Cleveland Mechanical Brakes, from the Nov./Dec. issue of the Luscombe Association Newsletter 173

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*Vintage Airplane* editor's note: The Cleveland wheels and brakes, also known as Van Sickle wheels and brakes, are common on a variety of lightplanes built in the 1940s, including Aeroncas, Taylorcrafts, and Luscombes. Treat them like precious metal, for they cost dearly! Here's a sterling method to keep them in good shape. —HGF

Luscombes came from the factory with a variety of brake types; Goodyear, Shinn, and Cleveland mechanical brakes were all used. Since my airplane is equipped with the Cleveland mechanicals, those are the brakes I'm most interested in keeping in good repair.

When all the Cleveland brake components are in good condition and the brakes are adjusted properly, they work well. But they are drum brakes. And the drum isn't very large or robust. The design is decidedly low tech and some (like me) may even say crude by modern standards. So any use of the brakes for more than taxiing or holding the airplane during run-up will lead to very rapid brake fade. Fortunately for us, as on any Luscombe, the less you use the brakes the better.

Keeping things working properly has another advantage besides functioning brakes. Parts prices for these things are absolutely staggering! DeBeers needs to get out of the diamond business and start a Cleveland brake parts cartel. I'm certain there would be more money in it for them!

The lever cam is the heart of the mechanical brake. Flats milled in the end of the cam push the brake shoes into contact with the brake drum. The lever return spring and shoe return spring are included just to add a chic and spendy atmosphere to the photo.

There is a good deal of information available online at the Cleveland Aircraft Wheel and Brake website at www.parker.com/ead/cm1.asp?cmid=349. Here you can find parts catalogs, service guides, and maintenance manuals. There are some good exploded drawings of the brakes and the wheels—they are most helpful for finding parts numbers. The brakes work by the rotating action of the machined flats on the lever cam pushing the shoes outward to make contact with the drums. The lever cam is housed in a milled hole in the aluminum backing plate. There are two flats milled into the end of the cam in which the brake shoes ride. The brake shoes have hardened wear pads peened onto the surfaces that contact the cam. The cam and the brake shoes are subject to wear at those contact areas. Treat the brake shoes with respect. Each one costs $657.60! That is not a typo...check the Univair catalog for yourself.

If the wear inserts on the brake shoes are badly worn, they can be replaced. The wear plates are a...
paltry $131.20 each. Yikes! Keep this up and pretty soon we’re going to be talking about real money! You don’t want to know what the cam costs.

I normally disassemble, inspect, and clean the brake assemblies at annual time. With the wheels off for bearing repacking, everything in the brake assembly is pretty easy to see and access. New brake linings are 0.220-inch thick. If you’re not getting good braking action, check the thickness of your linings. New spec on the brake drum is 5.4275 ± .0025-inch i.d. (That amazing tolerance figure is straight from the Cleveland tech rep’s mouth!) If you can’t get adequate braking action no matter how much the lever cam moves (about 0.5 inch or less of lever movement is normal free-play), it’s most likely worn linings and/or brake drums. New brake linings are cheap (relatively!) and easy, so do that first. The new linings should come with instructions for installing. The old lining rivets are simply drilled out, and the new linings are drilled and riveted to the shoes. The Cleveland website also

The many parts used in a Cleveland (Van Sickle) mechanical brake assembly. The early part numbers referred to a C7000 series; the later Cleveland and Parker drawings refer to the 30-3 series of brakes.

The Cleveland line of wheels and brakes is now owned by Parker Hannifin, Inc.

This is how all those expensive little bits are supposed to get together. It doesn’t look like it should cost as much as a week in Hawaii, does it?

 Removed from the vault and delivered to the hangar by a specially contracted armored car, here is the Cleveland brake backing plate, ready to install on the axle. They don't really need to be polished, but considering how much the parts cost, you may want to make it flutter and shine a little.
has the installation procedure. New brake drums are available, but make sure you are sitting down when you call Univair for pricing.

Once everything is cleaned and checked, I like to lube all the bearing surfaces with automotive high-temperature disc brake lube. If you apply it judiciously and don’t get any on the shoes or drum contact surfaces, it helps make everything work very smoothly. It may even help those precious parts last just a bit longer.

And while you have everything apart, don’t forget about the AD on the Cleveland DMB wheels. It’s AD 48-08-02. It calls for removal of the tires and inspection of the wheel flanges for cracks. This is to be done after the initial 500 hours in service and every 100 hours after that. These wheels have had failures in the past so it’s a good idea to look at them carefully. Just don’t even ask what new wheels cost...

After all that, and if all your parts and pieces are in serviceable shape, you should have brakes that work as well as the day they were new...which was just barely adequate for the job even in 1946. If you have many worn parts to replace, the cost can quickly become a prickly issue. So, you may be wondering, are there any alternatives? The Luscombe Heritage/Team Luscombe folks in Chandler, Arizona (www.luscombeh eritage.org), will gladly send you a complete conversion kit for new Cleveland hydraulic disc brakes and wheels. The current cost for the complete kit is $2,550. The installation can be done on a 337 field approval. And after pricing parts for the old mechanical brakes, the price of the new Cleveland hydraulic wheels and brakes will seem like a bargain.

The Cleveland brake assembly installed and ready to lay a streak of smoking-up-melted-tire rubber down the runway. Well, maybe not. Maybe it will hold you stationary at the run-up pad. If your airplane isn’t a Luscombe, your installation may be set up with all the fancy action parts of the backing plate at the bottom, instead of the top as shown here.