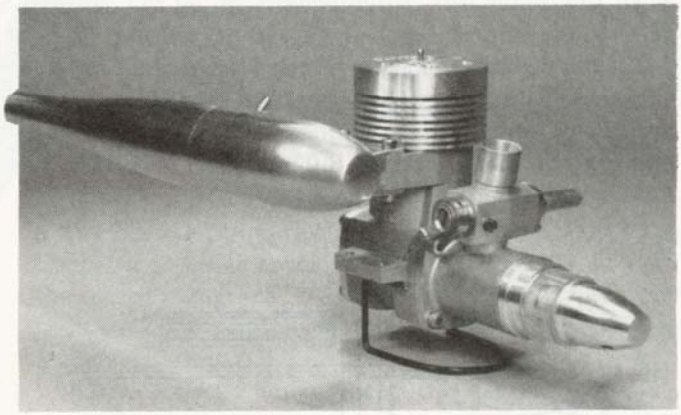
RCM PRODUCT REVIEW

By Clarence Lee

FITZPATRICK 61-ABC/61-H



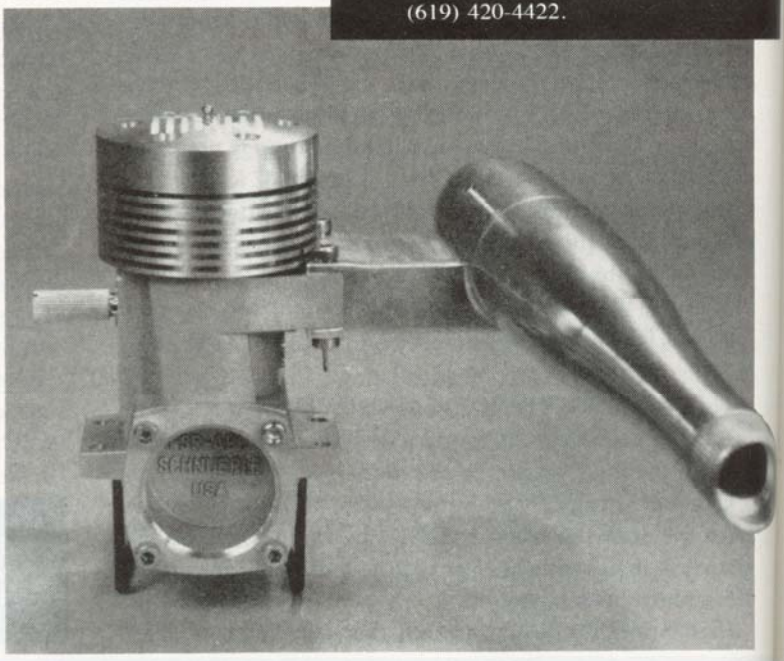
SPECIFICATIONS:

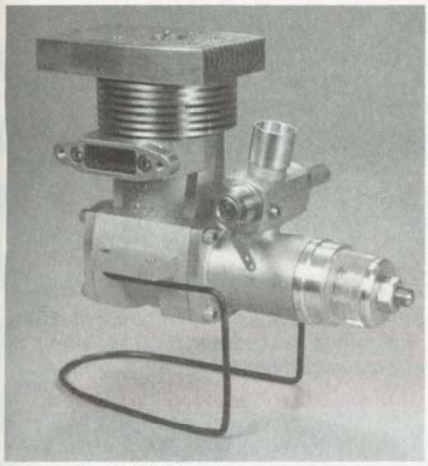
Type: Single cylinder, air cooled, 2-stroke cycle, Schnuerle scavenged ball bearing, ABC, glow ignition
Bore: .941''
Stroke: .876''
Displacement: .609 cu. in. (9.987cc)
Compression ratio: 9.85:1
Horsepower: Approx. 2.2 @ 16,000 rpm
Weight: 61-ABC bare 20.0 oz., with muffler 25.2 oz.; 61-ABC-H 22.3 oz.
Overall length: (backcover to face of prop driver) 3.960''
Overall height: (bottom of case to top of head) 3.950''
Overall width: (mounting lug to mounting lug) 2.365''
Crankcase width: 1.615''
Mounting bolt pattern: .781'' (25/32'') x 2.046'' (2-3/64'')
Manufacturer: Manufactured in Canada for the Fitzpatrick Brothers, 670 ''F'' St. Suite 73, Chula Vista, California 91910. Phone: (619) 420-2277, Fax: (619) 420-4422.

If one were to look up the word ''determination'' in the dictionary, you could almost expect to find a picture of the Fitzpatrick brothers, Charlie and Mike, as it has taken an immense amount of determination on the part of the two brothers to finally get their Fitzpatrick 61 on the hobby market in production quantities large enough so that the engine could be marketed through standard dealer channels, hobby shops, and mail order houses.

The Fitzpatrick brothers first gained recognition for their engine expertise as control line speed fliers in the 1960s. Using both modified engines and engines of their own design, they won or placed at all of the major contests in the New York and surrounding areas. In 1968 alone, they won five first places with their class B (.29 disp.) speed ship and placed 2nd at the Willow Grove Nats. This was in the days before Schnuerle scavenged engines and tuned pipes. By 1969 the Fitzpatricks were working with Schnuerle scavenged engines and had made their own tuned pipe as nothing was commercially available at that time.

With the knowledge gained from their control line speed days, the Fitzpatricks decided to try marketing their own .60 displacement size R/C engine. After three years of development work, in 1975 they had the design perfected and started looking for a company to manufacture their engine. However, after knocking on many doors, it was not until 1978 that they found a company that was interested in manufacturing their engine who also had the necessary equipment and capability. The name of the company was Swiss Craft, located in North Hollywood, California, a manufacturer of Swiss watch movements and related products. This seemed like the





Fitzpatrick ABC-H.

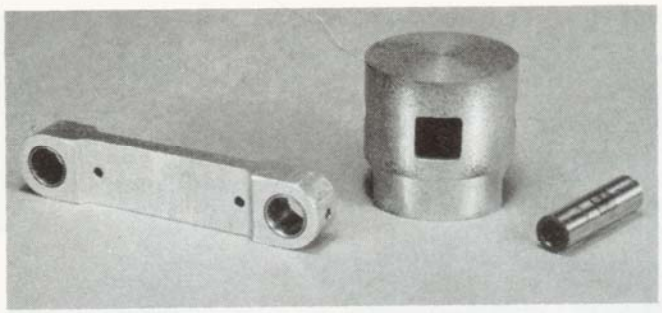
All parts, front housing, and backcover gaskets are made of copper and not paper.

ideal company, capable of manufacturing the Fitzpatrick's engine to the brothers' demanding specifications due to the company's previous experience with close tolerance production. However, after a considerable financial outlay, Swiss Craft found that the engine was more costly to produce than anticipated. Profitwise, they would be coming out at a loss trying to be competitive with other .60 displacement size engines on the market at the time, selling in the same price range ($150.00). As a result, the Fitzpatrick's arrangement with Swiss Craft was mutually terminated. Naturally, not without considerable unhappiness on the part of both parties. One hundred or so engines were actually sold, and today these first generation Fitzpatrick 60's are sought-after collector items.

Even with this major setback in the marketing of their engine, the Fitzpatricks were still determined to produce their engine. This time they decided to try and manufacture the engine on their own. Initially, by subcontracting parts to outside machine shops with the final assembly to be done personally by the Fitzpatricks. However, as is often the case when subcontracting parts, delivery schedules were not met, parts were not up to the Fitzpatrick's standards, etc. The decision was now made to produce the engine entirely on their own. Actually being professional photographers by trade, they sold their successful photography business in order to raise the capital to purchase new CNC machining equipment and related machinery required for the production of model engines. The manufacturing of model engines requires more than a two man operation, and the brothers soon found out that finding competent CNC machine operators, as well as machinists, capable of working to close tolerances in the Los Angeles area at the time, was next to an impossibility. Then, too, the business climate in the Los Angeles area is not the best for small businesses with high building rentals, taxes, insurance, etc. (Some of the very same factors that contributed to K&B moving from the Los Angeles area to Lake Havasu City, Arizona.) As a result, the Fitzpatricks had to close the doors with another 200 second generation Fitzpatrick 61's having been sold. The displacement designation having been changed from 60 to 61 with the second generation engines.

Still determined to get their engine marketed, the brothers again started looking for a manufacturer with the capability, personnel, and sufficient operating capital to manufacture their engine. They found such a company in Canada who had been involved with the manufacturing of aerospace products, government defense work, etc. With the cutback in defense related work, the company was looking for a saleable product to manufacture. Here now, was a company large enough to produce the Fitzpatrick 61 in large enough quantities to be marketed through standard dealer channels, hobby shops, and mail order houses. An important necessity if a

Front, side, and rear views of cylinder sleeve. A large and small side transfer port used in conjunction with a small rear boost port. Seven ports in all.



LEFT: Piston, wrist pin, and rod assembly. Small cut-out in piston aligns with sleeve boost port for piston cooling and mixture transfer. Con-rod bronze bushed at both crank pin and wrist pin ends with both ends sharing the same inside diameter. Note position of lubrication holes (see text). RIGHT: Crankshaft, bearings, and prop drive parts. Prop drive washer driven by flats on crankshaft eliminates the chance of drive collet slippage or loss of drive key.

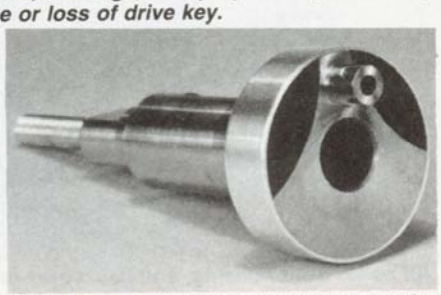
company is going to be successful in the model engine industry. Although the engines are being manufactured in Canada, all sales, distribution, service and repairs will be handled by the Fitzpatrick brothers in California.

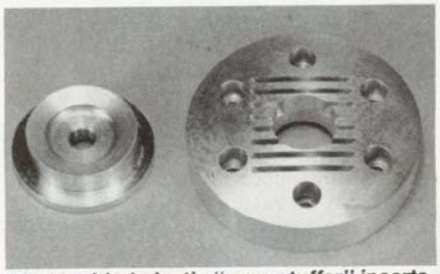
As of the first of January 1993, the new updated and refined third generation Fitzpatrick 61 was released to the hobby market in two versions — a side exhaust conventional aircraft model, and a side exhaust helicopter model. A rear exhaust configuration engine will be available at a later date. In my opinion, these engines have got to be one of the most beautiful production model engines of all time. Determination and perseverance on the part of the Fitzpatrick brothers to produce their engine has finally become a reality.

With the background history of the Fitzpatrick engine covered, let's take a look at the design and construction. As both the standard aircraft engine and helicopter version are the same, construction and designwise, we will deal with both engines as a single engine, noting exceptions that pertain to the helicopter version.

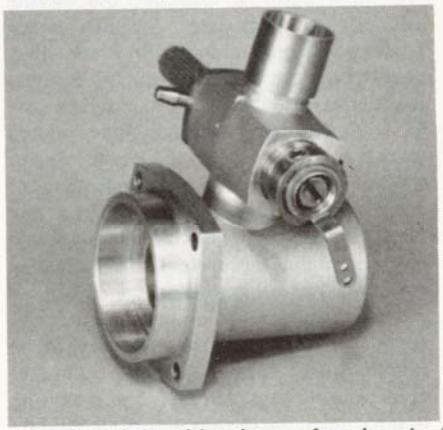
With a measured bore of .941'' and stroke of .876'', the engine is of ''overbore'' design rather than a ''long stroke'' as many of the model engine manufacturers are marketing the past couple of years. Normally, you can expect an overbore engine to develop its maximum power at higher rpm with the smaller prop sizes, and the long stroke designs to develop their maximum power at lower rpm with the larger prop sizes. Although the Fitzpatrick 61 does develop its maximum power at higher rpm, it is also a real stump puller with the larger props as well, turning our 14 x 6 Zinger faster than many of the long stroke 61's on the market, showing that the long stroke design is not an absolute necessity for strong low end torque. The overall design, porting, and timing all play a part.

Crankcase: The investment cast crankcase assembly is composed of a one piece center block with removable front housing and backcover. With all machine work having been performed on the latest CNC machining equipment, all internal surface finishes are just as beautiful as the exterior of the engine. Rather than paper gaskets, .010'' thick soft copper gaskets are used for sealing, and chrome-plated Allen socket head screws are used to retain the





LEFT: Counterbalance end of crankshaft showing molded plastic ''case stuffer'' inserts (see text). RIGHT: Two piece head assembly. Note unusual treatment given to the head fins. Separate head ''button'' has flat bottomed combustion chamber with unusually steep angled squish band. Helicopter head uses same combustion chamber button.

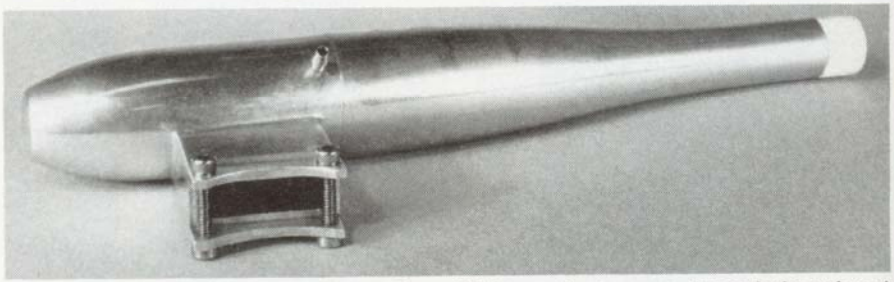


Left and right side views of carburetor/front housing assembly. Two needle type carburetor design worked flawlessly.

front housing, backcover, and head. A real touch of class that adds to the overall appearance of the engine.

Unusual, is the carburetor body being cast as part of the front housing. No chance of any air leakage between the carburetor and front housing here. To lessen fuel leakage out the front bearing, an approximately 3/64'' wide annular groove has been cast directly behind the front bearing. This, in turn, is connected to a 3/4'' long, approximately 1/8'' deep relieved area machined in the housing directly under the carburetor intake passage by means of a .042'' diameter drilled hole. Venturi vacuum then draws any excess fuel that collects in the annular groove back into the intake.

Crankshaft and Bearings: The crankshaft has been machined from bar stock steel, hardened, and finish ground on all bearing surfaces including the crank pin.



Fitzpatrick muffler has unusual mounting utilizing vertical screws through the exhaust stack which eliminates any chance of cylinder distortion. The 6-32 Allen screws thread into pressed in, brass inserts.

Rather than the threaded portion being machined as part of the crankshaft, a 1/4''-28 stainless steel, threaded stud screws into the hose of the crank. In the event of a bad crash, rather than having to replace the crankshaft if bent, only the threaded stud need be replaced.

The .390'' thick counterbalance is of the constant thickness design, cut away on either side of the crank pin for counterbalance action. An aluminum ring surrounds the counterbalance and the cut-out segments are filled with a black plastic, making a solid disc assembly. The purpose of this being to ''pack'' the crankcase, i.e., decrease the volume which, in turn, increases the engine's fuel draw ability and also increases crankcase pressure on the downstroke of the piston for stronger fuel mixture transfer action into the combustion chamber.

The counterbalance would balance out the full weight of the con rod, wrist pin, and approximately 10% of the piston's 9.5 gram weight. This is about as close as you can come to balancing a single cylinder, 2-stroke engine. As a result, it was very smooth for an engine of its displacement size, being one of the smoothest running .61 engines we have tested to date.

Following the recent trend to larger diameter main journals and rear bearings which, in turn, allow a larger intake port and gas passage through the crankshaft, a 30mm (1.181'') o.d. x 17mm (.669'') i.d., phenolic cage rear bearing is used. A larger than normal 24mm (.944'') o.d. x 12mm (.472'') i.d. phenolic cage, single shield front bearing is used to handle the load imposed on an engine by electric starter use.

Checking the crankshaft timing was somewhat difficult, due to the carburetor being part of the front housing and not removable. To compound matters, as mentioned previously, a machined chamber at the bottom of the carburetor passage makes seeing the actual edges of the chamber impossible. Timing had to be checked by looking from the rear down the crankshaft fuel passage. To the best of our determination, the crankshaft port opens 45° after BDC and closes 45° after TDC for a total duration of 180°. Actually, rather short duration and early closing, but a timing that increases the engine's fuel draw ability that, in turn, allows the use of a larger intake carburetor, as we will cover in the carburetor section.

Piston, Sleeve, and Rod: The Fitzpatrick 61 uses true ABC metalurgy, i.e., an aluminum piston running in a hard chrome-plated, brass sleeve. The use of hard chrome rather than nickel plating as used by many of the foreign imports being far more desirable, in my opinion.

The piston has been machined from an aluminum casting, and due to the high silicon content, no bronze bushings are used for the .234'' dia. hardened steel wrist pin which is retained in the piston by wire snap rings at either end. The high silicon content aluminum being an excellent bearing

material in itself.

The wrist pin has been given a treatment that I have not seen in a model engine since my old Lee and Veco 45's made back in the late 1950s and 1960s, i.e., the wrist pin has been hollow drilled from either end but left with a solid portion in the center for additional strength. If the wrist pin is used in a rear exhaust configuration engine, the solid section would also serve as a plug to keep the crankcase pressure from leaking out the exhaust through the hollow wrist pin.

Modified Schnuerle scavenging is utilized with both a large and small transfer port on either side of the divided exhaust (see photograph) and a single small boost port directly opposite the exhaust. Seven ports in all. Something I always like to see is a nice heavy .090'' thick sleeve wall that is less likely to warp or distort under some of those metal melting runs that a lot of fellows expose their engines to.

The exhaust is timed to open 73° before BDC and close 73° after BDC for a total duration of 146°, and the transfer and boost ports timed to open 58° before BDC and close 58° after BDC for a duration of 116°.

The connecting rod has been fabricated from bar stock aluminum and has been bronze bushed at both the crank pin and wrist pin ends. Those who have been reading our previous engine reviews will know that this is a feature that always wins points with me.

The rod's lubrication holes have been given a treatment different than anything I've seen previously, in that a .060'' hole has been drilled through the rod directly above the crank pin and another directly below the wrist pin parallel to the crank pin and wrist pin centerlines. Holes drilled through the bottom and top of the rod go all the way through the bushings, intersecting the two horizontal holes providing lubrication to both the top and bottom of the crank pin and wrist pin. Very unusual. Also not often seen is a rod that is completely symmetrical with both the crank pin and wrist pin holes having the same .234'' i.d., and the rod a constant width from top to bottom. This means that there is no top or bottom to the rod as it can be installed either way.

Cylinder Head: A two piece head design machined from bar stock aluminum is utilized with both the standard engine and helicopter version, both sharing the same combustion chamber ''button.'' The helicopter engine uses a rectangular finned portion which is given a gold anodize finish, and the standard engine the conventional round head with natural finish. However, the standard engine head only has fins cut in the center portion around the glow plug, with the balance being left solid. Another treatment to a head that we have not seen done before. The Fitzpatricks refer to the heads as standard and large ''thermal Dwell'' heat sink heads.

A .125'' deep, flat bottom combustion chamber surrounded by a .160'' wide, steeply inclined, squish band is used. The measured combustion chamber volume to the bottom of the glow plug holes was exactly .8cc which computes to a compression ratio of 9.85:1 figured with the closing of the .255'' high exhaust and a full stroke compression ratio of 13.48:1; 9.85:1 could be considered a little on the high side but the engine showed no tendency to kick back during hand starts or any signs of preignition even when run intentionally lean with the larger prop sizes.

Carburetor: The carburetor is the two-needle, rotating barrel type of design that the majority of the model engine manufacturers are using in one variation or another nowadays. This design carburetor, first introduced by Super Tigre, has proven to be easy to adjust and give excellent performance.

The Fitzpatrick carburetor has a rather large throat diameter of .375''. Normally, we associate a throat diameter this large with a pump or pressure feed system. However, the minimum crankcase volume utilized by the engine in conjunction with the crankshaft timing, seems to create sufficient fuel draw capability for the engine to use this large a size.

Performance: When testing the review engines, other than removing the backcovers and checking for metal chips, etc., and the screws for tightness (something that should always be done with

every new engine), the engines are run as received from the manufacturer or importer with complete disassembly not done until after the engines have been tested. As such, I did not know if there was any timing or other differences between the standard aircraft and helicopter engines. As the Fitzpatricks had asked that I run both engines, I assumed that there might be a difference between the two engines.

The standard aircraft engine comes complete with a muffler, but the helicopter engine does not; instead, having an adapter plate drilled for the O.S. 61SF-H muffler that will, in turn, fit many of the after-market mufflers fellows choose to use on their helicopters. For the purpose of our testing, the adapter plate was removed and both engines tested with the Fitzpatrick muffler. The standard aircraft engine was run with the full variety of prop sizes, and the helicopter engine spot tested with the 11 x 8, 12 x 6, 13 x 6, and 14 x 6. Strangely enough, both engines turned almost identical rpm with no more than a 100 rpm spread between engines. The helicopter engine turned about 100 rpm faster with the 11 x 8, but 100 rpm slower with the 14 x 6, and turned the same as the standard engine with the two in-between prop sizes. This led me to believe that the engines were identical other than for the heads and muffler mounting which later disassembly and inspection verified.

Our test fuel was composed of 10% nitromethane (by volume, not weight), 20% Klotz KL-200 synthetic oil, 2% castor oil, and balance methanol. The temperature of the day was a slightly cool (for California) 64°F, the relative humidity 46%, and the barometric pressure standard at 29.92 inches of mercury. The engines came equipped with a Fox idle bar glow plug and all propellers were Zingers. After our standard 30 minute break-in period, the following figures were obtained with the standard aircraft engine. Those for the helicopter engine would be the same, give or take 100 rpm.

11 x 7	13,100
11 x 8	12,000
11 x 10	10,650
12 x 6	11,900
12 x 8	10,600
13 x 6	11,200
13 x 8	8,700
14 x 6	9,750

As the preceding figures show, the Fitzpatrick 61 is one strong running engine. When we test the .60/.61 displacement size engines I always start with the 11 x 8 prop as this gives me a pretty good indication of the engine's potential. Most of your stronger muffler equipped 61's will turn the 11 x 8 Zinger in the 11,200 to 11,500 rpm range. It takes an exceptional engine to turn over 11,500 rpm. Until now, the only muffler equipped engine we have tested to do so was the ringed version, Fox Eagle IV which turned 11,800 rpm. We have a new "King of the Hill" now as the Fitzpatrick 61 would come up to 12,200-12,300 rpm from a rich setting and then settle down and hold 12,000-12,100. Although only a slight margin over the Fox Eagle, it is a significant margin over other engines in its displacement size. Now generally, if an engine runs strong with the smaller prop sizes, the low end with the larger sizes will suffer. Not so with the Fitzpatrick 61. It would turn 400 rpm stronger with the 14 x 6 than the Fox Eagle, and in some cases over 1,000 rpm stronger than other .61 muffler equipped engines we have tested. Few engines being able to turn much over 9,000 rpm with the 14 x 6. With a tuned pipe I would expect the engine to turn right with or exceed the stronger running piped engines such as the YS 61 and O.S. "Hanno Special." Obviously, the engine has a very flat torque curve which would prove particularly useful with the helicopter engine.

Even with all this power, the engine was still very "user friendly" with no bad traits or characteristics. It had a nice smooth transition from a rich 4-cycle to a leaned 2-cycle, a nice broad 2-cycle adjustment range, and was easily hand started hot or cold, although hot restarts did take a few extra flips of the prop on occasion. The engine would hold a steady, reliable 2250 rpm idle with the 11 x 8; 2000 with the 12 x 6; and a remarkable 1750 with the 14 x 6 with excellent acceleration recovery after a prolonged idle period. Quite outstanding when you consider the top end power the engine produces. Needless to say, I was very impressed with the performance of the engine.

Both engines carry the same list price of $319.99, but due to being sold through the mail order houses, should sell in the $200.00 range. For your money you are getting the strongest running, muffler equipped engine we have tested to date with quality equal to the best of the foreign imports. And to top it off, the engine carries a **lifetime** warranty against defective workmanship and materials with service and parts readily available from the Fitzpatrick brothers. What more could you ask for? □