temperature of the main delivery pipe from the main tank would be well above the boiling point of petrol (which at normal pressure is about 75 degrees Centigrade). It would boil the moment the vapour pressure in the pipe was reduced by the operation of the supply cock to 'On', when changing tanks from the 'jett' tank to partly-used main tank. Because we carried half our total fuel in the 'jett' tank, the change-over to main tank would always have to occur when more than half the flight had been completed and usually when the engine was very hot after the use of combat power, just after the final strafing run. Once the fuel had vaporised in the empty line the centrifugal pump would run dry and overheat and cause the engine to catch fire — as in Saxe's case. The failure in the Seafire III's fuel supply is, in fact, analogous to the fuel vapour lock sometimes experienced by some old cars when they are left in the sun after a hard, summer's drive.

(m) The Seafire XV. Some early problems

The first Spitfire to be flown with the new Griffon engine was flown by Jeffrey Quill in November 1941. In October 1944, he carried out the decklanding trials of the Seafire 46 and 47 in *Pretoria Castle,* and happened to be joined by Buster Hallett who was doing a few in the Seafire XV at the time. When I visited the Fifth Sea Lord on 8 December 1944 to ask whether we could take some Mark XVs with us to the Pacific, they were still not ready.

Thus, when we eventually received our first three XVs in Australia in November 1945, we were very proud of them. Three weeks afterwards, on 27 November, we were paid a visit at Schofields by the Australian Naval C-in-C. Not suspecting the Seafire's XV's potential dangers, we arranged a small flying display.

After an impressive balbo of all 36 Seafires, it was **S/Lt Norton's** turn. He was to do a solo demonstration in one of our Seafire XVs. In his display he was to carry out a slow roll on take-off followed by an immediate loop, to a fast run over the airfield at about 425 knots, then another loop and a roll-off-the-top to finish with. Like all Aussies, he was an experienced Spitfire pilot and knew exactly what he was doing. Lieutenant George Willcocks, DSC, RNVR, writing from Australia in 1984 writes of this incident:

> *"He went in just beyond the Wardroom. The aircraft broke up in mid-air and the starboard wing fell off. The engine travelled on for a mile with its prop still spinning, and set fire to some trees off the airfield. It was a tragedy, for Norton's parents were watching and so was his fiancée. He was due to marry next day with a large squadron party laid on."*

The Board of Enquiry found that it was "Pilot Error". They said he was exceeding the limit of 425 knots IAS.

I was not at all happy about this, neither was Nat Gould or Ian Lowden of the Aussie's Flight. Norton would not have done anything so stupid. My own experiments for the next two days revealed that both of our remaining Seafire XVs became left-wing-low at speeds above 400 knots. By 450 knots, all the aircraft had become so left-wing-low that strong aileron forces were required to keep laterally level. I looked across to the starboard wing, the one which had first come off Norton's aircraft, and saw that the up-going aileron angle was much greater than usual, yet the down-going aileron on the port wing had barely moved at all. It was obvious that the control wires were stretching and that the aileron on the starboard wing was 'upfloating' a great deal. I thought that this might be a very dangerous state of affairs at high IAS, as I had not seen it happen

before. Application of even harder aileron to raise the left wing had no effect and, if the speed was increased further in the dive, it showed signs of having the reverse effect. (The wing itself was twisting, the aileron acting as a tab, reversing the lift. No wonder Norton's wing came off, for the aileron would eventually tear off due to excessive 'upfloat' and this, and wing twist, would precipitate wing spar failure.)

I reported my findings to the ship's Senior Engineer Officer and he grounded all our new Seafires and those in the delivery pipeline at Brisbane. I had explained that I had thought that the large aileron forces to hold the right wing down were required at these very high speeds to offset the anti-torque twist built-in to the Griffon-powered version of the Spitfire. As 425 knots — the limit set in the Pilot's Notes — could easily be exceeded even in a shallow dive, we should be losing wings and pilots all the time in 801, unless something was done to improve things. The technical fault — well-known to aircraft designers — is correctly described as 'aileron reversal'.

Within two months, a party of aircraft technicians from the UK arrived. They stripped off the skin behind the main spar on the top surface of each wing root and replaced it with skin of a far thicker gauge. To be able to remedy this defect so quickly, it was obvious that the manufacturers had recently struck the snag themselves — 'aileron reversal' — but hoped that we in 801 would manage until they could get round to the remedy in Australia. After the modifications, we had no further trouble with wing twist, even when we exceeded 425 knots 'accidentally' by a further 50 knots or so.

The second lethal shortcoming of the Seafire XV was a supercharger fault. The 'self-change' mechanism from one blower speed to the higher speed was similar in action to the automatic clutch and gearbox of a car. When changing blower speeds on the climb, the blower speed of about 15,000 rpm had to be speeded up to about 20,000 rpm in a matter of seconds. If the clutch gripped too tightly it would strip the gears. If it gripped too loosely it would burn out. In both failures the engine would lose its supercharger and it would stop, catch fire, misfire or overheat. The only method of avoiding such failures was to engage the gear manually at reduced rpm. This was not always possible, neither did it always work, for there were several fatal engine failures.

There was a third shortcoming, much more involved and difficult for us to understand. One of the most welcome characteristics of the Seafire III had been its rapid acceleration, allowing it to take-off from the flight deck in 180-200 feet without the aid of a catapult for which it had been unnecessarily adapted. When the Australians in 801 took their first, halting, steps in our carrier training programme in January 1946, they tried to practice short take-offs — as on a flight deck — at Schofields. One just missed our flight huts as it swooped off the runway in a semi-stalled turn to the right, totally out of control. Pilots found that the extra 1000 horsepower of the Griffon VI, turning the other way to a Merlin, gave far more torque reaction. This was because of several factors, not just because of the increased engine power. First, the propeller was twisting the slipstream far more than in the Merlin engined version, for it had to absorb nearly twice the power in a propeller of the same diameter and at the same rpm. Second, the 'three point' unstick incidence of the Seafire XV was greater and nearer the stall, owing to the longer stroke oleos. Third, the aircraft weighed a ton-and-a-half more than the Seafire III, and therefore needed to unstick at a higher airspeed than the Seafire III. The static torque from the engine attempting to turn the aircraft in the opposite direction to the propeller was not the main reason for the trouble at take-off, for the torque on its own could be