Homework 3

For the side frame on the following sheet

A. Compute the vehicle bending deflection $\Delta$.

\[ F=1500 \text{ Lb.} \]
\[ a = 20 \text{ in.} \]
\[ b = 40 \]
\[ c = 40 \]
\[ d = 10 \]
\[ h = 30 \]

- Dimensions in Inches
- Frame is planar
- All metal thickness are .040 in
- Material Mild Steel
- Neglect Flanges - All sections are closed
- Sections are normal to beam axis
- All joints rigid except as noted

B. If the value for $\Delta$ computed in (A) exceeds the deflection requirement, which beam would you alter first and why?

C. Compute $(Gt)_{EFF}$ for torsion.
   Take $Q=1650$ Lb

D. If the value for $(Gt)_{EFF}$ computed in (C) is too low compared to the requirement, which beam would you alter first and why?
SIDE FRAME

40 40
30 20

SECTIONS

Rocker
Hinge Pillar
B Pillar Below Belt
C Pillar Below Belt
Roof Rail
A Pillar
B Pillar above Belt
C Pillar above Belt

JOINT RATES $K_{zz}$ (Nm/rad)

- A Pillar-Hinge Pillar  \( .2E6 \)
- Hinge Pillar - Rocker
- B Pillar-Rocker
- C Pillar- Rocker
- All Connections to Roof Rail  \( .01E6 \)
\[(Gt)_{\text{EFF}} = \frac{Q}{\delta}(L/H)\]