

JULY 1967 35 CENTS

Popular Science

MONTHLY

'68 CARS

Secret Color Photos
and Latest News

How to Time Your
Car Engine

Machines That Make
Money for You

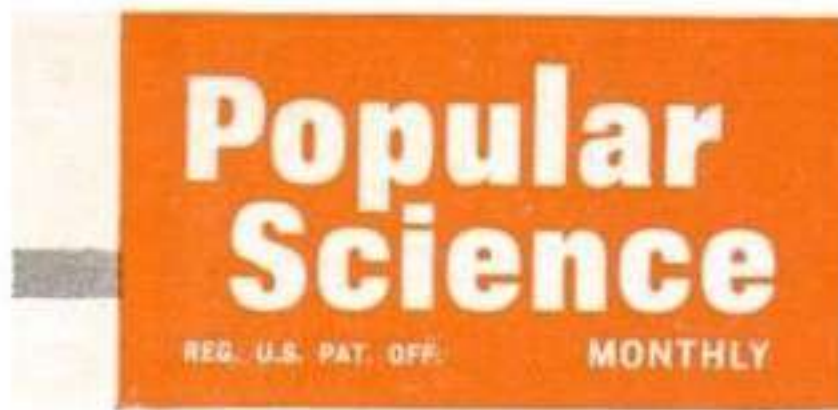
**New Deep-
Diving Sub:
OUR FIRST
FERRY
TO THE
BOTTOM
OF THE
SEA**

10 Smart Tricks
with a Router

Breakthrough! New
Toolproof Water Paints
You Can Use Anywhere

Surprising New Facts
About Your Muscles





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HIGHLIGHTS OF THIS ISSUE:

Our First Ferry to the Bottom of the Sea PAGE 47

Edwin A. Link, famous inventor and underwater pioneer, tells about Deep Diver, world's first sub that puts out divers to work—and picks them up again.

'68 Cars: Some Chopped, Others Stretched, All Sportier PAGE 50

What's coming up in the new cars? Here's the inside report—plus secret color photos.

Surprising New Facts About Your Muscles PAGE 54

Can you "feed" your muscles? How do you build up endurance? What about warming up and tapering off? Now, science gives you new insights into the human muscle system.

Breakthrough! New Water Paints You Can Use Anywhere PAGE 108

Inside or outside, walls, trim, or metal—there are now latex paints for you. Even enamels!

How to Time Your Sparks PAGE 115

Save gas and gain power with the auto-tuneup techniques you learn here.

COVER PAINTING BY PIERRE MION

CARS AND DRIVING

- [38 What's New for Your Car](#)
- [50 The '68 Cars: Some Chopped, Others Stretched, All Sportier](#)
- [76 I "Drove" Through a Town That Isn't](#)
- [88 Your Next Car May Have Variable-Ratio Steering](#)

SCIENCE AND INVENTIONS

- [47 Our First Ferry to the Bottom of the Sea](#)
- [54 Surprising New Facts About Your Muscles](#)
- [66 I Spent 90 Minutes in Hell](#)
- [70 Medical Miracles in South Vietnam](#)
- [74 "Dam" Holds In Oil Slicks](#)
- [101 Want "Instant Shade"? Well, Here's How](#)
- [111 Tiny Power Bike Really Goes](#)

SPACE AND AVIATION

- [60 The "Tin Goose" Comes Back](#)
- [80 By Wernher von Braun: Eyes in the Sky Will Help Feed the World](#)

ELECTRONICS

- [92 Five Kits You Can Build Just for Fun](#)
- [96 What's New in Electronics](#)
- [97 Ask-Our-Computer Service: How Much Will My New Driveway Cost to Build?](#)
- [98 A Telltale for Your Car's Tail Lights](#)

HOME AND SHOP

- [108 Breakthrough! New Foolproof Water Paints You Can Use Anywhere](#)
- [112 Build Your Own Reentry Kite](#)
- [120 For Modern Living: Two Coffee Tables Out of the Past](#)
- [124 Do You Need a Lawn Edger?](#)
- [127 PS Blueprint Project: Load-Equalizing Trailer Hitch](#)
- [131 How to Make Your Own Lawn Spiker](#)
- [132 What's New for Your Home](#)
- [133 Plumbing Know-How Series: How to Open Clogged Drains: Part II](#)
- [140 19 Smart Tricks with a Router](#)
- [146 What's New in Tools](#)
- [147 How to Build a Foam Raft Fast](#)
- [148 Smooth Way to Rough It](#)
- [152 A New Sawdust Collector for Radial Arms](#)
- [166 How to Get Full Value from a Home Tractor](#)

SPECIAL REPORT

- [62 Machines That Make Money for You](#)

BOATS AND BOATING

- [102 My Piggyback Boat Hauler Tows My Boat Trailer, Too](#)
- [104 Two Jim Roes Test the Glasspar](#)
- [107 What's New in Boating](#)

Build Your Own REENTRY

Space-vehicle design gives you an exciting sports kite

By WILL YOLEN

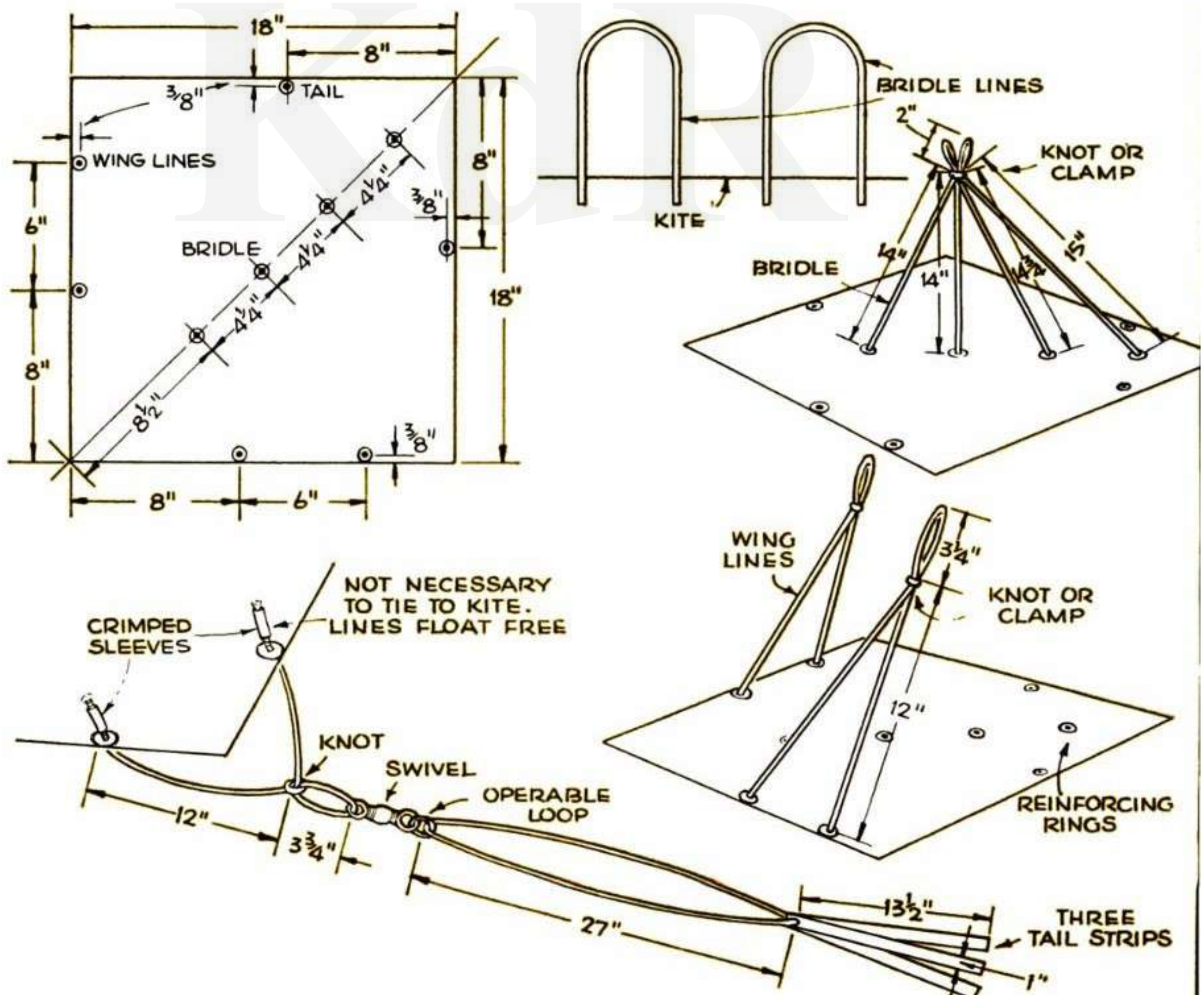
A kite in the space program? Yes, and POPULAR SCIENCE has made it possible for you to build your own. At this very moment, space scientists are running tests with the kite shown here. It may help solve the reentry-from-space problem for astronauts, enabling them to set down on land instead of splashing down at sea.

This is unlike any kite you have ever seen; there's no framework and it's flop-

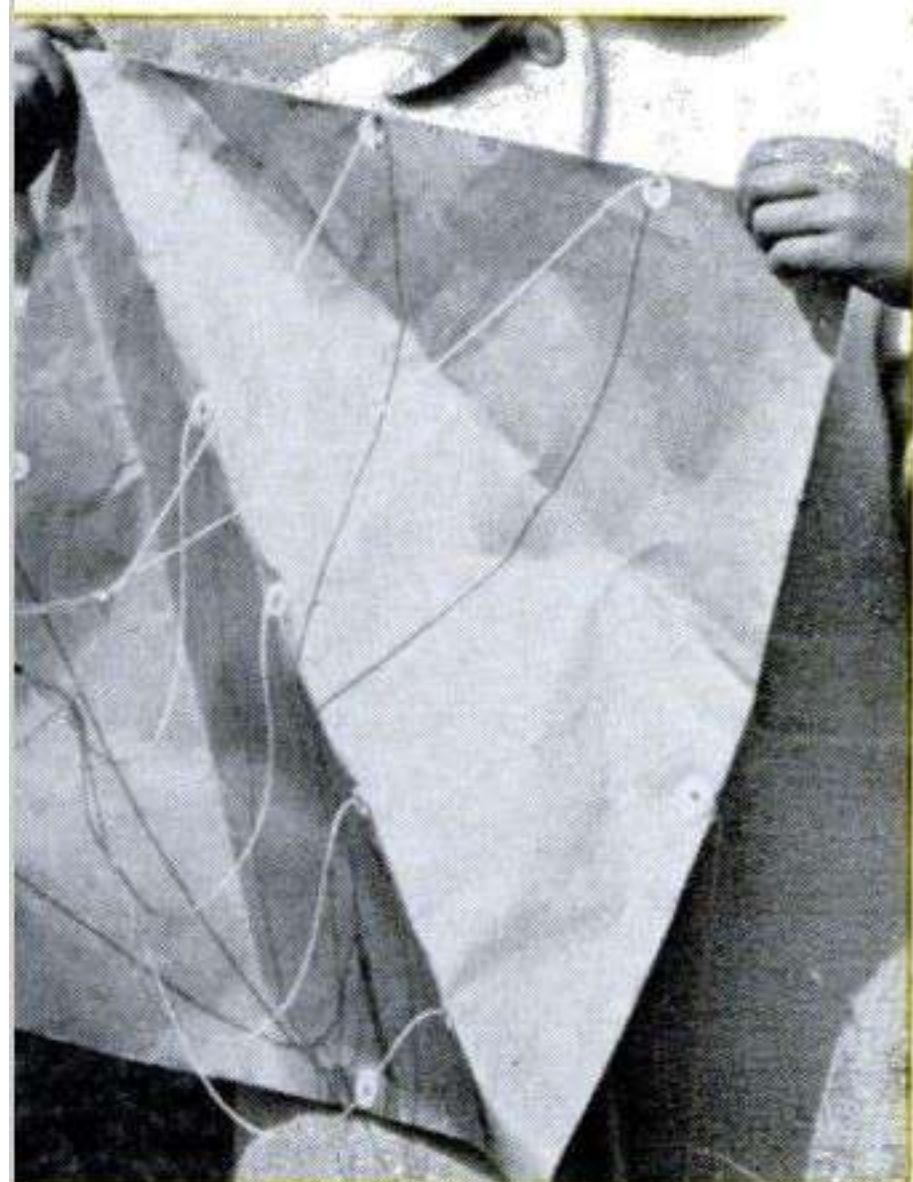
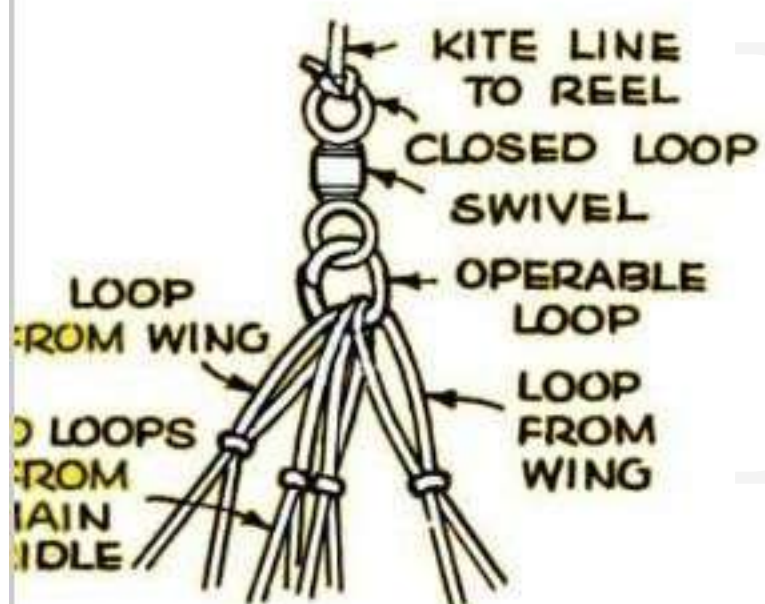
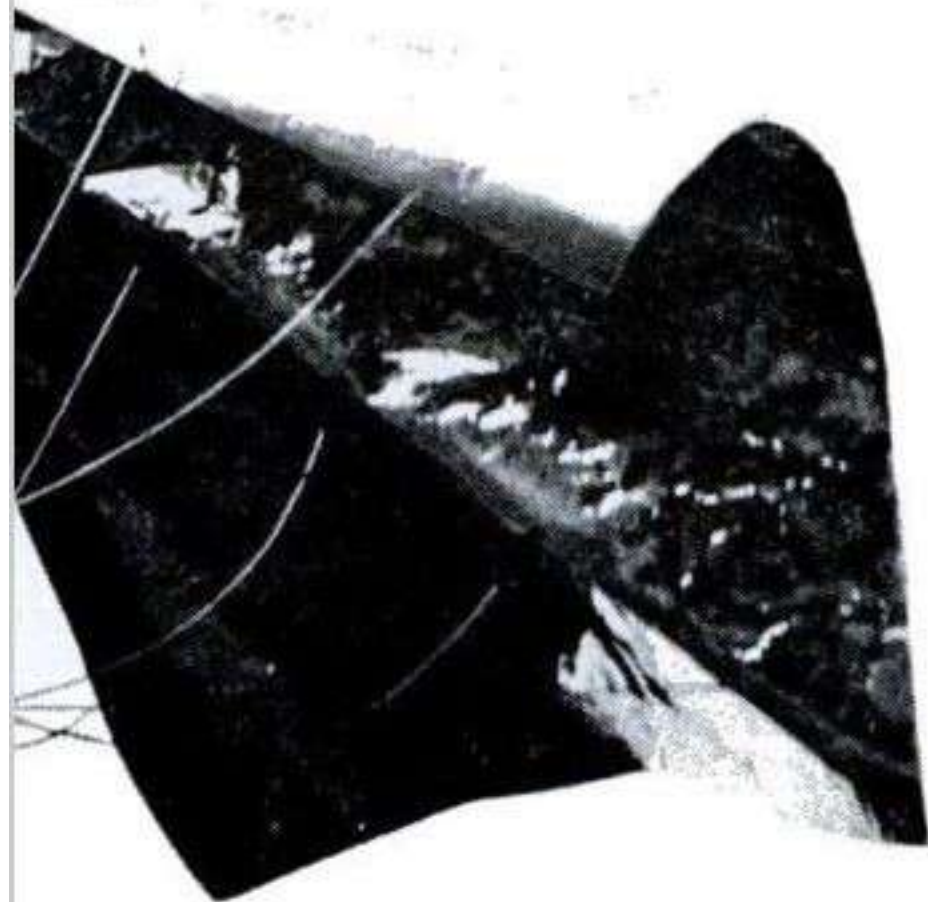
py. The kite, invented by NASA engineer Francis Rogallo, is so different that he had no trouble obtaining several patents on it. Head of the Low Speed Vehicle Branch, Rogallo experimented in the NASA wind tunnels.

Ordinary kites were used to test air turbulence. But stick-frame ones shattered easily, and too frequently, when turbulence slammed them against the wind-tunnel sides. Tiring of constant repair jobs, the inventor substituted shroud lines for the sticks. Tests proved his idea worked; the kite could take a beating

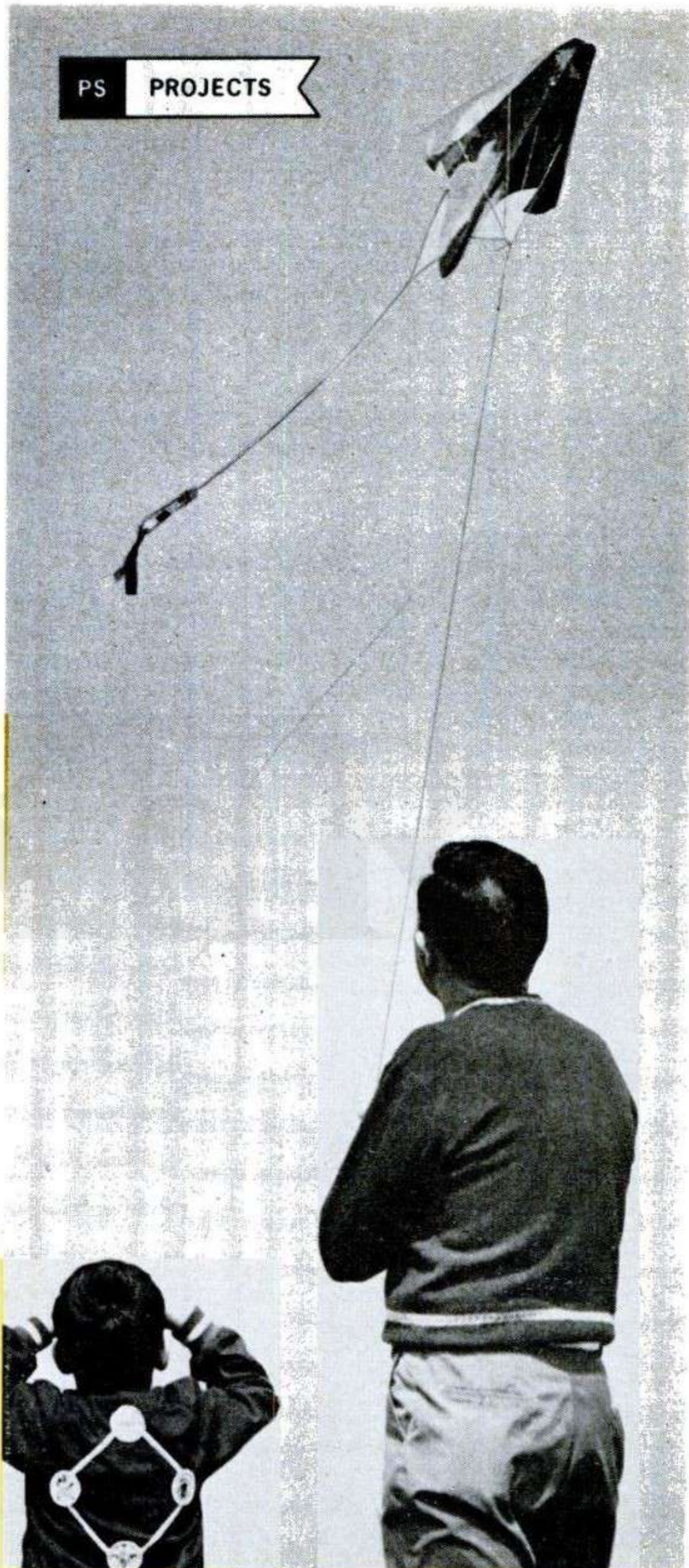
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KITE



Aluminum-coated Mylar (see top photo) proved to be the best material. The brown wrapping paper (photo above) formed lift-reducing creases.



Rogallo kite soars into blue after launching. Once filled with air it's almost impossible to keep it down. With a little practice you'll master dives, climbs, and loops. Use a fishing rod and reel for best line control.

and come out without a bit of damage.

Because it bends to turbulence and there are no rigid members on the kite, it can go through the sound barrier without breaking up. The thermal barrier is no problem as no friction is generated as it glides through the air.

These facts interested the government. Research-and-development contracts were awarded to Ryan Aircraft and North American Aviation. The contracts call for extensive exploration in areas other than space, too. The kite is being tested for Army cargo-drop use, and there's hope it can be used as a powered man-carrying craft.

It looks like a kissin' cousin to the parachute, but there's a difference. A parachute develops drag and descends; the Rogallo kite uses the static air current on the underside to give lift. Now the inventor has given his permission to POPULAR SCIENCE readers to build their own. But this approval is for personal use only; you can't make them for sale.

Choosing a material. Construction is simple; just make certain your measurements are accurate. There's a wide choice of materials. We tried brown wrapping paper, aluminum-coated Mylar, and polyethylene. The first two materials flew well; polyethylene wouldn't fly at all until the wing edges and axis were made more rigid by adding tape to them. The brown paper flew easily but, after eight or 10 flights, in strong beach breezes, it formed wing creases and lift was reduced. The Mylar was best in every way.

Start construction by cutting the kite to the dimensions shown in the drawing. Fold the paper to form a triangle and run the fold between the thumb and index finger to make a crease. The side of the paper with the valley is the top when finished. Measure and mark for the holes. Don't make the holes any larger than you need to get the lines through. It's best to reinforce the holes with notebook rings or Scotch tape.

Cut four pieces of line 36" long for the shroud lines. Assemble the bridle first. Lay the kite down with bottom up. Pass the four ends from two lines through the holes on the crease. Hold the two loops together and tie a knot 2" back from the ends. Make sure the string is flat and straight. Measure back the right distance

for each line and mark at that point on the string. You'll find the right point quickly when you turn the kite over. Do the same to make the wing lines; note the different loop length. Turn the kite over and slip a crimping sleeve on each strand, position at the mark, and crimp with pliers. Knots will do the job too, as long as they're large enough. Trim off the excess line. If you're using nylon seine, heat each cut to prevent unraveling. The four loops are attached to the swivel, as shown in the sketch.

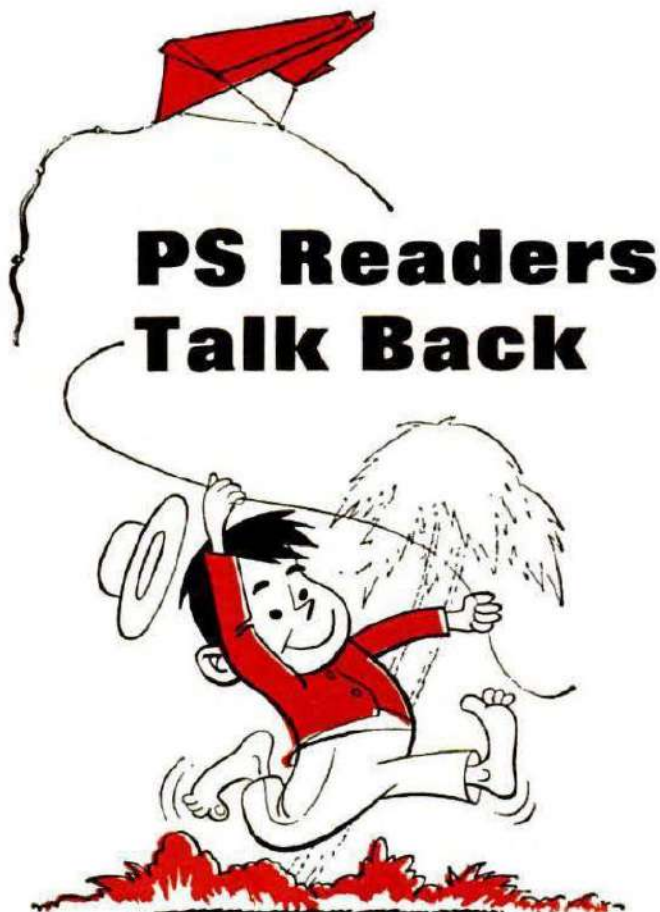
For the tail, cut a 40" piece of line and insert it in the closed ring of the swivel. Line up the string ends, centering the swivel, and tie the loop knot. Attach this section of the tail to the kite, using the same method as for the shroud lines. The tail strips are made of the same material as the kite. Pass a 54" length of line through the holes and tie the ends together. Attach this loop to the swivel.

Aluminum-coated Mylar is usually available at hobby and notion counters. Clear can be found in artist's-supplies shops. Get the crimping sleeves at a fishing-tackle store; the small ones work fine. Kite size can be altered, but hole spacing and shroud lines must be adjusted in proportion.

Where to fly it. The beach, because there is usually a breeze there, is an excellent place to fly this kite. If a beach is not handy, use an open field free of power lines and trees, and away from buildings. Pick a day when the winds are parallel to the ground; they're better than the puffy, gusty variety. If you have a fishing rod and reel, use it to fly the kite. It gives you better control when putting the craft through its paces. To get it aloft, you can either cast it in the air, or jerk it into the air from the ground. Stand with the kite in front of you and the wind at your back. Let the line out in short bursts.

There's no need to run with this one. In fact, it's a job to keep the kite down. If it dives, slacken the line. The kite will refill with air and right itself. To put it into a climb, pull on the line, reeling in rapidly. With a little practice you'll invent tricks of your own. To bring the kite in, walk to it, reeling the line in. Store it flat to keep it from wrinkling.

The countdown is on—happy flying. **[25]**



PS Readers Talk Back

Reentry kite is old stuff

I was amazed to read in "Build Your Own Reentry Kite" [July] that the "Chiringa" is going into space. The Chiringa is not a new invention, but a very popular kite among poor Cuban children, who cannot afford to buy a regular one. As early as 1928, I remember making Chiringas and flying them. I hope **POPULAR SCIENCE** will give proper credit in the space program to a humble and inexpensive toy that gave happiness and fun to thousands of poor kids who couldn't dream that they were playing with a future space reentry vehicle.

DR. ENRIQUE M. SENRA, Hilaleah, Fla.

The Chiringa is apparently widely known throughout the Caribbean and is also a favorite with Puerto Rican children.

Fill 'er up foamy again

"Things You Never Knew About Beer" [Aug.] tells only half the story. Filtering out taste-spoiling organisms makes possible the putting of draft beer into bottles and cans. But something else is needed, or it won't stay fit to drink very long without refrigeration because the brew can easily become contaminated during filling. A process known as aseptic filling is entitled to share the credit with membrane filtration for today's favorite packaged brews. This process came into being a few years ago with the discovery of an iodine-based sanitizer that

can, according to FDA regulations, be used all during the filling operation on packages, fillers, crowners, and cappers, without any following rinse.

MORRIS BANNER, Bloomington, Ill.

Jumbo Jet article a big hit

Your article "Come Fly to Europe with Me in the New Jumbo Jet" by Devon Francis [Mar.] created so much interest that our offices throughout the world have been besieged with requests for reprints. We have already distributed 10,000 and more requests are still coming in.

RICHARD N. BARKLE, Director
Public Relations Bureaus
Pan American World Airways, NYC.

Go-Go engine's name is a goof-goof

The engine called a Suzuki in "The Go-Go Engines That Power Motorcycles" [Aug.] is really a Yamaha, model YL-1 engine.

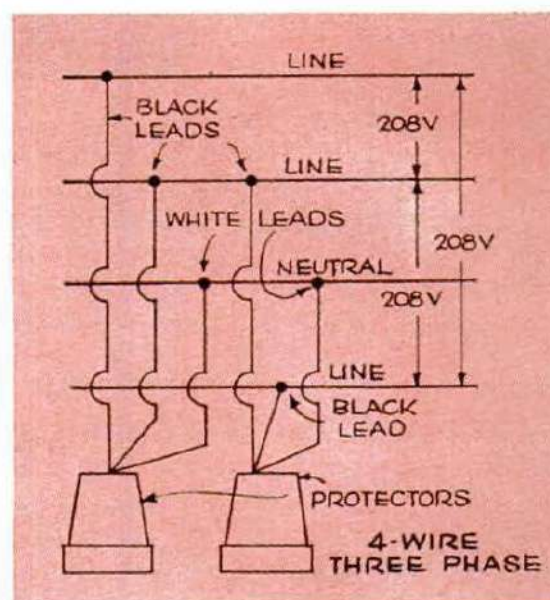
DAVID L. WORBY, Oshkosh, Wis.

Right you are.

Lightning protection for your home

I was startled by the wiring diagram in "Safeguarding Your Wires from Lightning" [Aug.], which shows the installation of GE lightning protectors on a three-phase power line. Your sketch shows the three "hot" lines shorted together.

ROSS CUTTING, Cleveland, Ga.



Our draftsman goofed. See accompanying diagram for the way it should look.

Recording a sour stereo note

In your article on recording stereophonic sound ["Today's Stereo Sound," Aug.], you unfortunately used Enoch Light and his popular but artificial Ping-Pong sound as an example. In a true stereophonic recording

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