WELL, WELL!

It's back in the saddle again! It's good to be back in print. We've got the long-awaited LDRS issue here for your reading pleasure. We've got so many good photos from the staff that we couldn't resist running a bunch of them. I'd also like to thank everyone who came out to LDRS, whether to watch or fly. The quality of craftsmanship and sportsmanship was outstanding. Do you realize that LDRS is the biggest launch of the year, again? It certainly was a fun time, and it was good to see you all out there. Sorry if I didn't get to talk to everyone as long as I would've liked. A special thanks to Chris Johnston who was drafted to write the LDRS article. And a great big round of applause goes to Chris Pearson for pulling off yet another fantastic meet. Also, Mike and Karen Wagner, and the whole Wagner family should be thanked for all their help with the field and facilities.

The answer to the July/August Issue's mystery cartoon was: "We don't have the best craftsmanship or skill...but we sure have the technology to beat the crap out of the committee." There were no winning entries, so the jackpot will double.

Thanks should also go to George, who honcho'd last issue, and did a fine job. It sure made it easy to get an issue out. By the way, the SNOAR MAC family has grown. In the far east, Bob Geler has acquired one, and way out west (even farther west than Utah, if you can imagine that!), Aaron Bernstein has landed one as well. Hopefully, we can all get together on the software! If anyone else out there has one, let me know. And if you don't, well, shame on you (Especially Chris Johnston, who recently bought SOMETHING ELSE).

That brings us to this issue's funny story. See, NAR Headquarters is buying a computer, and they settled on an IBM. So George wrote Pat Miller a letter, and at the end, wondered if the NAR had settled on the IBM so as to be "SNOAR Incompatible". Well, Pat didn't realize this was a joke, and replied with a lengthy justification. Oh, well, Pat, just go ahead and work with outdated machines. By the way, Benny is in charge of the computer project. You say you wouldn't have guessed?

Matt & Mac
The most unique payload was a model with an on-board computer. This machine was based on an RCA 1802 CMOS microprocessor. It took data from a scratchbuilt accelerometer and programmed an EPROM during flight. This was a real advance over the similar computer system shown at KentCon a few years back because, using the EPROM, only the chip itself has to survive the flight. You can lose the batteries and even destroy the computer as long as the EPROM is intact.

The lots of Crafts folks, Deb and Ron Shultz, brought their usual load of nice models. One of their new ones, the “Mini-Miss” (short for Magnum), looked like a sawed-off V-2, really moves on an IG engine it is built around LOC’s BT-56 tube (56” diameter). Topping all the manufacturers, lots of Crafts flew nearly 4,500 newton-seconds of power at the meet! Debbie also showed up with “Leggs”, a pink rocket with black face, that got everyone’s attention on the field. It certainly was the sexiest rocket on the field.

The real high point of the meet was Chuck Mund’s and John Holmberg’s Great Big Big Bertha. Imagine a 10’ tall 40 pound yellow Big Bertha, if you can’t be sure you must have had nightmares about something like this! This monster flew on Saturday morning using a cluster of engines and carried two Kodak Disc cameras, two movie cameras, and a radio-controlled ejection system. A minor prepping error caused the ejection system to fire while it was on the pad and resulted in the nose section being impaled on the launch rod. After patching up the hole and resetting the ejection system, the rocket made a spectacular flight on three Aerotech H and three I motors. It took three 6” diameter chutes to bring it down. It made a return on Sunday, flying on one Vulcan “L” engine. Maddy, when we know you!”

Manufacturers were in force at LDRS-4, with Aerotech, Vulcan, Ace, Lots of Crafts, Reaction Technology, AAA, and, of course, North Coast Rocketry. Korrey Kline flew some of his experimental “Visjeet” motors that had a neat red-purple flame, while Aerotech and Vulcan pulled out all the stops with their respective motor lines. One notable (and welcome) absence was that of Jerry Irvine and his various dubious companies. Dan Meyer represented the NAR Blue Ribbon Commission, and spent a lot of time talking to people, and taping the event for other commission members.

Overall, the trend has been to bigger, single motor models, as opposed to the clusters of G's and such seen at previous meets. With the availability of reliable high power motors, most people seem content to go this route. It also appears that the total newton-seconds flown at LDRS is roughly constant; there were fewer flights this year, but they averaged more power per motor. The big thrill of flying a G motor only three years ago (was it only that long ago?) has been replaced by the big H and I motors. Parts and kits are more available, yet we have seen a great deal of creativity in various designs. And, the birds are getting bigger, too! A lot of people showed up in vans this time around.

 Probably the best part of LDRS-4 was the relaxed laid back atmosphere that made things a lot of fun. LDRS is not only a rocket launch, it’s a social affair, and it’s got to be some of the most fun a high power freak can ever have. If you didn’t make it this year, start planning and saving for LDRS-5. It’s not that far away!

This is an admittedly incomplete description of what went on at LDRS-4. You would have more detail if Chris & Matt weren’t off wandering around in Connie Land - Chris Johnston.
METEOR 7 FLIES AGAIN!!

Chris Pearson brought out the infamous Meteor 7 to fly it again at LORS-4. This is one BIG bird, using three sections of NCR 6T-39 tubing to stand over 10 feet tall. Power is by D12's, using ten boosters drop staged to ten more sustainer motors. This was the biggest cluster of black powder flown at LORS, and is a crowd favorite.

Below: Chris Pearson and Matt Steele make final preparations prior to launch. Note the stack of D12's extending from the rear of the Meteor. Range Safety Officer Jim Backlas can be seen behind the rocket insuring that everything is OK.

Opposite Page, Bottom: Meteor-7 lifts off with a huge cloud of smoke.

Opposite Page, Top: Meteor-7 just prior to the burnout of ten D12-0's, and the inevitable shower of casings.

Our thanks to the LORS photographers who helped out with pics for this issue: Chris Pearson, Brad Bowers, Deb Schultz, Ron Schultz, and Matt Steele.
The California contingent showed up in force for LDPS. Kurrey Kline (above) brought a number of unusual rockets, including this variation of the old "Luna Swift". Powered by an F15, this bird glided rather nicely. "Moose" (below) was flying his super-slick movie camera on anything that would boost it, seen here hiding behind an Ace Fugue.

Bill Barber (above), another California rocketeer, brought a number of impressive models. Here he props one of his smaller birds to "test the wind". Proving that they are the premier high power club in the nation, SNOAR was out in force (below), as evidenced by Ron Schultz (kneeling), Don McPherson, Chris Johnston, and Matt Steele getting ready to fly a G powered screamer.
The King Viper III is a handful (above), even for LOC owner and designer Ron Schultz. Power was by three Aerotech I motors. Below: The business end of the Great Big Bertha. John Holmboe has it hoisted on his shoulder.

Above: The Big Bertha flew well on the Vulcan L motor.
Below: The Bertha was safely recovered by three huge parachutes. Far, the flights of this monster Estes kit were the highlight of the meet.
Above: Chris Pearson did an outstanding job of organization for LDRS, and was also seen flying quite a bit, including this immaculate Allegro Largo. Below: Korrey Kline poses with his huge Virljet powered design.

Ron Schultz worked with Gary Rosenfield (left and center, above) to build this special I powered Magnum in an Aerotech paint scheme. Don McPherson, right, helps load this beauty onto the pad. Below: Bob Ferrante helps Matt Steele load an NCR Aerobee H-1 Test onto the pad. This bird flew well on an North Coaster F75, but ended up in one of the few trees on the field. It was later recovered.
ROCKETEERS WITHOUT HATS
THE MODROC VIDEO SOUNDTRACK

ALL LYRICS, ORIGINAL MUSIC, VOCALS, TWELVE STRING GUITAR, KEYBOARD AND DRUM SYNTHESIZERS, SOUND EFFECTS, RECORDING, PRODUCTION AND PACKAGING BY ANTHONY "HADDOG" WILLIAMS. COPYRIGHT © 1985.

DEAD SKUNK IN THE MIDDLE OF THE FIELD MY HEROES WERE ALL CONTEST JUNKIES.
FERNANDO AND J.PAT
HIGH POWER BLUES (a salute to Slim Whitman)
VLADIMIR AND NICKI
BRICK SPACESHIP (instrumental)
TO ALL THE ROCKETS I HAVE FLOWN BEFORE WHAT THE ROCKET WOULD SAY
ALPHA III (instrumental).
ROCKET'S ROLL
CHICO
QUINN THE ESKIMO (Don’t ask me why...)
OLD MAN KUSHNERICK
HIGH POWER BLUES - REPRIZE
NOT MUCH ELSE...!

FUTURE ROCKET ENGINE DEVELOPMENTS

by Dan Meyer

Extracted from the High Power Blue Ribbon Commission Report

Before the 80 N-sec engine explicit power limit is dropped and engine power is limited only indirectly by propellant mass, it is important to estimate the long-term upper limits of power which this permits. It is power, not propellant mass, which determines rocket performance and hazard. This paper summarizes a lengthy study of model rocket propulsion trends written by Blue Ribbon Commission member (and professional propulsion engineer) Dan Meyer. It presents an excellent overview of future model rocket motor developments.

PROPELLANT BINDER

High-power (E and above) model rocket engines almost all use a modern propellant made up of about 16% elastomeric binder (hydroxy-terminated polybutadiene, HTPB) and 84% solid oxidizer (ammonium perchlorate, AP) with a few trace-quantity additives. This propellant's energy per unit weight, or specific impulse (isp) is about 215 sec, compared to 90 sec for the black powder used in D and smaller engines (Estes Industries engines) and some older-technology E and F engines (i.e., FSI and the old AVI E and F motors).

Current professional propellant technology has found no non-detonable binder with higher energy than HTPB. Since detonable propellants will not be classified by DOT as Class C regardless of quantity per engine, they cannot be used in model rocket engines. Only one area of binder improvement is available: adding nitroplasticizing agents. These are currently prohibitively expensive for hobby use, but could possibly add 5% to propellant isp over the next 20 years if they become cheaper.

PROPELLANT OXIDIZER

The oxidizer of choice in professional industry for the last 30 years has been ammonium perchlorate. Despite significant research efforts, no non-detonable oxidizer with higher isp and acceptable storage qualities has been discovered. None is foreseen for the next 20 years.

ADDITIONS

Model rocket engines today do not use metal additives (aluminum or magnesium) in more than trace quantities. Aluminum is widely used in professional motors, in place of up to 20% of the AP. Such large fractions require giant engine chambers to ensure their complete combustion prior to exhaust, but there is promise for even engines as small as model rockets in propellants with up to 5% aluminum. Some of the energy addition from the aluminum is negated by an increase in two-phase flow losses from its solid-phase reaction products, but there is potential here for a gain of up to 4.5% in isp over the next 20 years.
OTHER IMPROVEMENTS

Two more avenues are available for future increases in model rocket propellant performance: increasing the fraction of AP from 84% up to 90%; and increasing the engine combustion pressure from 500 psi up to 2000 psi. Both would increase the already significant difficulty and expense of manufacturing high-power model rocket engines for consumer use.

Propellants containing more than 84% solids become very thick and paste-like, and packing them into an engine casing would be much more difficult than the casting process currently used. An increase of up to 3.5% in ISP is possible if a 90% solids loading can be achieved.

An increase in engine operating pressure is the easiest method to improve model rocket engine efficiency. Current lightweight casing materials burst at around 2000 psi. They operate at large safety margin in today's model rocket engines, where even the highest-thrust engines do not exceed a peak pressure of 750 psi. An increase in combustion pressure to 2000 psi would require heavier nozzles to properly expand it. The payoff would be an increase of up to 10% in the ISP of high-thrust engines. Operating low-thrust engines at this pressure would require very small nozzle throats which would be difficult to manufacture and easy to clog during operation. If engine thrust is limited as proposed elsewhere in this report, a full 11.5% gain in ISP from operating pressure is therefore not available.

CONCLUSIONS

Using the technology demonstrated today in model rocket engines, an engine of up to 133 N-sec power is theoretically feasible with 62.5 grams of propellant. The most efficient design on the market actually delivers 138 N-sec. Multiplying all of the most optimistic estimates of future performance described here shows that an engine of up to 150 N-sec is potentially feasible in the next 20 years, probably at greatly increased expense. A full "G" of 160 N-sec is the absolute upper limit achievable with DOT Class C model rocket engines which are limited to 62.5 grams of propellant.
Phil Barnes and Art Rose win gold medals at the Sixth World Spacemodelling Championship in Bulgaria! Phil repeated as World Champion with his Cary's RC 35,maxing in all three competition rounds. Despite the heavy winds, Phil flew his trademark arrow-straight boost, and found enough lift to be the only competitor to max all three rounds. Jim Wilkerson flew just enough to capture the bronze in the event, and that gave the US a silver team medal. Art Rose, flying a D Region Tomanhawk and an Aerotech micro-C motor, set a new world record in C Scale Altitude, soaring to 1054 meters with the 9th place finish of Matt Steele, and the 1st place finish of Dan Winslows, the US won a team bronze in the event. Trip Barber won an individual bronze in B altitude with a flight of 705 meters. Trip used a two stage "dart" type model powered by two A motors. Trip also finished 6th in A 50. Ken Mixol finished 2nd in A 30, but didn't win a medal due to a first place tie. Charlie Sykes wound up fourth in C 96, which went into four flyoff rounds to decide the winner. The US won team bronze medals in B Altitude and A 50, which was a very good showing, all things considered. All members of the US team that flew won some sort of medal. The Russians kicked ass, and surprised everyone, particularly the host Bulgarians, who were second. The US and Czechoslovakia were tied for third. True to form, the scale kit building team was at it's best, as Jeff Vincent spent many sleepless nights scraping together a model, and Chris Pocock came nowhere close to completing a model. Complete coverage, including a sample of the dreaded Bulgarian national fruit (Mr. & Mrs. tomatoes), will be in the next issue of SNOAR NEWS, thanks to your intrepid reporting crew of Chris Pearson, Terry Lee, and Matt Steele. Watch for it at your newstands.

Chas Russell has been named a NAR Trustee to replace Jay Apt, who had to resign following his appointment as an NASA astronaut. For such a long time, SNOAR had no voice on the Board, and now we have two! Have we sold out? Not likely! Chas will also replace Jay on the new Blue Ribbon Commission that is interacting with the LORS committee. Way to go, Chas!

NARAM-28 will be held in Champaign-Urbana, IL, and hosted by NIRA. Our favorite competitor, Sunny, will be the contest director. Events tentatively will be: 1/2A PD, 1/2A SD, F 6G, and Too bad it's not officially and best single flight! D HD, B HD, C Eggrott Altitude, D 12G. C Eggrott Duration, Scale (Sport Scale for A Division), and R&D. Connie Pursley will direct NARCON-3, which promises to be pretty big this time around. The prize program will be in full swing, too, with $100 and $50 door prizes expected to be awarded, as well as an all-expense paid trip to NARAM-28. By the way, the leading candidate for NARAM-28 seems to be the LARS section in Los Angeles. We'll keep you posted.