The clutch does a pretty big job for its size. When you figure that its job is to move the car from a dead stop—and keep it rolling at high speeds—you can see that it has to be a sturdy mechanism.

Look at it this way—all the power from the engine has to go through the clutch on the way to the rear wheels. That adds up to quite a beating. And some people heap more abuse on a clutch by not taking care of it.

There's a lot of service in a clutch if the driver treats it right and lets you keep it adjusted. You fellas know the importance of keeping the right free-play in a clutch pedal. Some owners don't know that. So, you can do your customers a real favor by giving them the word on clutch adjustment.

When you think of the work a clutch has to do—even with normal use—it's surprising how long it actually lasts. But clutches do wear out—and that's where you fellas come in! So let's close in on our friend, the clutch, and see how it works.
THE CLUTCH IS THE "MIDDLE MAN"

No matter how you look at it, the clutch is always "in the middle!" That's because it has the job of transmitting the full turning force (engine torque, that is!) from the crankshaft and flywheel to the transmission and driveshaft.

And that job is a lot bigger than it sounds. It goes beyond the transmitting of power alone. For also to be considered are the many times a clutch must engage and disengage every time the gears are shifted. Small wonder that the clutch mechanism has been rightfully called one of the hardest-working parts of a car!

As far as clutch repairs are concerned, they hold no mystery for the mechanic who understands clutch operation from beginning to end. Once
he has the “know how” of clutch parts and how they work, the mechanic can put his finger on any clutch problem without wasting his time and the customer’s hard-earned cash!

And . . . like any other service operation, knowledge of the fundamentals plays an important part. So . . . let’s briefly run over the A-B-C-'s of the clutch by taking a look at . . .

**THE CLUTCH IN A NUTSHELL**

Boiled down to the bare essentials, there are three major elements in connection with the clutch assembly to keep in mind. These are:

1. the engine flywheel face
2. the clutch disc
3. the clutch pressure plate assembly
Notice that the flywheel and the pressure plate assemblies are bolted together and when the engine is turning, so are they. Now . . . the clutch disc is in between these two assemblies.

To understand how these three assemblies get together, let’s say the clutch pedal is let up engaging the clutch. Powerful springs force the pressure plate forward, locking the disc between the plate and flywheel. All three then revolve together. Since the clutch disc is splined to the transmission shaft, the engine’s power is transferred to the transmission when the clutch is engaged.

When the clutch pedal is pushed down to disengage the clutch, the pressure on the pressure plate is relieved, the disc is released from the other two spinning members and rides free.

In other words, the clutch has two positions; engaged and disengaged. But just how it arrives at either of these positions depends on the design of the clutch itself. And it also involves a few more parts than have been mentioned thus far. So . . . to get the full inside story, let’s take a close look at . . .
THE BORG & BECK CLUTCH

1. COVER
2. PRESSURE SPRING
3. RELEASE SPRING
4. RELEASE BEARING SLEEVE
5. RELEASE LEVER
6. EYEBOLT
7. PRESSURE PLATE
8. DRIVE LUG
9. DISC
10. FLYWHEEL
11. LEVER SPRING
12. STRUT
13. PIVOT PIN
14. EYEBOLT NUTS
In order to better understand just how this clutch works, we first have to see what an assembled clutch looks like. On page 6 you will notice a cross-sectional view of an assembled Borg & Beck clutch with all the parts identified. Also on that same page is a view of the clutch showing the parts disassembled for further identification.

Notice that the clutch cover is bolted to the flywheel. The pressure plate, located inside the cover, has drive lugs which extend through slots or openings in the cover. Between the pressure plate and the cover are those powerful pressure springs we mentioned.

The pressure plate moves in and out because of the action of release levers in the cover. These levers make contact with the plate through knife-edged struts and are pivoted in eyebolts attached to the cover. Let’s see how these parts work when the clutch engages.

When the clutch pedal is let up, the long ends of release levers move back, allowing the pressure plate to be pushed against the clutch disc by the pressure springs. This action squeezes the disc between the spinning pressure plate and flywheel and makes the disc turn with them.
When the pedal is pushed down, the reverse happens. The long ends of release levers move in, and the short ends pull the plate back. The clutch is then disengaged and the disc rides free. That brings us up to the operation of the disc itself.

THE CLUTCH DISC IS A "SOFTENER-UPPER"

Supposing this disc were solid. Then, transmitting the power of the engine to the disc would be an abrupt process to say the least! So, between the friction facings that receive the power, there are cushion springs. These cushion springs are arched to allow gradual engagement, thus assuring smooth clutch operation.

And here's another thing. The power comes from the engine in continuous impulses. If these impulses should reach the transmission, they would create noise. So-o-o—the disc also contains . . .
A DAMPER UNIT

A set of damper springs are so located around the disc hub that the power must go through them to get to the hub. These springs are held between the disc plate and a frame housing, with the hub itself between these two parts. When the power impulses come from the engine, they compress these damper springs on their way to the disc hub. To control the action of these springs, there are sets of thin friction shims on either side of the hub. These shims slow down the action of the springs as they compress and relax—thus damping out the power impulses and letting the power flow smoothly to the transmission.

Now, suppose we check the transfer of power once more... here's how it goes: from flywheel to clutch cover; from cover to pressure plate through the pressure plate drive lugs; from pressure plate and flywheel to the disc; and finally, from the disc through the damper unit to the drive pinion and then to the transmission.
HERE’S HOW THE LINKAGE GETS INTO THE ACT

To see how the linkage operates, let’s start at the pedal again. When you push the pedal down, you must overcome the resistance of the pressure springs in the clutch. To help out the driver, there’s an overcenter spring attached to the pedal linkage. When the pedal starts down, the overcenter spring is raised over the center of the pedal pivot and then begins to help pull the pedal down.

And another thing—you know that the engine is mounted flexibly and is free to move in the frame. This movement must be compensated for in the linkage. To take care of this, the linkage works through a torque shaft that has ball pivots on either end. One of these pivots is mounted rigidly on the frame. The other one is on a spring bracket on the engine, and together these ball pivots take up any engine movement different from that of the frame.
CLUTCH LINKAGE—PLAY BY PLAY

As the pedal goes down, the pedal rod moves to the rear. At the same time, the torque shaft is turned counterclockwise and the inner arm on the torque shaft moves a fork rod to the rear. Finally, the fork rod moves a fork which is on a pivot attached to the clutch housing. This fork pushes the release bearing against the release levers, causing the clutch to disengage.
On page 12, you'll find views of the Auburn clutch and its various parts. You'll notice that the pressure springs in this clutch are between the cover and the long ends of the release levers. Also notice that the short ends of the levers push against the adjusting screws that are in the pressure plate drive lugs.

When the pedal is depressed, the long ends of the levers are pushed in and they compress the pressure springs. At the same time, the short ends of the levers move out, allowing plate return springs to pull back the plate, disengaging the clutch. These springs hold the adjusting screws of the plate in constant contact with the short ends of the levers. And of course, when the pedal is let out, the levers are forced back by the pressure springs and the plate is pushed up against the disc again.

THEN THERE'S THE DAMPER UNIT

The damper assembly works in a lube-filled steel housing. Rubber gaskets, on either side of the hub, prevent the lube from working out. The action of this damper unit is interesting. If you'll look at the illustration, you'll notice there are buttons at the ends of each coiled spring. Inside these buttons, there's a tube-shaped damping spring. The friction of the tube-springs controls the action of the buttons as the coil springs are compressed. In this way the power impulses flow smoothly to the transmission.
SERVICING THE CLUTCH

Of course, you know you'll save a lot of time and trouble if you road-test a car that comes in with an ailing clutch. Road testing gives you a pretty good line on what's wrong. Besides, some things might pop up in operation that you might miss after you take the clutch apart.

Now, let's run over the ways a clutch might act up. Suppose on the road test, you noticed chattering. That could be caused by several things: oil or grease on the facings, a cocked pressure plate, or even the wrong type of facings on the disc.

DON'T HANDLE THE FACINGS!

It's good to get into the habit of handling the disc by the hub. Even that little bit of natural oil from your skin on those facings may cause the clutch to chatter. And, of course, oil from a leaky rear main bearing or an excess of lubricant from a release bearing, the transmission or the pilot bushing is almost sure to cause chatter. The only thing to do if you find lube on those facings is to replace the disc. And of course, track down the leak and stop it.

Unless the pressure plate meets the disc evenly, you might get chatter. If the plate is slightly out of parallel with the flywheel, the disc cushion springs ought to take it up. But, if the
levers are too far off, the plate will be cocked too much. So any time you suspect that the levers are out of adjustment, you ought to put the cover in the adjusting fixture and check them.

Finally, if the disc has been refaced with material, other than that designed for the clutch, chatter would probably result. So if you suspect this condition, install a new disc.

Just in case you're wondering about refacing instead of installing a new disc, let's kick that around a bit. It's possible to reface an old disc, but it's not always advisable. The chances are that if the facing is worn out, the hub damper unit might also be worn. Then again, the cushion springs under the facings might have lost their arch, if the clutch had been slipping very long. Also, in refacing, unless you have the right kind of equipment, you might make the contact surfaces irregular.

However, if you are equipped to reface old discs, there are a few things to watch out for. Don't distort the cushion springs while riveting the facings. If the rivets are squeezed too hard, the facing might break, and some time in the future it might rip off. Be sure to use facings of the same size and material as were originally installed in the car.
THIS BUSINESS OF DRAGGING

Let's say that you noticed that the clutch is slow in disengaging—or does not release at all. Then you'd have a condition commonly known as "dragging." When this condition is present, it is hard to shift gears without clashing.

Dragging may be caused by too much pedal free-play, a bent disc, or a tight clutch disc hub spline. And don't overlook the possibility that somebody may have thrown off the setting on the release levers.

Getting down to brass tacks on the causes of drag, let's first consider too much pedal free-play. This condition can cause drag because the release bearing cannot move the release levers far enough to release the clutch disc completely. Correcting the pedal free-play will take care of the dragging.

In the case of a bent disc, drag is created because the disc won't be parallel with flywheel and pressure plate and the disengagement won't be clean. And how could a disc get bent? Well... when putting in a new disc assembly, somebody may have hung the transmission on the disc hub thereby bending the disc. The only thing you can do to correct this condition
is to install a new disc assembly. It just isn’t worth the risk of trying to straighten out a bent disc. And when you install a new disc, be sure you use an arbor to line it up correctly. Otherwise you stand a chance of bending the disc when you put the transmission back in.

Drag can also be caused by a tight fit of the clutch disc hub on the drive pinion shaft. That’s because the disc will not move away from the flywheel. In this case, you’d have to either clean up the splines or install new parts.

And finally, there’s the possibility of the release levers being the cause of clutch drag. That’s because uneven release levers will naturally result in uneven disengagement.

On the type clutch that has pressure plate return springs there are two possible causes of drag. First, the plate return springs may have become too weak to function properly thus causing poor disengagement. Then again, it could be that the pressure plate drive lugs are binding in the clutch cover.
RELEASE BEARING OR
PILOT BUSHING OR ???

As far as clutch noises are concerned, there may be several
causes. For instance, you can get noise from a dry release
bearing or one that's worn. Noise will also develop when
an uneven release lever causes the release bearing to "shuffle"
on its sleeve. Then again, a dry pilot bushing or one that's
tight will be noisy.

TRACING THE CULPRIT!

The big question is —how do we tell
whether it's the re-
lease bearing or the
pilot bushing that's
making the noise?

Well . . . if the noise is continuously evident with the engine
running, the transmission in neutral and the clutch pedal
down, then it is most likely the release bearing.

However . . . if you get a high-pitched noise with the engine
running, transmission in gear and pedal down, that will
probably be a dry pilot bushing. Very often this particular
noise is evident only momentarily after the clutch is depressed
when stopping the car with the transmission in gear.
ONCE YOU’VE FOUND 'EM...

FIX 'EM! If you suspect that the release bearing is causing the noise, take it out and check it. Put hand pressure on it, and if it feels rough or gritty when you turn it, you'll need a new one. If the bearing is dry, you'll also have to replace it... because you can't lubricate it! You see, the release bearing is packed with lubricant at the time of manufacture, and further lubrication is not possible.

When you find it necessary to replace the release bearing, you must be careful so as to prevent damaging the bearing race. The bearing should not be driven on the sleeve with a hammer, for this might result in bearing damage and eventually cause noise.

EASY DOES IT!

Here's a method for installing release bearings that's sure to do the job right. Place the front sides of the old and new bearing together and press the new bearing on the sleeve until it is flush with the shoulder of the release bearing sleeve. To do this... line up the two bearings against the release bearing sleeve. Then, press the bearing on the sleeve in a vise clamp, turning the bearing as you do so.

COULD BE A SHUFFLE

In cases where you find the release bearing to be in good shape, and you still suspect it of making noise, it's high time you checked the release levers. For, as we said, an uneven lever can cause the release bearing to shuffle on the sleeve. There's only one cure for this condition, and that is to set the clutch up in a fixture and correct the lever height.
ABOUT THAT PILOT BUSHING

Once you've detected the cause of your noise to be a dry pilot bushing ... the thing to do is lubricate it. Or, if it shows signs of wear, install a new one. And right here ... a word of caution. That pilot bushing has a small appetite as far as lubricant is concerned! It can only take about a quarter teaspoonful—and no more. Also ... be sure to put the lube in the bushing, for if you put it on the pinion shaft, it will be scraped off on the splines before it ever reaches the bushing. If you have to install a new bushing be sure you burnish it to size.

WHEN THE DAMPER'S NOT ON THE JOB

Remember what we said about the damper unit in the clutch disc assembly? That it has the job of smoothing out engine power impulses so they won't get to the transmission? Well, any time the damper unit stops doing that important job, noise is bound to result.

But, don't let that noise fool you! You see, failure of the damper unit has led some folks to believe it's the rear end, or rough engine performance, or even the transmission, that's causing all the fuss.
Actually, there is a way to determine if the damper is the cause, thereby saving yourself a lot of extra work. And here’s how you go about it:

Take the car out on the road and gradually increase the speed. Now . . . while you are accelerating keep your ear cocked for that noise. If the damper unit’s at fault, you’ll usually pick that noise up somewhere between twenty-five and thirty miles per hour. But you’re very apt to get it in very limited speed ranges like from 26 to 28 m.p.h., or from 28 to 30 m.p.h.

Then again, this noise might only make itself known while you’re coasting in gear at around 40 to 38 m.p.h. And the chances are that the noise won’t occur in both instances on the same car, so use both tests to make sure you cover all the bases.

Whether you find the noise when you’re accelerating or when you’re coasting—the cure is the same. Since the damper unit is failing to do its job, a new clutch disc assembly must be installed.

**TAKING THE CLUTCH OUT**

When any of these conditions are discovered, you’ll have to take the clutch out to correct them. Before you start be sure to mark the cover and flywheel. That’s so you can put the assembly back in the same position and keep its original balance.

If you’re simply replacing a disc, there’s generally no need to adjust the release levers as long as there’s no evidence of
restaking around the adjusting nuts. And if you're replacing the whole cover assembly, remember that the levers in the new cover have already been accurately adjusted.

Before reassembling, clean the cover and flywheel with solvent to remove all dirt and grease. Then blow them dry.

**CHECK AND DOUBLE CHECK**

You take the clutch cover assembly apart by using a clutch fixture like the one shown here. Be sure to mark the cover and pressure plate for reassembly. Once you've taken the assembly apart, you'll want to check the pressure springs, the release levers, pressure plate and cover.

Check the pressure springs either with a tester or by comparing them with a new spring. If the paint is burnt or the bottom coils look too close together, the springs are probably weak—so replace them. If you suspect that only one spring looks
bad, it's best to replace them all because they are probably all affected, being in the same cover.

Inspect the release levers, pivot pins, struts and eyebolts for excessive wear, replacing all parts where needed. As a general rule this calls for good judgment. Just remember that all similar parts must be equal to work correctly.

Look the pressure plate over carefully for grooves on the friction face. Grooves on the pressure plate or the flywheel face will ruin a new disc, so replace the plates if the grooves are too deep. Scratches, however, can be cleaned up with emery cloth.

It's also important to make sure the cover isn't bent or damaged or that its drive lug openings are not badly worn. You see, worn drive lug openings might allow too much movement and cause noise. In cases where damage or wear is excessive, replace the cover with a new one.

IN OTHER WORDS CHECK AND DOUBLE CHECK
PUTTING IT BACK TOGETHER

When you put the cover assembly together again, first lubricate the sides of the drive lugs with a small amount of graphite-base lubricant or wheel bearing lube.

BUT NEVER USE OIL!...

it may wind up on the facings. And make sure that all parts are seated properly by working the levers up and down a few times.

Now you’re ready to adjust the levers. First, get a rough setting. It will help if you tap the eyebolts with a soft-faced hammer to seat the adjusting nuts. Then make the final adjustment of the release levers. By the way, take it easy when you restake the adjusting nuts so you won’t change the setting by distorting the parts. To be on the safe side, you ought to check the setting again after staking the nuts.
SPECIAL TIPS ON SERVICING THE AUBURN CLUTCH

The Auburn clutch can be disassembled in the same fixture by using the adapters that are available for use with the fixture.

After removing the adjusting screws and plate return springs, place the steel blocks under the outer end of each lever. Then, when you back off the compression nut on the fixture, the levers will hit the blocks and keep the pressure springs from flying out.

To remove a pressure spring, press down on the lever by hand and remove the steel block. Then release the lever slowly and the spring will come right out.

Give the plate return springs a careful check by comparing them with a new spring. If they show any signs of weakness, they should be replaced. Otherwise the pressure plate will not be returned properly.

Remember, too, that the release levers (fingers) and the lever pins should be checked for wear; that the clutch cover openings are not binding on the drive lugs on the pressure plate. And once you have the clutch cover reassembled and the levers adjusted, be sure to tighten the locknuts on the adjusting screws!
THE ASSEMBLIES ARE INTER-CHANGEABLE

While individual parts of the Auburn pressure plate assembly are available for service replacement, the complete assembly and disc are not... However, a Borg & Beck clutch disc assembly of a corresponding size can be used with an Auburn pressure plate. And the Auburn disc can likewise be used with a Borg & Beck pressure plate assembly.

CHECKING THE LINKAGE

Ordinarily, the only clutch linkage adjustment necessary is the adjustment of the push rod at the fork to maintain one inch of pedal free-play.

In order to get more free-play, the fork rod should be shortened at the fork end. By the way, it's important to take a look at the fork itself whenever you're adjusting for free-play. If that fork is in contact with the bell housing, free-play won't do a bit of good! For, when you notice that condition, the chances are that the disc is badly worn and needs replacing.
SETTING THE OVERCENTER SPRING

In a case where the clutch pedal is hard to operate, or will not return properly, it’s a good indication that the overcenter spring needs adjustment.

You can check the spring setting with the overcenter spring setting gauge. The adjustment is made at a turnbuckle on the rod between the clutch pedal and the torque shaft. An overly stiff pedal means the rod should be shortened. If the pedal action is soft—or when the pedal doesn’t come all the way back—the rod should be lengthened. But, in either case, be sure you have pedal free-play while you’re adjusting the turnbuckle or the setting will be wrong.

What’s more, that turnbuckle only sets up the position of the overcenter spring and should never be used to adjust pedal free-play!
NOTE:

Another cause of stiff pedal action might be a bent overcenter spring bracket. If this condition is found, the bracket should be straightened so that it is at right angles with the frame. Then adjust the overcenter spring position by using the gauge.

To save time, while working under the car, you can check the amount of free-play by taking the return spring off and measuring the amount of travel at the outer end of the fork. Five thirty-seconds of an inch travel there gives you one inch of free-play at the pedal. And that's exactly what it should be!
HERE'S A TIP FOR
THE LUBE SPECIALIST

If you use a high-pressure grease gun on the torque shaft fittings, put a bar between the clutch torque shaft spring bracket and the engine. It's possible to blow the inner pivot ball right out of the torque shaft if high pressure is applied without caution.
TEST YOURSELF WITH THESE 10 QUESTIONS ON CLUTCH OPERATION

1. The clutch disc cushion springs soften the engagement of flywheel, disc and pressure plate.
   
   RIGHT □    WRONG □

2. A noise heard when the clutch pedal is held down with engine running and transmission in neutral indicates that the pilot bushing is at fault.
   
   RIGHT □    WRONG □

3. Chatter can be caused by uneven clutch release lever setting.
   
   RIGHT □    WRONG □

4. If the release bearing is not turned as it is pressed on the sleeve the bearing may be damaged.
   
   RIGHT □    WRONG □
5. Line up the clutch disc with an arbor before installing the transmission to prevent distortion of the disc.
   
   RIGHT □       WRONG □

6. The turnbuckle is used to position the over-center spring.
   
   RIGHT □       WRONG □

7. To keep oil off the clutch disc facings always handle the disc by the hub.
   
   RIGHT □       WRONG □

8. If the clutch pedal does not come back all the way, adjust the fork rod.
   
   RIGHT □       WRONG □

9. The overcenter spring helps reduce the pressure needed to push the clutch pedal down.
   
   RIGHT □       WRONG □

10. A tight clutch disc hub can cause a dragging clutch.
    
    RIGHT □       WRONG □