

BUILDING A WINCH FOR 2-METER COMPETITION

By BUDDY FOX & JERRY KRAINOCK. . . If you've been looking for a reliable winch for glider launching, this is the ticket; it's to be the exclusive winch for future World Cup competition.

• The Two-Meter World Cup is an annual, multi-task soaring contest. In the past, the host club has supplied the winches. However, at the 1982 contest, certain winches were obviously better than others.

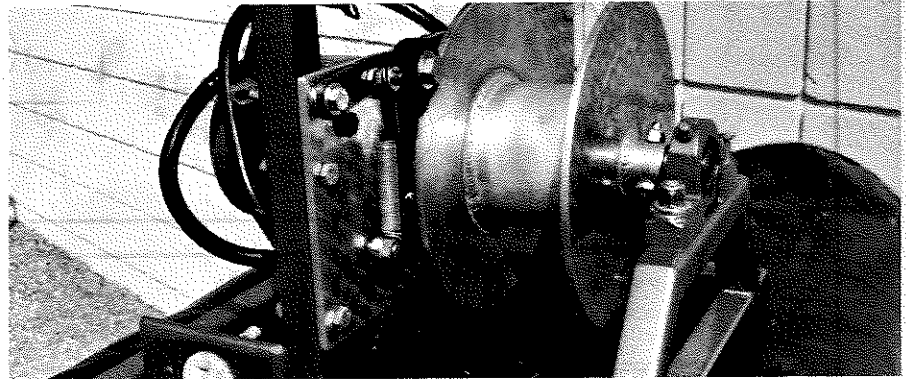
The winch presented here was designed and built by Buddy Fox. A total of five copies were constructed. By carefully selecting the motors, the difference in power output among the five winches was less than 5%. These winches will be supplied to the organizers of the subsequent World Cup events so the launching equipment will be the same for everyone.

This winch is designed for longevity and low maintenance. It is simple, yet sophisticated. It is very easy to build from readily available materials.

Start construction by cutting the one-inch tubing to length. Cut five pieces 14 inches long with a 45° cut on the ends. Cut two pieces 10 1/2 inches long, square on one end and 45° on the other. Cut two pieces 4 1/2 inches long, and one 7 inches long. . . all with 30° cuts on the ends.

Put four of the 14-inch pieces on a good flat surface and weld them together (forming a square). Heli-arc them your welds. Lay the remaining 14-inch piece and the two 10 1/2-inch pieces on a flat surface and weld them together, forming a "U" with the 14-inch piece in the center. Now, take the three remaining pieces, place them on your flat surface, and weld them together as shown on the plans.

Center the Pillow Block Support, which you made last, on one end of the square frame and weld it on at a true 90° angle. The remaining part is the Support Frame Mount for the aluminum plate for the



Starter solenoid and foot switch receptacle of the World Cup winch are mounted on the back side. All welds are heli-arc'd.

starter. Be sure that this support mounts at a true 90° angle to the frame or the starter will bind when bolted in place. Heat and bend these two supports to ensure parallelism if necessary. The starter support frame has to be welded on at the exact dimension called out in the plans, so, BE CAREFUL!

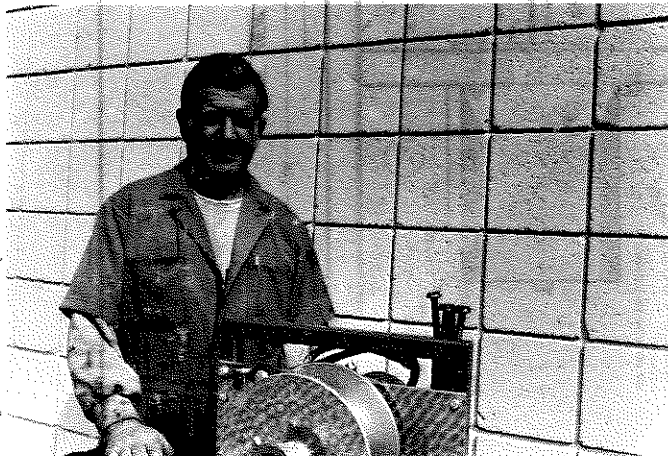
Now, remove the front starter mounting plate from the starter. Take the 14 x 6 x 3/16 inch aluminum plate and cut a 4 1/8-inch hole for the starter, as shown on the plans. After cutting the hole, mount the starter mounting plate in the hole with the top bolt hole straight up. "C" clamp this together and drill the three 3/8-inch holes shown on the plans. When this is done, drill the five 1/4-inch holes for mounting to the frame. Next, drill the three 1/4 x 28 holes for mounting the solenoid and brake stop bolt.

Secure the welded frame in a vise so the starter will be hanging straight down. Put the end plate back on the starter and

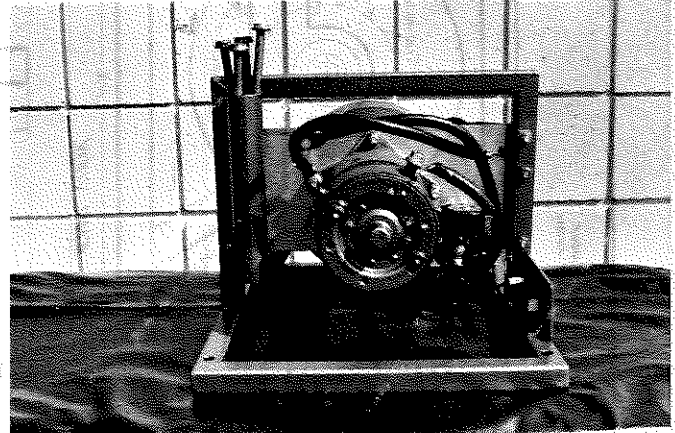
mount the starter to the aluminum plate using nuts and bolts. Lay this assembly on the frame in the vise. Now, take the 5/8-inch Pillow Block and slip it on the starter shaft with the set screws toward the starter. "C" clamp this all together so that the starter shaft will rotate freely. Drill the two 3/8-inch holes into the Pillow Block support. Now, install the Pillow Block nuts and bolts and tighten. Loosen the "C" clamp now and check to see if the starter is still free.

If the starter is still free, "C" clamp again and drill two of the 1/4-inch holes on one side motor support frame and bolt the aluminum mounting plate in place. Remove the "C" clamp and drill the remaining three holes. Install these nuts and bolts and then check to see that the starter still rotates freely. If the starter doesn't rotate freely, you will have to shim the Pillow Block. The Dodge Pillow Block is self-aligning up to a point.

The spool is pretty well explained on



Buddy Fox, designer and builder of the World Cup Winch.



Five of these winches were built, with different powerplants, and the difference in power output varied by only 5% between each winch.

the plans, but here is a little hint: When you lay out the 8-inch end plates, center punch a center and scribe a 3 1/2-inch circle on the inside of the plates. This will help you center the hub before welding in place.

Assemble all the pieces of the drum together with a long 5/8-inch bolt and nut. Mount this assembly in a vise by the end of the bolt and check with a dial indicator or protractor that the drum is true before you weld it. You should not have over .010 runout after welding. If you do, it will have to be trued in a lathe.

Now, let's put this winch together once before painting. Install the starter through the back side of the aluminum plate, through the spool and into the mounted Pillow Block. Bolt the starter in place.

Move the drum as close to the Pillow Block as possible and mark the location of the 1/4-inch drum bolt on the starter shaft. You can now disassemble the winch and drill the 1/4-inch hole in the starter shaft.

Tack weld the electrical outlet plate to

the frame and you are ready to paint.

After painting, re-assemble the winch. Install the solenoid with one 1/4 x 28 x 1/4-inch bolt in the inner hole and a 1/4 x 28 x 1-inch long bolt in the outer hole. The remaining threads from the bolt in the outer hole will be used to anchor one end of the brake spring. Install the brake. Adjust the spring so that it is in a relaxed condition when the brake is resting on the drum. If the brake spring is too tight, it will slow down the winch. The reason for the brake spring is to keep the brake from jumping off the drum when the winch is being pulsed. Be sure to drill and tap a 1/4 x 28 hole for the brake stop and install the bolt.

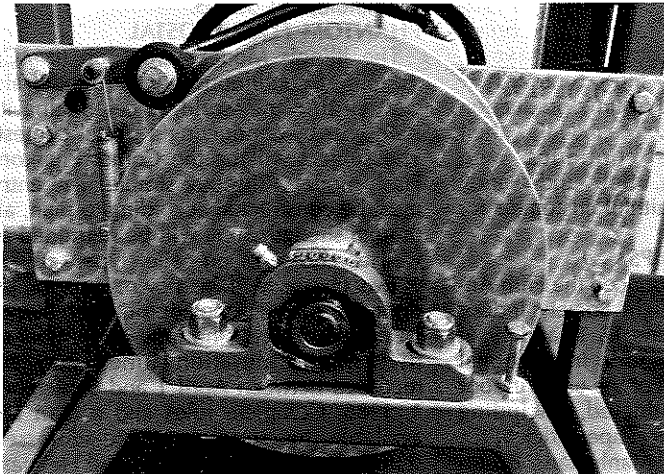
Install #10 wire from the solenoid to the foot pedal socket. Use #1 or #2 battery cable for the starter and battery.

If your sailplane isn't strong, you will have to pulse this winch. If, however, you build strong sailplanes and want to go into serious competition, you may want more power. If you want more power, disassem-

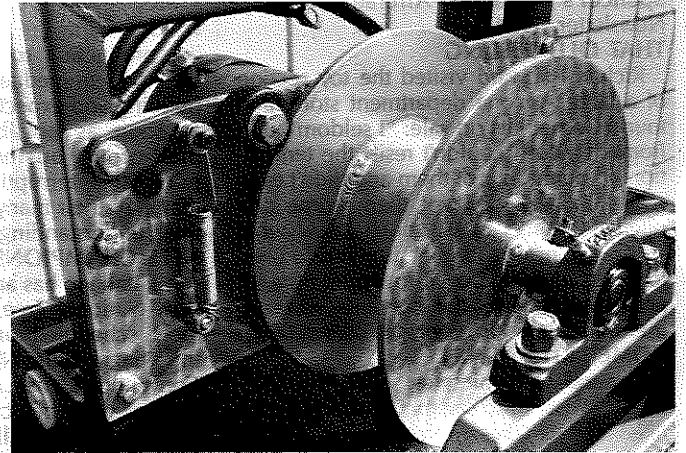
ble the winch and take the motor to a good starter re-builder. Have him add one or two fields. This is what some of our club members use for their F3B ships.

If you have a little money left after what you have done so far, I suggest you go to your local bearing supply store and purchase a 5/8-inch hardened sleeve (1R10C) and Torrington bearing (B1412) to be installed in the starter mounting plate. It takes a little machining but is well worth the effort to insure starter life. Be sure to machine the hole in the starter mounting plate all the way through for the hardened sleeve. Machine the hole for the Torrington bearing only deep enough to accept the bearing with a press fit. You will have to secure the sleeve to the starter shaft with Loctite Bearing Mount. All the Two-Meter World Cup winches I have built have this set-up. You should be able to build this winch, including bearings for \$150 material cost.

BEST OF LUCK WITH YOUR NEW WINCH!!!



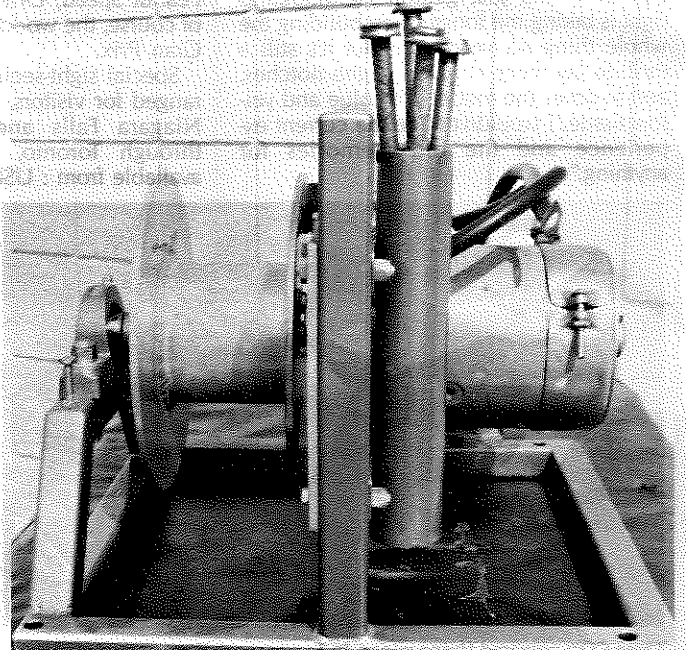
Winch shows consummate craftsmanship of its builder/designer.



Details of the drum brake and pillow block bearing. Black bolt head below drum brake is the brake stop.



The simple foot switch is a marine starter/ignition switch with solid brass contacts. The frame is aluminum and wood.



End view of the winch showing stake holder.