

Service Manual

Altronic III^{NG} Ignition System Units

Medium Engines, 2-16 Cylinders

Form ALT III^{NG} SM 11-20

altronic
HOERBIGER Engine Division

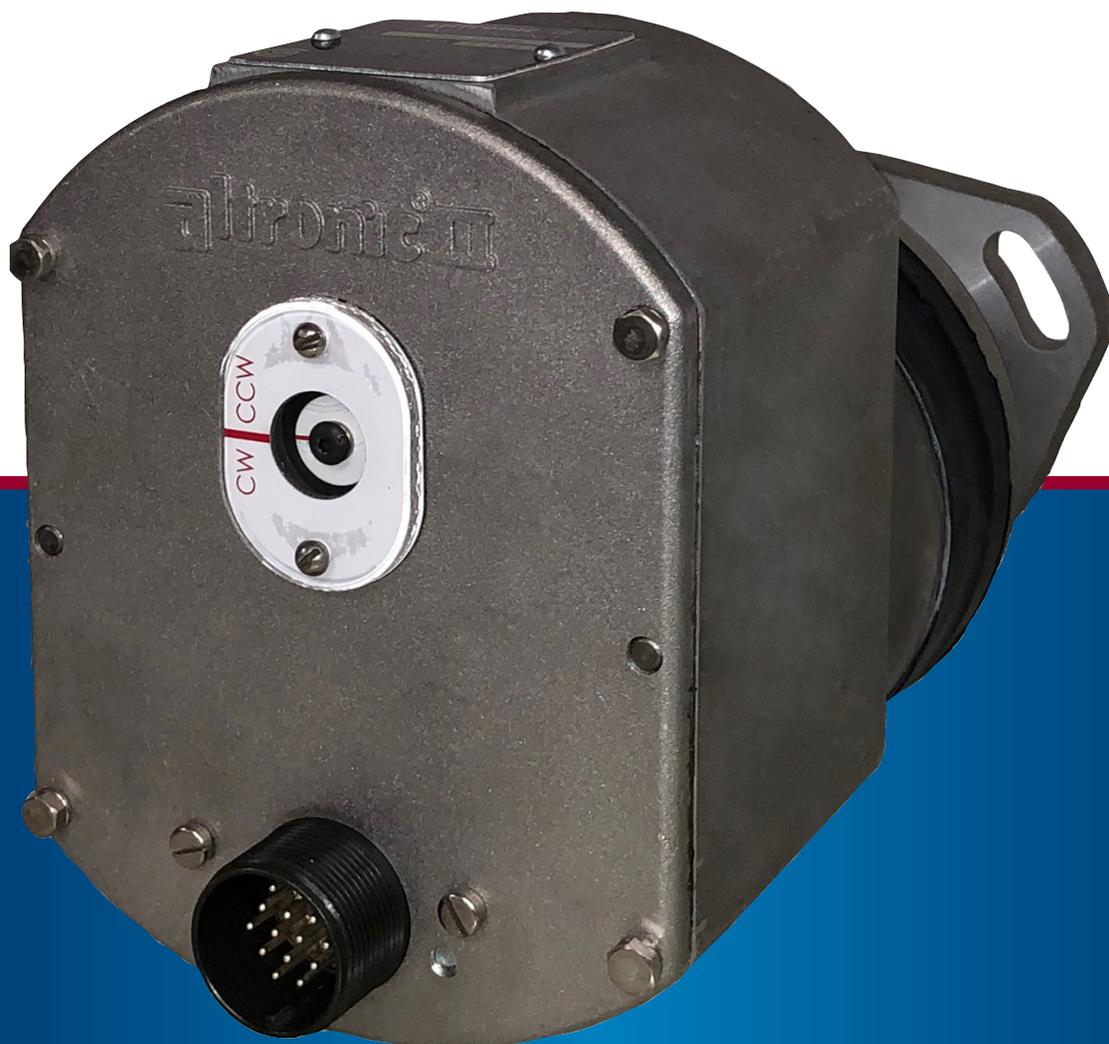


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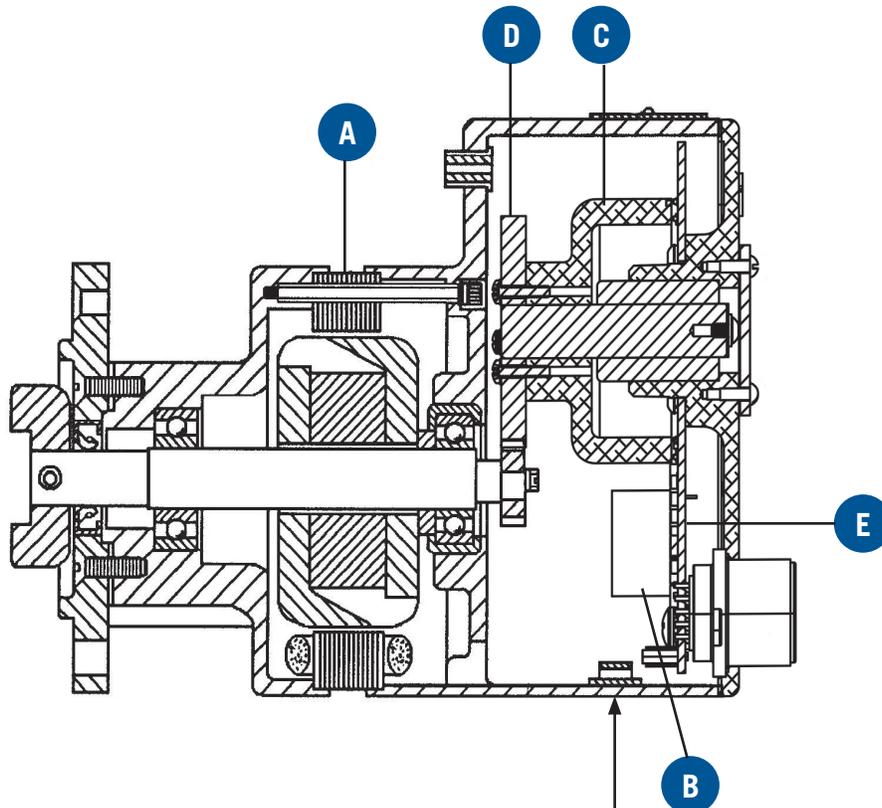
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IMPORTANT SAFETY NOTICE:
PROPER INSTALLATION, MAINTENANCE, REPAIR AND OPERATION OF THIS EQUIPMENT IS ESSENTIAL. THE RECOMMENDED PRACTICES CONTAINED HEREIN SHOULD BE FOLLOWED WITHOUT DEVIATION. AN IMPROPERLY INSTALLED OR OPERATING IGNITION SYSTEM COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

1.0 ALTRONIC III^{NG} IGNITION SYSTEM – DESCRIPTION

Altronic III^{NG} is an alternator-powered, electronic ignition system. All electronic parts are mounted to the back cover which disconnects from the alternator section as a module.

The alternator (A) provides the power to charge the energy storage capacitor (B). A separate pickup coil (C) and SCR (D) are used for each of the system's outputs, which usually correspond to each engine cylinder. A rotating timer arm (E), driven through speed-reducing gears, passes over the pickup coils to trigger the SCR switches to the on state in sequence. This releases the capacitor's stored energy to the ignition coils, which step up the voltage to fire the spark plugs.



CROSS-SECTIONAL VIEW — ALTRONIC III^{NG} UNIT

- A – Alternator
- B – Energy Storage Capacitor
- C – Magnet Holder
- D – Distribution Gears
- E – PCB

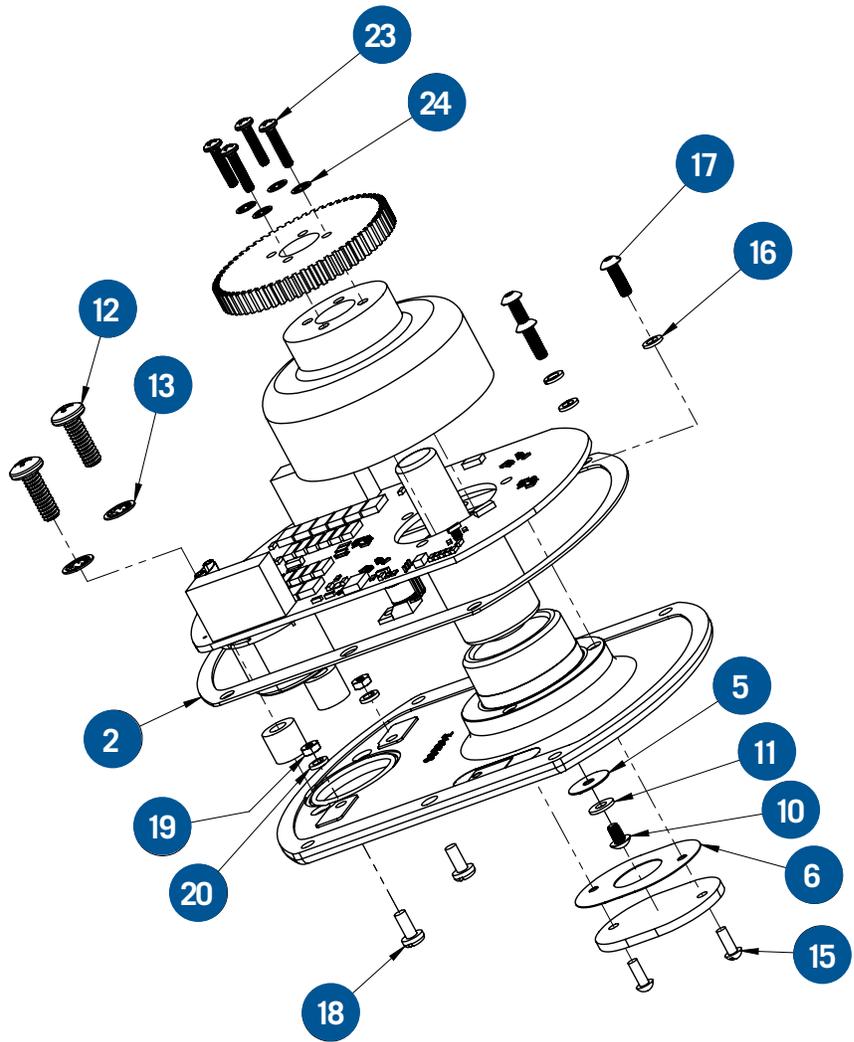
Note When upgrading an older alternator with an Altronic III^{NG} back cover, please remove this plastic clip from the housing to enable proper fit of new cover.

2.0 PARTS IDENTIFICATION AND SPECIFICATION

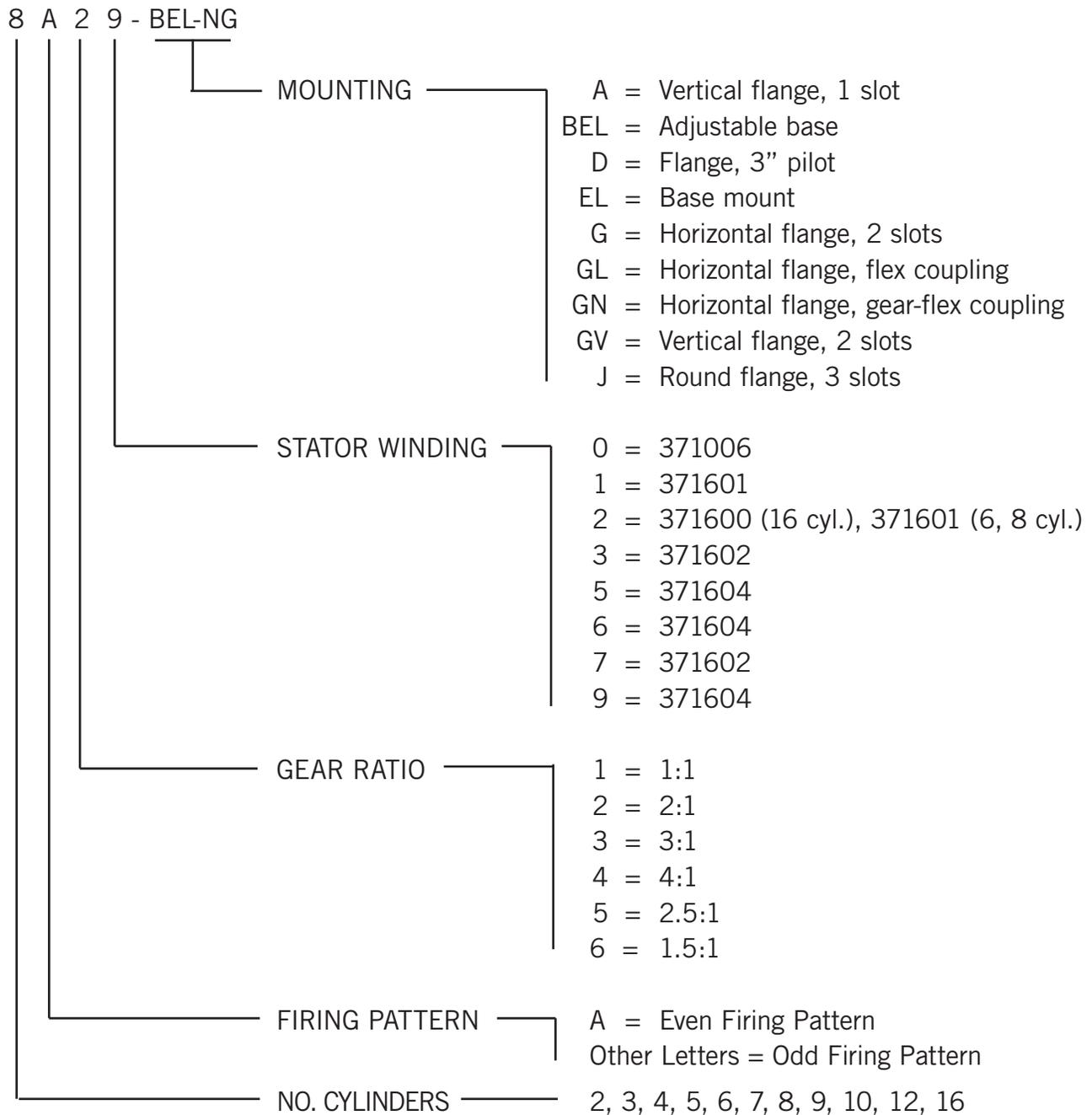
2.1 PARTS LIST

Reference numbers with a letter suffix are part of an assembly of the same number without a suffix. Example: (1a) is part of (1).

| REF. NO. | PART NO. | DESCRIPTION |
|----------|----------|----------------|
| 2 | 310392 | GASKET |
| 5 | 302106 | LABEL |
| 6 | 502226 | LABEL |
| 10 | 902541 | SCREW 8-32 |
| 11 | 901326 | WASHER #8 |
| 12 | 902836 | SCREW 1/4-20 |
| 13 | 900431 | LOCKWASHER 1/4 |
| 15 | 902064 | SCREW 6-32 |
| 16 | 900944 | LOCKWASHER #8 |
| 17 | 902465 | SCREW 8-32 |
| 18 | 902657 | SCREW 8-32 |
| 19 | 901698 | NUT 8-32 |
| 20 | 902548 | LOCKWASHER #8 |
| 23 | 902500 | SCREW 6-32 |
| 24 | 900423 | LOCKWASHER #6 |



2.2 PART NO. DESIGNATION



2.3 UNIT SPECIFICATIONS

Determine mounting, gear ratio and stator winding from unit part number. ALWAYS USE THE PART LISTED - DO NOT SUBSTITUTE.

| UNIT NO. | (10) STATOR | BACK COVER |
|----------|----------------|------------|
| 2A19 | 371604 | 381815-01 |
| 2A29 | 371604 | 381815-02 |
| 3A29 | 371604 | 381815-10 |
| 4A29 | 371604 | 381815-20 |
| 4A49 | 371604 | 381815-21 |
| 6A17 | 371602 | 381815-30 |
| 6A29 | 371604 | 381815-31 |
| 6A37 | 371602 | 381815-32 |
| 6A39 | 371604 | 381815-32 |
| 6A69 | 371604 | 381815-33 |
| 8A11 | 371601 | 381815-40 |
| 8A12 | 371601 | 381815-40 |
| 8A23 | 371602 | 381815-41 |
| 8A25 | 371604 | 381815-41 |
| 8A27 | 371602 | 381815-41 |
| 8A29 | 371604 | 381815-41 |
| 8A37 | 371602 | 381815-42 |
| 8A39 | 371604 | 381815-42 |
| 12A21 | 371601 | 381815-60 |
| 12A23 | 371602 | 381815-60 |
| 12A25 | 371604 | 381815-60 |
| 12A31 | 371601 | 381815-61 |
| 12A33 | 371602 | 381815-61 |
| 12A35 | 371604 | 381815-61 |
| 12B11 | 371601 | 381815-62 |
| 12P21 | 371601 | 381815-63 |
| 12Z21 | 371601 | 381815-64 |
| 16B21 | 371601 | 381815-80 |
| 16F21 | 371601 | 381815-81 |
| 16G23 | 371602 | 381815-82 |
| 16G33 | 371602 | 381815-83 |
| 16T21 | 371601 | 381815-84 |

2.4 CONNECTION SPECIFICATIONS

A. Wiring Color Code - Connector (51c)

3 to 12 Cylinders:

| | |
|------------|------------|
| G | orange |
| N | black |
| all others | all others |
| | white |

16 Cylinders:

| | |
|------------|------------|
| G | orange |
| all others | all others |
| | white |

2.5 BEARING FIT TOLERANCES:

| | | |
|----------------------------|---------------------------|-----------------|
| A. Housing Bearing Bores: | Front Housing (6) | 1.5737"/1.5739" |
| | Intermediate Housing (13) | 1.865"/1.867" |
| | Back Cover (58) | 1.1800"1.1803" |
| B. Shaft Bearing Diameter: | Drive Shaft (7) | .6693"/.6696" |

3.0 PERFORMANCE SPECIFICATIONS

Install unit on a test stand equipped with a suitable number of 501061 coils and spark gaps. Test stand wiring should conform to that shown in the Installation Instructions form AIII II.

3.1 VOLTAGE TEST

A. With the wiring harness unplugged, measure the positive voltage at the connector "G" pin:

| UNIT SPEED | CIRCUIT BOARD NO. | VOLTAGE OUTPUT |
|------------|-------------------|----------------|
| 70 rpm | Any | 60 VDC min. |
| 500 rpm | Any | 200-220 VDC |

3.2 OPERATING TEST

- A. At 70-90 RPM a 5mm gap should fire consistently.
- B. At the TEST RPM (see pages 12-15) a 15mm gap should fire consistently.

3.3 TIMING SPECIFICATIONS

- A. The Altronic III units are listed on pages 12-15. Establish the indicated TEST RPM and ROTATION.
- B. Check the Firing Degree Sequence as indicated. The basic tolerance is \pm one (1) distributor degree. This must be multiplied by the internal gear ratio since the degrees are read at the unit drive shaft speed.
- C. If timing is out of specification, change the pickup coil (31) in question.

4.0 TROUBLESHOOTING GUIDE

See Section 3.0 – 3.3 for proper electrical performance.

| PROBLEM | | |
|--|----|---------------------------|
| 1. One output not firing | a) | — |
| | b) | Replace back cover |
| | c) | — |
| 2. 8-12 cylinders: No output on every other output OR 4-6 cylinders No output but “G” lead has 100+ volts | a) | — |
| | b) | Replace back cover |
| | c) | — |

| PROBLEM | POSITIVE OHMMETER LEAD | NEGATIVE OHMMETER LEAD | SCALE | READING | REMEDY FOR FAULTY READING |
|----------------------|--------------------------------------|------------------------|----------|-----------------------------------|---------------------------|
| 3. Weak or no output | | | | | |
| a) Stator | Across 2-prong stator plug terminals | | 250VAC | Spin alternator coupling – 75 VAC | Replace stator (10) |
| b) Stator | Across both stator terminals | Ground | Rx10,000 | Infinite | Replace stator (10) |

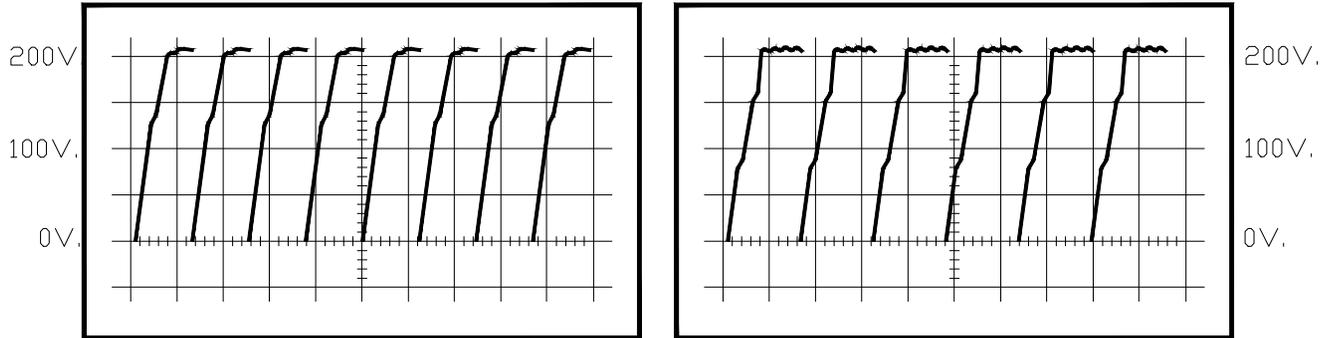
4.1 OSCILLOSCOPE TESTING

The system should be fully connected per section 3.0 with the Altronic III unit operating at the TEST RPM given in section 3.2. Connect the oscilloscope probe to the "G" lead of the output connector. Set the oscilloscope vertical calibration to 50 volts/div.; adjust the time base to get a full cycle of firings on the screen: No. of discharges = number of outputs for single capacitor unit; half the number of outputs for dual capacitor unit.

A. STORAGE CAPACITOR PATTERN: NORMAL

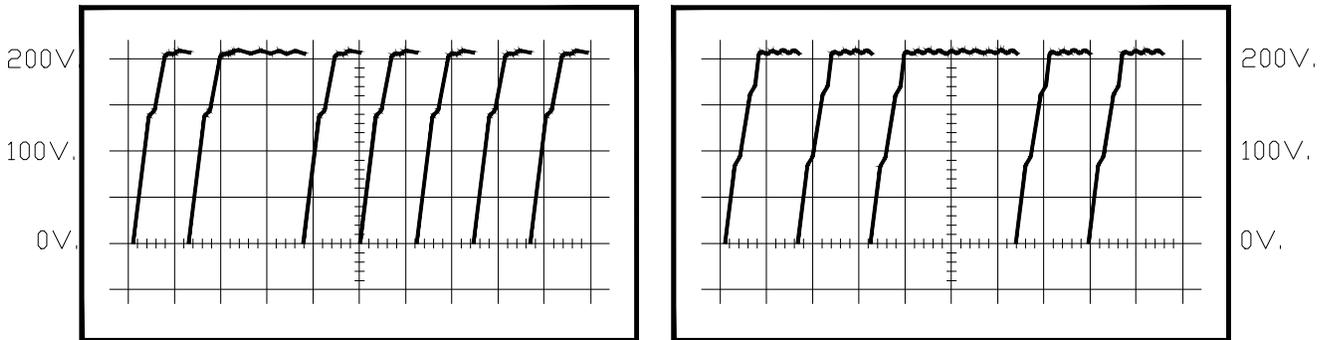
The normal patterns for typical single (8A29H) and dual storage capacitor (12A33H) units are shown below.

NOTE: Patterns below apply to units having 373xxxH circuit board assembly.



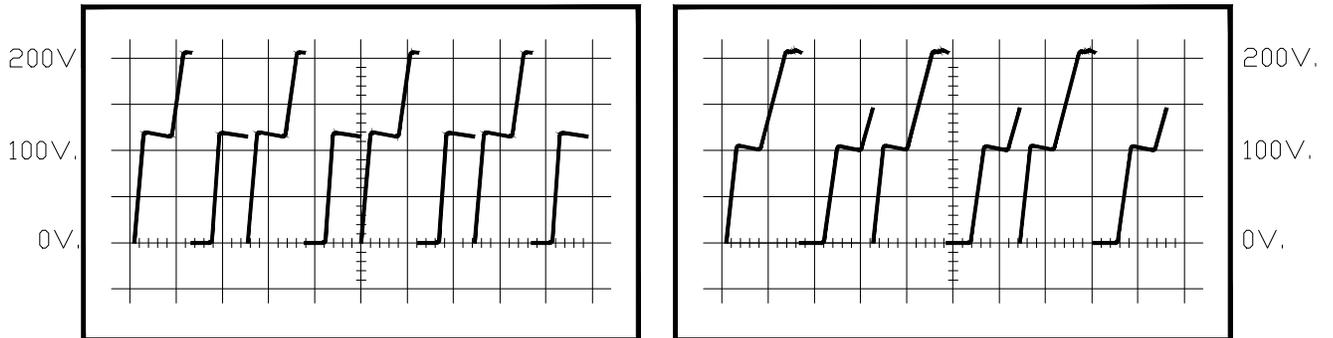
B. STORAGE CAPACITOR PATTERN: ABNORMAL

One cylinder misfiring. See troubleshooting section 4.2, no. 1.



C. STORAGE CAPACITOR PATTERN: NORMAL

Stepped waveform. See troubleshooting section 4.2, no. 3.



5.0 SERVICE – ALTERNATOR SECTION

- A. Replace all worn or defective parts.
- B. The procedures of this section require the use of a small arbor press.

5.1 DISASSEMBLY – COUPLING (1) OR (2)

- A. Drive spring pin (1a) or (2a) out of coupling (1) or (2) and shaft (7) and remove coupling from shaft.

5.2 DISASSEMBLY – FLANGE MOUNT UNIT

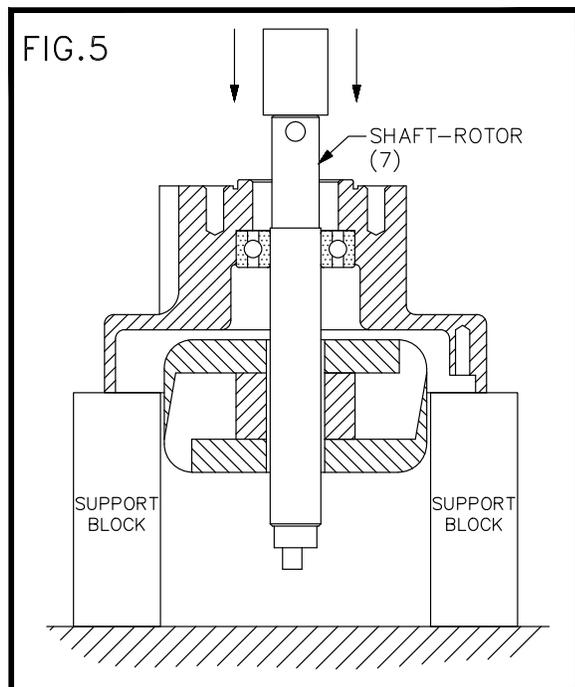
- A. Unscrew four screws (11) and remove flange (3) from housing (5). Note the relationship of flange to housing so that it may be reinstalled in the same position.

5.3 DISASSEMBLY – STATOR (10)

- A. Release the stator leads from clamp (17).
- B. Remove three screws (48) holding the alternator assembly together.
- C. Using a plastic or rubber hammer, tap intermediate housing (13) away from stator and front housing until free from bearing cover (9).
- D. Pull stator winding (10) and seal band (10a) free from housing (5) taking care not to damage Teflon® wrapping.

5.4 DISASSEMBLY – BEARINGS (6)

- A. Remove drive gear (16), then reinstall screw (20) in shaft.
- B. Remove rubber bearing cover (9). Use small bearing puller to remove gear end bearing (6).
- C. Referring to FIG. 5, support front housing (5) on the stator end. Using an arbor press, press on drive end of the main shaft until shaft assembly (7) is free from the front housing (5).
- D. Press the drive end bearing (6) from either housing (5) or shaft (7).

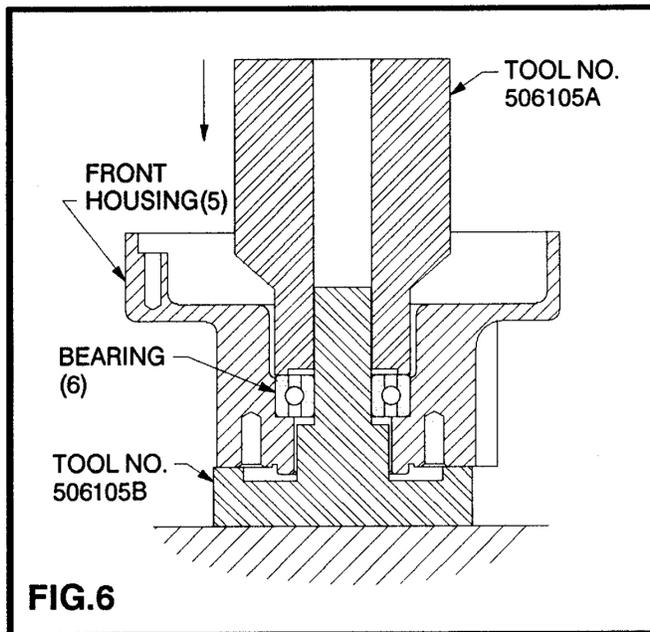


5.5 PARTS REPLACEMENT

- A. Replace gaskets (3b) and (4).
- B. Replace coupling (1 or 2), seal (3a), bearings (6) and bearing cover (9) with new parts.
- C. Replace any removed hardware with new parts.
- D. Aluminum housings should be cleaned in carbon tetrachloride or similar cleaning solution.
- E. Any metal filings should be cleaned from magnet-rotor (7) before reassembly.

5.6 REASSEMBLY – FRONT HOUSING ASSEMBLY

- A. Press new drive end bearing (6) into front housing (5) until it bottoms. Referring to FIG. 6, support the housing with tool 506105B; use the loose ring provided EXCEPT with adjustable base housing 360405. Press on the outer race of the bearing using tool 506105A.
- B. Referring to FIG. 7a, press the shaft-rotor assembly (7) into the front housing assembly (5). Use tool no. 506104A to press on the end of the shaft, and tool no. 506104C to support the inner race of the bearing. This will insure the correct extension of the shaft through the bearing (see FIG. 7a).
- C. Install bearing spacer (8) on shaft (see FIG. 7b).
- D. Press gear end bearing (6) on shaft (7) until it bottoms against the bearing spacer (8). Referring to FIG. 7b, leave tool no. 506104C (step 6.6B) in place to support the coupling end of the shaft. Press on the inner race of the bearing for this operation using tool no. 506104D.
- E. Install a new rubber bearing cover (9) on gear end bearing (6).
- F. Using a new lockwasher (32) and flat washer (18), install drive gear (16); if worn, use a new gear. Secure with screw (20).
- G. If the 360405 housing (-BEL) has been disassembled, use a lubricating grease on the mating surfaces and reinstall the large snap ring with its gap at the 3 o'clock position (90° from the base).



5.7 REASSEMBLY – ALTERNATOR

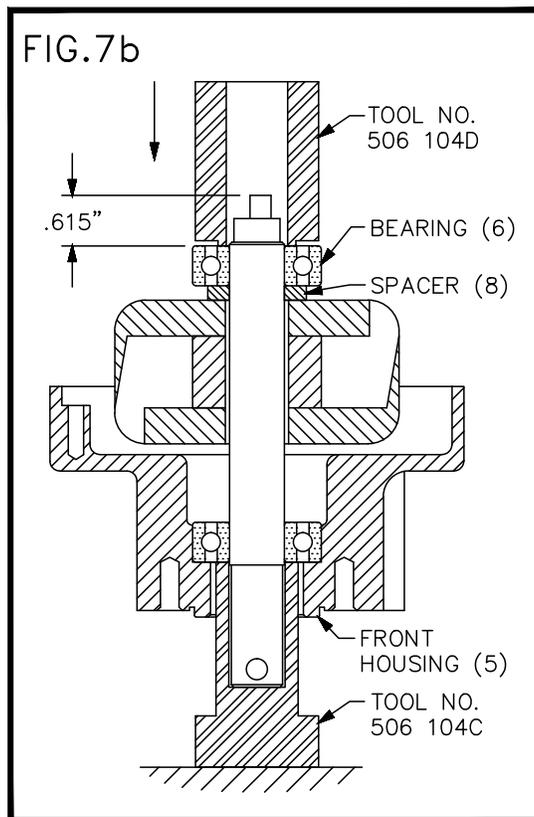
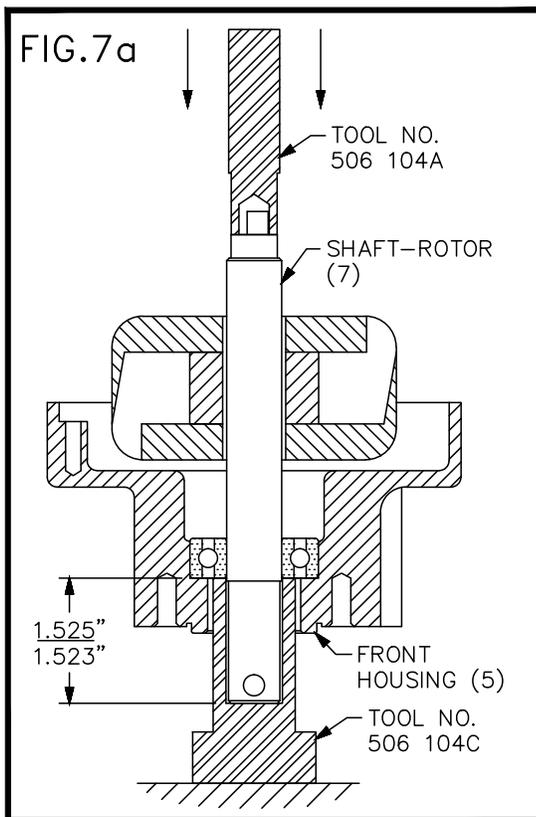
- A. Insert one 10-24 x 2-1/4" screw (48) through the stator hole, 180° from the stator leads and plug. Place stator (10) over rotor (7) so that the leads are on the same side as the flat base on housing (5). Use the screw to line up the stator holes properly with the tapped holes in the housing (5). Insert stator into front housing taking care not to damage the Teflon® wrapping or the windings. Remove screw.

NOTE: Stator 371604 replaces previous types 371004 and 371007. The hole in housing (13) for the stator leads must be enlarged to .750" diameter in units below S/N 12,000.

- B. Apply a film of Vaseline® or similar lubricant to the bearing bore in intermediate housing (13). THIS IS ESSENTIAL FOR PROPER ASSEMBLY.
- C. Insert the stator plug and leads through the .750" dia. hole in housing (13) and start the housing over bearing cover (9). Insert three new HEX SOCKET HEAD SCREWS (48) – DO NOT REUSE THE OLD SCREWS – and lockwashers (47) through housing (13) and stator (10) into the tapped holes in the front housing (5). Apply pressure evenly to bring housings (13) and (5) together over the stator. Take care not to damage the Teflon® wrapping on the stator core. Using a torque wrench, tighten the three screws (48) evenly in several steps to a final torque of 78 in.-lbs. (6.5 ft.-lbs.).

NOTE: This torque specification applies only to the hex socket head screws, part no. 902601. These should be used on all overhauls replacing the former filister head, slotted screw.

- D. At this point, the shaft should turn freely without mechanical drag. If there is mechanical interference (not to be confused with the magnetic drag of the 12-pole alternator), remove the intermediate housing (see steps 6.3B and 6.3C), and repeat steps 6.7B and 6.7C.
- E. Insert stator leads in clamp (17).
- NOTE: If clamp (17) has pulled loose from housing (13), use silicon rubber adhesive (503151) to secure clamp to housing.
- F. Install a stator seal band (10a) from the coupling end. The band should seat against the stator (10) between housings (5) and (13).



5.8 FLANGE MOUNT UNIT

- A. Replace oil seals (3a) in flange bracket (3) Place new gasket (4) on housing (5).
- B. Install flange bracket (3) to housing (5) and insert four new screws (11) – DO NOT REUSE OLD SCREWS. Note whether nameplate on unit calls for a flange to be mounted vertically with tapped hole up (-A or -GV), or horizontally (-D or -G). Tighten screws (11) to 10-12 ft-lbs.
- C. Glue a new flange gasket (3b) to the unit flange.

5.9 COUPLING

- A. Install coupling (1) or (2) on shaft (7) lining up holes in coupling and shaft.
- B. Use tool no. 506108A to drive spring pin (1a) or (2a) through coupling and shaft until flush with the coupling O.D.

5.10 REASSEMBLY – BACK COVER TO ALTERNATOR

- A. The timing mark on the back cover should line up with the stationary rotation mark (CCW or CW) on the cover just as the leading edge of the trigger arm reaches the hole in the steel plate for “A” (red) pickup coil.
- B. For FLANGE MOUNT UNITS, mate the back cover to the alternator with both set as shown in FIG. 8 for the correct unit rotation. If the back cover mark does not line up exactly with the proper rotation mark with the coupling set as shown, rotate the alternator shaft 180° and try again. Obtain as close of a line-up as possible with the CCW or CW mark.
- C. Secure the back cover assembly to the alternator section with hardware (34) and (47).

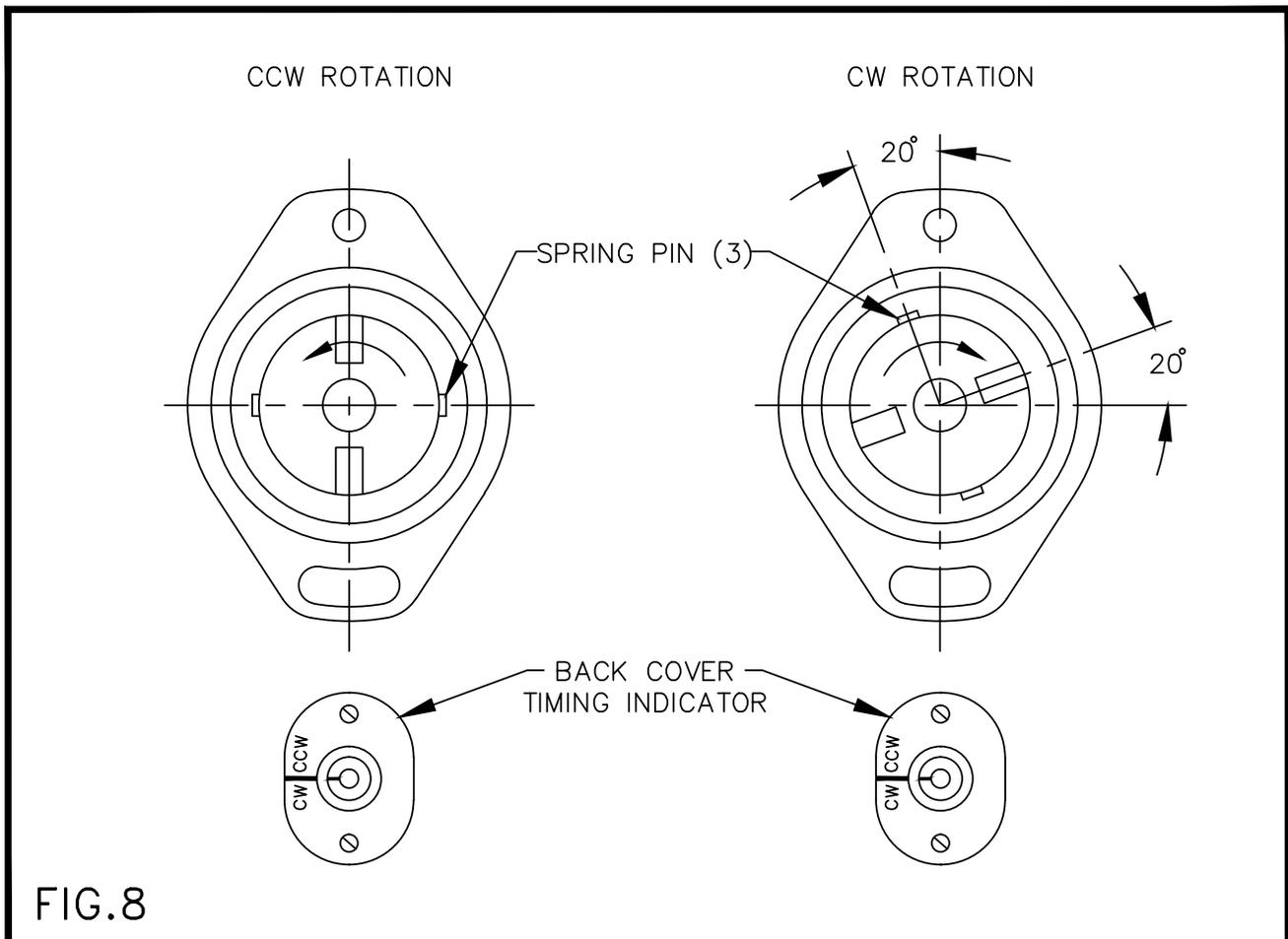


FIG.8

6.0 SERVICE – ASSEMBLY TOOLS

- A. The following assembly tools are referenced in sections 5.3, 6.6 and 6.9:
 - 506101A Press bearing-shaft (25) into back cover (58)
 - 506101C Support back cover (58)
 - 506104D Press timer arm assembly (24) on bearing-shaft (25)
 - 506104E Support bearing shaft (25)
 - 506105A Press bearing (6) into front housing (5)
 - 506105B Support front housing (5), including ring
 - 506104A Press shaft-rotor (7) into front housing (5)
 - 506104D Press gear-end bearing (6) on shaft-rotor (7)
 - 506104C Support front housing bearing (6)
 - 506108A Drive coupling pin (1a) or (2a) off and on

7.0 OPERATIONAL TEST

- A. Perform the tests following the guidelines in sections 3.0 through 3.3.
- B. Run the Operating Test in section 3.2B for one hour.
- C. After the one-hour Operating Test, check timing per section 3.3