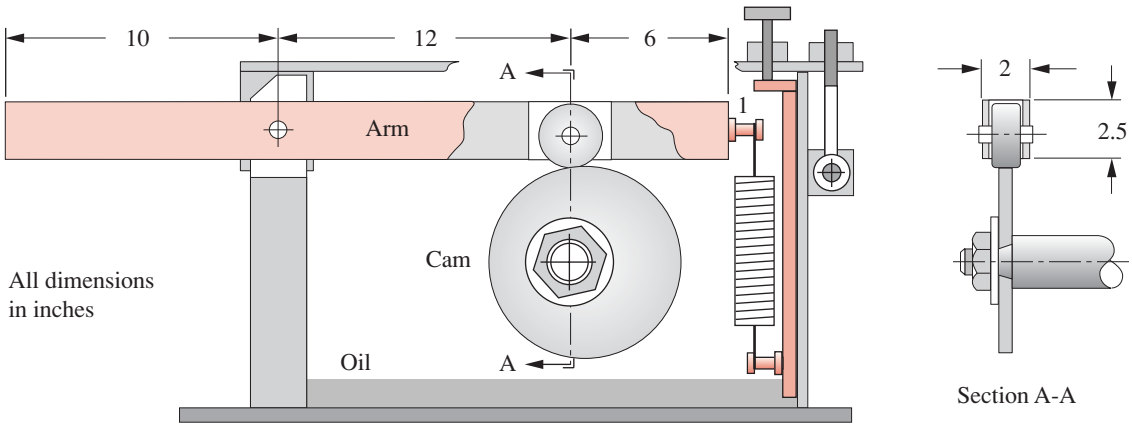

FIGURE P15-1

Problems 15-7 to 15-11

†15-7 Figure P15-1 shows a cam-follower system. The dimensions of the solid, rectangular 2 x 2.5 in cross-section aluminum arm are given. The cutout for the 2-in-diameter , 1.5-in-wide steel roller follower is 3 in long. Find the arm's mass, center of gravity location, and mass moment of inertia about both its *CG* and the arm pivot. Create a linear, one-*DOF* lumped mass model of the dynamic system referenced to the cam-follower and calculate the cam-follower force for one revolution. The cam is a pure eccentric with eccentricity = 0.5 in and turns at 500 rpm. The spring has a rate of 123 lb/in and a preload of 173 lb. Ignore damping.

†‡15-8 Repeat Problem 15-7 for a double-dwell cam to move the roller follower from 0 to 2.5 inches in 60° with modified sine acceleration, dwell for 120°, fall 2.5 inches in 30° with cycloidal motion, and dwell for the remainder. Cam speed is 100 rpm. Choose a suitable spring rate and preload to maintain follower contact. Select a spring from Appendix D. Assume a damping ratio of 0.10.

†‡15-9 Repeat Problem 15-7 for a double-dwell cam to move the roller follower from 0 to 1.5 inches in 45° with 3-4-5 polynomial motion, dwell for 150°, fall 1.5 inches in 90° with 4-5-6-7 polynomial motion, and dwell for the remainder. Cam speed is 250 rpm. Choose a suitable spring rate and preload to maintain follower contact. Select a spring from Appendix D. Assume a damping ratio of 0.15.

†‡15-10 Repeat Problem 15-7 for a single-dwell cam to move the follower from 0 to 2 inches in 60°, fall 2 inches in 90°, and dwell for the remainder. Use a seventh-degree polynomial. Cam speed is 250 rpm. Choose a suitable spring rate and preload to maintain follower contact. Select a spring from Appendix D. Assume a damping ratio of 0.15.

†‡15-11 Repeat Problem 15-7 for a double-dwell cam to move the roller follower from 0 to 2 inches in 45° with cycloidal motion, dwell for 150°, fall 2 inches in 90° with modified sine motion, and dwell for the remainder. Cam speed is 200 rpm. Choose a suitable spring rate and preload to maintain follower contact. Select a spring from Appendix D. Assume a damping ratio of 0.15.

† These problems are suited to solution using *Mathcad, Matlab,* or *TKSolver* equation solver programs. In most cases, your solution can be checked with program DYNACAM.