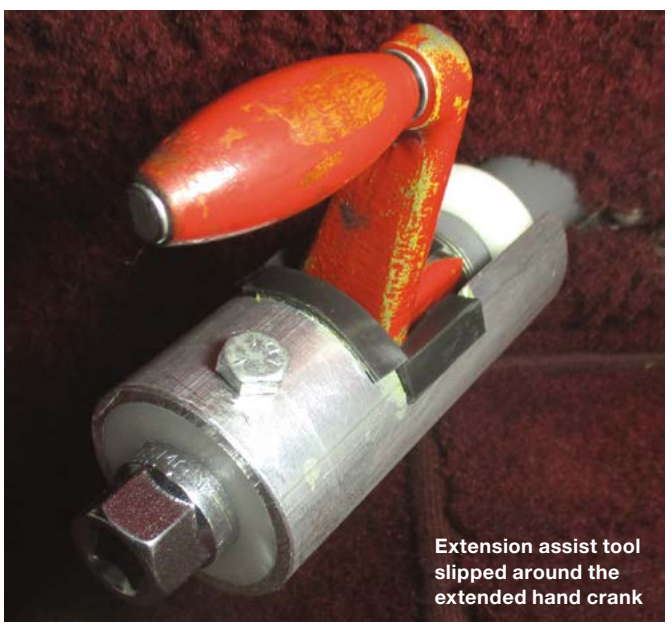
# Manual Landing Gear Extension Assist Tool Revisited

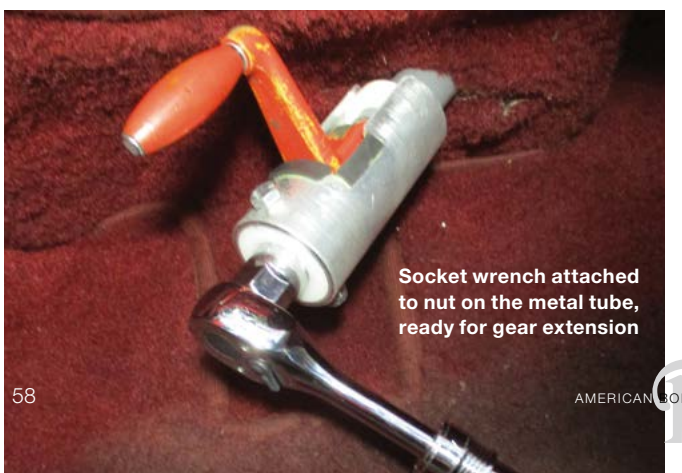
By Mark Komarek

Several years ago I was flying my K35 Bonanza solo on a local pleasure flight. When I went to lower the landing gear on my downwind leg, nothing happened. I checked the landing gear circuit breaker and it was not tripped. I suspected a bad spot on a motor brush or commutator so I pulled the circuit breaker, engaged the hand crank, and cranked the handle about one to two turns counterclockwise. I stowed the crank handle and reset the breaker, but the motor still did not run. I then knew I would have to crank the gear down by hand.

I pulled the gear circuit breaker again and engaged the handle. I let the tower know of my gear problem, and they cleared me to climb but stay in the pattern so they could verify my gear looked down and locked when I completed the manual extension. I climbed to 2,000 feet above the airport, slowed the plane to about 90 mph, and started the manual extension. Since I didn't have an autopilot to help fly the plane, I was hand-cranking the gear down (this takes approximately 50 turns counterclockwise in my plane) while flying the plane. I found it was very hard after about 20 or 30 turns as the air loads provide quite a resistance to hand cranking, especially for a 70-year-old pilot.



Extension assist tool slipped around the extended hand crank

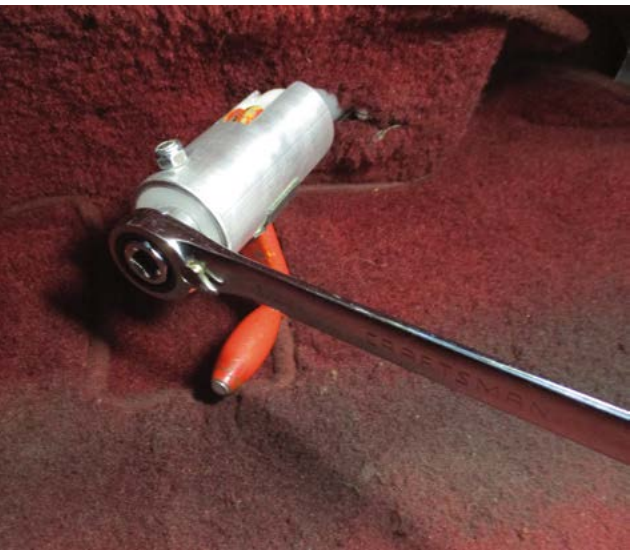


Socket wrench attached to nut on the metal tube, ready for gear extension

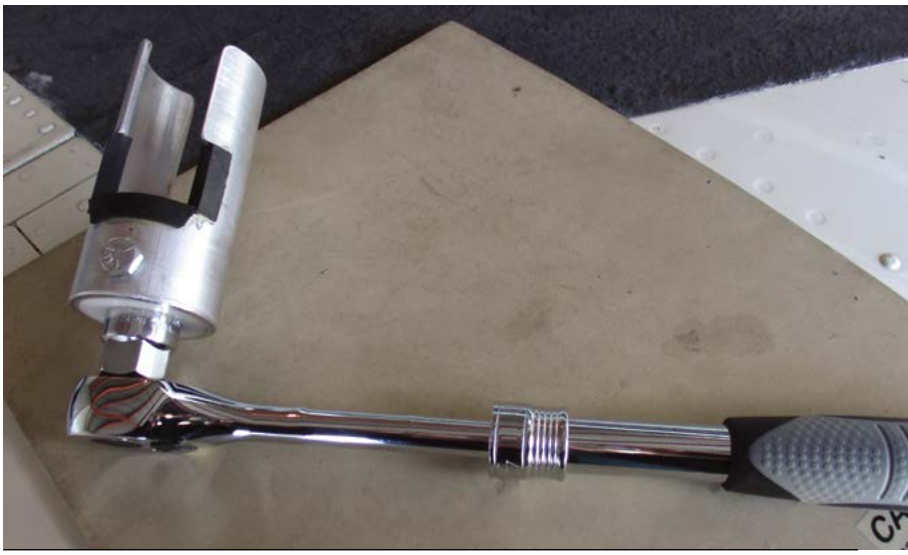
I was just able to complete the manual extension to the down internal stop in the gearbox, but it was quite an effort. I had practiced this in-flight some years previous so it was not a big deal, except now at my age my arm strength is not what it once was. I have had some right shoulder rotator cuff issues and since the crank uses the right arm, it was a chore to crank the gear down.

The tower checked my gear after I had completely turned the handle counterclockwise until it hit the internal stop and they said the gear appeared to be down and locked. I made a normal landing and taxied to my T-hangar very carefully. A rebuilt gear motor was ordered and installed, and the gear worked better than ever. The dynamic brake checked good in both up and down mode and the time to retract and extend was faster than with the old motor. The old motor was 30-plus years old so it didn't owe me anything. This was the first time in 30 years of flying a Bonanza that I actually had to hand-crank the gear down due to a motor problem.

I got to thinking it would be nice to have a tool to assist in hand-cranking the gear down if I ever needed to do it again. I seemed to recall an article in an earlier *ABS Magazine* that dealt with this subject. I researched my old magazines and found the article in the April 2007 edition on page 10181. It was written by Arthur Drake of Las Vegas, Nevada. He had devised a tool to slip over the engaged hand crank, and using a ratchet socket wrench to allow ratcheting the gear down in a lifting motion instead of hand cranking the small hand crank. I liked this idea and since I'm a retired mechanical engineer, decided to build one. But I made a few changes to Art's design.



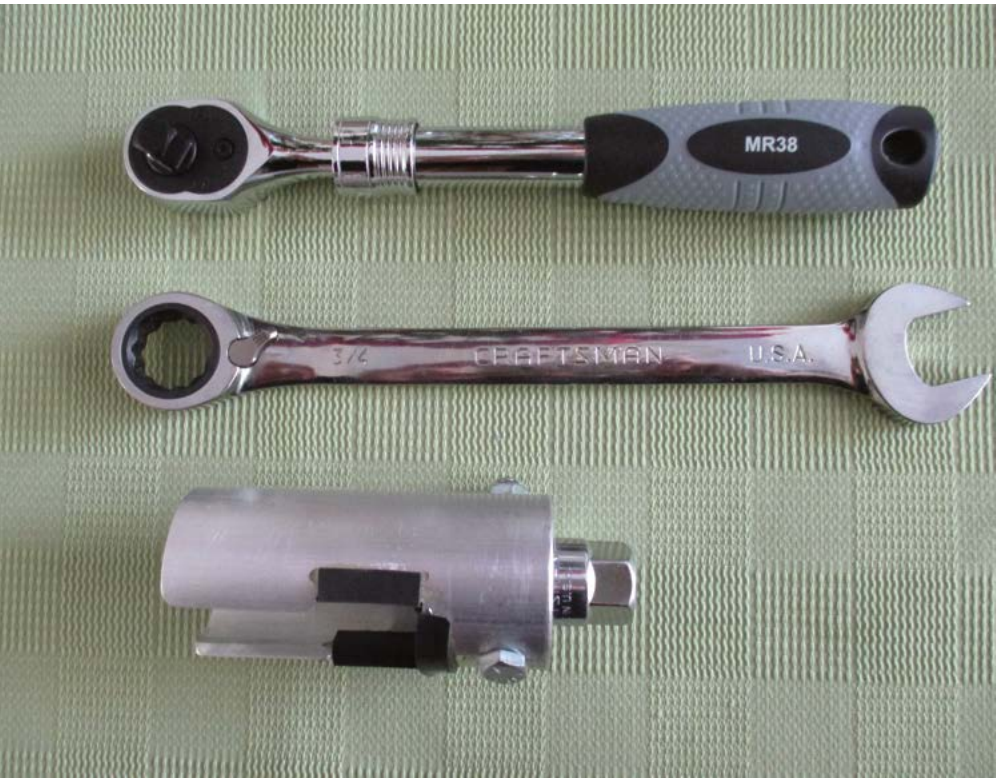
I can also use a manual wrench if the socket fails.



My gear extension assist tool with ratchet wrench attached

I chose to use a 1 ¾-inch aluminum tube with a 1/8-inch wall thickness instead of his design that used 1 ½-inch electrical conduit for the body of the tool. I used his dimensions for the length of the tool and the 2 ½-inch by 1-inch slot cut in the body. I added another slot about 7/8 inch by 1 ¾ inch opposite the larger slot (180 degrees from the larger slot) to allow clearance of the lower crank arm. I also added a 1/8-inch rubber "U" channel to the area that hits the crank arm as I did not like metal-to-metal contact, which could mar the crank arm.

For the plastic rings Mr. Drake used, I purchased a 12-inch-long Delrin plastic rod and had a friend of mine who has a lathe turn them to the dimensions Mr. Drake suggested in his article. I used a




**The entire kit weighs only two pounds and fits easily in my flight bag.**

5/8-inch spark plug socket, 3/8-inch drive, cut to length, and mated it with one of the plastic rings machined to accept the outer diameter (OD) of the socket to press-fit into the end of the tool body. I drilled a ¼-inch hole through the aluminum body, plastic ring, and press-fit socket to allow a ¼-inch Grade 5 bolt to lock the pieces together. I bought all the items to make the tool from McMaster-Carr in Chicago, except the 5/8-inch socket that I already had available. I chose the 5/8-inch spark plug socket because it has an external ¾-inch hex on the OD, which allows the use of an open-end wrench in case the ratchet wrench fails. This would not be required, but I like to have a backup plan.

I purchased a 3/8-inch expandable ratchet wrench that allows up to over 12-inch handle extension if desired. This gives great mechanical advantage for lowering the gear manually over the small diameter hand crank. With the hand crank engaged and the tool slipped over the handle, now the gear can be extended manually with very little effort. It takes more cranks on the ratchet than turns of the little handle, but it is very easy to do. I really like the idea of having the tool available in case I ever need to manually extend the gear again.

The wrench and tool together weigh less than two pounds. I keep it in my flight bag within easy access in case I ever need it. As the Boy Scout motto says, "Be Prepared."

I hope this article helps others who may have a difficult time cranking the gear down manually. If you have never tried lowering the gear manually in-flight, it takes much more effort than when the plane is on jacks in the hangar. The air loads make a big difference. I suggest anyone interested in making this tool review Mr. Drake's original article in the April 2007 *ABS Magazine*. If anyone would like to talk to me about this tool, please feel free to call me at 608-788-0735. Thanks, and happy flying!