BRAKE DRAG DIAGNOSIS

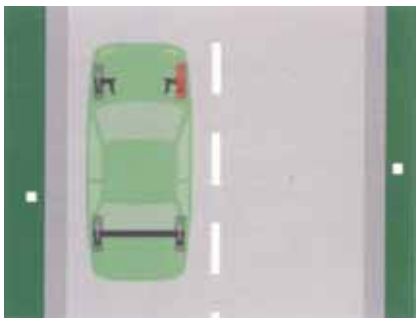
Wingate would like to welcome you to this video on "Brake Drag Diagnosis".

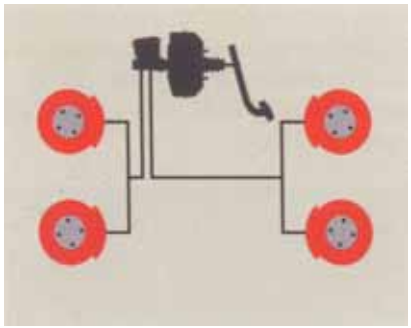
Brake drag occurs when whe lining material of either a drum brake or disc brake is held in contact with it's friction surface without the brake pedal being applied.

When brake drag is encoutered customer concerns usually centre around a lack of vehicle performance and an increase in fuel consumption.

Sometimes this may be indicated by an abnormally high brake pedal or in extreme cases a loss of brake effectiveness accompanied with a pungent burning odour.

Brake drag can occur on individual wheels, wheels on a common axle, diagonal pairs of wheels or all wheels of a vehicle. It can be caused by either hydraulic or mechanical means. As with all braking problems a logical and systematic approach to diagnosis greatly reduces diagnostic time.





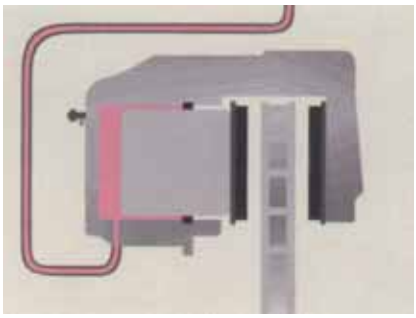
The flow chart provided, sets out the procedure we will be following througout this video.

The first step in the diagnostic process is to drive the vehicle, applying the brakes at regular intervals to bring them to operating temperature.

There are two important points to be observed when carrying out this process. The first is that we are not trying to fade the brakes. This only damages the lining material and is not necessary for our purposes.

The second is that we need to maintain this temperature for a period of approximately five minutes to ensure that the heat is transferred to the brake fluid as well as the brake assemblies themselves.

On completion of this temperature normalising process the vehicle should be returned to the workshop and the wheels raised clear of the ground.



All wheels should now be spun by hand to check for abnormal drag.

Once the wheel or wheels with abnormal drag have been identified we now have to determine if the problem is a hydraulic or mechanical one.

BRAKE DRAG DIAGNOSIS

The flow chart tells us to release the bleed nipple on the affected wheel or wheels. This allows us to determine whether hydraulic pressure is being retained in the system, causing the drag.

In a normal system, with unblocked bleed nipples, the fluid should only move slowly up the tube under the force of gravity.

If the system is retaining pressure a solid spurt of fluid will be seen moving rapidly up the bleeder tube until the pressure has been relieved.

Depending on the result of this test, the flow chart will now tell us to follow one of two paths. Initially, we will follow the path indicating retention.

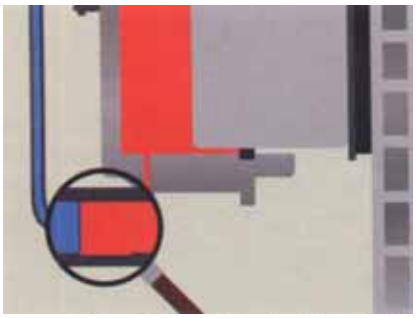
The first test is to remove the master cylinder cap and check to see if the system will gravity bleed.

The cap is removed to ensure that the diaphragm has not become inflexible or extended down too far due to low fluid level.

If this was the case, atmospheric presure would not be applied to the fluid, preventing it from flowing out from the bleed nipple. If fluid does not flow from the nipple, the next step on our chart tells us to disconnect the flexible hose from the steel pipe, and again check for fluid flowing from the system. This time from the end of the steel pipe.

Fluid dripping from the pipe indicates a problem exists with the flexible hose and it will need replacing.

Flexible hoses can deteriorate or become damaged to the point where they become partially blocked. Often a part of the inner lining can detach, acting like a flap valve and allowing fluid to flow one way unimpeded, but restricting flow in the opposite direction.



They may also become twisted due to improper assembly, creating a similar effect.

If fluid does not drip from the steel pipe, the flow chart will direct us to undo the fitting from the master cylinder, from the circuit it is connected to.

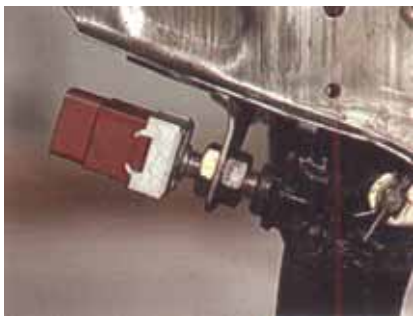
Fluid dripping from the master cylinder port would indicate that the problem lies in one of the steel lines running to the flexible hose. If this is the case the pipes should be inspected for external denting or crushing and any damaged ones replaced.

If fluid does not drip from the port, the master cylinder mounting nuts should

BRAKE DRAG DIAGNOSIS

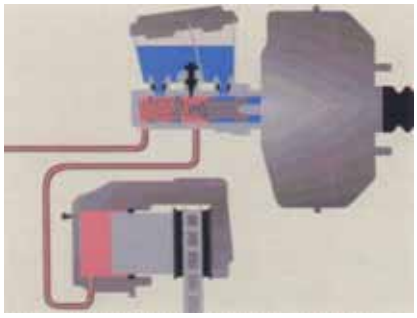
be loosened and the cylinder pulled forward approximately ten millimetres.

This checks to see if either the pedal push rod, booster output rod or stop light switch adjustment could be forcing the master cylinder piston forward blocking the compensating port or ports.



The compensating port is designed to allow for changes in the brake fluids volume due to heat build up in the brakes.

Should this port be covered over, the expanding fluid will not be able to enter the reservoir, causing pressure to build in the system, and the brakes to drag.



If the fluid now drips freely from the master cylinder port the adjustement of the pedal push rod and stop light switch will need to be checked and adjusted to manufacturers specifications as necessary.

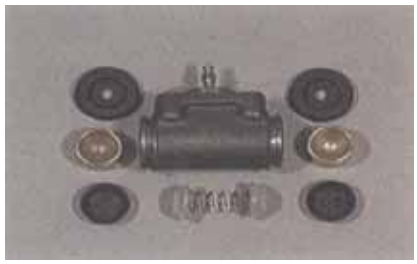
Should fluid still not have dripped from the master cylinder port the flow chart tells us to check for the presence of a residual line pressure valve. These valves sit in the outlet ports of some master cylinders and were only used with drum brakes.

Their purpose was to retain a small amount of pressure in the circuit when the brakes were released. This ensured that the wheel cylinder pistons were kept in contact with the ends of the brake shoes.

This eliminated the need for the pedal to be pumped to bring the pistons into contact with the shoes and helped maintain a high brake pedal.

The presence of these valves can be easily checked by pushing a small piece of wire into the port. If a line pressure valve is present, spring resistance will be felt followed by fluid dripping from the port.

These valves are no longer used in the majority of modern systems, wheel cylinders now being fitted with springs and cup expanders.



In a disc brake system any fluid pressure

BRAKE DRAG DIAGNOSIS

retained in the lines when the brakes are released will cause them to drag should a line pressure valve be fitted, the incorrect master cylinder will need changing with a genuine replacement part designed for the vehicle.

If no line pressure valve is present the problem will lie in the master cylinder itself.

The most probable cause being the compensating ports being covered by either sticking pistons, or swollen rubbers caused by fluid contamination, or in the centre valve design, swelling of the rubber valves.

If this is the case the master cylinder will require overhauling or replacement.

Now before we leave the pressure retention path here's a hint to help speed the diagnostic process.

If two or more wheels are dragging the problem will most likely lie in the master cylinder area, making it safe to proceed straight to the step on the flow chart that asks you to loosen off the master cylinder retaining nuts.

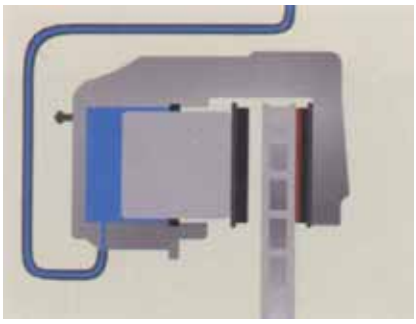
That completes the "pressure retention" path of the flow chart. We shall now follow the path that would be taken if the fluid discharge from the bleed nipple was normal, indicating no pressure was being retained in the system.

Looking at the flow chart reveals that we are again faced with a choice of two paths.

Since the majority of vehicles are now fitted with disc brakes to at least the front wheels, we shall follow the disc brake path first.

The first instruction on our flow chart is to check the caliper slides on floating calipers for seizing this is best done by first removing the caliper and then moving the slides to the limit of their travel in both directions.

Tight slides don't allow the caliper to release properly causing the outside pad to drag, overheat and wear more.



If this condition exists then the slides from both calipers on the axle should be removed, cleaned and lubricated.

Should the slides be free the next step on our chart is the checking of the caliper piston for seizing.

This can be easily accomplished by removing the pads and then pushing the piston all the way back in it's bore.

An assistant is then used to gently pump the brake pedal about half distance and the piston movement observed.

The piston should move freely with virtually no effort being required to push the brake pedal down.

If a caliper is found to have a seized or partially seized piston both it and the caliper from the other side should be overhauled at the same time.

BRAKE DRAG DIAGNOSIS

Our final check in the flow path is for rear disc brake calipers with integral handbrakes.

The drum in that design of park brake is only a small drum brake and hence will be covered in the drum brake path of the flow chart.

The first step with this design is to disconnect the handbrake cable and make sure the apply lever moves freely.

A seized or tight apply lever indicates internal problems necessitating a caliper overhaul of both sides.

If the levers prove to be free the next check is the cables themselves.

Have an assistant move the lever up and down while pulling on the cables.

They should slide easily and if tight will require lubrication or replacement.

Finally, ensure that the cables are adjusted as per manufacturers specifications and that the apply levers are back against their stops.

If we now turn our attention to the drum brake path we can see that due to the brake having more components, the list of possible faults is also correspondingly more.

If any diagnostic procedure it's always wise to check the simple things first and so it is with our first check – handbrake adjustment or cable seizure.

The solution may be as simple as backing off the adjustment or disconnecting the cable and check for seizing.

Our next step should the handbrake cables and adjustments be correct is to check the brake shoe adjustment.

Again, a simple readjustment of the brake may be all that is required.

Should these last two checks reveal no problems, the brake drums will need removing to allow a closer inspection of the brakes.

The brakes should be checked for broken or distorted shoe return springs or retaining clips.

Wheel cylinders should also be checked for seizing by having an assistant slowly depress the brake pedal whilst watching the pistons for movement.

Finally the chart suggests the checking of the brake shoes for distortion.

Whilst this is not a commong problem, instances still occur, especially if the brakes have been subjected to abnormally hard use. If distortion is suspected, accurate checking will require removal of the shoes from the backing plate.

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