



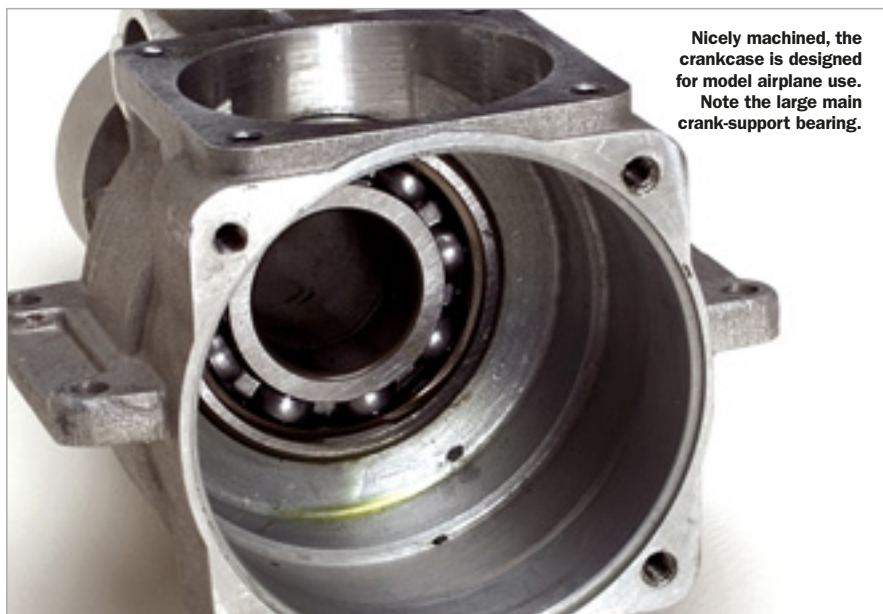
## New Gas-Powered 4-stroke

### RC Showcase's spellbinding RCS 45VT engine

**T**here's something magical about 4-stroke model-airplane engines. Maybe it's the slower cadence of the exhaust note or the sight of valve lifters tapping out the engine's power pulses. There's no denying the popularity of engines equipped with intake and exhaust valves, and the powerful low-end torque enjoyed by 4-stroke lovers certainly adds to the spell. But only a few 4-stroke engines run on gasoline, and the RCS 45VT from RC Showcase is the newest addition to this intriguing class of powerplant.

Mike Dooley and David Garrison of RC Showcase distribute some very fine gas-fed, 2-stroke, single-cylinder and 4-stroke radial engines. We at *Model Airplane News* were thrilled when Dave offered us the opportunity to test the new RCS 45VT, and we quickly ordered a bunch of test props in the size range specified by the engine's specs.

If you think the 45VT looks a bit familiar, it's because the engine is literally a chip off the old big-block RCS 215 5-cylinder, 13.1ci radial engine. The 45VT uses one of the 215's cylinders mated to a compact crankcase designed specifically for model airplane use.



Nicely machined, the crankcase is designed for model airplane use. Note the large main crank-support bearing.

#### INTERNAL FORTITUDE

Just like the huge RCS 215 radial, the 45VT's aluminum cylinder has a Nikasil-plated (nickel, silicon, carbide) piston sleeve, and its separate head casting forms a hemi-shaped combustion chamber. The front mounted cam and rocker arm/valve drivetrain allows easy maintenance (no valve covers to remove when checking the gap) and lends it that classic air-cooled, round-aircraft-engine look.

Inside the cylinder is a flat-topped aluminum-alloy piston. The piston skirt is cut rather short, and an amazing amount of material has been removed below the single compression ring. The machined-aluminum connecting rod has needle-bearing support and a hollow steel wristpin (retained with two C-rings) to keep it attached to the piston. Two main ball bearings support a traditional single-web-design crankshaft.

A stout 12mm (0.473-inch) crankpin sits opposite the crankweb counterbalance. It's here that the engine design sets itself apart. The ignition-sensor magnet is in the end of the crankpin, and it matches up to the ignition system's Hall-effect sensor that passes through the engine's backplate. Three countersunk bolts secure a thick brass plate to the web. This arrangement cleans up the engine by eliminating the externally attached sensor and bracket that are typically just behind the thrust washer. The sensor passes through the backplate and is sealed into place with a heat-resistant metal-filled epoxy filler material. The crankcase vent and pulse pressure tap that drives



The piston has a single compression ring and a relatively short skirt. Note the large amount of material removed to save weight.

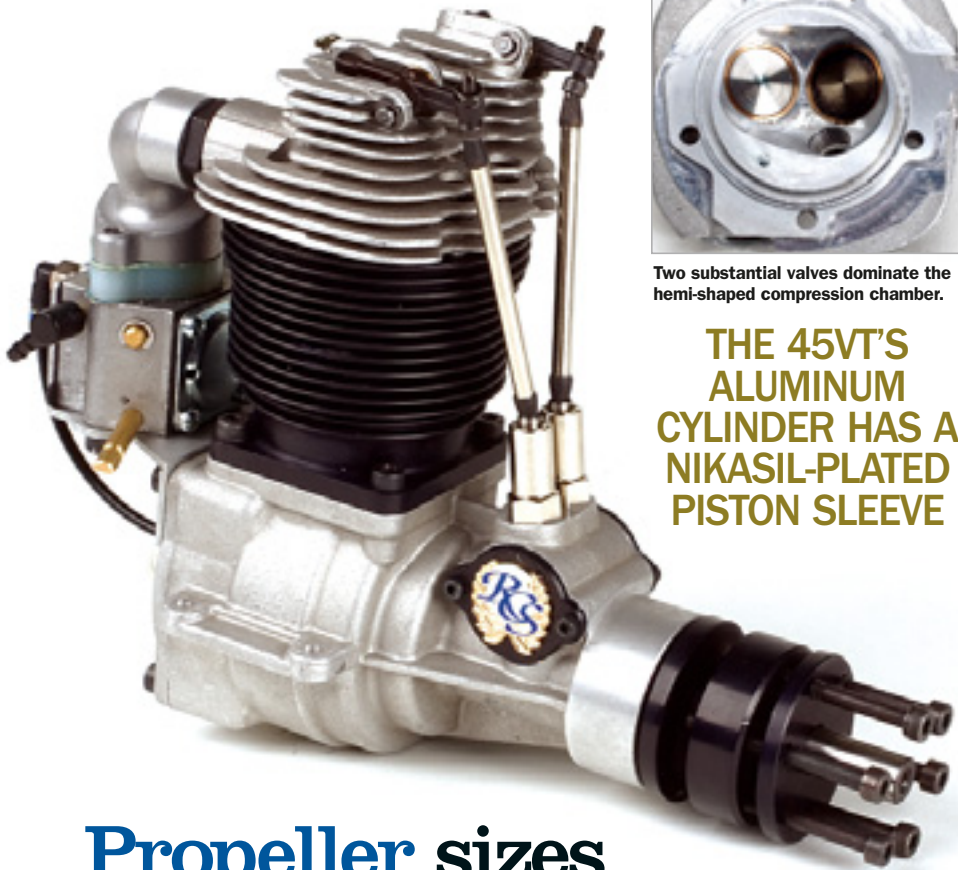


The crankshaft has a brass counterweight plate screwed onto it. The ignition-timing magnet is in the crankpin.



Two substantial valves dominate the hemi-shaped compression chamber.

## THE 45VT'S ALUMINUM CYLINDER HAS A NIKASIL-PLATED PISTON SLEEVE



## Propeller sizes

SIZE	BRAND	MAX RPM/DB	THRUST (LB.)	IDLE RPM/DB
24x8	Zinger (wood)	4,800/94	16.3	1,420/72
22x12	Menz (wood)	4,900/95	16.4	1,400/71
22x6-10	Top Flite Power Point	5,190/96	17.9	1,750/75
20x10	Zinger	5,800/98	15.2	1,740/74
20x10	Moki (wood)	6,970/98	22.7	1,860/73
20x10	Master Airscrew (wood)	6,400/99	18.5	1,470/72
20x10	Master Airscrew (Classic)	5,940/98	22.2	1,480/73
20x10	APC	6,400/98	19.7	1,490/72
20x8	APC	6,600/99	21	1,520/71
20x8	Top Flite Power Point	6,480/99	19	1,790/73
20x8	Master Airscrew (Classic)	6,300/97	18.5	1,500/73
20x6	Master Airscrew (Classic)	6,900/100	18	1,560/72
18x10	Menz	7,300/101	16.3	1,800/72
18x10	Master Airscrew (wood)	6,850/99	14	1,810/72

Note: db noise-level readings were taken at 10 feet, over a grass surface, on the exhaust side of engine.

the carburetor's diaphragm pump also pass through the backplate.

A small-diameter plastic tube that's retained at each end with sturdy connector fittings connects the pressure tab to the Walbro carb. The carb body is supported by an aluminum bracket that is bolted to the engine with the top two backplate-attachment bolts. A cast-aluminum intake manifold joins the carb to the intake port. A plastic isolator block and two gaskets separate the carb from the

intake manifold. The intake manifold is threaded on the end, and it is screwed into place at the rear right corner of the head casting just to the right of the spark plug.

The exhaust port is on the left side of the head, and a short steel exhaust pipe directs the exhaust goop (what little there is) away from the model's firewall. The exhaust pipe comes with a jam nut that secures it to the cylinder head and a capture nut on the end of the pipe. A vestige of the 215 radial-engine layout (it was

### SPECIFICATIONS

**ENGINE:** RCS 45VT

**TYPE:** 4-stroke

**MANUFACTURER:** RC Showcase

**LENGTH:** 8 in. (203.2mm), prop thrust washer to carb

**HEIGHT:** 6<sup>3</sup>/<sub>8</sub> in. (161.93mm)

**WIDTH:** 3<sup>1</sup>/<sub>4</sub> in. (82.55mm), mount lug to mount lug

**DISPLACEMENT:** 2.74ci (45cc)

**BORE:** 39mm (1.53 in.)

**STROKE:** 36mm (1.41 in.)

**RPM RANGE:** 1,200 to 7,500

**POWER OUTPUT:** approximately 2.5hp

**WEIGHT:** 3 lb. 7 oz. w/ignition

**FUEL/OIL RATIO:** 30:1 to 40:1 (synthetic only)

**IGNITION VOLTAGE:** 4.8 to 6.7 max.

**SPARK PLUG:** NGK CM6 (0.014-in. gap)

**PRICE:** \$837.50 (introductory); \$975 (list)

### FEATURES

Designed specifically for model aircraft use, the engine has conventional side-mounting lugs and can be run inverted. It is fitted with a Walbro pumper carburetor (with choke), and it has electronic ignition with automatic timing advance for easy hand-starting. The engine is designed to deliver ample low-end torque for turning larger props and developing thrust at lower speeds. The engine has great throttle response and is not intended for high-rpm operation.

### AIRCRAFT RECOMMENDATIONS

- Scale 18- to 20-lb. aircraft (lightly loaded designs such as DH-88 Tiger Moth, 1/4-scale Cubs, etc.)
- Aerobatic 12- to 14-lb. aircraft (1/5- to 1/4-scale CAPs, Extras, Sukhoi, etc.)

### HIGHLIGHTS

- Easy starting
- Tons of torque
- Reliable, low idle
- Excellent fuel economy

used to attach the pipe to the engine's collector ring), the capture nut is not required and can be cut off with a Moto-Tool and a cutoff disc.

### VALVE CAM

The cam is driven directly by helical threads machined into the front portion of the crankshaft, and the cam gear itself rides between two ball bearings supported by the cam-gear side covers. These covers seal the cam-gear compartment and support the RCS logo badges. Above the cam-gear compartment are two short transfer rods that drive the lifter rods that, in turn, drive the valve rocker arms.



The Falcon electronic ignition system comes with the engine. Notice the shielded spark-plug cable and cap.



The cam gear and lifter rods. Two ball bearings enclosed in the RCS logo nameplates support the cam.

A threaded ball cap and locknut are used to adjust the rocker arm/valve clearance, which should be set at 0.007 inch (measured with both valves fully closed). For lubrication, the exposed rocker arms require only a few drops of fine machine oil each time you go flying.

### ENGINE OPS

The 45VT is very economical to run and can be fed with a 14- to 16-ounce fuel tank. It is very quiet and does not require a muffler, so that results in a bit of weight saving. Vibration levels are very acceptable, and a large Du-Bro 1.20 to 1.80 4-stroke isolation engine mount can be used to secure it to the firewall. The engine can run upright or in an inverted position. I used a two-line fuel system: one for the tank vent and the other to feed fuel directly to the carb. I installed a T-fitting in the fuel-feed line and attached a length of tubing to fill the tank. Filling the tank this way does not flood the engine because the Walbro carb has a pumper diaphragm. Once the tank is full, I use a short 6-32 bolt or a Fuel Dot cap to seal the fuel system.

The Falcon electronic-ignition system that comes with the engine operates on 4.8 to 6.7 volts and performed nicely with a 1500mAh, 4.8V battery pack; you do have to supply your own heavy-duty switch harness. If you use a 5-cell battery pack, you must use a 6.5V voltage regulator. Higher voltage will damage the ignition system. The choke has an extended shaft, and you can attach a nosewheel steering arm to it as a handy choke lever. The carb comes with an industrial-grade throttle arm and requires modification for RC use. RC Showcase's optional throttle arm with a ball-link clevis arrangement works extremely well.

The engine is equipped with a 6-bolt prop hub, and RC Showcase offers a jig and a bolt-hole drill set as an accessory. Don't try to drill your prop hub without this jig. Use an electric drill and a stepped reamer to enlarge the prop-shaft hole to 10mm (0.395 inch). Set the jig in place, and drill the first bolt hole with the no.

19 (0.165-inch) drill bit. Insert one of the 4mm prop bolts into the hole, and drill the next hole. Insert the next bolt, and continue in this fashion until all six bolt holes have been drilled. Slide the prop onto the prop shaft, and position it so that you can flip the prop comfortably against the engine's compression. Fit the faceplate over the prop shaft, and insert all of the prop bolts. With a 3mm hex wrench, tighten all

prop several times to prime the carb. Turn the ignition on, and flip the prop until the engine "coughs" (that tells you there's fuel in the jug). Open the choke, set the throttle to a high-idle position and flip the prop again. The first time I ran the engine, it started on the third blade and settled into a smooth, reliable idle. After the engine had warmed up for a couple of minutes, I slowly advanced the throttle.

The 45VT transitions beautifully from idle to full-open throttle. Its response is crisp, and the idle is very low, but this is a factor of the size of the prop being run. To restart the engine, you have to switch the ignition off and back on again. The system has a "soft" shut-down feature that must be cycled to rearm the ignition after the engine has been idle for more than one minute. For the engine/prop testing, I first ran about half a gallon through the engine while turning a Master Airscrew 20x6 wooden prop. I used 87-octane gas mixed 30:1 with Honda HP2 synthetic 2-stroke oil. For the entire range of props shown in the prop chart, I used approximately 1 gallon of fuel. After each prop change, I tached the engine and readjusted the high-end needle valve. I richened the mixture slightly for about a 250rpm drop from the maximum settings, and then I took my readings.



## Tools & supplies

Available from RC Showcase, the RCS Four Cycle Tool Kit is a handy addition to your toolbox. It has all the tools you need to keep your RSC 45VT happy. It costs \$38.50 and includes a 0.007-inch feeler gauge, a 5.5mm combination wrench, 3 and 4mm Allen wrenches, a flat-blade screwdriver, a pinpoint oil dispenser and a carrying pouch.

of the bolts in a crisscross pattern until they are tightly snugged down. After several flights, check the bolts to make sure that they're tight. RCS recommends that you use a 20x10 prop for the first few gallons of fuel; then you can increase the prop size as needed. Use a slightly richer fuel mixture with bigger props.

### FIRE IN THE HOLE

To start the engine, turn the ignition off, open the throttle fully and close the choke. Flip the

### CONCLUSION

The 45VT from RC Showcase is a great-running engine. It is very easy to start and to operate, and I really enjoy listening to its throaty 4-stroke exhaust sound. It has a healthy low-end powerband that allows it to turn serious lumber without complaint. On the bench, the engine seems to favor the Moki 20x10 prop, but I'll have to do further "on-the-wing" tests to confirm this. I'll report my practical findings in a future "Thinking Big" column.

If you like gasoline-fed engines and the sound of powerful 4-strokes, you'll love the 45VT! ✚

See the Source Guide on page XXX for manufacturers' contact information.