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**	
Rear Rotor Diameter (in.)	**11.2205**	
Front Rotor Weight (lbs.)	**18.93**	
Rear Rotor Weight (lbs.)	**12**	

STEP 3 - Check Thermal Capacity

Weight of vehicle (lbs.)	**5000**	
Max speed of vehicle (mph)	**65**	
Kinetic Energy at max speed (ft. lbs.)	706,522	
Kinetic Energy at stop (ft. lbs.)	0	
Kinetic Energy Change (ft. lbs.)	706,522	
Temperature Rise (*F)	147	
Starting Temperature (*F)	**500**	
Brake Temp after stop (*F)	647	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.)	**2.9375**	**T-bird**
Piston diameter (rear) (in.)	**1.875**	**Explorer**
Actual Piston Area (each front calliper)	6.773691	This equation can be replaced with an area value if callipers have multiple pistons of unequal diameters
Actual Piston Area (each rear calliper)	2.759766	This equation can be replaced with an area value if callipers have multiple pistons of unequal diameters
Total Effective Piston Area (front)	13.54738	
Total Effective Piston Area (rear)	5.519531	

STEP 5 - Determine Brake Torque Required

Rolling Radius of Tire (in.)	**17.25**	

Tire Grip	**1**	Use 1.0 unless calculated otherwise

STEP 5a - Front

Horizontal distance from front axle to C of G (in.)	**50**	C of G = centre of gravity
Wheelbase (in.)	**94**	4-link Bronco (2" aft)
Vertical Height of vehicle's C of G (in.)	**36**	measured vertically from ground
Vertical Force on Both front Tires (lbs)	4,255	
Friction Force on Front Tire (lbs)	2,128	
Brake Torque Required - each front wheel (in. lbs.)	36,702	

STEP 5b - Rear

Vertical Force on both rear tires (lbs)	745	
Friction Force on Rear Tire (lbs)	372	
Brake Torque Required - each rear wheel (in. lbs.)	6,423	
Brake Balance		
Front	85%	
Rear	15%	

STEP 6 - Calculate Requird Hydraulic Pressure (psi)

Front		
Effective Rotor Radius (in)	**6**	
Coefficient of friction between pad and rotor	**0.44**	use 0.3, manufacturer’s specs, or estimate derived from the pad's DOT edge code
Hydraulic pressure required (front) (psi)	1026	
Rear		
Effective Rotor Radius (in)	**5**	
Coefficient of friction between pad and rotor	**0.38**	use 0.3 unless otherwise specified by pad manufacturer
Hydraulic pressure required (rear) (psi)	612	
Max System Hydraulic Pressure Required	1,026	Hydraulic pressure required, front or rear, whichever is greatest
STEP 7 - Pedal Effort Desired (lbs)	**75**	Driver's pedal effort at maximim 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)	450	pedal effort times pedal ratio

STEP 9c - Calculate MC size required (manual)

Area of MC piston required (sq. in.)	0.4385	
MC Bore required (diameter) (in.)	0.7474	

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 pedal travel. Min 1" for 4-wheel discs.
Actual MC piston area	0.9935	
Actual pressure produced	453	If value is red (less than B88): Increase pedal ratio, rotor effective radius, calliper piston size or add power booster
Hydraulic Ratio - Front	14 :1	
Hydraulic Ratio - Rear	6 :1	

STEP 9e - Add Power Booster (if required)

Booster Multplication	**4**	Use value from 2 to 5

STEP 9f - Calculate Power MC Pushrod Force

Power Pushrod Force (lbs)	1,800	Pedal effort times pedal ratio times booster multiplication

STEP 9g - Calculate MC size required (Power)

Area of MC piston required (sq. in.)	1.7540
MC Bore required (diameter) (in)	1.4948

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 travel
Actual MC piston area	0.9935	
Actual pressure produced	1,812	
Hydraulic Ratio - Front	14 :1	
Hydraulic Ratio - Rear	6 :1	

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

Max actual hydarulic pressure	**1812**	Enter the calculated value from either manual (B108) or power brakes (B132), above - or actual obtained from pressure gauge installed inline with brake tubing.
Front		
Required Brake Torque (front) (in. lbs)	36,702	
Calculate Clamping Force (front) (lbs)	24,548	
Calculate Brake Torque (front) (in. lbs.)	64,806	
Rear		
Required Brake Torque (rear) (in. lbs)	6,423	
Calculate Clamping Force (rear) (lbs)	10,001	

Calculate Brake Torque (rear) (in. lbs.)	19,003