

# Upscaling The Classics

## Who is this Guy?

---

### *Upscaling the Classics*

By: Mike Jerauld, 2281 Penrose Street, San Diego, CA 92110 (mjerauld@tns.net)  
NARCON 2003

- **I'm Mike (Sparky4.0) Jerauld, NAR 78750, L1.5** (past the test but the rocket crashed)
  - BAR +5 years
  - Owner/Operator of Blast From The Past Rocketry
  - Rocketry Service record: 1972-78, USAF (46170) Missile Tech 1982-88
  - Vice President D.A.R.T. 2001-Present
- **Contact me at:**
  - Phone: 619-276-6238
  - Email: mjerauld@tns.net
  - Snail mail:

Mike Jerauld  
2281 Penrose St.  
San Diego, CA 92110

← (Yeah, That's my street since '68)

# Upscaling The Classics

## Inspiration can strike ANYWHERE!

---

- **Keep your eyes out for the opportunity to strike out of the blue!**
  - One day at the Plaster City Launch, I was walking past Ray Dunakin's table when I saw this nosecone
  - The first look was "Oh, 4 inch conical – must be a Nike Smoke (wrong)"
  - Turning to the side revealed (to me) the Flagship of the 70's rocketry:
  - Estes K-50 Astron Interceptor



# Upscaling The Classics

## Get the Original Information

---

- **Original Plans from JimZ:** [www.dars.org/JimZ/rp00.htm](http://www.dars.org/JimZ/rp00.htm)
- **Catalog pictures from Sven Knudson at:** [www.ninfinger.org/~sven/rockets/rockets.html](http://www.ninfinger.org/~sven/rockets/rockets.html)
- **A. Shasta's Page:** [www.geocities.com/CapeCanaveral/Lab/4559/indexframe.html](http://www.geocities.com/CapeCanaveral/Lab/4559/indexframe.html)
- **Kurt Schachner's Decal Page:** [www.geocities.com/CapeCanaveral/Hangar/9936](http://www.geocities.com/CapeCanaveral/Hangar/9936)
- **Ryan McDaniell's:** <http://plans.rocketshoppe.com/>

**Get the key information about your classic:**

**Master Parts List**

**Main Body Tube Diameter (BT#)**

**Overall Length (OL)**

# Upscaling The Classics

## Crunch the Numbers

---

- **Decide the Upscale's Diameter and Engine Mount**
  - 3", 4", 5", 7.5" These go by Outside Diameter (OD)
  - 38mm, 54mm etc.. These tubes go by Inside Diameter (ID)
- **Determine the Scaling Factor (SF):**
  - Upscale Diameter / Original BT# Outside Diameter = Scaling Factor
- **4" LOC/1.335 OD(BT-55) = 3.019 SF**
- **Calculate your Upscale Overall Length**
  - SF x OL=UOL
- **Look up the nosecone and any special parts in the Parts List (JimZ) and cross-reference them in original Catalogs (Ninefinger)**

# Upscaling The Classics

## Crunch the Numbers

---

- Find the dimension length of the Nosecone from the shoulder to the tip.
- Note any difference in the original part vs. the Upscale Part from the shoulder to tip (Estes dimension 1) or Base Length (cylindrical extension from the cone to the shoulder)
- Do the same with any Tailcones
- Subtract the Nose/Tailcone lengths, ADD necessary Base Lengths from UOL to get your Upscale Tube Length (UTL)

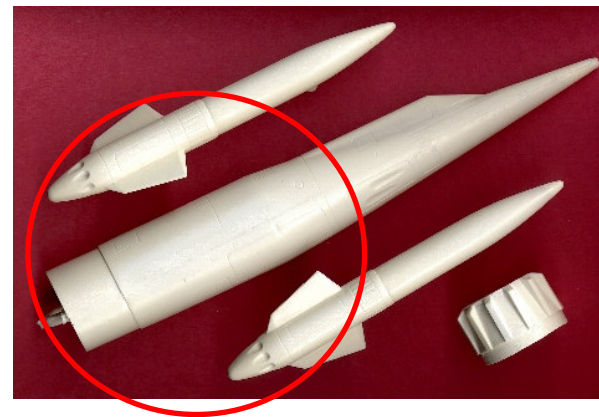


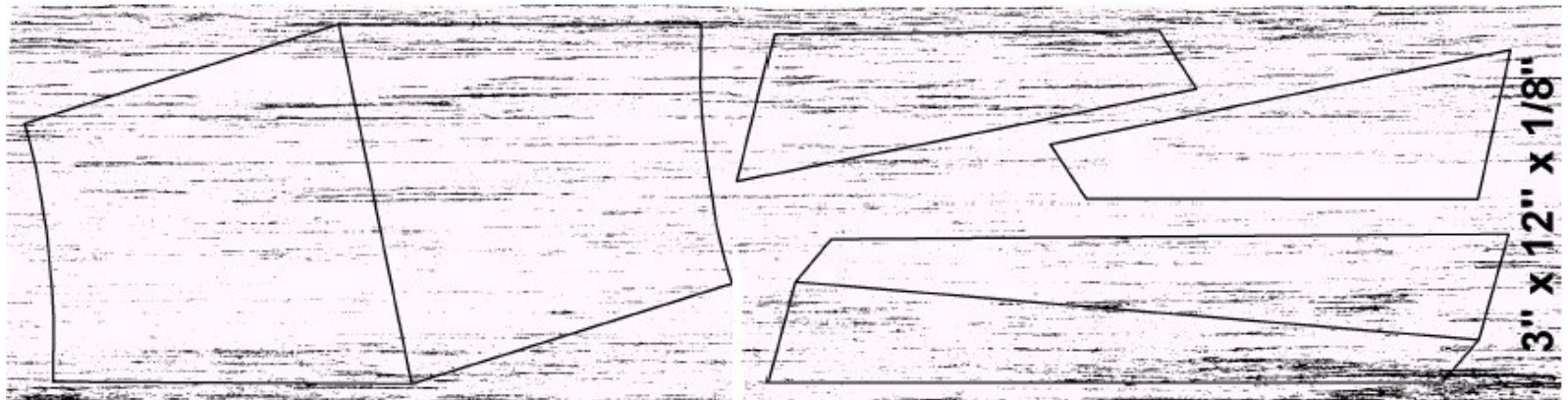
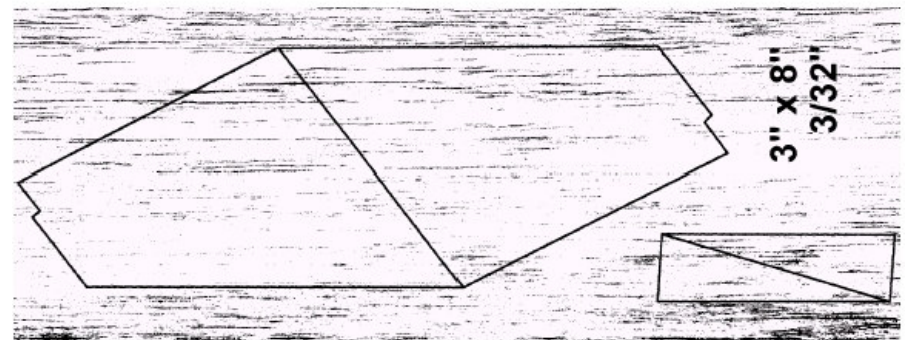
Photo courtesy of Mike Schmidt's  
Moldin' Oldies

# Upscaling The Classics

## Got Fins?

- Print out the Fin Scans (you **HAVE** fin scans don't you?) with your favorite graphics program (Paint Shop Pro 7)
- Make sure that the 1 inch reference bar (on most of JimZ's plans) is in fact, *1 inch*

These patterns are 3" wide. I used that dimension to print them out at the right size.



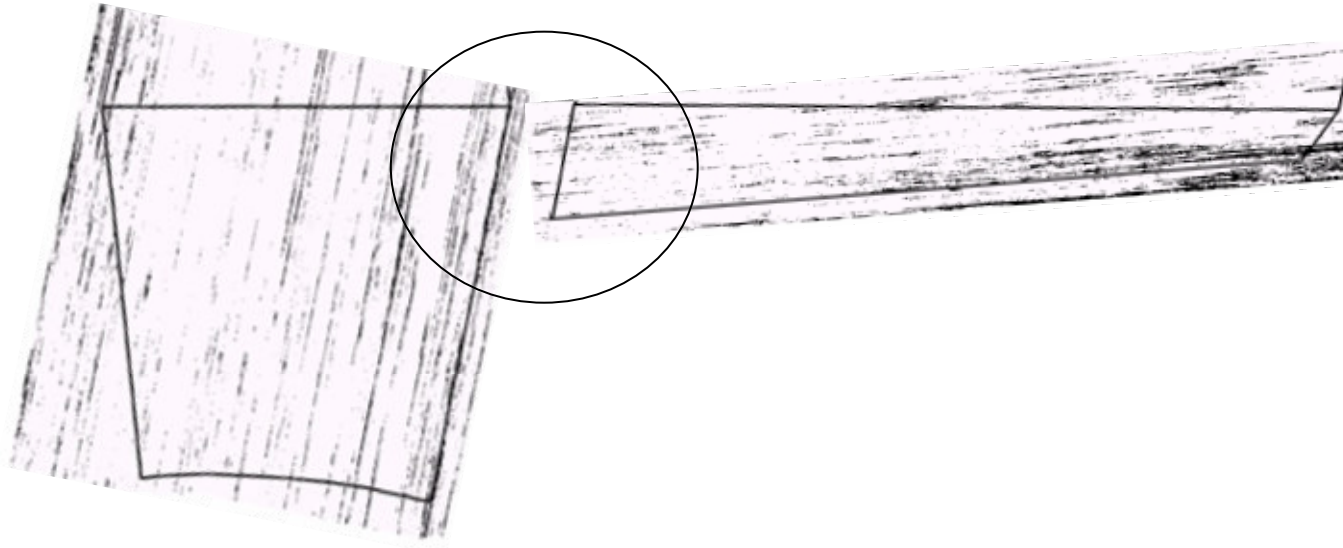
*These fin patterns Not to Scale (so to speak, err..type)*

# Upscaling The Classics

## Got Fins? – Manual Upscale

---

- **Measure each side of each fin part and record it in a table**
  - There are 19 straight and 1 curved on Interceptor fins (ignore the curved)
- **Multiply each fin dimension by SF and record it in an adjacent column**
- **Get an accurate protractor and measure the angles from the root edge (most fins)**
  - Match the Wing LERX (Leading Edge Root Extension) trailing edge angle to the leading edge of the Wing



# Upscaling The Classics

## Got Fins – Manual Upscale

---

- **Get some big paper (butcher, brown wrapping, Drafting, etc)**
- **One fin at a time:**
  - Draw Root Edge from calculated Upscale Lengths
  - Use protractor to mark angle of Leading & Trailing edges
  - Draw Leading & Trailing edges
  - Check the positioning of the LE & TE with the Tip Edge dimension
- **Calculate Through The Wall Fin Roots (TTWFR)**
  - Subtract OD of Upscale Engine Tube from OD Upscale Body tube and divide by 2:  
$$\begin{aligned} 38\text{mm OD} &= 2.7'' \\ 4'' \text{ LOC OD} &= 4.0'' \\ &= 1.3'' \quad \rightarrow 1.3''/2 = .65'' \end{aligned}$$



# Upscaling The Classics

## Got Fins – Manual Upscale

---

- **Calculate TTWFR (cont.)**

- Add the thickness of finishing if it is significant (i.e. fiberglass cloth)

.65 + .011 (2 layers of fiberglass cloth)

$$\text{TTWFR} = .661 \text{ or } 21/32^{\text{nds}}''$$

- Draw in rectangles below Root Edges of fins, .661 deep x the length of the Root Edge
- These can be notched to engage the centering rings during assembly

# Upscaling The Classics

## Got Fins – Computer Upscale (Mike style)

---

- **Insert Scans into Drafting (not graphics program)**
- **Trace over scans**
- **Scale fin drawings to original size**
- **Scale fins by Upscale Factor**
  - Combining LERX and Wing patterns
- **Add TTW Fin Root Rectangles**
- **Print out on 8.5” x 11” and cut and paste sheets together**

# Upscaling The Classics

## Got Fins

---

- **Original Fins cut from 1/8<sup>th</sup> & 3/32<sup>nd</sup> Balsa**
- **All Fins cut from .093 (3/32<sup>nds</sup>) G-10 for rigidity**
- **Fin Slots cut into Body tube (after fiberglassing) on table saw with thin kerf blade (.093 width)**

# Upscaling The Classics

## Pods & Tail

---

- **Pods were first pieced together with BT-60 tubing, PNC-60AH, and PNC-160(v).**
- **Andy Woerner developed a lathe turned plug, and then a mold for fiberglass pods**
- **Pods were slotted to fit wing tip**
  - Likely to break upon landing – need to redesign
- **Tailcone is from Skunk Works 4” Bullpup**
  - Cut to permit 38mm motor tubing to pass through

# Upscaling The Classics

## Put it together

---

- **4” to 38mm centering rings**
- **Standard High Power building practices**
- **Sand, Fill, Sand, Fill, Sand, Fill**
- **Paint, Paint, Paint**
- **FLY, FLY, FLY!**

# Upscaling The Classics

## Closing

---

- **I did the engineering, Andy Woerner built the 3X Upscale Interceptor**
- **Drafting Program: PowerCAD LT+**
  - Fully AutoCAD compatible
  - Excellent 2D Drafting program
  - \$99
  - 30 day free trial
  - <http://www.givemepower.com/products.cfm>