

STAR NEWS

June/July, 1988

THE LEADER IN SPACEMODELING

\$2.50

WHY IS THIS MAN SMILING?



Model Rocketry's Longest Publishing, Most Controversial Newsletter!

June/July 1988

Volume 14, Number 4



"I Want to Be Elected!!!"

Elected by Alice Cooper

It's that time of the year again! Election fever is gripping the nation! And, this year, even the NAR has caught the fever, with the upcoming Trustee elections.

It is so hard to decide who will make a good trustee and who is just an asshole. To make it easier for you, we've narrowed down the field to tell you a little about the "good" trustees and the "others". As usual, SNOAR NEWS is the only publication that will "tell it like it is".

Here's who we think you should vote for:
 Matt Steele: Well, OK, that's obvious.
 Chas Russell: Another obvious choice.
 Vern Estes: A guy who knows the hobby from the very first days.

(Continued on page 17)

Da Credits

QUOTABLE

"Him... if we didn't supposed to complain about NAR volunteers, Manning Butterworth would still be in charge!"

"Well, maybe that wouldn't have been so bad!"
 Overheard after the last SNOAR NEWS editorial.

COVER STORY:

Why is this man smiling? Because he reads SNOAR NEWS! Tom Beach holds his "Mr. Roboto" flying spaceman at NARAM 29. Matt Steele photo.

CREDITS:

Da Godfather: JD "Big Tony" McNeil; Da Family Leader: Matt "Steel Tony" Steele; "Da Moll": Robyn "Toni" Steele; "Da Enforcers": Chris "Norton Tony" Pearson, George "Big Tony" Gassaway, Mr. "Mr. Tony" Maddog; Da "Family": Chas "GLCM Tony" Russell, Vince "NASA-Marshall Tony" Haegele, Chris "NASA-Lewis" Johnston, Dan "Tony Mix" Kafun, Bob "Tony Bob" Ferrante, Lee "Tony O" Olyniec, Jason "Tony the Clown" Haynes, Randy "Bloody Tony" Redd, Gary "Tony the Horse" Price, Terry "Cosine

Tony" Lee, Randy "Tony the K" Kelling, Mary "Estes Tony" Roberts, Fred "MRC Tony" Fisher, Marty "Boccephus Tony" Williams, J. Pat "Da Law" Miller, Wayne "Crocodile Tony" Hendricks, Jack "Tony Mac" Kobzeff, Wasco "Tony the Shaft" Schafter, Heidi "Tony Smack" Smakula, Kukla, Fran, and Offie.2

IMPORTANT STUFF

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 Death to the Imperial IBM Army!

Radio Transmitters and Rocketry

By John Fleischer and Chris Pearson

Introduction

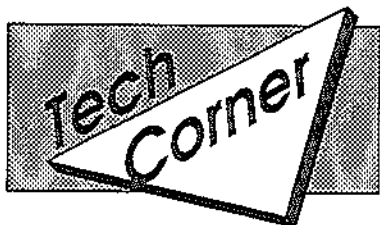
Many of us at one time or another have felt the urge to fly rocket electronics.

Perhaps this urge has been directed to radio controlled gliders, or perhaps in the direction of telemetry transmitters. Some rocketeers have developed sophisticated on-board computer systems, video cameras and TV transmitters, or they may have been as bare-bones as a directional finder. One must first reason why you want to engage in this endeavor, as it can be both time consuming and costly.

This report traces the history of early radio-transmitters, gives an overview of many of the then popular designs and suggests possible variations of certain current transmitters.

Overview of Past Transmitters

G. Harry Stine's Handbook of Model Rocketry contained a telemetry transmitter schematic using typical 1960's circuitry. Unless he has updated the section, the current edition still carries the same schematic. Anyone attempting to build these devices will be in for a

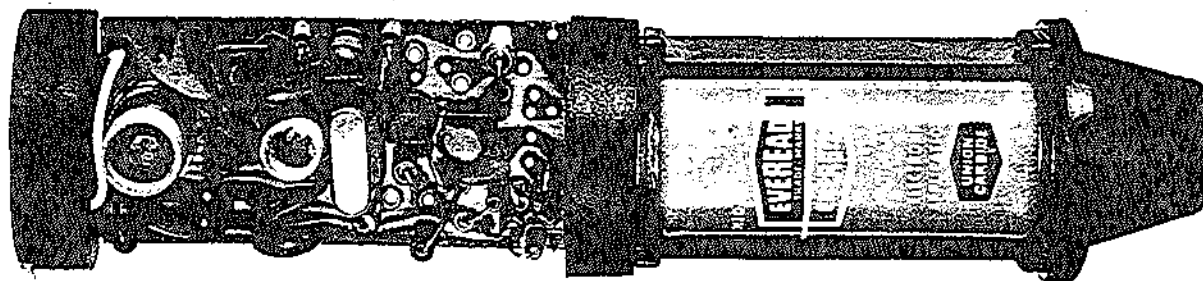


rude shock. Many of the parts listed are no longer manufactured, being obsolete technology. In addition, the transmitters simply didn't work, even when constructed correctly, with all the listed components. Dick Fox (of Foxmitter fame) once commented that it was this design that motivated him to design the transmitter that bears his name....he needed a transmitter that worked! Well...sometimes published designs are hard to get working correctly!

Early in the 70's, while they were still producing "Safe, Scientific and Sure" items, Estes Industries introduced the Transroc. It was an interesting concept, but all in all an exercise in futility (Figures 1 and 2). Employing an archaic UJT (Unijunction Transistor) oscillator, coupled with unnecessary transformers; with few meaningful or available sensors; this device lasted only a few years before being taken off the market. Estes obviously had the capability to make and sell a decent transmitter...but perhaps the average 14 year old rocketeer just doesn't want one.

Let's not forget MITS (Micro-Instrumentation and Telemetry Systems). This company, backed by Forrest Mims (to this day a well known Radio-Electronics author and writer), briefly sold a line of aerospace grade transmitters and sensors. Being overkill in both design and construction to the extreme, the rocket products were cancelled. MITS went on to build the ALTAIR, the first hobbyist microcomputer in 1975; and the rest

Figure 1: The Estes Transroc



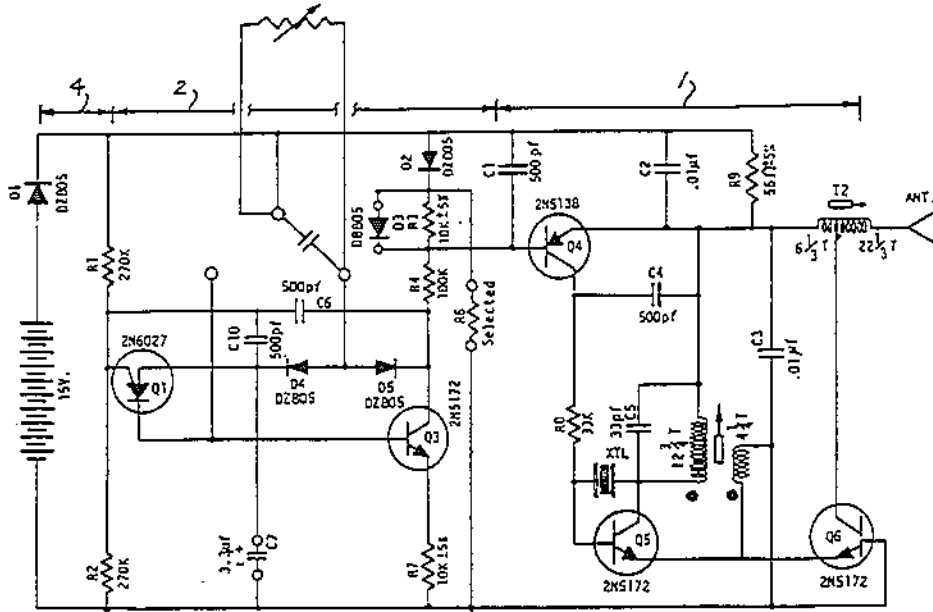
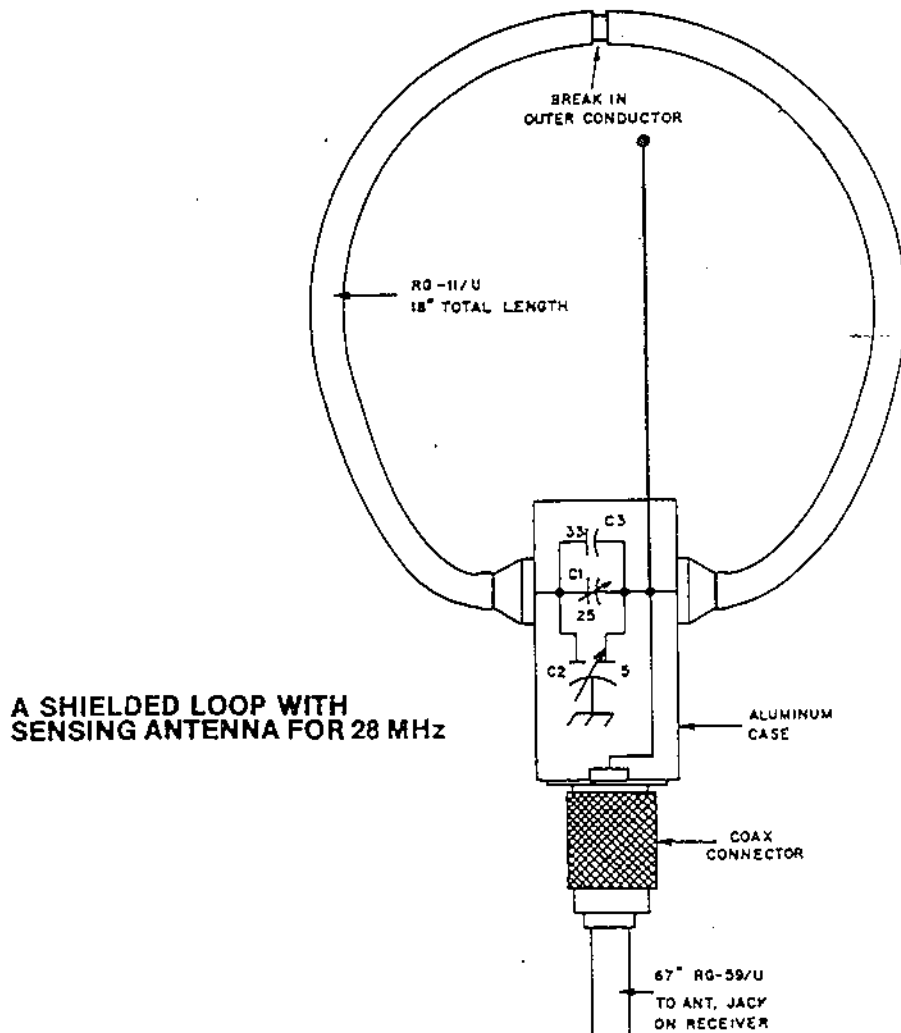


Figure 2: The Estes Transroc Schematic

Figure 3: A Directional Antenna



A SHIELDED LOOP WITH SENSING ANTENNA FOR 28 MHz

67" RG-59/U TO ANT. JACK ON RECEIVER

is history. The S100 bus standard they started was determined by a good surplus buy of 100 pin edge connectors (computer trivia!).

Applications

Who wants a radio-transmitter in their rocket anyway? The first application is as a homing beacon. Rockets are notorious for getting lost a mile or so down-range in a swamp, jungle, rain-forest (or that worst case scenario, ten foot high CORN!). Being small (relative to the landscape) and difficult to find, many rockets remain lost forever. This can be a real downer, especially if you are flying a megabuck rocket, full of expensive electronic payloads such as a camcorder or such. Installing a transmitter (such as the North Coast Rocketry XMTR-1) and a nine volt battery in the rocket's payload section, will allow you to "home-in" on the radio transmitter in the rocket if the vehicle is lost to sight. The area in which a transmitter will really shine on is directional finding from a great distance (up to a mile away). The trend for larger rockets has been to install a audible tone generator (ala SonoRoc) to allow locating. The problem with a SonoRoc is its relative short range (usually less than 100 feet). A radio-transmitter such as the XMTR-1 will enable you to locate the vehicle in almost any sort of terrain with ease. An optional radio directional finding antenna (RDF) (shown in Figure 3) can be built and used (if the walkie-talkie has a signal strength meter) for more precise and rapid location finding. North Coast Rocketry will be offering a Radio-Directional Finding Antenna (RDF-1) to be used with walkie-talkies and the XMTR-1 or XMTR-2.

Another application of radio transmitters in rocketry is telemetry transmission; that is, the sending of data to a remote receiver. (See Figure 4) Any physical

parameter, such as temperature, spin-rate, acceleration, etc., which can be translated into an electrical value by a transducer may be transmitted. The received data can then be processed by a computer, or displayed on a chart recorder. Some enterprising rocketeers have launched a mouse with a heart-beat and breathing sensors attached and monitored flight pressures on the animal. Launching animals is not recommended for any purpose and is against the NAR/HIAA Safety Code. The variable to be transmitted (physical parameter) is input into a modulator which impresses it on a RF carrier, which in turn is generated by a crystal-controlled RF oscillator. The parameter may be as simple as a pulsing audio tone (XMTR-1) for use as a location finding beacon. More complex, rapidly changing variables can also be transmitted. It is even possible to send multiple parameters by using a "time-division multiplex" process, which, of course, has to be sorted out by the ground receiver.

Basic Transmitter Design

The basic RF oscillator used in the Stine, Estes, Fox and other transmitters is the Pierce configuration (shown in Figure 5). This circuit generates a constant RF carrier frequency whose exact value is determined by a quartz (T) crystal. Typically 27 megahertz, this carrier must be modulated in order to send data. Various modulator schemes exist, all are basically audio oscillators which either switch the RF oscillator on and off at the audio rate, or cause the audio to "ride" on the carrier (Amplitude Modulation). The modulator is also a "signal-conditioner" designed to accept the transducer output. Some sensors, such as thermocouples or strain gauges, are a challenge to interface. The modulator may be a VCO (Voltage Controlled Oscillator), which shifts frequency in response to changing input voltage. Whatever "scaling" of units/frequency shift that is employed in your individual transmitter, the reverse operation must be performed at the ground station in order to "read" the temperature, acceleration, etc.

Figure 4: Simple Data Transmitter

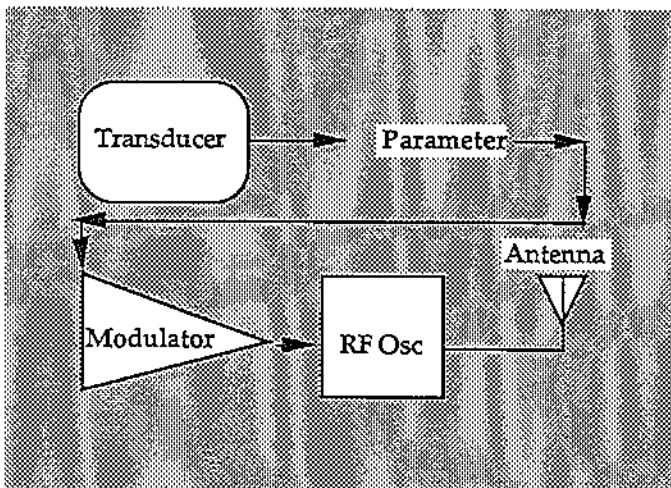
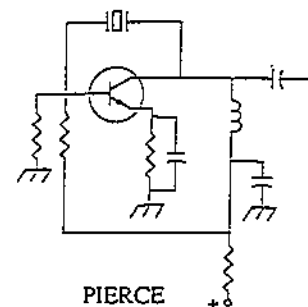


Figure 5: Pierce Configuration Oscillator



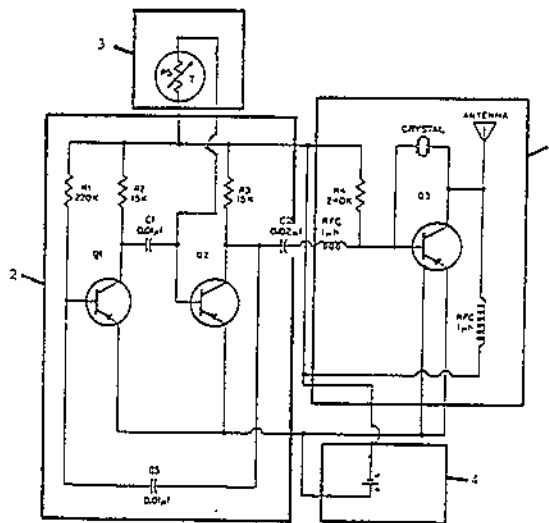
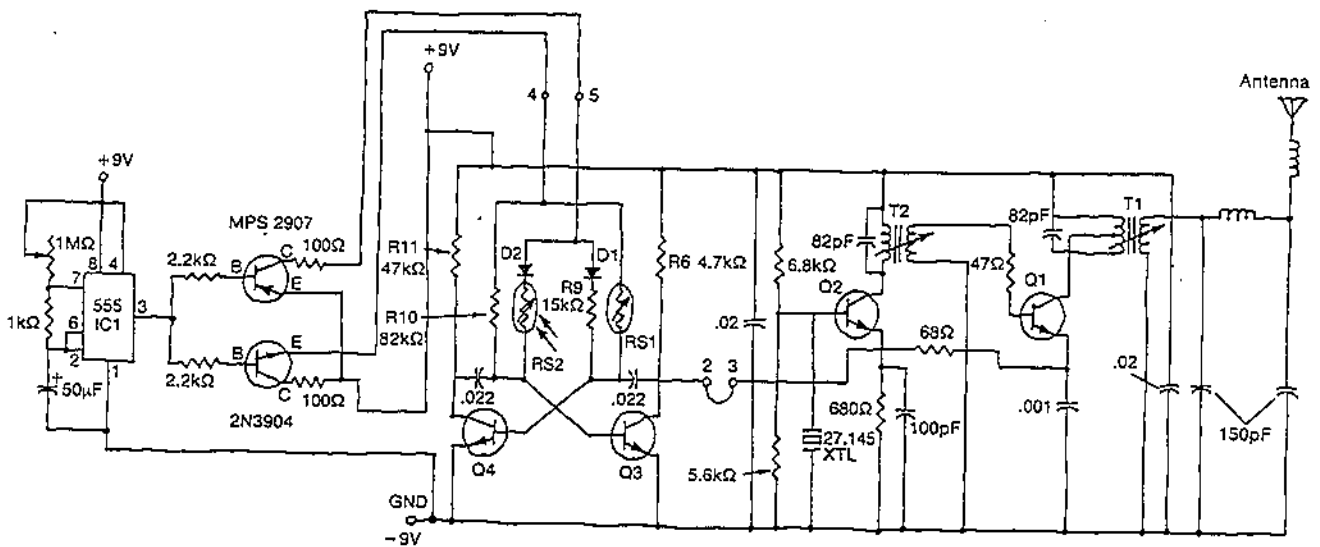


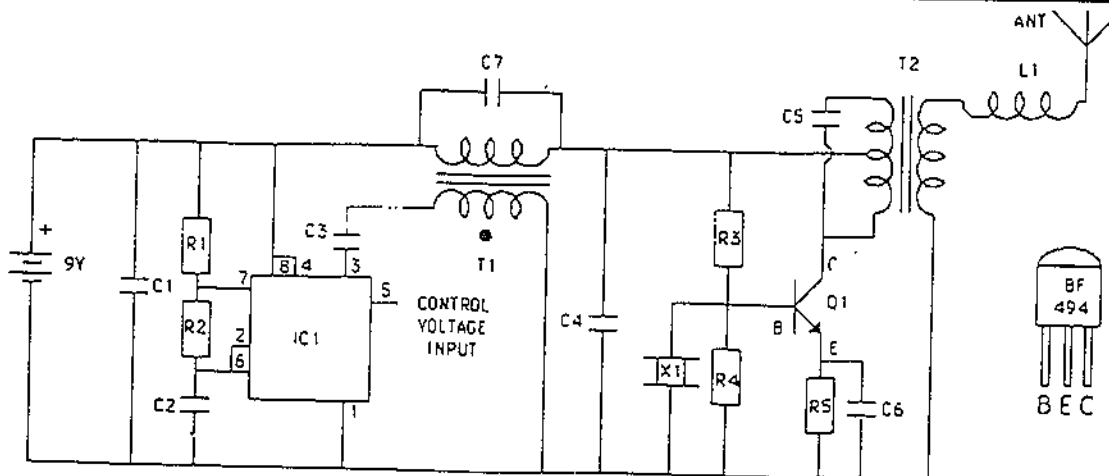
Figure 6 (Above): A simple transmitter design by Dave Babulski
 Figure 7 (Below): Another design by Dave Babulski



RS1 is a class bead thermistor rated at 82kΩ at 20 degrees centigrade.

RS2 is a CdS photocell, 276-116.

Figure 8 (Below): A transmitter design by Mike Gasperi



Transmitter Configurations

The simple transmitter design shown on the next page (Figure 6) was configured by Dave Babulski, and it shows how simple a sensor/modulator/RF oscillator circuit can be, as it has only three transistors! Greater complexity is necessary to insure high accuracy and operation over a wide temperature range without component value drift, and for versatility in the connection to different sensors.

The next Babulski example (Figure 7) shows a modification of a Radio Shack RC Control Module. This idea is hardly practical due to the low power output of the finished unit. Other than that (actually a major consideration), the unit has a couple of notable obsolete features. The Q3/Q4 multivibrator (Oscillator) dates back to the 1950's; and the use of two transformers is unnecessary, as direct coupling of stages is possible with OPAMP/logic impedance matching/buffering. The thermistor sensor to measure temperature is pretty typical, but how about using an electronic barometer to measure altitude? Well, read on!

Another "chop job" was described in an article in *American Spacemodeling*, authored by Michael Gasperi (Figure 8). This article hypes the 49 Mhz band as the best, but from our experiments, channel 35 on the 27 Mhz band seems to be the quietest. Again, a Radio Shack unit, the "Micro-Thin" walkie-talkie is modified (or used for parts). The unit has two transformers in the circuit which are really a poor design. With this unit, a steady tone is sent. The use of a 555 oscillator is the circuit's only good point.

Currently Available Transmitters

NCR currently offers two transmitters for hobby use. The XMTR-1 is a general purpose tracking transmitter for use in "must return" models. It is light, heavy duty, and relatively cheap. It also sends a pulsing tone, which is easier to track, and uses no bulky, hard to specify, costly transformers. Figure 9 shows a full size scan of the XMTR-1.

NCR also supplies the XMTR-2 barometric altimeter transmitter and DSPL-1 readout computer which displays the altitude in 50 foot increments. This advanced system uses modern circuit design techniques (no transformers!), components on an actual printed circuit board (no wire wraps), and may be encapsulated in RTV 700 silicone for those really rough flights. A SENSYM pressure sensor (a strain gauge with a vacuum reference cavity) is interfaced with an OPAMP buffer to a voltage/frequency converted, which drives the modulator and RF oscillator. At ground level, a constant tone of about 4 KHz is sent to the ground receiver (Figure 10). As the altitude increases, the tone decreases in frequency by a precise amount.

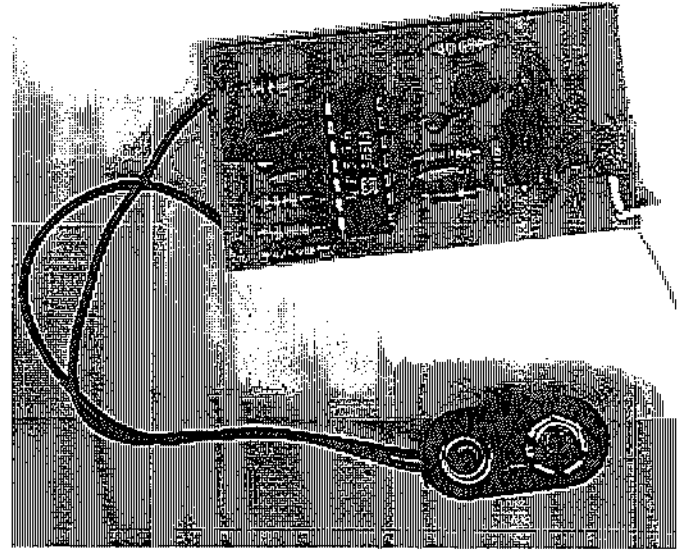


Figure 9: XMTR-1, full size)

The RF oscillator has power adequate for good range with high-power models. Eight minutes after turn-on, a pulsing tone beacon is activated, to save on battery power and to act as a homing beacon.

The DSPL-1 computer display unit converts the tone shift into altitude data, and displays it on a liquid

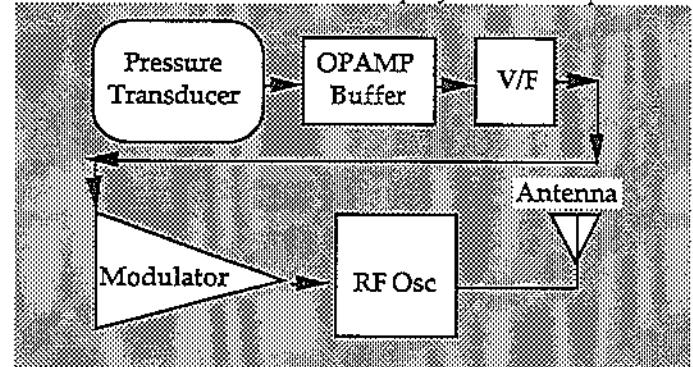


Figure 8: XMTR-2 Configuration

crystal display on the front of the unit. The altitude data can be recorded on an audio cassette recorder and saved for later playback into the DSPL-1. This allows better determination of flight parameters. Upgrades to the system are being developed.

Conclusion

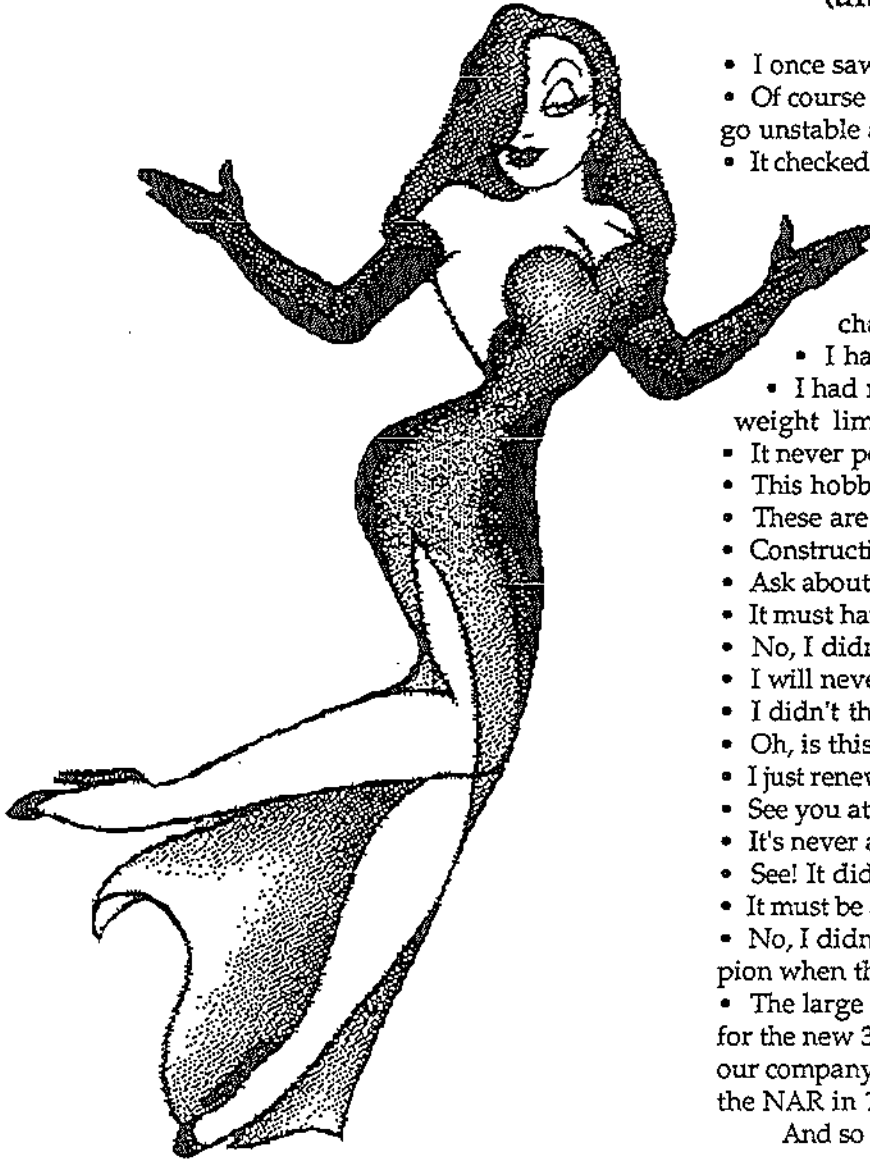
Model rocketry telemetering has come a long way from the Stine transmitter, to the XMTR-2. Perhaps the future holds more excitement, as full wave (2 way) telemetry may be the "wave" of the future!

This is North Coast Rocketry Technical Report #7, ©1988 by NCR, and is reprinted as a courtesy to SNOAR NEWS readers.

Jessica Rabbit, World Famous Cartoon Character, Reveals...

Common Lies In Model Rocketry

(and other Modern Myths)



- I once saw Pat Miller fly a rocket.
- Of course I added noseweight. I wouldn't want it to go unstable again!
- It checked out on the computer.
 - Of course I have an FAA waiver!
 - Of course we have insurance!
 - Boy! It was stable last time.
 - Uh, sure, I have the center of pressure charts here somewhere.
 - I had no idea it was over the weight limit.
 - I had no idea it was over the propellant weight limit.
- It never penetrated the roof of a building before!
- This hobby is safe and scientific. Sure!
- These are available *only* from..
- Construction is simple!
- Ask about our easy payment plan.
- It must have gone into orbit.
- No, I didn't sleep with Sally Loman.
- I will never be President of the NAR.
- I didn't think that was an H motor!
- Oh, is this an uncertified motor?
- I just renewed my NAR membership.
- See you at the next contest.
- It's never any fun for wives at a NARAM.
- See! It didn't cost that much!
- It must be a bad motor.
- No, I didn't mean to imply I was a national champion when the club won the section championship.
- The large Sport Line is the very first line of rockets for the new 3.3 lb. model rocket limits proposed by our company (U. S. Rockets) in 1981 and adopted by the NAR in 1986

And so it goes!

Big Poll Results Are Out!

A combined nationwide Gallup/Harris poll recently revealed that if the 1988 NAR Trustee election were held tomorrow, most people wouldn't vote, because they aren't NAR members!

Sorry, that one's been hanging around here for months, just waiting to fill up this space. It didn't do a very good job, did it? I mean, it isn't very long, is it? And, it's not so funny that you're rolling on the floor laughing right now, are you? That's the problems with these fancy computers is that they can make things easier, but they can't make things funnier. Hey, did I ever tell you about the time Orville and I were with these two broads who.....

From the Maddog/Fatcat Team design notebook:

LITTLE JON II

A dual egglofter from the seventies that's now an Estes kitbash!

LITTLE JON II is a strong, reliable dual egglofter that's easy to build and fly. And for those very reasons, it was a staple of the old Maddog/Fatcat Team's contest fleet. Now that Estes has re-released the blow-molded Enerjet/Centuri Egg Crate capsule, you too, can win friends and influence people by building and flying your very own LITTLE JON II.

In addition to the Estes EGGSPRESS kit, you'll need some 1/16" plywood fin stock, about 6 feet of 1/8" elastic shock cord, a wire cable shock cord mount (.028" diameter model airplane control cable works fine), a six inch section of tubing for the engine mount (North Coast Rocketry's BT-11 is highly recommended), a 24-30" fabric parachute, some additional shroud line, and some larger launch lugs, since a 3/16" diameter rod (or bigger) is the way to go for heavy, high-powered rockets.

Construction is pretty straight forward, so I'll just hit the highlights.

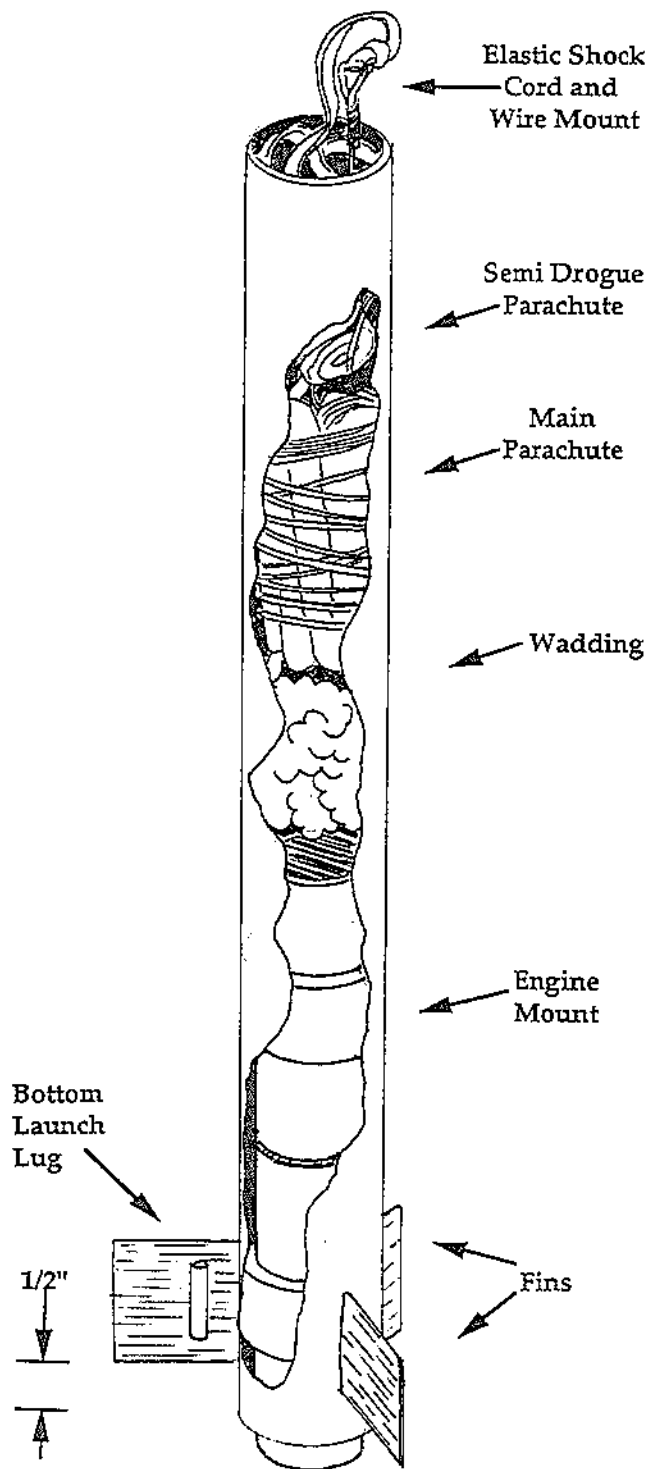
FINS: The small, low-aspect ratio fins cut from 1/16" model aircraft grade plywood should be sanded to a nice airfoil shape. If you're in a hurry, just round the leading and trailing edges. The tips are flat, for the lowest possible drag (so help me it's true!) Attach them to the body tube 1/2 inch from the end with aliphatic resin (Titebond, Elmer's Carpenters Glue, whatever) or epoxy, and add generous fillets. When properly shaped and installed, these fins are damned near indestructible.

ENGINE MOUNT: Wrap masking tape around the engine mount tube one inch from each end until you've achieved a snug slip fit into the main body tube. Smear glue into the edges of these masking tape centering rings and allow to dry before installing the "fail-safe" shock cord mount.

"FAILSAFE" SHOCK CORD MOUNT: Remove a 1/8" section of one centering ring. Wrap the wire cable around the middle of the engine mount tube. Tie the cable loop by wrapping with strong thread around it and secure it with lots of cyanoacrylate glue. Install the engine mount in the main body with epoxy or aliphatic resin.

EGG CAPSULE: Trim the nose cone and adapter sections as shown in the illustration. Use the pattern shown to cut a plywood or balsa bulkhead and glue it in the center of the payload tube.

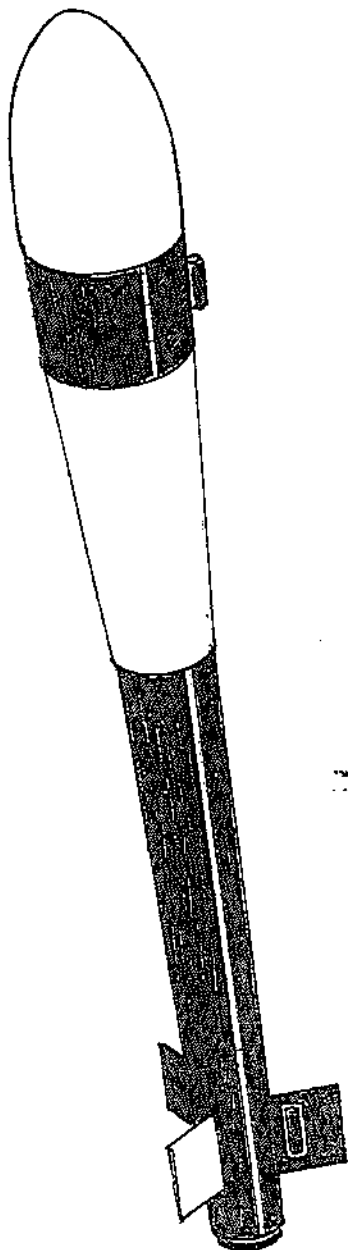
Refer to the drawings for more info.



Mr. Eggloft sez:

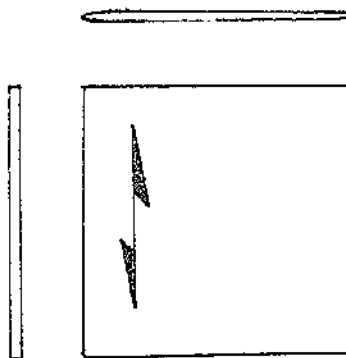


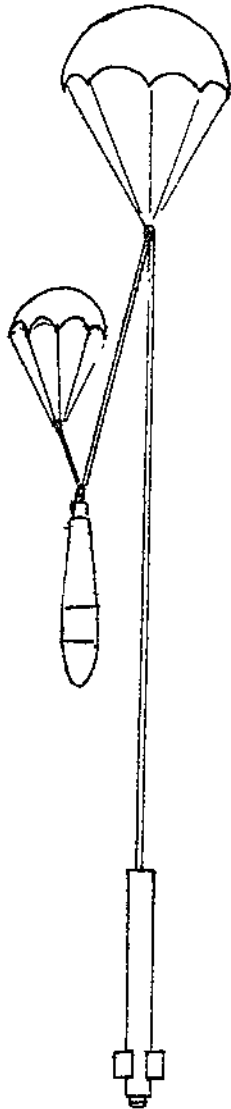
LITTLE JON II



FLYING: The LITTLE JON II will handle just about any engine you can fit into the mount, from black powder (E60's and F100's) to composite power. Just stay away from the low thrust motors such as F7's, E6's et cetera, they just don't have the kick needed to get a heavy bird like this a'flyin' straight.

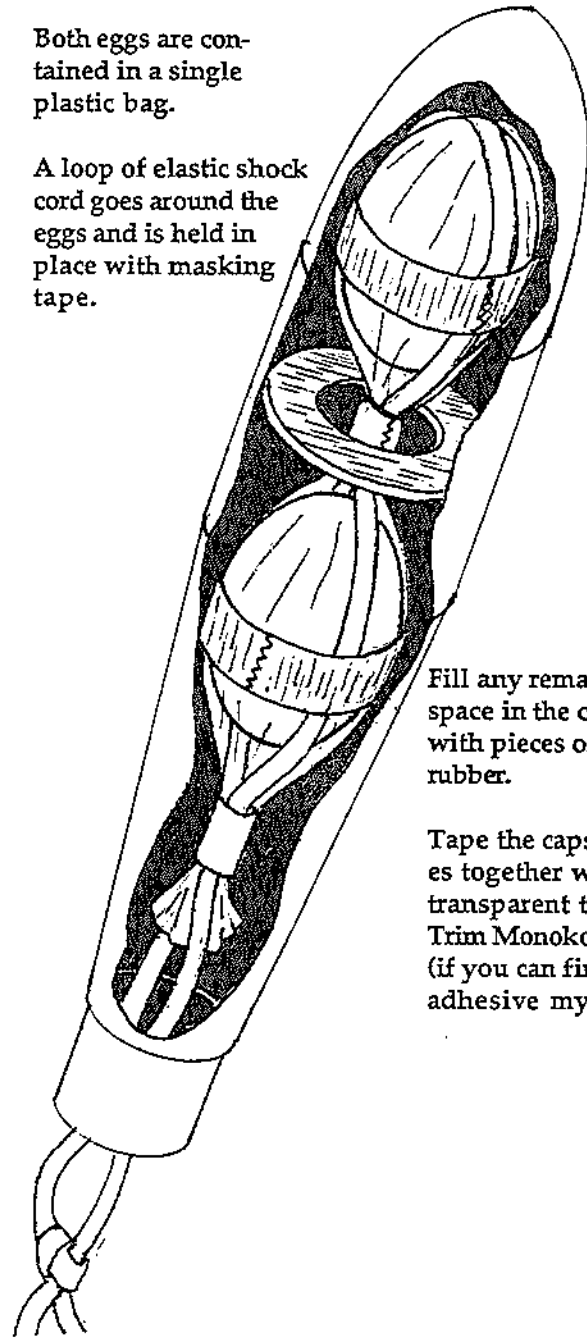
Wrap masking tape around the engine for a very snug fit in the engine mount tube. The LITTLE JON II doesn't have an engine block (so as to accommodate a wide variety of motor lengths), so wrap additional tape around the portion of the motor that sticks out of the model...sort of an external thrust ring, eh?





Both eggs are contained in a single plastic bag.

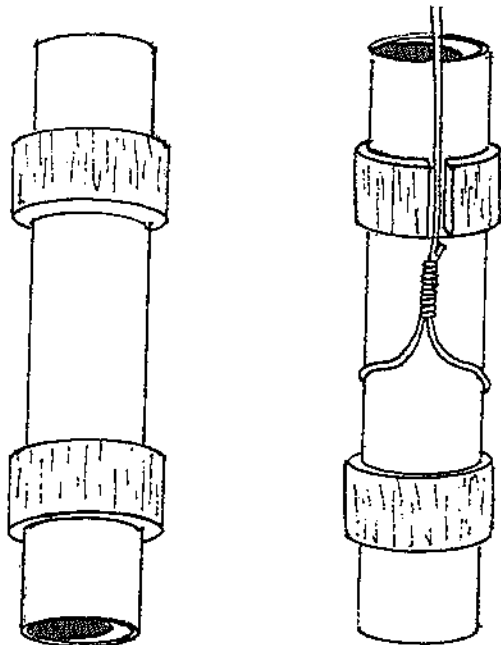
A loop of elastic shock cord goes around the eggs and is held in place with masking tape.



Fill any remaining space in the capsule with pieces of foam rubber.

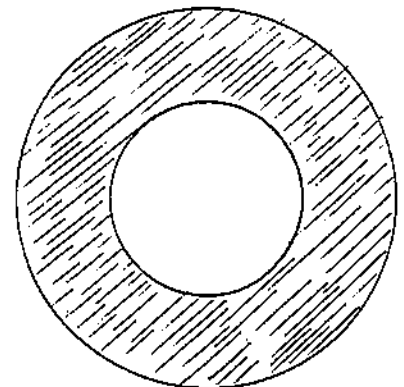
Tape the capsule pieces together with transparent tape, Trim Monokote™ or (if you can find it), adhesive mylar.

Little Jon II uses the semi-drogue parachute recovery system detailed in the April/May 88 SNOAR NEWS.



At Left:
Engine Mount Detail

At Right:
Egg Separation Ring



THE TOP ROCKET SCAMS OF ALL TIME!

by JD McNeil

We've seen 'em come and we've seen 'em go! Over the course of many years, there's been a number of people who have pulled off major "scams" on model rocketeers. Here's some of the better ones! - JD

FLIGHT SYSTEMS'S PULSATORS

First advertised in 1976, and we're still waiting for them! They were supposed two-grain motors that had a unique thrust profile, and had a bad habit of blowing nozzles. FSI 18mm motors have made several cameo appearances in hobby shops in Kansas, but have never been certified by the NAR.

AVI 'GOLD SERIES' MOTORS

Outrageously priced, supposedly "precision" black powder motors with gold spray painted caps. They ranged for the 1/8A (?) to F class. The 1/8A was totally useless except for collector novelty value, and the F motor was only about 60 n-s. The high impulse E and F motors were about 1.3" in diameter. NOBODY made a tube to fit them! The D and E motors were great for Egg Loft, but later versions catoed 100% of the time.

ESTES INDUSTRIES'S CYLON INVADER

Following hot on the heels of the also non-existent Black Hole "Cygnus" kit, the Cylon Invader kit supposedly never made it into a flying prototype in time before the series was cancelled.

US ROCKETS'S "NEAR EARTH ORBITAL PROJECT" (NEOP)

Also known as the Earth Orbital and Earth Sub-Orbital Flight. Jerry Irvine solicited contributions in the range of \$100 to \$1000 for a model rocket technology vehicle which would achieve orbital altitude. Unfortunately, Jerry still hasn't found out that fins don't work well in a vacuum. To the best of our knowledge, no one was duped into contributing money to this farce.

CNA SYSTEMS BANKRUPTCY

Al Celletti offered rocket accessories and electronics for the model rocket community. He opened a computer store, and decided to leave the rocket business. Unfortunately for many modelers with outstanding orders, he took their money with him, as he never filled the orders or refunded the money.

THE AVI" ENCYCLOG"

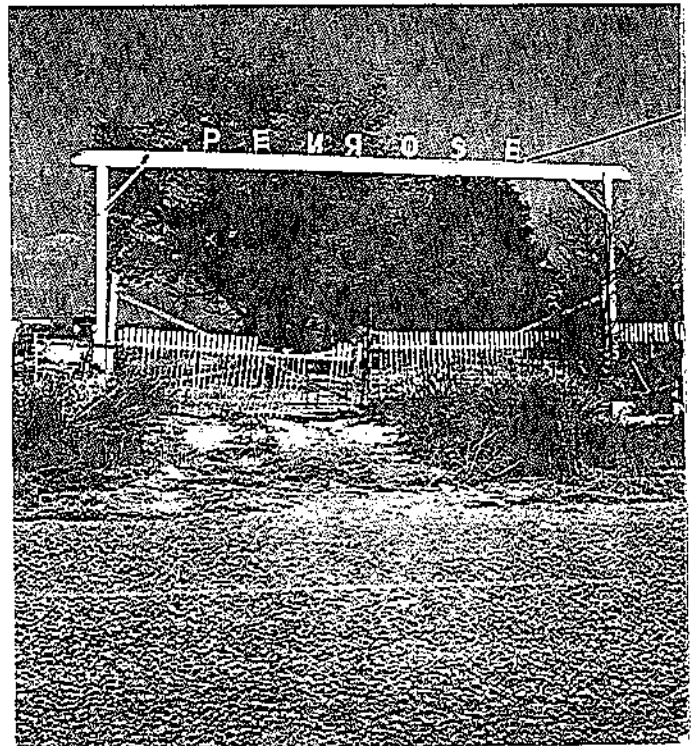
A virtual encyclopedia of rocket, space and science

related goodies, when it was finally published, about two years late, and after the price had more than doubled, it didn't quite live up to expectations nor keep AVI from going belly-up. In it were such never to be seen items as the infamous "Metrix Tubing", a series of telescoping tubes touted as a scale modelers dream. Basically, all we saw in it were old MPC, MRI, Estes and Centuri kits, dollhouses, space-rocks, kites and so on.

ACME ROCKET COMPANY

A product of Grant Boyd, former president of Centuri Engineering Company. Opened as a sideline for his comic book business, they advertised in the Model Rocketeer, later in Am Spam, for more than two years without delivering catalogs. The NAR finally pulled the ad until they filled all backordered catalogs. The "catalog" turned out to be only several xeroxed sheets selling old discontinued products, and "collector" items

Below: Penrose is the Model Rocket Capital of the World???



(at outrageous prices), plastic models, and publications. Acme has shown signs of life recently.

REACTION TECHNOLOGY; LONE STAR ROCKETRY; WHIRLWIND ROCKET MOTORS

Run by Mark Weber and JP O'Connor, this company was only in operation (barely) for one year. They had a nice catalog though. They dropped big bucks into motor development, only to abandon it. It took more than six months to deliver the first orders, only to shut down a few months later. Mark Weber sold the business to O'Conner, and the business later was sold and reopened as Lone Star Rocketry, which had about the same track record, come and gone in one year. Mark Weber later started "Whirlwind Rocket Motor Company" which had the distinction of having the first smoky composite model rocket motor (also known as the worlds largest and heaviest E motor).

HIGH POWER RESEARCH "STINGER" G30 MOTORS

Mike Nelson, sometimes publisher of High Power Research (See further on down in this article for more juicy details), decided it would be neat to start a rocket company (as it was fashionable to do in those early days). So he sold a few kits and tried to market the Stinger G30 motor, the world's only 1.5 inch diameter G motor. A totally brilliant move, which was typical of Nelson. He advertised and took orders (and money) for it before it was even developed. Both Vulcan Systems and Rocket Engineering Company took a look at it and refused to develop it. His kit line (one or two kits) was later distributed by another company.

HIGH POWER RESEARCH MAGAZINE

Mike Nelson also thought it would be neat to publish a rocketry magazine (he figured he could do a better job than Jerry Irvine), although when he started it, he had no high-power experience. It was an advertising driven magazine (read that as "send me some free kits, motors, etc., and I'll write a good review of it"), and turned out to be basically "what me and my friends are flying" and "what and who I think is important". Nice photos but no content. He managed to piss-off most of the manufacturers and a good many high-power flyers, and in recent years has only been publishing 1 or 2 issues a year.

FSI COMPOSITE MOTORS

Advertised several times, and talked about even more often, but never released, FSI negotiated with both AeroTech and Vulcan Systems for motors, and recently with ACS-Reaction Labs, but nothing has been submitted or sold.

US ROCKETS

Need we say more?

What more can be said of the world's greatest rocketry con man. Jerry Irvine will say or do just about anything to make a buck, including sell you the shirt off of his back. It is just unfortunate he decided to use rocketry as a vehicle to do it. He would have made a great used car salesman. His sales methods include advertising product that doesn't exist or he doesn't have. He has also sold kits that have yet to be developed, charged \$8.00 for four catalogs (which are actually just a bunch of xeroxed sheets), and claimed to be a AeroTech and Vulcan Dealer (he is neither). He also

Below: Mike Nelson, proudly displaying a cat of his Stinger G30 motor.



takes 6-12 months to deliver orders, refuses to give refunds, bounces checks off anyone he can (including the NAR, twice!), and takes credit for other peoples work. He claims to be the creator of high-power rocketry, but all he's really done is give the high power manufacturers a black eye. It is best to stay as far away as possible from him or any of his activities.

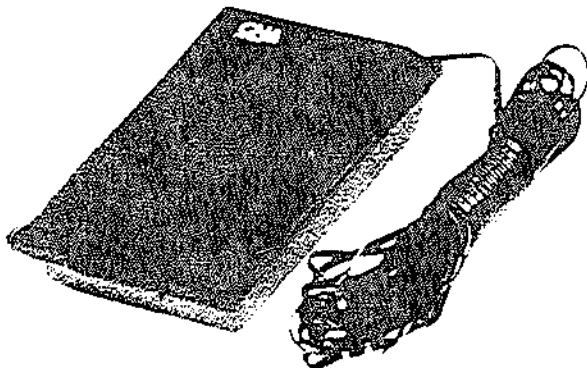
STARGATE FOAM NOSE CONES

These were the predecessor of the North Coast Rocketry 'Aerofoam' nose cone. Larry Broadbent dropped megabucks into their development and then dropped the project. He had at least four other manufacturers lined up to buy the cones once they were in stock. His entire product line suffered a similar fate, doomed by lack of advertising, a general sparse component line, and only two limited release kits. He is currently selling off his stock to US Rockets (cash up front, of course!).

Below: CNA advertised the Digi-Launcher in their catalog, but no one ever saw one.

DIGI-LAUNCHER

The CNA Systems' DIGI-LAUNCHER represents the latest in the series of hand-held digital countdown launch controllers. The DIGI-LAUNCHER utilizes the proven reliability of the MIDI-LAUNCHER circuitry combined with an overall design effect which places the DIGI-LAUNCHER years ahead of the competition. The DIGI-LAUNCHER features a sleek, futuristic case with a flip-top cover to protect the controls and display. Open the cover to view the LED display surrounded by stylish black graphics on a brushed aluminum faceplate. The DIGI-LAUNCHER is the finest hand-held controller available today. One look and you'll understand why. Included with the DIGI-LAUNCHER is a protective carrying case made from the finest imitation Corinthian leather. The DIGI-LAUNCHER, steeped in the tradition of the MAXI-LAUNCHER and CNA Systems' technology.



Operation of the DIGI-LAUNCHER is identical to the popular MIDI-LAUNCHER. Audible continuity and flashbulb ignition capability are standard features. Full "9" to "0" countdown with audible pulsing are also standard. Operates from a single 9 volt alkaline battery. Keeping with the highest standards of operation the DIGI-LAUNCHER is only available from CNA Systems, fully built and tested.

Catalog No. DG-1

CENTURI "ENERJET D21" MOTOR

Slated to be released in the early 1970's, the Enerjet D21 was supposed to be a C sized full D motor. Some were actually made and went into rocketeers hands for testing. They were within two weeks of release, and were never seen again. It was rumored that production

Here's the

big D

ENERJET
A SUBSIDIARY OF CENTURI ENGINEERING CO.
MODEL ROCKET ENGINE

every Model Rocketeer has been waiting for!

A SUBSIDIARY OF CENTURI ENGINEERING CO.

difficulties and higher than expected casing cost prohibited their manufacture. They are among the most desired collectable motor. So desired, in fact, that counterfeits have appeared in circulation.

FLIGHT SYSTEM'S D18 MOTORS

Developed as a response to the need for a mid-range 20 n-s D motor, this was thought to be the problem of lifting large scale models that were too heavy for a D12. They weren't available or certified until NAR-AM-13, and many modelers built scale rockets to take

NOW! YOU CAN ELIMINATE CLUSTERS OF LOW POWERED ENGINES WITH A SINGLE "D" ENGINE OF THE SAME DIAMETER!

The answer is...
ENERJET
 COMPETITION CONTEST WINNING
 ROCKET ENGINES

A NEW DIMENSION IN MODEL ROCKETRY

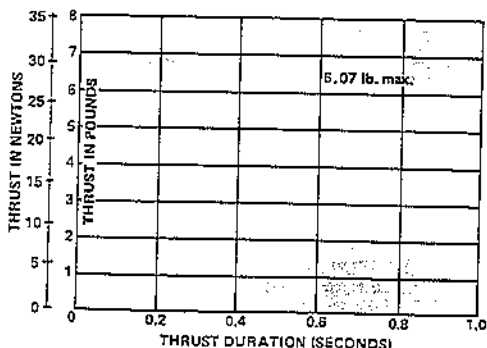
For years, model rocket propellant has been technically limited to a specific impulse of 80 to 90 sec. Now, however, ENERJET offers you a specially developed composite propellant with a specific impulse of 185 to 200. In other words, ENERJET propellant delivers nearly 2½ times more power per ounce of fuel.

What does the ENERJET concept mean to you, the contest minded rocketeer? It means lifting large scale birds with a single 'D' engine no larger in diameter than a standard 'A', 'B', or 'C' engine. Now you can eliminate clusters of lower powered engines — — — thus greatly improving your chances of a stable, straight-up flight. The ENERJET 'D' means "insurance" for a perfect flight and a "first place" in contest events. It means that you can now send those sport rockets higher than you ever dreamed of — — — without having to change engine mounts.

Centuri's ENERJET 'D' is truly a professional engine scaled down to model rocket size. The heart of this engine is the specially developed high energy composite propellant which uses a new space age plastic type binder.

The unique 'D' engine casing is formed of newly developed high strength, high temperature resistant, filament reinforced, plastic compound.

Even more amazing is the special engineered exhaust nozzle which withstands the tortuous temperatures and exhaust velocity of nearly 6,000 feet per second. A nozzle extension helps to fully form the exhaust plume and properly expand the exhaust gases for best operating efficiency.



SHOWN
ACTUAL
SIZE

**1 ENERJET "D" ENGINE
EQUALS 4 "B" type engines**

ENERJET 'D 21' ENGINE SPECIFICATIONS

Total Impulse	4.48 lb-sec	Specific Impulse	187 lb-sec per lb.
Average Thrust	4.7 lb.	Exhaust Velocity	5980 ft. per sec.
Thrust Duration	.95 sec.	Time Delays	4 sec, 7 sec, 10 sec
Maximum Thrust	6.07 lbs.	Overall Length	3.36"
Initial Weight	1.12 ounces	Diameter	0.695"
Propellant Weight	.024 pounds		

Catalog Numbers & NAR Code D21-4, D21-7, D21-10

\$120 ea. 3 for \$2⁹⁵
Includes special igniters.

Specifications subject to change.

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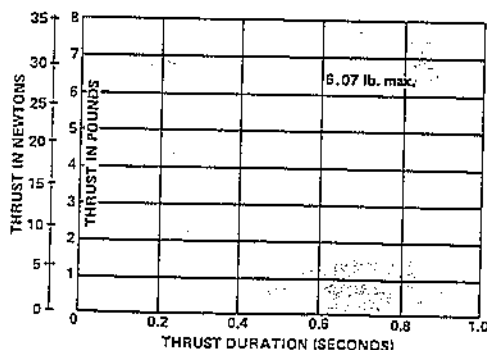
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solely the D18. As it turned out, the motor was more like a D9, with a large take-off spike and low sustain thrust. Model after scale model made it about 50 feet up only to impact under the low sustain thrust of the D18's, including Howard Kuhn's large scale Javelin model. In recent years, they have become very cat-o-prone.

FSI has had similar mislabeling problems with their motors. The FSI E5 has also been both a D and an E in past years; similarly the F100 has been rated both an E & an F. The NAR has been unable to force FSI to change their motor designations to tell the truth.

AND....

At right: The fateful 1980 Estes catalog page that promises the Cygnus Probe Ship would be available June, 1980. It never was. Note the lack of prices, too. The Black Hole Space Probe, like the movie "The Black Hole", bombed.

ESTES
CYGNUS PROBE SHIP
 Available June 1980
NEW!
 Skill Level 3
 This is one of science fiction's truly unique movie spaceships. Launched from the U.S.S. Cygnus mothership, it is designed primarily to probe the mysteries of the Black Hole. Normally piloted by humanoid robots, it is used as the escape vessel by the crew of the Palomino research craft. The Estes scale version features die-cut parts, quick-release engine mount, and dramatic 18" parachute recovery. Delivers spectacular flights over 400 feet.
Specifications
 Length 22" (55.88 cm)
 Diameter 3.5" (88.9 mm)
 Weight 3.8 oz. (107.73 g)
 Ship Wt. 16 oz.
Recommended Engines
 B4-2 B6-2 (First Flight)
 B5-3 C6-3
 Cat. No. 1351
NOT AVAILABLE IN CANADA
NEW!
 Now a spectacular motion picture from Walt Disney Studios
 ©1979 Walt Disney Productions
BLACK HOLE
Space Probe
 Skill Level 2
 Features include die-cut waterline, quick-release engine mount, plastic nose cone and display nozzle, 12" recovery parachute deploys automatically for a safe flight and gentle recovery every time. Space Probe Rocket can attain altitudes over 700 feet with "C" type engine.
Specifications
 Length 25" (63.5 cm)
 Diameter .976" (24.8 mm)
 Weight 1.59 oz. (45 g)
 Ship Wt. 10 oz.
Recommended Engines
 A8-3 (First Flight) B4-4 B6-4
 B8-5 B74-5 C6-5
 Cat. No. 1350
Available Now!
 Engines, Launch System, Glue, and Paint not included.

WHAT EVER HAPPENED
TO THESE COMPANIES?
(or "Rocket companies that
have come and gone since 1980".)

AAA Engineering
Internal Ballistics
Plasmajet
Composite Distribution
California Rocketry Magazine
High Power Research Magazine
Rocket Modeler Magazine
Pan Axion Aeronautics
Canaroc
Aerospace Vehicles Inc (AVI)
CNA Systems
Competition Model Rockets (CMR)
Stargate Rocket Systems
Aero Dynamic Cooperate Associates (ADC)
Rocket Glider Technology
Centuri Engineering Company
California Rocket Company
Roto-Rocket
Lone Star Rocketry
Whirlwind Rocket Motors
Reaction Technology Inc.
Model Rocket Technology
Celestial Engineering
Composite Dynamics
Small Rocket Sounding Systems
(later 'Crown Rocket Technology')
Astro Dynamics
Experimental Rocket Systems
Eagle Aerospace Systems
PowerTech
Para-Stream
Pine Cap Associates
Competition Chutes
Mom's Chutes
Dura-Flight
Kopter
ASC
Enerjet
Cox
MPC
MRI
KGB Aerospace
Contest Products
Nova Research Associates
American Rocketry Association
Rocket Development Company (RDC)

Kinda makes you wonder if Enertek is really going to happen, doesn't it?

From Your Sometimes Sober Editors
(Continued from Page 2)



Pat Miller: Despite all of our bitching, he does a good overall job. Besides, we need some one who can handle the manufacturers, the

AMA, and the NFPA.

John Worth: Although John isn't real familiar with rockets, he is an important conduit to the AMA. He also understands how organizations like the NAR work from top to bottom. Without a doubt, John was the most influential member of the last Board of Trustees, and deserves to be re-elected.

John Pursley: Here's another guy who is in touch with the hobby, and isn't afraid to take a stand on the tough issues. John is active in almost every aspect of the hobby, and has proven to be a great asset to the Board.

Connie Pursley: She, too, would be a great asset to the Board, having run the NAR Convention over the past four years. She has the unique outlook of the sport flyer who wants more out of the NAR than just competition.

John Kane: John is another old timer who has kept pace with the hobby. He runs the Standards and Testing lab.

Bryant Thompson: Here's an old timer who has returned. Bryant is now retired, and has spent a great deal of time helping get the NAR License Station program off to a good start. Of the three California candidates, he's the best choice.

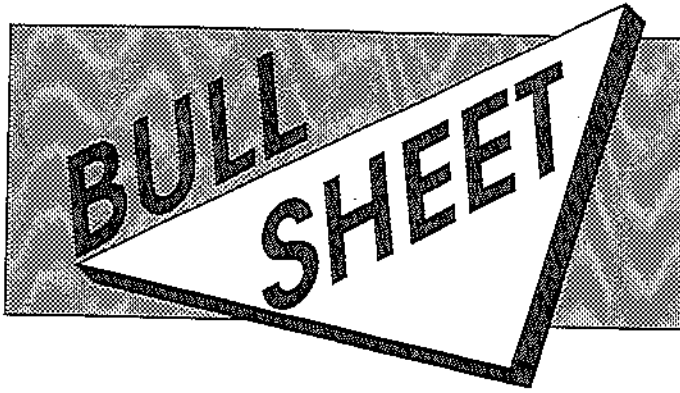
And that's our list of highly qualified candidates. But that's not 13, you say? Yep, that's right! Here's the other candidates that we're "lukewarm" to:

C. D. Tavares
Ed Muccio
Scott Hunsicker
Michael Gasperi
Claude Greenlee

And, don't bother to vote for:
Mark Bundick
Doug Frost

Regardless of the outcome, it should make for a very interesting Board of Trustees.

JD McNeil



NARAM-30 looks to be the largest NARAM since NARAM-13, according to CD Matt Steele. It appears that the Space and Rocket Center, the short drive for most folks, the thrill of F Altitude, and the fact that this is the first time Huntsville as hosted a NARAM have all combined to bring the crowds in.

Speaking of NARAMs, NARAM-31 will be hosted by NOVAAR at Manassas Historical Battlefield in Virginia. Trip Barber will be the Contest Director. The site is the same site that was used for NARAM-16, and is within easy driving distance (by Washington DC standards) to the Capital.

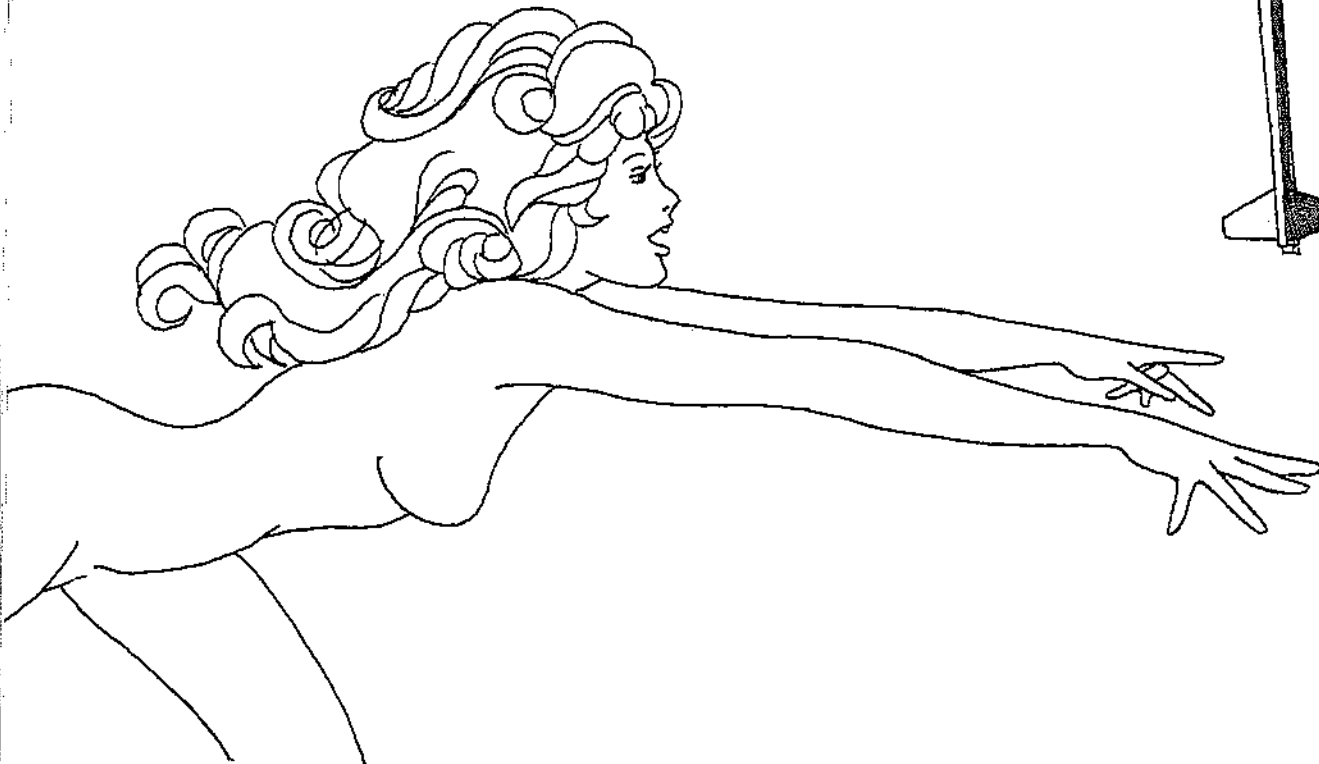
New motors have been certified by Enertek and Vulcan. Enertek's complete line of E and F motors have been certified (E15, E30, F25, F60), but there is no official release date for the motors. We hear now that Enertek kits and motors may make their debut in October. The Vulcan G50, rated at 130 n-sec, has been added to the list. Scott Dixon has yet to submit the rest of the Smoky Sam line to Standards and Testing, so there's no way of knowing when those motors will be certified.

Will American Spacemodeling get a new editor? Who knows? John Pursley says he's not stepping down as a result of his reprimand by the Executive Committee. None the less, the following people have applied for the job: Scott Hunsicker (Ft. Worth, TX), Kevin Funk (Escondido, CA), Henry Holzgreffe (Kalamazoo, MI), Todd Scheim (Chaska, MN), Gred Zsidisin (East Orange, NJ), and Larry Shenosky (St. Louis, MO). Also considering the job: Our own J. Pat McCarthy, with help from Jim Banke. One has to think that most of these people have no idea what they're getting into.

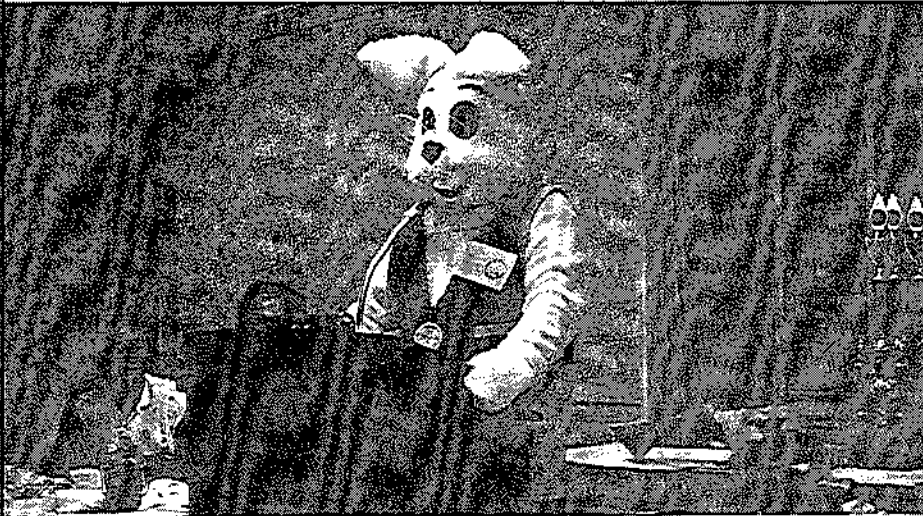
Want the new Ka-Plow! Pink Book? Be sure to write NAR HQ, as they are not being sent out automatically to the NAR membership.

And now, by popular request...

Barbie Mattel, Ms. Launch Rack '88 demonstrates her perfect form in recovering a Rotaroc.



NARAM FUN!



Are YOU easily embarrassed? If so, attending a NARAM might not be the best thing for you to do. We've attempted to capture the flavor of NARAMs past with these incriminating photos.

Left:
Mark "Bunny" Bundick, as portrayed by Claude Greenlee, welcomes NARAM-28 attendees to the banquet.



Above Right:
Chas Russell (L) and Matt Steele (R) pose with the worst and best trophies given out at NARAM, the "Best Midwest Qualified Flight" trophy (?) and the Rockwell LAC Newsletter Trophy.

Right:
A NARAM party, sometime after 3AM, featuring Gary Rosenfield, Mary Roberts, Matt Steele, Connie Pursley, and who knows who else!



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The Leader in Spacemodeling

*Model Rocketry's
Longest Publishing and
Most Controversial Newsletter*

From
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Huntsville, AL 35803

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