

Repair Instructions IV (Form 4750)

**Section 2
IGNITION**

Three basic types of ignition systems are used —

1. MAGNETRON™ ignition, a self-contained transistor module (no moving parts) and ignition armature.
2. A flywheel type, having either an internal or external breaker system. Fig. 4 and Fig. 25.
3. The Magna-Matic system, having the armature and rotor behind the flywheel, and an external breaker system. Fig. 44.

Check Ignition

Remove the spark plug. Spin the flywheel rapidly with one end of the ignition cable clipped to the 19051 tester and with the other end of the tester grounded on the cylinder head. If spark jumps the .166" (4.2 mm) tester gap, you may assume the ignition system is functioning satisfactorily. Fig. 1.

NOTE: Flywheel must rotate at 350 RPM, minimum with MAGNETRON™ ignition.

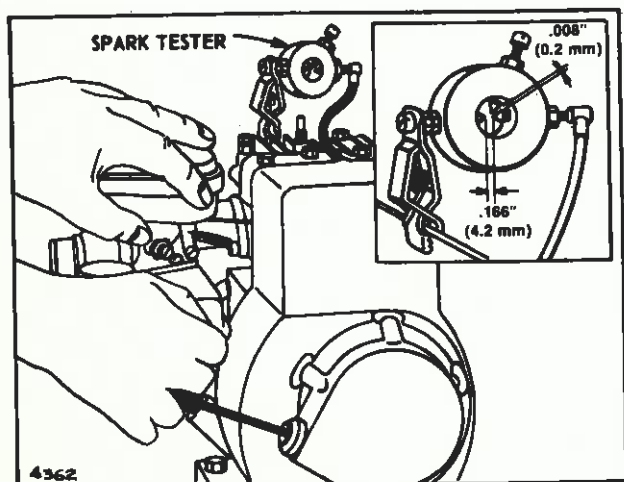


Fig. 1 — Checking Spark

NOTE: If engine runs but misses during operation, a quick check to determine if ignition is or is not at fault can be made by inserting the 19051 tester between the ignition cable and the spark plug. A spark miss will be readily apparent. While conducting this test on Magna-Matic equipped engines, Models 9, 14, 19 and 23, set the tester gap at .060" (1.5 mm).

SPARK PLUG

The plugs recommended for Briggs & Stratton engines are as follows:

<u>1-1/2" Plug</u>	<u>2" Plug</u>	<u>Manufacturer's Part Number</u>
CJ-8	J-8	Champion
RCJ-8	RJ-8	Champion Resistor
235	295	Autolite
245	306	Autolite Resistor
WS9E	—	Robert Bosch
3/4"	13/16"	Plug wrench (deep socket)

Spark Plug Cleaning.

Clean spark plug with a pen knife or wire brush and solvent and set gap at .030" (0.75 mm) for all models. If electrodes are burned away, or the porcelain is cracked, replace with a new plug. **DO NOT USE ABRASIVE CLEANING MACHINES.** Fig. 2.

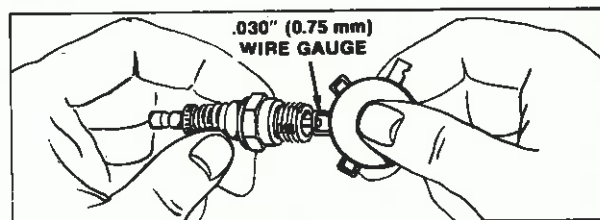


Fig. 2 — Adjusting Spark Plug Gap

**Coil and Condenser Testing
All Models**

Use an approved tester to test coils and condensers. Specifications are supplied by the tester manufacturer or refer to MS-7862, Testing Briggs & Stratton Ignition Coils.

TABLE NO. 1
SPECIFICATIONS FOR ALL POPULAR ENGINE MODELS

1. Spark plug gap: .030" (0.75 mm)
2. Condenser capacity: .18 to .24 M.F.D.
3. Contact point gap: .020" (0.50 mm)

BASIC MODEL SERIES	ARMATURE				FLYWHEEL PULLER PART NO.	FLYWHEEL NUT TORQUE		
	TWO LEG AIR GAP		THREE LEG AIR GAP			Foot Pounds†	Kilo-gram meter†	Newton meter†
	Inches	Milli-Meter	Inches	Milli-Meter				
ALUMINUM CYLINDER								
6B, 60000, 8B	.006 .010	0.15 0.25	.012 .016	0.30 0.41	19069	55†	7.6†	74.6†
80000, 82000, 92000, 93000, 94000, 95000, 110000	.006 .010	0.15 0.25	.012 .016	0.30 0.41	19069	55	† 7.6†	74.6†
100000, 130000	.010 .014	0.25 0.36	.012 .016	0.30 0.41	None	60†	8.3†	81.4†
140000, 170000, 190000, 220000, 250000	.010 .014	0.25 0.36	.016 .019	0.41 0.48	19165 or 19203*	65	† 9.0†	88.1†
CAST IRON CYLINDER								
5, 6, N, 8			.012 .016	0.30 0.41	None	55†	7.6†	74.6†
9					19068 or 19203	60	8.3	81.4
14					19068 or 19203	65	9.0	88.1
19, 190000, 200000	.010 .014	0.25 0.36	.022 .026	0.56 0.66	19068 or 19203	115†	15.9†	155.9†
23, 230000	.010 .014	0.25 0.36	.022 .026	0.56 0.66	19068 or 19203	115†	15.9†	155.9†
240000, 300000, 320000	.010 .014	0.25 0.36			19068 or 19203	145†	20.0†	196.6†

*Use on Model 250000 built after 1975.

†For rewind starter engines, use 19161 clutch wrench.

IGNITION
MAGNETRON™

The flywheel is located on the crankshaft with a special metal key. It is held in place by a Belleville washer and nut or starter clutch. The flywheel key must be in good condition to assure proper location of the flywheel for ignition timing. **DO NOT** use a steel key under any circumstances. Use only the soft metal key, as originally supplied.

The keyway in both flywheel and crankshaft should not be distorted. Flywheels used are made of aluminum, zinc or cast iron.

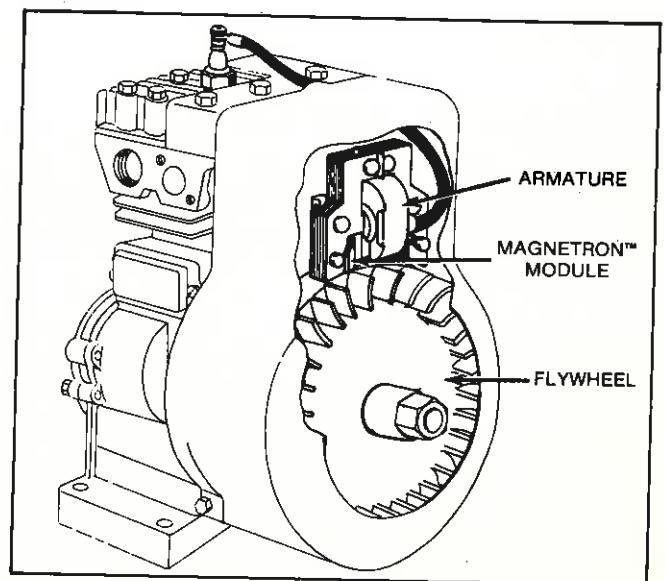


Fig. 3 — MAGNETRON™ Ignition

Flywheel Type — MAGNETRON™ — Internal Breaker

IGNITION

Flywheel Type — Internal Breaker

The flywheel is located on the crankshaft with a soft metal key. It is held in place by a nut or starter clutch. The flywheel key must be in good condition to insure proper location of the flywheel for ignition timing. **DO NOT** use a steel key under any circumstances. Use only the soft metal key, as originally supplied.

The keyway in both flywheel and crankshaft should not be distorted. Flywheels used are made of aluminum, zinc or cast iron.

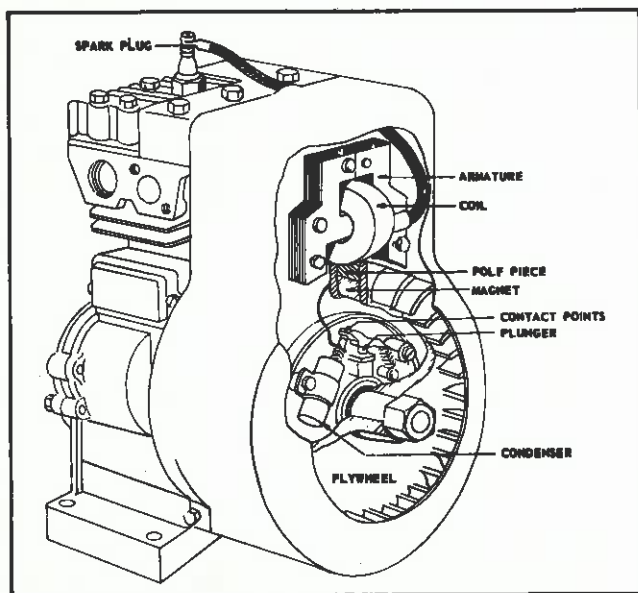


Fig. 4 — Flywheel Ignition Internal Breaker

REMOVING ARMATURE AND MAGNETRON™ IGNITION

The flywheel does not need to be removed to service MAGNETRON™ except to check keyways and flywheel key.

Remove armature screws and lift off armature. Use breaker point condenser P/N 294628 or 3/16" pin punch to release stop switch wire from MAGNETRON™ module. Fig. 5. Stop switch wire is soldered to module and armature primary wires. Unsolder to disconnect.

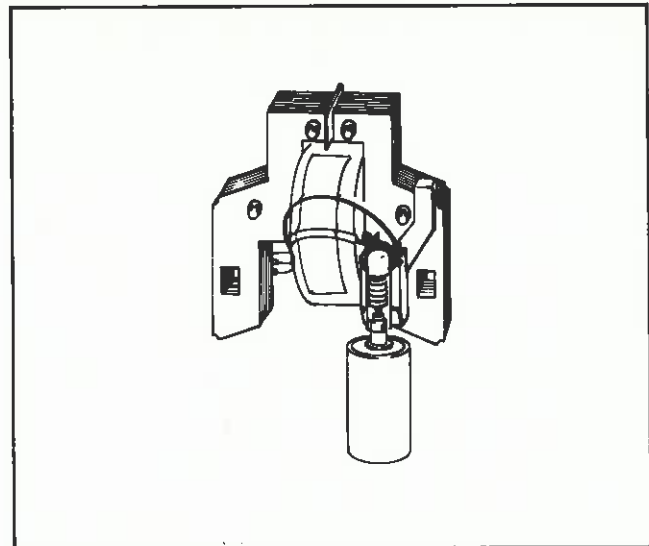


Fig. 5 — MAGNETRON™ Module

REMOVING MAGNETRON™ MODULE

Unsolder armature ground wire from module wire, Fig. 6. Remove tape and move module ground wire to clear armature coil and laminations. Push module retainer away from laminations and push module off laminations, Fig. 7.

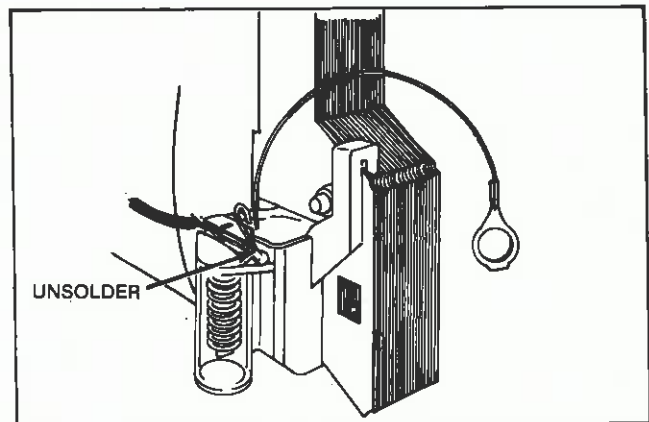


Fig. 6 —

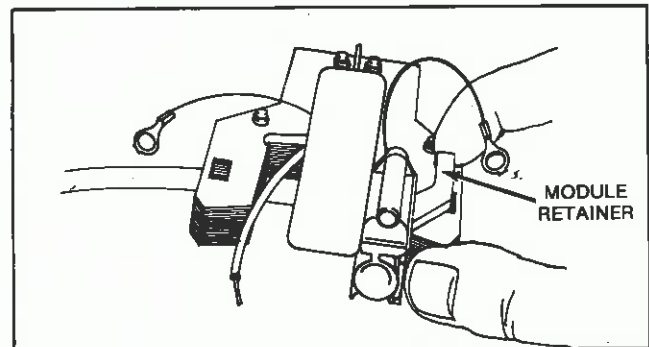


Fig. 7 —

IGNITION MAGNETRON™

INSTALLING MAGNETRON™ MODULE

Module is installed in reverse order of removal. Note that module retainer must be on back side of coil laminations, Fig. 8. Use Permatex™ or similar sealant to hold ground wires in place, Fig. 8.

Ignition timing is controlled by the location of the flywheel and crankshaft keyways on aluminum engines. On cast iron engines, refer to page 9.

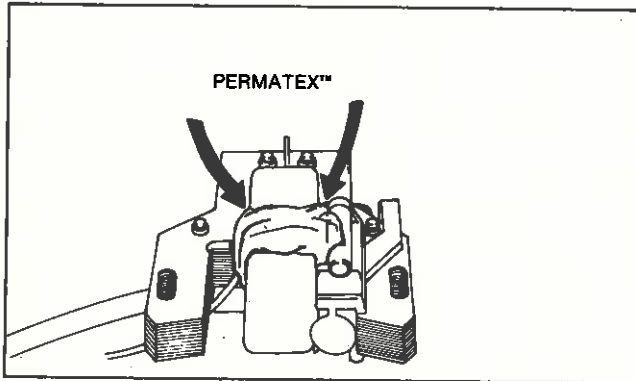


Fig. 8 —

Remove Flywheel Nut or Starter Clutch

On flywheels of 6-3/4" (171 mm) diameter or less, use flywheel holder 19167, to keep flywheel from turning. On rope starter engines, the 1/2" diameter thread flywheel nut is left handed and the 5/8" diameter thread is right handed. Fig. 9. Starter clutch used on rewind and wind-up starter has a right hand thread. Fig. 10. Remove clutch using P/N 19114 starter clutch wrench or P/N 19244 or 19161 1/2" square drive starter clutch wrench.

For flywheels or larger diameter place a block of wood under flywheel fin to prevent flywheel turning while loosening nut or starter clutch. Clamp engine base securely, Fig. 11.

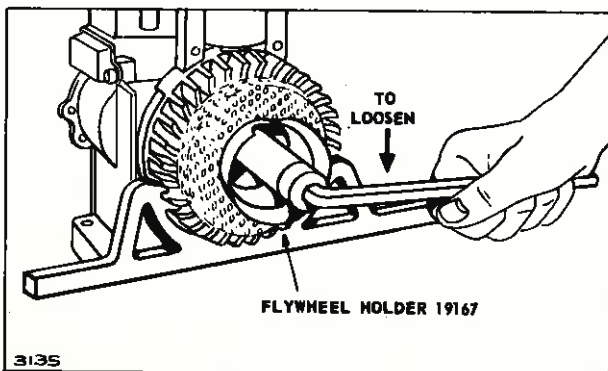


Fig. 9 — Loosen Flywheel, Rope Starter
(1/2" Dia. Threads)

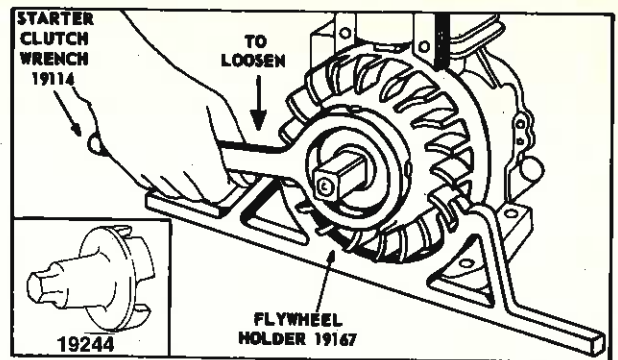


Fig. 10 — Loosening Flywheel
Rewind Starter and Wind-Up Starter Engines

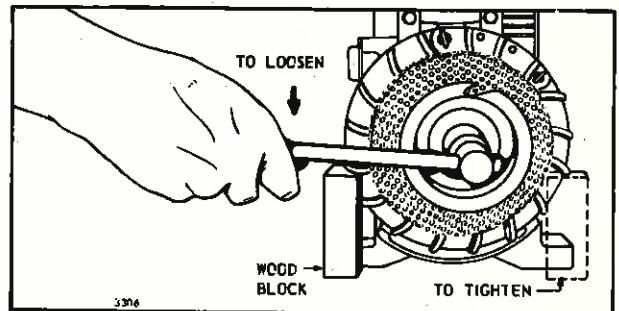


Fig. 11 — Loosening Large Flywheels

Remove Flywheel

Some flywheels have two holes provided for use of a flywheel puller. Use puller shown in Table 1. Leave nut loose on threads of crankshaft for puller to bear against, Fig. 12. Small cast iron flywheels do not require a flywheel puller. See note below.

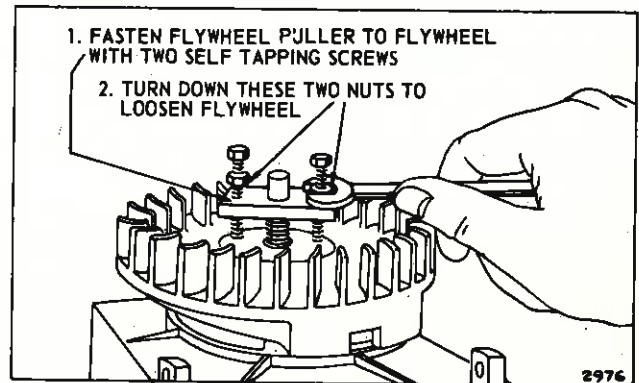


Fig. 12 — Removing Flywheel

NOTE: To remove small cast iron flywheels without puller holes, support the flywheel with a gloved hand, exerting an upward pull. Using a rawhide hammer, strike the outside rim of the flywheel with a sharp blow. Several blows may be required on an extremely tight flywheel.

NOTE: Care is required not to damage the flywheel fins, magnets or ring gear.

Flywheel Type — Internal Breaker

Check Breaker Point Plunger Hole

2

Removing Breaker Cover

Care should be taken when removing breaker cover, to avoid damaging cover. If cover is bent or damaged it should be replaced to insure a proper dust seal.

Breaker Points

Breaker point gap on all models is .020" (0.5 mm). Breaker points should be checked for contact and for signs of burning or pitting. Points set too wide will advance spark timing and may cause kick back when starting. Points gapped too close retard spark timing and decrease engine power.

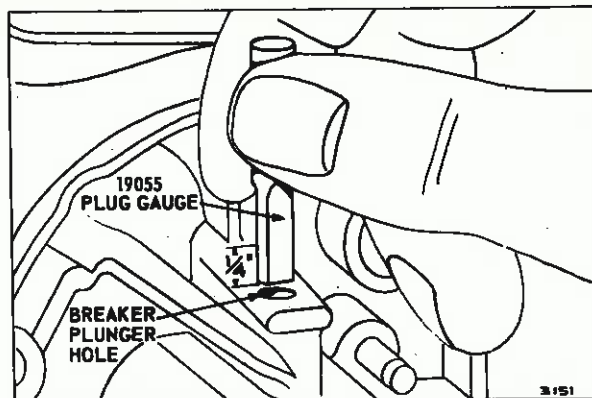


Fig. 15 — Checking Breaker Plunger Hole

If the breaker point plunger hole becomes worn excessively, oil will leak past the plunger and may get on the points, causing burning. To check, loosen breaker point mounting screw and move breaker points out of the way. Remove plunger. If the flat end of the 19055 plug gauge will enter the plunger hole for a distance of 1/4" (6.35 mm) or more, the hold should be rebushed. Fig. 15.

Install Breaker Point Plunger Bushing

To install the bushing, it is necessary that the breaker points, armature, crankshaft and starter be removed. Use reamer 19056, to ream out the old plunger hole. See Fig. 16. This should be done by hand. The reamer should be in alignment with the plunger hole. Drive the bushing 23513, with driver 19057 until the upper end of the bushing is flush with the top of the boss. Fig. 16. Finish ream the bushing with reamer 19058. All reaming chips or dirt must be removed.

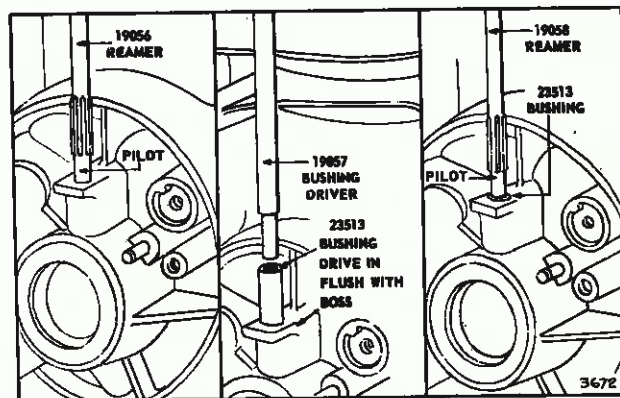


Fig. 16 — Installing Breaker Plunger Bushing

Remove Breaker Points

Breaker point assemblies of style shown in Fig. 13 are removed by removing condenser and armature wires from breaker points clip. Loosen adjusting lock screw and remove breaker point assembly.

Breaker point assemblies of style shown in Fig. 14 are removed by loosening the screw holding the post. The condenser on these models also includes the breaker point. The condenser is removed by loosening the screw holding the condenser clamp.

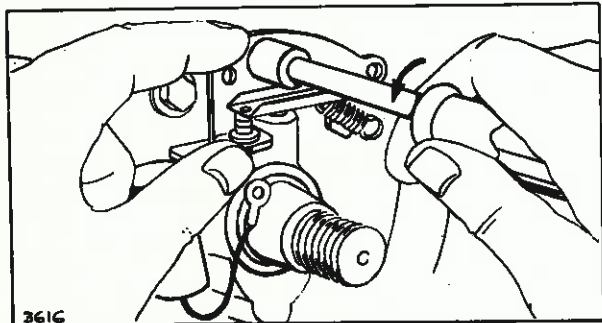


Fig. 13 — Breaker Point Assemblies

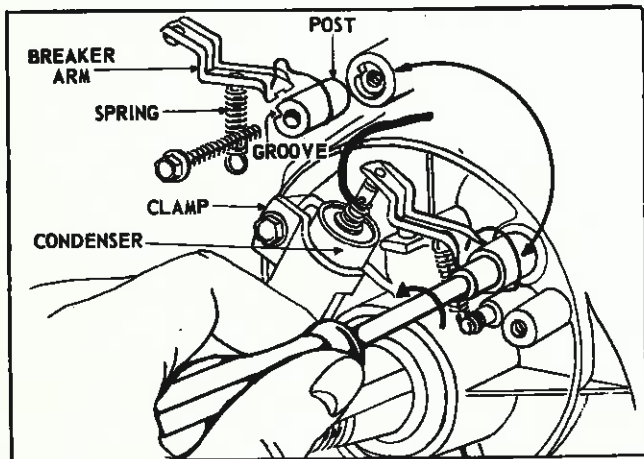


Fig. 14 — Breaker Point Assemblies

IGNITION

Flywheel Type — Internal Breaker

Breaker Point Plunger

If the breaker point plunger is worn to a length of .870" (22.1 mm) or less, it should be replaced. Plungers must be inserted with groove at the top when installed or oil will enter breaker box. See Fig. 17.

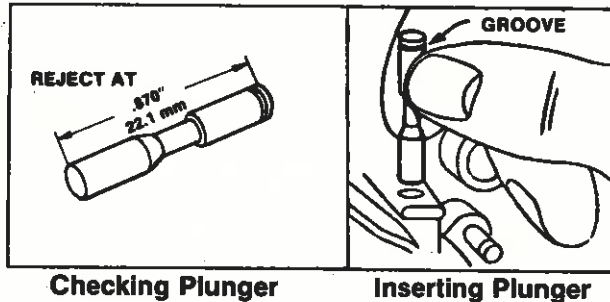


Fig. 17

Install Breaker Points

Insert breaker plunger into the plunger hole in cylinder. Breaker points as shown in Fig. 14 are installed by placing the mounting post of the breaker arm into the recess in the cylinder so that the groove in the post fits the notch in the recess. Tighten the mounting screw securely. Use a 1/4" spinner wrench if available. Slip the open loop of breaker arm spring through the two holes in the arm, then hook closed loop of spring over the small post protruding from the cylinder. Push flat end of the breaker arm into the groove in the mounting post. This places tension on the spring and pulls arms against the plunger. If condenser post is threaded, attach the coil primary wire (and ground wire if furnished) with the lockwasher and nut. If primary wire is fastened to condenser with spring fastener, compress spring. Fig. 18, and slip primary wire (and ground wire where furnished) into hole in condenser post. Release spring. Lay the condenser in place and tighten the condenser clamp securely.

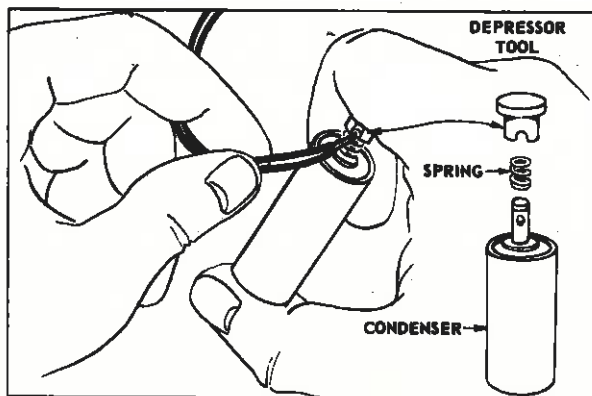


Fig. 18 — Assembling Condenser and Ignition Wires

When installing breaker point assemblies, as shown in Fig. 13, be sure the small boss on the magneto plate enters the hole in the point bracket. Mount points to magneto plate or cylinder with lock screw. Fasten the armature lead wire to the breaker points with the clip and screw. If these lead wires do not have terminals, the bare end of the wires can be inserted into the clip and screw tightened to make a good connection. Do not let the ends of the wire touch the point bracket or magneto plate or ignition will be grounded.

Adjusting Breaker Point Gap

Turn crankshaft until points open to widest gap. When adjusting breaker point assemblies as shown in Fig. 19, move condenser forward or backward with screw driver until a gap of .020" (0.5 mm) is obtained. Breaker points assemblies as shown in Fig. 20, are adjusted by loosening lock screw and moving contact point bracket up or down. Gap is .020" (0.5 mm).

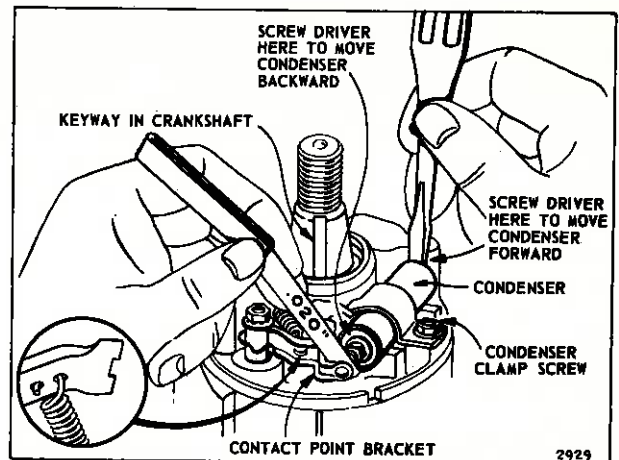


Fig. 19 — Adjusting Breaker Point Gap

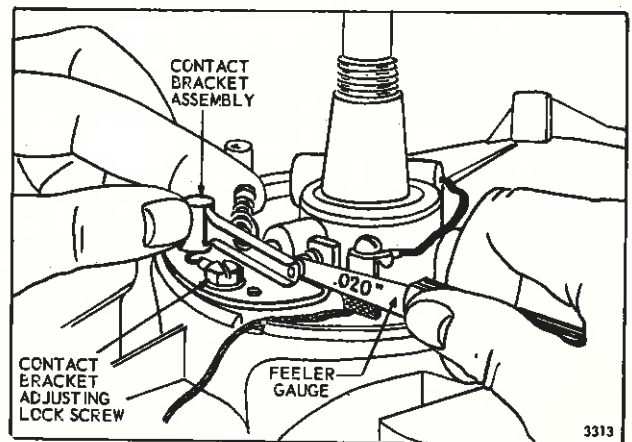


Fig. 20 — Adjusting Breaker Point Gap

Flywheel Type — Internal Breaker

Adjust Armature Air Gap

Three styles of armatures have been used (Fig. 23, Illus. 1, 2 and 3). Set air gap between the flywheel and armature as shown in Table 1. With armature up as far as possible, and one screw tightened, slip the proper gauge between armature and flywheel. Fig. 24. Turn flywheel until magnets are directly below the armature. Loosen the one mounting screw and the magnets should pull the armature down firmly against the thickness gauge. Then tighten the mounting screws.

2

NOTE: Always clean breaker points after adjustment. Open the points and insert a piece of lintless paper. Draw the paper through the points. Open points when removing paper so it will not tear, leaving paper between the points.

Breaker Point Cover

The breaker point cover, Fig. 21, protects the points from dirt. The opening for the primary and/or ground wire should be sealed with No. 2 Permatex™ or similar sealer to prevent dirt from entering the breaker box. Cover should not be distorted so as to lose its seal around the outer edge. Replace if damaged.

NOTE: Engines used for winter applications use vented breaker covers. See Engine Parts List.

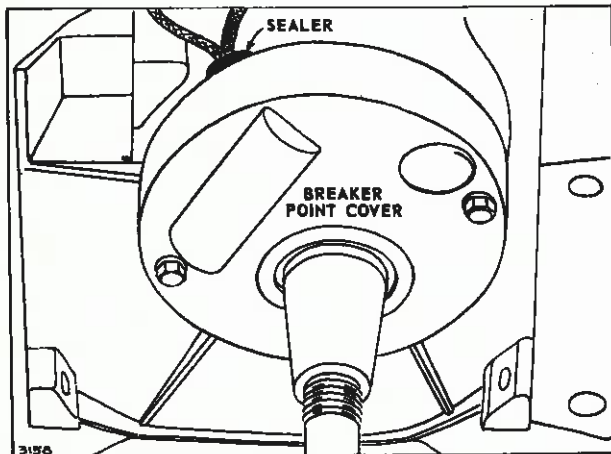


Fig. 21 — Breaker Point Cover

Install Armature

Install governor blade and armature, Fig. 22. The mounting holes in the armature laminations are slotted. Push armature up as far as possible and tighten one mounting screw to hold armature in place.

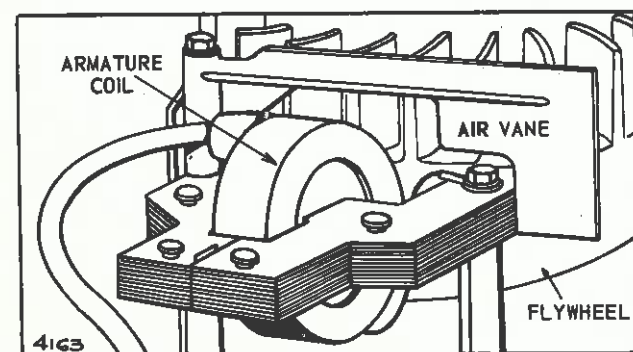
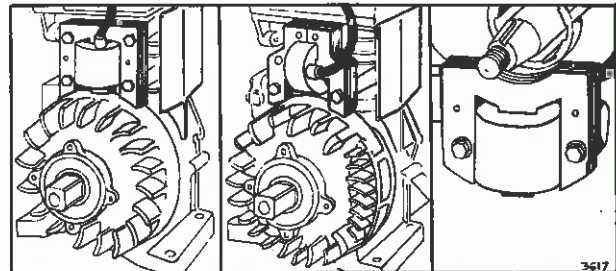


Fig. 22 — Install Armature and Governor Blade



Illus. 1 Illus. 2 Illus. 3

Fig. 23 — Armature Style Variations

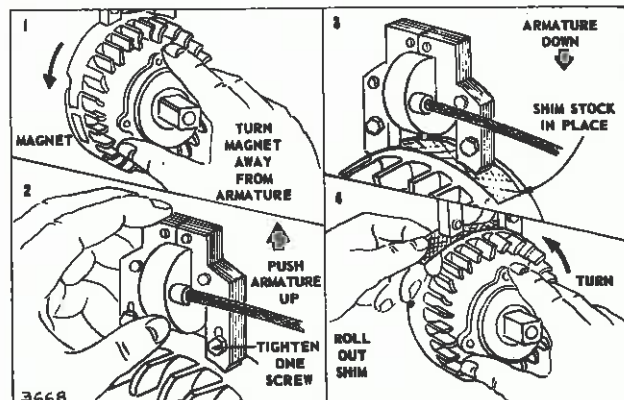


Fig. 24 — Adjusting Armature Air Gap

FLYWHEEL KEY

Inspect key for partial shearing. If sheared, replace. Check flywheel and crankshaft keyways for damage. If damaged, replace with new parts.

Install Flywheel, Nut and/or Starter Clutch

Remove all oil or grease, clean flywheel hole and tapered end of crankshaft before assembling flywheel to shaft. Insert zinc key into keyway. Slip spring washer over crankshaft with hollow side toward flywheel. To tighten flywheel nut or starter clutch, reverse removal operation. See "Remove Flywheel Nut or Starter Clutch." Torque to specifications listed in Table No. 1.

IGNITION

Flywheel Type — External Breaker

MODEL SERIES 193000, 200000, 230000,
243000, 300000, 320000, 19D, 23D

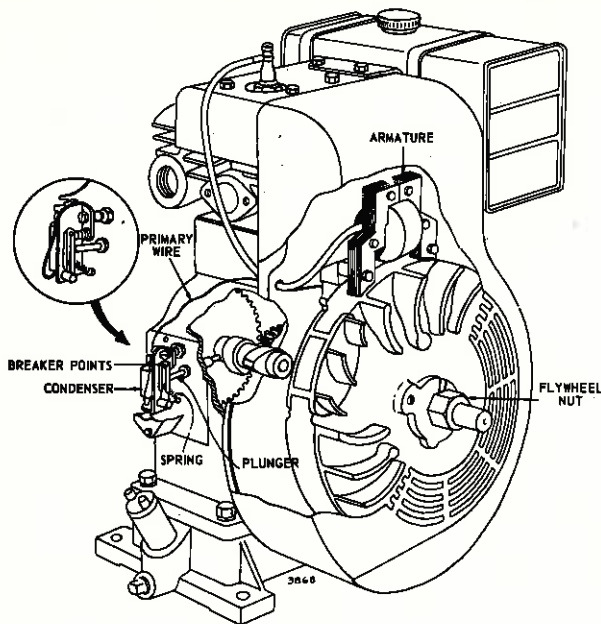


Fig. 25 — Flywheel Ignition External Breaker
Models 193000, 200000, 233000, 243000,
300000, 320000

Replace Breaker Points —

Model Series 193000, 200000, 230000,
243000, 300000, 320000, 19D, 23D

Turn crankshaft until points open to widest gap. This makes it easier to assemble and adjust points later if crankshaft is not removed. Remove condenser and upper and lower mounting screws. Loosen lock nut and back off breaker point screw. Fig. 26. Reverse process to install.

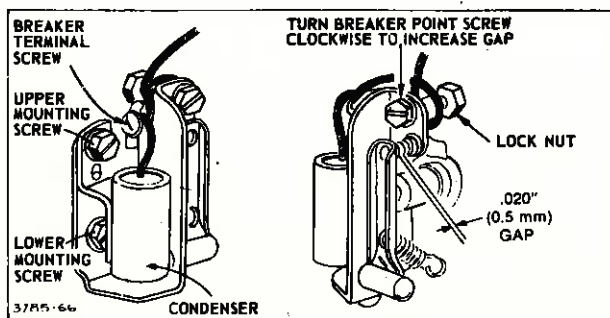


Fig. 26 — Breaker Points

To avoid the possibility of oil leaking past the breaker point plunger or moisture entering the crankcase between plunger and bushing, a plunger seal is now installed on engine models using this ignition system. Fig. 27. These parts may be added to engines in the field if contaminated points are experienced.

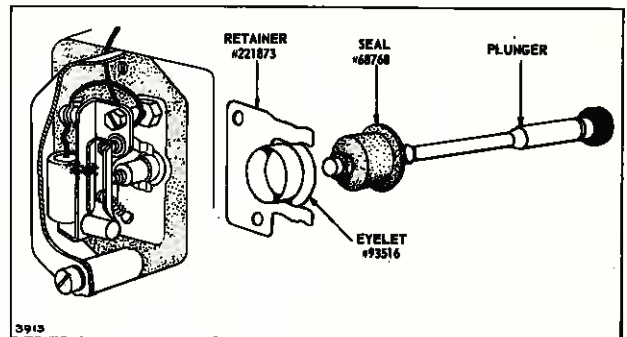


Fig. 27 — Seal Assembly

EXTREME CARE SHOULD BE TAKEN WHEN INSTALLING SEAL ON PLUNGER, OR SEAL MAY BE FRACTURED.

NOTE: Before mounting the breaker-condenser assembly, apply a sealer such as Permatex™ to the threads of both mounting screws and the adjustment screw. The sealer prevents oil from leaking into the breaker point area.

Mount the breaker point assembly, then tighten adjustment screw until the locknut has pushed the ferrule as far as possible toward the head of the adjustment screw. This secures the adjustment screw firmly to the breaker point.

Adjust and Clean Breaker Points

Turn the crankshaft until the points open to their widest gap. Turn breaker point adjusting screw until points open to .020" (0.5 mm). Tighten locknut, while holding adjustment screw, Fig. 26. To clean points turn crankshaft until points are closed. Insert a piece of lintless paper and draw the paper between the points. Open the breaker points to withdraw the paper (so the paper will not tear and allow a small portion to remain between the points).

Apply additional sealer at the point at which the primary wire passes under the breaker cover. This area must be re-sealed to prevent the entry of dust and moisture. See Fig. 28.

Flywheel Type — MAGNETRON™ — External Breaker

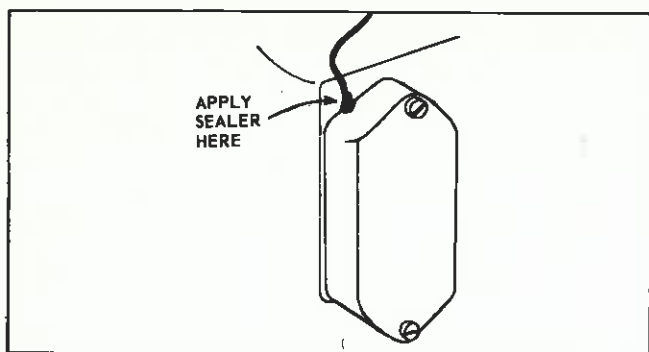


Fig. 28 — Sealing Breaker Cover

TIMING MAGNETRON™ IGNITION

1. Gasoline — Position armature bracket so mounting screws are centered in armature bracket and tighten screws, Fig. 29A.
2. Kerosene — Position armature bracket to the right, as far as it will go and tighten screws, Fig. 29B.

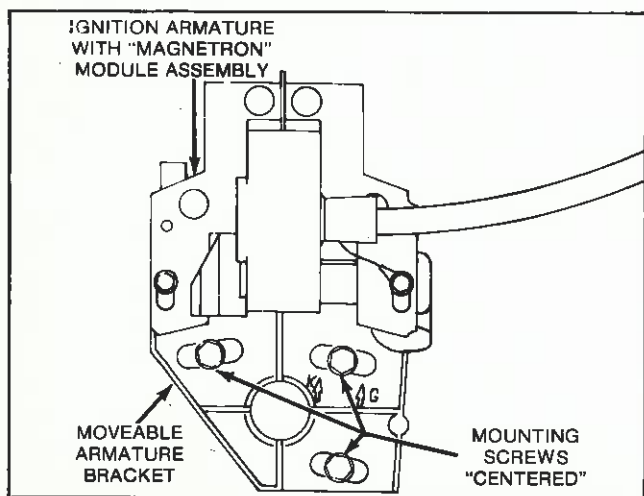


Fig. 29A — Gasoline Operation

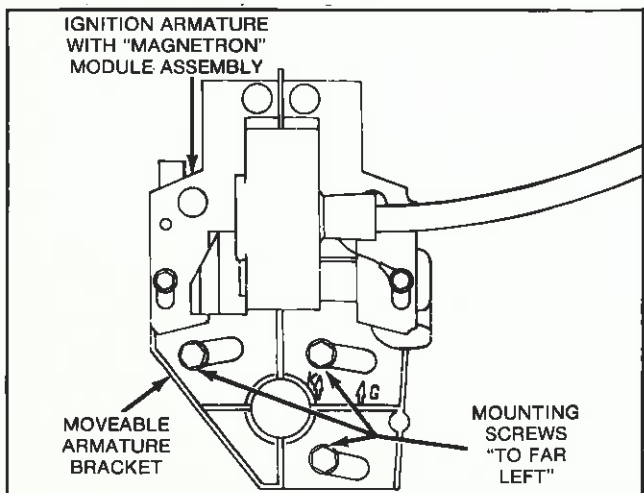


Fig. 29B — Kerosene Operation

ADJUST ARMATURE TIMING WITH BREAKER POINTS

MODEL SERIES 193000, 200000, 230000, 243000, 300000, 320000

Remove Flywheel

Use puller 19203 or 19068, running puller screws into holes tapped into flywheel. Continue to tighten screws until flywheel loosens, Fig. 30.

NOTE: Use flywheel nut to protect crankshaft threads.

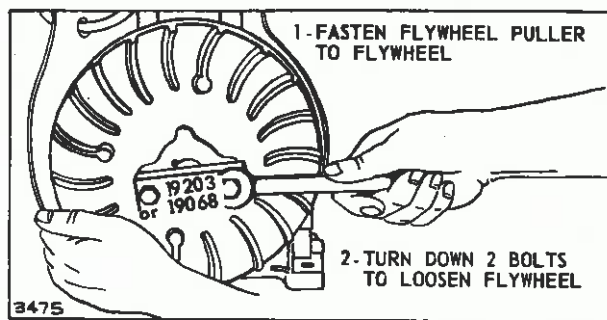


Fig. 30 — Removing Flywheel

Set point gap at .020" (0.5 mm). Position flywheel on crankshaft taper. Slip key in place. Install flywheel nut finger tight. Rotate flywheel and crankshaft clockwise until breaker points are just opening. Use a timing light. When points just start to open, arrow on flywheel should line up with arrow on armature bracket, Fig. 31.

If arrows do not match, slip off flywheel without disturbing crankshaft position. Slightly loosen mounting screws holding armature bracket to cylinder, Fig. 31. Slip flywheel back on crankshaft. Insert flywheel key. Install flywheel nut finger tight. Move armature and bracket assembly to align arrows. Slip off flywheel, tighten armature bracket bolts. Install key and flywheel. Tighten flywheel nut to torque specifications listed in Table No. 1. Set armature air gap at .010" - .014" (0.25 - 0.36 mm), Fig. 32.

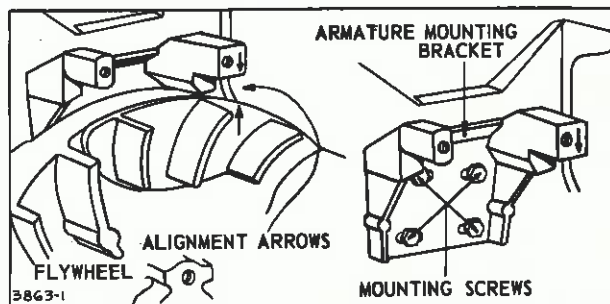


Fig. 31 — Timing Marks

2

IGNITION

Flywheel Type — External Breaker

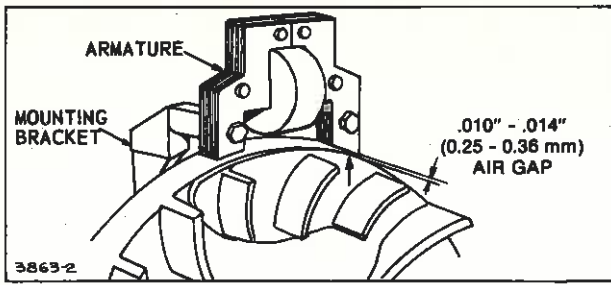


Fig. 32 — Armature Air Gap

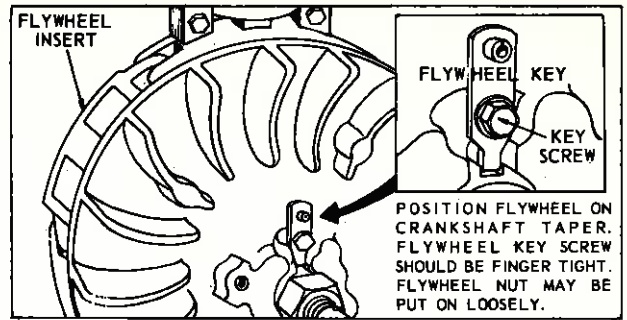


Fig. 34 — Flywheel Key

ADJUST ARMATURE TIMING

Model Series 19D, 23D

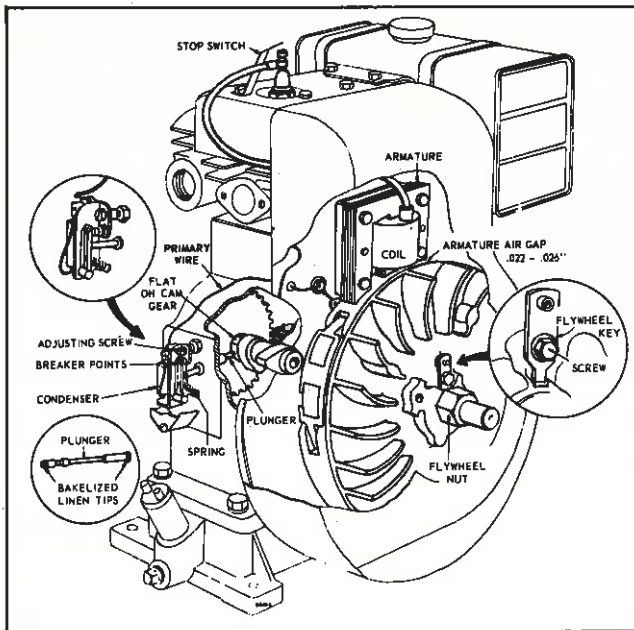


Fig. 33 — Model Series 19D, 23D

Rotate flywheel clockwise until breaker points are just opening (flywheel key drives crankshaft while doing this). Fig. 35. Use a timing light.

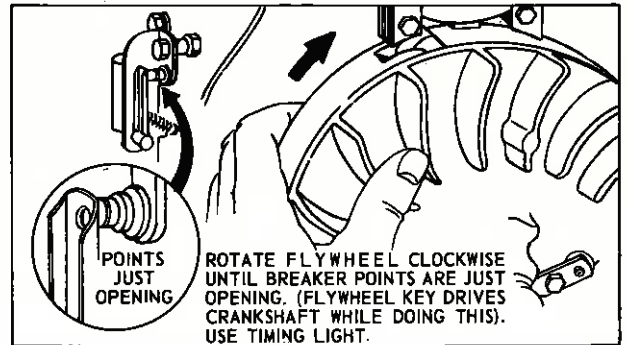


Fig. 35 — Flywheel Timing

Rotate flywheel slightly, counterclockwise, until edge of armature lines up with edge of flywheel insert, Fig. 36. (Crankshaft must not turn while doing this.) Tighten key screw. Tighten flywheel nut. See Table 1. Set armature air gap at .022" - .026" (0.56 - 0.66 mm).

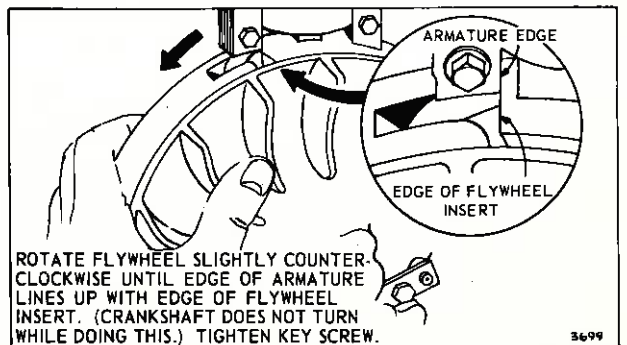


Fig. 36 — Flywheel Timing

Remove Flywheel

Use puller 19203 or 19068, running puller screws into holes tapped into flywheel. Continue to tighten screws until flywheel loosens, Fig. 30.

NOTE: Use flywheel nut to protect crankshaft threads.

Set points at .020" (0.51 mm) gap. Position flywheel on crankshaft taper. Flywheel key screw should be finger tight. Flywheel nut may be put on loosely, Fig. 33.

REPLACING BREAKER PLUNGER AND BUSHING

Model Series 19D, 23D, 193000, 200000, 230000, 243000, 300000, 320000

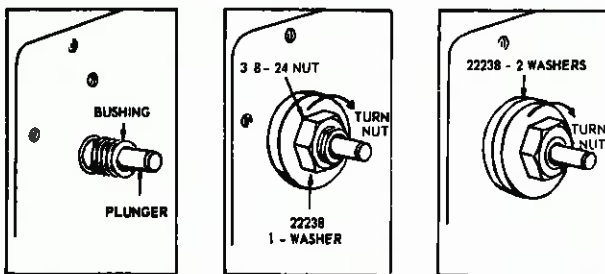
Two styles of plunger bushing have been used. Removal and installation is as follows.



Fig. 37

Remove breaker box cover, condenser and breaker assembly, Fig. 38, Illus. 1.

Place a thick 3/8" inside diameter washer, such as P/N 22238, over the end of bushing and screw on a 3/8-24 nut, as shown in Fig. 38, Illus. 2. Tighten the nut to pull the bushing. After the bushing has moved about 1/8", remove the nut and put on a second thick washer, as shown in Fig. 38, Illus. 3. A total stack of 3/8" of washers (2-22238) will be required to completely remove the bushing. Be sure the plunger does not fall out of the bushing as it is removed.



Illus. 1

Illus. 2

Illus. 3

Fig. 38 — Removing Plunger and Threaded Bushing

Installing Threaded Bushing and Plunger

Place the new plunger in the bushing with the large end of the plunger opposite the threads on the bushing. Screw the 3/8-24 nut onto the threads to protect them. See Fig. 39.

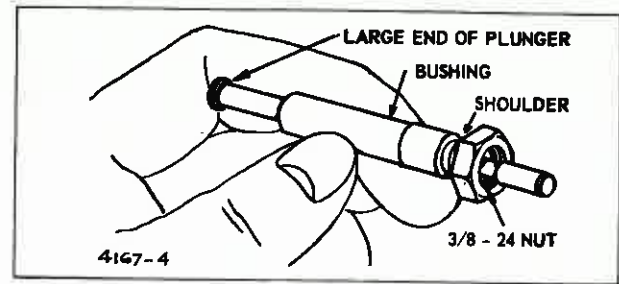


Fig. 39 — Plunger and Bushing

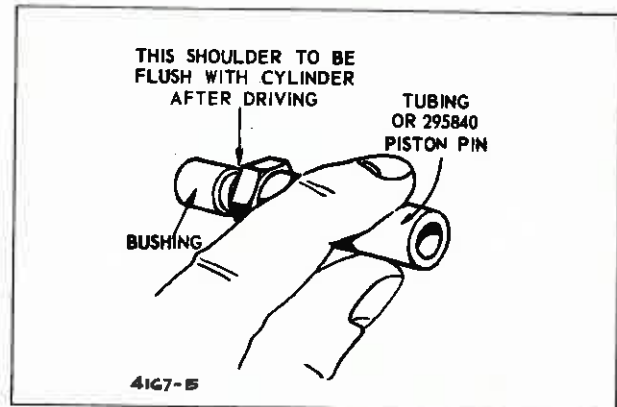


Fig. 40 — Inserting Bushing

Insert bushing into cylinder. Place a piece of tubing such as P/N 295840 piston pin against the nut, as shown in Fig. 40. Use a hammer to drive the bushing into the cylinder until the square shoulder on the bushing is flush with the face of the cylinder. Check to be sure plunger operates freely.

Alternate Design

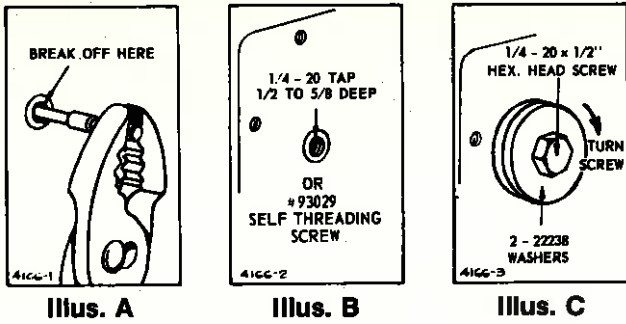


Fig. 41 — To Remove Bushing and Plunger

Pull plunger outward as far as possible. Use a pliers to break plunger off as close to bushing as possible. See Illus. A, Fig. 42. Use a 1/4-20 tap or a 93029 self-threading screw to thread the hole in the bushing to a depth of approximately 1/2 to 5/8" deep, as shown in Illus. B. Use 1/4-20 x 1/2" hex head screw and two spacer washers as shown in Illus. C, to pull the bushing out of the cylinder. The bushing will be free when it has been extracted 5/16". CAREFULLY remove the bushing and the remainder of the broken plunger. Do not allow the plunger or chips to drop into the crankcase.

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Illus. A
Illus. B
Illus. C
Fig. 42 — Removing Bushing and Plunger

To Install Bushing and Plunger

Insert the plunger in the new bushing as shown in Fig. 43.

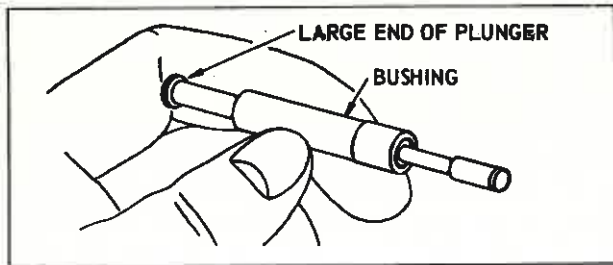


Fig. 43 — Inserting New Plunger in Bushing

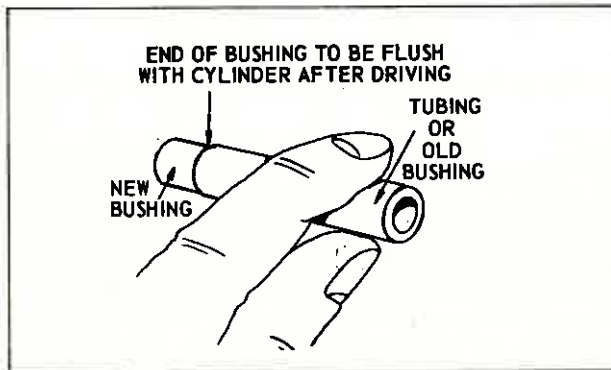


Fig. 44 — Inserting Plunger and Bushing in Cylinder

Insert plunger and bushing into the cylinder. Use a hammer and the old bushing to drive the new bushing into the cylinder until the new bushing is flush with the face of the cylinder. Check to be sure the plunger operates freely. Fig. 44.

MAGNA-MATIC SYSTEM Engine Models 9-14-19-23-191000-231000

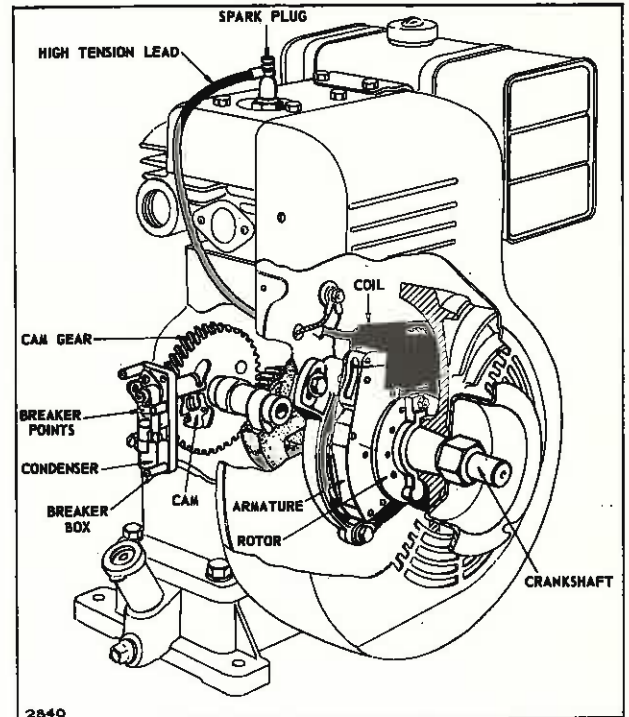


Fig. 45 — Magna-Matic System

Remove Flywheel

Use puller 19203 or 19068, running puller screws into holes tapped into flywheel. Continue to tighten screws until flywheel loosens. Fig. 46.

NOTE: Use flywheel nut to protect crankshaft threads.

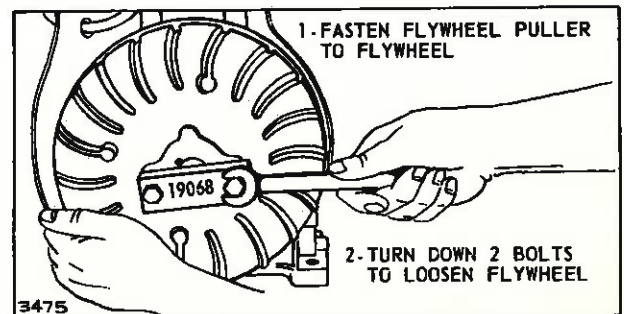
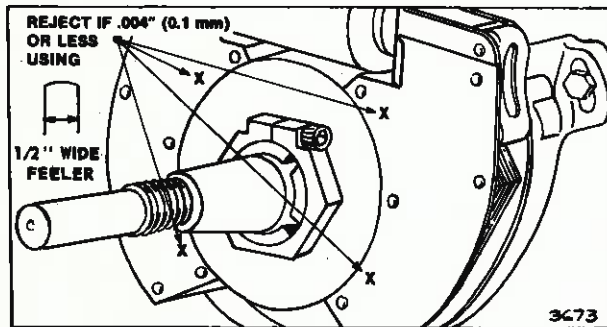


Fig. 46 — Removing Flywheel

Armature Air Gap

Armature air gap on engines equipped with Magna-Matic ignition is fixed and can change only if wear occurs on crankshaft journal and/or main bearing. Check for wear by inserting a feeler gauge 1/2" (12.7 mm) in width at points between the rotor and armature. Minimum feeler gauge thickness is .004" (0.1 mm). (Keep feeler gauge away from magnets on rotor or you will have a false reading.) Fig. 47.



**Fig. 47 — Checking Armature Gap
Magna-Matic Ignition**

Remove Rotor

The rotor is held in place by means of a Woodruff key and a clamp on later engines, and a Woodruff key and set screw on older engines. Fig. 48. **THE ROTOR CLAMP MUST ALWAYS REMAIN ON THE ROTOR (UNLESS THE ROTOR IS IN PLACE ON THE CRANKSHAFT AND WITHIN THE ARMATURE) OR A LOSS OF MAGNETISM WILL OCCUR.**

Loosen the socket head screw in the rotor clamp, allowing the clamp to loosen. It may be necessary to use a puller to remove the rotor from the crankshaft. On older models, loosen the small lock screw, then the set screw.

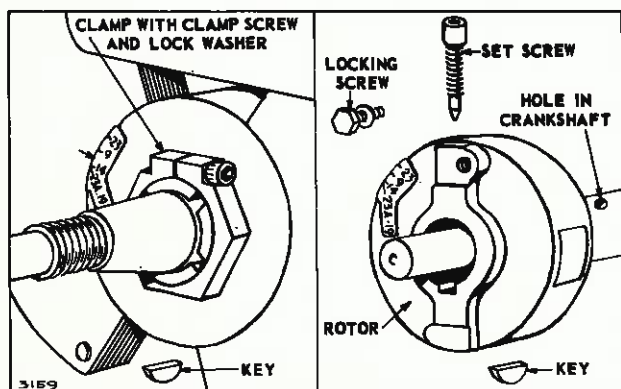


Fig. 48 — Rotor

Install Rotor

If rotor has a set screw, Fig. 48, Illus. 2, place the Woodruff key in keyway on crankshaft, then slide rotor onto crankshaft until the set screw hole in rotor and crankshaft are aligned. Be sure the key remains in place. Tighten the set screw securely, then tighten the lock screw to prevent set screw from loosening. The lock screw is self-threading and the hole does not require tapping.

If rotor has a clamp, Fig. 48, Illus. 1, place the Woodruff key in place in crankshaft, align keyways in rotor with Woodruff key. If necessary, use a short length of pipe and hammer to drive rotor onto shaft until .025" (0.64 mm) feeler gauge can be inserted between rotor and bearing support. Split in clamp must be between slots in rotor. Tighten clamp lock screws 60 to 70 inch pounds (.7 - .8 kg m or 6.8 - 8.0 newton m). Fig. 49.

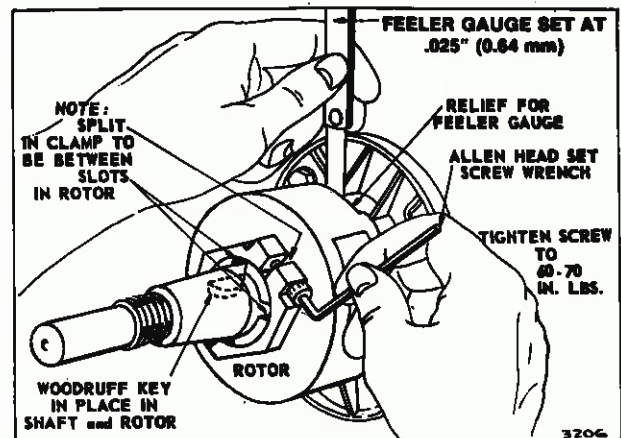


Fig. 49 — Install Rotor

Adjust Rotor Timing

The rotor and armature are correctly timed at the factory and require timing only if the armature has been removed from the engine, or if the cam gear or crankshaft has been replaced.

If necessary to adjust, proceed as follows: With the point gap set at .020" (0.5 mm) turn the crankshaft in normal direction of rotation until breaker points close and just start to open. Use a timing light or insert a piece of tissue paper between the breaker points to determine when points begin to open. With the three armature mounting screws slightly loose, rotate the armature until the arrow on armature lines up with the arrow on rotor as shown in Fig. 50. Align with corresponding number of engine model. On Models 9, align with 9, etc. Retighten armature mounting screws.

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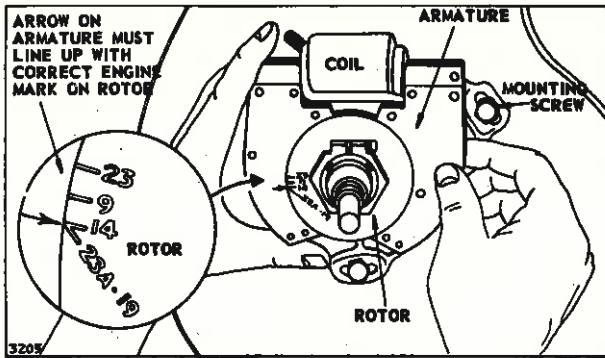


Fig. 50 — Adjusting Rotor Timing

Replace Coil or Armature or Both

Usually the coil and armature are not separated, but are left assembled for convenience. However, if one or both need replacement, proceed as follows: The coil primary wire and the coil ground wire must be unfastened. Pry out the clips that hold the coil and coil core to the armature. See Fig. 51. The coil core is a slip fit in the coil and can be pushed out of the coil.

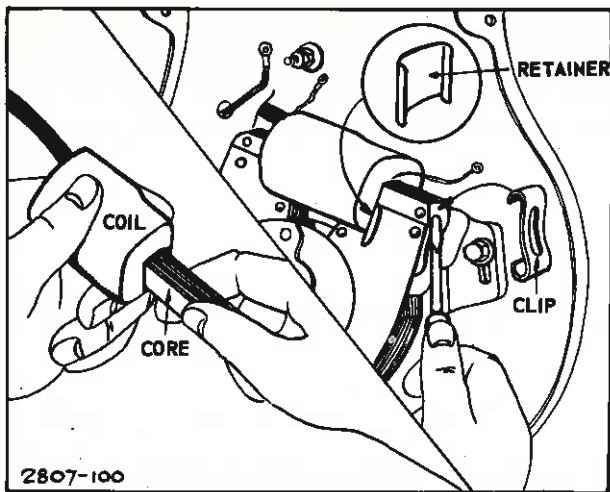


Fig. 51 — Replace Coil

To reassemble, push coil core into coil with rounded side toward the ignition cable. Place coil and core on armature with coil retainer between the coil and armature, with rounded side toward the coil. Hook the lower end of the clips into the armature; then press the upper end onto the coil core, Fig. 51.

Fasten the coil ground wire (bare double wires) to the armature support. (Replacing coil, Fig. 51). Now place the assembly against the cylinder around the rotor and bearing support. Insert the

three mounting screws together with washer and lockwasher into the three long oval holes in the armature. Tighten them enough to hold the armature in place but loose enough that the armature can be moved for adjustment of rotor timing. See Fig. 50. Attach primary wires from coil and breaker points to the terminal at the upper side of back plate. (This terminal is insulated from back plate.) Push the ignition cable through the louvered hole at left side of back plate.

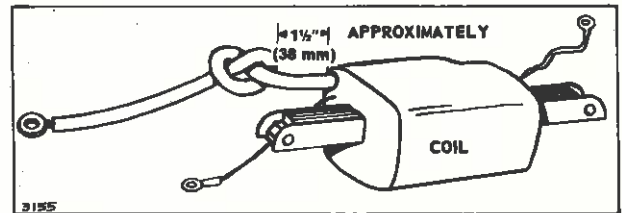


Fig. 52 — Shorten Cable — Model 9

NOTE: On Model 9 engines, knot the ignition cable before inserting it through the back plate. See Fig. 52. Be sure all wires clear flywheel.

Remove Breaker Points

Turn crankshaft until points open to widest gap. This makes it easier to assemble and adjust points later if crankshaft is not removed. With terminal screw removed, remove the spring screw. See Fig. 53. Loosen the breaker shaft nut until nut is flush with end of shaft. Tap nut to free breaker arm from tapered end of breaker shaft. Remove nut, lockwasher and breaker arm. Remove breaker plate screw, breaker plate, pivot, insulating plate and eccentric. Pry out breaker shaft oil seal with a sharp pointed tool.

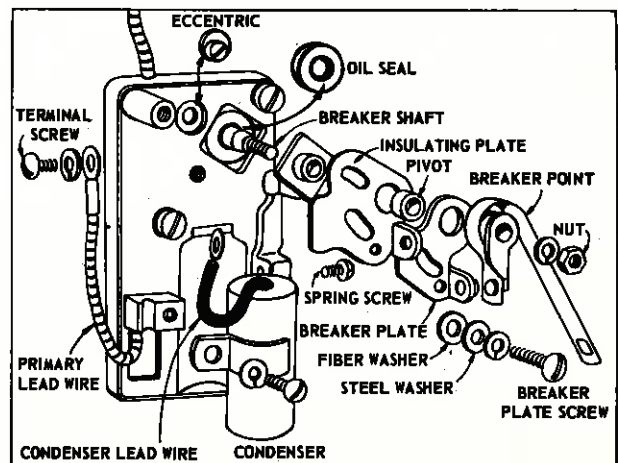


Fig. 53 — Breaker Box Assembly

Remove Breaker Box

Remove the two mounting screws, then remove the breaker box, turning it slightly to clear the arm at inner end of breaker shaft. See Fig. 54. Breaker points need not be removed to remove breaker box.

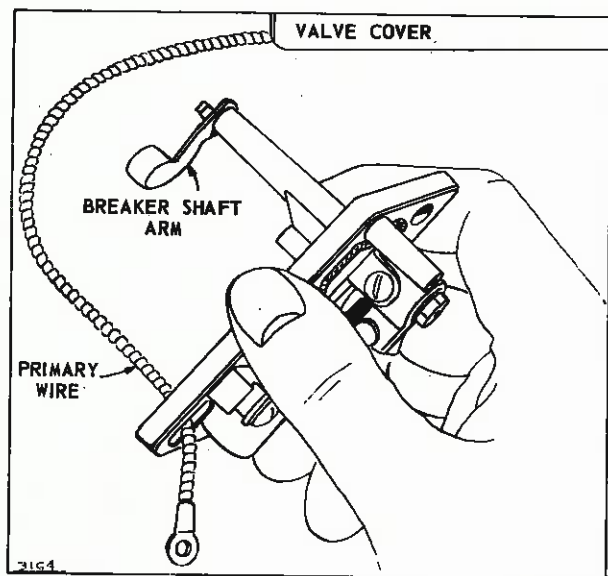


Fig. 54 — Removing Breaker Box Assembly

Remove Breaker Shaft

The breaker shaft can be removed (after breaker points are removed) by turning the shaft one half turn to clear the retaining spur at the inside of the breaker box.

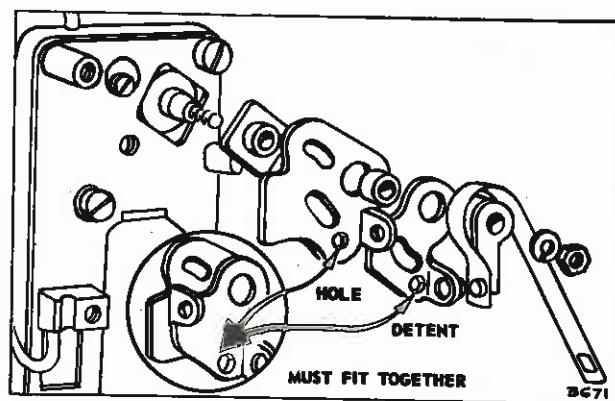


Fig. 55 — Breaker Box Assembly

Install Breaker Shaft

Insert the breaker shaft with arm upward so arm will clear the retainer boss. Push the shaft all the way in, then turn arm downward.

Install Breaker Box

Pull the primary wire through the hole at lower left corner of breaker box. See that the primary wire rests in the groove at top end of box; then tighten the two mounting screws to hold box in place.

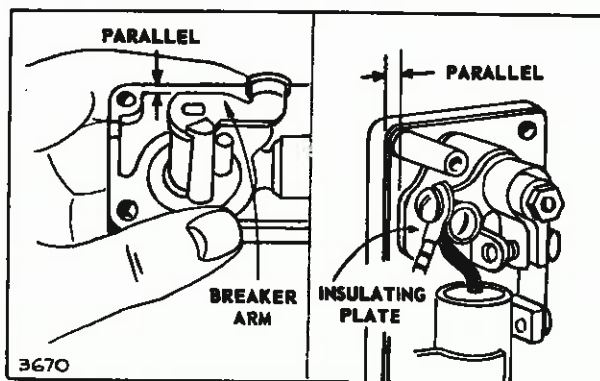


Fig. 56 — Insulating Plate Position

IGNITION

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Adjust Breaker Points

To adjust breaker points, turn the crankshaft until the breaker points open to widest gap. Loosen the breaker plate screw slightly. Rotate the eccentric to obtain a point gap of .020" (0.5 mm). Tighten the breaker plate screw. See Fig. 57.

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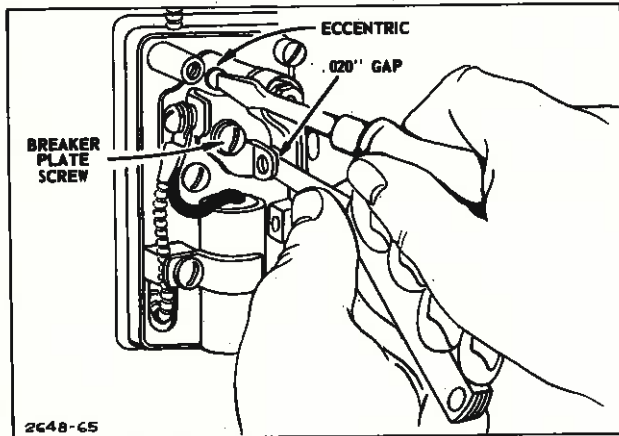


Fig. 57 — Adjusting Breaker Points

Clean Breaker Points

The points on all models should be cleaned by opening the points, inserting a piece of lintless paper and drawing the paper through between the points. Open the breaker points to withdraw the paper (so that the paper will not tear and allow a small portion to remain between the points).