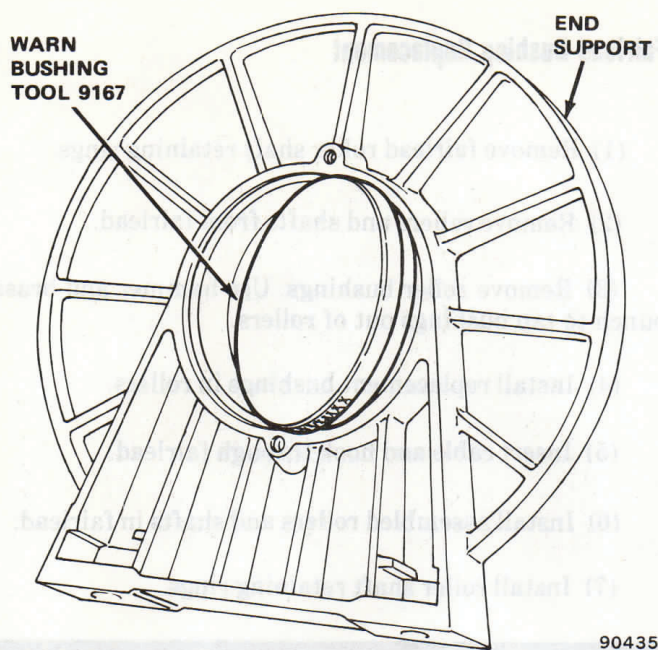


Fig. 5-63 Drum Shaft Bushing Removal

- (5) Install replacement motor in upper housing. Be sure motor shaft engages in drive pinion.
- (6) Install solenoid cluster on motor. Tighten cluster mounting clamps securely.
- (7) Connect cables to motor terminals.

### Upper Housing Replacement

**NOTE:** The gear in the upper housing is not serviceable. Do not attempt to remove the gear if it is damaged. Replace the gear and housing as an assembly only.

- (1) Disconnect cables at winch motor and solenoid cluster. Remove solenoid cover if necessary.

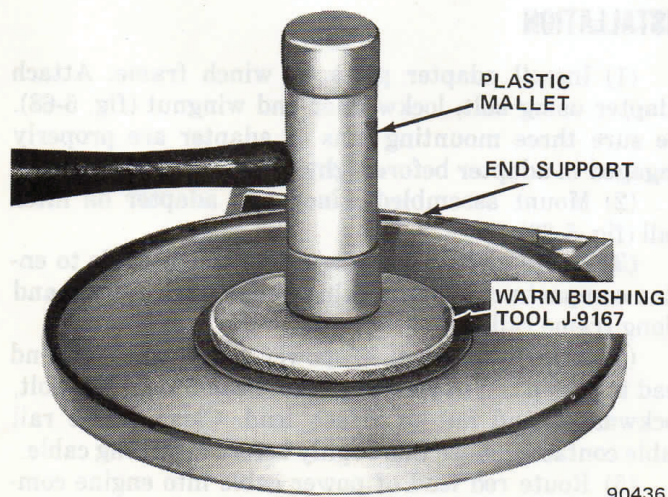


Fig. 5-64 Drum Shaft Bushing Installation

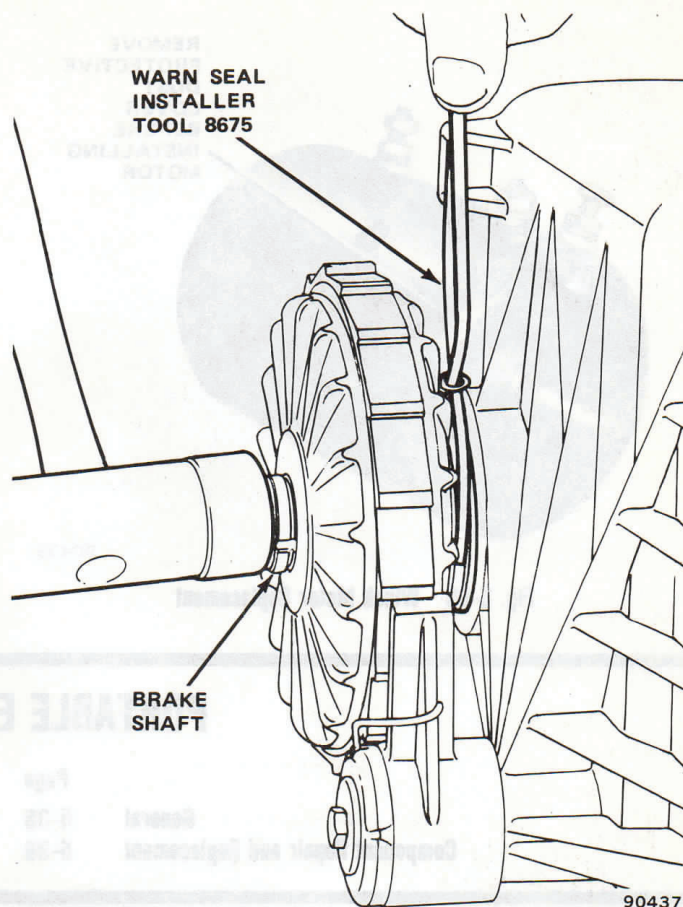
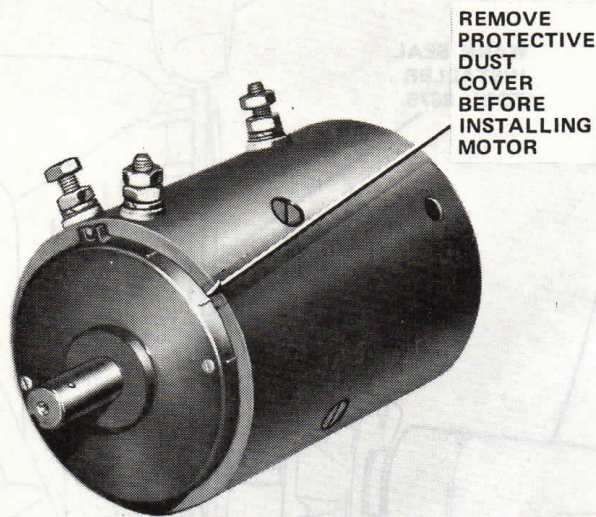


Fig. 5-65 Brake Shaft and Brake Assembly Installation

- (2) Remove bolts attaching motor to upper housing and remove motor and solenoid cluster as assembly.
- (3) Remove bolts attaching upper to lower housing and remove upper housing.
- (4) Remove clutch shifter assembly and drive pinion from upper housing.
- (5) Remove bearing from upper housing.
- (6) Install bearing in replacement upper housing.
- (7) Apply bead of Jeep Adhesive/Sealant or equivalent to mating surface of clutch shifter cover and to mating surface of lower housing.
- (8) Install drive pinion and clutch shifter assembly in replacement housing.
- (9) Install upper housing on lower housing. Tighten attaching bolts securely.
- (10) Install motor-solenoid cluster assembly in upper housing. Tighten motor attaching bolts to 150 inch-pounds (17 N•m) torque. Be sure motor shaft is engaged in drive pinion.
- (11) Connect cables to motor and solenoid terminals. Install solenoid cover if removed.



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Fig. 5-66 Winch Motor Replacement

## Fairlead Bushing Replacement

- (1) Remove fairlead roller shaft retaining rings.
- (2) Remove rollers and shafts from fairlead.
- (3) Remove roller bushings. Use hammer and brass punch to tap bushings out of rollers.
- (4) Install replacement bushings in rollers.
- (5) Insert cable and hook through fairlead.
- (6) Install assembled rollers and shafts in fairlead.
- (7) Install roller shaft retaining rings.

## PORTABLE ELECTRIC WINCH

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### GENERAL

The portable electric winch can be used on any 1976-79 Jeep vehicle equipped with a ball-type trailer hitch. The hitch must be a Class II or equivalent rating unit however.

The winch can be connected to the vehicle starter solenoid or directly to the battery. The winch motor is a permanent magnet type and is polarized for forward and reverse rotation.

Before beginning installation, check the kit contents to be sure all necessary components are included (fig. 5-67).

All references to bolt and nut sizes in the following procedures are in inches. Bolt sizes are indicated in diameter followed by length. For example, 3/8 x 1 represents a bolt that is 3/8-inch in diameter and one inch long. Whenever fine thread (NF) bolts are used, the number of threads per inch are also included in the size description, such as 1/2-20 x 3. In some cases, additional or replacement fasteners may be required to complete a kit installation. When necessary, obtain the required parts from your stock.

**WARNING:** The screws, bolts, nuts, lockwashers and flat washers used to attach the winch and winch mounting components are extremely important to safe and satisfactory winch operation. Winch attaching hardware must be grade 5 or better. Refer to the Standard

*Torque Specifications and Capscrew Markings Chart for bolt grade identification. Any attaching hardware that is not to specified quality must be replaced with grade 5 or better hardware. Do not use parts of lesser quality or substitute design at any time. In addition, specified torque values must be used when installing or servicing winch components. This is necessary to ensure proper retention of all winch components. Refer to the Torque Specification and Capscrew Marking Chart for non-specified torque values if they occur.*

### INSTALLATION

(1) Install adapter plate on winch frame. Attach adapter using bolt, lockwasher and wingnut (fig. 5-68). Be sure three mounting pins of adapter are properly engaged in adapter before tightening wingnut.

(2) Mount assembled winch and adapter on hitch ball (fig. 5-69).

(3) Route circuit breaker-end of power cable to engine compartment. Route cable underneath vehicle and along frame rail.

(4) Attach terminal of power cable black ground lead to frame rail at rear of vehicle near winch. Use bolt, lockwasher and nut to attach lead. Clean frame rail cable contact surface thoroughly before attaching cable.

(5) Route red lead of power cable into engine compartment and adjacent to starter solenoid.

(6) Disconnect battery negative cable at battery.

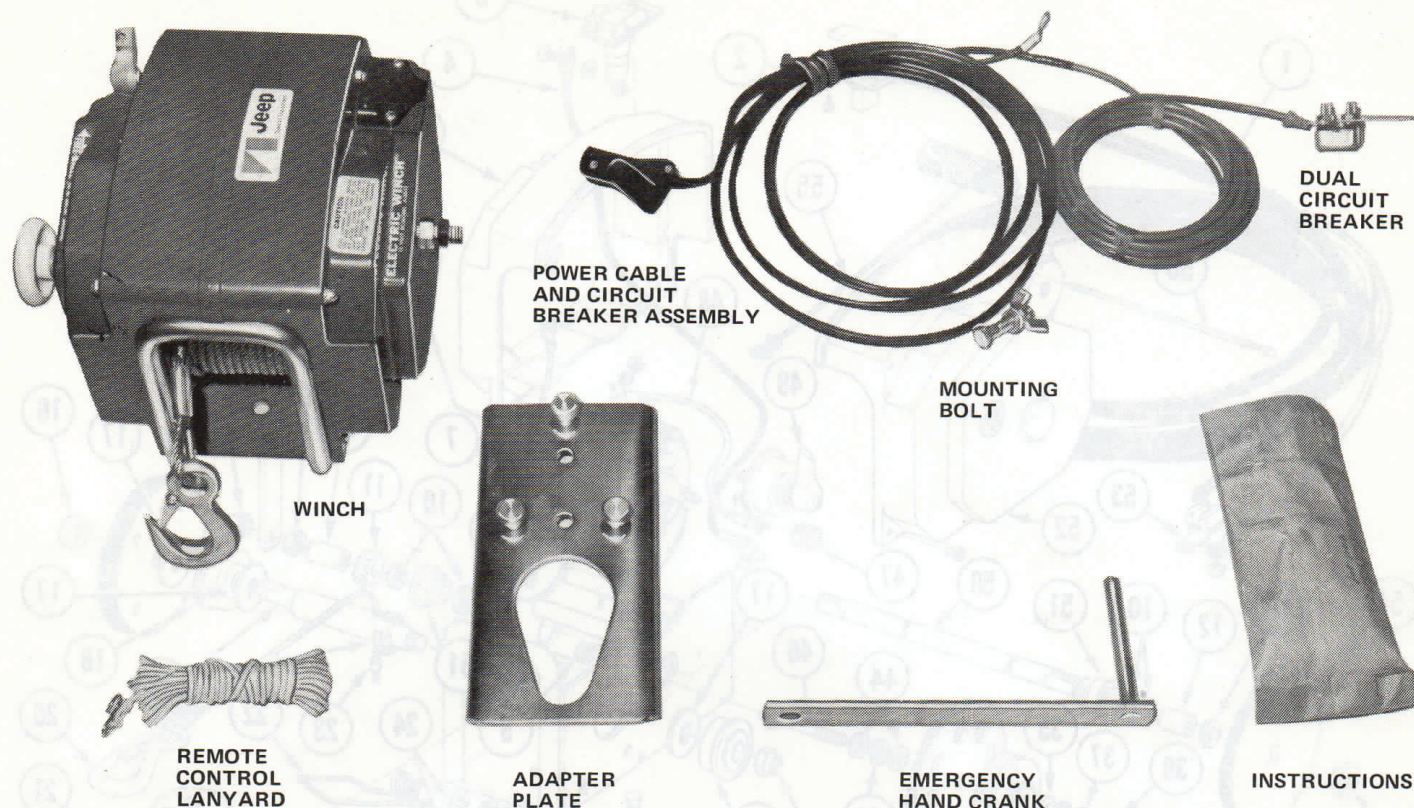


Fig. 5-67 Portable Electric Winch Kit

(7) Install dual circuit breaker assembly on starter solenoid (fig. 5-70). Remove nut attaching battery positive cable to solenoid terminal. Remove battery cable, mount circuit breaker assembly on solenoid terminal and install cable and nut on terminal. Tighten nut securely but do not overtighten.

(8) Attach power cable red lead to dual circuit breaker (fig. 5-70).

(9) Connect battery negative cable at battery.

**CAUTION:** The connector fits into the receptacle one way only. Align the connector and receptacle before hand. Do not attempt to insert the connector forcibly.

(10) Insert power cable connector into power cable receptacle (fig. 5-69).

**CAUTION:** When checking winch operation, do not allow the cable hook to enter the winch housing. The hook could damage the level wind springs.

(11) Check winch operation. Turn ignition on and rotate directional switch handle forward and rearward. Winch should rotate freely in both directions.

(12) After checking winch operation, disconnect power cable at winch and store winch, emergency hand crank and remote control lanyard in vehicle.

(13) Route power cable and connector into vehicle interior through convenient body knock-out plug, panel,

or access opening. Store as much of cable in vehicle as possible.

(14) Secure remaining portion of cable to vehicle frame rail. Be sure cable will not contact springs, axle, propeller shaft, etc.

## TROUBLESHOOTING

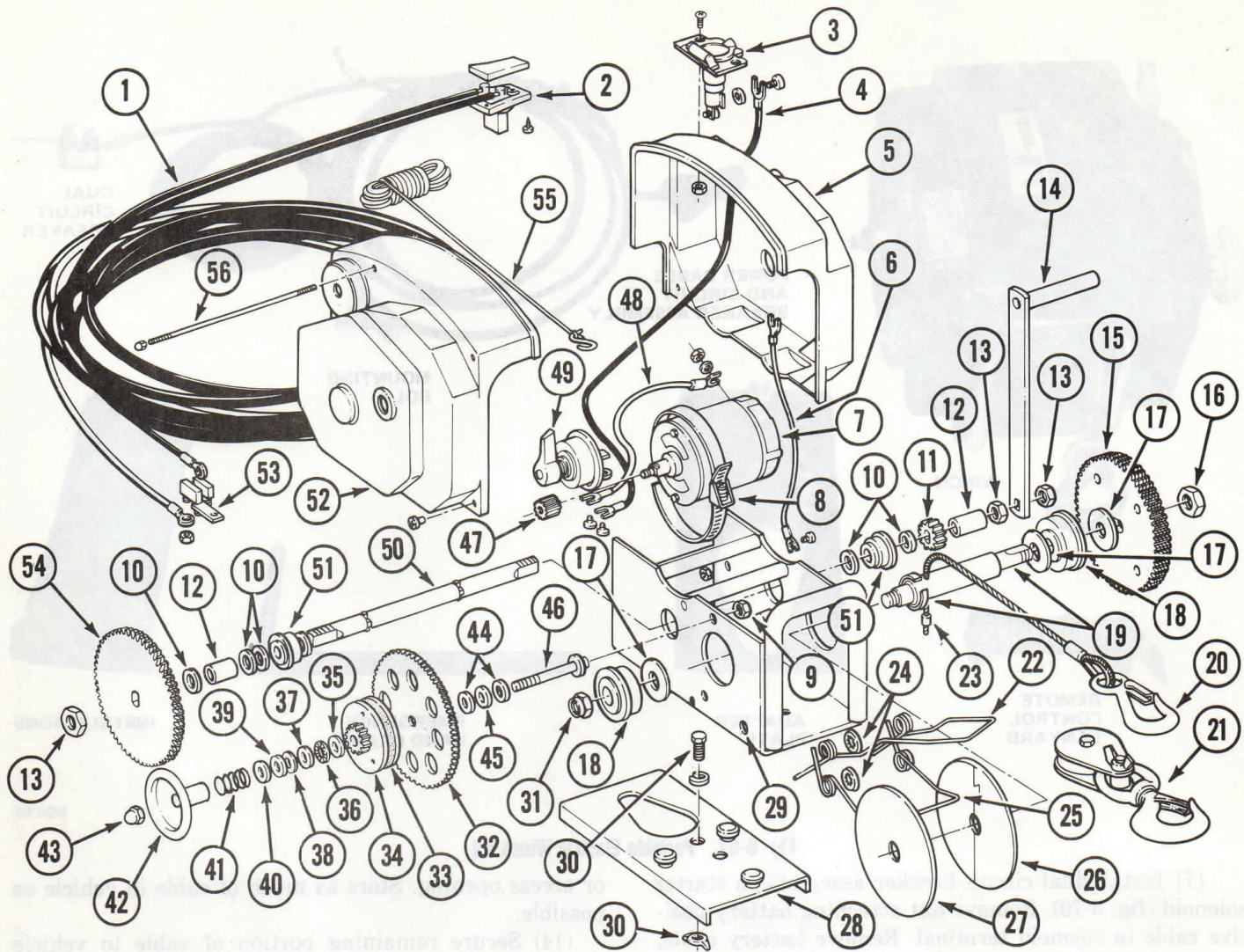
The portable electric winch will provide satisfactory and effective operation with proper use and regular maintenance. However, if a winch malfunction occurs, refer to the following troubleshooting information to locate and correct the cause of a problem.

Before performing service operations to correct a suspected malfunction, be sure the battery and alternator are in good condition and operating properly. The battery must have sufficient capacity to handle winch loads. An ampere hour rating of 70 or more is recommended.

If the winch will not operate, check the electrical system first as follows:

### Electrical Diagnosis

(1) Check battery connections and condition. If battery is OK and connections are clean and tight go to next step. If connections are faulty, repair as necessary.



- |   |  |
|---|--|
| <p>1 POWER CABLE<br/>                 2 POWER CABLE CONNECTOR<br/>                 3 CONNECTOR RECEPTACLE<br/>                 4 DIRECTIONAL SWITCH-TO-RECEPTACLE WIRE<br/>                 5 CASE HALF - RIGHT SIDE<br/>                 6 RECEPTACLE GROUND WIRE<br/>                 7 WINCH MOTOR<br/>                 8 MOTOR MOUNTING CLAMP (2)<br/>                 9 CLUTCH STUD LOCKNUT<br/>                 10 REAR SHAFT BEARING SPACERS<br/>                 11 PINION GEAR<br/>                 12 REAR SHAFT TUBE<br/>                 13 REAR SHAFT LOCKNUTS<br/>                 14 EMERGENCY HAND CRANK<br/>                 15 DRUM GEAR<br/>                 16 DRUM SHAFT LOCKNUT<br/>                 17 DRUM SHAFT BEARING SPACER<br/>                 18 DRUM SHAFT BEARING<br/>                 19 DRUM SHAFT AND CABLE GUIDE CLIP<br/>                 20 WINCH CABLE AND HOOK<br/>                 21 SNATCH BLOCK (OPTIONAL)<br/>                 22 LEVEL WIND SPRING (UPPER)<br/>                 23 CABLE RETAINING CLIP<br/>                 24 SPRING RETAINERS (4)<br/>                 25 LEVEL WIND SPRING (LOWER)<br/>                 26 DRUM SHAFT GUIDE (2-PIECE)<br/>                 27 DRUM SHAFT GUIDE (ONE-PIECE)<br/>                 28 ADAPTER PLATE</p> | <p>29 WINCH FRAME<br/>                 30 MOUNTING BOLT, LOCKWASHER AND WING NUT<br/>                 31 DRUM SHAFT LOCKNUT<br/>                 32 COMPOUND DRIVE GEAR/ROLLER CLUTCH ASSEMBLY<br/>                 33 CLUTCH LINING<br/>                 34 PINION CLUTCH GEAR AND BEARING<br/>                 35 THRUST BEARING RACE (.030 THICK)<br/>                 36 OUTER THRUST BEARING<br/>                 37 THRUST BEARING RACE (.060 THICK)<br/>                 38 BELLEVILLE SPRING WASHER<br/>                 39 BELLEVILLE SPRING WASHER<br/>                 40 BACKLASH SPRING WASHER<br/>                 41 BACKLASH SPRING<br/>                 42 CONTROL KNOB<br/>                 43 ACORN NUT<br/>                 44 THRUST BEARING RACE (.030 THICK)<br/>                 45 INNER THRUST BEARING<br/>                 46 CLUTCH STUD<br/>                 47 MOTOR GEAR<br/>                 48 DIRECTIONAL SWITCH-TO-MOTOR WIRE<br/>                 49 DIRECTIONAL SWITCH<br/>                 50 REAR SHAFT<br/>                 51 REAR SHAFT BEARING<br/>                 52 CASE HALF, LEFT-SIDE<br/>                 53 DUAL CIRCUIT BREAKER ASSEMBLY<br/>                 54 REAR SHAFT DRIVE GEAR<br/>                 55 REMOTE CONTROL LANYARD<br/>                 56 CASE ATTACHING RODS AND ACORN NUTS (2)</p> |
|---|--|

Fig. 5-68 Portable Electric Winch—Exploded View

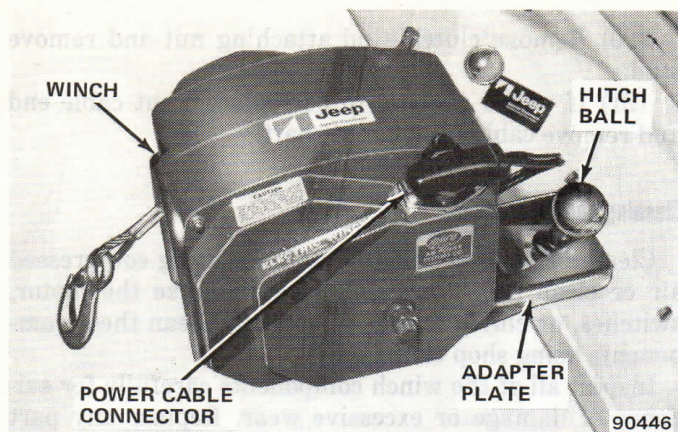


Fig. 5-69 Mounting Winch on Trailer Hitch Ball

(2) Check battery condition and capacity. Replace battery if in poor condition or has insufficient capacity. If battery is OK but low on charge, check and repair charging system.

(3) Check circuit breakers. Disconnect power cable at circuit breakers and connect cable to battery positive terminal. If winch runs, replace circuit breakers. If winch does not run, go to next step.

(4) Check power cable ground connection. If OK go to next step. If faulty repair as necessary.

(5) Check power cable insulation. If cable appears OK, go to next step. If cable is frayed or bare, repair or replace cable.

(6) Check cable continuity at cable connector. Connect test lamp probes to prongs in connector. If test lamp lights, go to next step. If lamp does not light, cable or connector is faulty. Repair or replace as necessary.

(7) Remove screws and rods attaching case halves together and to winch frame.

(8) Insert power cable connector into motor receptacle and check continuity of receptacle. If test lamp

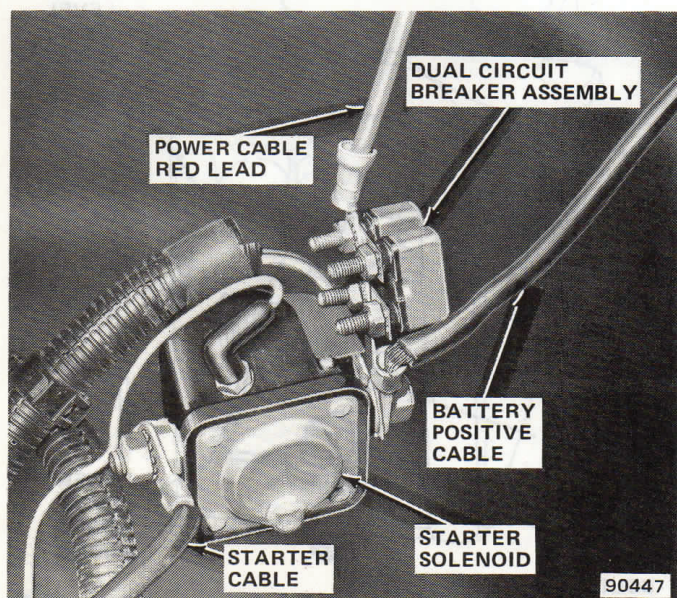


Fig. 5-70 Dual Circuit Breaker Installation

lights when test probes are placed on receptacle terminals, receptacle is OK, go to next step. If lamp does not light, receptacle is faulty. Repair or replace.

(9) Check winch directional switch. Bypass switch using jumper cable attached across switch terminals. If winch operates, switch is faulty and must be replaced. If winch does not operate, go to next step.

(10) Check wires connecting switch, receptacle, and motor. Using jumper wire, bypass each wire and operate winch. If winch operates replace faulty wire. If wires are OK and winch does not operate, motor has malfunctioned and must be replaced.

**NOTE:** If the winch motor does run but the drum shaft still does not rotate, refer to the Mechanical Diagnosis section.

### Mechanical Diagnosis

(1) If the winch motor runs but does not rotate the drum shaft, inspect all components for visible signs of damage, excessive wear, or being loose. Repair or replace parts as necessary.

(2) Check mesh of all gears and check motor gear for being loose or backed off armature shaft. If OK, go to next step.

**NOTE:** The motor gear and shaft have left-hand threads. If the winch wiring connections are not made as shown in figure 5-68, motor polarity can be reversed causing the gear to back off the shaft threads and become disengaged from the rear shaft drive gear.

(3) Check clutch assembly for evidence of wear or grease or excessive glazing on friction surfaces. Glaze or grease will cause clutch lining to slip. Replace worn parts and clean contaminated surfaces. Replace clutch brakelining if contaminated.

(4) Check clutch/brake operation. Back off control knob in counterclockwise direction. Rotate pinion clutch gear and bearing by hand in reverse direction. Gear should lock on shaft and stay locked under load. If gear does not lock, disassemble clutch/brake components and replace worn or damaged components.

### COMPONENT REPAIR AND REPLACEMENT

Apsco portable electric winches can be disassembled and serviced when necessary. Repair kits and parts are available for most of the winch components. Major components such as the motor, frame, shafts, gears, and cable are all serviceable. Refer to the Winch Overhaul procedures.

**NOTE:** The following overhaul procedure includes instructions for replacing individual components along with complete winch disassembly and assembly. To replace an individual component, simply follow the dis-

assembly procedure up to removal of the desired part. Then, refer to the necessary point in the assembly procedure where the part is installed and continue from there.

## Winch Overhaul

### Disassembly

(1) Remove rods and screws attaching cover halves together (fig. 5-68).

(2) Remove control knob attaching nut. Remove knob and backlash spring.

(3) Remove thrust bearing races, thrust bearing and spring washers from clutch stud.

**NOTE:** Observe the position of the washers and races for assembly reference. Mark or tag the washers, races and bearing for correct assembly.

(4) Separate case halves.

(5) Remove directional switch knob and switch locknut. Disconnect wires at switch and remove switch. Tag wires for assembly reference.

(6) Disconnect wires at motor receptacle (fig. 5-68). Tag wires for assembly reference.

(7) Remove screws attaching receptacle to case half and remove receptacle.

(8) Disconnect wire at motor. Tag wire for assembly reference.

(9) Remove clamps attaching motor to winch frame and remove motor.

(10) Remove motor gear from armature shaft of motor.

**NOTE:** The gear is threaded on the shaft. Both the shaft and gear have left-hand threads.

(11) Unwind cable from drum shaft.

**CAUTION:** Be careful when removing the level wind springs. They are under high spring tension.

(12) Remove level wind spring retainers (fig. 5-68), and remove springs.

(13) Remove rear shaft locknuts (fig. 5-68).

(14) Remove pinion clutch gear and bearing, clutch lining and compound drive gear/roller clutch assembly.

(15) Remove rear shaft drive gear, bearing spacer, shaft tube, thrust washers and bearing. Remove tube, pinion gear bearing spacers and bearing from opposite end of shaft and remove shaft.

(16) Remove drum shaft locknuts. Remove drum gear, bearings and bearing races from shaft ends.

(17) Separate halves of two-piece drum shaft guide (fig. 5-68), and remove from shaft.

(18) Slide one-piece drum shaft guide off drum shaft.

(19) Remove drum shaft and cable. Slide shaft and cable out of winch frame through bearing bore in frame.

(20) Remove clutch stud attaching nut and remove stud.

(21) If winch cable is to be replaced, cut cable end and remove cable from drum shaft.

### Cleaning and Inspection

Clean all parts thoroughly and dry using compressed air or clean shop towels. Do not immerse the motor, switches, or clutch linings in solvent. Clean these components using shop cloths only.

Inspect all of the winch components carefully for evidence of damage or excessive wear. Replace any part that exhibits these conditions.

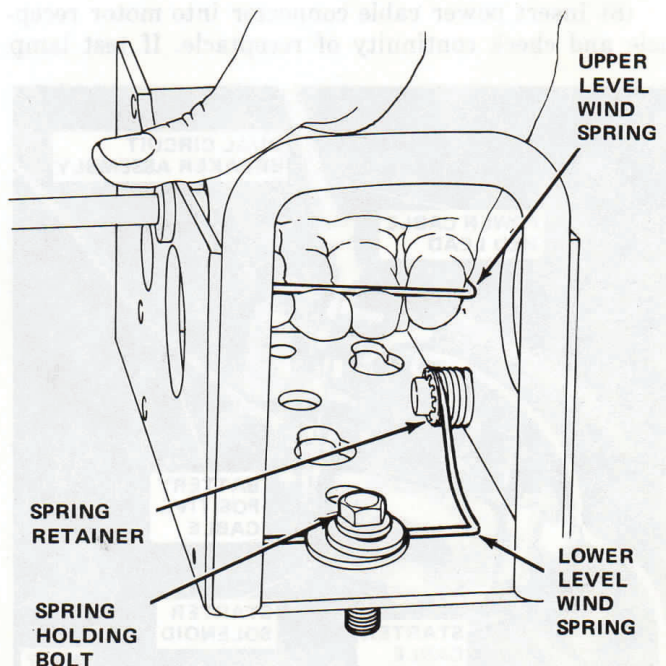
**NOTE:** The compound drive gear and clutch gears are serviced as assemblies only. Do not attempt to remove and service the gear bearings.

### Assembly

(1) Install clutch stud in winch frame. Use replacement locknut to attach stud and tighten nut securely.

(2) If winch cable is being replaced, insert replacement cable end through cable hole in drum shaft. Pull cable out counterbored end of hole and install replacement cable clip on cable end (fig. 5-68). Swage clip on cable end and pull cable and clip into counterbore of cable hole in shaft. When clip is seated in counterbore and is flush with shaft, bend cable sharply around first groove of drum shaft.

(3) Install lower-level wind spring (fig. 5-71). Position spring on locating lugs in winch and secure spring to winch frame using bolt (fig. 5-71).



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Fig. 5-71 Level Wind Spring Installation



**NOTE:** The spring holding bolt will prevent the spring from becoming dislodged when installing the upper spring and drum shaft.

(4) Install upper-level wind spring. Position spring on locating lug against lower spring and install spring retainers on lugs (fig. 5-71).

(5) Insert winch cable through drum shaft bearing bore in winch frame. Pull cable out front of winch.

(6) Lift upper-level wind spring (fig. 5-71). Position one-piece drum guide in winch frame. Insert drum shaft into bearing bores in winch frame and through shaft hole in drum guide. Install two-piece drum guide on shaft.

(7) Install drum shaft bearing spacers and bearings on shaft ends. Align bearings with winch frame bearing bores and seat bearings in frame.

(8) Install drum gear on shaft and install drum shaft locknuts (fig. 5-68). Tighten locknuts securely.

(9) Position rear shaft in winch frame. Install rear shaft bearing spacers, bearings, pinion gear and shaft tubes on rear shaft.

(10) Align rear shaft bearings with winch frame bearing bores and seat bearings in frame.

(11) Install drive gear on rear shaft and install locknuts on shaft ends. Tighten locknuts securely.

(12) Lubricate clutch assembly thrust bearings and races with motor oil only. Do not use grease of any type on bearings or races.

(13) Install inner thrust bearing and races on clutch stud (fig. 5-68). Installation sequence is race-bearing-race.

**NOTE:** The inner thrust bearing races are both 0.030-inch thick.

(14) Install compound drive gear/roller clutch assembly on clutch stud (fig. 5-68).

(15) Install clutch lining and pinion clutch gear and bearing on clutch stud (fig. 5-68).

(16) Install motor gear on armature shaft of motor. Thread gear completely onto shaft.

**NOTE:** The gear and armature shaft have left-hand threads.

(17) Install motor on winch frame. Position clamps around motor and tighten clamps securely.

(18) Install receptacle in right-side case half. Tighten receptacle attaching screws securely.

(19) Install directional switch in left-side case half. Tighten switch locknut securely and install switch lever and lever attaching screw.

(20) Connect wires to directional switch, receptacle and motor (fig. 5-68). Connect wires according to reference tags attached to wires during disassembly.

(21) Align case halves and install case attaching screws and rods.

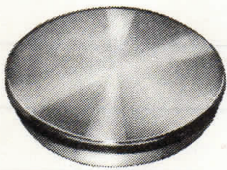
(22) Install 0.060-inch thick outer thrust bearing race on clutch stud. Install thrust bearing and install 0.030-inch thick thrust bearing race (fig. 5-68).

(23) Install belleville spring washers on clutch stud. Install spring washers so coned sides face away from one another.

(24) Install backlash spring washer on clutch stud.

(25) Install control knob on clutch stud. Thread knob onto stud completely and install acorn nut on stud.

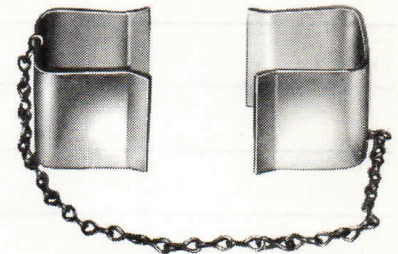
(26) Wind cable onto drum shaft in even layers. Maintain tension on cable while winding it onto shaft.



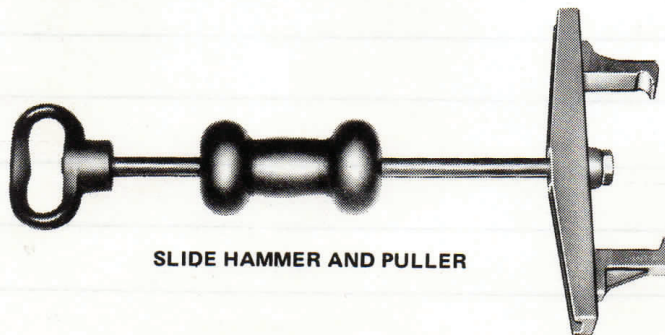
WARN WINCH BUSHING  
INSTALLER TOOL 9167



WARN WINCH BRAKE SHAFT  
SEAL INSTALLER 8675



WARN WINCH BRAKE  
HOLDING TOOL 9192



SLIDE HAMMER AND PULLER

## Tools