

## Engine Assembly Quick Note Steps!

### **1: Main Bearings, try down in block. Too big? too small?**

Install Dowel Pins (4)

### **2: Check End Play**

Make sure you have gasket on paper or metal

Place main bearing and flywheel on crank & tighten

Allowable play is .003-.005

place shims in and then .004 feeler and should be firm fit

.32 with just feeler

### **3. Mark Bearing in block**

### **4: Slip bearing on crank**

bang in woodruff key

1: Heavy Duty Gear, dots up, bevel down

Heat it up!! Use pipe if needed

2: Spacer

3: Brass Gear (heat it)

4: Clip

5: Then small #4 main bearing, open end faces down.

6: Last woodruff

### **5: Rods**

bump or number faces out. Numbers must match up.

Place bearing in rods with tab lined up (Be sure to oil)

Put all rods on finger tight

Torque

23-25 lb/ft for 1600cc

32-36 lb/ft for 36hp-40hp

They should spin freely, if not use some polish to smooth, or hit nuts w  
hammer

Then lock into groove.

### **6: Take Flywheel off to put crank in motor**

One open main bearing, place in block (middle)

Make sure bearings all line up and drop in with crank.

(should be no rocking in bearings, use other half bearing to test)

### **7: Install Cam Bearings (1600cc) oil em up!**

### **8: Install Lifters 40hp-60hp**

36hp test lifters in case at this point, adjust tabs if needed

### **9: Install Cam Shaft, line up two dots on crank gear with "O" on cam**

Rotate and test with no binding and check twice

Install and Permatex cap at the end of Camshaft

### **10: Install rubber "O" rings over studs for 1600cc**

Older motors be sure to Permatex (don't get on Bearings)

**LOOK BLOCK OVER AGAIN BEFORE ASSEMBLY**

**11: Permatex Block all the way around the outside of case.**

**12: Put lifter clips in 1200-1600cc to hold lifters**

Slide other half of case on.

New 40 hp lifters may have thicker heads, journals in case machined down?

oil Check oil pickup tube, should be tight and straight, adjust if necessary for screen.

**13: Before bolting down, place oil pump gaskets on (thick 1st) permatex if needed.**

Then slide in oil pump and gears, lube em up.

Tight 4 nuts down finger tight

**14: Start 8mm or 13mm nuts on case on lower side. Used correct washers.**

Torque to 14 lb/ft

**15: Big case nuts, Permatex Threads, Use correct washers, Permatex again**

Start in middle then work your way out.

18 lb/ft (1600cc) If using Sealing nuts, no Permatex needed.

22 - 25 lb/ft for 36hp-40hp (permatex)

**CAREFUL NOT TO DROP ANY NUTS INTO MOTOR**

**16: Tighten oil pump. (Not too Tight) 5 lb/ft**

**17: Install Oil Cooler**

8mm Cylindrical Seals (36hp-50hp) or 10mm seals 1970 +(1600cc)

Offset cooler will need an extra set of seals

Replacement coolers will need adapter 8mm to 10mm seals and spacer rings

Be SURE to CLEAN COOLER!! Spray and Rinse

**18: Install Pressure Relief Valve**

Test to be sure it does not stick using wooden dowel then oil up.

Do not stretch spring at all, use gasket and install.

1600cc dual relief will need an extra gasket or use old one.

**19: Install oil strainer with gaskets and washers**

Early 36hp may need modification

Then final oil plate torque to 5 lb/ft

**20: Install small front tin below crank Pulley**

Use correct tin screws

**21: Then Bolt on Pulley, may need hammer, torque to 85 lb/ft**

Be sure all is painted and cleaned.

**22: Install Genny Stand**

Permatex Block

Place Paper Gasket down, Permatex again

Then metal baffle, louvers down, flat parts face out, permatex again

The paper gasket, then more permatex

Place stand down with washers and nuts

Be sure cork gasket is good in oil cap.

### **23: Pistons & Cylinders**

Wash Pistons with Solvent then wash with soapy water, dry.

Do the same for cylinders, white rag em, be sure they are clean.

Look for arrows on pistons, they point to the flywheel

#1 piston first, put in clip on one side and start the pin on the other  
be sure to oil everything up, guide pin into rod, install last clip  
Then move on to #2 and move on.

\*Rings on pistons should be 12:00 for oil ring, then 3:00-4:00 and 8:00-9:00 for mid and top\*

### **24: Cylinders**

Clean off Bottom edge and permatex, place gasket down, then permatex again.

Oil up inside cylinders and outside pistons for easy install

Use ring compressor and install Cylinders

Install Copper Rings (36hp) split side facing head

### **AS SOON AS CYLINDERS ARE ON, PLACE AIR DEFLECTORS IN BETWEEN**

### **25: Install Heads then Pushrods (w lifters 36hp)**

Roll em to make sure they roll flat (1200-1600cc)

Then install Seals on each side of Pushrod Tubes, round part up

Place head on lightly, later 40hp + use round "O" rings on studs thru heads

Put on pushrod tubes with seams UP then slide pushrods in to hold in place

Then Guide head onto pushrod tubes and seals

Do one final check by twisting tubes to make sure they are seated

Then put nuts on finger tight, then tighten with small 3/8 ratchet about 7 lb/ft

start middle, then out, criss-cross X

Torque to 15 lb/ft to start with 1600cc

Then to 23 lb/ft for 1600cc with 10mm studs. '73 + 8mm studs go 18 lb/ft

Adjust to 27 lb/ft for 36HP

### **26: Rocker Arms**

Guide on to pushrods

Install half round caps

Finger tight nuts

Torque to 18 lb/ft on 1600cc, 14 lb/ft on 36hp

### **27: Adjust the Valves**

.007 on 1600cc

.005 on 36hp

After 300 Miles

.006 on 1600cc

.004 on 36hp

### **28: Install Distributor Drive Gear**

With shims, 2 for 1600cc, 1 for 36hp  
Engine must be on number 1  
Small half side toward the front pulley  
Enter on angle then turn slightly clockwise

**29: Install Distributor**

**30: Install Fuel Pump**

Get two gasket, thin one goes 1st on block then thick one (1200cc - 1600cc)

Make sure base drops in, not tight. If tight file down.  
Pack grease into fuel pump

**31: Place cylinder tins on**

**32: Install Manifold (loose)**

Be sure to have the right gaskets on heads  
For split type gaskets, split goes toward head.  
New Boots (1600cc)

**33: Distributor Cap, wires**

**34: Fan Shroud w Genny on**

Guide thermostat rod in through engine  
Setup Genny Strap and bolt down

**35: Install Heater Boxes**

Be Sure to put Tins on then install  
Check studs and for rust

**36: Finish Misc Tin**

**37: Assemble Muffler**

Tail Pipes  
Clamps

**38: Install Muffler**

Get gaskets for heat risers  
Clamp heat boxes to muffler

**39: Finish tightening and other misc**

Oil pressure switch  
Fan Belt  
Fuel filter and lines  
Grommets  
Plugs  
Remainder tins

**40: Check end play**

3 Shims on end of crank, no seal  
End play tool  
.004 Feeler gauge  
install rear main seal  
round "O" ring for 1600cc

Paper or metal gasket for 36-40hp  
Tighten flywheel to 250 lb/ft  
Grease gland nut bearing

**41: Oil**

2 3/4 Quart  
Change after 25 miles  
then 300 Miles with valve adjustment

**42: Start engine**

Crank till oil pressure, light goes out  
Start then rev to seat rings.