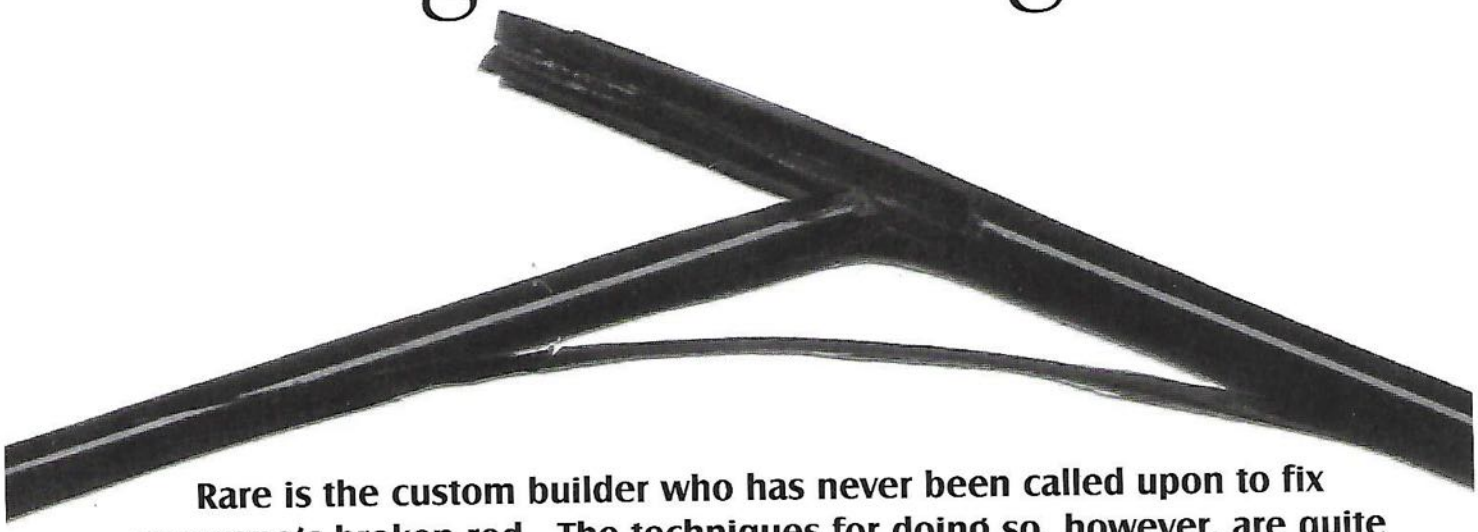
## Fundamental Repair Concepts

# Putting It Back Together



**Rare is the custom builder who has never been called upon to fix someone's broken rod. The techniques for doing so, however, are quite different from what is involved in building a new rod and many custom rod builders have little or no idea where to begin. The following article should put you on the right track.**

### Story and Photos by Ralph O'Quinn

There are more and more of you out there fixing up old rods, even fixing up not so old rods. Your high-end graphite fly rods, spin rods, plug casting rods, etc., are not noted for their ruggedness or durability. They are noted for their delightful handling characteristics and their not so delightful cost. It almost seems as though the higher the cost - the easier they break. The manufacturers of these rods usually have an unconditional warranty. Stomp on it, run over it with your pickup - whatever - they will replace it. But the replacement is not always a painless process. If it gets broken on a weekend and you want to go fishing the next weekend, you had better have a substitute rod or two on hand, or else you will find yourself staying home and thinking about the nice trip you might have had if only...

I'm finding more and more of these high end rods that are repaired - sorta -then I get them after the repair needs repairing. Ordinarily if a rod is damaged and the damage is repaired, the manufacturer will not honor the warranty because it has been altered. So you make your choice - send it back - or have it repaired. But you don't have it repaired for next week's long-planned trip, then send it to the manufacturer when you return. It's an either/or situation, not both.

For some reason more of the older rods are being repaired. I have repaired lots and lots of rods where the cost of the repair was substantially greater than what it would have been to replace the rod with a far better one. Sentimentality is usually involved here and I have no quarrel with that, as long as all the facts are laid on the table. The repairman must present all the facts of the poor economics of such, and the repairee must be of legal age and sound mind.

Quite a few of older rods are also being "reworked" or "re-furbished", and the expertise necessary to properly accomplish this job falls within the repair category. Once a guy has fished with the same rod for 30 years, caught many a memory and developed a feel for that particular stick - he doesn't listen to all the hype about the reel seat being rusty and

loose, the handle squishy and half gone, the guides mostly taped on. These things are irrelevant. He even goes with family and friends to local sports shops and handles literally dozens of new modern rods of a similar makeup - but nothing FEELS right. Then he learns about this guy that can make the old rod new again - at about twice the price of those he looked at in the shop!

**Repair Skill**

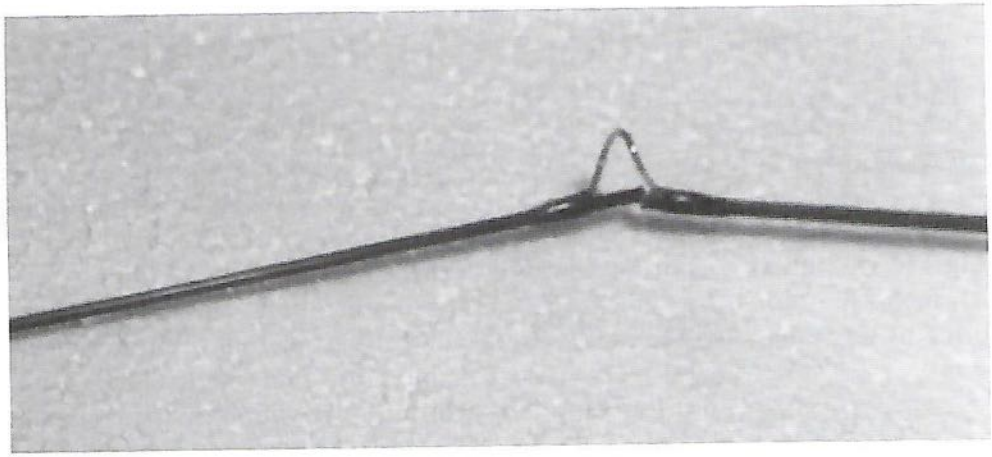
The skills involved in repairing a rod can be more demanding than the skills involved in building a rod. This statement, of course, will be challenged by the many fine craftsmen engaged in producing the excellent custom rods so prevalent in our fishing society, especially by those who have mastered thread art and specialize in beautiful butt wraps. However, from many of these fine craftsmen I see a lack of understanding of basic structural principals as well as a lack of knowledge of rudimentary rod blank construction. From very competent rod builders I have seen atrocious attempts at repair of the rod that they so expertly created. I think that a lot of this has to do with where the heart lies. If your heart isn't in it - forget it - don't clobber it up just to get it out of your hair. Probably one of the most common of repair jobs that any of us are asked to perform is the simple procedure of putting back together two pieces of a rod - usually tip sections - that were inadvertently separated. I have a few of these jobs in my shop at the present time, so let's go through the repair of some of them and analyze the reasoning behind each one. I have selected some that are very common to all of us, simple tip sections of fly rods and light spin rods - and progressive in their complexity. All are of graphite construction.

*1. A 4-weight fly rod, broken in the center of the guide adjacent to the tip*
*2. A 6-weight fly rod, broken about a foot from the tip, between the second and third guide*
*3. Another 4-weight fly rod, broken about 9 inches from the ferrule*
*4. A medium-weight spin rod, crushed forward of the gathering guide*
*5. A crushed ferrule on a very cheap discount store special fly rod*

**OBJECTIVE**

When we join two separated sections of a rod, the intent is that the completed repair be as structurally sound as the original and that it perform, feel and act as it did before it became disjointed. Therefore it follows that our repair materiel should represent as closely as possible the properties that are inherent in the original rod, i.e.. have the same stiffness, flex etc, but it is more important that we maintain the properties of the ROD itself. It must retain the same balance, the same flexure, the same power, the same overall properties inherent in the original design. The only logical manner in which to join these broken rod tips is to use a tapered tubular section of similar materiel and make a splice. You wouldn't believe some of the stuff I've removed from repairs that went sour. Piano wire, small nails, wooden dowels, aluminum tubing, brass tubing, steel tubing, solid plastic rods like pieces of plastic chop sticks——-you name it. Let's take the repair examples one at a time and analyze their differences and sameness.

**Number 1.** The fly rod tip broken in the center of the last guide is a very common break area. I'm not sure why, maybe the guide was wrapped too tightly and caused the section to go oval in shape under flex. For whatever the cause, this is a very common repair area in high modulus fly rods. First we must remove the guide in such a manner as not to damage or alter the area to be joined. Not only must the guide be removed, we also must remove all residual thread finish (epoxy). We must work with a clean section of graphite in order to obtain a satisfactory splice. This break is quite clean and all we have to do is a gentle squaring off of the ends. This is done with a sandpaper block of about 220 grit. The OD of each piece must match as closely as possible. At this point on the rod, the ID is a nonentity. OK, now we have two pieces to splice together. What do we splice it with? Remember that our goal is to maintain the original properties, therefore we must use the same materiel that is in the rod, right? So we scrounge up a piece of graphite from an old scrap fly rod and very carefully fashion a nice fitting sleeve splice, bond it together, and tie the guide in place. When completed we admire the handiwork and give it a test flex and promptly break the tip again just forward of the original repair. What happened? Our goal is to maintain



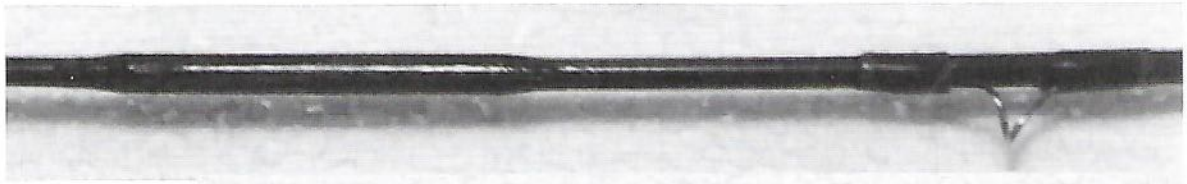
1. This fly rod has broken in the center of the tip-most guide. While many rod builders believe such a break cannot be effectively repaired, and that a replacement tip section is in order, that fact is that such a break can be repaired and the section returned to a very useable state.

the "properties of the rod"; this doesn't mean that we have to use the same materiel as is in the rod. When we made a graphite sleeve, we increased the OD of the rod at the repair point. This increased the "I" moment - stiffness, at that point, and the area on both sides of the sleeve are subjected to a bending force far beyond their capability. So if a graphite sleeve won't work on graphite, what do we use? The answer is simple. Keep in mind that whenever we use a sleeve, we are increasing the OD of the rod at that point. If we use a materiel of the same modulus, we are increasing the stiffness to an unacceptable level and inducing a break adjacent to the sleeve area. The answer is to use a materiel of LOWER MODULUS so as not to increase stiffness, and that materiel just happens to be our fiberglass rods. When repairing any graphite section with an external sleeve, always use a lower modulus materiel. Modulus is defined as STRESS divided by STRAIN. Think of it as relative stiffness. Now let's do our splicing correctly.

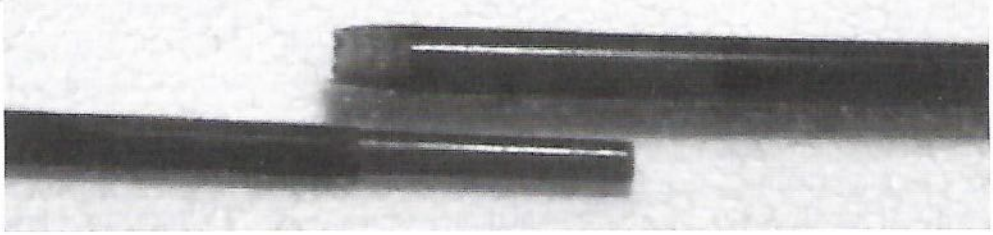
**SPLICING**

We have cleaned the repair area of the two pieces to be spliced, a micrometer shows us that the two pieces are the same diameter, further miking shows us that there is very little taper at this point on the rod. Obtain a piece of fiberglass fly rod tip section, cut it to fit snugly over the end of the main rod section. You will start the joining with a section about 1&1/2 inch long. Once you are sure that both pieces fit snugly, reduce the section by tapering the ends to about a 15degree angle. You will want to wind up with an overlap of both pieces of about 1/2 inch, the taper will consume about 1/8 inch, so your structure is about 3/8 inch overlap on both pieces approximately 1 inch long total. At this point, the taper of the rod has little or no bearing on our repair procedure. It is very significant on other sections of the rod. The idea now is to join the two pieces by using a suitable paste epoxy (what is more suitable than RodBond?). We left the tip in place so be sure it is aligned properly; set it aside to cure. When cured, we need to re-install the guide that was in that area, but at the same time since this is on the tip of a light rod, we do not wish to increase the mass anymore than what is absolutely necessary. We must reinforce our sleeve by wrapping it with size A thread but we do not wish to double wrap it when adding the guide. Tape the guide in place, mark the inside area where the thread will end, remove the guide and wrap the inside area between your two marks. Put the guide in place again and wrap the feet. Your wrap should end where the inside wrap ends, and they should blend when the finish is applied. Nobody will be the wiser and I'll never tell. As the picture shows, I used an epoxy finish on this one, but a lighter (Urethane) finish should be the choice here. Now try your flexure tests, bend it and observe how it bends progressively - - it merely follows the path of the graphite, and dutifully holds the structure together.

**Number 2.** The break shown in the first photo was in an area that will not see much flexure or bending. Under heavy load, the rod at this point will be mostly straight, except when casting the line. The act of casting is probably the peak load that this repair will ever see. As we go further up the rod the bending becomes more severe. The break in No. 2 is about 14 inches from the tip. The bending moment is more pronounced in this area. Your sleeve needs to be slightly longer in order to accommodate the longer moment arm and slightly stiffer sections being joined. So increase the length of this sleeve to about 1&1/2 inch to 1&3/4 inch over all, which will mean that



2. This break occurred about 14" from the tip. It is effectively repaired with the use of both an outer sleeve and an inner plug.



3. Properly executed, the use of both external and internal support can provide necessary strength without changing the inherent properties of the rod. Failure to keep this mind when enacting such a repair will likely lead to a future failure in the area of the original repair.

about 5/8 to 3/4 of an inch on each end will be structure. Don't forget the tapered ends. The bend moment on this area will be quite severe. Maybe enough for the graphite sections to rupture the low modulus sleeve even though it is wrapped and coated. To counter this shearing force, we will install a very small piece of either fiberglass or graphite on the INSIDE. This piece must fit snugly, and be about 1/4 inch long. If it is any longer it will be involved in the bending force and we don't want that. Be sure that this piece is in place before you position the outer sleeve. When the adhesive is cured, the sleeve is cleaned up and wrapped and finished like any guide or ferrule. Grasp the rod about a foot on each side of the repair sleeve and bend it into an arc with the repair in the center of the arc. The arc should be constant - no noticeable flat spot at the sleeve location. If there is a noticeable flat spot, then your sleeve is either too long or too heavy, i.e., too thick a wall section.

**TAPER TROUBLE**

At this area on most any fly rod is where you will have to start allowing for the taper of the blank when fitting a sleeve. The further back we go, the worse the problem becomes. No problem fitting the rear section - the largest OD -but depending upon the degree of taper - the front section can be quite challenging . This particular area is still so far toward the tip that the problem is very minimal. Your sleeve will fit very nicely over the rear section, but to fit it on the forward section you will find that the ID of the sleeve is smaller than the OD of the section that it must cover. Some repairs on fast taper rods require the removal of all guides and the tip in order to slide the sleeve into place. But what we have here is merely a snug fit. The sleeve must be pushed a tad but that's all.

**Number 3.** Now that we are into real structure, this one has to be good in every aspect or the rod is doomed. This is in the area of greatest flex which means greatest bend load and fatigue factor. But mostly, it is an area of sensitivity. You FEEL the rod in this general area and you want to maintain that feel. You don't want a 6-weight fly rod to feel like a 4-weight or an 8-weight. It will feel like a 4-weight if we use the same pattern of structure that we used in #2, because that design does not have sufficient stiffness to work with the bend load of the graphite in this area. To increase the stiffness using the same materiel, we merely have to increase the "I" moment, and this is easily accomplished by adding an internal doubler. Calculating the amount of overlap for this internal doubler or plug can be rather tricky. Too long and it will impede the flex of the graphite and change the feel of the rod. Too short and it will not support the external sleeve, making the rod feel wimpy and sluggish and it will probably break after very little usage. I wish I knew of some simple formula to apply here, but it dwindles down to a gut feeling combined with experience plus a little logic thrown in for good measure. Any aerospace stress engineer experienced in calculating design loads for wing structures could whip out his Slide Rule, (whoops, that one dated me) er, I mean calculator, and give you firm answers. But in the absence of calculable direction, let's find out where logic leads us and if there are any aerospace stress engineers out there - sound off. Take another piece of graphite tip section of this same approximate weight and flex the same area where we are making our repair. Flex it over a linear scale - 12 inch ruler will do fine. As you flex the rod, note on the scale and ask yourself the question, "If a piece were inside, how long (length) could it be before it resisted the flexing?" I judged this one to be about 2 inches, but

past experience has taught me that about 1&1/2 inches is best in this location for this weight of rod. Nevertheless I inadvertently went ahead and made the internal plug 2 inches long. Another way to determine this length is to figure that the overlap for the doubler will be between 3 and 4 times the diameter. Remember now, this plug is made of fiberglass and it is a smaller diameter than the rod, which means that by itself it will effect the graphite about as much as a wet noodle. However, combined with the external sleeve which we are about to construct, the graphite will have met its match. See figure 3. This plug is acting exactly like the plug "ferrules" on those rod blanks which design this type of ferrule such as Fisher, Scott, etc. After all, a ferrule is merely a joint and that is what we are doing here - making a joint. If it were going to be a ferrule, we would have to beef up that area of the blank where the ferrule is inserted, both ends. Then leave the end with the decreasing taper free to insert and disjoint at will. But since this joint is not intended to be a ferrule, it must be supported with an external sleeve similar to those we used in #1 and #2.

## EXTERNAL SLEEVE

The external sleeve must ALWAYS overlap the internal plug. A general rule of thumb for the overlap is twice the diameter at the overlap point. I like to round things out to nice even numbers, so I used a 1/2 inch overlap in this instance. Then add almost another 1/4 inch on each end for the taper and you have a sleeve about 3& 1/2 inches long. This overlap is critical to the integrity of the joint, much more so when the plug is graphite, but even as fiberglass it will exert stresses that could rupture the rod blank if the load is not properly distributed. Remember now, there is maximum bend at this point.

Your internal plug will be sized by inserting the selected piece of fiberglass through the nearby ferrule and out the broken end. The broken ends will have been smoothed and squared off prior to this point. Carefully mark and cut the piece so that you wind up with a plug with 1 inch inside the ferrule end and 1inch extending, that will fit snugly inside the tip end. As you do more and more of this type of repair on different sizes and types of rods it will become apparent to you that the forward section should have a little less plug length than the rear section and this ratio will vary with the wall thickness, degree of taper, and location on the rod. In our example here, the optimum is about 13/16 inch, but let's not quibble and just make it 1 inch for now. With your plug cut and sized, be sure and radius the ends. Round them off with a file at about a 45 degree angle. This will prevent a sharp edge from gouging into the rod wall.

## CONSTRUCTING THE SLEEVE

Select a piece of fiberglass rod section from what appears to be of the same or similar taper, and preferably non-painted. The painted fiberglass rods are the cheapies with thick walls and very coarse glass cloth construction. These make very poor external sleeves. Match your selected piece with the butt end of your joint - the larger end. Cut your fiberglass so that it will fit over the end and extend past your internal plug about an inch, which makes it about 2 inches total. Now trim your piece so that you have an equal amount for the other end. You should have a piece for a potential sleeve which is about 4 inches long at this point. Now you've got a problem. How do you get that tapered sleeve over the tapered tip section when the ID of the sleeve end is smaller than the OD of the rod end? You can take off all the guides and slide it on from the tip. There are 6 guides and the tip top and this is almost always the quality way to do it. So now it becomes a judgment call because there is a quicker (and easier) method which does the job quite nicely. ( Just don't let that stress engineer from the wing group know what we're doing, cause he might get out his slide rule and squash the whole deal.) First, size the sleeve to a net fit on the butt end, which means that you will trim it to about 1&5/8 inch overlap. Next, trim it to the same dimensions for the tip end. Touch the end of the sleeve to the tip section end and see if the sleeve will slide over and onto the tip section. It had better not! It easily slides over the butt section, so put it there for now. The taper in the rod makes a mismatch in diameters between the section of the tip end and the reinforcing sleeve. The end of the sleeve will match the rod some 1&1/2 inches inboard - which is where we want it to wind up. But how to get it there? Try this - bevel the end of the sleeve that attaches to the tip section to about a 15 degree angle, or as shallow as you can handle. A power disk sander or belt sander is ideal for this operation. Rotate the sleeve in your fingers as you bevel

and grind the end to zero. This beveled end will be quite flimsy, so match it to the tip section again and this time force the tip section into the beveled sleeve. Enter at a slight angle then push the rod section further into the beveled area which will split the sleeve at this point. This splitting will facilitate further movement until the sleeve is fully installed on the tip section. The other end of the sleeve which attaches to the butt section can now be beveled to the same degree. The splitting of the sleeve has done nothing to impede its structural integrity. The split is usually 1/4 to 1/2 of the length and is neutralized when the area is bonded, wrapped and finish applied. This is considerably faster than removing and replacing 6 guides and a tip top!

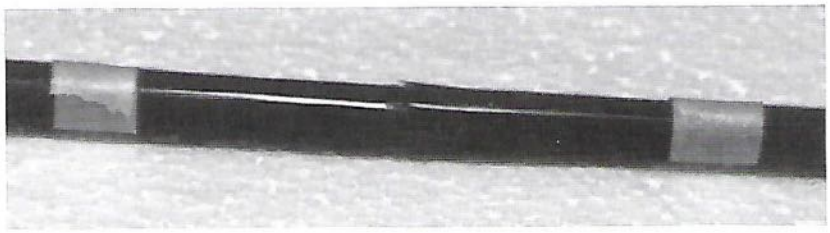
**BONDING**

The external surfaces of all pieces are prepared for bonding in the usual manner, i.e., light abrasion of the surfaces with Scotchbrite or 400 grit sandpaper. The inside of the rod pieces must be cleaned of loose particles by swabbing them out with a small bottle brush, a doubled up pipe cleaner or some similar instrument. Sometimes I use a small round file and on the larger blanks - a small notched dowel with a piece of sandpaper inserted into the notch and the other end chucked in my winding lathe jaws and rotated inside the blank. You will need a piece of rod or a stick of some kind to poke the internal plug all the way through the butt piece. Cover it with the paste epoxy and insert it in the ferrule end and push it through with your stick. Be sure and clean out the ferrule immediately. With the plug snugly in place, add more epoxy to the exposed end and bond in place the tip section The sleeve is loosely attached to this section, so slide the sleeve toward the tip and away from the repair area - then liberally coat the area toward the butt with epoxy, slide the sleeve over this epoxy and rotate it several times in order to thoroughly coat the inside of the sleeve. Now apply another thin coat of epoxy in the area of the repair and slide the sleeve into its position. Wipe off the epoxy that is forward of the sleeve, using IPA. With the sleeve in position, it must be wrapped. The wrap will be a temporary one, as its only purpose is to hold all parts snugly together while the epoxy cures. Since it must be wrapped very tight, I normally use D thread. The split end will close and epoxy will be squeezed out. When the epoxy has cured, there will be cleanup to do in the area of the split and at each of the beveled ends. When the cleanup is completed, apply your final wrap with a nice A thread to match the color scheme of the rod and finish off with your favorite epoxy wrap finish.

**Number 4.** This repair is more in the category of reconstruction as a goodly piece of the very heart of the rod had to be removed. A heavy tackle box lid slammed shut with the rod in the wrong place at the wrong time and it was no contest. The damage to the rod extended a little more than an inch in both directions from the impact area. It is very important to determine precisely where the damage ends, so careful examination with the aid of whatever magnification you have available is in order.

**REMOVING DAMAGED AREAS**

The first step is to remove the guide that just happens to be next to the damage. This must be accomplished very carefully so as not to expand the damaged area. Next, we have to remove all the damage. Once the extent of the damage is identified, mark each end where the damage stops. Wrap a piece of 1/2 inch masking tape around the rod at that point, add another 1/10 inch or so just to be sure. You need to remove this part of the rod and that means two cuts which must be clean cuts or you will extend the damage further. I use a Dremel tool with the flexible shaft and attach a 1 inch rotary abrasive cut off disk. Used properly this makes a very clean cut. In the absence of a power tool, you will need a triangle file. DO NOT USE A SAW OF ANY KIND. Graphite will ruin any saw that I know of and saw teeth tend to delaminate the fibers and fray the ends. Diamond wheels or any of the small abrasive cutting wheels are the way to go. A triangle file is just as good. Use the edge of your tape as a cutting guide, make a groove all the way around the blank and keep making the groove deeper until it is parted. Once the damage is removed, you will have to square off both ends. With the damage removed (I took out a piece 2 &1/4 inches long) and two pieces of rod needing to get back together, you can join the two pieces at their respective ends which will mean shortening the rod by the length of the removed portion - or you can maintain the original length of the rod. The latter is a bit more



4. On breakages which leave the rod splintered or crushed, the damaged area must be removed so that the repair can be made upon material that is structurally sound.

difficult, but it is the better choice in this case. In your scrap box, find a piece of the same taper as our patient and drop it through the butt end . It must protrude about 5 or 6 inches to be of any value. This piece should be graphite, not fiberglass. Slip the protruding end of the plug into the tip and measure the distance between the two rod sections. Ideally this distance will be 2&1/4 inches as that is the amount that we removed, but ideally is something that is nonexistent in my world. This distance was 4 inches and I couldn't find a piece with any better fit. The piece I chose was from a non-sanded blank - a rough out - so I had a little tolerance to play with. Light sanding on the tip end closed the gap to 3 inches. Any more sanding would have touched the graphite fibers so I settled for this. The overlap on the butt end was established at 1&1/2 inches and 1&1/4 inches on the tip end. Now you have an internal plug which joins the pieces, the piece is of smaller diameter than the original which means it is not as stiff even though it is also graphite, but we expect to add some stiffness with our outer sleeve. However, we cannot put on our outer sleeve over this 3 inch gap. This gap is filled with a "spacer" made from fiberglass, not graphite, and cut to fit snugly over the graphite plug. The OD of the spacer must be net or slightly less than the OD of the rod at this point. Otherwise it will interfere with the outer sleeve. With the spacer made and in place we can now construct the outer sleeve.

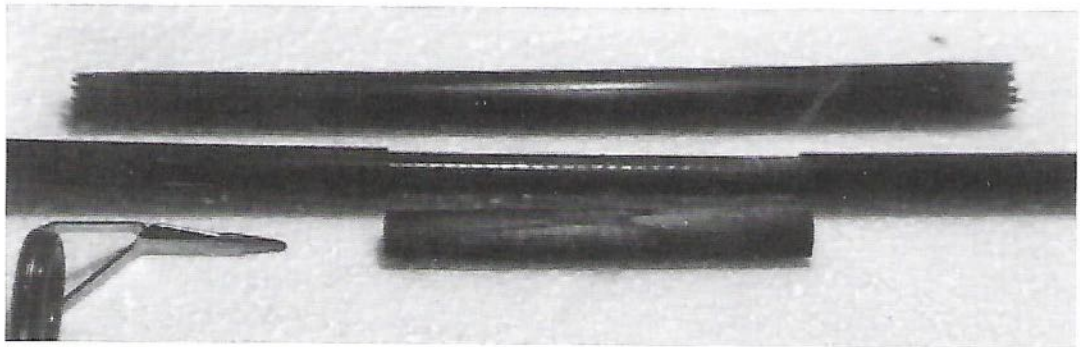
## OUTER SLEEVE CONSTRUCTION

This sleeve is made the same as in #3. We have a 5&3/4 inches inner plug and need about 1/2 inch overlap on each end so we need a sleeve about 6 &3/4 inches long. Size the butt end first but size it with the spacer in place, then taper the other end and fit it over the tip section splitting as necessary as we did in #3. Now you have 5 pieces of rod section ready to bond together - as in picture #4. The outer sleeve must be slipped onto the tip section, the inner plug gooped and poked through the end of the butt section. Now install the spacer onto the plug and the plug into the other (tip) section. The sleeve can now be slipped into place with a liberal amount of epoxy and wrapped tightly for curing. After the epoxy cures, the temporary wrap is removed, the area cleaned up and the permanent wrap installed with your favorite finish. In our illustrated example we removed a guide which must be replaced. The proper position for the guide falls on the aft end of the outer sleeve. This is no problem. Simply wrap the sleeve in entirety, position the guide in its proper location and wrap it in the usual way - bare thread to bare thread. Now you must be selective with your finish, the popular so-called high build epoxies will not hack it here. You need a high penetrating epoxy such as DuraGloss LS or other similar finish. Otherwise you must wrap the sleeve, apply your epoxy and allow it to cure, wrap the guide, and apply another coat of epoxy over the whole thing. Whichever method you choose to follow you should wind up with a finished rod as in picture #5 and the rod will act and feel like it did before the accident.

In this type of repair I have attempted several times to make the inner plug from fiberglass instead of graphite, and the rod always feels mushy. If we had chosen to shorten the rod by joining the two pieces with no gap to be filled between them, then fiberglass seems to be satisfactory for the inner plug. But whenever there is this extension a graphite plug for a graphite rod is necessary.

**Number 5.** This cheapie should have been thrown away but sentimentality overruled mentality. Somebody stepped on the ferrule and that sorta put things out of round, and that somebody wants to pay for it - so here we go. Picture of original break got lost, but it showed the ferrule with many pieces separated and damage extending about 1 &1/2 inches inboard from the end. This is a male ferrule so we want to restore the original OD as near as possible. I selected a piece of fiberglass that fit into the ferrule and cut it to extend 2&1/2 inches into the ferrule and rod. I left about 4 inches excess for the rod wrapping

When a large area of damage is removed, the remaining pieces will not mate properly due to variances in diameter. Thus it is necessary to fabricate a "spacer" to restore the area that was removed, making it possible to then utilize an internal plug and external sleeve in restoring the rod to good useable condition.



chuck. I applied a liberal quantity of RodBond to the reinforcing piece and to the inside of the damage. The piece was inserted in position and the frayed damage of the original carefully positioned around it. The ferrule was now wrapped with D thread very tightly. Wrapping is very slow as the frayed pieces have to be positioned as you go along. There will be lots of squeeze out which should be distributed liberally along the entire damaged area. When the RodBond is fully hardened, remove the thread and clean off the excess adhesive. Install it in your rod wrapper again and work the surface to a smooth finish with fine files and 320 to 400 grit abrasive paper. Wrapping the broken pieces around the insert should insure a good round OD, but final smoothing will be necessary. Now you can test your handiwork by inserting it into its intended place in life - the female part of the joint. When you are close to a final fit, cut off the excess and finish it by hand.

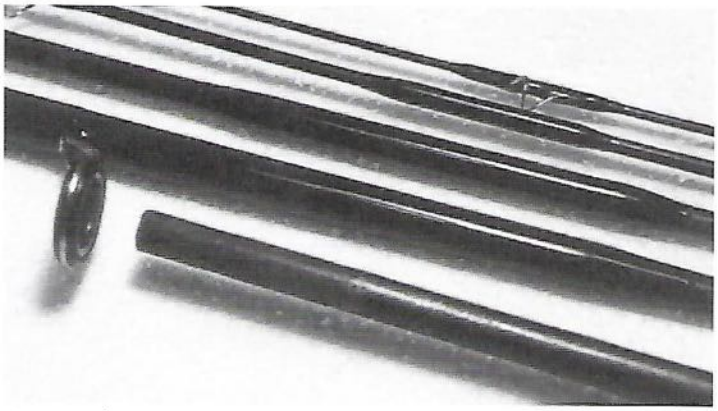
## FINISHING

The final act will be to coat the entire ferrule with 1 coat of Permagloss, or an equivalent Urethane. Why Urethane? Because urethanes have the best abrasion resistance of all the possible coatings that are available to you. After the Urethane is cured I always coat ferrules with U-40 Ferrule Lube and they will last much longer as this teflon product eliminates the friction and wear of a fiber to fiber ferrule and the ferrules will fit much tighter. *(ed. note - See the Sept/Oct '98 issue of RodMaker for a review on U-40 Ferrule Lube.)*

And all this for a $9.95 Wal Mart special! Don't expect to get rich.

## CONCLUSION

As many of you have concluded by now, repair work is a labor of love. And I have found it a lonesome labor. I can find all sorts of builders with talents far beyond mine, that will readily engage in discussions about finishes, spine, handle shapes, guides, thread art, (I hate it) any subject pertaining to building a better and/or prettier rod. But as soon as I broach the subject of repair I'm looked at like I'm some sort of weirdo that should crawl back under the rock from whence I came. The conversation now changes from enthusiasm to boredom with a faint trace of hostility thrown in for good measure. And not surprisingly, it is from these very same talented artisans that some of the most pitifully inadequate attempts at repair have originated. We as rod builders are usually judged as a group. If one very excellent rod is known to have been constructed by a custom rod builder, the general public sees ALL custom rod builders as producing the same thing. If one botched up repair job is known to have been botched by a custom rod builder, then ALL custom rod builders botch repair jobs. Repair is certainly not the most glamorous aspect of the custom rod builders' art, but it is becoming increasingly more in demand so it behooves us to recognize this fact and learn to do it correctly - or at least acceptably.



5. Crushed ferrules are very common. Luckily, they can be effectively repaired. In this case it was the male portion that was damaged. An internal reinforcement returned it to use. Above the repaired ferrule are a number of broken rods that have been returned to service with the techniques outlined in this article. In each case, the rod's appearance is changed only slightly and a favorite rod has been saved from the scrap pile.