

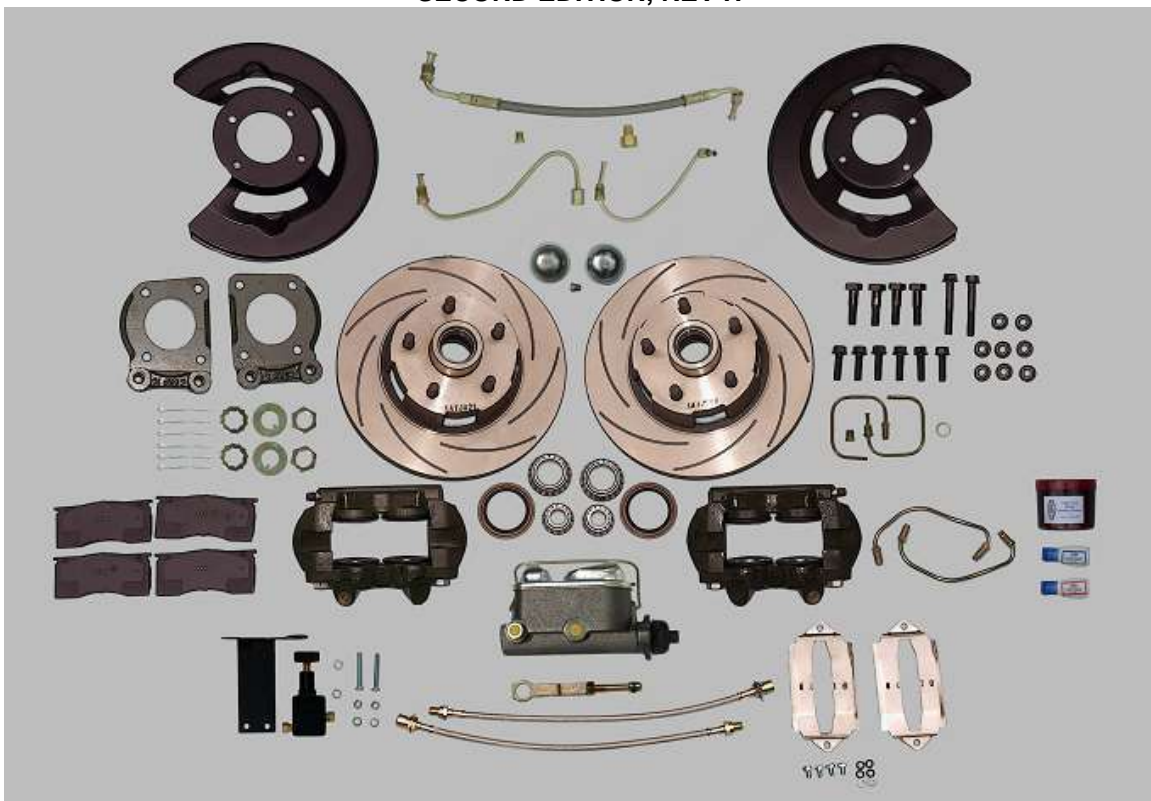


## CLASSIC SERVICES RESTORATION PARTS

### Installation Guide for the SWAP.1 FORD/KH 4 Piston Caliper Type Front Disc Brake Conversion for Mustang, Falcon, and Equivalent Applications

Manual brake 65-66 Mustang and equivalents

SECOND EDITION, REV H



**Please read this guide completely before starting the installation. Call us at 512-947-6718, or email to [info@discbrakeswap.com](mailto:info@discbrakeswap.com) if you need technical assistance**

## I. INTRODUCTION

The CSRP brand SWAP.1 front disc brake conversion kit is an upgraded reproduction of the excellent Kelsey-Hayes produced disc brake system originally available on 8 cylinder equipped 65-67 Mustang (and several other US brand cars in the mid 60's). Ford chose this system because of its simple application onto the standard 8 cylinder drum type steering knuckle (spindle). The under the fender part of this system is comprised of a stamped sheet metal dust shield, a cast caliper bracket, an 11.3" cast iron rotor, and a 4 piston rigid mounted iron caliper. Early production calipers suffered from problems with corrosion of the carbon steel pistons. Revised production materials have corrected this problem. The kit includes under the hood components necessary to complete the system.

The system will mount to any of the many 60-80 Falcon chassis based cars equipped with the Fairlane/Falcon/Mustang type 8 cylinder steering knuckle. The system can be applied to 6 cylinder cars as well, provided they are fitted with 8 cylinder type drum steering knuckles and 8 cylinder specification steering linkage assemblies. Knuckles made after 1966 have slightly different steering arm geometry and tie rod mount hole dimension. Drum steering knuckles from 67-69 are identical. Those from 70-73 are essentially identical and have a larger diameter spindle pin and larger tie rod mount hole than the earlier production. At this time, manual SWAP.1 kits are available for cars using 63-73 model steering knuckles, and power brake assist upgraded kits are available for 65-70 models. This kit will not mount to pre 66 6 cylinder spindles (pre 67 for Mustang) or 68-73 disc brake specific spindles.

### **What does the conversion involve?**

The SWAP involves replacing everything connected to the steering knuckle (spindle), as well as the soft brake hoses, the master cylinder and/or booster, and installing proportioning and residual pressure valves. Conversion kits for power assist on 67-70 Mustang include a replacement power assist type brake pedal that is transmission specific. The SWAP will require a set of serviceable basic tools and a torque wrench. A floor jack will make the job easier.

## II. DISASSEMBLY

### A. Removing the drum assembly

1. Loosen the front wheel lug nuts slightly. Jack the front of the car off the ground and place jack stands on a chassis hard point just to the rear of the front wheels. Perform steps 2-10 on one wheel at a time.
2. Remove the wheel.
3. Have a jar or basin ready. Cut the brake hose near the wheel cylinder. Direct the flow of leaking brake fluid to the container.
4. Turn the steering wheel as to align the drums in the normal forward driving position.
5. Knock the dust cap off of the drum. Remove the cotter pin that retains the spindle nut.
6. Remove the spindle nut retainer and then unscrew the spindle nut.
7. Locate the four 3/8" fine thread nuts on the back side of the spindle. Remove these with a 9/16" socket or spanner wrench.
8. The entire drum assembly, including the backing plate, can now be removed from the steering knuckle (spindle).

### B. Disassembly of the hydraulics

1. Separate the old hose from its hard line. It's best to use a flare wrench when tightening or loosening brake fittings. It helps to apply penetrating oil and or heat prior to the attempt to remove flare fittings.
2. Evaluate if the tubes are serviceable. Replace or repair any corroded or crimped tubes, or any bad fittings.
3. Remove the one or two hard lines from the master cylinder (depending on the year model of your application). A flare wrench makes the job much neater. You may find that the fittings will not come off or that the nut becomes stripped. In this case clamp a vise-grip onto the fitting snugly and strike it with a hammer in order to break the threads loose. It is possible that you will destroy the fitting or tube. The most important tube to preserve is the rear brake lead, the next important are the front leads.
4. Remove the bolts that connect the master cylinder or booster to the firewall.
5. Try to pull the master cylinder/booster straight out from the firewall. Sometimes the master cylinder push rod is mechanically retained in the master cylinder. If so, you will be required to wedge yourself under the dash and disconnect the push rod from the brake pedal. Remove the master cylinder. Be careful not to spill brake fluid on the paint. Immediately remove any spills from the paintwork.

### III. ASSEMBLY

#### A. Mounting the caliper bracket/dust shield assembly

1. The assembly order is bolts/dust shield/caliper bracket/steering knuckle flange/nuts.
2. The cutout in the shield, and the caliper brackets are oriented forward (9:00 o'clock on the driver side, 3:00 o'clock on the passenger side). The fasteners are 3/8" fine thread grade 8 bolts and Stover nuts (flanged prevailing torque nut that do not require a thread locking device or fluid).





3. Three of the bolts are the same size and one is about an inch longer. Their relative placement through the knuckle is quite obvious.
4. Thread the nuts and torque to 42-50 ft-lb. Prevailing torque nuts have an oval distortion at the top of their threads that provide locking force when a

stud or bolt is threaded through them. The threads reform to nearly circular. The manufacturers claim that they can be used 3 times.

## B. Mounting the rotor

1. Remove the rotors from their packaging. Regardless of package markings, the preferred orientation for the rotor slots for the outboard sides is to radiate from the hub to the edge in a clockwise fashion for the passenger side, and anti-clockwise for the driver side.
2. Pack the wheel bearings with disc brake service type wheel bearing grease (GCLB grade type NLGI 2 specification) . This author makes a mess of himself and my surroundings every time I pack bearings. The least messy method I know of is to put a bearing in a baggie along with a moderate quantity of grease and knead the grease into the bearing for a few minutes. Repeat with all four bearings. Make sure to add some more grease after each bearing.
3. Stage the bearings on a clean piece of paper until they are used.
4. Inspect the interior of the hub for excessive casting flash (unwanted metal), and casting sand. Use a wire brush and compressed gas to remove any sand present (not common). Remove any flash that would interfere with the pin (very uncommon).
5. Prepare the rotor. Apply a thick layer of the disc brake wheel bearing grease to the inside of the rotor hub and the bearing races. Careful, there may be sharp casting flash inside the hub.
6. Insert the inside (larger bearing) into the inside of the rotor hub such that it seats onto its race. See the photo below.
7. Place a wheel grease seal onto its recess on the inside of the hub. Carefully tap the edge of the seal until it becomes secured into place. Tap around the seal to insure it is completely seated. See the photo below.
8. Apply a scant amount of grease to the wheel seal's sealing surface on the spindle.
9. Carefully insert the rotor onto the spindle. Don't scrape the seal over the threads on the end of the spindle. You should be able to feel the seal slip over the sealing surface on the spindle. You may need to wobble the rotor a bit to seat the inner bearing onto its place on the stub axle.
10. Insert the outer (smaller) wheel bearing onto the spindle until it seats upon the hub race. The smaller ends of the two tapered bearings should be facing each other.
11. Fit the bearing retainer (large washer) onto the spindle with the tab seated in the keyway on the stub axle.
12. Fit the wheel nut onto the spindle. Hand tighten the nut.
13. Using a properly calibrated torque wrench, torque the wheel nut, while spinning the rotor, to 17-25 ft-lb. Spin the rotor several revolutions. The wheel bearings are now pre-loaded and subsequent retightening will torque accurately.



14. Back off the wheel nut a half turn.

15. Retighten the nut such that it torques to 10-15 ft-lb with the nut oriented such that the cotter pin can fit through both the hole in the spindle and through a castellation on the retainer. Fit the castellated retainer over the nut.



16. Insert a cotter pin and bend the exposed end to make it secure.
17. The rotor should rotate freely and should not scrape against the shield.
18. Coat the inside of the dust cap with grease. Don't fill the cap like Dad told you to do.
19. Fitting the dust cap can be a very frustrating ordeal. It is made easier if you have some form of mandrel to aid in the pressing. The mandrel can be a short length of 1.5" pipe or similar device that will fit over the hemispherical part of the cap, but not the flat flange part.
20. Ever so slightly crimp the skirt of the dust cap at three places at 120 degree intervals. Don't overdo it or the crimped spot will interfere against the bearing retainer.
21. Using three or four of your hands set the dust cap in place and put the mandrel on top of the dust cap. Strike the mandrel with a big hammer.
22. The cap will tend to go on crooked. Aim the hammer blows to even out the progress.
23. Once the cap goes in a bit, the progress will even out. Drive it home.
24. Wash your hands. Wipe everything with a clean cloth, and clean the rotor with brake cleaner.

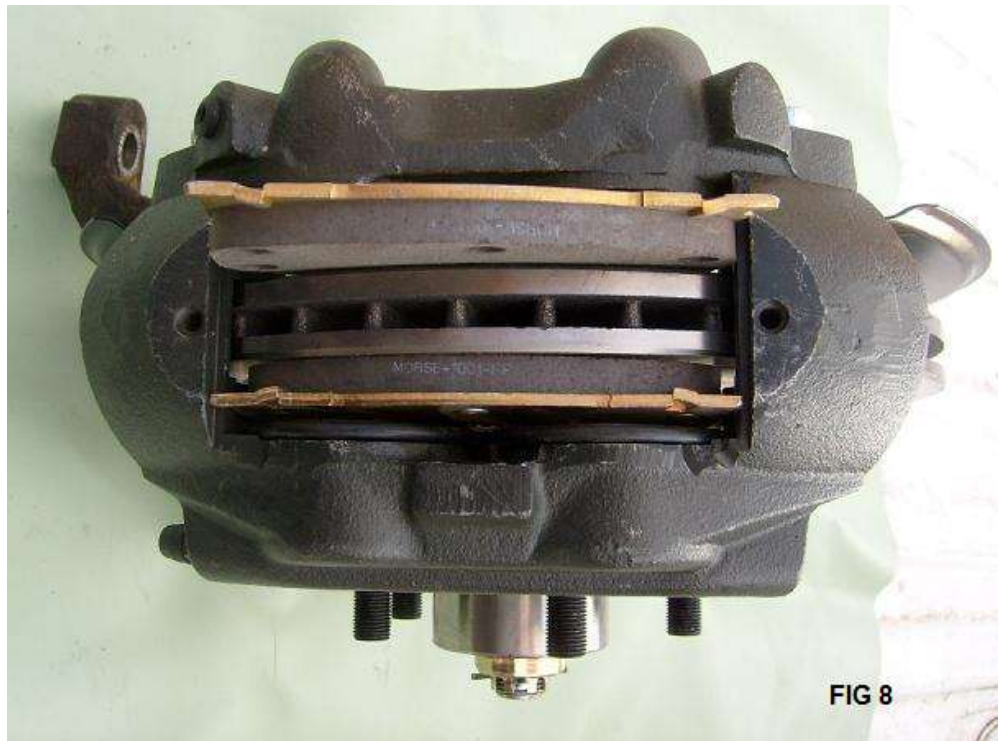


### C. Mounting the calipers and hardware

1. Fit the caliper over the rotor and onto the caliper bracket. The edges of the cutout in the dust shield, near where the caliper will reside, may need to be ground down a small amount to ease correct caliper mounting.
2. Secure the caliper with the 2 shoulder bolts provided. Use a small amount of red thread locker on these bolt's threads and torque them to 65 ft-lbs.
3. The calipers are side specific. The bleeder must be oriented upward. If not, you have mounted the wrong caliper.



4. Again, clean the rotor with solvent or detergent cleaner. Wash your hands. Place a pad into place along each side of the rotor. The 4 pads are identical and interchangeable. See the photo below.



5. Fit an anti-rattle clip onto the 2 mounting holes as shown in the picture below. Your kit may feature an alternate design “plate” type retainer (mount with the springy parts in contact with the pads). Secure the stainless steel bolt with the lock washer and a small amount of #241 (blue) thread locker.
6. Manipulate the caliper piston rubber boots so that they are not pinched under the clips.
7. Fit the caliper with a crossover tube. Use lube on the tube’s flare fitting. The crossover tubes are side specific and only 1 of the pair will fit. Loosely screw the inboard side fitting in first. Then align the other fitting by gentle bending such that it aligns well with the threads on the inboard side. Do not try to screw the nut into the fitting in order to force the fittings to mate; they must align well before they are screwed together (preferably, the fitting can be screwed in by hand). In order to achieve a leak free connection, the tube must be centrally located within the tube nut and perfectly perpendicular to the brass seat within the caliper.
8. Tighten the fitting only 30-45 degrees past when the fitting contacts its seat. Over tightening these fittings may result in damage to the conical seat inside the caliper with resulting leakage.



9. Fit the male end of the brake hose with one of the copper crush washers provided. The 2 hoses provided are identical and are interchangeable.
10. Apply a small amount of lube to this thread.
11. Screw the fitting into the hose inlet on the caliper and tighten it about 30-45 degree past where the fitting bottoms against its seat.
12. Connect the female end of the hose to the end of the original brake hardline (see fig 26) using the original hose support bracket or one included with the kit (in the original position).



13. Again, use a small amount of lube on the fitting.
14. Tighten it about 30-45 degree past where the fitting bottoms against its seat.
15. Use a c-clip to secure the hose to the bracket, either the original, or the one provided.
16. Repeat assembly sections A, B, and C to the other side.

#### D. Under hood installation

1. To bench bleed the master cylinder;
2. Secure the master.
3. Remove the master cylinder cap. Fill the reservoir with brake fluid. Remove the caps from the master cylinder outlets. There are 2 approved methods for bleeding the master cylinder.
4. **1<sup>ST</sup> METHOD:** Fit the 2 metal bench bleeding tubes to their outlets with the other end led into the respective reservoir. Actuate the master cylinders piston using a dowel or blunt rod. The piston is stroked slowly, avoiding applying too much pressure at the end of the stroke. Release the piston; it will retract on its own. Note the air being expelled from the tube followed by a solid stream of fluid. Continue until both bleeding tubes expel a solid stream. Remove the bleeding tubes and recap the outlets.

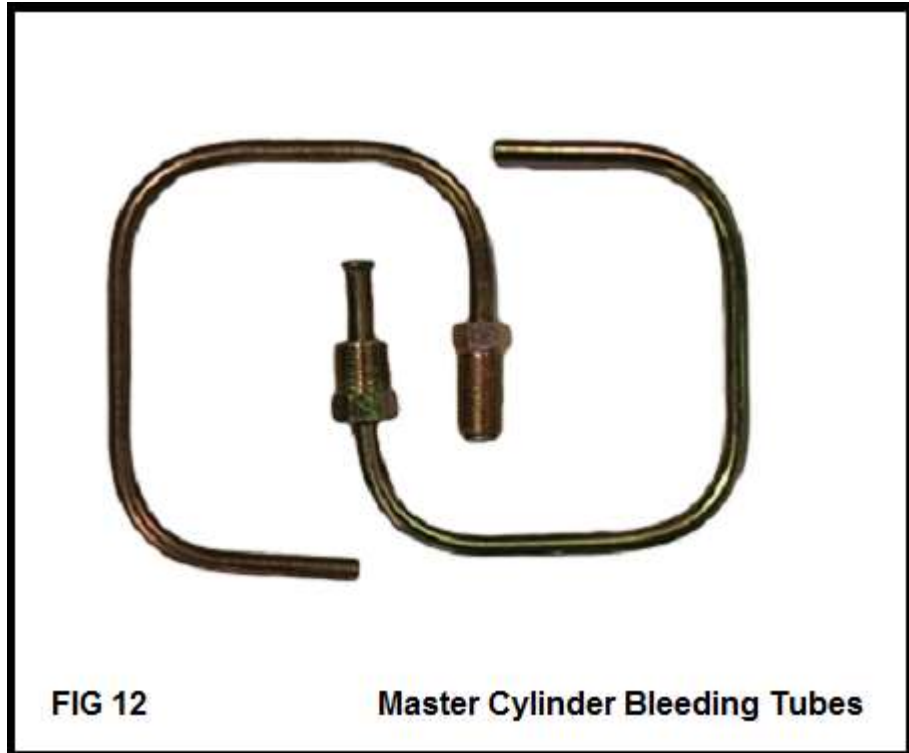
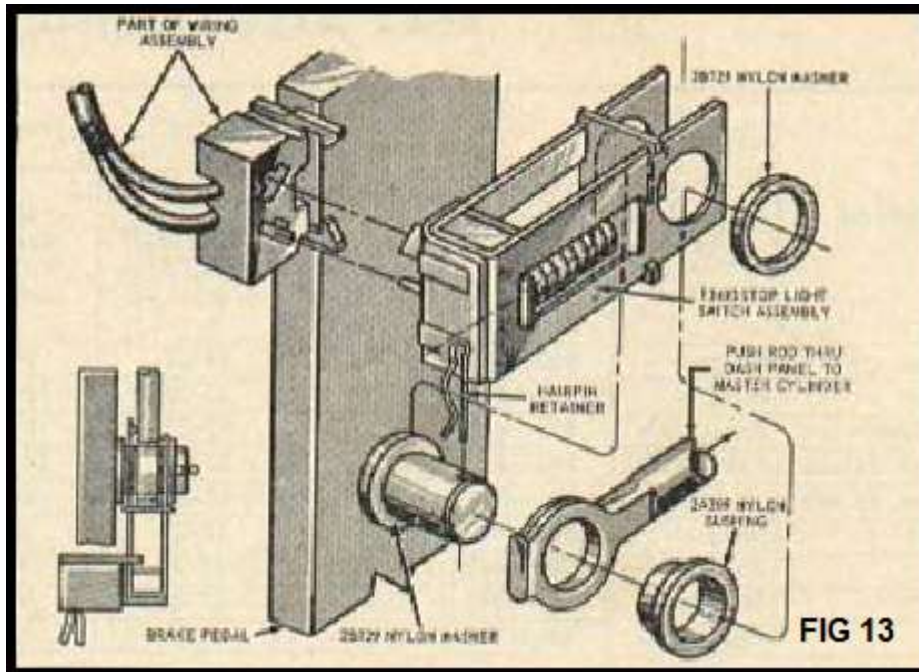
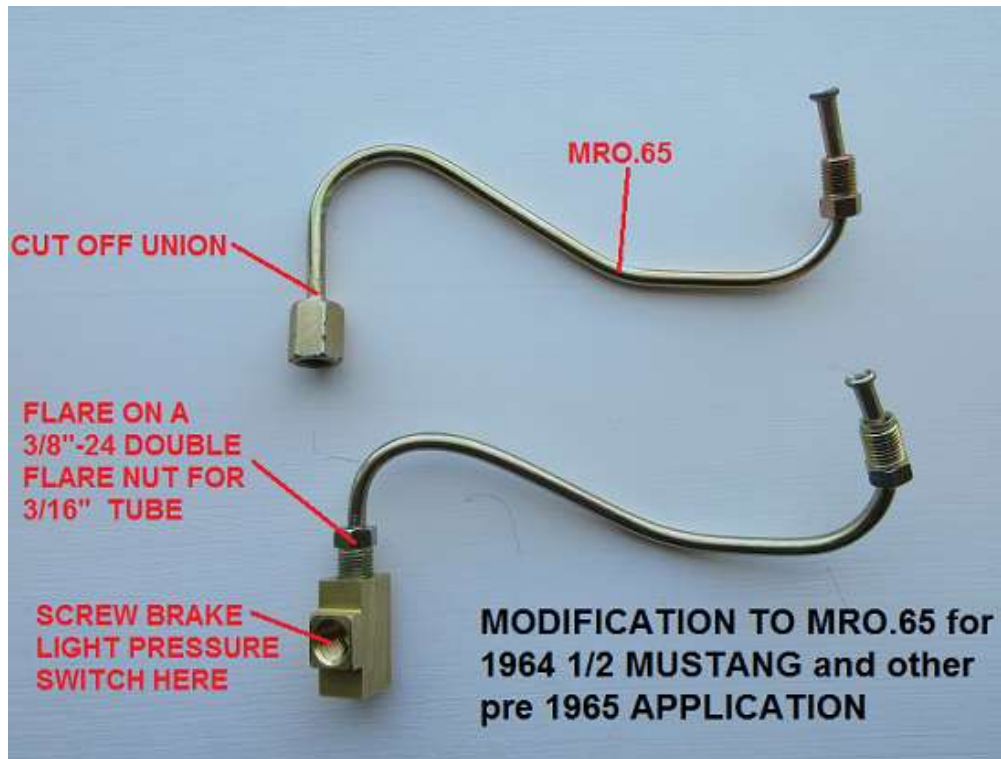


FIG 12

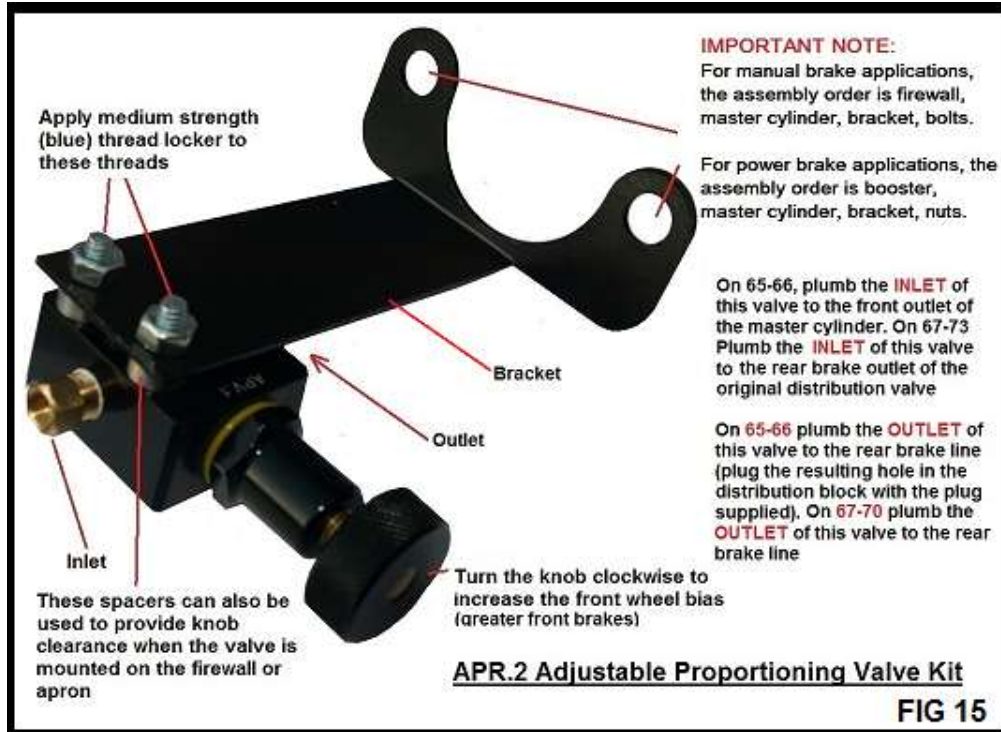
Master Cylinder Bleeding Tubes

5. **2nd METHOD:** If plugs (full pressure plugs, not just caps) are available, apply them to the outlets of the master cylinder. Actuate the master cylinder's piston using a dowel or blunt rod. The piston is stroked slowly, avoiding applying too much pressure at the end of the stroke. Release the piston; it will retract on its own. Air will be expelled from the bypass orifices in the master cylinder's reservoirs. The piston will be increasingly difficult to depress, eventually becoming so solid that it cannot be depressed.
6. Install the adjustable push rod supplied with the kit. Note that the push rod has a clip at its end that will firmly retain it in the master cylinder (it cannot be removed without damaging the rod and/or master cylinder).
7. Assemble the adjustable proportioning valve on its bracket. Since the valve is symmetrical, the knob can be oriented to point toward the inner fender or toward the engine.
8. Mount the master cylinder to the firewall along with adjustable proportioning valve and bracket. Note that the bracket is secured between the forward side of the master cylinder and the bolts that mount the master cylinder to the firewall. The assembly order is firewall, master cylinder, bracket, bolts.

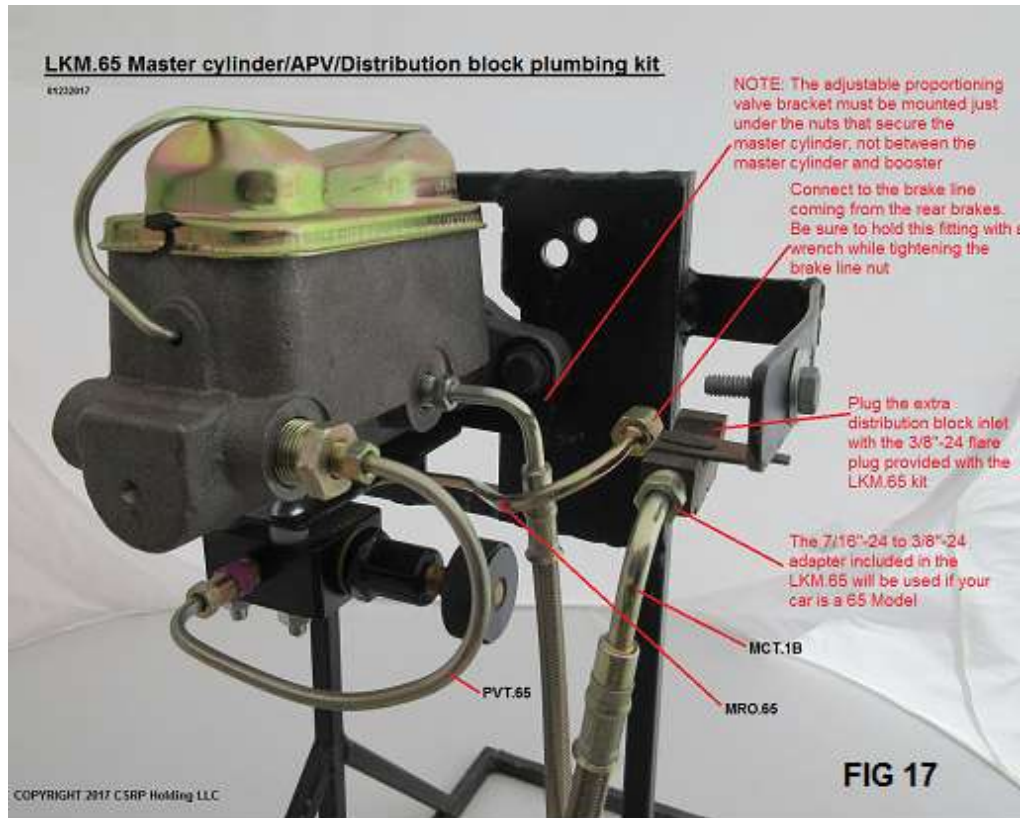




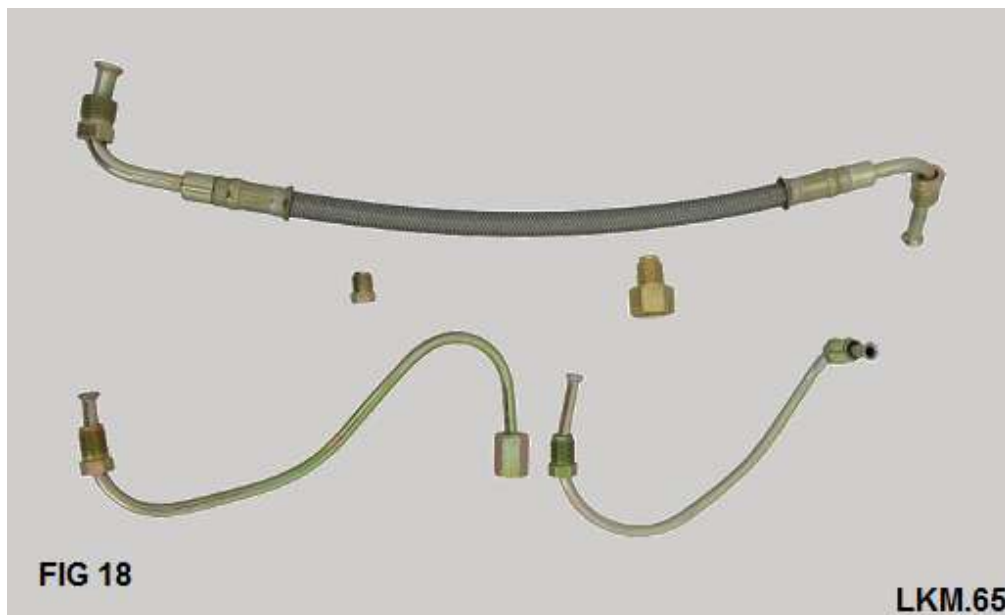
9. The push rod's length can be shortened or lengthened to adjust the pedal height. Make sure that the tip of the limiting arm at the top of the brake pedal does not touch the brake pedal hanger/bracket (or bumper) when the pedal is at rest.
10. Reconnect the eyelet end of the master cylinder push rod, onto the peg on the brake pedal, incorporating the existing brake light switch (the brake light switch on a "64 1/2" Mustang or pre 65 Falcon/Comet will be actuated by a pressure sensor, not a switch at the pedal). Plumb the 64 1/2 type pressure switch inline using TEE fitting connected in place of the female union fitting on the MRO.65 brake line. CSRP can supply the adapted pieces for a small charge.
11. Connect the LKM.65 line kit as shown in the year appropriate picture. The images depict the installation of the under hood brake line kit components.
12. **Do not** over tighten the fittings since the fitting seats can be damaged. The fittings require only 1/8 to 1/4 turn tightening past the point where the tube flare contacts the seat (past hand tight).
13. Be sure to install the 3/8" flare plug in the distribution block outlet that previously received the brake line coming from the rear brakes.
14. The flare nut at the end of the brake line coming from the rear brakes will now be fitted to the female fitting on the end of the line leading from the outlet of the proportioning valve. **Be sure** to support the female hex fitting with an appropriate wrench when tightening the nut. Failure to do so will damage the connection of the fitting to the tube.





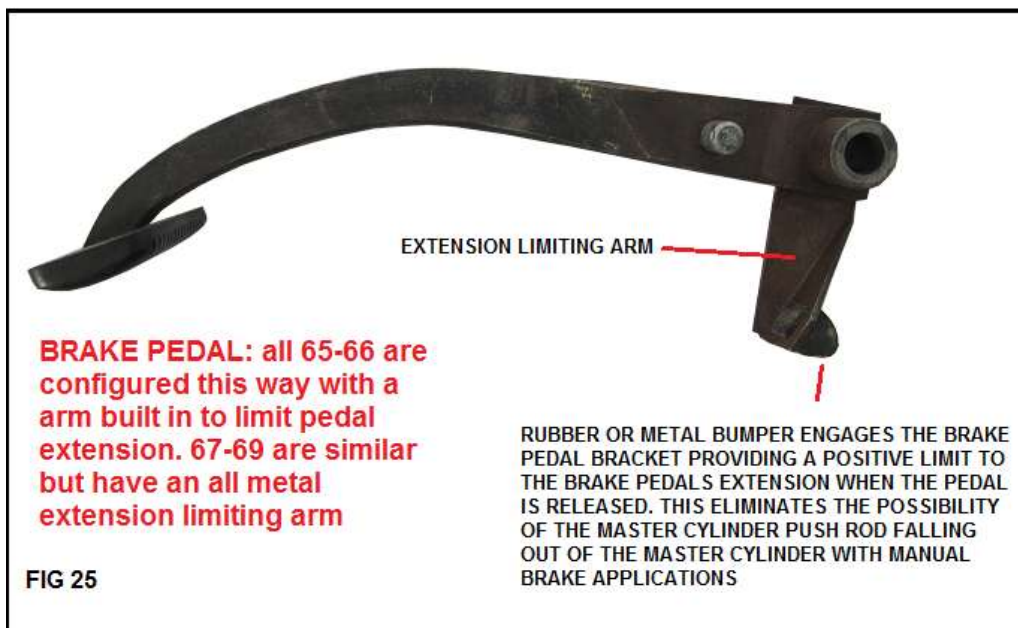


15. The new brake line leading from the rear port of the master cylinder on 65-66 (MCT.1B) has a 7/16"-24 threaded nut at the end that enters the original distribution block. This tube fitting will fit directly into the distribution block outlet on a 66 Mustang, but the 7/16" to 3/8" reduction adapter must be used with 65 Mustang since the 65 has a 3/8"-24 inlet.



## E. Bleed the brakes

1. Follow the instructions included with the master cylinder or bleeding aid to bleed the brakes.
2. The task of brake bleeding is made easier if a pressure bleeder is used. The use of speed bleeder screws also makes the task easier. We do not recommend the vacuum bleeding method.
3. The brake pedal should be firm and high when the brakes are properly bled.
4. Remember that there should be at least ½” of slop (1/2” of at rest free play between the bumper at the top of pedal and the pedal bracket).
5. A spongy feel at the pedal is indicative of the failure to bleed all of the air out of the system or the calipers being installed on the wrong sides.



## F. Front wheel alignment and steering issues

**The SWAP.1 kit installation does not affect the steering alignment**

## G. Setting the adjustable proportioning valve-APV

1. The mechanical installation must be complete.
2. Turn the APV knob fully counter clockwise.
3. Find a level isolated location with normal road surface. A parking lot would be ideal. Ignore the common advice to use a wet or gravel surface.
4. Perform a series of normal stops, like at a stop sign.
5. Turn the APV's knob 1-2 turns clockwise in between each stop.

6. Repeat this process until the stop terminates in a little front end dive. This indicates that the front end has commenced braking first.
7. Some fine tuning may be indicated.

#### H. Pad and rotor bedding-in.

1. Find a level isolated location with normal road surface. A large parking lot would be ideal.
2. Accelerate car to approximately 25 mph.
3. Apply brakes using light to moderate effort to reduce speed to approximately 5 mph (DO NOT stop, if possible).
4. Repeat this process at least 10 times allowing about 1/3 mile between cycles to cool the pads.
5. Avoid hard braking for the first 25 miles.

**The brake swap is complete. Carefully inspect all of the work. Have the new system inspected by a qualified mechanic before operating the car.**

#### IV. CSRP BRAKE SWAP FAQ

Q. Does the kit come with a dual reservoir master cylinder?

A. Yes, the kit comes with the proper dual reservoir master cylinder. Specify manual or power brakes when ordering. All applications come with an adjustable push rod.

Q. What size are the rotors?

A. The slotted rotors supplied with the kit are 11.3" diameter 5 lug type.

Q. Can I use the outer tie rod ends from my car with the kit?

A. Yes, the kit installation does not affect or change your tie rods.

Q. Do I need to adapt my hard brake lines?

A. No. New lines are provided or original equipment mounting locations and fittings are used.

Q. What does the kit include?

A. The kit has all NEW parts including caliper brackets, splash shields, an adjustable proportioning valve, performance 11.3" SLOTTED rotors, corrosion protection coated calipers, semi-metallic pads, braided stainless steel brake hoses and new hose mounting brackets and hardware, dual reservoir master cylinder, an adjustable push rod, a complete under hood plumbing kit including braided stainless steel brake lines, bearings and seals, wheel hardware, caliper hardware, grade 8 attachment bolts including correct caliper mounting shoulder bolts, blue and red thread locker, high temperature disc brake wheel bearing grease, and our renown installation guide via download. You need only bolt the kit, bleed the system, mount the wheels, adjust the proportioning valve, and the installation is complete.

Q. My car has power steering. Will the kit work?

A. Yes, the kit installation does not affect or change your tie rods, the track width, the steering geometry, or wheel alignment.

Q. My 65-66 Mustang has power brakes (or I want power brakes). Will the car's booster and master cylinder work with the SWAP.1 kit, or will the master cylinder provided with the kit fit on my car's booster?

A. No, the original booster/bracket system used on 65-66 Mustangs is not compatible for use with a dual reservoir master cylinder. There is not enough space between this booster's face and the shock tower to mount one. This is because Ford located the mechanical clutch linkage in a place that interferes with the direct mounting of the booster to the firewall. In order to accommodate both manual and automatic transmission applications with one assembly type, a standoff bracket is employed. This bracket places the booster about 3" away from the firewall. In this position, it will not mechanically interfere with the operation of the clutch linkage. This works fine with the single reservoir master cylinder which is standard to the model, but will not allow the mounting of the dual reservoir master cylinder necessary for a safe modern brake system.

In any case, the original booster/bracket must be removed. This presents the kit installer with a couple of options. For automatic transmission equipped 65-66 Mustang, CSRP offers a compatible MC/booster/ bracket system that will allow the use of the original pedal. One could also install the kit in manual brake mode. When purchasing the SWAP kit for these cars, the installer must specify a manual or a power brake kit. CSRP only offers power assist upgraded kits for Mustang and Cougar.

On a manual transmission car with original power brakes, the installer must still remove the original booster/bracket, but has fewer practical options for power brakes. CSRP offers a power brake upgrade for this application only if the clutch

linkage has been replaced with a cable or hydraulic type that eliminates the interference. Otherwise, the user must install the system as manual brakes or find other options.

Q. My 67-69 Mustang has power brakes (or I want power brakes). Will the master cylinder provided work with the SWAP.1 kit?

A. The kit configured for 67-73 can be provided with a power type master cylinder at a minimal extra cost when specified. This master cylinder will work with all existing boosters present on 67-73 cars. Those users wishing to upgrade their manual brakes from manual to power assist brakes can purchase our power brake assist upgrade kit for 67-70 cars. This upgrade kit will fit all 67-70 Mustang, regardless of transmission or engine type. We do not offer power brake upgrades for 71-73 cars.

Q. Will the SWAP.1 kit give me bumpsteer? What is bumpsteer?

A. No, the SWAP.1 kit installation does not affect the steering.

Bumpsteer is the change in steering output that occurs without driver input when the suspension moves. Basically, the wheels turn a little in response to going over bumps. This is a result of the fact that the radius of movement for the tie rods and the ball joints are different. Large deflections of the suspension cause different rates of movement of the control arms vs. the steering/tie rod assembly causing a small steering input. This effect is most noticeable, if at all, when performance modifications to the suspension, tires, and steering are made.

All Mustangs and many other 60's and 70's cars are based on the Falcon chassis that Ford developed in the early 60's. The suspension and steering gear for all of these cars are very similar. The suspension mounting configuration for the class, including most years of Falcon, Comet, Mustang, Cougar, Fairlane, Torino, Montego, Maverick, Granada, and Monarch remains the same from 63-80. There were basically two steering geometries during the period. The 64-66 Mustang and 63-65 Falcon models have a slightly different geometry than the later models. The later models have identical geometry.

It is generally recognized the Falcon class chassis had poor suspension geometry, especially the early applications. It is generally agreed that making major modifications to the suspension like using lowering coil springs, or cutting coil springs, or excessive lowering of the control arms can exacerbate the inherent poor steering dynamics of the early Mustang.

Q. Can I use my original wheels with the SWAP?

A. In general, original 14" stamped steel wheels built after 1964 and prior to 1974 will fit the SWAP.1 kit's caliper/rotor assembly. The availability of 14" tires is

becoming increasingly poor and the change to 15" or greater aftermarket wheels is very popular.

Q. Will the swap work with my 6 cylinder car, and will I need to change the steering gear?

A. The SWAP.1 kit is incompatible with the steering knuckle (spindle) on 6 cylinder Mustangs prior to 67 (prior to 66 on other models). Those from 67-69 are compatible. One may install the kit if the 65-66 6 cylinder steering knuckle are replaced from the same year class 8 cylinder type (will need to upgrade the steering linkage as well).

Q. Can I keep my 4 lug wheels with the SWAP?

A. No, the current version of this and nearly all other swaps have a 5 lug rotor included. This can make the selection of wheels awkward with 6 cylinder cars that have the original 4 lug wheels in the back. We have determined that, at this time, providing a 4 lug kit is not feasible. The selection of suitable aftermarket 4 lug wheels is poor and it is difficult to provide a suitable rotor/caliper set that will fit standard 14" 4 lug wheels.

Q. How long does it take to do the SWAP?

A. The removal of the old parts and installation of the new ones can easily be done in one weekend.

Q. What does a proportioning valve do?

A. A proportioning valve is a vital component of a disc brake system. It is a metering valve that controls the flow of brake fluid to the rear wheel cylinders. It functions to delay the full implementation of the rear brakes. Without the valve, the rear brakes would apply prematurely. An adjustable proportioning valve is the standard one included with the kit. It has an adjustment knob that functions much like a water faucet except that the flow of fluid is never stopped, just restricted. This valve is simple to plumb, but requires that the installer tune it by trial and error to give the desired rear braking performance (see installation procedure).

Q. Will I need to buy anything else?

A. All parts are included. The cars existing spindles, distribution block, and terminal brake lines are reused. If you chose to replace the brake lines, only the two front terminal lines and the rear terminal line are needed. Drum or disc type are the same with these three lines.

Q. Does the kit include instructions?

A. The kit includes internet access to the installation guide. This guide goes through the history of the swap, and includes a complete installation guide.

Q. Is the swap safe?

A. The system is based on an original Ford OEM design. The components are the best available. The installer must be reasonably proficient in mechanics. Brakes are a **seriously** necessary component of the safety system of your car. Have the new system inspected by a qualified mechanic before driving the car.

**CSRP will not accept the liability that the owner assumes when purchasing, installing, or using the swap.**

## V. LEGAL NOTICE

This document is only a guide. It in no way represents the ultimate authority on the subject presented. The user must exercise good judgment in relying on its content. It is incumbent upon the user to verify the guidance contained within. The seller of these parts and the authors of this guide provide the service of compiling parts that are generally recognized, when properly assembled, to provide a safe and effective front disc brake substitute for the antiquated drum brakes originally present on certain classic Fords from the 60's and 70's. The buyer must determine if is appropriate or prudent to undertake this front disc brake conversion using this kit and guide. The swap should only be undertaken by those who are competent in automotive brake system mechanics. The completed system must be installed or inspected by a certified mechanic, and any necessary adjustments made. The purchaser of the parts assumes all liability associated with their use. The seller does not accept liability associated with the use of these parts. The parts are warranted to be free of manufacturing defects for a period of 1 year from the time of purchase. This limited warranty is applied to replacement of the defective part(s) only. The warranty does not apply to any labor associated with installation of the part(s). Please see our terms of purchase located at our website [www.discbrakeswap.com](http://www.discbrakeswap.com). The provisions contained there apply to this install and the parts herein.

Thank you for purchasing the CSRP front disc brake conversion kit. Good luck and good motoring.