ALTRONIC

Altronic III-NG Service Manual

AIII-NG SM 6-24

SERVICE NOTE:

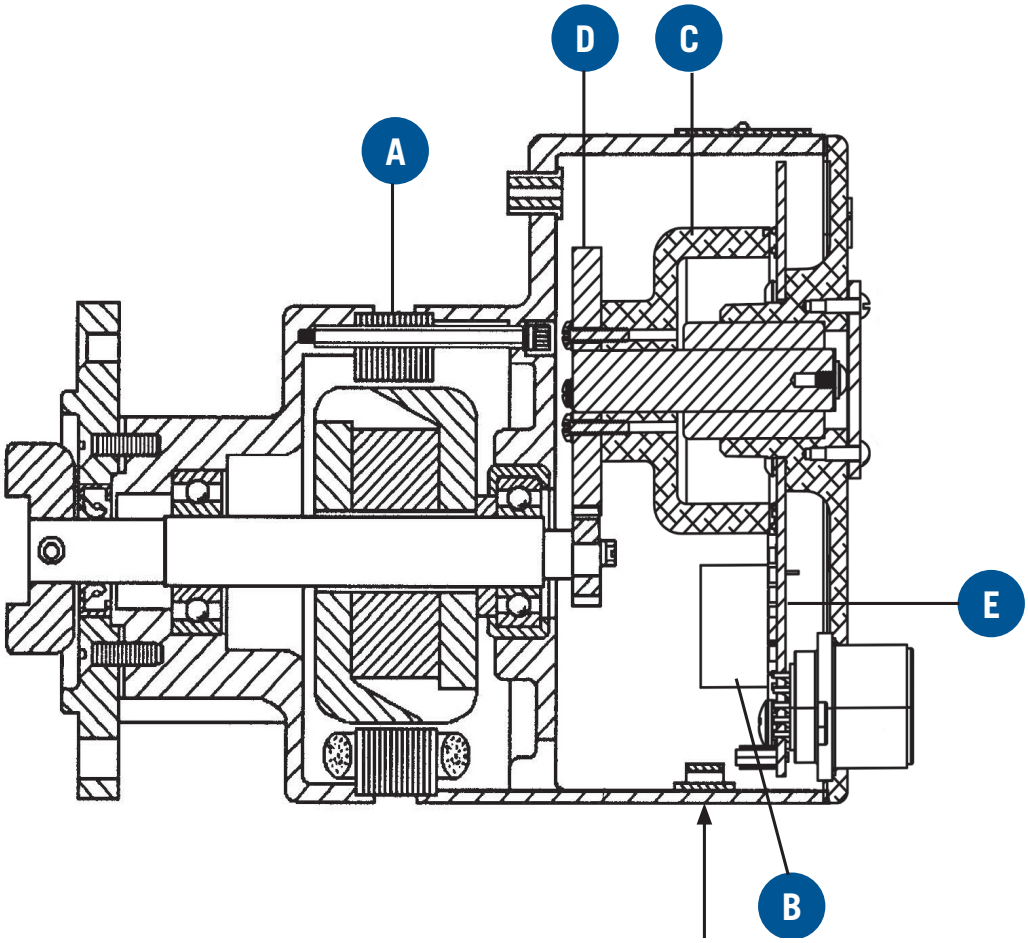
The Altronic III-NG circuit board assembly MUST only be replaced in a back cover that originally was an “NG” type cover. The NG circuit board will not fit properly on the legacy Altronic III cover casting.

CONTENTS:

1.0 SYSTEM OPERATION

OPERATION – The Altronic III-NG system 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 an energy storage capacitor (B). A separate HE magnetic switch and transistor on the unit circuit board (E) are used for each of the system's outputs, which usually correspond to each engine cylinder. A rotating timer/distributor rotor (C), driven through speed reducing gears (D), passes over each magnetic switch to trigger the output transistors on in sequence. This releases the capacitor's stored energy to the ignition coils which step up the voltage to fire the spark plugs.

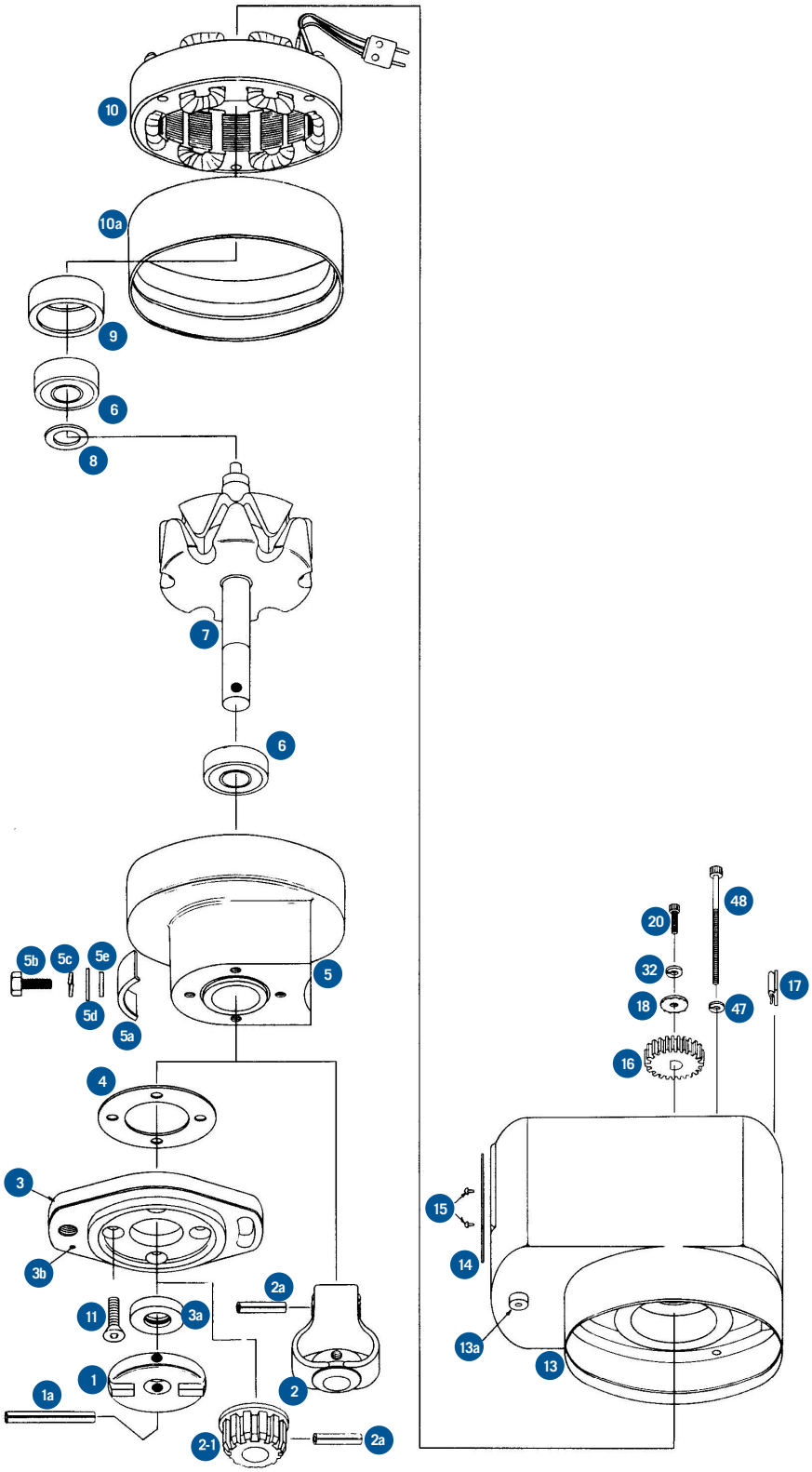


A – ALTERNATOR
B – ENERGY STORAGE CAPACITOR
C – TIMER/DISTRIBUTOR ROTOR
D – GEARS
E – CIRCUIT BOARD ASSEMBLY

Note: When upgrading an older Altronic III, remove the plastic clip from the housing to enable proper fit of the III-NG back cover.

2.0 UNIT PARTS BREAKDOWN

EXPLODED VIEW – ALTERNATOR

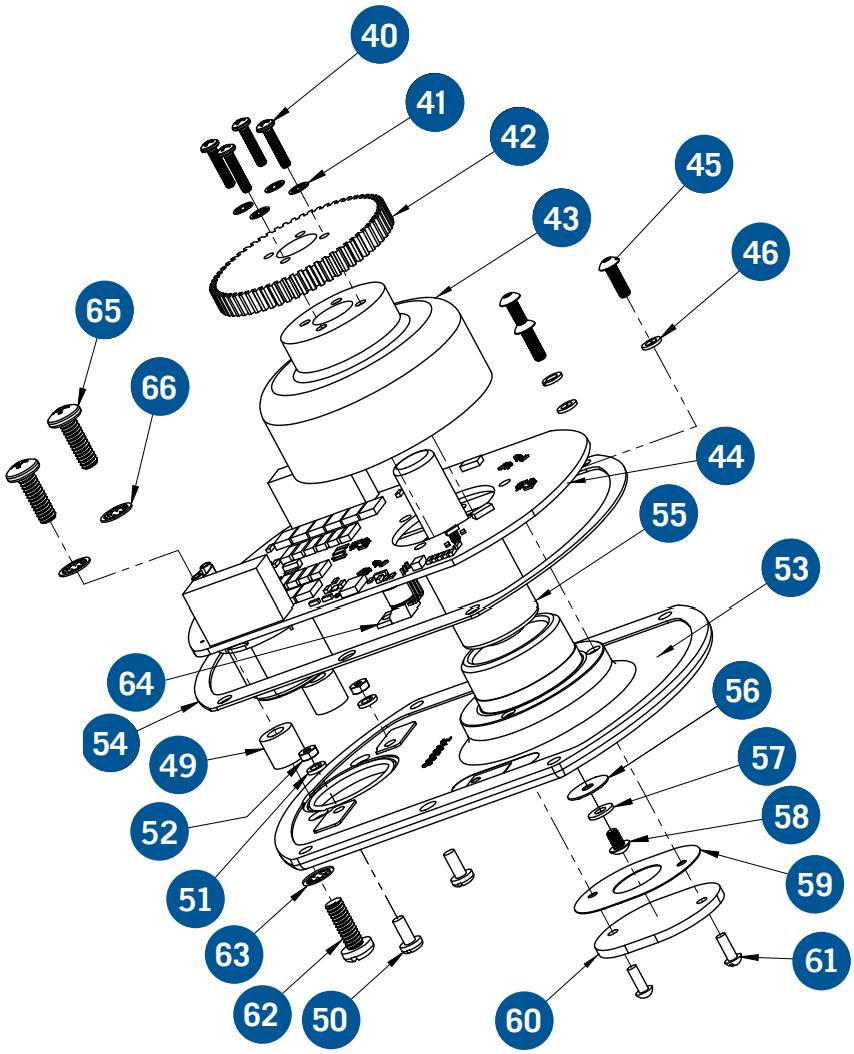


SEE NEXT PAGE FOR PARTS TABLE

PARTS TABLE – ALTERNATOR (see previous page)

REF. NO.	PART NO.	DESCRIPTION
1	510454-U 510454-P	COUPLING – YELLOW COUPLING – BLACK
1a	902478	SPRING PIN 2-1/8" LG.
2	560002	FLEX COUPLING W/PIN
2-1	560006	GEAR COUPLING W/PIN
2a	902475	SPRING PIN 1-1/8" LG.
3	310418-2 360465-1 360465-2 360465-3 360465-4 360465-5 360466	FLANGE (-GN, -GVN) FLANGE ASS'Y. (-A) FLANGE ASS'Y. (-G,-GV) FLANGE ASS'Y. (-D) FLANGE ASS'Y. (-AO) FLANGE ASS'Y. (-GO) FLANGE ASS'Y. (-J)
3a	510463	OIL SEAL
3b	510560	GASKET – MOUNTING
4	310490	GASKET – FLANGE
5	360401-F 360405	FRONT HOUSING (FLANGE) FRONT HOUSING (BASE)
5a	310414	SHIELD
5b	902543	SCREW 5/16-18
5c	901010	LOCKWASHER 5/16
5d	901347	WASHER 5/16
5e	902554	WASHER
6	510452	BEARING
7	360402-A	SHAFT-ROTOR ASS'Y.
8	310466	SPACER – BEARING
9	510459	COVER – BEARING
10	See Unit Specifications – section 3.3	STATOR
10a	310421	SEAL BAND – STATOR
11	902484	SCREW 1/4-20
13	310355-12	INTERMEDIATE HOUSING
13a	510764	VENTILATOR
14	302093	NAMEPLATE
15	902520	DRIVE PIN
16	310460 510357 510359 510476	DRIVE GEAR 4:1 DRIVE GEAR 2:1 DRIVE GEAR 3:1 DRIVE GEAR 1:1
17	REMOVE THIS CLAMP WHEN RETROFITTING TO A III-NG BACK COVER.	
18	901326	WASHER #8
20	902465	SCREW 8-32
32	900944	LOCKWASHER #8
47	901004	LOCKWASHER #10
48	902601	SCREW 10-24

EXPLODED VIEW – BACK COVER



SEE NEXT PAGE FOR PARTS TABLE

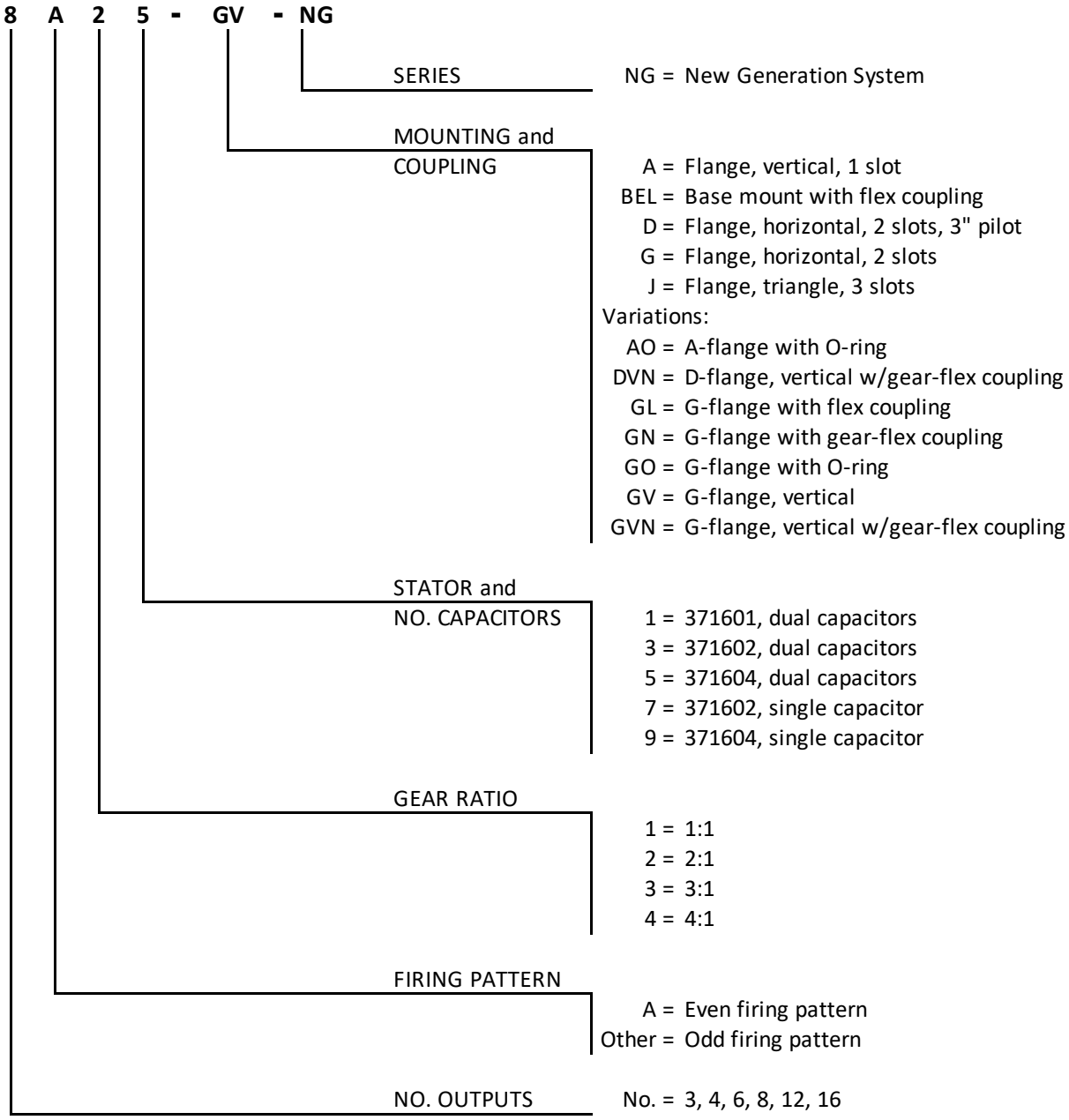
PARTS TABLE – BACK COVER (see previous page)

REF. NO.	PART NO.	DESCRIPTION
40	902500	SCREW 6-32
41	900423	LOCKWASHER #6
42	310461 510358 510360 510477	DRIVEN GEAR 4:1 DRIVEN GEAR 2:1 DRIVEN GEAR 3:1 DRIVEN GEAR 1:1
43	See Unit Specifications – section 3.3	DISTRIBUTOR ROTOR
44 *	See Unit Specifications – section 3.3	CIRCUIT BOARD ASSEMBLY *
45	902465	SCREW 8-32
46	900944	LOCKWASHER #8
49	310600	SPACER
50	902657	SCREW 8-32
51	902548	LOCKWASHER #8
52	901698	NUT 8-32
53	310474 310475	COVER HOUSING 8,12-CYL. COVER HOUSING 3,4,6-CYL.
54	310392	GASKET
55	310371	BEARING-SHAFT
56	302106	TIMING LABEL, SHAFT
57	901326	WASHER #8
58	902541	SCREW 8-32
59	502226	TIMING LABEL, COVER
60	310365	COVER PLATE
61	902064	SCREW 6-32
62	902472	SCREW 10-24
63	901004	LOCKWASHER #10
64	615600	SILPAD INSULATOR
65	902836	SCREW 1/4-20
66	900431	LOCKWASHER 1/4"

* NOTE: The circuit board assembly (44) MUST only be replaced in a back cover that was originally an “NG” type cover. The III-NG circuit board will not fit properly on the legacy Altronic III cover casting.

3.0 UNIT SPECIFICATIONS

3.1 IGNITION UNIT PART NO. DESIGNATION



3.2 OBSOLETE UNIT REPLACEMENT LIST

UNIT NO.	ALT. III BACK COVER	ALT. III-NG SUBSTITUTE
2A29	381801-0H	4A29
4G29	381801-3H	12A25 *
6B39	381802-3H	12A35 *
8A12	381803-21S	8A11 *
8A27	381803-1H	8A23 *
8A29	381803-1H	8A25 *

UNIT NO.	ALT. III BACK COVER	ALT. III-NG SUBSTITUTE
8A37	381803-9H	8A33 *
8A39	381803-9H	8A35 *
8B23	381803-6H	12A23
8B25	381803-6H	12A25
8B29	381803-3H	12A25 *
8T25	381803-20H	12A25

* Requires recalibration of ignition powered tachometers and speed switches; see * note under Application Notes at the end of section 2 of the AIII-NG AL.

3.3 UNIT SPECIFICATIONS

UNIT NO.	STATOR	ALT. III-NG BACK COVER	BOARD ASSEMBLY	DIST. ROTOR
3A29	371604	381815-10	380408-3	370407-1
4A29	371604	381815-20	380408-4	370407-1
4A39	371604	381815-21	380408-4	370407-1
6A17	371602	381815-30	380408-6	370407-1
6A29	371604	381815-31	380408-6	370407-1
6A37	371602	381815-32	380406-6	370407-1
6A39	371604	381815-32	380408-6	370407-1
8A11	371601	381815-40	380408-8	370407-1
8A23	371602	381815-41	380408-8	370407-1
8A25	371604	381815-41	380408-8	370407-1
8A33	371602	381815-42	380408-8	370407-1
12A21	371601	381815-60	380408-12	370407-6
12A23	371602	381815-60	380408-12	370407-6
12A25	371604	381815-60	380408-12	370407-6
12A31	371601	381815-61	380408-12	370407-6
12A33	371602	381815-61	380408-12	370407-6
12A35	371604	381815-61	380408-12	370407-6
12P21	371601	381815-63	380408-12	370407-5
12Z21	371601	381815-64	380408-12	370407-3
16B21	371601	381815-80	380408-16	370407-6
16F21	371601	381815-84	380408-16	370407-2
16G23	371602	381815-82	380408-16	370407-4
16G33	371602	381815-83	380408-16	370407-4
16T21	371601	381815-84	380408-16	370407-2

3.4 BEARING FIT TOLERANCES

Part	Housing Bearing Bore Dia.	Drive Shaft Dia.
Front Housing (5)	1.5737" / 1.5739"	
Intermediate Housing (13)	1.865" / 1/867"	
Back Cover (53)	1.1800" / 1.1803"	
Drive Shaft (7)		.6693" / .6696"

4.0 TEST SPECIFICATIONS

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

4.1 VOLTAGE TEST – With the wiring harness unplugged, measure the positive voltage at the connector "G" pin:

Unit Speed	Model	Voltage Output
70 rpm	Any	60 Vdc min.
500 rpm	Any	200-220 Vdc

4.2 OPERATING TEST

1. At 70-90 rpm, a 5 mm gap should fire consistently.
2. Operate the unit at the Test RPM shown in table 4.4. A 15 mm gap should fire consistently.

4.3 TIMING SPECIFICATIONS

1. Locate the specific Altronic III-NG unit no. in table 4.4; establish the Test RPM and Rotation specified.
2. Check the firing sequence indicated in table 4.4. 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. For example, the tolerance on the spark wheel is $\pm$ 2 degrees for a unit with 2:1 internal gears and $\pm$ 3 degrees for a unit with 3:1 internal gears.
3. If timing is out of specification, change the circuit board assembly (44).

4.4 TIMING SPECIFICATIONS TABLE

TEST RPM is the drive coupling speed.
RTN. is the coupling rotation looking at the drive end of the unit.
± is the tolerance in degrees.

UNIT NO.	TEST RPM	RTN.	A	B	C	D	E	F	H	I	J	K	L	M	±
3A29	2700	CW	0	240	120										2
4A29	1800	Both	0	180	0	180									2
4A39	2700	CCW	0	270	180	90									3
6A17	900	CW	0	60	120	180	240	300							1
6A29	1800	Both	0	120	240	0	120	240							2
6A37	2700	CCW	0	180	0	180	0	180							3
6A39	2700	Both	0	180	0	180	0	180							3
8A11	900	Both	0	45	90	135	180	225	270	315					1
8A23	1800	Both	0	90	180	270	0	90	180	270					2
8A25	1800	Both	0	90	180	270	0	90	180	270					2
8A33	2700	Both	0	135	270	45	180	315	90	225					3
12A21	1800	Both	0	60	120	180	240	300	0	60	120	180	240	300	2
12A23	1800	Both	0	60	120	180	240	300	0	60	120	180	240	300	2
12A25	1200	Both	0	60	120	180	240	300	0	60	120	180	240	300	2
12A31	2700	CCW	0	90	180	270	0	90	180	270	0	90	180	270	3
12A33	2700	Both	0	90	180	270	0	90	180	270	0	90	180	270	3
12A35	1800	Both	0	90	180	270	0	90	180	270	0	90	180	270	3
12P21	1800	CCW	0	55	120	175	240	295	0	55	120	175	240	295	2
12Z21	1800	CCW	0	40	120	160	240	280	0	40	120	160	240	280	2

UNIT NO.	TEST RPM	RTN.	A K	B L	C M	D N	E P	F R	H S	J T	±
16B21	1200	CCW	0 0	60 60	90 90	150 150	180 180	240 240	270 270	330 330	2
16F21	1200	CCW	0 0	30 30	90 90	120 120	180 180	210 210	270 270	300 300	2
16G23	900	CCW	0 0	48 48	90 90	138 138	180 180	228 228	270 270	318 318	2
16G33	1350	CCW	0 180	72 252	135 315	207 27	270 90	342 162	45 225	117 297	3
16T21	1200	CW	0 0	30 30	90 90	120 120	180 180	210 210	270 270	300 300	2

5.0 TROUBLESHOOTING

See section 4 for proper performance. The Altronic III-NG breaks into two major subsections: the alternator and back cover. The back cover consists of the circuit board assembly (containing all electronic components) and the distributor timing rotor. It is assumed here that mechanical issues, such as a broken drive coupling, worn bearings or gears, etc. are obvious and easily remedied by replacement of the defective part. Follow the guide below for issues with the electrical components. An ohmmeter and oscilloscope are required for complete testing.

5.1 GENERAL TROUBLESHOOTING

1. If some outputs operate, but not all, replace the circuit board assembly.
2. If there is weak or no output on all outputs, check the stator winding per the chart below. If the stator tests good, replace the circuit board assembly.

Test	Ohmmeter Positive Lead	Ohmmeter Negative Lead	Scale	Reading	Remedy for Faulty Reading
Stator	Stator pin 1	Stator pin 2	250 VAC Spin coupling by hand only	75 VAC	Replace stator (10)
Stator	Both stator pins	Ground	R X 10,000	Infinite	Replace Stator (10)

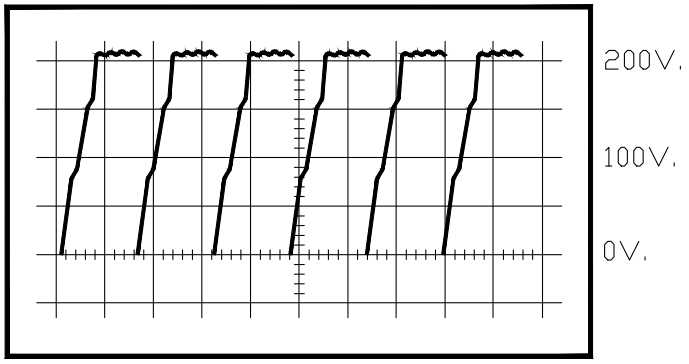
5.2 OCSILLOSCOPE TESTING

The unit should be operated on an ignition test stand per section 4 with the Altronic III-NG unit operating at the Test RPM shown in table 4.4. The patterns shown here are from a typical 6A single capacitor unit or 12A dual capacitor unit. The oscilloscope set-up is as follows:

1. Connect the oscilloscope probe to the “G” lead of the output connector.
2. Vertical calibration is 50 volts/div.
3. Adjust time basis to get a full cycle of firings on the screen. The no. of discharges shown equals the no. of outputs for a single capacitor unit and half the number of outputs for a dual capacitor unit.

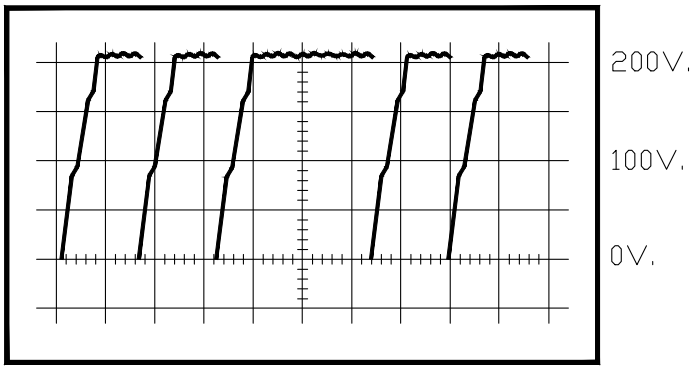
5.3 STORAGE CAPACITOR PATTERN: NORMAL

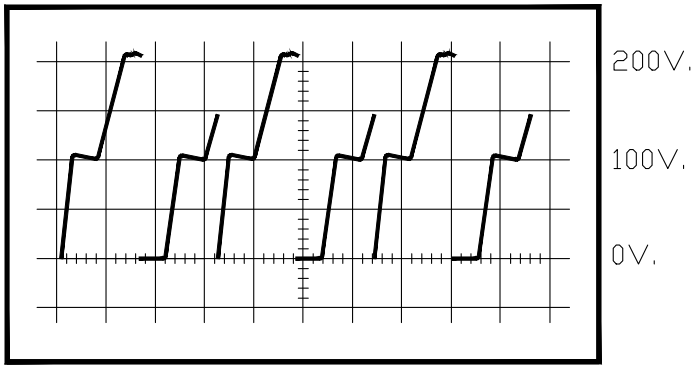
Note that the re-charging from the 0V. line starts with little or no delay.



5.4 STORAGE CAPACITOR PATTERN: ABNORMAL

Patterns such as these below indicate the electronic circuit board should be replaced.





6.0 SERVICE – BACK COVER

6.1 GENERAL – The procedures of this section require the use of a small arbor press.

6.2 DISASSEMBLY

1. Remove timing cover plate (60), timing label (56) and driven gear (42).
2. Support back cover (53) on both sides near the two dowel pin holes. Press on the timing mark end of the bearing-shaft (55) until the bearing is pressed out of the cover housing.
3. Support the distributor rotor (33) and press the gear end of the bearing-shaft out of the rotor.
4. Remove three screws (45) and lockwashers (46). Remove two screws (65) and lockwashers (66). The circuit board assembly (44) can now be removed from the back cover.

6.3 REASSEMBLY

1. Remove gasket (54). Clean the back cover (55) prior to reassembly.
2. Using tools 506101A and 506101C (see Fig. 3), press on the outer race of a new bearing-shaft (55) until it seats fully in the cover housing.

3. Reinstall the circuit board assembly (44). First line-up the two spacers (49) between the underside of the board assembly and the cover casting; install two screws (65) and lockwashers (66) that secure the output connector of the circuit board assembly. Snug these screws but do not fully tighten.
4. Install three screws (45) and lockwashers (46) around the large center hole of the board. Slowly tighten the three screws (45) and two screws (65), alternating between them to insure the board becomes securely fastened without binding or distorting it in any way. Then torque screws (65) to 35 in-lbs.

CAUTION: Insure that the power transistor and associated silpad insulator (64) seat squarely against the machined surface on the back cover. This is essential to provide adequate heat transfer from this component during operation.

5. Examine the distributor rotor (43). If there is no scribed mark on the outside diameter of the rotor lined up with the magnet on the outside edge of the rotor, make such a mark with a permanent dye marker. This mark indicates the position of the outer diameter timing magnet which is necessary to properly align the shaft timing label (58) in step 8 below.
6. Support the end of the shaft (55) using tool 506104E. Use tool 506022 to press the distributor rotor (43) onto the shaft until the shaft bottoms in the tool. A gap not exceeding .060" should be achieved between the magnet end of the rotor (43) and the small HE (black) magnetic switches on the board assembly. The distributor rotor must rotate freely the full 360 degrees of rotation.
7. Install driven gear (42) so that all four holes line-up with the tapped holes in distributor rotor (43). If worn, use a new gear. Use new screws (40) and lockwashers (41); tighten securely.
8. With the scribed mark on the rotor lined up at the 12 o'clock position (at the top of the circle opposite the output connector), the shaft timing label (56) should be lined up with the red mark on the cover housing timing label (59). Using hardware (57) and (58), secure the timing label (56) maintaining the proper alignment.
9. Install timing cover (60) with screws (61).

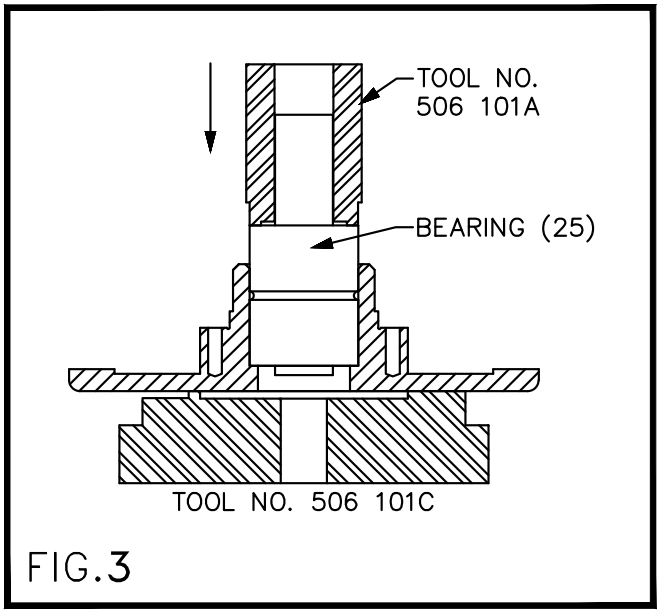


FIG.3

7.0 SERVICE – ALTERNATOR

7.1 GENERAL – Replace all worn or defective parts. The procedures of this section require the use of a small arbor press.

7.2 DISASSEMBLY – COUPLING (1) OR (2)

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

7.3 DISASSEMBLY – FLANGE MOUNT UNIT

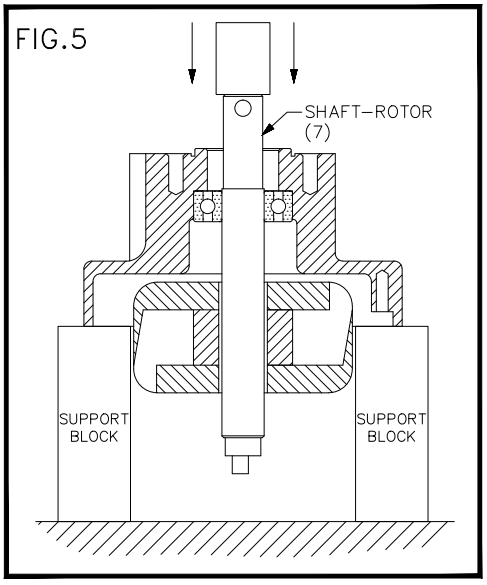
Unscrew four screws (11) and remove flange (3) from housing (5). Note the relationship of the flange to the housing so that it may be reinstalled in the same position.

7.4 DISASSEMBLY – STATOR (10)

1. Release the stator leads from clamp (17).
   NOTE: For III-NG units, the clamp MUST BE REMOVED.
2. Remove three screws (48) holding the alternator assembly together.
3. Using a plastic or rubber hammer, tap intermediate housing (13) away from the stator and front housing until free from bearing cover (9).
4. Pull stator winding (10) and seal band (10a) free from housing (5) taking care not to damage the Teflon® wrapping on the stator.

7.5 DISASSEMBLY – BEARINGS (6)

1. Remove drive gear (16), then re-install screw (20) in the shaft.
2. Remove rubber bearing cover (9). Use a small bearing puller to remove the gear-end bearing.
3. Referring to Fig. 5, support front housing (5) on the stator end. Using an arbor press, press on the drive end of the main shaft until shaft assembly (7) is free from front housing (5).
4. Press the drive-end bearing (6) from either housing (5) or shaft (7).



7.6 PARTS REPLACEMENT

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

7.7 REASSEMBLY – FRONT HOUSING ASSEMBLY

1. Press new drive end bearing (6) into front housing (5) until it fully seats. 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.
2. Referring to Fig. 7a, press the shaft-rotor assembly (7) into the front housing assembly (5). Use tool 506104A to press on the end of the shaft, and tool 506104C to support the inner race of the bearing. This will insure the correct extension of the shaft through the bearing (see Fig. 7a).
3. Install bearing spacer (8) on shaft - see Fig. 7b.
4. Press gear-end bearing (6) on shaft (7) until it seats against the bearing spacer (8). Referring to Fig. 7B, leave tool 506104C in place to support the coupling end of the shaft. Press on the inner race of the bearing for this operation using tool 506104D.
5. Install a new rubber bearing cover (9) on gear-end bearing (6).
6. Using a new lockwasher (32) and flat washer (18) install drive gear (16); if worn, use a new gear. Secure with screw (20).
7. If the 360405 housing (-BEL) has been disassembled, us 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).

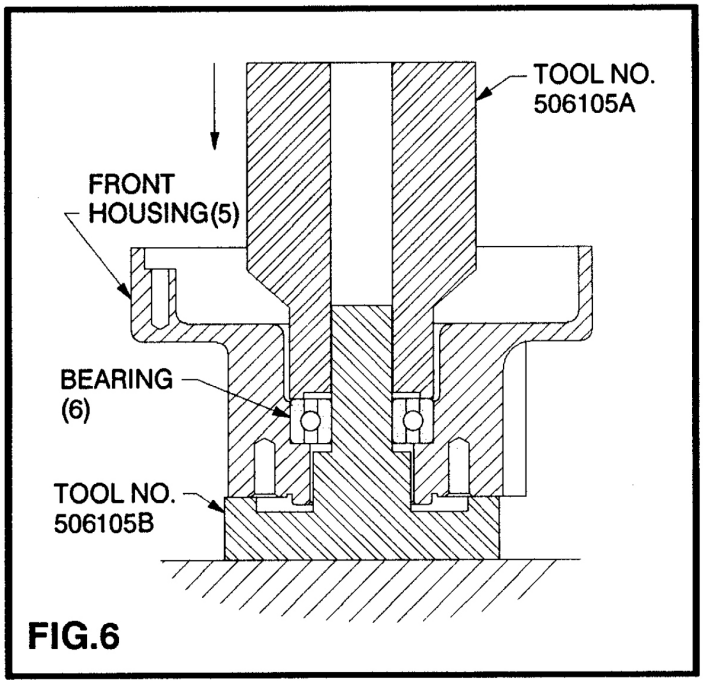
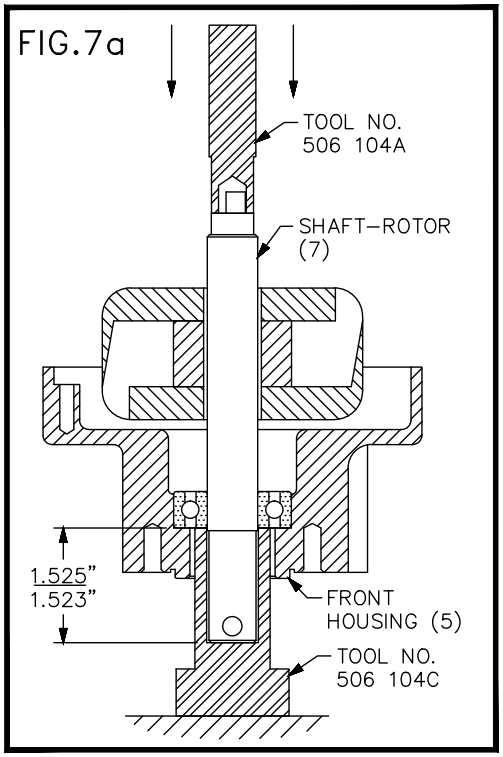
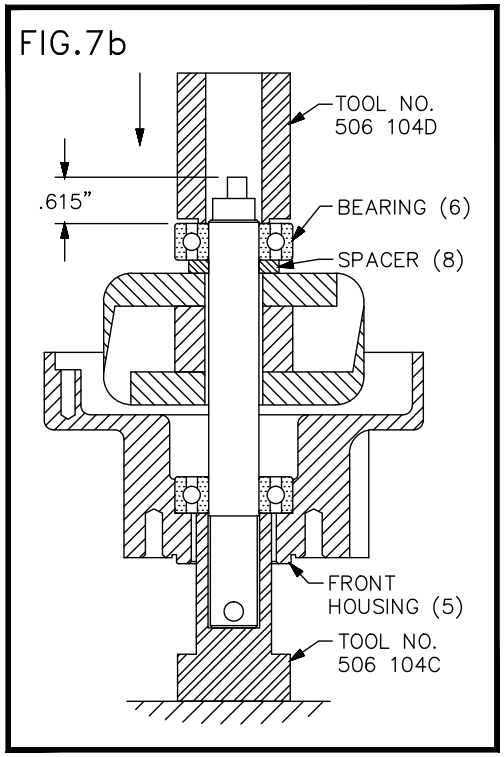


FIG.6

7.8 REASSEMBLY – ALTERNATOR

1. 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 the leads are aligned with the flat base on housing (5). Use the screw to line up the stator holes properly with the tapped holes in housing (5). Insert the stator into the front housing taking care not to damage the Teflon® wrapping or the windings. Remove screw.
   NOTE: Stator 371604 replaces older types 371004 and 371007. The hole in housing (13) must be enlarged to 0.75" diameter in units below S/N 12000.
2. Apply a film of Vaseline® or similar lubricant to the bearing bore in intermediate housing (13). THIS IS ESSENTIAL FOR PROPER ASSEMBLY.
3. Insert the stator plug and leads through the 0.75" dia. hole in housing (13) and start the housing over bearing cover (9). Insert three NEW hex socket head screws (48) with lockwashers (47) – DO NOT REUSE OLD HARDWARE – through housing (13) and stator (10) into the tapped holes of 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 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 in all overhauls replacing the former filister head, slotted screws.
4. At this point, the shaft should turn freely without mechanical drag. If there is mechanical drag (not to be confused with the magnetic drag of the 12-pole alternator), remove the intermediate housing (see DISASSEMBLY – STATOR) and repeat above steps of this section.
5. Install stator seal band (10a) from the coupling end. The band should seat against the stator (10) between housings (5) and (13).





7.9 FLANGE MOUNT UNIT

1. Replace oil seal (3a) in the flange (3). Place a new gasket (4) on housing (5).
2. Install flange (3) to housing (5) using four new screws (11) – DO NOT REUSE OLD SCREWS.
3. Glue a new flange gasket (3b) to the unit flange.

7.10 COUPLING

1. Install coupling (1), (2) or (2-1) on shaft (7) lining up the holes in coupling and shaft.
2. Use tool 506108A to drive spring pin (1a) or (2a) through coupling and shaft until flush with the coupling O.D.

7.11 REASSEMBLY – BACK COVER TO ALTERNATOR

1. The timing mark on the back cover should line up with the magnet rotor mark being at the 12 o'clock position (opposite the output connector) on the circuit board assembly (44).
2. 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 a line up as close as possible.
3. Secure the back cover assembly to the alternator section with hardware (62) and (63).

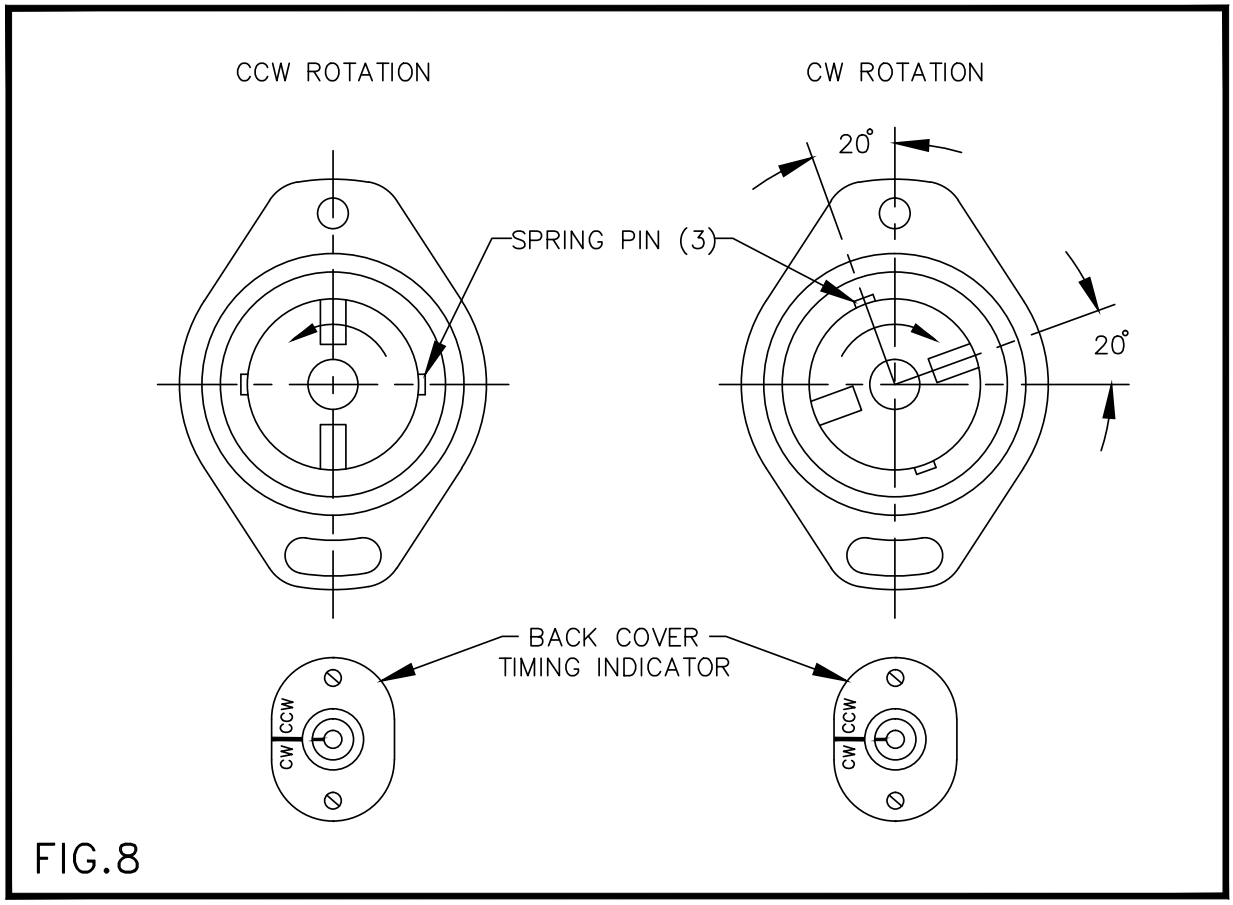


FIG.8

8.0 SERVICE TOOLS

The following service tools are referenced in sections 5 and 6.

506101A	Press bearing-shaft (55) into back cover (53).
506101C	Support back cover.
506104A	Press shaft-rotor (7) into front housing (5).
506104C	Support front housing bearing (6).
506104D	Press gear-end bearing (6) on shaft-rotor (7).
506104E	Support bearing-shaft (55).
506105A	Press bearing (6) into front housing (5).
506105B	Support front housing (5), including ring.
506108A	Drive coupling pin (1a) or (2a) off and on.
506022	Press distributor rotor (43) on bearing-shaft.

9.0 OPERATIONAL TEST

1. Perform the tests of paragraphs 4.2 and 4.3.
2. Run the Operating Test of paragraph 4.2, no. 2 for one hour.
3. After the one-hour Operating Test, check timing per section 4.4.