



**HYDRAULIC THROUGH
FRAME SLIDE-OUT
SERVICE MANUAL**

L I P P E R T
C O M P O N E N T S™

TABLE OF CONTENTS

Warning, Safety, and System Requirement Information	3
Description.....	3
Safety Information.....	3
Prior to Operation	4
Operation	4
Extending Slide-Out Room	4
Retracting Slide-Out Room.....	4
Maintenance	5
Inspection.....	5
System Maintenance	5
Electrical System Maintenance.....	5
Mechanical Maintenance.....	5
Troubleshooting	6
Troubleshooting Introduction.....	6
Hydraulic slide-out cylinder retract test.....	7
Hydraulic slide-out cylinder extend test.....	7
Fluid Recommendation.....	8
Motor Troubleshooting.....	9
Comparing 14.5° and 20° Rack and Pinion Gears	10
Gear Pack Replacement Instructions	11
Corrective Action for Squeaking Gear Packs	12
Wiring Diagram	13
Room Bar Measurement Chart	14
Adjusting room so it seals in the IN position	15
Adjusting room so it seals in the OUT position	15
Vertical & Horizontal Room Adjustment	16
Horizontal adjustment.....	16
Vertical adjustment.....	16
Synchronizing Room Travel	16
Extend and retract cylinder port locations.....	17
Manual Override.....	17

Warning, Safety, and System Requirement Information

Description

The Lippert Hydraulic Through Frame Slide-out System is a rack and pinion guide system utilizing a hydraulic cylinder to move the room assembly. The power unit drives the cylinder rod in a forward and backward motion to move the slide room in and out. The Lippert Hydraulic Slide-out System is designed to operate as a negative ground system.

Safety Information

WARNING

The “WARNING” symbol above is a sign that a service or maintenance procedure has a safety risk involved and may cause serious injury or death if not performed safely and within the parameters set forth in this manual.

Always wear eye protection when performing service or maintenance to the vehicle. Other safety equipment to consider would be hearing protection, gloves and possibly a full face shield, depending on the nature of the service.

This manual provides general service and maintenance procedures. Many variables can change the circumstances of the service procedure, i.e., the degree of difficulty involved in the service operation and the ability level of the individual performing the operation. This manual cannot begin to plot out procedures for every possibility, but will provide the general instructions for effectively servicing the vehicle. In the event the skill level required is too high or the procedure is too difficult, a certified technician should be consulted before performing the necessary service. Failure to correctly service the vehicle may result in death, serious injury or voiding the warranty. The owner’s manual for the unit may have more procedures for service and maintenance.

WARNING

Failure to act in accordance with the following may result in death, serious injury, coach or property damage.

The Lippert Hydraulic Through Frame Slide-out System is intended for the sole purpose of extending and retracting the slide-out room. Its function should not be used for any other purpose or reason than to actuate the slide-out room. To use the system for any reason other than what it is designed for may result in damage to the coach and/or cause serious injury or even death.

Before actuating the system, please keep these things in mind:

1. Parking locations should be clear of obstructions that may cause damage when the slide-out room is actuated.
2. Be sure all persons are clear of the coach prior to the slide-out room actuation.
3. Keep hands and other body parts away from slide-out mechanisms during actuation. Severe injury or death may result.
4. To optimize slide-out actuation, park coach on solid and level ground.

Prior to Operation

Prior to operating the Lippert Hydraulic Through Frame Slide-out System, follow these guidelines:

1. Coach should be parked on the most level surface available.
2. Leveling or stabilizing system should be actuated to ensure coach will not move during operation of slide-out system.
3. Be sure battery is fully charged.
4. Be sure to keep all people and pets clear of slide-out system during operation.

CAUTION

Always make sure that the slide-out room path is clear of people and objects before and during operation of the slide-out room. Always keep away from the slide rails when the room is being operated. The gear assembly may pinch or catch on loose clothing causing personal injury.

NOTE: Install transit bars (if so equipped) on the slide-out room during storage and transportation.

Operation

Extending Slide-Out Room

1. Level the coach.
2. Verify the battery is fully charged and hooked up to the electrical system.
3. Remove transit bars (if so equipped).
4. Press and hold the IN/OUT switch (Fig. 1) in the OUT position (Fig. 1B) until room is fully extended and stops moving.
5. Release switch, which will lock the room into position.

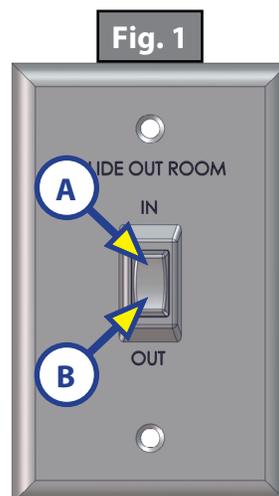
NOTE: Only hold OUT switch until room stops.

Retracting Slide-Out Room

1. Verify the battery is fully charged and hooked up to the electrical system.
2. Press and hold the IN/OUT switch (Fig. 1) in the IN position (Fig. 1A) until the room is fully retracted and stops moving.
3. Release the switch. This will lock the room into position.

NOTE: Only hold IN switch until room stops.

4. Install the transit bars (if so equipped).



Maintenance

Inspection

After servicing the slide-out system in any way, be sure to check the following:

1. Slide-out stops are installed and adjusted properly.
2. Head assemblies are installed and adjusted properly.
3. System is mounted properly.
4. Cross shafts are mounted properly and clear all other components.
5. Gear packs function properly.
6. Manual override is accessible.
7. Outside seals compress when slide-out is retracted.
8. Inside seals compress when slide-out is extended.
9. Slide-out extends and retracts smoothly.
10. Both sides of slide-out are synchronized.
11. Any dirt or debris is cleaned from the interior or exterior of the coach.

System Maintenance

The Lippert Through Frame Slide-out System has been static tested to over 4,000 continuous cycles without any noticeable wear to rotating or sliding parts. It is recommended that when operating in harsh environments (road salt, ice build up, etc.) the moving parts be kept clean. They can be washed with mild soap and water. No grease or lubrication is necessary and in some situations may be detrimental to the environment and long term dependability of the system.

Electrical System Maintenance

For optimum performance, the slide-out system requires full battery current and voltage. The battery must be maintained at full capacity. Other than good battery maintenance, check the terminals and other connections at the battery, the control switch, and the system for corrosion, and loose or damaged terminals. Check motor leads under the trailer chassis. Since these connections are subject to damage from road debris, be sure they are in good condition.

NOTE: The Lippert Through Frame Slide-out System is designed to operate as a negative ground system. A negative ground system utilizes the chassis frame as a ground and an independent ground wire back to battery is necessary. It is important that the electrical components have good wire to chassis contact. To ensure the best possible ground, a star washer should be used. Over 90% of unit electrical problems are due to bad ground connections.

Mechanical Maintenance

Although the system is designed to be almost maintenance free, actuate the room once or twice a month to keep the seals and internal moving parts lubricated. Check for any visible signs of external damage after and before movement of the travel trailer.

NOTE: For long-term storage: It is recommended that the room be closed (retracted).

Troubleshooting

Troubleshooting Introduction

This troubleshooting chart outlines some common problems, their causes and possible corrective actions. If any part or serial number information is available, provide it to the service technician when asking for assistance.

The Lippert Slide-out System is only one of four interrelated slide-out room system components. These four components are: chassis, room, coach, and Lippert Slide-out System. Each one needs to function correctly with the others or misalignment problems will occur.

Every coach has its own personality and what may work to fix one may not work on another even if the symptoms appear to be the same.

When something restricts room travel, system performance will be unpredictable. It is very important that slide tubes be free of contamination and allowed to travel full distance (Stroke). Ice or mud buildup during travel is an example of some types of contamination that can occur.

When you begin to troubleshoot the system, make sure the battery is fully charged, there are no visible signs of external damage to the system and that all connections are secure.

During troubleshooting, remember that if you change something, that change may affect something else. Be sure any changes you make will not create a new problem.

You can obtain additional information on the Lippert Slide-out System by visiting www.lci1.com/customerservice or by calling 574-537-8900.

What Is Happening?	Why?	What Should Be Done?
Room doesn't move when switch is pressed.	Restriction or obstruction inside or outside of unit.	Check for and clear obstruction.
	Low battery voltage, blown fuse, defective wiring.	Check battery voltage and charge if needed. Find and check fuse, replace if blown. Check battery terminals and wiring. Look for loose, disconnected or corroded connectors.
Power unit runs but room does not move.	Restrictions both inside and outside of unit.	Check for and clear restriction.
Power unit runs, room moves slowly.	Low battery, poor ground, extremely low outdoor temperature.	Charge battery and check ground wire.
Room drifts in both the "in" and "out" positions.	Possible external leak in the hydraulic system.	Tighten fittings. Inspect hoses, fittings and power unit for external leaks.
	Air in system.	After checking all connections, cycle pump several times in and out.
In the closed position, room drifts out.	Leaking cylinder seal.	See cylinder test next page.
	Fluid bypassing cylinder piston.	See cylinder test next page.
	Hose from pump is leaking.	Tighten fitting or replace hose.
	Air in system.	After checking all connections, cycle pump several times in and out.
In the open position, room drifts in.	Loose mounting bolts.	Tighten mounting bolts.
	Hose from pump is leaking.	Tighten fitting or replace hose.
	Leaking cylinder seal.	See cylinder test on next page.
	Fluid bypassing cylinder piston.	See cylinder test on next page.

Hydraulic slide-out cylinder retract test

1. Retract (close) all slide-outs (rooms) completely.
2. Disconnect all rooms from system (if coach is equipped with IRC, close all but one room).
3. Loosen hose from "E" (extend) port on the manifold of the power unit.
4. Plug opening on manifold to prevent drawing air into the system.

⚠ CAUTION

Do not attempt to run room out with the "E" port hose loose. The system will experience rapid fluid loss.

5. Energize the pump unit to retract (close) room.
6. When room is fully retracted, continue to run the room in and watch for fluid flow from hose/port "E". Fluid flow greater than a few drops will indicate internal cylinder leaking (bypassing of piston seal). If greater than a few drops leak from hose fitting, piston seal is bad and will need to be replaced. If there is no fluid flow, reconnect hose to "E" port and tighten.
7. Repeat steps 2 through 6 for each slide-out until all slide-outs have been tested. Energize the pump unit to retract (close) room.

⚠ CAUTION

Be sure to reconnect and tighten hose at the "E" port before attempting to extend (open) the room or the system will experience rapid fluid loss.

Hydraulic slide-out cylinder extend test

1. Extend (open) all slide-outs (rooms) completely.
2. Disconnect all rooms from system (if coach is equipped with IRC, open all but one room).
3. Loosen hose from "R" (retract) port on the manifold of the power unit. Individual slide-outs can be tested if the unit is equipped with an IRC block. Close all valves in IRC except the one to be tested.
4. Plug opening on manifold to prevent drawing air into the system.

⚠ CAUTION

Do not attempt to run room in (retract) with the "R" port hose loose. The system will experience rapid fluid loss.

5. Energize the pump unit to extend (open) room.
6. Continue to run the room out and watch for fluid flow from hose/port "R" (or IRC block if coach is equipped with IRC). Fluid flow greater than a few drops will indicate internal leaking (bypassing of piston seal). If greater than a few drops leak from hose fitting, piston seal is bad and will need to be replaced. If there is no fluid flow, reconnect hose to "R" port and tighten.
7. Repeat steps 2 through 6 for each slide-out until all slide-outs have been tested.

⚠ CAUTION

Be sure to reconnect and tighten hose at the "R" port before attempting to retract (close) the room or the system will experience rapid fluid loss.

Fluid Recommendation

The Lippert Electronic Leveling System is pre-filled, primed and ready to operate direct from the manufacturer. Type "A" Automatic Transmission Fluid (ATF) is utilized and will work. ATF with Dexron III® or Mercon 5® or a blend of both is recommended by Lippert Components, Inc.

In colder temperatures (less than 10° F) the jacks may extend and retract slowly due to the fluid's molecular nature. For cold weather operation, fluid specially formulated for low temperatures may be desirable. For a list of approved fluid specifications, see TI-188.

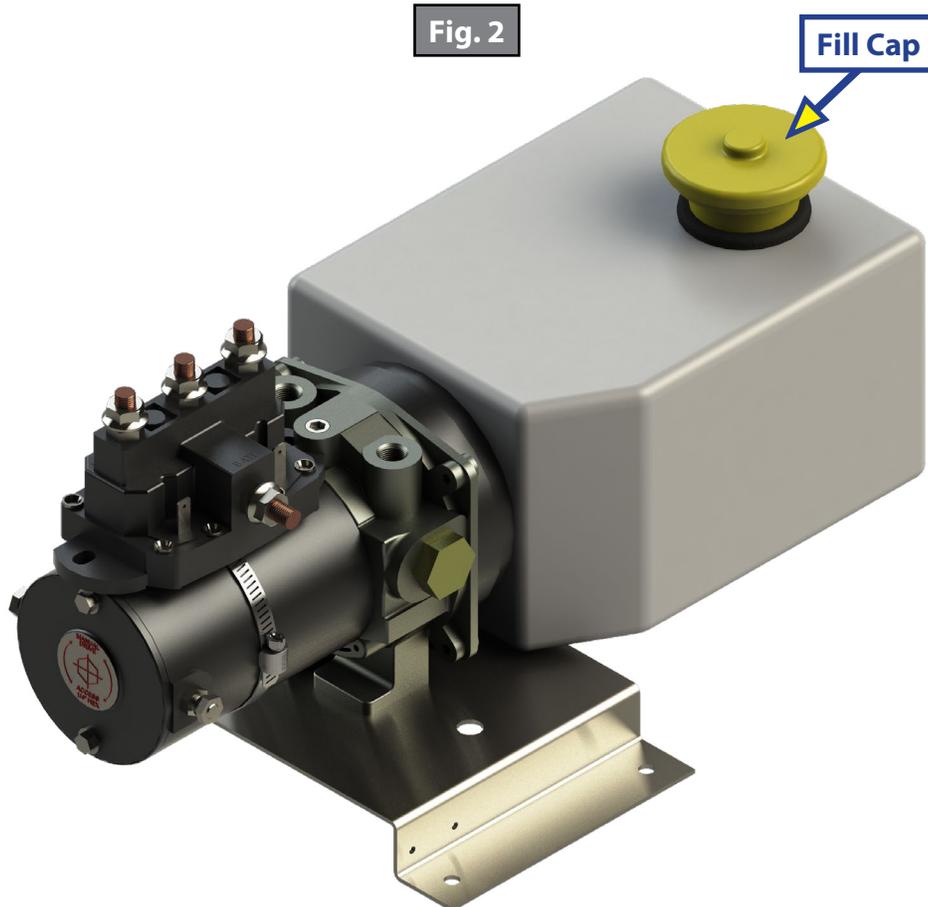
1. Remove Breather/Fill Cap (Fig. 2).
2. Pour ATF into Breather/Fill opening.

NOTE: Do not allow any contamination into reservoir during fill process.

NOTE: Standard reservoir holds approximately 2 quarts (1.89 liters) of ATF.

3. Fill to within ½" of top.
4. Replace Breather/Fill cap when finished.

NOTE: System is self-purging. By simply cycling the system 2-3 times, any air in the system will be forced back to the reservoir and out of the Breather/Fill cap.



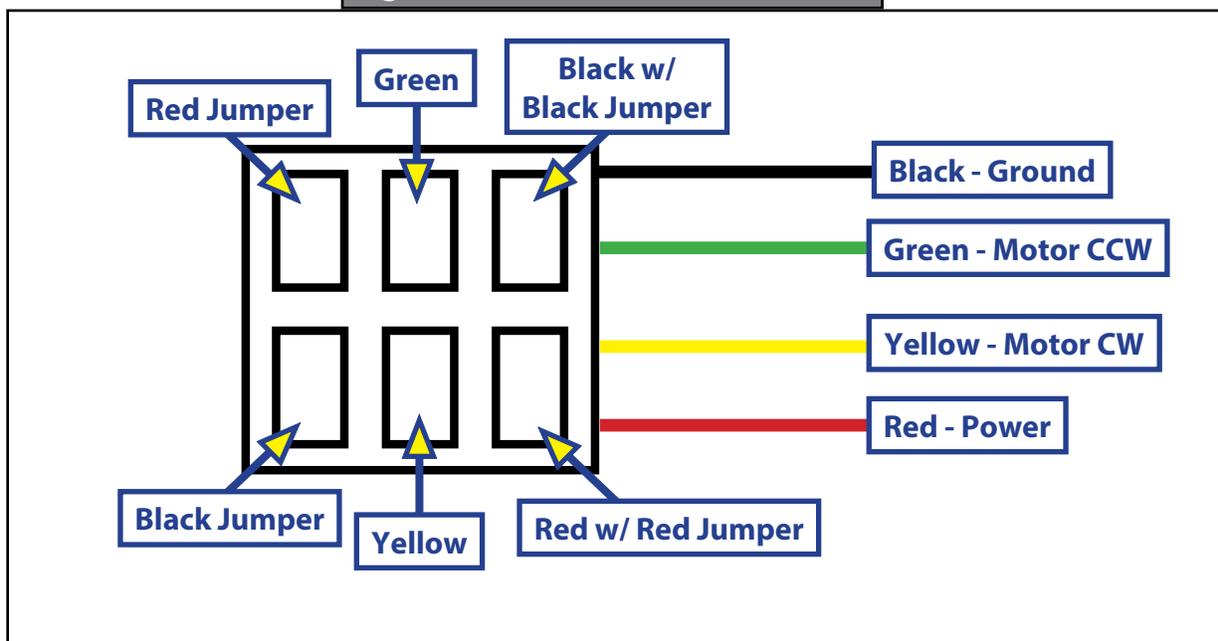
Motor Troubleshooting

Before attempting to troubleshoot the motor, make sure an adequate power source is available. The unit batteries should be fully charged or the unit should be plugged into A/C service with batteries installed. Do not attempt to troubleshoot the motor without assuring a full 12V DC charge.

The following tests require only a DC voltmeter (or DC test light) and a jumper lead.

1. Attach voltmeter (or test light) leads to the negative and positive switch terminals on back of wall switch. Does the meter indicate 12V DC? If **YES**, see **Step 2**; if **NO** see **Step 3**.
2. If **YES**, at the motor, check the incoming leads to 12V DC (if necessary, disconnect leads at wire splices). Does meter indicate 12V DC? If **YES**, motor needs to be replaced. The motor is not field serviceable. **DO NOT ATTEMPT TO REPAIR**. If **NO**, inspect all wires and connections between the wall switch and the motor. Repair connections as necessary. Recheck as in **Step 1**.
3. If **NO**, inspect all connections between battery and switch. Inspect 30A Auto-reset Circuit Breaker (See Page 14). Recheck as above in **Step 1**.
4. Since there are no field serviceable parts in the motor, electrical troubleshooting and service is limited to replacing only those components as previously outlined.
5. Thorough inspection of wiring and connections is the only other electrical service that can be performed.

Fig. 3 - Slide-out Switch Color Codes



Comparing 14.5° and 20° Rack and Pinion Gears

1. Start by measuring the distance between two individual adjacent teeth.
2. Using calipers or a steel rule, measure from the inside edge of one tooth (A), and then measure over to the inside edge of the next tooth (B) shown in (Fig. 4).
3. The 14.5° rack will measure approximately 0.170 inches (Fig. 5). The 20° rack will measure approximately 0.231 inches (Fig. 6).
4. The 14.5° rack will have 4 teeth per inch (Fig. 7). The 20° rack will have 3 teeth per inch (Fig. 8).

Fig. 4 - Side View

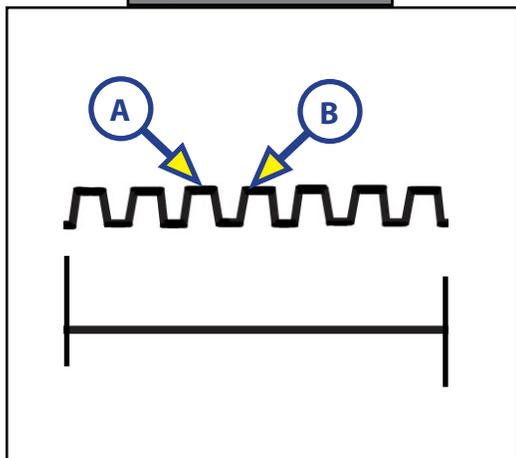


Fig. 5 - 14.5° Rack



Fig. 6 - 20° Rack

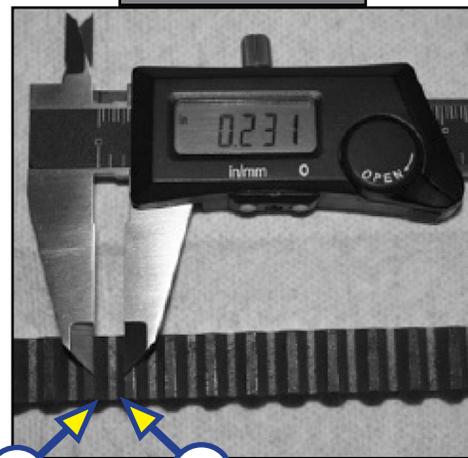


Fig. 7 - 14.5° Rack

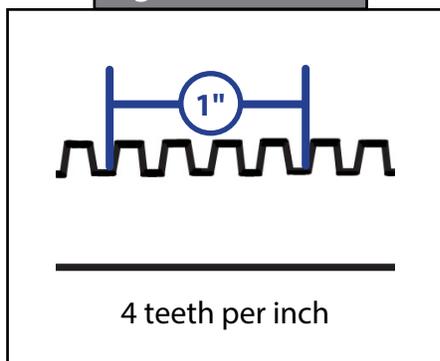
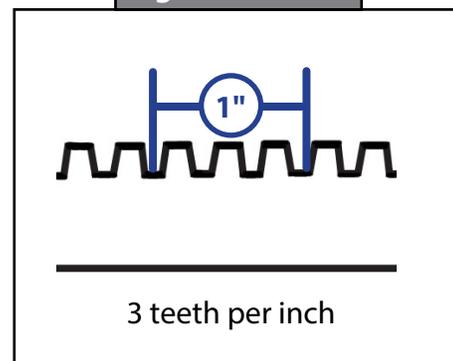


Fig. 8 - 20° Rack



The simplest way to differentiate between the 14.5° spur gear and the 20° spur gear is the number of teeth on the gear. Spur gear [#122739](#) (Fig. 9) has 18 teeth. Spur gear [#101941](#) (Fig. 10) has 15 teeth.

Fig. 9

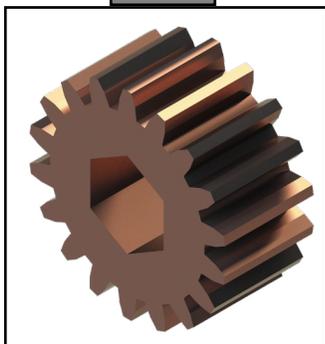


Fig. 10

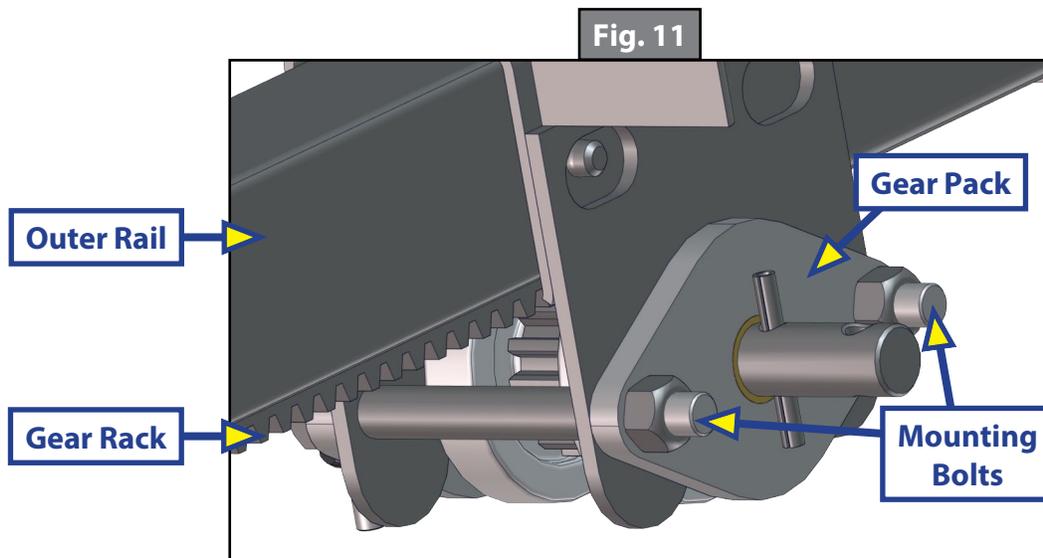


Gear Pack Replacement Instructions

In the event a gear pack needs to be replaced, follow these steps:

1. Run slide-out room half way out.
2. Place a jack under the inner arm of the slide-out.
3. Jack room up just enough to remove pressure off the gear pack.
4. Remove drive bolt from the cross shaft.
5. Remove bolts which hold the gear pack assembly in place on the outer rail.
6. Drop out the damaged gear pack.
7. Install the new gear pack.
8. Install bolts to hold gear pack assembly in place on the outer rail.
9. Install cross shaft and bolt.
10. Gear pack assembly does not need to be torqued down, only adequately and securely tightened.

Gear Packs	
281331	2 x 2
140409	2 x 3, 3 x 3
122837	Standard 2.5 x 2.5
123356	Heavy Duty 2.5 x 2.5
140418	Embedded Rack



Corrective Action for Squeaking Gear Packs

1. Loosen both gear pack bolts (Fig. 12A and B) until tension is off of the gear pack.
2. Apply dry silicone onto gear pack drive shaft at lubrication points (Fig. 13A), (Fig. 14A), (Fig. 15A through D).

NOTE: Do not lubricate rack or pinion gear teeth, lubricate drive shaft only.

3. Extend and retract slide-out arms several times to work lubricant through gear pack.

Fig. 12



Fig. 13

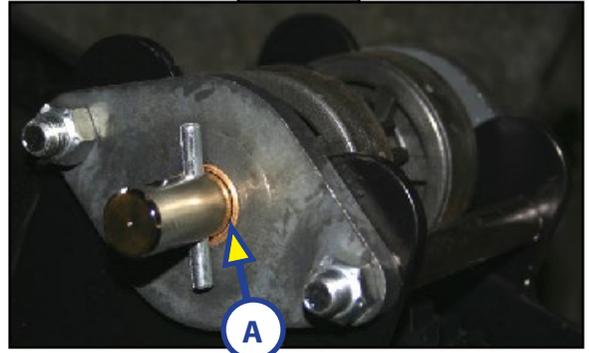


Fig. 14

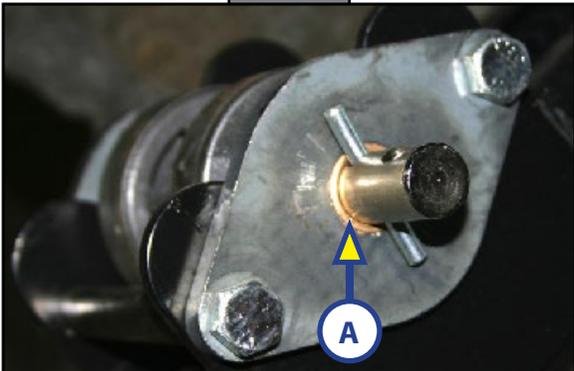
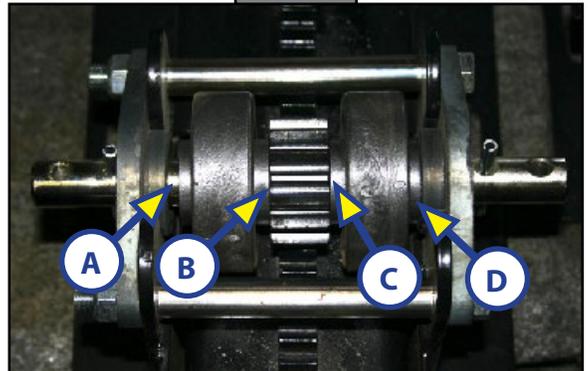
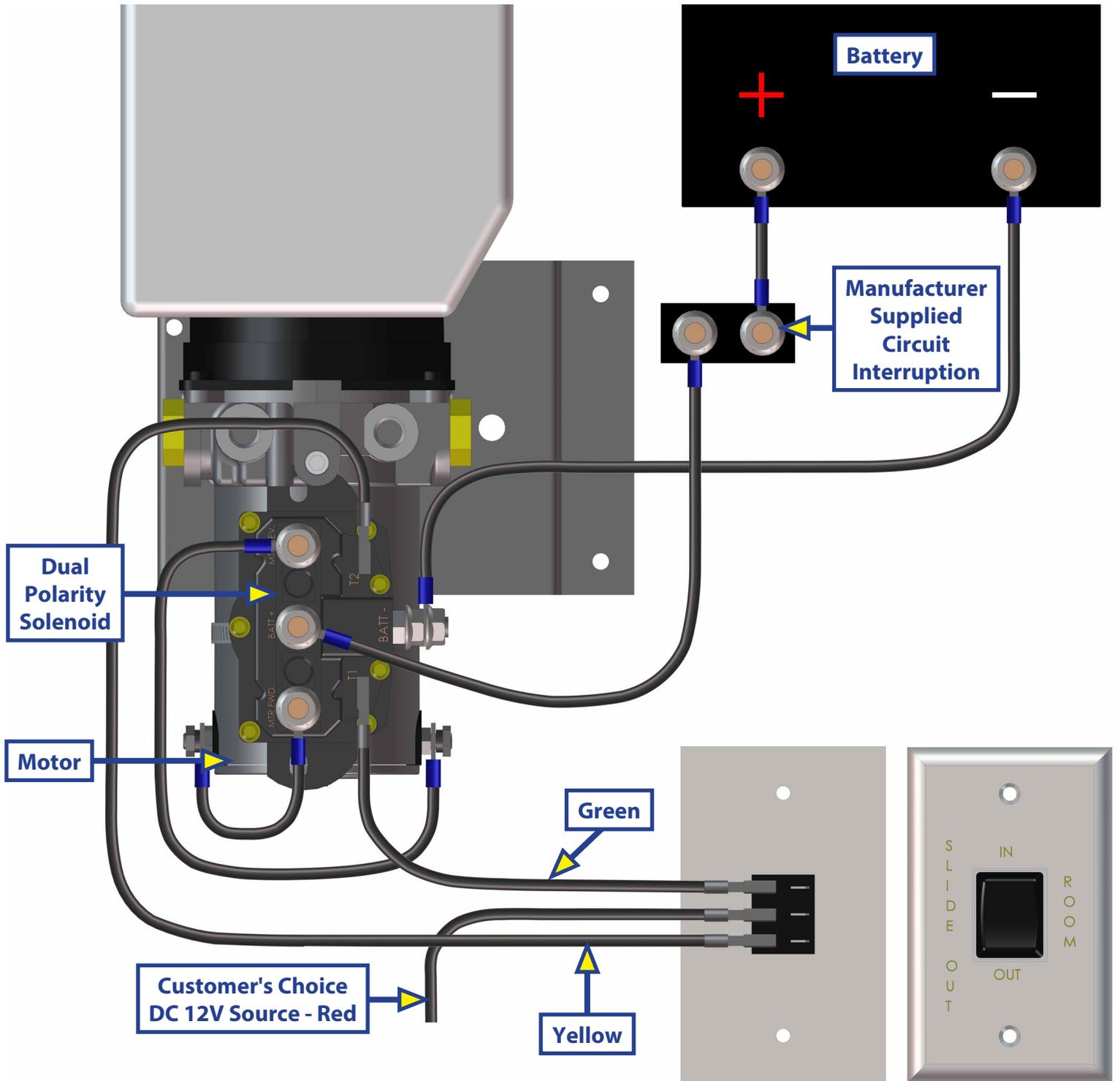


Fig. 15



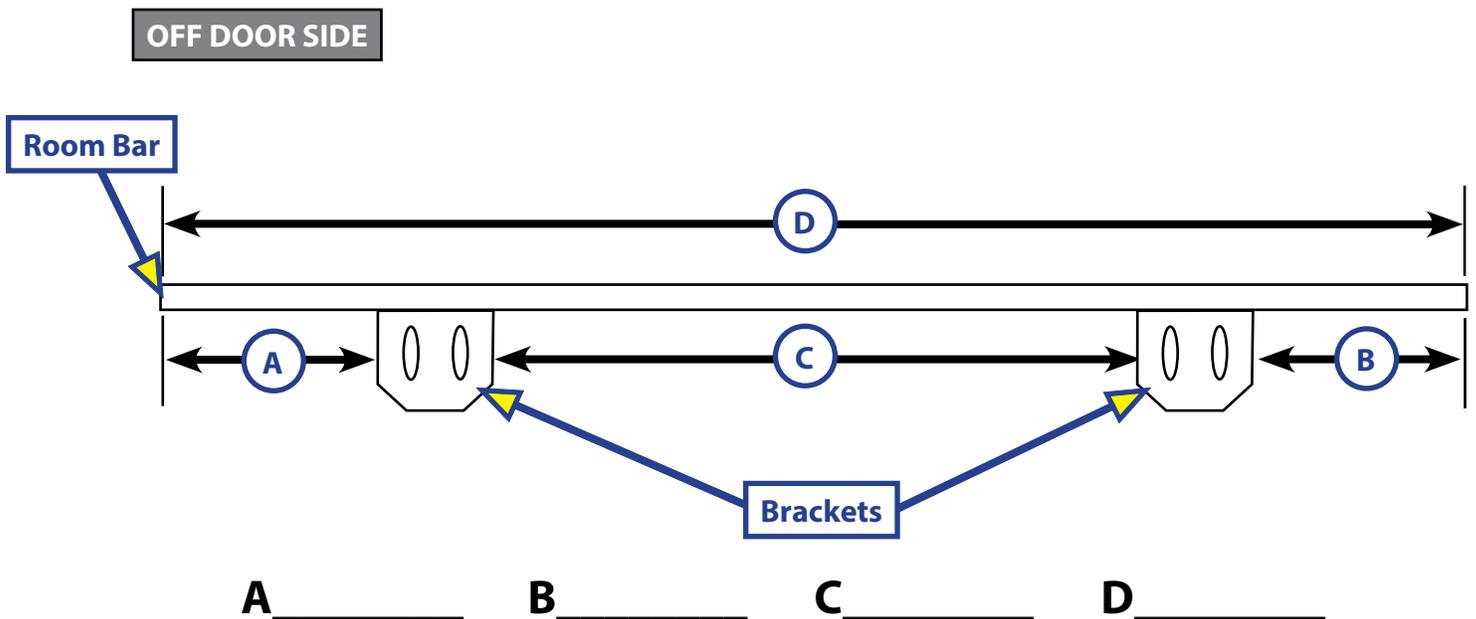
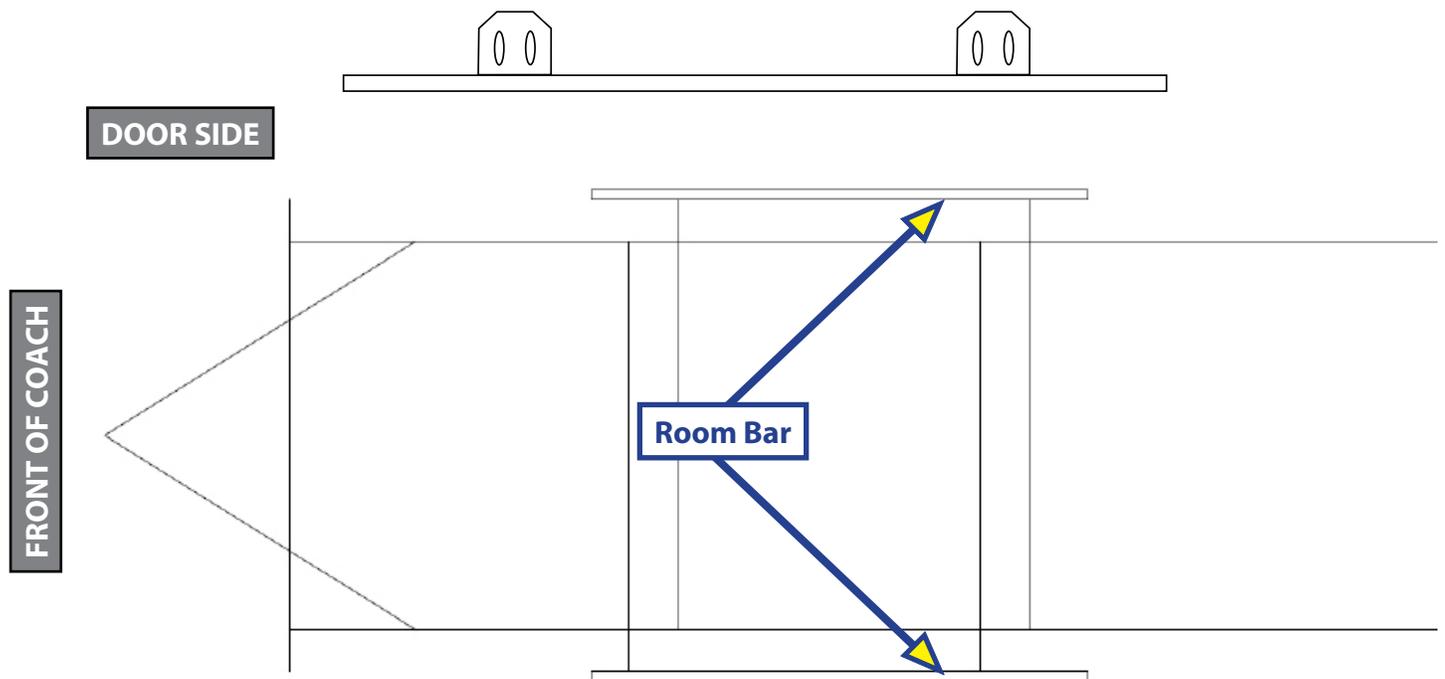
Wiring Diagram



NOTE: Change in polarity reverses motor

Room Bar Measurement Chart

1. Circle which side of your coach this room bar is for (Door Side or Off Door Side).
2. Enter the measurements for A, B, C, and D on the lines at the bottom.



Adjusting room so it seals in the IN position

1. Locate cylinder coming through the frame.
2. Run room partially out.
3. Hold jam nut (Fig. 16A) in place with wrench.
4. Adjust Nylock nut (Fig. 16C) towards the bracket if the room does not seal. Adjust the Nylock nut (Fig. 16C) away from the bracket if the room is too tight and damages the fascia.

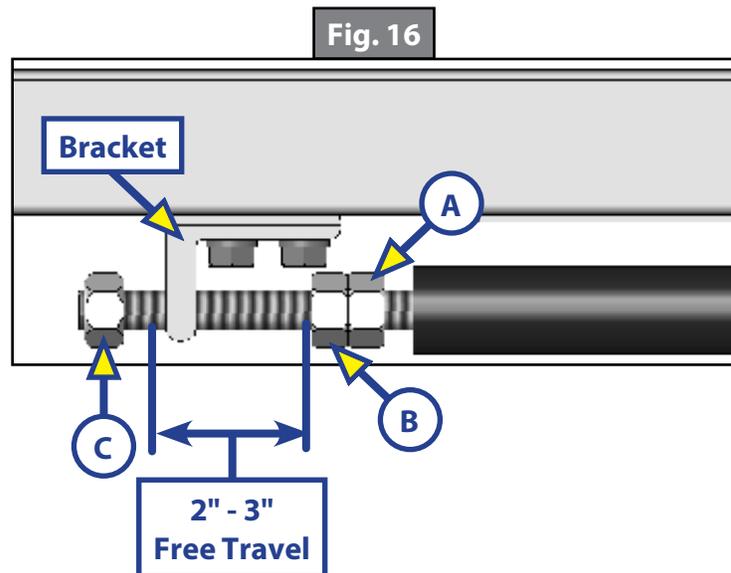
NOTE: Make small adjustments, running the room in after each adjustment until proper seal is achieved.

Adjusting room so it seals in the OUT position

1. Locate cylinder coming through the frame.
2. Extend room completely out.
3. Check the inside fascia and seal positioning.
4. Partially retract room.
5. Loosen and back off jam nut (Fig. 16A) from nut (Fig. 16B) to give nut (Fig. 16B) room for adjustment.
6. Adjust nut (Fig. 16B) away from the bracket if the room extends too far and damages the inside fascia. Adjust nut (Fig. 16B) towards the bracket if the room does not seal.

NOTE: Make small adjustments, running the room out after each adjustment until proper seal is achieved.

7. Tighten jam nut (Fig. 16A) to nut (Fig. 16B).



NOTE: 2" to 3" of free travel is normal.

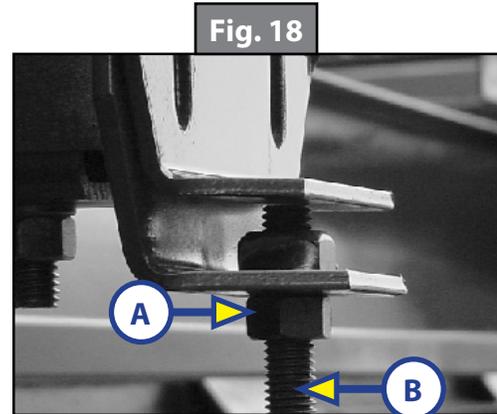
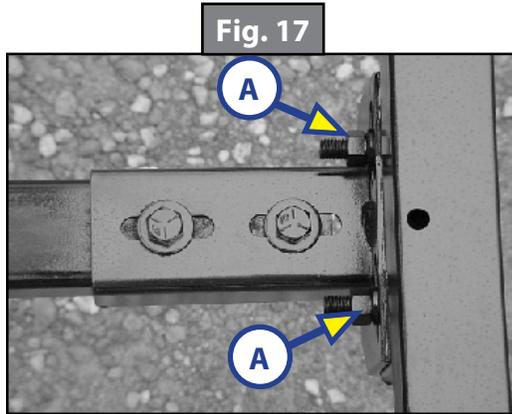
Vertical & Horizontal Room Adjustment

NOTE: All slide-out room adjustments must be performed by certified service technicians. Adjustments made by non-certified persons may void any and all warranty claims.

Horizontal adjustment

1. Loosen 2 carriage bolts (Fig. 17A) on each bracket located at the end of each guide tube.
2. Room is ready to be positioned horizontally by pushing on the outside, sidewall or by using a prying device inserted into the opening between the room and coach.

NOTE: Use caution when using prying device so seals do not become damaged.



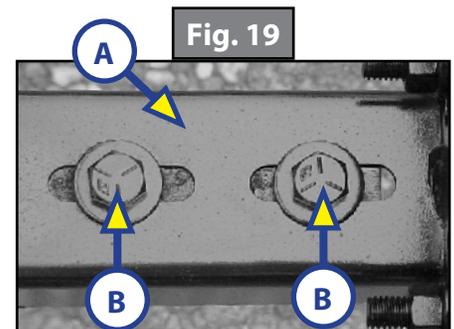
Vertical adjustment

1. Loosen 2 carriage bolts (Fig. 17A) on each bracket located at the end of each guide tube.
2. Loosen jam nut (Fig. 18A).
3. For vertical adjustment, turn vertical adjustment bolt (Fig. 18B) up or down to locate room height.
4. Once room height is located, tighten jam nut (Fig. 18A) and 2 carriage bolts (Fig. 17A).

Synchronizing Room Travel

The Lippert Hydraulic Slide-out System room travel (both sides of the room traveling the same distance) can be adjusted with a specially-designed synchronizing bracket mounted on the passive slide tube. The passive slide tube is the one that is not powered. The active slide tube is the one that has the cylinder attached. If one side of the room fails to seal, adjust as follows:

1. Extend the slide-out about halfway out.
2. Measure the active side from the "T"-molding on the slide-out back to the outside wall of the coach.
3. Then, measure the passive side in the same manner.
4. Loosen bolts (Fig. 19B) on top of the passive slide tube (Fig. 19A).
5. Push or pull room (on passive side) to align the passive side with the active side.
6. Tighten bolts (Fig. 19B) to secure the passive side position.
7. Retract room and run as normal.



Extend and retract cylinder port locations

Fig. 20 - Standard Slide-out Cylinder

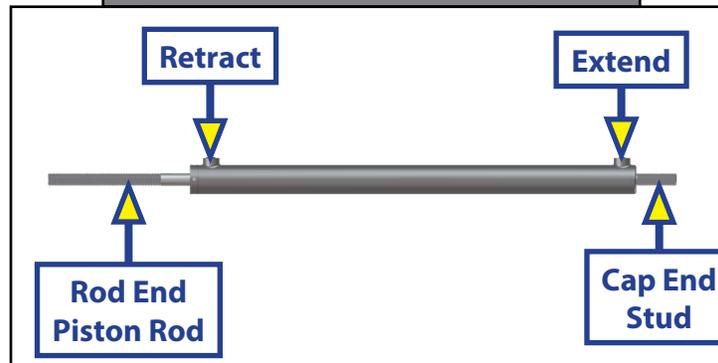
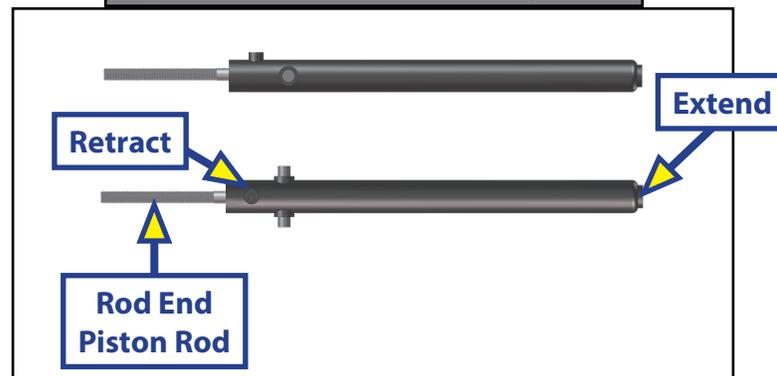


Fig. 21 - Trunnion Slide-out Cylinder



Manual Override

The Lippert Hydraulic Slide-out System can be run with auxiliary power devices like electric drills, ratchet wrenches or screwdrivers. In the event of electrical or system failure, this manual method of extending and retracting the slide-out room can be used. A standard hand-held drill is all that is required. A standard 38" room will take approximately 45 seconds to retract. See the instructions below.

1. Remove protective label (Fig. 22A).
2. Using a standard hex bit, insert auxiliary drive device (cordless drill, screwdriver, or ratchet wrench) into coupler found under protective label (Fig. 23).
3. Run drill counterclockwise to extend slide-out room and clockwise to retract slide-out room.

Fig. 22

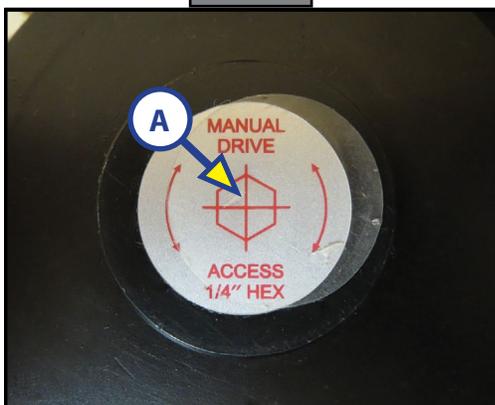
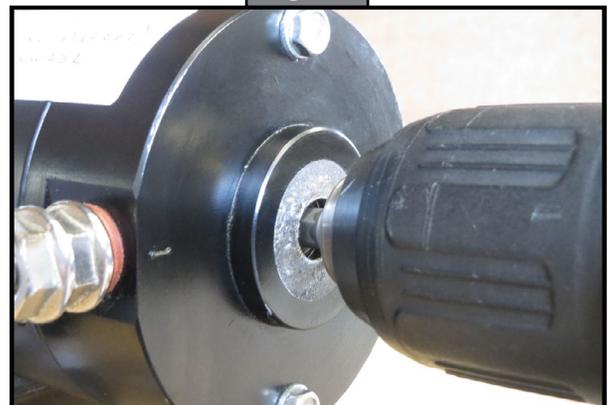


Fig. 23





L I P P E R T C O M P O N E N T S™

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