

# Has Your Muffler Had A Checkup?

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■ ■ The three of us who own a Mooney N 9373V are physicians and think of ourselves as pretty shrewd diagnosticians. Our little Ranger is a fine ship and we thought we knew her very well. The plane had performed flawlessly on a recent 12,000-mile round trip between Boston and Alaska. The only snag was locating a new battery in Whitehorse in the Northwest territories.

After our return, maybe we were complacent; in any case, we were just not mentally prepared for what was to shortly ensue.

Fall in New England is probably the most beautiful time of the year, but it does get cold and that means using the cabin heater. As physicians, we thought we knew all about carbon monoxide (CO). During our training, each of us had seen cases of CO poisoning, some of which were fatal.

Carbon monoxide is not a direct poison. It exerts its detrimental effects as a consequence of its ability to form a stable compound with hemoglobin (carboxyhemoglobin), thereby reducing the oxygen-carrying capacity of the blood. Carboxyhemoglobin is bright red and, after serious poisonings, patients have a characteristic cherry-red color to their lips. Symptoms of carbon monoxide poisoning include headache, irritability, confusion, poor judgment and memory, and unconsciousness. Progression of symptoms to collapse may occur within a few minutes, or may be more insidious if exposure is to low concentrations for a prolonged period.

In addition, all of us had read FAA circulars and had seen articles in various flying magazines cautioning against the subtle symptoms of carbon monoxide poisoning.

To be well informed is to be immune—that's what all of us thought. However, running an airplane engine without running your brain has potentially

very serious side effects, as all of us were shortly to learn.

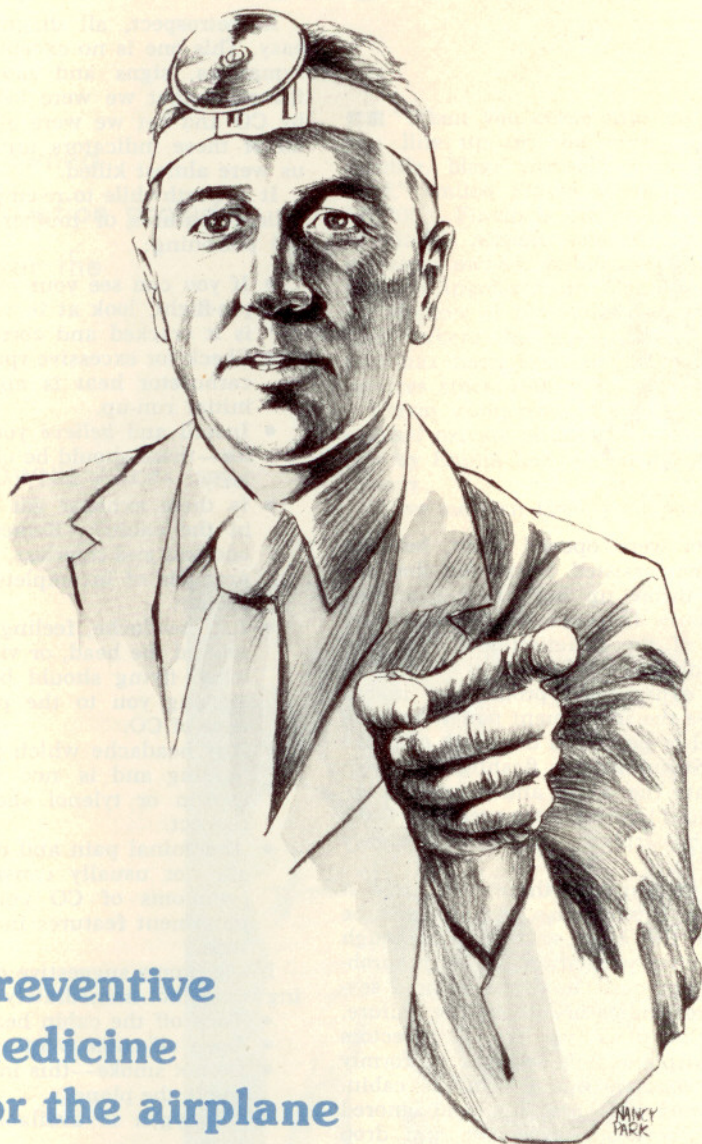
To finally get our attention and alert us unequivocally that we had a serious malfunction in our plane, we had three separate incidents, the last one a potential disaster.

It began on a CAVU late October day on a VFR trip from Boston to Moncton, Nova Scotia. Ron had made the trip many times and the route, terrain and scenery were all familiar and comfortable. Several hours into the flight, however, Ron became intensely uncomfortable because of a severe headache. Now he smokes relatively heavily and the work load had been high prior to leaving on the trip, so he pushed on toward an aspirin stop in Moncton.

Several days later, the return trip to Boston was even more unpleasant. The day began in marginal VFR weather with low ceilings and visibility. At Bangor, Me. where Customs were passed, the weather had improved and much of the turbulence, rain and cold weather was now behind. The return trip to Boston is an easy VFR flight if the ocean is kept off the left wing. In the vicinity of Portland, Ron's headache had returned. He had no other symptoms, but the pain was so intense that he even lost his urge to smoke. The outside temperature was less than 40°F and cabin heat was on. The approach to Hanscom Field was uneventful as was the roll-out.

Getting out of the airplane and tying it down, however, proved to be another matter. Every step was torture, exacerbating a sharp, pounding, intense headache. After tiedown, his walk to the car was interrupted many times by the necessity to stop moving and allow the intensity of the headache to subside. Later that day, after many aspirins had been consumed, his headache persisted at only a slightly diminished intensity

**Preventive  
medicine  
for the airplane  
can prolong  
the life of  
the pilot**



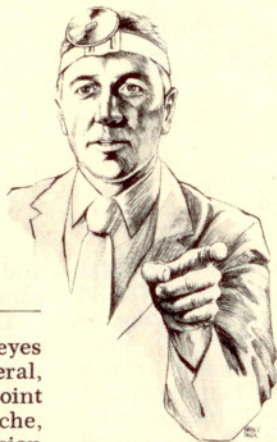
and it was the next day before it was completely gone.

The next chapter in our saga began on a low, overcast day in November with IFR weather covering much of the northeastern seaboard. The weather at my destination in Richmond, Va., was forecast as IFR with the possibility of improving to marginal VFR. Filing IFR through the New York area can be a battle of clearances offered by Center and refused by the pilot. Today was no exception. My flight plan was rejected and in its place I was offered Victor 139 some 40 miles offshore; fine for a jet, not very appealing to a single-engine plane—VFR or IFR.

After a 20-minute ground delay to straighten out my clearance, which was eventually approved as I had filed it, I was off and into the clouds at 1,000 feet. Moderate rime icing was encountered at 4,000 feet and rather than climbing to 6,000 as cleared, Center approved my remaining at 4,000. Things settled down and were relatively uneventful with no further accumulation of ice or other difficulties. New York Center again wanted me at 6,000 but continued to approve 4,000 after commercial jets were reporting severe icing at 6,000.

Once past Kennedy, the clouds were scattered; the temperature was slowly rising and the rime ice was gone before Asbury Park, N.J. The weather steadily improved to good VFR and I sat back to enjoy the ride. About 30 minutes out of Richmond, I encountered moderate turbulence and realized for the first time that I had both a splitting headache and difficulty reading the instruments. I attributed the latter to the turbulence, but it persisted once I was in smooth air again.

Now one tends not to believe this sort of thing, so I was squinting, changing the angle at which I was looking



#### MUFFLER MAINTENANCE *continued*

at the instruments, propping my eyes open, rubbing my eyes and, in general, doing everything but thinking. The point foremost in my mind was the headache, and putting headache and blurred vision together, I turned off the heater and opened the air vents. The blurred vision improved, but the headache did not.

The approach and landing at Richmond were VFR and uneventful, but the headache was excruciatingly intense and persisted for about eight hours. Aspirin was of no benefit.

The return trip also was uneventful. After climbing out through a shallow cloud deck, it was beautiful weather all the way to the Boston area where I let down through about 3,000 feet of clouds and broke out at 2,000 feet on the ILS to Runway 11 at Hanscom. I used the heater sparingly on the return trip and experienced no headache or other symptoms. The whole episode was filed in the back of my mind.

The last and potentially most serious incident occurred about two weeks later. Ivan and his fiancée, Susan (who is also a physician), left on a day trip to Greenville Junction, Me. The town is delightful, located on the southeast corner of Moosehead Lake with the Squaw Mountain ski area five miles away. The day was clear but very turbulent and the approach to Runway 32 at Greenville required a great deal of concentration.

Both Ivan and Susan noted after landing that they didn't feel very well, but attributed this to the severe buffeting that occurred on final approach. That evening, the return trip to Boston began with a turbulent climbout and within minutes both Ivan and Susan felt ill. Both experienced intense headaches, abdominal pain and waves of nausea. Cabin heat was turned off and

all vents were opened wide, but the symptoms persisted. Susan felt that she had to throw up but knew that this would only increase the tension and anxiety of the situation and was able to control the impulse.

Both experienced progressive inability to see the instrument panel, because of a real or perceived dimming of cabin lights. Susan held a flashlight to help illuminate the panel and a smooth approach and landing were executed. Once out of the airplane, both were intensely ill.

Now if that's all there was to it, it might be a pure case of having to be hit over the head with a big enough stick to rivet your attention on the problem. In our case, however, we had several other indicators of muffler failure. In the first place, we had CO detectors in the airplane. The detector uniformly told us that we had CO in the cabin. We nodded our head, yes, and ignored it. Next was our excessive rpm drop when carburetor heat was applied during initial run-up. This is a more subtle but very real finding when exhaust gases are directed back into the carburetor.

The explanation of an excessive rpm drop with carburetor heat may not be readily apparent, but the observation was there, and your mechanic knows. The last point was not the least bit subtle; it intermittently smelled of exhaust gas in the cockpit.

When we compared our experiences after that last episode, it was obvious to all of us that we were extremely lucky.

In retrospect, all diagnoses become easy. This one is no exception. We had symptoms, signs and laboratory confirmation that we were being poisoned by CO and yet we were able to ignore all of these indicators until several of us were almost killed.

It is worthwhile to re-emphasize some salient features of muffler failure and CO poisoning:

- If you can see your muffler during pre-flight, look at it; is it intact or is it cracked and corroded?
- Check for excessive rpm drop when carburetor heat is applied during initial run-up.
- Install and *believe* your CO detector—these should be changed regularly.
- Is there exhaust gas or oil smell in the cabin? (Remember, CO is odorless and colorless, but the other products of incomplete combustion are not.)
- Any headache, feeling of tightness around the head, or visual changes while flying should be a red flag alerting you to the possible presence of CO.
- Any headache which persists after landing and is not improved by aspirin or tylenol should be very suspect.
- Abdominal pain and nausea which are not usually considered to be symptoms of CO poisoning were prominent features in our last episode.

If symptoms suggestive of CO poisoning occur, act immediately:

- Turn off the cabin heater.
- Open all cabin vents.
- Do not smoke—this includes everyone in the plane.
- If oxygen is available, use it at once.
- Land as soon as it is safe and convenient.
- Respond positively and without delay to this challenge to your life by having the heating system and muffler in your plane checked by a competent mechanic.

This prescription pertains directly to the health and long life of all of us who fly. Compliance, however, is another matter. In our case, from now on, the doctors will do as the doctor ordered. □