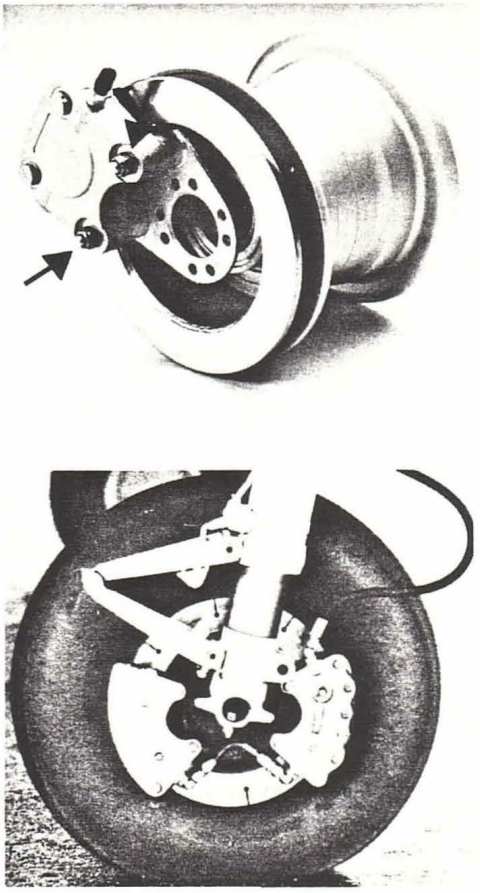
Cleveland Brake Preflight Inspection

Are you inspecting your brakes (not only the pads and plumbing, but the discs themselves) on each walk-around? Or are you among the many pilots who, either because they refuse to get their knees dirty, or they don't know what they're looking at, fail to check (really *check*) the brakes before each flight?

Don't take chances. Kneel down next to each brake on your first walkaround (kneelaround?) of the day, and give things a good looking over. Start by grabbing the brake caliper with one or both hands and shake it vigorously up and down. It won't move much, but you should be able to feel a slight looseness, a tiny amount of "give" relative to the rock-solid wheel. This "give" is necessary because the Cleveland (and McCauley) brake caliper is of the floating kind; it rides in and out (toward and away from the wheel, in a direction parallel to the axle) on a pair of stout *anchor pins*. If these pins get rusty or dirty—which they will, due to their operating environment—they can freeze in one place, rendering the caliper *non*-floating.

A non-floating caliper is bad for two reasons. Number one, braking effectiveness is lessened, because only the piston-side brake pad is applying pressure to the disc—the "back plate" pad is not snugging up (by equal and opposite reaction) against the other side of the disc. (Newton's law only works if the anchor pins are sliding freely in and out.) Number two, huge bending forces are applied to the root of each anchor pin when you step on the brake and force the piston out against the pad and disc. In other words, the pressure of the piston causes the whole brake to want to cock over against the anchor pins. If the pins were free to slide, this wouldn't happen.

Take a look at the piston-side brake pad(s). Compare their thickness to the back-side pads (on the wheel side of the disc). The pads should be of equal thickness (or thinness) on either side of the disc. (They should wear out at the same rate.) If the piston pads are thinner than the back-side pads, you've confirmed a diagnosis of sticky anchor pins. Pull the caliper through-bolts (thus liberating the back plate), slide the brake away from the wheel (don't kink any plumbing), and clean up your anchor pins with sandpaper and/or solvent (alcohol or gasoline; no MEK or acetone), and give the pins a thorough coating of dry-slide aerosol—G.E. Silicone or equivalent—before putting things back together. Periodically aim a blast of dry-slide (not oil or WD-40; they'll only attract dirt) at the anchor pins on walkaround, and you'll have no further trouble.



Anchor pins (arrows) provide sliding support for caliper assembly. Larger Clevelands have two calipers (bottom).

You're not out of the woods yet, though. If you've found rusty anchor pins and worn piston pads, make it a point—during your next scheduled inspection—to have the brake caliper dye-penetrant-inspected to detect hairline cracks at the base of each anchor pin. New brake castings aren't cheap, but you'll need them if cracks are apparent; this is the cost of not doing a proper preflight inspection.

Brake pads should absolutely, without question, be inspected prior to the first flight of each day. Cleveland specifies a minimum thickness of 0.100-in. for its organic linings. What you do is simply carry a 3/32-in. allen wrench (or other suitable "feeler") with you on walk-around, and compare it directly with each brake lining. If the lining is thicker than the allen, it's acceptable. If not, it (and the rest of the linings *on that wheel*) should be replaced prior to flight.

Thickness isn't the only go/no-go criterion for a lining, of course; you also want to look for evidence of cracking. Organic linings are made of friable material that will sometimes crack or split around rivet holes, or even let go in chunks. Look and see what you've got.

Eyeball the disc, too. The primary requirement is that it be dry (no hydraulic fluid anywhere), but it should also be relatively smooth, unwarped, and uncracked. Be honest with yourself about rust and pitting: If pitting is severe enough for Ray Charles to notice it, deal with the situation. Don't wait.

You have two options. One thing you can do is pull the disc from the wheel (which of course requires removing the wheel from the plane; but this is all allowable preventive maintenance under Part 43) and subject it to wire-brushing, followed by sanding with 220-grit sandpaper. After that, mike the disc in three or four spots and see if its flange thickness meets the go/no-go dimensions given in the Cleveland manual. (There are too many models to list the data here; see your mechanic or write the Aircraft Wheel & Brake Division, Parker Hannifin Corp., 1160 Center Rd., Avon, OH 44011; phone 216/937-6211.) If the disc is still thick enough to use, use it.

The other option is, of course, to buy new discs (either standard steel or chrome-plated), at a cost of about $100 each—which is cheap compared to the loss of an aircraft. Don't quibble. If you need new discs, buy them.

Finally, remember to tap the brakes (or pull the handle) in the cockpit prior to engine start. Both brakes should *feel* right before you even have to use them. Don't just *assume* they'll be there when you need them. If you don't check them out first, how will you know?