THE LEADING EDGE

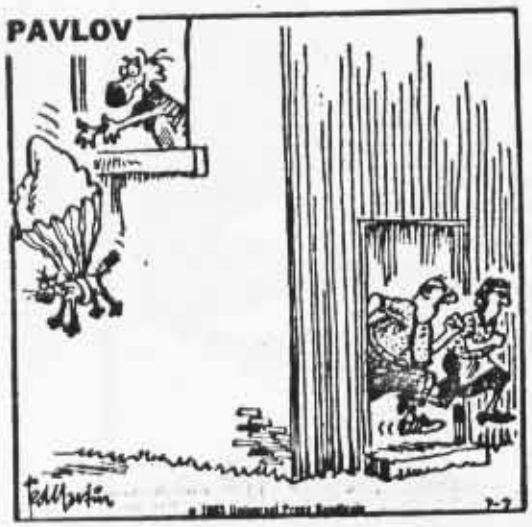
VOLUME 8, NO. 3
MAY/JUNE 1985
WINNER OF THE 1984 LAC NEWSLETTER AWARD

A PLEA FROM THE EDITOR
by Larry Mika

As you have probably noticed, the newsletter is late again. That's because college students are very busy, particularly around finals time. In the summer, we work full time jobs, just like many of you readers. Editors end up writing a lot of material. In short, this is **YOUR** newsletter, and we need more contributors.

Bunny, Ric and I have been working harder than ever to produce quality material, but I always (as did Ric) end up searching for more articles and plans. If you have an interesting, operable rocket plan, sent it to me! If you have a question for Mr. Know-It-All, sent it to me! If you have some modeling supplies to sell, put it in our classified ads! If you would like to volunteer to cover a club launch, let me know. I'll be asking members at random to write up launches if no one volunteers.

Please, help out your editor and gain a little recognition at the same time. Help keep the Leading Edge a quality newsletter. Submit!



"Let's grab the cat before Bob does another drop test for his R&D report."

T MINUS 1

REGULAR CLUB LAUNCHES
Ackerman Park, Glen Ellyn
St. Charles and SWIFT Roads
Sundays at 2:00 PM

May 12	May 19
June 2	June 30
July 14	July 21
August 11	August 25

Mark those dates on your calendar!!! Don't miss out on all the summer fun and great flights!

MWRC-85 May 25-26
Bong Field, WI
Events: A RG, B HD, B SD, C SRA, D ELA, 1/2A BG, A PD.
Contact Ric Gaff, 331 Third St. Northfield, IL 60093, 312-724-2975

SCOUT SHOW June 1
"Lakeview Section" of Hawthorne Park, 10 AM - 6 PM
We need models for display, people to answer questions, etc! Call Gary Glowienke at 929-7091 for details.

CANCELED

MONTHLY NIRA MEETING June 7
G.E. Civic Center 7:30 PM
Get the inside scoop on MWRC contest results, and (maybe) see our club videotape!!

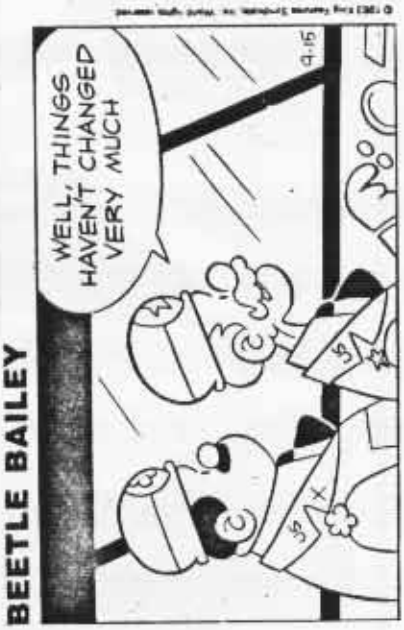
NOM-5, Open Meet June 8-9
SITE TO BE ANNOUNCED!!!!!
Events: A RG, B HD, B SD, C SRA, D ELA, 1/2A BG, A PD.
Contact Ric Gaff, 331 Third St. Northfield, IL 60093, 312-724-2975

NOM-6, Open Meet June 22-23
SITE TO BE ANNOUNCED!!!!!
Events: A RG, B HD, B SD, C SRA, D ELA, 1/2A BG, A PD.
Contact Ric Gaff.

MONTHLY NIRA MEETING
G.E. Civic Center 7:30 PM
Get in on the NARAM-27 trip planning. Also begin Labor Day Demo Launch planning.

NARAM-27 July 21-26
Johnson Space Center
Houston, TX
Come on down with the club and try (one more time!) to grab the brass ring!!!

MONTHLY NIRA MEETING Aug. 2
G.E. Civic Center 7:30 PM
Final planning for our 21st Annual Labor Day Demo. Get your best models ready to show off!!!



MODEL OF THE MONTH WINNERS

The Model of the Month Winner for March is "Jedi George" Riebesehl with his **Dark Star** RC BG. Congratulations, Jedi!

The Model of the Month Winner for April is Henry Veldenz with his Centuri **Saturn V.** Congratulations, Henry! (Sorry, but no picture!!!)

COVER PHOTO: Jon Dugan makes a parachute at the Park District class.

THE LEADING EDGE

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MIDCON-III
Low Key Convention Fun

by Bunny

For the third year in a row, the Great Lakes Association of Rocketry (GLAR) put together a well rounded, if somewhat low key, convention for midwestern rocketeers. They combined the standard mod roc convention with a 3+ hour workshop of the general public. While it might have overloaded some sections, GLAR's experienced troops and some eager volunteers pulled it off without a hitch. The site for all activities was the Midway Motor Lodge in suburban Detroit.

The "keynote" address was a plea for more aerospace education and adult involvement in the same by a local college instruction. He runs a NASA Resource Center in a Detroit area college, and has had lots of experience in aerospace education. The man practiced what he preached by helping out in Saturday's public workshops. The pizza and deli bash followed with some pretty good eats, and the conversation was typical for model rockets: scale, designs, competitions, NAR stuff, etc. The rest of Friday night was spent watching videos and slides.

Saturday saw one discussion group per discussion period. If 15 more people would have showed up, this might have been a bit difficult. As things were, it worked out OK.

Vince Bonkowski's **Static/Fantasy Spacemodeling** group is always a fun one for me. I always get some new ideas, mainly because Vince experiments when I'm afraid to. He suggested the following to spruce up your sport model designs. (1) Use the colored foil wrappers from candy bars for a good source covering materials for small parts. (2) Use "Bullet Bob's" favorite, Hobbypoxy stuff for filling balsa grain and body tube seams. (3) Use colored striping tapes for putting on small colored bits. It's easier to handle than solid color decal sheets cut into little pieces. (4) Build your fantasy models in sections, painting each section separately, and assembling afterwards. (5) Buy up cheap plastic model kits of old rockets, jets, etc. as a source of plastic parts. (6) Instant fillets can be made from microballoons and Squadron Green Putty filler. When dry and sanded to shape, give those fillets a shot of thick Cya glue for a perfect finish.

ROCKETIP - For heavy models, 1/4" sewing elastic makes strong shorck cords.

Gary Flatt's **Electronic and Model Rocketry** group showed me more working transmitters and carrier rockets than I'd ever seen. Garry has been at this a long time and his experience really came through in the group. He suggested two old Estes kits as good carrier vehicles, the "Sandhawk" and "Omega". Garry also recommended using solid music wire antennas as a means to improve transmitter performance. He also suggested high quality CB walkie talkies were a good investment to improve reception.

After a short lunch break, Chris Pearson talked about "High Power Construction Techniques". Chris classified high power as anything D powered or larger. He talked about various time-thrust curves of major motors and their applications. For construction tips, Chris noted that standard Estes kits cannot often be successfully converted to high power. Their materials simply aren't strong enough to take the composite motor poundings, though with material substitutions, they can be done.

Balsa fins are most expensive. Plywood, 1/16" and 1/8", is cheaper and stronger. For attachments, sand off the glassene covering, and use the "pin hole rivet" method (outlined in this month's "Dear Mr. Know-It-All). Body tubes should be heavy walled, up to 40/1000 thick. Chris noted by coating the edges with Hot Stuff, you stop peeling and make the edges sandable for perfect joints.

In the glue department, Chris recommended epoxy exclusively. He uses any high quality brand and stocks both five and thirty minute varieties in his workshop. Titebond is out completely in this power class.

High power rockets really abuse their recovery systems. Take extra care in making sure your recovery system can take it. For strong shock cord mounts, attach the cord to a bulkhead or use lots of epoxy. Spreading out the forces over a large area is the key to getting the mount to hold up. Oddly enough, I found out model airplane control line cable, something I would have though could take this sort of abuse, burns fairly readily!

Another tip was to tie your nose cones in payload sections on. If they pop off due to recovery forces, you'll get your expensive cone back. Also, make that nose cone fit on tight. The burnout deceleration forces are much higher on the big birds.

Bunny stepped up next with his infamous **Plastic Model Conversion** group. Bunny stressed reliability throughout. Select a model that can be stabilized, that gives you room for a recovery system and doesn't weigh too much. Take time and care in building the model. Fill in all seams and paint on an even base coat to provide an even background for color coats. Keep all your spare parts and decals for use on other projects or models. And finally, analyze all your flights, even those that prang. You'll learn something for your next conversion that way.

ROCKETIP - Try filling balsa nose cones with "Hot Stuff". It fills fast and can be sanded mirror smooth.

The workshop/building session for the public was going on at this time. GLAR used "Wizard" kits provided by Estes and build over 60 models during the 3 hour session. Hot Stuff and hot melt glue fillets speeded the process. The flying session for these birdies went off well, too. All in all, for a hectic three hour session, GLAR did a super job, introduced many newcomers to the fun of rocketry, and probably gained several new members.

Tom Pastrick and Carl Luce did a combined session on **Getting Started in Competition** and **Recovery Systems.** I missed this session, catching only the late stages of Tom's discussion on parachute building, folding and packing. Tom's hints and tips are geared toward a standard method of parachute recovery, and are time tested. If you're having problems with parachutes, ask Tommy P. for help.

Dinner intervened at this point, and when the troops returned, it was time for more NASA videos. The now-traditional GLAR "Swap Shop and Manufacturer's Display" then commenced. North Coast Rocketry and Lots of Crafts showed off their respective lines of high power kits and supplies, and that was it for the manufacturers. The rest of GLAR kept cleaning out their basements. (Tom Pastrick was also selling, but he'll never clean his basement out.) You could have gotten some good bargains in kits, supplies and engines. I restrained myself and came back with only two new plastic model kits.

Sunday's efforts were even more relaxed than usual. The videos were shown again. Bunny then went over the recent NAR Board of Trustees' decision to change the model rocket safety code to incorporate higher weight and power limits. Then Vince Bonkowski asked for suggestions and improvements for next year's efforts.

Bullet Bob lived up to his name by getting me door to door in under 4 1/2 hours. All in all, it was a pretty relaxing weekend, I picked up a few bargains and some modeling tips, and I sharpened my pool game in the game room. With some further tweeking and improvements, I suspect MIDCON-IV will be even bigger and better. Don't miss it!

WIND TUNNELS

by Larry Mika

In the aerodynamics business, the wind tunnel is an important research and testing tool. Just what are they and what do they do?

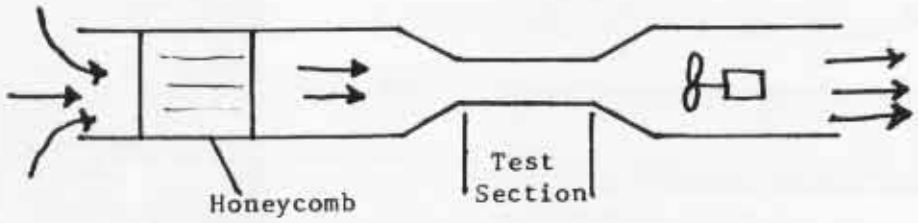
A wind tunnel is a device which blows air over a model at a controlled temperature, density and velocity. There are balances attached to the model to measure lift and drag. The model is located in a test section which is completely enclosed and in which the air is very "clean". "Clean" air has low turbulence and fairly uniform flow. The data is collected and reduced by computer, and in advanced tunnels, the computer controls the other variables such as angle of attack, and boundary layer simulation.

There are two general categories of tunnels, testing and research. The testing tunnels are for studying a final design. The air quality is lower than that of research tunnels, but testing tunnels are usually larger.

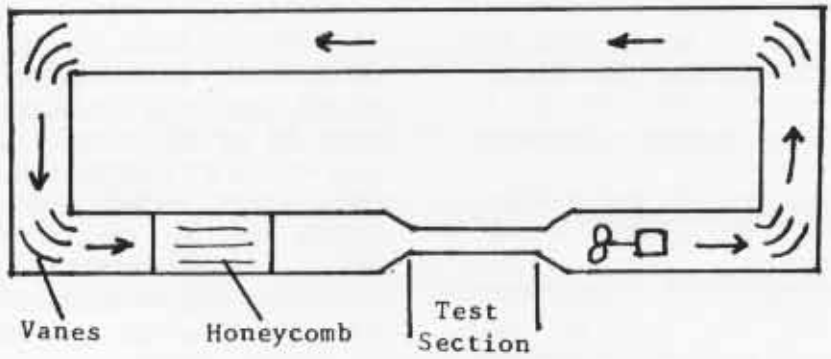
There are three basic types of tunnels: **open/closed return, blowdown/suckdown, and shock tube.** All can be seen in the explanatory diagrams. The return tunnels are self explanatory. The open return wastes power by expelling fast air to the surroundings. At the corners of the closed return, there are straightening devices. There are curved vanes which turn the air, then honeycombs which remove turbulence and vorticity (good news), but which reduce flow velocity (bad news). I saw tunnels where the honeycombs were just thousands of small drinking straws packed between the walls from top

Types of Tunnels

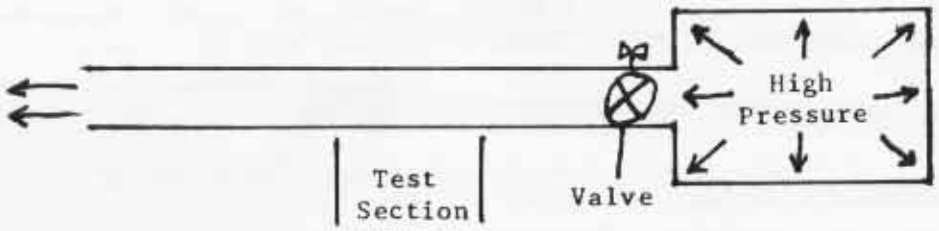
OPEN RETURN



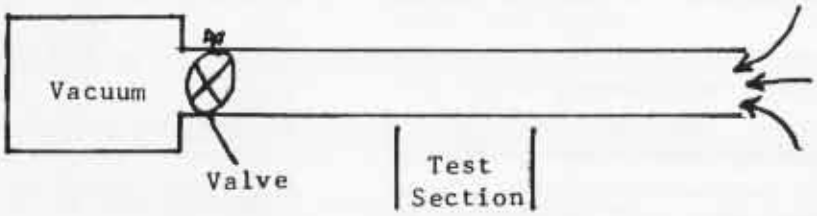
CLOSED RETURN



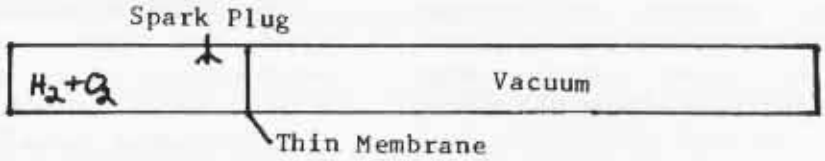
BLOWDOWN



SUCKDOWN



SHOCK TUBE



to bottom. The professor who led me around said that graduate students perfectly placed all those straws. What a job!

The blowdown/suckdown tunnels account for most of the supersonic wind tunnels. In the reservoir, there is either a high vacuum or high pressure, depending on the type. When the valve is opened, the air rushes either into the vacuum (suckdown) or to the atmosphere (blowdown). An interesting fact is the blowdown tunnel can operate longer at higher velocities with a given amount of air. That's because the mass flow rate decreases as velocity increases.
Blowdown/suckdown tunnels require an hour or more to charge up between tests.

The third type is the most rare. The shock tube tunnels were used to test Mercury capsules in the early space race days. On one side of the thin membrane is a mixture of hydrogen and oxygen; on the other is a partial vacuum. The membrane can be anything from Saran Wrap to 1/8" thick aluminum, depending on the tunnel size and velocity requirements. The spark plug causes the hydrogen-oxygen mixture to explode, rupturing the membrane, and the high velocity shock wave goes down the tunnel. All the measurements must be taken before the shock wave bounces back. So shock tunnels are very long, often over 200 feet.

I hope this article has helped you better understand how wind tunnels operate, and what they do. Tunnel testing is extremely important in designing aircraft, spacecraft, rockets, automobiles, and skyscrapers. Haven't you ever been downtown on a windy day and wished there had been more tunnel testing on the Hancock and Sears Tower buildings?

DEAR MR. KNOW-IT-ALL
by Larry Mika

Dear Mr. Know-It-All: How can I keep the fins from jumping off my high power birds?

Well, Rocky, I have a few tricks up my sleve for you. Fins shread due to high shear stresses at the root edge. The stress is a result of vibrations and fin drag, and it can break either the glue or the fin. You can reduce the shear stresses by increasing the area of contact at the fin root.

You can do this by increasing the length or thickness of the fins, any by using thicker fillets. Remember, the fillets must bond to the body tube and fins. Use a double titebond glue joint, then fillet several times until the fillets are about 1/8" thick. If you use epoxy, you must do it all at once, because two coats won't bond to each other.

Another way to try is the "rivet" method. Poke tiny pin holes in the body tube along the fin and fillet lines. When glue runs through the holes, a tiny rivet forms to hold the fin attached. Also, use a razor blade to make shallow diagonal cuts in the fin root. These two steps give more area for the glue to bond.

My favorite technique is to slit the outside body tube, and glue the fins directly to the motor tube. (See FPSM plans in the Jan./Feb. 1985 issue.) This forms sort of an "I beam", and is very strong.

Remember, Rocky, it's **stress**, force divided by area, that causes failure, not just force. So increasing the fin root area decreases stress and your fins stay on!

Get all your burning questions to me!!!

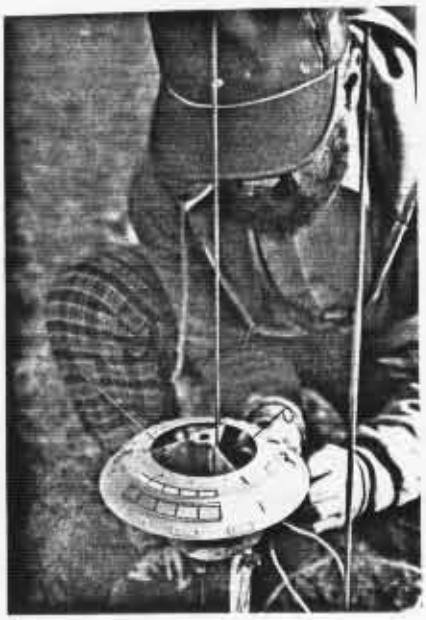
NARAM-27 CD Scott Hunsicker passed along the final NARAM-27 rates list to us recently. For a NARAM centered around a commercial hotel, these prices are really great.

Rooms will be $30 for a single, $35 for a double, $38 for a triple and $40 for a quad, per night. You'll also have to pay some 9% motel tax on top of that. But still, it works out to about $10 per night for a motel, folks. Clean sheets every night!!!

For those who don't want to sample the "NASA strip" resturants outside the JSC, a $60 meal package is available. That's three square ones a day and you don't have to tip. There's also going to be a special Texas style "all you can eat" barbeque for Wednesday night. The Awards Banquet is also an all you can eat affair!

Entry fees are $30 per person, and $35 per team plus $5 per team member. If you only want to go to the National Convention (Nat-Con 85), the fee is $20. Claude Greenlee set a goal of $5,000 in door prizes as well. So get the lead out and get down to the 27th Nationals.

Air fare from Chicago is running around $150 for a round trip, and I'll bet someone is going to come up with a fare lower than that. For less than $300, you can go to the best model rocket event in the land. So start making plans today.



ESTES FLYING SAUCER
A Product Review
by Tom Pastrick

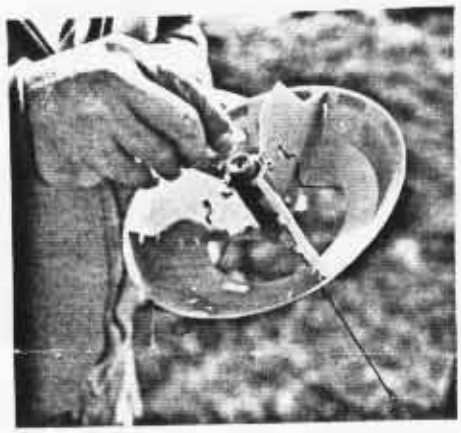
This new kit from Estes closely resembles the former Centuri **U.F.O.**. After a closer examination, several major differences appear.

Firstly, this thing is made almost entirely of plastic. The Centuri version was nearly all paper. The landing antennae are made of wire, as were the Centuri devices. And easy to build? You bet! It's made up of only 10 parts, and only six of those require gluing. It's so easy to build that you can put one together in about 15 minutes. You should let the plastic glue dry overnight for stronger joints. Add six stick-on decorations, and you're ready to fly.

Getting ready to fly is also easy. Your launch lugs are built into the molding. Insert your engine, twist on the engine retainer, insert a Solar igniter and place the model on the pad. The model flies with C6-0 boosters.

Flight characteristics make the **Saucer** nice for beginners and demo launches. It takes off slowly, climbs slowly to a low altitude, puffs its ejection charge, rolls over inverted, and floats slowly to the ground close by the launcher. No long chases on windy days! The **Saucer** is smaller than the older Centuri U.F.O., but weighs more due to the plastic. These two things offset one another to give both models similar flights.

While Estes rates this kit as a "Skill Level 2", I's call it a "Skill Level 1/2"! The real fun is in flying, not building this model.



MISSILES:
Warbirds Illustrated No. 12
by Michael J.H. Taylor
A book review by Ric Gaff

When it comes to books on space and rockets, I have a real weakness. It's almost impossible for me to pass one by! Even a book like "Missiles".

"Missiles" is a thin (68 pages), expensive ($12.95) photobook that is long on photos and short on information. This makes it not unlike Janes "Book of Missiles". There are a number of very good shots. For instance, there's an unusual rear view liftoff photo of an "up-side down" Bomarc. Unfortunatly, most of the photos are of the ordinary "I've-seen-that-before" variety. Typically, it's the airborne missiles that get a short shift since they are usually shown attached to some darn airplane. (Watch it, Gaff. Those "darn" planes can level your trailer. - Bunny) Little detail can be seen on the rocket. Since this book was written for people with a general interest in war machines and not for rocket nuts, this really isn't too surprising.

Most of the photos are B/W with four pages of color photos. Of the color photos, only the liftoff shots of a Regulus II and a Pershing 1-A were of any interest.

The layout of the book is also a bit of a mess, jumping from tactical to strategic to airborne to naval to antitank missiles without so much as a by-your-leave. This is primarily due to its small size, trying to pack as much as possible into as little space as possible.

If your like me, (my condolances), you MIGHT want to buy this book. If you're looking for information, then give this book a pass.

NIRA'S CLUB LIBRARY
by Ric Gaff

MODEL ROCKET LAUNCH SYSTEMS by Robert L. Cannon: An easy to follow introduction to basic electrical circuits and how it applies to launch control systems. Well illustated and partly done in a question and answer format. A painless intro to Ohms law. Excellent!

MODEL ROCKET STUDY GUIDE, TR-8: A step-by-step guide to develop basic and advanced rocket building skills. As name states this is a guide and requires additional materials to be affective for an individual. While some of this is obsolete (use of models no longer made by Estes) and may cause some confusion, it is still a good outline and has several very good glossaries.

LEADING EDGE CLASSIFIED ADS

FOR SALE---OLD MOTORS

What happens to rocket motors when they go out of production or the company folds? Why, they become valuable collectors items! I have a number of out-of-production model rocket motors that are surplus to my own collection. Start or add to your collection with some of the bargains I've got for you! Centuri and MPC mini-B's, MPC and Cox D's just to name a few. A complete list is available. See below for address.

FOUR SALE MICROPROCESSOR COURSES

Heathkit microprocessor courses with completely wired trainer and expansion accessory. List prices over $1000.00. Yours for $500.00. I will negotiate and/or break up set. Courses are 6800 based. See below for address.

ROCKETIP - Always wash plastic parts before gluing or painting. There is a small amount of lubricating release agent on plastic which prevents good adhesion.

FOUR SALE SCIENCE FICTION MAGAZINES

Over 400 Science Fiction magazines published over the last 20 years. **Analog, S&SF, IF, Galaxy, IA'sSFm,** and many more. Also a large number of fanzines. Prefer to sell entire set but will break up. $200.00 or best offer. List available. See below for address.

CRAZY GAFF'S PLASTIC MODEL SALE CONTINUES!!!

Buy them before he gets well!! MAKE ME AN OFFER I CAN'T REFUSE!!

REVELL (a) Tranquility Base in 1/48 scale, not "History Maker" series - $20.00. (b) Nike-Hercules ("History Maker") - $7. (c) Bomarc ("History Maker"), 1/47 scale - $7. (d) F16A Fighter, 1/72 scale - $10. (e) F-15E Strike Eagle, 1/32 scale - $12. (f) Columbia with booster rockets, 1/144 scale - $10. (g) SR-71 Blackbird, 1/72 scale - $5. (h) F-14A Tomcat, 1/32 scale - $10. (i) Douglas X-3 Stiletto - $3. (j) Saturn V ("History Maker", partially assembled), 1/144 scale - $20. (k) F18A Hornet, 1/48 scale - $5.

MONOGRAM (a)Marauder (Buck Rogers) - $4. (b) Space Shuttle, 1/72 scale - $10. **AMT** Apollo Spacecraft, 1/200 scale - $5. **RENWAL** Nike missile and launcher, two at $10 each.

LINDBERG (a) Star Probe-Space Shuttle for $10. (b) Star probe-USS Explorer - $10. (c) Mars Probe-Landing Module (oldie) - $20.

Everything must go!

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Vol. 5, No. 3,6. (1982)
Vol. 6, No. 1,3,4,6. (1983)
Vol. 7, No. 1,3,5,6. (1984)
Vol. 8, No. 1. (1985)
NARAM ISSUE 1983, 1984

Back issues are $.50 each. Now is the time to complete (or start) your collection of "tLE". Some issues in short supply.

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CONGRATULATIONS TO BUNNY AND BARB FROM NIRA

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