

XR-20

KIT NO. TR 106

SKILL LEVEL: IDEAL FOR BEGINNERS



MODEL RECTIFIER CORPORATION
2500 WOODBRIDGE AVENUE
EDISON, NJ 08817
Tel No. (201) 985-7800

PARTS LIST

1. NOSE CONE
2. NOSE CONE BASE
3. SHOCK CORD
4. PARACHUTE
5. SMALL BODY TUBE
6. HOLLOW BODY TUBE COUPLER
7. LARGE BODY TUBE
8. LAUNCH LUGS (SET OF 3)
9. Balsa FINS (SET OF 4)
10. ENGINE ADAPTER RING
11. ENGINE MOUNT TUBE
12. ENGINE ADAPTER RING
13. ENGINE HOOK
14. PARACHUTE CORDS
15. TAPE DISCS

SAFETY INSTRUCTIONS

For the safe and reliable performance of your model rocket
PLEASE NOTE:

1. That model rockets are not "toys" - that they are capable of causing personal injury to you and to others as well as property damage.
2. That you and you alone are responsible for the safe operation of your rocket.
3. That you must properly build and operate your model with a clear sense of that responsibility; that means taking no chances or risks which might endanger yourself or others.
4. That you read and observe the rules of the Model Rocketry Safety Code printed on the back of the cardboard insert included in your kit.

Remember, the thrill of rocketry lies in the safe construction of the rocket and in its careful operation. Make each launch a success and you will be proud of yourself and will really enjoy your hobby.

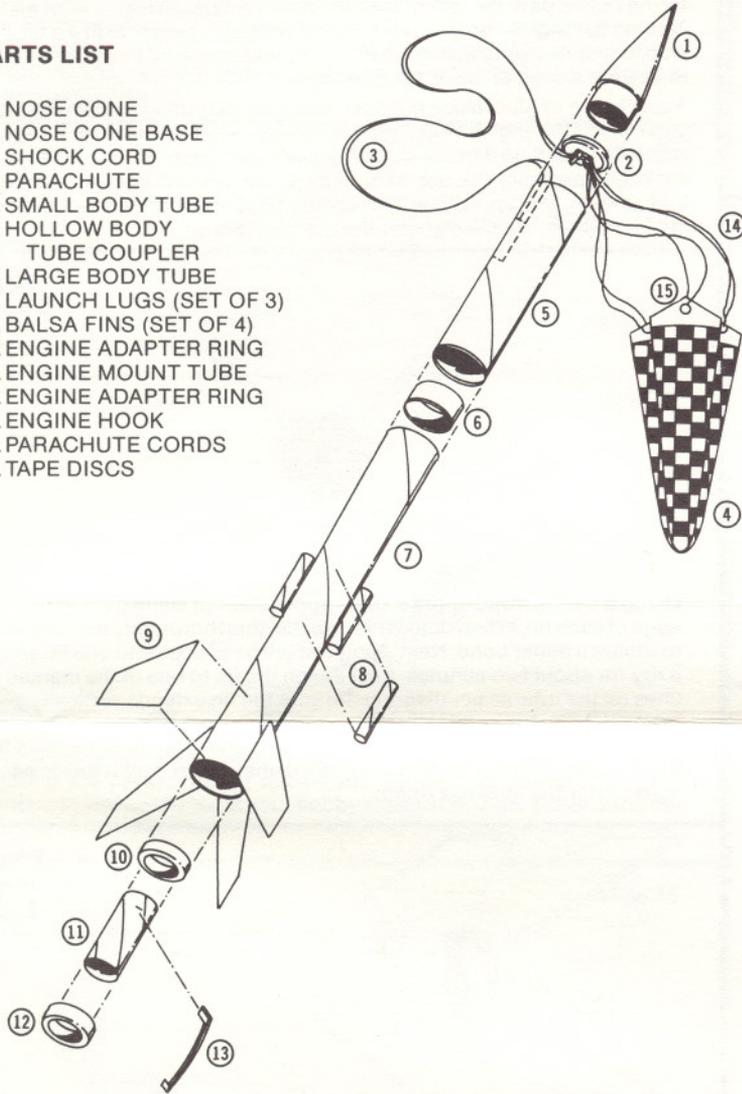
HELPFUL HINTS

Before building this kit gather the necessary tools and materials and read all instructions thoroughly. In addition, keep the following points in mind.

1. Read and understand each step and study the drawings before beginning any part in that step.
2. Always test fit the parts before assembling them. If they do not fit because they are too tight, sand them slightly. If they are too loose, build them up as described in the instructions.
3. Proper glue joints are vital for the safe operation of your model rocket. Use the recommended glues in the manner outlined by these instructions and by the glue manufacturer.

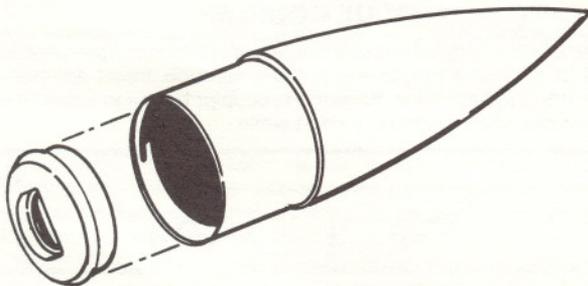
ITEMS REQUIRED FOR ASSEMBLY OF YOUR XR-20

- | | |
|---------------------------------------|---|
| 1. Cotton swab on stick (like Q-tip™) | 7. Modeling Knife |
| 2. Pencil | 8. White Glue or Aliphatic Resin Glue (such as Titebond™) |
| 3. 400 grit sandpaper | 9. Instant Glue (Crazy Glue™) or Plastic Glue |
| 4. Scissors | 10. Enamel Paint |
| 5. Ruler | |
| 6. Modelers Paint Brush | |



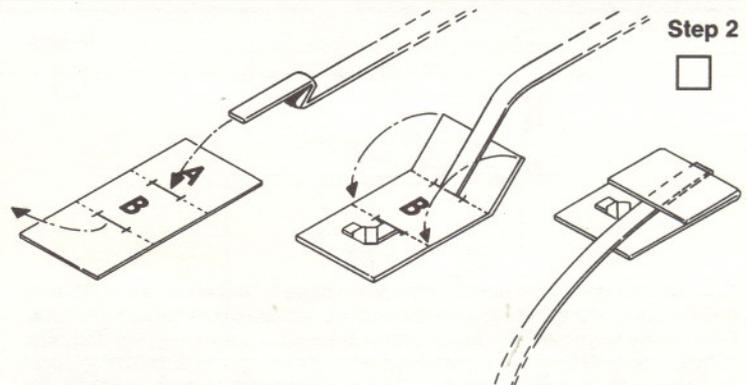
ASSEMBLY INSTRUCTIONS

Step 1

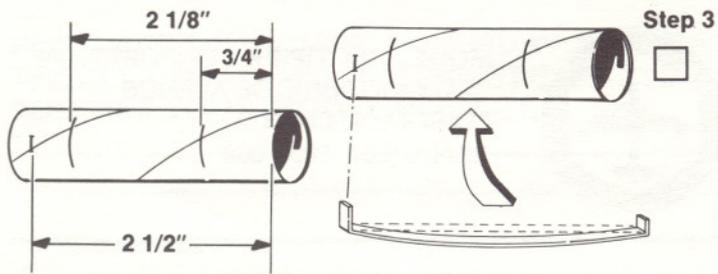


Using plastic cement or instant glue, glue the nose cone base to the nose cone. Wipe off excess glue and put aside to dry.

Step 2

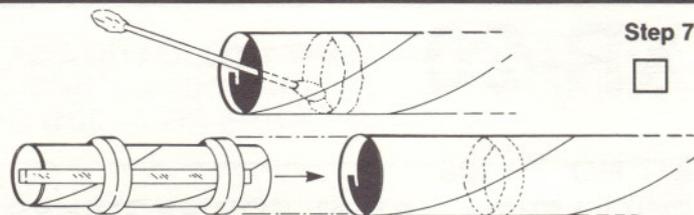


Cut out the shock cord holder on page 3 of the instructions. After it has been cut out, make two slits with your modelers knife on two dotted lines. Do not make slits any wider than is marked by the dotted lines. Feed the shock cord through the two slits as indicated in the drawing and put a small knot at the end of the shock cord. Apply white glue to Section B and fold A onto B along the large dotted line. Allow to dry.



Step 3

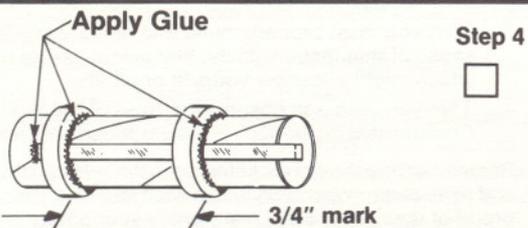
Make three marks on engine mounting tube at 3/4" and at 2 1/8" and at 2 1/2" from the rear of the tube. Cut a 1/8" slit in the tube at 2 1/2" from the rear of the tube. Put a slight bend into the engine hook. Make a note that the engine hook has one end larger than the other. Insert the larger size end of the hook into the slit as shown.



Step 7

Test fit the engine mount into the larger body tube with the engine hook facing outwards at the rear of the tube where the pencil marks were made. Turning the engine mount as you insert it will make it easier to fit the tube. If engine mount inserts with great difficulty, you may sand the adapter rings to achieve a snug fit inside the body tube.

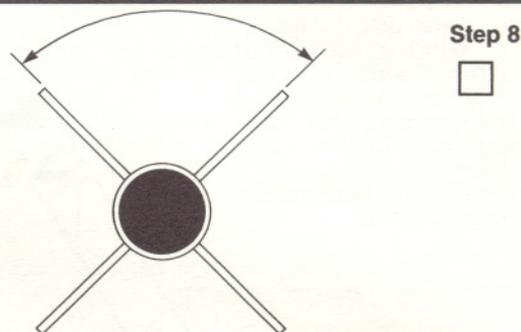
Apply a ring of glue inside the body tube approximately 1" from the tube edge. Insert the engine mount tube as you did before in one motion. Do not stop while inserting the tube since the glue might "grab" the mount while in the wrong position. The rear ends of the body tube and the engine mount tube should line up evenly. The engine hook must be located directly underneath the middle mark for the launch lug line.



Step 4

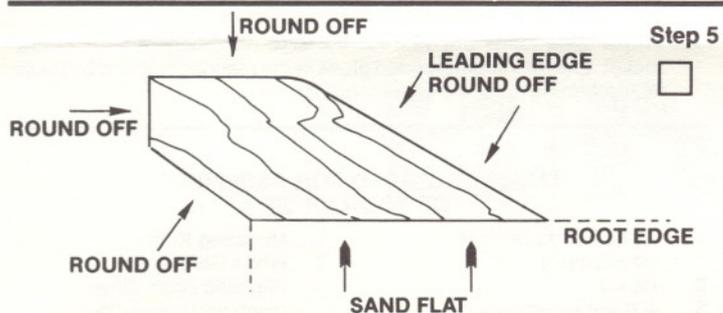
Apply Glue

Sand the inside of the rings for a proper fit. Push one ring onto the engine tube mount from the front and make it line up with the 3/4" mark on the tube so that the ring itself is no more than 3/4" from the rear of the tube. Slide the second ring onto the engine tube mount until it matches up with the 2 1/8" inch mark. Apply a ring of white glue on both sides of each ring at the joint where the rings meet the engine mount tube. Do not get glue on the outer surface of the rings. Apply a small dab of glue over the slit where the engine hook is inserted. Set this assembly aside to dry with the engine mount resting upright so the glue can dry evenly.



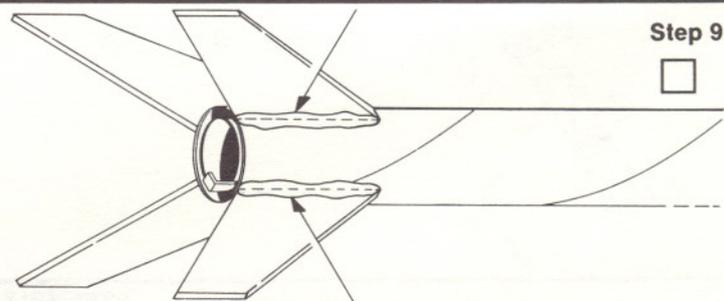
Step 8

Using a cotton swab apply a small application of white glue to the root edge of each fin. When doing this, rub the glue thoroughly into the wood to assure a better bond. Next, apply a small bead of glue to one fin and let it dry for about two minutes, then attach the fin to one of the marked fin lines on the tube as per diagram. Be sure the fin extends vertically away from the body tube and is straight along the pencil line. The body of the fin at the root edge should be even with the bottom of the tube. After each fin has dried, apply the next fin in the same manner. Erase any leftover pencil marks after the glue has dried.



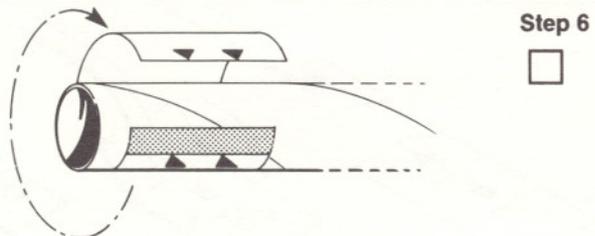
Step 5

Locate the die-cut fin sheet. Gently sand top and bottom sides of the sheet, and remove the fins by cutting along the die-cut marks using your modeling knife. Sand all edges so that the fins are identical. Refer to the diagram to identify the root edge. Sand the root edge flat. All other edges including the leading edge are to be rounded evenly.



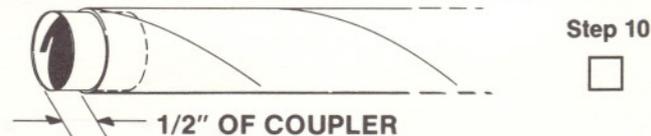
Step 9

Apply a line of white glue to each side of the four fins for reinforcement.



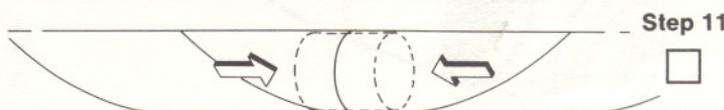
Step 6

Cut out the paper tube marking guide on page 3. Roll ends of the guide in the direction of the large arrows around the outside of the larger body tube. Line up the alignment arrows and tape the ends as shown in the diagram. "TAPE ONLY THE GUIDE; DO NOT PUT TAPE ON THE BODY TUBE." Position bottom of the guide at 1/4" from the end of the tube and put a small mark on the body tube by each vertical arrow. You should have fourteen marks on the tube when done. Mark each line if it is for a fin or a launching lug. Slide the marking guide off the body tube and gently clamp the tube between two solid objects. Using a ruler join each pair of marks in a vertical direction as straight as possible. The launch lug lines should extend for 7" from the end of the body tube.



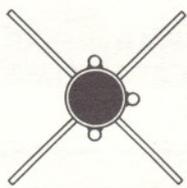
Step 10

Take the smaller body tube and the hollow body tube coupler. Apply a ring of glue to the inside of one end of the body tube. Insert one half of the coupler into the body tube. Be sure the coupler has been inserted evenly. Set this piece aside to dry for a short while.

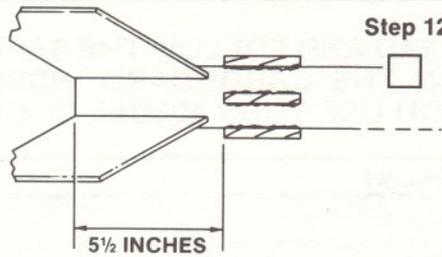


Step 11

Apply a ring of glue to the inside of the end of the remaining large body tube and at the opposite end from the engine mount and attach it over the exposed part of the hollow body tube coupler and the two tubes now joined should meet flush and straight. Set this assembly aside to dry.

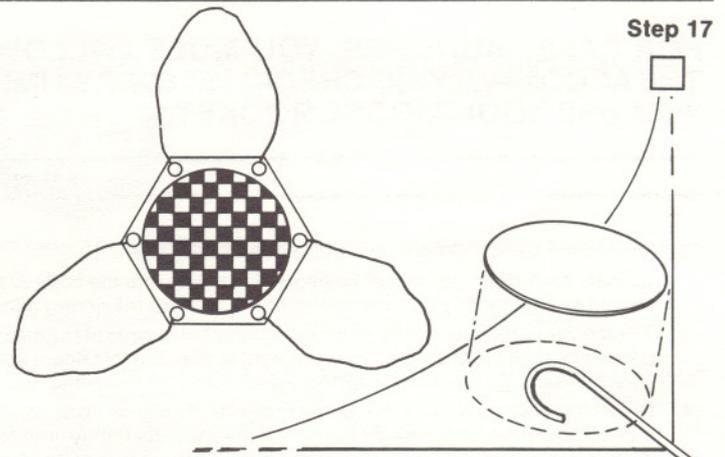


REAR VIEW



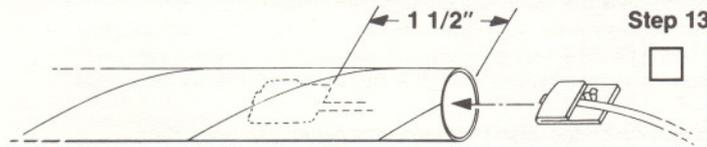
Step 12

Now glue the launch lugs onto the body tube. The rear of the lugs should be 5 1/2" from end point of the body tube. See diagram. After the glue has dried, add an additional bead of glue to each side of the launch lugs as a reinforcement bond.



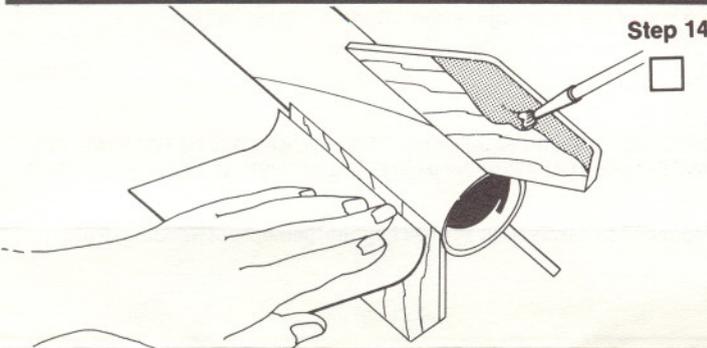
Step 17

Cut the parachute out along the dotted lines printed on the sheet. Take the bundle of parachute cord and cut it into 3 pieces of equal length, of about 24 inches each. Take one end of the parachute cord and bend it over for about 1/8 of an inch. Place this bent end on one of the circles drawn on the corner of the parachute and firmly press a self-adhesive tape disc over the end of the cord to hold the cord in place. Bend the other end of the parachute cord and tape it down to an adjacent corner of the parachute. Repeat this for the remaining two parachute cords.



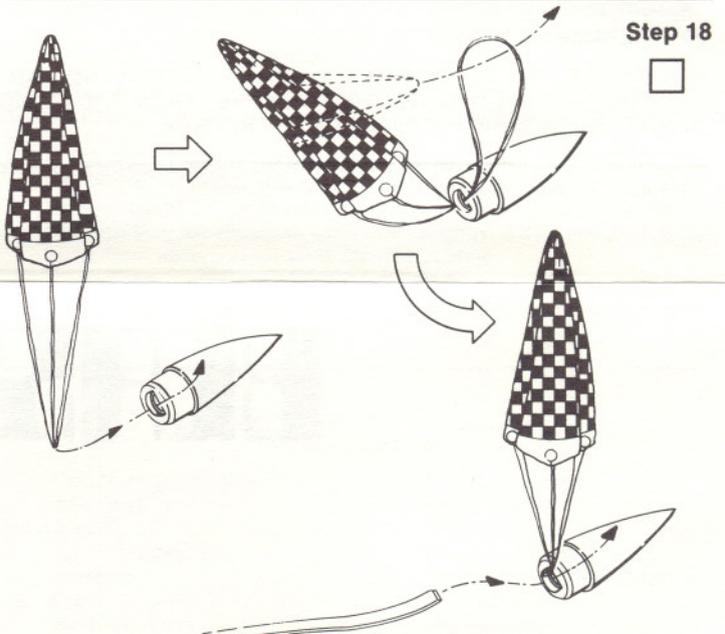
Step 13

Apply glue to a spot 1-1/2" inside the top of the body tube using a cotton swab. Press the shock cord mount onto the glue and hold it in place for a minute. Do not let the mount slide away from this position.



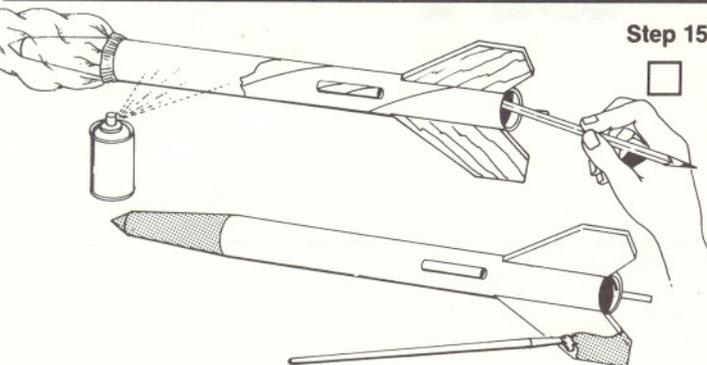
Step 14

Sand the fins using 400 grit sandpaper so that the fins are smooth before painting the rocket. As an option you can seal the balsa fins using sanding sealer (available at your hobby shop). If you use sealer, sand the fins after the application of sealer has dried to get the smoothest finish.



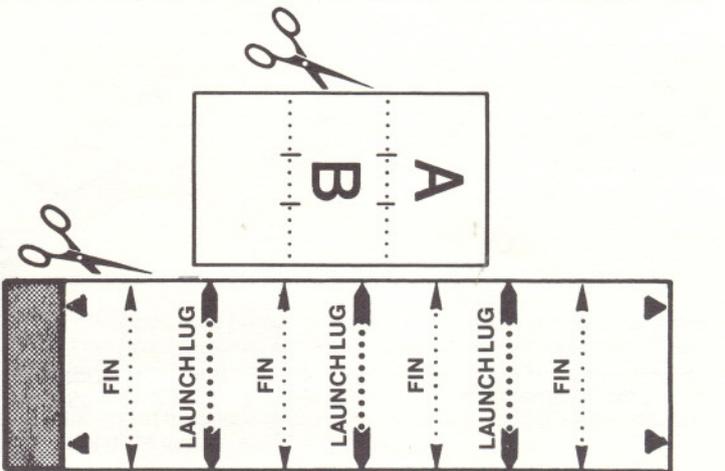
Step 18

Hold the parachute by its center and pull the cords together evenly. Pass the cords through the eye of the nose cone base and loop the cords around the nose cone so that the parachute is firmly attached to the nose cone as shown in the diagram. Tie the free end of the shock cord to the nose cone base with a double knot and put a drop of glue on the knot.



Step 15

To prepare for painting, the shock cord, parachute and nose cone should be protected from paint overspray. It is best to paint the rocket body white.



Step 16

The special MRC self-adhesive decals included in this kit can be instantly applied to the body tube after the paint has dried. Take your time in applying the decals because the glue on them is very strong and decals cannot be removed once applied.

To apply decals, remove individual decals from the sheet. Position the decal on the rocket lightly and carefully. Press the decal firmly onto the rocket, making sure the decal surface is evenly applied, with no bubbles or loose edges, by rubbing the surface with your fingernail. You may have to cut decals to fit around the launch lugs. Use the cardboard insert within polybag for decal location.

FOR SAFE LAUNCHES, YOU MUST FOLLOW THE ACCOMPANYING CHECKLIST EVERY TIME YOU USE YOUR MODEL ROCKET.

READ AND FOLLOW THE SAFETY WARNINGS ON THE CARDBOARD INSERT EACH TIME YOU USE YOUR MODEL ROCKET.

LAUNCH CHECKLIST

1. Disarm the launch system by removing the safety key.
2. Loosely pack three squares of flameproof wadding into the body tube from the forward end where the shock cord mount is located. The wadding should slide smoothly into the center of the tube for maximum effect.
3. Stretch the parachute out by holding all parachute cords at the end where they are tied together and at the center of the parachute itself. Roll the parachute to fit the body tube easily. A light application of talcum powder to the parachute as it is folded will help deployment of the parachute. Be sure the wadding has been inserted before inserting the parachute. It is best not to pack the parachute until you are ready for a launch.
4. Install the nose cone over the recovery device. The nose cone should fit snugly; not too tight or too loose. If the fit is too tight, you can sand the inside edge of the body tube or the nose cone shoulder lightly until you achieve a snug fit. If the nose cone is too loose, you can add masking tape to its shoulder to get a snug fit, or you can build up the inside edge of the body tube with a light application of glue. Be sure the glue is dry before test fitting the nose cone!
5. Carefully select the engine for launch. For a first flight, use the A8-3 engine as recommended. Insert the igniter as per engine instructions.
6. Engine Installation — Insert the engine into the engine tube mount until it stops against the top portion of the engine hook. The rear hook must latch over the rear of the engine. The igniter leads should be positioned between two fins and away from the launch lug side of the rocket. "DOUBLE CHECK THAT THE LAUNCH SYSTEM HAS BEEN DISARMED AS PER STEP 1 ABOVE".
7. Fit the launch rod through the launch lug of the rocket. The nose of the rocket should be pointing upwards. Be sure the rocket slides freely on the launch rod. Attach the launch system clips to the igniter leads. You can use any one of the three lugs on the XR-20.
8. Clear the launch area and follow all range and safety procedures.
9. Arm the launch system.
10. Countdown to launch!

IF A MISFIRE OCCURS, DISARM THE LAUNCH SYSTEM AND **WAIT ONE MINUTE** BEFORE APPROACHING THE ROCKET TO DETERMINE THE CAUSE OF MISFIRE. REMOVE THE SAFETY KEY FROM THE LAUNCH SYSTEM BEFORE YOU APPROACH THE LAUNCHER. **DO NOT** PUT YOUR HANDS AND FACE NEAR THE TOP OF THE ROCKET...

When you are ready to leave the launch site, we suggest you pick up and properly dispose of all debris such as used igniters, flameproof wadding or engine packages. A clean launch site is a safe launch site!

BLAST OFF



TM

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TODAY



Quick Page Finder



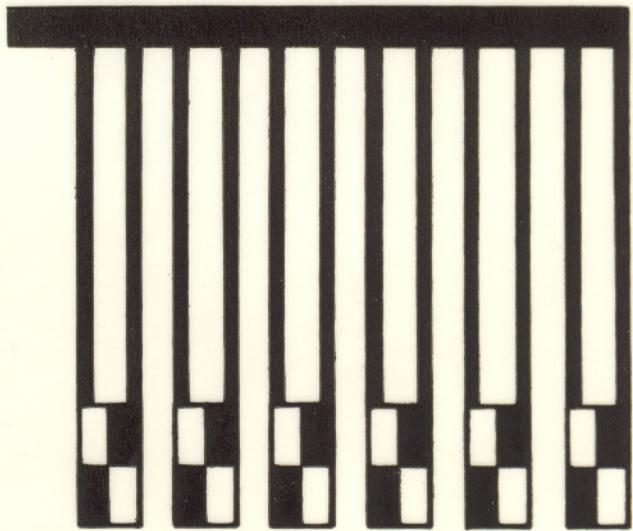
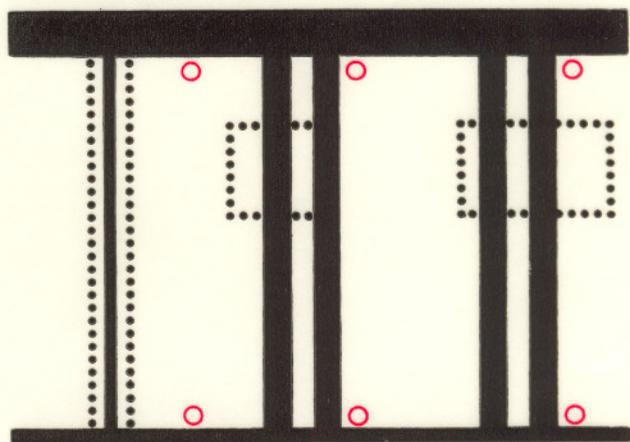
DESTRUCT
ARMING
SWITCH



TELEMETRY HATCH



XR-20



MRC XR-20

High flying Model Rocket Kit flies up to 1,000 feet high

- Stands almost 20" high
- Long, sleek aerodynamic design
- Pre-cut lightweight balsa fins
- Realistic, scale-like decals

Great for beginners



**Model Rectifier
Corporation**

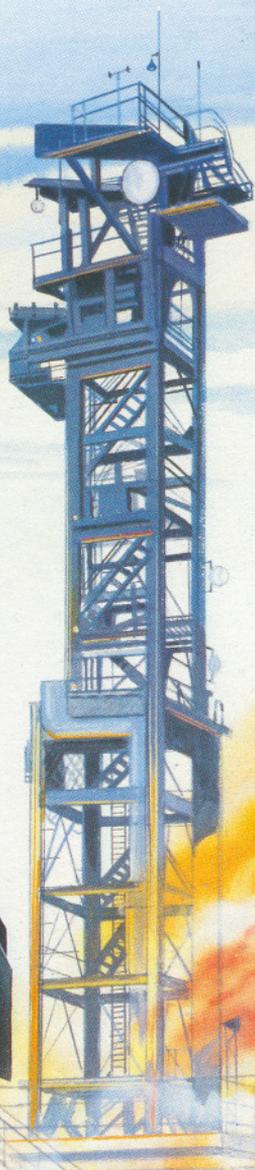
2500 Woodbridge Ave.
Edison, New Jersey 08817

Length: 19.50 in. (495.3mm)
Body Diameter: .976 in. (24.8mm)
Weight: 1.01 oz. (28.6 grams)

Recommended Engine

Sizes: 1/2A6-2, A8-3 (first flight)
B4-4, B6-4, C6-5, C6-7

Recommended for ages 10 to adult. Adult supervision recommended for ages 12 years and under. Keep out of reach of small children.



NAR/HIA MODEL ROCKETRY SAFETY CODE

1. CONSTRUCTION — My model rockets will be made of lightweight materials such as paper, wood, rubber, and plastic without any metal or other hazardous material as structural parts.

2. ENGINES — I will use only pre-loaded factory-made NAR certified rocket engines in the manner recommended by the manufacturer. I will not alter or dismantle model rocket engines or their ingredients in any way, or attempt to reload these engines.

3. RECOVERY — I will always use a recovery system in my model rockets that will return them safely to the ground so that they may be flown again. I will use only flame resistant recovery wadding in my rockets.

4. WEIGHT LIMITS — My model rockets will weigh no more than 1500 grams (53 ounces) at liftoff and the engines will contain a total of no more than 125 grams (4.4 ounces) of propellant. My model rockets will weigh less than the engine manufacturers' recommended maximum liftoff weight for the engines used, or I will use engines recommended by the manufacturer for my rockets.

5. STABILITY — I will check the stability of my model rockets before their first flight, except when launching models of already proven stability.

6. PAYLOADS — My model rockets will never carry live animals, or payloads that are intended to be flammable or explosive.

7. LAUNCH AREA — I will launch model rockets outdoors in a cleared area, free of tall trees, power lines, and buildings. I will ensure that people in the launch area are aware of the pending rocket launch and are in a position to see the rocket's liftoff before I begin my audible five-second count down.

8. LAUNCHER — I will launch my model rockets from a launch rod or other device which provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path. To prevent accidental eye injury, I will always place the launcher so that the end of the rod is above eye level or will cap the end of the rod when approaching it. I will cap or disassemble my launch rod when not in use and will never store it in an upright position. My launcher will have a jet deflector device to prevent the engine exhaust from hitting the ground directly. I will always clear the area around my launch device of brown grass, dry weeds, and other easy-to-burn materials.

9. IGNITION SYSTEM — The system I use to launch my model rockets will be remotely controlled and electrically operated, and will contain a launching switch that will return to "off" when released. The system will contain a removeable safety interlock in series with the launching switch. All persons will remain at least 15 feet

from the model rocket when I am igniting engines totalling 30 Newton-seconds or less of total impulse and at least 30 feet from the model rocket when I am igniting engines totalling more than 30 Newton-seconds total impulse. I will use only electrical igniters that will ignite my rocket engine(s) within one second of actuation of the launching switch.

10. LAUNCH SAFETY — I will not let anyone approach a model rocket on a launcher until I have made sure that the safety interlock has been removed or the battery has been disconnected from the ignition system. In the event of a misfire I will wait one minute before allowing anyone to approach the launcher.

11. FLYING CONDITIONS — I will launch my model rocket only when the wind is less than 20 miles per hour and under conditions where the model will not fly into clouds, fly near aircraft in flight, or be hazardous to people or property.

12. PRE-LAUNCH TEST — When conducting research activities with unproven designs or methods, I will, when possible, determine their reliability through pre-launch tests. I will conduct launchings or unproven designs in complete isolation from persons not participating in the actual launching.

13. LAUNCH ANGLE — I will not launch model rockets so that their flight path will carry them against targets. My launch device will be pointed within 30 degrees of vertical. I will never use model rocket engines to propel any device horizontally.

14. RECOVERY HAZARDS — If a model rocket becomes entangled in a power line or other dangerous place, I will not attempt to retrieve it. (Revised January 1, 1987)

Specifications:

Length: 19.50 in. (495.3mm)
Body Diameter: .976 in. (24.8mm)
Weight: 1.01 oz. (28.6 grams)

Recommended Engine Sizes:

½A6-2, A8-3 (first flight)
B4-4, B6-4, C6-5, C6-7

Glue required for assembly.
Launch system and rocket engines required for flight.

IMPORTANT

You must read and understand the model rocketry safety code on this card. Keep this code with you and adhere to its guidelines during all of your model rocketry activities without exception.

WARNING

For Safety Purposes, DO NOT modify, disassemble, or in any way tamper with model rocket engines or their contents. Soak engines in water to destroy.

