

# 3" DIAMETER SCHOOL ROCKET

*Flying Model Rocket Assembly Instructions*

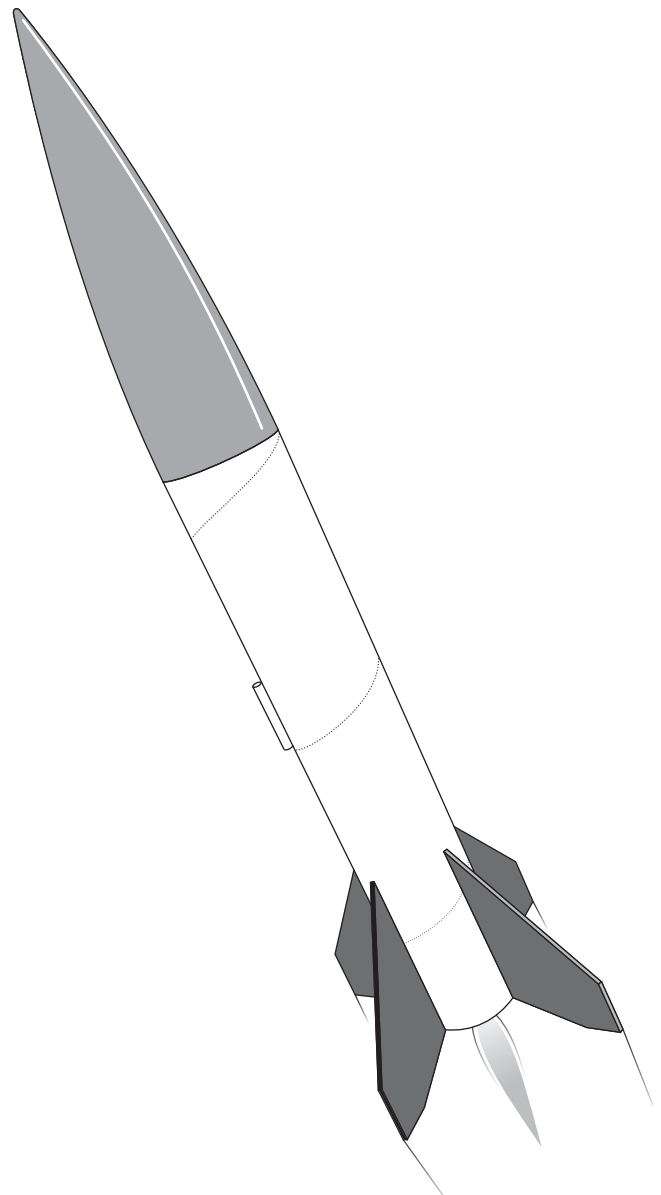
**NO Knife - No Cutting Required**  
**NO Pencil - No Marking Required**  
**NO Ruler - No Measuring Required**

**Recommended Engines: D12-3, E9-4**

Another Quality Kit from:



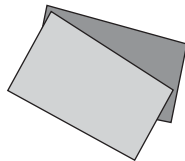
**Mercury Engineering Co.**  
 3900 S. Winchester  
 Pahrump, NV 89048  
 775-537-6232



*Additional Supplies You'll Need To Complete This Kit:*



**White or Yellow Glue**  
**3/4" Wide Masking Tape**

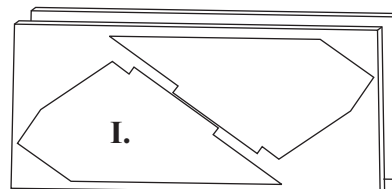
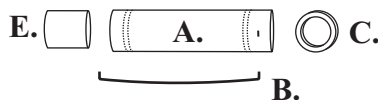
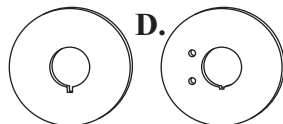
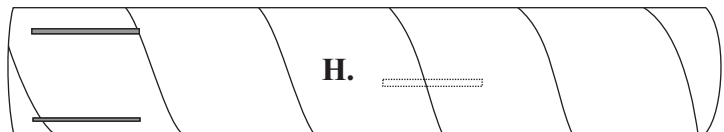
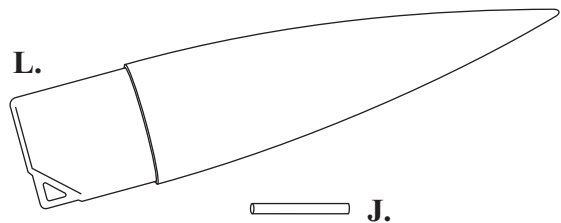
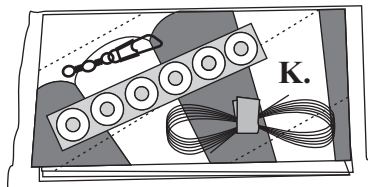


Finishing Supplies (*Optional*)  
**Sandpaper and Spray Paint**

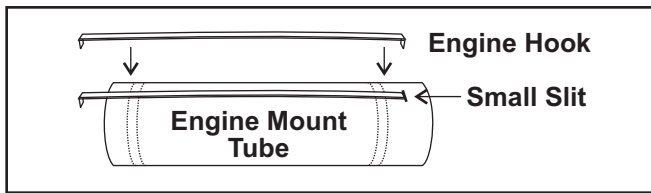
Inventory all parts and acquire any missing ones.

You should have:

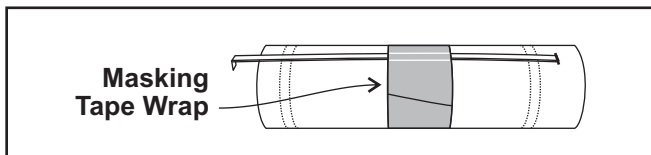
- A. Engine Mount Tube**
- B. Engine Hook**
- C. Engine Stop Block**
- D. Centering Rings, 2**
- E. D/E Engine Spacer**
- F. Kevlar® Shock Cord**
- G. Nylon Shock Cord**
- H. Body Tube**
- I. Four Fins**
- J. Launch Lug**
- K. Parachute Kit**
- L. Plastic Nose Cone**



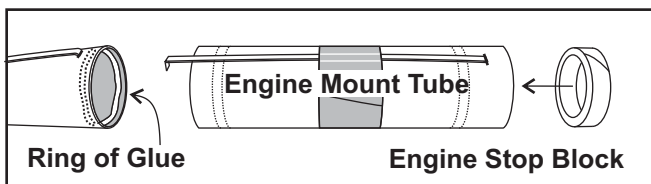
**Step 1.** Locate the **engine hook** and **engine mount tube**. Position the **engine hook** against the **engine mount tube** with one end of the **hook** through the **small slit** in the **tube**.



**Step 2.** Wrap **masking tape** around the center of the **tube** and over the **engine hook**.

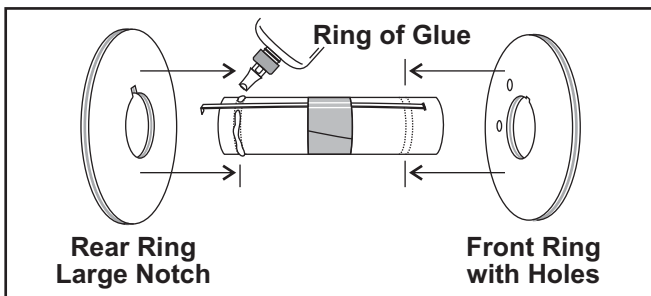


**Step 3.** Starting at the end with the **engine hook** in the slit, put a ring of glue inside the **engine mount tube**.



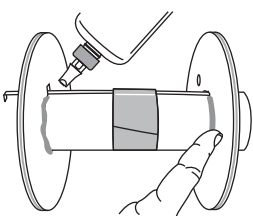
**Step 4.** Push the **engine stop block** into the ring of glue inside the **engine mount tube** making sure it stops and rests against the bend in the **engine hook**.

**Step 5.** Put a small amount of glue around the rear of the **engine mount tube** between the **laser scribed lines**. Slide the **rear centering ring** (center the large notch over the **engine hook**) until it is over the glue and centered between the two lines.

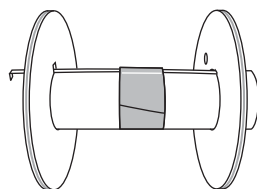


**Step 6.** Put a small amount of glue around the **engine mount tube** on the other **laser scribed line** and slide the remaining **centering ring** (with the two holes) over the line.

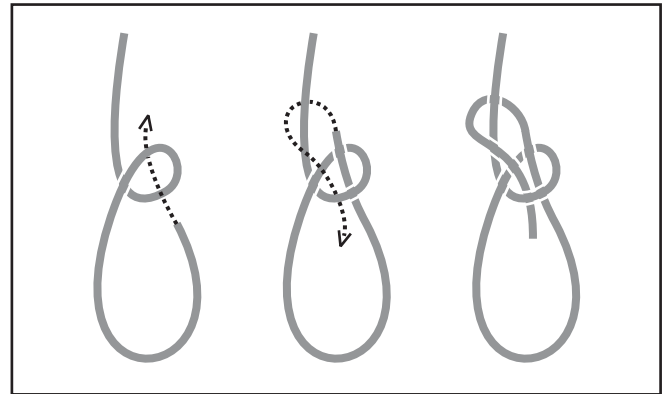
At this point, here's how the engine mount should look -



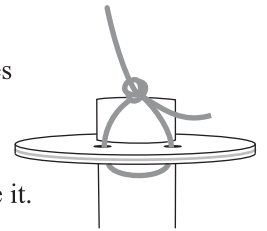
**Step 7.** Apply a bead of glue to the **centering ring, engine mount tube** joints. Smooth out the glue and remove excess with a fingertip.



**Step 8.** Study how to tie the **Bowline Knot** shown below. It will be used four times in the construction of this rocket.



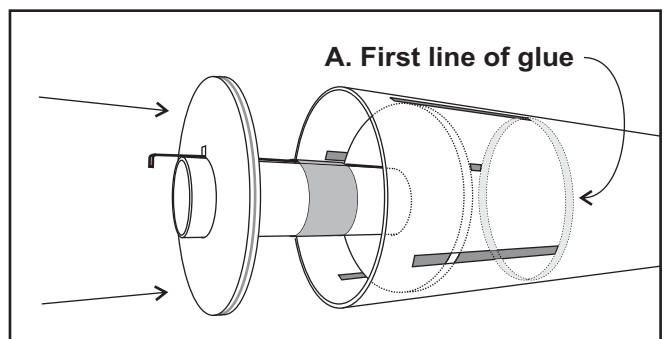
**Step 9.** Tie the yellow **Kevlar® shock cord** through the two holes in the upper **centering ring** using the **Bowline knot**. Tighten the cord and apply a drop of glue to the knot to secure it.



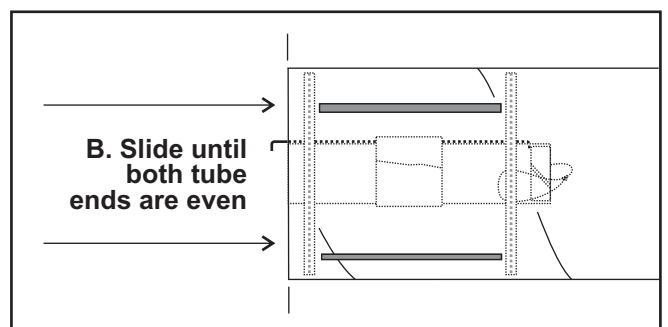
**Step 10.** Roll the **Kevlar line** into a small coil and stuff it into the upper end of the **engine mount tube**.

**Step 11.** You will now be installing the **engine mount** assembly and you need to work quickly so the glue does not dry before you have completely installed it. Study the entire assembly before applying any glue.

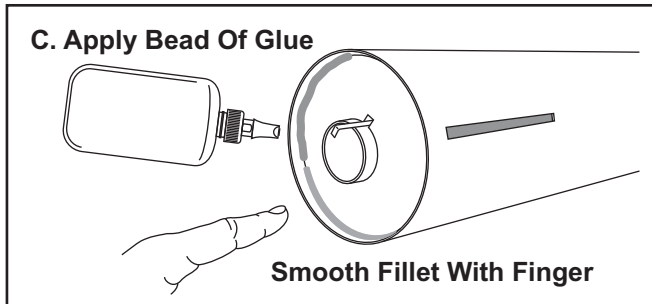
**A.** Place the glue bottle tip inside the **body tube** in the end with the **laser cut slots** and put a small ring of glue up inside the tube just above the top of the slots.



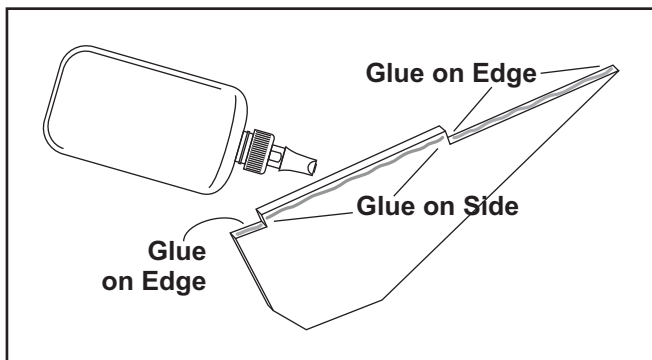
**B.** Push the **engine mount assembly** inside the **body tube** until the **engine mount tube** is even with the end of the **body tube**. Wipe any glue out of the slots. Be sure that neither **centering ring** is in the slots.



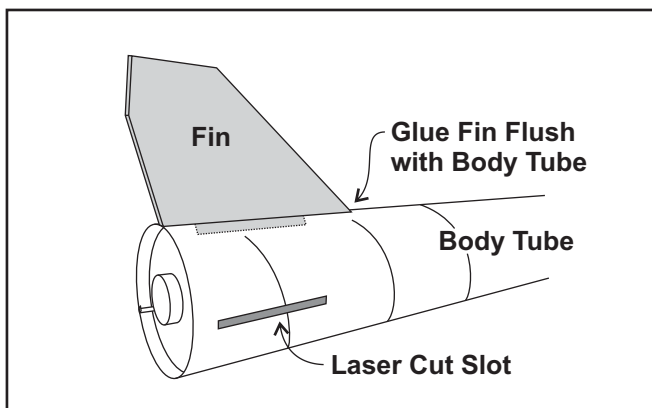
C. Apply a bead of glue in the **lower centering ring/body tube** joint. Smooth out and remove excess glue with a finger making a “fillet”.



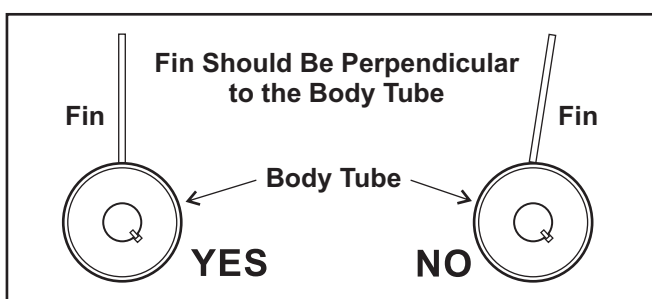
**Step 12.** Apply a thin strip of glue, no wider than about 1/2 the width of the **fin**, on the root edge and sides of the tab on the **fin**.



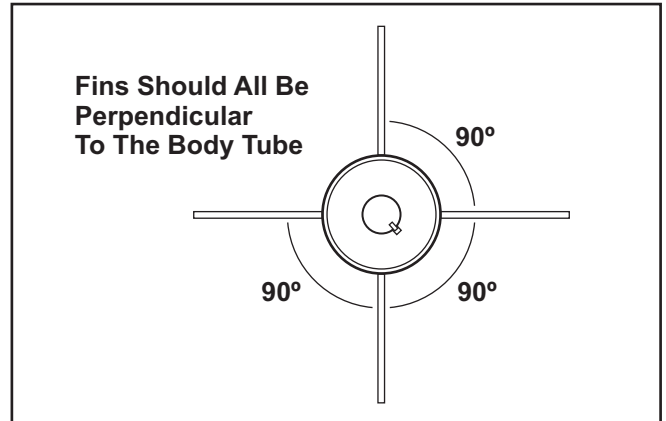
**Step 13.** Place the glued edge of the **fin** in one of the **laser cut slots**. The **fin** should now be glued flush with the end of the **body tube**.



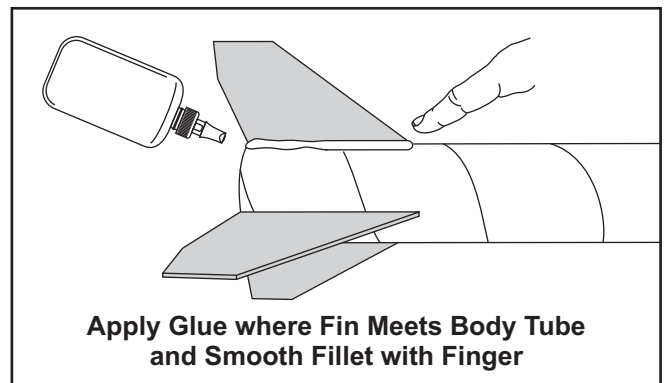
**Step 14.** Hold the **fin** firmly on for at least one minute and do not bump or move it. The **fin** should be perpendicular to the **body tube** as shown below. Hold the **body tube** horizontally with the **fin** sitting up and wait a minute before continuing.



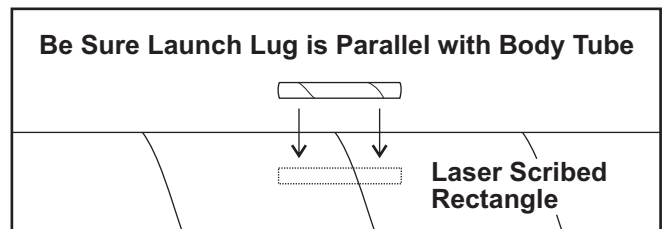
**Step 15.** Repeat Step 14 for the next three **fin**s. Allow time between installations so the glue dries well enough to hold the **fin**s. When all four **fin**s are on correctly, they should look like the diagram below. Adjust them as needed.



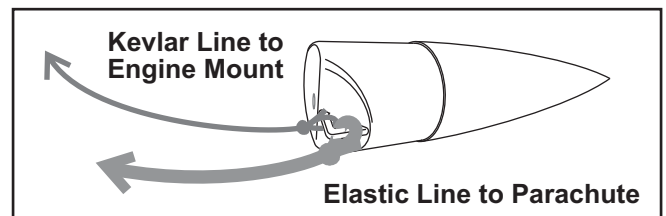
**Step 16.** Place a thin **fillet** (strip) of glue on each **fin** where it meets the **body tube**. Use your finger to smooth **fillet**. Wipe glue off of finger with damp cloth or paper towel.



**Step 17.** Place a thin strip of glue on one side of the **launch lug** and place it on the **laser scribed rectangle** on the **body tube**. When it is placed correctly, the **launch lug** will be parallel with the **body tube** as shown.



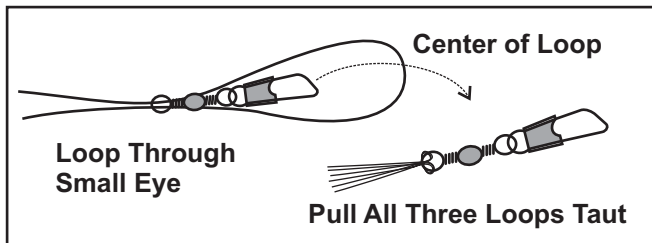
**Step 18.** Feed the **Kevlar® shock cord** through the **body tube** and out the top end. Tie the **Kevlar** line to the nose cone base loop with a **Bowline knot**.



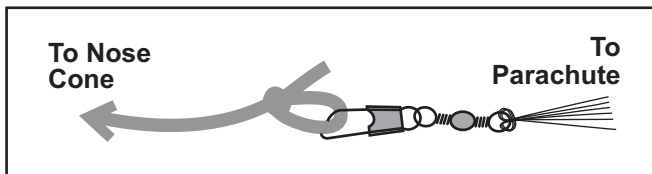
**Step 19.** Tie the 1/4" wide **elastic shock cord** to the **nose cone** base using a **bowline knot**. (See previous step.)

**Step 20.** Assemble the **parachute** using the directions printed on the corners of the plastic sheet. Follow Steps 1 - 4, don't attach the **parachute shroud lines** to the **nose cone**. Instead, attach them to the **snap swivel**.

**Step 21.** Find the center of each **shroud line** loop and pass through the small eye of the **snap swivel**. Push the top of the **swivel** through the loop and pull the shroud loop taut. Repeat with the other two **shroud line** loops.



**Step 22.** Tie a **Bowline knot** at the loose end of the **elastic shock cord**.

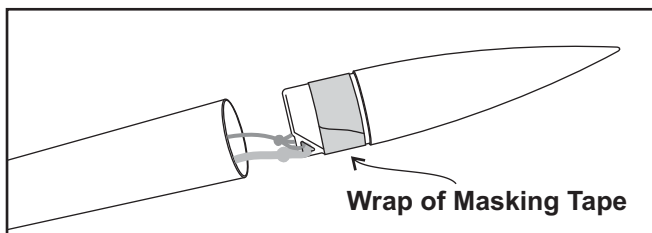


Open the end of the **snap swivel** and attach the loop. Close the **snap swivel**.

**Step 23.** Pack the **parachute** and slide it into the top of the **body tube**. Put the remainder of the **shock cord** in the **body tube** and carefully push the **nose cone** in the tube. Avoid pinching the **shock cord** between the **nose cone** and the **body tube**.

**Step 24.** Verify that the glue holding the  **fins** and **launch lug** on is dry.

Select a color and spray paint the rocket. After the paint is dry, make sure the **nose cone** will pull out of the **body tube** relatively easy. If it is too loose, add a wrap of masking tape around the shoulder.



**Step 25.** Obey and follow the **N.A.R Model Rocket Safety Code** and have fun, but most of all be safe when launching and recovering your rocket.



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## NATIONAL ASSOCIATION OF ROCKETRY MODEL ROCKET SAFETY CODE

Approved August 2012, [www.nar.org](http://www.nar.org)

1. **MATERIALS.** I will use only lightweight, non-metal parts for the nose, body, and fins of my rocket.
2. **MOTORS.** I will use only certified, commercially-made model rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer.
3. **IGNITION SYSTEM.** I will launch my rockets with an electrical launch system and electrical motor igniters. My launch system will have a safety interlock in series with the launch switch, and will use a launch switch that returns to the "off" position when released.
4. **MISFIRES.** If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.
5. **LAUNCH SAFETY.** I will use a countdown before launch, and will ensure that everyone is paying attention and is a safe distance of at least 15 feet away when I launch rockets with D motors or smaller, and 30 feet when I launch larger rockets. If I am uncertain about the safety or stability of an untested rocket, I will check the stability before flight and will fly it only after warning spectators and clearing them away to a safe distance. When conducting a simultaneous launch of more than ten rockets I will observe a safe distance of 1.5 times the maximum expected altitude of any launched rocket.
6. **LAUNCHER.** I will launch my rocket from a launch rod, tower, or rail that is pointed to within 30 degrees of the vertical to ensure that the rocket flies nearly straight up, and I will use a blast deflector to prevent the motor's exhaust from hitting the ground. To prevent accidental eye injury, I will place launchers so that the end of the launch rod is above eye level or will cap the end of the rod when it is not in use.
7. **SIZE.** My model rocket will not weigh more than 1,500 grams (53 ounces) at liftoff and will not contain more than 125 grams (4.4 ounces) of propellant or 320 N-sec (71.9 pound-seconds) of total impulse.
8. **FLIGHT SAFETY.** I will not launch my rocket at targets, into clouds, or near airplanes, and will not put any flammable or explosive payload in my rocket.
9. **LAUNCH SITE.** I will launch my rocket outdoors, in an open area at least as large as shown in the accompanying table, and in safe weather conditions with wind speeds no greater than 20 miles per hour. I will ensure that there is no dry grass close to the launch pad, and that the launch site does not present risk of grass fires.
10. **RECOVERY SYSTEM.** I will use a recovery system such as a streamer or parachute in my rocket so that it returns safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.
11. **RECOVERY SAFETY.** I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.

### LAUNCH SITE DIMENSIONS

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Dimensions (ft)
0.00 - 1.25	1/4A, 1/2A	50
1.26 - 2.50	A	100
2.51 - 5.00	B	200
5.01 - 10.00	C	400
10.01 - 20.00	D	500
20.01 - 40.00	E	1,000
40.01 - 80.00	F	1,000
80.01 - 160.00	G	1,000
161.01 - 320.00	Two Gs	1,500