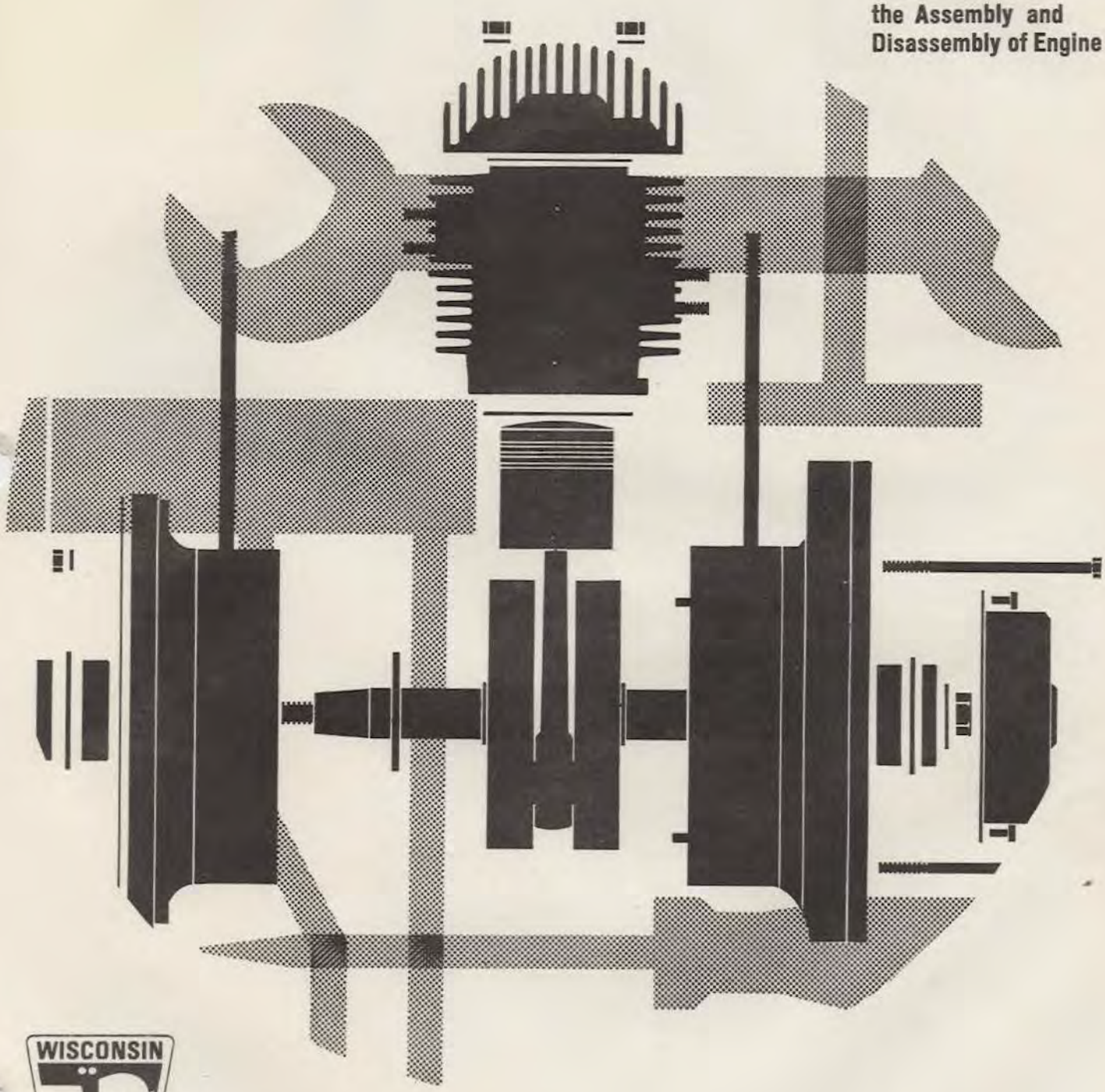
HIRTH MOTOREN KG

7141 BENNINGEN/NECKAR · KREIS LUDWIGSBURG · WEST GERMANY

Model 82 R

Instructions for the Assembly and Disassembly of Engine



WISCONSIN MOTOR CORPORATION

EXCLUSIVE SALES AND SERVICE REPRESENTATIVES FOR HIRTH ENGINES

Technical data - Hirth Type 82

Engine output	11 DIN H.P. at 5000 R.P.M.
Direction of rotation	Counter-clockwise in view of Power Take-Off Shaft
Bore	70 mm 2.76 ins.
Stroke	64 mm 2.52 ins.
Cylinder displacement	246 ccm 15.0 cu. ins.

Ignition timing	21° or 2.6 mm before TDC (0.102 ins.)
Recommended spark plug	Champion UK 10 or Bosch M 225 T1
Spark plug gap	0.4 – 0.5 mm (0.016 – 0.020 ins.)
Ignition unit	Bosch dynamo magneto ignition 40 Watt, 12 Volt

Dismantling the engine - 82 R

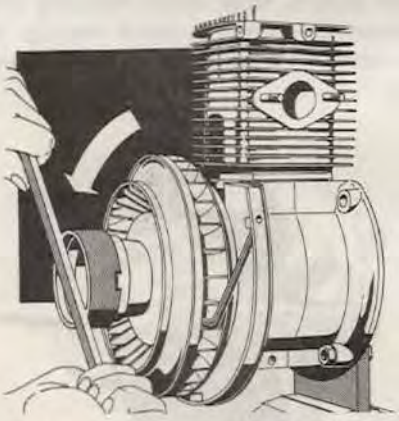
1. Dismount engine from vehicle and remove attaching parts.
2. Mount engine on bench vice by using mounting plate W 40.

Fan housing

3. Remove recoil starter. Remove fan housing by loosening the five securing bolts and by bending the metal clip holding the wires. Pull spark plug hood from spark plug.

Fan wheel

4. Apply socket head cap key 5 DIN 911 to holding fan wheel. Loosen catch piece for recoil starter with special wrench W 106. Remove catch piece and cover plate.



5. Remove hexagon nut on crankshaft with socket wrench (wrench size 24 mm).
6. Remove socket head cap key. Screw fan wheel puller W 79 on thread of the fan wheel, hold with a 32 mm open-end wrench against area provided for that purpose and tighten thrust screw of fan wheel puller until fan wheel comes loose. Remove Woodruff key on crankshaft. Take off the pressure disc.

Ignition

7. Unwind spark-plug hood from cable. Slip off connecting wire piece which is pulled over cable. Unscrew light, ground and short-circuit wire from connector.
8. Remove armature plate which is fastened with 3 cylindrical head screws. Spread a bit of oil on rubber socket for ignition wire on crankcase housing, through which the cables are run, in order to remove cable with armature plate more easily.
9. Take off ignition adjustment cam, pull out positioning pin for cam from crankshaft.

Cylinder

10. Lift off cylinder head and gasket by loosening the 4 hexagon nuts with 13 mm socket wrench. Lift off cylinder.

Piston

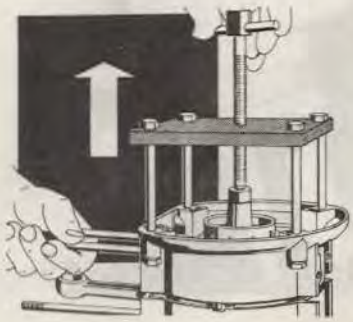
11. Remove piston pin retaining rings by using interior snap-ring pliers. Push out piston pin with drift pin W 39/4. If necessary, apply light hammer strokes. While doing it, support piston with hand and then remove piston.
12. Slide needle cage from small-end hole of connecting rod. It is suggested that it be mounted on piston pin, for safekeeping.

Oil seal rings

13. Release engine from bench vice. Place with ignition side on two square wooden pieces W 110. Unscrew mounting plate.
14. Remove oil seal on the P. T. O. side of the shaft, but make sure that neither the bearing underneath it nor the oil seal seat area is damaged. The oil seal must always be replaced.
15. Remove crankshaft circlip with external snap-ring pliers.

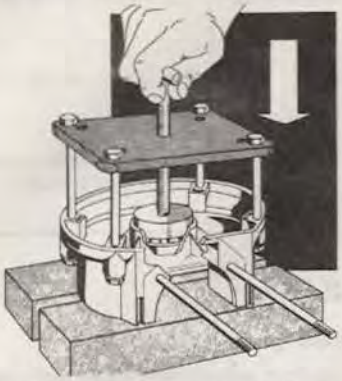
Crankcase

16. Using socket head cap wrench 5 DIN 911 loosen the 5 socket head cap screws which serve to join the two half-members of the crankcase housing.
17. Stick thrust piece W 105/4 into groove of crankshaft. Attach crankcase separator W 105 to crankcase housing flange. Pull off flange with thrust screw.

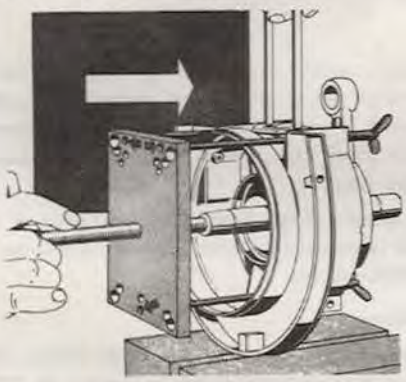


Crankshaft

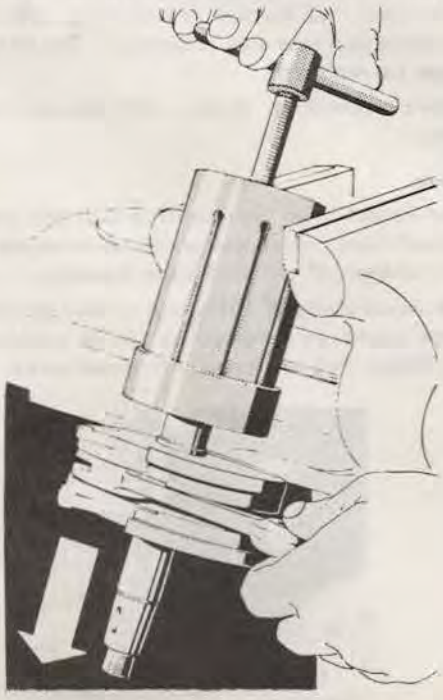
18. Press out crankshaft with ball bearing from fan side of crankcase housing half-member. For this purpose apply device W 105 with 3 tie rods W 105/2. By using thrust screw push crankshaft outward. After removal of crankshaft knock out the oil seal, by means of knocking same outwards with a punch and hammer.



19. Using interior ring pliers loosen both circlips in crankcase housing flange. Place crankcase housing flange with baffle plate on wooden pieces. Stick thrust plate W 105/3 on bearing. Push out bearing with crankcase separator W 105 and thrust screw.



20. Remove grooved ball bearing on ignition side from crankshaft with bearing puller W 107.



Magneto ring

21. If necessary, dismount magneto ring from fan wheel. To do this, loosen the 4 socket head cap screws. The magneto ring is usually removable by hand. If this should not be the case, remove magneto ring by way of the two holes in the fan wheel filled by plastic plugs and strike gently and evenly with a drift pin made of brass.
22. Wash engine parts in cleaning solvent. Carefully remove any remains of sealing material from sealing surfaces.
23. Replace defective parts.

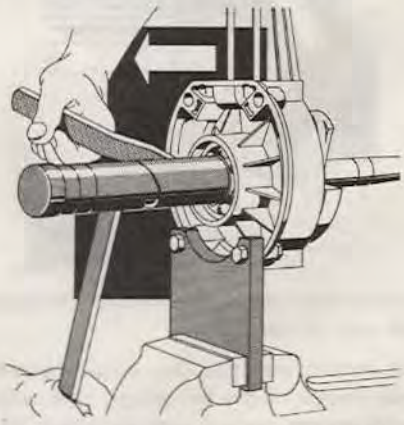
Assembling of engine - 82 R

Ball bearing

1. Install circlip on the P. T. O. side in the crankcase flange. Heat flange to 212 degrees but not above 285 degrees (100—140 degrees centigrade). Insert ball bearing until it catches the stop-pin of the circlip. Mount second circlip.
2. Lock crankcase flange on mounting plate W 40 and mount on bench vice.

Crankshaft

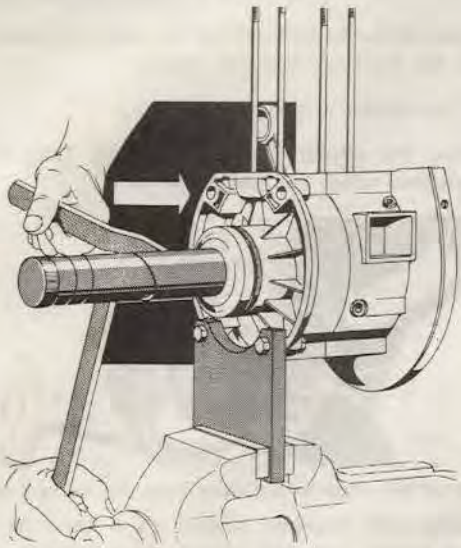
3. Insert the P.T.O. side of the crankshaft, through bearing, as illustrated.
   Screw cam acting device W 36 with assembly bolt W 37/6 and threaded bit W 37/7 into the internal threading of crankshaft end. By means of the two lever arms pull in crankshaft to the end of the bore of the tool. Make sure that the connecting rod is directed upward. Next, insert mounting ring W 37/4 under assembly bolt and repeat feeding- in process. Pull in crankshaft right up against the grooved ball bearing.



4. Insert circlip on the crankshaft, P.T.O. side.

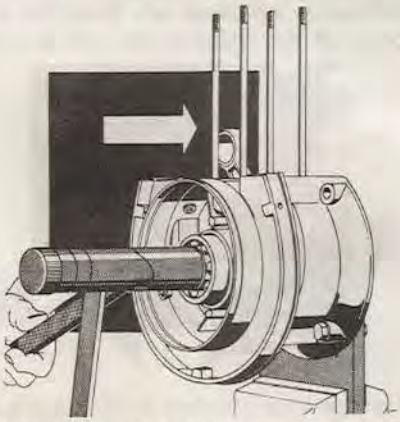
Oil seal rings

5. Push oil seal, with oil seal lip turned inward, over mounting case W 23 on to the shaft. Push pressure plate W 37/8 with the large plain surface against the oil seal. Installation of oil seal then follows as described above, by using cam acting device W 36, mounting bolt W 37/6 with the threaded bit W 37/7, and mounting rings W 37/4.



Crankcase housing

6. Mount crankcase flange, turned by 180 degrees, on bench vice.
7. Spread evenly sealing compound over sealing area of crankcase flange.
8. Heat crankcase halfmember, ignition side, to 212 degrees but not more than 285 degrees (100 to 140 degrees centigrade), and mount on flange. Pay close attention to fitting pins. Install ball bearing on crankshaft and with device W 36 pull it in into the end of the shaft. In performing this task, use mounting bolt W 37/1 with two mounting rings W 37/4. If needed, add one to two additional rings.

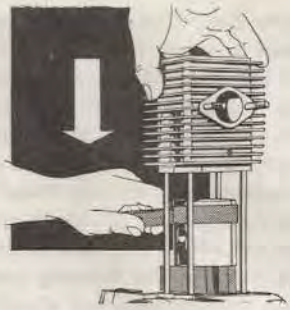


9. Install oil seal with oil seal lip turned inward, as described above. Use mounting bolt W 37/1.
10. Join crankcase halves by means of five socket-head cap screws and flat aluminium washers (on the ignition side). Tighten screws with 0,8—1 kpm.

Piston

11. Insert cylinder base gasket. Push needle cage into small-end hole (of connecting rod). Oil. Slip piston over connecting rod. Piston must be mounted in such a manner that the arrow which is stamped into the top of the piston points, in the direction of the exhaust port.
    Coked-up piston ring grooves should be cleaned **carefully.** Best by using a piece of a piston ring, possibly sharpened at one side.

    Warning: Do not forget the piston pin retaining rings.



Cylinder and cylinder head

12. Place piston supporting wooden block W 24 under piston. Oil piston and working surface of cylinder. Adjust piston rings in a manner which places the safety pin in piston ring groove between the thrust of the piston rings. With the piston ring strap W 108 press rings together. Mount cylinder (exhaust port in the direction of the arrow on the top of the piston).
13. Install cylinder head gasket and cylinder head with nuts and washers. Tighten hexagon nuts evenly at 18.1 ftlb (2.5 kpm).

Electrical wiring

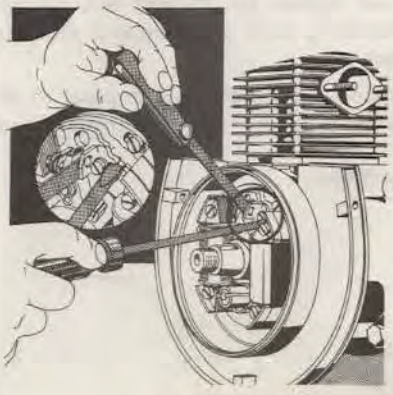
14. Drive carrier pin for cam into the predrilled boring of the pin on the ignition side of the crankshaft. Slip cam over it.
15. Spread a drop of oil on rubber socket for ignition wire in crankcase, to pull wire through more easily. Pull through the wire and simultaneously push armature plate over cam. While performing this task, make sure that the circuit breaker points upward. The three cables (brown: ground, yellow: light, black: short-circuit), which must be pulled through a protection hose piece, will then be plugged into the terminal-box. Protection hose piece must rest between the terminal-box and the armature plate.

Armature plate

16. Slightly tighten armature plate with three cylindrical head screws, toothed washers and flat washers, while making sure that the centre of the three oblong holes in the armature plate is aligned with the cylindrical head screws.

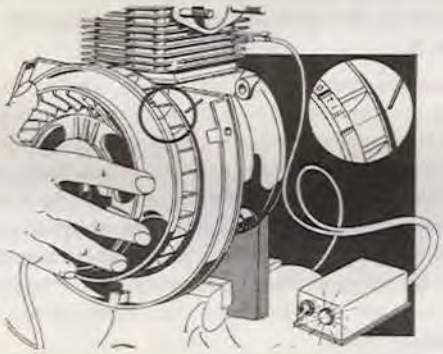
Adjusting the distance of circuit breaker

17. Adjust distance of circuit breaker to 0.016" (0.4 mm). First loosen slightly the securing bolt of the contact plate. Push a feeler gauge of a thickness of 0.016" (0.4 mm) between the contacts. With screwdriver adjust for correct distance by using the cut-outs in the armature plate and the contact plate. Then tighten securing bolt of contact plate.



Ignition position

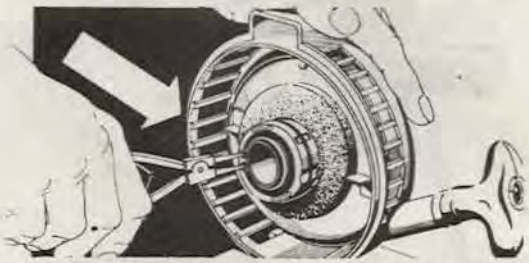
18. Insert pressure disc. Push Woodruff key into keyway. Affix fan wheel to taper. Connect ignition adjustment device 080.11 by connecting one wire clamp to ground (the housing) and the other to the black short-circuit wire. On crankcase housing a distinctly noticeable line at the right upper corner is raised on the housing. On the circumference of the fan wheel there is a line mark with the notation "O. T.", which means "top dead centre". Turn fan wheel until the notation O. T. matches the line mark on the housing and then turn on ignition timing device. Turn fan wheel approximately 45 degrees to the left and then to the right until the circuit breaker just starts to separate. (With a battery-operated ignition timing device there will be a change in buzzer tone and control-light brightens. In this position the distance, measured on the circumference of the wheel, from the O.T. notation on the fan wheel to the line mark on the crankcase housing, should be 37.5 mm or $1^{15}/_{32}$', amounting to 21 degrees before the O.T. point. If this measure is smaller (retarded ignition), then turn armature plate to the left. If the distance is larger (advanced ignition), turn armature plate to the right. When the ignition position is properly set, tighten the three cylindrical head screws on the armature plate.



19. From left to right connect brown wire (ground), yellow wire (light), and black wire (short circuit) with terminal plug. Pull protecting hose piece over the ignition wire. Mount spark-plug hood, but make sure that the threaded rod is pushed in firmly exactly in the centre of the wire until noticeable resistance is felt. Afterwards, screw in socket completely by slowly turning it clockwise. Insert spark-plug into socket and put on cylinder-head. By quickly turning fanwheel check ignition once, more, ignition spark must jump between electrodes of the spark plug. Screw in spark plug. Spark plug gap 0.016-0.020 ins.
20. Keep fan wheel from turning with holding device. Put on cover plate and tighten catch piece.
21. Mount and tighten fan housing and put ignition wire with protecting hose piece behind sheet-metal cover and bend tongue.
22. Install recoil in accordance with para. 16 of "Assembling the recoil starter". Attach remaining parts.
23. Test-run motor.

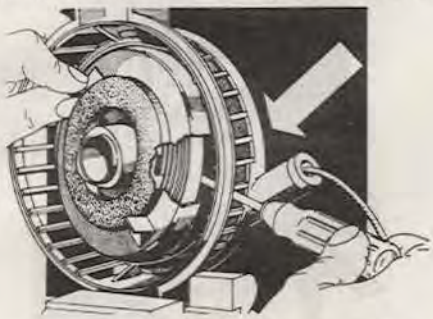
Dismantling the recoil starter

1. Remove securing bolts which are used to fasten starter to fan housing. Remove starter.
2. Grip the starter in a vice.
3. Remove the circlip with circlip pliers. Take out the lock washer which lies behind it.



4. Draw off the cage with rollers from the curved section.
5. Unscrew both hexagon screws which serve to fasten spring cover. Turn the spring cover slightly to the right and lift it a little. Then turn the spring cover to the left until the spring tension is released.

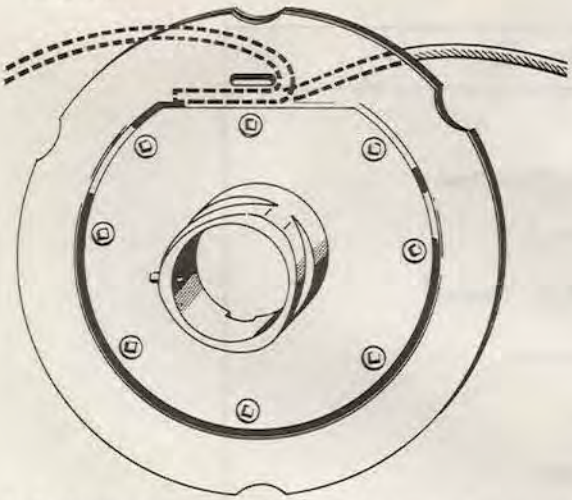
6. **Carefully** draw out the spring cover with spring, or else the spring will jump out. Press the loop end of the spring off the retaining clip with a screwdriver.



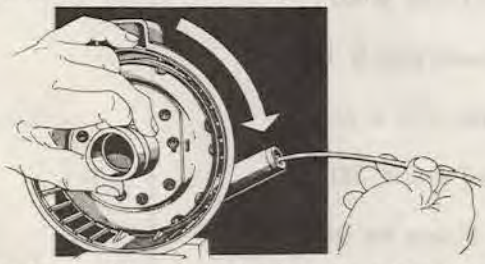
7. Pull the wire rope attached to the handle right out.
8. Turn the curved section with rope disc so that the cut-outs spaced evenly around the circumference of the rope disc match the three pins which are driven into the starter housing. Only then can the curved section be removed.
9. If the hole in the rope guide bushing is very worn, rotate out the bush. If the outside diameter of the bush has been damaged for any reason and it is no longer possible to rotate it out, heat up the starter housing. This will soften the plastic bush and enable it to be easily removed.
10. Wash all the components in cleaning solvent.

Assembling the recoil starter

1. Knock in the rope guide bushing with a hammer.
2. Assemble the handle. Push the end of the rope through the handle and the clamp ring. The clamp ring is conical and the larger diameter must be at the top. Bend the end of the rope into a loop so that the end of the rope can be pushed back again half way through the handle. Then fit the clamp piece into the loop of the rope so that the rope lies in the grooves in the clamp piece until the clamp piece jams tight with the rope in the clamp ring.
3. Smear the journal, thrust washer and bore of the curved section with a Molykote graphite bared Paste G. Ensure that the pin locks on the curved section.
4. Pull the rope through the rope guide bushing. Hold the hub of the rope disc upwards and push the free end of the rope from the right under the stud, so that the end of the rope protrudes about 0.4—0.6 ins. beyond the stud to the left. Bend the rope back over the stud by 180° and coil up 2 to 3 turns tightly in this direction.



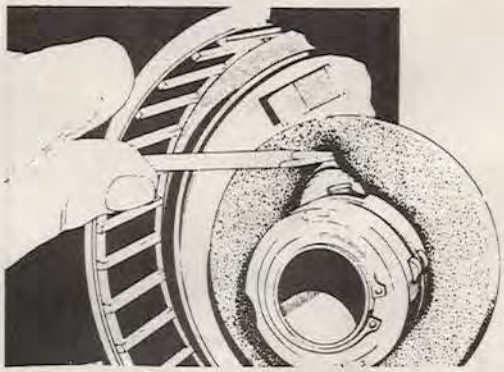
5. Push the curved section with rope disc over the journal on the starter housing. Ensure that 3 cut-outs in the rope disc match the 3 pins and that a 4th cut-out is close to the rope guide in the starter housing. Coil up the rope by clockwise rotation of the rope disc. At the same time, by holding tight the protruding rope, ensure that the rope windings lie as close as possible on top of each other.



6. If the foam rubber ring glued to the spring cover is damaged, renew the ring. Remove the old foam rubber ring cleanly. Glue the new foam rubber ring centrally to the bore of the spring cover using a glue which is suitable for glueing foam rubber to metal. When the adhesive has set, assemble the spring cover.
7. If the spring has jumped out, place the loop in the end of the coil spring over the riveted pin in the spring cover. Coil up the spring from outside to inside in a clockwise direction. Take care that the spring does not jump out.

New replacement springs are coiled up and supplied bound with a wire. Cut this wire. While doing so, press down the spring with a suitable tool, so that the uncoiling spring does not jump out of the cover. Lightly oil the spring with a thin oil (SAE 20).

8. Guide the spring cover with spiral spring over the curved section, taking care of the pin on the curved section. The curved inner end of the spring generally slips into the retaining lugs of the rope disc by itself when the spring cover is turned anti-clockwise. The end of the spring can be seen through the cut-out in the bore of the spring cover and the correct position for the spring end can thus be checked easily. Carefully press the end of the spring into the retaining lugs with a screwdriver.



9. With the help of the two lugs, turn the spring cover 10 ratchet positions to the right (1 step = $^1/_3$ turn).
10. Pull the rope out smoothly by the handle several times up to the stop (Do not let the handle snap back when the rope runs back). This ensures that the rope coils up properly. With the rope pulled fully out, the checking dimension of the rope guide bushing must have the following length to the stop face of the handle.

Total length	Checking measurement
1920 mm = 75.6"	1250—1330 mm = 49.2"—52.4"

If the rope is too long, turn the spring cover one more step to the right (1 step = approx. 10 cm = 3.9 ins.); if the rope is too short, release it one step (see Dismantling, no. 5).

11. Smear both sides of the two washers and lock washer with Molykote.
12. Slide one washer over the journal. Push the roller cage over the journal with its open end so that the

pin fitted on the curved section lies in the cut-out in the roller cage. The cage has two cut-outs for left and right hand running, which are marked by a cast arrow. Use the cut-out whose arrow points in the direction of rotation of the curved section.

13. Fit the second washer. Fit one or two lock washers against the second washer so that the corrugations show to the outside. Fit the locking ring in the groove in the journal. When pulling out the starter rope, the cage must remain at rest until the pin hits the stop. If the cage does not hit the pin, fit a second lock washer.

14. Insert 3 clamp rollers in the pockets in the cage with cold resistant grease (e. g. Aero Shell Grease 4 or Mobil Grease no. 22). Fit the circlip. Insert the annular spring over the cage into the grooves for the clamp rollers.

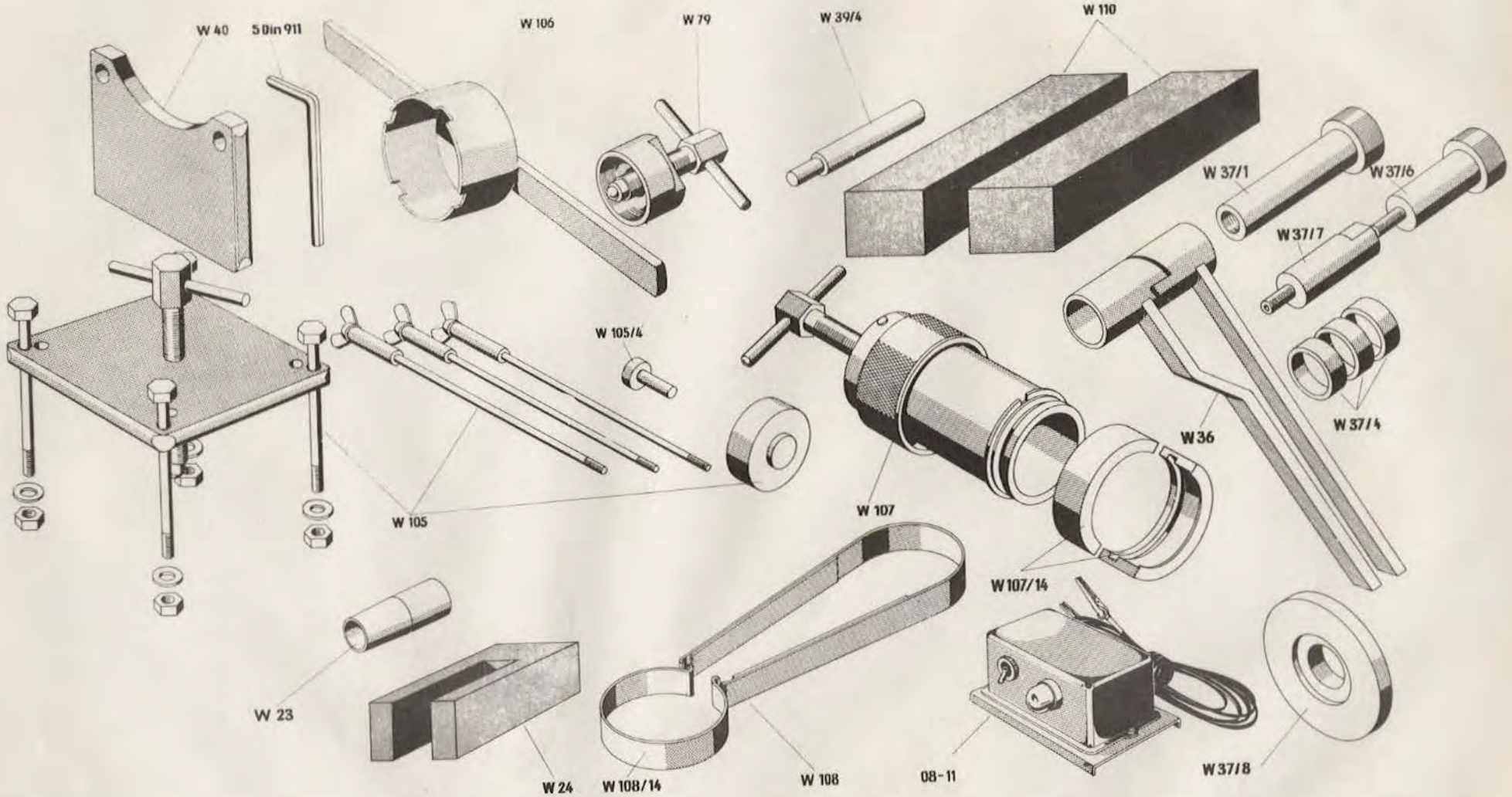
Note Clamp rollers, cage pockets and the running surface of the curved section must **not** be smeared with Molykote.

15. Pull out the rope with the handle and grease with cold resistant grease. (See item 14 for grease).

16. Fasten starter to fan housing by paying attention to the following procedure: 3 screws which serve to fasten the starter should be inserted by hand such that the starter can still be easily moved. Pull out starting rope by the handle with one hand, and hold taut. This procedure permits the three rollers in the free-running operation to align themselves in the coupling piece. It is in this position that the 3 screws should be tightened. Then insert and tighten the remaining 3 screws.

Set of Special Tools for Complete Assembly and Disassembly of the HIRTH engine 82 R

Hirth Part Number	Description
W 40	Assembly Plate
5 DIN 911	Holding Device for Fanwheel
W 106	Tubular Catch Wrench
W 79	Flywheel Puller R.H. Thread
W 39/4	Drift Pin for Piston pin
W 110	2 Wooden Blocks
W 105	Crankcase Separator
W 105/4	Pressure piece
W 107 with W 107/14	Bearing Puller
W 36	Cam acting device to draw Crankshaft into the Crankcase
W 37/1	Assembly Bolt (used with W 36)
W 37/4	3 Assembly Ring (used with W 36)
W 37/7	Threaded piece (used with W 36)
W 37/6	Assembly Bolt (used with W 36)
W 23	Tapered Assembly Sleeve for Oil Seal
W 37/8	Pressure plate for installing Oil Seal
W 24	Piston Support
W 108	Piston Ring Extractor
W 108/14	Piston Ring Compressor
080.11	Battery powered Ignition Timing Gauge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