

Comanche Lightweight Portable Jack Adaptors

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To borrow a phrase from the airline flight attendants, “in the unlikely event” you have a flat tire at an airport away from home, you may have difficulty finding a pair of hydraulic jacks that are short enough to fit under your airplane. On a weekend, the likelihood of locating the proper jacks is even smaller. Although my Comanche Travel Tool Kit (see *Comanche Flyer*, July 2007) covered most mechanical dilemmas, it never addressed repairing a flat tire without benefit of hydraulic wing jacks.

In the first few years of production for V-tailed Bonanzas, Beechcraft included with their airplanes a short tubular jack adapter that inserted into the axle of the landing gear. It still protruded enough that one could raise the intended wheel with virtually any automotive jack. This was the nidus of an idea for me. After approaching the problem of jacking up the landing gear one at a time and having seen how others were doing it, I was less than happy with existing methods because I didn't feel they were all that portable.

Figure 2: Nose Gear
Adaptor in use with
wheel off the ground.



Figure 3: Nose gear adaptor with wheel removed.



I normally place a piece of 1/8-inch thick silicone engine baffle material on the back of the jack adaptor plate between it and the fork to prevent it from marring the metal or paint where it is bolted on. After 40-plus years, many of these forks may have paint or grime inside the 3/8-inch hole and the bolt may be very tight. I recommend you take a piece of 3/8-inch all-thread or a small wire “bottle brush” and some solvent and clean out the bolt hole prior to using the adaptor with a new bolt. The 3/8-inch bolt that I use is an AN6-17, which is slightly over two inches long and has an appropriate *grip* length.

On the Comanche single fork main landing gear, there is a dust cap that covers the inboard end of the axle. If you remove it, you will see a long axle fixation bolt (AN4-13A) which passes at a 45-degree angle through the fork and the axle (see Figure 4).

This bolt is fairly easy to remove if you first unfasten and push aside the brake caliper. Because many of these bolts have been there since the airplane was new, you might have to apply a little *Liquid Wrench* to the bolt itself. Then, using a socket wrench, turning the bolt counterclockwise usually will bring it right out. Once the bolt is removed, you have a totally hollow axle tube into which you can place the main gear *axle tube jack adaptor* that I have fashioned (see figure 5).

Figure 4: Axle retainer bolt to be removed. This bolt must be removed in order to use the basic jack adaptor.

On landing gear with two-pronged forks, such as the nose gear on virtually all Comanches and the main gear in early vintage PA-24s and PA-30s, there is a 3/8-inch diameter hole drilled in the fork approximately one-inch above each axle hole. These smaller holes can be used to bolt an angled steel jack adaptor to the fork that will allow you not only to jack up the gear, but will afford you easy access to remove the long double-ended bolt that secures the two *wheel end plugs* that hold the axle in place. Once this hardware and the axle are removed, the axle spacer-bushings and the wheel will fall free. (see figures 1, 2, and 3.)

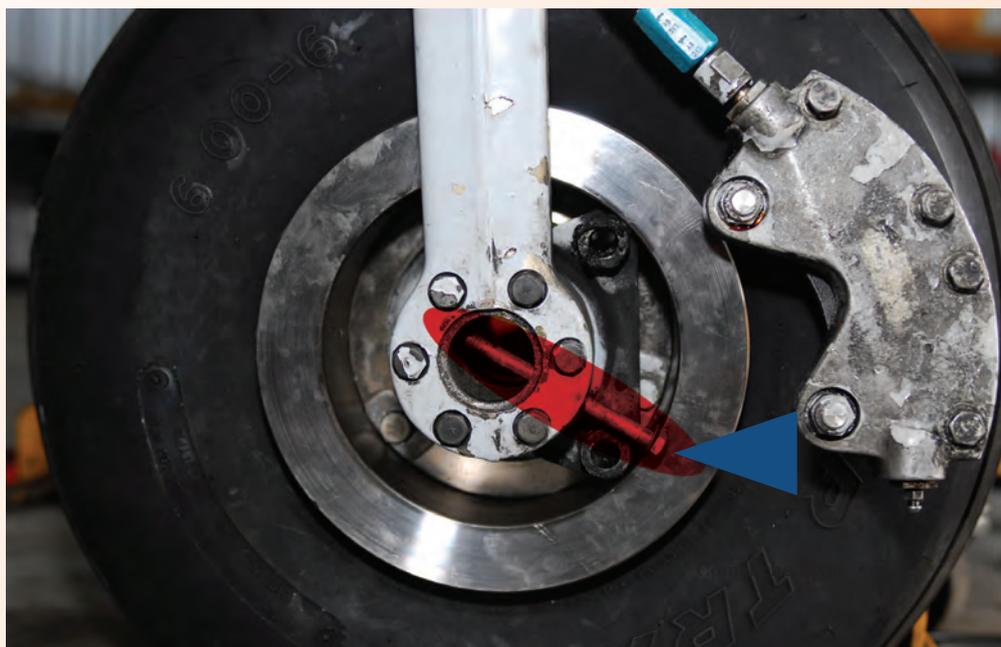


Figure 5: Main Gear Axle Tube Jack Adaptor



Figure 6: Combined Jack Adaptors



This adaptor is made from a six-inch length of 1.25-inch OD (1.010-inch ID) 4130 seamless tubular steel that has been turned down to 1.23-inch OD to allow an easy, but snug, fit. I have only reduced the OD on 4.75-inch of the 6-inch tube to form a small shoulder to prevent pushing the tube all the way into the axle. Onto this tube I have welded a plate which I will explain in the next paragraph. When I am using the basic tube adaptor by itself, I push the tube halfway into the axle and leave the other half to interface with the jack. If the tire is not completely flat you may be able to use just this basic jack adaptor tube with either a floor jack or the scissor jack from practically any rental car.

However, if the tire is completely flat, there may not be enough clearance to get a jack under the basic jack adaptor tube, in which case I press into service the nose gear jack adaptor bolted onto the plate on the main gear adaptor to produce a stair step effect which will give you an additional four inches of room for a jack. When I am using the combined adaptors, I push the basic tube adaptor into the axle as far as it will go so that the extension is as close to the wheel as possible. The aforementioned shoulder on the tube is to prevent the bolts on the adaptors from marring the paint or metal on the fork. (See figures 6 and 7.)

To address any concern as to the strength of the jack adaptors, either used singly or in combination, my informal engineering studies tell me that these pieces of steel will handle many thousands of pounds of shearing force – far in excess of our needs in lifting a single landing gear off the ground. Likewise, the TIG weld in the main gear adaptor should be as strong as the original metal itself or awfully close to it.

In addition to using the jack adaptors to fix a flat tire, if you have a problem *elsewhere* that requires your placing the aircraft up on hydraulic jacks (e.g., a leaky strut), but the only ones available are too tall for your airplane, you can use these jack adaptors to jack up the main gear one at a time and get the wings high enough to place the taller jacks beneath the jack points. For that matter, you can also use the jack

adaptors to put the plane up on jack stands if no jacks are available. This is only slightly more complicated, and you will have to raise one wing a few inches at a time in a stepwise fashion while adjusting the jack stands higher until you reach the desired height. If you have ever experienced a mechanical breakdown in your airplane at an airport that is a three-hour drive to the nearest maintenance facility, you know of what I speak. Obviously if you could do it an easier way, you would.

Ideally you would only place an airplane on jacks (or jack) in a hangar so that you are not at the mercy of the wind and other elements. However that luxury cannot always be arranged. Whether indoors or out, I recommend that when you jack up a landing gear, once the wheel has been removed, you should lower the fork as much as possible and put a short jack stand or a block of hardwood under the axle to support it. This action both lowers the center of gravity of the gear and adds to the stability of the situation. I have made myself a short jack stand to support the axle itself on both the single and double fork gear. With the double fork gear, I just re-insert the axle into the fork before placing it on my jack stand. By letting the axle rest on a low jack stand or wooden block while leaving the jack itself in place, you are given a kind of “belt and suspenders” protection against the plane falling off the jack.

A final word to the wise: when jacking up a wheel, always chock the other two wheels and tie down the tail for stability. I have used these jack adaptors many times and can attest to their strength, safety, ease of use, and unique portability. Their combined weight is less than five pounds.

As luck would have it, these jack adaptors are not a “one trick pony.” Even just using them at my home base, I have found that they are much more convenient for changing a tire than rounding up the hydraulic jacks and weighting down the tail. They are helpful not only in repairing/replacing a tire, but also in replacing brake discs and in packing wheel bearings. With them, I can jack up a wheel in a fraction of the time it would take me to put the entire plane “up on jacks.” 🛩️



Figure 7: Combined jack adaptors in action.