

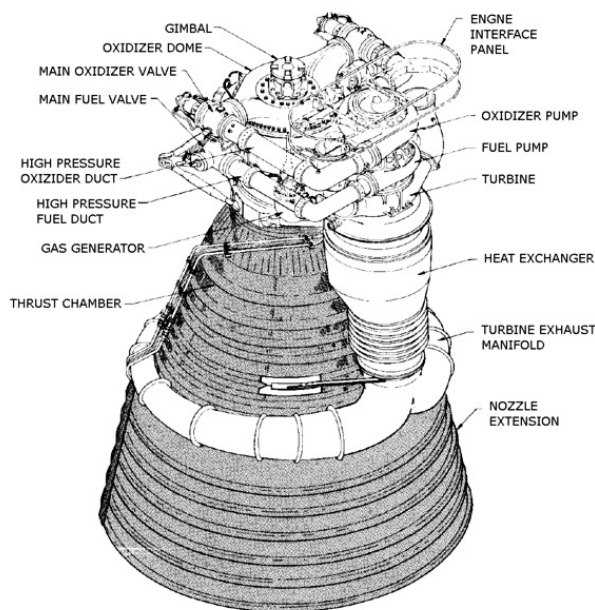
## Featured Engine No. 50

### The Saturn Five Engines

*I'd decided some time ago to "do something special" for FE50, quietly hoping that one of you would send me something spectacular. Alas, nothing at all has appeared, so I am upon my own resources.*

*Got to be something big though .... Ed*

The first stage engine was built by The Boeing Company at the Michoud Assembly Facility, New Orleans. Most of the vehicle's mass at launch was over 2,000 tonnes of propellant, in this case RP-1 rocket fuel and liquid oxygen oxidizer. It was 138' (42 m) tall, 33' (10 m) in diameter, and provided over 34 meganewtons (7,600,000 lb<sub>f</sub>) of thrust to get the vehicle through the first 200,000 feet (61 km) of ascent. The first stage had a dry weight of about 288,000 pounds (131 tonnes) and fully fueled at launch had a total weight of 5,000,000 pounds (230 tonnes). The five F-1 engines were arranged in a cross pattern. The centre engine was fixed, but the four outer engines could be hydraulically turned ("gimballed") to control the angle of the rocket in flight.



Ignition occurred about 7 seconds before liftoff and during launch, the S-IC fired its engines for 168 seconds. At engine cutoff, the vehicle was at an altitude of about 38 miles (61 km), was about 58 miles (93 km) downrange and was moving about 5,250mph (2,300 m/s). In flight, the centre engine was turned off about 26 seconds earlier than the outboard engines to limit acceleration.

The second stage engine was built by North American Aviation at Seal Beach, California. Using liquid hydrogen and liquid oxygen, it had five J-2 engines in a similar arrangement to the S-IC, also using the outer engines for control. The S-II was 81' 7" (24.87 m) tall with a diameter of 33' (10 m), identical to the S-IC, and thus was the largest cryogenic stage ever built at the time. The S-II had a

dry weight of about 80,000 pounds (36 tonnes) and fully fueled, weighed 1,060,000 pounds (480 tonnes). The second stage accelerated the Saturn V through the upper atmosphere with 5.1 meganewtons (1,100,000 lbf) of thrust (in vacuum). When loaded, significantly more than 90 percent of the mass of the stage was propellant; however, the ultra-lightweight design had led to two failures in structural testing. Instead of having an intertank structure to separate the two fuel tanks as was done in the stage one section. The second stage used a common bulkhead that was constructed from both the top of the liquid oxygen tank and bottom of the liquid hydrogen tank. It consisted of two aluminum sheets separated by a honeycomb structure made of phenolic resin. This bulkhead had to insulate against the 70 °C (158 °F) temperature difference between the two tanks. The use of a common bulkhead saved 3.6 tonnes (7,900 lb). Like the first stage, the second stage vehicle was transported by sea.

The third stage engine was built by Douglas Aircraft at Huntington Beach, California. It's single J-2 engine used the same fuel as the second stage. The S-IVB used a common bulkhead to insulate the two tanks. It was 58' 7 " (17.86 m) tall with a diameter of 21' 8" (6.604 m) and was also designed with high mass efficiency, though not quite as aggressively as the second stage! The S-IVB fully fueled, weighed about 262,000 pounds (119 tonnes).

The S-IVB-500 model used on the Saturn V differed from the S-IVB-200 used as the second stage of the Saturn IB, in that the engine was restartable

once per mission. This was necessary as the stage would be used twice during a lunar mission: first in a 2.5 min burn for the orbit insertion after second stage cutoff, and later for the trans-lunar injection (TLI) burn, lasting about 6 min. It was chosen on the sound basis that – alone of all rocket engines then available – it had never failed to light!



**Back to stationarv engines next month!**

## Calendar of Events

**Key. CN = Club Night. CU = Crankup**

April 3<sup>rd</sup>. Sunday. **Club Visit.** Drive yourself trip. Weston Zoyland Pumping Station. In Steam day.

April 9<sup>th</sup> Saturday. **Spring Enstone Sale.**

**NOTE CHANGE OF DATE BELOW!!**

April 10<sup>th</sup> (not 17<sup>th</sup>) Sunday. **CU** at Nunney Catch

April 18<sup>th</sup>. **CN.** *Early because of Easter BH.* Mike Horler. "Michael the country boy."

April 25<sup>th</sup> Easter Monday **Event** at Mells. Contact Robin Lambert 01373 463526 if you want to attend.

May 7<sup>th</sup> E. **The Breamore Countryside Museum.** Fordingbridge, Hampshire, SP6 2DF. Contact Eric Gay 01225 754374.

May 23<sup>rd</sup> . **CN.** Guest speaker John Heron. "**The RAF Harrier in the Cold War**"

June 1<sup>st</sup> Wed. **CU.** D-Day Cranmore station Yard. Bring something military if you can.

June 18/19<sup>th</sup> Wessex Midsummer Vintage Gathering. Our **club rally** at Semington

June 25/26<sup>th</sup>. **Event.** 27<sup>th</sup> **1000 Engine Rally**, Astle Park.

June 25/26<sup>th</sup>. **Event.** Please bring an engine **Cranmore Railway Station.** An in steam day at this popular venue.

June 27<sup>th</sup> . **CN.** Richard Harris. "**Restoring a Bedford TK.**"

July 22-24<sup>th</sup> . **Event.** **Netley Marsh Rally** at Meadowmead Farm, Netley Marsh, SO40 7GY contact Jean White on 023 8086 0313.

July 25<sup>th</sup> **CN.** Crankup at The Court Hotel

July 31<sup>st</sup> Sunday. **Event.** Mini rally at **Haynes Museum**, Sparkford mini - rally Haynes motor museum.

July 29-31<sup>st</sup> **Event.** **The 47<sup>th</sup> Welland Steam Rally**, Woodside Farm WR13 6NG Phone 01531 890 762 for an entry form.

August 22<sup>nd</sup> **CN.** *Early because of bank holiday.* **Photo presentation** by the members. Bring along ten photo's or slides. Prize for best effort.

Sept 10/11<sup>th</sup>. **Event.** Stockbridge Working Weekend. *Please phone Alan Vickery for details 01256 703169*

Sept 18<sup>th</sup> Sunday. **Club Visit.** Coach trip to Kew Bridge Steam Museum.

Sept 26<sup>th</sup> **CN.** Kim Siddom. "Engines at the 1000 Engine Rally"

Oct 8<sup>th</sup>. Sat. **Skittle match.** South Parade Club, Frome.

Oct 15<sup>th</sup> · Sat. **Autumn sortout** at Cranmore Station Yard.

Oct 31<sup>st</sup> **CN.** Selwood preservation club. **Inter club quiz.**

Nov 12<sup>th</sup> Saturday. **Autumn Enstone Sale.**

Nov 28<sup>th</sup>. **CN** Guest speaker Patrick Hassell. "Bristol Before Rolls-Royce"

Dec 4<sup>th</sup> Sunday. Antifreeze **CU** at Nunney Catch.

December **no club night.**

Dec 27<sup>th</sup>. Mince Pie **CU** at The Court Hotel

*All events are listed in good faith. You should always ascertain if an event is taking place before you go. If in doubt, ring Brian Baker on 01749 342671*

### Spring Sortout, Cranmore, 5th March

On a bitterly cold morning with a cold wind that went right through you, saw Oliver and myself arrive at Cranmore about 7-30. There were already three or four sellers in situ, including Robin. As I was selling, Oliver and I set about unloading the trailer and setting out the items for sale.

The site quickly filled up with stalls and the buyers started to arrive. We now had to man the gate and as Eric wasn't selling, he volunteered to be the

first to man to take the money. One buyer asked me if I had a soldering iron as he had spotted a "brass monkey" that needed attention as it was so cold. The buyers kept coming in, and Oliver and I were busy selling. We seemed to be short of people to man the gate. I collected money for a spell to relieve Eric, Jon Ivens then took over from me and Oliver manned the gate for a while, so I could take the punter's money on the stall. It was unbelievably cold and at one time I had to run the car's engine and put on the heater to thaw Oliver out.

The sellers and the buyers came from far and wide, including one very brave motorcyclist from Melksham. The final money we took was only slightly down on last year, so taking into the extreme cold, this was quite an achievement. The sortout ended bit earlier than previous ones due to the cold, with the stalls starting to pack up around 11.00 onwards. To sum up, from the club's point of view, another successful event. In October, we'll need more volunteers to man the gate. With our small committee, we cannot do it all. **Brian Baker.**

### Westonzoyland Steam Pumping Station – TA7 0LS

**Club Visit On Sunday 3<sup>rd</sup> April**

*Directions. From Bridgewater, follow the A372 Langport Road into Westonzoyland village. At the corner shop, turn sharp right and follow the tourist signs via Lake Wall for about a mile, then turn left into Hooper's Lane. In about a quarter of a mile, you will find the Museum entrance on the right.*



### Social news

By Earwig

Three of our senior club members celebrate their birthdays in April. Happy birthday to Graham White, Brian Munt and John Emery. We won't mention Graham's age, but in the year he was born the Battle of el Alamain took place and Cary Grant married Woolworth's heiress Barbara Hutton!

Welcome to new members Mr & Mrs J.C Webb & Mr & Mrs Squires of Bristol Road Whitchurch.

**Chairman's Annual report** (*printed as received*)

By Brian Baker

This is my seventeenth annual report to this club. Last year it was made more difficult than the last sixteen because we operated without a secretary. Most of the secretarial work has been done by me, setting up this years programme, contacting the guest speakers, sending those letters of thanks etc. I do not intend doing this indefinitely, so if no one comes forward to take on this important task I don't know what the future of this club will hold. In the past we have had quite a few of our female members as secretaries, so come on ladies, where are you? I would like to add this post carries an honorarium of £100 per annum. The clubs finances are really sound as you can see from the auditors report; I think we have more in the club accounts now than at any time in the clubs history. This is mainly due to two successful rallies run by Eric and his band of helpers. But don't forget this was due to fine weather for the last two years; if we have a wet rally that could wipe out a large sum of money that we have in the bank. At the last AGM we saw a change of treasurer, Keith Nash took over this very important job from Jackie and he is doing a brilliant job of it. We changed our accountant from one in Frome which was convenient for Jackie, to Keith's accountant in Castle Cary. This accountant also does our annual returns to Company House and the Inland Revenue, as when Arthur stood down I was worried who would carry out these tasks. This was the first full year here at the Court Hotel and we have been made very welcome indeed by Sue the landlady and her staff. The meetings here have by and large been well supported but some have resulted in fewer than normal present, including the last AGM when apart from the committee only 12 of you turned up. Why was this? Perhaps you can enlighten me. The crank-ups at Nunney, Cranmore and here at the Court were well supported, but the biggest disappointment to me was having to cancel the Mince- Pie crank-up. I think the committee will have to look at winter events to see if the dates need changing or deleting from the calendar. Mell's gathering which is run by Robin and his band of helpers put on a splendid display of engines which was oversubscribed and had a waiting list that just shows how popular this event has become. The "Sortouts" continue to grow, both of 2010 were the best yet, they are established now in the vintage calendar and people come from far and wide to attend, long may that continue. The rally as I previously mentioned was a huge success, with plenty of attractions on the field it saw a large number of people attend which resulted in a nice profit for club funds, which means funds to finance another rally this year. This success was due to the hard work put into planning it and running it by Eric and his rally sub-committee, well done all of you. The mini-rally at Haines was another successful event, this time we had a new area to exhibit in front of the

Museum instead of the field at the back. Hopefully we can use this again this year as it was agreed by all who exhibited it was far superior to the field. The annual skittle match and social evening in October was in a new venue, the South Parade Club in Frome. This venue was recommended by Diane Davis who organised the event, arranged the supper, and due to a very successful evenings entertainment has booked it for this year. Diane does sterling work for the club, running the club shop, organising the skittle match and standing in at times running the raffle. From the club Diane, a big thank you. Another person who does a very important job for the club is Jackie, when she stood down as treasurer she said she would still take the membership renewals; this meant a lighter work load for the treasurer. Thank you very much Jackie. The main source of income next to the subscriptions are the raffles, we are extremely lucky to have Carol selling the tickets at the events and meetings throughout the year as she seems to have the knack of extracting money from people, thank you very much Carol. In conclusion I would like to thank the committee of 2010 for their dedication and hard work, it was a pleasure working with you and I looked forward to working with you all this year too but sadly a lot of you resigned. I would like to thank the committee and the fifty odd members who attended this AGM.

**You never know ...**

Anon

Well, I used to be a milkman when I was first out of school and did various rounds in North Somerset over a period of about ten years. This was in the 1960's when old iron wasn't worth a lot, a TT winner could be found for thirty bob and First War farm engines were still doing what they were meant to. They might be held together with chewing gum and paper clips, but they could still be persuaded to fire up when needed and run all day on a drop of red Diesel and a squirt of petrol.

I went to the Wessex show at Semington last year, it being more or less on my doorstep, and blow me if there wasn't a double line of these old engines chuffing away in the sunshine! Well, that was it. I had to get myself one and despite the missus shaking her head and looking long faced at me, I soon got hold of Stationary Engine Magazine. I was pretty well floored by the prices, but I really wanted one that "hunted". I since learned that it's the interrupted ignition or valve lifter that does that!

I remembered that there was an engine behind a cottage on my last round. It ran a sawbench and the old boy used it for ripping firewood for his stove. It had been 30 years before but I remembered where it was and dropped in. Peered round the back – still there! The old boy had long gone to his rest, but his missus was still alive, remembered me after a minute and – after tea & bickies, dickering long & hard, I came away with my air cooled Amanco!