



10...9...8...

the voice of UKRA

volume 5
issue 2

UKRA 2001

A compendium of personal
reports

Postcard from Kourou

Andy Moore's experiences in
French Guiana

The Soviet Manned Lunar Programme

Part 1 of a new series



Editorial

by Pete & Angela Waddington

Welcome to the latest issue of 10...9...8... The summer season was well and truly kicked off with a rather wet & windy UKRA 2001 at the beginning of June - read all about it in this issue.

A few weeks after UKRA, the East Anglian Rocketry Society hosted their Big Ears launch, featuring some glorious weather, awesome rockets, a friendly atmosphere and what was probably one of the most impressive flights ever seen in the UK - Roy Trecziak-Hicks' level 3 V2. We hope to have full details of this vehicle in the next issue.

Keep the articles coming, we look forward to hearing from you. Last issue's competition is still open - was it too difficult for you?

Thanks to Darren Longhorn for compiling this issue virtually solo...for some reason all mail was delivered direct to Darren and not to us. Technology eh - ain't it wonderful?

The next big event will be IRW at Largs - look forward to seeing you there.

Pete & Angela

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Cover Photo: Flyers line up, UKRA 2001, Sunday morning. *(Photo courtesy Bob Arnott)*

Contents Photo: Roy Trecziak-Hicks' L3 attempt. *(Photo courtesy Bob Arnott)*

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UKRA 2001 Launch reports

My Rockets @ UKRA2001

by *Bob Arnott*



As usual, the weather was a prominent feature, especially Saturday

Writing a comprehensive report for an event the size of UKRA 2001 is a daunting task. So daunting in fact that, this year, no one was prepared to take it on! But, for the key UKRA launch event of the year, we simply had to have a report of some kind, so what follows is a compilation of various personal reports.

I'd already prepped my *Electric Blue* 4" rocket on Friday night in anticipation for flying it on Saturday if I had the chance. I did have a couple of chances first and last thing, but decided to wait for the alleged better weather on the Sunday. Come Saturday night I started to prep *Jabiru*, which was finished back in 1999 but just never flown, as I didn't have any electronics.

So I woke up on Sunday and looked out of the tent and to my great disappointment the weather was crap. There was low grey cloud and the wind was worthy of a windsurfing competition, not the type of weather you want to be flying high in. By the time I got back into the marquee and finished by cooked breakie a lot more flyers had turned up and the mood wasn't good as people started to scrub their big launches for the day.



Flier's photo, Sunday morning

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Being the eternal optimist that I am, I finished prepping *Jabiru* and loaded all the black powder ejection charges and put the rocket together. If I got to fly it, it would be the first flight of the rocket, the first flight of my new R-DAS and the first time I'd flown an I435. I was thinking that there was too many firsts in the equation and that something would go wrong.

When we eventually got to the range head I started to do the announcers job but as the weather was very slowly improving I managed to unload that job onto Mark Turner and setup *Electric Blue* using an ignitor dipped in Igniterman pyrogen to ensure ignition. The moment I pressed the button the rocket was off the rail like it had a rod hot poker up it's arse! The size of the flame was well impressive as was the vivid blue colour and the noise.

I was worried that the I357 would be like the H238 and not really worth bothering about unless you need a very quick dose of power. I couldn't have been more wrong and this wee motor is definitely on my to fly again list. After recovering *Electric Blue* and getting back to the flight line I discovered that there was a high altitude wind above the clouds coming as there were a few rockets that were simmed to go into the cloud base *Jabiru* being one of them. I quickly ran out to the pads with it and did the final prep of the electronics on the pad. I would definitely recommend that you fit switches to your electronics as twisting two wires together isn't the best solution...

Jeremy Tomes was also setting up a 3" rocket on the pads with an I435 in it so we decided to have a drag race as both rockets were of a similar size. When the count down was given we both pressed our buttons and shortly after *Jabiru* screamed into the sky with a tongue of blue flame licking out it rear end. Jeremy didn't have so much luck, the force of the motor ripped the rear launch lug off the rocket and knocked the pad over. This meant that his rocket went spearing over the heads of the assembled onlookers, who all turned round to watch it.

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It was at this point I realised that flying a white rocket with grey skies wasn't a good idea as my rocket disappeared into the cloud base, how was I ever going to spot it on the way down. Luckily young Tom "40/20 vision" Hicks was on hand and spotted it straight away on it's drogue shoot and Roy quickly pointed it out to me. It dropped to near the 400 feet programmed in for the main to deploy at and the main duly deployed.

I was ecstatic, the adrenaline was pumping through the veins. A year and three months since I spacked my AltAcc at the March Thrust launch I was finally back on track with dual deployment and bigger motors. We had to walk slightly further to recover *Jabiru* as it landed in a field over the road just outside the site. There was no damage and the chute was easily visible on top of the crops. The R-DAS was merrily beeping out 3,162 feet, which was quite a lot lower than predicted, but the rocket didn't go straight up. On later download it was found the actual altitude was 3,264 feet, which is slightly better, but still well short of the simulation.

All in all it was a cracking weekend with some fantastic flights. It's totally made my sit up and realise why I like flying rockets as there aren't many other things you can do that give you that buzz and warm glow of satisfaction when it all works as intended.

Why go to England to fly rockets?

by Björn Augustsson

It had been a long time since I got to launch anything big, I had vacation coming up, Ryanair had an intro price on their new route from Göteborg to London Stansted. Pete (Davy) volunteered to sponsor my visitor's HSE license. I had two level-2-capable rockets ready to go. I had to come. I managed to talk my friend Vilhelm Bergman into coming along, and off we went.

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Traveling with rockets

We were a bit unsure of whether traveling with the rockets would turn out to be a problem or not, but we built (the night before, in grand rocketeer tradition) some luggage out of half-meter-diameter steel ventilation tubing and boards. It can't be opened (non-destructively at least; I know what airline personnel are capable of) without a screwdriver, and we reckoned that would improve the chances of us being present when and if it'd get opened somewhere, and in that case we could (hopefully) explain ourselves before they blow the whole thing up.



Wilhelm with the luggage

Actually traveling with the huge luggage turned out to be a lot easier than we had feared. The trick is to let them know early on that they're "models", "inert", and not dangerous. The check-in guy at Säve airport in Sweden was a bit grumpy about the fact that it didn't fit on their conveyor belt but other than that, everything went fine, even changing trains twice. The biggest travel problem was getting a big enough cab from Sleaford to our B&B. When we did get a properly sized cab, the driver asked what was in the container, so I told him "rockets", and he went "Oh, so you're off to Pete's then?" "Yes, we are, do you know him?" "Yeah. He's a nutter."

Thursday

I had cleverly left Pete's phone number in Sweden and the directory information people didn't know anything about Pete so getting hold of him became a priority the next day. We got a cab and went over there. Pete wasn't in,

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but we met his parents, and they were very friendly and showed us some rocketry videos and gave us tea, and told us how to go sight-seeing in Heckington (church, windmill, pub, in roughly that order) so we did that for a while. When Pete and Chris Eilbeck showed up, other people started pouring in.

Spent the rest of the day talking about rockets, and getting the name -> face mapping reasonably right.

Day 1, Friday

Seeing as the weather sucked pretty much all day, a lot of time was spent in the tent, talking and sanding. I think about five rockets flew total on the Friday. I did fly one rocket, a fully glassed (well, except the nose cone) LOC Onyx on an H128-S for a nice takeoff and a loud spack. Right after that came a fat blue rocket that looked like a LOC Mini-Magg on some kind of hybrid (Steve Woolhead's on a Hypertek - Ed), which also came in ballistic. The statistics were going down the drain in a hurry.



Mini-Magg

After some looking we found the Onyx sitting in a potato field, and after wrestling the nose cone out of the ground, I was happy to see that the damage wasn't nearly as bad as I had thought. The casing was about two or three meters away from the rocket. It had popped through the Kaplow clips and out of the rocket as it compressed when it hit the dirt. The



Wilhelm examines the Onyx

sticker was still on the delay well, but the powder was burnt. Either the cone was on too tight or the chute too tight in the tube. I'm guessing the latter. An Onyx gets pretty short when you get the 29/180 casing in there. Either way Ben "Kaboom" Jarvis taunted me about my wimpy ejection charge afterwards.

Day 2, Saturday

The weather kept being British, but the wind died down to reasonable speeds every now and then and some good flying got done. After some discussion over who could do the certifying (I'm in Tripoli, and Ben Jarvis, the UK prefect, had lapsed his membership, but Charles Simpson, being on TAP, could do it. Good thing I had already done the written test!), I prepped the first of the level 2 candidates. I had one PML Tethys with a payload section, and *Stolpskott*, a flight-converted Swedish marker pole. There's one every fifty meters on either side of most Swedish roads, and they serve pretty much the same function as cat's eyes, except that they work better if there's snow. They're basically a white tube and a black nose cone with some reflexes on it. The lexan fins and 38mm motor mount on mine were, uh, consumer upgrades.

I chose the marker pole, because I liked the idea to certify on an oddroc. Plus, it's pretty damn near bulletproof. I just needed a parachute for it, so I bought a very nice skyangle 88 from Pete.

Sure enough, it got about 4300 feet (simulated) on a J350-L, hit about the only blue

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patch in the sky the whole day, recovered nicely, and wasn't even hard to find afterwards. Level 2! I wore that silly smile all day.

Kev Bullet was basically a big 3FNC that took off on seven Is, all Blue Thunder. It made a very good flame and an even better noise, it screamed for a short time, just as it took off. Apparently nobody really knows why it does that. Magic.

Vilhelm spent most of the day tracking rockets as they came down in the fields. With the kind of wind we had and the fairly high crops, that became a priority.



Stolpskott

Day 3, Sunday

On the last day the weather was supposed to be better, but apparently the rocket and weather gods hadn't been told. I prepped a I435-M for the tethys, since I thought it'd be a shame to bring it that far and not fly it. The I435 is one of my favorite motors, and besides it was the biggest I could use and not end up

above the cloud ceiling. (Supposedly it went to about 2300 feet, according to rocksim, and the clouds were at about 2500, according to Vilhelm, who is into weather.)

Pete was out of 38/600 casings, but he graciously offered to loan me his personal one, so that sorted itself out nicely.

I borrowed a beeper from Robin and Jeremy Tomes, who had the table next to ours, because I suspected it'd drift a good deal. I borrowed a lot of tape and other small supplies of of them and many others, since I couldn't bring much equipment with me on the plane. Pity that the weather wasn't good enough to fly their gorgeous carbon rocket, I'd liked to see that.

It made a spectacular takeoff, as something went bang just as it left. I was half-expecting not to have a rear closure on the motor when I found it, but it turned out to be OK. I'm guessing it was a small propellant shaving that flew out the nozzle and burned outside, in the flame. Or something. It drifted extremely far on it's chute (same Skyangle 88 that I used in the marker pole the day before), and would have been hard to find if a gentleman hadn't seen it come in, and met us, carrying it, a good mile and a half downwind. He was out there looking for his rocket and I helped him look for it for a couple of hours after that.

The big flight of the day was Hugh Gemmel's *Little Man*, that looks just like a PML ultimate endeavor. I saw it from about a mile out while recovering my Tethys, but it made a lasting impression anyway. It had a K700 and three J570s in it, which made for a respectable cloud of smoke and a nice roar (that reached me almost two seconds later!)

The shock cord broke on it but all the parts had a chute attached to them so the all came down safely. They weren't easy to find though. Vilhelm and a bunch of other people spent a good part of the evening before they found the booster, with all the motor casings.

Another good flight was Pete Waddington's extremely cool Mars Lander on a I211.

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I heard it got a bit damaged, but never saw it. I hope it was OK, (It bent a leg, which Pete says can be replaced - Ed) it was a fine rocket.

As the activities wound down for the day, the weather finally cleared up, and the following day was hot, sunny, and with almost no clouds. We must have been jinxed or something.

Finally, I'd like to thank everybody involved with this launch, which went very well under difficult (weather) conditions. I had a great deal of fun, and I got to see what the regular posters from rec.models.rockets and uk.tech.rocketry look like in real life, as well as get to know a lot of "new" people. And I think I made a new rocketeer out of Vilhelm...

A special thank you must go to Pete's parents, for taking care of us in the beginning, keeping us filled up with tea, and driving us all over the countryside.

Early on Sunday

by **Brian Best**

Emperor Blobbo (*King Blobbo* with extended airframe tube and fully glassed) first flight so used I357T reload with short delay. Nice straight flight but only burned for a few moments then it slowed quickly, hung in the air for a few seconds and deployed the Rocketman chute for a safe landing.

Warlock (3rd flight - did my L2 with this rocket at UKRA2000) J350W -S very straight climb under power then weather-cocked slightly before deploying new Skyangle chute bought the day before off Pete, safe landing and not too far to walk.

I thought the pad organisation was fine and there was little waiting, Charles was the RSO when I flew and he kept things moving nicely. The highlight of both days was the sausage man serving at the launch point - excellent.

UKRA2001 Pete's farm

by Steve Gibbings

This was my first time at Pete's farm and the annual UKRA launch. I had decided about 12 weeks earlier that I would build a new rocket to take along and after some thought I settled on a BSD Sprint XL. I liked the unusual elliptical fins. The size & weight would ensure some nice flights on G motors as well as being able to take a slow burning H motor.

I had to wait about 8 weeks for the delivery from those United States as BSD were snowed under with orders but I thought that 3 weekends and a few evenings would be OK. In the end I had to take a week off work to complete it in time. This was mainly my fault as I had decided part way through construction to build a removable altimeter bay to fly a G-Wiz LC Standard.

As this was to be my first rocket capable of flying on a G or H motor I wanted to ensure the recovery harness was installed appropriately. I finished the remained of construction just in time and left the recovery system to complete when I got to Pete's. Painting was completed Friday night and I got up early to apply the decals before I had to leave for Pete's farm.

When I arrived I assembled the rocket, with the G-Wiz, in the big tent, thanks to Zigi for the cable ties! I picked up my motors from Pete and went up to the range. I sought out Bob "knot aficionado" Arnott to assist with the recovery harness, thanks again Bob. With the rocket prepared I went out to the pads and set-up the rocket.

The sky still looked overcast and there was a little more wind than I would have liked for the first flight. I had decided to fly on an F50-6, which was the recommended first flight motor. I had bought a G40 & G80 for following flights too. There wasn't much out on the pads so after waiting for another launch, my turn was up. Bob did the announcement and started the count down.

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The motor lit very quickly and the rocket took off nice but slowly with the expected weather cocking. There wasn't much altitude but I was really just looking for a successful first flight, something, that as it happened, I wasn't going to get!

The trajectory took the rocket over the range tents and apogee was almost directly over them. As the rocket started to descend I got a that sickening feeling of knowing something was wrong. The ejection charge did finally fire about 3 metres from the ground with the nose pointing down. The delay had seemed more like 10 seconds, which was backed up by Zigi who had been coming up behind the range tents as I had launched. In fact the rocket had spacked about 6 metres from him.

After being given the clear to retrieve the rocket I inspected the remains. My main concern was the G-Wiz. Although the altimeter bay had survived and had protected the G-Wiz, the PP3 battery had not been so lucky. The impact had ruptured the casing and several of the cells had been pushed out. This meant that the G-Wiz had lost power so I couldn't tell what the altitude had been. Oh well!

After talking to several people, it seemed that the fin can could be reused to build an anti-zipper design. Over the following weeks I rebuilt the Sprint and it flew successfully for three flights at EARS (2 x G40 & G80). My first choice of delay was a bit long and prompted Bob to say during the flight "Oh no, not again".

I came back on the Sunday even though I had nothing else to fly. I was a good time to chat with people, watch some great flights and buy lots of parts from Pete! Even though I had just one unsuccessfully flight over the weekend I had a great time. I would encourage all fellow rocketeers to attend the event and I hope next year will be bigger, better and a lot more successful for me personally.

Thanks to the organisers and attendees that made UKRA 2001 one of the best launch meets.

Launch Report

by *Richard & Tony Harwood*

UKRA 2001 was the first launch event a which we flew any high power stuff and in that same weekend I had hoped to have certified UKRA level 1. We arrived on the Saturday morning at Pete's farm and said our hello's to all the usual suspects.

Having just finished building my Aerotech Mirage, Vaughn Brothers BoB, and my level 1 attempt rocket, a BSD Horizon, I was quite eager to lob some rockets.

After spending the best part of the morning prepping in the main marquee along with a few other NSRG members we made our way up to the launch site. To the far left was the model range and immediately behind that was the high power range. Everything was all set up with a great deal of organization, and this made for a very smooth and fast paced event.

By early afternoon flying was well under progress and I decided it was time to launch BoB. I took the rocket for inspection and set it up on Pete Waddington's pad. My heart began to race as the countdown reached 0, and then under the power of an F23 Black-Max motor, the rocket boasted perfectly as straight as an arrow. As the rocket coasted across the sky the chute popped out and the rocket made it's gentle descent back to earth landing about a quarter of a mile away in a field.

I was extremely happy and set off to recover my rocket. Some twenty minutes later I returned in a rather soggy state, but at least I got my rocket back without a scratch :-)

Also during that afternoon we flew a few models including a scratch built rocket mortar type thing called 'eggsocet' (Converted plastic Easter egg with a tailpipe and three fins!).

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After witnessing the awesome 'Kev-Bullet' launch and a few other scary rockets scream off the pads we went back down to the marquee. The highlight of the evening had to be Zigi's night launch rocket with additional pyrotechnics :-). After talking about rockets into the early hours we went to bed.

On Sunday morning we had a cracking breakfast and then started prepping. I decided I would fly my Mirage and attempt my level 1. Under the watchful eye of Darren I assembled my H motor and installed it into the BSD Horizon's 38mm motor mount. Once everything was ready we went up to the launch site and watched a few launches. The weather was not favorable for my level 1 launch and so on the advice of other rocketeers I decided not to go ahead. However I did launch my Mirage. After having the rocket inspected I placed it on Pete Waddington's pad and got ready for launch. As the announcers count reached 0 I hit the launch button and the rocket climbed slowly into the sky under the power of an G35-4W Econojet. The rocket coasted and the chute popped out, It slowly descended and landed fairly close by. Another textbook flight to my name! One other memorable flight was Pete Waddington's Tango Papa Mars Lander on 'T' power. It was one cool flight!

We really enjoyed UKRA 2001 and would both like to thank all those concerned who helped out and organized the event. Next big event is the International Rocket Week at Largs, Scotland. See you there!

Didn't Fly Much

by *Darren J Longhorn*

I took several rockets to fly, but in the end flew only *4R5E FIL73R* (TLP Rapier) and *Tintinique*. Not for the first time, I prepped *Accusatory Finger of Suspicion* at the start of a launch event, and unprepped it at the end. This was because I was nervous about

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the weather. Friday was rainy, Sunday was windy, Saturday was rainy and windy, in fact, for a time, on Saturday, the only thing in danger of flying was the NSRG marquee.

I flew *4R5E F1L73R* twice, once on a single use E and again on an 24mm RMS F. Typically, the RMS was kicked out at apogee. To cheer myself up I immediately bought a new casing. The next day Damian Burrin, found my lost casing! So, now I have two :-)



4R5E F1L73R

The intention was to fly *Tintinique* on a G104 (The only motor I've had success with, anyone remember the G80 at IRW?) for the last time, and then risk the wrath of the rocket gods with an H238. In the end I only used the G104, because I didn't want to risk flying on an H238 for the first time in a stiff breeze.

Before the event I had been worried that it might not live up to previous years, due to the move from Garlands. In the end it was different, but on balance better. As a flying site Pete's is superior to Garlands. Not as many facilities on site (bar and food) but this was partially alleviated by the sausage vendor (who supplied more than sausage!), and the proximity of Sleaford. My only niggle was the distance from the main marquee to the

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rangehead. I think the number of flights would have been greater if not for this. Next year it would be great to have the marquee closer to the flying. Perhaps a generator could be used for the electricity supply? All in all, an excellent weekend's flying - despite the weather.

A Half-arsed report

by Shaun Longhorn

UKRA 2001 was one of the best rocketry events I went to this year, despite the miserable weather. I arrived Friday lunchtime and unpacked the gear, finding that there were quite a few people already there. (Mainly the MARS crew) Unfortunately I didn't fly anything that day or the next due to the storms. (Some other people risked it though) On the last day I decided to attend one of John Bonsor's 'Rockets To Go' workshops along with Pete Waddington (NSRG) and built a scratch two staged rocket from a small piece of tubing, a sheet or two of card and some plasticine. (It's amazing what John can make from household items) I flew it later on with my new scratch built rocket *Flare* (on a G104). They both flew fantastically (Note, he doesn't say fantastically well - Ed). Over all I think the event was definitely worth the entry fee. (even if the weather was a bit dodgy)

First NWR meet of the year

by Dave Thomson

Sean was going for his Level 2 certification after successfully completing the exam a few days before. Andy was going for a first attempt at his Level 1. Sean had come up

with some cool Tee shirts with our Logo on. Unfortunately only two had been made as the machine to produce them had broken down. We hope to have more to go around our members by Largs. Myself, my son David and my Dad arrived at the little Chef outside Sleaford on the Saturday morning. Sean had arrived just before us and met us inside. Andy had gone down the night before and was camping out at Pete's.

The weather forecast had not been good and turned out to be almost as forecast. Crap! Windy, wet and overcast most of the time. This did not stop the flying and many launches took place over the weekend. Many of the usual faces and groups had turned out, MARS, NSR, EARS etc. The facilities arranged were good and we had additional smaller marquees set up at the launch site for the RSO and for prepping rockets.

Sean and I began with some 29mm single use G40's just to get something into the air. The drift was considerable and we had to reef the chutes to keep this down. Many rockets drifted well out of sight. Sean finally got his Upscale Estes Thunderhawk up and down in one piece.

I began to prepare the IRIS for a later afternoon flight. This was to be launched on a K550W. The rocket had undergone some modifications over the last week to convert it to CPR and also to beef up the recovery harness. The 24inch-drogue chute was in the lower section and was to be deployed by the Gwhizz at apogee. Two charges facing rearward from the center payload section where used. A backup separation charge was used. This was a long delay charge given from the motor itself. A long delay was chosen as this was simulated to fire after the expected apogee.

The upper section below the nose cone held the main 60inch chute. This was also deployed by the Gwhizz but at 400 feet. Again, two forward facing charges where used. No other redundancy system was used. The recovery harness used 1.5inch flat webbing with triangular quick links and heavy duty D links for chute connections. The upper

nose cone payload was a Video sender unit that had been used a number of times before. The system used was the same as at the UKRA2000 meeting.

The pad had to be set up beyond the HPR pad to a special area for K class and above. The video system was checked ok and radar clearance was given for an expected apogee above cloud level. The launch countdown commenced and the rocket accelerated quickly off the pad. K550's are a cool motor!!

The TV screen showed the rocket accelerating up at a rapid rate and it began to weathercock near apogee. The drogue was seen to be deployed as it was still ascending and not at or after apogee. The pictures validated that the sections where still connected and that the drogue was still connected. Both sections tumbled around rapidly during the initial decent. It seemed quite a while before we saw the rocket appear out of the cloud base. It tumbled further to what seemed a very low 400 feet AGL before the main was deployed. The rocket gently came down a few hundred feet away and was recovered intact with no damage except for a broken drogue chute line.

The altimeter reported 3188 feet. This was way lower than the 4500 feet simulated. Main reasons for this could be weather, yet the large delta clipper seemed to go higher than reported back at the IRW000 event. Could it be that the system is not reporting the correct altitude? Maybe to verify by ground base line observations could verify the data.

Andy Issott had his Blank Brant ready to fly for his level 1 certification attempt. The rocket was very nicely finished. The countdown ended and the button was pushed. Puff!! Nothing. This happened at least three times before Andy got the bird off the ground. The rocket flew high and straight. Recovery was just above cloud level. We could hear the charges go and it was not long before the rocket appeared fully in-tacked below the chute. Level 1 achieved. Well done Andy!

Myself, David (my son) and my Dad stayed at a local Travel lodge overnight which had a great little Chef next door. We woke up next morning to the weather being no better than the day before. We had breakfast and made our way to Pete's Farm.

Sean began prepping his upscale optima for his level 2 flight. I transferred the Video sender unit and camera into the nose cone of the Optima. Sean was flying on a J350W with medium delay. We managed to persuade Pete to let us use Sean's van to get all the equipment up to the launch site. The previous day we had a lot of trekking up and down the long track to the lunch site from the farm. We moved the pad from the day before onto the closer HPR clearing and loaded up Sean's onto the rail.



Shaun and Optima The aftermath

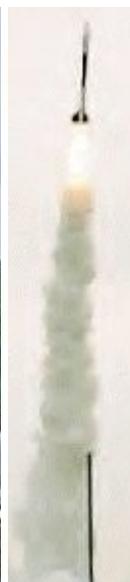
The camera was armed and Sean was given the all clear. The rocket lifted majestically off the pad to a decent altitude. The video transmission was good and unbroken. But all was not well !! The delay was way too long and the rocket was coming down at a fair speed before the ejection charge went. The nose cone came off but the chute stayed in the body. It appeared as if the air pressure created during the decent kept in the chute. The rocket came in hard and fast into the adjacent field and the camera stopped transmitting.

The remains were scattered over a wide area. Not much appeared to be left intact. After further inspection all fins, motor mount, bulkheads, couplers, harness etc were undamaged and could be recovered due to the bolt together nature of the design. The nose cone was damaged but repairable and the camera and sender unit had only minor cosmetic damage. The chute had been cut by the impact. Two new body tube lengths and the rocket could be back together quite quickly. (And it was, Sean flew it Big EARS, a few weeks later - Ed) Sean was not too pleased! level 2 was not to be this day.

I had prepped my old camera rocket to fly on a J570W. The camera was loaded and Andy supplied one of his homemade trackers to be put in the nose cone. The rocket was then put onto the rail. The rocket accelerated VERY quickly off the pad and disappeared well into the higher cloud. That J570 really does kick but!! We could hear the ejection charge go and it was a while before it was seen drifting well down range. Andy and myself began walking to retrieve the rocket using Andy's receiver. We spent what seemed like many hours walking through fields and coming across other rocket nuts looking for their rockets too. Andy tracked down ours while I searched around for some body else's.



Iris setup



Launch

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By the time we had got back Sean had his smaller Thunderhawk ready to fly on a G35J. Sean's flight went well but managed to land on one of the few buildings near by. Myself Andy, Sean and a guy from Sweden (forgot his name (It was Wilhelm - Ed)) spent the next few hours trying to get it down off a 25-foot barn roof. We tried a ladder in many positions. A part filled Coke bottle on a piece of string and thick pieces of rope with big knots on the end! In the end an accurately thrown Old Horse shoe tied onto a thin piece of string thrown by me managed to hook over the body and drag the rocket over the edge. The rocket was finally recovered with some minor damage.

Photo Credits

Thanks to Björn Augustsson, Andrew Bevan, Adrian Hurt, Mark Perman, SHAX, & Dave Thomson for allowing us to use their photos to illustrate this article.

Flight Statistics

Here's how the total motor usage breaks down by motor size.

Total motors = 182, breakdown:													
½A	A	B	C	D	E	F	G	H	I	J	K	L	M
1	7	9	45	38	9	9	19	8	23	12	2	0	0

Here's how that motor usage breaks down into flights and power.

Totals for UKRA 2001			
	Flights	Total Ns	Avg Ns
Friday late p.m.	4	968.0	242.0
Saturday a.m.	15	2371.5	158.1
Saturday early p.m.	30	3142.0	104.7
Saturday late p.m.	31	7738.2	249.6
Sunday	71	15030.3	211.7
Totals	151	29250.0	193.7

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Comparing with last years' figures that although the number of flights is down, the average power per launch is up.

Totals for UKRA 2000			
	Flights	Total Ns	Avg Ns
Friday late p.m.	16	1009.9	63.1
Saturday a.m.	19	216.8	11.4
Saturday p.m.	66	6678.2	101.2
Sunday a.m.	33	4975.2	150.8
Sunday p.m.	33	12271.8	371.9
Totals	167	25151.8	150.6

There isn't space in the newsletter for the full details of all the individual flight statistics, but they can be found on the UKRA website www.ukra.org.uk.

UKRA News

Council Meeting 13/05/01

Location

Pete's Farm, Heckington

Attendees

Charles Simpson, Pete Davy, Hugh Gemmel, Bob Arnott, Mike Crewe, Michael Williams, Mark Turner, Malcolm Ingram, Steve Randall (minutes), Darren Longhorn, Jim MacFarlane, Richard Osborne

Agenda

1. Apologies
2. Minutes of the SGM
3. Minutes of the last Council Meeting
4. UKRA 2001

1. UKRA 2001 on UKRA website
2. Letter to the membership
3. DVNM
4. A.O.B.

- Investigate the possibility of members using Direct Debit or Standing orders as a payment method. It was agreed that there was no immediate rush for this action to be cleared as it would only be needed toward the end of the year when renewals were due.

Apologies

Apologies were received from John Bonsor and Ziggy Kklynoski.

The minutes were unanimously accepted with the changes requested by Malcolm.

Minutes of the SGM (07/04/01)

The minutes of the SGM were unanimously accepted.

UKRA 2001 readiness

Jim agreed to procure power distribution board for UKRA 2001. It was agreed to site the registration and food desks together to ease the management of money. It was agreed that separate, easily distinguishable day and weekend passes would be produced. It was agreed that only a single additional port-a-loo was required and that this would be sited next to the flying area. Pete to discuss the viability of a Rocket to Go workshop with John Bonsor. It was agreed to order a further 10 Tables. Chas reported that he had agreed with Bruce Lee to link to the UKRA web site from the Tripoli site. It was agreed that members who were RSO would be asked to help fill the free slots in the RSO roster as they arrived. Jim to produce a launch controller for the 6 model pads. Mike W to organise a group photo at the event and to gather peoples photos after the event. Darren to place a notice on the web site asking fliers to ensure they have enough wire on their launch controllers. Pad owners will be asked if others can borrow their pad. It was agreed to have two RSOs at the high power area. The desk RSO would be responsible for checking flight card details and checking the rocket over. The pad RSO would control the allocation of pads and launch keys. The model pads would be controlled by a single RSO. All radio equipment (bar mobile phones) needs to be registered at check in.

Minutes of the last council meeting (07/04/01)

Malcolm Ingram asked for two changes:

- That he had communicated his intention to send a letter to the BMFA to the chairman.
- That he had apologised for his actions at the meeting.

The outstanding actions points were reviewed and discussed:

- It was agreed that Mike Crewe would keep the master copy of the constitution documents and that he would be the only person to do the updates.
- We are still awaiting a response from Tripoli regarding cross certification.
- Malcolm reported on the different types of lottery money available – education, community, safety. UKRA could bid for levels of funding: Big bid – the possibility of a national flying centre was discussed. There was some concern over the level of commitment needed to make this sort of bid successful. Small bid – this was recognised as more likely to succeed. Malcolm agreed to write an article for the newsletter calling for ideas for small bid projects.
- After recent discussion of council members that did not attend council meetings it was decided to publish attendance in 10,9,8. It was agreed that the list of names given in the minutes currently published were sufficient and that an attendance score card was not needed (as being too divisive). A vote was taken to this effect: 10 for, 1 abstention, 1 against.

UKRA 2001 Website

This was discuss the adding of UKRA 2001 specific information to teh UKRA website. It was agreed that this had already been done.

Letter to membership

It was agreed that Charles should rewrite this, removing references to enclosed documents. The letter to be sent out with 10,9,8. Malcolm raised some concerns over disciplinary procedures. These concerns are to be addressed.

DVNM

This will be held at Charles' school on Sunday 8th July. (Subsequently cancelled - Ed)

AOB

Malcom Ingram raised a point about a published approved motor list (as referred to in UKRA documentation). There was much discussion over the need for a list, the difficulty in keeping up-to-date and the situation with personal imports. It was agreed to give the matter some thought and discuss again at the next council meeting.

Competition Results

No correct entries were received for last weeks competition, so we're going to let it run for a while longer. So go back and take another look at last weeks competition. Just in case you've lost the last issue, or don't have it, you can find it online at www.ukra.org.uk/newsletter/index.shtml.

All you need to do is take a guess at the identities of the rockets, and that might be a bit easier if you look at teh colour pictures on the website. Send your answers to competition@ukra.org.uk The prize is a mystery Quest rocket kit.

10...9...8...

Project "Nike J"

by Paul Timoney

UKRA #1134

This rocket was thought of months before the IRW 1999. To say the least I'm glad I didn't attempt to build it before the IRW. There would of been a lot of time, money and propellant wasted. My original idea was to launch this rocket on a K550 RMS motor. I also had ideas on installing an onboard camera system. When I went to the IRW I was in for a big shock! The construction methods used in the HPR rockets that I saw there were far superior to mine. To be honest I'm glad that I didn't bother to build my "H" project never mind the "K" rocket. After a lot of looking around at other peoples rockets (particularly on Sunday as it rained all day) I was back to the drawing board after the IRW.

Design

I made some changes to the specification of the rocket. It was to fly on the more economical J350 motor and it didn't have to carry a camera. It was to be flown on a "H" or "I" motor as a test flight and to get my Level 1 cert., It would the be flown on a J350 to gain my Level 2 cert. The design was to be very basic, a LOC nose cone was to be used along with 2 LOC 4" tubes. I was to use to use 1/4" ply for the fins. The rocket was to carry no electronics. It would have a 38mm motor mount. This was to be a low cost project, hence the use of card tubes (not phenolic) and the fact that I would rely on a motor ejection for motor recovery. I gained a lot of practical HPR rocket construction methods through the building of my LOC IV and my Odyssey rocket. I showed the design to John Bonsor, he approved it.

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Construction

It was now time to order the parts from Rockets & Things, and to pay up. Meanwhile I went to my local model shop to buy the ply wood. While I waited for the other parts to arrive I cut out the fins and put a double wedge airfoil on them. The fins also received a few coats of polyester resin. When the parts arrived I could hardly wait to start, however I persuaded myself to hold on until the weekend so that I could confine myself to the loft for a two day non-stop building session.



The parts

Firstly I test fitted all of the parts, which went fine. I consulted with my working drawing and cut the 38mm MMT to the correct length. I then drilled the forward centring ring to accept an eye bolt; for recovery purposes. I also drilled the aft. centring ring to accept the BAR motor retainer. I inserted the tee nuts as per the instructions and epoxied them in with 5 min epoxy. I then epoxied on all of the 3 centring rings on to the 38mm MMT. As I had previously marked out the 38mm MMT to accept 3 fins I went about epoxying them on. As far as I am concerned that is the hard part over, so I rewarded myself with some lunch. After lunch I was straight back in to building the rocket. I bolted the eye bolt in to the forward centring ring and used some epoxy to seal it up. I then began to slide and then epoxy the MMT and fin assembly into the 4" LOC tube (Tony Betts had kindly cut the slots for me). It went in OK, the booster had more or less went together with out a hitch. I made

10...9...8...



MMT & fin assembly

sure that the MMT / fin assembly was secure and proceeded with the filleting of the fin joints and fixment of the launch lugs. The rocket was spray painted, which as usual ended up a shoddy mess. Mark Turner very kindly made me up some decals for the rocket at his work, thanks Mark.

IRW 2000

The IRW was to be the event at where I was to test the Nike J. However the cloud base was at 600' up at Birtlebog Farm so the flight had to be cancelled as did all of the other HPR stuff that day. This was probably a good thing as when Darren Longhorn simmed it on his lap top in the pavilion it was found to be unstable. Mike Linnock (Janet shurley? - ed), Pete Waddington and Darren helped me to clip the fins to size in order to make it stable. Thanks allot guys, I would have made a mess of this task on my own. Mike also determined that my parachute was going to be too small. Based on the results of the sims I decided to buy a I211-10W motor from Pete to try for my Level 1 some time after the IRW.

At Last!

After about 2 months I was at Birtlebog Farm again to attempt my Level 1 cert. The weather was good, a bit chilly but everything went ok, I assembled the motor, Thanks to Bobby Wark for the use of his motor hardware and launch box. Also thanks to Andy Norrie for the use of his launch pad. Andy was also the certifying officer for my flight. The rocket was now equipped with a large 5' home made 'chute. I got the rocket on the pad with help from my



Paul & Nike J

10...9...8...

Dad, Bob and Andy. The tracking beeper was switched on and the igniter installed. I was pretty nervous by now.

We all retreated from the rocket and the count was on, 5-4-3-2-1- LAUNCH. First there was nothing, then a trickle of smoke and the I211 came up to pressure. The rocket was off with a loud roar, I hold my breath until max Q, then gasp and wait for ejection. The rocket reaches apogee, the rocket looked to distant at 2000' then the nose cone ejected and the big 'chute was out, the Nike J looked beautiful as it descended from max altitude. My Dad and myself raced to find it, we found it lying in a distant field. The rocket was Ok, I had pulled off my level 1 certification! I jumped for joy.



The launch

Conclusion

In conclusion the rocket for fulfilled one of it's objectives- to get my level 1, but I now think it is doubtful that I will use it for a level 2 flight. I have recently finished a 54mm rocket that has electronic recovery capabilities, it is also fully fibre glassed. I will probably fly this at Boglob 2002 on a J350 or J570. I would like to thank many people for the help I received on this project, I have done this through out the passage. I would like to thank John Bonsor for the encouragement in rocketry over the last few years, the same also goes to Pete Davy. To see some more colour pictures of the Nike J go to the SARA website: www.sarauk.btinternet.co.uk look under "projects" and then "Nike J".

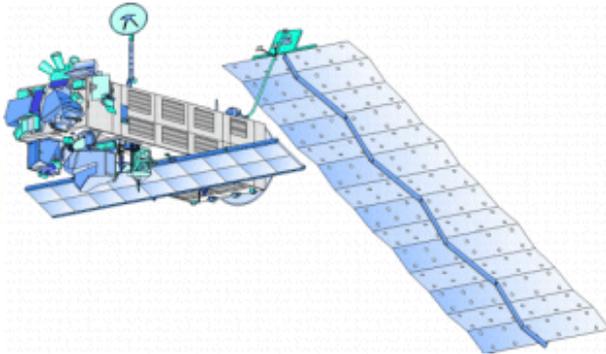
Postcard from Kourou

part 1

by *Andy Moore*

Introduction

I'd joined Vega, a software consulting company, in 1996 and was contracted out to a German company to handle the testing of all 10 instruments on the Envisat satellite. Envisat is a massive remote sensing satellite: massive both in terms of actual size (about 10m long, 8.5 tonnes), and also complexity. This would entail working 3 years in Bristol, and then another two in the Netherlands at ESTEC, the European Space Agency Technical Centre. After five years of test after test after test it was time to prepare for the launch campaign in South America. These are my tales of the launch campaign, and the way that I saw things in a part of the world that very few people visit.



Envisat

Jan 2001

It all started just after Christmas, when the "final" launch date was decided. So we all headed for the ESTEC medical centre for the first of many vaccinations. This visit was for Yellow Fever, Diphtheria/Polio/Tetanus. The Typhoid and Hepatitis was to follow a week later, with more after a month. French Guiana

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really is not the most convenient place for a launch site.

March 2001

Went to the medical centre for the final vaccination before leaving for French Guiana. However, one more jab is still required when I return in October.

May 2001

Week 1

My first ever trip to Paris. I've been to lots of places, including Russia and Canada, but even though I've visited France maybe 50 times I've never been to Paris. I have now. The plane to Cayenne only goes from Paris, and leaves quite early, so the company effectively paid me to visit one of the best cities in the world.

Eight of us, plus luggage all squeeze into 3 taxis to Orly Airport, bound for the 9-hour non-smoking flight to Cayenne. Not a problem for me, but at least one member of the group was starting to get withdrawal symptoms as we left the lounge. To make things worse, Air France supply every seat with a personal ashtray that you're not allowed to use! That's like 7 Eleven - open 24hours, 365 days per year, but they still have locks on the door. We arrive 5 time zones behind, in the early afternoon sun. Whilst taking the first photo (an Antonov cargo plane which we would use a week later), the camera lens instantly steamed up! That's the tropics for you: 31 Celsius, and nearly 100% humidity. As you walk across the car park just after a 10-minute rainstorm you can feel your clothes soak up the moisture from the air.

After an en-masse check in at our hotel (home for the next few months) we all pile into the nearest supermarket. Eight crazy Brits and Germans stocking up on Ti-Punch (55% ABV, and only 20 Francs/litre!). Had an amazing meal in a tin shack in a suburb not to dissimilar to Soweto. Checked out Ti

Punch the proper way: 50% raw cane sugar syrup poured from a jam jar, with 50% Rum, and a squeeze of lime. Definitely recommended! After being fed at Chez Dezou we all head for the nearest bar. Even though this is supposed to be France, all the bars seem to serve either Dutch or Belgian beer, and we've all just been living in Holland for two years! Bank Holiday Tuesday: Don't have many of those in the UK! Still seems to be a local market in town. The market seems to be the best place in the world to buy fresh papayas and chillis, but not much else! If you can find Maracudjas, I certainly recommend them!

Took a quick trip to the launch site to get bearings and check out the facilities. Quite impressive! There's a full scale Ariane 5 standing in the car park by the visitors reception. I thought it was half or three-quarter scale, as it looks so small, but we were assured that it is a full sized Ariane 5 model. Managed to find our new building, even though it is in the middle of nowhere in the jungle! Previously, we had only seen emailed photos of it as a building site, with one of the workmen pulling a baby crocodile out of a swamp by its tail!

First 747 freighter arrived at Cayenne on the Wednesday. This day seemed to be the day where things would start going wrong. A hydraulic leak in the scissor jack prevented the ground crew from removing the SAR antenna and cargo pallets from the aircraft. A seven-truck convoy also came with a spare lorry and also a breakdown truck. BOTH the spare truck and the rescue truck broke down! At least the 7 nominal trucks managed the 1-hour trip to the launch site. These trucks are wide loads, taking up both lanes of a single lane road all the way, so any oncoming traffic has to use the swampy verge, and any traffic behind cannot get past! What a pity!

Oh my god... have you ever had to unload seven 40-ton trucks in 90% humidity? Shade temperature was 31 degrees again. We were drinking bottled water by the crate! At least Arianespace provided about 20 guys to help. This was to continue every day for the next week, and a second 747 was on the

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way, with the Antonov a few days later. People might think that working in the space industry is prestigious, but the reality is somewhat different.

Week 2

What a beautiful weekend: glorious tropical sunshine; hardly a cloud in the sky. Today would be a really relaxing time by the hotel pool, with a few beers and cocktails. The space industry does have its perks after all! Oops! Got a bit sunburnt by that tropical sun... it will hurt tomorrow!

Took a short visit to the zoo on Sunday... saw the anacondas and crocodiles, which French Guiana is famous for, as well as lots of parrots and monkeys. Not really a zoo; more like a collection of sheds on a farm, but with dangerous animals inside, rather than sheep and pigs. The sign "Danger de mort" seemed to be quite common, even on enclosures with simple rusty chain-link fencing, and on one occasion where fencing was totally missing! [For the benefit of non-French speakers, that translates as "Danger of Death!"]. Remember we are on the edge of the Amazon rainforest where the wildlife is a little more interesting than back home.

Crocodiles, venomous snakes and spiders, jaguars and ocelots roam free. So far I've seen a grasshopper the size of an adult's hand; have been joined for dinner by two huge flying beetles; and as of day 8 the mosquito bite count is around 25, and they itch like hell! These blighters can bite through clothes with ease, but a bit of DEET jungle spray definitely helps to keep them at bay.

Back to the topic of language, everything here is French. The locals don't speak English, and the French don't want to! I've hardly needed to speak French since O-Levels, and that was in 1987.

For the first part of the week we took the liberty to unpack the refrigerated ISO containers (the type that you see on the back of lorries and on container ships) for a day. At around 10 Celsius, they are so refreshing inside. They even keep our beer at a nice temperature!

The Hotel was by now full of Americans from Intelsat and Loral all preparing for the Intelsat 901 flight. The scheduled launch date was June 8th, and would fly on an Ariane 4. They were the loudest bunch of Americans you could ever imagine. Once you got to know them, they were all actually quite cool guys.

We checked out the first "nightclub", which just happened to be on the opposite side of the water ski lake from our hotel. Now I would not really use the term nightclub to describe this place. It was more a cross between a gay-bar and an 80's school disco. The music did include YMCA, and plenty of other ridiculous tracks from that era. And as for the clientele, they seemed to be mostly French Foreign Legionnaires, all with regulation haircut and still dressed in their uniforms complete with tassels! This is also where all the Brazilian girls hang out. It is clear that they come here because there are lots of well-paid European men, away from their wives and families for extended periods.

Week 3

By now the heat and humidity just seemed natural. The air-conditioning in the car and hotel room were both switched to minimum, even though both the room and outside temperature was around 24-25 degrees Celsius at night, and 70% humidity. It is surprising how quickly you become accustomed to the weather. But this week was the first where the rains REALLY started. Now this rain actually hurts when you dash the 25 metres from the car in a downpour. Every rainstorm seems to last about 10-15 minutes, and then the sun comes out. In fact the sky can be completely devoid of clouds, with the most beautiful weather imaginable and within 5 minutes there can be a torrential downpour with 3 inches of standing water on the roads! When the sun comes you can see steam evaporating off the roads and rising out of the jungle as if someone was in there with a campfire. This weekend we took a boat trip into the rainforest and trekked up through the jungle to a waterfall. The rains came just as we jumped out of the boat, and because it was so hard even the trees provided no

shelter. I have never seen jungle so thick in my life. There is no way you could venture off the very narrow path by more than two metres without a machete. And judging by the number of spider nests (over one metre across) and fireflies you wouldn't want to! The ground was so swampy that one bit of mud is an inch deep, and the next step you would be up to your knees in swamp water. When we reached the waterfall, everyone was so wet and muddy that most just waded through fully clothed. On the way home, all the cars stank of swamp water, and everybody just dived straight into the shower complete with clothes and shoes! Everything had to be soaked overnight, just to try to get rid of the smell. I hesitate to think what the cleaners thought the next day!

Unfortunately, the purpose for us being in French Guiana was actually do some work. We did after all have one of the biggest satellites ever that needed to be tested and prepared ready for launch. The first few weeks had been spent unpacking 3 freighter aircraft, and setting up approximately 60 workstations and PCs. Still no Internet access; France Telecom would only allow unidirectional ISDN links with Europe, and no links at all to Scottish Telecom!

The satellite was out of its container and the SAR antenna was being mechanically integrated back onto the satellite. Whilst all this Sys Admin hassle was going on I also had to do my real job, which was to prepare for and perform the electrical testing of the SAR antenna to make sure it had actually survived the transport. This Antenna is such a large part of Envisat, both in terms of size and mission that if it failed Envisat would be rendered virtually useless. The Antenna reintegration was the smoothest operation we have ever performed, thanks to the effort that we put into the preparation. We had performed this 5 task times before, and made the most of that experience to ensure that the antenna was reinstalled in only half the expected time and managed to resolve all outstanding problems! Astrium were caught on the hop, but were grateful that the schedule could be brought forwards by about 3 days!

Week 4

Over the weekend the tide tables were favourable for seeing the marine turtles arrive at their nesting sites. We took the 200km journey north to St-Laurent du Maroni, the most northerly town in French Guiana. Firstly, we took lunch in a small restaurant, and this was our first real taste of local cuisine. The main course consisted of a selection of Couchon Bois (Wild boar), Agouty (a kind of rabbit/rat with no ears), Pac (another wild rodent), Tapir and Armadillo! They were all surprisingly tasty. We didn't try crocodile or iguana, but were assured that they were also very good. Saint Laurent is famous mainly for the "camp de transportation" prisons of Papillon fame, and lies on the Maroni River. The river is now the border between French Guiana and Surinam, and is famed more for trafficking of illicit substances, with most boats having both flags, and flying the one most favourable when they dock.

At the mouth of the river, the sandy Atlantic beaches stretch along the Surinami coast to the north, and French Guiana coast to the south, and these are where the turtles come to lay their eggs at high tide. We were very sceptical about seeing any, but just after dusk the first turtle just washed up in the surf about 10 metres away. At first we thought we were seeing things, but sure enough it was the first of many. These turtles are massive: I was expecting them to be maybe 50cm long, but they were easily 1.5m long, and 1 metre wide! The second turtle would be a main spectacle, appearing right at our feet almost. The WWF researchers gave a commentary whilst they took notes and checked the tags. We managed to see about 6 turtles, but those that stayed overnight managed to see about 15 and also saw many hatchlings.

After the turtle viewing expedition, this would prove to be the most boring week you could ever imagine. After finishing that SAR work early, we would go into a phase of mechanical activities, which did not involve our team of electrical engineers. The Payload and Service Modules would go through alignment tests. Secondly the payload and service modules would be

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bolted back together. Like the SAR antenna, they had to be separated from shipment due to the size of the satellite. Did you realise that the container for the payload, was a special low loader design so that it would fit under the bridges in Holland, and that it would only just fit inside the Antonov freighter aircraft! With the SAR antenna installed the container would be too high! The result of the alignment test indicated that the satellite (the size of a bus) had grown by 6mm, and that this would have major implications for launch. Eventually it was tracked down to a design change and was OK, but it made a good topic of discussion in the bar each night!

Meanwhile we were at that point where we had been on every excursion and had nothing to do, and the rain was now persistent. Relief would come from Intelsat and Arianespace, when they invited us to see the Ariane 4/Intelsat 901 preparations close up on the launch pad. We went to the top of the tower and walked down stopping at each major level. We were able to get within about 1 metre of the shroud, the third stage, and the boosters and could walk around the nozzles on the launch table.

The finale would be an invitation to see the launch from a viewing site approximately 4.5km from the launch tower. This was a night launch at 3.45am Saturday June 8th, after an aborted countdown the night before due to high winds at altitude. It's not just UKRA events that have poor weather!

Night launches are definitely the best! They light up the night sky, especially the clouds, and you can follow the rocket like a very bright star moving across the sky for many minutes. Being able to see the booster separation, and ignition of the other stages with the naked eye was amazing. The sound was amazing. I really do recommend to anybody that you see a launch, make sure it is a night launch, and take a good camera.

After the launch we all returned to the hotel, where a champagne reception was being held. OK, it was more of a champagne breakfast, with scrambled eggs and croissants also being laid on, whilst the sun

rose at 6.15am over the adjacent water ski lake! After congratulating the Intelsat engineers and managers we were wishing good luck for the Artemis team, who would be the next launch on an Ariane 5. The tentative launch date for this would be 18:58 on July 12th, which would also be a night launch, but only just. At least it would be at a more sociable hour!

Week 5

This was the halfway stage for our first period in French Guiana. Again it would prove to be a little boring, but again we had been on all but one excursion, and had no real work to do as the mechanical engineers had been bogged down with problems. This was the first time where the spacecraft had been bolted together in a complete flight configuration, with no test harnesses, break-out boxes or cooling pipes. During a rotation of the spacecraft, one of the engineers heard rattling noises coming from deep inside. So all work stopped, and the satellite was split in two again so that somebody could investigate. In the end, an engineer had to climb inside the hollow central tube (about 1m diameter) and slide right to the far end, and listen for noises whilst the spacecraft was rotated. It turned out to be some loose scrap from the riveting process that was trapped in a sealed hollow titanium bracket. It had actually been there all the time, but nobody had ever heard it! So the satellite had to be put back together yet again.

At the end of the week, four of us took an overnight trip deep into the primary rainforest, with a fully qualified guide. Yann, had served in Rwanda and Bosnia with the French Military. We set up camp, eventually managed to get a fire going (remember that this is rainforest, so the wood contains a very high moisture content!), and cooked a local smoked chicken dish. After we took a boat trip up river to see the night wildlife (night is when the animals come out to feed) and stop off at a foreign legionnaires camp. We managed to see caimans, snakes, and at the camp a spider that was even bigger than the one in our camp. This spider was easily the size of a man's hand! The stars were the

most amazing things. You could easily spot Mars, and many constellations in strange places and orientations. Orion would be upside down, the Plough pointing down to Polaris on the horizon! Pluto was in there somewhere, and the Milky Way could be seen arcing almost right overhead.

The return trip gave us an anteater that jumped out of the tree into the river, swam right up next to the boat so close that we could touch it, and then when it got back to the bank, it carefully climbed back up another tree. This was the first time our guide had ever seen an anteater swim, and he would take trips into the rainforest typically twice a week, and he had been here five years! But whilst on the river late at night, with only a few torches, the boat began to fill rapidly with water! The drain plug had fallen out, and there was a leak, and water had come over the back. We were within seconds of sinking, and all had to sit right on the front of the boat to counterbalance the water, whilst the lightest person bailed out the water, as fast as possible. Fortunately the flow of the river made us drift back to the bank, where there were lots of overhanging branches. If the boat had sunk we would have been stuck in a fast flowing river, with no light, probably only accompanied by crocodiles, piranhas and leeches. We really thought we were going to die!

The stay overnight would bring us lots of grasshoppers, which would keep all of us awake most of the night, and frogs with so many different calls. In the morning we were lucky enough to see a complete group of monkeys jumping from tree to tree right at the edge of the camp.

On return to civilisation we were invited to 2 barbeque evenings. One provided by ESA (with beer supplied by Astrium Germany), which was the best evening event we had been to since our arrival, with plenty to eat and drink. The partying went on until late. Astrium UK organised the second event more as a reaction to previous parties. It was clear that ESA and the Germans had outdone them, so tried to organise a big party in retaliation. The party was by

invitation only to control numbers, but when we arrived, there were no glasses left so we couldn't have even have a drink! There were a few small pieces of meat per person from the Barbecue, and when the bar opened after the meal, there was no beer left. Now bearing in mind that at the office one refrigerated lorry container had 150 crates of German beer that needed to be finished. Astrium UK was desperate to show they could organise a function on their own, and didn't want the help of the Germans. But they failed, and it showed.

Week 6

Well the two-week layoff had to come to an end sometime, and we do have that satellite to test. Week 6 would be the last main electrical tests of the complete satellite. They would be long days, and would basically provide the last reference test before the in-orbit operations. This was our last chance.

Week 7

This week was a continuation of the electrical tests, and all the associated paper work. This really is one set of paper work that has to be right. If you get it wrong, there is no going back, and one person could be personally liable for a multi- billion dollar satellite not working properly. You would have to live with that on your mind for life. Whilst the testing was in process, we managed to see one of the Ariane 5 boosters arriving. They are shipped in a huge container, which has a truck at both ends! The boosters are 30m long, so the container must be at least 40m, and 2 lanes wide, and the trucks at each end are a lot larger than a normal lorry. Given that it moves at about 5mph and is fully laden with shock sensitive solid propellant, you would not want to be stuck behind the convoy! The other thing to note is that the roundabouts are all offset or have a lane straight through the middle, so the wideloads can go straight on instead of round.

10...9...8...



Ariane 5 Launch

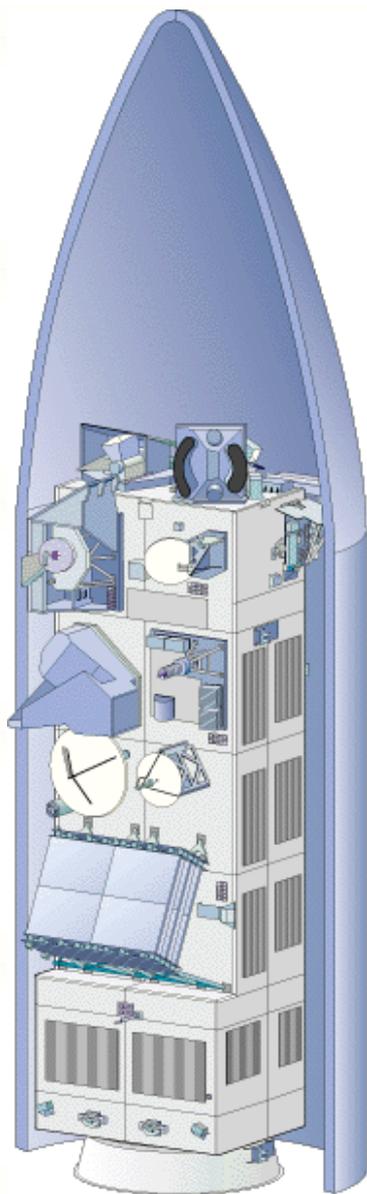
Week 8

Nearly the end of testing and the end of the project. After five year of hard work (10 or more years for some people), this was the point that we thought would never come. This was where colleagues would start working on new projects in different countries, and you may never see them again.

In the spare time, we were monitoring the passes of the International Space Station. We predicted that there would be a pass on 28th June at about 19:45, with an elevation of 57deg. The amount of cloud was concerning, but the sea breeze seemed to be clearing. Navigating by the use of the Southern Cross and the estimated position of the pole star, we guessed roughly where the ISS would appear. Sure enough, bang on time it appeared right out of the exact piece of cloud that we suspected and we managed to track it right across the sky until it disappeared into a cloud

page 24

near the horizon. The ISS is so bright that you can easily see it with the naked eye, and we guessed it is at least as bright as any star in the sky, but as that particular one was just below the horizon we couldn't actually compare!



Envisat in launch configuration

Week 9

Things would get very hectic, as people realised the full implications that there would be no more opportunities to test and debug the satellite operations on ground. If there were any problems now, particularly with the command and control they would have to be fixed in orbit. So the last real week of work

10...9...8...

was just demonstrating that it was safe to proceed, and that in-flight procedures were either correct or could be worked around. Fortunately we did manage to demonstrate everything successfully, but whether the in-orbit operations team can remain to be seen. Remember the complexity of Envisat, and that operations in orbit and on ground are very different!

Whilst we did all the hard work, all the managers decided to take a visit to the Ariane 5 facility. The Ariane 5 rocket was moved from its construction building to the building where it is prepared for launch, and the payloads are installed. Did you realise that it is moved vertically and is completely freestanding?

After the last hectic day we deserved a break, so we chartered a yacht for 10 people, and visited the Isles du Salut. These are a set of 3 islands about 2 hours sailing time off the coast of French Guiana, and were where people were imprisoned and held before being transferred to the mainland. Devil's Island is the most famous, but is the only one that you can't visit. The main island had monkeys jumping through all the trees, and could care at all about people. All of the islands are left with heavily derelict remains of the old prisons, and you can imagine the conditions they had to endure. And they were closed only 40 years ago!

The Last Days of Part 1

I was surprised how little testing work there was to be done, and how much spare time we would have. Having this amount of spare time paid for in a country where the temperature was a constant 27-31 degrees cannot be complained about. It's going to be strange being back in Europe, where there are actually people around, and where Renault Clios aren't the only brand of car. But we have to go back to French Guiana again in September and October for the final flight preparations and the launch of Envisat.

The expected launch date is October 12th on Ariane flight V145.

You may as well just throw your rocket in the bin...

...or why you should always put contact details on your rocket

by Bob Arnott

This sorry tale starts in December last year at the second EARS launch at their new flying site. Let me set the scene, it's windy, it's cold, it's getting late and the light is fading fast. You pull out a new rocket, it's never flown before, you've just finished painting it and you show the biggest motor you've ever used into the bottom of it.

You're up in a drag race, everyone is watching. The other rocket is away first and shoots straight up into the reddening sky on it's way to apogee. After a short delay your rocket joins it, but because it's got a bigger motor is out of sight in the gathering gloom. Some people say they hear the ejection charges go off although not everyone is sure as they desperately search the sky for any sign of a chute.

It's getting dark and there's no sign of the rocket, you'll have to come back in the morning to continue the search. Over the period on the next day three different people send up to 4 hours each looking for your rocket as well as another that was lost, but to no avail. Your rocket is lost.

Fast forward to July, you're sadly happy that your rocket has probably turned to mush throughout the winter, as it's lain undiscovered. Imagine your shock and horror when you're told exactly what fact befell your rocket.



Contact on a J415

As I was putting the direction signs up for the 1st July EARS launch a lone woman in a car stopped to ask me a couple of questions. She asked if we were going to be launching rockets, what time we were going to start, would they be big, should she come up and watch? I answered all the questions wondering why she was so interested, then she told me.

She told me that she'd found a rocket round about Christmas time, so I asked her if it was big and blue, she said yes. Ah, I thought, I know who's that is he'll be well chuffed to get it back. So I told her that I knew the owner and he'd be pleased she'd found it. Oh, she said, I don't have it any more, there wasn't a return address on it, so I think we took it to the tip in the end.

I had my head in my hands. Four hundred odd pounds worth of rocket sent to the tip because it didn't have a phone number on it. So we get to the moral of this tale, just like flying in crops without a beeper, always put your contact details on your rockets. If you don't you may as well just take them to the tip yourself.

The Soviet Manned Lunar Program

(Part 1)

edited & compiled by Marcus Lindroos

Abstract

Twenty years after the first American moon landing, on August 18, 1989 the USSR officially acknowledged the existence of their manned lunar program with an initial release of information by the Soviet newspaper Izvestija. An increasing number of photographs and blueprints of Soviet lunar hardware have become available to Western analysts and space observers. It is now clear that personal rivalries, shifting political alliances and bureaucratic inefficiencies bred failure and delays within the moon program. There was strong competition between research teams and laboratories. This internal competition and the low budget for manned exploration of the Moon explains the failure of Soviet technology against the successful American Apollo program.

This paper summarizes the Soviet manned lunar program in the light of the latest findings published in the West.

Red Star In Orbit

Soviet capability in space became clear to the world in October 1957, when the Soviet Union launched Sputnik 1, the first artificial satellite. The effect it produced in the United States varied between shock and panic. A month later, the Soviets launched Sputnik 2 -

a much heavier satellite carrying a dog, Laika. Subsequent surveys revealed that within months nearly all Americans had heard of Sputnik. Press reaction discussed the Soviet satellites in terms of American prestige, and its scientific and military reputation being at stake. Watching for Sputnik was a world-wide event, and newspapers gave predictions on its passes.

Two years later, the Soviets extended their early lead in space by launching probes that hit the Moon (Luna 2) and returned the historic first photograph of the far side of the Moon (Luna 3). Meanwhile, the unfortunate Americans failed to launch far smaller satellites (Vanguard 1 in December 1957) and lunar probes (Pioneer 1-4) during 1958-60. But on 31 January 1958, the US Army finally managed to launch the first American satellite - a small 15kg cylinder named Explorer 1. Since all the early satellites and lunar probes were launched on converted intercontinental ballistic missiles, the Soviet advantage underlined fears in the US that a "missile gap" existed between it and its Cold War enemy, an issue that Kennedy exploited to his advantage in the 1960 presidential campaign.

First Man In Space

At first, the shape that a US-Soviet space race would take was unclear. If President Dwight D. Eisenhower had had his way, there might never have been one at all. He consistently refused to approve space programs justified on purely political grounds, such as a \$38 million manned circumlunar mission proposed in December 1960. But Eisenhower did set up a civilian space agency to plan ahead - the National Aeronautics and Space Administration (NASA), which was inaugurated on 1 October 1958. Within seven days, NASA announced a man-in-space program called Project Mercury.

Politics affected the issue early in 1961, when John F. Kennedy became president. On 12 April 1961, Yuri Gagarin orbited the Earth in a Vostok spacecraft. Once again, the Soviets had beaten the Americans. Spurred

on by this setback (and by the Bay of Pigs fiasco five days later), President Kennedy had the necessary base for a national commitment and, on 25 May 1961, sent to Congress the message 'that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to the Earth.'

The Race Begins

Meanwhile, behind the scenes in the USSR, **Sergei Korolev** was busy preparing a response to the American challenge. Korolev was the top-secret "Chief Designer" who had developed the world's first intercontinental ballistic missile, the R-7 or "Zemyorka" (Little Seven). This rocket made a poor ICBM but an excellent launch vehicle; the R-7 had been used for all Soviet space launches to that point. Korolev was also a visionary and an excellent manager who had created & supervised most of the programs responsible for developing the rocket's payloads - Sputnik, Luna, Venera... His latest masterpiece, Gagarin's Vostok spacecraft, had been developed as a spy satellite but could also serve as a manned spacecraft.

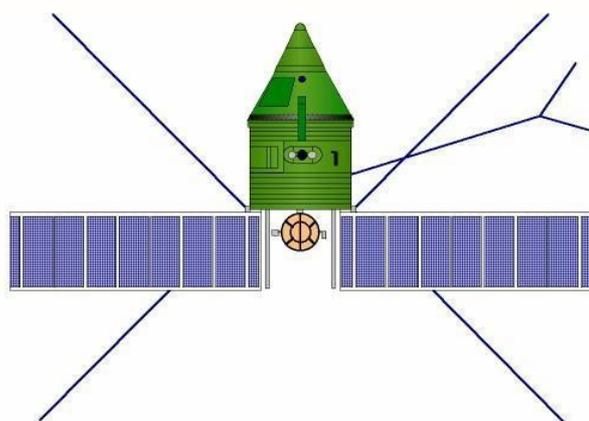
Unlike the Americans, the Soviet space program had no centralized organization or long-term plan. Korolev realized early on, in 1959, that the growing diversification of the space program would require a major reform of its organizational structure. Unfortunately for the Soviet space effort, Soviet premier Nikita Khrushchev ignored Korolev's proposal for reorganization and the space program remained in the hands of mostly non-specialized design bureaus, many of them working for different ministries. Although Korolev subsequently delegated most of the work on unmanned spacecraft to his associates, overseeing so many projects must have placed a tremendous burden on him and may have slowed many of them down (Hendrickx, 1996).

Designers Fall Out

Korolev was not the only designer of rockets and spacecraft, however. **Vladimir N. Chelomei** had developed military missiles but had no experience with space launchers. On the other hand, Chelomei had hired Khrushchev's son, Sergei. That family link offered a great advantage in a political system where personal connections were often all-important. With Khrushchev's blessing, he soon had the biggest project budget of all bureaus in the USSR. Chelomei OKB-52 had ambitions to expand his works into what had been Korolev's work (Harvey, 1996). In the USSR rival design bureaus not only designed but built hardware. Decisions about which craft would fly were taken much later by the Soviet leadership, based on recommendations from the Soviet academy of sciences led by Mstislav Keldysh. As a result, the Soviet space program contained several rival, parallel projects. This presented a roadblock to establishing a single coordinated plan for reaching the Moon.

Chelomei soon got an extremely important ally when **Valentin Glushko**, the primary designer of Soviet rocket engines, allied his Gas Dynamics Laboratory with OKB-52 following a strong disagreement with Korolev. Disputes between Glushko and Korolev dated to the 1930s, when Glushko's testimony helped to send Korolev to a forced-labor camp (Logsdon, 1994). The two men clashed over the new rocket engines for the next generation of Soviet launchers, but the conflict was also a question of authority. Korolev had been a former deputy of Glushko's before becoming chief designer, and both men collaborated on the R-7 project in the 1950s. Korolev wanted to use new high-energy cryogenic fuels such as liquid hydrogen. Glushko refused, preferring to design an engine fueled by storable but highly toxic hypergolic chemicals that ignite on contact (Mishin, 1990). His new highly efficient RD-253 rocket engine was quickly adopted for use by Chelomei, who proposed a series of "Universal Rockets" (Universalskaya Raketa - U.R.)

derived from one of his designs for a giant intercontinental ballistic missile - the UR-500 Proton (Logsdon, 1994). The go-ahead for this program was given on 29 April 1962 with the initial goal being a 3-stage space launcher called UR-500K. This was created simply by taking the UR-500 ICBM first stage and putting a small two-stage UR-200 rocket on top of it (Hendrickx, 1997).



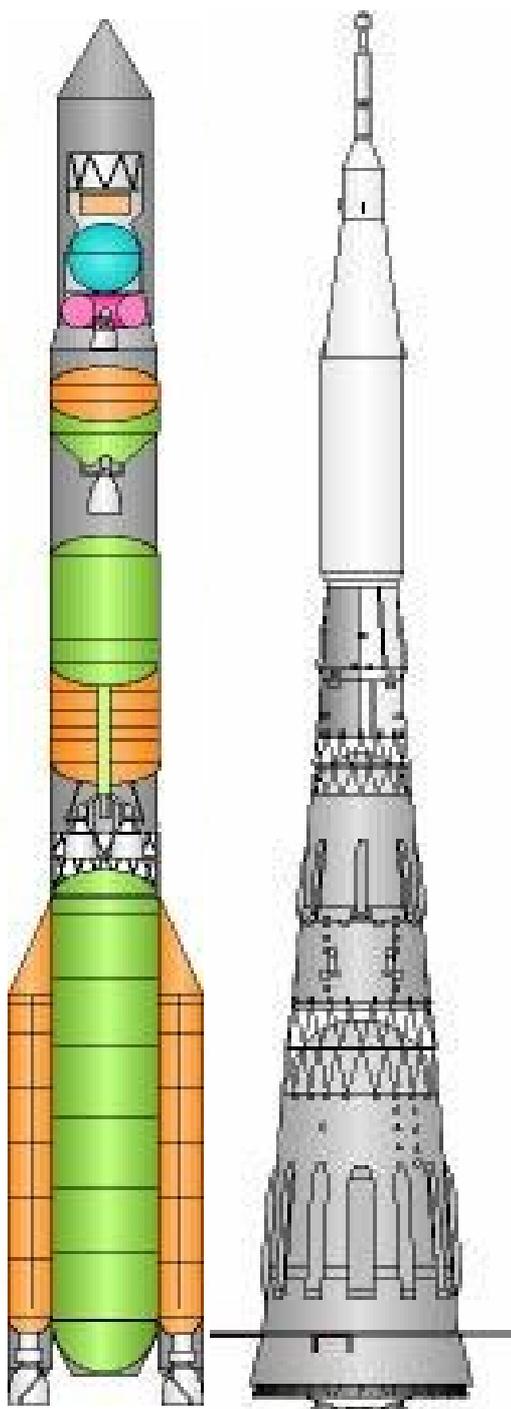
LK-1

In 1962 Khrushchev also assigned Chelomei's group to prepare for a manned spacecraft intended for circumlunar flight - the LK-1. At this time there was no stated goal of a Moon landing (Mishin, 1990).

Problems With The N1

Meanwhile, Korolev was busy working on his own carrier rocket proposal - the N-series (Nositel="Carrier"). A government resolution issued on 23 July 1960 called for a family of rockets to launch payloads ranging from heavy civilian & military satellites to heavy unmanned & manned spacecraft to the Moon, Venus and Mars (Hendrickx, 1996). Late in 1961, Korolev's team was asked to develop the N1, which would insert a 40-50t into low Earth orbit with a development time frame from 1962 to 1965. A larger version called N2 would launch heavier payloads in the 60-80t range, with a development period from 1963 to 1970. However, work on the N-rockets were limited to a conceptual design only when Chelomei's LK-1 became the primary manned lunar program in late 1961 (Mishin 1990, Landis 1992).

Later, Nikita Khrushchev wanted a larger updated version capable of launching a 75t military space station called "Zvezda" or OS-1, armed with nuclear weapons! The go-ahead for an updated N1 carrier rocket was given on 24 September 1962 with flight tests to begin in 1965 provided the necessary launch site was in service by that time. No other N1 payloads were authorized at this



UR-500KDM N1-L3 (1964)

stage although Korolev probably had both Earth orbit as well as lunar / interplanetary uses in mind when the OS-1 was under consideration (Vick, 1994).

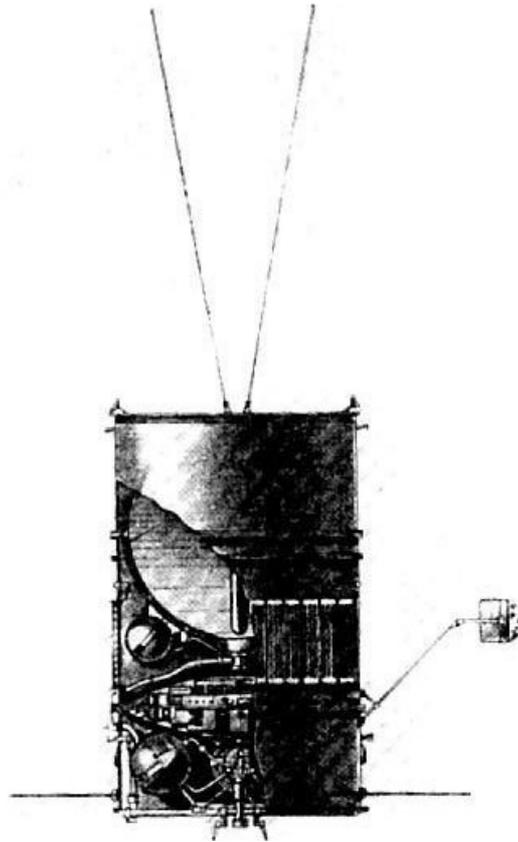
Korolev's falling-out with Glushko meant he had to find an alternative source of rocket engines. He turned to Nikolai D. Kuznetsov, who had developed and built only aircraft engines in the past such as those used in the Tupolev Tu-144 supersonic transport. Kuznetsov's group had to begin its work on rocket propulsion systems basically from scratch. In the limited time available, Kuznetsov was able to develop only a conventionally fueled engine of rather little power. The final N1 version needed no fewer than 30 such engines in its first stage to achieve sufficient power for a lunar mission (Harvey, 1996).

The Soyuz Spacecraft

Korolev's third cornerstone project (after the N1 heavy-lift/multipurpose rocket and OS-1 space station) in his man-in-space program was a new, advanced multipurpose spacecraft called 7K SOYUZ ("Union"). The older Vostok manned spacecraft was rather limited since it could not change orbits in space, rendezvous and dock with other spacecraft. Its lone cosmonaut was only a passenger, and the spherical descent capsule would have been unsuitable for lunar missions due to high G-forces during atmospheric reentry.

Although the future course of the Soviet space program was unclear when the Soyuz was conceived in 1959-62 (space stations, lunar missions or even a manned flight around Mars were considered), it was generally agreed on that rendezvous & docking would play a major role. So this requirement was part of the design right from the start. Like the US Apollo CSM, the new spacecraft (initially called "Sever" or South) would also be capable of flying around the Moon (Feoktistov, 1996). On 10 March 1962, actual work got underway when Korolev approved a document entitled 'Complex for the assembly of space vehicles in artificial satellite orbit (the Soyuz)'. This described a

3-man spacecraft that would dock in orbit with a stack of five separately launched solid rocket motors to boost 7K to the Moon, but other leading OKB-1 engineers convinced him this approach was not the right one. Korolev then turned to another system consisting of one manned spacecraft (Soyuz-A), a translunar injection stage containing automatic rendezvous and docking equipment (Soyuz-B) and three tanker spacecraft (Soyuz-V). The latter would refuel the Soyuz-B, which would dock with Soyuz-A, sending it on a circumlunar flyby. Initially, the "Soyuz complex" would allow the Soyuz to maneuver to high orbits and refuel the OS-1 space station. This plan was approved on May 10 1963 by Korolev, who already had experimented with launching two manned spacecraft at the same time during the Vostok 3,4 mission half a year earlier (Harvey, 1996). He also had plans for a manned lunar-landing craft that would have ferried cosmonauts between the lunar surface and a Soyuz craft in orbit around the Moon. But the Soviet leaders rejected both plans and continued to support Chelomei's LK-1 project.

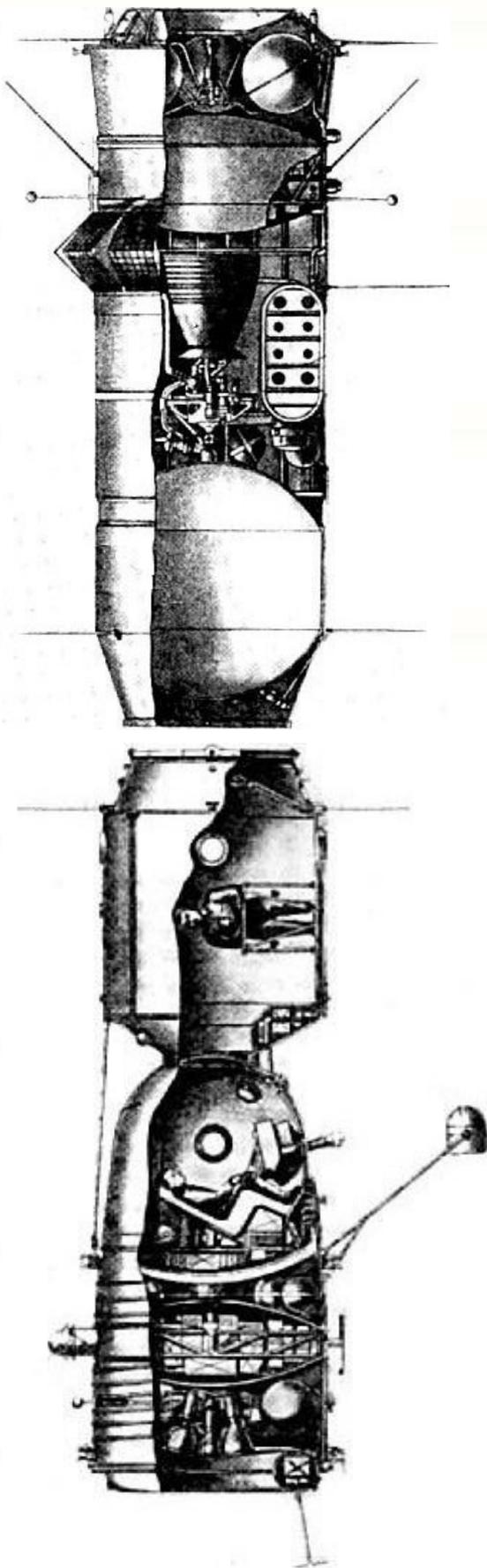


Soyuz B

New Leaders, New Lunar Plans

After the Vostok 5,6 flight in June 1963 the Soviet manned space program appeared to lay dormant to Western observers. But behind the scenes, Korolev was busy designing the N1 rocket, OS-1 space station (a full-scale 18.5m high mockup was constructed) and the Soyuz spacecraft that would transport cosmonauts to it. A new series of unmanned Luna probes attempting a soft landing on the Moon had been launched since January 1963, but so far without success. He also continued to lobby hard for a manned circumlunar mission, this time consisting of a Soyuz launched by a smaller N11 rocket (=N1 without the first stage). This too was rejected, but on 3 August 1964, the Central Committee finally passed a resolution (no. 655/268 'On work involving the study of the Moon and outer space') to put a single cosmonaut on the Moon in 1967-68 before the US Apollo flights. More than three years had passed since President Kennedy's speech. On 3 August the Chelomei bureau also received final approval to build the LK-1 spacecraft to send two cosmonauts on a circumlunar mission by October 1967, the 50th anniversary of the Bolshevik Revolution. At last, the Soviet effort appeared to gain momentum (Harvey,1996).

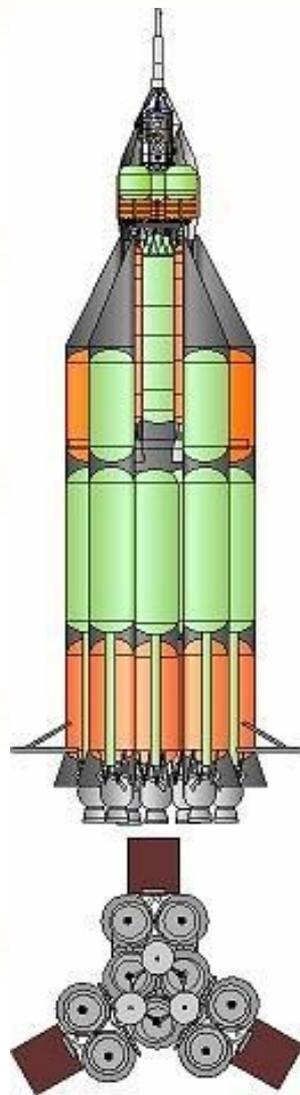
While all this was taking place, Korolev hurriedly designed a manned 'stopgap' program called Voskhod ('Sunrise') to satisfy Khrushchev's appetite for new space spectacles. First proposed in February 1964 (Hedrickx, 1997), Voskhod was basically a Vostok capable of carrying 2-3 cosmonauts into low Earth orbit to practise long duration spaceflight or (using additional equipment) spacewalks and dockings in space before Soyuz became available in 1966. But in order to accommodate more cosmonauts, Vostok's single ejection seat had to be removed, leaving the crew with no chance of survival if the R7 carrier rocket malfunctioned during the first 27 seconds of launch until the upper stage could fire (Harvey, 1996). Despite the huge risks,



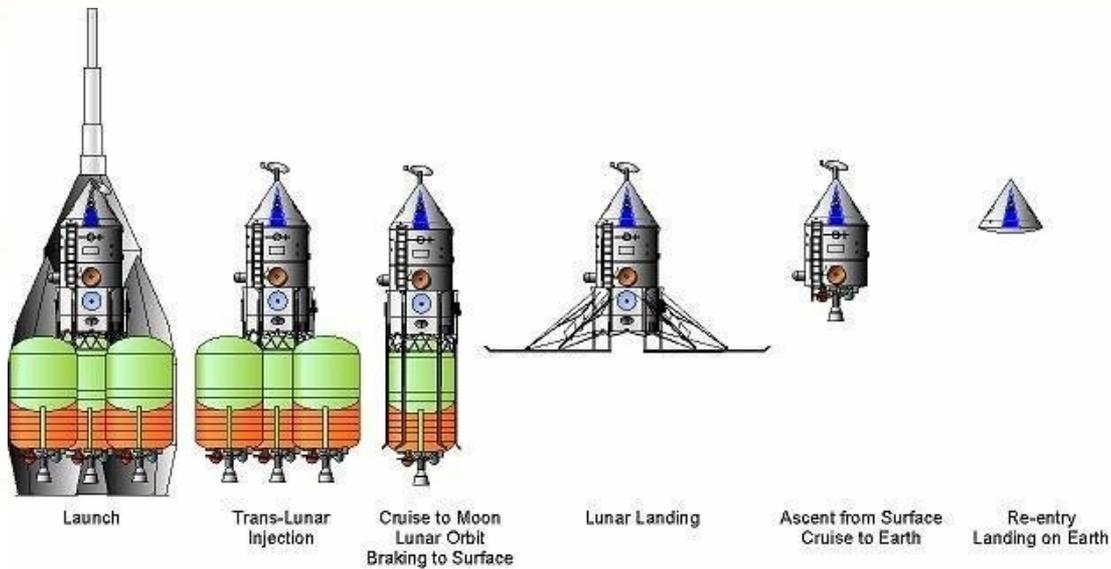
Soyuz V (top), Soyuz A (bottom)

Voskhod 1 took off on 12 October 1964 with three cosmonauts on board - then a new record. Khrushchev was removed from power by the Politburo later that day. The new leadership, headed by Leonid Brezhnev, was less interested in manned space 'firsts' than Khrushchev had been.

By late 1964, three design bureaus had submitted proposals for a manned landing on the Moon. Chelomei's OKB-52 proposed a lunar landing spacecraft based on the LK-1 circumlunar spacecraft. It would be equipped with a new high-energy deceleration rocket stage plus landing gear and could land two cosmonauts on the Moon with no need for rendezvous in Earth or lunar orbit. Chelomei claimed this would be simpler and quicker than assembling a vehicle in space like the Americans (and Korolev-) were proposing. The drawback was that his LK-700 spacecraft would have to be rather heavy since it would have to carry additional fuel plus landing equipment for the return to Earth. A large heavy-lift version of the Proton, called UR-700, would be required to launch the spacecraft. Chelomei had been working on this rocket since 1962 (Newkirk, 1992) and now proposed it as a more powerful alternative to the N1. Modular blocks from the Proton program would have been used to assemble a rocket as powerful as the American Saturn V, with a lifting capability of 130 tonnes to low Earth orbit (Clark, 1992).



UR-700 (1968)



LK-700 (1968)

10...9...8...

Rocketry Groups and Contacts

Perhaps the most common question asked by relative newcomers to rocketry is "Where is my nearest club?". Here is a list of all rocketry clubs known to UKRA, both UKRA affiliated and others. Also there is a list of regional UKRA contacts who are happy to be contacted with questions.

If you would like to be listed here, or have your details modified, please let us know.

Groups

AspireSpace

AspireSpace run the NRC (National Rocketry Challenge) a national competition for University teams.

Web site: www.aspirespace.org.uk

BSMA

The British Space Modelling Alliance is the BMFA specialist body for space modelling.

Contact: Stuart Lodge

Email: loggi.interspace@lodge28.freemove.co.uk

Black Knights

Black Knights are based in the West Midlands. They fly model and HPR rockets and have regular flying events.

Email: blackknights@cs.com

Web site: ourworld.compuserve.co.uk/blackknights/

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CROCK

Crock hold regular flying events. Details of events can be found on the Rockets & Things web site.

Contact: Tony Betts

Email: y2ksoftware@btinternet.com

Web site: <http://www.rockets-things.co.uk/>

DSC

The Discovery Space Club are primarily a "space watch" group though they do carry out occasional model rocket flying activities, sometimes in association with STAAR.

Contact: Robert Law

Tel: 01505 815100

EARS

The East Anglian Rocketry Society have a flying site near Cambridge, and regular flying event. See their website for details.

Contact: Steve Randall

Address: 47 Western Ave. Felixstowe, Suffolk, IP11 9SL

Tel: 01394 274579

Email: steve@btinternet.com

Web site: www.spackington.com/

HART

Hornchurch Airfield Rocket Team hold regular flying events. See their website for details.

Contact: Peter Barrett

Address: 22 Grey Towers Gardens, Hornchurch, Essex, RM11 1JH

Tel: 01708 458463 or 07866 314371 (mobile)

Email: pete@hartrockets.co.uk

Web site: www.hartrockets.co.uk/

MARS

Tel: 0141 8842008

Over its 10 year history, MARS Advanced Rocketry Society has grown into a national group of rocketeers committed to pushing the limits of non-professional rocketry, developing new rocketry technologies, breaking records and above all having fun!

Contact: Ben Jarvis

Email: info@mars.org.uk

Web site: www.mars.org.uk

North West Rockets

North West Rockets are a small, informal group of rocketry nuts who do it for fun! We are not out to break any records, but do like to make rockets and fly 'em.

Contact: Dave Thompson

Email: DATSCOPE@aol.com

Web site: www.angelfire.com/on/DATSCOPE/nwr.html

NSRG

The North Star Rocketry Group are based in West Yorkshire. They hold model rocket launches locally, and attend HPR launches around the UK.

Contact: Darren J Longhorn

Email: info@northstarrocketry.org.uk

Web site: www.northstarrocketry.org.uk

PRS

The Paisley Rocketeers' Society, founded in 1936, are the oldest continuously operating rocketry group in the world. Involved in almost every aspect of rocketry. Since 1965 the PRS has concentrated on the development of aquajet rocketry.

Contact: John D Stewart, PRS Honorary Secretary

Address: 15 Bushes Avenue, Paisley, PA2 6JR, Scotland, UK

SARA

Scottish Aeronautics and Rocketry Association. Based in the West of Scotland.

Contact: Paul Timoney

Email: sarauk@rocket-science.co.uk

Web site: www.sarauk.btinternet.co.uk

SERFS

Southern England Rocket Fliers.

Web site: www.serfs.co.uk

SRA

Sheffield Rocketry Association.

Contact: Hugh Gemmell

Email: hugh@cruiserd.demon.co.uk

Web site: www.cruiserd.demon.co.uk

STAAR Research

Space Technology Applications, Astronomy and Rocket Research have three main activities:

- Public and educational rocketry workshops.
- Scale flight research, particularly the Waverider aerospaceplane concept.
- Organisation and development of the annual International Rocket Week flying event, one of the main national events of the UK rocket flying calendar. See website for details.

Contact: John Bonsor

Address: 15 Smith Avenue, Longbar, Glengarnock, Ayrshire, KA14 3BN, Scotland, UK

Tel:

Email: c/o Bobby Wark

bob@scotroc.force9.co.uk

Web site: www.gbnet.net/orgs/staar/

Thrust

Contact: Mike Williams
Tel: 01283 533848
Email: 100306.20@compuserve.com
Web site: [ourworld.compuserve.com/
homepages/thrust_for_space/](http://ourworld.compuserve.com/homepages/thrust_for_space/)

UKRA

United Kingdom Rocketry Association.
See [page 2](#) for contact details.

WLRS

West Lancs Rocketry Society are based in the design and technology dept. in Edge Hill College in Ormskirk. We hold meetings roughly once a month although it really depends upon the weather.

Contact: Rob O'Brien
Email: club@wlrs.org.uk
Web site: www.wlrs.org.uk

WRS

Wirral Rocketry Society have launch sites in the Wirral and fly mainly A - D power Model Rockets.

Contact: Martin Sweeney
Tel: 0151 335 5415
Email: WRS@i12.com
Web site: www.WRS.i12.com/

UKRA Regional Rocketry Contacts

The following people have offered their contact details to UKRA in order to provide a more local point of contact for any rocketry related questions you may have. Feel free to contact them for advice about rocketry in their regions.

Ayrshire

Contact: Bobby Wark
Email: bob@scotroc.force9.co.uk

Cambridgeshire

Contact: Bob Arnott
Email: bob@fatboab.org

Lincolnshire

Contact: Charles Simpson
Email: chas@helix.ukf.net

London

Contact: Ben Jarvis
Email: rocketandroll@hotmail.com

Merseyside

Contact: Dave Thompson
Email: DATSCOPE@aol.com

South Yorkshire

Contact: Hugh Gemmell
Email: hugh@cruiserd.demon.co.uk

Staffordshire

Contact: Mike Williams
Email: lawn_dart@yahoo.com

Sussex

Contact: Rick Newlands
Email: rnewlands@aol.com

West Yorkshire

Contact: Darren J longhorn
Email: darrenlonghorn@yahoo.com

Worcestershire

Contact: Mark Perman
Email: liz.mark@virgin.net

Pete's Rockets

The UK High Power and Model Rocket Specialist



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- *AED 'RDAS' flight computers*
- *RATT-Works hybrid rocket motors*
- *MENTAL 29mm minimum diameter fibreglass rocket kits*
- *G-Wizz accelerometer / altimeters*



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High Power rocketry merchandise
at our shop and showroom!*

*The shop is situated in Heckington,
near Sleaford, Lincolnshire just off
the A1*

