AUTOPSY

4" Peanut Shell

Manufacturer: *Unknown*
Shell #1 Weight: *737 grams*
Shell #2 Weight: *277 grams*
Lift Charge: *63 grams 3FA BP*
Burst Charge: *66 grams KP on rice hulls*
Shell Type: *4" Chinese ball shells*
Time Fuse: *Double Chinese, 3 second delay time*
Star Type: *3/8" fast burning color stars*

Performance: *While it is more typical for the second shell in a peanut shell to break a few seconds after the first shell, both shells break at the same time in this case. The first shell is a color break while the second shell is a salute. The color break maintained good round symmetry, although tended to burn out sooner than would be desired. The salute, which breaks at the same time as the shell, was rather unimpressive for a 4" salute and no louder than the color shell break.*

Figure 2: Quickmatch passfire used to ignite 2nd shell.

Construction:
Peanut shells are really nothing more than a pre-packaged method of "double loading" ball shells. For those not familiar with the practice of double loading, the technique involves loading a ball shell into the mortar in the standard way, then clipping the leader short on a second ball shell, cutting back the paper to expose the raw black match, then dropping the second shell down on top of the first. When the first shell fires, the second shell fires at the same time and they both break simultaneously at the proper height. While some frown upon this method out of unsubstantiated fears, the technique is most often used as a way to double the number of finale shells fired at the end of a show without doubling the rack count.

Figure 3: Alternate passfire method using exposed prime on 2nd shell.

Peanut shells are really not multi-break shells in the true sense, since both shells ignite upon lift rather than the break of one shell igniting the time fuse of the next shell. This is why I consider it just a fancy way of double loading a shell. The main advantage to a peanut shell is that the manufacturer can control the delay between the two shell breaks, thus making ball shell effects such as color break with delayed bottom shot, simultaneous color

breaks, two break color shell etc.

Figure 4: Thick prime on upper shell.

The 4" peanut examined here uses a quickmatch leader to pass fire from the lift bag to the primed time fuse on the second shell. Figure 2 shows the passfire running up the side of the bottom shell into the cardboard collar that connects the two shells. An alternate method of making sure the second shell ignites is to expose the primed time fuse to the outside of the shell, which can be seen in the 2" Lidu peanut shell depicted in Figure 3. This exposed prime will easily take fire from the flame envelope rushing past the shell during lift. The disadvantage to this simpler method is the accidental ignition hazard created from the exposed prime.

Figure 4 shows a cardboard collar that is used to connect the two 4" shells together, giving them the tell-tale peanut look. This collar was only loosely connected using tape and was clearly intended to break apart on lift so that the two shells will drift on separate paths. This was likely done to prevent the scenario where the salute breaks before or exactly at the same time as the color break shell, which would likely blow the color break pattern out of symmetry at such a close range. A better effect would have been to put a longer delay on the salute shell, thus giving a color break followed by a delayed "bottom shot" effect.

Figure 5: Both shells shown with plastic lift bag.

Note in Figure 5 that the bottom shell has a hard, reddish sealant around the time fuses to help prevent flower potting. Peanut shells are subjected to greater pressures on the bottom shell due to the increased weight and length of the overall shell, so this extra precaution has been taken to prevent gas leaking around the fuse joint.

Both shells were double fused and heavily primed on the time fuses, but cross matching was not used on either end. Figure 6 shows the small rice paper bags of black powder grains fastened to the ends of each time fuse, used to insure a rapid spread of fire once the time fuses burn through. Note the red sealant around the base of both time fuses as an additional gas leak precaution.

Figure 6: Small BP burst bags fastened to time fuses.

The color break shell was loaded with 3/8" stars followed by rice paper liner and KP rice hulls in the standard configuration. Like all Chinese shells that have been autopsied here, the burst and stars seem to have been loaded in a damp state and all components tended to stick together into clumps when removed. The black spots where the stars contact the casing in Figure 6 is further evidence that they were damp upon insertion. Since this practice seems to be used by all the various manufacturers, it probably plays a key role in achieving good burst patterns.