

Notes on using this spreadsheet: Enter values in the cells that have blue text. Cells with black text are calculated. The area with yellow background is for power brakes only. Understand the limitations and interpret results with care. For example, there is no way to put a figure on the fluid displacement required to take up slop and flex in the system.

### STEP 1 - Install 4-wheel discs

### STEP 2 - SELECT ROTOR.

Front Rotor Diameter (in.)	11.7323	stock bronco
Rear Rotor Diameter (in.)	11.752	77 cj7
Front Rotor Weight (lbs.)	18.93	
Rear Rotor Weight (lbs.)	17.2	

### STEP 3 - Check Thermal Capacity

Weight of vehicle (lbs.)	5205	
Max speed of vehicle (mph)	65	
Kinetic Energy at max speed (ft. lbs.)	735,489	
Kinetic Energy at stop (ft. lbs.)	0	
Kinetic Energy Change (ft. lbs.)	735,489	
Temperature Rise (*F)	131	
Starting Temperature (*F)	500	
Brake Temp after stop (*F)	631	must not > 1000*F

### STEP 4 - Select Calliper

Number of callipers (each front wheel)	1
Number of callipers (each rear wheel)	1
Number of pistons (each front caliper)	1
Number of pistons (each rear caliper)	1

Calliper Design (front callipers)	2 1 = fixed, 2 = floating
Calliper Design (rear callipers)	2 1 = fixed, 2 = floating
Piston diameter (front) (in.)	3.09375 T-bird
Piston diameter (rear) (in.)	2.5 GM metric s-10
Actual Piston Area (each front calliper)	7.513462 This equation can be replaced with an area value if callipers have r
Actual Piston Area (each rear calliper)	4.90625 This equation can be replaced with an area value if callipers have r
Total Effective Piston Area (front)	15.02692
Total Effective Piston Area (rear)	9.8125

### STEP 5 - Determine Brake Torque Required

Rolling Radius of Tire (in.)	17.5 goodyear mt/r
Tire Grip	1 Use 1.0 unless calculated otherwise

#### STEP 5a - Front

Horizontal distance from front axle to C of G (in.)	45.15 C of G = centre of gravity
Wheelbase (in.)	94 4-link Bronco (2" aft)
Vertical Height of vehicle's C of G (in.)	40.94 measured vertically from ground
Vertical Force on Both front Tires (lbs)	4,972
Friction Force on Front Tire (lbs)	2,486
Brake Torque Required - each front wheel (in. lbs.)	43,504

#### STEP 5b - Rear

Vertical Force on both rear tires (lbs)	233
Friction Force on Rear Tire (lbs)	117
Brake Torque Required - each rear wheel (in. lbs.)	2,040
Brake Balance	
Front	96%
Rear	4%

## STEP 6 - Calculate Required Hydraulic Pressure (psi)

Front

Effective Rotor Radius (in)

5

Coefficient of friction between pad and rotor

0.44 use 0.3, manufacturer's specs, or estimate derived from the pad's D

Hydraulic pressure required (front) (psi)

1316

Rear

Effective Rotor Radius (in)

5 Still need actual measurement but it is close to stock bronco

Coefficient of friction between pad and rotor

0.3 use 0.3 unless otherwise specified by pad manufacturer

Hydraulic pressure required (rear) (psi)

139

Max System Hydraulic Pressure Required

1,316 Hydraulic pressure required, front or rear, whichever is greatest

## STEP 7 - Pedal Effort Desired (lbs)

50 Driver's pedal effort at maximum braking - normally 50-75 lbs.

## STEP 9a - Pedal Ratio

6 Pedal pivot to footpad distance divided by pivot to pushrod distance

## STEP 9b - Calculate Manual MC Pushrod Force

Manual Pushrod Force (lbs)

300 pedal effort times pedal ratio

## STEP 9c - Calculate MC size required (manual)

Area of MC piston required (sq. in.)

0.2280

MC Bore required (diameter) (in.)

0.5389

## STEP 9d - Insert actual MC size and calculate pressure

Actual MC Size (piston diameter) (in.)

1.1250 With due consideration to displacement required for acceptable ped

Actual MC piston area

0.9935

Actual pressure produced

302 If value is red (less than B88): Increase pedal ratio, rotor effective r

Hydraulic Ratio - Front

15 :1

Hydraulic Ratio - Rear

10 :1

**STEP 9e - Add Power Booster (if required)**

Booster Multiplication **3.667** Use value from 2 to 5

**STEP 9f - Calculate Power MC Pushrod Force**

Power Pushrod Force (lbs) 1,100 Pedal effort times pedal ratio times booster multiplication

**STEP 9g - Calculate MC size required (Power)**

Area of MC piston required (sq. in.) 0.8360

MC Bore required (diameter) (in) 1.0320

**STEP 9h - Insert actual MC size and calculate pressure**

Actual MC Size (piston diameter) (in.) **1.1250** With due consideration to displacement required for acceptable pedal effort

Actual MC piston area 0.9935

Actual pressure produced **1,107**

Hydraulic Ratio - Front 15 :1

Hydraulic Ratio - Rear 10 :1

**Step 11 - Calculate Actual Max brake Torque (in. lbs.)**

Max actual hydraulic pressure **1107** Enter the calculated value from either manual (B108) or power brake master cylinder pressure obtained from pressure gauge installed inline with brake tubing.

Front

Required Brake Torque (front) (in. lbs) 43,504

Calculate Clamping Force (front) (lbs) 16,635

Calculate Brake Torque (front) (in. lbs.) 36,597

Rear

Required Brake Torque (rear) (in. lbs) 2,040

Calculate Clamping Force (rear) (lbs) 10,862

Calculate Brake Torque (rear) (in. lbs.) 16,294