INSTALLATION OF A THREE-POINT SEAT BELT IN A MODEL A FORD

by Keith Smith
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In my early association with the Model A Ford hobby, I had some friends who had a not too serious accident on a busy city street. The car was going around 25 miles per hour and another car abruptly made a left turn in front of them. The resulting collision popped the passenger door open and deposited one of my friends in the middle of the street. She was lucky that she was not run over by another car. That incident made me realize that seat belts should be installed in Model A Fords to keep the passengers in the car, at least. From that time on, I have put belts in all my Model A's and suggested that my friends do the same. I know that this is a controversial subject to some, but I am convinced, never-the-less,

I have experienced, either first-hand or through news articles the scenes of Model A accidents where the driver has impacted the steering column and have seen what the driver's chest did to the steering wheel. Fortunately, I have never had to look at what the steering wheel did to the driver's chest. These accidents made me super-conscious of the inadequacies of the lap belt. With only a lap belt, the driver and the passenger are free to fold over the belt and their upper bodies are propelled forward until their chests or heads strike something solid, like the steering wheel, the dashrail, the windshield, or the windshield props sticking straight back into the passenger space. When I saw the picture of the devastation caused to the Cook's car in an accident in the Northwest, I decided to see if I couldn't find a three-point system that would adapt easily to my 1931 Victoria.

I had viewed pictures of the wreck on the FordBarn.com website and while browsing the site, saw an ad from Juliano's (www.julianos.com). They advertised a pair of three-point belts manufactured for the hot-rod crowd. The pictures and the description lead me to believe that they would work for me, but to be certain, I ordered a pair to study them more closely and see if I could engineer an acceptable installation in the Victoria. I was able to make these belts adapt to the Victoria and I think that with some ingenuity, they would work on other body styles, other than the open cars. The purpose of this paper is to inform those who might be interested in trying an installation of these belts of my experience and to give them a few tips.

Let me make on thing perfectly clear, if you read on and attempt this on your car, you are on your own! **You do this on your own responsibility and that I assume no obligation toward you if you follow any suggestion herein and it doesn't work for you! You are on your own!**

On the other hand, if you are successful, and you would like to share your findings with others, please get in touch with me and I'll incorporate your ideas into any updates of this paper. It would be especially helpful for installation in other body styles.

To make certain that we are all talking about the same product, let me describe the item. I ordered a pair of seat belts, three point, grey, part number JU010304 at $179.90 a pair from Juliano's Interior Products, 321 Talcottville Road, Vernon, CT 06066. Their order phone is 800-300-1932 and their technical phone is 860-872-1932. Their web site is www.julianos.com. The product comes with a four-page installation instruction which is clear and generally adequate for installation. Use the manufacture's instructions and this paper as a supplement . If you are contemplating this installation, I suggest you go to the Juliano's web site and click on "See our step by step how to guides." Then look over the examples. They have one for a 1940 Ford.

Now, I am going to talk primarily about what I did with my Victoria. Your body style might be different and you might need to make some changes to my procedures. The first thing that I saw that was going to have to be changed was that their recommended way to affix the attachment plate was by welding to the door posts. That would be the best way to go, if you were doing a ground up restoration, but where you didn't want to burn the paint on an already restored car, something else has to be done. (If welding is your selected process here, you will have to be careful not to burn the wood in your doorposts. I would think that TIG-Welding might be the way to go to minimize the heat and something to protect the wood would be in order. I am not a welding expert, so you should consult one, in this case.)

I elected to bolt the attachment plates to the door posts and for the most part, I was successful. Were I to do it again, I would make some changes and those are what I am going to describe and tell you why. The installation of the doorpost attachment plates is the key process, The rest is very easily done.

The first thing I considered was whether the attachment plate would be strong enough to withstand a bad accident if it were bolted to the door post. In putting in seat belts of any kind, we have to be realistic in our expectations of being saved by the belt. Modern cars and airplanes are built to withstand considerable forces in an accident and their design includes the survivability of the passenger space. No such consideration was made when the Model A Ford was manufactured. If you are going to install a belt, don't fool yourself into thinking that it will save you if you head-on

with an 18-wheeler! Therefore, you don't have to worry if the attachment plate rips out in this case. What you want to protect yourself from is more like running into a tree at 40 or 50 miles per hour. If you do that, you want the attachment points to stay pretty firm and the belt to hold you in the upright position in your seat and in the car! I judged that two 1/4-inch grade-8 bolts attaching the plate to the door post would survive a much worse crash than my old body would, so that is what I used.

Figure 1 is a picture of one of the attach plates. (The plate is installed vertically, but I have rotated it 90-degrees here to show it to you.) Notice that there is a tang on one end. This serves no purpose in my bolt-on installation, so I cut it off with a hacksaw. This plate is mounted with the attach nut facing the wood in the doorpost. The wooden doorpost must be drilled or chiseled out to let this nut into the post and keep the plate face flush with the metal portion of the doorpost. I installed the plate by drilling two 1/4-inch holes in the post at the position desired. It is very important to position the holes properly and to drill them at right angles to the surface of the outside of the doorpost. *Don't let the drill bit tilt up, down or sideways!* In order to keep my drill properly aligned, I just a tool known as a *Portalign*, which helps keep the hand drill aligned at right angles. I used the attach plate as a template to mark the locations of the holes on the doorpost. It was with some trepidation that I center punched the holes and brought the drill bit in contact with the paint on the door post. Holding my breath, I finally drilled the two holes and inserted the two bolts to see how the plate would install on the inside of the post. The plate fit on the bolts perfectly, but I discovered that the holes which lined up on the center of the raised portion of the outside of the post came through slightly to the rear of center!. This would not let the plate drop into the cavity inside the post and be flush with the steel of the post. In order to do this, I had to grind about 1/4 inch off the rear edge of the plate. Look at Figure 2a. You can see that the bolts do not protrude into the center of the door post. In Figure 2b, the plate has been slipped over the bolts. You can see the offset which had to be ground away. (Lots of work!) You can avoid this and a later problem that I encountered. If I were doing it again, here is what I would do:

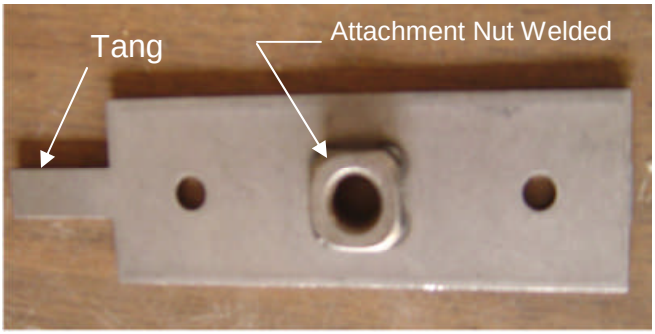
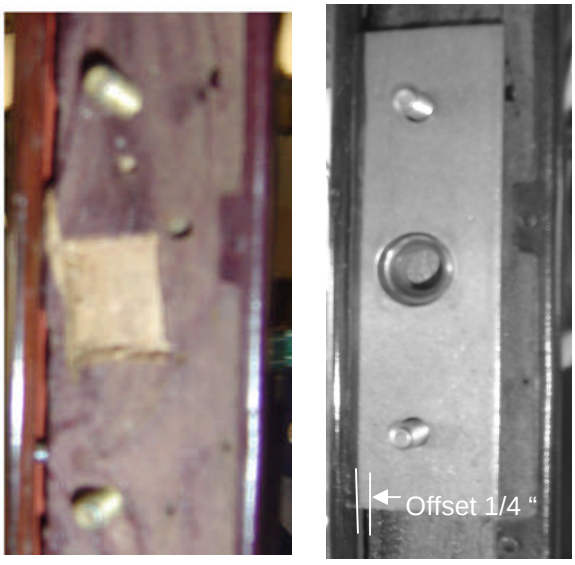
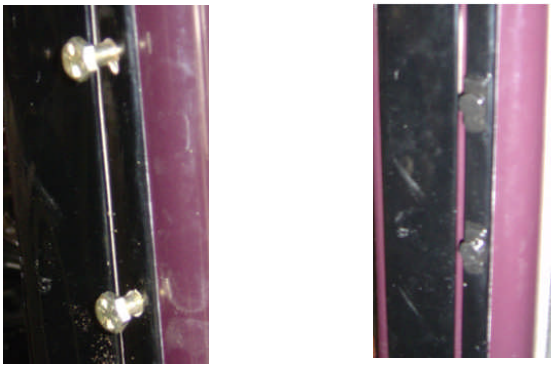


Figure 1
Attach Plate

First, I would weld the holes in the plate closed so that I could re-drill holes where I wanted them and make the plate drop into the cavity between the edges of the doorpost steel edges. Next I would drill the two holes using a Number Three drill bit in the same alignment with respect to the ends of the plate as the original holes, but off center to allow the plate to center between the steel edges of the doorpost. (I am writing this after all my work has been covered up, so I can't help you with any dimensions. You can figure this out better by making measurements directly from your car, anyway.) The Number three bit will allow you to tap the holes in the plate for a 1/4-inch 28 (NF) bolt. I used bolts and nuts which is <u>not</u> the way to go, as the nuts



Figures 2a and 2b
Bolts protrude though the wood are off-center. The hole in the wood for the nut on the mounting plate has been chiseled out.



Figures 3a and 3b
The camera can see a difference in the paint on the bolt heads, but the eye cannot detect this.

stick up and cause interference with the interior cover strip fastened to the inside of the doorpost. The tapped plate would give a smooth surface for the interior trim strip. Do all your work on the driver's side first as there are special considerations on the passenger side which will benefit from learning the easy side first. You should test your work by temporarily mounting the plate after you have drilled or chiseled out the hole for the nut welded to the plate. If all is well, you can cut the 1/4-inch mounting bolts to length to give you a flush fit with the surface.

Next, you can chuck the bolts up in a lathe and cut down the hexagonal head to make it round and then form it into a button top like a carriage bolt. In order to be able to apply torque to the bolt, you will need to take a hacksaw and cut a slot in it deep enough to take a screwdriver. Before permanently mounting the plate, you should apply "Locktight" or some other type of material to keep the bolts tight after they have been installed. After you have tightened the bolts, you could fill the screwdriver slot with some "Bondo" and sand it smooth before painting to match the doorpost. In modifying the bolts in this manner, you will be reducing the strength of the attachment plate somewhat. How much, I don't know. If you don't want to do this, you can skip this step and live with the hex-headed bolts. They are not very noticeable once painted to match the doorposts. However, don't forget the "Locktight!"

Figures 3a and 3b show my door post with the bolts installed (3a not pulled down) and after the heads were painted (3b).

You might pause to consider the way I installed the plate using a nut to fasten it and the way I am recommending—tapping the plate and machining the head. Are they relatively the same strength? Approximately. The nut is a bit thicker than the plate, so it may have one or two threads more to grip the nut. The bolts are going to be pulled in tension and bent in the event of an accident as they attempt to hold the belt against a moving body. A nut would conceivably hold a bit better than the lesser thickness of the plate and the handmade threads. If you feel that the nuts are the best way to go for you, then use them and follow my instructions on how to get by with the added thickness of the post and nuts. Also, the machining I suggested for the head has weakened it a bit. The effective area is ever so slightly reduced and the edges of the head could curl up reducing the area even more. This could cause the head to pull through the sheet metal more easily that an un-machined head. If you feel that this is critical and you can stand the hex-head poking out of the doorpost, don't modify the head! You are the engineer on this job and you only have to answer to yourself. There is no government inspector to say you can or can't do it! Remember, whatever you do will improve your chances, but there are no guarantees!

When you follow the manufacturer's instructions, you will note that you sat in the seat and positioned the driver's belt attachment at a convenient height. Now you have to consider two other things for the passenger side. The main one is a light switch in the doorpost (if you have one) and the other is the passenger's height. If you don't have a light switch, have your usual passenger sit in the seat and adjust the plate position for this dimension. If you don't have a usual passenger, then you are on your own.

If you have a light switch in the door post, you will probably want to keep it in the same location. This is especially true if you are working with a car that has been restored. The switch is already in position and the faceplate has imprinted the upholstery. If you are in the midst of a restoration project or are reupholstering, you may opt to move the switch if you are not too concerned about originality. If there is a switch there, more than likely, you will let the switch determine the location of the plate. It should be satisfactory even if it isn't optimal for your passenger size. Again, you don't have to look out for government regulations! One precaution: the switch and the plate will be in close proximity and if they touch in an inappropriate way, you can short the power to ground. If the circuit is fused, the fuse will blow. If it is not fused, the wire will burn up and could possibly do more damage. So be warned!

Figure 4
Passenger's Seat Belt mounted under light switch

Figure 5
Driver's Seat Belt showing retractor installation

I found all this out the hard way. After the belt installation, the first time I tried to turn on the dash light, it didn't work. This was some weeks after I had

installed the belts and I was on a tour. It wasn't until I got home and did a bit of troubleshooting that I discovered the source of my problem. The dash light and rear light were on the same fuse which had blown. I blew a few others searching for the culprit — the rear light switch touching the mounting plate. Grinding a groove in the plate gave the clearance needed to eliminate the short.

Now that you have mounted the plates, it is time to start to put things back to make the doorpost look normal. The upholstery strip that tacks on the doorpost will not fit if you used nuts on the attaching bolts. The solution to this is to determine the location of the nuts and to cut the hard backing material away so the nuts will allow smooth attachment of the strip. I used a suitable size of hollow punch. The strip can be placed upholstered side down on a hard board (such as scrap of Melamine) and the hollow punch hammered until the backing is cut, but not the upholstery. This sounds difficult, but actually, if the punch is not overly sharp it will not cut through the upholstery very easily and you can stop hammering before it does. If you should cut through the upholstery, a bit of contact cement should allow you to reapply the round patch to the outside of the hole after you install the strip.

A larger hollow punch will permit you to make a nice round hole clear through the upholstery strip at the proper place to allow you to screw the shoulder belt to the attaching plate.

Next we must consider how to attach the belt reel to the floor. This was fairly straight forward in the Victoria. For other body styles, you will have to see if the Victoria method works. If not, you'll have to make modifications.

I selected a spot on the floor directly below the attachment on the door post. I pulled back the carpet and found that I was looking at a hunk of oak framing. Looking under the body outside the door, I could see that there was a space of about 1/4-inch between the bottom of the body and the top of the splash apron. I then looked under the car to see where this would take me. This location under the car was outside the frame. I had hoped to attach the reel to the frame, but this would not be easily done. (See Note 1 at the end of the article.) The alternative was to attach to the body framing and the splash apron. "Would that work?" I asked myself. Again, we have to consider reasonable crash scenarios. The kit comes with a special reinforcing plate that the manufacturer claims will "gather up" the sheet metal when tension is placed on the bolt. Whatever force my body places on the belt in a crash is distributed to the two attach points. It is not all on this one point. How bad a crash would it take to rip the bolt through the splash apron and then through the oak frame. I don't know and I'd just not rather be around when that happens! If it's a lesser crash, then it will all hold together and maybe I'll live to drive my A another day! If this is not your philosophy, then I suggest that you engineer a way to take a few more "G" loads. One way to do this would be to weld up a triangular bracket which would attach to the side of the frame and come out far enough to pick up the bolt where it comes through the splash apron. In considering a more resistant attach point don't forget that an attachment that fails "gracefully" might be better in the long run! If the attachment is too stiff, you can be badly injured by the belt. It's your call.

Whatever you do, I think that it is a good idea to put some sort of material to take up compressive forces between the bottom of the body and the top of the splash apron. I used a couple of washers that slipped into this crack and filled the space. This will stiffen up the attachment, as well.

The kit includes a short "L" bracket which mounts to the floor (with the vertical leg near the doorpost. You don't need much clearance between the bracket and the door post as you can rotate the bracket to insert the bolt attaching the retractor and then rotate it back and tighten the bracket to the floor. You only need clearance to get a wrench on the head of the bolt attaching the retractor, since the nut can be placed on the inside where there is plenty of room to tighten with a ratchet and socket.

The third point of attachment (we'll get to the second attach point in a minute) is the other end of the lap belt which is sewn to a long metal piece that attaches to the "L" bracket using the same bolt as the retractor assembly. Once the retractor assembly and the free end of the belt were bolted in place, I was able to slip the carpet back in place between the bolt head and the bottom of the retractor assembly.

That left the stub belt for installation between the two seats. I had ordered the "hard arm" set which has a stiffening plastic sleeve for the stub belts. When I got around to installing the belts, I decided not to use the hard arms. I think that you should order the "hard arm" kit and make your determination of whether to use them or not when you get to this point of the installation. My decision was based on my belief that there was insufficient room between the seats and that this would cause the hard arms to wear the upholstery on the edges of the seats. The hard arms do make it much easier to latch the belts, but they are not difficult to latch without the hard arm. Some time after the installation, I decided to use the hard arms, which makes snapping the end of the seat belt into the buckle on the

stub arm much easier. Even though I thought that there wasn't room, it turned out that there was adequate space between the seats with the hard arms arranged with the driver's arm aft and the passenger's arm forward.

The Victoria has a thick plate under and between the two seat which forms a floor for the folding seat rear legs. I deemed this to be strong enough for the belt anchor for both the belts. (This plate held the anchor for the lap belts which I removed.) If you don't have such a handy place to attach the stub belts, you can go under the car and see what is there to form an anchor. The kit has two more hefty plates that can be used to reinforce under the car. A long piece of angle iron can be placed under the seats and span from one side of the frame to the other. It can be tack welded in place to the frame if you so desire. I would not rely solely on the floor or seat bottom sheet metal, even using the reinforcing plates provided with the kit. Remember, if you hook both stub seat belts to the same anchor point, you may have *two bodies* pulling together to break this anchor! If you have doubts about the strength of your anchor point, use two separate anchors for the belts in the middle. This might cause some interference between them, so they can be staggered a bit, fore and aft.

The intent of this paper is to be helpful. If you find any errors or have better ideas, especially when installing on other body styles, get in touch with me and let me know your ideas. I will update this paper and pass your thoughts on to others in our hobby. I'd be glad to hear from you in any event to let me know how your installation came out.

Keith Smith
14417 Colorado place
Canyon Country, CA 91387
661-298-0625
661-298-0641 (FAX)
keithramsey2@earthlink.net

Note 1.

In reading other material and listening to others who have installed seat belts in Model A Fords, I have been exposed to conflicting information. I refer to those who advise not to attach seat belts to the frame. Their reasoning being that should you have a sufficiently violent crash, the body bolts will shear or the body wood will fail and the body will move with respect to the fixed occupants. This would, they say cause more injury to the occupants than if the belts were attached to the body. While this might happen, there are serious doubts that a living person will still be inside the body. The seat belts will have done their duty and no more could be expected of them. If you doubt this reasoning, you could replace your body to frame bolts with class-8 bolts which would greatly increase the magnitude of this catastrophic accident. However, this will not prevent wood of the body frame from failing and allowing the body to move fore or aft, or even departing the frame in a broadside type accident. Again, I doubt that a person would survive the violence of such an accident, with or without seatbelts, so I would not try to design an installation that would protect me in this situation.

In a hard hit from behind, should the body move forward with the seat belts attached to the frame, the persons in the front seat will be squeezed more tightly by the belts as the seats move forward. In the same accident with belts fastened to the body, the driver will move forward and would eventually strike the steering wheel which is fixed in place, but the belt would not tighten. Probably this hit would break your neck, so maybe there is nothing to worry about.

Now consider a head-on crash; if the body moves, it would still be forward due to the inertia of the body and passengers, but this would probably be an even more violent accident than the one described before and would very probably not be survivable no matter where the seat belts are attached..

I would have more reluctance to drilling a hole in the frame than to fear the bolts shearing. If a hole already conveniently existed in the frame where I desired to attach a seat belt, I would not hesitate to use it feeling that an accident that sheared all the bolts holding the body to the car would be so violent that seat belts would be of little use in saving me. It is hard to say what will happen to 75 year-old wood, however. That's just my opinion and it certainly is open to argument.

Again, I want to point out, there are no government regulations that would guide you or restrict you. It is all up to you! There are those who say don't fasten to the frame and those that say don't fasten to the body. You can seek your own "experts" on this and then decide to do what you want. But, I do think that seat belts are much better than no seat belts.

One thing for certain, we Model A owners must realize that driving a Model A just isn't as safe as driving a modern car! This means that in addition to having seat belts, we must keep our steering, brakes and suspension in tip-top condition. We must have good lights for night driving and to make our cars visible to other drivers. Finally, we must always drive safely and keep a good margin of error for the careless driver.

I would like to hear of your seat belt installation experience and your opinions on attachments to frame or body.