

Student Name \_\_\_\_\_

KEY

Date \_\_\_\_\_

The amount of force being applied by any hydraulic piston is a simple product of the hydraulic force (in psi) times the piston area (in square inches, in<sup>2</sup>). The most difficult part is determining the piston area of the pistons. This is done using the formula given in Section 4.2; with the aid of a simple hand-held calculator, this is quick and easy. Except for problems 2 and 5, these are all simple circles.

1. The band servo piston has a diameter of 3.5"; what is the area of this piston? 9.62 in<sup>2</sup>

$$3.5 / 2 = 1.75 \times 1.75 = 3.06 \times 3.1416 = 9.62$$

At a fluid pressure of 60 psi, what is the apply force? 57.72 lbs.

$$60 \times 9.62 = 57.72$$

At a fluid pressure of 110 psi (reverse boost), what is the apply force? 1058.2 lbs.

$$110 \times 9.62 = 1058.2$$

2. The clutch piston has an outside diameter of 4.5" with a 2.75" center hole. What is the area of this piston? 9.96 in<sup>2</sup>

$$4.5 / 2 = 2.25 \times 2.25 = 5.06 \times 3.1416 = 15.9$$

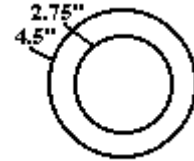
$$2.75 / 2 = 1.375 \times 1.375 = 1.89 \times 3.1416 = 5.94; \quad 15.9 - 5.94 = 9.96$$

At a fluid pressure of 60 psi, what is the apply force? 597.6 lbs.

$$60 \times 9.96 = 597.6$$

At a fluid pressure of 110 psi, what is the apply force? 1095.6 lbs.

$$110 \times 9.96 = 1095.6$$



3. The accumulator piston has a diameter of 2"; what is the area of this piston? 3.14 in<sup>2</sup>

$$2 / 2 = 1 \times 1 = 1 \times 3.1416 = 3.1416$$

At a fluid pressure of 60 psi; what is the apply force? 188.4 lbs.

$$60 \times 3.14 = 188.4$$

At a fluid pressure of 110 psi; what is the apply force? 345.4 lbs.

$$110 \times 3.14 = 345.4$$

4. The throttle boost valve (at the pressure regulator) has a diameter of 0.4"; what is the area of this valve?

$$\underline{0.12 \text{ in}^2}$$

$$0.4 / 2 = 0.2 \times 0.2 = 0.04 \times 3.1416 = 0.12$$

At a fluid pressure of 60 psi, what is the apply force? 7.2 lbs.

$$60 \times 0.12 = 7.2$$

At a fluid pressure of 110 psi, what is the apply force? 13.2 lbs.

$$110 \times 0.12 = 13.2$$

5. The pressure regulator valve has a diameter of 0.52" with a 0.062" hole in it.

What is the area of this valve? 0.217 in<sup>2</sup>

$$0.52 / 2 = 0.26 \times 0.26 = 0.07 \times 3.1416 = 0.22$$

$$0.062 / 2 = 0.031 \times 0.031 = 0.00096 \times 3.1416 = 0.003; \quad 0.22 - 0.003 = 0.217$$

At a fluid pressure of 60 psi, what is the apply force? 13.02 lbs.

$$60 \times 0.217 = 13.02$$

At a fluid pressure of 110 psi, what is the apply force? 23.87 lbs

$$110 \times 0.217 = 23.87$$

