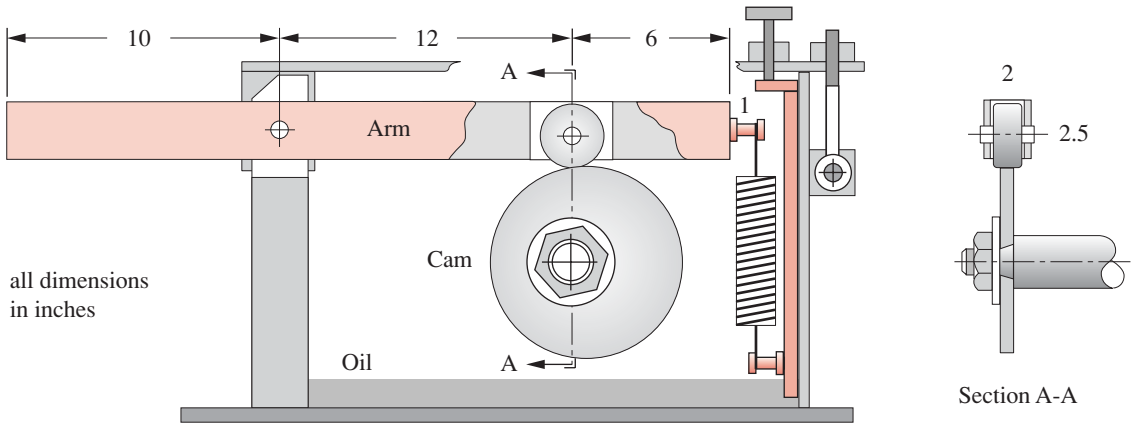

FIGURE P10-2

Problems 10-16, 10-17, 10-21, 10-26 and 10-29

†10-16 Figure P10-2 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 dia by 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. Ignore damping.

†10-17 The cam in Figure P10-2 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. Use the method of virtual work to find the torque required to rotate the cam through one revolution. Use the data from the solution to Problem 10-16.

*†10-21 Determine the effective spring constant and effective preload of the spring in Figure P10-2 as reflected back to the cam-follower. See Problem 10-17 for additional data.

*†10-26 For the cam-follower arm in Figure P10-2, determine a new location for its fixed pivot that will have zero reaction force when the cam applies its force to the follower.

†10-29 The arm in Problem 10-16 and Figure P10-2 has been redesigned such that the cross-section is no longer uniform and the material changed from aluminum to steel. However, the dimensions shown in the figure remain unchanged. The new arm has a total weight of 15.3 lb and, when supported on knife-edges at points 9.5 in to the left of the pivot and 17.5 in to the right of the pivot, the weights at the supports were found to be 7.1 lb and 8.2 lb, respectively. The arm was supported at its pivot point with a low-friction ball bearing and the period of oscillation was found to be 2.0 sec. What is the approximate moment of inertia of the arm with respect to its pivot axis?

* Answers in Appendix F.

† These problems are suited to solution using *Mathcad, Matlab,* or T*KSolver* equation solver programs.