Avgas – don’t panic yet

We might have come close to running out of avgas this summer but supplies are assured for next year, at a price. Pat Malone reports

The avgas shortage which bedevilled some airfields and flying clubs this summer is not likely to recur next year, and the supply of avgas seems secure at least for the medium term.

Dire warnings that an avgas crisis is looming seem to be overstated, and although it is likely to phased out in future, nobody is in a position to make anything more than a guess as to when that might be. Oil companies have made a commitment, they say, to the continued production of avgas, and chemical company Innospec – now the world’s key manufacturer of the vital ingredient tetraethyl lead – says it will be producing TEL for avgas “as long as there is a market”.

AOPA is closely involved in the deliberations of the Co-ordinating Research Council, a grouping of regulators, oil companies and users in the United States which is searching for a replacement for leaded avgas. While no viable alternative has yet been found, full-size engine tests by manufacturers and the FAA have settled the performance requirements for such a fuel, and the specification is heavily biased towards safety and reliability.

This year’s shortage was due entirely to refinery problems. There are four refineries in Europe making 100LL (low lead) avgas – BP at Coryton in Essex (currently up for sale), Total’s La Médé plant in the south of France, Shell’s Pernis refinery in Holland, and an Exxon refinery in Sicily. As competitors, they don’t co-ordinate their activities, and like British Gas digging up the road after British Telecom has finished replacing it, this year saw some of them scheduled maintenance downtime simultaneously. Unexpected problems delayed a return to full production, leaving several companies short of avgas right across Europe.

The situation was saved by imports from the United States, where there has been a surplus of avgas, and although some consumers found themselves shopping around for new suppliers, nobody quite ran out completely.

Air BP was always able to supply customers, and given its size was probably best placed to ensure continuity of supply. The small independent retailer CYMA had more than adequate supplies and picked up some new customers. Total’s Simon Fage says: “We always had product available, although it was a close-run thing – we weren’t a million miles from trouble. It is unusual for supplies to come in from the United States, because of problems associated with transport, and I don’t expect it to happen again next year.”

Transport is far from the only problem for avgas. It is difficult to blend – there’s no leeway in the specification for failure, and the testing regime is many times more rigorous than for motor fuel. Refineries don’t make much and they don’t make it often, and because of the highly-specialised requirements, it’s relatively easy for a batch to fail. One oil industry executive likened the process to making soufflé – if you’re the chef at the Dorchester you’ll get it right every time, but if you only make three a year, at least one will probably go flat. And you can’t just pour it back into the crude stream like you can with failed motor fuel – it has to be destroyed. Because of its lead content, avgas is deemed to contaminate everything it touches. Pipelines and tankers used for avgas cannot then be used for other fuels without the sort of cleaning that is prohibitively expensive or borderline impossible – hence, in part, the difficulty in finding tankers to carry it across the Atlantic. Refineries have to have dedicated distillation towers for avgas, dedicated tanks and dedicated jetty pipes, and compared with motor fuel, the market is tiny.

But general aviation cannot run without it – high-performance Lycoming and Continental engines are manifestly unsafe when run on anything else – and piston-engined planes and helicopters remain the last market of any size for leaded fuel.

Avgas needs lead because it must have a high ‘octane rating’, which reduces detonation, or pinking, in an engine. The octane rating is the fuel’s ability to ‘wait for the spark’, in that it will not ignite spontaneously under compression, in even a high-compression engine. Detonation causes loss of power and can even blow up your engine.

In testing, avgas must pass two octane specifications. The first is ‘motor octane number’, which is a more severe version of the ‘research octane number’ test often quoted for car fuel quality. Typical top quality automotive gasoline has a motor octane number of about 88 – avgas 100LL must exceed 99.5. However, even this is minor consideration when compared to the second octane test, ‘supercharge’. Here, the avgas is run in a special single-cylinder fuel-injected supercharged engine (there are only a handful of these testing engines in the world)
and the mixture is pushed to the absolute limits to try to induce detonations. If a sample fails this test, the whole batch - refineries blend batches of around 2,000 tonnes at a time - may have to be destroyed.

Another tough test concerns the ability of avgas to remain in storage for long periods without detriment to safety. Motor fuel is usually used within a couple of weeks, and if it lies around for a long time it can form gummy deposits that will clog your carbs. Avgas, however, may have to sit all winter in your wings, or possibly for years in drums in the baking African bush, and can't be allowed to behave like car fuel. Part of the chemical blend is aimed at preventing gum formation, and fuel from each batch is heated to 100 degrees, with 100 PSI of oxygen over the fuel, and held for 16 hours (five hours in the US) to make sure gum formation is kept to a minimum.

Again, destruction is the penalty for failure.

Avgas quality is governed by the American standard ASTM D910, and in the UK by Defence Standard 91-90 - although since the Shackletons retired the Ministry of Defence has been less bothered about avgas they still lend a guiding hand. There is far more to avgas than will fit into this magazine, and we could fill pages with descriptions of qualities that must follow suit. There is a minimum energy specification for avgas - there's no such requirement for car fuel. One way or another, avgas is the highest-quality gasoline fuel that a refinery can make.

Despite the difficulties, oil companies say they will continue to make avgas because it represents a significant revenue stream for them. While we're a long way from the heyday of avgas when Constellations crossed the world on it and avtur was largely a military requirement, it is still required in serious quantities - in the United States it constitutes a 1.5p margin on the half litre in the wholesale price of avgas. It is Most Important to Choose Your Cover With Care

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