

'TECHNICAL SHORTS'

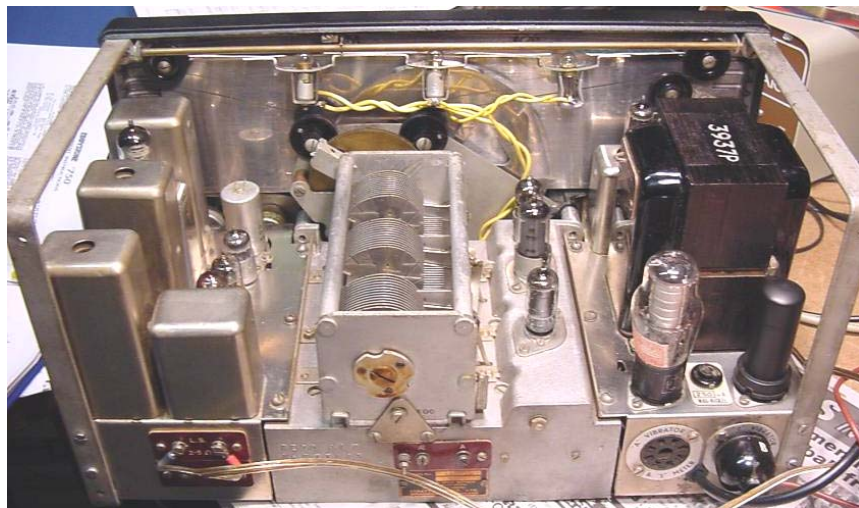
by Gerry O'Hara, G8GUH

'TECHNICAL SHORTS' is a series of (fairly) short articles prepared for the Eddystone User Group (EUG) website, each focussing on a technical issue of relevance in repairing, restoring or using Eddystone valve radios. However, much of the content is also applicable to non-Eddystone valve receivers. The articles are the author's personal opinion, based on his experience and are meant to be of interest or help to the novice or hobbyist – they are not meant to be a definitive or exhaustive treatise on the topic under discussion.... References are provided for those wishing to explore the subjects discussed in more depth. The author encourages feedback and discussion on any topic covered through the EUG forum.

No Case For Your Eddystone? Well, As Monty Python Said, "...Now For Something Completely Different..."

Having completed the restoration of my S.750, the remaining niggle was that it did not come with a case (it was sold as a 'parts set' on EBay and the seller, a knowledgeable radio amateur, confirmed that it was from an estate sale in the Okanagan Valley, British Columbia, and that he had indeed checked the various sale lots to see if the case was anywhere, but to no avail...). I would hazard a guess that the radio was probably fitted into a 'console' or rack at some point in its working life and the case was removed at that time and either discarded or stored in a 'safe' (and long-forgotten) place – it is probably now home to a family of mice...

I figured the chances of coming across a spare S.750-style metal case in British Columbia, or anywhere come to that, were at best a bit slim (but see Postscript!). The radio is a neat size for the desk in my office (currently sporting a Radio Shack DX-394 that I picked up new in a sale a couple of years ago for 100 bucks) and as the S.750 now works really well (and the tuning feels soooo good), I decided I wanted to put it into everyday use while I work or 'play' at my desk.



My naked S.750, post-restoration

I thought about several things I could do:

- Leave it without a case: sort of ok, but the innards would be subject to the continuous exploration efforts of my two very inquisitive cats - and they could burn their noses... or worse. It would also accumulate dust, bugs and cat hairs, as well as being susceptible to damage and potentially be a safety hazard (electric shock);
- Wait forever until a spare S.750 case showed-up;
- Use the case from my S.740: hmmm, robbing Peter to pay Paul? – not really, except, perhaps, for ‘special occasions’;
- Construct a metal case to emulate the original fitment: my metal working prowess does not go so far as pressing out the rounded corners of the Eddystone Style ‘D’ Case (Alan Clayton’s classification). I pondered constructing a case made from separate pieces of metal – one wrapping around, forming the top, sides and base, and one fitted to the back. To really look the part, I could install metal grids in the top, maybe also a hinged section as per the prototype and finish it in black crinkle finish. Even so, it would likely still look homebrew and ‘not-quite-right’;
- Look out for a suitable-sized metal or plastic box to modify into a suitable one-piece case: I did this for a couple of weeks and found a few plastic containers that were close (check out IKEA), but again, not-quite-right;
- Make a case out of something other than metal: the chassis and other components of the S.750 cleaned up really well and they look quite ‘cool’ in the yellowish light cast by the dial lamps and mauve glow of the VR150/30 – so I thought ‘why not show it off properly’ and build a case out of transparent acrylic sheet? (aka ‘Perspex’ or ‘Plexiglas’: I will call it Perspex from now on in this article). Ok, this would not give any RF screening (unless I installed some type of see-through fine metal mesh to the inside, eg. aluminium bug screen), but I have not found this too important at my QTH. Such a case would, however, provide the necessary dust and cat protection as well as the essential safety hazard mitigation. It would also not be trying to ‘pretend’ to be copying the original Eddystone case – and hence look ‘flawed’, but would act more like a museum exhibition case and not detract from its purpose. I decided to give it a go.

Measuring Up

Measuring - simple enough? Sort of. I decided to form the case out of two pieces of Perspex: one long piece, wrapped around to form the top, sides and base and one for the back. Perspex sheet comes in various thicknesses ranging from something that is very thin and flexible (though is still brittle when cold) to over a quarter inch thick. The price (at least here in BC) seems to rise exponentially with the thickness and size of sheet. I had some scraps of 0.125” sheet in the shack, one large enough for the flat back panel. This thickness is not so easily ‘worked’ into shape, however, and I decided to use a thinner sheet for the piece I would form the top, sides and base from – I bought a ‘scrap’ 48”x24”x0.09” piece for 10 bucks (it had a corner broken off, but otherwise it was ok): the longest dimension was a few inches shorter than needed, but I decided it would be ok

to leave a gap underneath that could be strapped-together to allow minor adjustment to the fit if needed, as well as some under-chassis ventilation.

I checked the dimensions of my S.740 case: 16.5”(wide)x8.5”(high)x 8.125”(deep), but those rounded corners made the exact size of the Perspex needed for the base, sides and top a bit difficult to work out with certainty, allowing for the corner radius's. I added a nominal 0.125” to each of the side and top dimensions figuring that if it came out slightly too large I could always make it a bit smaller... I measured the desired corner bend radius using one of those gadgets that allow awkward moulding shapes to be transferred to tiles etc. during your DIY endeavours (see photo below) – fitting it to the rebate on the front panel casting. I used this to select a suitable radius former (actually a piece of half-inch copper plumbing pipe) - this was a bit smaller than the measured inside corner radius, but experience told me that would be better than using a slightly larger former.

Working with Perspex

Perspex is 10 to 20 times 'stronger' than glass (so the label says). It is a thermoplastic that becomes flexible when heated above 100C or so such that it can be formed into shape (eg. rounded corners) and sets hard in the new shape on cooling. Clear Perspex does not become opaque when thus worked – I have noticed that some thermoplastics tend to do this. Perspex sheet can be cut to shape by scoring along the desired cut line several times with a sharp modelling knife (minimum of 6 times) and then snapping it along the score line – it helps to do the snapping along a right-angled table edge or similar, supporting the sheet up to the score line as much as possible and applying even pressure along the line to avoid 'breakaway' from the score line. Plexiglas can be drilled with HSS drill bits – it helps to 'sandwich' the Perspex between other materials to do this cleanly (underneath should be a scrap piece of wood to allow the drill bit to pass through cleanly) - as well as sawn, filed, sanded and tapped for screws or bolts. It scratches fairly easily, so leave the thin protective polythene sheets adhering to either side of the Perspex on purchase in place as long as possible during construction. Its brittleness when cold



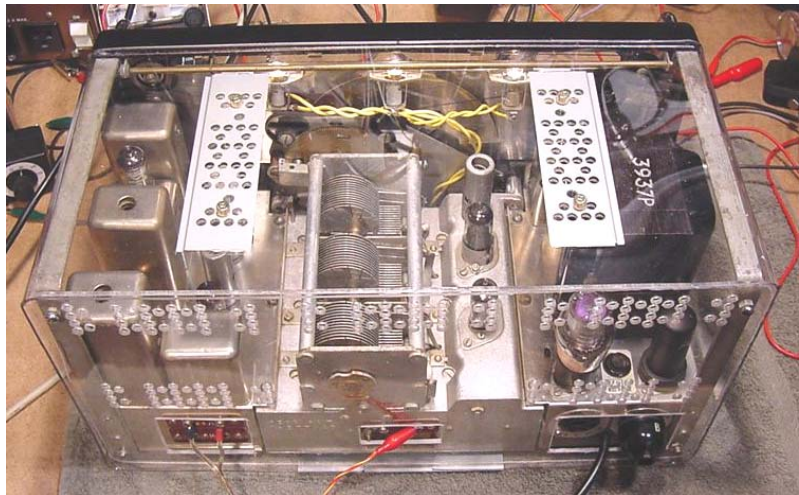
Tools of the Perspex-case maker: the template shows the actual outer radius of the case corners (S.740's case) on the left and that of the Perspex case corners on the right.

can be a problem that can result in cracking or breakout from drill holes or otherwise stressed areas. If a crack appears and it is in an inconspicuous place, drill a hole at either end to provide local stress distribution and thus minimise the risk of the crack propagating further. The crack can be sealed with a suitable acrylic glue or solvent.

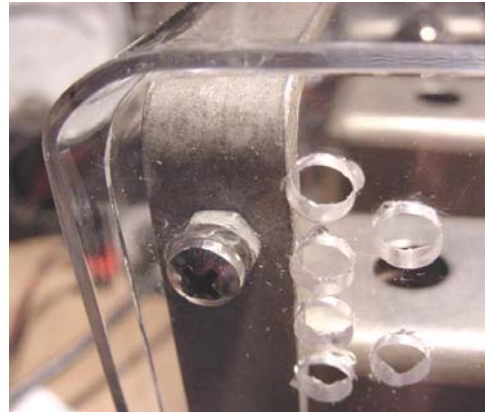
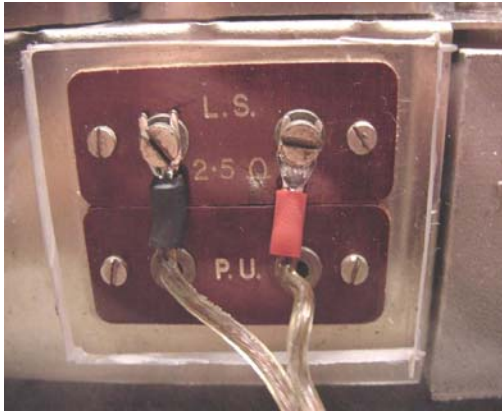
Constructing the Case

I decided to use my 'heat gun' (aka 'paint stripper gun', otherwise used in the shack mainly for shrinking heat-shrink tubing) to soften the Perspex while allowing it to form the desired radius bend – the air from this gun can easily reach over 200C. I fixed the copper plumbing pipe into a small bench vice, along the front of a sturdy bench and securely taped the other end of the pipe to the bench – thus giving the edge of the bench the correct radius for the corners of the case. Step-by-step case construction follows in bullet form:

- marked-up the Perspex sheets using a permanent marker pen;
- cut them to the desired dimensions by placing a metal straight-edge along the cut lines and then using a 'Stanley' knife to score repeatedly (at least 6 times for a reliable break along long dimensions);
- set-up the bending former (copper pipe) on the edge of the bench as described above;
- set-out a right-angle guide from a mark on the copper pipe across the bench top;
- placed the 48" x 8.125" marked-up piece of Perspex on the bench, with the first bend line (one of the case top/side bends) along



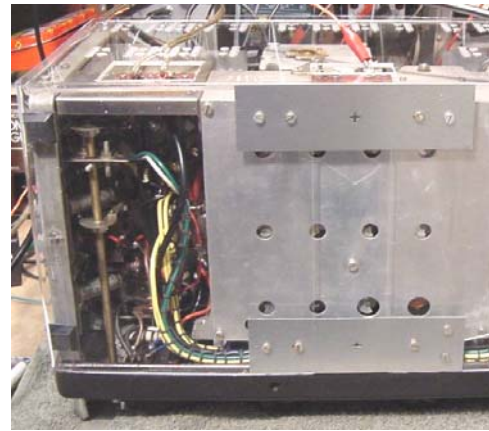
- the copper pipe and aligning the side of the sheet with the right-angle guide line. Temporarily secured the Perspex in place using masking tape;
- placed a large weight along the top of the sheet to counteract any tendency for the sheet to bow upwards during bending;
 - applied heat, using the hottest gun setting and smallest nozzle, evenly along the bend line, allowing the Perspex to bend gently around the copper pipe former, then removing the heat and gently 'working' the resulting bend to remove any adjacent warping using a piece of flat steel. Allowed this bend to cool/harden for a few minutes and repeated on the other three corners to complete the formation of the top, sides and base section of the case;
 - marked-up the cut-outs needed in the rear panel to accommodate the PU/Speaker connections, aerial/ground connections and the S-Meter/vibrator octal sockets;
 - used a 'Dremmel' (high-speed rotary cutting tool) fitted with a small cutting wheel to cut out the desired sections (see photo below);



- used a template (actually two pieces of perforated steel plate removed from a hard disk drive bay in a computer case) to drill ventilation holes in the top of the case and case back. I then secured these templates to the case top with small thumbscrew bolts to emulate the ones found on later Eddystone cases (sort of) securing the access panel. These plates also provided some additional rigidity;
- drilled the case back mounting holes, aligning these with the 2BA tapped holes in the S.750 chassis brackets;
- used two steel plates (again as removed from a computer case) to join the base panels together (see photo below). I bolted these up and pushed the completed top/sides/base onto the rebate in the S.750's front panel casting and fit-tested it – amazingly it fitted quite well (see photos above right);
- I did not have a good selection of 2BA bolts (never mind thumbscrews) and these are like the proverbial rocking-horse dudud over here in BC, so I spent ages trying to find a set of 4 suitable bolts, filing some threads away to allow a (spacer) nut to be threaded on and retain the bolts;



- the friction-fit of the case top/sides/base was good and with the back providing more rigidity, I questioned whether there was any need to fix the top/sides/base section to the back. I decided to glue these parts together rather than use metal brackets, as I felt the brackets would detract from the clean and simple lines of the case;
- finally, I polished the case inside and out with an anti-static acrylic cleaner.

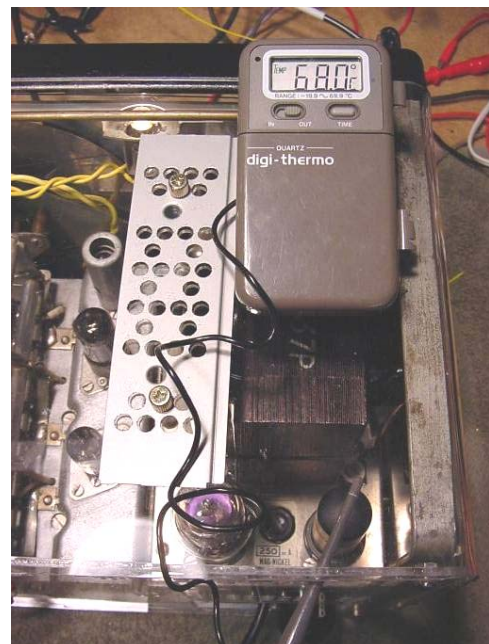
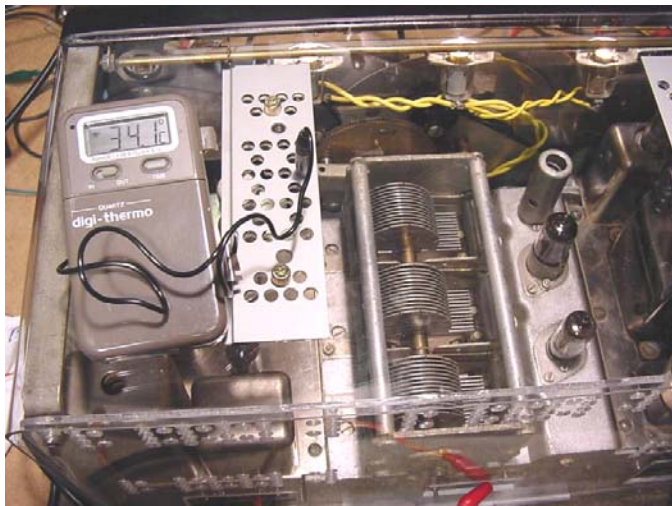


The Finished Product

Photos of the completed case fitted to my S.750 are shown below. The result is much as anticipated and it certainly makes for a great 'conversation piece'!

One concern I had is with respect to the internal heat generated mainly by the rectifier and audio output valves and the mains transformer, ie. would there be adequate ventilation? I inserted a thermometer probe into various areas of the upper part of the case with the radio operating for several hours (ambient external temperature around 21C): the following 'hot spots' were noted, with the majority of the inside of the case being at around 40C:

- above rectifier tube (metal-cased 5Z4): 68C
- above stabilizer tube (VR150/30): 52C
- above audio output valve (N78): 48C
- above mains transformer: 46C
- above BFO and 2nd mixer valves (both can-mounted, 6BA6 and ECH42 respectively): 42C
- above dial lights: 40C
- Above tuning gang: 39C



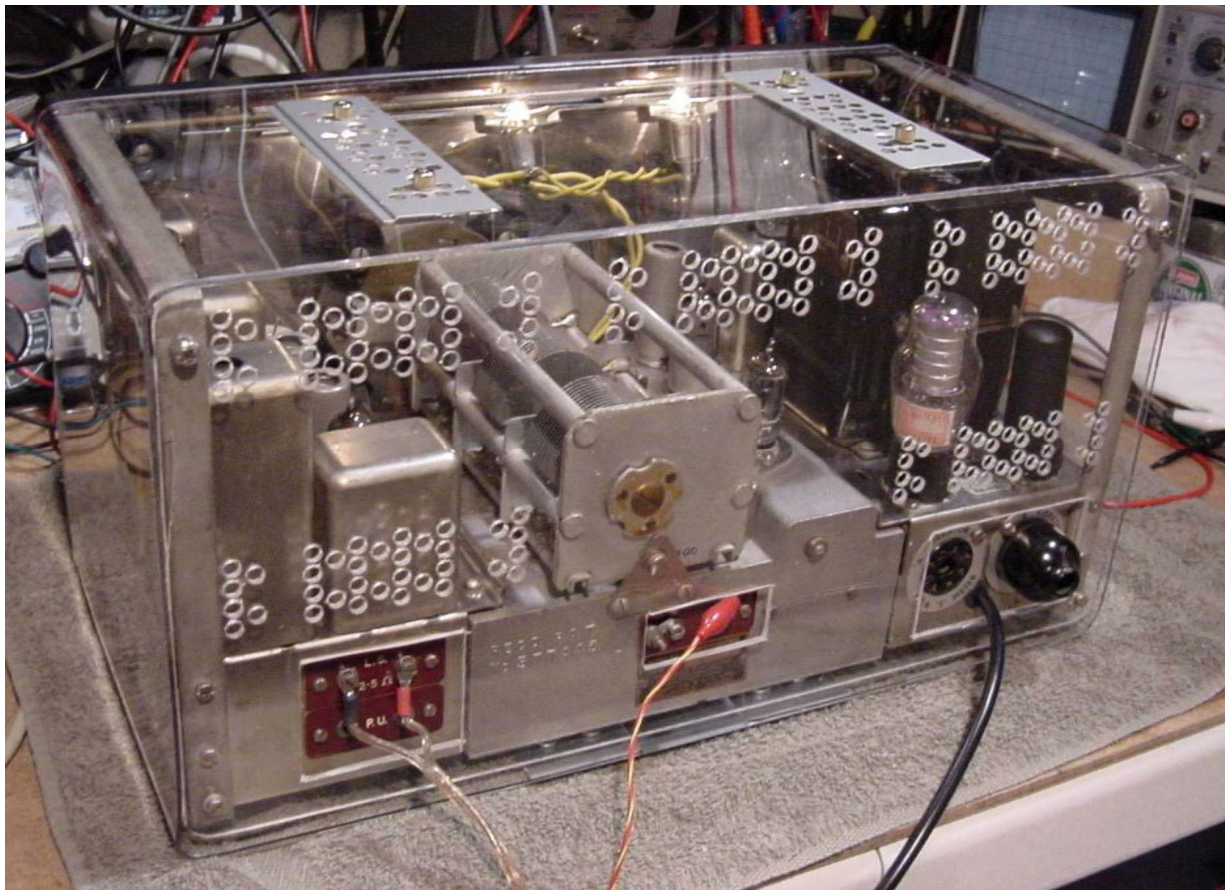
The main concern is therefore directly above the rectifier valve, although not hot enough to soften the Perspex, this temperature is just above that recommended for continuous service (see <http://www.sdplastics.com/acrylic.html>). This, combined with small dust particulates in the convection from the rectifier valve, could eventually discolour and weaken the Perspex in this location. I may therefore drill some additional ventilation holes at this location or mount a small metal deflection plate forcing better ventilation through the adjacent rear panel holes. The general case temperature is a little lower than that reported inside a real S.750 case by Terry Parker, G4NXN, in Lighthouse Issue 94, p20 – p28 in his excellent article 'Insiders Choice' (temperature noted as being 44C), though Terry also reported a higher external ambient of 24C to 27C.

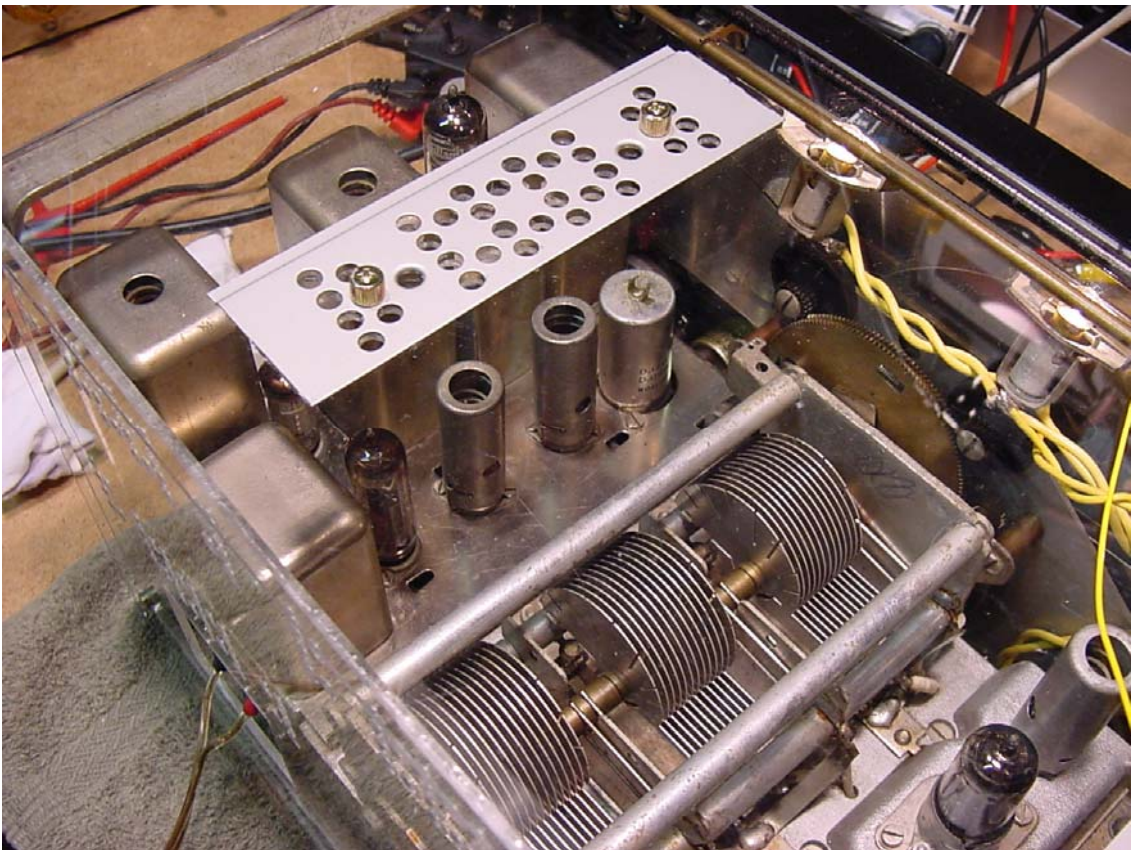
Closure

Well, that is about it for this article. My Perspex-cased S.750 has pride of place on my desk and does a great job of providing both background entertainment and occasional breaks of more serious listening while I work...

As with my other articles, I hope readers will find one or two useful tips in the above musings, or that they stimulate thought and curiosity, enthusiasm to 'do something' themselves, or for others to submit additional material, either as an article or a post on the EUG forum.

Gerry O'Hara, G8GUH, Vancouver, Canada, October, 2006 (G8GUH@telus.net)





Reference and Useful Websites

- Lighthouse Issue 94, p20 – p28 'Insiders Choice' by Terry Parker, G4NXN
- <http://www.plasticmag.com/ta.asp?aid=2332>
- http://www.ryanplastics.co.uk/materials_acrylics.php
- <http://www.3d-cam.com/materials/acrylic.asp>
- <http://www.sdplastics.com/acrylic.html>
- <http://www.misterplexi.com/infoweldon3.pdf>
- <http://www.qsl.net/eddystone/cases1.html> (Alan Clayton's site - currently down for updating)

Postscript

Well, now I believe that rocking horses do the proverbial after all.... Whilst I was attending the Vancouver Guitar Show today, I had a phone call from Pat at SPARC to ask me if I was interested in the case off an S.750 that would become available soon that he is thinking of buying for spares? – of course I am Pat! – AAARGHHHH.....



“Watch out for static electricity when working with acrylic plastic!”

(image to the left and above caption from <http://www.sdplastics.com/acrylic.html>) or, alternative caption from Pat:

“Would you be interested in buying an S.750 case Gerry?”