

**Structural Repair for the Home Craftsman-** You don't need a bunch of expensive woodworking equipment to do quality wood repair in the home. Repaired your wood with surgical tubing lately??? Repaired a chair without taking it apart? Find out how these and other techniques can help you around the home.

## What is Structural Repair?

Structural repair has to do with whatever keeps the “structure” of a piece of furniture together. This means that all the joints in a chair are tight so the chair does not sway or even worse collapse. The structure of a large cabinet keeps it tight and square so the doors and drawers work smoothly and evenly. A dining table might have loose or ill-fitting legs that make it unusable. Many modern pieces of furniture are put together with screws and other special types of hardware that might be lost in a move or ripped out in the moving process. All these things fall under the category of Structural Repair.



Woodworkers, have for many centuries, cloaked and shrouded the techniques for properly repairing furniture and wooden surfaces. **I do not intend to teach you everything** you need to know about wood restoration in this article. I am simply going to show you what **YOU can handle** easily around your home **if you are at least a little bit handy**. These repairs do not need extensive woodworking equipment, heavy clamps, or any previous experience. I will, however, expose you to some new repair materials and some “clever do-it-yourself” tools you may have never dreamed of!!! Just keep an open mind and with some practice you can keep your furniture in great shape.



## Our Shopping List of Repair Materials

This should be a lot of fun for you! You can source most of these supplies locally at your hardware store, home center, or even paint supply store.

**Cyanoacrylate based wood glue-** If you have a hobby shop near you that sells those radio controlled cars and planes they'll carry this stuff.

A few brand names are Hot Stuff, Zap, and we will even carry our own Furniture Physicians brands shortly if you can't find it locally. You'll find that they probably come in a thin, medium, and thick formulas. Buy a small bottle of all three. Also buy a bottle of “accelerator.” I'll explain their uses later. Even Gorilla brand glue makes a wood super glue.

**Yellow Aliphatic Wood Glue-** You've seen these in all hardware stores and paint centers. My favorite brand is Titebond (their world headquarters and plants are about 15 minutes from my shop) because it is consistent. Original formula Titebond is fine unless you think your repair work is going to receive some moisture abuse. Then choose newer Titebond II. Again just buy a small bottle of either one.

**Polyurethane Glue-** Yes, polyurethane glues not finishes. Distinctively brown in color. Gorilla brand is good and even Titebond is making this stuff now. Again buy a small bottle.

**2-Part Epoxy-** All hardware stores carry some type of 2 part epoxy in a dual syringe. Devcon makes many different types of epoxies this way. Many are rated for bonding many different materials. Just make sure the one you buy is rated for bonding at least **wood to wood**.

**Minwax High Performance Wood Filler-** Any Minwax dealer will carry this product or be able to order it for you. Again buy the smallest container available.

**Minwax Wood Hardener-** Buy a small container while you're still at your Minwax dealership.

**Latex Hose-** The last time your doctor or hospital took your blood they tied some of this yellow rubber hose around your arm to help them find your veins. It comes in 1/4" to 1/2" diameters. We used to tell people to go to medical supply houses but even Home Depot carries it in their plumbing section.. I even saw it at our local hardware store. Try to get 4 to 6 pieces that are at least 3 to 4 feet in length.

**Chemistry Hose-** This is another alternative if you are having trouble finding the latex hose. You can talk to any junior high, high school, or college lab instructor and they should be able to send you to a local supplier. You might even ask them for their old hose that is no longer safe for chemistry. Again we need 4 to 6 pieces about 3 to 4 feet in length.

**Shrink wrap or stretch wrap tape-** Office supply and some home centers carry this material. You've seen it holding bags of peat moss, sand, or concrete to a pallet. It only sticks to itself and actually has **no adhesive** on it. Get it in a roll of at least 4" width or preferably 6."

**Dowel Rods-** Again available at almost any hardware store or home center buy 1 each of full length (3 foot is typical) dowel rods starting at 1/8" in diameter and continuing up through 1 inch in diameter. This may cost you about 10 dollars or so but they'll really be handy later. You may even want to buy some packets of dowel pins that are pre-cut and available in 1/4, 3/8, and 1/2 inch diameters.

**Screw Selection-** My father grew up during the depression. I think he kept every screw and nail he ever removed and categorized them in jars. I will make this a little easier on you. There are three common types of screws that you will find in your furniture. This is what they will look like...

  
slotted  
screw

  
phillips  
screw

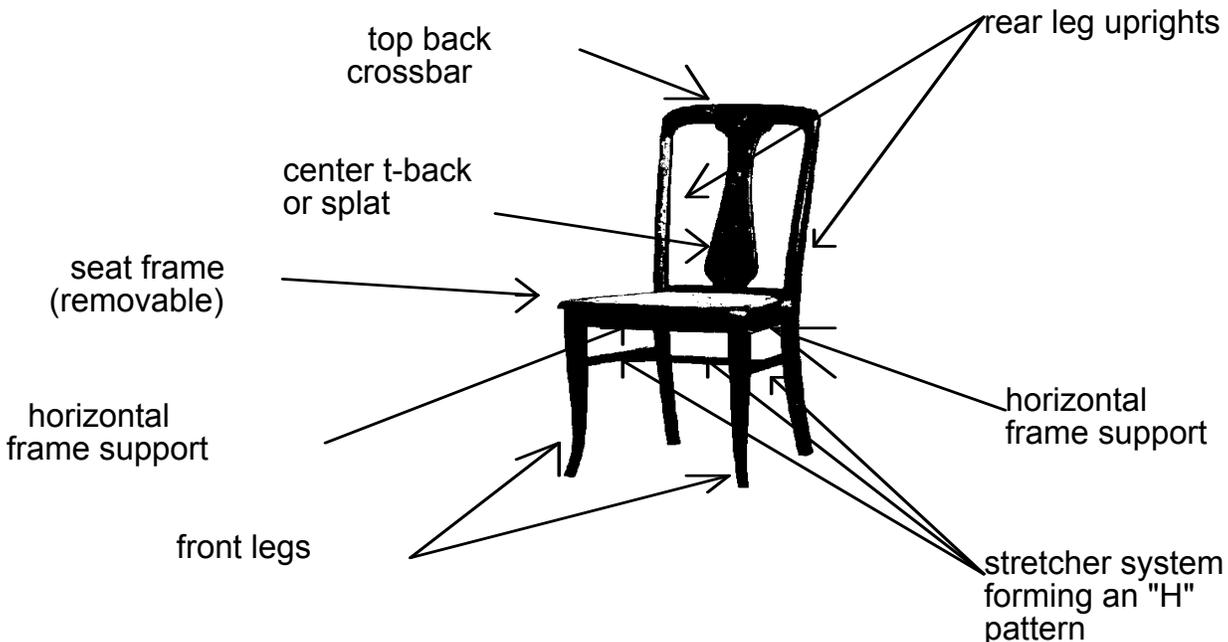
  
roberts  
screw

Most hardware or wood specialty supply shops will carry boxed assortments of these screws not only in various sizes but also in various length. You can buy an assortment now or simply identify the type of screw you have and take a sample with you to obtain more later. ( I always prefer to have screw assortments laying around as this saves me time "hunting" for screws quickly when I really need them!)

**Screwdrivers and Miscellaneous tools-** Just a nice cheap assortment of Stanley screwdrivers will do. You might also want to pick up a Latshaw brand multi-bit ratcheting screwdriver. These cost around \$10 but have all of the bit tips you will need for the three screw types we have talked about. Home Depot is a distributor. I use one professionally every day and wouldn't leave home without it! You might want to buy a decent "no blow," "no mar," polyurethane hammer. Make sure that it states that is specifically non marring. The head is loaded with lead shot to reduce bouncing. Again Stanley makes a nice one. A cordless drill (a 12 to 14 volt model is a good compromise) with a good set of nitrided cobalt drill bits. Black and Decker's Bullit bits are a good consumer buy. Of course any other socket sets, wrenches, nail pullers, or any other tool you may have accumulated in your household may be needed!



Let's get started! Yes, we have a winner!!! The household chair. This is what we repair the most of in your homes today. Even brand new they have usually have been treated rough in shipment. I was doing some "overflow" repair work for a large dinette retailer one day about 2 years ago. They unloaded 225 boxed chairs in about an hour. I repaired 52 of them before they went back out for delivery! It's not surprising then that you also have trouble with chairs in your home. Let's look a little closer at the anatomy of a chair like this one so you can identify some basic parts and understand how they are damaged.



This is a rather simple chair frame yet it has no less than 18 individual joints! If just one glue bond in a joint fails it may not be noticeable but if 2, 3 or 4 of these joints fails it's just like a house of cards. You may end up on the ground! Our goal here is to catch these loose joints as soon as possible so other joints aren't encouraged to fail as well. Let's test this chair or your other chairs right now.

Face the chair from the front looking to the back. Put your knee with all your weight directly in the middle of the chair seat while you grab each rear leg upright about 3 inches from the top. Try to wiggle the chair in a circular motion. If you feel like you've got a new dance partner you have several loose joints. If you only hear a little squeaking but the chair seems basically solid I would attempt **no repair** at this time. The most obvious place to look for loose joints first is the stretcher system that forms the "h" pattern. You can generally take your "no blow" hammer and lightly tap these joints apart enough to clean them with a little medium grit (about 120 to 150) sandpaper and re-glue them with regular Titebond Glue. Smear, sparingly, a little glue on each joint, tap the chair back together with your hammer again and use either surgical tube or the stretch wrap around the chair to tightly keep the joints together at least 24 hours. If your chair does not have a stretcher system on it more than likely your chair seat framework is loose. If this is the case the entire chair will probably need to be taken apart for proper repair. It's time to call a professional repair service. It's not that a consumer can't do this but just remember, 18 properly aligned and positioned joints on even the simplest of chairs!!!

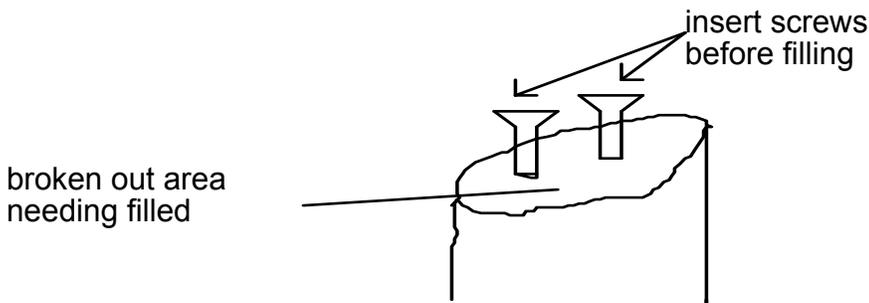
## So why didn't you choose one of the other glues for this chair

job??? That's easy. Remember, I said tap these joints apart? That means they still fit properly. If the stretcher system fell out and hit the ground when you were testing the chair I certainly would have picked another type of glue. Yellow glues like Titebond only work when you have closely fitting joints. If joints have enlarged with age and movement another type of glue is needed. If there is less than about a 1/8 inch gap in the joints I would probably use the slowest setting of the cyanoacrylate glues. Apply them just like you did the yellow glues but do something a little different so you don't have to clamp them. Use enough glue so a slight amount squeezes out around your edges. Now use the matching glue's accelerator and mist around the outside of the joint. This will harden the glue on the outside and act as a "holding jig" while the rest of the glue dries inside the joint. Neat, huh? Still give the joints 24 hours of sitting time before use. The polyurethane wood glue would also have been a candidate for this job as it expands and fills gaps as it dries but you would have needed your latex tubing or shrink wrap to clamp the chair again. Now let's take this chair gluing job a step further. Lets say that the stretcher holes are enormously enlarged or we have broken stretchers. Here you might want to use the epoxy to fill up enlarged holes. Let it cure for 24 hours and then re-drill the holes to their proper original size. This will make a tight fitting joint again. As for the broken stretcher the epoxy is the only glue short of replacing the entire stretcher that even stands a chance of holding.

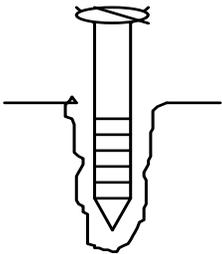
**Single Joints-** You're lucky! Just one simple joint? If you can slip the joint loose about 1/2 inch at least and coat with epoxy glue. Shove or tap it back together and shrink tape the piece for 24 hours. If you can't slip the joint apart you might try one of my quick fixes for a single joint. Feed a little of the thinnest of the cyanoacrylate glues slowly into the joint. Make sure to rag off any excess run out glue. Don't be tempted to accelerate it with the accelerator! Just shrink wrap it for 24 hours. This works about 90% of the time and is a decent repair.

**Noisy Joints-** Many joints will squeak like the dickens before they even become loose. This is wood on wood squeaking and happens where there is no glue contact. Try the same fix that I just talked about with the thin cyanoacrylate glue. It will get rid of noise when nothing else works!

**Rotting Feet-** No, No, it's not a jungle disease. I used to only see it on 100+ year old chairs but thanks to modern floor cleaning detergents and poor storage facilities we even see it on newer chairs. If the bottom of your chairs' feet seem "spongy" or you can pick chunks loose with your fingernail you've got the beginning stages of "wood rot." Put the chair someplace upside down where it can remain secure. Pour some of the Minwax Wood Hardener into a small disposable bowl and brush (disposable pipe dope brushes work great for this) this resin into the wood. On deeply rotted or darkened wood I will even pour this directly into the wood until it stops being absorbed. Wait at least 24 hours and you'll come back to nice hard wood again. If any chunks are missing now you can use the Minwax High Performance Wood Filler to fill and form the area back to shape. This material can be carved and stained. Just follow the directions on the can. Here's a little indispensable tip if you have an area of 1/4 inch depth or more to fill...



If you insert a couple of screws in the broken area before you put High Performance Wood Filler in the area it will give the filler something to "grip" onto. I prefer to use stainless steel screw for this as they will not weaken the filler over time internally.

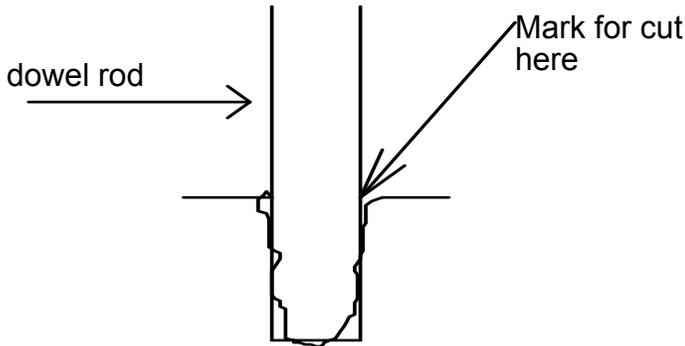


## The No. 2 Furniture Troublemaker-

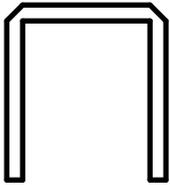
The stripped screw hole. Yes, because of these little "Achilles heels" even the strongest furniture can fail. Modern furniture building ( about the last 50 years) has grown very dependent on the screw. It provides sections that can be taken apart and serviced, it hold hinges, latches, and other functional items on furniture together, and with good design is the foundation for larger pieces of furniture. Like joints, if one screw comes loose in a piece, not such a big deal, but what about 2 or 3 or more! So you pick up the screw that just fell out of your armoire and you try to tighten it. Nothing happens. It won't tighten. If your furniture was built in the last 30 years or so it may be made of compressed paper. That's right, good ole' medium density fiberboard.

MDF for short. Screws tear right out of it, sometimes with hardly much effort. In an older piece the screws will sometimes tear out because the wood shrinks with age across it's face grain. The hole has actually enlarged allowing the screw to tear out. The fix for all stripped screw holes is the same. First, don't ever glue a screw back into the hole! Never, ever, ever do this. Didn't you notice that the screw is designed to be removable? You screw it in, you screw it out, etc., etc.

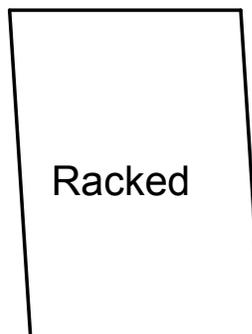
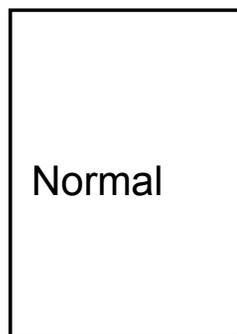
Besides, it probably won't hold. Get out those dowel rods. Pick one that will tightly pressure fit into the hole. Push it in until it bottoms out in the hole.



Mark with a pencil on the rod where it needs to be cut at to be flush with the surface. Pull it back out. Cut it with a saw. Put some of the medium thick cyanoacrylate glue (watch your fingers, you might want to have some disposable gloves on when you do this) in the screw hole and tap the cut dowel rod flush with the surface. Give it 24 hours to cure. You can then drill a small pilot hole to start your screw and you'll be back in business!

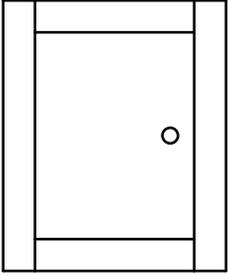


**The No. 3 Furniture Troublemaker-** No, it's not a place to kick a field goal through. It's a staple. They used to be made of steel. Now they are made from copper. Usually fed with a single wire that is shaped, cut, and driven in an instant in the modern furniture factory. Don't laugh about these little guys. They are big trouble. These hold the paper or plyboard backs onto your furniture. If enough of them are missing or broken your dressers, chests, armoires, and chinas will start to "rack." Your furniture frame starts to go out-of-square like this...



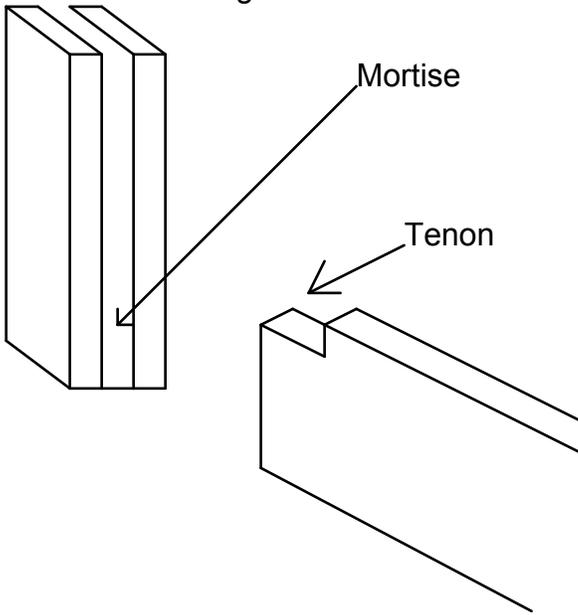
It may not sound like that big of a problem at first but just wait until you try to open your doors or drawers! Now, to fix broken staples don't think about buying some type of stapler. The best are air driven and that's many more hundreds of dollars than you need to spend for a good fix. Just replace broken staples with screws. It's easy. Just re-align the parts that have come loose back to their original position and space out screws spaced apart the same width as the staples were before. You

might want to drill small pilot holes for your screws to avoid any splitting. Speaking of staples, guess what's holding about half of all sofa and loveseat frames together? More staples!!! Again, made of copper, and up to 3 or 4 inches long. Before you throw away that \$1500 sofa that has the loose arms flip it upside down. Remove the black or white thin dust cover on the bottom. You might be able to see up inside that these plywood arms were just stapled to the main frame. Again you might be able to get several screws into the area to pull the arm up tight again. It's worth a try before tossing it in the dumpster!



## Panel construction or can we talk about mortise and

tenons? Panel construction like a typical set of cupboard doors or the side of some china closets always have the same failure. Everyone thinks that the panel is glued in place all the way around but indeed only the tongue (tenon) of each surrounding board is glued into the groove (mortise) of the other surrounding boards like this...



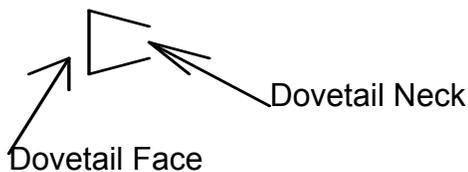
The panel only fits snugly. If the panel was perimeter glued, it's natural shrinkage, with time, across its' face grain would pull it apart or at least cause cracking. Like any joint over time and stress these joints come apart, too. If a door comes apart, just clean off all the old glues and reglue the areas where you see the original factory glues. Try to clean or sand as much of the old glue away as best as possible. You might want to use a framing square ( they look like a big "L", a two foot by 2 foot model will do nicely) to put on the outside of the door frame just to make sure it squares up well. Any of our glues are fine for this job. You might want to use your surgical tube for final clamping. If you find that the entire side of your dresser or chest is coming apart like this door example it is again time to seek professional help. It sometimes takes even 2 to 3 craftsmen in my shop to align these pieces properly in their reconstruction.



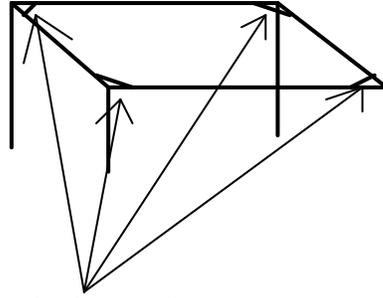
**The Modern Dowel Pin-** I saved the best for last. Consumers are terrible at replacing broken dowel pins. I am not exactly sure why. My best friends in this field say you just don't do it often enough to get a "feel" for it. Well, let's try it. First dowel pins are quite tough and resilient. They rarely come unglued and actually break. This means that you must saw, grind, or file the broken stubs flush first, then you can drill them out. Here is a suggestion for you so you don't over enlarge the hole. Try to center a 1/8 inch thick bit in the broken dowel. Drill this down until you feel a "give." This is the glue squeeze-out backspace. Don't drill any further! Now move up to the bit that is close or just slightly smaller than the dowel pin you are removing. Do the same thing again. If a further cleaning is needed in the hole to fit the new dowel pin you can use a rat-tail file to clean out the rest of the hole. Rat-tail files are available at any hardware store and look like this...



Once you have cleaned the holes out just use one of your appropriately sized packaged dowel pins. These are best since they already have spirals of flutes cut into them. This allows excess glue to be squeezed back into the backspace as the furniture builders intended. Glue them up and clamp if needed. If the pins fit tight use your tightbond. If you have some sloppiness consider the other glues instead.



**The Free Bonus Round-** Look at the sides of your drawers as you pull them out. Does this pattern look familiar? You are looking at dovetailed joints. They are the crowning achievement of mans' drawer building talents. It allows the drawer front to lock onto the sides of the drawer frame thus withstanding the daily pulling (more like "racking") motion. They are very durable joints but again with time and enough stress they simply come apart. Again only re-glue where you see glue remnants. Don't glue on the outside. Keep the glue only on the tail face and inside surface of the tail. I prefer medium thickness cyanoacrylate glue for this. I glue it and hold it while putting mild pressure on the drawer.



Tighten these bolts  
by hand or wrench

## The Second Free Bonus Round-

It happened to me again about a month ago. I was in a 1.7 million dollar home. The \$13,000 dining table was doing it's own dance routine. I reached up under each corner with my fingers and tightened the loose wingnuts that corner bolted the legs in position. The lady said it was a miracle. I laughed and said, "Give me a call when I can charge you for something." (She has sent a lot of business my way.) Come on! This isn't hard. If you have any type of 4 legged table (yes, even coffee and end tables) just reach up into the corners and feel for nuts of some kind. Wing nuts have distinctive ears you can feel with your fingers. Regular nuts will be square (older furniture) or hexagonal on newer furniture. Tighten them with the appropriately sized wrench. Yes, it's a miracle!

## And now for our exclusive Disclaimer...

I really didn't want to do this but I see every night on the news about the latest stupid thing that a person does to himself in the pursuit of "a hobby" or craft. Read labels, follow warnings, don't smoke while you work, use common sense and read all of the rest of this disclaimer very carefully...

**Although Furniture Physicians and Darrel Kestner Restorations is providing you with information about furniture structural repair we in no way can warranty or guarantee any specific results with your particular furniture. The consumer should understand that practice and repetition combined with our information is a good starting point for mastering these techniques. You or even professionals can further damage furniture if carelessly applying these techniques. Experimentation on scrap furniture and woods is advised. Furniture Physicians and Darrel Kestner Restorations assumes no responsibility for the health or safety of any individual using any of the products listed in this publication.**

About Darrel Kestner and Company...

Mr. Kestner along with his wife Annette and daughter Lora run the Furniture Physicians Company and Darrel Kestner Restorations. This material is taken directly from company files and classes taught by the Kestners over the last 32 years. Although we recommend products that we feel work, no solicitation from product manufacturers is accepted. These publications are in response to many e-mails we have received about these topics. We are so flooded with questions in our business it would be impossible to answer each one. Here's something novel for you, too.

A personal Thank you, from the desk of,  
Darrel D. Kestner  
Master Craftsman  
Furniture Physicians Co.  
Darrel Kestner Restorations

