

PUSH-PULL CONTROL LUBRICATION, THE EASY WAY

History:

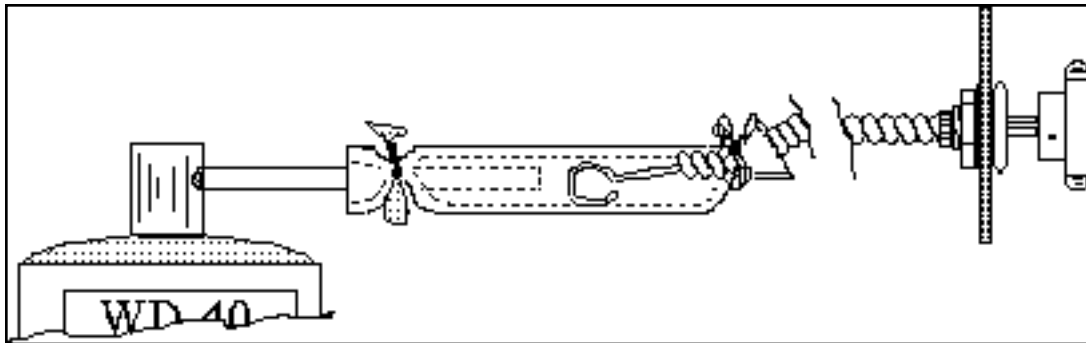
These are solutions for lubricating the push-pull cables on planes when they get a bit sticky or reluctant to move. What started out as a desperation cure on one starter cable became easier and better when the idea was shared with others who improved the original concept. One of the problems of push-pull cables is that ours are not lined with Teflon™ or other plastic liners for lifetime lubrication like those now available in all the plane parts catalogs. Washing the engine and firewall inevitably removes whatever initial lubrication there was in the push-pull cables, so some rusting takes place and dust gets in to make things bind a bit as well. When owners find that a cable is getting hard to manipulate or the control seems to have a mind of its own, the usual suggestion is that the entire cable be removed next annual and replaced. That means a lot of expensive time and effort and the next annual may be too many aggravating control movements from the moment.

Another suggestion is to “simply” remove the internal cable and lubricate it outside the plane and put it back in. Like many “easy” solutions, the reality is that most control cable ends are bent and are not amenable to straightening enough to get them out of the sheath...and then comes the even harder part if you do get it out...getting it to move back through the sheath without hanging up on every twist and every bend. The wire is very hard, and becomes brittle and will fracture with a couple of bends/rebends. The likelihood of you having a very straight, very willing inner wire is...small.

Solutions:

Because the mere straightening and then reconnection of the twisted or looped end of the control cable wire is enough to cause a fracture of the very hard wire, any technique that would do the job without the necessity of removing even the end of the cable would be most desirable. Eventually, a lot of contemplation during pauses at red signals and traffic jams gave us the *desperation solution*.

It minimizes or avoids disassembling, and requires a little bit of time, some patience, and these hints. The first example to be illustrated is the result of feedback which improved on the original methods discussed later in the article; we suggested our original solution to a Bonanza owner faced with having to remove and replace his throttle cable because it was so hard to move that he thought it might break. He took the ideas we gave him and went one better, using a pressurized can of WD-40™ rather than the 3-in-1™ oil we had used.



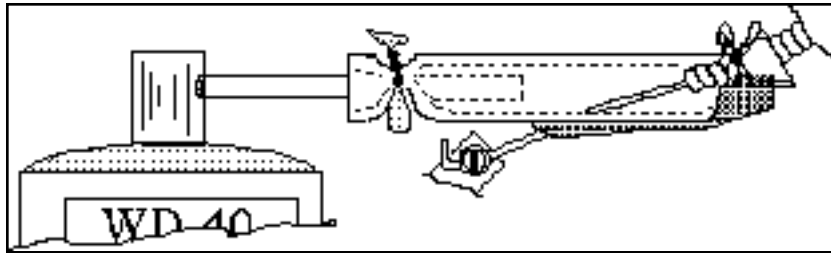
The magic of his solution was that the pressure of the can of WD-40™ was so effective in moving the lubricant rapidly through the push-pull cable. The concept is readily discernible from the figure. The tubing we used is rubber surgical tubing; it is effective because it is very pliable and therefore provides an excellent seal to the WD-40 feed tube and to the sheath of the cable with only the pressure of a spot tie cord as illustrated (take care to not apply so much knot pressure that the plastic tubing from the WD-40 can is crushed...safety wire might work, too). In this example, the end of the cable wire is shown detached from its normal termination to the mixture control and/or the carb heat control in order to have only the two ends of the tube to pressure seal.

Alert!!:

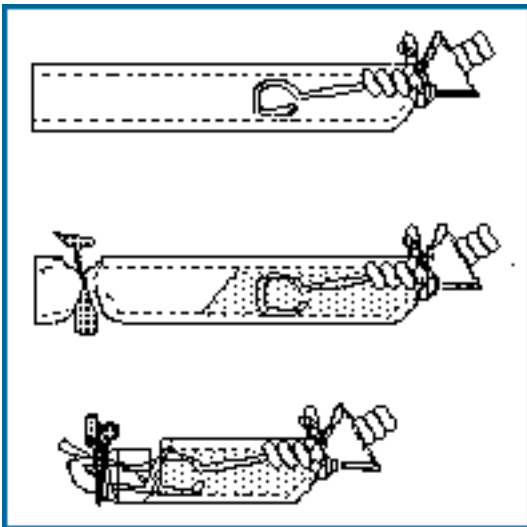
When you use the pressurized can of WD-40™, the step of the operation which you will skip the first time because you won't believe how effective the transfer of the oil throughout the cable is this: *pull out the cockpit end of the control by a half inch or so, and make sure you wrap the exposed section with an absorbent clean rag or good quality paper towel!!!!* After you ignore this step the first time, you will never again forget it! The pressure from the can and capillary action are remarkably effective in moving the lubricant through the cable to the cockpit end. Not much of a squirt is necessary, so make the squirts short, checking the top end before the next one.

Alternatives or Variations of the theme:

When the WD-40™ is seen at the top end, remove the assembly used to insert the oil, reconnect the cable end, and make sure the effort gets seen for correct attachment, movement of the control and signed off by your A&I. The advantage of this method is that the cable and plane are immediately usable after cleanup and reconnecting.



The best and often easiest solution was explained first, but it indicated that the end of the push-pull cable needed to be removed from its termination in order to place the surgical tube over it easily; in the event that is not practical, such as the day you can't get ahold of your A&I to sign off the removal and re-installation, consider the foregoing figure. In this instance, do not remove the end of the cable wire, but do slit the surgical tubing so that it goes over the end of the push-pull cable as shown and tie seal the ends as in the first instance. Then, apply fresh RTV to the slit in the tubing so that all of the slit will be sealed with the RTV. Make a "don't fly me because" sign to put where it will prevent any airplane use until this sequence is complete! After the RTV sets up (many types take less than a day to solidify, but a day is a nice period to be sure), apply the WD-40™ as before. After the WD-40™ is seen at the top end, the insertion assembly can be removed.



For the owner with a little more time or patience or one who lacks the can of WD-40™, there are other ways! The last figures illustrate the method first used, before the pressurized can was suggested by the happy Bonanza owner.

In the event the owner has a reluctant control cable, but lacks the can of WD-40™ at the moment, or if he wants to ensure that there is no chance of an eruption in the cockpit, the first methods we came up with are illustrated, showing the easiest case first, the one where the control wire can be disconnected from the item it is controlling. Push the surgical tube over the end and secure the end of it as usual. Next, partially fill the tube with light oil such as 3-in-1™. After squeezing out most of the air left in the tube, tie off the end so as to provide the second seal there (a small clamp as used for a stack of papers is easy to get and use as well). Then, slowly roll the end of the tube so that there is pressure on the oil within and then wrap some rubber bands around the doubled/rolled tubing to provide and sustain the pressure on the oil so as to force it up through the push-pull cable. We found it easy to verify that there was pressure because the surgical tubing bells out with the pressure, and we found it works best

if patience is used, leaving the assembly on until a day has passed. In the same fashion, make sure you pull out the cockpit end if you can (the cable that started this endeavor was a starter cable, and it can't easily be partially pulled out, but do it if there is some slack) and protect the cockpit end from excess oil by wrapping that end with a clean absorbent rag. Again, it will surprise you how well the oil will travel throughout the cable with so little pressure.

Although not shown, the combination of the RTV seal of the split tubing in order not to have to remove the secured end of the cable wire is possible with the 3-in-1 and the pressurized tubing—that method was the first used, on a starter cable, and worked like a charm.

So, with a little bit of surgical tubing, some light oil or a pressurized can of lubricant, some string and maybe some RTV, you too can have smooth operation of all the push-pull controls all of the time!! Once you see how easy the method is, you will never neglect lubrication and will never again wait until the next annual to do the task. Like the Bonanza owner, be happy!!

The All-Important Inspection and Signoff:

And don't forget to have the A&I see and sign off, as always.

Neal

version VI, filed as push-pull lubrication (PPlube)

Neal F. Wright 1542 South Wolfe Rd
Sunnyvale CA 94087