

Reach Out and Teach Someone

Now, for the rest of the story!

Reach Out and Teach Someone

Choosing the model

- **Features to consider for a beginner's model**

- Overall size (body diameter, length)
 - ✓ One inch diameter preferred, nine (9) to fifteen (15) inches long
 - » Sufficient room to easily pack the recovery system
 - » Works well with "A" motors (smaller fields required)
- Fin style
 - ✓ Single piece plastic fins are easiest and fastest to build
 - ✓ Multiple piece plastic fins are not recommended
 - » Can be difficult to assemble and require plastic cement (fume hazard)
 - ✓ Wood fins take more time and craftsmanship to build
 - » "Pre-slotted" tubes and tabbed fins can ease wood fin assembly
 - » See the Balsa Machining Service "classroom model" (see next page)
 - » Choose a model with laser cut fins if possible
 - ▲ Minimizes the need for knives to cut out fins
 - ✓ Tube fins (see the Custom Razor) can be a compromise between wood and plastic fin models

Reach Out and Teach Someone

Choosing the model (continued)



“Classroom Model” with tabbed fins and slotted body tube

Reach Out and Teach Someone

Choosing the model (continued)

- **Features to consider for a beginner's model (continued)**
 - Motor mounts
 - ✓ Choose a model with a motor retention clip and thrust ring
 - » All of the models on the next page have motor retention clips and thrust rings
 - » Easier to install and remove the motor
 - » Less chance that the motor will be ejected (causes recovery failure)
 - Recovery systems
 - ✓ Typically choose between streamers and parachutes
 - » Parachutes are time consuming to build and take skill to do well
 - ▲ Parachute recovery is more like “real” rockets
 - » Streamers are fast and easy
 - ▲ Streamers also minimize recovery drift; this can be important for small flying fields
 - » Light weight models with parachutes may have streamers substituted
 - ▲ The Custom Razor and Balsa Machining Service Classroom Rocket are candidates for streamer usage

Reach Out and Teach Someone

Sample Beginner's Models



Estes Alpha, Estes Alpha III, Quest Astra



Custom Razor



Estes Generic E2X

Reach Out and Teach Someone

Choosing the model (continued)

- **Features to consider for a beginner's model (continued)**
 - Nosecones
 - ✓ Single piece or balsa is preferred
 - » Two piece nosecones require plastic cement
 - ▲ Plastic cement has fumes and can be toxic
 - Launch lugs
 - ✓ Single long launch lug is preferred over multiple piece launch lugs
 - » Avoids alignment problems

Reach Out and Teach Someone

Prepare to Build!

- **Prepare the build area**

- Protect table tops from glue spills with newspaper, butcher paper, etc.
 - ✓ Provide corrugated cardboard pieces as cutting boards if parts are to be cut out
- Make sure trash cans are available
- Place paper towels at work areas to allow participants to wipe glue from hands or glue “runs” from models
 - ✓ Toothpicks and/or cotton swabs may also be useful for removing excess glue from models

- **Have building tools and supplies available**

- Rulers (if required)
 - ✓ Some kits have rulers printed in the instruction sheets
- Knives (if required)
 - ✓ Not recommended for younger groups
 - » Prefabricate steps that require knives to eliminate their need in the classroom

Reach Out and Teach Someone

Prepare to Build (continued)!

- **Have building tools and supplies available (continued)**
 - Scissors (if required)
 - ✓ Usually needed to cut out parachutes and shock cord mounts
 - ✓ Most safety scissors are worthless for cutting out plastic parachutes
 - ✓ Try to eliminate scissors from the build session
 - » Pre-cut parts prior to the classroom session
 - » Use a streamer to avoid cutting out the parachute
 - Masking tape
 - ✓ Absolutely indispensable for building rockets!
 - » Uses include holding parts while glue is drying, tightening a loose nosecone fit, and reinforcing a crushed or damaged tube
 - » 1/2 inch wide tape is adequate for most needs
 - Sandpaper
 - ✓ Highly recommended for models with wooden fins
 - » 3 inch squares of 320 grit sandpaper should be adequate
 - ▲ 320 grit is a compromise between slow and fast material removal

Reach Out and Teach Someone

Prepare to Build (continued)!

- **Have building tools and supplies available (continued)**
 - Adhesives
 - ✓ “Yellow” wood workers (or aliphatic) glue is the preferred adhesive because:
 - » Relatively safe to use and no objectionable fumes
 - » Less chance of allergic reactions from users
 - » Dries faster and stronger than white glue
 - ✓ Instant super glues have irritating fumes and the potential for allergic reactions
 - » Students will glue themselves to the model
 - ✓ “5-minute” epoxies require mixing and can cause skin reactions
 - ✓ “Plastic” cements are needed for some models
 - » Typically for plastic nose cones
 - » These do not work well on wood
 - ✓ Instructors might want super glue or epoxy on hand for emergency repairs

Reach Out and Teach Someone

Prepare to Build (continued)!

- **Have building tools and supplies available (continued)**
 - Adhesives (continued)
 - ✓ Wood glues may be repackaged in 1 ounce squeeze bottles
 - » Provides glue for each builder
 - » Bottle tips may be modified to slow the flow of glue
 - Pencils and pens
 - ✓ Many models require index marks to be made
 - ✓ Students can identify their model
 - » Consider permanent markers, e.g. Sharpies
 - Expended rocket motors
 - ✓ May be useful to prevent crushing of motor tubes during engine mount construction

Reach Out and Teach Someone

Prepare to Build (continued)!

- **Have building tools and supplies available (continued)**
 - Model decoration materials
 - ✓ Do not use paint
 - » Too messy
 - » Takes too long to dry
 - ✓ Colored markers are a possibility
 - » Models feel sticky if they are “colored” with a marker
 - ✓ Self adhesive stickers (recommended)
 - » Easy to apply
 - » Lots of creative possibilities
- **Refreshments**
 - Provides a break to let models dry
 - Youngsters have short attention spans; refreshments break up the session
 - Use the time for you safety briefing or a lesson topic

Reach Out and Teach Someone

Let's play!

- **Make sure you have sufficient help!**
 - A ratio of 10 students to 1 adult is typically the minimum level of supervision desirable
- **Build the models**
 - Start with the motor mount assembly on plastic finned models
 - ✓ Also start with the motor mount first on slot and tab wooden fin models
 - ✓ Give the adhesives time to dry before installing it in the body tube
 - Start with the fins first on wooden fin that glue to the outside of the body tube (surface mount fins)
 - ✓ Try to intersperse fin activity with other subassembly construction
 - ✓ Gives fins time to dry while other assemblies are built
 - Other subassemblies that can be built while fins and motor mounts dry
 - ✓ Two piece nosecones
 - ✓ Parachutes
 - ✓ Shock cord mounts
 - ✓ Glue launch lugs to body tubes

Reach Out and Teach Someone

Let's play (continued)!

- **What can possibly go wrong?**
 - About 50 to 75 different things (I learn new ones with each session)
 - Too much glue
 - ✓ Slows the drying process
 - » Fins fall off or shift out of alignment
 - ✓ Glue runs down the inside of the motor mount
 - » Prevents motor installation for flight
 - Not enough glue
 - ✓ Fins are weakly held on the model
 - ✓ Motor mount is not held in place
 - » Will “fly through” the model
 - Thrust ring is glued in wrong in end of the motor tube
 - ✓ Prevents motor installation for flight
 - Shock cord mount place too close to the front of the model
 - ✓ Blocks the nose cone from being fully installed

Reach Out and Teach Someone

Let's play (continued)!

- **What can possibly go wrong (continued)?**
 - Wrong edge of wooden fins glued to the body tube
 - ✓ Wood grain should not be parallel to the body tube
 - Crushed tubes
 - ✓ Centering rings can be tight fits over the motor mount tube
 - Mis-aligned launch lugs
 - Parachutes
 - ✓ Shroud lines are not even lengths
 - ✓ Shroud lines are tangled together
 - ✓ Knots are not tight to prevent loosening

Spare parts, prefabrication of difficult assemblies, alignment marks, and lots of patience are the only way to deal with problems (and there will be problems)!

Reach Out and Teach Someone

Let's play (continued)!

- **Fly the models**

- Prepping the launch field

- ✓ Launch equipment

- » The ability to prepare multiple rockets for launch at the same time will shorten the amount of time required for the launch

- ▲ Setup multiple launch pads and launch controllers (or use a launch controller that can support multiple launch pads)

- » Launch pads

- ▲ The recommended beginner models will need 1/8 inch diameter launch rods (36 inch long music wire from the hobby shop)

- ▲ Old steel sauce pans and pot lids from the thrift store make good, inexpensive blast deflectors

- » Launch controllers

- ▲ Controllers that use four AA batteries or a single 9 volt battery may require spare batteries for a large launch session

- ▲ “Gel cells” or automotive type batteries work best

Reach Out and Teach Someone

Let's play (continued)!

- **Fly the models (continued)**

- Prepping the launch field (continued)

- ✓ Miscellaneous launch equipment

- » Tables and chairs

- ▲ Use a small table to support the launch controller, e.g. a TV snack table

- » Crowd control items

- ▲ Consider for large groups or when lots of spectators are possible
 - ▲ Use pylons, stakes, flag lines, barrier tape to define launch area (keep out zone for non-participants)
 - ▲ Public address system

- » Fire prevention/equipment

- ▲ Fire equipment
 - ▲ Have a small “kitchen” style A:B:C dry powder fire extinguisher on hand
 - ▲ Water in buckets or “big mouth” bottles is best for grass fires
 - ▲ Fire prevention (clear flammable materials from launching areas) is the best defense

Reach Out and Teach Someone

Let's play (continued)!

- **Fly the models (continued)**
 - Prepping the launch field (continued)
 - ✓ Emergency items
 - » First aid kit
 - » Cellular telephone with emergency (fire and ambulance) phone numbers
 - Preparing the models
 - ✓ Prepare a “flight preparation kit” for each flight including:
 - » Pre-measured amount of wadding
 - » Rocket motor
 - » Igniter
 - » Nozzle plug
 - » Place the items in a sandwich bag
 - ✓ Other flight preparation supplies
 - » Talcum powder
 - ▲ Keeps plastic parachutes from sticking to themselves
 - ▲ Empty spice bottles with “sifter” type lids make good dispensers
 - » Chopsticks
 - ▲ Helps to pack the recovery wadding in the model

Reach Out and Teach Someone

Let's play (continued)!

- **Fly the models (continued)**

- Preparing the models (continued)

- ✓ “Pre-flight” the models; have the students:

- » Wiggle the fins and launch lug to make sure they are tightly attached to the model
 - » Look for and fix (by gentle bending) warps in plastics fins
 - » Push and pull on the engine mount to make sure it is tightly glued in the model
 - » Pull on the shock cord to make sure it is firmly attached to the model
 - » Inspect parachute lines to make sure they are not tangled
 - » Check the nosecone fit that it is not too loose (falls out from its own weight) or too tight
 - ▲ Fix loose nose cones by putting some masking tape on the nosecone “shoulder”
 - ▲ Sand the inside of the body tube or the nosecone shoulder if the fit is too tight
 - » Make sure the motor cannot be pulled out after it is installed
 - ▲ Make sure the friction fit is tight if no motor clip is used
 - ▲ Make sure the motor clip (if used) engages the motor

Reach Out and Teach Someone

Let's play (continued)!

- **Fly the models (continued)**

- Preparing the flyers

- ✓ Safety briefing

- » Identify the Range Safety Officer (RSO) to the participants

- ▲ His word is THE LAW; there are no arguments with the RSO

- ▲ Launches will be made only with the RSO's permission

- » Safety items

- ▲ All participants will be a minimum of 15 feet (30 feet for "E" or larger motors) from the launch pads. It is preferred that spectators be behind the launching individual.

- ▲ Participants may approach a launch pad only when permitted by the RSO

- ▲ Nobody handles the launch controller unless they have permission to launch their rocket

- ▲ No student shall retrieve their rocket from a hazardous area, e.g. trees, streets, roofs. Rockets shall NEVER be recovered from utility lines

- ▲ A 5 second countdown will be used ending in "Start", Blastoff", "Launch" or similar wording

- ▲ The word "Fire" will not be used unless a fire is seen

Reach Out and Teach Someone

Let's play (continued)!

- **Fly the models (continued)**
 - Preparing the flyers (continued)
 - ✓ Launch order
 - » Everybody wants to launch first
 - » Draw numbers from a hat for the launch order
 - ✓ Make the flights more interesting
 - » Spot landing competition
 - ▲ Whoever lands closest to the designated spot is the winner
 - » Duration competition
 - ▲ Whoever keep their rocket in the air the longest time is the winner

Reach Out and Teach Someone

In Summary

- **Any last questions?**
- **Contact me:**
 - Phone: 520-296-1689
 - Email: 103056.621@compuserve.com
 - Snail mail:
 - Stephen Lubliner
 - 9968 E. Domenic Lane
 - Tucson, AZ 85730
- **Survey**
 - What can I do to make this presentation more useful?