OPERATIONS MANUAL

AccuTek III®

SECTION 1

INTRODUCTION

Thank you for purchasing the ***ACCUTEK III*** Capacitive Discharge Ignition Analyser. The ***ACCUTEK III*** works with most ignition systems and their components to bring you reliable and accurate test information on component integrity and function.

*Listed below are some features of the **ACCUTEK III** analyser:*

- Full ignition diagnosis - on both shielded and unshielded systems
- Microprocessor based - allowing full diagnostic flexibility.
- Backlit liquid crystal display simplifies operator use
- Compatible with Altronic®, Bosch®, Fairbanks Morse (Holley)® and most other capacitive discharge ignition systems
- Rugged high impact case designed for field use
- High quality circuit design produces meaningful, reliable test data
- Low battery indicator with user replaceable cells (4 AA)
- Fully protected inputs and outputs
- Small, hand held design

The intention of this manual is to guide the user through a logical troubleshooting procedure to determine the integrity of the ignition system under test.

NOTICE

The ***ACCUTEK III*** analyser and information in this document are subject to change in order to improve reliability, design, or function without prior notice. Information or descriptions in this manual do not represent a commitment on the part of this company.

In no event will **Innovative Technical Solutions Inc**. be liable for direct, indirect, special or consequential damages arising out of the use of these products or documentation, even if advised of the possibility of such damages.

CONTENTS

SECTION 2

SAFETY

Please take the time to carefully read this users manual. It will assist you in fully utilizing the features of the ACCUTEK III in a safe and effective manner.

The ***ACCUTEK III*** has the potential to deliver high voltage and can produce much higher voltages when connected to other devices (eg. ignition coils).

This device utilizes storage capacitors and can hold a charge for an extended period of time - even if the power switch is in the ***OFF*** position.

This manual has been published for negative ground systems. Leads must be reversed when testing positive ground systems.

Purge all fuel from the engine before performing any static engine tests.

As with any electrical device, caution must be observed when using this product.

Multi-strike ignition systems must be operated in single strike mode when testing with the ***ACCUTEK III*.**

DO NOT USE IN AN EXPLOSIVE ATMOSPHERE

No tests should be performed with the ***ACCUTEK III*** unless the operator is fully capable of protecting himself from electrical shock.

Do not exceed the input or output specifications of the ***ACCUTEK III***.

Should any assistance be required in the safe operation of the ***ACCUTEK III***, please contact:

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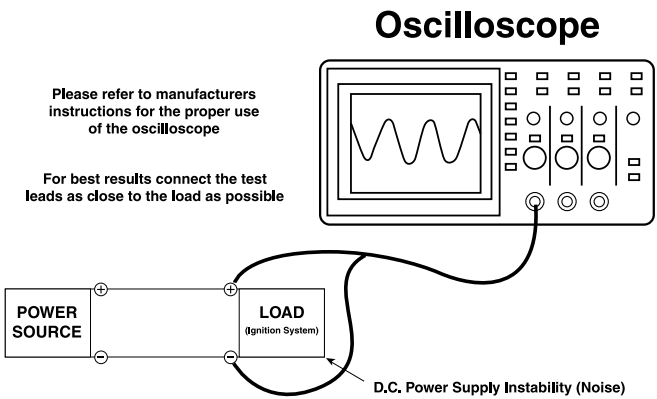
USING THE ACCUTEK III

Section 3

D.C. Power Supply

Power supply stability can be detrimental to proper operation of any D.C. powered equipment. Most manufacturers will supply a maximum amount of power supply instability (referred to as peak to peak noise) for their equipment. Exceeding these recommendations will result in unpredictable operation and possible failure of the equipment.

D.C. power stability MUST be established before any other tests are performed on an inoperative or erratic D.C. powered device such as an ignition module.



D.C. Power Supply Noise Test

- Please refer to the ignition manufacturer's guidelines for min/max D.C. levels and maximum peak to peak noise for the ignition system that you are testing.

Section 4

Ignition Coils

*The **ACCUTEK III** is designed to test most industrial ignition coils by discharging a storage capacitor at 1.0 Hz across the primary side of the ignition coil. The voltage stored on this capacitor is user adjustable from approximately 100 V.D.C. to approximately 350 V.D.C. This allows the operator to evaluate the characteristics of most industrial ignition coils.*

Ignition Coils - General Notes

When inspecting ignition coils, the ignition coil should be checked for the following:

- Evidence of physical damage which could hinder the ignition coil from performing in both its physical and environmental surroundings, eg. distorted case, cracked housing, damaged connector, damaged threads, etc.
- Close evaluation of the primary connector, locating pin, connector pins, connector threads, secondary threads, epoxy, teflon, or ceramic insulator condition, secondary tower/spring, etc.
- Ignition coil manufacturers typically specify an operating temperature of approx. 200 deg. F (93 deg. C) for ignition coils. Therefore check ignition coil operating temperatures.
- If corona action (viewed as corrosive erosion) is present on the secondary tower, the corrosion must be removed and if damage has occurred to the spring, it should be replaced. If the erosion has damaged the secondary tower, the ignition coil should be replaced.

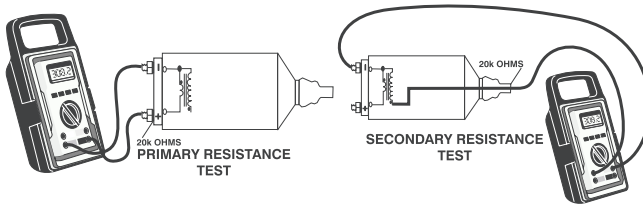
CAUTION REFER TO SECTION 2.

Testing Ignition Coils

The following procedure on resistance testing applies to both shielded and unshielded ignition coils.

4.1 Resistance Test

Ignition coil primary resistance tests are usually measured between terminals "A" and "B" on a shielded ignition coil or (+) and (-) on an unshielded ignition coil. Ignition coil secondary resistance is usually measured from the secondary tower to the (-) or "B" terminal. If in doubt please check with the ignition coil manufacturer.



- Connect the ignition coil to the multi-meter/ohmmeter using the appropriate cables and switch positions (refer to the manufacturer's operators manual for further instructions). The meter will now display the measured resistance. These results can be compared to manufacturer's data (section 15) to determine if the coil is within specs.

VERY IMPORTANT, PLEASE READ CAREFULLY

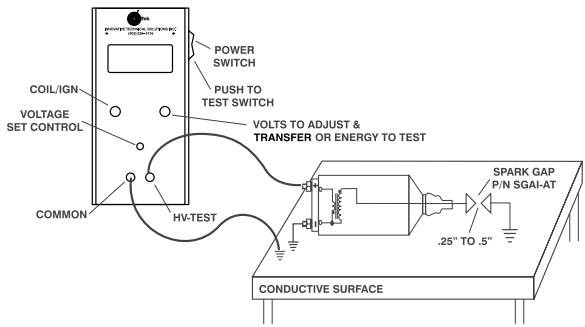
The information below deals with negative ground systems. Always observe ignition coil polarity before connecting the ACCUTEK III to ignition coils.

4.2 Firing Unshielded ignition coils

Note: A shock hazard exists if the following procedure is not followed carefully.

4.21 All tests must be performed in a nonhazardous area and on an electrically conductive surface.

4.22 A lead from the ***ACCUTEK III "COMMON"*** output, ignition coil negative, and one side of the spark gap, must be connected to the conductive surface - this will ensure that the spark energy will be able to return to the tester.



4.23 Place the ignition coil on the conductive surface. Supply a suitable spark gap for the ignition coil to fire (approximately 0.5"). Be sure to connect the ground side of the spark gap and ignition coil negative terminal to the conductive surface.

KEEP ALL PARTS OF YOUR BODY AWAY FROM THE IGNITION COIL WHEN YOU ARE FIRING THE IGNITION COIL.

ALLOWING AN UNSHIELDED COIL TO FIRE AN EXCESSIVELY LARGE GAP COULD SHOCK YOU AND MAY CAUSE DAMAGE TO THE IGNITION TESTER.

4.24 Place the ***TEST*** switch to the ***COIL/IGN*** position and place the ***MEASUREMENT*** switch to the ***PEAK VOLTS*** position.

4.25 Turn the ***ACCUTEK III*** on and depress ***PUSH TO TEST*** switch.

4.26 Set voltage to be delivered to the ignition coil by adjusting the ***VOLT SET*** potentiometer.

DO NOT EXCEED IGNITION COIL MANUFACTURER'S INPUT VOLTAGE

4.27 Connect the leads from the ***HV-TEST*** and ***COMMON*** outputs of the ***ACCUTEK III*** to the primary side of the ignition coil while observing proper polarity.

4.28 Place the ***MEASUREMENT*** switch to the ***TRANSFER*** position and depress the ***PUSH TO TEST*** switch.

The ignition coil should now be firing at 1.0 times per second across the spark gap. The LCD will be displaying (in microseconds) how long the ***ACCUTEK III*** is delivering energy to the ignition coil. This LCD reading should be noted and compared against similar ignition coils.

*When placed in the **ENERGY** position, a calculated value of pulse amplitude and duration supplied to the ignition coil from the **ACCUTEK III** will be displayed on the LCD (see ENERGY).*

***ENERGY** and **TRANSFER** readings will increase as voltage supplied to the ignition coil under test is increased.*

Ignition coils with display readings above or below normal may also have low or no secondary voltage output. If the operation of the ignition coil is questionable, compare results to a known good ignition coil. If tests are being performed on the engine, ensure that the area is non-hazardous and that all the fuel has been purged from the engine. Disconnect the wiring from the ignition source, consider the engine as the conductive surface and follow the above instructions (Refer to 4.21 to 4.28).

4.3 Testing Shielded Ignition Coils

Before proceeding, please perform resistance tests. (Refer to 4.1)

While there is a risk of electrical shock when firing a shielded ignition coil, the high voltage generated by the ignition coil should go to ground within the metal can surrounding the ignition coil.

DO NOT TEST COILS IN HAZARDOUS AREAS.

To minimize potential electrical shock, only test leads supplied by I.T.S. should be used to test shielded and unshielded ignition coils.

- Place the ignition coil so that the secondary tower is at a comfortable viewing angle.
- Follow steps 4.21 to 4.28

Note how the spark travels from the secondary tower to ground. In many cases, when the ignition coil integrity has been compromised, the spark will consistently go to ground through a hole or crack in the secondary insulating material which may be virtually impossible to see under normal operation but becomes very evident in this type of test.

In other cases, there will be some foreign contaminant on the high voltage insulator allowing the secondary high voltage spark to "travel" along the insulator with little or no resistance - allowing a portion of the intended insulator to become partially or completely inefficient. These problems may disappear with new plugs and light engine loads but tend to resurface with increased ignition demands.

Typically, ***TRANSFER*** readings are very consistent when testing identical ignition coils (same manufacturer and model). ***TRANSFER*** readings are usually between 20 to 50 microseconds for standard duration coils and somewhat longer for long duration coils (due to the higher coil primary resistance). ***ENERGY*** readings are a product of selected voltage and measured ***TRANSFER*** results.

An LCD display of "LLL" or a reading that is considerably lower than that of other similar ignition coils could indicate a defective ignition coil.

An LCD display of "HHH" or a reading higher than that of other similar ignition coils could indicate high resistance or a defective ignition coil.

When firing ignition coils, a displayed reading of HHH will force the internal oscillator to shut down for safety precautions. Oscillator output can be re-established by turning the *TEST* switch from the *COIL/IGN* position to any other position and then returning it back to the *COIL/IGN* position.

Section 5.0

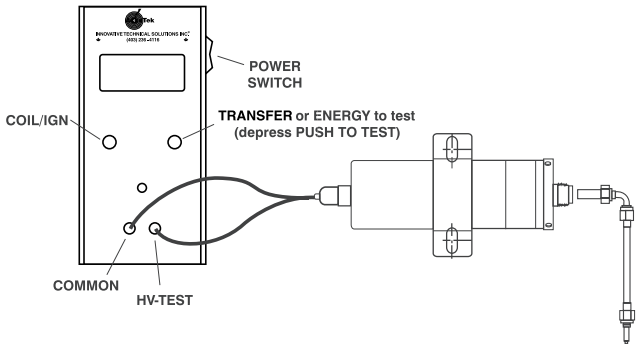
Secondary Leads and Extensions

The most common failure of secondary leads is due to the cracking of the high voltage insulating material covering the secondary lead. This generally occurs near the spark plug due to the high operating temperatures and physical handling experienced there.

Testing Shielded Secondary Leads

*The **ACCUTEK III**, in conjunction with a properly operating ignition coil, can be used to test the integrity of the insulation in a shielded ignition lead. Testing a shielded secondary lead is generally safe as the spark path should return to ground through the shielded lead. As always, caution must be exercised when performing high voltage tests.*

To test the integrity of the shielded secondary lead, connect the shielded secondary lead to a properly functioning ignition coil intended for use with the secondary lead to be tested and fire the ignition coil (see 4.24 to 4.27). The spark should consistently be able to jump a reasonable gap (approx. 0.25” to 0.75”). If it cannot jump the gap, the spark is probably going to ground inside the shielded secondary lead and repairs to the lead are required. If in doubt, compare results to a known good shielded secondary lead.



Testing Shielded Extensions

Many applications require the use of shielded or unshielded extensions. This can occur when the spark plug resides deep in the "well" of a valve cover. Shielded extensions can be tested in the same fashion as shielded secondary leads.

Unshielded Secondaries:

Evaluating unshielded secondaries can usually be performed on the engine as it is running by visual inspection. Replacement would be required if voltage is seen "arcing" out of the secondary lead.

Unshielded Extensions:

Please contact I.T.S. for information on how to properly test unshielded extensions (like those used with flange mounted coils).

Section 6
Wiring Harness

CHECK FOR AC AND DC VOLTAGES ON THE DEVICE TO BE TESTED BEFORE CONTINUING.

A point to point check of the ignition harness should be performed using an ohmmeter to confirm continuity and ensure that a low resistance path exists between the ignition system and the ignition coils.

6.1 Continuity Testing

Resistance tests below will be performed with an ohmmeter set to the appropriate range (refer to your manufacturer's operating manual).

6.11 Ensure all ignition coils, shutdown lead and leads to ignition source have been disconnected.

6.12 Determine the engine firing order and wiring pattern.

6.13 Place one lead of the ohmmeter to pin "A" from main the connector of ignition harness and the other lead to its termination point (ie. "A" or "+" of cylinder #1 ignition coil).

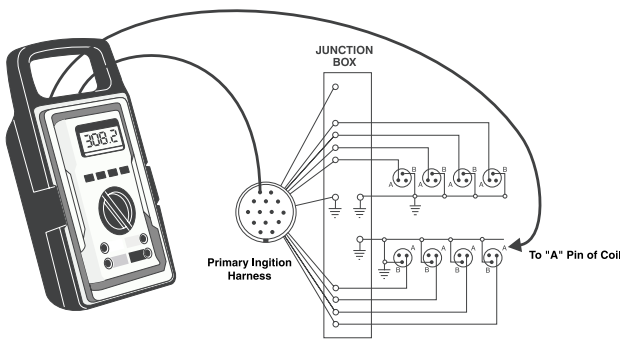
6.14 While referring to the ignition wiring diagram, check all connections to determine that the ignition harness is wired properly and there is a low resistance path from the ignition source to the intended ignition coil. In all cases, wiring from the ignition source to the ignition coils should have minimal resistance (near 0 ohms).

Ignition Harness Grounding (using ohmmeter)

Determine if the ignition harness is properly grounded by measuring the resistance between the ignition harness and engine. On unshielded harnesses, there should be a minimum of two ground points per bank, terminated at a clean and unpainted engine ground point. With shielded harnesses, the grounding is typically done within the conduit. This conduit must also be grounded at two separate locations and a ground wire should be attached from the ignition rail to a clean, unpainted, engine ground. Measurements between the ignition coil (negative terminal) and the engine block should be near zero (0) ohms.

6.2 Short Circuits

Disconnect all ignition coil primary wiring and place one lead of the ohmmeter to a good engine ground. Check all the pins feeding the ignition coils. A reading other than infinite resistance (open circuit) indicates a short or partial short to ground that must be corrected. A ***LEAKAGE*** test should also be performed at this time. ***(See Leakage Testing)***.



6.3 Ground Returns

Connect the negative lead of the ohmmeter to a good, clean engine ground. Connect the positive lead to the ground return wire in your harness at the ignition coils (typically “B” or “-”). Readings should be approximately zero (0) ohms.

Section 7

Leakage *(Insulator Integrity Testing)*

NOTE: It is very important to disconnect all connections to the ignition source (eg. ignition generator or solid state module) and to the ignition coils when performing the following tests. The ignition shut down lead must also be disconnected at the ignition harness for the following tests.

*The **ACCUTEK III** incorporates a high voltage source capable of supplying from approximately 200 V.D.C. to approximately 900 V.D.C. to the device under test. Low current output from the **ACCUTEK III** reduces any danger to safe levels but contact with the high voltage output should be avoided.*

LEAKAGE TEST

The TEST switch in Leakage mode and MEASUREMENT switch in PEAK VOLTS mode allows the user to select the voltage used for the LEAKAGE test (approximately 200 to 900 volts). With the TEST switch in LEAKAGE and the MEASUREMENT switch in any position except PEAK, the behavior is as follows: The ***Accutek III*** turns on the high voltage for 2 minutes in the LEAKAGE position once the PUSH TO TEST switch is depressed. Any time the PUSH TO TEST switch is pressed again, the 2 minute timer is restarted. Once the 2 minute timer expires, OFF is displayed and the high voltage oscillator is turned off. Whenever the TEST is changed to any other switch position, the 2 minute timer is immediately caused to expire and the high voltage is turned off. A display reading of '----' indicates no valid measurement has been acquired and will change to show 'OFF' when the 2 minute timer expires. While the 2 minute timer is not expired, the value of the measured impedance is shown.

7.1 Leakage Testing Wiring Harnesses

The ***ACCUTEK III*** has the ability to generate a very high voltage (*approximately* 900 V.D.C.) and can be used to test ignition harnesses by determining if the wire insulation has failed or is failing and allowing current to go to ground before it reaches its intended point.

7.11 Disconnect the shutdown lead, ignition source and all ignition coils.

7.12 Set the ***TEST*** switch to the ***LEAKAGE*** position and the ***MEASUREMENT*** switch to ***PEAK VOLTS***.

7.13 Depress the ***PUSH TO TEST*** switch and set the voltage you wish to test with by adjusting the ***VOLTAGE SET*** potentiometer.

7.14 Place the ***MEASUREMENT*** switch to the ***TRANSFER*** position. Using the supplied test leads, connect the ***COMMON*** (black) terminal of the **ACCUTEK III** to engine ground and depressand hold the ***PUSH TO TEST*** switch.

7.15 From the ***HV-TEST*** output of the ***ACCUTEK III***, use the supplied positive (red) lead to individually contact each connection on the main primary ignition harness connector except the ground pin. Any reading other than 100 on the LCD display indicates current flow to ground that should be corrected.

To determine what level of voltage the wiring insulation is able to withstand, turn the ***VOLTAGE SET*** potentiometer counterclockwise (with the ***PUSH TO TEST*** switch depressed) until the display shows 100. At this point, do not touch the ***VOLTAGE SET*** potentiometer and turn the ***MEASUREMENT*** switch to ***PEAK VOLTS***. The reading displayed is the maximum D.C. voltage your wiring insulation can withstand. Should the wiring be unable to carry 200 V.D.C., the ***ACCUTEK III*** will display a reading of less than 100.

Section 8

TESTING INSTRUMENTS

*The **ACCUTEK III** provides a highly accurate, crystal controlled, 60 Hz (approximately 100 to approximately 350 V.D.C.) source to ignition powered instruments. This supplies power to the instrument under test and in the case of tachometers, allows the user to determine tachometer accuracy.*

INSTRUMENT TEST

The TEST switch in INSTRUMENT mode allows the user to select the voltage used for the INSTRUMENT test (approximately 100 to 350 volts). With the TEST switch in INSTRUMENT mode and the MEASUREMENT switch in any positionexcept PEAK, the behavior is as follows: The high voltage oscillatoris turned on for 2 minutes after the PUSH TO TEST switch is depressed. Any time the PUSH TO TEST switch is presed again, the 2 minute timer is restarted and the ***Accutek III*** will operate as indicated in the operators manual. Once the 2 minute timer has expired, the LCD with display 'OFF'. Whenever the TEST switch is changed to any other position, the 2 minute timer is immediately caused to expire and the high voltage oscillator is turned off.

8.1 Testing C.D. Powered Tachometers:

Do not exceed maximum input voltage of the tachometer and observe proper polarity.

8.11 Place the ***TEST*** switch to the ***INSTRUMENT*** position and the ***MEASUREMENT*** switch to ***PEAK VOLTS***.

8.12 Set the output test voltage to be supplied to the tachometer by adjusting the ***VOLTAGE SET*** potentiometer.

8.13 Place the ***MEASUREMENT*** switch to the ***MISSING PULSE*** position. The ***ACCUTEK III*** will display "60" (Hz) while the tachometer being tested should be functioning and displaying a calibration R.P.M. on the tachometer. Tachometers usually have a switch bank on the back which determines the R.P.M. displayed for a given input frequency. Verify that the displayed R.P.M. agrees with the manufacturer's specs (at 60 Hz) for your switch setting. If the reading disagrees with the manufacturer's specs, recheck the switch settings and input voltage before replacing the tachometer.

8.2 Testing other CD powered instruments:
Perform Step 8.11 to 8.13

In this case, the ***ACCUTEK III*** will only be providing power to the C.D. powered instrument. The input signal (eg. thermocouple) to the device under test must also be supplied to the instrument and must be verified for proper operation as per instrument manufacturer's instructions. Devices that can be powered include most capacitive discharge powered pyrometer heads, frequency counters, pressure indicators, timing indicators and most other CD powered instruments.

Section 9

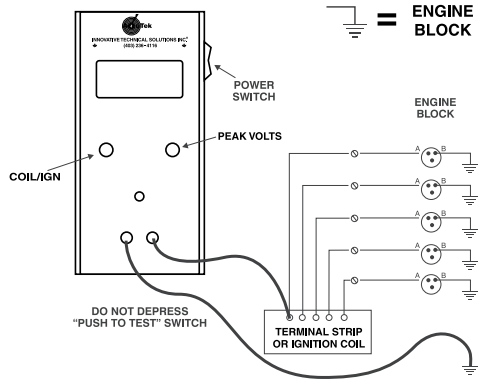
PEAK VOLTAGE

MULTI-STRIKE IGNITION SYSTEMS MUST BE OPERATED IN SINGLE STRIKE MODE WHEN TESTING WITH THE *ACCUTEK III*.

NOTE: For the following tests, the "PUSH TO TEST" switch is not depressed - (OFF)

This feature will display the primary peak voltage level generated by the ignition source being tested. When testing ignition system peak voltage, the test can be performed at the shutdown lead, ignition coil, primary wiring terminal strip etc.

9.1 Place the ***TEST*** switch to the ***COIL/IGN*** position and the ***MEASUREMENT*** switch to ***PEAK VOLTS.***



9.2 While observing polarity, connect the leads from the ***HV-TEST*** to the shutdown lead of the ignition system. The ***ACCUTEK III*** will now be displaying the primary peak output level being delivered from the ignition source. If it is safe to do so, disconnect all devices connected to the shutdown lead. If the measured primary voltage rises from the previous reading, this could indicate excessive load on the ignition source by one or more of the devices or instruments connected to the shutdown lead.

Primary voltage can be tested at each individual primary lead at the junction box. All readings should be relatively close in value. A substantial difference in one or more readings could indicate faulty wiring, a defective ignition source, mismatched ignition, coils etc.

The most informative place to perform a primary voltage test would be as close to the ignition coil as possible. This would ensure that you have taken into account all wiring and connections from the ignition source to its termination point. This is easily accomplished in unshielded ignitions but somewhat more complex with shielded systems. ***Innovative Technical Solutions*** has developed a new adaptor that will allow easy access (24T-ALT). With the engine running, the LCD will display the primary peak voltage being delivered to that ignition coil.

If it is felt that the ignition mag/module may be faulty, perform the following checks before replacing the ignition supply. Verify that the ignition wiring and all connections relating to the ignition system are in good condition. Also with solid state systems, verify incoming signals and D.C. power to the ignition module is correct. (See D.C. Power Supply)

Partial shorts in the wiring harness upstream or downstream of the test point would result in lower than expected primary peak voltages. (Zero if fully shorted.)

Resistance in the wiring harness upstream of the test-point would result in lower than expected primary peak voltages. (Zero if fully open.)

Resistance in the wiring harness downstream of the test point would result in higher that normal readings. This test should be made at the ignition coil if possible.

The following tests will be performed with the *"PUSH TO TEST"* switch depressed - (ON)

With the ***PUSH TO TEST*** switch depressed and the ***MEASUREMENT*** switch in the ***PEAK VOLTS*** mode, the ***ACCUTEK III*** will allow the operator to set the output voltage being delivered to ignition coils, instruments, high voltage test etc. The output voltage selected must never exceed the input voltage specified by the manufacturer of the item being tested. To supply the power to the item being tested, the ***ACCUTEK III*** "***TEST"*** switch must be moved to the ***TRANSFER*** or ***ENERGY*** position and then depressing the ***PUSH TO TEST*** switch output would be taken from ***HV-TEST*** (positive) and ***COMMON*** (negative).

*NOTE: Output from the **ACCUTEK III** will be disabled if incoming pulses are detected or if a low impedance load is not present across the **HV-TEST** and **COMMON** outputs. The **ACCUTEK III** must be turned off and back on to re-establish output capabilities. This feature has been included to provide additional safety to the operator.*

Section 10

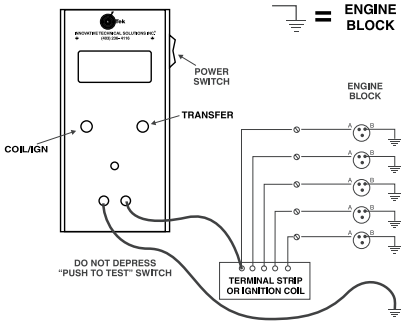
TRANSFER

MULTI-STRIKE IGNITION SYSTEMS MUST BE OPERATED IN SINGLE STRIKE MODE WHEN TESTING WITH THE *ACCUTEK III*.

*The **ACCUTEK III** has the ability to display a reading of how long (in microseconds) the primary voltage pulse being supplied to the ignition coil remained over 40 volts. Assuming identical (functional) ignition coils are used in the ignition system under test, the ignition source should see each ignition coil as an identical load and the **ACCUTEK III** should display similar readings for each primary circuit being tested. If there is a problem with any primary circuit of the ignition system, **TRANSFER** readings to that circuit will not be consistent with readings obtained from the other operational primary circuits. Steps to determine which component is at fault must be taken.*

Performing Transfer Test

10.1 Place the ***TEST*** switch to the ***COIL/IGN*** position and the ***MEASUREMENT*** switch in the ***TRANSFER*** position.



10.2 Connect the common lead from the ***ACCUTEK III*** to a good, clean engine ground.

10.3 Connect the HV-TEST output to the point to be monitored (i.e. ignition coil positive terminal, terminal strip, ignition coil junction box, etc).

With the engine running the ***ACCUTEK III*** should be displaying in microseconds how long the primary voltage associated with the point being tested remains over 40 volts.

TRANSFER *readings less than 5 microseconds will cause the* ***ACCUTEK III*** *to display "LLL". This reading usually indicates a short in the ignition system.*

TRANSFER *readings greater than 500 microseconds will cause the* ***ACCUTEK III*** *to display "HHH". This reading usually indicates an open or high resistance path in the ignition system.*

The most informative place to perform a ***TRANSFER*** test would be at each ignition coil. This test is easily accomplished in unshielded ignitions but somewhat more complex with shielded systems. ***Innovative Technical Solutions*** has developed a new adaptor that will allow easy access (24T-ALT). When testing unshielded systems, simply connect the positive lead from HV-TEST to the positive primary ignition coil wire. Performing the test at this point ensures that you are taking into account the ignition source and all of the associated primary wiring. With the engine running, the LCD will display the pulse duration of firing events being delivered to that ignition coil. Compare this reading with results from all other primary leads. If you are testing a shielded ignition system, connect to the junction box located closest to the shielded ignition coil under test.

The ***TRANSFER*** test can also be performed on each individual primary lead at the junction box. All readings should be relatively close in value. A substantial difference in one or more readings could indicate faulty wiring, defective ignition source, defective ignition coil etc.

Before replacing an ignition supply that is thought to be defective, verify that the ignition wiring and all connections relating to the ignition system are in good condition. Also with solid state systems, verify incoming signals and D.C. power to the module are correct.

Partial shorts in the wiring harness upstream or downstream of the test point would result in lower than expected readings as the current intended for the ignition coil would now have an easier path to ground. (Zero if fully shorted.) Readings below 5 microseconds will cause the ***ACCUTEK III*** *display to alternate between actual reading and "LLL".*

Resistance in the wiring harness downstream of the test point would result in higher than expected readings. Readings above 500 microseconds will cause the ***ACCUTEK III*** *display to alternate between actual reading and "HHH".*

Resistance in the wiring harness upstream of the test point would usually result in readings lower than expected.

Section 11

Energy

The function of an ignition system – by definition – is to ignite the air fuel mixture in the combustion chamber at the desired time. To accomplish this, the ignition source (mag or module) must be able to deliver sufficient energy to each of the ignition coils on the engine at the appropriate time.

A fully functional ignition harness must be capable of delivering energy generated by the ignition source to the intended ignition coil with minimal loss. The ignition coil then converts this low voltage, high current pulse to a low current very high voltage supply. Secondary voltage losses may be caused by resistance in the ignition wiring, eg. loose connections, defective components, poor grounds etc. Other types of losses could be due to leakage caused by chafed or cut primary wiring allowing the ignition source energy back to ground before reaching the ignition coils.

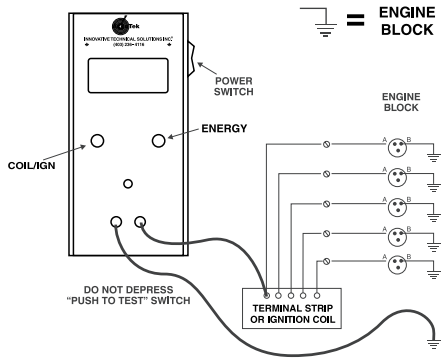
Energy level measurements are a product of peak measured voltage and pulse duration. Therefore, measurements between individual primary circuits should be relatively consistent if ***TRANSFER*** and ***PEAK VOLTS*** results are consistent.

Testing Energy Level

MULTI-STRIKE IGNITION SYSTEMS MUST BE OPERATED IN SINGLE STRIKE MODE WHEN TESTING WITH THE *ACCUTEK III*.

11.1 When the ***MEASUREMENT*** switch is placed in the ***ENERGY*** position, the ***ACCUTEK III*** will display a relative reading of energy being delivered to the ignition coil under test.

11.2 Place the ***TEST*** switch in the ***COIL/IGN*** position and the ***MEASUREMENT*** switch in the ***ENERGY*** position.



11.3 If the engine has a primary harness junction box, check energy being supplied to the ignition coils by placing the ***HV-TEST*** lead to each contact point on the terminal strip associated with an engine cylinder (engine running). Each primary lead should be delivering the same energy potential to its intended ignition coil. Should the energy level to any cylinder or cylinders be considerably higher or lower than the average readings, this is an indication of a potential problem. (Check individual components separately.)

11.4 When testing an unshielded ignition system, place the ***HV-TEST*** lead to the ignition coil positive and compare readings from all ignition coils. There should be minimal differences in the readings if the ignition harness and ignition coils are in good condition.

11.5 With the engine running, the ***ACCUTEK III*** will display a relative measurement of energy being delivered to that ignition coil.

If it is felt that the ignition mag/module may be faulty, perform the following tests before replacing the ignition supply. Verify that the ignition wiring and all connections relating to the ignition system are in good condition. With solid state systems, also verify incoming signals and D.C. power to the module are correct. (See D.C. Power)

Partial shorts in the wiring harness upstream or downstream of the test point would result in lower than expected readings as the current intended for the ignition coil would now have an easier path to ground. (Zero if fully shorted.)

Resistance in the wiring harness upstream of the test point would result in lower than expected readings as current flow to the ignition coil is restricted.(This reading would be zero if the circuit was fully open as there is no path for current flow to the tester.)

*Resistance in the wiring harness downstream of the test point would result in very high readings as the current is trying to return to ground through the high impedance of the **ACCUTEK III**.*

Section 12

Missing Pulse

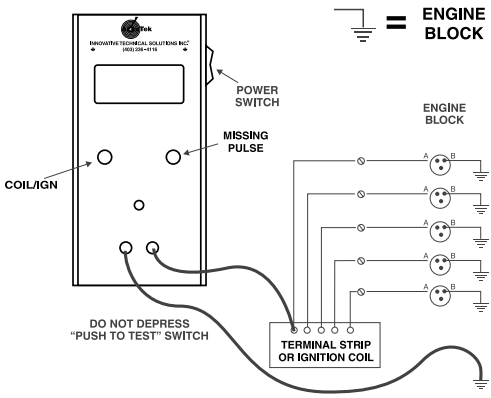
MULTI-STRIKE IGNITION SYSTEMS MUST BE OPERATED IN SINGLE STRIKE MODE WHEN TESTING WITH THE ACCUTEK III.

*The **ACCUTEK III** has the ability to anticipate firing events on an engine operating at a relatively constant R.P.M. This is very useful in determining if an intermittent engine miss is being caused by a problem with the ignition system. Should the ignition system fail to deliver a firing pulse to an ignition coil, at the anticipated interval, the engine will misfire. The **ACCUTEK III** will alert you by illuminating the Missing Pulse L.E.D.* and increment the count on the LCD. The **ACCUTEK III** can be connected to the primary lead of the cylinder where the misfires are occurring. This connection should be made as close to the ignition coil as possible.*

** The missing pulse LED is located to the right of the LCD display.*

Missing Pulse Testing

12.1 To perform this test, place the ***TEST*** switch in the ***COIL/IGN*** mode and the ***MEASUREMENT*** switch to the ***MISSING PULSE*** position.



12.2 Connect the ***COMMON*** output of the ***ACCUTEK III*** to a good, clean engine ground. Connect from the ***HV-TEST*** output to the (primary lead positive) point to be monitored. This could be either the primary harness junction box or, with unshielded ignition coils, this could also be performed at the primary (positive) connection on the ignition coil.

12.3 With the engine running at a constant speed, the ***ACCUTEK III*** will "learn" the normal operating pattern of the ignition system.

Should this pattern change, the ***ACCUTEK III*** LED will illuminate and the LCD display will increment according to the number of pulses missed.

Section 13

Maintenance

Battery Replacement
When battery voltage drops to about 3.5 volts, the Low Battery Indicator ***LO BAT*** will illuminate indicating that the batteries no longer have sufficient power to charge the high voltage portion of the ***ACCUTEK III***. Replace the exhausted batteries with fresh alkaline AA cells, taking care to insert the new cells in the correct orientation.

Calibration and Adjustments
All of the functions of the ***ACCUTEK III*** are controlled by the onboard microprocessor system.

The instrument should retain its full accuracy providing it is treated with care and the batteries are replaced when the ***LO BAT*** indicator illuminates.

Section 14

Warranty

Innovative Technical Solutions Inc. warrants that the ***ACCUTEK III*** is free from defects in workmanship or material. This warranty is valid for a period of one year from the date of purchase and is given only to the original purchaser of the ***ACCUTEK III***. Except where required by applicable legislation, this warranty is not transferrable. This warranty is void if the ***ACCUTEK III*** is used for anything other than its intended purposes or if any modifications or alterations are made to the ***ACCUTEK III***. Innovative Technical Solutions Inc.'s liability under this agreement shall be limited to repair and/or replacement of the ***ACCUTEK III***.

INNOVATIVE TECHNICAL SOLUTIONS INC. SHALL IN NO EVENT BE LIABLE FOR LOSS OF PROFITS OR SPECIAL OR INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM THE BREACH OF EXPRESS OR IMPLIED WARRANTIES OR NEGLIGENCE.

To exercise this warranty, the purchaser, at its sole cost and expense, shall return the ***ACCUTEK III*** to Innovative Technical Solutions Inc. together with the following:

1. Copy of sales receipt
2. Date of failure
3. Type of failure
4. Test being performed at time of failure
5. Name, address and phone number of contact person.

All warranty claims must be received by Innovative Technical Solutions Inc. within 90 days of the unit failure. Upon receipt of the defective ***ACCUTEK III***, Innovative Technical Solutions Inc. will repair or replace and return the product without charge within a reasonable period of time. Upon return, the ***ACCUTEK III*** shall have a warranty on the same terms and conditions as stated above for a period of 90 days or the balance of the original warranty, whichever period is greater. This agreement constitutes the entire agreement between the parties and supersedes any previous agreement, understanding or order between the parties. Should the terms and conditions of any purchase order issued in connection with the agreement conflict with the terms contained herein, the terms of this agreement shall prevail. No modifications or waiver of the terms of this agreement shall be binding unless made in writing and signed by both parties.

Section 15

Ignition Coil Resistance Specifications

MODEL	PRIMARY (Ohms)	SECONDARY (K Ohms)
ALTRONIC®		
291 001	1.3 - 2.7	7.5 - 10.2
291 0015	1.3 - 2.7	7.2 - 10.2
501 061	0.1 - 0.2	5.5 - 6.9
591 007	0.2 - 0.4	8.0 - 9.6
591 008	1.8 - 3.0	8.0 - 9.6
591 010	0.3 - 0.5	7.5 - 10.2
591 012	0.3 - 0.5	7.5 - 10.2
591 018	0.3 - 0.5	7.2 - 10.2
291 001S	1.3 - 2.7	7.5 - 10.2
501 061S	0.1 - 0.2	5.5 - 6.9
591 010S	0.3 - 0.5	7.5 - 10.2
591 011A	0.2 - 0.4	8.0 - 9.6
591 011B	0.2 - 0.4	8.0 - 9.6
591 060	0.12 - 0.16	6.0 - 11.0
791 030	0.2 - 0.3	6.0 - 7.5
791 020	0.2 - 0.3	6.0 - 7.5
591 040	0.2 - 0.3	6.0 - 11.0
FAIRBANKS MORSE®		
PPT2477P	0.3 - 0.6	11.0 - 13.0
PPT2477L	1.0 - 2.0	12.0 - 15.0
PPT2477AA6	0.2 - 0.3	1.65 - 2.0
PPT2477AA8	0.2 - 0.3	1.65 - 2.0
PPT2477AA10	0.2 - 0.3	1.65 - 2.0
PPT2477AA12	0.2 - 0.3	1.65 - 2.0
PPT2477AB5	0.4 - 0.6	4.0 - 5.0
PPT2477AB6	0.7 - 0.9	6.0 - 7.5
PPT2477AB12	0.7 - 0.9	6.0 - 7.5
PPT2477AC8	0.2 - 0.3	2.25 - 2.8
PPT2477AD	0.2 - 0.5	11.0 - 13.0
PPT2477ADL	0.35 - 0.4	12.0 - 15.0
PPT2477M	5.5 - 7.5	9.5 - 11.0
AMERICAN BOSCH®		
TCD90A1	0.2 - 0.3	3.0 - 3.4
TCD90A4	0.2 - 0.3	3.0 - 3.4
TCG90A3	0.5 - 0.6	7.3 - 7.9
TCG90A4	0.5 - 0.6	7.3 - 7.9
TCL150B1	0.2 - 0.4	5.4 - 6.6

SECTION 16

Product Specifications

Power Input	(4) AA alkaline cells with swithing regulator for extended cell life. (approx. 300 mA.)	
Leakage Function	Output voltage approx. Output Impedance	(200-900 VDC) (10 Meg Ohms)
Instrument Function	Output Impedance Output Voltage Output Frequency Duty Cycle	(3.3 K Ohms) (100 to 350 VDC) (60 Hz) (14 ms on, 2 ms off)
Coil/Ignition Function	Output Voltage Input Impedance Input Voltage Polarity Reversal Protection Open Circuit Oscillator Lockout	(100 to 350 VDC) (835 K Ohms) (40 to 400 VDC Rising Edge, Pulse Triggered)
Missing Pulse Function	Rising Edge Pulse Threshold Maximum Input Frequency	(40 VDC) (Approx 50 Hz)
Volts Function	Same as Coil/Ign Specifications	
Transfer Function	Rising Edge Pulse Threshold (40 VDC) < 5 micro seconds alternates between “LLL” and actual reading. > 500 micro seconds alternates between “HHH” and actual reading Maximum Transfer Measurement (Approx 20 ms)	
Energy Function	Modified product of Transfer and Volts	

Innovative Technical Solutions offers the following items for use with the Accutek III.

24BP-ALT

Used for testing Altronic® 3 pin shielded coils

24BP-FM

Used for testing Fairbanks Morse/Holley® 2 pin shielded coils

24BP-BS

Used for testing Bosch® 2 pin shielded coils

24BP-CAT

Used for testing Caterpillar® EIS coils

24T-ALT

Used as a means of obtaining access to the primary wiring on shielded ignitions using Altronic® flange mounted coils, integral coils or remote mounted shielded coils.

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