

PHELON MAGNETO - 2-CYLINDER ENGINES

I. FLYWHEEL

To work on the Phelon magneto, the flywheel must be removed. The recommended and safest method is described below:

After cowl or cover is removed on motor, the flywheel is accessible. If powerhead is removed from lower unit, place powerhead on service stand (91-24282 or 91-24259) after clamping stand in vise with splined end up to receive powerhead. If powerhead is not removed, use Universal Flywheel Holder (91-24937A1) to hold flywheel while removing flywheel nut with wrench.

Use Starter Ratchet Wrench (91-24719 for 6 HP and down; 91-24710 for 7.5 HP and up) to engage starter ratchet nut which fastens flywheel to crankshaft. Turn starter nut loose with sliding "T" wrench $\frac{1}{2}$ " drive. (Figure 19)

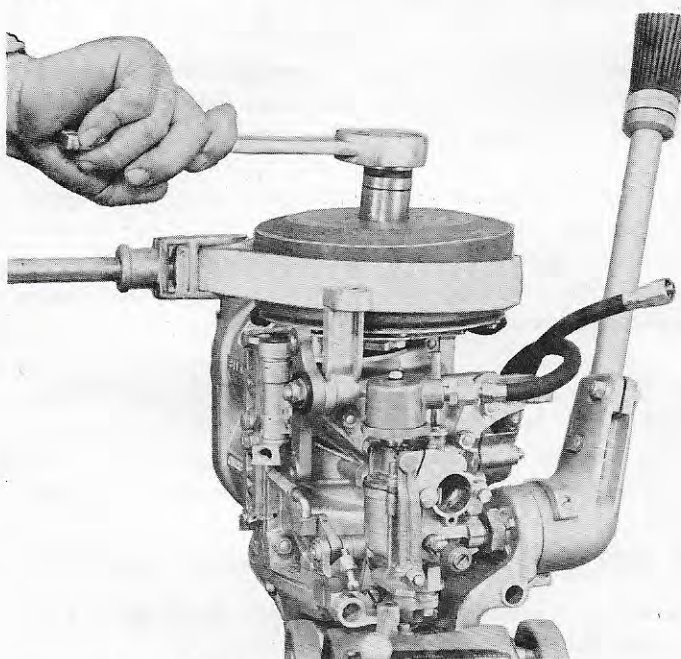


FIGURE 19. Removing Starter Ratchet Nut

Using Flywheel Puller (91-24695A1), place plug of tool over end of crankshaft, turn the 3 screws into the tapped holes in top of flywheel, so that it sets evenly above flywheel, and draw down on center screw. Tap screw with hammer if flywheel is exceptionally tight. (Figure 20) Remove washer, spring and/or flywheel key, whichever is part of the assembly. Magneto is now ready for inspection. (See correct test procedure of ignition parts, this section.)

II. MAGNETO

Entire magneto may be removed from the motor by completing the following:

- A. Remove both high tension leads from spark plug terminals.
- B. Remove clamp screws which hold high tension leads to cylinder block.

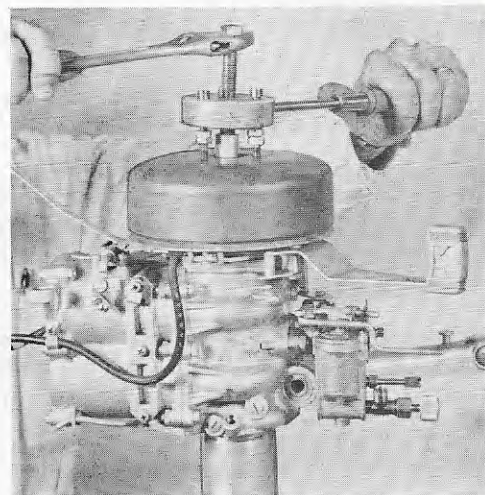


FIGURE 20. Pulling Flywheel

C. Loosen magneto.

1. Loosen the 2 screws below magneto stator plate and slide friction clamps which hold magneto on crankcase to allow removal of stator, or
2. Loosen 4 screws below magneto stator plate, bring friction hold-down clamp back and remove stator plate, or
3. On Merc 200-150-100 and Mark 10-10A-15A-28-28A, turn stator plate in clockwise direction and lift stator plate off.

D. Lift off magneto.

(IMPORTANT: Eiseman magnetos, used on a number of older models, are very similar to the Phelon magneto in construction. Refer to Phelon magneto for repair of Eiseman magnetos. Figure 21.)

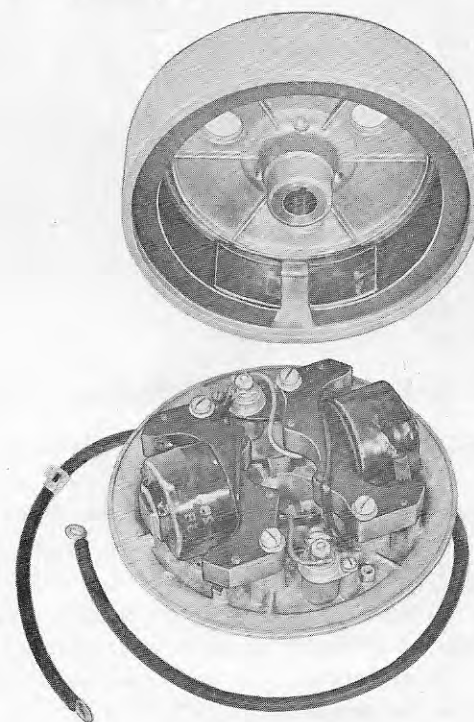


FIGURE 21. Eiseman Magneto Assembly

Repair - General

I. SPARK LEAKAGE--WHAT SHOULD BE INVESTIGATED

A. Check lead wire to see if spark is leaking through insulation at some point.

Caution: Avoid using a spark plug tester with hypodermic type needle on the end. It will puncture leads or spark plug protectors and will cause electrical leakage through the punctured hole.

B. Check breaker points. Be sure they are set to proper gap (.018"). Use a Feeler Gauge (91-24262)—even experts don't guess at it. (See Figure 22.) (Refer to "degree plate setting", following.) Be sure breaker rubbing surface is on highest part of cam when checking points. This is the part of cam which follows directly after points have opened. Be sure they are clean. Lightly rub a piece of white, unprinted cardboard between them. Moisten cardboard with cleaning fluid or lacquer thinner if available, but be sure not to use anything that could contaminate the points and make sure not to leave any lint between them.

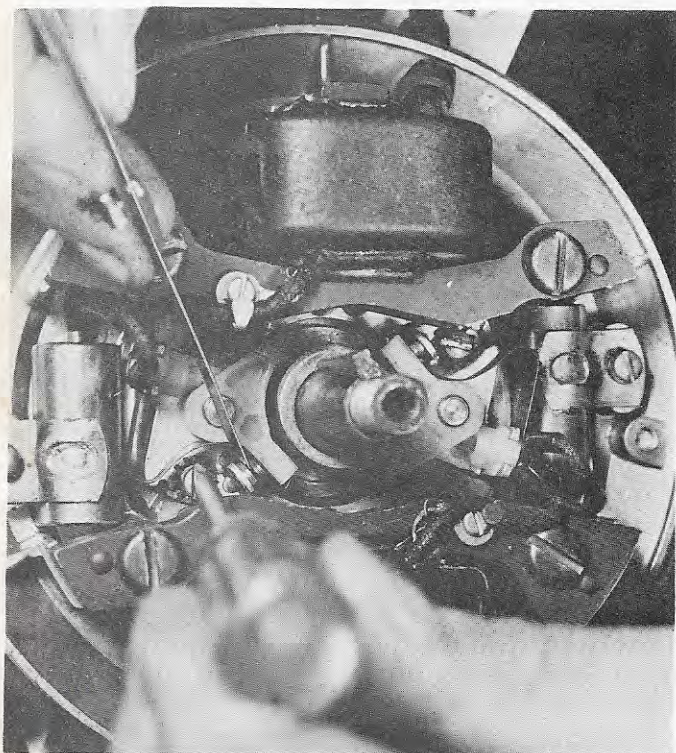


FIGURE 22. Adjusting Points on Phelon

If the points are pitted, replace them. Check the condenser, as a defective condenser may be the cause of badly pitted points.

If points are severely burned, entire breaker assembly must be replaced either in pivot type or pivotless, as disassembly or replacement of individual parts of this type unit is not recommended.

C. Set magneto lever (in cases of models with twist grip control, the centerline of magneto) in centerline of

engine. Rotate crankshaft until breaker points are fully open. Be sure breaker gaps are equally set for smoothest performance.

For proper settings, see information on "degree plate", following.

If replacement points are not available, they can be stoned, using care to keep surfaces flat and parallel. They should be removed separately and rubbed against the stone. Do not use a file, as this may contaminate points with iron particles. *Caution: Never use a plated gauge in checking point gap, as plating may come off.*

After resetting breaker points, recheck magneto at cranking speed as outlined previously. This check may eliminate the necessity for removing coil and condenser and is the most positive method of determining if magneto is operating satisfactorily.

If magneto does not function properly, check coil with Magneto Analyzer. Settings and value data are compiled in Coil Test Chart, following in this section.

D. Check condenser on a condenser tester. For capacities, see Condenser Test Chart, following in this section. *Caution: Do not substitute another condenser of a different capacity. Check leakage, series resistance and breakdown.*

E. Inspect coil for insulation leakage or for evidence that spark has been leaking to ground from terminal where spark plug lead is connected. Check coil on a coil tester in accordance with specifications (see chart) given by coil tester manufacturer.

II. HOW TO REPLACE COIL ON PHELON MAGNETO

A. Remove primary connection and spark plug wire. Ground the connection.

B. Bend down clip holding coil down on core, taking care not to break off this clip.

C. Remove core screws which free coil and core. Place coil assembly across open jaws of a vise with bottom of coil resting on tops of vise jaws and tap center leg of core gently 'til coil comes off.

D. In replacing coil on core, great care must be taken not to bend core which, being laminated, is quite easily distorted. (*Apply a light film of DC4 Compound [92-24108] on lamination before reinstalling core.*) The core must be supported under center leg while new coil is being pressed on. Be sure coil is "bottomed" before bending tab. New coil now can be put in place on stator plate, being careful that primary leads are in proper position. Use same or new self-tapping screws to replace core. They will act as dowels. Align core with bosses on stator plate carefully, or flywheel magnets will strike and cause damage to flywheel or magneto assembly.

E. Check ground connection to be sure it is making a good contact both under screw and at crimped part of terminal. Check for good contact at live terminal ends.

F. Check insulation at breaker point connection to be sure the lead does not ground against spring or fixed contact.

G. Lubricate cam and pack crook of breaker arm with a fibre grease like S.A.E. No. 60. If cam wick becomes dry, it should have a high melting point grease, like Lubriplate No. 50, worked into it. (Do not oil wick.) If breaker arm pivot is dry, lubricate lightly with Lubriplate Aero or equivalent light grease which will not

“freeze” in cold weather. Do not use any oil and avoid excess lubrication which might get on points.

III. SERVICING: WHAT SERVICING SHOULD BE DONE TO THE MAGNET UNIT IN THE FLYWHEEL?

Absolutely none. The magnet unit is an integral part of the flywheel, assembled permanently and machined with the flywheel. It should never be removed.

This magnet unit should not require recharging. Any attempt to recharge the magnet unit with ordinary means will only result in discharging it, which requires return to the factory.

REASSEMBLY - PHELON MAGNETO

REINSTALLING PHELON MAGNETO

After magneto assembly has been thoroughly checked and repaired, as instructed in previous paragraphs, re-install in the following manner:

A. Replace cam breaker (on engines equipped with cam) on crankshaft with arrow marking down and in direction of rotation of engine. See that nub in cam is on top for point

setting. Insert key into slotted keyway on crankshaft.

B. Replace thrust washer, spring or wave washer and flywheel key, whichever is used on this particular model motor. (Not present on newer models.)

C. Seat magneto, install clamps and lock snugly with knurled head screws. Tension on screws tightens magneto rotation accordingly.

SETTING BREAKER POINTS - 2-CYL. ENGINES

With flywheel removed from engine, and stator assembly, coils, condensers and breaker points tested on Magneto Analyzer 91-25213, defective parts or parts not up to standard have been replaced.

Place Synchronizing Plate 91-28619A1 on rim of stator plate. (Figure 23) Move stator to position where magneto cam touches carburetor pickup lever. (Figure 24) Leave stator set at this position throughout rest of settings.

Thread proper size indicator arm (included with tool) onto threaded end of crankshaft until it seats on shoulder. (Select indicator arm from chart below.)

Model Adaptable	Thread Size	Indicator Arm No.
Merc 60 & Mark 6-6A-7	7/16"-20	91-28623
Mark 15 & KG4	1/2"-20	91-28886
Mark 10-10A-15A-28-28A-25	5/8"-18	91-28885
Merc 100-150-200	5/8"-18	91-28885

Thread flywheel nut against indicator arm to hold arm securely in position. (Nut acts as a jam nut) Remove spark plugs to relieve compression when turning crankshaft. Turn crankshaft -- not indicator arm -- to prevent binding indicator arm. Adjust breaker points so that breaker cam follower arm is at high point on cam (about 1/4" rotation after points open).

A. Set first breaker assembly at .018" with a feeler gauge.

B. Set Magneto Analyzer (91-25213) selector switch on No. 2 (resistance) or, employing Continuity Meter (91-22966), attach one small test lead to stator plate (ground) and second small test lead to spring arm of breaker point.

C. Rotate indicator arm counterclockwise to allow breaker to close. Next, rotate crankshaft and indicator

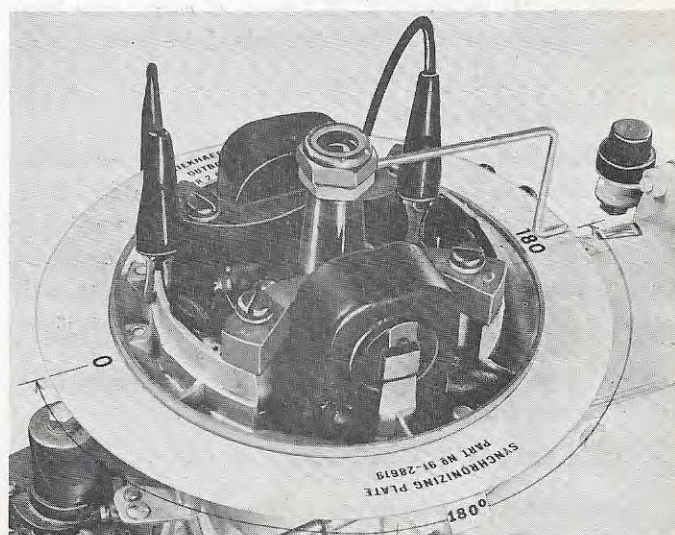


FIGURE 23. Degree Plate on Stator

arm (turn crankshaft, not indicator arm, to prevent bending indicator arm) clockwise until meter hand moves (breaker points open). This will be indicated by sudden movement of meter pointer hand.

D. Move degree plate in either direction required to place 0° mark directly under indicator arm.

E. Move small test lead from first breaker point spring to second point spring and attach.

F. Rotate indicator arm clockwise toward second breaker assembly until indicator arm is directly over 180° mark. Second breaker must open exactly at this time. If not, readjust breaker points until they just begin to open, as indicated by the meter pointer hand movement.

G. Recheck settings on No. 1 and No. 2 breaker points to assure that settings have not changed due to possible movement of degree plate.

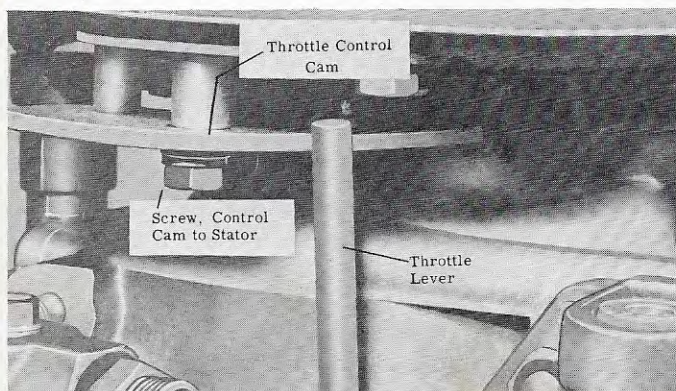


FIGURE 24. Cam Touches Pickup Lever

Note: If degree plate 91-28619A1 is not available, set breaker arms at highest point on lobe of cam. Using Feeler Gauge (91-24262) between open faces of points, set them at .018" clearance. To set other breaker point opening, rotate crankshaft 180° and set gap the same.

Note: The breaker cam should be checked for looseness. Install with arrow in direction of rotation. It should be tight on the crankshaft. If loose, it may cause misfire at idling speed. (Newer models have cam cut on shaft.)

III. SYNCHRONIZATION

Synchronization between magneto cam and carburetor throttle shaft is important. Magneto cam should pick up throttle lever at centerline of engine. It may vary slightly and pickup too soon or too late in order to maintain smooth intermediate operation. Improper synchronization will cause a "flat spot" or four-cycling in engine operation.

NOTE: Refer to "Timing, Adjusting and Synchronizing" of 2-cylinder engines on Pages 45-thru-48A.

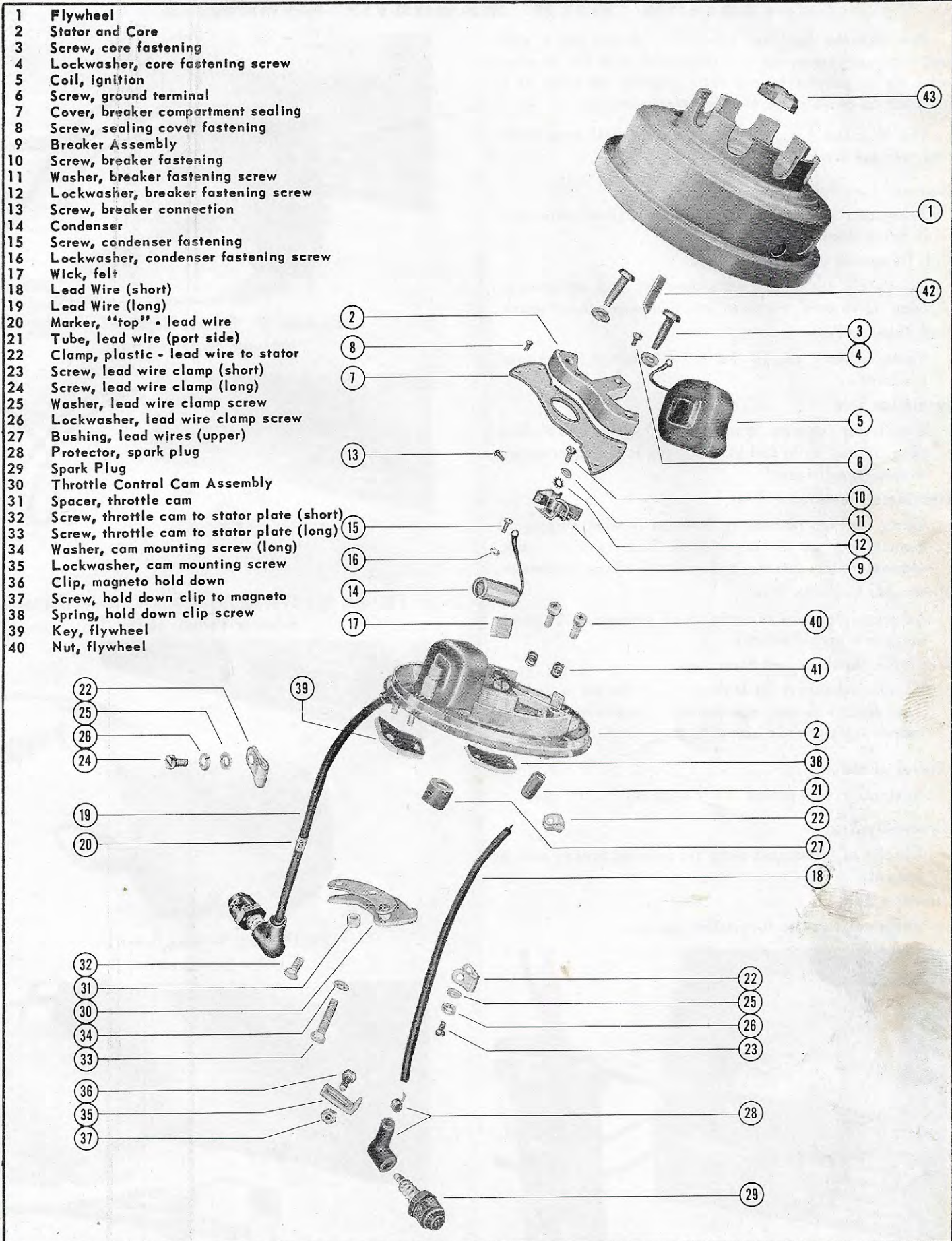
IV. REINSTALLING FLYWHEEL

After points have been set, flywheel can be installed:

A. Place flywheel on shaft over key. Place flat washer on top of flywheel (optional on some models).

B. Place ratchet or nut on crankshaft on top of washer and tighten with starter ratchet or socket wrench, using Torque Wrench (91-24163 or 91-25667) to tighten to required number of foot pounds. (See Torque Chart Specifications, Section VIII.)

NOTES



- 1 Flywheel
- 2 Stator and Core
- 3 Screw, core fastening
- 4 Lockwasher, core fastening screw
- 5 Coil, ignition
- 6 Screw, ground terminal
- 7 Cover, breaker compartment sealing
- 8 Screw, sealing cover fastening
- 9 Breaker Assembly
- 10 Screw, breaker fastening
- 11 Washer, breaker fastening screw
- 12 Lockwasher, breaker fastening screw
- 13 Screw, breaker connection
- 14 Condenser
- 15 Screw, condenser fastening
- 16 Lockwasher, condenser fastening screw
- 17 Wick, felt
- 18 Lead Wire (short)
- 19 Lead Wire (long)
- 20 Marker, "top" - lead wire
- 21 Tube, lead wire (port side)
- 22 Clamp, plastic - lead wire to stator
- 23 Screw, lead wire clamp (short)
- 24 Screw, lead wire clamp (long)
- 25 Washer, lead wire clamp screw
- 26 Lockwasher, lead wire clamp screw
- 27 Bushing, lead wires (upper)
- 28 Protector, spark plug
- 29 Spark Plug
- 30 Throttle Control Cam Assembly
- 31 Spacer, throttle cam
- 32 Screw, throttle cam to stator plate (short)
- 33 Screw, throttle cam to stator plate (long)
- 34 Washer, cam mounting screw (long)
- 35 Lockwasher, cam mounting screw
- 36 Clip, magneto hold down
- 37 Screw, hold down clip to magneto
- 38 Spring, hold down clip screw
- 39 Key, flywheel
- 40 Nut, flywheel

FIGURE 25. Phelon Magneto Parts Identification (Mark 10-10A)