

ALTRONIC®, INC.
712 TRUMBULL AVE.
GIRARD, OHIO 44420

ALTRONIC II IGNITION SYSTEM

INSTALLATION INSTRUCTIONS FORM AII II 7-85

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| <p>WARNING: An improperly installed or operating ignition system may lead to improper engine operation which consequently could pose the threat of personal injury to operators or other nearby personnel.</p> |
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DESCRIPTION

Altronic II is a self-contained, capacitor discharge ignition system. It consists of a permanent-magnet alternator powering a breakerless, electronic firing circuit, a shielded wiring harness, and an appropriate number of ignition coils (one per spark plug). A single Altronic II unit handles even or odd firing patterns up to 20 cylinders. In most applications, the Altronic II unit provides adequate starting output at an engine speed of 35-50 RPM.

For non-hazardous operations there is an unshielded epoxy coil 291 001. For hazardous area operations, shielded primary cable assemblies are available for connection to one of two optional shielded coil series - 291 001-S or 591 008.

OPERATION

The operating sequence is as follows: The alternator provides the power to charge the energy storage capacitor(s). A voltage is induced in a pick-up coil by the passage of a trigger pin mounted to the alternator's magnet rotor. This voltage activates the trigger circuitry on the back cover circuit board which produces an output signal suitable for triggering the system's power SCR's. The trigger signal is directed to a particular SCR through an associated magnetically operated solid state switch on the back cover distributor board. The solid state switches are sequenced by a rotating distributor magnet. When triggered on, the power SCR discharges the storage capacitor through the primary of an ignition coil which steps up the voltage to fire the spark plug. Two pick-up coils and separate electronic trigger circuits are used to extend the system's capability to engines with certain odd-firing patterns.

1.0 MOUNTING ALTRONIC II UNIT

- 1.1 Set the engine with No. 1 cylinder in firing position (full advance for normal operation).
- 1.2 The flex coupling (560 002, 560 003 or 560 009) should be attached to the unit shaft with a spring pin. Attach the engine drive member (560 001 or 560 008) to the end of the coupling using the two spring pins provided. Flange mount units may use lug-type coupling 510 454-P in which case the engine drive member referred to above is not used.

NOTE: For the safety of operating personnel, the engine manufacturer's shield must be in place covering the flex coupling/engine drive.

- 1.3 Remove the hex plug from the side of the Altronic II unit.
- turn alternator shaft until distributor magnet becomes visible through side hole
 - adjust shaft slightly until spring pin holding coupling to shaft lines up vertically, or until 1/4" rod engages hole in alternator drive shaft through hole near the coupling end of unit

Replace hex plug. In case of doubt, remove the back cover and turn shaft until the red marks on gears line up. The Altronic II unit is now set to fire No. 1 cylinder.

- 1.4 Install the unit on engine bracket. Slip engine drive member 560 001 or 560 008 over the existing drive hub (or new hub 510 551); insert and tighten locking screw and locknut. Flex couplings 560 002 and 560 003 should not be stretched or compressed; with the gear-flex coupling 560 009 or lug-type coupling 510 454-P, allow .015" clearance for the floating member. Secure the unit to engine bracket with 3/8"-16 screws maintaining proper alignment.

- 1.5 At this point, the ignition timing is approximately correct. Exact timing should be set using a timing light with the engine running at full operating speed with no load. Depending on the type of unit, timing is set either with the adjust-arm on top of the unit or by rotating the main body of the unit inside the front mounting housing (unit with provision for automatic timing adjustment).

2.0 PRIMARY WIRING

- 2.1 Insert the wiring harness connector into the Altronic II unit and tighten hand tight; carefully tighten an additional one-sixth turn with a wrench.

- 2.2 Altronic II Unit No. _____ fires in this sequence:

- 2.3 Connect the harness leads in the junction box in accordance with the engine's firing order. The leads from the junction box corresponding to the above system outputs connect to the ignition coil negative (-) terminals - see Wiring Diagrams. The "N" harness lead is the switch or shutdown wire; it must be grounded to kill the ignition (see section 3.0). The "P" lead must be grounded to the engine in the junction box and also connected to the common coil ground lead connecting the positive (+) terminals of the ignition coils. On V-engines, run a separate common ground lead for each bank. All primary wiring should be protected from physical damage and vibration.

- 2.4 Primary wire should be no. 16 gauge stranded, tinned copper wire. The insulation should have a minimum thickness of .016" and be rated 105° C. or higher. Irradiated PVC or polyolefin insulations are recommended. Altronic primary wire no. 503 188 meets these specifications.

- 2.5 If two ignition coils per cylinder connected to a common output are used, use parallel wiring as shown on the Wiring Diagrams.

3.0 "N" HARNESS LEAD - SAFETY SWITCH WIRING

- 3.1 The "N" harness lead is used as the safety shutdown wire. It must be grounded to kill the ignition. For purposes of checking system performance with an oscilloscope, connecting to this lead shows the firing of all cylinders on a single-circuit unit or one-half of the cylinders on a dual-circuit unit.
- 3.2 To minimize arcing at the switch(es) connected to the "N" lead, use a 100 ohm, 1 watt resistor in series with the "N" lead.
- 3.3 Safety switches and associated wiring must be in top condition for proper operation with the Altronic II system. Partial shorts or leakage in this wiring can prevent the system from operating properly. It is recommended that safety switches and associated wiring be checked with a megger before installing the Altronic II system. There should be no indication of leakage to ground.
- 3.4 If the above wiring and/or switches are the problem, the usual result is one of the following:
 - engine will start but stops when safety shutdown devices are switched in
 - engine will start but will not carry load
- 3.5 If ignition output is thought to be weak, the first step should be to disconnect the safety switch wiring completely. This will show whether the problem is in this area. If so, the individual switches and wires must be checked out to find the source of the leak to ground.

4.0 SECONDARY WIRING

- 4.1 Mount the ignition coils as close as possible to the engine spark plugs consistent with a secure mounting and avoidance of temperatures in excess of 185° F.
- 4.2 Secondary wiring should consist of 7mm, silicone insulated, tinned copper conductor. Keep spark plug leads as short as possible; the use of secondary leads longer than 18 inches is not recommended. Spark plug leads should be kept at least 2 inches away from any grounded engine part. In deep spark plug well applications, use rigid insulated extenders projecting out of the well.
- 4.3 The use of a clear, silicone grease (such as Dow Corning DC-200) is recommended for all high-tension connections and boots. This material helps seal out moisture and prevent corrosion from atmospheric sources.

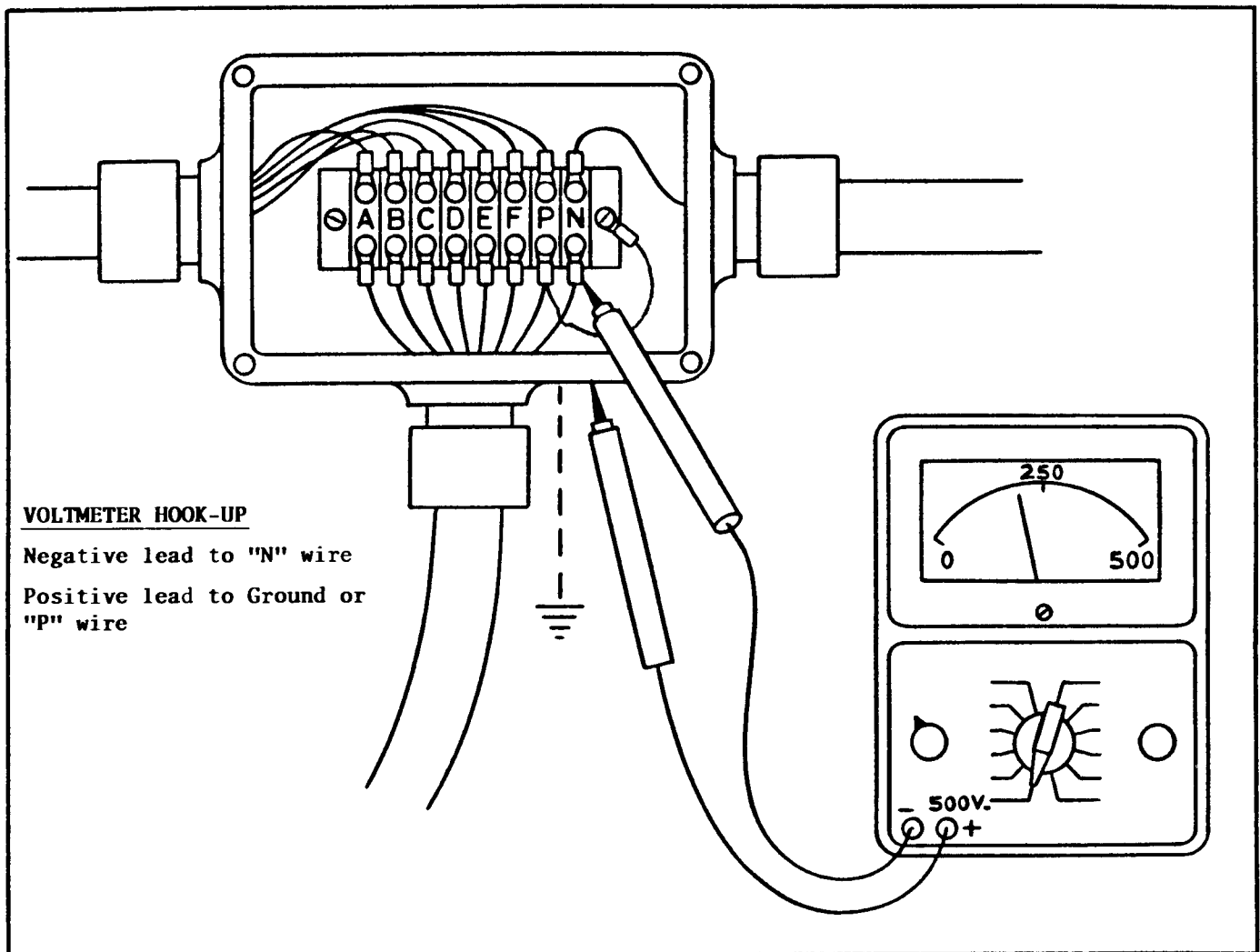
5.0 VOLTMETER CHECK

5.1 Operators are urged to make one simple voltmeter check after the Altronic II ignition system is installed and the engine is operating at normal speed and load. Use a DC voltmeter with a 500VDC scale and connect as illustrated below. Record the voltmeter reading here for future reference:

VOLTMETER READING _____

5.2 Most Altronic II units will give a steady voltmeter reading with a value between 130 and 280 volts depending on engine speed, number of cylinders, etc. Some units with very odd (non-repetitive) firing patterns will give a pulsating reading when operating normally.

- A. If reading is lower than normal, first disconnect the "N" wire from the engine shutdown devices to be sure that faulty wiring and/or shutdown switches are not causing the low reading.
- B. If an engine misfire is being caused by the Altronic II unit, the voltage will pulsate each time the misfire occurs. If the reading pulsates or otherwise varies from the normal reading recorded above, proceed with the electrical checks given in the service manual form AII SM 2400.
- C. If an engine is misfiring but the voltage is steady, look for a bad spark plug, coil or some other engine problem.



6.0 MAINTENANCE

6.1 Due to a minimum of moving parts, maintenance should be minimal. The unit may be inspected at periodic intervals for condition of wiring, bearings, etc. To remove the back cover assembly, remove the four attaching screws; then pull the cover straight backwards from the unit slowly and carefully disengage the 5-prong plug(s) inside.

6.2 Alternator Drive Gear

- check condition of gear teeth; no lubrication is required
- the red mark should line up with a trigger disc mounting screw; if not, replace the drive gear

6.3 Distributor Shaft Assembly

- check the condition of the bearings and driven gear
- check that the magnet is securely fastened to the phenolic spacer and that the mounting screw is tight; remove any metal filings or dirt from magnet

6.4 Back Cover Assembly

- check condition of wiring and insulation
- check mounting of magnetic switches on distributor board
- check condition of O-ring in bearing bore

6.5 Wiring - inspect all wiring to the output connector. The color code for these wires is as follows:

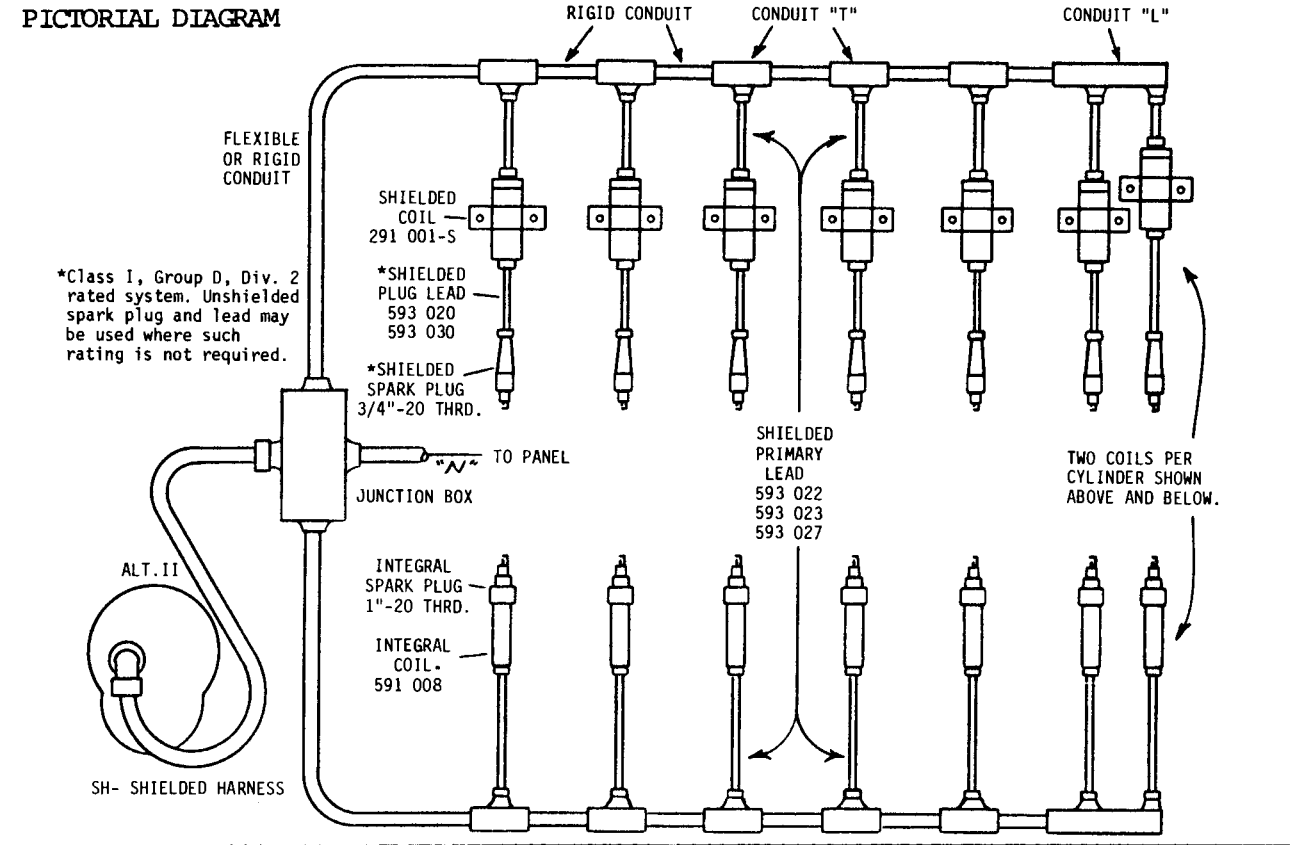
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|-----------|------------------|
| A: red | K: white/orange |
| B: blue | L: white/black |
| C: brown | M: white/red |
| D: green | N: orange |
| E: yellow | P: black |
| F: gray | *R: white/brown |
| G: white | *S: white/green |
| H: violet | *T: white/yellow |
| J: black | *U: white/blue |

*used only on 14-16 cylinder units

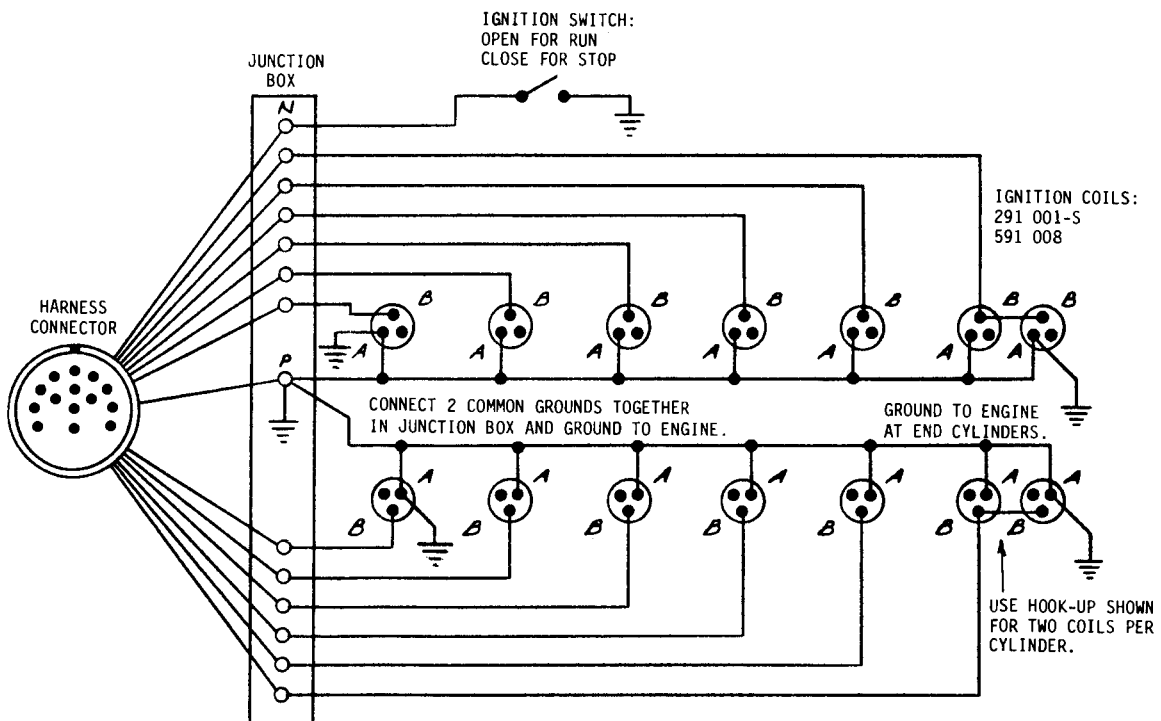
6.6 When reassembling unit, install distributor shaft assembly into unit so that the red marks on the two gears line up. Be sure the gear end bearing seats all the way into the alternator housing bore. Position the back cover assembly next to the unit with the bottom tilted upward so that the 5-prong plug(s) can be plugged into the alternator socket(s). Carefully push the back cover into place and secure with the four attaching screws.

"V" ENGINE - SHIELDED INSTALLATION

PICTORIAL DIAGRAM

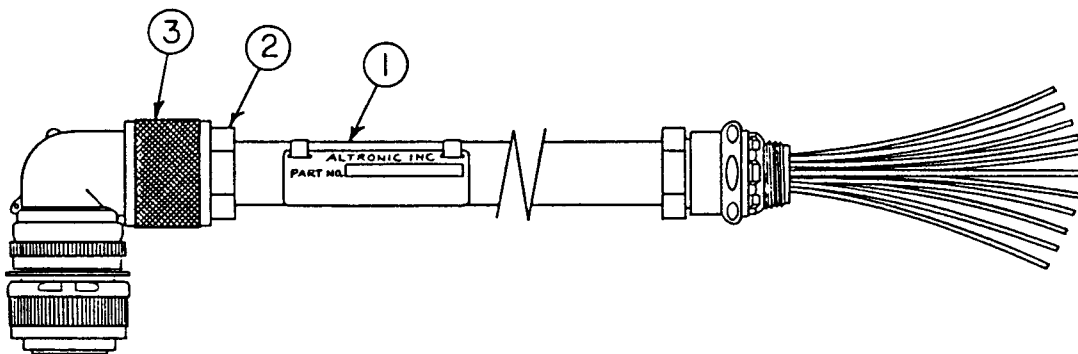
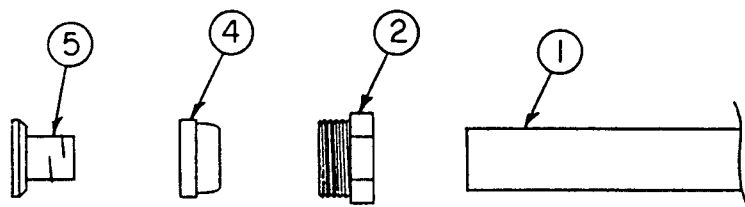


WIRING DIAGRAM



TO SHORTEN HARNESS

- A. LOOSEN AND DISENGAGE NUT (2) AND REMOVE CONDUIT (1) COMPLETELY FROM CONNECTOR AND HARNESS ASSEMBLY (3).
- B. REMOVE ITEMS (5), (4) AND (2) IN THAT ORDER FROM CONDUIT (1). NOTE THREADS ON (5).
- C. CUT CONDUIT TO LENGTH WITH HACKSAW AND DRESS WITH FILE TO INSURE A CLEAN, SQUARE END. REMOVE FILINGS FROM INSIDE CONDUIT.
- D. REINSTALL ITEMS (2), (4) AND (5) IN THAT ORDER.
- E. INSTALL REASSEMBLED CONDUIT INTO (3) AND TIGHTEN (2).



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|---|----------|---|--------|---------|----------|----------|--------------------|
| TOLERANCES UNLESS OTHERWISE SPECIFIED .XXX - ±.005 .XX - ±.010 | MATERIAL | DRAWN | TRACED | CHECKED | DESIGNER | APPROVED | DATE |
| | ANALYSIS | DA | | | | | 5-28-85 |
| | | ALTRONIC, INC. | | | | | SCALE |
| | | GIRARD (YOUNGSTOWN), OHIO | | | | | |
| | | NAME SHIELDED HARNESS CONDUIT LENGTH ADJUSTMENT | | | | | PART NO. 509025 |