

# Quad ESL Mods And Stacking

There is nothing better than a pair of the original Quad ESLs90. except possibly two poles-.

by Chris Beeching

## Doubly Essential: More On The ESL

Quad's original Electrostatic is still one of the most revered loudspeakers in hi-fi. Ever since its introduction in 1957, it has wooed many, and once you've lived with it, it is hard to get used to anything else. In a previous article ['The Essential ESL', Nov 93] (described some ideas for updates and minor mods which do not alter the basic of character of the speaker. But it is possible to take things a lot further!

I would never pretend that the Electrostatic (now retrospectively designated 57 to avoid confusion with the current ESL-63) isn't flawed. But the speaker's inherent strengths outweigh by some considerable margin any weaknesses. In fact, if you ask a non-owner, or someone who hasn't listened to them you'll find the list of supposed 'weaknesses' long, and probably inaccurate.

First to be mentioned is the speaker's dipole configuration, but it could be argued that this is one of the speaker's strengths. As with anything worthwhile, a little bit of effort is needed to get the best out of it. but it would be wrong merely to dismiss the panel's rear radiation as 'unwanted'.

The diaphragm in the treble panel is often said to be too large to perform well. The bass diaphragms are not large enough, and not mounted rigidly enough, to couple effectively and efficiently with the air in the room at low frequencies.

In general terms, to produce high volume levels at low frequencies a speaker diaphragm must be able

to move a lot of air, which means that the cone or diaphragm must be large, or (as is the case with modern long throw drive units) must move back and forth quite a long way. In the case of the Electrostatic, there is a practical limit to the deflection of diaphragm as the perforated plates must be relatively close in order to exercise their charge over the whole surface of the diaphragm to get the thing to work.

But the historical perspective is also important; the Electrostatic was designed and developed at a time when the bandwidth of audio replay systems was much more limited than it is today.

In the 1950s, although hi-fi amplifiers could reproduce low frequencies cleanly, contemporary turntables produced relatively large amounts of rumble. If not filtered out in the amplifier, such unwanted very-low-frequency signals could cause speaker cones to flap uncontrollably, or, in the case of the Electrostatics, large movements of the diaphragm, which could cause arcing as the diaphragm came too close to the charged plates. Like other manufacturers, Quad designed its pre-amp (the 22) with limited low frequency extension, in order to protect the loudspeakers. A really extended upper frequency performance was not part of the design equation, either. Hi-fi systems of the time were limited at the extreme top end by the tracking abilities of pickups, and in any case a response to 15 kHz was regarded as ample. Thus, the Electrostatics designed strength is in the mid-range, and its response extends typically from about 70 Hz to perhaps 17kHz.

In valve days amplifier power was at a premium, with only about 20W available even from the more adventurous makers. With a sensitivity of around 86 dB, the Electrostatics could give good results from around 12W (Quad's matching 11 power amplifier was rated at 15W). Nonetheless, the Electrostatic was criticised for being less sensitive than contemporary conventional speaker designs.

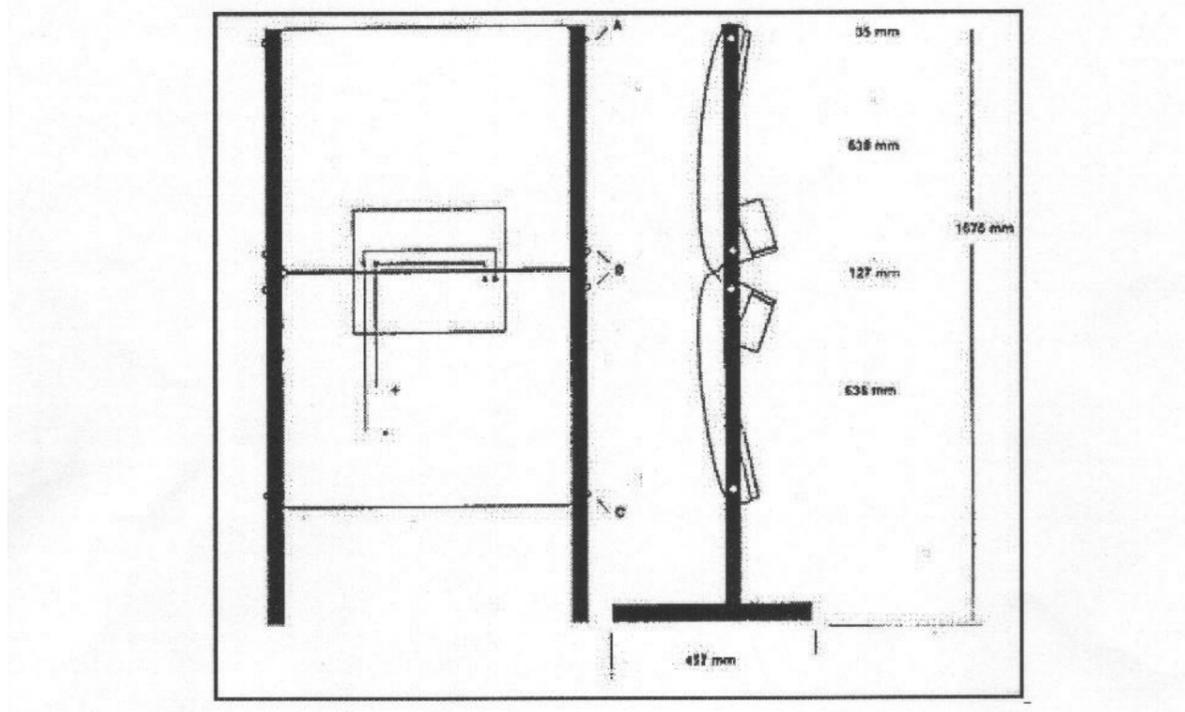
One early review commented that when the cat walked past for the first time while the Electrostatic was playing, it stood on end. This may have been caused by the electrostatic charge: but it could have happened just because the speaker did (and does) have the ability to recreate uncannily accurate and lifelike sound images in the home.

### Stacking Quads

Some users, while appreciating the Quad's unbeatable realism, have attempted to overcome its limitations by stacking two pairs. This in effect creates a very large bass drive unit, and providing both speakers in each stack are driven by the same amplifier to ensure phase integrity, bass power and extension can be noticeably improved. Also, by connecting them in parallel the overall impedance curve is considerably flatter, and hovers around 8 to 12 ohms rather than the 15-going-on-30ohm curve for a single panel. **Note Joost: yes but the impedance at HF will be almost a short circuit, I advice 'Vertical Bi-Amping'.**

Over the years, the advocates of this approach have included many notables of the hi-fi world SME founder Alistair Robertson-Aikman, who over the years has striven to create the best possible replay system in his superb purpose-built music room, began with just one pair of Electrostatics, then used a stacked pair, and somewhere along the line used eight pairs per side, arranged in a continuous symmetrical arc. Mr Robertson-Aikman's system now uses two pairs of Quad ESL-63s, again with one pair facing forward while the other pair are positioned outside these and facing across, facing across the room. The '63s have been modified to give better structural rigidity.

On the other side of the Atlantic, one of the trite luminaries of the American audio scene also experimented with Electrostatics. In the early 1970s, having just founded the company that bear his name, Mark Levinson built systems using stacked Quads. He appreciated the relaxed performance, utterly transparent midrange, and that window on the concert hall feeling. Despite all this, Levinson felt ultimately that the Electrostatic did have other failings which he could not tolerate. The siting limitations, limited dynamic range and sensitivity to high-power amplifiers (with possibly damaging results) eventually led him to abandon the Quads in favour of 'more rewarding' designs. The stacking idea survived, though: in 1986, when Mark Levinson developed the Amati speakers for his new company Cello, he used a special version of the Acoustic Research LSTs.



Quad acknowledges that stacking Electrostatics can bring about performance gains, and has provided information on how it can be done. The side pieces are removed and replaced by a single taller frame, in which the two speakers are mounted one above the other. The lower speaker is upside down, the upper one being the right way up, so the connections are brought conveniently close together. Quad's connection diagram suggests communing the mains supply, and paralleling the speaker feeds from the amplifier.

Room placement is a subject for experiment, as the low frequency cancellation effects will now occur at different points to those found with a single pair. Be prepared to spend time getting it right in the room. Once this is achieved, the imaging improves considerably too. As mentioned in the earlier article, removing the front grilles will also improve matters, but beware the dangerously high voltages laid bare.

### **Other Modifications**

Experimenters in search of the ultimate transparency have removed the hessian-type absorbent material behind the bass units, with mixed results. Dick Olsher [writing in *Stereophile*, Aug 87] suggested that this produced a trade-off between transparency and bass control, but he warned against removing the felt padding behind the central treble unit. (Note that if this is removed, care should in any case be taken to insulate the exposed HT connections against possible shorting.)

Writing three years earlier, when the ESL-63 had been launched but the old Electrostatic was still in production ['Panel power', *HFN/RR*, June 1984], Martin Colloms reported that he had achieved improvements by removing the padding behind all the units, provided the speakers were far enough (say 1.5 metres away) from the rear wall. The absorbent material is there to soak up at least some of the rear radiation from the panel, and this is necessary when the speakers are fairly close to a wall: otherwise, wall reflections will colour the sound. However, the material itself must produce some reflections, giving audible coloration and a loss of transparency. In the same article, Martin explored the largely beneficial effects of raising the Quads on stands somewhat higher than the standard small wooden feet.

One improvement, not desperately expensive, is to power each panel with its own HT supply. Russ Andrews (RATA) can supply an upgraded single power supply with higher-quality components, or supplementary HT blocks. Once fitted with these, the speaker took on a completely new guise, being subjectively faster, more dynamic and with a greater degree of transparency. Overall sensitivity changes little, whilst becoming a little more amplifier friendly. For full information on RATA's Quad mods, call (0539) 823247

A completely new crossover unit, to be connected to the transformer in place of the original, has been on sale in the USA since 1979. This is The Quad Mod by John Koval of California. Koala claims that this gives a flatter frequency response

through the mid/treble: the bass is not significantly extended, but it is said to be improved. The overall result is a brighter sounding speaker, which received favourable comment from Dick Olsher [again, *Stereophile*, Aug 87]. Sensibly, John Koval urges owners to make sure the speakers are working properly before making any mods. He can be contacted on (0101) 714-838 6555.

Some owners have undertaken still more drastic alterations to the original design. There arose in Bristol a (notorious?) band who proceeded to strip down Electrostatics and rebuild them on more rigid frameworks. One enthusiast, Dave Park, even changed the orientation of the panels. He placed the bass ones horizontally and put the tweeter across the top [as illustrated in the Nov 93 article]. The timber framework was much heavier and more substantial than the original, and the panels were very rigidly mounted. Triangulation struts added further rigidity to the structure.

Subjectively, the performance characteristics were now quite different to those of the standard model, and the speaker acquired a new get-up-and-go. Bass response, though probably no deeper, also had more weight, probably due to the increased rigidity of the frame which would allow the diaphragm to wholly drive the air and not end up moving the frame as well.

Dave Park has experimented with many configurations of panels including the equivalent of two stacked speakers per side. He added a new dimension to the performance by the judicious application of (horror of horrors) a graphic equaliser in the system, just to tailor out a small hump in the response at about 2kHz. However, Dave has now settled on a different design. He has retained just two bass panels per side. This, he says, is to retain the clarity of the bottom end: with four bass panels the bass tended to become too overpowering in comparison, he says. The treble panels are doubled up, and face slightly outwards. The whole lot is bi-amped, with a modified Audio Research valve amp driving the treble panels, and a Quad 606 driving the bass. Each panel is separately powered by its own HT supply, and each has its own audio transformer too. The sound is quite unlike their (at this stage, crude) appearance, being lucid, dynamic and tremendously transparent and detailed. Dave still uses a graphic equaliser, just to tailor the 1-2kHz band by a, single dB which certainly makes them perform well: if set to a flat response instead, they do lose just a touch of 'involvement'. I felt that these are perhaps the cleanest pair of Electrostatics I have ever heard, and the bass, for once, has all the right perspective and weight: the slight but hanging in the air is that they will probably not sound as good in another room.

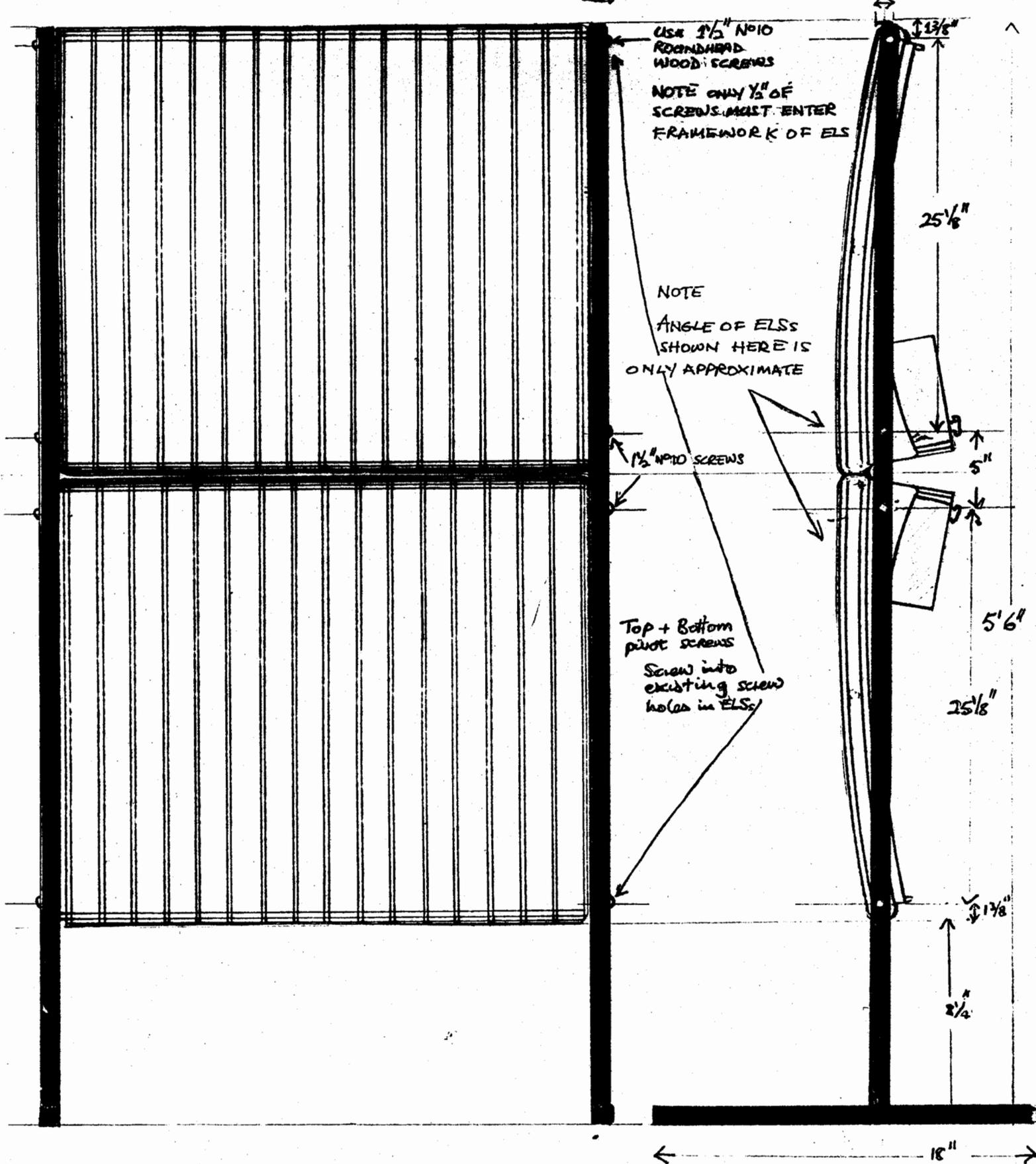
Turning the other cheek Dr. Mike Hopkins has a completely standard pair of stacked Electrostatics, stacked as per Quad's 201 Information Sheet. Hopkins found that stacked like this they become less sensitive to room dimensions and type, so this may be the answer for many. The reason for the apparent reduction in room-sensitiveness may be that the speaker is larger, and so, essentially, is more in control of the air in the room, the room, conversely, has less effect on the speaker. Thus, the speaker drives the room more than the other way round. But if ultimate performance is your holy grail, a compromise between minor modifications (as in 'The Essential ESL') and complete reworking as per Dave Park might be the best answer.

No one should forget just how far ahead of its time the Electrostatic rely was. Even since the introduction of the ESL-63 in 1981-2, the original speaker has risen in many people's estimation.

Whether they are seeing it through rose-tinted spectacles just because it is no longer manufactured. I don't know. But it has a beguiling sound quality which many find superior to or should I say more acceptable, than that of the newer model. And of course, credit must go to Quad for continuing to supply most of the spares for this wonderful creation: at the time of writing, the only part you can't buy from Quad is the wooden frame.

There seems to be some consensus among enthusiasts that the more than one pair approach is ultimately the best. Having now heard several pairs in various configurations, I have to agree: one pair is no longer enough on its own. but finding space for two pairs is currently beyond me. Never mind: when I move, I'll put a large enough room on top of the priorities list. If you can, listen to a stacked pair. You'll be in for quite a shock and then there's no hope for you.

STACKED QUAD ELECTROSTATICS.  
 SUGGESTED STACKING FRAME CONSTRUCTION  
 USING 1" SQUARE SPEED FRAME TUBING,  
 OR SIMILAR.



Assembly suggestions.

Note Polished side rails have to be removed to mount speakers in this manner.  
 Drill Speedframe to accept NO10 Woodscrews (a 3/16" hole approx.) in order to assemble  
 Mount top ELS first, by top pivot screws only, + allow speaker to take up position by  
 gravity, + fix in position by the lower screws. mount lower speaker into frame  
 upside down as shown, by the bottom pivot screws + adjust speaker to line up with upper  
 ELS as shown.

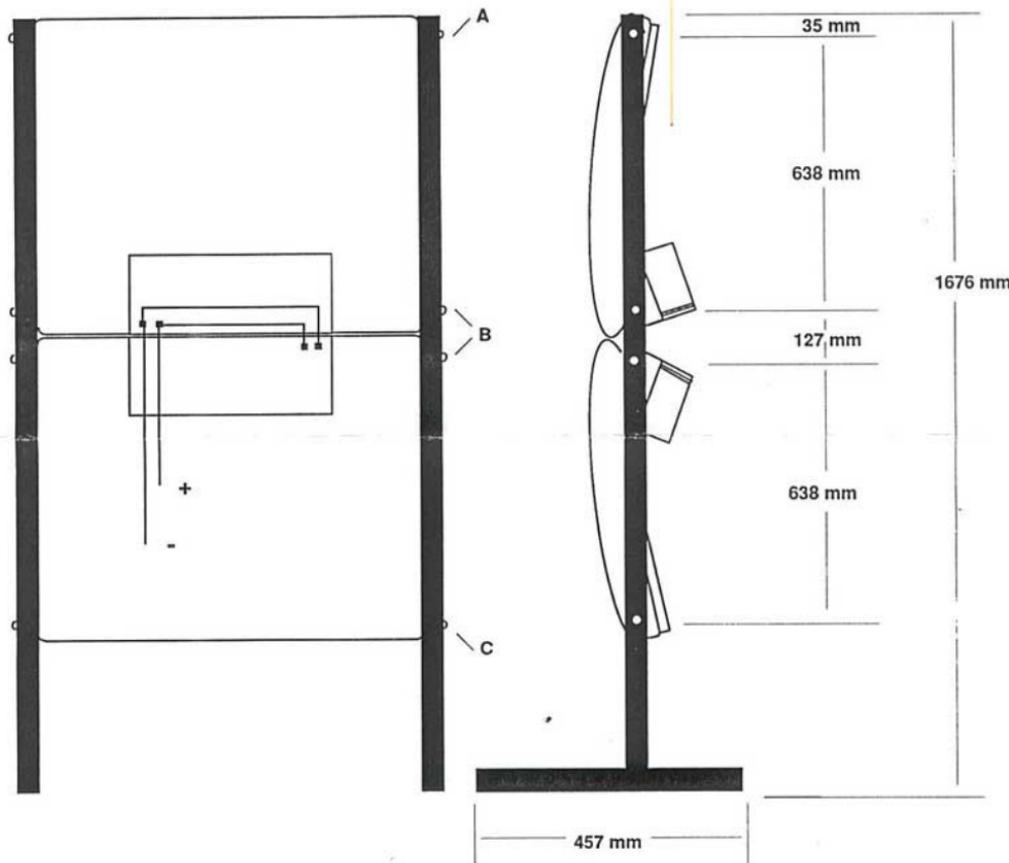
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## Stacking Quad Electrostatic Loudspeakers

The early type ESL,s may be stacked if required. The following information shows a suggested method of mounting using a stacking frame constructed from 'Speedframe' or similar 25 mm square material. It is important that the ESL,s are connected in parallel and we would advise that each speaker is fitted with our clamp protection circuit kit QELCLPK - see TI 001.



### Assembly Suggestions

The polished wood side rails have to be removed to mount in this manner. Drill square tubing to accept the 1.5" No.10 woodscrews (5 mm approx.). In order to assemble fit top ELS first, by top pivot screws (A), and allow speaker to take up position (as shown in diagram) by gravity, Then fix in position with centre screws (B). Mount lower speaker into frame upside down as shown, by the bottom pivot screws (C), and adjust to line up with the upper speaker. Fix in position with the centre screws (B).

**Note:** Only 0.5" of the fixing screws must be allowed to enter the wooden framework of the ESL's.