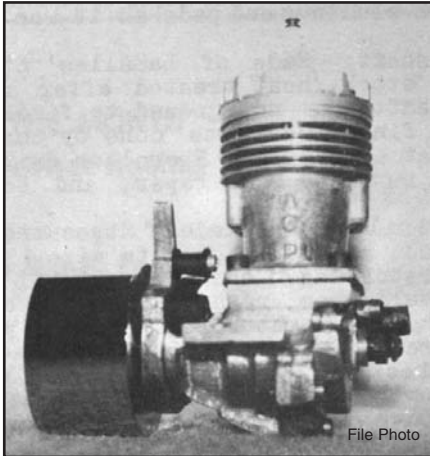


A

A. C. MOTORS - Oakland, CA
(Charlie Anderson & Walt Cave)



A. C. SPECIAL - 1938 - .607 in³ spark. Actual predecessor to the Hornet racing engine. Sand cast case halves, head, timer and cylinder. Cylinder has "AC SPL" cast on bypass. Ball bearing shaft. Ringed piston. Very few made.

A.C.E. MODEL WORKS
Brooklyn, NY (Adams-Collins Mfg. Co., Pittsburgh, PA)

Sensational Bargains

Length—4 3/4"
Height—2"
Weight—2 oz.
Power—App.
1/10 H.P.

ACE MOTOR
\$1.95
complete Kit

Easily installed and will positively fly Rubber Band models from 36 to 60 inch Wingspan. The simplest, safest and lowest cost motor unit. Operates on Carbide, Dry Ice and Water, R.P.M.—App. 500 to 2000. No Machining to be done. Starts instantly, runs smoothly, economically and powerfully.

KIT Complete with all parts, simple blue prints and easy instructions \$1.95 (plus 25c postage)

Built and ready to run—only \$3.00 (plus 25c postage)

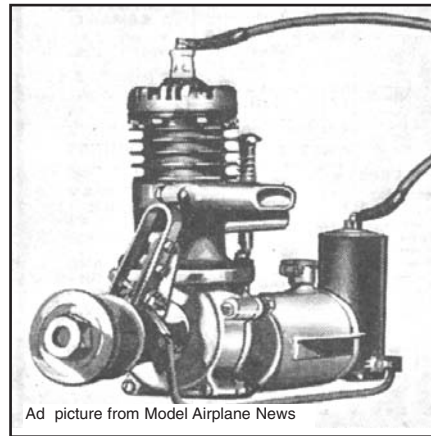
A.C.E. - September 1937 - Carbide & Dry Ice. Twin cylinder inline. Sheet metal stamped parts. Rocking valve for timing cylinders attached to crank at rear of shaft. Available as kit for \$1.95 or finished ready to run for \$3.00.

A.C.E. - 1938 - Carbide & Dry Ice. Twin cylinder inline. Sheet metal stamped parts. Timing valve now attached to center of shaft.

See also Mercury Models

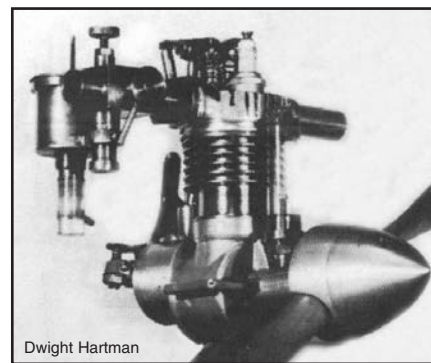


A.J.C. MOTORS - Ingleside, IL
A.J.C. - 1936 - .604 in³ spark. Sand cast. Built up cylinder with bolt on exhaust. Finless head. Lapped piston. Radial mount. Few built. No known examples.



A.J.C. - 1937 - .604 in³ spark. Like 1936 model, but with finned head and ringed piston. Few built. No known examples

A. L. ENGINES - 1938 - 1.687



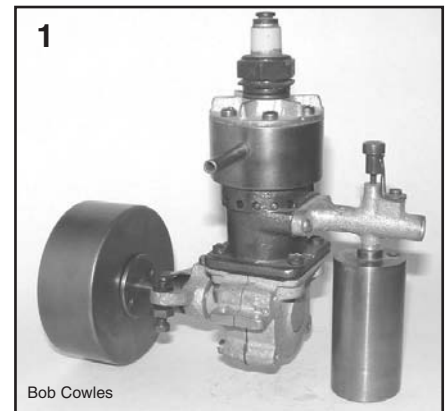
in³ spark. 4-cycle. Overhead valve. Sand cast. Large enclosed timer at rear of case. Float carburetor. Photo from March-April, 1968 MECA Bulletin, #20.

KRAMER & GROW Mfg.
San Diego, CA
(John Kramer & Sam Grow)



ACE TWIN - 1947 - .639 in³ spark. Opposed Twin with offset cylinders. Timer & mount at rear. Dual shaft intake via manifold on top of case. Single venturi. Dual ball bearings on shaft. Name on cylinders. 100 engines built.

ACUNTRA TOOL & DIE Co.
New York, NY (Continuation of the Knight engines) (All models spark)



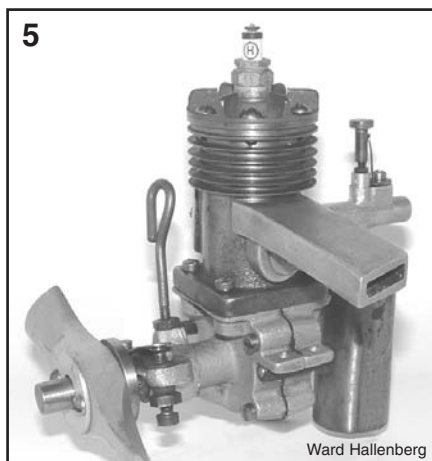
1 - FIREBALL 500 MARINE - 1936 - .687 in³ (measured). Sand cast split crank case. Cast iron cylinder. Lapped piston. Sand cast radial finned alloy head. Plain venturi with brass tank beneath. Water jacket on cylinder. 12mm Bosch spark plug. **NOTE:** In using up parts from the Knight engines, many 12mm plug heads and alloy cylinders were used on early Acuntra engines.

2 - FIREBALL 500 - 1937 - .785 in³. Blind bore cast aluminum cylinder includes head. Flat top except protrusion for spark plug

boss. Venturi at rear of cylinder with small plastic tank under venturi. No known examples.

3 - FIREBALL 500 - 1938 - .785 in³. Similar to 1937 model, but without breather in case. Added fin on spark plug boss. Larger plastic tank under venturi. No known examples.

4 - "37" - 1938 - .375 in³. New design. One piece crankcase with screw in back cover. Brazed up cylinder screws into case. Bolt-on spoke finned head. Enclosed timer housing. Exhaust on left side with sideport venturi under exhaust. Air cleaner choke on venturi. Brass tank on back cover. No known examples.



Ward Hallenberg



File Photo

5 - FIREBALL 500 - 1939 - .78 in³. Spoke head. Split sand cast crankcase. Cast iron cylinder. Long exhaust stack (some streamlined, some rectangular). Curved intake extension. Head, venturi extension and tank are brass sand castings. Some have screw in rather than bolt on head. *NOTE: The two dif-*

ferent engines pictured are of basically the same model.

6 - FIREBALL 500 - 1940 - .78 in³. Similar to 1939 model except brass head now has parallel fins. Air cleaner and choke unit on end of venturi rather than the curved extension. Enclosed timer housing. No known examples.

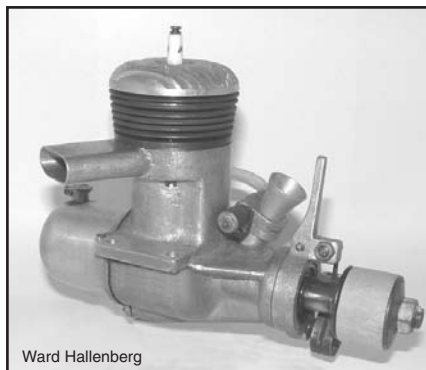
7 - MARVEL 60-C - 1941 - .605 in³. New design. One piece crank-case with screw in back cover. Cylinder has rounded fin profile. Enclosed timer housing. Exhaust on left side with sideport venturi like O&R. Air cleaner choke on venturi. Brass tank on back cover. "MARVEL 60-C" on bypass cover. No known examples.

8 - "V" TWIN - 1940-41 - 1.57 in³. Cylinders similar to "37" engine except both exhausts point down with intake manifold across top of "V". Radial mounting. Enclosed timer. No other data available. No known examples.

AERO ACE - AERO LITE - AERO MIDGET

See Gil

AERO-DYNE - Detroit, MI



Ward Hallenberg

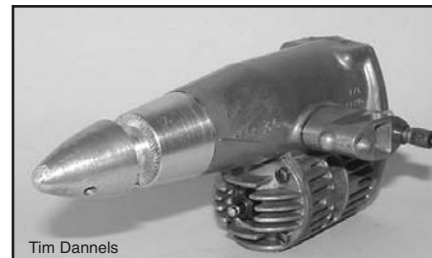
AERO-DYNE 60 - 1946 - .597 in³ spark. Sand cast. Ringed piston. Ball bearing shaft. Front rotary port in crank web. Venturi offset to left side at front. Back cover mounted tank. Dual swept back exhausts. Very low production.

AERO PRECISION MACHINE WORKS - Pasadena, CA

See Precision

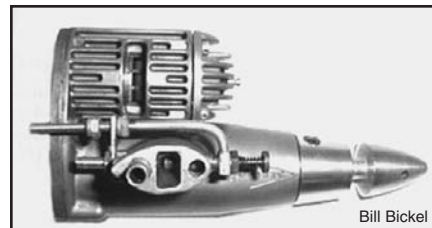
AERO RESEARCH & DEVELOPMENT - Buffalo, NY
(Neil Savage & John Piston)

See also Savage 60



Tim Dannels

AERO 35 - 1963 - .3469 in³ glow. Die cast. Ringed piston. Cylinder parallel to crankshaft. Cylinder head in line with prop. Standard venturi. Uses a "T" shaped rod to transmit motion to piston. Intake timing by notch in shaft wall, not a crankshaft as normally found.



Bill Bickel

AERO 35 R/C - 1963 - .3469 in³ glow. R/C carburetor bolted on to replace standard carburetor using sliding restrictor to vary speed.

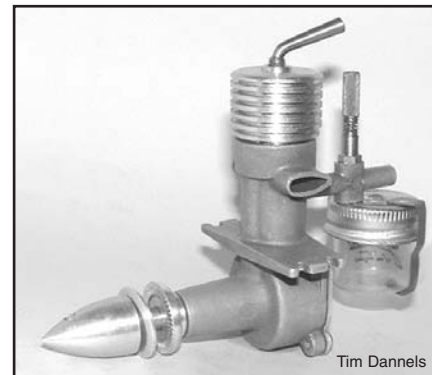
AEROCRAFTERS - Chicago, IL
(Robert Miller)

See Condor Midget Motors
Condor Kopper King

AEROMARINE Co.

See Dyna-Jet - Jet Section

AMERICA'S HOBBY CENTER
New York, NY

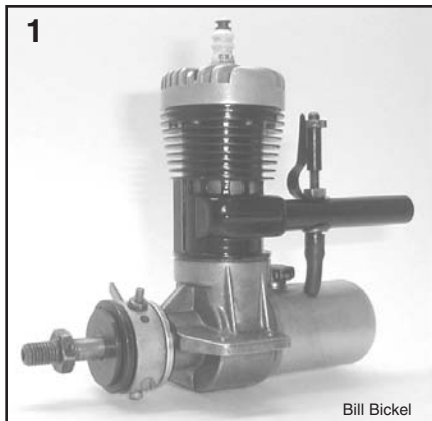


Tim Dannels

AHC Diesel - 1947 - .125 in³ diesel. Sideport, variable compression. Die cast case. Only a couple actually built by AHC. Listed here because close to 1000 case castings were made and a number have been completed. Pictured for identification purpose is a representative example of an engine built from the casting and resembling the only known original. Tank from the Genie 29 was used on original.

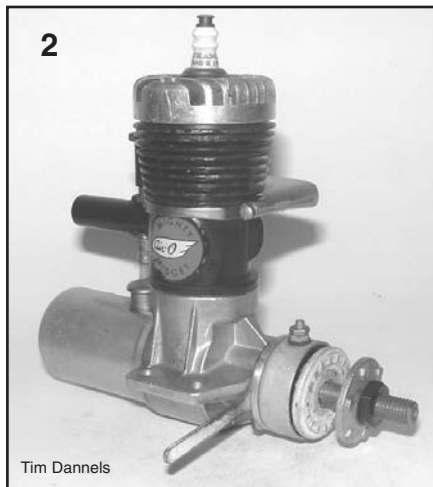
AIR-O-MODEL SUPPLY Co.

Hawthorne, CA Ray Accord re-designed continuation of the "Bunch" line of engines. **NOTE:** *Usage of shaft, prop nut and prop washer type seems to follow no set pattern. A mixture of these parts can be found on most Air-O engines. Early and late style cases were also used randomly as the engines were being built.*



1 - AIR-O-MIGHTY MIDGET - 1946 - .451 in³ spark. New style crankcase with web added above shaft housing. Six bolt aluminum finned head. Gloss black painted cylinder with "AIR-O" decal in circle on bypass. 6 square exhaust holes. No exhaust stack. Enclosed timer with clicker. Point cam on shaft. "D" hole style black drive washer is slightly larger than timer housing. Assorted unusual knurl patterns on drive washer. Flat black steel prop washer early, die cast on later engines.

2 - AIR-O-MIGHTY MIDGET



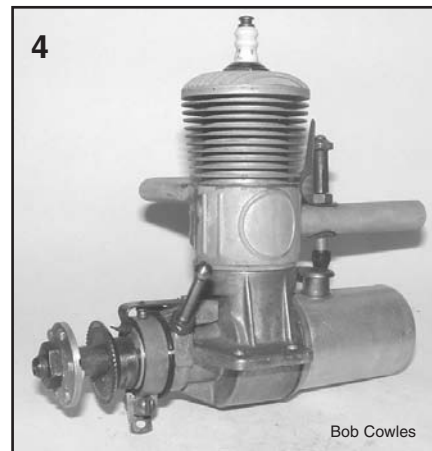
- 1946 - .451 in³ spark. New style crankcase with web added above shaft housing. Bolt on aluminum finned head. Clamp on exhaust. Enclosed timer with clicker. Black cylinder with "AIR-O" decal in circle on bypass. 4 splined cadmium plated Ohlsson type drive washer fits new splined shaft. Die cast aluminum prop washer with 1/4" hole to fit shaft. No shoulder on prop nut.



3 - AIR-O-DIESEL - 1948 - .278 in³ diesel. Same crankcase casting and crankshaft as .451 in³ displacement engines, but case is not machined for timer. Variable com-

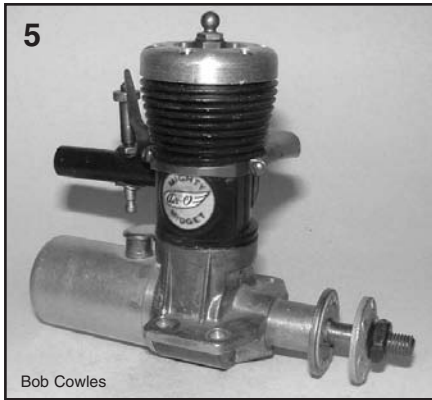


pression adjustment with Allen wrench. Tank on back cover. Pin type drive washer with no cam. Cast aluminum front prop washer. Earliest versions (3a) had black finish on cylinder. (3b) and (3c) show both case styles. Other variations known.



4 - AIR-O-COBRA - 1948 - .451 in³ spark. Like Bunch Tiger Aero, but with 10 fin cadmium plated cylinder. No name in circle on bypass. Pin type attachment of drive washer/cam unit. 3/8" spark plug. Back cover mounted tank. No name in circle on bypass. No shoulder on prop nut. Die cast front prop washer with 1/4" hole.

5 - AIR-O-MIGHTY MIDGET - 1948 - .451 in³ glow. Bolt on finless head. Clamp on exhaust. No timer. Most have shaft with 4 splines for Ohlsson type stamped drive washer. **NOTE:** *5 or 6 .50 in³ glow engines were made special for the Air Force flying team. These were not marked in any way, but would have an oversize piston and/or stroke.*



6 - AIR-O-DIESEL (Numerous variations for car use.) - 1949 - .278 in³ diesel. Horizontal needle valve. Pin through shaft keys into hub on car wheel in most applications. Heavy back cover threaded for axle shaft for opposite car wheel (6a). One mounting lug is sometimes cut off to fit in pan. Mounting holes frequently not drilled. *NOTE: A number of diesels with the cross mounted needle valve exist with prop drive washer, front washer and nut as aircraft engines (6b).*



7 - AIR-O-COBRA - 1949 - .451 in³ spark. Like 1948 Cobra #4,



but has new shorter 8 fin cylinder with top two fins partly filled in. Shorter venturi tube. 1/4-32 spark plug. No shoulder on prop nut. No name in circle on bypass.

8 - AIR-O-COBRA - 1949 - .451 in³ glow. As #7, but no timer or tank. 1/4-32 glow plug. No photo.

AIRCRAFT INDUSTRIES

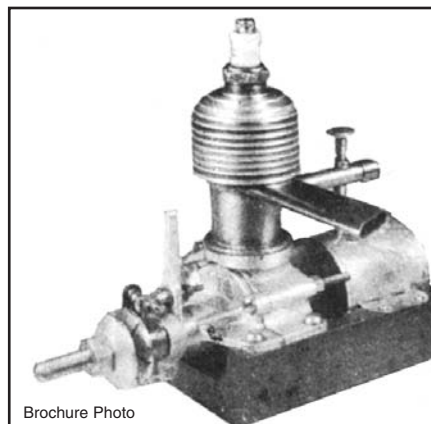
See Cyclone, Baby & Super

AIREQUINE

See Dynamic Manufacturing Co.

St. JOHN MODEL SHOP

Winnipeg, CANADA

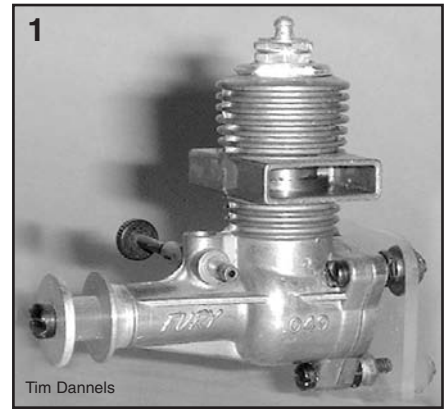


AJAX - 1938 - .359 in³ spark. Sand cast case and front cover with name cast in. Sideport. Open timer on front. Long exhaust stack on left side. Advertised and brochures printed. No known examples.

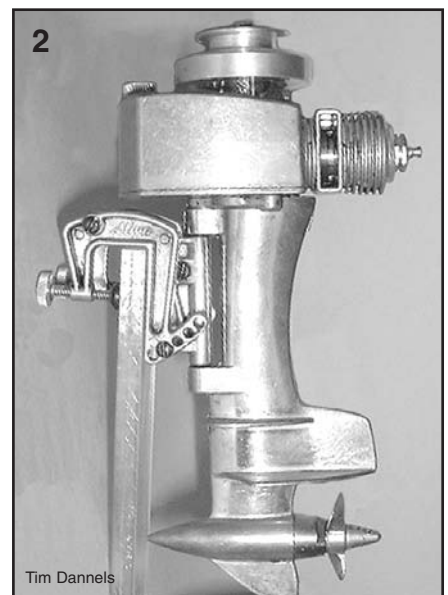
ALLYN SALES Co.

6425 McKinley Ave., Los Angeles, CA (All models glow)

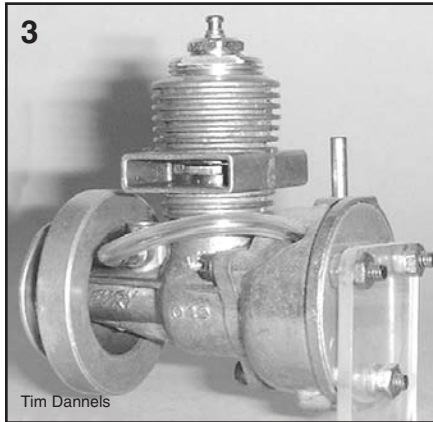
NOTE: The Fury engines were designed by Perin Culver and manufactured by Allyn Sales Co. prior to their merger with K&B at which time all manufacturing was done in one facility. The Sky Fury .049, Mar Fury .049 and Sea Fury .049 outboard and inboard were all manufactured by Allyn Sales. These engines all had "049" and "FURY" on the left side of the crankcase. The larger displacement engines and twins were designed at this time, but were not produced until after the K&B/Allyn merger.



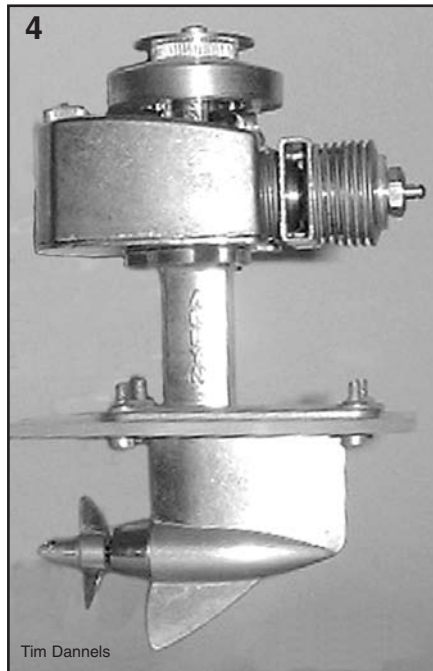
1 - SKY FURY - December, 1953 - .049 in³. Dual exhaust stacks. "049" cast on case. Back cover mounted tank. Standard glow plug. Slight taper to fin profile. Thin ports in cylinder liner. Short prop driver. Small size venturi. Sold with plain back cover and tank.



2 - SEA FURY OUTBOARD - May, 1954 - .049 in³. Sky Fury engine mounted on an outboard frame with flywheel. No knurl in flywheel starter groove on earliest engines. Air cooled. Bevel gears drive 13/16" diameter prop. Transom mounted. No spring steel steering ratchet device. Ported for clockwise rotation.



3 - MAR FURY MARINE - December, 1954 - .049 in³. Like Sky Fury. No knurl in flywheel starter groove on earliest engines. Air cooled. Back cover mounted tank. Inboard design. Special stud and nut for prop shaft attachment.



4 - SEA FURY INBOARD - February, 1955 - .049 in³. Sky Fury engine mounted on frame designed to mount through hull rather than on

transom. 13/16" diameter prop. Knurl in flywheel starter groove. Ported for clockwise rotation.

ALTERNATE FIRING TWIN

See Chunn

AMALGAMATED SALES and SERVICE Corp.

See Ott, Joe

AMERICAN STANDARD

See Tlush Super Ace

AMETEK-CALMEC

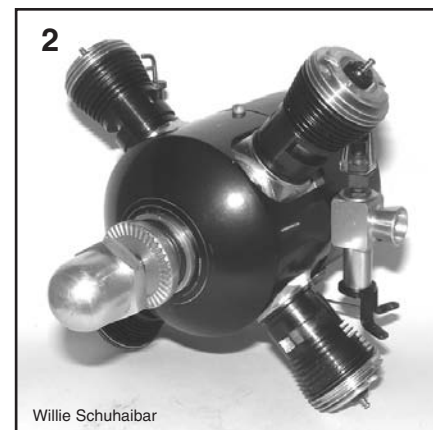
Los Angeles, CA

See also Four Aces

Bancroft & Martin



1 - XA902 - 1968 - .30 in³ glow. Simultaneous firing opposed twin utilizing two Cox Medallion .15 engines. Investment castings. Ball bearings on central gear driven prop shaft. A single K&B multi-speed carburetor supplies both engines through internal ports. Radial mounting.



2 - XA904 - 1968 - .61 in³ glow. Four cylinder radial utilizing four Cox Medallion .15 engines. Opposing cylinders simultaneous

firing. Fully machined components. Ball bearings carry central prop shaft. Dual K&B Multi-Speed carburetors linked together. *NOTE: An advertising brochure shows the engines with a dark case. Very low production on the dark engines. The majority seem to have been produced by Bancroft & Martin.*

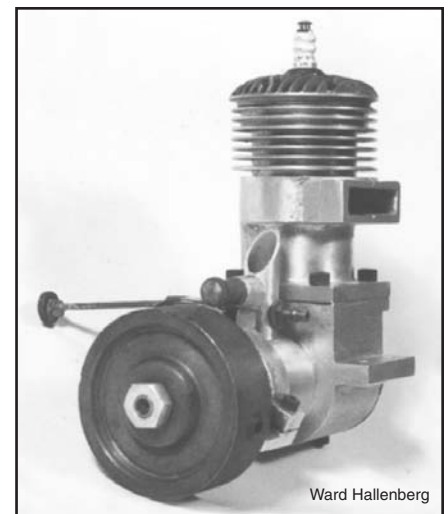
AMF

See Wen-Mac

MODEL MOTOR SUPPLY

Tulsa, OK (Ancil Rouch)

ANCIL 60 - 1946 - .604 in³ spark. Race car engine. Front rotary. Sand cast cylinder. Bar stock case. McCoy style timer.



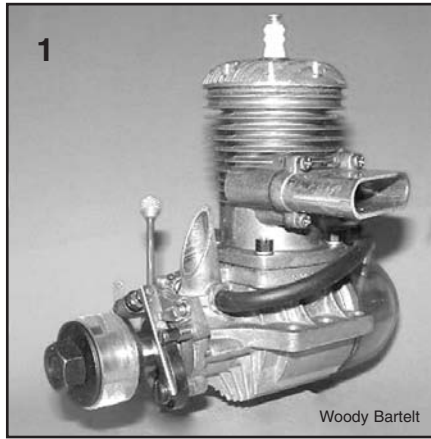
ANCIL 65 - Like .60, but with bore increased. Low Production.

ANDERSON, MEL Mfg. Co.

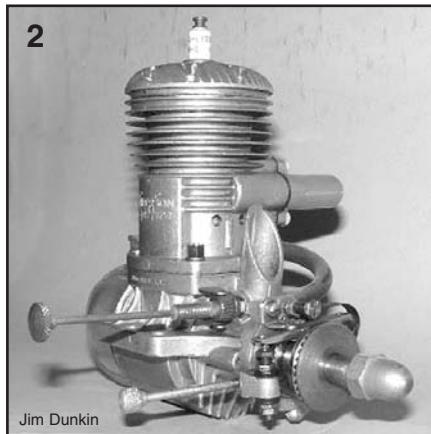
Los Angeles, CA (Mel Anderson)

NOTE: In early 1946 an engine called "Thunderbolt" was advertised. This actually became the Anderson Spitfire in early 1948. "Watch For" ads started running in April, 1946 for the Spitfire.

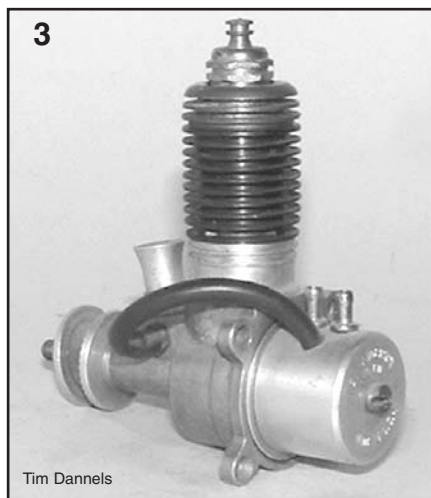
1 - ANDERSON SPITFIRE - 1948 - .604 in³ spark. In appearance, this is a larger, more robust version of the Super Cyclone. It is a totally new engine. .937 x .875 bore and stroke. Inboard ball bearing on shaft. All die cast. Four bolts holding exhaust stack. 6 mounting bolt holes in beams. Clear plastic back cover



mounted tank. No induction ports in front or back of cylinder. Point cam is on drive washer. Low production.



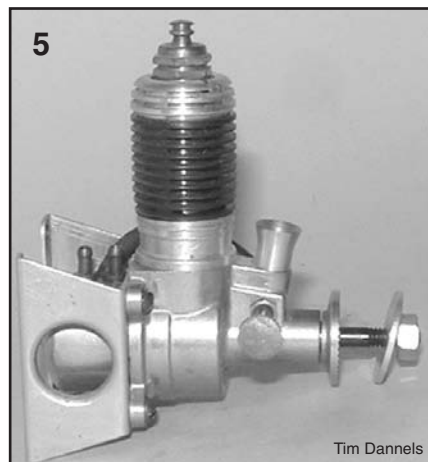
2 - ANDERSON SPITFIRE - July, 1948 - .647 in³ spark. Brochure says, "After July 1, 1948, all Spitfires go to .65 cu. in. displacement." .937 x .937 bore and stroke. Two induction ports in front and back of cylinder. *NOTE: Blue anodized bar stock high compression "Denver" head offered as accessory.*



3 - BABY SPITFIRE - 1949 - .045 in³ glow. Die cast. Name around bottom front of case. Very delicate three piece needle valve assembly. Back cover mounted square edge fuel tank with name stamped into back. Brass head. *NOTE: Nickel plating on early needle valve jets and tank filler tubes. No plating on later engines.*

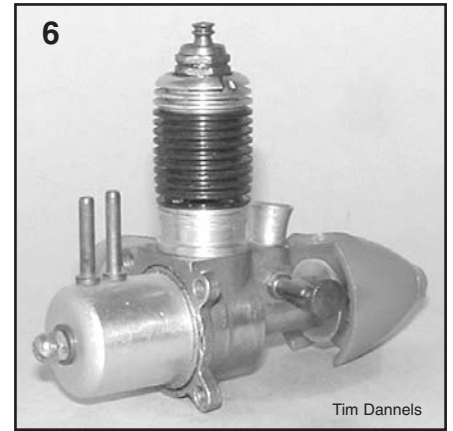


4 - BABY SPITFIRE - 1949 - .045 in³ glow. As #3, but with a variety of different colored heads and bypasses, ie gold, blue, green, red, etc. Sold as a promotional item. Originally sold in a large display box with stamped metal mounting bracket, prop and wrench. Last sold in very small box with engine and tank only. No accessories except wrench.

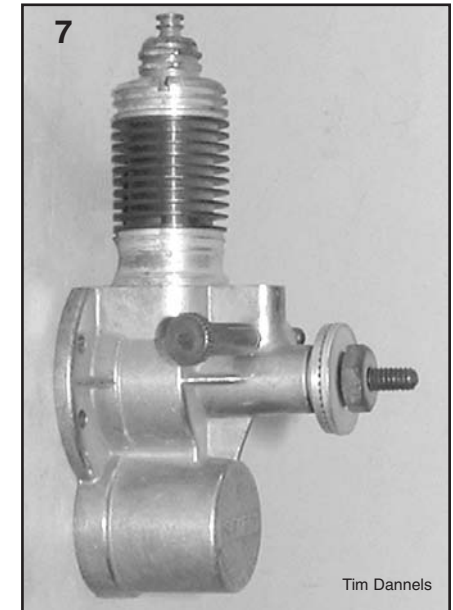


5 - BABY SPITFIRE - 1949 - .045 in³ glow. As #4, but with plain aluminum head. Rounded end tank with no name. Various accessory mounts.

6 - BABY SPITFIRE - 1950 -



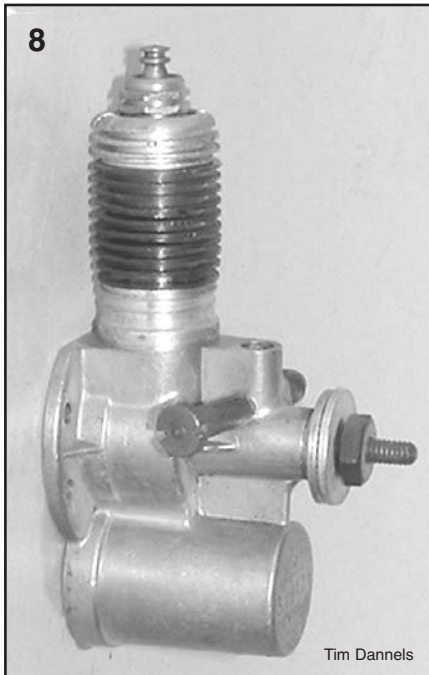
.045 in³ glow. Built for Wen-Mac for use in the first "Aeromite" Ready-to-Fly (RTF) model. Longer tank screw serves as mounting in model. Long tank with tall brass filler vents. With red plastic spinner. Some have red heads.



7 - SPITZY - 1950 - .045 in³ glow. Short fuel tank cast under case. Screwed in back cover. Aluminum head. One piece spray bar. No venturi insert. Different numbers on front of tank supposedly indicate die cavity number.

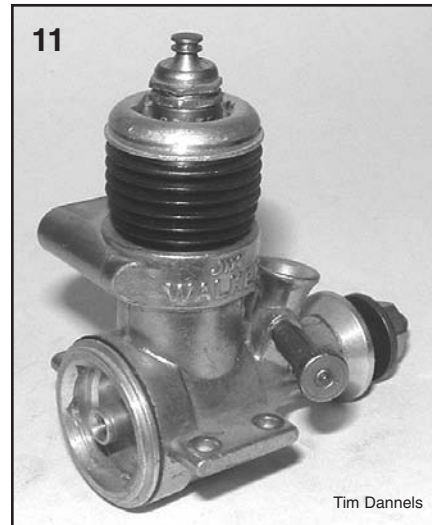
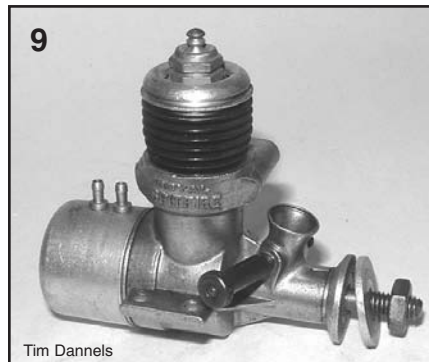
8 - SPITZY Sr. - 1951 - .045 in³ glow. As #7, but long tank cast under case. Most have a brass head.

9 - ROYAL SPITFIRE - 1951 - .065 in³ glow. Cast in exhaust stack. Needle valve angled back. Tank on back cover. Natural aluminum head. Beam mount. "ROYAL SPITFIRE"

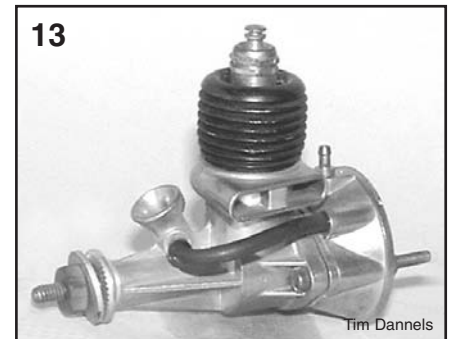


Hornet .09!" It is doubtful this engine was ever more than a concept. The ad photo was of a retouched Royal Spitfire. This also appears to be the last ad by Mel Anderson!

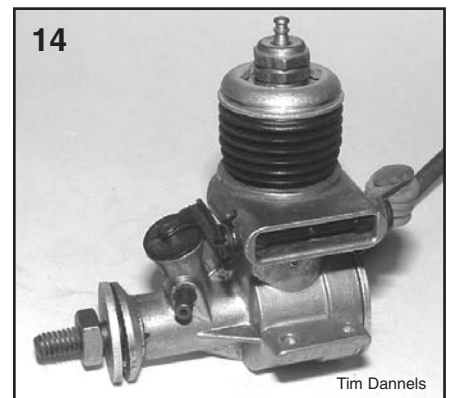
SPITFIRE PRODUCTS Co.
Compton, CA (Lew Mahieu)



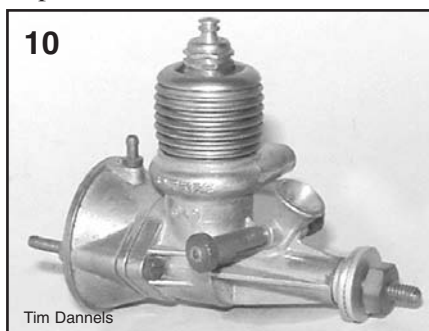
11 - JIM WALKER "FIRE-CRACKER" - 1954 - .065 in³ glow. Built for American Junior Aircraft (Jim Walker). Identical to Royal Spitfire except "JIM WALKER" on bypass opposite exhaust. No tank supplied.



13 - ROYAL BABY SPITFIRE - 1955 - .049 in³ glow. Like last .049, but with either natural aluminum or black anodized cylinder muff.

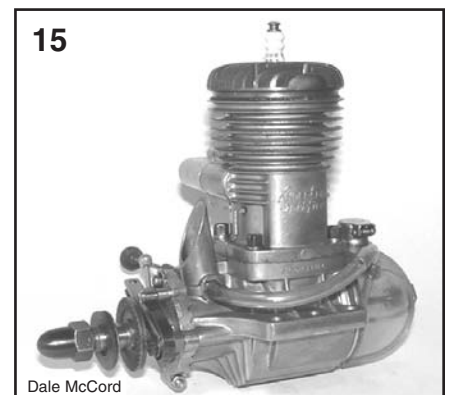


14 - JIM WALKER "FIRE-CRACKER" - 1955 - .065 in³ glow. Built for American Junior Aircraft (Jim Walker) for use in a ready-to-fly U/C model. Regular Jim Walker engine fitted with pneumatically actuated exhaust baffle and venturi cap for speed control. No tank supplied.



10 - ROYAL BABY SPITFIRE - 1952 - .049 in³ glow. Two point radial mount. Cast in exhaust stack. "SPITFIRE" on exhaust collector ring. "049" on right side of cylinder. Needle valve angled back. Light blue anodized cylinder muff.

NOTE: The Mel Anderson ad in the June 1953 issue of Model Airplane News shows the "New Spitfire



McCORD PRECISION PRODUCTS/ PESCO - Anaheim, CA
(Bob McCord)

15 - SPITFIRE 65 - 1958 - .647 in³ spark. Built using remaining parts from original project. Most with finned head anodized blue. Last engines used a machined barstock head anodized a light blue. Point cam on drive washer.

16 - SPITFIRE 65 - 1958 - .647 in³ spark. Point cam now on shaft rather than drive washer as on all earlier Spitfires. Snap ring on shaft behind cam. No induction ports in case. Light blue anodized die cast head early. Square profile bar stock head anodized dark blue later. Available ringed or lapped. Also available with an R/C throttle.



17 - SPITFIRE 65 - 1958 - .654 in³ glow. Dark blue anodized sleeve cover cam on shaft. Blue anodized head. No tank supplied. Available ringed or lapped.



18 - SPITFIRE 65 R/C - 1958 - .654 in³ glow. Dark blue anodized sleeve cover cam on shaft. No tank supplied. Available ringed or lapped. K&B Throttle in cut down venturi.

REMCO

Denver, CO (Ralph Mroch)

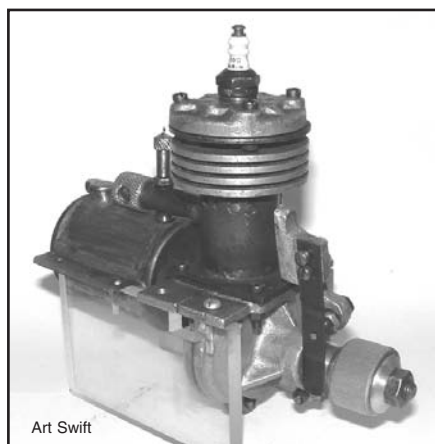
19 - SPITFIRE 65 - 1970 - .647 in³. Identical to the last McCord built Spitfires including snap ring shaft retainer. Available in either spark or glow. Most with uncolored cast finned head. Some new parts cast. No photo.

MILLER, MARVIN - Soquel, CA



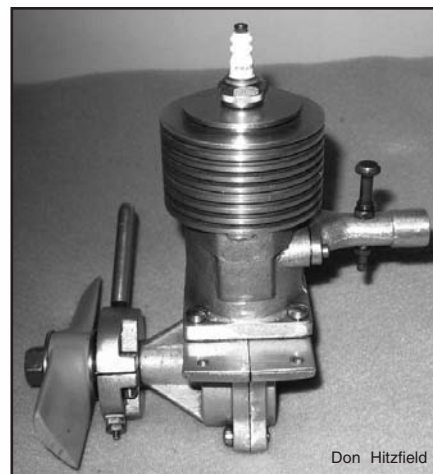
20 - ANDERSON SPITFIRE 65 - 1972 - .647 in³. New investment castings have matte/sand blast finish. Cast finned head, otherwise identical to the last McCord built Spitfires including snap ring shaft retainer. Point cam on drive washer. Available in either spark or glow.

APEX MOTORS - Berkley, CA



APEX "SKYLARK" - 1936 - .562 in³ spark. Kit engine, but some said to have been made and sold as complete engines by Apex. Sand cast head, timer and case. Brazed up cylinder with shrunk on aluminum fins. Split case with through bolt

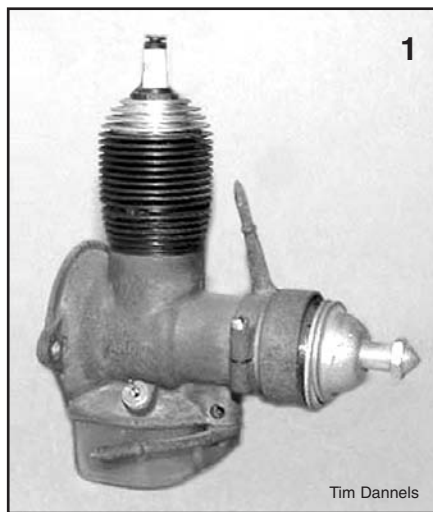
clamping. Lapped piston. *REPRO by Don Stroot.*



APEX "120" - 1936 - 1.20 in³ spark. Sand cast engine resembling Forster 99 but with many differences. Overall larger in size. Bypass cast into cylinder. *NOTE: Not connected in any way with Forster although several parts appear to be interchangeable. Most existing engines are from original patterns, but recently built.*

MICRO-BUILT, Inc.

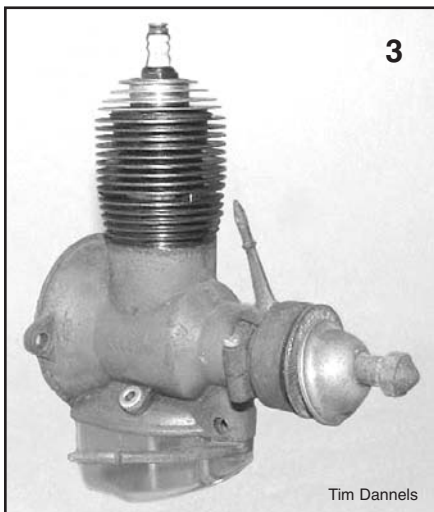
Danbury, CT (Ray Arden)



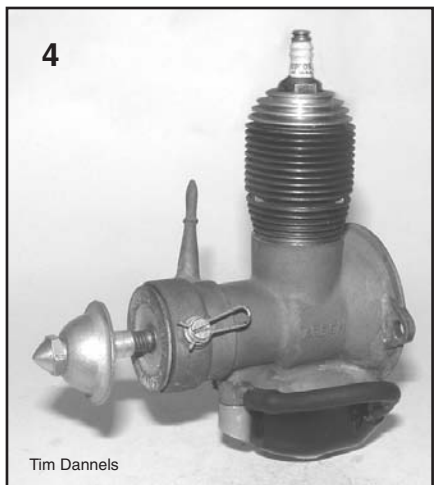
1 - ARDEN 09 - 1946 - .099 in³ spark. Magnesium castings. Plain bearing shaft. Throttle valve (no needle valve). Clear plastic tank. Black fuel proof tank offered later. *NOTE: Only around 1000 .09's were built with magnesium heads. All the rest were aluminum. NO magnesium head .19's.*



2 - ARDEN 09 - 1946 - .099 in³ spark. As #1, but with ball bearing mounted shaft. Case has two holes behind front bearing on bottom. No other visible difference in plain bearing and ball bearing engines.

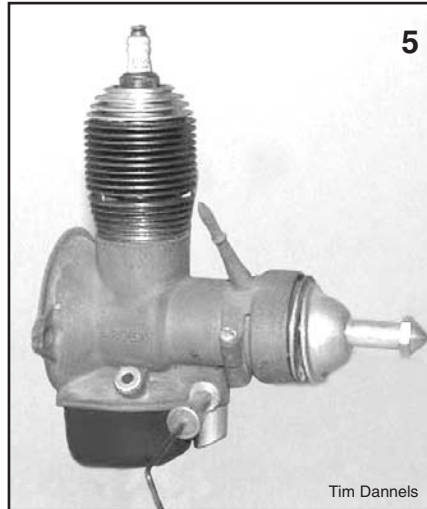


3 - ARDEN 19 - 1946 - .198 in³ spark. Enlarged version of .09. Ball bearing shaft. Clear plastic tank. Throttle valve. Same timer as .09.

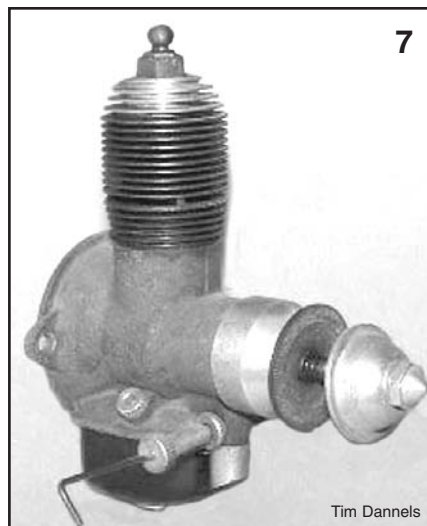
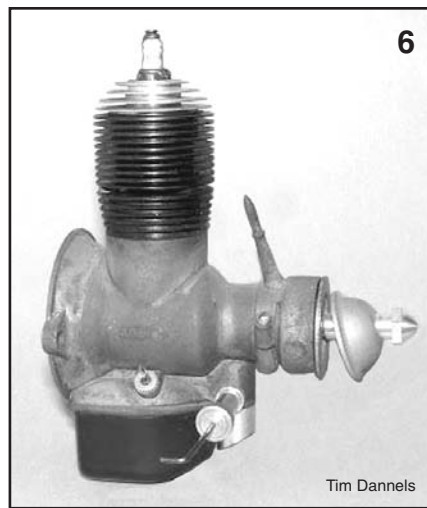


4 - ARDEN 09 - 1947 - .099 in³ spark. Now has needle valve. Aluminum venturi insert and black fuel proof plastic tank. Red tanks

accessory items for hot glow fuels. Plain bearing.



5 - ARDEN 09 - 1947 - .099 in³ spark. As #4, but with ball bearing shaft. Outwardly identical to plain bearing engine except two holes on bottom of shaft housing behind bearing.



6 - ARDEN 19 - 1947 - .198 in³ spark. Like throttle valve .19, but has needle valve. Aluminum venturi insert and black plastic tank.

7 - ARDEN 09 - 1949 - .099 in³ glow. Like .09 #2, but with aluminum cover over cam. Sold only with a ball bearing crankshaft. Late production went to aluminum castings.



8 - ARDEN 19 - 1949 - .198 in³ glow. Like .19 #6 but with aluminum cover over cam. Late production went to aluminum castings. *NOTE: There are numerous Arden Diesel conversions for both size engines. These were not built nor offered by Micro-Built. A few early Ardens had magnesium heads. There were no plain bearing Arden 19's.*



9 - ARDEN 09 & 19 FREE FLIGHT CHASSIS - 1946

Accessory item available for all Arden engines. Sold with or without the engine. Unit contains built in coil, flight timer, condenser, engine mounting flange, wheels and struts (not pictured on this example) and booster jack connections. Pen cell (AA) batteries also fit into the unit. Body of unit is bright red plastic and mounting plate is black plastic. Pictured engine has magnesium head.

ARLINGTON MOTOR Co.

San Mateo, CA

ARLINGTON ENGINE -

1946 - .512 in³ spark. Advertised castings kit engine. Sideport. Available as rough castings kit (\$5.00) or partly machined kit (\$7.50). Only a line drawing shown in ads. No other data available. No known examples.

ARM (American Racing Machine)

Built and designed by Roger Theobald & John Barr at the K&B factory, but not strictly a K&B product.



ARM - 1972 - .152 in³ diesel. Investment cast case includes front shaft housing. "15" over "ARM" cast into bypass bulge. Rear drum valve intake. Designed as a team race engine mounted inverted, so the Cox supplied venturi and needle would point up in actual use. Approx 90 made.

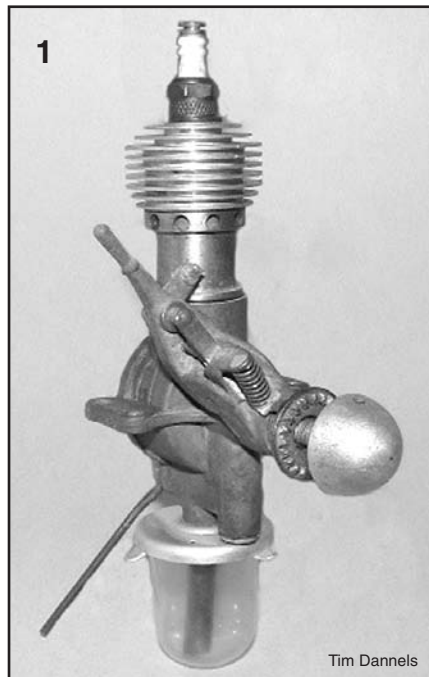
ATHEARN

See POGO

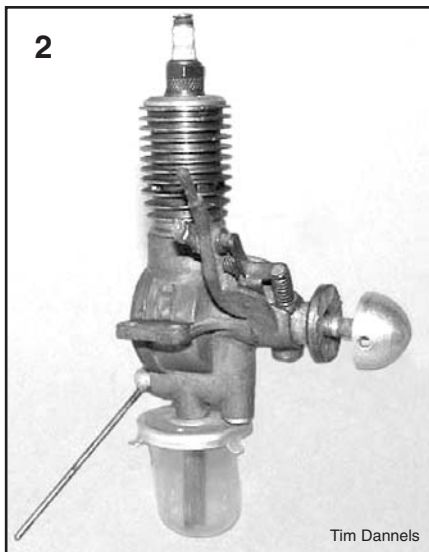
MICRODYNE ENGINES

Danbury, CT (Ray Arden)

1 - MIGHTY ATOM - 1939 - .097 in³ spark. Rounded, bulb-like aluminum cylinder fins. Fuel passes through valve in center of piston. No bypass grooves in cylinder. Holes drilled around cylinder for exhaust. Magnesium castings. Serial number stamped around back of cylinder boss. Fuel mixing valve has straight sides with rounded end. "Thimble" tank snaps into stamped top with three ears. "Teeth" around

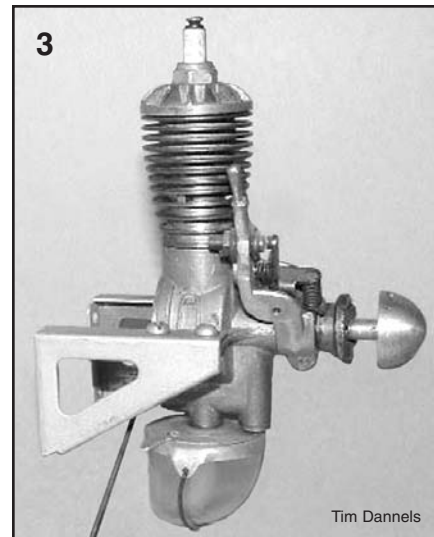


rim of drive washer. Serial number range approximately 0 to 04000. (See accompanying chart.)

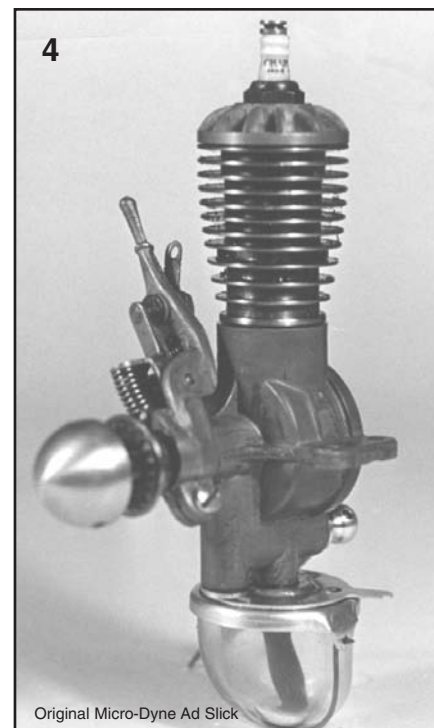


2 - SUPER ATOM - 1940 - .097 in³ spark. Same case and lower end as Atom #1. Serial number moved to edge of mounting lug on last production. Straight fin profile. Flat head with 8 wrenching holes. Serial numbers range 04001 through approximately 10000.

3 - SUPER ATOM - 1941 - .098 in³ spark. Aluminum castings. Tank has wire bale. Radial or "spoke" type head fins, tapered fin profile. Drive washer has 6 "bumps" around edge. Fuel mixing valve has "bump"



end. Serial numbers in the 12000+ range.



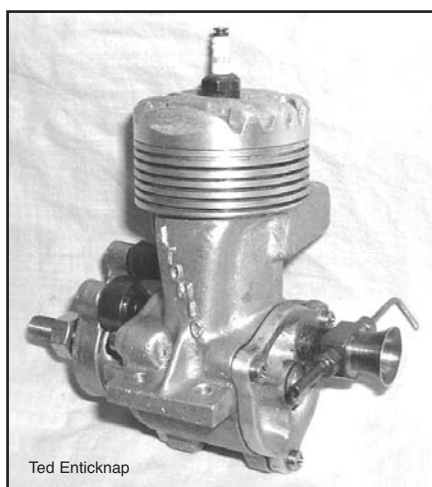
4 - SUPER ATOM - 1946 - .098 in³ spark. Like last Atom above, but with all magnesium castings. Serial numbers in the 30000 range. **NOTE:** Large quantities of finished engines and unfinished parts "turned up" in the 1960's. Many of these have been converted into finished engines. Most will not have serial numbers. These have been built into all four models. **REPROS EXIST**

See Issue #84, May, 1968 Engine Collectors' Journal for the complete Atom story.

ATOM DATA SHEET

MODEL ONE	MODEL TWO	MODEL THREE	MODEL FOUR
PISTON			
1 	2, 3 & 4 	NOTE: Atom engines use a unique form of fuel bypassing through the two piece piston.	
2 Port 		5 Port 	
SUB PISTON			
1 & 2 		3 & 4 	
THROTTLE			
1 & 2 		3 & 4 	
TANK			
1 & 2 		3 	4
20 Points		6 Lugs	8 Ridges
PROP DRIVE			
1 	2 	Aluminum Castings 3 	Magnesium Castings 4
HEAD			

ATOMIC ENGINES - Bill Cubitt



ATOMIC - 1946 - .60 in³ spark. Racing engine similar to Hornet 60. Three bolt front and back cover attachment. All sand cast. Name cast diagonally on bypass. Double ball bearing supported shaft. Dural rod bushed both ends. Hemi arrangement on piston and head. Low production. **REPROS EXIST**

ATWOOD - NOTE: This listing is being presented as best as can be determined of engines designed and manufactured by Bill Atwood without regard to the particular manufacturing company name he happened to be using at the time. It is a chronological listing running 20 years from Phantom Motors (1938) thru Signature Engines (1958).

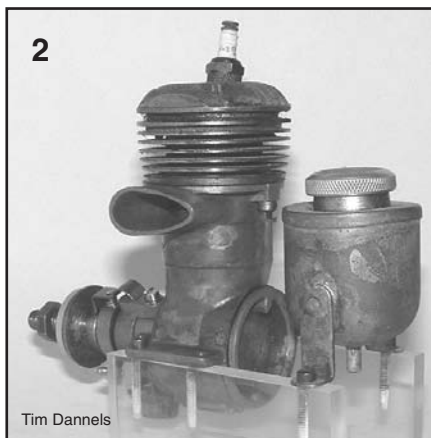
PHANTOM MOTORS

Hi-Speed Division

Los Angeles, CA (All models spark)

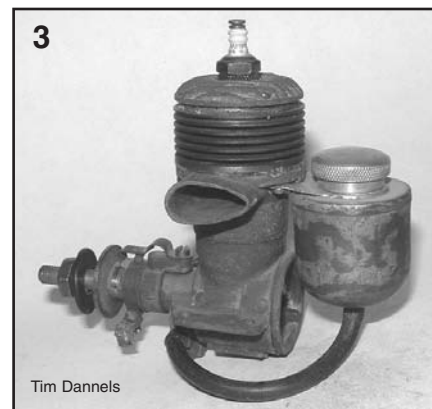


1 - ATWOOD PHANTOM - 1938 (early) - .276 in³. Round exhaust. Two bolt cylinder attachment. "PHANTOM MOTOR" on bypass. Spark plug in center of head. Separate cadmium plated brass fuel tank mounted on engine bearers. "K" in serial number. Five cylinder fins.

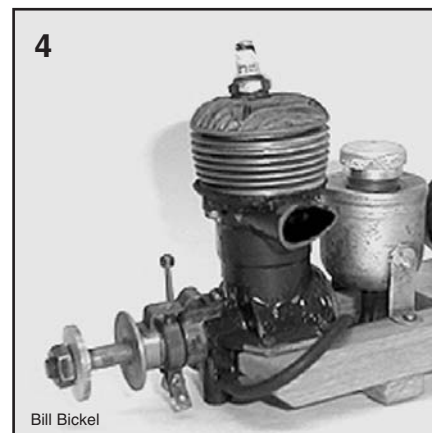


2 - ATWOOD PHANTOM - 1938 (late) - .276 in³. Teardrop exhaust stack. Two bolt cylinder attachment. Six cylinder fins.

Separate cadmium plated brass fuel tank mounted on engine bearers.



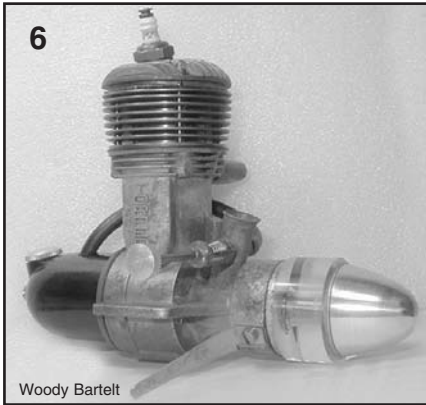
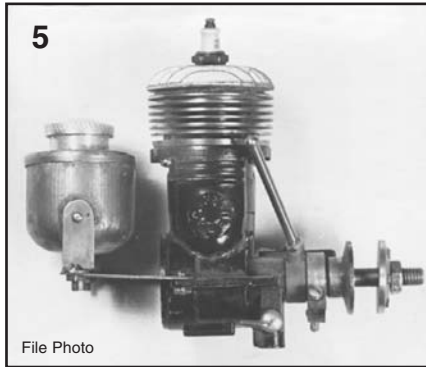
3 - ATWOOD PHANTOM - 1938 (later) - .276 in³. Teardrop exhaust stack. Four bolt cylinder attachment. Six cylinder fins. "G" in serial number. No paint. Cadmium plated brass fuel tank attaches to rear two cylinder screws.



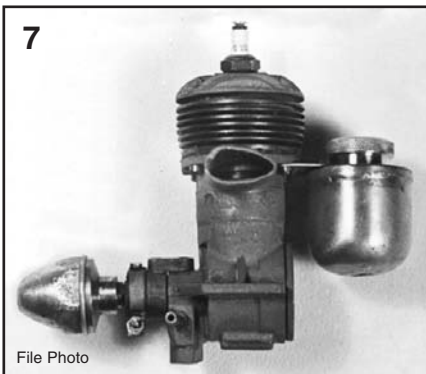
4 - HI-SPEED - 1938 - .276 in³. Virtually identical to the 1938 Atwood Phantom #2 with teardrop exhaust except that the name "HI-SPEED" is cast on bypass and the head is larger in diameter giving a tapered fin profile. Spark plug offset and angled. Two bolt cylinder attachment. Last ones were painted dark blue or black crackle.

5 - HI-SPEED - 1939 (early) - .276 in³. Same as the last painted version above, but with four bolt cylinder attachment. Flatter profile on head.

6 - HI-SPEED TORPEDO - 1939 (July) - .299 in³. Black wrinkle paint (some unpainted). Red bake-lite tank. Four head bolts extending

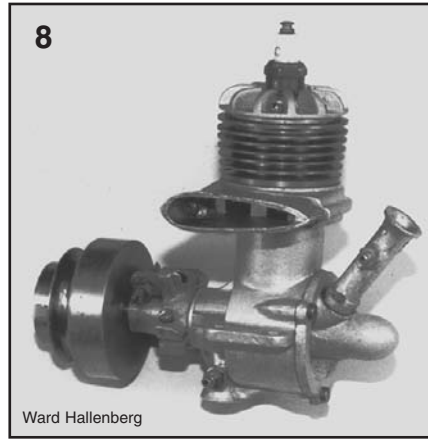


into case (the last of these had eight head bolts, four through to case and four just into top of cylinder). First small Atwood with intake above crankshaft.

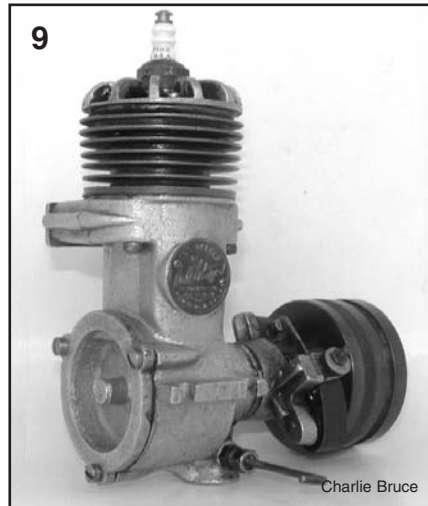


7 - HI-SPEED BULLET - 1939 (late) - .275 in³. "BULLET MOTOR" now cast on bypass. Black wrinkle paint changing to red wrinkle, Feb. 1940. Last engines unpainted. Tank mounted by a bracket attached to two rear cylinder bolts.

CHAMPION PRODUCTS Co.
Los Angeles, CA (All models spark.)
Brochure photos used to illustrate most designs as no examples are known of many of these engines - Engine Collectors' Journal, Issue #143 has complete Champion details.



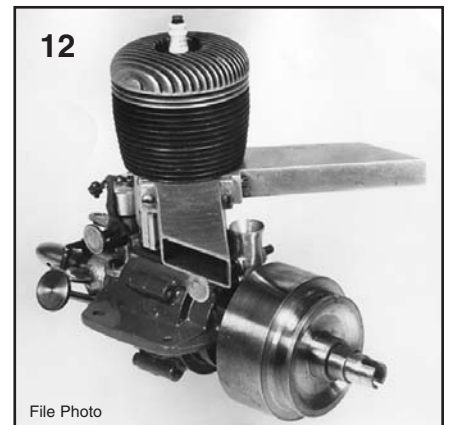
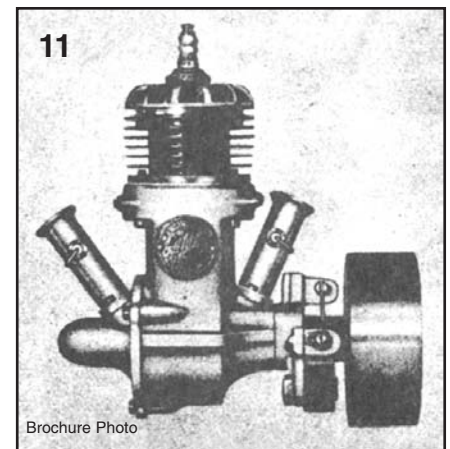
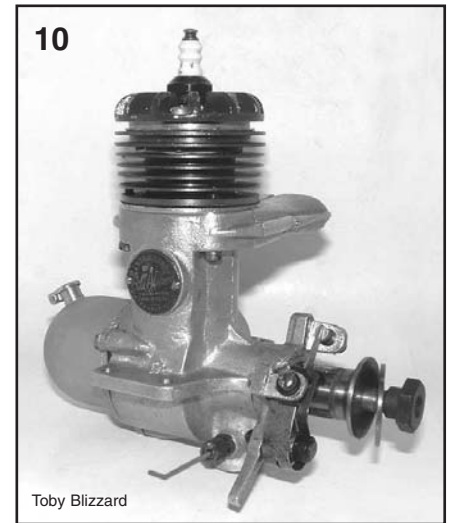
8 - BLUE CROWN CHAMPION - March, 1940 - .604 in³. This appears to be the highest production of any of this line. Bottom front rotary valve and rear drum valve. Two needles. "Spoke" head fins. Embossed name plate riveted to bypass. Flywheel. *NOTE: Even though these engines are called Blue Crown, Red Crown, Green Crown, etc., none of them had colored heads. All were natural aluminum.*



9 - RED CROWN CHAMPION - April, 1940 - .604 in³. Like Blue Crown but with only single front rotary and single needle valve. No tank. Car engine.

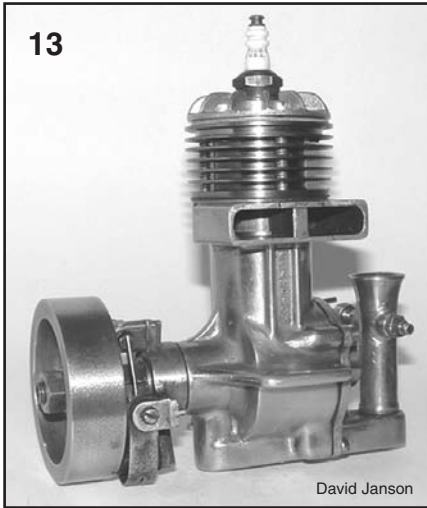
10 - GREEN CROWN CHAMPION - April, 1940 - .604 in³. Aircraft version. Single front rotary valve. Tank on back cover.

11 - PURPLE CROWN CHAMPION - April, 1940 - .604 in³. Boat engine. Dual top mounted carburetors. Flywheel. No known examples.



12 - SILVER CROWN CHAMPION - 1940 - .90 in³ (15cc). Boat engine. Dual carburetors mounted above shaft. Large swept exhaust stacks. Parallel head fins. Clamp on bypass and exhaust manifold. Flywheel. Offered by several builders as a kit engine, many variations exist and are still being made.

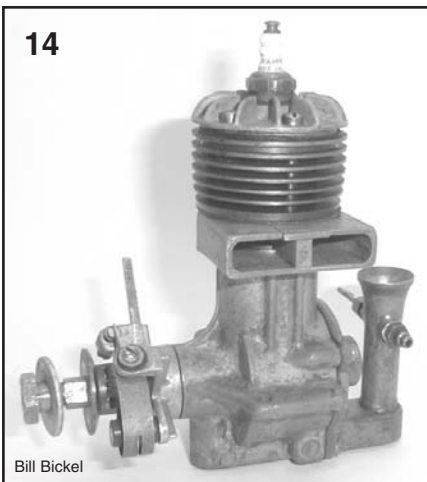
13 - CHAMPION RACE CAR - 1940 - .597 in³. Combination drum



13

David Janson

and shaft rotary. Single needle valve on "stove pipe" venturi. Spoke head fins. No "H" cast on bypass. Aluminum castings polished, possibly tumbled. No flats on shaft for drive washer. No arm on timer frame. Has flywheel.



14

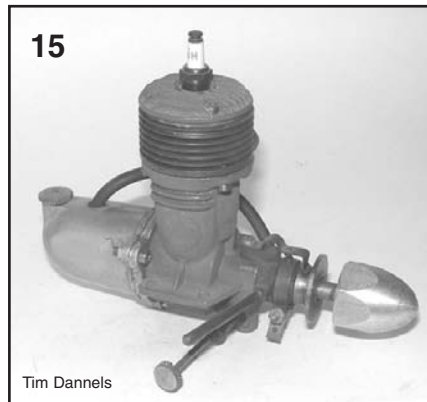
Bill Bickel

14 - CHAMPION AIRCRAFT - 1940 - .611 in³. Combination drum and shaft rotary. Single needle valve on "stove pipe" venturi. Spoke head fins. No "H" cast on bypass. Magnesium castings. Has flats on shaft for drive washer. Cast arm on timer frame.

PHANTOM MOTORS

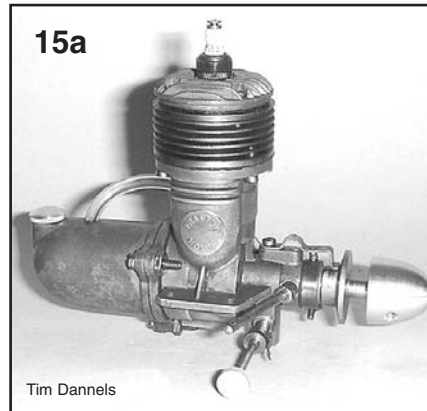
Los Angeles, CA (All models spark)

15 - PHANTOM "BULLET" - 1940 (June) - .276 in³. "PHANTOM MOTOR" cast on bypass. Fuel tank has three ears for attachment to mounting ring trapped between case and back cover. Early engines paint-



15

Tim Dannels



15a

Tim Dannels

ed black wrinkle, later red wrinkle and by Sept. 1940 were unpainted. Early engines have needle valve angled back from prop arc (Figure 15). Later needle valves were parallel to prop arc (Figure 15a)! Alternating use of aluminum and magnesium/dowmetal castings.



16

Tim Dannels

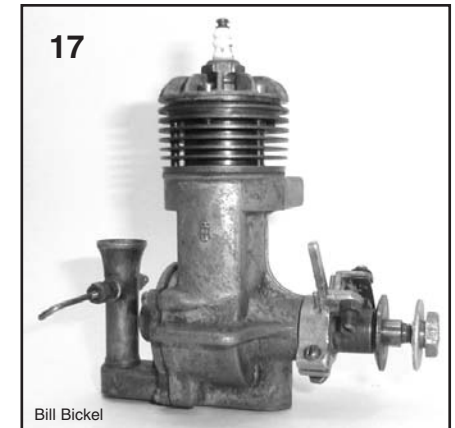
16 - PHANTOM "TORPEDO" - 1940 (June) - .299 in³. Fuel tank mounts to flange as on Phantom Bullet, but has a "float" and gauge added. Eight bolt head attachment. Early engines painted black wrinkle, followed by red and then unpainted. First engines had no web between lugs and side of case. This was

added around the time the cases were left unpainted. Name "TORPEDO" cast vertically on bypass.

NOTE: Phantom P-30 listed under "P". Not Atwood engines!

WETZEL and ATWOOD MOTORS

Los Angeles, CA



17

Bill Bickel

17 - ATWOOD CHAMPION (Model "H") - 1945 - .603 in³ spark. Spoke head fins. "H" cast on bypass and various internal parts. Magnesium castings, otherwise same as 1941 Champion. *NOTE: The last Phantom Bullets also produced by Wetzel & Atwood Motors.*

ATWOOD and ADAMS Mfg.

Burbank, CA (All models spark)

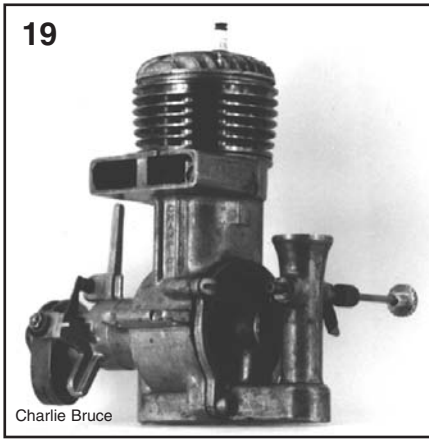


18

Bert Striegler

18 - ATWOOD CHAMPION (Model "H") - 1946 - .611 in³. "H23" cast vertically on bypass. Lapped Piston, .930" bore. Parallel head fins. 1/4-32 spark plug. Steel (instead of cast iron) cylinder.

19 - ATWOOD CHAMPION



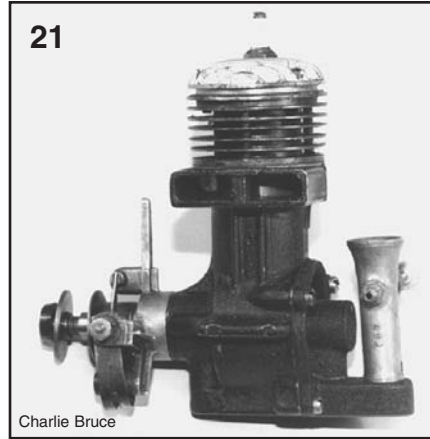
19
 (Model "J") - 1946 - .625 in³. Similar to Model "H" #18, but with minor cosmetic differences. Available in either ringed (.940 bore) or lapped (.930 bore) so displacement will vary from .625 (ringed) to .611 (lapped)



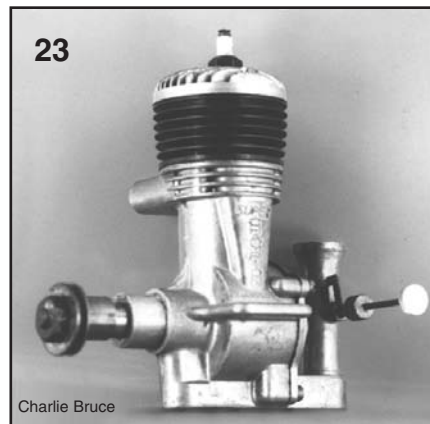
20
 - ATWOOD SUPER CHAMPION (Model "JH") - 1946 - .611 in³. Lapped or ringed piston as #19. Exhaust now on opposite side from all previous models. "JH" in circle above vertical "ATWOOD" cast on bypass. Large bypass.

21 - ATWOOD CHAMPION (Model "J") - 1946 - .625 in³. Similar to Model "H", but has black wrinkle painted case and back cover. Timer, head and "smoke stack" unpainted. Paint applied to cover rough castings from worn out dies!

ATWOOD Mfg. Co.
 Burbank, CA

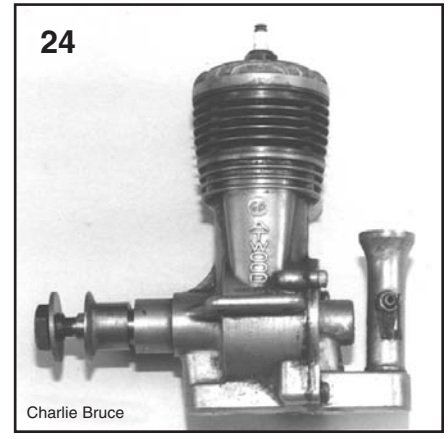


22 - SUPER CHAMPION - 1948 - .630 in³ spark. Similar to Atwood "JH" Champion, but has "SUPER CHAMPION" on bypass. Small narrow bypass.

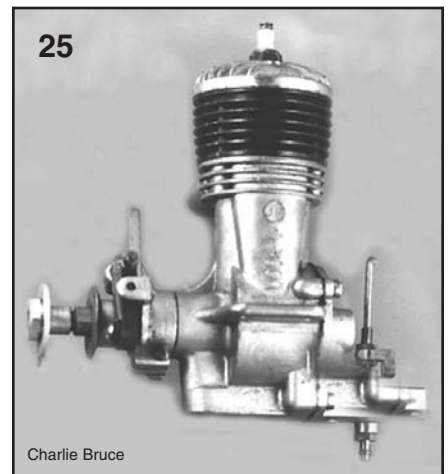


23 - GLO-DEVIL - 1948 - .625 in³ glow. Similar to previous "SUPER CHAMPION", but no timer. Small narrow bypass.

24 - GLO-DEVIL - 1948 - .625 in³ glow. Same case casting as "JH" Champion, but "GD" replaces "JH" in circle above "ATWOOD" on large bypass. (NOTE: Some



"GD" engines were reported to have been sold with timer as an ignition engine.)



25 - ATWOOD CHAMPION Model "DR" - 1948 - .625 in³ spark. Similar to Glo-Devil, but with increased bypass and exhaust areas. "DR" on bypass. Stub intake straight out back. No vertical stack.



26 - GLO-DEVIL Model "GD" - 1948 - .625 in³ glow. Like previous but without timer. "GD" on bypass.

27 - TRIUMPH 49 - 1948 - .491 in³ spark. New Atwood design. Two piece case split below mounting lugs. Front rotary valve. Back cover mounted tank. Enclosed timer. "49" stamped on top of mounting lug. No other name or markings on engine.



28 - TRIUMPH 51 - 1948 - .503 in³ spark. Two piece case split below mounting lugs. Front rotary valve. Back cover mounted tank. Enclosed timer. "51" stamped on top of mounting lug.

29 - TRIUMPH 49 - 1948 - .491 in³ glow. Two piece case split below mounting lugs. Front rotary valve. Back cover mounted tank. No timer and case not machined for one. "49" stamped on top of mounting lug on most engines. *NOTE: Control line engines (pictured example) in both sizes sold without tank and back cover tank screw boss not threaded. Needle valve on left side.*

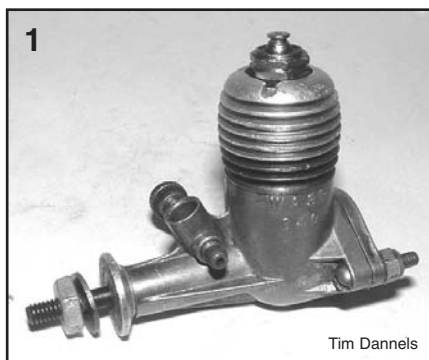


30 - TRIUMPH 51 - 1948 - .503 in³ glow. Two piece case split

below mounting lugs. Front rotary valve. Back cover mounted tank. No timer and case not machined for one. "51" stamped on top of mounting lug. *NOTE: Not all engines received the "49" or "51" stamp on the lug. Also most, but not all, Triumphs were serialized inside the back cover.*

ATWOOD Mfg.

Pico, CA (All models glow.) *NOTE: The last "Triumph" 49 and 51's were manufactured under the Atwood Mfg. company name. The Atwood 1/2A engine listing will have it's own numbering series.*

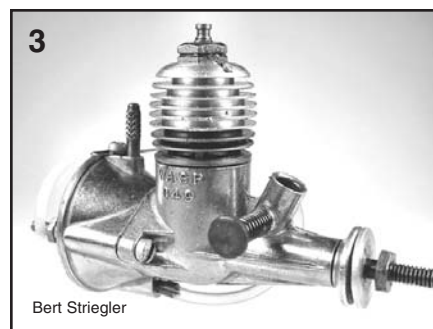


1 - WASP - 1950 - .049 in³. First Atwood built 1/2A engine. "WASP" over "049" on both sides of case. Thin drive washer splined onto 5-40 size shaft with prop nut. Glow plug. First engines sold had the back cover only, no tank. Shown with original brown and yellow box (#1a). *NOTE: Variations in venturi length are not a good indicator of different models. These were production variations.*

2 - WASP - 1950 - .049 in³. "WASP" over "049" on both sides of case. Thin drive washer splined onto 5-40 size shaft with prop nut. Tank



part of back cover. Fuel pickup from bottom of tank.



3 - WASP - 1950 - .049 in³. "WASP" over "049" on both sides of case. Thin drive washer splined onto 5-40 size shaft with prop nut. Pictured engine shows optional timer tank.

ATWOOD MOTORS

Montrose, CA (All models glow.)

At this point, identification of specific Atwood 1/2A's becomes most difficult. Advertising is of no help because the same ad was often run over and over. Some of the advertised engines have never been found. Identical engines were sold in different boxes with different names. Identical boxes were sold containing a variety of different engines. Parts interchangeability was used extensively by Atwood to market new engines.

The following progression of features would be a logical way to approach the evolution of Atwood 1/2A's.

1 - Crankcase castings remain fairly constant. Differences are in venturi length, shaft size and deck height. The one outstanding difference is the late "U-Control" engines having a heavy web cast underneath the shaft and the very last with no

displacement designation. This lack of displacement numbers also appeared on "regular" crankcases.

2 - Crankshafts progressed from a 5-40 shaft with nut, to a crankshaft with tapered seat for longer prop drive washer and threaded in prop screw, to an 8-32 size shaft with nut. At "the end" engines apparently were assembled with whatever could be salvaged from the parts bin.

3 - Anodizing of cylinders and parts maintained their original intent as to model designation. Exceptions include, but are not limited to, a gold drive washer and spinner as found on engine #29.

4 - Drive washers were thin on the 5-40 thread shafts, long on the tapered shafts, and a return to thin on the 8-32 thread shafts.

5 - 3 styles of head fins were used. 1st version was tapered with a glow plug. 2nd was a return to the rounded profile of the Wasp. These were intermixed according to model. 3rd was the glow head used on the final production. This was advertised as being recommended for use on earlier engines.

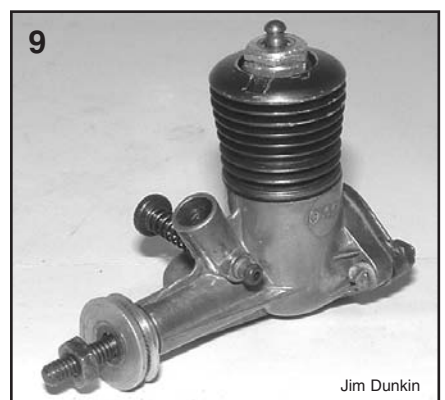
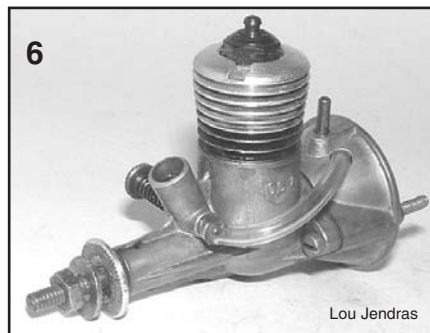
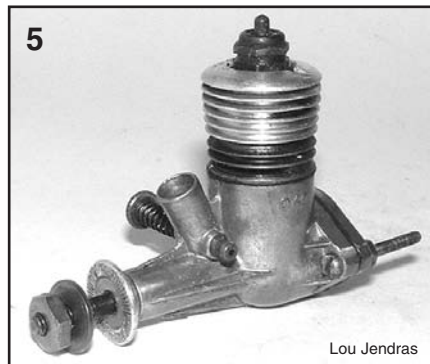
6 - Atwood also produced the early models of the Wen-Mac engines and there is interchangeability here as well - especially on internal parts and cylinders.

With all of these overlapping differences in mind, here is a suggested progression of the Atwood 1/2A engines. Not all types are pictured.

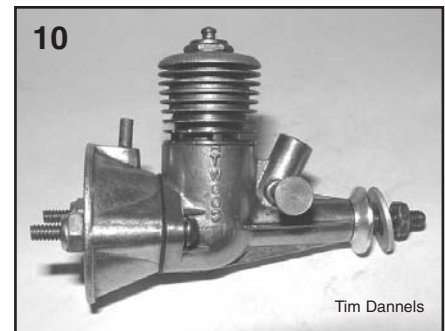
4 - **ATWOOD "F/F"** - 1953 - .049 in³. New crankcase casting has "ATWOOD" on right side of case, "049" on left side. Retains 5-40 size prop shaft with nut. Thin drive washer. Slightly different shape to castings. Back cover mounted tank with fuel line hole on top. Straighter fin profile. Sold at \$4.75

5 - **ATWOOD "U/C"** - 1953 - .049 in³. Identical to #4, but sold with only the plain back cover. Straighter fin profile. Sold at \$4.50

6 - **ATWOOD "F/F"** - 1953 -



Tapered fin profile. No tank. Sold at \$4.50.



10 - **ATWOOD** - January, 1954 - .051 in³. "ATWOOD" on right side of case, "051" on left side. 5-40 size prop shaft with nut. Thin drive washer. Increased stroke. Sold with back mounted tank. Fuel pickup from top of tank. Straighter fin profile. Sold at \$4.75.

7 - **ATWOOD "U/C"** - 1953 - .051 in³. Identical to #6, but sold with plain back cover and no tank. Straighter fin profile. Sold at \$4.50

8 - **ATWOOD "F/F"** - January, 1954 - .049 in³. "ATWOOD" on right side of case, "049" on left side. 5-40 size prop shaft with nut. Thin drive washer. Red anodized head. Back cover mounted tank. Tapered fin profile. Sold at \$4.75.

9 - **ATWOOD "U/C"** - January, 1954 - .049 in³. "ATWOOD" on right side of case, "049" on left side. 5-40 size prop shaft with nut. Thin drive washer. Blue anodized head.



11 - **ATWOOD "CADET"** - February, 1954 - .049 in³. "ATWOOD"

on right side of case, "049" on left side. 5-40 size prop shaft with nut. Thin drive washer. Silver head. No tank. Lower price engine.

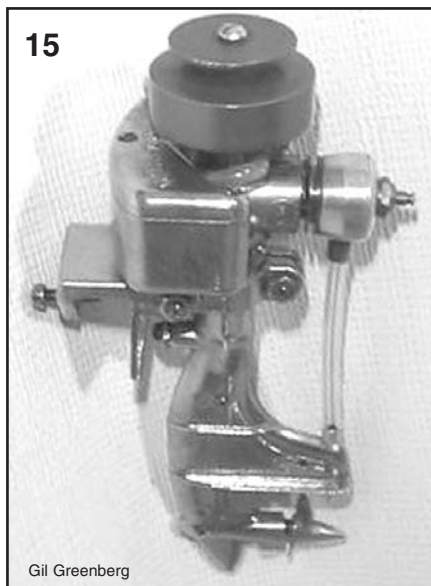
12 - ATWOOD "CADET" - February, 1954 - .051 in³. "ATWOOD" on right side of case, "051" on left side. 5-40 size prop shaft with nut. Thin drive washer. Silver head. No tank. Lower price engine.



13 - ATWOOD OUTBOARD - April, 1954 - .049 in³. Air cooled. Cadet engine mounted on outboard motor unit using flexible shaft in lower housing. Red flywheel. "ATWOOD MOTORS" on top of fuel tank. *NOTE: First marine engines, both outboard and inboard, used the 5-40 size shaft with nut. Later going to the shaft with tapered seat and screw in prop shaft.*

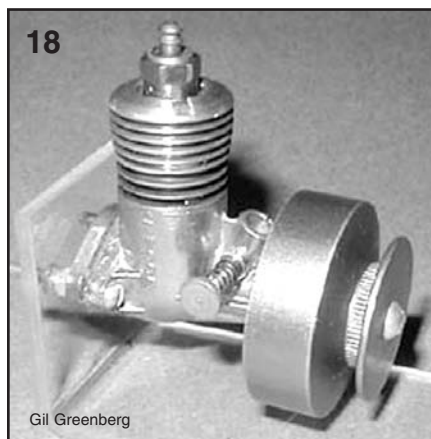
14 - ATWOOD OUTBOARD - April, 1954 - .051 in³. Identical to air cooled outboard #13, except has .051 size engine. Blue Flywheel

15 - ATWOOD OUTBOARD - April, 1954 - .049 in³. Water cooled Cadet engine mounted on outboard motor unit using flexible shaft in lower housing. Silver fins. "ATWOOD MOTORS" on top of fuel tank. Has a water jacket over cylinder fins. Water pickup tube. Red flywheel.



16 - ATWOOD OUTBOARD - April, 1954 - .051 in³. Identical to water cooled outboard #15, except has .051 size engine. Blue flywheel.

17 - ATWOOD INBOARD - April, 1954 - .049 in³. Air cooled. Cadet engine. Silver fins. Longer needle. Red flywheel.

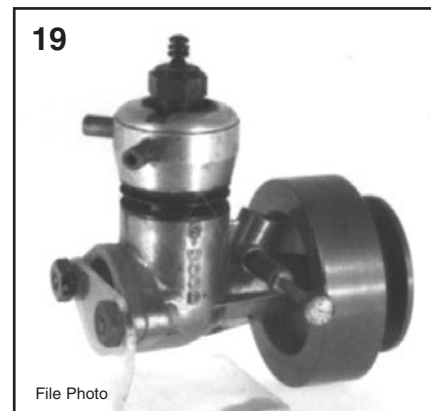


18 - ATWOOD INBOARD - April, 1954 - .051 in³. Air cooled. Cadet engine. Silver fins. Longer needle. Blue flywheel.

19 - ATWOOD INBOARD - April, 1954 - .049 in³. Water cooled Cadet engine. Silver fins. Longer needle. Red flywheel.

20 - ATWOOD INBOARD - April, 1954 - .051 in³. Water cooled Cadet engine. Silver fins. Longer needle. Blue flywheel.

21 - ATWOOD 049 "F/F" - August, 1954 - .049 in³. Similar to previous Atwood, but has crankshaft



with tapered seat for longer prop drive washer and screw in prop shaft. Crankcase machined shorter. Prop spinner standard equipment. Back cover mounted tank. Red anodized cylinder.

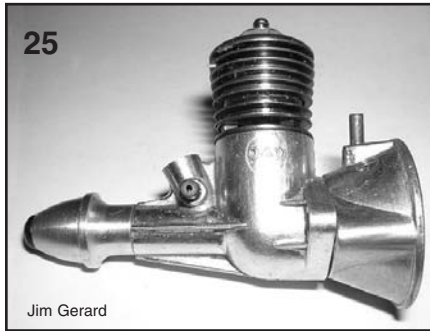
22 - ATWOOD 049 "U/C" - August, 1954 - .049 in³. Similar to previous Atwood, but has crankshaft with tapered seat for longer prop drive washer and screw in prop shaft. Crankcase machined shorter. Prop spinner standard equipment. Plain back cover with no tank.



23 - ATWOOD "CADET" - August, 1954 - .049 in³. Shorter crankcase and crankshaft with tapered seat for longer prop drive washer and screw in prop shaft. No spinner. No tank.

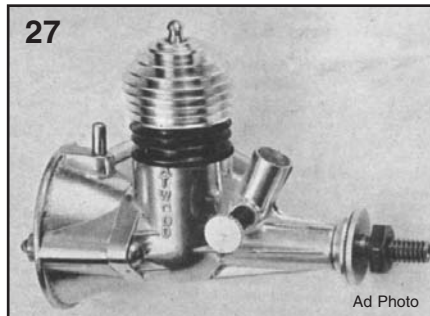
24 - ATWOOD "CADET" - August, 1954 - .051 in³. Shorter crankcase and crankshaft with tapered seat for longer prop drive washer and screw in prop shaft. No spinner. No tank.

25 - ATWOOD "SIGNATURE" - September, 1954 - .049 in³. Like Cadet #23, but with green anodized fins. *NOTE: Supposedly hand*



selected to turn 17,000 rpm or better. "Signature" name was applied to box the with a sticker. It would be difficult to tell a "Signature" from a "Standard" model without the anodizing or the box.

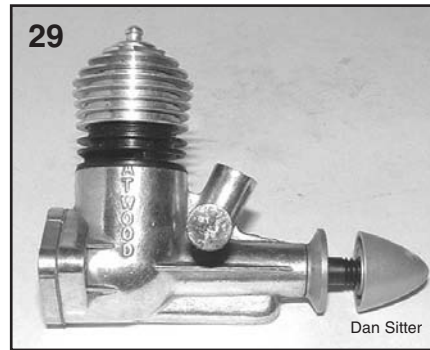
26 - ATWOOD "SIGNATURE"
 - September, 1954 - .051 in³. Like .049 #25, with increased stroke. "051" on case. Green anodized fins.



27 - ATWOOD SHRIEK "F/F"
 - March, 1956 - .049 in³. Slightly longer shaft and shaft housing. 8-32 prop shaft with nut. Thin prop washer splines to shaft. Shaft counterbalanced with larger shaft porting. Back cover mounted tank. Glow head introduced. FF model sold for \$6.50.

28 - ATWOOD SHRIEK "F/F"
 - March, 1956 - .051 in³. Slightly longer shaft and shaft housing. Shaft counterbalanced with increased porting. 8-32 prop shaft with nut. Back cover mounted tank. Glow head. Increased stroke.

29 - ATWOOD SHRIEK "U/C"
 - March, 1956 - .049 in³. Heavy web under shaft housing. Shiny case. 8-32 size prop shaft with nut. Shaft counterbalanced. Thin drive washer. Gold anodized drive washer and spinner nut. Glow head. No tank. U/C model sold for \$5.95. **NOTE:** A



"Super Signature" engine was also advertised at \$6.95. Further details unknown.



30 - ATWOOD SHRIEK "U/C"
 - March, 1956 - .051 in³. Heavy web under shaft housing. 8-32 size prop shaft with nut. Shaft counterbalanced. Thin drive washer. Glow head. Increased stroke.



31 - ATWOOD SHRIEK SUPER CADET - 1956 - .049 in³. Similar to Shriek F/F, but no tank. Steel shaft bearing. Thin drive washer. Glow head.

32 - ATWOOD SHRIEK SUPER CADET - 1956 - .051 in³. As .049, with increased stroke. "051" on case. Glow head.

33 - ATWOOD SHRIEK SPECIAL U/C - July, 1957 - .049 in³. Basically identical to 1956 Shriek



Free Flight, but with no tank. Advertised at \$4.95. **NOTE:** Pictured in #33 is an example of Atwood's parts mixing. This is a New In Box engine and the box is actually signed by Bill Atwood himself as a gift to one Dick Robinson. What's wrong? The engine has the glow head but with internally threaded shaft for a screw. The screw used on this engine is a length of all-thread and the front washer is a short rear prop washer from earlier engines installed backwards. To top it off, the prop nut is not the proper thread.



34 - ATWOOD SHRIEK SPECIAL U/C - July, 1957 - .051 in³. Basically identical to #33, but with "051" on case. The boxes for #'s 33 and 34 were orange and dark blue and the engine cutouts were obviously for different engines. The engine name was rubber stamped on the insert, and in the case of the .051 engine, this was marked out and hand written in. Advertised at \$4.95.

NOTE: The last Atwood ads appeared in 1958 and were for a steam engine powered model boat.

SIGNATURE ENGINES, Inc.

Tulsa, OK

No advertising can be found for Signature Engines in Tulsa, OK.

35 - ATWOOD SHRIEK "F/F"

- 1958 - .049 in³. Identical to Atwood Shriek "F/F" #27 except displacement disk on left side is blank. No "049" or "051" shown.

36 - ATWOOD SHRIEK "F/F"

- 1958 - .051 in³. Sold, but can't be identified without measuring. Possibly has an extra gasket shim between cylinder and case.



37 - ATWOOD SHRIEK "U/C"

- 1958 - .049 in³. Identical to Atwood Shriek "U/C" #29 except displacement disk on left side is blank. No "049" or "051" shown. U/C model \$5.95.

NOTE: A "Super Signature" engine was presumed to have been still been offered, but details are unknown.

38 - ATWOOD SHRIEK "U/C"

- 1958 - .051 in³. Sold, but can't be identified without measuring. Possibly has an extra gasket shim between cylinder and case.



39 - ATWOOD SHRIEK SPECIAL "U/C" - 1958 - .049 in³.

While this appears to be a new engine, the use of a glow plug type cylinder muff indicates the using up of older parts.

40 - ATWOOD SHRIEK "U/C"

- 1958 - .049 in³. While this appears to be a new engine, the use of a glow plug type cylinder muff indicates the using up of parts. Or collector assembled at a later time.



41 - ATWOOD SHRIEK SUPER CADET - 1958 - .049 in³. Another mixing of parts. Note early Wasp type fuel tank. Engine is new in Signature Engines, Inc. box. Box is bright yellow with red print. Probably built as an .051 also.

NOTE: Pictured Tulsa built engines have a variety of glow plugs which are probably not what came new on the engine. Most original plugs were a fairly low profile design.

AVIATION INDUSTRIES

See New Hurricane

AVIATION PRODUCTS Co.

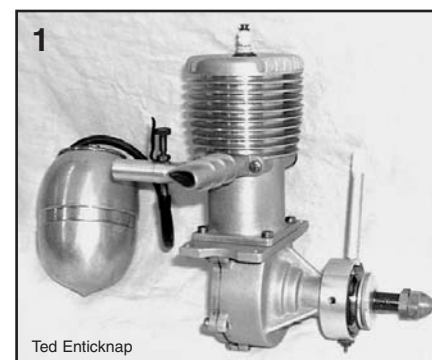
See New Hornet

AVION MACHINE & TOOL

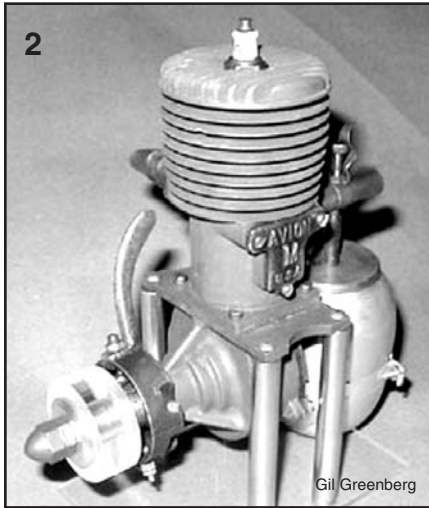
Woonsocket, RI

1 - AVION MERCURY - 1938

- 1.503 in³ spark. Webbed case front with lugs at rear for rear cover with 5 screws. "Duralumin" castings. Supplied tank not attached to venturi as with later models. Instructions call for tank being placed at CG of model. Left hand shaft threads. Exhaust on right side.

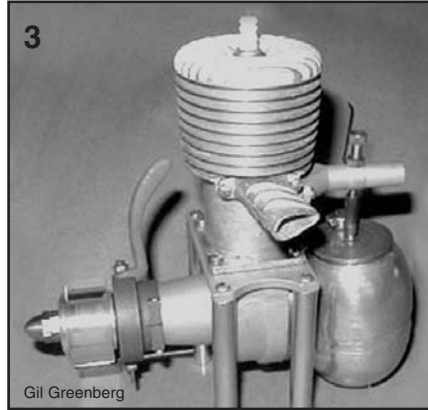


NOTE: Early timers were an almost exact copy of the Forster 99 timer, including straight timer arm. Cast, keyed, styled timer arm appeared later in production of this first model.

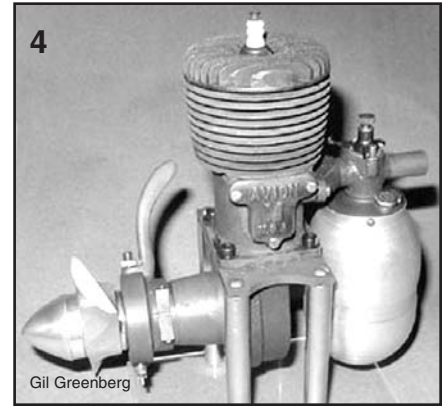


2 - AVION MERCURY - 1938
 - 1.503 in³ spark. Webbed case front with lugs at rear for rear cover with 5 screws. Magnesium castings. Tank is mounted directly beneath

venturi. Left hand shaft threads. Exhaust on right side.



3 - AVION MERCURY - 1945
 - 1.609 in³ spark. Bore increased. Exhaust on left. Rear of case has boss for screw in rear cover. Plain front housing. Aluminum castings.



4 - AVION MERCURY - 1946
 - 1.609 in³ spark. Like #2 with the addition of a throttle on venturi. Smooth crankcase and front cover. Return to exhaust on right side.



PARTS LIST

Item No.	Name	Part No.	Item No.	Name	Part No.
1	Cylinder Head	1257	22	Lock nut	6540
2	Liner	1560	23	Acorn cap nut	6743
3	Exhaust stack	1765	24	Timer case	7048
4	By-pass cover	2068	25	Lever (timer)	1342
5	Piston	2271	26	Point, screw and check nut, breaker arm, spring, pt. screw and 2 washers assembly	1645
6	Rings (2 required)	2576	27	Cylinder base gasket	2147
7	Bushings (2 required)	2779	28	Bi-pass gasket	2450
8	Wrist pin	3084	29	Exhaust stack gasket	2952
9	End Plugs (2 required)	3287	30	Carburetor gasket	3255
10	Connecting rod	3592	31	Crankcase gasket	2757
11	Upper bushing	3795	32	Needle valve	4060
12	Lower bushing	4000	33	Needle valve body	4865
13	Rear crankcase	4203	34	Lock nut	4868
14	Front crankcase housing	4008	35	Throttle lever	5367
15	Ball Bearing	4711	36	Bowl cover	5670
16	Ball Bearing	5016	37	Throttle valve	6172
17	Compression seal	5219	38	Carburetor body	6977
18	Oil absorbing washer	5524	39	Siphon Tube	6475
19	Crankshaft, crankpin and compression plug assembly	5727	40	Filler cap	7280
20	Cam and rear propeller flange	6032	41	Tank cover	7782
21	Front propeller flange	6035	42	Tank	8085

Carburetor (pat. applied for)

Standard Steel Screws and Sundries

Quantity		Quantity	
3	8-32 x 5-16 Fillister hd	1	2-56 x 1-2 Oval hd.
1	8-32 x 3-8 " "	4	5-40 x 5-16 Fillister hd.
1	2-56 x 7-8 " "	3	2-56 x 1-4 Round hd.
3	2-56 x 1-2 " "	2	5-40 x 1-4 Hex alum. nuts & lock washers
3	2-56 x 5-32 Hex nuts	2	No. 1 Woodruff keys
1	0-80 x 5-16 Fillister hd	3	4-40 x 1-4 Fillister hd.
1	0-71 x 1-8 Flat hd.	1	V-2 Champion Spark Plug