



BRAKE FAULT DIAGNOSIS GUIDE



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The purpose of this booklet is to help car repairers identify and remedy brake faults. This is an expert guide for everybody in the industry who is involved in brake repairs and maintenance. By following this guide, correct brake fault diagnosis becomes easier, and repairs will be achieved more efficiently and effectively.

Isidore Sostak established WINGATE MOTORS on the 1st of April 1960. He served his apprenticeship as a motor mechanic from the age of 16. His son Saul, also trained in the automotive industry as well as in electronics, joined the company in 1988.

WINGATE, with the formidable experience and know-how gained since its inception in 1960, has become one of South Africa's largest independent suppliers and re-manufacturer of brake and steering parts, assemblies and accessories to the automotive parts market as well as the Original Equipment Market.

WINGATE built its reputation on its specialist ability, firstly as a specialist brake repairer and rebuilder. With the development of the Brake Hydrobooster, WINGATE was introduced into the field of power steering rebuilding.

WINGATE is now a major supplier of brake and power steering components, brake pads and kits to the general aftermarket and to the OEM market. All parts are manufactured to standards that comply with all international market and OEM requirements. WINGATE has become South Africa's largest INDEPENDENT supplier of brake and power steering specialised parts and services, and has entered other specialised sectors of the automotive industry as well.

In the 1970s WINGATE introduced the first non-asbestos, semi-metallic type of brake pad to the South African market and is now a leader in the brake pad market. Representing Bendix Australia in Africa, WINGATE has been the leader in the non-asbestos brake pad field. These pads are now used in major OEM aftermarket programs in Africa. WINGATE is also presently marketing the first specially formulated 4x4 brake pad material to the P&A division of a major motor manufacturer.

In our fifth decade, we will continue to break new ground with innovative product concepts, as we were the first to introduce the Nu-Tech polymer rebushing system to the marketplace, start a resleeving program using stainless steel tubing for all types of hydraulic brake cylinders, publish the most comprehensive hydraulic brake catalogue, the first one in the last ten years for the African Market. We carry a stock inventory of around 12,500 part numbers giving the ability to complete any order request to almost 100%, with a cross referencing of +/- 200,000 part numbers. WINGATE has international partners in many countries in the world, and is able to source most parts requested. We will be developing an undercar program in the future, together with a comprehensive training program in brake repairs and franchised "ABS" brake shops.

SYMPTOM 1 – LOW FLUID IN MASTER CYLINDER RESERVOIR



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POSSIBLE CAUSES	CORRECTIVE ACTION
Normal friction pad/brake lining wear.	Refill the reservoir. Work the brakes and see if the fluid level falls again. If the level does fall, follow the procedure for 'Hydraulic fluid leak'.
Hydraulic fluid leak. 	Check all the hydraulic connections for leaks. Check the master cylinder, calipers, hoses, wheel cylinders, and pressure-reducing valve (where fitted). Peel back the rubber boots if necessary. Note, though, there might be a little assembly fluid under the boot left over from manufacturing. If you find any loose connections, tighten them.
Remote and direct type brake booster unit (where fitted), internal fluid leak. 	Take the vacuum hose off the booster, take out the non-return valve, and check the operation. If there's any fluid inside the booster shell, either repair or replace the cylinder.

SYMPTOM 2 – EXCESSIVE TRAVEL IN THE BRAKE PEDAL OR HANDBRAKE LEVER

POSSIBLE CAUSES	CORRECTIVE ACTION
Failure of one circuit in a dual circuit braking system.	Check for fluid leaks in the brake system as per symptom one. If there are no leaks, dismantle the master cylinder, and if the bore is undamaged repair the cylinder with the appropriate repair kit. It's often preferable to simply replace the entire master cylinder.

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<p>Worn or unadjusted wheel bearing causing run out of the hub and disc and 'knock back' of pistons in calipers or wheel cylinders.</p> 	<p>Renew or adjust the wheel bearings according to the manufacturers specifications. Disc runout is often improved by refitting the disc in a different position on the hub. Use a dial indicator to ensure that disc runout is not more than 0.1mm.</p>
<p>Manual adjusted drum brakes out of adjustment.</p>	<p>Turn the adjuster until the shoe touches the drum and the drum won't turn. Then loosen the shoes so they are just clear of the drum and the drum turns freely. Apply the brake pedal to centre the shoes in the drum. Try the brakes again to check the adjustment. Use a high temperature silicon based lubricant on the adjuster and shoe abutments.</p>
<p>Wrongly adjusted handbrake cable or inoperative rear brake auto adjusting mechanism (if fitted).</p>	<p>Adjust the handbrake cable according to the manufacturers specifications. If this doesn't help, take the brake drums off and see if the automatic rear adjusters are working correctly. Use a high temperature silicon based lubricant on the adjuster and shoe abutments.</p>
<p>Excessive booster to master cylinder clearance.</p>	<p>Adjust the booster output rod according to the manufacturer's specifications.</p>
<p>Worn pedal linkage and/or free play.</p>	<p>Replace pedal pivot bushes and pins. Adjust according to the manufacturer's specifications and reset stoplight switch.</p>
<p>Fast fill valve not operational.</p>	<p>Remove the reservoir cap and observe if the fluid level rises on initial pedal application. If so the fast fill valve is faulty and the master cylinder should be replaced. Note however that the fluid level will rise on further brake pedal application. This is normal.</p>

SYMPTOM 3 – SPONGY BRAKE PEDAL

POSSIBLE CAUSES	CORRECTIVE ACTION
<p>Faulty brake hose.</p>	<p>Check all hoses for leaks and ballooning under pressure. Also flex the hoses to check for cracks. Replace where necessary.</p>

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<p>Air in the brake system.</p> 	<p>Bleed the system, refill the reservoir, and check the system for hydraulic fluid leaks as in symptom one. Start bleeding with bleed screw furthest from master cylinder and work towards it, finishing with the nearest bleed screw.</p>
<p>Oversize brake drums.</p>	<p>Oversize brake drums may flex or distort on brake application. Check that they are within the manufacturer's specified limits.</p>
<p>Tapered Pads.</p>	<p>Inspect brake pads for tape in both longitudinal and radial directions. Also check inner pads for flatness as they sometimes wear concave during heavy braking. Replace if necessary.</p>
<p>Moisture in brake fluid – vaporisation.</p>	<p>Check brake fluid appearance and colour. If discoloured or cloudy, replace. Brake fluid must be replaced at least at manufacturer's recommended intervals, as its natural tendency is to absorb moisture.</p>

SYMPTOM 4 – BRAKE DRAG ON WHEELS

POSSIBLE CAUSES	CORRECTIVE ACTION
<p>Mechanical: Binding or obstructed brake pedal.</p>	<p>Check that the brake pedal comes back to the off position without obstruction, for instance by a wrongly adjusted stop light switch.</p>
<p>Hydraulic: Pressure build-up in master cylinder.</p>	<p>Contaminated brake fluid may have caused the rubber components in the system to swell and block the by-pass ports retaining hydraulic pressure. Check for this by loosening the tube nuts at the master cylinder and see if this releases the brakes. Replace any faulty items as per next point.</p>

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<p>Rubber cups or seals swelling due to brake fluid contamination by petrol, kerosene, or mineral oil.</p> 	<p>These types of contaminants can often be identified by their smell in the master cylinder reservoir or by corrosion. Flush the system, and then replace all rubber parts including caps, seals, and hoses.</p>
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SYMPTOM 5 – BRAKE DRAG ON ONE WHEEL OR AXLE

POSSIBLE CAUSES	CORRECTIVE ACTION
Disc pads seized or sticking in a caliper recess.	Remove the split pins and retaining springs. Take out the pads and shims. Clean the caliper recess with brake cleaner and cloth. Avoid inhaling the dust it may be harmful. Clean the pads and where appropriate thinly coat the steel backing plates and shims with a high temperature silicon-based lubricant. Don't contaminate the friction surfaces. Put back the pads and springs. Secure them with new split pins, and check the disc spins freely.
Seized piston in disc brake caliper or wheel cylinder.	Remove the pads or brake drums as applicable. Carefully work the brake pedal and check the movement of the piston(s) in the suspect assembly. Replace the entire caliper or wheel cylinder assembly if a piston is seized. NB: It is strongly recommended that both calipers and/or all wheel cylinders per axle sets be replaced or overhauled.
Obstruction in a brake hose.	Find the fault. Check the hose is faulty by disconnecting it. Replace the hose.
Handbrake assembly is wrongly adjusted or seized.	Check the handbrake cable, clevis pins and yokes as applicable. Also check the handbrake mechanism at the back plate. It may be necessary to remove the brake drum to check for correct actuation. Lubricate with a high temperature silicon-based lubricant being careful not to contaminate eth linings, and then adjust the handbrake.
Weak or broken brake shoe pull-ff springs.	Take the brake drum off and examine the assembly. Replace the faulty spring(s) as necessary.

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SYMPTOM 6 – PULL OR JUDDER UNDER BRAKES

POSSIBLE CAUSES	CORRECTIVE ACTION
<p>Pads or linings are contaminated with oil, grease or brake fluid.</p> 	<p>Check the pads or shoes to find the source of the contamination. Replace the culprit parts. Small amounts of friction material contamination can be moistened and rubbed off with a fine emery cloth. (Avoid inhaling the dust). Severely contaminated pads or shoes must be replaced in axle sets regardless of their condition.</p>
<p>Different grades of friction material used on pads/linings in an axle set.</p>	<p>Check that the front and rear friction materials are the same grades by taking off the pads or drums. Replace with complete axle sets where necessary.</p>
<p>Seized piston in disc brake caliper or wheel cylinder.</p>	<p>Remove the pads or brake drums as applicable. Carefully work the brake pedal and check the movement of the piston(s) in the suspect assembly. Replace the entire caliper or wheel cylinder assembly if the piston is seized. NB: It is strongly recommended that both calipers and/or all wheel cylinders per axle sets be replaced or overhauled.</p>
<p>If associated with judder:</p> <p>a). Disc</p> <ul style="list-style-type: none"> - surface condition - run out - thickness variation <p>b). Drum</p> <ul style="list-style-type: none"> - excessive run-out - distortion 	<p>Use a fine emery cloth to rub off minor disc friction surface faults. If there's any doubt, replace the disc. Check that disc run-out does not exceed 0.1mm. Check the wheel bearings and replace or readjust as applicable. Check that the disc is the same thickness all around. Replace the disc if there's more than 0.02mm difference. Check for rear drum judder by carefully pulling on the handbrake at low speed.</p>
<p>Loose caliper mounting bolts, loose back plate, steering and suspension components, tyre pressures.</p>	<p>Check the security of the brake assembly. Check the steering and suspension parts for wear. Check tyres are OK and inflated to correct pressures.</p>

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SYMPTOM 7 – HARD PEDAL

POSSIBLE CAUSES	CORRECTIVE ACTION
<p>Inoperative brake booster unit.</p>	<p>Exhaust all the servo units vacuum by turning off the engine and pressing the brake pedal repeatedly. You should hear the servo hiss each time you press the pedal. When the vacuum is gone, lightly press the brake pedal and restart the motor. If the servo is working, the pedal will sink as the servo operates. The air inlet should not hiss while the brakes are held on. Further checks can be made of the vacuum hose, check valve and fittings. If there is any doubt, it's advisable to replace the unit.</p>
<p>Glazed or worn-out pads or brake shoes.</p> 	<p>Carefully rub of any glazed surfaces on pads or shoes with a rough abrasive paper. Moisten first with a damp rag. (Avoid breathing the dust). It's often safer to simply replace the pads or shoes.</p>
<p>Damaged or rusty friction surfaces of brake disc.</p>	<p>Check the discs for cracks, scoring, or burned-on rust (a black appearance). Minor surface imperfections can be rubbed off with a fine emery cloth but if any doubt exists, replace the disc. Replace both discs at one to ensure balanced braking.</p>
<p>Pads or linings are contaminated with oil, grease, or brake fluid.</p>	<p>Check the pads or shoes to find the source of the contamination. Replace the culprit parts. Small amounts of friction material contamination can be moistened and rubbed off with a fine emery cloth. (Avoid inhaling the dust). Severely contaminated pads or shoes must be replaced in axle sets regardless of their condition.</p>
<p>Seized piston in disc brake caliper or wheel cylinder.</p>	<p>Remove the pads or brake drums as applicable. Carefully work the brake pedal and check the movement of the piston(s) in the suspect assembly. Replace the entire caliper or wheel cylinder assembly if a piston is seized. NB: It is strongly recommended that both calipers and /or all wheel cylinders per axle sets be replaced or overhauled.</p>

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SYMPTOM 8 - BRAKE SQUEAL

POSSIBLE CAUSES	CORRECTIVE ACTION
High frequency pad vibration.	Remove the disc pads and shims. Lightly smear or coat the shims and metal backplate with Disc Brake Anti-Squeal Adhesive. Don't contaminate the friction material. Replace the pads and secure with the springs and retaining pins. If applicable, check the cutaway part of the piston is correctly positioned and not clogged with dust.
Loose caliper mounting bolts.	Check to see if the bolts are loose. If so, tighten to the manufacturers recommended torque setting.

SYMPTOM 9 – DRUM BRAKE SQUEAL

POSSIBLE CAUSES	CORRECTIVE ACTION
Lack of lubrication and/or excessive lining dust in brake assembly.	Take off the drum, shoes, and other parts. Clean the assembly (avoid breathing the dust) with a vacuum cleaner or damp rag. Lubricate the shoes, cylinder, and abutment slots with high temperature silicon based grease. Also lubricate the backplate where the brake shoe platform touches. Clean the friction surfaces of the drum. Check that there is no grease on the shoe linings, rubber parts or the drums friction surface.