

INDIGO ELECTRONICS AT-4D IGNITION

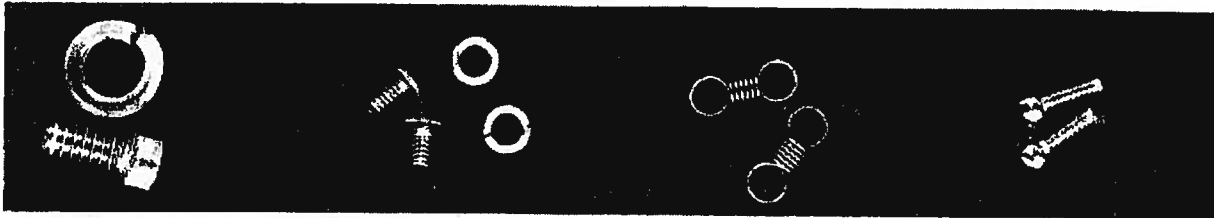
TOOLS REQUIRED FOR INSTALLATION

Medium Flat Blade Screwdriver
 Small Flat Blade Screwdriver
 3/8" Open End Wrench
 1/2" Box/Open End Wrench
 9/16" Box/Open End Wrench

13/16" Box/Spark Plug Wrench
 9/16" or 14mm Socket
 Standard Pliers
 Needle Nose Pliers

HARDWARE

(In Order of Usage)



5/16 x 1/2"
 Hx. Hd. Bolt &
 Lockwasher (1)

8/32 x 1/4"
 Pan Head
 & Lockwashers (2)

Springs
 Centrifugal
 Advance (2)

8/32 x 3/8"
 Filister Hd
 (2)

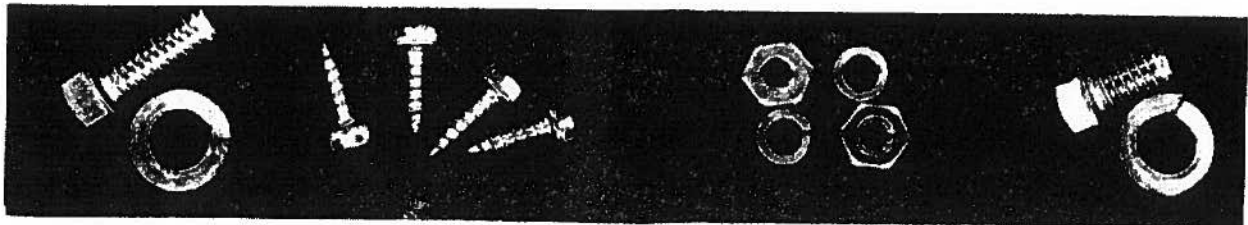


8/32 x 1/4"
 Pan Head
 (1)

6/32 x 3/16"
 Pan Head &
 Ring Connector (1)

4-40 x 3/16"
 Pan Head
 (1)

Tie Wrap

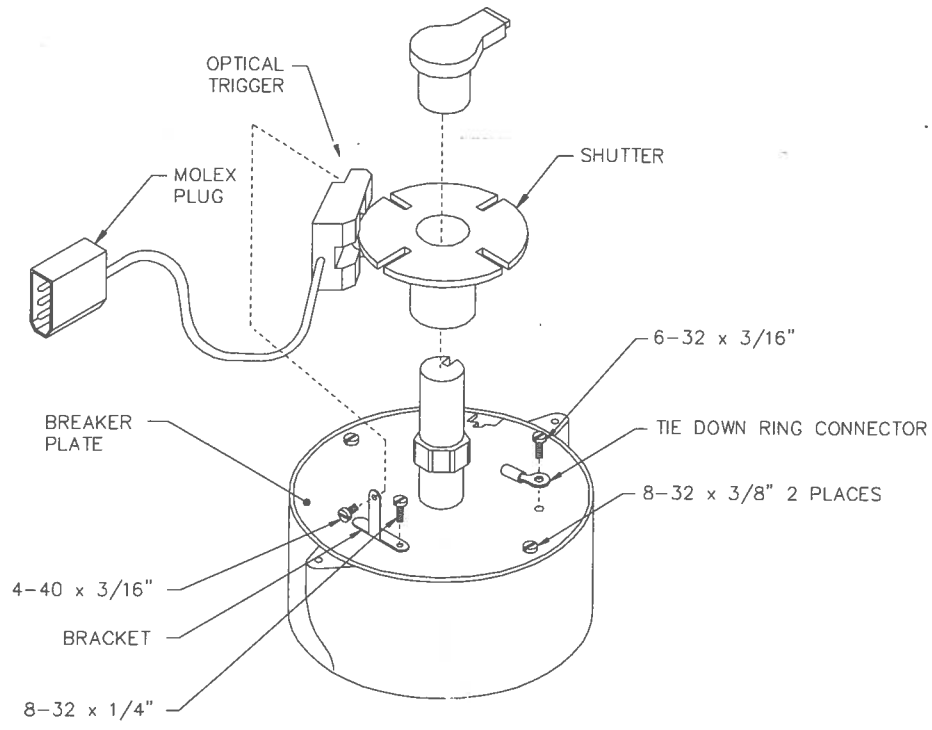


5/16 x 3/4"
 Hx. Hd. Bolt &
 Lockwasher (1)

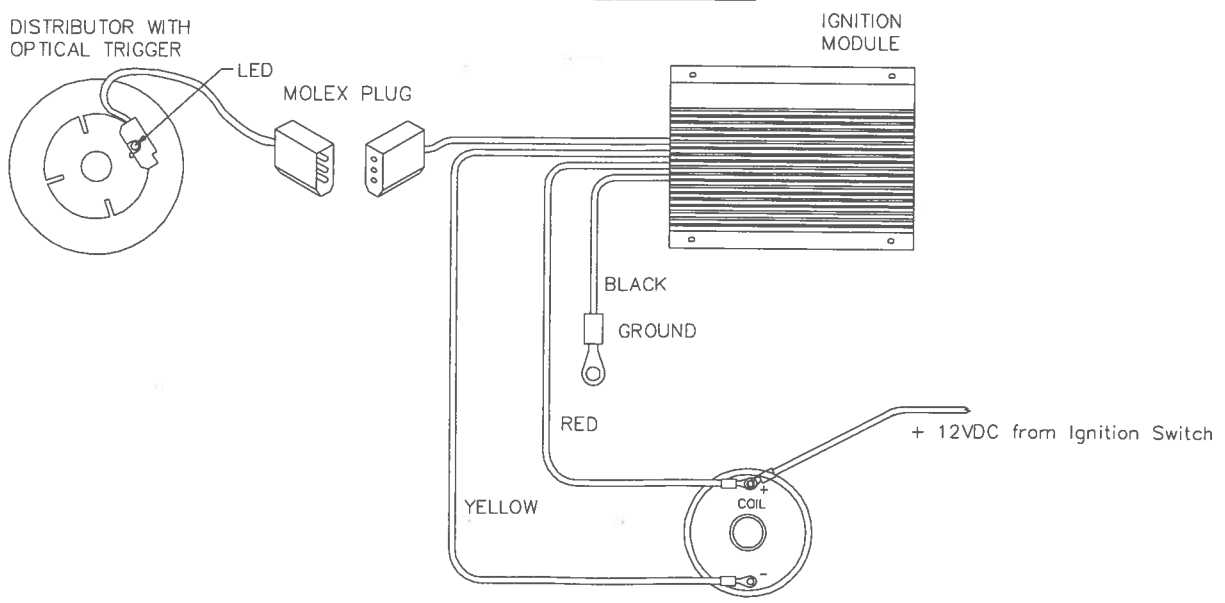
#8 x 1/2" Hx.
 Hd. Sheet Metal
 Screws (4)

10-32 Nuts
w/ Lockwashers
 (2)

5/16 x 1/2"
 Hx. Hd. Bolt &
 Lockwasher(1)



DISTRIBUTOR RETROFIT



SYSTEM OUTLINE

INSTALLATION INSTRUCTIONS

INDIGO ELECTRONICS AT-4D HIGH INTENSITY IGNITION ATOMIC 4 - DELCO DISTRIBUTOR

☑ Important

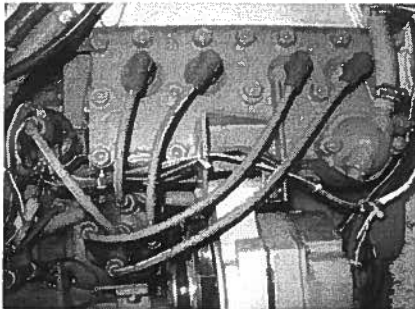
For easiest upgrade and later reinstallation of distributor, the engine crankshaft must not be rotated once the proper position has been established in Step 6.

The only coil recommended for use with this kit is the Indigo high performance coil provided because this coil has an internal resistance of about 3.8Ω . Other coils will most likely cause the electronic module to burn out!

1. Disconnect negative battery cable.

2. Determine which tower of distributor cap is connected to # 1 spark plug (#1 cylinder is the one closest to flywheel end of engine). Note location of this #1 tower relative to engine (it should be tower farthest from the #4 spark plug. See Fig. 1).

Fig. 1



3. Note location and firing order of old spark plug wires. Proper firing order is 1, 2, 4, 3 in a clockwise direction when viewing distributor from top. With a twisting-pulling motion, remove each spark plug wire from its tower and spark plug. Also, remove coil/distributor wire in same manner.

4. Remove all four spark plugs using a 13/16" socket or box wrench. Take extreme care to prevent entry of any foreign matter into spark plug openings. Lay a rag across top of engine.

5. Using a medium blade screwdriver, remove distributor cap by loosening two hold down screws, one on transmission side near oil dipstick and one on opposite side of cap.

6. Note position of distributor rotor. (See Fig. 2) Engine crankshaft must be rotated to position rotor such that it is pointing directly away from #4 spark plug hole (end of rotor is above protruding flat area on breaker plate).

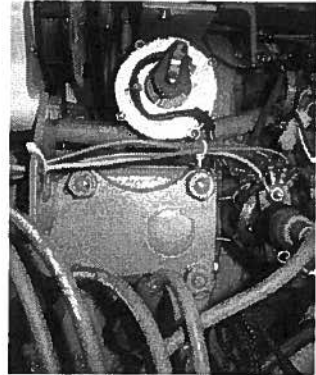


Fig. 2

This is easily accomplished by inserting hand crank, provided with engine, in opening in flywheel cover and rotating crankshaft in CCW direction (looking at engine) until rotor points directly away from #4 spark plug hole. Final crankshaft positioning is obtained by aligning top end of hand crank pin in end of crankshaft with raised triangular mark cast into flywheel cover or notch in cover (See Fig. 3) This position places the #1 cylinder at Top Dead Center. (If hand crank is not available or access is awkward, crankshaft can be rotated by placing transmission in the "forward" position and rotating engine propeller shaft coupling with a 9/16" box or open end wrench on one coupling bolt. Rotating in a CCW direction as viewed from the flywheel end will insure that coupling bolts are not loosened inadvertently.)

7. Using a 1/2" box or open end wrench, remove distributor clamp bolt located at base of

Fig. 3



distributor. This is best accessed from alternator side of engine, near oil dipstick.

8. Disconnect lead(s) from (-) terminal of ignition coil by removing 10-32 nut using a 3/8" open end wrench. Note and mark leads other than existing distributor lead for later installation.

9. Lift distributor from engine.

☑ Important

Note that rotor rotates about 30 degrees CCW (when viewed from top) as distributor is removed. On installation, rotor will rotate in CW direction a similar amount.

10. Remove lead(s) from (+) terminal of coil by removing 10-32 nut using a 3/8" open end wrench. Note and mark lead(s) for later installation on (+) terminal of new coil.

Note: New coil has an internal ballast resistor. If the old coil had an external resistor (ceramic looking rectangular piece or resistor wire) it must be removed such that full ignition voltage (+12V) is available to (+) terminal of coil. It is unlikely that any external resistor will be found.

11. Remove old coil with mounting bracket still attached by using a 1/2" box or open end wrench to remove 5/16" mounting bolt found on either side of coil. These bolts are installed in a horizontal direction and can be reached from top of engine, reaching over transmission end of head on either side of coil (See Fig. 4).

12. Remove mounting bracket from old coil using a screwdriver and perhaps a pair of pliers to hold the associated nut.

13. Clean bracket free of corrosion, especially the "ear" which mounts on alternator side. Also clean engine block in way of mounting bolts on alternator side. This area will later become the Ignition Module "ground" location. Cleaning can best be accomplished with sandpaper or a wire brush.

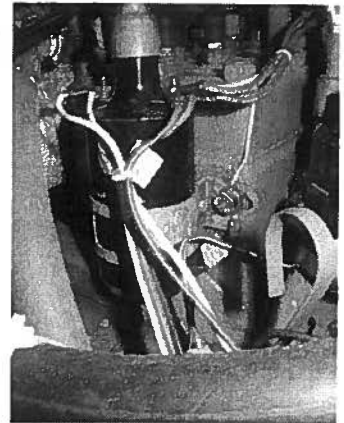


Fig. 4

14. Install new coil in bracket in about same orientation as found. Tighten bracket screw.

15. Mount coil and bracket on engine block using one 5/16" x 1/2" stainless steel hex head bolt and lock washer (provided in Kit) installed in tapped hole on exhaust manifold side of engine block.

15. Mount coil and bracket on engine block using one 5/16" x 1/2" stainless steel hex head bolt and lock washer (provided in Kit) installed in tapped hole on exhaust manifold side of engine block.

DISTRIBUTOR REBUILD

16. Remove old rotor (See Fig. 5).

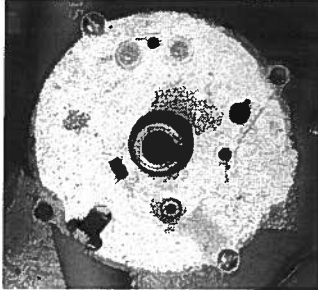
Fig. 5



17. Remove one 8-32 and one 6-32 machine screws securing condenser and points to breaker plate and remove condenser and points (See Fig. 6). Remove two 8-32 fillister head machine screws which secure breaker plate to distributor

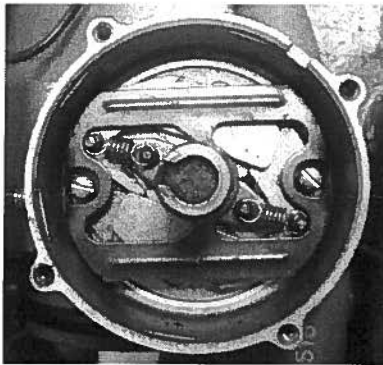
base. Lift plate up and over distributor cam shaft. Clean any corrosion from breaker plate in preparation for reassembly.

Fig. 6



18. Remove two springs attached to small posts on centrifugal advance mechanism using needle nose pliers (See Fig. 7). If broken or missing, shake pieces out of distributor by turning distributor upside down and shaking vigorously.

Fig. 7



19. With distributor in normal orientation, remove two 8-32 fillister head machine screws and lock washers which secure the retainer piece which keeps the centrifugal weights and camshaft assembled. Lift camshaft up and off distributor shaft paying particular attention to the relationship of arms on camshaft to centrifugal advance weights. One arm on camshaft will be stamped with a "W".

☑ Important

Camshaft arms can be installed either way so be extra careful to note orientation when disassembling. A quick check for proper installation is to rotate rotor clockwise and hold gear at bottom. Rotor should rotate about 15°.

Wiggle centrifugal advance weights side to side with a small screwdriver to insure freedom of motion. Apply a drop of clean engine oil to each pivot point. Clean mating surfaces of distributor

shaft and inside of camshaft free of old lubricant. Reassemble camshaft on distributor shaft applying several drops of clean engine oil to mating surfaces.

20. Lubricate all surfaces of centrifugal advance assembly with a light coat of clean engine oil. Install retainer plate over centrifugal advance assembly using new stainless steel 8-32 x 1/4" pan head machine screws and lock washers (provided in Kit). Install new stainless steel springs (provided in Kit) using needle nose pliers. Wipe off any excess lubricant.

21. Install breaker plate on distributor base with stainless steel 8-32 x 3/8" fillister head machine screws (provided in Kit). Orient plate such that notch in plate lines up with notch in distributor base. One screw goes in first hole CCW (as viewed from top) from notch in breaker plate and the other one goes in hole on opposite side.

22. Attach Optical Trigger mounting bracket in same location as previously occupied by the points (See Fig. 8). Use a stainless steel 8-32 x 1/4" pan head machine screw (provided in Kit).

Fig. 8



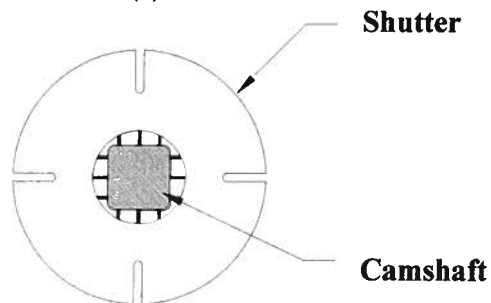
23. Attach Optical Trigger cable tie down ring connector to base plate in tapped hole previously occupied by condenser retaining screw using a stainless steel 6-32 x 3/16" pan head machine screw (provided in Kit). Orient ring connector with the "barrel" pointing toward camshaft and flat side of the connector down against breaker plate.

24. Position plastic Shutter on distributor camshaft.

Note: For ease of installation of Shutter, place Shutter in boiling water for one minute just prior to installation on distributor camshaft

☑ Important

The four groups of 3 raised areas within the bore of the Shutter must be aligned as shown such that they land against the flat areas (4) on the Camshaft.



Using a 9/16" or 14mm socket, press Shutter down over camshaft flats ("Cup side" down) into final position. (lower edge of shutter 5/8" up from surface of breaker plate). Avoid applying pressure to rim of Shutter during installation as Shutter may break (See Fig. 8 for finished installation).

25. Using a small blade screwdriver, attach Optical Trigger to mounting bracket using a stainless steel 4-40 x 3/16" pan head machine screw (provided in Kit). Optical Trigger should attach to the mounting bracket such that the wiring coming out of the Trigger should lead directly to the tie down ring without making a "U-turn". Also, the Trigger will cover up the machine screw used to attach the bracket to the breaker plate. Adjust Trigger height such that Shutter rim ends up 2/3 from top and 1/3 from bottom in the opening in the Optical Trigger (See Fig. 9). Tighten screw. **DO NOT OVER TIGHTEN AS TRIGGER THREADS WILL STRIP!**

☑ Important

Check for clearance around all parts that will be rotating when in service. Verify that Shutter is level and does not rub or touch any other components. However, Optical Trigger must be close enough to the Shutter so that the infrared

beam in the Optical Trigger is interrupted by the slots in the Shutter. There should be about a 1/32" gap between the outer diameter of the Shutter and the Optical Trigger. Readjust the bracket as necessary. It may be necessary to bend the bracket in toward the Shutter to obtain this clearance.

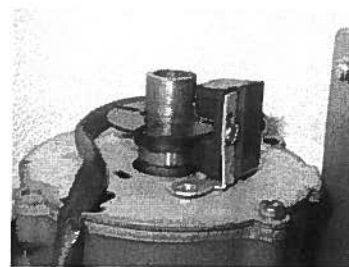


Fig. 9

26. Install new rotor.

27. Position Optical Trigger cable in slot previously occupied by wire from points to coil. Attach cable to tie down ring connector previously mounted on breaker plate using one nylon tie wrap.

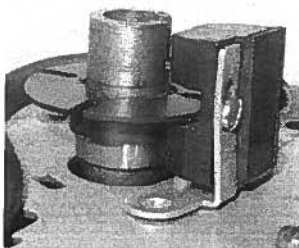
28. Gap spark plugs (use new spark plugs if installing Complete Kit) to .030" and install in engine using a 13/16" socket or box wrench. Torque to 30 foot pounds.

29. With distributor positioned over engine distributor opening in preparation for installation, orient distributor such that slot now occupied by Optical Trigger cable points roughly toward ignition coil. With distributor held in this orientation, rotate distributor shaft with rotor such that rotor points directly away from #4 spark plug (end of rotor is above protruding flat area on breaker plate). Now rotate rotor about 30 degrees CCW, as viewed from top, to allow for gear engagement as distributor is inserted into engine. Insert distributor. It may be necessary to jiggle distributor shaft to effect gear engagement. With distributor fully seated, rotor should now be pointed in same direction as it was prior to initial removal (away from #4 spark plug).

30. Insert stainless steel 5/16 x 3/4" hex head bolt with lock washer (provided in Kit) through distributor clamp and install in engine. Tighten

with a 1/2" box or open end wrench to the point that distributor body will just rotate by hand. Remove rotor. Rotate distributor body to position Optical Trigger such that the closest Shutter slot is approximately 1/16" to the right (Clockwise) of the LED (small yellowish plastic object imbedded in Optical Trigger just below shutter) in Optical Trigger (as viewed from the top. See Fig. 10). This is the initial timing position of distributor. Final Timing is discussed in Paragraph 39. Tighten distributor clamp bolt to prevent further distributor rotation. **Replace rotor!**

Fig. 10



WIRING

31. Mount Electronic Module in a convenient location such that there will be sufficient slack in all cables and still yield a tidy installation. Module should be positioned away from exhaust piping, away from potential water hazards, and not on the engine itself. Attach with two #8 stainless steel sheet metal screws (provided in Kit) using a screwdriver or 1/4" socket.

32. There are only three wiring connections which must be made to complete installation of the Electronic Ignition System. The System Outline drawing schematically shows location of these connections. To begin, position red lead ring connector and any other wires previously removed from the (+) terminal on coil (terminal on exhaust manifold side) in Step 10 on the (+) terminal of coil. Insure that any other wires being attached are clean and free of corrosion so as to make a good connection. Secure in place with a stainless steel 10-32 nut (provided in Kit) using a 3/8" open end wrench. In a similar manner, position yellow lead ring connector on the (-) terminal of coil.

Note: The **only** wire on the (-) terminal other than the yellow lead would be a (-) lead from an electronic tachometer is such a device is used.

Secure in place with a stainless steel 10-32 nut (provided in Kit) using a 3/8" open end wrench.

33. The final connection to be made is the ground which is the black lead with a large ring connector. Secure this ring connector to the engine block with one 5/16 x 1/2" stainless steel hex head bolt and lock washer (provided in Kit) installed in the remaining tapped hole for the ignition coil mounting bracket on distributor side of engine block. Tighten both mounting bracket bolts using a 1/2" box or open end wrench. A **good** ground is very important to proper operation of the ignition system.

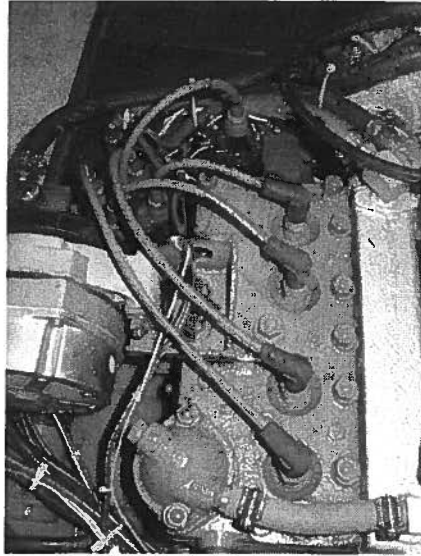
34. Check and double check the identification of coil (+) and (-) terminals and the position of all connected leads. Improper coil connection may damage the ignition module.

35. Connect two halves of Molex plug. Secure wiring to vessel with tie wraps.

36. Place cap (use new cap if installing Complete Kit) on distributor aligning recess in mounting surface of cap with protruding piece on breaker plate. Cap will only seat properly in one orientation. Secure cap in place by tightening two hold down screws.

37. Install the new spark plug wires one at a time starting with #1 tower on distributor cap (tower farthest away from #4 spark plug). #1 spark plug is the one at flywheel end of engine. Apply the Silicone grease supplied to the inside of each spark plug boot to aid in removal. Install remaining spark plug wires in firing order sequence (1,2,4,3 in CW rotation as viewed from top of distributor). Install coil/distributor wire (See Fig. 11)

Fig. 11



38. Connect negative battery terminal insuring that mating surfaces are clean and free of corrosion.

39. **FINAL TIMING** - Insure that transmission is in Neutral and start engine using normal starting procedure. You should experience a significant improvement in the ease with which the engine starts and the smoothness of operation. After engine has reached proper operating temperature, additional fine adjustment of timing can be accomplished. There is no need to use a timing light as good timing marks are not present on the flywheel. Experience has shown that very good and accurate timing can be accomplished by adjusting the distributor with the boat running at normal cruising speed so as to obtain maximum RPM at a fixed throttle setting. Loosen distributor hold down bolt to allow distributor to be rotated. With the boat underway at normal cruise speed, slowly rotate distributor first in CCW direction and then in CW direction until maximum engine speed is obtained (without changing throttle position). Tighten distributor hold down bolt. Close throttle to idle position and verify smooth idle. Adjust idle speed adjusting screw as necessary. Engine is now ready for operation.

TROUBLE SHOOTING PROCEDURE

ENGINE WILL NOT START

The external LED on the ignition module can be a very effective troubleshooting tool. If the engine will not start when cranked over (with power to the ignition module), observe the LED on the module **while cranking**. (LED will **not** be lit with ignition switch and the engine stationary). If the LED flashes on and off, then the electronic ignition system is working properly. If it does **not** flash on and off, then there is a failure in either the module, optical trigger or coil.

Check the wiring before assuming that the module or optical trigger is at fault!

Distributor Checks

1. Verify that rotor is installed in distributor and coil/distributor wire is in place.
2. Verify that the gap between the Shutter and Optical Trigger is no more than 1/32". If not, bend bracket to position Optical Trigger.
3. Pull coil/distributor wire out of distributor and place it 3/16" away from engine block (ground). Crank engine with ignition turned on. If spark jumps from coil wire to ground, the problem is in the distributor itself. Possible causes include: rotor left out of distributor, rotor or cap defective, timing is off (Optical Trigger not properly aligned, distributor moved out of proper location), spark plug firing order not proper.
4. Reinstall coil/distributor wire in distributor. Remove the No. 1 sparkplug wire, insert something metallic, such as a screwdriver, into the boot and hold the wire such that the metallic piece is about 3/16" away from the sparkplug. Crank the engine with the ignition on and a spark should jump between the metallic piece and the sparkplug. If there is no spark and the rotor is in place, the distributor has been installed with the drive gear on the end of the shaft engaged in the wrong tooth on its mating gear. Refer back to the distributor

installation paragraph 29 in the earlier part of this instruction for directions to obtain the proper relationship of the distributor.

5. If there is no spark, connect a 12 volt test light between the **COIL (-)** terminal and ground. Ground the coil/distributor wire and crank engine with ignition turned on. If light flashes on and off, Optical Trigger and Ignition Module are functioning properly. The coil may be defective. Try another coil.

6. If the light used in step 5 does not flash, repeat test in step 5 using a known good coil. Try disconnecting any tachometer wire to **COIL (-)** as it may have shorted. If light still does not flash, check "**ELECTRICAL CONNECTIONS**" and "**OPTICAL TRIGGER**"

ELECTRICAL CONNECTIONS

1. Check ground connection. Make sure the ground point is free of paint and/or corrosion.
2. Check for +12 volts on **COIL (+)** terminal with ignition turned on. If no voltage or low voltage, clean connection and trace out wiring looking for loose or corroded connections.

OPTICAL TRIGGER

1. Verify that wire colors match side to side on Molex plugs, i.e. white to white, black to black, and silver to silver.
2. Pull coil/distributor wire out of distributor and place it 3/16" away from engine block (ground). Disconnect Molex plug. Switch ignition on. Rapidly tap a screwdriver blade between the white and silver wires on Molex plug on cable from module. Tapping screwdriver should cause coil to

spark between coil/distributor wire and ground. If coil sparks, Ignition Module is functioning properly, but Optical Trigger may be mis-aligned or may have failed. If coil does not spark, Ignition Module may have failed.

3. Remove Optical Trigger from its mounting bracket but leave wiring harness attached. With ignition switch on, pass a small flat blade screwdriver or similar device back and forth across the infrared light path between the LED and Phototransistor in the Optical Trigger. This action will simulate the shutter passing within the Optical trigger. If Optical Trigger is working properly, a spark should jump between the coil/distributor wire and ground as in the previous step. If Optical Trigger proves OK, alignment of the Optical Trigger to the shutter is the most likely problem. Perhaps the Optical Trigger has been installed backwards on the mounting bracket. (See Step 25).

ROUGH OR INTERMITTENT OPERATION

1. Check for clogged fuel filter screen in fuel pump bowl. This is a common problem that may cause symptoms similar to ignition troubles.
2. Check electrical connections and Optical Trigger as explained in above procedures. Check for loose or corroded connection and broken wires. Check ground connection. Check distributor for loose or misaligned parts in Optical Trigger assembly or centrifugal advance mechanism.
3. Replace spark plugs and insure that they are proper type (Champion J12 or RJ12C) and properly gapped.
4. Replace rotor, cap, spark plug wires and coil.

Indigo Electronics, Inc
105 Pipe Kiln Court
Williamsburg, VA 23185

Model AT-4D and 4P

Spare and Renewal Parts

Description	Price
Shutter	\$ 8.00
Centrifugal Advance Springs (2)	\$ 7.00
Optical Trigger	\$30.00
Electronics Module	\$85.00
Rotor - Delco	\$ 5.00
Rotor - Prestolite/Autolite	\$15.00
Cap - Delco	\$ 8.00
Cap - Prestolite/Autolite	\$ 8.00
Coil	\$30.00
SparkPlug Wire Set	\$30.00
Sparkplugs Champion RJ8C (each)	\$ 2.00
Sparkplugs Champion RJ12C (each)	\$ 3.00
Hardware	\$10.00
Installation Instructions	\$10.00

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