APPENDIX 2.1

Let

$w = m$, for a SRGD design,

$= n$, for a triangular design,

$= 2s - 1$, for a L_2 design,

$= v - p$, for a rectangular design.

It is now required to show that for the four classes of designs mentioned above

$$(v-k)(b-r) - (v-rk)(v-w) > 0.$$

Proof. Let $Q = (v-k)(b-r) - (v-rk)(v-w)$.

Now,

$$Q = [(v-k)(b-r)(b-1) - (v-rk)(v-w)(b-1)]/(b-1)$$

$$= [(v-k)(b-r)(b-v+w-1) + (v-k)(b-r)(v-w)$$

$$- (v-rk)(v-w)(b-1)]/(b-1)$$

$$= [(v-k)(b-r)(b-v+w-1) + v(v-w)(r-1)^2] / (b-1).$$

Hence, if $b \geq v - w + 1$, then $Q > 0$. Now, for the
four classes of designs mentioned above, $b \geq v - w + 1$.
Hence $Q > 0$ for the four classes of designs mentioned
above.