

# How to Avoid Killing Yourself with a Jack

## SERVICING THE “MODERN CAR” Part 1

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### Introduction

Have you wanted to do routine maintenance on your “Modern Car”, but have not felt you knew enough of the practicalities? Many of our PNW Region members would like to perform routine servicing themselves, either for economy or for self satisfaction. Performing service really does increase bonding between owner and car and when finished one can be certain that no shortcuts were taken. This article addresses the Silver Spirit/Spurs and their various Bentley and other derivatives. While these models are often 20-30 years old, the RROC classes these as “Modern Cars”. The article does not address the earlier Silver Shadows, the later Seraphs, or the still later cars built after the split between BMW and VW). I will use my car, a 1993 Bentley Turbo R, as an example of servicing the Spirit/Spur series. Please note that other models may have many differences from one model year to the next.

All Spirit/Spurs and later cars use a modified mineral oil (HSMO = hydraulic system mineral oil) for the brake and suspension systems. The previous Silver Shadows use a modified brake fluid (RR363) for the same purpose. Do NOT use RR363 in the mineral oil cars. The mixture of RR363 and HSMO will form a gel, and the cleaning bill for mucking out the system can easily run \$10,000 if you have some one else do it.

For ease of printing, this article is divided into the following parts: “How to Avoid Killing Yourself with a Jack”, Changing the Engine Oil and Coolant, Changing the Transmission and Differential Oils. All sections are available from the author on individual request, but will likely appear in print in succeeding editions.<sup>1</sup>

### Section 1: Safety, or “How to Avoid Killing Yourself with a Jack”

#### **A. General:**

Much of what is said here may seem obvious, but tragically it is often ignored and injuries occur. Wear snug-fitting clothes and confine long hair (and beards) so that there is nothing that can get caught up in rotating parts such as the fan. The wearing of ties in work settings are often prohibited for these reasons. Take off all your rings and metal wristband watch, as a dead short between ground and any source of 12 volts connected directly to battery plus terminal, will cook or functionally amputate your finger or hand. Keep your hands out of the fan. Stay away from ignition high tension voltage, as the shock may cause you to jerk into something dangerous. Beware of gasoline vapor, which is highly explosive, the vapor is heavier than air and will collect along the floor. Ignition takes only a spark from a light switch, a pilot lamp of a water heater, or the hot filament of a trouble light when the glass bulb shatters from a drip of cold gasoline. Open containers of gasoline belong only outdoors.

#### **B. The Fundamental Principle of a Trolley Jack:**

The more fortunate of us own a hydraulic lift. The rest of us use a floor (trolley) jack to raise the car and then let it down onto jack stands. If not properly used, both floor jacks and jack stands can unexpectedly drop the car, hopefully not on you. My stepmother’s first husband was killed when his pickup slipped off a jack. Usually spouses do not approve of you doing this (smile). I once dropped an MGB off a floor jack, narrowly avoiding significant damage to the car. Rolls-Royces are much more expensive than MG’s. So, what to do to be safe for both you and the car? Understanding the fundamental principle of a trolley jack is a key to success.

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<sup>1</sup> Please also note also that the usual caveats apply. It is assumed that one is reasonably handy and mechanically knowledgeable, and that the proper tools are on hand. I have endeavored to be complete and accurate; however, please do your own verification. Use common sense. Use of anything said here is your responsibility. Neither I nor the Hose Clamp accept any liability for error or omission

A trolley jack consists of a 12-18 inch long arm with a fixed pivot point at one end. The arm is lifted in an arc by the use of a hydraulic piston. The crucial principle to understand is as the arm is lifted from the horizontal position to vertical, the center of the lifting pad moves horizontally about six inches. This fact is easily seen by these two photos of a jack in the lowered and the raised position. The only difference in these photos is that the jack has been raised.



To compensate for this difference in location, the trolley jack is equipped with wheels that will roll forward under the car as the jack is raised. *It is absolutely imperative that these wheels be able to roll* as if they do not move, one of two things will happen and only one of these is the least bit tolerable. If the jack happens to be aligned with the front to back axis of the car, it is possible that the car will slowly roll toward the person lifting the car. This would be tolerable. But if the jack is positioned at an angle to the major axis (most often this is so), the car's wheels might not roll at all. The only alternative then is quite dire. Simply stated, the carefully placed lifting pad will slip out of position and **the car will fall off the jack!!!** Moreover, the car will come crashing down *with the jack still raised*. The damage done to radiators, hoses, sheet metal, high pressure tubing, and other less robust parts of your PMC can be considerable. Of course, the ultimate loss would be if the car fell on the person lifting the car! So the fundamental principle is: **As the car is being lifted, carefully watch the jack wheels and insure that they are rolling.** Soft asphalt, carpeting, loose soil, trash, or anything else that impedes the rolling of the jack wheels should be avoided for success. Lives have been lost by failing to follow this principle. Unfortunately, I have never seen jack instructions that identify this risk.

### C. Raising and Lowering the Car:

Do not raise the bonnet (hood) until the car is completely raised off the floor. Verify that the bonnet does not jam up against an overhead obstruction. I once buckled a hood, fortunately not an expensive R-R or Bentley, by jacking the car with the hood raised up and crushing it against an overhead mezzanine.

A so-called "Modern Car" weighs ~5,500 lb, so you need a jack that can lift about 2/3 of that, say 2-3 tons capacity. It is not uncommon for less expensive trolley jacks to slowly leak thus gradually lowering the car. While this can be tolerated if the car is put on jack stands without delay, a higher quality jack is preferable. Decent quality jack stands are also needed to safely take a less than perfectly distributed off-center load on their heads. Capacities of jack stands are listed per pair. Get either 3-ton or 6-ton, with welded plate steel base and cast steel adjustable head. Simple sheet metal jack stands should be avoided. Rubber pads for both the jack lifting pad and the jack stand tops are recommended. A hard, smooth, and level concrete floor is recommended. Asphalt can be used, but special safety precautions are needed to insure that the jack wheels can easily roll.

The R-R service manual (TSD 6000 Fig A8-1) shows jacking and support (jack stand) locations. However, they don't really describe them adequately, which I will try to do here. Jack up the car from the rear first,

otherwise you will not be able to later get the jack under the long rear overhang. But before jacking, loosen the lug nuts on the rear wheels so you will later be able to get them off when the car is up in the air. My car has left hand thread nuts on the left side and right hand thread nuts on the right side, so turn the nuts appropriately. Right and left are defined as looking forward. A right hand thread nut tightens when turned clockwise. A left hand thread is the opposite. An 11/16" SAE deep socket worked on my car. Your car may have Whitworth or metric nuts.

To jack up the car, roll the floor jack under the car from the rear, placing the lifting pad under the center of the finned differential casing, right over the drain plug as shown at right. This is the R-R approved trolley jack location (position 6 on Fig A8-1 of TSD 6000). A thick rubber pad will prevent scarring the casing. My floor jack would not clear the spare tire, so I had to slide the jack in at an angle just on the right of the spare. Now it is crucial that the jack wheels roll as the car will not roll at an angle.

Jack the car as far up as it will lift. The rear wheels and stub axles are now supported only by the hydraulic load leveling cylinder seals of the rear suspension. Don't leave the seals loaded in this manner for long, certainly not overnight. Remove the



rear road wheels. Place two jack stands under the control arms at the rear axle centerline. Molded rubber pads help keep the jack stand heads centered. See photo at left.

These are the R-R approved jack stand locations (positions 5 on figure A8-1 of TSD 6000). Carefully lower the car down onto the jack stands and continue until the jack is unloaded and the road springs are fully compressed. The car now thinks it is supported by the wheels. Remove the jack. Test the security of the position by pushing **hard** side to side and front to back. Note that when the springs are compressed, the car has lost about half the height it had with the jack fully raised. There is plenty of room to slide around under the car, but clearance for a creeper is still pretty tight.

Move the jack to the front, and place the jack lifting pad under the inner or centerline pivots of the front suspension A-frames. See photo below. This is the R-R approved jacking location (position 1 on Fig A8-1 of TSD 6000). Line up the jack handle perpendicular to the rear axle centerline. *This is necessary so that the jack does not pull the front of the car sideways, thus torquing (or twisting) the two rear jack stands, which would tend to tip them over.* Note that most all jack stand instruction sheets do not advise lifting all four corners of the car, but they usually do not say why. I believe torquing is the reason. Note also that most all professional repair shops routinely place cars on four jack stands, written instructions notwithstanding.



Observing the same safety precautions as for the rear of the car, jack the front of the car up, place two jack stands under the outer pivots of the front suspension A-frames (see photo below) and then lower the car down onto the jack stands. These are the R-R approved jack stand locations (positions 5 on Fig A8-1 of TSD 6000).

Adjust the height of the jack stands so that the car is level front to back. When jacking up the car, it rotates vertically relative to the rear jack stands, so observe them carefully to make sure they don't slip sideways or rock fore and aft. Remove the jack. Test the security of the support by pushing **hard** side to side at both the front and the rear, as well as from front to back. If the car falls off the jack stands, you want it to happen now and not when you are under the car.

By following these procedures the car is now properly raised on jack stands and it should be safe against anything except an earthquake (smile). It is time to get ready for work. While this procedure has taken four pages of photos and explanation in words, in practice it can be done easily within 30 minutes.

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