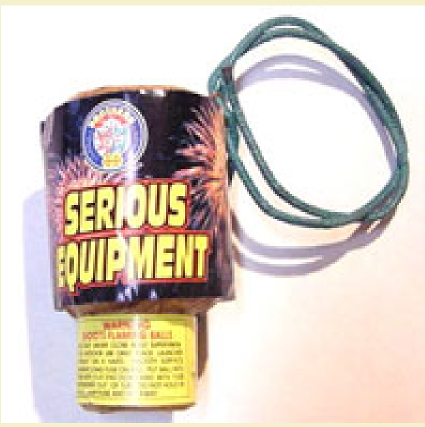
AUTOPSY

1-3/4" Brothers Class C Canister Shell

by Michael Fales



Manufacturer:	*Brothers*
Shell Weight:	*58 grams*
Lift Charge:	*3.9 grams 2Fg BP*
Burst Charge:	*7.5g loose KP + 11g KP on hulls*
Shell Type:	*1-3/4" oriental canister*
Time Fuse:	*Single Chinese, 1.5 second delay time*
Shell O.D.:	*1-3/4"*
Shell Height:	*1-7/8"*
Wall Thickness:	*1/8"*
Cup Set:	*7/8" deep X 1-1/2" I.D. X 1/16" wall thickness*
Star Type:	*18.6 grams of Dragon Egg clustered stars*
Mortar Size:	*1-15/16" I.D. X 14" tall X 1/4" wall thickness, mounted on polymer base and held in place with a nail*

Figure 2: Lift cup pasted onto shell with a turn of light weight kraft.

Canister Design Scales Well:
Unlike Italian style canister shells, where the methods of construction change considerably as the shell size becomes very small or very large, the Chinese method of building canister shaped shells changes very little with size. Ball shells share this same advantage, and really the Chinese method of canister shell construction is basically the same as ball shell construction with the exception that cylindrical shaped hemis are used instead of spherical hemis. For an example of a larger shell constructed in the same method shown here, see the previous autopsy of the 5" Lidu Crossette Canister Shell.

As is common with most class C items, the label is decorated with beautiful big breaks. The names given to Brothers products are often artifacts taken from American culture that come across as humorous attempts at marketing across a vast culture gap. This one seems to be targeting the consumer's desire out-do his neighbors on the block with the title "serious equipment". The label only shows the Brothers logo and which end to place up in the mortar. Nowhere on the shell does it describe the effect you might expect!

Figure 2 reveals a single layer of thin pasted kraft starting at the top edge of the shell and reaching down on to the lift cup where it was crimped down and held in place with another single layer band of pasted kraft paper.

The lift cup is a thin paper tube 1” in diameter and 7/8” in height with a 1/16” wall. It is glued to the bottom of the shell and held in place by the previously mentioned final paste layer. A hole is pierced through the side of the lift cup to accept the fast visco type fuse used as the leader. A small piece of clear tape is placed over the leader at this hole and half way up the shell. The lift is 3.9 grams of 2Fg size BP and is kept in place by a square of kraft paper pasted over the bottom of the lift cup which is then covered by another band of paper and the warning label.

The time fuse is placed in the center bottom of the shell just as a regular ball shell would be constructed. It is cut straight and slurry primed with black powder. A small wrap of pasted gampi tissue is wrapped around the base of the time fuse, appearing to protect against lift gases blowing around the time fuse.

Removing the thin outer paste layer revels that the shell is pasted in with vertical strips much like a ball shell, as seen in Figure 5. Approximately 6 layers of kraft paper are used to paste in two strawboard “hemi-cylinders”. The strips are approximately 1” wide and reach from the time fuse at bottom center to slightly past the top center of the shell. These strips were not tapered at the ends, so they created a slight build up at the top and bottom centers of the shell. A small loop of string is pasted into the last layer for supporting the fast visco leader while loading the shell.

Separating the two strawboard hemis reveals an innovative loading procedure. A thin cardboard liner the height of the shell is first placed inside the one of the hemis, most likely the time fused side. The contents of the break are then dumped in to fill the entire height of the shell. The other hemi-cylinder cup is fitted onto the top and held in place with a single band of pasted kraft around the equator of the shell. One can imagine a worker rapidly scooping the shell contents from a large tub of pre-mixed break/stars, closing it and handing it off to the next worker to paste in.

The time fuse is a total of ¾” long and cut at an angle on the inside of the shell only giving about 5/8” length before igniting the inside of the shell. Both ends of the time fuse are slurry primed. The contents of the shell were not placed in any particular order as is common with class C type shells. Stars, KP coated rice hulls and loose KP powder were mixed throughout and filled the shell entirely. The stars are irregularly shaped ranging in size from 3/16” to 1/4” and contain dragon egg type microstars. They appear to be charcoal star formula coated on dragon eggs that are rolled and allowed to form into small groups of dragon egg bursts. Each star contains around 2 to 5 dragon egg bursts.

The break charge found here is an interesting mixture that has also been found in other smaller shells as well. The combination of coated rice hulls and a fine grained powder mixed in loosely among them seems to add more kick than either one of these

Figure 3: Lift cup filled with 3.9g of 2Fg.

Figure 4: Slurry primed chinese fuse.

Figure 5: Cup set pasted in with strips.

Figure 6: Gampi tissue fire block around time fuse.

Figure 7: Liner with aggragate mixture of stars, KP hulls and loose granulated KP powder.

Figure 8: KP coated rice hulls.

Figure 9: Finely granulated KP burst charge.

Figure 10: Clusters of small dragon egg micro stars rolled into globs.

charges would produce alone. The hulls most likely serve to fill the extra space and keep the loose powder from caking, while the fine grained powder increases the burn rate by exposing more surface area. The use of KP is somewhat surprising and suggests that this charge does not need all that much confinement to reach the pressure where its burn rate ramps up to a point equal to the strength of H3. Shimizu notes that KP is inadequate for shells under 4" in size, but here we find it being used in a tiny 1-3/4" shell!

This shell breaks in a hard pattern that is not perfectly round but certainly better than par for Class C shells of this size. The weak spot at the center of the shell resulting from the seam where the two hemis meet may play a key role in the break pattern. This insures that the shell will break at the center point, thus removing the risk of one or both ends blowing out and creating an undesirable spray of stars in one direction (a common problem with small canister shells). The avoidance of flash as a break charge shows Brothers concern for the quality of their effects, sparing the viewers the annoying retina spotting caused by the flash broke shells that are common in this size.