

Technically Speaking

B.I.T.S.

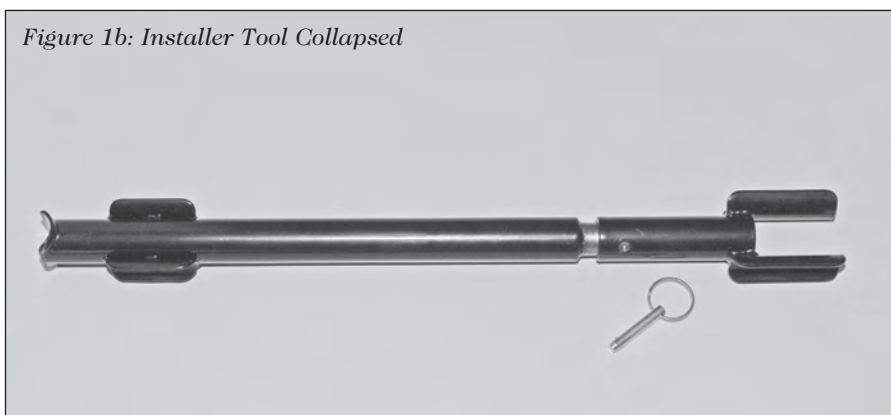
A New Bungee Installation Tool System

by David Clark, A/P, ICS #8592

Figure 1a: Installer Tool Expanded



Figure 1b: Installer Tool Collapsed



A hot topic recently has been the bungee cords and how often to change them. I have found myself changing mine more frequently and have revisited a topic that has been a pebble in my shoe for over 20 years.

As a pilot/mechanic, I have dealt, and occasionally struggled, with the bungee cords in our landing gear. I have used three different tools for installing the bungees in the wing and at least that many methods of stretching the bungees onto an installing device. I like using a bungee tool to remove the bungees in a controlled fashion and don't think it is a good idea to cut them or to use a pry bar. In recent years, I purchased the Bogert bungee tools and felt that they were a step in the right direction, although using their installation tool requires quite a bit of physical strength to insert it between a stretched bungee in order to remove it from the wing. In addition, I have always been impressed with how much stored up energy a stretched bungee contains and have been more than a little wary of the dangers involved if one of these tools were dropped when "loaded" or if they simply "got away from you" in the stretching process.

For a time, I couldn't figure out how to make a rigid tool work without a struggle. After several attempts to modify previous designs to my liking, I decided to start fresh and design a bungee installation system that was easy to use and, above all, safe. In conversations with other mechanics, I found at least two who had modified the Bogert tool by grinding down some portion of the channel iron flanges on the *inboard* or *bungee arm end* in order to make it more user-friendly. It seemed that there must be an easier way to insert a tool there. In the past I had used a bungee insertion device fabricated by a fellow mechanic that was made of a generous amount of all-thread rod with receptacles on both ends to capture the bungee and the pulleys prior to removing them. With the exception that this tool required an incredible amount of wrench work (one-eighth turn at a time), it was a good idea. I reasoned that if you inserted a shortened bungee tool between the bungee cord halves and were able to expand it easily to the required length, this would make removing and re-installing the bungee

Figure 2: Installer Tool, Inboard End



Figure 3: Installer Tool, Outboard End



almost effortless. I therefore fabricated a tool from steel tubing that would decrease in length about three inches, in telescope fashion, to a shorter version of itself (see figure 1a).

I found that the all-thread just wasn't needed since I wasn't using the tool to stretch the bungee. This tool was much easier to insert between the bungee halves – not only was it shorter, but the inboard end of the tool was free to swivel, adding to the ease of insertion. Once the tool was between the bungee halves, it could be easily expanded to the intended length simply by pushing the two parts of the tool apart by hand. I drilled some holes in the device to allow a detent ring pin to hold it in place at full length. When I expand the tool, I can see the two holes overlap about 90 percent. By placing a #2 Phillips screwdriver in the holes, they align perfectly and I can insert the ring pin (see figure 1b).

Now the tool works the same as the various rigid insertion tools of the past. And I have found that this collapsible feature is very useful when removing the tool from between the stretched halves after installing a new bungee in the wing. Likewise I collapse the tool when “loading” a new bungee on the stretching tool which I describe below. It makes it just that much easier to get in between the tightly stretched bungee halves even when not working on your back with your arms up over your head, such as when you are using the tool in the wing (see figure 2).

Another feature I incorporated into the installer tool was a much wider “saddle flange” on the outboard end to accommodate the outboard bungee pulley. This was done to prevent the pulley bracket from ever slipping off or cocking askew – something I had seen happen in earlier bungee tools and which could be potentially quite hazardous (see figure 3).

To design a new bungee stretching tool, I consulted Bob Lakey, an old friend and hangar neighbor who also happens to be a gifted engineer. Together we came up with a device that fulfilled our criteria (i.e., it was easy to use and very safe). The new bungee stretcher to be used in conjunction with the insertion tool incorporates some Acme threaded rod as a jackscrew and an internal thrust bearing to push apart the ends of a two-part telescopic steel tube (see figure 4).



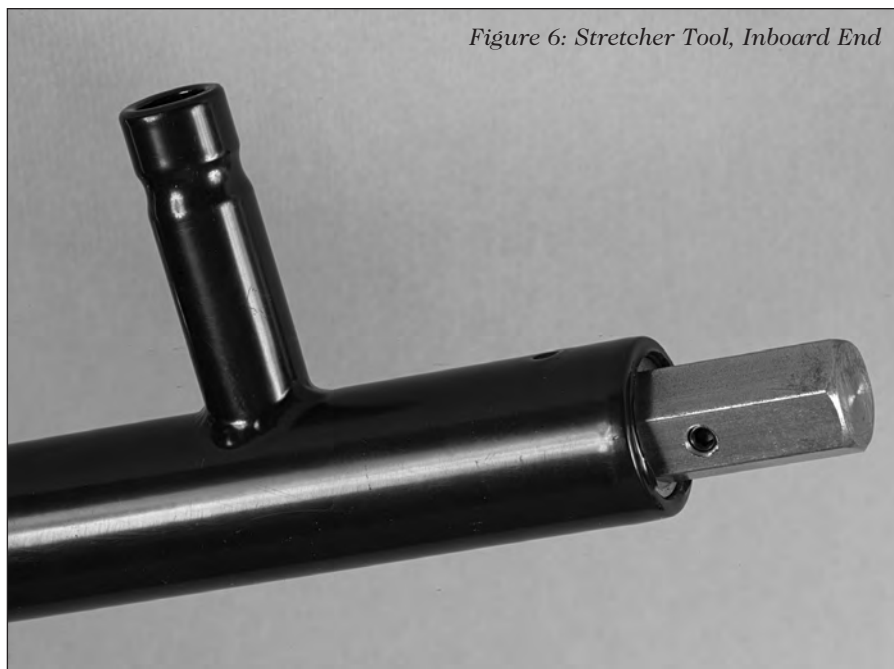
Figure 4: Stretcher Tool

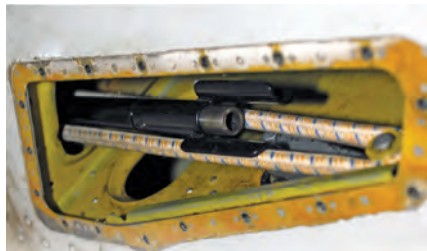


Figure 5: Stretcher Tool, Outboard End

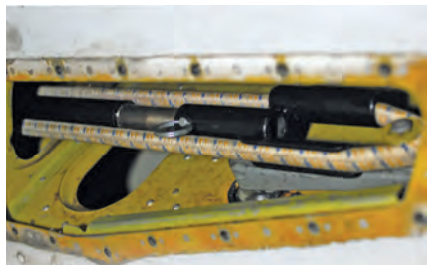
On the smaller end there is a vertical arm with a hole to accommodate the bolt which normally holds the outboard bungee pulley bracket in the nut plate in the wing (see figure 5). The larger tube has another vertical arm over which we can place the un-stretched bungee cord. At the end of the larger tube protrudes an elongated hex nut that turns the jackscrew (see figure 6).

Figure 6: Stretcher Tool, Inboard End

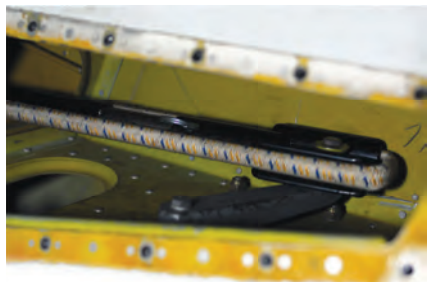




Installer tool in collapsed configuration



Installer tool in expanded configuration



Installer tool after gear is raised



*Pulley bracket assembly
attached to outboard vertical
arm of stretcher tool*



*Bungee placed over
inboard vertical arm
of stretcher tool*




Installer tool in place on stretcher tool

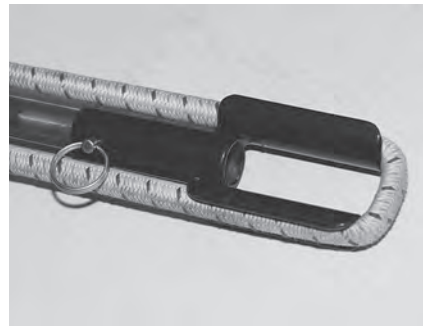
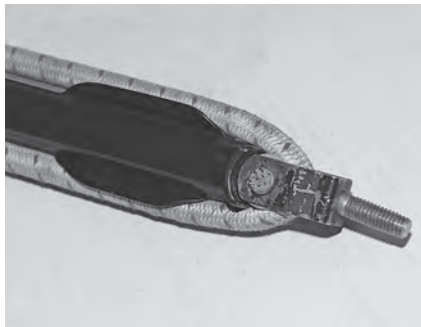


Installer tool removed after expanding stretcher tool

Outboard end of installer tool with bungee – detail view (left) and inboard end of installer tool with bungee – detail view (right).

The stretcher tool is designed so that you can use either a socket wrench, an electric drill, or an impact wrench to spread its arms. It can be operated in a handheld manner, but we made a small aluminum bracket to hold it in a vice to give you a “third hand” if so desired. Once the arms have stretched the bungee to sufficient length, you can place the insertion tool between the bungee halves and then back off on the jack screw which will allow the bungee to be captured on the inserter. You then unscrew the bolt from the arm at the outboard end and you are ready to install the bungee in the wing.

With this new bungee tool system, I have found that I can replace a bungee in one wing in about 20 minutes from start to finish. I am hopeful that we can find a tool manufacturer who will make this tool system available to Comanche mechanics in the near future. 



Bungee ready to be replaced

