

## SECTION 8 CARE OF YOUR RCV

### **NORMAL MAINTENANCE**

At the end of each days flying it is recommended that a few squirts of clean machine oil are introduced into the crankcase via the crank breather.

If the engine is to be removed from the model and laid up for any significant period, we recommend that the engine should be flushed out with after-run oil.

### **DISSASSEMBLING YOUR ENGINE**

RCV do not recommend disassembling your engine unless necessary. If you do wish to do this, please follow the instructions below

1. Remove the carburettor, exhaust & the six socket headed screws holding the crankcase together.
2. Separate the lower crankcase half and carefully remove the crankshaft/piston assembly. Take care not to lose the small plastic pad in the side of the piston.

To replace the front bearing :-

1. Remove the pop nuts, washer, prop driver & woodruff key.
2. The piston / conrod assembly is removed together with the bronze thrust washer (note the big end position on reassembly).
3. The front bearing is a light press fit on the shaft and can normally be removed by tapping the shaft down onto a soft material (ie. hard wood or plastic).

### **RE-ASSEMBLING YOUR ENGINE**

Reassembly is a simple operation & the main difficulty is ensuring that the gears are engaged in the correct position so that the engine is timed correctly.

1. Carefully remove any bearing lock material from the back bearing and the crankcase halves.
2. Assemble the crankshaft piston assembly in reverse order.
3. Take the cylinder jacket and rotate the cylinder until the cylinder port is equally visible in the exhaust and inlet ports.
4. Now insert two cocktail sticks (or similar) into the exposed segments of the port to lock the cylinder in position. Insert the piston into the cylinder bore and engage the gears in such a way that the piston is at top dead centre checking that the crankshaft web is horizontal.
5. Apply a small amount of bearing lock onto each bearing and assemble the bottom half of the crankcase with the six screws. Do not over tighten these screws.
6. Remove the cocktail sticks.

## SECTION 9 GUARANTEE & TECHNICAL SUPPORT

Your engine is guaranteed free from manufacturing defects and workmanship for a period of 24 months from date of supply\*. This does not apply to damage caused by incorrect usage, handling, running in, non-observance of these instructions, or modification. Furthermore the manufacturers cannot be liable for any fault caused through incorrect assembly or disassembly-assembly of the engine, our factory offers a full after sales service should you require work done on your engine.

**\*To validate this guarantee we must receive your completed warranty form and proof of purchase within 1 month of purchase. This guarantee does not affect your statutory rights.**

Any engines being returned to RCV **must** have a returns number (issued by RCV)

**REMEMBER: SAFE OPERATION OF YOUR MODEL AND ENGINE IS YOUR RESPONSIBILITY. SPECIFICALLY, NO RESPONSIBILITY IS ASSUMED FOR ANY DAMAGE TO ANY MODEL, ACCESSORY, RADIO CONTROL EQUIPMENT, PERSON OR PROPERTY RESULTING FROM THE USE OR MISUSE OF AN RCV MODEL ENGINE.**

For queries, warranty issues or more information on spares available, please contact:

**RCV Engines Limited**

4 Haviland Road, Ferndown Industrial Estate, Wimborne, Dorset, BH21 7RF, UK

**Tel: +44 (0)1202 877044 Fax: +44 (0)1202 871836**

**Email: sales@rcvengines.com Web: www.rcvengines.com**



## **RCV91-CD FOUR STROKE ENGINE OWNERS GUIDE**

**Congratulations on purchasing an RCV Engine. With simple care this design can offer you years of trouble free service. Some aspects of the RCV engine are different to conventional engines therefore even if you are an experienced modeller please read all these instructions carefully before using your engine. Please pay particular attention to the RCV CD do's and don'ts listed below before attempting to run your engine. If in doubt, contact RCV Engines for advice.**

**WARNING! READ ALL INSTRUCTIONS BEFORE OPERATING YOUR RCV ENGINE!**

## SECTION 1 RCV 91CD DO'S & DON'Ts

### **ALLOW FOR PROPSHAFT CENTRE-LINE OFFSET**

The propshaft centre line is offset 3.6 mm above the engine bearers. When installing the engine in a model ensure this is taken into account.

### **ONLY USE RECOMMENDED FUELS**

We recommend you use a methanol based fuel containing 10% Nitro. Oil content should be 15% including between 3 & 6% castor. Avoid the use of more than 6% castor as this can cause rough running. For more information on fuels please see SECTION 3.

### **ONLY USE RECOMMENDED PLUGS**

We strongly recommend the use of an OS type F plug. Fitting a non-recommended plug may produce a significant drop in performance when the glow battery is disconnected.

### **SET UP THE CARBURETTOR CORRECTLY**

As supplied, the idle needle is set at rich to protect the valve. To achieve smooth running this must be adjusted as per instructions. (SEE SECTION 6)

### **ENSURE THE EXHAUST IS PROPERLY TIGHTENED**

Prior to use, tighten the exhaust pipe and muffler using the recommended procedure (SEE SECTION 4)

### **ENSURE ADEQUATE COOLING**

4-stroke engines tend to run hotter than 2-strokes so provision for cooling is important (SEE SECTION 7)

### **DO NOT DISSASSEMBLE YOUR ENGINE**

RCV do not recommend disassembling your engine, however if you need to do this, please follow the instructions in SECTION 8

## SECTION 2 RECEIVING YOUR ENGINE

We take every care to ensure this engine reaches you in perfect condition. If this is not the case, please advise us at the earliest opportunity. Your package should contain the following items:

- RCV-CD Series Engine
- Exhaust Pipe & Muffler
- Carburettor\*
- Warranty Form (please complete & return immediately)

### **Please Note:**

1. \*To avoid transit damage this is supplied detached from the engine. To assemble please use the two screws and the Allen key provided, ensuring that the gasket is seated between engine and manifold.
2. Please remove plastic plug from crankcase breather (this is to prevent oil seepage during transit).
3. As part of quality control some engines are tested prior to use, therefore mounting marks may be seen on your new engine

## SECTION 3 GLOW PLUG, FUEL & PROPELLER SELECTION

### GLOW PLUG

- As the glow plug on the RCV is ported, selection is more critical than on conventional engines, and fitting a non-recommended plug may produce a significant drop in performance when the glow battery is disconnected. **It is strongly recommended that the OS type F plug is fitted**
- DO NOT USE AN IDLE BAR PLUG. This may protrude into the rotary valve, and lock the engine up, damaging the surface of the rotary valve.

### FUEL

- For maximum efficiency, we recommend that 10% Nitro content fuel is used and the RCV compression ratio is set up to use 10% Nitro. Fuel with too low a Nitro content will produce a significant drop in RPM when the glow battery is disconnected as well as an unreliable idle. Do not use fuel with more than 15% Nitro as this can result in engine failure.
- Fuels must have an oil content of around 15%, between 3 & 6% of which should be Castor Oil. Do not use more than 6% castor as this can cause rough running. The reason we recommend a blend of castor and synthetic is because castor promotes cooling, whilst synthetic protects the engine components from wear
- Model Technics Duraglo fuel with a mixture of 6% Castor Oil, 9% EDL (Synthetic Oil), 10% Nitromethane, 75% Methanol, has been used for the bulk of the flying and bench testing to date and found to give good results. Other suitable fuels include: Morgan Omega 10%, 10% Byron Sports 'Standard or 4-cycle'. Cheap fuels or home blended fuels may reduce the lifespan of the engine.

### PROPELLERS

- The RCV91-CD engine (unlike our SP series) uses conventional sized propellers. There are numerous different sizes of propellers which could be used and this is really dependent on the airframe and the type of flying.
- For general running in etc, RCV recommend an 14 x 6 APC type prop. This propeller gives a good all round performance. Examples of suitable propellers are listed below.
- We would recommend you try a number of different propeller sizes and see which suits yourself and the application best.
- Once your engine has been fully run in, you should expect the following performance (this is a guideline only):

Propeller	Idle	Max. RPM
13 x 6	2,200	10,400
14 x 6	2,200	9,100
14 x 8	2,200	8,200

## SECTION 4 STARTING

### ***PRIOR TO USE, ENSURE YOUR EXHAUST IS TIGHTENED***

#### **Recommended procedure for tightening your exhaust pipe**

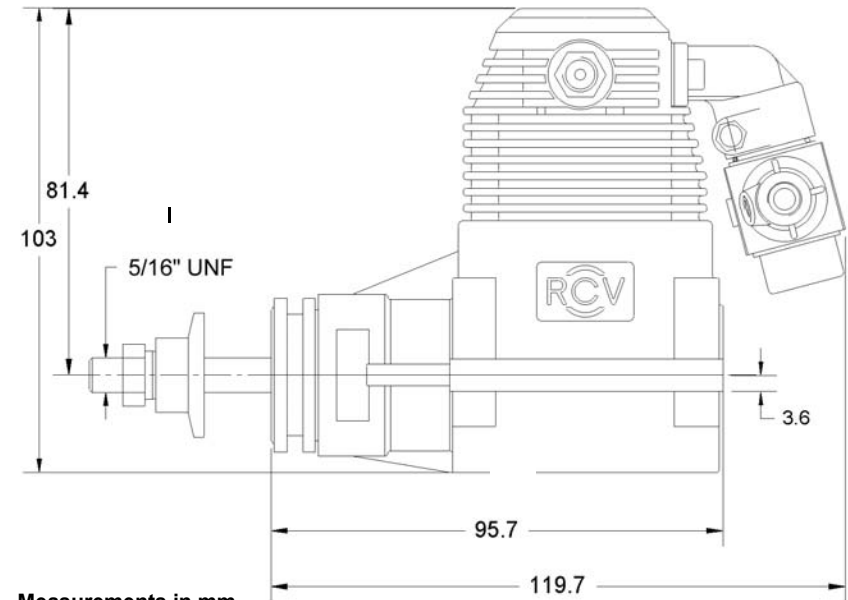
Use a 12 mm spanner which has a ring spanner at one end and a conventional open spanner at the other. Use the open-ended spanner to remove the muffler. Slide the ring spanner along the exhaust pipe and locate it over the exhaust pipe lock nut. Turn the exhaust pipe to the desired angle and tighten the lock nut firmly. Slide ring spanner off down pipe. Replace silencer and tighten locking nut with open-ended spanner. Carry out the above operation with the engine warm so that the exhaust is tightened when the threads are expanded and use the maximum amount of thread.

If you need a different angled exhaust pipe, you can use one that is suitable for other 4-stroke engines. RCV use standard exhaust thread sizes: - 91CD = M11 x 0.75

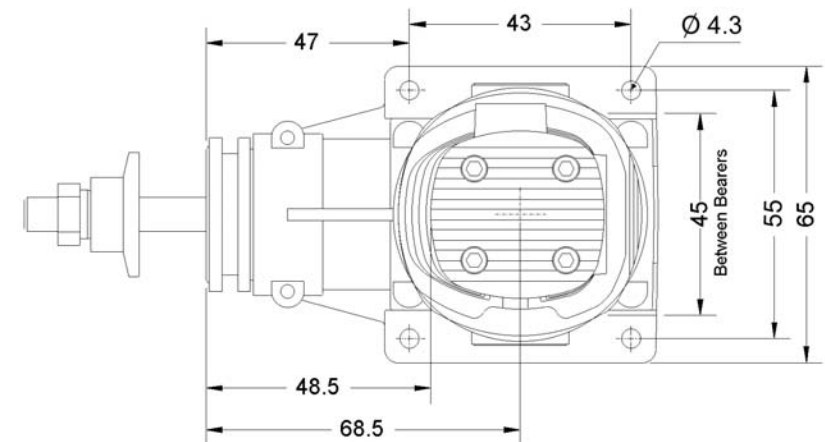
### **GLOW PLUG CONNECTION**

- Use either a conventional clip on or remote glow plug connector.

## RCV91-CD Dimensions



Measurements in mm  
Not to Scale



Power Equivalence  
Engine RPM Range  
Output Shaft Diameter

Standard 91 size 4-stroke
2,200 – 12,000 rpm
5/16 " UNF

## SECTION 6 CARBURETTOR ADJUSTMENT

**Main needle (high speed) adjustment:** The main needle should be adjusted with the engine operating at full throttle. The engine should be leaned out until the RPM peaks, then enriched a small amount. This will allow for the leaning out that normally occurs in flight. If the engine is installed in a model, the nose of the model should be raised to the vertical to check that the engine will run without leaning out in this attitude. Note that to lean the engine out the needle is screwed in.

**Idle needle (low speed) adjustment:** If the engine does not run cleanly at low or mid throttles the usual problem is that the idle needle is incorrectly set. This can be adjusted with the small brass screw. Please follow the guidelines below to decide how the idle needle should be adjusted.

### Idle Needle Adjustment Fault Finder

**Idle mixture too lean:** There will be a tendency for the engine not to start at low throttle settings. Once it does start it will run cleanly at mid throttle but will tend to die at low throttle. It will also tend to die when the throttle is opened rapidly. In general there will be little or no increase in engine speed when the glow plug is energised.

**Idle mixture too rich:** The engine will start readily. It will run roughly at mid throttle settings, and at idle will splutter and pop. When glow is energised the engine will run more cleanly and the idle will speed up considerably.

**Idle mixture correctly set:** The engine will start readily and run cleanly from idle to max RPM. The idle will sound slightly rich and "poppy". Idle speed will increase slightly when the glow is energised. The throttle can be opened rapidly without the engine stalling.

**NB.** The idle mixture is sensitive, therefore increments of 1/8th of a turn or less are all that is normally required.

### Factory Needle Settings

If you need to get back to the original factory needles settings, please use the info below. This is only a starting point as there is no hard fast rule.

**Main Needle:** Screw the needle in fully and then unscrew 1 3/4 turns

**Idle Needle:** Close the throttle arm. Screw the needle in fully and then unscrew 3 1/2 - 4 turns

## SECTION 7 INSTALLING THE ENGINE IN A MODEL

The RCV CD series produces a similar amount of power to a conventional 4 stroke, therefore use the 4-stroke engine size as recommended by your model kit manufacturer. An RCV CD engine is designed to be mounted between conventional beam mount engine bearer.

**NB.** The Prop shaft centre line is 3.6 mm above the bearer top face. Ensure that this is taken into account when installing the engine

- Provide adequate cooling for the engine - a good guideline to follow when deciding on the necessary air outlet/inlet requirements is 2:1 or if possible 3:1. This enables hot air to escape from the cowl which is one of the main causes of overheating.
- The Carburetor may be rotated 180° to aid mounting
- The engine can be mounted in any configuration including in an inverted position
- The fuel tank should be installed with its centre line as near as possible to the centre line of the carburetor.
- We recommend using the fitting provided on the silencer to pressurise the fuel tank
- The crankcase breather is the same as on a conventional four stroke. It cannot be used for fuel pressurisation and should simply be vented to the atmosphere
- A piece of fuel tubing can be attached to crankcase breather – max 2-3"

## INSTALLING THE ENGINE IN A TEST STAND

- WARNING. ENSURE YOU HAVE SECURELY FASTENED THE ENGINE TO YOUR TESTSTAND
- Ensure that the bench the engine is attached to will not be pulled over by the thrust of the engine.
- Fit a suitable sized propeller for running in. eg. APC type or 14x6 (2-bladed propeller);

### **STARTING METHOD**

- STARTING MUST ALWAYS BE CARRIED OUT WITH SAFETY IN MIND. Use a conventional electric starter with a correctly sized cup for you spinner.

### TIPS & HINTS FOR STARTING PROCEDURE

1. Eye protection should always be worn when starting and running your engine.
2. **The crankshaft must be rotated anticlockwise (i.e.) the same direction as normal propeller rotation**
3. On a new engine or if very cold, the engine will feel quite stiff to the turn and until the engine has had a tank or two of fuel passed through it. For initial starting purposes, we recommend needle should be 2 turns open. At all times ensure that the engine is on a low throttle setting when you start it (1/8-1/4). High throttle will make the engine difficult to turn over.
4. When you have set up the starting arrangement as described above you can now start the engine. Ensure fuel is getting through to the carb, and that the needle is open the correct amount. Turn the glow on. Hold the starter very firmly but without pressing hard. Press the starter button. The engine should immediately turn over rapidly and fire within a few seconds.
5. **Under No circumstances should you keep turning the engine over if it does not fire as this may cause damage to the engine.** From the earliest prototypes the RCV engine has always been an excellent starter. If the engine will not start there is always a logical reason for it. In particular check that the glow is adequate, and that fuel is getting through. If fuel doesn't appear to be getting through, unscrew the idle needle by a ½ turn.
6. If the starter will not turn the engine over remove the starter, turn the glow off, turn the prop back to top dead centre, close the throttle slightly to reduce the compression load on the starter, turn the glow on and try again. If you do experience problems starting your engine contact RCV and we will be happy to assist
7. When starting the engine in a new plane for the first time it is best to carry out the first few starts without the cowl fitted in order to get used to it.

## SECTION 5 RUNNING IN

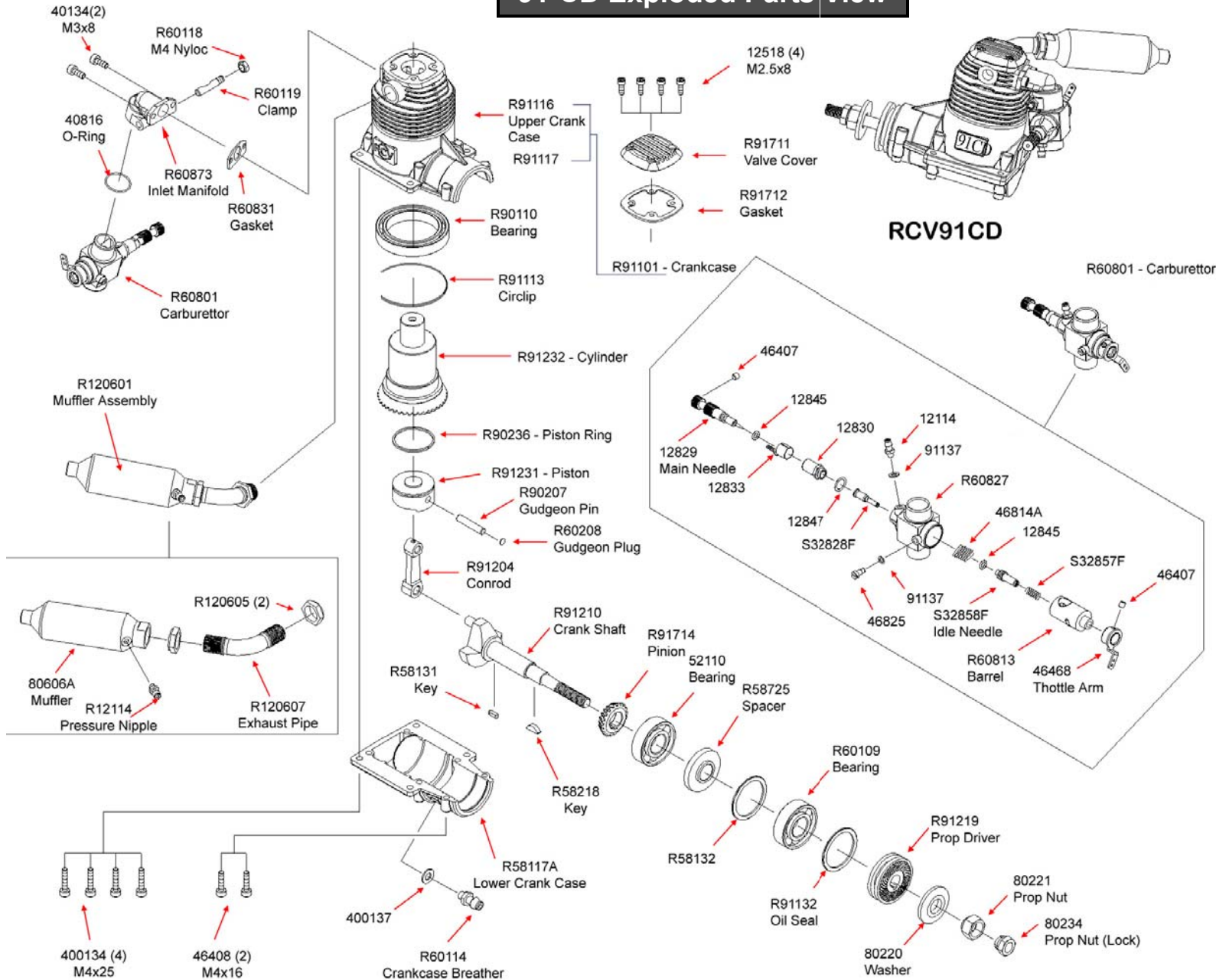
- The rotary cylinder valve design incorporates close fitting components, therefore your engine will benefit from extended running in (eg. 1 - 2 hrs). Power will also increase during running in.
- Do not allow the engine to overheat during running in, therefore run in short bursts.

Once the engine starts for the first time, leave the glow supply connected and let the engine warm up at a fast idle speed for 30 seconds. Increase the throttle setting to about ¼, and tune the high-speed needle valve for slightly rich running i.e. a slightly burbling exhaust note (if you have a tachometer aim for around 6000 rpm). The glow supply can now be disconnected although some drop in RPM may occur due to the rich mixture and comparatively low engine temperature. Leave the engine running like this for around 15 minutes. Stop it using the throttle and allow it to cool for a further 15 minutes.

Now you can obtain the correct carburettor setting using the following procedure:

- a) Restart the engine, open the throttle wide and adjust the main needle for just slightly rich (a few rpm short of peak).
- b) Close the throttle to around 1/3rd and, with the engine at around 6000 rpm, screw in the secondary needle until the rough (rich) running smoothes out into a nice four-stroke note. The needles are now ROUGHLY set but you will probably have to richen the main needle on the throttle up to full power. Test and adjust before returning to 6000 rpm.
- c) **Reliable, slow running will not be achieved until the engine has been run in for at least one hour.** When this running time has elapsed you can fine tune the idle needle. NB. Close attention to the idle needle settings will pay dividends in smoothness.

## 91-CD Exploded Parts View



## 91-CD Spares

RCV Engines are inherently reliable, however as with all engines, spares will sometimes be required. Below is a list of common spares which are available for the RCV91CD. Some components are only available as a complete assemblies - this enables RCV to keep our spares prices at the lowest possible prices. If you need different spares to the ones listed below, or would like help in identifying a spare, please contact RCV.

Part	UK & EU £GBP	Other \$USD
<b>Manifold Spares Pack - R60873SPARES</b> <i>Contents: R60119, R60831, R60118</i>	£3.00	\$4.80
<b>Prop Nut Spares Pack - 80228-120</b> <i>Contents: 80220, 80221, 80234</i>	£2.95	\$4.75
<b>Muffler Assy - R120601</b>	£13.50	\$21.50
<b>Inlet Manifold - R60873</b>	£2.95	\$4.75
<b>Con Rod Assy - R91204</b>	£9.75	\$15.60
<b>Carburettor - R60801</b>	£16.25	\$25.00
<b>Carb. - Fuel Inlet Nipple—12819</b> <i>Contents: 12114, 91137</i>	£0.95	\$1.50
<b>Carb. - Hi Speed Needle Assy - 12829ASSY</b> <i>Contents: 12829, 46407</i>	£2.75	\$4.40
<b>Carb. - Throttle Arm Assy - 46864ASSY</b> <i>Contents: 46864, 46407</i>	£2.50	\$4.00
<b>Inlet Manifold Gasket - R60831</b>	£0.50	\$0.80
<b>Piston Ring - R90236</b>	£3.75	\$6.00
<b>OS 'F' GLOW PLUG - PEZ00017</b>	£5.95	\$9.50
<b>Adjustable Engine Mount</b>	£5.60	\$8.95

**Shipping and Handling: S&H on spares is free if ordered with an engine, otherwise the following charges apply:**

UK £3.50 ;

Europe, USA & Canada £5 (\$8)

Rest of World £10 (\$16)

### RCV Engines Ltd

4 Haviland Road, Ferndown Industrial Estate,  
Wimborne, Dorset, BH21 7RF, UK

Tel: +44 (0)1202 877044

Fax: +44 (0)1202 871836

Email: sales@rcvengines.com