Perturbation theory of course tells us very little about the non-vanishing zeroes of β. If we calculate β to any finite order we might expect zeroes to occur at values:

$$\frac{\bar{g}^2}{4\pi} \quad C_2(G) \simeq O(1) \tag{4.13}$$

since this is the effective expansion parameter. On the other hand such approximations to β are totally unreliable for these values of g. It is perfectly possible that in gauge theories β is negative semi-definite and all values of the coupling constant are in the domain of attraction of the origin. Clearly for such theories to describe the strong interactions it is necessary that this domain be relatively large. It would therefore be useful to know the value of b_1, which we have not calculated.

The value of b_1 would be interesting in another context. Since it is possible, by including the requisite number of fermions, to render b_o very small, one might hope to construct models for which g_1 is very small. For example if the gauge group is SU(3) and we have 16 or 17 triplets of fermions then b_o will equal $\frac{1}{24\pi^2}$ or $-\frac{1}{24\pi^2}$ respectively. This value is suppressed by a factor of roughly thirty compared to the 'natural' scale of b_o. Therefore unless there are similar cancellations in the calculation of b_1, we would expect $g_1{}^2$ to be rather small, and calculable to a good approximation from the two loop expression for β. If this is so one could construct models which have UV stable fixed points at zero or