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The T-Craft

The modest amount of dihedral for hands-off stability is an acceptable departure from true scale. Electric motor drive shows as circle just behind prop hub. Sheet metal gear a practical departure from struts for sport flier.

Powered either by an 02 electric motor, or TD 02 engine, this famous lightplane makes a pleasant calm weather scale job for either Ace pulse-rudder or any "tini" system for more than one channel. ■ Vern Schroeder

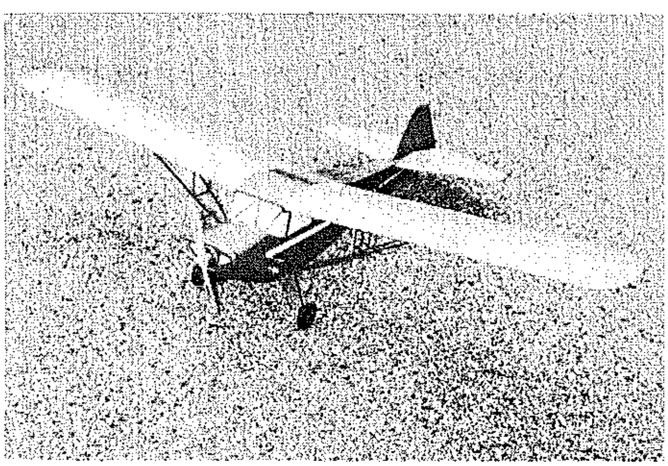
RECENTLY described as the "cheapest, smallest and most outdated production airplane in the country today", the Taylorcraft, more often called T-Craft, is again rolling off the assembly line. Through the efforts of a man named Charlie Feris, that classic little puddlejumper of the 1930's and 1940's has been back in production for over three years now in a small factory just a few miles from the original Taylorcraft plant in Alliance, Ohio. (Editor's Note: This article was prepared in 1977.)

Founded in 1931 by C. G. Taylor and a man named Piper, the Taylor Aircraft Company's first airplane was called the Cub. Later, in 1935, Taylor and Piper split up and Piper took the Cub with him. Taylor reorganized and came out with the side-by-side version of the Cub and named it the Taylorcraft Model A. By 1941 it had evolved into the familiar T-Craft shape and was called the B12.

Production resumed after the war with the improved model BC-12D. During the first six months of 1946, 2800 of this model were produced and shortly thereafter, Taylorcraft like almost everyone else, went broke. In 1949 Taylor started up again and produced the T-Craft in small numbers until 1954.

In 1967, Charlie Feris, present builder of the T-Craft, sold his airport near Chicago for a cool $1.5 million and instead of retiring and counting his money as he had planned, Charlie gathered up the jigs and parts he had purchased in 1946 at the bankruptcy auction and then began to search for the buyers of the other remnants of the Taylorcraft Company. After five years he had enough tools, jigs and dies to begin production.

Today the T-Crafts are rolling out at the rate of about three a month and you'll have



The T-Craft, contemporary with the Cub, has a distinctive character, is side-by-side rather than tandem as the Cub. Use of an NACA 23012 airfoil with convex undercamber gave it seven-league-boots cruising distance. Very fine airplane overshadowed by the Cub. Actually, the model uses flat-bottomed Ace foam wing panels, and is docile flier.

to wait a year to get one. Designated as the F-19 Sportsman, it boasts a 100-hp Continental engine giving it a maximum speed of 127 mph, a cruise of 115 mph and a rate of climb of 775 fpm. Range is 400 miles. The physical dimensions are: length—22 ft. 1 in., wing span—36 ft., and it uses a NACA 23012 airfoil. At a price of $9,250 this writer still could not afford one, so we decided to build a model instead.

We chose the model BC-12D, which is virtually the same as the latest F-19 version, as the subject of our model. (A 3-view appeared in the February 1968 issue of *American Aircraft Modeler*.) Our original plans were to use an Ace constant chord wing which dictated a scale of approximately 1" equals 1'; but at the last minute we decided to use a built-up wing in an effort to keep the ship as light as possible.

There is ample room in the cabin for almost any type of 2-3 channel radio gear and the Ace Pulse Commander system is all but lost in the generous sized interior. Originally, we had planned to install our Ace tail-wagger system but during construction we acquired a Cannon Tini-Twin system and with all the room available we couldn't resist our temptation to install it in the T-Craft. If you plan to use more than one channel, we recommend using a glow engine rather than electric; since the prototype with an all up weight of 22 oz. was a mite underpowered and performance was quite marginal. On the other hand, a Tee Dee .020-powered tail-wagger might require some means of power reduction, especially for the novice flier. Summing up, we'll put it this way: for electric power keep everything light, especially the radio.

Since most scale models are tail heavy, we decided to build the nose from hard balsa blocks. This produced a sturdy model and the added weight enabled us to balance the ship correctly without additional nose weight. A gas-powered version could be more of a problem since a glow engine weighs much less than electric motor; however, careful placement of the radio gear as far forward as possible, could conceivably compensate for this.

Tail Surfaces: The rudder and elevator are built in the conventional manner over the plan, which is first covered with Saran Wrap or other type of clear plastic material. All material sizes are called out on the plan and are balsa unless otherwise noted. The curved tip pieces are cut from scrap ⅛" sheet. Note that the ⅛" sq. vertical spruce upright is made long enough for it to extend down between the fuselage sides. When completed, round off all edges and sand thoroughly in preparation for covering.

Fuselage: Begin construction by cutting two sides from medium 1/16" sheet balsa and then mark off the locations for the bulkheads F-2, F-3, and F-4. Be sure to mark off one right and one left, since two rights or two lefts make assembly rather difficult. The 1/16" sheet doublers in the cabin area are cemented in place with the grain running vertically, using contact cement.

Next, join the two sides together at the tail with the ⅛" sq. spruce rudder upright sandwiched in between, and then add bulkhead F-2 at the trailing edge of the wing. The use of Hot Stuff, Zap, etc. for this operation speeds up assembly time considerably. Add firewall F-1, followed by bulkheads F-3 and F-4. If one of the slower drying cements are used, the sides can be held together with rubber bands. Now cover the fuselage top and bottom with 1/16" sheet, running the grain spanwise. ⅛" plywood is used on the bottom where the landing gear mounts. Cement enough balsa blocks together to form a chunk large enough to carve the cowl and windshield. The upper half, as shown on the plan, is made removable for access to the engine. The lower half is hollowed just enough to fit the engine and an opening is cut into the bottom of the cowl for fuel drainage, or in the case of electric power, for proper airflow for engine cooling.

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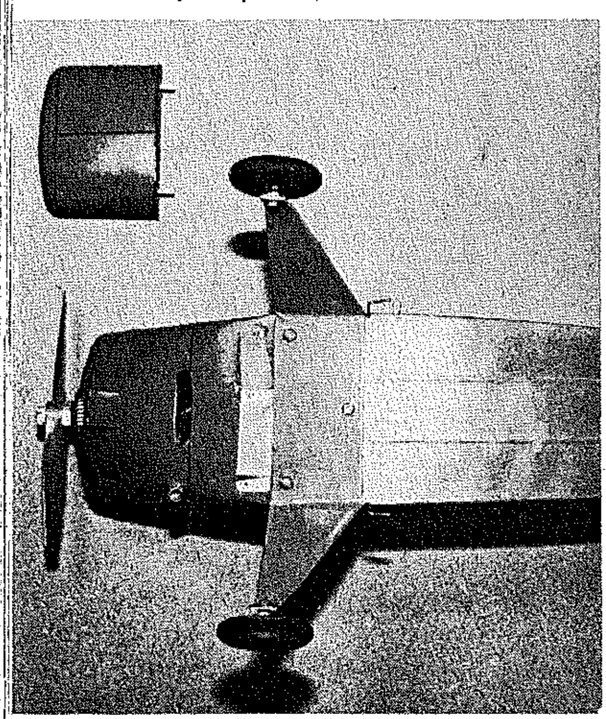
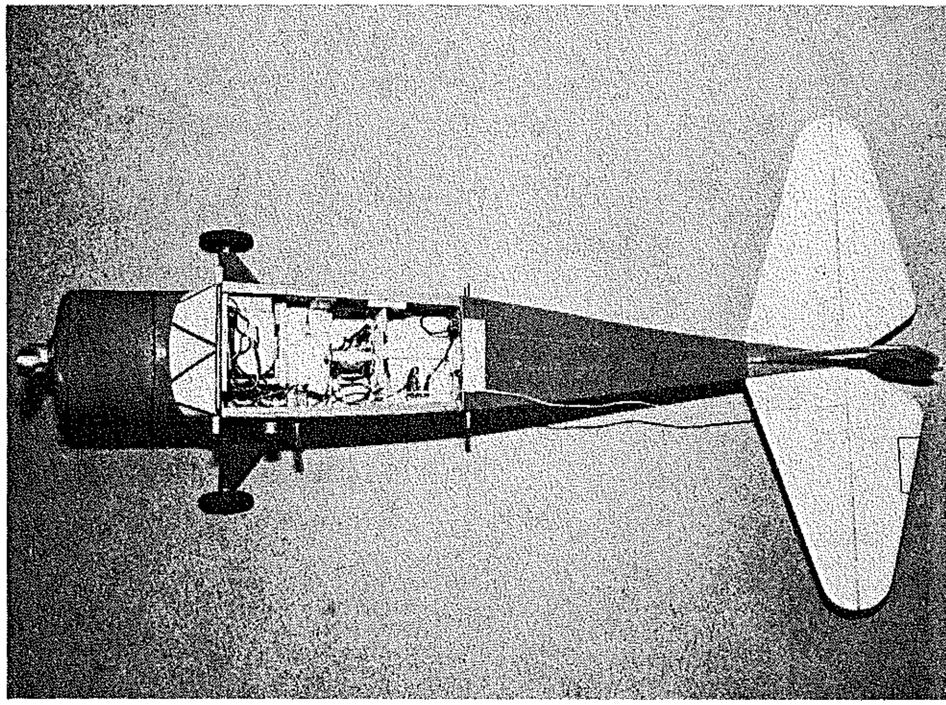
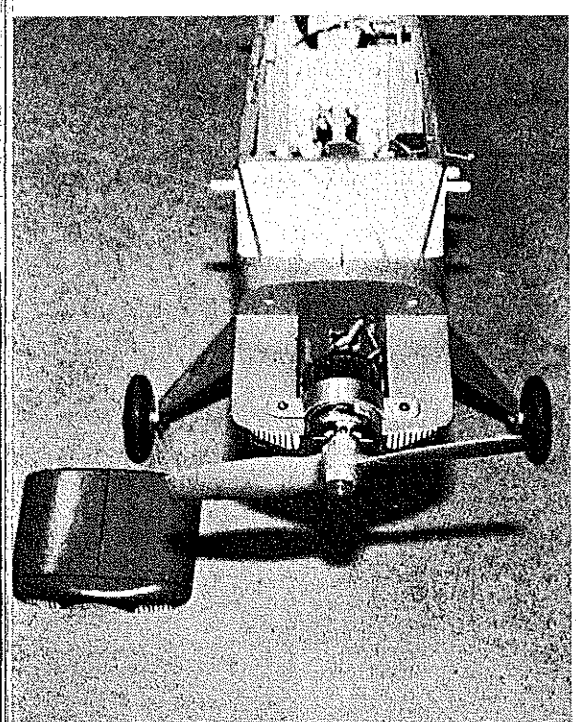
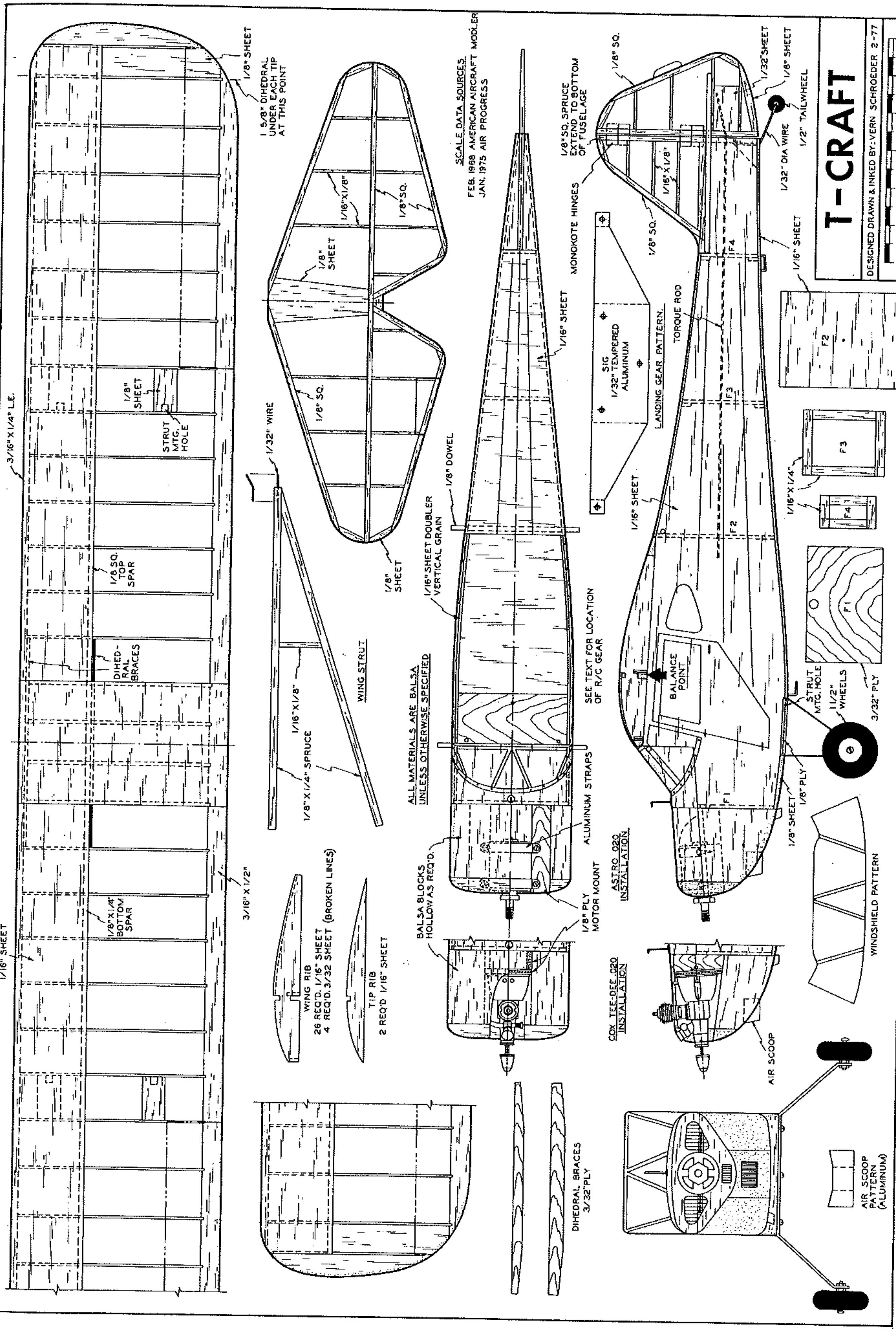






Above, L: Some details that show in addition to bolt-on gear: cooling slot in bottom of cowl, peg-in cowl cover, bolt-mounted wheels, bottom stringers, and scale-like steps. Above: Everything fits in big cabin: radio, battery packs, Ace pulse-rudder actuator. Note push-pull switch on side. Left: Two screws and bracket hold down motor. Ship easily modified for gas engine.



FULL-SIZE PLANS AVAILABLE . . . SEE PAGE 112

know what happened. They flew! Four times! Their longest flight was 59 seconds, covering 852 feet over the ground and an estimated half mile through the air, as the wind was blowing better than 20 mph.

The Flyer I never flew again, having been wrecked by the wind shortly after its fourth landing on that historic day. It was eventually shipped to England for display in the Science Museum in London because the Smithsonian insisted that Langley had been the inventor of the airplane. In 1948, it was finally placed on display in Washington, after the stuffy Museum people admitted that the Wrights, and not Langley, had been the first.

And so today the Flyer I hangs in all its glory just inside the entrance of the National Air & Space Museum, where 20 million people have seen it in just the first two years since the new museum opened. Yet the true superiority of the Wrights is still not fully appreciated by the world. It isn't merely that they were the first to fly a fully controlled heavier-than-air machine. No, their accomplishments span the whole spectrum of aeronautics: Aerodynamics, structures, control, engines, propellers, flight training.

The race to be the first to fly really wasn't much of a race. The 59-second flight of Dec. 17, 1903, wasn't bettered by anyone else for almost four years! And by then, Wilbur had to his credit a 38-minute flight which covered 24 miles! They were so far ahead it was like no one else was even trying.

And if you still think that 75 years is such a long time, consider the case of Steve Wittman, undisputed king of pylon air racing and record holder in the new Formula Vee Class. Steve was born just 3½ months after the Wrights' first flight, and he's still as active as any pilot. If you ever run into Steve, ask to see his FAI Sporting License...it's signed by "O. Wright".

T-Craft/Schroeder

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Wing: Begin by cutting out all of the ribs from the materials called out on the plan. There are many methods of cutting out wing ribs; but the one preferred by this builder is to pin the blanks together in stacks about one inch high, trace the pattern onto the top of the stack and sand them to shape on a disc sander. The table must be set at exactly 90 degrees to the sanding disc or the ribs will vary from the top of the stack to the bottom. The notches for the spars can be cut with a band, jig or razor saw before the ribs are split apart. An alternate method would be to cut a template from light sheet metal, pin it down on the sheet balsa and cut around the edges, making one rib at a time. More time consuming perhaps, but the results are the same.

Pin the spars, leading and trailing edges down over the plan and, after carefully checking each rib for proper fit, cement it in place. Next, add the wing tips which are cut from 1/8" sheet balsa. Finally, add the upper spars. Join the two outer panels to the center section, using the plywood dihedral braces for reinforcement. Next, cover the leading edges and center section with 1/16" sheet, top only. Sand and shape as necessary in preparation for covering.

Covering and Finish: With the many types of coverings and finishes available today, it is sometimes difficult to decide which method to use. This builder has more or less standardized on MonoKote, or other plastic covering material, for the wing and tail surfaces and doped Silkspan-covered surfaces for the fuselage.

Sand the fuselage thoroughly with #400 grit sandpaper, dust off and apply a coat of clear dope. At this point, simulate the longerons by applying 1/32" wide strips of masking tape or thread at the appropriate places shown on the plan. Next, the entire fuselage is covered with one layer of lightweight Silkspan, followed by two coats of a 20% cornstarch and 80% clear dope mixture. After another sanding with #400 grit sandpaper, the structure is ready for color doping. Two or three coats of your favorite color, preferably sprayed, will usually give a satisfactory finish.

The windows and numbers are cut from white and black MonoKote trim sheets.

RC Gear Installation: The location of the

RC gear will be determined mainly by the type of power used. Since the Astro 02 electric-powered version is considerably heavier than the Tee-Dee .020, a more rearward location of the radio gear will be necessary to balance the model at the point shown on the plan. The Tee-Dee-powered version, on the other hand, will require the RC gear to be placed as far forward as possible and, perhaps, some additional nose ballast may be necessary to balance the ship at the proper location.

An excellent set of instructions is included with the Ace Pulse Commander, showing several different types of actuator mounting and torque rod installations. Any one could be used, but the one shown on the plan has the advantage of being invisible after the plane is completed; a feature which is especially nice for a scale aircraft.

Flying: Under no circumstances should the T-Craft be flown until the aircraft has been balanced at the location shown on the plan. This is true of any model and failure to do so could very well spell disaster for the ship. A nose-heavy ship could possibly survive but one that is tail heavy is strictly bad news.

The T-Craft, as with all models of this size, is strictly a calm weather airplane, which in the author's midwest location means either early morning or late evening flying sessions. The use of electric power permits this; since the flying of gas-powered aircraft at these times is usually not permitted at most fields.

The Ace Pulse Commander radio is supplied with a very good set of instructions on pulse rudder-only flying techniques so we don't see any point in repeating them here.

Build your model light, but sturdy, and follow the manufacturer's instructions for engine and RC installation and you will get many hours of relaxation and enjoyment from the T-Craft.

Power/Weber

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by passing less torque and more rpm through the clutch.

In fact, torque and power are related by the following simple equation:

$$\text{Power} = 0.00019 \times \text{Torque} \times \text{rpm}$$

where power is in horsepower (hp) and torque in pound-feet (lb. ft.). Look closely at the equation: power is the product of torque and rpm. For a fixed engine speed, an increase of torque gives a proportional increase in power. Or, considered the other way, for a fixed torque, more rpm means more power.

When comparing two model engines, we may hear that one has more torque but the other has more power. This apparent contradiction is explained by the fact that the rpm considered for the two engines will be different. Remember that for any specified rpm, more torque always means more power.

The first figure shows power and torque curves for an OS FS-60 4-cycle engine and a K&B 3.5cc (.21) engine. Notice that the K&B 3.5 can produce more power than the OS FS-60 if both engines operate above 12,300 rpm, or if the K&B 3.5 operates above 16,000 rpm. At low speed, however, the OS FS-60 has more power and torque. So when you read that you need torque to turn large props, what the writer means is that you need good power at low rpm, as illustrated by the OS FS-60. Still, if both engines in this example are run at their power peaks, the K&B 3.5 will fly the model faster, providing that the propeller can be matched correctly to the plane. In many cases, such as planes with large cowls or high drag, this would require gearing down the prop. Gearing gains torque at the expense of rpm. Power delivered to the prop is unchanged, except for small losses in the gears or belt. If gearing is not practical, then the OS FS-60 would outperform the K&B 3.5 on large props because the OS FS-60 has more power and torque at low engine speed.

The second figure shows power and torque required to turn a typical 11-7 propeller at different speeds on a test stand or stationary airplane. It can be seen that increasing rpm raises power more rapidly than torque. This is because, for a prop, power again is the