Tel.800-269-1462 Fax.800-311-9857
P.O. Box 100279, Birmingham, AL 35210

www.ClassicConnectors.com

Classic Connectors, Inc.

Inner Workings of an Automatic Splice and Using ClampStar as a Safety Tool

Carl R. Tamm

ClampStar is used as a tool by several utilities as a "safety" when performing line work on a conductor that contains an automatic splice in the span.

As a work method precaution, many utilities require the crew to install a "safety" over an automatic splice if any work is to be done on a live line, including changing insulators or crossarms, or any work during which the subject span containing an automatic might be disturbed. Properly installed, automatic splices are predominantly reliable. However, due to the number of incidents that have occurred, many times it is found that the conductor was not properly inserted. The most prominent "improper insertion" is known as "partial insertion." In this case, for various reasons, usually because the installer failed to properly mark the conductor before starting, the conductor is not inserted to a sufficient depth to push the pilot cup completely through the jaws.

The problem then becomes that the jaws cannot close completely on the conductor, and obviously, it has a propensity to slip.

To state our position once again, "Properly installed, automatic splices are predominantly reliable." Some people have thought that CCI is pushing for the "ban" of automatic splices – but that is not the case. We have also stated that automatic splices are "a <u>must</u> – for storm restoration." They are, without question, the most economical, and certainly the fastest means of reliably splicing a conductor. Do other methods, such as compression connectors, offer a higher integrity connection? I think that the manufacturers of automatics would agree that is the case – as they also offer the compression option – but nobody would argue against the importance of the "quick" means afforded by the automatic splice.

Because so many people ask, it seemed appropriate to share some of the inner workings of automatics. While most people who use them know what is inside, perhaps it will assist them when installing these connectors, to understand the purpose of the components, and possibly give them a bit more appreciation for the manufacturer's instructions!

The following is a picture of the "guts" of one side of an automatic – the other side is the same.

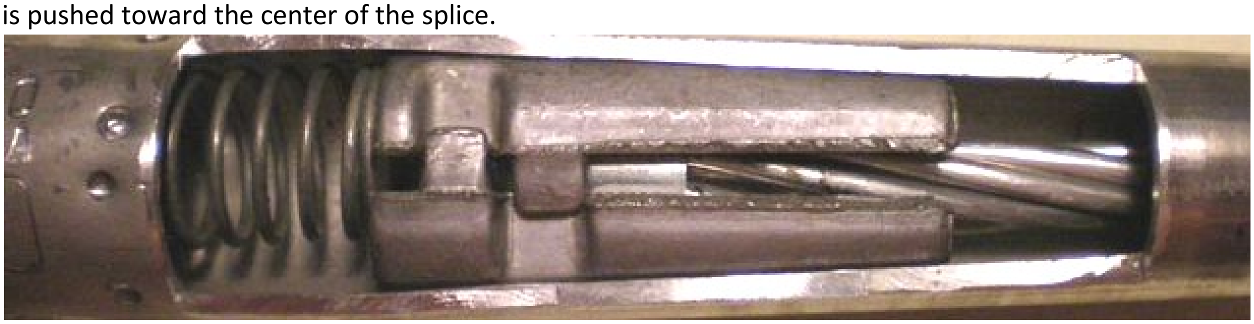
Beginning at the upper left and moving clockwise, we have (a) the spring, which provides a forward thrust to the jaw assembly during installation, (b) two jaws which interlock and make up the "jaw assembly", (c) the pilot cup, which captures the ends of the conductor strands, and maintains their position (keeps them together) during the installation, and at the bottom, the yellow component is the "funnel guide" which serves to hold the pilot cup inside the assembly and guide the stranded ends of the conductor into the pilot cup – all within the tapered body of the splice.

To illustrate the action of the pilot cup, the following photo shows how the conductor, once inserted through the funnel guide, fits within the confines of the pilot cup.

Prior to insertion, having this side cut out from the splice, one can see the position of the jaws, urged forward by the force of the spring, awaiting insertion of the conductor.

Upon insertion of the conductor, having picked up the pilot cup as it passes through the funnel guide, the “resistance” that is felt during installation is the force required to push the jaw assembly backward against the spring.

As can be seen, the pilot cup serves to maintain the conductor’s position, centered within the jaws as it is pushed toward the center of the splice.

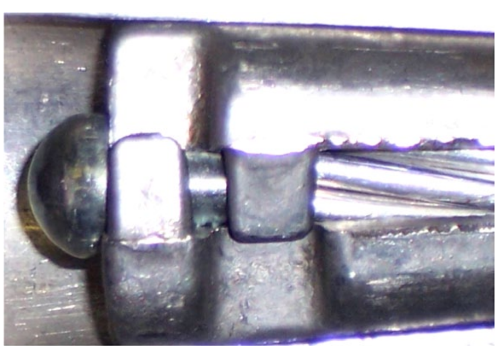


Properly installed, the conductor will carry the pilot cup completely through the jaws, to the center of the splice. Because the pilot cup must contain the entire conductor, it is obviously of larger diameter than the conductor, and as can be seen in the following photo, upon passing the pilot cup completely through the jaws, the jaw assembly will "spring" forward, and the taper of the body will force the jaws into intimate contact with the conductor! Additional tension on the device will serve to further "seat the jaws" and urge them into increased forced contact with the conductor.

Without question, 75-80% of the problems with automatic splices occur due to installation error, and about 80% of those are "partial insertion" errors, where the conductor is simply not inserted to its full intended depth such that the pilot cup has not "cleared" the jaws!

The result is that of the following photos. In the instance of the first photo, insufficient force was provided to drive the pilot cups into the jaws, and the conductor was simply not gripped. If this occurs, the lineman will immediately recognize there is a problem, and take action to correct that, by installing another splice.

However, in the instance that follows, the pilot cup has passed almost to the end of the jaws, which is the most dangerous situation, as the tips of the jaws may capture the conductor, leading the installer to believe that the splice is made adequately, and the conductor may withstand the initial tension of the line, but the jaws are prevented from closing completely on the conductor by the invading pilot cup! In such instances, the splice may be left in service for days, weeks, or even years, before some event jostles the line sufficiently or components of corrosion allow the conductor to slip out! This condition may be impossible to detect with infrared techniques, depending on the current load on the line.



A second type of insertion error occurs from time to time, when upon inserting the conductor, the lineman pulls it back a bit (possibly to get a better grip because it was obvious that the conductor did not go it far enough – such as the condition in the previous photo and the pilot cup does not come back, as it is held in the jaws. The purpose of the pilot cup is to keep the ends of the strands together, and assure that they all pass completely through the end. In the scenario where the conductor is retracted as much as ½ inch, the strands can escape from the pilot cup, and one may erroneously slip through the side between the jaws. In this instance, although the conductor may be fully inserted, the errant strand between the jaws prevents them from closing completely, and because it is not within the bundle, the overall diameter is reduced and again, the conductor can slip from the grasp of the jaws.

The critical concern is that neither of these situations are visible or otherwise readily detectable, and while the splice may hold the line under the stringing tension of a few hundred pounds, additional tension or other disturbance during work on the line may be enough to allow it to slip.

The old method of putting a set of grips and come-a-long on the line, could in its own movement, cause the line to slip before it is secure. If that occurs, there is an arc flash hazard, along with the fallen conductor. If one puts the MAC cable (ground set used as a jumper cable) on first, it can eliminate the arc flash, but may in itself drop the line.

Placing a ClampStar on the line in a gentle fashion allows both the electrical and mechanical safety to be applied at the same time, and is faster and safer to install. If the splice appears bad, i.e., has burnt funnel guides or has evidence of obvious expulsion of contaminants (looks like black grease) running out of it, perhaps it would be wise to simply leave the ClampStar in place!

However, if there is sufficient confidence concerning the integrity of the splice, the ClampStar can be removed, and used again.

Have you ever looked up as you were driving, and noting a splice in the conductor passing over the road, wondered if that splice was one of many that, although it is there today, may have been improperly installed, and could “let go” at any moment with no warning? Perhaps one might sleep a little better if they saw a ClampStar covering that splice, knowing that one connector had been “corrected”!