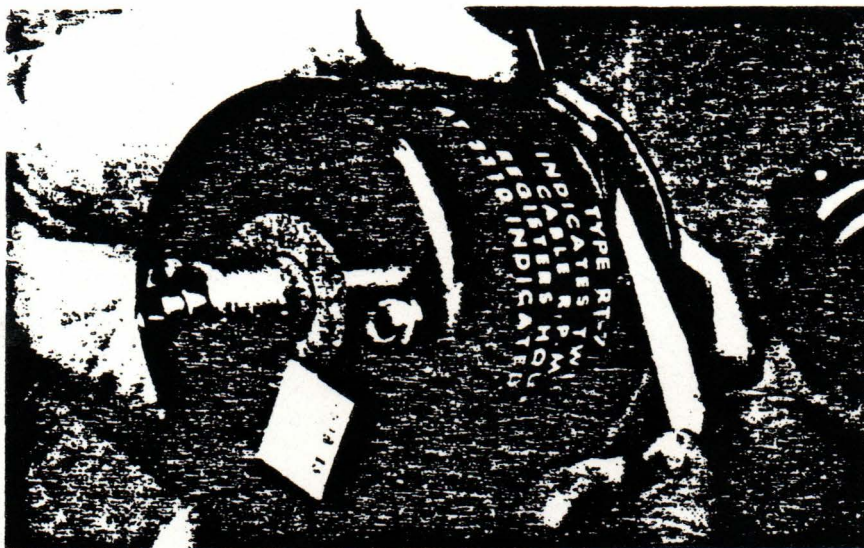
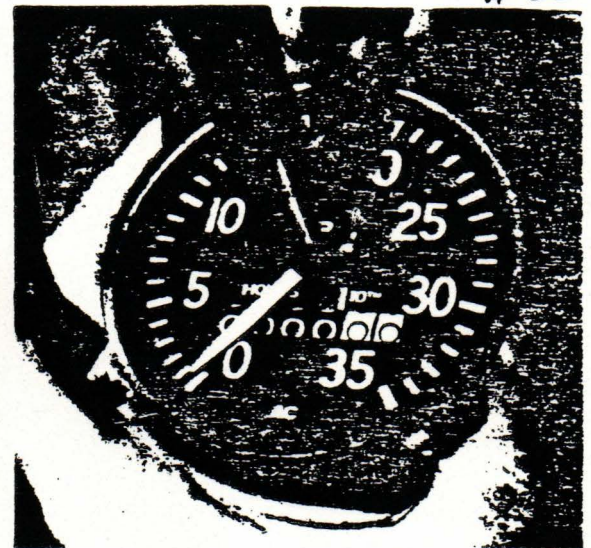


#10

#47



The retaining ring at the base of the tach is pried loose.



Remove the pointer gently with needlenose pliers.

Tachometer Repairs for the Beginner

by Michael L. Stockhill

In an earlier article (May '84), I talked briefly about the removal and installation of tachometers, offered a few suggestions concerning silkscreening of range marks, and mentioned in passing that it is a very good idea to have the recording hourmeter of any replacement tachometer adjusted to reflect the aircraft's total time in service. The latter suggestion not only makes your logbooks much neater, but minimizes future research on the part of your mechanics, ultimately saving you money.

Replacing a tachometer is such a simple task that it should hardly bear mentioning, yet the trials I endured when trying it myself read like Homer's *Odyssey*. It all started quite simply: My original AC tachometer began fluctuating erratically at the upper rpm range, so I set about looking for a replacement. I chanced upon a Trade-A-Plane ad for new recording tachs for something like \$29 each. I should have known better. I ordered one, with the stipulation that the range marks be silkscreened per customer specs on the face (for which I paid extra, naturally).

The new off-brand tach arrived and was installed with due alacrity. Or should I say *lack* of alacrity—I noted that the new instrument seemed to read about 220 rpm slower at full throttle than the old tach. Borrowing a freshly calibrated tester, I

confirmed my initial hunch, and after some negotiations with the supplier I elected to send my original tachometer back for overhaul and refinishing of the dial face. All for the same price. Some time later, the supplier dropped me a line advising that the returned Brand X tach checked out just fine on his calibration device. I concluded that that may have been possible in level flight, or when the unit was installed perfectly vertical and motionless in his calibration device; but when I tested it myself, the unit was definitely off, perhaps owing to the deck angle of the airplane (which was about five degrees nose-up). As it turns out, only AC advertises accuracy in all flight attitudes.

Unfortunately, after reinstalling the original tach—now presumably (ostensibly, allegedly) overhauled—I found that it still behaved erratically. Had it actually been overhauled, or had it just been calibrated and its dial refinished? Somewhat irked, I trotted off to the local Van Dusen supplier and picked up a brand-new AC Model RT-7 recording tachometer. Because of family ties (I'll be honest), I paid just \$65—but if you think your local FBO gets generous markups on such equipment, you're wrong. The markup is minimal, and in any case you can do just about as well as I did through Aircraft Components Inc. (ACI), who currently charge \$74.28 for recording tachs by AC. My new one, alas, had no range marks as purchased (other than some decals for sticking on the glass face), and its hourmeter was a fresh row of zeros—unfortunately not anywhere near

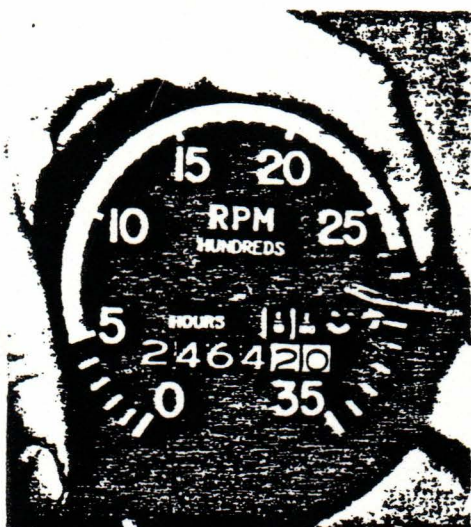
the total time on my machine. Both of these discrepancies, I determined, needed fixing. (Fussy, fussy, fussy.)

Instead of venturing over to the instrument repair station, I first decided to attack the old tach myself, with designs on stealing its freshly silkscreened dial face (and with hope of learning how the hourmeter section could be tweaked). Happily, the process turned out to be fairly easy. Can you do it too? Probably. Can you do it legally? Not really, unless you have your work blessed by a duly authorized instrument repair facility. (Forget about an A&P signoff: No A&P can legally perform instrument repairs.)

Here, for anyone interested, is what I learned: Should you need to replace a tachometer and wish to keep the professional appearance of a silkscreened dial face, you can either have an instrument shop refinish the new tach's face to your specs, or you can swap your original dial face into a new tach. At the same time, the hourmeter can be adjusted. I encourage you to start with the old tachometer, if you intend to do any of this, so you can get the process down pat without breaking anything expensive. The photos show what's involved.

On AC tachs, and probably all off-brand varieties as well, the instrument glass (which is surrounded by a rubber seal roughly similar to an O-ring) is secured to the instrument case by means of a thin metal ring, which is crimped over a flange on the instrument case. This retaining ring must be removed by carefully prying along its perimeter with a suitable tool. I used a simple blade screwdriver, a

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Remove gun-blued face screws . . .



And the recorder mechanism is accessed.

though a similar implement with more rounded edges would better prevent damage to the retaining ring.) Work the crimped metal back along at least three quarters of the circumference and then pop the ring and glass off by prying through the gaps in the crimp at each of the mounting screw tabs.

Next, with a pair of needlenose pliers, remove the pointer to avoid damaging it, prapping it as shown in the accompanying photographs. The tach's innards are freed by removing the two screws or bolts on the back of the instrument case, found on either side of the tachometer drive shaft. The dial face can then be removed easily; just undo the two gun-blued screws on its face.

Before removing the hourmeter, which is a drumlike assembly with a stack of numeralled discs, look at the back side of the drum and note how the numbered discs are separated by small bright-metal rings with slotted fingers. Note also that the row of slotted fingers is kept from turning by a metal blade (see photos). Before removing the drum, write down the old tach's indicated time. (If you wish, you can add that time to any other time in service for the aircraft.) Remove the recording hourmeter by holding the tachometer assembly so that it faces you as if installed in the aircraft. At the drum's left side there is a small clip that slips over the hourmeter shaft. Remove the clip (using either a screwdriver or needlenose pliers) and slide the hourmeter to the left until the right end of the shaft is free. Lift the hourmeter drum up and to the right until it is free.

My first impression of trying to set the new was similar to my first confrontation with Rubik's cube. Fumbling with the new instrument's hourmeter, it was only by

sheer dumb luck that I dialed in the total time in service of my aircraft. Leaving well enough alone, I then toyed with the old hourmeter, confident that somehow it could be set systematically. In due time I stumbled upon the method, which turned out to be very easy. (I recommend that you experiment with the old hourmeter drum until you are ready to tackle the new tach.)

Start by holding the removed drum so you can read the numbers, with all of the slotted fingers lined up away from your face. When the hourmeter is installed in its cage, the displayed readout is exactly opposite the slotted fingers. Now, with your right-hand thumb and forefingers, hold the far right slotted finger so it cannot turn; then, with your left hand, rotate the balance of the drum's discs by working the small slotted fingers, keeping them all aligned. Each revolution will increase or decrease the displayed number by one digit, depending on which direction you go. The total time in service of my Comanche was 2,501.83 hours. By turning the discs around in the foregoing manner three revolutions, the first digit set was the three. To set the eight (i.e., the second number from the right), I simply held two of the slotted fingers from turning with my right hand while rotating the rest of the discs with my left hand. The procedure is repeated for the remaining numbers, working right to left.

If that description seems confusing, be thankful you were not present during the discovery process. The photographs speak more clearly on this than I could hope to. Suffice to say, once the concept is grasped, it's easy enough for a fourth-grader.

After you've played with your old hourmeter, by setting it to zero or something, practice reinstalling it in the old tachometer mechanism. Using the re-

verse of the removal procedure, slip the left end of the shaft into the cage; align the slotted fingers and drop them over their metal retaining blade; then slip the right end of the shaft into place. Replace the retaining clip, and the unit is ready for reassembly.

Once you tire of experimenting and are reasonably satisfied that you won't break anything, you can tackle the new tach using the same methodology. Swap out the dial faces, as described; set the hourmeter; and replace the pointer. The pointer is easily installed using needlenose pliers. Be certain it is zeroed, and that the needle is not bent so as to rub the dial or glass face. (Again, you may wish to practice on the old tach. The pointer is one item that could easily be broken if you aren't careful.) Finally, slip the assembly into the instrument case, reinstall the two case retaining screws, and reinstall the glass, seal, and retaining ring. (You will probably need to clean the glass before final installation.) I used a small ball-peen hammer to recrimp the retaining ring. Tap *lightly* and frequently, rather than smashingly.

After you're done, I encourage you to keep your work legal by trotting over to your local instrument shop for a test run and the repairman's blessing. Then the new tach, with its proper range marks and hourmeter setting, can be installed in your plane—with a logbook entry, from A&P (yes, it's required).

Other than experience, what have you gained from all this? You've saved a Jackson or two to have your dial face silk-screened to specs, plus ten bucks or so for setting the hourmeter, and you've bought a decent tachometer at a discount, rather than paying retail through your local Cessna or Piper dealer (if there still is such a thing). You've also maybe kept yourself from wasting a lot of time and aggravation on questionable alternatives to the name-brand-tach route. Looking back, I wonder how I let myself be hassled so much by such a simple task. Tachs really are simple—once you get to know them.

