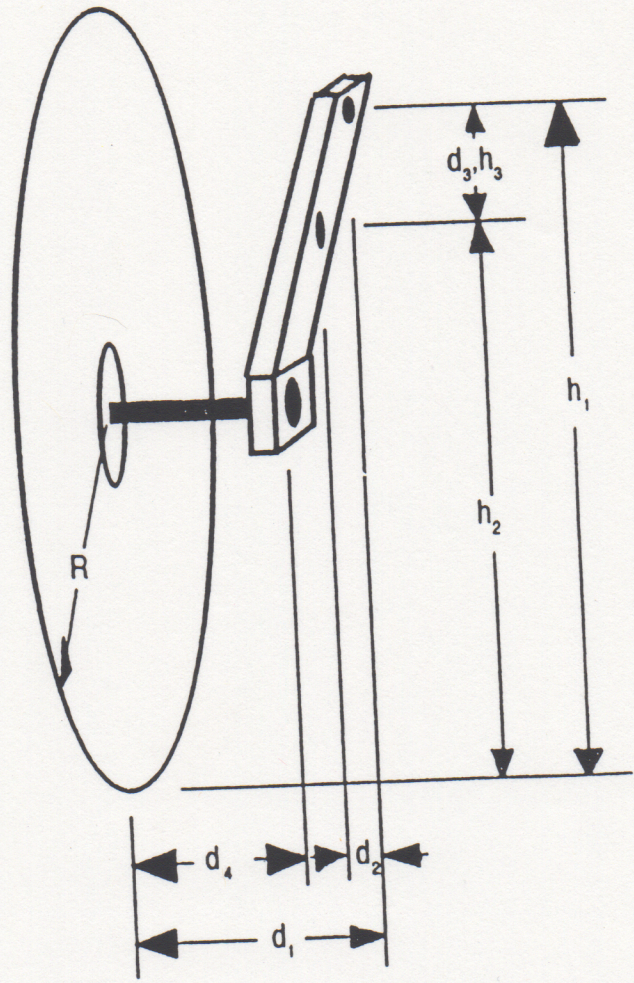


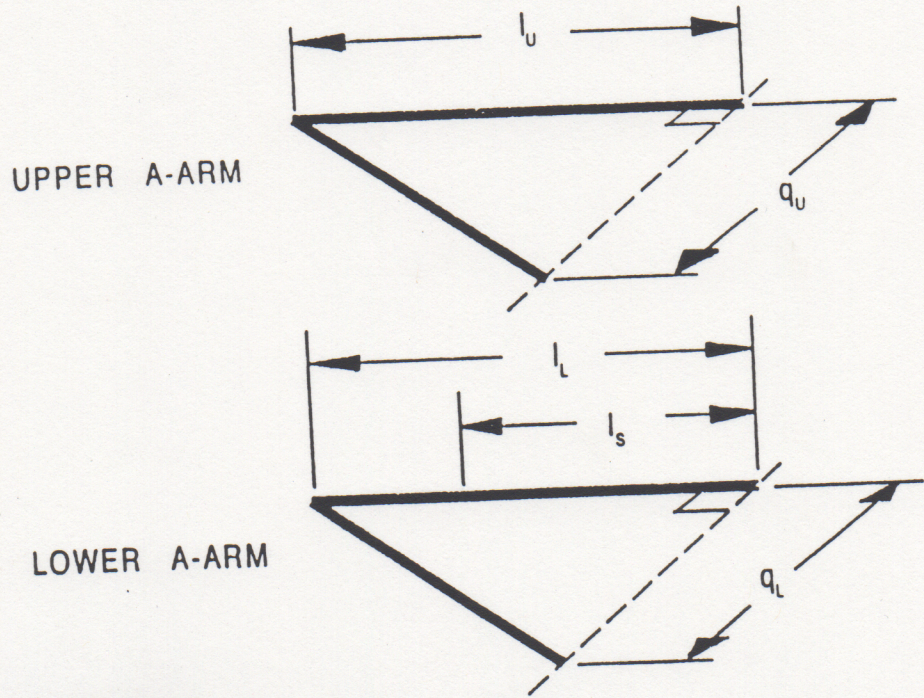
# HANDOUT 4. SOLAACA FRONT SUSP. FORCES

[FROM A SR. DESIGN REPORT ON AURORA II]



WHEEL/AXLE

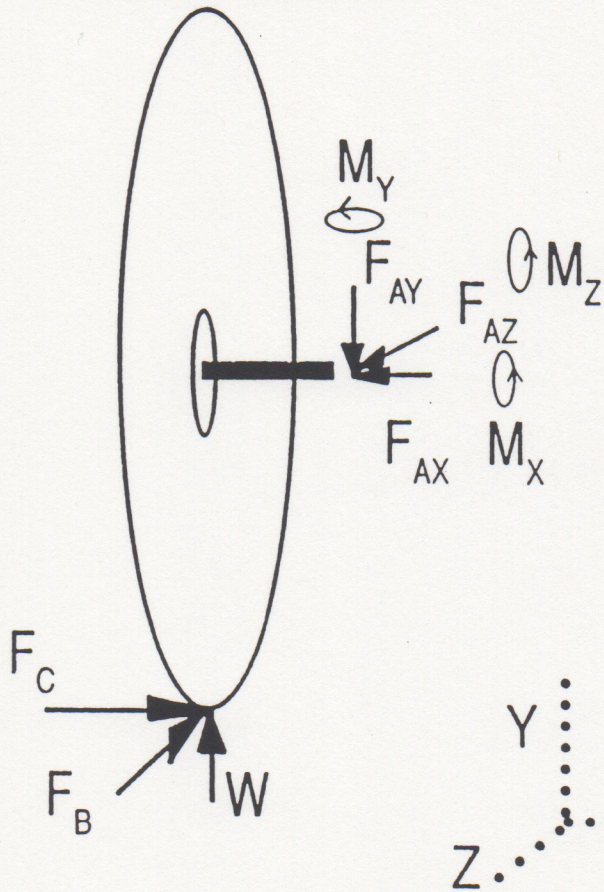
NOTE A-ARM DESIGN — ONE LEG IS PARALLEL TO AXLE LINE — (AURORA style)



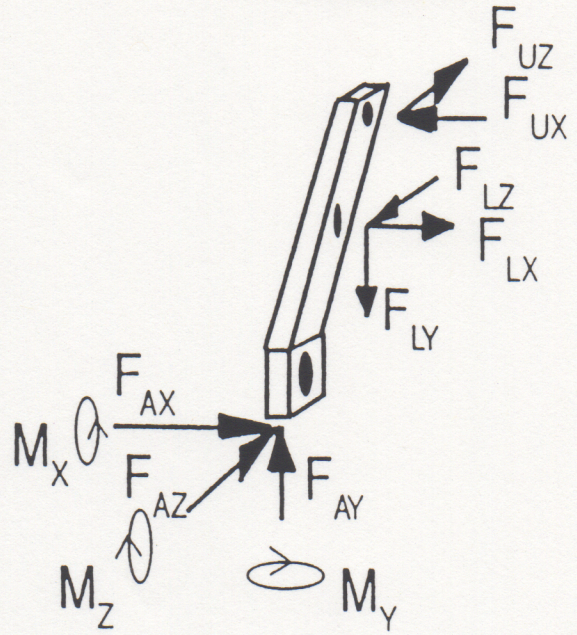
UPPER A-ARM

LOWER A-ARM

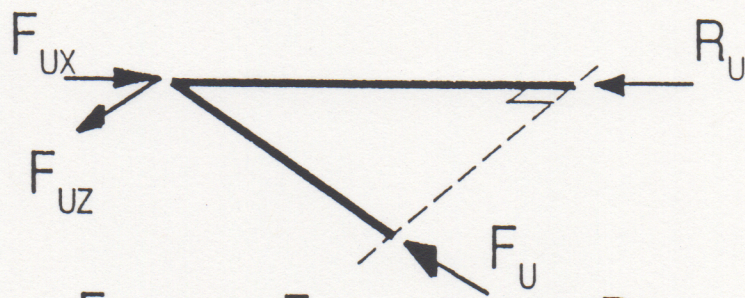
### Wheel & Axle



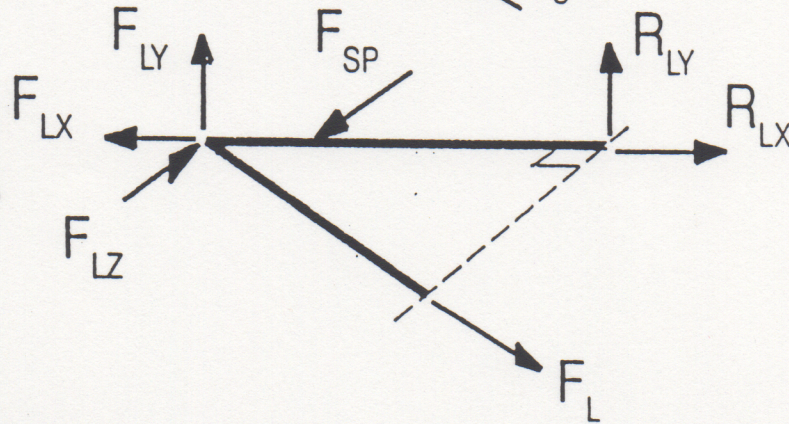
### Kingpin



### Upper A-Arm



### Lower A-Arm



## Front Suspension Force Equations

### At Upper Kingpin Connection:

$$F_{UX} = [ W ( d_1 - d_2 ) / d_3 ] + ( h_2 / h_3 ) F_C \quad \text{inside wheel}$$

$$= [ W ( d_1 - d_2 ) / d_3 ] - ( h_2 / h_3 ) F_C \quad \text{outside wheel}$$

$$F_{UY} = 0.000 \quad \text{both wheels}$$

$$F_{UZ} = ( h_2 / h_3 ) F_B \quad \text{both wheels}$$

### At Lower Kingpin Connection:

$$F_{LX} = [ W ( d_1 - d_2 ) / d_3 ] + ( h_1 / h_3 ) F_C \quad \text{inside wheel}$$

$$= [ W ( d_1 - d_2 ) / d_3 ] - ( h_1 / h_3 ) F_C \quad \text{outside wheel}$$

$$F_{LY} = W \quad \text{both wheels}$$

$$F_{LZ} = ( h_1 / h_3 ) F_B \quad \text{both wheels}$$

### At Axle Connection:

$$F_{AX} = F_C \quad \text{inside wheel}$$

$$F_{AX} = - F_C \quad \text{outside wheel}$$

$$F_{AY} = W \quad \text{both wheels}$$

$$F_{AZ} = F_B \quad \text{both wheels}$$

$$M_X = (R) F_B \quad \text{both wheels}$$

$$M_Y = (d_4) F_B \quad \text{both wheels}$$

$$M_Z = (d_4) W + (F_C) R \quad \text{inside wheel}$$

$$= (d_4) W - (F_C) R \quad \text{outside wheel}$$

At Frame Connections:

$$R_U = [ W (d_1 - d_2) / d_3 ] + (h_2 / h_3) F_C - [ (h_2 / h_3) (l_U / q_U) F_B ] \quad \text{inside wheel}$$

$$= [ W (d_1 - d_2) / d_3 ] - (h_2 / h_3) F_C - [ (h_2 / h_3) (l_U / q_U) F_B ] \quad \text{outside wheel}$$

$$F_U = F_B (h_2 / h_3) [ (q_U^2 + l_U^2)^{1/2} / q_U ] \quad \text{both wheels}$$

$$R_{LX} = W [ [(d-d_2)/d_3] + [(l_L/l_S)\cot(\theta)] ] + [(h_1/h_3)F_C] - [(h_1/h_3)(l_L/q_L)F_B] \quad \text{inner wheel}$$

$$= W [ [(d-d_2)/d_3] + [(l_L/l_S)\cot(\theta)] ] - [(h_1/h_3)F_C] - [(h_1/h_3)(l_L/q_L)F_B] \quad \text{outer wheel}$$

$$R_{LY} = W [ (l_L - l_S) / l_S ] \quad \text{both wheels}$$