



BMW E36/E46

Exact Fit Clutch Line

Installation Instructions



Proper service and repair procedures are vital to the safe, reliable operation of all motor vehicles as well as the personal safety of those performing the repairs. Standard safety procedures and precautions (including use of safety goggles and proper tools and equipment) should be followed at all times to eliminate the possibility of personal injury or improper service which could damage the vehicle or compromise its safety.

## INTRODUCTION

Installing an Exact Fit clutch line on your BMW is a fairly easy project, but you'll be working underneath the vehicle, so you'll have to be able to safely raise it up and support it to give yourself plenty of room. The only "tricky" part of the job can be bleeding the air from the clutch hydraulic system, but with a little preparation and patience, you'll be able to get it done without much trouble. An experienced technician can make short work of this, but if this is all new to you, plan a few hours to get it done, in case you run into any problems. We'll give you a run down on the replacement, and a few tips along the way. The time you invest will be worth the effort, knowing that you're installing one of the best replacement clutch lines money can buy.

### ECS Difficulty Gauge



As you can see, we've revved up our difficulty meter a little for this job *because* of some of the tricky parts. The best approach is to read through these instructions first to familiarize yourself with all of the required tools and gain an understanding of their importance in this job.

One final tip before you begin: Pay close attention to the "feel" of the clutch pedal and how far it travels before the clutch begins to engage. This will give you a reference point to use in determining whether all of the air has been bled from the system after installing the new Exact Fit line. Thank you for looking to ECS Tuning for all your performance and repair needs. We appreciate your business!

- 1 - **Easy:** Requires only basic skills
- 2 - **Moderate:** Some experience recommended
- 3 - **Advanced:** Advanced skills and experience required
- 4 - **Professional:** Professional skills and specialty tools required

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## Symbols:

The following symbols may be used throughout these instructions indicating special attention:



**FORK IN THE ROAD:** When there are different options within any given kit, we will direct you to the proper page and step to continue.



**YIELD:** Pause for a moment to double check component installation before you continue. Ignoring this can cost you time later during the installation.



**CAUTION:** Pay close attention to these warnings and instructions. Difficult installation, personal injury or component damage may occur if ignored.



**STOP:** The upcoming steps require specific preparation and/or assistance in the interest of safety. Please read ahead in the instructions and prepare before continuing.

## REQUIRED TOOLS

Note: The tools required for each step will be listed by the step number throughout these instructions.

**Tool Recommendations:** The following list of tools are part of a standard automotive tool set, and are used in various combinations for most automotive repairs. The tools required for this installation are **highlighted in red**, but we recommend you have this complete standard selection to overcome any issues that may arise such as rust, corrosion, or broken and stripped fasteners. The specific tools required for each step will be listed by the step number throughout these instructions, and any tools listed below with a **hyperlink** are available on our website.

- Protecta-Sockets (for lug nuts)..... [ES#2221243](#)
- 3/8" Drive Ratchet ..... [ES#2765902](#)
- 3/8" Drive Torque Wrench..... [ES#2221245](#)
- 3/8" Drive Deep and Shallow Sockets ..... [ES#2763772](#)
- 3/8" Drive Extensions ..... [ES#2804822](#)
- **Hydraulic Floor Jack** ..... [ES#240941](#)
- Torx Drivers and Sockets ..... [ES#11417/8](#)
- 1/2" Drive Deep and Shallow Sockets ..... [ES#2839106](#)
- 1/2" Drive Ratchet
- 1/2" Drive Extensions
- 1/2" Drive Torque Wrench ..... [ES#2221244](#)
- 1/2" Drive Breaker Bar ..... [ES#2776653](#)
- Bench Mounted Vise
- Crows Foot Wrenches
- **Hook and Pick Tool Set**..... [ES#2778980](#)
- 1/4" Drive Ratchet ..... [ES#2823235](#)
- 1/4" Drive Deep and Shallow Sockets ..... [ES#2823235](#)
- 1/4" Drive Extensions ..... [ES#2823235](#)
- Plier and Cutter Set..... [ES#2804496](#)
- Flat and Phillips Screwdrivers ..... [ES#2225921](#)
- **Jack Stands** ..... [ES#2763355](#)
- Ball Pein Hammers
- Pry Bar Set..... [ES#1899378](#)
- Electric/Cordless Drill
- Wire Strippers/Crimpers
- Drill Bits
- Punch and Chisel Set
- Hex Bit (Allen) Wrenches and Sockets ..... [ES#11420](#)
- Thread Repair Tools ..... [ES#1306824](#)
- **Open/Boxed End Wrench Set** ..... [ES#2765907](#)

**Specialty Tool Requirements:** The following specialty tools are not considered part of a standard tool set and are required specifically for the installation of the BMW Exact Fit Clutch Line. Tools with a hyperlink are available on our website.

- Brake Fluid Pressure Bleeder ..... [ES#2774831](#)
- Brake Fluid Catch Bottle ..... [ES#2773388](#)
- Line Stoppers..... [ES#2748908](#)

## SHOP SUPPLIES AND MATERIALS

**Standard Shop Supply Recommendations:** We recommend that you have a standard inventory of automotive shop supplies before beginning this or any automotive repair procedure. The following list outlines the basic shop supplies that we like to keep on hand. Shop supplies with a hyperlink are available on our website.

- Hand Cleaner/Degreaser - [Click Here](#)
- Pig Mats - for protecting your garage floor and work area from spills and stains - [Click Here](#)
- Spray detailer - for rapid cleaning of anything that comes into contact with your paint such as brake fluid - [Click Here](#)
- Micro Fiber Towels - for cleaning the paint on your car - [Click Here](#)
- Latex Gloves - for the extra oily and dirty jobs - [Click Here](#)
- Medium and High Strength Loctite Thread lock compound - to prevent bolts from backing out - [Click Here](#)
- Anti-Seize Compound - to prevent seizing, galling, and corrosion of fasteners - [Click Here](#)
- Drain Pan - [Click Here](#)
- Aerosol Brake/Parts Cleaner - for cleaning and degreasing parts
- Shop Rags - used for wiping hands, tools, and parts
- Penetrating oil - for helping to free rusted or stuck bolts and nuts
- Mechanics wire - for securing components out of the way
- Silicone spray lube - for rubber components such as exhaust hangers
- Paint Marker - for marking installation positions or bolts during a torquing sequence
- Plastic Wire Ties/Zip Ties - for routing and securing wiring harnesses or vacuum hoses
- Electrical tape - for wrapping wiring harnesses or temporary securing of small components

## INSTALLATION NOTES

- **RH** refers to the passenger side of the vehicle.
- **LH** refers to the driver side of the vehicle.
- Always use the proper torque specifications.
- If applicable to this installation, torque specifications will be listed throughout the document and at the end as well.
- Please read all of these instructions and familiarize yourself with the complete process **BEFORE** you begin.

## GENERAL PREPARATION AND SAFETY INFORMATION

ECS Tuning cares about your health and safety. Please read the following safety information. This information pertains to automotive service in general, and while it may not pertain to every job you do, please remember and share these important safety tips.

- Park your car in a safe, well lit, level area.
- Shut the engine off and remove the key from the ignition switch.
- Make sure any remote start devices are properly disabled.
- **ALWAYS** wear safety glasses.
- Make sure the parking brake is applied until the vehicle is safely lifted and supported.
- If using an automotive lift, be sure and utilize the factory specified lift points. Lifting a vehicle in an incorrect location can cause damage to the suspension/running gear.
- When lifting a vehicle using a jack, always utilize the factory specified lift points. Lifting a vehicle in an incorrect location can cause damage to the suspension/running gear. **ALWAYS** support the vehicle with jack stands.
- Always read and follow all safety information and warnings for the equipment you are using.



**Never get underneath a vehicle that is supported only by a jack. Always make sure that the vehicle is securely supported on jack stands.**

## ECS TUNING EXACT FIT CLUTCH LINES

### Exact Fit Clutch Line Construction

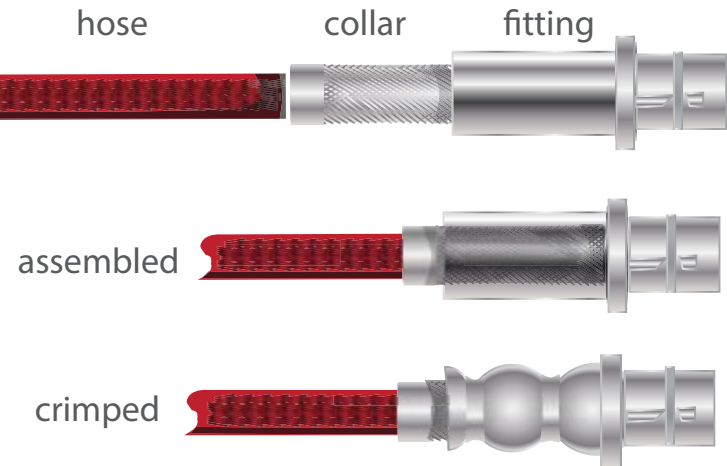
The core of an ECS Tuning Exact Fit clutch line is made of extruded PTFE. Stronger than rubber, PTFE swells less under pressure, is flexible and durable, and is unaffected by chemicals and petroleum based fluids that can be damaging to stock rubber type clutch hoses.

The inner core is surrounded by a stainless steel mesh that is stronger than the fabric mesh reinforcement used in stock hoses. As a result, the stainless mesh resists core expansion under pressure better than fabric mesh, and provides added shielding to protect the core from abrasion and impact damage. Less core expansion provides a consistent, positive clutch feel.

The outer coat is made of a bright red seamless polymer. Attractive and more impact resistant than synthetic and rubber materials that make up a stock hose, the Exact Fit outer layer also provides added protection from chemical and UV attack.

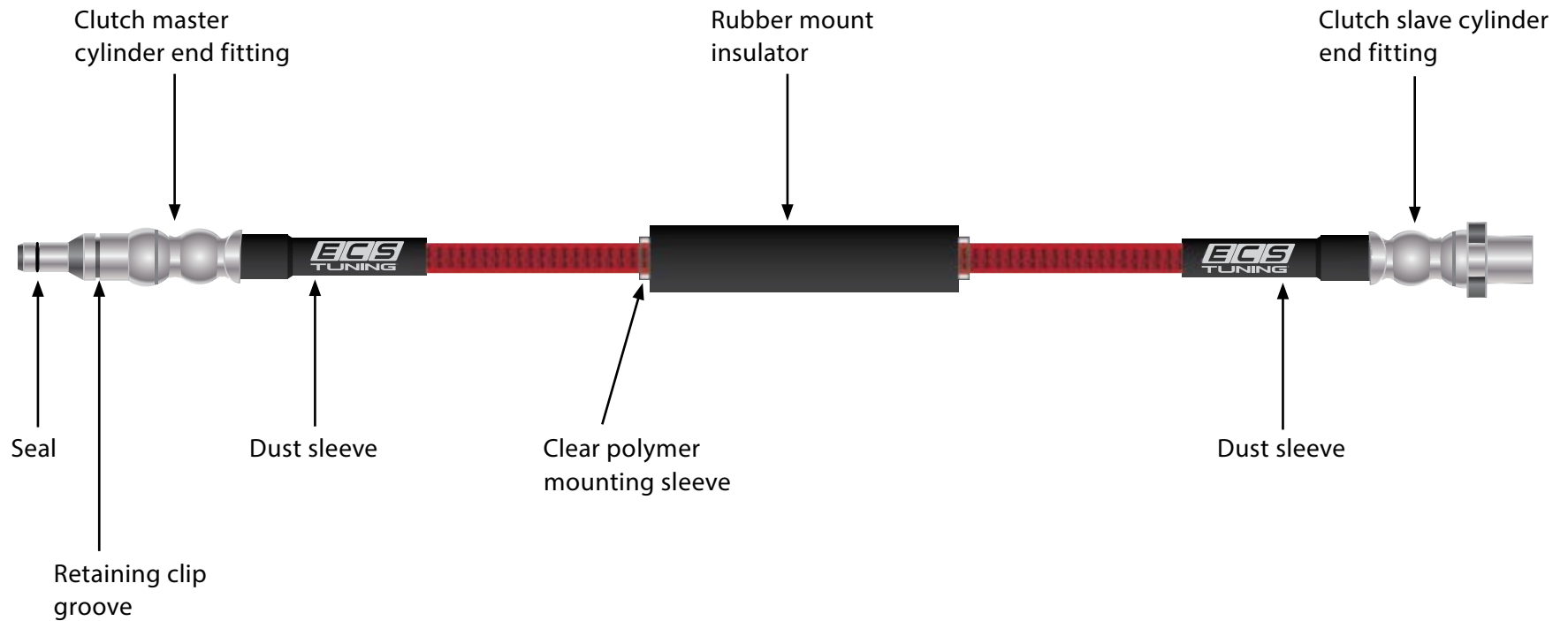


Exact Fit clutch lines use a two piece fitting design. An aluminum crimp collar is slid over the hose end, then the collar and hose are inserted into a zinc-coated, corrosion resistant fitting, which is then crimped by a shaped set of dies that compresses the fitting and collar tightly around the hose. The fitting collar changes shape when crimped to create multiple compression bands for added strength.



## ECS TUNING EXACT FIT CLUTCH LINES

### The BMW E36/E46 Clutch Line





## INSTALLING THE EXACT FIT CLUTCH LINE

### Step 1:

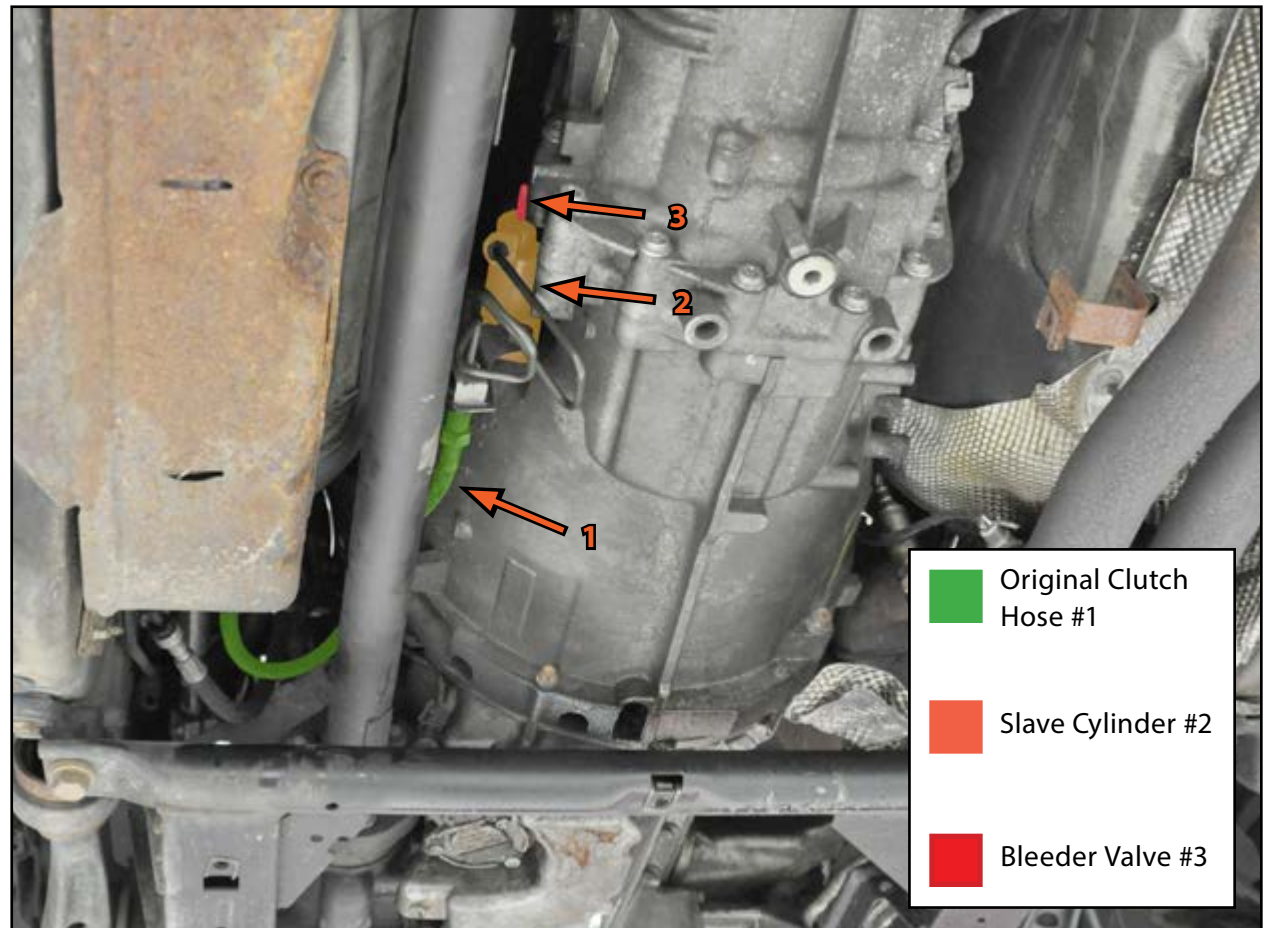
First, safely raise and support the vehicle to access the underside where you'll be doing most of the work. Depending on what's installed on your car, you may need to remove lower insulation panels or skid plates in order to gain better access to everything.

Now you can see where everything is located.

The original clutch hose (#1 highlighted in green), runs between the slave cylinder hard line and the master cylinder hard line. You cannot see the master cylinder because it is mounted inside the vehicle just below the clutch pedal, however the clutch hose connects to it **outside** of the firewall, so all work will be performed from underneath.

The clutch slave cylinder (#2 highlighted in orange) is mounted on the transmission bell housing.

The bleeder screw (#3 highlighted in red) is located on the end of the slave cylinder.



## INSTALLING THE EXACT FIT CLUTCH LINE

### Step 2:

Now is a good time to get a few things together before you continue.



Open/Boxed End Wrenches  
[ES#2765907](#)

Open end wrenches: Specifically you'll need 7mm, 11mm, 14mm, and 17mm. It will be useful if you have two 17's on hand too.

Get a drain pan ready to catch dripping brake fluid during the installation.



Drain Pan  
[ES#2748892](#)

We'll use a line stopper to keep the master cylinder from running dry.



Line Stoppers  
[ES#2748908](#)



Small Angled Pick Set  
[ES#2778980](#)

Pick set: You'll need one small angled pick to pull out the retaining clip at the front of the clutch hose.

Place a few pig mats down to protect the floor. Even with a drain pan, the fluid seems to somehow randomly drip wherever it wants.



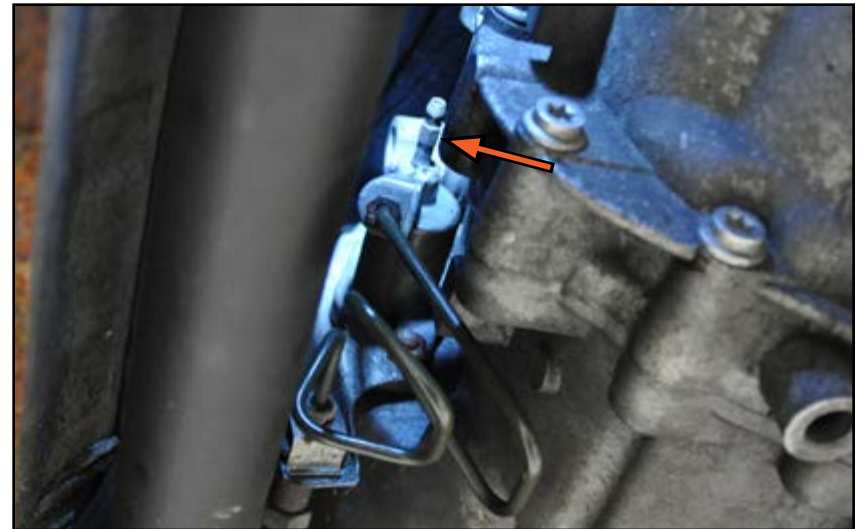
Pig Mats  
[ES#2137109](#)

## INSTALLING THE EXACT FIT CLUTCH LINE

### Step 3: 7mm Wrench

Although we're not bleeding the system now, we always start by opening the bleeder valve on the slave cylinder. It's important to make sure it opens **before** you install the new Exact Fit Line. There's nothing worse than getting done and finding out the bleeder breaks off or won't open, requiring cylinder replacement.

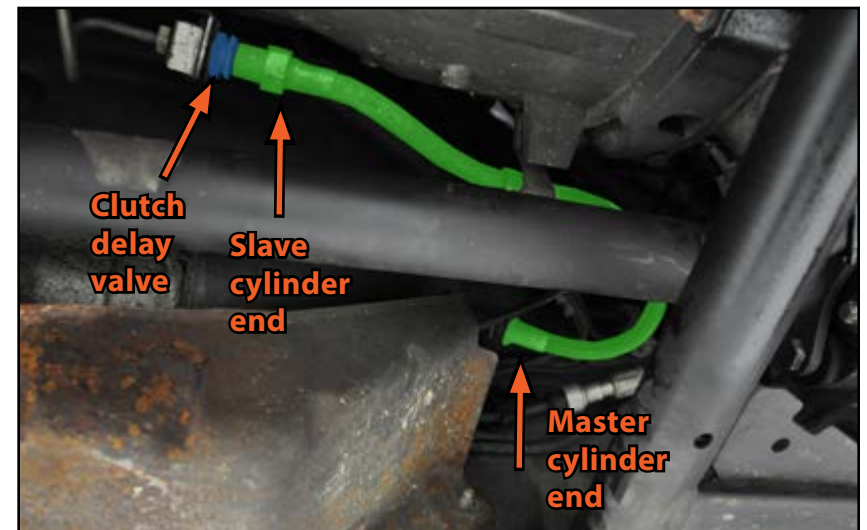
If the bleeder opens, then close it and continue with the installation. If you're not able to open it, even with penetrating oil or heat, you'll have to postpone the job and order a replacement slave cylinder.



### Step 4:

Here's a different view of the original clutch hose. You can see where it connects to the slave cylinder hard line on the left, and where it connects to the master cylinder hard line on the right.

Also note the clutch delay valve, highlighted in blue here. This is a separate component installed between the hose and the slave cylinder hard line.



## INSTALLING THE EXACT FIT CLUTCH LINE

### Step 5: Line Stopper

Using a line stopper or equivalent, cap the slave cylinder end of the new Exact Fit clutch line.



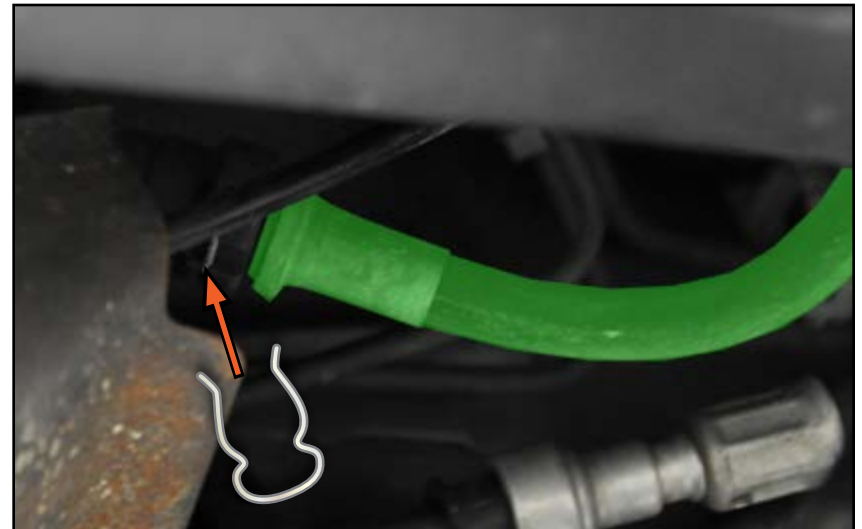
Never pinch or crimp an Exact Fit line. Damage to the line will occur.



### Step 6: Small Angled Pick

Take a close up look at the original clutch hose where it connects to the master cylinder hard line. You'll just see the end of a metal clip.

Hook the exposed end of the clip and pull it out. It will pull out very easily, but be prepared to catch it, these can disappear pretty easily if you drop them, and you'll definitely need it.



## INSTALLING THE EXACT FIT CLUTCH LINE

### Step 7:

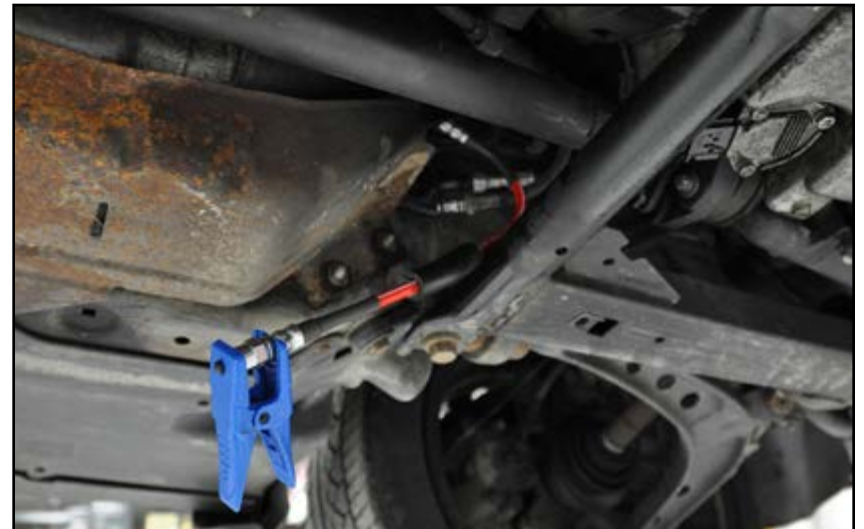
Now simply pull the end of the original clutch hose out and push the new Exact Fit line back into the master cylinder hard line. Reinstall the clip.

In this photo you can see the new Exact Fit line connected and the end of the original line hanging free.



### Step 8:

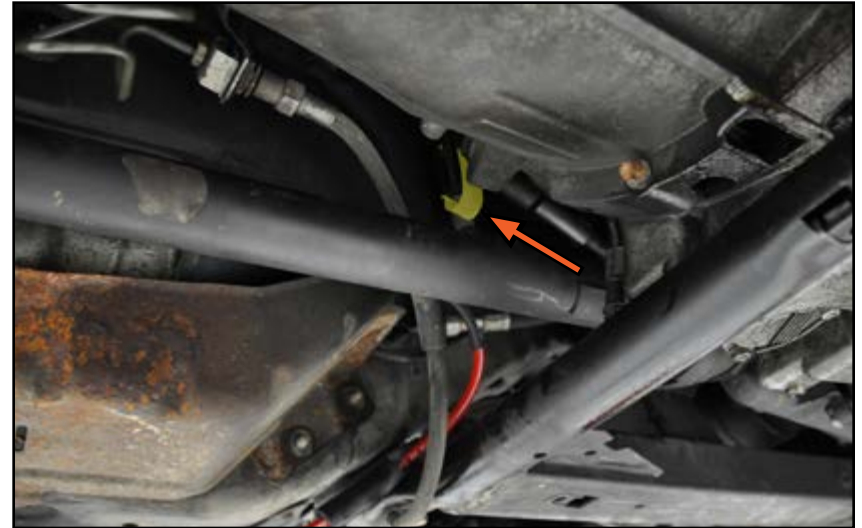
As you can see, we've connected the new Exact Fit line to the clutch master cylinder, and we have the other end plugged with the line stopper. The most important thing here is that we are keeping the brake fluid from running out, which will prevent the clutch master cylinder from ingesting air.



## INSTALLING THE EXACT FIT CLUTCH LINE

### Step 9:

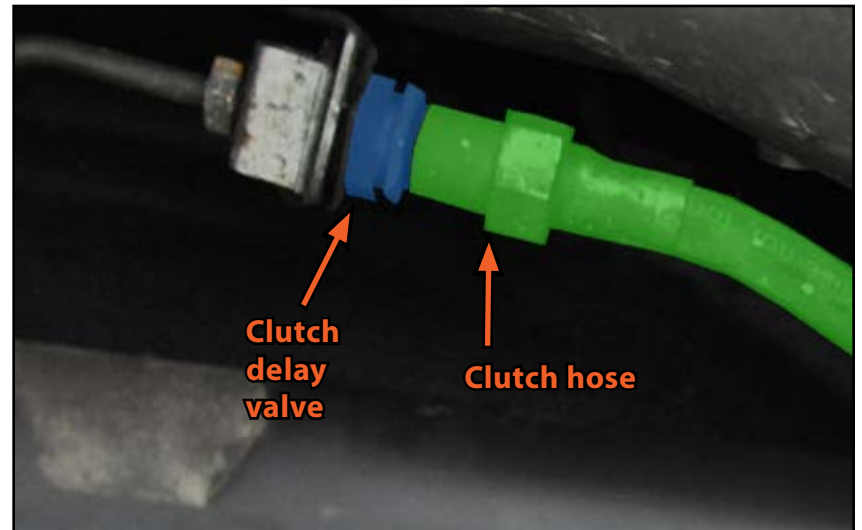
Unhook the center of the original clutch hose from the hanger located on the side of the transmission (arrow).



### Step 10: 17mm Open End Wrenches

Now let's look at the slave cylinder hard line connection. The original hose connects to the clutch delay valve, and the delay valve to the hard line.

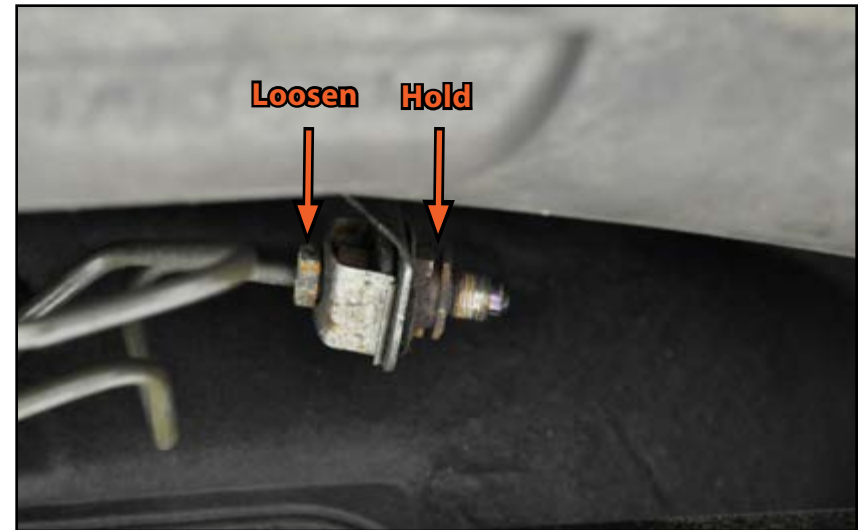
Hold the delay valve to keep it from spinning, then loosen and remove the original clutch hose.



## INSTALLING THE EXACT FIT CLUTCH LINE

### Step 11: 11mm, 17mm Wrenches

Hold the delay valve and loosen the slave cylinder hard line. It is not necessary to remove the valve. Once the hard line is loose, the delay valve and hard line nut should rotate freely.



### Step 12:

Now, simply remove the line stopper and thread the delay valve into the end of the new Exact Fit line and tighten it. Then, tighten the slave cylinder hard line into the delay valve, and finally, hook the new line back into the hanger on the side of the transmission.

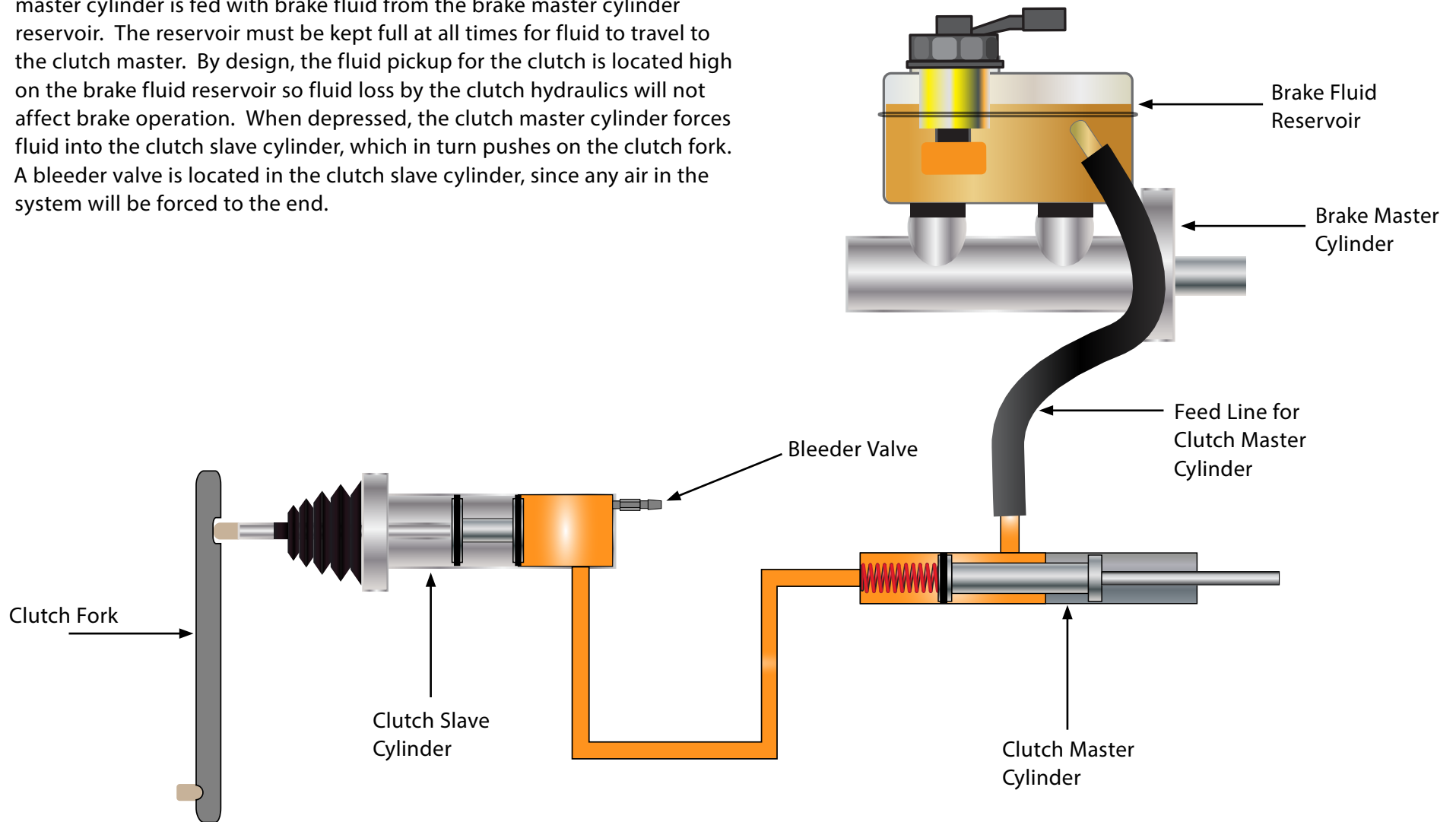
#### TECH TIP

After you remove the line stopper, brake fluid will begin to drip out of the new clutch line. Allow the fluid to drip out of the line for a minute before tightening it. This will generally force most of the air out and make the bleeding process much easier.



## BLEEDING THE CLUTCH HYDRAULIC SYSTEM

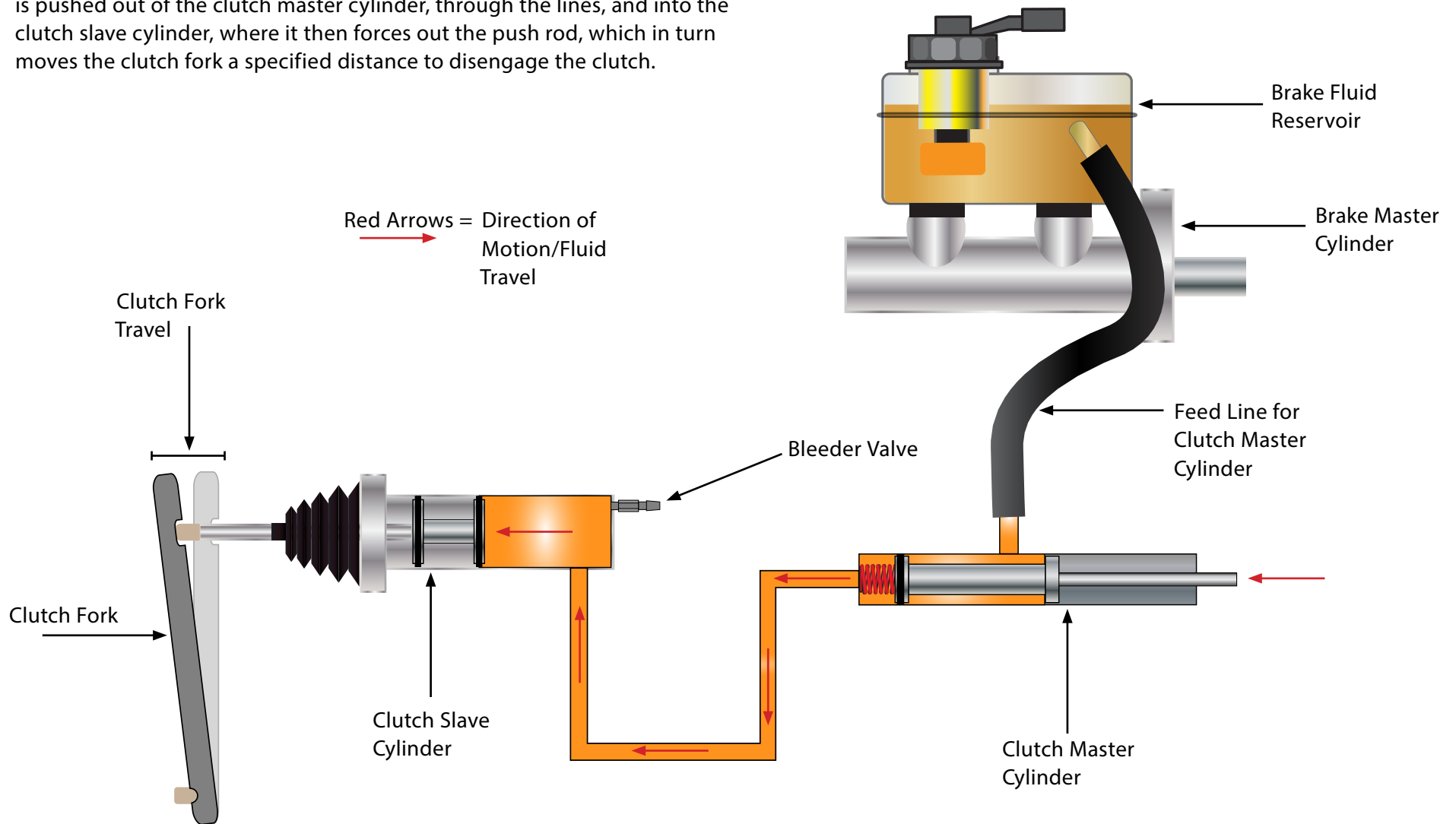
Let's start with an overview of the clutch hydraulic system. The clutch master cylinder is fed with brake fluid from the brake master cylinder reservoir. The reservoir must be kept full at all times for fluid to travel to the clutch master. By design, the fluid pickup for the clutch is located high on the brake fluid reservoir so fluid loss by the clutch hydraulics will not affect brake operation. When depressed, the clutch master cylinder forces fluid into the clutch slave cylinder, which in turn pushes on the clutch fork. A bleeder valve is located in the clutch slave cylinder, since any air in the system will be forced to the end.





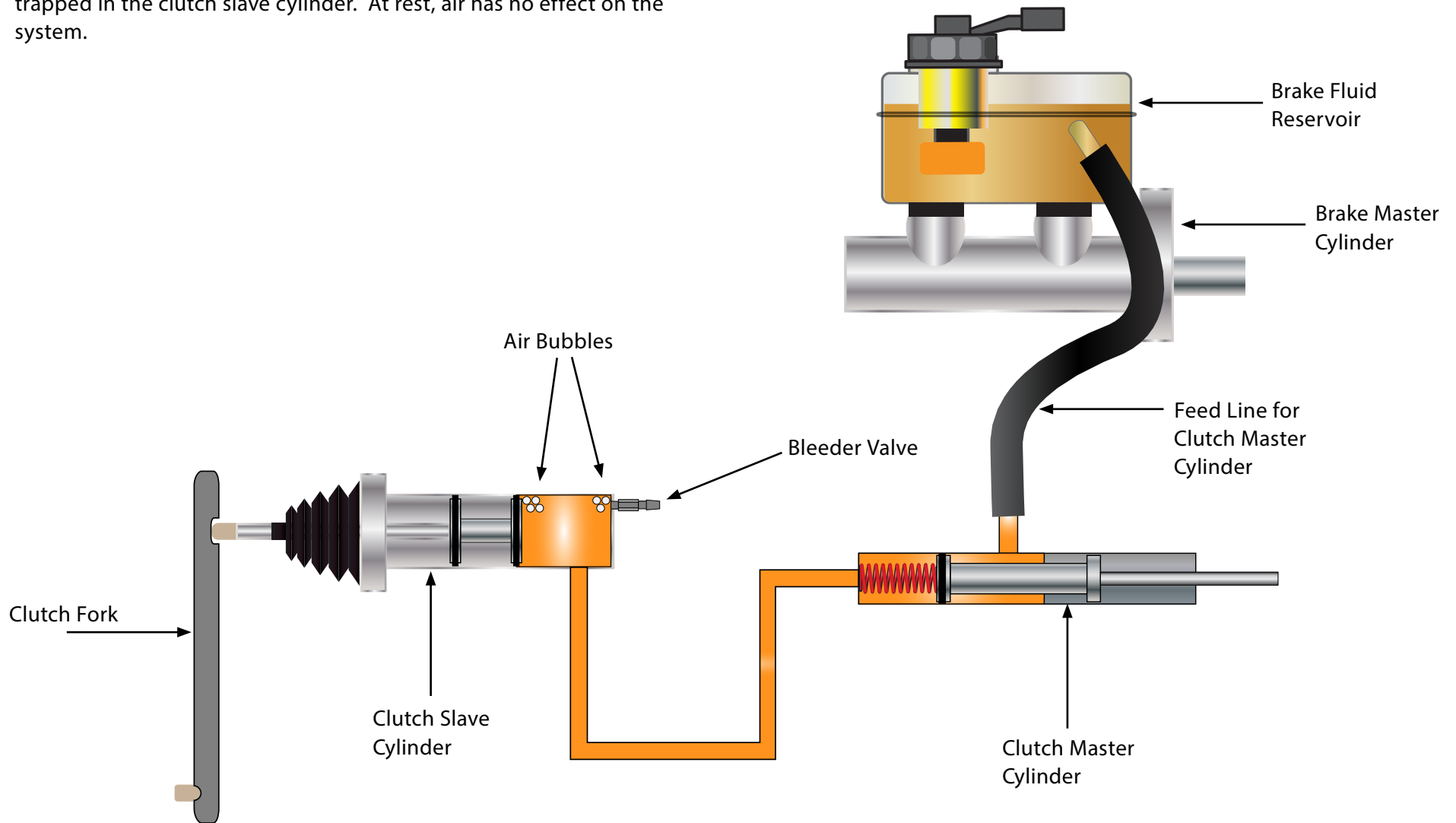
# BLEEDING THE CLUTCH HYDRAULIC SYSTEM

During normal operation, when you press on the clutch pedal, brake fluid is pushed out of the clutch master cylinder, through the lines, and into the clutch slave cylinder, where it then forces out the push rod, which in turn moves the clutch fork a specified distance to disengage the clutch.



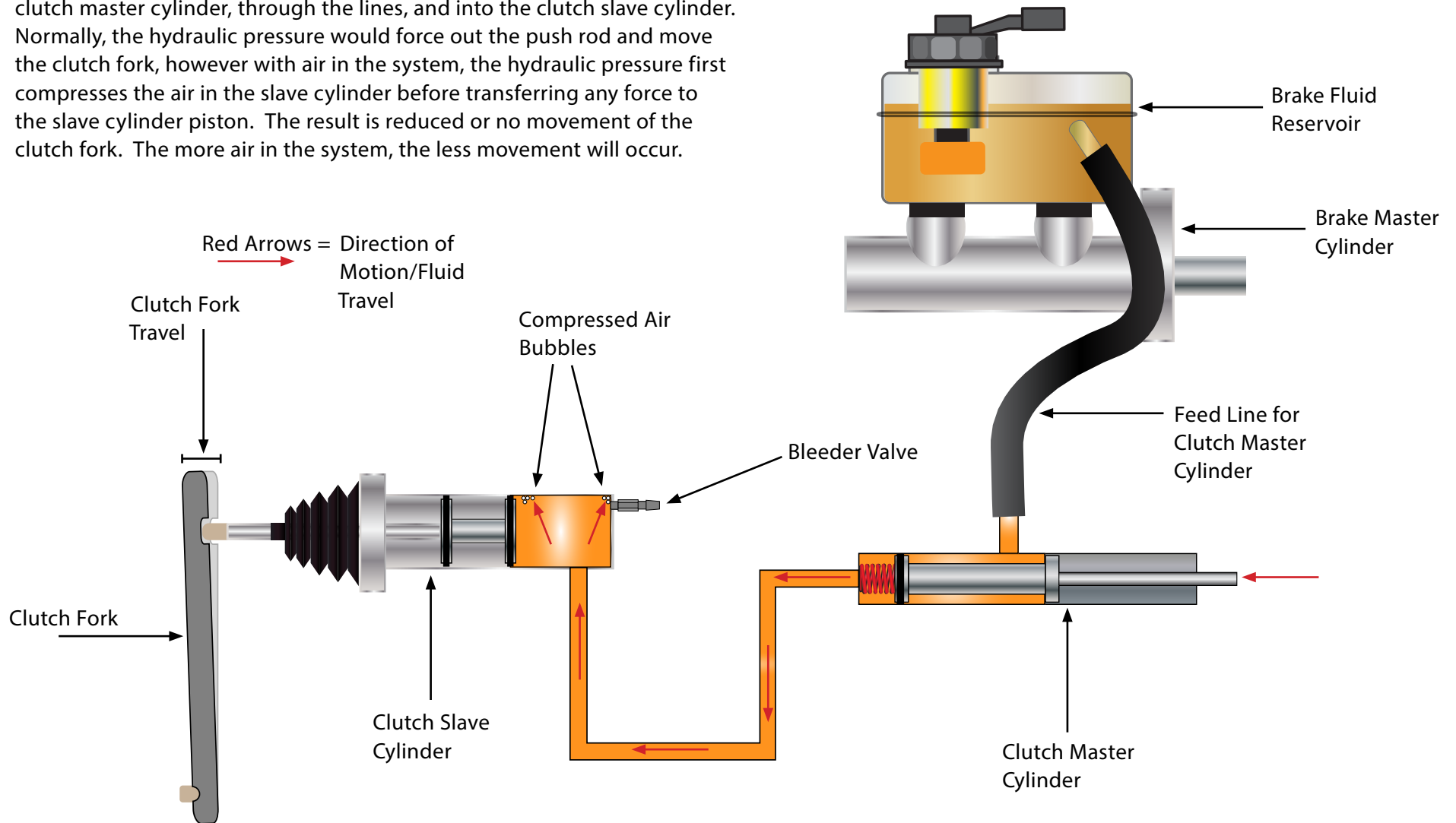
## BLEEDING THE CLUTCH HYDRAULIC SYSTEM

Here is the clutch hydraulic system at rest, but there are air bubbles trapped in the clutch slave cylinder. At rest, air has no effect on the system.



# BLEEDING THE CLUTCH HYDRAULIC SYSTEM

When the clutch pedal is depressed, brake fluid is pushed out of the clutch master cylinder, through the lines, and into the clutch slave cylinder. Normally, the hydraulic pressure would force out the push rod and move the clutch fork, however with air in the system, the hydraulic pressure first compresses the air in the slave cylinder before transferring any force to the slave cylinder piston. The result is reduced or no movement of the clutch fork. The more air in the system, the less movement will occur.



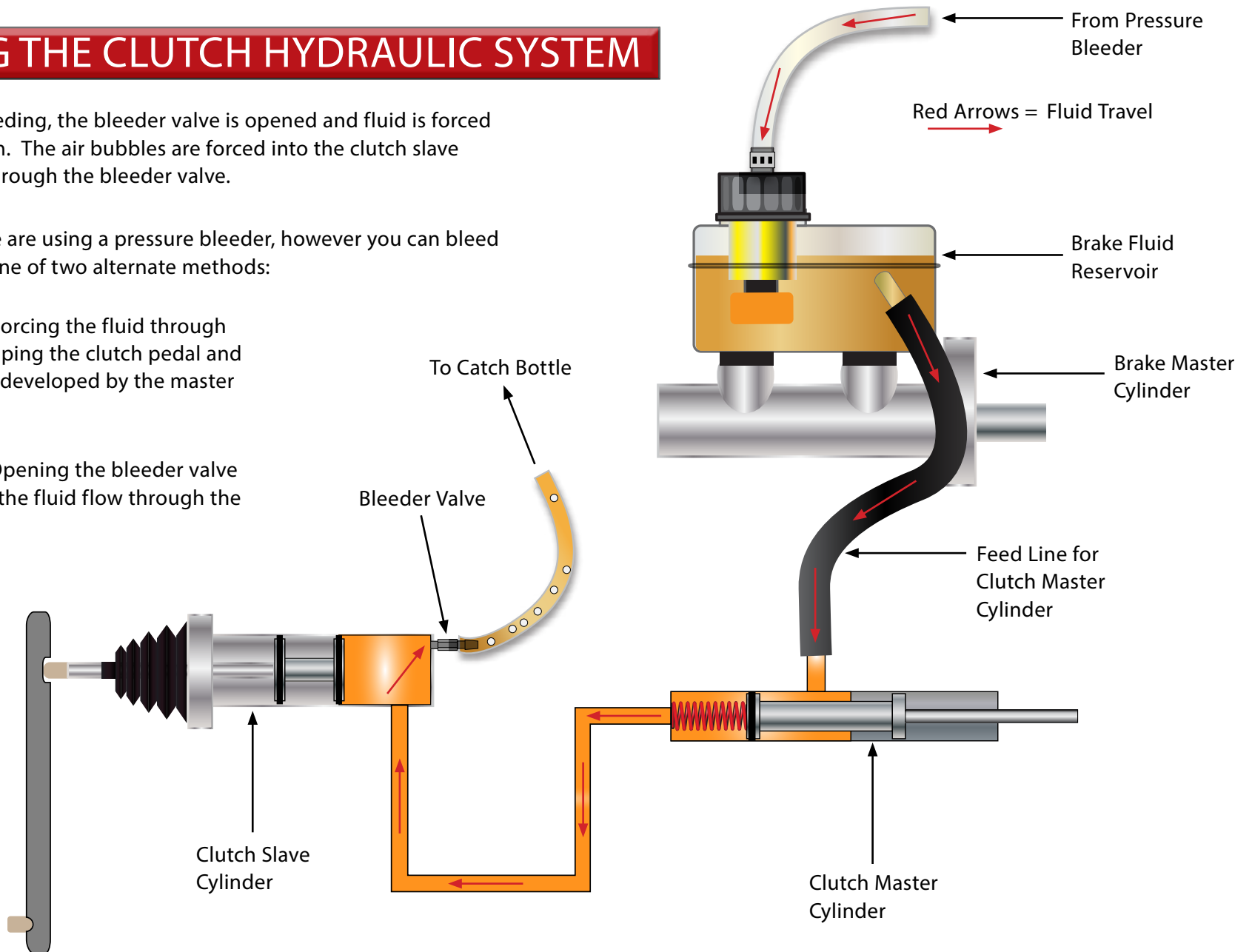
# BLEEDING THE CLUTCH HYDRAULIC SYSTEM

During system bleeding, the bleeder valve is opened and fluid is forced through the system. The air bubbles are forced into the clutch slave cylinder and out through the bleeder valve.

In this example, we are using a pressure bleeder, however you can bleed the system using one of two alternate methods:

**Manual Bleeding:** Forcing the fluid through the system by pumping the clutch pedal and using the pressure developed by the master cylinder.

**Gravity Bleeding:** Opening the bleeder valve and simply letting the fluid flow through the system.



## BLEEDING THE CLUTCH HYDRAULIC SYSTEM

### Step 1:

Now that we've covered the process, it's time to bleed the air out of the system. Decide what method you are going to use, keeping in mind the following:

- Pressure bleeding is generally the most efficient method for clutch systems.
- Due to the design of clutch hydraulic systems, it can sometimes be difficult to get all of the air out. You may have to use a combination of different methods to successfully bleed the system.



Pressure Bleeder  
[ES#2774831](#)

A pressure bleeder will efficiently force brake fluid through the system.

Catch Bottle  
[ES#2773388](#)



A catch bottle makes bleeding or flushing a one person job, and makes it a lot cleaner too.



Brake Fluid  
[ES#1971190](#)

A high quality brake fluid such as Pentosin Super DOT 4 should be adequate for most systems. If you are not sure in any way what to use, consult your vehicle service information or a professional repair facility.

## BLEEDING THE CLUTCH HYDRAULIC SYSTEM

### Step 2:

Install a catch bottle onto the bleeder screw of the slave cylinder and open the bleeder screw.



### Step 3:

Follow the instructions included with the pressure bleeder to connect it to the brake master cylinder reservoir and pressurize the system. Bleed fluid through until no more air bubbles flow out, then close the bleeder screw.




















## BLEEDING THE CLUTCH HYDRAULIC SYSTEM

### Here are some final tips on bleeding the system:

- If you installed the new Exact Fit line following these instructions and you allowed fluid to drip out of the line before tightening the fittings, you may find that most of the air has been forced out of the system. Depress the clutch pedal a few times to see how it feels, then open the bleeder valve and allow it to “gravity” bleed for a few moments. Any small remaining traces of air will exit through the bleeder.
- If you have installed a new Exact Fit line as a result of a failed line or if you have replaced multiple components, the system may have ingested a considerable amount of air. Be patient and use different methods if necessary to bleed the system.
- When bleeding a system that has ingested a large amount of air, when it appears as if you have bled all of the air from the system and have solid fluid coming out of the bleeder, it is not uncommon to have to pump the clutch pedal 25-30 times before it will build pressure. This is normal for this type of hydraulic system.
- Even if you find that the system has successfully “gravity” bled during installation of the new Exact Fit line, it is a good idea to flush all of the old fluid out. Use the same methods as bleeding the system.

## SCHWABEN - BUILD THE ULTIMATE TOOL COLLECTION

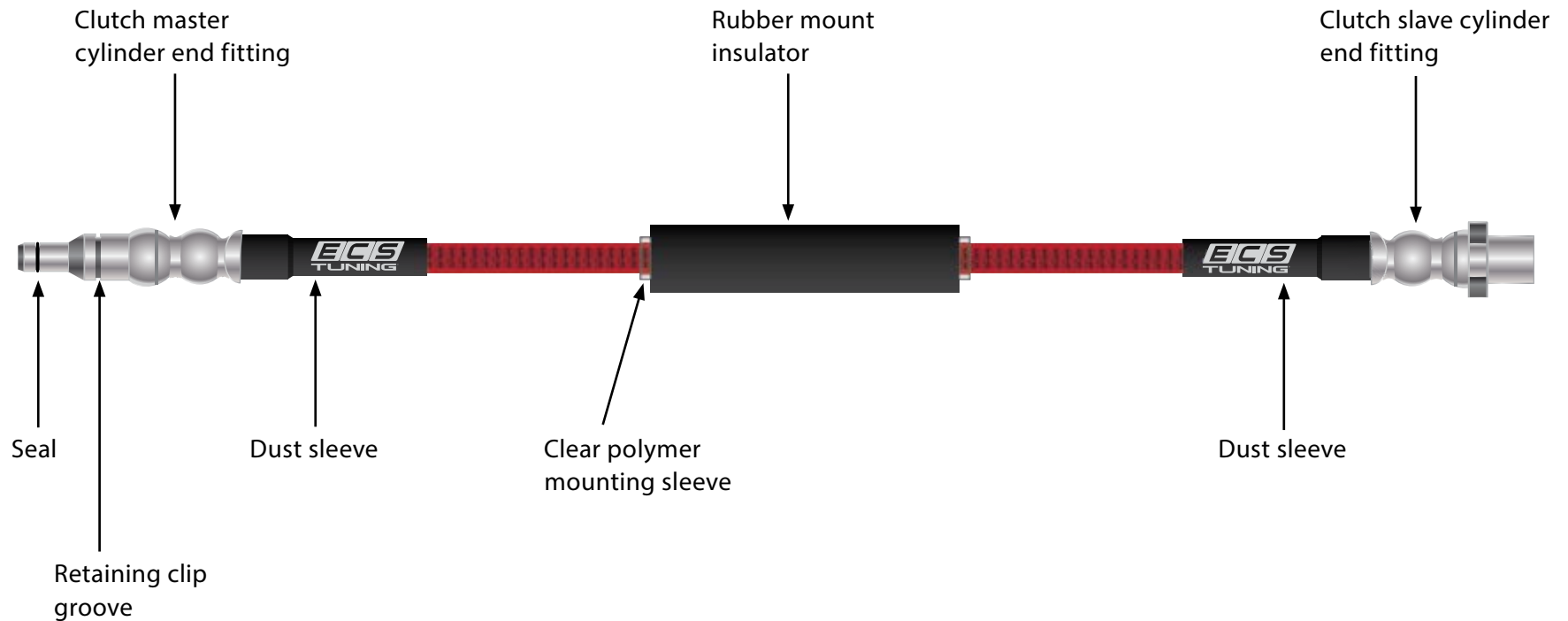
At ECS Tuning, we carry a line of high quality Schwaben Tools and Equipment to help you build your ultimate tool collection. Never before has affordability and quality been so closely related. Our entire Schwaben line is subjected to strict in house testing for strength and durability. See what we have to offer and equip your garage without breaking the bank.

|   |   |  |   |   |   |
|---|---|--|---|---|---|
|    |    |    |    |    |    |
|    | <a href="#"><u>Breaker Bar</u></a>  | <a href="#"><u>Scraper, Hook, &amp; Pick Set</u></a>                                 | <a href="#"><u>Sockets</u></a>  |    |   |
| <a href="#"><u>Creepers</u></a>   | <a href="#"><u>Gloves</u></a>   | <a href="#"><u>Camshaft Tools</u></a>  | <a href="#"><u>E-Drive Sockets</u></a>  |   |   |
| <a href="#"><u>Engine Bars</u></a>  | <a href="#"><u>Screwdrivers</u></a>   | <a href="#"><u>Fan Clutch Wrenches</u></a>   | <a href="#"><u>Car Ramps</u></a>  |  |   |
| <a href="#"><u>Pressure Bleeders</u></a>  | <a href="#"><u>Lighting</u></a>   | <a href="#"><u>Tie Rod Tools</u></a>   | <a href="#"><u>Torx Drivers</u></a>   |  |   |
| <a href="#"><u>Coil Spring Compressors</u></a>                                      | <a href="#"><u>Pry Bars</u></a>   | <a href="#"><u>Brake Fluid Catch Bottle</u></a>                                      | <a href="#"><u>Jack Stands</u></a>  |   |   |
| <a href="#"><u>Camber Gauge</u></a>   | <a href="#"><u>Hose Pinch Pliers</u></a>  | <a href="#"><u>Tubing Cutter</u></a>   | <a href="#"><u>Circuit Tester</u></a>   |   |   |
| <a href="#"><u>Wheel Bolt Pattern Gauge</u></a>                                     | <a href="#"><u>Wheel Bolt Pattern Gauge</u></a>                                     | <a href="#"><u>Booster Cables</u></a>  | <a href="#"><u>Ratchets</u></a>   |   |   |
| <a href="#"><u>Ball Joint Separator</u></a>   | <a href="#"><u>Ball Joint Separator</u></a>   | <a href="#"><u>Oil Filter Tools</u></a>  | <a href="#"><u>Exhaust Hanger Pliers</u></a>  |   |   |
| <a href="#"><u>Vanos Solenoid Socket</u></a>  | <a href="#"><u>Vanos Solenoid Socket</u></a>  | <a href="#"><u>Service Carts</u></a>   | <a href="#"><u>Bubble Flaring Tool</u></a>  |   |   |
|   |   | <a href="#"><u>Battery Charger</u></a>   | <a href="#"><u>Thread Chaser</u></a>  |   |   |
|   |   | <a href="#"><u>Stethoscope</u></a>   | <a href="#"><u>Drain Pans</u></a>   |   |   |
|   |   | <a href="#"><u>Battery Terminal Brush</u></a>  | <a href="#"><u>Wrenches</u></a>   |   |   |
|   |   | <a href="#"><u>Wheel Chocks</u></a>  | <a href="#"><u>Impact Sockets</u></a>   |   |   |
|   |   | <a href="#"><u>Torx Sockets</u></a>  | <a href="#"><u>Torque Wrenches</u></a>  |   |   |
|  |  |  |  |  |  |



# Your E36/E46 Exact Fit Clutch Line Installation is complete!

## The BMW E36/E46 Clutch Line



These instructions are provided as a courtesy by ECS Tuning

Proper service and repair procedures are vital to the safe, reliable operation of all motor vehicles as well as the personal safety of those performing the repairs. Standard safety procedures and precautions (including use of safety goggles and proper tools and equipment) should be followed at all times to eliminate the possibility of personal injury or improper service which could damage the vehicle or compromise its safety.

Although this material has been prepared with the intent to provide reliable information, no warranty (express or implied) is made as to its accuracy or completeness. Neither is any liability assumed for loss or damage resulting from reliance on this material. SPECIFICALLY, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY IS MADE OR TO BE IMPLIED WITH RESPECT TO THIS MATERIAL. In no event will ECS Tuning, Incorporated or its affiliates be liable for any damages, direct or indirect, consequential or compensatory, arising out of the use of this material.