ALTRONIC

Altronic V-NG Service Manual

AV-NG SM 4-26

NOTICE: The Altronic V-NG ignition system is suitable for use in Class I, Division 2, Group D hazardous locations when installed in accordance with these instructions.

WARNING: DEVIATION FROM THESE INSTALLATION INSTRUCTIONS MAY LEAD TO IMPROPER OPERATION OF THE ENGINE WHICH COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

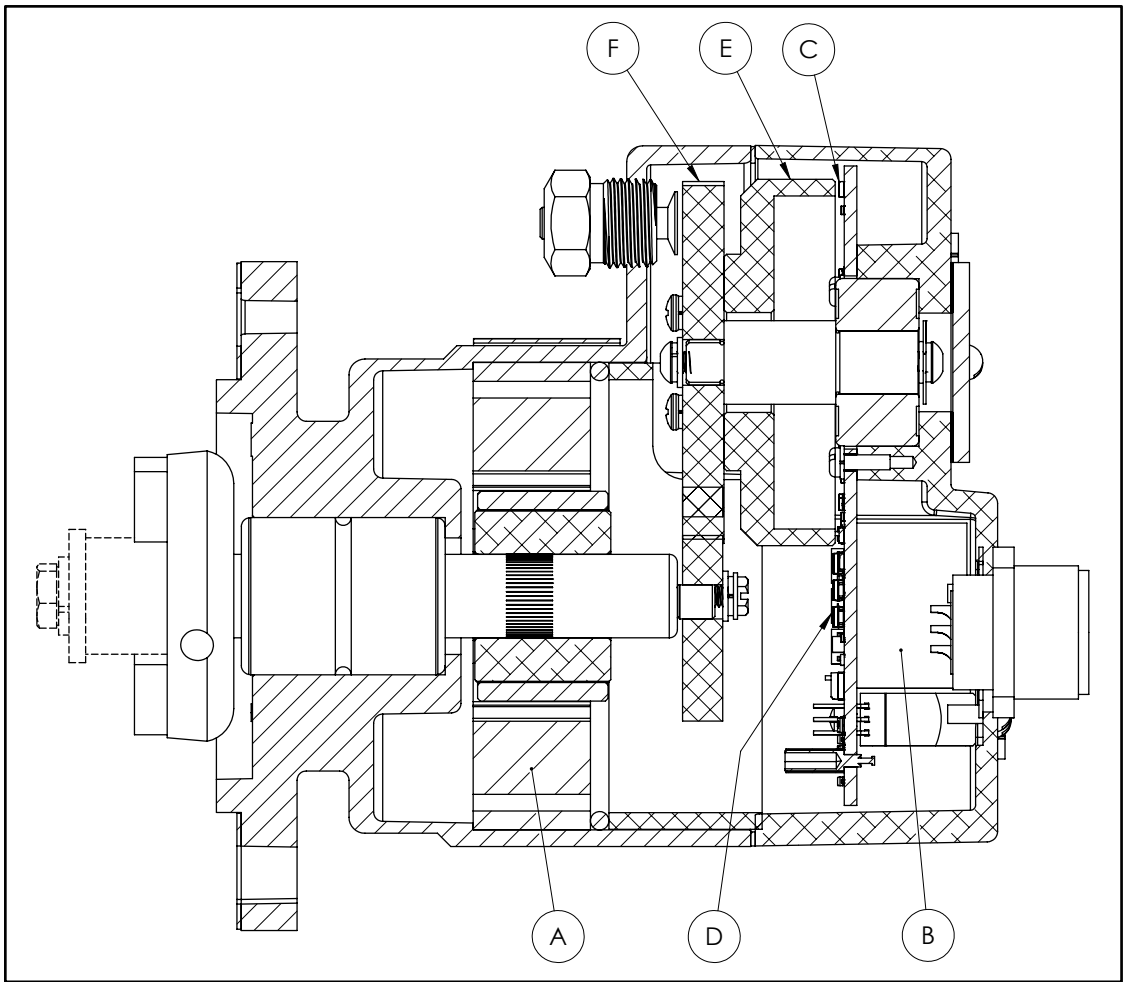
SERVICE NOTE:

These instructions include information on a revised stator part number which provides improved starting output for the Altronic V-NG system. See sections 2.0 and 4.2.

CONTENTS:

1.0 SYSTEM OPERATION

OPERATION – The Altronic V-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.

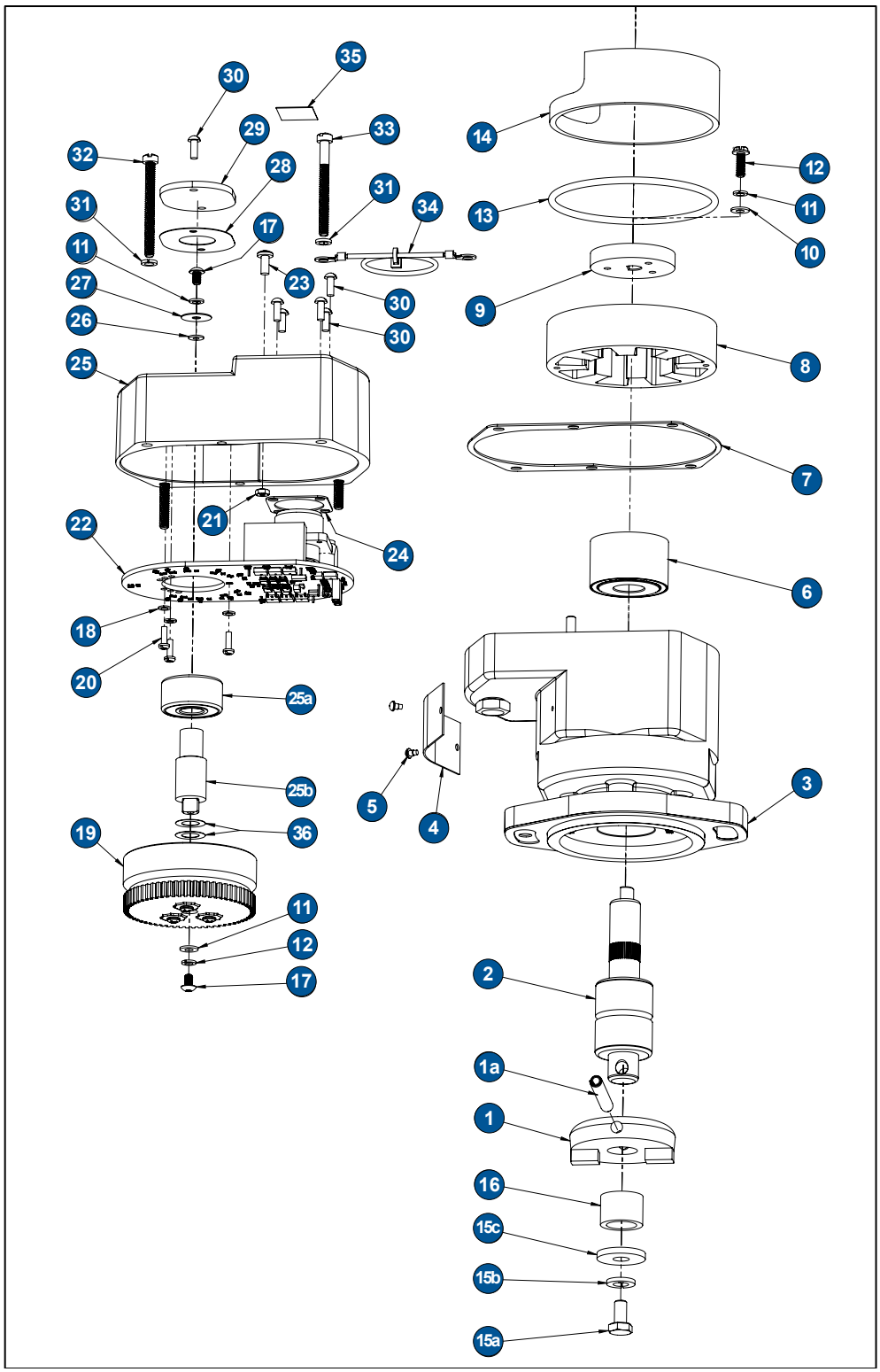


The alternator (A) provides the power to charge an energy storage capacitor (B). A separate HE magnetic switch (C) and transistor (D) on the unit circuit board are used for each of the system's outputs, which usually correspond to each engine cylinder. A rotating timer/distributor rotor (E), driven through speed reducing gears (F), 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 – HE MAGNETIC SWITCH
D – TRANSISTOR SWITCH
E – TIMER/DISTRIBUTOR ROTOR
F - DISTRIBUTOR GEARS

2.0 UNIT PARTS BREAKDOWN

EXPLODED VIEW (see next page for part numbers)



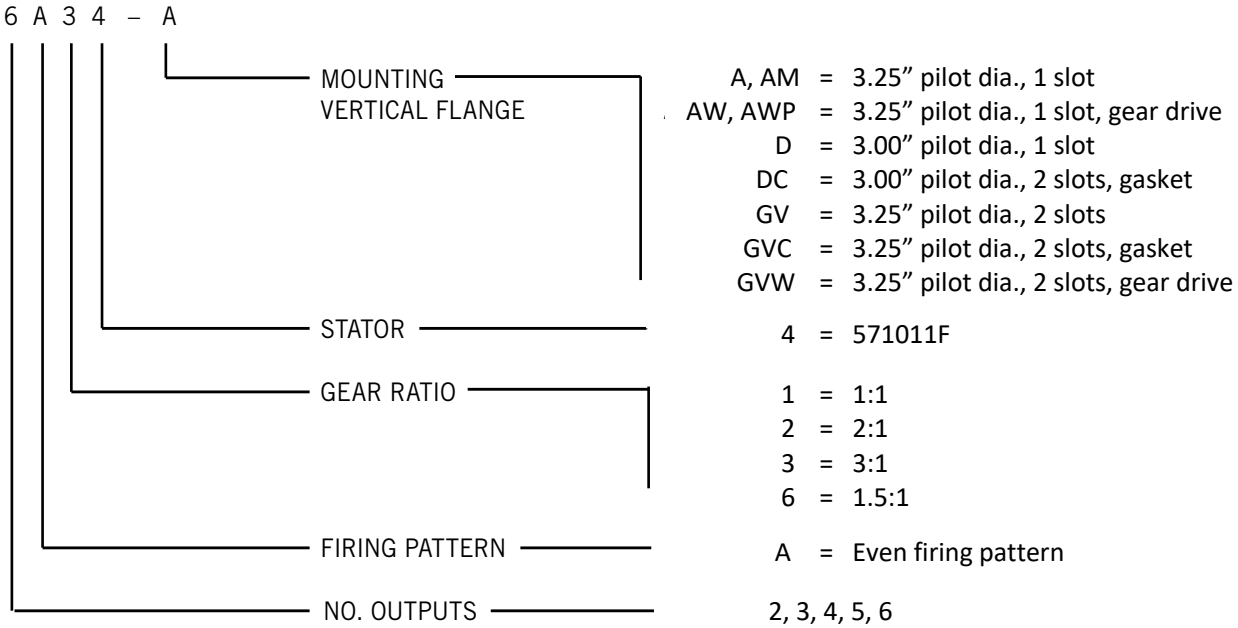
PARTS TABLE (see previous page)

REF.	PART NO.	DESCRIPTION
1	510454-U	Coupling, yellow
	510699	Coupling
1a	902478	Spring Pin 2-1/8" Lg.
2	410063	Bearing-shaft, short
	510654	Bearing-shaft, long
3	560004-1	Housing -A, -AM, -AW
	560004-2	Housing -GV, -GVW
	560004-3	Housing -D
	560004-4	Housing -GVC
	560004-5	Housing, Caterpillar unit
	560004-6	Housing, -DC
4	502229	Nameplate
5	902520	Drive pin
6	560011	Magnet-Rotor
7	410039	Gasket
8	571011F	Stator
9	310518	Drive gear 1.5:1
	510357	Drive gear 2:1
	510359	Drive gear 3:1
	510625	Drive gear 1:1
10	901326	Washer
11	900944	Lockwasher #8
12	902465	Screw, 8-32
13	510462	O-ring
14	410038	Spacer
15a	902585	Screw, 5/16"-18
15b	901010	Lockwasher, 5/16"
15c	902586	Washer
16	410045	Bushing, extended shaft
17	902541	Screw, 8-32

REF.	PART NO.	DESCRIPTION
18	14C-HC55	Lockwasher #4
19	570410-1	Distributor Rotor 1:1 gear
	570410-2	Distributor Rotor 2:1 gear
	570410-3	Distributor Rotor 3:1 gear
	570410-6	Distributor Rotor 1.5:1 gear
20	901090	Screw, 4-40
21	901679	Nut, 8-32
22	580056-2F	Circuit Board, 2-output
	580056-3F	Circuit Board, 3-output
	580056-4F	Circuit Board, 4-output
	580056-5F	Circuit Board, 5-output
	580056-6F	Circuit Board, 6-output
23	902834	Screw, 8-32 x 3/16"
24	501335	Gasket, 5-pin connector
	501368	Gasket, 7-pin connector
25	570005	Back cover, 5-pin connector
	570028	Back cover, 7-pin connector
25a	410058	Bearing
25b	510660	Shaft, distributor
26	902591	Washer
27	302106	Label, timing - shaft
28	502226	Label, timing - back cover
29	310365	Cover plate
30	902064	Screw, 6-32
31	901004	Lockwasher #10
32	902587	Screw, 10-24 x 2"
33	902483	Screw, 10-24 x 2-1/4"
34	501504	Wire assembly, ground
35	502233	Label, ground warning
36	902579	Washer, shim (as needed)

3.0 UNIT SPECIFICATIONS

3.1 IGNITION UNIT PART NO. DESIGNATION



3.2. UNIT SPECIFICATIONS

UNIT NUMBER	BACK COVER P/N	CIRCUIT BOARD P/N
2A14	581409-4	580056-2F
2A18	USE UNIT 2A14	
3A14	581409-9	580056-3F
3A64	581409-8	580056-3F
4A24	581409-12	580056-4F
4A34	581409-13	580056-4F
5A24	581409-7	580056-5F
6A24	581409-17	580056-6F
6A34	581409-15	580056-6F

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 AV-NG II.

4.1 VOLTAGE TESTS – With the wiring harness unplugged, operate the unit at a coupling speed of 500 rpm; measure the positive voltage at the indicated connector pin.

Model	Connector Pin	Voltage Output
2A, 3A	"E"	200-220 Vdc
4A, 5A, 6A	"G"	200-220 Vdc

4.2 OPERATING TESTS

Stator	Unit Speed	Gap for consistent firing
571003F	150 rpm	7 mm
571011F	130 rpm	7 mm
Any	TEST RPM of Section 4.3	15 mm

4.3 TIMING SPECIFICATIONS

1. The table below gives the firing sequence in degrees of the drive coupling shaft. Locate the specific Altronic V-NG unit no. in the table and establish the TEST RPM and ROTATION specified.
2. TEST RPM is the drive coupling speed.
   ROTATION is the coupling rotation looking at the drive coupling end of the unit.
   TOL. ± is the tolerance in degrees.
3. If the timing is out of specification, change the circuit board assembly (22).

UNIT NO.	TEST RPM	ROTATION	A	B	C	D	E	F	TOL. ±
2A14	2000	CW	0	180					2
3A14	1800	CW	0	120	240				2
3A64	2700	CW	0 180	0 180	0 180				3
4A24	900	CW	0	180	0	180			2
4A34	1800	CW	0	270	180	90			3
5A24	2700	CW	0	144	288	72	216		2
6A24	2700	CW	0	120	240	0	120	240	2
6A34	900	CCW	0	180	0	180	0	180	3

5.0 TROUBLESHOOTING

See section 4 for proper performance. The Altronic V-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 (22).
2. If there is weak or no output on all outputs, check the stator winding (8) per the chart below. If the stator tests good, replace the circuit board assembly (22).

Stator Part No.	Ohmmeter Positive Lead	Ohmmeter Negative Lead	Reading at 68°F. / 20°C.	Remedy for Faulty Reading
571003F	Center pin	Outer pin	480 - 640 ohms	Replace Stator (8) with P/N 571011F
	Center pin	Other outer pin	4,800 - 6,400 ohms	
	Center pin	Lamination core	Infinite	
571011F	Center pin	Outer pin	360 - 480 ohms	Replace Stator (8)
	Center pin	Other outer pin	6,000 - 8,000 ohms	
	Center pin	Lamination core	Infinite	

Note: The 571011F stator provides improved starting performance and should be used whenever replacing the stator.

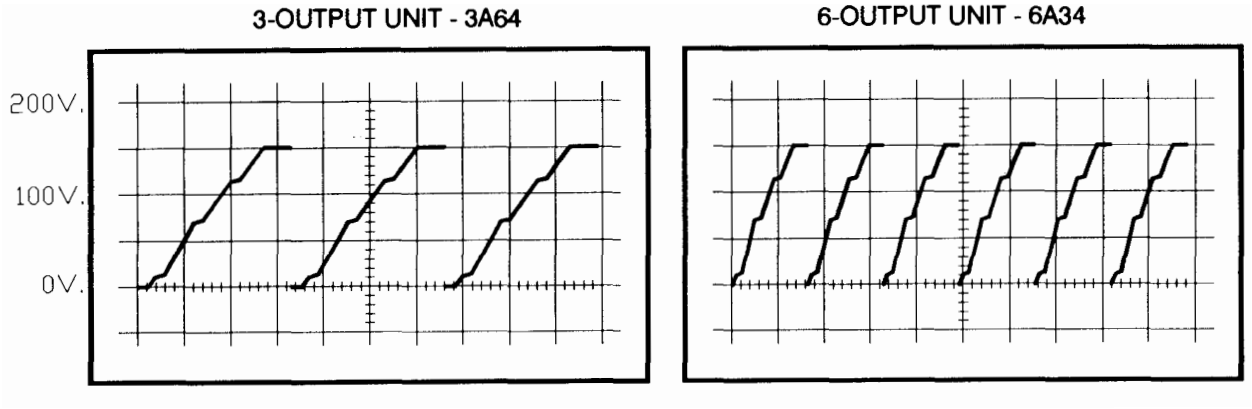
5.2 OSCILLOSCOPE TESTING

The unit should be operated on an ignition test stand per section 4 with the Altronic V-NG unit operating at the TEST RPM shown in section 4.3. The oscilloscope set-up is as follows:

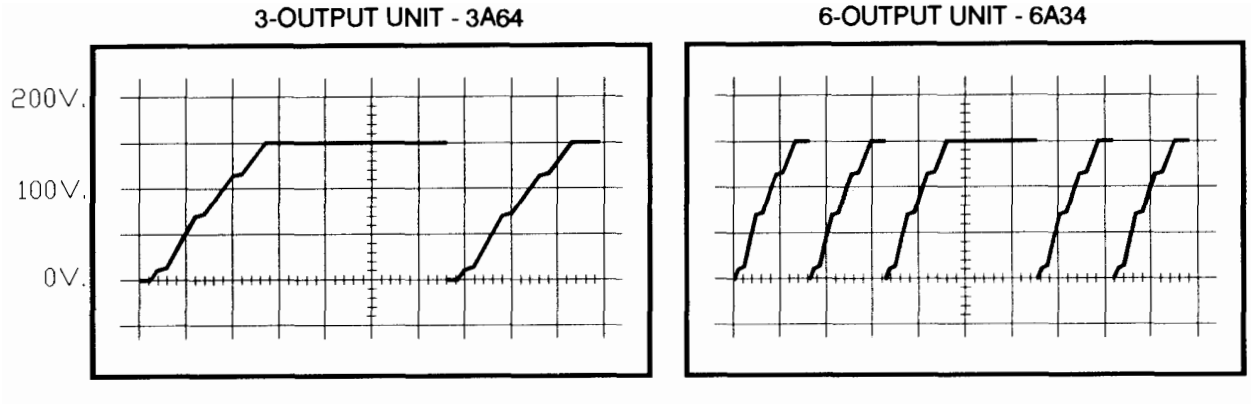
1. Connect the oscilloscope probe to the “E” pin (5-pin connector) or “G” pin (7-pin connector).
2. Vertical calibration is 50 volts/div.
3. Adjust time basis to get a full cycle of firings on the screen. The no. of discharges shown should equal the no. of outputs.

5.3 STORAGE CAPACITOR PATTERNS:

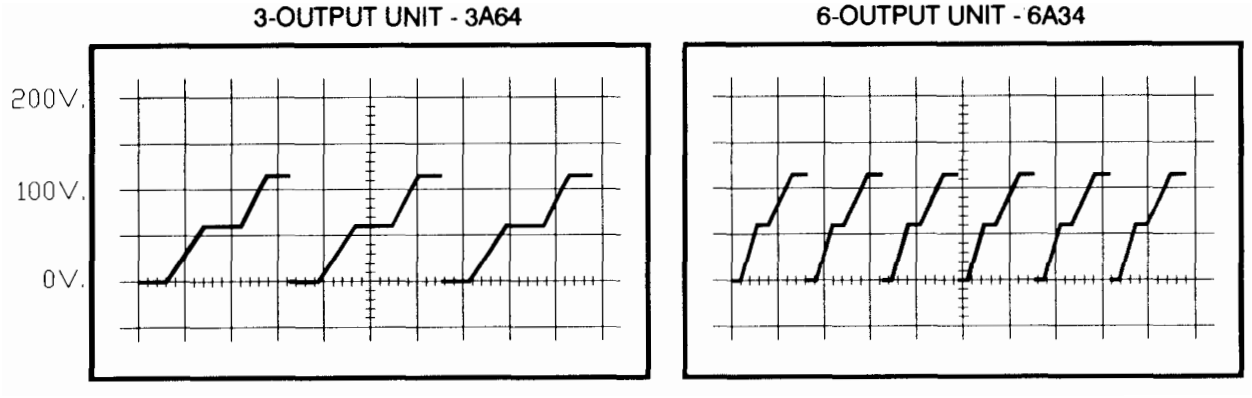
A. NORMAL PATTERN: The normal patterns for the typical 3-output (3A64) and 6-output (6A34) units are shown below. Note: There will be a short delay at the 0V. line before charging resumes.



B. ABNORMAL PATTERN: One cylinder misfiring - replace circuit board assembly (22).



C. ABNORMAL PATTERN: Irregular charging waveform - refer to section 5.1.



6.0 SERVICE – BACK COVER

6.1 GENERAL

1. The procedures of this section require the use of a small arbor press.
2. The unit breaks down into two major parts: the Alternator section and the Back Cover Assembly. Remove the four back cover attaching screws (32) and (33) and carefully pull the back cover assembly away from the alternator section. Unplug the the 3-prong stator connector.

6.2 DISASSEMBLY

1. Remove timing cover plate (29) and timing label (27).
2. Remove screw (17), lockwasher (12) and washer (11); pull the distributor gear/rotor assembly (19) from shaft (25b). DO NOT loosen the small hex-socket screws holding the gear to the distributor rotor. Keep track of shim washers (36).
3. Remove three screws (20), lockwashers (18), screw (23) and four connector screws (30). Pull circuit board assembly (22) from the back cover.
4. Support back cover (25) on both sides near the two dowel pin holes. Press on the timing mark end of the shaft (25b) until the shaft is pressed out of the cover housing bearing.
5. Support back cover (25) and press the bearing (25a) out of the back cover housing.

6.3 PARTS REPLACEMENT AND CLEANING

1. Replace bearing (25a) and any other worn or defective parts.
2. Replace any removed hardware with new parts.
3. Aluminum housings should be cleaned in carbon tetrachloride or similar cleaning solution.

6.4 REASSEMBLY

1. Support cover housing (25) with tool 506103B; slide bearing (25a) over the guide of tool 506103B and press the bearing into the cover housing using tool 506103A until it bottoms.
2. Support the inner race of bearing (25a) with tool 506104B and using tool 506104A, press on the gear shoulder of shaft (25b) until the shaft bottoms against the bearing.
3. Install the circuit board assembly (22). First insert the output connector through the cover housing hole and secure with screws (30). Secure the board heatsink with screw (23). Carefully seat the circuit board in place over bearing (25a) and secure with three screws (20) and lockwashers (18).
4. Install the distributor gear/rotor assembly (19) onto shaft (25b). When fully seated, the air gap between the rotating distributor rotor and the small HE (black) magnetic switches on the board assembly should be between .020” and .060”. Use shim washers (36) as needed to establish this gap. Secure the distributor gear/rotor assembly with hardware (11), (12) and (17). Re-check the gap; the distributor rotor must rotate freely the full 360 degrees of rotation.
5. With the small magnet on the distributor rotor lined up at the 12 o’clock position (at the top of the circle opposite the output connector), the shaft timing label (27) should be lined up with the red mark on the cover housing timing label (28). Using hardware (11), (17) and (26), secure the timing label (27) maintaining the proper alignment.
6. Install timing cover (29) with screws (30).

7.0 SERVICE – ALTERNATOR

7.1 GENERAL

1. The procedures of this section require the use of a small arbor press.

7.2 DISASSEMBLY

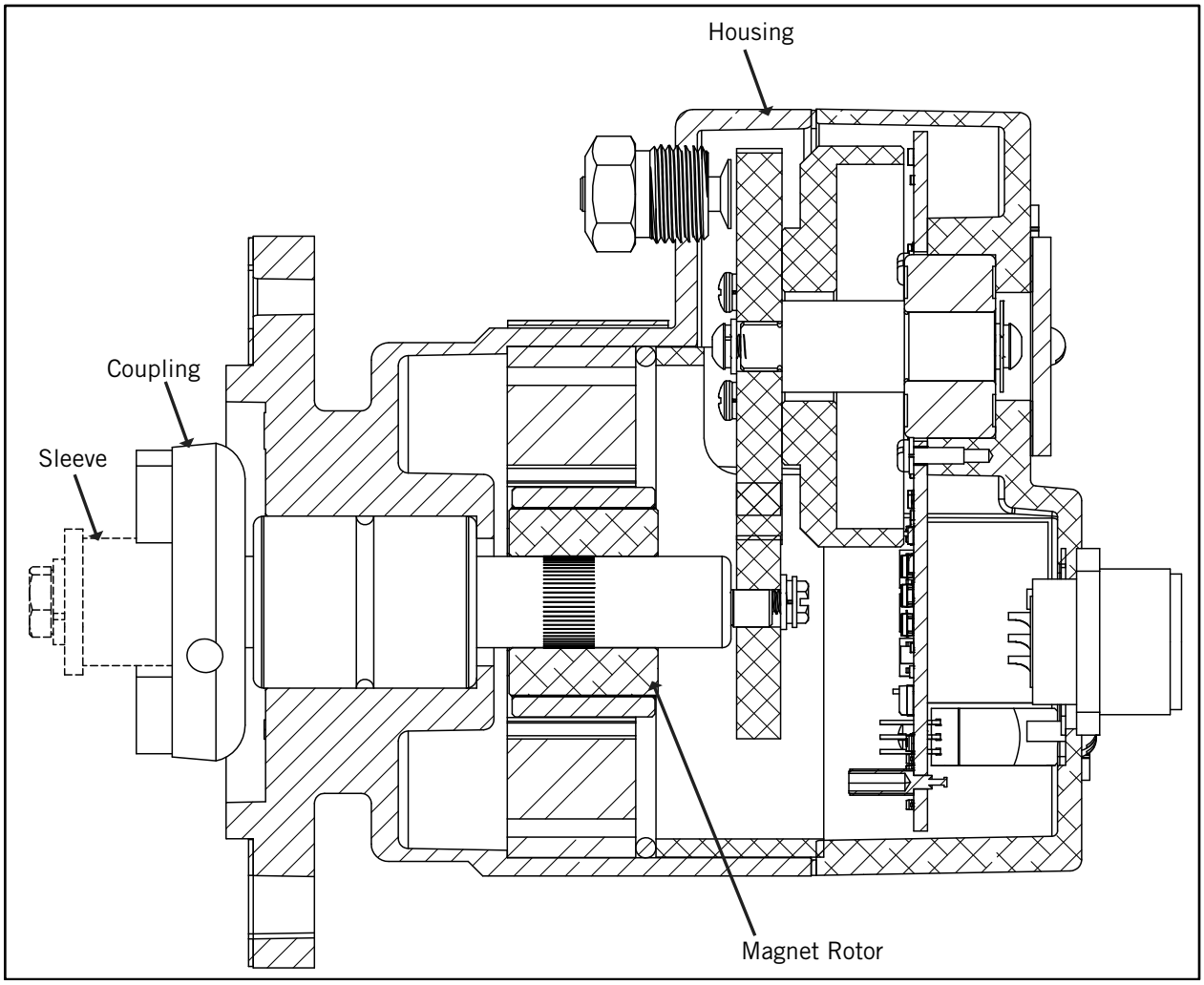
1. Remove spacer (14), O-ring (13) and stator (8) from the alternator housing.
2. Remove screw (12), lockwasher (11), washer (10) and drive gear (9).
3. -AW and -GVW units only: Remove hardware (15a), (15b), (15c) and (16).
4. Using tool 506108A, drive spring pin (1a) out of coupling (1) and shaft (2) and remove the coupling.
5. Support housing (3) on the coupling end and press bearing-shaft (2) out of magnet-rotor (6) and housing (3).
6. Wrap magnet-rotor (6) in a cloth or paper to keep it clean.

7.3 PARTS REPLACEMENT AND CLEANING

1. Replace gasket (7) and O-ring (13).
2. Replace coupling (1), bearing-shaft (2) and any other worn or defective 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 (6) before reassembly.

7.4 REASSEMBLY – FRONT HOUSING ASSEMBLY

1. Press new bearing-shaft (2) into front housing (3) until it fully seats. Use tool 506101B to support housing (4) behind the internal shoulder and use tool 506101A to press on the outer race of the bearing.
2. Clean all debris from the magnet-rotor assembly (6).
3. Press the magnet-rotor onto shaft (2). Use tool 506102B to support the coupling end of the shaft and use tool 506102C to press the magnet-rotor onto the shaft 0.575” beyond the shoulder for the drive gear.
5. Install coupling (1) on shaft (2) lining up the holes in coupling and shaft. Use tool 506108A to drive spring pin (1a) through the coupling and shaft until flush with the coupling O.D.
6. -AW and -GVW units only: Install sleeve (16) and secure with hardware (15a), (15b) and (15c).
7. Using a new lockwasher (11) and flat washer (10) install drive gear (9); if worn, use a new gear. Secure with screw (12).
8. Install the stator (8) with leads at the 6 o’clock position, O-ring (13) and spacer (14).

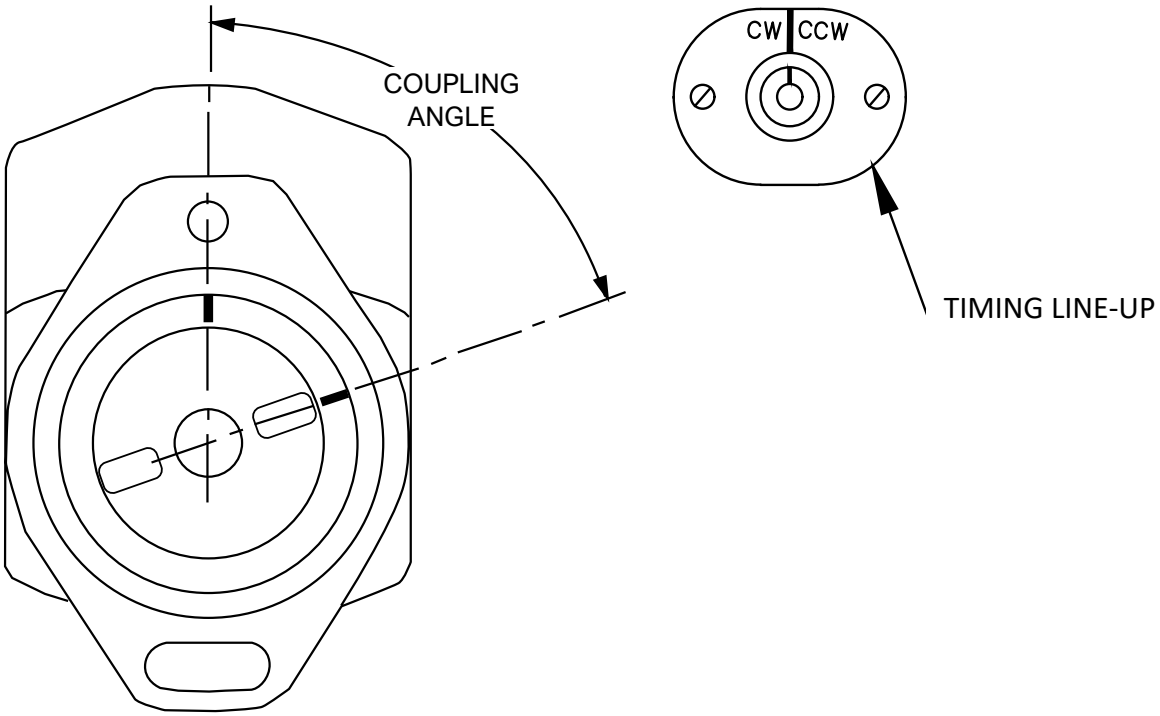

Housing
Coupling
Sleeve
Magnet Rotor

7.5 REASSEMBLY – BACK COVER TO ALTERNATOR

1. The timing mark on the back cover should line up with the magnet rotor magnet at the 12 o'clock position (opposite the output connector) on the circuit board assembly (22).
2. With the two red marks aligned on the back cover (see below), mate to the alternator section with the coupling set as shown in the chart below. 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 (31), (32), (33) and if used, (34).

UNIT NO.	COUPLING ANGLE	
	CCW	CW
2A14-A, -GV	0°	70°
2A14-AW, -GVW	–	70°
2A14-D	–	0°
2A14-GV	–	70°
3A14-A, -GV	0°	70°
3A14-D	–	0°
3A64-A, -GV	0°	70°
3A64-AM	–	45°
3A64-AW, -GVW	–	70°
4A24-A, -GV	0°	70°
4A24-AW, -GVW	–	70°

UNIT NO.	COUPLING ANGLE	
	CCW	CW
4A24-D	–	0°
4A34-A	0°	–
4A34-GVW	–	70°
5A24-GV	0°	–
6A24-D, DC	–	0°
6A24-GV	0°	–
6A34-A, -GV	0°	70°
6A34-AM	–	45°
6A34-AW, -GVW	–	70°
6A34-GVC	–	70°



8.0 SERVICE TOOLS

The following service tools are referenced in sections 6 and 7.

506101A Press bearing-shaft (2) into housing (3).
506101B Support housing (3).
506102B Support shaft (2).
506102C Press magnet-rotor (6) on bearing-shaft (2).
506103A Press bearing (25a) into cover housing (25).
506103B Support cover housing (25) and bearing (25a).
506104A Press shaft-rotor (25b) into bearing (25a).
506104B Support bearing (25a).
506108A Drive scoupling spring pin (1a) off and on.

9.0 OPERATIONAL TEST

1. Perform the tests of paragraphs 4.2 and 4.3.
2. Run a one-hour operating test using the specifications in the table of section 4.3.
3. Re-check the timing per section 4.3 at the end of the one-hour test run.